

OPERATION MANUAL



WHISPERWATT™ SERIES MODEL

DCA70SSIU4FPD

60 Hz GENERATOR

(ISUZU BR-4JJ1X DIESEL ENGINE)

S/N 7360342 AND ABOVE

INSTRUCTION MANUAL NO. M2844300104

Revision #0 (08/19/26)

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THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.

PROPOSITION 65 WARNING



DCA70SSIU4FPD 60 Hz Generator

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DISCLAIMER:

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SAFETY DECALS

SAFETY DECALS

Safety decals are attached to the generator as shown in Figure 1. Keep these safety decals clean at all times. When the safety decals become worn or damaged, contact your nearest dealer or the Multiquip Parts Department.

NOTICE

For safety decal part numbers, refer to the associated parts manual.

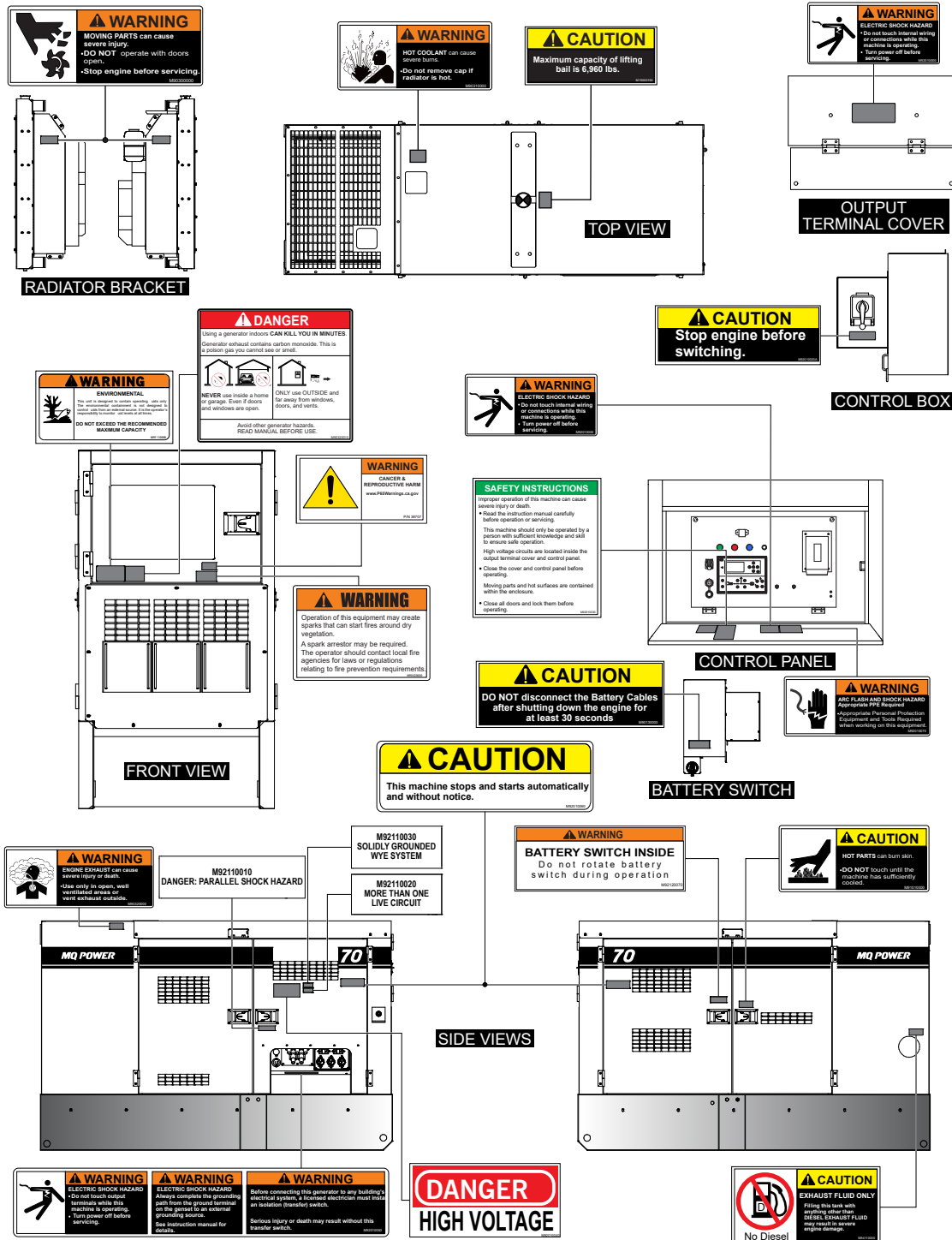


Figure 1. Safety Decals

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

 DANGER
Indicates a hazardous situation which, if not avoided, WILL result in DEATH or SERIOUS INJURY .
 WARNING
Indicates a hazardous situation which, if not avoided, COULD result in DEATH or SERIOUS INJURY .
 CAUTION
Indicates a hazardous situation which, if not avoided, COULD result in MINOR or MODERATE INJURY .
NOTICE
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 or illness, or when on medication.
- **NEVER** operate this generator under the influence of drugs or alcohol.



- **ALWAYS** check the generator for loosened threads or bolts before starting.
- **NEVER** 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 to read.
- Manufacturer does not assume responsibility for any accident due to equipment modifications. Unauthorized modification of the generator 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 the 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** generator.

NOTICE

- **ALWAYS** ensure the generator is on level ground before use.
- **ALWAYS** keep the generator in proper running condition.
- Fix damage to the generator and replace any broken parts immediately.
- **ALWAYS** store the generator properly when it is not being used. The 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 of this generator requires an adequate, free flow of cooling air. **NEVER** operate this equipment 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 equipment or engine.



- When operating the generator outdoors, **DO NOT** place the generator near doors, windows or vents that could allow carbon monoxide to enter and build up in occupied spaces.

WARNING

- **NEVER** place hands or fingers inside the engine compartment when the 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.
- **NEVER** operate the generator with the doors open. Stop the engine before servicing.
- **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** drain the engine oil while the engine is hot. Hot oil will gush out and severely scald any persons near the generator.



- Operation of the generator may create sparks that can start fires around dry vegetation. A spark arrestor may be required. The operator should contact local fire agencies for laws or regulations relating to fire prevention requirements.

CAUTION

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



NOTICE

- **NEVER** run the engine without an air filter or with a dirty air filter. Severe engine damage may occur. Service the 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 30-35% 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.

SAFETY INFORMATION

FUEL SAFETY

DANGER

- **NEVER** 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.
- **NEVER** fill the fuel tank while the engine is **running** or **hot**.
- **NEVER** overfill the fuel tank. Spilled fuel can 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.
- **NEVER** smoke around or near the equipment. Fire or explosion could result from fuel vapors or if fuel is spilled on a hot engine.



TOWING SAFETY

CAUTION

- Check with your local county or state safety towing regulations, in addition to meeting **Department of Transportation (DOT) Safety Towing Regulations**, before towing your generator.
- Refer to the MQ Power trailer manual for additional safety information.
- In order to reduce the possibility of an accident while transporting the generator on public roads, **ALWAYS** make sure that the trailer that supports the generator and the towing vehicle are both mechanically sound and in good operating condition.
- **ALWAYS** shut down the engine before transporting.



- Make sure the hitch and coupling of the towing vehicle are rated equal to or greater than the trailer **gross vehicle weight rating**.
- **ALWAYS** inspect the hitch and coupling for wear. **NEVER** tow a trailer with defective hitches, couplings, chains, etc.
- Check the tire air pressure on both the towing vehicle and the trailer. **Inflate trailer tires as indicated on side wall of tire**. Also check the tire tread wear on both vehicles.
- **ALWAYS** make sure the trailer is equipped with **safety chains**.
- **ALWAYS** properly attach the trailer's safety chains to the towing vehicle.
- **ALWAYS** make sure the vehicle and trailer directional, backup, brake, and trailer lights are connected and working properly.
- DOT requirements include the following:
 - Connect and test electric brake operation.
 - Secure portable power cables in cable tray with tie wraps.
- The maximum speed for highway towing is **55 MPH** unless posted otherwise. Recommended off-road towing is not to exceed **15 MPH** or less depending on the type of terrain.
- Avoid sudden stops and starts. These can cause skidding or jackknifing. Smooth, gradual starts and stops will improve towing.
- Avoid sharp turns to prevent rolling.
- The trailer should be adjusted to a level position at all times when towing.
- Raise and lock the trailer wheel stand in the upright position when towing.
- Place **chock blocks** underneath the wheels to prevent **rolling** while parked.
- Place **support blocks** underneath the trailer's bumper to prevent **tipping** while parked.
- Use the trailer's swivel jack to adjust the trailer height to a level position while parked.

SAFETY INFORMATION

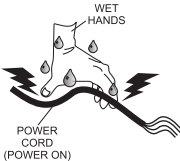
ELECTRICAL SAFETY

DANGER

- **NEVER** touch the output terminals during operation. Contact with the 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 the generator and all circuit breakers **OFF** before performing maintenance on the generator or making contact with the 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 equipment to the generator. Inspect the insulation for cuts.
- **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 the proper power or extension cord has been selected for the job. See the Cable Selection Chart in this manual.

Grounding Safety

DANGER

- **ALWAYS** make sure that electrical circuits are properly grounded to a suitable earth ground (ground rod) per the National Electrical Code (NEC) and local codes before operating the generator. **Severe injury or death by electrocution** can result from operating an ungrounded generator.
- **NEVER** use gas piping as an electrical ground.

BATTERY SAFETY

DANGER

- **DO NOT** drop the battery. There is a possibility that the battery will explode.
- **NEVER** 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 gases.
- If the battery liquid (dilute sulfuric acid) comes into contact with **clothing or skin**, rinse skin or clothing immediately with plenty of water.

SAFETY INFORMATION

- 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.

ENVIRONMENTAL SAFETY/DECOMMISSIONING

NOTICE

Decommissioning is a controlled process used to safely retire a piece of equipment that is no longer serviceable. If the equipment 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 the rules below:

- **NEVER** 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 equipment.
- When the life cycle of this equipment is over, remove the battery and bring it to an appropriate facility for lead reclamation. Use safety precautions when handling batteries that contain sulfuric acid.
- When the life cycle of this equipment is over, it is recommended that the 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 equipment 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 equipment 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.

SPECIFICATIONS

Table 1. Generator Specifications

Model	DCA70SSIU4FPD	
Type	Revolving field, self-ventilated, open protected type synchronous generator	
Armature Connection	Star with Neutral	Zigzag
Phase	3	1
Standby Output	61 kW (77 kVA)	44 kW
Prime Output	56 kW (70 kVA)	40 kW
3Ø Voltage (L–L/L–N) Voltage Selector Switch at 3Ø 240/139	208Y/120, 220Y/127, 240Y/139	N/A
3Ø Voltage (L–L/L–N) Voltage Selector Switch at 3Ø 480/277	416Y/240, 440Y/254, 480Y/277	N/A
1Ø Voltage (L–L/L–N) Voltage Selector Switch at 1Ø 240/120	N/A	240/120
Power Factor	0.8	1.0
Frequency	60 Hz	
Speed	1,800 rpm	
Aux. AC Power	Single phase, 60 Hz	
Subtransient	0.085	
Transient	0.203	
Synchronous	1.942	
Zero Sequence Reactance	0.0081	
Overload Protection	OCR/main circuit breaker	
Aux. Voltage/Output	120V/4.8 kW (2.4 kW × 2)	
Dry Weight	3,329 lb. (1,510 kg)	
Wet Weight	4,211 lb. (1,910 kg)	

Table 2. Engine Specifications

Model	Isuzu BR-4JJ1X Final Tier 4	
Type	4-cycle, water-cooled, direct injection, turbocharged with intercooler and cooled EGR	
No. of Cylinders	4	
Bore × Stroke	3.76 in. × 4.13 in. (95.4 mm × 104.9 mm)	
Displacement	183 cu. in. (3.0 liters)	
Rated Output	86.5 hp at 1,800 rpm	
Starting	Electric	
Coolant Capacity	5.5 gal. (21.0 liters) ¹	
Lubricating Oil Capacity	3.96 gal. (15 liters) ²	
Lubricating Oil Type	API service class CJ-4 SAE 15W-40 or JASO DH-2	
DEF Tank Capacity	7.4 gal. (28 liters)	
Fuel Tank Capacity	103 gal. (390 liters)	
Fuel Type	#2 diesel fuel (ultra-low sulfur diesel fuel only)	
Fuel Consumption	4.4 gal. (16.6 L)/hr. at full load	3.5 gal. (13.4 L)/hr. at 3/4 load
	2.6 gal. (9.8 L)/hr. at 1/2 load	1.7 gal. (6.4 L)/hr. at 1/4 load
Battery	27 (CCA 0°F 840A) × 1	

¹ Includes engine and radiator with hoses.

² Includes filters.

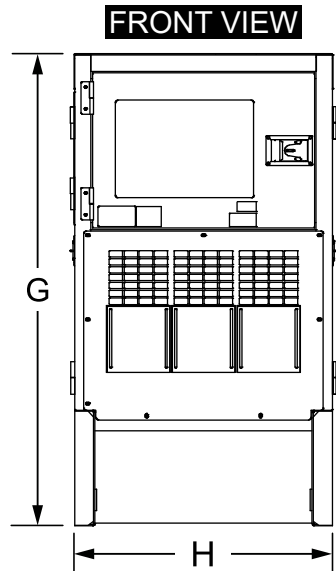
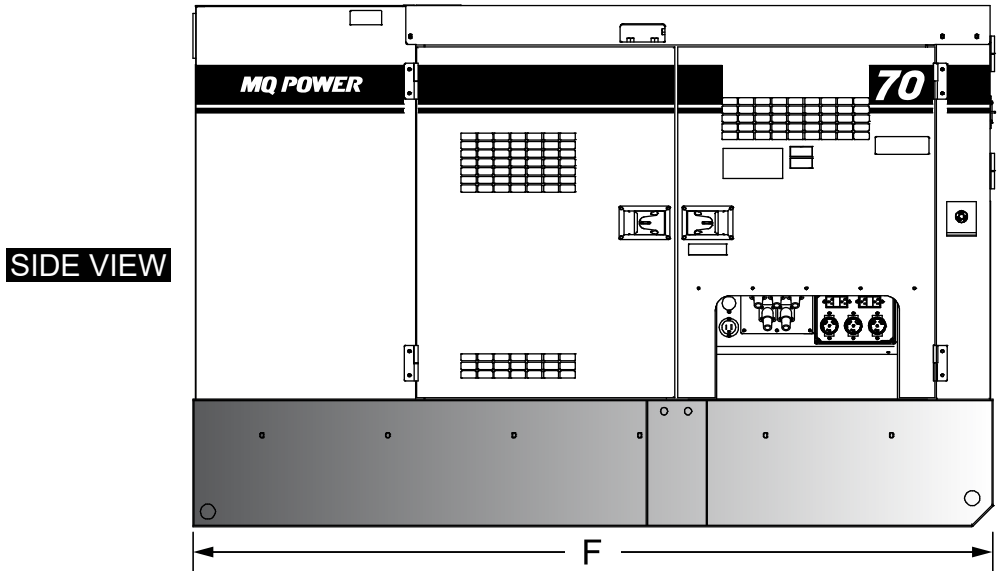
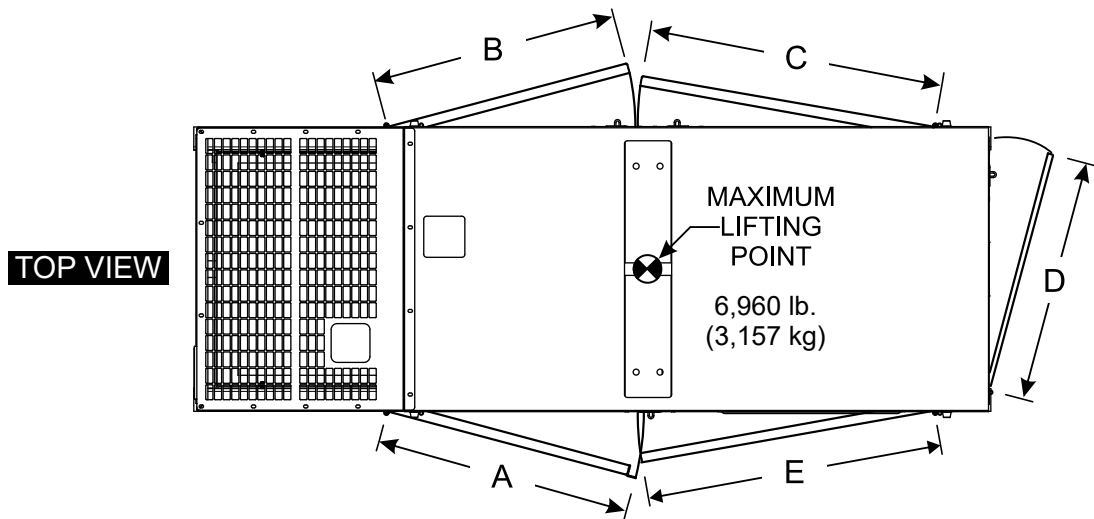


Figure 2. Dimensions

Table 3. Dimensions			
Reference Letter	Dimension in. (mm)	Reference Letter	Dimension in. (mm)
A	33.86 (860)	E	33.78 (858)
B	29.45 (748)	F	105.12 (2,670)
C	38.19 (970)	G	68.30 (1,735)
D	32.28 (820)	H	37.40 (950)

[illegible]

GENERATOR GROUNDING

ALWAYS refer to Article 250 (Grounding and Bonding) of the National Electrical Code (NEC).

NOTICE

ALWAYS check with state, province, district, and municipalities for electrical grounding requirements before using the generator.

EXAMPLE of how to ground the unit (Figure 3) if the condition of use requires such a device:

Connecting The Ground

Consult with local electrical and safety codes for proper connection based on condition of use. Refer to the Conductor Grounding Table, Article 250 of the NEC handbook.

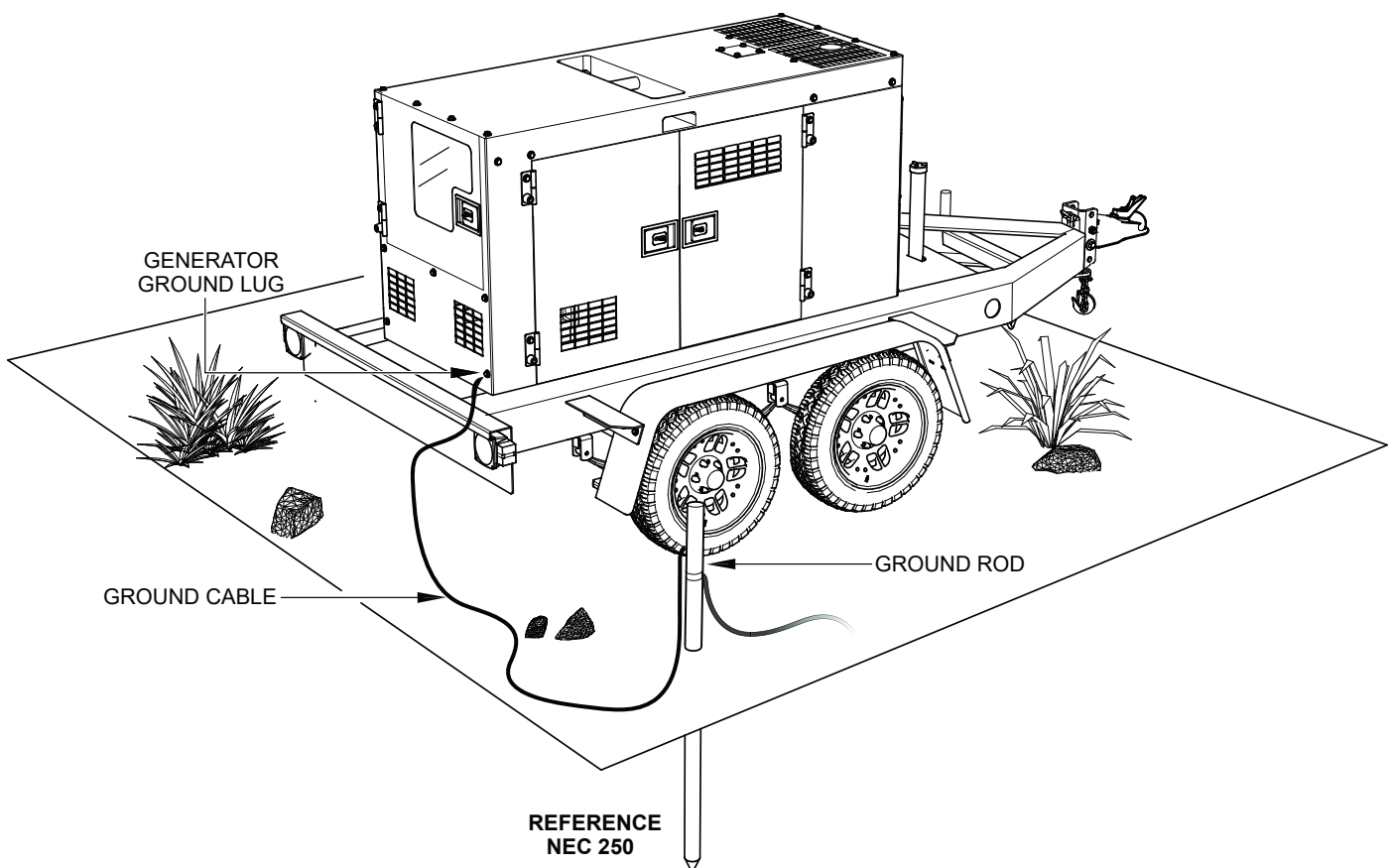


Figure 3. Typical Generator Grounding Application

NOTICE

Trailer-mounted generators are the sole responsibility of MQ Power.

OUTDOOR INSTALLATION

Install the generator in an 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 equipment should be protected from excessive moisture. Failure to do so 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 be mounted at least 6 inches above the floor or grade level as referenced in the National Fire Protection Association handbook (NFPA 110, Chapter 7, Section 7.4).

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

This generator is designed as a high-quality, portable (requiring a trailer for transport) power source for telecom sites, lighting facilities, power tools, submersible pumps, and other industrial and construction machinery.

CONTROL AND OPERATION PANEL

The **control and operation panel** is provided with the following:

- DEIF AGC 150 Genset Controller
- Panel Light/Panel Light Switch
- Control Power Switch
- Contactor Closed Lamp (Green)
- Contactor Open Lamp (Red)
- USB-B Receptacle
- Ethernet Receptacle
- Low DEF Level Lamp (Blue)
- Pilot Lamp
- 3-Pole, 200-Amp Main Circuit Breaker

CONTROL BOX (located behind control panel)

The **control box** is provided with the following:

- Automatic Voltage Regulator
- Current Transformers
- Overcurrent Relay
- Starter Relay
- Fuel Pump Switch
- Contactor

OUTPUT TERMINAL PANEL

The **output terminal panel** is provided with the following:

- Three 240/120V Output Receptacles (CS6369), 50A
- Three Auxiliary Circuit Breakers, 50A
- Two 120V Output GFCI Duplex Receptacles, 20A
- Two GFCI Duplex Circuit Breakers, 20A
- Five Output Terminal Lugs (3Ø Power)
- Generator Ground Lug
- Five Cam-Lok Connectors (3Ø Power)
- Voltage Selector Switch
- Voltage Select Switch
- Emergency Stop Switch
- Parallel Signal Switch
- Parallel Communication Receptacles (2)
- Remote-Start Contacts
- Battery Charger
- Engine Block Heater

OPEN-DELTA EXCITATION SYSTEM

Each generator is equipped with a state-of-the-art, **open-delta** excitation system. The open-delta system consists 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 provide 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 open-delta design provides virtually unlimited excitation current, offering maximum motor-starting capabilities. The excitation does not have a 'fixed ceiling' and responds according to the demands of the required load.

ENGINE

This generator is powered by a 4-cycle, water-cooled, direct-injection, turbocharged with intercooler and cooled EGR Isuzu BR-4JJ1X diesel engine. This engine is designed to meet every performance requirement for the generator. Refer to 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.

MICROPROCESSOR CONTROL SYSTEM

The microprocessor controls the speed (RPM) of the engine. When the engine demand increases or decreases, the microprocessor system regulates the frequency variation to $\pm 0.25\%$.

EXTENSION CABLES

When electrical power is to be provided to various tools or loads at some distance from the generator, extension cords are normally used. Cables should be sized to allow for distance in length and amperage so that the voltage drop between the generator and point of use (load) is held to a minimum. Use the cable selection chart (Table 6) as a guide for selecting the proper extension cable size.

GENERAL PARALLELING INFORMATION

PARALLELING

Paralleling is the sharing of a load between two or more generator sets.

LOAD SHARING

Load sharing is defined as the proportional division of the kW and kVAR total load between multiple generator sets in a paralleled system.

Load sharing is essential to avoid overloading and stability problems on the system's generator sets.

ACTIVE POWER (KW) LOAD SHARING

When generator sets operate in parallel, the engine speed governor of each generator set determines the proportional sharing of the total active power requirements (kW) of the system.

The kW load sharing is achieved by increasing or decreasing fuel to the system's engines. As the fuel to the engine of one generator set in a group is increased it will not lead to an increase in speed and hence frequency (as it would if it were operating alone), but it will lead to an increase in the proportion of the total kW load that it will deliver.

As the fuel to the engine of one generator set in a group is decreased it will not lead to a decrease in speed and hence frequency (as it would if it were operating alone), but it will lead to a decrease in the proportion of the total kW load that it will deliver.

The control system of the generator sets (via the engine speed control system) monitors and controls the sharing of the total kW load in proportion to the relative rating of the engines on the system's generator sets.

REACTIVE POWER (KVAR) LOAD SHARING

When generator sets operate in parallel, the alternator field excitation system of each generator set controls the proportional sharing of the total reactive power requirements (kVAR) of the system.

The kVAR load sharing is achieved by increasing or decreasing the field excitation to the system's alternators.

As the field excitation of one generator set in a group is increased (i.e. over excited) it will not lead to an increase in voltage (as it would if it were operating alone), but it will lead to an increase in the proportion of the total kVAR load it will deliver and a decrease in its power factor.

As the field excitation of one generator set in a group is decreased (i.e. over excited) it will not lead to a decrease in voltage (as it would if it were operating alone), but it will lead to a decrease in the proportion of the total kVAR load it will deliver and an increase in its power factor.

An undesirable circulating reactive current (cross current) will flow in the system if the excitation of the alternators is not matched.

LOAD MANAGEMENT

These generators are set up to automatically manage load, based on demand. While in Auto mode, if the auto-start contacts are closed, load management is active by default. Load management will only run the number of units needed to support the load.

If the load demand is small, only one generator will run while the other generators remain in Standby mode. If the load increases above 90% of its capacity, it will start the next generator. The next generator priority is based on the time remaining on the maintenance timer.

Generators with more time until scheduled maintenance will take priority over units that are almost due for maintenance. Once the second unit starts, it will synchronize and parallel in, then ramp up to share the load. If the load levels drop below 40% of its combined rating, the generator that is no longer needed will ramp off, shut down and wait in standby mode.

MAJOR COMPONENTS

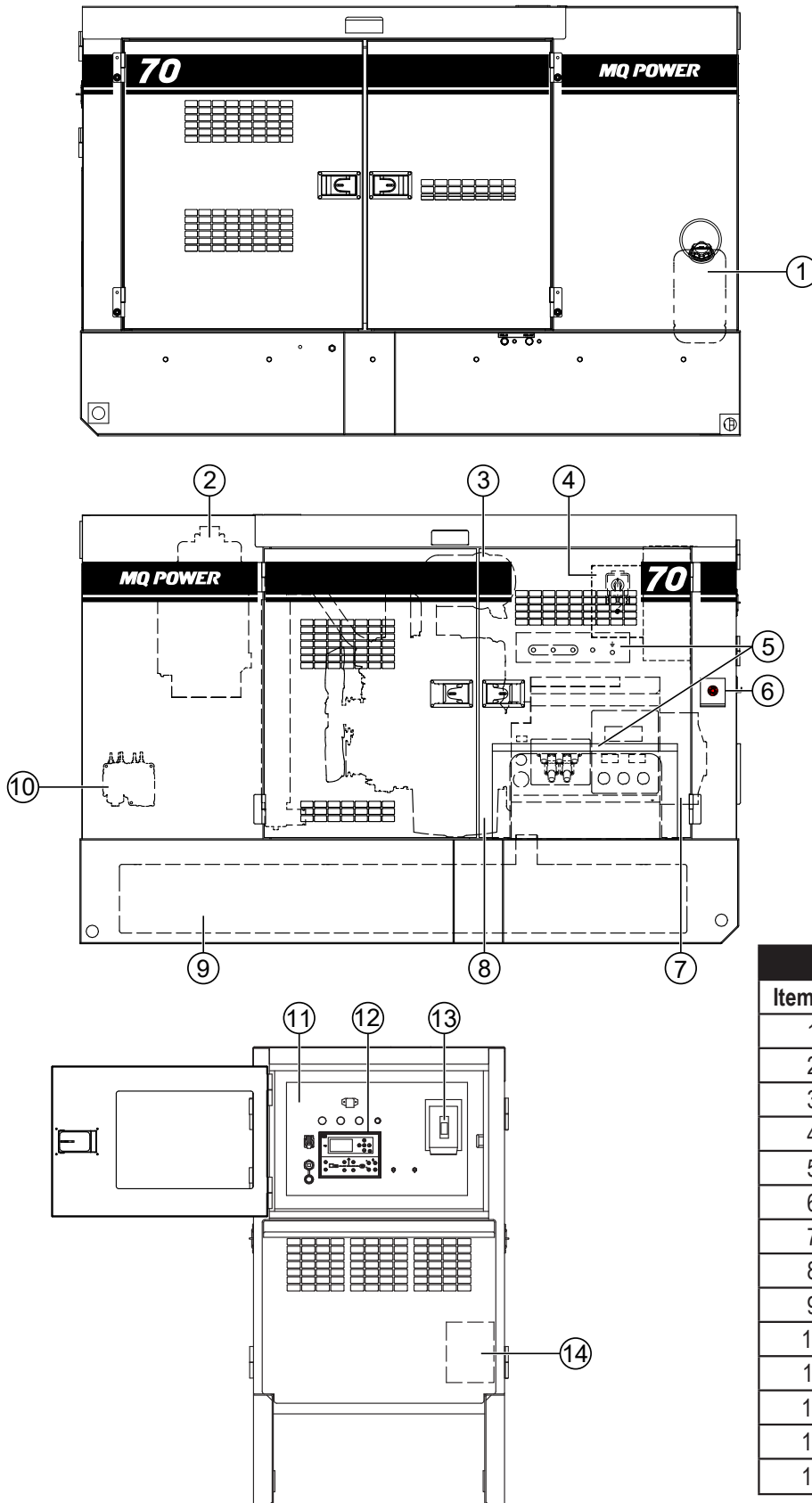


Table 4. Major Components	
Item No.	Description
1	DEF Tank Assembly
2	Muffler Assembly
3	Air Cleaner Assembly
4	Voltage Selector Switch Assembly
5	Output Terminal Panel Assembly
6	Emergency Stop Switch Assembly
7	Generator Assembly
8	Engine Assembly
9	Fuel Tank Assembly
10	DEF Supply Module Assembly
11	Control and Operation Panel Assembly
12	DEIF AGC 150 Controller Assembly
13	Main Circuit Breaker Assembly
14	Battery Assembly

Figure 4. Major Components

CONTROL AND OPERATION PANEL

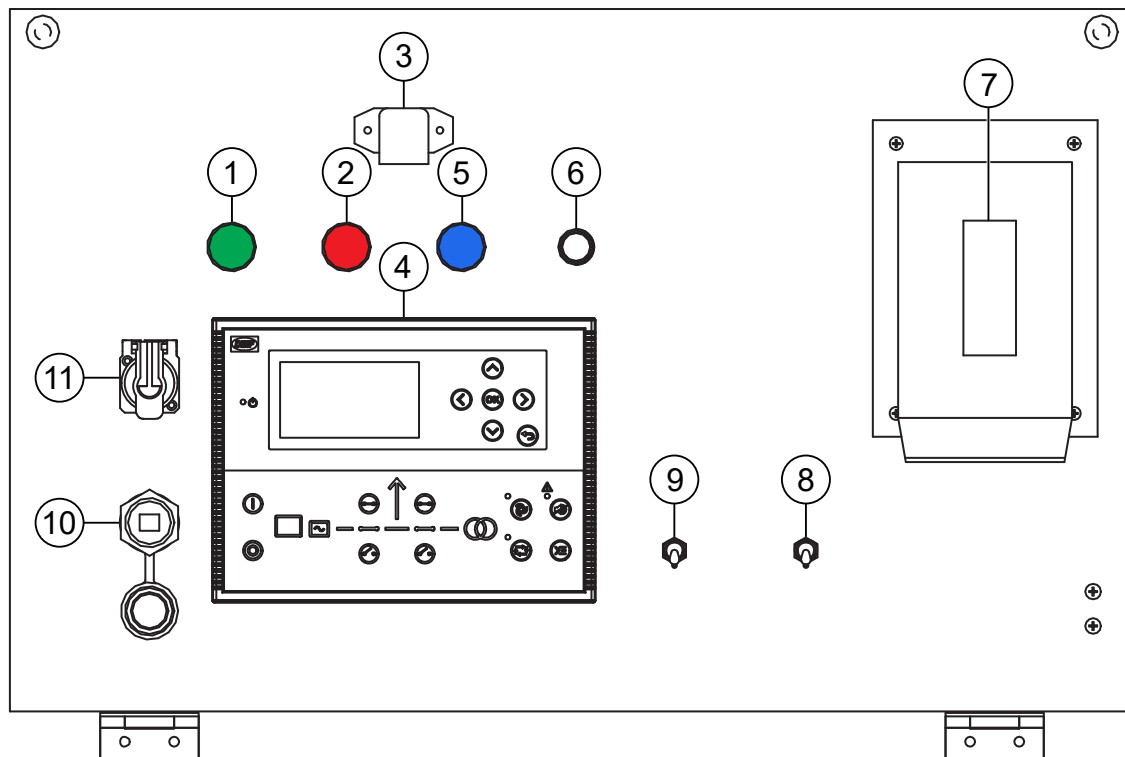


Figure 5. Control And Operation Panel

The controls and functions of the **control and operation panel** (Figure 5) are described below:

1. **Contactors Closed Lamp** — Illuminates (green) when the contactor contacts are closed.
2. **Contactors Open Lamp** — Illuminates (red) when the contactor contacts are open.
3. **Panel Light** — Illuminates the control panel for reading meters and gauges during low-light or nighttime operation.
4. **DEIF AGC 150 Genset Controller** — Provides systematic control of the generator. Allows the user to start and stop the genset, monitor operating parameters, and view diagnostic troubleshooting messages. Refer to the *DEIF AGC 150 Digital Genset Controller* section for more information.
5. **Low DEF Level Lamp** — Illuminates (blue) when the DEF level drops below 15%.
6. **Pilot Lamp** — Illuminates when the unit is operational.
7. **Main Circuit Breaker** — 3-pole, 200-amp, motor-controlled circuit breaker connects or disconnects the generator output from the output terminals and protects the unit from short circuits or overcurrent.
8. **Panel Light Switch** — Turns the control panel light ON/OFF. Make sure the panel light switch is in the OFF position when the light is not needed.
9. **Control Power Switch** — Provides power to the DEIF controller. Place the switch in the ON position for normal operation. Place in the OFF position when the generator is not in use.
10. **USB Receptacle** — Connect a USB cable to this port for testing/configuration of the DEIF controller via a remote computer.
11. **Ethernet Receptacle** — Connect an ethernet cable to this port for testing/configuration of the DEIF controller via a remote computer. For faster data rates this is the preferred method of communication.

DEIF AGC 150 DIGITAL GENSET CONTROLLER

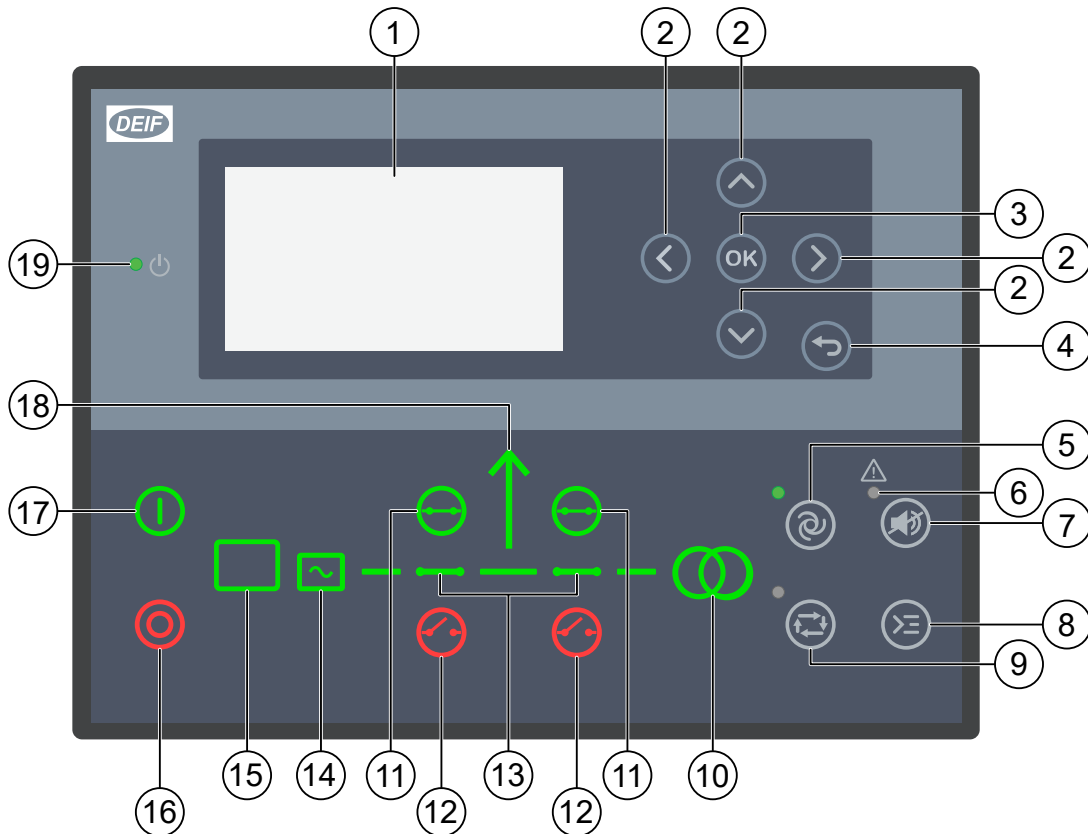


Figure 6. DEIF AGC 150 Controller

The controls and functions of the **DEIF AGC 150 generator controller** (Figure 6) are described below:

1. **Display Screen** — A 240 × 128-pixel, 88.5 × 51.4 mm screen that displays up to six lines with up to 25 characters per line. Serves as the local information source for metering, alarms, pre-alarms, and protective functions.
2. **Navigation Arrows** — Press these buttons to move the onscreen selector up, down, left and right.
3. **OK Button** — Press to access the Menu system, or to confirm the onscreen selection.
4. **Back Button** — Press to return to the previous page.
5. **Auto Mode Button** — Press to place the generator in Auto mode.
6. **Alert Indicator** — Flashes to indicate an alarm.
7. **Silence Horn Button** — Press to silence the alarm horn and to enter the Alarm menu.
8. **Shortcut Menu Button** — Press to access the Jump menu, Mode selection, Test, and Lamp test.
9. **Semi-Auto Mode Button** — Press to place the generator in Semi-Auto mode.
10. **Mains Indicator** — When lit (GREEN), indicates mains voltage and frequency are OK and the controller can synchronize and close the contactor. When lit (RED), indicates a mains failure.
11. **Close Contactor Button** — Press to close the contactor.
12. **Open Contactor Button** — Press to open the contactor.

DEIF AGC 150 DIGITAL GENSET CONTROLLER

13. **Breaker Indicators** — When lit (GREEN), indicates the main circuit breaker and contactor are closed.
When flashing (GREEN), indicates synchronizing or deloading is in progress.
When lit (RED), indicates main circuit breaker/contactator failure.
14. **Generator Indicator** — When lit (GREEN), indicates generator voltage and frequency are OK. The controller can synchronize and close the contactor.
When flashing (GREEN), indicates generator voltage and frequency are OK, but the Voltage and Frequency OK timer is still running. The controller cannot close the contactor.
When lit (RED), indicates generator voltage is too low to measure.
15. **Engine Indicator** — When lit (GREEN), indicates the controller is receiving running feedback from the engine.
When flashing (GREEN), indicates the engine is getting ready.
When lit (RED), indicates the engine is not running, or there is no running feedback.
16. **Stop Button** — Press to stop the generator while in Semi-Auto or Manual mode.
17. **Start Button** — Press to start up the generator when Semi-Auto or Manual mode has been selected.
18. **Load Indicator** — When OFF, indicates a power management application.
When lit (GREEN), indicates the supply voltage and frequency are OK.
When lit (RED), indicates supply voltage/frequency failure.

OUTPUT TERMINAL PANEL FAMILIARIZATION

OUTPUT TERMINAL PANEL

The **output terminal panel** (Figure 7) is provided for the connection of electrical loads. Open the door to access terminal lugs.

NOTICE

Terminal O is neutral bonded to the ground from the factory.

NOTICE

Output Terminal Bolt Torque: 554.9 lbf-in (62.7 N·m)

The output terminal panel is provided with the following:

- Three (3) 240/120-volt output receptacles @ 50 amps
- Three (3) 50-amp auxiliary circuit breakers
- Two (2) 120-volt GFCI receptacles @ 20 amps
- Two (2) 20-amp GFCI circuit breakers
- Five (5) output terminal lugs (U, V, W, O, Ground)
- Five (5) cam-lock connectors (U, V, W, O, Ground)
- One (1) 15-amp battery charger receptacle
- One (1) 30-amp engine block heater receptacle
- Remote-start contacts

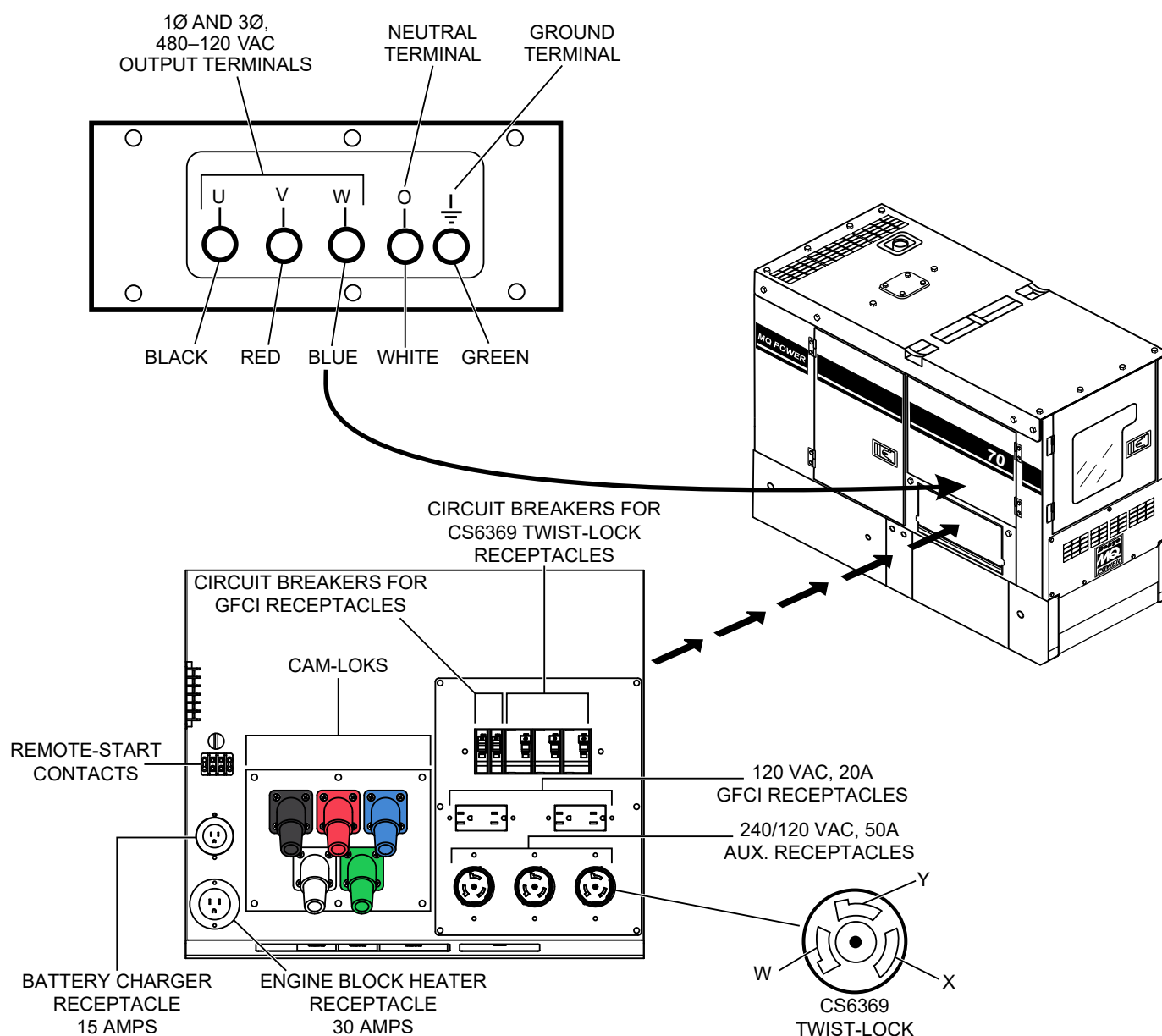


Figure 7. Output Terminal Panel

OUTPUT TERMINAL PANEL FAMILIARIZATION

120-Volt AC GFCI Receptacles

NOTICE

It is recommended that the GFCI receptacles be tested when the generator is initially uncrated. The receptacles should then be tested daily at startup.

There are two 120-volt, 20-amp GFCI (duplex Nema 5-20R) receptacles provided on the output terminal panel. These receptacles can be accessed in any voltage selector switch position.

Each receptacle is protected by a 20-amp circuit breaker. These breakers are located directly above the GFCI receptacles. Remember that the load output (current) of both GFCI receptacles is dependent on the load requirements of the U, V, and W output terminal lugs.

Press the **Reset button** (Figure 8) in the center of a GFCI receptacle to reset the receptacle after it has been tripped. Press the **Test button** to check the GFCI function. Both receptacles should be tested at least once a month. Refer to the **Maintenance** section in this manual for further testing of the GFCI receptacles.

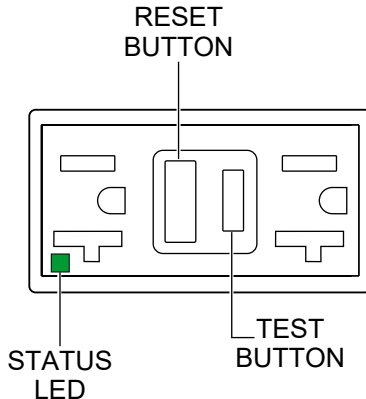


Figure 8. 120-Volt GFCI Receptacle

Twist-Lock Dual-Voltage 240/120-Volt AC Receptacles

There are **three 240/120-volt, 50-amp, auxiliary twist-lock (CS6369) receptacles** (Figure 9) provided on the output terminal panel. These receptacles can only be utilized when the voltage selector switch is placed in the single-phase, 240/120-volt position.

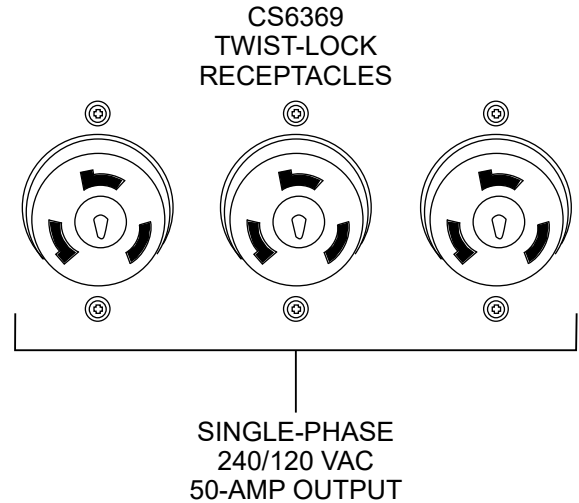


Figure 9. 240/120-Volt Twist-Lock Auxiliary Receptacles

Each auxiliary receptacle is protected by a 50-amp circuit breaker. These breakers are located directly above the GFCI receptacles. Remember the load output (current) on all three receptacles is dependent on the load requirements of the output terminal lugs.

Removing The Plastic Face Plate (Hard Wire Hookup Panel)

The output terminal lugs are located behind a **protective cover** (Figure 10). Unscrew the **retaining bolts** (2) and remove the cover to gain access to the output terminal lugs.

After the load wires have been securely attached to the output terminal lugs, reinstall the protective cover and reinstall the retaining bolts.

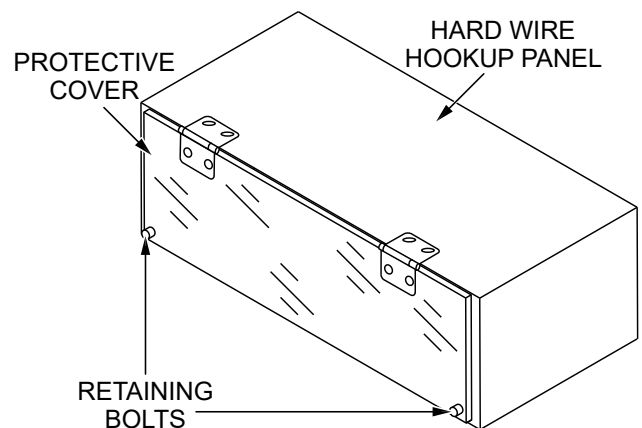


Figure 10. Protective Cover (UVWO Terminal Lugs)

OUTPUT TERMINAL PANEL FAMILIARIZATION

Connecting Loads

Loads can be connected to the generator via the **cam-loks**, **output terminal lugs**, or **convenience receptacles** (Figure 11). 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, 200-amp, main circuit breaker is provided. Make sure to switch **ALL** circuit breakers to the **OFF** position prior to starting the engine.

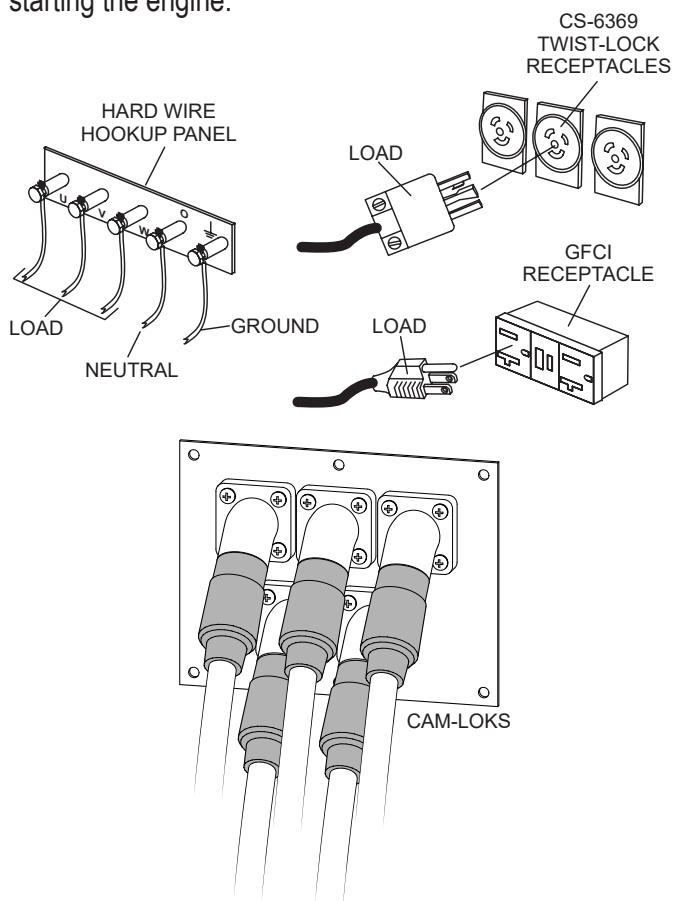


Figure 11. Connecting Loads

Overcurrent Relay

An **overcurrent relay** (Figure 12) is connected to the main circuit breaker. In the event of an overload, both the circuit breaker and the overcurrent relay may trip. If the circuit breaker cannot be reset, the **Reset button** on the overcurrent relay must be pressed. The overcurrent relay is located inside the control box.

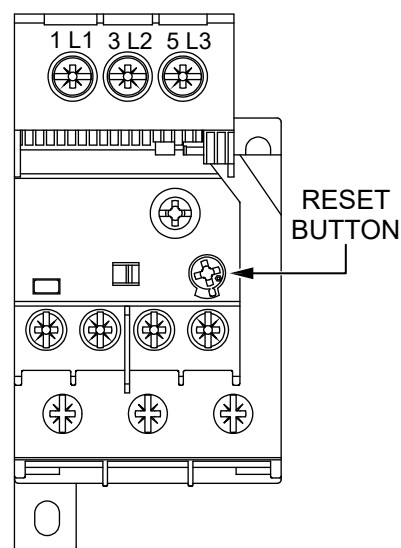


Figure 12. Overcurrent Relay

NOTICE

The overcurrent relay monitors the current flowing from the U,V, and W output terminal lugs to the load. In the event of a short circuit or overcurrent condition, it will automatically trip the 200-amp main circuit breaker.

To restore power to the output terminal panel, press the Reset button on the overcurrent relay and place the main circuit breaker in the closed (ON) position.

LOAD APPLICATION

SINGLE-PHASE LOAD

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

Generally, the wattage listed on the nameplate of the equipment is its rated output. Equipment 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 equipment.

NOTICE

If wattage is not given on the equipment's nameplate, 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 (single phase) is 1.0. See Table 5 below when connecting loads.

Table 5. Power Factor By Load

Type of Load	Power Factor
Single-phase induction motors	0.4–0.75
Three-phase induction	0.65–0.85
Electric heaters, incandescent lamps	1.0
Fluorescent lamps, mercury lamps	0.4–0.9
Electronic devices, communication equipment	1.0
Common power tools	0.8

Table 6. Cable Selection (60 Hz, Single-Phase Operation)

Current in Amperes	Load in Watts		Maximum Allowable Cable Length			
	At 100 Volts	At 200 Volts	#10 Wire	#12 Wire	#14 Wire	#16 Wire
2.5	300	600	1,000 ft.	600 ft.	375 ft.	250 ft.
5	600	1,200	500 ft.	300 ft.	200 ft.	125 ft.
7.5	900	1,800	350 ft.	200 ft.	125 ft.	100 ft.
10	1,200	2,400	250 ft.	150 ft.	100 ft.	
15	1,800	3,600	150 ft.	100 ft.	65 ft.	
20	2,400	4,800	125 ft.	75 ft.	50 ft.	

CAUTION: Equipment damage can result from low voltage.

NOTICE

Cable selection table is a general guideline. **ALWAYS** consult local and national electrical codes when sizing cables.

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 3-phase load (kVA) is not given on the equipment nameplate, approximate 3-phase load may be determined by multiplying voltage by amperage by 1.732.

NOTICE

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

An inadequately sized 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.

The power factor of this generator (3 phase) is 0.8.

- 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

A wide range of voltages (Table 7) is available for many different applications.

Table 7. Voltages Available						
UVWO Output Terminal Lugs	Voltage Selector Switch 3-Phase 240/139V Position			Voltage Selector Switch 3-Phase 480/277V Position		
3Ø Line-Line	208V	220V	240V	416V	440V	480V
1Ø Line-Neutral	120V	127V	139V	240V	254V	277V
Voltage Selector Switch Single-Phase 240/120V Position						
1Ø Line-Neutral/Line-Line	120V Line-Neutral	N/A	N/A	240V Line-Line	N/A	N/A

Voltage Selector Switch

Voltages are selected using the **Voltage Selector switch** (Figure 13) which is located above the output terminal panel's hard wire hook-up panel. This switch has been provided for ease of voltage selection.

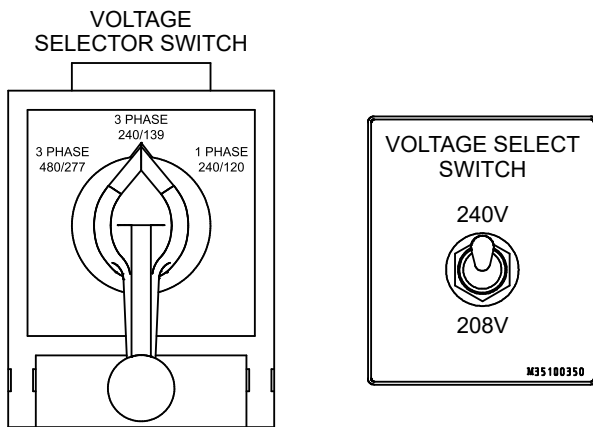


Figure 13. Voltage Switches

Voltage Select Switch

When the Voltage Selector switch is set to the 3-phase, 240/139-volt position, use the **Voltage Select switch** (Figure 13) to select either 240 or 208 volts. The Voltage Select switch is only used when the Voltage Selector switch is placed in the 240/139-volt position.

CAUTION

NEVER change the position of the voltage switches while the engine is running. **ALWAYS** place the circuit breaker in the **OFF** position before selecting voltage.

Maximum Amps

Table 8 shows the **maximum** amps the generator can provide. **DO NOT** exceed the maximum amps as listed.

Table 8. Generator Maximum Amps	
Rated Voltage	Maximum Amps
Single phase 120 volts	155.4 amps (4 wire) 168 amps × 2 (zigzag)
Single phase 240 volts	77.8 amps (4 wire) 168 amps (zigzag)
Three phase 240 volts	168 amps
Three phase 480 volts	84 amps
Main Line Circuit Breaker Rating	
200 amps	
Overcurrent Relay Trip Set Point (480V Mode Only)	
84 amps	

GFCI Receptacle Load Capability

The load capability of the GFCI receptacles is directly related to the voltage being supplied at either the output terminals or the twist-lock auxiliary receptacles.

Table 9 shows the amount of power and current available at the GFCI receptacles when the output terminals and twist-lock receptacles are in use. Be careful that your load does not exceed the available current capability at the receptacles.

Table 9. Simultaneous Power And Current			
3-Phase 480V/240V UVWO Terminals		120V Duplex NEMA 5-20R GFCI Receptacles	
Single-Phase 240V/120V or Twist-Lock (CS6369) Receptacles			
Power In Use		Power Available	Current Available
kVA	kW	kW	A
70.0	40.4	0	0
65.8	39.2	1.2	5
61.7	38.0	2.4	10
57.5	36.8	3.6	15
53.3	35.6	4.8	20

OUTPUT TERMINAL PANEL CONNECTIONS

UVWO TERMINAL OUTPUT VOLTAGES

Various output voltages can be obtained using the UVWO output terminal lugs. The voltages at the terminals are dependent on the position of the Voltage Selector switch and Voltage Select switch.

NOTICE

ALWAYS make sure that the connections to the UVWO terminals are **secure** and **tight**. The possibility exists of arcing that could cause a fire. Torque tie bolts to 554.9 lbf-in (62.7 N·m).

3-Phase 240-Volt UVWO Terminal Output Voltages

1. Place the **Voltage Selector switch** in the **3-phase, 240/139-volt** position as shown in Figure 14.

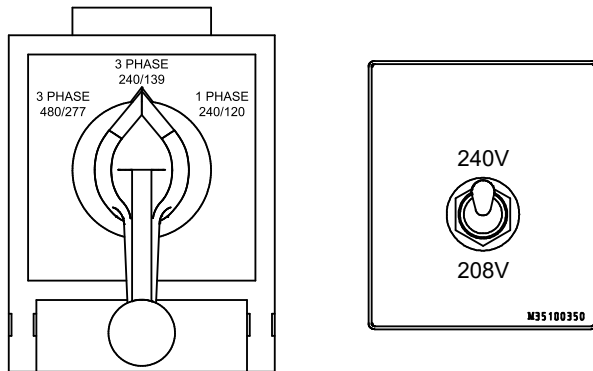


Figure 14. 3-Phase 240/139-Volt Selection

2. Place the **Voltage Select switch** in the **240-volt** position as shown in Figure 14.
3. Connect the load wires to the **UVWO terminal lugs** as shown in Figure 15.

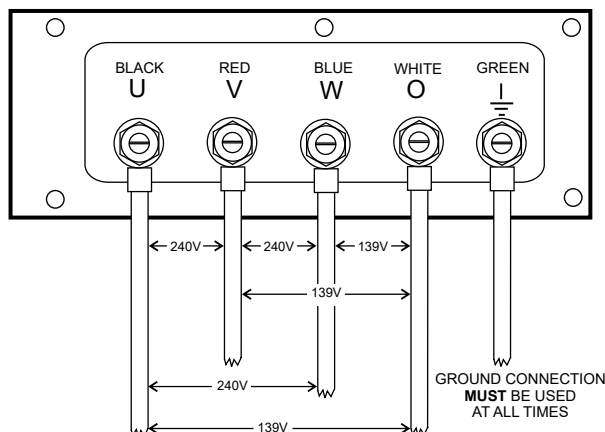


Figure 15. UVWO Terminal Lugs
3-Phase 240-Volt Connections

3-Phase 208-Volt / Single-Phase 120-Volt UVWO Terminal Output Voltages

1. Place the **Voltage Selector switch** in the **3-phase, 240/139-volt** position as shown in Figure 16.

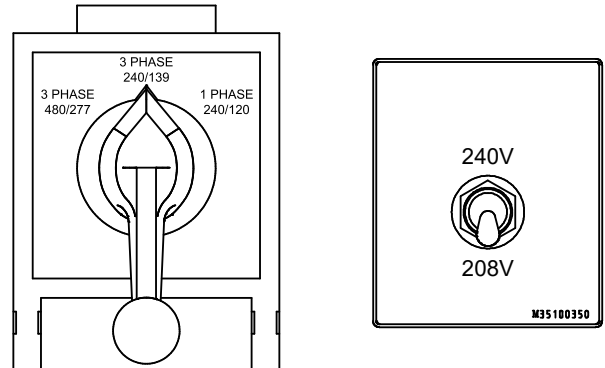


Figure 16. 3-Phase 208/120-Volt Selection

2. Place the **Voltage Select switch** in the **208-volt** position as shown in Figure 16.
3. Connect the load wires to the **UVWO terminal lugs** as shown in Figure 17.

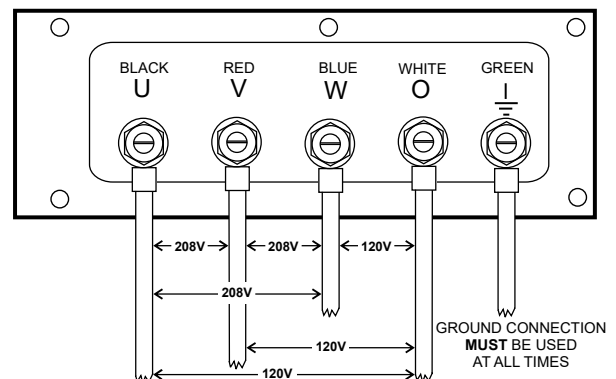


Figure 17. UVWO Terminal Lugs
3-Phase 208-Volt / 1-Phase 120-Volt
Connections

OUTPUT TERMINAL PANEL CONNECTIONS

3-Phase 480/277-Volt UVWO Terminal Output Voltages

1. Place the **Voltage Selector switch** in the **3-phase, 480/277-volt position** as shown in Figure 18.

NOTICE

The Voltage Select switch (240V/208V) does not affect the output when the Voltage Selector switch is placed in the 3-phase, 480/277-volt position.

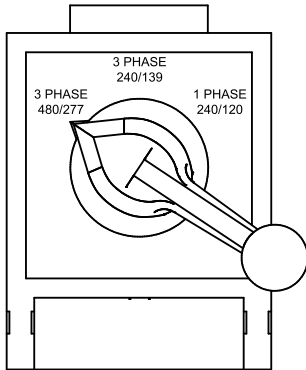


**Figure 18. Voltage Selector Switch
3-Phase 480/277-Volt Position**

2. Connect the load wires to the **UVWO terminal lugs** as shown in Figure 19.

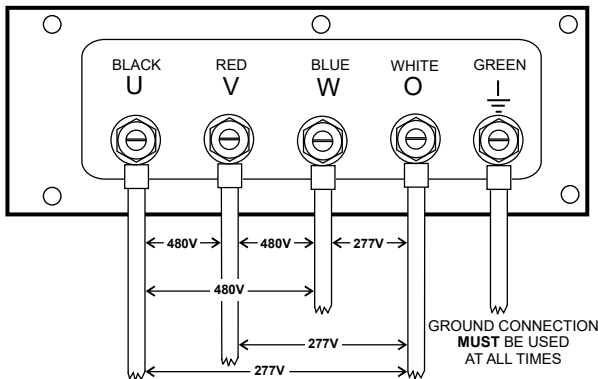


**Figure 19. UVWO Terminal Lugs
3-Phase 480-Volt Connections**

Single-Phase 240/120-Volt UVWO Terminal Output Voltages

1. Place the **Voltage Selector switch** in the **single-phase, 240/120-volt position** as shown in Figure 20.

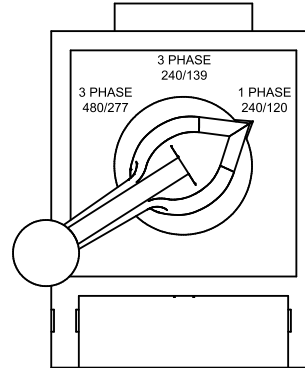


**Figure 20. Voltage Selector Switch
1-Phase 240/120-Volt Position**

2. Connect the load wires to the **UVWO terminal lugs** as shown in Figure 21.

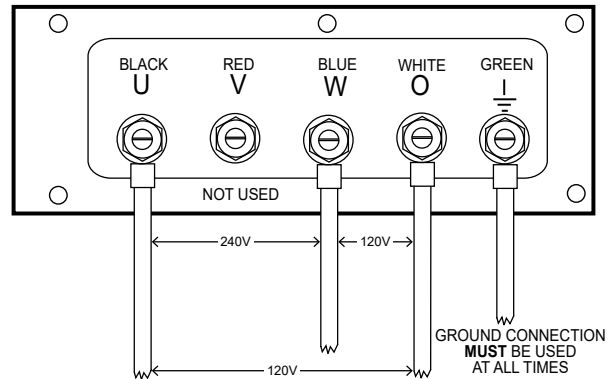


**Figure 21. UVWO Terminal Lugs
1-Phase 240/120-Volt Connections**

ENGINE OIL CHECK

1. To check the engine oil level, place the generator on secure, level ground with the engine stopped.
2. Remove the **engine oil dipstick** from its holder (Figure 22) and wipe it clean.

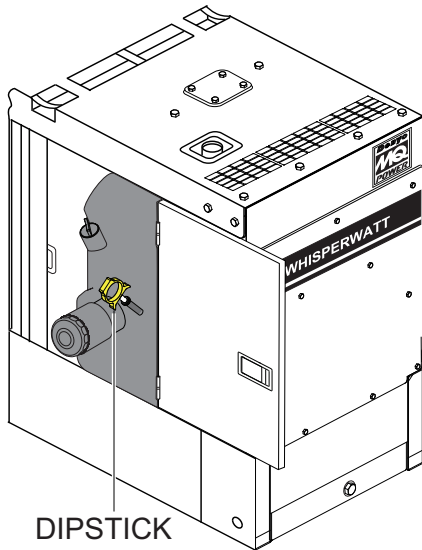


Figure 22. Engine Oil Dipstick

3. Reinsert the dipstick, then remove the dipstick from its holder. Check the oil level shown on the dipstick (Figure 23).

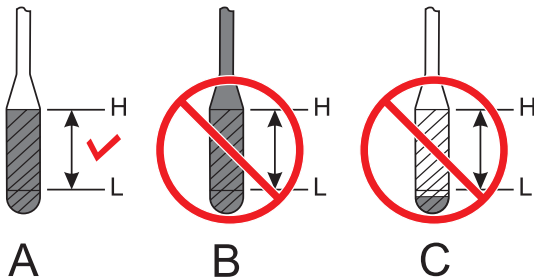


Figure 23. Engine Oil Level

4. Verify that the engine oil level is maintained between the **H** and **L** markings on the dipstick as shown in Figure 23A.

5. If the engine oil level is low (Figure 23C), remove the cap from the **oil filler port** (Figure 24) and fill to a safe operating level (max) as indicated by the dipstick (Figure 23A). Fill with the recommended oil type shown in Table 10. Maximum oil capacity is 15.8 quarts (15 liters).

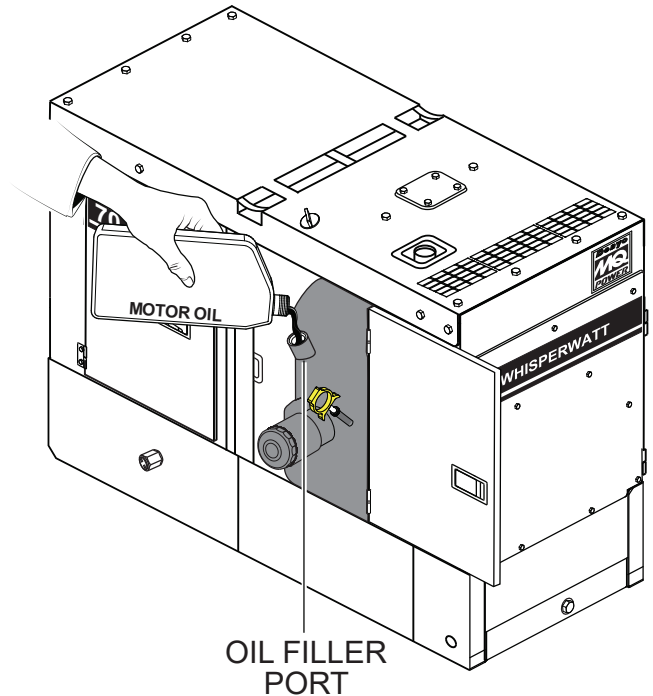
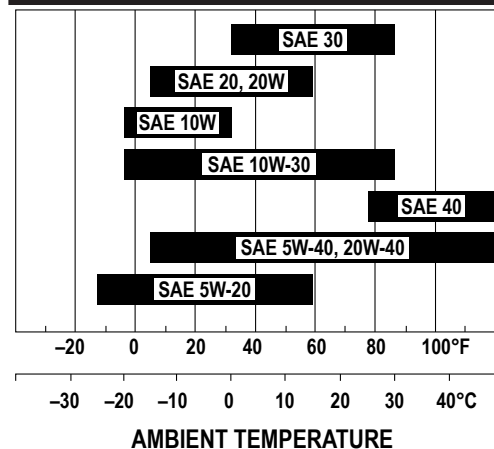


Figure 24. Engine Oil Filler Port

6. When checking the engine oil, be sure to check if the oil is clean. If the oil is not clean, drain the oil as described in the **Maintenance** section of this manual.

Table 10. 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. **ALWAYS** shut down the engine prior to cleaning up any spilled fuel.

NOTICE

ALWAYS check the DEF tank level when adding fuel.

Refilling The Fuel System

NOTICE

DO NOT refuel while the engine is running.

CAUTION

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

ALWAYS fill the fuel tank (Figure 25) with clean, fresh, #2 diesel fuel. Pay attention to the fuel tank capacity when replenishing fuel. **DO NOT** fill the fuel tank beyond its capacity.

Close the fuel filler cap (Figure 25) 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.

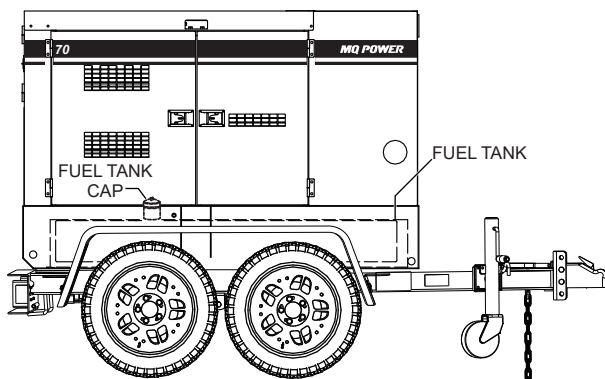


Figure 25. Fuel Tank

Refueling Procedure

WARNING



Diesel fuel and its vapors are dangerous to your health and the surrounding environment. Avoid inhalation of fumes and contact with skin.

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 26).

CAUTION

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

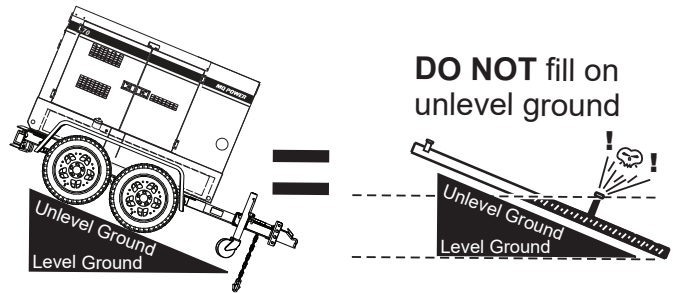


Figure 26. Only Fill On Level Ground

NOTICE

ONLY use #2 diesel fuel (ultra-low sulfur diesel fuel) when refueling.

2. Remove the cap from the fuel filler port and fill the fuel tank as shown in Figure 27.

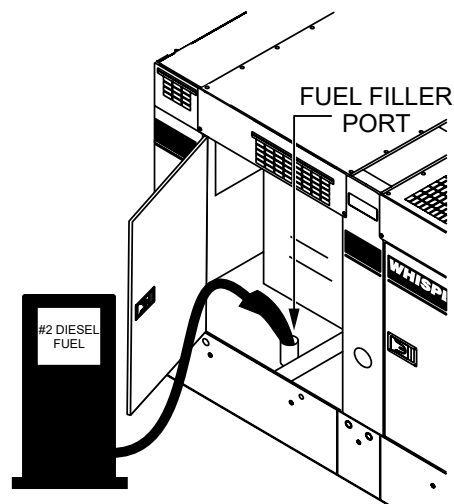


Figure 27. Fueling The Generator

3. **NEVER overfill the fuel tank.** When refueling, **DO NOT** wait for fuel to rise inside the filler neck (Figure 28). Leave room for fuel expansion. Fuel expands when heated (Figure 29).



Figure 28. Full Fuel Tank

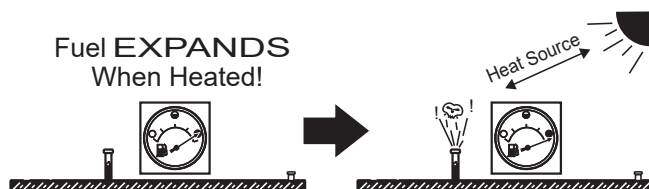


Figure 29. Fuel Expansion

DIESEL EXHAUST FLUID

Diesel exhaust fluid (DEF) is an aqueous solution made with 32.5% high-purity urea (carbamide) and 67.5% deionized water. DEF is used as a consumable in selective catalytic reduction (SCR) in order to lower NO_x concentration from diesel exhaust emissions.

ALWAYS check the DEF level when refueling. Before initial start-up, completely fill the DEF tank with DEF fluid. **DO NOT** overfill.

DEF Refilling

NOTICE

ONLY fill the DEF tank with **diesel exhaust fluid**. Any other type of fluid may cause severe engine damage.

1. Make sure the engine is **OFF**.
2. Remove the cap from the DEF tank filler port (Figure 30).

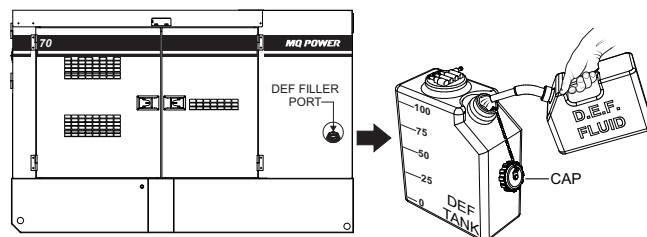


Figure 30. Filling The DEF Tank

3. Add diesel exhaust fluid to the tank. **DO NOT** overfill.
4. Reinstall the DEF tank cap. Tighten securely.

DEF Refilling (Continuous Operation)

It is recommended to **shut down the engine** prior to refilling the DEF tank. However, during special applications where shutdown is not possible, it is recommended to **ONLY** refill the DEF tank when the fluid level has been consumed down to 50%.

The DEF level sending unit requires a gradual DEF level decrease during continuous operation to validate proper operation. Failure of this sensor to report the decrease could result in an engine shutdown. An engine service technician would be required to remedy the shutdown.

COOLANT (ANTIFREEZE/SUMMER COOLANT/WATER)

Isuzu 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 Isuzu engine owner's manual for further details.

! WARNING



When 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 reserve tank. When adding coolant to the radiator, **DO NOT** remove the radiator cap until the unit has completely cooled. See Table 11 for engine, radiator, and recovery tank coolant capacities.

Table 11. Coolant Capacity	
Engine and Radiator	5.5 gal. (21 liters)
Reserve Tank	0.29 gal. (1.1 liters)

NOTICE

Normally, only the coolant level in the reserve tank needs to be checked. However, the radiator cap should be opened once a week to verify that coolant is visible (full) inside the radiator.

Verify that the coolant level inside the **coolant reserve tank** is between the **FULL** and **LOW** markings as shown in Figure 31.

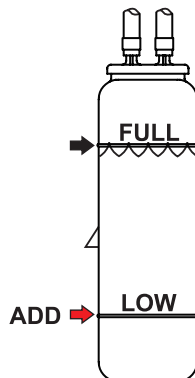


Figure 31. Coolant Reserve Tank

Operation In Freezing Weather

When operating in freezing weather, be certain the proper amount of antifreeze (Table 12) has been added.

Table 12. Coolant Concentration		
Climate	Outside Temperature	Longlife Coolant Concentration
Warm	10°F (-12°C) or above	30%
Cold	-22°F (30°C) or above	50%

Cleaning The Radiator

The engine may overheat if the radiator cooling fins (Figure 32) become overloaded with dust or debris. Periodically clean the radiator fins with compressed air. Cleaning inside the machine is dangerous, so clean only with the engine turned **OFF** and the negative battery terminal disconnected.

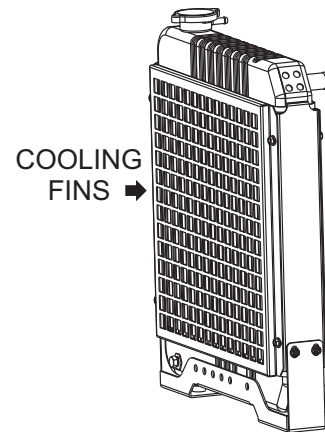


Figure 32. Radiator (Cooling Fins)

ENGINE AIR CLEANER

Periodic cleaning and replacement of the **engine air cleaner** (Figure 33) is necessary. Inspect the air cleaner in accordance with the **Maintenance** section of this manual or the Isuzu engine owner's manual.

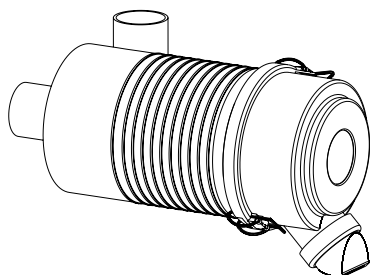


Figure 33. Engine Air Cleaner

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 **Isuzu engine owner's manual**.

The fan belt tension is proper if the fan belt bends 0.17–0.20 in. (4.2–5.0 mm) when pressed with the thumb as shown in Figure 34.

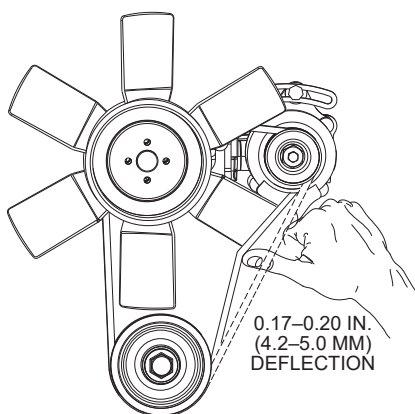


Figure 34. Fan Belt Tension

Table 13. Fan Belt Deflection	
Standard Value Amount of Deflection	Standard Value (Vibration Frequency)
0.2–0.3 in. (6–8 mm)	210 Hz

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 the battery fluid level between the specified marks. Battery life will be shortened if the fluid level is not properly maintained. Add only distilled water when replenishment is necessary.

DO NOT overfill. Check to see whether the battery cables are loose. Poor contact may result in poor starting or malfunctions. **ALWAYS** keep the terminals firmly tightened. Coat the terminals with an approved battery terminal treatment compound. Replace the battery only with the recommended type battery. The battery type used in this generator is BCI Group 27.

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 electrical source, be sure to disconnect the battery cables.

Battery Cable Installation

ALWAYS be sure the battery cables (Figure 35) 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 the negative terminal **LAST**.

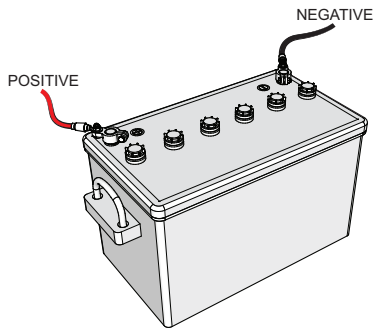


Figure 35. Battery Connections

When connecting the battery:

1. **NEVER** connect the battery cables to the battery terminals while the **Control Power switch** is in the **ON** position. **ALWAYS** make sure that this switch is in the **OFF** 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 cables are connected incorrectly, electrical damage to the generator will occur. Pay close attention to the polarity of the battery when connecting the battery.

NOTICE

Inadequate battery connections may cause poor starting of the generator or other malfunctions.

Battery Switch

Located in the engine compartment, the **Battery switch** (Figure 36) connects and disconnects the battery. Place the switch in the **ON** position prior to starting the generator. When the generator is not in use, place the switch in the **OFF** position.

NOTICE

NEVER place the battery switch in the **OFF** position while the engine is running. The engine may not be able to be stopped by normal operation, and damage to the equipment may result.

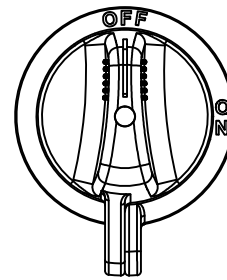


Figure 36. Battery Switch

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 in 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 CONNECTIONS

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

If any fuel or oil hose lines are defective, replace them immediately.

GENERATOR START-UP PROCEDURE (SINGLE UNIT)

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, GFCI or auxiliary** circuit breakers in the **ON** (closed) position.

1. Make sure **all circuit breakers** are in the **OFF** position.
2. Make sure the **Voltage Selector switch** (Figure 37) has been configured for the desired output voltage.

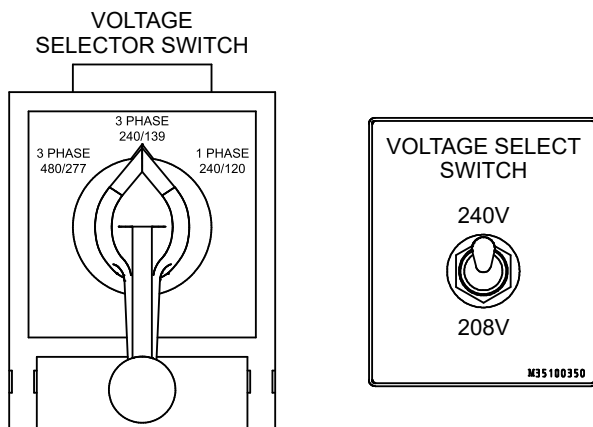


Figure 37. Voltage Switches

3. If the Voltage Selector switch has been placed in the 3-phase, 240/139-volt position:
 - For 240/139-volt output, place the **Voltage Select switch** (Figure 37) in the **240-volt** position.
 - For 208/120-volt output, place the **Voltage Select switch** in the **208-volt** position.
4. Place the **Battery switch** (Figure 38) in the **ON** position.

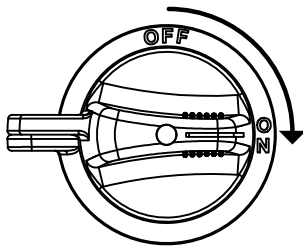


Figure 38. Battery Switch (ON)

5. Place the **Control Power switch** (Figure 39) in the **ON** position.



Figure 39. Control Power Switch (ON)

6. When the controller is turned on, the **View menu** is displayed on the screen, which shows operating status (Figure 40A) and generator values (Figure 40B). The View menu page number (Figure 40C) is shown in the bottom-right corner of the screen. The Alarms list is shown instead of the View menu if a fault alarm is active.

A	DG BLOCKED FOR START			
	G	0	0	0kW
B	G S			0kVA
	G V-L3L1			0V
C	BB V-L3L1			0V
	G f-L1			0.00Hz

Figure 40. Display Screen (View Menu)

7. Verify that the **Contactor Open lamp** (Figure 41) is **ON (RED)**. This indicates that the contactor contacts are open.

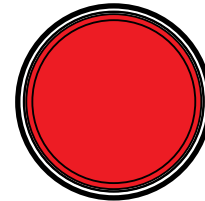


Figure 41. Contactor Open Lamp (ON)

8. Connect the load to the output terminal lugs, convenience receptacles, or cam-loks as shown in Figure 11. These load connection points can be found on the output terminal panel and the output terminal panel's hard wire hookup panel.

NOTICE

ALWAYS make sure that the connections to the UVWO terminals are **secure** and **tight**. The possibility exists of arcing that could cause a fire. Torque tie bolts to 554.9 lbf-in (62.7 N·m).

GENERATOR START-UP PROCEDURE (SINGLE UNIT)

9. Close all engine enclosure doors (Figure 42).

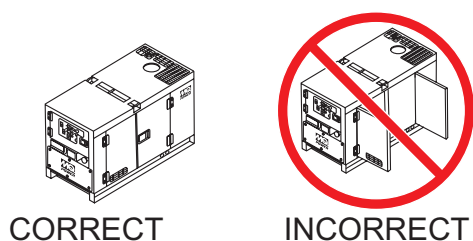


Figure 42. Engine Enclosure Doors

Application Selection (Single DG)

1. From the View Menu on the digital controller, press the **OK button** (Figure 43).

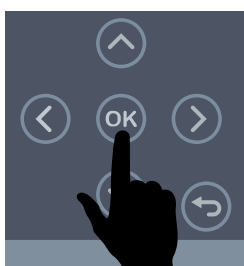


Figure 43. OK Button

2. Press the **Down Arrow button** (Figure 44) until **Parameters** is highlighted on the display screen, then press the OK button.



Figure 44. Select Parameters

3. Make sure **Basic Settings** is highlighted (Figure 45), then press the OK button.



Figure 45. Select Basic Settings

4. Make sure **Application Type** is highlighted (Figure 46), then press the OK button.

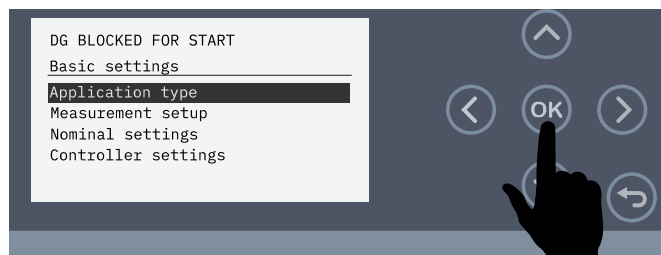


Figure 46. Select Application Type

5. Make sure **Standalone or PM** is highlighted (Figure 47), then press the OK button.

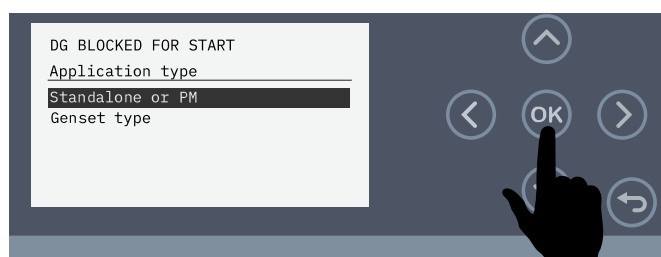


Figure 47. Select Standalone Or PM

6. Make sure **Application Select** is highlighted (Figure 48), then press the OK button.



Figure 48. Select Application Select

7. Make sure **Active Application 1** (Figure 49) is displayed.

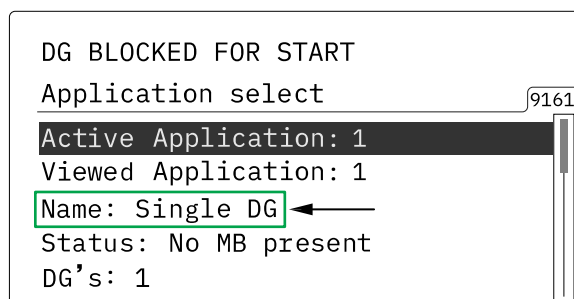


Figure 49. Active Application 1 (Single DG)

GENERATOR START-UP PROCEDURE (SINGLE UNIT)

- If Active Application 1 is displayed (Figure 49), skip steps 9–12 and continue to the next section, **Starting (Semi-Auto Mode)**. If a different application is displayed, press the OK button (Figure 50) and continue to the next step.

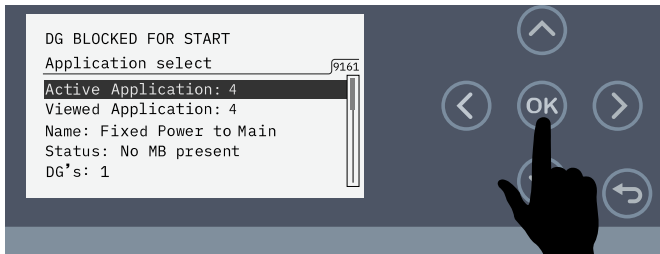


Figure 50. Select Active Application

- The master password is **2001**. Use the arrow buttons to enter the master password (Figure 51), then press the OK button.



Figure 51. Enter Master Password (2001)

- Make sure **Setpoint** is highlighted, then press the OK button.
- Use the Arrow buttons to select **Application 1**, then press the OK button.
- Confirm that **Name** is displayed as **Single DG** (Figure 49).

STARTING (SEMI-AUTO MODE)

While in Semi-Auto mode, the controller cannot automatically start, stop, connect, or disconnect the genset. Only the operator or an external signal (via the remote-start contacts) can start these sequences. The controller automatically synchronizes before closing the circuit breaker, and automatically de-loads before opening the circuit breaker.

- On the digital controller, press the **Semi-Auto Mode button** as shown in Figure 52. The **green LED** next to the button will turn on, and the status message **ISLAND SEMI** will appear on the screen (Figure 54).

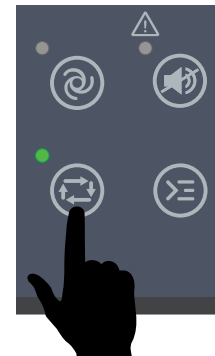


Figure 52. Semi-Auto Mode Button

- Press the **Start button** (Figure 53) on the digital controller to start the engine.

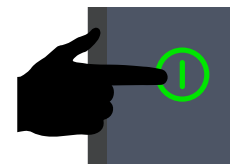


Figure 53. Start Button

NOTICE

After starting, the warmup period will start automatically. During the warmup period, the relay is operational and the battery voltage will fluctuate intermittently.

NOTICE

In cold weather conditions, the engine will pre-heat automatically and then start automatically when the pre-heating cycle has completed.

GENERATOR START-UP PROCEDURE (SINGLE UNIT)

NOTICE

When the **Idle Inhibit ON** shortcut has been activated, the engine will not undergo the standard idling warmup period upon start-up nor the standard cooling period upon shutdown. To find this shortcut, press the Shortcut Menu button and select General shortcuts.

- Listen for any abnormal noises. If any abnormalities exist, shut down the engine and correct the problem.
- After the warmup process has completed, engine speed will automatically switch to 1,800 rpm indicating the unit is ready for operation.
- The **Engine indicator** (Figure 54) and the **Generator indicator** on the digital controller should both be lit (**GREEN**). Verify the voltage (V) and frequency (Hz) values match the expected output.

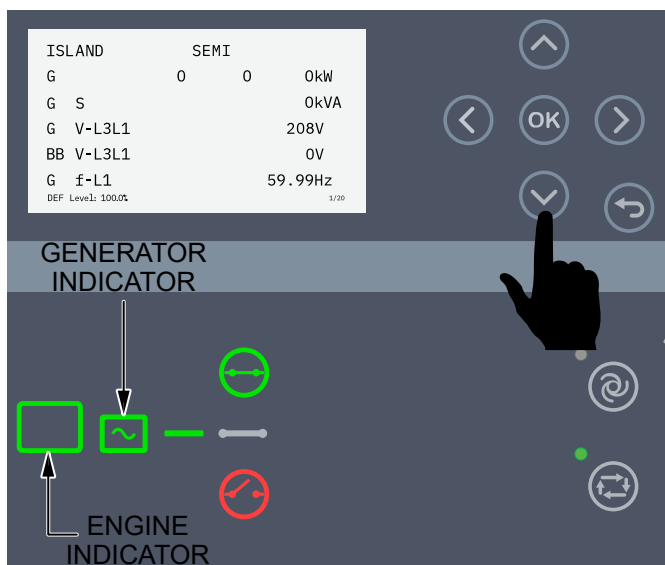


Figure 54. View Menu (Voltage And Frequency)

- Place the **main circuit breaker** in the **CLOSED (ON)** position. See Figure 55.

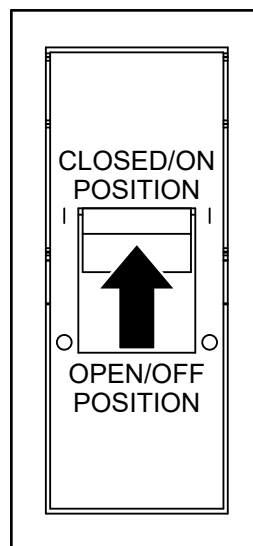


Figure 55. Main Circuit Breaker (Closed/ON)

- Press the **Close Contactor button** (Figure 56) on the digital controller.

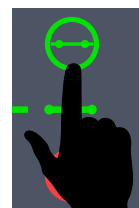


Figure 56. Close Contactor Button

- Verify that the **Contactor Closed lamp** (Figure 57) is **ON (GREEN)**. This indicates that the contactor contacts are closed and power has been sent to the output terminals.

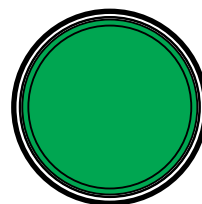


Figure 57. Contactor Closed Lamp (ON/GREEN)

GENERATOR START-UP PROCEDURE (SINGLE UNIT)

9. Place the **GFCI and auxiliary circuit breakers** (Figure 58) in the **ON** position to send power to the GFCI (120V) and auxiliary (dual-voltage) receptacles.

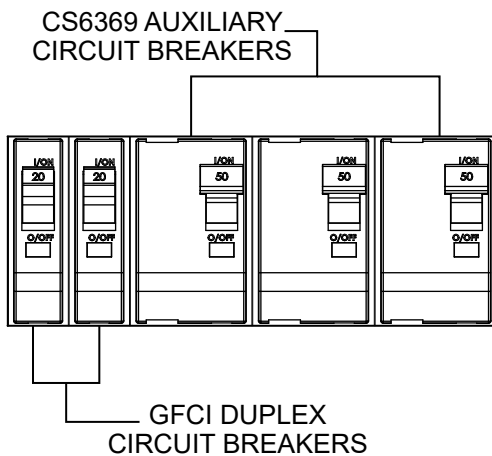


Figure 58. GFCI And Auxiliary Circuit Breakers (ON)

10. Press the **Down Arrow button** (Figure 59) to navigate to the View menu page that displays **current (A)** and verify it reads the anticipated amount of current with respect to the load. The current readings will indicate zero amps until a load is applied.

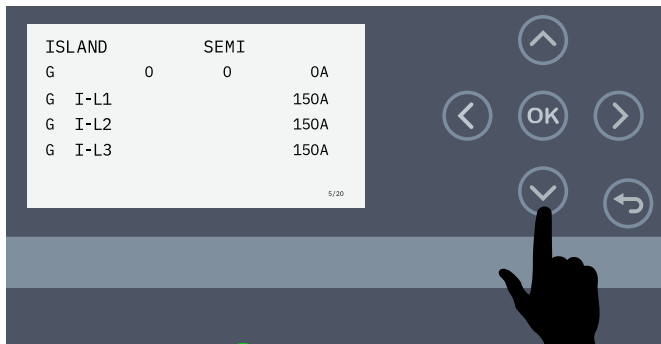


Figure 59. View Menu (Current)

11. To view engine operating parameters, press the **Up Arrow button** (Figure 60) to navigate to the **Engine Status screen** which displays engine speed, coolant temperature, engine oil pressure, and diesel exhaust fluid (DEF) level.

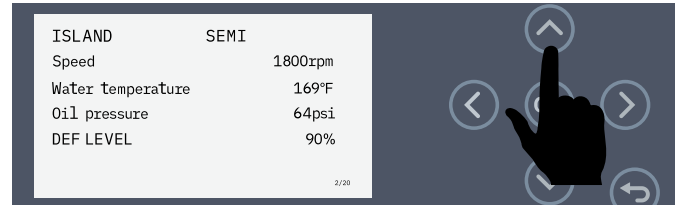


Figure 60. Engine Status Screen

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

GENERATOR START-UP PROCEDURE (SINGLE UNIT)

STARTING (AUTO MODE)

While in Auto mode, the controller automatically starts and stops (and connects and disconnects) the genset. The operator cannot start a sequence manually.

WARNING

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

NOTICE

When the generator is placed in Auto mode, the engine glow plugs will be warmed if necessary and the engine will start automatically.

NOTICE

The main circuit breaker must be in the **CLOSED (ON)** position to start.

1. Place the **main circuit breaker** in the **CLOSED (ON)** position. See Figure 55.
2. Press the **Auto Mode button** (Figure 61) on the digital controller.

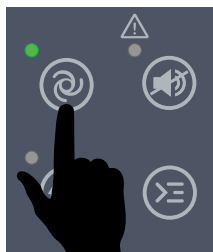


Figure 61. Auto Mode Button

3. Once the start signal is received (the remote-start contacts are closed), the pre-heating process will begin. When the pre-heating process has completed, the engine will start automatically and accelerate to rated speed.
4. When voltage and frequency match the expected output, the main circuit breaker contacts will close automatically and send power to the load.
5. Upon removal of the start signal (the remote-start contacts are opened), the main circuit breaker contacts will open automatically and disconnect from the load.

6. Once the main circuit breaker contacts are open, the engine will shut down after a 60-second cool-down period. The control system will remain in Auto mode and continue monitoring the remote-start contacts.

GENERATOR SHUTDOWN PROCEDURE (SINGLE UNIT)

NORMAL SHUTDOWN PROCEDURE

WARNING

NEVER stop the engine suddenly except in an emergency.

1. Place the load's ON/OFF switch in the **OFF** position.
2. Press the **Open Contactor button** (Figure 62) on the digital controller to open the contactor contacts.

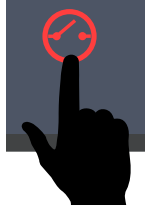


Figure 62. Open Contactor Button

3. Verify that the **Contactor Open lamp** (Figure 63) is **ON (RED)**. This indicates that the contactor contacts are open.

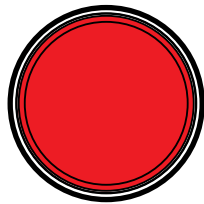


Figure 63. Contactor Open Lamp (ON/RED)

4. Place the **GFCI and auxiliary circuit breakers** (Figure 64) in the **OFF** position.

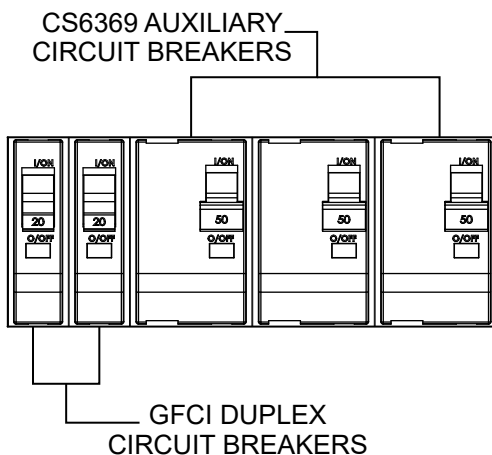


Figure 64. GFCI and Auxiliary Circuit Breakers (OFF)

5. Place the **main circuit breaker** in the **OPEN (OFF)** position. See Figure 65.

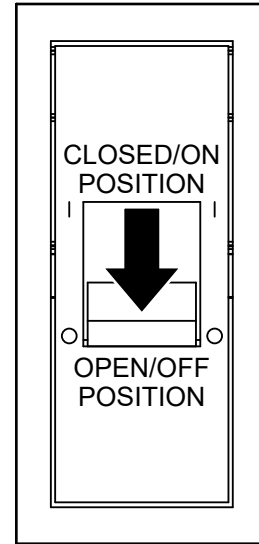


Figure 65. Main Circuit Breaker (Open/OFF)

6. Press the **Stop button** (Figure 66) on the digital controller. The engine will shut down after a 60-second cool-down period.

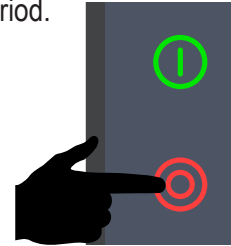


Figure 66. Stop Button

7. Place the **Control Power switch** (Figure 67) in the **OFF (down)** position.



Figure 67. Control Power Switch (OFF)

8. Place the **Battery switch** (Figure 68) in the **OFF** position.

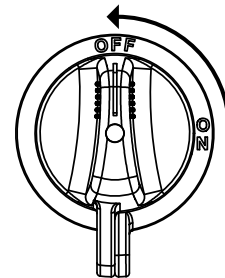


Figure 68. Battery Switch (OFF)

GENERATOR SHUTDOWN PROCEDURE (SINGLE UNIT)

EMERGENCY SHUTDOWN PROCEDURE

NOTICE

The Emergency Stop switch should only be used to stop the engine in case of an emergency or to lock out operation during service. **NEVER** use the Emergency Stop switch for routine stopping of the engine.

To stop the engine in the event of an emergency:

1. Press the **Emergency Stop switch** (Figure 69), located on the side of the generator next to the output terminal panel.

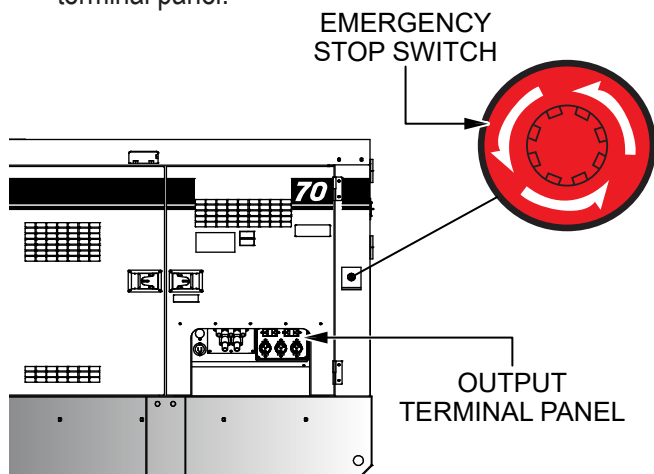


Figure 69. Emergency Stop Switch

2. After the engine has completely stopped, place the **Control Power switch** in the **OFF** position (Figure 67).
3. Place **all circuit breakers** in the **OFF** position.
4. Place the Control Power switch in the **OFF** position.
5. The Emergency Stop switch is a push-locked type switch. The switch contact can only be released by rotating the button in the clockwise direction. The engine cannot be restarted until the contact is released (closed) and all alarms have been cleared from the list on the touch display.

AUTOMATIC SHUTDOWN SYSTEM

This generator is equipped with engine protection devices that will automatically shut down the engine and provide a warning to the operator when a fault occurs. Refer to the **Troubleshooting (Faults)** section of this manual for more information. Table 19 and Table 20 contain lists of engine and exhaust after-treatment system fault codes. If necessary, contact MQ Power for additional technical support.

NOTICE

Before inspecting the cause of an engine shutdown, make sure the STOP button on the touch display has been activated (the main circuit breaker contacts are open). Also, place all circuit breakers in the **OFF** position.

NOTICE

Although the unit is equipped with engine protection devices, regularly scheduled preventive maintenance is strongly advised. Refer to Table 14.

GENERATOR START-UP PROCEDURE (PARALLEL OPERATION)

NOTICE

To ensure stable operation of multiple generator units connected in parallel and working as one unit, it is necessary to maintain equal voltage, frequency, and engine governor characteristics between them.

For this reason, it is necessary to perform parallel operation using generator units with identical alternator pitch and brand-compatible controllers. **Therefore, using multiple units of the same model generator for paralleling is recommended.**

COMMUNICATION AND POWER CONNECTIONS (TWO GENERATORS)

1. Make sure the spacing between each generator does not exceed **25 feet (7.62 m)**. See Figure 70.
2. **On generator #1**, connect the male end of the 25-foot (7.62-meter) communication cable to the female parallel operation receptacle labeled **CN32** (Figure 70).
3. **On generator #2**, connect the female end of the communication cable to the male parallel operation receptacle labeled **CN31** (Figure 70).
4. Place the **Parallel Signal switch** on each generator in the **END** (up) position (Figure 70).
5. Connect the output terminals on each paralleled unit in accordance with local state/county and National Electrical Code requirements.
6. To prevent arcing, make sure all wires are securely connected. In addition, make sure the phasing is correct. All wires should be matched with the letters (U, V, W, O) engraved on the output terminal panel of each unit.
7. Make sure the load's ON/OFF switch is in the **OFF** position.



WARNING



ALWAYS connect the output terminals to the load **before** starting up the generators. Making power connections while the generators are running can lead to shock/electrocution, causing **severe personal injury or even death!**

COMMUNICATION AND POWER CONNECTIONS (THREE OR MORE GENERATORS)

NOTICE

A maximum of 32 generators can be operated in parallel. The total length of all communication cables used must be less than 328 feet (100 meters).

1. Make sure the spacing between each generator does not exceed **25 feet (7.62 m)**. See Figure 71.
2. **On generator #1**, connect the male end of a 25-foot (7.62-meter) communication cable to the female parallel operation receptacle labeled **CN32** (Figure 71).
3. **On generator #2**, connect the female end of the communication cable to the male parallel operation receptacle labeled **CN31** (Figure 71).
4. **On generator #2**, connect the male end of another 25-foot (7.62-meter) communication cable to the female parallel operation receptacle labeled **CN32** (Figure 71).
5. **On generator #3**, connect the female end of the communication cable to the male parallel operation receptacle labeled **CN31** (Figure 71).
6. Connect any remaining generators to the system using additional communication cables as shown in Figure 71.
7. **On generator #1**, place the **Parallel Signal switch** in the **END** (up) position (Figure 71).
8. **On the last generator in the system**, place the **Parallel Signal switch** in the **END** position (Figure 71).
9. **On each generator located in between the first and last generators**, place the **Parallel Signal switch** in the **MIDDLE** (down) position (Figure 71).
10. Connect the output terminals on each paralleled unit in accordance with local state/county and National Electrical Code requirements.
11. Make sure all wires are securely connected. In addition, make sure the phasing is correct. All wires should be matched with the letters (U, V, W, O) engraved on the output terminal panel of each unit.
12. Make sure the load's ON/OFF switch is in the **OFF** position.

GENERATOR START-UP PROCEDURE (PARALLEL OPERATION)

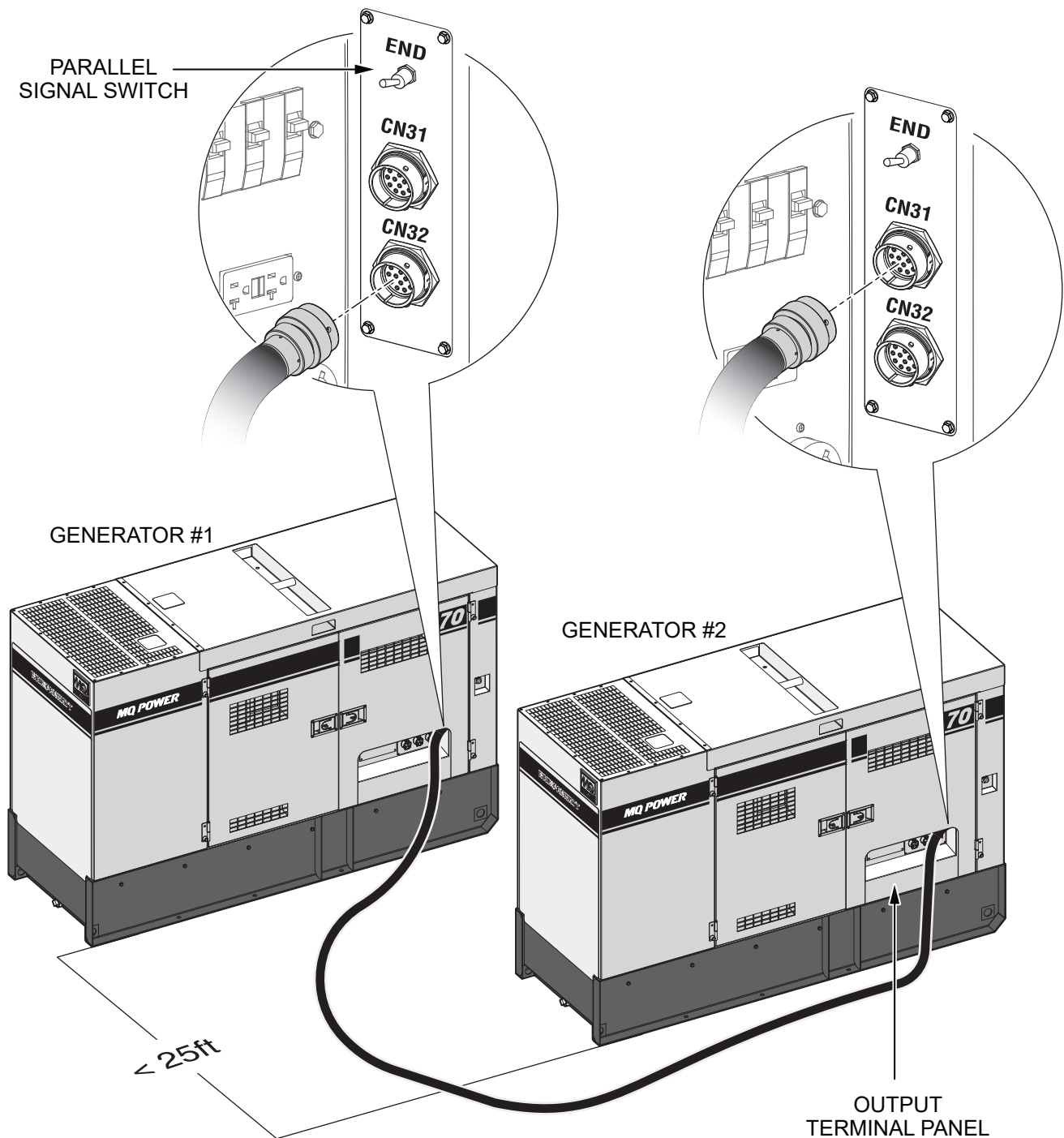


Figure 70. Communication Cable Connections (Two Generators)

GENERATOR START-UP PROCEDURE (PARALLEL OPERATION)

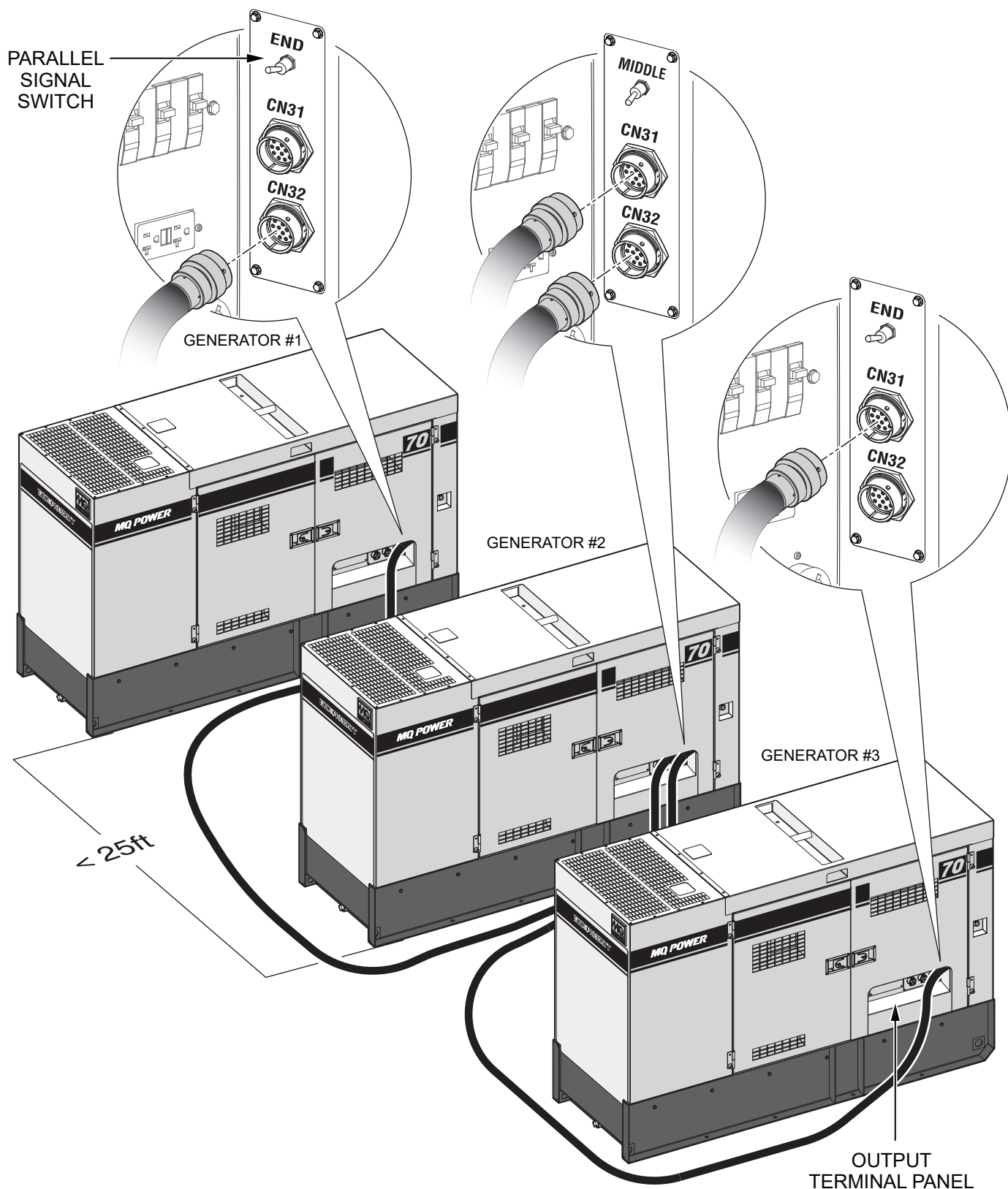


Figure 71. Communication Cable Connections (Three Or More Generators)

GENERATOR START-UP PROCEDURE (PARALLEL OPERATION)

BEFORE STARTING

WARNING



ALWAYS connect the output terminals to the load **before** starting up the generators. Making power connections while the generators are running can lead to shock/electrocution, causing **severe personal injury or even death!**

NOTICE

If the preset voltage (set using the voltage selector switches) is different between the paralleled units, the main circuit breakers **will not turn on**.

On each generator, perform steps 1–9 under **Before Starting** in the **Generator Start-Up Procedure (Single Unit)** section of this manual.

APPLICATION SELECTION (50/50 LOADSHARE)

Perform the following steps when paralleling **only** two units. If paralleling more than two units, skip ahead to the **Application Selection (3 or More Units)** section.

Perform the following procedure on both generators:

1. From the View Menu on the digital controller, press the **OK button** (Figure 72).

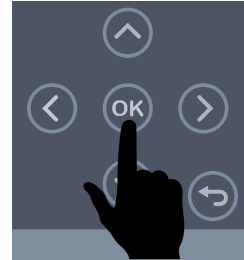


Figure 72. OK Button

2. Press the **Down Arrow button** (Figure 73) until **Parameters** is highlighted on the display screen, then press the OK button.



Figure 73. Select Parameters

3. Make sure **Basic Settings** is highlighted (Figure 74), then press the OK button.



Figure 74. Select Basic Settings

GENERATOR START-UP PROCEDURE (PARALLEL OPERATION)

4. Make sure **Application Type** is highlighted (Figure 75), then press the OK button.

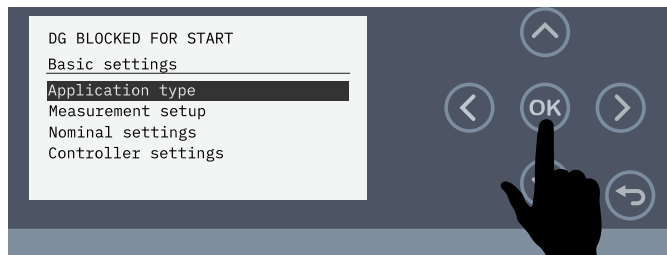


Figure 75. Select Application Type

5. Make sure **Standalone or PM** is highlighted (Figure 76), then press the OK button.

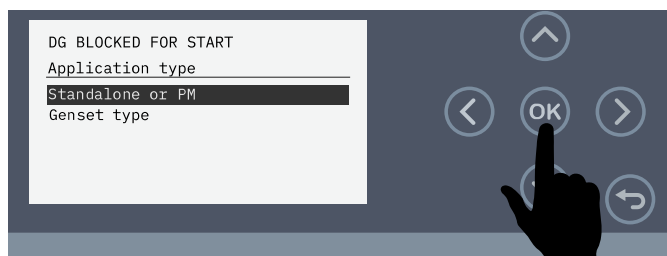


Figure 76. Select Standalone Or PM

6. Make sure **Application Select** is highlighted (Figure 77), then press the OK button.

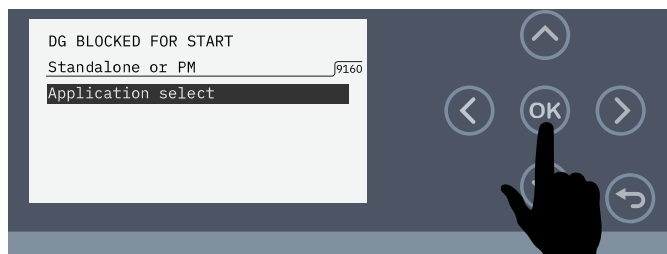


Figure 77. Select Application Select

7. Make sure **Active Application** is highlighted (Figure 78), then press the OK button.

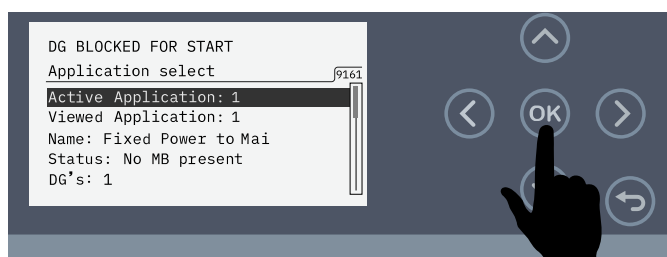


Figure 78. Select Active Application

8. The master password is **2001**. Use the arrow buttons to enter the master password (Figure 79), then press the OK button.

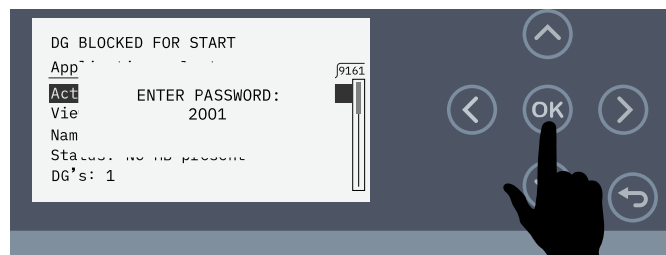


Figure 79. Enter Master Password (2001)

9. Make sure **Setpoint** is highlighted, then press the OK button.
10. Press the Up Arrow button to select **Application 2**, then press the OK button.
11. Verify that **Name** is displayed as **50/50 Loadshare** (Figure 80).

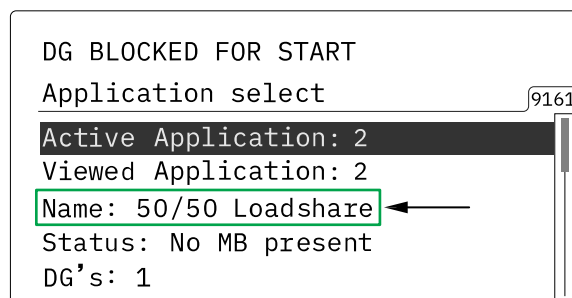


Figure 80. 50/50 Loadshare

GENERATOR START-UP PROCEDURE (PARALLEL OPERATION)

To verify Power Management is active:

1. From the View Menu on the digital controller, press the **OK button** (Figure 72).
2. Press the **Down Arrow button** (Figure 73) until **Parameters** is highlighted, then press the OK button.
3. Make sure **Basic Settings** is highlighted (Figure 74), then press the OK button.
4. Press the **Down Arrow button** (Figure 81) until **Genset Type** is highlighted, then press the OK button.

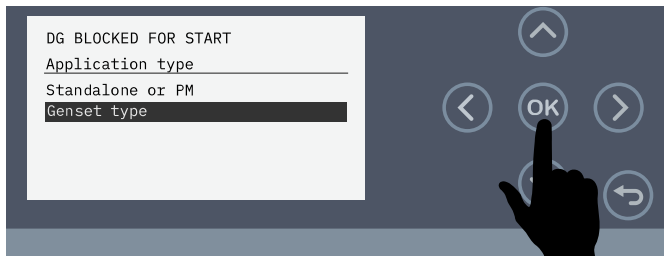


Figure 81. Select Genset Type

5. Make sure **Plant Mode** is highlighted (Figure 82), then press the OK button.

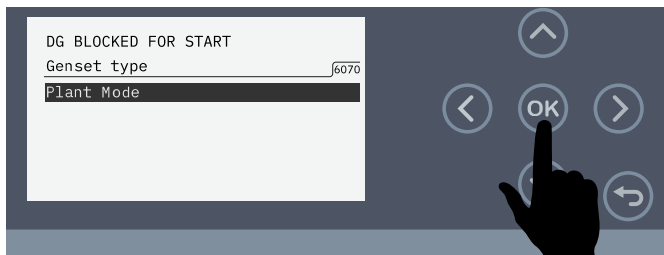


Figure 82. Select Plant Mode

6. Make sure **Power Management** is shown on the display screen (Figure 83).

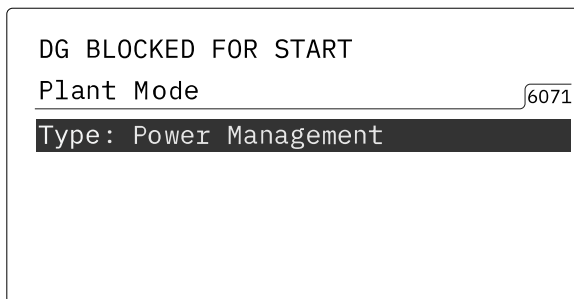


Figure 83. Power Management

APPLICATION SELECTION (3 OR MORE GENERATORS)

Perform the following steps when paralleling *more than two* units. If paralleling only two units and the 50/50 Loadshare application has already been selected, skip ahead to the **Setting Internal Communication IDs** section.

Perform the following procedure on each generator:

1. From the View Menu on the digital controller, press the **OK button** (Figure 84) on the digital controller.

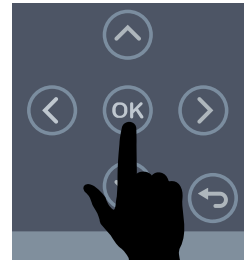


Figure 84. OK Button

2. Press the **Down Arrow button** (Figure 85) until **Parameters** is highlighted on the display screen, then press the OK button.

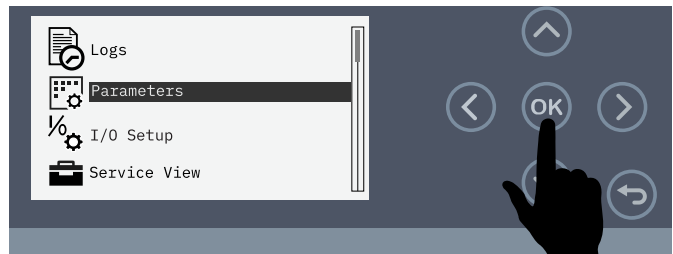


Figure 85. Select Parameters

3. Make sure **Basic Settings** is highlighted (Figure 86), then press the OK button.



Figure 86. Select Basic Settings

GENERATOR START-UP PROCEDURE (PARALLEL OPERATION)

4. Make sure **Application Type** is highlighted (Figure 87), then press the OK button.

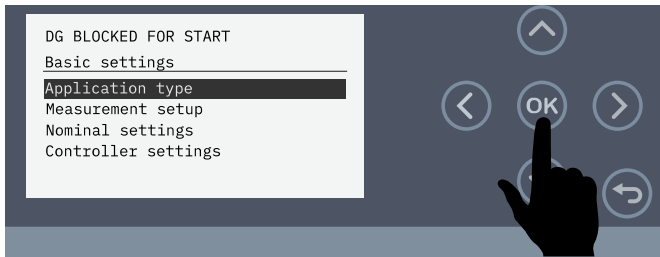


Figure 87. Select Application Type

5. Make sure **Standalone or PM** is highlighted (Figure 88), then press the OK button.

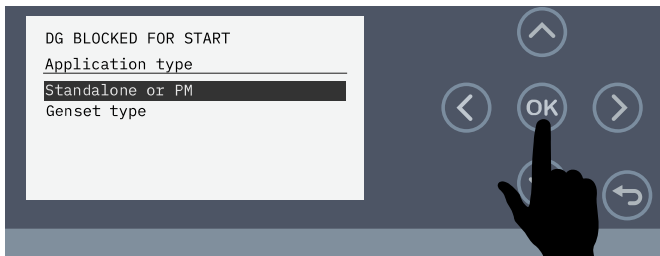


Figure 88. Select Standalone Or PM

6. Make sure **Application Select** is highlighted (Figure 89), then press the OK button.

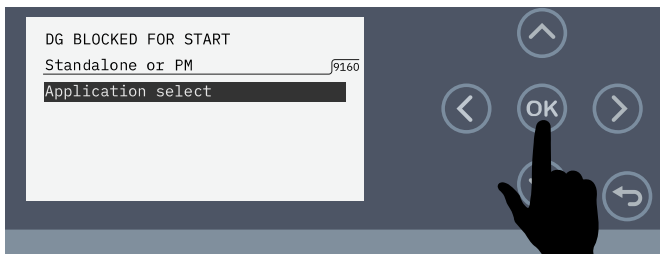


Figure 89. Select Application Select

7. Make sure **Active Application** is highlighted (Figure 90), then press the OK button.



Figure 90. Select Active Application

8. The master password is **2001**. Use the arrow buttons to enter the master password (Figure 91), then press the OK button.

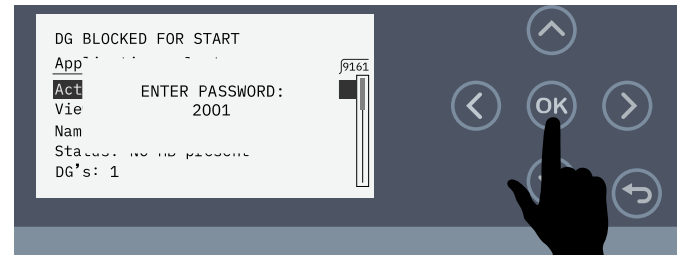


Figure 91. Enter Master Password (2001)

9. Make sure **Setpoint** is highlighted, then press the OK button.
10. Press the Up Arrow button to select **Application 3**, then press the OK button.
11. Verify that **Name** is displayed as **3 or More Generators** (Figure 92).

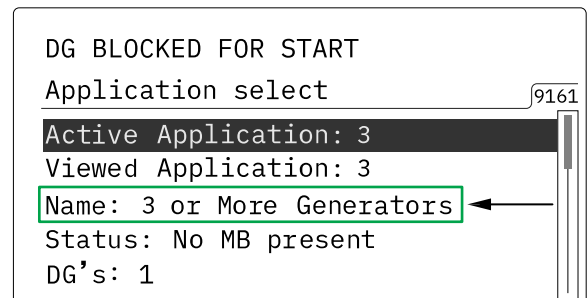


Figure 92. 3 Or More Generators

GENERATOR START-UP PROCEDURE (PARALLEL OPERATION)

SETTING INTERNAL COMMUNICATION IDs

Once the appropriate application has been selected, an internal communication ID must be applied to each unit.

Perform the following procedure on each generator:

1. From the View Menu on the digital controller, press the **OK button** (Figure 72).
2. Press the **Down Arrow button** (Figure 73) until **Parameters** is highlighted, then press the OK button.
3. Press the Down Arrow button until **Communication** (Figure 93) is highlighted, then press the OK button.



Figure 93. Select Communication

4. Make sure **Power Management ID** is highlighted (Figure 94), then press the OK button.



Figure 94. Select Power Management ID

5. Make sure **Int. Comm. ID** is highlighted (Figure 95), then press the OK button.

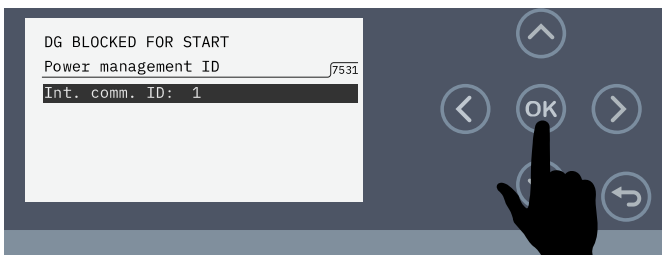


Figure 95. Select Int. Comm. ID

6. The master password is **2001**. Use the arrow buttons to enter the master password (Figure 96), then press the OK button.

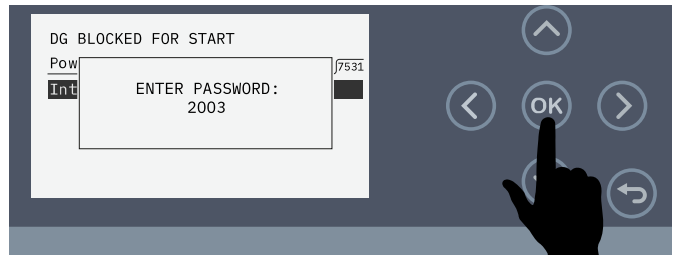


Figure 96. Enter Master Password (2001)

7. Press the Up Arrow or Down Arrow button to change the Internal Communication ID to the desired value.

NOTICE

The **Internal Communication ID value** is unique for each generator. A different numerical value must be assigned to each generator. Enter a value of **1** on generator #1 and a value of **2** on generator #2, etc.

8. Once the desired Internal Communication ID value has been selected, press the OK button to save.

GENERATOR START-UP PROCEDURE (PARALLEL OPERATION)

STARTING (SEMI-AUTO MODE)

While in Semi-Auto mode, engine starting and contactor switching must be performed manually. Synchronization and load distribution will be performed automatically.

NOTICE

When multiple generators are connected in parallel to act as a single unit, it is important that the voltage and phasing of each generator be synchronized.

NOTICE

DO NOT try to run parallel units in Manual mode.

1. On the digital controller, press the **Semi-Auto Mode button** as shown in Figure 97. The **green LED** next to the button will light up, and the status message **ISLAND SEMI** will appear on the screen (Figure 54).

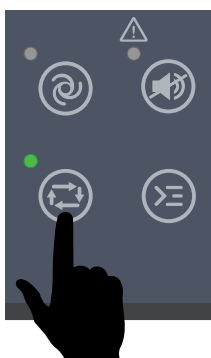


Figure 97. Semi-Auto Mode Button

2. Place the **main circuit breaker** in the **CLOSED (ON)** position. See Figure 98.

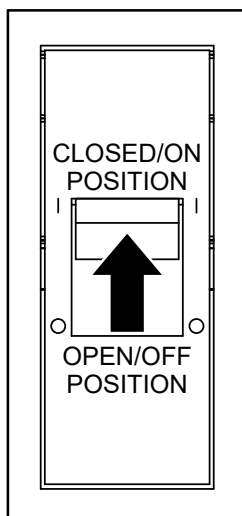


Figure 98. Main Circuit Breaker (Closed/ON)

NOTICE

The main circuit breaker must be in the **CLOSED (ON)** position to start.

3. Press the **Start button** (Figure 99) on the digital controller to start the engine.

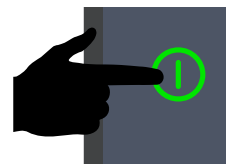


Figure 99. Start Button

NOTICE

In cold weather conditions, the engine will pre-heat automatically and then start automatically when the pre-heating cycle has completed.

4. Listen for any abnormal noises. If any abnormalities exist, shut down the engine and correct the problem.
5. The **Engine indicator** (Figure 100) and the **Generator indicator** on the digital controller should both be lit (**GREEN**). Verify the voltage (V) and frequency (Hz) values match the expected output.

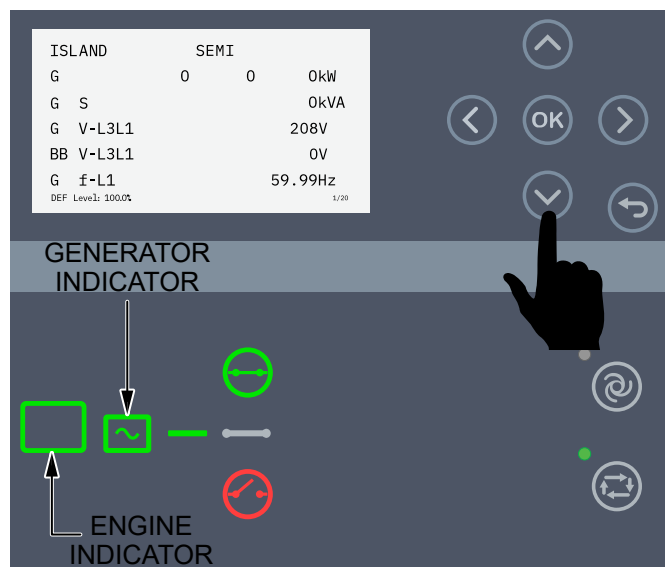


Figure 100. View Menu (Voltage And Frequency)

GENERATOR START-UP PROCEDURE (PARALLEL OPERATION)

6. Press the **Close Contactor** button (Figure 101) on the digital controller.



Figure 101. Close Contactor Button

7. The green **Breaker indicator** (Figure 102) will **flash** while the controller is **synchronizing**. When the icon stops flashing and remains **lit (GREEN)**, it indicates **the contactor contacts are closed** and power has been sent to the load.



Figure 102. Breaker Indicator

NOTICE

The controller automatically synchronizes before closing the contactor, and automatically deloads before opening the contactor.

8. Perform steps 1–6 **on each remaining generator** in the system.

STARTING (AUTO MODE)

While in Auto mode, the controllers automatically start, stop, connect, and disconnect the gensets. The operator cannot start a sequence manually.

WARNING

When running a generator in **Auto mode**, remember that the generator can start up at any time without warning. **NEVER** attempt to perform any maintenance while a generator is in **Auto mode**.

NOTICE

When a generator is placed in **Auto mode**, the engine glow plugs will be warmed if necessary and the engine will start automatically.

NOTICE

DO NOT try to run parallel units in Manual mode.

NOTICE

The main circuit breaker must be in the **CLOSED (ON)** position to start.

1. Place the **main circuit breaker** in the **CLOSED (ON)** position. See Figure 98.
2. Press the **Auto Mode** button (Figure 103) on the digital controller. The **green LED** next to the button will light up, and the status message **ISLAND AUTO** will appear on the screen.

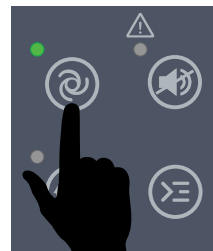


Figure 103. Auto Mode Button

GENERATOR START-UP PROCEDURE (PARALLEL OPERATION)

3. The paralleled system will now start up or shut down connected generators as needed, utilizing a 90/40 threshold scheme: Once the load has reached 90% of the total combined capacity of all active units, another generator will be brought online automatically. Once the load has dropped to below 40% of the total combined capacity of all active units, one of the units will shut down automatically.
4. The engines may also be started by closing the remote-start contacts on all units, beginning with generator #1 and moving down the chain. Once the start signals are received (the remote-start contacts are closed), the engine pre-heating process will begin.
5. When the engine pre-heating process has completed, the engines will start automatically and accelerate to rated speed.
6. When voltage and frequency match the expected output, the main circuit breaker contacts will close automatically and send power to the load.
7. Upon removal of the start signals (the remote-start contacts are opened), the main circuit breaker contacts will open automatically and disconnect from the load.
8. Once the main circuit breaker contacts are open, the engines will shut down after a 30-second cool-down period. The control system will remain in **Auto mode** and continue monitoring the remote-start contacts.

GENERATOR START-UP PROCEDURE (PARALLEL OPERATION)

PARALLEL OPERATION (SINGLE GENERATOR IN PARALLEL WITH TRANSFER SWITCH)

Perform the following procedures to operate one unit in parallel with a transfer switch (automatic or manual).

Communication And Power Connections

ALWAYS consult with the local Authority Having Jurisdiction (AHJ) before attempting to connect the generator to a transfer switch.

NOTICE

ALWAYS check state, province, district, and municipality electrical requirements before connecting a generator to a transfer switch.



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 connecting the generator to an 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.



WARNING

Incorrect electrical connections could cause severe damage to equipment and **serious injury or death** to personnel.

Before Starting

Perform steps 1–9 under **Before Starting** in the **Generator Start-Up Procedure (Single Unit)** section of this manual.

Application Selection

1. From the View Menu on the digital controller, press the **OK button** (Figure 104) on the digital controller.

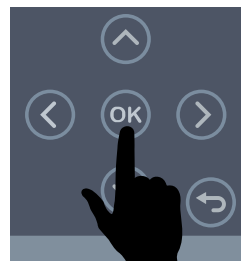


Figure 104. OK Button

2. Press the **Down Arrow button** (Figure 105) until **Parameters** is highlighted on the display screen, then press the OK button.

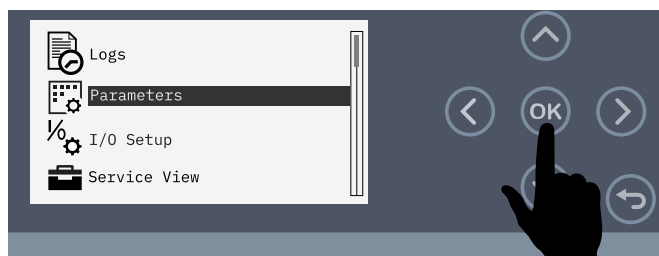


Figure 105. Select Parameters

3. Make sure **Basic Settings** is highlighted (Figure 106), then press the OK button.



Figure 106. Select Basic Settings

GENERATOR START-UP PROCEDURE (PARALLEL OPERATION)

4. Make sure **Application Type** is highlighted (Figure 107), then press the OK button.

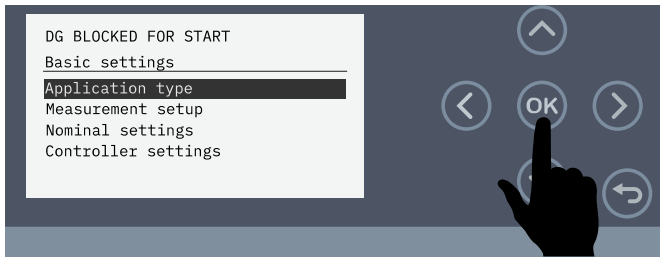


Figure 107. Select Application Type

5. Make sure **Standalone or PM** is highlighted (Figure 108), then press the OK button.

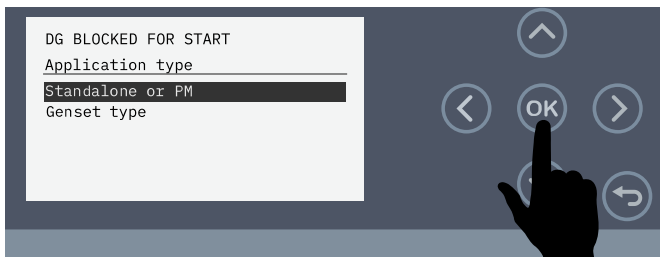


Figure 108. Select Standalone Or PM

6. Make sure **Application Select** is highlighted (Figure 109), then press the OK button.

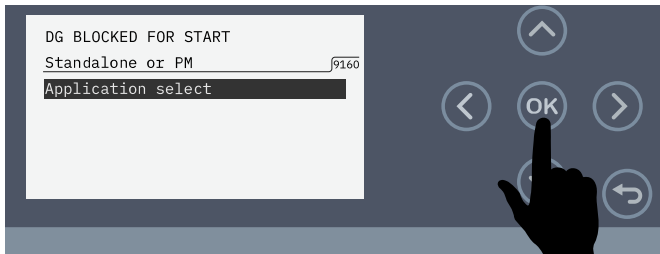


Figure 109. Select Application Select

7. Make sure **Active Application** is highlighted (Figure 110), then press the OK button.



Figure 110. Select Active Application

8. The master password is **2001**. Use the arrow buttons to enter the master password (Figure 111), then press the OK button.



Figure 111. Enter Master Password (2001)

9. Make sure **Setpoint** is highlighted, then press the OK button.
10. Press the Up Arrow button to select **Application 4**, then press the OK button.
11. Verify that **Name** is displayed as **Fix Power to Main** (Figure 112).

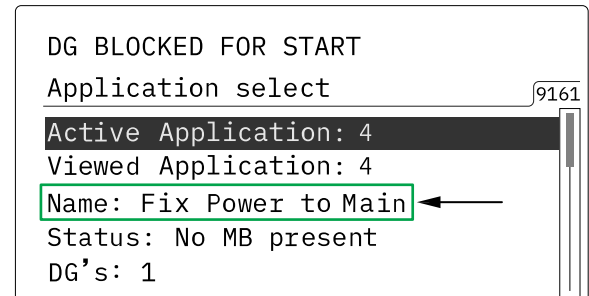


Figure 112. Fix Power To Main

GENERATOR START-UP PROCEDURE (PARALLEL OPERATION)

Starting (Single Generator In Parallel With Transfer Switch)

NOTICE

When the generator is placed in **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 **Auto mode**, remember that the generator can start up at any time without warning. **NEVER** attempt to perform any maintenance while the generator is in **Auto mode**.

NOTICE

When the generator is placed in **Auto mode**, the engine glow plugs will be warmed if necessary and the engine will start automatically.

NOTICE

While operating in **Auto mode**, should a power outage occur while connected to an **automatic transfer switch (ATS)**, the ATS will start the generator automatically via the generator's auto-start contacts connected to the ATS's start contacts. Please refer to your ATS installation manual for instructions on the correct installation of the auto-start contacts of the generator to the ATS.

NOTICE

While operating in **Auto mode**, should a power outage occur while connected to a **manual transfer switch (MTS)**, the MTS **will not start the generator automatically**. The generator will only start once the MTS has been closed manually. Please refer to your MTS installation manual for instructions on the correct installation of the auto-start contacts of the generator to the MTS.

1. Place the **main circuit breaker** in the **CLOSED (ON)** position. See Figure 113.

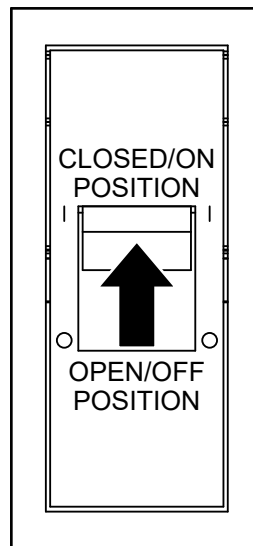


Figure 113. Main Circuit Breaker (Closed/ON)

NOTICE

The main circuit breaker must be in the **CLOSED (ON)** position to start.

2. Press the **Auto Mode button** (Figure 114) on the digital controller. The **green LED** next to the button will light up, and the status message **ISLAND AUTO** will appear on the screen.

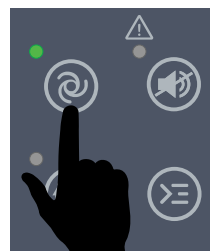


Figure 114. Auto Mode Button

GENERATOR START-UP PROCEDURE (PARALLEL OPERATION)

- When the generator is connected to a building's AC power source via an **automatic** transfer switch (ATS), and the building's power has been interrupted (power outage), the ATS will start the generator automatically via the generator's auto-start contacts connected to the ATS's start contacts (Figure 115). If the generator is connected via a **manual** transfer switch (MTS), close the switch manually to start the generator.

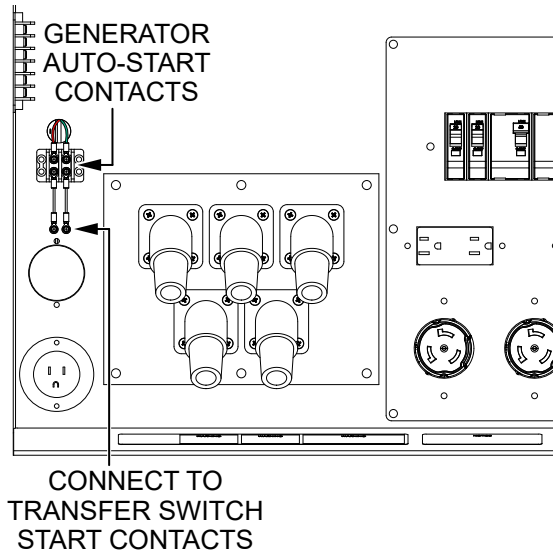


Figure 115. Auto-Start Contacts

- Once the generator receives the start signal from the transfer switch (automatic or manual), the engine will start and accelerate to rated speed.
- When voltage and frequency match the expected output, the main circuit breaker contacts will close automatically and send power to the load.
- Upon removal of the start signal (from the transfer switch), the main circuit breaker contacts will open automatically and disconnect from the load.
- Once the main circuit breaker contacts are open, the engine will shut down. The control system will remain in **Auto mode** and continue monitoring the auto-start contacts.

GENERATOR SHUTDOWN PROCEDURE (PARALLEL OPERATION)

SHUTDOWN PROCEDURE (PARALLEL OPERATION)

WARNING

NEVER stop the engine suddenly except in an emergency.

1. Place the load's ON/OFF switch in the **OFF** position.
2. **On generator #1**, place the **GFCI and auxiliary circuit breakers** in the **OFF** position.
3. **On generator #1**, press the **Open Contactor button** (Figure 116) on the digital controller to open the contactor contacts.



Figure 116. Open Contactor Button

4. **On generator #1**, place the **main circuit breaker** in the **OPEN (OFF)** position. See Figure 117.

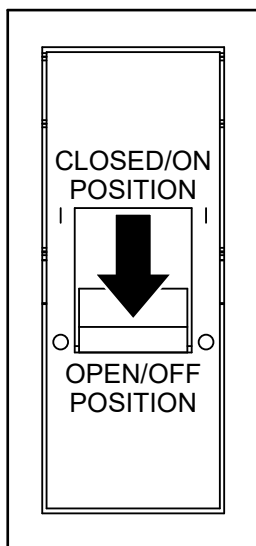


Figure 117. Main Circuit Breaker (Open/OFF)

5. **On generator #1**, verify that the **Contactor Open lamp** (Figure 118) is illuminated (**RED**). This indicates that the contactor contacts are open.

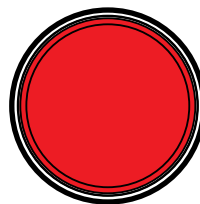


Figure 118. Contactor Open Lamp (ON/RED)

6. Repeat steps 2–5 on **each generator** in the system.
7. **On generator #1**, press the **Stop button** (Figure 119) on the touch display. The engine will shut down after a 30-second cool-down period.

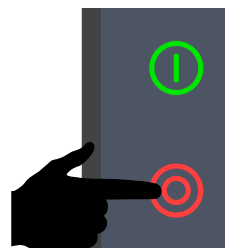


Figure 119. Stop Button

8. Repeat step 7 on **each generator** in the system.

NOTICE

Be sure to remove all generator communication cables when not performing parallel operation.

Table 14. Inspection/Maintenance		Daily	Every 250 Hours	Every 500 Hours	Every 1,000 Hours	Other
Engine	Check Engine Oil and Coolant Levels	X				
	Check Fuel Filter / Water Bowl	X				
	Check Battery Fluid Level	X				
	Check Air Cleaner	X				
	Check for Leaks	X				
	Visual Walk-Around Inspection	X				
	Clean Air Cleaner Element		X			
	Replace Engine Oil and Oil Filter* ¹		(X)	X		
	Replace Fuel Filter Elements		(X)	X		
	Check Fan Belt Condition	X		X		
	Check Electrical Ground Connection			X		
	Clean Radiator and Check Cooling System			X		
	Check and Adjust Engine Valve Clearance				X	
	Clean Inside Fuel Tank				X	
	Check All Hoses and Clamps				X	
	Check Engine Mounts				X	
	Replace Air Cleaner Elements* ²				X	
	Replace DEF Filter (in Supply Module)					3,000 hours
	Check SCR System* ³					4,500 hours
	Inspect Dosing Module (SCR System)* ³					4,500 hours
	Flush and Refill Cooling System* ⁴					1 year or 2,000 hours
Generator	Measure Insulation Resistance Over 3M Ohms		X			
	Check Rotor Rear Support Bearing			X		
Complete Machine	Inspect Acoustic Insulation			X		

*¹ During the initial operation of a new engine, change oil and filter between a minimum of 100 hours and a maximum of 250 hours. Service interval depends on oil type.

*² Replace air cleaner element when restriction indicator shows a vacuum of 635 mm (25 in. H₂O).

*³ Perform inspection and maintenance of DEF in the SCR system every 4,500 hours. The system does not need to be replaced/exchanged if no problem is detected. **DO NOT** make any modification or changes, nor remove the emission control system's related parts. Please contact your nearest dealer or the Multiquip Service Department for SCR maintenance.

*⁴ Use fully formulated antifreeze/coolant.

*⁵ Make sure to disconnect the O – Ground line and the connector on terminal 62–69 of the AGC150 before performing the measurement. Refer to the **Generator Wiring Diagram**.

GENERAL INSPECTION

Prior to each use, the 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 14 as a general maintenance guideline. For more detailed engine maintenance instructions, refer to the engine owner's manual.

ENGINE AIR CLEANER

This Isuzu diesel engine is equipped with a replaceable, high-density, paper air cleaner element (Figure 120). The air cleaner is also equipped with an inner (secondary) element that is used as a backup filter should the primary element become damaged. Check the air cleaner daily or before starting the engine. Replace the air cleaner as needed.

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 the air cleaner more frequently if these conditions exist.

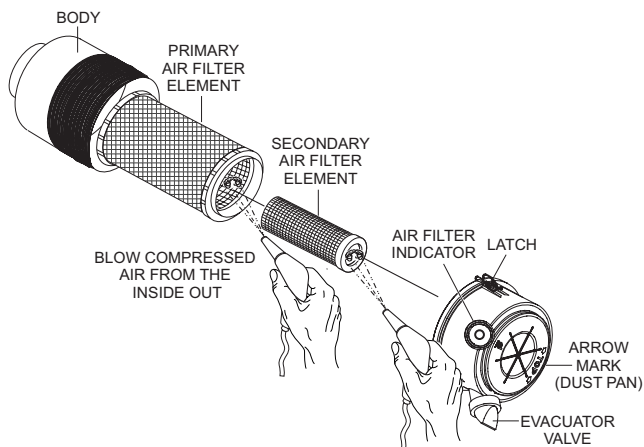


Figure 120. Engine Air Cleaner

Primary And Secondary Air Cleaner Elements

Every 250 hours: Remove the air cleaner elements and clean them with a light spray of compressed air.

CAUTION



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

1. Release the latches that secure the cover to the air cleaner body (Figure 120).
2. Remove the air cleaner cover (Figure 120) and set it aside.
3. Remove both the primary and secondary air cleaner elements (Figure 120).
4. 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.

5. To clean the primary element (paper air filter) as shown in Figure 120, 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/cm²), through the filter element from the inside out.
6. Clean the secondary element (paper air filter) as described in step 5.
7. Replace both elements if they are damaged or excessively dirty.
8. Clean the inside of the air cleaner body (Figure 120).
9. Reinstall the primary and secondary air filter elements back into the air cleaner body.
10. Reinstall the air cleaner cover and secure with latches.

NOTICE

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

Air Cleaner Restriction Indicator

The air cleaner is equipped with a **restriction indicator** (Figure 121). As the air cleaner element becomes clogged, air intake restriction increases and the indicator signal shows **RED**, indicating that the element needs to be replaced. After replacing the air cleaner element, press the restriction indicator button to reset the indicator.

PUSH BUTTON TO RESET



Figure 121. Air Cleaner Restriction Indicator

NOTICE

The air cleaner element should not be changed until the indicator displays **RED**. Dispose of the old element. It cannot be cleaned or reused.

ENGINE FUEL FILTER

Inspect the engine fuel filter daily. If the fuel filter has collected a significant amount of water and sediment at the bottom of the cup, it should be drained off immediately.

Draining The Fuel Filter

1. Loosen the **air bleeder plug** (Figure 122) on the fuel filter body.
2. To discharge the fuel inside the fuel filter cartridge, open the **drain valve** on the fuel filter by turning the knob **counterclockwise** (Figure 122A) approximately 3-1/2 turns until the valve drops down 1 inch (25.4 mm) and draining occurs (Figure 122B).

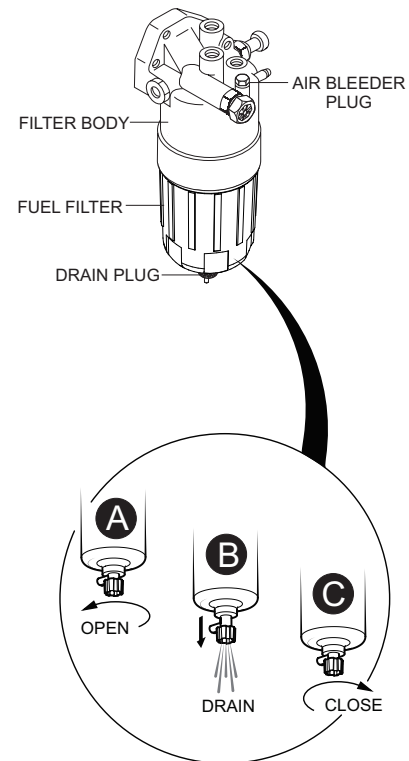


Figure 122. Draining The Fuel Filter

3. Let the residue or foreign substances inside the fuel filter flow into a suitable container.
4. At completion of draining, close the drain valve (Figure 122C).

Fuel Filter Element Replacement

1. Using a filter wrench, remove the **element case** from the **fuel filter body** (Figure 123).

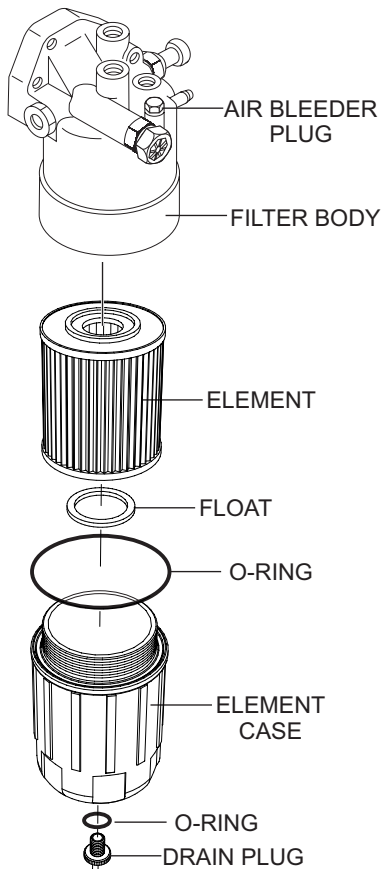


Figure 123. Fuel Filter Replacement

2. Wipe the inside of the **filter body** (Figure 123) with a clean cloth to remove any foreign matter or debris that may have accumulated.
3. Insert the new fuel filter element into the element case.
4. Replace both **O-rings**. Coat each O-ring with a small amount of clean 15W-40 engine oil.
5. Reinstall the element case first by hand until it makes contact with the fuel filter body surface.
6. Torque the element case to 22.4 lbf·ft (30 N.m).
7. Torque the drain plug to 1.4 lbf·ft (2.0 N.m).
8. Remove the air from the fuel system. Refer to **Bleeding the Fuel System** in the Isuzu engine owner's manual.

ELECTROMAGNETIC FUEL PUMP (500 HOURS)

The filter inside the **electromagnetic fuel pump** (Figure 124) is either a paper type or steel mesh type depending on the fuel pump type. Clean or replace the fuel pump filter as follows:

9. Disconnect any electrical connections that are attached to the fuel pump.
10. Prepare a fuel collector to drain the fuel into. Secure any fuel lines to prevent fuel from spilling.
11. Remove the fuel pump from the generator enclosure.
12. Remove the **filter** and **gaskets** (Figure 124) from the fuel pump housing.

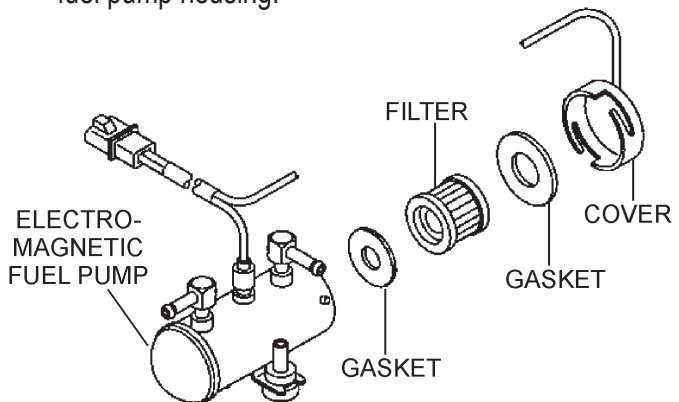


Figure 124. Electromagnetic Fuel Pump

NOTICE

When the fuel pump filter is removed, always make sure to replace both gaskets and clean the magnet portion inside the cover.

13. Clean or replace the fuel pump filter. Replace both gaskets.
14. Reassemble the fuel pump and mount it back onto the generator enclosure.
15. Reconnect all fuel lines and electrical components.
16. Check for fuel leaks.

DRAINING THE CONTAINMENT TANK

1. This generator is equipped with an environmental containment tank. Inspect this tank regularly.
2. If the tank becomes full with fluids, remove the **containment tank drain bolt** (Figure 125), then allow the fluids to drain into a suitable container.

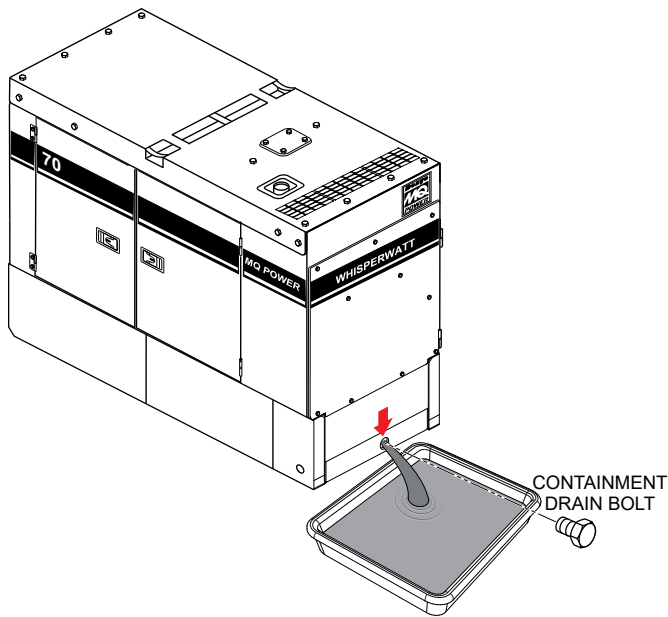


Figure 125. Draining The Containment Tank

CLEANING INSIDE THE FUEL TANK

If necessary, drain the fuel inside the fuel tank completely. Using a spray washer (Figure 126) wash out any deposits or debris that have accumulated inside the fuel tank.

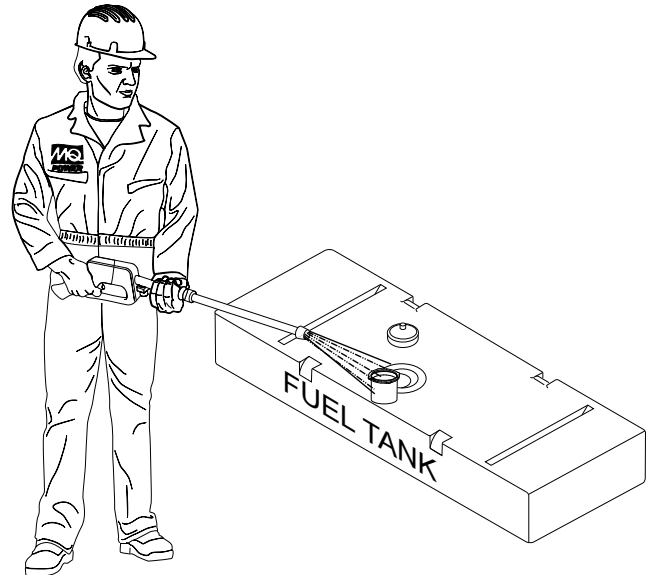


Figure 126. Cleaning The Fuel Tank

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 or hardening.
- **Fuel Tank Lining** — Inspect the fuel tank lining for signs of excessive amounts of oil or other foreign matter.

DRAINING THE ENGINE OIL

1. Run the engine until the engine coolant reaches a temperature of 140°F (60°C).
2. Turn the engine **OFF**.
3. Remove the oil dipstick from its holder.
4. Remove the **oil drain cap** (Figure 127).

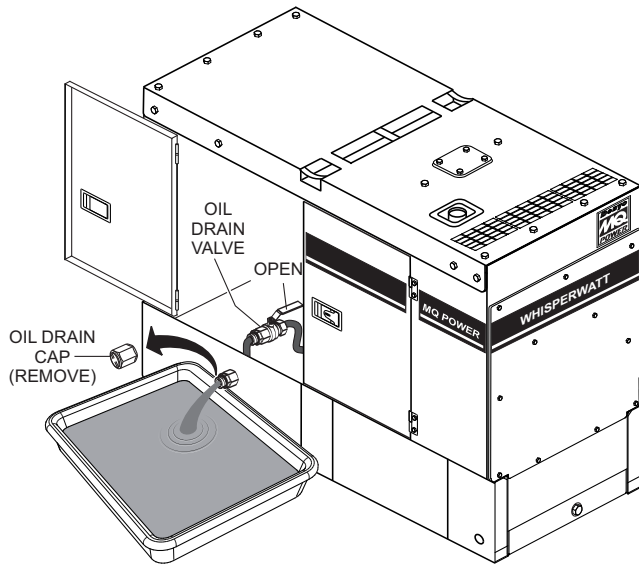


Figure 127. Draining The Engine Oil

5. Place the **oil drain valve** in the open position (Figure 127) and allow the oil to drain into a suitable container.
6. After the engine oil has completely drained, reinstall the oil drain cap and tighten securely.
7. Place the oil drain valve in the closed position and reinstall the oil dipstick.

ENGINE OIL FILTER REPLACEMENT

NOTICE

Filter head appearance may vary.

1. Clean the area around the **oil filter head** (Figure 128).

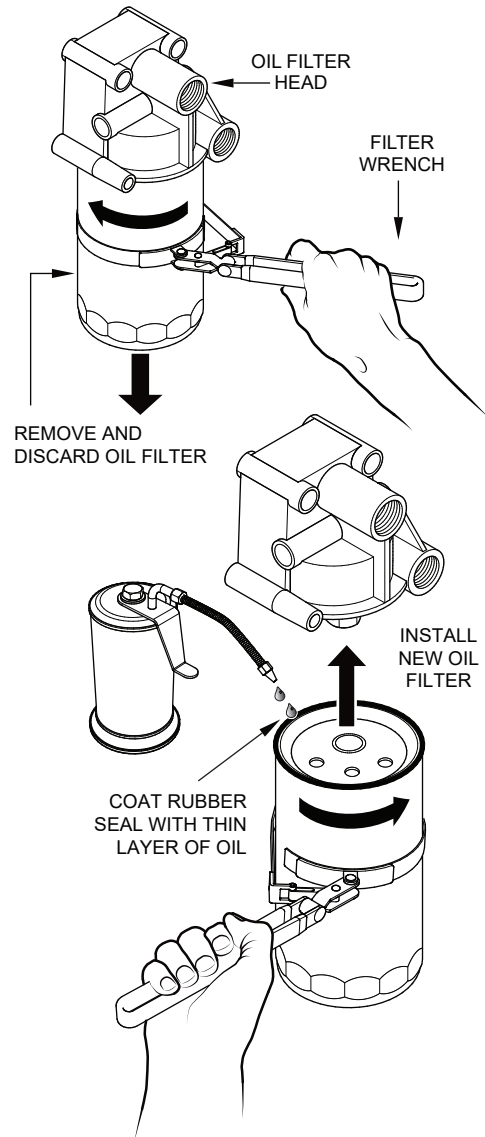


Figure 128. Engine Oil Filter Removal

2. Using an oil filter wrench, remove the **engine oil filter** (Figure 128).
3. Coat the rubber seal (gasket) surface of the new oil filter with clean 15W-40 engine oil (Figure 128).
4. Install the new (main) oil filter first by hand until it makes contact with the filter head surface. Tighten it another 3/4 turn using a filter wrench.

5. Fill the engine crankcase with high-quality detergent oil classified "For Service CI-4." Fill to the upper limit of the dipstick. **DO NOT** overfill. Refer to Table 2 for engine oil capacity.
6. 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 THE 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 the pressure cap.

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

1. Remove the **radiator pressure cap** (Figure 129) only if the coolant temperature is below 120°F (50°C).

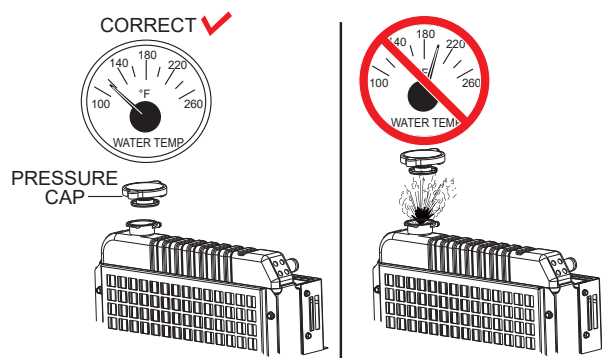


Figure 129. Radiator Pressure Cap Removal

2. Place the **coolant drain valve** in the **OPEN** position (Figure 130) and allow the coolant to drain into a suitable container.

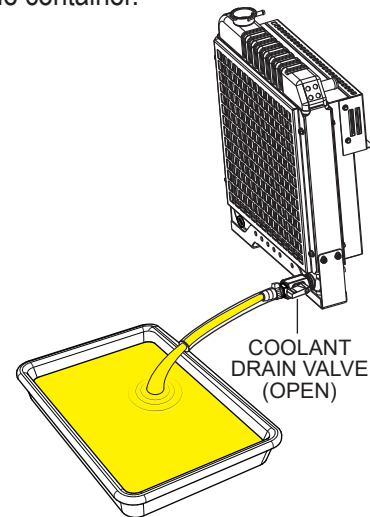


Figure 130. Draining The Engine Coolant

3. After the coolant has completely drained, place the coolant drain valve in the **CLOSED** position.
4. Reinstall the radiator pressure cap and tighten securely.
5. Flush out the radiator and replace the coolant. Refer to **Cleaning the Coolant Passages** and **Filling the Coolant System** in the Isuzu engine owner's manual.

! WARNING



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

CLEANING THE RADIATOR

The radiator (Figure 131) 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.

NOTICE

It may be necessary to remove additional generator components in order to access the radiator for cleaning.



Figure 131. Cleaning The Radiator

DRIVE BELT

Drive Belt Tension

A slack drive belt may contribute to overheating or insufficient charging of the battery. Adjust the drive belt in accordance with the Isuzu engine owner's manual.

Drive Belt Inspection

1. Inspect the **drive belt** (Figure 132) for damage and wear. Horizontal cracks (across the belt) are acceptable. Vertical cracks (direction of belt ribs) that intersect with horizontal cracks are not acceptable.

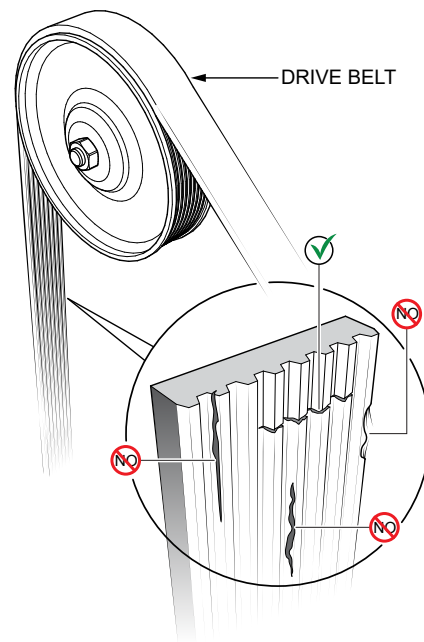


Figure 132. Drive Belt Inspection

2. Examine the belt and determine if it is oil soaked or glazed (a hard shiny appearance on the sides of the belt). Either of these two conditions can cause the belt to run hot, which can weaken it and increase the danger of it breaking.
3. If the drive belt exhibits any of the above wear conditions, replace it immediately.

TESTING THE GFCI RECEPTACLES

NOTICE

The GFCI receptacles are designed to interrupt power when a ground fault exists to prevent injuries and shock hazards. **DO NOT** use a GFCI receptacle if the test below fails. Consult a qualified electrician for repair or replacement of the GFCI receptacle. Test the GFCI receptacles **at least once a month**.

1. Start the generator as shown in the start-up procedure in this manual.
2. Place a **GFCI circuit breaker** (Figure 133) in the **ON** position.

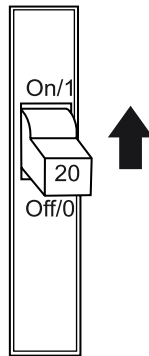


Figure 133. GFCI Circuit Breaker

3. Verify that the **status LED** on the corresponding GFCI receptacle (Figure 134) is **ON (GREEN)**.

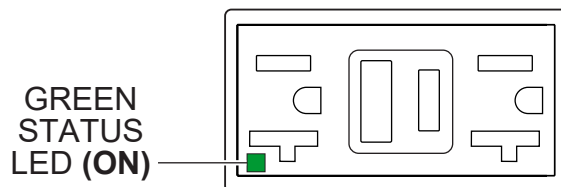


Figure 134. GFCI Receptacle (ON)

4. Press the **TEST button** (Figure 135) on the GFCI receptacle and verify that the status LED turns **OFF**.

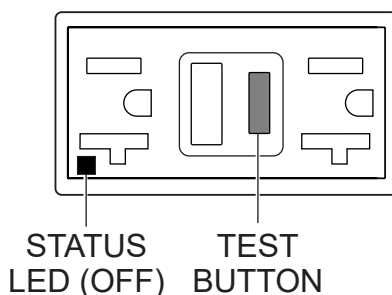


Figure 135. GFCI Receptacle (OFF)

5. Press the **RESET button** (Figure 136) to restore power to the GFCI receptacle and verify that the status LED is **ON (GREEN)**.

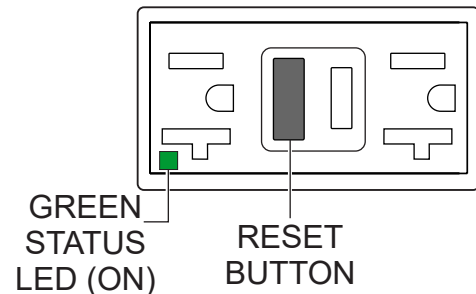


Figure 136. GFCI Receptacle (ON/Restore)

6. If the **status LED** (Figure 137) is **flashing (RED)**, **DO NOT** use the GFCI receptacle. Replace it immediately.

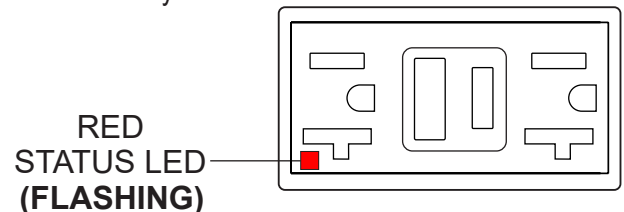


Figure 137. GFCI Receptacle (Red Flashing LED)

7. Repeat the above procedure for the other GFCI receptacle.

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.
- Disconnect the battery.
- Make sure engine coolant is at the proper level.
- Cover the generator and store it in a clean, dry place.
- If the generator is mounted on a trailer, jack the trailer up and place it on blocks so the tires do not touch the ground, or block and completely remove the tires.

ENGINE BLOCK HEATER AND INTERNAL BATTERY CHARGER 120 VAC INPUT RECEPTACLES

This generator comes equipped with an **engine block heater** and an **internal battery charger**. These components are provided with electrical power cords to connect to a commercial power source.

The engine block heater and internal battery charger (Figure 138) both require 120 VAC in order to operate. Two power receptacles are provided on the output terminal panel to allow commercial power to be applied.

These units will **ONLY** function when commercial power has been supplied to them. When using extension cords, refer to Table 6 for the correct size and length.

When using the generator in hot climates there is no reason to apply power to the engine block heater. However, if the generator will be used in cold climates it is always a good idea to apply power to the heater at all times.

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, **ALWAYS** keep power supplied to the generator's internal battery charger to ensure adequate starting capability.

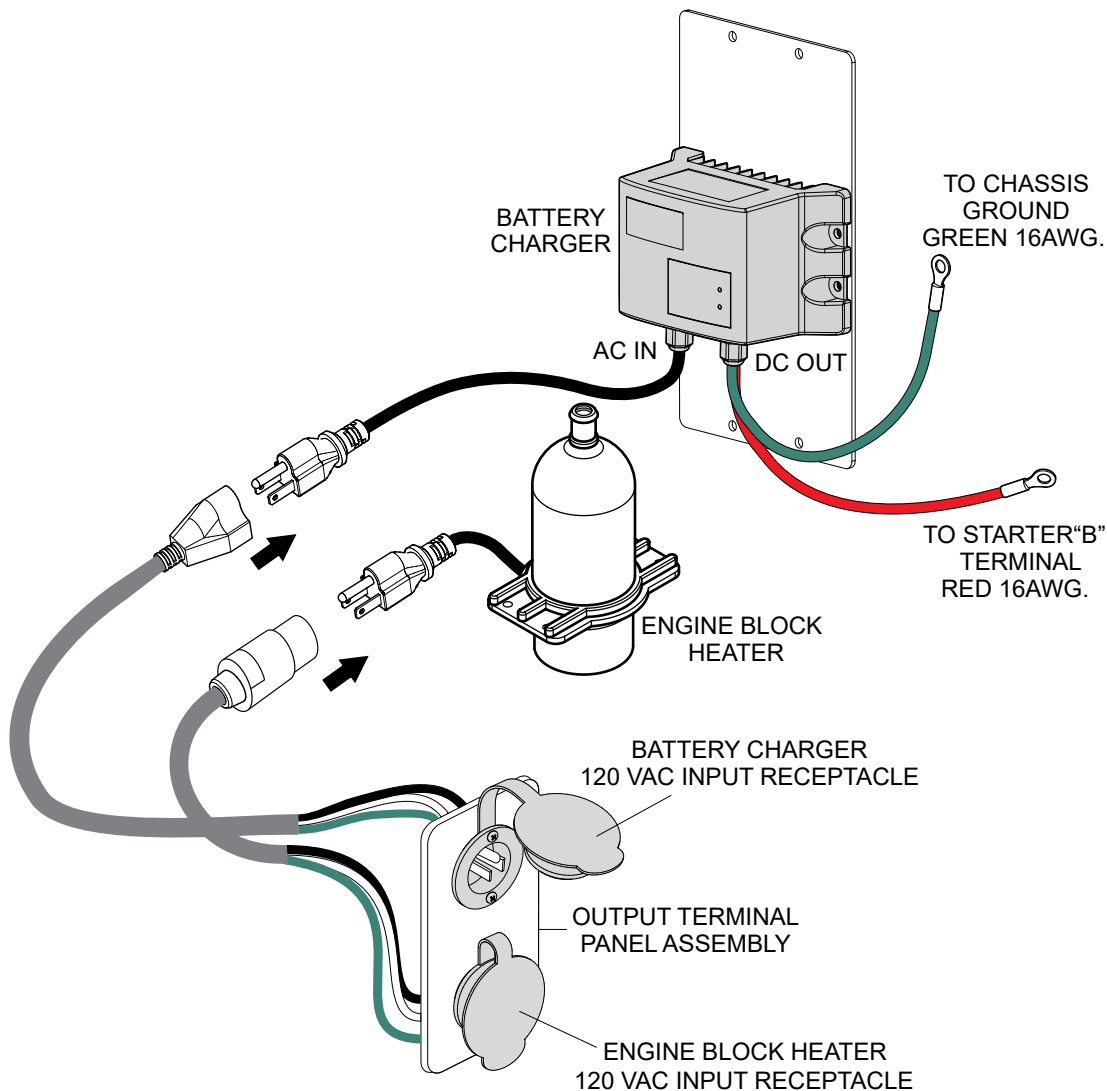


Figure 138. Engine Block Heater And Internal Battery Charger

EMISSION CONTROL

The emission control system employed with this diesel engine consists of a **diesel oxidation catalyst (DOC)** and a **selective catalytic reduction (SCR)** catalyst as an exhaust gas after-treatment system that helps reduce harmful gases and destroy the organic fraction of particulate matter produced from the exhaust gas to meet the requirement for EPA Tier 4 (Final) regulations.

The **DOC device** (Figure 139) helps filter out large amounts of harmful nitrogen oxides (NOx) and particulate matter (PM) which are emitted by diesel engines. These exhaust emissions pose serious environmental and health risks. It is important to maintain and service the DOC emission safety device on a periodic basis.

Diesel Oxidation Catalyst (DOC)

The DOC does not filter particles; it oxidizes them. This catalyst (honeycomb-like structure) uses a chemical process to break down pollutants in the exhaust stream into less harmful components. In general this catalyst collects/burns accumulated particulates. The DOC contains palladium and platinum which serve as catalysts to oxidize hydrocarbons and carbon monoxide.

PREVENTIVE MAINTENANCE PROGRAMS

Most challenging to a rental organization is the fact that a customer's power assumptions may not meet the minimum load requirements of the power equipment selected. When in doubt, it is always recommended to apply a **load bank application** to the equipment following a longer rental period.

Equipment on extended, long-term contracts needs periodic on-site inspection. If possible, interview the operator and survey the equipment hooked up to the generator to estimate load conditions.

Preventive maintenance and a few extra steps prevent downtime and protect your investment and business. A well-planned preventive maintenance program will reward you with years of service.

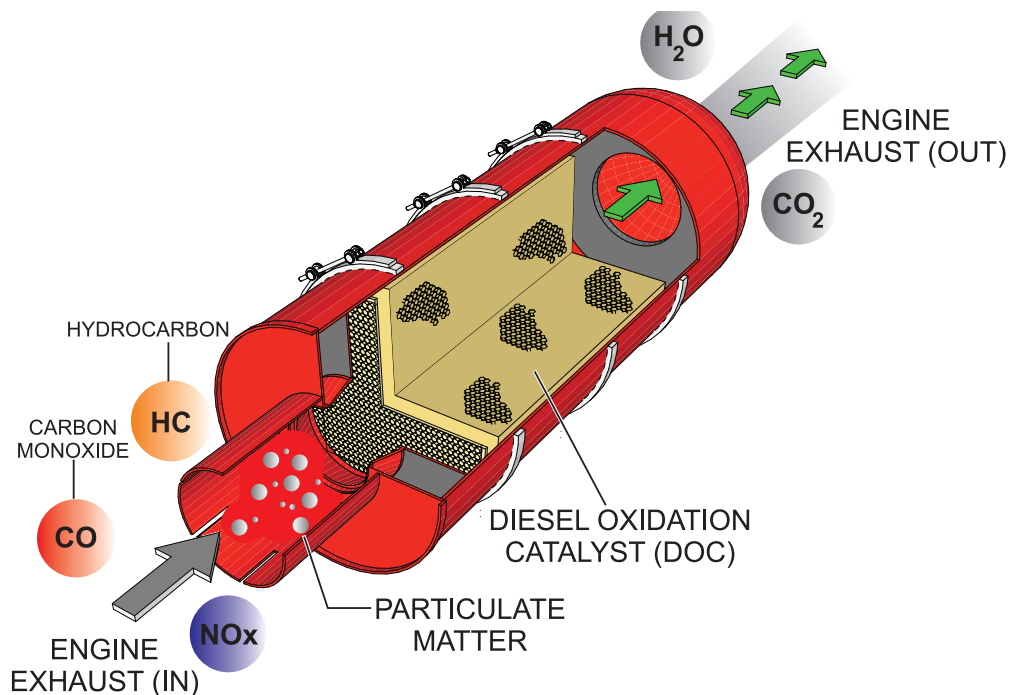


Figure 139. Diesel Oxidation Catalyst (DOC)

SELECTIVE CATALYTIC REDUCTION (SCR)

Diesel engines can be run with a lean burn air-to-fuel ratio, to ensure the full combustion of soot and to prevent the exhaust of unburnt fuel. The excess of air necessarily leads to generation of nitrogen oxides (NOx), which are harmful pollutants, from the nitrogen in the air. **Selective catalytic reduction (SCR)** is used to reduce the amount of NOx released into the atmosphere.

Diesel exhaust fluid (DEF) is injected from a separate tank into the exhaust pipeline, where the aqueous urea solution vaporizes and decomposes to form ammonia and carbon dioxide. Within the SCR catalyst, the nitrogen oxides are catalytically reduced by the ammonia (NH₃) into water (H₂O) and nitrogen (N₂), which are both harmless; these are then released through the exhaust.

The SCR system creates a certain amount of ammonia (NH₃) that is stored within the SCR catalyst. During purge operations the increase in temperature at regular intervals eliminates the stored ammonia.

The process of keeping accurate ammonia storage amounts is by counting urea injection quantities from the dosing control unit (DCU).

SCR PURGE OPERATION

During operation, some reductant particles remain and accumulate on the SCR substrate. This accumulated reductant composite must be removed periodically by a purge operation to prevent clogging, low efficiency of SCR process performance, and other problems.

SCR Purge Operation Guidelines

For the safe operation of equipment, protection of the surrounding area, and prevention of bodily harm, use the guidelines below when a purge operation is required:

- **DO NOT** perform purge operations in conditions where it may be unsafe due to high exhaust temperatures.
- **DO NOT** operate the unit in an area with poor ventilation.
- If operating the engine indoors, install exhaust/ventilation equipment and ensure that there is sufficient ventilation.
- If you begin to feel sick, stop the unit immediately and ventilate the area.

■ **REMEMBER** — Due to the emission reduction functions of the exhaust system, exhaust emissions from the tailpipe have a different smell than those emitted from engines without urea SCR systems.

■ During the purge operation, the area above and around the generator should be free of any type of debris or flammable/combustible materials, as temperatures during the purge process can reach as high as 1,022°F (550°C).

■ If a purge operation is performed while the unit is operating under a light load (0–30%), unusual sounds may be produced. This should not be considered a problem.

■ During SCR purge operations, white smoke may be temporarily emitted from the exhaust tailpipe. This should not be considered a failure. In addition, the smell of ammonia during the purge process should not be considered a failure.

Automatic Purge Operation

The Automatic Purge operation is performed automatically every 30 hours. No operator action is required for this process. The **SCR Purge indicator** (Table 15) will be shown on the digital controller screen.

Table 15. SCR Purge System Indicator Action			
Purge Action	Automatic Purge	Forced Purge	Forced Purge Request
SCR Purge Indicator	 Not Flashing	 Not Flashing	 Slow Flashing

Forced Purge Operation

NOTICE

DO NOT run the unit in parallel during a Forced Purge operation.

If the Automatic Purge operation cannot be performed, **Forced Purge operation** will activate automatically for a unit in single operation (not in parallel).

If the unit is in parallel operation (2 or more units) during this condition, the Automatic Purge operation will not be activated and the SCR purge indicator (Table 15) will flash slowly. In this condition, perform the following procedure to activate the Forced Purge operation.

1. Press the **Open Contactor button** (Figure 140) on the digital controller. If the generator is running in Auto mode, stop the engine and place the unit in Semi-Auto mode.

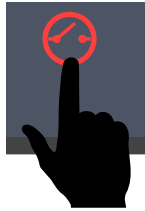


Figure 140. Open Contactor Button

2. The unit will run as a single unit and the Forced Purge operation will be performed automatically.
3. Once the Forced Purge operation has completed, press the **Close Contactor button** (Figure 141) on the controller.

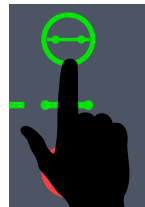


Figure 141. Close Contactor Button

4. After the contactor has closed, the generator can be returned to parallel operation.

If the Forced Purge operation cannot be completed or is interrupted (engine shutdown), approximately 8 hours after the Forced Purge request is displayed, the engine will stop.

In this condition, the engine can still be restarted. Make sure to perform the above procedures after the engine has been restarted. The engine can only run for approximately 5 minutes after restart and will shut down again if the Forced Purge operation is not performed.

If the Forced Purge operation is still not performed for approximately another two hours, manual purging will become impossible. If this occurs, contact your nearest MQ Power dealer.

DIESEL EXHAUST FLUID (DEF) MAINTENANCE

During operation, the amount of fluid in the DEF tank is indicated on the **Engine Status screen** (Figure 142).

ISLAND	SEMI
Speed	1800rpm
Water temperature	169°F
Oil pressure	64psi
DEF LEVEL	90% 

2/20

Figure 142. Engine Status Screen (DEF Level)

The **DEF indicator** (Table 16) displayed on the digital controller screen indicates one of the following:

- The level of diesel exhaust fluid in the DEF tank is below 10% capacity. Refer to Table 16, DEF Level System Action.
- DEF quality is poor. Check the DEF tank level and check active diagnostic trouble codes.

Table 16. DEF Level System Action			
DEF Level	Below 15%	Below 10%	Below 5%
Controller Message	DEF Low 15% WA	DEF Low 10% SD	DEF Low 5% SD
Low DEF Level Lamp	 ON	 ON	 ON
DEF Level Warning Indicator	—	 Not Flashing	 Slow Flashing
Engine Shutdown	—	Restart Available	Restart Unavailable

NOTICE

When the DEF level decreases to 10%, the engine will shut down, but can still be restarted. When the DEF level decreases to 5%, the engine will shut down, and will not be able to restart until DEF is replenished.

INDUCEMENT

When the system senses improper usage such as no supply of DEF, use of poor quality DEF, problems with DEF dosing, or disconnection of sensors, a warning will be issued before the situation becomes critical. If the warnings are ignored and the unit enters intermittent operation, the emergency shutdown will activate. The warning levels are shown in Table 17 and Table 18:

NOTICE

Replace the DEF filter (located in the urea SCR system supply module) every 3,000 hours of operation. Refer to the **Replacement of DEF Filter** section in the Isuzu engine owner's manual.

Table 17. DEF Inducement (DEF Level)

Stage	DEF Indicator	Check Engine Indicator	Engine Shutdown Indicator	Engine Emission Indicator
Stage 1 Warning Level 1		—	—	—
Stage 2 Warning Level 2	 Slow Flashing	—	—	—
Stage 3 Shutdown	 Fast Flashing	—		—
Escape Mode	 Fast Flashing	—	—	—

Table 18. DEF Inducement (Poor Quality, Tampering, and Repeat Offense)

Stage	DEF Indicator	Check Engine Indicator	Engine Shutdown Indicator	Engine Emission Indicator
Stage 1 Warning Level 1			—	
Stage 2 Warning Level 2	 Slow Flashing		—	
Stage 3 Shutdown	 Fast Flashing			
Escape Mode	 Fast Flashing		—	

ESCAPE MODE

When emergency shutdown occurs, inspection and repair should generally be performed promptly. However, if emergency protective measures are necessary which require the unit to be running, the engine can be started in **Escape mode**, which allows the unit to run for 30 minutes.

NOTICE

Escape mode can only be activated if the exhaust system indicators are displayed as shown in Table 18.

NOTICE

This unit will perform an emergency shutdown if the DEF level falls to below 5%. It will not be able to be restarted without replenishing DEF. Escape mode cannot be activated in this low-DEF state on this model.

Escape Mode Activation

1. Press the **Shortcut Menu button** (Figure 143) on the digital controller.

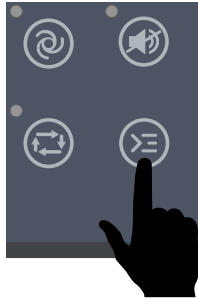


Figure 143. Shortcut Menu Button

2. Make sure **Engine shortcuts** (Figure 144) is highlighted on the display, then press the **OK button**.

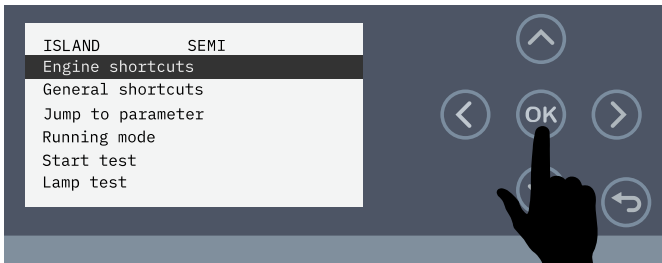


Figure 144. Select Engine Shortcuts

3. Make sure **ECU Diagnose** (Figure 145) is highlighted on the display, then press the **OK button**.

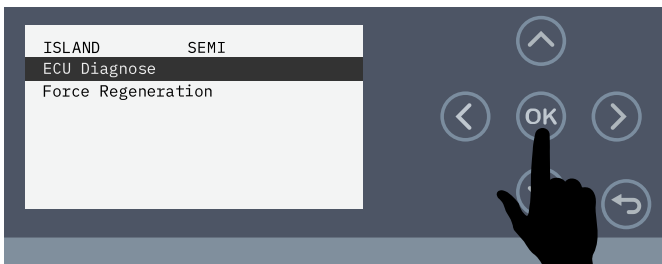


Figure 145. Select ECU Diagnose

4. Press the **Shortcut Menu button** (Figure 143) on the digital controller.
5. Make sure **Engine shortcuts** (Figure 144) is highlighted on the display, then press the **OK button**.
6. Press the Down Arrow button until **Escape mode OFF** is highlighted on the display screen, then press the OK button. The line text will change to **Escape mode ON**.

7. Press the **Start button** (Figure 146).

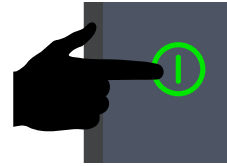


Figure 146. Start Button

Escape Mode Deactivation

1. Press the **Stop button** (Figure 147) on the digital controller.

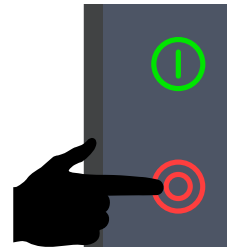


Figure 147. Stop Button

2. Place the **Control Power switch** (Figure 148) in the **OFF** (down) position.



Figure 148. Control Power Switch (OFF)

- If Escape mode is temporarily suspended before the 30-minute period has ended, no request for Escape mode is necessary when the unit is restarted. The 30-minute period will resume from the last shutdown after the unit is restarted.
- Once the Escape mode period (30 minutes) ends, the engine will automatically stop. The Escape mode can only be requested **one time**. Please perform inspection and repair the fault before restarting the engine.
- If the unit returns to Warning Level 1 while Escape mode is running, Escape mode will be canceled, the Escape Mode timer display will close, and normal operation will resume.

TROUBLESHOOTING (FAULTS)

FAULTS/ALARMS

This unit is equipped with engine protection devices that automatically shut down the engine when a fault occurs.

1. When a fault is detected, the controller automatically shows the **Alarm list** (Figure 149) on the display screen.

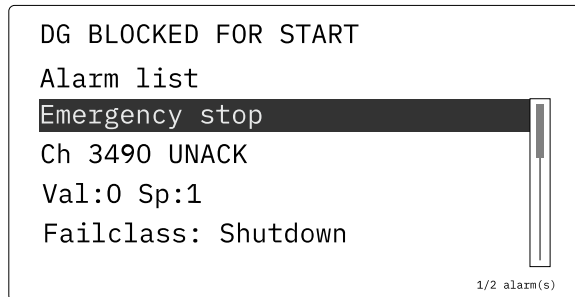


Figure 149. Alarm List

2. The display only shows one alarm at a time. The number of alarms on the list is shown at the bottom-right corner of the screen. Press the Up Arrow or Down Arrow button to view the rest of the list.
3. To acknowledge an alarm, select the alarm and press the **OK button** (Figure 150).

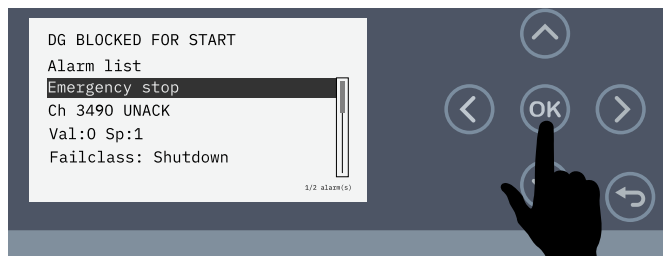


Figure 150. Alarm Acknowledgment

4. To clear a fault condition, stop operation and shut down the engine. Allow a sufficient cooling period, then inspect the unit and repair the problem before restarting operation. See Table 19 for a list of engine fault codes and Table 20 for a list of exhaust after-treatment system fault codes.
5. Once an alarm has been acknowledged and the fault condition has been cleared, the alarm will be removed from the alarm list.

DIAGNOSTIC MODE

Diagnostic mode allows the digital controller to communicate with the engine control module (ECM) to view active fault messages and codes as well as previous fault occurrences which have been recorded in the ECM. Whenever the generator cannot be started due to a fault, place the generator in Diagnostic mode to identify the problem without starting the engine.

NOTICE

Always place the generator in Diagnostic mode when utilizing the Isuzu Diagnostic Service System to clear and refresh codes, take diagnostic readings, and perform limited calibrations.

Diagnostic Mode Activation

1. Press the **Shortcut Menu button** (Figure 151) on the digital controller.

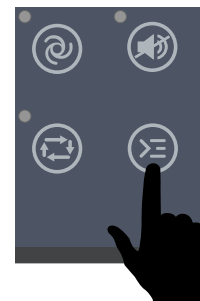


Figure 151. Shortcut Menu Button

2. Make sure **Engine shortcuts** (Figure 152) is highlighted on the display, then press the **OK button**.

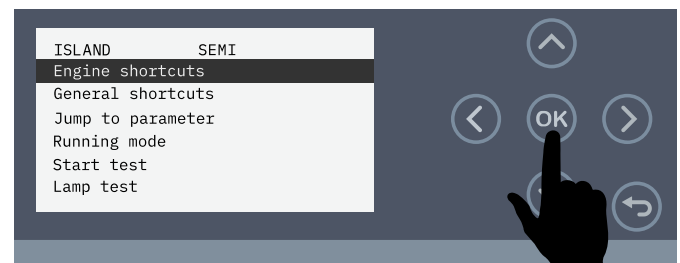


Figure 152. Select Engine Shortcuts

TROUBLESHOOTING (FAULTS)

3. Make sure **ECU Diagnose** (Figure 153) is highlighted on the display, then press the **OK** button.

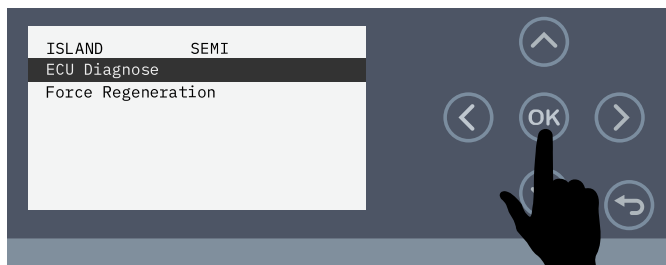


Figure 153. Select ECU Diagnose

4. The status message **Diagnostics Active** (Figure 154) will appear on the screen.

Diagnostics		Active	
G	0	0	0kW
G	S		0kVA
G	V-L3L1		0V
BB	V-L3L1		0V
G	f-L1		0.00Hz
DEF Level: 100.0%		1/20	

Figure 154. Diagnostics Active

5. After completing fault diagnostics, press the **Stop** button (Figure 155) to exit Diagnostic mode.

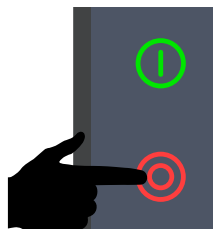


Figure 155. Stop Button

TROUBLESHOOTING (FAULTS)

Table 19. Isuzu Engine Diagnostic Trouble Codes

SPN-FMI	P Code	Condition
636-7	P0016	Crankshaft Position - Camshaft Position Correlation Error
646-4	P0047	Turbocharger EVRV Control Circuit High
10035-4	P0079	Exhaust Valve Control Solenoid Circuit Low
10035-3	P0080	Exhaust Valve Control Solenoid Circuit High
633-7	P0087	Fuel Rail/System Pressure - Too Low
157-15	P0089	Fuel Pressure Regulator Performance
1347-4	P0091	Fuel Pressure Regulator Control Circuit Low
1347-3	P0092	Fuel Pressure Regulator Control Circuit High
1131-4	P0097	Intake Air Temperature (IAT) Sensor 2 Circuit Low Voltage
1131-3	P0098	Intake Air Temperature (IAT) Sensor 2 Circuit High Voltage
132-4	P0102	Mass Air Flow Sensor Circuit Low Input
132-3	P0103	Mass Air Flow Sensor Circuit High Input
172-4	P0112	Intake Air Temperature Sensor Circuit Low
172-3	P0113	Intake Air Temperature Sensor Circuit High
110-4	P0117	Engine Coolant Temperature Sensor Circuit Low
110-3	P0118	Engine Coolant Temperature Sensor Circuit Low
10022-4	P0122	Throttle Position Sensor Circuit Low
10022-3	P0123	Throttle Position Sensor Circuit High
174-4	P0182	Fuel Temperature Sensor Circuit Low
174-3	P0183	Fuel Temperature Sensor Circuit High
157-4	P0192	Fuel Rail Pressure Sensor Circuit Low
157-3	P0193	Fuel Rail Pressure Sensor Circuit High
651-5	P0201	Injector Circuit Open - Cylinder 1
652-5	P0202	Injector Circuit Open - Cylinder 2
653-5	P0203	Injector Circuit Open - Cylinder 3
654-5	P0204	Injector Circuit Open - Cylinder 4
110-0	P0217	Engine Coolant Over Temperature Condition
190-0	P0219	Engine Overspeed Condition
102-0	P0234	Turbocharger Overboost Condition
102-4	P0237	Turbocharger Boost Sensor Circuit Low
102-3	P0238	Turbocharger Boost Sensor Circuit High
102-1	P0299	Turbocharger Underboost
723-2	P0335	Crankshaft Position Sensor Circuit
723-8	P0336	Crankshaft Position Sensor Circuit Range/Performance
636-2	P0340	Camshaft Position Sensor Circuit
676-5	P0380	Glow Relay Circuit Error
10002-2	P0404	EGR Control Circuit Range/Performance
10001-2	P0409	EGR Sensor Circuit
10014-4	P041C	EGR Cooler Outlet 1 Temp Sensor Circuit Low

TROUBLESHOOTING (FAULTS)

Table 19. Isuzu Engine Diagnostic Trouble Codes

SPN-FMI	P Code	Condition
10014-3	P041D	EGR Cooler Outlet 1 Temp Sensor Circuit High
173-4	P0427	Catalyst Temperature Sensor Circuit Low Sensor 1
173-3	P0428	Catalyst Temperature Sensor Circuit High Sensor 1
10024-4	P042C	Catalyst Temperature Sensor Circuit Low Sensor 2
10024-3	P042D	Catalyst Temperature Sensor Circuit High Sensor 2
-	P0521	Engine Oil Pressure Sensor Performance
100-4	P0522	Engine Oil Pressure Sensor Circuit Low Input
100-3	P0523	Engine Oil Pressure Sensor Circuit High Input
10053-4	P0545	EGR Cooler Inlet 1 Temp Sensor Circuit Low
10053-3	P0546	EGR Cooler Inlet 1 Temp Sensor Circuit High
158-3	P0563	System Voltage High
628-2	P0601	Internal Control Module Memory Check Sum Error
10032-2	P0602	Internal Control Module QR Code Error
10033-2	P0604	Internal Control Module RAM Error
1077-2	P0606	Internal Control Module CPU Error
10007-2	P060A	Internal Control Module CPU IC Error
10008-2	P060C	Internal Control Module AID Processing Performance
677-5	P0615	Starter Relay Circuit Error
10022-2	P0638	Throttle Actuator Control Range/Performance
1485-5	P0685	ECM Power Relay Control Circuit Open
1485-6	P0687	ECM Power Relay Control Circuit High
1079-2	P06A6	Sensor Reference Voltage 1 Circuit
1080-2	P06A7	Sensor Reference Voltage 2 Circuit
10009-2	P06A8	Sensor Reference Voltage 3 Circuit
10010-2	P06A9	Sensor Reference Voltage 4 Circuit
10050-2	P06AF	Injector Custom IC
10082-2		Injector Custom IC Communication Line
10083-2		Injector Custom IC Check Sum
10011-2	P06D5	Sensor Reference Voltage 5 Circuit
10051-4	P1076	Charge Air Cooler (CAC) Temperature Sensor 1 Circuit Low Voltage
10051-3	P1077	Charge Air Cooler (CAC) Temperature Sensor 1 Circuit High Voltage
1239-17	P1093	Fuel Rail Pressure Too Low
105-4	P1097	Compressor Outlet Temperature Sensor Circuit Low
105-3	P1098	Compressor Outlet Temperature Sensor Circuit High
5285-1	P1236	Charge Air Cooler Performance Failure
10005-2	P1261	Injector Positive Voltage Control Circuit Group 1
10006-2	P1262	Injector Positive Voltage Control Circuit Group 2
10001-13	P1404	EGR Position Fault

TROUBLESHOOTING (FAULTS)

Table 19. Isuzu Engine Diagnostic Trouble Codes

SPN-FMI	P Code	Condition
10046-2	P1606	SWIC-1 Internal Failure
10048-2		SW-IC 1 Communication Line Failure
10045-2	P160B	AD-IC Failure Error
10013-2	P1621	Control Module Long Term Memory Performance
10013-12	P1622	Control Module EEPROM Hardware Error
10043-2	P204F	SCR System Error (No Inducement)
4332-12	P207F	Urea Fluid Concentration Too Low
10044-1	P20C9	SCR System Error
91-4	P2122	Pedal Position Sensor 1 Circuit Low Input
91-3	P2123	Pedal Position Sensor 1 Circuit High Input
91-4	P2127	Pedal Position Sensor 2 Circuit Low Input
91-3	P2128	Pedal Position Sensor 2 Circuit High Input
91-2	P2138	Pedal Position Sensor 1 - 2 Voltage Correlation
10003-2	P2146	Fuel Injector Group 1 Supply Voltage Circuit
10004-2	P2149	Fuel Injector Group 2 Supply Voltage Circuit
108-4	P2228	Barometric Pressure Circuit Low Input
108-3	P2229	Barometric Pressure Circuit High Input
10054-17	P2457	Exhaust Gas Recirculation (EGR) Cooling System Performance
10029-0	P2458	Purge Time Out Error
10042-12	P2BAA	SCR System Error (Inducement, No Purge)
1239-31	P3093	Fuel Rail Pressure Too Low
SPN-FMI	U Code	Condition
10040-19	U0001	CAN Bus Error (ISO-CAN)
639-19	U0073	Control Module Communication Bus Off
639-2	U0101	Lost Communication With CAN
10041-2	U010E	Lost Communications With Dosing Control Module

TROUBLESHOOTING (FAULTS)

Table 20. Urea SCR System Diagnostic Trouble Codes

SPN-FMI		P Code	Condition
10042-12	10514-12	P0607	Control Module Performance
10042-12	10514-12	P060B	Internal Control Module AID Processing Performance
10042-12	10514-12	P062F	Control Module EEPROM Error
10042-12	10514-12	P0641	Sensor Reference Voltage Circuit
	10515-12		
10042-12	10515-12	P0658	Actuator Supply Voltage Circuit
10042-12	10515-12	P0659	Actuator Supply Voltage Circuit
10042-12	10526-12	P1462	Urea Fluid Quality Sensor Timeout Error
-	10534-12	P1464	Main Relay Performance
10043-2	10528-12		
-	10517-12	P1468	Urea Dosing Control Module (DCM) Overtemperature
-	10518-12	P1491	Urea Fluid Overpressure
-	10517-12	P1493	Urea Dosing Control Module (DCM) Driver Overtemperature
-	10519-12	P149C	Urea Fluid Pressure Reduction Malfunction
10043-2	10521-12	P149D	Urea Fluid Tank Overtemperature
10044-1	10522-12	P203B	Urea Fluid Tank Level Sensor Stuck
10044-1	10531-12	P203D	Urea Fluid Tank Level Sensor High Voltage
10042-12	10500-12	P2048	Urea Fluid Injector Circuit Low Voltage
10042-12	10500-12	P2049	Urea Fluid Injector Circuit High Voltage
10042-12	10512-12	P204B	Urea Fluid Pressure Sensor Performance
10042-12	10511-12	P204C	Urea Fluid Pressure Sensor Circuit Low Voltage
10042-12	10511-12	P204D	Urea Fluid Pressure Sensor Circuit High Voltage
-	10506-12	P205B	Urea Fluid Tank Temperature Sensor Performance
10042-12	10532-12	P205D	Urea Fluid Tank Temperature Sensor High Voltage
10042-12	10529-12	P206A	Urea Fluid Quality Sensor Circuit
-	10535-12	P206B	Urea Sensor Over Temperature Condition
10042-12	10529-12	P206C	Urea Fluid Quality Sensor Circuit Open
10042-12	10529-12	P206D	Urea Fluid Quality Sensor Circuit Short
4332-12	10523-12	P207F	Urea Fluid Concentration Too Low
10042-12	10508-12	P208A	Urea Fluid Pump Control Circuit
10042-12	10509-12	P208B	Urea Fluid Pump Performance
10042-12	10508-12	P208C	Urea Fluid Pump Control Circuit Low Voltage
10042-12	10508-12	P208D	Urea Fluid Pump Control Circuit High Voltage
10042-12	10501-12	P208E	Urea Fluid Injector Stuck
10043-2	10510-12	P20A0	Urea Fluid Reverting Valve Circuit Open
10042-12	10536-12	P20A2	Urea Fluid Reverting Valve Circuit Low Voltage
10043-2	10510-12	P20A3	Urea Fluid Reverting Valve Circuit High Voltage

TROUBLESHOOTING (FAULTS)

Table 20. Urea SCR System Diagnostic Trouble Codes

SPN-FMI		P Code	Condition
10044-1	10513-12	P20AC	Urea Fluid Pump Temperature Sensor Performance
10042-12	10513-12 10508-12		
-	10516-12	P20AD	Urea Fluid Pump Module Temperature Sensor Performance
10042-12	10507-12	P20B1	Urea Fluid Tank Heater Coolant Control Valve Circuit Open
10042-12	10507-12	P20B3	Urea Fluid Tank Heater Coolant Control Valve Circuit Low Voltage
10042-12	10507-12	P20B4	Urea Fluid Tank Heater Coolant Control Valve Circuit High Voltage
10042-12	10533-12	P20E8	Urea Fluid Pressure Underpressure
10042-12	10530-12	P20E9	Urea Fluid Overpressure
-	10534-12	P20EA	Urea Fluid Pressure Reduction Malfunction
10042-12	10520-12	P20FE	Urea Fluid Pressure Build-Up Error
10044-1	10505-12	P2201	Upstream NOx Sensor Performance
10044-1	10504-12	P2206	Reading the error (open) information detected by Ft NOx sensor
10044-1	10504-12	P2207	Reading the error (short) information detected by Ft NOx sensor
10044-1	10503-12	P242B	Exhaust Gas Temperature (EGT) Sensor 3 Performance
10044-1	10502-12	P242C	Exhaust Gas Temperature (EGT) Sensor 3 Circuit Low Voltage
10044-1	10502-12	P242D	Exhaust Gas Temperature (EGT) Sensor 3 Circuit High Voltage
SPN-FMI		U Code	Condition
10042-12	10525-12	U0002	CAN Bus Off
10042-12	10525-12	U0100	Lost Communication with Engine Control Module (ECM)
10044-1	10527-12	U029D	CAN communication error between DCU and Ft NOx sensor
	10524-12		

TROUBLESHOOTING (FAULTS)

Table 21. Automatic Engine Shutdown System

Fault Code	Condition	Display Message	Setpoint	Timer	Fail Class
1000	Reverse Power	Reverse Power 1	–10%	30 s	Warning
1010	Reverse Power	Reverse Power 2	–15%	10 s	Trip + Stop
1030	Over Current	Over Current 1	101%	300 s	Warning
1040	Over Current	Over Current 2	111%	60 s	Warning
1050	Over Current	Over Current 3	115%	30 s	Trip + Stop
1060	Over Current	Over Current 4	120%	10 s	Trip + Stop
1130	Fast Over Current	Fast OverCurnt 1	150%	2 s	Trip + Stop
1140	Fast Over Current	Fast OverCurnt 2	200%	0.5 s	Trip + Stop
1150	Over Voltage	G OverVoltage 1	110%	10 s	Warning
1160	Over Voltage	G OverVoltage 2	115%	5 s	Shutdown
1170	Under Voltage	G UnderVoltage 1	90%	10 s	Warning
1180	Under Voltage	G UnderVoltage 2	80%	5 s	Trip + Stop
1210	Over Frequency	G OverFreq 1	105%	5 s	Warning
1220	Over Frequency	G OverFreq 2	110%	3 s	Shutdown
1240	Under Frequency	G UnderFreq 1	95%	5 s	Warning
1250	Under Frequency	G UnderFreq 2	90%	5 s	Trip + Stop
1450	Over Load	kW Overload 1	100%	60 s	Warning
1460	Over Load	kW Overload 2	105%	30 s	Trip GB
1470	Over Load	kW Overload 3	110%	10 s	Safety Stop
1520	Reverse kVAR	Loss of Excit	40%	10 s	Trip + Stop
1981	GB External Trip	GB Ext. tripped			Warning
1983	MB External Trip	MB Ext. tripped			Warning
2130	GB Breaker Synchronization Failure	GB Sync Failure		60 s	Block
2140	MB Breaker Synchronization Failure	MB Sync Failure		60 s	Warning
2150	Phase Sequence Error DG	Phas seq err DG			Block
2155	Phase Sequence Error BB	Phas seq err BB			Block
2160	GB Open Failure	GB Open Fail		2 s	Warning
2170	GB Close Failure	GB Close Fail		2 s	Warning
2180	GB Breaker Position Failure	GB Pos fail		1 s	Warning
2200	MB Open Failure	MB Open Fail		2 s	Warning
2210	MB Close Failure	MB Close Fail		2 s	Warning
2220	MB Breaker Position Failure	MB Pos fail		1 s	Warning
2270	Close Before Excitation Failure	Cl.bef.exc.fail		5 s	Warning
2320	Busbar Blocked	Busbar blocked		1 s	Warning
2560	Governor Regulation Fail	GOV reg. fail	30%	60 s	Warning
2630	Deload Error	Deload error		10 s	Warning
2680	AVR Regulation Failure	AVR reg. fail	30%	60 s	Warning
3440	Low Coolant Level	Low Coolant Lvl		0 s	Shutdown
3450	Air Cleaner Clogged	Check AirFilter		0 s	Warning

TROUBLESHOOTING (FAULTS)

Table 21. Automatic Engine Shutdown System

Fault Code	Condition	Display Message	Setpoint	Timer	Fail Class
3460	Crank Case SW Clogged	Crank Case Pres		0 s	Shutdown
3490	Emergency Stop	Emergency STOP		0 s	Shutdown
3570	Force Regeneration Request Error	Force purge ERR		0 s	Controlled Stop
4120	Low Fuel	Low Fuel WA	20%	90 s	Warning
4130	Low Fuel	Low Fuel SD	5%	90 s	Controlled Stop
4540	Run Feedback Fail	Run feedb. fail		2 s	Warning
4570	Start Failure	Start failure			Block
4580	Stop Failure	Stop failure		30 s	Shutdown
4610	Low DEF Level	DEF Low 15% WA	-16%	5 s	Warning
4620	Low DEF Level	DEF Low 10% SD	-10%	4 s	Controlled Stop
4630	Low DEF Level	DEF Low 5% SD	-5%	5 s	Controlled Stop
4960	Low Battery Voltage	Lo DC Volts T1	18 V	20 s	Warning
4970	High Battery Voltage	Hi DC Volts T1	30 V	0 s	Warning
4980	Low Battery Voltage	Lo DC Volts.T98	18 V	20 s	Warning
4990	High Battery Voltage	Hi DC Volts.T98	30 V	0 s	Warning
6280	Internal Communication Fail	Int. comm. fail			Warning
6352	External Engine Stop	Ext. Eng. Stop		10 s	Warning
6411	Battery Test	Battery test	18 V		Warning
7533	Missing All Units	Miss. all units			Warning
7534	Fatal CAN Error	Fatal CAN error			Warning
7535	Any DG Missing	Any DG missing			Warning
7536	Any DG Missing	Any mains miss.			Warning
7600	EIC Over speed	EIC Overspeed	115%	0.5 s	Shutdown
7610	EIC Coolant Temperature High	EIC Coolant T.1	200°F	0 s	Warning
7620	EIC Coolant Temperature High	EIC Coolant T.2	212°F	0 s	Controlled Stop
7630	EIC Oil Pressure Low	EIC Oil Pres. 1	25 psi	5 s	Warning
7640	EIC Oil Pressure Low	EIC Oil Pres. 2	7 psi	5 s	Controlled Stop
7871	Any BTB Missing	Any BTB miss.			Warning
7872	Any BTB Application Hazard	Appl. hazard			Warning
7873	Any Load Group missing	Any LG miss.			Warning
7874	Any PV Missing	Any PV miss.			Warning
7875	Any Battery Missing	Any Bat miss.			Warning
7940	CAN2 Communication Error	CAN2 Comm Error		10 s	Warning
8124	Ground Failure	Ground failure		1 s	Trip GB
8131	Ground Open fail	Gnd Open fail		1 s	Trip GB
8133	Ground Close Fail	Gnd Close fail		1 s	Block
8135	Ground Position Fail	Gnd Pos fail		1 s	Trip GB
8291	BB Measurement Failure	BB meas failure		10 s	Trip + Stop

TROUBLESHOOTING (FAULTS)

Table 22. Fail Class Actions (Engine Running)

Fail Class	Alarm Horn	Alarm Display	De-Load	Trip of GB	Trip of MB	Cool Down Generator	Stop Genset
Block	✓	✓	–	–	–	–	–
Warning	✓	✓	–	–	–	–	–
Trip GB	✓	✓	–	✓	–	–	–
Trip + Stop	✓	✓	–	✓	–	✓	✓
Shutdown	✓	✓	–	✓	–	–	✓
Trip MB	✓	✓	–	–	✓	–	–
Safety Stop	✓	✓	(✓)	✓	–	✓	✓
Trip MB/GB	✓	✓	–	✓	✓	–	–
Controlled Stop	✓	✓	✓	✓	–	✓	✓

Table 23. Fail Class Actions (Engine Stopped)

Fail Class	Block Engine Start	Block MB Sequence	Block GB Sequence
Block	✓	–	–
Warning	–	–	–
Trip GB	✓	–	✓
Trip + Stop	✓	–	✓
Shutdown	✓	–	✓
Trip MB	–	✓	–
Safety Stop	✓	–	–
Trip MB/GB	✓	✓	✓
Controlled Stop	✓	–	✓

TROUBLESHOOTING (GENERATOR)

Practically all breakdowns can be prevented by proper handling and maintenance inspections, but in the event of a breakdown, use Table 24 shown below for diagnosis of the generator. If the problem cannot be remedied, consult our company's business office or service plant.

Table 24. Generator Troubleshooting		
Symptom	Possible Problem	Solution
No Voltage Output	Defective AC voltmeter?	Check output voltage and replace if necessary.
	Loose wiring connection?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
	Defective rotating rectifier?	Check and replace.
Low Voltage Output	Low engine speed?	Check and adjust.
	Loose wiring connection?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
High Voltage Output	Loose wiring connection?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
Circuit Breaker Tripped	Short circuit in load?	Check load and repair.
	Over current?	Confirm load requirement and reduce.
	Defective circuit breaker?	Check and replace.
	Overcurrent relay actuated?	Confirm load requirement and reset.

TROUBLESHOOTING (ENGINE)

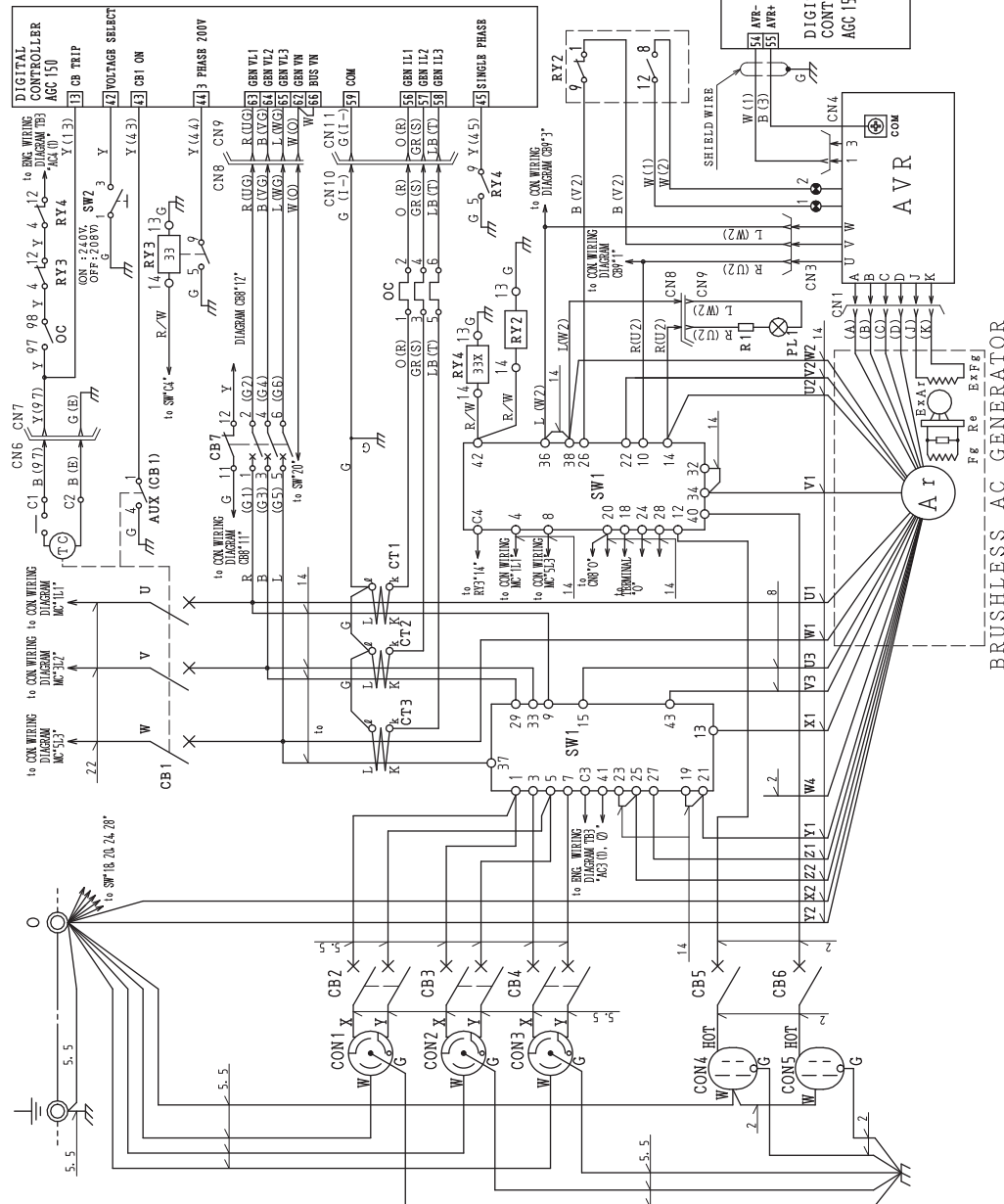
Troubleshooting (Engine)		
Symptom	Possible Problem	Solution
Engine will not start or start is delayed, although engine can be turned over.	No fuel reaching injection pump?	Add fuel. Check entire fuel system.
	Defective fuel pump?	Replace fuel pump.
	Fuel filter clogged?	Replace fuel filter and clean tank.
	Faulty fuel supply line?	Replace or repair fuel line.
	Compression too low?	Check piston, cylinder and valves. Adjust or repair per engine repair manual.
	Fuel pump not working correctly?	Repair or replace fuel pump.
	Oil pressure too low?	Check engine oil pressure.
	Low starting temperature limit exceeded?	Comply with cold starting instructions and proper oil viscosity.
	Defective battery?	Charge or replace battery.
	Air or water mixed in fuel system?	Check carefully for loosened fuel line coupling, loose cap nut, etc.
At low temperatures engine will not start.	Engine oil too thick?	Refill engine crankcase with correct type of oil for winter environment.
	Defective battery?	Replace battery.
Engine fires but stops as soon as starter is switched off.	Fuel filter blocked?	Replace fuel filter.
	Fuel supply blocked?	Check the entire fuel system.
	Defective fuel pump?	Replace fuel pump.
Engine stops by itself during normal operation.	Fuel tank empty?	Add fuel.
	Fuel filter blocked?	Replace fuel filter.
	Defective fuel pump?	Replace fuel pump.
	Mechanical oil pressure shutdown sensor stops the engine due to low oil?	Add oil. Replace low oil shutdown sensor if necessary.
Low engine power, output and speed.	Fuel tank empty?	Add fuel.
	Fuel filter clogged?	Replace fuel filter.
	Fuel tank venting is inadequate?	Ensure tank is adequately vented.
	Leaks at pipe unions?	Check threaded pipe unions. Tape and tighten unions as required.
	Speed control lever does not remain in selected position?	See engine manual for corrective action.
	Engine oil level too full?	Correct engine oil level.
	Injection pump wear?	Use No. 2-D diesel fuel only. Check the fuel injection pump element and delivery valve assembly and replace as necessary.

TROUBLESHOOTING (ENGINE)

Troubleshooting (Engine) - continued		
Symptom	Possible Problem	Solution
Low engine power output and low speed, black exhaust smoke.	Air filter blocked?	Clean or replace air filter.
	Incorrect valve clearances?	Adjust valves per engine specification.
	Malfunction at injector?	See engine manual.
Engine overheats.	Too much oil in engine crankcase?	Drain off engine oil down to upper mark on dipstick.
	Entire cooling air system contaminated or blocked?	Clean cooling air system and cooling fin areas.
	Fan belt broken or elongated?	Change belt or adjust belt tension.
	Coolant insufficient?	Replenish coolant.
	Radiator net or radiator fin clogged with dust?	Clean net or fin carefully.
	Fan, radiator, or radiator cap defective?	Replace defective part.
	Thermostat defective?	Check thermostat and replace if necessary.
	Head gasket defective or water leakage?	Replace parts.

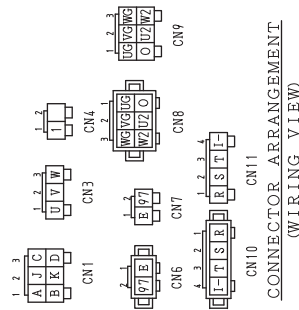
GENERATOR WIRING DIAGRAM (M2814000703)

SYMBOL	DESIGNATION
Ar	MAIN GENERATOR ARMATURE WINDING
Fg	MAIN GENERATOR FIELD WINDING
ExAr	EXCITER ARMATURE WINDING
ExFg	EXCITER FIELD WINDING
AVR	AUTOMATIC VOLTAGE REGULATOR
Re	RECTIFIER
CT1~3	CURRENT TRANSFORMER 250:5A
CB1	CIRCUIT BREAKER 3P 750A
CB2~4	CIRCUIT BREAKER 2P 50A
CB5, 6	CIRCUIT BREAKER 1P 20A
CON1~3	RECEPTACLE 250V 50A
CON4, 5	RECEPTACLE 125V 20A x 2 (G. F. C. I.)
OC	OVER CURRENT RELAY
SW1	SELECTOR SWITCH
SW2	VOLTAGE SELECT SWITCH
RY2~4	RELAY
PL1	PILOT LAMP
R1	RESISTOR
CB7	CIRCUIT BREAKER 3P 5A



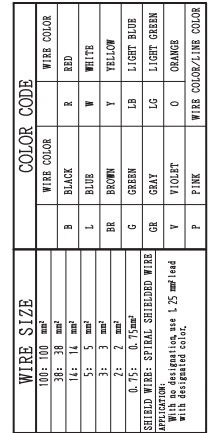
WIRE SIZE	WIRE COLOR	COLOR CODE	WIRE COLOR
21: 2mm ²	B	BLACK	R
14: 3mm ²	L	BLUE	W
8: 5mm ²	BR	BROWN	Y
5.5: 5.5mm ²	G	GREEN	LB
2: 2mm ²	GR	GRAY	LG
	V	VIOLET	OR
	P	PINK	ORANGE
			WIRE COLOR/LINE COLOR

CT 1 ~ 3
Written mark at CT
k
1
No mark
K
L
No mark

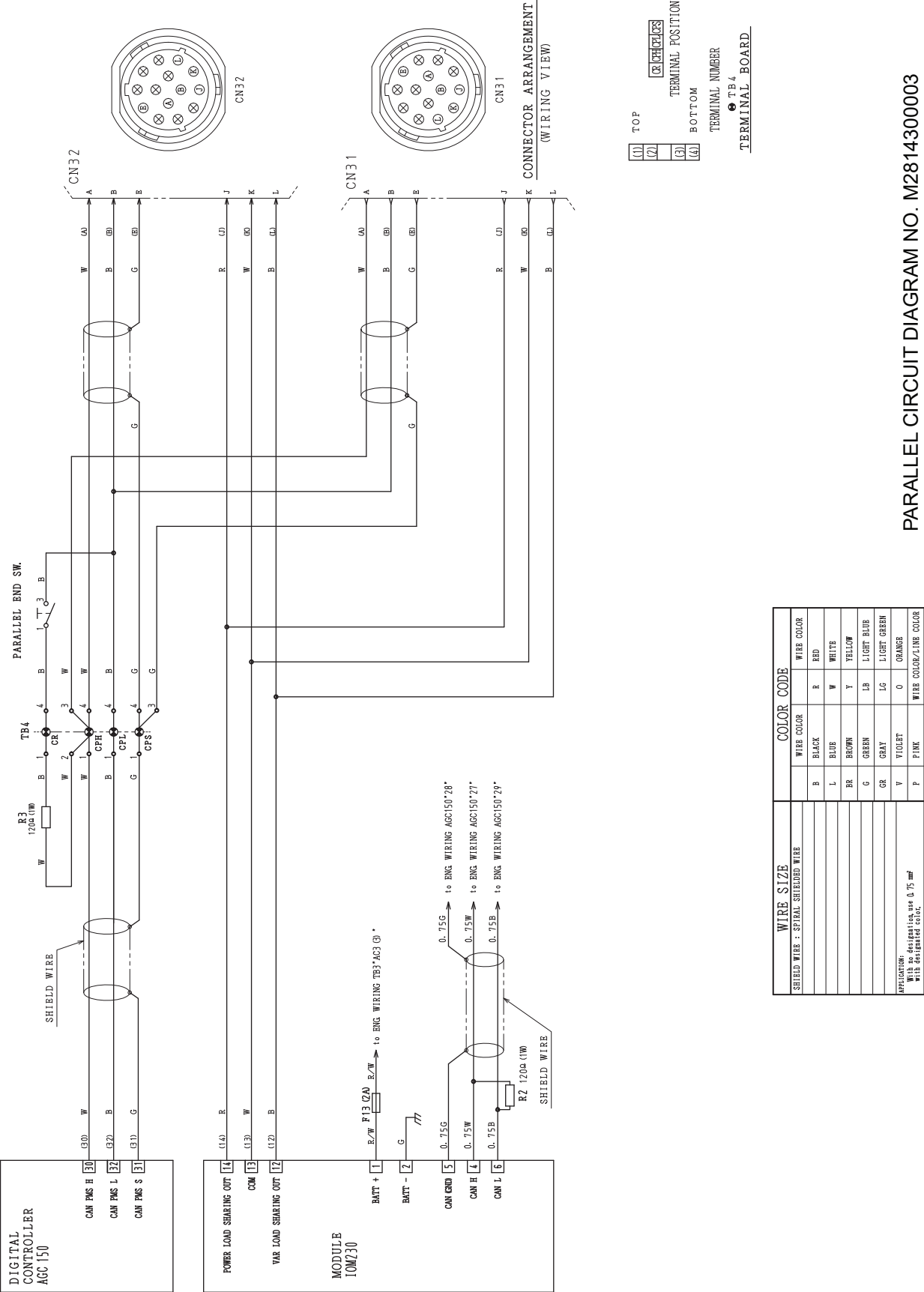


GENERATOR WIRING DIAGRAM NO. M2814000703

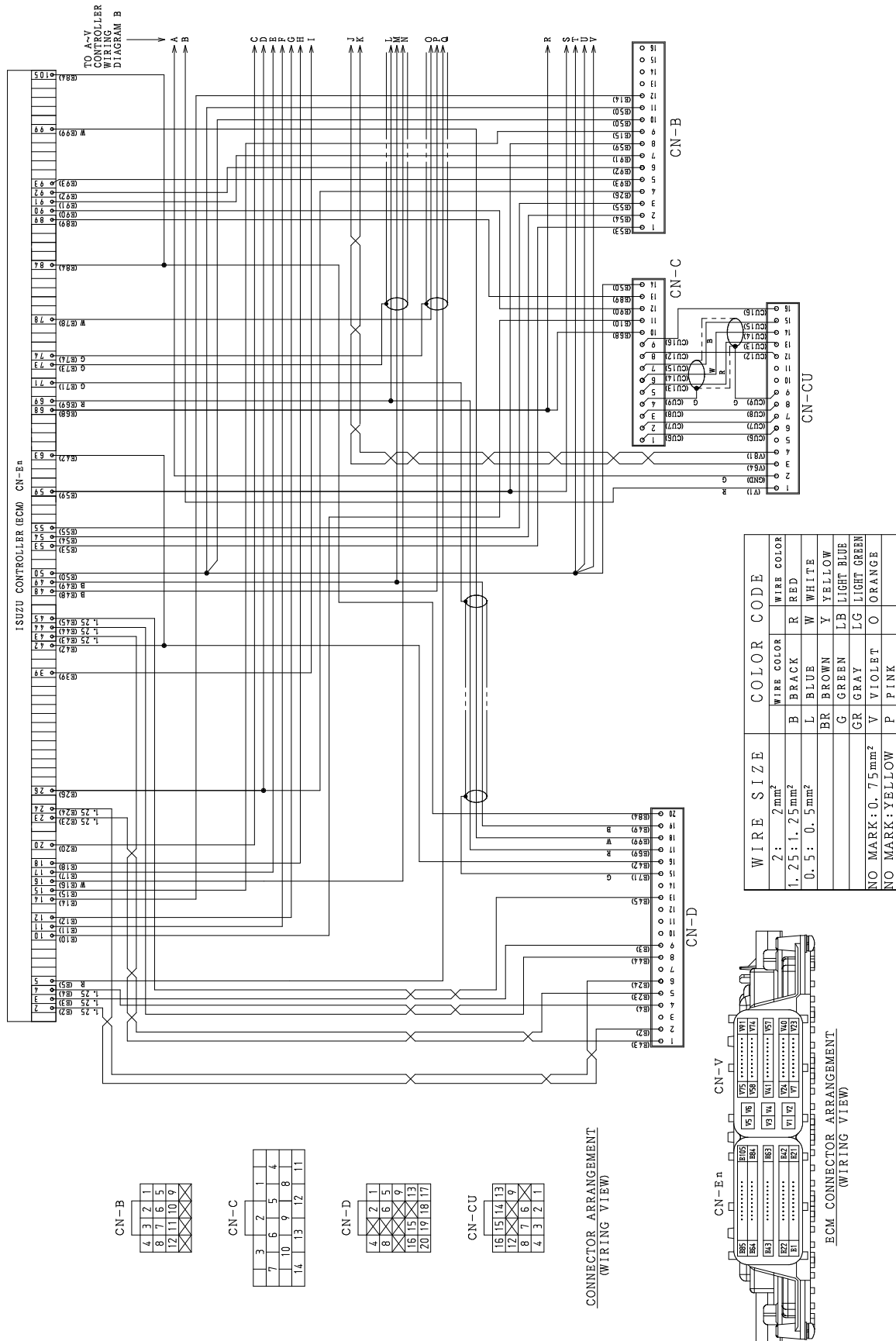
ENGINE WIRING DIAGRAM NO. M2814101203



PARALLEL CIRCUIT DIAGRAM (M2814300003)

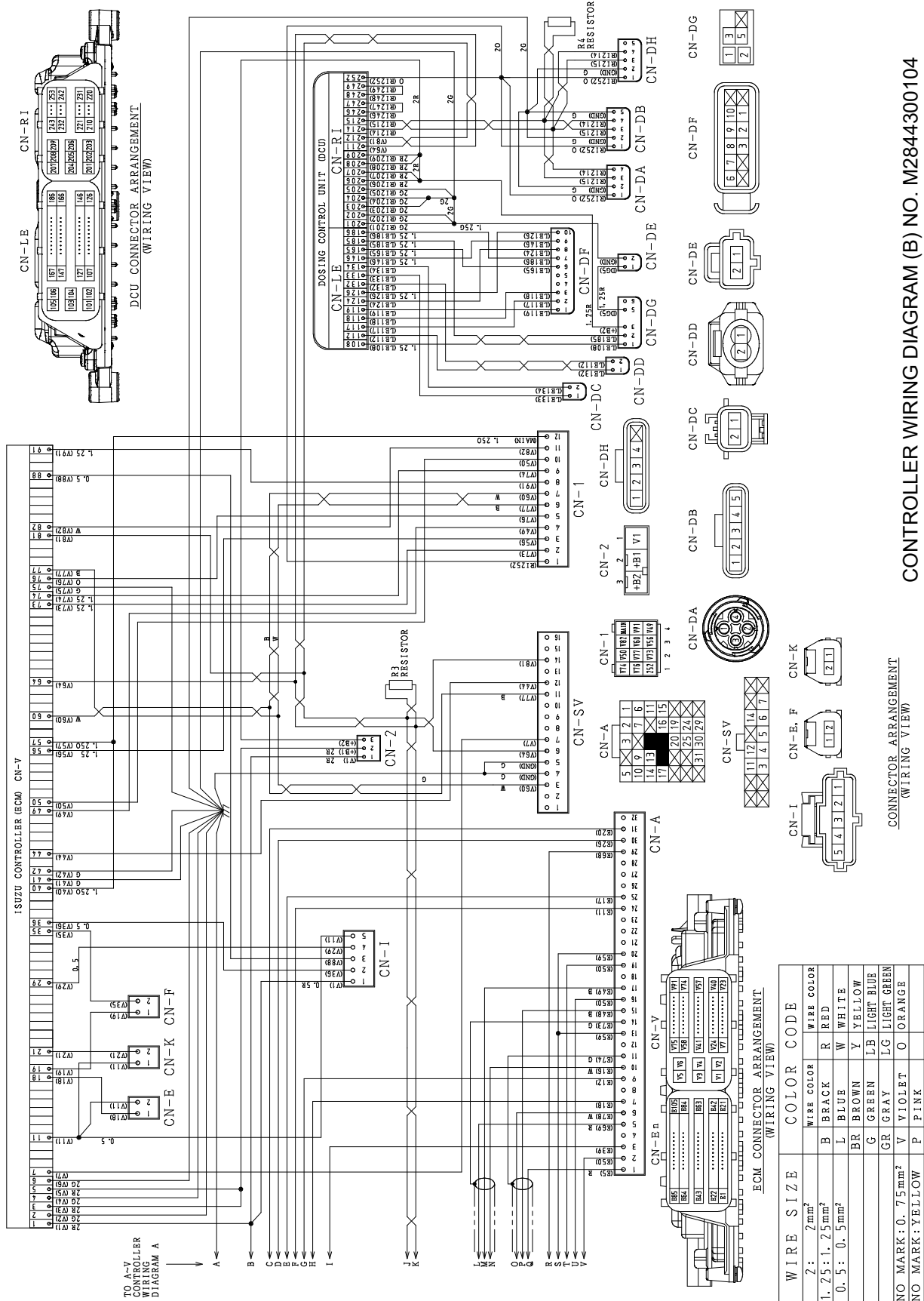


CONTROLLER WIRING DIAGRAM (A) (M2844300104)

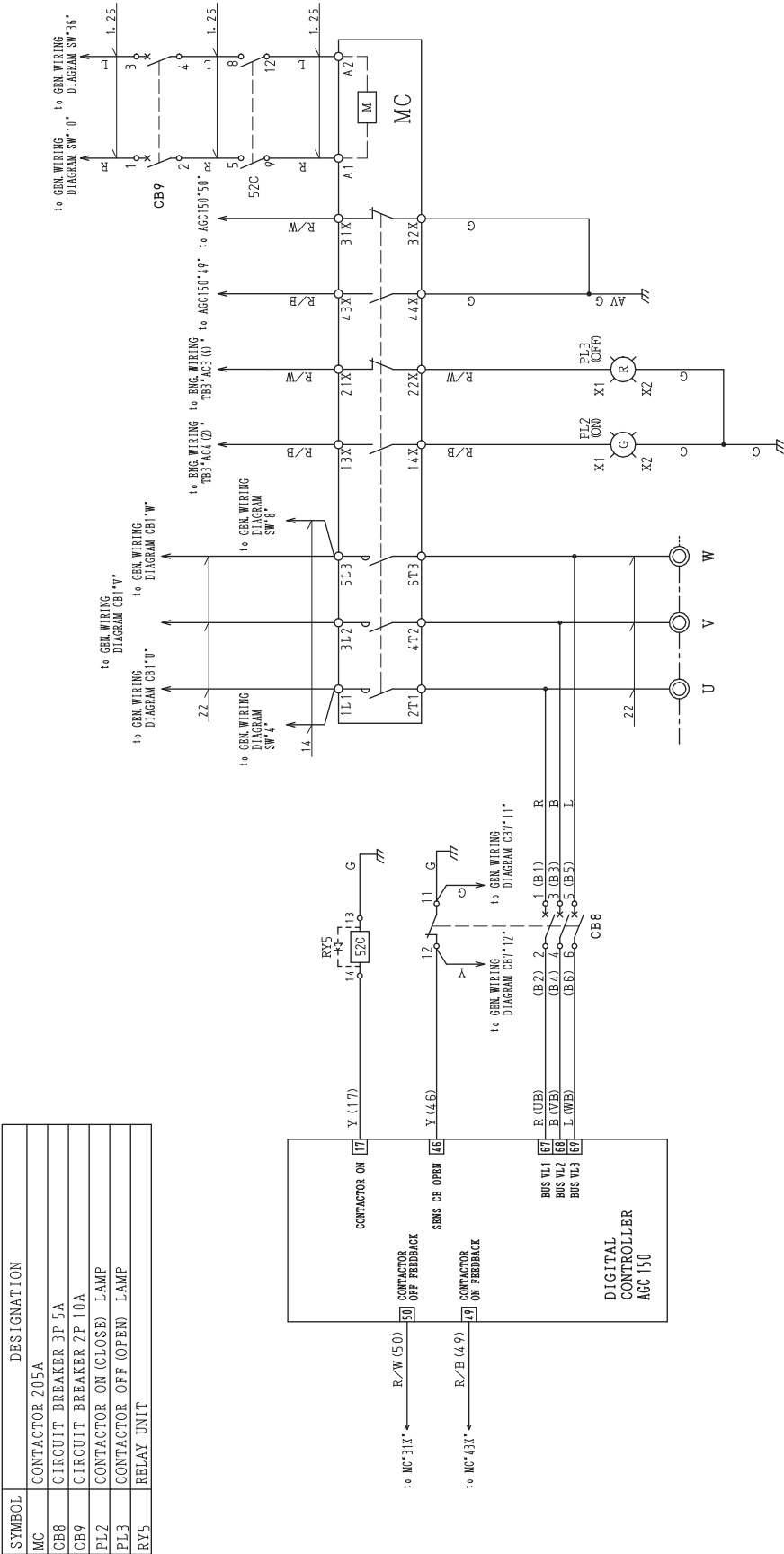


CONTROLLER WIRING DIAGRAM (A) NO. M2844300104

CONTROLLER WIRING DIAGRAM (B) (M2844300104)



CONTACTOR WIRING DIAGRAM (M2814200003)



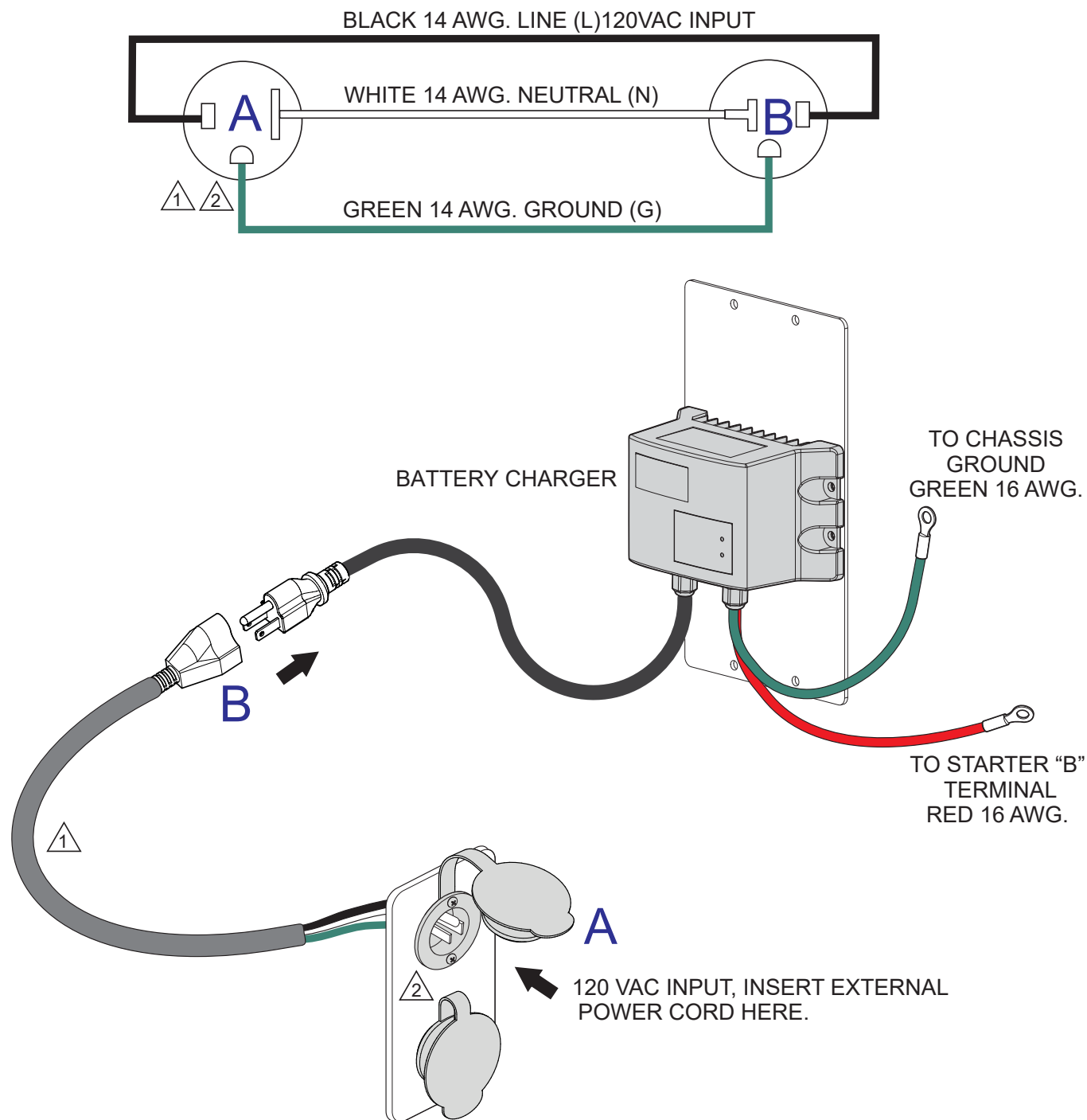
SYMBOL	DESIGNATION
MC	CONTACTOR 205A
CB8	CIRCUIT BREAKER 3P 5A
CB9	CIRCUIT BREAKER 2P 10A
PL2	CONTACTOR ON (CLOSE) LAMP
PL3	CONTACTOR OFF (OPEN) LAMP
RY5	RELAY UNIT

WIRE SIZE	COLOR CODE	
	WIRE COLOR	WIRE COLOR
22, 32 mm ²	B	BLACK
14, 16 mm ²	R	RED
1.25, 1.75 mm ²	L	BLUE
	W	WHITE
	BR	BROWN
	Y	YELLOW
	G	GREEN
	LB	LIGHT BLUE
	LG	LIGHT GREEN
	GR	GRAY
	V	VIOLET
	P	PINK
		WIRE COLOR/LINE COLOR

SHIELD WIRE: SPIRAL SHIELDED WIRE
APPLICATION: Wire designation use 0.75 mm² lead with 0.75 mm² lead

CONTACTOR WIRING DIAGRAM NO. M2814200003

BATTERY CHARGER WIRING DIAGRAM



NOTES:

- 1 INLET RECEPTACLE & CORD, NEMA 5-15P, 15 AMP, 125V, P/N EE62076
- 2 RECEPTACLE IS MOUNTED ON OUTPUT TERMINAL PANEL ASSY.

OPERATION MANUAL

HERE'S HOW TO GET HELP

PLEASE HAVE THE MODEL AND SERIAL
NUMBER ON HAND WHEN CALLING

UNITED STATES

Multiquip Inc.

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6141 Katella Avenue Suite 200
Cypress, CA 90630
E-MAIL: mq@multiquip.com
WEBSITE: www.multiquip.com

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E-MAIL: infocanada@multiquip.com

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This manual MUST accompany the equipment at all times. This manual is considered a permanent part of the equipment and should remain with the unit if resold.

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