OPERATION MANUAL

MQ POWER®

WHISPERWATT™ SERIES

MODEL DCA300SSJU4F2

60Hz GENERATOR

(JOHN DEERE 6090HFG06 DIESEL ENGINE)

Revision #1 (09/20/19)

To find the latest revision of this publication or associated parts manual, visit our website at:
www.mqpower.com

THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.


WARNING
CANCER &
REPRODUCTIVE HARM
www.P65Warnings.ca.gov
P/N 38707

DCA300SSJU4F2
60 Hz Generator

NAMEPLATE AND SAFETY LABELS

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

NOTICE

For safety label part numbers, reference parts manual.

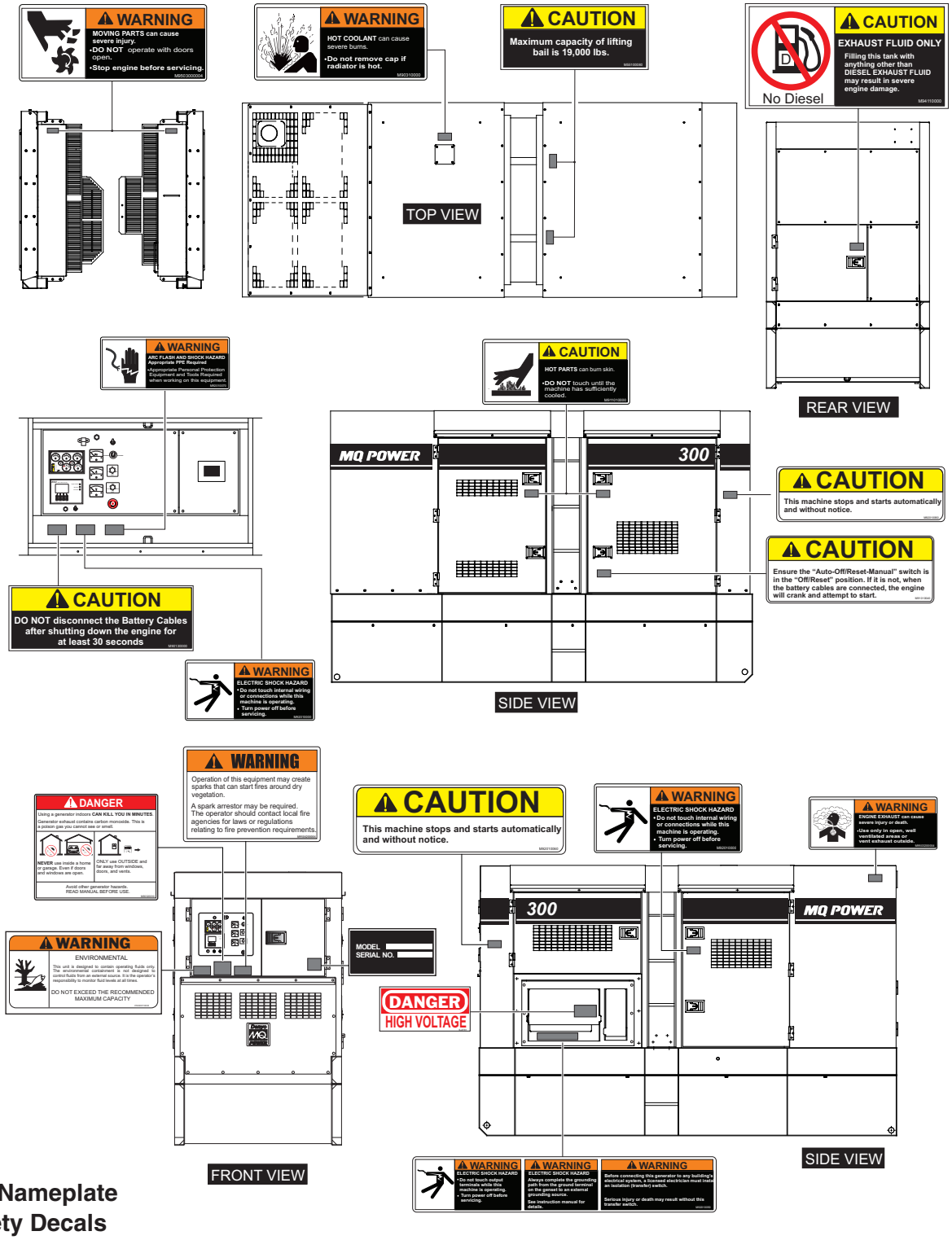


Figure 1. Nameplate and Safety Decals

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

GENERAL SAFETY

⚠ CAUTION

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

- **NEVER** operate this generator when not feeling well due to fatigue, illness or when under medication.

- **NEVER** operate this generator under the influence of drugs or alcohol.

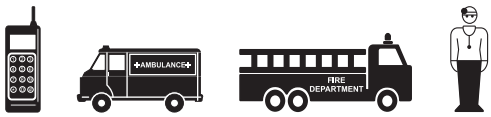
- **ALWAYS** check the generator for loosened threads or bolts before starting.
- **DO NOT** use the generator for any purpose other than its intended purposes or applications.

NOTICE

- This generator should only be operated by trained and qualified personnel 18 years of age and older.
- Whenever necessary, replace nameplate, operation and safety decals when they become difficult read.
- Manufacturer does not assume responsibility for any accident due to generator modifications. Unauthorized generator modification will void all warranties.
- **NEVER** use accessories or attachments that are not recommended by MQ Power for this generator. Damage to the generator and/or injury to user may result.
- **ALWAYS** know the location of the nearest **fire extinguisher.**

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

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



GENERATOR SAFETY

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

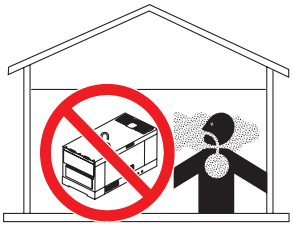
NOTICE

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

ENGINE SAFETY

⚠ DANGER

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



⚠ WARNING

- **DO NOT** place hands or fingers inside engine compartment when engine is running.
- **NEVER** operate the engine with heat shields or guards removed.
- Keep fingers, hands hair and clothing away from all moving parts to prevent injury.

- **DO NOT** remove the radiator cap while the engine is hot. High pressure boiling water will gush out of the radiator and severely scald any persons in the general area of the generator.

- **DO NOT** remove the coolant drain plug while the engine is hot. Hot coolant will gush out of the coolant tank and severely scald any persons in the general area of the generator.
- **DO NOT** remove the engine oil drain plug while the engine is hot. Hot oil will gush out of the oil tank and severely scald any persons in the general area of the generator.

⚠ CAUTION

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

NOTICE

- **NEVER** run engine without an air filter or with a dirty air filter. Severe engine damage may occur. Service air filter frequently to prevent engine malfunction.
- **NEVER** tamper with the factory settings of the engine or engine governor. Damage to the engine or generator can result if operating in speed ranges above the maximum allowable.

- Wet stacking is a common problem with diesel engines which are operated for extended periods with light or no load applied. When a diesel engine operates without sufficient load (less than 40% of the rated output), it will not operate at its optimum temperature. This will allow unburned fuel to accumulate in the exhaust system, which can foul the fuel injectors, engine valves and exhaust system, including turbochargers, and reduce the operating performance.

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

  Wet stacking does not usually cause any permanent damage and can be alleviated if additional load is applied to relieve the condition. It can reduce the system performance and increase maintenance. Applying an increasing load over a period of time until the excess fuel is burned off and the system capacity is reached usually can repair the condition. This can take several hours to burn off the accumulated unburned fuel.
- State Health Safety Codes and Public Resources Codes specify that in certain locations, spark arresters must be used on internal combustion engines that use hydrocarbon fuels. A spark arrester is a device designed to prevent accidental discharge of sparks or flames from the engine exhaust. Spark arresters are qualified and rated by the United States Forest Service for this purpose. In order to comply with local laws regarding spark arresters, consult the engine distributor or the local Health and Safety Administrator.

FUEL SAFETY

⚠ DANGER

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

ELECTRICAL SAFETY

⚠ DANGER

- **DO NOT** touch output terminals during operation. Contact with output terminals during operation can cause **electrocution, electrical shock or burn.**

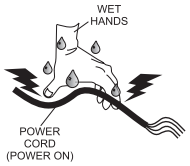
- The electrical voltage required to operate the generator can cause severe injury or even death through physical contact with live circuits. Turn generator and all circuit breakers **OFF** before performing maintenance on the generator or making contact with output terminals.
- **NEVER** insert any objects into the output receptacles during operation. This is extremely dangerous. The possibility exists of **electrical shock, electrocution or death.**

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

Power Cord/Cable Safety

⚠ DANGER

- **NEVER** let power cords or cables **lay in water.**
- **NEVER stand in water** while AC power from the generator is being transferred to a load.
- **NEVER** use **damaged** or **worn** cables or cords when connecting generator to generator. Inspect for cuts in the insulation.
- **NEVER** grab or touch a live power cord or cable with wet hands. The possibility exists of **electrical shock, electrocution or death.**



- Make sure power cables are securely connected to the generator's output receptacles. Incorrect connections may cause electrical shock and damage to the generator.

NOTICE

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

Grounding Safety

DANGER

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

NOTICE

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

BATTERY SAFETY

DANGER

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

WARNING

- **ALWAYS** wear safety glasses when handling the battery to avoid eye irritation. The battery contains acids that can cause injury to the eyes and skin.

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

CAUTION

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

ENVIRONMENTAL SAFETY/DECOMMISSIONING

NOTICE

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

- **DO NOT** pour waste or oil directly onto the ground, down a drain or into any water source.
- Contact your country's Department of Public Works or recycling agency in your area and arrange for proper disposal of any electrical components, waste or oil associated with this generator.

- When the life cycle of this generator is over, remove battery(s) and bring to an appropriate facility for lead reclamation. Use safety precautions when handling batteries that contain sulfuric acid.
- When the life cycle of this generator is over, it is recommended that the generator frame and all other metal parts be sent to a recycling center.

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

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

EMISSIONS INFORMATION

NOTICE

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

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

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

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

Emission Control Label

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

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

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

Table 1. Generator Specifications	
Model	DCA300SSJU4F2
Type	Revolving field, self ventilated, open protected type synchronous generator
Armature Connection	**Star with Neutral**
Phase	3Ø
Standby Output	264 kW (330 kVA)
Prime Output	240 kW (300 kVA)
3Ø Voltage (L-L/L-N) Voltage Change-Over Bd. at 3Ø 240/139	208Y/120, 220Y/127, 240Y/139
3Ø Voltage (L-L/L-N) Voltage Change-Over Bd. at 3Ø 480/277	416Y/240, 440Y/254, 480Y/277
1Ø Voltage (L-L/L-N) Voltage Change-Over Bd. at 1Ø 240/120	N/A
Power Factor	0.8
Frequency	60 Hz
Speed	1800 rpm
Aux. AC Power	Single Phase, 60 Hz
Aux. Voltage/Output	4.8 Kw (2.4 kW x 2)
Dry Weight	11,220 lbs. (5,090 kg)
Wet Weight	15,010 lbs. (6,810 kg)

Table 2. Engine Specifications		
Model	John Deere 6090HFG09 EPA Tier 4 Final Certified	
Type	4 cycle, water-cooled, direct injection, turbo-charged charged air cooled, EGR, DOC and SCR	
No. of Cylinders	6 cylinders	
Bore x Stroke	4.64 in. x 5.34 in. (118.4 mm x 136 mm)	
Displacement	549.2 cu. in. (9.0 liter)	
Rated Output	437 HP (326 kW) at 1800 rpm	
Starting	Electric	
Cold Weather Starting Aid	NVT Dieselmatic Starting Fluid System	
Coolant Capacity with Radiator	17.7 gal. (67 liters)[1] John Deere Cool-Gard II ™	
Lube Oil Capacity	9.3 gal. (35 liters)[2]	
Lubricating Type Oil	API service class CJ-4, ACEA E9 or ACEA E6	
DEF Tank Capacity	29.7 gal. (112.4 liters)	
Fuel Type	#2 Diesel Fuel (Ultra low sulfur diesel fuel only)	
Fuel Tank Capacity	430.6 gal. (1,630 liters)	
Fuel Consumption	16.7 gal. (63.2 L)/hr at **full load**	12.5 gal. (47.4 L)/hr at **3/4 load**
	8.9 gal. (33.8 L)/hr at **1/2 load**	5.8 gal. (21.9 L)/hr at **1/4 load**
Battery	8D (CCA 0°F 1400A) X 1	

[1] Includes engine and radiator hoses, [2] Includes filters

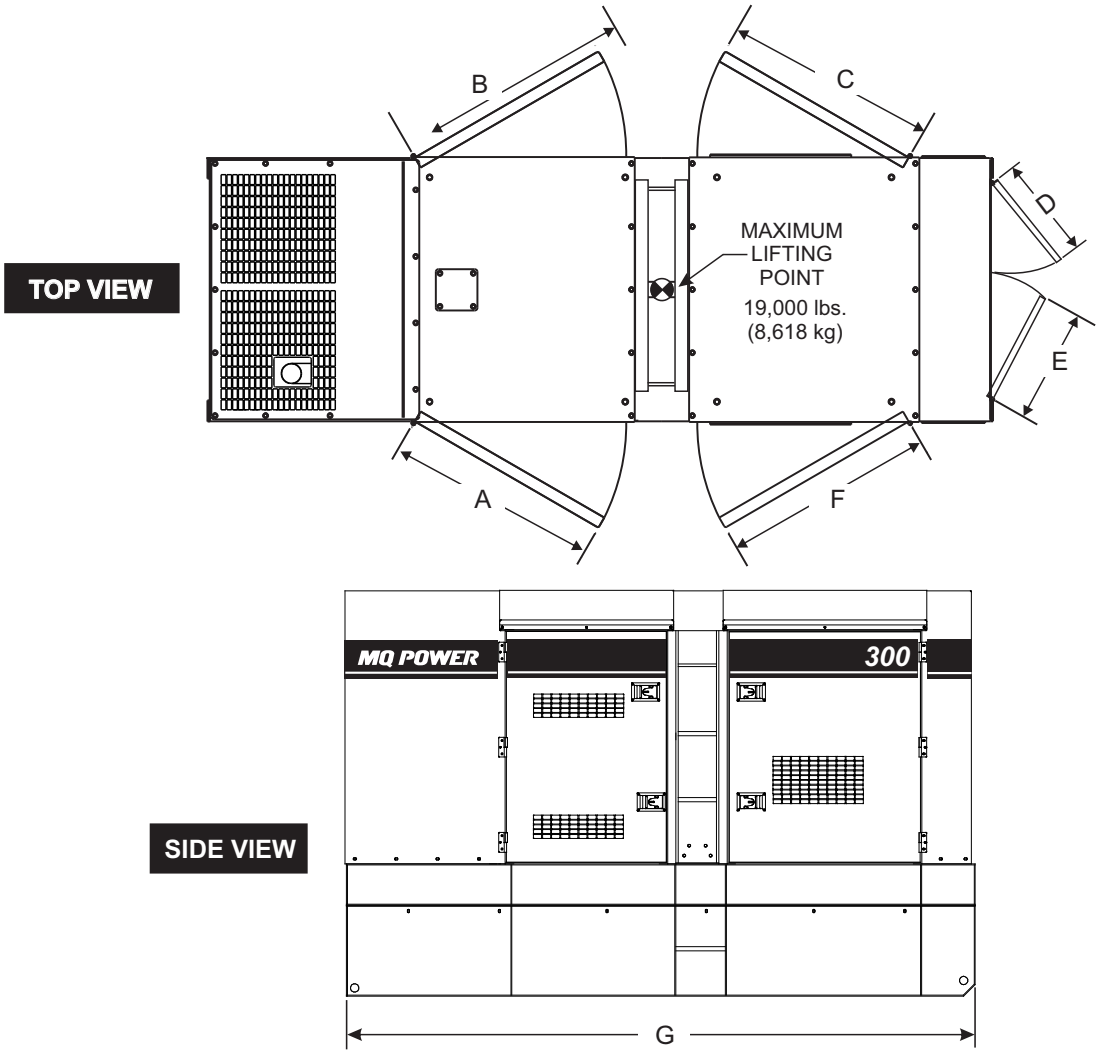


Figure 2. Dimensions

Table 3. Dimensions			
Reference Letter	Dimension in. (mm)	Reference Letter	Dimension in. (mm)
A	38.19 (970)	F	46.42 (1,179)
B	38.19 (970)	G	149.60 (3,800)
C	45.47 (1,155)	H	96.46 in. (2,450)
D	23.03 (585)	I	59.05 in. (1,500)
E	25.20 (640)		

NOTES

CONNECTING THE GROUND

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

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

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

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

Connect one end of the ground cable terminal to the generator ground point (Figure 3). Connect the other end of the ground cable to a suitable earth ground (ground rod)

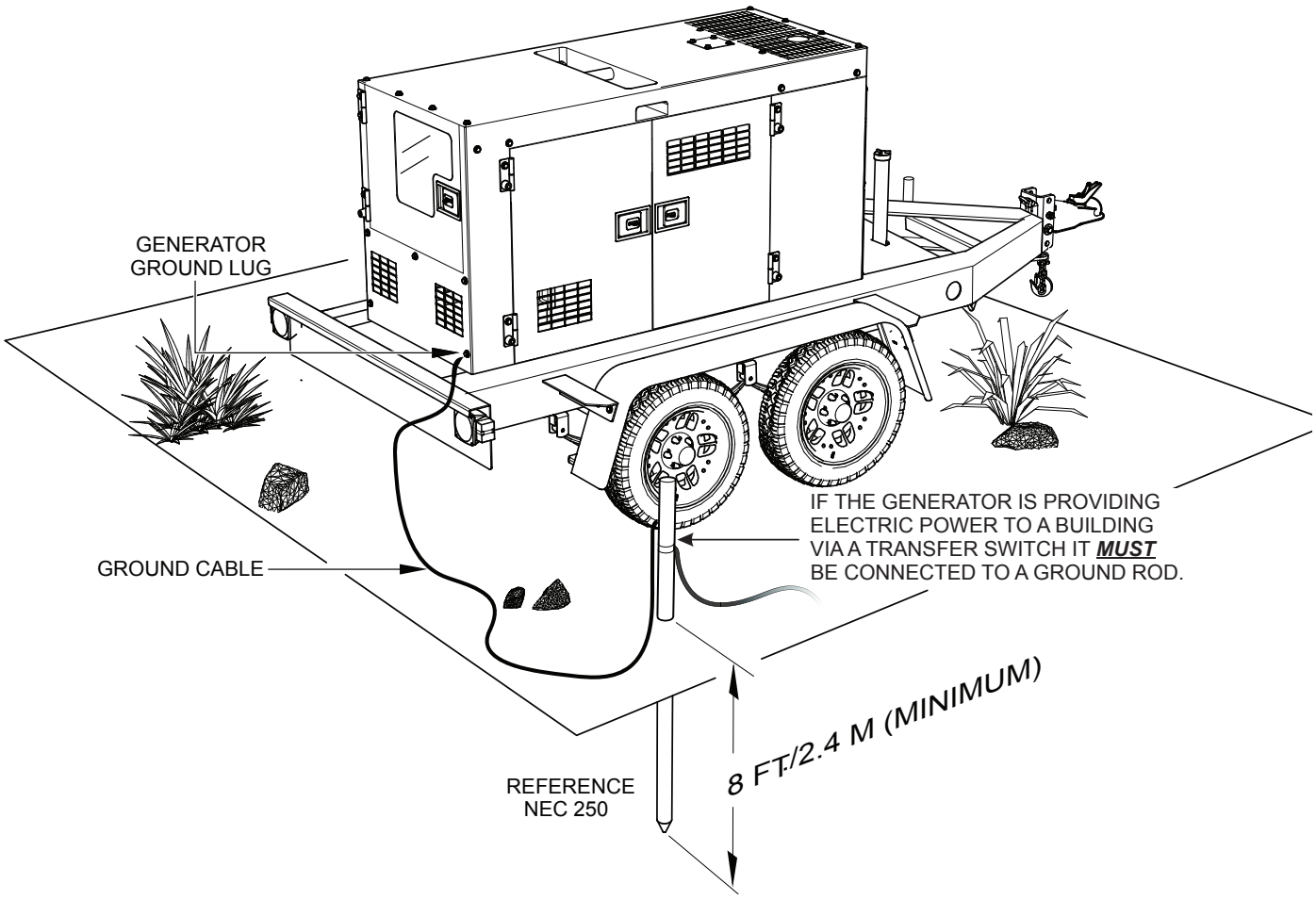


Figure 3. Typical Generator Grounding Application

OUTDOOR INSTALLATION

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

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

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

⚠ CAUTION

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

INDOOR INSTALLATION

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

MOUNTING

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

GENERATOR GROUNDING

NOTICE

The Occupational Safety and Health Administration (OSHA) and the National Electrical Code (NEC) recommend that if the generator is providing electrical power to a structure (home, office shop, trailer or similar) it ***must*** be connected to a grounding electrode system, such as driven ground rod (Figure 3).

If applicable, to guard against electrical shock and possible damage to the equipment, it is important to provide a good **EARTH** ground, (Figure 3).

NOTICE

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

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

NEC article 250 specifices the following grounding requirements:

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

NOTICE

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

GENERATOR

This generator (Figure 7) is designed as a high quality portable (requires a trailer for transport) power source for telecom sites, lighting facilities, power tools, submersible pumps and other industrial and construction machinery.

OPERATING PANEL

The "Operating Panel" is provided with the following:

- ECU-845 Controller
- Gauge Unit (ECU-670)
  - Oil Pressure Gauge
  - Water Temperature Gauge
  - Charging Voltmeter
  - Fuel Gauge/DEF Gauge
  - Tachometer/Generator Load
- Panel Light/Panel Light Switch
- Hour Check Button
- Auto Start/Stop Switch
- Emergency Stop Button
- Engine Speed Switch
- Fuel Leak Detected Alarm Lamp

CONTROL PANEL

The "Control Panel" is provided with the following:

- Frequency Meter (Hz)
- AC Ammeter (Amps)
- AC Voltmeter (Volts)
- Ammeter Change-Over Switch
- Voltmeter Change-Over Switch
- Voltage Regulator
- 3-Pole, 800 amp Main Circuit Breaker
- "Control Box" (located behind Control Panel)
  - Automatic Voltage Regulator
  - Current Transformer
  - Over-Current Relay
  - Starter Relay
  - Voltage Change-Over Board

OUTPUT TERMINAL PANEL

The "Output Terminal Panel" is provided with the following:

- Three 120/240V output receptacles (CS-6369), 50A
- Three auxiliary circuit breakers, 50A
- Two 120V output receptacles (GFCI), 20A
- Two GFCI circuit breakers, 20A
- Eight output terminal lugs (3Ø power)
- Ground lug
- Battery Charger (Optional)
- Jacket Water Heater (Optional)

OPEN DELTA EXCITATION SYSTEM

Each generator is equipped with the state of the art **"Open-Delta"** excitation system. The open delta system consist of an electrically independent winding wound among stationary windings of the AC output section.

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

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

The connections of the AVR to the AC output windings are for sensing only. No power is required from these windings.

The open-delta design provides virtually unlimited excitation current, offering maximum motor starting capabilities. The excitation does not have a **"fixed ceiling"** and responds according the demands of the required load.

ENGINE

This generator is powered by a 6 cylinder, 4-cycle water cooled, direct injection, turbocharged, air cooled EGR John Deere 6090HFG06 diesel engine. This engine is designed to meet every performance requirement for the generator. Reference Table 2 for engine specifications.

In keeping with MQ Power's policy of constantly improving its products, the specifications quoted herein are subject to change without prior notice.

ELECTRIC GOVERNOR SYSTEM

The electric governor system controls the RPMs of the engine. When the engine demand increases or decreases, the governor system regulates the frequency variation to ±.25%.

EXTENSION CABLES

When electric 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 8) as a guide for selecting proper extension cable size.

NOTICE

When the paralleling option is employed, the Basler DGC-2020HD controller ***must*** be installed. The factory installed ECU-845 controller cannot be used for paralleling.

PARALLELING

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

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 systems' 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 systems'.

The kW load sharing is achieved by increasing or decreasing fuel to the systems' 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 systems' 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 systems' 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 an decrease in voltage (as it would if it were operating alone) but It will lead to an decrease in the proportion of the total **kVAR** load it will deliver and a increase in its power factor.

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

ETHERNET COMMUNICATION

Ethernet communication is the preferred method for paralleling. This method supports breaker negotiation to avoid simultaneous breaker closures, kW load sharing and kVAR sharing, soft load transfers on and off loading.

The Ethernet ports are located at the output bus splash panel area. There are two ports which are identical so either one can be used. Using a standard Ethernet cable, interconnect units to be paralleled and or sequenced.

LOAD MANAGEMENT

These generators are set up to automatically manage load, based on demand. Load management is only functional in auto mode. 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 remain running while the other generators will be in standby mode. If the load increases above 80% 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 35% of its combined rating, the generator that is no longer needed will ramp off, shut down and wait in standby mode.

SEQUENCING

NOTICE

Ethernet communication is required when the generators are configured for the sequencing mode of operation.

These generators are capable of sequencing for control of balanced maintenance schedules. As described above, these generators can start and stop as demand raises or lowers. In addition, if the units get to the point of maintenance, it will ramp off and start the next generator to relieve it based on the time remaining on the maintenance timer.

After maintenance is performed, the maintenance timers should be reset to the recommended service interval. This is usually 250 hours depending on the engine oil type.

MAINTENANCE INTERVAL

Maintenance intervals are factory set for 250 hours. The maintenance interval timer will count down to zero indicating that it is time for the unit to be serviced.

Once the timer counts down to zero, a pre-alarm will appear indicating that the unit is due for maintenance. To reset the maintenance interval back to the default time of 250 hours, press and hold the "Reset" button for ten seconds.

To reset the maintenance interval using the reset button, the Maintenance Due pre-Alarm must be active, and the Basler controller must display the "Overview Screen" (Main Screen).

If the maintenance timer has not yet expired and it is desired to reset the unit back to 250 hours, navigate back to the settings menu. Settings Menu->System Parameters->Engine Statistics->Hours To Maintenance.

PASSWORD ENTRY 2.04 AND LOWER

When highlighted, press the "Edit" button. Username and Password is required. User Name is **A** and Password is **A**. Use the up arrow button (↑) and scroll to the alpha character **A**, then press edit to select.

Next, the cursor will move to the ***password*** field, press the up arrow button (↑) and scroll to the alpha character **A**, then press edit to select.

The complete password sequence is shown in Figure 4. The set-point for the desired hours until maintenance can now be changed. Press edit to save.

Figure 4. Password Sequence 2.04 and Lower

PASSWORD ENTRY 2.04 AND HIGHER

User Name and Password is **A**.

Once prompted, the cursor will be in the user name field. Press the down button (↓) twice to highlight the **A** character.

Once the user name of **A** is populated in the user name field, press the up arrow (↑) button four times to highlight the check box in the upper right corner of the screen. With the check box highlighted press the edit button to accept the entry.

The cursor will move to the password field. Again, press the down arrow (↓) button twice until the **A** is highlighted and then press edit. Press the up arrow (↑) button four times to highlight the check box in the upper right corner of the screen. With the check box highlighted press the edit button to accept the entry. This completes the password entry.

The complete password sequence is as follows:

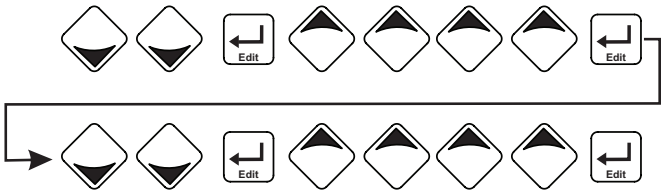


Figure 5. Password Sequence 2.04 and Higher

Pre-alarm Silence allows the user to suppress the toggling of the alarm screen when a new Pre-alarm becomes active. While a Pre-alarm is active, pressing the Alarm Silence button will suppress the fault display.

This happens to be very handy function when the "Maintenance Interval" Pre-Alarm occurs. Right after the Pre-Alarm occurs it will begin toggling between the ***pre-alarm*** and the ***overview screen***.

While in this mode, pressing the reset button does not reset the maintenance interval. In order to reset the maintenance interval the overview screen ***must*** be selected.

Pressing the alarm silence button will stop the toggling between the pre-alarm and the overview screen.

Once the overview screen is selected, the maintenance interval can be reset by pressing and holding the reset button for 10 seconds.

THREE PHASE 480V/208V PARALLEL WIRING VIA CAMLOCKS

REQUIRED EQUIPMENT

- 4/0 Single Conductor Cable (User Supplied)
- CAT5E Shielded Cable or Better (User Supplied)
- Power Distribution Panel (User Supplied)

The following procedure intended to assist the user with the parallel wiring configuration for the DCA300SSJU4F2 generator using the camlok connector panel.

NOTICE

Only a **qualified service technician** or **licensed electrician** with proper training should perform this installation. Follow all shop safety rules when performing this installation.

PREPARATION

1. Make sure generator is turned off and engine is cool.
2. Disconnect any loads connected to the generator.
3. Place the main circuit breaker in the **OFF** position.
4. Place the generator in an area free of dirt and debris Make sure it is on secure level ground.
5. Disconnect ***negative*** battery cable from the battery.

3Ø-480 VAC PARALLEL WIRING CONFIGURATION

1. Using 4/0 cables connect the two generators to the power distribution panel as referenced in the 3Ø-480V parallel wiring diagram.

DANGER

To prevent arcing make sure cables are securely tighten at power distribution panel, the possibility exist of the unit catching on fire thus causing equipment damage and severe bodily harm.

NOTICE

When connecting load cables to the power distribution panel be sure to select the correct size of the load cables to handle full load/amperage of both generators (parallel).

3Ø-208 VAC PARALLEL WIRING CONFIGURATION

1. Using 4/0 cables connect the two generators to the power distribution panel as referenced in the 3Ø-208V parallel wiring diagram.

ETHERNET CABLE CONNECTION

1. Connect a CAT5E Ethernet cable (shielded) between port 1 on both generators as shown in Figure 6.

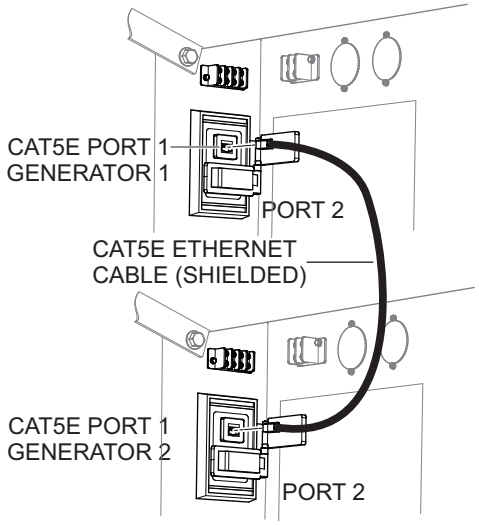


Figure 6. Ethernet Cable Connection

2. Reference Table 4 for additional Ethernet port connections.

Table 4. Ethernet Cable Connections

Generator 1	Generator 2
Port 2	Port 1
Port 1	Port 2
Port 2	Port 2

3. Reconnect battery.
4. Start generator as outlined in start up section of this manual.

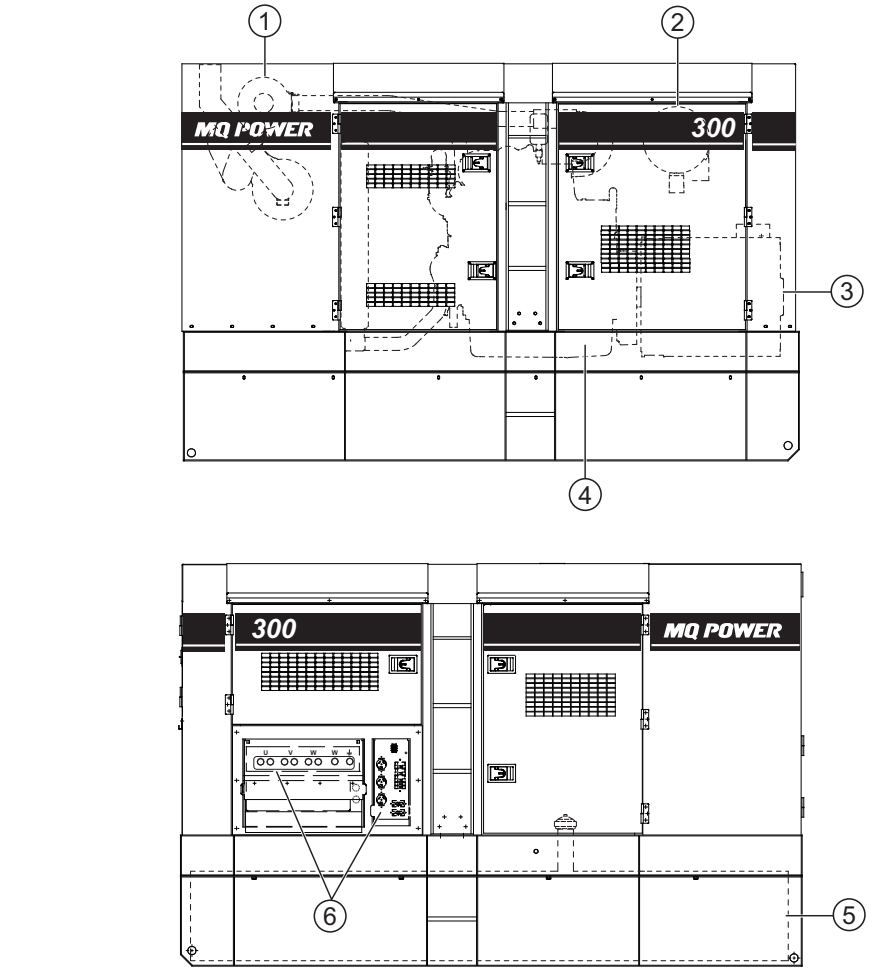


Table 5. Generator Major Components	
ITEM NO.	DESCRIPTION
1	Muffler Assembly
2	Air Filter Assembly
3	Generator Assembly
4	Engine Assembly
5	Fuel Tank Assembly
6	Output Terminal Assembly
7	ECU-670 Gauge Unit Assembly
8	Generator Control Panel Assembly
9	Voltage Change-Over Board Assembly
9	Auto Start/Stop Controller Assembly
10	Circuit Breaker Assembly
11	Battery Assembly
12	ECU-845 Controller Assembly

Figure 7. Major Components

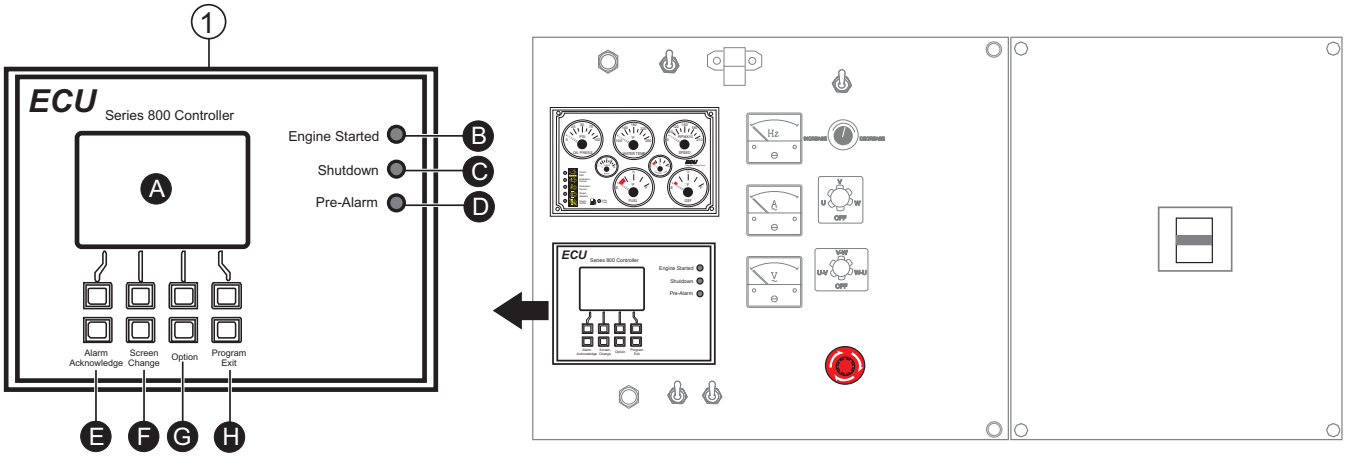


Figure 8. Engine Control Unit (ECU-845)

The definitions below describe the controls and functions of the Engine Control Unit (Figure 8).

1. **ECU-845 Controller** — This auto start/stop controller displays the parameters and the diagnostic troubleshooting messages of the engine.

   In addition, this controller also displays symbols and indications related to the exhaust gas after treatment system (DOC, SCR) including the Diesel Exhaust Fluid (DEF) level in the DEF tank.

   A. **ECU Display Screen** — Engine fault diagnostic messages are shown on this LCD display. screen

   B. **Engine Started Lamp** — This lamp when lit indicates engine is operating normally.

   C. **Engine Shutdown Lamp** — When an engine failure has occured this lamp will blink, indicating the engine has been shutdown. The diagnostic fault message will be displayed on the LCD screen.

   D. **Pre Alarm Lamp** — When an engine failure has occured this lamp will blink. Indicating a pre-fault engine condition and the possibility of engine shutdown.The diagnostic fault message will be displayed on the LCD screen.

   E. **Alarm Acknowledge Button** — When the engine experiences a fault, the "Pre Alarm Lamp" or the "Shutdown Lamp" will start blinking. Pushing this button will confirm the fault message and the blinking lamp will change to a solid lamp display. The fault message will be displayed on the screen. When multiple engine faults occur, the lamp will continue blinking until all fault messages are confirmed. The blinking lamp will change to a solid lamp display all current confirmed fault messages will scroll across the screen.

   F. **Screen Change Button** — When this button is pushed during operation, the screen (Figure 9) will cycle through main and secondary parameter screens.

	VOLTS		AMPS
UO 278	**UV** 480	**U** 361
VO 278	**VW** 480	**V** 361
WO 278	**WU** 480	**W** 361
240 kW		300 **kVA**
60 **Hz**		100 **h**

ENGINE GENERATOR SYSTEM OK

Figure 9. Generator Parameter Screen

> ***NOTICE***
>
> The screen as shown in (Figure 9) represents the phase voltages for each phase to neutral (UO, VO and WO) and the line voltages between each phase (UV, VW and WU).

   G. **Option Button** — This button is not active. Do not use.

   H. **Program/Exit Button** — Push this button from the home screen to enter the main menu.

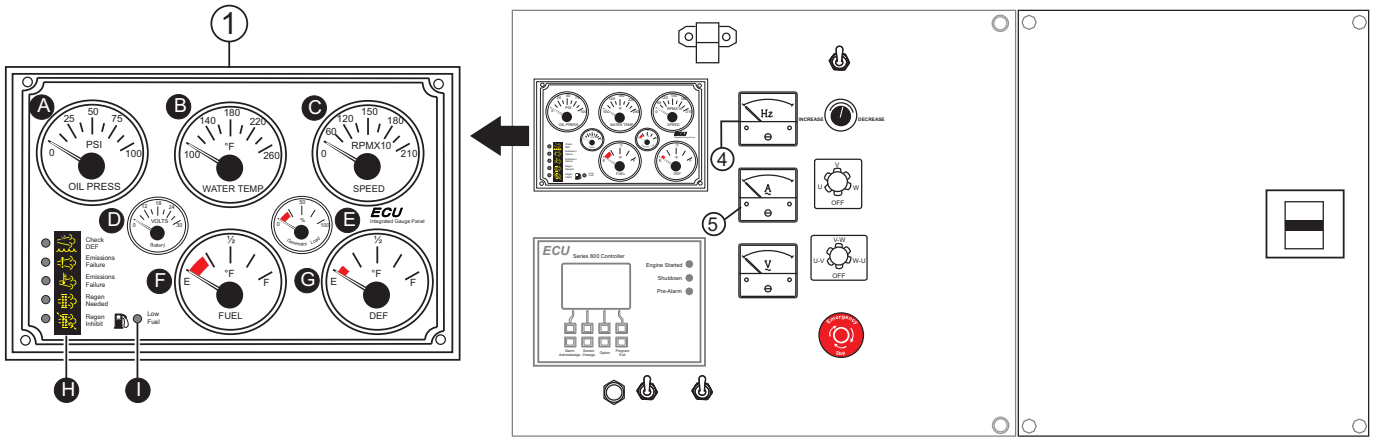


Figure 10. Gauge Unit

The definitions below describe the readouts and functions of the Gauge Unit Assembly (Figure 10).

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

   A. **Oil Pressure Gauge** — During normal operation, this gauge should read approximately 44 psi. (300 kPa). When starting the generator, the oil pressure may read a little higher but after the engine warms up, the oil pressure should return to the correct pressure range.

   B. **Water Temperature Gauge** — During normal operation this gauge should read between 185° and 207°F (85°~97°C).

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

   D. **Battery Voltmeter Gauge** — During normal operation this gauge indicates a minimum 14 VDC.

   E. **Generator Load Gauge** — Indicates the generator load rate. It is recommended the load be above the red area (20%) for maintaining sufficient exhaust temperature.

   F. **Fuel Gauge** — Indicates amount of diesel fuel available. The red area in the gauge indicates a low fuel level (20%).

   G. **DEF Gauge** — Indicates amount of diesel exhaust fluid available. The red area in the gauge indicates a low DEF level (10%).

   H. **Exhaust System State Indicator Lamps** — Lamps illuminate when engine is at Exhaust System State or DEF state. Refer to the maintenance section of this manual for more detailed indormation.

   I. **Low fuel Warning LED** — When ON (lit) indicates that fuel level is low.

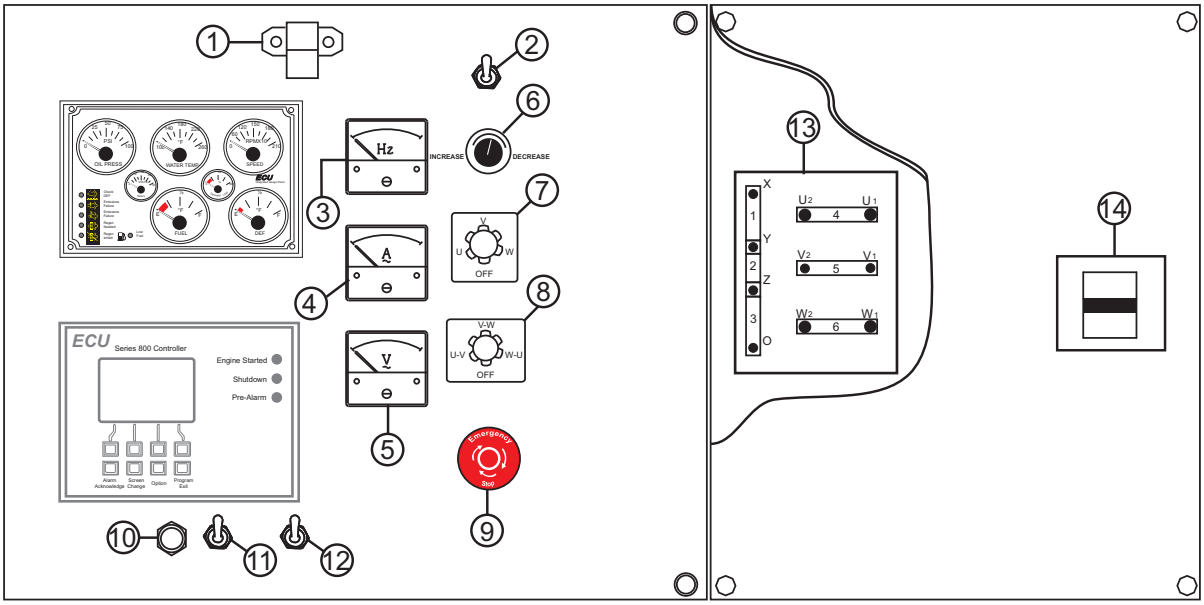


Figure 11. Generator/Engine Control Panel

The definitions below describe the controls and functions of the Generator/Engine Control Panel (Figure 11).

1. **Panel Light** — For operation at night, panel light illuminates control panel for ease of reading meters and gauges. Make sure oanel light switch is in the OFF position when light is not in use.
2. **Panel Light Switch** — When activated will turn on control panel light.
3. **Frequency Meter** — Indicates the output frequency in hertz (Hz). Normally 60 Hz
4. **AC Ammeter** — Indicates the amount of current the load is drawing from the generator per leg selected by the ammeter phase-selector switch.
5. **AC Voltmeter** — Indicates the output voltage present at the **U,V, and W Output Terminal Lugs.**
6. **Voltage Regulator Control** — Allows ±15% manual adjustment of the generator's output voltage.
7. **Ammeter Change-Over Switch** — This switch allows the AC ammeter to indicate the current flowing to the load connected to any phase of the output terminals, or to be switched off. This switch does not effect the generator output in any fashion, it is for current reading only.
8. **Voltmeter Change-Over Switch** — This switch allows the AC voltmeter to indicate phase to phase voltage between any two phases of the output terminals or to be switched off.
9. **Emergency Stop Switch Button** — In the event of an emergency press this button to shut down the generator.
10. **Hour Check Button** — With the engine stopped, press and hold ths button. The total running hours, fuel level, and battery voltage will be displayed.
11. **Auto/Start Switch** — This switch selects either manual or automatic operation. Center position is **OFF** (reset).
12. **Engine Speed Switch Switch** — This switch controls the speed of the engine low or high.
13. **Voltage Change-Over Board** — 6 jumper plates that allows the generator to be configured for either 3Ø, 240 or 480 VAC output.
14. **Main Circuit Breaker** — This three-pole, 800 amp main breaker is provided to protect the **U,V, and W Output Terminal Lugs** from overload.

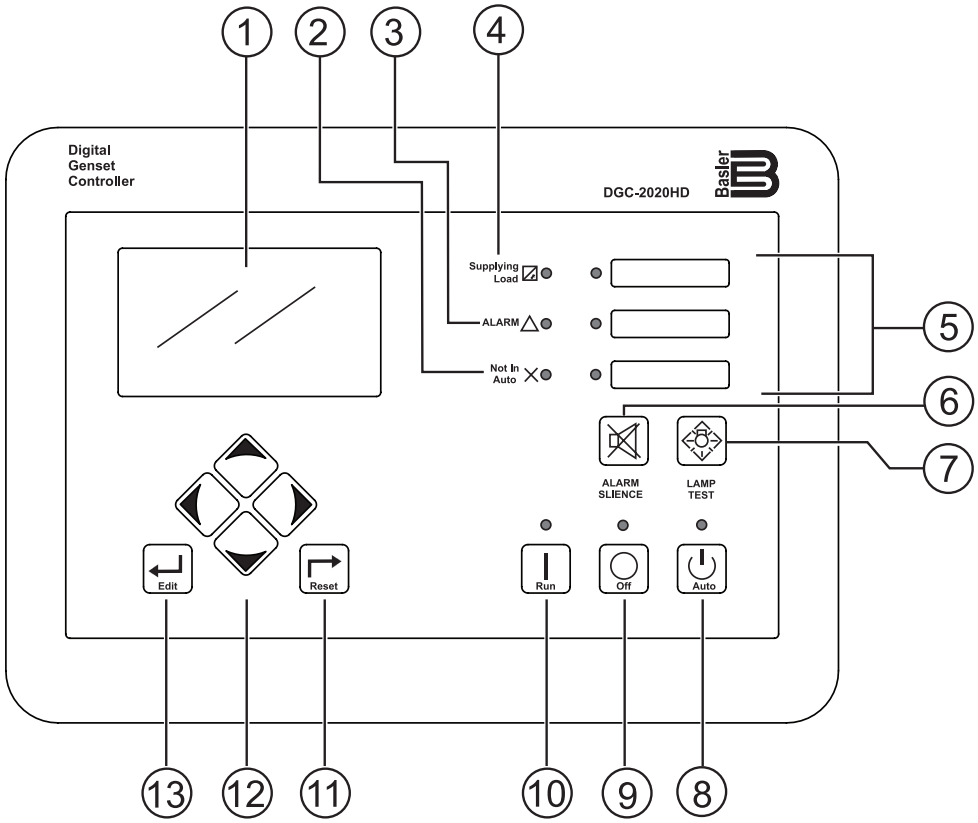


Figure 12. Basler DGC-2020HD

NOTICE

The Basler DGC-2020HD is an ***option***. It replaces the ECU 845 controller that comes standard with this generator when the paralleling option is employed.

The definitions below describe the controls and functions of the Digital Genset Controller (Figure 12).

1. **LCD Display** — Display consists of a LCD ***color touch screen***. The backlit, 272X480 pixel color LCD serves as the local information source for metering, alarms, pre-alarms, and protective functions. Touch screen capability provides convenient navigation through metering and settings. Display operation is maintained down to –4°F (–20°C).
2. **Not In Auto Indicator** — This ***red*** LED lights when the DGC-2020HD is not operating in **AUTO** mode.
3. **Alarm Indicator** — This ***red*** LED lights continuously during alarm conditions and ***flashes*** during pre-alarm conditions.
4. **Supplying Load Indicator** — This ***green*** LED lights when the generator current is greater than emergency power supply (EPS) threshold current.
5. **Programmable Indicators** — These three ***red*** LEDs light when the corresponding logic element is set true. Logic element PROGLED 1 controls the ***upper*** LED, PROGLED 2 controls the ***middle*** LED, and PROGLED 3 controls the ***lower*** LED. A card is provided for labeling the programmable indicators. See Programmable Indicator Configuration, below.
6. **Alarm Silence Pushbutton** — Pressing this button tests the DGC-2020HD indicators by exercising all LCD pixels and lighting all LEDs.
7. **Lamp Test Pushbutton** — Pressing this button tests the DGC-2020HD indicators by exercising all LCD pixels and lighting all LEDs.
8. **Auto Pushbutton and Mode Indicator** — Pressing the Auto button places the DGC-2020HD in ***Auto*** mode. The ***green Auto*** mode LED lights when Auto mode is active.

   While in "AUTO" the controller will be in standby awaiting a signal to start via the remote start terminals. While in auto, closure of the auto start contacts will immediately start the engine. Once the generator is up to speed and voltage it will compare its voltage to the bus.

   If the bus is dead it will immediately close the contactor to provide power to the load(s). If the bus is already hot from another generator it will first synchronize then close its contactor then slowly ramp up to share load if load were present.
9. **Off Pushbutton and Mode Indicator.** — Pressing this button places the DGC-2020HD in Off mode. The ***red Off*** mode LED lights when the DGC-2020HD is in ***Off*** mode. This button also resets the Breaker Management Pre-Alarms and all MTU ECU Alarms.
10. **Run Pushbutton and Mode Indicator.** — Pressing this button places the DGC-2020HD in ***Run*** mode. The ***green Run*** mode LED lights when Run mode is active.
11. **Reset Pushbutton** — This button is pressed to cancel a settings editing session and discard any settings changes. When pressed momentarily, this button resets the Breaker Management Pre-Alarms and all MTU ECU Alarms. This button is also used to reset the Maintenance Interval when pressed for 10 seconds while viewing Hours Until Maintenance or Maintenance Due Pre-Alarm.
12. **Arrow Pushbuttons** — These four buttons are used to navigate through the front panel display menus and modify settings.
    - The ***left*** and ***right*** arrow buttons are used to navigate through the menu levels. The right arrow button is pressed to move downward through the menu levels and the left arrow button is pressed to move upward through the menu levels.
    - Within a level, the ***up*** and ***down*** arrow buttons are used to move among items within the menu level. Pressing the down arrow button moves to items lower in the list. Pressing the up arrow button moves to items higher in the list.
    - During a settings editing session, the up and down arrow buttons are used to raise and lower the value of the selected setting. The right and left arrow buttons move to different digits.
13. **Edit Pushbutton** — Pressing this button starts an editing session and enables changes to DGC-2020HD settings. At the conclusion of an editing session, the ***Edit*** pushbutton is pressed again to save the setting changes.

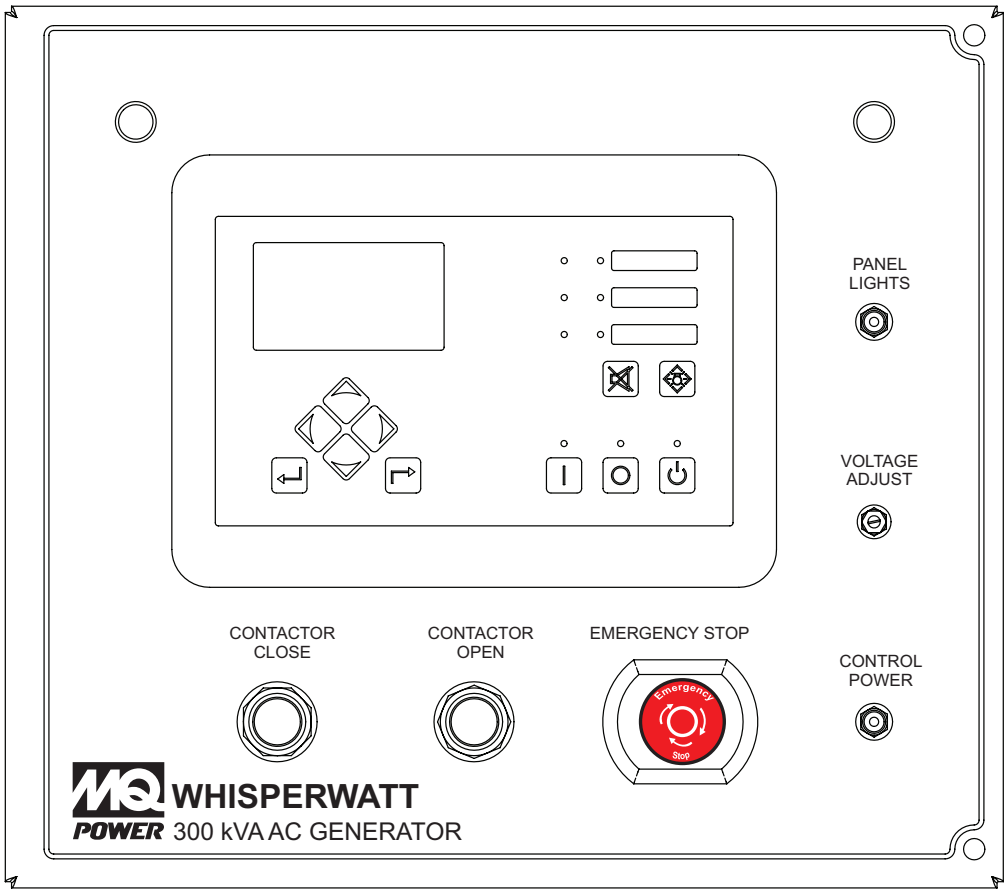


Figure 13. Paralleling Panel Components

The definitions below describe the controls and functions of the Paralleling Panel (Figure 13).

1. **Panel Lights** — For operation at night or in dark areas, panel light illuminates paralleling panel for ease of reading.

2. **Panel Light Switch** — When activated will turn on control panel light.

3. **Voltage Adjust potentiometer** — The ***voltage adjust potentiometer*** is a way to adjust the voltage up or down for fine tuning. The adjustment sends a signal to the controller to offset the system rated voltage (Trim Voltage). It is important that all machines are set to the same value when paralleling.

   When first turning on the control power, the controller will begin its boot sequence much like a computer does. After completing the boot sequence the unit will be ready to run or be placed in auto for auto start applications.

4. **Control Power Toggle Switch** — The control power switch is a master power switch for the digital controller. The control power switch has a latch feature that prevents powering down control power while the engine is running.

5. **Emergency Stop Button Switch** — The Emergency Stop pushbutton switch is used to stop the engine in case of emergency or to lock out operation during service. The emergency stop button ***should not be used for routine stopping of the engine***.

   Actuation of the Emergency stop button while the control power is on will illuminate the light on the button as well as display “Emergency Stop” on the controller display. Actuating the Emergency stop button will de-energize all controller outputs and cause the engine to stop as well as tripping the circuit breaker. This condition is a latched condition that must be reset prior to restarting the engine.

   The procedure for resetting the emergency stop requires several actions. Rotate the emergency stop button to release the spring latch. To clear the latch, the controller must be placed into the off mode by pressing the “OFF” button. While in the “OFF” mode, the “RESET” button must be pressed to clear the E-STOP fault.

   For units with manual operated breakers, the breaker will need to be reset by toggling the handle down, then can be turned back to the “ON” position. On models with spring charged breakers resetting the breaker is not necessary.

6. **Contactor Operation (Manual Mode)** — The For manual run applications, user action is required to get the generator power to the output bus. Depending on the model, some utilize contactors in series with toggle handle circuit breakers and others have spring charged automatic circuit breakers.

   On the spring charged types, the buttons on the breaker itself are not intended for circuit breaker operation. For instructional purposes both will be referred to as “contactor”.

   There are two pushbuttons on the control panel for controlling the contactor. There is a green “CLOSE CONTACTOR” button to close the contactor and a red “OPEN CONTACTOR” button to open the contactor. These buttons illuminate to show the contactor status. If the contactor is open, the red “OPEN CONTACTOR” button will be illuminated. If the contactor is closed the green “CLOSE CONTACTOR” button will be illuminated.

   These buttons can sometimes be multifunctional depending on the situation. For stand-alone operation the buttons simply close and open the contactor as expected. For paralleling the buttons can act a little different.

   When the bus is already hot from another generator, pressing the green online button will initiate a synchronizing sequence before closing the contactor. There will be an image of a synchro scope on the controller display and when the voltage and phases are matched, the contactor will close.

   If there was already load on the bus the unit will slowly ramp up load until it is sharing equally with the other generator(s). While sharing load with other generators, pressing the red “OPEN CONTACTOR” button once will initiate a ramp down sequence. The unit will begin to ramp down and when at a low level of load it will automatically open it contactor. Pressing the red “OPEN CONTACTOR” button twice will immediately open the contactor.

OUTPUT TERMINAL PANEL

The Output Terminal Panel (Figure 15) shown below is provided for the connection of electrical loads. Lift up on the cover to gain access to receptacles and terminal lugs.

NOTICE

Terminal legs "O" and "Ground" are considered bonded grounds

OUTPUT TERMINAL FAMILIARIZATION

The "Output Terminal Panel" (Figure 15) is provided with the following:

- Three (3) 240/139V output receptacles @ 50 amp
- Three (3) Circuit Breakers @ 50 amps
- Two (2) 120V GFCI receptacles @ 20 amp
- Two (2) GFCI Circuit Breakers @ 20 amps
- Eight (8) Output Terminal Lugs (U, V, W, O, Ground)

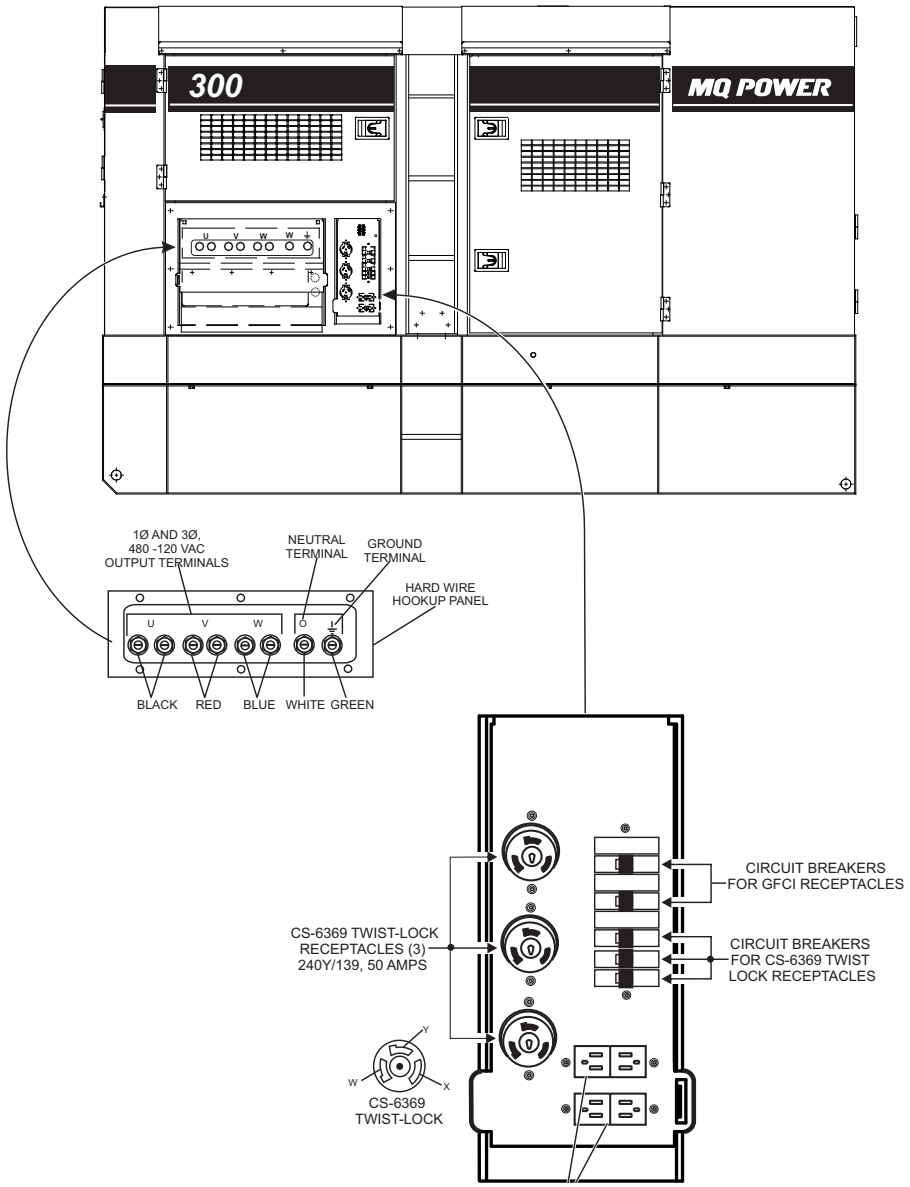


Figure 14. Output Terminal Panel

120 VAC GFCI Receptacles

There are two 120 VAC, 20 amp GFCI (Duplex Nema 5-20R) receptacles provided on the output terminal panel. These receptacles can be accessed in any ***voltage change-over board*** position. Each receptacle is protected by a 20 amp circuit breaker. These breakers are located directly above the GFCI receptacles. Remember the load output (current) of both GFCI receptacles is dependent on the load requirements of the U, V, and W output terminal lugs.

Pressing the **reset** button resets the GFCI receptacle after being tripped. Pressing the **test button** (See Figure 15) in the center of the receptacle will check the GFCI function. Both receptacles should be tested at least once a month.

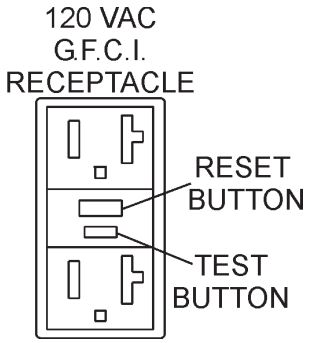


Figure 15. G.F.C.I. Receptacle

Twist Lock Dual Voltage 120/240 VAC Receptacles

There are three 240/139V, 50 amp auxiliary twist-lock (CS-6369) receptacles (Figure 16) provided on the output terminal panel. These receptacles can **only** be accessed when the voltage change-over board is configured for **single-phase 240/120** application

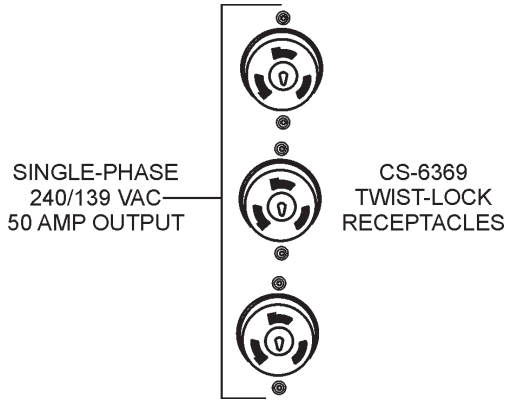


Figure 16. 240/139V Twist-Lock Auxiliary Receptacles

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.***

Turn the ***voltage regulator control knob*** (Figure 17) on the control panel to obtain the desired voltage. Turning the knob clockwise will **increase** the voltage, turning the knob counter-clockwise will **decrease** the voltage.

Figure 17. Voltage Regulator Control Knob

Connecting Loads

Loads can be connected to the generator by the **Output Terminal Lugs** or the convenience receptacles (Figure 18). 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, 800A **main** circuit breaker is provided. Make sure to switch **ALL** circuit breakers to the **OFF** position prior to starting the engine.

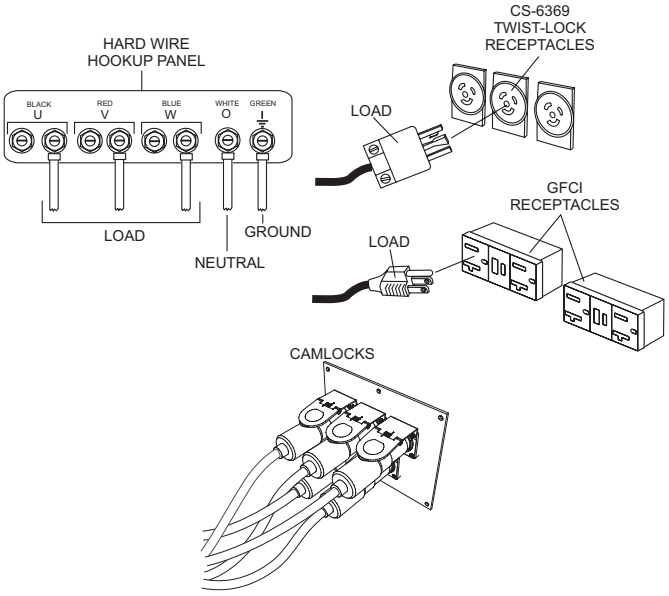


Figure 18. Connecting Loads

Over Current Relay

An **over current relay** (Figure 19) is connected to the main circuit breaker. In the event of an overload, both the circuit breaker and the over current relay may trip. If the circuit breaker can not be reset, the **reset button** on the over current relay must be pressed. The over current relay is located in the control box.

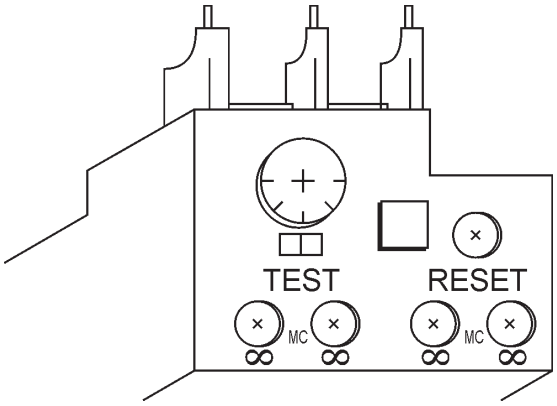


Figure 19. Over Current Relay

NOTICE

Remember 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 over current condition, it will automatically trip the 800 amp main 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** position (**ON**).

SINGLE PHASE LOAD

Always be sure to check the nameplate on the generator and equipment to insure 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 name plate, approximate wattage may be determined by multiplying nameplate voltage by the nameplate amperage.

WATTS = VOLTAGE x AMPERAGE

The power factor of this generator is 0.8. See Table 7 below when connecting loads.

Table 7. Power Factor By Load

Type of Load	Power Factor
Single-phase induction motors	0.4-0.75
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 8. 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	1000 ft.	600 ft.	375 ft.	250 ft.
5	600	1200	500 ft.	300 ft.	200 ft.	125 ft.
7.5	900	1800	350 ft.	200 ft.	125 ft.	100 ft.
10	1200	2400	250 ft.	150 ft.	100 ft.	
15	1800	3600	150 ft.	100 ft.	65 ft.	
20	2400	4800	125 ft.	75 ft.	50 ft.	
CAUTION: Equipment damage can result from low voltage						

THREE PHASE LOAD

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

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

NOTICE

If 3Ø load (kVA) is not given on the equipment nameplate, approximate 3Ø 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 inadequate size connecting cable which cannot carry the required load can cause a voltage drop which can burn out the appliance or tool and overheat the cable. See Table 6.

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

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

DANGER

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

GENERATOR OUTPUT VOLTAGES

A wide range of voltages are available to supply voltage for many different applications. Voltages are selected by using the **voltage change-over board** (Figure 20). To obtain some of the voltages as listed in Table 9 (see below) will require a fine adjustment using the **voltage regulator** (VR) **control knob** located on the control panel.

Voltage Change-Over Board

The **voltage change-over board** (Figure 20) is located on the control box, behind the generator control panel. This board has been provided for ease of voltage selection.

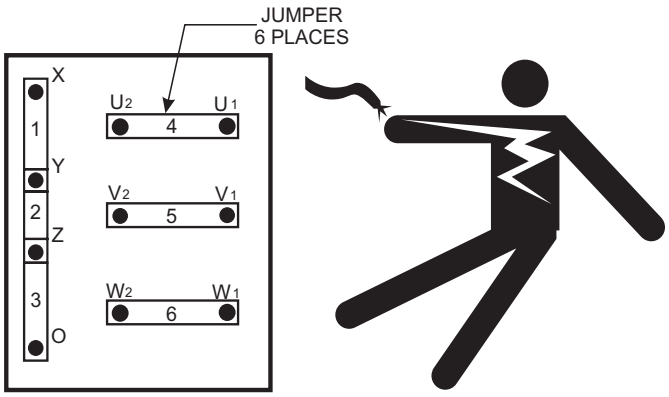


Figure 20. Voltage Change-Over Board

CAUTION

NEVER attempt to place jumper plates on the **voltage change-over board** while the generator is in operation. There exist the possibility of **electrocution, electrical shock or burn, which can cause severe bodily harm or even death!**

Table 9. Voltages Available

UVWO Output Terminal Lugs	Voltage Change-Over Board 3-Phase 240/139V Position			Voltage Change-Over Board 3-Phase 480/270V Position		
3Ø **Line-Line**	208V	220V	240V	416V	440V	480V
1Ø **Line-Neutral**	120V	127V	139V	240V	254V	277V
Voltage Change-Over Board Single-Phase 240/120V Position						
1Ø **Line-Neutral/ Line-Line**	120V Line-Neutral	N/A	N/A	240V Line-Line	N/A	N/A

Maximum Amps

Table 10 shows the **maximum** amps the generator can provide. **DO NOT** exceed the maximum amps as listed.

Table 10. Generator Maximum Amps

Rated Voltage	Maximum Amps
1Ø 120 Volt	666.7 X 2 amps (4 wire)
1Ø 240 Volt	333.3 amps (4 wire)
3Ø 240 Volt	722 amps
3Ø 480 Volt	360 amps
Main Line Circuit Breaker Rating	800 amps

HOW TO READ THE AC AMMETER AND AC VOLTAGE GAUGES

The AC ammeter and AC voltmeter gauges are controlled by the AC ammeter and AC voltmeter change-over switches.

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

Before taking a reading from either gauge, configure the ***Voltage Change-Over Board*** (Figure 21) for the desired output voltage.

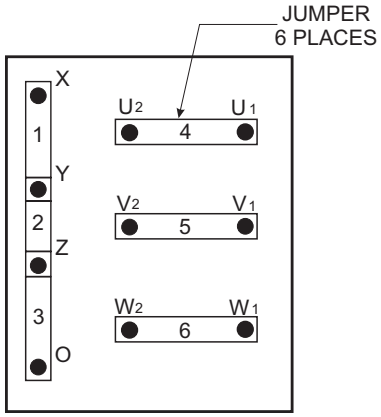


Figure 21. Voltage Change-Over Board-240/3Ø Position

AC Voltmeter Gauge Reading

Place the ***AC Voltmeter Change-Over Switch*** (Figure 22) in the W-U position and observe the phase to phase voltage reading between the W and U terminals as indicated on the ***AC Voltmeter Gauge*** (Figure 23).

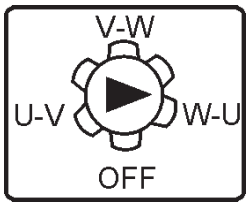


Figure 22. AC Voltmeter Change-Over Switch

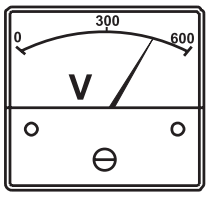


Figure 23. AC Voltmeter Gauge (Volt reading on W-U Lug)

AC Ammeter Gauge Reading

Place the ***AC Ammeter Change-Over Switch*** (Figure 24) in the U position and observe the current reading (load drain) on the U terminal as indicated on the ***AC Ammeter Gauge*** (Figure 25). This process can be repeated for terminals V and W.

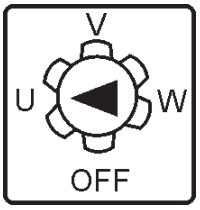


Figure 24. AC Ammeter Change-Over Switch

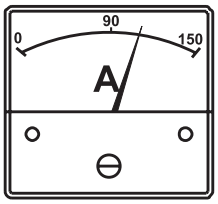


Figure 25. AC Ammeter (Amp reading on U Lug)

NOTICE

The ***ammeter*** gauge will only show a reading when the ***Output Terminal Lugs*** are connected to a load and in use.

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 placement of the jumpers plates (6) on the **Voltage Change-Over Board** and the adjustment of the **Voltage Regulator Control Knob**.

Remember the voltage change-over board determines the **range** of the output voltage and can be configured in two different positions that provide 6 different output voltages at the UVWO output terminals. The generator is shipped from the factory in the 240V configuration. The voltage regulator (VR) allows the user to increase or decrease the selected voltage.

3Ø-240V UVWO Terminal Output Voltages

1. Jumper the voltage change-over board for 240V operation as shown in Figure 26

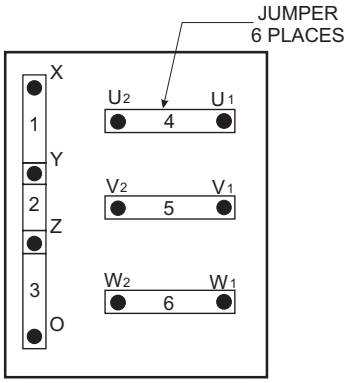


Figure 26. Voltage Change-Over Board 240V Configuration

2. Connect the load wires to the UVWO terminals as shown in Figure 27

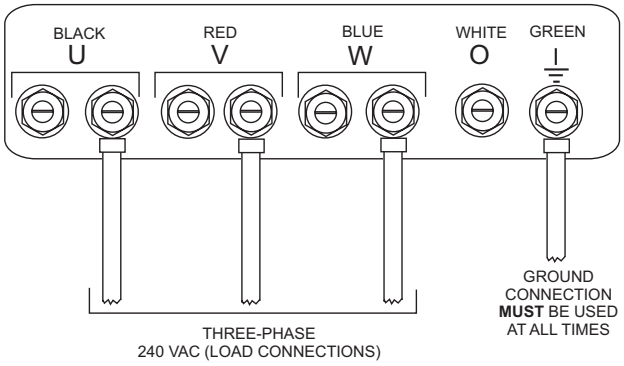


Figure 27. UVWO Terminal Lugs 3Ø-240/1Ø-139 Connections

3. Turn the voltage regulator knob (Figure 28) clockwise to increase voltage output, turn counterclockwise to decrease voltage output. Use voltage regulator adjustment knob whenever fine tuning of the output voltage is required

Figure 28. Voltage Regulator Knob

1Ø-240V UVWO Terminal Output Voltages

1. Make sure the voltage change-over board is jumpered for 240V operation as shown in Figure 26.
2. Connect the load wires to the UVWO terminals as shown in Figure 29.

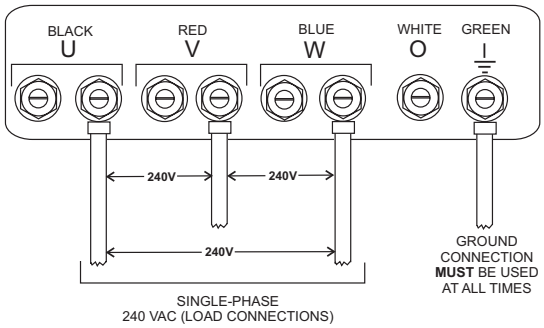


Figure 29. UVWO Terminal Lugs 1Ø-240V Connections

1Ø-120V UVWO Terminal Output Voltages

1. Make sure the voltage change-over board is jumpered for 240V operation as shown in Figure 26.
2. Adjust voltage regulator knob (Figure 28) for an output of 208V to obtain 120V at the UVWO terminals.
3. Connect the load wires to the UVWO terminals as shown in Figure 30

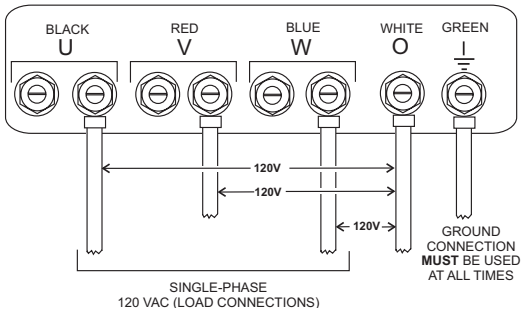


Figure 30. UVWO Terminal Lugs 1Ø-120V Connections

NOTICE

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

3Ø-480V UVWO Terminal Output Voltages

1. Jumper the voltage change-over board for 480V operation as shown in Figure 31. This configuration uses 6 jumper plates in 3 different positions. Remember there are 2 jumper plates at every position. Every jumper plate **must** be used.

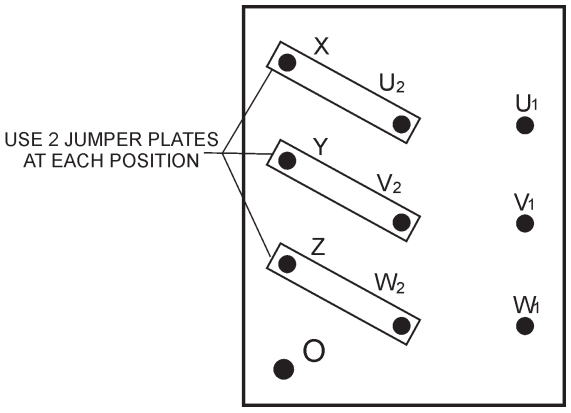


Figure 31. UVWO Terminal Lugs 1Ø-120V Connections

2. Connect the load wires to the UVWO terminals as shown in Figure 32.

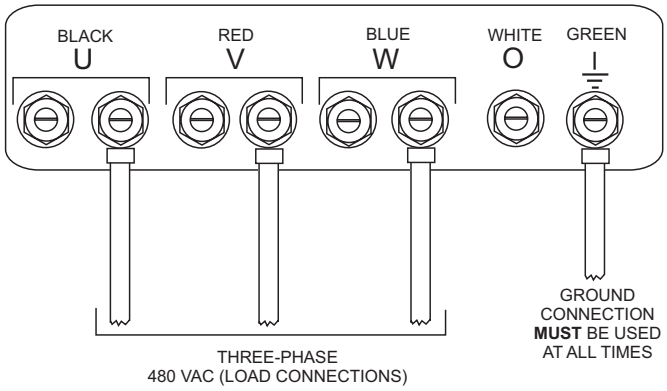


Figure 32. UVWO Terminal Lugs 3Ø-480V Connection

1Ø-480V UVWO Terminal Output Voltages

1. Make sure the voltage change-over board is jumpered for 480V operation as shown in Figure 31.
2. Connect the load wires to the UVWO terminals as shown in Figure 33.

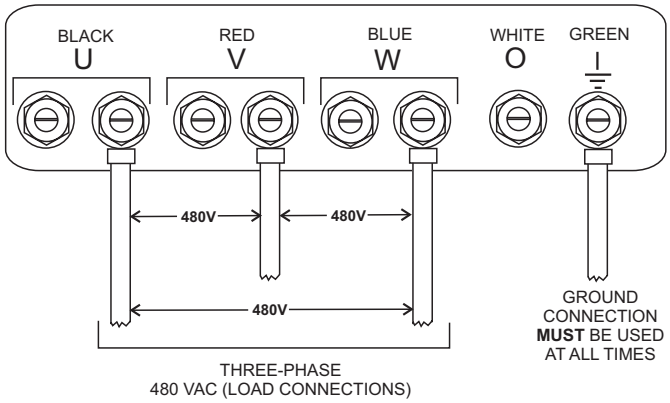


Figure 33. UVWO Terminal Lugs 1Ø-480V Connections

1Ø-277V UVWO Terminal Output Voltages

1. Make sure the voltage change-over board is jumpered for 480V operation as shown inFigure 31.
2. Connect the load wires to the UVWO terminals as shown in Figure 34.

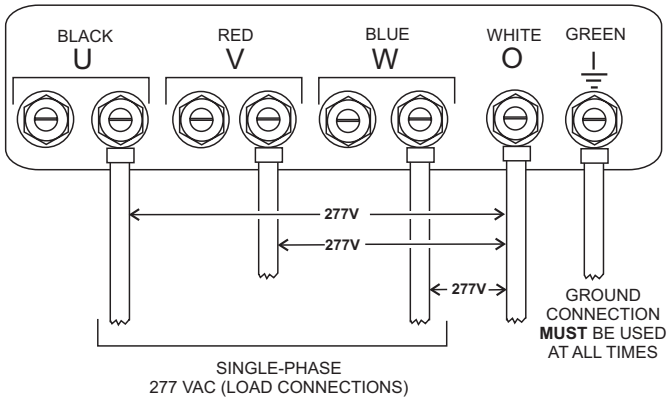


Figure 34. UVWO Terminal Lugs 1Ø-277V Connections

CIRCUIT BREAKERS

To protect the generator from an overload, a 3-pole, 800 amp, main circuit breaker is provided to protect the **U,V, and W Output Terminals** from overload. In addition two single-pole, 20 amp **GFCI** circuit breakers are provided to protect the GFCI receptacles from overload. Three 50 amp **load** circuit breakers have also been provided to protect the auxiliary receptacles from overload. Make sure to switch **ALL** circuit breakers to the **OFF** position prior to starting the engine.

LUBRICATION OIL

Fill the engine crankcase with lubricating oil through the filler hole, but **DO NOT** overfill. Make sure the generator is level and verify that the oil level is maintained between the two notches (Figure 35) on the dipstick. See Table 11 for proper selection of engine oil.

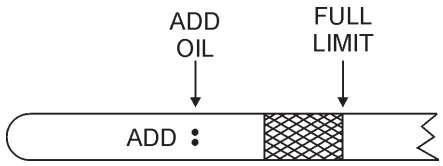
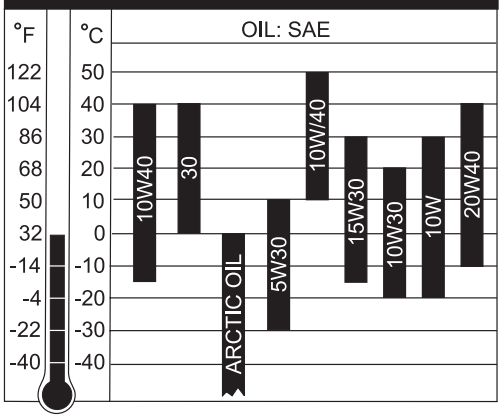


Figure 35. Engine Oil Dipstick

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

API service class engine oil is the recommended engine oil for this generator. When replacing engine oil please refill using API CJ-4, ACEA E9 or ACEA E6 engine oil.

Table 11. Recommended Motor Oil



FUEL CHECK

DANGER

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

Refilling the Fuel System

CAUTION

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

This generator has an internal fuel tank located inside the enclosure (). **ALWAYS** fill the fuel tank with clean fresh **#2 diesel fuel. DO NOT** fill the fuel tank beyond its capacity. Some units may be equipped with a fuel cell mounted inside the trailer frame.

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

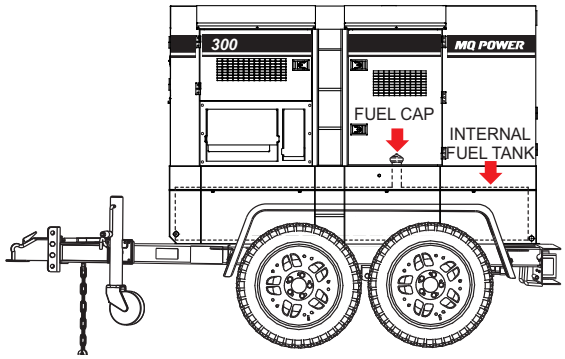


Figure 36. Internal Fuel Tank System

Refueling Procedure:

WARNING

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

1. **Level Tanks** — Make sure fuel cells are level with the ground. Failure to do so will cause fuel to spill from the tank before reaching full capacity (Figure 37).

CAUTION

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

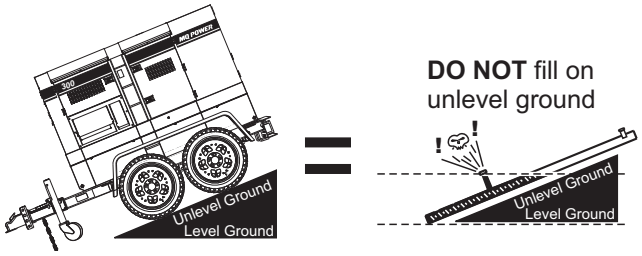


Figure 37. Only Fill on Level Ground

NOTICE

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

2. Open the enclosure door and remove fuel cap and fill tank as shown in Figure 38.

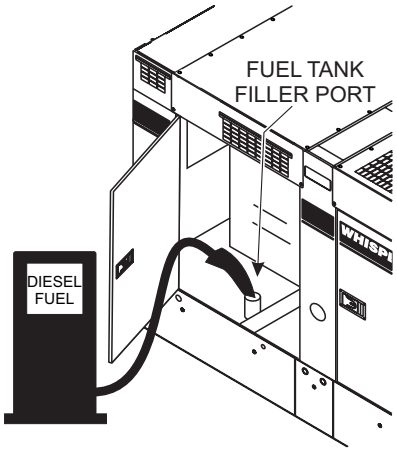


Figure 38. Fueling the Generator

3. **NEVER overfill fuel tank** — It is important to read the fuel gauge when filling trailer fuel tank. **DO NOT** wait for fuel to rise in filler neck (Figure 39).

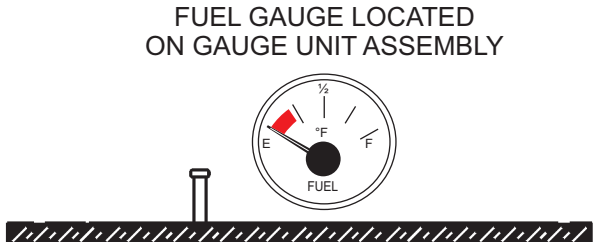


Figure 39. Full Fuel Tank

CAUTION

DO NOT OVERFILL fuel system. Leave room for fuel expansion. Fuel expands when heated (Figure 40).

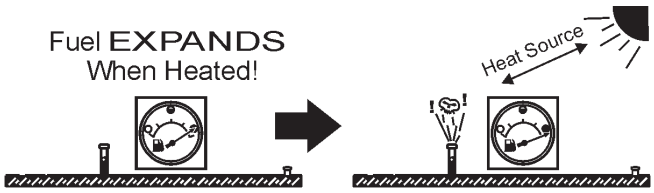


Figure 40. Fuel Expansion

DEF Refilling

NOTICE

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

Diesel exhaust fluid is an aqueous solution made with 32.5% high puirty ***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.

1. Make sure engine is **OFF**.
2. Open the enclosure door and remove the filler cap from the DEF tank (Figure 41).
3. Upon initial start up, ***completely fill*** the DEF tank with DEF fluid. **DO NOT** overfill.

DEF Refilling (Continuous Operation)

It is recommended to ***shut down the engine*** prior to refilling the DEF tank. However, in 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. A engine service technician would be required to remedy the shutdown.

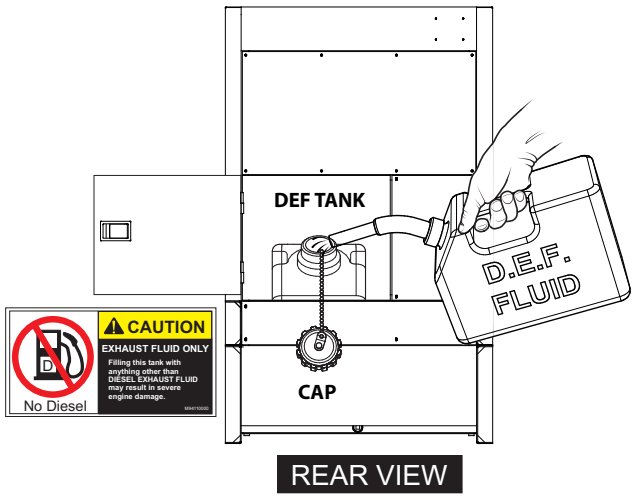


Figure 41. DEF Tank Filling

COOLANT (ANTIFREEZE/SUMMER COOLANT/ WATER)

John Deere recommends Cool-Gard II™ 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 **John Deere Engine Owner's Manual** for further details.

⚠ WARNING

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

Day-to-day addition of coolant is done from the recovery tank. When adding coolant to the radiator, **DO NOT** remove the radiator cap until the unit has completely cooled. See Table 12 for engine, radiator, and recovery tank coolant capacities. Make sure the coolant level in the recovery tank is always between the "H" and the "L" markings.

Table 12. Coolant Capacity

Engine and Radiator	17.7gal (67 liters)
Reserve Tank	N/A

Operation in Freezing Weather

When operating in freezing weather, be certain the proper amount of antifreeze (Table 13) has been added.

Table 13. Coolant Capacity

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

NOTICE

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

Cleaning the Radiator

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

AIR CLEANER

Periodic cleaning/replacement is necessary. Inspect air cleaner in accordance with the **John Deere Engine Owner's Manual**.

FAN BELT TENSION

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

The fan belt tension is proper if the fan belt bends 10 to 15 mm (Figure 42) when depressed with the thumb as shown below.

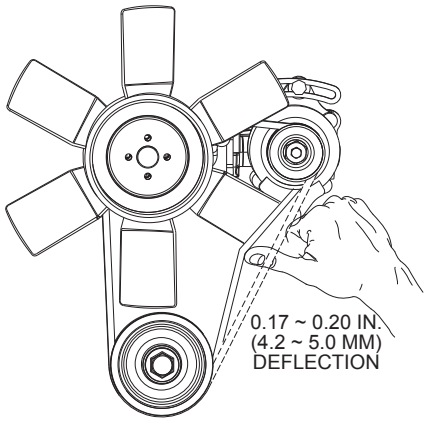


Figure 42. Fan Belt Tension

CAUTION

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

BATTERY

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

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

Battery Cable Installation

ALWAYS be sure the battery cables (Figure 43) are properly connected to the battery terminals as shown below. The **red cable** is connected to the positive terminal of the battery, and the **black cable** is connected to the negative terminal of the battery.

CAUTION

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

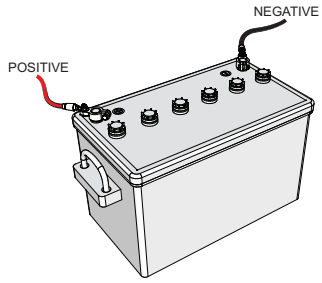


Figure 43. Battery Connections

When connecting battery do the following:

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

NOTICE

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

⚠ CAUTION

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

ALTERNATOR

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

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

WIRING

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

PIPING AND HOSE CONNECTION

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

If any hose (**fuel or oil**) lines are defective replace them immediately. cold weather engine starting fluid (ether system)

This unit is equipped with an automatic controlled Engine Starting Fluid System (KBi's DIESELMATIC NVT) that assists the engine starting during ***low*** ambient temperature operation.

The system is designed to spray a controlled amount of starting fluid into the air intake system of the engine during and immediately after the engine cranks. The fluid cylinder is located on the unit's right side center frame.

⚠ WARNING

The engine starting fluid used in the system is extremely flammable and toxic. It can be harmful and fatal if swallowed. Avoid contact with skin or breathing fumes.

DO NOT smoke when installing, removing, maintaining, testing or troubleshooting the system. Make sure you are in a well-ventilated area away from heat, open flames or sparks.

In low ambient temperature condition, if the engine does not start within a normal period of cranking, the starting fluid cylinder may be empty and need to be replaced. For more information about the system, refer to the provided KBi DIESELMATIC NVT Instruction Manual.

BEFORE STARTING

⚠ CAUTION

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

⚠ WARNING

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

1. Place the **main, G.F.C.I., and aux.** circuit breakers (Figure 44) in the **OFF** position prior to starting the engine.

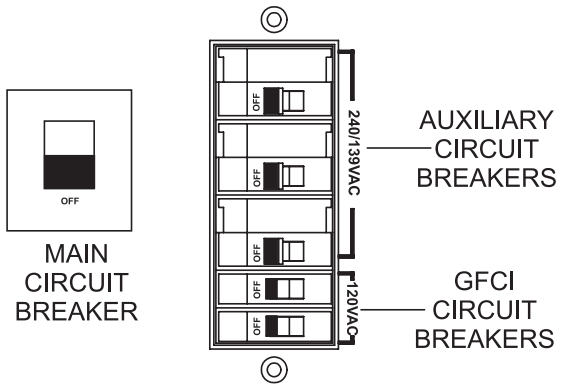


Figure 44. Main, Aux. and GFCI Circuit Breakers (OFF)

2. Make sure the **voltage change-over board** has been configured for the desired output voltage.
3. Connect the load to the **receptacles** or the **output terminal lugs** as shown in Figure 18. These load connection points can be found on the output terminal panel and the output terminal panel's hard wire hookup panel.
4. Tighten terminal nuts securely to prevent load wires from slipping out.
5. Close all engine enclosure doors (Figure 45).

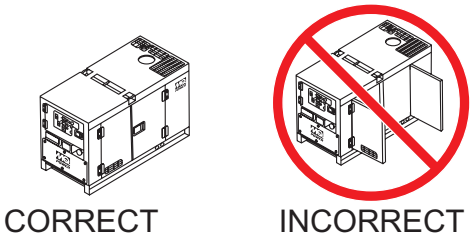


Figure 45. Engine Enclosure Doors

STARTING (MANUAL)

1. Place the ***Auto-Off/Reset Manual Switch*** in the **MANUAL** position to start the engine (Figure 46).

Figure 46. *Auto-Off/Reset* Manual Switch (Manual Position)

NOTICE

If engine fails to start in a specified number attempts, the shutdown lamp will illuminate and the Auto-Off/ Reset Switch must be placed in the Off/Reset position before the engine can be restarted.

NOTICE

Engine will pre-heat automatically in cold weather conditions." Glow Plug Hold " message will be displayed and the engine will start automatically after pre-heating..

2. Once the engine starts, let the engine run for 1-2 minutes Let engine idle longer in cold weather conditions. Listen for any abnormal noises. If any abnormalities exist, shut down the engine and correct the problem.
3. The generator's frequency meter (Figure 47) should be displaying the 60 cycle output frequency in **HERTZ.**

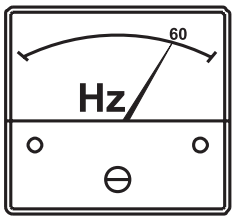


Figure 47. Frequency Meter

4. The generator's AC-voltmeter (Figure 48) will display the generator's output in **VOLTS**.

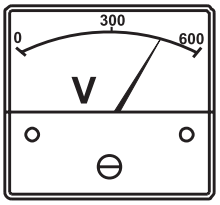


Figure 48. Voltmeter

5. If the voltage is not within the specified tolerance, use the voltage adjustment control knob (Figure 49) to increase or decrease the desired voltage.

Figure 49. Voltage Adjust Control Knob

6. The ***ammeter*** (Figure 50) will indicate **zero amps** with no load applied. When a load is applied, the ammeter will indicate the amount of current that the load is drawing from the generator.

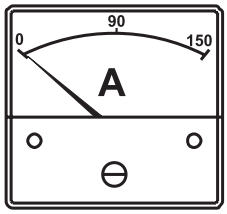


Figure 50. Ammeter (No Load)

7. The ***engine oil pressure gauge*** (Figure 51**A**) will indicate the oil pressure of the engine. Under normal operating conditions the oil pressure is approximately 35 to 65 psi. (193~586 kPa).

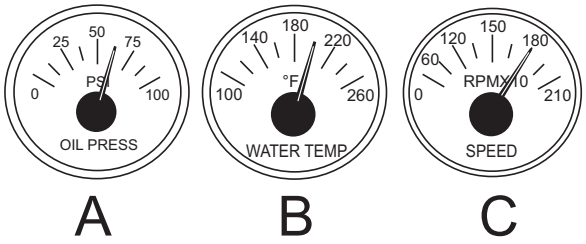


Figure 51. Engine Gauges

8. The ***coolant temperature gauge*** (Figure 51**B**) will indicate the coolant temperature. Under normal operating conditions the coolant temperature should be between 185°~207°F (85°~97°C).

9. The ***tachometer gauge*** (Figure 51**C**) will indicate the speed of the engine when the generator is operating. Under normal operating conditions this speed is approximately 1800 RPM's.

10. The ***generator load gauge*** (Figure 52) Indicates the generator load rate. It is recommended the load be above the red area (20%) for maintaining sufficient exhaust temperature.

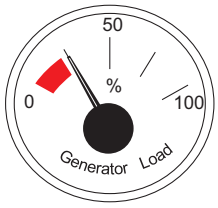


Figure 52. Generator Load Gauge

11. Place the **main, GFCI, and aux.** circuit breakers in the **ON** position (Figure 53).

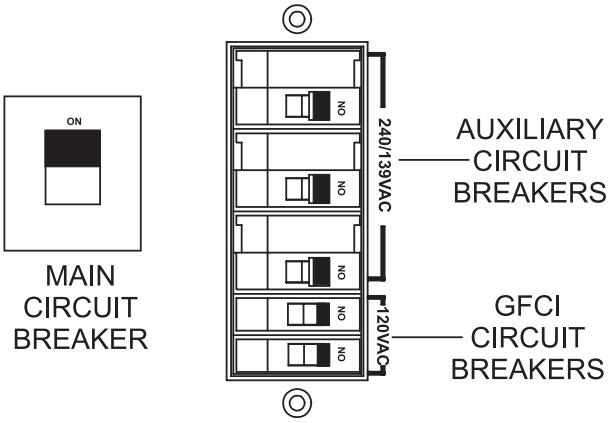


Figure 53. Main, Aux. and GFCI Circuit Breakers (ON)

12. Observe the generator's ammeter (Figure 54) and verify it reads the anticipated amount of current with respect to the load. The ammeter will only display a current reading if a load is in use.

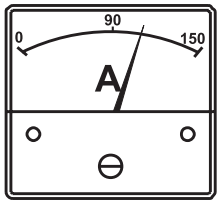


Figure 54. Ammeter (Load)

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

STARTING (AUTO MODE)

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.

CAUTION

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

NOTICE

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

WARNING

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

NOTICE

When the ***Auto Off/Reset Manual Switch*** is placed in the **AUTO** position, the engine glow plugs will be warmed and the engine will start automatically.

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

1. Perform steps 1 through 5 in the Before Starting section as outlined in the Manual Starting Procedure.
2. Place the **Auto Off/Reset Manual Switch** (Figure 55) in the **AUTO** position.

Figure 55. Auto Off/Reset Manual Switch (AUTO)

3. Continue operating the generator as outlined in the Manual Start-up procedure (start at step 2).

NOTICE

If the unit has ***Power Balance***™ installed and once the main breaker is closed, the ***Power Balance***™ should activate after 1 minute if the load is below 30% of rated load.

If at any time the load spikes to 90% or more, the Power Balance will immediately drop out and wait 5 minutes to re-evaluate the load.

⚠ WARNING

NEVER stop the engine suddenly except in an emergency.

NORMAL SHUTDOWN PROCEDURE

To shutdown the generator, use the following procedure:

1. Place both the **MAIN, GFCI and LOAD** circuit breakers as shown in Figure 56 to the **OFF** position.

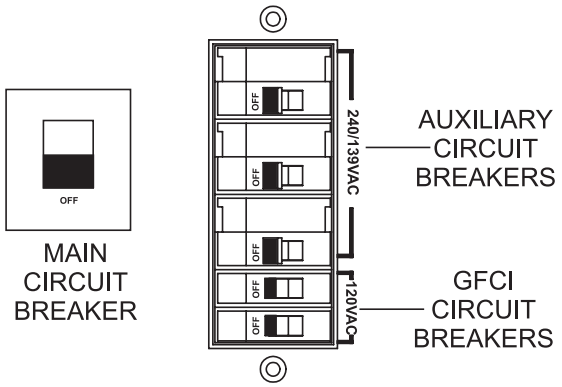


Figure 56. Main, Aux. and GFCI Circuit Breakers (OFF)

2. Let the engine cool by running it at low speed for 3-5 minutes with no load applied.
3. Place the **Auto Off/Reset Manual Switch** (Figure 57) in the **OFF/RESET** position.

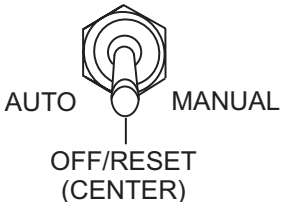


Figure 57. Auto Off/Reset Manual itch (Off/Reset)

4. Verify that all status LEDs on the ECU control panel are **OFF** (not lit).
5. Remove all loads from the generator.
6. Inspect entire generator for any damage or loosening of components that may have occurred during operation.

EMERGENCY SHUTDOWN PROCEDURE

1. In the event of an emergency, push the ***Emergency Stop Pushbutton Switch*** (Figure 58) to shutdown the generator.

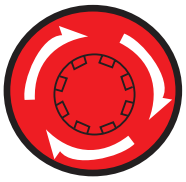


Figure 58. Auto Off/Reset Manual Switch (OFF)

Table 14. Inspection/Maintenance		10 Hrs DAILY	250 Hrs	500 Hrs or Every 12 Months	3000 Hrs or Every 36 Months	OTHER
Engine	Check Engine Oil and Coolant Levels	X				
	Check Fuel Filter/Water Separator Bowl	X				
	Check Air Cleaner/Element	X				
	Clean or Replace Air Cleaner/Element		X			
	Check for Leaks/Hoses/Clamps	X				
	Check for Loosening of Parts	X				
	Change Engine Oil and Oil Filter *1		X			
	Clean Unit, Inside and Outside		X			
	Replace Fuel Filter Elements			X		
	Check Engine Mounts			X		
	Service Battery			X		
	Check Air Intake Hoses			X		
	Check Fan Belt Condition			X		
	Check Automatic Belt Tensioner			X		
	Check Electrical Ground Connection			X		
	Clean Radiator, Check Cooling System			X		
	Coolant Solution Analysis, Add SCA's As Required			X		
	Pressure Test Cooling System			X		
	Check Engine Speed			X		
	Test Thermostats				X	
	Check and Adjust Engine Valve Clearance					1000 hrs.
	Test Glow Plugs				X	
	Replace DEF Filter In (Supply Module)					4500 hrs.
	Replace DOC Catalyst*5					As Required
	Check SCR System*2					4500 hrs.
	Inspect Dosing Module (SRC System)					4500 hrs
	Flush and Refill Cooling System*3					1 yr. or 2000 hrs.
	Clean Inside of Fuel Tank					1000 hrs.
	Clean DEF Tank					As Required
	Replace Air Cleaner Elements *4					As Required
Generator	Measure Insulation Resistance Over 3M ohms		X			
	Check Rotor Rear Support Bearing			X		

*1 During initial operation of a new engine, change oil and filter between a minimum of 100 hrs. and a maximum of 500 hrs. Service interval depends on type of oil.

*2 Perform inspection and maintenance of Urea SCR system every 4500 hours. The system does not need to replace/exchange if no problem is found. Do not make any modification, changes or remove the emission control system and related parts. Please contact your nearest dealer or Multiquip Service Dept. for SCR maintenance.

*3 If John Deere COOL-GARD™ II is used, the flushing intervals may be extended. See "Testing Diesel Coolant" in engine manual.

*4 Replace primary air filter element when restriction indicator shows a vacuum of 625 mm (25 in. H_20).

*5 Service should be done as indicated by Diagnostic Gauge. Contact Multiquip Service Dept. for DOC replacement.

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 **Engine Side** (Refer to the Engine Instruction Manual)

Air Filter Dust Indicator

NOTICE

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

The air filter indicator (Figure 59) is attached to the air filter. When the air filter element is clogged, air intake restriction becomes greater and the air filter indicator signal shows **RED.** When indicator is red, replace filter immediately. After changing the air filter, ***press*** the air filter indicator button to reset.

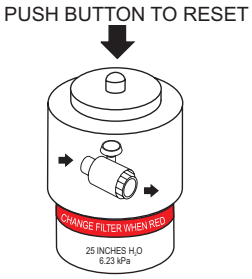


Figure 59. Air Filter Dust Indicator

AIR CLEANER

NOTICE

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

Every 250 hours: Remove air cleaner element (Figure 60) and clean the heavy duty paper element with light spray of compressed air. Replace the air cleaner as needed.

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

⚠ CAUTION

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

Primary and Secondary Air Cleaner Elements

1. Release the latches (Figure 60) that secures the cover to the air cleaner body.
2. Remove the air cleaner cover and set aside.
3. Remove both the primary and secondary air cleaner elements.
4. Check the air cleaner daily or before starting the engine.
5. Check for and correct heavy buildup of dirt and debris along with loose or damaged components.

NOTICE

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

6. To clean the primary element (paper air filter) as referenced in (Figure 60), tap the filter element several times on a hard surface to remove dirt, or blow compressed air not to exceed 30 psi (207 kPa, 2.1 kgf/cm^2) through the filter element from the inside out.

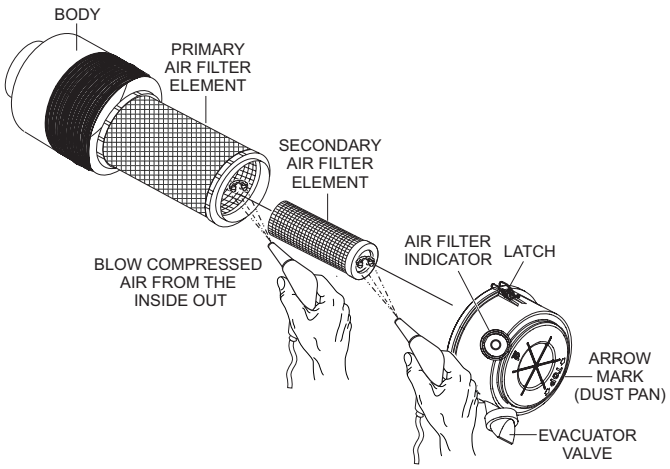


Figure 60. Air Cleaner

7. Clean the secondary element (paper air filter) as referenced in step 6.
8. Replace both elements if they are damaged or excessively dirty.

9. Clean the inside of the air cleaner body.
10. Reinstall the primary and secondary air filter elements back into air cleaner body.
11. Reinstall the air cleaner cover, and secure with latches.

DRAINING FUEL FILTER CARTRIDGE

NOTICE

Inspect the fuel filter ***daily***. If the fuel filter (Figure 61) has collected a significant amount of water and sediment at the bottom of the cartridge, it should be drained off immediately.

1. Loosen the air bleeder plug (Figure 61) 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*** (**A**) approximately 3-1/2 turns until the valve drops down 1-inch (25.4 mm) and draining occurs (**B**).

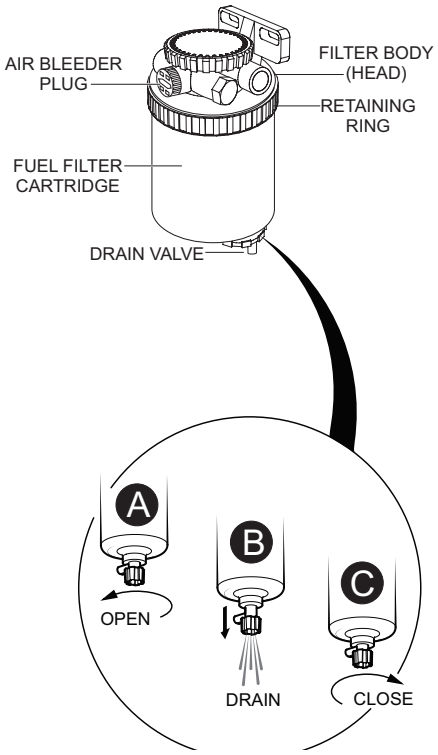


Figure 61. Fuel Filter Draining

3. Let the residue or foreign substances inside the cartridge flow into a suitable container.
4. At completion of draining **CLOSE** drain valve (**C**).

FUEL FILTER ELEMENT REPLACEMENT

1. Use a filter wrench to remove the fuel filter cup (Figure 62) from the fuel filter body.

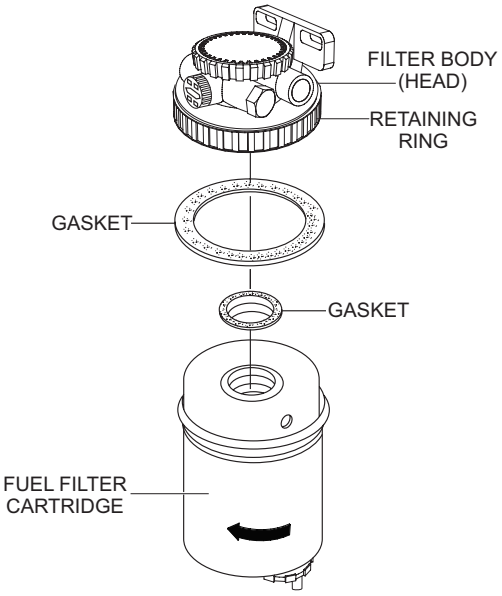


Figure 62. Fuel Filter Cartridge Replacement

2. Wipe the inside of the filter body (head) with a clean cloth to remove any foreign matter or debris that may have accumulated.
3. Replace both gaskets. Coat each gasket with a small amount of clean 15W-40 engine oil.
4. Install new fuel filter cartridge first by hand until it makes contact with the fuel filter body surface.
5. Tighten fuel filter cartridge securely. **DO NOT** over-tighten.
6. Remove the air from the fuel system. Reference John Deere Owner's Manual, "Bleeding the Fuel System.

FUEL WATER SEPARATOR SEDIMENT BOWL

1. Remove the sediment bowl from the fuel water separator cartridge as shown in Figure 63.

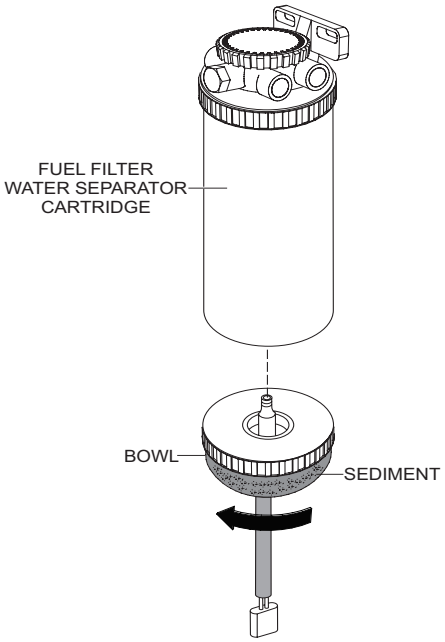


Figure 63. Sediment Bowl

2. Let the residue or foreign substances inside the sediment bowl flow into a suitable container.
3. Wipe the inside of the sediment bowl with a clean cloth to remove any foreign matter or debris that may have accumulated.
4. Reinstall sediment bowl back onto fuel water separator cartridge
5. Tighten securely. **DO NOT** over-tighten.

FUEL WATER SEPARATOR REPLACEMENT

1. Use a filter wrench to remove the fuel water separator cartridge (Figure 59) from the cartridge body head.

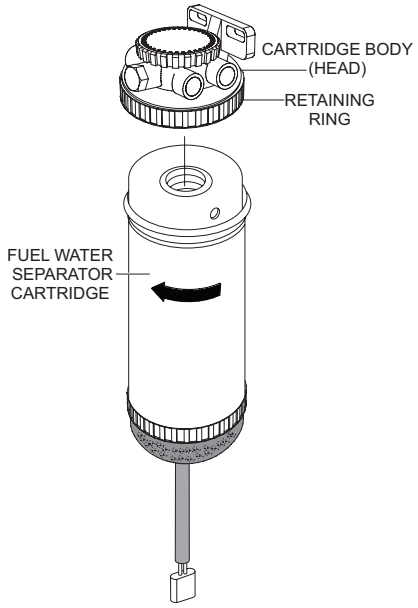


Figure 64. Fuel Water Separator

2. Wipe the inside of the fuel water separator cartridge body (head) with a clean cloth to remove any foreign matter or debris that may have accumulated.
3. Install new fuel water separator cartridge first by hand until it makes contact with the cartridge body (head) surface.
4. Tighten fuel water cartridge securely. **DO NOT** over-tighten.

Removing Water from the Fuel Tank

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

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

Cleaning Inside the Fuel Tank

If necessary, drain the fuel inside the fuel tank completely. Using a spray washer (Figure 65) wash out any deposits or debris that have accumulated inside the fuel tank.

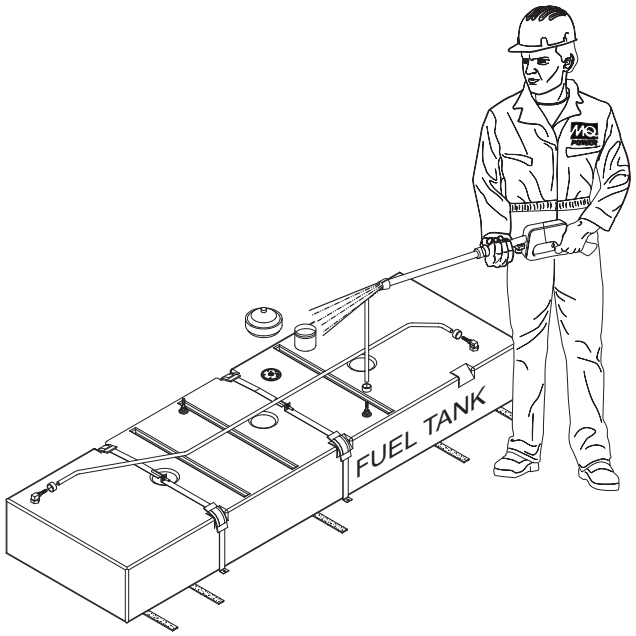


Figure 65. Fuel Tank Cleaning

FUEL TANK INSPECTION

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

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

DRIVE BELT DAILY)

Drive Belt Tension

A slack drive belt (Figure 12) may contribute to overheating, or to insufficient charging of the battery, adjust drive belt in accordance with the John Deere Operator's manual.

Drive Belt Inspection

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

Also, examine the belt and determine if it is ***oil soaked*** or "***glazed***" (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.

If the drive belt exhibits any of the above wear conditions, replace the drive belt immediately.

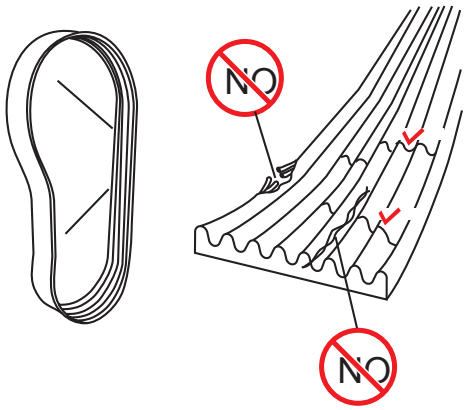


Figure 66. Drive Belt Inspection

ENGINE OIL CHECK (DAILY)

1. When checking or adding oil, place the machine so the engine is level.
2. Pull the engine oil dipstick from its holder.
3. Determine if engine oil is low. Oil level should be between the upper land lower limit (Figure 67) on the dipstick.

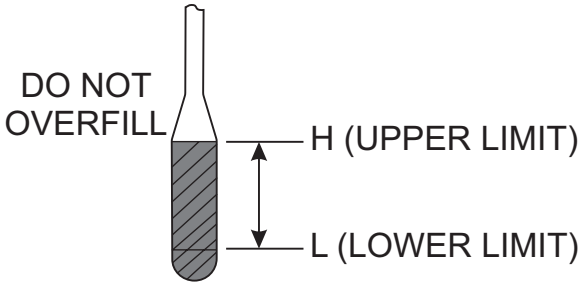
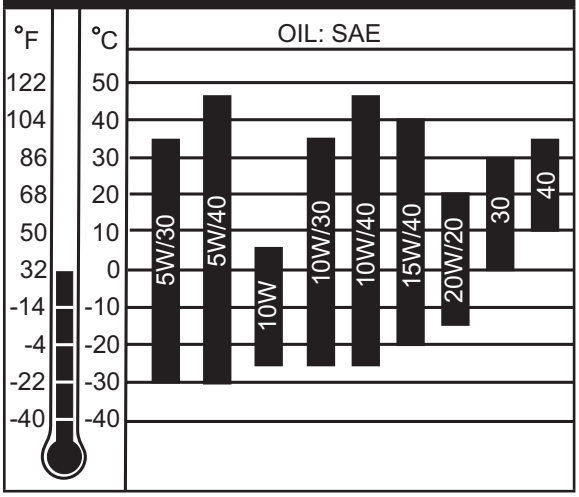


Figure 67. Dipstick Engine Oil Level

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

Table 15. Oil Selection Chart



DRAINING ENGINE OIL

1. Run the engine until the engine coolant reaches a temperature of 140°F (60°C) Turn the engine off.
2. Remove the oil dipstick from its holder.
3. Next, remove ***oil drain cap*** (Figure 68)
4. Place the ***oil drain valve*** in the **OPEN** position and allow the oil to drain into a suitable container.

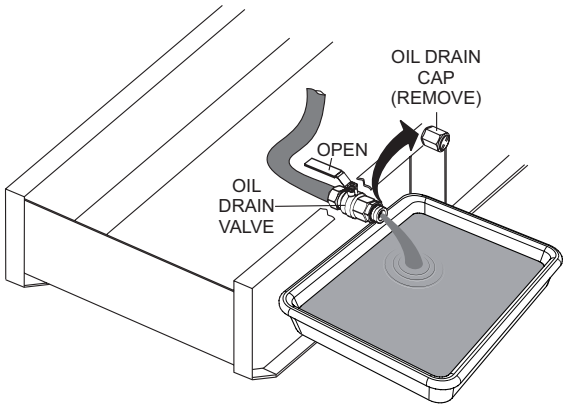


Figure 68. Draining Engine Oil

5. After engine oil has been completely drained, reinstall oil drain cap and tighten securely.
6. Place the ***oil drain valve*** in the **CLOSED** position.

ENGINE OIL FILTER REPLACEMENT

1. Using an oil filter wrench (Figure 69), remove engine oil filter.

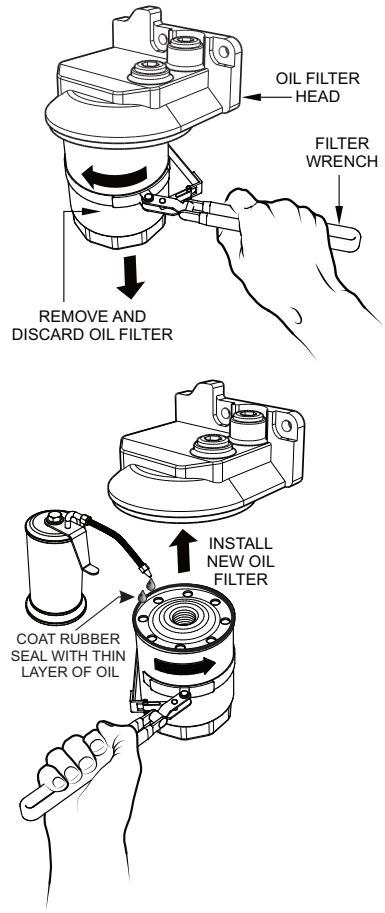


Figure 69. Engine Oil Filter Removal

2. Clean the area around the lubricating oil filter head.
3. Coat the rubber seal (gasket) surface of oil filter (Figure 69) with clean 15W-40 engine oil.
4. Install new oil filter first by hand until it makes contact with the filter head surface. Tighten it another 3/4 turn using the filter wrench.
5. Fill engine crankcase with high quality detergent oil classified "For Service CI-4". Fill to the upper limit of dipstick. **DO NOT** overfill. Reference Table 2 for engine crankcase 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.

FLUSHING OUT RADIATOR AND REPLACING COOLANT

⚠ WARNING

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

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

1. Place the ***coolant drain valve*** in the **OPEN** position (Figure 70) and allow the coolant to drain into a suitable container.

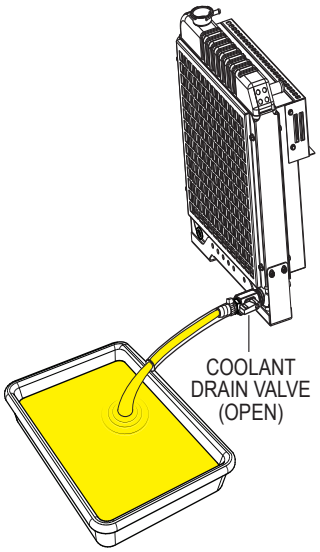


Figure 70. Draining Engine Coolant

2. Check hoses for softening and kinks. Check clamps for signs of leakage.
3. Remove and inspect radiator cap.
4. Flush the radiator by running clean tap water through radiator until signs of rust and dirt are removed. **DO NOT** clean radiator core with any objects, such as a screwdriver.
5. Tighten water cock and replace the overflow tank.
6. Place the coolant drain valve in the **CLOSED** position.
7. Replace with coolant as recommended by the engine manufacturer.
8. Reinstall radiator cap. Tighten securely.

RADIATOR CLEANING

The radiator (Figure 71) should be sprayed cleaned) with a high pressure washer when excessive amounts of dirt and debris have accumulated on the cooling fins or tube. When using a high pressure washer, stand at least 5 feet (1.5 meters) away from the radiator to prevent damage to the fins and tube.

Figure 71. Radiator Cleaning

GENERATOR STORAGE

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

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

ENGINE BLOCK HEATING ELEMENT AND INTERNAL BATTERY CHARGER 120 VAC INPUT RECEPTACLES (OPTIONAL)

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

The engine block heating element and internal battery charger both require 120 VAC in order to operate. A receptacle (Figure 72) has been 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 need to apply power to jacket water heater (heating element). However, if the generator will be used in **cold** climates, it is best to apply power to the jacket water 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 and to ensure adequate starting capability, always have power applied to the generator's internal battery charger.

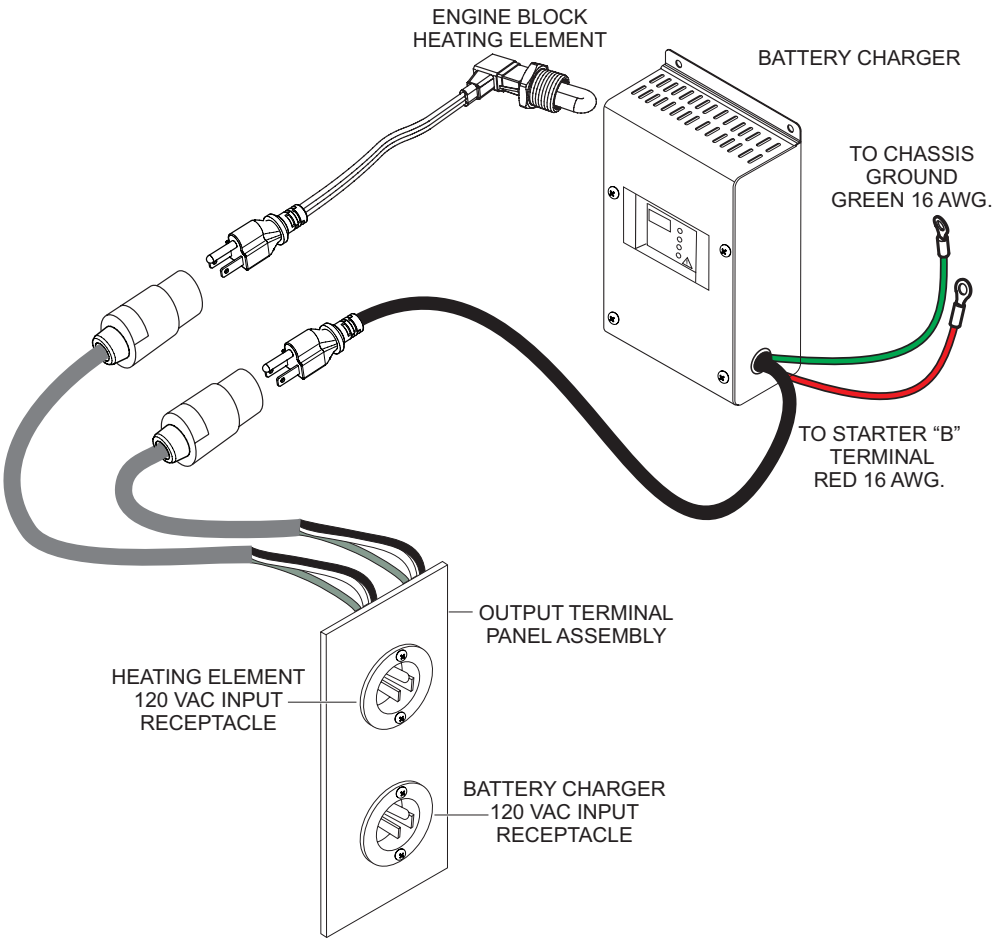


Figure 72. Heater Element and Battery Charger (Option)

EMISSION CONTROL

The emission control system employed with the **John Deere 6090HF** diesel engine consist of a ***Diesel Oxidation Catalyst*** (DOC) and a ***Selective Catalytic Reduction*** (SCR) catalyst as an exhaust gas after-treatment system that helps reducing harmful gases and destroying the organic fraction of the particulate matter produced from the exhaust gas to meet the requirement for EPA Tier 4 Final regulations.

The DOC device (Figure 73) helps in filtering 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 a catalysts to oxidize hydrocarbons and carbon monoxide.

EMISSION CARBON CHECK

Deposition of carbon (soot, unburned fuel) in the exhaust pipe line and muffler could cause not only system derates but also could lead to fires.

To reduce soot and unburned fuel, run the unit at rated power until the exhaust gas becomes mostly colorless every 250 hours operation time. More carbon will be generated when the unit operates at less then 30% of rated power. In this case, perform the above procedures more frequently.

NOTICE

Applying a large load suddenly to the unit when the carbon deposition is generated in the exhaust system could produce sparks and will lead to abnormal combustion. Therefore, apply load gradually and observe the exhaust gas color during the process.

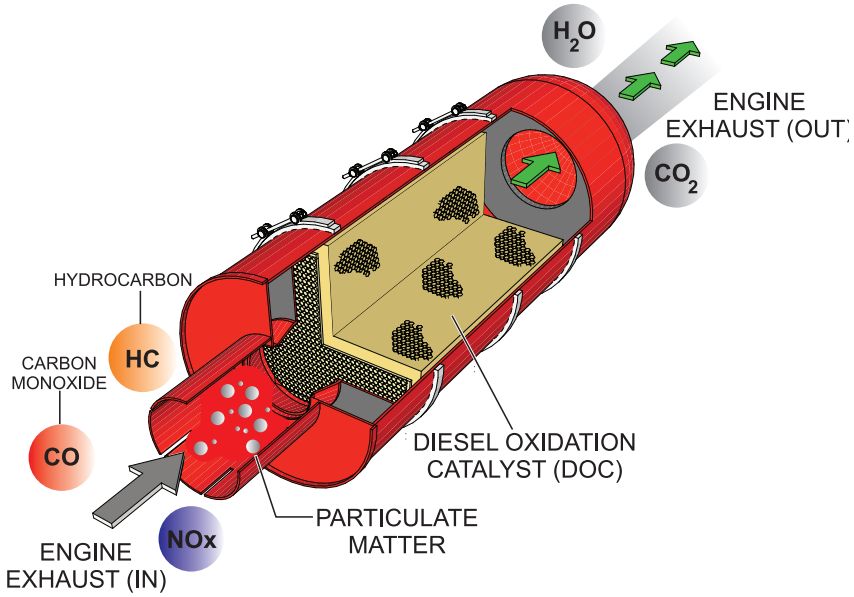


Figure 73. Diesel Oxidation Catalyst DOC)

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 (NO_x), which are harmful pollutants, from the nitrogen in the air. ***Selective Catalytic Reduction*** is used to reduce the amount of NO_x released into the atmosphere.

Diesel Exhaust Fluid (DEF) from a separate tank is injected into the exhaust pipeline, where the aqueous urea vaporizes and decomposes to form ammonia and carbon dioxide. Within the SCR catalyst, the NO_x are catalytically reduced by the ammonia (NH_3) into water (H_2O) and nitrogen (N_2), which are both harmless; and these are then released through the exhaust.

The SCR system creates a certain amount of ammonia (NH_3) that is stored in SCR catalyst. During purging operations the increase in temperature at regular intervals eleminates the stored ammonia.

The process of keeping accurate amonia storage amounts is by counting urea injection quantities from the Dosing Control Unit (DCU)

The SCR Purge symbol (Figure 74) will be displayed on the ECU controller during operation when either an ***automatic*** or ***forced*** system purge operation is in process.

The pre-alarm lamp is only **ON** during SCR forced system purging and **OFF** during automatic system purging

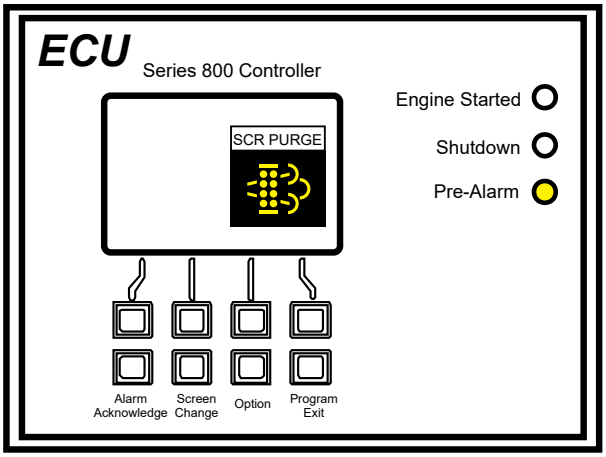


Figure 74. SCR Purge Symbol

NOTICE

During urea SCR system purging, ***white smoke*** may be emitted from the exhaust tailpipe temporarily this shoud not be considered a failure. In addition the smell of ***ammonia*** during the purging process should not be considered a failure.

If the purging process is underway while running a light load (0-35%) the unit may produce unusual sounds. This should not be considered a failure or malfunction.

SYSTEM PURGING GUIDELINES

NOTICE

DO NOT perform purging in conditions where it may be unsafe due to high exhaust temperatures.

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

NOTICE

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

- **DO NOT** operate the unit in 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.
- Exhaust emissions from the tailpipe have a smell different from those emitted from engines without urea SCR systems due to the exhaust emission reduction functions of the exhaust system.

If the ***diesel exhaust fluid (***DEF) symbol (Figure 75) is displayed during ECU controller operation, it indicates the following:

- DEF tank level is below 10%. Reference Table 16, DEF Level System Action System.
- DEF quality is poor. Check DEF tank level and check active ***diagnostics trouble codes*** (DTC).

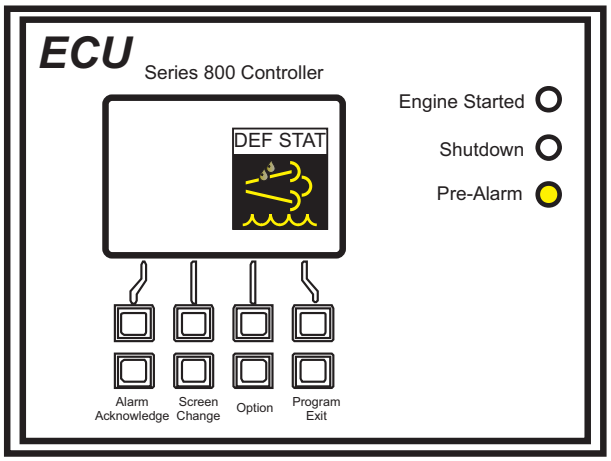


Figure 75. ECU DEF State Pre-Alarm

NOTICE

Models equipped with the ***845 Series ECU Controller*** will enter emergency shutdown when the DEF level has reached 0% and emergency protective measures are necessary. When this condition exist, the unit can only be restarted after the ESCAPE MODE is activated and the unit will run for 30 minutes. Reference "Escape Mode" section in this manual.

DIESEL EXHAUST FLUID (DEF)

The amount of fluid in the DEF tank will be shown on the ECU Controller main screen during operation. The symbol shown in Figure 76 will be shown on the ECU monitor indicating the level of fluid in the DEF tank.

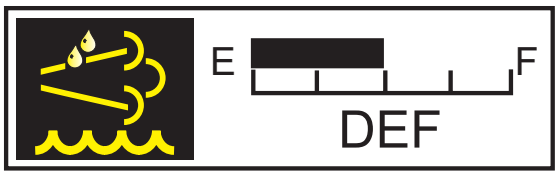


Figure 76. DEF Tank Level Guage

Table 16. DEF Level System Action System

DEF Level	Over 10%	Below 10%	0%	Empty or After 4 hrs. From 0%
Controller Message	—	DEF<10% Tank Level	DEF<10% Tank Level	DEF Tank Empty Level
DEF Symbol	—	ON	Blinking	Blinking
Pre-Alarm Lamp	—	—	ON	ON
Shutdown Lamp	—	—	—	ON Engine Shutdown

INDUCEMENT

When the system senses improper usage such as no supply of DEF, use of poor quality DEF, problems with DEF jets, 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 three warning levels are referenced in Table 17:

Table 17. DEF Inducement

Stage	Controller Message	SCR System Pop-Up	DEF Symbol	Pre-Alarm Lamp	Shutdown Lamp
Stage 1 Warning Level 1	SCR System Malfunction	SCR SYS ERR		● ON	—
Stage 2 Warning Level 2	SCR System Malfunction	SCR SYS ERR	 Slow Blinking	● ON	—
Stage 3 Shutdown[1]	SCR System Malfunction	SCR SYS ERR	 Fast Blinking	● ON	● ON

[1]When emergency shutdown occurs, inspection and repair should generally be performed promptly. However, if emergency protective measures are necessary, unit will enter **ESCAPE MODE** and may require as much as 30 minutes to restart.

HOW TO ACTIVATE ESCAPE MODE

If the ECU displays any messages referenced in Table 18 or Figure 77, it may be necessary to restart via ESCAPE MODE.

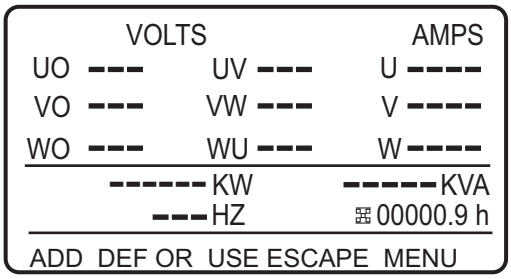


Figure 77. Add DEF/Escape Menu Screen

Starting

1. Start the Diagnostic Mode as referenced in the "Troubleshooting Diagnostics" section in this manual.
2. Exit the Status Check Screen by pressing the [**EXIT**] button (Figure 78).

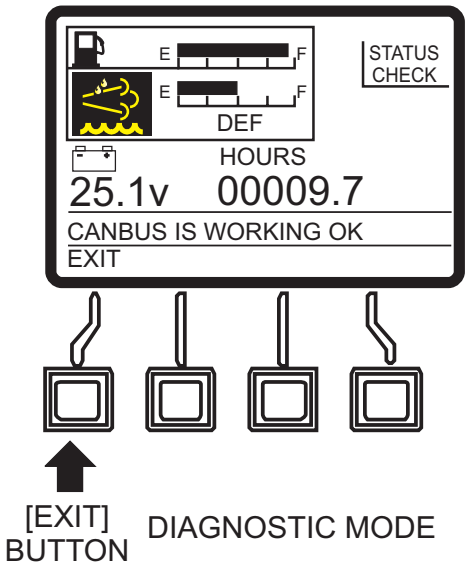


Figure 78. Status Check Screen Diagnostic Mode)

3. Next, press the [**Program/Exit**] button (Figure 79) to enter the Main Menu.

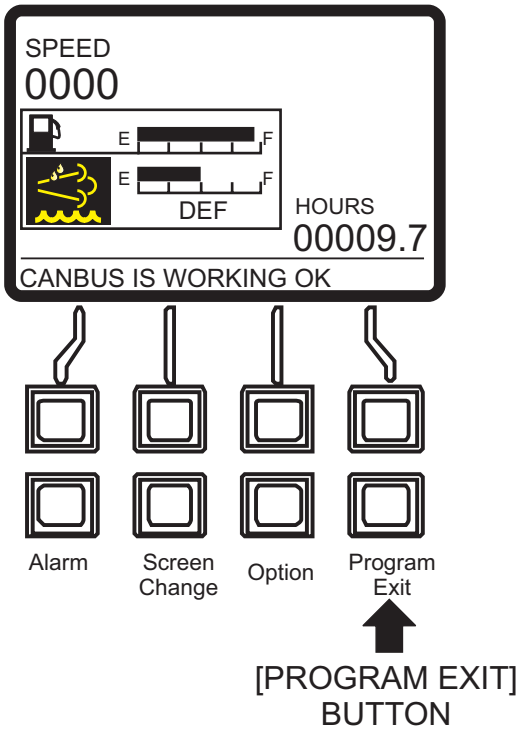


Figure 79. Main Screen

4. Press the [**DOWN**] button (Figure 80) to scroll to the Escape Mode item.

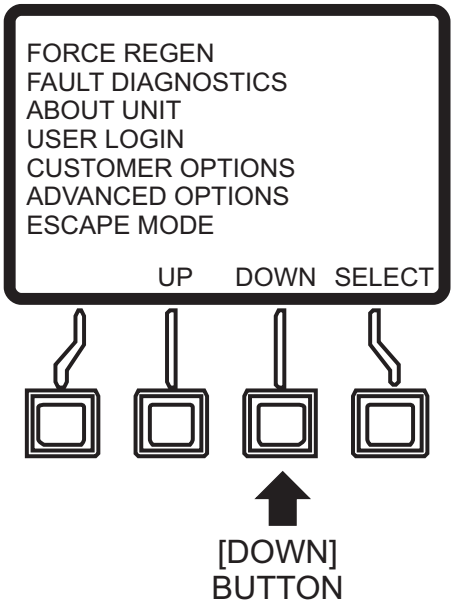


Figure 80. Main Menu Down Button)

5. Press the [**SELECT**] button (Figure 81) to enter the "Escape Mode" menu.

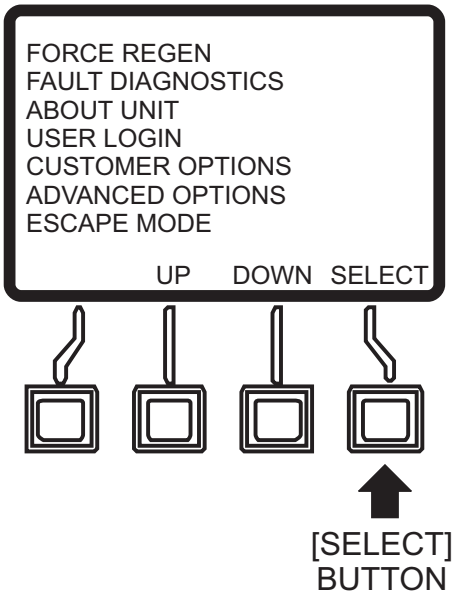


Figure 81. Escape Mode (Select Button)

6. Press the [**REQUEST**] button (Figure 82) to send "Escape Mode Request" signal to ECM.

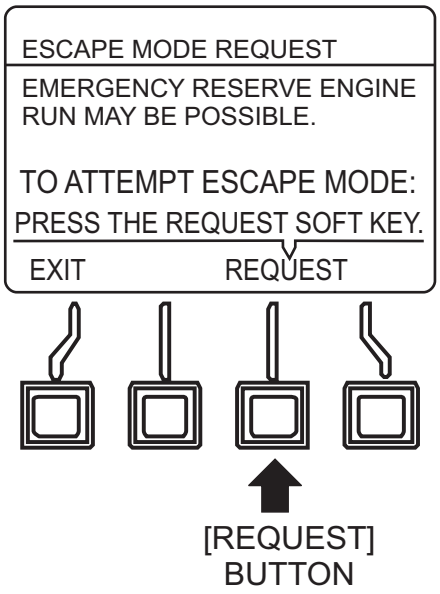


Figure 82. Escape Mode (Request Button)

7. Once the [**REQUEST**] button has been pressed, the display will indicate that escape mode has been activated (Figure 83).

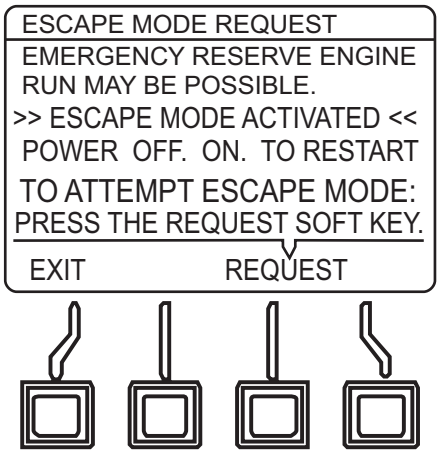


Figure 83. Escape Mode Activated Screen

8. Place the Auto Start/Stop Switch (Figure 84), to the "Off /Reset" position.

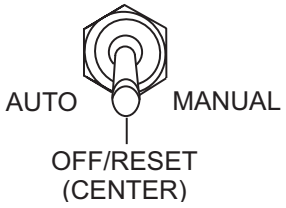


Figure 84. Auto Off/Reset Manual Switch (Off/Reset Position)

9. Next, place the Auto Start/Stop Switch (Figure 85) to the "Manual" position to start the engine.

Figure 85. *Auto-Off/Reset* Manual Switch (Manual Position)

10. The ***Escape Mode Timer*** (Figure 86) will appear on the ***main*** screen. This timer displays remaining time the unit can be operated.

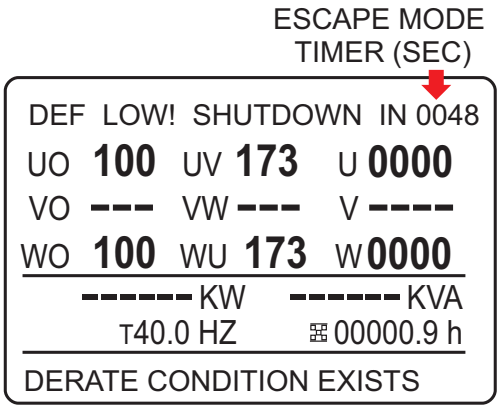


Figure 86. Escape Mode Timer

- If ESCAPE MODE is temporarily suspended, it is not necessary to return to the ESCAPE MODE screen and press the [**REQUEST**] button. ESCAPE MODE operation will be available until around 30 minutes after operation has been ended.
- Once the ESCAPE MODE timer reaches zero minutes, the engine will stop since the ESCAPE MODE time has expired. Please perform maintenance to return unit to proper operating condition.
- If the unit returns to Warning Level 1 while ESCAPE MODE is running, ESCAPE MODE will be cancelled, the ESCAPE MODE timer display will close, and normal operation will resume.

PROTECTION DEVICES

Automatic Shutdown System

This unit is equipped with engine protection devices that automatically shut down the engine if any of the faults shown in Table 18 occur. The “Shutdown” LED on the ECU Controller will turn on just before the shutdown and will stay on after the shutdown. Messages will appear on the ECU display.

After the automatic shutdown, check all Diagnostic Test Codes (DTC) displayed on the ECU Controller. Reference the Troubleshooting Diagnostic section in this manual.

Place the Auto Start/Stop Switch in the “Off/Reset” position. In addition, place all circuit breakers in the **OFF** position. Before troubleshooting, allow sufficient time for adequate cooling. Before attempting to restart the generator, perform overall inspection of the generator and correct the problem that caused the shutdown. If necessary, contact your nearest Multiquip dealer for additional technical support.

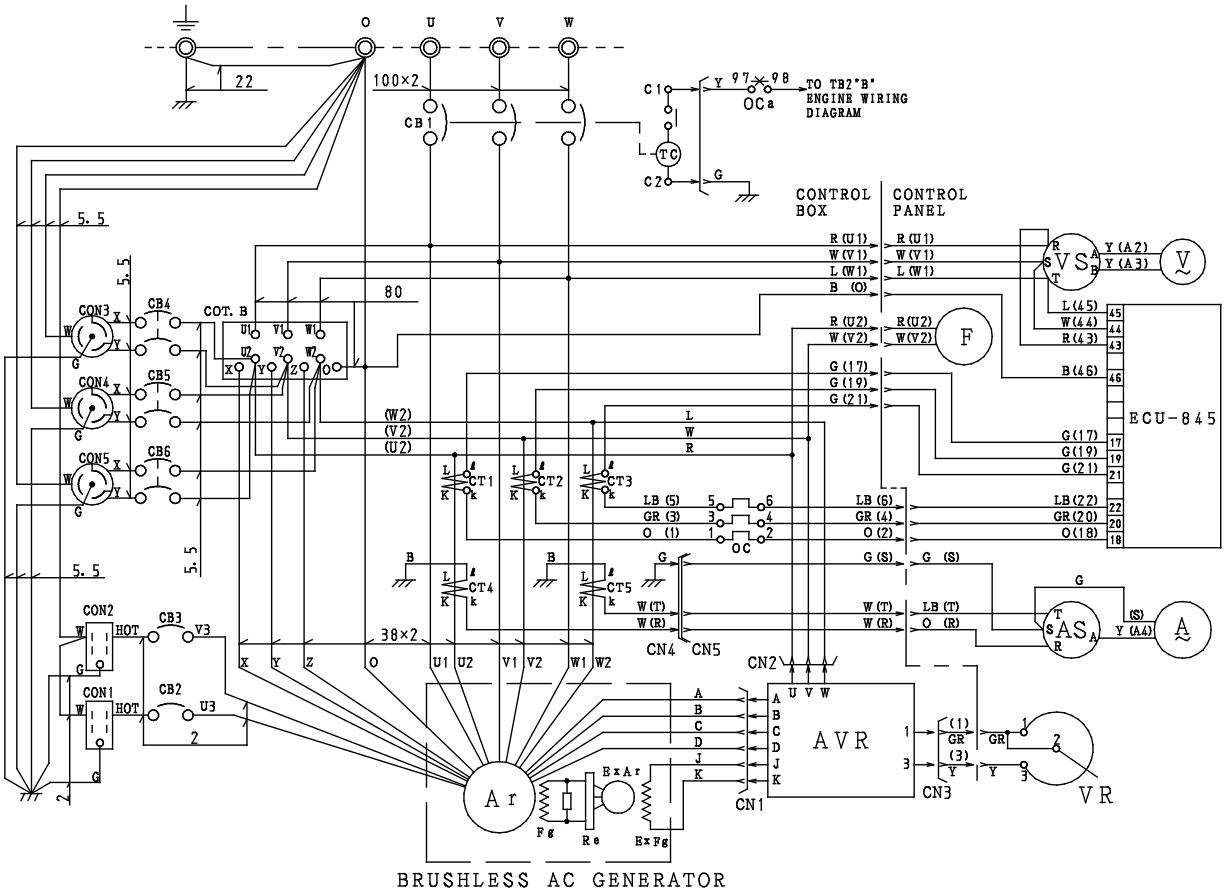
Restart the generator as reference in the Generator Startup Procedure (Manual Start).

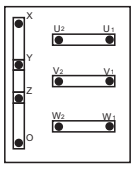
NOTICE

Although the unit is equipped with engine protection devices, regularly scheduled ***preventative maintenance*** is strongly advised.

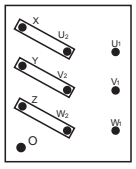
Table 18. Automatic Engine Shutdown System

Operating Parameter	ECU Shutdown LED	Operating Condition/Set Point
Low Oil Pressure	ON	Set Point: 17 PSI ((117 kPa)
High water Temperature	ON	Set Point: 240°F (116°C)
Low Coolant Level	ON	Falls Below Specified Level
High Water Level In Fuel Water Separator	ON	Water Level has Exceeded Filter Capacity
High Engine Fuel Temperature	ON	Fuel Temperature Too High
High Charged Air-Cooler Outlet Temperature	ON	Fuel Temperature Too High
Exhaust System Severe Malfunction	ON	Reference Exhaust System, DEF, Regeneration Sections
Over-Voltage	ON	Set Point: 110%
Under-Voltage	ON	Set Point: 75%
High Power (kW)	ON	Set Point: 115%
Over-Frequency (Hz)	ON	Set Point: 110%
Under-Frequency (Hz)	ON	Set Point: 90%
Over-Current	Main CB Trip	Load Capacity Exceeded





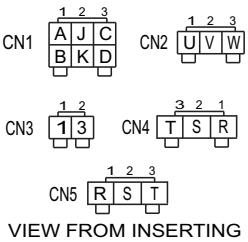
Voltage Change-Over Board-240V Set



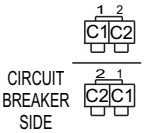
Voltage Change-Over Board-480V Set

CURRENT TRANSFORMERS (CT4 ~ 5)	
REF. DES.	MARK AT CT
k	X1
l	NO MARK
K	H1
L	NO MARK
NOTE: EACH CABLE IS PASSED TWICE THROUGH CURRENT TRANSFORMERS CT4~5	

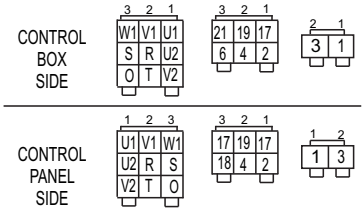
SYMBOL	DESIGNATION
Ar	MAIN GENERATOR ARMATURE WINDING
Fg	MAIN GENERATOR FIELD WINDING
ExAr	EXCITER ARMATURE WINDING
ExFg	EXCITER FIELD WINDING
Re	RECTIFIER
AVR	AUTOMATIC VOLTAGE REGULATOR
VR	VOLTAGE REGULATOR (RHEOSTAT)
CT 1~3	CURRENT TRANSFORMER 500:5A
CT 4~5	CURRENT TRANSFORMER 500:5A
AS	CHANGE-OVER SWITCH,AMMETER
A	AC AMMETER 0~500, 1000A
V	AC VOLTMETER 0~600V
F	FREQUENCY METER 45~65 Hz @220V
CB1	CIRCUIT BREAKER, 3P 800A
CB2~3	CIRCUIT BREAKER, 1P 20A
CB4~6	CIRCUIT BREAKER, 2P 50A
CON1~2	RECEPTACLE, GFCI, 125 VAC @ 20 AMPS X 2
CON3~ 5	RECEPTACLE, CS6369, 250 VAC@ 50 AMPS
OC	OVER CURRENT RELAY
COT. B	VOLTAGE CHANGE-OVER BOARD
AS	AC AMMETER CHANGE-OVER SWITCH



VIEW FROM INSERTING WIRE SIDE

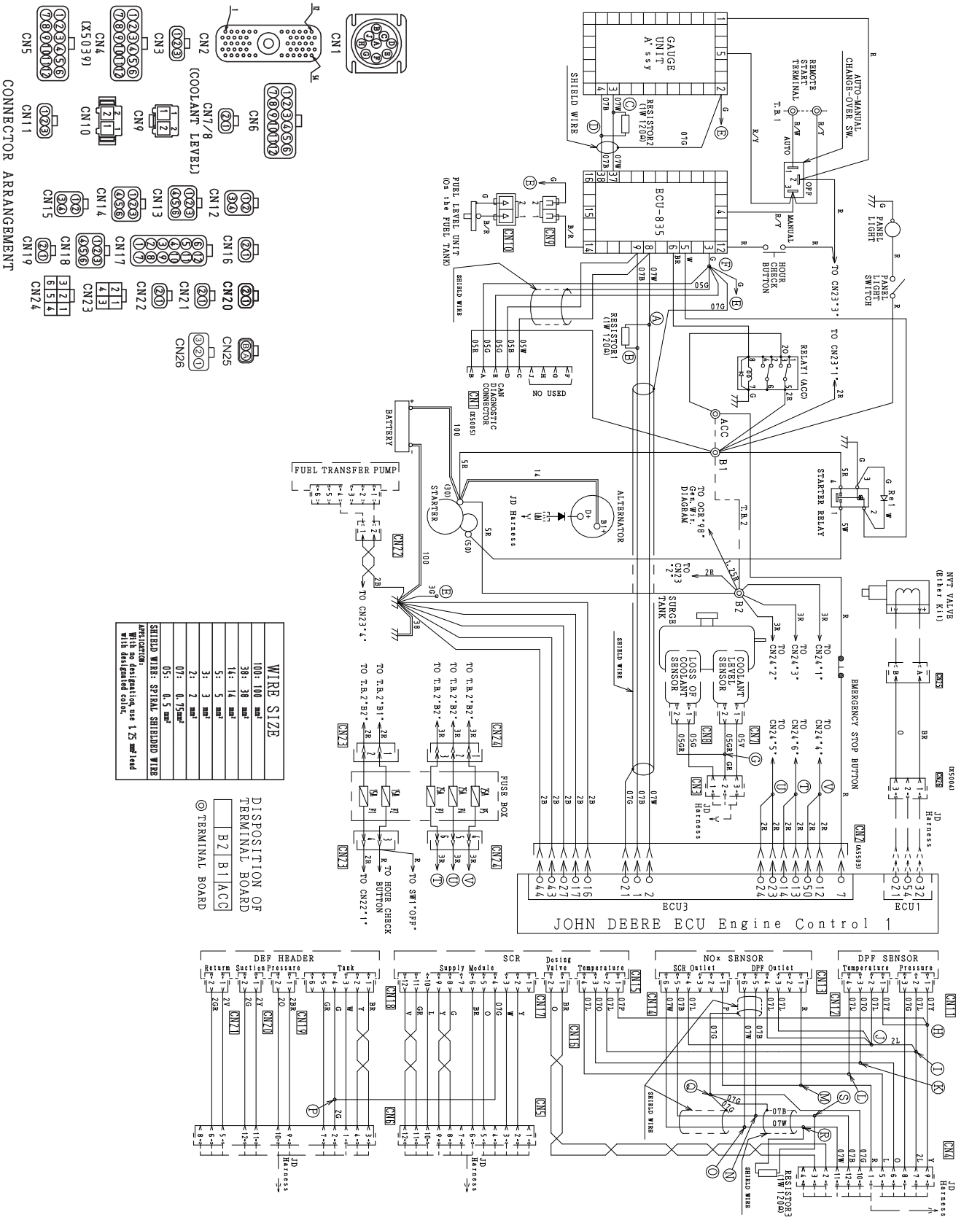


CB1 CONNECTOR (VIEW FROM INSERTING WIRE SIDE)

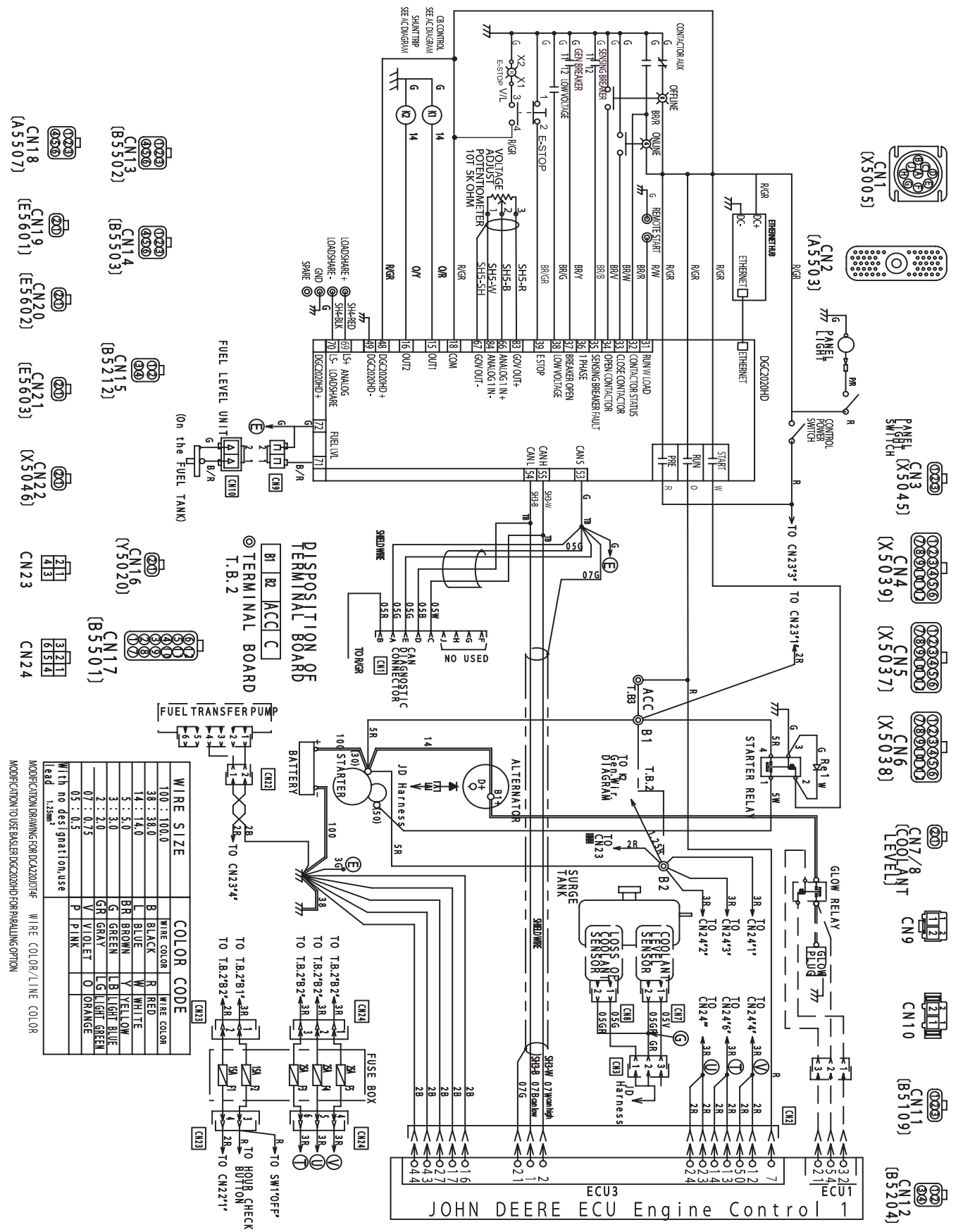


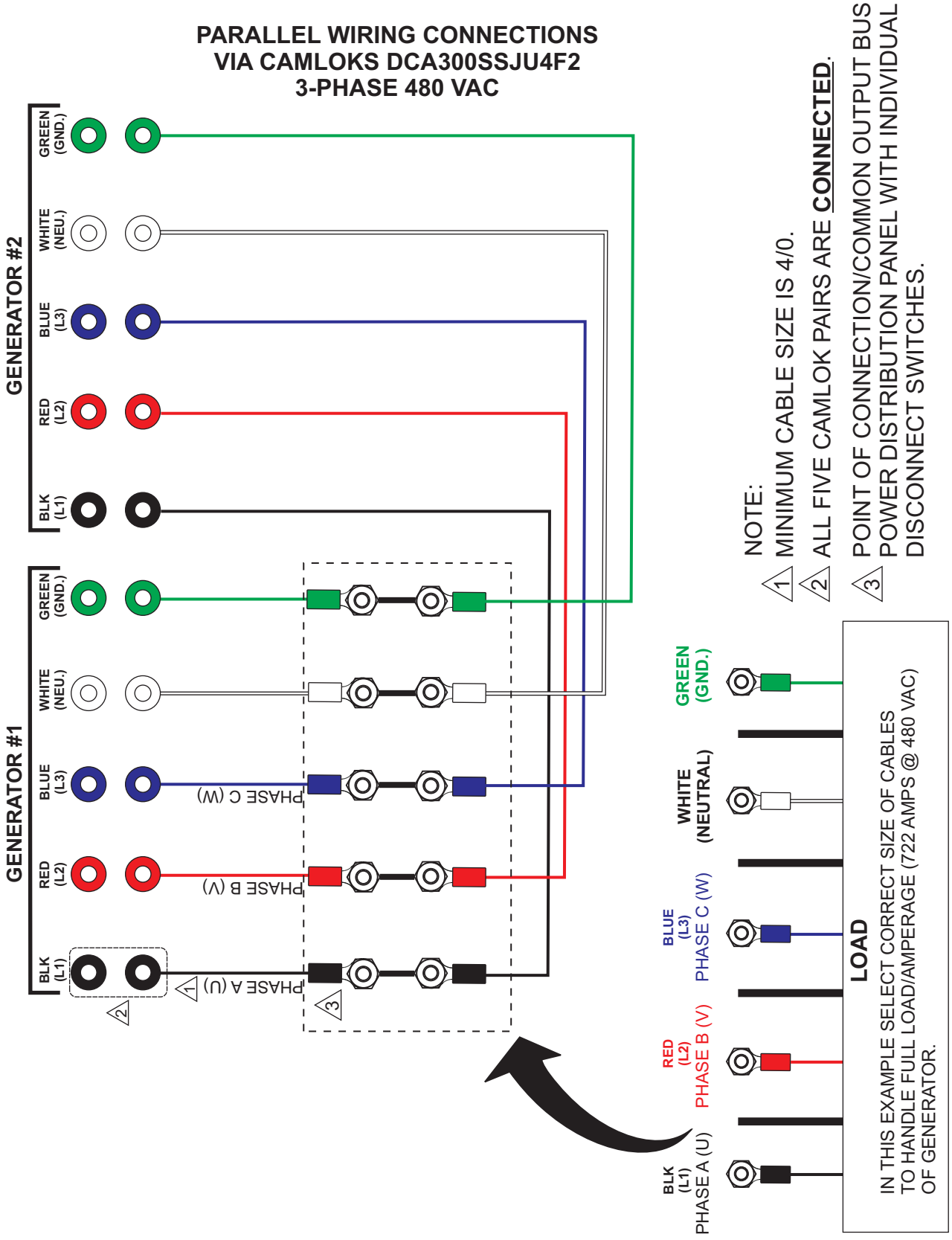
CONNECTOR (VIEW FROM INSERTING WIRE SIDE)

WIRE SIZE	CODE/WIRE COLOR			
125: 125 mm²	B	BLACK	R	RED
100: 100 mm²	L	BLUE	W	WHITE
80: 80 mm²	BR	BROWN	Y	YELLOW
22: 22 mm²	G	GREEN	LB	LIGHT BLUE
14: 14 mm²	GR	GRAY	LG	LIGHT GREEN
8: 8 mm²	V	VIOLET	O	ORANGE
5.5: 5.5 mm²	P	PINK		
NO MARK WIRE SIZE: 1.25 mm²				

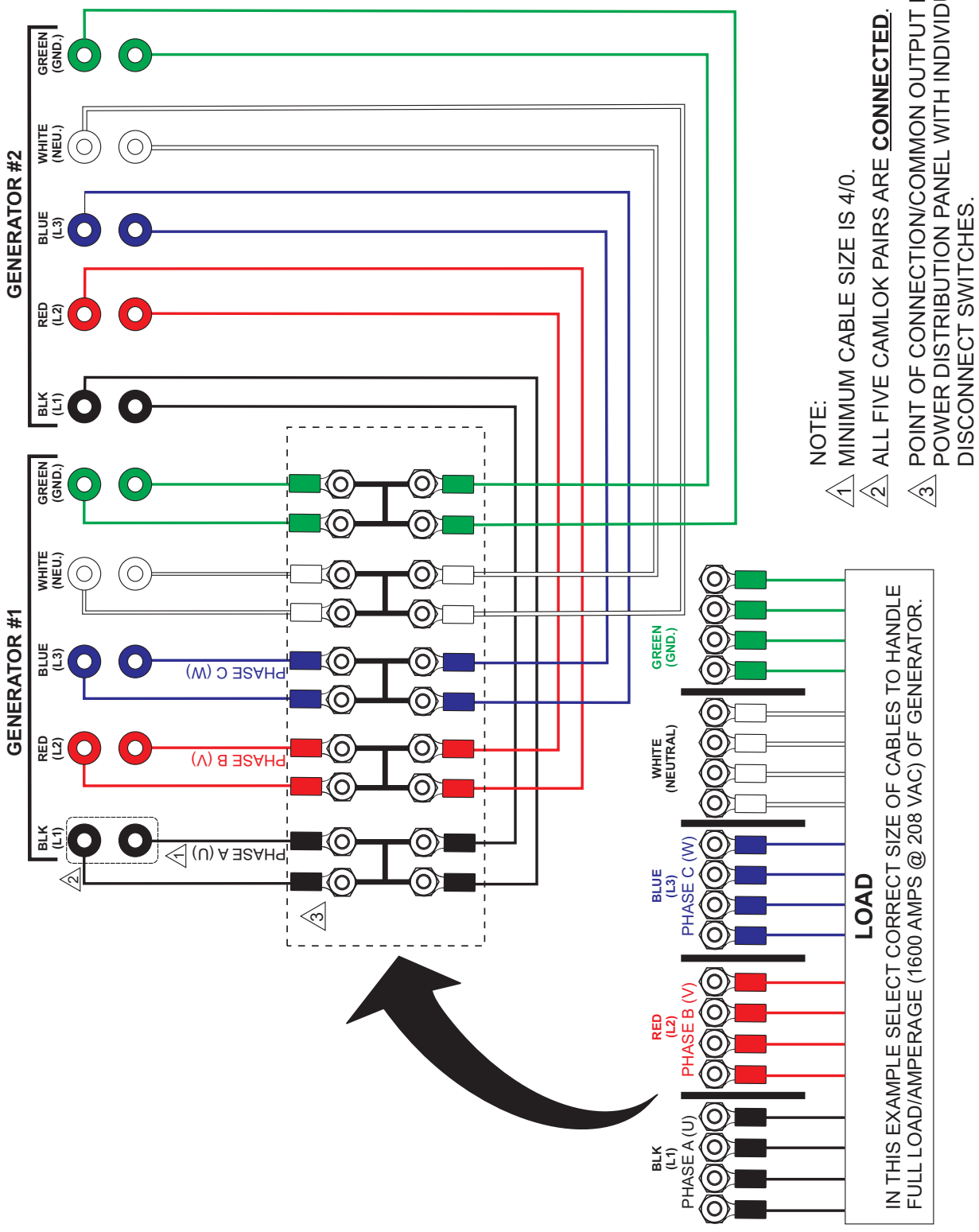

CONNECTOR ARRANGEMENT
(WIRING VIEW)
CN1
CN2
CN3
CN4
CN5
CN6
CN7/8
CN9
CN10
CN11
CN12
CN13
CN14
CN15
CN16
CN17
CN18
CN19
CN20
CN21
CN22
CN23
CN24
CN25
CN26
(COOLANT LEVEL)
ECU-835
GAUGE UNIT A'ssy
SHIELD WIRE
REMOTE START TERMINAL
AUTO-MANUAL CHANGE-OVER SW.
PANEL LIGHT
PANEL LIGHT SWITCH
HOUR CHECK BUTTON
FUEL LEVEL UNIT (On the FUEL TANK)
RESISTOR1 (1W 120Ω)
RESISTOR2 (1W 120Ω)
RESISTOR3 (1W 120Ω)
CAN DIAGNOSTIC CONNECTOR
NO USED
RELAY1 (ACC)
STARTER RELAY
BATTERY
FUEL TRANSFER PUMP
STARTER
ALTERNATOR
SURGE TANK
COOLANT LEVEL SENSOR
LOSS OF COOLANT SENSOR
EMERGENCY STOP BUTTON
NVT VALVE (Ether Kit)
FUSE BOX
ECU3
ECU1
JOHN DEERE ECU Engine Control 1
DBF HEADER
SCR
NOx SENSNOR
DPF SENSOR
JD Harness
WIRE SIZE
100: 100 mm²
38: 38 mm²
14: 14 mm²
5: 5 mm²
3: 3 mm²
2: 2 mm²
07: 0.75mm²
05: 0.5 mm²
SHIELD WIRE: SPIRAL SHIELDED WIRE
APPLICATION:
With no designation, use 1.25 mm² lead with designated color.
DISPOSITION OF TERMINAL BOARD
B2 B1 ACC
TERMINAL BOARD

ENGINE WIRING DIAGRAM (BASLER DGC2020HD OPTION)



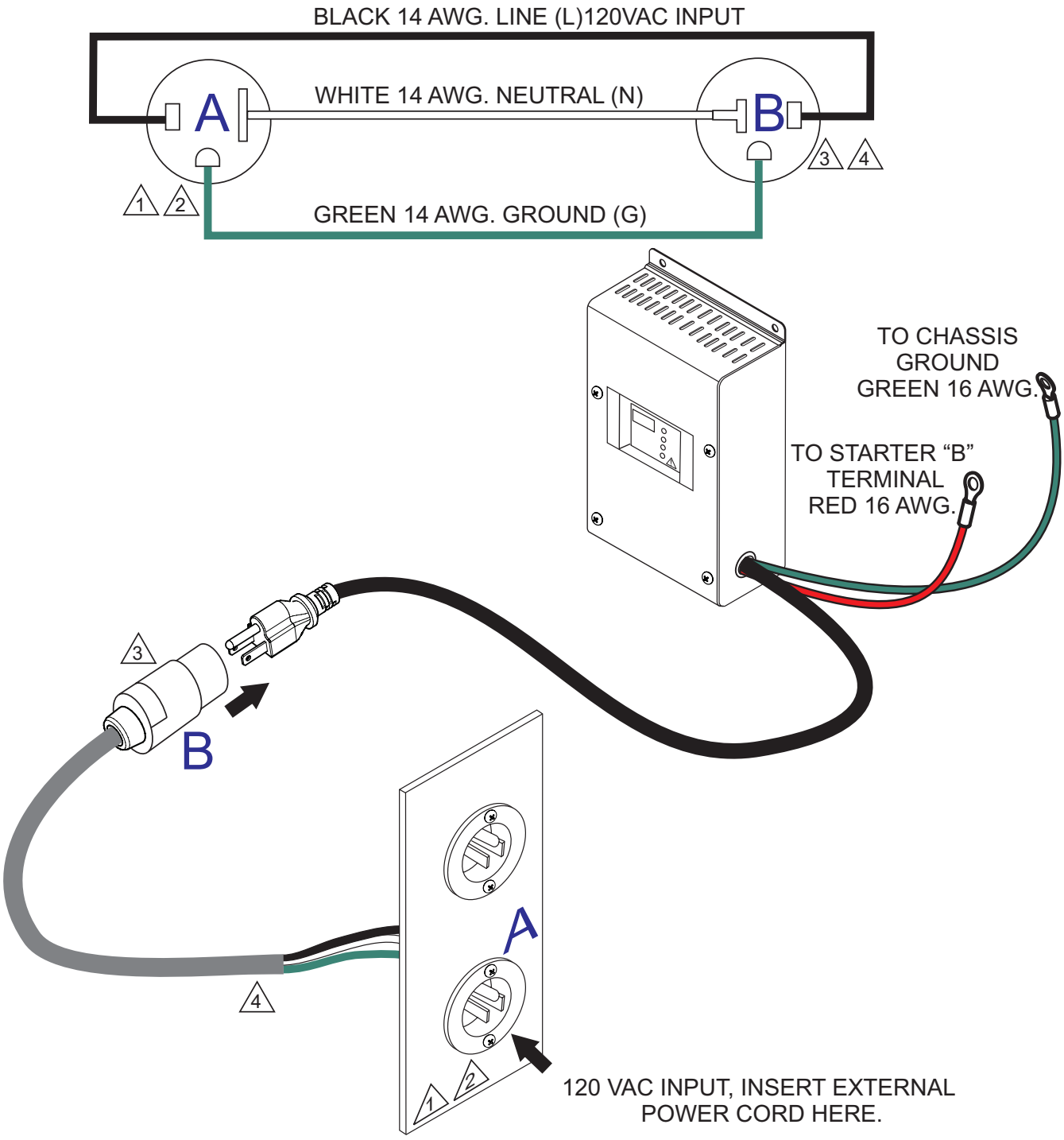

PARALLEL WIRING CONNECTIONS
VIA CAMLOKS DCA300SSJU4F2
3-PHASE 480 VAC
GENERATOR #2
GENERATOR #1
BLK (L1)
RED (L2)
BLUE (L3)
WHITE (NEU.)
GREEN (GND.)
PHASE A (U)
PHASE B (V)
PHASE C (W)
NOTE:
1 MINIMUM CABLE SIZE IS 4/0.
2 ALL FIVE CAMLOK PAIRS ARE CONNECTED.
3 POINT OF CONNECTION/COMMON OUTPUT BUS POWER DISTRIBUTION PANEL WITH INDIVIDUAL DISCONNECT SWITCHES.
LOAD
IN THIS EXAMPLE SELECT CORRECT SIZE OF CABLES TO HANDLE FULL LOAD/AMPERAGE (722 AMPS @ 480 VAC) OF GENERATOR.

PARALLEL WIRING CONNECTIONS
VIA CAMLOKS DCA300SSJU4F2
3-PHASE 208 VAC



NOTE:
1. MINIMUM CABLE SIZE IS 4/0.
2. ALL FIVE CAMLOK PAIRS ARE **CONNECTED**.
3. POINT OF CONNECTION/COMMON OUTPUT BUS POWER DISTRIBUTION PANEL WITH INDIVIDUAL DISCONNECT SWITCHES.

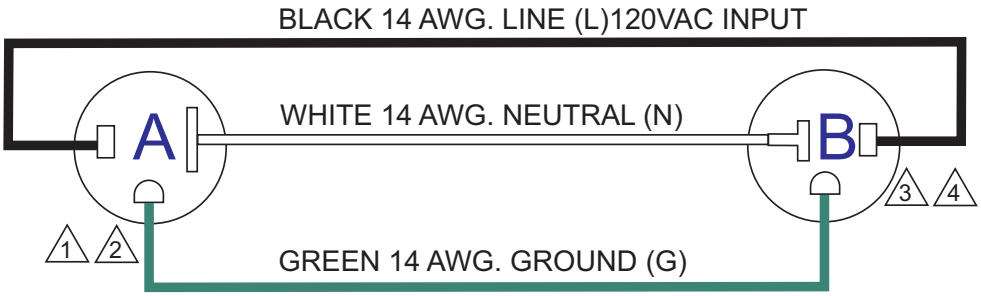
BATTERY CHARGER WIRING DIAGRAM

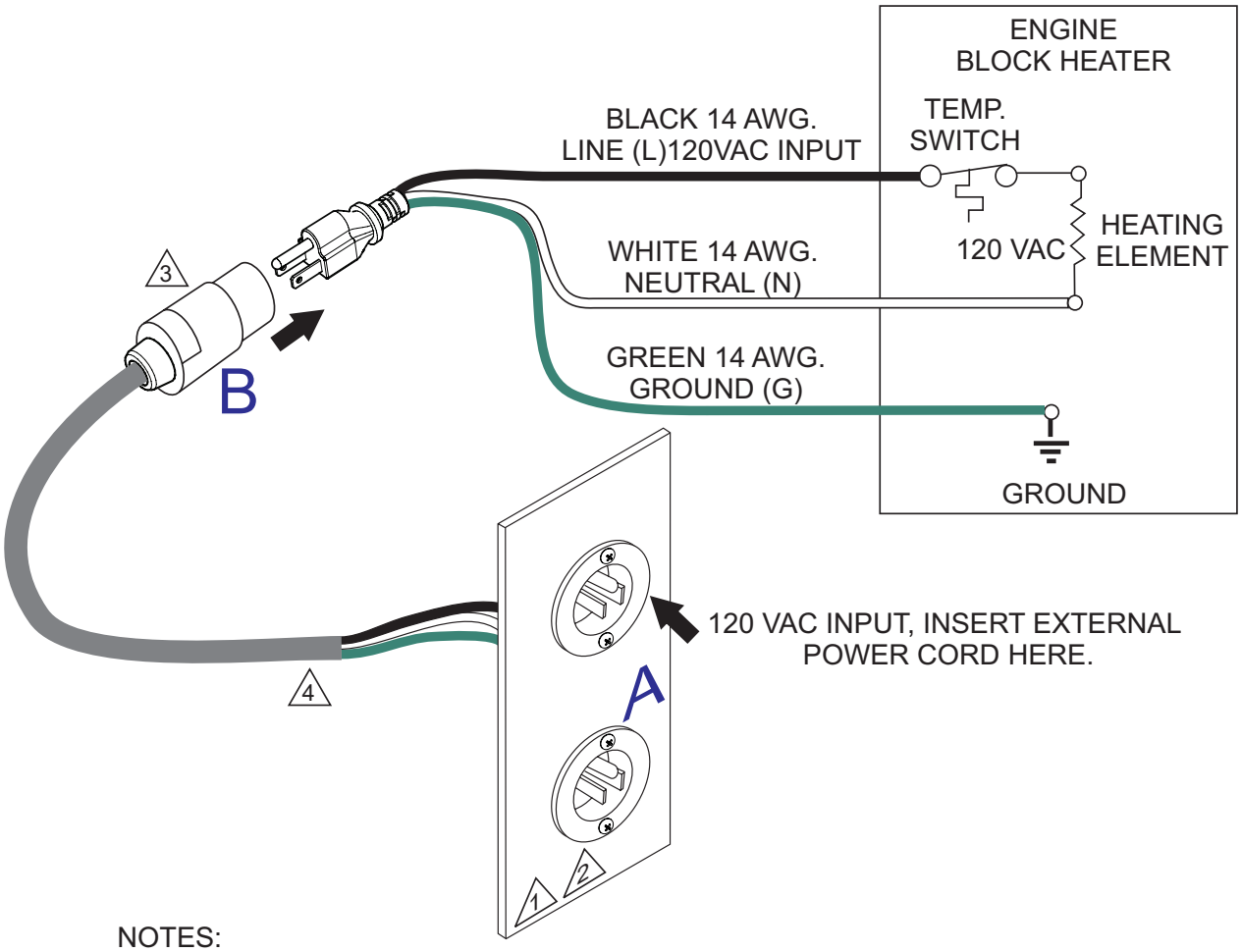


NOTES:

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

ENGINE BLOCK HEATER WIRING DIAGRAM





NOTES:

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

Practically all breakdowns can be prevented by proper handling and maintenance inspections, but in the event of a breakdown, use Table 19 shown below for diagnosis of the Generator. If the problem cannot be remedied, consult our company's business office or service plant.

Table 19. Generator Troubleshooting

Symptom	Possible Problem	Solution
No Voltage Output	AC Voltmeter defective?	Check output voltage using a voltmeter.
	Is wiring connection loose?	Check wiring and repair.
	Is AVR defective?	Replace if necessary.
	Defective Rotating Rectifier?	Check and replace.
	Defective Exciter Field?	Check for approximately 19 ohms across J & K on CN1
Low Voltage Output	Is engine speed correct?	Place engine speed switch in "High" position.
	Is wiring connections loose?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
High Voltage Output	Is wiring connections loose?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
Circuit Breaker Tripped	Short Circuit in load?	Check load and repair.
	Over current?	Confirm load requirements and reduce.
	Defective circuit breaker?	Check and replace.
	Over current Relay actuated?	Confirm load requirement and replace.

Troubleshooting (Engine)		
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 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?	Replace fuel filter.
	Fuel filter clogged?	Replace fuel filter.
	Fuel tank venting is inadequate?	Ensure that tank is adequately vented.
	Leaks at pipe unions?	Check threaded pipe unions tape and tighten unions a 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) - 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 uppermark on dipstick.
	Entire cooling air system contaminated/ 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.

845 ECU SERIES CONTROLLER

The engine controller of this generator diagnoses problems that arise from the engine control system and the engine itself.

1. With the engine stopped (**OFF**). Push and hold the ***Hour Check Button*** (Figure 87) located on the control panel.

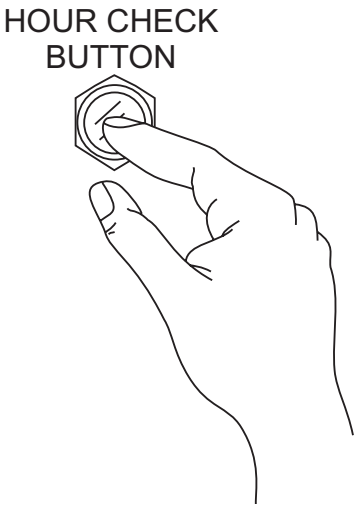


Figure 87. Hour Check Button

2. While keeping the ***Hour Check Button*** pressed, place the ***Auto Off/Reset Manual Switch*** (Figure 88) in the **MANUAL** position.

***Figure 88. Auto-Off/Reset* Switch (Manual Position)**

3. The ***Hour Check Menu Screen*** will be displayed on the ECU controller.
4. Releasing the ***Hour Check Button*** and pushing the ***Program/Exit Button*** on the ECU controller will return the controller to the main screen.

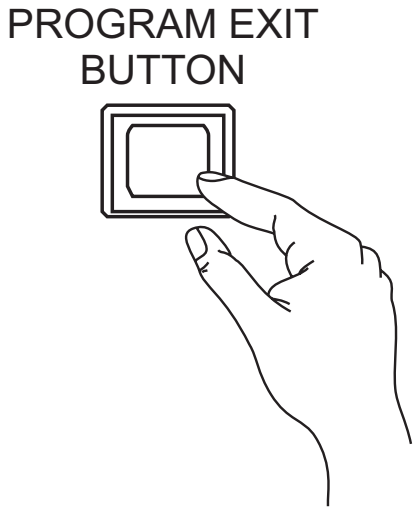


Figure 89. Program Exit Button

5. Push the ***Program/Exit Button*** on the ECU controller and select the ***Fault Diagnostics*** mode. This mode enables the ability to carry out the fault diagnostics as listed below:

- **DM1 Active Faults** — Displays active fault messages and codes.
- **DM2 Messages and Codes** — Displays messages and codes which previously occurred that are recorded in the Engine Control Module (ECM).
- **Last Shutdown** — Displays the messages and codes that caused the most recent shutdown.

6. After perfoming diagnostic tests, place the ***Auto Off/ Reset Manual Switch*** in the **OFF** position

DGC2020HD SERIES CONTROLLER

At times, it may be desired to power up the Engine Control Module (ECM), key switch **ON** while the engine is not running. This can be useful for diagnostic purposes and fault clearing.

To enter the ***diagnostic mode*** with the controller in the **OFF** mode and the engine not running do the following:

1. Press and hold the ***Alarm Slience*** and ***Lamp Test*** buttons (Figure 90) at the same time for 10 seconds.

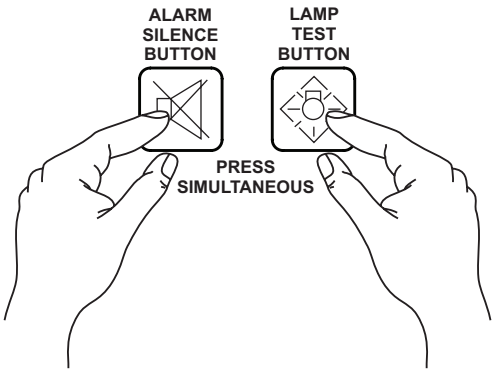


Figure 90. Alarm Silence/Lamp Test Buttons

2. Listen for an audiable click inside the control panel which is the ***run relay*** that controls the key switch.
3. While in diagnostic mode the controller can see real time engine CAN Bus data including ***Diagnostic Trouble Codes*** (DTC).
4. To view active DTC codes navigate to Metering >J1939 ECU>DTC Active Data.
5. For previously active codes navigate to Metering>J1939 ECU>DTC Prev Data.
6. Real time ECM parameters are not supported due to lack of sensors etc. and will display NS for No Signal.
7. The dianostic mode will remain active until the ***Reset*** button (Figure 91) is pressed or if the engine rpm becomes greater than zero.

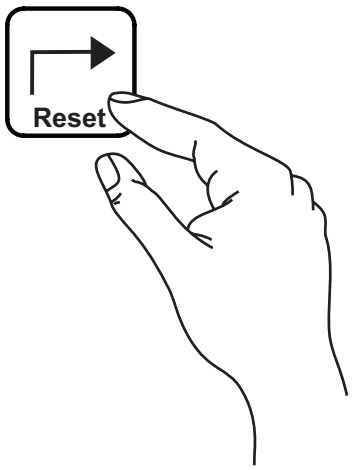


Figure 91. Reset Button

OPERATION MANUAL

HERE'S HOW TO GET HELP

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

UNITED STATES

Multiquip Inc.

(310) 537- 3700
6141 Katella Avenue Suite 200
Cypress, CA 90630
E-MAIL: mq@multiquip.com
WEBSITE: www.multiquip.com

CANADA

Multiquip

(450) 625-2244
4110 Industriel Boul.
Laval, Quebec, Canada H7L 6V3
E-MAIL: infocanada@multiquip.com

UNITED KINGDOM

Multiquip (UK) Limited Head Office

0161 339 2223
Unit 2, Northpoint Industrial Estate,
Globe Lane,
Dukinfield, Cheshire SK16 4UJ
E-MAIL: sales@multiquip.co.uk

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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