

# OPERATION MANUAL



**MQ POWER**

**WHISPERWATT™ SERIES  
MODEL DCA70USI3CAN  
60HZ GENERATOR  
(ISUZU BJ4JJ1-XYGD-02 DIESEL ENGINE)**

INSTRUCTION MANUAL NO. M2844400014

Revision #2 (06/25/25)



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associated parts manual, visit our website at:  
[www.mqpower.com](http://www.mqpower.com)



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

## FUEL AND CHEMICAL WARNING

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 <b>WARNING</b> 
Diesel engine exhaust and some of its constituents are known to cause cancer, birth defects and other reproductive harm.

## REPORTING SAFETY DEFECTS

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If you believe that your vehicle has a defect that could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Multiquip at 1-800-421-1244.

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

To contact NHTSA, you may either call the Vehicle Safety Hotline toll-free at 1-888-327-4236 (TTY: 1-800-424-9153), go to <http://www.nhtsa.dot.gov>; or write to:

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

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

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#### **NOTICE**

Equipment specifications are subject to change without notice.



## SAFETY INFORMATION

Do not operate or service the equipment before reading the entire manual. Safety precautions should be followed at all times when operating this equipment. 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 equipment will be referenced with hazard symbols which may appear throughout this manual in conjunction with safety messages.

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

# SAFETY INFORMATION

## GENERAL SAFETY

### CAUTION

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



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



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

### NOTICE

- This equipment 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 equipment modifications. Unauthorized equipment modification will void all warranties.

- **NEVER** use accessories or attachments that are not recommended by MQ Power for this equipment. Damage to the equipment 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 equipment 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 machine in proper running condition.
- Fix damage to machine and replace any broken parts immediately.
- **ALWAYS** store equipment properly when it is not being used. Equipment should be stored in a clean, dry location out of the reach of children and unauthorized personnel.

# SAFETY INFORMATION

## ENGINE SAFETY

### DANGER

- The engine fuel exhaust gases contain poisonous carbon monoxide. This gas is colorless and odorless, and can cause death if inhaled.

- The engine of this equipment requires an adequate free flow of cooling air. **NEVER** operate this equipment in any enclosed or narrow area where free flow of the air is restricted. If the air flow is restricted it will cause injury to people and property and serious damage to the equipment or engine.



### 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** operate generator with doors open. Stop the engine before servicing.

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



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

- **DO NOT** 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.

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

### CAUTION

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



### 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 equipment can result if operating in speed ranges above the maximum allowable.



- Wet stacking is a common problem with diesel engines which are operated for extended periods with light or no load applied. When a diesel engine operates without sufficient load (less than 30–35% of the rated output), it will not operate at its optimum temperature. This will allow unburned fuel to accumulate in the exhaust system, which can foul the fuel injectors, engine valves and exhaust system, including turbochargers, and reduce the operating performance.

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

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

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



## SAFETY INFORMATION

### FUEL SAFETY



#### DANGER

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



### TOWING SAFETY



#### CAUTION

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






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

# SAFETY INFORMATION

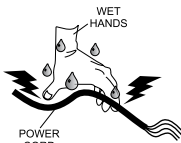
## ELECTRICAL SAFETY

### 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 equipment 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


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

## BATTERY SAFETY

### DANGER

- **DO NOT** drop the battery. There is a possibility that the battery will explode.
- **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.

# SAFETY INFORMATION

- 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 equipment that is no longer serviceable. If the equipment poses an unacceptable and unrepairable safety risk due to wear or damage or is no longer cost effective to maintain (beyond life-cycle reliability) and is to be decommissioned (demolition and dismantlement), be sure to follow 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 equipment.
- When the life cycle of this equipment is over, remove battery and bring to appropriate facility for lead reclamation. Use safety precautions when handling batteries that contain sulfuric acid.
- When the life cycle of this equipment is over, it is recommended that the frame and all other metal parts be sent to a recycling center.



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

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

## EMISSIONS INFORMATION

### NOTICE

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

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

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

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

### Emission Control Label

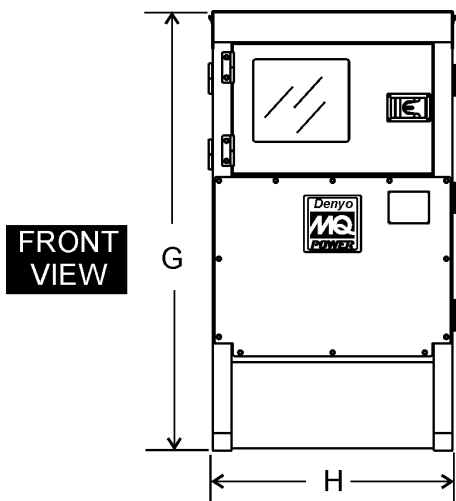
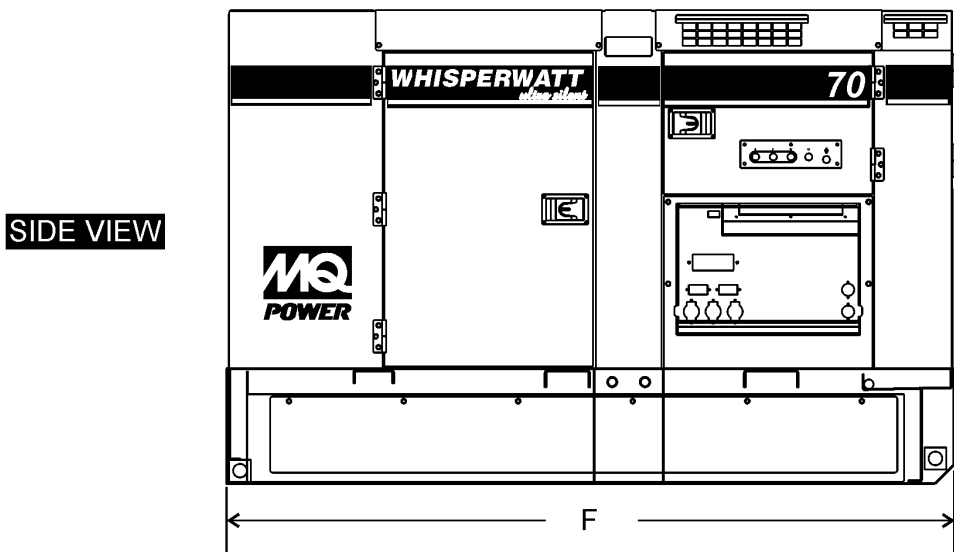
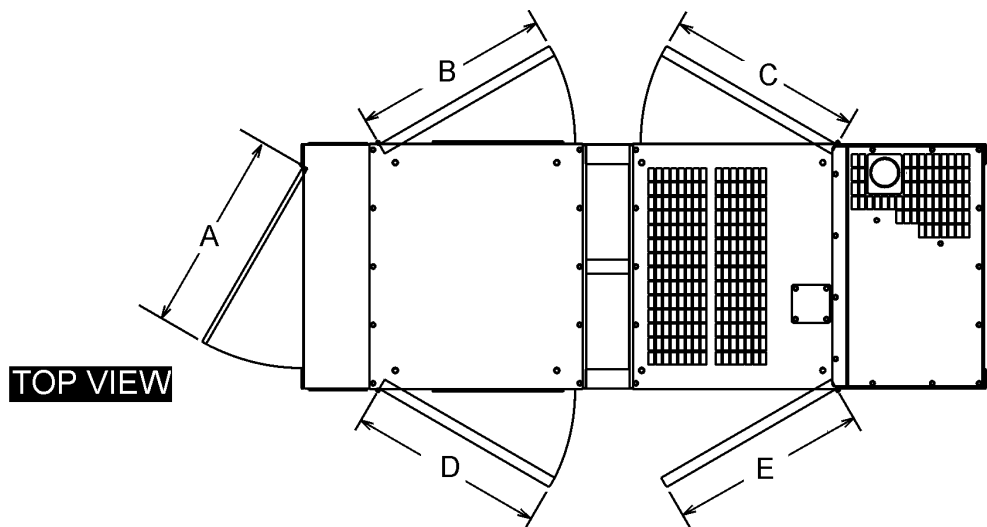
The emission control label is an integral part of the emission system and is strictly controlled by regulations.

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

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

# SPECIFICATIONS

Table 1. Generator Specifications		
Model	DCA-70USI3CAN	
Type	Revolving field, self ventilated, open protected type synchronous generator	
Armature Connection	Star with Neutral	Zigzag
Phase	3	Single
Standby Output	77 kVA (62 kW)	44 KW
Prime Output	70 kVA (56 KW)	40 KW
Voltage	240 or 480V	240 or 120V
Frequency	60 Hz	
Speed	1800 rpm	
Power Factor	0.8	1.0
Aux. AC Power	Single Phase, 60 Hz	
Voltage	120V	
Output	4.8 Kw (2.4 kW x 2)	
Weight (No Fuel)	3,771 lbs. (1,710 kg)	
Weight (Fuel)	4,553 lbs. (2,065 kg)	
Maximum Lifting Capacity	14,050 lbs. (6,370 kg)	
Table 2. Engine Specifications		
Model	ISUZU BJ-4JJ1XYGD-02 Tier 3	
Type	4 cycle, water-cooled, direct injection, turbo-charged air to air intercooled	
No. of Cylinders	4 cylinders	
Bore x Stroke	3.76 in. x 4.13 in. (95.4 mm x 105 mm)	
Displacement	183 cu. in. (3,000 cc)	
Rated Output	87.4 HP/1800 RPM	
Starting	Electric	
Coolant Capacity	3.57 gal. (13.5 liters)	
Lube Oil Capacity	3.96 gal. (15.0 liters)	
Fuel Type	#2 Diesel Fuel	
Fuel Tank Capacity	103 gal. (390 liters)	
Fuel Consumption	4.1 gal. (15.4 L)/hr at <b>full load</b>	3.1 gal. (11.9 L)/hr at <b>3/4 load</b>
	2.1 gal. (8.10 L)/hr at <b>1/2 load</b>	1.3 gal. (4.80 L)/hr at <b>1/4 load</b>
Battery	12V 72Ah x 1	



**Figure 1. Dimensions**

Table 3. Dimensions			
Reference Letter	Dimension in. (mm)	Reference Letter	Dimension in. (mm)
A	30.10 in. (790 mm.)	F	105.1 in. (2,670 mm.)
B	30.20 in. (766 mm.)	G	68.30 in. (1,735 mm.)
C	30.20 in. (766 mm.)	H	37.40 in. (950 mm.)
D	30.20 in. (766 mm.)		
E	30.20 in. (766 mm.)		

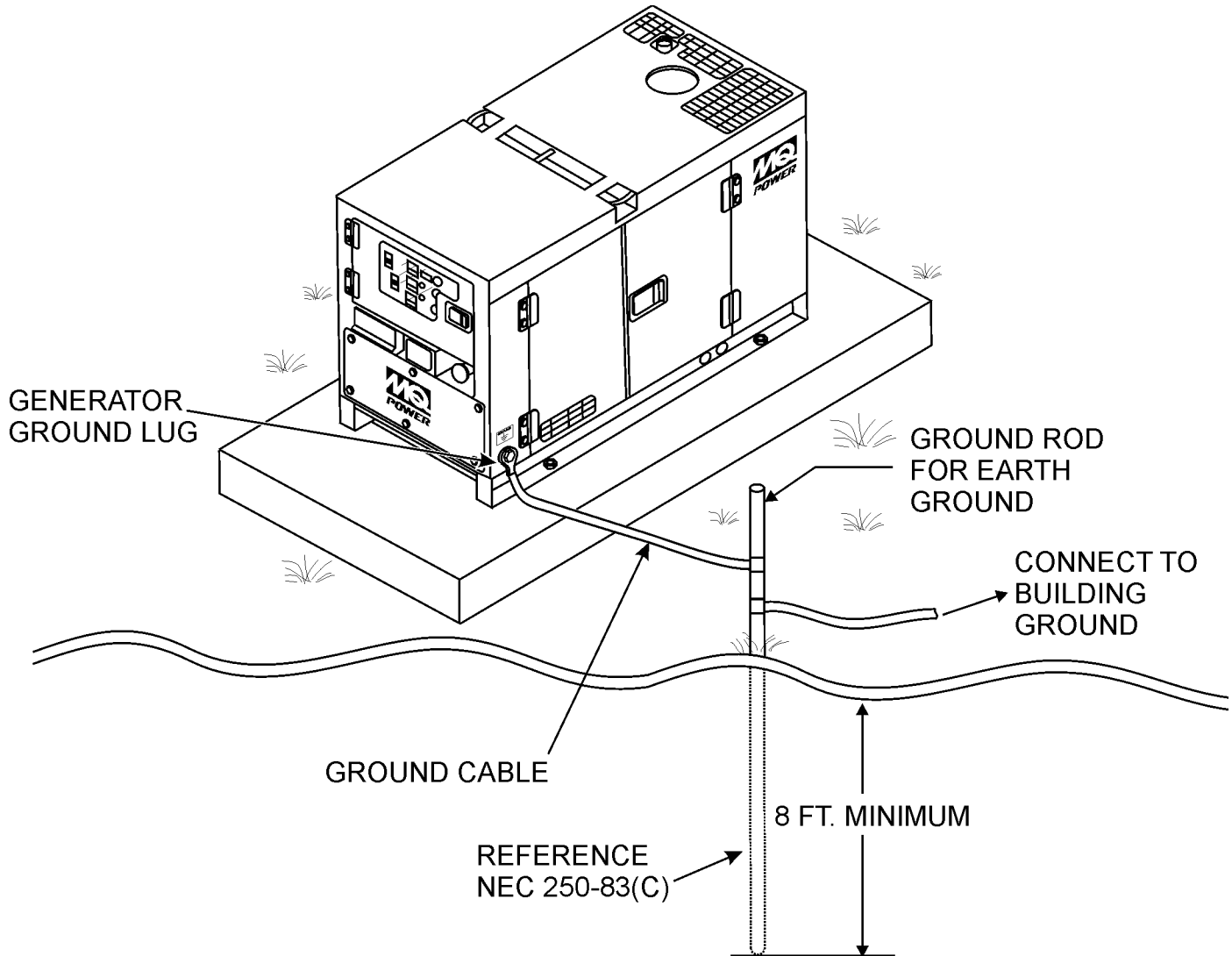


Figure 2. Typical Generator Grounding Application

## 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 5-4.1). **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

To guard against electrical shock and possible damage to the equipment, it is important to provide a good **EARTH** ground.

Article 250 (Grounding) of the National Electrical Code (NEC) provides guide lines 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 articles 250-64(b) and 250-66 set the following grounding requirements:

1. Use one of the following wire types to connect the generator to earth ground.
  - a. Copper - 8 AWG (5.3 mm<sup>2</sup>)
  - b. Aluminum - 6 AWG (8.4 mm<sup>2</sup>)
2. When grounding the generator (Figure 2) connect the ground cable between the lock washer and the nut on the generator and tighten the nut fully. Connect the other end of the ground cable to earth ground.
3. NEC article 250-52(c) 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 3) is 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.

## ENGINE OPERATING PANEL

The “Engine Operating Panel” is provided with the following:

- Tachometer
- Water Temperature Gauge
- Warning Lamp
- Fuel Leak Detected Alarm Lamp
- Pre-Heat Lamp
- Oil Pressure Gauge
- Charging Ammeter Gauge
- Fuel Level Gauge
- Panel Light/Panel Light Switch
- ECU Controller
- Engine Speed Switch

## GENERATOR CONTROL PANEL

The “Generator 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, 175 amp Main Circuit Breaker
- “Control Box” (located behind the Gen. Control Panel)
  - Automatic Voltage Regulator
  - Current Transformer
  - Over-Current Relay
  - Starter Relay
  - Voltage Selector Switch

## 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
- Five output terminal lugs (3Ø power)

## OPEN DELTA EXCITATION SYSTEM

This 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 unit incorporates an ISUZU BJ-4JJ1X diesel engine. This engine is designed to meet every performance requirement for the generator. Reference Table 2 for engine specifications.

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

## ELECTRIC GOVERNOR SYSTEM

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

## 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 6) as a guide for selecting proper extension cable size.



# MAJOR COMPONENTS

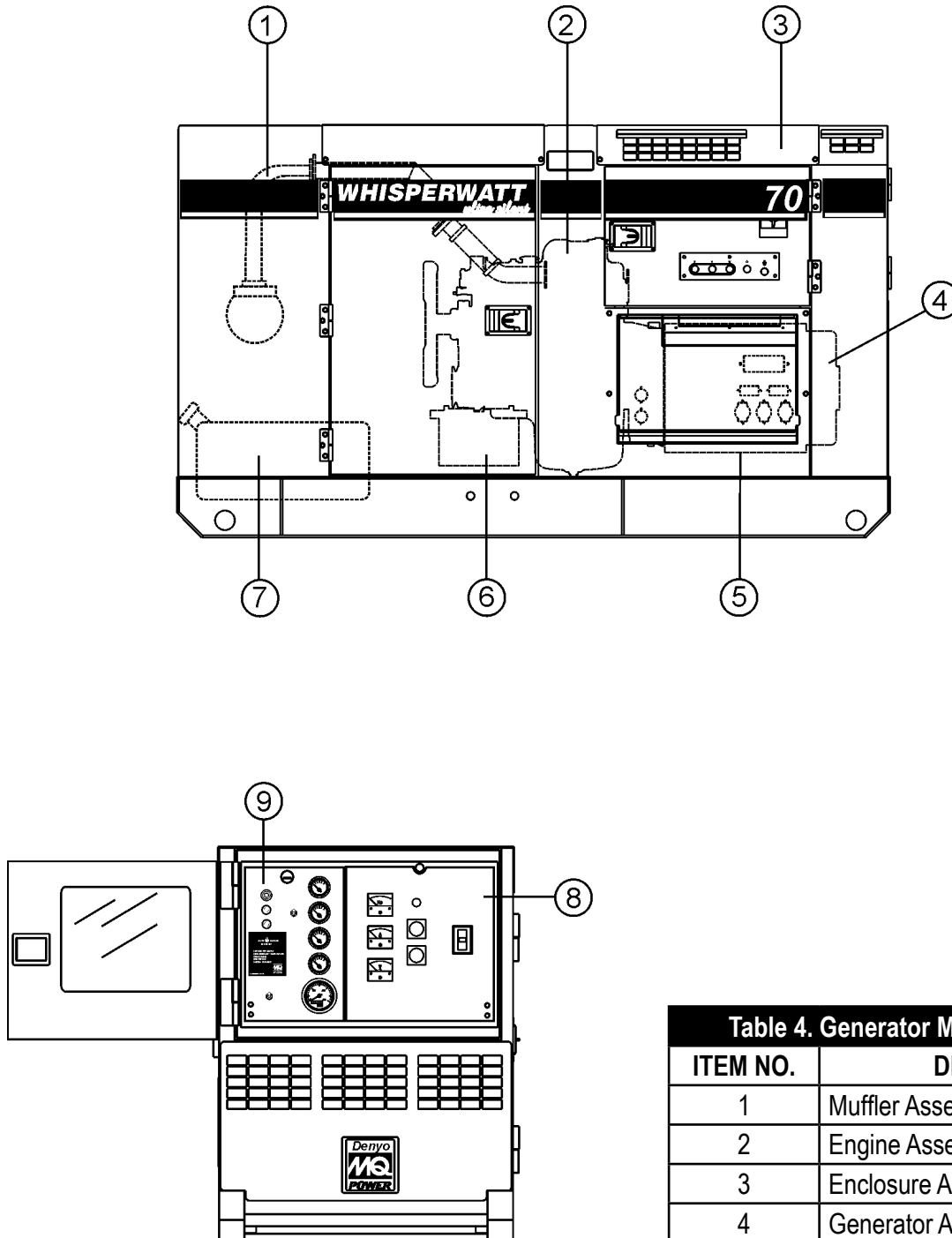
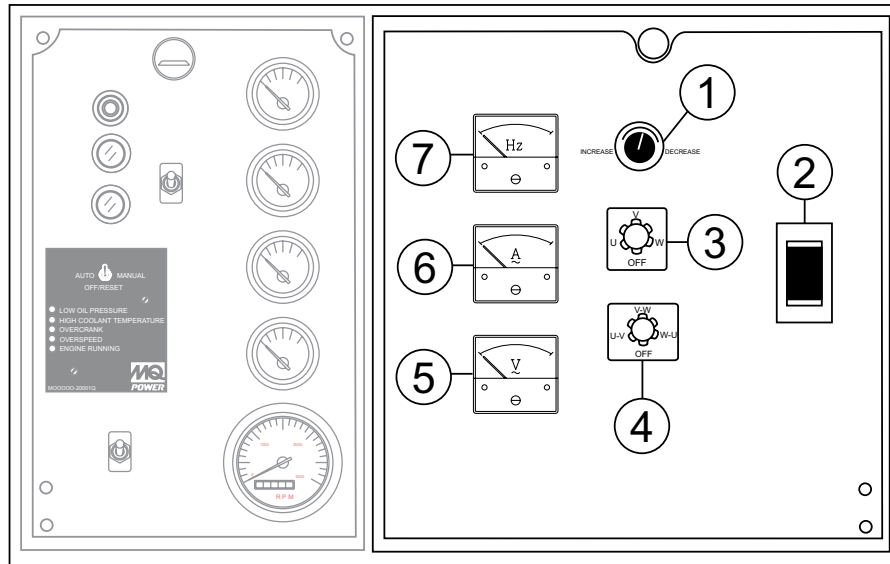


Table 4. Generator Major Components	
ITEM NO.	DESCRIPTION
1	Muffler Assembly
2	Engine Assembly
3	Enclosure Assembly
4	Generator Assembly
5	Output Terminal Assembly
6	Battery Assembly
7	Fuel Tank Assembly
8	Generator Control Panel Assembly
9	Engine Operating Panel Assembly

Figure 3. Major Components

# GENERATOR CONTROL PANEL



**Figure 4. Generator Control Panel**

The definitions below describe the controls and functions of the Generator Control Panel (Figure 4).

1. **Voltage Regulator Control** — Allows  $\pm 15\%$  manual adjustment of the generator's output voltage.
2. **Main Circuit Breaker**—This three-pole, 175A main breaker is provided to protect the U,V, and W Output Terminal Lugs from overload.
3. **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.
4. **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.
5. **AC Voltmeter** — Indicates the output voltage present at the U,V, and W Output Terminal Lugs.
6. **AC Ammeter** — Indicates the amount of current the load is drawing from the generator per leg selected by the ammeter phase-selector switch.
7. **Frequency Meter** — Indicates the output frequency in hertz (Hz). Normally 60 Hz.

Located behind the generator control panel is the Generator Control Box. This box contains some of the necessary electronic components required to make the generator function.

The Control Box is equipped with the following major components:

- Over-Current Relay
- Automatic Voltage Regulator (AVR)
- Starter Relay
- Current Transformer
- Voltage Selector Switch
- Main Circuit Breaker

## 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 175 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**).



# ENGINE OPERATING PANEL

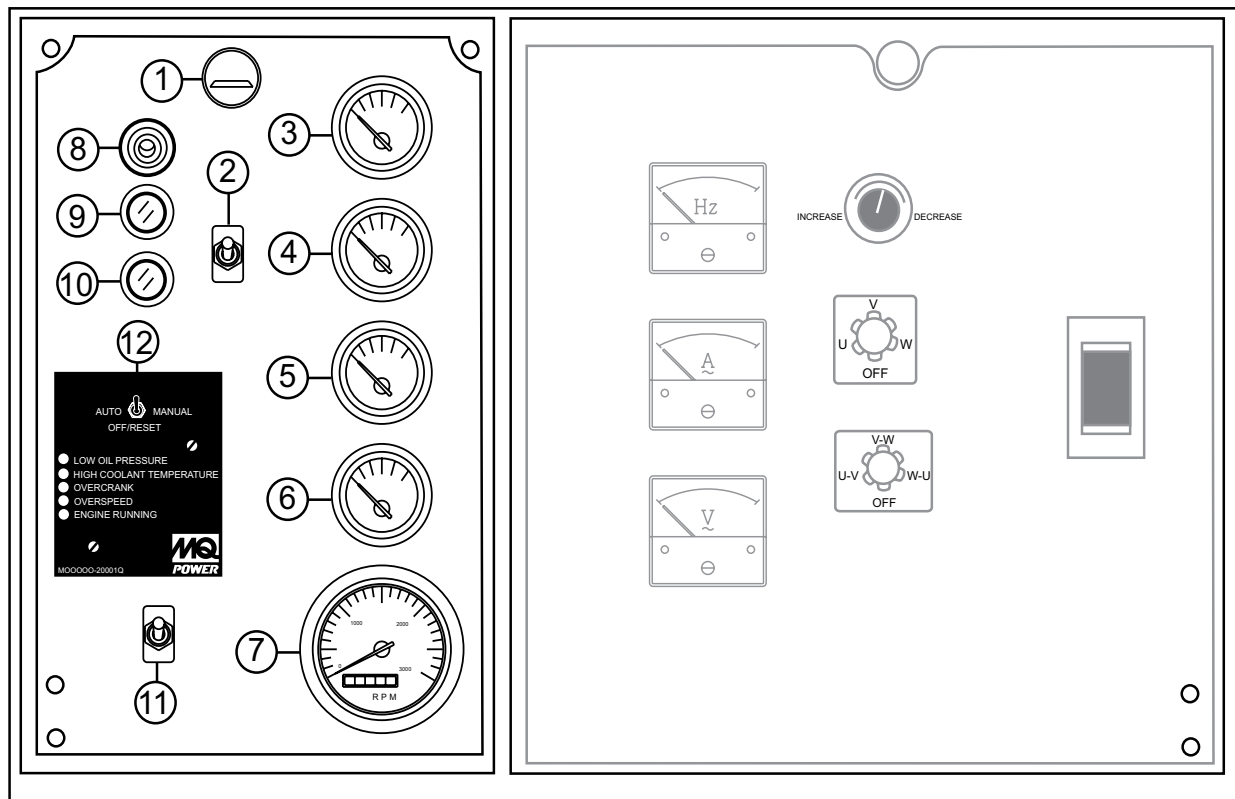
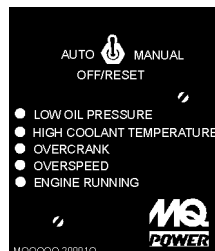


Figure 5. Engine Operating Panel

## ENGINE OPERATING PANEL

The definitions below describe the controls and functions of the Engine Operating Panel (Figure 5).

1. **Panel Light** — Normally used in dark areas or at night time. When activated, panel lights will illuminate. When the generator is not in use be sure to turn the panel light switch to the OFF position.
2. **Panel Light Switch** — When activated will turn on control panel light.
3. **Oil Pressure Gauge** — During normal operation this gauge should read between 42 ~71 psi. (290~490 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.
4. **Water Temperature Gauge** — During normal operation this gauge should read between 167°~203°F (75° ~95°C)
5. **Charging Ammeter Gauge** — Indicates the current being supplied by the engine's alternator which provides current for generator's control circuits and battery charging system.
6. **Fuel Gauge** — Indicates amount of diesel fuel available.
7. **Tachometer** — Indicates engine speed in RPM's for 60 Hz operation. This meter should indicate 1800 RPM's when the rated load is applied. In addition a built in hour meter will record the number of operational hours that the generator has been in use.
8. **Preheat Lamp** — As the engine cranks, this lamp will illuminate to indicate automatic preheating of the engine glow plugs. When the lamp turns off, this indicates that the preheat cycle is complete and the engine will start automatically.
9. **Warning Lamp** — This lamp will illuminate when a critical engine fault has occurred.
10. **Fuel Leak Detected Alarm Lamp** — This lamp will illuminate when fuel level is low (25.5 gal/98 liters)
11. **Engine Speed Switch** — This switch controls the speed of the engine (low/high).
12. **Auto START/STOP Engine Controller (ECU)** — This controller has a vertical row of status LED's (inset), that when lit, indicate that an engine malfunction (fault) has been detected. When a fault has been detected the engine controller will evaluate the fault and all major faults will shutdown the generator. During cranking cycle, the ECU will attempt to crank the engine for 10 seconds before disengaging.



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

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

- A. **MPEC Control Switch** — This switch controls the running of the unit. If this switch is set to the OFF/RESET position, the unit will not run. When this switch is set to the manual position, the generator will start immediately.

If the generator is to be connected to a building's AC power source via an automatic transfer switch (isolation), place the switch in the AUTO position. In this position, should an outage occur, the automatic transfer switch (ATS) will start the generator automatically via the generator's auto-start contacts connected to the ATS's start contacts. Please refer to your ATS installation manual for further instructions for the correct installation of the auto-start contacts of the generator to the ATS.

- B. **Low Oil Pressure** — Indicates the engine pressure has fallen below 15 psi (103 kPa). The oil pressure is detected using variable resistive values from the oil pressure sending unit. This is considered a major fault.
- C. **High Coolant Temperature** — Indicates the engine temperature has exceeded 230°F (110°C). The engine temperature is detected using variable resistive values from the temperature sending unit. This is considered a major fault.
- D. **Overcrank Shutdown** — Indicates the unit has attempted to start a pre-programmed number of times, and has failed to start. The number of cycles and duration are programmable. It is pre-set at 3 cycles with a 10 second duration. This is considered a major fault.
- E. **Overspeed Shutdown** — Indicates the engine is running at an unsafe speed. This is considered a major fault.
- F. **Engine Running** — Indicates that engine is running at a safe operating speed.

# OUTPUT TERMINAL PANEL FAMILIARIZATION

## OUTPUT TERMINAL PANEL

The Output Terminal Panel (Figure 6) shown below is located on the right-hand side (left from control panel) of the generator. 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 6) is provided with the following:

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

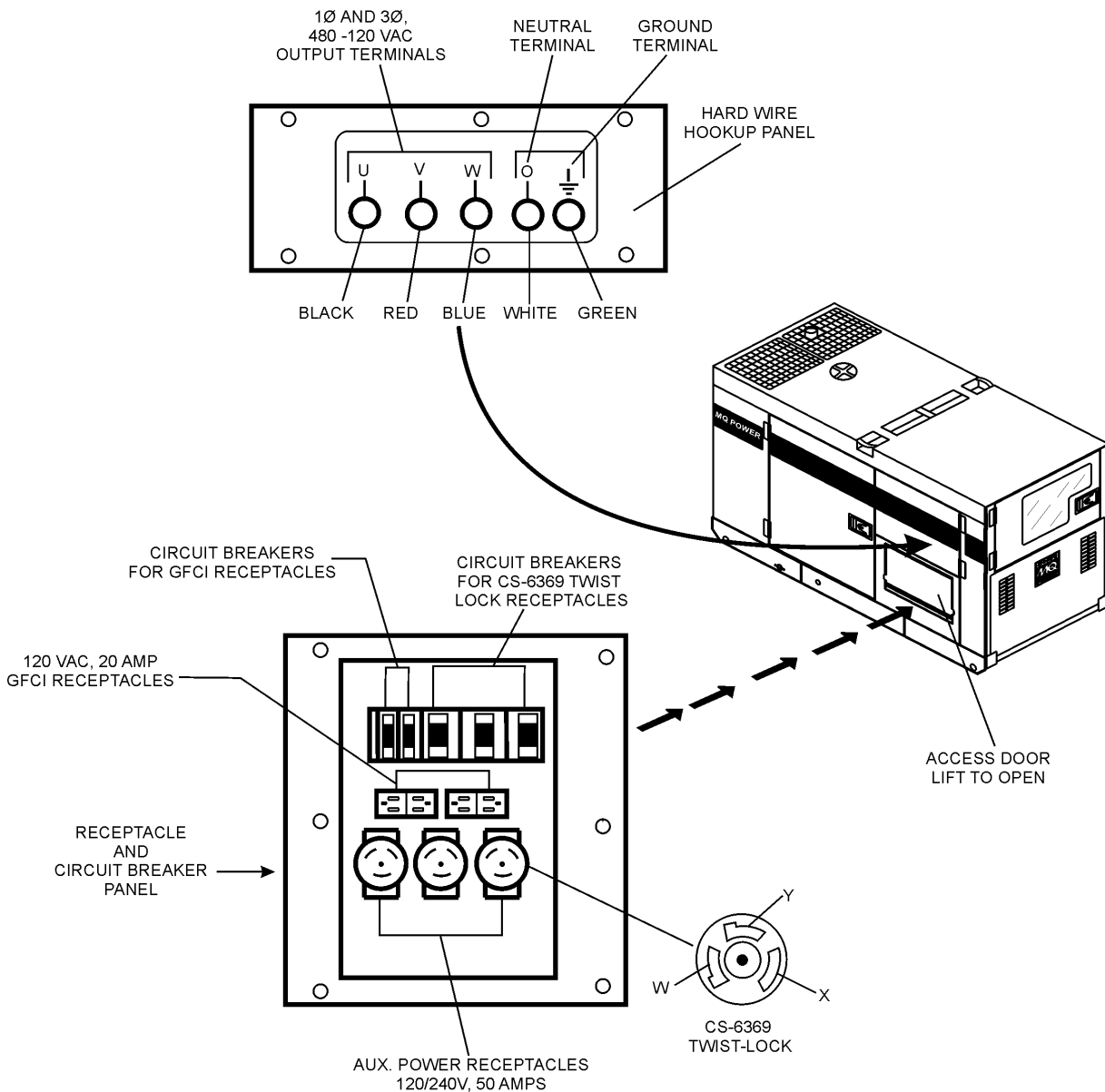


Figure 6. Output Terminal Panel

# OUTPUT TERMINAL PANEL FAMILIARIZATION

## 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 selector switch** 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 7) in the center of the receptacle will check the GFCI function. Both receptacles should be tested at least once a month.

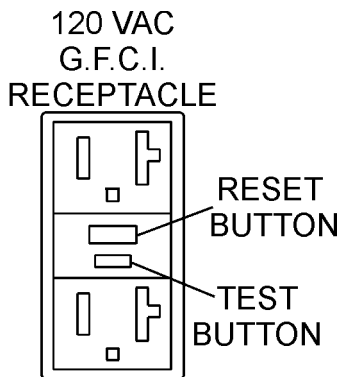


Figure 7. G.F.C.I. Receptacle

## Twist Lock Dual Voltage 120/240 VAC Receptacles

There are three 120/240V, 50 amp auxiliary twist-lock (CS-6369) receptacles (Figure 8) provided on the output terminal panel. These receptacles can **only** be accessed when the voltage selector switch is placed in the **single-phase 240/120** position.

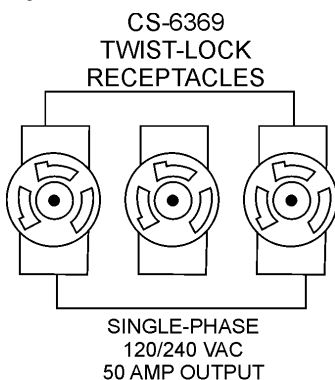


Figure 8. 120/240V Twist-Lock Auxiliary Receptacles

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 9) 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 9. Voltage Regulator Control Knob

## Removing the Plastic Face Plate (Hard Wire Hookup Panel)

The **Output Terminal Lugs** are protected by a plastic face plate cover (Figure 10). Unscrew the securing bolts and lift the plastic terminal cover to gain access to the terminal enclosure.

After the load wires have been securely attached to the terminal lugs, reinstall the plastic face plate.

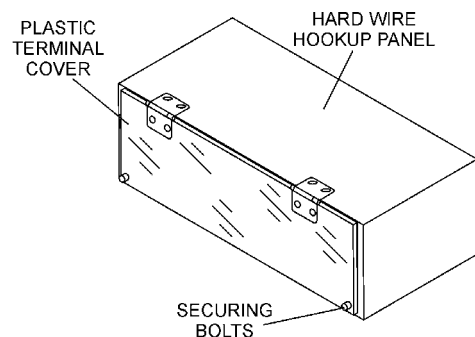


Figure 10. Plastic Face Plate (Output Terminal Lugs)

# OUTPUT TERMINAL PANEL FAMILIARIZATION

## Connecting Loads

Loads can be connected to the generator by the **Output Terminal Lugs** or the convenience receptacles (Figure 11). Make sure to read the operation manual before attempting to connect a load to the generator.

To protect the output terminals from overload, a 3-pole, 175A **main** circuit breaker is provided. Make sure to switch **ALL** circuit breakers to the **OFF** position prior to starting the engine.

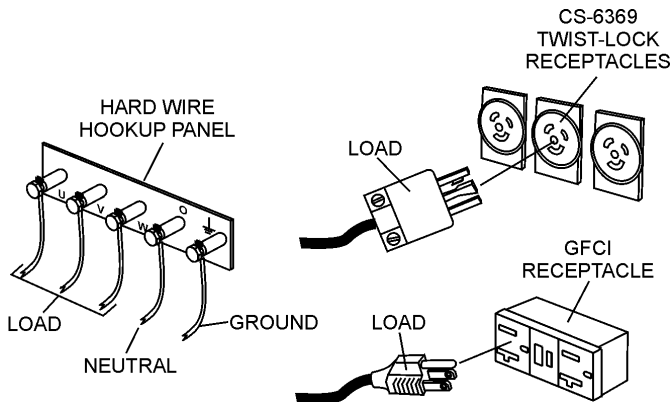


Figure 11. Connecting Loads

## Over Current Relay

An **over current relay** (Figure 12) 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.

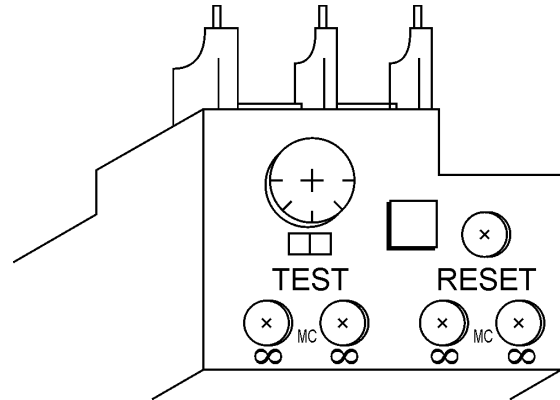


Figure 12. Over Current Relay



# LOAD APPLICATION

## 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.

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

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

**Table 5. Power Factor By Load**

Type of Load	Power Factor
Single-phase induction motors	0.4-0.75
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 6. Cable Selection (60 Hz, Single Phase Operation)**

Current in Amperes	Load in Watts		Maximum Allowable Cable Length			
	At 100 Volts	At 200 Volts	#10 Wire	#12 Wire	#14 Wire	#16 Wire
2.5	300	600	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:

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

### 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 OUTPUTS

## GENERATOR OUTPUT VOLTAGES

A wide range of voltages are available to supply voltage for many different applications. Voltages are selected by using the **voltage selector** switch (Figure 13). To obtain some of the voltages as listed in Table 7 (see below) will require a fine adjustment using the **voltage regulator (VR) control knob** located on the control panel.

### Voltage Selector Switch

The voltage selector switch (Figure 13) is located above the output terminal panel's Hard Wire Hook-up Panel. It has been provided for ease of voltage selection.

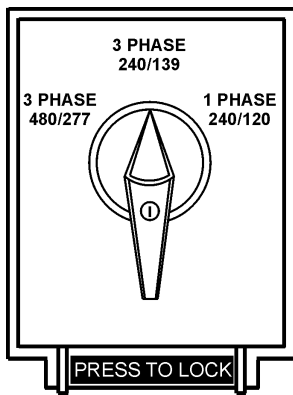


Figure 13. Voltage Selector Switch

### Voltage Selector Switch Locking Button

The voltage selector switch has a locking button to protect the generator and load from being switched while the engine is running. To lock the voltage selector switch, press and hold the red button located at the bottom of the switch.

### CAUTION

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

Table 7. Voltages Available

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

## Generator Amperage

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

Table 8. Generator Maximum Amps

Rated Voltage	Maximum Amps
1Ø 120 Volt	155.5 X 2 amps (4 wire) 168 amps X 2 (Zigzag)
1Ø 240 Volt	78.8 amps (4 wire) 168 amps (Zigzag)
3Ø 240 Volt	168 amps
3Ø 480 Volt	84 amps

## GFCI Receptacle Load Capability

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

Table 9 and Table 10 show what amount of current is available at the GFCI receptacles when the output terminals and twist lock receptacles are in use. Be careful that your load does not to exceed the available current capability at the receptacles.

Table 9. 1Ø GFCI Receptacle Load Capacity

KW in Use Twist Lock (C6369)	Available Load Current (Amps)
1Ø 240/120V	GFCI Duplex 5-20R 120V
40.4	0
39.2	5 amps/receptacle
38.0	10 amps/receptacle
38.6	15 amps/receptacle
35.6	20 amps/receptacle

Table 10. 3Ø Generator Maximum Amps

KVA in Use (UVWO Terminals)	Available Load Current (Amps)
3Ø 240/480V	GFCI Duplex 5-20R 120V
70	0 amps/receptacle
65.8	5 amps/receptacle
61.7	10 amps/receptacle
57.5	15 amps/receptacle
53.4	20 amps/receptacle

# GENERATOR OUTPUTS/GAUGE READING

## 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, set the **Voltage Selector Switch** (Figure 14) to the position which produces the required voltage (For example, for 3Ø 240V, choose the center 3Ø 240/139V position on the voltage selector switch).

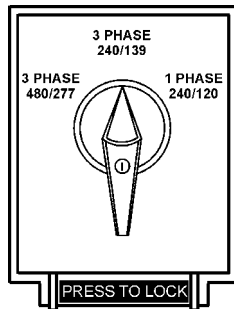


Figure 14. Voltage Selector Switch  
240/139V 3Ø Position

### NOTICE

For 3Ø 208V/1Ø,120V, place the Voltage Selector Switch in the 3 Phase 240/139 position.

## AC Voltmeter Gauge Reading

Place the **AC Voltmeter Change-Over Switch** (Figure 15) 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 16)

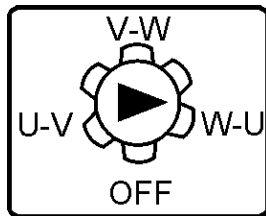


Figure 15. AC Voltmeter  
Change-Over Switch

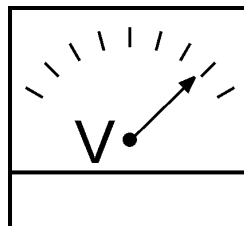


Figure 16. AC Voltmeter  
Gauge

## AC Ammeter Gauge Reading

Place the **AC Ammeter Change-Over Switch** (Figure 17) in the U position and observe the current reading (load drain) on the U terminal as indicated on the **AC Ammeter Gauge** (Figure 18). This process can be repeated for terminals V and W.

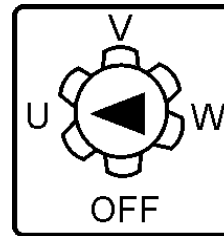


Figure 17. AC Ammeter  
Change-Over Switch

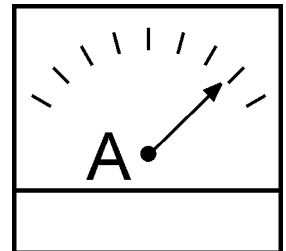


Figure 18. AC Ammeter  
(Amp Reading on U Lug)

### NOTICE

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

# OUTPUT TERMINAL PANEL CONNECTIONS

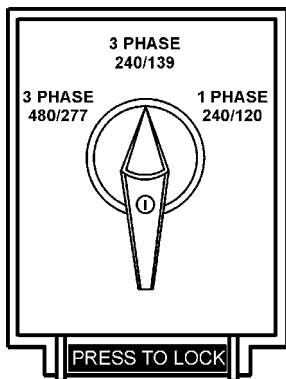
## UVWO TERMINAL OUTPUT VOLTAGES

Various output voltages can be obtained using the UVWO output terminal lugs. The voltages at the terminals are dependent on the position of the **Voltage Selector Switch** and the adjustment of the **Voltage Regulator Control Knob**.

Remember the voltage selector switch determines the **range** of the output voltage. The voltage regulator (VR) allows the user to increase or decrease the selected voltage.

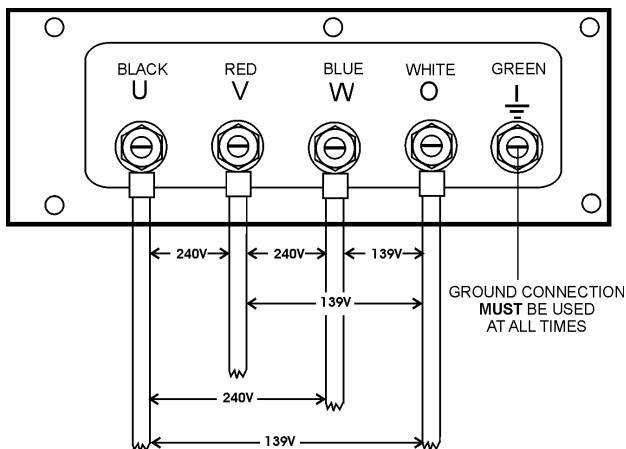
### 3Ø-240/139 UVWO Terminal Output Voltages

1. Place the voltage selector switch in the 3Ø 240/139 position as shown in Figure 19..



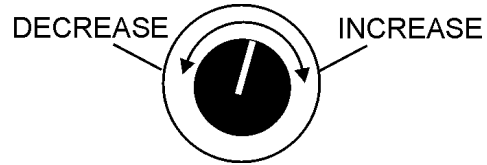
**Figure 19. Voltage Selector Switch  
3Ø-240/139V Position**

2. Connect the load wires to the UVWO terminals as shown in Figure 20.



**Figure 20. UVWO Terminal Lugs  
3Ø-240/139V Connections**

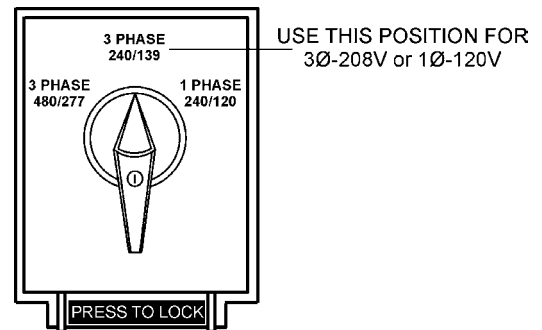
3. Turn the voltage regulator knob (Figure 21) clockwise to increase voltage output, turn counterclockwise to decrease voltage output. Use voltage regulator adjustment knob whenever fine tuning of the output voltage is required.



**Figure 21. Voltage Regulator Knob**

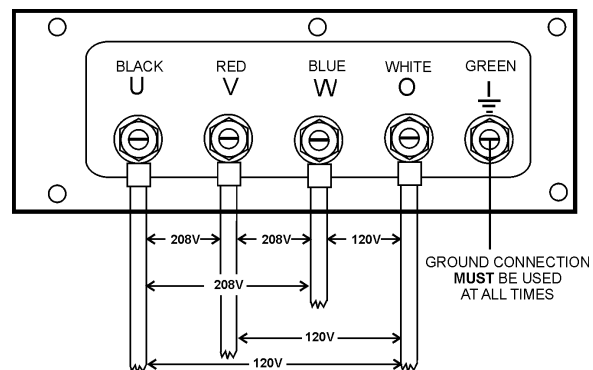
### 3Ø-208V/1Ø-120V UVWO Terminal Output Voltages

1. Place the voltage selector switch in the 3Ø 240/139 position as shown in Figure 22.



**Figure 22. Voltage Selector Switch  
3Ø-240/139V Position**

2. Connect the load wires to the UVWO terminals as shown in Figure 23.



**Figure 23. UVWO Terminal Lugs  
3Ø-208/1Ø-120V Connections**

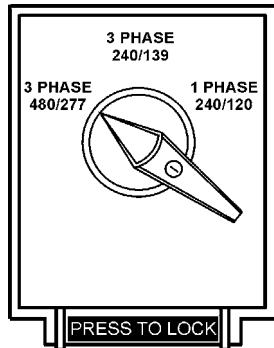
### NOTICE

To achieve a 3Ø 208V output the voltage selector switch must be in the 3Ø-240/139 position and the voltage regulator must be adjusted to 208V..

# OUTPUT TERMINAL PANEL CONNECTIONS

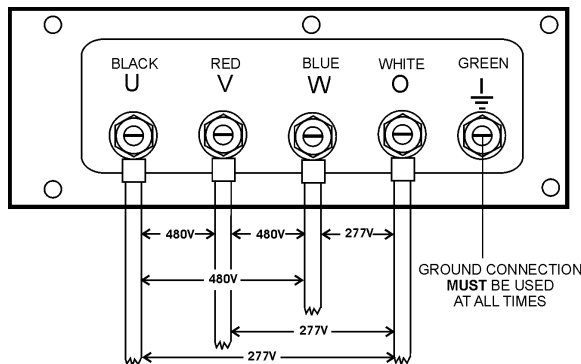
## 3Ø-480/277V UVWO Terminal Output Voltages

1. Place the voltage selector switch in the 3Ø 480/277 position as shown in Figure 24.



**Figure 24. Voltage Selector Switch  
3Ø-480/277V Position**

2. Connect the load wires to the UVWO terminals as shown in Figure 25.

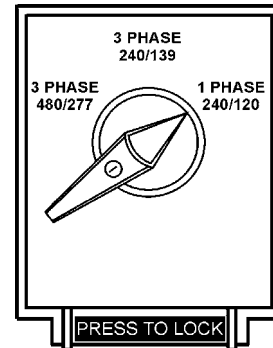


**Figure 25. UVWO Terminal Lugs  
3Ø-440/254V Connections**

3. Turn the voltage regulator knob (Figure 21) 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.

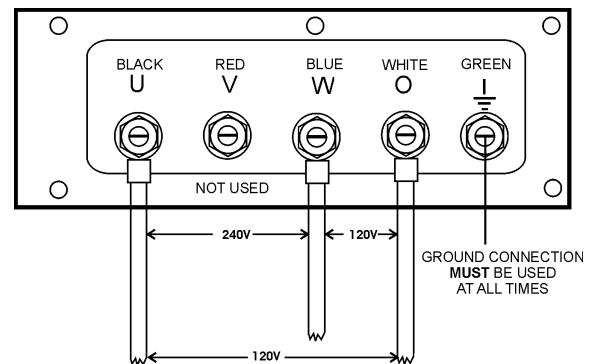
## 1Ø-240/120V UVWO Terminal Output Voltages

1. Place the voltage selector switch in the 1Ø 240/120 position as shown in Figure 26.



**Figure 26. Voltage Selector Switch  
1Ø-240/120V Position**

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



**Figure 27. UVWO Terminal Lugs  
1Ø-240/120V Connections**

3. Turn the voltage regulator knob (Figure 27) 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.

### NOTICE

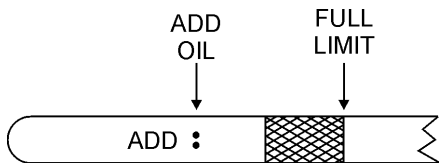
**ALWAYS** make sure that the connections to the UVWO terminals are **secure** and **tight**. The possibility of arcing exists, that could cause a fire.

## CIRCUIT BREAKERS

To protect the generator from an overload, a 3-pole, 175 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 28) on the dipstick. See Table 11 for proper selection of engine oil.



**Figure 28. 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 **ISUZU Engine Owner's Manual**. Oil should be warm before draining.

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

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

Table 11. Recommended Motor Oil		
OIL: SAE		
°F	°C	
122	50	10W/40
104	40	30
86	30	10W/40
68	20	15W/30
50	10	10W/30
32	0	10W
-14	-10	5W/30
-4	-20	ARCTIC OIL
-22	-30	
-40	-40	

## 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.

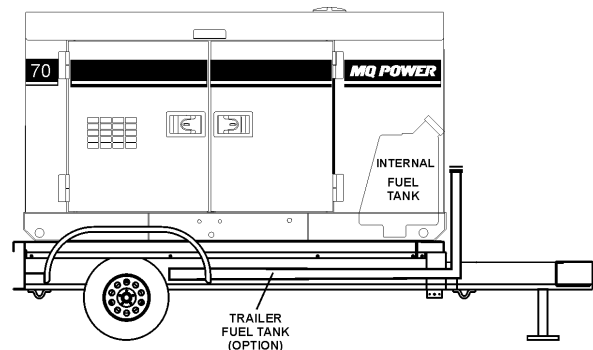
## Refilling the Fuel System

### **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 trailer frame and may also be equipped with an environmental fuel tank (Figure 29). **ALWAYS** fill the fuel tanks with clean fresh **#2 diesel fuel**. **DO NOT** fill the fuel tanks beyond their capacities.

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



**Figure 29. Internal Fuel Tank System**

## INSPECTION/SETUP

### 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 30).

#### 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.

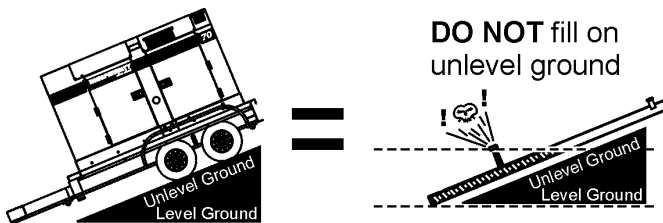


Figure 30. Only Fill on Level Ground

#### NOTICE

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

2. Open cabinet doors on the “right side” of the generator (from generator control panel position). Remove fuel cap and fill tank (Figure 31).

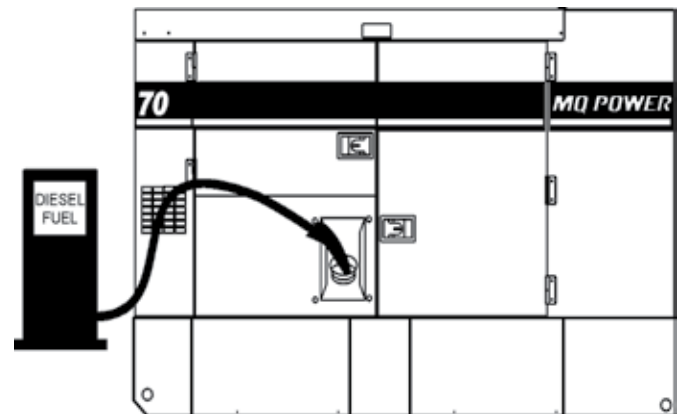


Figure 31. Fueling the Generator

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 32).

FUEL GAUGE LOCATED  
ON CONTROL PANEL

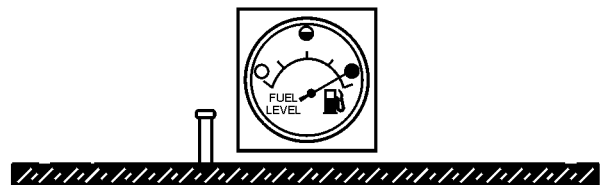


Figure 32. Full Fuel Tank

#### CAUTION

**DO NOT OVERFILL** fuel system. Leave room for fuel expansion. Fuel expands when heated (Figure 33).



Figure 33. Fuel Expansion



## COOLANT (ANTIFREEZE/SUMMER COOLANT/ WATER)

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

### WARNING



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	3.57 gal (13.5 liters)
Reserve Tank	2 quarts (1.9 liters)

## Operation in Freezing Weather

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

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

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

### 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.

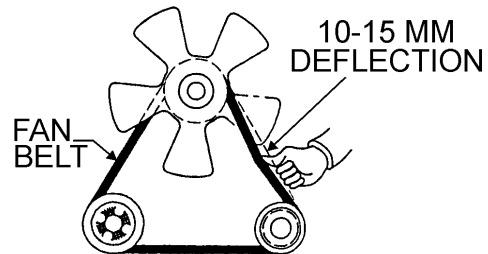
## AIR CLEANER

Periodic cleaning/replacement is necessary. Inspect it in accordance with the **ISUZU 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 **ISUZU Engine Owner's Manual**.

The fan belt tension is proper if the fan belt bends 10 to 15 mm (Figure 34) when depressed with the thumb as shown below.



**Figure 34. Fan Belt Tension**

### CAUTION



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



## BATTERY

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


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

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

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

### Battery Cable Installation

ALWAYS be sure the battery cables (Figure 35) are properly connected to the battery terminals as shown below. The **red cable** is connected to the positive terminal of the battery, and the **black cable** is connected to the negative terminal of the battery.

 **CAUTION**

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

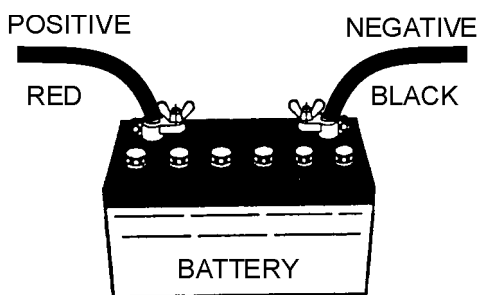


Figure 35. Battery Connections

When connecting battery do the following:

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

### NOTICE

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

### CAUTION

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

## ALTERNATOR

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

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

## WIRING

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

## PIPING AND HOSE CONNECTION

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

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

# GENERATOR START-UP PROCEDURE

## BEFORE STARTING

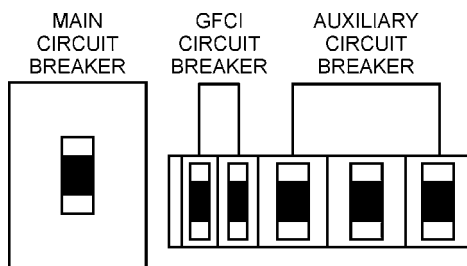
### CAUTION

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

### WARNING

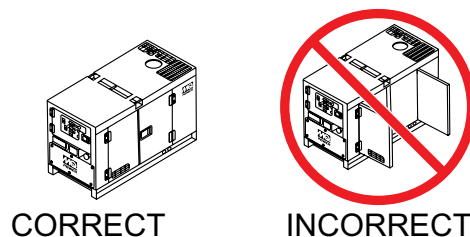
**NEVER** manually start the engine with the **main, GFCI or auxiliary** circuit breakers in the **ON** (closed) position.

1. Place the **main, G.F.C.I., and aux.** circuit breakers (Figure 36) in the **OFF** position prior to starting the engine.



**Figure 36. Main, Aux. and GFCI Circuit Breakers (OFF)**

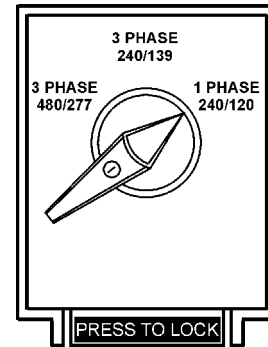
2. Make sure the **voltage change-over board** has been configured for the desired output voltage.
3. Connect the load to the **receptacles** or the **output terminal lugs** as shown in Figure 11. These load connection points can be found on the output terminal panel and the output terminal panel's hard wire hookup panel.
4. Tighten terminal nuts securely to prevent load wires from slipping out.
5. Close all engine enclosure doors (Figure 37).



**Figure 37. Engine Enclosure Doors**

## STARTING

1. Place the **voltage selector switch** in the desired voltage position (Figure 38).



**Figure 38. Voltage Selector Switch**

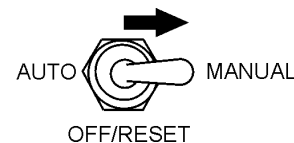
## STARTING (MANUAL)

1. Place the engine speed switch (Figure 39) in the **LOW** (down) position.



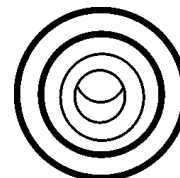
**Figure 39. Engine Speed Switch (Low)**

2. Place the **MPEC control switch** in the **MANUAL** position to start the engine (Figure 40).



**Figure 40. MPEC Control Switch (Manual Position)**

3. Depending on the temperature of the coolant (cold weather conditions), the pre-heat lamp (Figure 41) will light (**ON**) and remain on until the pre-heating cycle has been completed. After completion of the pre-heating cycle, the light will go **OFF** and the engine will start up automatically.



**Figure 41. Pre-Heat Lamp**

4. Once the engine starts, let the engine run for 1-2 minutes. Listen for any abnormal noises. If any abnormalities exist, shut down the engine and correct

# GENERATOR START-UP PROCEDURE

the problem. If the engine is running smoothly, place the engine speed switch (Figure 42) in the **HIGH** (up) position.



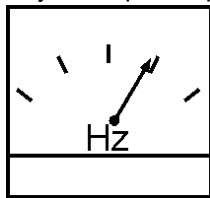
**Figure 42. Engine Speed Switch (High)**

5. Verify that the **engine running** status LED on the MPEC module (Figure 43) is lit (ON) after the engine has started.



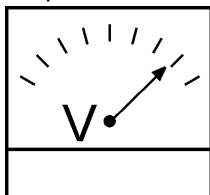
**Figure 43. Engine Running (LED ON)**

6. The generator's frequency meter (Figure 44) should be displaying the 50 cycle output frequency in **HERTZ**.



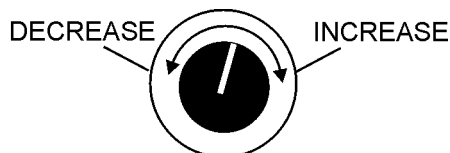
**Figure 44. Frequency Meter**

7. The generator's AC-voltmeter (Figure 45) will display the generator's output in **VOLTS**.



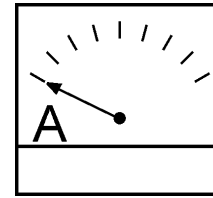
**Figure 45. Voltmeter Meter**

8. If the voltage is not within the specified tolerance use the voltage adjustment control knob (Figure 46) to increase or decrease the desired voltage.



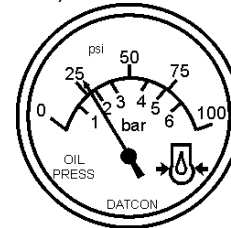
**Figure 46. Voltage Adjust Control Knob**

9. The ammeter (Figure 47) 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.



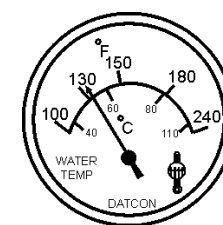
**Figure 47. Ammeter (No Load)**

10. The engine oil pressure gauge (Figure 48) will indicate the oil pressure of the engine. Under normal operating conditions the oil pressure is approximately 42 to 71 psi. (290~490 kPa).



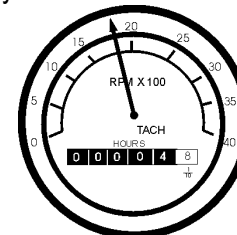
**Figure 48. Oil Pressure Gauge**

11. The **coolant temperature gauge** (Figure 49) will indicate the coolant temperature. Under normal operating conditions the coolant temperature should be between 167°~203°F (75°~95°C) (**Green Zone**).



**Figure 49. Coolant Temperature Gauge**

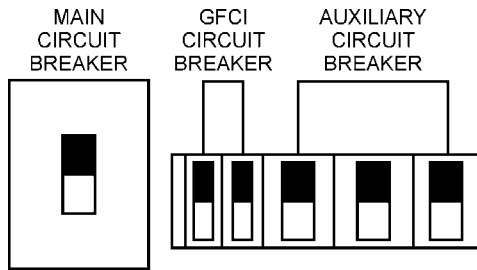
12. The **tachometer gauge** (Figure 50) will indicate the speed of the engine when the generator is operating. Under normal operating conditions this speed is approximately 1800 RPM's.



**Figure 50. Engine Tachometer Gauge**

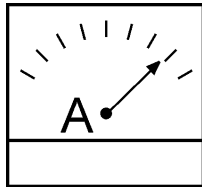
# GENERATOR SHUT-DOWN PROCEDURES

13. Place the **main, GFCI, and aux.** circuit breakers in the **ON** position (Figure 51).



**Figure 51. Main, Aux. and GFCI Circuit Breakers (ON)**

14. Observe the generator's ammeter (Figure 52) 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 52. Ammeter (Load)**

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

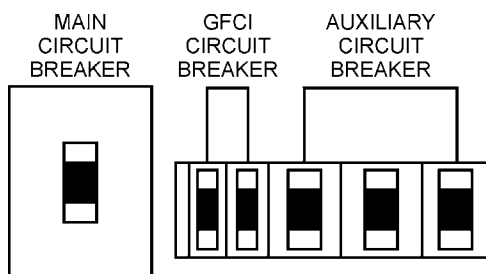
## WARNING

**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 53 to the **OFF** position.



**Figure 53. Main, GFCI and Load Circuit Breakers (OFF)**

2. Place the engine speed switch (Figure 54) in the **"LOW"** (down) position..



**Figure 54. Engine Speed Switch (Low)**

3. Let the engine cool by running it at low speed for 3-5 minutes with no load applied.
4. Place the **MPEC Control Switch** (Figure 55) to the **OFF/RESET** position.



**Figure 55. MPEC Control Switch (Off/Reset)**

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

## EMERGENCY SHUTDOWN PROCEDURE

1. Place the **MPEC Control Switch** (Figure 55) in the **OFF/RESET** position.

## AUTOMATIC SHUT-DOWN SYSTEM

This unit is equipped with safety devices to automatically stop the engine in the event of low oil pressure, approximately 14 psi (97 kPa), or high water temperature, approximately 230° F (110° C), overspeed approximately +15%. The alarm lamps on the ECU illuminate to signify the reason for the shutdown.

## NOTICE

Before inspecting generator, check that the Auto/Manual switch is in the **OFF/RESET** position, and place all circuit breakers in the **OFF** position. Allow sufficient time for adequate cooling. When ready to restart, complete all steps in the Generator Startup Procedure section of this manual.

Table 14. Inspection/Maintenance		10 Hrs DAILY	250 Hrs	500 Hrs	1000 Hrs
Engine	Check Engine Fluid Levels	X			
	Check Air Cleaner	X			
	Check Battery Acid Level	X			
	Check Fan Belt Condition	X			
	Check for Leaks	X			
	Check for Loosening of Parts	X			
	Replace Engine Oil and Filter * 1		X		
	Clean Air Filter		X		
	Check Fuel Filter/Water Separator Bowl	X			
	Clean Unit, Inside and Outside		X		
	Change Fuel Filter			X	
	Clean Radiator and Check Coolant Protection Level*2			X	
	Replace Air Filter Element * 3			X	
	Check all Hoses and Clamps * 4				X
	Clean Inside of Fuel Tank				X
Generator	Measure Insulation Resistance Over 3M ohms		X		
	Check Rotor Rear Support Bearing			X	

\*1 Replace engine oil and filter at 100 hours, first time only.

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

\*3 Replace primary air filter element when restriction indicator shows a vacuum of 625 mm (25 in. H2O).

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

## GENERAL INSPECTION

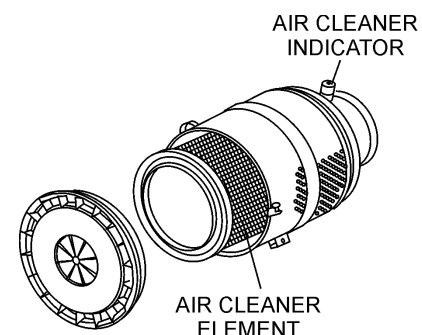
Prior to each use, the generator should be cleaned and inspected for deficiencies. Check for loose, missing or damaged nuts, bolts or other fasteners. Also check for fuel, oil, and coolant leaks. Use Table 14 as a general maintenance guideline **Engine Side** (Refer to the Engine Instruction Manual)

## AIR CLEANER

Every 250 hours: Remove air cleaner element (Figure 56) and clean the heavy duty paper element with light spray of compressed air. Replace the air cleaner as needed.

### Air Cleaner with Dust Indicator

This indicator (Figure 56) is attached to the air cleaner. When the air cleaner element is clogged, air intake restriction becomes greater and the dust indicator signal shows **RED** meaning the element needs changing or service. After changing the air element, press the dust indicator button to reset the indicator.



**Figure 56. Air Cleaner/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.

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.

## FUEL ADDITION

Add diesel fuel (the grade may vary according to season and locations).

## 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 57) wash out any deposits or debris that have accumulated inside the fuel tank.

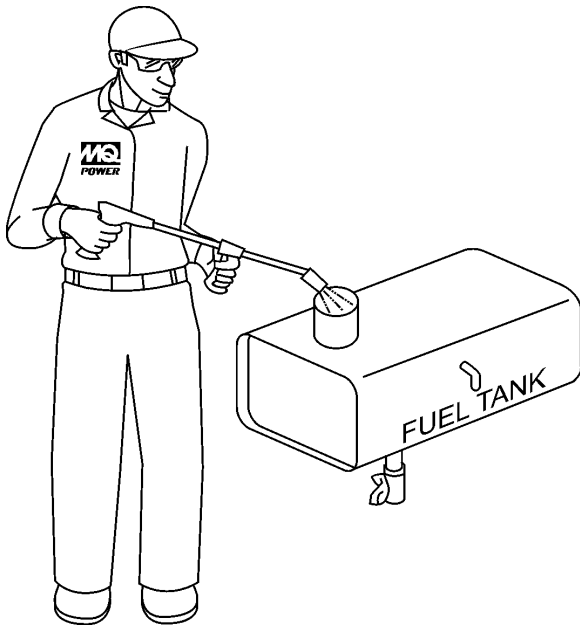


Figure 57. Fuel Tank Cleaning

## 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.

## Replacing Fuel Filter

- Replace the fuel filter cartridge with new one every 500 hours or so.
- Loosen the drain plug at the lower top of the fuel filter. Drain the fuel in the fuel body together with the mixed water. **DO NOT** spill the fuel during disassembly.
- Vent any air

## AIR REMOVAL

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

To restart after running out of fuel, turn the switch to the **“ON”** position for 15-30 seconds. Try again, if needed.

## CHECK OIL LEVEL

Check the crankcase oil level prior to each use, or when the fuel tank is filled. Insufficient oil may cause severe damage to the engine. Make sure the generator is level. The oil level must be between the two notches on the dipstick as shown in Figure 28.

## Replacing Oil Filter

- Remove the old oil filter.
- Apply a film of oil to the gasket on the new oil filter.
- Install the new oil filter.
- After the oil cartridge has been replaced, the engine oil will drop slightly. Run the engine for a while and check for leaks before adding more oil if needed. Clean excessive oil from engine.

## FLUSHING OUT RADIATOR AND REPLACING COOLANT

- Open both cocks located at the crankcase side and at the lower part of the radiator and drain coolant. Open the radiator cap while draining. Remove the overflow tank and drain.
- Check hoses for softening and kinks. Check clamps for signs of leakage.
- Tighten both cocks and replace the overflow tank.
- Replace with coolant as recommended by the engine manufacturer.
- Close radiator cap tightly.
- 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.

### WARNING



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

## RADIATOR CLEANING

The radiator (Figure 58) 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.

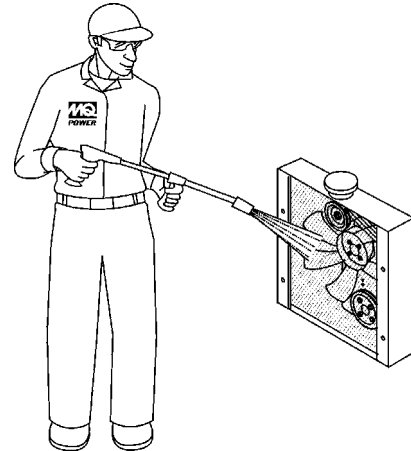


Figure 58. Radiator Cleaning

## 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.

# TRAILER MAINTENANCE

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## TRAILER MAINTENANCE

This section is intended to provide the user with generic trailer service and maintenance information. The service and maintenance guidelines referenced in this section refer to a wide range of trailers.

Remember periodic inspection of the trailer will ensure safe towing of the generator and will prevent personal injury and damage to the equipment.

The definitions below describe some of the major components of a typical trailer that would be used with generator.

1. **Fuel Cell** — Provides an adequate amount of fuel for the equipment in use. Fuel cells must be empty when transporting equipment.
2. **Braking System** — System employed in stopping the trailer. Typical braking systems are electric, surge, hydraulic, hydraulic-surge and air.
3. **GVWR** — Gross Vehicle Weight Rating (GVWR) is the maximum number of pounds the trailer can carry, including the fuel cell (empty).
4. **Frame Length** — Measurement is from the ball hitch to the rear bumper (reflector).
5. **Frame Width** — Measurement is from fender to fender
6. **Jack Stand** — Trailer support device with maximum pound requirement from the tongue of the trailer.
7. **Coupler** — Type of hitch used on the trailer for towing.
8. **Tire Size** — Indicates the diameter of the tire in inches (10,12,14, etc.), and the width in millimeters (175,185,205, etc.). The tire diameter must match the diameter of the tire rim.
9. **Tire Ply** — The tire ply (layers) number is rated in letters; 2-ply, 4-ply, 6-ply, etc.
10. **Wheel Hub** — The wheel hub is connected to the trailer's axle.
11. **Tire Rim** — Tires mounted on a tire rim. The tire rim must match the size of the tire.
12. **Lug Nuts** — Used to secure the wheel to the wheel hub. Always use a torque wrench to tighten down the lug nuts. See Table 18 and Figure 61 for lug nut tightening and sequence.
13. **Axle** — Indicates the maximum weight the axle can support in pounds, and the diameter of the axle expressed in inches. Please note that some trailers have a double axle. This will be shown as 2-6000 lbs., meaning two axles with a total weight capacity of 6000 pounds.
14. **Suspension** — Protects the trailer chassis from shocks transmitted through the wheels. Types of suspension used are leaf, Q-flex, and air ride.
15. **Electrical** — Electrical connectors (looms) are provided with the trailer so the brake lights and turn signals can be connected to the towing vehicle.
16. **Application** — Indicates which units can be employed on a particular trailer.



## BRAKES

Trailer brakes should be inspected the **first 200 miles** of operation. This will allow the brake shoes and drums to seat properly. After the first 200 mile interval, inspect the brakes **every 3,000 miles**. If driving over rough terrain, inspect the brakes more frequently.

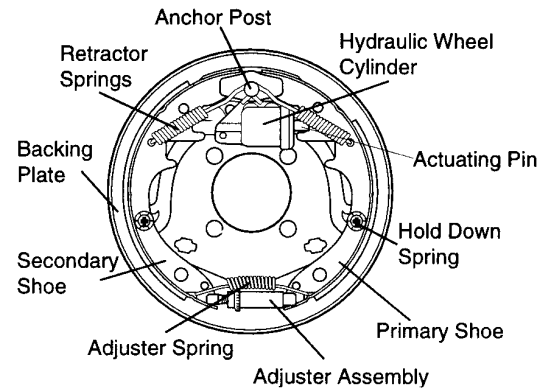
Figure 59 displays the major hydraulic surge brake components that will require inspection and maintenance. Please inspect these components as required using steps 1 through 8 and Table 15 as listed below:

### Brake Adjustment

1. Place the trailer on jack stands. Make sure the jack stands are placed on secure level ground.
2. Check the wheel and drum for free rotation.
3. Remove the adjusting hole cover from the adjusting slot at the bottom brake backing plate.
4. With a screwdriver or standard adjusting tool, rotate the star wheel of the adjuster assembly to expand the brake shoes.
5. Adjust the brake shoes outward until the pressure of the lining against the wheel drum makes the wheel difficult to turn.
6. Adjust, rotate the star wheel in the opposite direction until the wheel rotates freely with slight lining drag.
7. Replace the adjusting hole cover and lower the trailer to the ground.
8. Repeat steps 1 through 7 on the remaining brakes.

## Hydraulic Surge Brakes

Hydraulic surge brakes (Figure 59) should not require any special attention with the exception of routine maintenance such as shoe and lining replacement. Brake lines should be periodically checked for cracks, kinks, or blockage.



**Figure 59. Hydraulic Brake Components**

### Actuator

Hydraulic surge braking requires the installation of an actuator at the tongue of the trailer. Remember the **surge or push** of the trailer toward the tow vehicle automatically synchronizes the trailer brakes with the tow vehicle brakes. As the trailer pushes against the tow vehicle the actuator telescopes together and applies force to the master cylinder, supplying hydraulic pressure to the trailer brakes. Periodically check and test the surge “actuator” to make sure that it is functioning correctly. Never use an undersized actuator.

**Table 15. Hydraulic Brake Troubleshooting**

Symptom	Possible Cause	Solution
No Brakes	Brake line broken or kinked?	Repair or replace.
Weak Brakes or Brakes Pull to One Side	Brake lining glazed?	Reburnish or replace.
	Trailer overloaded?	Correct weight.
	Brake drums scored or grooved?	Machine or replace.
	Tire pressure correct?	Inflate all tires equally.
	Tires unmatched on the same axle?	Match tires.
Locking Brakes	Brake components loose, bent or broken?	Replace components.
	Brake drums out-of-round?	Replace.
Noisy Brakes	System lubricated?	Lubricate.
	Brake components correct?	Replace and correct.
Dragging Brakes	Brake lining thickness incorrect or not adjusted correctly?	Install new shoes and linings.
	Enough brake fluid or correct fluid?	Replace rubber parts fill with dot 4 fluid.

# TRAILER MAINTENANCE

## TIRES/WHEELS/LUG NUTS

Tires and wheels are a very important and critical components of the trailer. When specifying or replacing the trailer wheels it is important the wheels, tires, and axle are properly matched.

### CAUTION



**ALWAYS** wear safety glasses when removing or installing force fitted parts. Failure to comply may result in serious injury.

### CAUTION









**DO NOT** attempt to repair or modify a wheel. **DO NOT** install in inner tube to correct a leak through the rim. If the rim is cracked, the air pressure in the inner tube may cause pieces of the rim to explode (break off) with great force and cause serious eye or bodily injury.

## Tire Wear/Inflation

Tire inflation pressure is the most important factor in tire life. Pressure should be checked cold before operation **DO NOT** bleed air from tires when they are **hot!** Check inflation pressure weekly during use to insure the maximum tire life and tread wear.

Table 16 (Tire Wear Troubleshooting) will help pinpoint the causes and solutions of tire wear problems.

Table 16. Tire Wear Troubleshooting

Wear Pattern	Cause	Solution
	Center Wear	Over inflation. Adjust pressure to particular load per tire manufacturer.
	Edge Wear	Under inflation. Adjust pressure to particular load per tire manufacturer.
	Side Wear	Loss of camber or overloading. Make sure load does not exceed axle rating. Align wheels.
	Toe Wear	Incorrect toe-in. Align wheels.
	Cupping	Out-of-balance. Check bearing adjustment and balance tires.
	Flat Spots	Wheel lockup and tire skidding. Avoid sudden stops when possible and adjust brakes.

## Suspension

The **leaf suspension** springs and associated components (Figure 60) should be visually inspected every 6,000 miles for signs of excessive wear, elongation of bolt holes, and loosening of fasteners. Replace all damaged parts (suspension) immediately. Torqued suspension components as detailed in Table 17.

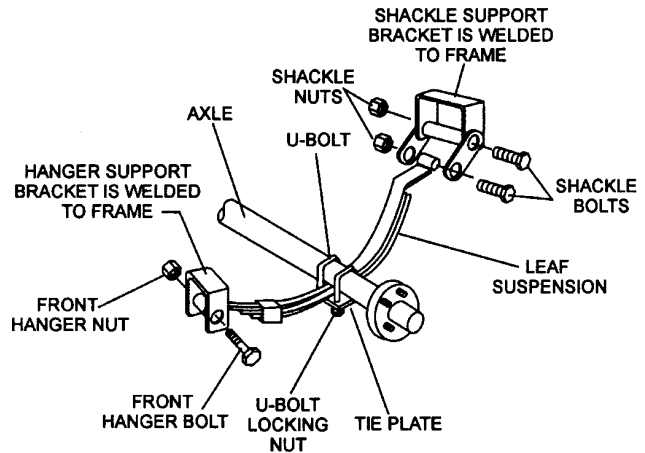


Figure 60. Major Suspension Components

Table 17. Suspension Torque Requirements

Item	Torque (Ft.-Lbs.)
3/8" U-Bolt	Min-30 Max-35
7/16" U-Bolt	Min-45 Max-60
1/2" U-Bolt	Min-45 Max-60
Shackle Bolt Spring Eye Bolt	Snug fit only. Parts must rotate freely. Locking nuts or cotter pins are provided to retain nut-bolt assembly.
Shoulder Type Shackle Bolt	Min-30 Max-50

# TRAILER MAINTENANCE

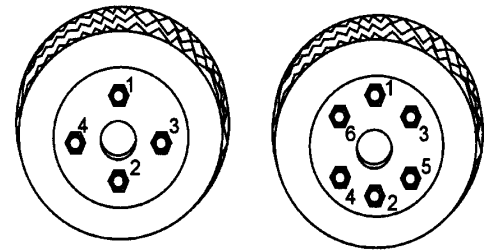
## Lug Nut Torque Requirements

It is extremely important to apply and maintain proper wheel mounting torque on the trailer. Be sure to use only the fasteners matched to the cone angle of the wheel. Proper procedure for attachment of the wheels is as follows:

1. Start all wheel lug nuts by hand.
2. Torque all lug nuts in sequence (see Figure 61). **DO NOT** torque the wheel lug nuts all the way down. Tighten each lug nut in 3 separate passes as defined by Table 18.
3. After first road use, retorque all lug nuts in sequence. Check all wheel lug nuts periodically.

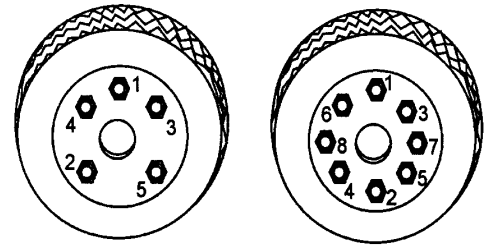
**Table 18. Tire Torque Requirements**

Wheel Size	First Pass FT-LBS	Second Pass FT-LBS	Third Pass FT-LBS
12"	20-25	35-40	50-65
13"	20-25	35-40	50-65
14"	20-25	50-60	90-120
15"	20-25	50-60	90-120
16"	20-25	50-60	90-120



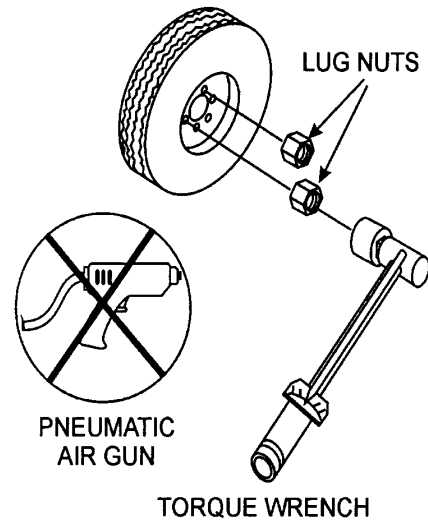
4-LUG NUTS

6-LUG NUTS



5-LUG NUTS

8-LUG NUTS



**Figure 61. Wheel Lug Nuts Tightening Sequence**

### NOTICE

**NEVER** use an pneumatic air gun to tighten wheel lug nuts.

# TRAILER WIRING DIAGRAM

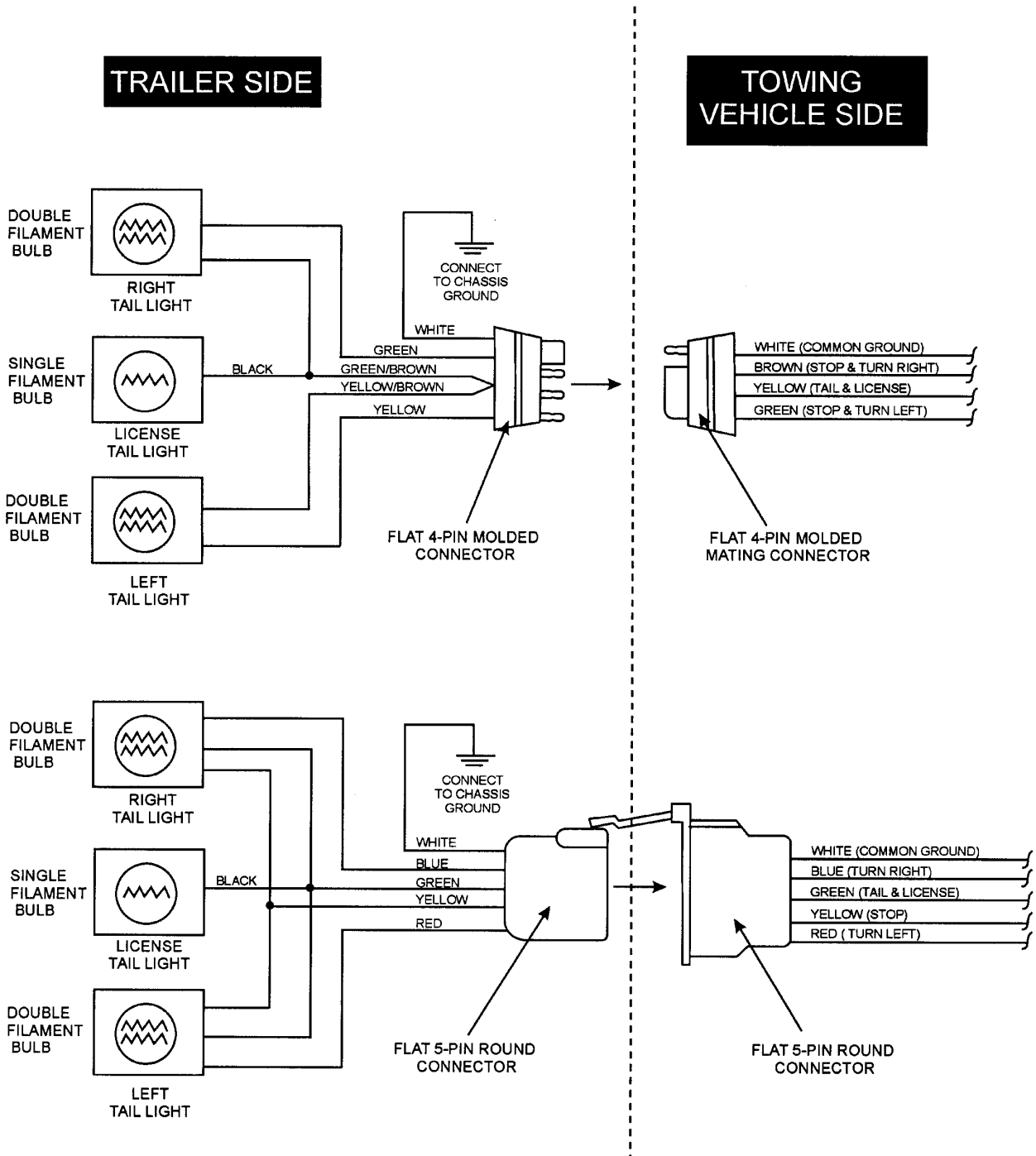
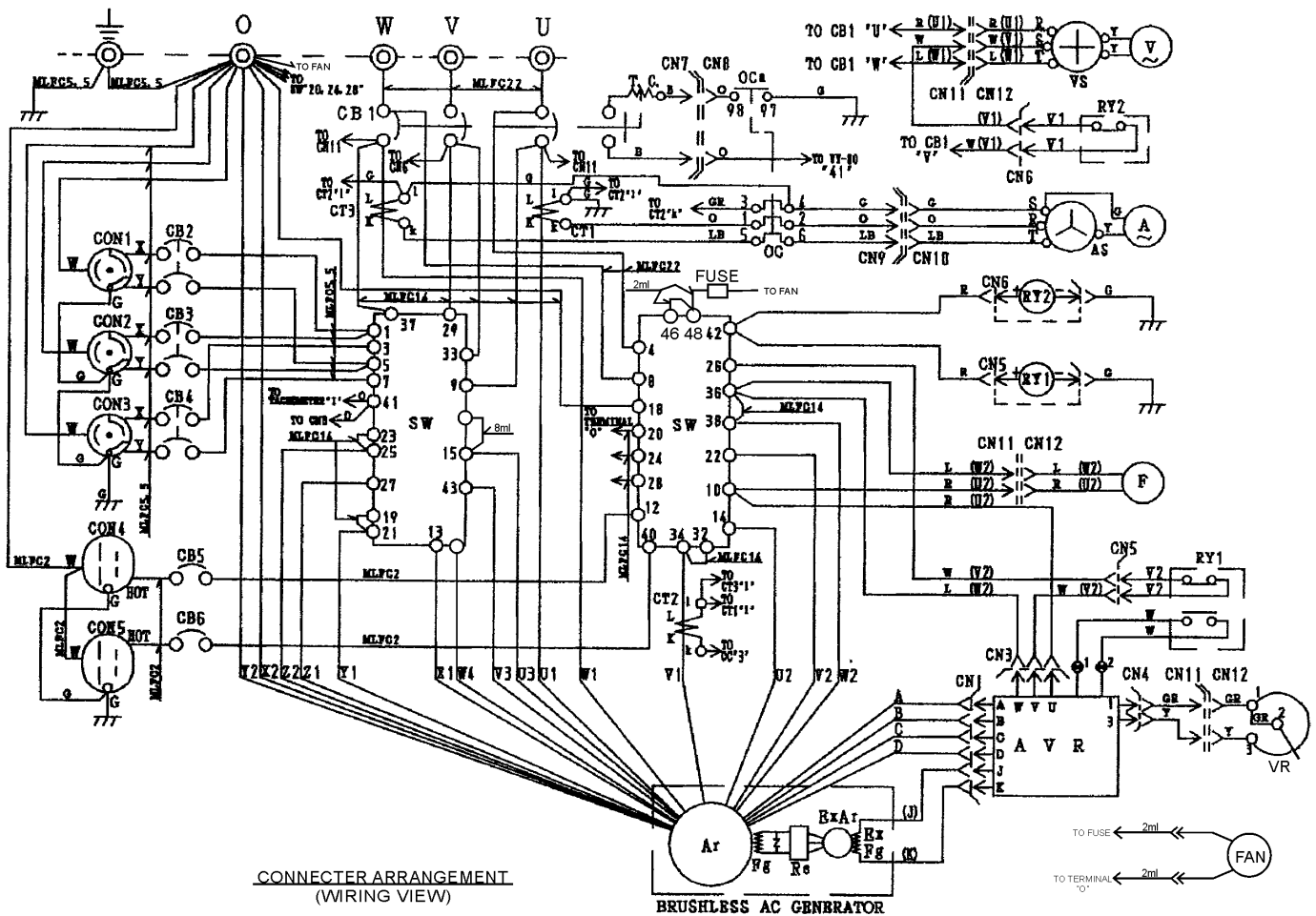


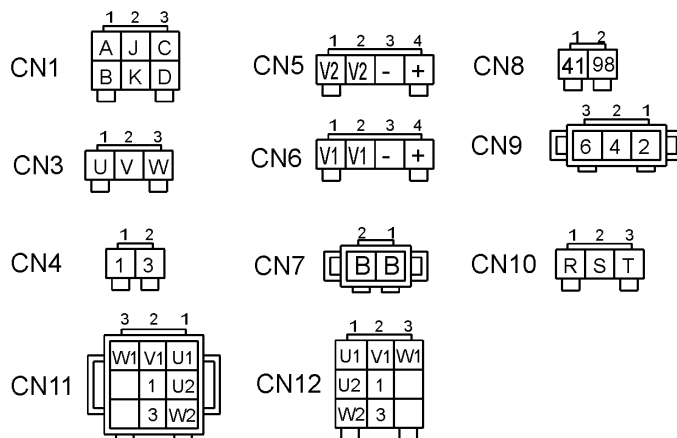
Figure 62. Trailer/Towing Vehicle Wiring Diagram

# GENERATOR WIRING DIAGRAM



CONNECTER ARRANGEMENT  
(WIRING VIEW)

BRUSHLESS AC GENERATOR



COLOR CODE			
SYM.	WIRE COLOR	SYM.	WIRE COLOR
B	BLACK	R	RED
L	BLUE	W	WHITE
BR	BROWN	Y	YELLOW
G	GREEN	LB	LIGHT BLUE
GR	GRAY	LG	LIGHT GREEN
V	VIOLET	O	ORANGE
P	PINK		

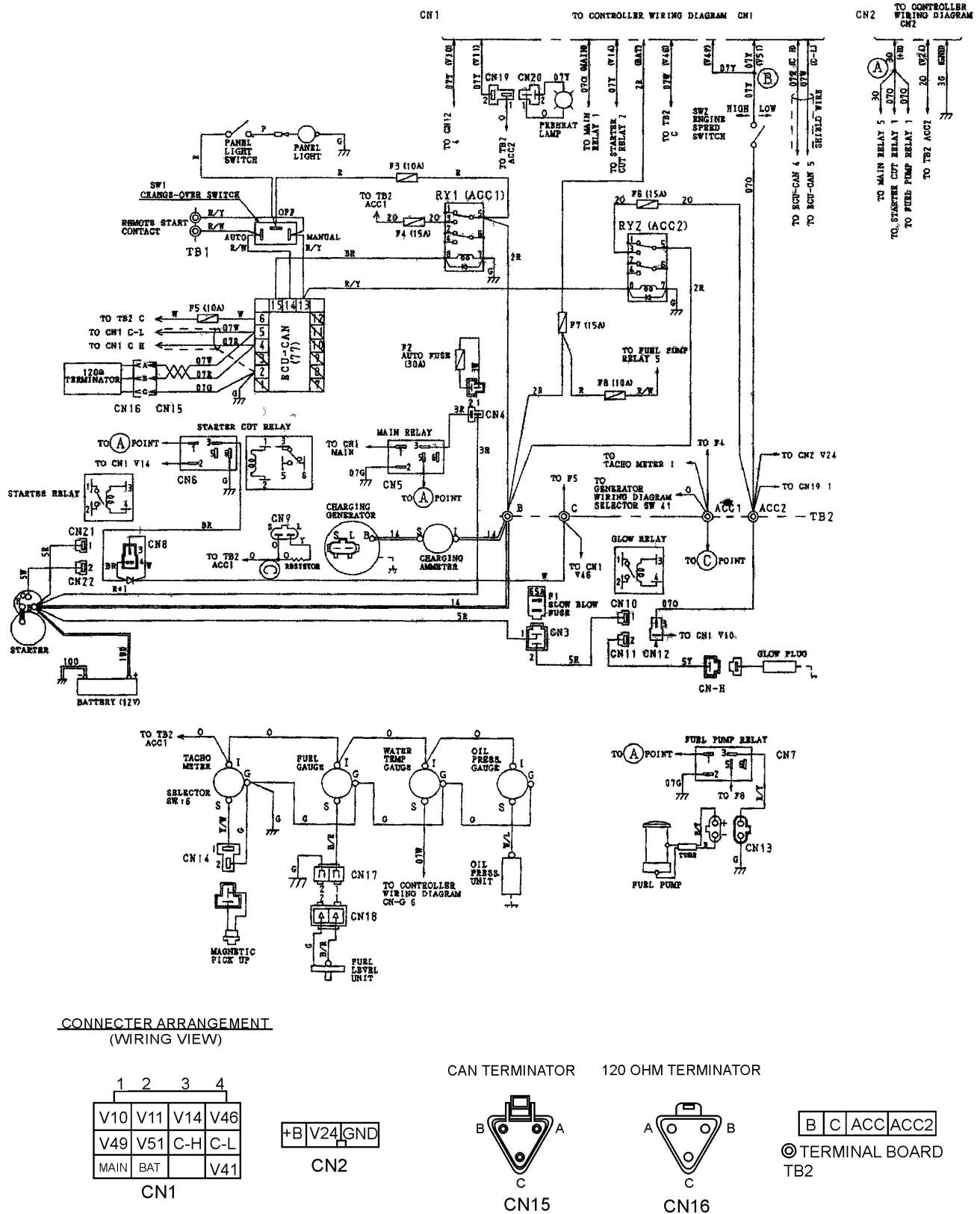
Notice:

1. No designation lead size : 1.25

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 1,2,3	CURRENT TRANSFORMER
AS	CHANGE-OVER SWITCH, AMMETER
A	AC AMMETER
VS	CHANGE-OVER SWITCH, VOLTMETER
V	AC VOLTMETER
F	FREQUENCY METER
CB1	CIRCUIT BREAKER 3P 175A
CB2,3,4	CIRCUIT BREAKER 2P 50A
CB5,6	CIRCUIT BREAKER 1P 20A
CN1,2,3	RECEPTACLE 250V 50A
CN4,5	RECEPTACLE 125V 20A
OC	OVER CURRENT RELAY
SW	SELECTOR SWITCH
RY1,2	RELAY UNIT
Re1	RECTIFIER
FAN	FAN MOTOR
FUSE	15A

Figure 63. Generator Wiring Diagram

# ENGINE WIRING DIAGRAM



# CONTROLLER WIRING DIAGRAM

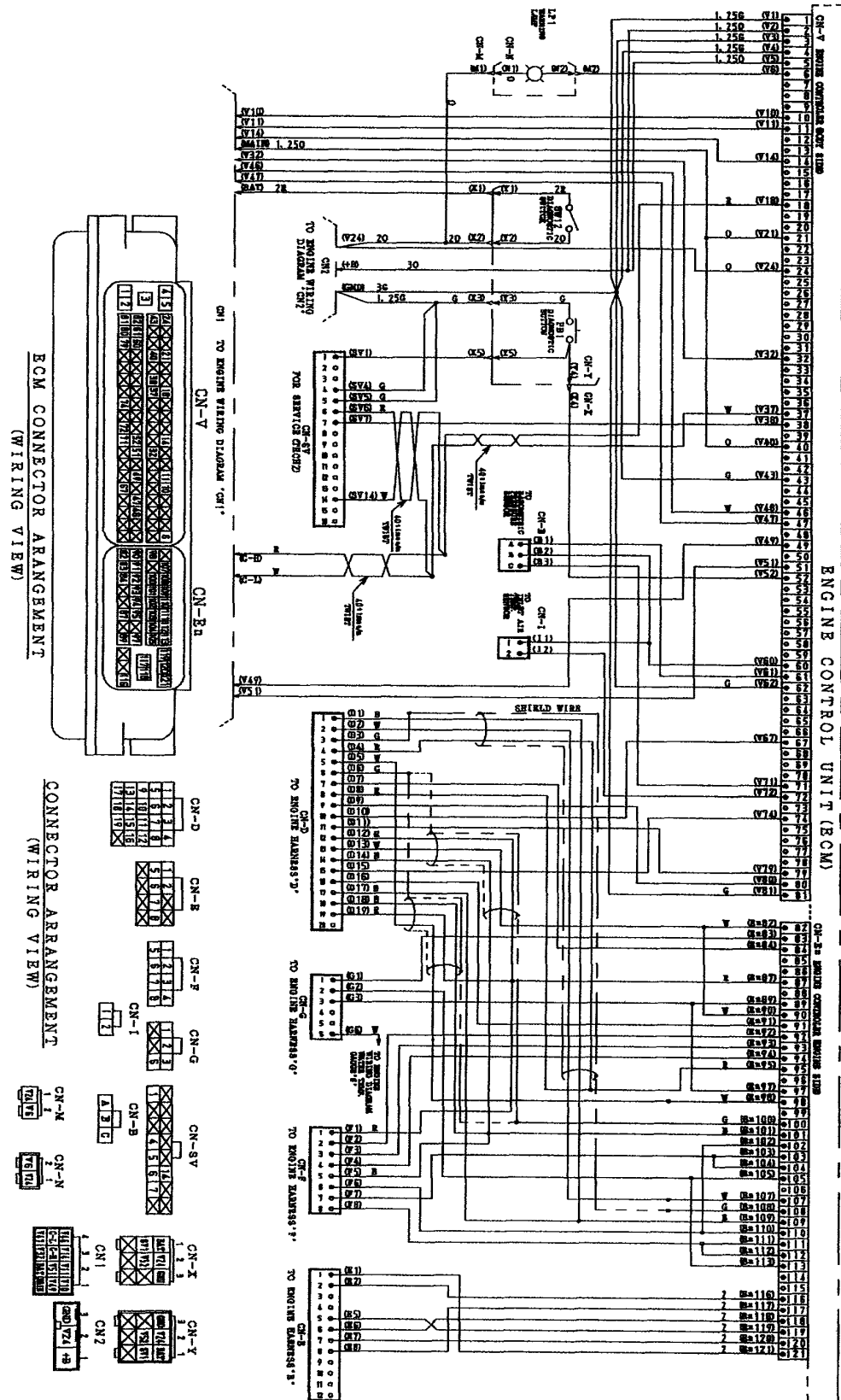


Figure 65. Engine Controller

## TROUBLESHOOTING (GENERATOR)

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 17.3 ohms across J & K on CN1
Low Voltage Output	Is engine speed correct?	Turn engine throttle lever to "High".
	Is wiring connections loose?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
High Voltage Output	Is wiring connections loose?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
Circuit Breaker Tripped	Short Circuit in load?	Check load and repair.
	Over current?	Confirm load requirements and reduce.
	Defective circuit breaker?	Check and replace.
	Over current Relay actuated?	Confirm load requirement and replace.



## TROUBLESHOOTING (DIAGNOSTIC LAMP)

The engine controller of this generator diagnoses problems that arise from the engine control system and the engine itself. Press the diagnostic button (Figure 66) on the diagnostic panel to determine if an engine malfunction has occurred.

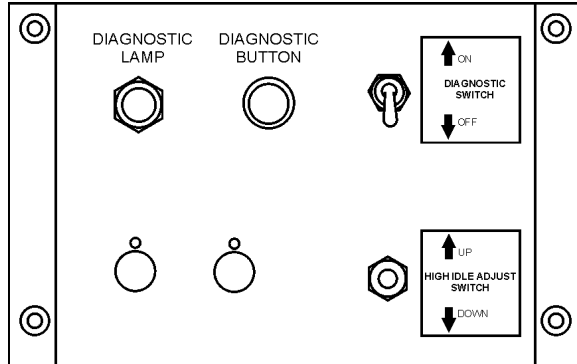


Figure 66. Diagnostic Panel

### METHOD OF OPERATION

1. Normally, the diagnostic lamp will be **dimly** lit when the **MPEC Control Switch** is placed in the **MANUAL** position.
2. If engine trouble occurs, the diagnostic lamp will be **brightly** lit as long as the control switch is left in the manual position.
3. The diagnostic lamp will indicate that an engine malfunction has occurred.

#### NOTICE

For a complete understanding of error codes and troubleshooting procedures, refer to the enclosed engine instruction manual.

#### NOTICE

If the engine is cranked while the diagnostic switch is in the **"ON"** position, the engine will not be stopped even if the starter switch is turned to the **"OFF"** position. In such case, turn the diagnostic switch to the **"OFF"** position.

# 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](mailto:mq@multiquip.com)  
WEBSITE: [www.multiquip.com](http://www.multiquip.com)

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### CANADA

***Multiquip***

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

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MQ Power Inc.  
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DENYO MANUFACTURING CORP.

