

OPERATION MANUAL



WHISPERWATT™ SERIES
MODEL
TLG8SSK4F2
PORTABLE GENERATOR
(KUBOTA Z482-E4B-DGDE-4 DIESEL ENGINE)
INSTRUCTION MANUAL NO. A6844300514

Revision #0 (04/06/23)

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THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.

PROPOSITION 65 WARNING



TLG8SSK4F2
Portable Generator

Proposition 65 Warning 2

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NOTICE

Specifications are subject to change without notice.

SAFETY DECALS

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

NOTICE

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

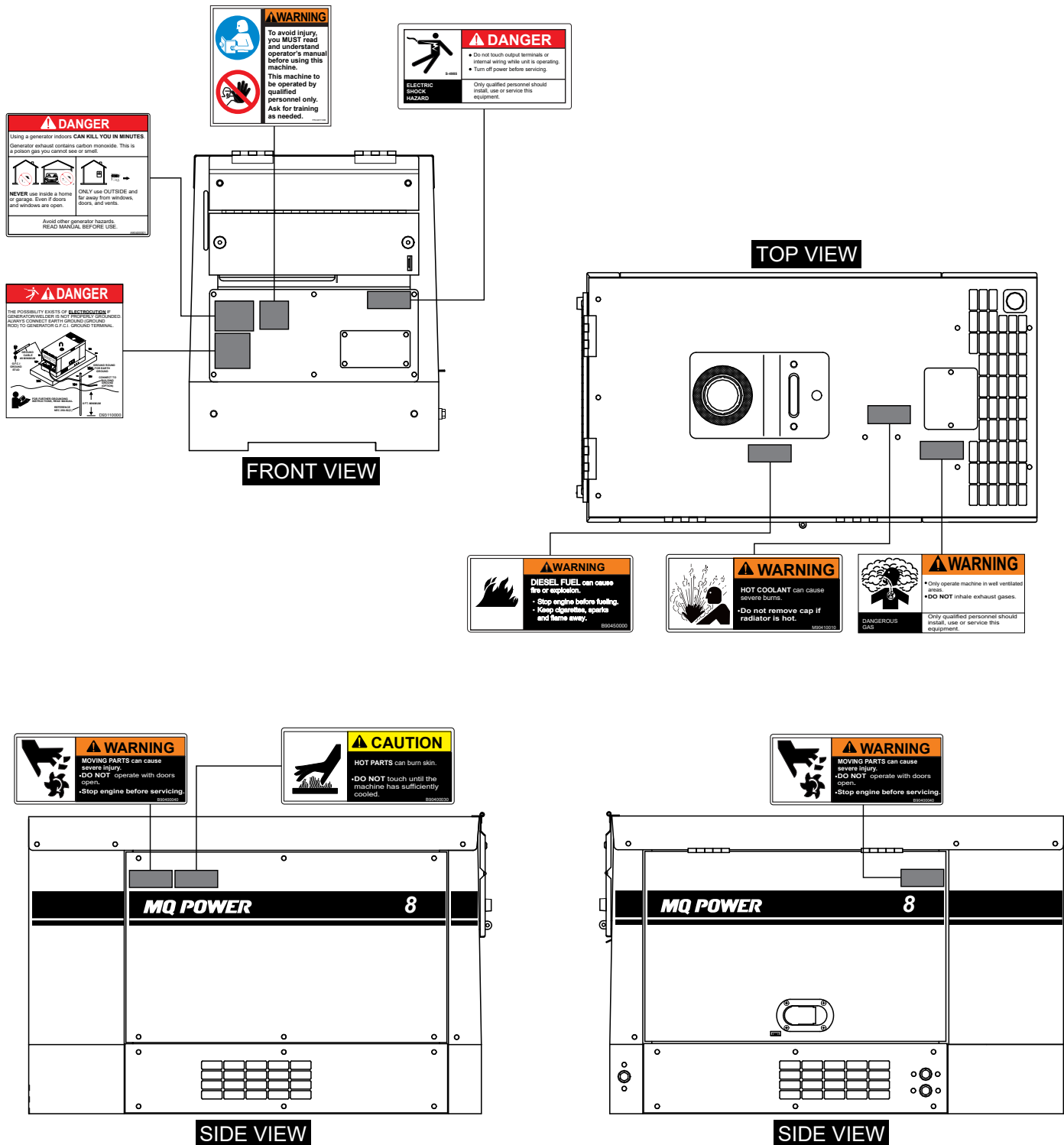


Figure 1. Safety Decals


SAFETY INFORMATION

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


SAFETY MESSAGES

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


SAFETY SYMBOLS

 **DANGER**

Indicates a hazardous situation which, if not avoided, **WILL** result in **DEATH** or **SERIOUS INJURY**.

 **WARNING**

Indicates a hazardous situation which, if not avoided, **COULD** result in **DEATH** or **SERIOUS INJURY**.








 **CAUTION**

Indicates a hazardous situation which, if not avoided, **COULD** result in **MINOR** or **MODERATE INJURY**.

NOTICE

Addresses practices not related to personal injury.

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

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

SAFETY INFORMATION

GENERAL SAFETY

CAUTION

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



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



- **ALWAYS** check the generator for loosened threads or bolts before starting.
- **NEVER** use the generator for any purpose other than its intended purposes or applications.

NOTICE

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



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



GENERATOR SAFETY

DANGER

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



WARNING

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

CAUTION

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

NOTICE

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

SAFETY INFORMATION

ENGINE SAFETY

DANGER

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



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

WARNING

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



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

CAUTION

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



NOTICE

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



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

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

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

SAFETY INFORMATION

FUEL SAFETY

DANGER

- **NEVER** start the engine near spilled fuel or combustible fluids. Diesel fuel is extremely flammable and its vapors can cause an explosion if ignited.
- **ALWAYS** refuel in a well-ventilated area, away from sparks and open flames.
- **ALWAYS** use extreme caution when working with **flammable** liquids.
- **NEVER** fill the fuel tank while the engine is **running** or **hot**.
- **NEVER** overfill the fuel tank. Spilled fuel can ignite if it comes into contact with hot engine parts or sparks from the ignition system.
- Store fuel in appropriate containers, in well-ventilated areas and away from sparks and flames.
- **NEVER** use fuel as a cleaning agent.
- **NEVER** smoke around or near the equipment. Fire or explosion could result from fuel vapors or if fuel is spilled on a hot engine.



TOWING SAFETY

CAUTION

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






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

SAFETY INFORMATION

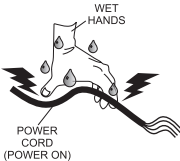
ELECTRICAL SAFETY

DANGER

- **NEVER** touch the output terminals during operation. Contact with the output terminals during operation can cause **electrocution, electrical shock, or burn**. 
- The electrical voltage required to operate the generator can cause **severe injury or even death** through physical contact with live circuits. Turn the generator and all circuit breakers **OFF** before performing maintenance on the generator or making contact with the output terminals.
- **NEVER** insert any objects into the output receptacles during operation. This is extremely dangerous. The possibility exists of **electrical shock, electrocution or death**. 
- Backfeed to a utility system can cause **electrocution** and/or property damage. **NEVER** connect the generator to a building's electrical system without a transfer switch or other approved device. All installations should be performed by a **licensed electrician** in accordance with all applicable laws and electrical codes. Failure to do so could result in electrical shock or burn, causing **serious injury or even death**. 

Power Cord/Cable Safety

DANGER

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

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

NOTICE

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


Grounding Safety

DANGER


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

BATTERY SAFETY

DANGER

- **DO NOT** drop the battery. There is a possibility that the battery will explode.
- **NEVER** expose the battery to open flames, sparks, cigarettes, etc. The battery contains combustible gases and liquids. If these gases and liquids come into contact with a flame or spark, an explosion could occur. 

WARNING

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

SAFETY INFORMATION

- If the battery liquid (dilute sulfuric acid) comes into contact with **eyes**, rinse eyes immediately with plenty of water and contact the nearest doctor or hospital to seek medical attention.

CAUTION

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

ENVIRONMENTAL SAFETY/DECOMMISSIONING

NOTICE

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

- **NEVER** pour waste or oil directly onto the ground, down a drain, or into any water source.
- Contact your country's Department of Public Works or recycling agency in your area and arrange for proper disposal of any electrical components, waste or oil associated with this equipment.
- When the life cycle of this equipment is over, remove the battery and bring it to an appropriate facility for lead reclamation. Use safety precautions when handling batteries that contain sulfuric acid.
- When the life cycle of this equipment is over, it is recommended that the frame and all other metal parts be sent to a recycling center.



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

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

EMISSIONS INFORMATION

NOTICE

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

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

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

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

Emission Control Label

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

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

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

SPECIFICATIONS

Table 1. Generator Specifications		
Model	TLG8SSK4F2	
Type	Revolving field, self-ventilated type synchronous generator	
Armature Connection	Star with neutral	
Phase	3	
Standby Output	6.4 kW (8.0 kVA)	
Prime Output	6.0 kW (7.5 kVA)	
3Ø Voltage (L-L/L-N)	208Y/120, 220Y/127, 240Y/139	
Power Factor	0.8	
Frequency	60 Hz	
Speed	3,600 rpm	
Aux. AC Power	Single phase, 60 Hz	
Aux. Voltage/Output	120V / 2.4 kW	
Dry Weight	580 lb. (263 kg)	
Wet Weight	646 lb. (293 kg)	
Table 2. Engine Specifications		
Model	Kubota Z482-E4B-DGDE-4	
Emission Regulation	EPA Tier 4 Final	
Type	Vertical, water-cooled, 4-cycle diesel engine	
No. of Cylinders	2	
Bore × Stroke	2.64 in. × 2.68 in. (67 mm × 68 mm)	
Displacement	29.23 cu. in. (479 cc)	
Rated Output	12.3 hp (9.2 kW) at 3,600 rpm	
Starting	Electric	
Coolant Capacity	2.95 quarts (2.8 liters)	
Lube Oil Capacity	2.64 quarts (2.5 liters)	
Fuel Tank Capacity	6.9 gal. (26 liters)	
Fuel Type	#2 diesel fuel	
Fuel Consumption	0.69 gal. (2.6 L)/hr. at full load	0.55 gal. (2.1 L)/hr. at 3/4 load
	0.48 gal. (1.8 L)/hr. at 1/2 load	0.37 gal. (1.4 L)/hr. at 1/4 load
Exhaust Gas After-Treatment System	DOC	
Battery	12V 35Ah × 1	

Effects Of Altitude And Heat

The maximum output of the engine listed above is applicable to supplying electrical power for continuous service at ambient conditions in accordance with SAE Test Code J607. The above ambient conditions are at standard sea level, with a barometric reading of 29.92 inches and a temperature of 60°F (15.5°C).

Generally, the engine's output power will decrease 3.5% for every 1,000 feet (305 meters) of altitude above sea level, and 1% for each 10°F (−12.2°C) above the standard temperature of 60°F (15.5°C).

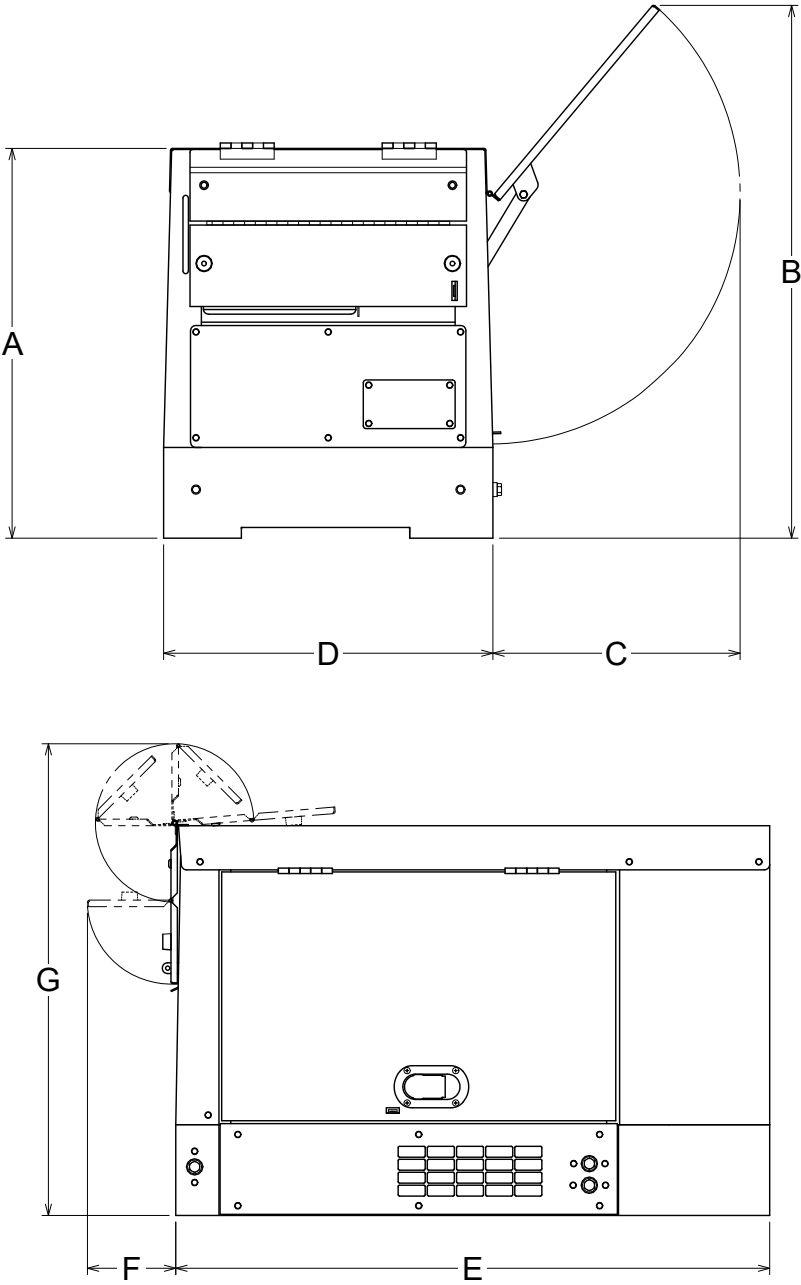


Figure 2. Dimensions

Table 3. Dimensions			
Reference Letter	Dimension in. (mm)	Reference Letter	Dimension in. (mm)
A	28.35 (720)	E	43.31 (1,100)
B	38.86 (987)	F	6.457 (164)
C	18.11 (460)	G	34.41 (874)
D	24.02 (610)		

GENERATOR GROUNDING

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

NOTICE

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

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

Connecting The Ground

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

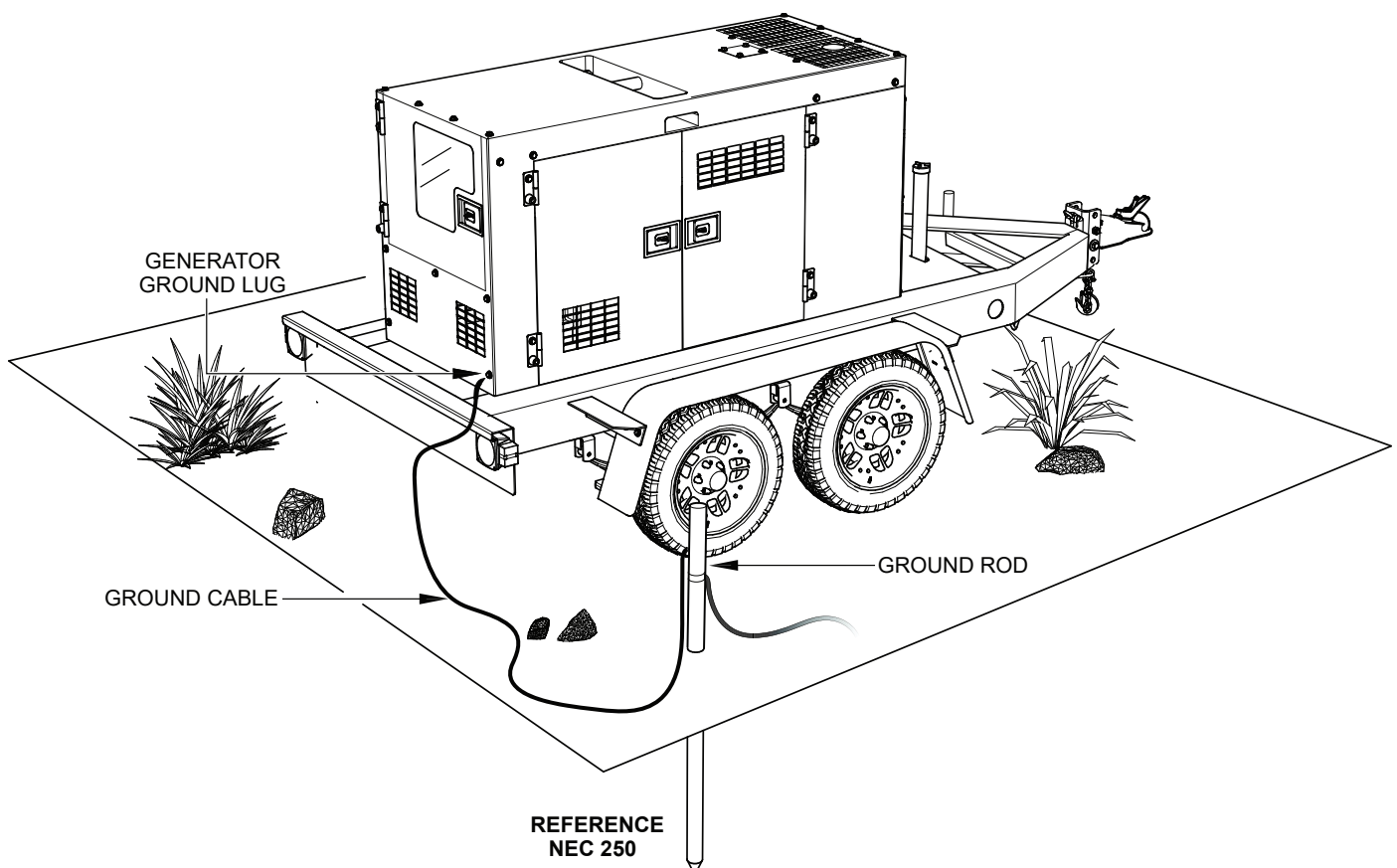


Figure 3. Typical Generator Grounding Application

NOTICE

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

OUTDOOR INSTALLATION

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

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

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

CAUTION

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

INDOOR INSTALLATION

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

MOUNTING

The generator must be mounted on a solid foundation (such as concrete) and set firmly on the foundation to isolate vibration of the generator when it is running. The generator must be mounted at least 6 inches above the floor or grade level as referenced in the National Fire Protection Association handbook (NFPA 110, Chapter 7, Section 7.4).

DO NOT remove the metal skids on the bottom of the generator. They are to resist damage to the bottom of the generator and to maintain alignment.

GENERATOR

This generator (Figure 4) is designed as a high-quality, portable (requiring a trailer for transport) power source for telecom sites, lighting facilities, power tools, submersible pumps, and other industrial and construction machinery.

CONTROL AND OPERATION PANEL

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

- Warning Lamp Unit
- AC Voltmeter
- AC Ammeter
- Frequency Meter
- Hour Meter
- Voltage Regulator
- Engine Speed Switch
- Starter Switch
- Four 240V 3-Phase Output Terminal Lugs
- 3-Pole Circuit Breaker, 20A (for 3-Phase)
- 120V Duplex Output Receptacle (GFCI), 20A
- GFCI Circuit Breaker, 20A (for 5-20R)
- Ground Terminal

ENGINE PROTECTION SYSTEM

Engine protection failsafe features are provided in the event of low oil pressure, high coolant temperature, or failure of the battery to charge. If any of the above conditions occur while the generator is in operation, it will cause a complete unit shutdown.

Oil Pressure Warning Alarm

This unit is equipped with a protective device that detects low oil pressure. If the lubricating oil pressure of this unit should become abnormally low, the protective device will automatically shut down the engine. If this condition should occur, please refer to the **Engine Troubleshooting** table in this manual.

Water Temperature Alarm

This unit is equipped with a protective device that triggers an alarm and automatically stops the engine when the engine coolant temperature becomes abnormally high. This protective device will not function properly if the machine is operated with less than the proper amount of coolant.

Battery Charge Alarm

This unit is equipped with a protective device that triggers an alarm and automatically stops the engine when loss of charge from the engine alternator occurs.

EXCITATION SYSTEM

The generator uses a brushless exciter to create rated output electricity. This system will use the mechanical energy generated by the 3,600 rpm engine to spin the rotor (or armature) inside the generator (or alternator end).

Excitation current is sourced from the battery to the excitation winding in the stator. Current applied to this coil creates a magnetic field. The rotating armature within the stator is then induced with AC current.

ENGINE

The generator is powered by a water-cooled, four-cycle, Kubota diesel engine. This engine is designed to meet every performance requirement of the generator.

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

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 the proper extension cable size.

MAJOR COMPONENTS

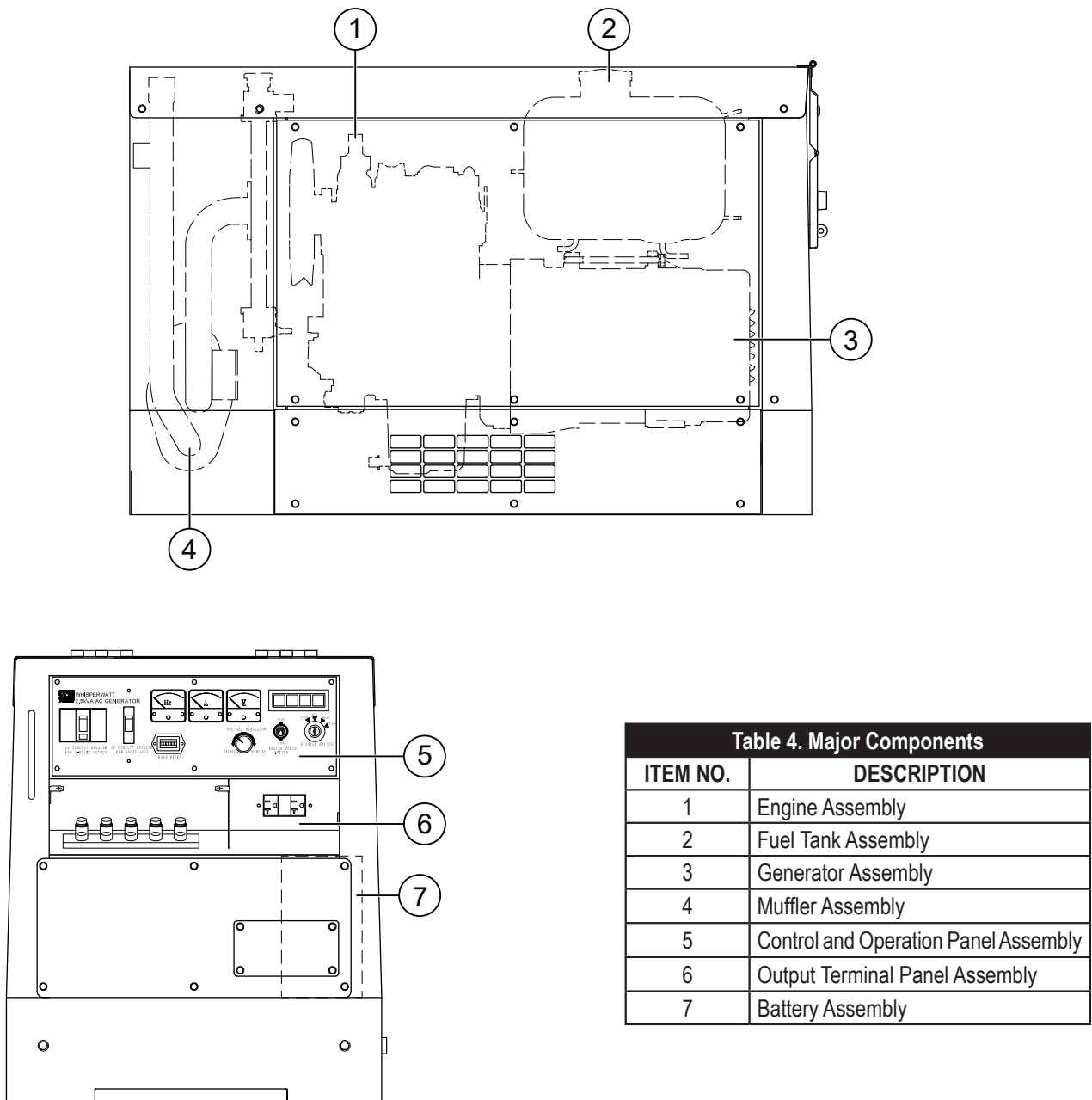


Figure 4. Major Components

CONTROL AND OPERATION PANEL

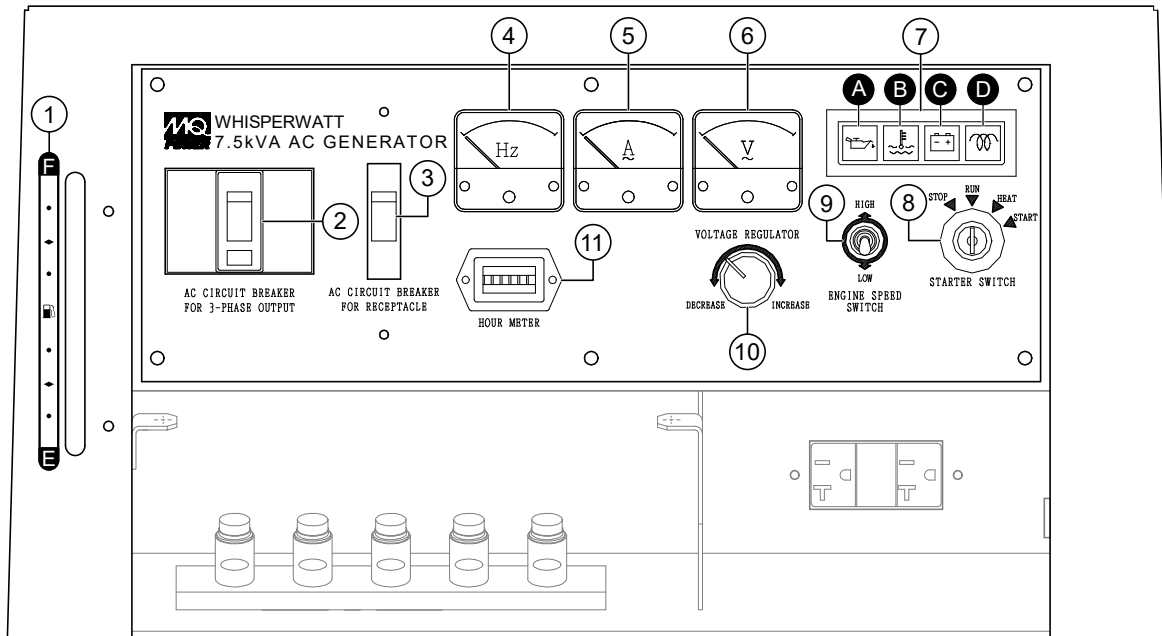






Figure 5. Control And Operation Panel

The definitions below describe the controls and functions of the **control and operation panel** (Figure 5).

1. **Fuel Gauge** — Indicates the amount of fuel in the fuel tank.
2. **3-Phase Circuit Breaker** — 3-pole, 20-amp circuit breaker protects the generator from short circuiting or overloading. When starting the generator, always place this circuit breaker in the OFF position.
3. **GFCI Circuit Breaker** — 2-pole, 20-amp circuit breaker protects the 120-volt GFCI duplex receptacle. When starting the generator, always place this circuit breaker in the OFF position.
4. **Frequency Meter** — Indicates the output frequency in hertz (Hz). Normally 60 Hz.
5. **AC Ammeter** — Indicates the amount of current the load is drawing from the U terminal.
6. **AC Voltmeter** — Indicates the output voltage present at the U and V output terminal lugs.
7. **Warning Lamp Display Module** — Displays the following engine alarms:
 - A. **Oil Pressure Lamp** — Will light when the engine oil pressure drops suddenly. This condition will cause the engine to shut down immediately. 
 - B. **Water Temperature Lamp** — Will light when the temperature rises to an abnormally high level. This condition will cause the engine to shut down immediately. 
 - C. **Charge Lamp** — Will light when the battery fails to charge. This condition will cause the engine to shut down immediately. 
 - D. **Preheat Lamp** — The preheat lamp will turn **ON** when the Starter switch is placed in the HEAT position. When the preheat cycle is completed the lamp will turn **OFF** and the engine can be started. 
8. **Starter Switch** — Insert the ignition key and turn clockwise to start the engine.
9. **Engine Speed Switch** — Controls engine speed (low/high).
10. **Voltage Regulator** — Allows $\pm 15\%$ manual adjustment of the generator's output voltage.
11. **Hour Meter** — Indicates the operational hours of the generator.

OUTPUT TERMINAL PANEL FAMILIARIZATION

OUTPUT TERMINAL PANEL

The **output terminal panel** (Figure 6) shown below is provided for the connection of electrical loads. Lift up on the cover to gain access to a receptacle and terminal lugs.

NOTICE

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

OUTPUT TERMINAL FAMILIARIZATION

The output terminal panel (Figure 6) is provided with the following:

- One (1) 120-volt, 20-amp GFCI receptacle
- One (1) GFCI ground terminal
- Four (4) output terminal lugs (U, V, W, O)

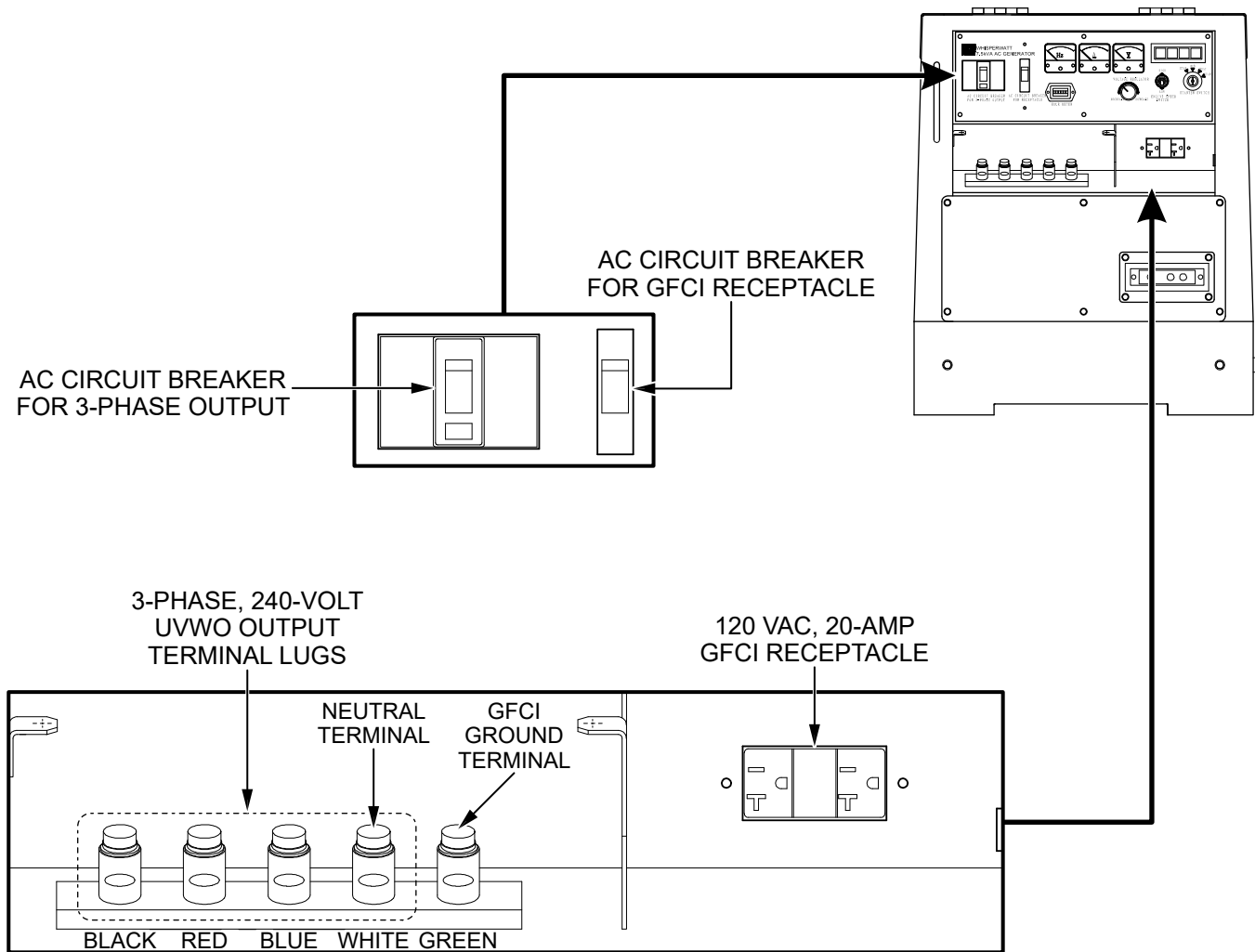


Figure 6. Output Terminal Panel

OUTPUT TERMINAL PANEL FAMILIARIZATION

120-Volt AC GFCI Receptacle

NOTICE

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

There is one **120-volt, 20-amp GFCI (duplex NEMA 5-20R) AC receptacle** (Figure 7) located on the output terminal panel. This receptacle is protected by a 20-amp circuit breaker which is located on the control and operation panel.

Press the **Reset button** (Figure 7) to reset the GFCI receptacle after it has been tripped. Press the **Test button** in the center of the receptacle to check the GFCI function. The receptacle should be tested at least once a month. Refer to the **Maintenance** section for further testing of the GFCI receptacle.

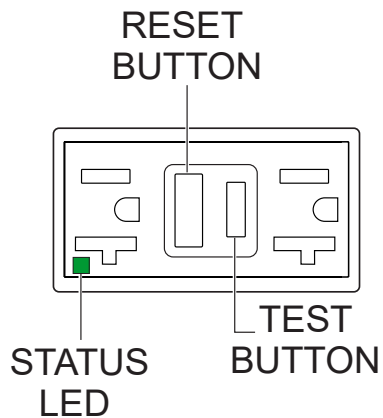


Figure 7. 120-Volt GFCI Receptacle

Connecting Loads

Loads can be connected to the generator by the **output terminal lugs** or the **GFCI convenience receptacle** (Figure 8). 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, 20-amp, main circuit breaker is provided. Make sure to switch **ALL** circuit breakers to the **OFF** position prior to starting the engine.

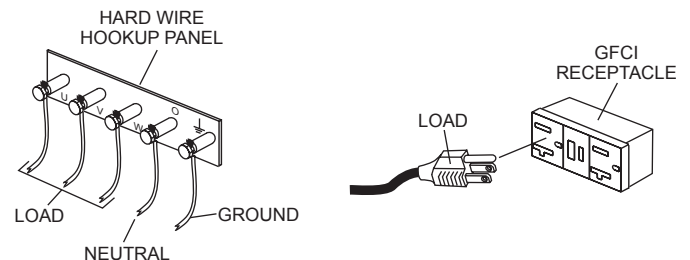


Figure 8. Connecting Loads

LOAD APPLICATION

SINGLE-PHASE LOAD

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

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

NOTICE

If wattage is not given on the equipment's nameplate, approximate wattage may be determined by multiplying the 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 120 Volts	At 240 Volts	#10 Wire	#12 Wire	#14 Wire	#16 Wire
2.5	300	600	1,000 ft.	600 ft.	375 ft.	250 ft.
5	600	1,200	500 ft.	300 ft.	200 ft.	125 ft.
7.5	900	1,800	350 ft.	200 ft.	125 ft.	100 ft.
10	1,200	2,400	250 ft.	150 ft.	100 ft.	
15	1,800	3,600	150 ft.	100 ft.	65 ft.	
20	2,400	4,800	125 ft.	75 ft.	50 ft.	

CAUTION: Equipment damage can result from low voltage.

NOTICE

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

THREE-PHASE LOAD

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

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

NOTICE

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

NOTICE

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

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

- When connecting a resistance load such as an incandescent lamp or electric heater, a capacity of up to the generating set's rated output (kW) can be used.
- When connecting a fluorescent or mercury lamp, a capacity of up to the generating set's rated output (kW) multiplied by 0.6 can be used.
- When connecting an electric drill or other power tools, pay close attention to the required starting current capacity.
- When connecting ordinary power tools, a capacity of up to the generating set's rated output (kW) multiplied by 0.8 can be used.

DANGER

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

GENERATOR OUTPUTS

GENERATOR OUTPUT VOLTAGES

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

Table 7. Voltages Available			
UVWO Output Terminal Lugs	UVWO Terminal Output Voltages		
3Ø Line-Line	208V	220V	240V
1Ø Line-Neutral	120V	127V	139V

VOLTAGE REGULATOR

To obtain some of the voltages listed in Table 7 will require a fine voltage adjustment using the **voltage regulator** (Figure 9) located on the control panel.



Figure 9. Voltage Regulator

Turn the voltage regulator to obtain the desired voltage. Turning the knob **clockwise** will **increase** the voltage. Turning the knob **counterclockwise** will **decrease** the voltage.

MAXIMUM AMPS

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

Table 8. Generator Maximum Amps	
Rated Voltage At 240 Volts	Maximum Amps
Standby	19.2
Prime	18

GFCI Receptacle Load Capacity

The load capability of the GFCI receptacle is directly related to the voltage being supplied at the output terminals.

Table 9 shows the amount of current available at the GFCI receptacles when the output terminals are in use. Make sure your load does not exceed the available current capability at the receptacle.

Table 9. 3Ø Generator Maximum Amps	
KVA In Use 240V 3-Phase UVWO Output Terminals	Duplex NEMA 5-20R 120V Receptacle Available Load Current (Amps)
7.5	0 amps/receptacle
6.9	5 amps/receptacle
6.3	10 amps/receptacle
5.7	15 amps/receptacle
5.1	20 amps/receptacle

OUTPUT TERMINAL PANEL CONNECTIONS

UVWO TERMINAL OUTPUT VOLTAGES

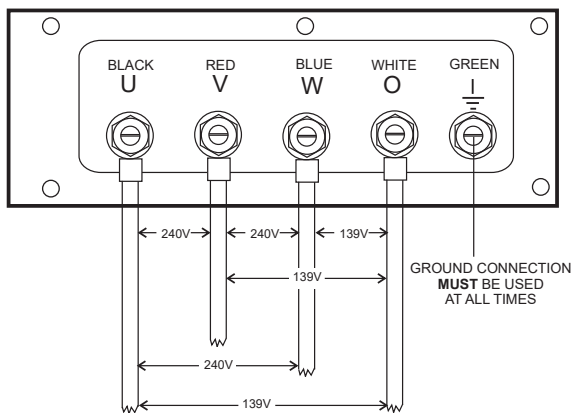
Various output voltages can be obtained using the UVWO output terminal lugs. The voltages at the terminals are dependent on the adjustment of the **voltage regulator** (Figure 11). The voltage regulator allows the user to increase or decrease the selected voltage.

3-Phase 240-Volt / Single-Phase 139-Volt UVWO Terminal Output Voltages

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.

1. Connect the load wires to the **UVWO terminal lugs** as shown in Figure 10.



**Figure 10. UVWO Terminal Lugs
(3-Phase 240-Volt / 1-Phase 139-Volt Connections)**

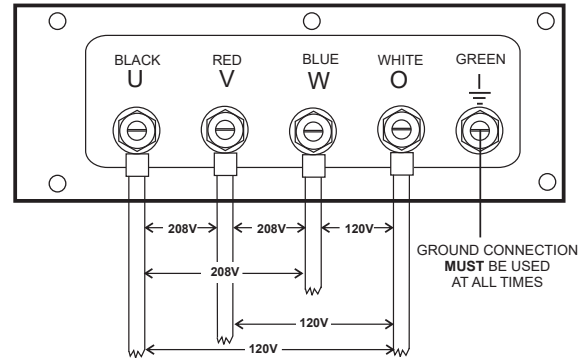
2. Turn the **voltage regulator** (Figure 11) clockwise to increase voltage output as needed. Turn counterclockwise to decrease voltage output.



Figure 11. Voltage Regulator

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

1. Connect the load wires to the **UVWO terminal lugs** as shown in Figure 12.



**Figure 12. UVWO Terminal Lugs
(3-Phase 208-Volt / 1-Phase 120-Volt Connections)**

NOTICE

To achieve 3-phase 208-volt output, the **voltage regulator** (Figure 11) must be adjusted to 208 volts.

BEFORE STARTING

1. Read all safety information at the beginning of this manual.
2. Clean the generator, removing dirt and dust, particularly the engine cooling air inlet. Caution must be taken to ensure the generator is 100% dry before use.
3. Check the air filter for dirt and dust. If the air filter is dirty, replace it with a new one as required.
4. Check fastening nuts and bolts for tightness.

ENGINE OIL CHECK

1. To check the engine oil level, place the generator on secure, level ground with the engine stopped.
2. Remove the **engine oil dipstick** from its holder (Figure 13) and wipe it clean.

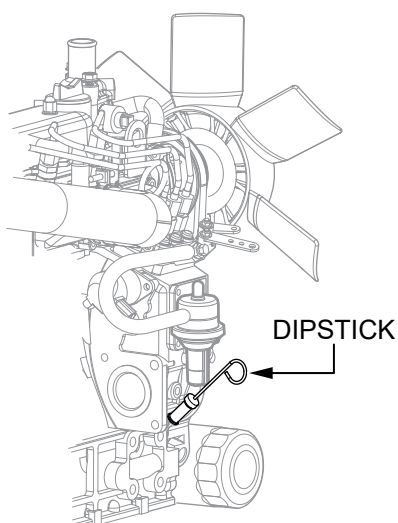


Figure 13. Engine Oil Dipstick

3. Reinsert the dipstick, then remove the dipstick from its holder. Check the oil level shown on the dipstick (Figure 14).

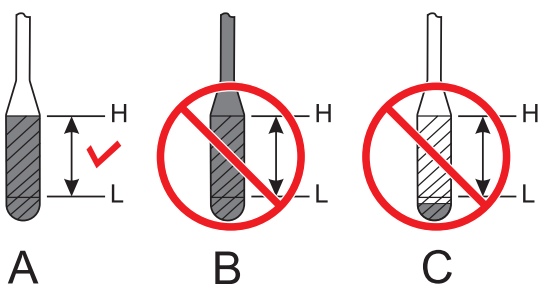


Figure 14. Engine Oil Dipstick

4. Verify that the engine oil level is maintained between the **H** and **L** markings on the dipstick as shown in Figure 14A.
5. If the engine oil level is low (Figure 14C), remove the cap from the oil filler port (Figure 15) and fill to a safe operating level (max) as indicated by the dipstick (Figure 14A). Fill with the recommended oil type as listed in Table 10. Maximum oil capacity is 2.64 quarts (2.5 liters).

NOTICE

When adding engine oil **DO NOT** overfill (Figure 14B).

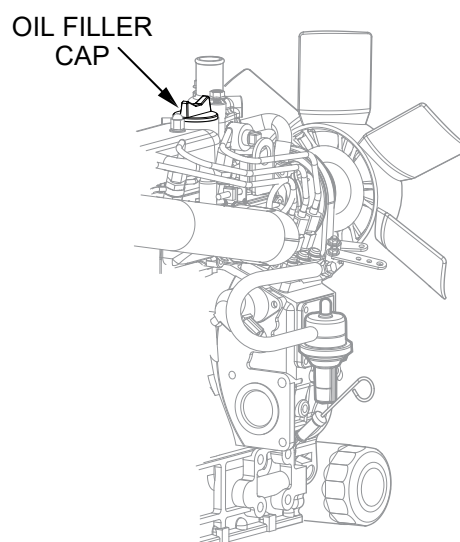


Figure 15. Engine Oil Filler Port

6. Allow enough time for any added oil to make its way to the oil pan before rechecking.
7. When checking the engine oil level, be sure to check if the oil is clean. If the oil is not clean, drain the oil as described in the **Maintenance** section of this manual.

Table 10. Oil Type

Temperature	Oil Type
Above 77°F (25°C)	SAE 30 or SAE10W-30 SAE 15W-40
32–77°F (0–25°C)	SAE 20 or SAE10W-30 SAE 15W-40
Below 32°F (0°C)	SAE 10 or SAE10W-30 SAE 15W-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. **ALWAYS** shut down the engine prior to cleaning up any spilled fuel.

Refilling The Fuel System

NOTICE

DO NOT refuel while the engine is running.

CAUTION

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

ALWAYS fill the **fuel tank** (Figure 16) with clean, fresh **#2 diesel fuel**. **DO NOT** fill the fuel tank beyond its capacity.

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.

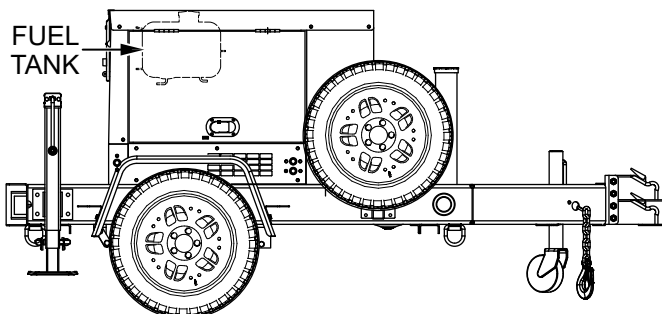


Figure 16. Fuel Tank

Refueling Procedure

WARNING



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

1. **Level the tank** — Make sure the fuel tank is level with the ground. Failure to do so will cause fuel to spill from the tank before reaching full capacity (Figure 17).

CAUTION

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

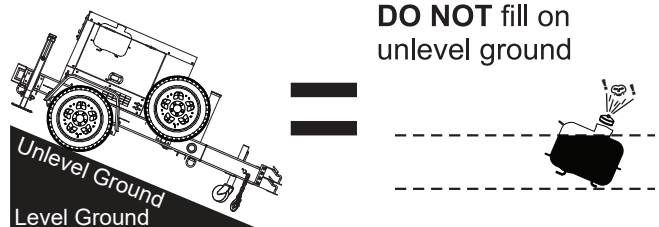


Figure 17. Only Fill On Level Ground

NOTICE

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

2. Remove the **fuel filler cap** (Figure 18) located on top of the generator and fill the fuel tank as shown in Figure 18.

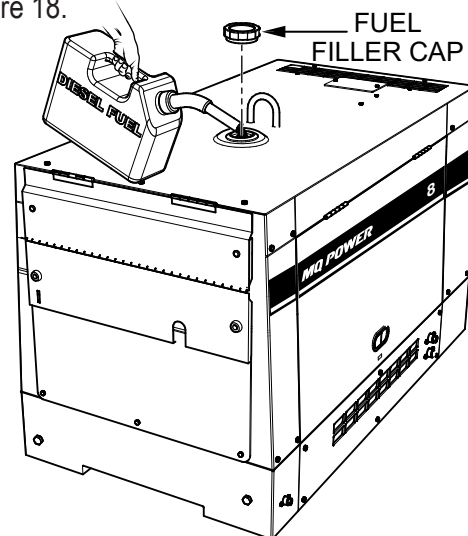


Figure 18. Fueling The Generator

1. **NEVER overfill the fuel tank** — It is important to observe the **fuel gauge** (Figure 19) while filling the fuel tank. **DO NOT** wait for fuel to rise in the filler neck.

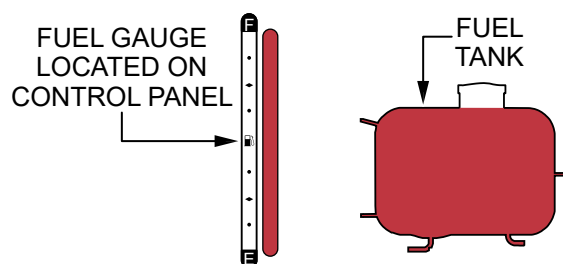


Figure 19. Full Fuel Tank

CAUTION

DO NOT OVERFILL the fuel system. Leave room for fuel expansion. Fuel expands when heated (Figure 20).

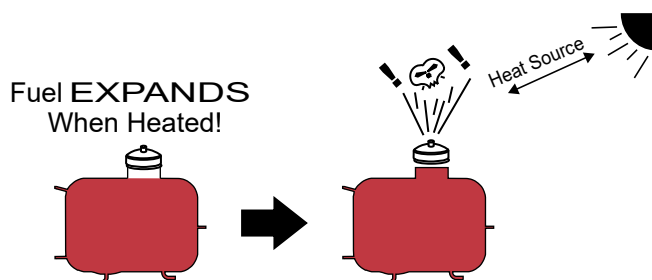


Figure 20. Fuel Expansion

DANGER



Motor fuels are highly flammable and can be dangerous if mishandled. **DO NOT** smoke while refueling. **DO NOT** attempt to refuel the generator in the dark or when the engine is hot or running.

NOTICE

When refueling, be sure to use a strainer for filtration. **DO NOT** top off fuel. **DO NOT** fill the tank beyond capacity. Wipe up any spilled fuel immediately!

COOLANT CHECK (ANTIFREEZE/SUMMER COOLANT/WATER)

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

WARNING



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

Day-to-day addition of coolant is done from the reserve tank. When adding coolant to the radiator, **DO NOT** remove the radiator cap until the unit has completely cooled. See Table 11 for engine, radiator, and reserve tank coolant capacities.

NOTICE

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

Verify that the coolant level in the **coolant reserve tank** is between the **FULL** and **LOW** markings as shown in Figure 21.

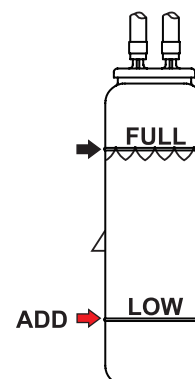


Figure 21. Coolant Reserve Tank

Table 11. Coolant Capacity

Engine and Radiator	2.95 quarts (2.8 liters)
Reserve Tank	0.23 gal. (0.87 liters)

Operation In Freezing Weather

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

Table 12. Antifreeze Operating Temperatures		
Vol. % Antifreeze	Freezing Point	
	°C	°F
50	-37	-34

NOTICE

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

Cleaning The Radiator

The engine may overheat if the **radiator cooling fins** (Figure 22) become overloaded with dust or debris. Periodically inspect the radiator fins and clean with compressed air as needed. Cleaning inside the machine is dangerous, so clean only with the engine turned **OFF** and the **negative** battery terminal disconnected.

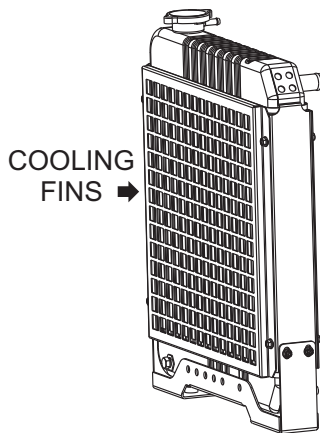


Figure 22. Radiator (Cooling Fins)

ENGINE AIR CLEANER

Periodic cleaning/replacement of the **engine air cleaner** (Figure 23) is necessary. Inspect the air cleaner in accordance with the **Maintenance** section of this manual or the **Kubota engine owner's manual**.

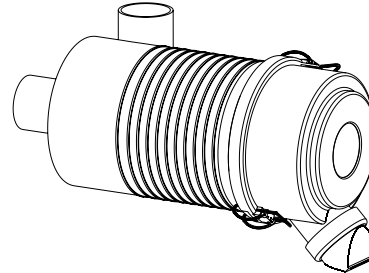


Figure 23. Engine Air Cleaner

DRIVE BELT TENSION

A slack drive belt may contribute to overheating, or to insufficient charging of the battery. Inspect the drive belt for damage and wear and adjust it in accordance with the **Maintenance** section of this manual or the **Kubota engine owner's manual**.

The drive belt tension is proper if the drive belt bends 0.28–0.35 in. (7–9 mm) when depressed with the thumb as shown in Figure 24.

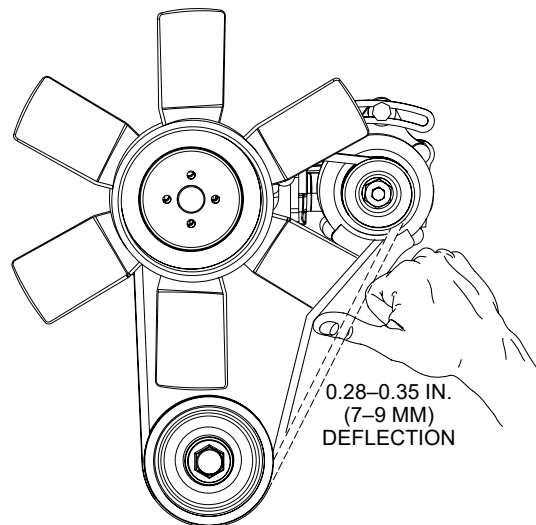


Figure 24. Drive Belt Tension

CAUTION



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

BATTERY

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

DO NOT overfill. Check to see whether the battery cables are loose. Poor contact may result in poor starting or malfunctions. **ALWAYS** keep the terminals firmly tightened. Coat the terminals with an approved battery terminal treatment compound. Replace only with the recommended type of 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 are properly connected to the battery terminals as shown in Figure 25. 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**.

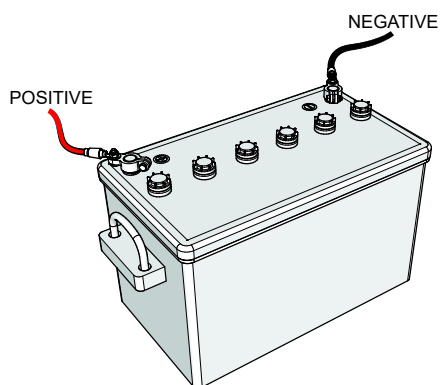


Figure 25. Battery Connections

When connecting battery, do the following:

1. **NEVER** connect the battery cables to the battery terminals while the **Ignition Switch** is in the **START** position. **ALWAYS** make sure that this switch is in the **OFF** position when connecting the battery.
2. Place a small amount of battery terminal treatment compound around both battery terminals. This will ensure a good connection and will help prevent corrosion around the battery terminals.

NOTICE

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



CAUTION

Inadequate battery connections may cause poor starting of the generator or 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 in alternator failure.

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

WIRING

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

PIPING AND HOSE CONNECTIONS

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

If any 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 start the engine with the **3-phase or GFCI** circuit breakers in the **ON** (closed) position.

1. Place the **3-phase and GFCI** circuit breakers (Figure 26) in the **OFF** position.

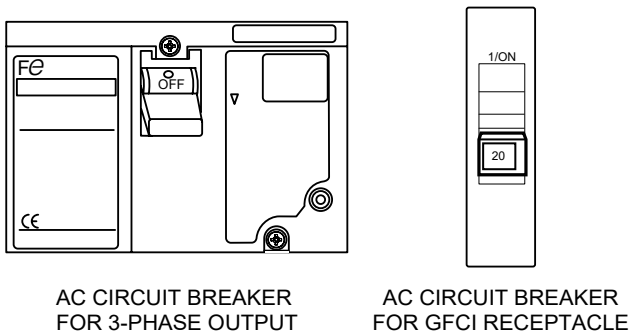


Figure 26. 3-Phase and GFCI Circuit Breakers (OFF)

2. Open the generator door and place the **fuel cock lever** (Figure 27) in the **ON** position.

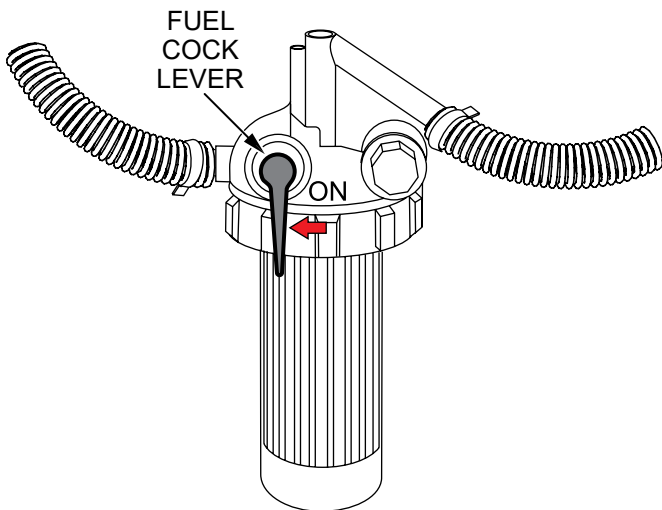


Figure 27. Fuel Cock Lever (ON)

3. Make sure the **generator door** (Figure 28) is closed before operating the generator.

NOTICE

NEVER operate the generator with the door open. Operation with the door open may cause insufficient cooling of the unit, and engine damage may result. Close the door for normal operation.

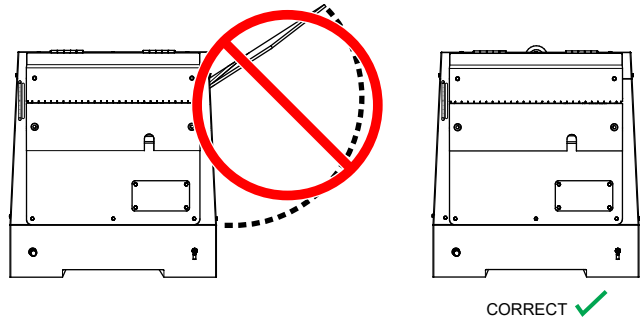


Figure 28. Generator Door

4. Connect the load to the **receptacle** or the **output terminal lugs** as shown in Figure 8. These load connection points can be found on the output terminal panel.
5. Tighten terminal nuts securely to prevent load wires from slipping out.

GENERATOR START-UP PROCEDURE

STARTING THE ENGINE

1. Place the **Engine Speed switch** in the **LOW** position (Figure 29).



Figure 29. Engine Speed Switch (LOW)

2. Insert the **ignition key** into the **starter switch** (Figure 30) and turn it clockwise to the **RUN** position.

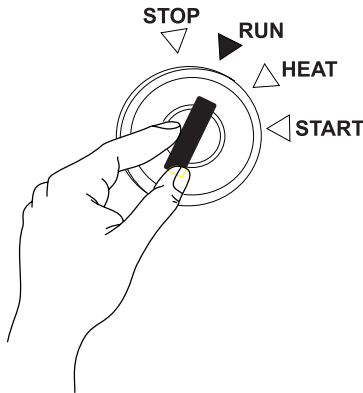


Figure 30. Starter Switch (RUN)

3. Make sure the **Oil Pressure lamp** (Figure 31A) and **Charge lamp** (Figure 31B) are both lit (ON). If either light is not on, check the system and wiring (refer to the Kubota engine owner's manual).

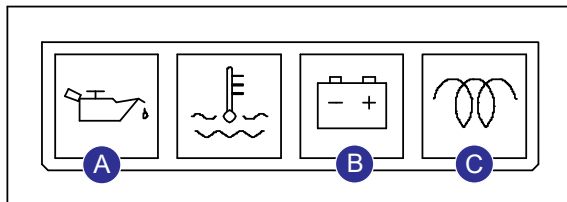


Figure 31. Warning Lamp Display

4. Turn the **ignition key** clockwise to the **HEAT** position (Figure 32). In cold weather conditions, the **Pre-Heat lamp** (Figure 31C) will turn ON.

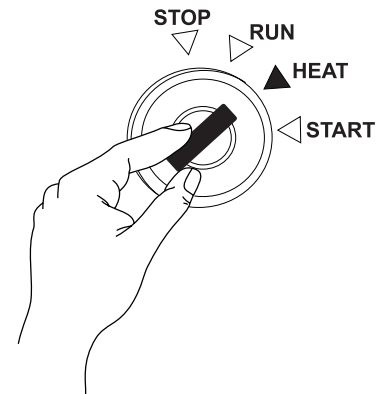


Figure 32. Starter Switch (HEAT)

5. When the **Pre-Heat lamp** (Figure 31C) turns OFF, turn the **ignition key** clockwise to the **START** position (Figure 33) to start the engine. As soon as the engine starts, release the key. The key will automatically return to the **RUN** position.

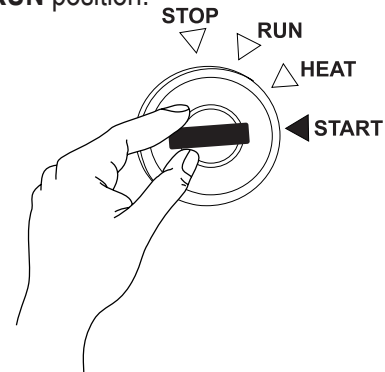


Figure 33. Starter Switch (START)

6. If the engine does not start within 10 seconds after the key is turned to the **START** position, wait for about 30 seconds, then repeat steps 1–3.
7. When the engine starts, the **Oil Pressure lamp** (Figure 31A) and **Charge lamp** (Figure 31B) should both turn OFF. If these lights stay on, immediately stop the engine and check the system and wiring (refer to the Kubota engine owner's manual).
8. Let the engine idle for five minutes with the **Engine Speed switch** in the **LOW** position (Figure 29).

GENERATOR START-UP PROCEDURE

9. Place the **Engine Speed** switch in the **HIGH** position (Figure 34).

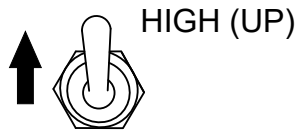


Figure 34. Engine Speed Switch (HIGH)

10. The generator's **frequency meter** (Figure 35) will display the 60-cycle output frequency in **HERTZ**.

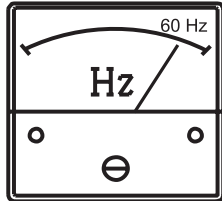


Figure 35. Frequency Meter

11. The generator's **AC voltmeter** (Figure 36) will display the generator's output in **VOLTS**.

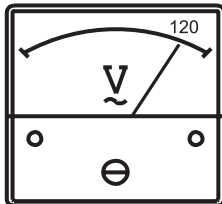


Figure 36. Voltmeter

12. If the voltage is not within the specified tolerance, use the **voltage regulator** (Figure 37) to increase or decrease the desired voltage.



Figure 37. Voltage Regulator

13. The **AC ammeter** (Figure 38) 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.

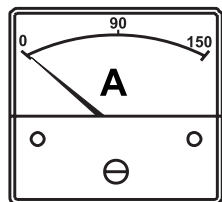


Figure 38. Ammeter (No Load)

14. Place the **3-phase and GFCI circuit breakers** (Figure 39) in the **ON** position.

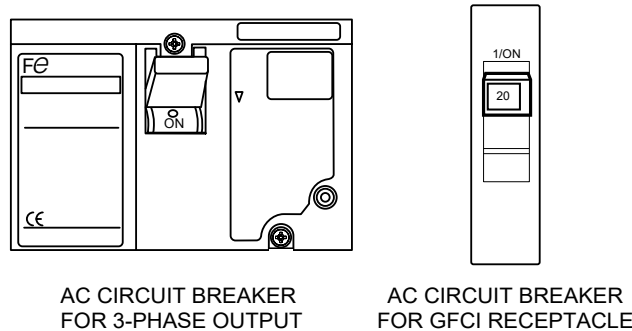


Figure 39. 3-Phase and GFCI Circuit Breakers (ON)

15. Observe the **AC ammeter** (Figure 40) and verify it displays the anticipated amount of current with respect to the load. The ammeter will only display a current reading if a load is in use.

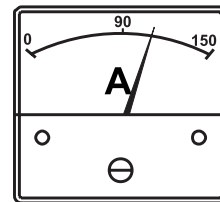


Figure 40. Ammeter (Load)

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

GENERATOR SHUTDOWN PROCEDURES

NORMAL SHUTDOWN PROCEDURE

1. Place the load's ON/OFF switch in the **OFF** position.
2. Place the **3-phase and GFCI circuit breakers** (Figure 41) in the **OFF** position.

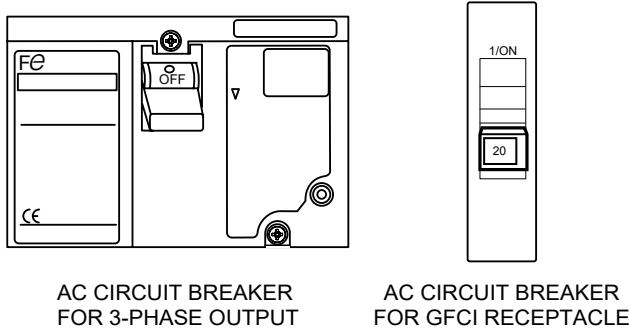


Figure 41. 3-Phase and GFCI Circuit Breakers (OFF)

3. Place the **Engine Speed switch** in the **LOW** position (Figure 42).



Figure 42. Engine Speed Switch (LOW)

4. Let the engine cool by running it at low speed for 3–5 minutes with no load applied.
5. Turn the **ignition key** counterclockwise to the **STOP** position (Figure 43) and remove the key from the **starter switch**.

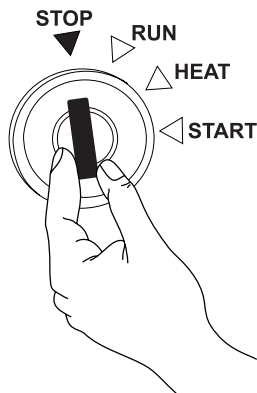


Figure 43. Starter Switch (STOP)

6. Open the generator door and place the **fuel cock lever** (Figure 44) in the **OFF** position.

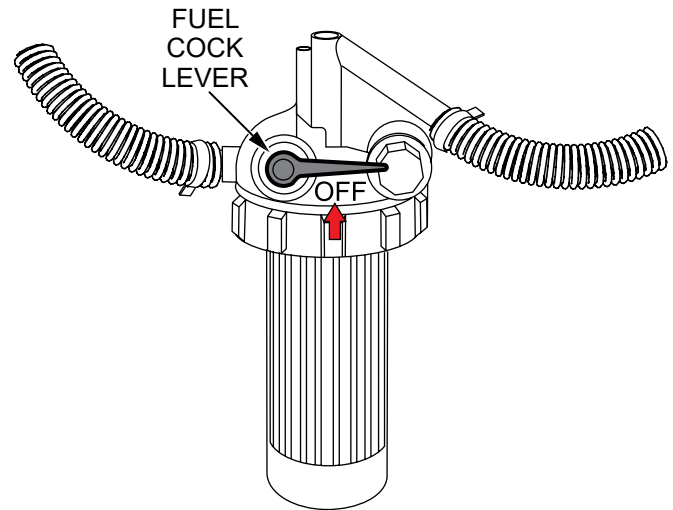


Figure 44. Fuel Cock Lever (OFF)

7. Remove all load connections from the generator.

EMERGENCY SHUTDOWN PROCEDURE

1. Quickly turn the **ignition key** counterclockwise to the **STOP** position (Figure 43) and remove the key from the **starter switch**.
2. Open the generator door and place the **fuel cock lever** (Figure 44) in the **OFF** position.

MAINTENANCE

Table 13. Inspection/Maintenance* ³	Daily	First Month or 50 Hours	Every 3 Months or 25 Hours	Every 6 Months or 50 Hours	Every Year or 100 Hours	Every 2 Years or 200 Hours	Every 8 Years or 800 Hours
Check Engine Oil	X						
Change Engine Oil		X			X		
Replace Oil Filter Cartridge						X	
Check Air Cleaner Element	X						
Clean Air Cleaner Element* ¹				X			
Check for Loosening of Nuts and Bolts, Retighten If Necessary	X						
Check Cooling Fins				X			
Clean Inside of Fuel Tank						X	
Clean Fuel Filter					X		
Replace Fuel Filter Element		X				X	
Replace Fuel Lines (If Necessary)* ²						X	
Replace Battery						X	
Replace Radiator Hoses and Clamps (If Necessary)* ²						X	
Change Radiator Coolant						X	
Check and Adjust Idle Speed* ²					X		
Check and Adjust Valve Clearance* ²							X

*¹ Service more frequently when used in dusty areas.

*² These items should be serviced by your service dealer, unless you have the proper tools and are mechanically proficient. Refer to the Kubota shop manual for service procedures.

*³ For commercial use, log hours of operation to determine proper maintenance intervals.

NOTICE

Thoroughly remove dirt and oil from the engine and control area. Clean or replace the air cleaner elements as necessary. Check and retighten all fasteners as necessary.

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 13 as a general inspection and maintenance guideline. For more detailed engine maintenance instructions, refer to the engine owner's manual.

ENGINE AIR CLEANER

The **air cleaner** (Figure 45) of this Kubota diesel engine is equipped with a replaceable, high-density, paper **filter element**. Check the air cleaner daily or before starting the engine. Open the **evacuator valve** once a week under ordinary conditions (or daily when used in dusty conditions) to get rid of large particles of dust and dirt. Replace the air cleaner every year or every six cleanings.

NOTICE

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

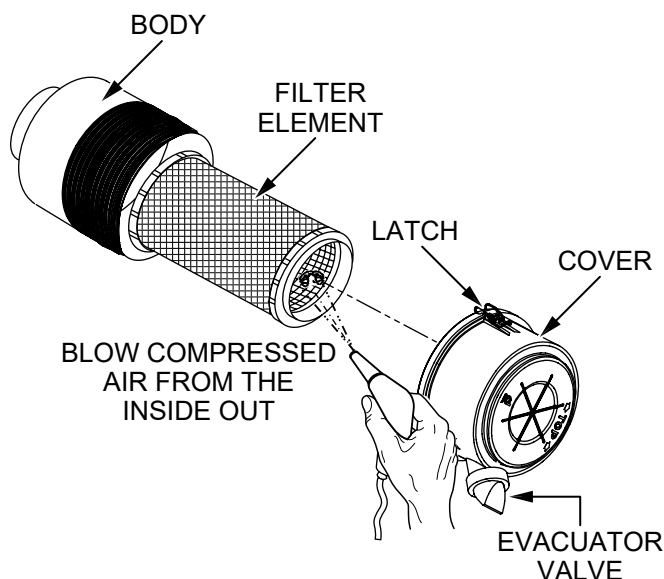


Figure 45. Engine Air Cleaner

Air Cleaner Element

Every 6 months or 50 hours: Remove the air cleaner element and clean it as directed below.

CAUTION



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

NOTICE

The air cleaner element is a dry-type filter. **NEVER** apply oil to it.

1. Release the latches (Figure 45) that secure the air cleaner cover to the air cleaner body.
2. Remove the air cleaner cover (Figure 45) and set it aside.
3. Remove the filter element (Figure 45).
4. To clean the filter element (paper air filter) as shown in Figure 45, blow compressed air, not to exceed 30 psi (205 kPa, 2.1 kgf/cm²), through the filter element from the inside out.
5. Replace the filter element if it is damaged or excessively dirty.
6. Use a cloth to clean the inside of the air cleaner body (Figure 45).
7. Reinstall the air filter element into the air cleaner body.
8. Reinstall the air cleaner cover and secure it with the latches. Make sure the latches are tight.

NOTICE

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

NOTICE

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

ENGINE FUEL FILTER

Clean the engine fuel filter once a year or every 100 hours of operation.

Replace the fuel filter element after the first month or 50 hours of operation, then every two years or 200 hours of operation thereafter.

Inspect all fuel lines every 50 hours of operation. Replace fuel lines and clamps every 2 years of operation, or whenever they become worn or damaged. Always air bleed the fuel system after replacement of fuel lines.

Cleaning The Fuel Filter

1. Place the **fuel cock lever** (Figure 46) in the **OFF** (closed) position.

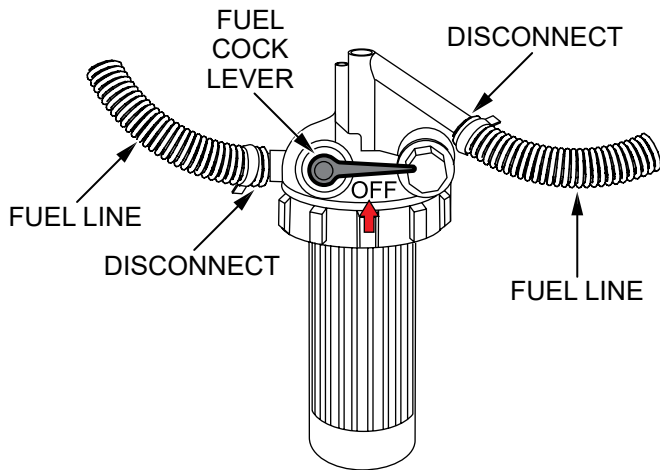


Figure 46. Fuel Cock Lever (OFF)

2. Disconnect the **fuel lines** (Figure 46) from the fuel filter.
3. Unscrew the **filter bowl** (Figure 47) from the **filter head**.

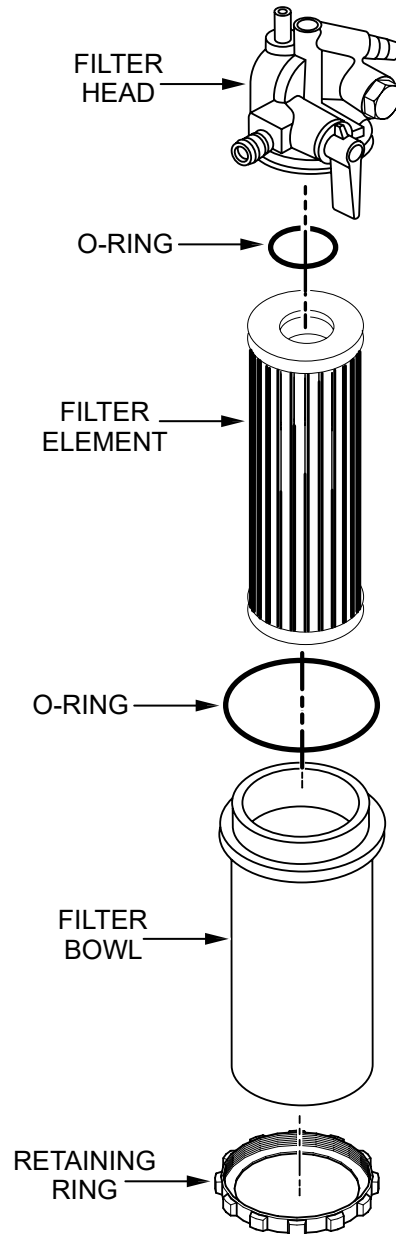


Figure 47. Fuel Filter Disassembly

4. Rinse the inside of the **filter head** and the **filter bowl** (Figure 47) with diesel fuel.
5. Remove the **filter element** (Figure 47) and rinse it with diesel fuel.
6. Reinstall the **filter bowl** and **filter element** back onto the **filter head**. Tighten the retaining ring by hand.
7. Reconnect the fuel lines to the fuel filter.
8. Air bleed the fuel system. Refer to **Air Bleeding the Fuel System** in the Kubota engine owner's manual.

Fuel Filter Element Replacement

1. Unscrew the **filter bowl** from the **filter head** (Figure 47).
2. Remove the **filter element** (Figure 47) and replace it with a new one.
3. Replace the larger (filter bowl) **O-ring** (Figure 47) and coat it with a small amount of clean 15W-40 engine oil.
4. Insert the new filter element into the filter bowl.
5. Reinstall the filter bowl onto the filter head surface. Tighten by hand only.
6. Air bleed the fuel system. Refer to **Air Bleeding the Fuel System** in the Kubota engine owner's manual.

REMOVING WATER FROM THE FUEL TANK

After prolonged use, water and other impurities accumulate in the bottom of the fuel 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.

If water contamination is present within the fuel tank, remove the **fuel tank drain bolt and O-ring** (Figure 48), then allow the fuel to drain into a suitable container. When finished, reinstall the fuel tank drain bolt and O-ring.

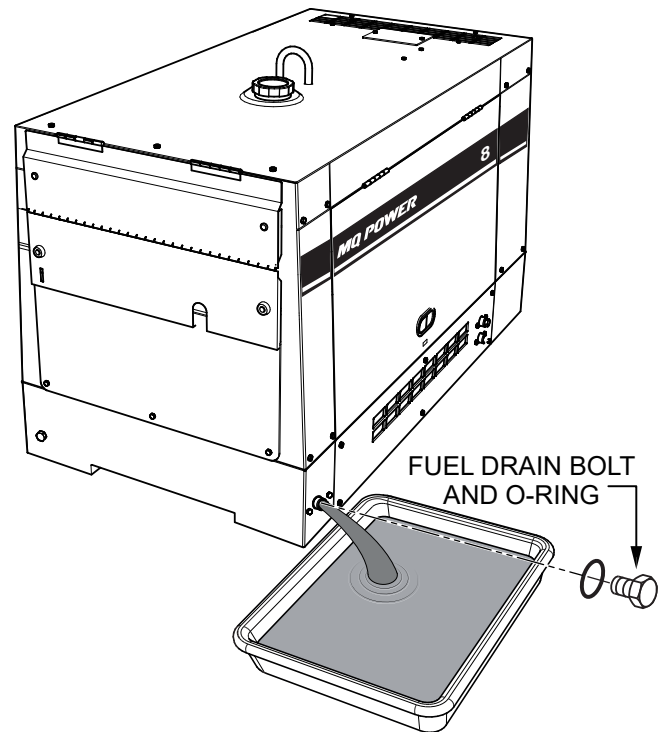


Figure 48. Draining The Fuel Tank

CLEANING INSIDE THE FUEL TANK

If necessary, drain the fuel inside the fuel tank completely. Using a **spray washer** (Figure 49), wash out any deposits or debris that have accumulated inside the fuel tank.

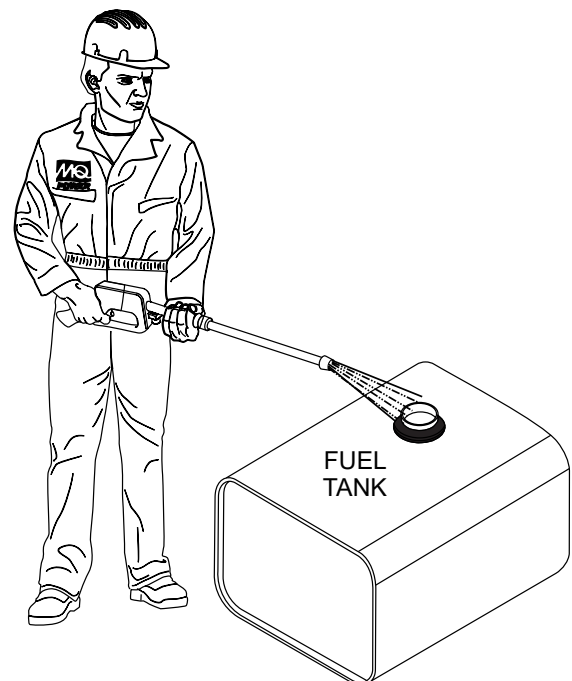


Figure 49. Cleaning The Fuel Tank

FUEL TANK INSPECTION

In addition to cleaning the fuel tank, inspect the following components for wear:

- **Fuel Hoses** — Inspect nylon and rubber hoses for signs of wear, deterioration, or hardening.
- **Fuel Tank Lining** — Inspect the fuel tank lining for signs of excessive amounts of oil or other foreign matter.

ENGINE OIL

Change the engine oil after the first month or 50 hours of operation, then every year or 100 hours of operation thereafter. Replace the oil filter cartridge every 2 years or 200 hours of operation.

Draining The Engine Oil

NOTICE

ALWAYS drain the engine oil while the oil is **warm**.

1. Remove the **oil drain bolt** and **O-ring** (Figure 50) and allow the oil to drain into a suitable container.

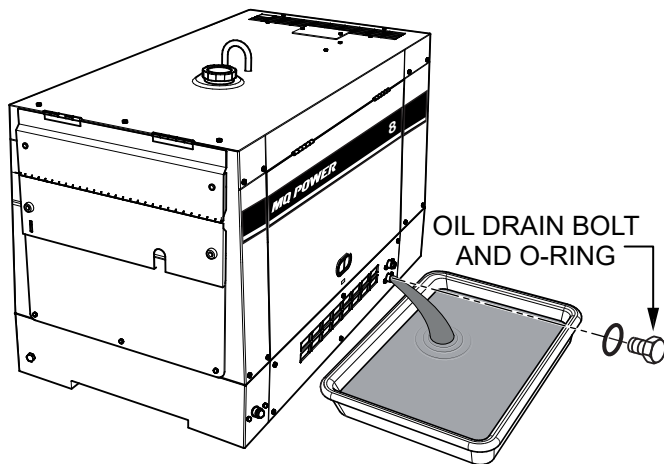


Figure 50. Draining Engine Oil

2. After the oil has completely drained, reinstall the **oil drain bolt** and **O-ring**.

Engine Oil Filter Replacement

1. Clean the area around the oil filter head.
2. Using an **oil filter wrench** (Figure 51), remove the **engine oil filter**.

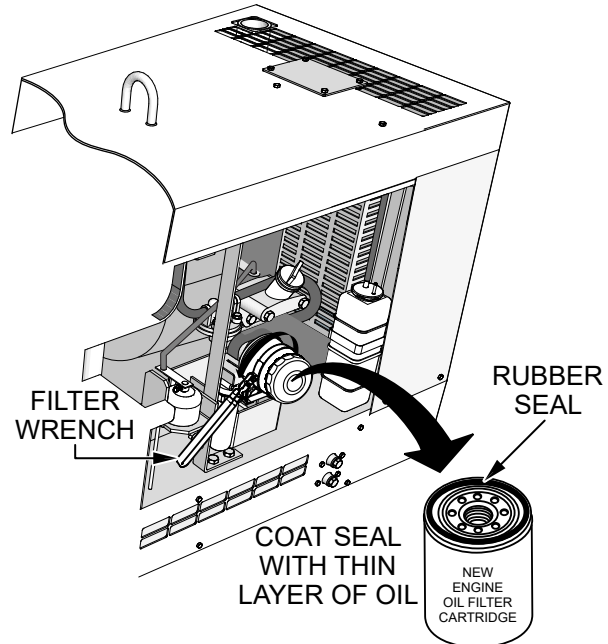


Figure 51. Oil Filter Replacement

3. Coat the **rubber seal (gasket)** surface of the new oil filter with clean 15W-40 engine oil (Figure 51).
4. Install the new oil filter first by hand until it makes contact with the filter head surface. Tighten it another 3/4 turn using a filter wrench.
5. Add engine oil as specified in Table 10. Fill to the upper limit of the dipstick. **DO NOT** overfill. Engine oil capacity is 2.64 quarts (2.5 liters).
6. Run the engine for several minutes. Watch for oil leakage. Shut the engine down and allow it to sit for several minutes. Top off the oil to the upper limit on the dipstick.


ENGINE COOLANT

Check the coolant level in the reserve tank daily. Change the engine coolant every 2 years or 200 hours of operation.

Draining The Engine Coolant

! WARNING

DO NOT remove the pressure cap from the radiator when the engine is hot! Wait until the coolant temperature is below 120°F (50°C) before removing the pressure cap. Heated coolant spray or steam can cause severe scalding and personal injury.



1. Remove the **radiator pressure cap** (Figure 52) only when the coolant temperature is below 120°F (50°C).

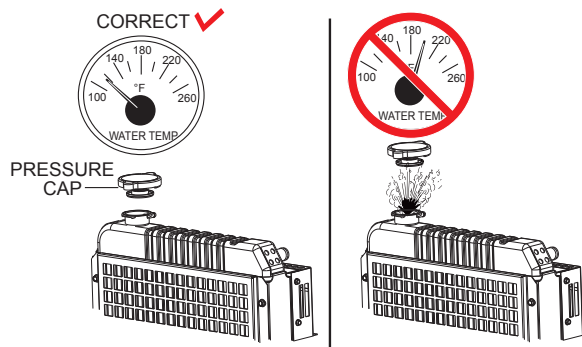


Figure 52. Radiator Pressure Cap Removal

2. Remove the **coolant drain bolt and O-ring** (Figure 53) and allow the coolant to drain into a suitable container.

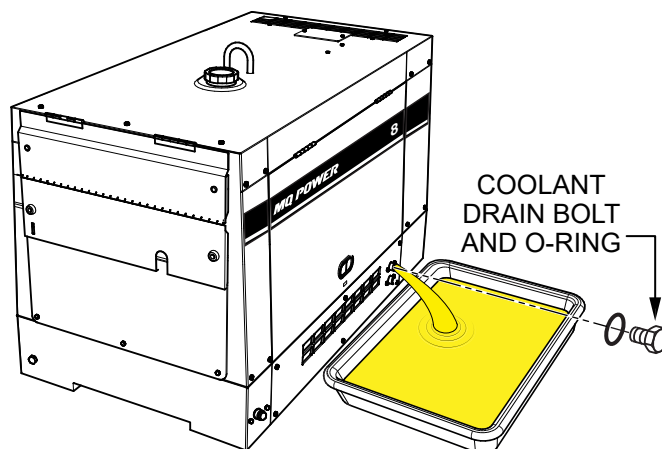


Figure 53. Draining Engine Coolant

3. Remove and drain the **coolant reserve tank** (Figure 21).

4. Flush out the radiator by running clean tap water through it until all signs of rust and dirt are removed. **DO NOT** clean the radiator core with any objects, such as a screwdriver.
5. Inspect radiator hoses for softening or kinks. Inspect hose clamps for signs of leakage. Replace hoses and clamps if necessary.
6. Reinstall the coolant reserve tank.
7. Reinstall the coolant drain bolt and O-ring.
8. Reinstall the radiator pressure cap and tighten it securely.

RADIATOR CLEANING

The **radiator** (Figure 54) should be spray-cleaned with a high-pressure washer when excessive amounts of dirt and debris have accumulated on the cooling fins or tube. When using a high-pressure washer, stand at least 5 feet (1.5 meters) away from the radiator to prevent damage to the fins and tube.

NOTICE

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



Figure 54. Radiator Cleaning

DRIVE BELT

Drive Belt Tension

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

Drive Belt Inspection

Inspect the **drive belt** (Figure 55) for damage and wear. Horizontal cracks (across the belt) are acceptable. Vertical cracks (direction of belt ribs) that intersect with horizontal cracks are not acceptable.

Also, examine the belt and determine if it is **oil soaked** or **glazed** (a hard shiny appearance on the sides of the belt). Either of these two conditions can cause the belt to run hot, which can weaken it and increase the danger of it breaking.

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

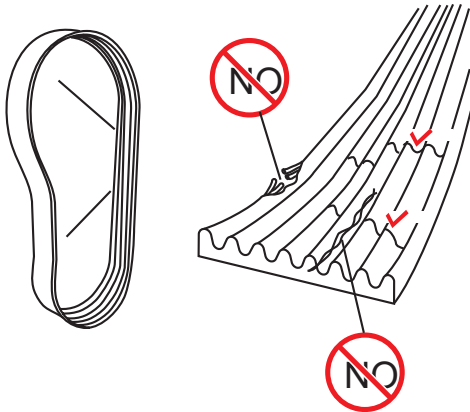


Figure 55. Drive Belt Inspection

TESTING THE GFCI RECEPTACLE

NOTICE

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

1. Start the generator as shown in the start-up procedure in this manual.
2. Place the **GFCI circuit breaker** (Figure 56) in the **ON** position.

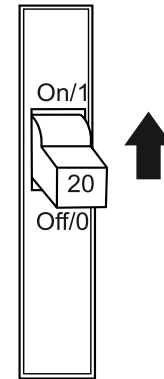


Figure 56. GFCI Circuit Breaker

3. Verify that the **status LED** on the **GFCI receptacle** (Figure 57) is **ON (GREEN)**.

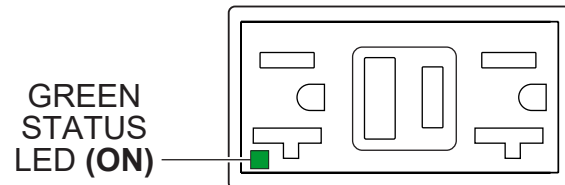


Figure 57. GFCI Receptacle (ON)

4. Press the **TEST** button (Figure 58) on the GFCI receptacle and verify that the status LED turns **OFF**.

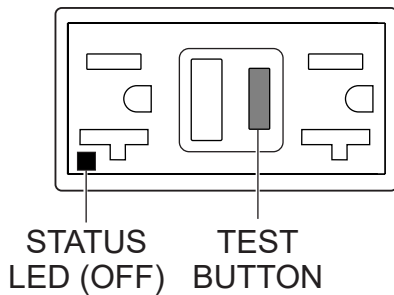


Figure 58. GFCI Receptacle (OFF)

5. Press the **RESET** button (Figure 59) to restore power to the GFCI receptacle and verify that the status LED is **ON (GREEN)**.

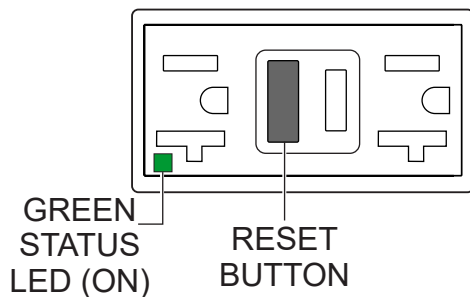


Figure 59. GFCI Receptacle (ON/Restore)

6. If the **status LED** (Figure 60) is **flashing (RED)**, **DO NOT** use the GFCI receptacle. Replace it immediately.

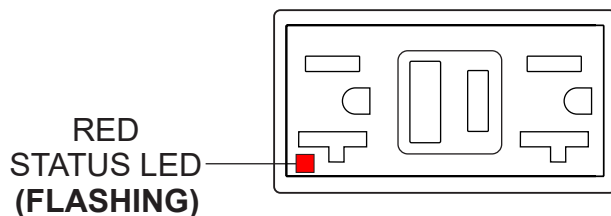


Figure 60. GFCI Receptacle (Red Flashing LED)

GENERATOR STORAGE

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

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

TROUBLESHOOTING

Table 14. Engine/Generator Troubleshooting

SYMPTOM	POSSIBLE PROBLEM	SOLUTION
Engine fails to start and starter does not rotate.	Dead battery?	Replace battery.
	Defective starter switch?	Replace switch.
	Defective starter?	Replace starter.
	Fuse F5 burned out?	Replace fuse.
Engine fails to start but starter rotates.	Broken pre-heat circuit?	Check pre-heat circuit.
	No fuel?	Add fuel.
	Defective wiring?	Check wiring.
Engine starts and engine speed switch is in HIGH position but engine remains at low speed.	Defective engine speed switch?	Replace switch.
	Clogged fuel strainer?	Clean or replace.
	Clogged air cleaner?	Clean or replace.
	Disconnected wiring?	Check and repair wiring.
	Defective solenoid?	Replace solenoid.
	Fuse F2 burned out?	Check solenoid and solenoid circuit and replace fuse.
Engine starts and engine speed switch is in HIGH position. Engine speed rises but no voltage is present at AC power source.	No voltage present at AC power source?	Replace rectifier.
	Defective rotor?	Replace rotor.
	Defective voltmeter?	Replace voltmeter.
	Disconnected wiring?	Check and repair wiring.
	Layer short circuit in armature winding?	Replace armature.
	Defective AVR?	Replace if necessary.
Engine starts and engine speed switch is in HIGH position. Engine speed rises but voltage is too low or cannot be used.	Defective circuit breaker?	Replace circuit breaker.
	Layer short circuit, broken wires in armature winding?	Repair or replace armature.
	Defective AVR?	Replace if necessary.
Engine starts and engine speed switch is in HIGH position. Engine speed rises and battery discharges too soon.	Defective engine regulator?	Replace regulator.
	Defective wiring?	Repair or replace wiring.
Engine starts and engine speed switch is in HIGH position. Engine speed rises and engine seems overloaded.	Defective alternator?	Repair or replace alternator.
	Damaged alternator bearing?	Replace alternator bearings.

TROUBLESHOOTING

Table 14. Engine/Generator Troubleshooting

SYMPTOM	POSSIBLE PROBLEM	SOLUTION
Engine starts and engine speed switch is in HIGH position. Engine speed rises and engine vibrates excessively.	Bad engine installation?	Reinstall engine.
Engine starts and engine speed switch is in HIGH position. Engine speed rises and engine noise is abnormal.	Loose engine parts?	Check all engine parts for tightness.
	Defective alternator?	Check alternator for damaged bearing or loose clamping bolts.
	Defective enclosure?	Check enclosure bolts for tightness.
Engine starts and engine speed switch is in HIGH position. Engine speed rises and remains at high speed when engine speed switch is placed in the LOW position.	Defective engine speed switch?	Replace engine speed switch.
	Defective solenoid?	Replace solenoid.

TROUBLESHOOTING

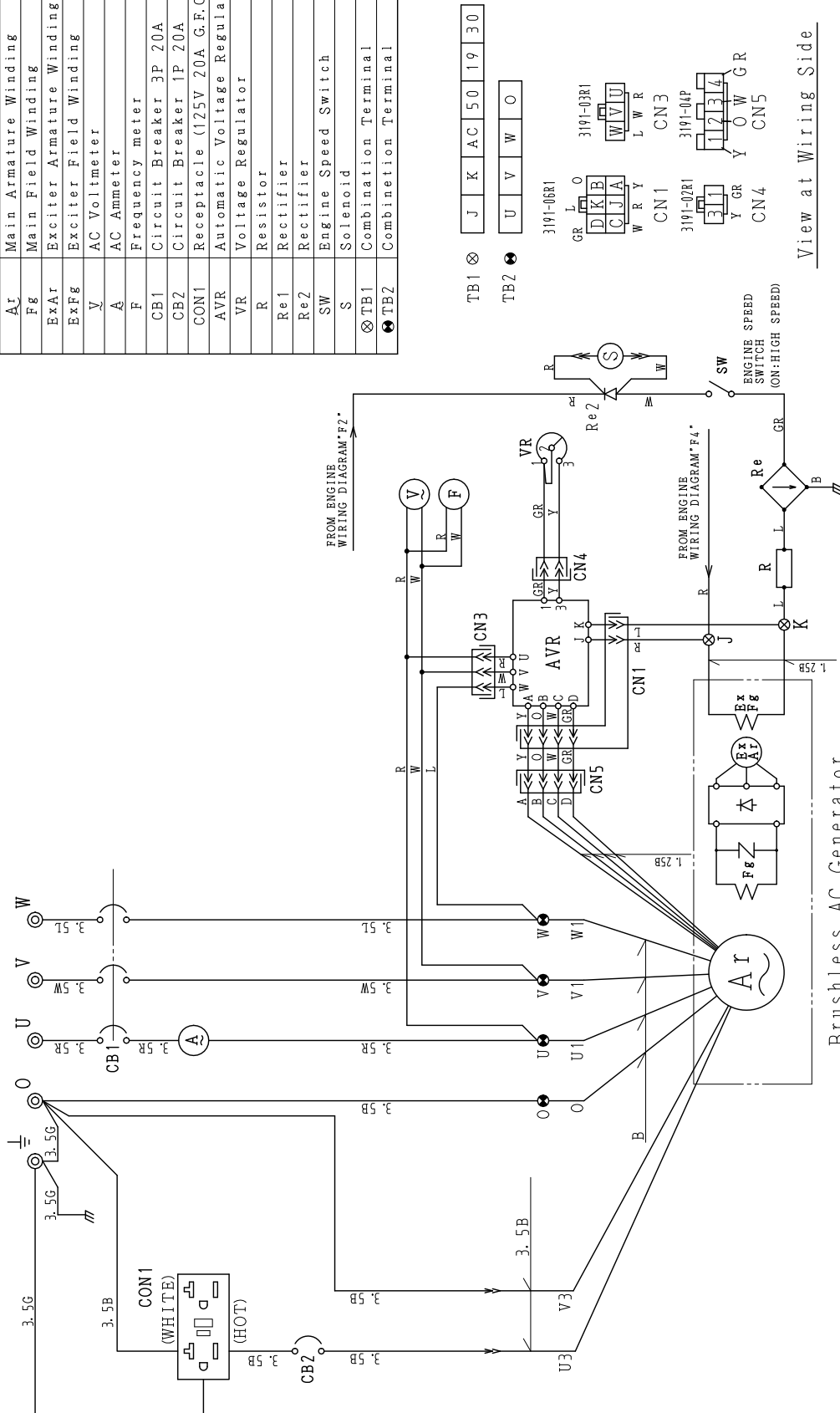
Troubleshooting (Engine)		
Symptom	Possible Problem	Solution
Engine will not start or start is delayed, although engine can be turned over.	No fuel reaching injection pump?	Add fuel. Check entire fuel system.
	Defective fuel pump?	Replace fuel pump.
	Fuel filter clogged?	Replace fuel filter and clean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

TROUBLESHOOTING

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

GENERATOR WIRING DIAGRAM (A6814001003)

SYMBOL	PARTS NAME
A	Main Armature Winding
F_g	Main Field Winding
E_{VAR}	Exciter Armature Winding
E_{XFG}	Exciter Field Winding
V	AC Voltmeter
A	AC Ammeter
F	Frequency meter
$CB1$	Circuit Breaker 3P 20A
$CB2$	Circuit Breaker 1P 20A
$CON1$	Receptacle (125V 20A G.F.C.I.)
AVR	Automatic Voltage Regulator
VR	Voltage Regulator
R	Resistor
$Re1$	Rectifier
$Re2$	Rectifier
SW	Engine Speed Switch
S	Solenoid
$\otimes TB1$	Combination Terminal
$\bullet TB2$	Combination Terminal

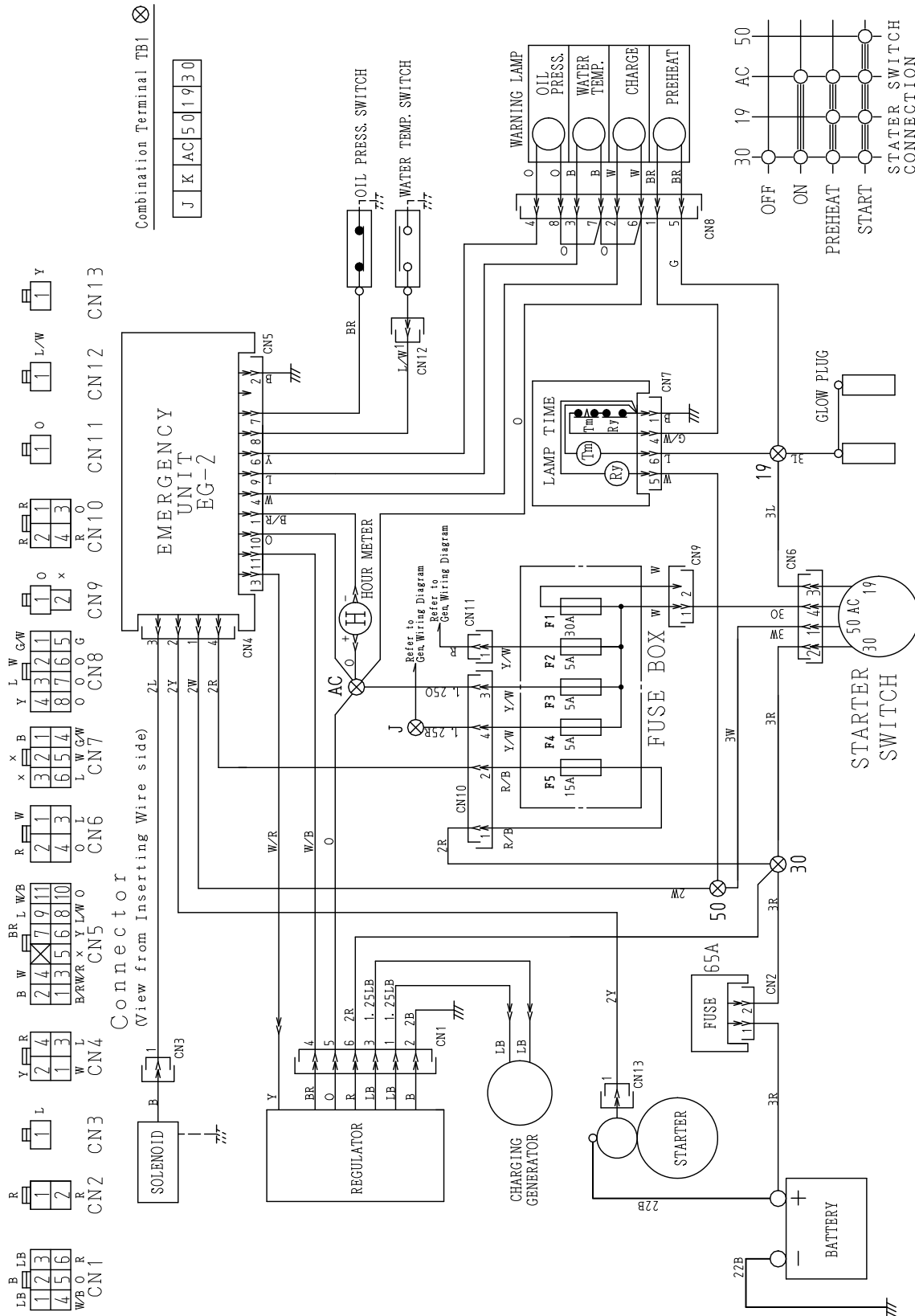


View at Wiring Side

Wire Size	WIRING COLOR CODE			
0. 75: 0. 75mm	SYNCRU	COLOR	SYNCRU	COLOR
2: 2. 0mm	B	BLACK	R	RED
3. 5: 3. 5mm	L	BLUE	W	WHITE
	BR	BROWN	Y	YELLOW
	G	GREEN	LB	LIGHT BLUE
NO MARK: 1. 25mm	GR	GRAY	LG	LIGHT GREEN
	V	VIOLET	O	ORANGE
	P	PINK		

GENERATOR WIRING DIAGRAM NO. A6814001003

ENGINE WIRING DIAGRAM (A6814100903)



ENGINE WIRING DIAGRAM NO. A6814100903

OPERATION MANUAL

HERE'S HOW TO GET HELP

PLEASE HAVE THE MODEL AND SERIAL
NUMBER ON HAND WHEN CALLING

United States

Multiquip Inc.

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

Canada

Multiquip

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

United Kingdom

Multiquip (UK) Limited Head Office

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

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by
DENYO MANUFACTURING CORP.

