OPERATION MANUAL

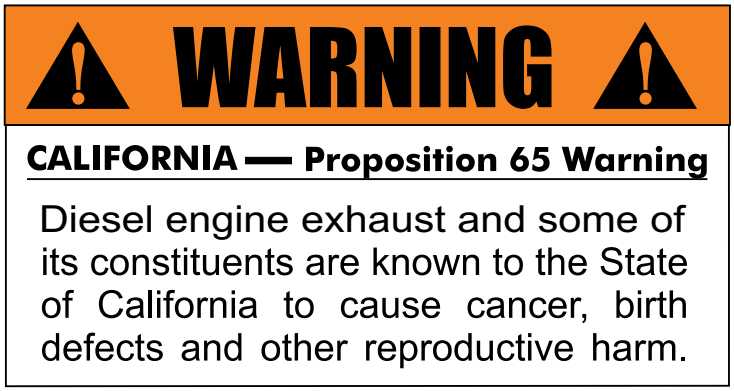
MQ POWER®

WHISPERWATT™ SERIES
MODEL TLG8SSK4F
PORTABLE GENERATOR
(KUBOTA Z482-E4B-DGDE-3 DIESEL ENGINE)

Revision #1 (02/10/17)

To find the latest revision of this publication, visit our website at: www.multiquip.com

THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.


WARNING
CALIFORNIA — Proposition 65 Warning
Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects and other reproductive harm.

TLG8SSK4F Generator

NOTICE

Specifications and part numbers are subject to change without notice.

NAMEPLATE AND SAFETY LABELS

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

NOTICE

For safety label part numbers, reference parts manual.

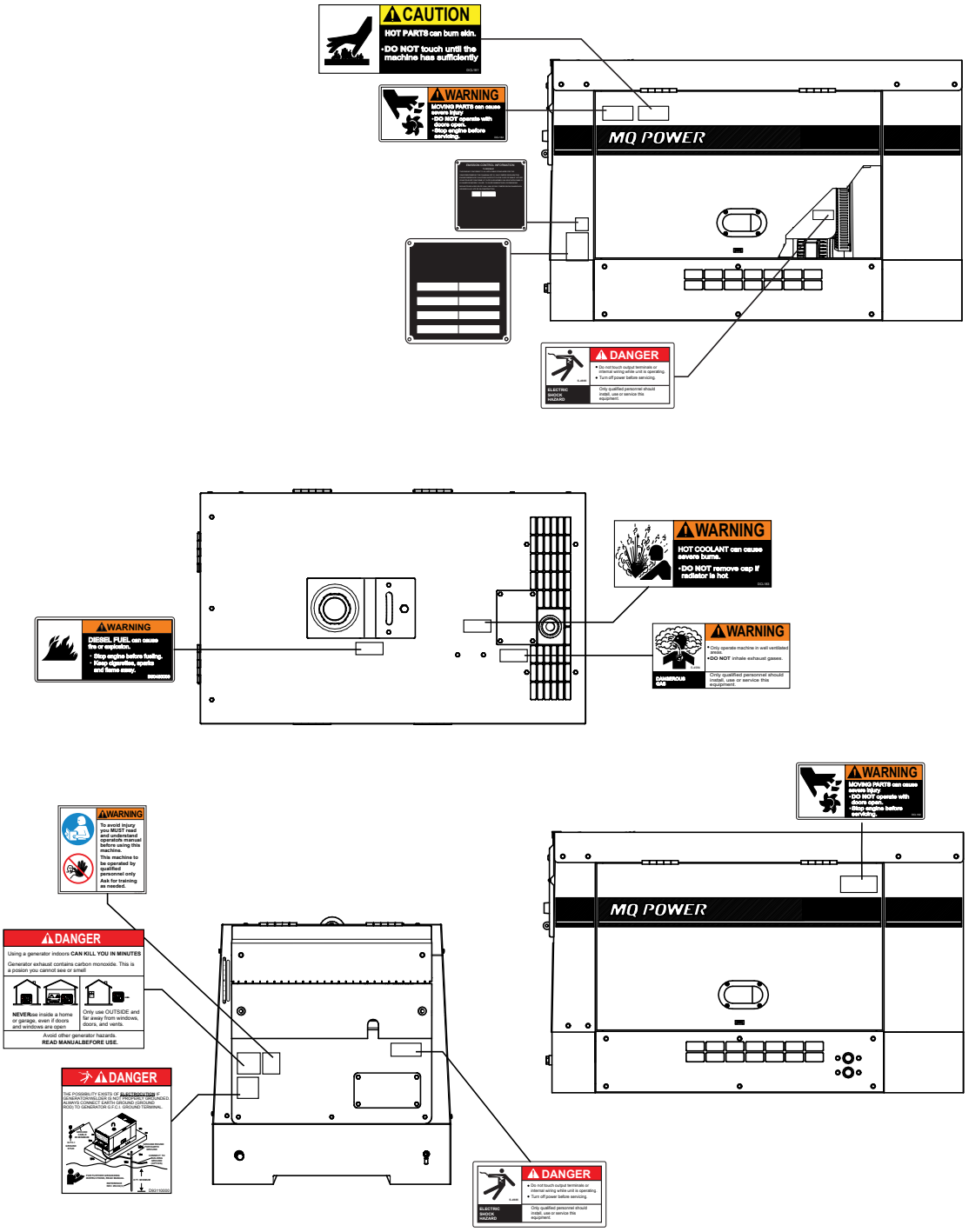


Figure 1. Nameplate and Safety Decals

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

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.

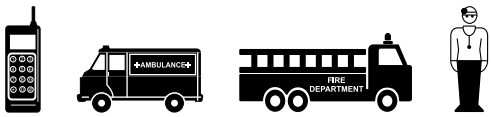
- **ALWAYS** check the equipment for loosened threads or bolts before starting.
- **DO NOT** use the equipment for any purpose other than its intended purposes or applications.

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.

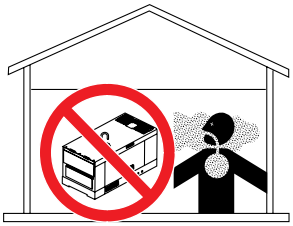
NOTICE

- **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

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** remove the radiator cap while the engine is hot. High pressure boiling water will gush out of the radiator and severely scald any persons in the general area of the generator.

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

⚠ CAUTION

- **NEVER** touch the hot exhaust manifold, muffler or cylinder. Allow these parts to cool before servicing 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 40% of the rated output), it will not operate at its optimum temperature. This will allow unburned fuel to accumulate in the exhaust system, which can foul the fuel injectors, engine valves and exhaust system, including turbochargers, and reduce the operating performance.

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

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

FUEL SAFETY

⚠ DANGER

- **DO NOT** start the engine near spilled fuel or combustible fluids. Diesel fuel is extremely flammable and its vapors can cause an explosion if ignited.
- **ALWAYS** refuel in a well-ventilated area, away from sparks and open flames.
- **ALWAYS** use extreme caution when working with **flammable** liquids.
- **DO NOT** fill the fuel tank while the engine is running or hot.
- **DO NOT** overfill tank, since spilled fuel could ignite if it comes into contact with hot engine parts or sparks from the ignition system.
- Store fuel in appropriate containers, in well-ventilated areas and away from sparks and flames.
- **NEVER** use fuel as a cleaning agent.
- **DO NOT** smoke around or near the 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 to 50 psi cold.*** 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 **tipping** while parked.
- Use the trailer's swivel jack to adjust the trailer height to a level position while parked.

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.

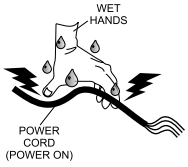
- **NEVER** insert any objects into the output receptacles during operation. This is extremely dangerous. The possibility exists of **electrical shock, electrocution or death.**

- 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.

- 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 trowel 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.

Table 1. Generator Specifications	
Model	TLG8SSK4F
Type	Revolving field, self ventilated type synchronous generator
Armature Connection	Star with Neutral
Speed	3,600 RPM
Cooling System	Self-Ventilation
Standby Output	6.4 kW (8.0 kVA)
Prime Output	6.0 kW (7.5 kVA)
3 -Phase Voltage (L·Ul·N)	208Y/120, 220V/127, 240Y/139
Aux AC Power	Single Phase, 60 Hz
Aux. Voltage/Output	2.4kW
Phase	3-phase
Frequency	60 Hz
Power Factor	0.8
Wet Weight	646 lbs. (293 kg)
Dry Weight	580 lbs. (263 kg)

NOTICE

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

Table 2. Engine Specifications	
Kubota Engine Model	Z482-E4B-DGDE-3
Tier	4
Gen. Enclosure Color	White
Type	Vertical, water-cooled, 4-cycle diesel engine
Bore X Stroke	2.64 in. X 2.68 in. (67 mm x 68 mm.)
Displacement	29.23 cu.-in. (479 cm^3)
Number of Cylinders	2
Max Output	12.5~13.9 H.P./3600 R.P.M.
Fuel	#2 Diesel Fuel
Fuel Capacity	6.9 gal. (26 liters)
Fuel Consumption	0.7 gals. (2.65 liters)/hr.
Coolant Capacity	3.12 quarts (2.95 liters)
Lube Oil Capacity	2.64 quarts (2.5 liters)
Oil Alert System	Yes
Starting Method	Electric Start
Battery	12 Volt @ 35 Ah

Effects of Altitude and Heat

The maximum output of the engines listed above are applicable to supplying electrical power for continuous service at ambient conditions in accordance with SAE Test cord 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 3-1/2% for each 1000 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).

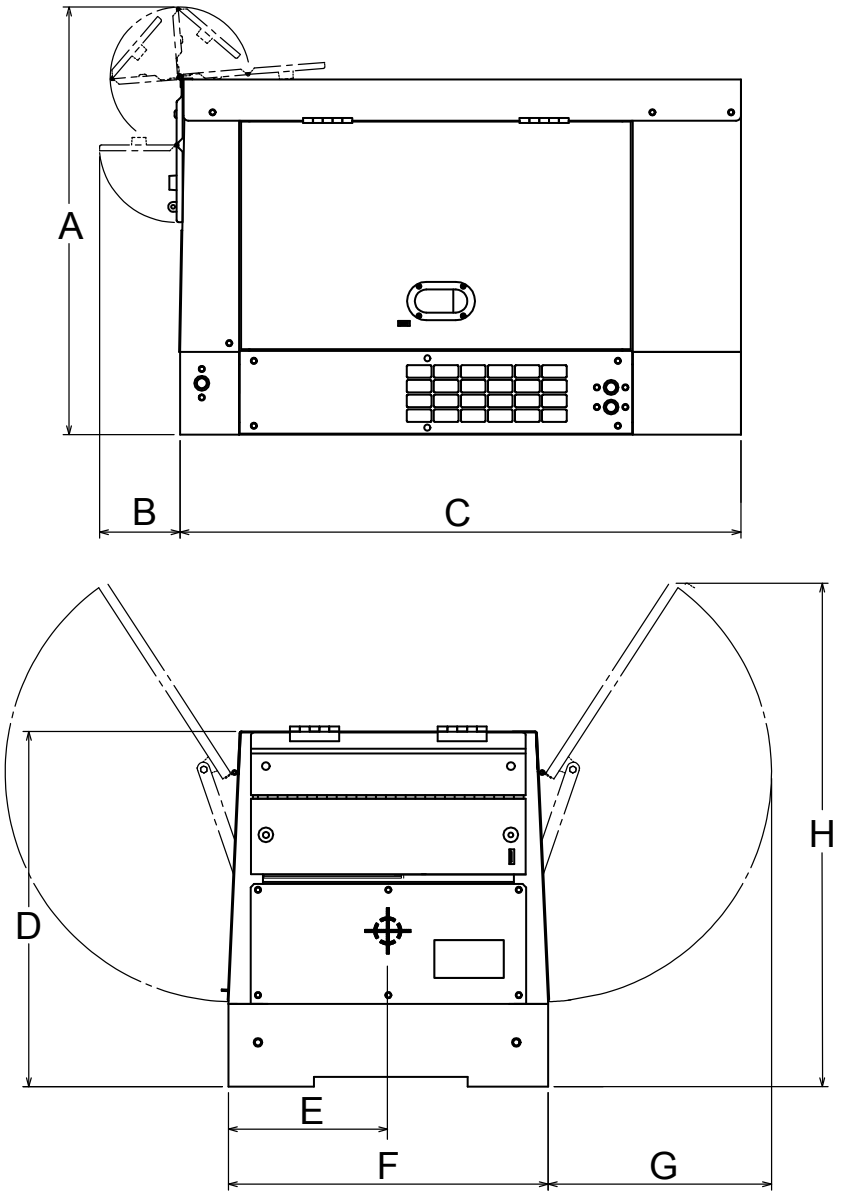


Figure 2. Dimensions

Table 3. Dimensions				
Housing	**A**	**B**	**C**	**D**
	approx. 34.4 in (875 mm)	approx. 6.5 in (165 mm)	43.3 in (1100 mm)	28.3 in (720 mm)
	E	**F**	**G**	**H**
	11.8 in (300 mm)	24.0 in (610 mm)	approx. 17.9 in (460 mm)	approx 38.8 in (985 mm)

CONNECTING THE GROUND

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

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

The nut and ground terminal on the generator should always be used to connect the generator to a suitable ground when required. The ground cable should be #8 size wire minimum.

At the generator, connect the terminal of the ground cable between the lock washer and the nut (Figure 3) and tighten the nut fully. Connect the other end of the ground cable to a suitable earth ground (ground rod).

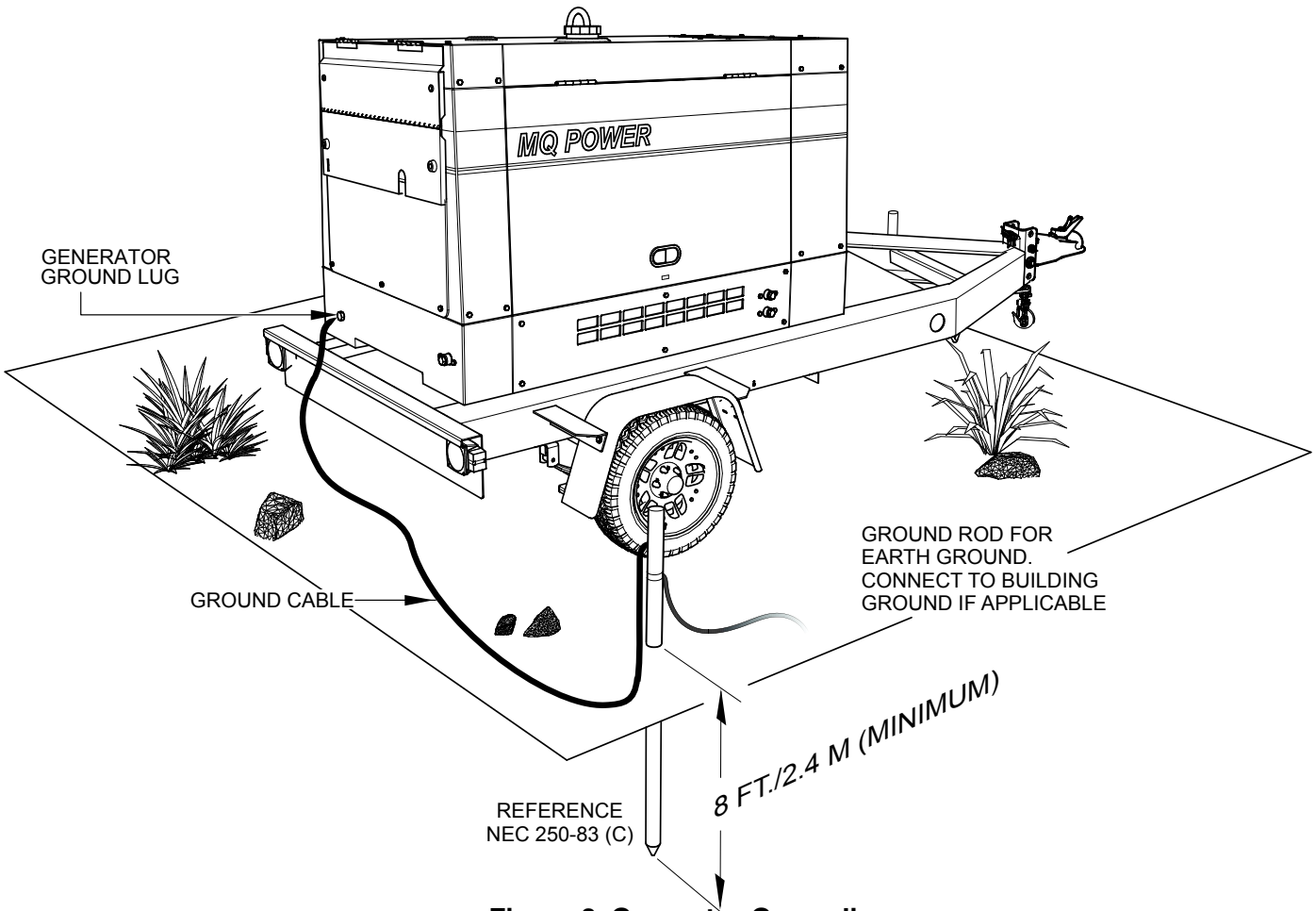


Figure 3. Generator Grounding

OUTDOOR INSTALLATION

If possible, 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.

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 a short circuit and grounding.

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

WARNING

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 gas 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.

PLACEMENT

The generator should always be placed on a flat level surface when it is running. **DO NOT** place the generator on slopes. The possibility exists that the generator could slide.

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^2)
   b. Aluminum - 6 AWG (8.4 mm^2)
2. When grounding the generator (Figure 3), 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 building's electrical system **ALWAYS** consult with a licensed electrician.

DANGER

Before connecting this generator to any building's electrical system, a licensed electrician must install an isolation (transfer) switch.

Serious injury or death may result without this transfer switch.

GENERATOR

The Multiquip TLG8SSK4F is a 6.0 kW (continuous output), 6.4 kW (max output) A.C. generator designed as a portable dual purpose power source for 60 Hz (three phase), 120/240V for lighting facilities, power tools, submersible pumps and other industrial and construction machinery.

CONTROL PANEL

The control box is provided with the following:

- 120 VAC Receptacle (5-20R)
- 3 Phase 4 wire Output Terminals
- AC Ammeter
- Frequency Meter
- AC Voltmeter
- 20 Amp 3 Phase Circuit Breaker
- 20 Amp Circuit Breaker (for 5-20R)
- Engine Speed Switch
- Voltage Regulator
- Starter Switch
- Warning Lamp Unit
- Hour Meter
- Ground Terminal

ENGINE PROTECTION SYSTEM

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

BATTERY CHARGE ALARM

This unit is equipped with a protective shutdown device that signals the emergency relay and automatically stops the engine when loss of charge from the engine alternator occurs. An indicator lamp will be displayed on the control panel.

WATER TEMPERATURE ALARM

This unit is equipped with a temperature switch that signals the emergency relay and automatically stops the engine when the temperature of the engine coolant becomes abnormally high. The coolant temperature switch will not function properly if the machine is operated with less than the proper amount of coolant.

OIL PRESSURE WARNING ALARM

This unit is equipped with an oil pressure switch that detects low oil pressure. If the lubricating oil pressure of this unit should become abnormally low, the oil pressure switch signals the emergency relay to shut down the engine. If this condition should occur, please refer to the engine troubleshooting table in this manual.

EXCITATION SYSTEM

The TLG8SSK4F generator uses a brushless exciter to create rated output electricity. This system will use the mechanical energy generated by the 3600 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 TLG8SSK4F generator is powered by a water-cooled, 4-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 its products, the specifications quoted herein are subject to change without prior notice.

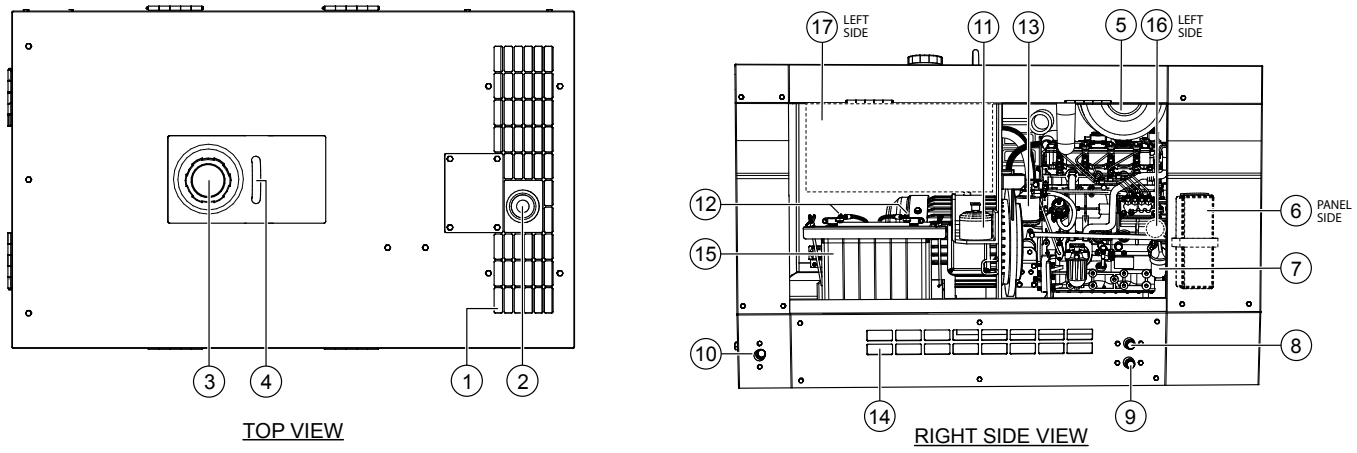


Figure 4. Generator Components (1 of 2)

1. **Air Outlet Vent** — Allows inside hot air to exit. **Never** block this opening.
2. **Air Outlet Exhaust** — Allows engine exhaust to exit the generator into the open air. **NEVER** block this opening.
3. **Fuel Cap** — Remove this cap to add fuel. Add only #2 diesel fuel. Always keep an adequate amount of fuel in the tank. **DO NOT** top off. Wipe up any spilled fuel immediately.
4. **Lifting Hook** — Use this hook to lift the generator.
5. **Engine Air Cleaner** — Prevents dirt and other debris from entering the fuel system. Lift locking latch on air filter canister to gain access to filter element.
6. **Expansion Bottle** — Supplies coolant to the radiator when radiator coolant level is low. Fill to indicated level as shown on expansion bottle.
7. **Engine Oil Filler Port** — Remove this cap to add engine oil. Use only the recommended oil type. See Table 8.
8. **Coolant Drain Plug** — Remove this plug to drain coolant from the radiator.
9. **Oil Drain Plug** — Remove this plug to drain oil from the engine.
10. **Fuel Drain Plug** — Remove this plug to drain fuel from the fuel tank.
11. **Automatic Idle Control Solenoid** — Automatically regulates engine speed depending on load.
12. **Battery Terminals** — Connect these output cables to the terminals on the battery. Always pay close attention to the polarity of the terminals when connecting to the battery, **RED** (positive), and **BLACK** (negative).
13. **Fuel Filter** — Prevents dirt and other debris from entering the fuel system. Change fuel filter as recommended in the maintenance section of this manual.
14. **Air Inlet Vent** — Allows outside air to enter the generator. **NEVER** block this opening.
15. **Battery** — Provides +12 VDC power for the generator. When replacing battery (12V 35 AH), use only recommended type battery.
16. **Oil Filter** — Provides filtering for the engine oil. Change oil filter as recommended in the maintenance section of this manual.
17. **Fuel Tank** — Holds 6.9 gallons (26 liters) of diesel fuel.

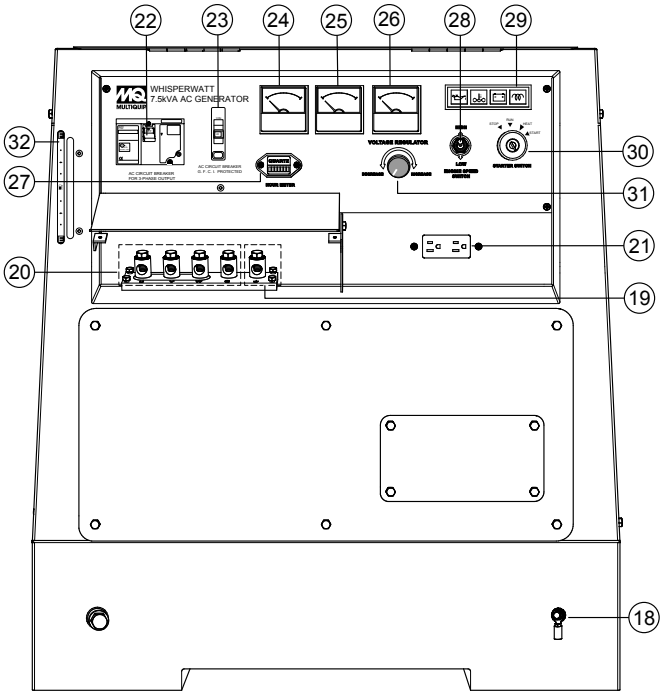


Figure 5. Generator Components (2 of 2)

18. **Frame Ground Lug** — Connect a ground strap between this lug and a ground rod. Make sure that the ground rod is inserted deep into the ground to provide a good earth ground. Consult with local Electrical and Safety Codes for proper connection based on condition of use.
19. **Ground Terminal** — Used to connect external equipment ground so that the GFCI receptacle will have a ground path.
20. **240V 3Phase Output terminals(4Wire)** — It will provide 240V, 60 Hz output at 18 amps.
21. **Duplex Receptacles** — NEMA 5-20R receptacle provides 120V, 60 Hz output at 20 amps.
22. **20 Amp Breaker (3-phase)** — 3-pole, 20 Amp circuit breaker protects the generator from short circuiting or overloading When starting the generator, always have this circuit breaker placed in the "**OFF**" position.
23. **20 Amp Breaker (for 5-20R)** — Single-pole, 20 Amp circuit breaker protects the 120V duplex receptacle. When starting the generator, always have this circuit breaker placed in the "**OFF**" position.
24. **Frequency Meter** — Indicates the output frequency in hertz (Hz), normally 60 Hz.
25. **AC Ammeter** — Indicates the amount of current the load is drawing from the U terminal of the generator.
26. **AC Voltmeter** — This voltmeter indicates the output voltage present at the U and V Output Terminal Lugs.
27. **Hour Meter** — Indicates number of hours the machine has been in use or hours the engine was run.
28. **Engine Speed Switch** — This switch controls the speed of the engine (low/high).
29. **Warning Lamp Display** — Lights red when the following conditions occur:
    - **Oil Pressure Lamp** — If the oil pressure drops suddenly, the oil pressure lamp will go on, and the generator will shut down.
    - **Charge Lamp** — The charge lamp will go on when loss of engine alternator charge exists and the generator will shut down.
    - **Water Temperature Lamp** — The water temperature lamp will go on if the temperature rises to an abnormally high level, and the generator will shut down.
30. **Starter Switch** — With key inserted, turn clockwise to start engine.
31. **Voltage Regulator Control** — Allows ± 15% manual adjustment of the generator's output voltage.
32. **Fuel Gauge** — Indicates the amount of fuel in the fuel tank.

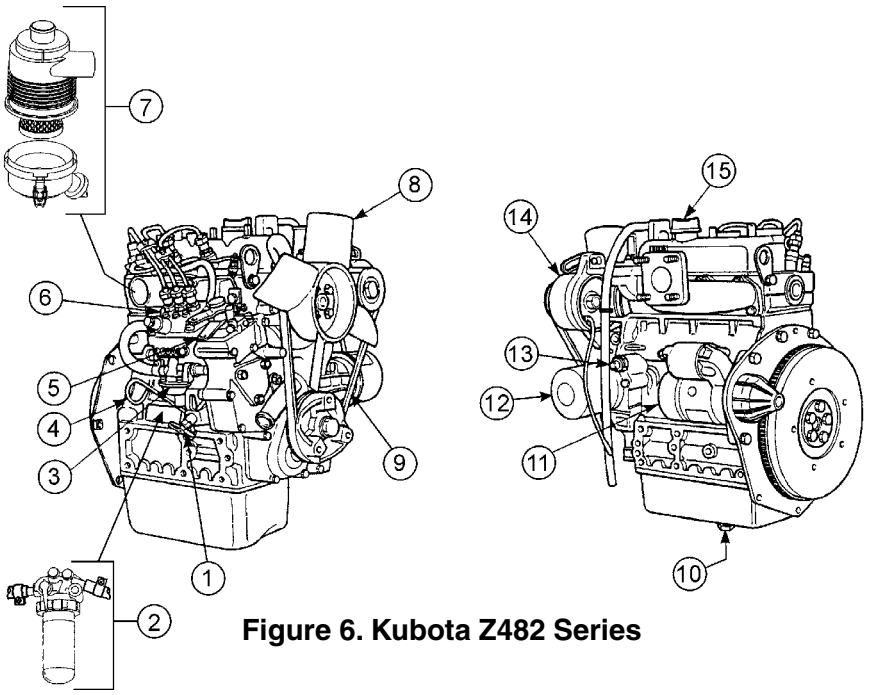


Figure 6. Kubota Z482 Series

INITIAL SERVICING

The engine (Figure 6) must be checked for proper lubrication and filled with fuel prior to operation. Refer to the manufacturer's engine manual for instructions and details of operation and servicing.

1. **Water Drain Cock** — Open this cock to drain water.
2. **Fuel Filter** — Prevents dirt and other debris from entering the fuel system. Replace filter as recommended in the maintenance section of this manual.
3. **Fuel Feed Pump** — Pumps fuel to the injection system.
4. **Oil Dip Stick/Gauge** — Remove to check amount and condition of oil in crankcase. Refill or replace with recommended type oil as listed in Table 8.
5. **Speed Control Lever** — Controls engine speed. This lever is factory set at 3600 rpm to maintain proper voltage and frequency. **DO NOT** adjust this lever out of factory range.
6. **Injector Pump** — Provides fuel under pressure to the injector nozzles.
7. **Air Filter** — Prevents dirt and other debris from entering the air intake system. Loosen clips on side of air filter canister to gain access to filter element. Replace with manufacturer's recommended type air cleaner only.
8. **Cooling Fan Blades** — Make sure cooling fan blades are not bent or broken. A damaged fan blade can cause the engine to run hot and overheat.
9. **Fan V-Belt** — **ALWAYS** make sure V-belt is properly tensioned. A loose or defective V-belt can adversely affect the performance of the generator.
10. **Crankcase** — Remove to drain crankcase oil. Fill with recommended type oil as listed in Table 8. Crankcase holds a maximum of 2.64 quarts (2.5 liters) of motor oil.
11. **Starter** — Starts engine when ignition key is rotated clockwise to the "**ON**" position.
12. **Oil Filter** — Spin-on type, filters oil contaminants. Replace filter as recommended in the maintenance section of this manual.
13. **Oil Pressure Switch** — Monitors engine oil pressure. In the event of low oil pressure engine will shutdown.
14. **Alternator** — Provides power to the +12VDC electrical system. Replace with only manufacturer's recommended type alternator.
15. **Oil Filler Cap** — Fill with recommended type oil as listed in Table 8.

OUTPUT TERMINAL

The output terminal shown in Figure 7 is located on the side (below the control panel) of the generator. Lift up on the cover to gain access to terminal lugs.

NOTICE

Terminal lugs "O" and "Ground" are considered bonded grounds.

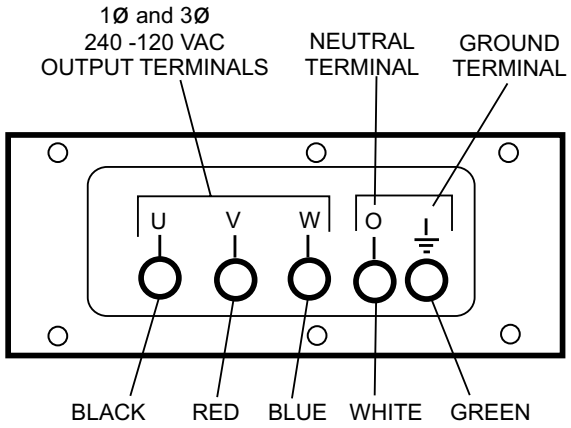


Figure 7. Output Terminal

120 VAC GFCI Receptacle

There is a 120 VAC, 20 amp GFCI (Duplex Nema 5-20R) receptacle below the control panel. The receptacle is protected by a 20 amp circuit breaker. This breaker is located on the control panel. The load output (current) of the GFCI receptacle 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** (Figure 8) in the center of the receptacle will check the GFCI function. Receptacle should be tested at least once a month.

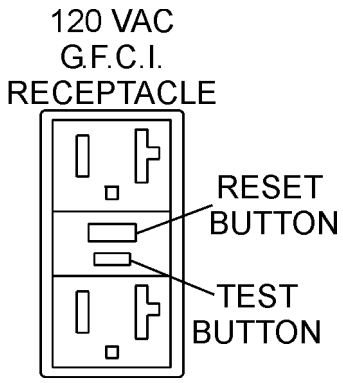


Figure 8. GFCI Receptacle

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

Figure 9. Voltage Regulator Control Knob

Connecting Loads

Loads can be connected to the generator by various methods; output terminal lugs, camlocks, or the convenience receptacles. 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, 18A **main** circuit breaker is provided. Make sure to switch **all** circuit breakers to the **OFF** position prior to starting the engine.

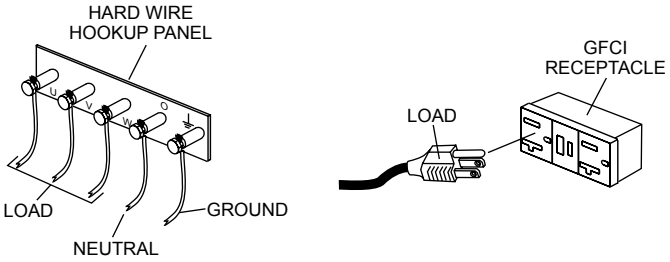


Figure 10. Connecting Loads

SINGLE PHASE LOAD

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

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

NOTICE

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

WATTS = VOLTAGE x AMPERAGE

The power factor of this generators is 0.8. See Table 4 below when connecting loads.

Table 4. 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 5. Cable Selection

Current In Amperes	Load In Watts		Maximum Allowable Cable Length			
	120 Volts	240 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.						

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 generators and point of use (load) is held to a minimum***. Use the cable selection chart (Table 5) as a guide for selecting proper cable size.

THREE PHASE LOAD

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

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

NOTICE

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

NOTICE

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

An inadequate size connecting cable which cannot carry the required load can cause a voltage drop which can burn out the appliance or tool and overheat the cable. See Table 5.

- 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 generator'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/OUTPUT TERMINAL CONNECTIONS

GENERATOR OUTPUT VOLTAGES

A wide range of voltages are available to supply voltage for many different applications. To obtain some of the voltages listed in Table 6 will require a fine adjustment using the **voltage regulator** (VR) **control knob** located on the control panel.

Table 6. Voltages Available			
UVWO Output Terminal Lugs	UVWO Terminal Output Voltages		
3Ø **Line-Line**	208V	220V	240V
1Ø **Line-Neutral**	120V	127V	139V

GFCI Receptacle Load Capability

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

Table 7 shows 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 7. 3Ø Generator Maximum Amps	
KVA in Use (UVWO Terminals)	**Available Load Current (Amps)**
3Ø 240V	GFCI Duplex 5-20R 120V
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

UVWO TERMINAL OUTPUT VOLTAGES

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

The voltage regulator (VR) allows the user to increase or decrease the selected voltage.

3Ø-240V UVWO Terminal Output Voltages

1. Connect the load wires to the UVWO terminals as shown in Figure 11.

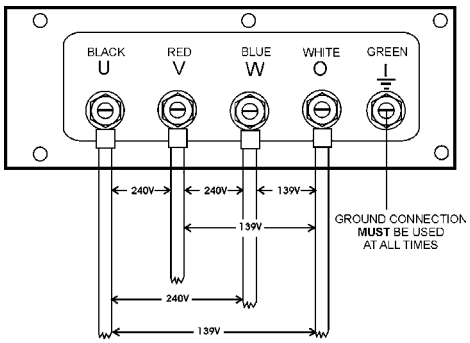


Figure 11. UVWO Terminal Lugs 3Ø-240V/1Ø-139V Connections

2. Turn the voltage regulator knob (Figure 12) 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 12. Voltage Regulator Knob

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

1. Connect the load wires to the UVWO terminals as shown in Figure 13.

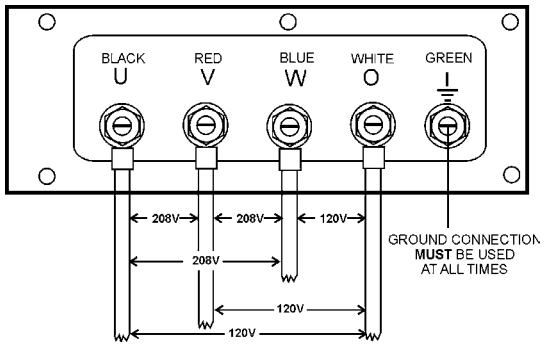


Figure 13. UVWO Terminal Lugs 3Ø-208/1Ø-120V Connections Connections

NOTICE

To achieve a 3Ø-208V output, the voltage regulator must be adjusted to 208V.

Before Starting

1. Read safety infromation at the beginning of manual.
2. Clean the generator, removing dirt and dust, particularly the engine cooling air inlet. Caution must be taken to ensure generator is 100% dry before use.
3. Check the air filter for dirt and dust. If air filter is dirty, replace air filter 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 dipstick from its holder (Figure 14) and wipe clean.

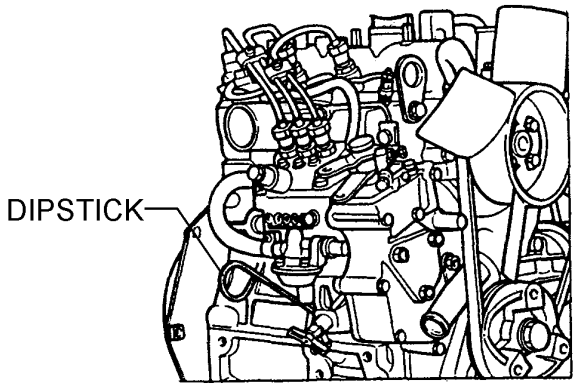


Figure 14. Engine Oil Dipstick Removal

3. Reinsert dipstick (Figure 15), then remove dipstick from its holder. Check the oil level shown on the dipstick.

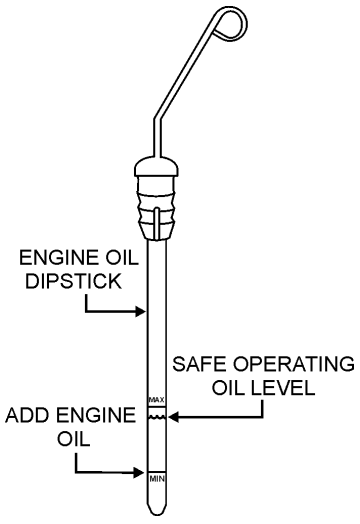


Figure 15. Engine Oil Dipstick

4. If the oil level is low, remove the oil filler cap (Figure 16) and fill to a safe operating level (max) as indicated by the dipstick. Fill with recommended type oil as listed in Table 8. Maximum oil capacity is 2.64 quarts (2.5 liters).

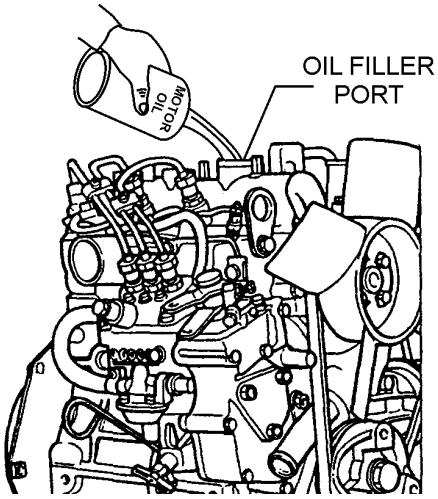


Figure 16. Engine Oil Filler Port

Table 8. 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

NOTICE

When adding engine oil, **do not** overfill.

Fuel Check

Fill the fuel tank with #2 diesel fuel. **DO NOT** fill the tank beyond capacity.

Pay attention to the fuel tank capacity when replenishing fuel. Refer to the fuel tank capacity listed in Table 2.

The fuel tank cap must be closed tightly after filling. Handle fuel in a safe container. If the container does not have a spout, use a funnel.

1. Read the fuel gauge located on the left side of the generator (Figure 17) to determine if the fuel level is low.

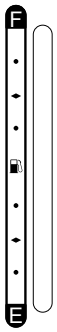


Figure 17. Fuel Gauge

2. If fuel is low, remove the fuel cap (Figure 18) located on top of the generator and replenish with clean #2 diesel fuel.

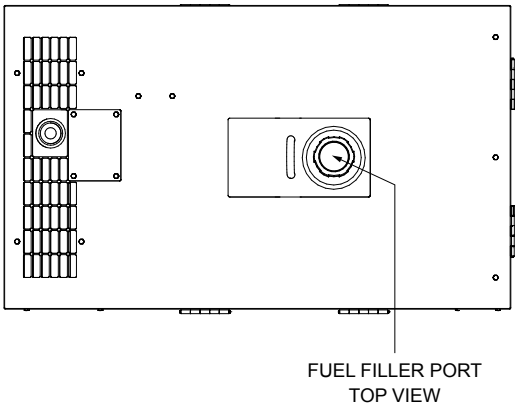


Figure 18. Adding Fuel

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 if 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 (Antifreeze)

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

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 9 for engine, radiator, and recovery tank coolant capacities. Make sure the coolant level in the recovery tank is always between the "**H**" and the "**L**" markings.

Table 9. Coolant Capacity

Engine and Radiator	.78 gal (2.95 liters)
Reserve Tank (Full)	.23 gal (.87 liters)

Operation Freezing Weather

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

Table 10. Anti-Freeze Operating Temperatures

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

NOTICE

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

CLEANING THE RADIATOR

The engine may overheat if the radiator fins become overloaded with dust or debris. Periodically clean the radiator fins with compressed air. Cleaning inside the 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 KUBOTA 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 Kubota Engine Owner's Manual.

The fan belt tension is proper if the fan belt bends 10 to 15 mm (Figure 19) when depressed with the thumb as shown below.

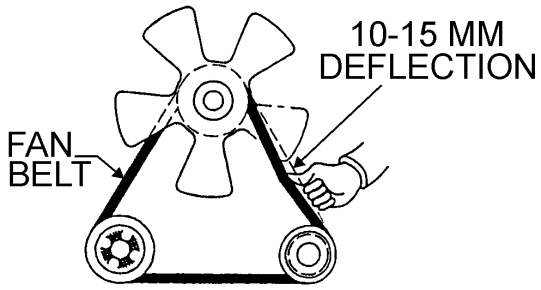


Figure 19. Fan Belt Tension

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

DO NOT over fill. Check to see if the battery cables are loose. Poor contact may result in poor starting or malfunction. **Always** keep the terminals firmly tightened. Coat 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 falls to 1.245 or lower, the battery 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 20) 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**.

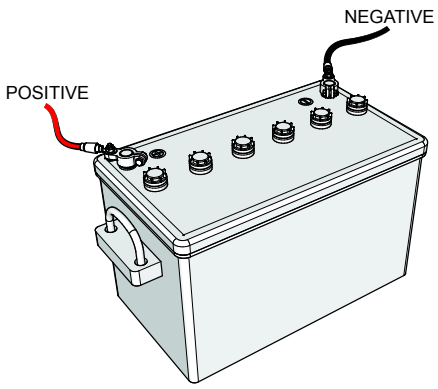


Figure 20. Battery Connections

When connecting battery, do the following:

1. **NEVER** connect the battery cables to the battery terminals when the **Ignition Switch** is in the **START** position. **ALWAYS** make sure that the **Ignition 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 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.

Before Starting the Engine

⚠ CAUTION

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

NOTICE

Never start the engine with the 3-phase and 1-phase circuit breakers in the **ON** (closed) position.

1. Open the cabinet door and turn the fuel cock lever (Figure 21) to the "ON" position.

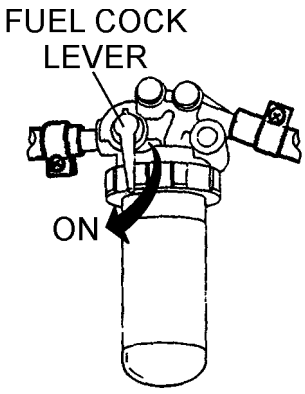


Figure 21. Fuel Cock Lever (ON)

2. **NEVER** operate the generator with the doors ***open*** (Figure 22). Operation with the doors open may cause insufficient cooling of the unit, and engine damage may result. Close the doors for normal operation.

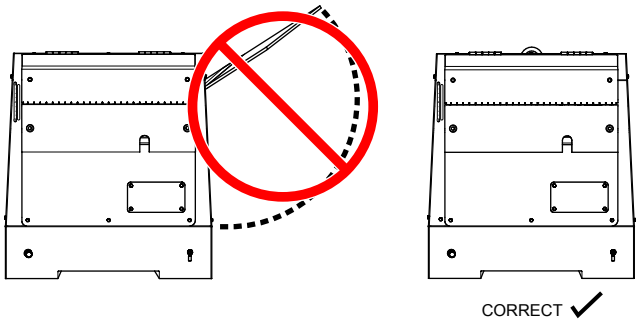


Figure 22. Generator Doors

3. **NEVER** start the engine with the 3-phase and 1-phase circuit breakers in the **ON** position. Always place circuit breakers (Figure 23) in the **OFF** position before starting.

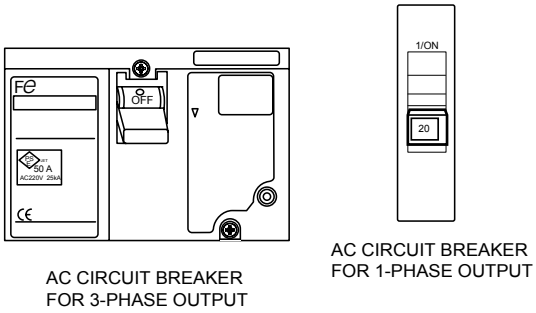


Figure 23. 3-Phase and 1-Phase Circuit Breaker (OFF)

4. Connect the load to the receptacle or the output terminal lugs as shown in Figure 10. These load connection points can be found on the output terminal panel and the hard wire hookup panel.

5. Tighten terminal nuts securely to prevent load wires from slipping out.

STARTING THE ENGINE

1. Insert the key into the starter switch (Figure 24) and turn it to the **RUN** position. Check to see that the oil pressure and charge lights on the "Warning Lamp Unit Display" are lit. If either light is not lit, check the system and wiring (refer to the Engine Operation Manual).

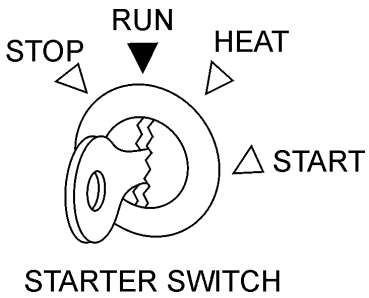


Figure 24. Starter Switch

2. Turn the ignition key to the **HEAT** position. When the preheat light goes off, turn the key to the **START** position to start the engine. As soon as the engine starts, release the key. The key will automatically return to the **RUN** position.

3. In cold weather conditions, it may be required to extend the duration of the **HEAT** position for proper starting.

4. If the engine does not start within 10 seconds after the key is turned to the **START** position, wait for about 30 seconds and repeat the procedure as described in steps 1-3.
5. When the engine starts, the oil pressure light and charge light should go out. If these lights stay on, immediately stop the engine and check the system and wiring (refer to the Engine Operation Manual).
6. Let the engine idle for five minutes with the ***Engine Speed Switch*** (Figure 25) placed in the **LOW** position.

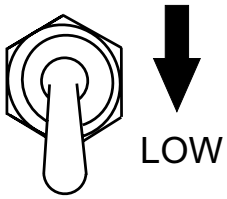


Figure 25. Engine Speed Switch (LOW)

Output Voltage Verification

1. Place ***Engine Speed Switch*** circuit breaker (Figure 26) in the **HIGH** position.

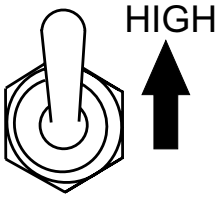


Figure 26. Engine Speed Switch (HIGH)

2. The generator's frequency meter (Figure 27) should be displaying the 60 cycle output frequency in **HERTZ**.

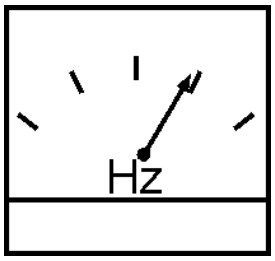


Figure 27. Frequency Meter

3. The generator's AC voltmeter (Figure 28) will display the generator's output in **VOLTS**.

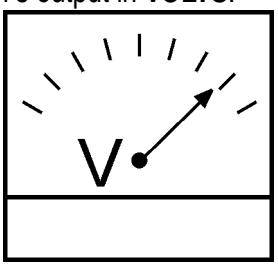


Figure 28. Voltmeter

4. Use the voltage adjustment control knob to increase or decrease voltage (Figure 29).

Figure 29. Voltage Adjust Control Knob

5. The ammeter (Figure 30) 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.

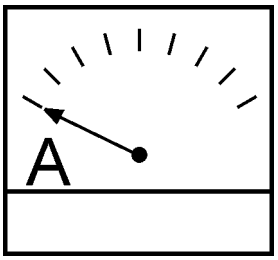


Figure 30. Ammeter (No Load)

6. Place 3-phase and 1-phase circuit breakers (Figure 31) in the **ON** position.

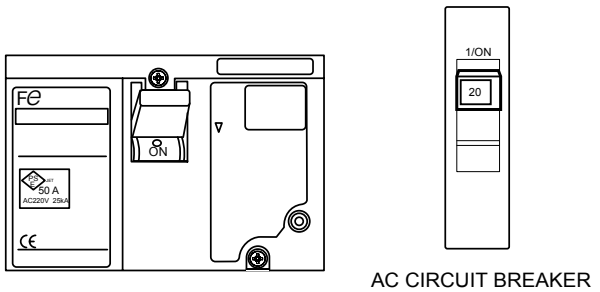


Figure 31. 3-Phase and 1-Phase Circuit Breakers (ON)

7. Observe the generator's ammeter (Figure 32) 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.

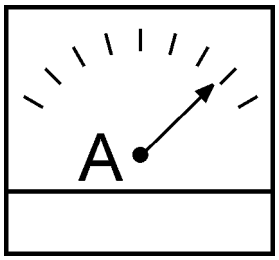


Figure 32. Ammeter (Load)

Stopping the Engine (Normal Shutdown)

1. Place the 3-phase and 1-phase circuit breakers (Figure 23) in the **OFF** position before starting.
2. Place the ***Engine Speed Switch*** (Figure 33) in the **LOW** position.

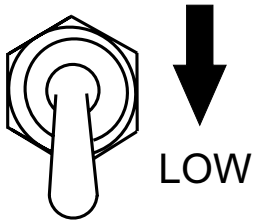


Figure 33. Engine Speed Switch (LOW)

3. Let engine run at idle with no load for 3-5 minutes.
4. Place the starter switch key (Figure 34) in the **STOP** position and remove the key. Place fuel cock lever in the **OFF** position.

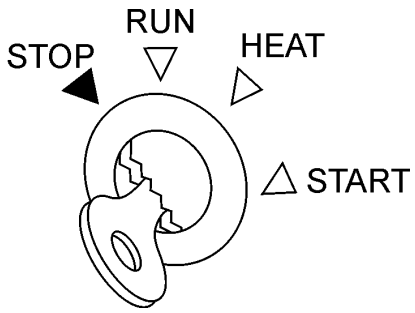


Figure 34. Starter Switch (Stop Position)

5. Remove all load connections from the generator.

Emergency Shutdown

1. Place starter switch key in **STOP** position. Remove key. Place fuel cock lever in the **OFF** position.

GENERATOR STORAGE

For storage of the generator for over 30 days, the following is required:

- Run the engine until all the fuel is completely consumed.
- Drain the fuel tank completely, or add STA-BIL to the fuel.
- Completely drain the oil from the crankcase and refill with fresh oil.
- Disconnect the ***negative battery cable*** from the battery.
- Clean all external parts of the generator with a cloth.
- 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.
- Cover the generator and store in a clean, dry place.

Use Table 11 as a general maintenance guideline when servicing your engine. For more detail engine maintenance information, refer to the engine owner's manual supplied with your engine.

Table 11. Engine Maintenance Schedule

DESCRIPTION (3)	OPERATION	DAILY	FIRST MONTH OR 50 HRS.	EVERY 3 MONTHS OR 25 HRS.	EVERY 6 MONTHS OR 50 HRS.	EVERY YEAR OR 100 HRS.	EVERY 2 YEARS OR 200 HRS.	EVERY 8 YEARS OR 800 HRS.
Engine Oil	CHECK	X						
	CHANGE		X			X		
Oil Filter Cartridge	CHANGE						X	
Air Cleaner Element	CHECK	X						
	CLEAN				X (1)			
All Nuts & Bolts	RETIGHTEN IF NECESSARY	X						
Cooling Fins	CHECK				X			
Fuel Tank	CLEAN						X	
Fuel Filter	CLEAN					X		
Fuel Filter Element	CHANGE		X				X	
Fuel lines	CHANGE	Every 2 years, replace if necessary (2)						
Battery	CHANGE						X	
Radiator Hoses/ Clamps	CHANGE	Every 2 years, replace if necessary (2)						
Radiator Coolant	CHANGE						X	
Idle Speed	CHECK-ADJUST					X (2)		
Valve Clearance	CHECK-ADJUST							X (2)

(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.

Maintenance

Perform the scheduled maintenance procedures as defined by Table 11 and below:

Engine Oil

Every 100 hours: Change engine oil after the first 50 hours of operation and 100 hours thereafter. Always check the crankcase oil level prior to each use, or when the fuel tank is filled. Insufficient oil may cause severe engine damage. Make sure generator is level when checking oil level. The oil level must be between the two notches on the dipstick as shown in Figure 15.

1. Remove engine oil drain plug located at the bottom of the generator enclosure (Figure 35) and drain oil from crankcase. For best results drain oil while engine is warm. Reinstall oil drain plug, and add engine oil as specified in Table 8. Crankcase oil capacity is 2.64 qts. (2.5 liters).

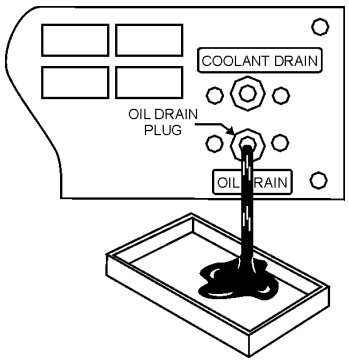


Figure 35. Engine Oil Drain Plug

Oil Filter Cartridge

Every 200 hours: Replace the engine oil filter cartridge after every 200 hours of operation.

1. Clean oil filter mounting base, and coat oil filter seal (Figure 36) with clean engine oil.

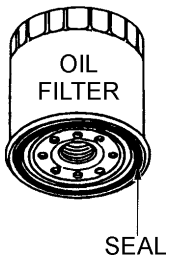


Figure 36. Oil Filter Cartridge

2. Screw on new oil filter by hand until seal contacts the filter mounting base. Install drain bolt with sealing washer and hand tighten.

> ***NOTICE***
>
> When installing the oil filter, coat rubber seal with a small amount of lubricant (motor oil). **DO NOT** over-tighten cartridge. Hand tighten only.

3. Replace engine oil with recommended type oil as listed in Table 8. For engine oil capacity, see Table 2 (engine specifications). Fill to upper limit as shown in Figure 15.

Engine Air Filter

Every 50 hours: Replace air filter on the KUBOTA Z482 engine. This is a dry type filter. **NEVER** apply oil to it. If generator is used in severe dusty areas service air cleaner element more frequently.

1. Release the air cleaner retaining clamps (Figure 37) and remove the air cleaner element.

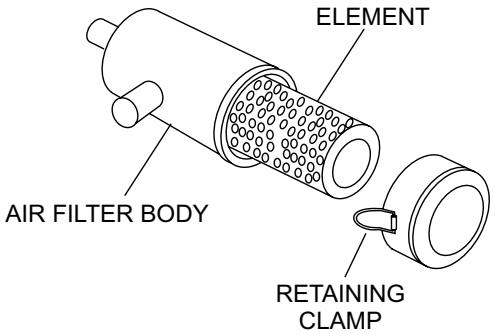


Figure 37. Air Cleaner

2. Wipe the inside of the air cleaner with a clamp cloth and remove all dust and debris that may have accumulated inside air cleaner body.

3. Tap the paper filter element (Figure 37) several times on a hard surface to remove dirt, or blow compressed air [not exceeding 99 psi (686 kPa, 2.1 kgf/cm2)] through the filter element from the inside while turning the element. **NEVER** brush off dirt. Brushing will force dirt into the fibers.

4. Replace the filter element once a year or every six cleanings or if it is excessively dirty.

Cleaning the Fuel Filter

Every 100 hours: Clean fuel filter every 100 hours of operation or once a month to remove dust or water.

1. Place fuel cock lever (Figure 38) in the close position.
2. Disconnect fuel lines from fuel filter.

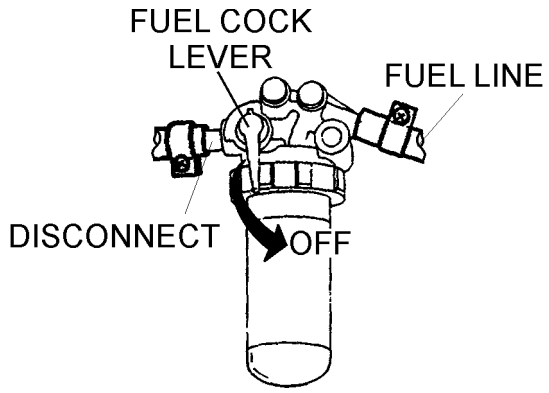


Figure 38. Fuel Cock Lever (OFF)

Replacing Fuel Filter Element

Every 200 hours: Replace fuel filter element.

1. Remove the top cap (Figure 39) from the fuel filter and rinse cap and filter bowl with diesel fuel.
2. Remove element, and rise with diesel fuel.
3. Reinstall fuel filter and connect fuel lines.

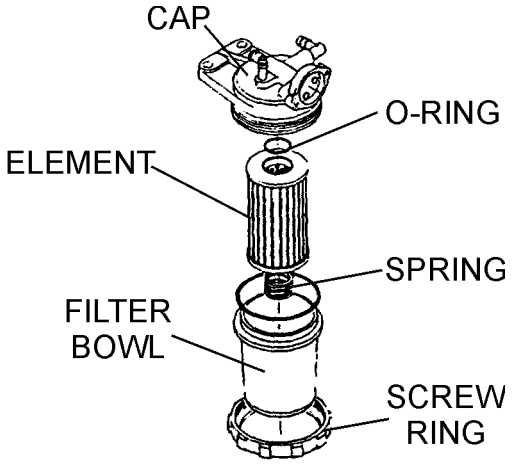


Figure 39. Fuel Filter Disassembly

4. Inspect all fuel lines every 50 hours.

Radiator

Check Daily: Always check the level of the coolant in the radiator before starting the engine. Remove the radiator cap and verify that the coolant reaches top of radiator coils.

1. **DO NOT** remove the radiator cap while the coolant is hot. The possibility exists of severe burns or scalding from the coolant gushing out. Let the coolant cool before removing radiator cap.
2. Check coolant in the reserve tank daily (Figure 40). Make sure the level is between the FULL (**H**) and LOW (**L**) markings. Fill reserve tank with a mixture of 50/50 antifreeze/water.

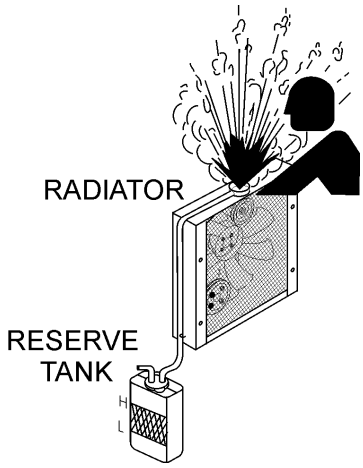


Figure 40. Radiator/Reserve Tank

Flushing Out Radiator and Replacing Coolant

1. Remove radiator coolant plug (Figure 41) located at the bottom of the generator enclosure and drain radiator coolant. Open the radiator cap while draining. Remove the overflow tank and drain.

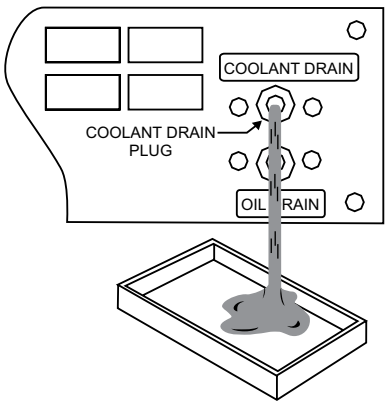


Figure 41. Coolant Drain Plug

2. 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.
3. Check hoses for softening and kinks. Check clamps for signs of leakage; replace as needed.
4. Tighten coolant drain plug and reinstall the overflow tank.
5. Fill with coolant as recommended by the engine manufacturer.
6. Close radiator cap tightly.

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 42) 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.

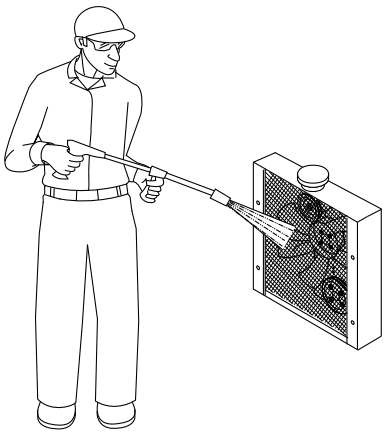
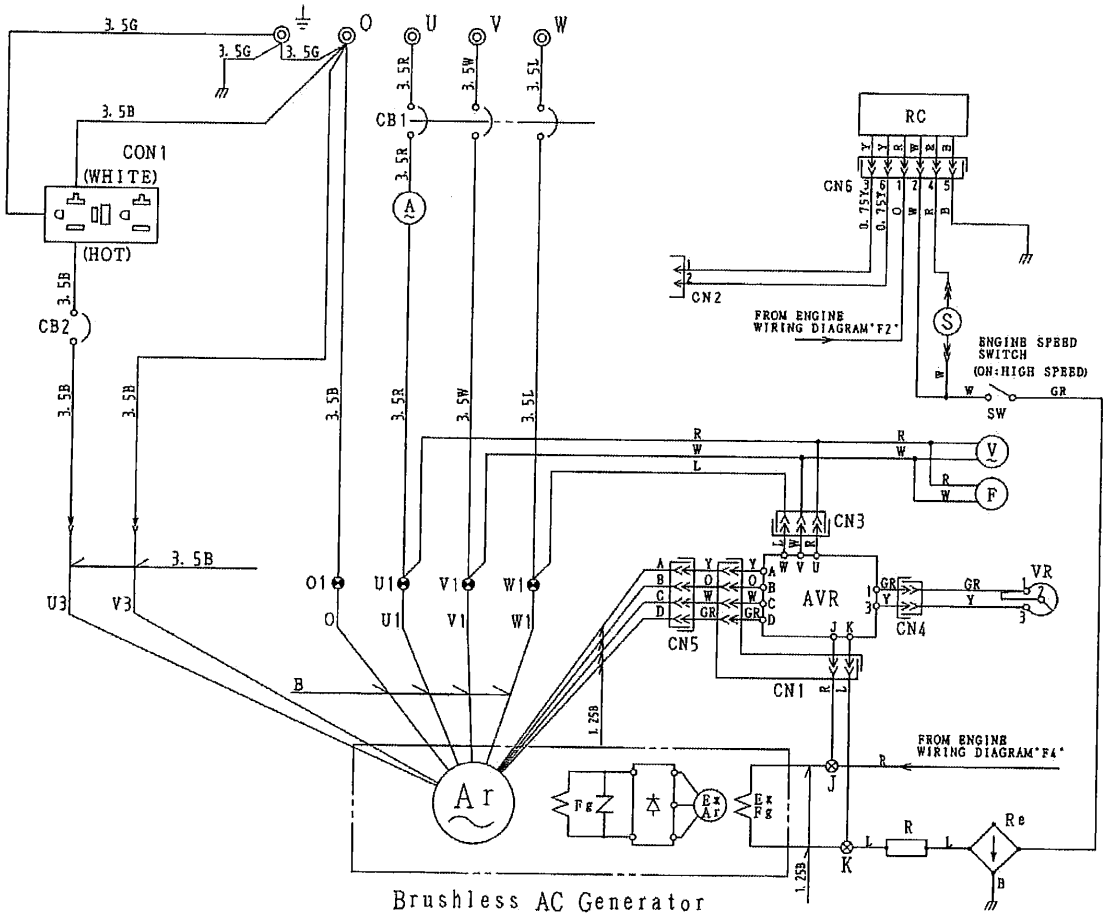
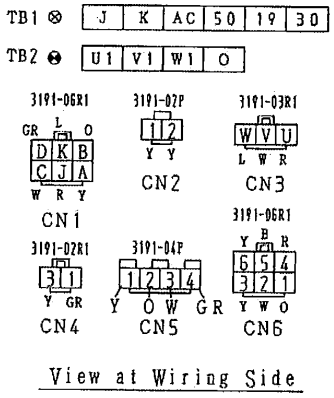


Figure 42. Radiator Cleaning



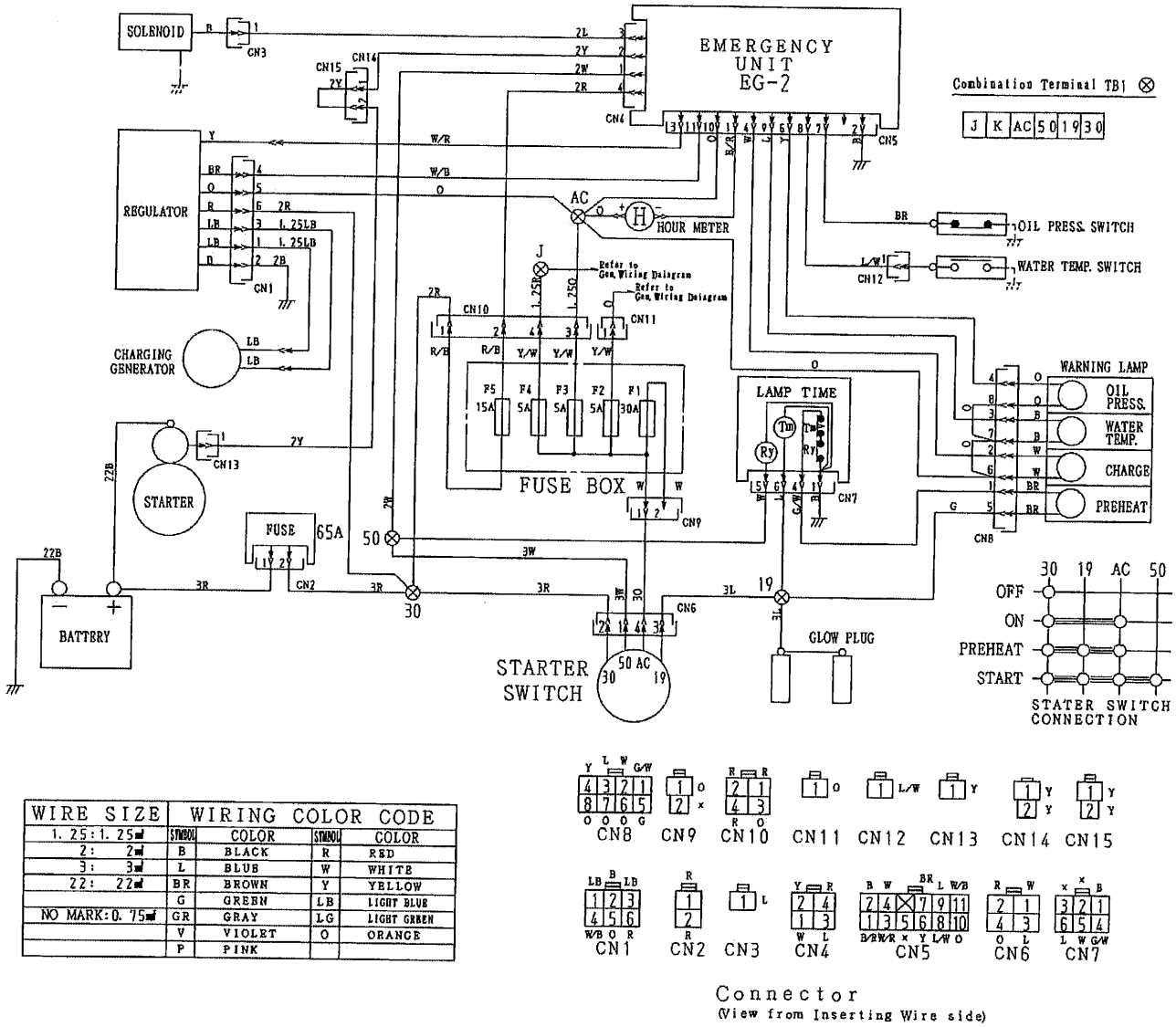
Brushless AC Generator

SYMBOL	PARTS NAME
Ar	Main Armature Winding
Fg	Main Field Winding
ExAr	Exciter Armature Winding
ExFg	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
Re	Rectifier
SW	Engine Speed Switch
RC	Idle Control Device
S	Solenoid
⊗TB1	Combination Terminal
⊜TB2	Combinetion Terminal



Wire Size	WIRING COLOR CODE			
0.75:0.75㎟	SYMBOL	COLOR	SYMBOL	COLOR
2: 2.0㎟	B	BLACK	R	RED
3.5: 3.5㎟	L	BLUE	W	WHITE
	BR	BROWN	Y	YELLOW
	G	GREEN	LB	LIGHT BLUE
NO MARK: 1.25㎟	GR	GRAY	LG	LIGHT GREEN
	V	VIOLET	O	ORANGE
	P	PINK		

Figure 43. Generator Wiring Diagram (TLG8SSK4F SERIES)



WIRE SIZE	WIRING COLOR CODE			
1.25:1.25㎟	SYMBOL	COLOR	SYMBOL	COLOR
2: 2㎟	B	BLACK	R	RED
3: 3㎟	L	BLUE	W	WHITE
22: 22㎟	BR	BROWN	Y	YELLOW
	G	GREEN	LB	LIGHT BLUE
NO MARK:0.75㎟	GR	GRAY	LG	LIGHT GREEN
	V	VIOLET	O	ORANGE
	P	PINK		

Figure 44. Engine Wiring Diagram

Table 12. Engine and 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 and starter rotates.	Broken Pre-Heat Circuit?	Check Pre-Heat Circuit.
	No Fuel?	Add Fuel.
	Defective Wiring?	Check Wiring.
Engine starts. "Engine Speed Switch" is in HIGH position and 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 and no voltage is present in AC power source.	No Voltage Present in AC Power source?	Replace Rectifier (RE).
	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 and voltage is too low or cannot be used	Defective Circuit Breaker (Protector)?	Replace Circuit Breaker (Protector).
	Layer Short-Circuit, Broken Wires In Armature Winding?	Repair or Replace Armature.
	Defective AVR?	Replace If Necessary.

Table 12. Engine and Generator Troubleshooting		
SYMPTOM	**POSSIBLE PROBLEM**	**SOLUTION**
Engine starts. "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 Rotor.
Engine starts and "Engine Speed Switch" is in HIGH position. Engine speed rises and engine has large vibrations overload.	Bad Engine Installation?	Repeat Installation of Engine. .
Engine starts and "Engine Speed Switch" is in HIGH position. Engine speed rises and engine has abnormal noise.	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.

Table 13. Engine Troubleshooting		
SYMPTOM	**POSSIBLE PROBLEM**	**SOLUTION**
Engine does not start.	No fuel?	Replenish fuel.
	Air in the fuel system?	Bleed system.
	Water in the fuel system?	Remove water from fuel tank.
	Fuel pipe clogged?	Clean fuel pipe.
	Fuel filter clogged?	Clean or change fuel filter.
	Excessively high viscosity of fuel or engine oil at low temperature?	Use the specified fuel or engine oil.
	Fuel with low cetane number?	Use the specified fuel.
	Fuel leak due to loose injection pipe retaining nut?	Tighten nut.
	Incorrect injection timing?	Adjust.
	Fuel cam shaft worn?	Replace.
	Injection nozzle clogged?	Clean injection nozzle.
	Injection pump malfunctioning?	Repair or replace.
	Seizure of crankshaft, camshaft, piston, cylinder liner or bearing?	Repair or replace.
	Compression leak from cylinder?	Replace head gasket, tighten cylinder head bolt, glow plug and nozzle holder.
	Improper valve timing?	Correct or replace timing gear.
	Piston ring and liner worn?	Replace.
	Excessive valve clearance?	Adjust.
Starter does not run.	Battery discharged?	Charge battery.
	Starter malfunctioning?	Repair or replace.
	Key switch malfunctioning?	Repair or replace.
	Wiring disconnected?	Connect wiring.

Table 13. Engine Troubleshooting (Continued)		
SYMPTOM	**POSSIBLE PROBLEM**	**SOLUTION**
Engine revolution is not smooth.	Fuel filter clogged or dirty?	Clean or change.
	Air cleaner clogged?	Clean or change.
	Fuel leak due to loose injection pipe retaining nut?	Tighten nut.
	Injection pump malfunctioning?	Repair or replace.
	Incorrect nozzle opening pressure?	Adjust.
	Injection nozzle stuck or clogged?	Repair or replace.
	Fuel over flow pipe clogged?	Clean.
	Governor malfunctioning?	Repair.
Either white or blue exhaust gas is observed.	Excessive engine oil?	Reduce to the specified level.
	Piston ring and liner worn or stuck?	Repair or replace.
	Incorrect injection timing?	Adjust.
	Deficient compression?	Adjust top clearance.
Either black or dark gray exhaust gas is observed.	Overload?	Lessen the load.
	Low grade fuel used?	Use the specified fuel.
	Fuel filter clogged?	Clean or change.
	Air cleaner clogged?	Clean or change.
	Deficient nozzle injection?	Repair or replace the nozzle.
Deficient output.	Incorrect injection timing?	Adjust.
	Engine's moving parts seem to be seizing?	Repair or replace.
	Uneven fuel injection?	Repair or replace the injection pump.
	Deficient nozzle injection?	Repair or replace the nozzle.
	Compression leak?	Replace head gasket, tighten cylinder head bolt, glow plug and nozzle holder.

OPERATION MANUAL

HERE'S HOW TO GET HELP

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

UNITED STATES

Multiquip Corporate Office

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

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

MQ Parts Department

800-427-1244
310-537-3700

Fax: 800-672-7877

Service Department

800-421-1244
310-537-3700

Warranty Department

800-421-1244
310-537-3700

Fax: 310-943-2249

Technical Assistance

800-478-1244

Fax: 310-943-2238

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Laval, Quebec, Canada H7L 6V3
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Tel: (450) 625-2244
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Fax: (450) 625-8664

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Tel: 0161 339 2223
Fax: 0161 339 3226

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

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