

OPERATION AND PARTS MANUAL



WHISPERWATT™ SERIES MODEL DCA20SPXU2 DIGITAL CONTROLLER 60HZ GENERATOR (ISUZU BV-4LE2 DIESEL ENGINE)



PARTS LIST NO. M1873300004

Revision #1 (03/25/11)

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

REPORTING SAFETY DEFECTS

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

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

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

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

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

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PARTS ORDERING PROCEDURES

Ordering parts has never been easier! Choose from three easy options:

Effective:
January 1st, 2006



Order via Internet (Dealers Only):

Order parts on-line using Multiquip's SmartEquip website!

- View Parts Diagrams
- Order Parts
- Print Specification Information



If you have an MQ Account, to obtain a Username and Password, E-mail us at: **parts@multiquip.com**.

To obtain an MQ Account, contact your District Sales Manager for more information.

Goto www.multiquip.com and click on

Order Parts to log in and save!

Use the **internet** and qualify for a **5% Discount** on **Standard orders** for all orders which include complete part numbers.*

Note: Discounts Are Subject To Change



Order via Fax (Dealers Only):

All customers are welcome to order parts via Fax.

Domestic (US) Customers dial:

1-800-6-PARTS-7 (800-672-7877)

Fax your order in and qualify for a **2% Discount** on **Standard orders** for all orders which include complete part numbers.*

Note: Discounts Are Subject To Change



Order via Phone: Domestic (US) Dealers Call:
1-800-427-1244

Non-Dealer Customers:

Contact your local Multiquip Dealer for parts or call 800-427-1244 for help in locating a dealer near you.



International Customers should contact their local Multiquip Representatives for Parts Ordering information.

When ordering parts, please supply:

- | | |
|---|--|
| <input type="checkbox"/> Dealer Account Number | <input type="checkbox"/> Specify Preferred Method of Shipment: |
| <input type="checkbox"/> Dealer Name and Address | <input checked="" type="checkbox"/> UPS/Fed Ex <input checked="" type="checkbox"/> DHL |
| <input type="checkbox"/> Shipping Address (if different than billing address) | <input checked="" type="checkbox"/> Priority One <input checked="" type="checkbox"/> Truck |
| <input type="checkbox"/> Return Fax Number | <input checked="" type="checkbox"/> Ground |
| <input type="checkbox"/> Applicable Model Number | <input checked="" type="checkbox"/> Next Day |
| <input type="checkbox"/> Quantity, Part Number and Description of Each Part | <input checked="" type="checkbox"/> Second/Third Day |

NOTICE

All orders are treated as *Standard Orders* and will ship the same day if received prior to 3PM PST.

WE ACCEPT ALL MAJOR CREDIT CARDS!



www.multiquip.com



SAFETY INFORMATION

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

SAFETY MESSAGES

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

SAFETY SYMBOLS

DANGER

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

WARNING

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








CAUTION

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

NOTICE

Addresses practices not related to personal injury.

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

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


SAFETY INFORMATION

GENERAL SAFETY

CAUTION

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



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



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

NOTICE

- This equipment should only be operated by trained and qualified personnel 18 years of age and older.
- Whenever necessary, replace nameplate, operation and safety decals when they become difficult read.
- Manufacturer does not assume responsibility for any accident due to equipment modifications. Unauthorized equipment modification will void all warranties.

- **NEVER** use accessories or attachments that are not recommended by MQ Power for this equipment. Damage to the equipment and/or injury to user may result.

- **ALWAYS** know the location of the nearest fire extinguisher.



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



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



GENERATOR SAFETY

DANGER

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



WARNING

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

CAUTION

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

NOTICE

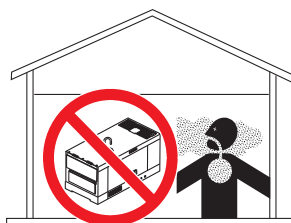
- **ALWAYS** ensure generator is on level ground before use.
- **ALWAYS** keep the machine in proper running condition.
- Fix damage to machine and replace any broken parts immediately.
- **ALWAYS** store equipment properly when it is not being used. Equipment should be stored in a clean, dry location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

SAFETY INFORMATION

ENGINE SAFETY

DANGER

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



WARNING

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

SAFETY INFORMATION

FUEL SAFETY



- **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



- 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.

SAFETY INFORMATION

ELECTRICAL SAFETY

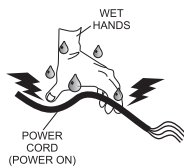
DANGER

- **DO NOT** touch output terminals during operation. Contact with output terminals during operation can cause **electrocution, electrical shock or burn.** 
- The electrical voltage required to operate the generator can cause severe injury or even death through physical contact with live circuits. Turn generator and all circuit breakers **OFF** before performing maintenance on the generator or making contact with output terminals.
- **NEVER** insert any objects into the output receptacles during operation. This is extremely dangerous. The possibility exists of **electrical shock, electrocution or death.** 
- Backfeed to a utility system can cause **electrocution** and/or property damage. **NEVER** connect the generator to a building's electrical system without a transfer switch or other approved device. All installations should be performed by a **licensed electrician** in accordance with all applicable laws and electrical codes. Failure to do so could result in electrical shock or burn, causing **serious injury or even death.** 

Power Cord/Cable Safety

DANGER

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



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

NOTICE

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

Grounding Safety

DANGER

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

SAFETY INFORMATION

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

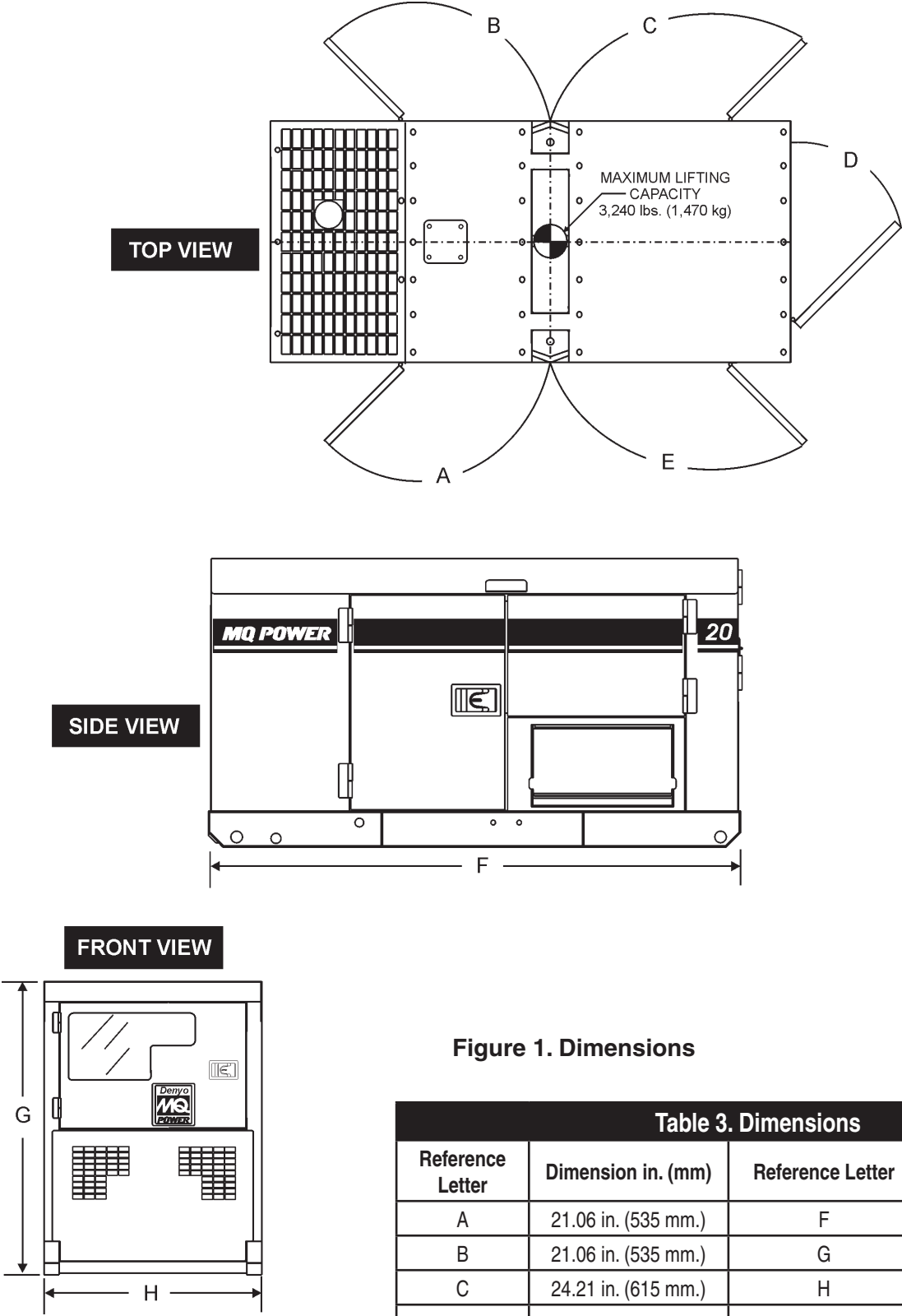
NOTICE

- Dispose of hazardous waste properly. Examples of potentially hazardous waste are used motor oil, fuel and fuel filters.
- **DO NOT** use food or plastic containers to dispose of hazardous waste.
- **DO NOT** pour waste, oil or fuel directly onto the ground, down a drain or into any water source.



SPECIFICATIONS

Table 1. Generator Specifications		
Model	DCA-20SPXU2D (Digital)	
Type	Revolving field, self ventilated, open protected type synchronous generator	
Armature Connection	Series	
Phase	Single-Phase 3-Wire	
Standby Output	22 kW	
Prime Output	20 kW	
Voltage	120/240V	
Frequency	60 Hz	
Speed	1800 rpm	
Power Factor	1.0	
Aux. AC Power	Single Phase, 60 Hz	
Sound Level db (A) full Load at 23 ft. (7 meters)	63	
Weight (No Fuel)	1,412 lbs. (640 kg.)	
Weight (Fuel)	1,563 lbs. (709 kg.)	
Table 2. Engine Specifications		
Model	ISUZU BV-4LE2 Interim Tier 4	
Type	4 cycle, water-cooled, direct injection	
No. of Cylinders	4 cylinders	
Bore x Stroke	3.34 in. x 3.77 in. (85 mm x 96 mm)	
Displacement	133 cu. in. (2,179 cc)	
Rated Output	34.3 HP/1800 RPM	
Starting	Electric	
Coolant Capacity	1.74 gal. (6.6 liters)	
Lube Oil Capacity	2.25 gal. (8.5 liters)	
Fuel Type	#2 Diesel Fuel	
Fuel Tank Capacity	17 gal. (65 liters)	
Fuel Consumption	1.66 gal. (6.3 L)/hr at full load	1.21 gal. (4.6 L)/hr at 3/4 load
	0.85 gal. (3.2 L)/hr at 1/2 load	0.58 gal. (2.2 L)/hr at 1/4 load
Battery	12V 53Ah x 1	



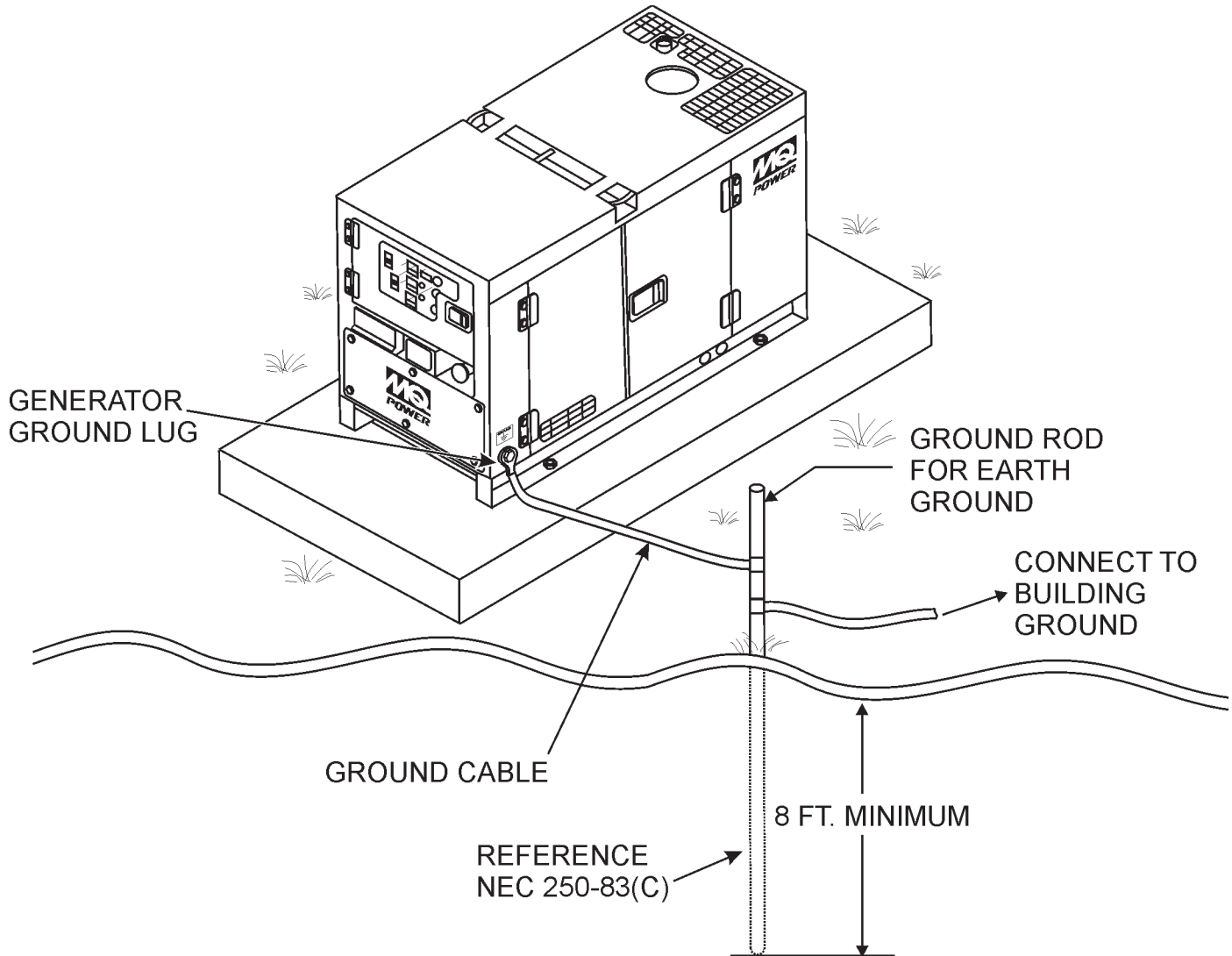


Figure 2. Typical Generator Grounding Application

OUTDOOR INSTALLATION

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

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

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

CAUTION

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

INDOOR INSTALLATION

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

MOUNTING

The generator must be mounted on a solid foundation (such as concrete) and set firmly on the foundation to isolate vibration of the generator when it is running. The generator must set at least 6 inches above the floor or grade level (in accordance to NFPA 110, Chapter 5-4.1). **DO NOT** remove the metal skids on the bottom of the generator. They are to resist damage to the bottom of the generator and to maintain alignment.

GENERATOR GROUNDING

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

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

NEC articles 250-64(b) and 250-66 set the following grounding requirements:

1. Use one of the following wire types to connect the generator to earth ground.
 - a. Copper - 8 AWG (5.3 mm²)
 - b. Aluminum - 6 AWG (8.4 mm²).
2. When grounding the generator (Figure 2) connect the ground cable between the lock washer and the nut on the generator and tighten the nut fully. Connect the other end of the ground cable to earth ground.
3. NEC article 250-52(c) specifies that the earth ground rod should be buried a minimum of 8 ft. into the ground.

NOTICE

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

GENERATOR

This generator (Figure 3) is a high quality portable (requires a trailer for transport) power source for telecom sites, lighting facilities, power tools, submersible pumps and other industrial and construction machinery.

CONTROL PANEL

- Digital Controller (monitors the following:
 - Oil Pressure
 - Fuel Level
 - Battery Voltage
 - Water Temperature
 - Output Voltage
 - Amps (Load)
 - Frequency (Hz)
- Panel Light
- Panel Light Switch
- Control Power Switch
- 3-Pole, 90 amp Main Circuit Breaker
- “Control Box” (located behind the Control Panel)
 - Engine Controller
 - Automatic Voltage Regulator (AVR)
 - Current Transformer
 - Over-Current Relay
 - Starter Relay
 - 3-pole, 90 amp Main Circuit Breaker

OUTPUT TERMINAL PANEL

The “Output Terminal Panel” is provided with the following:

- Two 120/240V output receptacles (CS-6369), 50A
- Two auxiliary circuit breakers, 50A
- Two 120V output receptacles (GFCI), 20A
- Two GFCI circuit breakers, 20A
- Four output terminal lugs (1Ø power)

OPEN DELTA EXCITATION SYSTEM

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

There are four connections of the open delta A, B, C and

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

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

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

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

ENGINE

This generator is powered by a 4 cylinder, water cooled, direct injection, **Isuzu Model BV-4LE2 diesel engine**. This engine is designed to meet every performance requirement for the generator. Reference Table 2 for engine specifications.

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

ELECTRIC GOVERNOR SYSTEM (OPTION)

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

EXTENSION CABLES

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

MAJOR COMPONENTS

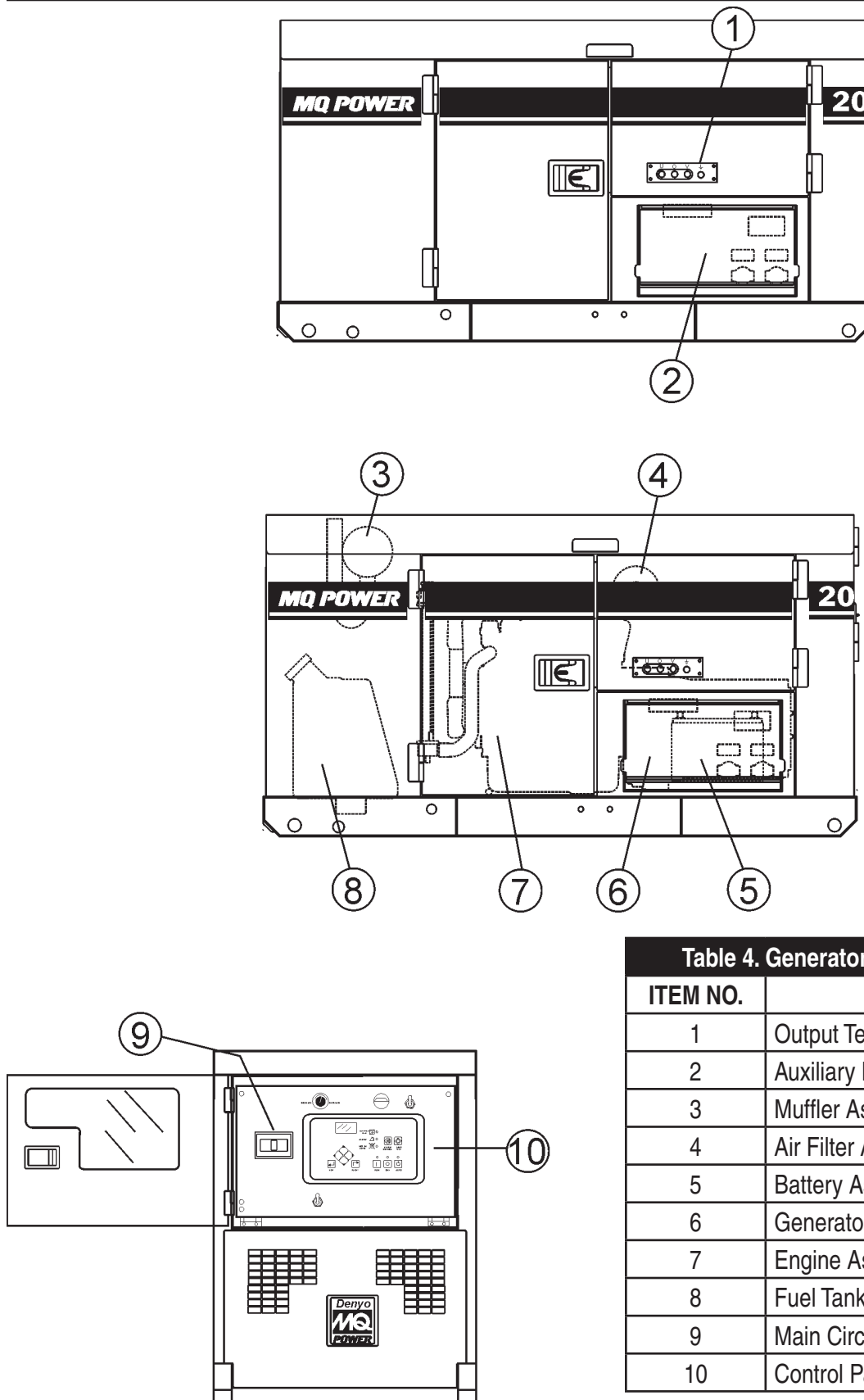


Table 4. Generator Major Components	
ITEM NO.	DESCRIPTION
1	Output Terminal Assembly
2	Auxiliary Receptacles Assembly
3	Muffler Assembly
4	Air Filter Assembly
5	Battery Assembly
6	Generator Assembly
7	Engine Assembly
8	Fuel Tank Assembly
9	Main Circuit Breaker Assembly
10	Control Panel Assembly

Figure 3. Major Components

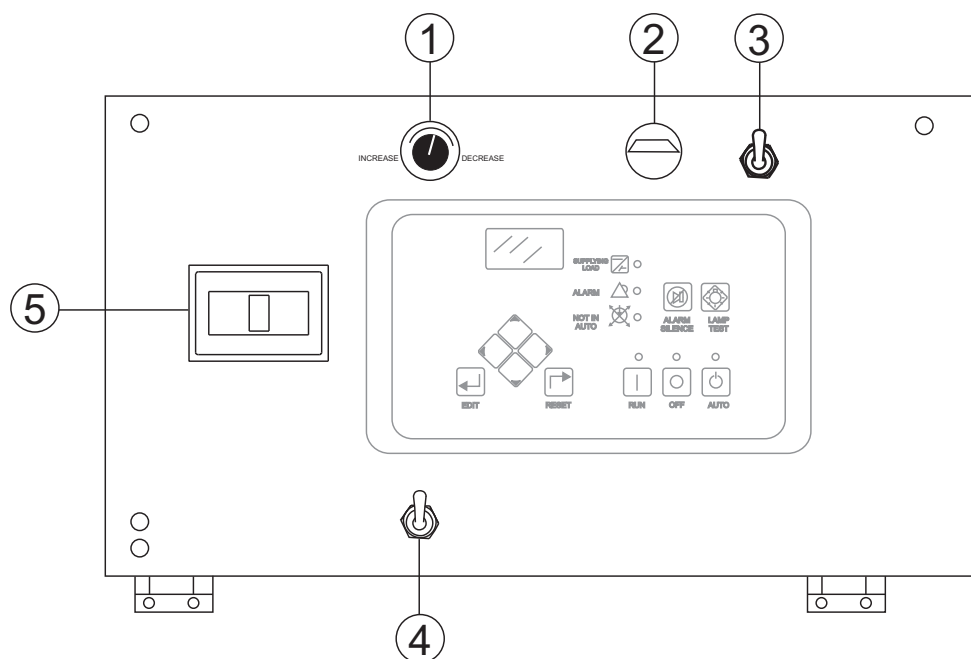


Figure 4. Control Panel

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

1. **Voltage Regulator Control** — Allows $\pm 15\%$ manual adjustment of the generator's output voltage.
2. **Panel Light** — Normally used in dark areas or at night time. When activated, panel lights will illuminate. When the generator is not in use be sure to turn the panel light switch to the OFF position.
3. **Panel Light Switch** — Place switch in the ON position to activate generator. Place switch in OFF position when generator is not in use.
4. **Control Power Switch** — Activates Digital Controller.
5. **Main Circuit Breaker**—This three-pole, 90A main breaker is provided to protect the the U,O, and V output terminal lugs from overload.

DIGITAL CONTROLLER PANEL

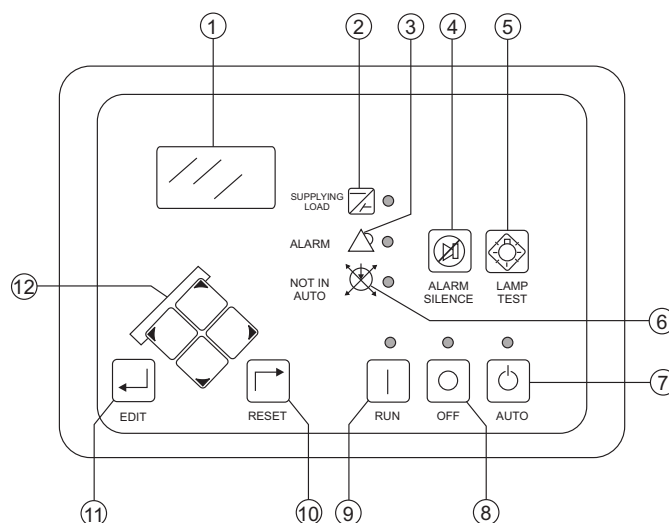


Figure 5. Digital Controller Panel

The definitions below describe the controls and functions of the Digital Control Panel (Figure 5).

1. **Liquid Crystal Display (LCD)** — The LCD serves as the local information source for metering, alarms, pre-alarms, and protective functions.
2. **Supplying Load Indicator** — This **green** LED lights when the generator current is greater than the EPS threshold.
3. **Alarm Indicator** — This **red** LED lights continuously during alarm conditions and flashes during pre-alarm conditions.
4. **Alarm Silence** — Not used.
5. **Lamp Test Pushbutton** — Press this pushbutton to test the illumination of all LCD pixels and LED's on the Digital Controller.
6. **Not in Auto Indicator**—This **red** LED lights when the Digital Controller is not operating in **auto mode**.
7. **Auto Pushbutton and Mode Indicator** — Press this pushbutton to place the Digital Controller in **auto mode**. The green auto LED will light when the auto mode is active.
8. **Off Pushbutton and Mode Indicator** — Press this pushbutton to place the Digital Controller in the **off mode**. The red off mode LED will light when the Digital Controller is in the off mode.
9. **Run Pushbutton and Mode Indicator** — Press this pushbutton to place the Digital Controller in the **run mode**. The green run mode LED will light when the Digital Controller is in the run mode.
10. **Reset Pushbutton** — Press this pushbutton to cancel a settings editing session and discard any changes made to the settings.
11. **Edit** — Press this pushbutton to start an editing session and enable changes to the Digital Controller settings. At the conclusion of an editing session, the edit pushbutton is pressed again to save the setting changes.
12. **Arrow Pushbuttons** — These four pushbuttons are used to navigate through the display menus and modify settings.

The left and right arrow buttons are used to navigate through the display menus and modify settings. The right-arrow button is pressed to move downward through the menu levels and the left-arrow is pressed to move upward.

Within a level, the up-arrow and down-arrow buttons are used to move among items within the menu level. Pressing the down-arrow button moves to items lower in the list.

Pressing the up-arrow button moves to items higher in the list. During a settings editing session, the up and down arrow buttons are used to raise and lower the value of the selected setting.

LCD DISPLAY/GENERATOR CONTROL BOX

The definitions below describe the monitoring parameters of the Digital Control Panel Display (Figure 6).

①	②	③	④
VOLT	AMP	PH	Hz
240	0	AB	60.0
56	50	170	12.7
OIL	FUEL	TEMP	BATT
⑤	⑥	⑦	⑧

Figure 6. LCD Display

1. **VOLT** — Indicates the phase to phase reading at the output terminals.
2. **AMP** — Indicates the current flowing to the load connected at the output terminals.
3. **PH** — Indicates the voltage phase.
4. **Hz** — Indicates output frequency of the generator.
5. **OIL** — During normal operation this gauge should read between 35 ~65 psi. (241~448 kPa). When starting the generator the oil pressure may read a little higher, but after the engine warms up the oil pressure should return to the correct pressure range.
6. **FUEL** — Indicates the percent of fuel remaining in the fuel tank.
7. **TEMP** — During normal operation this gauge should read between 167°~203°F (75° ~95°C).
8. **BATT** — When the engine is running this value should be greater than 13 VDC.

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

The Control Box is equipped with the following major components:

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

NOTICE

Via the internet, go to www.basler.com, for more detail Digital Control Panel operating instructions.

OUTPUT TERMINAL PANEL FAMILIARIZATION

OUTPUT TERMINAL PANEL

The Output Terminal Panel (Figure 7) shown below is located on the right-hand side (left from control panel) of the generator. Lift up on the cover to gain access to receptacles and terminal lugs.

NOTICE

Terminal legs “O” and “Ground” are considered bonded grounds.

OUTPUT TERMINAL FAMILIARIZATION

The “Output Terminal Panel ” (Figure 7) is provided with the following:

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

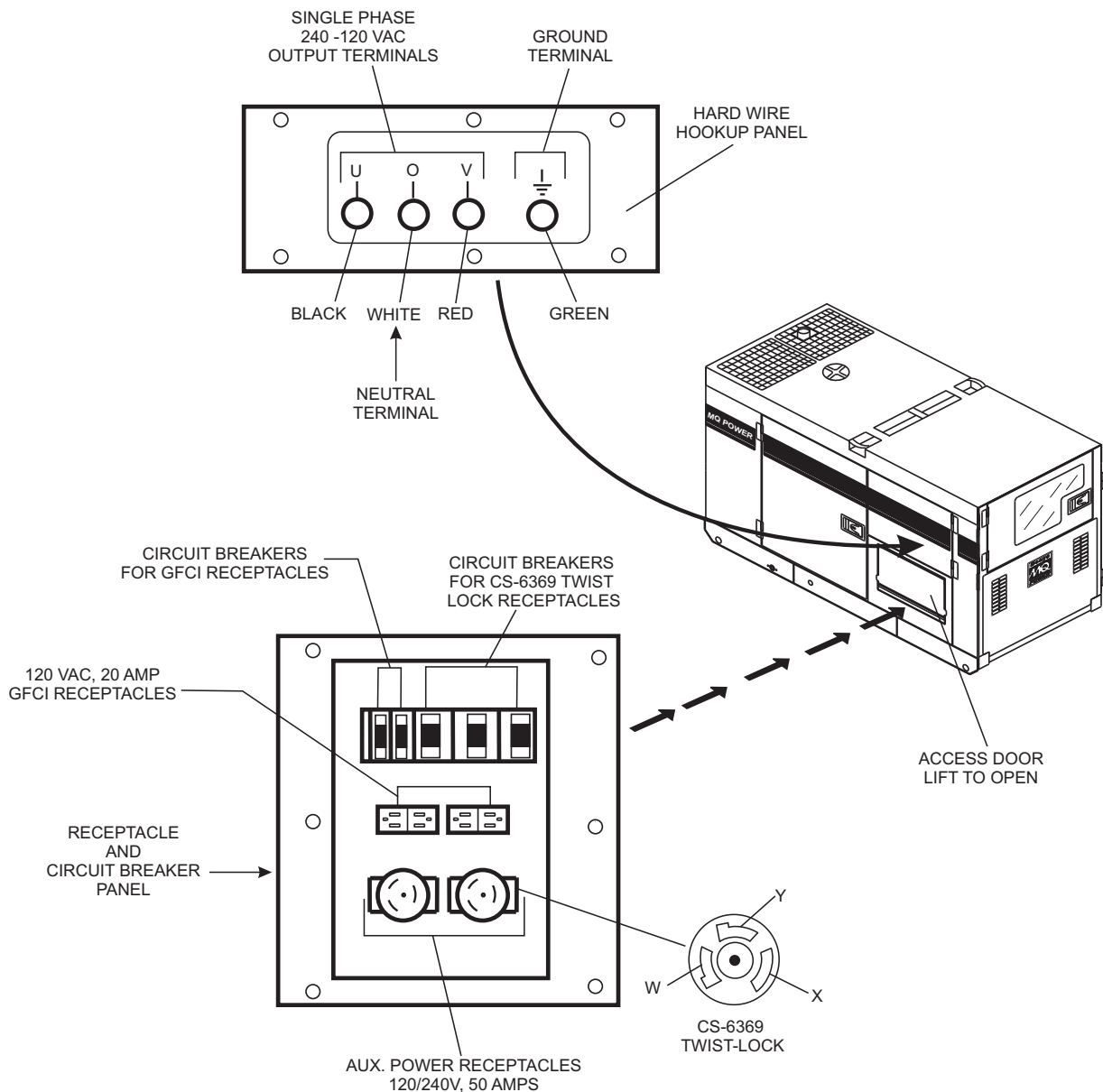


Figure 7. Output Terminal Panel

OUTPUT TERMINAL PANEL FAMILIARIZATION

120 VAC GFCI Receptacles

There are two 120 VAC, 20 amp GFCI (Duplex Nema 5-20R) receptacles provided on the output terminal panel. Each receptacle is protected by a 20 amp circuit breaker. These breakers are located directly above the GFCI receptacles. Remember the load output (current) of both GFCI receptacles is dependent on the load requirements of the U, O, and V output terminal lugs.

Pressing the **reset** button resets the GFCI receptacle after being tripped. Pressing the **test button** (See Figure 8) in the center of the receptacle will check the GFCI function. Both receptacles should be tested at least once a month.

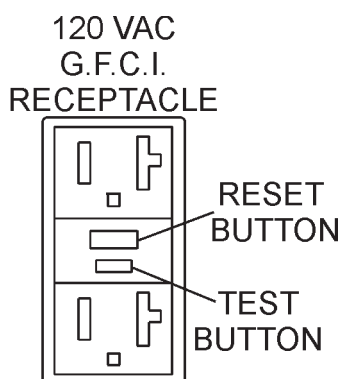


Figure 8. G.F.C.I. Receptacle

Twist Lock Dual Voltage 120/240 VAC Receptacles

There are two 120/240V, 50 amp auxiliary twist-lock (CS-6369) receptacles (Figure 9) provided on the output terminal panel..

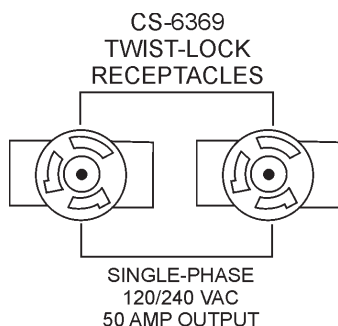


Figure 9. 120/240V Twist-Lock Auxiliary Receptacles

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

Turn the **voltage regulator control knob** (Figure 10) on the control panel to obtain the desired voltage. Turning the knob clockwise will **increase** the voltage, turning the knob counter-clockwise will **decrease** the voltage.



Figure 10. Voltage Regulator Control Knob

Removing the Plastic Face Plate (Hard Wire Hookup Panel)

The **output terminal lugs** are protected by a plastic face plate cover (Figure 11). Un-screw the securing bolts and lift the plastic terminal cover to gain access to the terminal enclosure.

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

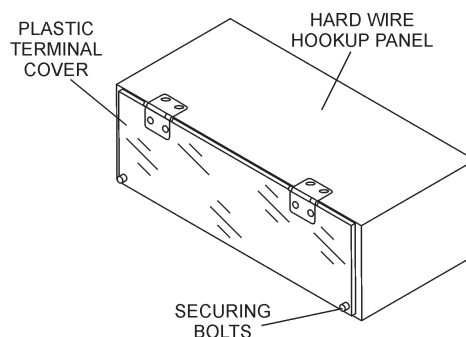


Figure 11. Plastic Face Plate (Output Terminal Lugs)

OUTPUT TERMINAL PANEL FAMILIARIZATION

Connecting Loads

Loads can be connected to the generator by the **output terminal lugs** or the convenience receptacles (Figure 12). 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, 90A **main** circuit breaker is provided. Make sure to switch **ALL** circuit breakers to the **OFF** position prior to starting the engine.

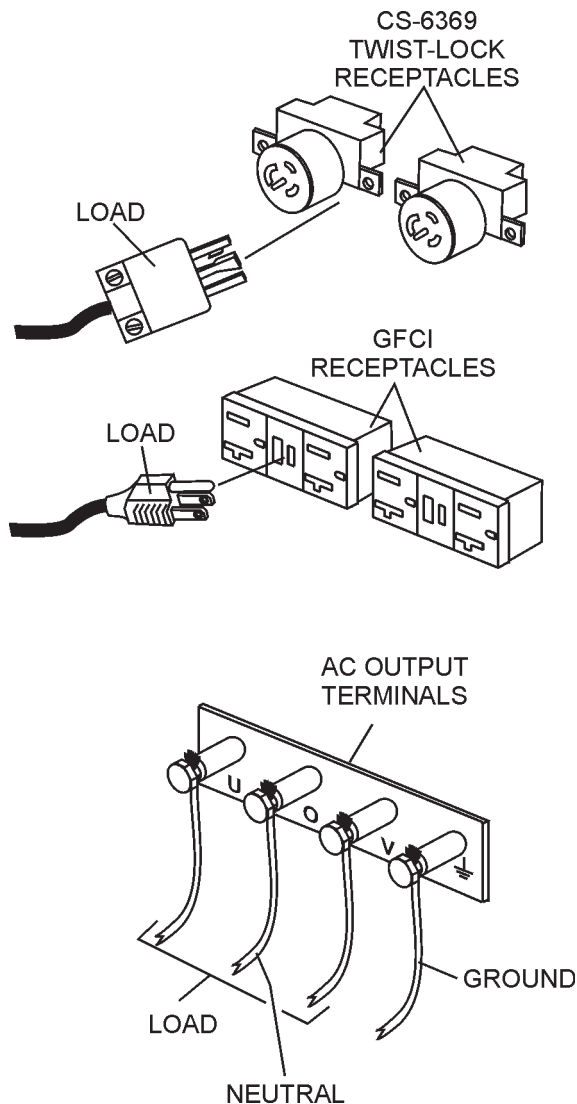


Figure 12. Connecting Loads

Over Current Relay

An **over current relay** (Figure 13) is connected to the main circuit breaker. In the event of an overload, both the circuit breaker and the over current relay may trip. If the circuit breaker can not be reset, the **reset button** on the over current relay must be pressed. The over current relay is located in the control box.

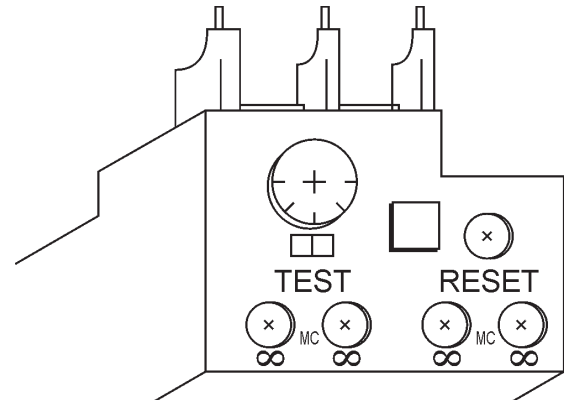


Figure 13. Over Current Relay

NOTICE

When connecting a load to the generator **ALWAYS** make sure the load has an ON/OFF switch. **DO NOT** use the circuit breakers on the generator as a method of turning the load ON and OFF.

LOAD APPLICATION/GENERATOR OUTPUT

SINGLE PHASE LOAD

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

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

NOTICE

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

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

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

Table 5. Power Factor By Load

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

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

Current in Amperes	Load in Watts		Maximum Allowable Cable Length			
	At 100 Volts	At 200 Volts	#10 Wire	#12 Wire	#14 Wire	#16 Wire
2.5	300	600	1000 ft.	600 ft.	375 ft.	250 ft.
5	600	1200	500 ft.	300 ft.	200 ft.	125 ft.
7.5	900	1800	350 ft.	200 ft.	125 ft.	100 ft.
10	1200	2400	250 ft.	150 ft.	100 ft.	
15	1800	3600	150 ft.	100 ft.	65 ft.	
20	2400	4800	125 ft.	75 ft.	50 ft.	

CAUTION: Equipment damage can result from low voltage

NOTICE

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

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

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

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



DANGER

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

Generator Amperage

Table 7 shows the **maximum** amps the generator can provide. **DO NOT** exceed the maximum amps as listed.

Table 7. Generator Maximum Amps

Rated Voltage	Maximum Amps
1Ø 120 Volt	83 X 2 amps (4 wire)
1Ø 240 Volt	83 amps (4 wire)

OUTPUT TERMINAL PANEL CONNECTIONS

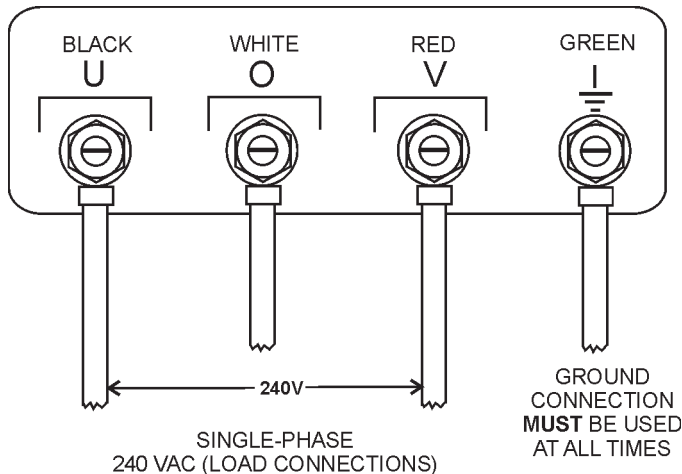
UOV TERMINAL OUTPUT VOLTAGES

240/120V output voltages can be obtained using the **output terminal lugs**.

The voltage regulator (VR), Figure 15 allows the user to increase or decrease the selected voltage.

1Ø-240 Output Terminal Voltage

1. Connect the load wires to the output terminal lugs as shown in Figure 14.



**Figure 14. Output Terminal Lugs
1Ø-240 Volt Connections**

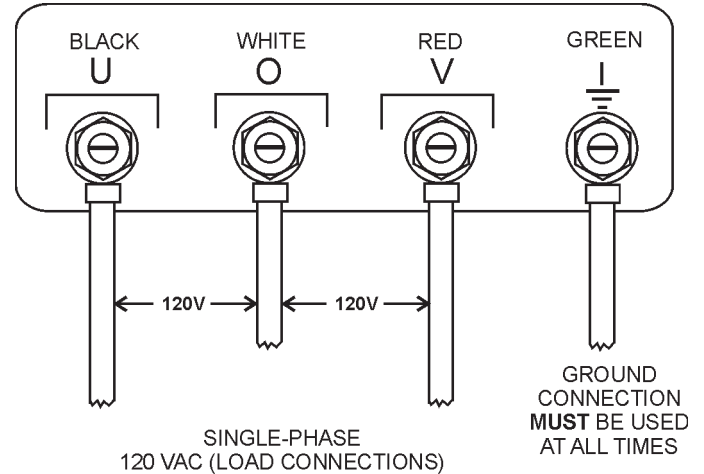
2. Turn the voltage regulator knob (Figure 15) clockwise to increase voltage output, turn counterclockwise to decrease voltage output. Use voltage regulator adjustment knob whenever fine tuning of the output voltage is required.



Figure 15. Voltage Regulator Knob

1Ø-120 Output Terminal Voltage

1. Connect the load wires to the output terminal lugs as shown in Figure 16.



**Figure 16. Output Terminal Lugs
1Ø-120 Volt Connections**

2. Turn the voltage regulator knob (Figure 15) clockwise to increase voltage output, turn counterclockwise to decrease voltage output.

NOTICE

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

CIRCUIT BREAKERS

To protect the generator from an overload, a 3-pole, 90 amp, main circuit breaker is provided to protect the **U,O and V Output Terminals** from overload. In addition two single-pole, 20 amp **GFCI** circuit breakers are provided to protect the GFCI receptacles from overload. Two 50 amp **load** circuit breakers have also been provided to protect the auxiliary receptacles from overload. Make sure to switch **ALL** circuit breakers to the **OFF** position prior to starting the engine.

LUBRICATION OIL

Fill the engine crankcase with lubricating oil through the filler hole, but **DO NOT** overfill. Make sure the generator is level and verify that the oil level is maintained between the two notches (Figure 17) on the dipstick. See Table 8 for proper selection of engine oil.

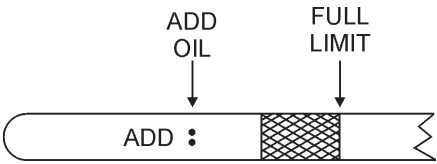
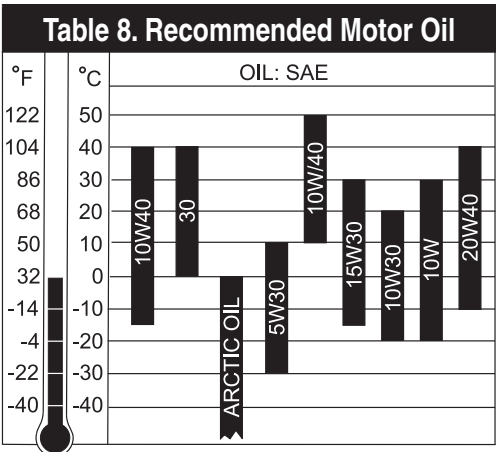


Figure 17. Engine Oil Dipstick


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


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

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




FUEL CHECK

**DANGER**



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

Refilling the Fuel System

**CAUTION**

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

This generator has an internal fuel tank located inside the trailer frame and may also be equipped with an environmental fuel tank (Figure 18). **ALWAYS** fill the fuel tanks with clean fresh **#2 diesel fuel**. **DO NOT** fill the fuel tanks beyond their capacities.

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

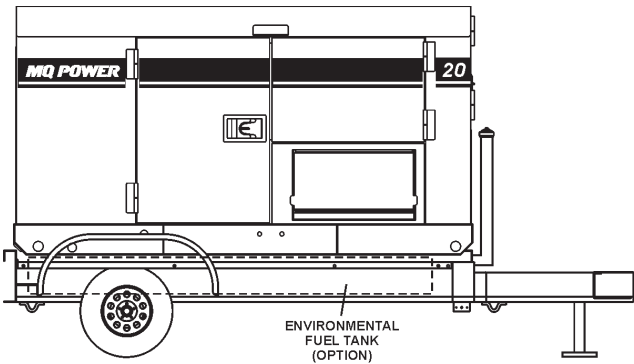


Figure 18. Internal Fuel Tank System

INSPECTION/SETUP

Refueling Procedure:

WARNING



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

1. **Level Tanks** — Make sure fuel cells are level with the ground. Failure to do so will cause fuel to spill from the tank before reaching full capacity (Figure 19).

CAUTION

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

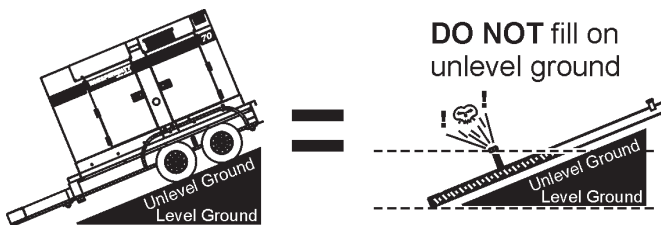


Figure 19. Only Fill on Level Ground

NOTICE

ONLY use #2 diesel fuel when refueling.

2. Open cabinet doors on the “right side” of the generator (from generator control panel position). Remove fuel cap and fill tank (Figure 20).

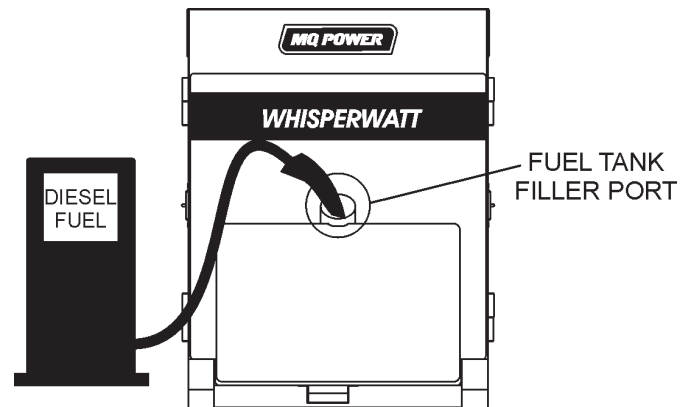


Figure 20. Fueling the Generator

3. **NEVER overfill fuel tank** — It is important to read the fuel gauge when filling trailer fuel tank. **DO NOT** wait for fuel to rise in filler neck (Figure 21).

FUEL GAUGE LOCATED
ON CONTROL PANEL

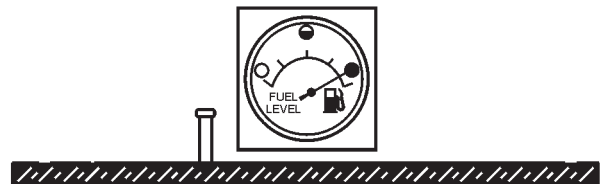


Figure 21. Full Fuel Tank

CAUTION

DO NOT OVERFILL fuel system. Leave room for fuel expansion. Fuel expands when heated (Figure 22).




Figure 22. Fuel Expansion

COOLANT (ANTIFREEZE/SUMMER COOLANT/ WATER)

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

! WARNING



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	1.74 gal (6.58 liters)
Reserve Tank	0.26 gal (1 liter)

Operation in 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		Boiling Point	
	°C	°F	°C	°F
50	-37	-34	108	226

NOTICE

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

CLEANING THE RADIATOR

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

AIR CLEANER

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

FAN BELT TENSION

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

The fan belt tension is proper if the fan belt bends 10 to 15 mm (Figure 23) when depressed with the thumb as shown below.

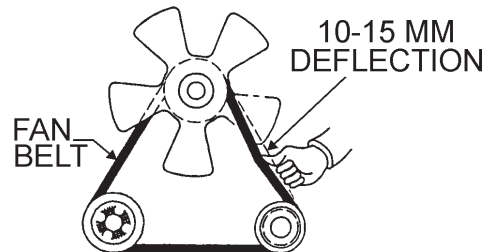



Figure 23. Fan Belt Tension

! CAUTION



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

BATTERY

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


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

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

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

Battery Cable Installation

ALWAYS be sure the battery cables (Figure 24) 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**.

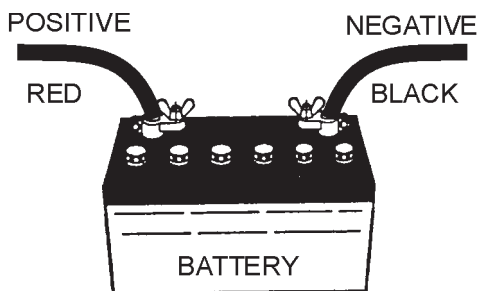


Figure 24. Battery Connections

When connecting battery do the following:

1. **NEVER** connect the battery cables to the battery terminals when the **Control Power Switch** is in either the **ON** position. **ALWAYS** make sure that the **Control Power 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.

GENERATOR START-UP PROCEDURE (MANUAL)

BEFORE STARTING

CAUTION

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

WARNING

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

1. Place the **main, G.F.C.I., and aux.** circuit breakers (Figure 25) in the **OFF** position prior to starting the engine.

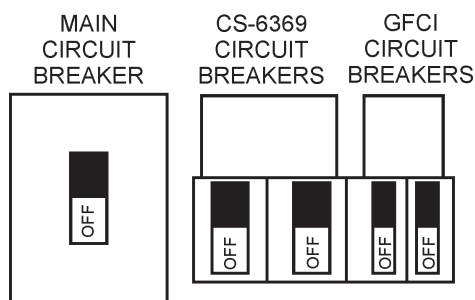


Figure 25. Main, Aux. and GFCI Circuit Breakers (OFF)

2. Connect the load to the **receptacles** or the **output terminal lugs** as shown in Figure 12. These load connection points can be found on the output terminal panel and the output terminal panel's hard wire hookup panel.
3. Tighten terminal nuts securely to prevent load wires from slipping out.
4. Close all engine enclosure doors (Figure 26).

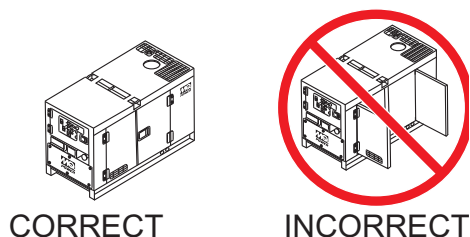


Figure 26. Engine Enclosure Doors

STARTING (MANUAL)

1. Place the **control power switch** on the control panel (Figure 27) in the **ON** position.



Figure 27. Control Power Switch

2. Press the **RUN** button (Figure 28) on the controller to start the engine.

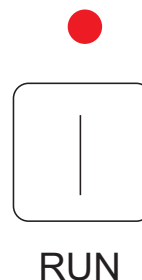


Figure 28. Run Button

3. Once the engine starts, let the engine run for 1-2 minutes. At temperatures below freezing, this time period must be extended to 2-4 minutes.
4. Listen for any abnormal noises. If any abnormalities exist, shut down the engine and correct the problem.
5. Using the controller display, verify that the no-load frequency and speed is approximately 62.5 Hz (1875 rpm).
6. Place the **main, G.F.C.I., and aux.** circuit breakers (Figure 29) in the **ON** position. Voltage is now available at the output terminals and receptacles.

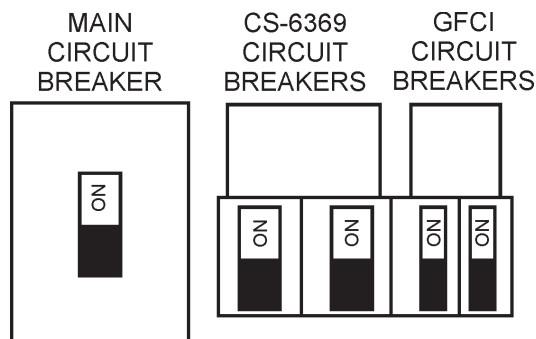


Figure 29. Main, Aux. and GFCI Circuit Breakers (ON)

GENERATOR START-UP PROCEDURE (AUTO)

STARTING (AUTO MODE)

DANGER



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

CAUTION

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

NOTICE

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

WARNING

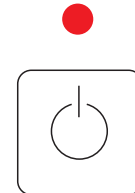
When running the generator in the **AUTO** mode, remember the generator can start up at any time without warning. **NEVER** attempt to perform any maintenance when the generator is in the auto mode.

NOTICE

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

1. Pressing the **AUTO** button (Figure 30) on the controller places the Digital Controller in the auto mode. This mode allows the controller to monitor the remote start contacts.

Closure of the remote start contacts will begin engine cranking. When the contacts are opened, cranking will stop or if the engine is running, engine will stop.



AUTO

Figure 30. Auto Button

NOTICE

If the generator is to be connected to a building's AC power source via an automatic transfer switch (isolation). Press the **AUTO** button (Figure 30).

In this position, should an outage occur, the automatic transfer switch (ATS) will start the generator automatically via the generator's auto-start contacts connected to the ATS's start contacts.

Please refer to your ATS installation manual for further instructions for the correct installation of the auto-start contacts of the generator to the ATS.

GENERATOR SHUT-DOWN PROCEDURES

NORMAL SHUTDOWN PROCEDURE

To shutdown the generator, use the following procedure:

WARNING

NEVER stop the engine suddenly except in an emergency.

1. Place the **main, G.F.C.I., and aux.** circuit breakers (Figure 31) in the **OFF** position.

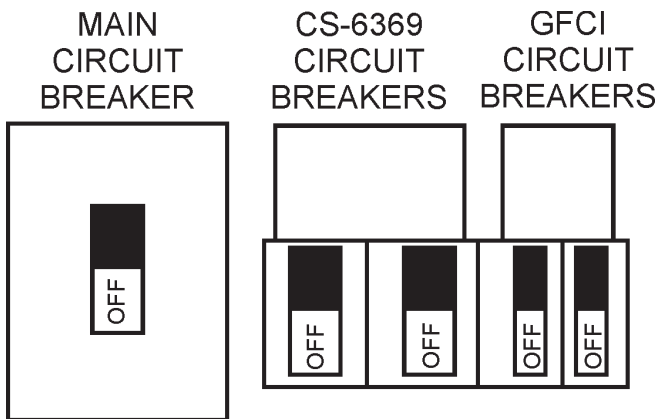


Figure 31. Main, Aux. and GFCI Circuit Breakers (OFF)

2. Let the engine cool by running it at low speed for 3-5 minutes with no load applied.
3. Press the **OFF** button (Figure 32) on the Digital Controller to shutdown the engine.



Figure 32. OFF Button

4. Place the **control power switch** on the control panel (Figure 33) in the **OFF** position.



Figure 33. Control Power Switch (OFF)

EMERGENCY SHUTDOWN PROCEDURE

1. Place the **main, G.F.C.I., and aux.** circuit breakers (Figure 31) in the **OFF** position.
2. Press the **OFF** button (Figure 32) on the Digital Controller to shutdown the engine.

Table 11. Inspection/Maintenance		10 Hrs DAILY	250 Hrs	500 Hrs	1000 Hrs
Engine	Check Engine Fluid Levels	X			
	Check Air Cleaner	X			
	Check Battery Acid Level	X			
	Check Fan Belt Condition	X			
	Check for Leaks	X			
	Check for Loosening of Parts	X			
	Replace Engine Oil and Filter * 1		X		
	Clean Air Filter		X		
	Check Fuel Filter/Water Separator Bowl	X			
	Clean Unit, Inside and Outside		X		
	Change Fuel Filter			X	
	Clean Radiator and Check Coolant Protection Level*2			X	
	Replace Air Filter Element * 3			X	
	Check all Hoses and Clamps * 4				X
	Clean Inside of Fuel Tank				X
Generator	Measure Insulation Resistance Over 3M ohms		X		
	Check Rotor Rear Support Bearing			X	

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

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

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

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

GENERAL INSPECTION

Prior to each use, the generator should be cleaned and inspected for deficiencies. Check for loose, missing or damaged nuts, bolts or other fasteners. Also check for fuel, oil, and coolant leaks. Use Table 11 as a general maintenance guideline **Engine Side** (Refer to the Engine Instruction Manual)

AIR CLEANER

Every 250 hours: Remove air cleaner element (Figure 34) and clean the heavy duty paper element with light spray of compressed air. Replace the air cleaner as needed.

Air Cleaner with Dust Indicator

This indicator (Figure 34) is attached to the air cleaner. When the air cleaner element is clogged, air intake restriction becomes greater and the dust indicator signal shows **RED** meaning the element needs changing or service. After changing the air element, press the dust indicator button to reset the indicator.

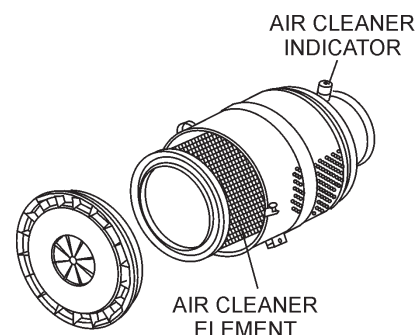


Figure 34. Air Cleaner/Indicator

NOTICE

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

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

FUEL ADDITION

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

Removing Water from the Fuel Tank

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

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

Cleaning Inside the Fuel Tank

If necessary, drain the fuel inside the fuel tank completely. Using a spray washer (Figure 35) wash out any deposits or debris that have accumulated inside the fuel tank.

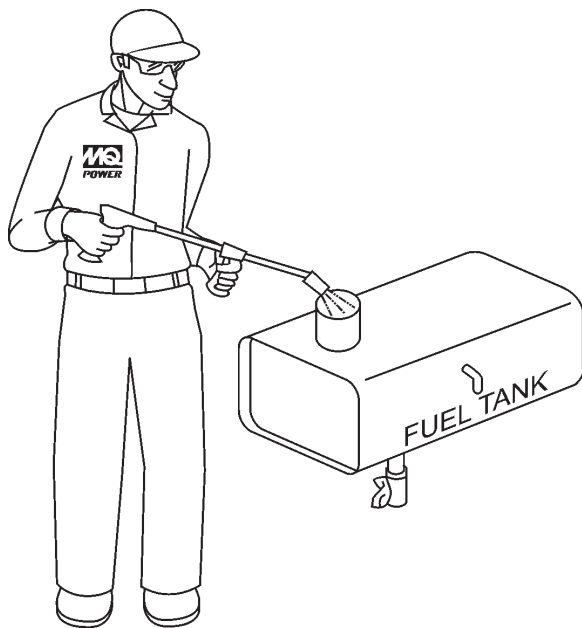


Figure 35. Fuel Tank Cleaning

FUEL TANK INSPECTION

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

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

Replacing Fuel Filter

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

AIR REMOVAL

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

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

CHECK OIL LEVEL

Check the crankcase oil level prior to each use, or when the fuel tank is filled. Insufficient oil may cause severe damage to the engine. Make sure the generator is level. The oil level must be between the two notches on the dipstick as shown in Figure 17

Replacing Oil Filter

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

FLUSHING OUT RADIATOR AND REPLACING COOLANT

- Open both cocks located at the crankcase side and at the lower part of the radiator and drain coolant. Open the radiator cap while draining. Remove the overflow tank and drain.
- Check hoses for softening and kinks. Check clamps for signs of leakage.
- Tighten both cocks and replace the overflow tank.
- Replace with coolant as recommended by the engine manufacturer.
- Close radiator cap tightly.
- Flush the radiator by running clean tap water through radiator until signs of rust and dirt are removed. **DO NOT** clean radiator core with any objects, such as a screwdriver.

WARNING



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

RADIATOR CLEANING

The radiator (Figure 36) 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.

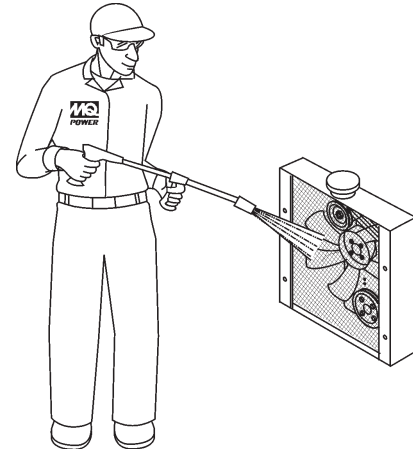


Figure 36. Radiator Cleaning

GENERATOR STORAGE

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

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

JACKET WATER HEATER AND INTERNAL BATTERY CHARGER 120 VAC INPUT RECEPTACLES (OPTIONAL)

This generator can be optionally equipped with two 120 VAC, 20 amp input receptacles located on the output terminal panel.

The purpose of these receptacles is to provide power via commercial power to the **jacket water heater** and **internal battery charger**.

These receptacles will **ONLY** function when commercial power has been supplied to them (Figure 37). To apply commercial power to these receptacles, a power cord of adequate size will be required (See Table 6).

When using the generator in **hot** climates there is no reason to apply power to jacket water heater. However, if the generator will be used in **cold** climates it is always a good idea to apply power to the jacket water heater at all times. To apply power to the jacket water heater simply apply power to the jacket water heater receptacle via commercial power using an power cord of adequate size.

If the generator will be used daily, the battery should normally not require charging. If the generator will be idle (not used) for long periods of time, apply power to the battery charger receptacle via commercial power using a power cord of adequate size.

NOTICE

To ensure adequate starting capability, always have power applied to the generator's internal battery charger.

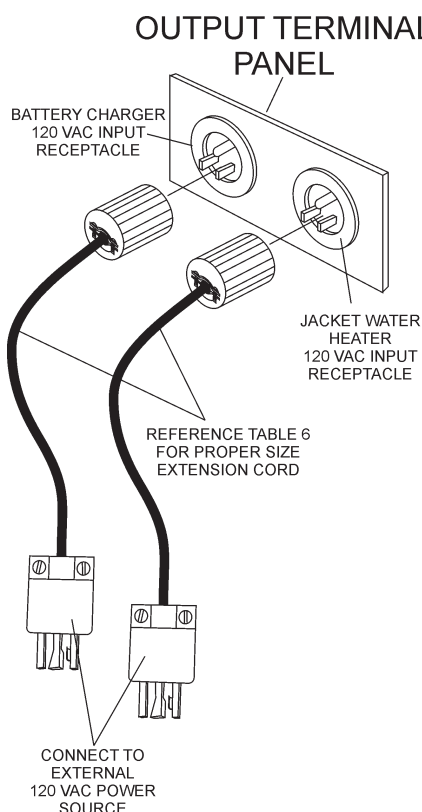


Figure 37. Batter Charger and Jacket Water Heater Power Connections

TRAILER MAINTENANCE

TRAILER MAINTENANCE

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

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

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

1. **Fuel Cell** — Provides an adequate amount of fuel for the equipment in use. Fuel cells must be empty when transporting equipment.
2. **Braking System** — System employed in stopping the trailer. Typical braking systems are electric, surge, hydraulic, hydraulic-surge and air.
3. **GVWR** — Gross Vehicle Weight Rating (GVWR) is the maximum number of pounds the trailer can carry, including the fuel cell (empty).
4. **Frame Length** — Measurement is from the ball hitch to the rear bumper (reflector).
5. **Frame Width** — Measurement is from fender to fender
6. **Jack Stand** — Trailer support device with maximum pound requirement from the tongue of the trailer.
7. **Coupler** — Type of hitch used on the trailer for towing.
8. **Tire Size** — Indicates the diameter of the tire in inches (10,12,14, etc.), and the width in millimeters (175,185,205, etc.). The tire diameter must match the diameter of the tire rim.
9. **Tire Ply** — The tire ply (layers) number is rated in letters; 2-ply,4-ply,6-ply, etc.
10. **Wheel Hub** — The wheel hub is connected to the trailer's axle.
11. **Tire Rim** — Tires mounted on a tire rim. The tire rim must match the size of the tire.
12. **Lug Nuts** — Used to secure the wheel to the wheel hub. Always use a torque wrench to tighten down the lug nuts. See Table 15 and Figure 40 for lug nut tightening and sequence.
13. **Axle** — Indicates the maximum weight the axle can support in pounds, and the diameter of the axle expressed in inches. Please note that some trailers have a double axle. This will be shown as 2-6000 lbs., meaning two axles with a total weight capacity of 6000 pounds.
14. **Suspension** — Protects the trailer chassis from shocks transmitted through the wheels. Types of suspension used are leaf, Q-flex, and air ride.
15. **Electrical** — Electrical connectors (looms) are provided with the trailer so the brake lights and turn signals can be connected to the towing vehicle.
16. **Application** — Indicates which units can be employed on a particular trailer.

BRAKES

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

Figure 38 displays the major hydraulic surge brake components that will require inspection and maintenance. Please inspect these components as required using steps 1 through 8 and Table 12 as listed below:

Brake Adjustment

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

Hydraulic Surge Brakes

Hydraulic surge brakes (Figure 38) should not require any special attention with the exception of routine maintenance such as shoe and lining replacement. Brake lines should be periodically checked for cracks, kinks, or blockage.

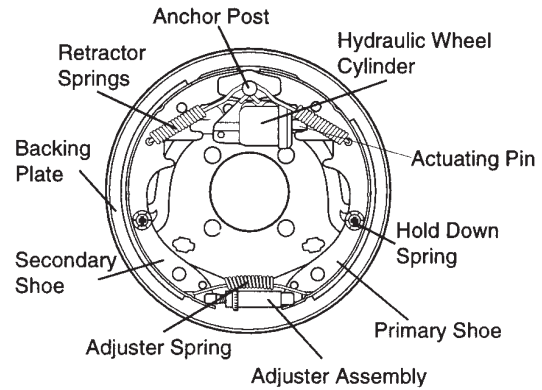


Figure 38. Hydraulic Brake Components

Actuator

Hydraulic surge braking requires the installation of an actuator at the tongue of the trailer. Remember the **surge or push** of the trailer toward the tow vehicle automatically synchronizes the trailer brakes with the tow vehicle brakes. As the trailer pushes against the tow vehicle the actuator telescopes together and applies force to the master cylinder, supplying hydraulic pressure to the trailer brakes.

Periodically check and test the surge “actuator” to make sure that it is functioning correctly. Never use an undersize actuator.

Table 12. Hydraulic Brake Troubleshooting

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

TRAILER MAINTENANCE

TIRES/WHEELS/LUG NUTS

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

CAUTION



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

CAUTION









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

Tire Wear/Inflation

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

Table 13 (Tire Wear Troubleshooting) will help pinpoint the causes and solutions of tire wear problems.

Table 13. Tire Wear Troubleshooting

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

Suspension

The **leaf suspension** springs and associated components (Figure 39) should be visually inspected every 6,000 miles for signs of excessive wear, elongation of bolt holes, and loosening of fasteners. Replace all damaged parts (suspension) immediately. Torqued suspension components as detailed in Table 14w.

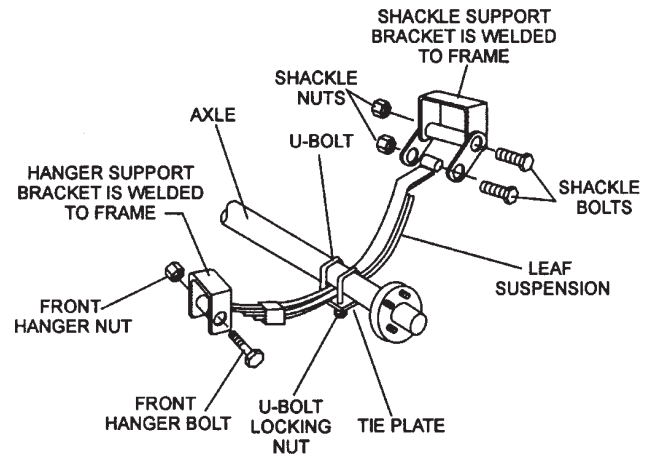


Figure 39. Major Suspension Components

Table 14. Suspension Torque Requirements

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

TRAILER MAINTENANCE

Lug Nut Torque Requirements

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

1. Start all wheel lug nuts by hand.
2. Torque all lug nuts in sequence (Figure 40). **DO NOT** torque the wheel lug nuts all the way down. Tighten each lug nut in 3 separate passes as defined by Table 15.
3. After first road use, retorque all lug nuts in sequence. Check all wheel lug nuts periodically.

Table 15. Tire Torque Requirements

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

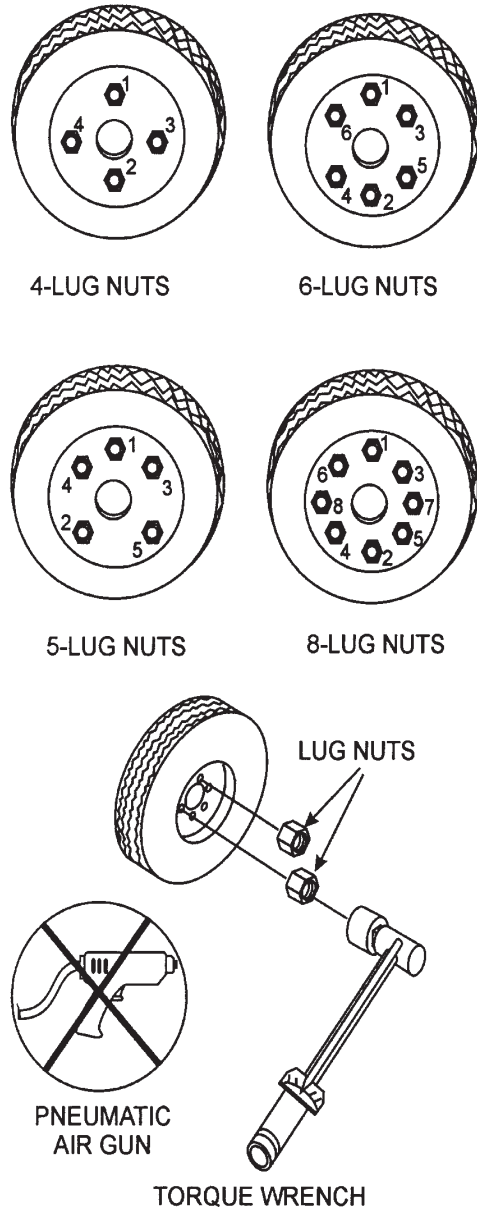


Figure 40. Wheel Lug Nuts Tightening Sequence

NOTICE

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

TRAILER WIRING DIAGRAM

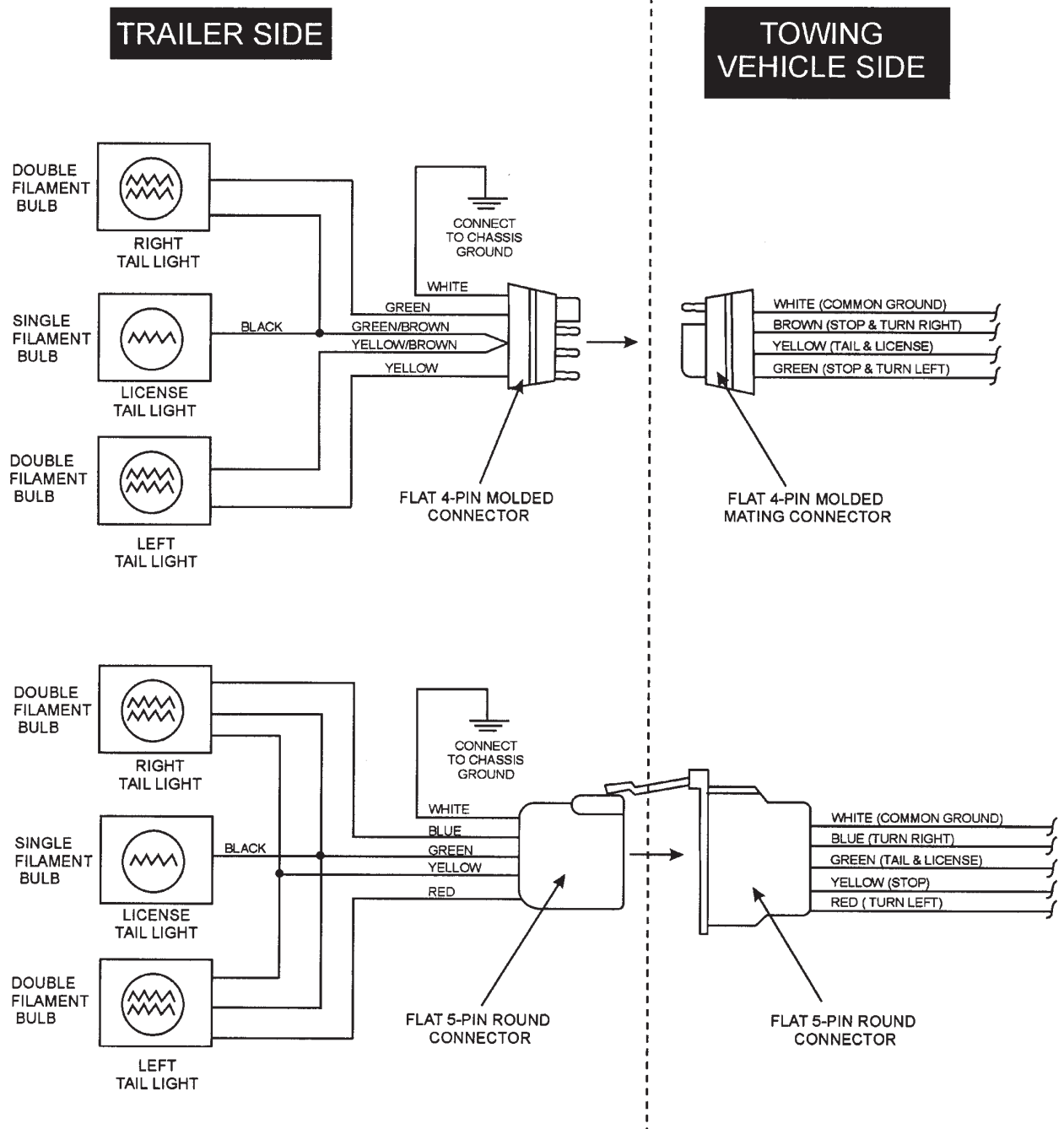
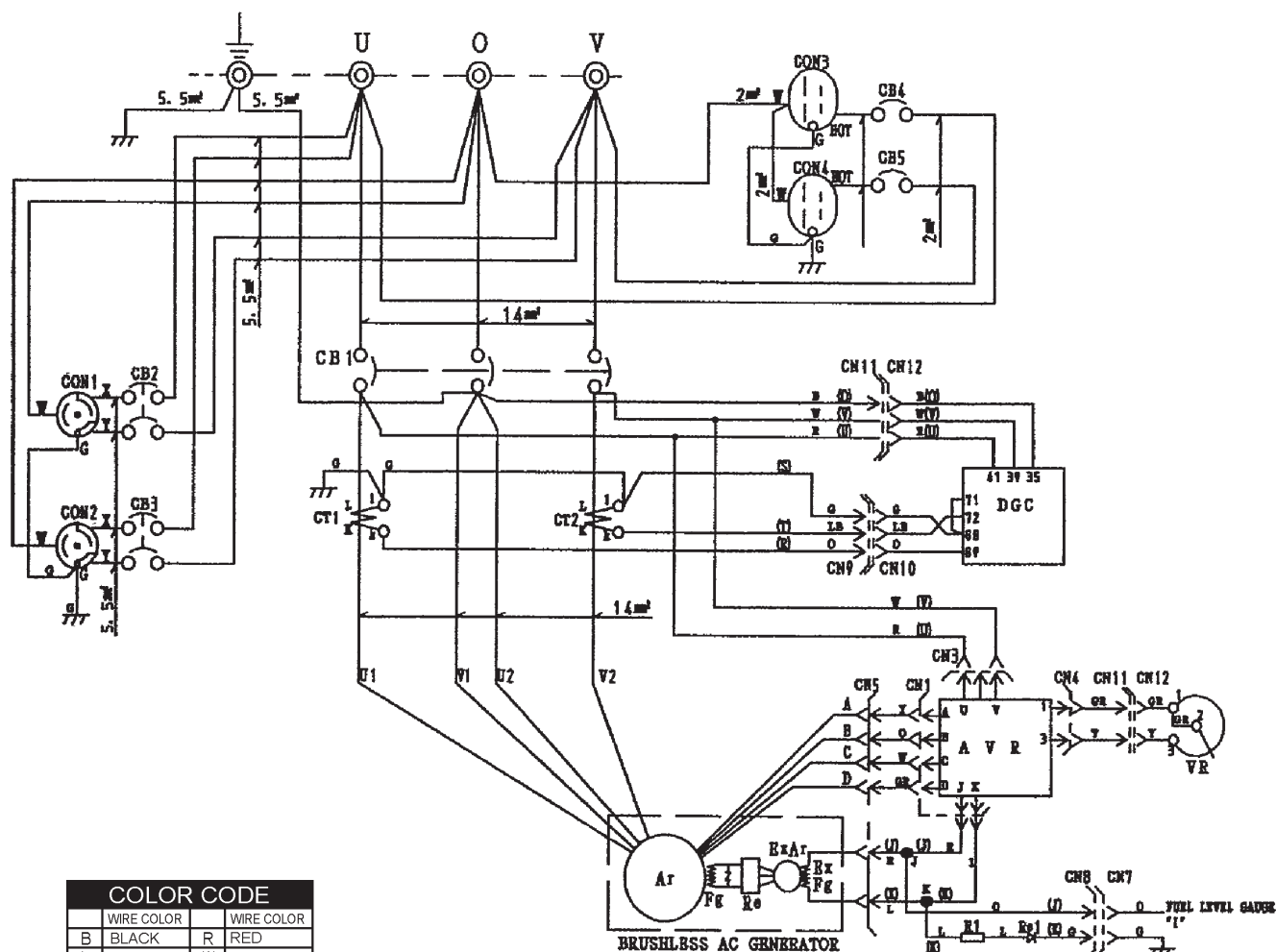


Figure 41. Trailer/Towing Vehicle Wiring Diagram

GENERATOR WIRING DIAGRAM



SYMBOL	DESIGNATION
Ar	MAIN GENERATOR ARMATURE WINDING
Fg	MAIN GENERATOR FIELD WINDING
ExAr	EXCITER ARMATURE WINDING
ExFg	EXCITER FIELD WINDING
Re	RECTIFIER
AVR	AUTOMATIC VOLTAGE REGULATOR
VR	VOLTAGE REGULATOR (RHEOSTAT)
CT 1,2	CURRENT TRANSFORMER
AS	CHANGE-OVER SWITCH, AMMETER
A	AC AMMETER
V	AC VOLTMETER
F	FREQUENCY METER
CB1	CIRCUIT BREAKER
CB2,3	CIRCUIT BREAKER
CB4,5	CIRCUIT BREAKER
CON1,2	RECEPTACLE
CON3,4	RECEPTACLE
R1	RESISTOR
Re1	RECTIFIER
DGC	DIGITAL CONTROLLER DGC-2020
J, K	RELAY UNIT

Figure 42. Generator Wiring Diagram

ENGINE WIRING DIAGRAM

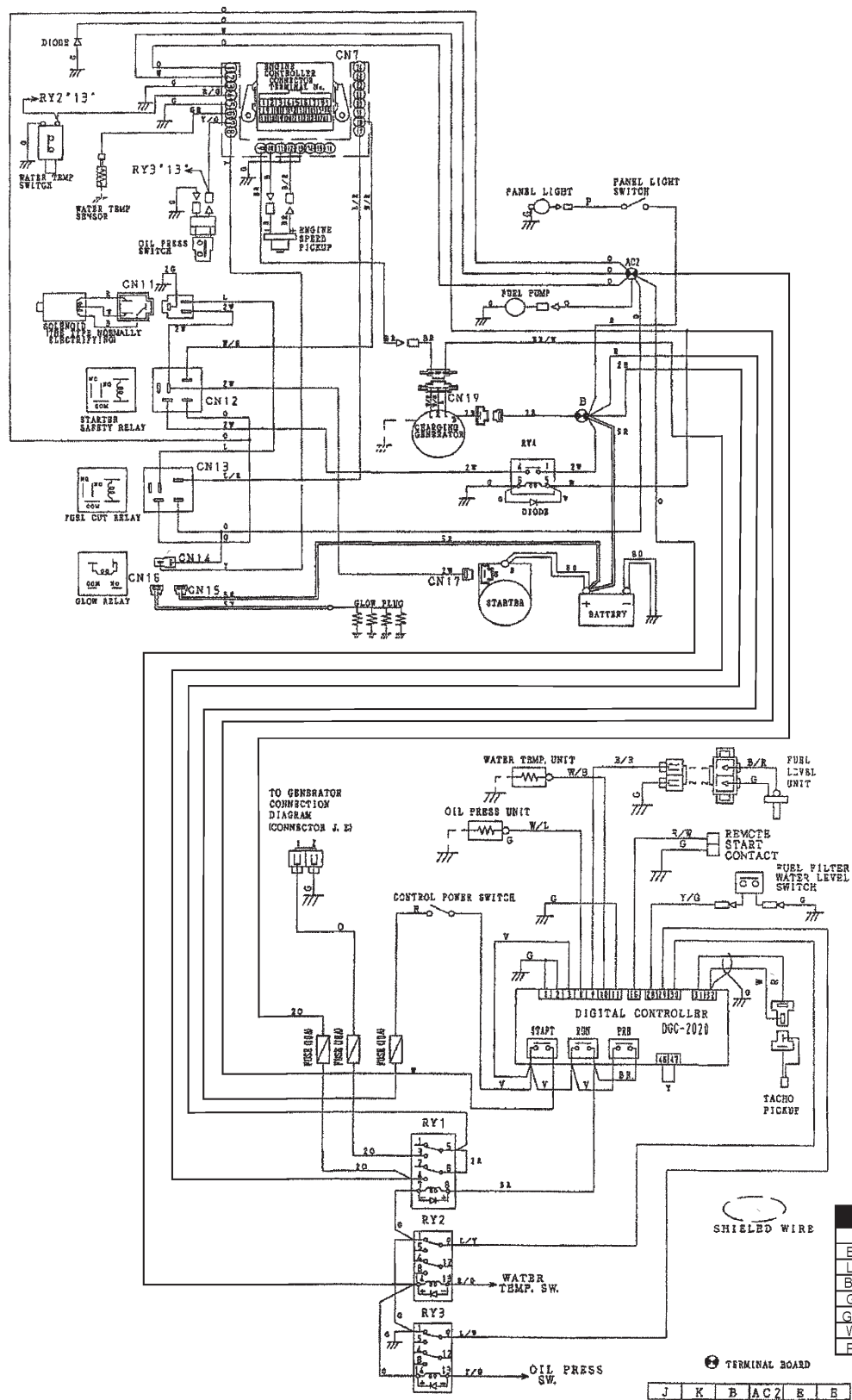


Figure 43. Engine Wiring Diagram

TROUBLESHOOTING (GENERATOR)

Practically all breakdowns can be prevented by proper handling and maintenance inspections, but in the event of a breakdown, use Table 16 shown below for diagnosis of the Generator. If the problem cannot be remedied, consult our company's business office or service plant.

Table 16. Generator Troubleshooting		
Symptom	Possible Problem	Solution
	Is wiring connection loose?	Check wiring and repair.
	Is AVR defective?	Replace if necessary.
	Defective Rotating Rectifier?	Check and replace.
	Defective Exciter Field?	Check for approximately 17.3 ohms across J & K on CN1
	Is wiring connections loose?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
High Voltage Output	Is wiring connections loose?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
Circuit Breaker Tripped	Short Circuit in load?	Check load and repair.
	Over current?	Confirm load requirements and reduce.
	Defective circuit breaker?	Check and replace.
	Over current Relay actuated?	Confirm load requirement and replace.

NOTICE

A digital controller is an electronic component. Before the insulation resistance can be measured, be sure to unplug the 6-pin connector as shown in Figure 44.

Failure to unplug the connector may cause serious damage to the Digital Controller.

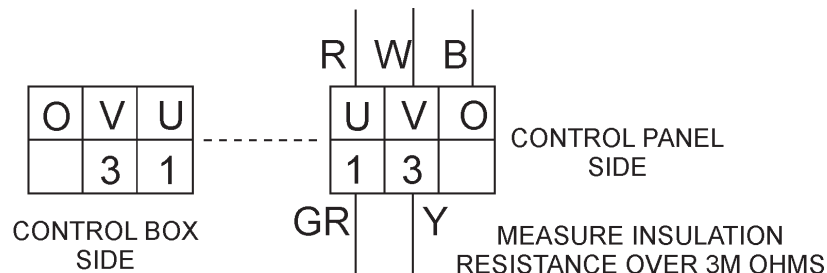


Figure 44. 6-Pin Connector

PROTECTIVE DEVICES

Protection devices and emergency stop devices are provided for protection of the generator against trouble during operation. When the alarm LED on the Digital Controller lights or flashes, stop the engine immediately and remedy the cause of the problem.

The alarm LED and the LCD display on the Digital Controller indicate the reason for the shutdown. After automatic shutdown always inspect the generator and eliminate any problems that might of caused the shutdown before attempting to restart the generator.

Before inspecting or troubleshooting the generator, press the **OFF** button on the Digital Controller. Place all circuit breakers in the **OFF** position and allow sufficient time for adequate cooling.

When ready to restart the generator, make sure all circuit breakers are **OFF**. Also check and make sure the that **OFF** button on the Digital Controller has been pressed to clear the system and that the OFF LED on the Digital Controller is **RED**. Restart the generator as outlined in the Manual/ Auto startup sections within this manual.

Table 17 list the setpoint of various protection devices and the action taken.

Table 17. Protective Devices				
PARAMETER	MAIN BREAKER	STOP ENGINE	DIGITAL CONTROLLER DISPLAY	SET POINT
Low Oil Pressure	ON	YES	Low Oil Press.	14.2 PSI (6.89 kPa)
High Water Temperature	ON	YES	High Water Temp.	230°F (110°C)
Overspeed	ON	YES	Overspeed	+15%
Fuel Filter Water Level	ON	NO	F/F Water Level	Device is activated whe water level is high
Over-Current	OFF	NO	N/A	Over-current will trip main breaker

EXPLANATION OF CODE IN REMARKS COLUMN

The following section explains the different symbols and remarks used in the Parts section of this manual. Use the help numbers found on the back page of the manual if there are any questions.

NOTICE

The contents and part numbers listed in the parts section are subject to change **without notice**. Multiquip does not guarantee the availability of the parts listed.

SAMPLE PARTS LIST

NO.	PART NO.	PART NAME	QTY.	REMARKS
1	12345	BOLT.....	1	INCLUDES ITEMS W/%
2%		WASHER, 1/4 IN.....		NOT SOLD SEPARATELY
2%	12347	WASHER, 3/8 IN....	1	MQ-45T ONLY
3	12348	HOSE		A/R ...MAKE LOCALLY
4	12349	BEARING	1	S/N 2345B AND ABOVE

NO. Column

Unique Symbols — All items with same unique symbol

(@, #, +, %, or >) in the number column belong to the same assembly or kit, which is indicated by a note in the “Remarks” column.

Duplicate Item Numbers — Duplicate numbers indicate multiple part numbers, which are in effect for the same general item, such as different size saw blade guards in use or a part that has been updated on newer versions of the same machine.

NOTICE

When ordering a part that has more than one item number listed, check the remarks column for help in determining the proper part to order.

PART NO. Column

Numbers Used — Part numbers can be indicated by a number, a blank entry, or TBD.

TBD (To Be Determined) is generally used to show a part that has not been assigned a formal part number at the time of publication.

A blank entry generally indicates that the item is not sold separately or is not sold by Multiquip. Other entries will be clarified in the “Remarks” Column.

QTY. Column

Numbers Used — Item quantity can be indicated by a number, a blank entry, or A/R.

A/R (As Required) is generally used for hoses or other parts that are sold in bulk and cut to length.

A blank entry generally indicates that the item is not sold separately. Other entries will be clarified in the “Remarks” Column.

REMARKS Column

Some of the most common notes found in the “Remarks” Column are listed below. Other additional notes needed to describe the item can also be shown.

Assembly/Kit — All items on the parts list with the same unique symbol will be included when this item is purchased.

Indicated by:

“INCLUDES ITEMS W/(unique symbol)”

Serial Number Break — Used to list an effective serial number range where a particular part is used.

Indicated by:

“S/N XXXXX AND BELOW”

“S/N XXXX AND ABOVE”

“S/N XXXX TO S/N XXX”

Specific Model Number Use — Indicates that the part is used only with the specific model number or model number variant listed. It can also be used to show a part is NOT used on a specific model or model number variant.

Indicated by:

“XXXXX ONLY”

“NOT USED ON XXXX”

“Make/Obtain Locally” — Indicates that the part can be purchased at any hardware shop or made out of available items. Examples include battery cables, shims, and certain washers and nuts.

“Not Sold Separately” — Indicates that an item cannot be purchased as a separate item and is either part of an assembly/kit that can be purchased, or is not available for sale through Multiquip.

SUGGESTED SPARE PARTS

DCA20SPXU2D WHISPERWATT GENERATOR WITH ISUZU BV-4LE2 DIESEL ENGINE

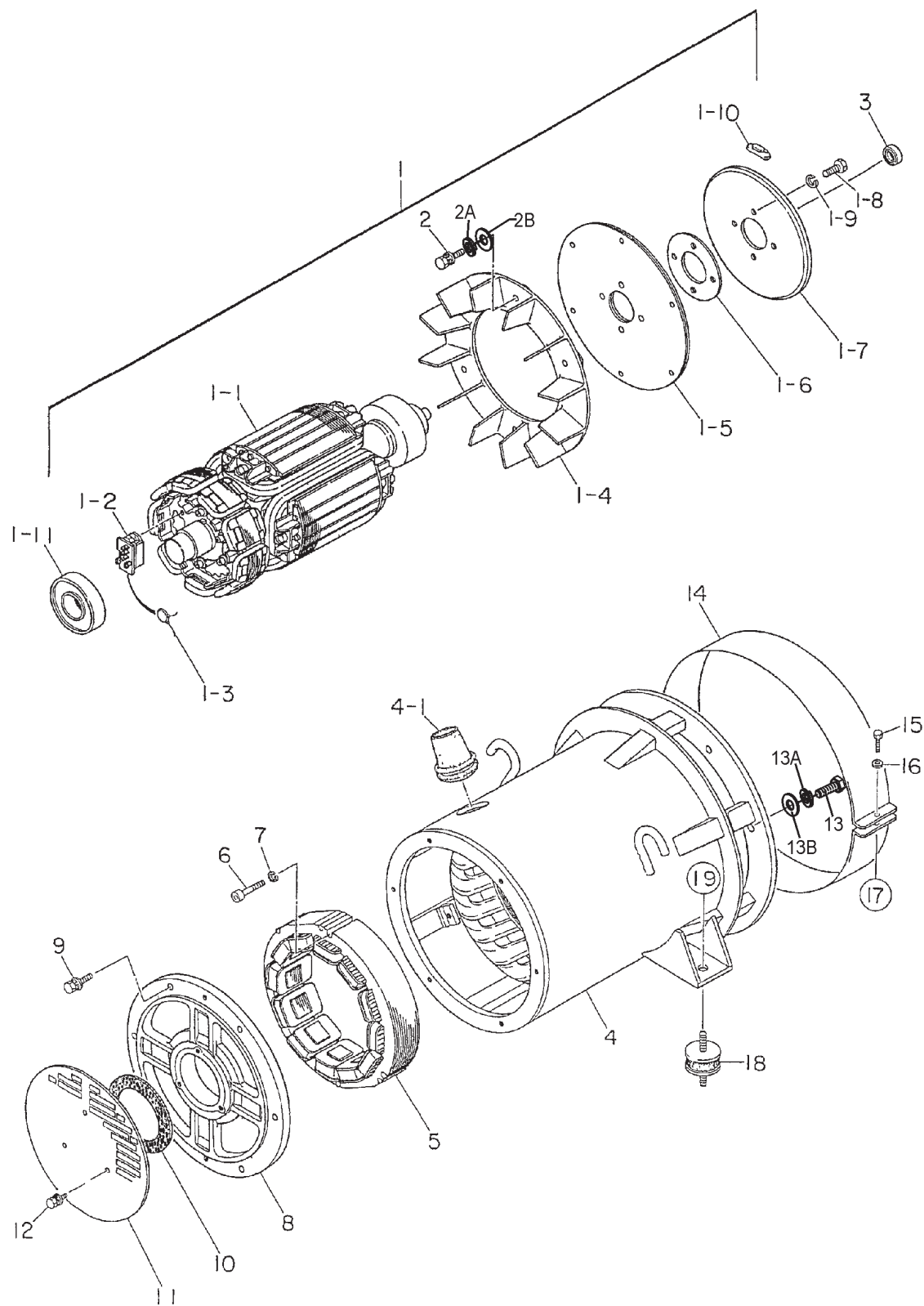
1 to 3 units

QTY.	P/N	DESCRIPTION
1.....	B1312500403	HOSE, RADIATOR UPPER
1.....	B1312500503	HOSE, RADIATOR LOWER
1.....	.0602011079.....	RADIATOR CAP
1.....	.0605505070.....	FUEL CAP
1.....	.0602122272.....	UNIT, OIL PRESSURE
1.....	.0602123275	UNIT, WATER TEMPERATURE
6.....	.8980374810.....	FILTER, FUEL CARTRIDGE
6.....	.8944370220.....	FILTER, FUEL (FUEL PUMP)
6.....	.8943142633.....	FILTER, OIL CARTRIDGE
3.....	.0602046321.....	FILTER, AIR (ELEMENT)
1.....	.0601870440.....	CIRCUIT BREAKER, 1P, 120V @ 20A
1.....	.0601870441.....	CIRCUIT BREAKER, 2P, 250V @ 50A
1.....	LY2DUS12VDC	RELAY
1.....	.8972606490.....	FAN BELT
1.....	.0601820626.....	AUTOMATIC VOLTAGE REGULATOR
1.....	.0601840073.....	RHEOSTAT
1.....	.0601840100.....	KNOB, RHEOSTAT
1.....	.1824100990.....	SENSOR, OIL SENSOR
1.....	.8973022030.....	SWITCH, OVERHEAT
1.....	.0605501078.....	FUEL SENDER
1.....	.0605516090.....	GASKET, FUEL SENDER

NOTICE

Part number on this Suggested Spare Parts list may supersede/replace the P/N shown in the text pages of this book.

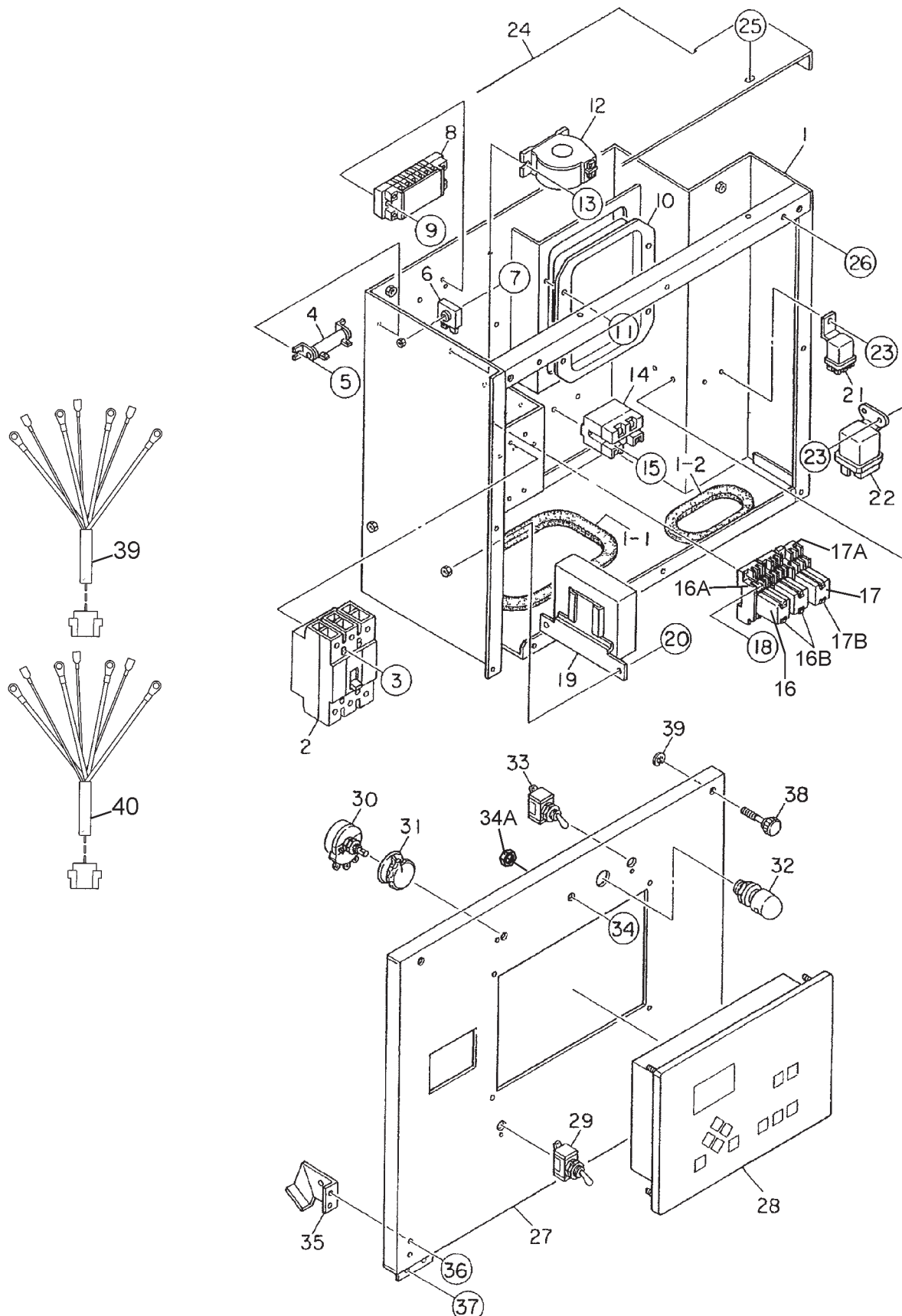
GENERATOR ASSY.



GENERATOR ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	B1110001402	ROTOR ASSY.....	1	INCLUDES ITEMS W/#
1-1#		FIELD ASSY.....	1	NOT SOLD SEPARATELY
1-2#	7961025004	RECTIFIER	1	
1-3#	0601822643	SURGE ABSORBER	1	
1-4#	8001070003	FAN	1	
1-5#	8351611004	COUPLING DISC	2	
1-6#	8351612004	COUPLING HUB WASHER	1	
1-8#	0010310025	HEX HEAD BOLT	4	
1-9#	0042510000	WASHER, LOCK	4	
1-10#	0601000209	BALANCING WEIGHT KIT	1	
1-11#	0071906308	BEARING	1	
2	0012308035	HEX HEAD BOLT	6	
2A	0040080000	WASHER, LOCK	6	
2B	0041208000	WASHER, FLAT	6	
3	0070506803	BEARING	1	
4	B1130001503	STATOR ASSY.	1	
4-1	0845041904	GROMMET	1	
5	B113700103	FIELD ASSY. EXCITER	1	
6	0016008045	HEX HD CAP SCREW	3	
7	0042508000	WASHER, LOCK	3	
8	8351315003	END BRACKET	1	
9	0017108035	HEX HEAD BOLT	6	
10	8351312004	PACKING	1	
11	8351331004	SUCTION COVER	1	
12	0017106016	HEX HEAD BOLT	3	
13	0010310030	HEX HEAD BOLT	6	
13A	0040001000	WASHER, LOCK	6	
13B	0041210000	WASHER, FLAT	6	
14	B0155400204	FAN COVER	1	
15	0010106030	HEX HEAD BOLT	1	
16	0041206000	WASHER, FLAT	1	
17	0600815000	NUT	1	
18	M9312600004	RUBBER SUSPENSION	2	
19	0207010000	HEX NUT	2	

CONTROL BOX ASSY.



CONTROL BOX ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	M121300140	CONTROL BOX	1	
1- 1	033000048	EDGING	1	
1- 2	033000025	EDGING	1	
2	060187043	CIRCUIT BREAKER 3P 90A	1	
3	002100407	MACHINE SCREW	4	
4	060184238	RESISTOR, 20W 50 OHM	1	
5	002710401	MACHINE SCREW	2	
6	0601823240	RECTIFIER	3	
7	0027104050	MACHINE SCREW	1	
8	0601815759	TERMINAL BOARD	1	
9	0027104020	MACHINE SCREW	2	
10	0601820626	AUTOMATIC VOLTAGE REGULATOR	1	
11	0027105016	MACHINE SCREW	4	
12	0601801123	CURRENT TRANSFORMER	2	
13	0027106020	MACHINE SCREW	4	
14	0601826031	RELAY	1	
15	0027104010	MACHINE SCREW	2	
16	0601824518	RELAY, DC12V	2	
16A	PYF08A	BASE.....	2	REPLACES P/N 0601823143
16B	PYCA1	CLIP.....	2	REPLACES P/N 0601824400
17	LY2DUS12VDC	RELAY.....	1	REPLACES P/N 0601827656
17A	PTF08A	BASE.....	1	REPLACES P/N 0601823109
17B	PYCA1	CLIP.....	1	REPLACES P/N 0601824400
18	0027104020	MACHINE SCREW	6	
19	8973259120	ENGINE CONTROLLER.....	1	REPLACES P/N 0602202523
20	0016906016	HEX. HEAD BOLT	2	
21	5825500290	RELAY.....	2	REPLACES P/N 0602201400
22	8942481610	GLOW RELAY.....	1	REPLACES P/N 0602202502
23	0027105016	MACHINE SCREW	4	
24	M1213500803	CONTROL BOX COVER		
25	0016906016	HEX. HEAD BOLT	5	
26	0016906016	HEX. HEAD BOLT	9	
27	M1223001303	CONTROL PANEL	1	
28	0602120630	DIGITAL CONTROLLER, OGC-2020	1	
29	0601831330	CONTROL POWER SWITCH	1	
30	0601840073	RHEOSTAT (VR), 2W 1K OHM	1	
31	0601840100	KNOB, RHEOSTAT.....	1	REPLACES P/N 0601840121
32	0601810141	PANEL LIGHT		
33	0601831330	SWITCH, PANEL LIGHT	1	
34	0021808015	MACHINE SCREW		
34A	0207008000	HEX. NUT		
35	1223100104	STOPPER		
36	0027105010	MACHINE SCREW	2	
37	0027105010	MACHINE SCREW	4	
38	M 922010000	SET SCREW	2	
39	008020000	SNAP RING	2	
39	M 1246705304	WIRE HARNESS, GENERATOR	1	
40	M 135720220	WIRE HARNESS, ENGINE	1	

Technical drawing of a mechanical assembly, likely a pump or engine component, showing multiple views and numbered parts.

Top View: Shows the main assembly with components labeled 1 through 61. Key features include a central housing (17), a vertical shaft (19), and various ports and fittings. A cross-section line 1-1 is indicated.

View-Y: A side view showing the assembly from the left, highlighting components 32, 33, 34, 35, 36, and 37.

View-Z: A side view showing the assembly from the right, highlighting components 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, and 61.

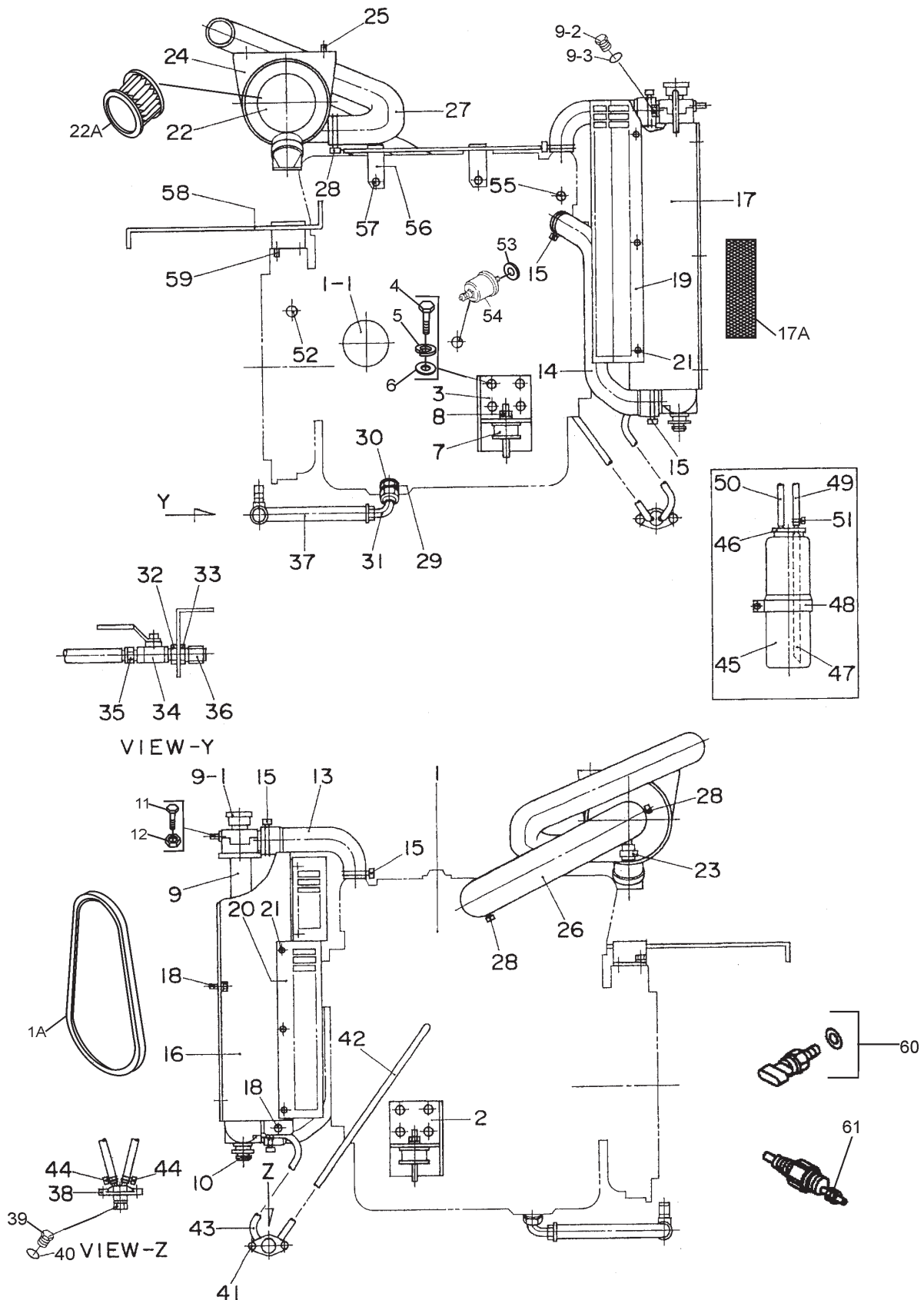
Detail Views:

- 1-1:** A cross-sectional view of the central housing.
- 17A:** A detail of a textured surface on the housing.
- 20-21:** A detail of a valve or fitting.
- 22-24:** A detail of a flange or cap.
- 25-28:** A detail of a shaft or pin.
- 29-31:** A detail of a joint or connection.
- 32-36:** A detail of a valve or fitting.
- 37-41:** A detail of a joint or connection.
- 42-44:** A detail of a valve or fitting.
- 45-49:** A detail of a valve or fitting.
- 50-51:** A detail of a valve or fitting.
- 52-54:** A detail of a valve or fitting.
- 55-57:** A detail of a valve or fitting.
- 58-59:** A detail of a valve or fitting.
- 60-61:** A detail of a valve or fitting.

ENGINE AND RADIATOR ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	M1923200104	ENGINE, ISUZU BV-4LE2	1	
1A	8972606490	FAN BELT	1	REPLACES P/N 0602011430
1-1	8943142633	OIL FILTER CARTRIDGE	1	REPLACES P/N 8944567411
2	M1303200304	ENGINE FOOT	1	
3	M1305200204	ENGINE FOOT	1	
4	0010310025	HEX HEAD BOLT	8	
5	0040010000	WASHER, LOCK	8	
6	0041210000	WASHER, FLAT	8	
7	0605000066	RUBBER SUSPENSION	2	
8	0207010000	HEX NUT	2	
9	M1923200094	RADIATOR	1	
9-1	0602011079	RADIATOR CAP	1	
9-2	M9200100904	PLUG	1	
9-3	0150000016	O-RING	1	
10	M9312200104	RUBBER MOUNT	2	
11	0016908040	HEX HEAD BOLT	2	
12	0207008000	HEX NUT	2	
13	B1312500403	RADIATOR HOSE, UPPER	1	REPLACES P/N M1310500803
14	B1312500503	RADIATOR HOSE, LOWER	1	REPLACES P/N M1310500903
15	0605515069	HOSE BAND	4	
16	M1310200003	FAN SHROUD	1	
17	M1310200103	FAN SHROUD	1	
17A	M1493105004	ACCOUSTIC SHEET	1	
18	0016908020	HEX HEAD BOLT	8	
19	M1310300703	FAN GUARD	1	
20	M1310300804	FAN GUARD	1	
21	0016908020	HEX HEAD BOLT	8	
22	0602046531	AIR CLEANER	1	
22A	0602046611	AIR CLEANER ELEMENT	1	REPLACES P/N 0602046321
23	0602040690	AIR CLEANER INDICATOR	1	
24	0602040552	AIR CLEANER BRACKET	1	
25	0016908030	HEX HEAD BOLT	2	
26	M1373100303	AIR CLEANER HOSE	1	
27	M1373100503	AIR CLEANER HOSE	1	
28	0605515139	HOSE BAND	3	
29	0602022560	ADAPTER	1	
30	M1320300304	PACKING	1	

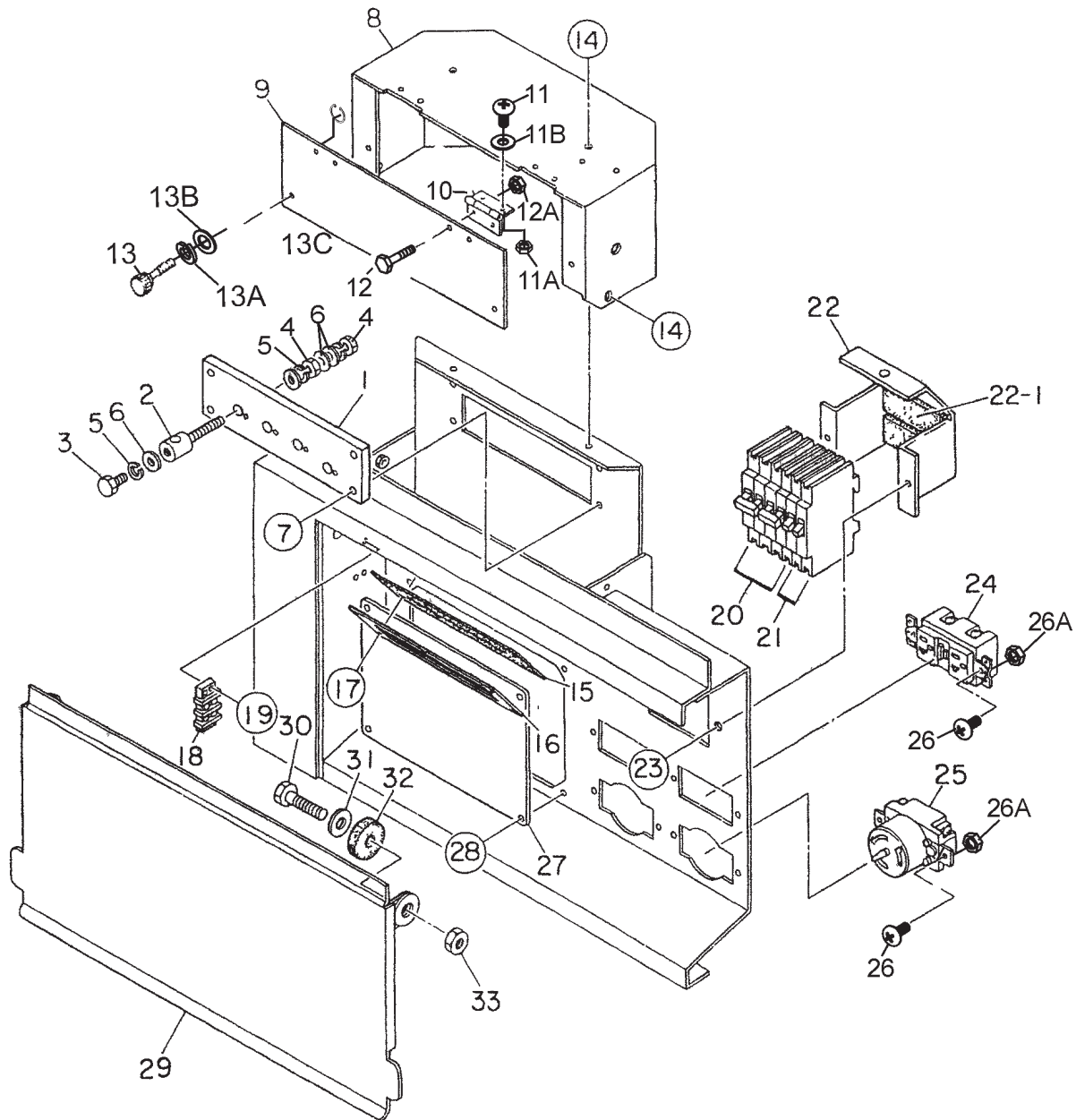
ENGINE AND RADIATOR ASSY. (CONTINUED)



ENGINE AND RADIATOR ASSY. (CONTINUED)

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
31	0602022561	90 DEGREE ELBOW	1	
32	0603306590	CONNECTOR	1	
33	0603300285	LOCKNUT	1	
34	0605511395	VALVE	1	
35	0603306395	HOSE JOINT	1	
36	0602021070	CAP	1	
37	0269200280	DRAIN HOSE	1	
38	M9602000003	DRAIN JOINT	1	
39	M9200200004	PLUG	1	
40	0150000018	O-RING	1	
41	0016906020	HEX HEAD BOLT	2	
42	0199900600	DRAIN HOSE	1	
43	0199900500	DRAIN HOSE	1	
44	0605515106	HOSE BAND	4	
45	M9300100003	RESERVE TANK	1	
46	M9300100003	RESERVE TANK CAP	1	
47	0199100215	HOSE	1	
48	M1317100004	RESERVE TANK BRACKET	1	
49	0199100350	HOSE	1	
50	0193600850	HOSE	1	
51	0605515106	HOSE BAND	2	
52	0602120481	TACHOMETER PICK UP	1	
53	M9200100004	ADAPTER	1	
54	0602122272	OIL PRESSURE UNIT	1	
55	0602123275	WATER TEMPERATURE UNIT	1	
56	M1353800004	CLAMPER ROD	1	
57	0016908020	HEX HEAD BOLT	2	
58	M1357300104	CLAMPER ROD	1	
59	0016910020	HEX HEAD BOLT	2	
60	1824100990	SENSOR, OIL PRESSURE	1	
61	8973022030	SWITCH, OVERHEAT	1	

OUTPUT TERMINAL ASSY.



ADD THE FOLLOWING DIGITS AFTER THE PART NUMBER WHEN ORDERING ANY PAINTED PANEL TO INDICATE COLOR OF UNIT:

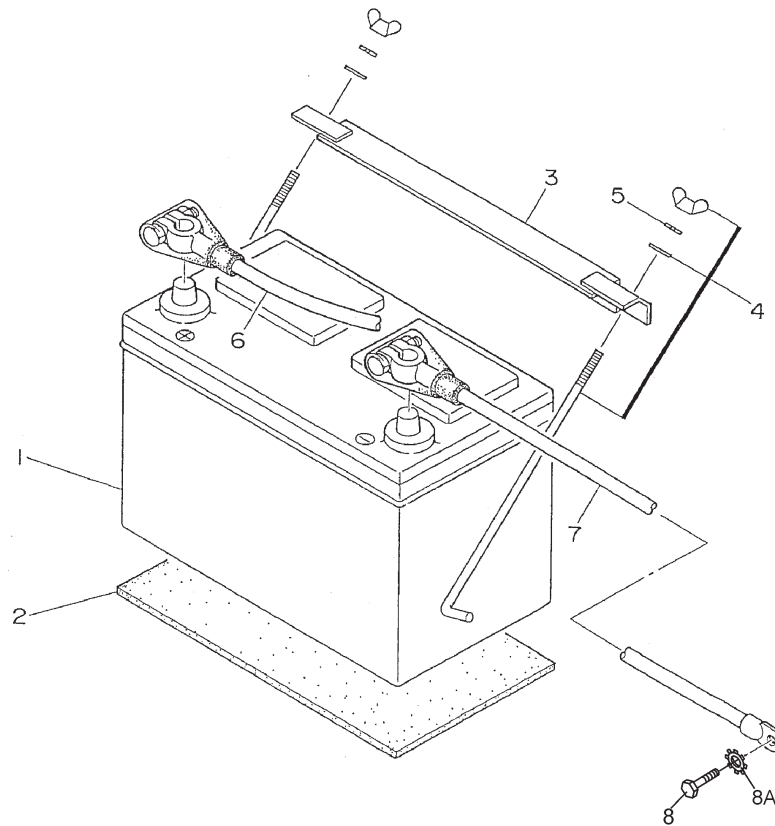
- | | |
|-----------------|----------------------|
| 1-ORANGE | 5-BLACK |
| 2-WHITE | 6-CATERPILLAR YELLOW |
| 3-SPECTRUM GREY | 7-CATO GOLD |
| 4-SUNBELT GREEN | 8-RED |

THE SERIAL NUMBER MAY BE REQUIRED.

OUTPUT TERMINAL ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	M1230700203	TERMINAL PANEL	1	
2	M9220000204	OUTPUT TERMINAL BOLT	4	
3	M9220000104	TIE BOLT	4	
4	0039308000	HEX BRASS NUT	8	
5	0040008000	WASHER, LOCK	12	
6	0041408000	WASHER, FLAT	16	
7	0016906025	HEX HEAD BOLT	4	
8	M1236101503	TERMINAL COVER	1	
9	M1236100404	OUTPUT WINDOW	1	
10	0605010040	HINGE	2	
11	0027103010	MACHINE SCREW	4	
11A	0030003000	HEX HEAD NUT	4	
11B	0041203000	WASHER, FLAT	4	
12	0027103010	MACHINE SCREW	4	
12A	0030003000	HEX HEAD NUT	4	
13	M9220100804	SET SCREW	2	
13A	0040006000	WASHER, LOCK	2	
13B	0041206000	WASHER, FLAT	2	
13C	0080200005	RETAINING RING	2	
14	0016906016	HEX HEAD BOLT	4	
15	M1236400004	CABLE OUTLET COVER	1	
16	M1236300004	CABLE OUTLET COVER SUPPORTER	1	
17	0016906020	HEX HEAD BOLT	6	
18	0601815194	TERMINAL	1	
19	0027104016	MACHINE SCREW	2	
20	0601870441	CIRCUIT BREAKER, 2P 50A	2	
21	0601870440	CIRCUIT BREAKER, 1P 20A	2	
22	M1260700404	BREAKER FITTING COVER	1	
22-1	0222100080	RUBBER CUSHION	2	
23	0016906020	HEX HEAD BOLT	2	
24	0601814013	RECEPTACLE, 125V 20A (GF-20LA)	2	
25	0601812538	RECEPTACLE, 250V 50A (CS6369)	2	
26	0027104016	MACHINE SCREW	8	
26A	0207004000	HEX NUT	8	
27	M1236400104	COVER	1	
28	0016906016	HEX HEAD BOLT	4	
29	M1236100503	TERMINAL COVER	1	
30	0010112045	HEX HEAD BOLT	2	
31	0041212000	WASHER, FLAT	2	
32	M9310200004	RUBBER STAY	2	
33	0030012000	HEX NUT	2	

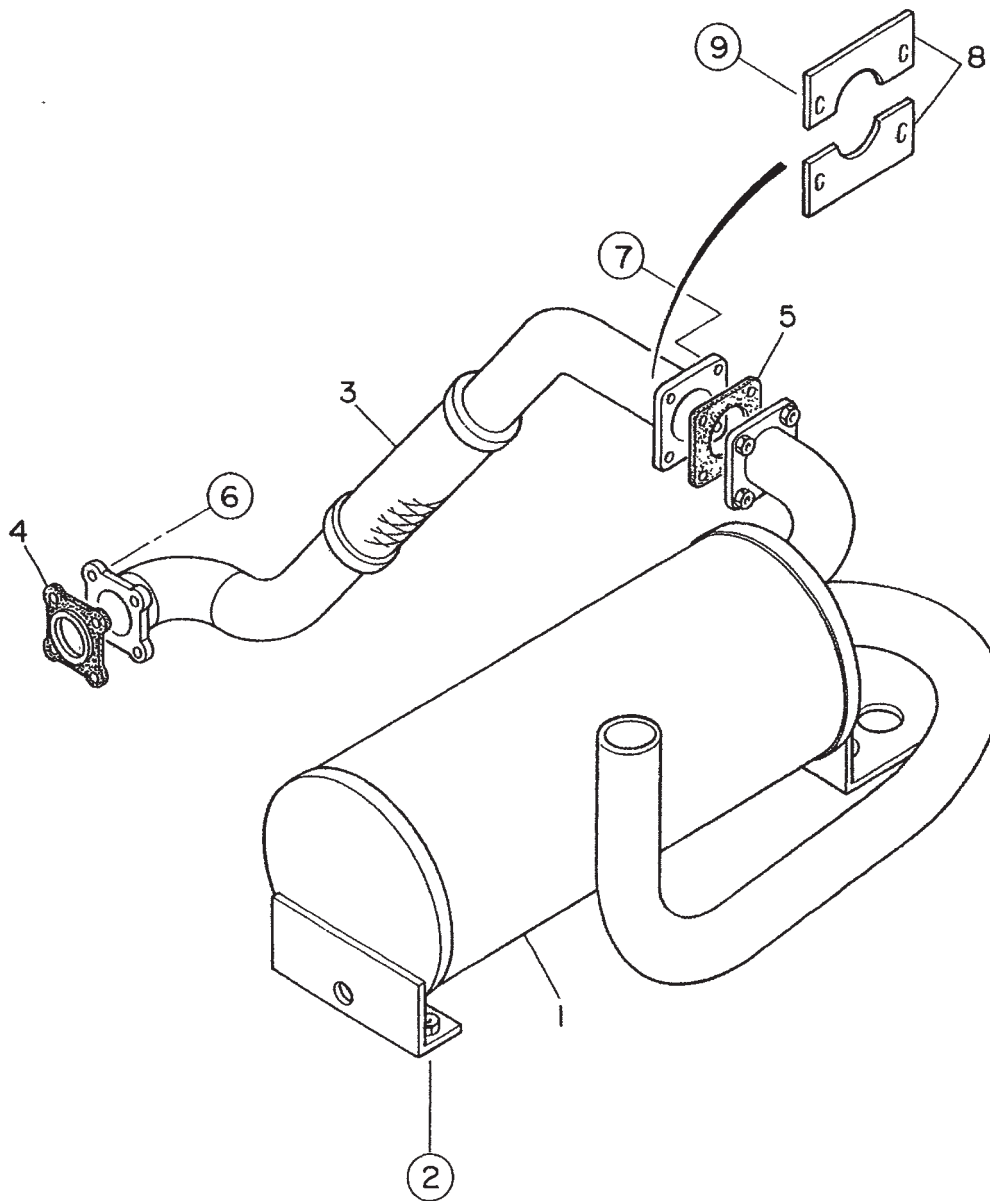
BATTERY ASSY.



BATTERY ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	0602220185	BATTERY	1	
2	B9310500014	BATTERY SHEET	1	
3	M9103000304	BATTERY BAND	1	
4	0602220920	BATTERY BOLT SET	2	
5	0040006000	WASHER, LOCK	2	
6	M1348400204	BATTERY CABLE	1	
7	M2346400104	BATTERY CABLE	1	
8	0016910020	HEX HEAD BOLT	1	
8A	0040510000	TOOTHED WASHER	3	

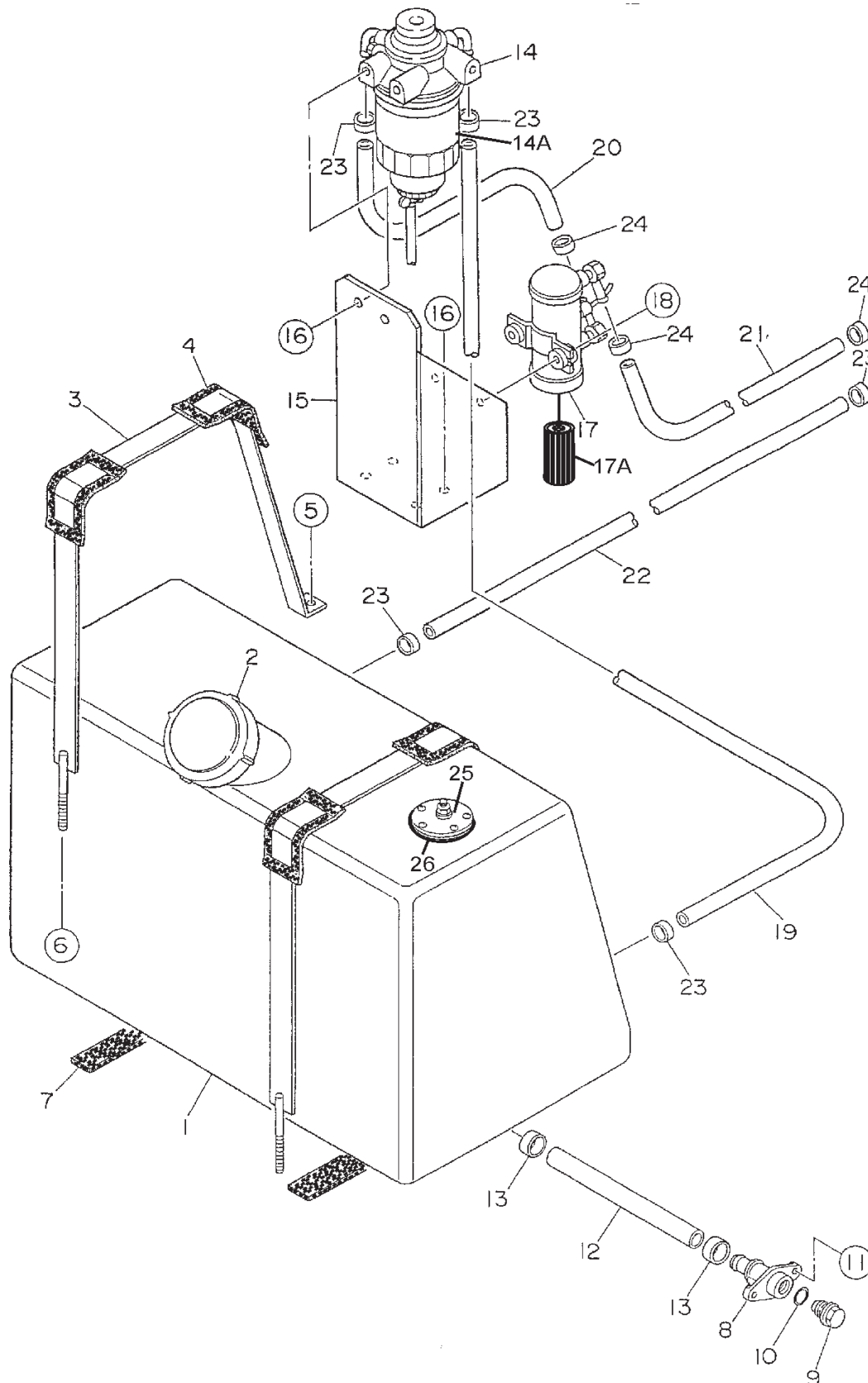
MUFFLER ASSY.



MUFFLER ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	M1330100803	MUFFLER	1	
2	0016908020	HEX HEAD BOLT	4	
3	M1333002803	EXHAUST PIPE	1	
4	0602320100	GASKET	1	
5	M1333200014	GASKET	1	
6	0207008000	HEX NUT	4	
7	0016908035	HEX HEAD BOLT	4	
8	M1330400804	COVER	2	
9	0016906016	HEX HEAD BOLT	4	

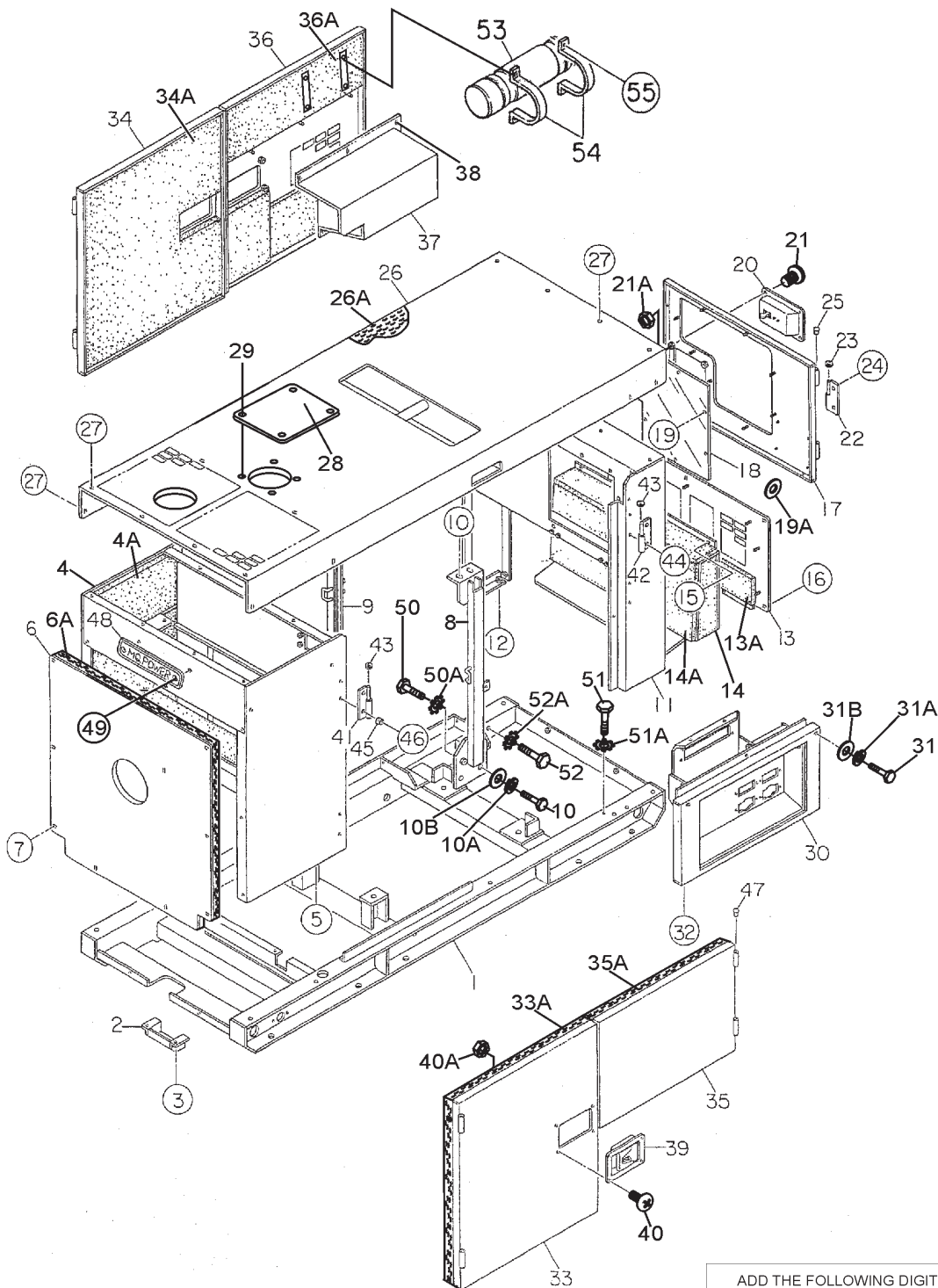
FUEL TANK ASSY.



FUEL TANK ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	M1363000212	FUEL TANK	1	
2	0605505070	FUEL TANK CAP	1	
3	M1363200004	TANK BAND	2	
4	M9310500104	SUPPORTER SHEET	4	
5	0016908020	HEX HEAD BOLT	2	
6	0207308000	SUPER LOCK NUT	2	
7	0222100080	RUBBER SHEET	4	
8	M9200000003	DRAIN JOINT	1	
9	M0920020004	DRAIN BOLT	1	
10	0150000018	O-RING	1	
11	0016906020	HEX HEAD BOLT	2	
12	M1363400104	DRAIN HOSE	1	
13	0605515198	HOSE BAND	2	
14	8943672922	FUEL FILTER	1	REPLACES P/N 0602042202
14A	8980374810	FUEL FILTER CARTRIDGE	1	REPLACES P/N 8943692993
15	M1366700104	FUEL FILTER BRACKET	1	
16	0016908020	HEX HEAD BOLT	6	
17	8970398340	FUEL PUMP	1	REPLACES P/N 0602023177
17A	8944370220	FUEL FILTER (FUEL PUMP)	1	REPLACES P/N 0602042425
18	0016906025	HEX HEAD BOLT	2	
19	0191200900	SUCTION HOSE	1	
20	0191200300	SUCTION HOSE	1	
21	0191200650	SUCTION HOSE	1	
22	0191201100	RETURN HOSE	1	
23	0605515108	HOSE BAND	5	
24	0605515198	HOSE BAND	3	
25	0605501078	FUEL SENDER	1	
26	0605516090	GASKET, FUEL SENDER	1	

ENCLOSURE ASSY.



ADD THE FOLLOWING DIGITS AFTER THE PART NUMBER WHEN ORDERING ANY PAINTED PANEL TO INDICATE COLOR OF UNIT:

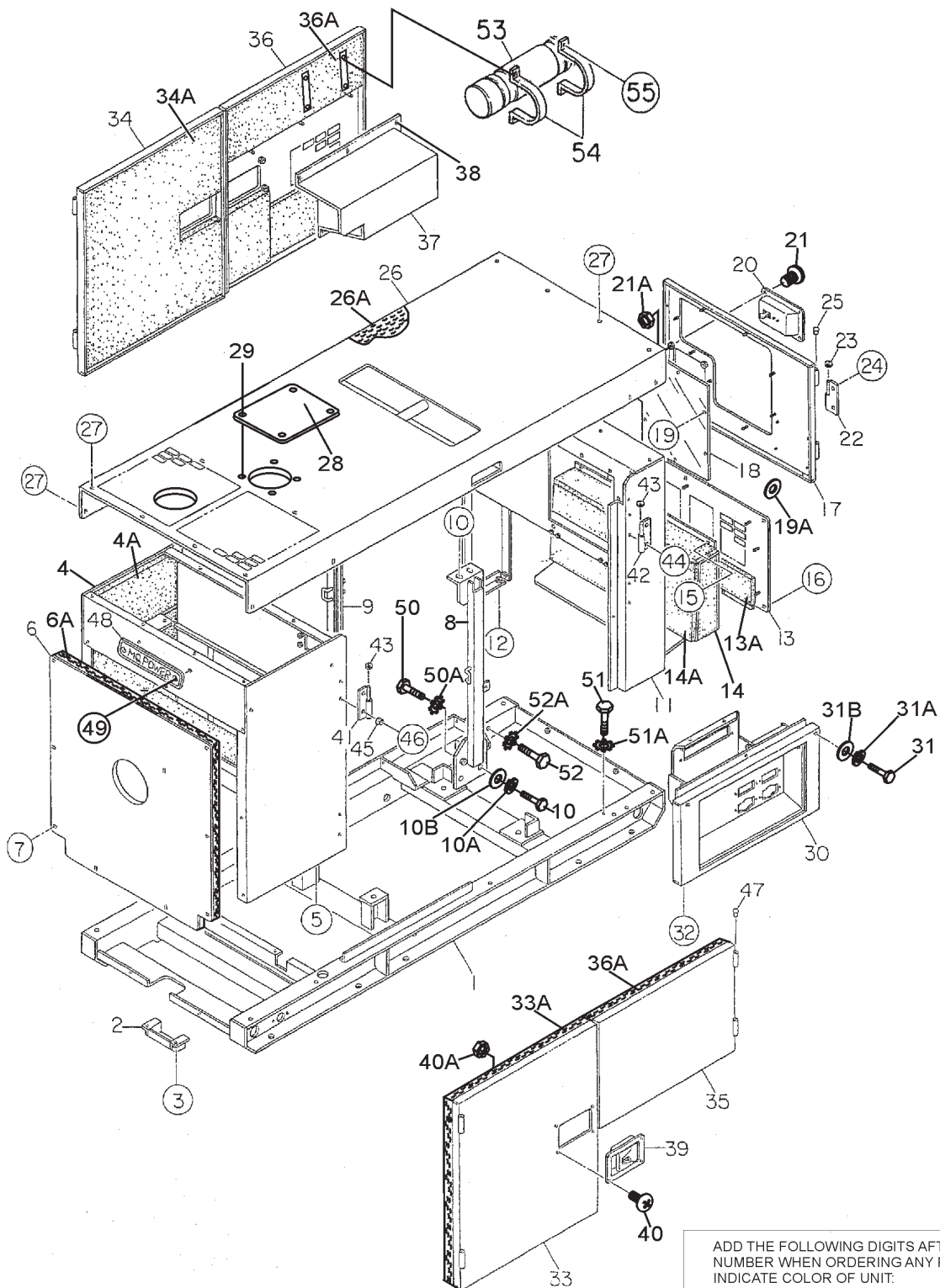
1-ORANGE	5-BLACK
2-WHITE	6-CATERPILLAR YELLOW
3-SPECTRUM GREY	7-CATO GOLD
4-SUNBELT GREEN	8-RED

THE SERIAL NUMBER MAY BE REQUIRED.

ENCLOSURE ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	M1413003302	BASE	1	
2	M1413400004	UNDER COVER	1	
3	0016908020	HEX HEAD BOLT	2	
4	M1423002302	FRONT FRAME	1	
4A	M1493104903	ACOUSTIC SHEET	1	
5	0016908020	HEX HEAD BOLT	4	
6	M1423200304	FRONT FRAME COVER	1	
6A	M1493100604	ACOUSTIC SHEET	1	
7	0019208020	HEX HEAD BOLT	11	
8	M1433000203	CENTER FRAME	1	
9	M1433000303	CENTER FRAME	1	
10	0010114030	HEX HEAD BOLT	8	
10A	0040014000	WASHER, LOCK	8	
10B	0041214000	WASHER, FLAT	8	
11	M1443001902	REAR FRAME	1	
12	0016908020	HEX HEAD BOLT	4	
13	M1443301803	REAR COVER	1	
14	M1443301703	REAR COVER DUCT	1	
14A	M1493303604	ACOUSTIC SHEET	1	
15	0207006000	HEX NUT	7	
16	0019208020	HEX HEAD BOLT	7	
17	M1443200613	REAR DOOR	1	
18	M1443600114	WINDOW PLATE	1	
19	0037906000	U-NUT	8	
19A	0041206000	WASHER, FLAT	8	
20	M9113000002	DOOR HANDLE ASSY.	1	
21	0021806016	MACHINE SCREW	4	
21A	0030006000	HEX HEAD NUT	4	
22	M9110100204	HINGE	2	
23	M9116100004	WASHER	2	
24	0019208020	HEX HEAD BOLT	3	
25	M9310000004	BLIND PLUG	2	
26	M1463002202	ROOF PANEL	1	
26A	M1493502903	ACOUSTIC SHEET	1	
27	0019208020	HEX HEAD BOLT	18	
28	M3310600004	ROOF COVER	1	
29	0019208020	HEX HEAD BOLT	1	
30	M1453201202	SPLASHER PANEL	1	
31	0019108055	HEX HEAD BOLT	2	
31A	0042308000	WASHER, LOCK	2	
31B	0042408000	WASHER, FLAT	2	
32	0016908020	HEX HEAD BOLT	2	

ENCLOSURE ASSY. (CONTINUED)



ADD THE FOLLOWING DIGITS AFTER THE PART NUMBER WHEN ORDERING ANY PAINTED PANEL TO INDICATE COLOR OF UNIT:

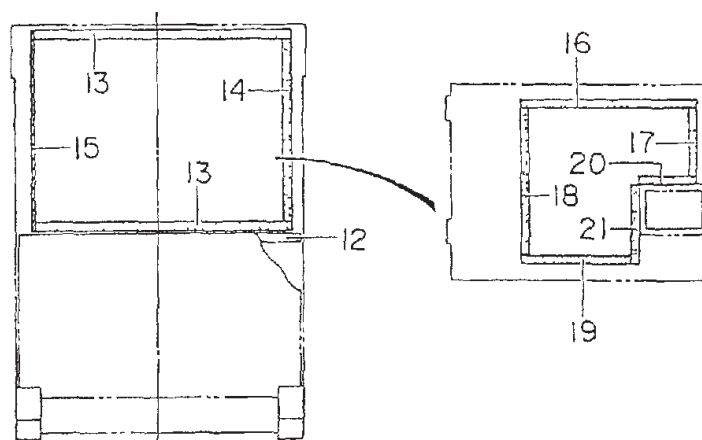
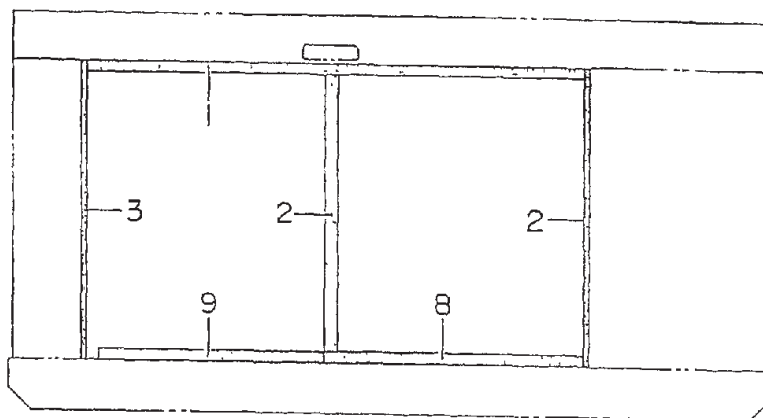
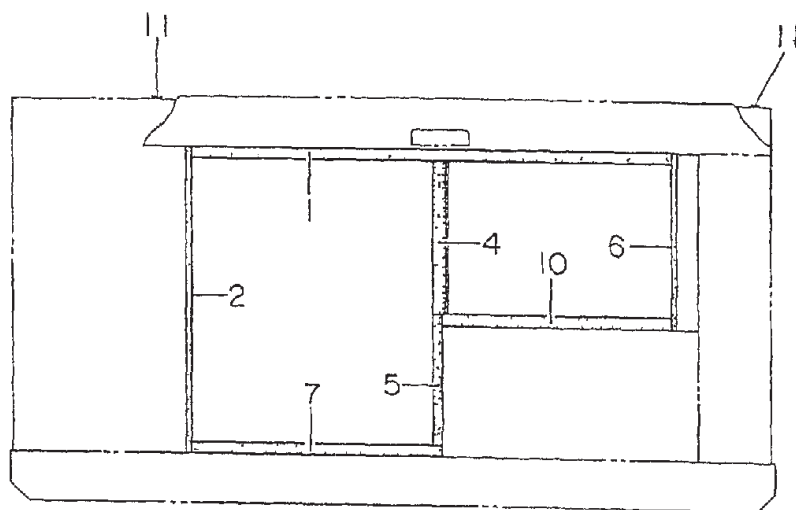
- | | |
|-----------------|----------------------|
| 1-ORANGE | 5-BLACK |
| 2-WHITE | 6-CATERPILLAR YELLOW |
| 3-SPECTRUM GREY | 7-CATO GOLD |
| 4-SUNBELT GREEN | 8-RED |

THE SERIAL NUMBER MAY BE REQUIRED.

ENCLOSURE ASSY. (CONTINUED)

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
33	M1453003803	SIDE DOOR	1	
33A	M1493405604	ACOUSTIC SHEET	1	
34	M1453003903	SIDE DOOR	1	
34A	M1493405704	ACOUSTIC SHEET	1	
35	M1453004003	SIDE DOOR	1	
35A	M1493405804	ACOUSTIC SHEET	1	
36	M1453004703	SIDE DOOR	1	
36A	M1493409404	ACOUSTIC SHEET	1	
37	M1453301403	DUCT	1	
38	0207006000	HEX NUT	8	
39	B9114000002	DOOR HANDLE ASSY.	3	
40	0021806016	MACHINE SCREW	12	
40A	0030006000	HEX HEAD NUT	12	
41	M9110100204	HINGE	4	
42	M9110100304	HINGE	4	
43	M9116100004	WASHER	8	
44	0019208020	HEX HEAD BOLT	9	
45	0601850097	DOOR STOPPER	8	
46	0027208025	MACHINE SCREW	8	
47	M9310000004	BLIND PLUG	8	
48	0600500090	EMBLEM	1	
49	0025106016	MACHINE SCREW	2	
50	0016910020	HEX HEAD BOLT	1	
50A	0040510000	TOOTHED WASHER	1	
51	0016908020	HEX HEAD BOLT	1	
51A	0040508000	TOOTHED WASHER	1	
52	0016906020	HEX HEAD BOLT	1	
52A	0040506000	TOOTHED WASHER	1	
53	0600800321	MANUAL HOLDER	1	
54	M1483600804	MANUAL HOLDER CLAMP	1	
55	0016906016	HEX HEAD BOLT	4	

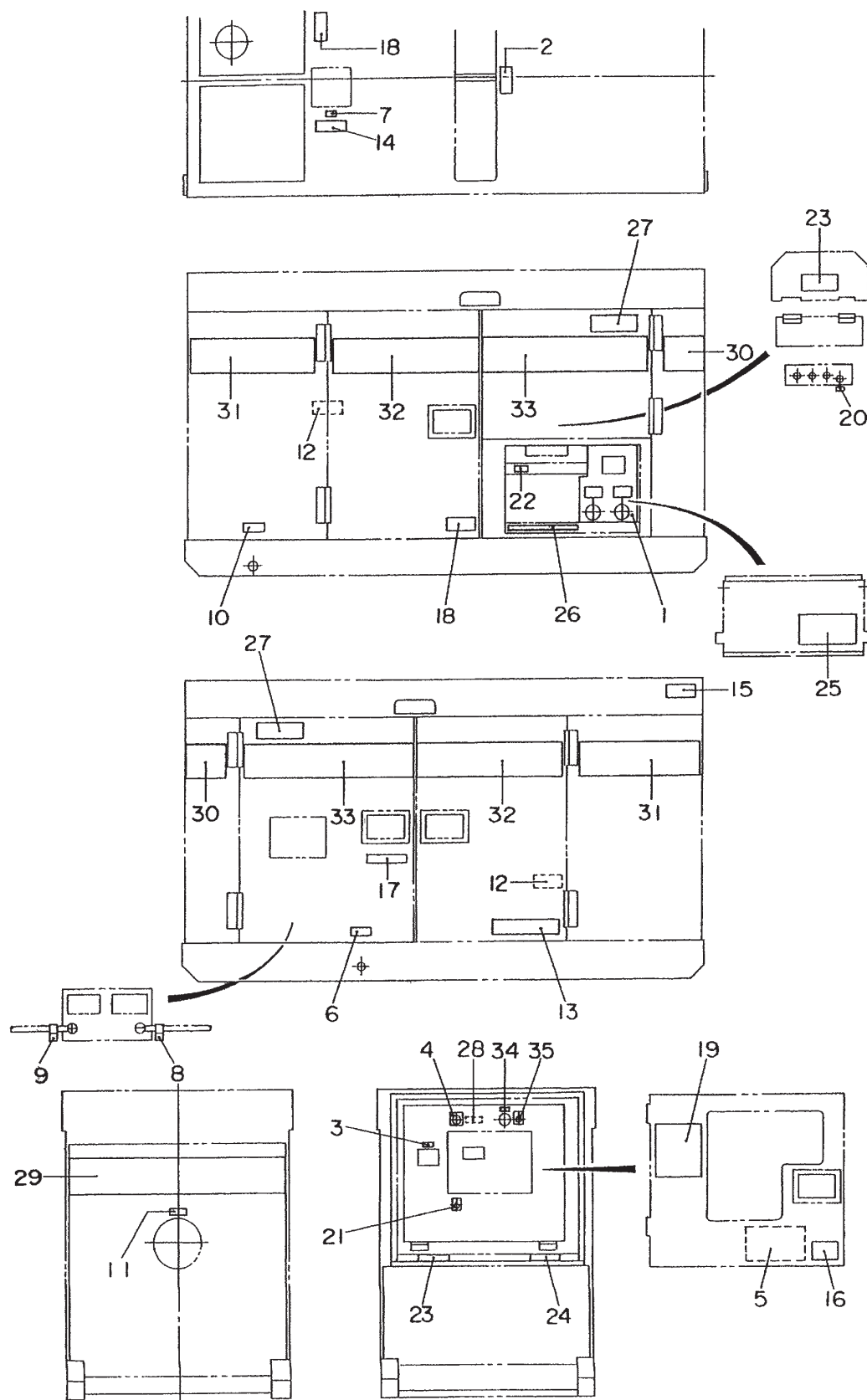
RUBBER SEALS ASSY.



RUBBER SEALS ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	0228901150	RUBBER SEAL	2	
2	0228900695	RUBBER SEAL	3	
3	0228900755	RUBBER SEAL	1	
4	M1490300004	RUBBER SEAL	1	
5	0228800325	RUBBER SEAL	1	
6	0229400430	RUBBER SEAL	1	
7	0228900540	RUBBER SEAL	1	
8	0228900550	RUBBER SEAL	1	
9	0229200595	RUBBER SEAL	1	
10	0228900610	RUBBER SEAL	1	
11	0229200750	RUBBER SEAL	2	
12	0229200740	RUBBER SEAL	1	
13	0228800670	RUBBER SEAL	2	
14	0228800525	RUBBER SEAL	1	
15	0228800565	RUBBER SEAL	1	
16	0228100458	RUBBER SEAL	1	
17	0228100171	RUBBER SEAL	1	
18	0228100351	RUBBER SEAL	1	
19	0228100285	RUBBER SEAL	1	
20	0228100153	RUBBER SEAL	1	
21	0228100180	RUBBER SEAL	1	

NAMEPLATE AND DECALS ASSY.



NAMEPLATE AND DECALS ASSY.

NO.	PART NO.	PART NAME	QTY.	REMARKS
1	M1550001803	DECAL: AUXILLARY OUTPUT	1	M15000180
2	M1550001904	DECAL: CAUTION : LIFTING CAP	1	M15000190
3	M9522000504	DECAL: CIRCUIT BREAKER	1	M92200050
4	M9522000604	DECAL: VOLTAGE REGULATOR	1	M92200060
5	M1550004403	DECAL: OPERATING PROCEDURES.....	1	M15000440
6	M9500000004	DECAL: OIL DRAIN PLUG	1	M90000000
7	M9500100004	DECAL: WATER	1	M90010000
8	M9500300004	DECAL: -	1	M90030000
9	M9500300104	DECAL: +.....	1	M90030010
10	M9500500104	DECAL: FUEL DRAIN PLUG	1	M90050010
11	M9500500304	DECAL: DIESEL FUEL.....	1	M90050030
12	M9503000004	DECAL: WARNING.....	1	M90300000
13	M9503000103	DECAL: WATER * OIL CHECK.....	1	M90300010
14	M9503100004	DECAL: WARNING.....	1	M90310000
15	M9503200004	DECAL: WARNING.....	1	M90320000
16	M9503200104	DECAL: DANGER	1	M90320010
17	M9510000104	DECAL: DOCUMENT BOX	1	M91000010
18	M9510100004	DECAL: CAUTION.....	1	M91010000
19	M9510200002	DECAL: MQ.....	1	M91010000
20	M9520000004	DECAL: GROUND.....	1	M92000000
21	M9520001704	DECAL: CONTROL POWER SWITCH	1	M92000170
22	M9520000504	DECAL: START CONTACT.....	1	M92000050
23	M9520100004	DECAL: WARNING.....	1	M92010000
24	M9520100304	DECAL: SAFETY INSTRUCTIONS.....	1	M92010030
25	M9520100404	DECAL: DANGER	1	M92010040
26	M9520100503	DECAL: WARNING.....	1	M92010050
27	M9520100603	DECAL: CAUTION.....	1	M92010060
28	M9521000004	DECAL: TERMINAL	1	
29	M1560100403	DECAL: STRIPE WHISPERWATT	1	
30	M1560102604	DECAL: STRIPE 20	2	
31	M1560101604	DECAL: MQ POWER	2	
32	M1560101704	DECAL: STRIPE	2	
33	M1560101804	DECAL: STRIPE	2	
34	M9522000804	DECAL: PANEL LIGHT.....	1	M9220080
35	M9522000704	DECAL: PANEL LIGHT SWITCH.....	1	M9220070

TERMS AND CONDITIONS OF SALE — PARTS

PAYMENT TERMS

Terms of payment for parts are net 30 days.

FREIGHT POLICY

All parts orders will be shipped collect or prepaid with the charges added to the invoice. All shipments are F.O.B. point of origin. Multiquip's responsibility ceases when a signed manifest has been obtained from the carrier, and any claim for shortage or damage must be settled between the consignee and the carrier.

MINIMUM ORDER

The minimum charge for orders from Multiquip is \$15.00 net. Customers will be asked for instructions regarding handling of orders not meeting this requirement.

RETURNED GOODS POLICY

Return shipments will be accepted and credit will be allowed, subject to the following provisions:

1. A Returned Material Authorization must be approved by Multiquip prior to shipment.
2. To obtain a Return Material Authorization, a list must be provided to Multiquip Parts Sales that defines item numbers, quantities, and descriptions of the items to be returned.
 - a. The parts numbers and descriptions must match the current parts price list.
 - b. The list must be typed or computer generated.
 - c. The list must state the reason(s) for the return.
 - d. The list must reference the sales order(s) or invoice(s) under which the items were originally purchased.
 - e. The list must include the name and phone number of the person requesting the RMA.
3. A copy of the Return Material Authorization must accompany the return shipment.
4. Freight is at the sender's expense. All parts must be returned freight prepaid to Multiquip's designated receiving point.

5. Parts must be in new and resalable condition, in the original Multiquip package (if any), and with Multiquip part numbers clearly marked.
6. The following items are not returnable:
 - a. Obsolete parts. (If an item is in the price book and shows as being replaced by another item, it is obsolete.)
 - b. Any parts with a limited shelf life (such as gaskets, seals, "O" rings, and other rubber parts) that were purchased more than six months prior to the return date.
 - c. Any line item with an extended dealer net price of less than \$5.00.
 - d. Special order items.
 - e. Electrical components.
 - f. Paint, chemicals, and lubricants.
 - g. Decals and paper products.
 - h. Items purchased in kits.
7. The sender will be notified of any material received that is not acceptable.
8. Such material will be held for five working days from notification, pending instructions. If a reply is not received within five days, the material will be returned to the sender at his expense.
9. Credit on returned parts will be issued at dealer net price at time of the original purchase, less a 15% restocking charge.
10. In cases where an item is accepted, for which the original purchase document can not be determined, the price will be based on the list price that was effective twelve months prior to the RMA date.
11. Credit issued will be applied to future purchases only.

PRICING AND REBATES

Prices are subject to change without prior notice. Price changes are effective on a specific date and all orders received on or after that date will be billed at the revised price. Rebates for price declines and added charges for price increases will not be made for stock on hand at the time of any price change.

Multiquip reserves the right to quote and sell direct to Government agencies, and to Original Equipment Manufacturer accounts who use our products as integral parts of their own products.

SPECIAL EXPEDITING SERVICE

A \$35.00 surcharge will be added to the invoice for special handling including bus shipments, insured parcel post or in cases where Multiquip must personally deliver the parts to the carrier.

LIMITATIONS OF SELLER'S LIABILITY

Multiquip shall not be liable hereunder for damages in excess of the purchase price of the item with respect to which damages are claimed, and in no event shall Multiquip be liable for loss of profit or good will or for any other special, consequential or incidental damages.

LIMITATION OF WARRANTIES

No warranties, express or implied, are made in connection with the sale of parts or trade accessories nor as to any engine not manufactured by Multiquip. Such warranties made in connection with the sale of new, complete units are made exclusively by a statement of warranty packaged with such units, and Multiquip neither assumes nor authorizes any person to assume for it any other obligation or liability whatever in connection with the sale of its products. Apart from such written statement of warranty, there are no warranties, express, implied or statutory, which extend beyond the description of the products on the face hereof.

Effective: February 22, 2006

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OPERATION AND PARTS 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 (800) 537-3927

Service Department

800-421-1244
310-537-3700

Fax: 310-537-4259

Technical Assistance

800-478-1244

Fax: 310-943-2238

MQ Parts Department

800-427-1244
310-537-3700

Fax: 800-672-7877
Fax: 310-637-3284

Warranty Department

800-421-1244
310-537-3700

Fax: 310-943-2249

MEXICO

MQ Cipsa

Carr. Fed. Mexico-Puebla KM 126.5
Momoxpan, Cholula, Puebla 72760 Mexico
Contact: pmastretta@cipsa.com.mx

Tel: (52) 222-225-9900
Fax: (52) 222-285-0420

CANADA

Multiquip

4110 Industriel Boul.
Laval, Quebec, Canada H7L 6V3
Contact: jmartin@multiquip.com

Tel: (450) 625-2244
Tel: (877) 963-4411
Fax: (450) 625-8664

UNITED KINGDOM

Multiquip (UK) Limited Head Office

Unit 2, Northpoint Industrial Estate,
Globe Lane,
Dukinfield, Cheshire SK16 4UJ
Contact: sales@multiquip.co.uk

Tel: 0161 339 2223
Fax: 0161 339 3226

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

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