

# OPERATION AND PARTS MANUAL



**MQ POWER®**

**WHISPERWATT™ SERIES  
MODEL DCA220SSCU  
MODEL DCA220SSCU4i  
60Hz GENERATOR  
(CUMMINS QSB7-G6 DIESEL ENGINE)**

**PARTS LIST NO. M4870300204**

Revision #0 (10/25/12)

To find the latest revision of this  
publication, visit our website at:  
[www.mqpower.com](http://www.mqpower.com)



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



**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

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

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

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

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

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

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### NOTICE

Specifications are subject to change without notice.




# SAFETY INFORMATION

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


## SAFETY MESSAGES

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


## SAFETY SYMBOLS

 **DANGER**

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

 **WARNING**

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








 **CAUTION**

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

**NOTICE**

Addresses practices not related to personal injury.

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

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


# SAFETY INFORMATION

## GENERAL SAFETY

### ⚠ CAUTION

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



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



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

### NOTICE

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

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

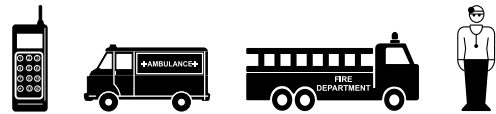
- **ALWAYS** know the location of the nearest **fire extinguisher**.



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



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



## GENERATOR SAFETY

### ⚠ DANGER

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



### ⚠ WARNING

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

### ⚠ CAUTION

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

### NOTICE

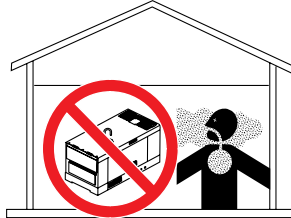
- **ALWAYS** ensure generator is on level ground before use.
- **ALWAYS** keep the machine in proper running condition.
- Fix damage to machine and replace any broken parts immediately.
- **ALWAYS** store equipment properly when it is not being used. Equipment should be stored in a clean, dry location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

# SAFETY INFORMATION

## ENGINE SAFETY

### DANGER

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



### WARNING

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



### 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

### DANGER

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



## TOWING SAFETY

### CAUTION

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



- Make sure the hitch and coupling of the towing vehicle are rated equal to, or greater than the trailer “gross vehicle weight rating.”
- **ALWAYS** inspect the hitch and coupling for wear. **NEVER** tow a trailer with defective hitches, couplings, chains, etc.
- Check the tire air pressure on both towing vehicle and trailer. **Trailer tires should be inflated to 50 psi cold.** Also check the tire tread wear on both vehicles.
- **ALWAYS** make sure the trailer is equipped with a **safety chain**.
- **ALWAYS** properly attach trailer’s safety chains to towing vehicle.
- **ALWAYS** make sure the vehicle and trailer directional, backup, brake and trailer lights are connected and working properly.
- DOT Requirements include the following:
  - Connect and test electric brake operation.
  - Secure portable power cables in cable tray with tie wraps.
- The maximum speed for highway towing is **55 MPH** unless posted otherwise. Recommended off-road towing is not to exceed **15 MPH** or less depending on type of terrain.
- Avoid sudden stops and starts. This can cause skidding, or jack-knifing. Smooth, gradual starts and stops will improve towing.
- Avoid sharp turns to prevent rolling.
- Trailer should be adjusted to a level position at all times when towing.
- Raise and lock trailer wheel stand in up position when towing.
- Place **chock blocks** underneath wheel to prevent **rolling** while parked.
- Place **support blocks** underneath the trailer’s bumper to prevent **tipping** while parked.
- Use the trailer’s swivel jack to adjust the trailer height to a level position while parked.

# 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.**



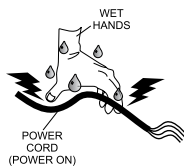
- Backfeed to a utility system can cause **electrocution** and/or property damage. **NEVER** connect the generator to a building's electrical system without a transfer switch or other approved device. All installations should be performed by a **licensed electrician** in accordance with all applicable 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**

<b>Model</b>	DCA220SSCU/ DCA220SSCU4i
<b>Type</b>	Revolving field, self ventilated, open protected type synchronous generator
<b>Armature Connection</b>	<b>Star with Neutral</b>
<b>Phase</b>	3
<b>Standby Output</b>	194 kW (242 kVA)
<b>Prime Output</b>	176 kW (220 kVA)
<b>3Ø Voltage (L-L/L-N) Voltage Change-Over Bd. at 3Ø 240/139</b>	208Y/120, 220Y/127, 240Y/139
<b>3Ø Voltage (L-L/L-N) Voltage Change-Over Bd. at 3Ø 480/277</b>	416Y/240, 440Y/254, 480Y/277
<b>1Ø Voltage (L-L/L-N) Voltage Change-Over Bd. at 1Ø 240/120</b>	240/120
<b>Power Factor</b>	0.8
<b>Frequency</b>	60 Hz
<b>Speed</b>	1800 rpm
<b>Aux. AC Power</b>	Single Phase, 60 Hz
<b>Aux. Voltage/Output</b>	4.8 Kw (2.4 kW x 2)
<b>Dry Weight</b>	6,636 lbs. (3,010 kg)
<b>Wet Weight</b>	7,496 lbs. (3,400 kg)

**Table 2. Engine Specifications**

<b>Model</b>	Cummins QSB7-G6 EPA Interim Tier 4 Certified	
<b>Type</b>	4 cycle, water-cooled, direct injection, turbo-charged air cooled and EGR	
<b>No. of Cylinders</b>	6 cylinders	
<b>Bore x Stroke</b>	4.21 in. x 4.88 in. (107 mm x 124 mm)	
<b>Displacement</b>	409 cu. in. (6.7 liter)	
<b>Rated Output</b>	282 HP at 1800 rpm	
<b>Starting</b>	Electric	
<b>Coolant Capacity</b>	11.4 gal. (43.0 liters) <sup>1</sup>	
<b>Lube Oil Capacity</b>	4.6 gal. (17.5 liters) <sup>2</sup>	
<b>Lubricating Type Oil</b>	API service class CJ-4 SAE 15W-40	
<b>Fuel Type</b>	#2 Diesel Fuel (Ultra low sulfur diesel fuel only)	
<b>Fuel Tank Capacity</b>	100 gal. (380 liters)	
<b>Fuel Consumption</b>	12.4 gal. (46.8 L)/hr at <b>full load</b>	9.5 gal. (36.0 L)/hr at <b>3/4 load</b>
	6.9 gal. (26.0 L)/hr at <b>1/2 load</b>	4.4 gal. (16.8 L)/hr at <b>1/4 load</b>
<b>Battery</b>	27 (CCA 0°F 800A) X 2	

<sup>1</sup> Includes engine and radiator hoses

<sup>2</sup> Includes filters

# DIMENSIONS

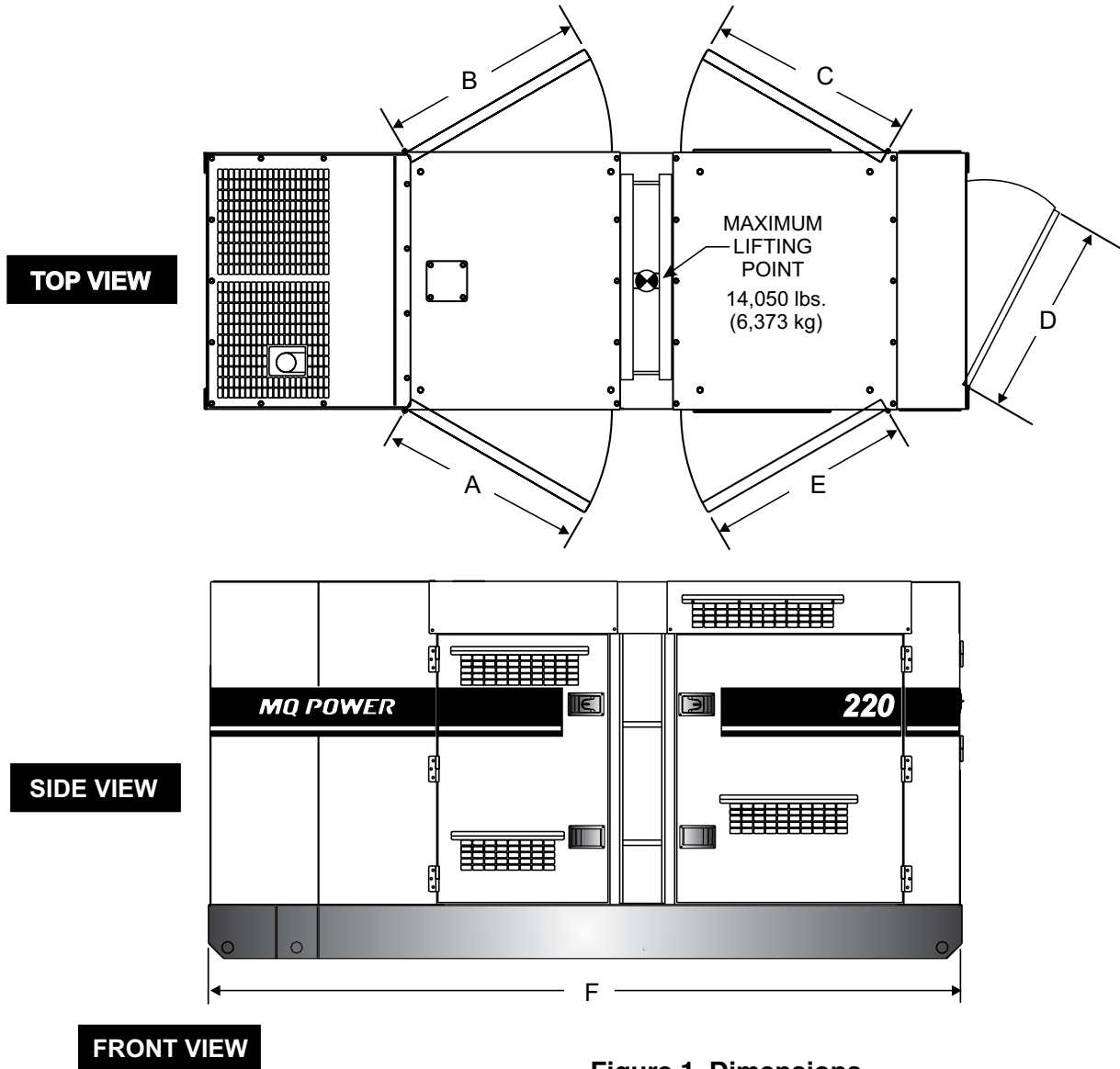


Figure 1. Dimensions

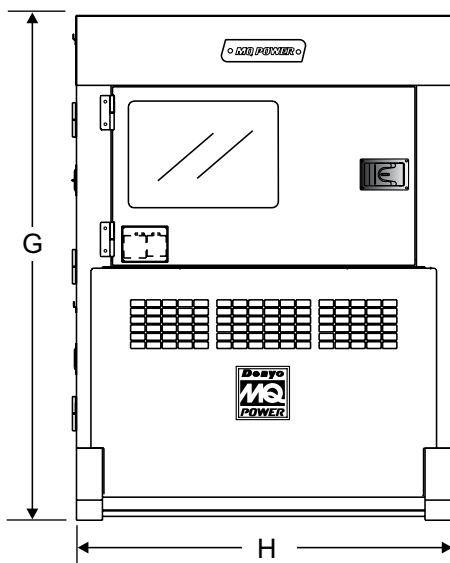


Table 3. Dimensions

Reference Letter	Dimension in. (mm)	Reference Letter	Dimension in. (mm)
A	31.10 in. (790 mm)	E	41.33 in. (1,050 mm.)
B	31.10 in. (790 mm)	F	137.79 in. (3,500 mm)
C	41.33 in. (1,050 mm)	G	68.89 in. (1,750 mm)
D	41.33 in. (1,050 mm)	H	51.18 in. (1,300 mm)

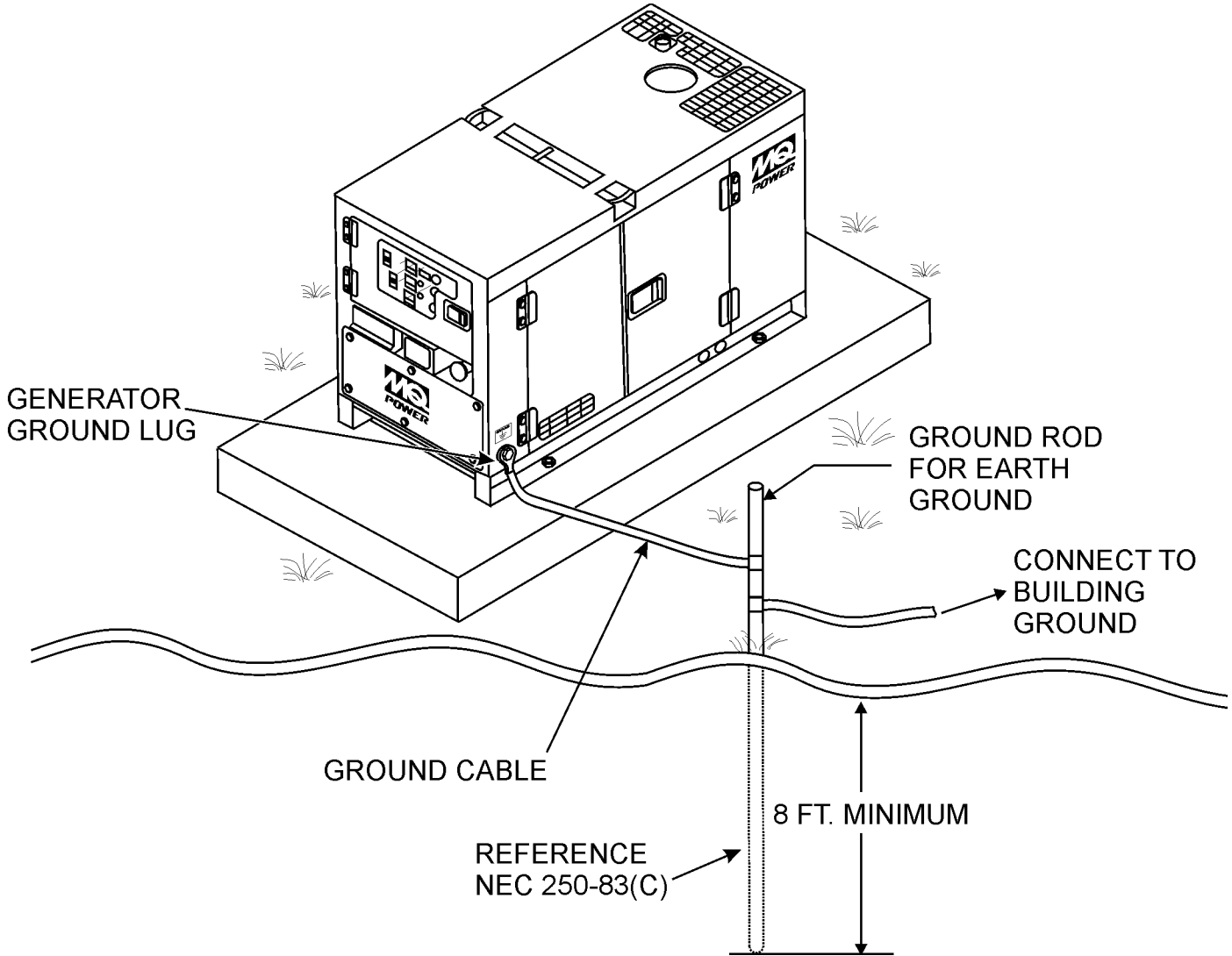


Figure 2. Typical Generator Grounding Application

## OUTDOOR INSTALLATION

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

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

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

### CAUTION

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

## INDOOR INSTALLATION

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

## MOUNTING

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

## GENERATOR GROUNDING

To guard against electrical shock and possible damage to the equipment, it is important to provide a good **EARTH** ground (Figure 2).

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

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

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

### NOTICE

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

### NOTICE

This generator has a permanent bonding conductor between the generator stator windings and the frame.

# GENERAL INFORMATION

## GENERATOR

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

## OPERATING PANEL

The “Operating Panel” is provided with the following:

- ECU Controller
- Gauge Unit Assembly
  - Oil Pressure Gauge
  - Water Temperature Gauge
  - Charging Voltmeter
  - Fuel Gauge
  - Tachometer
- Panel Light/Panel Light Switch
- Hour Check Button
- Auto Start/Stop Switch
- Engine Speed Switch
- Emergency Stop Button
- Water Temperature Gauge

## CONTROL PANEL

The “Control Panel” is provided with the following:

- Frequency Meter (Hz)
- AC Ammeter (Amps)
- AC Voltmeter (Volts)
- Ammeter Change-Over Switch
- Voltmeter Change-Over Switch
- Voltage Regulator
- 3-Pole, 600 amp Main Circuit Breaker
- “Control Box” (located behind Control Panel)
  - Automatic Voltage Regulator
  - Current Transformer
  - Over-Current Relay
  - Starter Relay

## OUTPUT TERMINAL PANEL

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

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

## OPEN DELTA EXCITATION SYSTEM

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

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

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

The connections of the AVR to the AC output windings are for sensing only. No power is required from these windings. The open-delta design provides virtually unlimited excitation current, offering maximum motor starting capabilities. The excitation does not have a “fixed ceiling” and responds according the demands of the required load.

## ENGINE

This generator is powered by a 6 cylinder, 4-cycle water cooled, direct injection, turbocharged, air cooled Cummins QSB7-G6 diesel engine. This engine is designed to meet every performance requirement for the generator. Reference Table 2 for engine specifications.

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

## ELECTRIC GOVERNOR SYSTEM

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

## EXTENSION CABLES

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



# MAJOR COMPONENTS

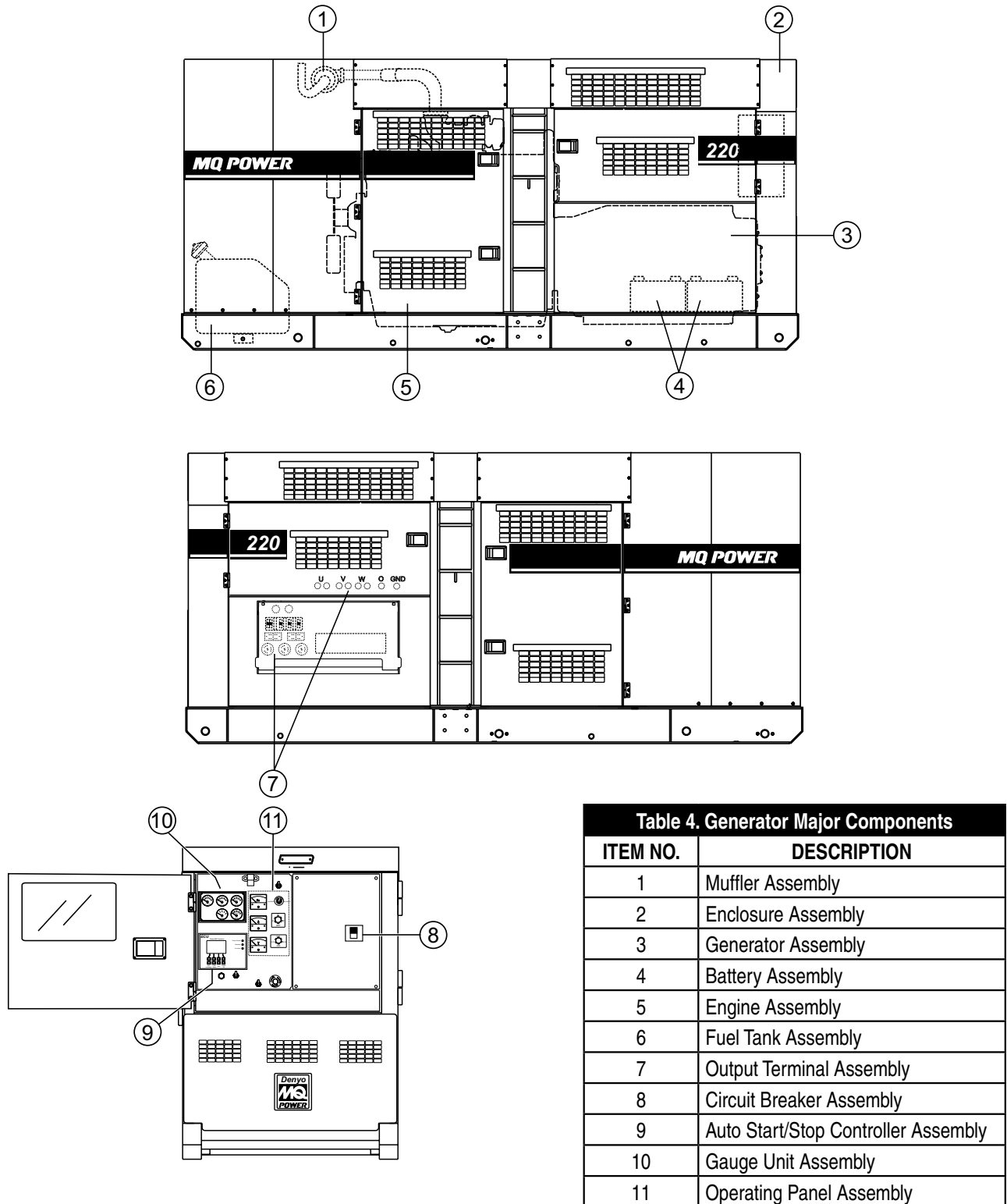


Table 4. Generator Major Components	
ITEM NO.	DESCRIPTION
1	Muffler Assembly
2	Enclosure Assembly
3	Generator Assembly
4	Battery Assembly
5	Engine Assembly
6	Fuel Tank Assembly
7	Output Terminal Assembly
8	Circuit Breaker Assembly
9	Auto Start/Stop Controller Assembly
10	Gauge Unit Assembly
11	Operating Panel Assembly

Figure 3. Major Components

# ENGINE CONTROL UNIT (ECU)

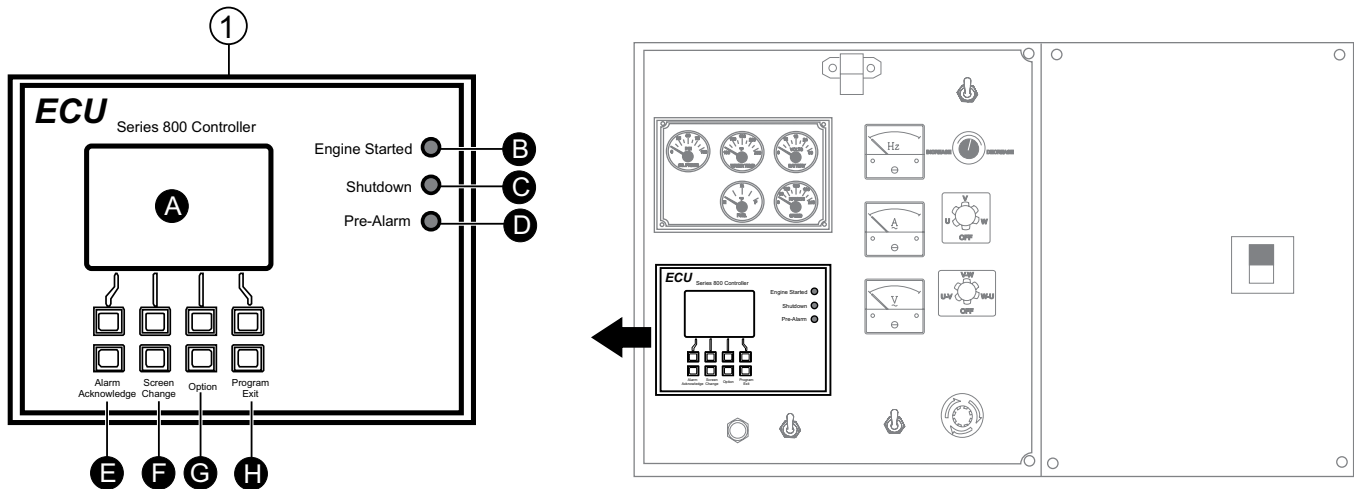
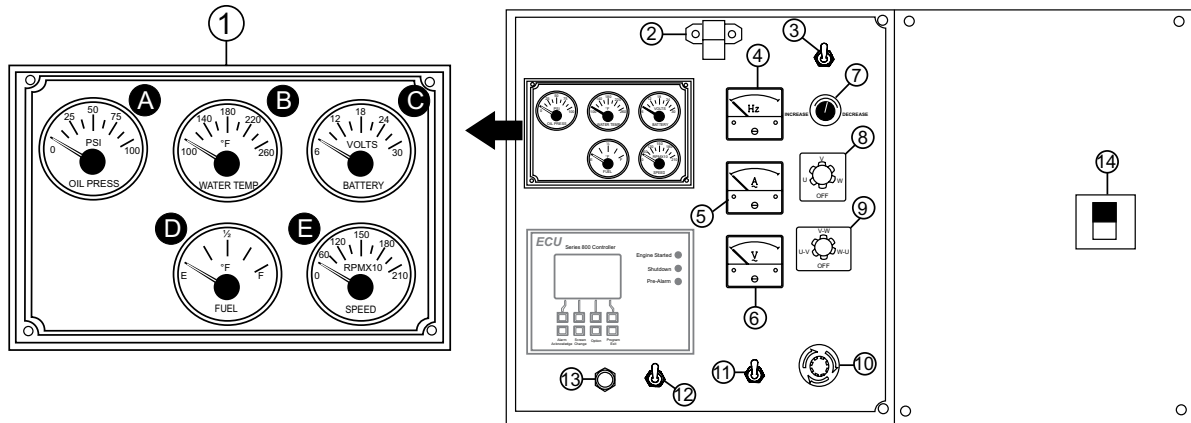


Figure 4. Engine Control Unit (ECU)

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

1. **ECU Controller** — This auto start/stop controller displays the parameters and the diagnostic troubleshooting messages of the engine, and controls DPF regeneration.
  - A. **ECU Display Screen** — Engine fault diagnostic messages are shown on this LCD display. screen
  - B. **Engine Started Lamp** — This lamp when lit indicates engine is operating normally.
  - C. **Engine Shutdown Lamp** — When an engine failure has occurred this lamp will blink. Indicating the engine has been shutdown. The diagnostic fault message will be displayed on the LCD screen.
  - D. **Pre Alarm Lamp** — When an engine failure has occurred this lamp will blink. Indicating a pre-fault engine condition and the possibility of engine shutdown. The diagnostic fault message will be displayed on the LCD screen
  - E. **Alarm Acknowledge Button** — When the engine experiences a fault, the "Pre Alarm Lamp" or the "Shutdown Lamp" will start blinking. Pushing this button will confirm the fault message and the blinking lamp will change to a solid lamp display. The fault message will be displayed on the screen. When multiple engine faults occur, the lamp will continue blinking until all fault messages are confirmed. The blinking lamp will change to a solid lamp display all current confirmed fault messages will scroll across the screen.
  - F. **Screen Change Button** — When this button is pushed during operation, the screen will cycle through each parameter screen.
  - G. **Option Button** — This button is not active. Do not use.
  - H. **Program/Exit Button** — Pushing this button allows the DPF Force Regen and diagnostic code to be confirmed.

# ENGINE/GENERATOR CONTROL PANEL



**Figure 5. Gauge Unit Assembly**

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

1. **Gauge Unit Assembly** — This assembly houses the various engine monitoring gauges. These gauges indicate: oil pressure, water temperature, charging voltmeter, fuel and engine speed RPM (tachometer).
  - A. **Oil Pressure Gauge** — During normal operation this gauge should read between 35 to 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.
  - B. **Water Temperature Gauge** — During normal operation this gauge should read between 180° and 225°F (82°~107°C).
  - C. **Charging Voltmeter Gauge** — During normal operation this gauge indicates minimum 26 VDC
  - D. **Fuel Gauge** — Indicates amount of diesel fuel available.
  - E. **Tachometer** — Indicates engine speed in RPM's for 60 Hz operation. This meter should indicate 1800 RPM's when the rated load is applied. .
2. **Panel Light** — For operation at night, panel light illuminates control panel for ease of reading meters and gauges. Make sure panel light switch is in the OFF position when light is not in use.
3. **Panel Light Switch** — When activated will turn on control panel light.
4. **Frequency Meter** — Indicates the output frequency in hertz (Hz). Normally 60 Hz
5. **AC Ammeter** — Indicates the amount of current the load is drawing from the generator per leg selected by the ammeter phase-selector switch.
6. **AC Voltmeter** — Indicates the output voltage present at the **U,V, and W Output Terminal Lugs**.
7. **Voltage Regulator Control** — Allows  $\pm 15\%$  manual adjustment of the generator's output voltage.
8. **Ammeter Change-Over Switch** — This switch allows the AC ammeter to indicate the current flowing to the load connected to any phase of the output terminals, or to be switched off. This switch does not effect the generator output in any fashion, it is for current reading only.
9. **Voltmeter Change-Over Switch** — This switch allows the AC voltmeter to indicate phase to phase voltage between any two phases of the output terminals or to be switched off.
10. **Emergency Stop Button** — Push this button inward to stop the engine in the event of an emergency. **DO NOT** use this button as a means of stopping the engine.
11. **Engine Speed Switch** — This switch controls the speed of the engine (low/high).
12. **Auto/Start Switch** — This switch selects either manual or automatic operation. Center position is OFF (reset).
13. **Hour Check Button** — With the engine stopped, press and hold this button. The total running hours, fuel level, and battery voltage will be displayed.
14. **Main Circuit Breaker** — This three-pole, 600 amp main breaker is provided to protect the **U,V, and W Output Terminal Lugs** from overload.

# 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:

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

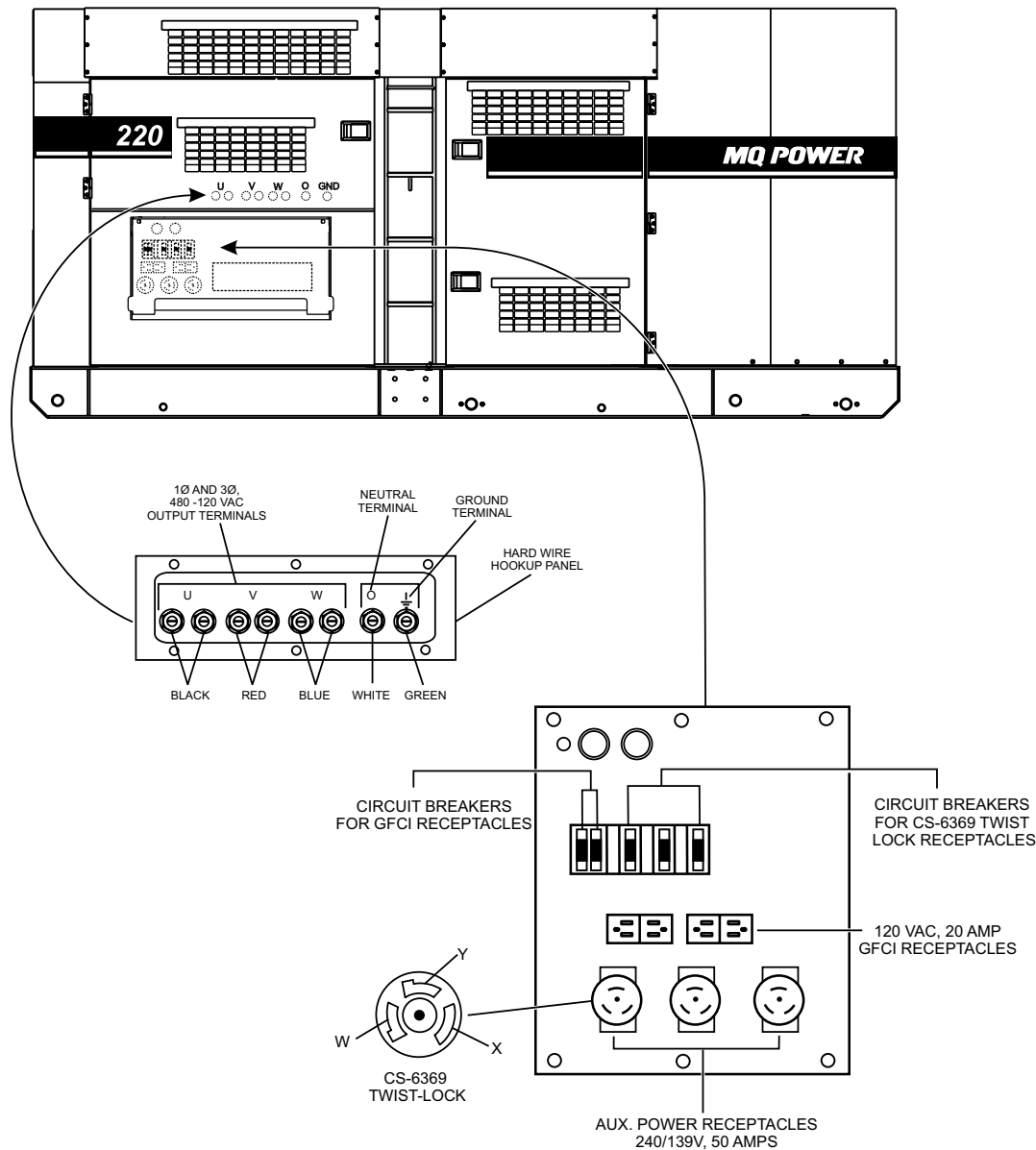


Figure 6. Output Terminal Panel

# OUTPUT TERMINAL PANEL FAMILIARIZATION

## 120 VAC GFCI Receptacles

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

Pressing the **reset** button resets the GFCI receptacle after being tripped. Pressing the **test button** (See Figure 7) in the center of the receptacle will check the GFCI function. Both receptacles should be tested at least once a month.

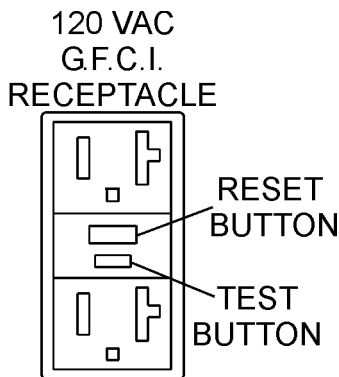


Figure 7. G.F.C.I. Receptacle

## Twist Lock Dual Voltage 120/240 VAC Receptacles

There are three 240/139V, 50 amp auxiliary twist-lock (CS-6369) receptacles (Figure 8) provided on the output terminal panel. These receptacles can **only** be accessed when the voltage change-over board is configured for **single-phase 240/120** application

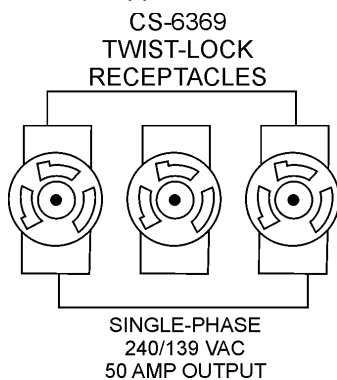


Figure 8. 240/139V Twist-Lock Auxiliary Receptacles

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

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



Figure 9. Voltage Regulator Control Knob

# OUTPUT TERMINAL PANEL FAMILIARIZATION

## Connecting Loads

Loads can be connected to the generator by the **Output Terminal Lugs** or the convenience receptacles (Figure 10). 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, 600A **main** circuit breaker is provided. Make sure to switch **ALL** circuit breakers to the **OFF** position prior to starting the engine.

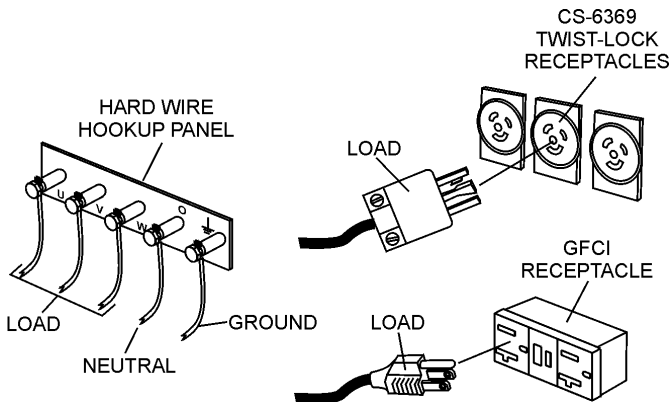


Figure 10. Connecting Loads

## Over Current Relay

An **over current relay** (Figure 11) 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.

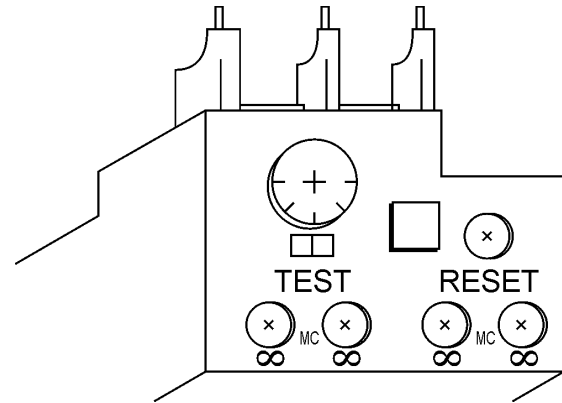


Figure 11. Over Current Relay

### NOTICE

Remember the **overcurrent relay** monitors the current flowing from the **U,V, and W Output Terminal Lugs** to the load.

In the event of a short circuit or over current condition, it will automatically trip the 600 amp main breaker.

To restore power to the **Output Terminal Panel**, press the reset button on the overcurrent relay and place the **main** circuit breaker in the **closed** position (**ON**).

# LOAD APPLICATION

## SINGLE PHASE LOAD

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

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

### NOTICE

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

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

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

**Table 5. Power Factor By Load**

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

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

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

CAUTION: Equipment damage can result from low voltage

## THREE PHASE LOAD

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

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

### NOTICE

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

### NOTICE

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

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

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

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

### DANGER

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

# GENERATOR OUTPUTS

## GENERATOR OUTPUT VOLTAGES

A wide range of voltages are available to supply voltage for many different applications. Voltages are selected by applying jumpers (6) to the **voltage change-over board** (Figure 12). To obtain some of the voltages as listed in Table 7 (see below) will require a fine adjustment using the **voltage regulator (VR) control knob** located on the control panel.

### Voltage Change-Over Board

The **voltage change-over board** (Figure 12) is located on the control box, behind the generator control panel. This board has been provided for ease of voltage selection.

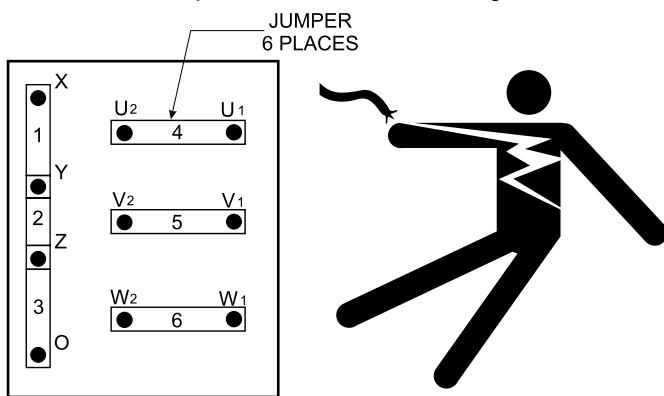


Figure 12. Voltage Change-Over Board

**CAUTION**

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

Table 7. Voltages Available						
UVW Output Terminal Lugs	Voltage Change-Over Board 3-Phase 240/139V Position			Voltage Change-Over Board 3-Phase 480/270V Position		
	3Ø Line-Line	208V	220V	240V	416V	440V
1Ø Line-Neutral	120V	127V	139V	240V	254V	277V
Voltage Change-Over Board Single-Phase 240/120V Position						
1Ø Line-Neutral/ Line-Line	120V Line-Neutral	N/A	N/A	240V Line-Line	N/A	N/A

## Maximum Amps

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

Table 8. Generator Maximum Amps	
Model	DCA220SSCU/ DCA220SSCU4i
Rated Voltage	Maximum Amps
Single Phase 120 Volt	488.9 amps (4 wire)
Single Phase 240 Volt	244.4 amps (4 wire)
Three Phase 240 Volt	529 amps
Three Phase 480 Volt	264 amps



# GENERATOR OUTPUTS/GAUGE READING

## HOW TO READ THE AC AMMETER AND AC VOLTAGE GAUGES

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

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

Before taking a reading from either gauge, configure the **Voltage Change-Over Board** (Figure 13) which produces the desired output voltage.

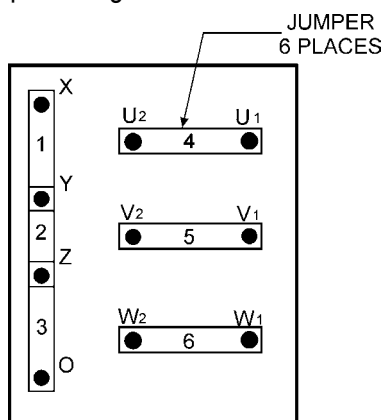


Figure 13. Voltage Change-Over Board  
240/3Ø Position

## AC Voltmeter Gauge Reading

Place the **AC Voltmeter Change-Over Switch** (Figure 14) in the W-U position and observe the phase to phase voltage reading between the W and U terminals as indicated on the **AC Voltmeter Gauge** (Figure 15).

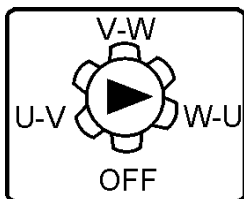


Figure 14. AC Voltmeter Change-Over Switch

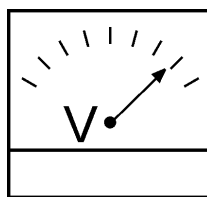


Figure 15. AC Voltmeter Gauge  
(Volt reading on W-U Lug)

## AC Ammeter Gauge Reading

Place the **AC Ammeter Change-Over Switch** (Figure 16) in the U position and observe the current reading (load drain) on the U terminal as indicated on the **AC Ammeter Gauge** (Figure 17). This process can be repeated for terminals V and W.

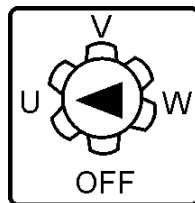


Figure 16. AC Ammeter Change-Over Switch

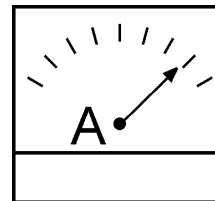


Figure 17. AC Ammeter  
(Amp reading on U Lug)

### NOTICE

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

# OUTPUT TERMINAL PANEL CONNECTIONS

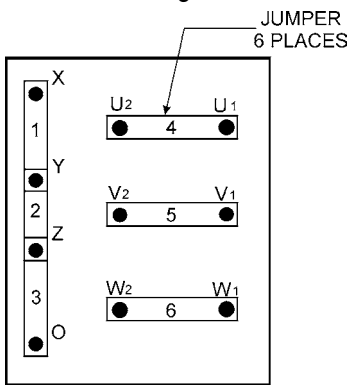
## UVWO TERMINAL OUTPUT VOLTAGES

Various output voltages can be obtained using the UVWO output terminal lugs. The voltages at the terminals are dependent on the placement of the jumpers plates (6) on the **Voltage Change-Over Board** and the adjustment of the **Voltage Regulator Control Knob**.

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

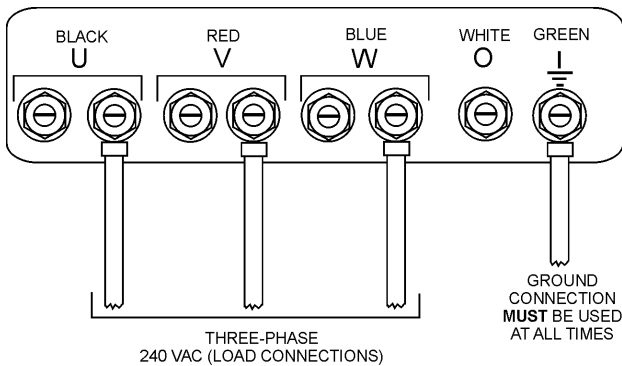
### 3Ø-240V UVWO Terminal Output Voltages

1. Jumper the voltage change-over board for 240V operation as shown in Figure 18



**Figure 18. Voltage Change-Over Board 240V Configuration**

2. Connect the load wires to the UVWO terminals as shown in Figure 19.



**Figure 19. UVWO Terminal Lugs**

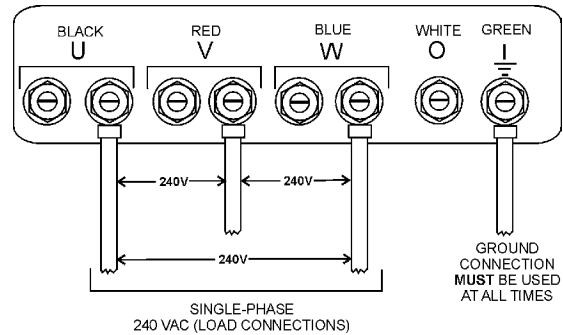
3. Turn the voltage regulator knob (Figure 20) clockwise to increase voltage output, turn counterclockwise to decrease voltage output. Use voltage regulator adjustment knob whenever fine tuning of the output voltage is required



**Figure 20. Voltage Regulator Knob**

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

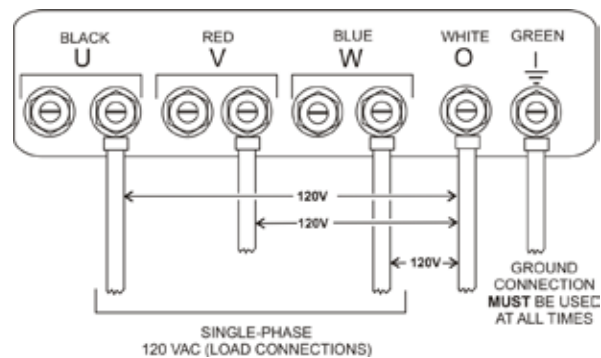
1. Make sure the voltage change-over board is jumpered for 240V operation as shown in Figure 18.
2. Connect the load wires to the UVWO terminals as shown in Figure 21.



**Figure 21. UVWO Terminal Lugs 1Ø-240V Connections**

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

1. Make sure the voltage change-over board is jumpered for 240V operation as shown in Figure 18.
2. Adjust voltage regulator knob (Figure 20) for an output of 208V to obtain 120V at the UVWO terminals.
3. Connect the load wires to the UVWO terminals as shown in Figure 22.

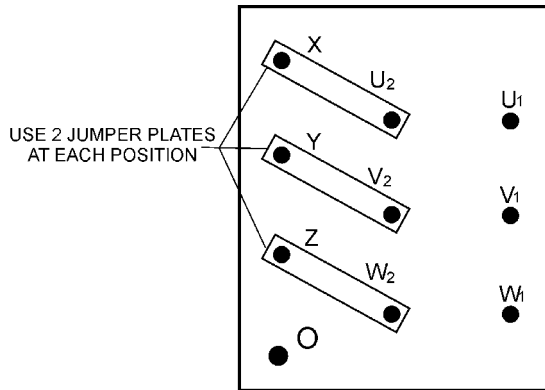


**Figure 22. UVWO Terminal Lugs 1Ø-120V Connections**

# OUTPUT TERMINAL PANEL CONNECTIONS

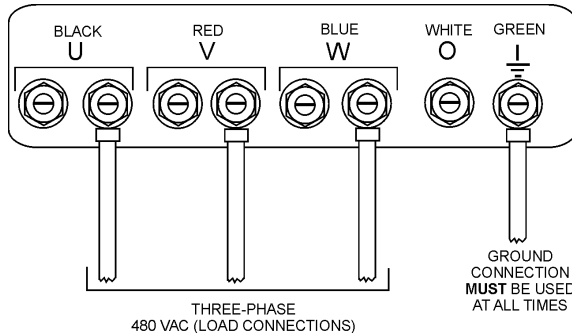
## 3Ø-480V UVWO Terminal Output Voltages

1. Jumper the voltage change-over board for 480V operation as shown in Figure 23. This configuration uses 6 jumper plates in 3 different positions. Remember there are 2 jumper plates at every position. Every jumper plate **must** be used.



**Figure 23. Voltage Change-Over Board 480V Configuration**

2. Connect the load wires to the UVWO terminals as shown in Figure 24.



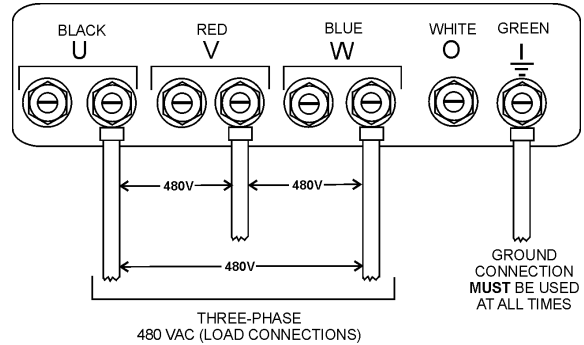
**Figure 24. UVWO Terminal Lugs 3Ø-480V Connections**

### NOTICE

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

## 1Ø-480V UVWO Terminal Output Voltages

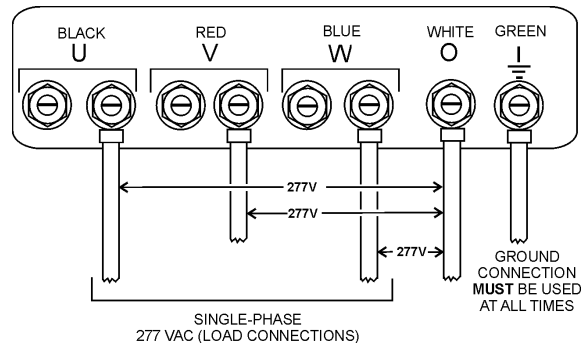
1. Make sure the voltage change-over board is jumpered for 480V operation as shown in Figure 23.
2. Connect the load wires to the UVWO terminals as shown in Figure 25.



**Figure 25. UVWO Terminal Lugs 1Ø-480V Connections**

## 1Ø-277V UVWO Terminal Output Voltages

1. Make sure the voltage change-over board is jumpered for 480V operation as shown in Figure 23.
2. Connect the load wires to the UVWO terminals as shown in Figure 26.



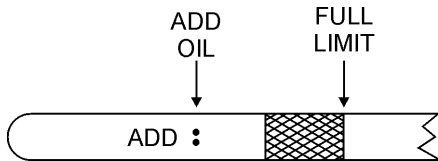
**Figure 26. UVWO Terminal Lugs 1Ø-277V Connections**

## CIRCUIT BREAKERS

To protect the generator from an overload, a 3-pole, 600 amp, main circuit breaker is provided to protect the **U, V, and W Output Terminals** from overload. In addition two single-pole, 20 amp **GFCI** circuit breakers are provided to protect the GFCI receptacles from overload. Three 50 amp **load** circuit breakers have also been provided to protect the auxiliary receptacles from overload. Make sure to switch **ALL** circuit breakers to the **OFF** position prior to starting the engine.

## LUBRICATION OIL

Fill the engine crankcase with lubricating oil through the filler hole, but **DO NOT** overfill. Make sure the generator is level and verify that the oil level is maintained between the two notches (Figure 27) on the dipstick. See Table 9 for proper selection of engine oil.



**Figure 27. 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 **Cummins Engine Owner's Manual**. Oil should be warm before draining.

Delo® engine oil is the recommended engine oil for this generator. When replacing engine oil please refill using Delo® 400 LE SAE 15W-40 (API CJ-4) engine oil.

Table 9. Recommended Motor Oil		OIL: SAE	
°F	°C		
122	50	10W/40	10W/40
104	40	30	15W/30
86	30	ARCTIC OIL	10W/30
68	20	5W/30	10W
50	10		20W/40
32	0		
14	-10		
-4	-20		
-22	-30		
-40	-40		

## FUEL CHECK

### **DANGER**



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

## Refilling the Fuel System

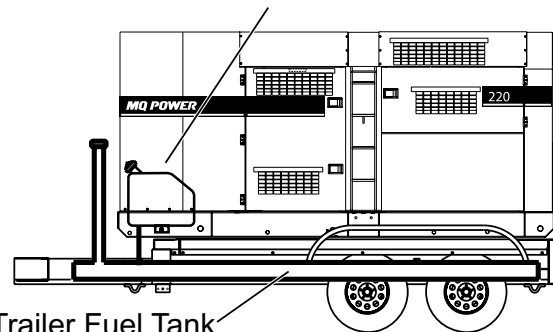
### **CAUTION**

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

This generator has an internal fuel tank located inside the trailer frame and may also be equipped with an environmental fuel tank (Figure 28). **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.

### Generator Internal Fuel Tank



**Figure 28. Internal Fuel Tank System**

## Refueling Procedure:

### WARNING



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

- 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 29).

### 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.

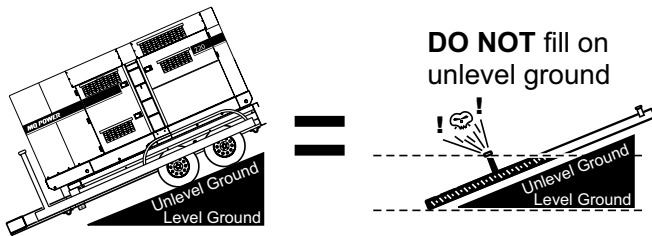


Figure 29. Only Fill on Level Ground

### NOTICE

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

- Open cabinet doors on the “right side” of the generator (from generator control panel position). Remove fuel cap and fill tank (Figure 30).

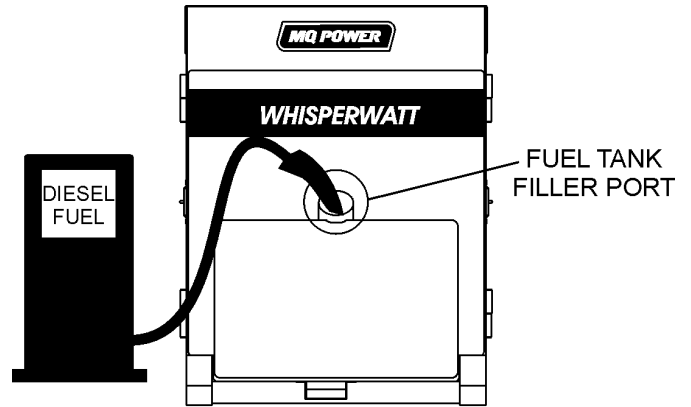


Figure 30. Fueling the Generator

- 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 31).

FUEL GAUGE LOCATED ON CONTROL PANEL

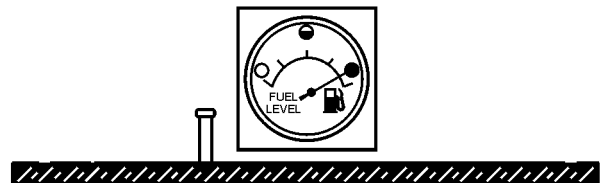


Figure 31. Full Fuel Tank

### CAUTION

**DO NOT OVERFILL** fuel system. Leave room for fuel expansion. Fuel expands when heated (Figure 32).

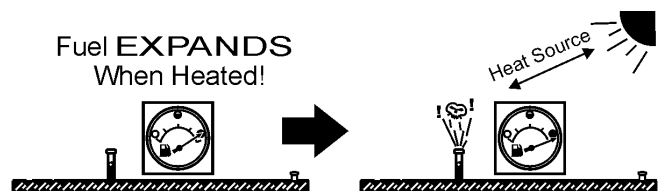



Figure 32. Fuel Expansion

## COOLANT (ANTIFREEZE/SUMMER COOLANT/WATER)

Cummins 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 **Cummins 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 10 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 10. Coolant Capacity	
Engine and Radiator	11.4 gal (43 liters)
Reserve Tank	N/A

## Operation in Freezing Weather

When operating in freezing weather, be certain the proper amount of antifreeze (Table 11) has been added.

Table 11. Anti-Freeze Operating Temperatures		
Vol % Anti-Freeze	Freezing Point	
	°C	°F
50	-37	-34

**NOTICE**

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

## Cleaning the Radiator

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

## AIR CLEANER

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

The fan belt tension is proper if the fan belt bends 10 to 15 mm (Figure 33) when depressed with the thumb as shown below.

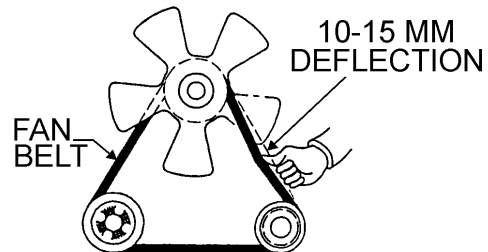



Figure 33. Fan Belt Tension

**CAUTION**



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

## BATTERY

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

**DO NOT** over fill. Check to see whether the battery cables are loose. Poor contact may result in poor starting or malfunctions. **Always** keep the terminals firmly tightened. Coating the terminals with an approved battery terminal treatment compound. Replace battery with only recommended type battery. The battery type used in this generator is BCI Group 27.

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

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

### Battery Cable Installation

ALWAYS be sure the battery cables (Figure 34) 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**.

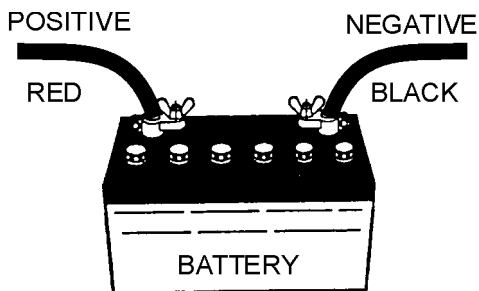


Figure 34. Battery Connections

When connecting battery do the following:

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

### NOTICE

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

### CAUTION

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

## ALTERNATOR

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

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

## WIRING

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

## PIPING AND HOSE CONNECTION

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

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

# GENERATOR START-UP PROCEDURE (MANUAL)

## BEFORE STARTING

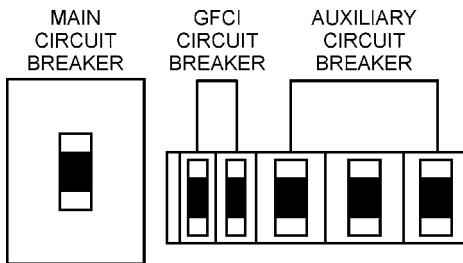
### CAUTION

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

### WARNING

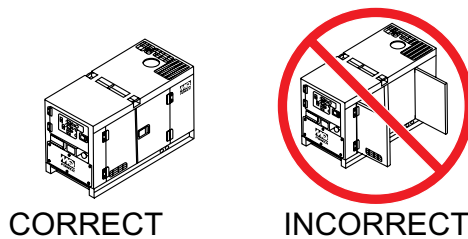
**NEVER** manually start the engine with the main, GFCI or auxiliary circuit breakers in the **ON** (closed) position.

1. Place the **main, G.F.C.I., and aux.** circuit breakers (Figure 35) in the **OFF** position prior to starting the engine.



**Figure 35. Main, Aux. and GFCI Circuit Breakers (OFF)**

2. Make sure the **voltage change-over board** has been configured for the desired output voltage.
3. Connect the load to the **receptacles** or the **output terminal lugs** as shown in Figure 10. These load connection points can be found on the output terminal panel and the output terminal panel's hard wire hookup panel.
4. Tighten terminal nuts securely to prevent load wires from slipping out.
5. Close all engine enclosure doors (Figure 36).



**Figure 36. Engine Enclosure Doors**

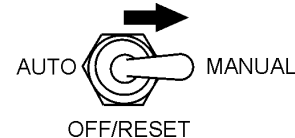
## STARTING (MANUAL)

1. Place the engine speed switch (Figure 37) in the **LOW** (down) position.



**Figure 37. Engine Speed Switch (Low)**

2. Place the **Auto-Off/Reset Manual Switch** in the **MANUAL** position to start the engine (Figure 38).



**Figure 38. Auto-Off/Reset Manual Switch (Manual Position)**

### NOTICE

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

### NOTICE

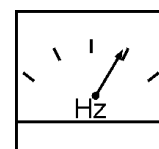
Engine will pre-heat automatically in cold weather conditions. "Glow Plug Hold" message will be displayed and the engine will start automatically after pre-heating..

3. Once the engine starts, let the engine run for 1-2 minutes (let engine idle longer in cold weather conditions). Listen for any abnormal noises. If any abnormalities exist, shut down the engine and correct the problem. If the engine is running smoothly, place the engine speed switch (Figure 39) in the **HIGH** (up) position.



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

4. The generator's frequency meter (Figure 40) should be displaying the 60 cycle output frequency in **HERTZ**.

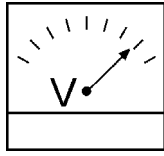


**Figure 40. Frequency Meter**



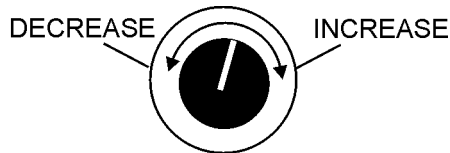
# GENERATOR START-UP PROCEDURE (MANUAL)

5. The generator's AC-voltmeter (Figure 41) will display the generator's output in **VOLTS**. If the voltage is not within the specified tolerance,



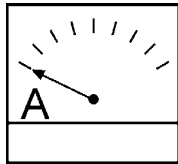
**Figure 41. Voltmeter**

6. Use the voltage adjustment control knob (Figure 42) to increase or decrease the desired voltage.



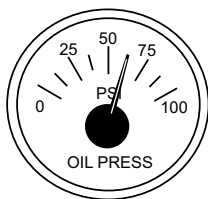
**Figure 42. Voltage Adjust Control Knob**

7. The ammeter (Figure 43) will indicate **zero amps** with no load applied. When a load is applied, the ammeter will indicate the amount of current that the load is drawing from the generator.



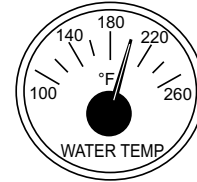
**Figure 43. Ammeter (No Load)**

8. The engine oil pressure gauge (Figure 44) will indicate the oil pressure of the engine. Under normal operating conditions the oil pressure is approximately 35 to 65 psi. (193~586 kPa).



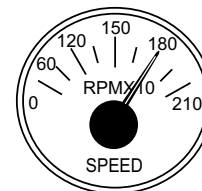
**Figure 44. Oil Pressure Gauge**

9. The **coolant temperature gauge** (Figure 45) will indicate the coolant temperature. Under normal operating conditions the coolant temperature should be between 180°~225°F (75°~95°C) (**Green Zone**).



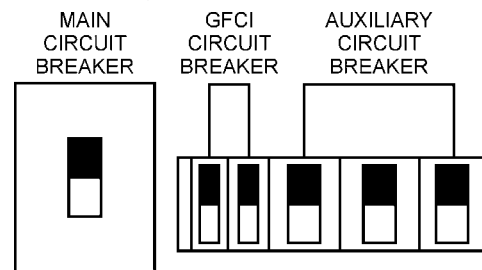
**Figure 45. Coolant Temperature Gauge**

10. The **tachometer gauge** (Figure 46) will indicate the speed of the engine when the generator is operating. Under normal operating conditions this speed is approximately 1800 RPM's.



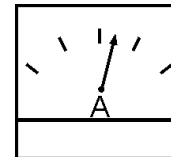
**Figure 46. Engine Tachometer Gauge**

11. Place the **main, GFCI, and aux.** circuit breakers in the **ON** position (Figure 47).



**Figure 47. Main, Aux. and GFCI Circuit Breakers (ON)**

12. Observe the generator's ammeter (Figure 48) and verify it reads the anticipated amount of current with respect to the load. The ammeter will only display a current reading if a load is in use.



**Figure 48. Ammeter (Load)**

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

# GENERATOR START-UP PROCEDURE (AUTO MODE)

## 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.

### CAUTION

The engine speed switch **must** be set to the "High" position when running in the **auto-start** mode. Failing to set the switch in the proper position can result in damage to your generator when it turns on.

### NOTICE

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

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

1. Perform steps 1 through 5 in the Before Starting section as outlined in the Manual Starting Procedure.
2. Place the **Engine Speed Switch** (Figure 49) in the **HIGH** position

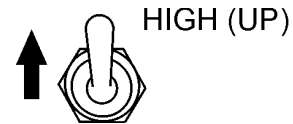


Figure 49. Engine Speed Switch (High)

3. Place the **Auto Off/Reset Manual Switch** (Figure 50) in the **AUTO** position.



Figure 50. Auto Off/Reset Manual Switch (AUTO)

4. Continue operating the generator as outlined in the Manual Start-up procedure (start at step 5).

# GENERATOR SHUT-DOWN PROCEDURES

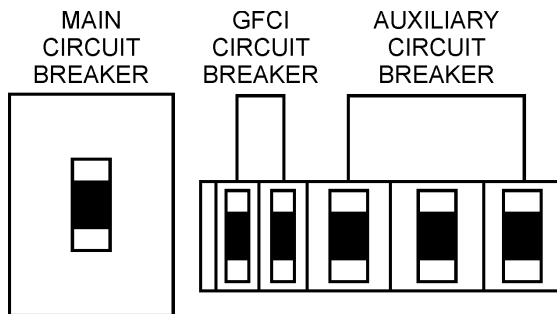
## **WARNING**

**NEVER** stop the engine suddenly except in an emergency.

## NORMAL SHUTDOWN PROCEDURE

To shutdown the generator, use the following procedure:

1. Place both the **MAIN, GFCI and LOAD** circuit breakers as shown in Figure 51 to the **OFF** position.



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

2. Place the **Engine Speed Switch** (Figure 52) in the “LOW” (down) position.



**Figure 52. Engine Speed Switch (Low)**

3. Let the engine cool by running it at low speed for 3-5 minutes with no load applied.
4. Place the **Auto Off/Reset Manual Switch** (Figure 53) in the **OFF/RESET** position.



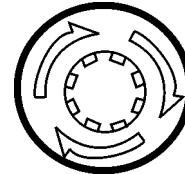
**Figure 53. Auto Off/Reset Manual Switch (Off/Reset)**

5. Verify that all status LEDs on the ECU control panel are **OFF** (not lit).

6. Remove all loads from the generator.
7. Inspect entire generator for any damage or loosening of components that may have occurred during operation.

## EMERGENCY SHUTDOWN PROCEDURE

1. To stop the engine in the event of an emergency, **PUSH** the emergency stop button (Figure 54) inward. This button is located on the engine operating panel, see Figure 5.



**Figure 54. Emergency Stop Button**

## **NOTICE**

The emergency stop pushbutton switch is a push-lock type switch. The switch contacts will remain locked once the button has been pushed. To release the switch contacts rotate the button clockwise. The engine will not start unless the contacts are released.

Table 12. Inspection/Maintenance		10 Hrs DAILY	250 Hrs	500 Hrs	1000 Hrs
<b>Engine</b>	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
<b>Generator</b>	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

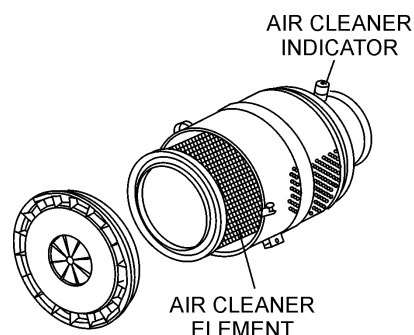
Prior to each use, the generator should be cleaned and inspected for deficiencies. Check for loose, missing or damaged nuts, bolts or other fasteners. Also check for fuel, oil, and coolant leaks. Use Table 12 as a general maintenance guideline **Engine Side** (Refer to the Engine Instruction Manual)

### AIR CLEANER

Every 250 hours: Remove air cleaner element (Figure 55) 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 ( ) 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 55. 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

Drain the fuel inside the fuel tank completely. Using a spray washer (Figure 56) wash out any deposits or debris that have accumulated inside the fuel tank.

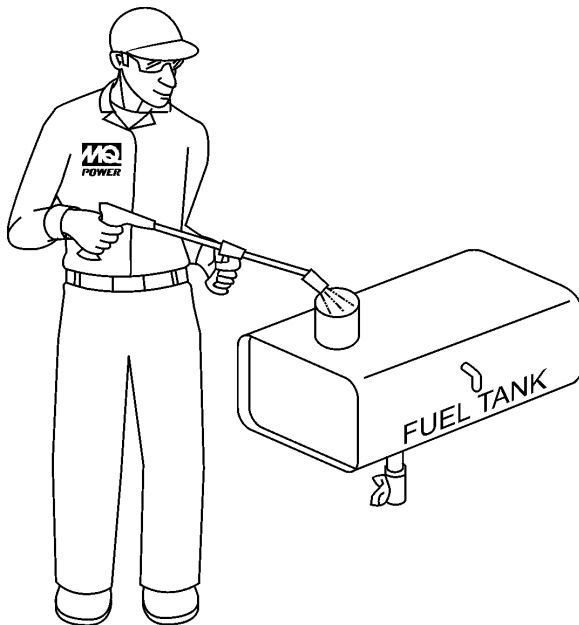


Figure 56. Fuel Tank Cleaning

## 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 **Cummins 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. This unit is equipped with an automatic air bleeding system.

## 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 27.


## 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 57) 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.

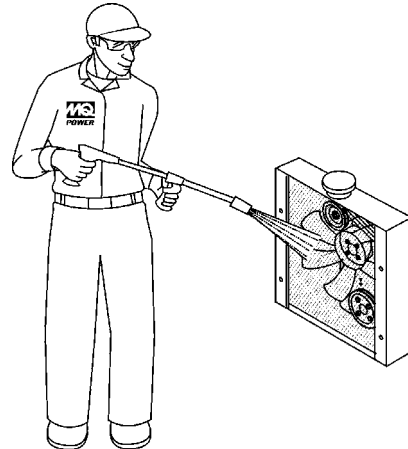


Figure 57. Radiator Cleaning

## 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**.

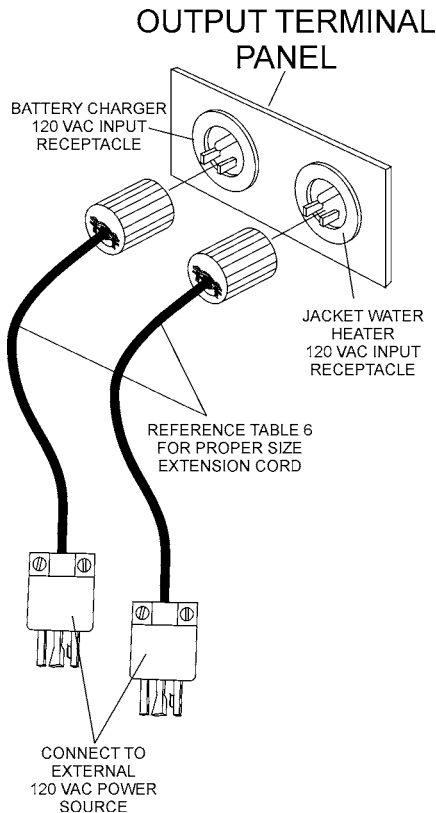
These receptacles will **ONLY** function when commercial power has been supplied to them (Figure 58). To apply commercial power to these receptacles, a power cord of adequate size will be required (See Table 6).

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 58. Battery Charger and Jacket Water Heater Power Connections**

## EMISSION CONTROL

The emission control system employed with the Cummins QSB&-G6 diesel engine consist of a Diesel Oxidation Catalyst (DOC) and a Diesel Particulate Filter (DPF). The oxidation catalyst and particulate filter are housed in one unit. See Figure 61.

These devices help in filtering out large amounts of harmful Nitrogen Oxides (NOx) and Particulate Matter (PM) which are emitted by diesel engines. These exhaust emissions pose serious environmental and health risks. It is important to maintain and service this DOC/DPF emission safety device on a periodic basis.

### Diesel Oxidation Catalyst (DOC)

The DOC does not filter particles it oxidizes them. This catalyst (honeycomb like structure) uses a chemical process to break down pollutants in the exhaust stream into less harmful components. In general this catalyst collects/burns accumulated particulates. The DOC contains palladium and platinum which serve as a catalysts to oxidize hydrocarbons and carbon monoxide.

### Diesel Particulate Filter (DPF)

A diesel particulate filter (DPF) is a device designed to remove diesel particulate matter (soot) from the exhaust gas of a diesel engine. This type of filter usually removes about 85-95% of the soot.

Soot accumulated in the DPF is removed via the "regeneration process". Regeneration is the process of removing the accumulated soot from the filter. This regeneration process can occur in a few different ways.

■ **Passive Regeneration** — Occurs during normal operation, typically under heavy load applications. Soot is oxidized faster than it is collected.

■ **Active Regeneration** — Occurs when engine exhaust temperatures are not high enough to oxidize the soot collected in the DPF. Active regeneration requires assistance from the engine to help increase the heat level in the after-treatment system.

Active regeneration occurs at a normal engine speed of 1800 rpm. In addition active regeneration is initiated automatically by the Engine Control Module (ECM) timer based program every 96 hours. This timer base program will reset at the end of any regeneration mode.

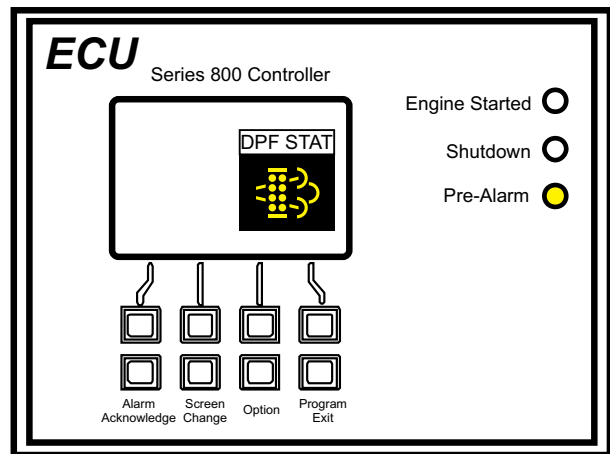
■ **Forced (Stationary) Regeneration** — A forced regeneration only occurs when the operator has initiated this action at the ECU and the ECM recognizes a pre-programmed set point of soot in the PDF to allow a forced regeneration cycle.

This process can take anywhere from 30 minutes to 1-1/2 hours. When forced regeneration is in process all loads must be removed from the generator, all circuit breakers must be placed in the OFF position (OPEN), and the engine speed set to idle.

## DPF PRE-ALARM

In the event the Engine Control Unit (ECU) determines the soot level back pressure and/or tempertaure has reached a pre-determined trip point the ECU will indicate a maintenance action is required by the operator.

This maintenance action will be shown on the LCD display (DPF Warning Symbol) and the AMBER pre-alarm LED on the ECU control panel will be ON (lit). See Figure 59.



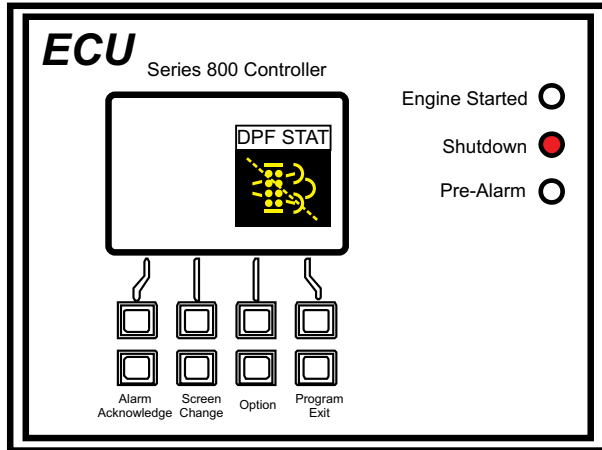
**Figure 59. ECU DPF Pre-Alarm**

The DPF pre-alarm status symbol displayed in Figure 59 indicates the soot level buildup has exceeded a pre-determined level and a "Forced Regeneration" action is required.

### NOTICE

If the **AMBER** pre-alarm warning LED is ever **ON**, the operator should always take **immediate action** to correct the problem. If the engine is allow to run under this condition, a higher pressure differential will be created in the DPF and will result in the **RED** status LED being **ON**, causing an engine shutdown.





**Figure 60. ECU DPF Engine Shutdown**

### NOTICE

If the **RED** engine shutdown LED is ever **ON** (Figure 60), Cummins recommends that the DPF be removed, cleaned or replaced. In addition the shutdown code must be cleared. To clear the code, the ECM must be reset by a licensed Cummins Engine Service Technician, using Cummins service software.

### NOTICE

Soot and ash will accumulate in the DPF over time and must be cleaned. The ash is a result of the normal oil consumption while the engine is operated. The ash cleaning interval will largely depend on the engine's duty cycle and condition. Normal service intervals for cleaning ash from the DPF is every 6 months (5000 hours).

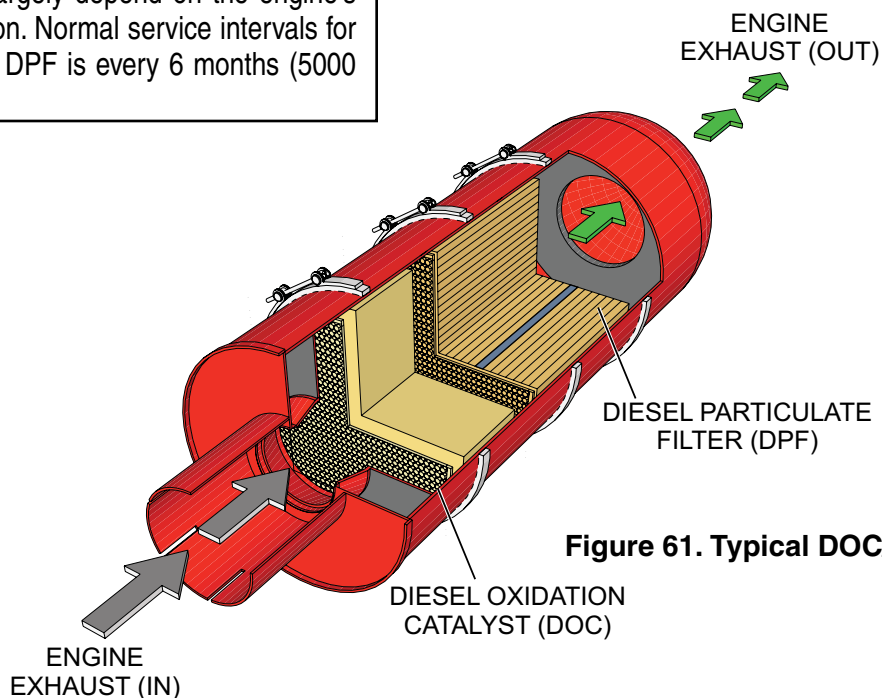
## FORCED REGENERATION PROCEDURE

Follow the steps below to initiate a forced regeneration:

1. Verify that the **AMBER** pre-alarm LED is **ON** or **FLASHING** and the DPF symbol is shown on the ECU display.
2. Place all circuit breakers in the **OFF** position.
3. Place the engine speed switch in the **LOW** position.
4. Press the **Program/Exit** button on the ECU controller and select **FORCE REGEN** mode.
5. Press and hold the request until the **REGEN ACTIVE** message is displayed on the screen, then release.
6. Once activated, regeneration will start automatically and the engine idling speed will increase through the forced regeneration cycle. This process will last anywhere from 30 minutes to 1-1/2 hours.

### NOTICE

During the regeneration cycle the High Exhaust System Temperature (**HEST**) symbol may be displayed. Display of this symbol can be considered normal during the regeneration period.



**Figure 61. Typical DOC/DPF Unit**

# TRAILER MAINTENANCE

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## TRAILER MAINTENANCE

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

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

The definitions below describe some of the major components of a typical trailer that would be used with the 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 16 and Figure 62 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.

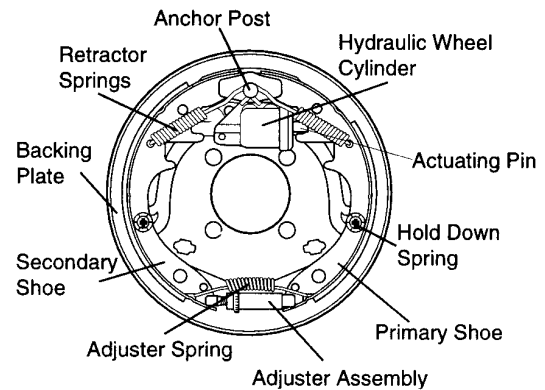
Figure 62 displays the major hydraulic surge brake components that will require inspection and maintenance. Please inspect these components as required using steps 1 through 8 and Table 13 as listed below:

### 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 62) 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 62. 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 13. 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 14 (Tire Wear Troubleshooting) will help pinpoint the causes and solutions of tire wear problems.

Table 14. 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 63) 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 15.

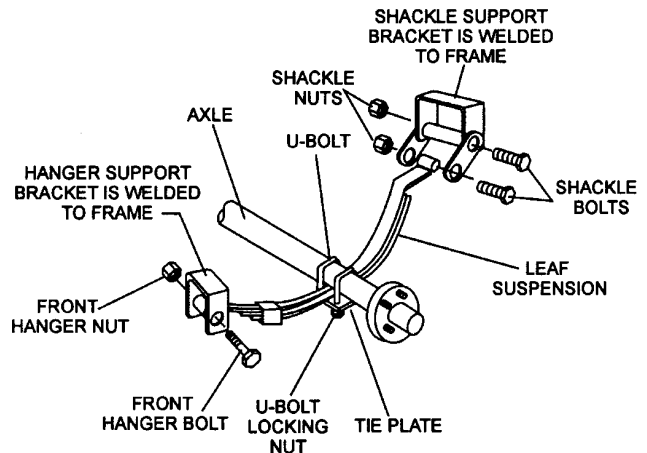


Figure 63. Major Suspension Components

Table 15. Suspension Torque Requirements

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

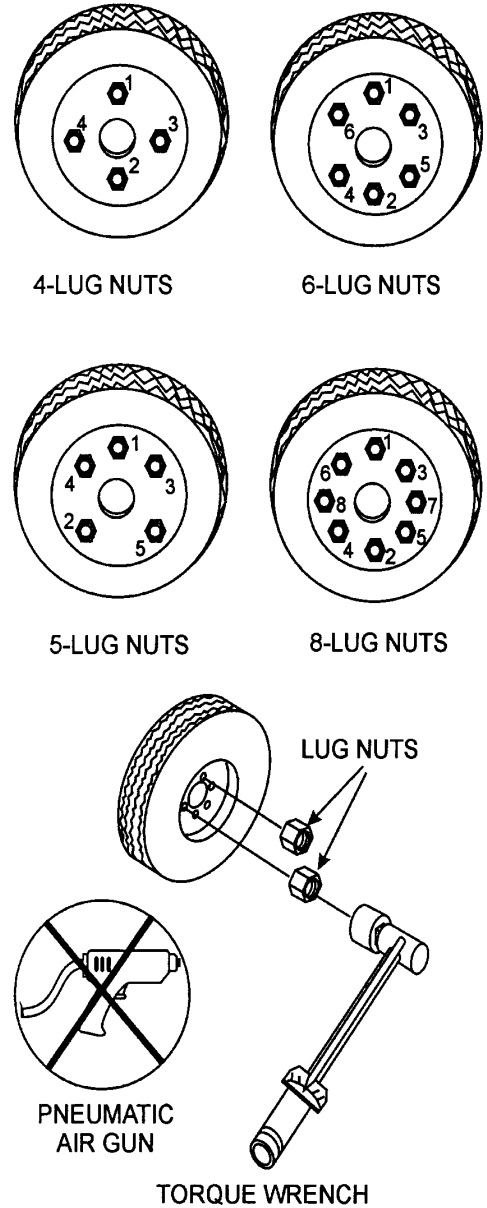
# TRAILER MAINTENANCE

## Lug Nut Torque Requirements

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

1. Start all wheel lug nuts by hand.
2. Torque all lug nuts in sequence (see Figure 64). **DO NOT** torque the wheel lug nuts all the way down. Tighten each lug nut in 3 separate passes as defined by Table 16.
3. After first road use, retorque all lug nuts in sequence. Check all wheel lug nuts periodically.

Table 16. 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 64. Wheel Lug Nuts Tightening Sequence**

**NOTICE**

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

# TRAILER WIRING DIAGRAM

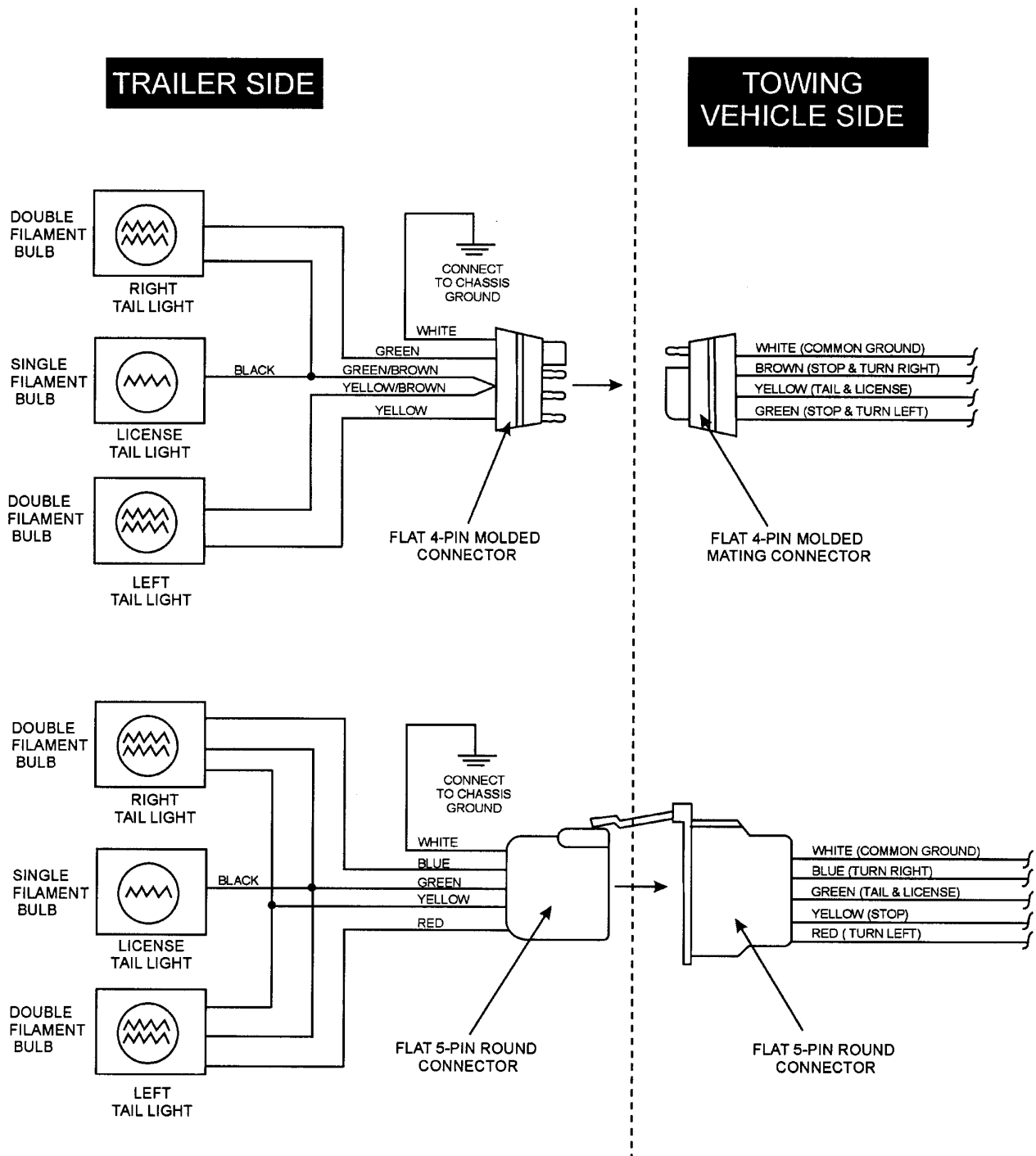


Figure 66. Trailer/Towing Vehicle Wiring Diagram

# GENERATOR WIRING DIAGRAM

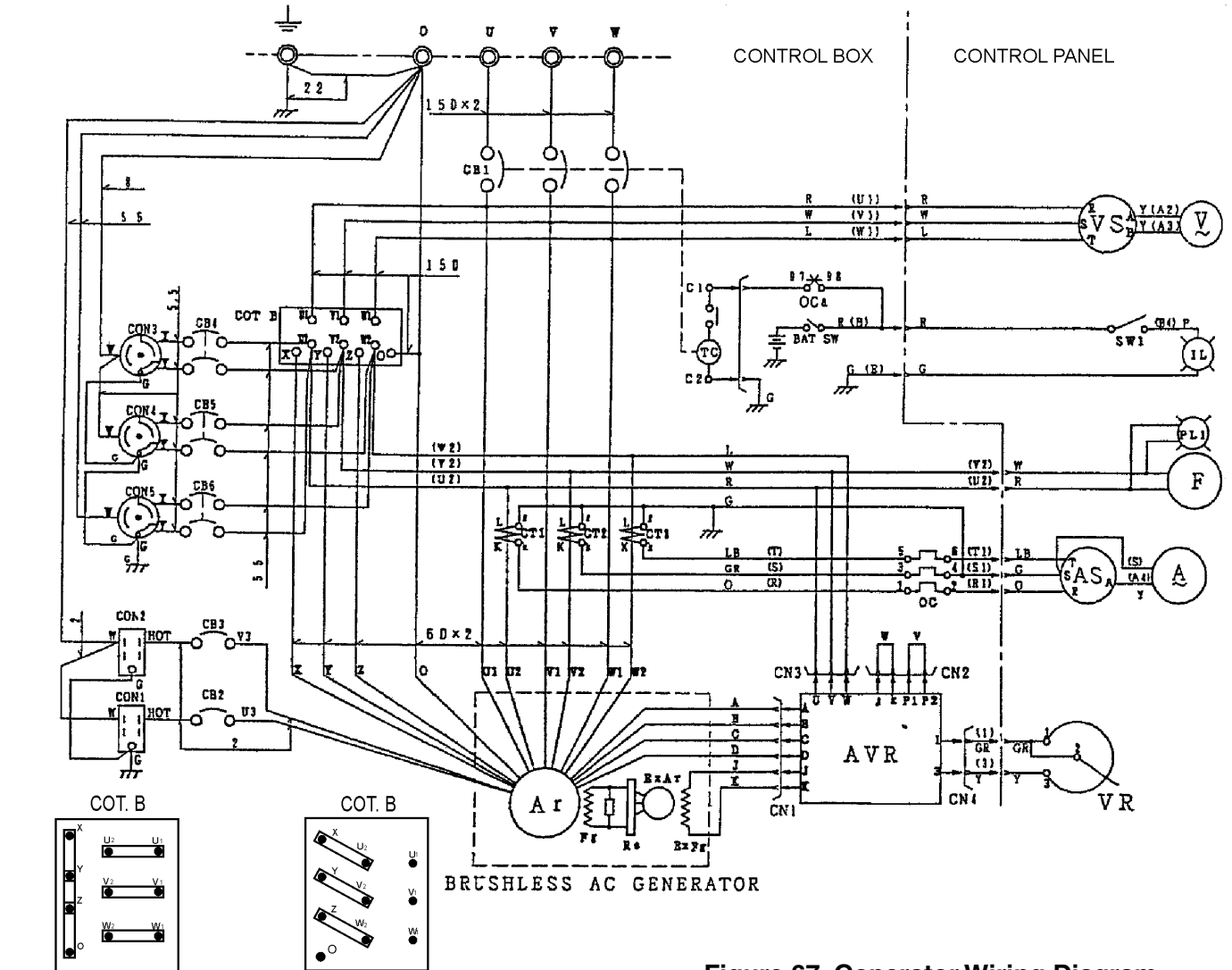
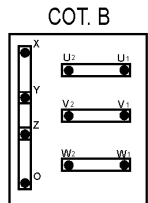
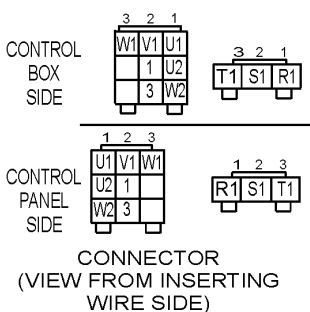
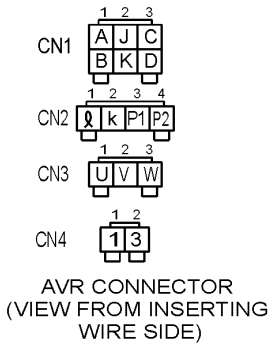
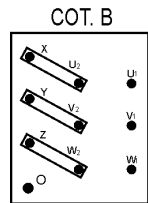


Figure 67. Generator Wiring Diagram

Voltage Change-Over Board-240V Set



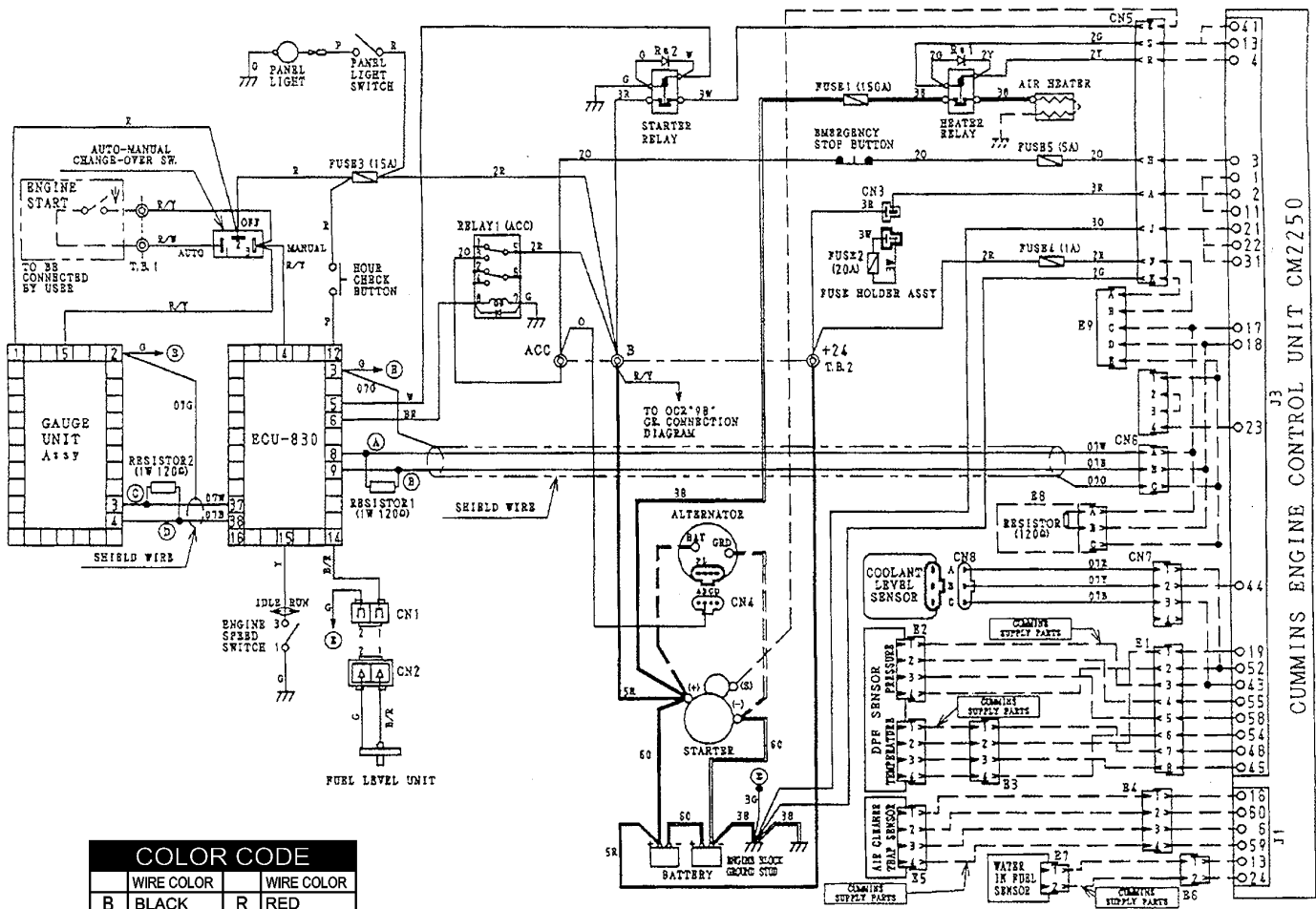
Voltage Change-Over Board-480V Set



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

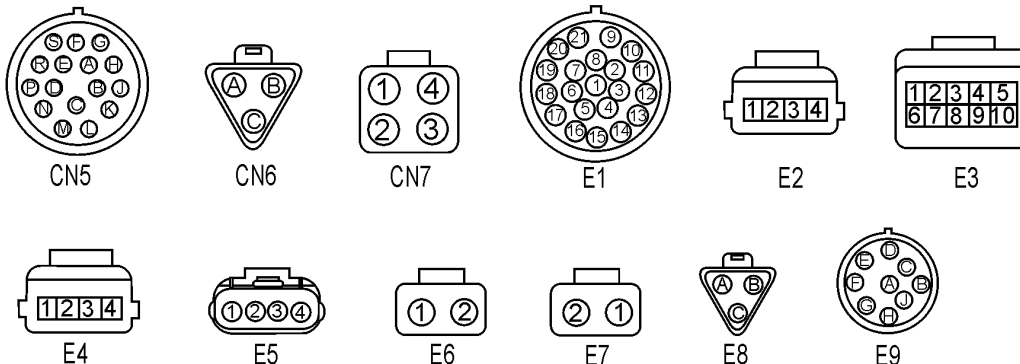
SYMBOL	DESIGNATION	SYMBOL	DESIGNATION
Ar	ARMATURE WINDING	A	AC AMMETER 0-750, 1,500A
Fg	MAIN GENERATOR FIELD WINDING	VS	VOLTMETER CHANGE-OVER SWITCH
Ex Ar	EXCITER ARMATURE WINDING	V	AC VOLTMETER 0-600V
Ex Fg	EXCITER FIELD WINDING	F	FREQUENCY METER 45-65 Hz
AVR	AUTOMATIC VOLTAGE REGULATOR	PL1	PILOT LAMP
VR	VOLTAGE REGULATING RHEOSTAT	CB2-3	AUX. CIRCUIT BREAKER 20A
Re	RECTIFIER	CB4-6	AUX. CIRCUIT BREAKER 50A
CT1-3	CURRENT TRANSFORMER 750/5A	CON2-3	RECEPTACLE 520R GFCI 20A, 125V
CB1	CIRCUIT BREAKER 800 AMPS	CON3-5	RECEPTACLE CS-6369 50A, 120/240V
OC	OVER CURRENT RELAY	IL	PANEL LIGHT
COT. B	VOLTAGE CHANGE-OVER BOARD	SW1	PANEL LIGHT SWITCH
AS	AMMETER CHANGE-OVER SWITCH		

# ENGINE WIRING DIAGRAM



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

Figure 68. 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 17 shown below for diagnosis of the Generator. If the problem cannot be remedied, consult our company's business office or service plant.

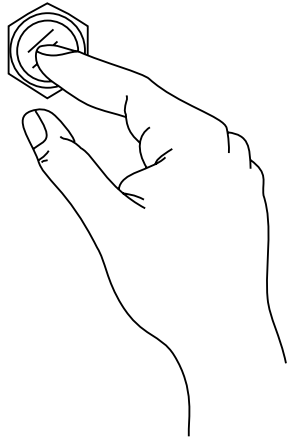
<b>Table 17. Generator Troubleshooting</b>		
<b>Symptom</b>	<b>Possible Problem</b>	<b>Solution</b>
No Voltage Output	AC Voltmeter defective?	Check output voltage using a voltmeter.
	Is wiring connection loose?	Check wiring and repair.
	Is AVR defective?	Replace if necessary.
	Defective Rotating Rectifier?	Check and replace.
	Defective Exciter Field?	Check for approximately 19 ohms across J & K on CN1
Low Voltage Output	Is engine speed correct?	Turn engine throttle lever to "High".
	Is wiring connections loose?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
High Voltage Output	Is wiring connections loose?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
Circuit Breaker Tripped	Short Circuit in load?	Check load and repair.
	Over current?	Confirm load requirements and reduce.
	Defective circuit breaker?	Check and replace.
	Over current Relay actuated?	Confirm load requirement and replace.

# TROUBLESHOOTING DIAGNOSTICS

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

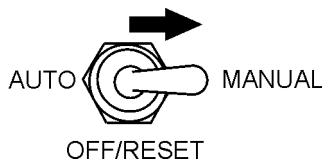
1. With the engine stopped (**OFF**). Push and hold the **Hour Check Button** (Figure 69) located on the control panel.

HOUR CHECK  
BUTTON



**Figure 69. Hour Check Button**

2. While keeping the **Hour Check Button** pressed, place the **Auto Off/Reset Manual Switch** (Figure 70) in the **MANUAL** position.



**Figure 70. Auto-Off/Reset Switch  
(Manual Position)**

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

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

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

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



# 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

### DCA220SSCU/DCA220SSCU4I WHISPERWATT GENERATOR WITH CUMMINGS QSB7-G6 DIESEL ENGINE

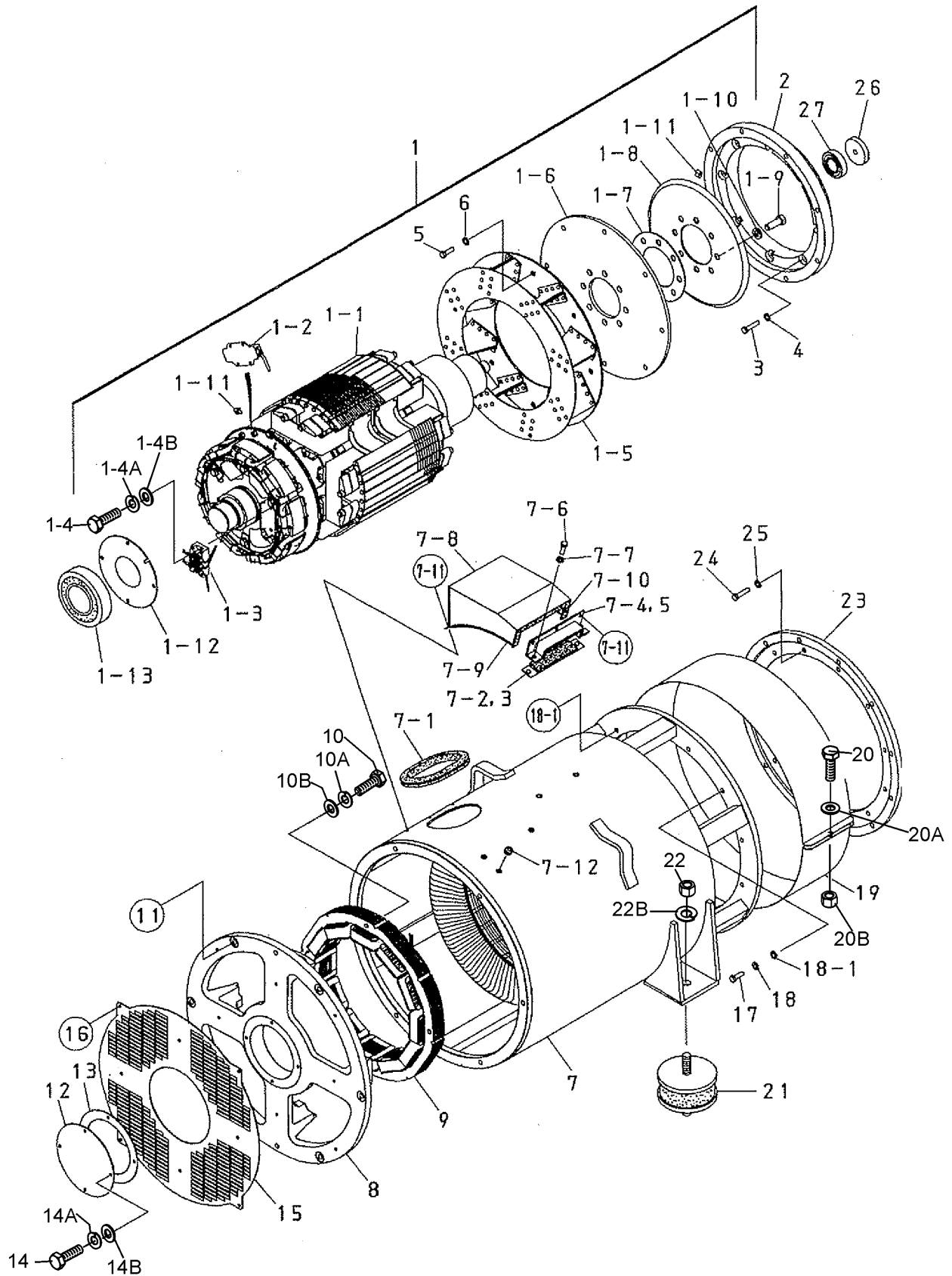
#### 1 TO 3 UNITS

Qty.	P/N	Description
3.....	Y0602015150 .....	HOSE, RADIATOR, HUMP
2.....	Y0602015151 .....	HOSE, RADIATOR
2.....	Y0602015152 .....	HOSE, RADIATOR
1.....	Y0602015153 .....	HOSE, RADIATOR
3.....	Y0602015246 .....	BELT, FAN
1.....	4921517.....	SENSOR, OIL PRESSURE
1.....	Y0602211320 .....	SWITCH, COOLANT LEVEL
6.....	Y0602042578 .....	FUEL FILTER CARTRIDGE
6.....	Y0602042579 .....	CARTRIDGE WATER SEPERATOR
6.....	Y0602041296 .....	FILTER, OIL CARTRIDGE
3.....	AF55014 .....	ELEMENT AIR CLEANER PRIMARY
3.....	AF55308 .....	ELEMENT AIR CLEANER SAFETY
1.....	.0601808803.....	CIRCUIT BREAKER 1P 20A
1.....	.0601808804.....	CIRCUIT BREAKER 2P 50A
2.....	LY2DUS24VDC ....	RELAY
1.....	Y0601806603 .....	FUSE, 150A
1.....	.0601806671.....	(LEFT) 15A
1.....	.0601802131.....	FUSE, (CENTER) 1A
1.....	.0601802133.....	FUSE, (RIGHT) 5A
1.....	Y0601806646 .....	FUSE, 20A

#### NOTICE

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

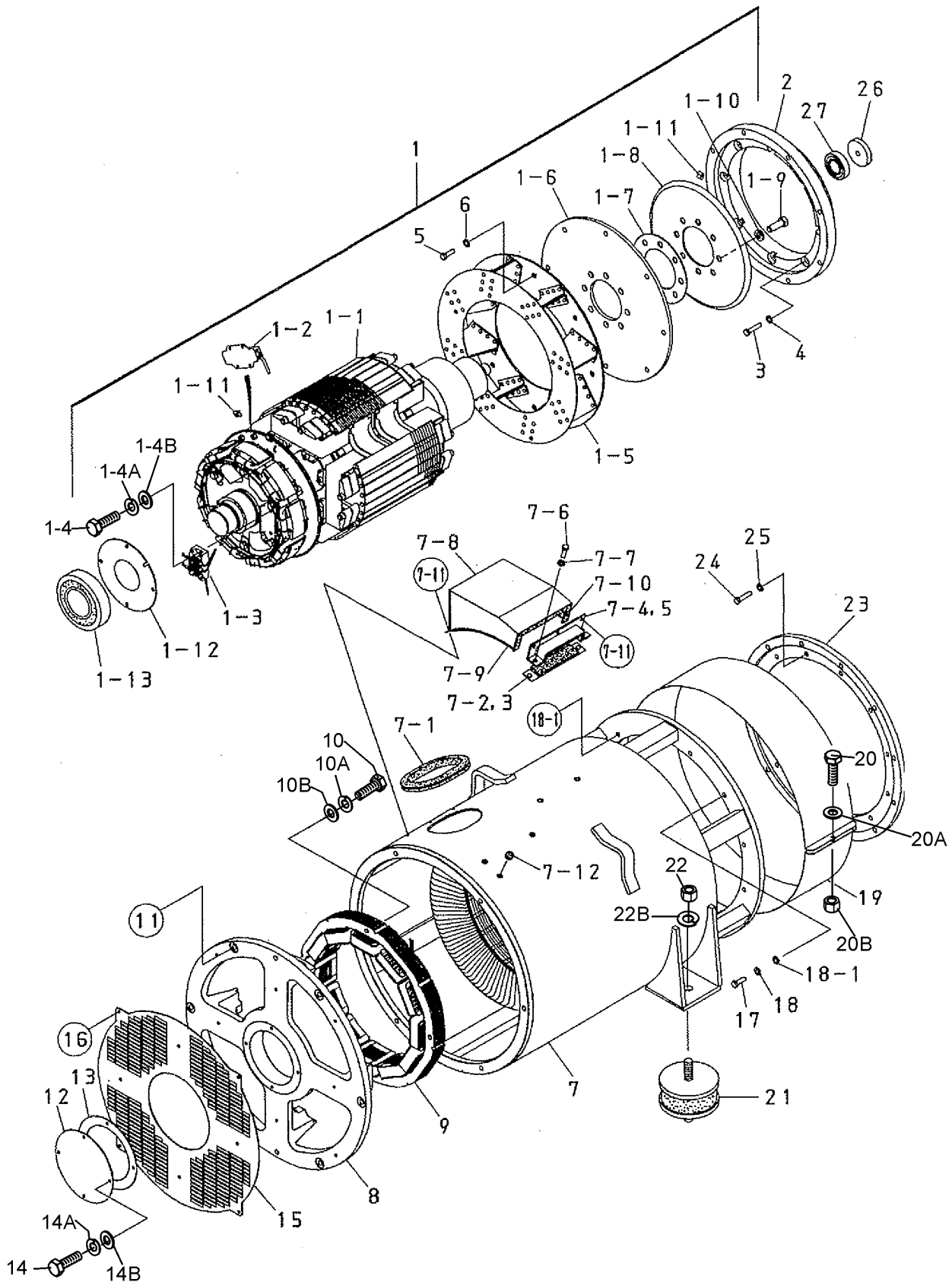
# GENERATOR ASSY.



## GENERATOR ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	C1110100302	ROTOR ASS'Y .....	1.....	INCLUDES ITEMS W/#
1-1#		FIELD ASS'Y	1	
1-2#	0601842334	RESISTOR	1	
1-3#	0601823282	RECTIFIER	1	
1-4#	0018205020	HEX. SOCKET HEAD CAP SCREW	2	
1-4A#	0032005000	WASHER, LOCK	2	
1-4B#	0401450050	WASHER, FLAT	2	
1-5#	8171070002	FAN	1	
1-6#	8171611003	COUPLING DISK	9	
1-7#	C1164200004	WASHER, COUPLING HUB	1	
1-8#	8171015003	BALANCING PLATE.....	1.....	WHEN PURCHASING BALANCING ..... PLATE ITEM 1-11 MUST ALSO BE ..... ORDERED
1-9#	0012116045	HEX. HEAD BOLT	8	
1-10#	0042616000	WASHER, LOCK	8	
1-11#	0601000209	BALANCING WEIGHT KIT	1	
1-12#	C1112500004	BEARING FLANGE	1	
1-13#	0071906314	BEARING	1	
2	M3163400603	COUPLING RING	1	
3	Y0343204200	HEX. HEAD BOLT	8	
4	EM923344	WASHER, LOCK	8	
5	012112040	HEX. HEAD BOLT	8	
6	0042512000	WASHER, LOCK	8	
7	C1130000103	STATOR ASS'Y	1	
7- 1	0226100420	RUBBER SEAL	1	
7- 2	8171323004	CLAMPER	1	
7- 3	0223300120	RUBBER SEAL	1	
7- 4	8171323103	CLAMPER	1	
7- 5	0221200300	RUBBER SEAL	1	
7- 6	0010110035	HEX. HEAD BOLT	2	
7- 7	031110160	WASHER, FLAT	2	
7- 8	C1132200003	COVER	1	
7- 9	0226000510	RUBBER SEAL	2	
7- 10	0225000470	RUBBER SEAL	1	
7- 11	0017106016	HEX. HEAD BOLT	6	
7- 12	0601850144	GROMMET	1	
8	C1154000002	END BRACKET	1	
9	C1138000003	FIELD ASS'Y, EXCITER	1	
10	0012110065	HEX. HEAD BOLT	4	
10A	0042610000	WASHER, LOCK	4	
10B	031110160	WASHER, FLAT	4	
11	0017112045	HEX. HEAD BOLT	6	
12	C1154400004	COVER, BEARING	1	
13	C1154300004	GASKET, BEARING	1	
14	0010106060	HEX. HEAD BOLT	4	
14A	0040006000	WASHER, LOCK	4	
14B	952404470	WASHER, FLAT	4	

# GENERATOR ASSY. (CONTINUED)



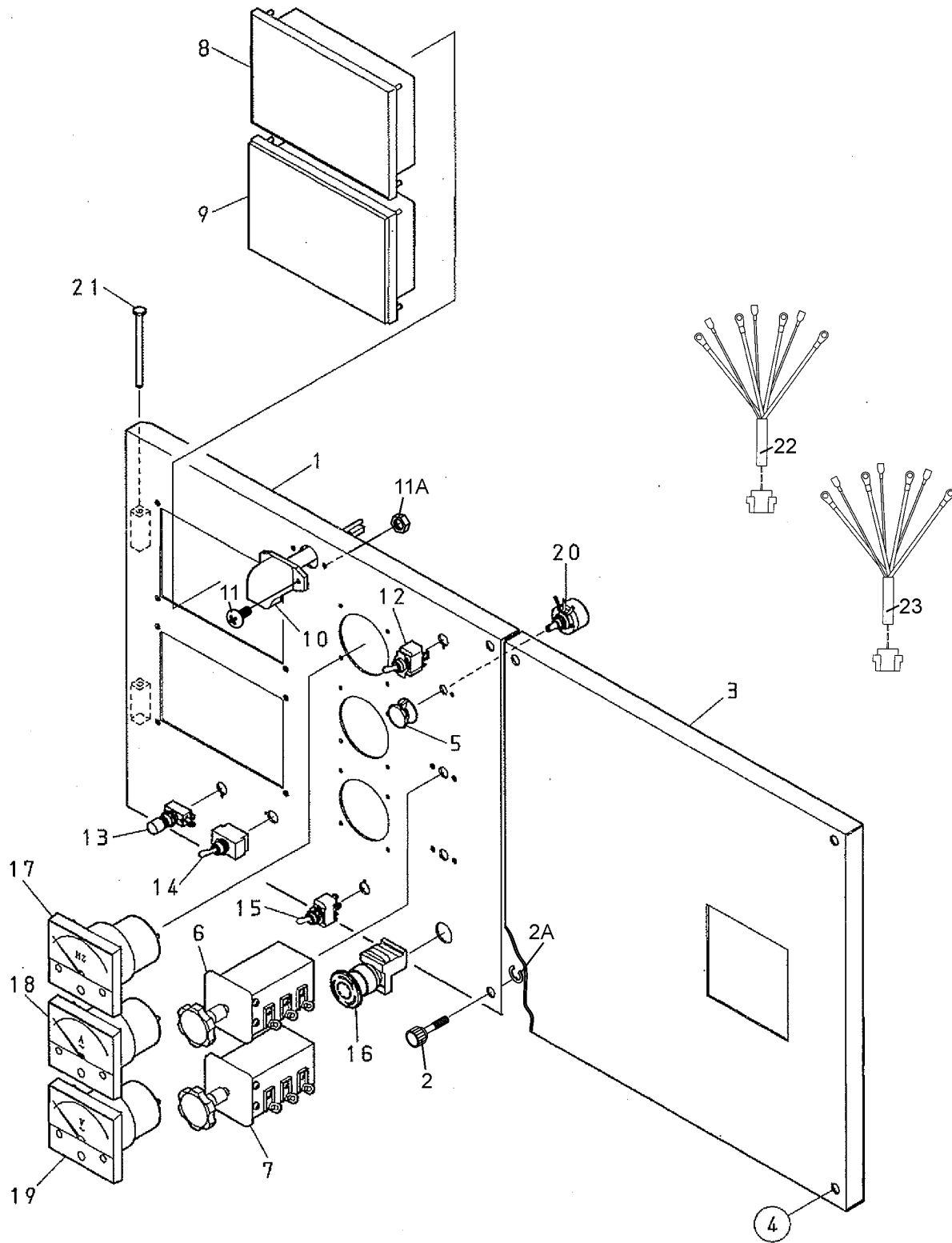


## GENERATOR ASSY. (CONTINUED)

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<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
15	C1154400103	SUCTION COVER	1	
16	011106015	HEX. HEAD BOLT	8	
17	012112040	HEX. HEAD BOLT	12	
18	0042512000	WASHER, LOCK	12	
18-1	031112230	WASHER, FLAT	2	
19	C1132300114	COVER, FAN	1	
20	0010006030	HEX. HEAD BOLT	1	
20A	952404470	WASHER, FLAT	1	
20B	020106050	NUT	1	
21	0605000012	RUBBER SUSPENSION	2	
22	0030020000	HEX. NUT	4	
22A	030220510	WASHER, LOCK	4	
23	M3163600103	COUPL ING ADAPTER	1	
24	012010030	HEX. HEAD BOLT	12	
25	030210250	WASHER, LOCK	12	
26	M3163700004	SPACER, BEARING	1	
27	0070506207	BEARING	1	

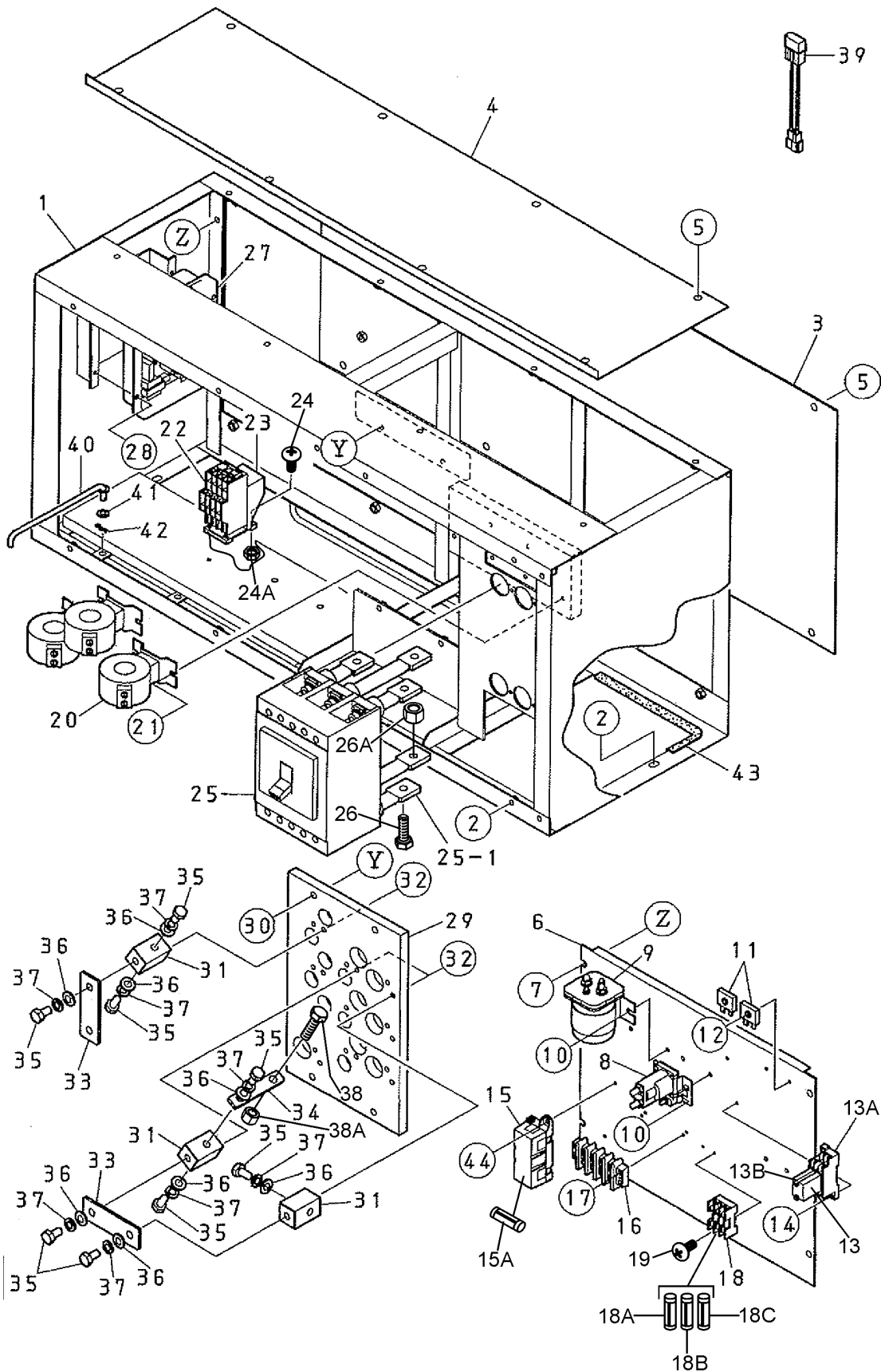
# CONTROL PANEL ASSY.



## CONTROL PANEL ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	M4223000503	CONTROL PANEL	1	
2	M9220100004	SET SCREW	2	
2A	Y0080200007	E-RING	2	
3	M4223000604	CONTROL PANEL	1	
4	0017108040	HEX. HEAD BOLT	4	
5	0601840100	KNOB	1	
6	0601801040	CHANGE-OVER SWITCH, AMMETER	1	
7	0601801041	CHANGE-OVER SWITCH, VOLTMETER	1	
8	Y0602202642	ECU CONTROLLER	1	
9	Y0602120569	GAUGE UNIT ASS'Y.	1	
10	0601810171	PANEL LIGHT, 24V	1	
11	0027104020	MACHINE SCREW	2	
11A	OEMAA8	HEX. NUT	2	
12	0601831330	PANEL LIGHT SWITCH	1	
13	0601831205	PUSH BUTTON	1	
14	82608	TOGGLE SWITCH	1	
15	0601830710	SWITCH, PANEL LIGHT	1	
16	0601831557	EMERGENCY STOP BUTTON	1	
17	0601807642	FEQUENCY METER, 45~65 HZ @240V	1	
18	0601808992	AC AMMETER, 0~400A/800A:5A	1	
19	0601800275	AC VOLTMETER, 0~600V	1	
20	0601840073	VOLTAGE REGULATOR, 1K OHM	1	
21	0605011211	PIN	1	
22	M4246700604	WIRE HARNESS, GENERATOR	1	
23	M4357200202	WIRE HARNESS, ENGINE	1	

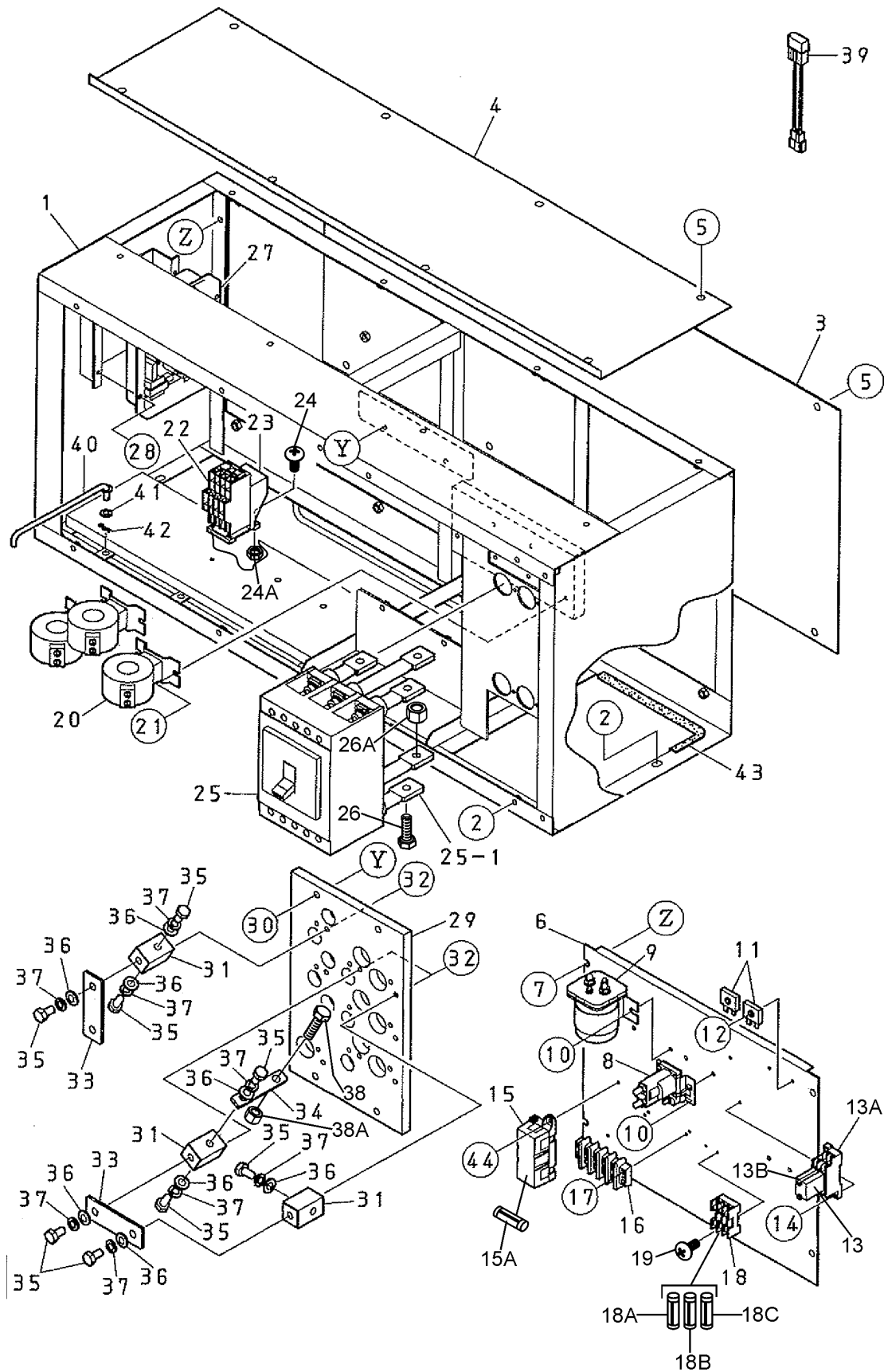
# CONTROL BOX ASSY.



## CONTROL BOX ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	M4213000212	CONTROL BOX	1	
2	011008020	HEX. HEAD BOLT	14	
3	M4213400104	BACK PANEL	1	
4	M4213500104	TOP PANEL	1	
5	011008020	HEX. HEAD BOLT	16	
6	M4260500103	SET PANEL	1	
7	011008020	HEX. HEAD BOLT	4	
8	Y0602201456	MAGNETIC SWITCH	1	
9	Y0602201457	MAGNETIC SWITCH	1	
10	0016906016	HEX. HEAD BOLT	4	
11	0601821370	RECTIFIER	2	
12	0027104020	MACHINE SCREW	2	
13	LY2DUS24VDC	RELAY .....	1	REPLACES P/N 0601827655
13A	PTF08A	RELAY BASE .....	1	REPLACES P/N 0601823109
13B	PYCA1	RE LAY CLIP .....	1	REPLACES P/N 0601824400
14	0027104020	MACHINE SCREW	2	
15	Y0601872130	HOLDER, FUSE	1	
15A	Y0601806603	FUSE, 150A	1	
16	0601815153	TERMINAL BLOCK	1	
17	0027104020	MACHINE SCREW	2	
18	0601802218	HOLDER, FUSE	1	
18A	0601806671	FUSE (LEFT), 15A	1	
18B	0601802131	FUSE (CENTER), 1A	1	
18C	0601802133	FUSE (RIGHT), 5A	1	
19	0027103020	MACHINE SCREW	2	
20	0601809667	CURRENT TRANSFORMER	3	
21	0027106020	MACHINE SCREW	6	
22	Y0801820847	OVER CURRENT RELAY	1	
23	0601820848	OVER CURRENT RELAY	1	
24	0027104020	MACHINE SCREW	2	
24A	OEMAA8	HEX. NUT	2	
25	Y0601807523	CIRCUIT BREAKER, 3P 600A	1	
25-1	Y0601827412	REAR TERMINAL BUSBAR	2	
26	014210040	HEX. HEAD BOLT	6	
26A	021112140	SELF-LOCKING NUT	6	
27	0601820604	AUTOMATIC VOLTAGE REGULATOR	1	

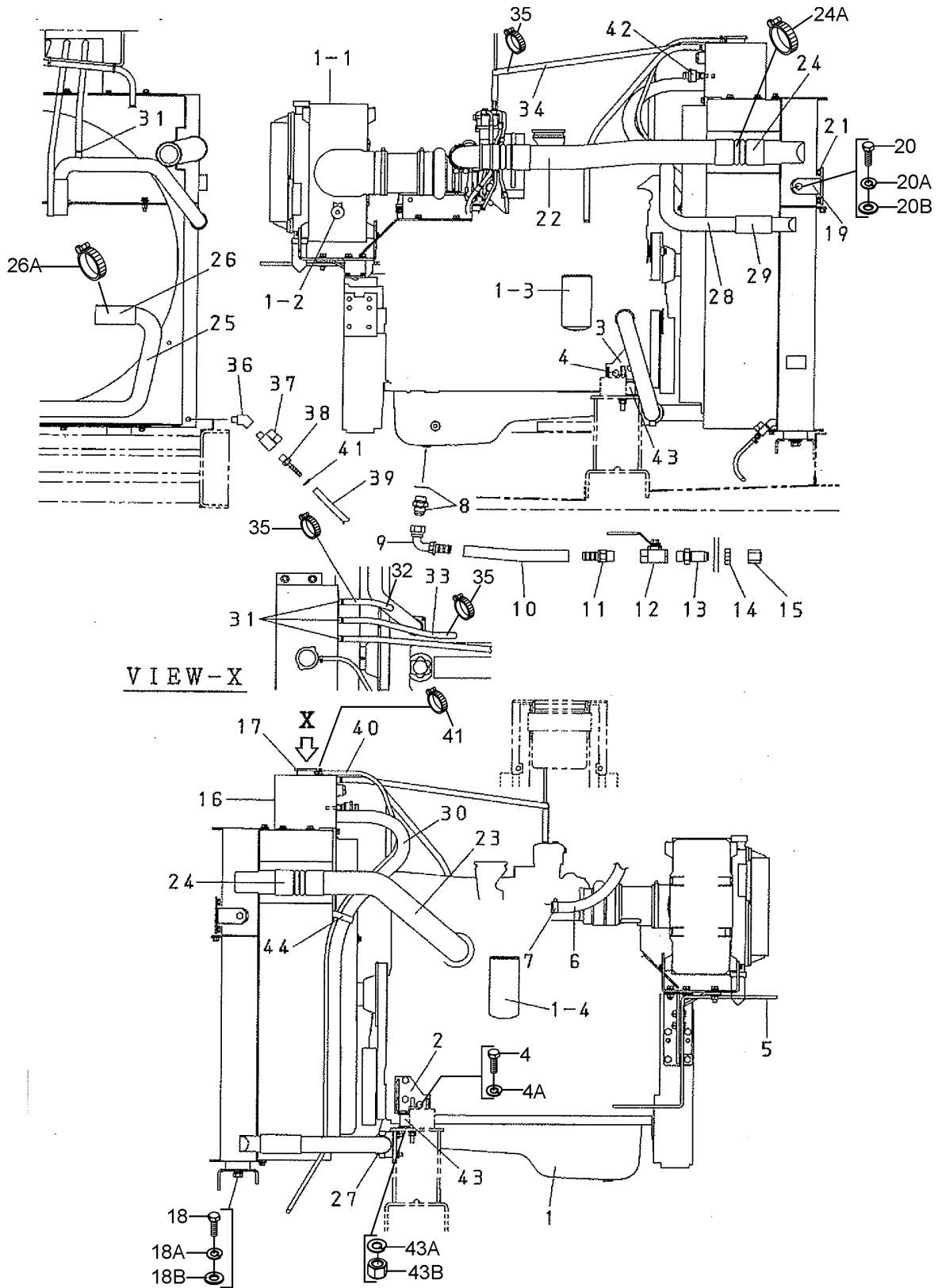
# CONTROL BOX ASSY. (CONTINUED)



## **CONTROL BOX ASSY. (CONTINUED)**

<b><u>NO.</u></b>	<b><u>PART NO.</u></b>	<b><u>PART NAME</u></b>	<b><u>QTY.</u></b>	<b><u>REMARKS</u></b>
28	0027105016	MACHINE SCREW	4	
29	M4273000003	TERM. BD, VOLTAGE CHANGE-OVER	1	
30	011208030	HEX. HEAD BOLT	4	
31	8181852104	CHANGE TERMINAL	10	
32	Y0917106025	HEX. HEAD BOLT	20	
33	8181853104	CHANGE-OVER PLATE	6	
34	M4276200004	CHANGE PLATE	3	
35	012210020	TIE BOLT	26	
36	0041410000	WASHER, FLAT	26	
37	0040010000	WASHER, LOCK	26	
38	014210040	HEX. HEAD BOLT	3	
38A	021112140	SELF-LOCKING NUT	3	
39	Y0601808646	FUSE, 20A	1	
40	M4213600104	STOPPER, CONTROL PANEL	1	
41	952404470	WASHER, FLAT	1	
42	505015300	SNAP PIN	1	
43	0330000250	EDGING	1	
44	0027104020	MACHINE SCREW	2	

# ENGINE AND RADIATOR ASSY.

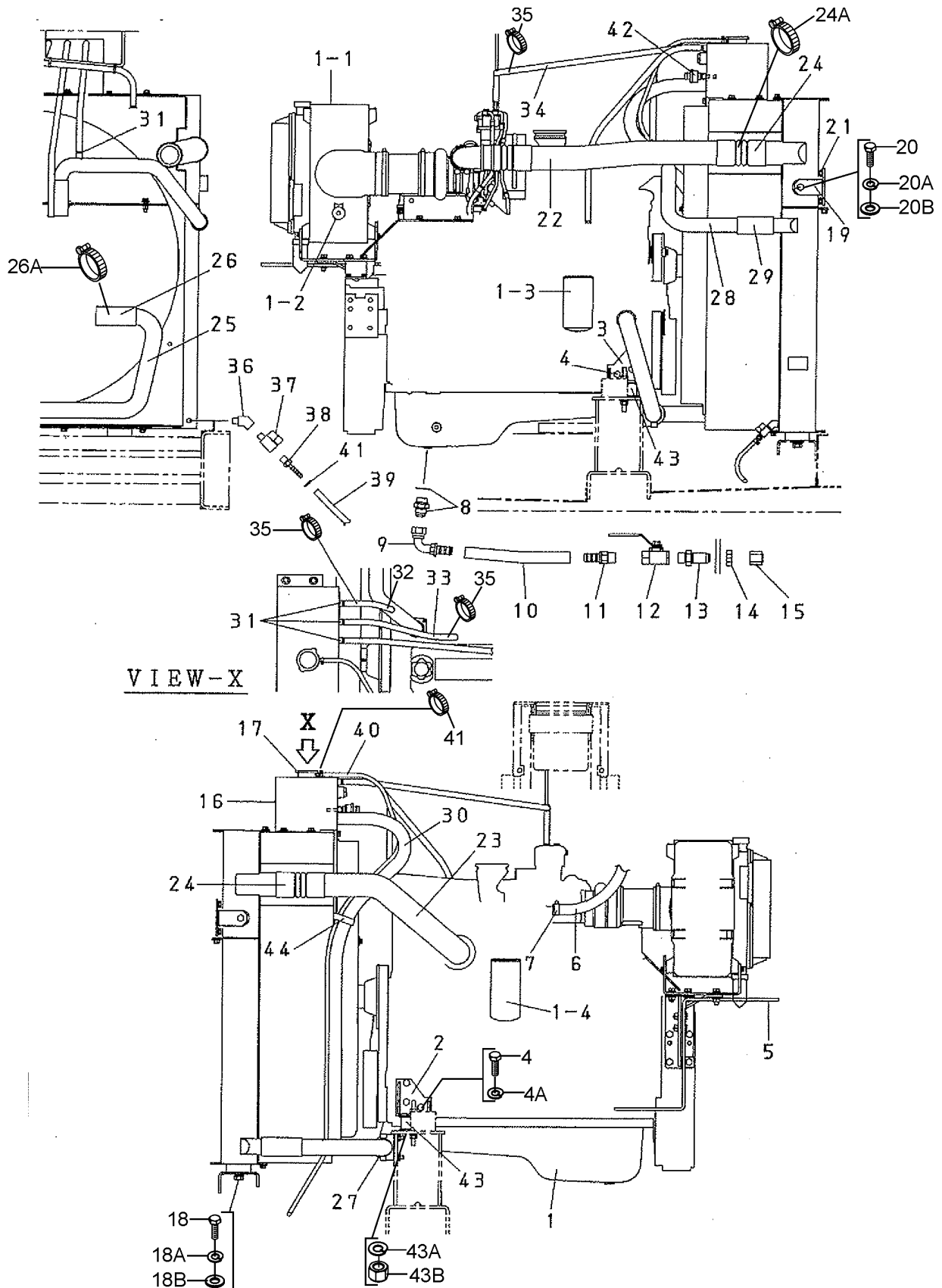




## ENGINE AND RADIATOR ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	M4923200054	ENGINE, CUMMINS QSB7-G6	1	
1A	Y0602015246	FAN BELT	1	
1-1	Y0602046648	ELEMENT, AIR CLEANER, INNER	1	
1-1A	Y0602046649	ELEMENT, AIR CLEANER, OUTER	1	
1-2	RBX002252	AIR CLEANER INDICATER	1	
1-3	Y0602041296	CARTRIDGE, OIL FILTER	1	
1-4	Y0602042578	CARTRIDGE, FUEL FILTER	1	
2	M4303200603	ENGINE FOOT	1	
3	M4303200703	ENGINE FOOT	1	
4	0131151240	HEX. HEAD BOLT	6	
4A	0040012000	WASHER, LOCK	6	
5	M4357300103	HARNES CLAMP	1	
6	Y0191701800	BLOWBY HOSE	1	
7	0605515149	HOSE BAND	2	
8	Y0602022588	ADAPTER	1	
9	Y0602022579	90° ELBOW	1	
10	Y0379500800	DRAIN HOSE	1	
11	Y0603306399	HOSE JOINT	1	
12	Y0605511399	VALVE	1	
13	Y0603306597	CONNECTOR	1	
14	Y0603300286	LOCKNUT	1	
15	Y0602021071	CAP	1	
16	Y0602012739	RADIATOR/CAC ASS'Y	1	
17	Y0602011024	CAP, RADIATOR	1	
18	Y0343207038	HEX. HEAD BOLT	2	
18A	0043007000	WASHER, LOCK	2	
18B	0043107000	WASHER, FLAT	2	
19	M4310201514	BRACKET	2	
20	0343206120	HEX. HEAD BOLT	2	
20A	030206150	WASHER, LOCK	2	
20B	0043106000	WASHER, FLAT	2	
21	0016310025	HEX. HEAD BOLT	4	
22	Y0602013263	TUBE, CAC HOT SIDE	1	
23	Y0602014823	TUBE, CAC COLD SIDE	1	
24	Y0602015150	HOSE, HUMP	3	
24A	Y0605515258	CLAMP, HOSE	6	
25	Y0602014822	TUBE, WATER INLET	1	
26	Y0602015151	HOSE, 70-175, L=5- 00"	2	
26A	Y0605515257	CLAMP, HOSE	4	
27	Y0602326067	U-BOLT SET	1	
28	Y0602013262	TUBE, WATER OUTLET	1	
29	Y0602015152	HOSE, 70-175 L=5. 00"	2	
29A	Y0605515256	CLAMP, HOSE	4	
30	Y0602015153	HOSE, 70-100 L=52"	1	
30A	Y0605515259	CLAMP, HOSE	2	
31	Y0605512198	HOSE JOINT	4	

# ENGINE AND RADIATOR ASSY. (CONTINUED)

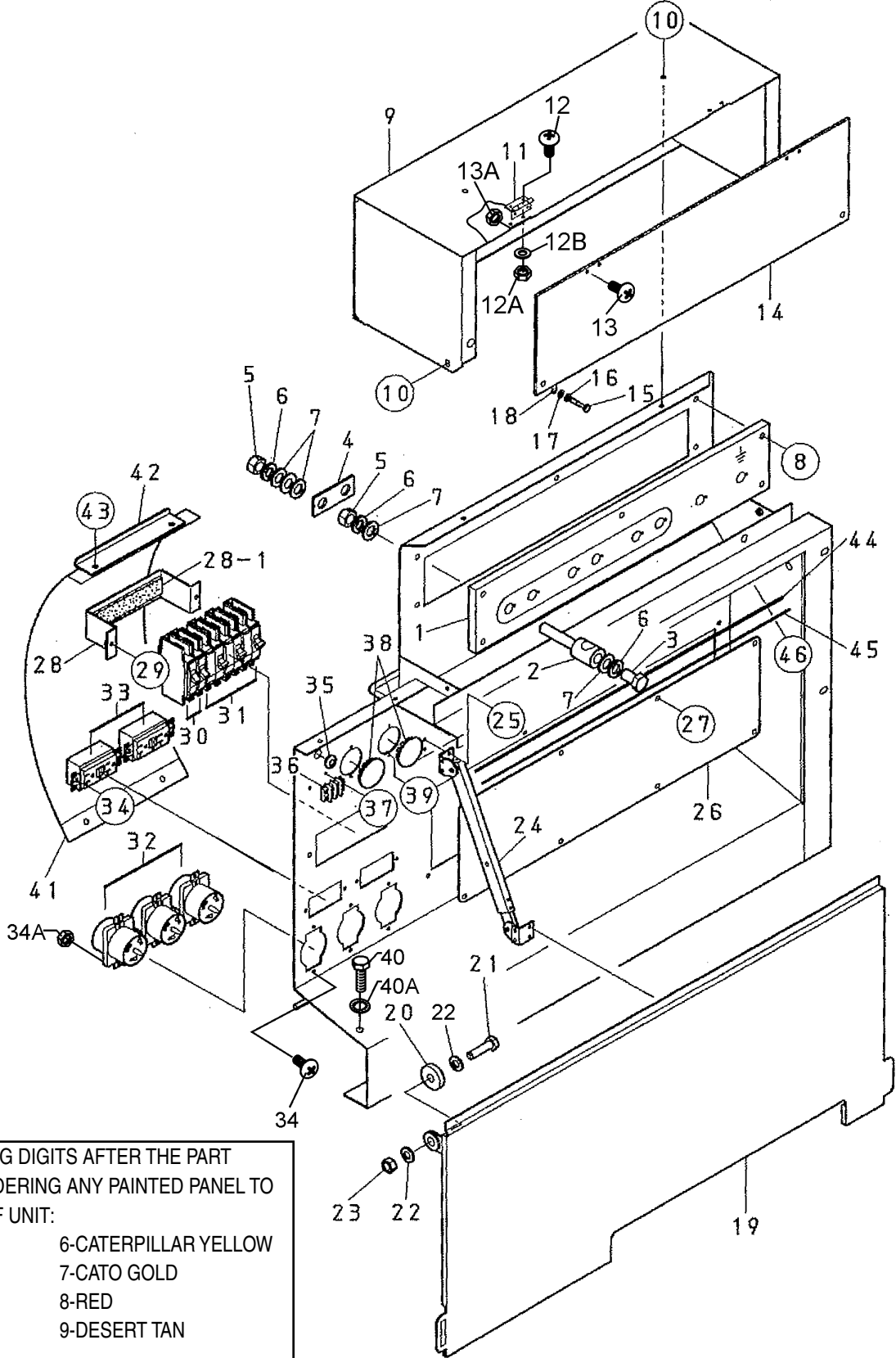


## **ENGINE AND RADIATOR ASSY. (CONTINUED)**

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<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
32	Y0602015154	HOSE, 70-038 L=18"	1	
33	Y0602015155	HOSE, 70-038 L=29.5"	1	
34	Y0602015156	HOSE, 70-038 L=43.5"	1	
35	0605515198	HOSE BAND	6	
36	Y0603307520	45° ELBOW	1	
37	Y0605511394	VALVE	1	
38	Y0605512192	HOSE JOINT	1	
39	0193600400	DRAIN HOSE	1	
40	Y0199101900	OVER FLOW HOSE	1	
41	0605515170	HOSE BAND	2	
42	Y0602211320	COOLANT LEVEL SWITCH	1	
43	Y0605000010	RUBBER SUSPENSION	2	
43A	0030012000	HEX. NUT	2	
43B	0040012000	WASHER, LOCK	2	
44	M3483600104	CLAMP	1	

# OUTPUT TERMINAL ASSY.



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

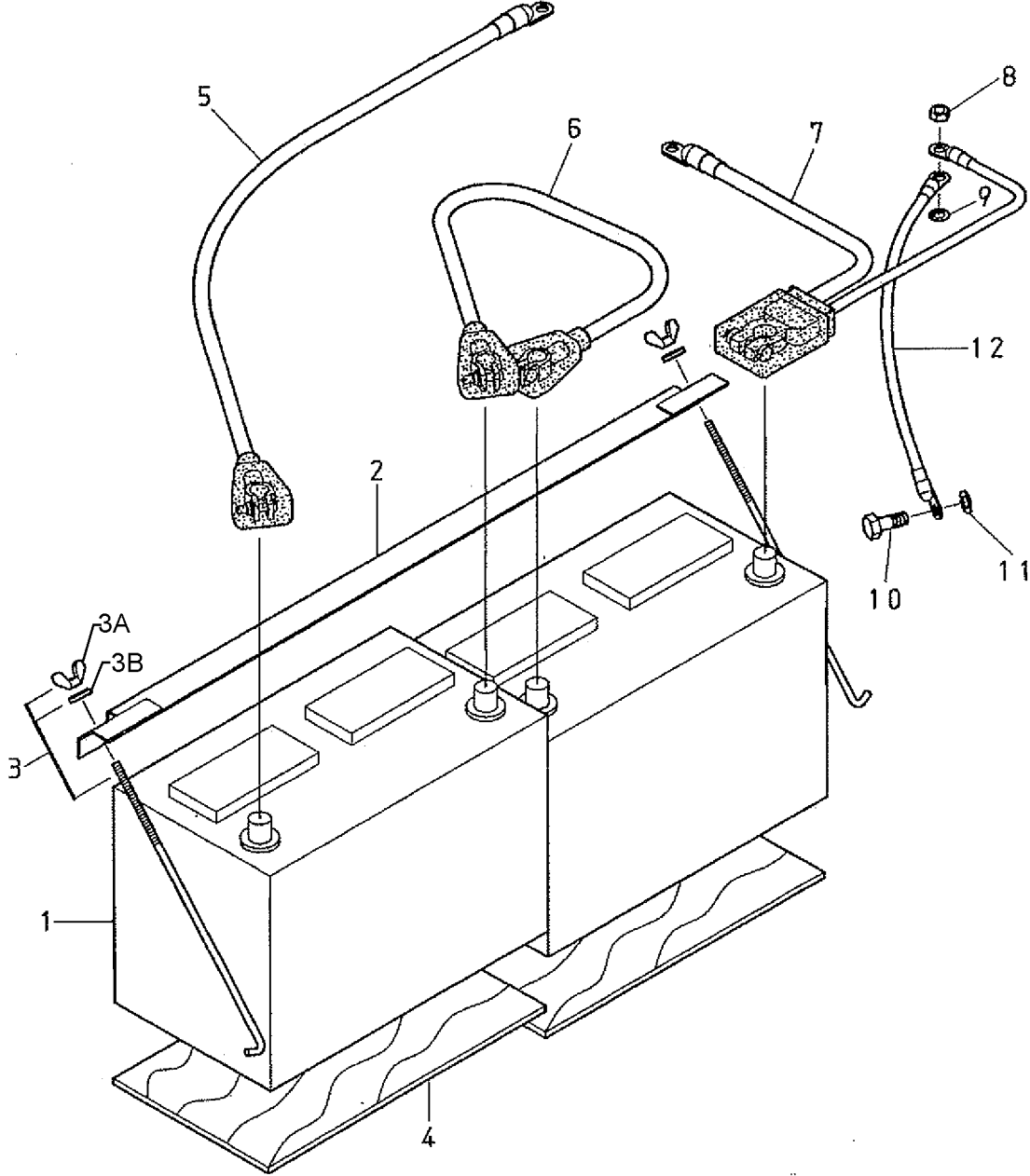
1-ORANGE	6-CATERPILLAR YELLOW
2-WHITE	7-CATO GOLD
3-SPECTRUM GREY	8-RED
4-SUNBELT GREEN	9-DESERT TAN
5-BLACK	

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	C1231700003	TERMINAL BOARD	1	
2	M9220100304	OUTPUT TERMINAL BOLT	8	
3	0801830804	TIE BOLT	8	
4	3461860504	TERMINAL PLATE	3	
5	0039316000	HEX. NUT	16	
6	0040016000	WASHER, LOCK	24	
7	0401450160	WASHER, FLAT	32	
8	0016908040	HEX. HEAD BOLT	5	
9	M4236100403	TERMINAL COVER	1	
10	0016906016	HEX. HEAD BOLT	4	
11	0605010040	HINGE	2	
12	0027103010	MACHINE SCREW	4	
12A	0207003000	HEX. NUT	4	
12B	0041203000	WASHER, FLAT	4	
13	0027103015	MACHINE SCREW	4	
13A	0207003000	HEX. NUT	4	
14	M4236100504	OUTPUT WINDOW	1	
15	M9220100804	SET SCREW	2	
16	0040006000	WASHER, LOCK	2	
17	952404470	WASHER, FLAT	2	
18	0080200005	RING	2	
19	M4236100703	TERMINAL COVER	1	
20	0805009804	STAY RUBBER	2	
21	012212045	HEX. HEAD BOLT	2	
22	031112230	WASHER, FLAT	4	
23	0030012000	HEX. NUT	2	
24	0605011505	STAY	1	
25	0027105016	MACHINE SCREW	4	
26	M4236400204	COVER	1	
27	0016906016	HEX. HEAD BOLT	8	
28	M4260600104	BRACKET, CIRCUIT BREAKER	1	
28-1	0222100150	RUBBER CUSHION	1	
29	011206020	HEX. HEAD BOLT	2	
30	0601808803	CIRCUIT BREAKER, 1P, 20A	2	
31	0601808804	CIRCUIT BREAKER, 2P, 50A	3	
32	Y0601814014	RECEPTACLE, CS-6369L, 50A	3	
33	0601814013	RECEPTACLE, GF-20LA, 20A	2	
34	7538070	MACHINE SCREW	10	
34A	OEMAA8	HEX. NUT	10	
35	0601850275	GROMMET	1	
36	0601815194	TERMINAL BLOCK	1	
37	7538070	MACHINE SCREW	2	
38	0603306775	BLIND PLUG	2	
39	7538070	MACHINE SCREW	4	
40	0017110025	HEX. HEAD BOLT	1	
40A	0040510000	TOOTHED WASHER	1	
41	M4236100604	INSULATING COVER	1	
42	M4236400304	BRACKET	1	
43	0016906016	HEX. HEAD BOLT	2	
44	M4236400004	CABLE OUTLET COVER	1	
45	M4236400104	SUPPORTER, CABLE OUTLET COVER	1	
46	011206020	HEX. HEAD BOLT	8	

**BATTERY ASSY.**

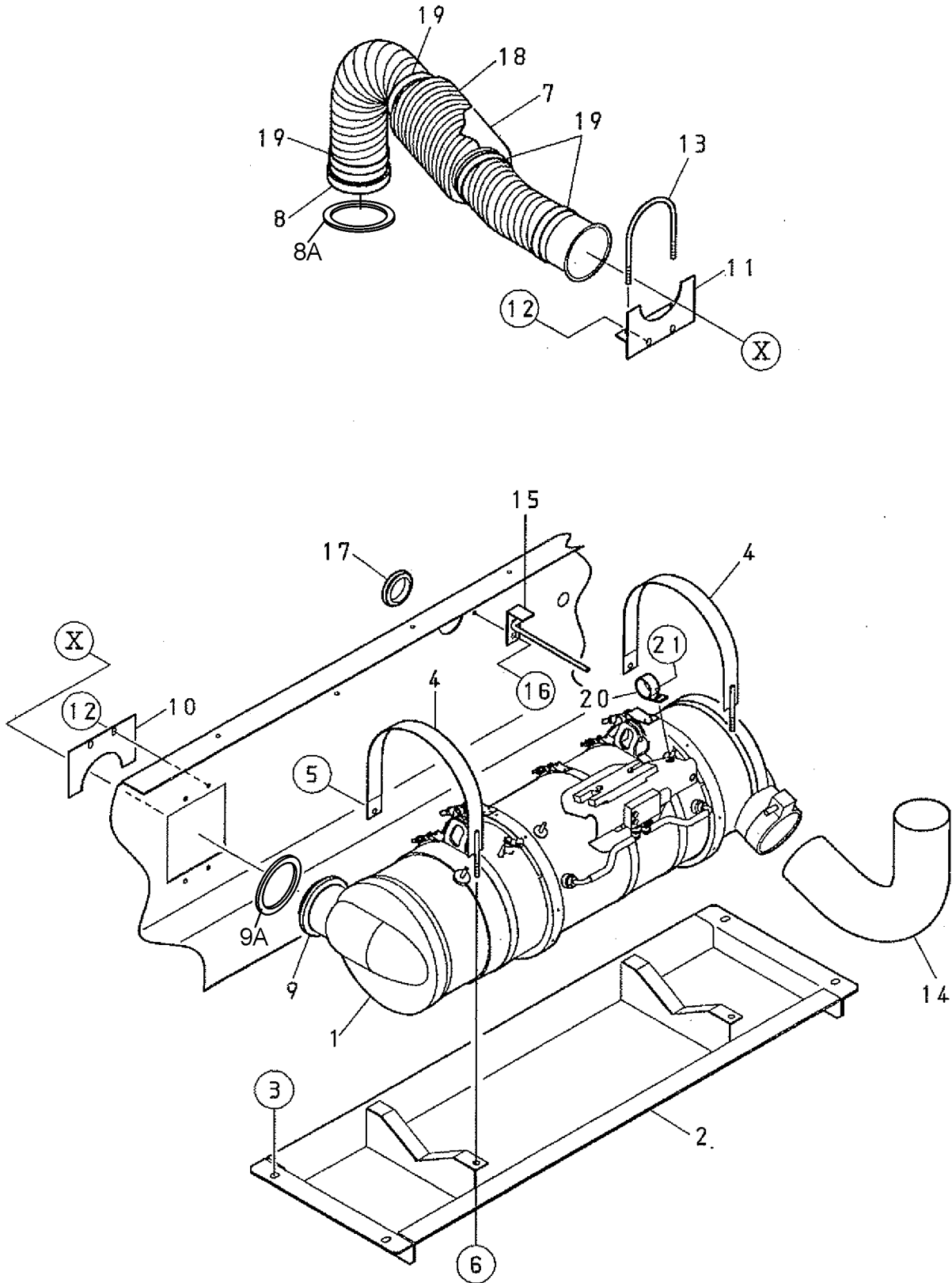


## BATTERY ASSY.

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<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	0602220199	BATTERY	2	
2	M9103000804	BATTERY BAND	1	
3	0602220920	BATTERY BOLT SET .....	2 .....	INCLUDES ITEMS W/#
3A#		WING NUT	2	
3B#		PLASTIC WASHER	2	
4	M9310500014	BATTERY SHEET	2	
5	M4346900404	BATTERY CABLE	1	
6	M3346902104	BATTERY CABLE	1	
7	M4346900504	BATTERY CABLE	1	
8	020108060	HEX. NUT	1	
9	0040508000	TOOTHED WASHER	1	
10	0016910025	HEX. HEAD BOLT	1	
11	0040510000	TOOTHED WASHER	1	
12		EARTH CABLE .....	1 .....	MAKE LOCALLY

# MUFFLER ASSY.



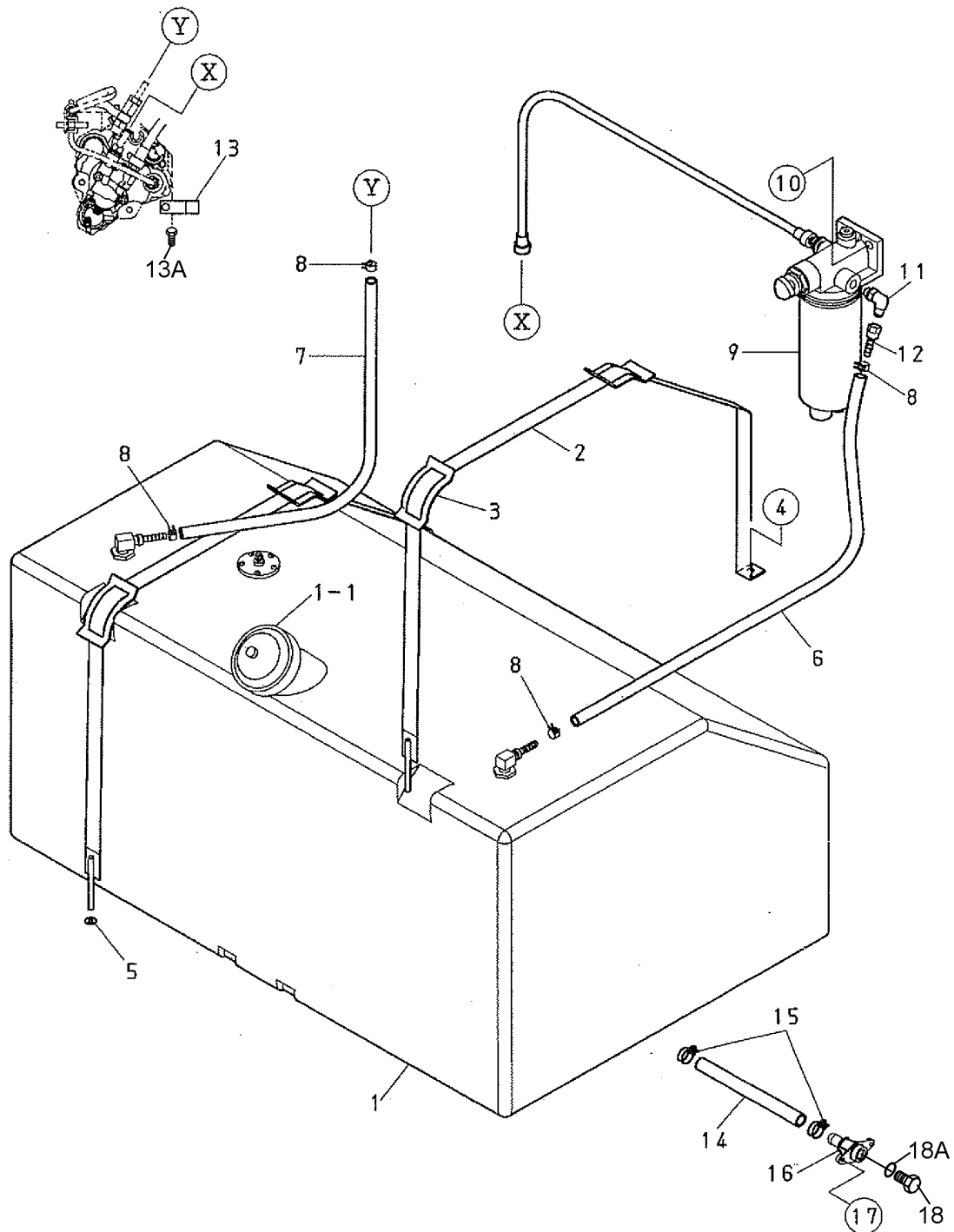


## MUFFLER ASSY.

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<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	Y0602300240	DEVICE, AFTER TREATMENT	1	
2	M4330400003	BRACKET	1	
3	0016910025	HEX. HEAD BOLT	4	
4	M2330400704	BAND	2	
5	011008020	HEX. HEAD BOLT	2	
6	0207308000	SUPER LOCK NUT	2	
7	M4333000503	EXHAUST PIPE	1	
8	Y0602325039	V-BAND CLAMP	1	
8A	Y0602320129	GASKET	1	
9	Y0602325038	V-BAND CLAMP	1	
9A	Y0602320128	GASKET	1	
10	M3330400804	EXHAUST PIPE COVER	1	
11	M3330400903	EXHAUST PIPE BRACKET	1	
12	011008020	HEX. HEAD BOLT	4	
13	0602326062	U-BOLT SET	1	
14	M4333100004	EXHAUST TAIL PIPE	1	
15	M4357300014	HARNESS CLAMP	1	
16	011008020	HEX. HEAD BOLT	2	
17	0601851736	GROMMET	1	
18	Y0602311130	EXHAUST INSULATING WRAP	1	
19	0605515225	HOSE BAND	4	
20	0602220911	CLAMP	1	
21	0016910025	HEX. HEAD BOLT	1	

# FUEL TANK ASSY.

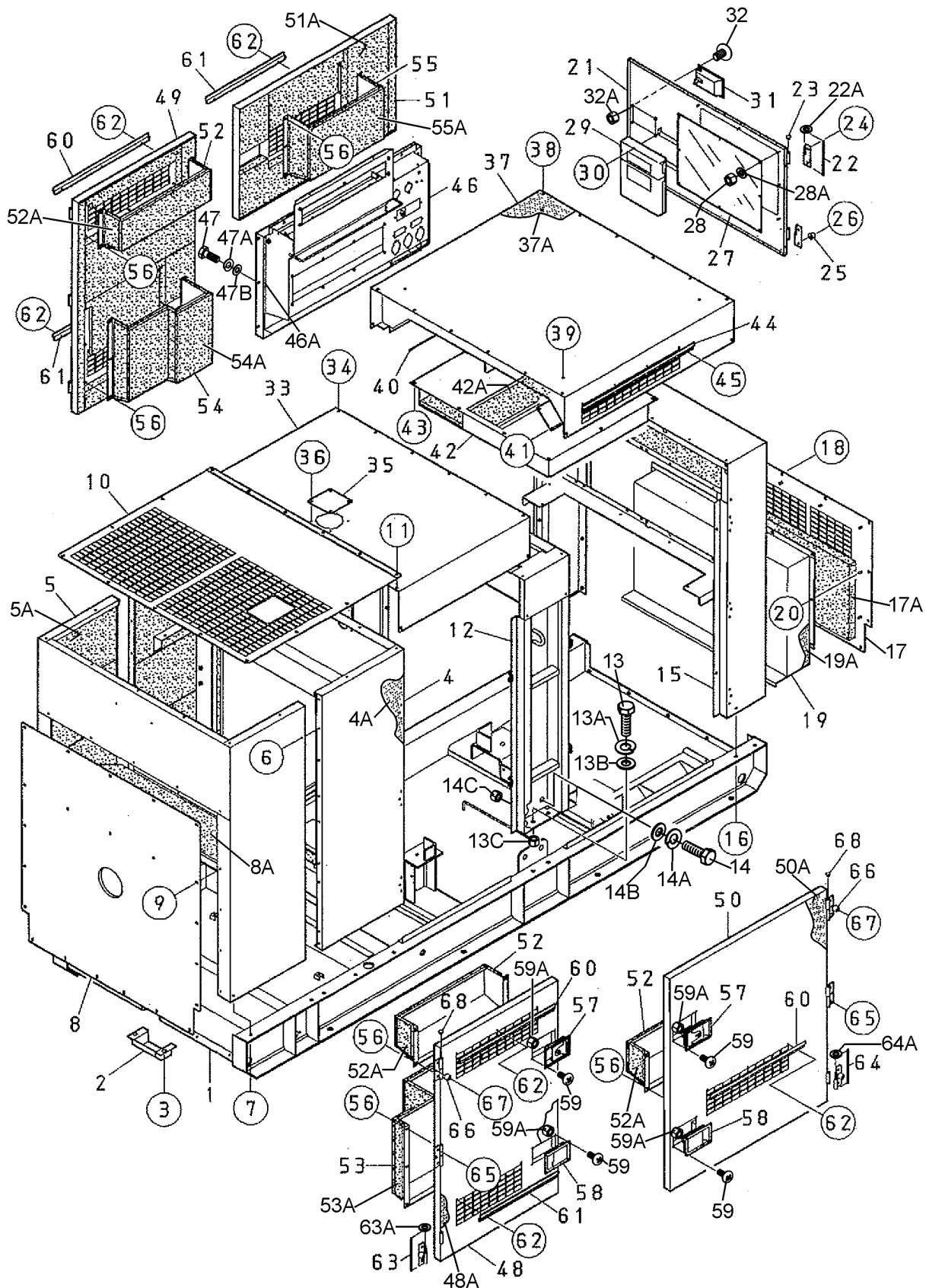


## FUEL TANK ASSY.

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<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	M4363000202	FUEL TANK	1	
1-1	0605505070	FUEL TANK CAP	1	
2	M4363200004	TANK BAND	2	
3	M9310500104	SUPPORTER SHEET	4	
4	011008020	HEX. HEAD BOLT	2	
5	0207308000	SUPER LOCK NUT	2	
6	0191302300	SUCTION HOSE	1	
7	Y0191204000	RETURN HOSE	1	
8	0605515109	HOSE BAND	4	
9	Y0602042579	CART., FUEL WATER SEPARATOR	1	
10	014210040	HEX. HEAD BOLT	2	
11	Y0602022578	90° ELBOW	1	
12	Y0602022985	HOSE JOINT	1	
13	0602220911	CLAMP	1	
13A	0016906016	HEX. HEAD BOLT	1	
14	M1363400104	DRAIN HOSE	1	
15	0605515198	HOSE BAND	2	
16	1502025103C	DRAIN JOINT	1	
17	011206020	HEX. HEAD BOLT	2	
18	0802011104	DRAIN BOLT	1	
18A	0150000018	O-RING	1	

# ENCLOSURE ASSY.



## ENCLOSURE ASSY.

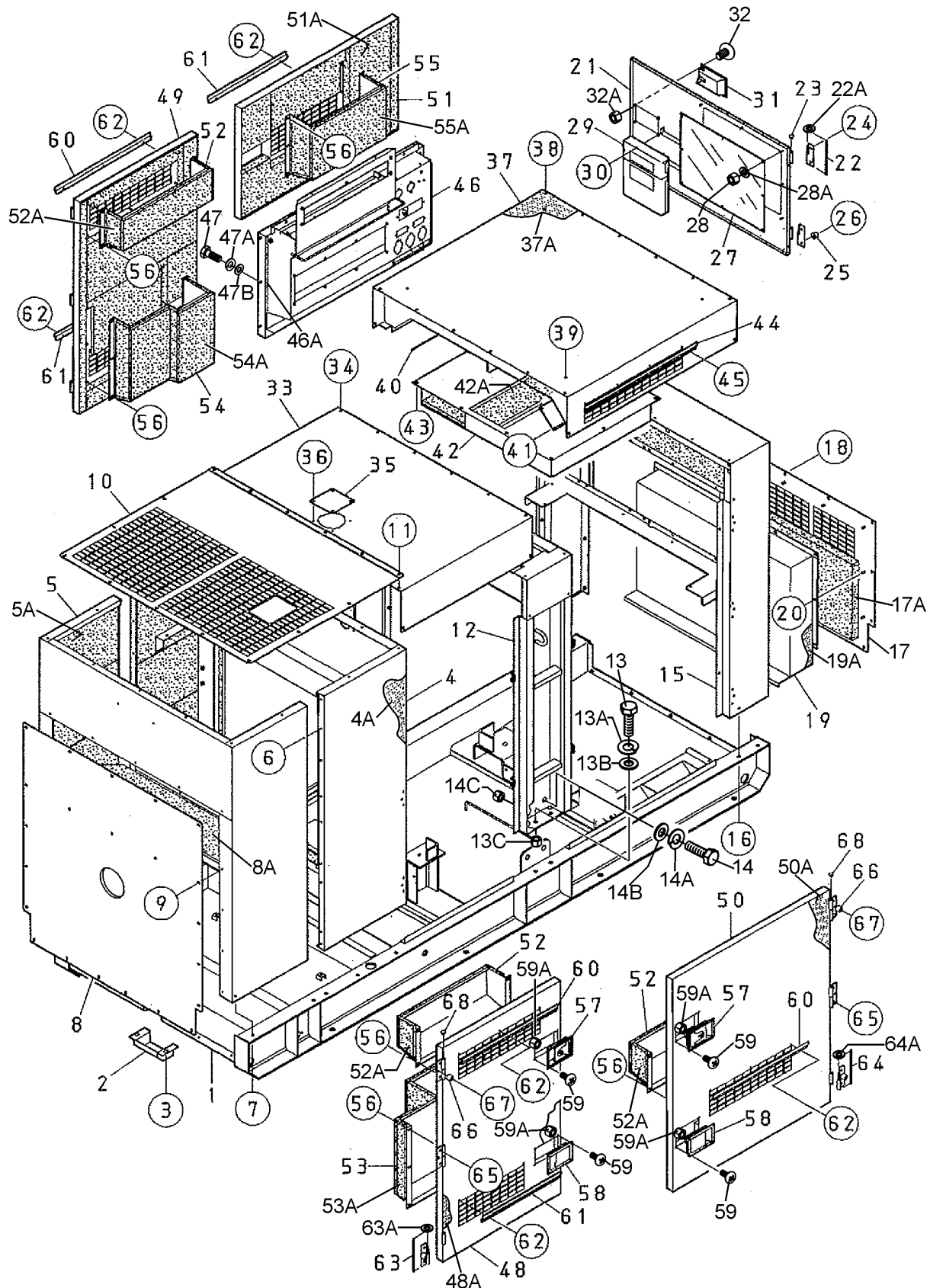
<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	M4413000412	BASE	1	
2	M1413400004	COVER	1	
3	011008020	HEX. HEAD BOLT	2	
4	M4423000512	FRONT FRAME	1	
4A	M4493104603	ACOUSTIC SHEET	1	
5	M4423000602	FRONT FRAME	1	
5A	M4493104603	ACOUSTIC SHEET	1	
6	011008020	HEX. HEAD BOLT	10	
7	0016910025	HEX. HEAD BOLT	10	
8	M4423200004	COVER, FRONT FRAME	1	
8A	M4493100004	ACOUSTIC SHEET	1	
9	0019208020	HEX. HEAD BOLT	22	
10	M4423200503	TOP COVER, FRONT FRAME	1	
11	0019208020	HEX. HEAD BOLT	15	
12	M4433000212	CENTER FRAME	1	
13	0010114040	HEX. HEAD BOLT	4	
13A	030214350	WASHER, LOCK	4	
13B	031114260	WASHER, FLAT	8	
13C	515455840	HEX. NUT	4	
14	0010120050	HEX. HEAD BOLT	4	
14A	030220510	WASHER, LOCK	4	
14B	0041220000	WASHER, FLAT	8	
14C	0030020000	HEX. NUT	4	
15	M4443000202	REAR FRAME	1	
15A	M4493302804	ACOUSTIC SHEET	1	
16	0016910025	HEX. HEAD BOLT	4	
17	M4443300404	COVER, REAR FRAME	1	
17A	M4493302904	ACOUSTIC SHEET	1	
18	0019208020	HEX. HEAD BOLT	14	
19	M4443300503	DUCT, REAR FRAME	1	
19A	M4493303004	ACOUSTIC SHEET	1	
20	020108060	HEX. NUT	9	
21	M4443200403	DOOR, REAR FRAME	1	
22	M9110100204	HINGE	2	
22A	M9116100004	WASHER	2	
23	0845031504	BLIND PLUG	2	

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

1-ORANGE	6-CATERPILLAR YELLOW
2-WHITE	7-CATO GOLD
3-SPECTRUM GREY	8-RED
4-SUNBELT GREEN	9-DESERT TAN
5-BLACK	

THE SERIAL NUMBER MAY BE REQUIRED.

# ENCLOSURE ASSY. (CONT.)



## ENCLOSURE ASSY. (CONT.)

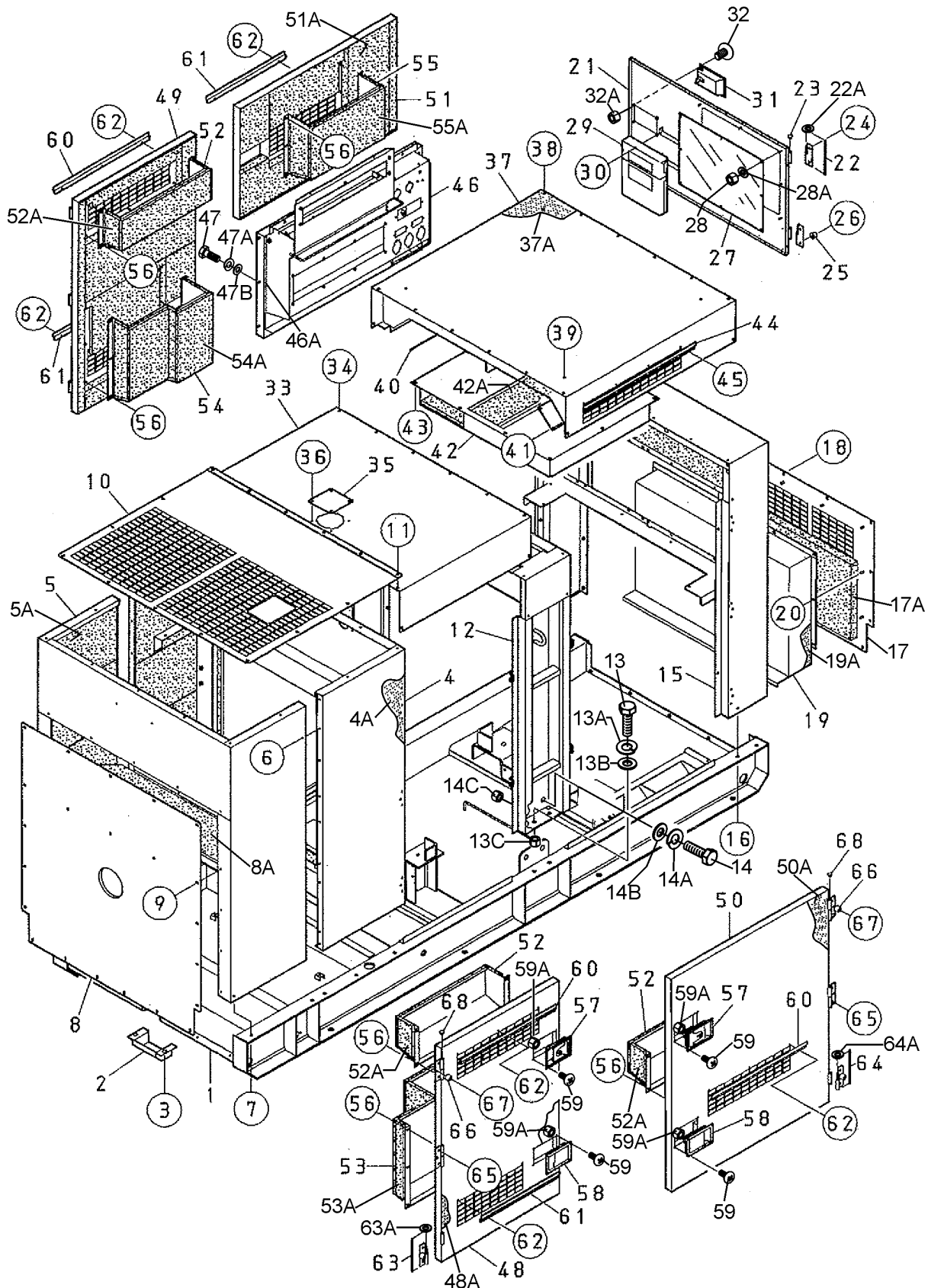
<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
24	0019208020	HEX. HEAD BOLT	3	
25	0601850097	STOPPER	1	
26	0027208025	MACHINE SCREW	1	
27	M4443600004	WINDOW PLATE	1	
28	020106050	SELF-LOCKING J NUT	8	
28A	952404470	WASHER, FLAT	8	
29	0600800320	MANUAL PACK	1	
30	0021806016	MACHINE SCREW	4	
31	M9114000002	DOOR HANDLE	1	
32	0021806016	MACHINE SCREW	4	
32A	020106050	HEX. NUT	4	
33	M4463100302	ROOF PANEL	1	
33A	M4493503004	ACOUSTIC SHEET	1	
34	0019208020	HEX. HEAD BOLT	10	
35	M3310600004	COVER	1	
36	0019208020	HEX. HEAD BOLT	4	
37	M4463200502	ROOF PANEL	1	
37A	M4493503103	ACOUSTIC SHEET	1	
38	0019208020	HEX. HEAD BOLT	16	
39	0017110025	HEX. HEAD BOLT	4	
40	M4463200304	COVER	2	
41	Y0016908016	HEX. HEAD BOLT	12	
42	M4463200603	DUCT, REAR ROOF	1	
42A	M4493503204	ACOUSTIC SHEET	1	
43	0016908020	HEX. HEAD BOLT	10	
44	M4463500204	GUTTER	2	
45	0019206015	HEX. HEAD BOLT	8	
46	M4453200202	SPLASHER PANEL	1	
46A	M4493403604	ACOUSTIC SHEET	1	
47	0019108065	HEX. HEAD BOLT	6	
47A	0042308000	WASHER, LOCK	6	
47B	031108160	WASHER, FLAT	6	
48	M4453001403	SIDE DOOR	1	
48A	M4493407404	ACOUSTIC SHEET	1	
49	M4453001503	SIDE DOOR	1	
49A	M4493407504	ACOUSTIC SHEET	1	

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

1-ORANGE	6-CATERPILLAR YELLOW
2-WHITE	7-CATO GOLD
3-SPECTRUM GREY	8-RED
4-SUNBELT GREEN	9-DESERT TAN
5-BLACK	

THE SERIAL NUMBER MAY BE REQUIRED.

# ENCLOSURE ASSY. (CONT.)





## ENCLOSURE ASSY. (CONT.)

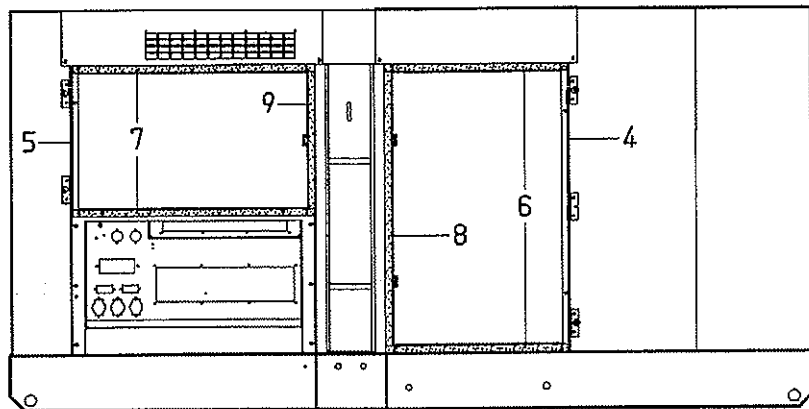
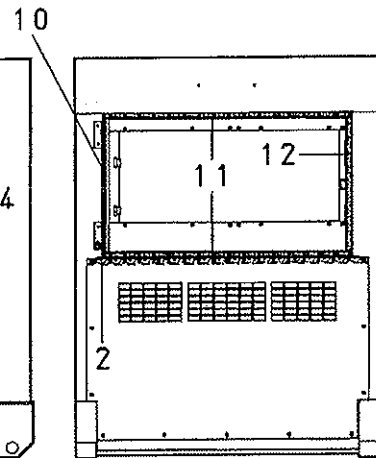
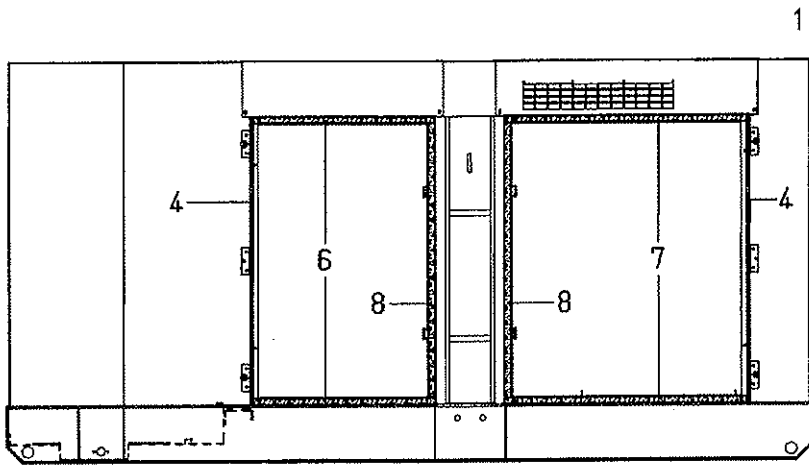
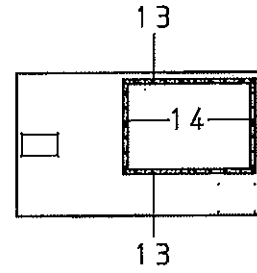
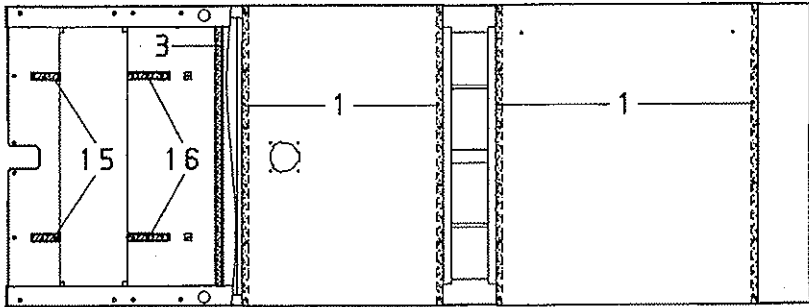
<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
50	M4453001603	SIDE DOOR	1	
50A	M4493407604	ACOUSTIC SHEET	1	
51	M4453001703	SIDE DOOR	1	
51A	M4493407704	ACOUSTIC SHEET	1	
52	M4453301104	DUCT	3	
52A	M4493407804	ACOUSTIC SHEET	3	
53	M4453301204	DUCT	1	
53A	M4493407904	ACOUSTIC SHEET	1	
54	M4453301304	DUCT	1	
54A	M4493408004	ACOUSTIC SHEET	1	
55	M4453301404	DUCT	1	
55A	M4493408104	ACOUSTIC SHEET	1	
56	020108060	HEX. NUT	36	
57	M9114000002	DOOR HANDLE	4	
58	M9113000102	DOOR HANDLE	3	
59	0021806018	MACHINE SCREW	28	
59A	020106050	HEX. NUT	28	
60	M4453600004	GUTTER	3	
61	M4453600104	GUTTER	3	
62	0019206015	HEX. HEAD BOLT	18	
63	0845046904	HINGE	5	
63A	M9116100004	WASHER	5	
64	0845047004	HINGE	6	
64A	M9116100004	WASHER .	6	
65	0019208020	HEX. HEAD BOLT	25	
66	0601850097	STOPPER	8	
67	0027208025	MACHINE. SCREW	8	
68	0845031504	BLIND PLUG	11	

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

1-ORANGE	6-CATERPILLAR YELLOW
2-WHITE	7-CATO GOLD
3-SPECTRUM GREY	8-RED
4-SUNBELT GREEN	9-DESERT TAN
5-BLACK	

THE SERIAL NUMBER MAY BE REQUIRED.

# RUBBER SEALS ASSY.

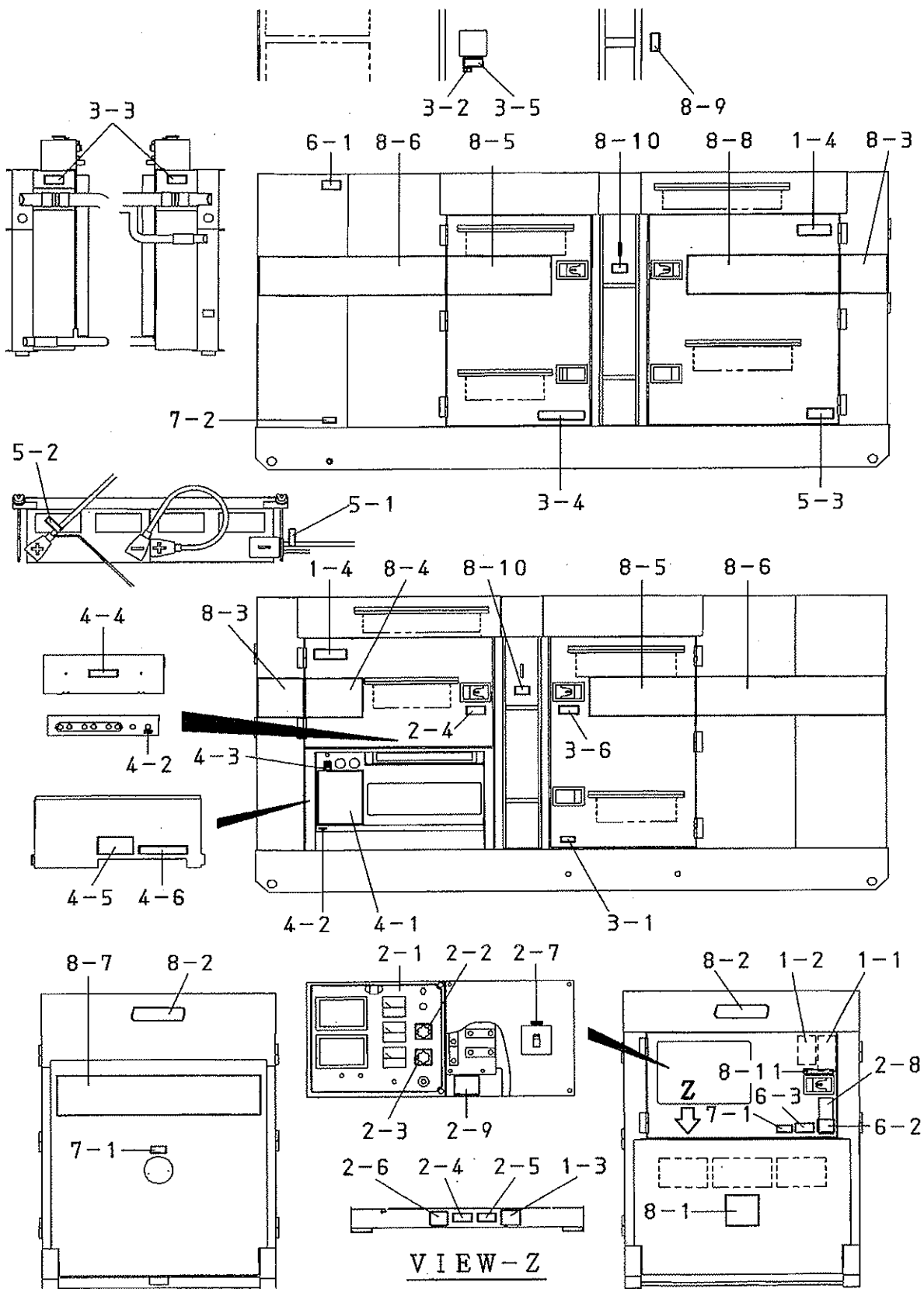


## **RUBBER SEALS ASSY.**

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<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	0229201300	SEAL RUBBER	4	
2	0229201200	SEAL RUBBER	1	
3	0228901120	SEAL RUBBER	1	
4	0228901260	SEAL RUBBER	3	
5	0228900660	SEAL RUBBER	1	
6	0228900795	SEAL RUBBER	4	
7	0228901055	SEAL RUBBER	4	
8	0228901200	SEAL RUBBER	3	
9	0228900600	SEAL RUBBER	1	
10	0229400630	SEAL RUBBER	1	
11	0228801050	SEAL RUBBER	2	
12	0228800590	SEAL RUBBER	1	
13	0228100560	SEAL RUBBER	2	
14	0228100370	SEAL RUBBER	2	
15	0222100120	RUBBER SHEET	2	
16	0222100180	RUBBER SHEET	2	

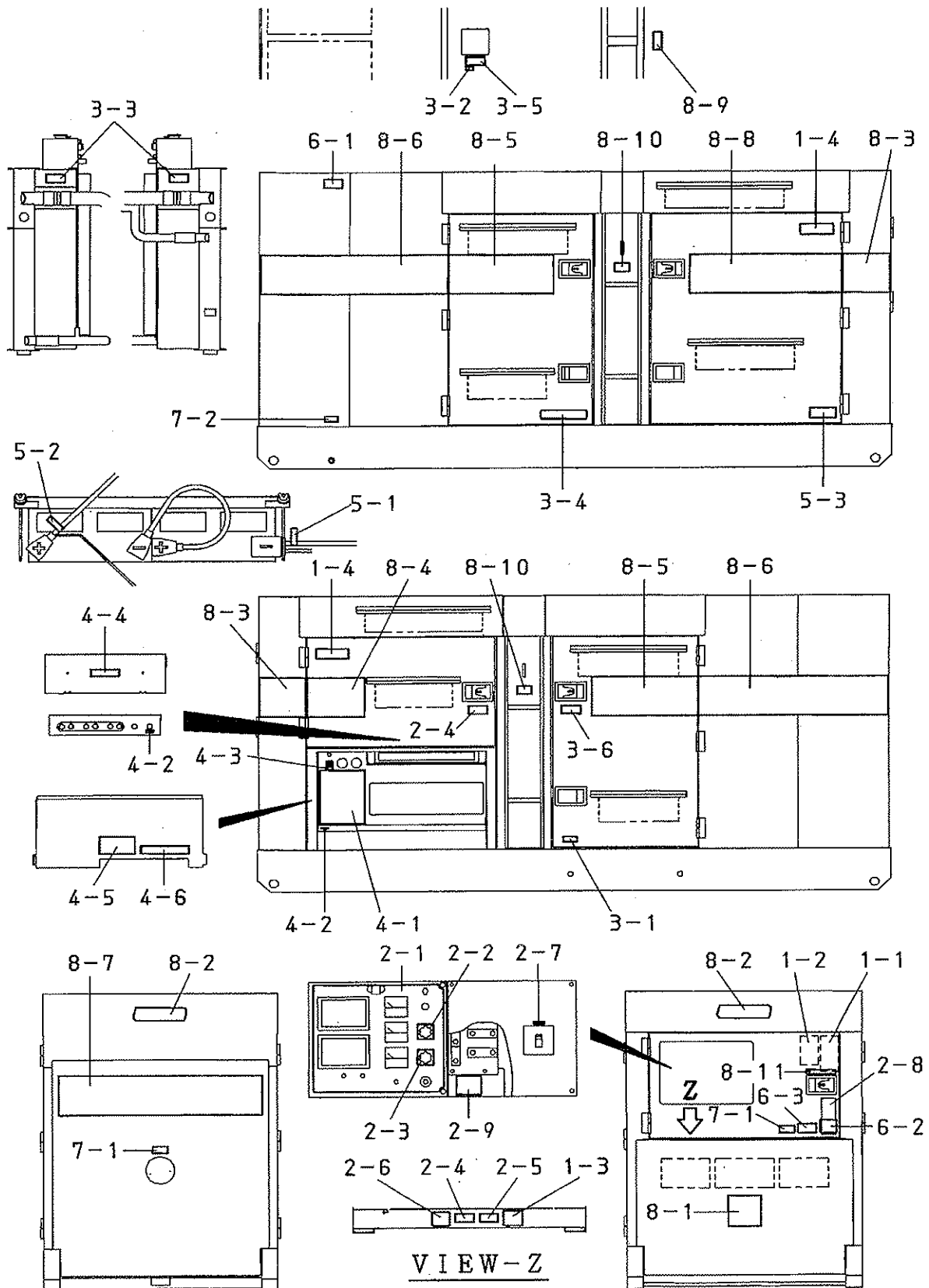
# NAMEPLATE AND DECALS ASSY.



## NAMEPLATE AND DECALS ASSY.

<b>NO.</b>	<b>PART NO.</b>	<b>PART NAME</b>	<b>QTY.</b>	<b>REMARKS</b>
1-1	M4550000603	DECAL: OPERATING PROCEDURES .....	1	M45000060
1-2	M4550000703	DECAL: DPF REGEN. PROCEDURES .....	1	M45000070
1-3	M9520100304	DECAL: SAFETY INSTRUCTIONS .....	1	M92010030
1-4	M9520100603	DECAL: CAUTION .....	2	M92010060
<b>CONTROL PANEL AND BOX GROUP .....</b>				
2-1	M4550000402	DECAL: CONTROL PANEL .....	1	M4S000040
2-2	M9520000104	PLATE: AMMETER CHANGE-OVER SW. ....	1	M92000010
2-3	M9520000204	PLATE: VOLTMETER CHANGE-OVER SW. ....	1	M92000020
2-4	M9520100004	DECAL: WARNING, ELECT. SHOCK HAZ. ....	2	M92010000
2-5	M9520100704	DECAL: WARNING, ARC FLASH .....	1	M92010070
2-6	M9520200404	DECAL: OVER CURRENT RELAY .....	1	M92020040
2-7	M9522000504	DECAL: CIRCUIT BREAKER .....	1	M92200050
2-8	M9520200303	DECAL: SET FOR OUTPUT VOLTAGE .....	1	M92020030
2-9	M9520200504	DECAL: SET FOR OUTPUT VOLTAGE (S) ....	1	M92020050
<b>ENGINE AND RADIATOR GROUP .....</b>				
3-1	M9500000004	DECAL: OIL DRAIN PLUG .....	1	M90000000
3-2	M9500100004	DECAL: WATER .....	1	M90010000
3-3	M9503000004	DECAL: WARNING, ROTATING PART .....	2	M90300000
3-4	M9503000103	DECAL: WATER OIL CHECK .....	1	M90300010
3-5	M9503100004	DECAL: WARNING, HOT COOLANT .....	1	M90310000
3-6	M9510100004	DECAL: CAUTION, HOT PARTS .....	1	M91010000
<b>MOUNT TERMINAL GROUP .....</b>				
4-1	M4550000503	DECAL: RECEPT. AND CB .....	1	M45000050
4-2	M9520000004	DECAL: GROUND .....	2	M92000000
4-3	M9520000504	DECAL: START CONTACT .....	1	M92000050
4-4	M9520000704	DECAL: 3-PHASE OUTPUT TERMINAL .....	1	M92000070
4-5	M9520100404	DECAL: DANGER, HIGH VOLTAGE .....	1	M92010040
4-6	M9520100503	DECAL: WARNING .....	1	M92010050
<b>BATTERY GROUP .....</b>				
5-1	M9500300004	DECAL: - .....	1	M90030000
5-2	M9500300104	DECAL: + .....	1	M90030010
5-3	M9510100403	DECAL: CAUTION .....	1	M91010040
<b>MUFFLER GROUP .....</b>				
6-1	M9503200004	DECAL: WARNING, ENGINE EXHAUST .....	1	M90320000
6-2	M9503200104	DECAL: DANGER, EXHAUST .....	1	M90320010
6-3	M9504200004	DECAL: WARNING, START FIRES .....	1	M90420000
<b>FUEL TANK GROUP .....</b>				
7-1	M9501500004	DECAL: DIESEL FUEL .....	2	M90150000
7-2	M9500500104	DECAL: FUEL DRAIN PLUG .....	1	M90050010

# NAMEPLATE AND DECALS ASSY. (CONT.)



## NAMEPLATE AND DECALS ASSY. (CONT.)

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
		<b>ENCLOSURE GROUP</b>		
8-1	M9510200002	DECAL: MQ .....	1.....	M91020000
8-2	0600500090	EMBLEM	2	
8-2A	0021106016	MACHINE SCREW	4	
8-3	M4560100704	STRIPE .....	2.....	M46010070
8-4	M4560101404	STRIPE .....	1.....	M46010140
8-5	M4560101504	STRIPE .....	2.....	M46010150
8-6	M4560101603	STRIPE .....	2.....	M46010160
8-7	M4560100003	STRIPE .....	1.....	M46010000
8-8	M4560101703	STRIPE .....	1.....	M46010170
8-9	M3550002204	DECAL: CAUTION .....	1.....	M35000220
8-10	M9512000004	DECAL: SUPPORT HOOK .....	2.....	M91200000
8-11	M9510000104	DECAL: DOCUMENT BOX LOCATED .....	1.....	M91000010

# 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





# OPERATION MANUAL

## HERE'S HOW TO GET HELP

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

### UNITED STATES

#### ***Multiquip Corporate Office***

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

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

#### ***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

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### 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

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### 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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Your Local Dealer is:

