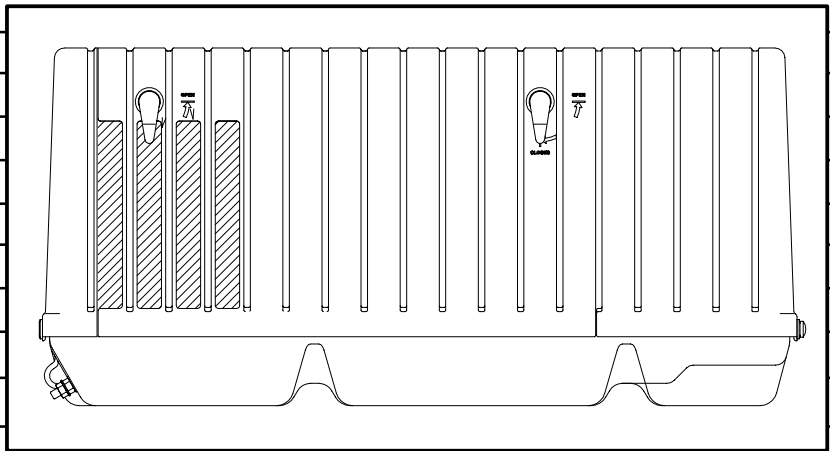
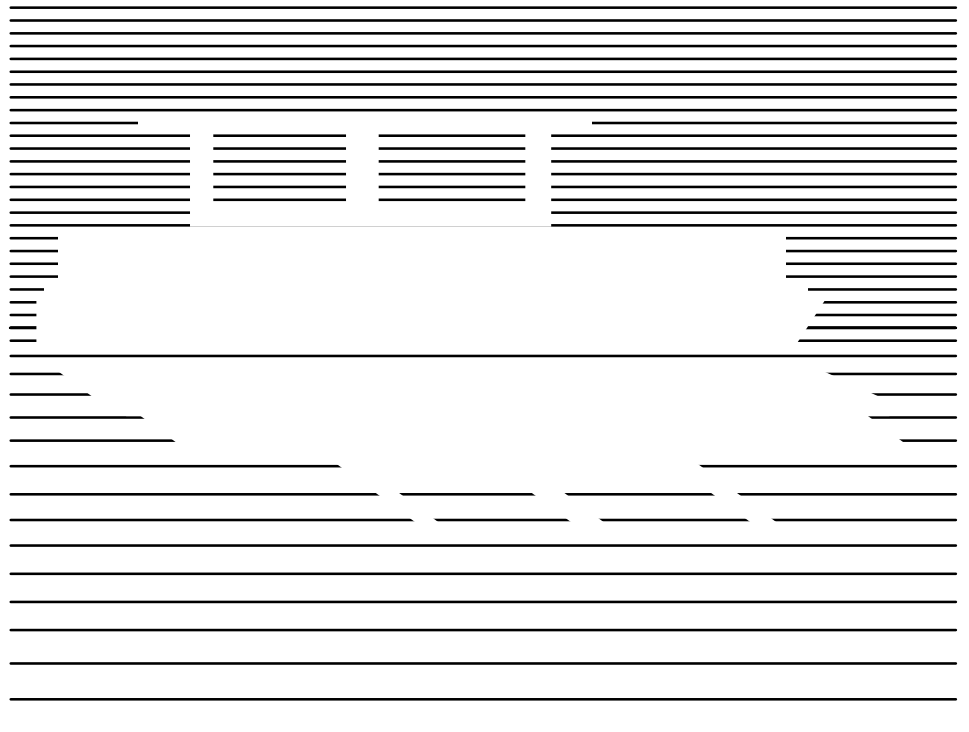






# PONTOON GENSET

## Installation Manual

**MKY**



 **WARNING:**   
The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

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# Safety Precautions

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Thoroughly read the **OPERATOR'S MANUAL** before operating the genset. Safe operation and top performance can be obtained only when equipment is operated and maintained properly.

The following symbols in this manual alert you to potential hazards to the operator, service person and equipment.

**⚠ DANGER** alerts you to an immediate hazard which will result in severe personal injury or death.

**⚠ WARNING** alerts you to a hazard or unsafe practice which can result in severe personal injury or death.

**⚠ CAUTION** alerts you to a hazard or unsafe practice which can result in personal injury or equipment damage.

Electricity, fuel, exhaust, moving parts and batteries present hazards which can result in severe personal injury or death.

## GENERAL PRECAUTIONS

- Keep ABC fire extinguishers handy.
- Make sure all fasteners are secure and torqued properly.
- Keep the genset and its compartment clean. Excess oil and oily rags can catch fire. Dirt and gear stowed in the compartment can restrict cooling air.
- Before working on the genset, disconnect the negative (–) battery cable at the battery to prevent starting.
- Use caution when making adjustments while the genset is running—hot, moving or electrically live parts can cause severe personal injury or death.
- Used engine oil has been identified by some state and federal agencies as causing cancer or reproductive toxicity. Do not ingest, inhale, or contact used oil or its vapors.
- Benzene and lead in some gasolines have been identified by some state and federal agencies as causing cancer or reproductive toxicity. Do not ingest, inhale or contact gasoline or its vapors.
- Do not work on the genset when mentally or physically fatigued or after consuming alcohol or drugs.
- Carefully follow all applicable local, state and federal codes.

## GENERATOR VOLTAGE IS DEADLY!

- Generator output connections must be made by a qualified electrician in accordance with applicable codes.
- The genset must not be connected to the public utility or any other source of electrical power. Connection could lead to electrocution of utility workers and damage to equipment. An approved switching device must be used to prevent interconnections.
- Use caution when working on live electrical equipment. Remove jewelry, make sure clothing and shoes are dry and stand on a dry wooden platform.

## ENGINE EXHAUST IS DEADLY!

- Learn the symptoms of carbon monoxide poisoning in this manual and never sleep in the boat while the genset is running unless the boat is equipped with a working carbon monoxide detector.
- The exhaust system must be installed in accordance with the genset Installation Manual. Engine cooling air must not be used for heating a cabin or other compartment.
- Inspect for exhaust leaks at every startup and after every eight hours of running.
- Make sure there is ample fresh air when operating the genset in a confined area.
- See *The Hazards of Carbon Monoxide*.

## **FUEL IS FLAMMABLE AND EXPLOSIVE**

- Do not smoke or turn electrical switches ON or OFF where fuel fumes are present or in areas sharing ventilation with fuel tanks or equipment. Keep flame, sparks, pilot lights, arc-producing equipment and all other sources of ignition well away.
- Fuel lines must be secured, free of leaks and separated or shielded from electrical wiring.

## **BATTERY GAS IS EXPLOSIVE**

- Wear safety glasses and do not smoke while servicing batteries.

- When disconnecting or reconnecting battery cables, always disconnect the negative (-) battery cable first and reconnect it last to reduce arcing.

## **MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH**

- Do not wear loose clothing or jewelry near moving parts such as PTO shafts, fans, belts and pulleys.
- Keep hands away from moving parts.
- Keep guards in place over fans, belts, pulleys, etc.

# The Hazards of Carbon Monoxide

Most people know not to run a car in the garage. Many people know about the threat of carbon monoxide poisoning in the house. But few people are aware that this invisible killer is even more dangerous aboard a boat.

Engine-driven generators can produce harmful levels of carbon monoxide that can injure or kill you. The nature of boating is such that you can be harmed by this poisonous gas despite good generator set maintenance and proper ventilation.

## WHAT IS CARBON MONOXIDE POISONING?

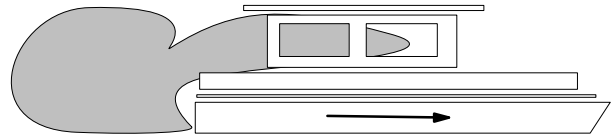
Carbon Monoxide (CO) is an odorless and colorless gas. You cannot see it or smell it. Red blood cells, however, have a greater affinity for CO than for Oxygen. Therefore, exposure even to low levels of CO for a prolonged period can lead to asphyxiation (lack of oxygen) resulting in death. Mild effects of CO poisoning include eye irritation, dizziness, headaches, fatigue and the inability to think clearly. More extreme symptoms include vomiting, seizures and collapse.

## WHAT ARE THE SPECIAL RISKS OF CO ON PONTOON BOATS?

Depending on air temperature and wind, CO can accumulate between the pontoons, under an overhanging deck or rear swimming platform and in and around the boat. A swimmer can be exposed to lethal levels of CO when the genset is running. Passengers on deck and in the living quarters can also be exposed, especially when the boat is docked, beached or tied to a neighboring boat.

The risk of exposure to CO can be multiplied greatly by the “station wagon” effect, obstructions that block exhaust dissipation, and infiltration from neighboring boats. To protect against all three situations, Onan recommends that reliable CO detectors be installed on your boat.

- **The Station Wagon Effect** – A boat pushes aside the air through which it is moving, causing a zone of low pressure in the back of the boat and cabins into which exhaust gases can be drawn (see figure). A breeze across an anchored boat can have the same effect. Opening doors and windows so that air can flow through the boat can reduce the effect.



- **Obstructions** – Anchoring near a large object such as a boat house or sea wall or in a confined space such as a canyon can cause exhaust gases to accumulate in and around the boat despite good generator set maintenance and proper ventilation. Don't run the generator set when anchored in such places.
- **Exhaust from Neighboring Boats** – When boats are anchored in close quarters exhaust from neighboring boats can accumulate in and around yours.

## ONLY YOU CAN PROTECT YOURSELF FROM CO POISONING!

- Watch constantly for swimmers when the generator set is running.
- Make sure exhaust cannot get under the deck, between pontoons or enter the living quarters through a window, vent or door.
- Make sure all CO detectors are working.
- Pay attention to the signs of CO poisoning.
- Check the exhaust system for corrosion, obstruction and leaks each time you start the generator set and every eight hours if you run it continuously.

# Introduction

## ABOUT THIS MANUAL

This manual is a guide for the installation of the MKY Series of generator sets (gensets) in an enclosure on the deck of a pontoon boat. Proper installation is essential for safe, reliable and quiet operation. Read through this manual before starting the installation.

**⚠WARNING** *Improper installation can result in severe personal injury, death and equipment damage. The installer must be qualified to perform the installation of electrical and mechanical equipment.*

**⚠WARNING** *Gensets present hazards of asphyxiation, electrocution and fire. Because these hazards vary depending on many vessel-related factors, THIS UNIT MAY BE INSTALLED ONLY ON PONTOON BOATS. THE INSTALLATION MUST BE IN STRICT CONFORMANCE WITH THESE INSTRUCTIONS.*

**⚠WARNING** *Because wind, temperature, adjacent boats or structures and other environmental factors can affect exhaust gas travel, Onan strongly recommends installing a CO detector at the same time as this genset.*

This manual addresses the following aspects of the installation:

- Location and Mounting
- Ventilation and Noise Reduction
- Exhaust Connections
- Fuel Connections
- Electrical Connections (AC power output, control and battery)
- Startup

For operation and maintenance see the Operator's Manual and for service the Service Manual.

**Note:** Manuals are updated from time-to-time to reflect changes in the equipment and its specifications. For this reason, only the copy of the installation manual supplied with the genset should be used as a guide for the installation.

## INSTALLATION CODES AND STANDARDS FOR SAFETY

The pontoon boat builder bears sole responsibility for the selection of the appropriate genset, for its proper installation and for obtaining approvals from the authorities (if any) having jurisdiction over the boat.

As of the date of the publication of this manual no specific standards are known to exist for the installation of these gensets in the type of application outlined in this manual.

It is recommended, however, that the codes and installation standards in Table 1 be obtained for reference as a guide for the application and installation of the genset.

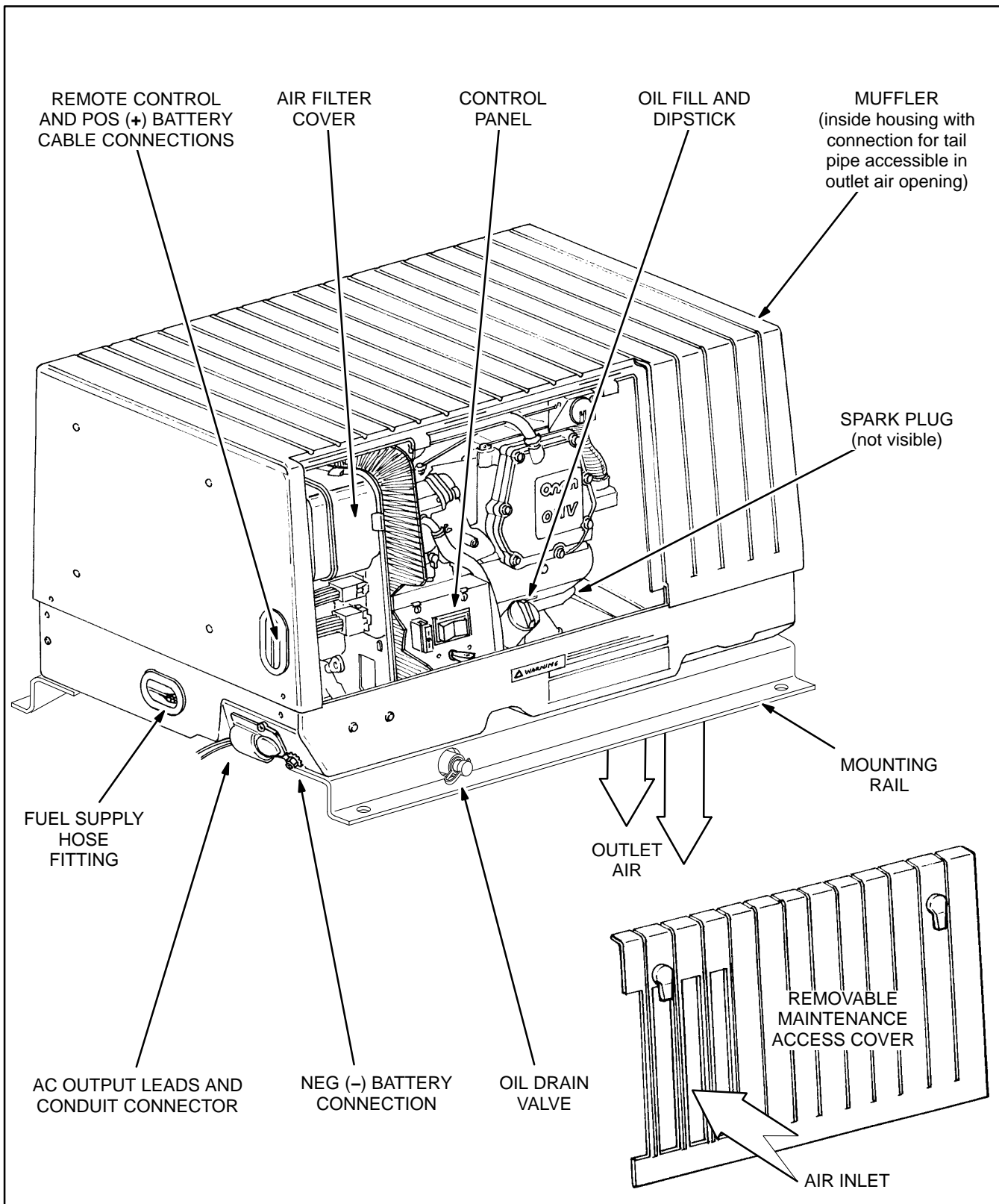
**TABLE 1. REFERENCE CODES AND STANDARDS**

NFPA No. 70 ( <i>National Electrical Code</i> ) and No. 302 ( <i>Pleasure and Commercial Motor Craft</i> )	National Fire Protection Association 470 Atlantic Avenue Boston, MA 02210
USCG Code of Federal Regulations (CFR) Title 25, Chapter 3	U. S. Government Printing Printing Office Washington, D. C. 20404
ABYC Standards and Recommended Practices for Small Craft	American Boat and Yacht Council, Inc. P. O. Box 747 Millersville, MD 21108

## GENSET CONFIGURATION AND DIMENSIONS

See Figure 1 for an overall view of the genset. Note the locations of the components to which access will be required for operation and maintenance.

See *Outline Drawings* for the dimensions of the genset. Detailed are the exact locations of the mounting bolt holes, all connection points (fuel, battery, remote control, AC, exhaust), the sizes and types of connection fittings, the locations of the inlet and outlet air openings, the location of the oil drain valve, the location of the maintenance door and the overall dimensions. See your Onan dealer for larger scale drawings and a floor template to locate the opening cutouts.



**FIGURE 1. TYPICAL GENSET**



# Location and Mounting

The genset must be isolated from the boat cabin much as the propulsion engine is to reduce the entrance of engine exhaust, gasoline vapors and noise. Refer to *Outline Drawings* for details concerning mounting bolt holes, overall dimensions, floor cutout dimensions, location of connectors, etc. Figure 2 illustrates a typical mounting location on a pontoon boat. When locating and mounting the genset:

1. Support the genset on a structure able to resist the dynamic weight of the genset: cyclic forces of at least  $\pm 555$  lbs ( $\pm 3$  g-force) vertical and  $\pm 185$  lbs ( $\pm 1$  g-force) horizontal.
2. Orient the genset so that the maintenance access cover (Figure 1) is outboard.
3. Size the genset compartment such that:
  - A. There is access to the AC output, battery, remote control and fuel connections on the left side of the genset (Figure 1). At least 1 inch (25 mm) is required.
  - B. There is clearance all around. At least 1/4 inch (6 mm) is required around the sides of the genset and 1 inch (25.4 mm) at the top. If the compartment is to be lined with acoustic insulation, the clearances are to the insulation. See *Ventilation and Noise Reduction*.
  - C. Cooling air is not restricted. At least 1-1/2 inch (38 mm) clearance is required at the front if the compartment air inlet does not line up with the air inlet in the maintenance access cover on the genset. See *Ventilation and Noise Reduction*.
4. Size the genset compartment access opening such that the genset maintenance access cover (Figure 1) can be removed easily and the engine oil drain valve opened and the oil drained.
5. Make sure other boat equipment or bulkheads will not obstruct the air inlet and outlet openings or interfere with operating the genset, performing routine maintenance or removing the genset for service.
6. There must be a vapor-tight, fire-resistive barrier between the genset and the interior of the boat cabin. (The equivalent of 26 gauge galvanized steel is recommended.)
7. This is not an "ignition protected" genset. The battery and fuel compartments must not share ventilation with the genset compartment.

**⚠WARNING** EXHAUST GAS IS DEADLY. Construct a suitable vapor barrier of approved materials between the genset and vehicle interior to keep out exhaust gas.

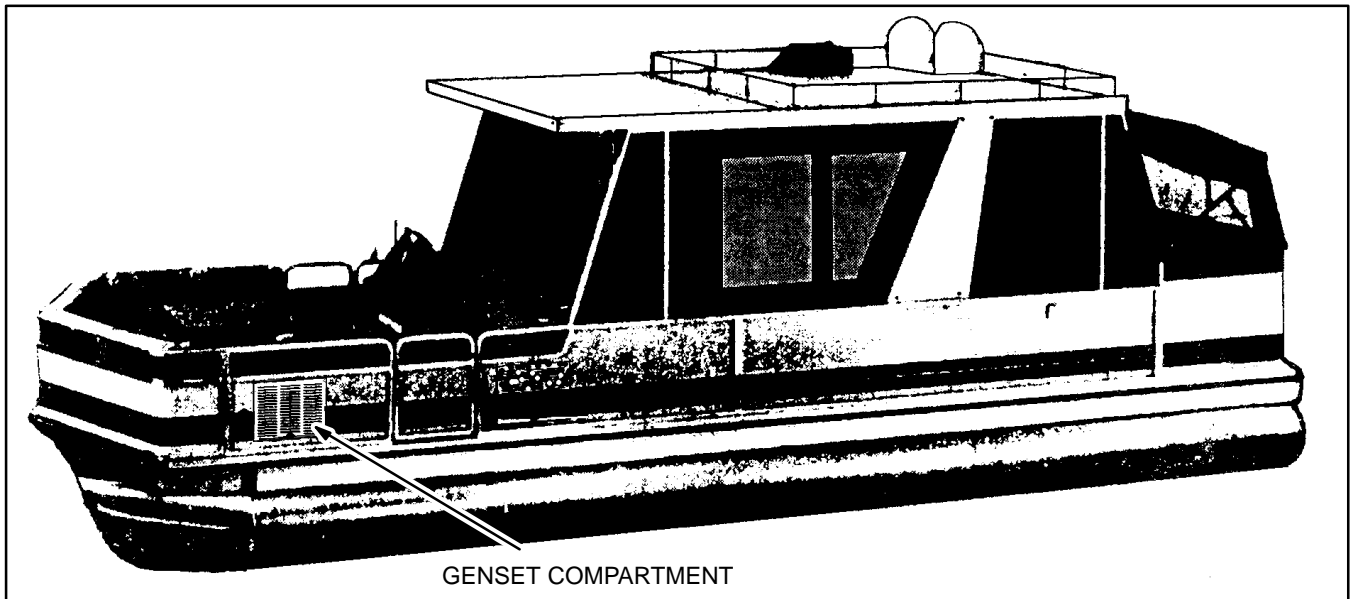


FIGURE 2. TYPICAL MOUNTING LOCATION ON THE DECK OF A PONTOON BOAT

# Ventilation and Noise Reduction

## VENTILATION

The genset cooling blower draws cooling air through the air inlet in the maintenance access cover and pushes it across the generator, engine cooling fins and muffler. The air is discharge out the bottom of the genset. See Figure 3. *The access cover is an essential part of the genset cooling system and must be kept in place when the genset is running to maintain proper cooling air flow through the genset.*

The air flow to and from the genset must be free of obstructions and restrictions or the genset will tend to overheat, causing shutdowns and possible damage to the genset. Air inlet openings in the genset compartment should be located as high as possible to promote convective air cooling when the genset shuts down. Otherwise, compartment temperatures could cause hard starting due to fuel vapor lock.

Air ducts and decorative grills restrict air flow. For example, the free-air opening of expanded metal grilles is only 60 to 90 percent of total area. A minimum free-air inlet of 40 in<sup>2</sup> (258 cm<sup>2</sup>) is required. Contact the material supplier for help in calculating grill areas that will provide the specified free-air opening.

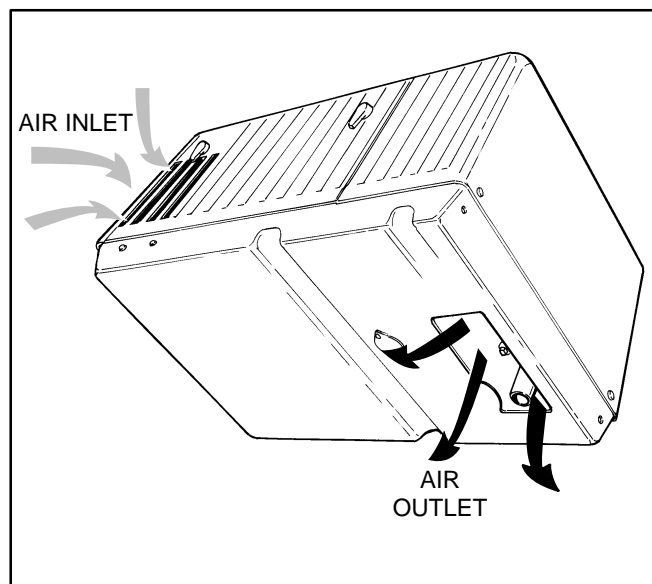
A noise deflector on the air outlet side must be located a minimum of 6 inches (150 mm) below the genset and be open on three sides. Direct the air flow to minimize recirculation to the air inlet.

To ventilate gasoline fumes, Coast Guard Regulations (see *Introduction*) require 15 square inches of open area communicating directly with the outside

for each cubic foot of net compartment volume, or an approved power ventilator.

**⚠WARNING** *Gasoline fumes are explosive and can cause severe personal injury or death. The genset compartment must be ventilated to prevent the accumulation of gasoline fumes. The genset compartment must also be vapor-tight to prevent gasoline fumes from entering the boat cabin.*

**⚠WARNING** *EXHAUST GAS IS DEADLY! Because discharged genset cooling air can include deadly exhaust gas, never use it to heat the boat cabin.*



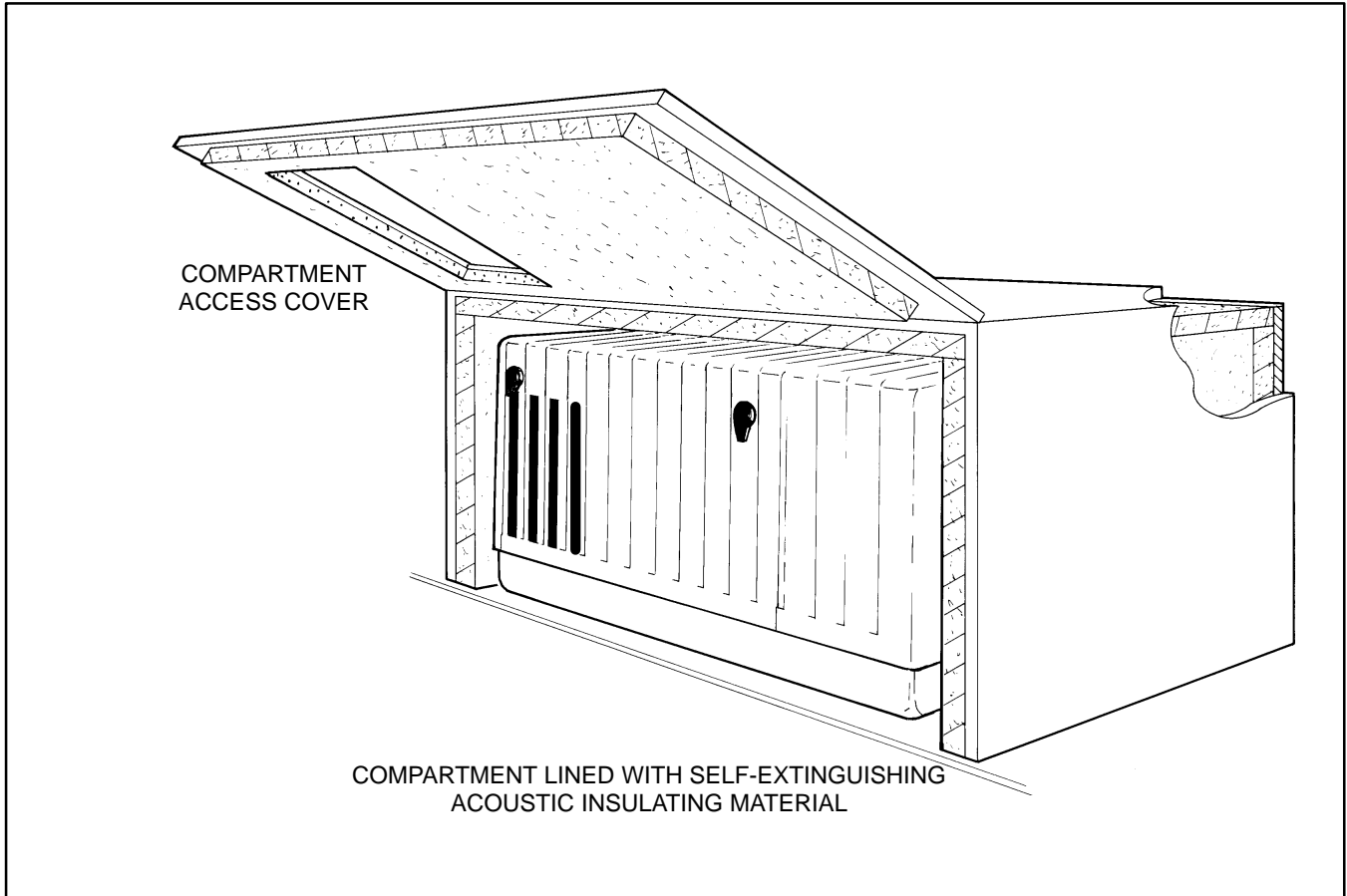
**FIGURE 3. COOLING AIRFLOW THROUGH THE GENSET**

## NOISE REDUCTION

The design of the genset minimizes noise. For additional noise reduction, line the top and sides of the genset compartment with 1/2 to 1 inch (13 to 25.4 mm) thick sound absorbing (acoustic) insulation. See Figure 4. The insulation and adhesive should have a "Self-Extinguishing" fire hazard classification of at least 200°F (90°C). Acoustic insulation should not be used to line the bottom of the compartment as it will absorb spilled fuel and oil.

See *Location and Mounting* regarding the required clearances to the insulation.

Noise can further be reduced by reducing the number and size of compartment openings to the minimum required for ventilation and by baffling openings to reduce line-of-sight noise. Note however that unless the air inlet openings in the compartment and genset line up exactly, the clearance at the front must be increased. See Item 3.C. under *Location and Mounting*.



**FIGURE 4. NOISE REDUCTION COMPARTMENT**

# Exhaust Connections

The exhaust system must be gas-tight and designed to limit entry of exhaust gases into the boat cabin or under the boat (between the pontoons).

**⚠ WARNING** *EXHAUST GAS IS DEADLY! To keep exhaust gases from entering the boat or endangering swimmers, do not terminate the exhaust tailpipe underneath the boat (between pontoons or underneath a swimming platform) or closer than specified to openings into the boat cabin. Use approved materials and parts only.*

The muffler is approved by the U.S. Forest Service and other codes as a spark-arrest muffler. (Failure to provide and maintain a spark arrester can be a violation of the law.) Liability for damage, injury and warranty expense due to the modification of the exhaust system or to the use of unapproved parts becomes the responsibility of the person performing the modification or installing the unapproved parts. Contact an Onan distributor for approved exhaust system parts.

The muffler is mounted inside the genset housing and has a tailpiece to which the customer supplied tailpipe is clamped (Figure 5). When routing and connecting the tailpipe:

1. Make the tailpipe from 18-gauge 1-1/8 inch I.D. aluminized steel or steel tubing of equivalent corrosion resistance. (Do not use flexible pipe; it is neither gas tight nor durable.) Clamp the tailpipe to the muffler tailpiece with an automotive-type U-bolt muffler clamp. Support a tailpipe longer than 1-1/2 feet (457 mm) near its end and at intervals of 3 feet (900 mm) or less. Use automotive-type tailpipe hangers. Attach the hangers to metal framework, not to wood or other combustible material.

See *Outline Drawings* for the location of a 5/16-18NC threaded hole in the base of the genset for attaching a tailpipe hanger. The length of the screw used must be such that it will not extend more than 1/2 inch (12 mm) into the genset.

2. Do not terminate the tailpipe underneath the boat. Extend it a minimum of 1 inch (25 mm) beyond the perimeter of the boat (Figure 6).

3. Do not route the tailpipe such that it will interfere with draining engine oil or restrict the air outlet.
4. Do not route the tailpipe closer than 3 inches (76 mm) to combustible material (wood, felt, cotton, organic fibers, etc.) unless it is insulated or shielded. The temperature rise (above ambient) on adjacent combustible material must not exceed 117°F (65°C).
5. Do not route the tail pipe near fuel lines or fuel tanks.
6. Do not terminate the tailpipe such that it is closer than 6 inches (153 mm) to any opening into the boat interior (door, window, vent).
7. Make sure a tailpipe deflector will not cause excessive back pressure.

**⚠ CAUTION** *Excessive back pressure can cause engine damage.*

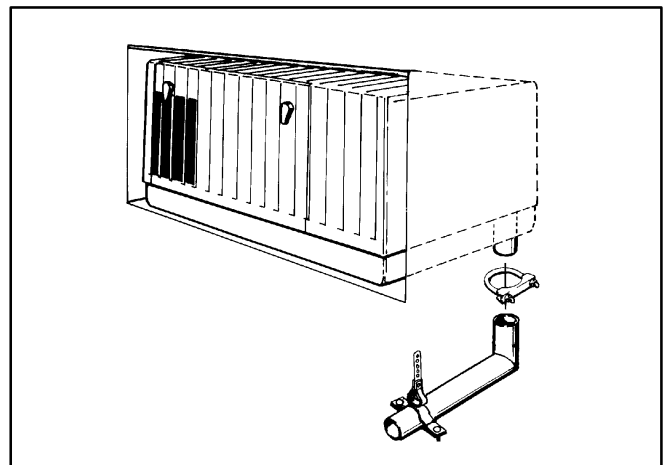


FIGURE 5. EXHAUST CONNECTIONS AT GENSET

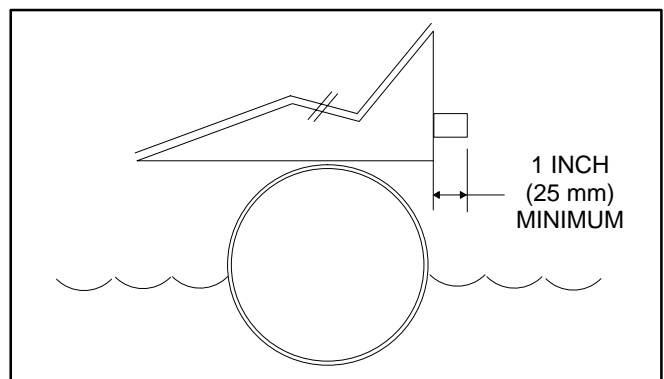


FIGURE 6. TERMINATING THE EXHAUST TAILPIPE

# Fuel Connections

**⚠ WARNING** Gasoline is flammable and can cause severe personal injury or death. Do not smoke or allow any flame, spark, pilot light, arc-producing equipment or other ignition sources around fuel or fuel components, or in areas sharing ventilation. Keep a type ABC fire extinguisher nearby.

Either use a separate fuel pickup tube for the genset or a separate fuel tank. Do not connect the genset fuel line to the propulsion engine fuel line. Follow the boat manufacturer's instructions when making connections to the main fuel tank.

**⚠ CAUTION** Either or both engines could starve for fuel if the genset and propulsion engine fuel lines are interconnected. Always use separate fuel lines or a separate fuel tank for the genset.

To prevent the genset from running the boat out of fuel, do not extend the genset fuel pickup tube down into the fuel tank as far as the pickup tube for the propulsion engine.

The fuel supply tank filler cap should relieve pressure at not more than 1-1/2 psi to prevent flooding the genset engine with fuel.

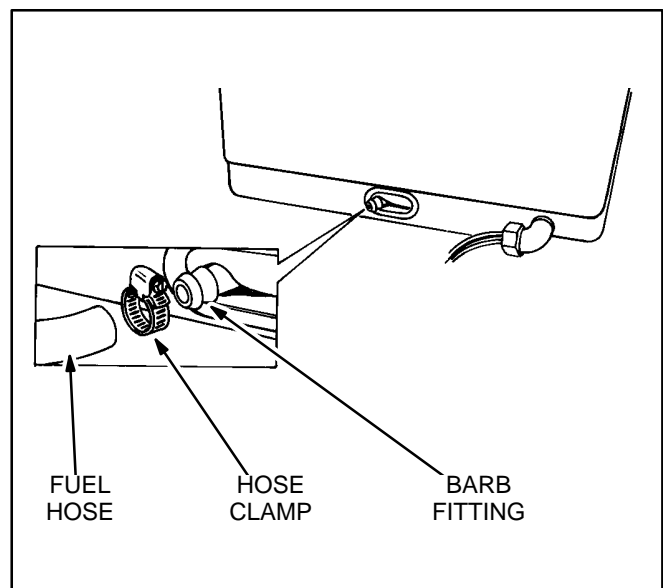
**⚠ WARNING** Flooding the genset engine with fuel can lead to fire aboard the boat. Fuel supply line pressure must not exceed 1-1/2 psi under any condition.

For long runs, copper or hot dip coated seamless steel tubing (ASTM A-254) with double-flared fit-

tings should be used. See Figure 7 for the connection at the genset. Use 1/4 inch I. D. fuel hose (SAE 30-R7) and a stainless steel hose clamp.

Run the fuel line at or above the top of the fuel tank to reduce the risk of siphoning fuel out of the tank if the line should break. The maximum fuel pump lift is 36 inches (914 mm).

Route fuel lines away from electrical wiring and hot engine exhaust components. Fuel lines should be accessible for inspection and replacement, protected from damage and secured to prevent kinking, contact with sharp edges and chafing due to vibration.



**FIGURE 7. FUEL CONNECTION AT THE GENSET**

# Electrical Connections

Do not connect the battery cables to the battery until so instructed in *Installation Review and Startup* to prevent accidental starting of the genset during installation.

**⚠WARNING** *Accidental starting of the genset can cause severe personal injury or death. Do not connect the starting battery until so instructed in Installation Review and Startup.*

## AC POWER OUTPUT

The genset is equipped with 75 inch (1.9 m) long AC power output leads which exit through a 1/2 inch trade size conduit connector (Figure 8). *If these leads must be replaced by longer leads, make sure their ampacity, as determined by the appropriate chart in the National Electrical Code (NEC), is at least 115 percent of the amps marked on the face or handle of the line circuit breaker on the genset control panel. (Unless you can match the 125° C rated factory leads, you will have to use heavier gauge wire to obtain the required ampacity.)*

See Figure 9 for typical connections.

## Wiring Methods

Follow the National Electrical Code, noting the following especially:

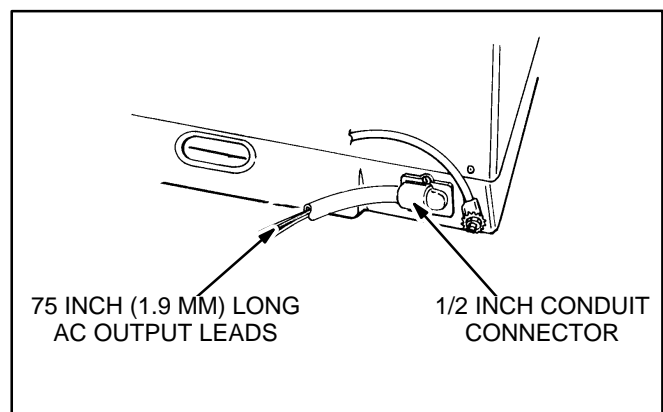
1. A qualified electrician should supervise and inspect the installation of all AC wiring on the boat.
2. Vibration-proof switches and controls should be used to prevent the opening and closing of circuits while the boat is in motion.
3. Rain-tight conduit, connectors and junction boxes should be used for all exterior wiring.

4. Ground fault circuit interrupters (GFCIs) should be used for all branch circuits with convenience power receptacles.
5. All wiring entrance holes into the interior of the boat cabin should be sealed (inside and outside all conduit connectors) with silicone rubber or an equivalent type of sealant to keep out exhaust gas.

**⚠WARNING** *EXHAUST GAS IS DEADLY! Seal all wiring openings into the boat interior to keep out exhaust gas.*

6. AC wiring, remote control wiring and fuel lines should all be routed separately.
7. The genset and all connected AC and DC equipment and controls should be bonded to a common grounding point in accordance with applicable codes.

**⚠WARNING** *Faulty grounding can lead to fire and electrocution, resulting in severe personal injury or death. Grounding must be in accordance with applicable codes.*



**FIGURE 8. AC POWER OUTPUT LEADS**

## Connecting The Boat To Shore Power

When the boat has provision for connecting shore power it must have an approved device to keep the genset and utility from being interconnected. See Figure 9 for typical connections.

**⚠WARNING** *Interconnecting the genset and the public utility (or any other power source) can lead to the electrocution of personnel working on the utility lines, damage to equipment and fire. An approved switching device must be used to prevent interconnections.*

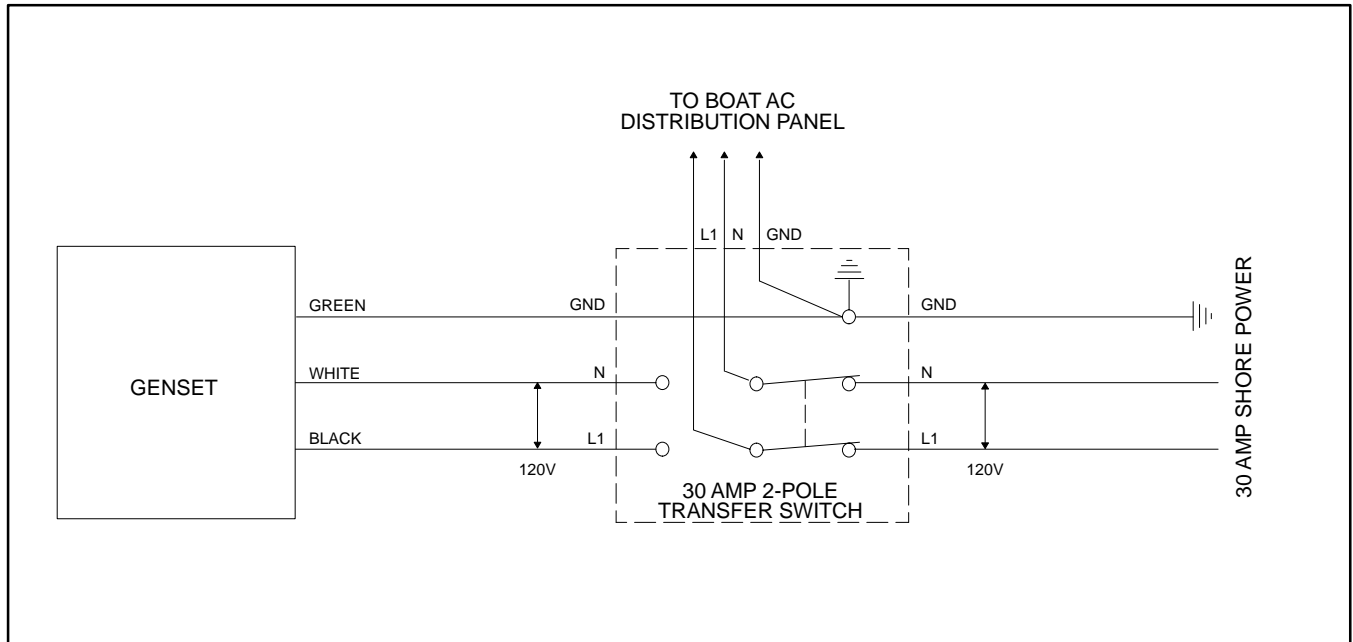


FIGURE 9. TYPICAL CONNECTIONS WITH TRANSFER SWITCH AND SHORE POWER

## 50 Hertz Genset Reconections

If necessary, reconnect a 50 Hertz genset in accordance with Figure 11 to obtain the required voltage. Remove the maintenance access door for access to the generator leads and circuit breaker terminals. If the housing is removed for easier access, first disconnect the leads from the battery charging regulator (VR2) mounted inside the housing on the left side. Mark the leads for easier reconections.

Check voltage after reconections and adjust no-load voltage as necessary with the adjustment pot under the hole plug on the genset control panel (Figure 10).

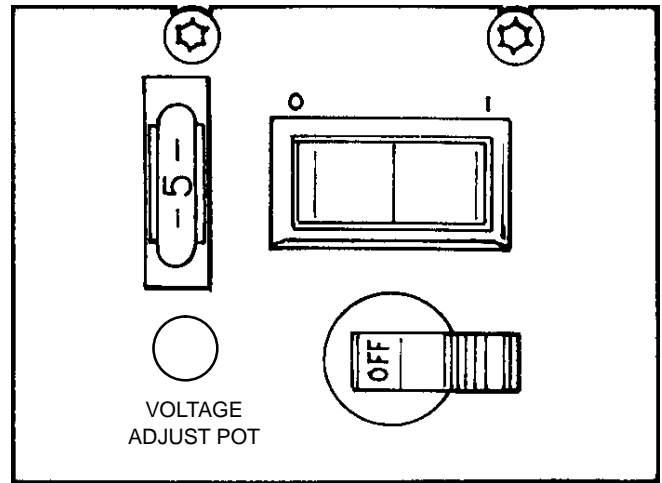


FIGURE 10. AC VOLTAGE ADJUST (50 HZ ONLY)

FROM:	TO:						
	3 WIRE 110/220 OR 120/240V		2 WIRE 110 OR 120V		2 WIRE 220 OR 240V		
	NEUTRAL GROUNDED	NEUTRAL ISOLATED	NEUTRAL GROUNDED	NEUTRAL ISOLATED	LINE TO GND=220V NEUTRAL GROUNDED	LINE TO GND=110V NEUTRAL GROUNDED	NEUTRAL ISOLATED
T1-LINE T2-LINE T3-LINE T4-LINE	CB1-LINE GROUND GROUND CB2-LINE	CB1-LINE SPLITTER SPLITTER CB2-LINE	CB1-LINE GROUND CB2-LINE GROUND	CB1-LINE SPLITTER CB2-LINE SPLITTER	SPLITTER GROUND CB1-LINE SPLITTER	CB1-LINE GROUND GROUND CB2-LINE	CB1-LINE SPLITTER SPLITTER CB2-LINE
CB1-LOAD (L1) NEUTRAL (N) CB2-LOAD (L2) GROUND (GND)	CB1-LOAD GROUND CB2-LOAD GROUND	CB1-LOAD SPLITTER CB2-LOAD GROUND	CB1-LOAD GROUND CB2-LOAD GROUND	CB1-LOAD SPLITTER CB2-LOAD GROUND	CB1-LOAD GROUND OPEN GROUND	CB1-LOAD OPEN CB2-LOAD GROUND	CB1-LOAD OPEN CB2-LOAD GROUND
SPECIAL INSTRUCTIONS	SPLITTER NOT USED		CONNECT L1-L2 AT JUNCTION BOX SPLITTER NOT USED			SPLITTER NOT USED	
110 OR 120V 220 OR 240V	L1-N, L2-N L1-L2	L1-N, L2-N L1-L2	(L1,L2)-N N/A	(L1,L2)-N N/A	N/A L1-N	N/A L1-L2	N/A L1-L2
RECONNECTION DIAGRAMS							

FIGURE 11. 50 HZ GENSET RECONNECTIONS



## REMOTE CONTROL

Onan offers three varieties of remote control panel:

- Remote start/stop switch with indicator lamp only (Figure 12).
- Remote start/stop switch with indicator lamp and hour meter (Figure 13).
- Remote start/stop switch with indicator lamp and DC voltmeter (Figure 14).

An 8-pin connector for remote control connections (Figure 15) is stowed inside the genset housing. Remote control wiring harnesses in several lengths and remote control panels in three styles are available separately. Figure 16 is a schematic of typical remote control connections. It identifies the function of each connector pin number. To make connections to a remote control panel:

1. Remove the genset access door.
2. Push the remote control wire harness connector through the entrance hole in the side of the genset housing and snap it together with the genset connector. If the wiring harness is made up by others, insulated 18 AWG copper conductors should be used for distances up to 30 feet (9 metres) and heavier gauge conductors for distances that are greater. The remote panel end of each lead should be marked to identify the connector pin number.
3. Refer to Figure 16 to make the proper connections at the remote control panel.
4. Route control leads separately from AC power leads to reduce the possibility of erratic operation due to false induced signals.
5. Seal the hole where the leads enter the boat cabin with silicone rubber or an equivalent type of sealant to keep out exhaust gas.

**⚠ WARNING** *EXHAUST GAS IS DEADLY! Seal all wiring openings into the boat cabin to keep out exhaust gas.*

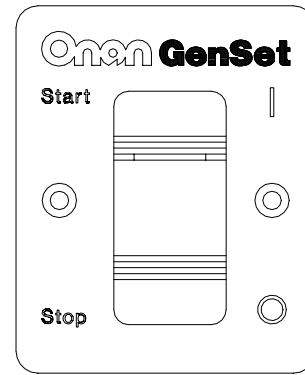


FIGURE 12. REMOTE CONTROL

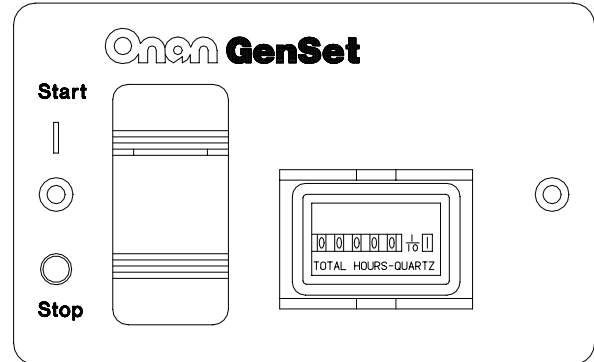


FIGURE 13. REMOTE CONTROL / HOUR METER

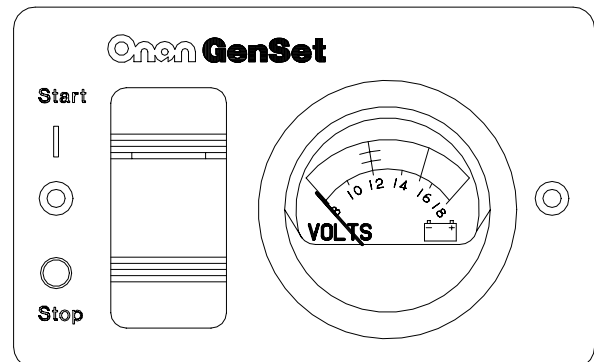


FIGURE 14. REMOTE CONTROL / DC VOLTMETER

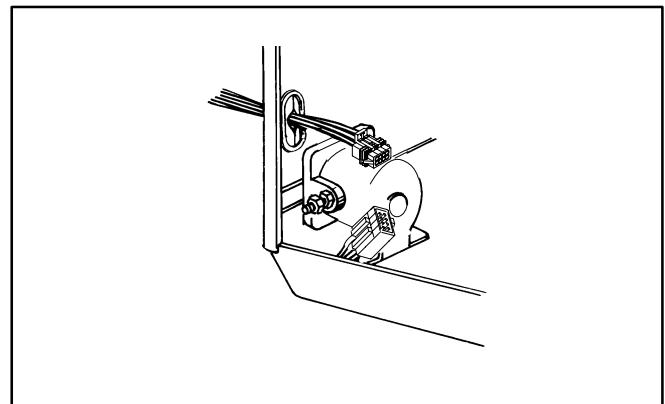


FIGURE 15. REMOTE CONTROL CONNECTOR

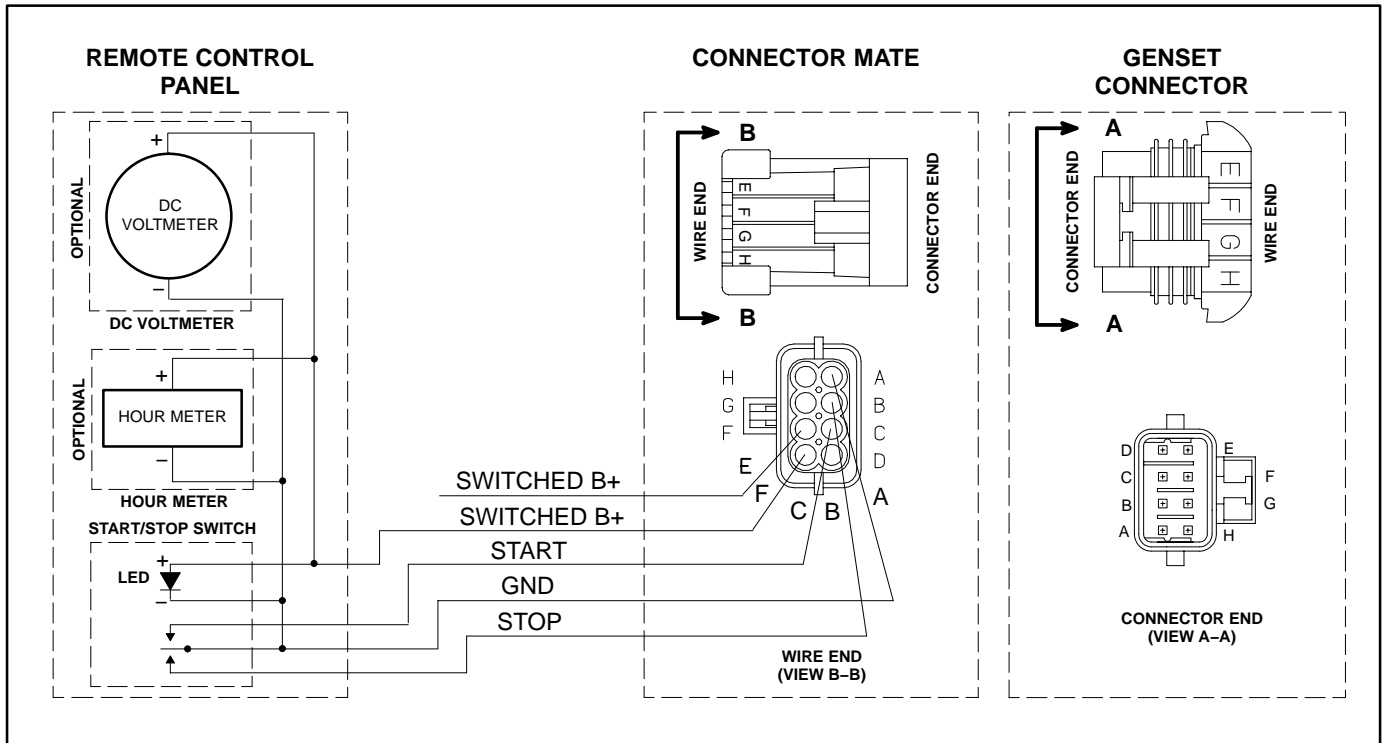


FIGURE 16. SCHEMATIC OF TYPICAL REMOTE CONTROL CONNECTIONS

## BATTERIES

Do not connect the battery cables to the battery until so instructed in *Installation Review and Startup* to prevent accidental starting of the genset during installation.

**⚠WARNING** *Accidental starting of the genset can cause severe personal injury or death. Do not connect the starting battery until so instructed in Installation Review and Startup.*

The genset has a 12 VDC, negative-ground engine control and cranking system. See *Specifications* for the requirements for cranking batteries.

### Battery Compartment

Batteries must be mounted in a separate compartment from that of the genset and away from spark-producing equipment. An enclosed compartment must have openings of at least 1.7 square inches (11 square centimetres) at the top and bottom for ventilation of battery gasses. It should be mounted such that spills and leaks will not drip acid on fuel lines, wiring and other equipment that could be damaged.

**⚠WARNING** *Arcing can ignite the explosive hydrogen gas given off by the battery, causing severe personal injury. The battery compartment must be ventilated and must isolate the battery from spark-producing equipment.*

### Battery Cables

Cables should be run from both terminals of the battery to the genset. It is not recommended that the boat frame be used as a path to the battery negative (-) terminal because of the high cranking currents involved. Size the cables according to Table 2. Total cable length is the sum of the lengths of the positive (+) and negative (-) cables. In other words, total cable length will be approximately twice the distance between the battery and the genset.

**TABLE 2. BATTERY CABLE SIZES FOR TEMPERATURES DOWN TO -20° F (-29° C)**

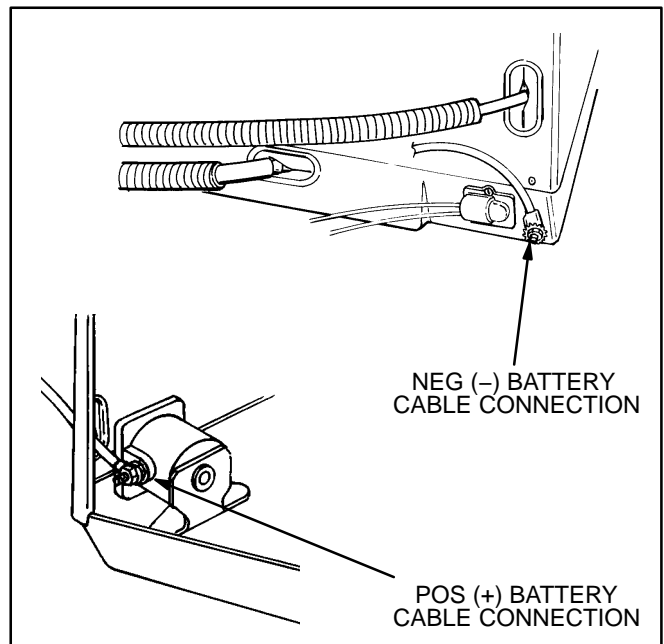
TOTAL CABLE LENGTH, FEET (METRES)	CABLE SIZE, AWG
0 to 10 (0 to 3)	2*
11 to 15 (3 to 4.5)	0
16 to 20 (4.5 to 6)	000

\* – A total length of up to 20 feet (6 metres) may be used in warmer climates or when battery capacity totals at least 1000 CCA (Cold Cranking Amps).

Route battery cables away from fuel lines and hot engine exhaust components. Battery cables should be accessible for inspection and replacement, protected from damage and secured to prevent chafing due to vibration.

### Connecting Battery Cables

Clearly and permanently mark both ends of each battery cable as to its polarity, positive (+) or negative (-). After making sure the battery cables are not connected at the battery, connect the battery cables to the genset (Figure 17). Shield or insulate the positive (+) terminal of the battery against accidental contact to prevent short circuiting.



**FIGURE 17. BATTERY CABLE CONNECTIONS**

# Specifications

	4MKY	3.6MKY
<b>GENERATOR:</b> 2-Pole Revolving Field, Self-Excited, Electronically Regulated, 1-Phase		
Power	4000 watts	3600 watts
Frequency	60 Hertz	50 Hertz
Voltage	120 volts	220 volts
Current	33.3 amperes	16.4 amperes
Speed	3600 rpm	3000 rpm
<b>FUEL CONSUMPTION:</b>		
No load	0.29 gph (1.1 l/h)	0.21 gph (0.79l/h)
Half load	0.48 gph (1.8 l/h)	0.37 gph (1.4 l/h)
Full load	0.71 gph (2.7 l/h)	0.58 gph (2.2 l/h)
<b>ENGINE:</b> 1-Cylinder, 4-Stroke Cycle, Spark-Ignited, OHV, Air Cooled		
Bore	3.11 inch (79 mm)	
Stroke	2.44 inch (62 mm)	
Displacement	18.5 inch <sup>3</sup> (304 cc)	
Compression Ratio	8.5 : 1	
Oil Capacity**	1.6 quart (1.5 l)	
Intake Valve Clearance (Cold)	0.002 inch (0.05 mm)	
Exhaust Valve Clearance (Cold)	0.002 inch (0.05 mm)	
Spark Plug Tightening Torque	13 lbs-ft (17 N-m)	
Ignition Timing (magneto ignition)	25° BTDC, non-adjustable	
Spark Plug Gap	0.025 inch (0.64 mm)	0.020 inch (0.51 mm)
<b>DC SYSTEM:</b>		
Control Fuse	5 amperes	
Nominal Battery Voltage	12 volts	
Minimum Battery Cold Cranking Capacity: Above/Below Freezing	360/450 amperes	
Battery Charging Current	–	10 amp, regulated voltage
<b>INSTALLATION:</b>		
Weight of Genset	185 pounds (84 Kg)	
Minimum Compartment Size (H x D x W)*	16.4 inch x 20.6 inch x 30.5 inch (420 mm x 523 mm x 775 mm)	
Minimum Free Air Inlet Area	40 inch <sup>2</sup> (258 cm <sup>2</sup> )	
Muffler Outlet Collar O. D.	1.13 inch	
Fuel Connection	1/4 inch barb fitting for gasoline hose	
* See <i>Location and Mounting</i> and <i>Outline Drawings</i> for additional considerations when sizing the genset compartment.		
** See <i>Periodic Maintenance</i> in the Operator's Manual for oil filling instructions.		

# Outline Drawings

## WITHOUT MOUNTING RAILS

### NOTES:

1. PRIMARY DIMENSIONS ARE MILLIMETERS.

2. COMPARTMENT ACCESS SHALL BE PROVIDED FOR SERVICE DOOR AND ACCESS TO THE FOLLOWING SERVICEABLE COMPONENTS:

CIRCUIT BREAKER, FUSE  
START-STOP SWITCH, FUSE  
AIR CLEANER ELEMENT  
AIR CLEANER HOUSING  
CARB AND CHOKE ADJUSTMENTS  
SPARK PLUG VALVE COVER  
START SOLENOID

3. MIN. UNIT CLEARANCE FROM

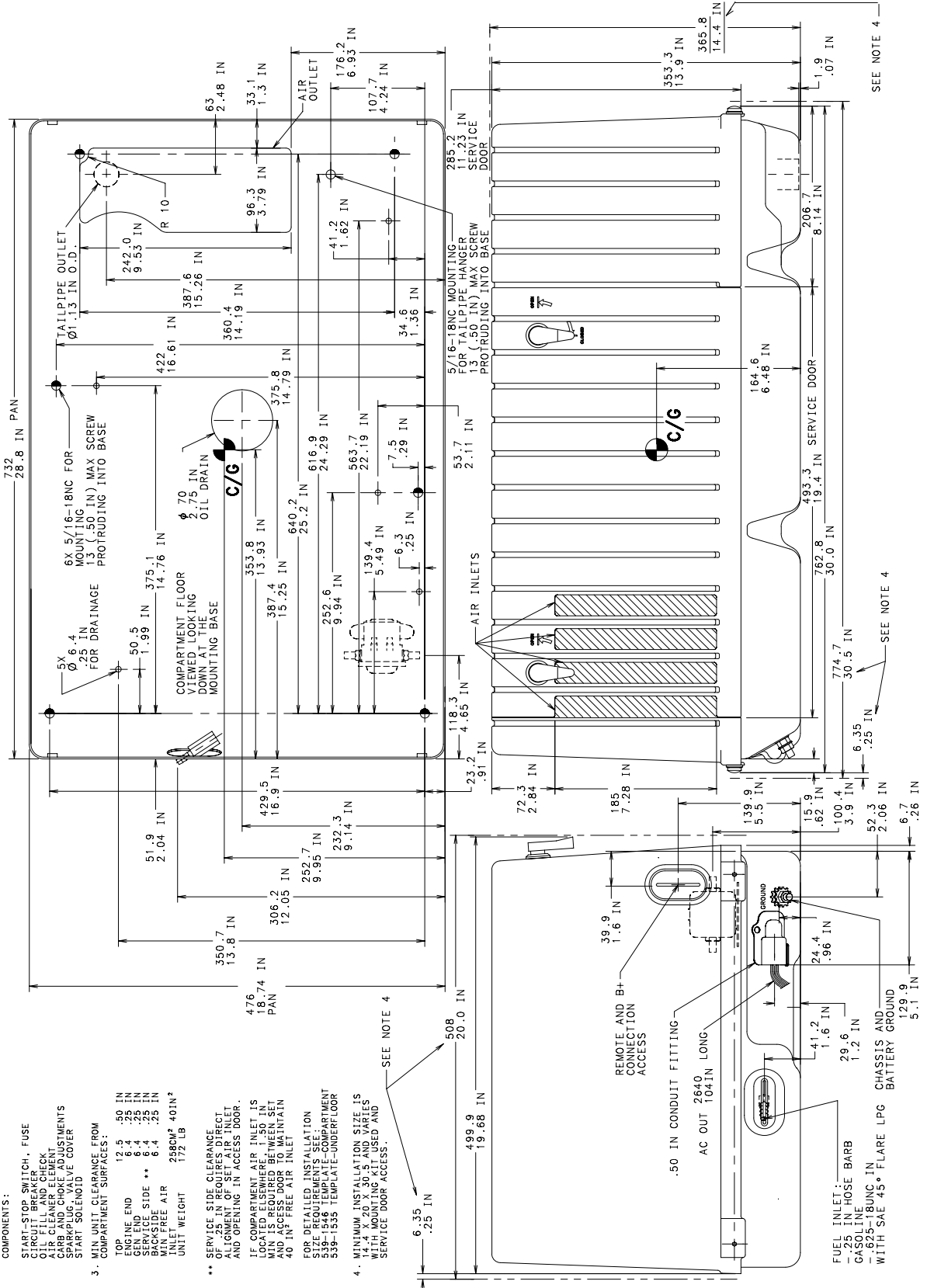
TOP 12.5 .50 IN  
FRONT 18.74 1.50 IN  
GEN END 6.4 .25 IN  
SERVICE SIDE \*\* 6.4 .25 IN  
WIDE SIDE AIR 6.4 .25 IN  
INLET 258CM<sup>2</sup> 40IN<sup>2</sup>  
UNIT WEIGHT 172 LB

\*\* SERVICE SIDE CLEARANCE OF 1.25 IN REQUIRES DIRECT ACCESS TO SERVICE DOOR AND OPENING IN ACCESS DOOR.

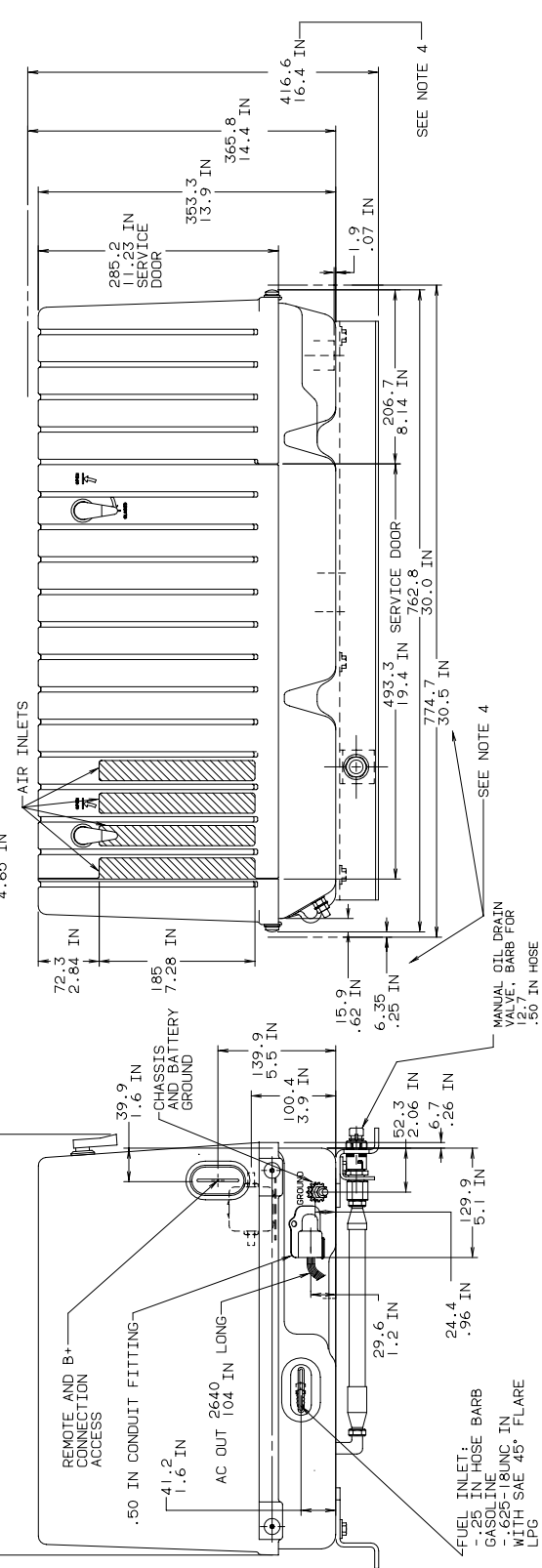
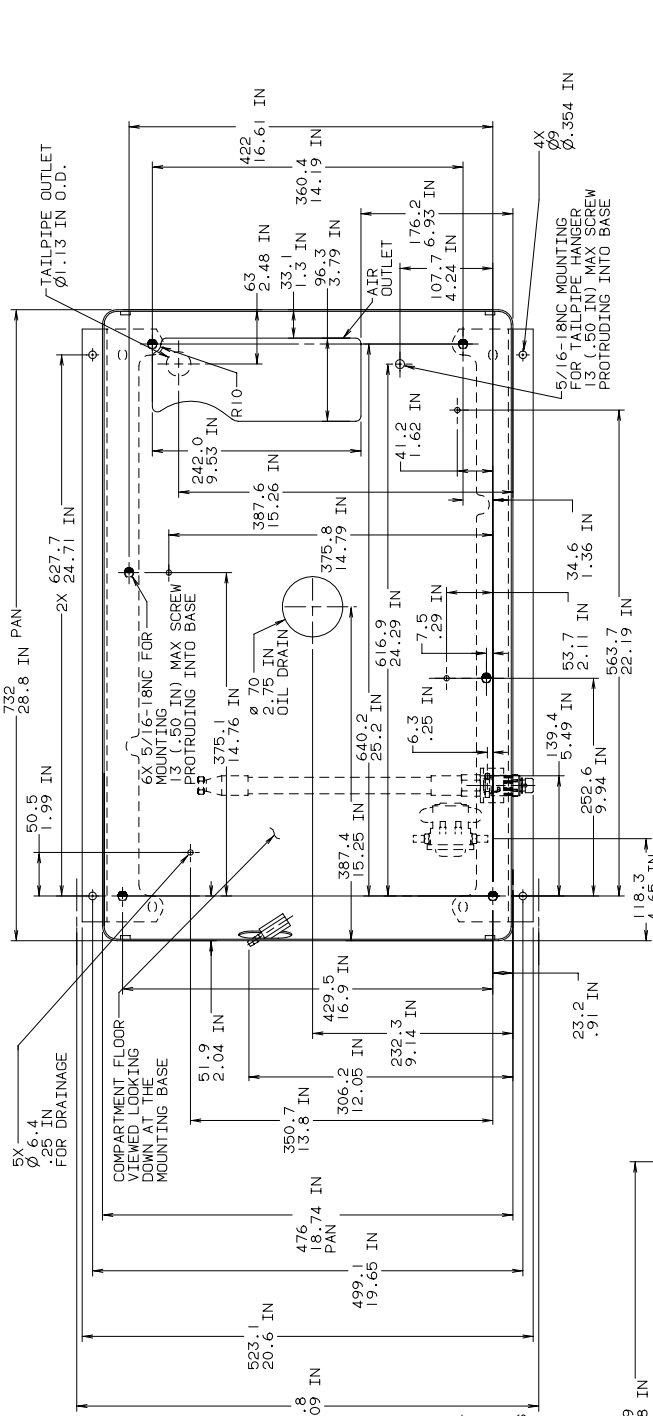
IF COMPARTMENT AIR INLET IS LOCATED ELSEWHERE, 1.50 IN MIN IS REQUIRED BETWEEN SET AND ACCESS DOOR TO MAINTAIN 40 IN<sup>2</sup> FREE AIR INLET.

FOR DETAILED INSTALLATION INFORMATION SEE COMPARTMENT 539-154 TEMPLATE UNDERFLOOR 539-155 TEMPLATE UNDERFLOOR

4. MINIMUM INSTALLATION SIZE IS 539-154 TEMPLATE UNDERFLOOR 539-155 TEMPLATE UNDERFLOOR WITH MOUNTING KIT USED AND SERVICE DOOR ACCESS.



# WITH MOUNTING RAILS



- NOTES:
1. PRIMARY DIMENSIONS ARE MILLIMETERS.
  2. COMPARTMENT ACCESS SHALL BE PROVIDED FOR REMOVAL AND REPLACEMENT OF SERVICE DOOR AND ACCESS TO THE FOLLOWING SERVICEABLE COMPONENTS:
    - START-STOP SWITCH, FUSE CIRCUIT BREAKER
    - OIL FILL AND CHECK
    - CHASSIS AND BATTERY
    - CARBON AND CHOKE ADJUSTMENTS
    - SPARKPLUG VALVE COVER
    - START SOLENOID
  3. MIN UNIT CLEARANCE FROM COMPARTMENT SURFACES:
 

TOP	12.5	50	IN
ENGINE END	6.4	.25	IN
GEN END	6.4	.25	IN
BACKSIDE	6.4	.25	IN
BACKSIDE **	6.4	.25	IN
MIN FREE AIR INLET	2580 <sup>#</sup>	40IN <sup>#</sup>	
UNIT WEIGHT	185	LB	

\*\* SERVICE SIDE CLEARANCE 535.8 OF .25 IN REQUIRES DIRECT 1.09 IN TO ACCESS DOOR AND OPENING IN ACCESS DOOR.

IF COMPARTMENT AIR INLET IS USED, MIN CLEARANCE BETWEEN SET AND ACCESS DOOR TO MAINTAIN 40 IN<sup>#</sup> FREE AIR INLET FOR DETAILED INSTALLATION SIZE REQUIREMENTS SEE: 539-1546 TEMPLATE-COMPARTMENT
  4. MINIMUM INSTALLATION SIZE IS 16.4 X 20.6 X 30.5 AND VARIES WITH MOUNTING KIT USED AND SERVICE DOOR ACCESS.

# Review and Startup

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## INSTALLATION REVIEW

Before starting the genset inspect the installation and check off (√) each of the following questions if it can be answered "YES". If an item cannot be checked off provision must be made to satisfy the requirement.

- [ ] Is the control panel on the genset easily accessible for starting and stopping the genset, resetting circuit breakers, checking and adding engine oil, replacing the spark plug and changing the air filter?
- [ ] Is the genset securely bolted in place?
- [ ] Is there the specified clearance all around the genset housing?
- [ ] Are the air inlet and outlet openings free of obstructions and directed so that recirculation does not occur?
- [ ] Is there easy access for draining the engine oil?
- [ ] Are all tailpipe connections tight and all hangers and support straps secure?
- [ ] Does the tailpipe terminate at least 1 inch (25 mm) beyond the perimeter of the boat and at least 6 inches (153 mm) away from any opening into the boat cabin such as a door, window, vent or fan inlet?
- [ ] Is the genset located outside the interior (living) space of the boat and separated by approved vapor-tight and fire-resistive materials?
- [ ] Are all wiring holes into the boat cabin (inside and outside AC conduit connectors) sealed to keep out exhaust gas?
- [ ] Have all AC connections been inspected and approved?
- [ ] Has a properly sized battery(ies) been installed in a ventilated compartment isolated from the genset and the fuel supply tank?
- [ ] Have properly sized battery cables been installed and secured at sufficient intervals to

prevent chaffing and contact with sharp edges, fuel lines and hot exhaust parts?

- [ ] Are all fuel connections tight?
- [ ] Has the fuel line been secured at sufficient intervals to prevent chaffing and contact with sharp edges, electrical wiring and hot exhaust parts?
- [ ] Are the two warning labels shipped with the genset manuals affixed at locations on the pontoon boat visible when operating the genset?

## STARTUP

When all the items on the Installation Review check list have been checked off, connect the battery cables to the battery, positive (+) cable first.

**⚠WARNING** *Batteries give off explosive gases that can cause severe personal injury. Do not smoke near batteries. Keep flames, sparks, pilot lights, electrical arcs and arc-producing equipment and all other ignition sources well away.*

***Do not disconnect the battery cables while the genset is cranking or running: the arcing can ignite the explosive battery gases.***

Read through the Operator's Manual and perform the maintenance and pre-start checks instructed. The genset is shipped from the factory with the proper level of engine oil, which should nevertheless be checked before the genset is started. Start and operate the genset, following all the instructions and precautions in the Operator's Manual.

**⚠WARNING** ***EXHAUST GAS IS DEADLY! Do not operate the genset when the boat is indoors unless there is ample fresh air ventilation.***

Check for fuel and exhaust leaks and unusual noises while the genset is running under full and intermediate loads. To calculate electrical loads see *Powering Equipment* in the Operator's Manual. Do not place the genset in service until all fuel and exhaust leaks have been fixed and operation is satisfactory.







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