

ENTECH WEST, INC.

Marine Diesel Generators



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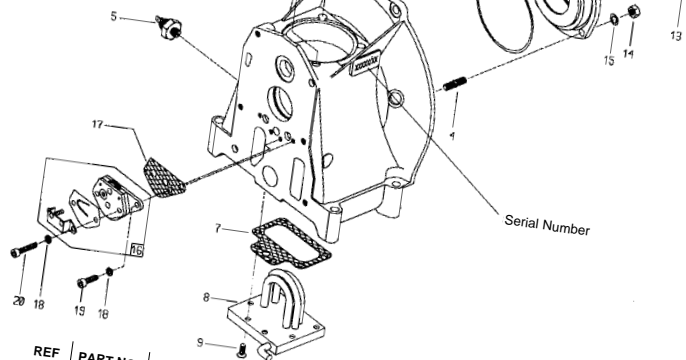
We congratulate you on your purchase of the Model EW-4200D generator. These operating instructions are based on the most recent state of development, and every possible effort has been taken to exclude errors and omissions.

All those involved in the installation and operation of this unit should read the Installation Instructions and the Operating Instructions carefully, before installing and operating the generator. If any questions remain after reading these documents, we suggest you call the factory for further assistance.

1-800-458-5065

References in parenthesis, as noted in these instructions, refer to the Spare Parts List. The first number indicates the Page number; the second number is the Item or Reference number, ie: (2/12), means Page 2 Item 12.

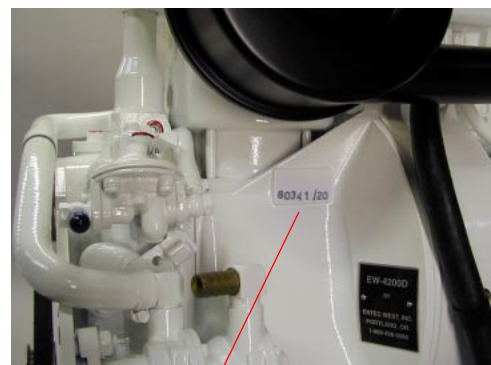
(2/12)



REF	PART NO.	DESCRIPTION	QTY
1	711-1187	Crankcase (includes Items 2, 3, and 4)	1
2	512-0884	Rear Cylinder Stud	2
3	512-0884	Front Cylinder Stud	2
4	512-0904	Stud, Main Bearing	4
5	237-0032	Low Oil Pressure Switch, 12/18 PSI (C Series) (Normally Closed)	2
7	237-40-07	Low Oil Pressure Switch, 15 PSI (D Series) (Normally Open)	1
8	770-1484	Oil Cooler Gasket	1
9	124-10-48	Oil Cooler, EW-4200-D (S/N 62947/01 and Later)	1
10	890-3106	Socket Head Capscrew, M06 x 20 (Torque 7 ft.-lbs.)	1
11	850-0214	O-Ring, 99mm x 3.0mm	1
12	727-0514	Main Bearing Plate	1
13	890-2023	Internal Snap Ring, 80mm x 2.5mm	6
14	890-5957	Seal, 60mm x 80mm x 08mm, Type BA	1
15	890-3805	Nut, M08 (Torque 22 ft.-lbs.)	1
16	890-6603	Internal Tooth Lockwasher, M08	1
17	724-0206	Oil Pump	1
18	770-1674	Oil Pump Gasket	4
19	890-7802	Split Spring Lockwasher, M06	4
20	890-3106	Socket Head Capscrew, M06 x 20 (Torque 7 ft.-lbs.)	1
	890-3131	Socket Head Capscrew, M06 x 30 (Torque 7 ft.-lbs.)	1
		Included in Complete Gasket Set 770-2618	3
			2

16710 SW 72nd • Portland, Oregon 97224 • (503) 624-7118
Entec West, Inc.

The engine/generator has been thoroughly tested at the factory. All pertinent data including, but not limited to, oil pressure, output voltage, output current, and frequency, have been recorded in our permanent file system. *All technical and/or service questions will be answered correctly, when the engine Serial Number is provided (2/0).* When contacting us for assistance, please provide the Serial Number of your unit.



Serial Number

LOCATING THE GENERATOR

Every vessel will have an ideal or preferred spot for a generator. Ambient air temperature must be considered when selecting a location for the generator. Even though most marine engines are water cooled, there will always be radiant heat from the engine. Also, many generator ends are air cooled with their own internal fan, thus adding more heat to the compartment. This effects the air needed by the engine for combustion. Remember, combustion air temperature will effect performance. If the ambient air temperature in the compartment exceeds 120 degrees F., significant loss of performance may occur.

Extended operation at ambient air temperatures above 120 degrees F. may even damage the unit. (Most engine generator manufacturers will provide operating specifications.) Therefore, the compartment should be well ventilated. If necessary, forced air flow must be installed.

This temperature problem is not unique — it effects *all* engines. Engine output ratings are commonly measured at an ambient temperature of 68 degrees F. at sea level. A typical de-rating is 3% per 20° F. increase above ambient temperature. Most installations never get involved with this problem, however, we have seen installations in the main engine room where ambient temperatures were as high as 130 degrees F.

The Entec West generator set is far less restrictive in location choices than generators by other manufacturers. The EW-4200 uses a fresh water cooled engine AND a fresh water cooled generator. The engine has a water cooled cylinder, a water cooled cylinder head, and a water cooled oil heat exchanger.

The generator has a water cooled shell that directly cools the stationary stator assembly. The outside of the generator housing also provides cooling for the radiant heat produced by the engine. This total system approach permits the unit to be installed in our Sound Enclosure without the need for external cooling air.

Yes! We do need cool air for combustion. If you decide to install the unit in a *closed* compartment or enclosure, contact us for instructions about how to get fresh combustion air to the engine.

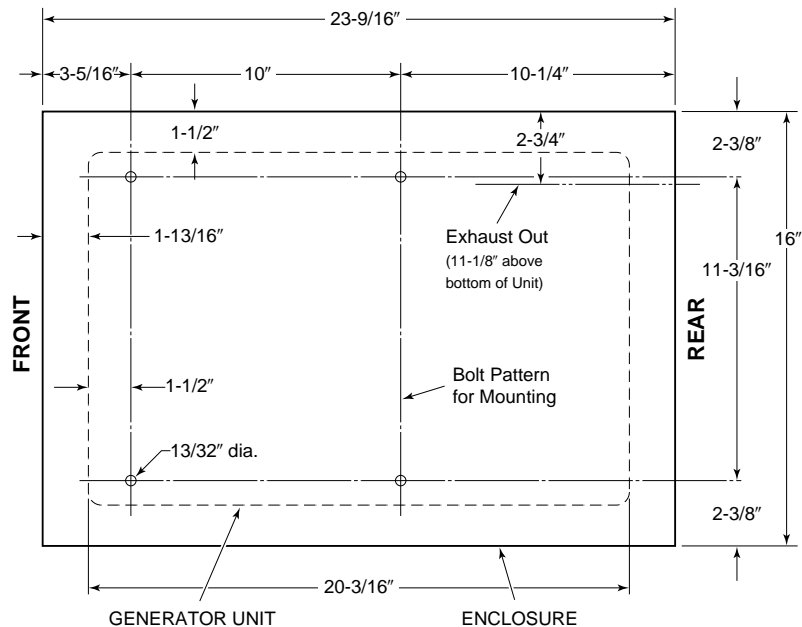
If the unit is going to be installed *without* our Sound Enclosure, the previously mentioned temperature considerations must be addressed.

Location Checklist

- Ambient Air Temperature*
- Clearance for proper Exhaust System pathway*
- Proper elevation for Percolating Muffler location*
- Access to Raw Water for Heat Exchanger*
- Access to cool Combustion Air*
- Ample clearance for support structure and platform*

MOUNTING

The unit should be securely fastened to a strong, stiff, platform. The platform should be marine grade plywood of at least 1" in thickness. Two 3/4" sheets, glued and screwed together are ideal. Anything of a thinner character will result in vibration of the platform and create noise in the boat. The platform should be supported by stiff structural members secured to the vessel. Additional vibration mounts between the generator and the support system are not required, and in fact may add vibration noise due to sympathetic resonances between the mounts. (Lag bolts have a tendency to work loose. We recommend thru bolts if possible.) There are four mounting holes in the base of the unit that will accept 3/8" fasteners. Do not drill additional holes; the base is also a drip pan and its integrity will be destroyed. The angle of installation should be zero degrees, unless approved by Entec West, Inc.



RAW WATER FOR COOLING

A raw water thru hull dedicated to the exclusive use of the generator is preferred. It should consist of a sea cock with not less than a 1/2" I.D. hose connection, a sea strainer with cleanable screen, and wire reinforced hose that will not collapse from suction or bending. The EW-4200 unit has a hose barb for 1/2" I.D. hose on the front panel of the Sound Enclosure, or a 1/2" hose barb on the input of the Raw Water Pump (if the Sound Enclosure is not used).

It is possible to share sea cocks with other devices that require raw water, however the method used must be approved by Entec West, or the warranty will be void. Call us for consultation.

If the generator is going to be installed on a "high speed" boat, the raw water intake should NOT be of the forward facing scoop type. The ram effect of high speed planing may force water through the scoop and into the raw water cooling system. It is possible to force the water hard enough to fill the percolating muffler, back fill the exhaust hose, and flood the engine. There is only one way to avoid this; CLOSE the sea cock when the generator is not running. For convenience, a remotely operated electric solenoid valve can be used to protect the engine. Be sure to use a corrosion resistant valve compatible with the raw water.



Raw Water Inlet

Raw Water Outlet

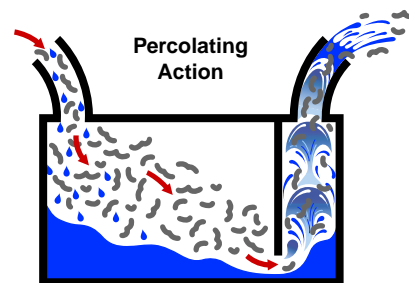
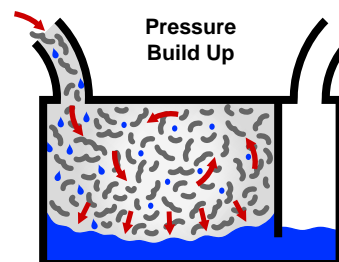
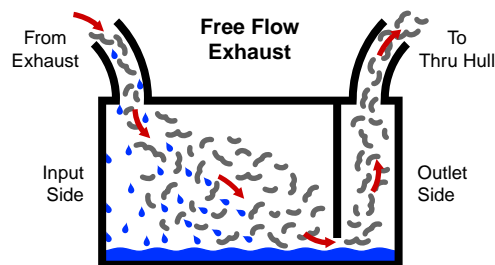
EXHAUST SYSTEM DESIGN

The engine is equipped for a “wet marine” exhaust system. That is, the waste raw water is injected into the Exhaust Elbow and sprayed into the hot exhaust gases to cool them. The cooled waste water and exhaust gas mix is then disposed of through a marine “percolating” type muffler and a 1½" I.D. marine grade, wire reinforced exhaust hose. The rear of the Enclosure has a hole for the exhaust hose to pass through so it can be secured to the Exhaust Elbow on the engine.

Exhaust Elbow Outlet



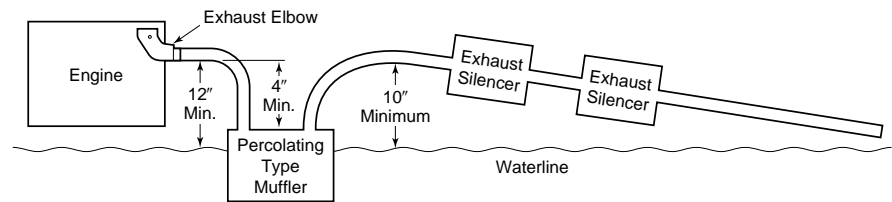
Percolating mufflers are available from several manufacturers with different brand names. Aqualift, Water Lock, Water Lift, etc., are just a few. They all operate on the same principal. The device is divided into two sections. A large surface area on the input side, and a small surface area on the outlet side. A vertical baffle divides the two sections from the top to just above the bottom. The mixed water and exhaust gas is fed into the top or side of the percolator. The water falls to the bottom of the percolator and the gas escapes around the bottom of the baffle and through the outlet. As the water level rises, the opening to the outlet side is blocked and the gas is trapped in the input side. Exhaust gas pressure (back pressure) increases and applies a force to the large surface area of the water. Ultimately this force reaches sufficient strength to “lift” some of the water up the outlet side to the outlet port. This “percolated” water proceeds upward to the high point of the exhaust system, crosses *over* the high point, then gravity flows to the exhaust thru hull and overboard. There are several critical points to consider.



Typical Percolating Muffler

EXHAUST SYSTEM DESIGN (cont.)

Typical Installation. In a typical installation, that is, one in which the generator is located above the waterline, the Exhaust Elbow on the engine must be at least 12" above the waterline, in all conditions.



Typical Exhaust Installation

Percolator Inlet

The inlet to the percolator muffler must always be 4" or more below the Exhaust Elbow outlet of the engine, including the effects of pitch and roll on the vessel. The connection should be within a reasonable horizontal distance, never loop up and down, but always proceed in a steady downward direction.

Percolator Outlet

The outlet of the percolator should be connected to 1½" I.D., wire reinforced, marine grade exhaust hose. The hose should run in a vertical or near vertical direction until it reaches at least 10" above the vessel waterline. At that point it can be curved over and should continue in a downward direction to the exhaust thru hull. The horizontal distance from the top of the curve to the thru hull has no limit on length; however, once the hose starts its downward direction *it must never* loop up and down. If in doubt, call us for consultation.

When a typical marine exhaust system is installed with the thru hull mounted above the vessel's waterline, it is not unusual to hear a "whooshing" noise on the outside of the vessel near the exhaust outlet. This can be reduced, or in some cases eliminated, with the installation of one or two inline exhaust silencers. Be sure to select a silencer that does not restrict the exhaust flow and create "back pressure."

WHEN TO USE AN ANTI-SIPHON EXHAUST

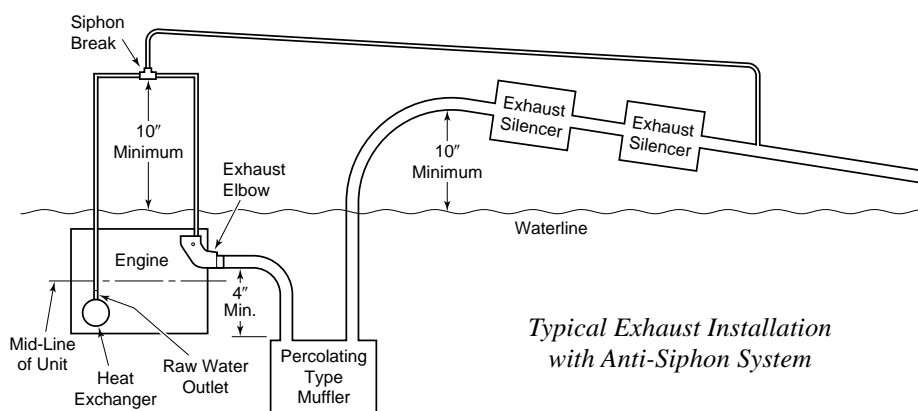
If the mid-line of the unit is to be installed at or below the waterline of the vessel, a Siphon Break must be used. Either a “valve” or “tee” type can be used.

Siphon Break Valve. The valve must always be at least 10" above the waterline, regardless of the pitch and roll of the vessel. There is no maximum height. Commercially available anti-siphon valves are fairly reliable; however, they do get fouled and can stick in either the open or closed position. Regular maintenance is necessary.

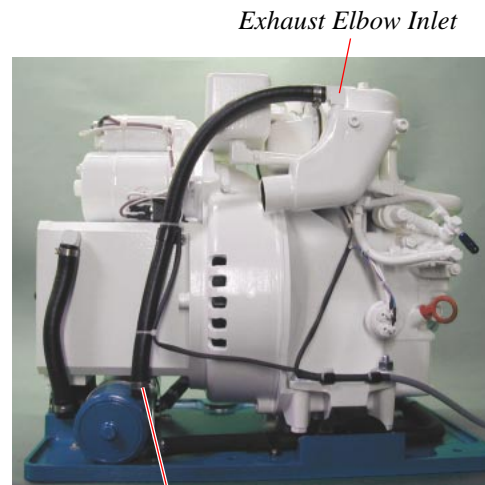
Siphon Break Tee. The “tee” method is a more reliable type of siphon break. The tee is generally designed with 1/2" hose barbs on the input and output connections and a smaller connection on the branch. The branch hole should be restricted to 1/8" dia. Mount the tee a minimum of 10" above the vessel's waterline. The branch side of the tee is connected to an overboard thru hull, also mounted above the waterline. Or, the branch side of the tee can be tapped into the exhaust hose, after the Silencers. The hose from the branch should always flow in a continuous up or down direction. Never loop the hose up and down. If in doubt, call us for consultation. The thru hull should be mounted so it is always vented to atmosphere, never under water.

CONNECTIONS FOR ANTI-SIPHON SYSTEM

Remove the hose (16/12) that connects the Heat Exchanger to the Exhaust Elbow Inlet. Install a new 1/2" wire reinforced hose between the Heat Exchanger and the inlet of the anti-siphon device. Install a second 1/2" wire reinforced hose between the outlet of the siphon break and the exhaust water Inlet on the Exhaust Elbow.



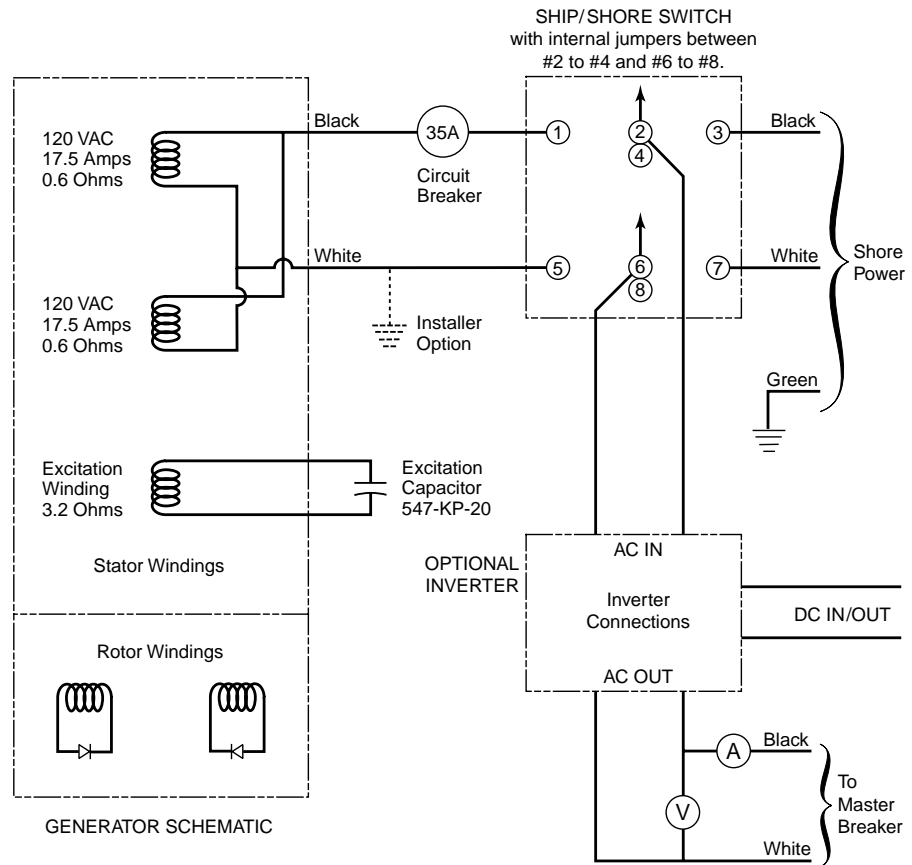
Typical Exhaust Installation with Anti-Siphon System



Raw Water Outlet on Heat Exchanger

A.C. WIRING

Wiring Color Codes. In the United States, commercial and domestic wiring follows a color code established by the National Electrical Manufacturers Association (NEMA). Three wires are used for standard 120 volt circuits. A black color is used for the 120 volt “Hi side,” a white wire is the “Low side,” and a green wire is used for earth ground. If you measure the voltage between the black and white wires, you will measure 120 volts. If you measure the voltage between the black and green wires, you will measure the same 120 volts. This is because the white wire and green wires are connected together at the power distribution transformer. Vessels built in the U.S. normally follow this three wire system. The main shore cable also has a black, white, and green wire. The black and white wires go to the vessel’s main circuit breaker, while the green wire goes to the vessel’s ground buss.



Polarity Indicators. Vessels equipped with polarity indicators can monitor the local dock power for correct polarity. This can be quite helpful. Many older dock power outlets do not follow the NEMA wiring code, and can be hazardous to you and your vessel. Some foreign built vessels do not follow the NEMA code either. In fact, we have seen some that are genuinely confusing, even to the point of changing from one color to another along the length of the wiring harness.

Earth Ground. The output winding on the EW-4200 generator is *not* grounded to the frame (earth ground). We provide a two wire system; a black “Hi side,” and a white “Low side.” Electrically, the output is “floating” and has no reference to the “earth.”

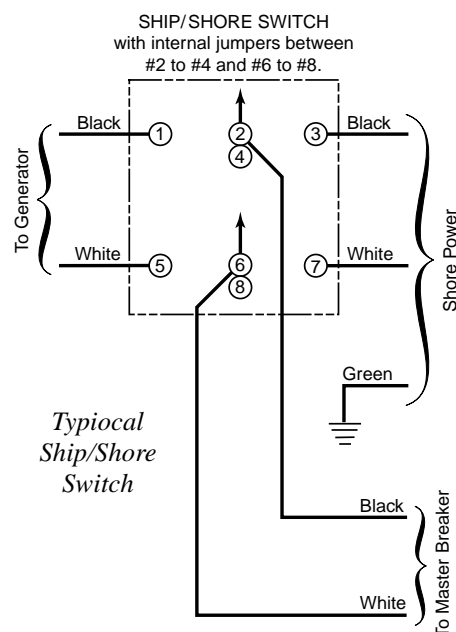
If you wish to establish an earth ground reference for the generator output, add a jumper wire from the white wire “Low side” to the chassis of the engine generator. Then, connect a green earth wire from this new point to the vessel’s ground buss.

A.C. WIRING (cont.)

Ship/Shore Switch. A proper system should include a “ship/shore” switch so the vessel can be powered from either shore power or generator power. This is a special switch used to disconnect the vessel’s main breaker from the shore power cable and connect it to the generator, and vice versa.

Connect both the black “Hi side” and the white “Low side” wires to a set of “input” terminals on the switch. Disconnect the shore power cable from the master circuit breaker, and reconnect it to the other set of “input” terminals on the switch. The “output” set of terminals is then connected to the master breaker. Some vessels have split systems with two shore power cables. If you have this arrangement, call us for a technical consultation and we will explain your options. If you have, or plan to install, a D.C. to A.C. inverter for occasional A.C. power, you may also wish to call us for a technical consultation.

Circuit Breaker. The generator is rated for 35 amps output, so a 35 amp (or lower) circuit breaker should be installed in the A.C. circuit for generator protection.



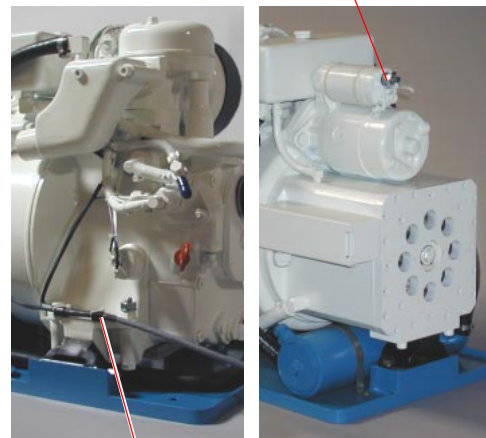
12 Volt D.C. Battery Connections

The starter motor on the engine draws approximately 60 amps during cranking. Use wire equal to or greater than #4 gauge. The +12 volt terminal on the starter motor will accept a 3/8" ring type wire terminal.

The -12 volt battery cable connection can be made to the engine bracket bolt on the left front side of the engine. A 3/8" ring terminal will fit the bolt.

Typical starting time is 3 to 7 seconds for a properly operating engine. This translates into 0.1 ampere hour of power. The D.C. current demand by the unit during normal operation is only 1 amp; therefore, it is practical to draw power from the ship’s main engine battery. Connection can be made at either the battery switch or the engine. If a separate battery is to be dedicated to the generator, a small trickle type battery charger can be used to keep the battery fully charged. A charger capacity of 1 amp is more than adequate. It should be noted, that since the unit only requires 1 amp of D.C. power to operate, hand crank starting in an emergency can easily be accomplished. Even though the battery may not be able to turn the engine over, it will almost always have sufficient reserve to provide 1 amp for running. A couple of 6 volt lantern batteries, connected in series, will also provide the power needed.

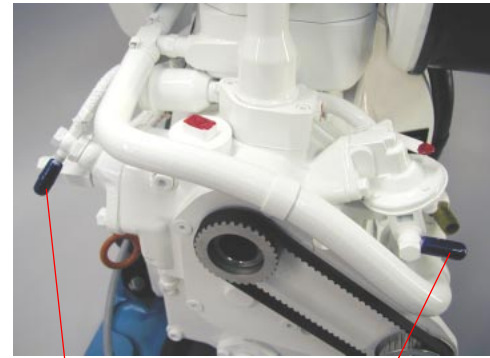
+12 Volt Starter Terminal



-12 Volt Connection
on Engine Bracket Bolt

FUEL CONNECTIONS

The unit is equipped with a 1/4" hose barb on the fuel transfer pump for fuel "in" (11/8) and a 1/4" hose barb on the injection pump for fuel "return." Although the engine is equipped with a "final" filter, there should be a primary filter/water separator device between the tank and the generator. We recommend a filter that is dedicated to the generator, rather than sharing a filter with the "main" engine. The generator fuel return connection should be directed back to the source tank. *Do not draw fuel from one tank and return to another tank.* Also, do not return the fuel to the input line. Coast Guard approved hose must be used.

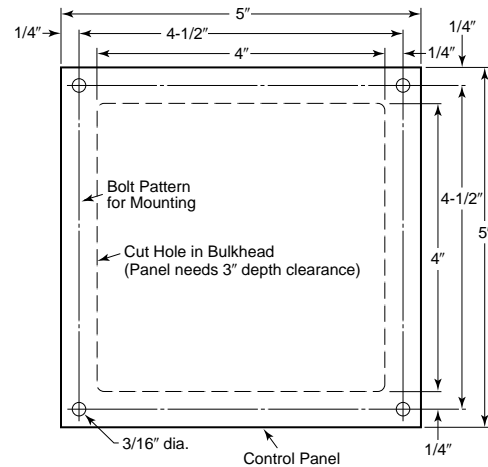


Fuel Return

Fuel In

CONTROL PANEL

The standard Remote Control Panel is 5" high by 5" wide. It has a 4 1/2" x 4 1/2" bolt pattern for mounting and requires a 4" x 4" hole in the vessel's bulkhead for clearance. Allow for 3" depth behind the panel. If you cut the hole in the bulkhead first, you can use the panel as a template for the mounting hole pattern. The panel has a plug for connection to the 30 foot Extension Cable supplied. The Extension Cable connects to the generator. *Cutting and splicing this cable will void the warranty unless specific approval is given by Entec West, Inc.*



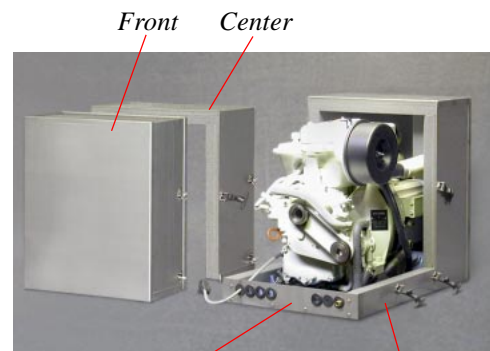
ENGINE OIL

There are several very good oils on the market. We have been using a Chevron product for many years and have concluded that it is one of, if not *the* best, oil for small diesel engines. It is called DELO 400. We recommend a viscosity of 15W-40 for all seasons. Your local supplier can suggest an equivalent to this oil. Perform the first oil change at approximately 50 hours. Thereafter a 75 to 100 hour change interval is adequate.

SOUND ENCLOSURE

The sound enclosure comes in four parts; bottom, front, center, and pass-thru panel. The engine/generator will be delivered inside the sound enclosure (if a sound enclosure was ordered). The front and center sections are removable for normal service. The panel which is the "pass through point" for all lines and hoses, can be removed with the engine/generator as an assembly, for ease of installation. This can also ease removal and replacement if major service of the engine or generator is required.

!!!! INSTALLATION IS COMPLETE !!!!



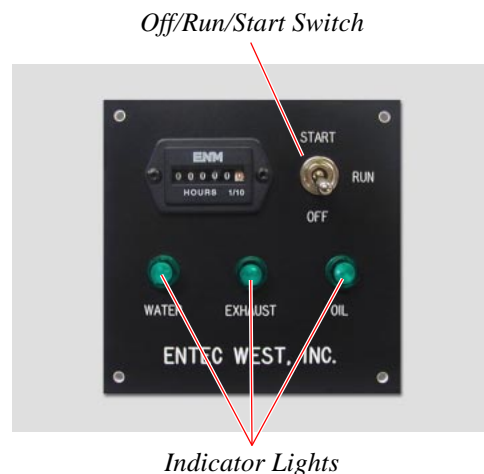
Pass-thru Panel

Bottom Section

SPECIAL NOTES

Safety Stops. The control circuitry for the Safety Stop system is activated immediately on placing the Off/Run/Start switch in the Run position. The low oil pressure switch, on the side of the engine, will not activate until the oil pressure reaches 15 psi. The engine will not start until this pressure switch is closed; therefore, it is impossible to start the engine until the bearings are flooded with oil. This added feature should extend the life of the bearings, as most engine wear occurs when starting a “cold” engine.

Starting the Engine. Watch the Indicator Lights on the Control Panel. If, after all of the green Indicator Lights are on, *the engine does not start within 7 to 10 seconds, stop cranking!* Engine damage will occur if cranking is continued.



CAUTION

Whenever the engine is cranked, the Raw Water Pump continues to pump water through the raw water system. It is possible with continued cranking, to fill the Exhaust Percolating Muffler, the Exhaust Hose, the Exhaust Manifold, and if the Exhaust Valve is open, the engine combustion chamber. If the raw water is sea water, the damage to the engine can be severe. If this ever happens, corrective action must be taken at once. *If the engine will not start within 7 to 10 seconds, stop cranking!*

Refer to “Starting the Engine for the First Time,” in the Operating Instructions, for complete information.

QUESTIONS ?

We have designed and built a generator that we expect will give you top performance. Most of the problems we have observed over the years started with an improper installation. **DO NOT GUESS!** *Call us* if you have questions. 1-(800) 458-5065