

## 10.0 Installation Instructions

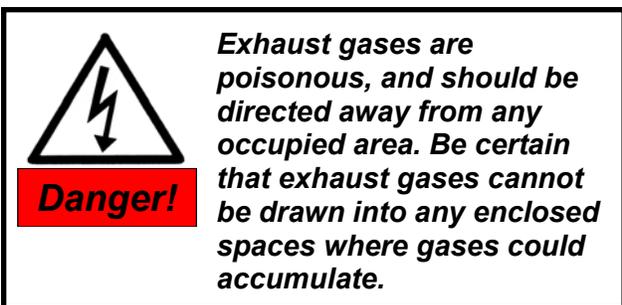
### 10.1 General Mounting Instructions

The framework must be constructed in accordance with good mechanical design so that the weight of the generator system will not stress the compartment construction. Plan the location to be large enough to permit set removal. Allow additional clearance for easy access to the oil fill, oil filter, oil drain, coolant fill, fuel filter, air filter, as well as the voltage regulator and main load circuit breaker. Allow enough clearance so that the exhaust system may be disconnected for future service work. Design the compartment large enough for the generator system, observe the clearances shown on installation template drawing. Install the generator system in its own compartment. Separate the compartment area from the storage areas, fuel supply areas and personnel.

**An installation drawing is supplied Figure 10.6.1 to aid in locating the mounting holes, hot air discharge opening and exhaust outlet.**

Construct the compartment floor in a manner so as to prevent oil, fuel, or water accumulation. Compartment drainage can be accomplished via 1/4" diameter holes on the compartment floor. Secure the modular generator system to the compartment frame using 3/8-16 UNC, grade 5 bolts. Use flat washers, lock washers and nuts to complete the mounting.

### 10.2 Exhaust Gas System



Typically the exhaust gas system consists of exhaust gas manifold, muffler and tailpipe. All of this will necessarily restrict the flow of the exhaust gas; such restriction must not exceed the limits specified for the particular engine, SEE "DESIGN AND SPECIFICATION CHART", SECTION 10.5.

### Additionally:

- The exhaust system must prevent the entrance of rain, road sprays or other water sources into the engine.
- To prevent recirculation of exhaust gases into the engine combustion or cooling air system locate the exhaust outlet as far as possible from these systems.
- Use flexible tubing to connect the engine exhaust to any rigid pipe extensions. This is used to prevent transmission of vibration.

### Exhaust Backpressure

The exhaust system will produce a certain resistance to the exhaust gas flow ("exhaust backpressure") consisting of the total resistance of the system, including the pipes, pipe bends, muffler, tailpipe and/or exhaust accessories.

The exhaust backpressure of a given engine installation will depend upon the size of the pipes, the number and types of bends and joints and the chosen muffler.

Exhaust system design must ensure that the total system flow resistance does not exceed the maximum permissible backpressure, Refer to Section 10.5 for Specifications.

The engine exhaust manifold I.D. constitutes the reference value for designing the exhaust piping. It is not permissible to reduce the I.D. beyond this size.

### Mufflers

STADCO supplies a muffler with the gensets. If for some reason the standard muffler does not work with your application and you have to design your own muffler for the STADCO genset, the following are factors that govern the selection of the muffler:

- 1) Exhaust volume flow at rated output and speed ("hot gas"). Data for the engines are published in Section 10.5 Design Features and Specifications.
- 2) maximum permissible engine exhaust backpressure.
- 3) degree of noise reduction required in dB(A).
- 4) configuration required.
- 5) available space.

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Whenever the muffler is not mounted on the engine, suitable engine-muffler connections must be provided. These connections must be as short as possible.

### Elbows

Provide sweeping bends to minimize exhaust backpressure. 90° elbows should have a radius not smaller than the pipe I.D.:

#### Minimum bend radius by size:

I.D.: 1.5"	Min. Radius: 3.0"
1.25	3.0
2.0	3.0

**NOTE: Use of short radius water pipe elbows and/or miter cut elbows is strictly forbidden and may void engine warranty.**

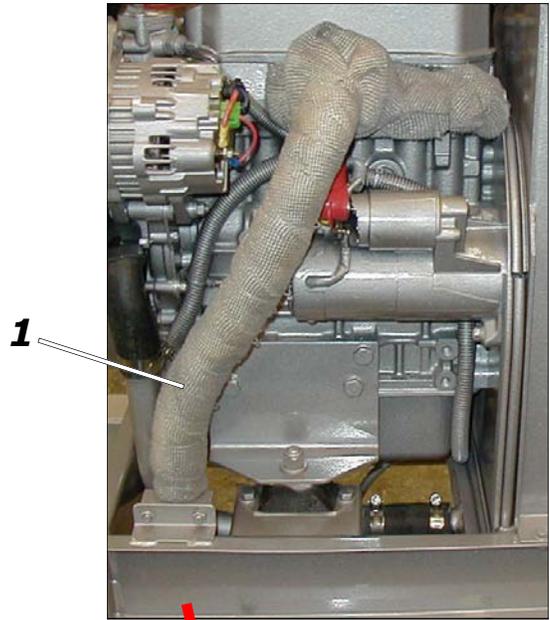
### Exhaust Connections

The exhaust outlet should be installed so the exhaust is directed away from any operator station and shall be properly guarded to protect the operator.

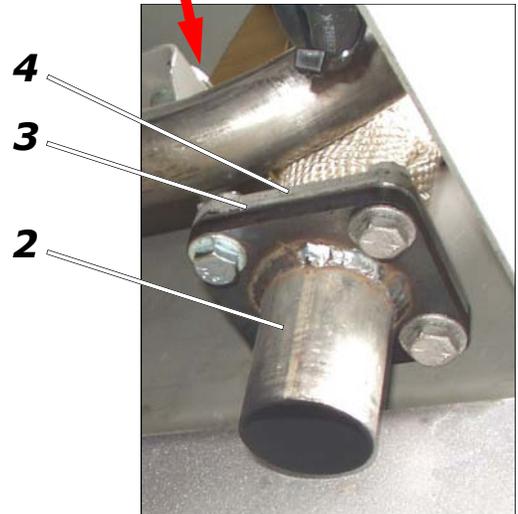
The engine is supplied with a flexible exhaust tailpipe **Item#1, Figure 10.2.1**.

Supplied loose with the genset is an exhaust connection adapter **Item#2, Figure 10.2.2** with 1.5" dia. connection pipe.

The installer is required to cut a hole in the compartment floor for connection to exhaust tailpipe connection flange **Item#4** prior to placing generator set in the compartment. After the generator is in place, the exhaust connections can be made. Place the supplied gasket **Item#3** in between the two connection flanges and attach connection flanges with (4) 5/16-18 hex bolts and washers (provided). Finish off the exhaust system by mounting the exhaust muffler and interconnecting with flexible exhaust tubing and clamps.



**Figure 10.2.1**



**Figure 10.2.2**



**Inhalation of exhaust gases can result in severe personal injury or death**  
**Be sure that exhaust system does not leak.**

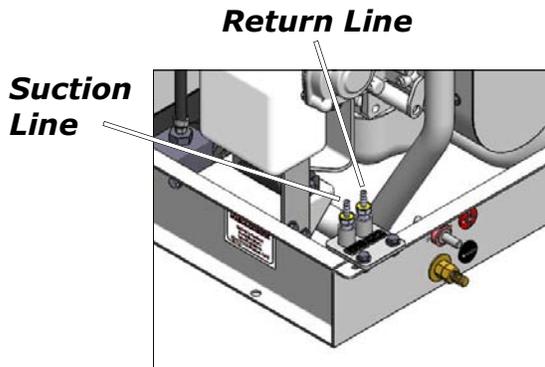
**Danger!**

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### 10.3 Fuel System

Refer to **Figure 10.3.2** on next page.

The fuel system for the Mitsubishi L & SL engines require a fuel suction & return line. A hose barb for 1/4" dia. hose has been provided for these connections. See **Figure 10.3.1** for location. If for some reason this connection does not work for your application you can unscrew this fitting and replace with a fitting to meet your needs. The minimum inside diameter for the suction line is 1/4".



**Figure 10.3.1**

#### Inline Fuel Filter

Install the inline fuel filter in the Fuel Suction Line, between the fuel tank and the 12VDC fuel pump, in an accessible location (preferably inside the genset compartment) for easy service. Install with arrow in direction of the fuel flow.

Use screw clamps on hoses to prevent leakage and to allow for easy replacement.



The fuel piping system may consist of both rigid and flexible material. Rigid lines can be made of seamless copper or stainless steel. Metal lines must be thoroughly cleaned prior to installation. When using rigid lines use an approved flexible line to make the connection from rigid lines to fuel connections on engine. The flexible hoses should be capable of operating in a temperature range from -40°F to +200°F without deteriorating and should be compatible with diesel fuel.

All fuel pipes must be located in protected areas, away from intensive heat sources (engine exhaust system) and securely

The fuel piping routing must also be carefully designed. Avoid any sharp bend, keep the number of connections to a minimum and do not use excessively long runs.

Any air which has found its way into the fuel system can cause irregular running of the engine and decrease its performance, even leading to stopping of the genset and preventing its restarting. Bleed trapped air from the fuel system as instructed in **Section 11.3**.

Fuel dip tube and/or fuel connections at the fuel tank should be located below fuel level at all times to prevent air cavitation of the fuel system. Fuel suction point in fuel supply tank should be located a minimum of 1 to 1-1/2 inches above the floor of the tank to minimize the pick up of fuel sediment and tank condensate material into the fuel system. The return line must also return below the fuel level to prevent drain back of the fuel system. If the return line does not return below the fuel level a check valve must be installed in the supply line near the fuel tank.

**Note:** If the fuel for the generator is being supplied by the vehicle tank, the supply line must be configured so that it can only utilize 75% of the total tank volume. A fuel check valve can be installed to prevent fuel drain back.

#### IMPORTANT

Air cavitation causes engine starting problems by virtue of fuel starvation. To avoid this condition, make sure that all joints and connections in the fuel system are 100% air tight. The engine is equipped with an electric fuel transfer pump which feeds the fuel supply from the fuel tank to the fuel filter system and subsequently to the fuel injection pump. Install a fuel check valve in the fuel supply line near the fuel tank if difficulty is encountered with fuel drain back.

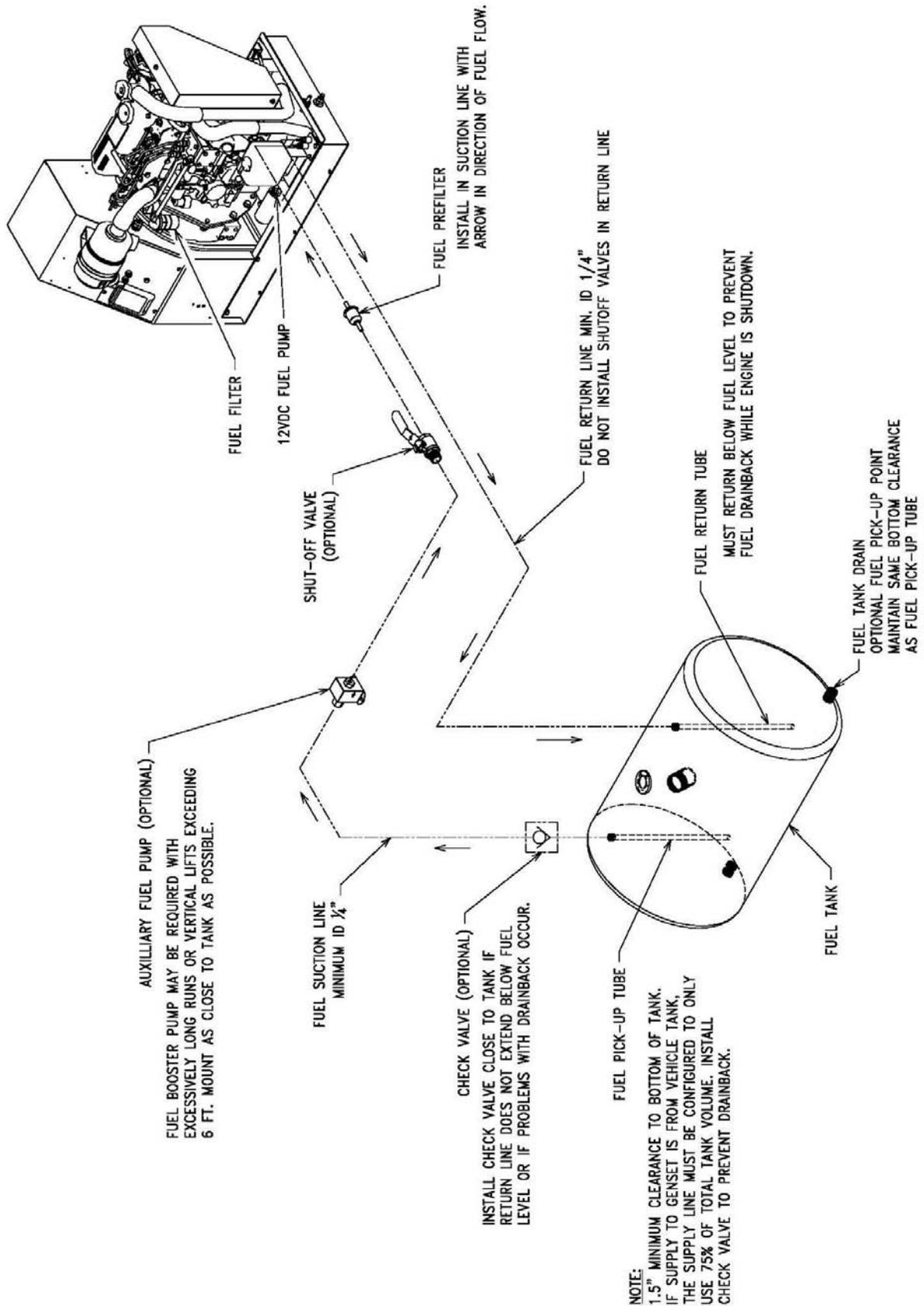


**Do not install fuel shut-off valves in the return line of the engine fuel system.**

**Warning!**

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Figure 10.3.2



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### 10.4 Cooling System

Mitsubishi engines are liquid-cooled diesels. The genset is complete with a heat exchanger which is horizontally mounted between the frame rails of the generator mounting (**SEE FIGURE 10.4.1**) and a cooling fan driven by an A.C. electric motor. For this reason there is no need for special intake ducts to direct the cooling air in and out of the compartment.

However, the installer needs to cut an opening in the floor of the vehicle compartment for cooling air discharging through the heat exchanger (See air flow directions in **Figure 10.4.1**).

An opening is also needed for supplying air to the cooling fan which is located in the generator enclosure on the non-service side of the genset. This opening is best located somewhere away from the discharge of hot air from the heat exchanger and also away from other heat sources such as exhaust piping and mufflers. Cooling air should be supplied through a louvered panel, or a cutout in a side wall whichever the installation permits.

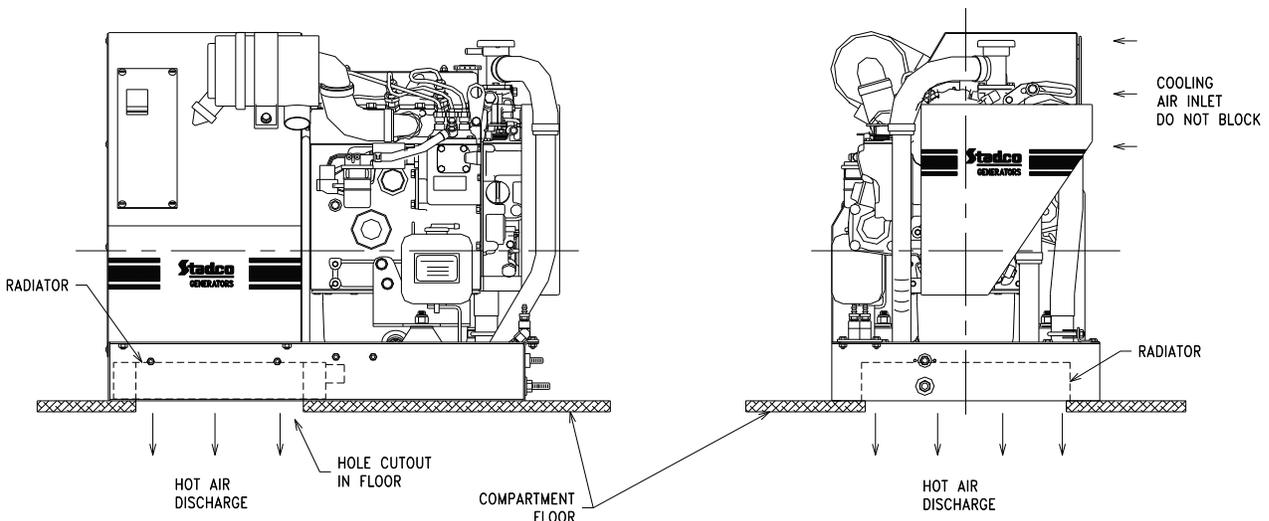
Cooling air inlet and hot air discharge openings must be large enough to permit air flow for full-load operation or the engine will overheat and could result in costly repairs. Inlet and outlet opening must be carefully designed to meet this requirement, see **Section 10.5 & 10.6** for design features.

**CAUTION:** Due to the design of the cooling system and for the safety of any personnel, it is imperative that the generator set is not started unless all panels of the generator/cooling enclosure are in place. Failure to observe this caution will cause overheating of the engine and will create a danger for the operator.

#### **Special Configuration** **Bottom air inlet required**

If the configuration of the mounting compartment requires the cooling air inlet opening to be in the floor of the compartment, separation of the hot air discharge and the cooling air intake openings must be ensured (See **Figure 10.4.2**).

**Figure 10.4.1 Cooling Air Flow Direction 12065**



#### NOTES:

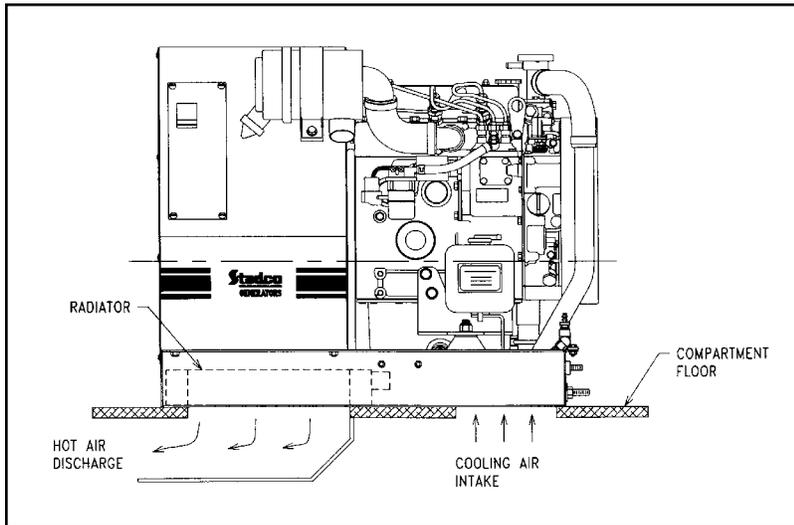
1. DO NOT BLOCK COOLING AIR INLET OR HOT AIR DISCHARGE.
2. AN AIR INLET OPENING MUST BE PROVIDED TO ALLOW COOLING AIR INTO THE GENERATOR COMPARTMENT.

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### 10.4 Special Configuration cont.

Provide a duct beneath the floor to discharge the hot air away from the cooling air inlet, this will prevent hot air from being recirculated into the cooling air stream.

**CAUTION:** When designing the discharge duct, make sure the opening of the duct is not in a direction that will “scoop” air when the vehicle is being driven. This will cause road dirt & debris to be forced into the radiator causing it to become contaminated and less efficient.



**Figure 10.4.2**

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### 10.5 Design Features and Specifications

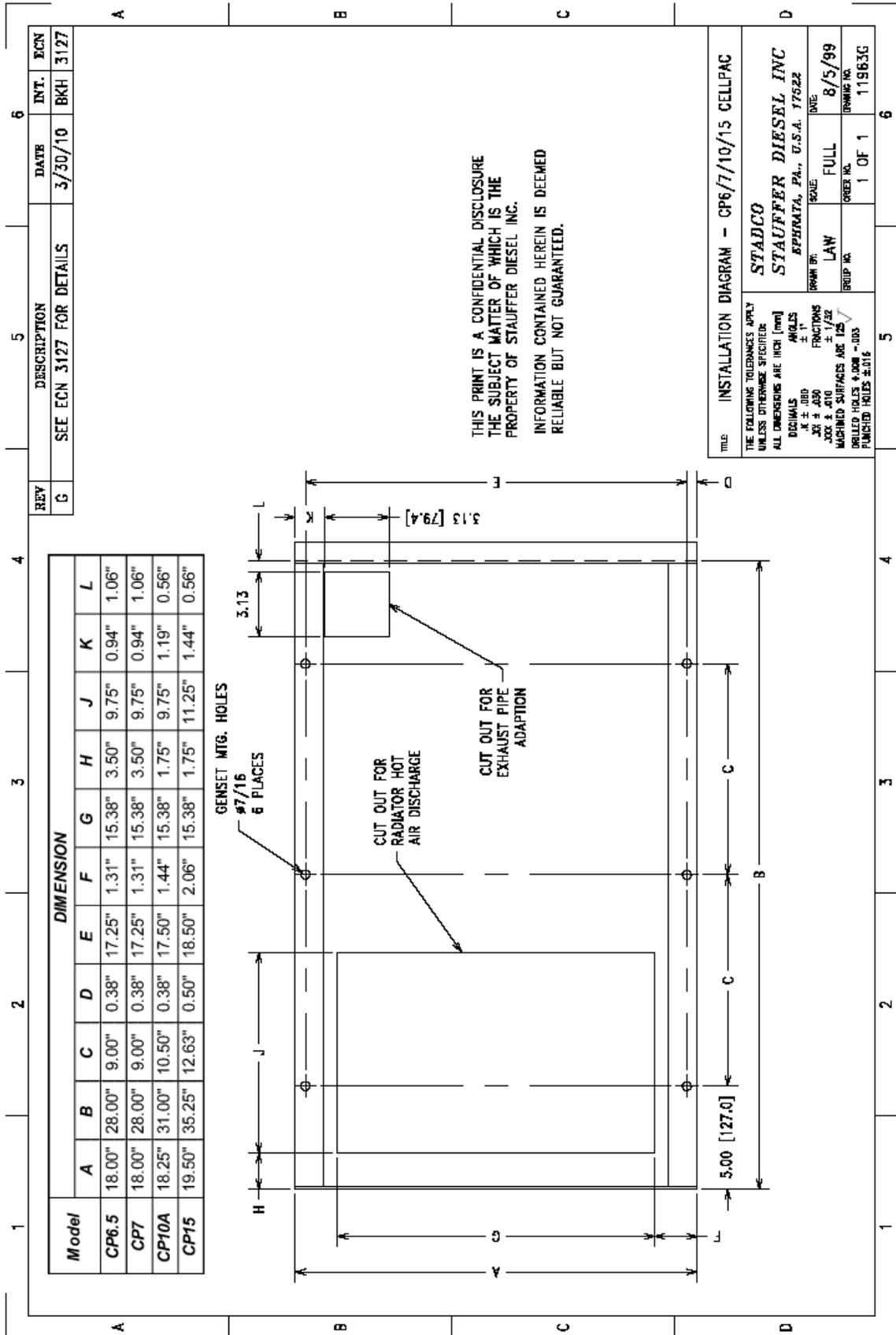
<i>Item</i>	<i>Unit</i>	<i>CP6.5</i>	<i>CP7</i>	<i>CP10A</i>	<i>CP15</i>
Engine Speed	RPM	1800	1800	1800	1800
Engine Model		L3E	L3E	S3L2	S4L2
Recommended Battery Capacity	CCA	450	450	700	700
* Engine Lube oil Capacity with Filter	Quarts	* 3.7	* 3.7	* 4.4	* 5.7
Combustion Air Flow	CFM	26	26	36	48
Maximum Intake Restriction	In. H2O	20	20	20	20
Exhaust Gas Flow	CFM	63	63	63	127
Max. Exhaust Backpressure	In. H2O	31.5	31.5	27.6	27.6
Genset Cooling System Air flow Req'd.	CFM	800	800	1200	2200
Minimum Cross Sectional Area for Cooling Air Inlet	Sq. In.	100	100	120	150
** Cross Sectional Area Required for Cooling Air Discharge	Sq. In.	**	**	**	**
<b>Generator Rating 60HZ</b>					
Standby Rating <b>60HZ</b>	Watts	6,000	7,250	10,000	15,000
Continuous Rating <b>60HZ</b>	Watts	5,000	6,000	9,000	13,500
Cont. Amps @ 240VAC, 1-Ph. 1.0 PF.	Amps	20.8	25	37.5	56.3
Generator # of Poles		4	4	4	4
Number of Leads		4	4	4	4
<b>Generator Rating 50HZ</b>					
Standby Rating <b>50HZ</b>	Watts		4,700	6,000	8,000
Continuous Rating <b>50HZ</b>	Watts		4,500	*** 5,500	*** 7,500
Cont. Amps @ 220VAC, 1-Ph. 1.0 PF.	Amps		20.4	25	34
*** 50HZ ratings are with std. alternator, special 50HZ alternators are available.		11969 specifications.xls			

**Figure 10.5.1**

- \* Refer to Section 11.2 for oil fill procedures. Fill to upper marking on dipstick.
- \*\* Refer to Section 10.6 for opening size.

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10.6 Installation Floor Plan (Dwg 11963)



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### 10.7 Installation Checks

#### Prestart Checks

Before starting the generator set, perform these steps:

- Check oil level in oil pan (Section 11.2)  
Check for leaks. See Section 9.1 for the recommended oil and quantity Section 10.5.
- Bleed air from fuel system (Section 11.3).
- Check coolant level (Section 11.6).
- Check Battery connections for tightness.
- Check to make sure that the Load circuit breaker is in the “OFF” position.
- Check all electrical connections and be sure that all bolts have been securely tightened.
- Refer to Installation Review, this section.
- Follow the Start-Up Section in Section 6.

Do not attempt to start generator system until all Installation Review questions have been answered satisfactorily. Once this has been done, proceed to the Operator’s Section for the Start-Up sequences.

#### Installation Review

Prior to initial start-up of the generator system, address each of the following installation review items; correct as necessary.

- Is the generator mounted securely to the floor of compartment? (**Section 10.1**)
- Is there adequate airflow openings both for inlet airflow and discharge airflow? (**Section 10.4, 10.5 & 10.6**)
- Are all the generator power output cables routed in such a way as to prevent chaffing?
- Are the power output cables of the generator connected properly & tightened? (See Wiring Diagrams **Section 8.3**)
- Are the battery cables connected properly & tightened? (**Section 7.2**)
- Are the 12VDC control system plugs wired & connected properly? (**Section 7.3 & 7.4**)

#### Can the following Routine Maintenance be Performed?

- Change oil & filter, fuel filter and air filter.
- Check the valve clearance.
- Check oil level in engine.
- Check coolant level.
- Fill & Drain the radiator.
- Operate main load circuit breaker.

**NOTE** Are electrical junction boxes adequately sealed, and of adequate size for the power circuit?

## 11.0 Points of Maintenance

### Maintenance Precautions

The recommendations and instructions in this section of the manual are of a general nature, if more detailed information is required consult the complete engine maintenance manual and Service manual.

- The engine should receive regular attention during the first 500 hours of its life from new and after a major overhaul.
- Long periods of light or “no load” running early in the engines life may lead to cylinder bore glazing and high oil consumption.
- The instructions given in Section 11.1 “Routine Maintenance Schedule” are based on average operating conditions and cover the minimum requirements to keep an engine running at peak performance with trouble free operation.
- Under very dusty conditions, air cleaners, lubricating oil and fuel filters will require more frequent attention.
- Before carrying out any maintenance work on engine or generator make sure **Power Switch Item#1, Figure 5.1.1** is in the **OFF** position and the negative battery cable is removed.
- It is essential to ensure that nuts and bolts are tightened to the torques as specified in the Workshop Manual.
- When reassembling an engine lubricate all moving parts with new engine oil.
- Renew nuts and bolts that have been taken from high stress locations.
- The fuel injector can only be checked and set, off the engine, using suitable nozzle testing equipment. Have fuel injectors tested by an authorized distributor.

### Break-in Instructions

It is recommended that the following receive regular attention until the engine has run 50 hours.

- Check the alternator/Fan belt tension, **Section 11.5.**
- Check lube oil level 2x daily, adjust if necessary, **Section 11.2.**
- Check nuts, bolts and connections paying particular attention to the fuel system. Tighten if necessary.
- Observe the exhaust at full load. A black exhaust could mean that the engine is overloaded or the injection system is out of order. Do not allow the engine to run with a dirty exhaust without determining the cause as this may result in an expensive engine failure.