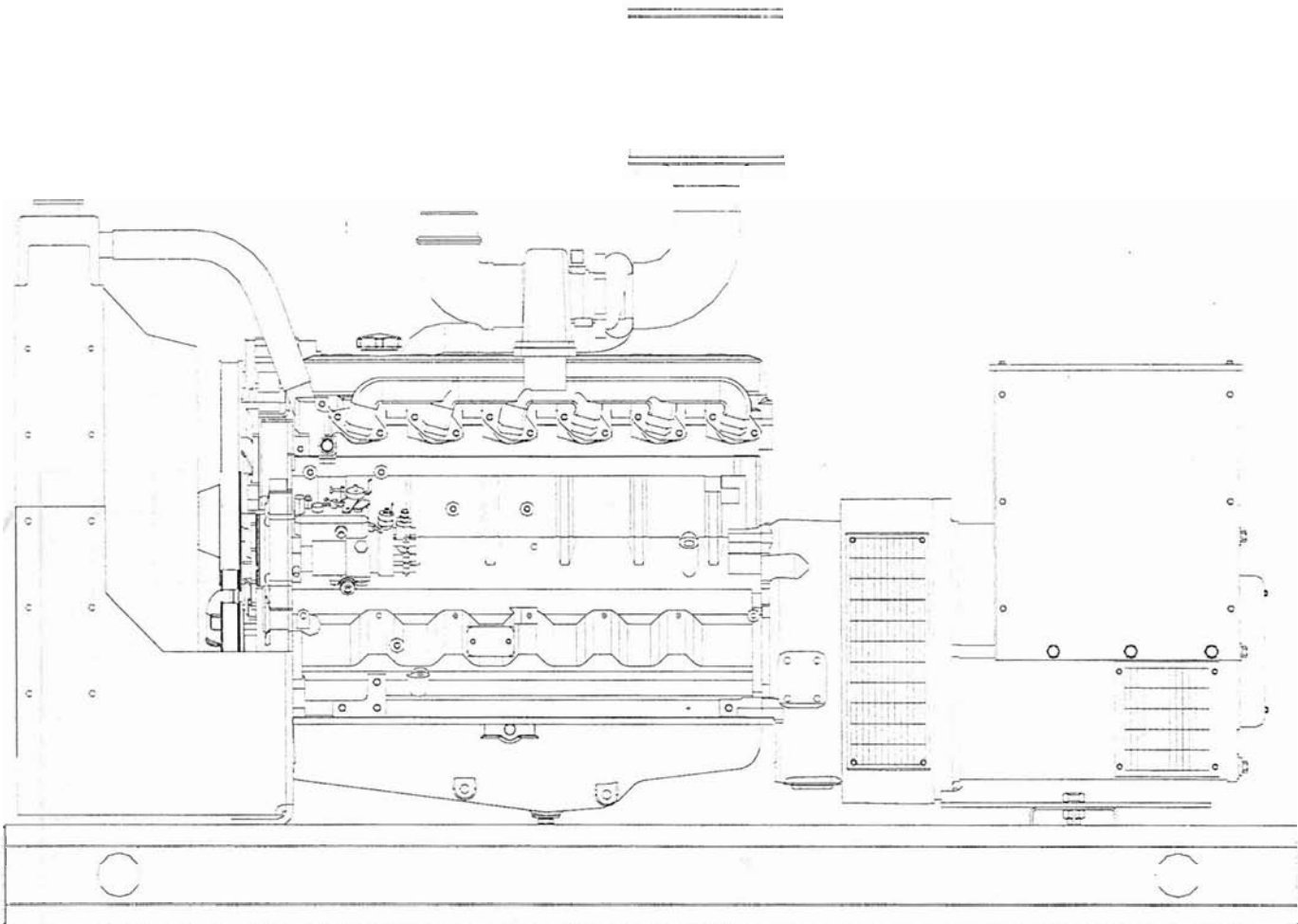


# **WINPOWER**

## **HEAVY DUTY GENERATORS**

## **LIQUID COOLED GENERATOR INSTALLATION BULLETIN**

### **TECHNICAL BULLETIN**



#### **CAUTION !**

All electrical/mechanical equipment should be operated at regular intervals to insure reliable performance lubrication and to dry electrical winding. WINPOWER recommends running generator sets once a week at no load for 15 minutes (an optional automatic exercising clock is available for remote start units), and once a month under full connected load for a similar interval.

*Heavy Duty Power Plants Since 1925 - Over 72 Years of Leadership & Innovation*

# Installation Instructions

## Safety Information

CAUTION: Possible damage to equipment

**CAUTION**

Caution notes indicate any condition or practice, which if not strictly observed or remedied, could result in damage or destruction of the equipment.

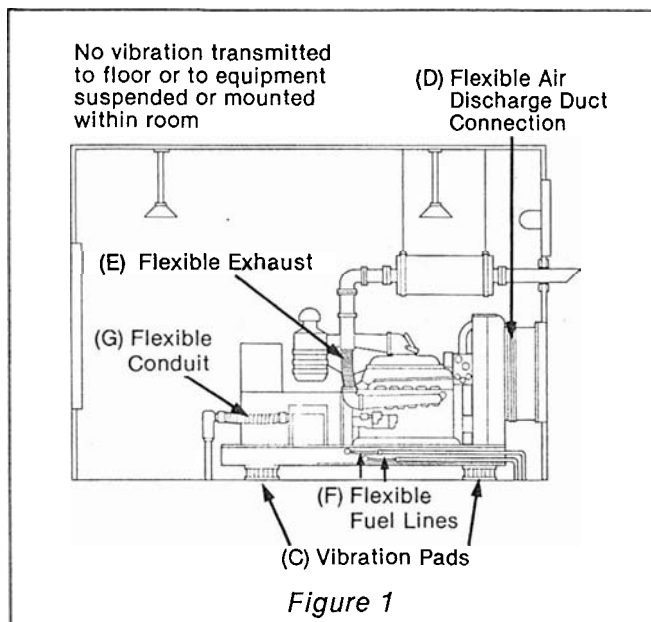
WARNING: Personal danger



Warning notes indicate any condition or practice, which if not strictly observed, could result in personal injury or possible loss of life.

The size of the automatic emergency power package or generator set, associated control panel, and switch/gear has to be established, and plans for installation should be prepared. Proper attention to mechanical and electrical engineering details assure a satisfactory power system installation. The information in this bulletin is offered as a guide to finalizing your installation plans.

- A. Space required and location
- B. Floor loading
- C. Vibration transmitted to building and equipment
- D. Ventilation of room, engine and generator
- E. Engine exhaust and piping
- F. Size and location of fuel system
- G. Electrical connections
- H. Local, state and federal codes, and insurance regulations



## A. Space Required and Location

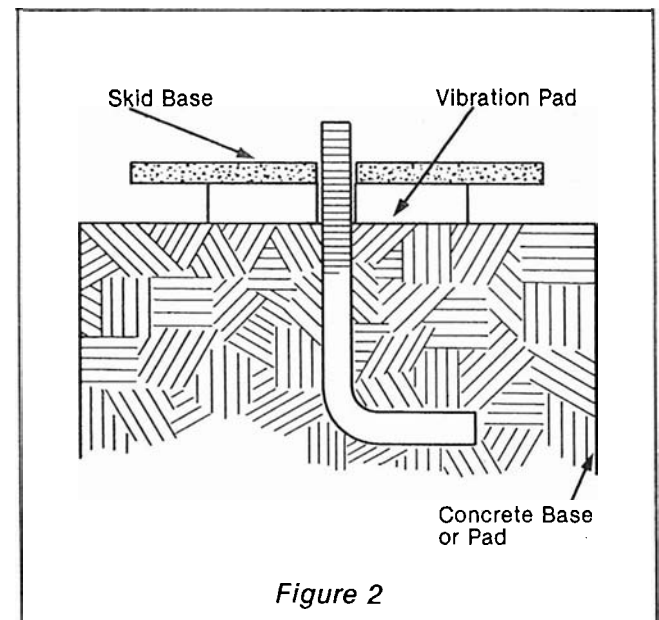
The space required should allow for ample working room around and in back of engine generator set. A general rule to follow is three (3) feet clearance. This allows service men to repair and remove engine or generator parts in the event service is needed. The generator should be placed near an outside wall. Location of engine generator should be as close to electrical service and fuel source as possible. This will reduce the cost of electrical and fuel runs. The unit should be protected from adverse weather conditions.

## B. Floor Loading

Floor type and loading should be taken into consideration when installing an engine generator set. The engine generator should be anchored to a 4" to 6" concrete pad. The WINCO engine generator set is shock mounted to the skid on gas/gasoline models. This allows the skid to be directly mounted to the pad. On the larger and heavier diesel powered units, the skid vibration will have to be isolated from the pad with suitable shock mounts. Vibration pads are provided standard.

## C. Vibration Transmitted to Building and Equipment

The engine generator is a rotating piece of equipment that causes vibration to be transmitted to any surface it comes in contact with. When installing



an engine generator this must be taken under consideration. Most buildings or enclosures cannot withstand excessive vibration. When installing the skid, if unit is not already shock mounted to the skid, vibration pads should be installed between the skid and pad. See Figure 2.

When installing the holds down nuts, a wedge or channel washer should be used. Do not over-tighten, as this will dampen the effect of the vibration pad. See Figure 3.

Once the unit is bolted down, you should grab a solid piece of the engine and shake it. The unit

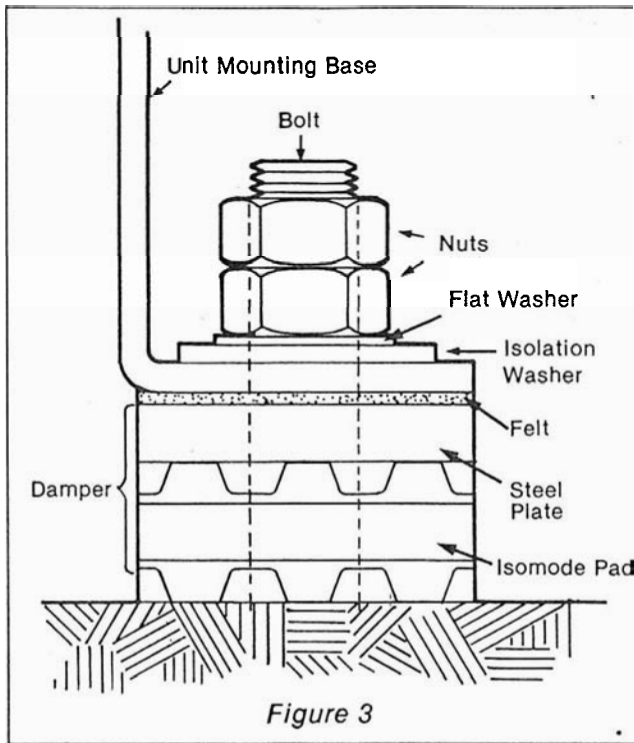


Figure 3

should have some movement, about 1/2" minimum in each direction. If the unit doesn't have the necessary deflection, back off the lock nuts.

**D. Ventilation of Room, Engine and Generator**

The engine is an internal combustion device which can be air-cooled or water-cooled. On water-cooled sets, you will need to provide inlet and outlet air, for proper engine performance. The

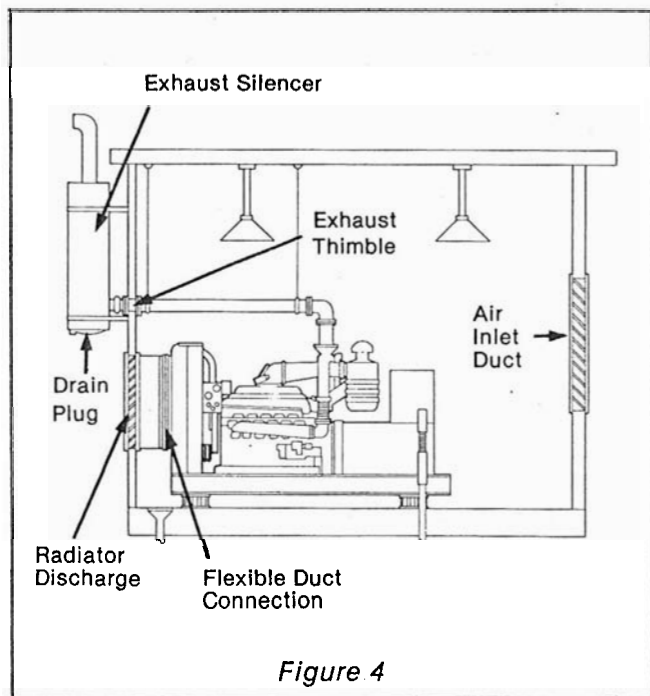


Figure 4

water-cooled units have a radiator with a pusher-type fan that is skid mounted. To discharge hot air out of the building, it will be necessary to duct it out. The hot air discharge duct should be made of

sheet metal with a flexible duct connection installed. See Figure 4.

The flexible section is installed to allow vibration and flex movement of the engine. This flexible section should be capable of expanding a minimum of 2". The air discharge duct should be air tight to the outside. The discharge end of the duct should have a screen or some other device to keep rodents out. Louvers can be used to keep building secure and minimize winter drafts. Movable or fixed type louvers can be used with satisfactory results.

**NOTE:** Local weather conditions should be considered when choosing the type of louver.

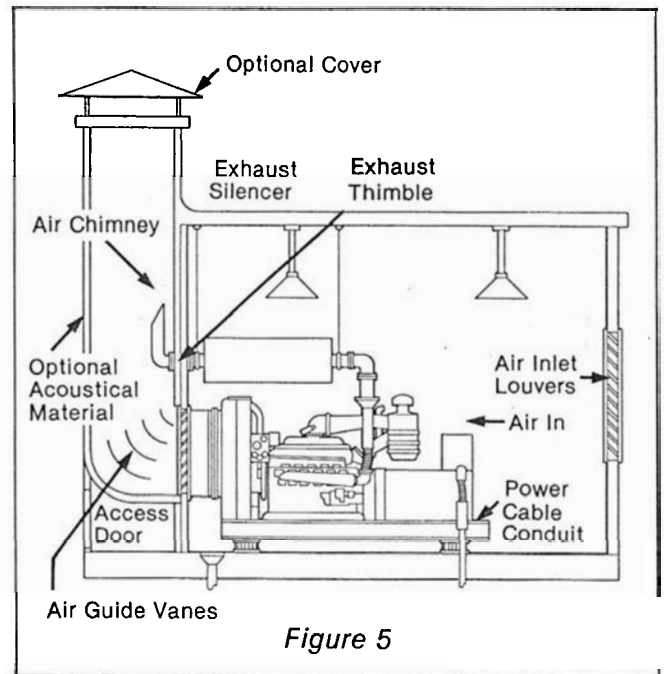


Figure 5

Cool air inlet opening should be 1 1/2 times as large as the radiator air out duct. The extra inlet area is needed to minimize restriction and to provide combustion air for the engine. This inlet should ideally be opposite the hot air exhaust, sweeping a flow of air across the entire machine. See Figure 5.

Thermostatically controlled vents in the roof or high wall can be added to help cool the upper area. These vents would be optional.

On air-cooled units, the ventilation should also be a sweeping flow. When an engine-generator is installed in a building, it should have an air inlet opening 1 1/2 times the area of the engine inlet screen, and an air discharge opening at least as large as the engine inlet screen. The hot air discharge should be above the cool air inlet, as the hotter air will rise. See Figure 6.

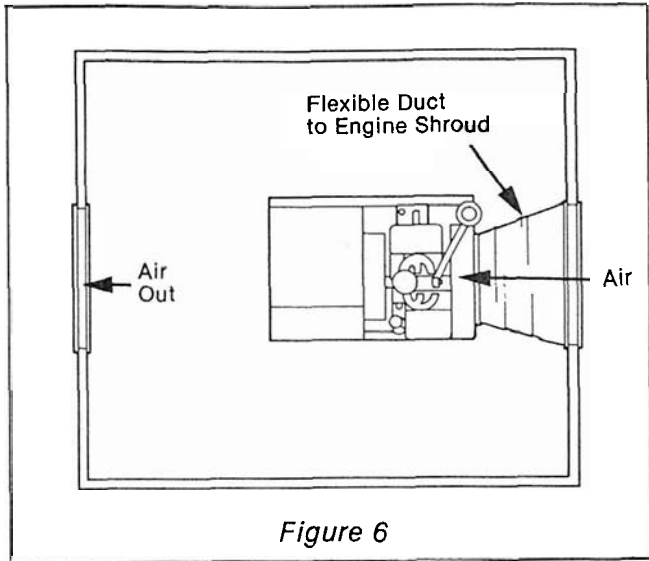



Figure 6

 Engine exhaust gases are deadly and **must** be vented to the outside of any building.

**E. Engine Exhaust and Piping**

The exhaust piping must be as short as possible. On runs over 25 feet, consult the factory. The exhaust run should be limited to three 90° elbows or six 45° elbows. The pipe size should remain the same size or larger than the exhaust manifold of the engine. No reducers are permitted in an exhaust run, since it creates excessive back

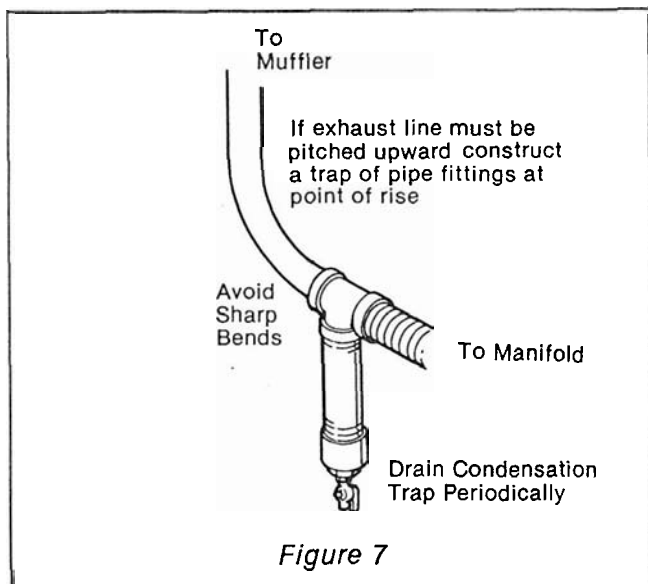


Figure 7

pressure which overheats the engine. A long condensation trap on the muffler should be installed. See Figure 7.

The muffler preferably will be installed outside to keep the room cooler. If the muffler must be in-

stalled in the room it should be insulated to reduce heat radiation and guarded to protect personnel. Adequate ventilation must be provided.

Fire Hazard, Consult NFPA

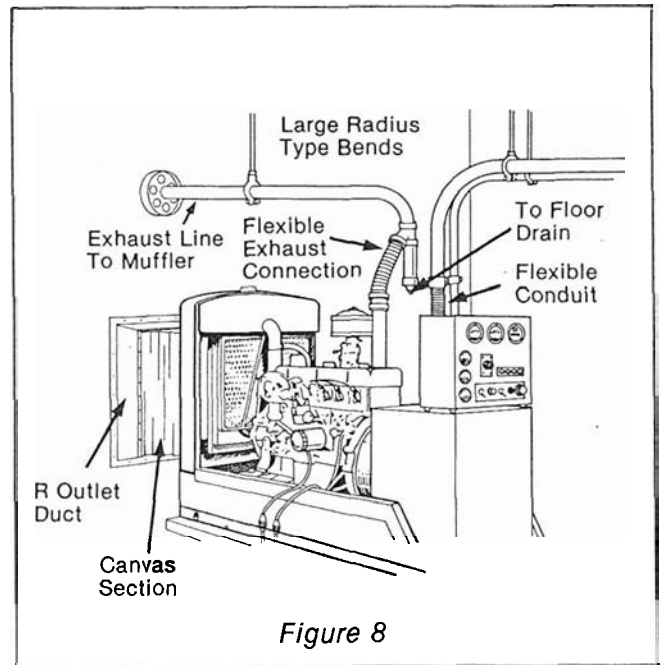


Figure 8

Flexible pipe section: a flexible exhaust section must be installed in the exhaust run, as near to the engine as practical. See Figure 8.

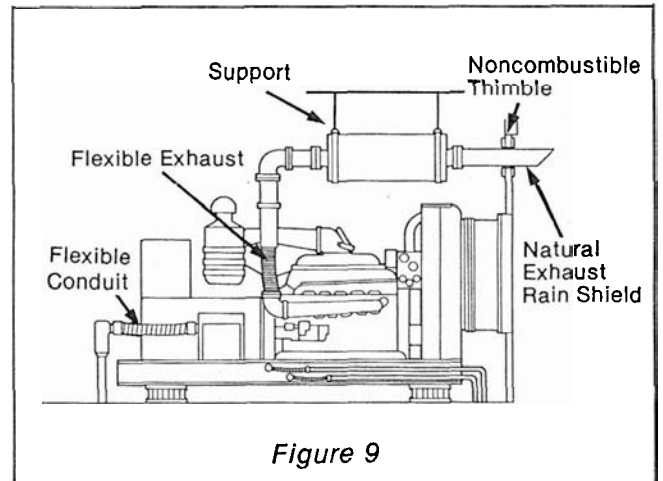


Figure 9

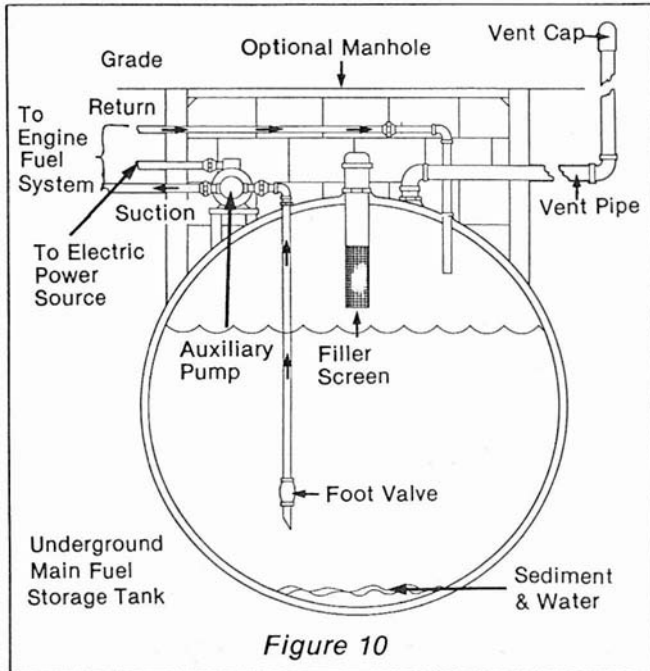
The flex exhaust section is not intended to be used as an elbow or exhaust hanger. The exhaust run must be supported with a noncombustible strap and thimble to take the weight off the engine exhaust manifold. Consult NFPA for recommended practices. See Figure 9.

If the exhaust pipe passes through the building wall, a noncombustible exhaust thimble must be used to prevent fires. Exhaust temperatures can exceed 900° F. The exhaust thimble prevents excessive heating of the building wall or roof. Consult NFPA for construction and installation details.

### F. Size and Location of Fuel System

The fuel supply should be as close to the engine generator as possible. This will reduce the installation cost of the fuel runs. See Figure 10.

Diesel fuel: The tank size is dependent on the length of the power outage. A minimum recom-

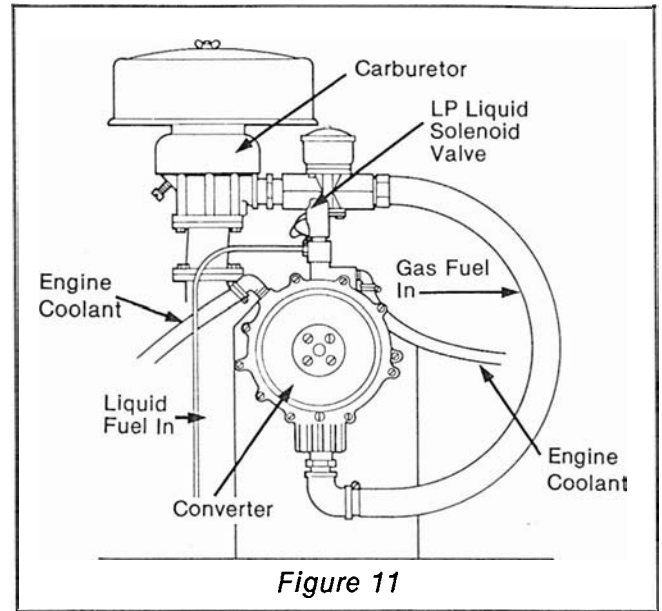


mended fuel supply would be for 24 hours. *Example:* If the engine generator fuel consumption is 5.6 gallons at full rated load, 5.6 gallons × 24 hours = 134.5 gallons, and a 150 gallon supply of diesel fuel would be sufficient. Tank installation can be above or below ground. All tank installations must comply with NFPA, local, state, and county codes. If the tank is less than 25 feet away from the engine-generator, the supply line should be ½" and the return line ¾". The use of a day tank or auxiliary tank will be determined by the lift on the fuel injector pump. If a day tank is used, it should be capable of holding one hour of fuel at full load. *Example:* If the fuel consumption is 8.6 gallons per hour, the day tank size should be 10 gallons.

Above ground type fuel tanks are gravity fed and should be installed in compliance with NFPA, local, state, and county codes. Some engine injector pumps cannot withstand the positive head pressure created by an above ground tank. Consult the factory for recommendations.

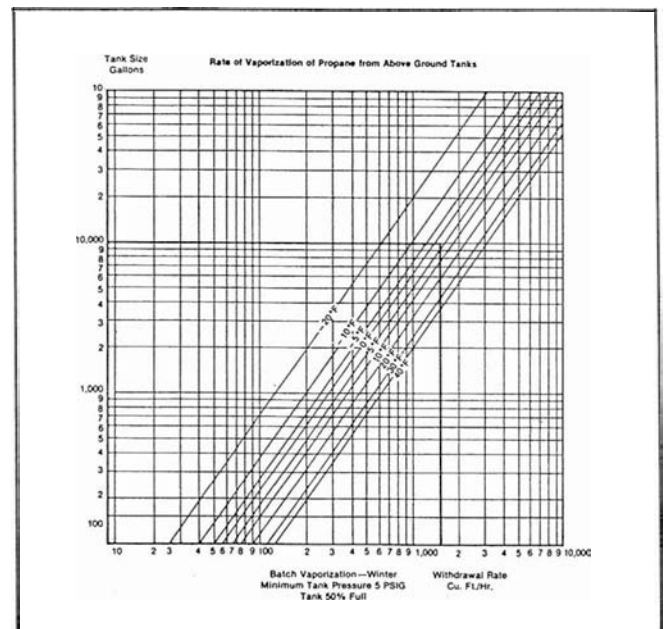
Gaseous Fuel Operation: Includes LP vapor withdrawal and natural gas operation. The important factor to be considered is a constant incom-

ing line pressure of 4 oz. to 6 oz. (7" to 11" W.C.). If the pressure is in the 4-6 oz. range, a primary regulator is not required. See Table 1 for recommended line size.



See Table 2 for LP vapor tank size. Note the tank must be larger to supply adequate fuel @ a lower temperature. See Table 4. Table 3 provides fuel consumption data by KW.

LP liquid withdrawal is recommended for most water-cooled engine-generator sets of over 30 KW rating. LP liquid withdrawal fuel should be used to minimize the size of the fuel tank needed in an LP system. By using a converter, the fuel can be drawn out of the tank as a liquid and converted to vapor by using hot water taken from the engine cooling system. See Figure 11. We strongly recommend the engine be equipped with a tank or block heater. This heater is available as an option or can be installed in the field by qualified personnel.



## **Local, State or NFPA Regulations**

### **Bibliography**

This manual is a guide to proper installation instructions. Listed below is a source of material to refer to for more detailed information:

NFPA Pamphlet #30 - *Handling and Use of Flammable Liquids*

NFPA Pamphlet #70 - *National Electrical Code*

NFPA Pamphlet #58 - *Storage and Handling of Liquefied Petroleum Gases*

NFPA Pamphlet #54 - *Installation of Gas Piping and Gas Appliances in Buildings*

NFPA Pamphlet #37 - *Installation and Use of Internal Combustion Engines*

Fire Protection Code

National Building Code