

# Safely Installing Your Standby Generator

Standby electric generators can provide you an extra sense of security in view of Montana's unpredictable weather and the occasional resulting power outage. We understand that a generator can be a convenient source of power around your home or business. We only ask, for your sake and power company employees, that generators be properly installed and used safely. Even small, portable electric generators - if they're used improperly - can threaten you safety and the safety of power company linemen working on the electrical system.

To protect yourself and your family, read and follow the safety instructions contained in every generator operations manual. Before purchasing a generator, please consider how you'll be using it. That will help you ensure that you're buying a generator that is correctly sized for the application you have in mind. Next, you'll need to know how it should be installed, and where to safely operate it. Finally, you'll want to read the summary of safety tips presented in this brochure to ensure the generator is correctly installed and used properly.

## **Portable generators**

Portable, gasoline-driven generators are designed to be used with appliances with cords connected to them. They can be especially convenient to use in remote locations, such as camping sites or construction areas. Lights, small appliances, etc. can be plugged directly into outlets on portable generators. In general, they are not designed to be connected to your home or any building wiring. Do not attempt to personally install these devices to your electrical panel.

## **Fixed Generators**

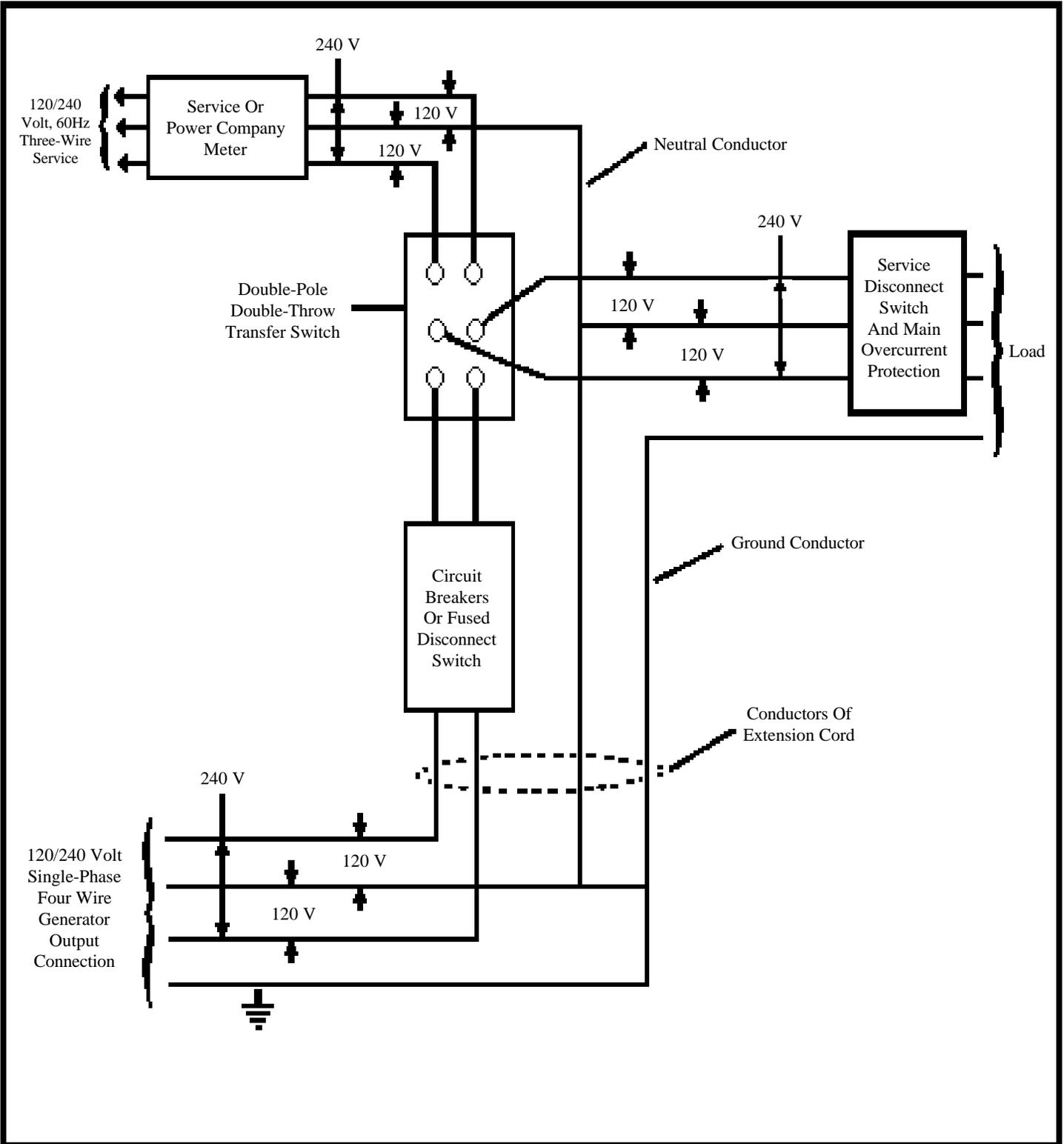
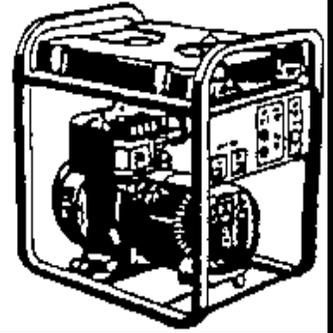
Large, fixed generators generally are directly connected to building wiring to provide standby power during emergencies and power outages. However, the wiring needs to be properly installed by a qualified electrical contractor. Properly installing a "permanent" generator is extremely dangerous, and not a "do it yourself" job. If you plan to have this type of generator installed, you may need to obtain an electrical permit from your local electrical or building inspector's office. Contact **Montana Building Codes Division** at **444-3933**.

## **"Back Feeding" - a dangerous condition**

Improperly connecting a portable generator to electric wiring can produce "back feed" - a dangerous current that can electrocute or critically injure you or others. Back feed into power lines from a generator could create "hot" power lines during an outage. Linemen who expect the line to be de-energized could be injured.

One good way to avoid back feeding is to install a double-pole, double-throw transfer-switch gear. A qualified electrical contractor can install this transfer switch so that a dangerous back feed can be prevented.

“In accordance with the National Electric Code, paragraph 700-6; Transfer equipment shall be designed and installed to prevent the inadvertent interconnection of normal and emergency sources of supply in any operation of the transfer equipment. Automatic transfer switches shall be electrically operated and mechanically held.” The transfer switch must be a break-before-make switch which will “break” the electrical connection with commercial power lines before it “makes” the connection between your generator and wiring. The switch also will prevent utility power from damaging the generator when regular service is restored. Make sure the transfer switch is rated at the same or greater than the main over current protection. An electrical diagram of an installation using a transfer switch appears in *Figure 1*.



Since transfer switches can be expensive, another way to install a generator is to have a sub-panel with main breakers and power from the main power or generator. Main panel breaker and generator breaker in sub-panel would have handles interlocked to prevent both being opened and close at the same time. This prevents back feed to commercial power when generator is in use. *See Figure 2.*

1. Install breaker and wiring from main panel to feed sub-panel. **Note:** Wiring and breaker sizes are determined by circuit load needed.

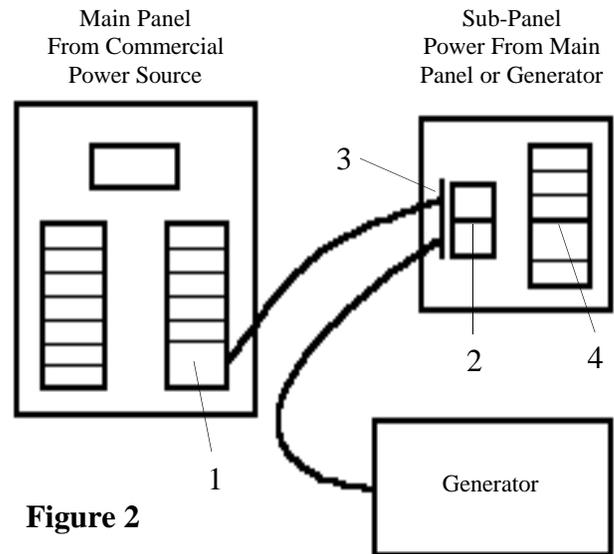
**Breaker / Wiring Size Chart**

<b>30 Amp</b>	<b>10-3 with ground wiring</b>
<b>40 Amp</b>	<b>8-3 with ground wiring</b>
<b>50 Amp</b>	<b>6-3 with ground wiring</b>

2. Install sub-panel with proper sized main breakers. Power for one from the main panel and the other from the generator.

3. Install dual supply main breaker / service disconnect retaining kit and handle interlock. **Note:** Not all manufactures supply the handle interlock retaining kits for all models of breaker disconnects.

4. Install breakers in sub-panel for circuits desired to be energized from generator. **Note:** Smaller generators may not be able to carry the total load for all circuits. Use the load calculation chart (*Figure 3*) to determine total load. A smaller generator than the total load can be used by turning off some of the breakers when the appliance or lights are not needed. Always use a generator that is at least 25% larger than most necessary loads. This allows for some of the nonessential loads to be used at once.



**Figure 2**

**The dangers of carbon monoxide**

When using a generator, be sure to locate it outside so poisonous carbon monoxide gas is exhausted. Never operate a generator in an enclosed building, especially in a building attached to a dwelling. Make certain, too, that the generator has enough air to breath and that it's exhaust is vented properly. Fumes from burnt fuel can be deadly. Always insure proper ventilation, and air flow around the generator.

**Generators and water don't mix**

Do not use a portable generator in a flooded basement. That could be a dangerous combination. In addition, make sure your hands are dry, that you're standing in a dry place, and the generator is properly grounded whenever you operate your generator.

**Using gasoline safely**

Gasoline should only be stored in approved containers, and out of reach of children. It goes without saying that all flames or cigarettes should be extinguished when handling gasoline. Have a fully charged, approved extinguisher located near the generator, and never fuel a generator when the generator is running.

## Other Safety Reminders

Here are some rules to follow to help assure that generators are installed and used safely:

- Always check out the unit thoroughly each new season before you fire it up.
- Never attempt to repair an electric generator, only a qualified serviceman should perform repairs.
- Don't remove or tamper with safety devices; they are there to protect you and your property.
- Many engine parts are very hot during operation, severe burns may result if touched.
- Keep children away from generators at all times.

- Always properly disconnect from your utility service before starting your backup generator.

### Don't put your life at risk

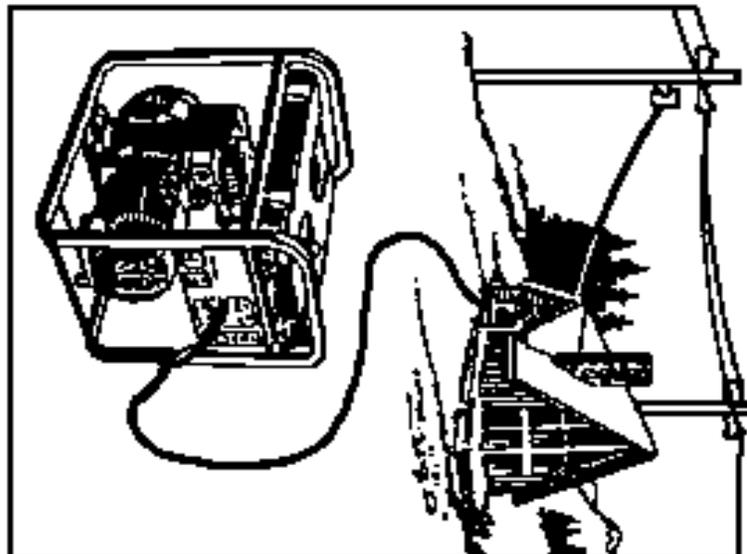
Electric generators can provide you with piece of mind and convenience as long as you don't take chances with your safety or the safety of others. Be sure to follow these safety guidelines so you don't put yourself or the lives of others in danger. **Improper use or installation of an electric generator can cause property damage, serious injury and even death.**

## FIGURE 3 - APPROXIMATE LOAD CALCULATIONS

Check with your specific equipment & appliance instructions for exact specifications.

	Running Watts	Start up Watts		Running Watts	Start up Watts		Running Watts	Start up Watts
Pumps:			Electric Range:			Furnace motors:		
1/3 HP 3600 RPM	800	1200	6" Element	1500	-0-	1/6 HP	500	600
1/2 HP 3600 RPM	1000	2000	8" Element	2100	-0-	1/4 HP	600	900
3/4 HP 3600 RPM	1200	2100	Bake element	3000	-0-	1/3 HP	800	
1 HP 3600 RPM	1400	2200	Broil element	3000	-0-	1400		
						1/2 HP	1000	2100
Bath fan	100	200	TV set	500	-0-	Fireplace fan	200	300
Kitchen fan	200	300	Coffee maker	1200	-0-	Garage door	800	1700
Freezer or refr.	900	2100	Ave. light circuit	500	-0-	Vacuum cleaner	1000	-0-
Microwave oven	800	-0-	Toaster	1200	-0-	Water heater	4500	-0-
Clothes iron	1200	-0-						

MT DISASTER & EMERGENCY SERVICES DIVISION  
 (406) 841-3911  
 MT BUILDING CODES DIVISION  
 LINCOLN COUNTY EMERGENCY MANAGEMENT  
 PIVAL ELECTRIC & PLUMBING CO., LIBBY  
 FLATHEAD ELECTRIC COOP., INC., KALISPELL



**SAFELY  
 INSTALLING  
 Your Standby  
 Electric Generator**