



## SPECIAL EDITION

### Generator Transfer Switch Options

#### ● Optional Standby Systems Are A Good Way To Keep The Lights On

Power outages can occur at any time and may last for a prolonged time. Anyone, who has endured a power outage, especially one that lasted more than a few hours, may be highly motivated to install an electrical generator to avoid a repeat experience.

To prepare for these expected power outages many people choose to purchase an optional standby system for their home or business. **Optional standby systems** also called “**back-up generators,**” are often installed to provide an alternate source of “on-site generated power” for residences, industrial and commercial buildings, and farms. You can restore power manually or automatically. Whether a small portable gasoline or a large diesel powered stationary generator, all back-up generator systems have the same purpose, to deliver safe usable electricity when and where it is most needed.

The Department of Labor and Industries has the responsibility of ensuring the safe delivery of all electrical power within every home and business. One thing all back-up generator systems have in common is the need for a way to transfer the power source from the utility to your generator. We will explore the various transfer switch options available for back-up generator systems within a home.

How will the generated electricity get from the generator to the electrical equipment that needs the power? When considering the installation of a back-up generator system the generator is only part of the equation.

The simplest back-up generator configuration might be to purchase a small inexpensive portable generator that delivers its electrical energy through an extension cord directly to specific pieces of equipment (e.g. refrigerator, freezer, microwave, portable room heater, lamps, etc.). The advantage of this type of installation is its low cost and flexibility; however, the electrical loads that may be connected are very limited. When you need to have generator power for permanently connected electrical equipment (e.g. furnace, oven, water heater, etc.), you must have a more sophisticated and permanent back-up generator wiring system. If you fail to properly install your back-up generator system, you and your family are at significant risk from suffocation, electrocution, and structural fire.

There are many types and sizes of back-up generators, and many variables to consider when installing your back-up generator system. Each size and type of back-up generator has different wiring connection requirements.



Stationary Optional Standby Generator



Portable Optional Standby Generator

### ● Transfer Switches Are An Essential Part Of All Back-up Generator Systems

Generally, a “**transfer switch**” is a device designed to supply power to an electrical circuit from multiple power sources. A transfer switch is required for any back-up generator other than a portable back-up generator that uses an extension cord to supply single electrical loads like your refrigerator or a lamp.

A transfer switch is necessary to isolate the generator from the utility system when you install a back-up generator to your house’s wiring system. Failure to properly transfer your power places you, your family, and utility workers at great risk of electrocution. Connecting a generator directly to any point of the home’s electrical wiring without a transfer switch is illegal and dangerous due to the possibility of “back-feeding.” Back-feeding happens when you connect your back-up generator directly to the home’s wiring without having a legal transfer switch.

Without a legal transfer switch, your generator’s electricity can be sent back into the power grid from your house. This will energize the utility’s power lines in your street. This poses an electrocution hazard for utility workers and your neighbors who may not know that your voltage is present on the shared lines. If utility power is restored, your back-up generator and house wiring may be severely damaged.

### ● Transfer Switches Can Be Manual, Automatic, Or A Combination Of Manual And Automatic

Transfer switches can be manual or automatic and switch between multiple power sources. They can be very simple or very sophisticated in design and operation. They can send power to a single circuit or can be part of a panel that supplies multiple circuits. If your transfer switch is rated as “*Suitable for Use as Service Equipment*,” it will be considered to be your service disconnect and may be installed in your electrical system upstream from your electrical panel’s main circuit breaker. Installing your transfer switch ahead of your main breaker will require some modifications to the wiring in your current service panel. Because of the complexities of wiring your transfer switch this way, you will likely need electrical experience yourself or you may need to hire a licensed electrical contractor to make the installation.

**Manual Transfer Switches (MTS)** are generally the least expensive and least complicated of the two types of transfer switches. MTS’s require someone to be on-site to start and shut down the generator and physically operate the MTS. Manual transfer switches come in various sizes and different configurations to suit your specific application. Both portable and stationary generators may use manual transfer switch equipment.



**Automatic Transfer Switches (ATS)** monitor the power supplies and automatically switch from the normal (utility) supply over to the generator supplied power source in the event of a power outage.

ATS equipment can have many different control and alarm features. An ATS, with built in logic, can monitor the utility power, sense any power disruptions, and switch to an alternate power source. Some ATS equipment can even start and stop the generator on a predetermined maintenance schedule to assure the back-up generator works when you need it. In the event of a utility power failure, it is common for an ATS to automatically start your back-up generator and transfer your power source from the utility to the generator. When utility power is reestablished, the ATS will automatically transfer back to the normal supply and shut the generator down. Because of the complexities of using an ATS, we will not discuss their use in this article. If you want an ATS, you should probably hire a licensed electrical contractor to make your installation.

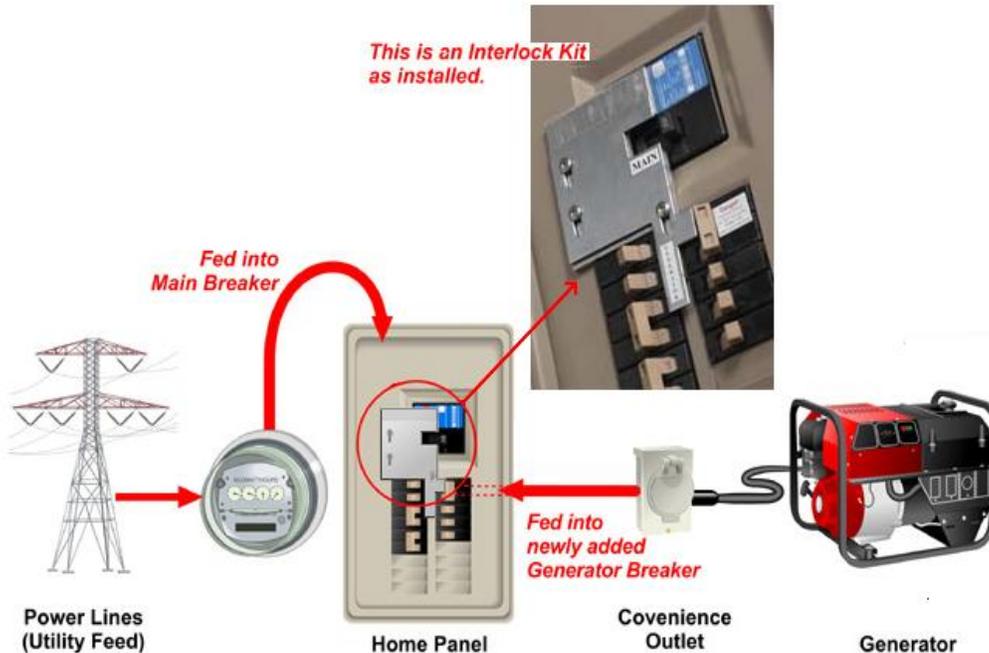
● **Adding A Transfer Switch To Your New Or Existing Electrical Panel**

If you are planning to add a transfer switch to your electrical system, there are several types and configurations available in the market to choose from. When choosing which piece of equipment is best for you, a transfer panel may be the logical choice. When you are buying your back-up generator and transfer switch, you must consider the voltage and amperage of the electrical loads you want to run. Some typical 120 volt loads in your house are: 1,500 watt – refrigerator, 75 watt – one lamp, 1,500 watt – microwave. If you are unsure what size back-up generator or transfer switch equipment to buy, you should consult a qualified electrical contractor or retail outlet.

● **There Are Several Ways To Install Your Transfer Switch**

Installing an **aftermarket interlock accessory** kit is one of the least expensive ways to incorporate a transfer switch into your existing electrical system. Several panelboard manufacturers offer accessory kits designed to allow you to convert your existing electrical service panel to a sub-transfer service panelboard. Kits typically consist of a generator receptacle outlet, a circuit breaker suitable for back feeding, and a mechanical interlocking device (attached to the dead front cover of your existing service panel). Only use an interlock kit approved for your existing panelboard. Using another brand is extremely unsafe and could cause your family to be electrocuted or major damage to your house’s electrical system.

*Picture Courtesy of Generator Interlock Technologies*



A **multi-circuit manual transfer switch panel** is compatible with small portable generators that are typically 5,000 watt (5 kilowatt) or smaller back-up generators. This common size back-up generator is usually available for purchase at most retail stores and is a good option for houses with an existing electrical panel. The installation of the multi-circuit manual transfer switch panel is relatively simple to other types of transfer switching methods, requires minimal changes to your existing wiring, and there is minimal interruption to your house’s electrical power while making the installation. Multi-circuit manual transfer switch panels commonly come in 6, 8 and 10 circuit models. You can install them on the wall surface or flush in the wall next to your service panel. They come with a pre-wired wiring harness that connects directly into your existing panel. Inside your existing panelboard, you must splice the harness into any existing circuits you want to power from your back-up generator.



The multi-circuit manual transfer switch panel comes with provisions to plug a power cord from your back-up generator into the front of the panel. As with other types of transfer switch panels, accessories are available to relocate the power inlet connection to a place outside the home avoiding the need to run a power cord from the generator to the transfer switch through a door or window.

A **transfer sub panel** is a good option for either new or existing electrical system installations. Installing a transfer sub-panel can accomplish many of the same goals as the use of a main transfer panel without some of the disadvantages. If incorporated into an existing home this option may involve some re-wiring of the existing service panel.

The transfer sub-panel is usually smaller than a main transfer panel, but is essentially identical to it in design and arrangement of circuit breakers. A standard circuit breaker in your existing panelboard feeds the "normal power" to your transfer sub-panel. You will connect two back-fed circuit breakers in your transfer sub-panel to your normal supply and back-up generator. You should size your back-up generator to carry the loads you need to operate.

If you are using a transfer sub-panel, you will not have to replace your existing legally installed service panel and you can choose your critical circuits in advance so you will not need to make circuiting decisions when you transfer power to your generator. You can leave all your branch circuits "ON."



A **main transfer panel** is one way to connect your back-up generator into your electrical system. The transfer panel is nearly identical in appearance and function to a typical house main panel. A transfer panel uses a back-fed circuit breaker to control power from your back-up generator and has a manual locking device that you must operate to shift from utility power to your generator. The main circuit breaker is usually located close to the back-fed generator breaker and cannot be closed if the manual locking device has been shifted to allow power from your back-up generator. The locking device prevents both breakers from being closed at the same time. This safety feature prevents back-feeding to the utility system and endangering utility workers and your electrical system.

This type of system requires removing and replacing your existing service panel, but there is generally no need for other extensive electrical work. If your back-up generator is not large enough to power all your circuits simultaneously, you will need to turn off enough of your branch circuit breakers in advance of transferring power so that you do not overload your back-up generator.



*Pictures Courtesy of Eylander Corporation*

## ● For Your Family's Protection – Be Aware

Transfer equipment is available that is not approved. All electrical equipment must have an appropriate **approval label** from a Washington approved electrical testing laboratory. It is very unsafe to use equipment that is not approved or properly installed and puts your family and utility workers at significant risk from electrocution. This type of electrical work **always requires a permit and an inspection** by your local electrical inspector. **Do not place anyone at risk from an improper electrical installation.** If you are at all **unsure of what you are doing, hire a licensed electrical contractor** to make your installation. Our electrical website has a list of licensed electrical contractors. They are properly bonded and qualified to do your job safely and economically.