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RESIDENTIAL GARAGE WIRING

This handout attempts to answer the questions asked most often by homeowners. The information in this is NOT all you need to know to do your project, it is only to assist you in the project. The wiring must be done to the standards of the 1999 National Electrical Code (NEC). We do not have copies available for sale, and they are expensive- running about $30-$40. Libraries and electrical supply dealers have so-called "wiring made easy" books available that will assist you.

An Electrical Permit is required for all electrical work, including wiring a garage. In a single-family residence, the owner-homesteader may obtain the permit to do the work his/herself. For other residential occupancies, with a few small exceptions, an electrical contractor must be hired to do the work and obtain the permit.

Some basic rules:

1. Most homeowners choose to run the electrical underground. The two most popular methods are direct-burial cable and PVC (plastic) conduit. Direct burial cable is designated as UF (**U**nderground **F**eeder) or for larger sizes, USE (**U**nderground **S**ervice **E**ntrance). These cables may be buried directly in the ground at 24 inches below grade. They must have mechanical protection such as PVC conduit wherever they are closer than 24" below grade. The most common points that this happens is where the run is brought up above grade to enter the house and garage. PVC conduit is the other popular method used. The PVC MUST be approved as conduit- other types such as PVC plumbing pipe is **not** acceptable. Standard insulated conductors may then be pulled inside the PVC. These single conductors must have a "W"(for water-resistant) in their designation that is stamped on the jacket of the wire. Examples of this designation would be: TH**W**N, XHH**W**, etc. PVC conduit may be buried at 18 inches below grade (this is measured to the top of the conduit, so the trench will have to be deeper than 18").

2. A disconnect must be installed in the garage to shut off all power to the building. This disconnect must be immediately inside the garage at the entrance point of the feed from the house. If you are using a multi-circuit panelboard in the garage and have no more than 6 breakers in the panel, these breakers may be used as the disconnecting means. More than 6 breakers, you must have a main breaker in the panelboard. If you are running a single 15 or 20 ampere circuit from the house to feed a minimum number of lights and outlets, you may use a separate single-pole switch (such as a standard light switch) as a disconnect. This switch must be the first device that is on the circuit once it enters the garage, and it may be used only as a disconnect-it cannot be used to control lights or other equipment. This disconnect must be marked as the disconnecting means on its box cover. (see figure 1 on diagram pages)

3. "Romex" or Non-Metallic Cable (NM-B) may be used inside the garage. It must be drilled through the studs, not run on the face of them. Also, never drill through factory roof trusses, run the Romex on the top edge in a location it will not be damaged. If you run Romex horizontally, such as between boxes on a wall, if the wall is not enclosed by sheetrock the Romex cannot be run horizontally lower than 8 feet above the floor. As an example, to run between two boxes on an unfinished wall, you would have to run the Romex up from one box to a height of 8' or more, run horizontally until you are even with the other box, and then run back down to the

second box. This method is required because there is too much chance of physical damage to the cable by hanging tools, etc on the horizontal runs if they were lower than 8'. Other installation requirements in the National Electrical Code, including Article 336 also apply.
Another wiring method is metal conduit, such as EMT. This method may be run on the face of the studs, and does not have to be drilled into the studs. There are other requirements in the NEC, especially Articles 346-368, depending on the type of conduit.

4. In general, all 120 volt general-purpose outlets below 6' 7'=must be Ground Fault Circuit Interrupter (GFCI) type. Outlets for a specific appliance, such as a refrigerator or freezer do NOT have to be GFCI, but must be a single outlet for the appliance. Several standard outlets may be protected by one GFCI outlet. See the manufacturer's instructions for details.

5. The 1999 NEC allows either a single circuit or feeder from the house to the garage. No more multiple circuits between buildings are allowed.

6.If a single circuit with a grounding conductor (either green or bare and attached to the grounding system in the house) is run from the house to the garage, no ground rod is required at the garage (see Figure 1). For feeders from the house to the garage, an 8-foot ground rod must be driven at the garage. If a grounding conductor is run with the feeder, or if there is metal conduit from the house to garage, the ground rod is used for bonding the ground system in the garage (see Figure 2). If there is no grounding conductor or metal conduit, then the neutral must be re-grounded to the ground rod conductor (see Figure 3).
This ground rod may be driven right outside the garage, and a #6 copper ground wire attached to it. If the wire is subject to physical damage on the outside or inside of the garage, it must be protected by conduit. 1/2 inch PVC is usually the easiest method of protection. The #6 wire must be attached to the grounding system for the electrical in the garage. See the diagrams for connection requirements.(Including the previously mentioned neutral re-grounding requirements)

Again, please be aware that these are NOT all the requirements for wiring a garage, they are the questions that are asked most often.
If you have other questions after consulting the wiring books available, call the Electrical Inspector for your area. In Saint Paul, they can be reached at (651)266-9003 between 7:30 and 9:00am Monday through Friday.