

## Residential Detached Garage Wiring Information Sheet

This handout answers questions most often asked by homeowners. This information is a guide to the most common questions. It is not intended, nor shall it be considered, a complete set of requirements. The wiring must be done to the standards of the latest state-adopted *National Electrical Code* (NEC). Libraries and electrical supply dealers may have other books available to further assist you.

An Electrical Permit is required for all electrical work, including wiring a garage. In the City of Waupaca all residential and commercial occupancies, a city licensed electrical contractor must be hired to do the work and obtain the permit.

### Rules to operate by:

1. Most homeowners choose to run the electrical underground. The two most popular methods are direct-burial cable or PVC (plastic) conduit. Direct burial cable is designated as UF (Underground Feeder) or for larger sizes, USE (Underground Service Entrance). Direct-burial cables may be buried in the ground at 24 inches below grade. They must have mechanical protection, such as PVC conduit, wherever they are closer than 24 inches below grade. The most common point where this occurs is when the run is brought up above grade to enter the house and garage. PVC conduit must be approved as electrical conduit. Other types, such as PVC plumbing pipe, are not acceptable. Standard insulated conductors may be pulled inside the PVC. These single conductors must have a "W" (water-resistant) in the designation stamped on the jacket of the wire. Examples of such designations include: THWN, XHHW, etc. Type "Romex" or Non-Metallic Cable (NM-B) cannot be run inside underground conduit, because the outer jacket of the NM-B is not rated for wet locations. PVC conduit must 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 inches.) 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

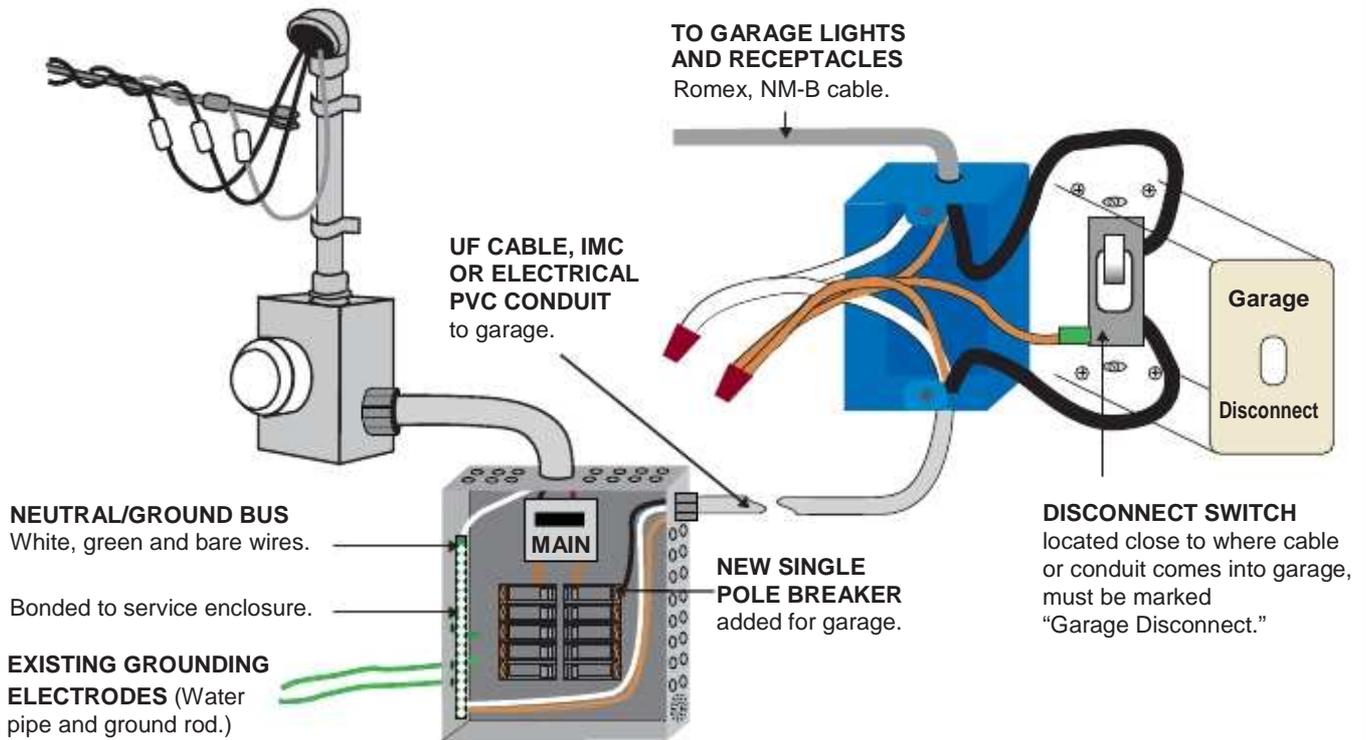
panelboard in the garage and have no more than six breakers in the panel, these breakers may be used as the disconnecting means. When using more than six breakers, a main breaker is required in the panelboard. If you are running a single 15- or 20-ampere circuit from the house to feed a minimum number 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; it may be used only as a disconnect and cannot be used to control lights or other equipment. This disconnect must be labeled as the disconnect switch on its box cover. See *Detached Garage Supplied by a Three Wire Branch Circuit*.

3. Romex or NM-B may be used inside the garage. It must be drilled and inserted through the studs, not run on the face of them. Also, never drill through factory roof trusses, run the Romex or NM-B on the top edge in a location where it will not be damaged. Romex or NM-B cable is to be routed so it is not subject to physical damage.
4. All 125-volt, single-phase, 15- and 20-ampere receptacles installed in garages must be a Tamper-Resistant (TR) type and protected by a Ground Fault Circuit Interrupter (GFCI), including any receptacles for garage door openers or specific appliances. There are two forms of GFCI-protected devices. You may use a tamper-resistant receptacle-type, GFCI-protected device or a breaker-style GFCI protective device. Both devices are installed at the beginning of the circuit to be protected and several standard tamper-resistant outlets may be protected "downstream" by one GFCI outlet. See the manufacturer's instructions for details. On a GFCI, the line is the power in and the load is the power out to other receptacles. TR receptacles are designed with a "shutter" over the slots so only a standard cord cap (plug) can be inserted. Add-on plug covers are not acceptable.

Any receptacles on the exterior of the garage must be tamper-resistant (TR), GFCI-protected and Weather Resistant (WR). (There will be a "WR" visible on the face of the receptacle.)

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## DETACHED GARAGE SUPPLIED BY A THREE-WIRE BRANCH CIRCUIT

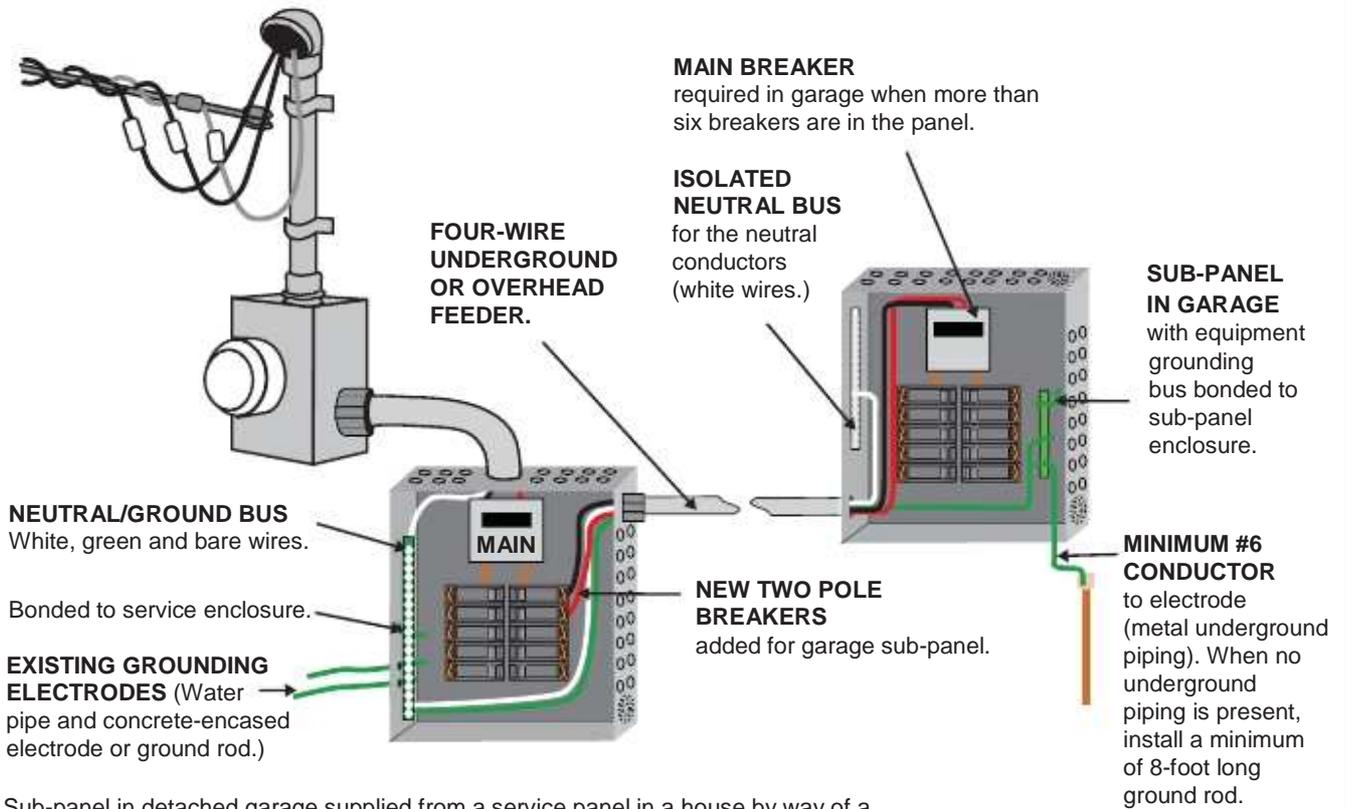


Detached garage supplied from a service panel in the house by way of a three-wire branch circuit: one hot (black), neutral/grounded (white) and equipment ground (bare copper or green) conductor. This is an economical way to wire a garage with UF cable buried a minimum of 24 inches deep or electrical PVC conduit buried 18 inches deep.

5. 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 *Detached Garage Supplied by a Three Wire Branch Circuit*. For feeders from the house to the garage, an eight-foot ground rod must be driven at the garage. A grounding conductor is required with the branch circuit or feeder. When a feeder or more than one circuit is supplying the garage, a grounding electrode is required at the garage. If there is no existing grounding electrode, (metal underground water pipe) a ground rod is required and is connected to the equipment grounds in the garage, see *Detached Garage Supplied by a Four Wire Feeder*. This ground rod may be driven right outside the garage with 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. The easiest method of protection is typically 1/2-inch PVC. The #6 wire must be attached to the grounding system for the electrical in the garage.

6. The minimum wiring required in a detached garage that has electricity would include a means to disconnect the power to the garage, switches at the service door to control a light inside the structure, and a light outside the garage service door. Vehicular (overhead) doors of a garage are exempt from any lighting requirements. A minimum of one GFCI-protected readily-accessible receptacle somewhere inside the garage is also required.

## DETACHED GARAGE SUPPLIED BY A FOUR-WIRE FEEDER



Sub-panel in detached garage supplied from a service panel in a house by way of a four-wire feeder: two hots (black), neutral (white) and a ground (bare copper or green).

## DETACHED GARAGE WIRING

