

# HOW-TO BOOKLET #3106

## CHIMES & DOORBELLS



### TOOL & MATERIAL CHECKLIST

- Chimes or Doorbell(s)
- 120-V Transformer
- Junction Box
- Electrician's Tape
- 12/3 or 14/3 Cable
- Continuity Tester and Voltage Meter
- Fish Tape
- Bell Wire
- Screwdrivers (Phillips/Standard)
- Wire Connectors
- Medium Grit Abrasive

*Read This Entire How-To Booklet for Specific Tools and Materials Not Noted in The Basics Listed Above.*

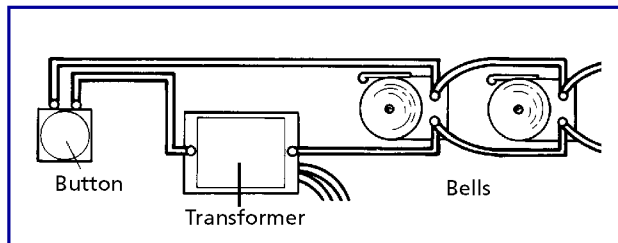
**NOTE:** *Replacement only doesn't need house wiring*

Doorbells, chimes, and buzzers operate on a low-voltage electrical system which usually requires 16 to 24 volts of power (sometimes a little more or a little less than this figure). The electricity is supplied by 120-volt housepower connected to a bell/chime transformer. The transformer reduces the 120-volt housepower load to the lower voltage figure.

Bell wire which you can buy in single insulated rolls is 18- or 20-gauge. Transformers are pre-wired for housepower connections. The connections are made in a junction box; the transformer usually is fastened directly to the junction box or alongside of it. Chimes and bells are also usually pre-wired, making wire connections easy directly to screw type terminals.

If you are installing a new system, replacing old chimes, buzzers, or bells with new sounding devices, or just repairing the system, you'll find the techniques very similar and extremely easy to do. The exception might be a new system where the bell wires have to be fished through walls, ceilings, and framing members; this can require lots and lots of patience.

If you are replacing old bells, buzzers, or chimes with new ones, it's just a matter of disconnecting the wires at the devices, removing them, and hooking up the new devices—almost without exception. Any difference will be noted in the manufacturer's instructions that are packaged with the units.



This How-To-Booklet is divided into three segments: repairing a doorbell/chime system; replacing parts; installing a new doorbell/chime system.

## REPAIRING THE SYSTEM

When the doorbell, chimes, or buzzer won't sound, one of four problems can exist. All are simple to solve. The problems, in order of "breakdown" are:

**Non-working bell buttons.** These buttons are located on the trim or siding of the house outdoors. They are attached with screws; the screws sometimes are hidden by a decorative escutcheon that snaps into place over the button assembly.

As you would guess, rain, snow, heat, and cold can play havoc with the button connections—usually in the form of metal corrosion. The procedure:

- 1 Remove the button from its mounting by backing out the screws. If the screws are hidden, try prying up with the tip of a standard screwdriver on the decorative escutcheon covering the button assembly. Easy does it. Don't damage the thin metal. Then remove the screws. This should expose the button terminals and the bell wires.
- 2 Remove the bell wires from the terminals. With sandpaper, clean away any corrosion

from the various parts. Then touch the wires together, holding them by the insulation. (Since the system is low-voltage you don't have to worry about electrical shock; however, it is recommended that you don't touch bare wires and that you disconnect the system from the power source when working at the transformer/housepower connection where higher voltage is present.)

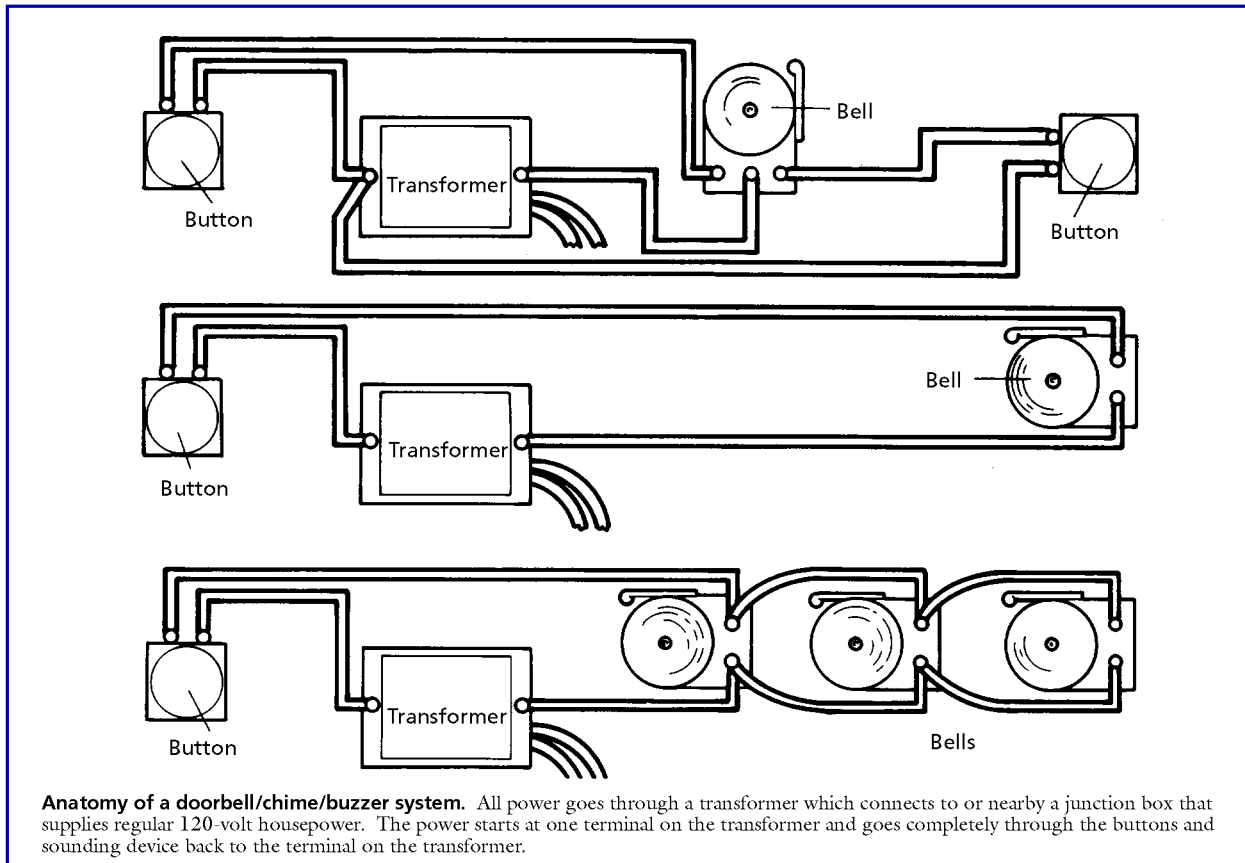
- 3 When the wires touch, the bell, chime, or buzzer should sound. If it DOES sound, the problem is in the button. Simply replace the old button with a new button and connect the bell wires to the terminals. If it does NOT sound, the problem is elsewhere. Read on to solve the mystery.

**Loose or disconnected wires** at the bell(s), chimes, or buzzer(s). Loose wires on terminals are not typically common. However, it can happen through sound vibration of the device. Check the bell wire at the terminals and retighten the terminals with a screwdriver. The terminals turn down clockwise.

As a suggestion, twist the bare bell wires together at the button so you don't have to keep running back and forth to test the system after you tighten terminals on the sounding device. If the device doesn't sound after this check, try this:

**Loose or disconnected wires** at the transformer. It isn't likely, but have a look. For safety, disconnect the housepower at the main service entrance. Then tighten or reconnect the bell wires to the transformer. Turn on the power. No noise? Go to the next step below:

**A transformer gone bad.** With a voltmeter, touch each terminals with the meter probes. If there is no reading, the transformer needs replacement. If you don't have a voltmeter, and with the power on, use a jumper wire to test the transformer. Be careful. To make a jumper wire, use a short length of No. 14 or No. 16 gauge single wire. Strip the



**Anatomy of a doorbell/chime/buzzer system.** All power goes through a transformer which connects to or nearby a junction box that supplies regular 120-volt housepower. The power starts at one terminal on the transformer and goes completely through the buttons and sounding device back to the terminal on the transformer.

insulation back about 3/4-inch on each end. Touch one bare end to a bell wire terminal and the other bare end to the other bell wire terminal. You should see a faint spark when you move the wire across one or the other terminal. If so, the transformer is okay. If not, the transformer will have to be replaced.

**If the system chimes** with a 2-button operator, and none of the above works, take the voltmeter and touch one probe to the terminal marked “front” on the chimes. Touch the other probe to the terminal marked “trans.” If the voltmeter has any reading at all, the chimes are bad and need replacement. If you don’t have a voltmeter, try hooking the chimes directly to the transformer. The chimes will ring if they are okay.

Should all of the above fail, the problem most likely is a broken bell wire somewhere in the system. Here, you’ll have to restring the wires; start with the transformer wire first, and then the button wires.

## REPLACING THE SYSTEM

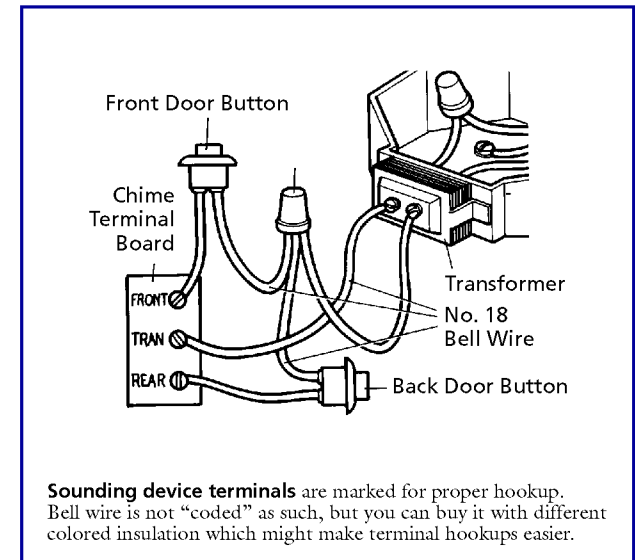
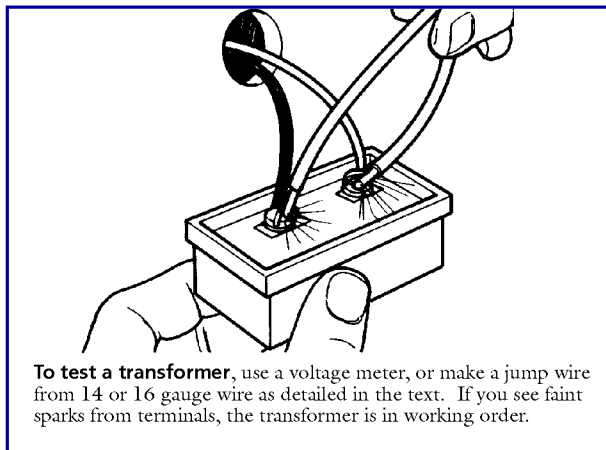
Replacing is easier than checking out the system for malfunction, as detailed above. Here, you will replace the buttons and the chimes, bells, or buzzer; you probably can use the old transformer and most certainly the bell wires with few exceptions. Just make sure that the new system you buy utilizes the same voltage as the old—read the markings on the equipment to be sure.

- 1 Remove the old chimes, buzzers, bells. Install the new products and fasten them in place. Tag the wires marked “front,” “back,” and “trans,” so you won’t mix the wires when reconnecting them.
- 2 Connect the tagged wires to the proper terminals.
- 3 Remove and disconnect the old bell buttons. Then install the new ones and connect them to the bell wires. Test the system. It should work perfectly.

## INSTALLING A NEW SYSTEM

The first step is to select a spot for the sounding device. It is recommended that you place it near the center of the house and mount it about 6 ft. above the floor. Do not mount the device above a heat source or on a door. Next, locate the power source. You will have to tap into it for power via the transformer to the sounding device and the door buttons. The power source can’t be switch-controlled.

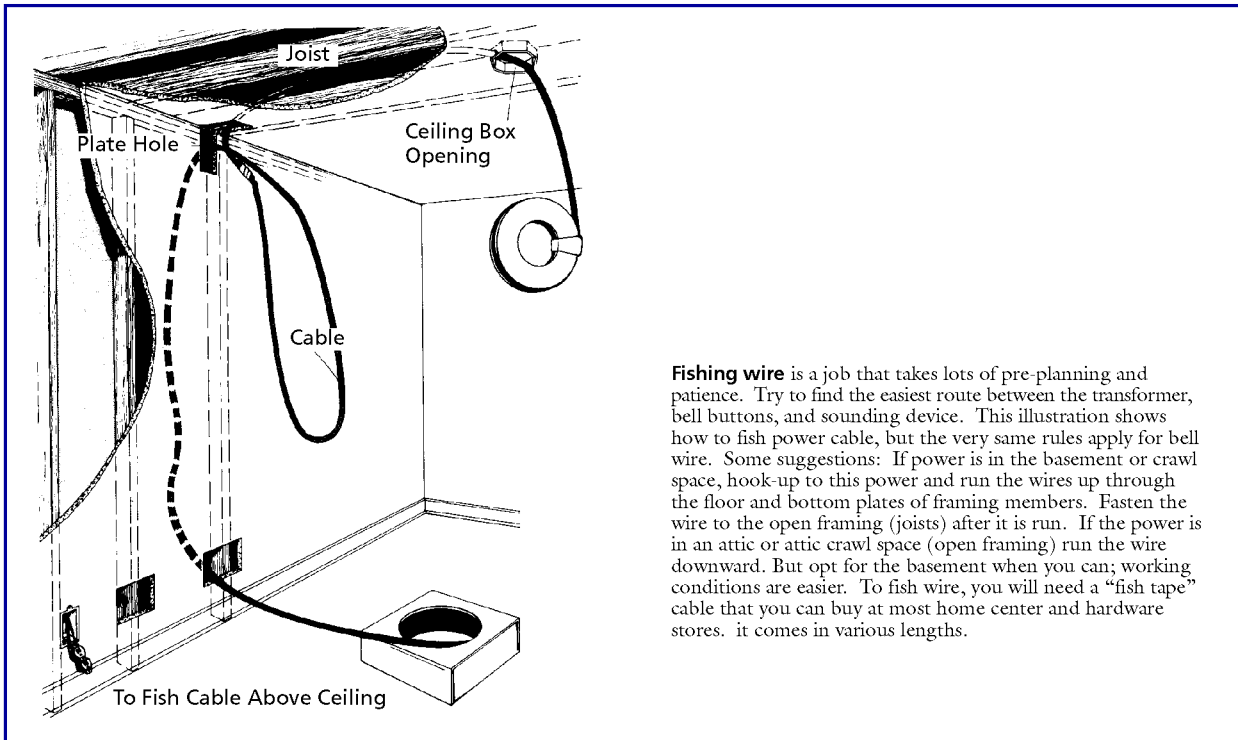
The transformer can be wired directly into a junction box in a basement or attic or above a dropped ceiling. Once the doorbell and transformer locations are determined, you can estimate the amount of bell wire you will need. Measure the entire distance in feet from the transformer to the sounding device and then from the device to each door button. Add an extra 15 feet to your measurement for connections and pathway turns. The wire you buy should be “low-voltage” that is rated at 300 volts. It probably will be designated as thermostat wire, a No. 20 or larger AGW rated wire, or an equivalent bell wire. The doorbell will dictate what size transformer is needed in amps and reduced voltage. This information usually is clearly marked by manufacturers on or in the packages.



**Mount the transformer first.** Determine which circuit feeds the outlet that you will mount the transformer on. Turn off the power to this circuit. Remove one of the knockouts in the junction box and mount the transformer according to the manufacturer’s instructions. The illustrations in this Booklet can serve as a guideline.

Usually, there will be two terminals on the outside of the transformer and two wires extending out from the transformer. The terminals are for bell wire. The wires are to be connected to the higher voltage circuit wires.

Pass the wires, which are not color-coded, through the knockout. Connect one of the high voltage wires to the black insulated cable wire in the junction box and the other high voltage wire to the white insulated cable. The order makes no difference. Use wire connectors for the connection and tape the wire connectors with electrician’s tape. Fasten the transformer to the junction box, or nearby, and replace the cover on the junction box.



**Fishing wire** is a job that takes lots of pre-planning and patience. Try to find the easiest route between the transformer, bell buttons, and sounding device. This illustration shows how to fish power cable, but the very same rules apply for bell wire. Some suggestions: If power is in the basement or crawl space, hook-up to this power and run the wires up through the floor and bottom plates of framing members. Fasten the wire to the open framing (joists) after it is run. If the power is in an attic or attic crawl space (open framing) run the wire downward. But opt for the basement when you can; working conditions are easier. To fish wire, you will need a “fish tape” cable that you can buy at most home center and hardware stores. It comes in various lengths.

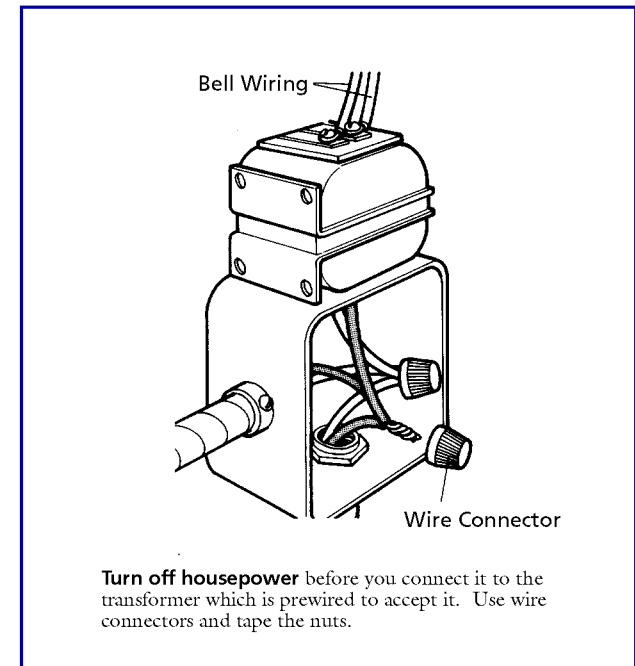
**Low voltage connections.** The instructions for wiring the bell may vary: follow them carefully. In essence, you will have three places from which you must run wire—the door buttons (front and back) and the sounding device.

**1** The Openings. Drill a 1/2-inch hole in the wall for the sounding device. Drill a 3/4-inch entry hole in the framing plate in order to run the wire to the transformer. Then create the openings for the door buttons. Measure up about 4 1/2-feet from the ground, or stoop, or porch and mark. Measure in about 4 inches from this mark. Otherwise, you will drill into the studs at the side of the door frame. Drill a 1/2-inch hole at this mark—or whatever size hole is needed for the door button. You will have to drill a 3/4-inch hole in

**2** Fishing bell wire is the hard part. This is where a plan comes in handy. Try to find or adapt a power source in a spot that makes wire fishing easier. For example, try to run the wire along open framing in the basement or attic. This way, the wiring will be up or down instead of having to wind through walls. The illustrations show wire fishing techniques for wire cable. The same applies for bell wire. The bell wires have to extend from the transformer to the sounding device, from the sounding device to the door

buttons, and from the door buttons to the transformer. You can use cable staples to staple the wires to wooden framing members. Space the staples about every 4 feet.

- 3** Transformer Hookup. Remove about 1/2-inch of insulation from the bell wires. Connect the wires to the transformer terminals as marked and tighten the terminal screws. Do the same for the wires at the door button and sounding device locations.
- 4** Finishing the Job. Mount the sounding device with the right kind of wall anchors—toggles or Molly anchors. Mount the door buttons with wood screws or screws and lead plugs in masonry. You will have to use a masonry drill to punch the holes for the lead plugs. Or use a small star drill. Wear eye protection.



**Turn off housepower** before you connect it to the transformer which is prewired to accept it. Use wire connectors and tape the nuts.