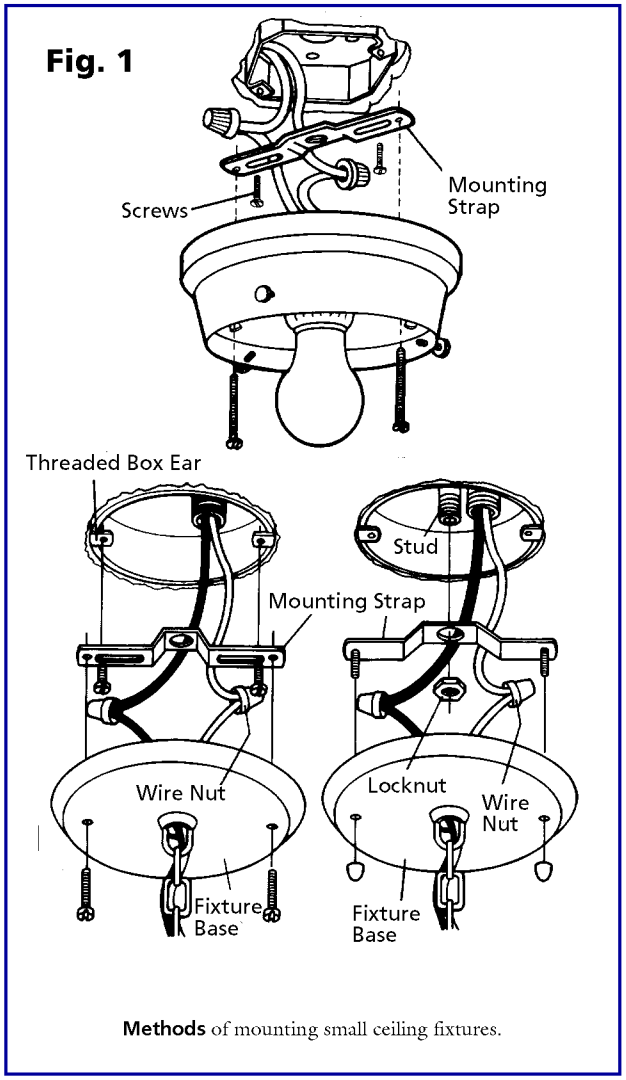
HOW-TO BOOKLET #3073

CEILING LIGHTING FIXTURES



Methods of mounting small ceiling fixtures.

TOOL & MATERIAL CHECKLIST

- ❑ Wire Stripper
- ❑ Drill
- ❑ Tape Measure
- ❑ Wire Cutter
- ❑ Hammer
- ❑ Adjustable Wrench
- ❑ Voltage Tester
- ❑ Snap Line
- ❑ Screwdriver
- ❑ Square
- ❑ Electrician's Tape
- ❑ Wire Connectors

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

The artificial lighting in your home falls into two categories: general lighting, which illuminates a room as a whole; and task lighting, which focuses on areas where you perform specific jobs. Task lighting, or local lighting, is needed over a kitchen sink, a chopping block, a range or cooktop, or above a desk or dining area.

Ceiling fixtures most commonly supply the general lighting in a home. If you wish to increase general lighting, you can add a central ceiling fixture. You may also select a hanging fixture designed in styles ranging from an elaborate chandelier to a simple industrial lamp. But, regardless of the ceiling fixture you select, the following simple rules of electricity must be followed:

- **Always work with the power turned off.**
- **The source is the panel, the load is the light.**
- **Always follow the National Electrical Code and local codes.**

THE POWER SOURCE

The power source for a new ceiling fixture is usually a ceiling junction or major box to which you have access in the attic. If there is no attic, power is normally drawn from an existing receptacle or outlet in the room in which the fixture is to hang.

Tapping into this existing power involves fishing cable from the power source to the ceiling boxes. This is explained in detail in How-To Booklet #3131: Extending Existing Wiring.

You can also create a new circuit for ceiling lights, and this could be easier than fishing for power. If you opt for a new circuit, we suggest that you run the cable from the main electrical service panel, make the necessary connections along the line, and then have a professional electrician inspect your work and make the power hookup at the main service panel.

SMALL CEILING FIXTURES

Examples of small close-to-ceiling fixtures used in homes are globe, open dish, and hanging light types. To install a new fixture of this type, proceed as follows:

1. Turn the power off at the source and remove the existing fixture or cover plate.

SAFETY NOTE: The service panel and circuit breaker is the power source NOT the switch!

2. Determine the hot and cold wires by color. Black or red is hot, white is neutral, and green or bare is ground.

NOTE: If the wires are not color-coded, test the wires with a wire tester. Ask your local retailer for details or call an electrician.

3. Attach the mounting strap to the ceiling box in one of two ways (**Fig. 1**). The more common way is to screw the strap into the corner tabs of the box. If the box is plastic, the strap must be grounded.
4. Wire the black and white wires to the respective leads with approved wire nuts. If the fixture is a metal one, run a short pigtail from the grounding screw to the grounding wire.
5. Thread the fixture nipple through the mounting strap. Fixtures not using a nipple to hold the fixture in place may skip to the next step.
6. Loop the wires into the box, place the fixture base over the nipple, and push flush to the ceiling. Thread the locknut or mounting nut over the nipple to hold the base secure to the ceiling. For fixtures that do not use a nipple, use long screws through the fixture base into the screw threads on the mounting strap.
7. Install light bulbs, turn on the power, and test the fixture by turning on the switch.

NOTE: Some fixture covers mount over the nipple and are secured with a finished cap nut against the glass dish or globe. Be careful not to overtighten and break the glass.

INSTALLING CHANDELIERS

A carefully selected chandelier adds charm to the decor of a room. Choose a contemporary or a traditional style to match the furniture, or mix elements to create an eclectic atmosphere. The trick in chandelier installation is to determine the amount of weight that the existing ceiling outlet box can support. Refer to the manufacturer's instructions regarding the support (in pounds) that the box must provide. The various types of outlet boxes are shown in **Fig. 2**.

To add support to a pancake box, install an extra screw through the plate and into the ceiling joist. A flange or bar box may require that you open up the area between the joists and shore up the bar feet or other side of the flange box with extra screws or blocking. Cut a new piece of wallboard to cover the open area around the box. On plaster ceilings you can still use wallboard to patch with a spacer between the joists and wallboard to make the patch the same level as the surrounding ceiling.

NOTE: For patching and texturing see How-To Booklets #3040: Patching Plaster or #3041: Drywall Joints.

The installation and wiring is basically the same as given for small ceiling fixtures.

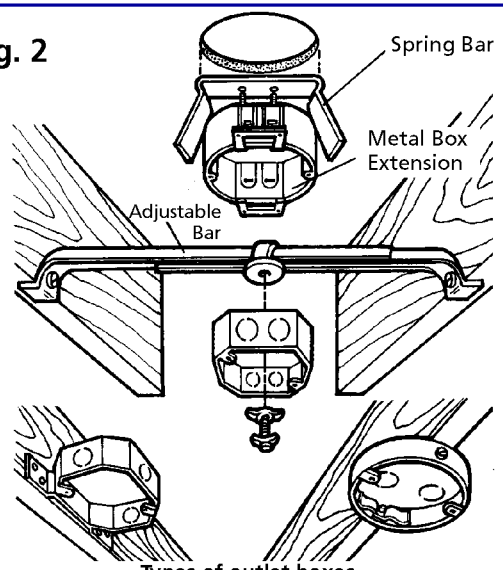
1. Remove the old fixture. Depending on the style of the fixture, remove the globe, light diffuser, and bulbs from the fixture. The canopy, escutcheon, or fixture base is held to the ceiling electrical box with a locknut or fixture bolts. Remove these fasteners; turn them counterclockwise. This will expose the contents of the ceiling box.
2. Disconnect the wiring. Have a helper hold the fixture while you disconnect the black and white wires from the fixture. If a helper isn't handy, you can make a hook support from a bent coat hanger to hold up the fixture. If there are more than two wires in the box, note the configuration and connections. The other wires could be switch and grounding wires.

If the fixture is held by a hickey and nipple or a nut and stud, unscrew these connectors, releasing the fixture.

3. Install a new fixture. Have a helper hold up the new fixture or support it with a coat hanger arrangement while you connect the fixture wires to the circuit wires. Most fixtures are prewired; remove 3/4" insulation from the wires for connection.

   Mate and twist the black wire of the fixture to the black wire of the circuit; do the same with the white wires and ground wires, if any. Use wire nuts and tape them.
4. Mount the fixture. The fixture is supported by mounting devices in or on the box (**Fig. 3**). A fixture between 10 to 20 pounds in weight is mounted on a hickey that is screwed to the stud in the box. The cap nut only secures the fixture base to the hickey; it doesn't hold the fixture up. A stud, hickey, and threaded adaptor are used to mount a heavy fixture of over 20 pounds. The necessary parts usually are packaged with the fixture.

Fig. 2



Types of outlet boxes.

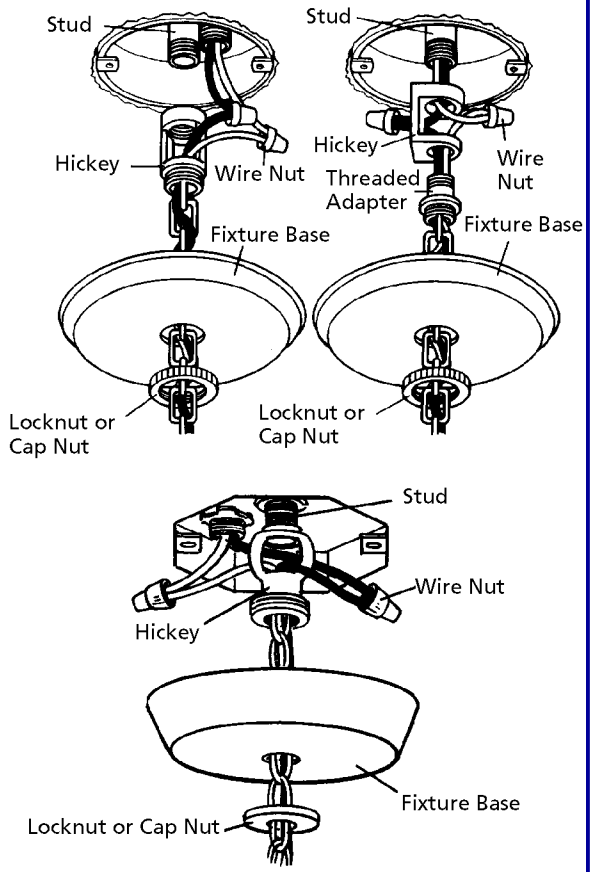


Fig. 3 **Methods** of mounting chandeliers.

PENDANT LIGHTS

Lightweight pendant or swagged fixtures offer several interesting installation arrangements depending on their style (**Fig. 4**). For example, an adjustable pendant has a separate hanging block so it doesn't have to hang directly below the canopy. Other types of pendant ceiling lights include coiled-cord or counterbalanced rise-and-fall pendants, which can be lowered to give low-level side lamp style illumination.

To install the wiring, follow the instructions for small close-to-ceiling fixtures.

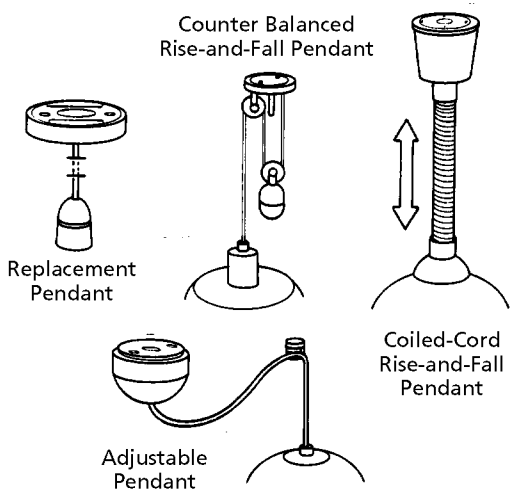
FLUORESCENT FIXTURES

Fluorescent lights are low wattage and very popular in kitchens or baths. You can also install them exposed or hidden with a valance or soffit to suit your needs (**Fig. 5**). They can also be ganged together or linked with cable to provide continuous strips or cluster of lighting.

The three main parts of a fluorescent fixture are a fluorescent tube (which may be straight or circular), a starter, and a ballast. There are also three types of fluorescent lamps: preheat, rapid-start, and instant-start. In the preheat type, the starter is separate from the ballast and is replaceable without removing the ballast. Rapid-start models have the starter built right into the ballast, and instant-start fixtures have no starter. While the latter lights are less common than the other types; they are distinguishable by the use of tubes with a single pin at each end.

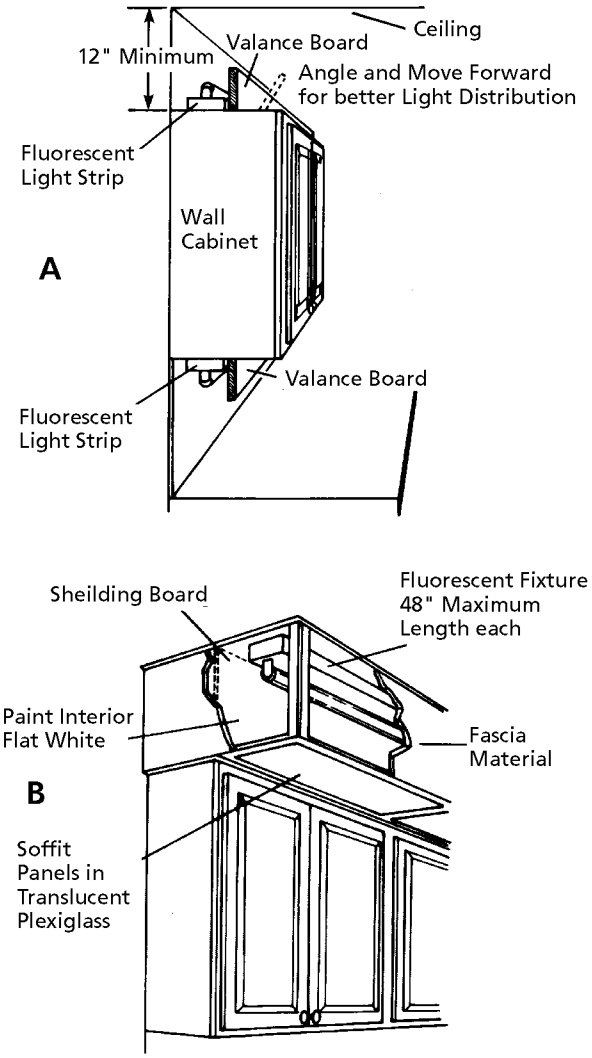
When installing or replacing a fluorescent fixture, you have several common designs to choose from.

Fig. 4



Various mounting arrangements for pendant lights.

Fig. 5



(**A**) Fluorescent tubes are shielded by valance boards above and below the cabinets. Angle the boards for better light distribution.

(**B**) An effective way of adding lighting to a work area. Placement in the soffit appears built-in; the diffuser creates even illumination.

Circular Fixtures (Fig. 6). In the center of the ceiling box, add a threaded stud, if one is not present. The fixture hangs on this stud. Add a reducing nut to the stud. Have a helper hold the fixture while you connect the power wires: black to black, white to white. Wire nut the splices and wrap them with electrician's tape.

Push the wires into the box, thread the nipple through the hole in the center of the fixture, and secure the fixture with a cap nut.

One-Tube Designs (Fig. 7). You will need a hickey and nipple if the box has a stud. If not, you can attach the fixture to a nipple and strap screwed to the ears in the box.

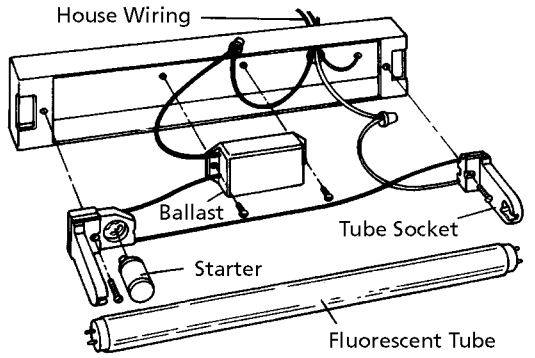
First splice the fixture wires to the house wires, wire nut the splices, and wrap the splices with plastic electrician's tape. Then attach the fixture to the ceiling box with the nipple, a washer, and a locknut.

Have a helper hold the fixture while you assemble and fasten it to the ceiling box. When the fixture is stable, drive a couple of sheet-metal screws through the fixture housing into the ceiling at each end.

Multi-Tube Models. Fixtures with more than two tubes usually have a center cutout that is used when hanging the fixture from an octagonal box. The fixture uses a stud, hickey, nipple, and a mounting strap inside the housing (**Fig. 8**). The assembly is held with a locknut. Connect the wiring with wire nuts. Then push the wires into the box and secure the fixture.

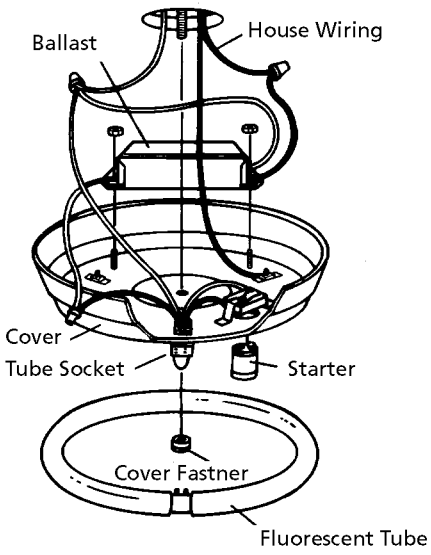
Sometimes new fluorescent fixtures will flutter or one or all lights will barely light. This is usually due to the tube not being properly installed. Check your specific instruction about replacing tubes. Pay particular attention to specifications about turning or twisting the tube into place to get the best connection.

Fig. 7



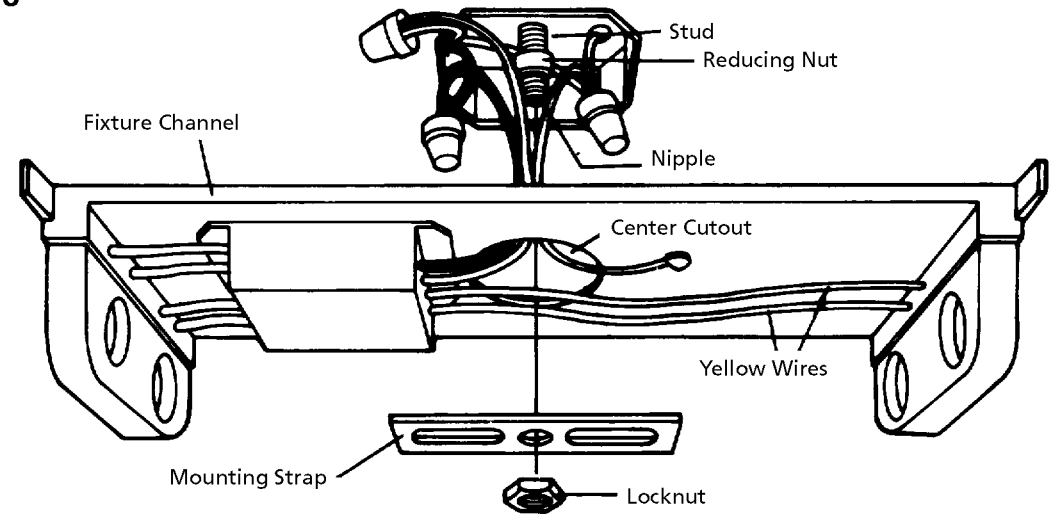
Wiring one tube preheat fluorescent fixture

Fig. 6



Wiring of circular fluorescent fixtures

Fig. 8



Wiring of multi-type rapid-start fixture