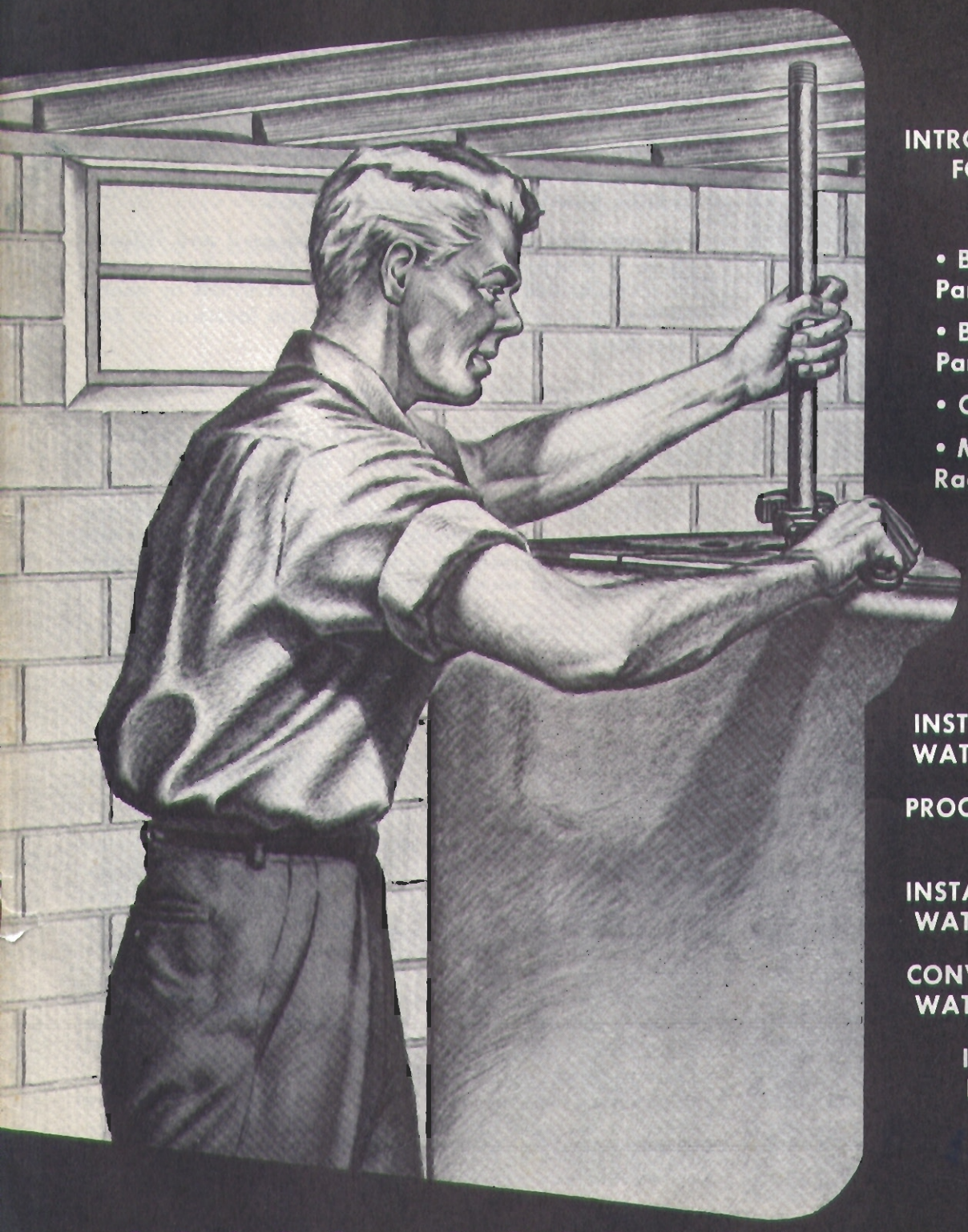
HOW TO INSTALL

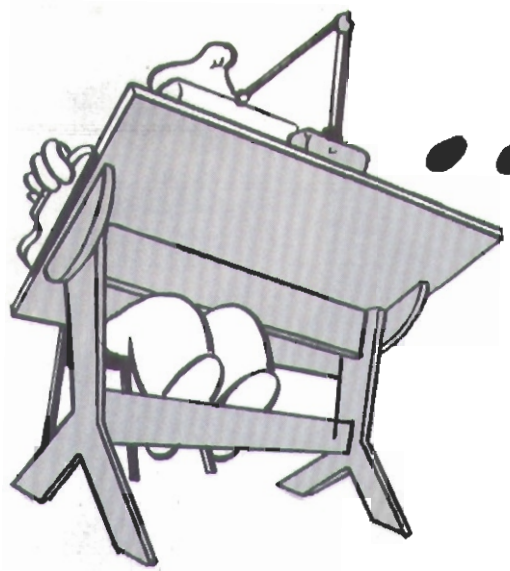
HOMART

HOT-WATER AND STEAM HEATING SYSTEMS

how to do it yourself FOR BETTER LIVING



SEARS, ROEBUCK AND CO.



....Sears C

HAVE MADE IT

CONTENTS

YOUR FREE SEARS PLAN

The installation plan you have received is similar to the one shown in *figure 1;* but it is drawn to scale from the sketches you made for us . . . tailored exactly to your home. *Pages 4 to 9* show typical installation plans, and the finished installations made according to them. These illustrations will help you understand *your plan* and visualize how your installation will look.

You will find *your plan* very easy to read and follow. There is a separate layout for each floor where rooms are to be heated. The rooms are all identified by name, the boiler is drawn in its approximate location — and everything is drawn to scale.

HOW TO READ YOUR PLAN

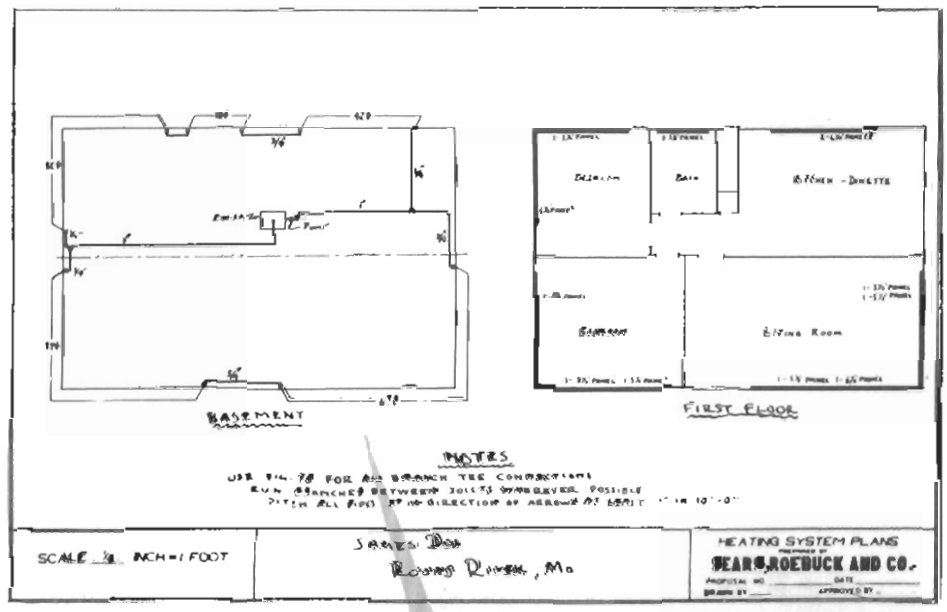
The piping layout *(fig. 2)* shows the location of the boiler and all the piping and fittings that make up the mains and branches to the radiation units. Special details are included to cover any special connections that are peculiar to your installation. A note on *your plan* will refer you to illustrations in this book that are applicable to your system.

The size (inside diameter) of each line of piping is indicated in inches *(such as 3/4")* alongside it. Although the fittings are not specifically named or sized, they can be identified easily from *your plan.* You can tell by the way the pipes come together what kind of fittings are required at each connection. They are sized according to the sizes of the pipes they join, as shown on the illustration.

The first-floor layout (and second-floor, if used) shows the locations of all radiation units in the various rooms. For radiant panel installations, this layout will tell you the number and lengths of panels required at each location — for example: *One 5 1/2′ panel and one 6 1/2′ panel.* The panel lengths do not include the fittings needed to connect them together. An extra six inches must be added to each end and between each pair of panels in a row. Sears consultants have taken this into consideration when planning *your installation.* If you intend to place panels in any location other than shown on *your plan,* make sure there is enough room for the panels *and the fittings.* Convector panels are indicated by total length of finned core required — such as: *BB Conv. 16′.*

onsultants

EASY FOR YOU



TYPICAL CUSTOMER'S PLAN

Figure 1

If your installation calls for cast-iron radiators, they will be specified by a series of three numbers at each location. The first number is the number of sections in the radiator; the second is the height of the radiator from the floor to its top; and the last is the number of tubes in each section. A radiator that is shown as 16-25-6, for example, is 16 sections long, 25 inches high, and 6 tubes wide. See *figure 29.* This code makes it easy for you to place the correct radiator at each location.

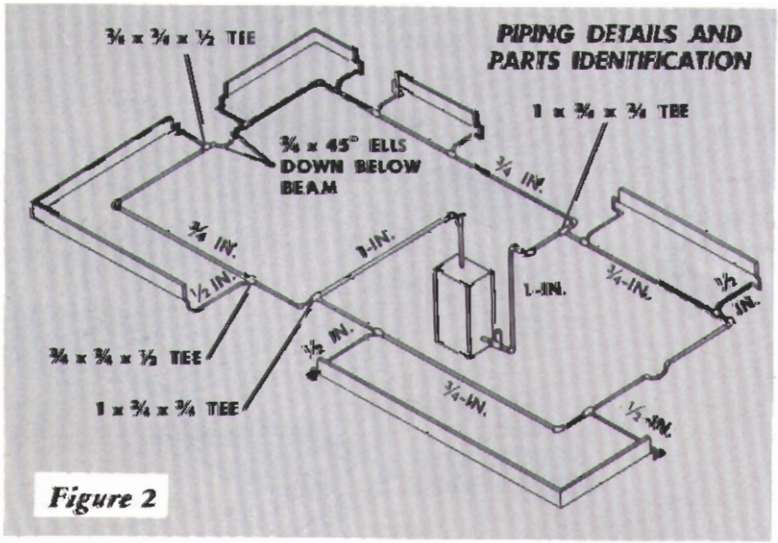


Figure 2

The symbol (□) appears on your piping layout where each radiation group is to be located. With it (in square feet of effective radiation area) is the amount of radiation that each unit provides. Many building codes require this data on approved plans, although you will never need to use it.

The arrows alongside the pipes in the mains indicate the direction in which the pipes must be pitched *up* to insure proper circulation.

A layout of the boiler connections, and details of all special equipment used with the boiler, is included in the instruction book supplied with the boiler. Typical connections for most boiler installations are shown in this book on *p. 21.*

YOUR FREE SEARS PLAN (cont.)

TYPICAL FORCED HOT-WATER

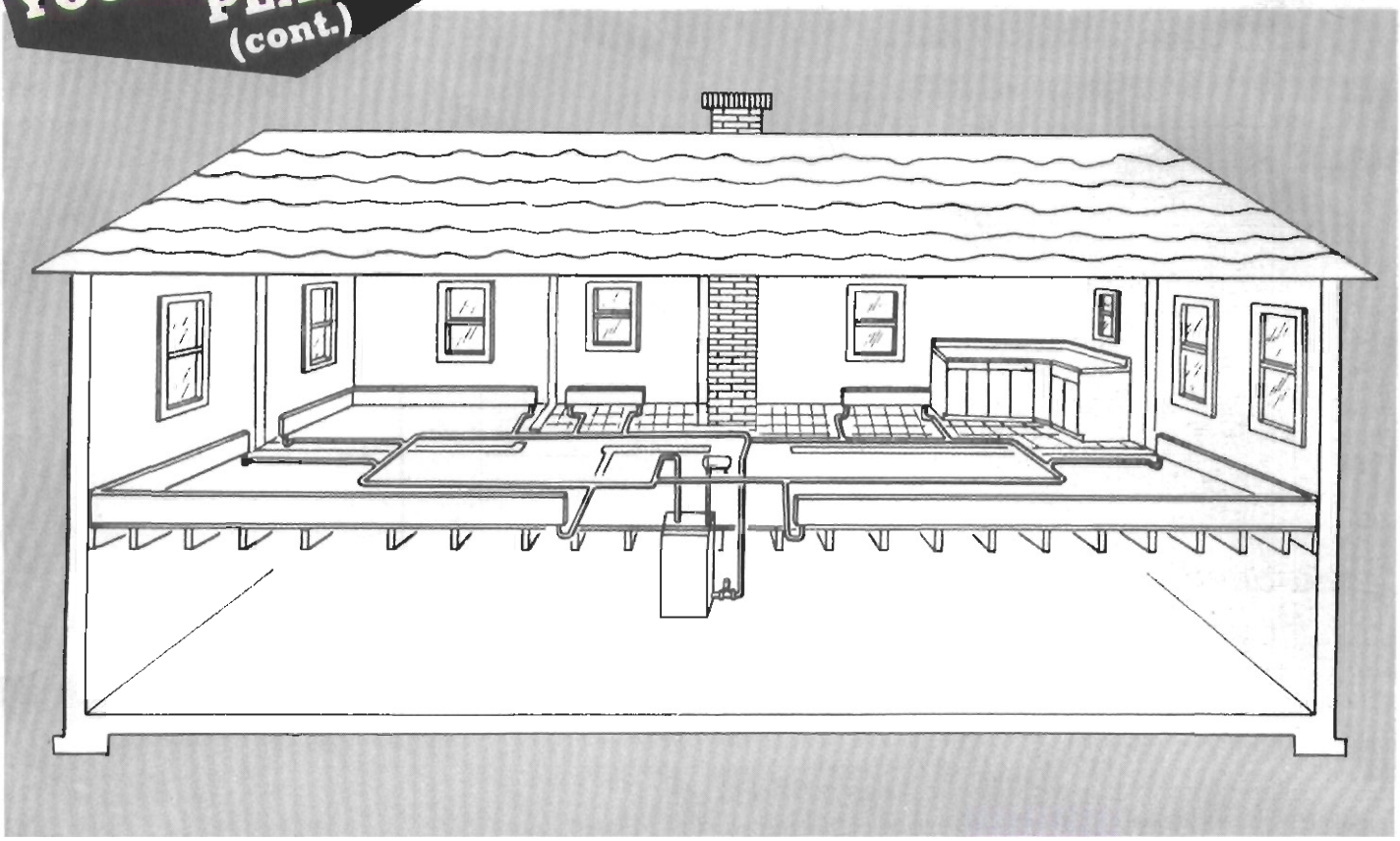
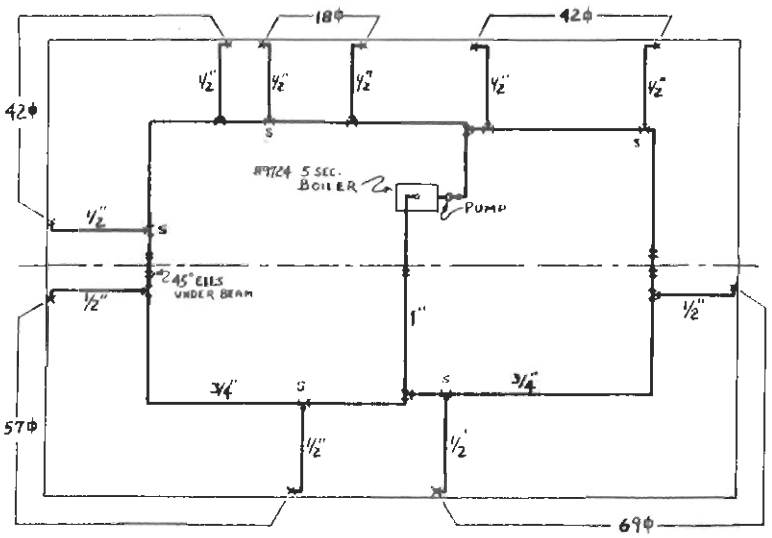
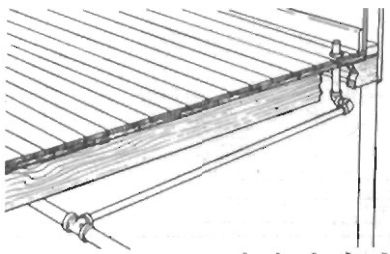


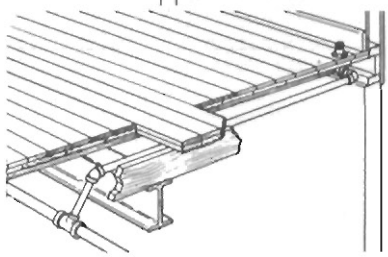
Figure 3



PLAN No. A
ONE-PIPE SYSTEM
BASEMENT INSTALLATION



BRANCH PIPES BELOW JOISTS



BRANCH PIPES BETWEEN JOISTS

The plan and installation drawing shown here represent a typical treatment only. Individual problems will vary the treatment. For correct details *always refer to your own special plan.*

SYSTEM INSTALLATION PLANS

Easy to Follow

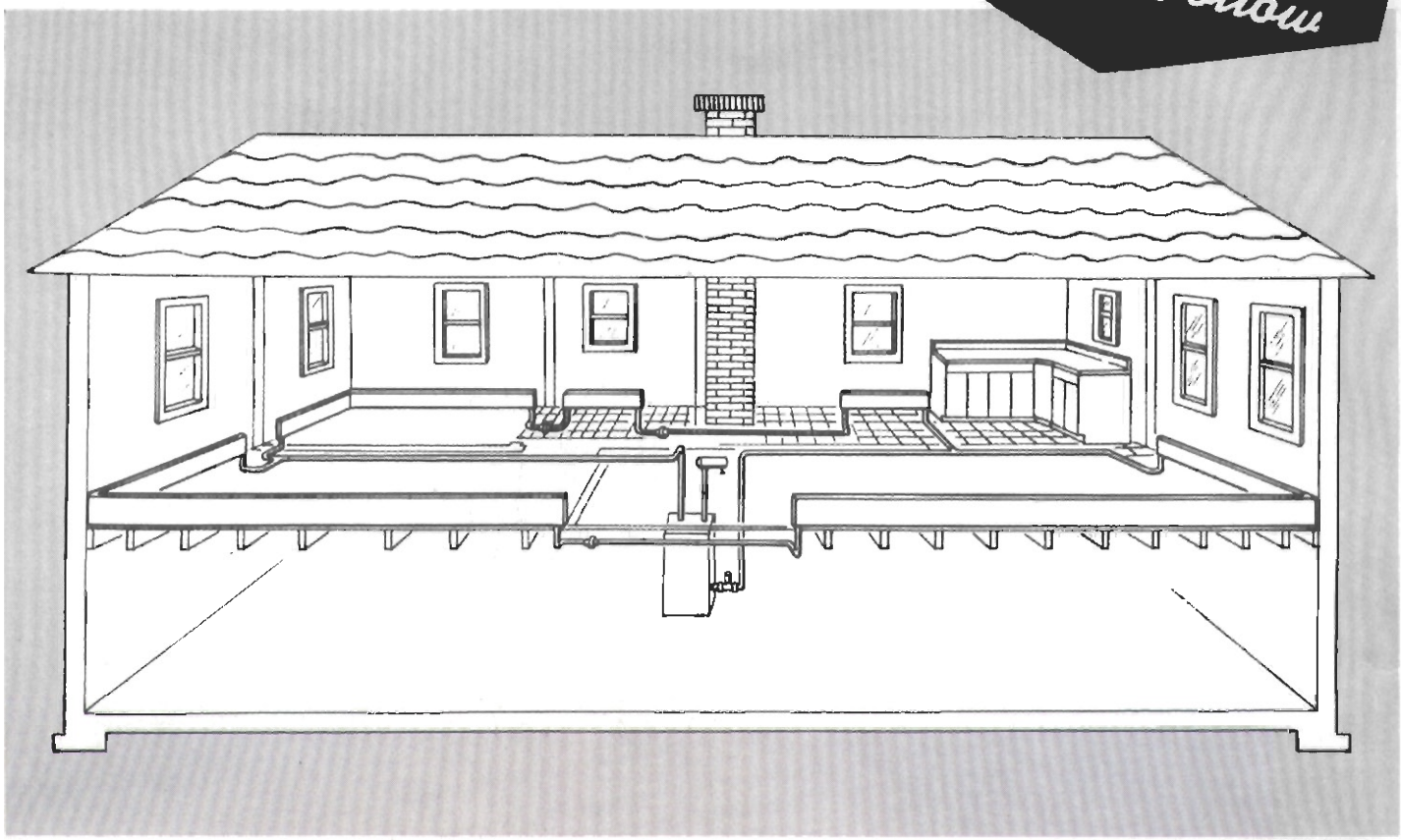
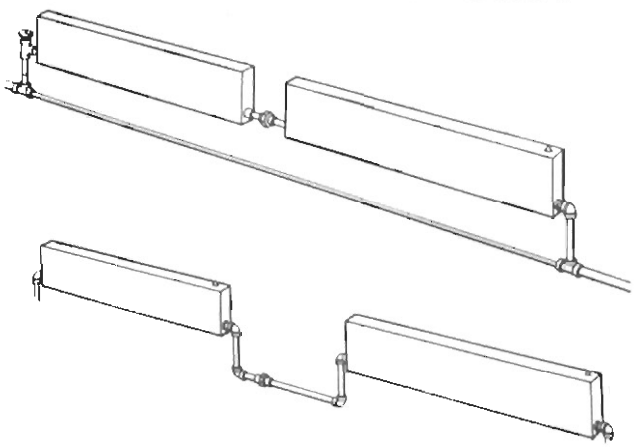
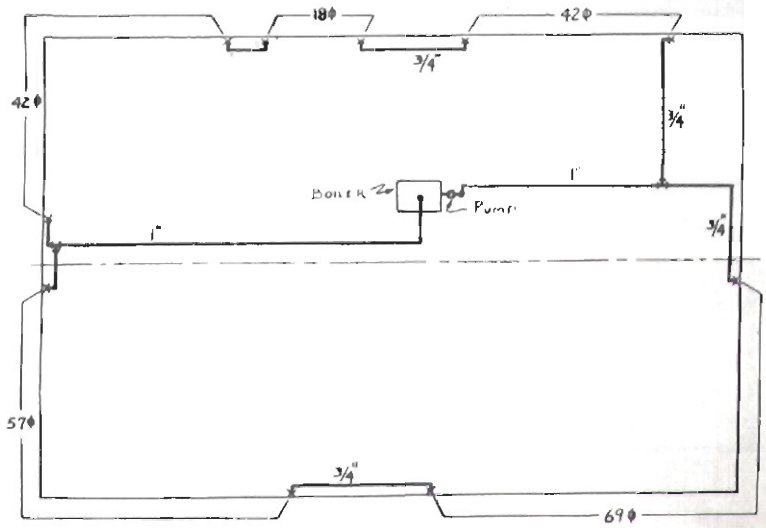


Figure 4

PLAN No. B
SERIES-LOOP SYSTEM
BASEMENT INSTALLATION

TYPICAL SERIES-LOOP RADIATION UNIT CONNECTIONS





The plan and installation drawing shown here represent a typical treatment only. Individual problems will vary the treatment. For correct details *always refer to your own special plan.*

YOUR FREE SEARS PLAN (cont.)

TYPICAL FORCED HOT-WATE

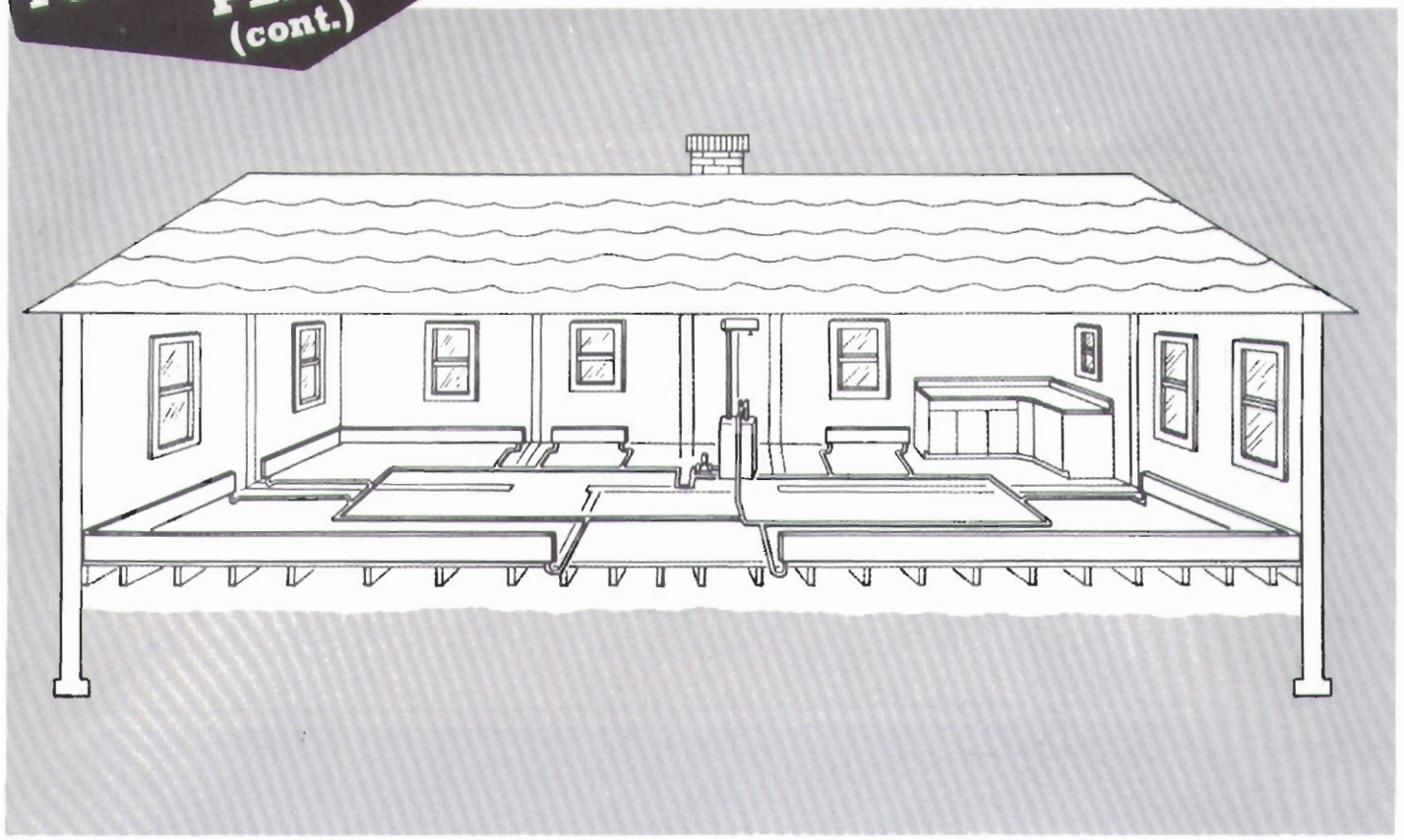
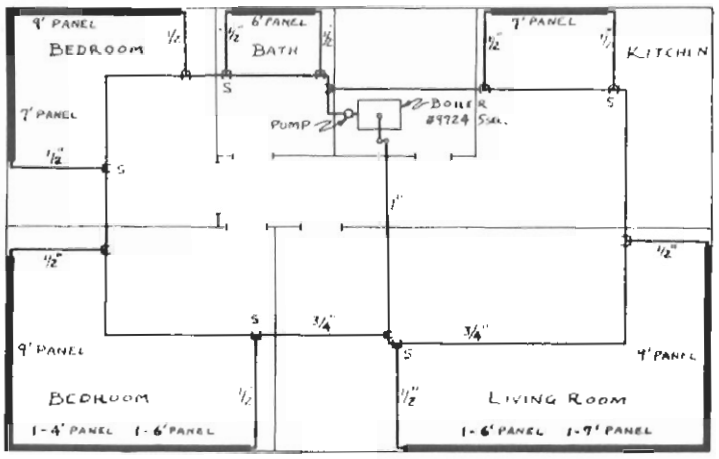
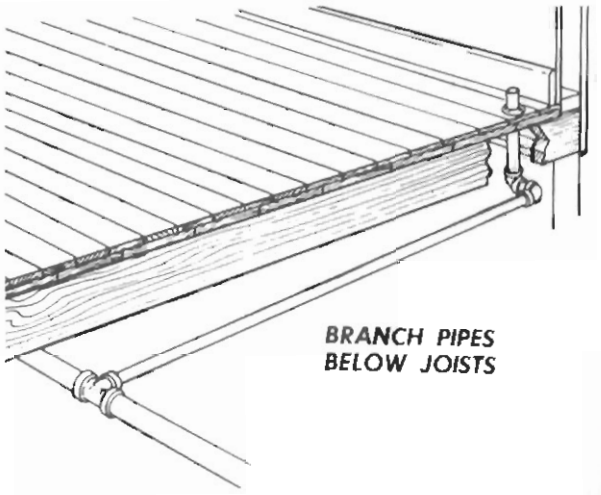


Figure 5



PLAN No. C

ONE-PIPE CRAWL-SPACE SYSTEM
UTILITY-ROOM INSTALLATION



The plan and installation drawing shown here represent a typical treatment only. Individual problems will vary the treatment. For correct details *always refer to your own special plan.*

SYSTEM INSTALLATION PLANS

Easy to Follow

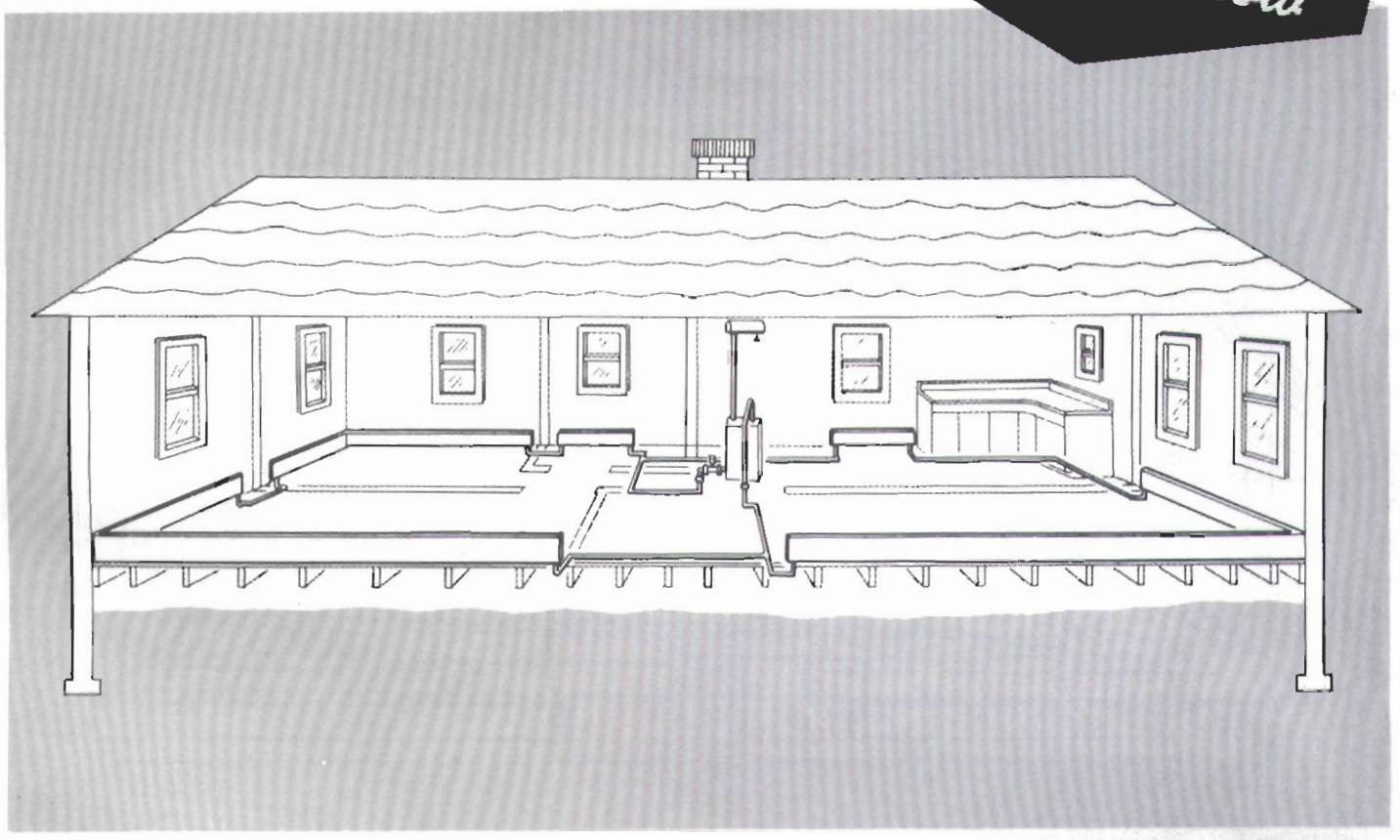
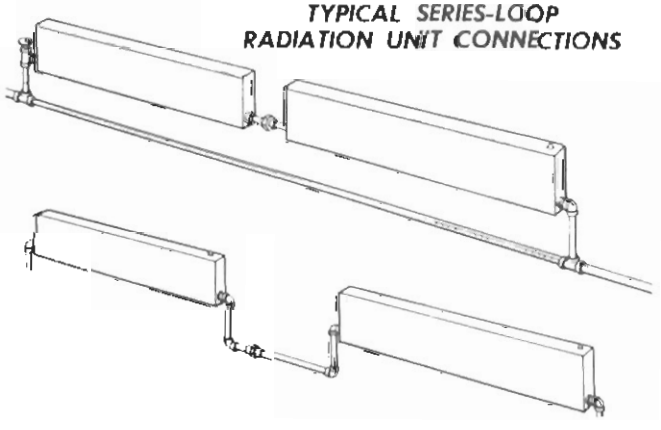


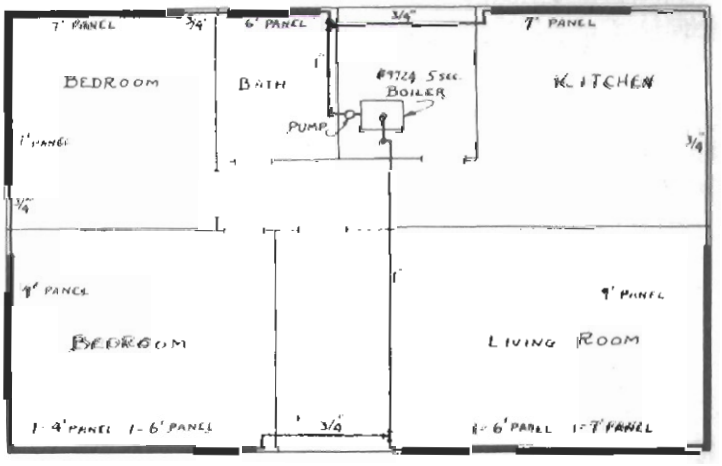
Figure 6

PLAN No. D

SERIES-LOOP CRAWL-SPACE SYSTEM
UTILITY-ROOM INSTALLATION



TYPICAL SERIES-LOOP RADIATION UNIT CONNECTIONS



The plan and installation drawing shown here represent a typical treatment only. Individual problems will vary the treatment. For correct details *always refer to your own special plan.*

YOUR FREE SEARS PLAN (cont.)

TYPICAL FORCED HOT-WATE

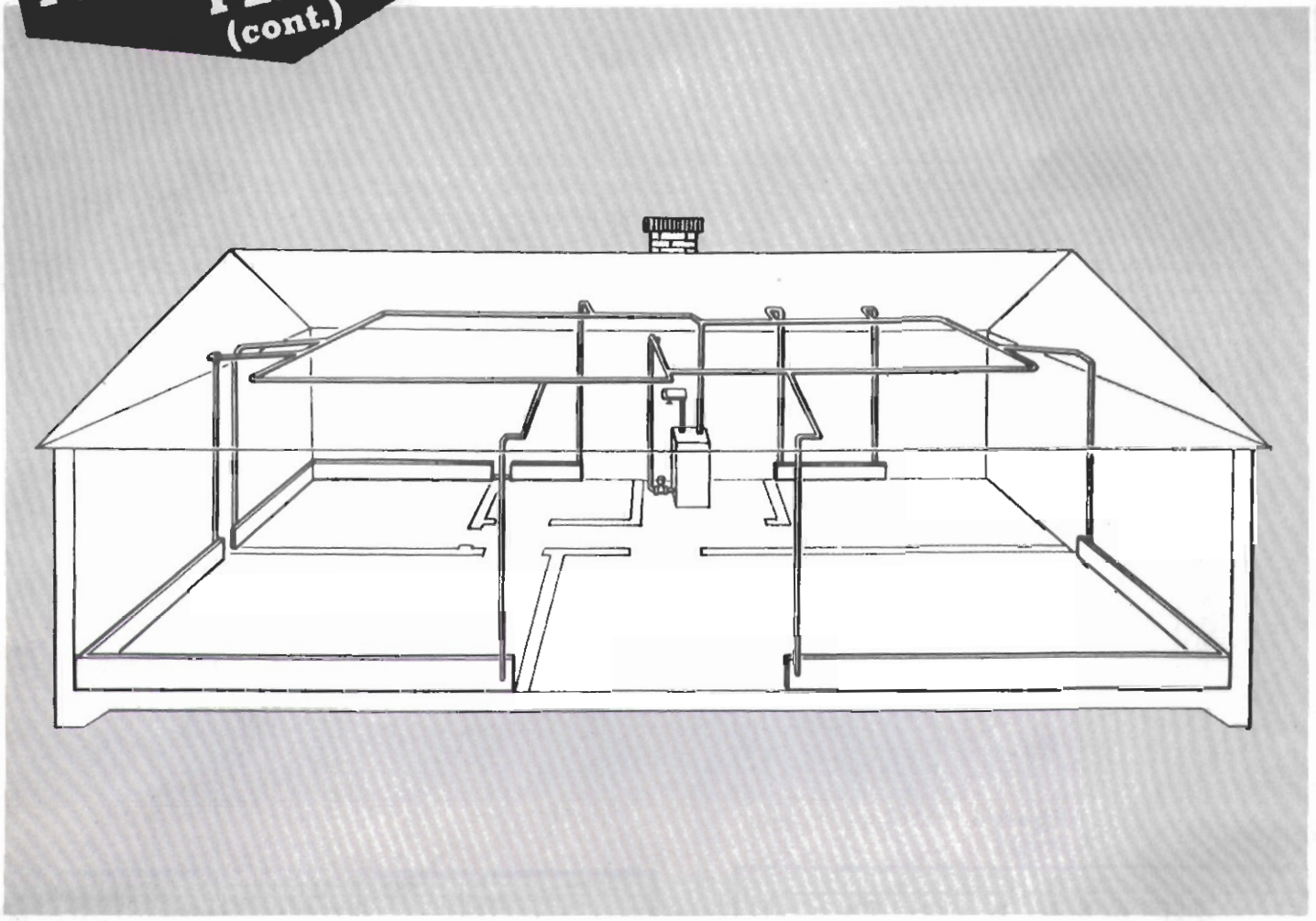
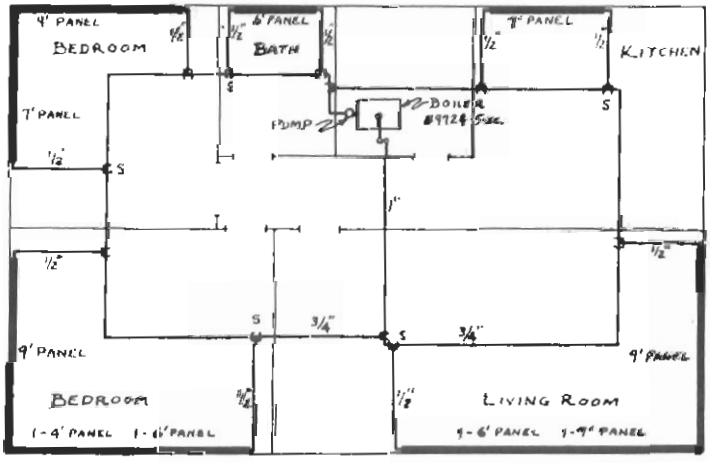
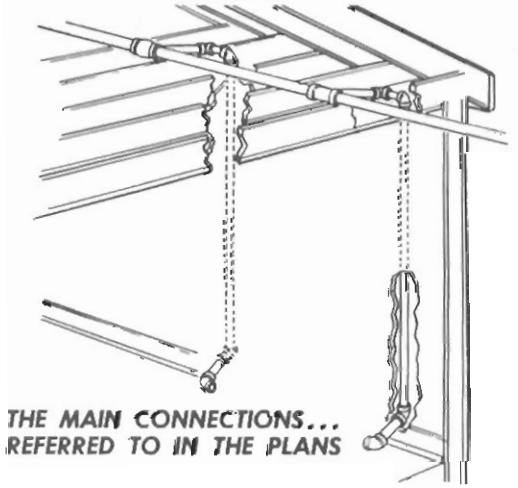


Figure 7



PLAN No. E

ONE-PIPE ATTIC SYSTEM
UTILITY-ROOM INSTALLATION



THE MAIN CONNECTIONS... REFERRED TO IN THE PLANS

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SYSTEM INSTALLATION PLANS

Easy to Follow

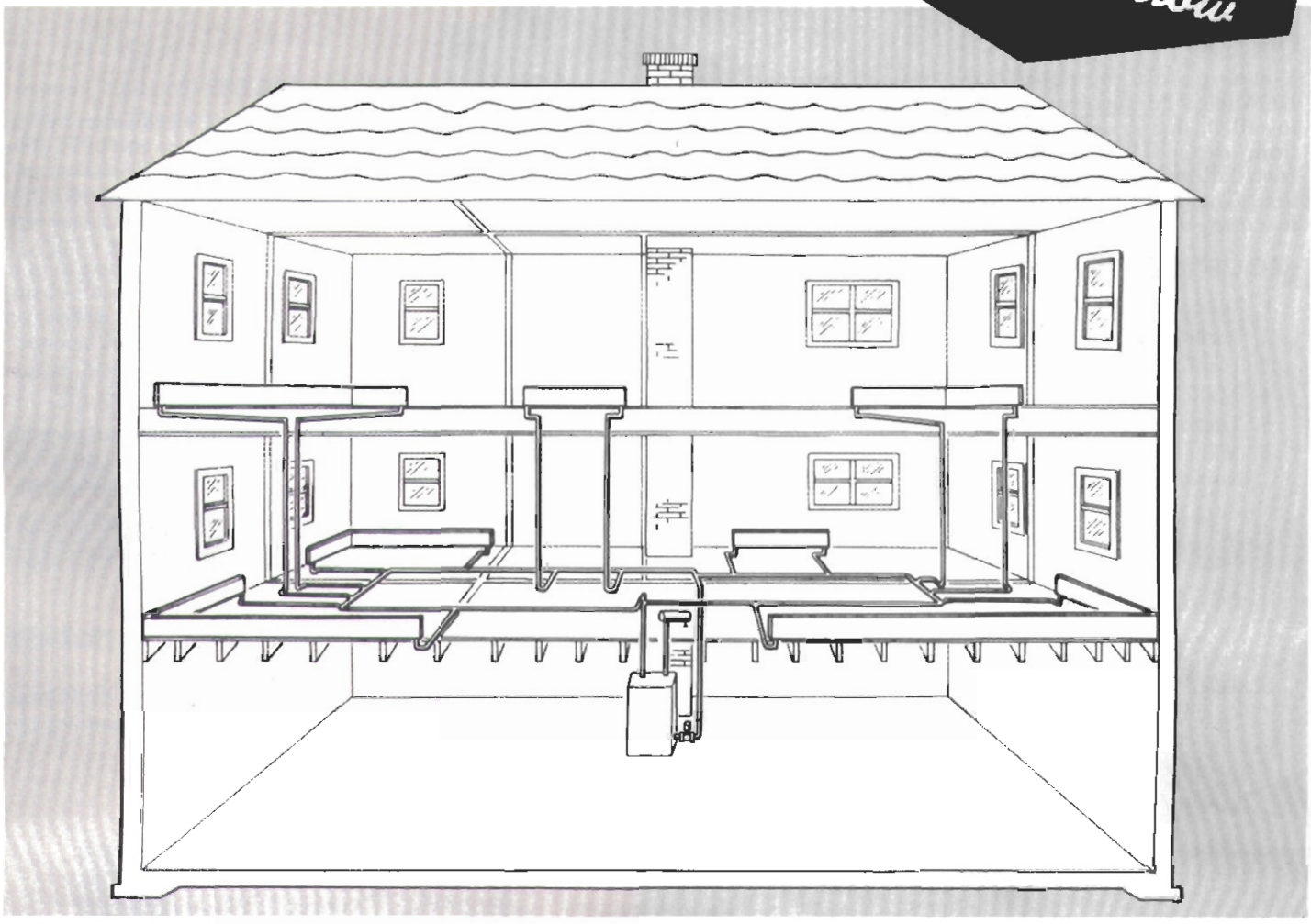
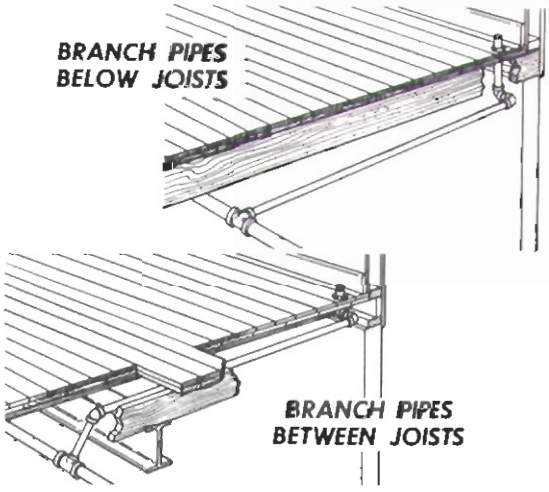
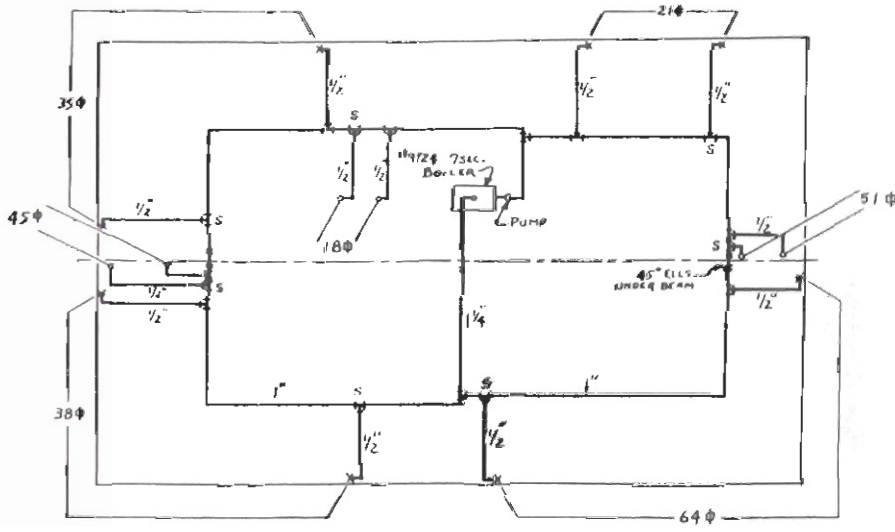


Figure 8

PLAN No. F

ONE-PIPE TWO-STORY SYSTEM
BASEMENT INSTALLATION





The plan and installation drawing shown here represent a typical treatment only. Individual problems will vary the treatment. For correct details *always refer to your own special plan.*

FIRST OF ALL . . .

You have the highest quality materials in your new Sears HOMART Forced Hot Water Heating System. Properly installed, this system will give years of heating satisfaction, dependable service and economical operation. Installation will be easier if you read this book carefully first. The detailed instructions for these seven steps in installing your system give practical help and advice.

SEQUENCE OF STEPS

1. Identify and check parts
2. Install radiation units
3. Install boiler and smoke pipe
4. Make boiler connections
5. Install piping
6. Wire controls (covered in burner instruction booklet)
7. Operate and check-out your system

Because installations differ, specific detailed instructions for your particular plan can't, of course, be included. For that reason, this book covers all types of installations. The following pages give the installation steps and other information you will need to install your Forced Hot Water System (other systems are at the back). Refer to the instruction book shipped with the boiler for details of the controls and other special parts. Methods of joining various kinds of pipe and fittings are given on pages 30-33.

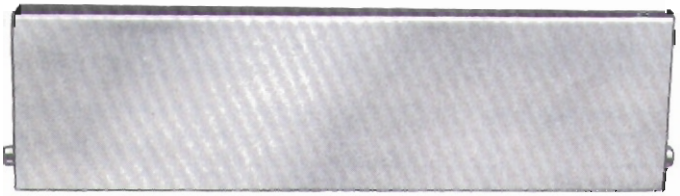
WHEN YOUR SHIPMENT ARRIVES

It is important that you check your shipment of parts as soon as possible. Check the shipping list to see if all boxes and crates are included. Examine unboxed or un-

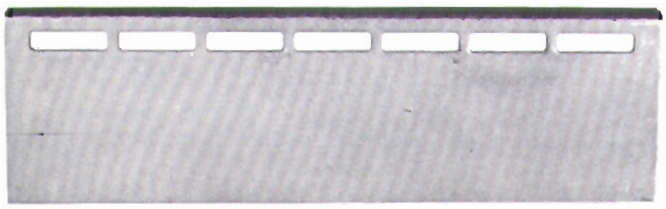
PARTS

RADIATION UNITS AND FITTINGS

The parts illustrated here are for various types of systems. Your plan (p. 2) will show exactly which parts you will receive and where



RADIANT PANELS IN LENGTHS:
3½ FT. (NO. 8719); 5½ FT. (NO. 8720);
6½ FT. (NO. 8721); AND 8½ FT. (NO. 8722)



FRONT VIEW • RADIANT-FIN
PANELS IN LENGTHS: 2½ FT. (No. 8714);
3½ FT. (No. 8715); 4½ FT. (No. 8716); AND 6½ FT. (No. 8717)

BACK VIEW

(May be used with radiant-fin panels)

RIGHT END COVER (No. 8728)
LEFT END COVER (No. 8727)
NOT SHOWN

SPACER PLATES IN LENGTHS:
8 IN. (NO. 8724); 16 IN. (NO. 8725);
AND 30 IN. (NO. 8726)

INSIDE (NO. 8730) AND
OUTSIDE (NO. 8729) CORNERS

(Used also with radiant-fin panels)

HANGER CLIP
NO. 8723

SPACER PLATE
6 IN. (No. 8713)

LEFT END COVER (No. 8711)
RIGHT END COVER (No. 8712)
NOT SHOWN

LEG
No. 8718

FIGURE 9

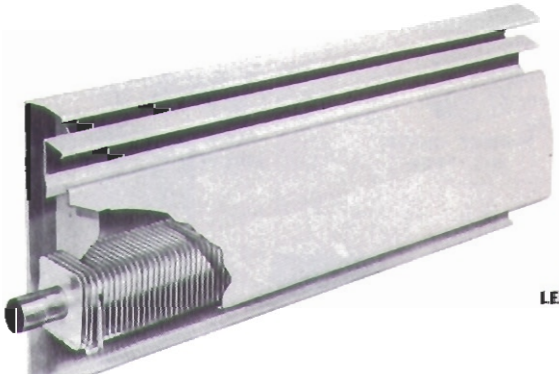
crated material and any received in broken boxes or crates. If there are missing or damaged items, have your freight agent note this on your copy of the freight bill over his signature—before accepting the shipment. Should you find damaged parts or shortages when you unpack the shipment after accepting it, report it immediately to the freight company. Ask them to call and make an inspection before you use any of the parts.

In any event, send us both the freight bill and inspection report, and we will send replacement materials. But we must have the signed inspection report to prove the freight company's liability.

Unpack your shipment carefully. Examine any excelsior or paper filler for small parts. Prior to use, store parts where they can't be damaged.

IDENTIFICATION

each is to be located. The illustrations and descriptions will help you identify the parts. *No one installation ever uses all of the parts shown here.*

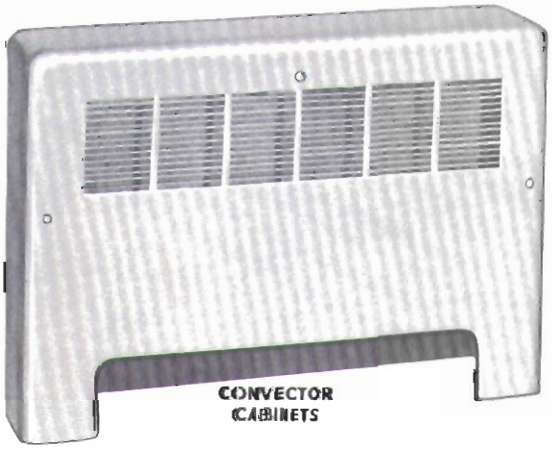


CONVECTOR PANEL ASSEMBLIES IN LENGTHS — INCLUDES 3 SPLICE PLATES AND COUPLING: 3 FT. (NO. 8756); 4½ FT. (NO. 8757); 6 FT. (NO. 8758) 3 FT. CABINET ONLY (NO. 8759)

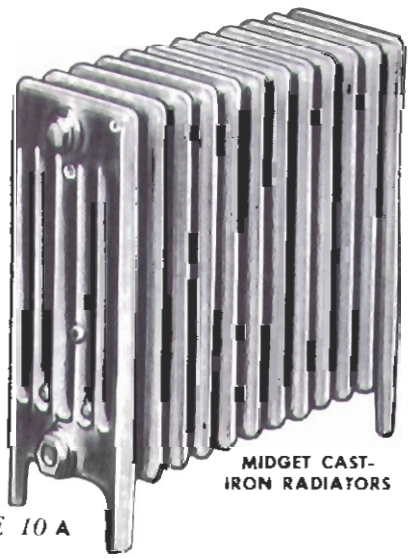
RIGHT (NO. 8761) AND LEFT (NO. 8762) END COVER

WALL TRIM NO. 8760

OUTSIDE CORNER (NO. 8763)



CONVECTOR CABINETS



MIDGET CAST-IRON RADIATORS

FIGURE 10 A

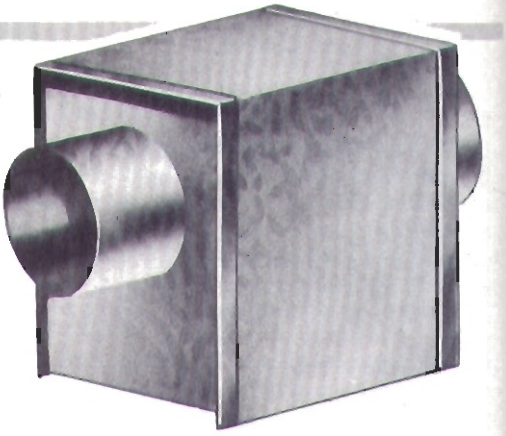
FORCED HOT-WATER SYSTEM PARTS (Cont.)

SMOKE PIPE

DRAWBAND
NO. 8906

PIPE SECTION
NOS. 8900-32

DRAFT DIVERTER
NO. 8917



DRAFT DIVERTER
NO. 8996

AUTOMATIC
DRAFT REGULATOR
No. 9148

90° ELBOW
NOS. 8902-31

45° ELBOW
NOS. 8901-30

THIMBLE
NO. 89/210

IRON PIPE AND FITTINGS

SCOOP TEE
NO. 8622

PLAIN TEE
NO. 1113

UNION
NO. 1266

FLANGE UNION
NO. 1124

FLOW CONTROL
VALVE NO. 8811

UNION ELBOW
NO. 8866

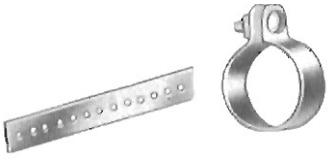
90° ELBOW
NO. 1110

45° ELBOW
NO. 1111

REDUCING
ELBOW
NO. 1112

COUPLING
NO. 1274

BUSHING
NO. 1256



HANGERS
AND STRAPS

NIPPLES

PIPE

FIGURE 10B

COPPER TUBING AND FITTINGS

90° ELBOW NO. 1643

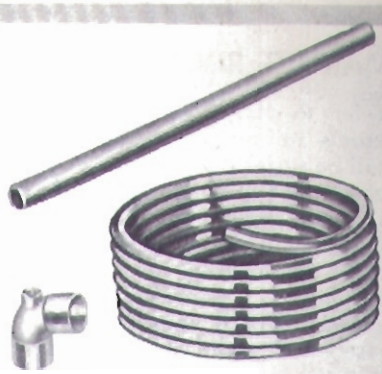
90° STREET ELBOW (Copper to copper) NO. 1658

45° ELBOW NO. 1644

90° ELBOW (Copper to female iron pipe) NO. 1623

TEE No. 1645

COUPLING NO. 1642



COPPER TUBING

FITTING ADAPTER (Copper to female iron pipe) NO. 1629

UNION (Copper to copper) NO. 1608

FLUSH BUSHING NO. 1617

ADAPTER (Copper to iron pipe) NO. 1646

ADAPTER (Copper to female iron pipe) NO. 1626

VENT ELBOW NO. 1657

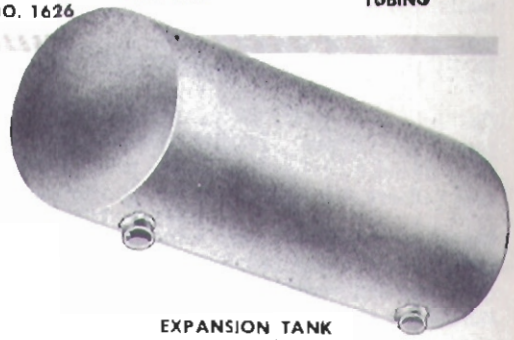
SYSTEM SPECIALTIES

MAIN AIR VENT No. 8865

AUTOMATIC AIR VENT (CONVECTOR) No. 8862

AIR ELIMINATOR FITTING No. 8817

AUTOMATIC AIR VENT (RADIANT PANEL) No. 8870



EXPANSION TANK No. R31/88

MANUAL AIR VENT No. 8863 AND KEY No. 8864

FLOOR AND CEILING PLATES No. 8869

RADIATOR VALVE (Iron pipe) NO. 8867 (Copper) NO. 8850

DRAIN COCK NO. 1730

STOP COCK NO. 1758

TANK DRAIN FITTING No. 8842

CIRCULATOR No. 8808

AUTOMATIC FILL VALVE No. 8841

AIR TRAP FITTING No. 8823

RELIEF VALVE No. 8840

STEAM SYSTEM PARTS

STEAM RELIEF VALVE NO. 8836

MAIN AIR VENT NOS. 8827 & 8899

RADIATOR AIR VENT NOS. 8810 & 8898

RADIATOR VALVE NO. 8868

ECCENTRIC REDUCER NO. R 11/23

FIGURE 10 C

Installation Procedures —

INSTALLING BASEBOARD RADIANT AND RADIANT-FIN PANELS

MAKING READY

Refer to *your plan* and distribute the various length panels among the rooms as indicated. The entire job will be easier if you install the panels in *all* rooms before starting on the piping. HOMART baseboard panels are designed to fit against the finished plaster and above the finished floor. If you have a house under construction, make the heating installation after the plastering and flooring are completed but before the wood baseboards are installed. If your house is older, remove the wood baseboard along the walls in each room where *your plan* shows a panel. Try not to damage the wood baseboard as short lengths will be needed to finish the walls. Do *not* attempt to recess the panels in the plaster.

PREPARING THE PANELS

Arrange the panels in each room exactly as shown on *your plan.* Trace the direction of water flow through each panel by referring to the plan, and mark the return end (where the water leaves) on the panel with chalk.

Install an automatic air vent in the tapping at the end of each panel (*fig. 11*). Tighten this air vent several turns until the drain spigot faces the front of the panel. *Before you mount the panels, read all of these instructions.*

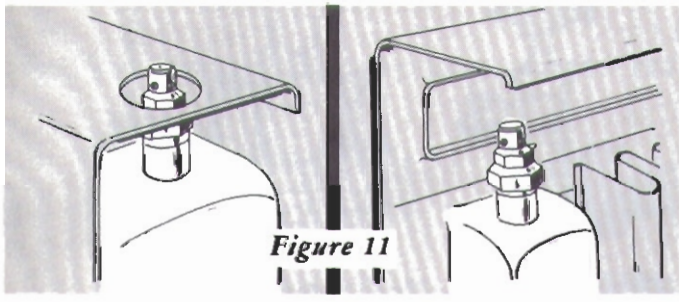


Figure 11

MOUNTING THE PANELS

Locate the studs in each panel area and mark these locations on the floor with chalk. Cut off a piece of foil insulation (included in your shipment) about six inches longer at each end than the over-all panel length. Tack this to the wall, shiny side out, and stand the panel up against it. (With radiant-fin panels, attach legs first as described below.) Using a nail, scratch a line in the foil even with the top of the panel (*fig. 12*). Do not cut off the excess foil at this time.

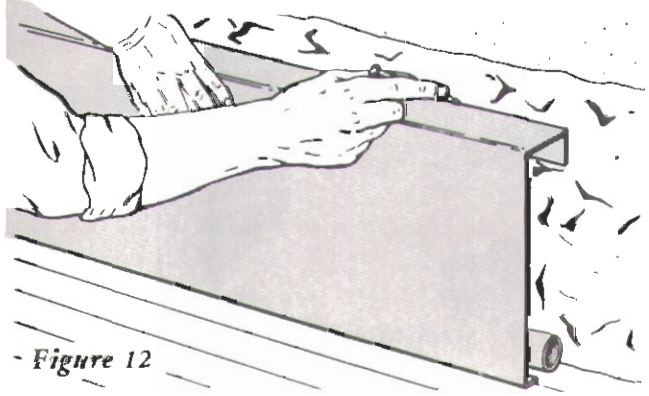


Figure 12

Remove the panel and nail two of the hanger clips to those studs nearest the ends of the panel (*fig. 13*). Then nail the remaining clips, if used (see table below), to the studs spaced evenly between the first two.

HANGER CLIPS PER PANEL

Panel Length:	2½′	3½′	4½′	5½′	6½′	8½′
No. of Clips:	2	2	2	2	3	3

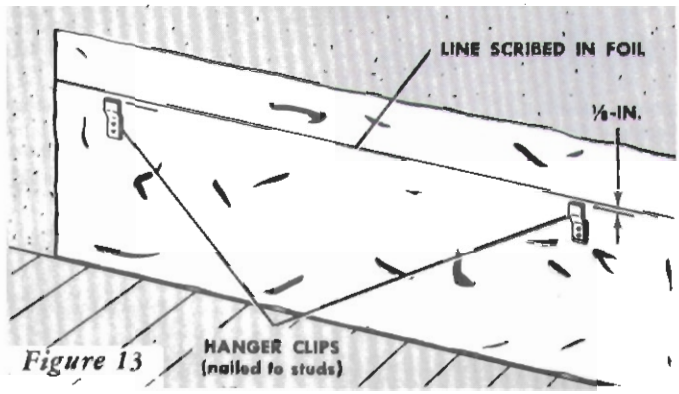


Figure 13

Mount the panel by catching the upper flange on the hanger clips. If your wall is uneven, it may keep the upper flange of a long panel from touching the wall throughout its entire length. When such a gap is not excessive and is not at either end of the panel, it will be concealed by the trim moulding. Gaps at the ends of a panel, however, may prevent the hanger clips from catching the upper flange properly. If this is the case with a *radiant panel,* spring the panel slightly to fit the wall contour. *Do not do this with radiant-fin panels.* Bend a hanger clip instead, if necessary.

SPECIAL INSTRUCTIONS ON RADIANT-FIN PANELS

Each *radiant-fin* panel is supported about 1⅜″ above the floor on legs that clip onto the back of the bottom edge of the panel (*fig. 14a*). Put a leg at the extreme end of each row of panels and then space the balance of the legs evenly in between, using two legs per panel. Before setting the panels in place, tack the foil insulation to the wall and attach the hanger clips as described above. Then install fittings as described below.

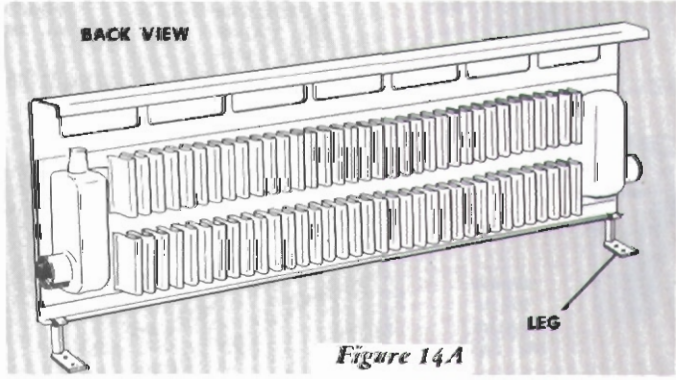


Figure 14A

Place panels against wall in desired location, mark the position of the legs, and remove the panels. Remove legs from panels and screw legs to floor with back edge of

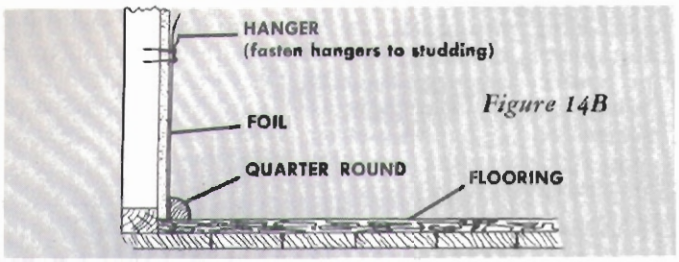


Figure 14B

leg even with wall. Then cover the crack between the floor and wall with quarter round or shoe moulding, as in *fig. 14b.*

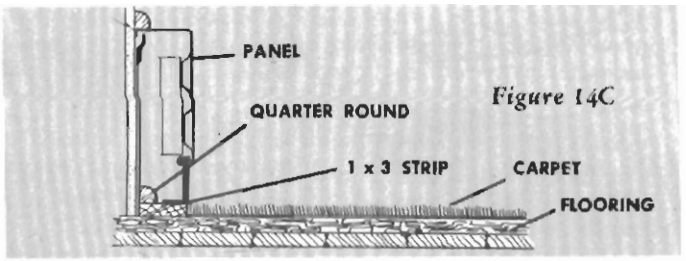


Figure 14C

If the room has wall to wall carpeting or if carpeting is anticipated, we suggest mounting the radiant-fin panels on a 1x3 board (*fig. 14c*). The 1x3 can be trimmed along its front edge so it will be flush with the front of the panels and accessories. The carpet can be trimmed to butt neatly against the 1x3. An installation made in this way simplifies cleaning beneath the panels and assures proper size air opening at the bottom of the panel.

CONNECTING THE PANELS

Do not attempt to connect radiant panels and radiant-fin panels in the same series.

Panels In Corners

This job will be easier if you install panels located in corners (if any) first then work outward from these. These panels are joined with a ¾-inch close nipple and a union elbow (*fig. 15*). Take the union apart and screw the spud (the piece with the large ring nut) into the connection in the panel on your right. Tighten the spud securely (*fig. 16*). Put the close nipple and the other half of the union into the connection in the panel on your left. Now assemble the union finger tight, to join the two panels

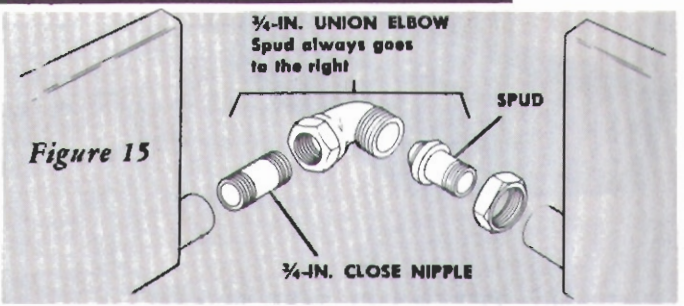


Figure 15

Figure 16

Panels in Straight Rows

Panels in straight rows are joined with two ¾-inch close nipples and a straight union. Separate the union into its two parts and thread a nipple into each part. Now start each nipple into the fitting of its respective panel, and tighten the union part and nipple simultaneously. Note that the spud part of the union should be on the panel at your right (*fig. 17*), while the other piece belongs on the panel at your left. Assemble the two parts of the union together finger tight, to join the two panels.

The above arrangement spaces two panels properly for the standard eight-inch spacer plate (radiant panel) or six-inch plate (radiant-fin panel). You can space radiant panels farther apart by using longer nipples and the extra-length radiant panel spacer plates. Up to 14 inches takes the 16-inch spacer plate; up to 28 inches takes the 30-inch size. To extend a row of radiant-fin panels, use the long spacer plates at the extreme ends of the row of panels for best appearance.

INSTALLING END FITTINGS

The return end of each group of panels is now fitted with a ¾-inch close nipple and 90° elbow (fig. 17). Most Series-Loop Systems also use these same fittings at the supply end. Some Series-Loop and all One-Pipe Systems use a radiator valve at the supply end. Check your plan carefully, and install the fittings that are shown.

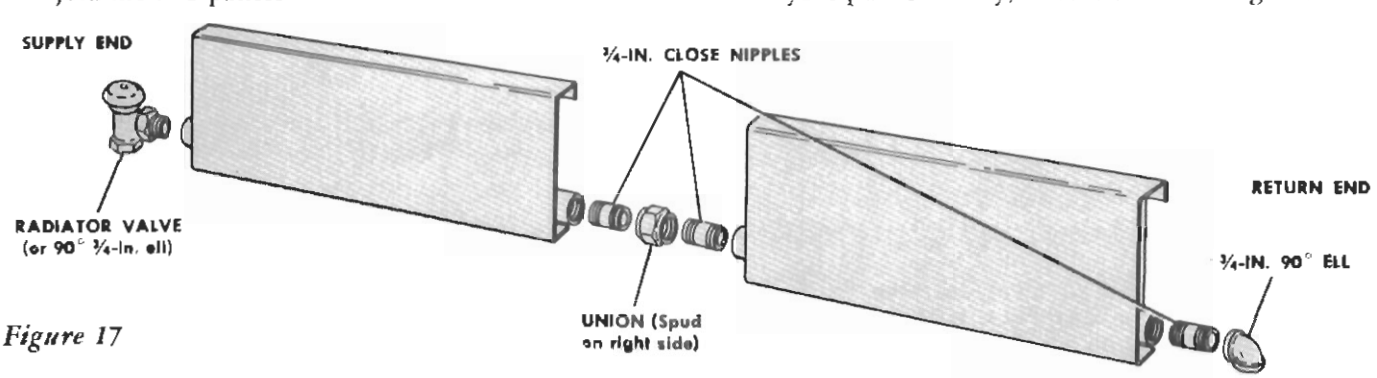


Figure 17

INSTALLATION—FORCED SYSTEMS (Cont.)

CUTTING THE RISER PIPE HOLES

Before you cut the riser pipe holes, check for obstructions under the floor by drilling small holes through the floor directly under the fittings at the two ends of each panel group (fig. 18). Go into the basement (or crawl space) and locate these holes on the underside of the floor. Make certain that joists or other obstructions won't interfere with the piping. If necessary, you can shift a straight row panel group several inches in either direction to get its piping in the clear—but you cannot shift panels in corners. In the latter case, use a longer nipple to replace the ¾-inch close nipple (above) to place the hole in the clear.

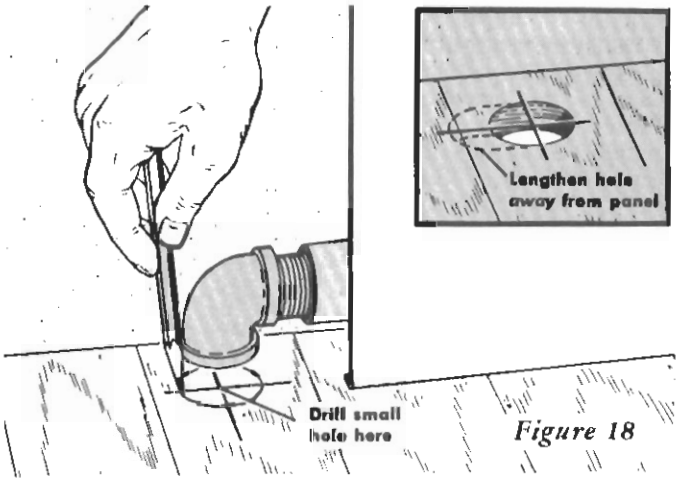


Figure 18

When you are certain each hole will be in the clear, mark the holes to be made—then loosen the finger-tight unions (above) and remove the end panels in each group. Now cut oval holes in the floor, with the long axis of each oval parallel to the wall (so riser pipes can move as panels expand or contract). For panels up to 25 feet over-all length each oval is to be 1¼ x 1½-inch size. Increase the 1½-inch dimension by ⅛-inch for each additional 10 feet of panel length. It's easiest to bore a 1¼-inch diameter hole then lengthen it with a key-hole saw, outward from the end of the panel.

FINISHING THE INSTALLATION

Replace the panels on the hangers, and connect and securely tighten the unions. Install the risers and all remaining piping (p. 24-27) according to your plan. Completely fill the system with water (p. 28) so it will be under pressure—then check all fittings for leaks. When satisfied that there are no leaks, hang all accessories (ends, spacers, corner covers) over top of panels (fig. 19) and press down into position.

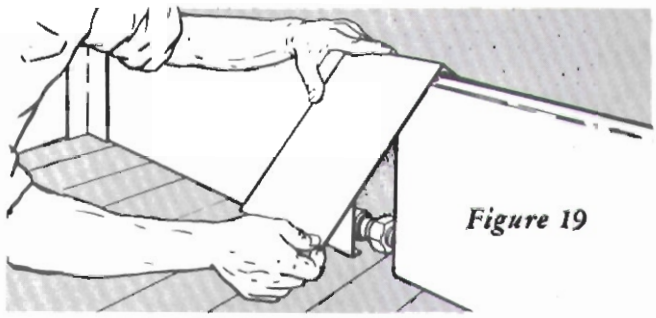


Figure 19

The best method of finishing is to replace short lengths of the original baseboard between the ends of each panel group and the nearest room corners. Cover the bottom of the baseboard with quarter round. Fold the exposed foil over the top edge of each panel—then nail a piece of quarter round moulding tightly on top of each panel group and trim off any foil that shows (fig. 20). This makes a seal that prevents dirt streaks on the wall and holds accessories in place.

With radiant panels, nail another piece of quarter round at the floor in front of each panel group to hold accessories against panels.

With radiant-fin panels, nail a small section of quarter round to the floor in front of and around each end cover (you already will have put moulding along the wall beneath the panel itself). Bend tabs on bottom of six inch spacers under lower edge of panel to hold spacer in position.

Decorate the panels as described on p. 33.

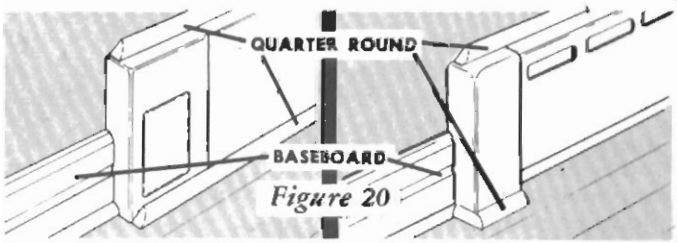


Figure 20

INSTALLING BASEBOARD CONVECTOR PANELS

MAKING READY

These panels are designed to fit against the finished plaster and on top of the finished floor. If you have a new house under construction, make the panel installations after the plastering and flooring are completed, but before the baseboards are installed. If your house is older, remove the baseboard along the walls in each room where *your plan* shows a panel. Try not to damage the baseboard, as short lengths will be needed to finish the walls. Do *not* attempt to recess the panels in the plaster.

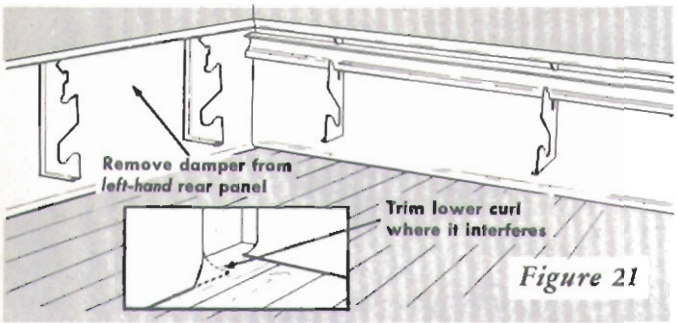


Figure 21

Always start with the corners *(fig. 21)* if radiation is to be installed on adjacent walls. Place a rear panel against the *right-hand* wall, sliding it all the way into the corner. Next, release the damper springs and remove the damper from *another* rear panel. Position this panel against the *left-hand* wall, sliding it into place against the *right-hand* panel. Then, trim the lower curl of the *left-hand* panel to make a neat joint at the bottom.

On straight row installations it is not necessary to remove the dampers from any panels. Simply place the rear panels against the wall, butted together. Temporarily secure the panels — either straight row, or corner — in position.

INSTALLING THE ELEMENTS

Slide the female end of a street elbow over either end of an element. Hang this element on the *right-hand* rear panel so that the center line of the elbow *(fig. 22)* is 1½-inches from the back of the *left-hand* panel. Next, hang the *left-hand* element, with a coupling at the corner end, leaving a ⅛ to ¼-inch gap between element and elbow.

LOCATING THE RISER PIPE HOLES

Temporarily install end covers on each end of a series of panels and note how much the elements must be shortened *(fig. 23)* to enclose the piping. Cut and de-burr the element tube and remove six fins to make room for the end fittings. The fins are easily twisted off.

Assemble to the elements — but do not solder — the fittings *(fig. 24)* necessary to connect them to the riser pipes. Mark the floor directly under the vertical portion of the end fittings, 1½-inches out from the wall. Drill a small hole through the floor at each of the marks. Go into the basement (or crawl space) and locate the holes on the underside of the floor to make sure there are no joists or other obstructions that would interfere with the piping.

If obstructions are encountered, continue checking with a drill until clear areas are found at both ends. Then, remove the panels and cut the riser pipe holes in the floor. A 1¾-inch diameter round hole is satisfactory for panels up to 20 feet long, *if* the pipe is centered in the hole. Longer panels require an oval hole, with the axis parallel to the wall *(fig. 25)*. Each oval riser hole must be ⅛-inch longer for each added 10 feet of panel over 20 feet.

In straight row installations, merely plan to center the panels between the riser pipe holes. In corner installations it may be necessary to shorten the elements in order to get the end fittings to line up with the riser holes at both ends. Do not attempt to lengthen the elements with tubing — the cover plates will not be long enough to cover the piping and attach to the cabinets.

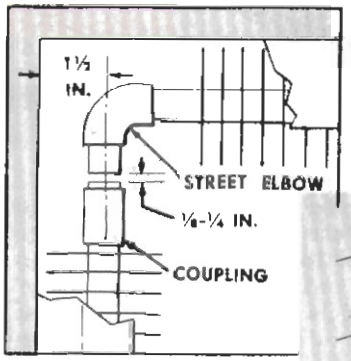


Figure 22

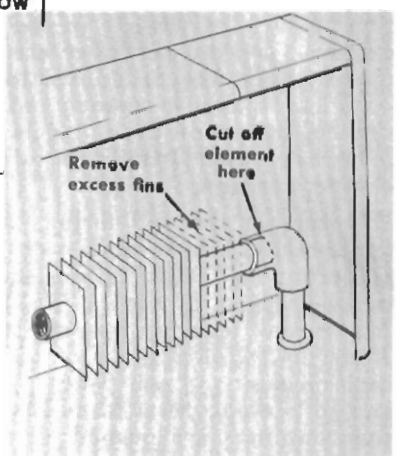
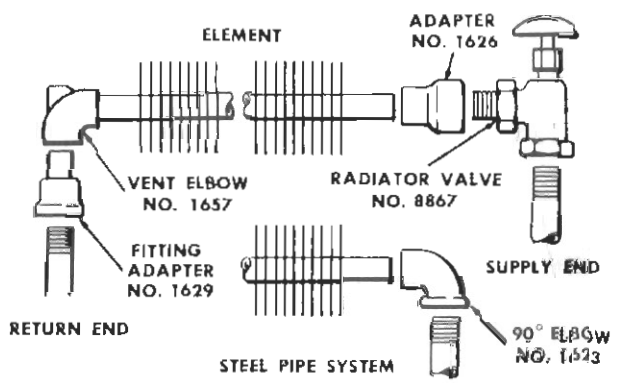


Figure 23



Note: Always use a vent elbow at the return end

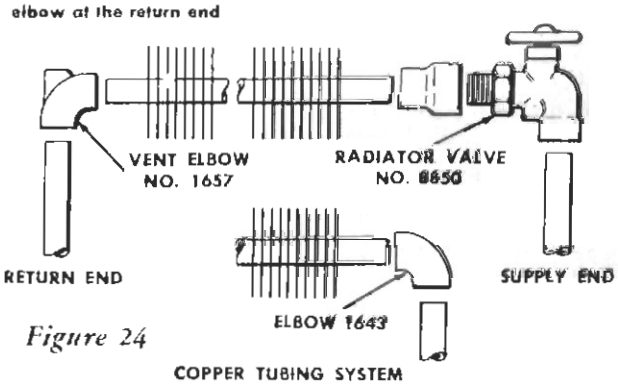


Figure 24

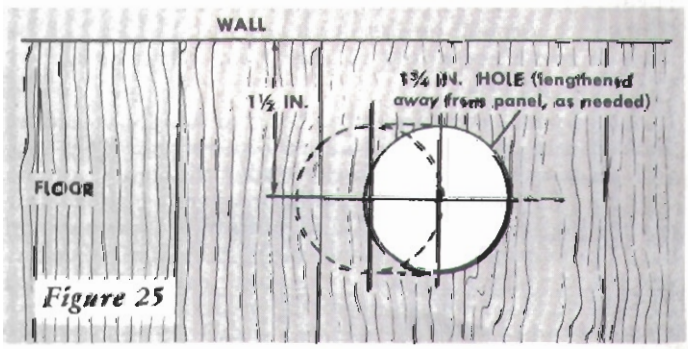


Figure 25

INSTALLATION — FORCED SYSTEMS (Cont.)

FINAL MOUNTING OF PANELS AND ELEMENTS

Replace the rear panels in their proper places against the wall, making sure they are level, and nail them to the studding. In corner installations, mount the *right-hand* rear panel first; then mount the *left-hand* panel. Cut 2⅝-inches off the *corner end* of the damper for the *left-hand* panel. Install the damper and engage the damper springs.

Disassemble the end fittings and elements that were temporarily joined and prepare all connections for soldering *(p. 31-32)*. Hang the elements on the rear panel brackets as shown *(fig. 22)*, and reassemble the proper end fittings *(see your plan and fig. 24)*. Before soldering, slide a piece of cardboard carton between each element and rear panel to insure proper alignment and to prevent metal to metal contact. And, make sure the couplings are pushed all the way onto the street elbows in corner installations *(fig. 26)* and centered between the elements in straight row installations. Solder all connections, *including* riser pipes, before removing cardboard spacers. Install an automatic air vent *(fig. 27)* into the vent elbow.

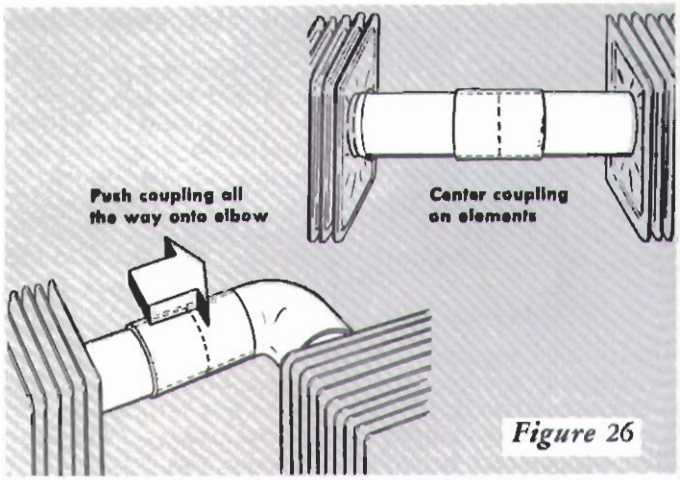


Figure 26

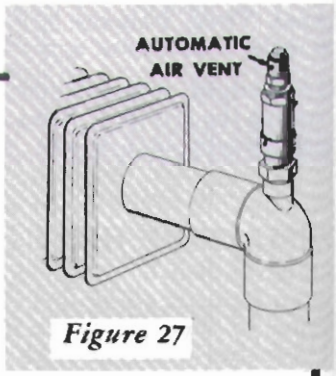


Figure 27

FINISHING THE INSTALLATION

Attach the cabinet accessories after the system has been filled, checked for leaks, and purged of air. Hang the front covers *(right-hand* panels first, in corners), upper and lower splice plates, and end covers or wall trim pieces — as shown on *your plan*. Bend over the tabs on the accessory pieces *(fig. 28)* to hold them firmly in place. Do not join the dampers with splice plates if they are to be entirely closed at night; they are much easier to handle individually.

Finish the installation by using pieces of the original wood baseboard between the end covers and the nearest corners. If the walls are noticeably irregular, a quarter-round moulding can be used along the top edge of the cabinet to close the gaps.

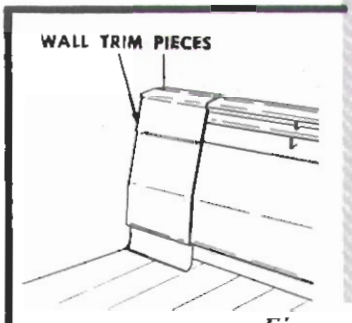
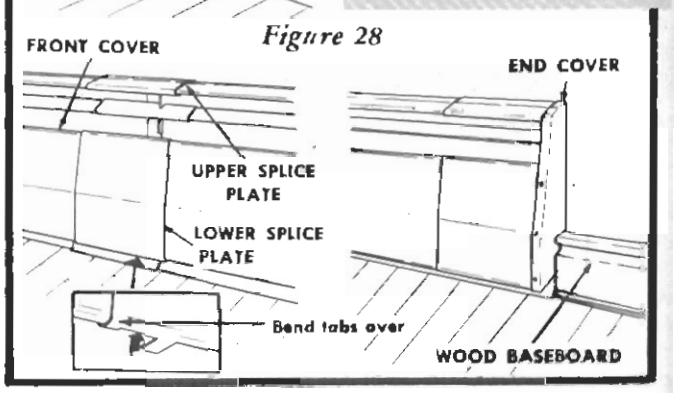


Figure 28



INSTALLING CAST-IRON RADIATORS

HANDLING RADIATORS

Because of their size and weight, cast-iron radiators are usually difficult to handle. You can easily move a radiator without marring the floor by resting the radiator legs on small boards or an old rug, and "walking" it along — pushing the boards (or rug) ahead by foot, as required. The entire job will be simpler if you install the radiators in each room according to *your plan,* before installing any of the piping.

If one of your radiators is too long to handle, it can be divided into two parts. Remove the tie rods *(fig. 29)*, and place two wooden blocks under the center of the radiator. Carefully pry the radiator apart — alternately prying 1/16 inch at the top and bottom — with an iron bar. The wooden blocks will support the two sections when the radiator is finally divided. Take care not to damage or lose the short metal pieces — called *push nipples* — which join the sections at the top and bottom.

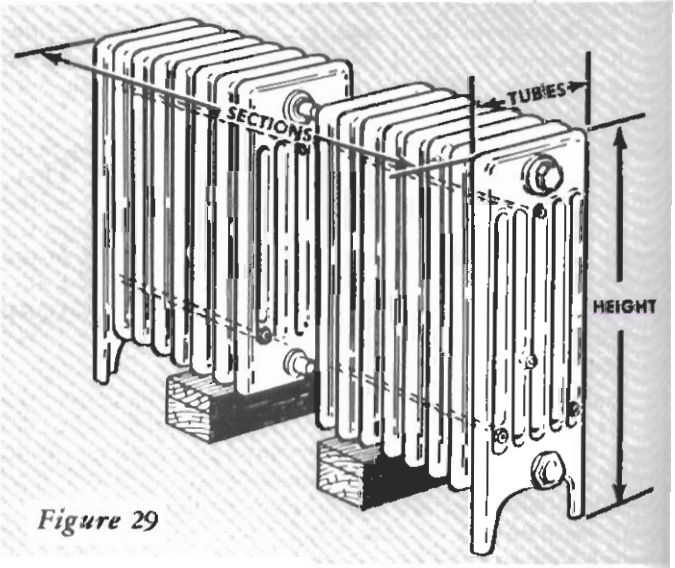


Figure 29

To reassemble the radiator in the desired location, lightly oil and install the two push nipples — then press the two sections squarely together. Install the tie rods and tighten the nuts *one turn at a time,* until the sections are firmly assembled. Afterwards, back each nut off ¼ turn.

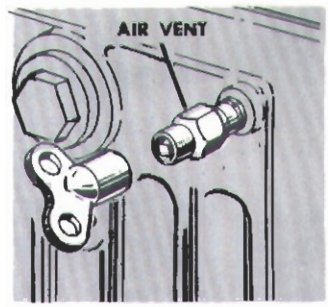
PREPARATIONS FOR INSTALLATION

When the radiators are all properly positioned, check *your plan* and determine the direction of water flow through each one. Install an air vent *(fig. 30)* in the small threaded opening in the return end of each radiator (where the water leaves). Put a ⅛-inch pipe plug in the opening in the supply end of each radiator. Install the fittings — usually a reducer bushing and union elbow — in the large threaded opening in the bottom of the return end of each radiator. Thread the supply fittings — usually a reducer bushing and radiator valve — in the supply end of each radiator. Refer to figure 16 for the method of threading the spud into the radiator.

INSTALLATION

Mark the floor directly under the fittings at the two ends of the radiator *(fig. 31),* and drill small holes through the floor at the marks. Locate the holes on the underside of the floor and make sure joists or other obstructions won't interfere with the piping. Move the radiator slightly as required to avoid interference. Bore holes in the floor for the riser pipes (at right), when clear areas have been found. Place the radiator over the holes, install the riser pipes, and cover the holes with floor plates.

Figure 30



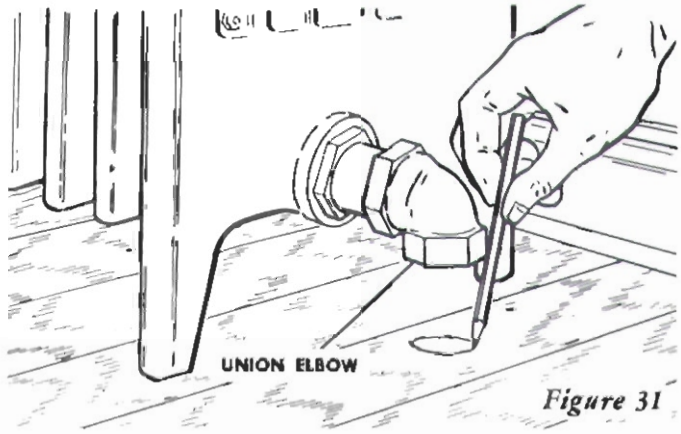


Figure 31

RISER PIPE HOLE SIZES

Pipe (Ins.):	¾	1	1¼	1½
Hole (Ins.):	1¼	1½	1¾	2

INSTALLING CONVECTOR CABINETS

PREPARATION FOR INSTALLATION

Distribute the convector cabinets in the rooms where they are shown on *your plan.* Remove the baseboard from the wall behind each cabinet. Take the front panel off the unit and install an automatic air vent in the small threaded hole in the return end of the heating element *(fig. 32).* Put a pipe plug in the similar hole at the supply end. A check of *your plan* will quickly tell you which way the water flows through the cabinet.

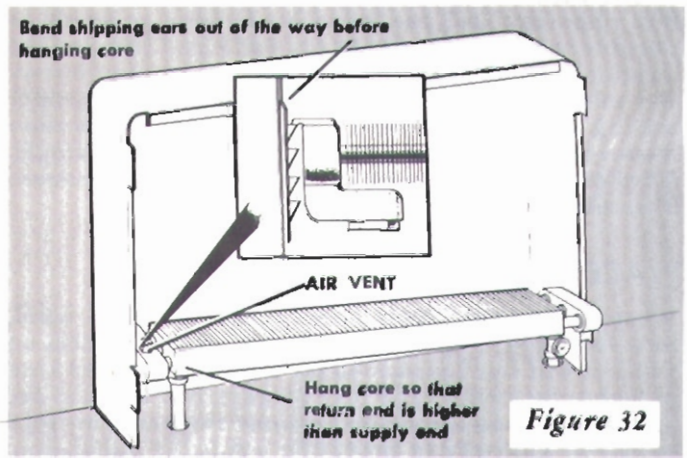


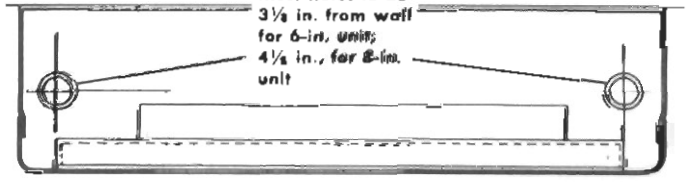
Figure 32

INSTALLATION

Mark the floor for the riser pipe holes as shown *(fig. 33).* Drill small holes through the floor at each of the marks — then locate the holes on the underside of the floor, and check for obstructions that would interfere with the piping. If necessary, shift the unit slightly until clear areas for the riser pipes are found.

When ready, bore the riser pipe holes — sized according to the table above. Position the unit against the wall, and complete your piping *(p. 24).* Afterwards, replace the front panel. Use short pieces of the baseboard to finish the wall between the cabinet and the nearest corners.

Figure 33



CONVECTOR LENGTH	18	22	26	30	34	38	42	46	50	54	58	62
RISER SPACING	14	18	22	26	30	34	38	42	46	50	54	58

INSTALLING BOILER AND SMOKE PIPE

READ THE INSTRUCTIONS WITH YOUR BOILER

Detailed installation and operating instructions for your specific boiler are shipped with it. Carefully read *all* these directions *before starting the installation.*

HANDLE YOUR BOILER WITH CARE

A boiler is extremely heavy and hard to handle. Even the separate pieces are usually too heavy for one person. Be sure to have ample help — at least one (and better still, two) helper on hand before attempting to move the boiler. Rough handling can seriously damage the boiler. *Be careful* — protect yourself and your boiler.

The heaviest boiler can be moved easily on planks and rollers. Use 2 x 6 planks, and tip the boiler up on its narrowest side when it is necessary to move it down stairs. The planks must be long enough to extend from the top to the bottom of the stairs. *Never stand below* a boiler that is being moved down stairs.

LOCATE BOILER ACCORDING TO *YOUR PLAN*

It is important that you locate your boiler as nearly as possible to where it is shown on *your plan.* Changing the location will alter the piping and smoke pipe layout, and might adversely affect the operation of the entire heating system. Take measurements to find the location shown on the plan — and position the boiler accordingly. A boiler should be located within 10 feet of the chimney, if possible.

PLACE BOILER SOLID AND LEVEL

Whatever its type, your boiler should be on a solid, level base. The construction of the floor or platform on which it will rest depends on the type of boiler and kind of fuel to be used — and may be governed by local fire ordinances. Refer to the instructions shipped with your boiler for guidance in providing a suitable foundation, adequate working space around the boiler, and detailed set-up procedures. *If you have an unusual problem, we will be glad to help you.*

VENTILATION

The boiler room must have an adequate air supply for proper ventilation and combustion. Instructions supplied with your boiler will provide recommendations for ventilating it.

INSTALLING SMOKE PIPE

Refer to *your plan* and lay the parts that will make up your run on the floor in their proper order. Typical installations and alternate arrangements (dotted lines)

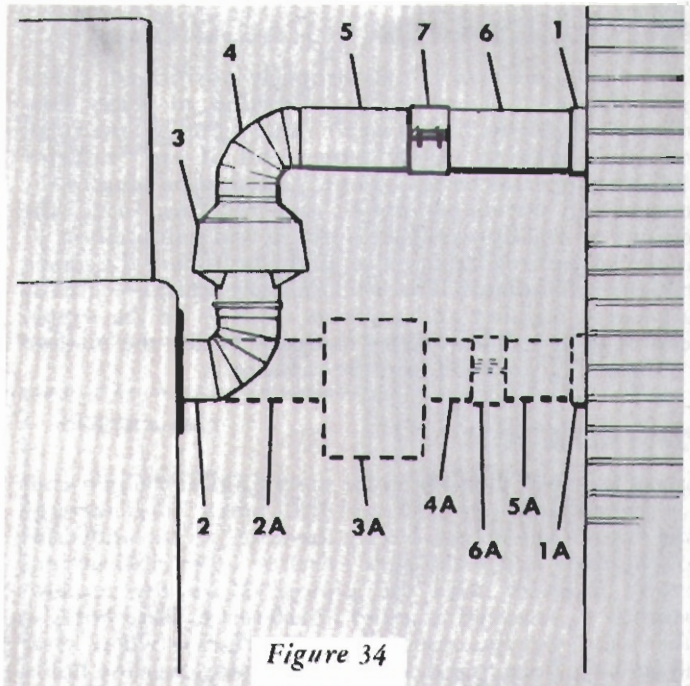


Figure 34

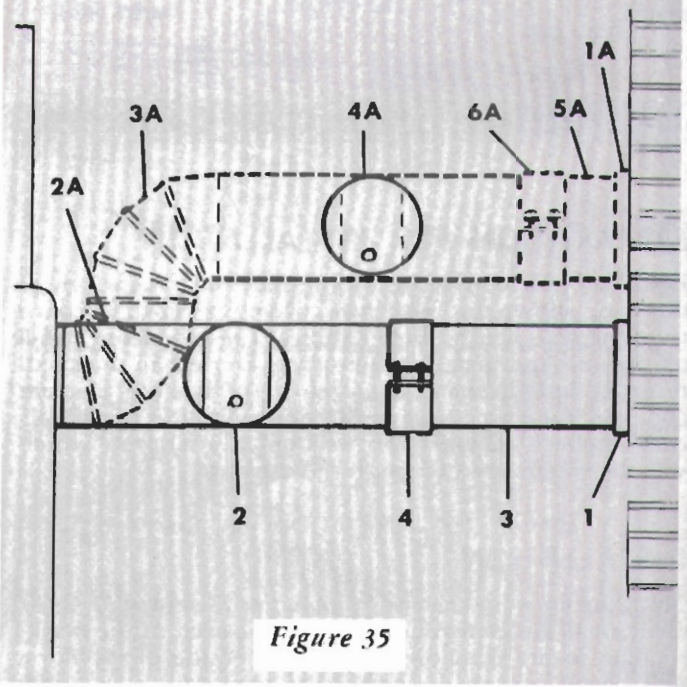


Figure 35

are illustrated *(figs. 34 and 35).* The numbers indicate the sequence in which the parts should be assembled. Install the chimney thimble first, then start at the boiler and work towards the thimble with the pieces of the run. Put the damper section (or draft diverter) as close to the boiler as possible. Shorten the last section of the run as required, and make the final joint with a draw-band.

The only way you can get a solid, gas-tight installation is by using properly adjusted elbows to make the required turns. A curving, loose-fitting smoke pipe just won't do the job — and it's dangerous. Most important of all, the run should rise — or be perfectly level — all the way from the boiler to the chimney; *it must not dip at any point.* Support the run at least at every other section (if there are more than two pieces), and at every turn located in the center of the run. Use stove pipe wire looped around the run and attached to a solid support above.

If yours is an oil- or coal-burning boiler and your run passes within 6 inches of any wood (joists, etc.), provide a 2-inch thick insulation of fire-resistant material between the wood and the run (this can be nailed to the wood).

CONNECTING FUEL SUPPLY AND CONTROLS

If yours is a gas- or oil-fired boiler, the last step is to connect the fuel supply and wire the controls. If you have a coal-fired boiler, there may be a stoker to install — and controls. In any event, refer to the instructions furnished with your boiler (or stoker) for the proper procedures — and follow them *carefully.* If you need additional instructions in methods of pipe assembly, ask for our booklet "How to Install Plumbing", *form No. F11768.* Should you have problems concerning the wiring to the electrical controls, our Electrical Appliance Department has a booklet "Electric Wiring for Home or Farm", *form No. F5428,* which you can obtain at nominal cost — and which will tell you how to provide a branch circuit to the controls.

TYPICAL CONNECTIONS AT THE BOILER

After installing the radiation units (panels, radiators or convectors) and setting up the boiler, you are ready to make the piping connections at the boiler. This involves installing all accessories and fittings on the boiler that connect it to the water supply and mains. Specific details of the connections to *your* boiler are included in the instruction book shipped with it.

The typical boiler connections *(figs. 36 to 40)* are shown to enable you to better understand *your plan,* and make your job easier. Your installation will closely resemble one of these typical installations. Notice that all five typical installations include an expansion tank, an automatic fill valve and a relief valve. The expansion tank provides a cushion to permit the system to expand while the water is being heated. The fill valve automatically supplies water to the boiler when it is needed.

BASEMENT BOILER INSTALLATION (Top tapping)

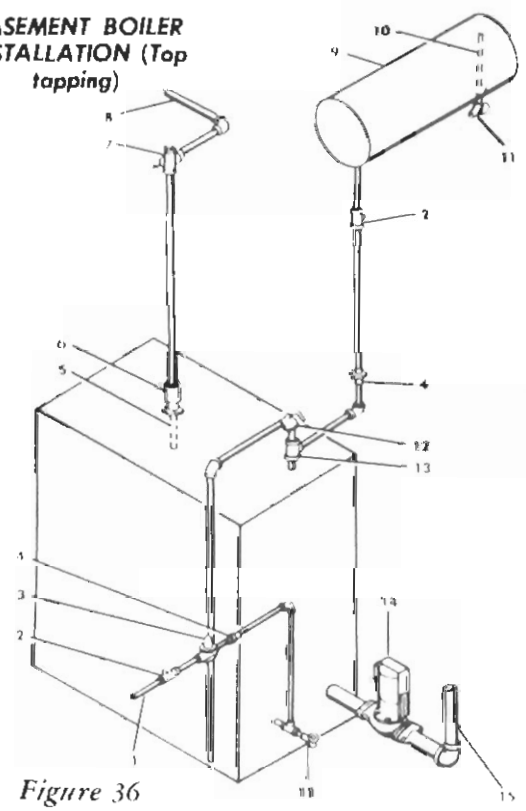


Figure 36

UTILITY ROOM BOILER INSTALLATION (Top tapping)

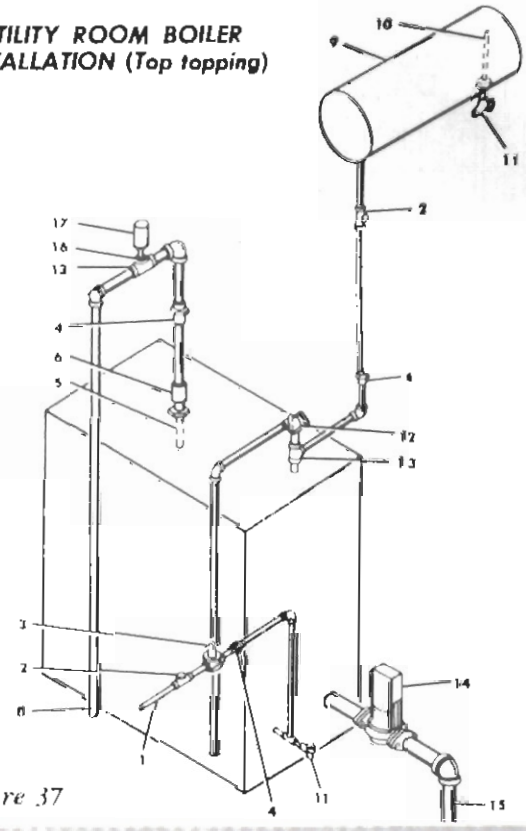


Figure 37

1. WATER SUPPLY LINE
2. STOP COCK
3. AUTOMATIC FILL VALVE
4. UNION
5. AIR ELIMINATOR FITTING
6. COUPLING
7. FLOW CONTROL VALVE (IF USED)
8. SUPPLY MAIN
9. EXPANSION TANK
10. TANK DRAIN FITTING
11. DRAIN COCK
12. RELIEF VALVE
13. TEE
14. CIRCULATOR
15. RETURN MAIN
16. REDUCER BUSHING
17. MAIN AIR VENT

INSTALLATION—FORCED SYSTEMS (Cont.)

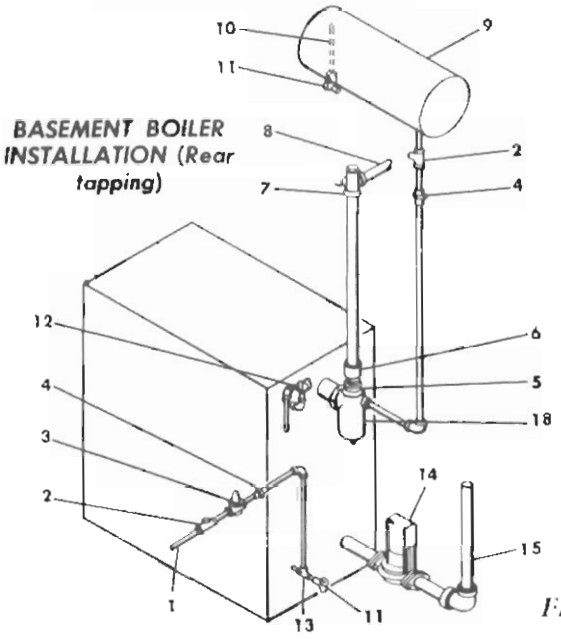
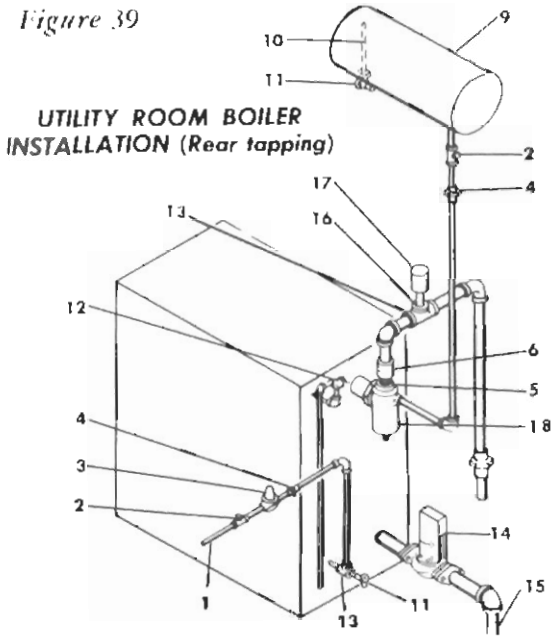


Figure 38

Figure 39



1. WATER SUPPLY LINE	6. COUPLING	11. DRAIN COCK	16. REDUCER BUSHING
2. STOP COCK	7. FLOW CONTROL VALVE (IF USED)	12. RELIEF VALVE	17. MAIN AIR VENT
3. AUTOMATIC FILL VALVE	8. SUPPLY MAIN	13. TEE	18. AIR TRAP FITTING
4. UNION	9. EXPANSION TANK	14. CIRCULATOR	
5. AIR ELIMINATOR FITTING	10. TANK DRAIN FITTING	15. RETURN MAIN	

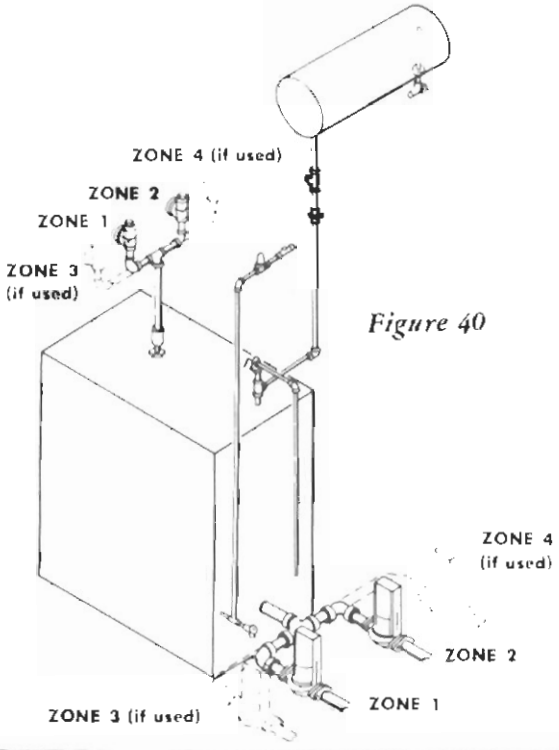


Figure 40

ZONE CONTROL BOILER DETAILS

Larger, rambling houses, where the heating requirements are different in various sections of the house, are often heated by zone controlled systems. Zone controlling is also used extensively when rooms are being added to a house because it is not necessary to disturb the existing piping to heat the new rooms.

If *your plan* calls for zone control, that is, there are two, or more, thermostats, circulators, and piping systems, *figure 40* shows the approximate main piping arrangement at the boiler. *Figures 36-39* cover all details not on figure 40. If your installation differs much from this illustration, refer to the special instructions on *your plan* and your boiler instruction book for the necessary information.

INSTALLING THE PIPING

GENERAL INFORMATION

Always study *your plan* carefully before attempting to install the piping. The required lengths of piping must be measured as it is installed. *Do not try to scale pipe lengths off your plan.* Although the plan is drawn to scale, its small size makes this an extremely inaccurate way to measure pipe. To obtain lengths of pipe you must measure between the necessary points as described on *p. 30.*

ONE-PIPE SYSTEM

Definition

In a one-pipe system, a single main pipe carries the hot water around (through one or more loops) and back to the boiler through the circulator. This main is usually installed about five feet in from the outside walls and connected to the individual radiation units by branch piping.

Installing the Main

The entire main for a one-pipe system is installed before any of the radiation units are connected to it. If your system has more than one loop, you should complete each full loop before starting on the next one. Start with the *supply end* of the main at the boiler, according to *your plan,* and assemble the various pipe lengths and fittings in sequence as shown on the plan. Assemble the tees for the various loops, if used, and the tees for the radiation unit branches in their proper places, as the main is pieced together.

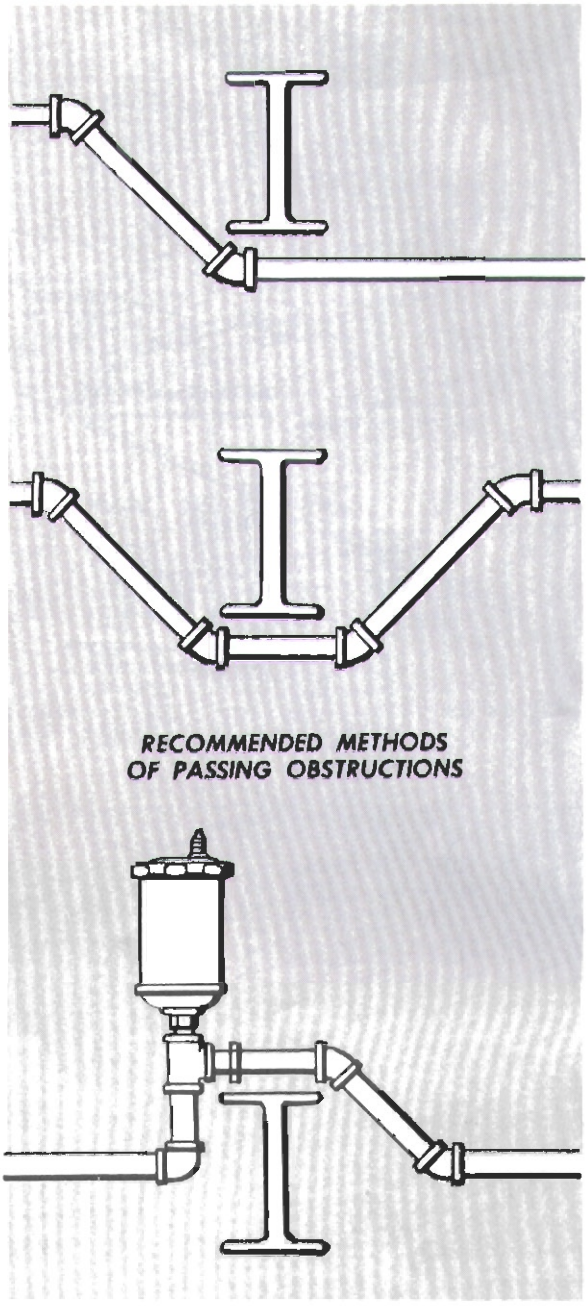
NOTE

Each branch line tee *must* be located at least one foot from any elbow in the main.

If you have to pass the main around beams, or other obstructions that are not covered by *your plan,* use one of the recommended methods shown *(fig. 41).*

As you assemble the main, make sure each connection is properly prepared *(refer to p. 30)* and tight, before proceeding to the next one . . . it is almost impossible to repair a finished main without disassembling it all the way back to the faulty connection. Both ends of the main should be connected to the boiler with unions to facilitate the removal of accessories — and even the boiler itself — without disturbing the piping.

Temporarily support the main every 8 or 10 feet as it progresses. Don't install the permanent hangers until all of the radiation units are connected.



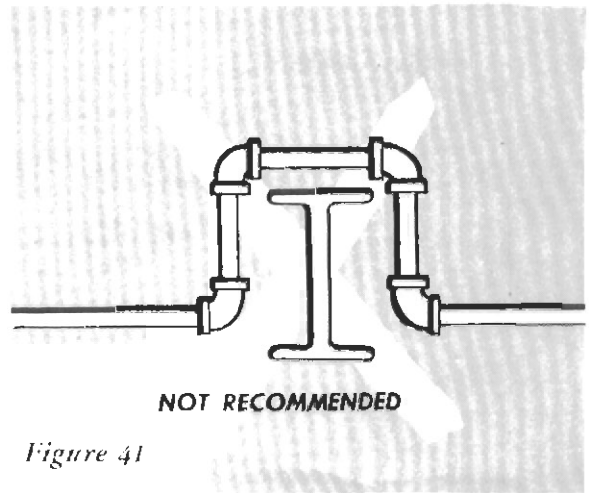


Figure 41

Connecting the Radiation Units

FIRST-FLOOR UNITS: When the main is finished, connect the radiation units to it with two branch pipes, as shown *(fig. 42)*. First, assemble the fittings shown on *your plan* to the two ends of each radiation unit. These parts will make a *swing joint* in each branch pipe that makes it easier to connect the piping.

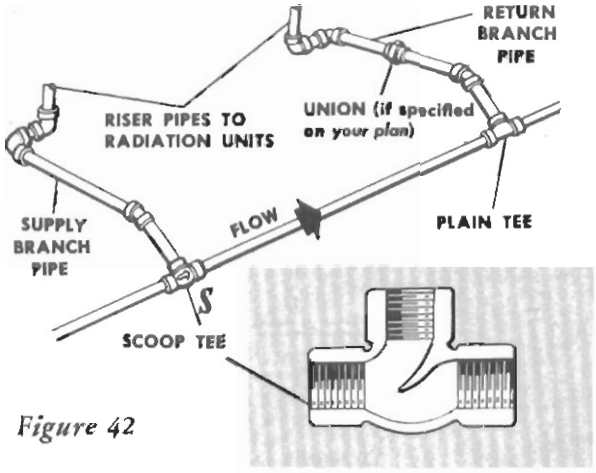


Figure 42

If the branch pipes are to be run between the joists *(fig. 43)*, assemble the nipple and 45° elbow to the first branch line tee in the main. Then measure and cut the length of pipe necessary to connect the 45° elbow (above) with its swing joint. Wherever possible in a basement installation it is desirable to run the branches between the joists to save overhead space.

The 45° elbow and nipple are not needed if the branch piping is to be run below the joists *(fig. 44)*. In this type of installation, simply measure and cut the length of pipe necessary to connect the branch line tee in the main with its swing joint.

Repeat the steps in the paragraph above to connect the second branch line to the first radiation unit . . . then proceed to the next radiation unit, and so on, until all units are connected to the main.

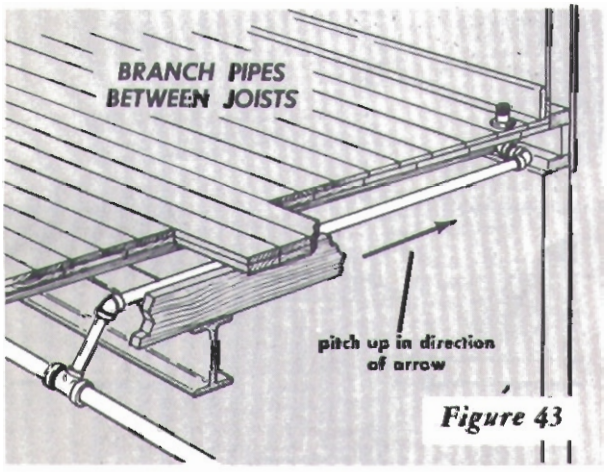


Figure 43

SECOND-FLOOR UNITS: If your installation requires radiation units on the second floor, they must be connected to the main by long riser pipes. Because there is usually less ceiling space in the basement than in the rooms above, installing these risers inside of partitions or walls (they can be put in outer walls if properly insulated) requires that, when steel pipe is used, each riser must consist of two shorter lengths coupled together as they are installed upward from below *(fig. 45A)*. Or you may substitute copper tubing and install it from above, uncoiling it as required *(fig. 45B)*.

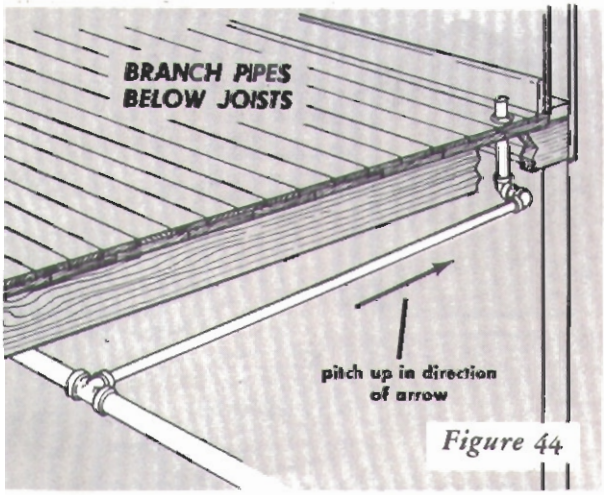


Figure 44

An easier method is to let the risers be exposed in the first-floor rooms — then conceal them as shown on *page 34*.

SPECIAL ARRANGEMENTS: When the boiler is in a utility room and the main is in the attic, or when radiation units are to be in the basement, the pipe concealment problem is the same as in a second-floor installation. Connections between these riser pipes and the swing joints at the ends of each radiation unit are much the same as in a basement installation *(figs. 46 and 47)*. The branch piping that connects the riser piping to the main *must* be pitched up toward the main for proper circulation when the radiator is below the main.

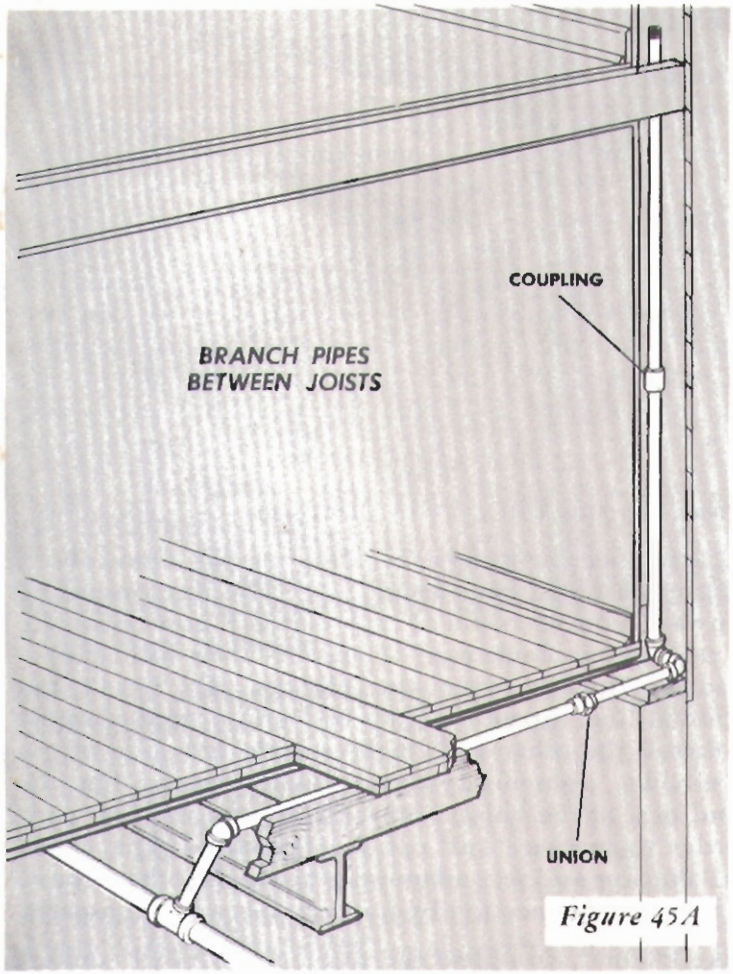


Figure 45A

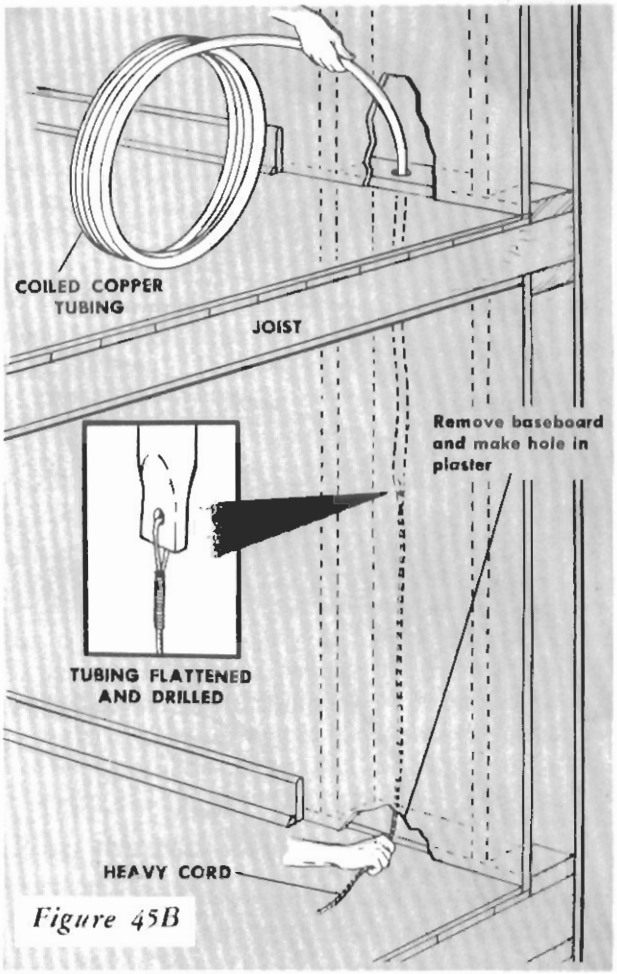


Figure 45B

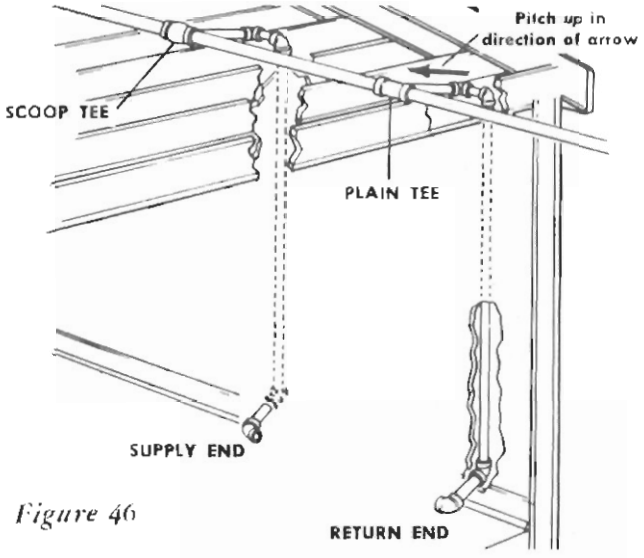


Figure 46

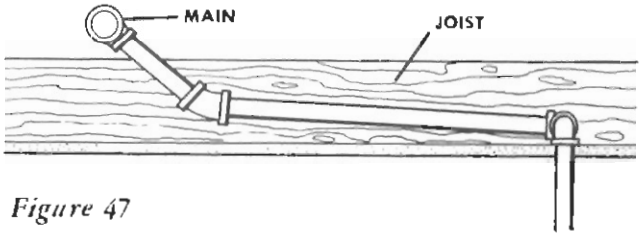


Figure 47

Supporting the Piping

After all of the radiation units are connected to the main, check the piping to be sure it is pitched as shown on *your plan.* Then support the main with hangers, as shown *(fig. 48).* For iron pipe the hangers should be spaced every 8 to 10 feet. Copper tubing less than 1½ inch in diameter should be supported every 6 feet.

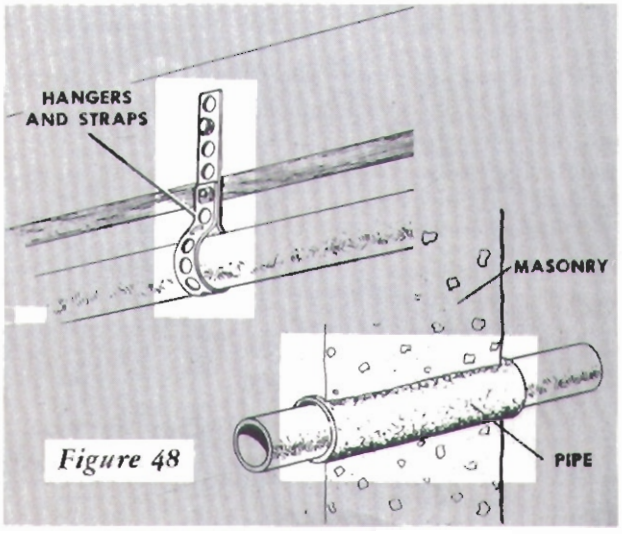


Figure 48

SERIES-LOOP SYSTEM

Definition

In a series-loop system *(fig. 49)* there is no continuous separate main. Instead, the main simply serves to connect the various radiation units together, in series, to form a continuous loop — and the two ends of this loop are connected to the boiler. Hot water then flows from unit to unit around the loop and back through the circulator to the boiler. Those parts of the loop used to join two radiation units together are called *jumpers*, and the pipes used to connect the first and last radiation unit to the boiler are referred to, respectively, as the *supply and return mains.*

Connecting the Units With Jumpers

First, assemble the fittings specified on *your plan* to both ends of each radiation unit *(fig. 50)*. The line extending downward from each end of each unit will now terminate in a 90° elbow. Each pair of units is then joined by a horizontal line, between the elbows. To install the horizontal line, thread one half of a union onto a nipple and thread the other end of the nipple into one of the 90° elbows, tightening them simultâneously. Put the second part of the union temporarily onto the first part, in order to measure and cut the length of pipe. Then install the pipe and second union piece in the other elbow, and finish the connection by joining the two union parts.

In like manner, complete the other jumpers to connect all of the radiation units in series.

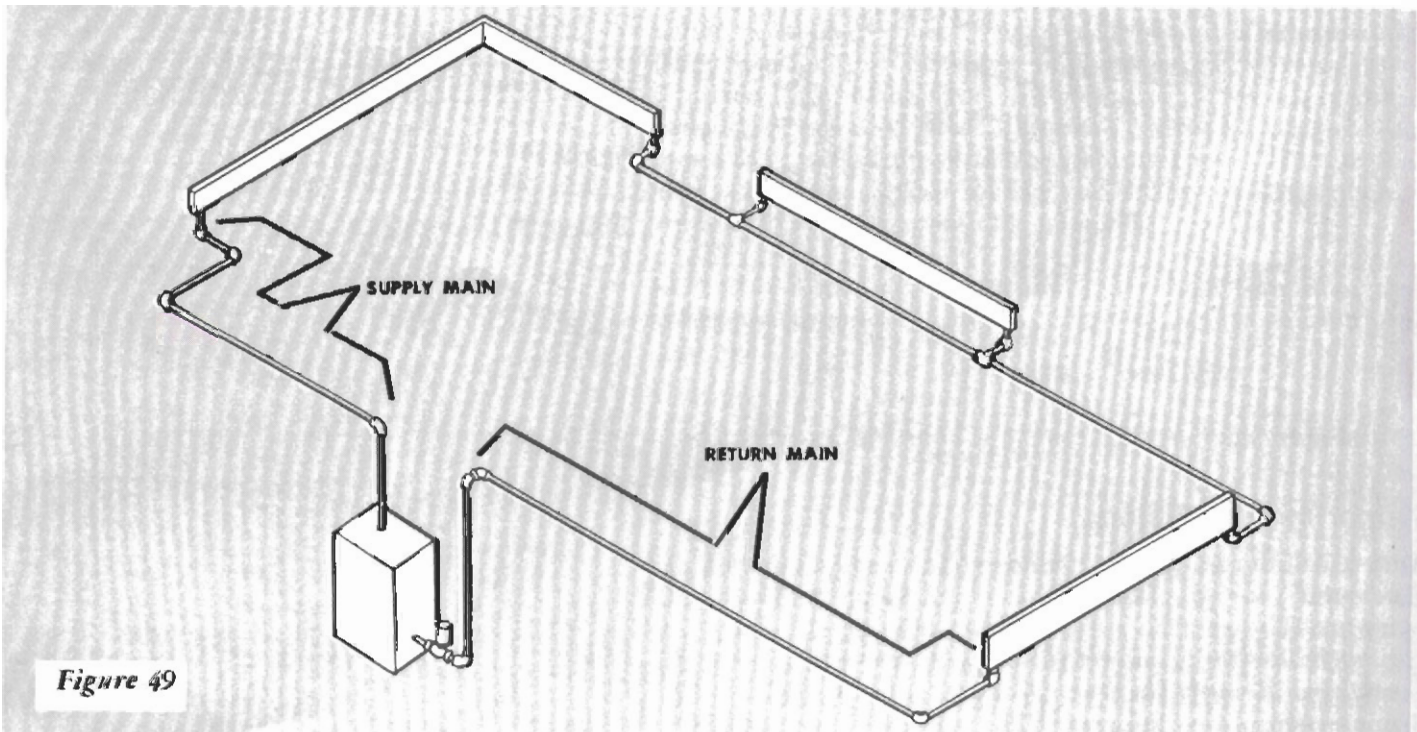


Figure 49

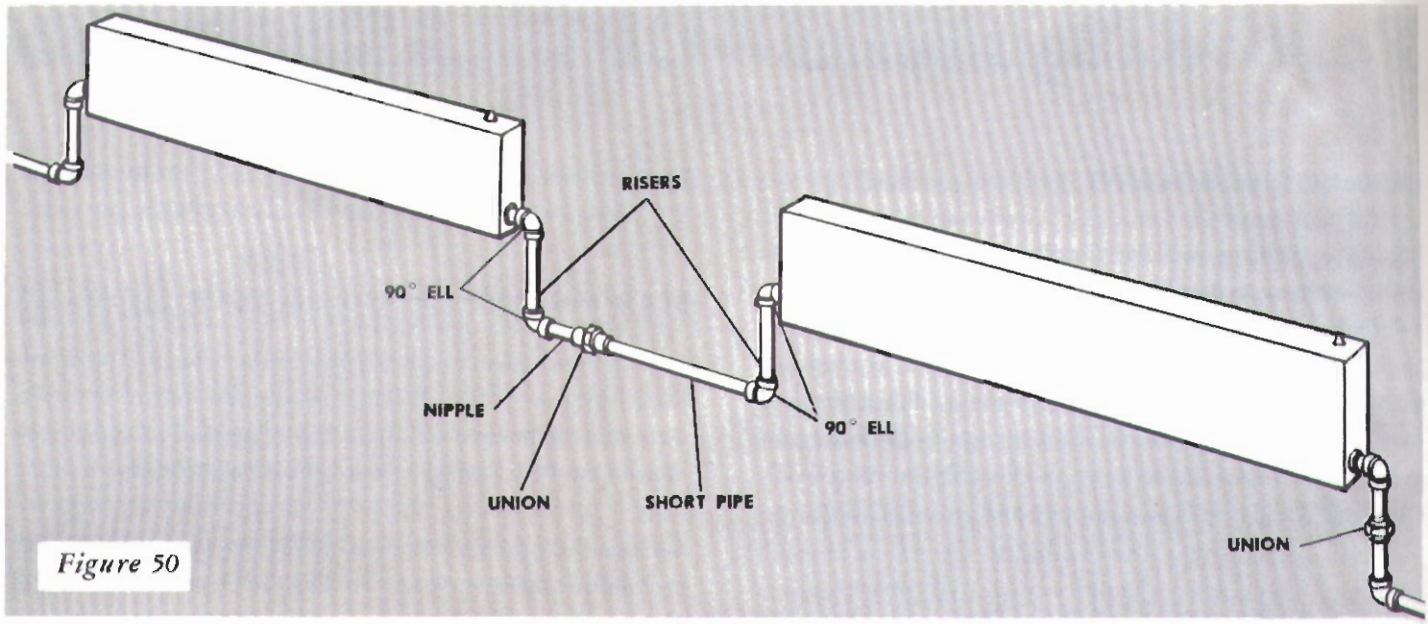


Figure 50

Controlling Individual Units

The basic series-loop system does not permit individual control of the radiation units. You can easily see that cutting off the water to any one of the units would stop circulation through the entire loop. If you want to be able to regulate the temperature in a particular room, you can install a *by-pass (fig. 51)* around the radiation unit(s) for this room — then install a radiator valve at the supply end of the unit. When this valve is closed the hot water will by-pass the unit and flow on through the rest of the system. Be sure to use *½-inch pipe for the by-pass,* instead of the ¾-inch pipe used in the rest of the loop. This smaller pipe is required so that, when the valve is open, the hot water will take the path of least resistance and flow through the larger pipe and the unit, instead of through the by-pass.

Installing the Mains

After all the radiation units are connected together, you are ready to install the supply and return mains *(fig. 49).* Measure and cut the lengths of pipe needed for these mains according to *your plan,* and install each main beginning at the boiler.

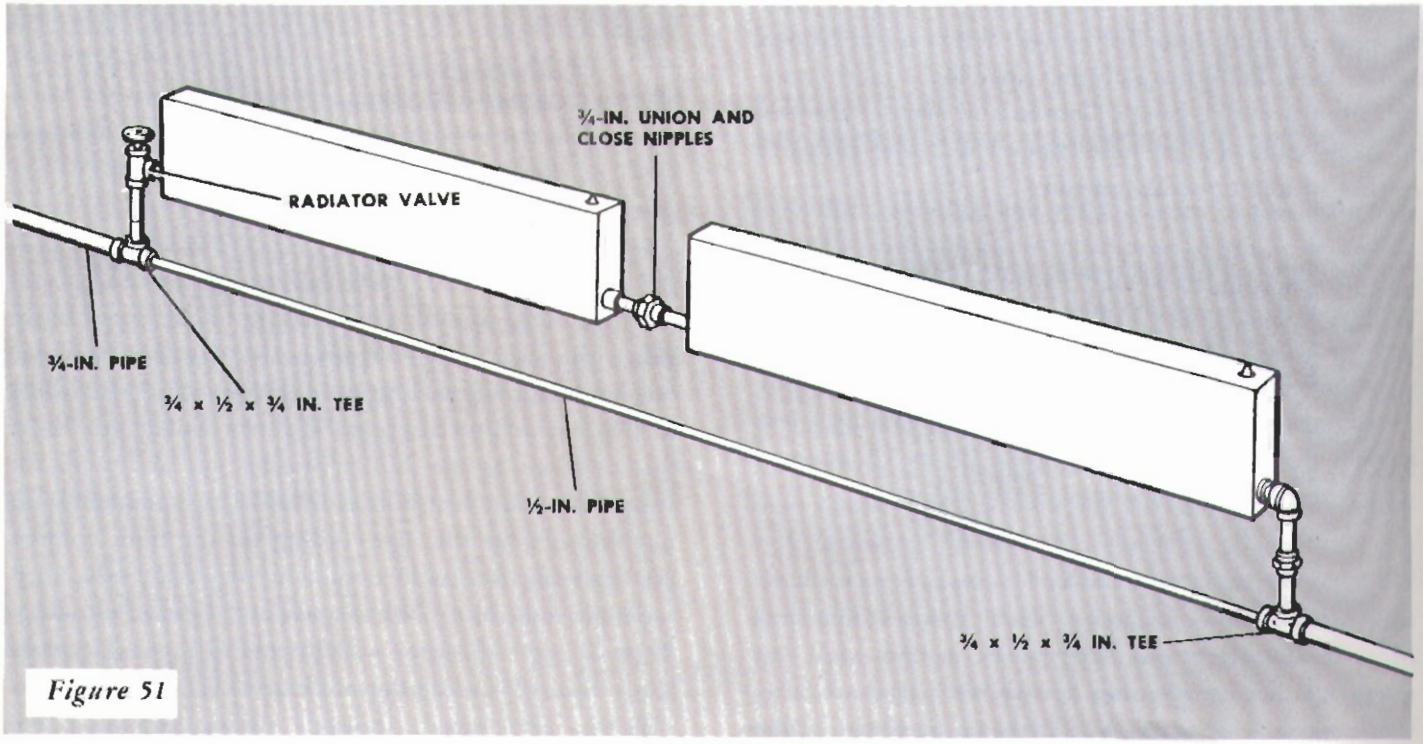


Figure 51

Forced Systems—OPERATION AND

READ INSTRUCTIONS *FIRST*

Specific operating data for the various components that make up *your system* is contained in the instructions shipped with them. Study this data and read over the general information on these pages before attempting to operate your system. The reliable and economical operation of the entire system depends upon how you use the controls . . . become thoroughly familiar with all of them and you'll save money and avoid trouble.

FILLING THE SYSTEM WITH WATER

Close the air vents on all the radiation units except one, and open all the radiator valves, if used. Make sure the boiler and expansion tank drain cocks and the air bleed screw on the expansion tank drain fitting are tightly closed. Open the valve in the line between the boiler and the expansion tank, then open the water supply stop-cock.

To speed up the filling process, turn the *fast fill* screw on the top of the automatic fill valve several turns in a clockwise direction. You should then be able to hear the water rushing into the system. When water begins to flow from the open air vent, close it . . . and check the boiler pressure gauge. Loosen and remove the *fast fill* screw from the fill valve when the boiler pressure reaches 10 to 12 pounds pressure.

Next, vent the air from the remaining radiation units by opening their air vents one at a time until water flows from each one. After the air has been vented from all the radiation units and all the air vents are again tightly closed, recheck the boiler pressure gauge. Within a few minutes the pressure should reach 10 to 12 pounds, which the fill valve will automatically maintain.

While the system is cold and under this pressure, check all the connections for leaks. Slight leaks, which may occur in any newly installed system, are no cause for alarm, for they usually plug themselves in a short time. Connections which have excessive, or persistent leaks must be retightened. When satisfied that the connections are tight, you are ready to operate the system.

STARTING AND OPERATING YOUR SYSTEM

It is a good idea to have your boiler checked and adjusted by one of our trained servicemen before firing it. *The slight cost involved is insurance against starting your new HOMART heating system off with a handicap.*

Set the thermostat, which controls the operation of the circulator and burner, for the desired room temperature. Next, adjust the limit control, which regulates the temperature of the water in the boiler, according to the boiler instructions. The temperatures listed in the table (below) have been found to be satisfactory for most installations. They can be varied, if necessary, to suit the climate in which you live — but the boiler temperature should never be less than 170°, whatever type of radiation units you may have.

BOILER WATER TEMPERATURES

Type of Heating Unit	*Limit Control Setting*
Convector B.B. Panels Cabinet Convectors	195°
Radiant-Fin Panels Cast Iron Radiators	205°
Radiant Panels	215°

When the thermostat and limit control have been set, turn on the power switch and fire your boiler according to the instructions supplied with it. Watch the boiler thermometer as the boiler warms up, and note the temperature at which it stabilizes. If this temperature is not the same as the dial reading on the limit control, readjust the control to obtain the desired boiler thermometer indication. Don't be alarmed if these indications differ — any difference will be due to the fact that the limit control and boiler thermometer are located in different parts of the boiler. Always use the boiler

MAINTENANCE INFORMATION

thermometer when adjusting the controls, for it is the more accurate of the two.

RECHARGING THE EXPANSION TANK

As the water in the system heats up, its pressure increases and it expands into the expansion tank, further compressing the air above it in the tank. This compressed air cushion permits the water in the system to expand as necessary to accomodate temperature changes. At a boiler temperature of 200° the tank is about half full of water.

Normal operation of the radiation unit air vents over an extended period, or a leaky (or loose) air bleed screw in the tank drain fitting will cause the loss of this air cushion. The tank is then said to be "waterlogged", and it cannot absorb system expansion. When this happens, the system pressure gradually builds up to 29-30 pounds, at which point the relief valve opens and begins to drip water. Too high a boiler pressure (over 25 pounds), or a dripping relief valve are indications that the expansion tank needs to be re-charged with air.

Before recharging the tank, *shut off the burner.* Then close the valve in the line between the boiler and the expansion tank. Open the tank drain cock and the air bleed screw on the tank drain fitting. A garden hose connected to the drain cock will make it easier to dispose of the water released. When water no longer flows from the expansion tank, close the drain cock and the air bleed screw, making certain the latter is tight. Open the valve in the line between the boiler and expansion tank and your system is again ready for operation.

GENERAL OPERATION INFORMATION

With cast-iron radiation, the night thermostat setting can be reduced as much as 10 degrees below the daytime setting. Panel radiation systems, however, respond much more slowly to changes in temperature. Therefore, it is best not to lower the thermostat setting for these at night more than 2 or 3 degrees below the daytime setting. You can save *substantial* amounts on your fuel bill by this reduction of nighttime temperature, which is greatly simplified by using the HOMART day-night clock thermostat.

If the circulator runs continuously (which is normal for panel installations in cold weather), but the house is not warm enough — in spite of a satisfactory thermostat setting — either the boiler temperature is too low, or there is air in the radiation units. Ordinarily, the automatic air vents in the units will expel air as it accumulates, but these may work too slowly when the system is first started. If there is air in the units, they will be considerably hotter to the touch at the bottom than at the top. You can release the air rapidly by loosening the top of the vent a half turn, or so. After bleeding all trapped air from the units, the boiler temperature can be increased slightly, if the house still is not warm enough.

There is no need to drain the water from the system at the end of each heating season. We recommend that you use the same water from year to year. The automatic fill valve will add whatever water is necessary every time you start the system after a shutdown.

HEATING SYSTEM MAINTENANCE

Detailed operating and maintenance instructions were shipped with all of the components in your system. Put these instructions in a safe, convenient place where they can be referred to easily when needed. Regularly perform any maintenance operations called for, such as oiling the circulator and burner motors. Although your HOMART heating system is of the highest quality, it can be ruined by neglect. The system should be checked once a year — preferably at the start of the heating season — by a trained Sears service specialist. He can save you money by heading off major repairs and "tuning" the system for most efficient operation . . . and he can spare you the needless discomfort of breakdowns in cold weather. *Follow the instructions* and your heating system will give you many years of trouble-free home comfort.

METHODS OF ASSEMBLIN

STEEL PIPE

MEASURING

Pipe lengths to be cut should be measured very carefully, as allowance must be made for the threads needed to engage the fittings. The best way to measure is to use the face-to-face method. First measure the exact distance from *face-to-face* of the fittings (*figure 52*). Next, refer to the table (below) to determine the extra length necessary for screwing into the fittings. Remember that *double this length* is necessary for two ends.

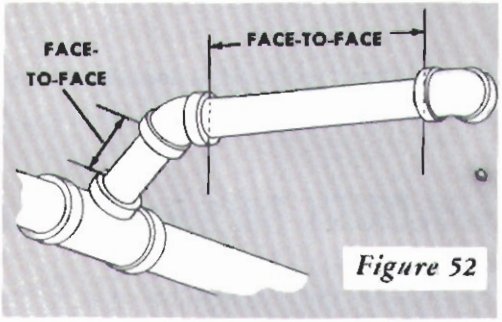


Figure 52

DISTANCE PIPE IS SCREWED INTO FITTINGS

Size	Distance	Size	Distance
½"	½"	1¼"	⅝"
¾"	½"	1½"	⅝"
1"	⅝"	2"	¾"

CUTTING

Use either a hacksaw or a pipe cutter. Proper threading of the pipe depends largely on how the pipe is cut. If not cut squarely across and cleanly, threading will be difficult. For this reason, the pipe should be held in a pipe vise. Mount the vise solidly. Place it so there is ample room on each side for handling the longest pipe to be cut or threaded.

Using A Hacksaw

Mark the pipe where it is to be cut and tighten it in place in the vise. Hold the saw at a 90° angle to the pipe, and make your cut with smooth, even strokes. With the pipe still positioned in the vise, remove the burrs with a pipe reamer or round file.

Using A Pipe Cutter

Loosen the cutter wheel by turning the handle until the cutter will slide over the pipe (*figure 53*). Place the cutting wheel exactly on the cutting mark, and tighten the handle until the cutting wheel is forced slightly into the pipe. Apply thread cutting oil to the cutter wheel and the pipe. Now rotate the cutter one complete turn around the pipe. Tighten the cutter wheel and go around the pipe again. Repeat this operation until the pipe is cut off. Remove the burrs with a pipe reamer (*figure 54*) or file.

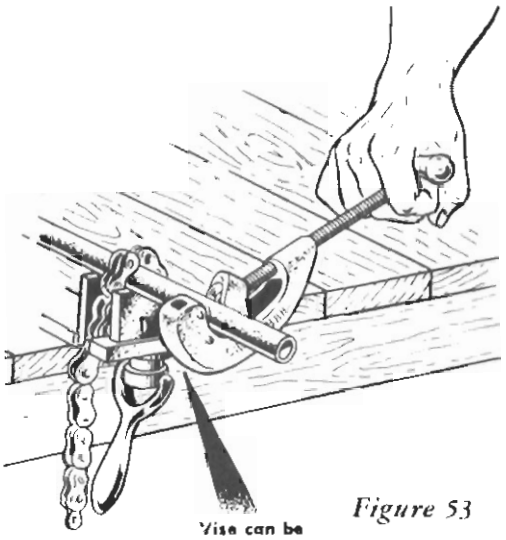


Figure 53

Vise can be mounted on a bench or a stand

THREADING

This operation should be performed carefully to insure clean-cut threads for engagement with the fittings. Pipes are threaded by using a stock and die. The stock contains a receptacle on one side in which the die sets, and an opening on the other side for inserting a guide. The guide makes it possible to start the die squarely.

Each die is marked with its size. Select the same size die as the size of the pipe to be threaded. Loosen the thumb nut on the stock, slide the cover plate over, and insert the die. Make certain the printing on the die faces up toward the cover. Slide the cover plate back in place and tighten the thumb nut.

Either an adjustable guide or individual guides can be used. Each individual guide is marked for the size pipe it fits. Select the correct size guide, insert it in the opening in the stock, and tighten it in place with the lock bolt.

Place the pipe in the vise, and slide the stock over the end of the pipe with the guide on the inside. Push it onto the pipe until the die catches the pipe. Turn the stock slowly in a *clockwise* direc-

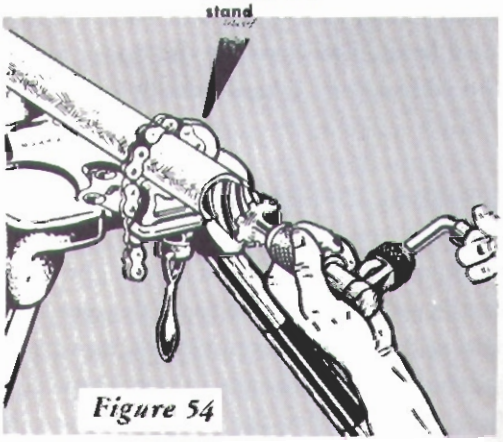


Figure 54

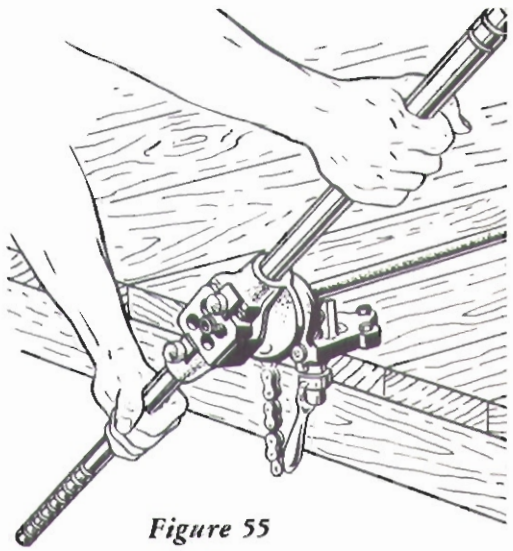


Figure 55

tion, keeping the die pressed firmly against the pipe. After cutting just enough thread so the die is firmly on the pipe, apply plenty of cutting oil to the threads of the die and those on the pipe.

Continue to turn the stock, backing off about 1/4 turn after each 1/2 turn forward — to clear away the chips. Continue the threading, applying cutting oil often, until the pipe protrudes to the face of the die (*figure 55*).

To remove the tool after threading, turn it *counterclockwise.* Wipe off the surplus oil, and all chips from the thread — before using the pipe.

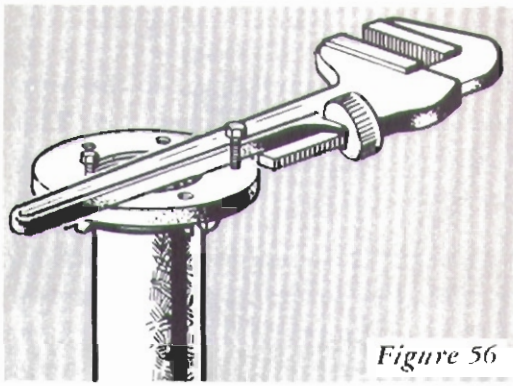


Figure 56

Use an open-end, adjustable-head, or monkey wrench on nuts, unions, valves — and to hold fittings which have flat surfaces to be gripped. Never use a pipe wrench on any plated or polished pipe, as the finish will be marred if you do. Use a pipe wrench, however, to hold all other pipe. Do not tighten the jaws of a pipe wrench too tightly or they will tend to crush the pipe (this wrench gets tighter when you turn it). Always put pipe joint compound on the male threads before screwing pipe into a fitting. Screw the pipe all the way in, to the distance indicated in the table (*see MEASURING*). Pull threads up tight — but do not force tighten. Excessive tightening breaks fittings.

Where it is necessary to install flange unions, take them apart and assemble the pieces to the pipe as shown (*fig. 56*).

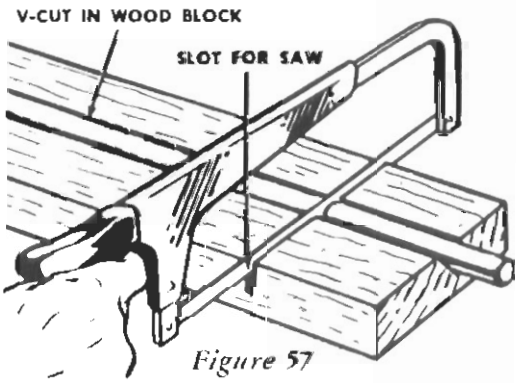


Figure 57

RIGID COPPER TUBING

MEASURING

This tubing is measured *face-to-face* in the same manner as galvanized steel pipe (*p. 30*) — but add on the depths of the soldering hubs in the fittings to be used.

CUTTING

If considerable tubing is to be cut, you will find it advantageous to build a jig (*as shown in figure 57*) for holding the tubing and guiding the hacksaw. This will enable you to get an even, square cut. To cut the tubing, use a fine tooth hacksaw blade (preferably a No. 24 blade). You can also use a tube cutter, without a jig. After the tubing is cut, remove all burrs by reaming.

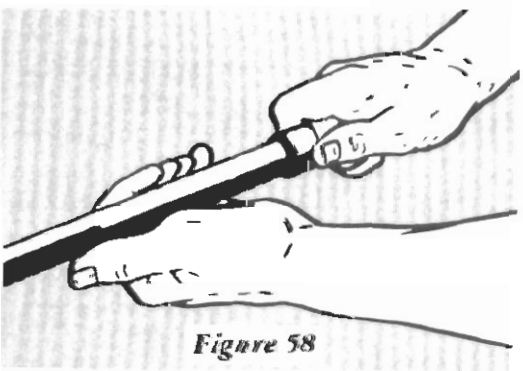


Figure 58

MAKING CONNECTIONS

Clean and brighten the end of the tube — and the inside of the fittings to be soldered — with steel wool or fine emery cloth. Clean surfaces are essential in forming good solder connections. Do not use a file as it will score the surface. Also, the tube end *must be perfectly round,* not out-of-round or dented.

Apply a thin coat of non-corrosive flux or soldering paste on the cleaned portion of both the tube and fitting. Place the tube in the fitting and rotate it a few times to spread the flux coat evenly (*figure 58*). Remove excess flux from outside of the fitting.

ASSEMBLING PIPES (Cont.)

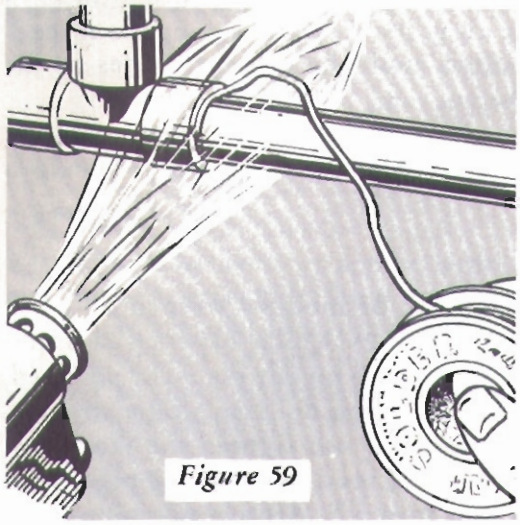


Figure 59

Heat the connection evenly with a blowtorch by applying the flame directly to the fitting. Use two blowtorches simultaneously on the larger (1¼ to 2 inch) sizes, applying one to each side of the fitting to obtain uniform heating. When the flux begins to boil and bubble out, touch the end of your solder stick to the edge of the fitting (*figure 59*). If the fitting and tube are hot enough (which they should now be), the solder will flow and fill the joint immediately. (The solder will be drawn into the space between the tube and fitting by capillary attraction — even if it has to travel upward into the fitting). When a line of solder shows completely around the joint, the connection is filled with solder. Do not hold the flame on the connection after it is filled, as further heating will only result in loss of solder from the connection (which might make it necessary to start over again).

When the joint is completed, remove all surplus solder with a small brush or soft cloth, while the metal is still hot.

CAUTION

Make sure the pipe and fitting do not move while the solder is cooling. Movement may result in a weak joint. If you have not overheated the connection, the solder will be firm in less than a minute.

If you make other solder connections to the same fitting, wrap the finished joints with wet rags. This will prevent the solder in these joints from melting.

If you find it necessary to unsolder a connection, simply heat it until the solder runs — then pull the tube out. Use wet rags (as above) to keep from unsoldering other connections to the same fitting.

SMOKE PIPE

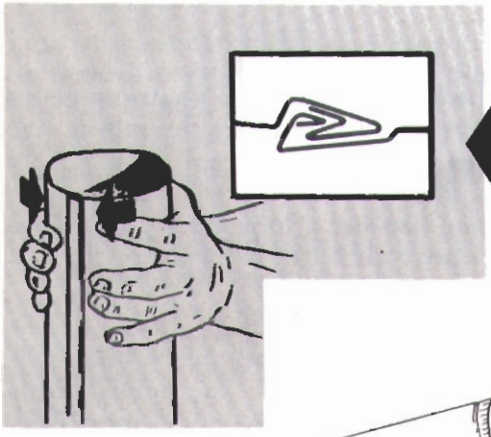


Figure 60

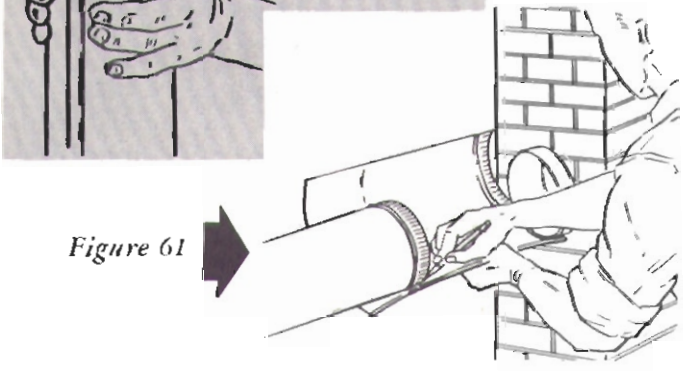


Figure 61

SHAPING NESTED PIPE

Smoke pipe is generally shipped open so that it can be nested for compact packaging. With your two hands (*fig. 60*), shape the pipe round — slightly overlapping the edges. Press the *tongue* (on one edge) into the *slot* (on other edge), and allow the seam to "snap" closed. Do *not* attempt to hammer the seam shut.

SHORTENING PIPE SECTIONS

If a short length will be needed, measure and cut this *before* shaping the pipe round (as above). Always plan to cut off the *plain* end (*fig. 61*), not the *crimped* end. Use tin snips (*fig. 62*) to cut the open pipe — then use a screwdriver (*fig. 63*) to pry open the seam edge where the snips have squeezed the slot closed.

JOINING PIPE SECTIONS

The *crimped* end of one section (or elbow) slides inside the *plain* end of the adjoining section (or elbow) *(fig. 64)* — and the crimped ends must always face *away from* the boiler. Push the crimped end *all the way in* for a tight joint. For neatness, keep the seam edges in a straight line. For best results, especially if run is long, use two sheet-metal screws *(fig. 65)* to secure each joint. An awl or ice pick can be used to punch the holes for these screws.

The last joint should be closed with a drawband *(fig. 66)*. Chances are that one of the sections will be a shortened one — and the drawband will cover the slight gap which would otherwise result.

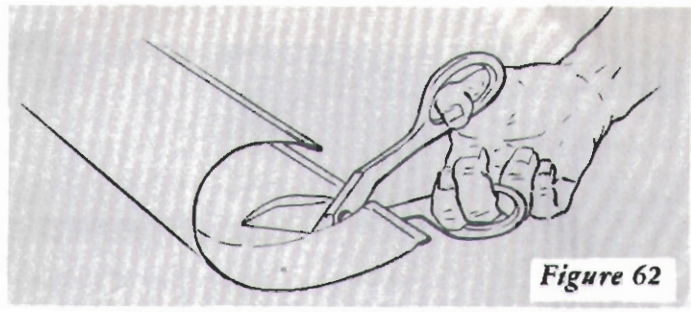


Figure 62

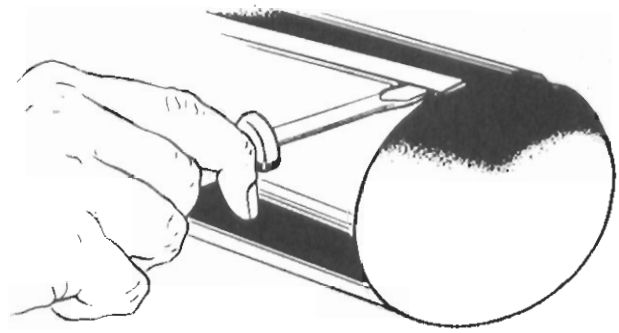
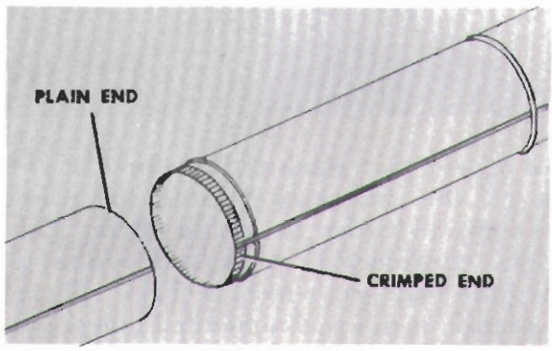


Figure 63

Figure 64



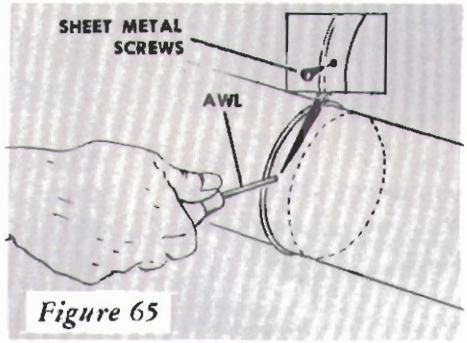


Figure 65

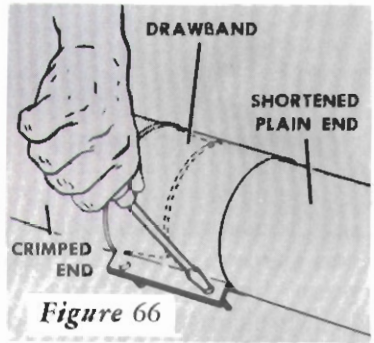


Figure 66

Painting or Covering Radiation Units

HOMART radiation units are painted with one coat of primer before shipment. When your installation is finished, you can paint them any color except gold or aluminum. Radiant and convector panels, which blend into the baseboard, are inconspicuous when they are painted the color of the walls in the room. Radiators and convector cabinets also look best when they are painted the same color as the walls.

If your installation is made in the winter, wait until a fairly mild day, when the heat can be turned off, before painting the radiation units. After the units have cooled, apply the paint and allow it to dry the full time recommended by the paint manufacturer — before turning the heat on again.

It is not necessary to remove an old coat of paint before applying another color, when redecorating. The units will continue to heat perfectly with as many as five coats of paint.

It is well to remember that baseboard radiant panels and cast-iron radiators heat by means of radiation — that is, by emitting invisible heat rays which travel outward to, and will heat, any solid objects in their paths. These heat rays are easily absorbed by dark and/or dull surfaced objects, which then become heated; but will "bounce" off bright and shiny surfaces. On the other hand, baseboard convector panels and convector cabinets heat by convection — that is, by a flow of air through the unit, which heats the air before it circulates back into the room.

Figure 67

CONCEALING PIPES

There is, of course, no problem to installing pipes in a house that is under construction. If risers must run through first-floor partitions, you can install them before finishing the partitions, and the locations of all joists and studs will be obvious, so that these can easily be avoided.

When the house is already constructed, however, you may be faced with two problems: *1)* What to do about risers which must go through first-floor rooms, either from the basement up to the floor above, or from the attic down to the first-floor radiation units; or *2)* How to locate wall studs and/or floor joists which might be in the way.

You can, of course, plan the locations for risers — then strip off the necessary plaster (or other partition finish) in order to install them. This often involves considerable work, and replastering the partition may prove to be difficult. Therefore, this solution is not recommended unless you are already planning major redecorations which would make the work necessary.

It is easier, quicker and more economical to run risers close against partitions — either in the open room or in a closet. If in the open room, they can then be painted to match the walls, or can be decoratively boxed in, as suggested in the illustrations *(fig. 67)*.

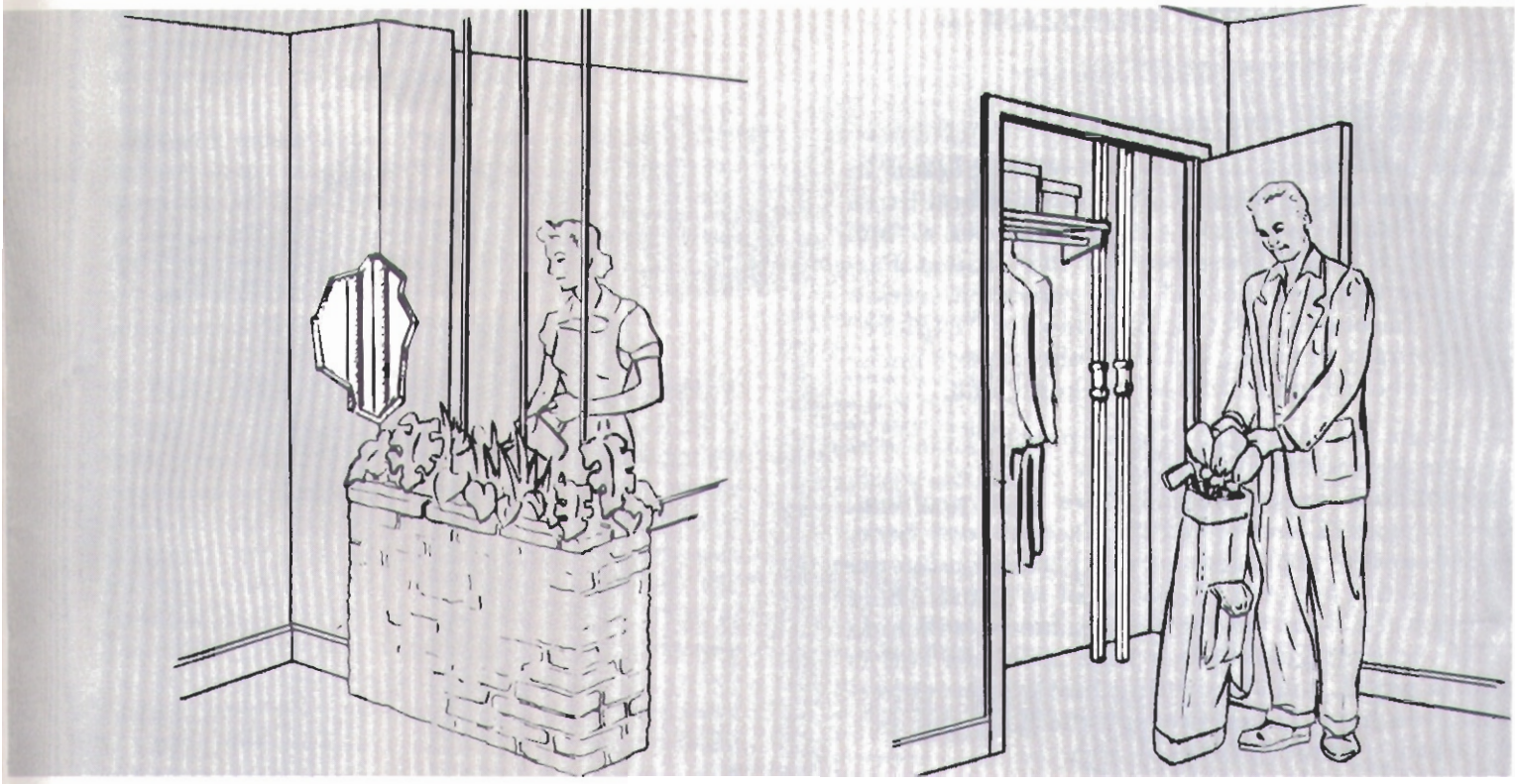
RUNNING RISERS INSIDE PARTITIONS

The Problems Involved

The accompanying illustration *(fig. 68)* will familiarize you with the usual arrangements of studs (in a partition) and joists (in a floor). Regardless of the type of wall finish used (plaster on wood or metal lath, plasterboard, etc.) or the type floor covering used, studs and joists are generally spaced 16 inches apart, center-to-center. If you are running a riser through an old partition, all you need do then is locate one stud — and plan to set the pipes between this stud and the next one.

To run risers in a partition you will have to drill through the *floor plate* — and, if your run goes to the floor above, through the *ceiling plate*. In rare cases you may also find a *header* in the way. Should you run into a header you will either have to open the partition to drill through it, or move over to the next stud space which is clear.

Lines and Risers



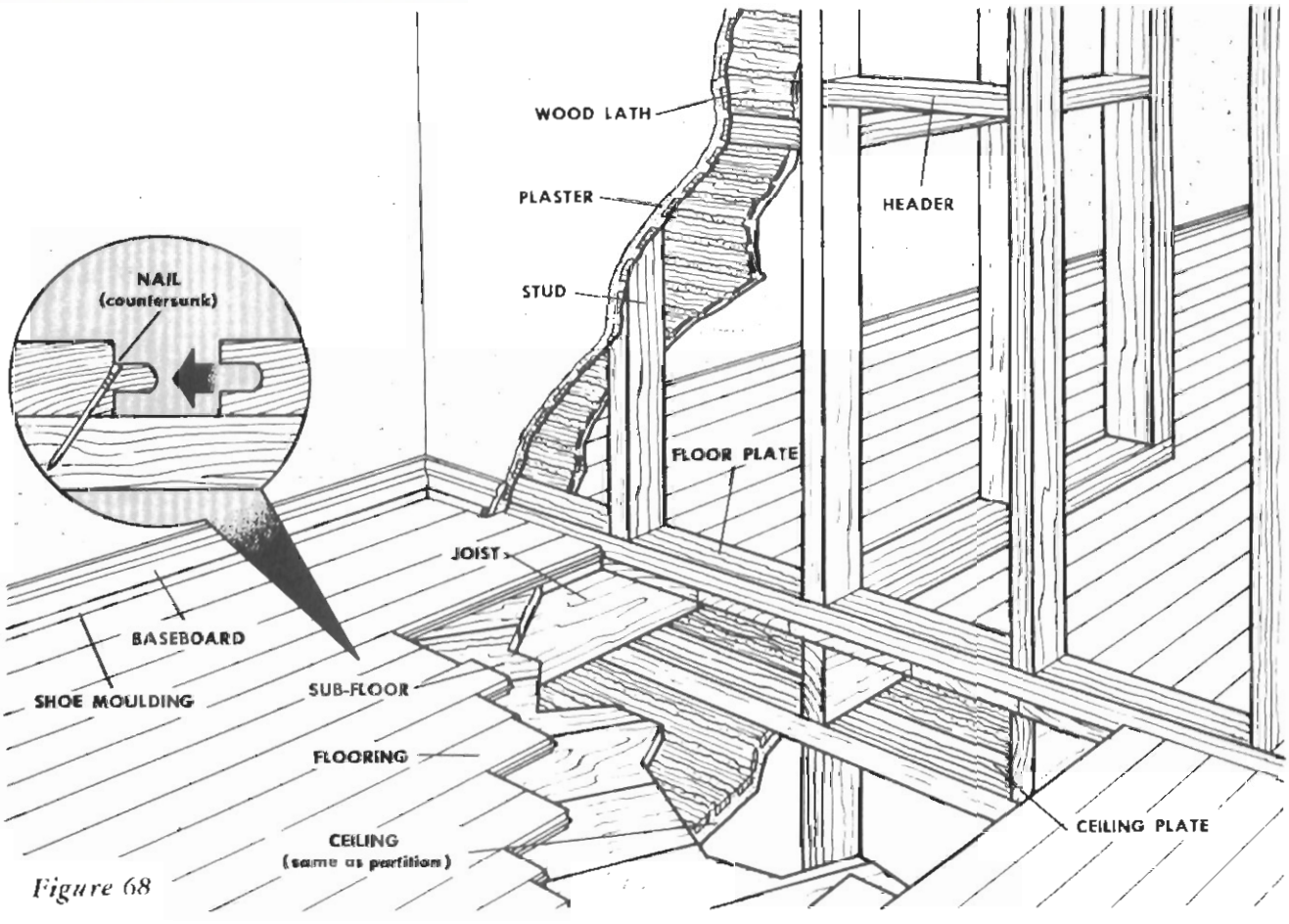


Figure 68

Locating Studs and Joists

There are several ways to find studs hidden in partitions. One is to tap with a hammer and listen for the "solid" sound when tapping over a stud. Another is to use a commercial *stud locator.* Perhaps the simplest method is to remove a section of the baseboard — then continually "explore" by driving a finishing nail into the plaster under the baseboard, until the nail strikes a stud.

To locate first-floor joists is no problem — these can be seen from the basement or crawl space. Second-floor joists present more of a problem. Best remove a section of the second-floor baseboard, and a small area of the plaster under the baseboard *(fig. 69).* Now drill a small hole through the floor where the baseboard will hide it. If the drill goes deeper than 2 inches and is still in wood, you are drilling into a joist. Otherwise, you have drilled through the floor and subfloor into a clear (joist-free) area.

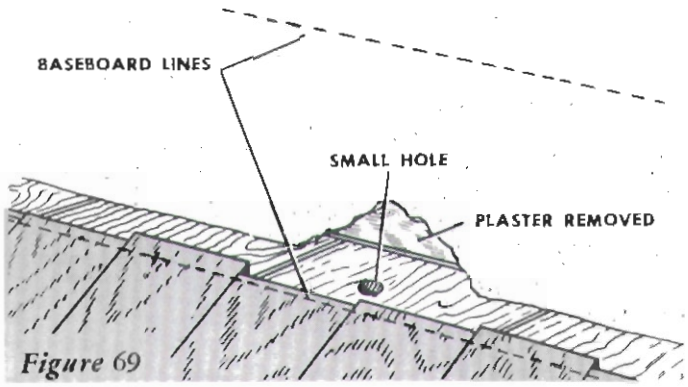


Figure 69

Drilling Riser Pipe Holes

If your riser runs from the basement up to a second-floor radiation unit — and is being installed inside an existing partition — it must (as already noted) pass through the floor and ceiling plates of the first-floor partition, and through the floor plate of the second-floor partition above. The two top holes can be drilled simultaneously from above — by using a ratchet-type hand auger and a long (14 inch, or longer) bit. You will have to remove enough plaster to make room for the auger and bit, then drill straight down through the center of the second-floor floor plate and the ceiling plate below it. Drill a 1¼-inch hole. Afterwards, locate a spot *directly* below these holes (by taking careful measurements), then — from the basement or crawl space — drill the third hole through the first-floor floor plate.

If your riser runs from a first-floor radiation unit up into the attic, you will have but one hole to drill: through the ceiling plate of the partition. This is easily done from in the attic.

RUNNING RISERS IN THE OPEN ROOM

Locate studs and joists in the manner already described. Plot the locations for your holes carefully. If the riser passes through the first-floor ceiling into a floor (or attic) above, drill this hole before drilling any other holes required. Drill a 1¼-inch hole from above, being careful not to break through the first-floor ceiling plaster. Now drill a small hole through the ceiling plaster (to locate the hole) — then go below and drill the larger hole upward through the plaster, so as not to chip or break it.

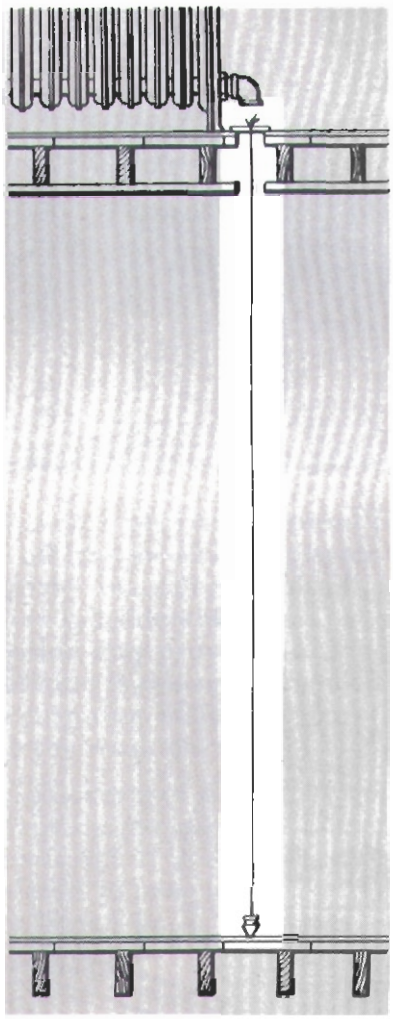


Figure 70

If a hole through the first floor is also required, use a plumb bob and line *(fig. 70)* to locate it — then drill down through the floor.

The Right Kind of Chimney

GOOD DRAFT MEANS EFFICIENT HEATING

By far the most common cause of inefficient heating is a faulty draft. No fire — whether coal, oil or gas — will burn at top peak without a *constant supply of fresh air flowing through it.* "Burned air" (the oxygen burns out of it) is *hot* air. If given a good chimney it rises quickly, carrying with it the gases and soot of the fire so that fresh air can flow in to the flame. But if the chimney is too short or too small to pass all the burned air, the fire becomes partially smothered in its own soot and gases.

IF YOU ARE BUILDING A NEW CHIMNEY

Check the points listed *(fig. 71)*, and see to it that your chimney is built to these minimum requirements. Use only solid masonry units (not porous materials), and an approved liner material at least 5/8 inch thick with smooth mortar joints. Keep the inner edge of the thimble flush with the inner face of the flue. If you incorporate two flues in the one chimney (a second one might be required for other units), keep them entirely separate. Never have a single flue to serve various units which burn different fuels — nor join your boiler, to a flue which also serves a fireplace or similar opening. Keep wood or other combustible material at least 2-inches from the outer side of your chimney. Fill the space between with a non-combustible insulation, such as asbestos. Metal lathe and plaster, however, can be laid directly against the chimney.

IF YOU HAVE AN OLD CHIMNEY

Inspect it carefully, keeping in mind all the points listed *(fig. 71)*, and the minimum dimensions given in the accompanying tables. Check the flue to which you will join your boiler, especially if chimney has two flues, to make certain: *1)* That it is airtight throughout; *2)* That it is entirely separate from the adjoining flue(s); *3)* That the thimble and clean-out door are properly installed; and *4)* That it is not clogged by dirt or an ornament. If it does not pass the above check the chimney will be unsatisfactory for any type of fuel — and this also applies to an unlined chimney in which the bricks are cracked or the mortor is loose. An unlined chimney which is solid and tight may be satisfactory for other fuels, but will probably not be satisfactory for burning gas. You will improve your use of any fuel by properly lining the chimney — or by rebuilding the entire chimney, if necessary.

A MASONRY CHIMNEY

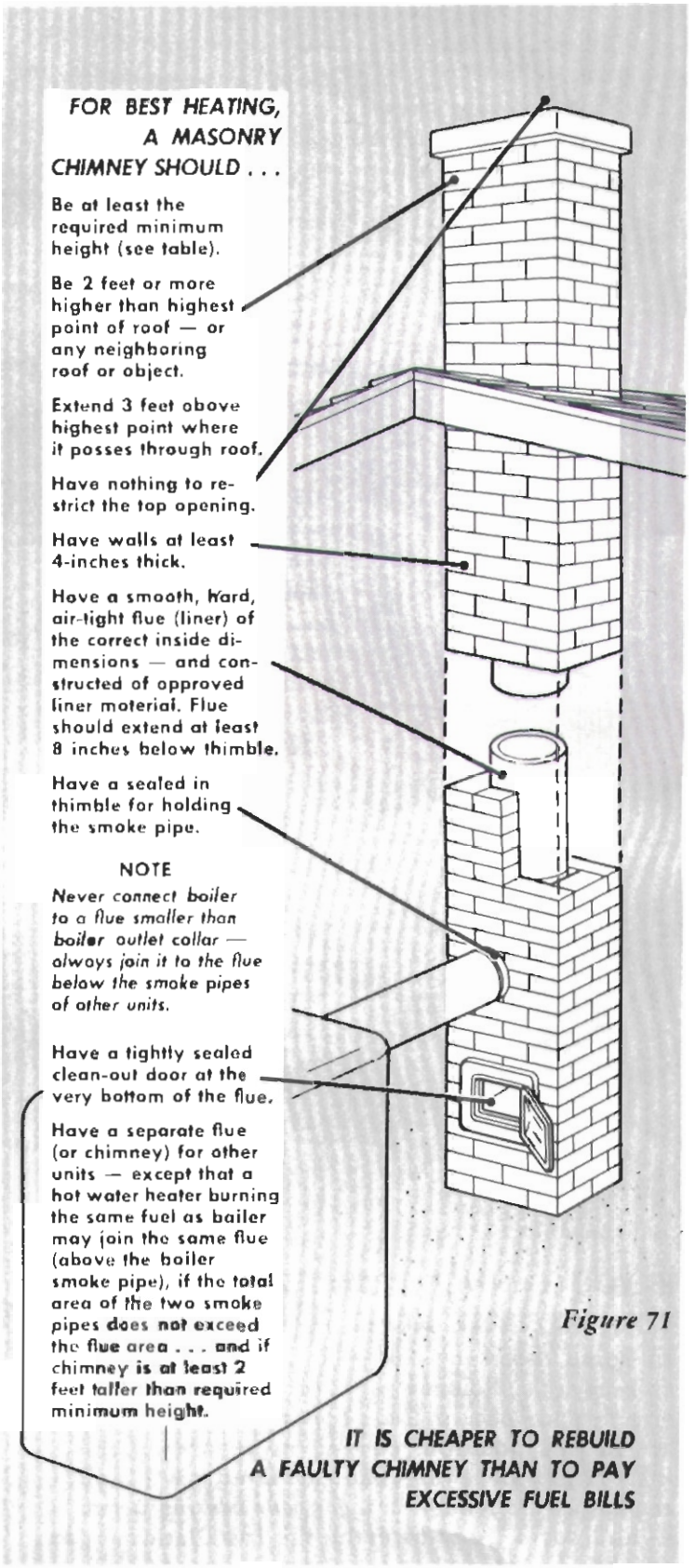


Figure 71

IT IS CHEAPER TO REBUILD A FAULTY CHIMNEY THAN TO PAY EXCESSIVE FUEL BILLS

Chimney (cont.)

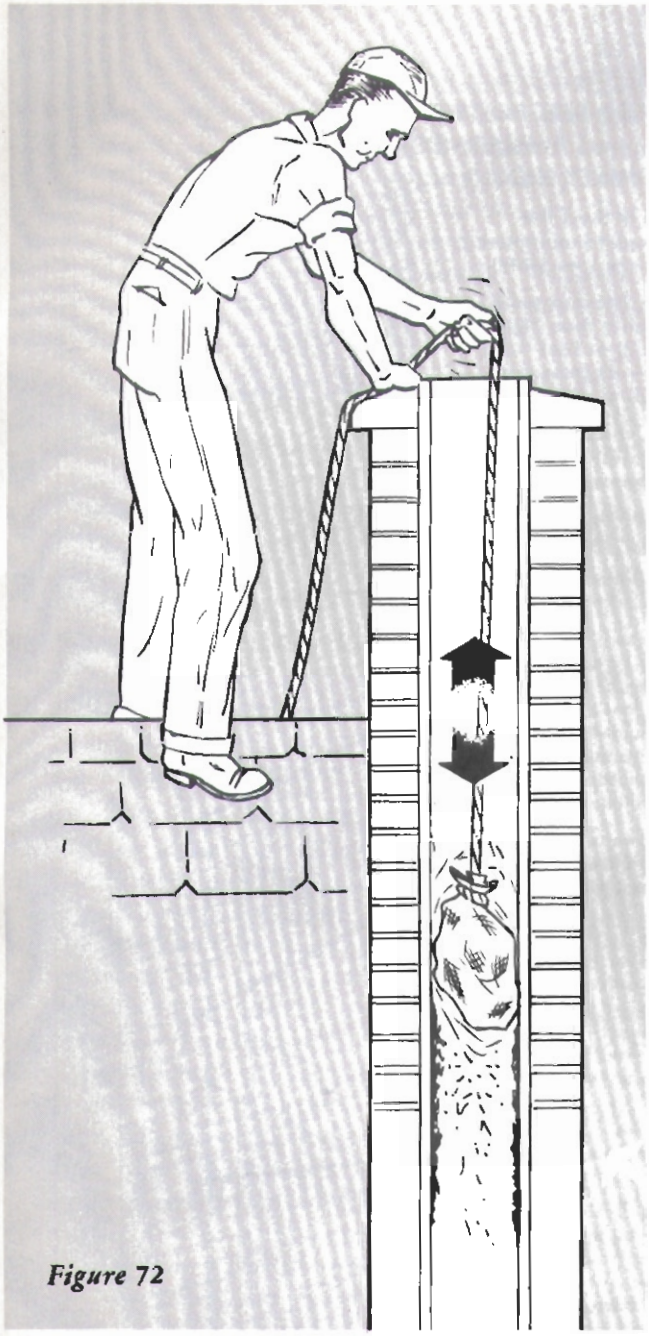


Figure 72

IF YOU CANNOT PROVIDE A CHIMNEY WITH NORMAL ADEQUATE DRAFT

In some cases it is impractical to provide a chimney of sufficient height, or with an adequate size flue, to obtain the necessary draft. If you are in this position, consult us regarding the installation of a Mechanical Draft. We will recommend a *suitable type for your heating system* — and advise how to make the installation.

CHIMNEY SPECIFICATIONS

NOTE

All chimney heights are to be measured from top of thimble to top of flue.

*GAS-FIRED BOILER

GAS INPUT (Btuh)	FLUE AREA IN SQ. INS.	
	10-FT. CHIMNEY	15-FT. CHIMNEY
15 to 25,000	7	7
25 to 50,000	19	12
50 to 100,000	28	28
100 to 200,000	50	50
200 to 300,000	78	63

± *OIL-FIRED BOILER

NOZZLE SIZE (Gals. per Hr.)	FLUE HT. (In Feet)	FLUE AREA (In Sq. In.)
0.75 to 1.00	12	38
1.00 to 1.35	12	49
1.35 to 1.75	13	56
1.75 to 2.50	13	77

±The heights and areas shown are the minimum allowable. If possible, use a 15-ft. high chimney. A larger area flue can be used if not more than twice the size listed above.

*If your home is located more than 2,000 ft. above sea level, add 3-ft. to chimney heights for gas- and oil-fired boilers. If above 5,000 ft., consult us for advice.

HAND-FIRED BOILER

θBOILER SIZE (Radiation Area)	FLUE HT. (In Feet)	FLUE AREA (In Sq. Ins.)
0-300 Sq. Ft.	26	57 to 74
300-400 Sq. Ft.	28	57 to 74
400-550 Sq. Ft.	30	74 to 87
550-700 Sq. Ft.	35	87 to 117

θ*Refer to specifications furnished with your boiler*

STOKER-FIRED BOILER

Refer to the Hand-Fired Table above and reduce flue heights and areas to 75% (¾) of the figures given.

HOW TO CLEAN YOUR CHIMNEY

It is good practice to inspect your chimney flue once a year, and to clean it out if necessary. Use a burlap bag with a brick or two inside. Tie this at the end of a long rope and "jiggle" it up and down throughout the whole length of the flue. Loosened soot and dirt can then be removed through the clean-out door.

A PRE-FABRICATED CHIMNEY

The use of a pre-fabricated chimney (or vent) — especially when you have an attic or utility room boiler installation *(fig. 73)* will often prove more economical and entirely satisfactory. However, before planning such a chimney, consult your local code for specifications and limitations.

There are several generally approved types of pre-fabricated chimneys. Some employ double-wall metal sections which are assembled like ordinary smoke pipe. Some are constructed of tile-like materials. Still others consist of hollow building-block sections which are erected much like a brick chimney. The kind of fuel you will burn may require use of one type or another. If you need advice, consult us — *we will be glad to make proper recommendations for your installation.*

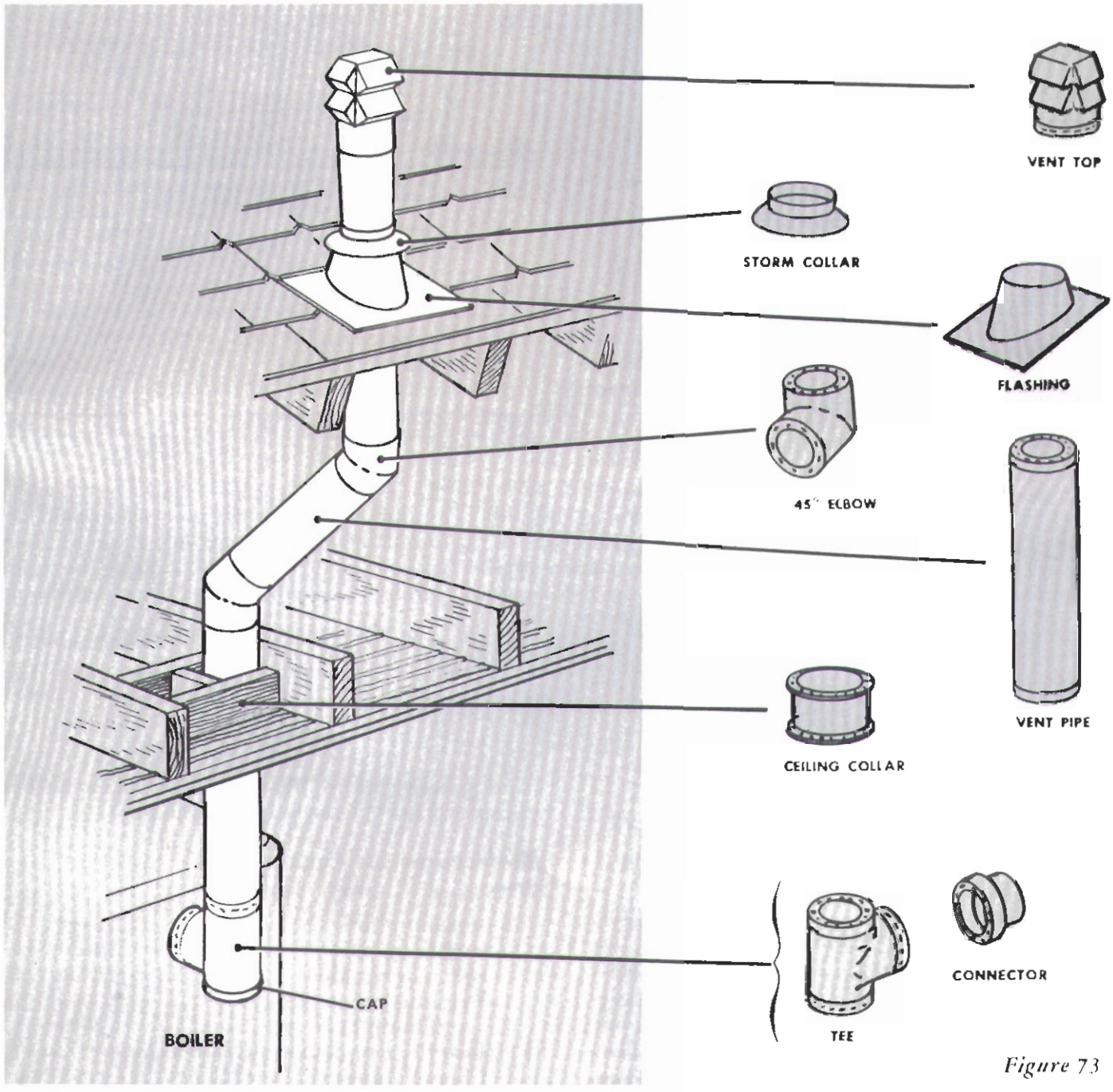


Figure 73

Gravity HOT-

WHY THIS SYSTEM IS STILL USED

Although the greater flexibility of the forced hot-water system makes it the better choice for the majority of installations, there is still a definite place for the gravity system in today's heating picture. And the gravity hot-water system has one distinct advantage over any other type. It does not depend on an outside source of power — such as the circulator, which is electrically operated, in a forced hot-water system. Circulation is provided by the boiler's heating energy, and mechanical breakdown is virtually impossible. When coupled with a hand-fired boiler, the gravity hot-water system is the logical selection for rural areas where there is no electricity, or where power failure is always threatened.

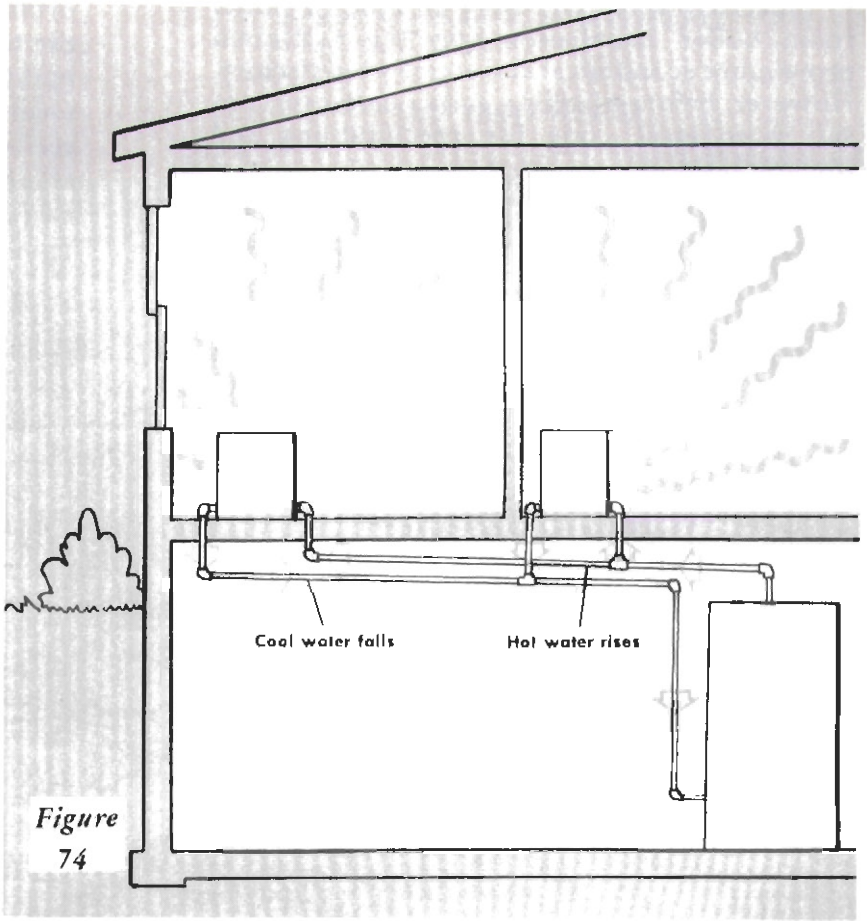


Figure 74

HOW THE SYSTEM OPERATES

When water is heated in the boiler it expands and becomes less dense (lighter) — then rises through the supply piping and into the radiation units in the rooms above *(fig. 74)*. The cooler (heavier) water, in turn, flows down through the return piping to the boiler, to be reheated. Thus, circulation is effected entirely by the difference in weight between the hot water and the cooler water. As long as there is a fire in the boiler, the water will circulate and heat your home.

INSTALLING A GRAVITY SYSTEM

General Information

Installation of your gravity hot-water system is simple and easy. The sequence of steps and most of the installation details are the same as for a forced hot-water system *(p. 20-27)*. Much the same parts are used in both systems, and the working procedures *(p. 30-39)* are identical. Remember, however, that cast-iron midget radiators only, are used with this system. Before you start, read this entire section on gravity systems, which covers only the differences between forced and gravity procedures — and study *your plan*, prepared for you by Sears consultants.

References for Operations Covered in Other Sections

WATER SYSTEMS

Your Plan

Just as in the case of a forced system, *your gravity system plan* includes all the information you need to make the installation. Read the instructions covering a forced-system plan *(p. 2-3)* for a clear understanding of *your plan,* which will resemble the plan illustrated here *(fig. 75). Figure 76* shows how the system in this typical plan will look when installed.

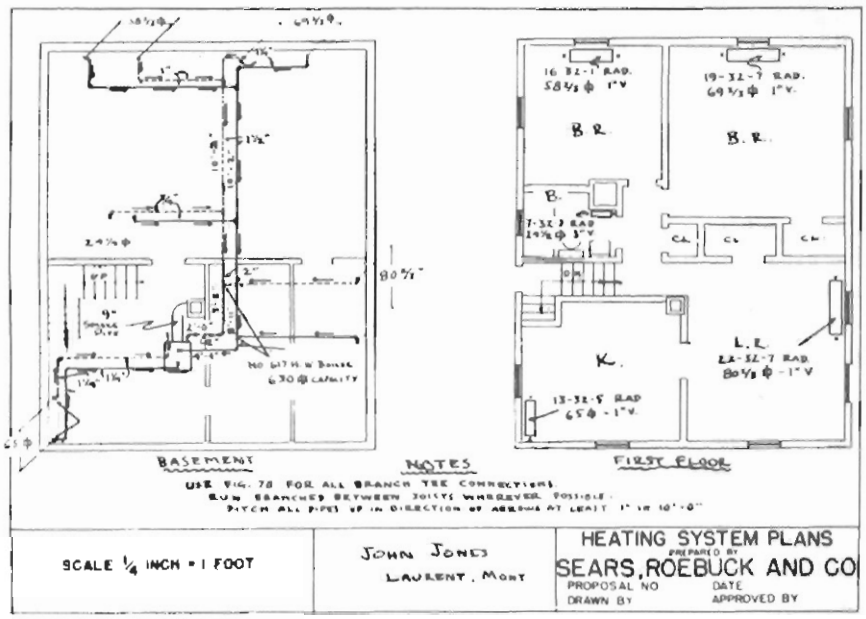


Figure 75

Note that the piping in *your plan* is extremely simple. It is important that you avoid using unnecessary fittings which might restrict the circulation. Gravity system mains are reduced in diameter as they run out farther from the boiler. The correct diameter of every length of pipe is specified on *your plan.* Follow these sizes exactly — correct sizing plays a big part in obtaining the circulation your system needs to function satisfactorily. Also, because all pipe larger than one inch in diameter is cut to length for you, *your plan* will show the length of each individual pipe alongside it. Arrows are placed alongside all of the pipes to indicate the direction in which the piping must be pitched upward. To insure proper circulation, all pipes in a gravity system *have to be pitched up from the boiler to the radiator* at least one inch for every 10 feet of pipe length.

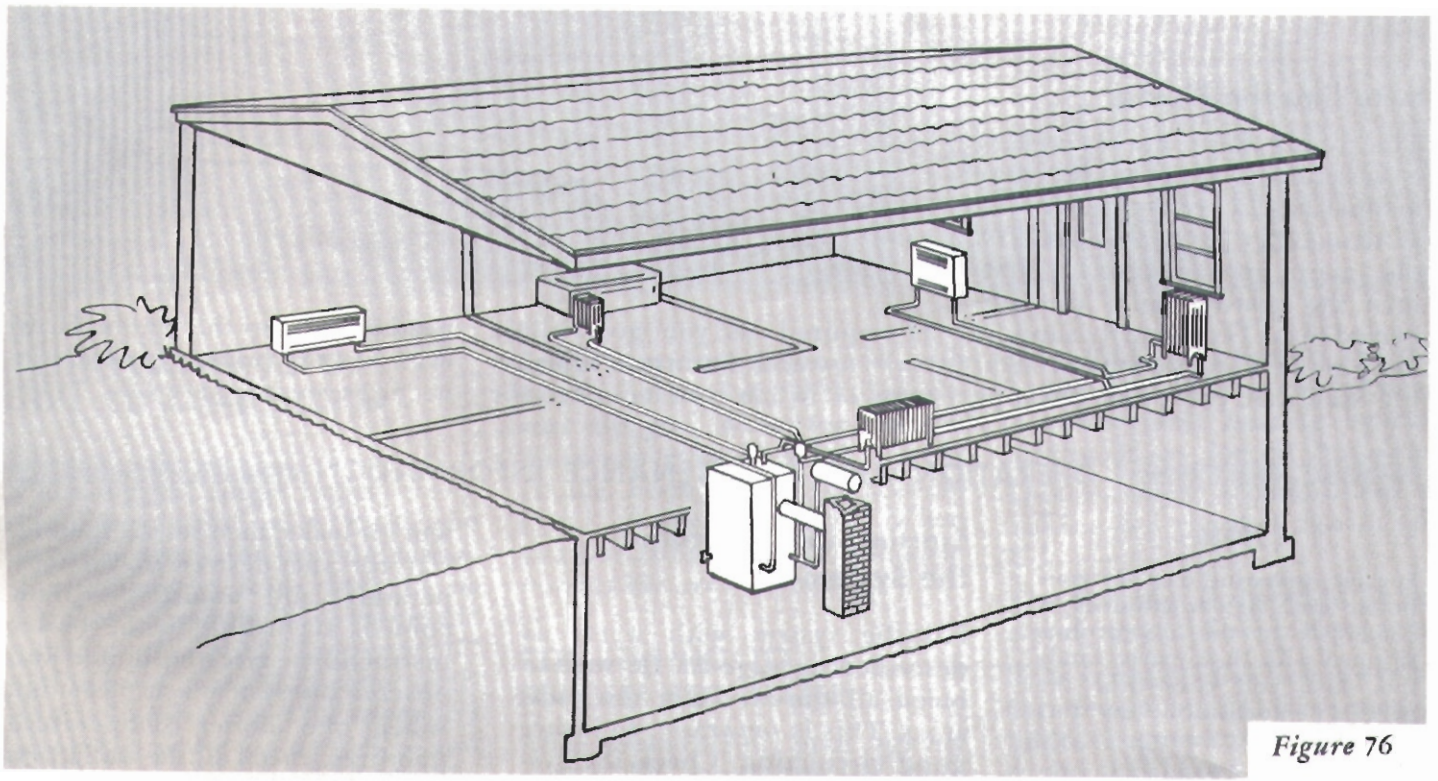


Figure 76

GRAVITY HOT-WATER SYSTEMS (Cont.)

Connections at the Boiler

Figure 77 (p. 42) shows typical connections at the boiler for a gravity hot-water heating system. The operating instructions supplied with your boiler include a detail drawing that illustrates the specific parts needed to connect the boiler to the water supply and mains. This detail, and all of the calculations we used in making the layout of your system, are based on a basement ceiling height of *at least 6½ feet.* If your basement ceiling height is only 6 to 6½ feet, you must install your boiler in a pit that will lower it enough to make the ceiling 6½ feet above the base of the boiler. If your basement ceiling height is less than 6 feet, it will be impractical for you to install a gravity system — *do not attempt it without first consulting us.*

Carefully study the instructions shipped with your boiler, and *your plan* — before installing and connecting up the boiler.

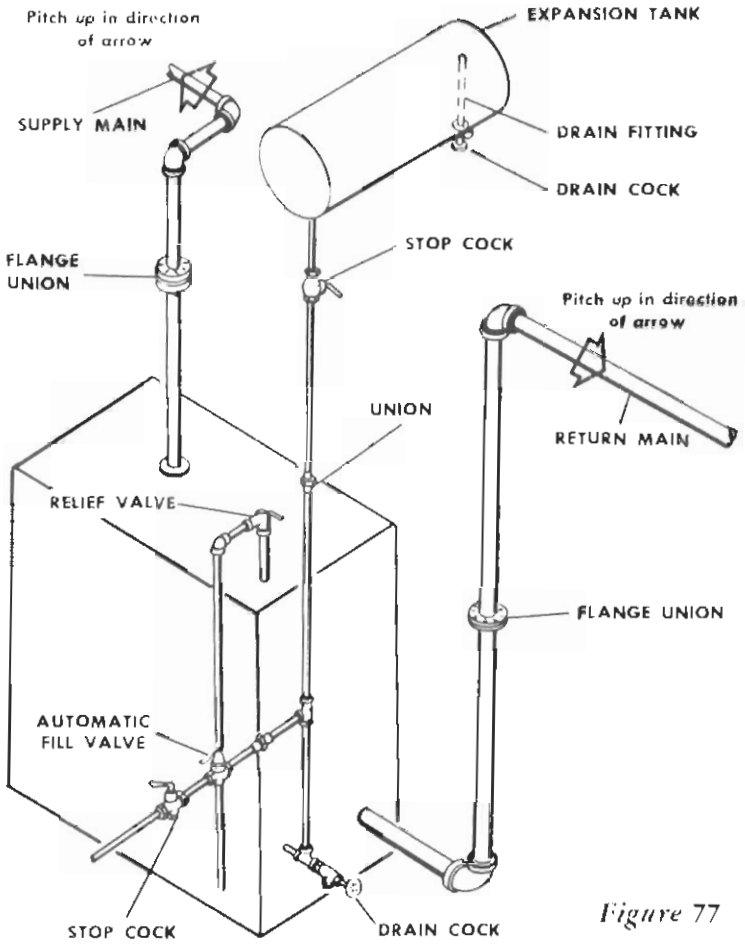


Figure 77

Installing the Piping

The piping for a gravity system is assembled in much the same manner as a one-pipe forced system *(refer to p. 23)*: that is, the main is constructed first, then the heating units are connected to it. Temporarily support the pipe as it is assembled, making sure that you pitch the pipe as required, as you go. Follow *your plan* and the instructions on *page 24* when you connect the heating units to the mains. However, use the branch piping connections shown here *(fig. 78)*.

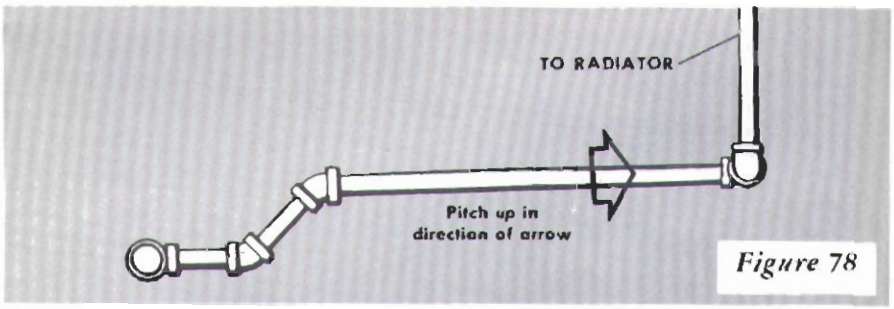


Figure 78

OPERATION AND MAINTENANCE INFORMATION

NOTE

Specific operating data for your boiler and system controls is contained in the instructions shipped with these parts. Study this data, and read over the general information on this page, *before* attempting to operate your system.

Starting and Operating the System

Fill the system with water as described on *page 28.* Be sure to bleed all the air from the radiators. This is *important*, to insure good circulation. Check the system for leaks, then set the thermostat for the desired room temperature and adjust the limit control according to the boiler instructions. Fire the boiler and observe the system as it heats up. When the boiler temperature stabilizes, check all the radiators.

If some of them have failed to heat up, or if rumbling water hammer noises are heard, shut the system down and recheck to make certain that all piping has the necessary pitch. After adjusting the hangers on any improperly pitched pipes, your system should operate perfectly. Refer to *page 28* for more detailed information on expansion tank operation and thermostat setting.

Maintenance

Because the gravity system is so simple, there is virtually no maintenance required. The boiler instructions will cover any maintenance it needs. As with all heating systems, it is best to have your gravity hot-water system inspected at least once a year by one of our trained service specialists.

IMPROVING

AN EXISTING GRAVITY SYSTEM

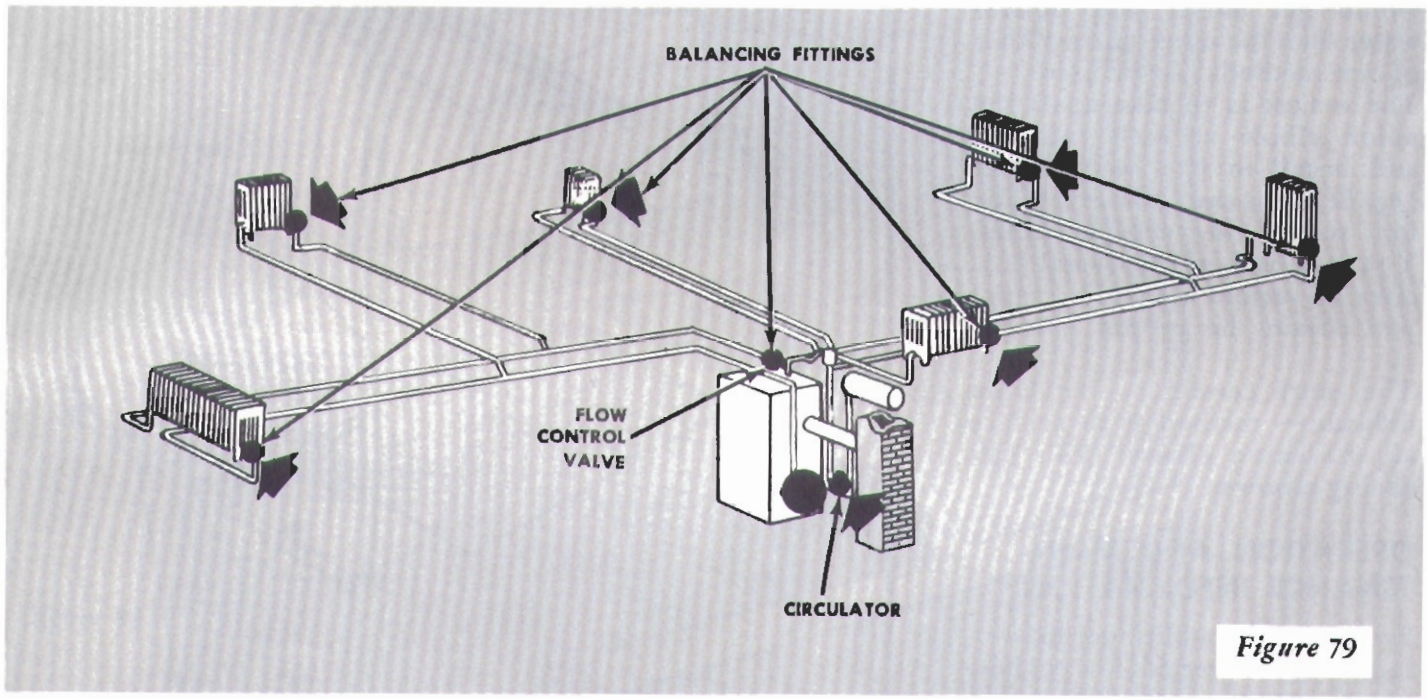


Figure 79

CONVERTING TO GAS, OIL OR COAL STOKER

The biggest single improvement you can make in a hand-fired gravity hot-water heating system is to convert it to gas, oil or stoker operation. With automatic firing you gain "fire control" which, in turn, eliminates over- or under-heating. This gives you comfort while saving fuel — and adds years to your boiler's life.

Select your conversion unit with extreme care. Let Sears consultants aid you. Write for the *free conversion estimate blank* of your choice: *Form F6432 (Gas); F6194 (Oil) or F6126 (Stoker).* When you buy from Sears, *full detailed instructions are included.*

CONVERTING TO FORCED HOT-WATER

After modernizing your gravity system by converting to automatic firing, you can go one step farther and obtain the ultimate in comfortable heating by converting it to forced hot-water.

This is easily accomplished by making the changes shown *(fig. 79).*

The first step is the addition of a circulator and flow control valve.

If, as is usually the case, there are two return mains, they must be joined together *(fig. 80)* ahead of the circulator.

The supply mains must also be joined together ahead of the flow control valve.

The installation of the circulator requires alteration of the control wiring so that the thermostat will control its operation — but wiring diagrams in the conversion unit instructions explain how to do this with a minimum of effort.

The remaining step is to provide a means of balancing the various radiators. Without such means the radiators nearest the boiler would get more (and hotter) water than the other units. Either of two methods can be used.

The easiest is to take apart the union elbow at each radiator, and install in it a lead washer *(fig. 81)*. Use the table as a guide for sizing the washer holes. You may have to try several hole sizes at various radiators before you obtain the proper balance.

The more certain — but more difficult — method is to replace all the union elbows with balancing elbows.

OPERATION AND MAINTENANCE INFORMATION

Except for the additional balancing, your converted forced hot-water system is operated and maintained in exactly the same manner as the basic forced system *(refer to p. 28-29)*.

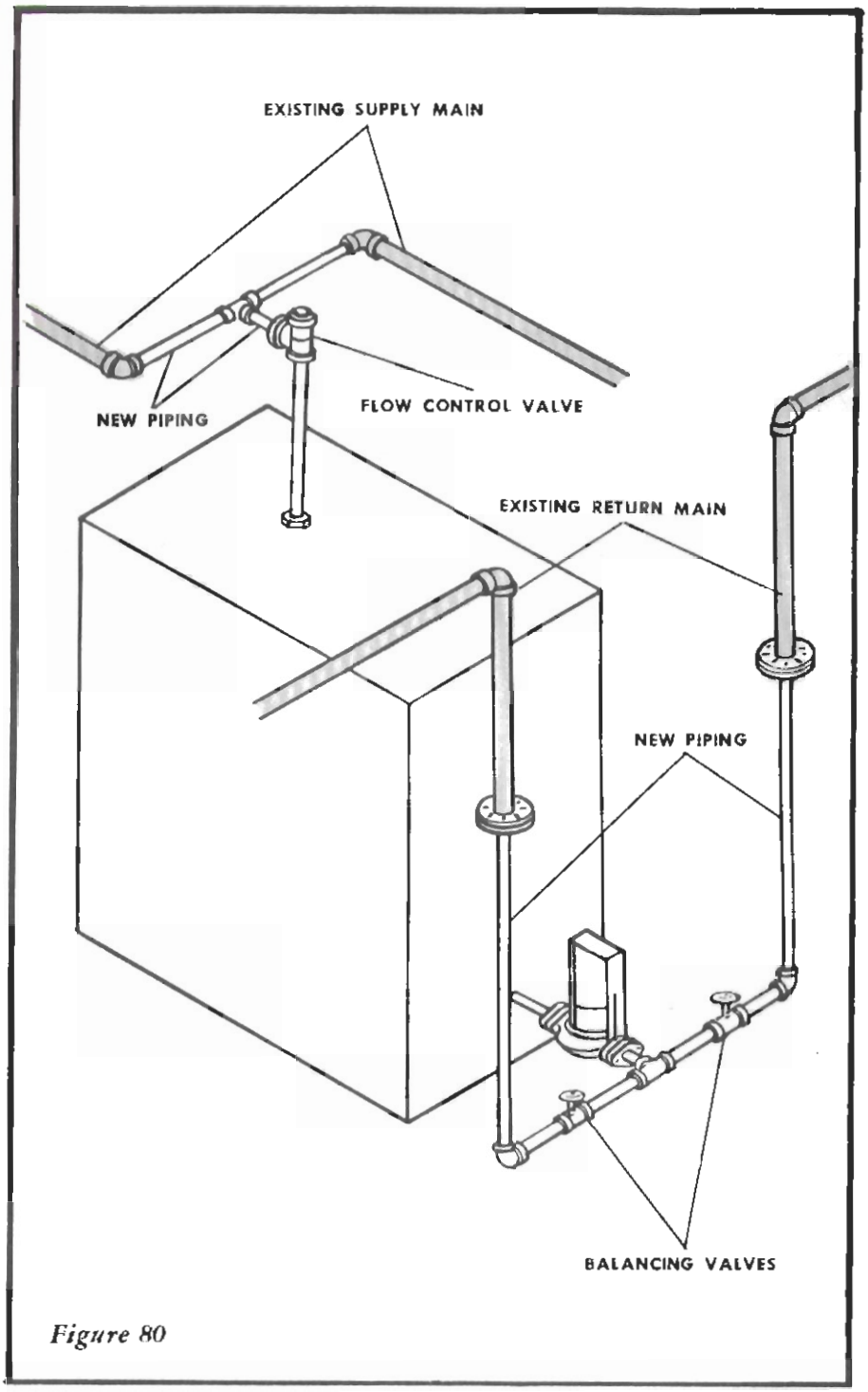


Figure 80

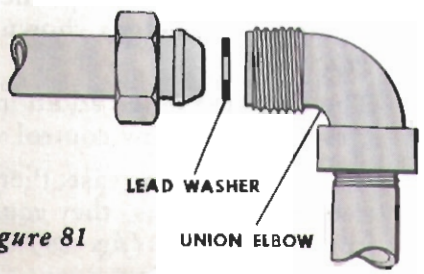


Figure 81

ORIGINAL RISER PIPE SIZE	WASHER OUTSIDE DIAMETER	WASHER HOLE DIAMETER
½-IN.	1-IN.	5/16-IN.
¾-IN.	1¼-IN.	⅜-IN.
1-IN.	1½-IN.	7/16-IN.
1¼-IN.	1¾-IN.	½-IN.
1½-IN.	2-IN.	9/16-IN.

Steam HEATING SYSTEMS

GENERAL INFORMATION

Although steam heating systems are not as widely used as they once were, the new HOMART midget radiators (which are extremely modern in appearance) will make up into an efficient, comfort producing steam system that will satisfy a number of heating needs. But remember, you cannot use panel radiation with a steam system.

HOW THE SYSTEM OPERATES

When the water in the boiler is heated it boils and generates steam, which rises through the main and branch pipes to the radiators. After displacing the air in these units, which is released by the automatic air vents, the steam liberates its heat and condenses into water. Characteristic of the steam system is the single branch pipe to each radiator *(fig. 82)*, through which the condensed water returns to the main, against the inrushing steam. The main, which is pitched *down* from the supply end to the return end, carries this water around its single loop and back to the boiler for reheating — and also carries the steam upward to the branch pipes. The system operates as long as the boiler is hot enough to generate steam.

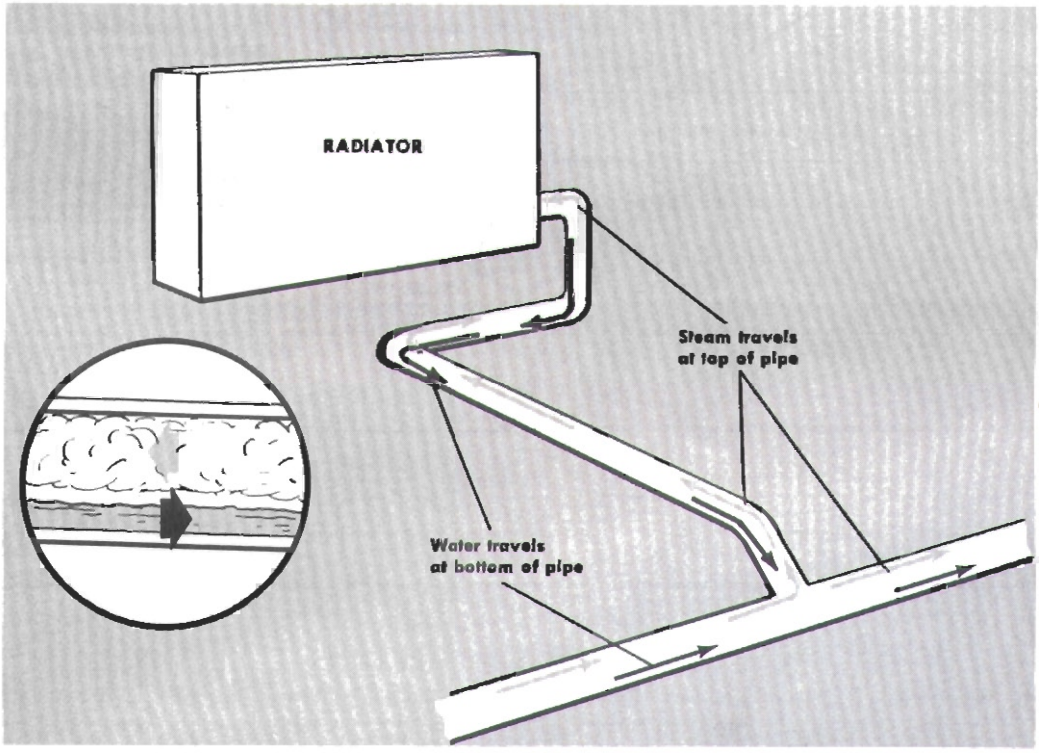


Figure 82

INSTALLING A STEAM SYSTEM

General Information

Your steam system installation will be simple and easy if you follow the sequence of steps and installation procedures given on *pages 20-27* for forced hot-water systems. Practically all of the installation details are the same for both systems. Before you start, read this entire section, which covers only the differences between steam and forced hot-water systems, and study *your plan*, prepared for you be Sears consultants.

References for Operations Covered in Other Sections

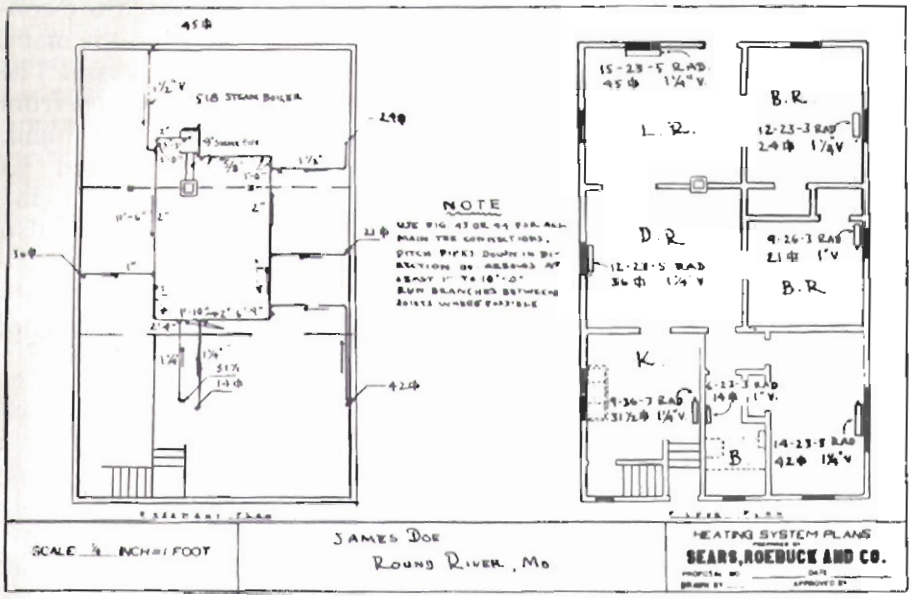


Figure 83

Your Plan

Your steam system plan includes all the information you need to make the installation. Read the instructions covering a forced-system plan *(p. 2-3)* for a clear understanding of *your plan,* which will resemble the plan illustrated here *(fig. 83). Figure 84* shows how the system in this typical plan will look when installed.

Arrows are placed alongside all of the pipes, to indicate the direction in which the piping must be pitched *downward.* To insure proper circulation, all main pipes in a steam system have to be pitched down towards the return of the boiler, at least ½ inch for every 10 feet of pipe length. And branch lines must be pitched down towards the mains, at least 1 inch for every 5 feet.

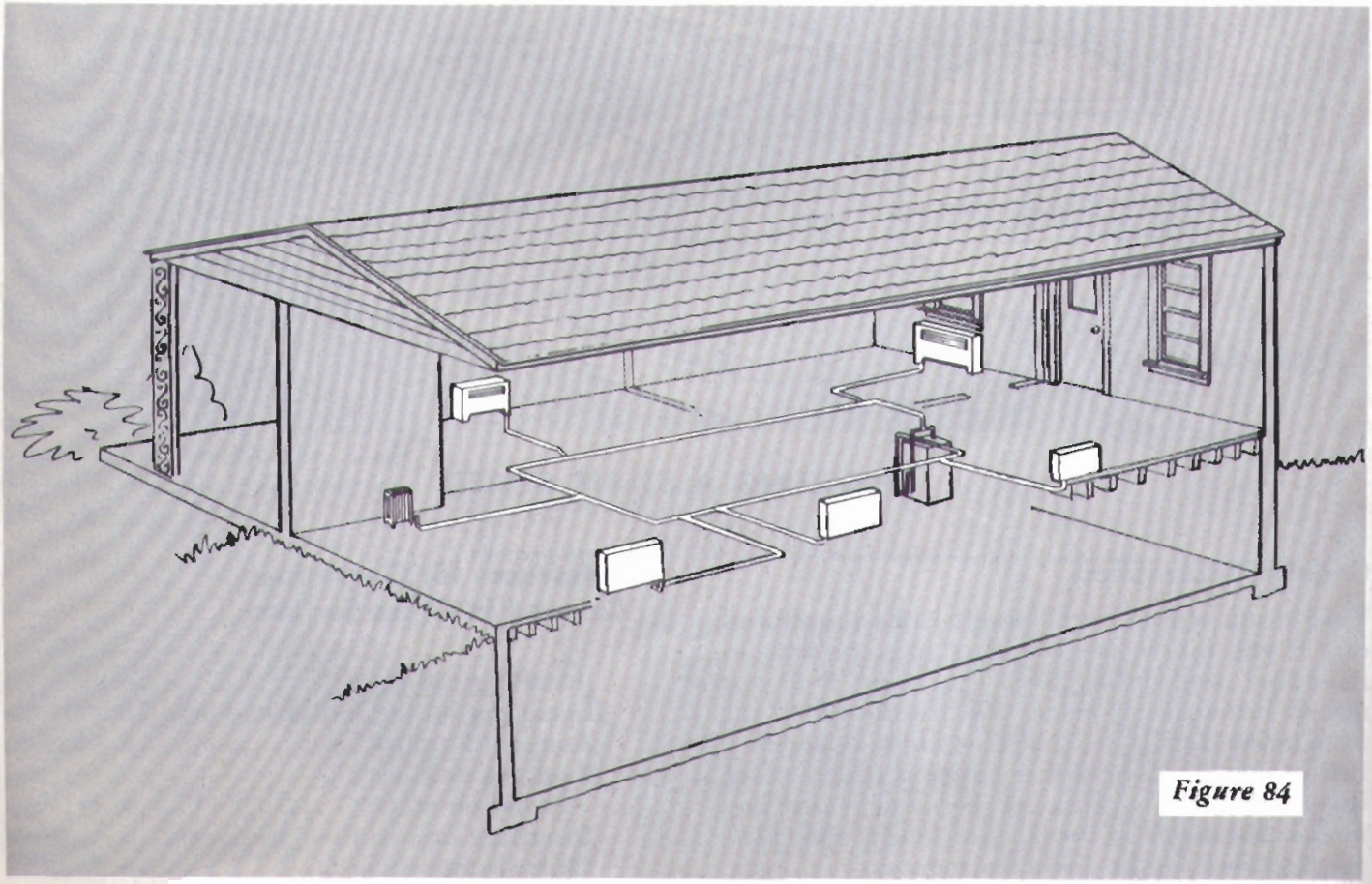


Figure 84

Connections at the Boiler

Figure 85 shows typical connections at the boiler for a steam heating system. The instructions with your boiler include a detail drawing that illustrates the specific parts needed to connect your boiler to the water supply and mains. Steam boiler connections should include a loop of pipe (called a *Hartford loop*) that connects the supply and return ends of the main together. This loop prevents any water carry-over out of the boiler from entering the supply main — by directing it into the return main near the boiler.

Installing the Piping

The piping for a steam system is assembled in much the same manner as for a one-pipe forced hot-water system *(refer to page 23)*: that is, the main is constructed first, then the radiators are connected to it. Start the main as close as possible to the basement ceiling, after connecting it to the supply tapping of the boiler. Pitch it down at least ½ inch in 10 feet as you complete the loop back to the return tapping on the boiler. If the total length of the main is less than 40 feet, it must have a *total down-pitch of at least 2 inches.*

Be sure to use eccentric reducers as shown *(fig. 86)* when it is necessary to go to a smaller size pipe in the return main. The eccentric reducer provides the least obstruction to the return flow of water, when installed in this manner.

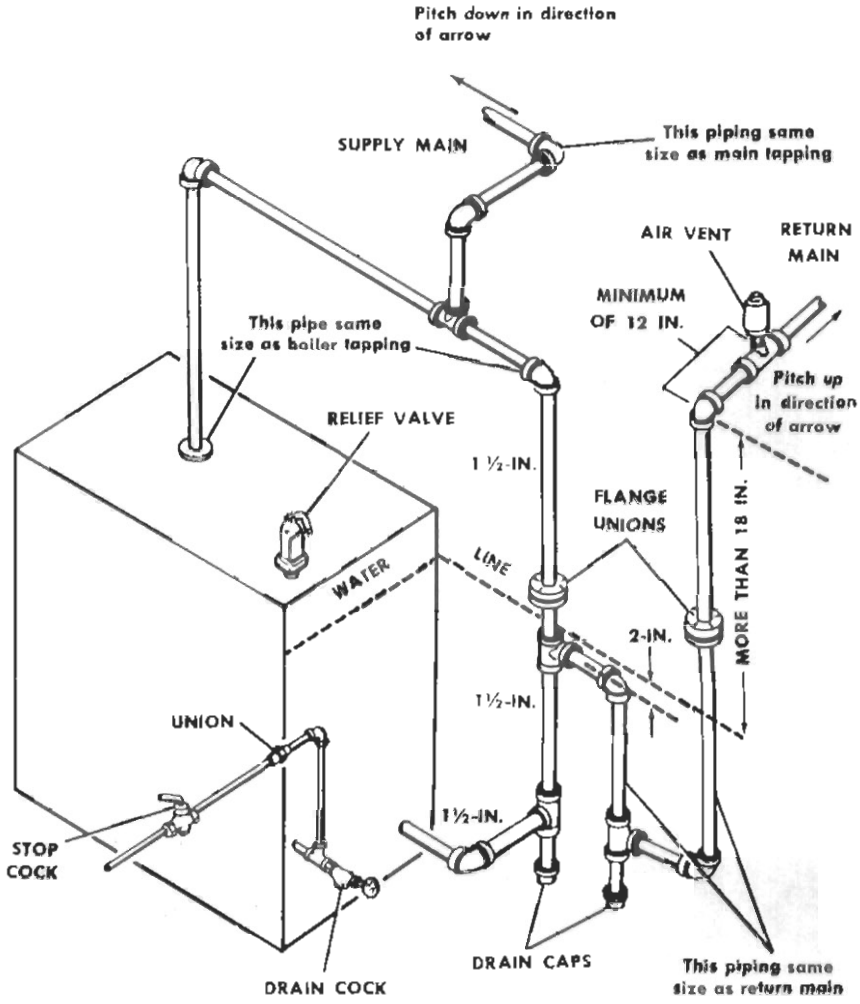


Figure 85

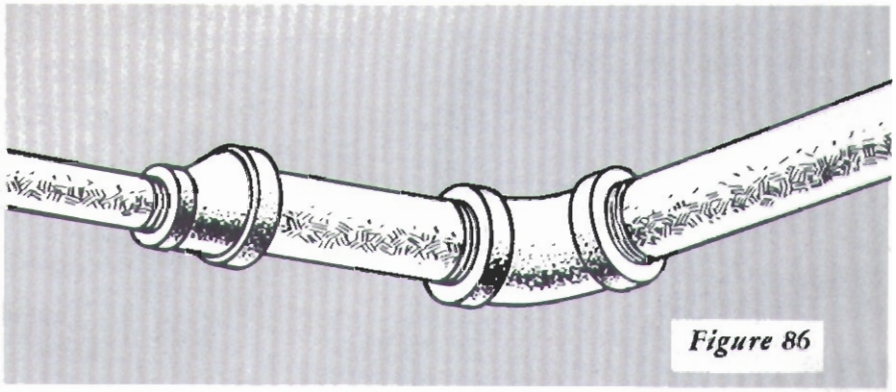


Figure 86

OPERATION AND MAINTENANCE INFORMATION

Complete operation and maintenance information for your steam heating system is included with the instructions shipped with the boiler.

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is your assurance that you have purchased quality merchandise that will give you outstanding service. Remember, Sears stands back of each product it sells — backs its claims with a guarantee that assures you complete satisfaction.

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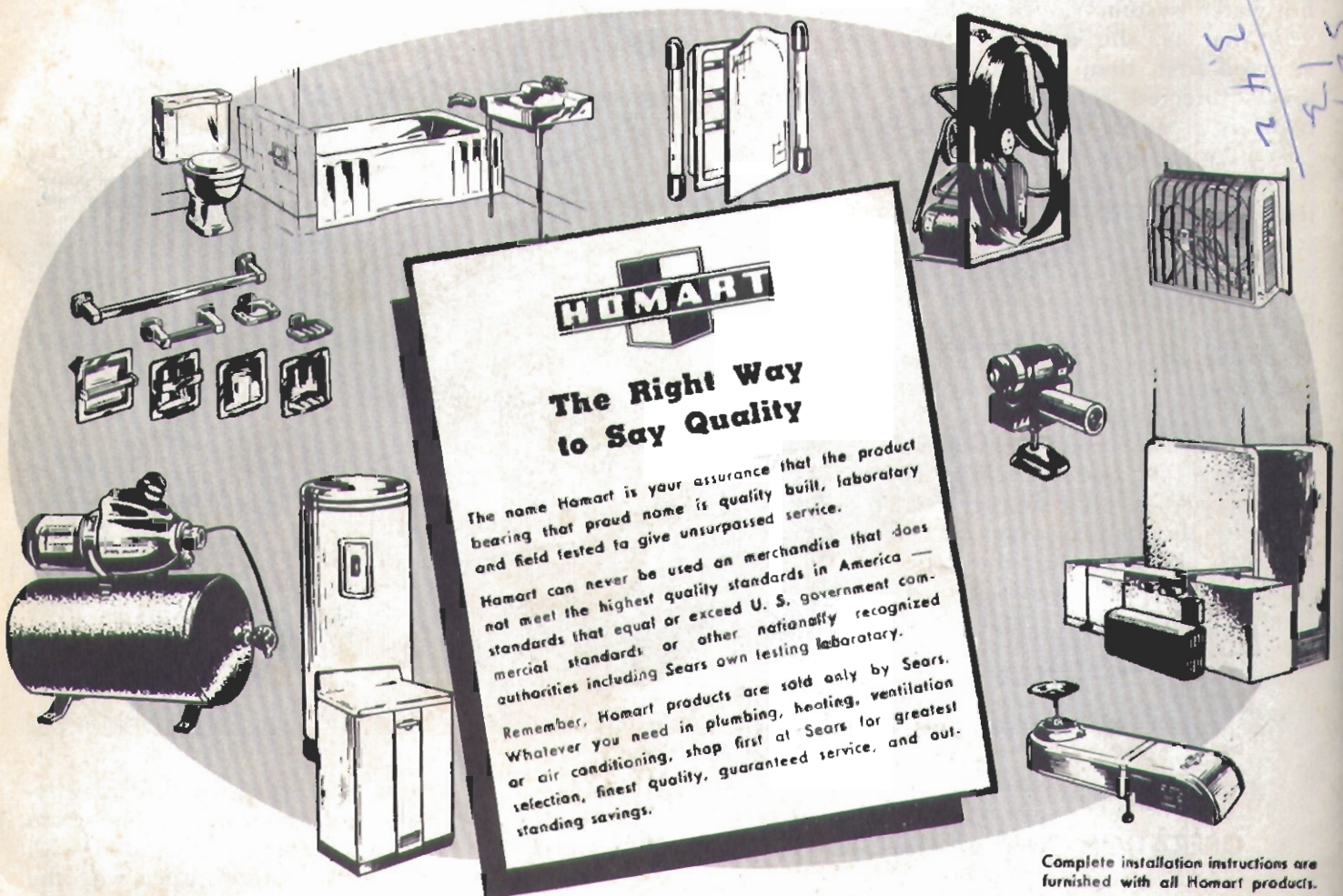

Complete installation instructions are furnished with all Homart products.

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