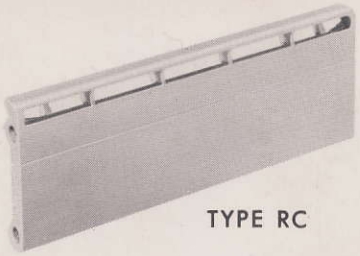
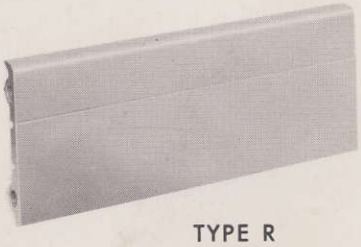
CRANE

radiant baseboard panels

- FEATURES
- ENGINEERING DATA
- RATINGS
- INSTALLATION INSTRUCTION



TYPE RC



TYPE R

Index

CRANE Radiant Baseboard Panels Offer Many Advantages

Crane Radiant Baseboard Panels introduce an even distribution of radiant warmth at the floor level. They inconspicuously replace conventional wood baseboard, thus leaving the entire floor area of the room free from obstructions and allowing complete flexibility in arranging furniture. Floor-length draperies may be used -- and without interfering with heat output. Crane Radiant Baseboard Panels are modern and attractive in design and may be finished in any color oil base paint to carry out desired decorating motifs. They eliminate the streaking of walls caused by concentrated heat sources.

Crane Radiant Baseboard Panels may be used on either hot water or steam systems. Because when installed, they are distributed over a great area -- 1, 2, 3 or 4 walls -- they provide an even distribution of heat and eliminate "hot spots" in the room.

With Crane Radiant Baseboard Panels installed, the difference in air temperature from floor to ceiling is often no more than two or three degrees even in zero weather, and they show excellent reaction to rapid changes in outside temperatures.

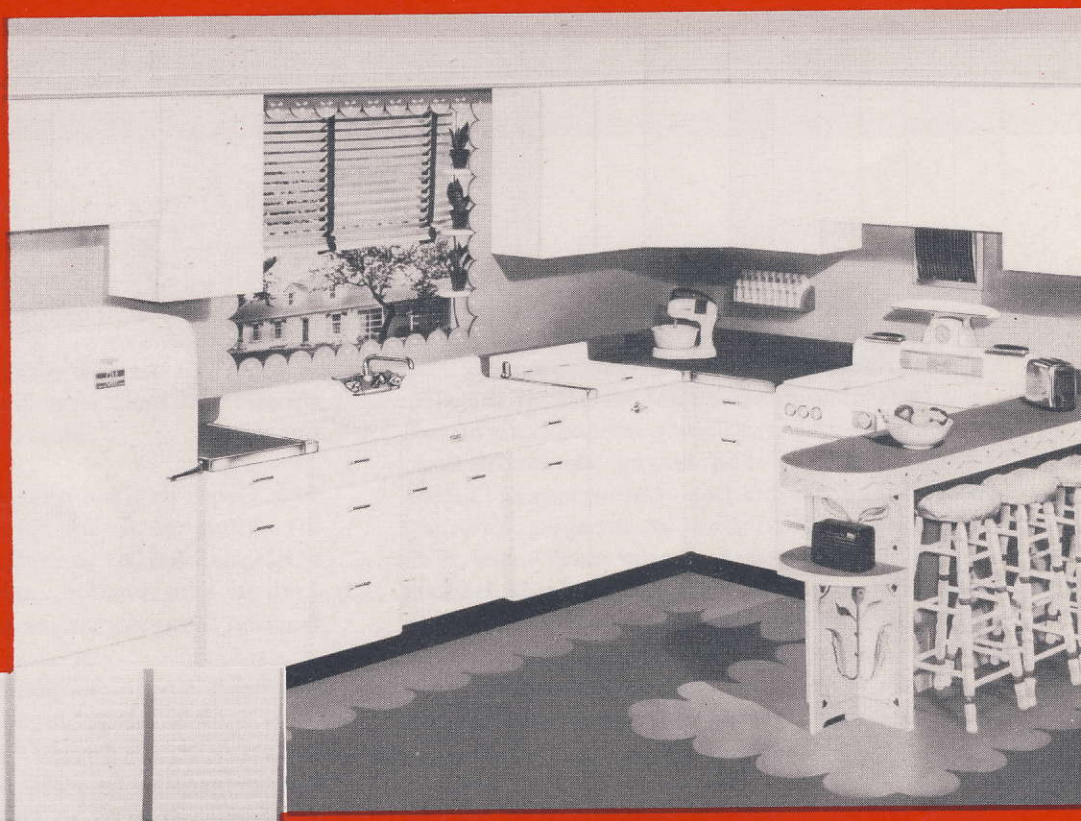
The flexibility in design of Crane Radiant Baseboard Panels makes them ideally suited to installation in bay window areas and in "U" shaped installations. Where the baseboard area is limited, such as in some kitchens and bathrooms, they may be installed at the ceiling level or in vertical positions.

MAY BE USED IN NEW OR REMODELED BUILDINGS

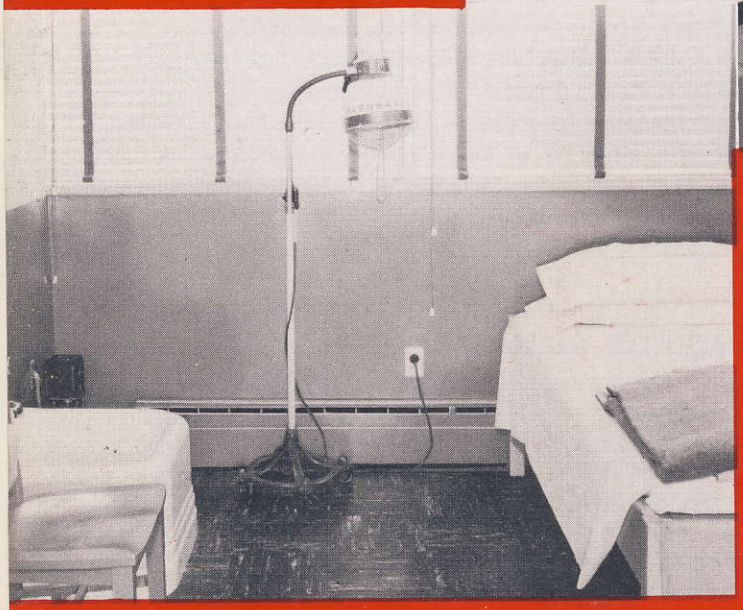
Unlike other types of radiant heating systems, Crane Radiant Baseboard Panels may be easily installed in existing structures as well as new construction. The installation consists simply of replacing wood base molding with as much Radiant Baseboard as is needed to furnish the required amount of heat. Matching wood baseboard is available for the balance of the installation.

IDEAL FOR COMMERCIAL & INDUSTRIAL APPLICATIONS

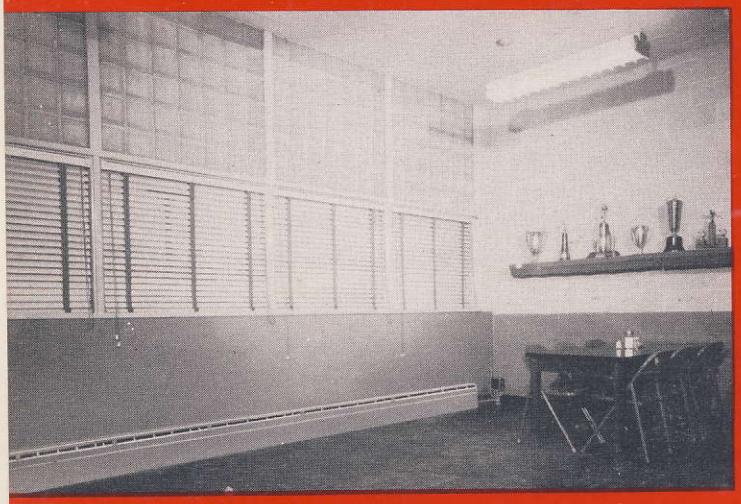
Crane Radiant Baseboard Panels are a great asset to industrial and commercial establishments where floor area is expensive and usually at a premium. It has been found that Radiant Baseboard Panels not only provide an even distribution of heat throughout the room, but also remove the visible sources of heat supply.



Where wall areas are limited, Crane Baseboard Panels may be effectively installed at the ceiling level.



Crane Radiant Baseboard Panels provide the required clean and evenly distributed heat in hospital rooms.



Industrial plants offer a big market for Crane Radiant Baseboard Panels. Here, they are used in a plant cafeteria.

Homes of large size may also be efficiently heated with Crane Radiant Baseboard.

Crane Radiant Baseboard Panels save valuable space and are attractive in reception and waiting rooms.

Recreation rooms become more attractive when Crane Radiant Baseboard Panels are installed.

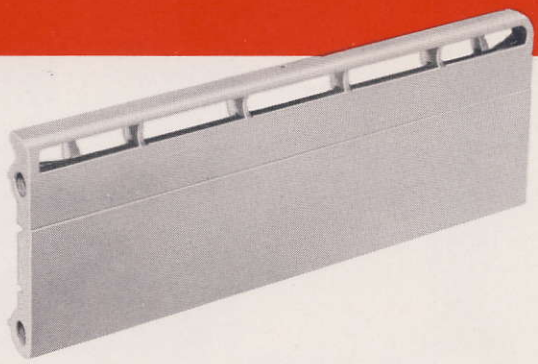
Crane Radiant Baseboard Panels are competitive in price for low cost housing installations.

Crane Radiant Baseboard Panels are ideal for bathrooms. They require a minimum of floor and wall area and provide ample radiant warmth.

CRANE Radiant Baseboard Panels

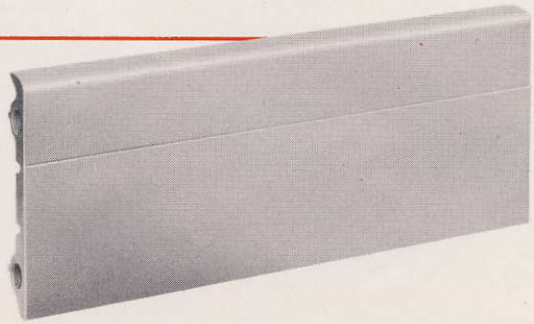
Type "RC"

Type "RC" Radiant Panels have slotted openings in the front of the panel at the top and bottom. Air enters the bottom and is heated as it rises over finned surfaces which are cast integrally with the hot water chamber, thus providing greater heat output per lineal foot. The warm air circulates into the room through the top openings. In addition, the smooth front emits radiant heat. The Type "RC" panels are approximately 9 inches high and are made in 1-foot and 2-foot sections which may be assembled in any desired length.



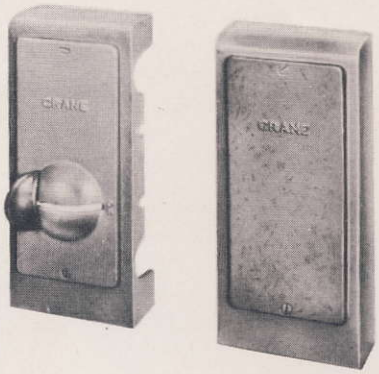
Type "R"

Type "R" Radiant Panels have a solid front, and heat is radiated from the smooth front surface. Hot water chambers are cast into the sections, and each section is 2 feet long and approximately 9 inches high. The base and top of the panel usually are finished with a wood molding.

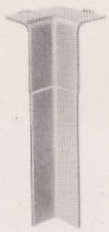


Supply and Return Enclosure

Heat may be regulated by means of a valve which is operated by a lever through the enclosure. It is not necessary to remove housing to regulate valve. Return piping and vent valves are concealed in matching enclosures.

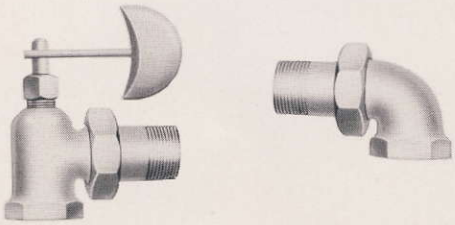


Corner Piece

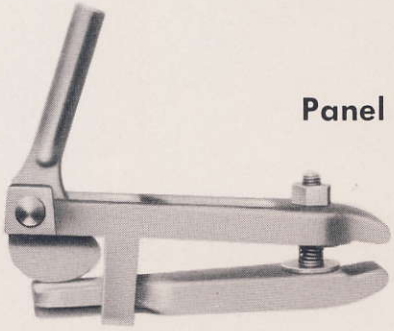


This corner piece, which matches Crane Radiant Baseboard Panels, conceals inside corner connections.

Supply Valve and Union Ell



Panel Tool



A unique tool for connecting Crane Baseboard Panels. It permits quick, easy assembly without the need of wrenches or pliers.

Type "RC" and "R" Parts and Fittings

TYPE RC:

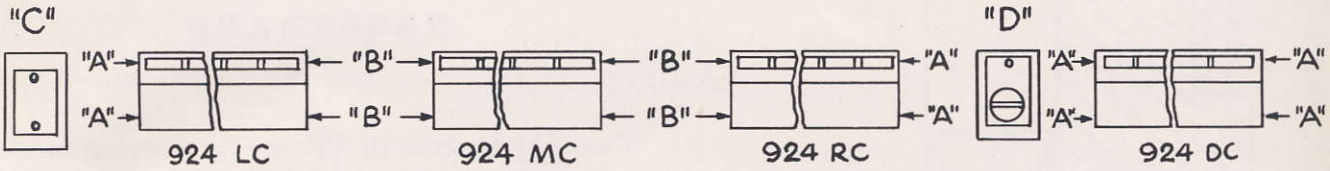
924 LC-- Convector type 9" high, 24" long, 3/4" threads on left end and nipple ports on right end.

924 RC- Convector type, 9" high, 24" long, 3/4" threads on right end and nipple ports on left end.

924 MC-- Convector type, 9" high, 24" long, nipple ports on both ends.

912 LC-- Convector type, 9" high, 12" long, 3/4" threads on left end and nipple ports on right end.

924 DC-- Convector type, 9" high, 24" long, 3/4" threads on both ends.



"C" IS 9" LER BOX (LEFT END RETURN)
"D" IS 9" REV BOX (RIGHT END VALVE)
"A" ARE 3/4" THREADED OPENINGS (FOR VALVES, AIR VENTS, ETC.)
"B" ARE NIPPLE PORTS (FOR JOINING PANELS TOGETHER)

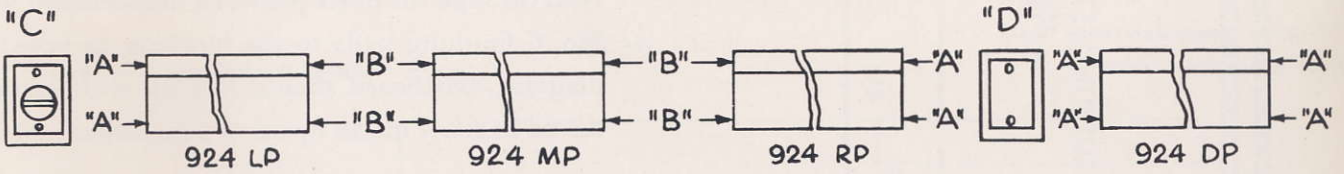
TYPE R:

924 LP-- Radiant type, 9" high, 24" long, 3/4" threads on left end and nipple ports on right end.

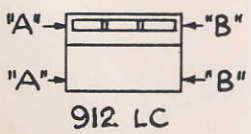
924 RP-- Radiant type, 9" high, 24" long, 3/4" threads on right end and nipple ports on left end.

924 MP-- Radiant type, 9" high, 24" long, nipple ports on both ends.

924 DP-- Radiant type, 9" high, 24" long, 3/4" threads on both ends.



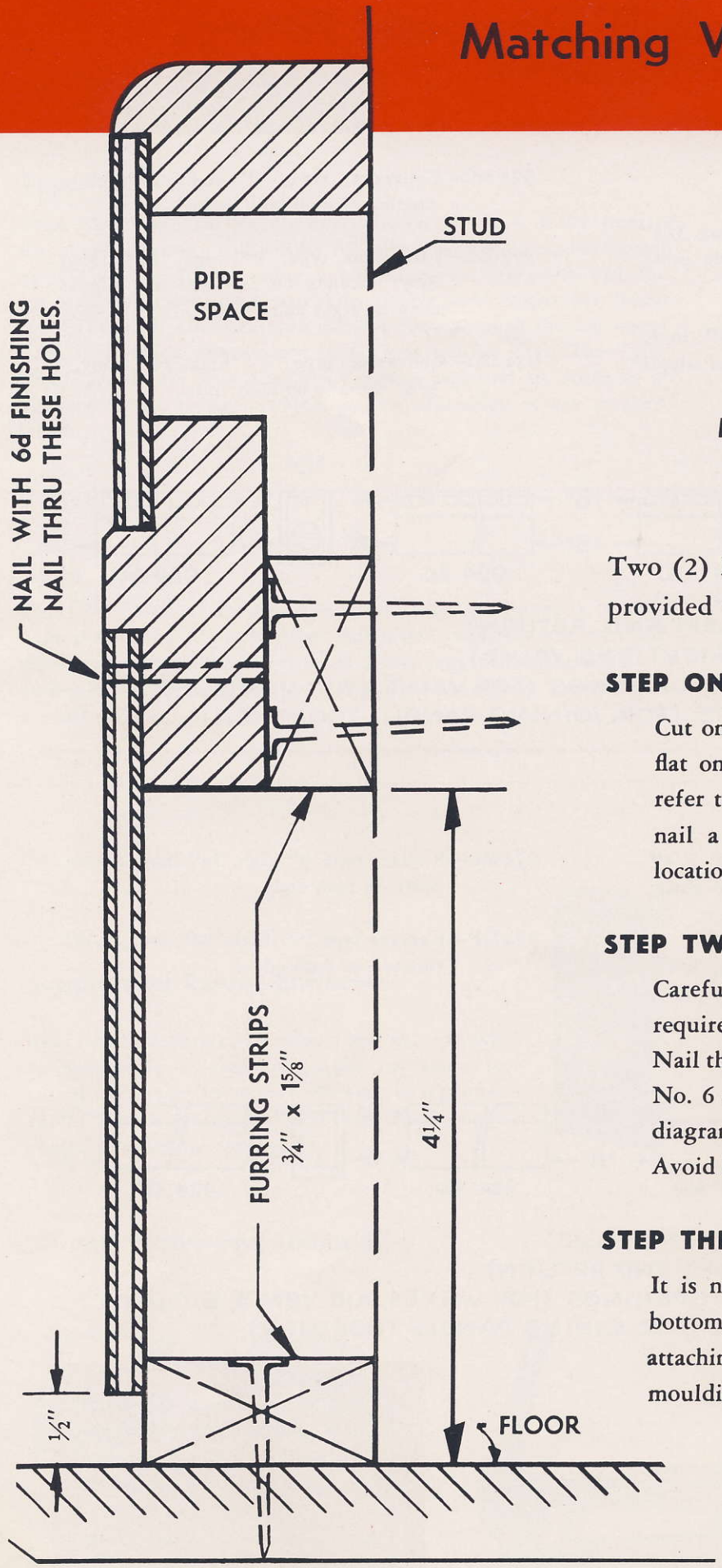
"C" IS 9" LEV BOX (LEFT END VALVE)
"D" IS 9" RER BOX (RIGHT END RETURN)
"A" ARE 3/4" THREADED OPENINGS (FOR VALVES, AIR VENTS, ETC.)
"B" ARE NIPPLE PORTS (FOR JOINING PANELS TOGETHER)



Made only in convector type (12" long)

LER - Left End Return Enclosure
RER - Right End Return Enclosure
LEV - Left End Valve Enclosure
REV - Right End Valve Enclosure

Face Plates for Valve and Return Enclosures are Interchangeable.



INSTRUCTIONS FOR INSTALLING MATCHING WOOD BASEBOARD

Two (2) lengths of ¾" x 1⅝" furring strips ar provided with each length of baseboard.

STEP ONE:

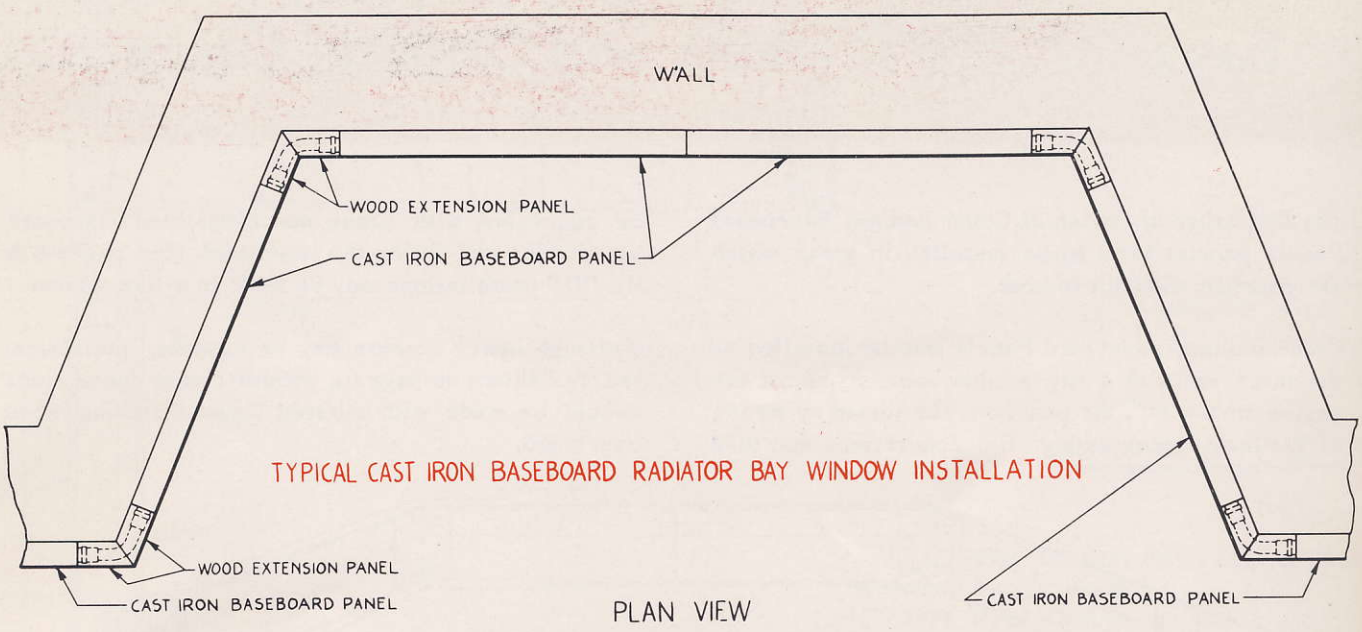
Cut one furring strip to length required and nai flat on the floor tightly against the studs. Nov refer to the diagram at the side of this sheet and nail a second piece of furring to the studs a location shown on diagram.

STEP TWO:

Carefully cut the baseboard to the exact length required, using a square to facilitate a square cut Nail through the holes provided in baseboard with No. 6 finishing nails to the blocking as noted in diagram. Baseboard should line up with casting Avoid hammer marks by using a carpenter nail set

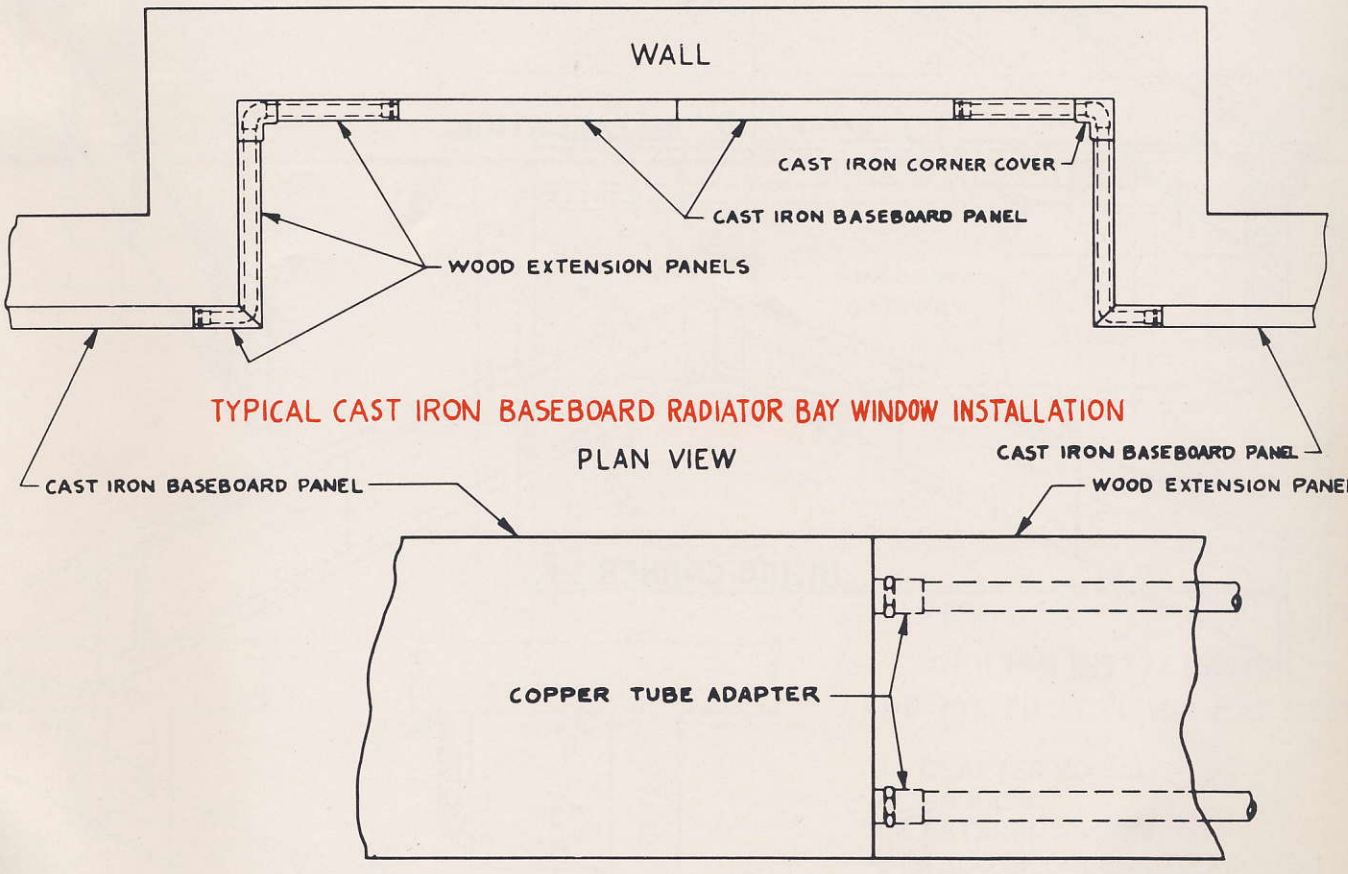
STEP THREE:

It is not necessary to nail the baseboard at the bottom, as this fastening can be accomplished by attaching a shoe moulding or regular quarter round moulding at the floor.



TYPICAL CAST IRON BASEBOARD RADIATOR BAY WINDOW INSTALLATION

PLAN VIEW



TYPICAL CAST IRON BASEBOARD RADIATOR BAY WINDOW INSTALLATION

PLAN VIEW

VIEW SHOWING COPPER TUBE ADAPTER ON CAST IRON BASEBOARD PANEL

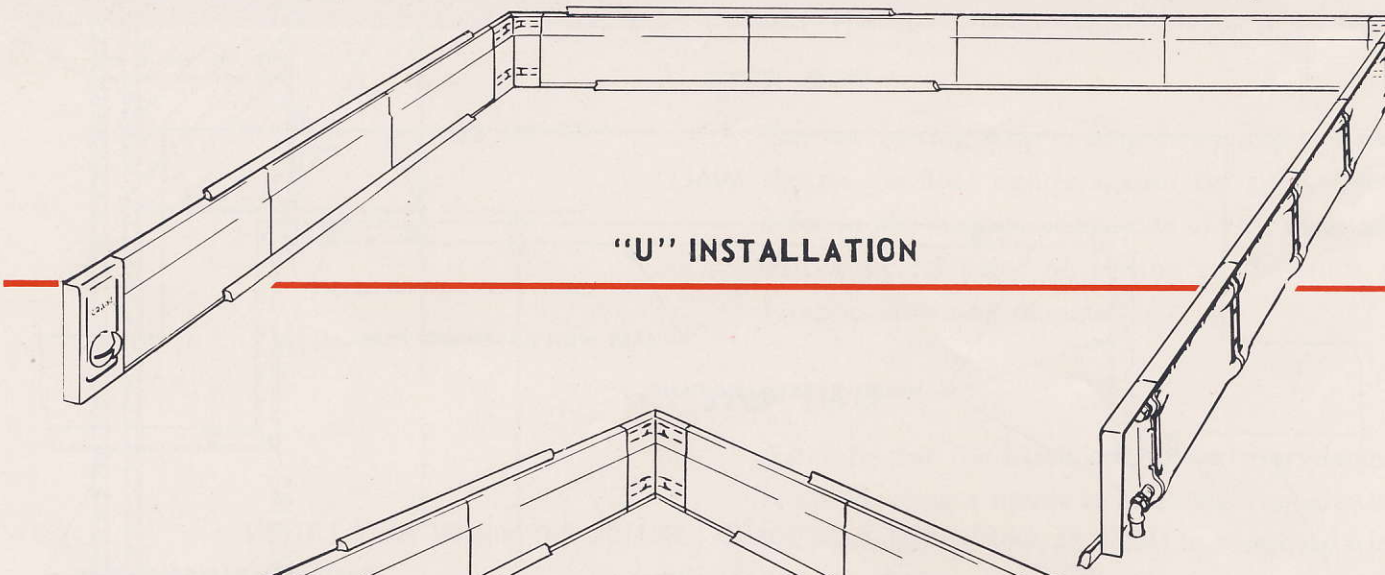
Application of Radiant Baseboards in Window Bays, "U" Installations and Outside Corners

The flexibility of design of Crane Radiant Baseboard Panels permits them to be installed in areas which are generally difficult to heat.

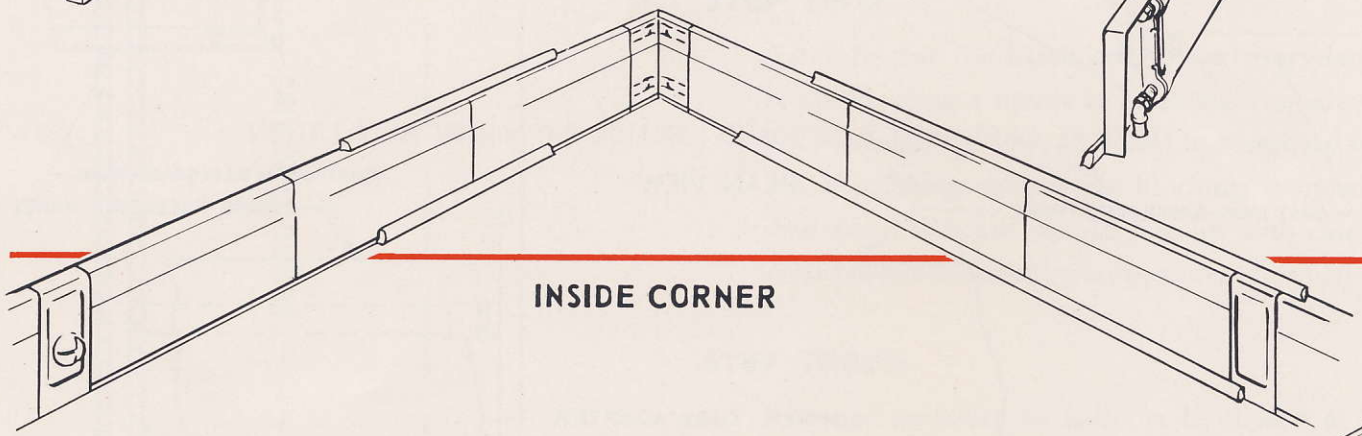
Crane Radiant Baseboard Panels may be installed on the three walls in a bay window area. Although the angles are not 90°, the panels may be joined by means of 3/4-inch copper tubing. The connections may then be concealed with Crane matching wood baseboard by mitering and fitting the baseboard. (See pages 8 & 9). "U" installations may be made in a like manner.

Although inside corners may be furnished prefabricated, (as shown on page 6), outside corner connections should be made with mitered Crane matching wood baseboard.

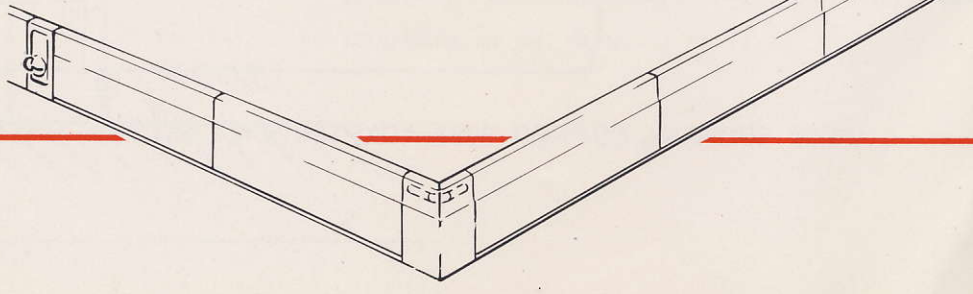
BAY WINDOW



"U" INSTALLATION

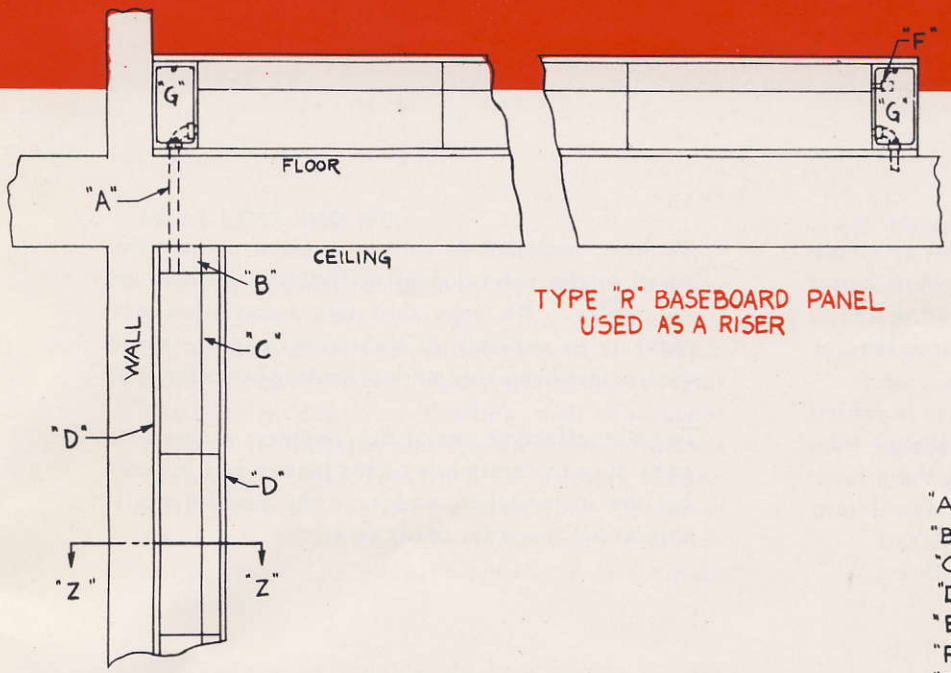


INSIDE CORNER

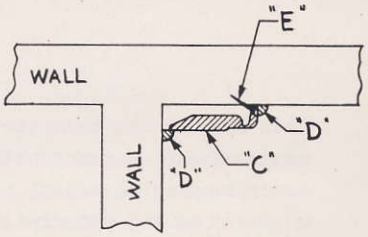


OUTSIDE CORNER

Ceiling and Wall Installations

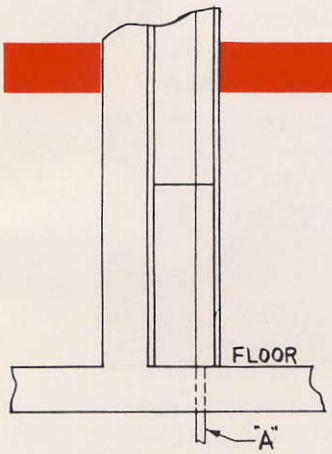


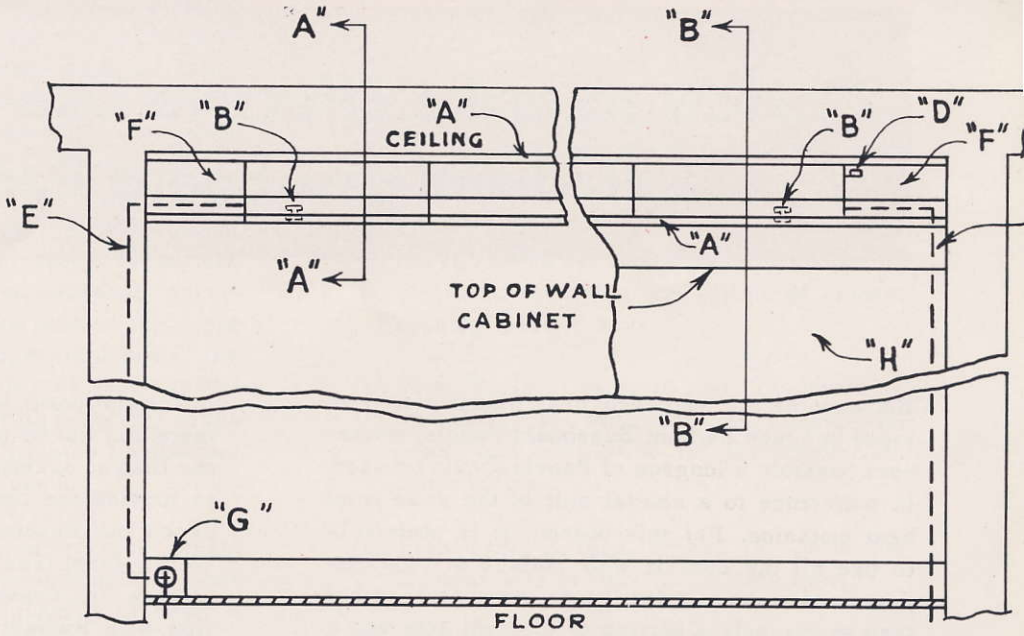
TYPE "R" BASEBOARD PANEL
USED AS A RISER

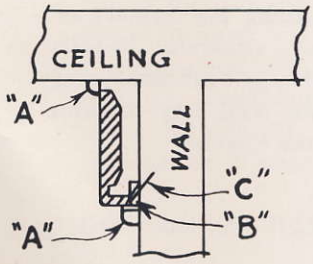


PLAN VIEW "Z-Z"

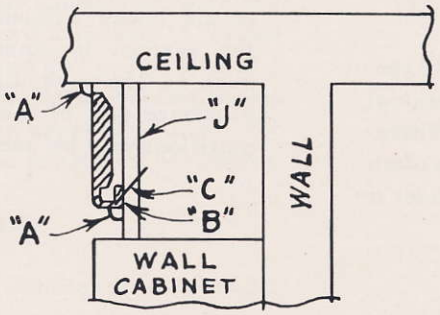
"A" - $\frac{3}{4}$" COPPER (OR IRON PIPE) CONNECTIONS
"B" - WOOD FILLER PIECE
"C" - TYPE "R" BASEBOARD
"D" - QUARTER ROUND
"E" - RETAINING SCREW
"F" - AIR VENT
"G" - ENCLOSURE BOXES







SECTION "A-A"
CEILING INSTALLATION



SECTION "B-B"
CEILING INSTALLATION

CEILING INSTALLATION
ADD 20% TO ACTUAL HEAT LOSS

"A" QUARTER ROUND
"B" HANGERS
"C" RETAINING SCREW
"D" TACO OR DOLE AUTO AIR VENT
"E" FEED AND RETURN CONNECTIONS
"F" CRANE WOOD BASEBOARD
"G" END ENCLOSURE AND 174½ VALVE
"H" WALL CABINET
"J" WOOD BACKING STRIP

How to make Effective Use of this Booklet

This booklet has been prepared for you by Crane Engineers for the purpose of giving you a better understanding of radiant baseboard heating and to aid you in making attractive and efficient installations.

We have endeavored to give you the important sales features of Crane Radiant Baseboard Panels; a description of the panels and their function; and the recommended methods of installation under varying conditions.

We have included in this booklet, a section devoted to the selection of the heating system and the boiler. We hope that this information may prove to be valuable to architects, engineers and contractors in making modern heating installations.

To make effective use of this booklet, understand each step in determining heat losses and in making the installation, and have the booklet available at all times for ready reference.

How to make Effective Use of Crane Radiant Baseboard Panels

Because of the improved heat distribution provided by Crane Radiant Baseboard Panels, wherever possible a long run of Panels should be used in preference to a shorter unit of the same total heat emission. For this reason, it is preferable to use all the outside wall surface at your disposal and to have a low water temperature rather than to use only a portion of the wall area and a maximum water temperature.

The Type "R" Radiant Panels and the Type "RC" Radiant Convector Panels have identical water passages and push nipple centers. Therefore, they may be used interchangeably. This often is advantageous in some rooms, such as under a large window.

In certain rooms, such as kitchens and bathrooms, there may not be sufficient available wall area at the floor to accommodate enough Baseboard Panel to provide the required amount of heat. In such cases the Baseboard Panel may be installed at ceiling level (see page 11), or Compac Radiators or cast iron convectors may be used in conjunction with Radiant Baseboard Panels in the rest of the house without disturbing the balance of the system. In other rooms, structural details such as doorways, fireplaces, or bookcases, may eliminate part of the outside wall area. Interior partitions may be used for the Panels.

Estimating Heat Loss

HEAT LOSS AND BTU

Accurate calculation of heat loss is the first essential step in determining the size of the heating plant. Modern residential construction tends to reduce heat losses. Thus, rule-of-thumb methods usually lead to overloading, with consequent costs of installation and operation which are unnecessarily high. The I-B-R Installation Guides have simplified the Btu per hour (Btu/Hr.) method of calculation and provide accuracy which is not found in more casual methods of determining heat losses.

The method for calculating heat losses in this book is taken from the I.B.R. Installation Guides, and is based on the factors found in the American Society of Heating and Ventilating Engineers Guide. By using Tables 1, 2 and 3, considerable time will be saved in the calculation of heat losses. The factors in this guide book are based on a wind velocity of fifteen miles per hour, which is considered ample over the entire range of outdoor temperatures because, very rarely, is there excessive wind at the minimum temperatures for which systems are designed. No added allowance for infiltration for rooms facing the prevailing winds is considered necessary except for large structures, which are outside the scope of this book. For these larger structures, the method of determining heat losses found in the ASHVE Guide or the Engineering Standards of the Heating, Piping and Air Conditioning Contractors National Association may be used.

British Thermal Unit (Btu), rather than square feet of radiation, is used throughout this book because a Btu is a definite quantity of heat. A Btu is the quantity of heat required to raise one pound of water one degree Fahrenheit. A square foot of *steam* radiation equals 240 Btu/Hr.; whereas, a square foot of *hot water* radiation has a varying Btu/Hr. output depending upon the temperature of water in the baseboard or radiator.

DETERMINING HEAT LOSS

Determine the heat loss from each room to be heated, in terms of Btu/Hr., as follows:

(a) Determine the areas and volume.

GROSS WALL AREA: only walls exposed to the outdoors or unheated space, including exposed walls of closets opening into the room.

WINDOW AREA: based on the outside measurements of the sash.

DOOR AREA: based on the actual size of the door.

NET WALL AREA: gross wall area minus the area of the windows and doors.

CEILING AREA: ceiling exposed to unheated space, including the ceilings of closets opening into the room.

FLOOR AREA: floor exposed to unheated space, including the floors of closets opening into the room. No heat loss is calculated for floors over a basement.

INFILTRATION: based on the volume of the room, including the volume of closets opening into the room.

(b) From Table 1, (pgs. 16 and 17), determine the factors for wall, ceilings, floors, windows, and infiltration for the appropriate construction.

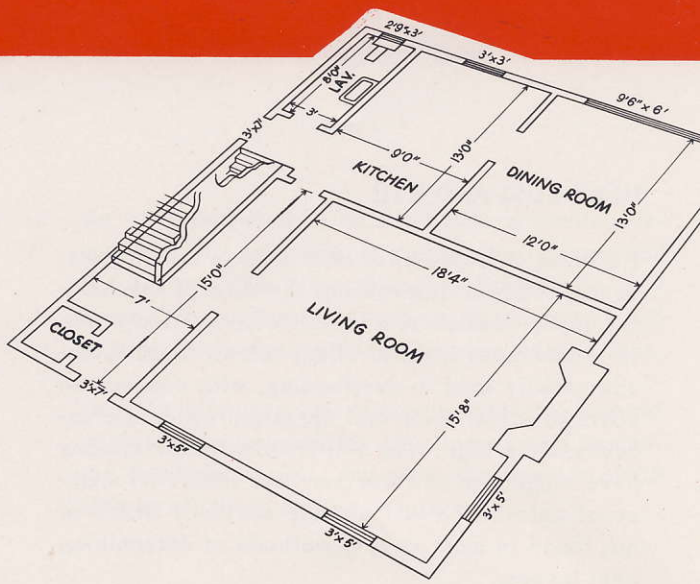
(c) From Table 2, (pgs. 18 and 19), determine the heat loss in Btu/Hr. for each item.

(d) Total the Btu/Hr. heat loss for all items to determine the total Btu/Hr. heat loss for the room at 70°F. temperature difference.

(e) From Table 3, (pg. 20), convert item (d) above to Btu/Hr. heat loss at the required temperature difference.

NOTE: It is common practice to increase the *corrected* Btu/Hr. heat loss of a bathroom by 20% to provide extra radiation.

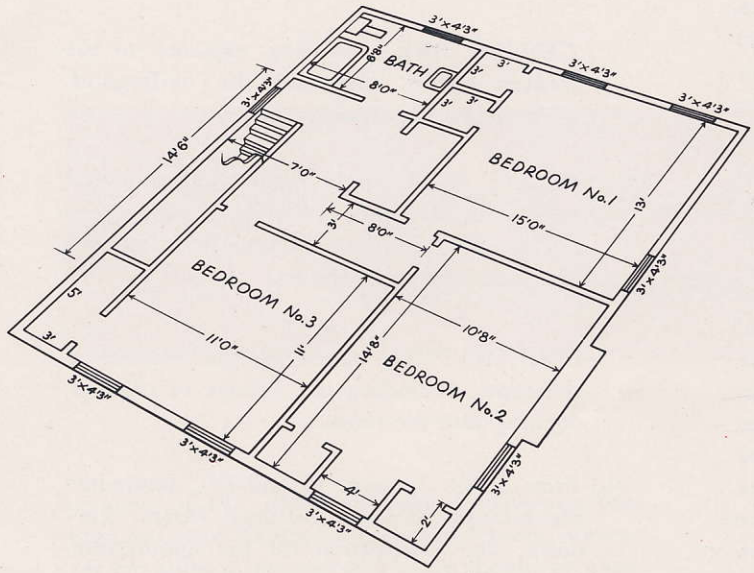
The Example Floor Plan

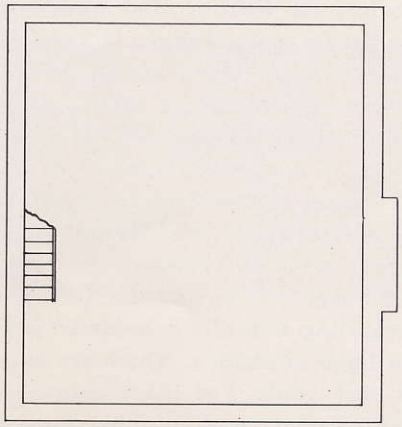


In order that a better understanding may be had of the various phases of making a Crane Radiant Baseboard installation, in this booklet we refer continually to the Example Floor Plan and as to how the particular phase is applicable to this plan.

The Example Floor Plan is a floor plan of a typical two-story house which may be best used to illustrate the installation of Crane Radiant Baseboard and the conditions which may arise in actual installations.

Below are the three floor plans which you will find reproduced throughout this booklet.





APPLICATION IN THE EXAMPLE FLOOR PLAN

Calculation of Quantities in Living Room

		From Table 1 Pages 16 & 17		From Table 2 Pages 18 & 19
		Item	Factor	Btu/Hr. Required
Gross Wall-(18'4" + 15'8") X 7'8"	258 Sq. Ft.			
Windows-(3 x 5) x 3	= 45 Sq. Ft.	19A (Pg. 17)	1.13	3,600
Net Wall -- Gross Wall 258 Less Wind .45	= 213 Sq. Ft.	2E (Pg. 16)	.08	1,200
Infiltration (Room Volume) 18'4" X 15'8" X 7'8"	= 2166 Cu. Ft.	22B (Pg. 17)	.017	2,600
			Total for 70F Indoor -- Outdoor Temp. Diff.	7,400

For an 80F temperature difference, refer to table 3, (Pg. 20) in the column headed 70F move down to 7400, then horizontally to column headed 80F and read the heat loss as 8,460 BTU.

CALCULATION SHEET

OWNER _____ ADDRESS _____ DATE _____

DEALER _____ KIND OF BUILDING _____ CHIMNEY SIZE _____

CONSTRUCTION: WALL FRAME--WOOD SIDING-3-5/8" ROCK WOOL -- LATH & PLASTER ROOF OR CEILING 3-5/8" ROCK WOOL -- LATH & PLASTER

WINDOWS SINGLE PANE -- WEATHER STRIPPED SILL HEIGHT: 1ST. FLOOR _____ 2ND FLOOR _____

BASEMENT HEIGHT: ABOVE GRADE _____ BELOW GRADE _____ AVERAGE WATER TEMPERATURE 180° TD. 80°

COLUMN 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
ROOM	ROOM SIZE			WINDOW AND/OR DOOR SIZE		AREA, SQ. FT					VOLUME CU. FT.	BTU AT 70 F TD.	BTU AT 80 F TD.	LENGTH OF AVAILABLE WALL FT.	BTU PER LINEAR FT. OF WALL	TYPE & HEIGHT OF BASEBOARD OR RADIATOR	LENGTH OF RADIANT BASEBOARD	FOOTAGE SQ.FT.
	L	W	H	W	H	GROSS WALL	GLASS	NET WALL	CEILING	FLOOR A .011 B .017 C .027								
LIVING RM.	18^4	15^8	7^8	3/3	5	258	45	213			2166	7400	8460	21	403	9" RC	16	52.0
						X	3600	1200		B	2600							
DINING RM.	13	12	7^8	9^6 3	6_3 4^3	190	70	120			1186	7700	8800	23	383	9" RC	16	52.0
						X	5600	700		B	1400							
KITCHEN	13 4	9 4	7^8 7^8	3 3	3 7	99	30	69			1011	4000	4570	12	381	9" RC	9	29.25
						X	2400	400		B	1200							
LAVATORY	8	3	7^8	2^9	3	84	9	75			182	1200	1370	9	152	9" RC	3	11.7
						X	700	400		A	100							
HALL--1st	15	7	7^8	3	7	167	21	146			798	4000	4570	22	348	9" RC	14	45.5
						X	1700	800		C	1500							
HALL--2nd	14^6	7	7^4	3	4^3	106	13	93	102		745	2700	3090					
						X	1000	500	600	A	600							
BATH	8	6^8	7^4	3	4^3	107	13	94	53		387	2100	2400 480 2880	9	320	9" RC	6	19.5
						X	1000	500	300	A	300							
BED RM. No. 1	15	13	7^4	3/3	4^3	226	39	187	213		1555	7300	8340	26	321	9" R	26	50.7
						X	3100	1100	1200	B	1900							
BED RM. No. 2	14^8	10^8	7^4	2/3	4^3	185	26	159	155		1132	5300	6060	15	403	9" RC	11	35.75
						X	2100	900	900	B	1400							
BED RM. No. 3	11	11	7^4	2/3	4^3	139	26	113	136		993	4300	4910	13	378	9" RC	9	29.25
						X	2100	600	800	A	800							
						X												
						X												
TOTALS													53,050					325.65

TABLE 1

HEAT LOSS FACTORS

EXPOSED WALLS

No. 1. Frame, Not Insulated

(*a*)	Clapboards or wood siding, studs, lath and plaster or plaster board (no sheathing)	0.35
(*b*)	Same as (*1a*) with composition siding over wood siding	0.28
(*c*)	Wood siding, paper, sheathing, studs, lath and plaster or plaster board	0.25
(*d*)	Same as (*1c*) with composition siding over wood siding	0.21
(*e*)	Same as (*1c*) substituting asphalt or asbestos shingles for wood siding	0.30

No. 2. Frame, Insulated

(*a*)	Wood siding, paper, sheathing, studs, ½" rigid insulation, plaster or plaster board	0.19
(*b*)	Wood siding, 25/32" rigid insulation, studs, lath and plaster or plaster board	0.19
(*c*)	Wood siding, paper, sheathing, ½" flexible insulation in contact with sheathing, studs, lath and plaster or plaster board	0.17
(*d*)	Same as (*2c*) with air space on both sides of insulation	0.15
(*e*)	Same as (*2c*) substituting 3⅝" rock wool or equivalent for ½" flexible insulation	0.08
(*f*)	Same as (*2c*) substituting 2" rock wool or equivalent for ½" flexible insulation	0.10

No. 3. Brick, Not Insulated

(*a*)	8" Brick, plaster or plaster board one side	0.46
(*b*)	8" Brick, furred, lath and plaster or plaster board one side	0.30
(*c*)	12" Brick, plaster or plaster board one side	0.35
(*d*)	12" Brick, furred, lath and plaster or plaster board one side	0.24
(*e*)	4" Brick, 8" hollow tile, plaster or plaster board one side	0.33
(*f*)	4" Brick, 8" hollow tile or cinder block, furred lath and plaster or plaster board	0.24
(*g*)	4" Brick, paper, sheathing, studs, lath and plaster or plaster board	0.27
(*h*)	4" Brick, 4" light weight aggregate block, furred, lath and plaster or plaster board	0.21

No. 4. Brick, Insulated

(*a*)	8" Brick, furred, ½" rigid insulation, plaster or plaster board one side	0.22
(*b*)	12" Brick, furred, ½" rigid insulation, plaster or plaster board one side	0.19
(*c*)	4" Brick, 8" hollow tile, ½" rigid insulation, plaster or plaster board one side	0.18
(*d*)	4" Brick, 4" light weight aggregate block, ½" rigid insulation, plaster or plaster board one side	0.16
(*e*)	4" Brick, paper, sheathing, studs, rigid insulation, plaster or plaster board	0.20
(*f*)	4" Brick, 25/32" rigid insulation, studs, lath and plaster or plaster board	0.21
(*g*)	4" Brick, paper, sheathing, 3⅝" rock wool or equivalent, studs, lath and plaster or plaster board	0.08
(*h*)	Same as (*4g*) substituting 2" blanket for 3⅝" blanket insulation	0.10

EXPOSED WALLS

No. 5. Hollow Tile

(*a*)	8" Tile, stucco exterior, furred, lath and plaster or plaster board	0.2
(*b*)	Same as (*5a*) substituting ½" rigid insulation for lath	0.2

No. 6. Hollow Concrete Block, Gravel Aggregate

(*a*)	8" Block, plain, above grade	0.
(*b*)	Same as (*6a*) plaster or plaster board one side	0.
(*c*)	Same as (*6a*) furred, lath and plaster or plaster board	0.
(*d*)	Same as (*6c*) substituting ½" rigid insulation for lath	0.
(*e*)	Same as (*6a*) basement wall below grade	0.
(*f*)	12" Block, plain, above grade	0.
(*g*)	Same as (*6f*) basement wall below grade	0.

No. 7. Hollow Concrete Block, Cinder Aggregate

(*a*)	8" Block, plain	0.
(*b*)	Same as (*7a*) plaster or plaster board one side	0.
(*c*)	Same as (*7a*) furred, lath and plaster or plaster board	0.
(*d*)	Same as (*7c*) substituting ½" rigid insulation for lath	0.

No. 8. Hollow Concrete Block, Light Weight Aggregate

(*a*)	8" Block, no interior finish	0.
(*b*)	Same as (*8a*) plaster or plaster board one side	0.
(*c*)	Same as (*8a*) furred, lath and plaster or plaster board	0.
(*d*)	Same as (*8c*) substituting ½" insulating board for lath	0.
(*e*)	Same as (*8c*) plus 1" insulating blanket	0.

No. 9. Poured Concrete

(*a*)	8" Wall, above grade	0.
(*b*)	8" Wall, below grade	0.
(*c*)	12" Wall, above grade	0.
(*d*)	12" Wall, below grade	0.

No. 10. Limestone or Sandstone

(*a*)	8" Stone, furred, lath and plaster or plaster board	0
(*b*)	Same as (*10a*) substituting ½" rigid insulation for lath	0
(*c*)	12" Stone, furred, lath and plaster or plaster board	0
(*d*)	Same as (*10c*) substituting ½" rigid insulation for lath	0
(*e*)	12" Stone below grade	0
(*f*)	16" Stone below grade	0

No. 11. Glass Block

(*a*)	3⅝" Block, corrugated surface	0

TABLE 1

HEAT LOSS FACTORS

PARTITIONS

No. 12. Frame

(*a*)	With lath and plaster or plaster board one side only	0.31
(*b*)	Same as (*12a*) substituting ½" rigid insulation for lath	0.18
(*c*)	Same as (*12a*) with ½" rigid insulation on exposed side	0.13
(*d*)	With lath and plaster or plaster board both sides	0.17
(e)	Same as (*12d*) substituting ½" rigid insulation for lath	0.10
(*f*)	Same as (*12d*) with 3⅝" rock wool or equivalent	0.04
(*g*)	Same as (*12d*) with 2" rock wool or equivalent	0.06

CEILINGS

No. 13. Attic Space Above

(*a*)	Lath and plaster or plaster board, no floor above	0.32
(*b*)	Lath and plaster or plaster board, tight floor above	0.20
(*c*)	Same as (*13a*) substituting ½" rigid insulation for lath	0.23
(*d*)	Same as (*13b*) substituting ½" rigid insulation for lath	0.16
(*e*)	Same as (*13a*) with ½" rigid insulation on top of joists	0.18
(*f*)	Same as (*13a*) or (*13b*) with 3⅝" rock wool or equivalent	0.08
(*g*)	Same as (*13f*) except with 2" rock wool or equivalent	0.13

No. 14. Part of Single Roof — No Attic Space

(*a*)	Lath and plaster or plaster board, rafter, sheathing, shingles	0.29
(*b*)	Same as (*14a*) substituting ½" rigid insulation for lath	0.21
(*c*)	Same as (*14a*) with 3⅝" rock wool or equivalent	0.08
(*d*)	Same as (*14a*) with 2" rock wool or equivalent	0.10

No. 15. Part of Built-up Roof — No Attic Space

(*a*)	Lath and plaster or plaster board, rafter, sheathing, built-up roofing	0.31
(*b*)	Same as (*15a*) substituting ½" rigid insulation for lath	0.23
(*c*)	Same as (*15a*) with 3⅝" rock wool or equivalent	0.08
(*d*)	*Same as* (*15a*) with 2" rock wool or equivalent	0.10

No. 16. Part of Metal Roof — No Attic Space

(*a*)	Lath and plaster or plaster board, joists, sheathing, metal roof	0.46
(*b*)	Same as (*16a*) substituting ½" rigid insulation for lath	0.28
(*c*)	Same as (*16a*) with 3⅝" rock wool or equivalent	0.08
(*d*)	Same as (*16a*) with 2" rock wool or equivalent	0.13

FLOORS

No. 17. Wood, Over Exposed or Unheated Space

(*a*)	Double floor on joists over enclosed, unheated space	0.17
(*b*)	Same as (*17a*) over exposed space	0.35
(*c*)	Same as (*17a*) with ½" rigid insulation on bottom of joists	0.10
(*d*)	Same as (*17b*) with ½" rigid insulation on bottom of joists	0.18
(*e*)	Same as (*17a*) with 2" rock wool or equivalent between joists	0.06
(*f*)	Same as (*17b*) with 2" rock wool or equivalent between joists	0.13
(*g*)	Same as (*17a*) with 3⅝" rock wool or equivalent between joists	0.04
(*h*)	Same as (*17b*) with 3⅝" rock wool or equivalent between joists	0.08

No. 18. Concrete

(*a*)	4" thick floor on ground	0.06
(*b*)	4" thick floor on 3" cinder fill	0.06
(*c*)	Same as (*18b*) with hardwood floor on pine sub-floor	0.06
(*d*)	Floor on ground, below grade	0.04

WINDOWS

No. 19. Windows

(*a*)	Single (no storm sash)	1.13
(*b*)	With storm sash or double glazed	0.45
(*c*)	Double glazed with ¼" air space	0.60

EXTERIOR DOORS

No. 20. With or Without Glass

Same as Windows

INFILTRATION

(Based on volume of room in cubic feet)

No. 21. Windows and Doors Without Weatherstripping or Storm Sash

(*a*)	Rooms with windows or exterior doors on one side only	0.017
(*b*)	Rooms with windows or exterior doors on two sides	0.027
(*c*)	Rooms with windows or exterior doors on three sides	0.036
(*d*)	Entrance Halls	0.036
(*e*)	Sun Rooms with many windows on three sides	0.054

No. 22. Windows and Doors Weatherstripped or with Storm Sash

(*a*)	Rooms with windows or exterior doors on one side only	0.011
(*b*)	Rooms with windows or exterior doors on two sides	0.017
(*c*)	Rooms with windows or exterior doors on three sides	0.027
(*d*)	Entrance Halls	0.027
(*e*)	Sun Rooms with many windows on three sides	0.036

TABLE 2

Btu/Hr. REQUIREMENTS FOR AREAS AND VOLUME

70 F Indoor Minus Outdoor Temperature Difference

Btu/Hr. Required	WINDOW AND DOOR AREAS Sq. Ft.			INFILTRATION Room Volume, Cu. Ft.					WALL, CEILING AND FLOOR AREAS, SQ. FT.										
	FACTORS			FACTORS					FACTORS										
	0.45	0.60	1.13	0.011	0.017	0.027	0.036	0.054	0.04	0.06	0.08	0.10	0.13	0.15	0.16	0.17	0.18	0.19	0.20
100	3.2	2.4	1.3	130	84	52.9	39.7	26.5	35.7	23.8	17.9	14.3	10.9	9.5	8.9	8.4	7.9	7.5	7.1
200	6.4	4.8	2.5	260	168	106	79.4	52.9	71.4	47.6	35.7	28.6	21.9	19.0	17.8	16.8	15.9	15.0	14.3
300	9.5	7.1	3.8	390	252	159	119	79.4	107	71.4	53.6	42.9	32.9	28.5	26.7	25.2	23.8	22.6	21.4
400	12.7	9.5	5.1	519	336	212	159	106	143	95.2	71.4	57.1	43.9	38.1	35.7	33.6	31.7	30.1	28.6
500	15.9	11.9	6.3	649	420	265	198	132	179	119	89.3	71.4	54.9	47.6	44.6	42.0	39.7	37.6	35.7
600	19.0	14.3	7.6	779	504	317	238	159	214	143	107	85.7	65.9	57.1	53.6	50.4	47.6	45.1	42.9
700	22.2	16.7	8.8	909	588	370	278	185	250	167	125	100	76.9	66.7	62.5	58.8	55.6	52.6	50.0
800	25.4	19.0	10.1	1039	672	423	317	212	286	190	143	114	87.9	76.1	71.4	67.2	63.5	60.1	57.1
900	28.6	21.4	11.4	1169	756	476	352	238	321	214	161	129	98.9	85.7	80.3	75.6	71.4	67.7	64.3
1000	31.7	23.8	12.6	1299	840	529	397	265	357	238	179	143	110	95.2	89.3	84.0	79.4	75.2	71.4
1100	34.9	26.2	13.9	1429	924	582	437	291	393	262	196	157	121	105	98.2	92.4	87.3	82.7	78.6
1200	38.1	28.6	15.1	1558	1008	635	476	317	429	286	214	171	132	114	107	101	95.2	90.2	85.7
1300	41.3	31.0	16.4	1688	1092	688	516	344	464	310	232	186	143	124	116	109	103	97.7	92.8
1400	44.4	33.3	17.7	1818	1176	741	556	370	500	333	250	200	154	133	125	118	111	105	100
1500	47.6	35.7	18.9	1948	1260	794	595	397	536	357	268	214	165	143	134	126	119	113	107
1600	50.8	38.1	20.2	2078	1345	846	635	423	571	381	286	229	176	152	143	134	127	120	114
1700	53.9	40.5	21.5	2208	1429	899	675	450	607	405	304	243	187	162	152	143	135	128	121
1800	57.1	42.9	22.7	2338	1513	952	714	476	643	429	321	257	198	171	161	151	143	135	129
1900	60.3	45.2	24.0	2468	1597	1005	754	503	679	452	339	271	209	181	170	160	151	143	136
2000	63.5	47.6	25.2	2597	1681	1058	794	529	714	476	357	286	220	190	179	168	159	150	143
2100	66.7	50.0	26.5	2727	1765	1111	833	556	750	500	375	300	231	200	187	176	167	158	150
2200	69.8	52.4	27.8	2857	1849	1164	873	582	786	524	393	314	242	210	196	185	175	165	157
2300	73.0	54.8	29.0	2987	1933	1217	913	608	821	548	411	329	253	219	205	193	183	173	164
2400	76.2	57.1	30.3	3117	2017	1270	952	635	857	571	429	343	264	229	214	202	190	180	171
2500	79.4	59.5	31.6	3247	2101	1323	992	661	893	595	446	357	275	238	223	210	198	188	179
2600	82.5	61.9	32.8	3377	2185	1376	1032	688	929	619	464	371	286	248	232	218	206	195	186
2700	85.7	64.3	34.1	3506	2269	1429	1071	714	964	643	482	386	297	257	241	227	214	203	193
2800	88.9	66.7	35.3	3636	2353	1481	1111	741	1000	667	500	400	308	267	250	235	222	211	200
2900	92.0	69.0	36.6	3766	2437	1534	1151	767	1036	690	518	414	319	276	259	244	230	218	207
3000	95.2	71.4	37.9	3896	2521	1587	1190	794	1071	714	536	429	330	286	268	252	238	226	214
3100	98.4	73.8	39.1	4026	2605	1640	1230	820	1107	738	554	443	341	295	277	260	246	233	221
3200	101	76.2	40.4	4156	2689	1693	1270	847	1143	762	571	457	352	305	286	269	254	241	229
3300	105	78.6	41.6	4286	2773	1746	1310	873	1179	786	589	471	363	314	295	277	262	248	236
3400	108	81.0	42.9	4416	2857	1799	1349	899	1214	810	607	486	374	324	304	286	270	256	243
3500	111	83.3	44.2	4545	2941	1852	1389	926	1250	833	625	500	385	333	312	294	278	263	250
3600	114	85.7	45.4	4675	3025	1905	1429	952	1286	857	643	514	396	343	321	303	286	271	257
3700	117	88.1	46.7	4805	3109	1958	1468	979	1321	881	661	529	407	352	330	311	294	278	264
3800	121	90.5	48.0	4935	3193	2011	1509	1005	1357	905	679	543	418	362	339	319	302	286	271
3900	124	92.9	49.2	5065	3277	2063	1548	1032	1393	929	696	557	429	371	348	328	310	293	279
4000	127	95.2	50.5	5195	3361	2116	1587	1058	1429	952	714	571	440	381	357	336	317	301	286
4100	130	97.6	51.7	5325	3445	2169	1627	1085	1464	976	732	586	451	390	366	345	325	308	293
4200	133	100	53.0	5455	3529	2222	1667	1111	1500	1000	750	600	461	400	375	353	333	316	300
4300	136	102	54.2	5584	3613	2275	1706	1138	1536	1024	768	614	472	409	384	361	341	323	307
4400	140	105	55.5	5714	3697	2328	1746	1164	1571	1048	786	629	483	419	393	370	349	331	314
4500	143	107	56.7	5844	3781	2381	1786	1190	1607	1071	804	643	494	429	402	378	357	338	321
4600	146	110	58.1	5974	3866	2434	1825	1217	1643	1095	821	657	505	438	411	387	365	346	329
4700	149	112	59.3	6104	3950	2487	1865	1243	1679	1119	839	671	516	448	420	395	373	353	336
4800	152	114	60.6	6234	4034	2540	1905	1270	1714	1143	857	686	527	457	429	403	381	361	343
4900	156	117	61.8	6364	4118	2593	1944	1296	1750	1167	875	700	538	467	437	412	389	368	350
5000	159	119	63.1	6494	4202	2645	1984	1323	1786	1190	893	714	549	476	446	420	397	376	357

TO USE THIS TABLE

Enter at top under factor determined from Table 1.
Read down to nearest value in sq. ft. or cu. ft.
Read to left to determine the Btu/Hr. required.

TABLE 2—Continued

Btu/Hr. REQUIREMENTS FOR AREAS AND VOLUME

70 F Indoor Minus Outdoor Temperature Difference

Btu/Hr. Required	WALL, CEILING AND FLOOR AREAS, SQ. FT.																					
	FACTORS																					
	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.30	0.31	0.32	0.33	0.35	0.37	0.39	0.42	0.46	0.49	0.51	0.56	0.69
100	6.8	6.5	6.2	5.9	5.7	5.5	5.3	5.1	4.9	4.8	4.6	4.5	4.3	4.1	3.9	3.7	3.4	3.1	2.9	2.8	2.6	2.1
200	13.6	12.9	12.4	11.9	11.4	10.9	10.5	10.2	9.9	9.5	9.2	8.9	8.7	8.2	7.7	7.3	6.8	6.2	5.8	5.6	5.1	4.1
300	20.4	19.5	18.6	17.9	17.1	16.5	15.8	15.3	14.8	14.3	13.8	13.4	13.0	12.2	11.6	10.9	10.2	9.3	8.7	8.4	7.7	6.2
400	27.2	25.9	24.8	23.8	22.8	21.9	21.1	20.4	19.7	19.0	18.4	17.9	17.3	16.3	15.4	14.7	13.6	12.4	11.7	11.2	10.2	8.3
500	34.0	32.4	31.0	29.7	28.5	27.5	26.4	25.5	24.6	23.8	23.0	22.3	21.6	20.4	19.3	18.3	17.0	15.5	14.6	14.0	12.8	10.4
600	40.8	38.9	37.2	35.7	34.2	32.9	31.7	30.6	29.6	28.6	27.6	26.8	26.0	24.5	23.1	22.0	20.4	18.6	17.5	16.8	15.3	12.4
700	47.6	45.4	43.4	41.6	39.9	38.5	37.0	35.7	34.5	33.3	32.3	31.2	30.3	28.6	27.0	25.6	23.8	21.7	20.4	19.6	17.9	14.5
800	54.4	51.9	49.6	47.6	45.7	43.9	42.3	40.8	39.4	38.1	36.9	35.7	34.6	32.6	30.9	29.3	27.2	24.8	23.3	22.4	20.4	16.6
900	61.2	58.4	55.8	53.5	51.4	49.4	47.6	45.9	44.3	42.8	41.5	40.2	39.0	36.7	34.7	33.0	30.6	27.9	26.2	25.2	23.0	18.6
1000	68.0	64.9	62.1	59.5	57.1	54.9	52.9	51.0	49.3	47.6	46.1	44.6	43.3	40.8	38.6	36.6	34.0	31.1	29.1	28.0	26.0	20.7
1100	74.8	71.4	68.3	65.4	62.8	60.4	58.2	56.1	54.2	52.4	50.7	49.1	47.6	44.9	42.5	40.3	37.4	34.2	32.1	30.8	28.1	22.8
1200	81.6	77.9	74.5	71.4	68.5	65.9	63.5	61.2	59.1	57.1	55.3	53.6	52.0	49.0	46.3	44.0	40.8	37.3	35.0	33.6	30.6	24.8
1300	88.4	84.4	80.7	77.3	74.2	71.4	68.9	66.3	64.0	61.9	59.9	58.0	56.3	53.1	50.2	47.6	44.2	40.4	37.9	36.4	33.2	26.9
1400	95.2	90.9	86.9	83.3	79.9	76.9	74.1	71.4	69.0	66.7	64.5	62.5	60.6	57.1	54.0	51.3	47.6	43.5	40.8	39.2	35.7	29.0
1500	102	97.3	93.1	89.2	85.7	82.4	79.4	76.5	73.9	71.4	69.1	67.0	65.0	61.2	57.9	54.9	51.0	46.6	43.7	42.0	38.3	31.0
1600	109	104	99.3	95.2	91.4	87.9	84.7	81.6	78.8	76.2	73.7	71.4	69.3	65.3	61.8	58.6	54.4	49.7	46.6	44.8	40.8	33.1
1700	116	110	106	101	97.1	93.3	89.9	86.7	83.7	80.9	78.3	75.9	73.6	69.4	65.6	62.3	57.8	52.8	49.5	47.6	43.4	35.2
1800	122	117	112	107	103	98.8	95.2	91.8	88.7	85.7	82.9	80.4	77.9	73.5	69.5	65.9	61.2	55.9	52.5	50.4	45.9	37.3
1900	129	123	118	113	109	104	100	96.9	93.6	90.5	87.6	84.8	82.3	77.5	73.3	69.6	64.6	59.0	55.4	53.2	48.5	39.3
2000	136	130	124	119	114	110	106	102	98.5	95.2	92.1	89.3	86.6	81.6	77.2	73.3	68.0	62.1	58.3	56.0	51.0	41.4
2100	143	136	130	125	120	115	111	107	103	100	96.8	93.7	90.9	85.7	81.1	76.9	71.4	65.2	61.2	58.8	53.6	43.5
2200	150	143	137	131	126	121	116	112	108	105	101	98.2	95.2	89.8	84.9	80.6	74.8	68.3	64.1	61.6	58.7	45.5
2300	156	149	143	137	131	126	122	117	113	110	106	103	99.6	93.8	88.8	84.2	78.2	71.4	67.0	64.4	61.2	47.6
2400	163	156	149	143	137	132	127	122	118	114	111	107	104	97.9	92.6	87.9	81.6	74.5	69.9	67.2	63.8	49.7
2500	170	162	155	149	143	137	132	127	123	119	115	112	108	102	96.5	91.6	85.0	77.6	72.9	70.0	66.3	51.8
2600	177	169	161	155	149	143	138	133	128	124	120	116	113	106	100	95.2	88.4	80.7	75.8	72.8	68.9	53.8
2700	184	175	168	161	154	148	143	138	133	129	124	121	117	110	104	98.9	91.8	83.8	78.7	75.6	71.4	55.9
2800	190	182	174	167	160	154	148	143	138	133	129	125	121	114	108	103	95.2	86.9	81.6	78.4	74.0	58.0
2900	197	188	180	173	166	159	153	148	143	138	134	129	126	118	112	106	98.6	90.0	84.5	81.2	76.5	60.0
3000	204	195	186	179	171	165	159	153	148	143	138	134	130	122	116	110	102	93.2	87.4	84.0	79.1	62.1
3100	211	201	193	185	177	170	164	158	153	148	143	138	134	127	120	114	105	96.3	90.3	86.8	81.6	64.2
3200	218	208	199	190	183	176	169	163	158	152	147	143	139	131	124	117	109	99.4	93.2	89.6	84.2	66.2
3300	224	214	205	196	189	181	175	168	163	157	152	147	143	135	127	121	112	102	96.2	92.4	86.7	68.3
3400	231	221	211	202	194	187	180	173	167	162	157	152	147	139	131	125	116	106	99.1	95.2	89.3	70.4
3500	238	227	217	208	200	192	185	179	172	167	161	156	152	143	135	128	119	109	102	98.0	91.8	72.5
3600	245	234	223	214	206	198	190	184	177	171	166	161	156	147	139	132	122	112	105	101	94.4	74.5
3700	252	240	230	220	211	203	196	189	182	176	170	165	160	151	143	136	126	115	108	104	96.9	76.6
3800	258	247	236	226	217	209	201	194	187	181	175	170	165	155	147	139	129	118	111	106	99.5	78.7
3900	265	253	242	232	223	214	206	199	192	186	180	174	169	159	151	143	133	121	114	109	102	80.7
4000	272	260	248	238	229	220	212	204	197	190	184	179	173	163	154	147	136	124	117	112	105	82.8
4100	279	266	255	244	234	225	217	209	202	195	189	183	177	167	158	150	139	127	119	115	107	84.9
4200	286	273	261	250	240	231	222	214	207	200	194	187	182	171	162	154	143	130	122	118	110	86.9
4300	292	279	267	256	246	236	228	219	212	205	198	192	186	175	166	158	146	134	125	120	112	89.0
4400	299	286	273	262	251	242	233	224	217	209	203	196	190	180	170	161	150	137	128	123	115	91.1
4500	306	292	279	268	257	247	238	230	222	214	207	201	195	184	174	165	153	140	131	126	117	93.2
4600	313	299	286	274	263	253	243	235	227	219	212	205	199	188	178	168	156	143	134	129	120	95.2
4700	320	305	292	280	269	258	249	240	232	224	217	210	203	192	181	172	160	146	137	132	122	97.3
4800	326	312	298	286	274	264	254	245	236	229	221	214	208	196	185	176	163	149	140	134	125	99.4
4900	333	318	304	292	280	269	259	250	241	233	226	219	212	200	189	179	167	152	143	137	128	101
5000	340	325	311	298	286	275	265	255	246	238	230	223	216	204	193	183	170	155	146	140	130	104

TO USE THIS TABLE

Enter at top under factor determined from Table 1.
Read down to nearest value in sq. ft. or cu. ft.
Read to left to determine the Btu/Hr. required.

TABLE 3

EQUIVALENT Btu/Hr. HEAT LOSS

For Various Indoor Minus Outdoor Temperature Differences

70 F	50 F	55 F	60 F	65 F	75 F	80 F	85 F	90 F
1000	710	790	860	930	1070	1140	1210	1290
1100	790	860	940	1020	1180	1260	1340	1410
1200	860	940	1030	1110	1290	1370	1460	1540
1300	930	1020	1110	1210	1390	1490	1580	1670
1400	1000	1100	1200	1300	1500	1600	1700	1800
1500	1070	1180	1290	1390	1610	1710	1820	1930
1600	1140	1260	1370	1490	1710	1830	1940	2060
1700	1210	1340	1460	1580	1820	1940	2060	2190
1800	1290	1410	1540	1670	1930	2060	2190	2310
1900	1360	1490	1630	1760	2040	2170	2310	2440
2000	1430	1570	1720	1860	2140	2290	2430	2570
2100	1500	1650	1800	1950	2250	2400	2550	2700
2200	1570	1730	1890	2040	2360	2510	2670	2830
2300	1640	1810	1970	2140	2460	2630	2790	2960
2400	1710	1890	2060	2230	2570	2740	2910	3090
2500	1790	1960	2140	2320	2680	2860	3040	3210
2600	1860	2040	2230	2410	2790	2970	3160	3340
2700	1930	2120	2310	2510	2890	3090	3280	3470
2800	2000	2200	2400	2600	3000	3200	3400	3600
2900	2070	2280	2490	2690	3110	3310	3520	3730
3000	2140	2360	2570	2790	3210	3430	3640	3860
3100	2210	2440	2660	2800	3320	3540	3760	3990
3200	2290	2510	2740	2970	3430	3660	3890	4110
3300	2350	2590	2830	3060	3540	3770	4010	4240
3400	2430	2670	2910	3160	3640	3890	4130	4370
3500	2500	2750	3000	3250	3750	4000	4250	4500
3600	2570	2830	3090	3340	3860	4110	4370	4630
3700	2640	2910	3170	3440	3960	4230	4490	4760
3800	2710	2990	3260	3530	4070	4340	4610	4890
3900	2790	3060	3340	3620	4180	4460	4740	5010
4000	2860	3140	3430	3710	4290	4570	4860	5140
4100	2930	3220	3510	3810	4390	4690	4980	5270
4200	3000	3300	3600	3900	4500	4800	5100	5400
4300	3070	3380	3690	3990	4610	4910	5220	5530
4400	3140	3460	3770	4090	4710	5030	5340	5660
4500	3210	3540	3860	4180	4820	5140	5460	5790
4600	3290	3610	3940	4270	4930	5260	5590	5910
4700	3360	3690	4030	4360	5040	5370	5710	6040
4800	3430	3770	4110	4460	5140	5490	5830	6170
4900	3500	3850	4200	4550	5250	5600	5950	6300
5000	3570	3930	4290	4640	5360	5720	6070	6430
5100	3640	4010	4370	4740	5460	5830	6190	6560
5200	3710	4090	4460	4830	5570	5940	6310	6690
5300	3790	4160	4540	4920	5680	6060	6440	6810
5400	3860	4240	4630	5010	5790	6170	6560	6940
5500	3930	4320	4710	5110	5890	6290	6680	7070
5600	4000	4400	4800	5200	6000	6400	6800	7200
5700	4070	4480	4890	5290	6110	6520	6920	7340
5800	4140	4560	4970	5390	6210	6630	7040	7460
5900	4210	4640	5060	5480	6320	6740	7160	7590
6000	4290	4710	5140	5570	6430	6860	7290	7710
6100	4360	4790	5230	5670	6540	6970	7410	7840
6200	4430	4870	5310	5760	6640	7090	7530	7970
6300	4500	4950	5400	5850	6750	7200	7650	8100
6400	4570	5030	5490	5940	6860	7320	7770	8230
6500	4640	5110	5570	6040	6960	7430	7890	8360
6600	4710	5190	5660	6130	7070	7540	8010	8490
6700	4790	5260	5740	6220	7180	7660	8140	8610
6800	4860	5340	5830	6310	7290	7770	8260	8740
6900	4930	5420	5910	6410	7390	7890	8380	8870

70 F	50 F	55 F	60 F	65 F	75 F	80 F	85 F	90 F
7000	5000	5500	6000	6500	7500	8000	8500	9000
7100	5070	5580	6090	6600	7610	8120	8620	9130
7200	5140	5660	6170	6690	7710	8230	8740	9260
7300	5210	5740	6260	6780	7820	8340	8860	9390
7400	5290	5810	6340	6870	7930	8460	8990	9510
7500	5360	5890	6430	6960	8040	8570	9100	9640
7600	5430	5970	6510	7060	8140	8690	9230	9770
7700	5500	6050	6600	7150	8250	8800	9350	9900
7800	5570	6130	6690	7240	8360	8920	9470	10030
7900	5640	6210	6770	7340	8460	9030	9590	10160
8000	5710	6290	6860	7430	8570	9140	9710	10290
8100	5790	6360	6940	7520	8680	9260	9840	10410
8200	5860	6440	7030	7610	8790	9370	9960	10540
8300	5930	6520	7110	7710	8890	9490	10080	10670
8400	6000	6600	7200	7800	9000	9600	10200	10800
8500	6070	6680	7290	7890	9110	9720	10320	10930
8600	6140	6760	7370	7990	9210	9830	10440	11060
8700	6210	6840	7460	8080	9320	9940	10560	11190
8800	6290	6910	7540	8170	9430	10060	10690	11310
8900	6360	6990	7630	8260	9540	10170	10810	11440
9000	6430	7070	7710	8360	9640	10290	10930	11570
9100	6500	7150	7800	8450	9750	10400	11050	11700
9200	6570	7230	7890	8540	9850	10520	11170	11830
9300	6640	7310	7970	8640	9960	10630	11290	11960
9400	6710	7390	8060	8730	10070	10740	11420	12090
9500	6790	7460	8140	8820	10180	10860	11540	12210
9600	6860	7540	8230	8910	10290	10970	11660	12340
9700	6930	7620	8310	9010	10390	11090	11780	12470
9800	7000	7700	8400	9100	10500	11200	11900	12600
9900	7070	7780	8490	9190	10610	11320	12020	12730
10000	7140	7860	8570	9290	10710	11430	12140	12860
10100	7210	7940	8660	9380	10820	11540	12260	12990
10200	7290	8010	8740	9470	10930	11660	12390	13110
10300	7360	8090	8830	9560	11040	11770	12510	13240
10400	7430	8170	8910	9660	11140	11890	12630	13370
10500	7500	8250	9000	9750	11250	12000	12750	13500
10600	7570	8330	9090	9840	11360	12120	12870	13630
10700	7640	8410	9170	9940	11460	12230	12990	13760
10800	7710	8490	9260	10030	11570	12340	13110	13890
10900	7790	8560	9340	10120	11680	12460	13240	14010
11000	7860	8640	9430	10210	11790	12570	13360	14140
11100	7930	8720	9510	10310	11890	12690	13480	14270
11200	8000	8800	9600	10400	12000	12800	13600	14400
11300	8070	8880	9690	10490	12110	12920	13720	14530
11400	8140	8960	9770	10590	12210	13030	13840	14660
11500	8210	9040	9860	10680	12320	13140	13960	14790
11600	8290	9110	9940	10770	12430	13260	14090	14910
11700	8360	9190	10030	10860	12540	13370	14210	15040
11800	8430	9270	10110	10960	12640	13490	14330	15170
11900	8500	9350	10200	11000	12750	13600	14450	15300
12000	8570	9430	10290	11140	12860	13720	14570	15430
12100	8640	9510	10370	11240	12960	13840	14690	15560
12200	8710	9590	10460	11330	13070	13940	14810	15690
12300	8790	9670	10540	11420	13180	14060	14940	15810
12400	8860	9740	10630	11510	13290	14170	15060	15940
12500	8930	9820	10710	11610	13390	14290	15180	16070
12600	9000	9900	10800	11700	13500	14400	15300	16200
12700	9070	9980	10890	11790	13620	14520	15420	16320
12800	9140	10060	10970	11890	13710	14630	15540	16460
12900	9210	10140	11060	11980	13820	14740	15660	16590

TO USE THIS TABLE

Enter under column headed 70 F.
Read down to Btu/Hr. determined from Table 2.
Read across to the column which represents the indoor minus outdoor temperature difference for which the system is designed.

Selecting Crane Radiant Baseboard Paneling

It is necessary to determine the length of the wall which is available for installation of the Baseboards, allowing 4-3/8" for each end enclosure and 3-3/16" for a standard corner connection. Also, remember that Crane Baseboard Panels are furnished in 1-foot increments for the Type "RC" units and 2-foot increments for the Type "R" units. The outside walls should be covered first; if there is insufficient outside wall space available, the inside partitions also may be used. Record the length of available wall in Column 15 of the Calculation Sheet. (See page 15).

Divide the total heat loss from each room by the length of available wall to get the heat loss per linear foot and record in Column 16. *The room which has the highest heat loss per linear foot provides the basis for the selection of the average water temperature for the entire system.*

Use Table on page 22, to select a water temperature which will permit this room to be heated by one of the two types which will cover as much of the available wall as possible. Then use the same average water temperature for the rest of the rooms. Record in Column 17 the type and height of baseboard; in Column 18, the length; and in Column 19 the square feet.

APPLICATION IN THE EXAMPLE FLOOR PLAN
SEE PAGE 23

Example: Living room heat loss 8460 Btu/Hr. available wall space 21'--required heat output 8460 ÷ 21 = 403 Btu/Hr. per linear foot. This room has been selected because it has the highest required heat output per linear foot of all rooms. It can be heated by using 16 ft. of 9" type "RC" at 180 deg. water temperature which gives 8840 Btu. Therefore, all other Baseboards to be installed in this house must be selected on the basis of 180 deg. water temperature.

In existing installations, where Baseboards are to replace radiation in some rooms, it is important to install Baseboards of sufficient capacity to equal the amount of radiation removed from the room, provided it was satisfactorily heated originally.

If any room has insufficient wall space to permit the use of Baseboards, it is satisfactory to use other types of heating units. However, it should be noted that only cast iron radiators or cast iron convectors should be used with Cast Iron Radiant Baseboards.

RATINGS FOR CRANE TYPE "RC" RADIANT BASEBOARD PANELS

LENGTH OF PANEL FT.	STEAM RATING *		HOT WATER RATINGS IN BTU PER HOUR													
			AVERAGE WATER TEMP.	215	210	205	200	195	190	185	180	175	170	165	160	155	150
	SQ. FT.	BTU/HR	B.T.U. EMISSION FACTOR	240	230	220	210	200	190	180	170	160	150	140	130	120	110
2	6.5	1560		1560	1500	1430	1370	1300	1240	1170	1110	1040	980	910	850	780	720
3	9.75	2340		2340	2240	2150	2050	1950	1850	1760	1680	1560	1460	1370	1270	1170	1070
4	13.0	3120		3120	2990	2860	2730	2600	2470	2340	2210	2080	1950	1820	1690	1560	1430
5	16.25	3900		3900	3740	3580	3410	3250	3090	2930	2760	2600	2440	2280	2110	1950	1790
6	19.5	4680		4680	4490	4290	4100	3900	3710	3510	3320	3120	2930	2730	2540	2340	2150
7	22.75	5460		5460	5230	5010	4780	4550	4320	4100	3870	3640	3410	3190	2960	2730	2500
8	26.0	6240		6240	5980	5720	5460	5200	4940	4680	4420	4160	3900	3640	3380	3120	2860
9	29.25	7020		7020	6730	6440	6140	5850	5560	5270	4970	4680	4390	4100	3800	3510	3220
10	32.5	7800		7800	7480	7150	6830	6500	6180	5850	5530	5200	4880	4550	4230	3900	3580
11	35.75	8580		8580	8220	7870	7510	7150	6790	6440	6080	5720	5360	5010	4650	4290	3930
12	39.0	9360		9360	8970	8580	8190	7800	7410	7020	6630	6240	5850	5460	5070	4680	4290
13	42.25	10140		10140	9720	9300	8870	8450	8030	7610	7180	6760	6340	5920	5490	5070	4650
14	45.5	10920		10920	10470	10010	9560	9100	8650	8190	7740	7280	6830	6370	5920	5460	5010
15	48.75	11700		11700	11210	10730	10240	9750	9260	8780	8290	7800	7310	6830	6340	5850	5360
16	52.0	12480		12480	11960	11440	10920	10400	9880	9360	8840	8320	7800	7280	6760	6240	5720
17	55.25	13250		13260	12710	12160	11600	11050	10500	9950	9390	8840	8290	7740	7180	6630	6080
18	58.5	14040		14040	13460	12870	12290	11700	11120	10530	9950	9360	8780	8190	7610	7020	6440
19	61.75	14820		14820	14200	13590	12970	12350	11730	11120	10500	9880	9260	8650	8030	7410	6790
20	65.0	15600		15600	14950	14300	13650	13000	12350	11700	11050	10400	9750	9100	8450	7800	7150
21	68.25	16380		16380	15700	15020	14330	13650	12970	12290	11600	10920	10240	9560	8870	8190	7510
22	71.5	17160		17160	16450	15730	15020	14300	13590	12870	12160	11440	10730	10010	9300	8580	7870
23	74.75	17940		17940	17190	16450	15700	14950	14200	13460	12710	11960	11210	10470	9720	8970	8220
24	78.0	18720		18720	17940	17160	16380	15600	14820	14040	13260	12480	11700	10920	10140	9360	8580
25	81.25	19500		19500	18690	17880	17060	16250	15440	14630	13810	13000	12190	11380	10560	9750	8940
26	84.5	20280		20280	19440	18590	17750	16900	16060	15120	14370	13520	12680	11830	10990	10140	9300
27	87.75	21060		21060	20180	19310	18430	17550	16670	15800	14920	14040	13160	12290	11410	10530	9650
28	91.0	21840		21840	20930	20020	19110	18200	17290	16380	15470	14560	13650	12740	11830	10920	10010
29	94.25	22620		22620	21680	20740	19790	18850	17910	16970	16020	15080	14140	13200	12250	11310	10470
30	97.5	23400		23400	22430	21450	20480	19500	18530	17550	16580	15600	14630	13650	12680	11700	10730

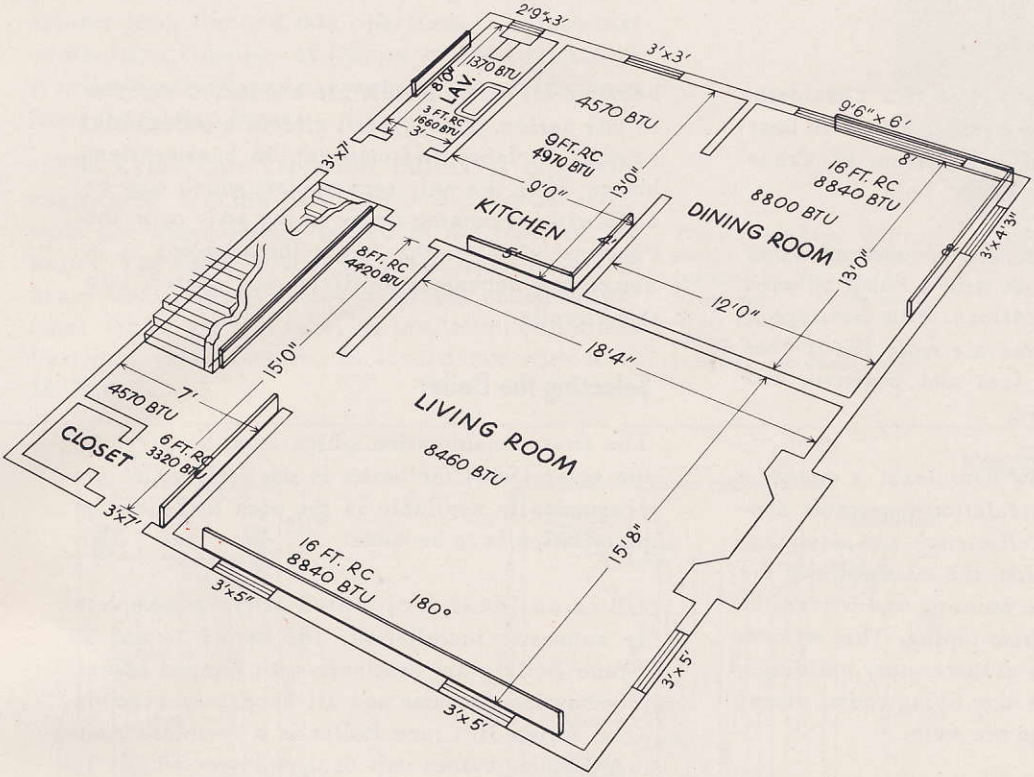
* RATINGS ARE BASED ON A STANDARD EMISSION OF 240 B.T.U. PER HR. PER SQ. FT. FOR STEAM OR AVERAGE HOT WATER TEMPERATURE OF 215° F.

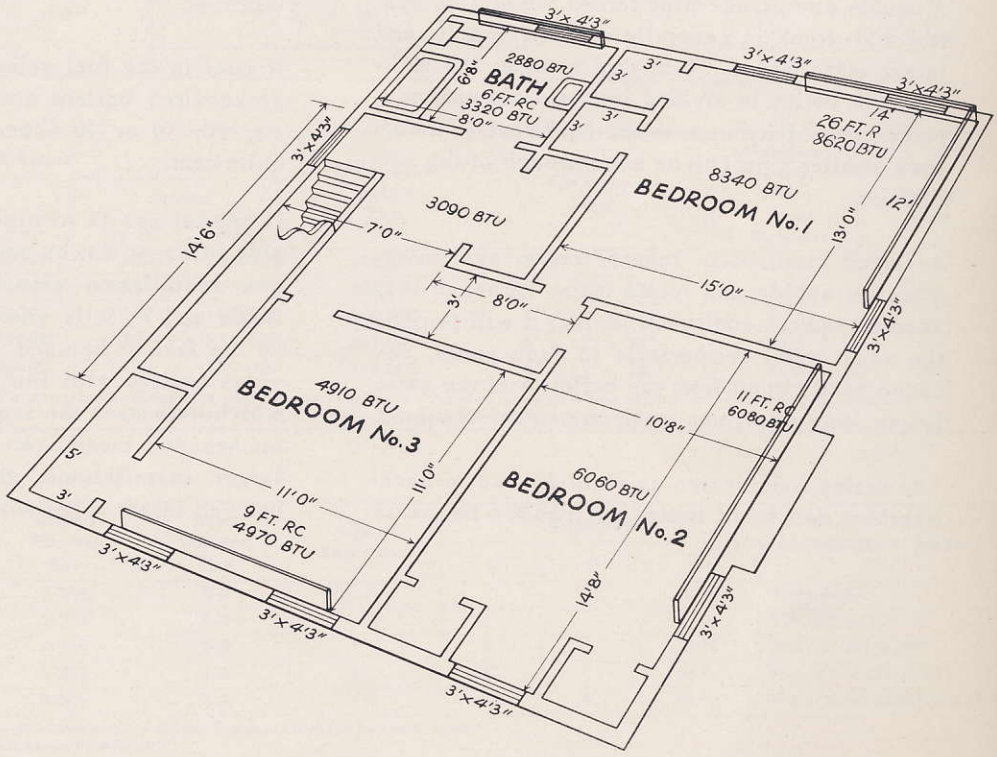
RATINGS FOR CRANE TYPE "R" RADIANT BASEBOARD PANELS

LENGTH OF PANEL FT.	STEAM RATING *		HOT WATER RATINGS IN B.T.U. PER HOUR													
			AVERAGE WATER TEMP.	215	210	205	200	195	190	185	180	175	170	165	160	155	150
	SQ. FT.	BTU/HR	B.T.U EMISSION FACTOR	240	230	220	210	200	190	180	170	160	150	140	130	120	110
2	3.9	940		940	900	860	820	780	740	700	660	620	590	550	510	470	430
4	7.8	1870		1870	1790	1720	1640	1560	1480	1400	1330	1250	1170	1090	1010	940	860
6	11.7	2810		2810	2690	2570	2460	2340	2220	2110	1990	1870	1760	1640	1520	1400	1290
8	15.6	3740		3740	3590	3430	3280	3120	2960	2810	2650	2500	2340	2180	2030	1870	1720
10	19.5	4680		4680	4490	4290	4100	3900	3710	3510	3320	3120	2930	2730	2540	2340	2150
12	23.4	5620		5620	5380	5150	4910	4680	4450	4210	3980	3740	3510	3280	3040	2810	2570
14	27.3	6550		6550	6280	6010	5730	5460	5190	4910	4640	4370	4100	3820	3550	3280	3000
16	31.2	7490		7490	7180	6860	6550	6240	5930	5620	5300	4990	4680	4370	4060	3740	3430
18	35.1	8420		8420	8070	7720	7370	7020	6670	6320	5970	5620	5270	4910	4560	4210	3860
20	39.0	9360		9360	8970	8580	8190	7800	7410	7020	6630	6240	5850	5460	5070	4680	4290
22	42.9	10300		10300	9870	9440	9010	8580	8150	7720	7290	6860	6440	6010	5580	5150	4720
24	46.8	11230		11230	10760	10300	9830	9360	8890	8420	7960	7490	7020	6550	6080	5620	5150
26	50.7	12170		12170	11660	11150	10650	10140	9630	9130	8620	8110	7610	7100	6590	6080	5580
28	54.6	13100		13100	12560	12010	11470	10920	10370	9830	9280	8740	8190	7640	7100	6550	6010
30	58.5	14040		14040	13460	12870	12290	11700	11120	10530	9950	9360	8780	8190	7610	7020	6440

* RATINGS ARE BASED ON A STANDARD EMISSION OF 240 B.T.U. PER HR. PER SQ. FT. FOR STEAM OR AVERAGE HOT WATER TEMPERATURE OF 215° F.

Crane Radiant Baseboard Panels are rated in terms of heat emission, expressed in Btu per hour per lineal foot. This method of listing ratings is used since the heat loss from a building is calculated in Btu per hour, and thus the selection of the proper size panels may be made directly without converting to square feet of radiation. The ratings in this table are shown for various length panels, from two to thirty feet, and for fourteen diff average water temperatures. For convenience in pr and estimating, Column 2 in the Table give ratin square feet of radiation based on standard heat emi of 240 Btu per hour per square foot at an average temperature of 215°F.


2'9"x3'
3'x3'
LAV.
6'8"
1370 BTU
3 FT. RC
1660 BTU
3'
4570 BTU
9 FT. RC
4970 BTU
9'6"x 6'
8'
16 FT. RC
8840 BTU
8800 BTU
DINING ROOM
13'0"
3'x4'3"
3'x7'
9'0"
13'0"
KITCHEN
5'
8 FT. RC
4420 BTU
12'0"
18'4"
15'0"
7'
4570 BTU
6 FT. RC
3320 BTU
CLOSET
3'x7'
LIVING ROOM
8460 BTU
15'8"
16 FT. RC
8840 BTU
180°
3'x5"
3'x5'
3'x5'


3'x 4'3"
3'x 4'3"
3'x 4'3"
2880 BTU
BATH
6 FT. RC
3320 BTU
6'8"
8'0"
3'
3'
3'
3'x4'3"
14'6"
26 FT. R
8620 BTU
14'
12'
8340 BTU
BEDROOM No. 1
13'0"
3090 BTU
7'0"
15'0"
3'
8'0"
3'x4'3"
4910 BTU
BEDROOM No. 3
11 FT. RC
6080 BTU
10'8"
11'0"
6060 BTU
BEDROOM No. 2
5'
3'
11'0"
9 FT. RC
4970 BTU
14'8"
3'x4'3"
3'x4'3"
3'x4'3"
3'x4'3"

Selecting the System and the Boiler

Several factors should be taken into consideration when selecting the system which is best suited for the proposed installation of Crane Radiant Baseboard Panels.

For a number of reasons, it is recommended that a forced hot water system with a pump be used on new, complete installations. With this type of system, room temperatures are more easily controlled. Circulation is fast and positive, and smaller piping is required.

In small homes with low heat loss, a one-pipe single circuit forced circulation hot water system may be used with efficiency and economy. In this type of installation, the main follows the four outside walls of the building and leaves the basement ceiling free from piping. This system may be used in one, two or three-story buildings. It is advisable to have the living room, dining room and kitchen first on the main.

A double circuit, one-pipe forced circulation system with trunk is generally used in medium and larger installations. With this system, the main from the boiler is divided into two circuits at a predetermined location in the basement. This allows smaller piping to be used on each of the two circuits.

A forced circulation, reverse return system requires a supply and return main. Although this system requires additional piping, it will provide the same water temperature to each panel, because each circuit from the boiler is of the same length. More even room temperatures are obtained.

The series loop system is ideal for use in basementless and small homes. It requires no mains because all of the panels are connected together in one series. This system effects a substantial savings in labor and material. In basementless homes, it is the only type system which may be used without running mains in the attic or in the concrete slab. In the larger installations it is sometimes necessary to divide the system into two circuits.

Selecting the Boiler

The first consideration which must be given t the selection of the boiler is the fuels which ar economically available in the area in which th installation is to be made.

Oil is an ideal fuel which offers a complet ly automatic installation. The Series 14 and 2 Crane Boilers are available with flanged burne combustion chamber and all necessary control The Series 16 Crane Boiler is a complete pac aged boiler burner unit designed specifically f oil.

If coal is the fuel selected, either hand-fired c stoker-fired boilers are available in the Serie 14, 20, 30 or 40 Crane line to meet every r quirement.

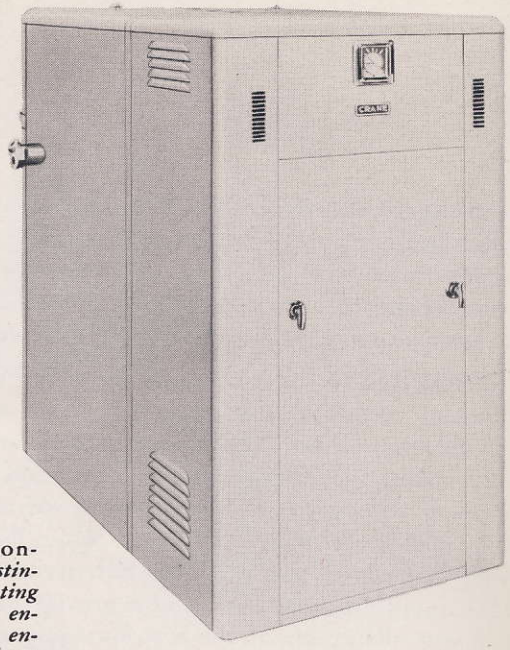
If natural gas is available in the area at reas able rates, it may be used to many advantages. gas installation eliminates coal bins and tanks and is fully automatic. If gas is selec as the fuel to be used, the 2-WG Crane Line p vides boilers with Btu net ratings up to 126,0 which will meet the requirements of medium si houses and small, two-apartment buildings. larger installations, the Crane-Line Series or even larger sizes may be used.

Crane 16 Boiler

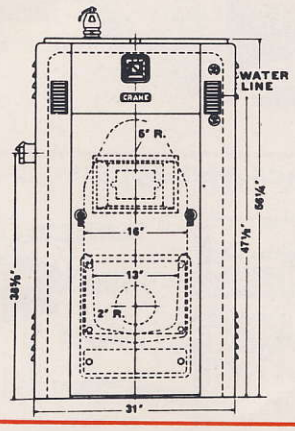
The CRANE SIXTEEN Boiler is a "packaged" unit combining both boiler and burner—the whole unit is designed for the most efficient burning of oil.

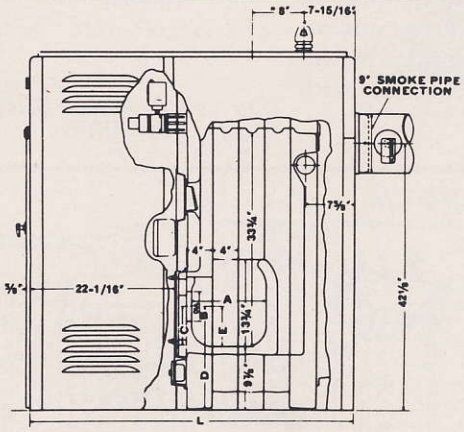
The boiler incorporates the exclusive Sustained Heat Principle and Controlled Water Travel. Heavy cast iron construction with precision fitted sections assures long life and safe operation. The pre-cast combustion chamber of factory molded refractory is scientifically shaped to assure maximum efficiency from the burner flame.

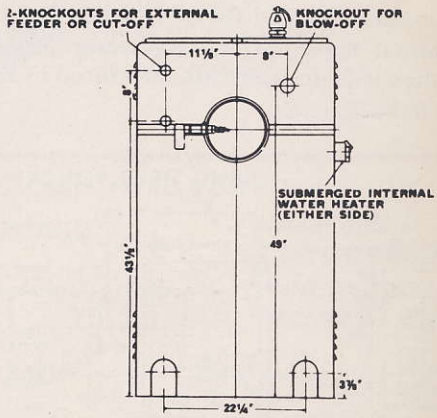
The Crane-Line *Conservoil* Burner is especially engineered for the SIXTEEN, and burner controls are conveniently located in the front of the boiler. The entire unit is enclosed in an attractive heavy steel jacket finished in green, baked-on enamel. Thick air cell asbestos insulation minimizes heat loss. Manufactured in accordance with A. S. M. E. code.



The Crane-Line Conservoil *Burner is distinguished by its floating flame which burns entirely in suspension, enabling the boiler surfaces to absorb maximum heat.*







Boiler Number	Net I-B-R Rating: Steam Sq. Ft.	Net I-B-R Rating: Steam b.t.u.	Net I-B-R Rating: Water Sq. Ft.	Net I-B-R Rating: Water b.t.u.	Gross I-B-R Output b.t.u.	Chimney Size	Maximum I-B-R Firing Rate Gallons	Flue Inserts Used
16-4	460	110,000	840	126,000	168,000	8" x 8" x 20'	1.60	No
16-5	570	137,000	1030	155,000	206,000	8" x 8" x 22'	1.95	No
16-6	680	163,000	1220	183,000	244,000	8" x 12" x 24'	2.30	No
16-7	790	190,000	1405	211,000	281,000	8" x 12" x 26'	2.65	No
16-8	900	216,000	1590	239,000	318,000	8" x 12" x 28'	3.00	No

*Net Boiler Load is the amount of actual installed radiation which may be attached to the boiler, based on a heat emission rate from the radiators of 240 b.t.u. per sq. ft. for steam, 150 b.t.u. for gravity hot water. 200 b.t.u. for forced circulation hot water recommended.

Number of Boiler: Steam	Number of Boiler: Water	Outlets No. and Size	Inlets No. and Size	Size of Pop Valve	Dimensions: C	Dimensions: D	Dimensions: L	Assemblage of Sections
S-16-4	W-16-4	2-2½	2-3	¾			47⅜"	F-MT-M-RT*
S-16-5	W-16-5	2-2½	2-3	¾			51⅜"	F-M-MT-M-RT*
S-16-6	W-16-6	3-2½	2-3	1	8"		55⅜"	F-MT-M-MT-M-RT*
S-16-7	W-16-7	3-2½	2-3	1	8"		59⅜"	F-M-MT-M-MT-M-RT
S-16-8	W-16-8	4-2½	2-3	1¼	8"	8"	63⅜"	F-MT-M-MT-M-MT-M-RT*

F—Front Section. M—Intermediate Section. MT—Intermediate Section Tapped. RT—Rear Section Tapped.
*TH—Tankless Water Heater Section (Rear) Tapped—Available.

STANDARD EQUIPMENT

Sixteen Series "D" boilers are furnished in a complete unit with factory-molded refractory, trombone tank type or tankless water heater as specified, Crane Conservoil Burner with standard controls as follows: Plain room thermostat, limit control and combustion control. Steam boilers also include: Low water cut-off, pop safety valve, water gauge, pressure and vacuum gauge, try cocks and flue brush. Water boilers also include combination altitude gauge and thermometer, flue brush.

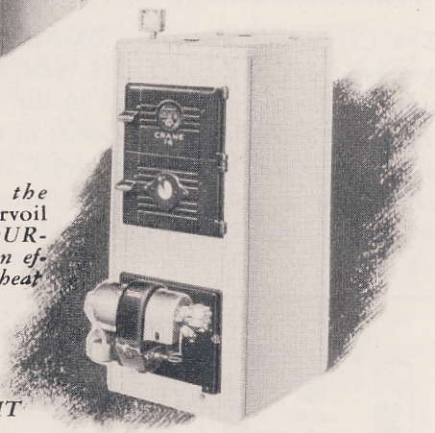
Crane 14 Boiler

Here is the CRANE FOURTEEN Boiler—an efficient, compact heating unit for steam or hot water systems. Its neatly styled steel jacket has an attractive baked-on enamel finish; and doors are finished in black heat-resistant paint. The boiler is also insulated.

The FOURTEEN has a completely water jacketed combustion chamber. The water circulates not only above the combustion chamber but on both sides and below, making maximum use of every particle of heat developed. This type of construction permits the FOURTEEN Boiler to be placed on a wood floor with no special insulation needed. And because of the low return connection, installation of a gravity hot water system with the boiler on the first floor is practical—basement installation is not required.

The FOURTEEN is designed to burn solid fuels or oil economically. It may be installed for hand-firing and later changed over to stoker or oil-firing and an internal tank or tankless water heater may be installed if so desired. Manufactured in accordance with A. S. M. E. code.

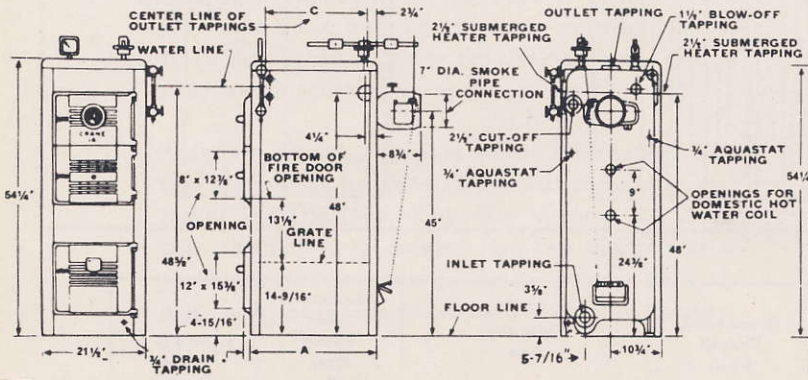
CRANE FOURTEEN completely equipped for the hand-firing of coal.



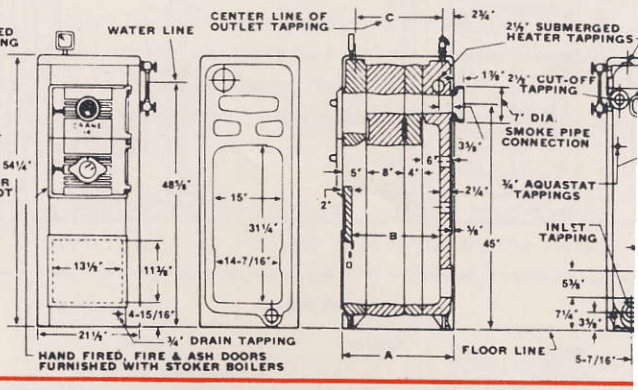
Equipped with the Crane-Line Conservoil *Burner, the FOURTEEN becomes an efficient automatic heating unit.*

GAS CONVERSION UNIT ALSO AVAILABLE

HAND FIRED BOILERS



AUTOMATICALLY FIRED BOILERS



Steam Boiler Number	Water Boiler Number	Net I-B-R Rating				Gross I-B-R Output b.t.u.	**External Heating Surface Sq. Ft.	Chimney Size	I-B-R Firing Rate Per Hour	Flue Inserts Used	Dimensions Inches		
		Steam		Water							A	B	C
		Sq. Ft.	b.t.u.	Sq. Ft.	b.t.u.								
FOR HAND FIRING													
S-14-4	W-14-4	170	41,000	270	41,000	96,000	60	8x8x25	.....	No	15⅝	10¾	10
S-14-5	W-14-5	235	56,000	375	56,000	132,000	66	8x8x28	.....	No	19⅝	14¾	14
S-14-6	W-14-6	305	73,000	485	73,000	169,000	76	8x8x30	.....	No	23⅝	18¾	18
S-14-7	W-14-7	375	90,000	600	90,000	205,000	78	8x8x33	.....	No	27⅝	22¾	22
FOR OIL FIRING													
SO-14-4	WO-14-4	265	64,000	490	74,000	98,000	60	8x8x20	1 Gal.	Yes	15⅝	10¾	10
SO-14-5	WO-14-5	340	82,000	625	94,000	125,000	66	8x8x25	1¼ Gal.	Yes	19⅝	14¾	14
SO-14-6	WO-14-6	415	100,000	760	114,000	152,000	76	8x8x25	1½ Gal.	Yes	23⅝	18¾	18
SO-14-7	WO-14-7	495	119,000	900	135,000	180,000	78	8x8x30	1¾ Gal.	Yes	27⅝	22¾	22
FOR STOKER FIRING													
SM-14-5	WM-14-5	340	82,000	625	94,000	125,000	66	8x8x30	14.0 lb.	No	19⅝	14¾	14
SM-14-6	WM-14-6	415	100,000	760	114,000	152,000	76	8x8x30	17.0 lb.	No	23⅝	18¾	18
SM-14-7	WM-14-7	495	119,000	900	135,000	180,000	78	8x8x35	20.0 lb.	No	27⅝	22¾	22

**Room Heating Effect in Sq. Ft. of Radiation with Unjacketed Boiler.
Oil Ratings based on using *Conservoil* flue inserts furnished with Boiler.
*Net Boiler Load is the amount of actual installed radiation which may be attached to the boiler, based on a heat emission rate from the radiators of 240 b.t.u. per sq. ft. for steam, 150 b.t.u. for gravity hot water. 200 b.t.u. for forced circulation hot water recommended.

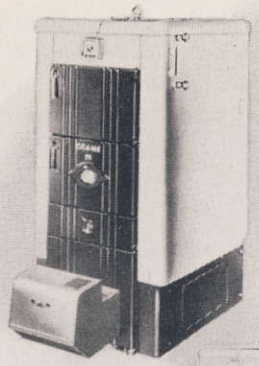
HAND-FIRED BOILERS: STEAM BOILERS INCLUDE—Pop Safety Valve, Water Gauge, Pressure Gauge, Damper Regulator and firing tools.
WATER BOILERS INCLUDE—Combination Altitude Gauge and Thermometer Damper Regulator and firing tools.
OIL AND STOKER BOILERS—Same as hand-fired except Regulator is omitted and flue scraper only is furnished in lieu of firing tools.

Crane 20 Boiler

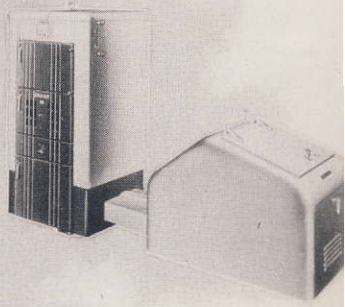
The CRANE TWENTY is an efficient boiler that will give trouble-free service whether you burn coal, coke or oil. The attractive design of the TWENTY Boiler makes it ideal for the modern basement or recreation room. The jacket is of steel with a heavy coat of green enamel baked on. Doors have black-satin finish. The non-heat handles remain cool to the touch.

Maximum heat absorption is assured in the CRANE TWENTY Boiler by its multiple flue construction which provides more ceiling heating surface directly over the flame. The patented Controlled Water Travel which directs the water over the hottest heating surfaces scrubs away the insulating film of sluggish water that would otherwise reduce efficiency.

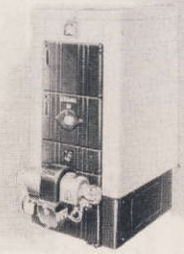
The CRANE TWENTY is suitable for hand, stoker or oil-firing. It may easily be converted from hand to automatic-firing after installation if desired. Manufactured in accordance with A. S. M. E. code.



In localities where g is available for heatin the CRANE TWENT Boiler may be efficient used, providing a ful automatic, care-free un

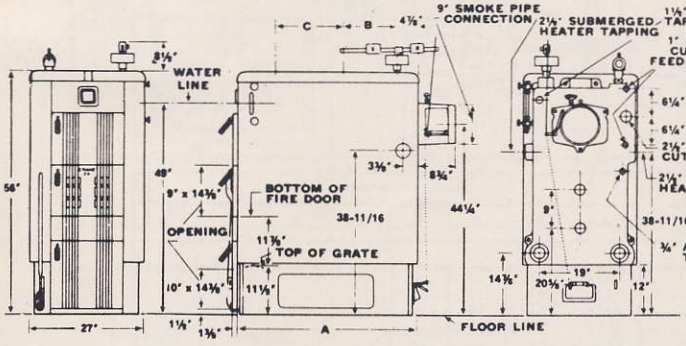


Stoker-fired, the CRANE TWENTY Boiler gives even, controlled temperatures. Stoker can be easily installed at either side or front of the boiler.

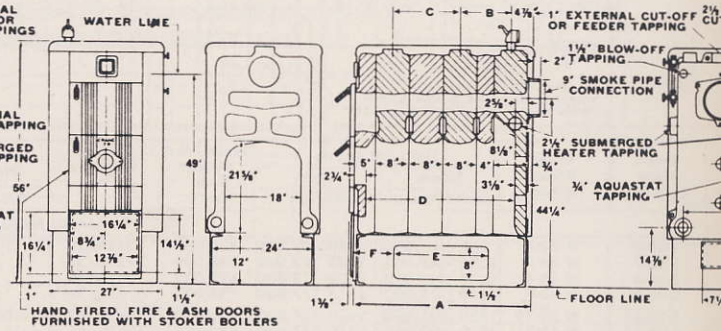


The Crane-Line Conserv-oil *Burner installed on the CRANE TWENTY Boiler provides trouble-free, fully automatic oil heating.*

HAND FIRED BOILERS



AUTOMATICALLY FIRED BOILERS



Steam Boiler Number	Water Boiler Number	Net I-B-R Rating Steam Sq. Ft.	Net I-B-R Rating Steam b.t.u.	Net I-B-R Rating Water Sq. Ft.	Net I-B-R Rating Water b.t.u.	Gross I-B-R Output b.t.u.	Chimney Size	I-B-R Firing Rate Per Hour	Flue Inserts Used	Dimensions Inches A	B	C	D	E	F
FOR HAND FIRING															
S-20-5	W-20-5	260	62,000	420	62,000	146,000	8x 8x30	.....	No	21⅞	.....	.....	.....	.....	.....
S-20-6	W-20-6	360	86,000	580	86,000	198,000	8x 8x35	.....	No	25⅞	12	.....	.....	.....	.....
S-20-7	W-20-7	460	110,000	740	110,000	247,000	8x12x35	.....	No	29⅞	16	.....	.....	.....	.....
S-20-8	W-20-8	560	134,000	900	134,000	295,000	8x12x35	.....	No	33⅞	12	.....	.....	.....	.....
S-20-9	W-20-9	660	158,000	1060	158,000	342,000	8x12x35	.....	No	37⅞	16	.....	.....	.....	.....
S-20-10	W-20-10	760	182,000	1220	182,000	386,000	12x12x35	.....	No	41⅞	12	16	.....	.....	.....
S-20-11	W-20-11	860	206,000	1380	206,000	430,000	12x12x40	.....	No	45⅞	16	16	.....	.....	.....
****FOR OIL FIRING**															
SO-20-5	WO-20-5	330	79,000	610	92,000	122,000	8x 8x30	1.20 Gal.	Yes	21⅞	.....	.....	15¼	.....	.....
SO-20-6	WO-20-6	400	96,000	730	110,000	146,000	8x 8x30	1.45 Gal.	Yes	25⅞	12	.....	19¼	.....	.....
SO-20-7	WO-20-7	475	114,000	865	130,000	173,000	8x 8x30	1.70 Gal.	Yes	29⅞	16	.....	23¼	.....	.....
SO-20-8	WO-20-8	545	131,000	985	148,000	197,000	8x12x30	1.90 Gal.	Yes	33⅞	12	.....	27¼	.....	.....
SO-20-9	WO-20-9	620	149,000	1115	167,000	223,000	8x12x30	2.20 Gal.	Yes	37⅞	16	.....	31¼	.....	.....
SO-20-10	WO-20-10	695	167,000	1245	187,000	249,000	8x12x35	2.45 Gal.	Yes	41⅞	12	16	35¼	.....	.....
SO-20-11	WO-20-11	770	185,000	1370	206,000	274,000	8x12x35	2.70 Gal.	Yes	45⅞	16	16	39¼	.....	.....
FOR STOKER FIRING															
SM-20-6	WM-20-6	400	96,000	730	110,000	146,000	8x 8x30	16.0 Lb.	No	25⅞	12	.....	.....	15¼	5⅛
SM-20-7	WM-20-7	475	114,000	865	130,000	173,000	8x 8x30	19.0 Lb.	No	29⅞	16	.....	.....	15¼	7⅛
SM-20-8	WM-20-8	545	131,000	985	148,000	197,000	8x12x30	22.0 Lb.	No	33⅞	12	.....	.....	22¼	5⅛
SM-20-9	WM-20-9	620	149,000	1115	167,000	223,000	8x12x30	25.0 Lb.	No	37⅞	16	.....	.....	22¼	7⅛
SM-20-10	WM-20-10	695	167,000	1245	187,000	249,000	8x12x35	27.0 Lb.	No	41⅞	12	16	.....	22¼	9⅛
SM-20-11	WM-20-11	770	185,000	1370	206,000	274,000	8x12x35	30.0 Lb.	No	45⅞	16	16	.....	22¼	11⅛

Oil Ratings based on using conservoil flue inserts furnished with boiler. *Net Boiler load is the amount of actual installed radiation which may be attached to the boiler, based on a heat emission rate from the radiators of 240 b.t.u. per sq. ft. for steam, 150 b.t.u. for gravity hot water. 200 b.t.u. for forced circulation hot water is recommended.

HAND-FIRED BOILERS: STEAM BOILERS INCLUDE—Pop Safety Valve, Water Gauge, Pressure Gauge, Damper Regulator and firing tools.

WATER BOILERS INCLUDE—Combination altitude Gauge and Thermometer, Damper Regulator and firing tools.

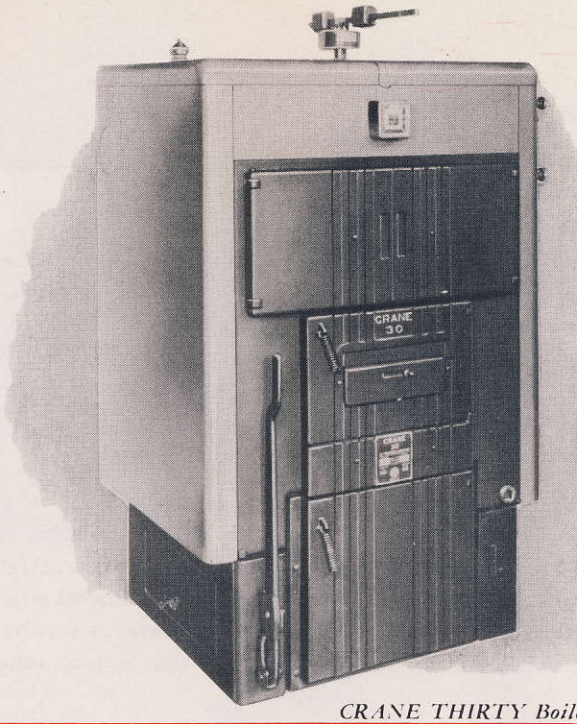
OIL AND STOKER BOILERS: Same as hand-fired except Regulator is omitted and Flue Scraper only is furnished in lieu of firing tools.

Crane 30 Boiler

The CRANE THIRTY Boiler is designed to efficiently heat buildings requiring up to 3,000 sq. ft. of radiation for steam, or 4,800 sq. ft. of radiation for hot water when automatically fired. It is ideally suited for installation in larger homes, duplexes, small to medium-sized apartment buildings, small schools, churches and commercial buildings. The CRANE THIRTY burns either coal or oil and can be fired manually or automatically.

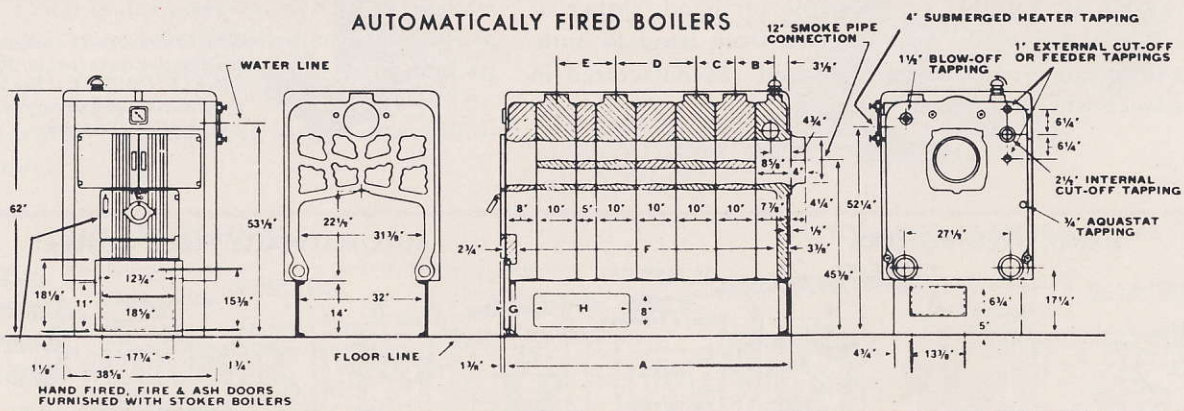
Incorporating all the proved advantages of Crane Boiler design, the THIRTY Boiler has corrugated multiple-pass flues that present greater area to the fire and hot gases, patented baffles for controlled water travel, multiple waterways, precision ground sections which assure a close, tight fit, and has large fuel capacity.

The CRANE THIRTY also has a gear shift shaking mechanism to prevent accidental dumping of the fire. The modern insulated jacket has a handsome, green baked-on enamel finish. Provision has also been made for a trombone tank type water heater. Boiler is manufactured in accordance with A. S. M. E. code.



CRANE THIRTY Boil

AUTOMATICALLY FIRED BOILERS



Steam Boiler Number	Water Boiler Number	Net I-B-R Rating Steam sq.ft.	Net I-B-R Rating Steam b.t.u.	Net I-B-R Rating Water sq.ft.	Net I-B-R Rating Water b.t.u.	Gross I-B-R Output b.t.u. per Hr.	Chimney Size	I-B-R Firing Rate Gal.	I-B-R Firing Rate Lb.	Dimensions Inches A	B	C	D	E	F	G	H
HAND-FIRED																	
S-30-6	W-30-6	860	207,000	1380	207,000	430,000	12x12x30			26⅜	9⅞						
S-30-7	W-30-7	1090	262,000	1745	262,000	528,000	12x12x33			31⅜	14⅞						
S-30-8	W-30-8	1330	319,000	2130	319,000	626,000	12x16x36			36⅜	9⅞	10					
S-30-9	W-30-9	1570	377,000	2515	377,000	724,000	12x16x39			41⅜	9⅞	15					
S-30-10	W-30-10	1820	437,000	2910	437,000	822,000	16x16x42			46⅜	9⅞	10	10				
S-30-11	W-30-11	2070	497,000	3310	497,000	920,000	16x16x45			51⅜	9⅞	10	15				
S-30-12	W-30-12	2300	553,000	3685	553,000	1,009,000	16x20x48			56⅜	9⅞	20	10				
S-30-13	W-30-13	2540	610,000	4065	610,000	1,099,000	16x20x51			61⅜	9⅞	20	15				
S-30-14	W-30-14	2790	669,000	4460	669,000	1,188,000	16x20x54			66⅜	9⅞	10	20	10			
S-30-15	W-30-15	3040	730,000	4865	730,000	1,278,000	20x20x57			71⅜	9⅞	10	20	15			
S-30-16	W-30-16	3300	792,000	5280	792,000	1,367,000	20x20x60			76⅜	9⅞	10	20	20			
OIL-FIRED																	
SO-30-6	WO-30-6	750	180,000	1340	201,000	268,000	8x12x25	2.75		26⅜	9⅞				19¾		
SO-30-7	WO-30-7	970	232,000	1705	256,000	341,000	8x12x28	3.45		31⅜	14⅞				24¾		
SO-30-8	WO-30-8	1190	285,000	2075	311,000	414,000	12x12x31	4.10		36⅜	9⅞	10			29¾		
SO-30-9	WO-30-9	1410	339,000	2435	365,000	487,000	12x12x34	4.80		41⅜	9⅞	15			34¾		
SO-30-10	WO-30-10	1640	394,000	2800	420,000	560,000	12x12x37	5.45		46⅜	9⅞	10	10		39¾		
SO-30-11	WO-30-11	1870	449,000	3165	475,000	633,000	12x16x40	6.05		51⅜	9⅞	10	15		44¾		
SO-30-12	WO-30-12	2090	502,000	3510	527,000	702,000	12x16x43	6.70		56⅜	9⅞	20	10		49¾		
SO-30-13	WO-30-13	2310	555,000	3855	578,000	771,000	16x16x46	7.35		61⅜	9⅞	20	15		54¾		
SO-30-14	WO-30-14	2540	609,000	4205	631,000	841,000	16x16x49	8.05		66⅜	9⅞	10	20	10	59¾		
SO-30-15	WO-30-15	2770	665,000	4555	683,000	911,000	16x16x52	8.70		71⅜	9⅞	10	20	15	64¾		
SO-30-16	WO-30-16	3000	720,000	4905	736,000	981,000	16x20x55	9.40		76⅜	9⅞	10	20	20	69¾		
STOKER-FIRED																	
SM-30-6	WM-30-6	750	180,000	1340	201,000	268,000	8x12x25		29.0	26⅜	9⅞				19¾	5½	15½
SM-30-7	WM-30-7	970	232,000	1705	256,000	341,000	8x12x28		37.0	31⅜	14⅞				24¾	5½	20½
SM-30-8	WM-30-8	1190	285,000	2075	311,000	414,000	12x12x31		45.0	36⅜	9⅞	10			29¾	8	20½
SM-30-9	WM-30-9	1410	339,000	2435	365,000	487,000	12x12x34		54.0	41⅜	9⅞	15			34¾	8½	24½
SM-30-10	WM-30-10	1640	394,000	2800	420,000	560,000	12x12x37		62.0	46⅜	9⅞	10	10		39¾	10	26½
SM-30-11	WM-30-11	1870	449,000	3165	475,000	633,000	12x16x40		70.0	51⅜	9⅞	10	15		44¾	12½	26½
SM-30-12	WM-30-12	2090	502,000	3510	527,000	702,000	12x16x43		77.0	56⅜	9⅞	20	10		49¾	5½	20½
SM-30-13	WM-30-13	2310	555,000	3855	578,000	771,000	16x16x46		85.0	61⅜	9⅞	20	15		54¾	5½	20½
SM-30-14	WM-30-14	2540	609,000	4205	631,000	841,000	16x16x49		92.0	66⅜	9⅞	10	20	10	59¾	8	20½
SM-30-15	WM-30-15	2770	665,000	4555	683,000	911,000	16x16x52		100.0	71⅜	9⅞	10	20	15	64¾	8½	24½
SM-30-16	WM-30-16	3000	720,000	4905	736,000	981,000	16x20x55		108.0	76⅜	9⅞	10	20	20	69¾	8	20½

Oil Ratings based on using Conservoil flue inserts furnished with boiler.

*Net Boiler Load is the amount of actual installed radiation which may be attached to the boiler, based on a heat emission rate from the radiators of 240 b.t.u. per sq. ft. for steam, 150 b.t.u. for gravity hot water. 200 b.t.u. for forced circulation hot water recommended.

All oil-fired boilers are to be used with flue inserts furnished with boiler.

BOILER EQUIPMENT:

STEAM BOILERS INCLUDE—Pop Safety Valve, Water Gauge, Pressure Gauge, Damper Regulator and firing tools.

WATER BOILERS INCLUDE—Combination altitude Gauge and Thermometer, Damper Regulator and firing tools.

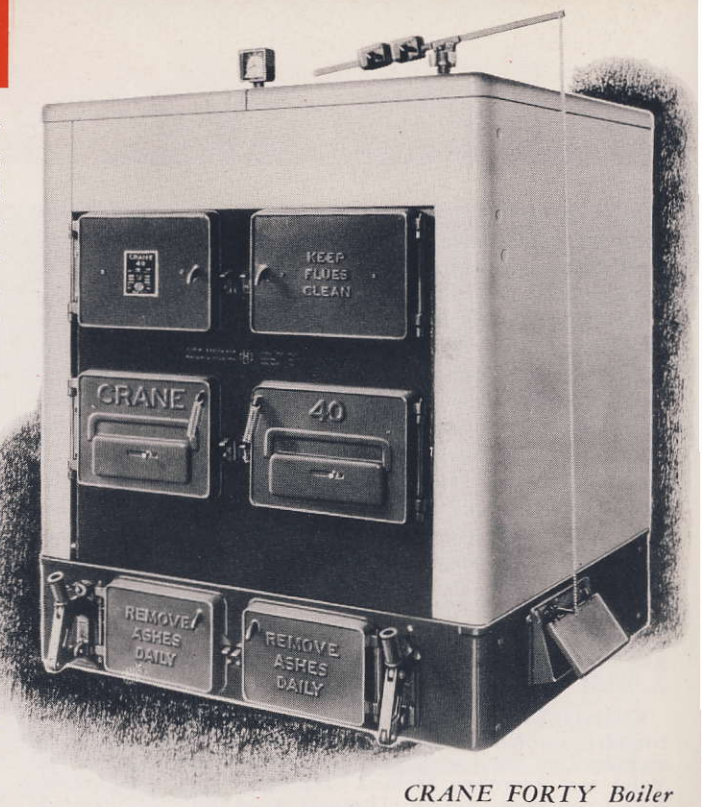
OIL AND STOKER BOILERS—Same as hand-fired except Regulator is omitted and Flue Scraper only is furnished in lieu of firing tools.

Crane 40 Boiler

The CRANE FORTY Boiler possesses the capacity and dependability necessary to heat the largest homes and duplexes, apartment buildings, schools and churches, restaurants, small hotels and hospitals, commercial and other non-residential buildings. It is designed to meet the requirements of buildings containing up to 7,000 sq. ft. of radiation for steam, or 11,200 sq. ft. of radiation for hot water when automatically fired. The CRANE FORTY burns coal or oil and can be fired manually or automatically.

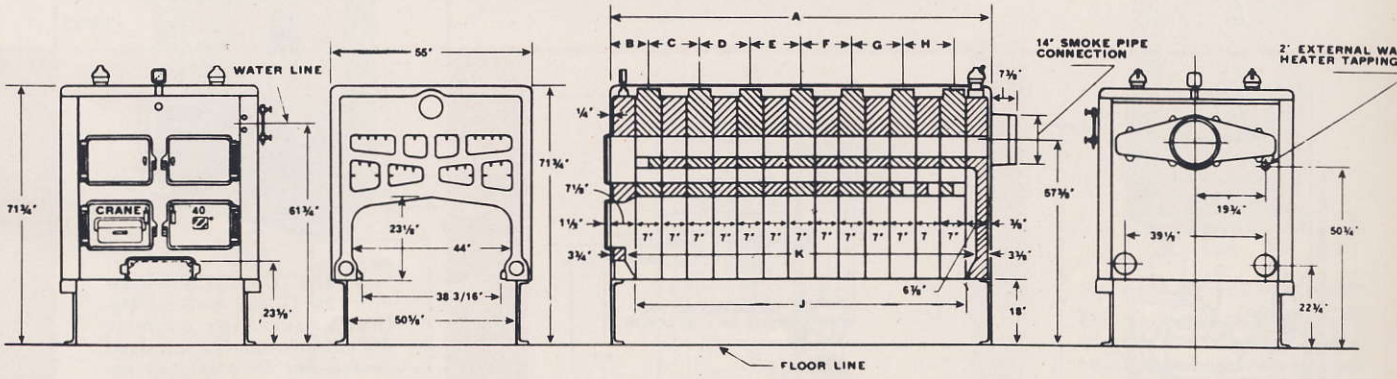
Design and construction features of the CRANE FORTY that assure maximum heating efficiency and greatest possible fuel economy include: multiple finned flue passages that present greater area to the fire and hot gases; patented baffles for controlled water travel-multiple waterways; precision ground sections assuring close, true fit; and has large fuel capacity.

The handsome jacket has a green, baked-on enamel finish. Thick, moisture-proof insulation is attached to top and sides of jacket and all doors and dampers are precision fitted to prevent air or dust leaks. Manufactured in accordance with A. S. M. E. code.



CRANE FORTY Boiler

AUTOMATICALLY FIRED BOILERS



Steam Boiler Number	Water Boiler Number	Net I-B-R Rating Steam Sq. Ft.	Steam b.t.u.	Water Sq. Ft.	Water b.t.u	Gross I-B-R Output b.t.u per hr.	Chimney Size	I-R-B Burner Capacity Gal.	Lb.	Dimensions Inches A	B	C	D	E	F	G	H	J	K
HAND-FIRED																			
S-40-7	W-40-7	3330	792,000	5280	792,000	1,367,000	20x20x55	.....	.....	49⅜	10⅝	14	14	....	....	....	....	.....	.....
S-40-8	W-40-8	3830	919,000	6130	919,000	1,544,000	20x24x58	.....	.....	56⅜	10⅝	14	14	....	....	....	....	.....	.....
S-40-9	W-40-9	4360	1,046,000	6975	1,046,000	1,712,000	20x24x62	.....	.....	68⅜	10⅝	14	14	14	....	....	....	.....	.....
S-40-10	W-40-10	4900	1,176,000	7840	1,176,000	1,878,000	24x24x65	.....	.....	70⅜	10⅝	14	14	14	....	....	....	.....	.....
S-40-11	W-40-11	5430	1,303,000	8690	1,303,000	2,035,000	24x24x68	.....	.....	77⅜	10⅝	14	14	14	14	....	....	.....	.....
S-40-12	W-40-12	5960	1,430,000	9535	1,430,000	2,186,000	24x24x72	.....	.....	84⅜	10⅝	14	14	14	14	....	....	.....	.....
S-40-13	W-40-13	6500	1,560,000	10400	1,560,000	2,335,000	24x24x75	.....	.....	91⅜	10⅝	14	14	14	14	14	....	.....	.....
OIL-FIRED																			
SO-40-9	WO-40-9	3000	720,000	4905	736,000	981,000	16x20x50	9.65	.....	63⅜	10⅝	14	14	14	....	....	....	49⅜	55⅜
SO-40-10	WO-40-10	3670	881,000	5905	886,000	1,181,000	16x20x53	11.55	.....	70⅜	10⅝	14	14	14	....	....	....	56⅜	62⅜
SO-40-11	WO-40-11	4340	1,042,000	6945	1,042,000	1,376,000	20x20x57	13.35	.....	77⅜	10⅝	14	14	14	14	....	....	63⅜	69⅜
SO-40-12	WO-40-12	5000	1,200,000	8000	1,200,000	1,566,000	20x24x60	15.05	.....	84⅜	10⅝	14	14	14	14	....	....	70⅜	76⅜
SO-40-13	WO-40-13	5670	1,361,000	9070	1,361,000	1,759,000	20x24x63	16.90	.....	91⅜	10⅝	14	14	14	14	14	....	77⅜	83⅜
SO-40-14	WO-40-14	6340	1,522,000	10145	1,522,000	1,960,000	24x24x67	18.85	.....	98⅜	10⅝	14	14	14	14	14	....	84⅜	90⅜
SO-40-15	WO-40-15	7000	1,680,000	11200	1,680,000	2,164,000	24x24x70	20.85	.....	105⅜	10⅝	14	14	14	14	14	14	91⅜	97⅜
STOKER-FIRED																			
SM-40-9	WM-40-9	3000	720,000	4905	736,000	981,000	16x20x50	.....	108	63⅜	10⅝	14	14	14	....	....	....	49⅜	55⅜
SM-40-10	WM-40-10	3670	881,000	5905	886,000	1,181,000	16x20x53	.....	130	70⅜	10⅝	14	14	14	....	....	....	56⅜	62⅜
SM-40-11	WM-40-11	4340	1,042,000	6945	1,042,000	1,376,000	20x20x57	.....	151	77⅜	10⅝	14	14	14	14	....	....	63⅜	69⅜
SM-40-12	WM-40-12	5000	1,200,000	8000	1,200,000	1,566,000	20x24x60	.....	172	84⅜	10⅝	14	14	14	14	....	....	70⅜	76⅜
SM-40-13	WM-40-13	5670	1,361,000	9070	1,361,000	1,759,000	20x24x63	.....	193	91⅜	10⅝	14	14	14	14	14	....	77⅜	83⅜
SM-40-14	WM-40-14	6340	1,522,000	10145	1,522,000	1,960,000	24x24x67	.....	215	98⅜	10⅝	14	14	14	14	14	....	84⅜	90⅜
SM-40-15	WM-40-15	7000	1,680,000	11200	1,680,000	2,164,000	24x24x70	.....	238	105⅜	10⅝	14	14	14	14	14	14	91⅜	97⅜

*Net Boiler Load is the amount of actual installed radiation which may be attached to the boiler, based on a heat emission rate from the radiators of 240 b.t.u. per sq. ft. for steam, 150 b.t.u. for gravity hot water. 200 b.t.u. for forced circulation hot water recommended.

HAND-FIRED BOILERS. STEAM BOILERS INCLUDE—Pop Safety Valve, Water Gauge, Pressure Gauge, Damper Regulator and firing tools.

WATER BOILERS INCLUDE—Combination Altitude Gauge and Thermometer, Damper Regulator and firing tools.

OIL AND STOKER BOILERS. Same as Hand-Fired except Regulator is omitted and flue scraper only is furnished in lieu of firing tools.

Crane-Line 2WG Boiler

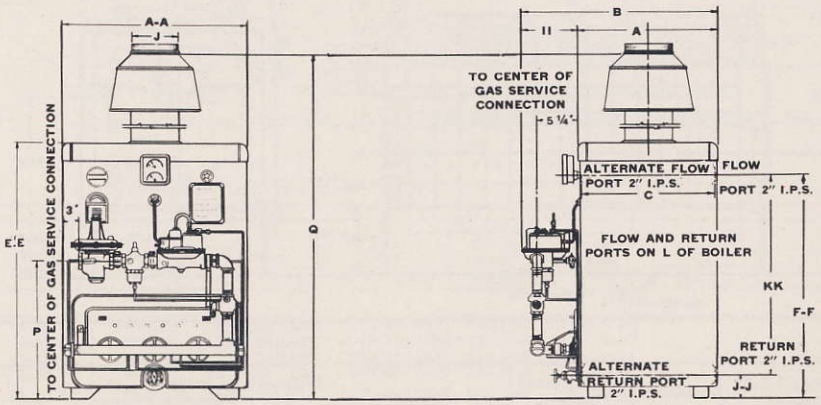
With the new Crane-Line Basmor 2WG Boiler, the comforts and conveniences of a 100% automatic, gas-fired heating system are now as practical for small homes and individually heated apartments, as for costly homes and big buildings. The 2WG is clean, odorless, quiet, efficient. A foolproof, self-acting control system assures absolute safety. Designed for hot water systems only, the 2WG is of wet base construction, allowing installation on wood floors without insulation. The heavy cast iron sections embody a "Staggered Heat Travel" arranged to extract maximum heat from the fuel. An attractive baked-on enameled steel jacket, heavily insulated, is furnished with Standard or DeLuxe boilers.

The 2WG is available in either Standard or DeLuxe models, completely assembled, ready to connect to gas and water lines. Manufactured in accordance with A. S. M. E. code.

STANDARD BOILER requires a Room Thermostat only for complete automatic room temperature regulation. Equipment includes Gas Valve with Hydraulic Limit Control, Relay Gas Valve and Recycling Manual Control Switch; Transformer; BASO complete Shut-off (Thermostatic Pilot); Gas Pressure Regulator; Manual Gas Shut-off Valve; Combination Thermometer and Altitude Gauge; Pilot Pressure Regulator, Drain Cock, Pilot Cock, Draft Diverter, Gas Manifold; Tubing and miscellaneous fittings.

Basmor 2WG Deluxe Gas Boiler

Standard *Crane-Line* Basmor 2WG *gas boiler.* Deluxe *Crane-Line* Basmor 2WG *is identical to* Standard *models but is completely enclosed in attractive housing.*



Boiler Size	b.t.u. Output (Net)	Actual Cast Iron Radiation Boiler Handles		Size of Gas Valve		Size of Pilot Valve		Size of Manual Gas Valve		Size of Gas Pressure Regulator		No. and Size of Flow Ports Inches	No. and Size o Return Ports Inches
		150 b.t.u. Emission	200 b.t.u. Emission	Nat. Gas In.	Mfd. Gas In.	Nat. Gas In.	Mfd. Gas In.	Nat. Gas In.	Mfd. Gas In.	Nat. Gas In.	Mfd. Gas In.		
2 WG 2	37,500	250	187	¾	¾	.....	.....	¾	¾	¾	¾	2-2	2-2
2 WG 3	72,000	480	360	1	1	¾	1	1	1	¾	¾	2-2	2-2
2 WG 4	99,000	660	495	1	1	¾	1	1	1	¾	1	2-2	2-2
2 WG 5	126,000	840	630	1	1	1	1	1	1	1	1	2-2	2-2

	VARIABLE DIMENSIONS					
Number of Boiler	A	B	C	J	P	Q
2 WG 2	9⅝	17⅛	9½	4	17 3/16"	46¾
2 WG 3	13½	22¼	13¼	6	17 3/16"	50¾
2 WG 4	17¼	26	17	6	17 3/16"	50¾
2 WG 5	21	30	20¾	7	17 3/16"	51⅞

SERIES 2WG DELUXE BOILER—Dimensions are the same as for the Standard Boiler, shown on the table, with the following exceptions:
B—Add 3¾ inches EE—Add 3½ inches

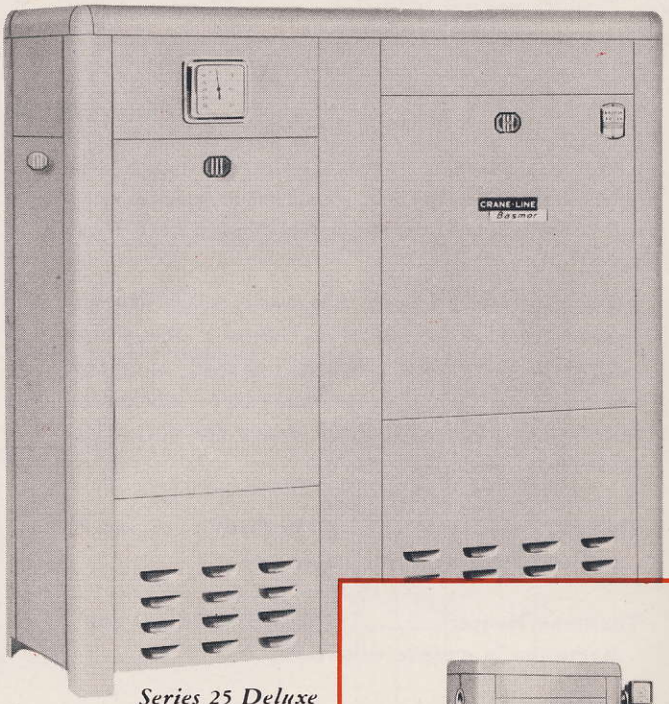
CONSTANT		
	Series-2WG Boilers	Dimensi
A-A	Over-All Housing Depth	23½
E-E	Floor-to-Top-of-Housing	33¼
F-F	Floor-to-Flow-Port	28⅞
I-I	End-of-Housing-Over-Controls	8½
J-J	Floor-to-Center-of-Return Tappings	3
K-K	Vert. Dim. Between-Flow & Return-Tappings	25⅞

Crane-Line 25 Boiler

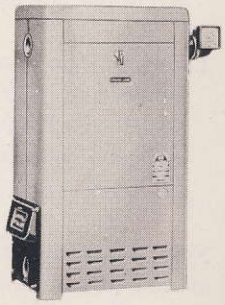
Any steam or hot water heating system built around the Crane-Line *Basmor Series 25* Boiler is extremely clean, fast, efficient and flexible. It has the capacity to meet the requirements of average-sized to large homes. Boiler is 100% automatic—rarely needs attention. Maintenance is negligible; installation is simple. The unit is easily accessible through panels in the jacket and seal plates between the cast iron boiler sections.

The wet base construction of the boiler circulates water around and below the combustion chamber, permitting installation on wood floors. The "Staggered Heat Travel"—between tooth-shaped fins of cast sections—absorbs extra percentages of heat. The foolproof, self-acting Control System assures absolute safety.

The Series 25 Boiler is very saving of floor space and headroom. The heavy metal jacket is attractively finished in baked-on green enamel, and is fully insulated with asbestos. The Series 25 is ideal for the modern basement or utility room as well as replacement or remodeling jobs. Manufactured in accordance with A. S. M. E. code.

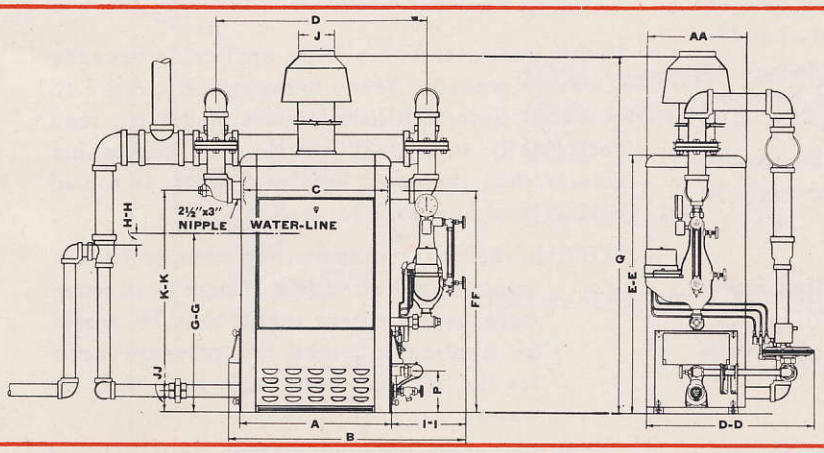


Series 25 Deluxe



Standard Series 25 *gas boiler.*

Deluxe Series 25 *gas boiler is identical to* Standard *models except it is completely enclosed in attractive housing.*



RATINGS FOR TYPE "S" (STEAM) AND TYPE "W" (WATER)—NATURAL, MIXED AND MANUFACTURED GASES

STEAM Boiler Size	STEAM Net BTU	STEAM Net Sq. Ft.	WATER Boiler Size	WATER Net BTU	WATER Net Sq. Ft. 150 BTU	WATER Net Sq. Ft. 200 BTU	Size of Gas Connection Natural Mixed	Size of Gas Connection Mfg.	Size of Pop Safety Valve for Steam Boilers	Size of Flue Connection
25-S-3	44,250	185	25-W-3	52,000	345	260	¾	1	1"	5
25-S-4	66,750	280	25-W-4	77,500	515	387	¾	1	1"	6
25-S-5	90,500	380	25-W-5	104,000	690	520	¾	1	1"	7
25-S-6	113,500	475	25-W-6	129,000	860	645	1	1¼	1"	8
25-S-7	137,000	570	25-W-7	155,000	1030	775	1	1¼	1"	8
25-S-8	161,000	670	25-W-8	181,000	1205	905	1¼	1½	1"	9
25-S-9	186,000	775	25-W-9	207,000	1380	1035	1¼	1½	1"	9
25-S-10	210,000	875	25-W-10	233,000	1550	1165	1¼	1½	1"	10
25-S-11	235,000	980	25-W-11	258,000	1720	1290	1¼	1½	1"	10

VARIABLE DIMENSIONS

Boiler Size	A	B	C	D	J	P	Q
3	13¾	28¾	13¼	22⅜	5	15¾	56½
4	17½	32½	17	26⅛	6	15¾	59⅜
5	21¼	36¼	20¾	29⅞	7	15¾	60¾
6	25	40	24½	33⅜	8	15¾	62
7	28¾	43¾	28¼	37⅜	8	15¾	62
8	32½	47½	32	41⅛	9	15¾	63
9	36¼	51¼	35¾	44⅞	9	15¾	63
10	40	55	39½	48⅜	10	15¾	63⅜
11	43¾	58¾	43¼	52⅜	10	15¾	63⅜

CONSTANT DIMENSIONS

	Series 25 Boilers	Dimensions
A-A	Overall Housing Depth	16⅜"
D-D	Over Controls & Boiler Front to Rear	28⅛"
E-E	Floor to Top of Housing	42⅛"
F-F	Floor to Flow Port	36³⁄₁₆"
G-G	Floor to Water Line	29³⁄₁₆"
H-H	Water Line to Loop	2 "
I-I	End of Housing Over Controls	11¾"
J-J	Floor to Center of Return Tappings	3⁵⁄₁₆"
K-K	Vertical Dim. Between Flow & Return Tappings	32⅞"

SERIES 25 DELUXE BOILER

Dimensions are the same as for the Standard Boiler, shown on the table, with the following exceptions:

AA—17 inches

B—Standard dimensions plus 5¼ ins.

Hot Water One Pipe System—Single Circuit

(Based on temperature drop of 20° through system)

Single Circuit Main

From this booklet, select boiler having a Net I-B-R Rating in Btu/Hr. equal to or greater than the total as calculated under Determining Heat Loss.

Allowance for domestic hot water need only be made in the selection of a boiler if there are more than two bathrooms to be served, or if the use of domestic hot water exceeds 75 gallons in twenty-four hours, in which cases the following allowances should be made:

Storage Type Heater.....120 Btu/Hr. for each gallon of storage tank capacity.

Tankless Heater.....12,000 Btu/Hr. for each bathroom in excess of two.

Example: The house used as an example in this Guide has one bathroom and a heat loss of 53,050 Btu/Hr. (See calculation sheet, pg. 15.) A boiler with a Net I-B-R Rating equal to or in excess of 53,050 Btu/Hr. should be used.

Next, select air cushion tank. The tank capacity should be not less than one gallon for each 30 square feet of installed radiation.

Example: 325.65 square feet of installed radiation in house. 325.65 ÷ 30 = 10.8 gallons. Select an 11-gallon tank or the next larger available size.

Next, select trial pump size from Table 5A, (pg. 40) and determine pressure head from manufacturer's catalog. Table 5B, (pg. 40), represents conservative averages which may be used until manufacturer's data can be consulted.

Example: 53,050 Btu/Hr. total load on system. Table 5A indicates that either a 1-1/4" standard pump or a 1" high head pump may be used Table 5B, for a total load of 50,000 Btu/Hr. (closest to 53,050), shows 6.0 ft. of water for a 1-1/4" standard pump. (Head for 1" high head pump is 8.25 ft. of water.

Using Table 7A, 7B, 7C or 7D Page 40 (depending upon the pressure head--which we found to be 6 ft. for a 1¼" standard pump) and in this example it is 7A because it covers pressure heads from 4.8 to 6.7 ft. The values in the left-hand column equal the length of circuit plus a "radiator allowance" of 12 ft. for each heating element.

Example:

Measured length of main.....102 ft.
Radiator allowance (10 heating elements).120 ft.
Total..... 222 ft.

(Use 220 ft. in Table 7A Page 40)

Total load.....53,050 Btu/Hr.

Pressure head (1¼" standard pump) . . . . . .
.....6.0 ft. of water

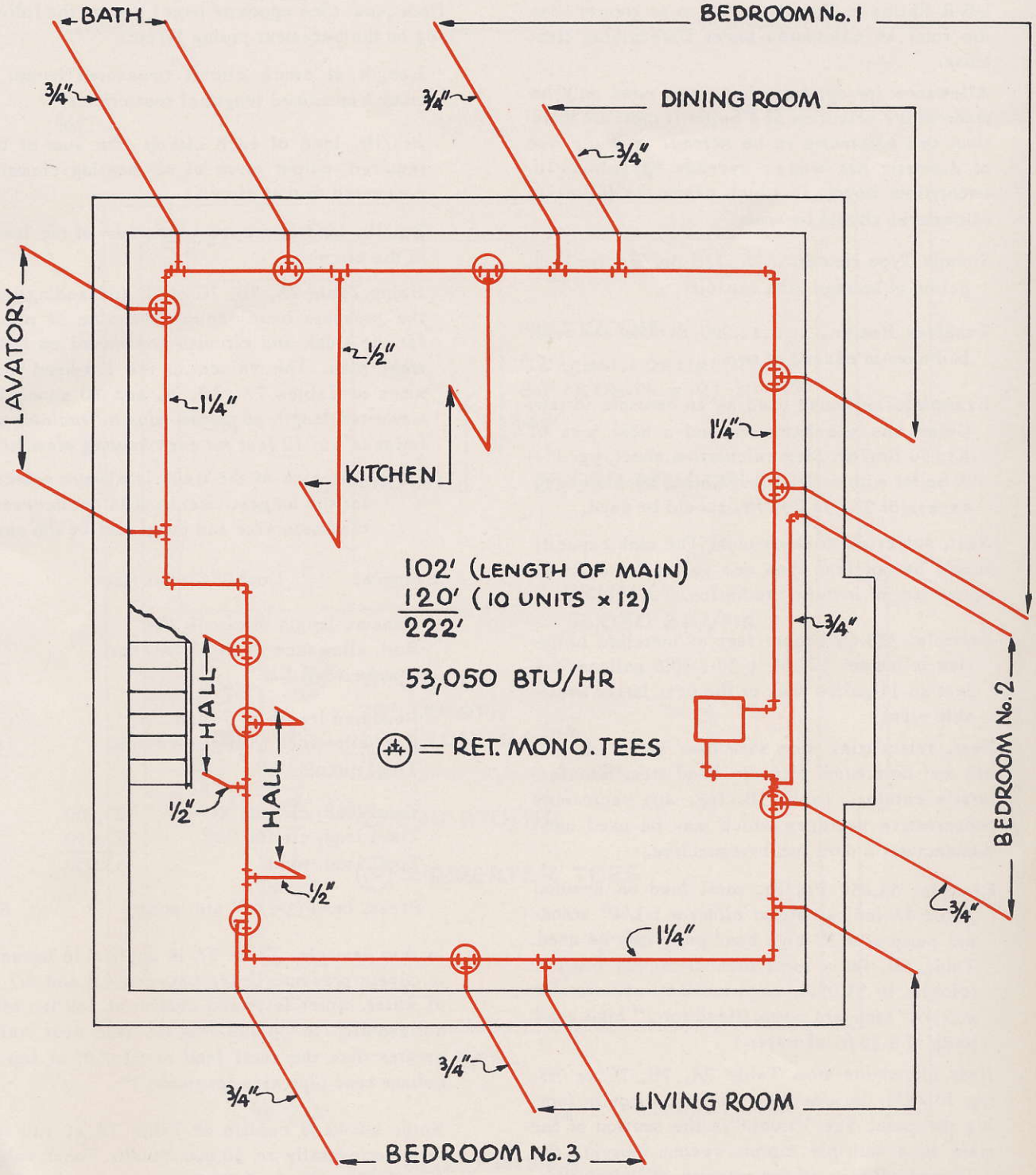
In this example, Table 7A is applicable because it covers pressure heads between 4.8 and 6.7 ft. of water. Enter left-hand column at 220 ft.; read horizontally to 89,000 Btu/Hr. (the next value greater than the total load of 53,050; at top of column read pipe size for main, 1-1/4".

NOTE: In the above example, the same procedure would be followed if a 1" high head pump were used, except that Table 7B would be applicable since the pressure head for the 1" high head pump is 8.25 ft. of water.

Next, determine the branch sizes for Baseboards from Table 6, (pg. 40). The branch size for a Baseboard is independent of the main size and hence will be the same for either the double or single circuit system.

Example:
Dining Room heat loss.....8,800 Btu/Hr.
Baseboard location.....1st floor above main
Length of Baseboard.....16 ft.

From Table 6 it is found that the branch size will be 3/4".


BATH
BEDROOM No. 1
DINING ROOM
3/4"
3/4"
3/4"
LAVATORY
1/2"
1 1/4"
KITCHEN
1 1/4"
102' (LENGTH OF MAIN)
120' (10 UNITS x 12)
222'
53,050 BTU/HR
= RET. MONO. TEES
3/4"
HALL
HALL
1/2"
1/2"
BEDROOM No. 2
3/4"
1 1/4"
3/4"
3/4"
LIVING ROOM
BEDROOM No. 3

Hot Water One Pipe System—Double Circu

(Based on temperature drop of 20° through system)

From this booklet, select boiler having a Net I-B-R Rating in Btu/Hr. equal to or greater than the total as calculated under Determining Heat Loss.

Allowance for domestic hot water need only be made in the selection of a boiler if there are more than two bathrooms to be served, or if the use of domestic hot water exceeds 75 gallons in twenty-four hours, in which cases the following allowances should be made.

Storage Type Heater.....120 Btu/Hr. for each gallon of storage tank capacity.

Tankless Heater.....12,000 Btu/Hr. for each bathroom in excess of two.

Example: The house used as an example in this Guide has one bathroom and a heat loss of 53,050 Btu/Hr. (See calculation sheet, pg. 15.) A boiler with a Net I-B-R Rating equal to or in excess of 53,050 Btu/Hr. should be used.

Next, select air cushion tank. The tank capacity should be not less than one gallon for each 30 square feet of installed radiation.

Example: 325.65 square feet of installed radiation in house. 325.65 ÷ 30 = 10.8 gallons. Select an 11-gallon tank or the next larger available size.

Next, select trial pump size from Table 5A, (pg. 40) and determine pressure head from manufacturer's catalog. Table 5B, (pg. 40), represents conservative averages which may be used until manufacturer's data can be consulted.

Example: 53,050 Btu/Hr. total load on system Table 5A indicates that either a 1-1/4" standard pump or a 1" high head pump may be used. Table 5B, for a total load of 50,000 Btu/Hr. (closest to 53,050), shows 6.0 ft. of water for a 1-1/4" standard pump. (Head for 1" high head pump is 8.25 ft. of water.)

Next, determine from Table 7A, 7B, 7C or 7D, (pg. 40 & 41), the size of the trunk and circuits forming the main. The "trunk" is the section of the main in a multiple circuit system carrying the combined capacity of the circuits. A "circuit" is that portion of the main carrying only a part of the total capacity of the system.

Dividing the system into two or more circuits usually results in the use of smaller pipe. If two or more circuits are used, square head cocks should be installed in each circuit for balancing.

Lay out the basement piping to scale on base floor plan. (See opposite page) Record the fol ing on the basement piping layout:

Length of each circuit (measured lengt trunk + measured length of that circuit)

Btu/Hr. load of each circuit (the sum of required output rates of all heating elem connected to that circuit)

Btu/Hr. load of the trunk (the sum of the lo of the circuits)

Using Table 7A, 7B, 7C or 7D, (depending u the pressure head) select the size of pi for the trunk and circuits and record on b ment plan. The values in the left-hand umns of Tables 7A, 7B, 7C and 7D equal measured length of circuit *plus a "radiator lowance" of 12 feet for each heating eleme*

NOTE: The size of the trunk is always sele for the longest circuit. It is not neces that main size and pump size be the s

Example: Double Circuit Main

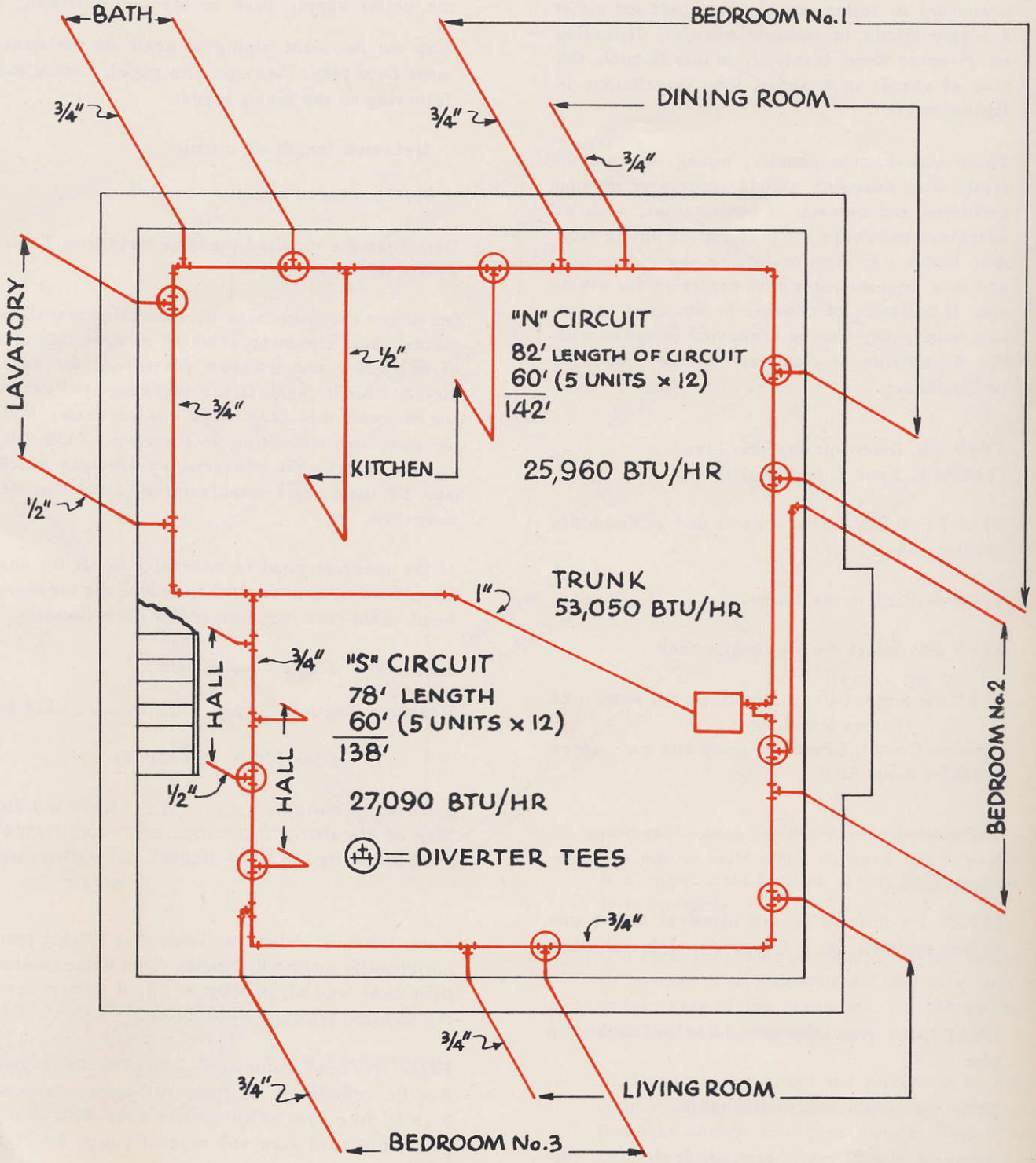
Measure length of circuit "N"	
Rad. allowance (5 Htg. elements)	
Total circuit "N"	
Measured length of circuit "S"	
Rad. allowance (5 Htg. elements)	
Total circuit "S"	
Total load, circuit "N"	25,960
Total load, circuit "S"	27,090
Total load, trunk	53,050
Press. head (1-1/4" std. pump)	

In this example, Table 7A is applicable bec it covers pressure heads between 4.8 and 6. of water. Enter left-hand column at 140 ft.; horizontally to 58,000 Btu/Hr. (the next greater than the total load of 53,050; at to column read pipe size for trunk, 1".

Enter left-hand column of Table 7A at 140 read horizontally to 30,000 Btu/Hr. (next v greater than load of 25,960); at top of co read pipe size for Circuit N, 3/4".

Similarly, the size of Circuit S is 3/4" and carrying capacity is 30,000 Btu/Hr.

It is only necessary to use a diverter tee or turn connection from each panel above main.


BATH
BEDROOM No.1
DINING ROOM
3/4"
3/4"
3/4"
LAVATORY
"N" CIRCUIT
82' LENGTH OF CIRCUIT
60' (5 UNITS x 12)
142'
2 1/2"
3/4"
KITCHEN
25,960 BTU/HR
1/2"
TRUNK
53,050 BTU/HR
1"
3/4"
"S" CIRCUIT
78' LENGTH
60' (5 UNITS x 12)
138'
HALL
HALL
1/2"
27,090 BTU/HR
= DIVERTER TEES
BEDROOM No.2
3/4"
3/4"
3/4"
LIVING ROOM
BEDROOM No.3

Hot Water Series Loop System—Single Circuit

(Based on temperature drop of 20° through system)

Series Loop installations, where Baseboards are connected in series, may be designed for either a single circuit or multiple circuits, depending on pressure head involved. In this Manual, the size of *circuit* in a series loop installation is limited to 3/4".

Where construction permits, piping may run directly from assembly around corners or through partitions and closets. If obstructions, such as fireplaces and doors, are present, the piping must drop below the floor to bypass the obstruction and this segment must have provision for drainage. If radiators or convectors are used in certain rooms, they may be connected in series with the Baseboards or connected to the main with two runouts.

STEP 1-S: Determine the heat loss
(Tables 1, 2 and 3, pgs. 16-20)

STEP 2-S: Select the Baseboards and/or Radiators (Tables page 22).

STEP 3-S: Select the boiler

STEP 4-S: Select the air cushion tank

STEP 5-S: Single Circuit: Determine the pump size (Tables 8 and 5B)
Double Circuit: Determine pump and main sizes (Tables 8 and 5B)

The example which follows each of the Steps refers to the Example Floor Plan on the opposite page.

STEPS 1-S through 4S are identical to the procedure outlined for a Conventional Installation.

HEAT LOSS: Has been calculated and marked on plan.

STEP 5-S: SINGLE CIRCUIT MAIN

A single circuit may be used, if desired, provided the pressure head as determined under this Step is not excessive. If a single circuit is used, the piping must be 3/4". (See above.)

The measured length of a circuit in a Series Loop installation includes the length of the Baseboards and of the piping connecting these units fro the boiler supply back to the boiler return.

Lay out basement piping to scale on the bas ment floor plan. (See opposite page). Record th following on the piping layout.

Measured length of circuit

Btu/Hr. load of circuit.

Determine the required pressure head from Tabl 8, (pg. 40).

Determine the pump size by consulting manufac turers' data. The pump selected must be capabl of delivering one gallon per minute for eac 10,000 Btu/Hr. against the pressure head dete mined under this Step. *It is not necessary tha the pump and main size be the same.* Table 5E (pg. 40), represents conservative averages whic may be used until manufacturers' data can b consulted.

If the pressure head is excessive or if, for an other reason, it is desired to reduce the pressur head, divide the loop into two or more circuits.

Example: Single Circuit Main

Measured length of loop.....124 f

(Use 120 ft. in Table 8)

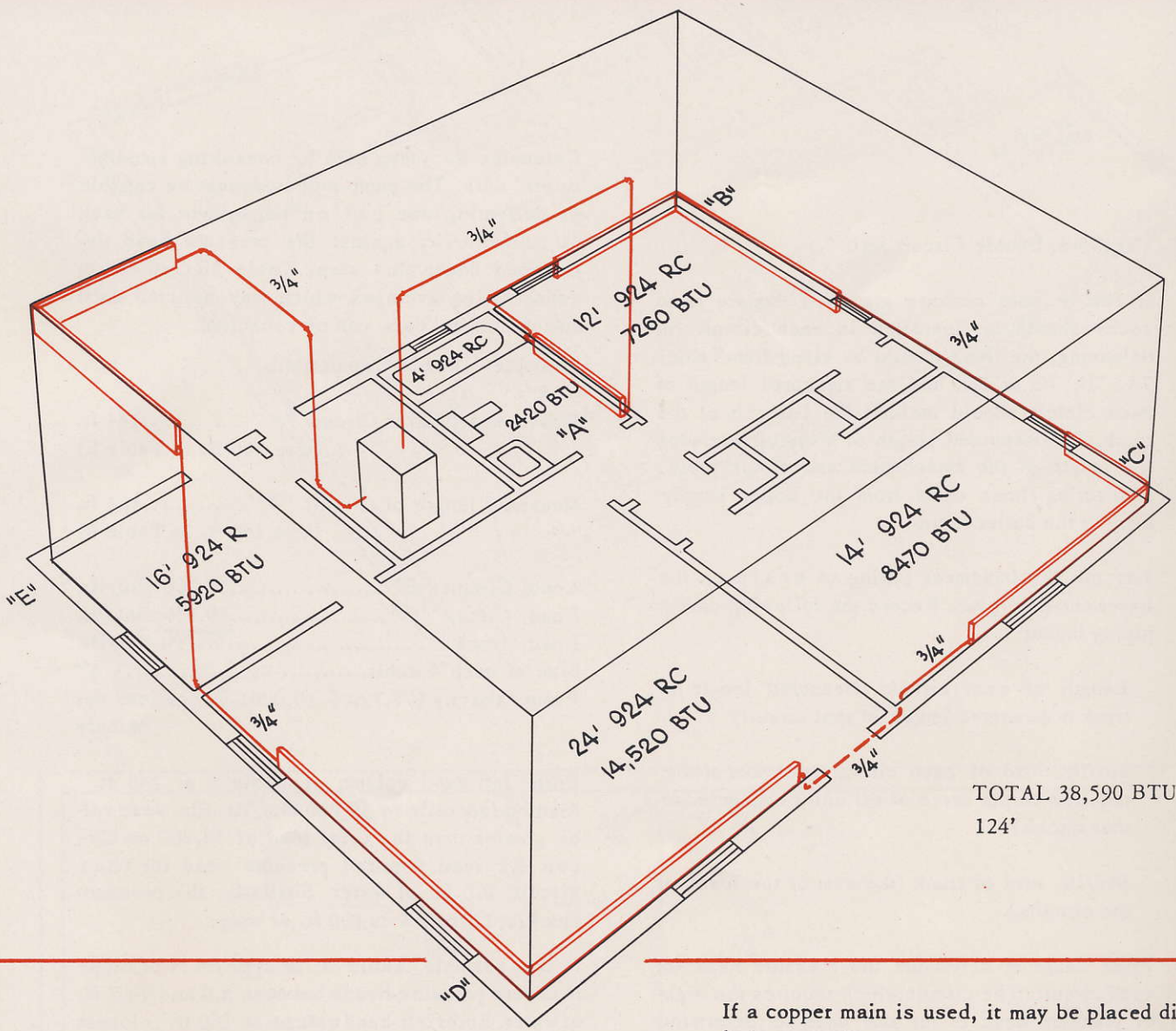
Load on circuit.....38,590 Btu/H
Size of circuit..... 3/4
Pump capacity (38,590 ÷ 10,000). .3.9 gallons p minute.

Enter left-hand column at Table 8 at 120 ft.; rea horizontally to 39,000 Btu/Hr. (next value greate than total load of 38,590); at top of column rea the required pressure head, 7.0 ft.

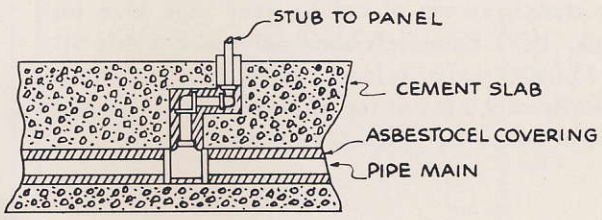
Enter left-hand column of Table 5B at 50,00 Btu/Hr. (closest to 38,590); read horizontally t 8.25 ft. (the next value greater than 7.0); at to of column read size and type of pump, 1" hig head pump.

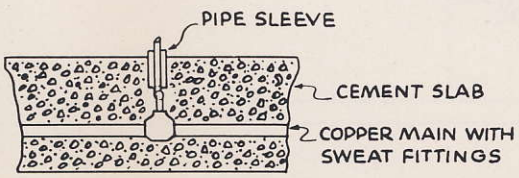
Note: In this example, the pressure head is no excessive and, therefore, a single circui loop may be used, if desired. However, double circuit could be used in this case if desired.

Basementless House on Concrete Slab



TOTAL 38,590 BTU
124'





If a copper main is used, it may be placed directly in concrete.

If a steel pipe main is used, it should be entirely covered with asbestos air cell pipe covering to take care of any expansion. Runouts to panels should also be covered.

NOTE: In using either the pipe main or copper main it is necessary that pipe from runout up to panel be inside of a pipe sleeve. This is necessary to take care of any expansion in the panel itself.

Hot Water Series Loop System - Double Circuit

(Based on temperature drop of 20° through system)

STEP 5-S: Double Circuit Main

If two or more circuits are used, square head cocks should be installed in each circuit for balancing; the trunk should be sized from Tables 7A, 7B, 7C or 7D, and the measured length of each circuit should include the length of the trunk. The measured length of a circuit includes the length of the Baseboards and of the piping connecting those units from the boiler supply back to the boiler return.

Lay out the basement piping to scale on the basement floor plan. Record the following on the piping layout:

Length of each circuit (measured length of trunk + measured length of that circuit)

Btu/Hr. load of each circuit (the sum of the required output rates of all units connected to that circuit)

Btu/Hr. load of trunk (the sum of the loads of the circuits).

From Table 8, determine the pressure head for each circuit. The circuit which requires the higher pressure head is the one used to determine the size of the pump. The trunk size is based on the measured length and pressure head for the circuit which requires the higher pressure head, using Tables 7A, 7B, 7C, or 7D, whichever is applicable. *It is not necessary that the pump and trunk size be the same.* The circuit sizes must be 3/4"

Determine the pump size by consulting manufacturers' data. The pump selected must be capable of delivering one gallon per minute for each 10,000 Btu/Hr. against the pressure head determined under this step. Table 5B represents conservative averages which may be used until manufacturers' data can be consulted.

Example: Double Circuit Main.

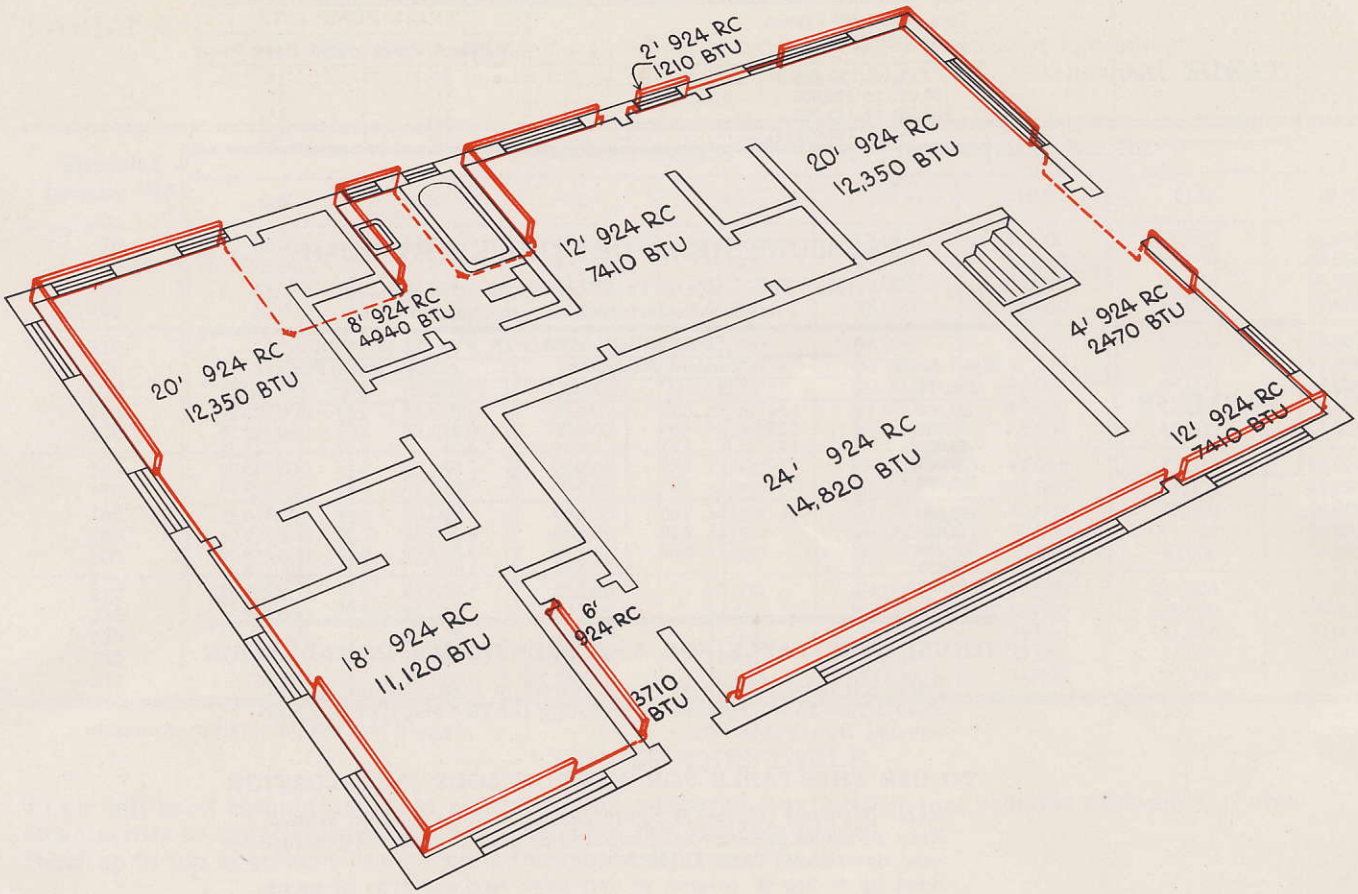
Measured length of Circuit "E".....141 ft.
(Use 140 ft. in Table 8)

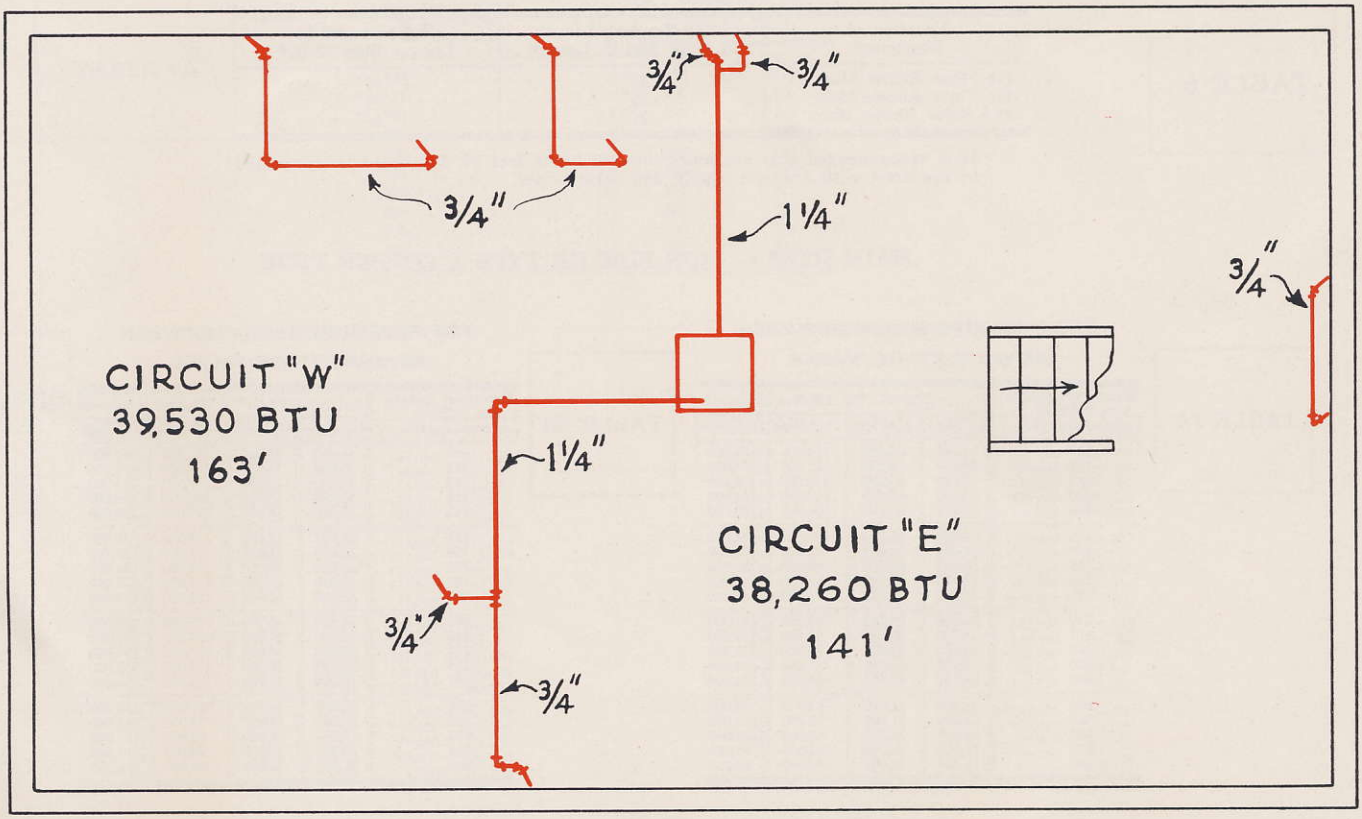
Measured length of Circuit "W".....163 ft.
(Use 160 ft. in Table 8)

Load, Circuit "E".....38,260 Btu/Hr.
Load, Circuit "W".....39,530 Btu/Hr.
Load, Trunk.....77,790 Btu/Hr.
Size of each Circuit.....3/4"
Pump capacity (77,790 ÷ 10,000)..7.8 gallons per minute

Enter left-hand column of Table 8 at 140 ft.; read horizontally to 39,000 Btu/Hr. (the next value greater than the total load of 38,260 on Circuit E); read required pressure head for that circuit, 8.0 ft. of water. Similarly, the pressure head for Circuit W is 9.0 ft. of water.

In this example, Table 7C is applicable because it covers pressure heads between 8.8 and 10.7 ft. of water. Enter left-hand column at 160 ft. (closest to 163); read horizontally to 139,000 Btu/Hr. (the next value greater than the total load of 77,790 on the trunk); at top of column read pipe size for trunk, 1¼". Enter left-hand column of Table 5B at 75,000 Btu/Hr. (closest to 77,790) read horizontally to 9.0 ft.; at top of column read size and type of pump, 1¼" high head pump.


2' 924 RC
1210 BTU
20' 924 RC
12,350 BTU
12' 924 RC
7410 BTU
8' 924 RC
4940 BTU
20' 924 RC
12,350 BTU
4' 924 RC
2470 BTU
12' 924 RC
7410 BTU
24' 924 RC
14,820 BTU
18' 924 RC
11,120 BTU
6'
924 RC
3710
BTU


3/4"
3/4"
3/4"
1 1/4"
3/4"
CIRCUIT "W"
39,530 BTU
163'
1 1/4"
3/4"
3/4"
CIRCUIT "E"
38,260 BTU
141'

TRIAL PUMP SIZE

TABLE 5A

Total Load on System Btu/Hr.	TRIAL PUMP SIZE	
	Standard Pump	High Head Pump
Up to 50,000	1"	1"
50,001 to 100,000	1¼"	1"
100,001 to 150,000	1½"	1¼"
Over 150,001	1½"	1½"

PRESSURE HEAD DEVELOPED BY PUMP

Note: This Table is based on conservative averages. Consult manufacturers' data for closer accuracy.

TABLE 5B

Total Load Btu/Hr.	PRESSURE HEAD IN FT. OF WATER					
	Standard Pump			High Head Pump		
	1"	1¼"	1½"	1"	1¼"	1½"
25,000	5.50	6.25	6.75	8.50	9.50	10.75
50,000	5.25	6.00	6.75	8.25	9.25	10.50
75,000	4.75	5.75	6.50	8.00	9.00	10.25
100,000	4.50	5.50	6.50	7.75	8.75	10.00
125,000	4.00	5.25	6.25	7.25	8.25	9.50
150,000		5.00	6.00	6.75	7.75	9.25
175,000		4.50	6.00	6.25	7.25	9.00
200,000		4.00	5.75	5.75	6.75	8.50
225,000			5.50	5.00	6.25	8.00
250,000			5.25	4.00	5.50	7.50
275,000			5.00		4.75	6.75

TO USE THIS TABLE FOR A CONVENTIONAL INSTALLATION

Enter left-hand column at figure closest to total load on system. Read across to the column representing the size and type of pump selected from Table 5A.

TO USE THIS TABLE FOR A SERIES LOOP INSTALLATION

Enter left-hand column at figure closest to total load on system. Read across to pressure head equal to or greater than the pressure head determined from Table 8.
Read up to top of column to determine size and type of pump.

BRANCH SIZES FOR BASEBOARDS

Based on the use of one-pipe fittings in the main

TABLE 6

Location of Baseboard	If Baseboard is 10 ft. or less in Length	If Baseboard is Longer than 10 ft.*
1st Floor **Below** Main	¾"	¾"
1st Floor **Above** Main	½"	¾"
2nd Floor Above Main	¾"	¾"

* It is recommended that not more than 40 linear feet of Baseboard be connected to the main with a single supply and return riser.

MAIN SIZES — IRON PIPE OR TYPE L COPPER TUBE

FOR PRESSURE HEADS BETWEEN 4.8 and 6.7 FT. OF WATER

TABLE 7A

Measured Length plus radiator allowance, Ft.	CAPACITY IN Btu/Hr.			
	¾" Pipe	1" Pipe	1¼" Pipe	1½" Pipe
100	34,000	64,000	116,000	176,000
110	33,000	63,000	113,000	172,000
120	32,000	61,000	110,000	168,000
130	31,000	60,000	107,000	164,000
140	30,000	58,000	104,000	160,000
150	30,000	56,000	101,000	156,000
160	29,000	54,000	99,000	153,000
170	28,000	53,000	98,000	150,000
180	27,000	52,000	96,000	147,000
190	27,000	51,000	94,000	144,000
200	26,000	50,000	92,000	141,000
210	25,000	49,000	90,000	139,000
220	25,000	48,000	89,000	136,000
230	24,000	47,000	87,000	134,000
240	24,000	46,000	86,000	132,000
250	24,000	45,000	84,000	130,000
300	21,000	41,000	78,000	120,000
400	19,000	36,000	68,000	105,000
500	16,000	33,000	62,000	95,000
600	15,000	30,000	56,000	88,000

FOR PRESSURE HEADS BETWEEN 6.8 and 8.7 FT. OF WATER

TABLE 7B

Measured Length plus radiator allowance, Ft.	CAPACITY IN Btu/Hr.			
	¾" Pipe	1" Pipe	1¼" Pipe	1½" Pipe
100	41,000	77,000	141,000	213,000
110	40,000	75,000	137,000	208,000
120	39,000	73,000	133,000	203,000
130	38,000	71,000	130,000	198,000
140	37,000	68,000	127,000	194,000
150	36,000	67,000	124,000	189,000
160	35,000	65,000	121,000	185,000
170	34,000	64,000	118,000	181,000
180	33,000	62,000	115,000	177,000
190	32,000	61,000	113,000	173,000
200	31,000	60,000	111,000	170,000
210	30,000	59,000	109,000	167,000
220	30,000	58,000	107,000	164,000
230	29,000	56,000	105,000	161,000
240	28,000	55,000	103,000	158,000
250	28,000	54,000	101,000	156,000
300	26,000	50,000	94,000	145,000
400	23,000	44,000	82,000	127,000
500	20,000	39,000	74,000	115,000
600	18,000	36,000	68,000	104,000

TABLE 8

CAPACITY OF SERIES LOOP MAINS
¾" IRON PIPE OR TYPE L COPPER TUBE

Note: This Table applies to Baseboards having friction heads not exceeding the friction head of a ¾" pipe the same length as the Baseboard.

Measured Length, Ft.*	Maximum Capacity for Various Pressure Heads, Btu/Hr.							
	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0
70	40,000	44,000	47,000	51,000	55,000	58,000	61,000	63,000
80	38,000	42,000	45,000	49,000	53,000	56,000	58,000	60,000
90	36,000	39,000	43,000	47,000	50,000	53,000	56,000	58,000
100	34,000	38,000	41,000	45,000	48,000	51,000	53,000	55,000
110	33,000	37,000	40,000	43,000	46,000	49,000	51,000	53,000
120	32,000	36,000	39,000	42,000	44,000	47,000	49,000	51,000
130	31,000	35,000	38,000	41,000	43,000	46,000	48,000	50,000
140	30,000	34,000	37,000	39,000	41,000	44,000	47,000	49,000
150	30,000	33,000	36,000	38,000	40,000	43,000	46,000	48,000
160	29,000	32,000	35,000	37,000	39,000	42,000	45,000	47,000
170	28,000	31,000	34,000	36,000	38,000	41,000	43,000	45,000
180	27,000	30,000	33,000	35,000	37,000	40,000	42,000	44,000
190	27,000	30,000	32,000	34,000	36,000	39,000	41,000	43,000
200	26,000	29,000	31,000	33,000	35,000	38,000	40,000	42,000
210	25,000	28,000	30,000	32,000	34,000	37,000	39,000	41,000
220	25,000	28,000	30,000	32,000	34,000	36,000	38,000	40,000
230	24,000	27,000	29,000	31,000	33,000	35,000	37,000	39,000
240	24,000	26,000	28,000	31,000	33,000	35,000	37,000	39,000
250	24,000	26,000	28,000	30,000	32,000	34,000	36,000	38,000

* including radiator allowance, if any.

TO USE THIS TABLE

Enter left-hand column at figure closest to the measured length, including radiator allowance, if any.
Read across to capacity equal to or greater than the capacity needed.
Read up to top of column to determine the required pressure head.

TABLE 9A

HEAT EMISSION RATES

For Various Radiator or Convector Temperatures

Average Radiator or Convector Temperature	HEAT EMISSION RATES Btu/Hr. per Sq. Ft.	
	Radiators	Convectors
170	150	140
175	160	150
180	170	160
185	180	170
190	190	180
195	200	190
200	210	205
205	220	220
210	230	230
215	240	240

TABLE 7C

FOR PRESSURE HEADS BETWEEN 8.8 and 10.7 FT. OF WATER

Measured Length plus radiator allowance, Ft.	CAPACITY IN Btu/Hr.			
	¾" Pipe	1" Pipe	1¼" Pipe	1½" Pipe
100	48,000	89,000	162,000	245,000
110	46,000	86,000	158,000	239,000
120	44,000	84,000	154,000	234,000
130	43,000	81,000	150,000	228,000
140	41,000	79,000	146,000	223,000
150	40,000	77,000	142,000	218,000
160	39,000	75,000	139,000	213,000
170	38,000	73,000	137,000	208,000
180	37,000	72,000	134,000	204,000
190	36,000	70,000	131,000	200,000
200	35,000	69,000	128,000	196,000
210	34,000	67,000	126,000	193,000
220	34,000	66,000	123,000	190,000
230	33,000	65,000	121,000	186,000
240	33,000	63,000	119,000	183,000
250	32,000	62,000	117,000	180,000
300	29,000	58,000	108,000	167,000
400	26,000	51,000	95,000	147,000
500	23,000	45,000	86,000	133,000
600	21,000	41,000	79,000	122,000

TABLE 7D

FOR PRESSURE HEADS BETWEEN 10.8 and 12.7 FT. OF WATER

Measured Length plus radiator allowance, Ft.	CAPACITY IN Btu/Hr.			
	¾" Pipe	1" Pipe	1¼" Pipe	1½" Pipe
100	53,000	100,000	181,000	276,000
110	51,000	97,000	176,000	269,000
120	49,000	94,000	172,000	263,000
130	48,000	91,000	168,000	257,000
140	47,000	89,000	164,000	250,000
150	46,000	86,000	159,000	244,000
160	45,000	84,000	155,000	239,000
170	43,000	82,000	152,000	234,000
180	42,000	80,000	148,000	229,000
190	41,000	78,000	145,000	225,000
200	40,000	77,000	142,000	220,000
210	39,000	76,000	140,000	216,000
220	38,000	74,000	138,000	212,000
230	37,000	73,000	136,000	209,000
240	37,000	72,000	133,000	205,000
250	36,000	71,000	131,000	202,000
300	33,000	65,000	121,000	188,000
400	29,000	57,000	107,000	166,000
500	26,000	51,000	96,000	149,000
600	24,000	47,000	89,000	137,000

TO USE THESE TABLES

Enter left-hand column at figure nearest to measured length plus radiator allowance.
Read horizontally to capacity equal to or greater than capacity needed.
Read up to top of column to determine pipe or tube size.

Hot Water Reverse Return System

(Based on temperature drop of 20° through system)

To select pipe sizes for the two-pipe forced circulation reversed return system having a total load of 53,050 Btu, Assume a difference of 20 Deg. in supply and return water temperature. The total equivalent length of longest circuit is 90 ft. plus 45 ft. (50%) for friction or 135 equivalent feet.

The water to be circulated is 53,050 Btu divided by 9,600 or 5.52 gals. per minute.

From the pump performance chart on page 45 it will be found that 5.52 G.P.M. will be delivered by a 1" pump against a 6.25 ft. head or 75,000 mil-inches. (6.25 x 12,000). The longest equivalent circuit, including the supply and the return main is 135 equivalent feet. Divide 75,000 mil-inches by 135 ft. and arrive at 556 mil-inches per foot. Use the 600 mil-inches column in "Heat carrying capacity of standard black pipe," Page 44 to arrive at pipe sizes.

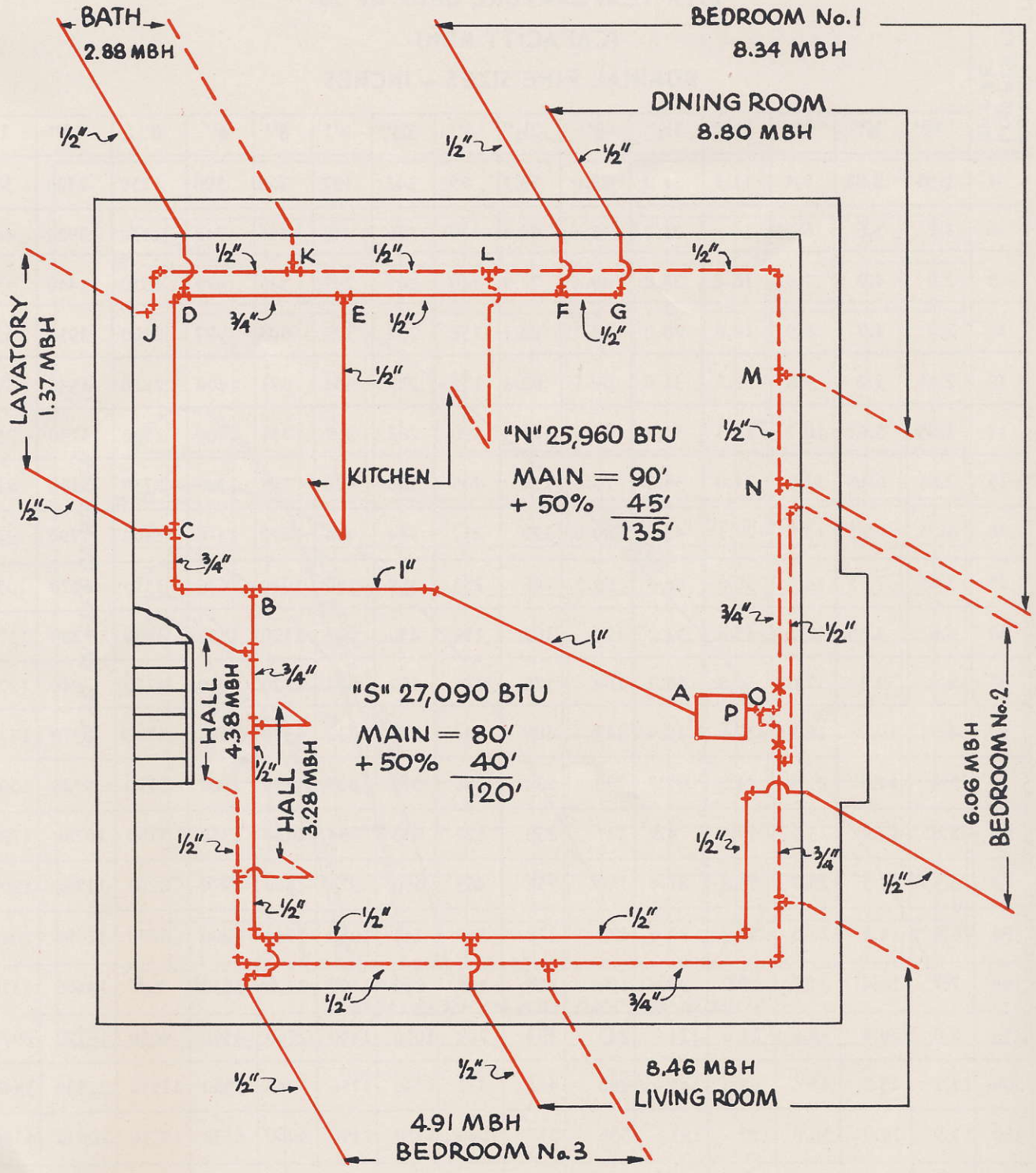
Refer to basement floor plan and note the various sections of the mains are identified as follows.

CIRCUIT "N"

Supply Main			Return Main		
Section	M B H	Pipe Size	Section	M B H	Pipe Size
AB	53.05	1"	JK	1.37	1/2"
BC	25.96	3/4"	KL	4.25	1/2"
CD	24.59	3/4"	LM	8.82	1/2"
DE	21.71	3/4"	MN	17.62	1/2"
EF	17.14	1/2"	NO	25.96	3/4"
FG	8.8	1/2"	OP	53.05	1"

Size Circuit "S" in same manner.

Size radiator circuits also from the 600 mil-inch column.

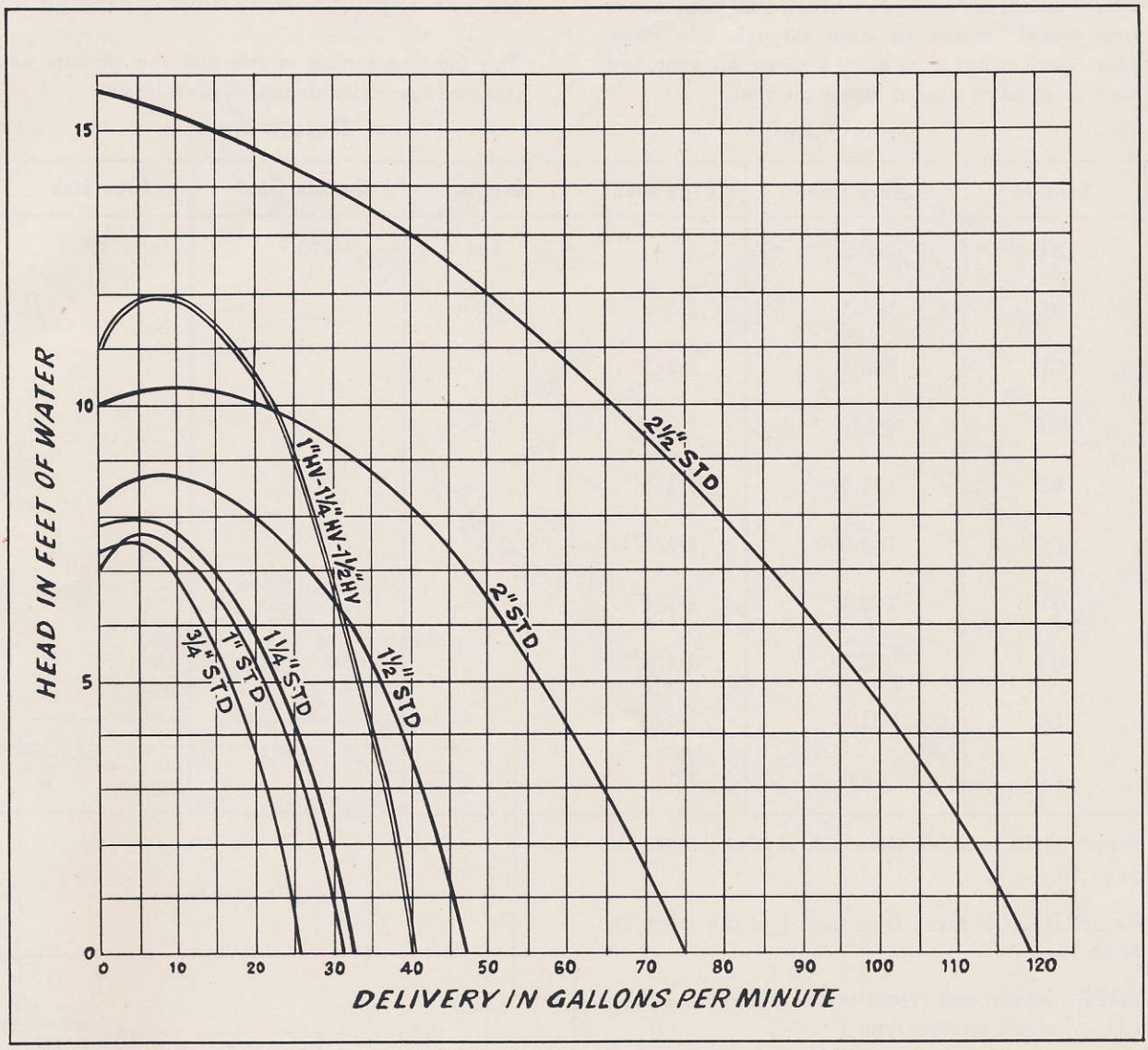

BATH
2.88 MBH
BEDROOM No.1
8.34 MBH
DINING ROOM
8.80 MBH
LAVATORY
1.37 MBH
KITCHEN
"N" 25,960 BTU
MAIN = 90'
+ 50% 45'
135'
"S" 27,090 BTU
MAIN = 80'
+ 50% 40'
120'
HALL
4.38 MBH
HALL
3.28 MBH
6.06 MBH
BEDROOM No.2
8.46 MBH
LIVING ROOM
4.91 MBH
BEDROOM No.3
J
D
K
L
E
F
G
M
N
C
B
A
O
P
½"
¾"
1"

Heat Carrying Capacity of Standard Black Pipes

MIL-INCH FRICTION LOSS PER FT. OF PIPE	WITH TEMPERATURE DROP OF 20° (CAPACITY MBH) NOMINAL PIPE SIZES -- INCHES														
	½"	¾"	1"	1¼"	1½"	2"	2½"	3"	3½"	4"	5"	6"	8"	10"	12"
4	1.35	2.85	5.4	11.3	17.0	33.0	53.1	95	141	197	363	596	1250	2320	3730
6	1.7	3.6	6.75	14	21.2	41.3	66.4	119	176	248	456	748	1570	2920	4690
8	2.0	4.2	7.9	16.4	24.8	48.4	77.9	140	207	291	535	879	1850	3440	5520
10	2.2	4.7	8.9	18.6	28.0	54.7	88.1	158	234	329	605	997	2100	3910	6270
12	2.45	5.2	9.8	20.5	31.0	60.4	92.4	175	259	364	671	1100	2320	4330	6950
14	2.65	5.65	10.7	22.3	33.7	65.8	106	190	282	397	731	1200	2530	4730	7590
16	2.85	6.05	11.5	24.0	36.3	70.8	114	205	303	428	787	1300	2730	5100	8190
20	3.25	6.85	13.0	27.1	41.0	80.0	129	232	344	484	892	1470	3100	5790	9300
25	3.65	7.75	14.7	30.6	46.3	90.5	146	263	389	548	1010	1670	3510	6570	10560
30	4.0	8.55	16.2	33.8	51.2	100	162	290	430	607	1120	1850	3900	7280	11710
35	4.4	9.3	17.6	36.8	55.7	109	176	316	469	661	1220	2010	4250	7940	12780
40	4.7	10.0	18.9	39.6	59.9	117	189	341	505	712	1320	2170	4580	8570	13780
50	5.3	11.3	21.4	44.7	67.7	133	214	386	572	807	1490	2460	5190	9720	15650
60	5.85	12.4	23.6	49.4	74.9	147	238	427	633	893	1650	2730	5760	10780	17300
70	6.35	13.5	25.7	53.8	81.4	160	258	465	690	973	1800	2970	6280	11760	18950
80	6.8	14.5	27.6	57.9	87.6	172	278	500	743	1050	1940	3200	6770	12690	20440
100	7.7	16.4	31.1	65.9	99.0	194	314	566	840	1190	2200	3630	7680	14400	23200
150	9.6	20.4	38.8	81.6	124	243	393	709	1050	1490	2760	4560	9650	18120	29220
200	11.2	23.9	45.4	95.5	145	285	461	832	1240	1750	3240	5360	11350	21320	34400
300	13.9	29.7	56.6	119	181	356	577	1040	1550	2190	4060	6730	14270	26830	43300
400	16.2	34.7	66.2	140	212	417	676	1220	1820	2570	4780	7910	16790	31580	51000
500	18.3	39.2	74.8	158	239	471	765	1380	2060	2910	5410	8970	19040	35890	57880
600	20.1	43.2	82.5	174	264	521	846	1530	2280	3220	5990	9930	21100	39740	64210
700	23.6	50.5	96.5	204	310	610	992	1790	2670	3780	7030	11670	24820	46780	75620

From Chapter 23, Heating, Ventilating Air Conditioning Guide 1949.

Type "H" Booster Capacity Chart



Reproduced by courtesy of Bell & Gossett Company

One-Pipe Steam System

A one-pipe steam heating system operates at approximately one pound steam pressure.

A single main starts at the boiler and circles basement and returns to boiler. A single pipe connects each panel to main. Steam from main enters panel through this pipe, and condensate from panel returns to main through this same pipe. Each panel must have a steam air vent, and main must have a main steam air vent.

On following plan notice that main air vent is installed where dry return main drops and is connected into boiler.

In designing the piping for a one-pipe steam system, in an average residence, use a one ounce pressure drop as shown in table on page 50.

The basement plan shown has the various sections of the main identified as follows:

Supply Main			Return Main		
Section	**Square Feet**	**Pipe Size**	**Section**	**Square Feet**	**Pipe Size**
AB	220.7	2"	LM	220.7	1"
BC	195.5	2"			
CD	160.3	1-1/2"			
DE	139.9	1-1/2"			
EF	123.95	1-1/2"			
FG	108.00	1-1/4"			
GH	102.3	1-1/4"			
HJ	90.3	1-1/4"			
JK	71.3	1-1/4"			
KL	36.6	1"			

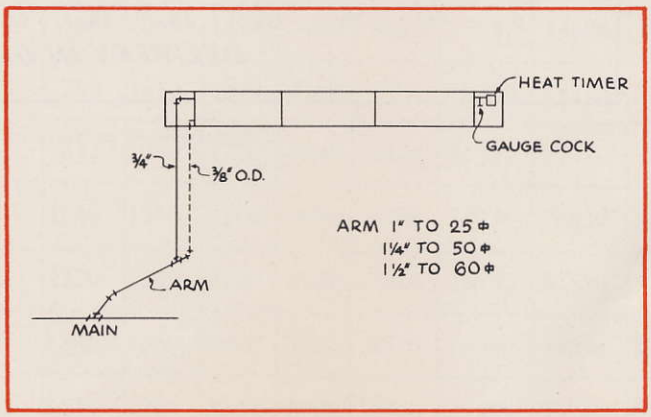
Supply main is sized from Col. B of the table on page 50.

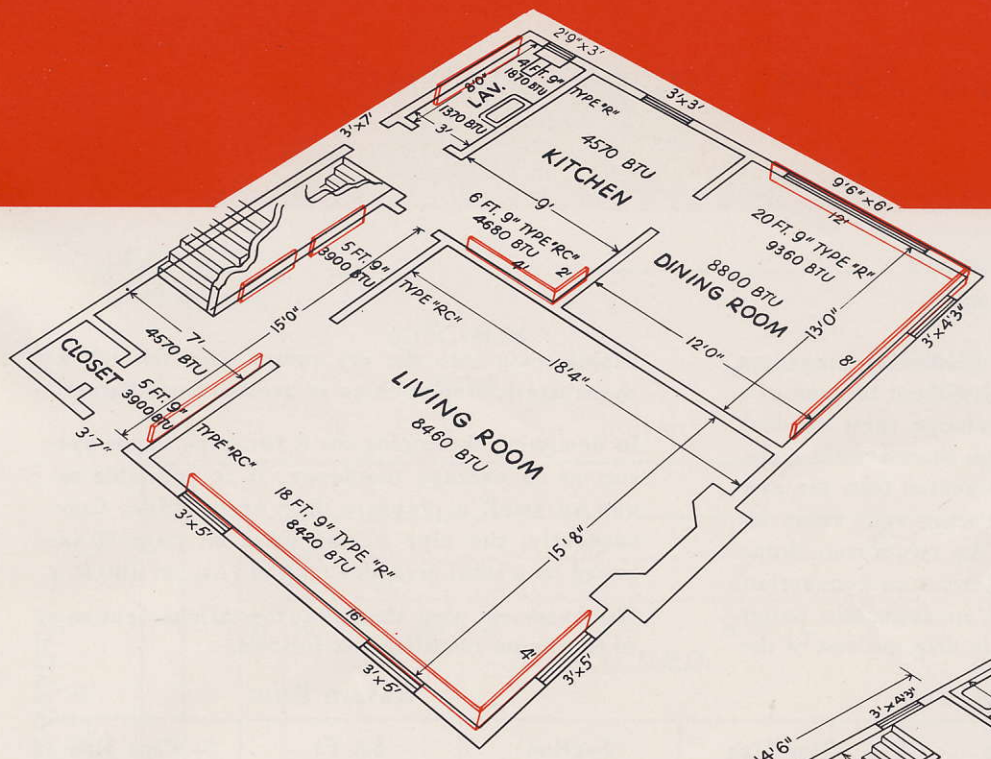
Return main is sized from Col. J of the table on page 50.

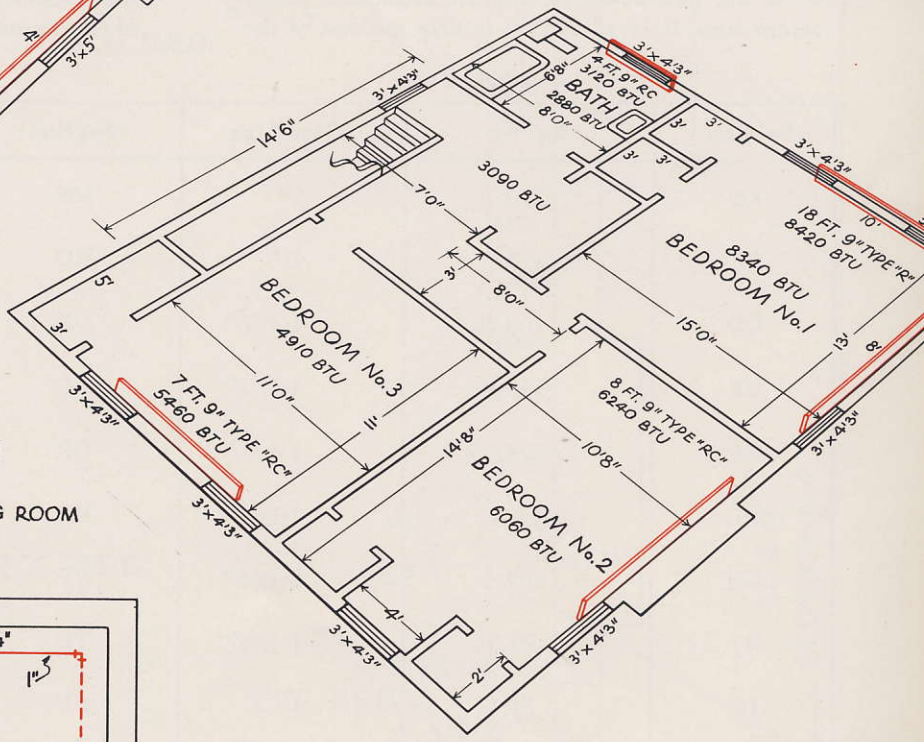
NOTE: Supply and return mains should never be sized smaller than 1".

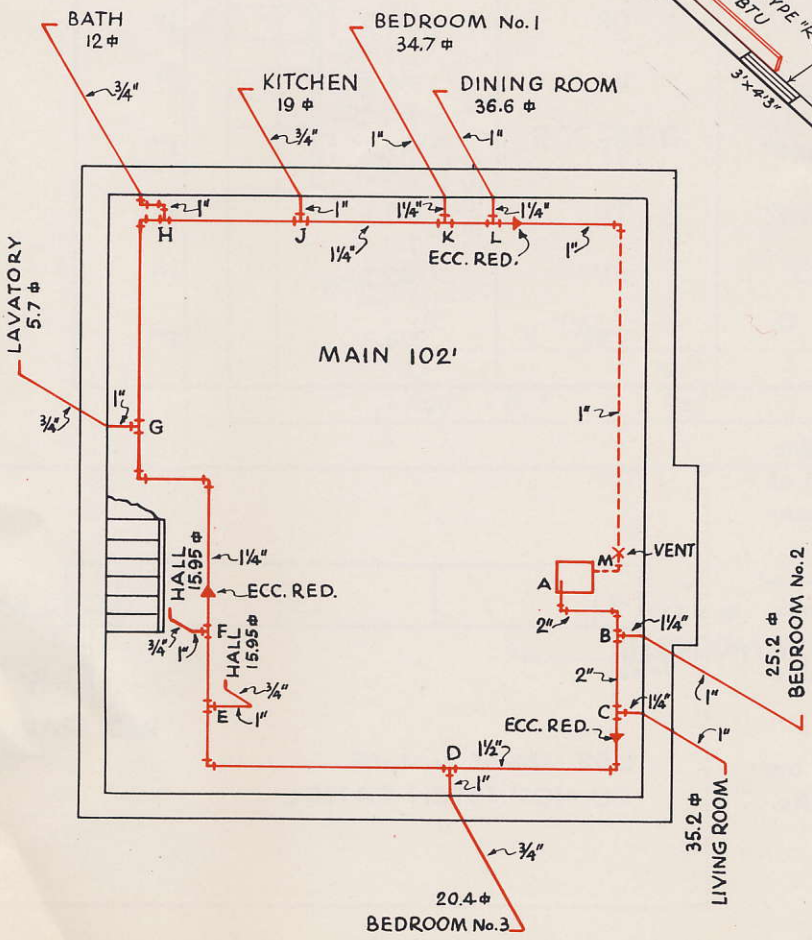
Supply risers are sized from Col. E, vertical connections from Col. F and runouts from Col. G in table on page 50. High point of main is at boiler so that condensate will run through main, back to boiler by gravity. Use connection shown on page 46 and with a Heat Timer air vent. A radiator valve cannot be installed with this connection. Because of this the gauge cock at Heat Timer must be turned off, thus air binding the panel to shut off the heat.

Caution: All corner baseboard panels must be connected together at corners with two 3/4" No. 192-1/2 union ells.




LAV.
1870 BTU
1370 BTU
KITCHEN
4570 BTU
6 FT. 9" TYPE "RC"
4680 BTU
5 FT. 9"
3900 BTU
DINING ROOM
8800 BTU
20 FT. 9" TYPE "R"
9360 BTU
CLOSET
LIVING ROOM
8460 BTU
18 FT. 9" TYPE "R"
8420 BTU
TYPE "RC"
TYPE "R"


BATH
3120 BTU
2880 BTU
3090 BTU
BEDROOM No.1
8340 BTU
18 FT. 9" TYPE "R"
8420 BTU
BEDROOM No.3
4910 BTU
7 FT. 9" TYPE "RC"
5460 BTU
BEDROOM No.2
6060 BTU
8 FT. 9" TYPE "RC"
6240 BTU


BATH
12 ¢
BEDROOM No.1
34.7 ¢
KITCHEN
19 ¢
DINING ROOM
36.6 ¢
LAVATORY
5.7 ¢
ECC. RED.
MAIN 102'
HALL
15.95 ¢
HALL
15.95 ¢
VENT
25.2 ¢
BEDROOM No.2
35.2 ¢
LIVING ROOM
20.4 ¢
BEDROOM No.3

220.7 ¢

Two Pipe Vapor System

Two-pipe vapor systems operate at pressures from 20 in. vacuum to 15 psi without the use of a vacuum pump. Radiators discharge their condensate and eliminate air through thermostatic traps to a dry return main. Air is vented from the system through a vacuum type main vent valve located at the point where the dry return main drops from the ceiling to the boiler return connection. It is not necessary to use an automatic boiler return trap. It is advisable to drip the end of the supply main into the dry return main through a thermostatic trap such as is used on the radiators.

In designing the piping for a two-pipe vapor system in an average residence, it is desirable to use as small a pressure drop as possible. Consequently, the pipe sizing table on page 50 is based on a total pressure drop of 1 oz. per 100 ft.

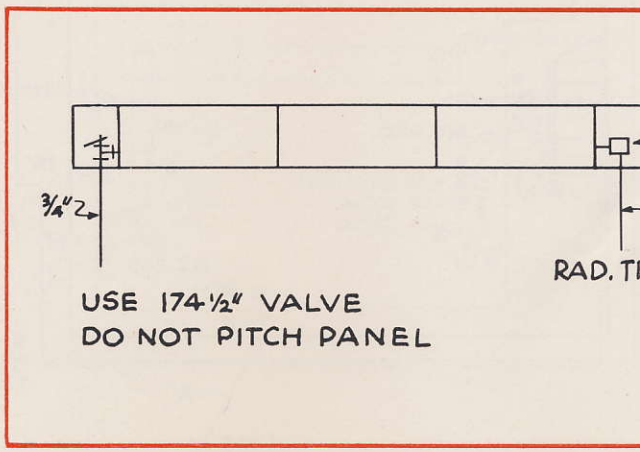
The basement plan shown has the various sections of the mains identified as follows:

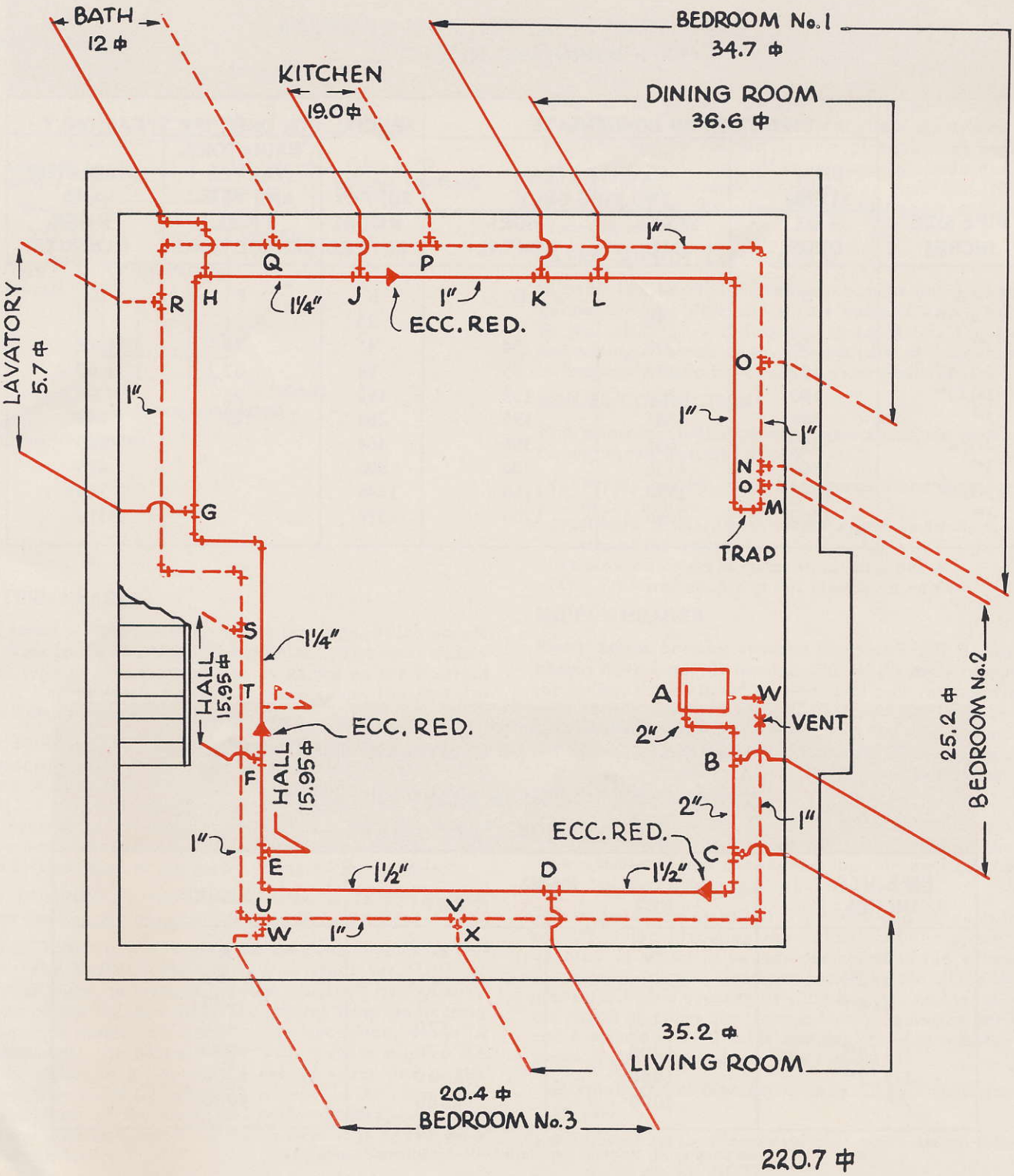
Supply Main			Return Main		
Section	Sq. Ft.	Pipe Size	Section	Sq. Ft.	Pipe Size
AB	220.7	2"	MN	25.2	1"
BC	195.5	2"	NO	59.9	1"
CD	160.3	1-1/2"	OP	96.5	1"
DE	139.9	1-1/2"	PQ	115.5	1"
EF	123.95	1-1/2"	QR	127.5	1"
FG	108.0	1-1/4"	RS	133.2	1"
GH	102.3	1-1/4"	ST	149.15	1"
HJ	90.3	1-1/4"	TU	165.1	1"
JK	71.3	1"	UV	185.5	1"
KL	36.6	1"	VW	220.7	1"

Supply mains are sized from Col. B of the Table on page 50. Return mains are sized from Col. J of the Table on page 50. (Note: Supply and return mains should never be smaller than 1 in.)

Supply risers are sized from Col. C and runouts from Col. D in Table on page 50. Return risers and runouts are sized from Col. J and K in Table on page 50.

Caution: All corner baseboard panels must be connected together at corners with two 3/4" No. 192-1/2 union ells.




BATH
12 ϕ
KITCHEN
19.0 ϕ
BEDROOM No. 1
34.7 ϕ
DINING ROOM
36.6 ϕ
LAVATORY
5.7 ϕ
Q
P
R
H
J
K
L
1¼"
ECC. RED.
1"
O
N
M
TRAP
G
S
1¼"
HALL
15.95 ϕ
T
ECC. RED.
F
HALL
15.95 ϕ
A
W
VENT
2"
B
2"
1"
ECC. RED.
C
E
1½"
D
1½"
U
V
W
X
25.2 ϕ
BEDROOM No. 2
35.2 ϕ
LIVING ROOM
20.4 ϕ
BEDROOM No. 3
220.7 ϕ

CAPACITIES IN SQ. FT., EDR, OF STEAM MAINS AND RISERS

PIPE SIZE INCHES	DIRECTION OF CONDENSATE			SPECIAL FOR ONE PIPE STEAM ONLY		
	WITH STEAM	AGAINST STEAM TWO PIPE ONLY		SUPPLY RISERS UPFEED	RADIATOR VALVES AND VERTICAL CONNECTIONS	RADIATOR AND RISER RUNOUTS
	1 OZ. DROP	VERTICAL	HORIZONTAL			
A	B	C	D	E	F	G
3/4"		30		25		
1"	56	56	34	45	28	28
1-1/4"	122	122	75	98	62	62
1-1/2"	190	190	108	152	93	93
2"	386	386	195	288	169	189
2-1/2"	635	635	395	464		260
3"	1160	1130	700	800		475
3-1/2"	1740	1550	1150	1140		745
4"	2460	2040	1700	1520		1110

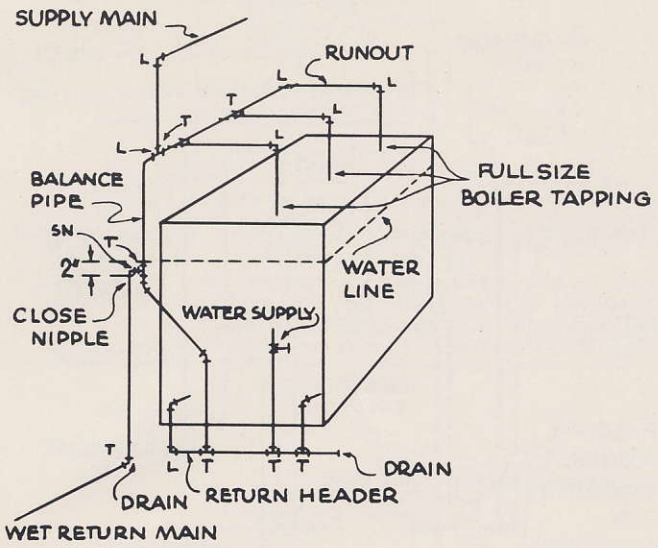
RETURN PIPE CAPACITIES FOR LOW PRESSURE SYSTEMS
CAPACITY EXPRESSED IN SQ. FT. OF EQUIVALENT DIRECT RADIATION

CAPACITY OF RETURN MAINS AND RISERS
1 OUNCE PRESSURE DROP

PIPE SIZE INCHES	MAINS		RISERS
	WET	DRY	
H	I	J	K
1/2"			60
3/4"			190
1"	700	320	450
1-1/4"	1200	670	990
1-1/2"	1900	1060	1500
2"	4000	2300	3000

From Chapter 24, Heating, Ventilating Air Conditioning Guide 1949.

Typical Steam Boiler Connections Showing "Hartford Loop"



RETURN HEADER

All steam boilers have two return tappings, which should be connected with a RETURN HEADER. The most widely used type of return connection is known as the Hartford Loop, Underwriter's Loop, Hydraulic Loop, Hartford Return Connection, etc.

The FEATURES of the Hartford Loop include (1) a direct connection without valves between the supply and return sides of the boiler -- the "balance pipe" or "equalizer" and (2) a connection between the wet return from the heating system and the boiler return header, this connection to be made into the balance pipe at a point 2" below the normal water line of the boiler, using a close nipple.

The PURPOSE of the Hartford Loop is to prevent the water leaving the boiler under any circumstances.

The METHOD of connecting the Hartford Loop is as follows: The SUPPLY HEADER, from which the SUPPLY MAIN is taken, is dropped into the RETURN HEADER by means of the balance pipe. The returns from the heating system are connected into a single wet return, which is connected to the balance pipe with a close nipple, the top of which is 2" below the normal water line of the boiler. The SUPPLY HEADER may be in the same horizontal plane as the horizontal boiler runouts, or it may be some distance below, in which case it is known as a DROP HEADER.

The SIZE OF THE BALANCE PIPE is determined by the size of the boiler. Boilers having a grate area under 4 square feet should have a 1½" balance pipe, 4 to 15 square feet, a 2½" pipe and over 15 square feet, a 4" pipe. The size of the RETURN HEADER should be two sizes larger than the wet return entering the boiler, i.e., for a 1¼" wet return, use a 2" RETURN HEADER.

BLOW-OFF CONNECTION

The blow-off or drain connection should be at the lowest point in the system, usually in the return header. The PURPOSE of the BLOW-OFF is to drain the system when required and to rid the system of scale and sediment which may be drained off at frequent intervals when the heating plant is new. A single plug cock (CRANE No. 250) should be installed at this low point and near a floor drain.

WATER SUPPLY CONNECTION

A city water service connection must be provided with a galvanized iron pipe and a gate valve (CRANE No. 440 or No. 410). This connection is for filling the system and adding make-up water. The addition of make-up water is frequently made by means of water feeders.

BOILER CONNECTIONS

The following boiler piping connections are necessary for any steam heating system:

(1) Supply header, with flow connections from the top of the boiler.
(2) Return header, with return connections to the bottom of the boiler.
(3) Blow-off or drain connection, with valve.
(4) Cold water supply or fill pipe, with valve.

SUPPLY HEADER

Every steam heating system, however small it may be, should have a supply header. For each supply tapping in the boiler, there should be a vertical pipe the full size of the tapping, and a horizontal runout which may be one size smaller than the vertical pipe. All the runouts are to be connected to a SUPPLY HEADER of a size sufficient to carry the maximum steam load under any conceivable condition.

The PURPOSE of the SUPPLY HEADER is to provide additional steam space in which the generated steam can be accumulated and excess moisture drained off, before being circulated through the heating system.

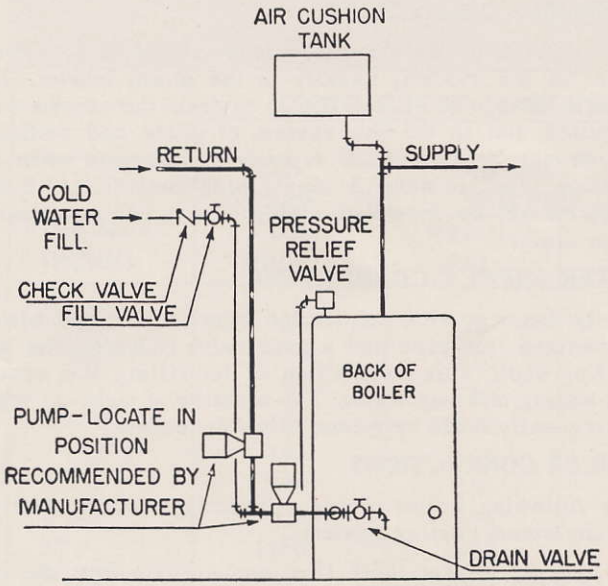
The SIZE of the SUPPLY HEADER can be calculated from formulae involving the velocity of the steam, the quantity of steam in pounds per hour and the volume of the steam in cubic feet per pound at the given steam pressure. With a velocity of 1200 feet per minute, a quarter pound of steam per square foot of radiation per hour and a volume of 26.8 cubic feet per pound at atmospheric pressure (14.7 lbs. gauge), the formula is:

Internal area of pipe in sq. in. = .0134 X radiation in sq. ft.

The internal areas of standard pipe sizes are as follows:

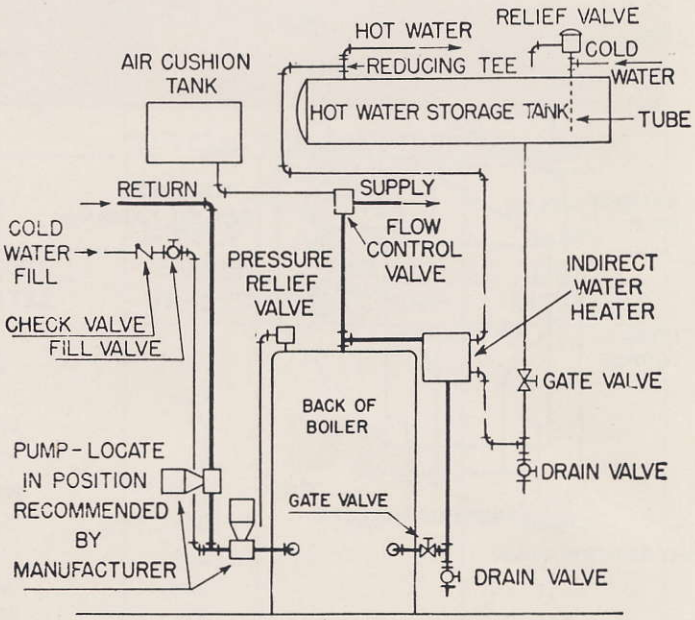
2½"	4.788 sq. in.	NOTE:
3"	7.393 sq. in.	
3½"	9.886 sq. in.	Never size the SUPPLY HEADER
4"	12.730 sq. in.	any smaller than the boiler outlets,
5"	20.006 sq. in.	i.e., should the header figure 3½"
6"	28.891 sq. in.	by the formula and the boiler has
8"	50.027 sq. in.	4" supply tappings, USE A 4" SUPPLY HEADER.

TYPICAL BOILER CONNECTIONS



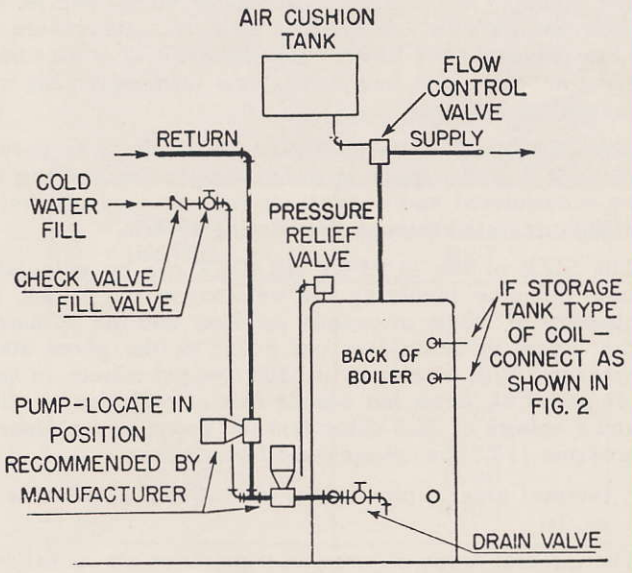
WITHOUT DOMESTIC HOT WATER SUPPLY

Figure 1



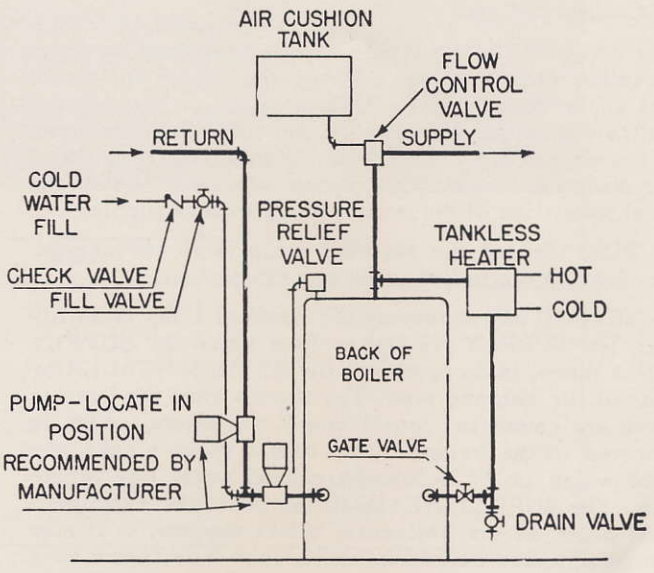
WITH INDIRECT HEATER AND STORAGE TANK INSTALLATION

Figure 2



WITH SUBMERGED HEATER INSTALLATION

Figure 3



WITH INDIRECT TANKLESS INSTALLATION

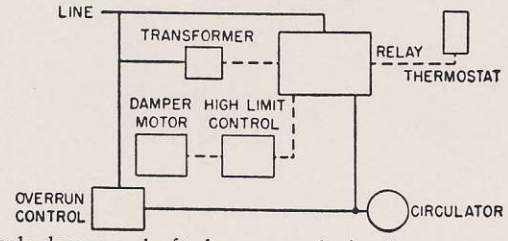
Figure 4

NOTE: IN ALL CASES SUPPLY SHOULD BE CONNECTED TO FRONT TAPPING IN TOP OF BOILER

SUGGESTED CONTROL ARRANGEMENTS FOR HOT WATER HEATING SYSTEMS

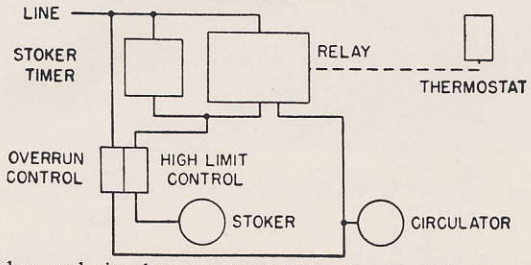
NO DOMESTIC HOT WATER SUPPLY

Hand Fired



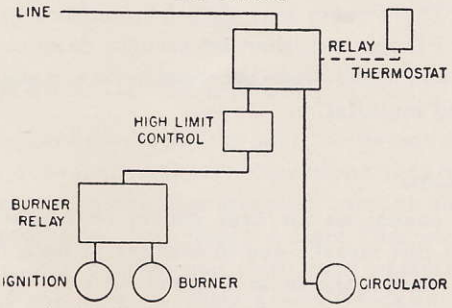
1. Check damper, draft damper and circulator controlled by Thermostat.
2. High boiler water temperature causes High Limit Control to close draft damper and open check damper.
3. Excessive boiler water temperature causes Over-run Control to start circulator even though Thermostat is satisfied.

Stoker Fired



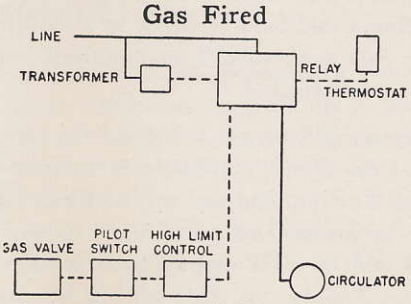
1. Stoker and circulator controlled by Thermostat.
2. High boiler water temperature causes High Limit Control to stop stoker.
3. Excessive boiler water temperature causes Over-run Control to start circulator even though Thermostat is satisfied.
4. Stoker Timer operates stoker at regular intervals to maintain fire.

Oil Fired



1. Burner and circulator controlled by Thermostat.
2. High boiler water temperature causes High Limit Control to stop burner but not circulator.

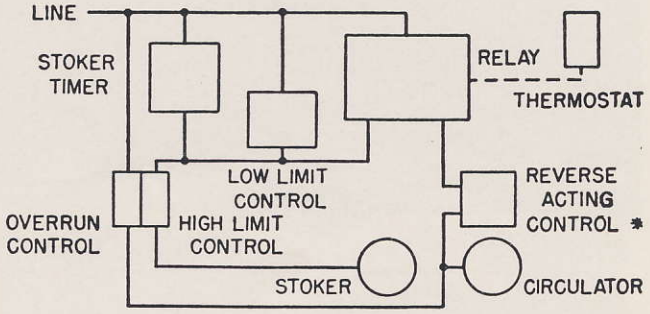
Gas Fired



1. Burner and circulator controlled by Thermostat.
2. Should pilot flame be extinguished, Burner cannot operate until pilot has been relighted and pilot switch re-set.
3. High boiler water temperature causes High Limit Control to stop burner but not circulator.
4. Gas Valve can be opened manually in event of current failure.

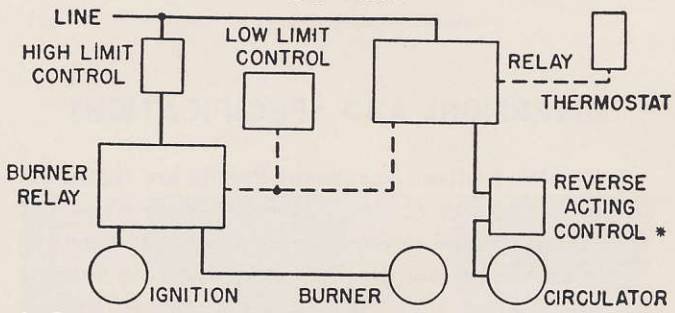
WITH DOMESTIC HOT WATER SUPPLY

Stoker Fired



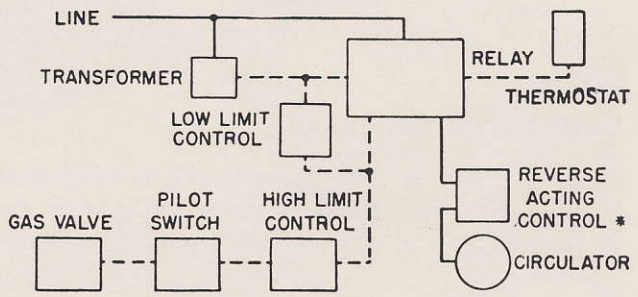
1. Stoker and circulator controlled by Thermostat.
2. High boiler water temperature causes High Limit Control to stop stoker.
3. Excessive boiler water temperature causes Over-run Control to start circulator even though Thermostat is satisfied.
4. Stoker Timer operates stoker at regular intervals to maintain fire.
5. Low Limit Control operates stoker to maintain minimum boiler water temperature.

Oil Fired



1. Burner and circulator controlled by Thermostat.
2. High boiler water temperature causes High Limit Control to stop burner but not circulator.
3. Low Limit Control operates burner to maintain minimum boiler water temperature.
4. With tankless type domestic water heater, the Reverse Acting Control prevents circulator operation when boiler water temperature is too low.

Gas Fired



1. Burner and circulator controlled by Thermostat.
2. Should pilot flame be extinguished, Burner cannot operate until pilot has been relighted and pilot switch re-set.
3. High boiler water temperature causes High Limit Control to stop burner but not circulator.
4. Gas Valve can be opened manually in event of current failure.
5. Low Limit Control operates burner to maintain minimum boiler water temperature.
6. With tankless type domestic water heater, the Reverse Acting Control prevents circulator operation when boiler water temperature is too low.

*For Tankless Heaters only

Assembly and Installation

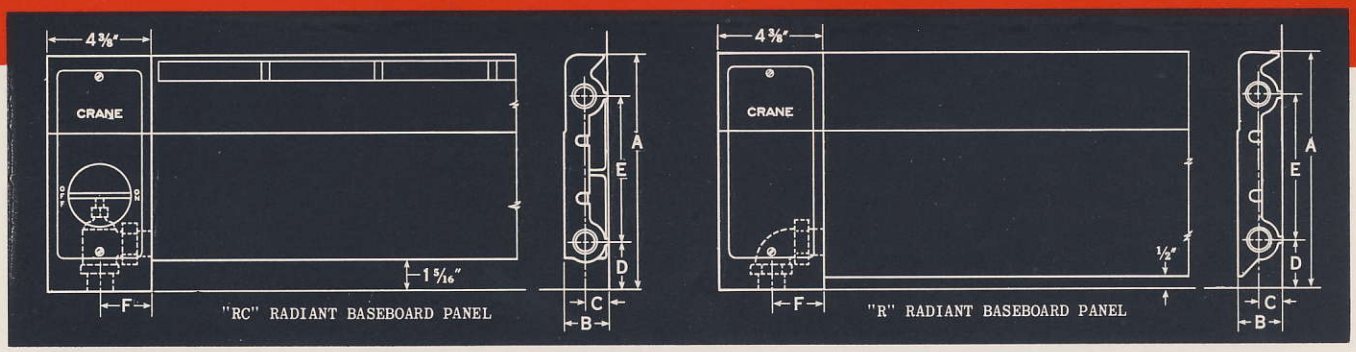


TABLE 10-ROUGHING-IN DIMENSIONS-INCHES

TYPE OF PANEL	A	B	C	D	E	F**
"R" Panel	9-7/8	1-7/8	1	2	6-1/8	2-3/16
"RC" Panel	9-7/8*	1-7/8	1	2*	6-1/8	2-3/16

*Add ½ in. if installed with wood base strip for wall to wall carpeting.

**This dimension applies to Crane No. 192½, ¾ in. radiator union elbow and also to Crane No. 174½, ¾ in. radiator valve.

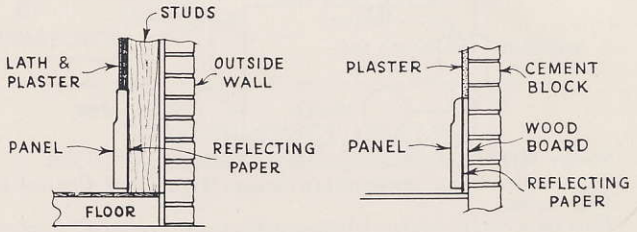
DIMENSIONS AND SPECIFICATIONS

CRANE Radiant Baseboard Panels are furnished in sections 2 ft. long, and 1 ft. long only, and are assembled in any desired length by means of push nipples and tie bolts. Sections are shipped from factory unassembled, and a special tool is available for drawing up the assembly on the job. Instructions are furnished with this tool. Special end enclosures are furnished to conceal the piping connections at each end of a Panel. These enclosures are bolted directly to the ends of the units and have removable doors which provide access to the vent valve, union elbow and supply valve.

INSTALLATION DETAILS

CRANE Radiant Baseboard Panels are installed against the wall, flush against the plaster, at the floor line -- in place of the regular wood base molding.

The Panels may also be fastened to the studding in the bathroom or in other rooms, and lath and plaster or tiling brought down to the Panels. This makes a semi-recessed installation. This method of application may be used to good advantage in providing heat while construction is in progress.



Where a cement block wall is encountered with the plaster directly on the blocks, a board should be fastened to the blocks before plaster is applied. The Panels may then be fastened to the board. Plaster will then be brought down to the board and flush with the board, thus making a finished installation.

AIR SEAL

In all cases, an air seal should be provided to prevent dirt streaks due to leakage in back of the Panel. As is shown in Figures 4, 6 and 7, this seal may be either of non-asphalt base building paper or of a foil type insulation. It is placed in back of the Panel for its full height, lapped over the top flange and held in place by a molding. The paper or foil seal should be installed before the hangers are installed.

The strip should be cut 8-3/4 in. longer than the length of the Panel assembly to include the enclosures. For the Radiant and Radiant Convector Panels, the air seal strip is 10-3/8 in. wide. However, if wall-to-wall carpeting is used with the Convector Panels, the strip should be cut 10-7/8 in. wide. The air seal is held in place along the wall by the wall brackets as described below. See Fig. 4.

Fig. 1: *Tool for assembling Radiant Baseboard Panels.*

Fig. 2: *Assembling Radiant Baseboard Panels.*

ROUGHING-IN PIPING

Rough in supply and return risers according to dimensions shown in Table 10. Allow approximately 1/4 in. on the diameter of drilled holes, to permit expansion of piping and panels.

ASSEMBLY OF SECTIONS

Preparation for assembly of sections begins by lining up the necessary number of sections that will give the desired length. Wipe the push nipples and nipple ports free from dirt. Apply a light film of graphite paste to the nipples and seat them squarely in the ports of one section, using a wood block and hammer. Fit the other section to the nipples and seat again, making sure the two ends of the sections are parallel and approximately 1/4 in. apart.

Assembling Panels. When assembling Panels, Figures 1 and 2, it is necessary to pull up a little on each nipple, keeping the faces parallel by moving the tool from side to side and gripping the flanges adjacent to each hub. APPLYING THE JAWS OF THE TOOL TO THE CENTER OF THE RECESS IS LIKELY TO RESULT IN CRACKING OF THE FLANGES.

Bolting. The Panel Sections are then bolted together with 5/16 in. tie bolts. See Figure 3.

Fig. 3: *Installing tie bolt between panels.*

Installing Fittings. Install tailpieces for supply valve and return elbow, 3/4 in. plug in upper tapping of supply end and 3/4 in. x 1/8 in. bushing and air vent valve in upper tapping of return end.

INSTALLING RADIATOR CLIPS AND WALL BRACKETS

SEE TABLE "B" FOR THE NUMBER OF RADIATOR CLIPS AND WALL BRACKETS TO USE. The radiator clip and wall brackets should be approximately evenly spaced along the length of the panel. Fasten the radiator clips to panels with #10-24 x 3/4 flat head machine screws, lock washer and nut. SEE FIGS. 5. The length of the wall brackets locates panels the proper height from floor. Place wall brackets on floor against air seal strip on same centers that radiator clips are spaced; fasten to wall with #4-L x 1-7/8 Molly Screw Anchor furnished with bracket. If wall bracket is in line with a stud wood screws may be used in place of Molly Screw Anchor. If floors are uneven, the intermediate wall brackets should be adjusted, vertically by placing shims under foot of the wall bracket. The top of wall brackets must be in line, so that each carry part of the load. To keep wall bracket snug against the air seal at bottom, drive a small nail through hole in foot of wall bracket.SEE FIGS. 10 and 11.

TABLE B

LENGTH OF PANEL	NUMBER OF RADIATOR CLIPS & WALL BRACKETS
1 Section	1
2 to 3 Sections	2
4 to 6 Sections	3
7 to 9 Sections	4
10 to 12 Sections	5
13 to 15 Sections	6

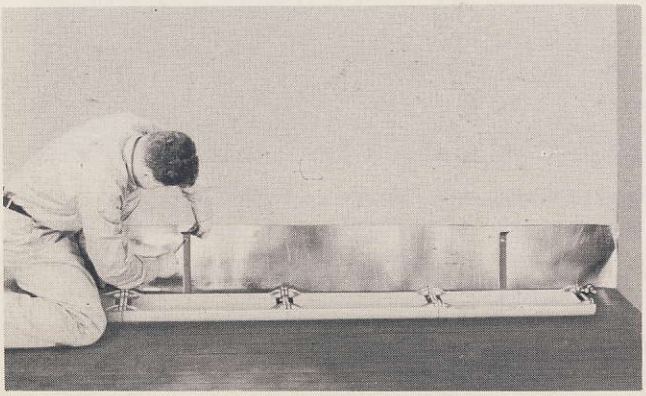


Fig. 4: *Wall brackets hold sealing strip of aluminum foil or non-asphalt paper in place.*

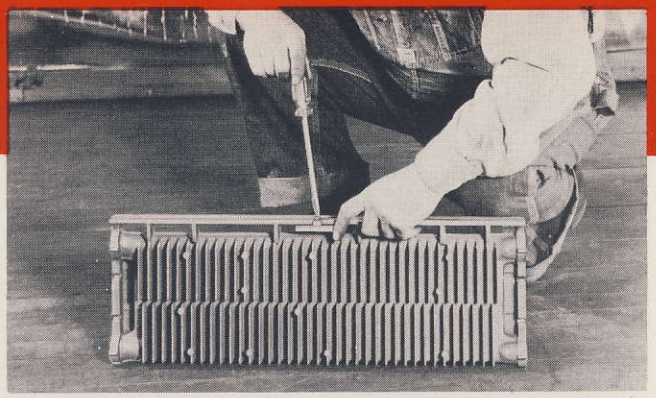


Fig. 5: *Fastening radiator clips to panels.*

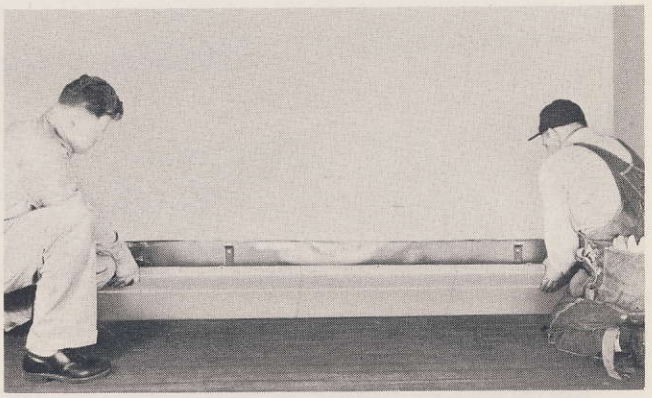


Fig. 6: *After assembled baseboard is in position, sealing strip is lapped over top.*

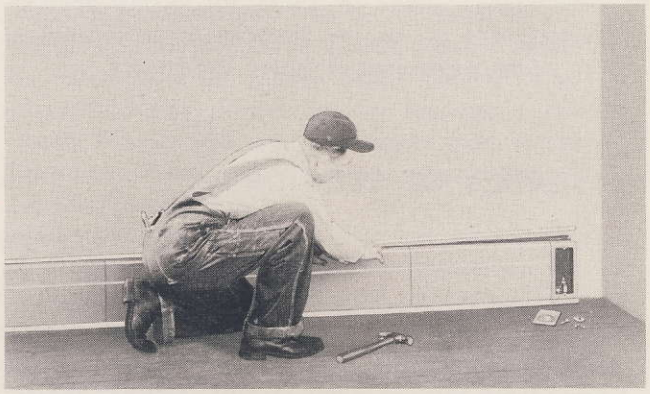


Fig. 7: *A strip of quarter round molding fastened on top of baseboard covers the seal.*

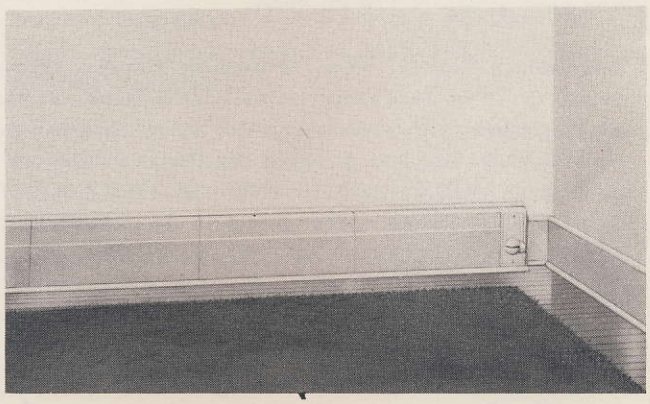


Fig. 8: *Installation complete with all moldings in place.*

Fig. 9: *Corner cover plate is held in place by wood screw in floor.*

HANGING THE PANEL

Set the panel assembly carefully on the wall brackets without disturbing the air seal, so that all radiator clips will be engaged by the wall brackets. SEE FIGS. 6, 10 and 11.

Tighten Unions. After the Panel is placed on the hangers, the next step is to tighten the unions of the supply and return fittings.

INSTALLING END ENCLOSURES

To install the supply end or return end enclosure, insert the tie bolt in the slot of the Panel section. Then slide the enclosure over the bolt and tighten the nut. Be sure the enclosures line up with the top surface and the lower front face of the Panel. The bottom of the enclosure should rest on the floor.

INSTALLING ACCESS DOORS

Install the enclosure access doors and valve handle. The supply valve door has a raised slotting opening to accommodate the valve operating lever. The handle is fastened to the lever by means of a small set screw on the bottom. The return end door is a flat plate. The location of the air vent valve is indicated by a sheet metal disc which is installed under the lower screw.

FINISHING

Type R Panels. The hanger location is such that the bottom flange of the 9 in. Radiant Panels is 1/2 in. above the floor. Any standard molding, such as a 1/2 in. by 3/4 in. shoe molding, may be used to cover this 1/2 in. gap and to finish the bottom of the unit. Also, a similar shoe mold is installed at the top to cover the air seal and the retaining screw recesses, as shown in Figures 7 and 10.

Type RC Panels. The Radiant Convector Panel is hung on the same type hangers and in the same manner as the Radiant Panels -- according to the dimensions shown in Figure 11. An air opening of 1-5/16 in. height is provided under the Panels and a 3/4 in. x 3/4 in. cove mold is placed at the base of the wall to conceal the joint between the wall and the floor. No molding is installed along the front of the panels except at the end enclosures. In some cases, it may be desired to use wall-to-wall carpeting. This necessitates raising the hangers 1/2 in. and installing a 1-7/8 in. by 1/2 in. base strip under the units with a 1/2 in. quarter round in front of the strip. This is shown in Figure 11.

CORNER CONNECTIONS

Where two Radiant Baseboard Panels are installed on adjacent walls of a room and it is desired to connect them in series around the corner, standard No. 192½ radiator union elbows should be used. The roughing in length from the wall to the face of each panel is 3-3/16".

If one union elbow is used in the two bottom outlets, an air vent must be used in each of the two baseboard assemblies.

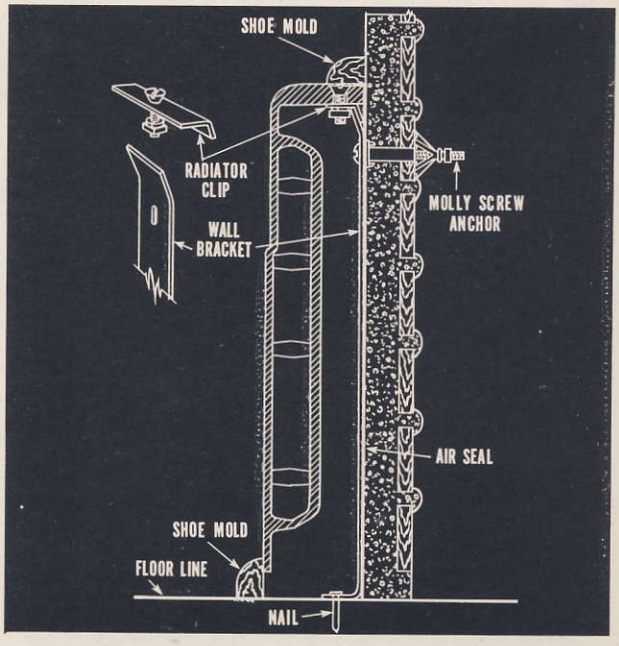


Fig. 10: *Installation details for type R Radiant Baseboard Panels.*

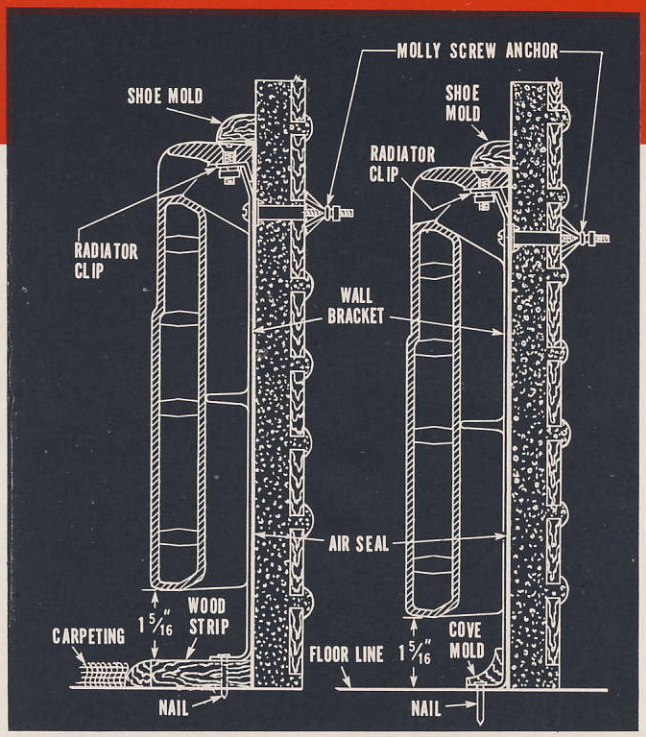


Fig. 11: *Installation details for type RC Radiant Baseboard Convector Panels.*

If one union elbow is used in the two top outlets, only one air vent is required.

If two union elbows are used connecting both the top and bottom outlets only one air vent is needed. A cast iron corner piece is available to conceal the piping and to provide a uniform appearance. See See Figures 12, 13 and 14. In this type of installation the air seal strip is carried around the corner in back of the cover plate.

The Corner Cover Plate fits snugly against both Panels and is screwed to the floor with a wood screw. Figure 9.

Finishing the Corner. The corner is finished with the same standard moldings as are used on the rest of the Panels, making mitered joints at the corner. It is necessary to fit the moldings over the cover plate. Figure 13.

If the location of the Panels is such that a standard No. 192½ union elbow cannot be used at the corner, the piping may be concealed by using Crane Wood baseboards. Where a Radiant Panel does not completely cover a wall the ends can be finished by butting Crane Wood baseboard against the end enclosures of the Panels. See Figures 14 and 15.

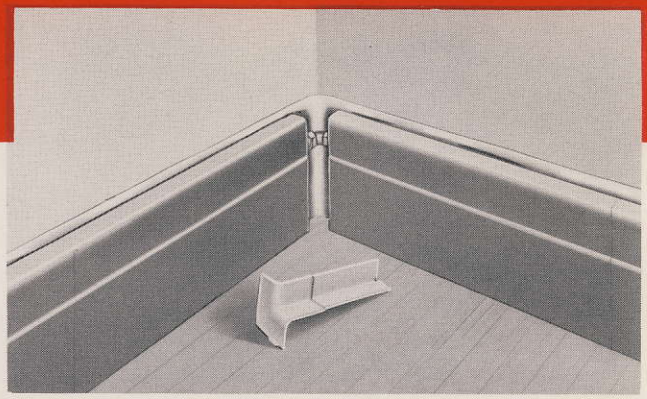


Fig. 12: *Corner installation showing air sealing strip.*

Fig. 13: *Finished corner with all moldings in place.*

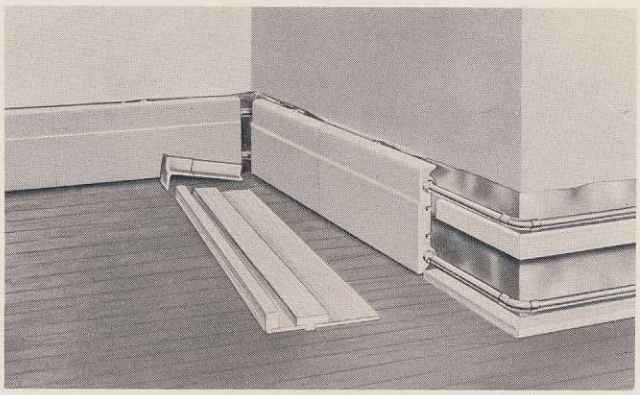


Fig. 14: *Matching wood baseboard used around corner. Note that sealing strip is recommended here, too.*

Fig. 15: *Matching wood baseboard permits continuity of appearance all around the room.*

PIPING AND CONNECTIONS

Wherever possible, piping connections to the Radiant Baseboard Panels should be made individually to each unit from the distributing mains. In many rooms this will be entirely feasible since one or, at the most, two walls will provide sufficient wall space for the required heat input. In such cases, the piping connections, union elbows or valves, will be concealed inside the special end enclosures, and the risers will run directly down through the floor.

In some rooms, the outside wall may be interrupted by doorways or fireplaces. The units may be piped individually on each side of the obstruction; or, in a forced circulation series installation, the piping may be run under the floor between the two units. Provision for draining this segment of piping must be made. In some cases, particularly on second floors, it may be desirable to connect two or more panels in series around corners or through partitions. These corner connections may be made with standard radiator union elbows or with copper tubing and solder type fittings. If tubing is used, it should be at least 3/4 in. in outside diameter. The piping around the corners may be concealed by the special cast iron corner piece or by Crane wood baseboard made to match the Radiant Baseboard Panels.

VENT VALVES

In hot water systems, air vent valves must be provided on each Panel assembly. These vent valves, No. 206 hand wheel operated, are installed in 3/4 in. x 1/8 in. bushings at the return end of the Panel and are concealed inside the special end enclosure. Venting is accomplished by removing the access door and discharging air and water into a small cup or a rag. There are automatic vents which can be used in lieu of the No. 206, and which require no attention.

SHUT-OFF VALVES

Shut-off valves for Radiant Baseboard Panels should be used only where necessary. It is felt that in living rooms, dining rooms, bathrooms and other rooms for daytime occupancy, shut-off valves are unnecessary. For bedrooms and in certain other special cases, shut-off valves may be desirable. These valves are concealed inside the special end enclosures, and extension handles are provided for operating the valves without removing the access doors. The valves, Crane No. 174½, are furnished in only one size -- 3/4 in. IPS.

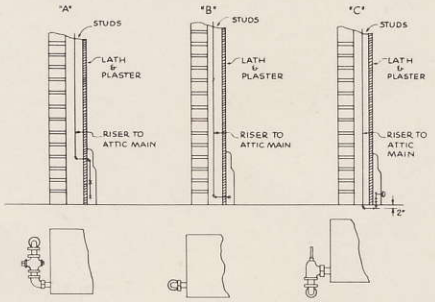
MODERNIZATION JOBS

Installations of Radiant Baseboard Panels in new buildings should present no problems different from those encountered in any radiator heating system. Piping may be concealed in the walls in the normal manner, and the Panels can be finished by the carpenter while he is installing the remainder of the base molding and trim.

However, on modernization jobs, the installation of Radiant Baseboard Panels on upper floors may be somewhat more difficult. In many cases, it may be possible to conceal risers in closets, pantries or other places where exposed piping is not objectionable. The use of series connections between two or more units will often facilitate piping. Copper tubing may be used, size at least 3/4 in. O.D., for piping around corners and in walls.

CONTROLS

The electrical control system used with CRANE Radiant Baseboard Panels is the same as for any other hot water or steam heating system. They also, of course, may be for any fuel or method of firing. There are certain precautions which should be taken, however. In addition to the usual rules for locating the room thermostat, care should be taken to place it so that it is not exposed to direct radiation from any of the Radiant Baseboard Panels.



These are the three possible connections to baseboard panel from an overhead main.

Sketch "A"

A No. 250 square head cock can be installed in a plain end enclosure and wrench furnished for cock. Cover plate will have to be opened to operate cock. Square head of cock should not face the cover plate.

Sketch "B"

192½ elbows can be used at both ends of panel. Common practice on automatically fired hot water systems is to use valves on bedroom panels only.

Sketch "C"

A two-inch deep channel can be cut in the floor and a regular No. 174½ valve used.

If a one-pipe forced hot water job is installed in a basementless house which has a concrete slab, and it is not desirable to use an overhead main, the main can be placed in concrete slab.

CRANE

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