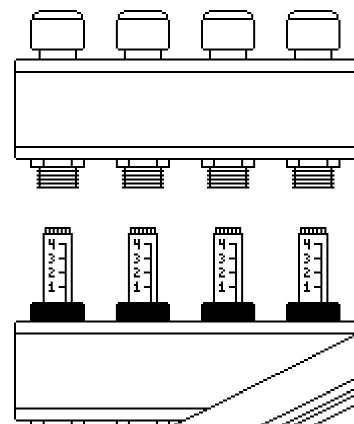
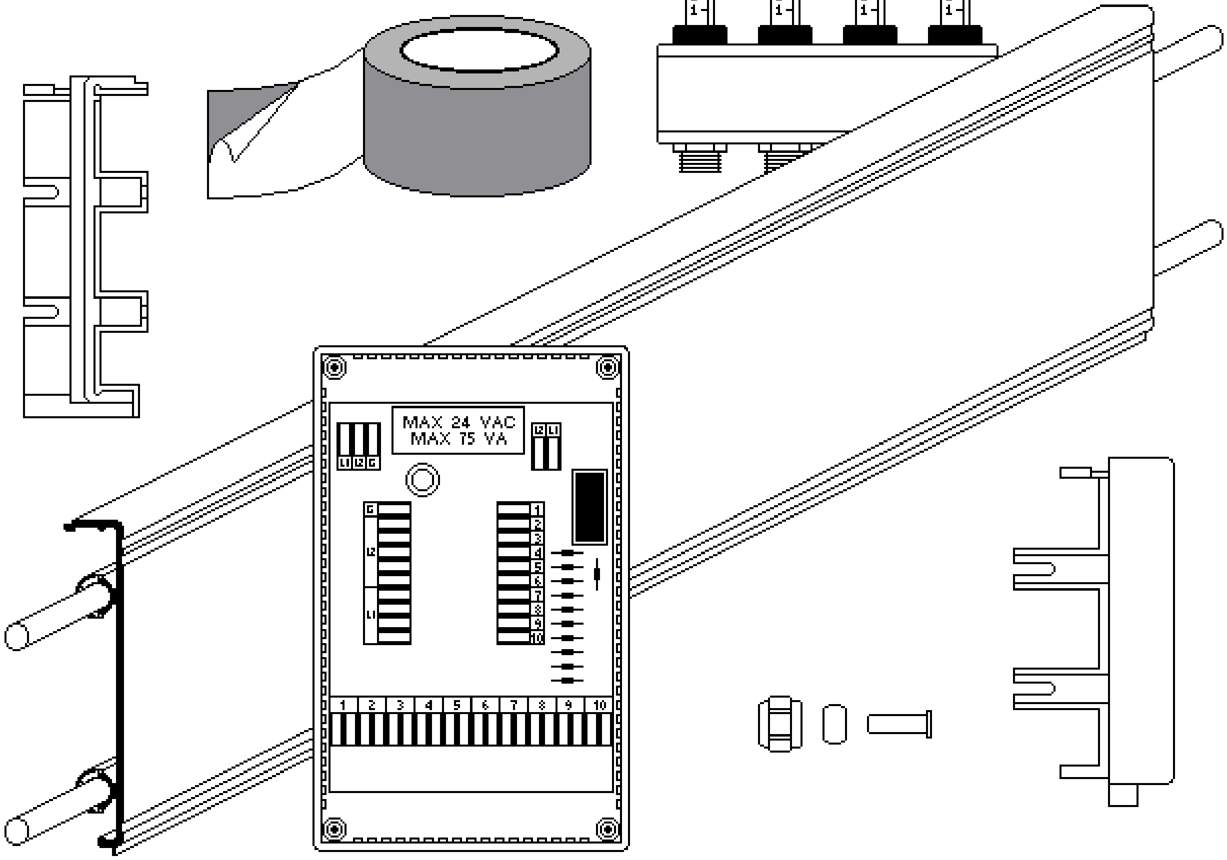
A.I.M. Radiant Heating

Slimline 2000
and Radiant Accessories





Installation Manual

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Getting Started

The first step in the successful installation of any type of heating system is to perform a heatloss calculation. A heatloss calculation determines how many BTU's (British Thermal Units) of heat a specific area looses every hour. This will dictate exactly how many linear feet of Slimline 2000 Heating Panels will be required to heat that area.

International Software Solutions has developed a Windows® based computer program specifically for A.I.M. called Heatloss Helper. This program was designed so that even someone not remotely familiar with the heating industry, would be able to perform a heatloss calculation with ease. Its extremely simple operation actually walks the user step by step through the heatloss process explaining what information needs to be inputted and where. In most areas of the program drop down windows allow the user to simply point and click to input information and many of the factors in the program can also be customized to suite the users needs.

Heatloss Helper boasts a variety of other capabilities such as the ability to input company name, address, telephone number and fax number as well as a company logo. It also data bases both customers and projects and when a heatloss is completed the program lists the calculated losses room by room and/or a project summary to assist in determining boiler size. Most importantly Heatloss Helper displays the total number of linear feet of Slimline 2000 that each room needs to heat it adequately. The system requirements are a 486-33 MHz PC with Microsoft Windows® 3.1, Word for Windows® or Windows® 95. In addition a 3.5" disk drive, 4 MB RAM, 5 MB hard disk drive space and a Mouse pointer will be needed. Heatloss Helper (part # 0152) is available direct from A.I.M.

To perform any type of heatloss calculation, the following information is a necessity;

- **Room Dimensions (length, width and height)**
- **Wall, Ceiling and Floor Insulation Values (i.e. R-11, R-30 and R-19)**
- **Window and Door Dimensions (width and height)**
- **Window and Door Insulation Values (i.e. R-2 and R-1.56)**
- **Window and Door Quantities (i.e. 4 - 3' X 5.2' Double Pane)**
- **How Many Linear and Gross Feet of Exterior Wall (i.e. if a room is 10' in length, 12' in width and 9' in height and has one 10' and one 12' wall which are exterior walls, that means there is 22 (10'+12')linear feet of exterior wall and 198 (22'x 9') gross feet of exterior wall)**
- **Outside Design Temperature (ODT is the coldest temperature a specific region would likely experience)**
- **Inside Design Temperature (IDT is the temperature needed to be maintain in a specific are at the coldest temperature)**
- **Infiltration (how much air circulates through a specific area per hour)**

All of the above information is simplified and explained further in Heatloss Helper.

Another alternative to performing a heatloss calculation is to have either your local Slimline 2000 dealer or A.I.M. Radiant Heating execute it.

After a heatloss calculation has been done the next step is selecting and sizing the system components.

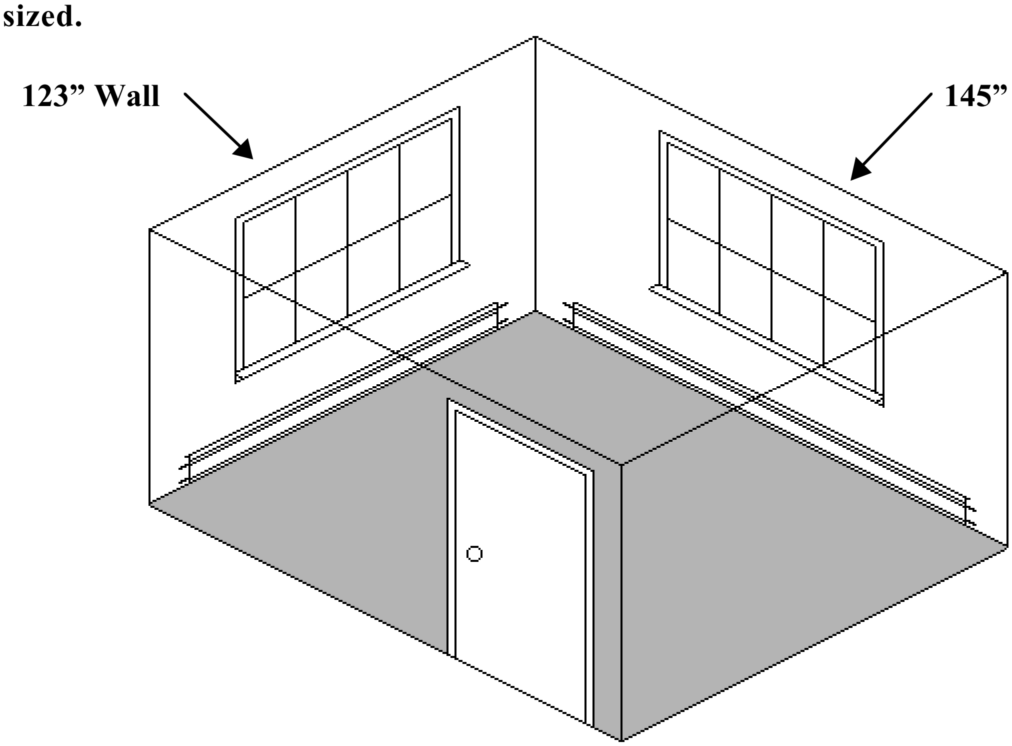
Selecting and Sizing the System Components

To determine the total number of linear feet of Slimline 2000 required to heat a specific area with a heatloss program other than Heatloss Helper use the calculation described below.

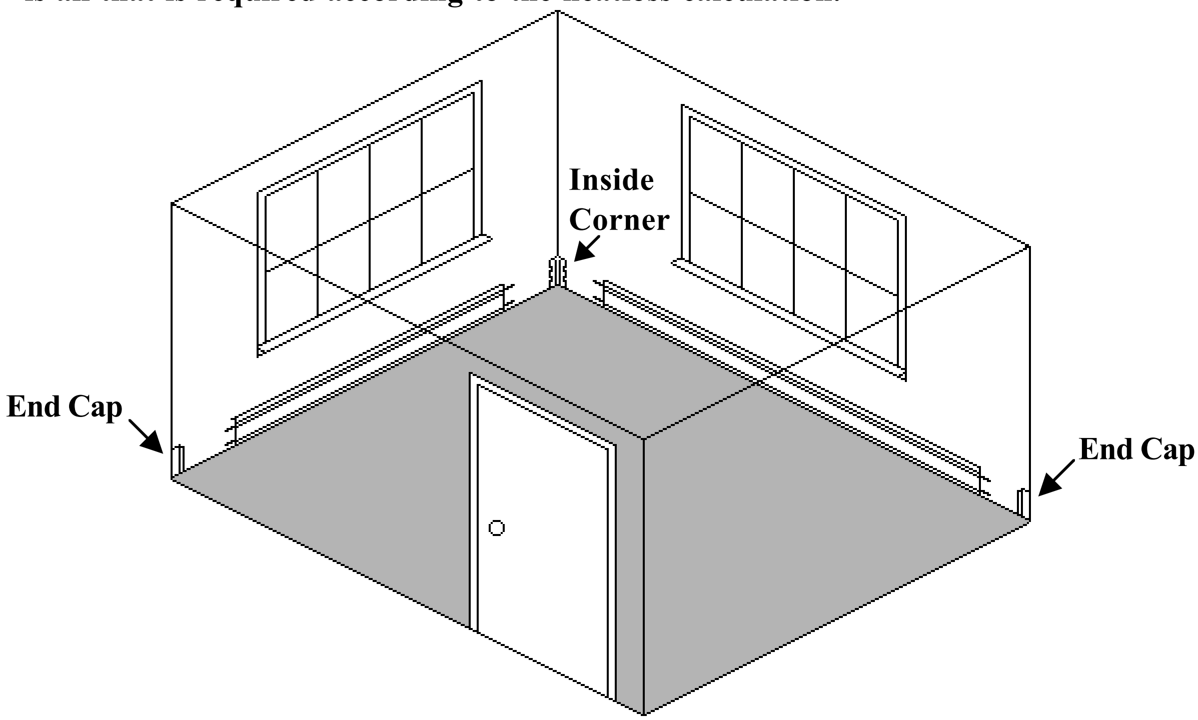
Each linear foot of Slimline 2000 with 180ºF water flowing through it at a rate of 1 gallon per minute produces 220 BTU's per hour. If example room A has a heatloss of 3680 BTU's per hour, simply divide 3680 by 220. The sum is 16.72, which is always rounded up to the next whole number in this case being 17. This means that 17 linear feet of Slimline 2000 are needed to heat example room A.

If a linear foot of Slimline 2000 has 190ºF water flowing through it at a rate of 4 gallons per minute it produces 250 BTU's per hour. If example room B has a heatloss of 3680 BTU's per hour, then divide 3680 by 250. The sum is 14.72, which is always rounded up to the next whole number in this case being 15. In this example 15 linear feet of Slimline 2000 are needed to heat example room B.

As can be seen by the examples above, water temperature and flow rate are the major factors in determining the Heating Panels' heat output. This does not mean that hotter and faster is better. The optimum temperature and flow rate to operate the system at is described in example room A 180ºF at 1 gallon per minute and that room required 17 linear feet of Slimline 2000. Given these requirements, the drawing below of the example room shows how the Heating Panels would be sized.



A minimum of 12” is required on each end of a Heating Panel for the connections. If two or more panels are connected on one wall 12” must be allowed for connections between each panel. On the 145” wall of the room above a 120” or 10’ Heating Panel (part # 0110) can be placed and 25” of Filler Panel (part # 0113) will be necessary to trim that panel. A Heating Panel up to 96” could be used on the 123” wall but an 84” or 7’ Heating Panel (part # 0107) with 39” of Filler Panel is all that is required according to the heatloss calculation.



The room above shows where the End Caps and Inside Corner would be placed. If flush mount trimming is preferred a Filler Panel Bracket can be substituted for each End Cap to eliminate the use of the End Cap. In addition, the installation of each Heating Panel will require 2 - Heating Panel Mounting Brackets, 2 - Filler Panel Mounting Brackets and 2 - Front Cover Clips. Though it is not a necessity, 286” of Reflecting Foil Tape can be placed behind the heating panels of the example room to increase the operating efficiency of the system.

In corners other than 90° use 2 - Filler Panel Mounting Brackets in place of an Inside or Outside Corner.

To trim the other walls of the room with Filler Panel rather than wood trim, simply add the total length of the other walls together and this total will equal the additional Filler Panel required. Also due to that the Filler Panel comes in 5’ sections figure 1 - Filler Panel Bracket and 1 - Front Cover Clip per 5’ length of wall. View the “Trim” section of this manual for further detail of these options.

At this point, a decision should be made as to how the system is preferred to be connected and controlled. There are numerous different ways that the system can be piped. Some of these alternatives may be less expensive in relation of material, but more labor intensive. Though the Slimline 2000 system has been designed to be connected with either PEX or copper pipe, A.I.M. strongly recommends the use of PEX due to its ease of installation and high degree of durability. All of the piping options are illustrated in the “Rough-in” section of

this manual. A.I.M. has a wide range of options such as thermostats, manifolds and zone valve operators to optimize comfort and efficiency. These controls and their purpose are explained further in this section. Please review this and the "rough-in" section of this manual at this time and decide what type of piping and control options are preferred so that they may be ordered with the other material. If after review there are still some questions, simply contact A.I.M. Radiant Heating and a representative will be glad to assist you. The A.I.M. Product Catalog may also be helpful in understanding product function and operation.

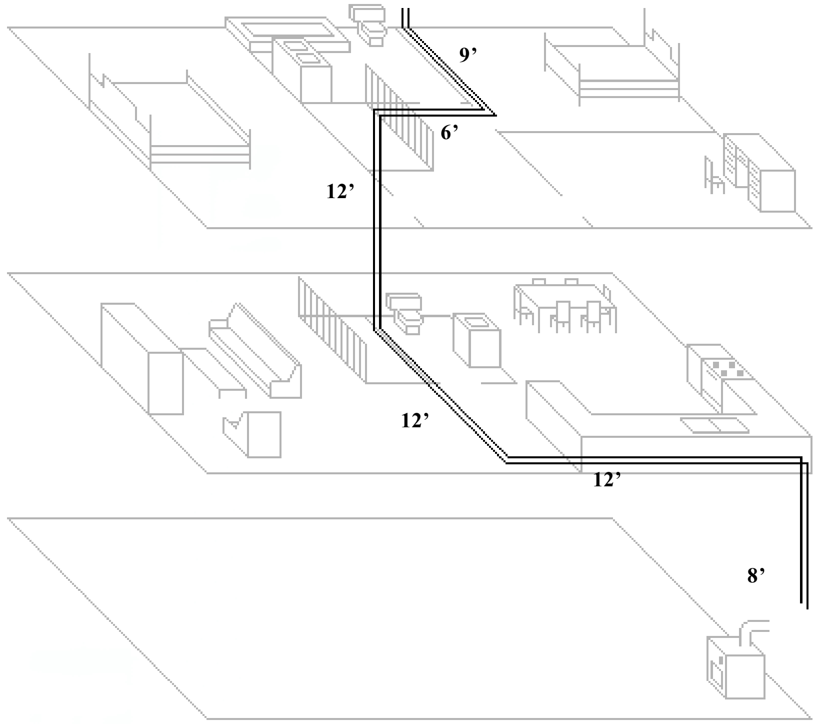
If all copper pipe is being used to connect the Heating Panels, a total of the components for the example room can now be tallied. The following will be required:

- **1 - 7 ft. Slimline 2000 Heating Panel (part # 0107)**
- **1 - 10 ft. Slimline 2000 Heating Panel (part # 0110)**
- **2 - 5 ft. Slimline 2000 Filler Panel (part # 0113)***
- **2 - Heating Panel Mounting Bracket (part # 0114)**
- **2 - Filler Panel Mounting Bracket (part # 0115)**
- **2 - Front Cover Clip (part # 0116)**
- **2 - End Cap (part # 0117)**
- **1 - Inside Corner (part # 0118)**

***Only 64" of Filler Panel is required for the example room. The additional 56" can be used to trim other rooms of the installation or the other walls of example room A.**

The list above is a basic material list and it will be added to dependent upon what options are preferred. It will be referred to at other times in this manual. For instance, as mentioned previously, the 268" of Reflecting Foil Tape (part # 0120) is optional, but if preferred, may be added to the Basic Material List.

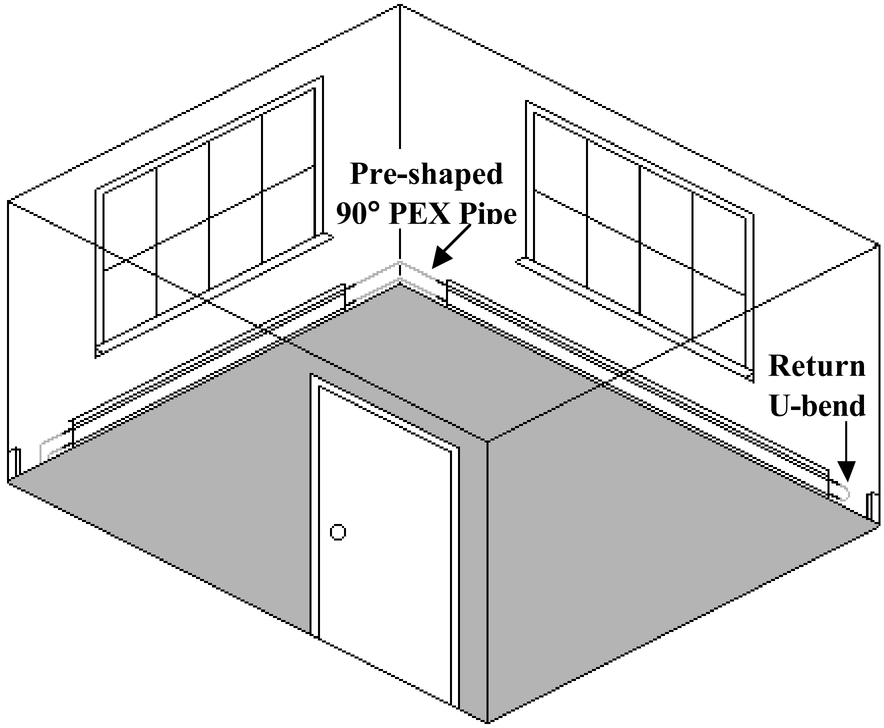
Though it may also be used for copper, the diagram below illustrates how to determine the total length PEX Pipe required to reach a specific room or zone.



When calculating the lengths of pipe, it is important to remember not to run it up through exterior walls to avoid the possibility of freeze-ups. Determine the total length of pipe needed by measuring in 90° sections until a sum is reached. The example house above indicates how the measurements should be taken. The vertical runs of pipe are calculated simply by adding two feet to the ceiling height of the room the pipe is running up through. In the example house, the ceiling height is 10’. Add 2’ to total 12’ as shown above. Once a total length of a run has been determined it must then be multiplied by two to allow for both a supply and return line to the heating system and back to the boiler room.

The total length of Pex Pipe needed for the supply and return lines in the room of example house on the previous page is 118’ (59’ x 2).

Due to the small inside diameter of the PEX Pipe, it has a high restriction of flow. Because of this the maximum length of supply and return lines combined is 120’ for PEX and 160’ for copper (with copper, each 90° copper elbow is equivalent to approximately 2 _ feet of pipe). If the total runs exceed the limits a manifold must be placed in a remote location, closer to the room such as a closet or pantry to reduce the length of pipe. Another alternative if a run is to long may be to use a larger diameter pipe for the main lines to and from a room or zone which is then reduced to either 3/8” copper or 12mm PEX before the come up through the holes in the floor.



In the example room above, the Pre-shaped 90° Pex Pipe is shown in the inside corner. These components can be used in either inside or outside corners to connect two heating panels and are extremely easy to install.

At the end of a run of heating panels, in the type of application shown, a return U-bend is made by connecting an 8" piece of PEX Pipe to the top and bottom pipe at the end of the last unit on that zone.

The connections to the heating panels from the PEX Pipe are made with a 12mm Compression Fitting coupled to a 3/8" Copper X 12mm Male Adapter. Each heating panel will require 4 of each of these fittings to connect the panels to the PEX Pipe. To determine the material required for the example room, using PEX Pipe add to the basic material list:

- **118' - 12mm PEX Pipe (part # 0122)**
- **2 - Pre-shaped 90° PEX Pipe (part # 0121)**
- **8 - 12mm Compression Fittings (part # 0124)**
- **8 - 3/8" Copper X 12mm Male Adapters (part # 0123)**

The products above are explained further in the "Connecting with PEX" section of this manual.

If added zone control is preferred, the Deluxe Manifold will deliver optimal comfort and efficiency. These units are used in place of building a manifold with copper fittings and components. They are extremely inexpensive, compact and easy to install. The manifolds include an isolation valve on the supply side and on the return side an integrated balancing valve-flow rate indicator with a locking ring so that it cannot be tampered with. To view how these manifolds are piped refer to the "Boiler Piping" section of this manual.

One Deluxe Manifold zone will accommodate a maximum of 60 linear feet of heating panel. If specific areas are preferred to be controlled independently figure one zone for each area, up to the maximum. An area which exceeds the

maximum will require an extra zone. For example the first floor of a house with the rooms listed below will require the following amounts of panels and deluxe manifold zones if each area is to be controlled independently;

- **30' of heating panel in the dining room requires 1 zone**
- **41' of heating panel in the kitchen requires 1 zone**
- **5' of heating panel in the powder room requires 1 zone**
- **63' of heating panel in the living room requires 2 zones**
- **15' of heating panel in the Entry requires 1 zone**

The total is 6 zones, meaning that a 6 zone Deluxe Manifold is required. Since the maximum size of the Deluxe Manifold is a 4 zone, two manifolds must be coupled together with a Deluxe Manifold Connector to form a 6 zone. A 2 and a 4 zone or two 3 zones can be used to create a 6 zone manifold. If two Deluxe Manifolds are to be coupled together to form a larger manifold add 2 Deluxe Manifold Connectors and the necessary additional Compression Fittings to the list below. When three are to be coupled together add 4 Deluxe Manifold Connectors and the necessary additional Compression Fittings to the list below. As can be seen two connectors and the necessary additional Compression Fittings are added for each manifold section added. An additional mounting bracket is also recommended for support in the center of manifolds with a total of 10 or more zones. Each zone will also require a 24V Zone Valve Operator for Deluxe Manifold if more than one thermostat is used to control the different zones of a manifold. These units open and close the valve on the supply side of the manifold, which allows and prohibits the water from flowing to a specific zone. The Deluxe Manifolds can also be used for balancing and isolation purposes only. In this event 1 thermostat will control an entire manifold. Repeat this process of determination for each floor or area to be zoned. When ordering keep in mind that each Deluxe Manifold requires;

- **2 - Deluxe Manifold Plugs (part # 0135) or**
- **2 - Deluxe Manifold Plugs with 1/2" Tapping (part # 0136)**
- **2 - Mounting Brackets for Deluxe Manifold (part # 0133)**
- **Appropriate quantity of 12mm Compression Fittings from PEX to Deluxe Manifold (part # 0137)***
- **Appropriate quantity of 24V Zone Valve Operators for Deluxe Manifold (if preferred) (part # 0129)**

***The amount of Deluxe Manifold zones ordered should be multiplied by 2 to determine the quantity of Compression Fittings required. Remember to indicate the size(12mm) and type (PEX to Deluxe Manifold) along with the correct quantity, when ordering Compression Fittings.**

A Control Box (part # 0128) is used as a connecting point for up to ten 24V Zone Valves and thermostats. This unit also controls the circulator relay, which turns the circulator on and off, so even though a manifold may be less than 10 zones, each manifold should have its own Control Box.

The system can be controlled with most types of 24V thermostats. However A.I.M. features extremely accurate high quality 24V Thermostats that blend well

with any decor. There is a basic 24V Thermostat (part # 0126) that can be operated independently or as a slave to the 24Hr. Set Back Thermostat (part # 0127).

The last option to consider is the Boiler Room in a Box (part # 0153). This pre-assembled series of manifolds and controls is custom designed by A.I.M. for each application and priced accordingly. All of the components are mounted in a shipping crate which is then bolted in place when it arrives at the site. Just a few simple connections and the installation is complete. Contact A.I.M. for a price quote on the Boiler Room in a Box.

After deciding which components will be used, determine the total quantity of each component and place an order with A.I.M. An order form can be found in the back of the A.I.M. Product Catalog, which may be copied and sent or faxed to A.I.M. Be sure to enclose the following information with every order;

- Company Name (if applicable)
- Contact Name
- Billing Address
- Shipping Address
- Telephone Number
- Fax Number
- Purchase Order Number (only applicable if an account has been previously established with A.I.M.)

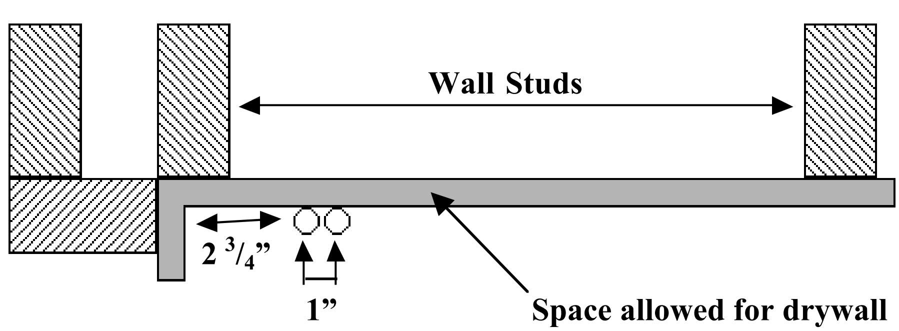
If an account has not been established with A.I.M. prior to placing an order, please contact A.I.M. at this time for deposit information.

Material will normally be shipped within two weeks of placing an order unless otherwise specified.

Rough-in

As described in section 1 there are a variety of different ways that the Slimline 2000 system can be piped, and at this time the decision should have already been made as to how. The diagrams that follow show how each type is done.

Below the diagram displays the proper distances to be maintained when the PEX Pipe or copper pipe is stubbed up through the floor. It is extremely important to follow these specifications closely to avoid problems later on in the installation.



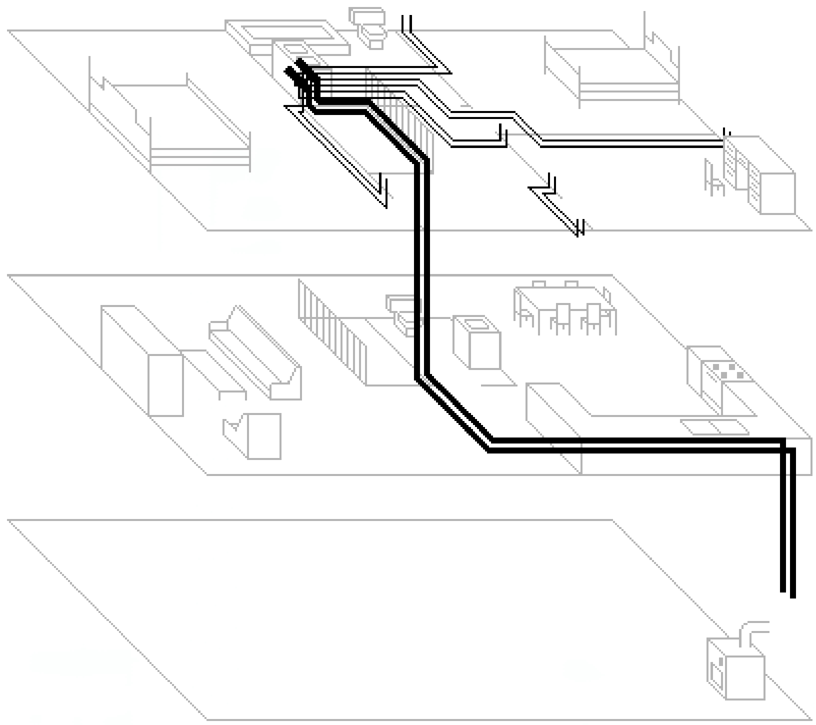
On the wall in which a zone of heat is to begin, two $^5/_8$" holes should be drilled 1" on center, 2 $^3/_4$" away from a corner or where the door trim is to be placed. There must be a space allowed for the drywall or paneling, but the holes drilled must be right against where the finish wall will be. If the holes are not placed right against the finish wall the pipes will inhibit the Filler Panel from fitting into place and this is a very difficult problem to correct. To determine how far from the stud plate (the board that is nailed to the floor in which the wall studs are nailed into) the center of the holes should be drilled through the floor, take the thickness of the drywall or paneling and add $^5/_{16}$" to that measurement. Do not ever drill any hole through the floor larger than $^5/_8$". Holes drilled through wall studs and floor joists can be larger to accommodate more than one pipe if preferred, but should be done within local code specifications.

As mentioned previously in this manual, the pipes need to be run in the most direct route to each room or zone. It is important to allow enough pipe in the room to reach the heating panel and in the boiler area to reach the location of the manifolds. At the manifold or boiler location mark all pipes clearly as to which room they run to. Doing so will make deciphering where each line needs to be connected a great deal easier, later in the installation when they are to be connected.

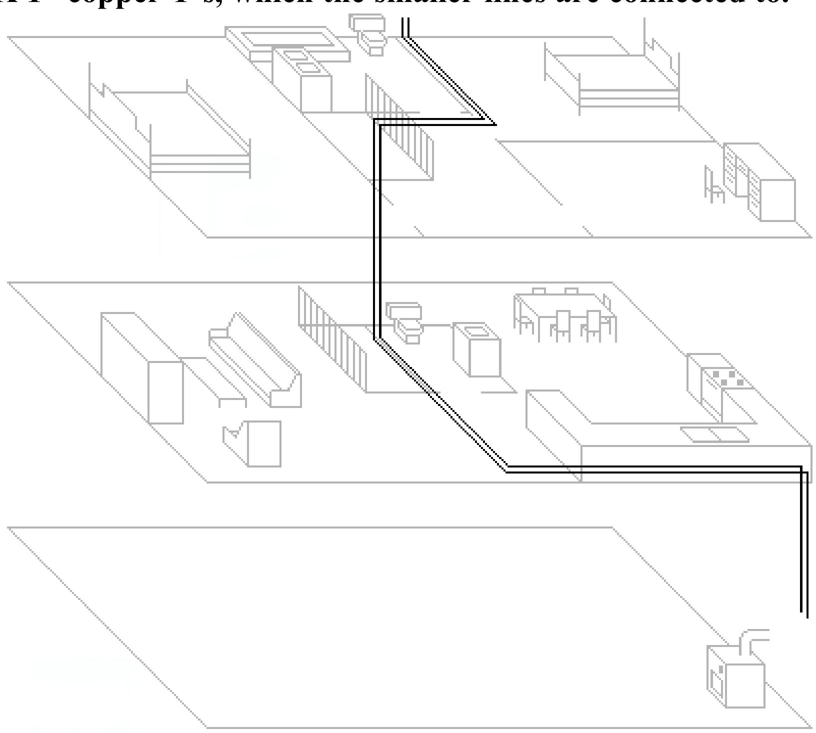
The maximum length of PEX Pipe which can be run to a room or zone is 60' each for supply and return or 120' total. The most $^3/_8$" copper pipe that can be run continuous to a room or zone is 80' each for supply and return or 160' total. Each $^3/_8$" copper 90° elbow is equivalent to approximately 2 $^1/_2$ feet of $^3/_8$" copper pipe. Keep this in mind when calculating the total length of the runs of pipe as to not exceed the pipe limits.

If the total runs exceed the limits a manifold must be placed in a remote location, closer to the room such as a closet or pantry to reduce the length of pipe. Another alternative if a run is to long may be to use a larger diameter pipe for the main lines to and from a room or zone which is then reduced to either 3/8" copper or 12mm PEX before the come up through the holes in the floor.

The following diagram illustrates how the system should be roughed if the runs of pipe exceed the limit. This type of rough-in can also be utilized to minimize the amount of tubing needed for the installation.

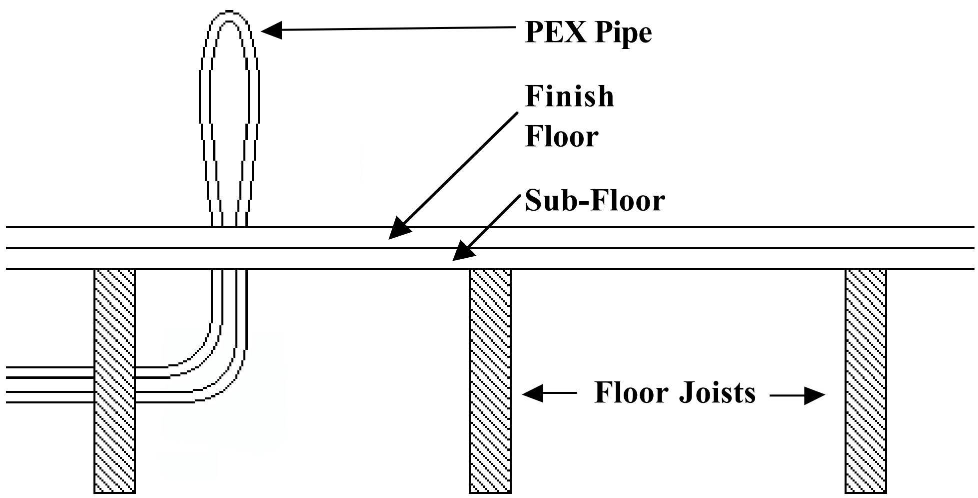


In the drawing above, the main lines are 1” copper which run up to the vanity in the bathroom. The mains are then either coupled to a manifold or series of 1” X $^3/_8$” X 1” copper T’s, which the smaller lines are connected to.

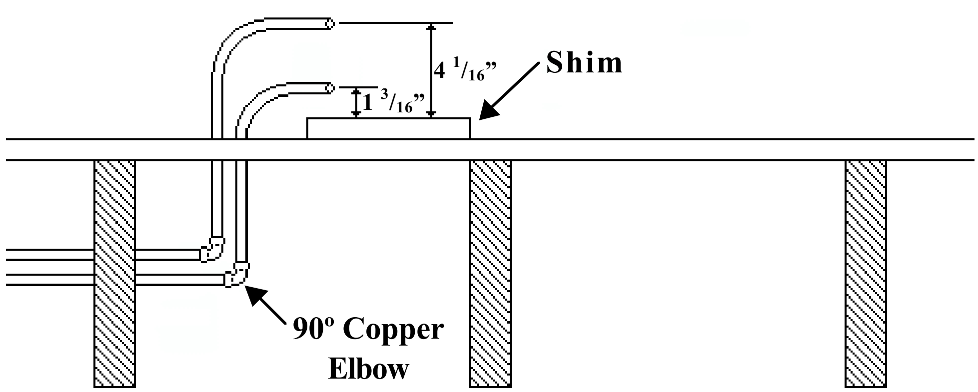


The diagram above shows how a room of a system should be piped using 12mm PEX or $^3/_8$” copper pipe to have a multi-zone system which has the capability of having each room controlled with an independent thermostat. Each additional room will also require both a supply and return line as well to complete the rough-in. In the boiler area there should be two lines for each room on the

system. When roughing PEX in this type of system run one end of the pipe from the room down to the boiler or manifold (wherever the pipe will be connected). <u>Don't cut the pipe yet.</u> The PEX Pipe has measurements on it. Use these measurements to determine how much pipe the first run required. Now pull that same amount off the coil and cut the pipe, making sure there is enough to reach. Then take that line and run it down to boiler or manifold. The object is to have one continuous pipe so that when the ends of the line are connected at the boiler or manifold, additional fittings will not be necessary to cap the other ends of the pipe above the floor for the pressure test. The drawing below illustrates how the PEX lines should look when installed correctly.

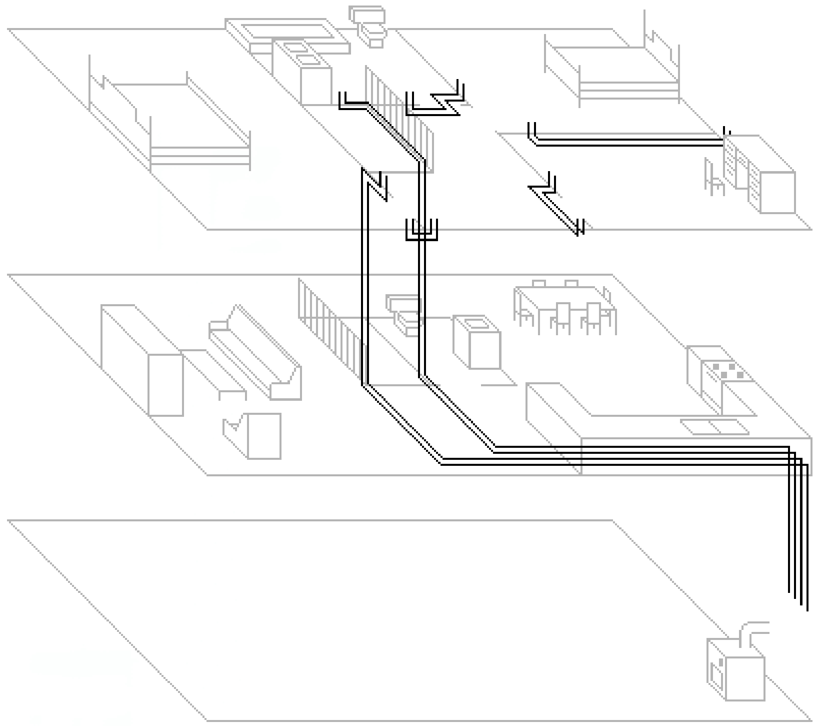


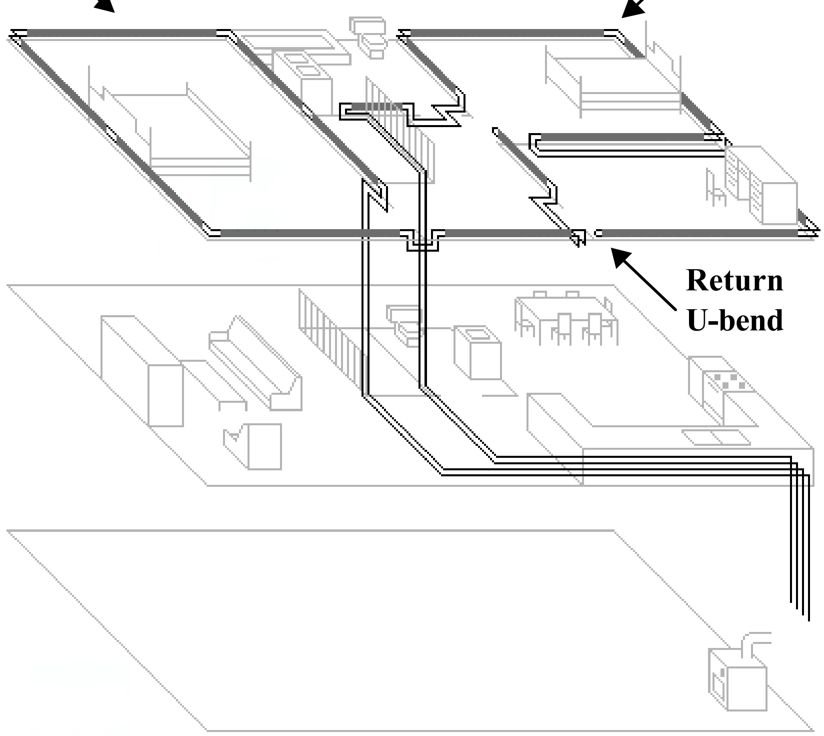
The drawing below illustrates how the 3/8" copper pipe should be installed for the type of installation described on the previous page. As shown the copper lines, above floor level, must be bent with a pipe bender rather than using a 90° elbow. If 90° elbows are used the Filler Panel will not fit properly in place. The measurement from the finish floor to the center of the bottom pipe should be 1 $^{3}/_{16}$" and 4 $^{1}/_{16}$" to the center of the top pipe. If the finish floor has not yet been installed, use a shim block which is the thickness of the finish floor for measuring purposes.



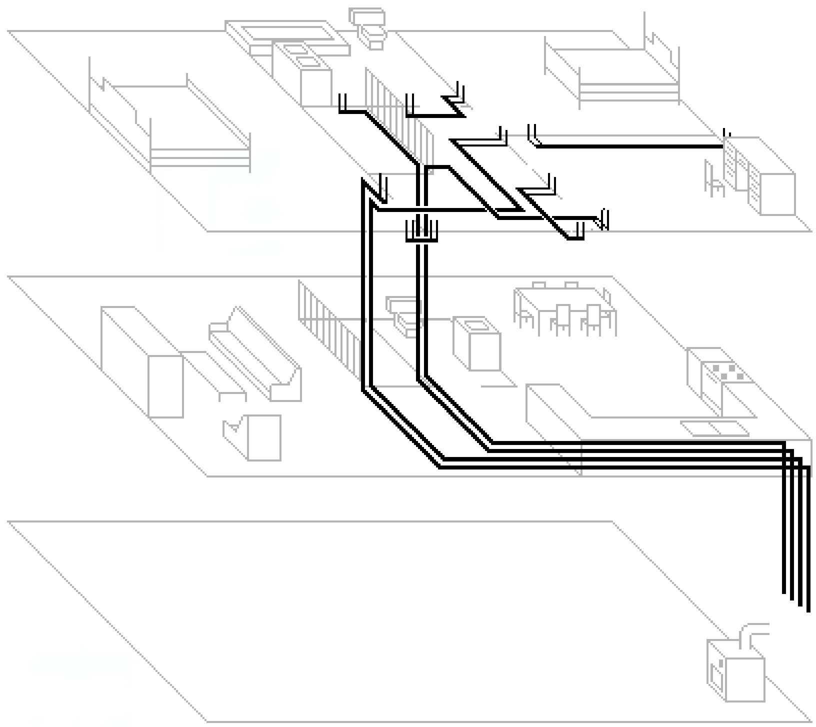
The diagram below shows how a house should be roughed-in with 12mm PEX or 3/8" copper if the maximum amount of heating panels are preferred to be

operated on each zone. In this example, 2 thermostats on the top floor would be the maximum possible. All the lines shown in the drawing that are not completely vertical are running between the floor joists.

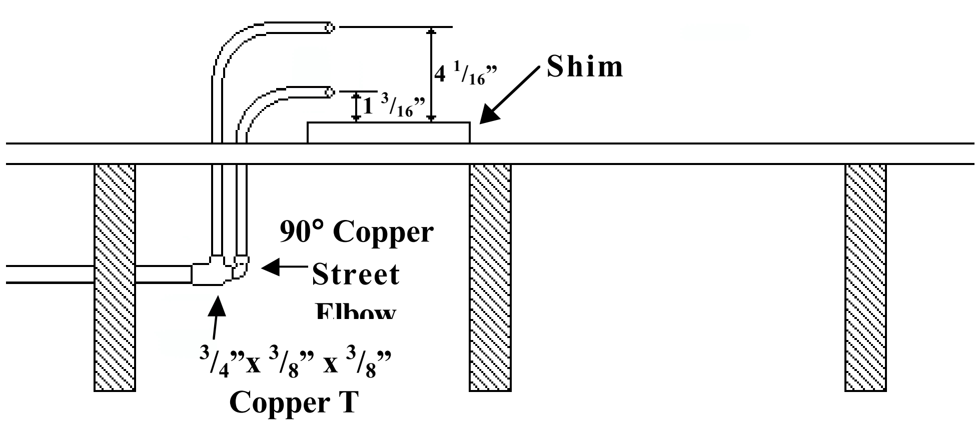




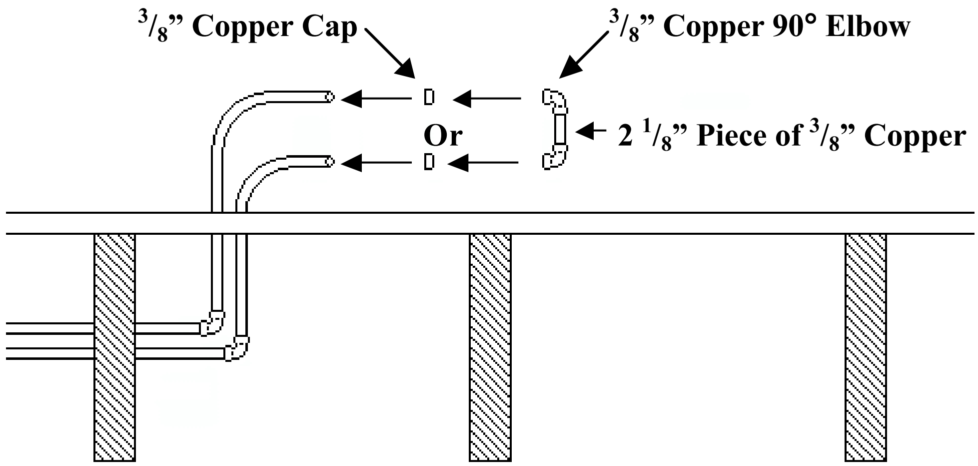
The diagram above is illustrated with the Slimline 2000 Heating Panels installed, to better understand the reasoning behind the piping layout. Notice that at the end of each run of heat there is a return U-bend. Conventional heating systems supply on one end and return on the other end. Slimline 2000 can be piped either way, but A.I.M. does recommend piping with the return U-bends. However, if conventional piping is still preferred review the diagram below for instruction.



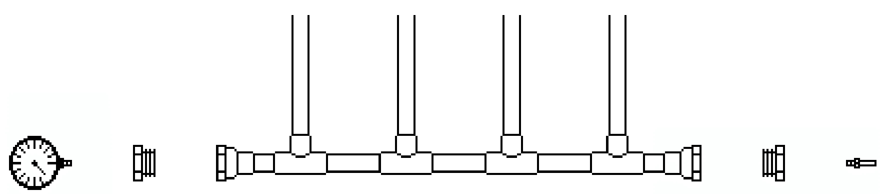
The main lines shown on the previous diagram are $^{3}/_{4}$" copper, which are each then reduced to two $^{3}/_{8}$" copper lines just before they are connected to the heating panels. Again it is extremely important to reduce the main lines to $^{3}/_{8}$" before they come up through the floor, that is the maximum size of pipe that may be utilized. Any larger size pipe used above the floor level will inhibit the Filler Panel from being used. The following drawing illustrates how a system should be piped as described above.



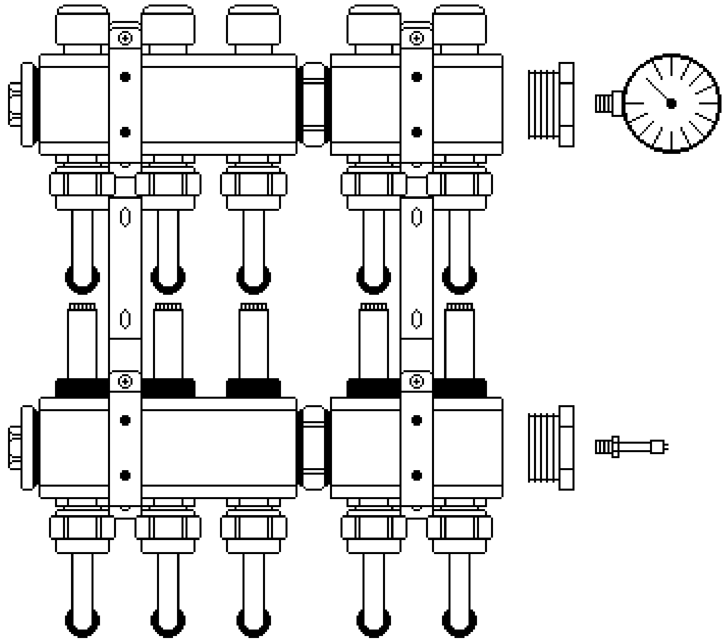
The final stage of the rough-in is to pressure test the supply and return lines that have been installed, before the drywall or paneling is set in place. If installed properly the PEX pipes should not need to be capped. The copper lines however, will need to be capped to perform the pressure test. This is done by sweating a $^3/_8$" copper cap to each of the copper pipes coming up through the floor. If $^3/_8$" copper caps are not available two copper 90°elbows and a 2 $^1/_8$" piece of $^3/_8$" copper pipe can be used in place. The diagram below shows how this is done.



Once all of the pipes above the floor have been capped, determine if there is enough time before the drywall or paneling is installed to complete the next phase of the installation which is piping the boiler. If there is, proceed to that section of the manual and continue with the installation. If there is not enough time, basic connections should be made at this time in the boiler room or at the manifold. The following drawings illustrate how to make these connections.



As can be seen in the drawing above all of the $^3/_4$" copper pipes in the boiler room have been joined using $^3/_4$" copper T's. At each end there is a $^3/_4$" copper X female adapter. Into one adapter there is a $^3/_4$" X $^1/_4$" reducing bushing to accept a $^1/_4$" pressure gauge and into the other adapter there is a $^3/_4$" X $^1/_8$" reducing bushing to accept a snifter valve. If using manifolds, refer to the Manifold section of this manual for assembly and mounting instructions. Then return to this section and refer to the following diagram for further information on pressure testing.



Once the manifold has been mounted to the wall and all of the pipes have been connected to it, as indicated in the manifold section, the fittings above can be installed. Into the supply manifold there is a 1" X $^{1}/_{4}$" reducing bushing to accept a $^{1}/_{4}$" pressure gauge and into the return manifold there is a 1" X $^{1}/_{8}$" reducing bushing to accept a snifter valve. These fittings should installed using Teflon tape only. Make sure all of the valves are open on the manifold.

Now, pressurize either system to 50 p.s.i. (pounds per square inch) and see if the system maintains pressure. If the pressure begins to drop, spray the fittings with a mixture of 1 part dish soap to 10 parts water. If bubbles begin to form on a fitting, it must be repaired. When all the leaks have been repaired and the system has held 50 p.s.i. for at least 24 hours, the drywall or paneling can be installed.

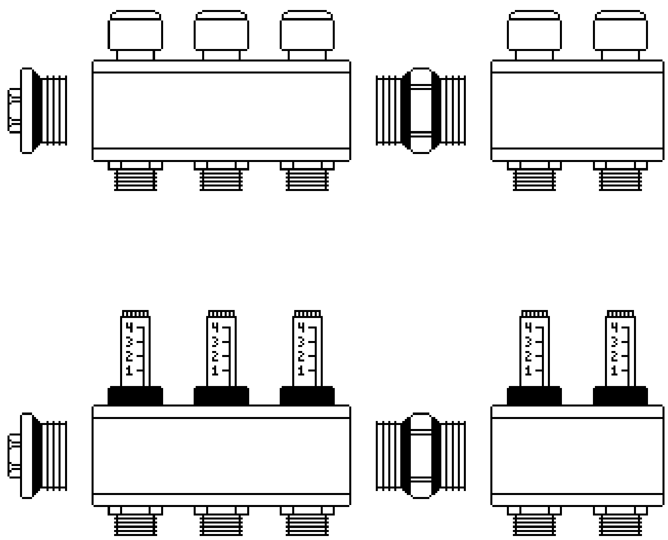
Where to Place Thermostat Wires

At some point in the rough-in phase of the installation thermostat wires must be installed. An 18 gauge 5 conductor thermostat wire is recommended. The wire should be placed on an interior wall, directly next to a wall stud and at 5' in height. The wire should be run from the room where the thermostat is to be located to the location of that rooms manifold. There should be ample wire allowed to reach the manifold, because this is where the Control Box will be placed and that is where the wire will be connected. If a manifold is to be placed in a remote location a thermostat wire must be run from that location to the area which the boiler is to be placed, allowing ample slack (approximately 10'). This thermostat wire must be at least a 5 conductor wire. Be sure to mark each wire as to where it is running from.

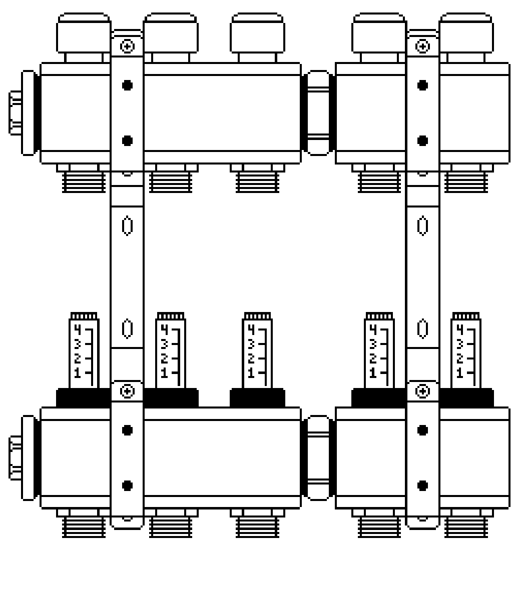
Installing the Manifolds

If Deluxe Manifolds are being used, the following procedures should be observed.

First, assemble the manifold as shown below. Screw the Deluxe Manifold Plug into one of the supply manifold sections hand tight plus a half turn. Then, if one is needed, screw the Deluxe Manifold Connector into the other end of the supply manifold hand tight. Now screw the other supply manifold section onto the connector, hand tight, until the tops are even. Repeat these processes with the return manifolds.



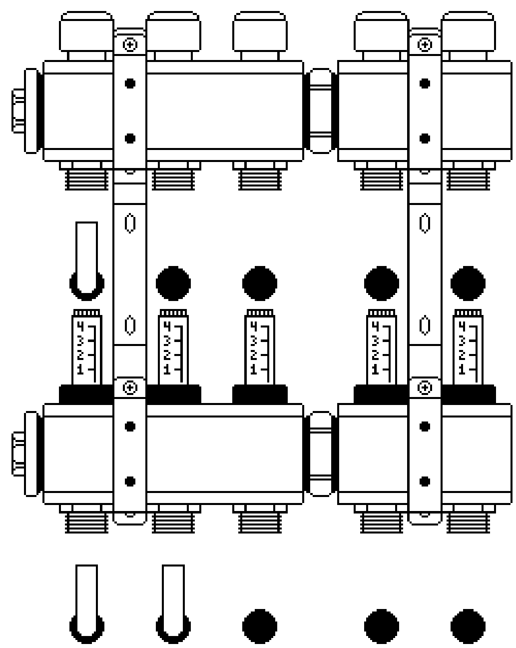
Once the manifold sections have been connected the Mounting Brackets for Deluxe Manifold can be installed. As shown below, the mounting brackets should be placed one zone in from each end of the assembled sections. Be sure the brackets are installed so that the return manifold is on the bottom and being held further away from the wall.



Now, determine a location to place the manifold. Mount a piece of plywood, which is approximately 12” larger than the manifold in both length and height, on

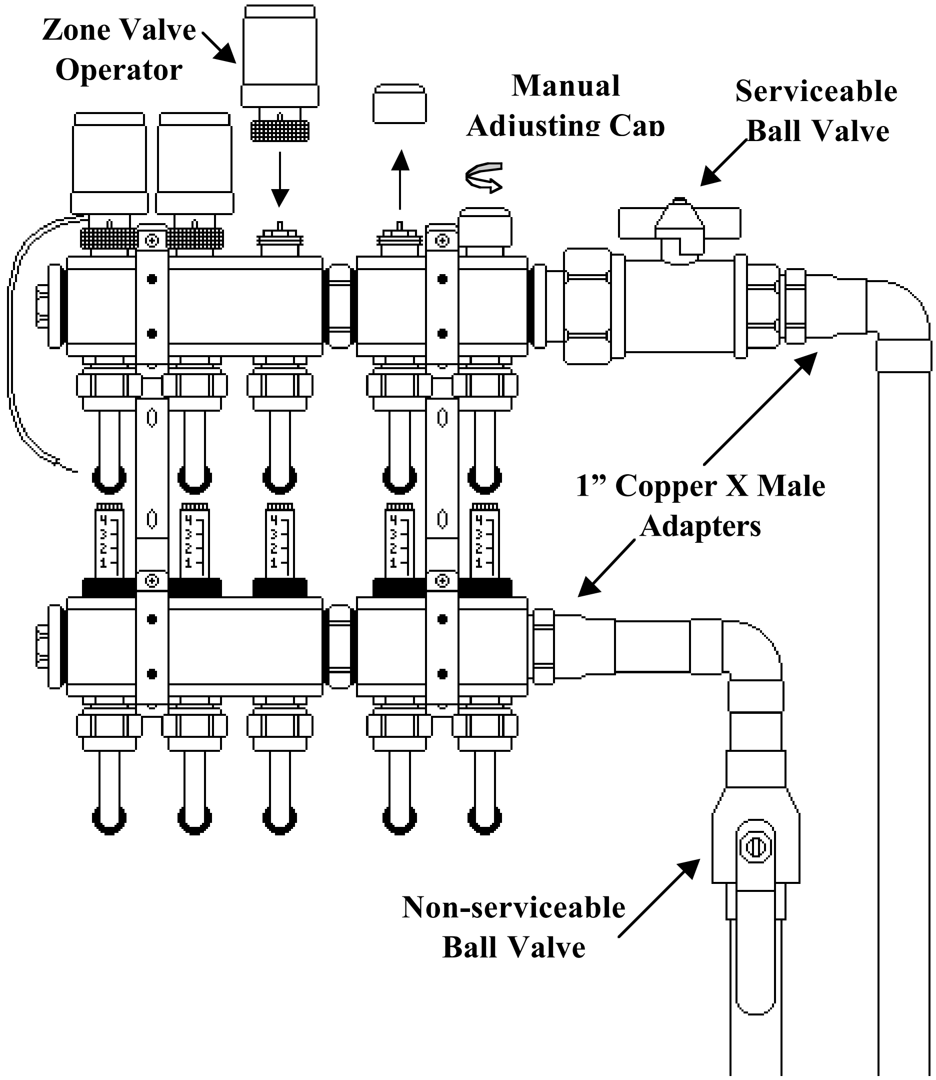
the wall studs in that location. If multiple manifolds will be used in one location, such as the boiler room, one large piece of plywood can be used. Determine where the top of the manifold should be and make a mark there. Be sure to allow an additional 4" on the top of the manifold if 24V Zone Valve Operators are being used. Place a level on the mark and draw a line. Hold the manifold assembly up to the line and screw it to the plywood. Make sure the screws do not poke through the back of the plywood, because that is where the tubing will be run and the screw tips could damage it.

Once the manifold has been screwed in place the holes need to be drilled for the pipes. Begin by drilling a $^3/_4$" hole directly above each of the Flow Rate indicators on the return manifold. <u>Make sure there are no pipes located behind where the holes will be drilled.</u> Then drill a $^3/_4$" hole, 4" and directly under each return manifold zone. After all of the holes have been drilled, insert the pipes for that manifold through them. Be sure that the supply pipes are through the top holes and the return pipes through the bottom. Most importantly, the pipe directly above and below each other must be from the same room or area.



When all of the pipes are through their proper holes, the compression fittings need to be installed.

Begin by pushing the nut and ring over the PEX pipe, in that order, and then sliding in the insert. Then gently bend the pipe upward, making sure not to kink it, and slip the insert into the bottom of the manifold. Be sure not to damage the
O-ring on the insert when sliding it in place. Holding the pipe up into the manifold slide the ring and nut up to the threads and tighten the nut a much as possible by hand. Then using a wrench secure the nut, but do not over tighten it. Repeat, until all of the pipes are connected. The following diagram illustrates the compression fittings installed as well as the installation of the 24V Zone Valve Operators and the copper pipe.



As shown above the Manual Adjusting Caps on the supply manifold are unscrewed and removed. Then screw the 24V Zone Valve Operators on to the manifold, in place of the caps applying a slight downward pressure to the top of the operator. Only tighten the operator hand tight, <u>do not use a wrench</u>.

Also shown in the above illustration, is how to pipe the manifolds with copper pipe from the boiler. The “Piping the Boiler” section of the manual depicts exactly where each component is located. One of the components shown in those diagrams is the ball valve. In the drawing above, the ball valve on the return manifold (bottom) is one which is soldered in place. The ball valve on the supply manifold (top) is self-sealing into the manifold and highly recommended by A.I.M. due to that it allows the manifold to be disconnected from the copper pipe in a matter of seconds.

The 1” Copper X Male adapters shown above must be assembled with Loctite 262 and Loctite Primer only. <u>If these connections are made with plumbers tape or pipe dope they will leak.</u>

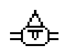
Boiler Layout and Piping

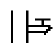
As mentioned earlier in this manual, the boiler piping should be done while the drywall is being installed. This will allow all of the labor to be completed consecutively.

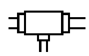
The layouts shown in this section should be used as a guide. Pipe size, component types, and quantity of zones will vary per system. Pressure drop calculations should be performed to determine the proper pipe sizes.

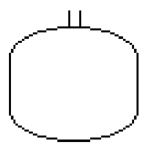
There are many different types of components which will be shown in this section. These components are shown below with a description of what they are.

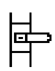
 **-------- Flow Check Valve**

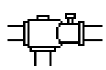
 **-------- Automatic Fill Valve**

 **-------- Boiler Drain**

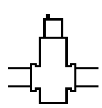
 **-------- Back Flow Preventer**

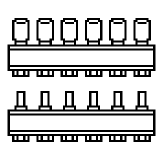
 **-------- Expansion Tank**

 **-------- Ball Valve**

 **-------- Tempering Valve**

 **-------- Circulator**

 **-------- Micro-Bubble Eliminator**

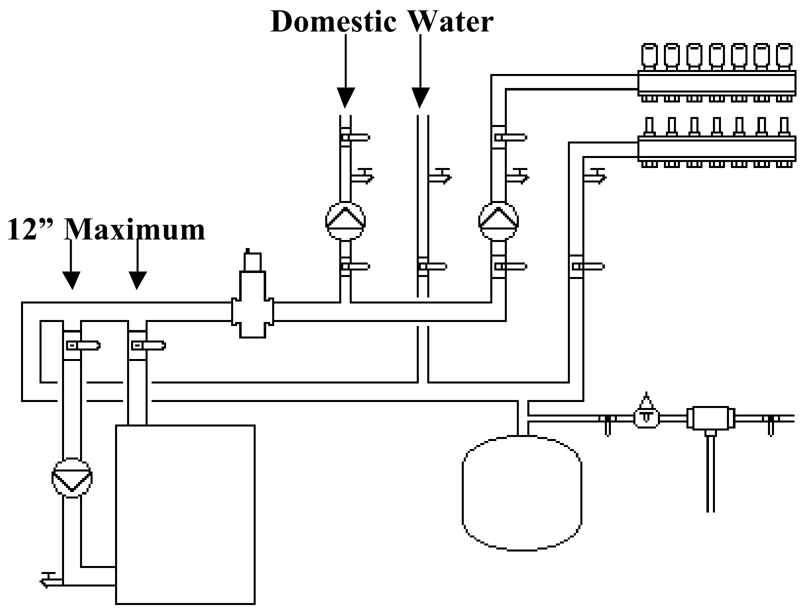
 **-------- Manifold**

It is important to become familiar with the components shown above to ensure that they are all placed in their proper location.

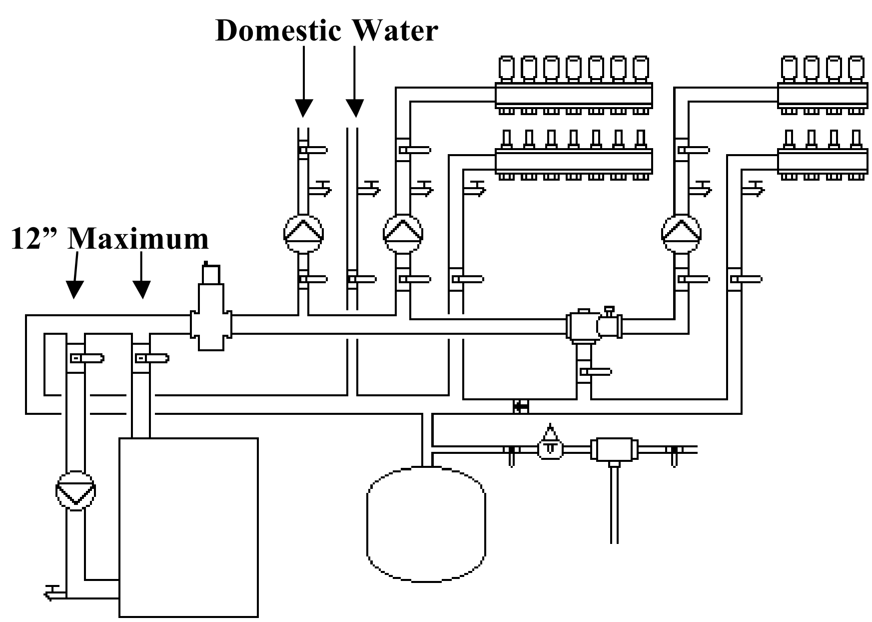
The first diagram shown depicts a basic system with Slimline 2000 Radiant Baseboard and piping for an external domestic hot water tank.

It is very important that the pipe length, from the center of the boiler return pipe to the center of the boiler supply pipe, does not exceed 12”. This will apply to all of the piping diagrams in this section.

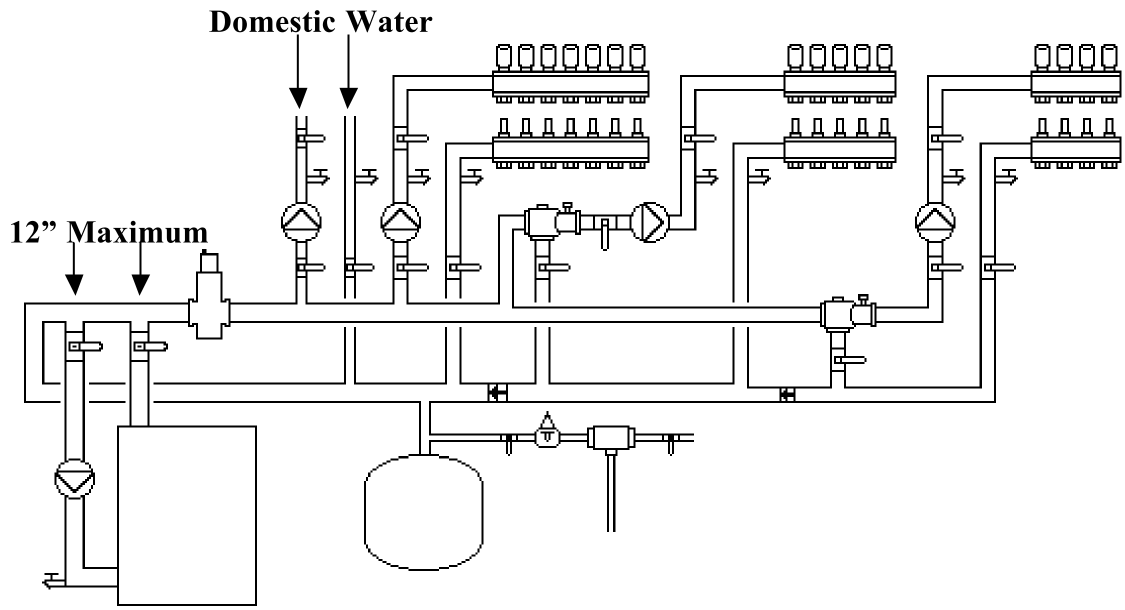
If Manifolds are used without Zone Valve Operators, an A.I.M. representative should be consulted for piping alterations.



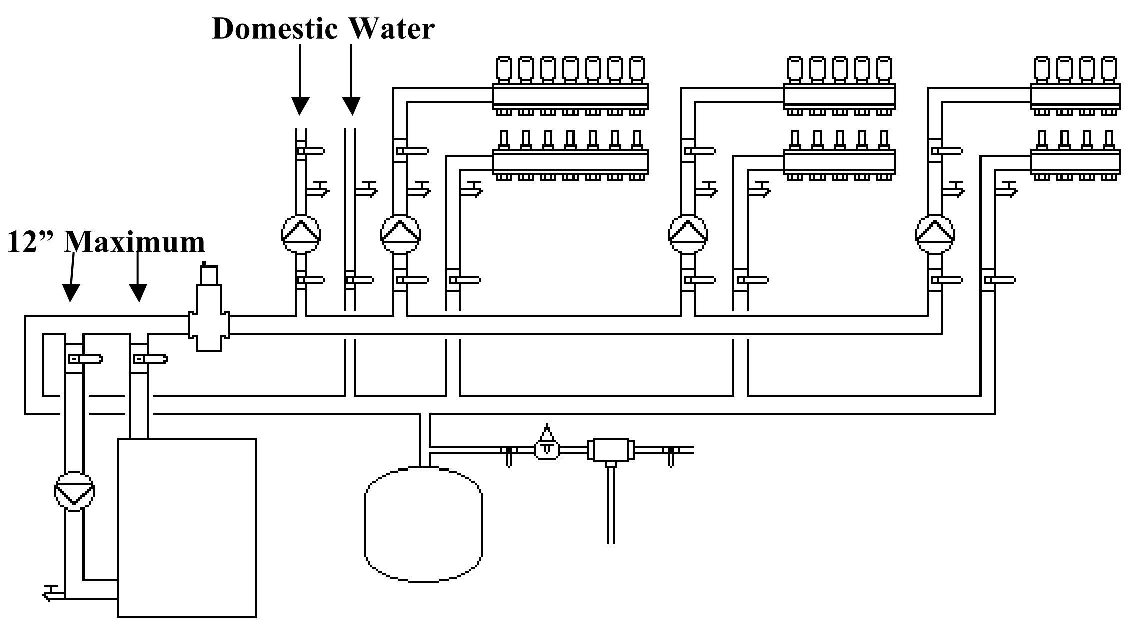
The next illustration is of a system that consists of Slimline 2000 Radiant Baseboard and piping for an external domestic hot water tank and a one temperature radiant floor system.



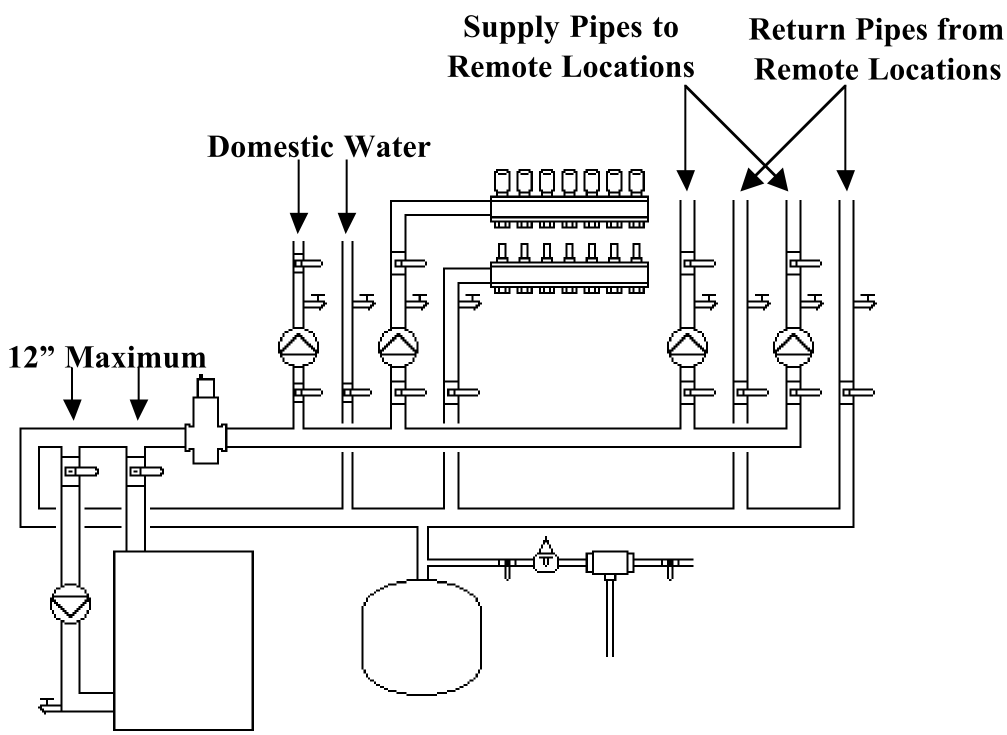
The next drawing is of a system that consists of Slimline 2000 Radiant Baseboard and piping for an external domestic hot water tank and a two temperature radiant floor system.



If a system is to be solely Slimline 2000 Radiant Baseboard it can be broken up so that each manifold handles a floor or section of a house. The illustration below shows how this type of system should be piped.

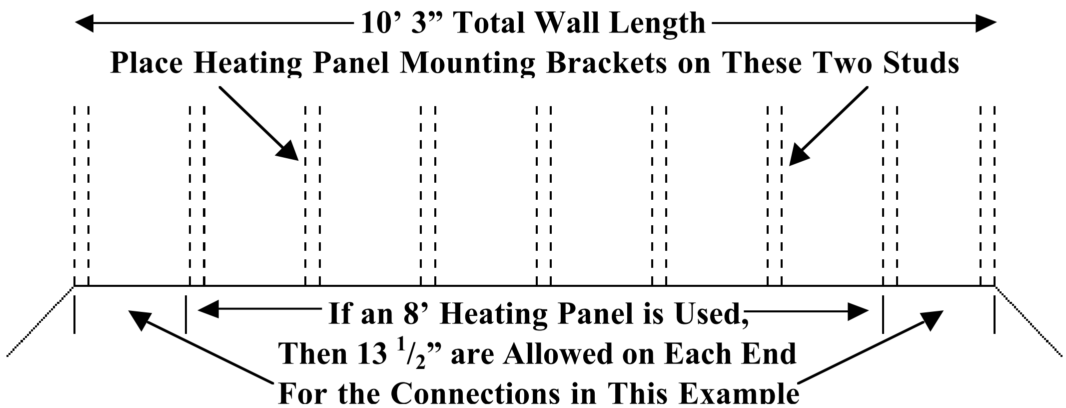


If a system is to be set up as in the previous illustration, but the manifolds are to be located in remote locations, pipe the system as follows.

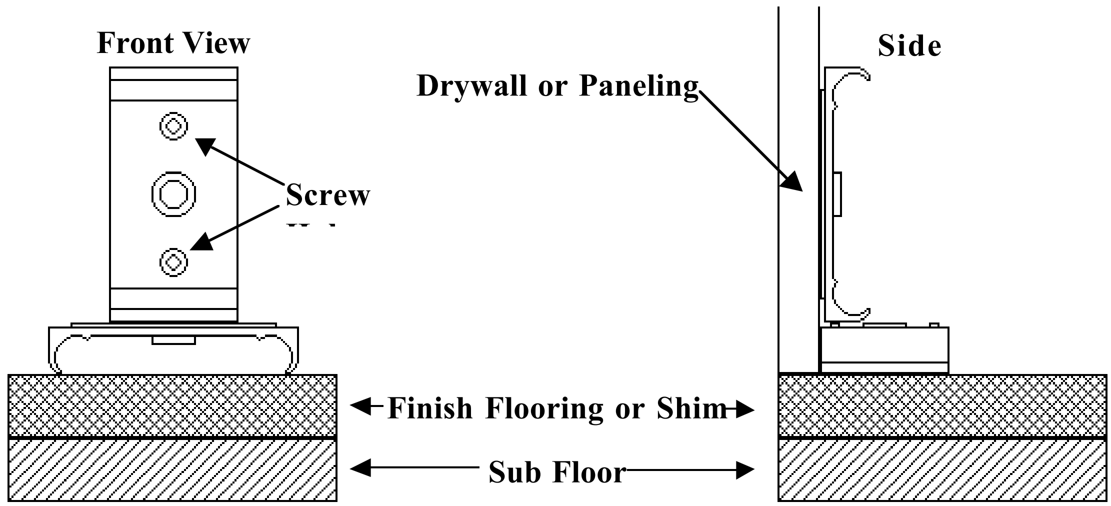


<u>Mounting Slimline 2000 Heating Panels</u>

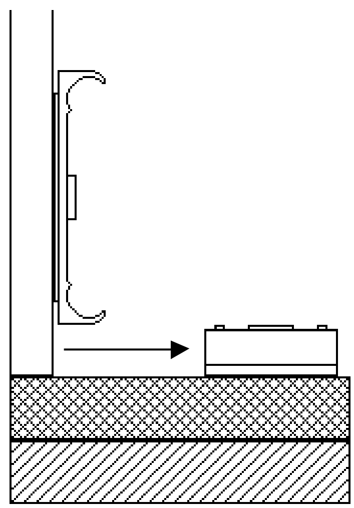
The mounting of the heating panels is relatively simple due to the fact that no panel, regardless of size, will require more than two Heating Panel Mounting Brackets. If more than two brackets are used noise will occur when the heating panels are expanding and contracting. To install the Heating Panel Mounting Bracket it must first be determined where the brackets are to be placed. The brackets should each be located between 6 and 12 inches in from the ends of the heating panel on a wall stud. If there is no stud in the area where the bracket needs to be, wall anchors, shown on page___, may be used to secure the bracket to the wall. In rooms that have paneling, it is not important to place the Heating Panel Mounting Bracket on a stud or to use wall anchors. The paneling is support enough for the screws that are holding brackets in place. Below the drawing illustrates where to locate the brackets in the event that is still unclear.



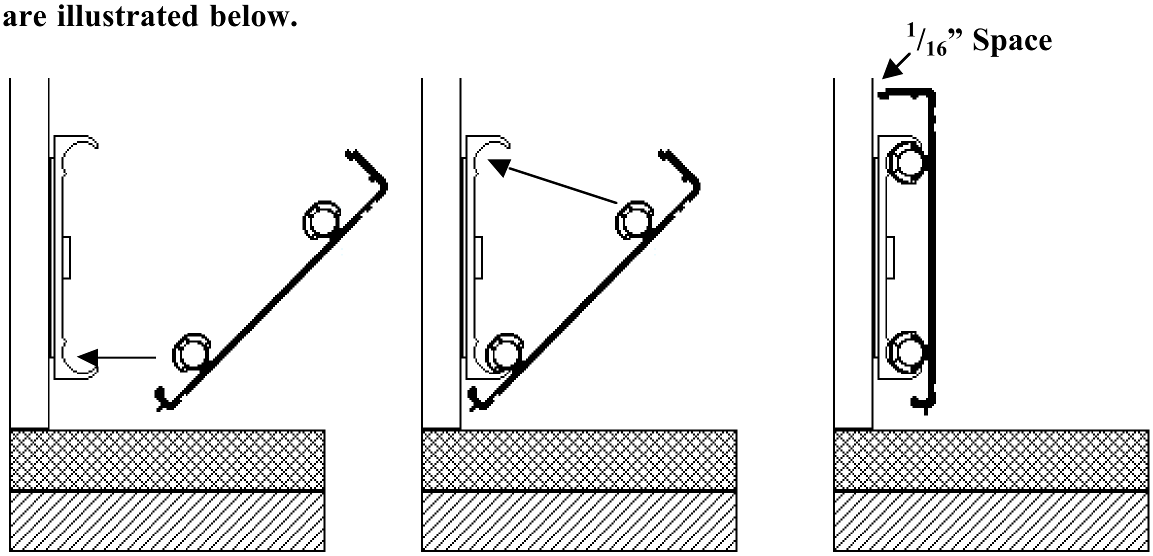
To mount the Heating Panel Mounting Brackets, lay one bracket down on the floor against the finish wall with the back facing up. If the finish flooring is not yet in place, a shim block which is the thickness of the finish flooring must be placed under the bracket. Next, place another bracket on top of the first with the back up against the wall. Now secure the bracket to the wall using two 2" drywall screws placed in the center of the two screw holes. It is extremely important not to over tighten the screws. They should be snug but not so tight that they compress or bow the drywall or paneling.



After the Heating Panel Mounting Bracket has been screwed in place the bottom bracket is removed and used as a spacer for the next mounting bracket.



When the second bracket is set in place the spacer bracket is again removed, and at this time the panel can be mounted to the wall by following the three steps which are illustrated below.



Step 1

Holding the Slimline 2000 Heating Panel at a slight angle, place the bottom pipe of the panel into the lower channels of the two Heating Panel Mounting Brackets.

Step 2

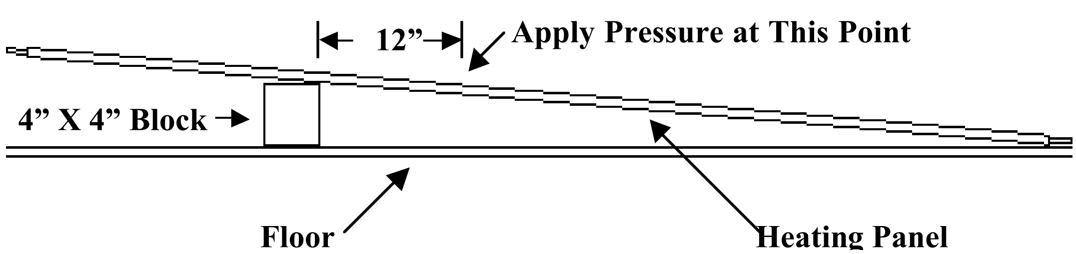
Applying a slight downward pressure, swing the Slimline 2000 Heating Panel in towards the wall until it snaps into the upper channels of the mounting brackets.

Step 3

Once properly in place, center the panel on the wall so the space on each end is equal. There must be a $^{1}/_{16}$" space sustained between the entire length of the wall and the panel.

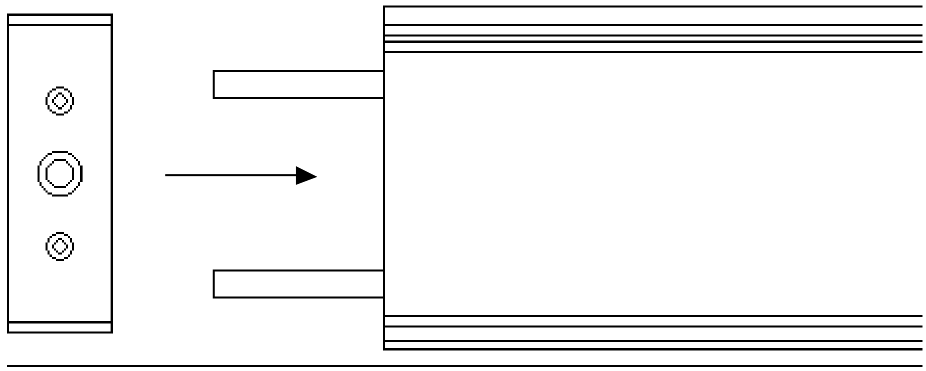
The $^{1}/_{16}$" space specified on the previous page is extremely important. If the heating panel touches the wall at any point it will make noise when the unit is expanding and contracting. The plastic clips which are factory installed on the back of the heating panels are designed to hold the copper pipe in place and the panel away from the wall. However, they are placed approximately 12" apart allowing the possibility of panel coming in contact with the wall in between each clip. In this event, simply remove the panel from the mounting brackets and slide the clip closest to where the panel is touching the wall to the point that the panel is in contact. After which the panel can be returned to the mounting brackets.

If there is an area in which the heating panel is to far away from the wall, it may be bent to contour it to the shape of the wall. To do this place a 4" X 4" block approximately 12" away from the contour point and with hands, apply downward pressure to that point. Take care not to scratch the panel.

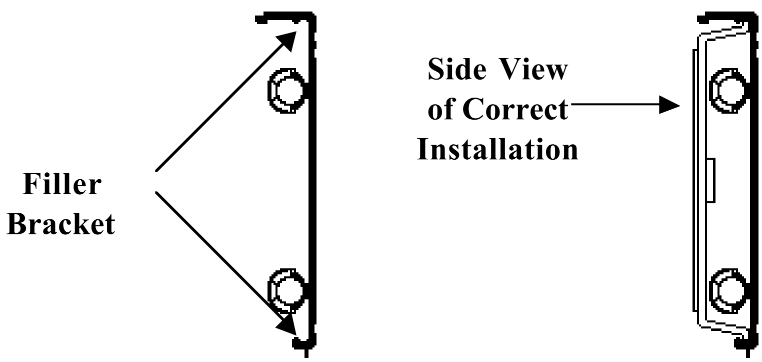


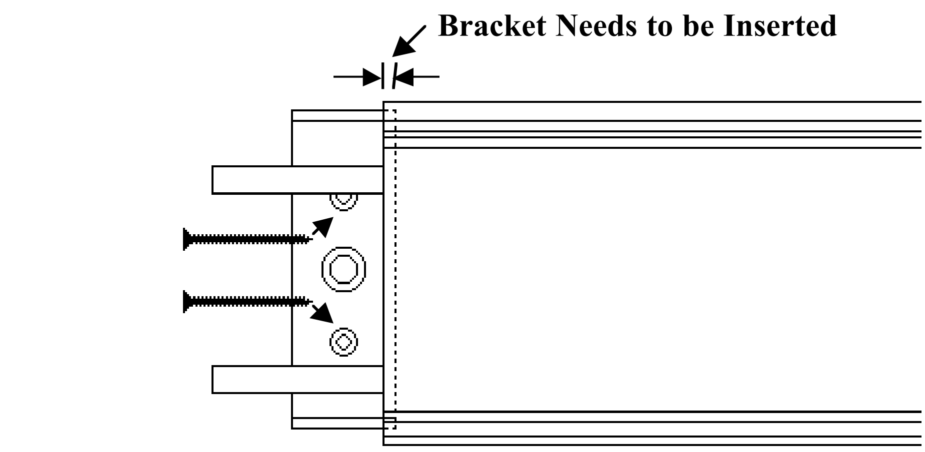
In some instances the space between the wall and the panel may be to extreme to contour the panel to. If this is the case, a trim molding may be used above Slimline 2000 to cover the gap. The trim molding will also help the heating panels to appear even more as baseboard molding. Installation of the trim molding above the heating panels is explained on pages 53 and 54.

After the panel has been snapped into the mounting brackets and the adjustments have been made, the Filler Panel Mounting Brackets need to be installed. The steps below indicate the installation process for this component.

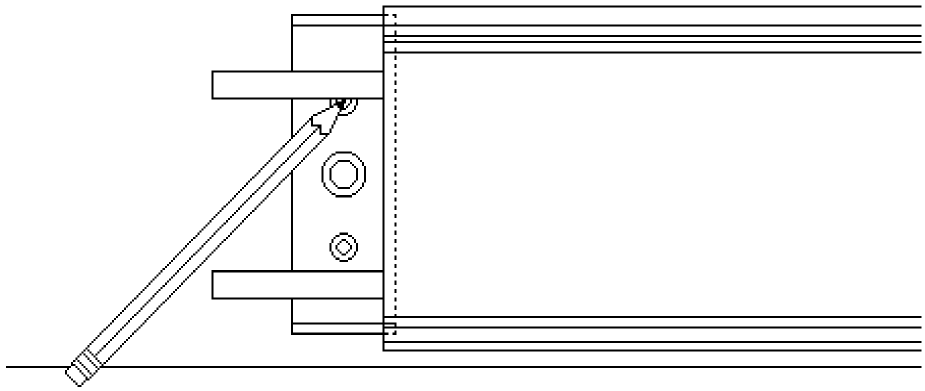


Step 1 - Double check that the panel is centered on the wall. Then holding the Filler Panel Mounting Bracket up against the wall and slide it horizontally behind the pipes of the Heating Panel and into the panel $^{3}/_{16}$". It must be placed straight up and down, and in the correct channels of the panel. The channels are indicated in the following diagram.

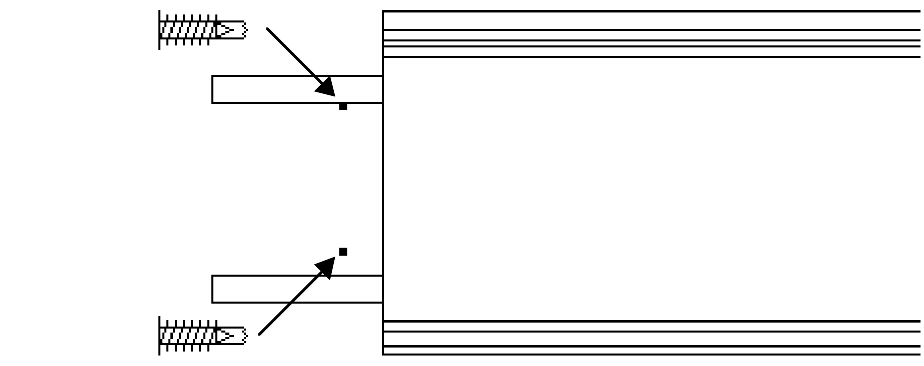




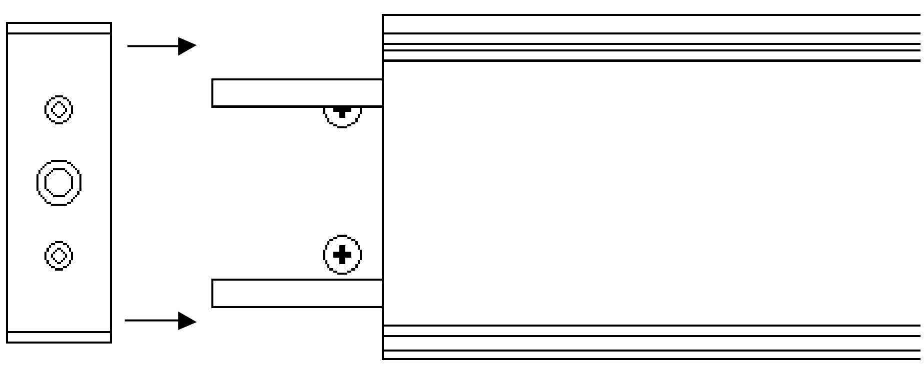
Step 2 - Once the Filler Panel Mounting Bracket is in the correct position, and paneling is used for the finish walls or there happens to be a stud in the location where the Filler Bracket needs to be located. Screw a 2" drywall screw in the center of each of the screw holes beginning with the bottom hole. This will then complete the installation of the bracket. <u>If drywall is used for the finish walls proceed to step 3.</u>



Step 3 - If drywall is used for the finish walls and there is no stud where the bracket needs to be located, mark the center of the two screw holes and slide the bracket out.



Step 4 - Screw a drywall anchor (use only the type shown) into the drywall in the middle of each of the center marks.



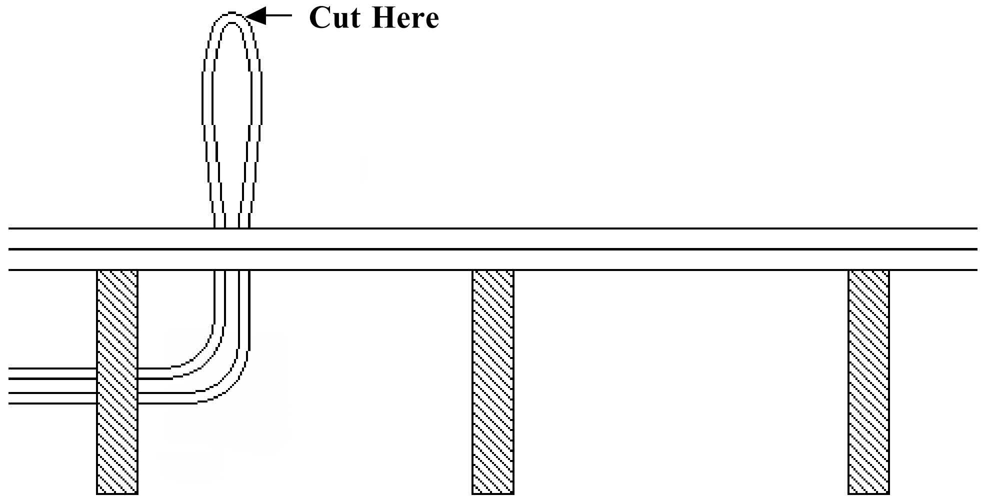
Step 5 - After the wall anchors are screwed in place slide the Filler Panel Mounting Bracket back into place as done in step 1. Screw a 2" drywall screw into each screw holes, as shown in step 2, and the installation of the bracket is then completed.

When all of the Filler Panel Mounting Brackets have been installed the connection of the Slimline 2000 Heating Panels can begin.

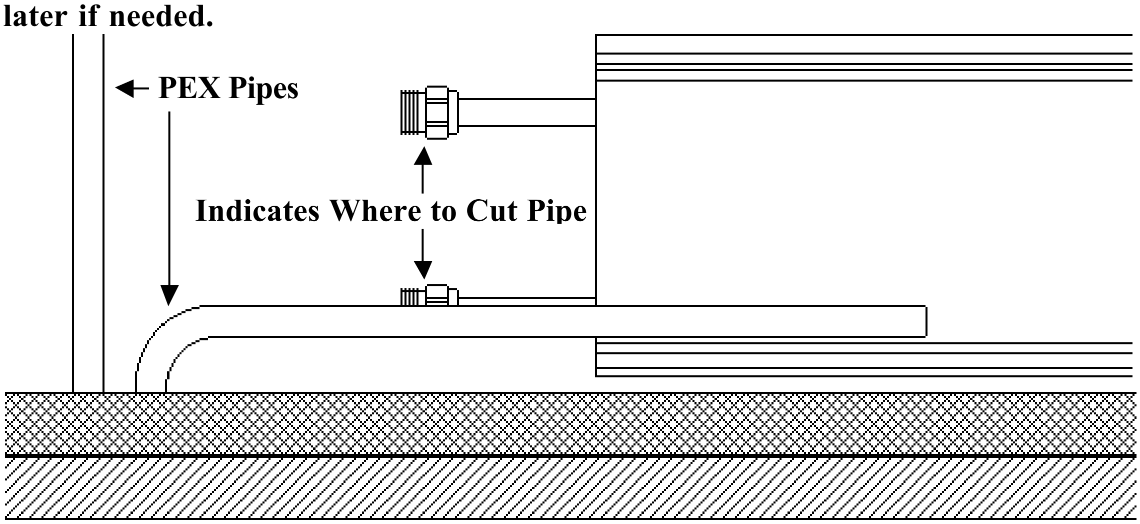
Connecting the Panels with PEX Pipe

As discussed earlier, connecting the panels with PEX Pipe is the easiest way to make the connections. There are five different types of PEX connections. They are shown in the order of how they should be performed. If there is a type of connection which is not to be used, proceed to the next type of connection.

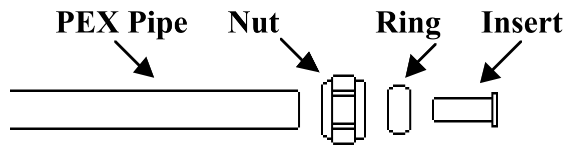
The first type is a through floor connection. Begin this process by cutting the PEX Pipe loop where indicated in the drawing below.



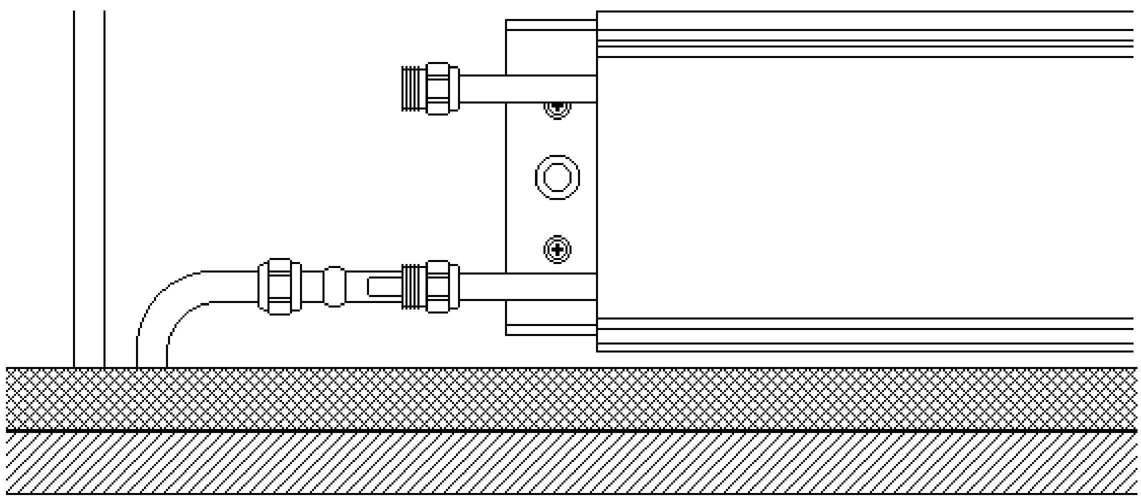
Then take the pipe closest to the panel and carefully bend it down in front of the panel as shown. The center of the 3/8" Copper X 12mm Male Adapter indicates where the PEX Pipe needs to be cut. Be sure that the pipe is cut square. Do not shove the excess pipe down in the hole instead of cutting it off. Doing this could cause a kink in the pipe below the floor surface, which at this point would be extremely difficult to repair. The process of cutting and connecting the PEX Pipe, as described for this type of connection, will be referred to many times in this section. It is important to follow these instructions carefully and refer to them later if needed.



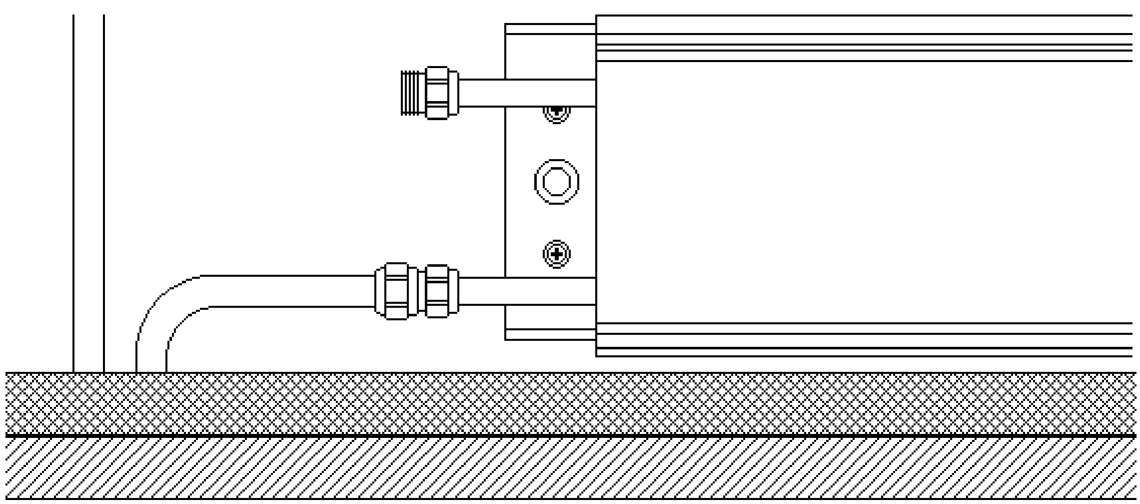
After cutting the first pipe, slide a 12mm Compression Fitting over the pipe in the order shown in the next drawing.



Insert the end of the PEX Pipe into the 3/8" Copper X 12mm Male Adapter.

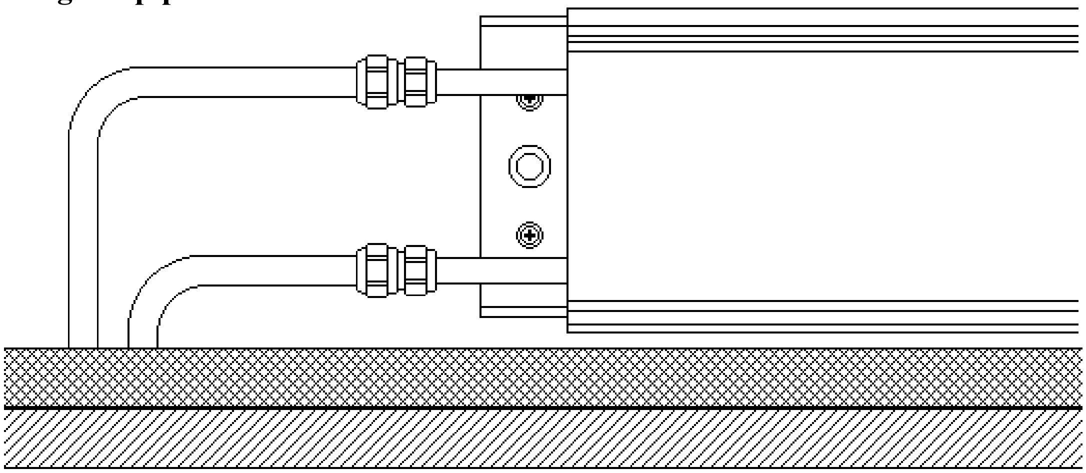


Apply two drops of household oil to the threads of the adapter and screw the nut onto the adapter hand tight. Holding the adapter with an adjustable or ___mm open end wrench, tighten the nut with a 20mm open end wrench, clockwise, until the space shown is 1/8" and a flat side of the nut faces front (very important).

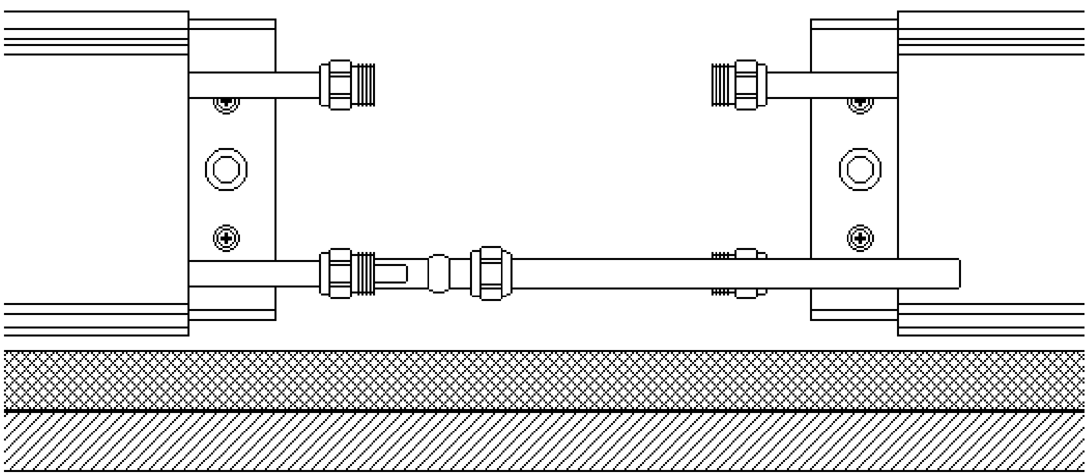


Once the bottom pipe has been connected, repeat all of the steps above for the top pipe. The following drawing illustrates how both of the PEX connections on the end of the panel should look like when completed. Understandably, it would be very difficult to produce the type of 90° bends of the PEX Pipe as

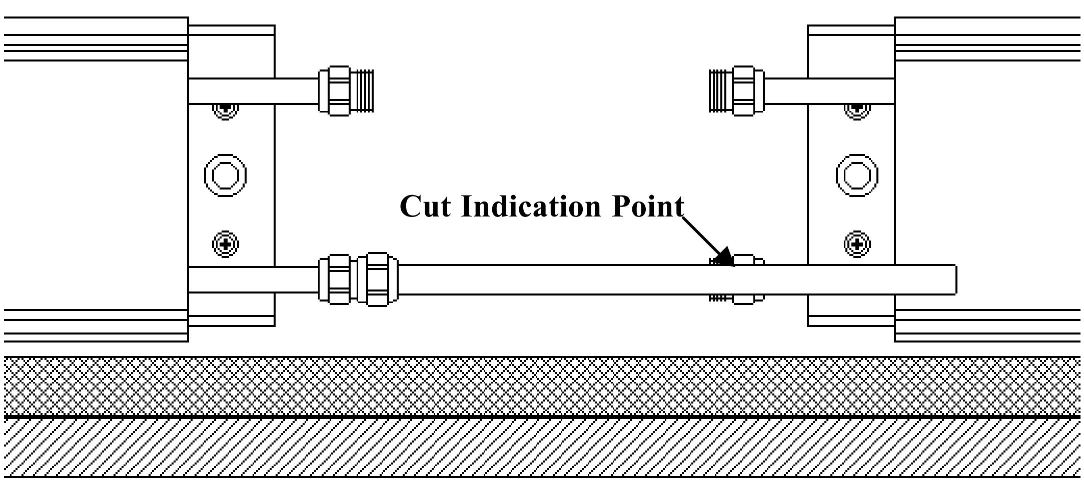
illustrated in the drawings, nor are these type of bends necessary. Simply, avoid kinking the pipe and bend it in a manner that feels comfortable.



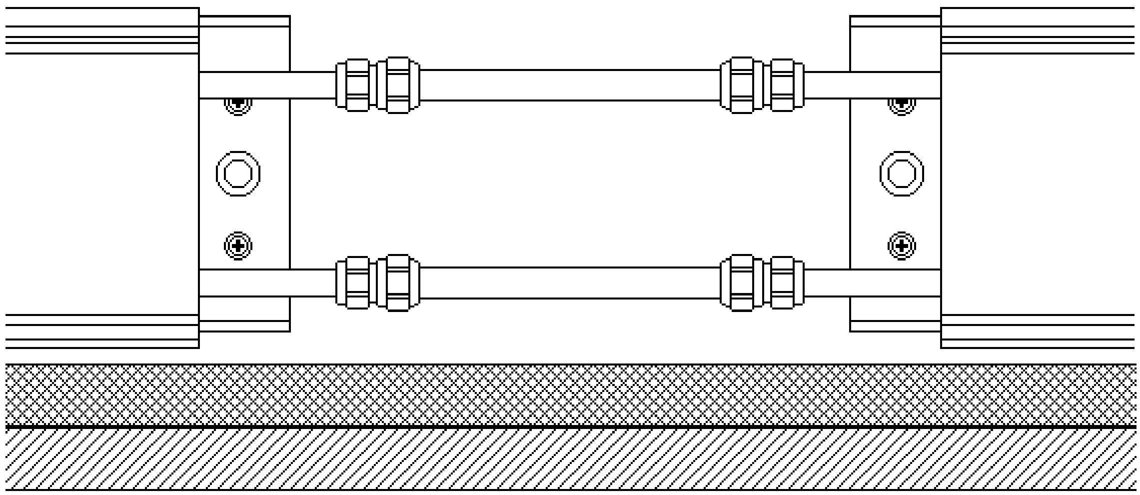
The next type of connections to be completed are the straight panel to panel connections. These type of connections occur when two or more panels are used on one straight section of wall. If none of these connections are required proceed to the next type of connection. If they are to be used, refer to the drawing below.

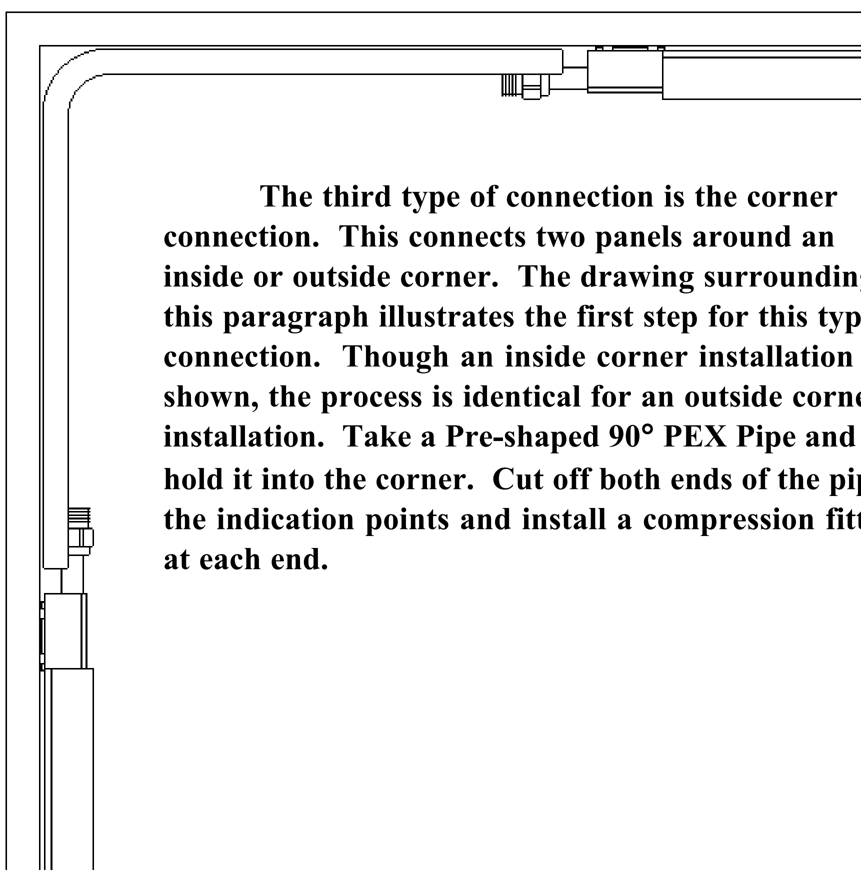


As illustrated above, connect one end of a piece of PEX Pipe to a heating panel with a compression fitting.

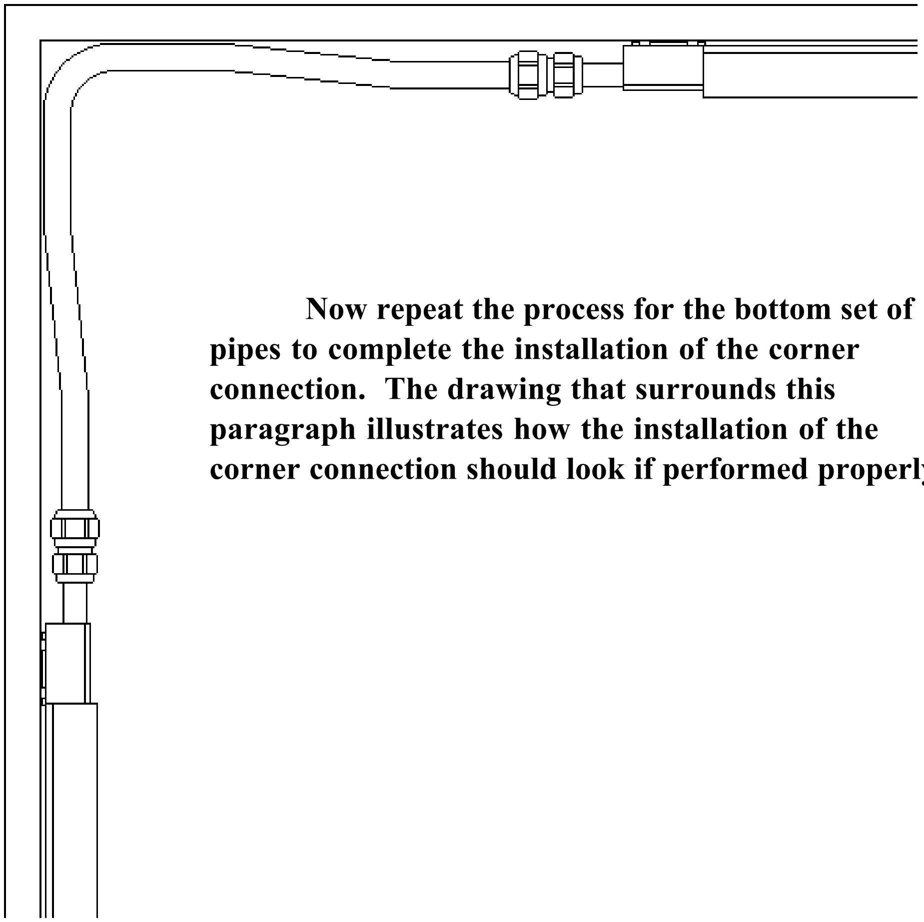


Once one end of the pipe has been connected, cut the other end of the pipe at the indication point, and connect it to the panel with a compression fitting, as indicated in the previous drawing. Now repeat the process for the top pipe to complete this type of connection. The drawing below illustrates how the connections should look when completed.**



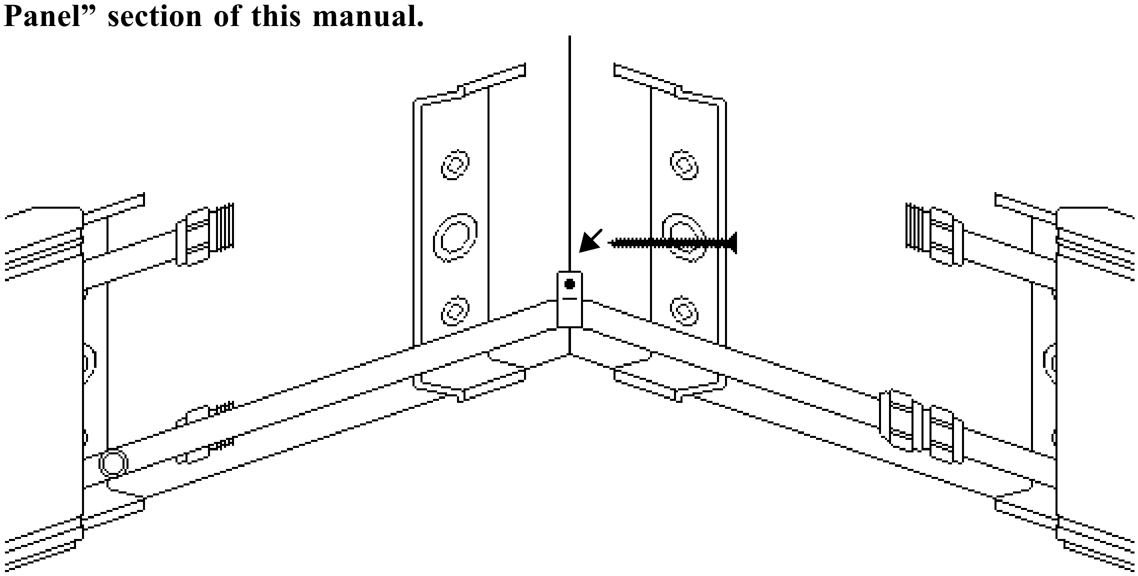


The third type of connection is the corner connection. This connects two panels around an inside or outside corner. The drawing surrounding this paragraph illustrates the first step for this type of connection. Though an inside corner installation is shown, the process is identical for an outside corner installation. Take a Pre-shaped 90° PEX Pipe and hold it into the corner. Cut off both ends of the pipe at the indication points and install a compression fitting at each end.

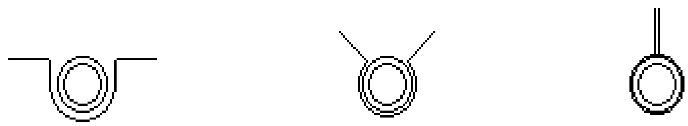


Now repeat the process for the bottom set of pipes to complete the installation of the corner connection. The drawing that surrounds this paragraph illustrates how the installation of the corner connection should look if performed properly.

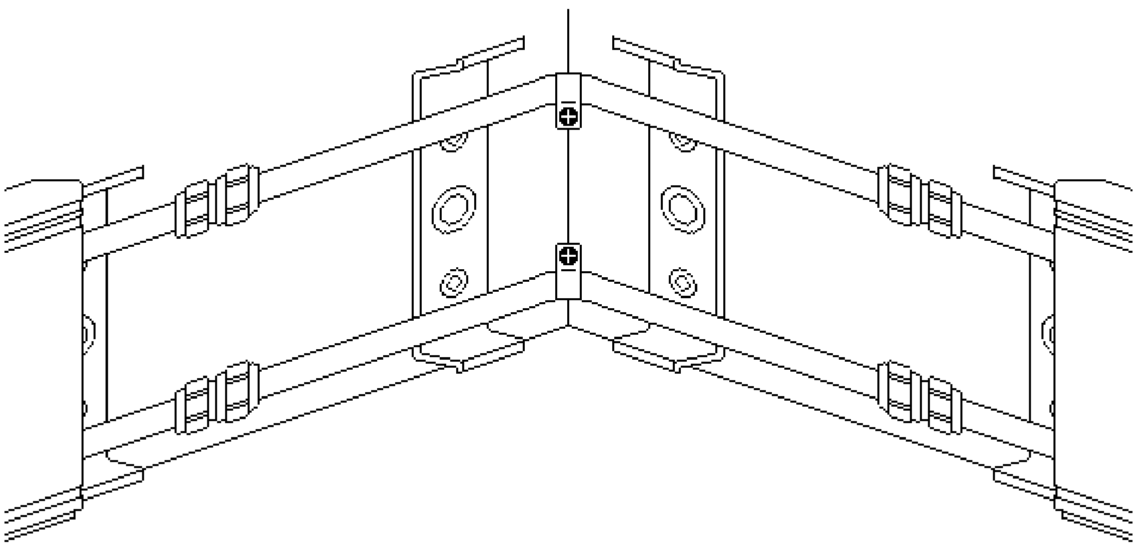
The next type of connection illustrated is an alternate angle connection. It has been depicted in the drawing below as a 45° corner, but this procedure can be used for a variety of different angles. To begin, set a Filler Panel Mounting Bracket against the wall, on each side of the corner. Do not secure them at this time. The actual securing of the brackets is explained in the "Mounting the Filler Panel" section of this manual.



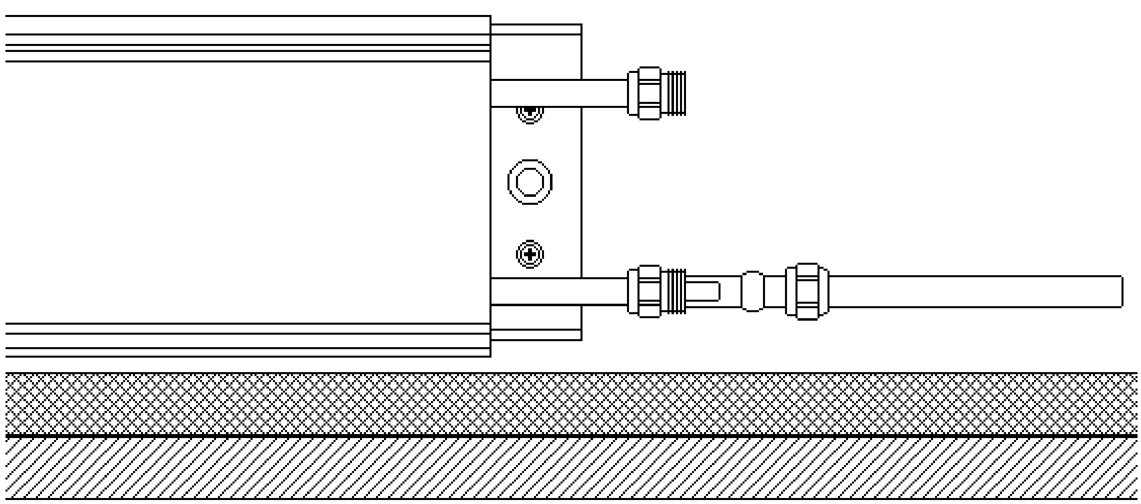
Connect an end of a piece of PEX Pipe to a pipe of one of the heating panels, as shown on the previous page. It is not necessary to use Pre-shaped 90° PEX Pipes in corner with angles of 45° or less. Gently, bend the pipe into the corner and secure it in place. This is done by bending a _” copper strap around the pipe so that both of the screw holes line up. Now insert a 2” drywall screw through the holes and screw it into the center of the corner ensuring that the pipe is parallel to the floor. The drawing below shows how the strap should be bent around the pipe.



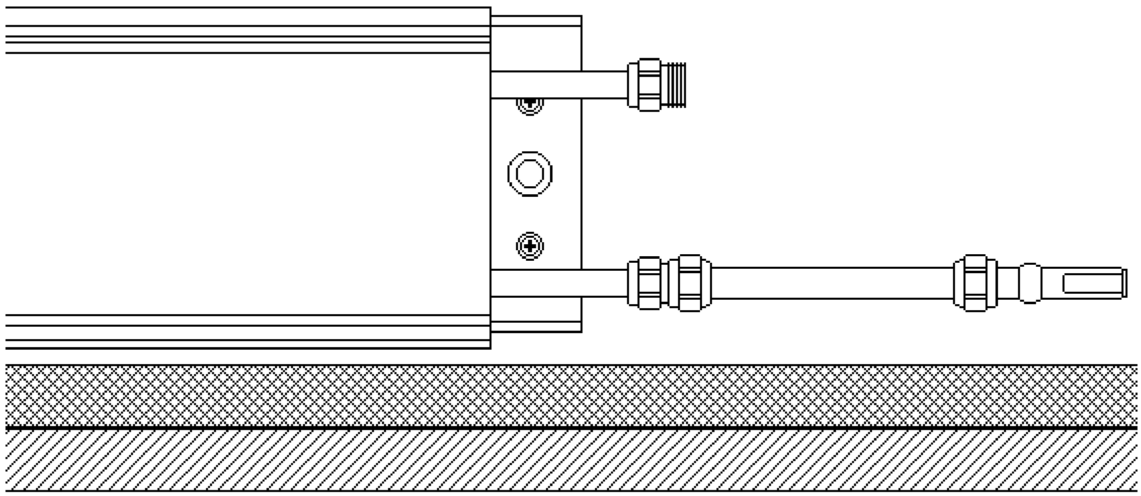
Continue by cutting the opposite end of the first pipe at the indication point and connecting it with a compression fitting. Repeat the process for the top pipes of the heating panel to complete the alternate angle connection. The drawing below shows how the corner should look when completed.



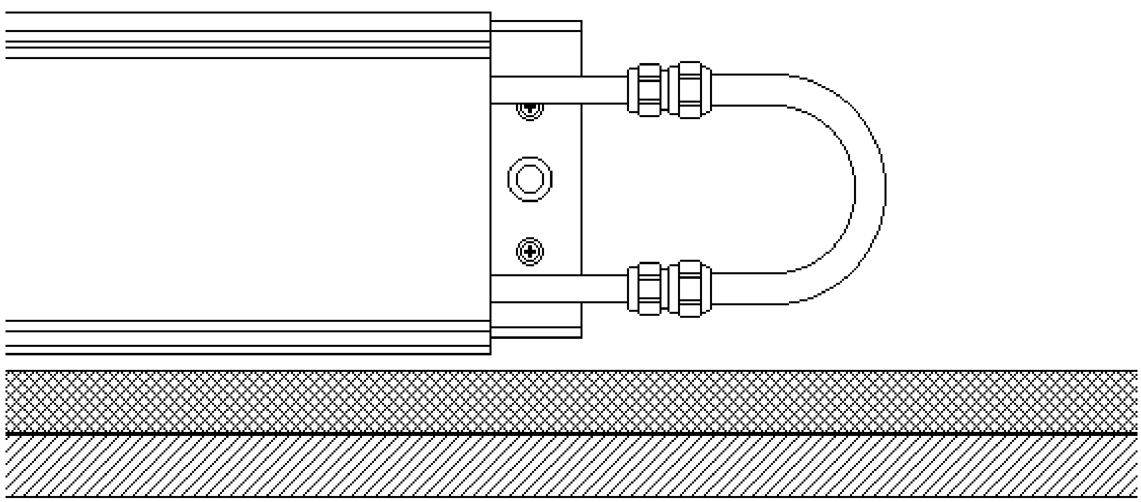
The final, and easiest, type of PEX Pipe connection is the return U-bend. This directs the water from the top pipe to the bottom pipe of the heating panels to take it back to the boiler. The drawing below depicts the installation process.



With a compression fitting connect an 8” piece of PEX Pipe to the lower pipe of the heating panel. After the first compression fitting has been tightened, slide the second compression fitting onto the other end of the PEX Pipe.



Now gently bend the PEX Pipe upward and insert the end into the other adapter and tighten the compression fitting. The bend should be gradual and when complete, resemble the illustration below.

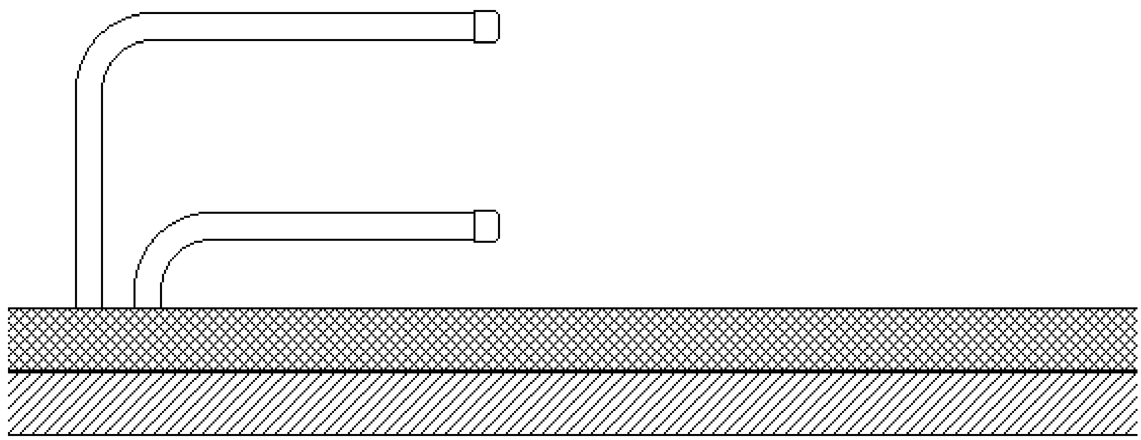


Complete the connections for the entire system and then perform a pressure test. If there are any leaks repair them and re-apply pressure to the system. When the system has maintained pressure for a minimum of 24 hours the End Caps, Inside Corners, Outside Corners and alternate Filler Panel Mounting Brackets can be installed. The installation of these components is explained in depth, later in this manual.

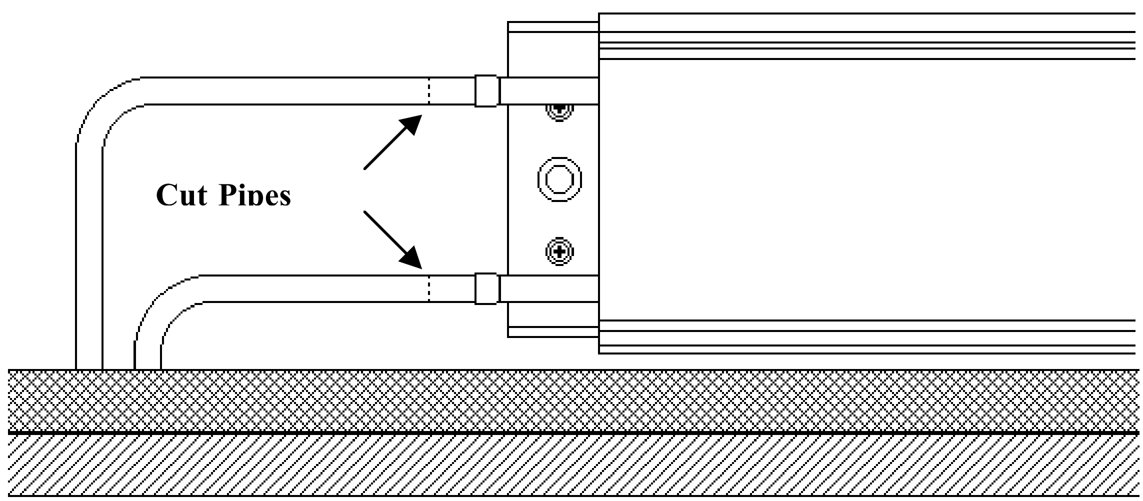
Connecting the Panels With Copper

The process of piping the system with copper is very similar to piping the system with PEX. The procedures of how to clean and sweat copper fittings are not explained in this manual. If these procedures are not familiar, the installer should use the PEX Pipe in the installation instead. As there is with the PEX Pipe, there are also five different types of connections with copper.

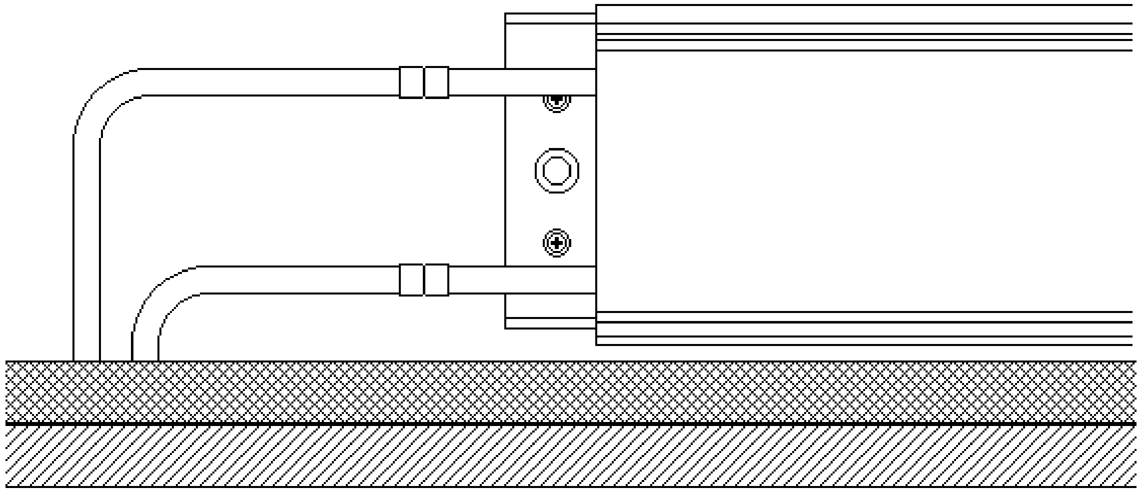
The first type is a through floor connection.



Begin by marking the pipes coming up through the floor at the end of the panel pipes as shown in the drawing below.

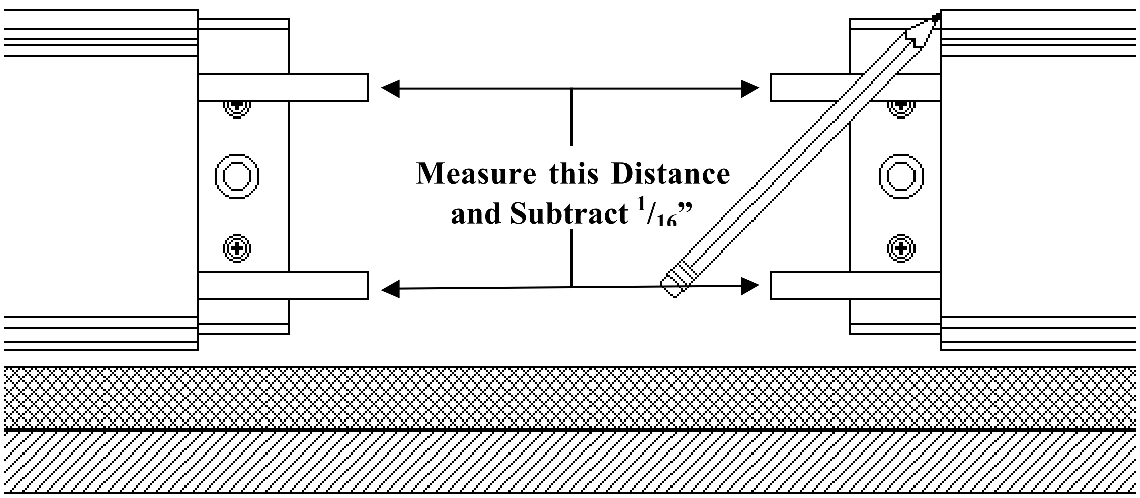


Now cut the pipes where marked, place a $^3/_8$" Copper X Copper Coupling on each pipe and insert the pipes from the panel into the couplings. It is important to make sure that the copper pipes which are coming up through the floor remain as close to the wall as possible so that the it does not interfere with the Filler Panel installation. Sweat the fittings in place and proceed to the next through the floor connection. The following drawing depicts how the connection should look when performed properly. Understandably, the bends of the copper pipe will not be as perfect as shown.

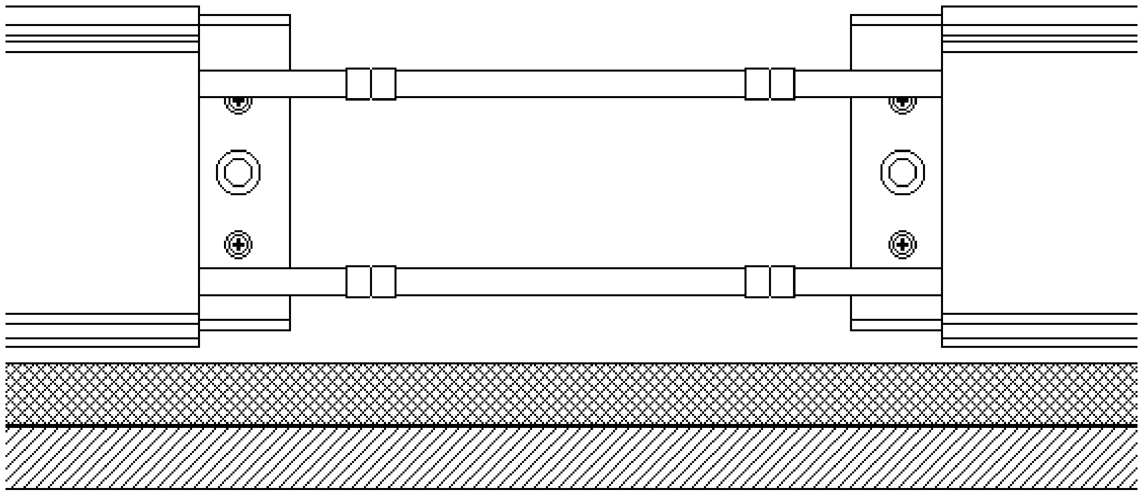


Once all of these type of connections are completed, the next ones can be performed.

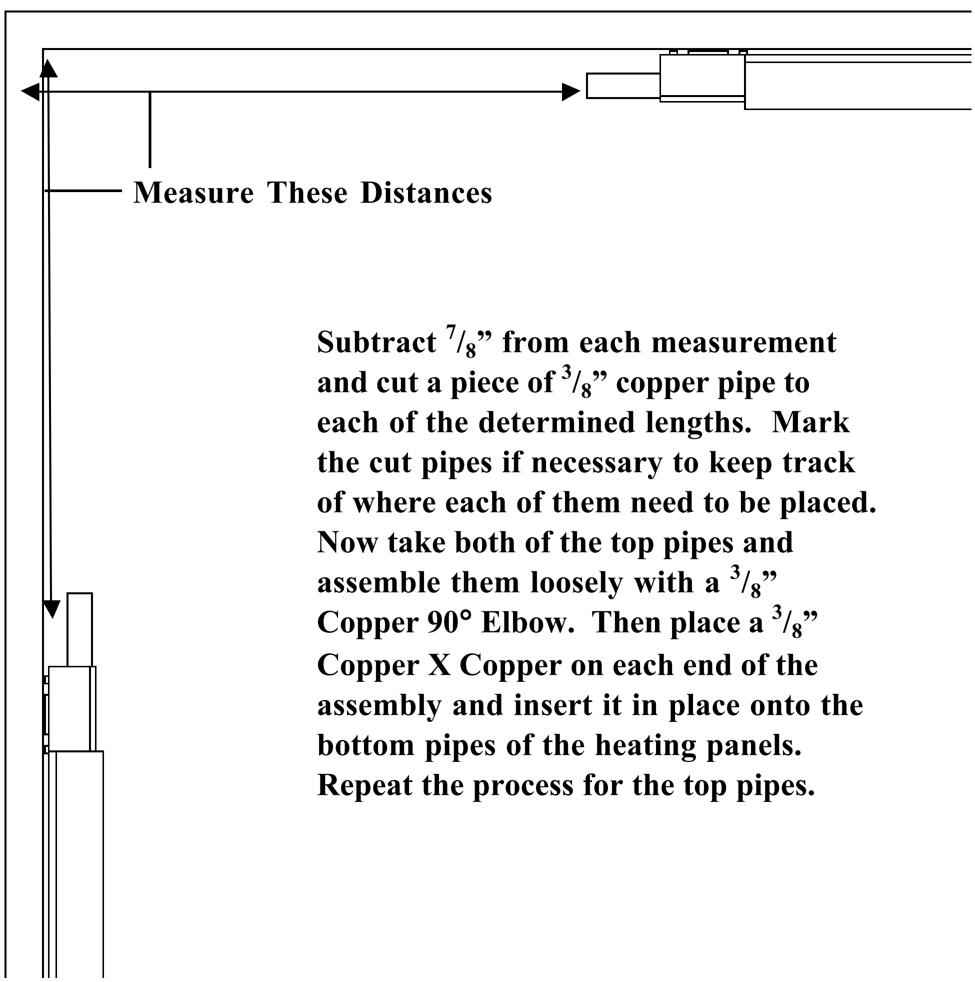
The second type of connection is the straight panel to panel connection. These type of connections occur when two or more panels are used on one straight section of wall. If none of these connections are required proceed to the next type of connection. If they are to be used, refer to the drawing below.



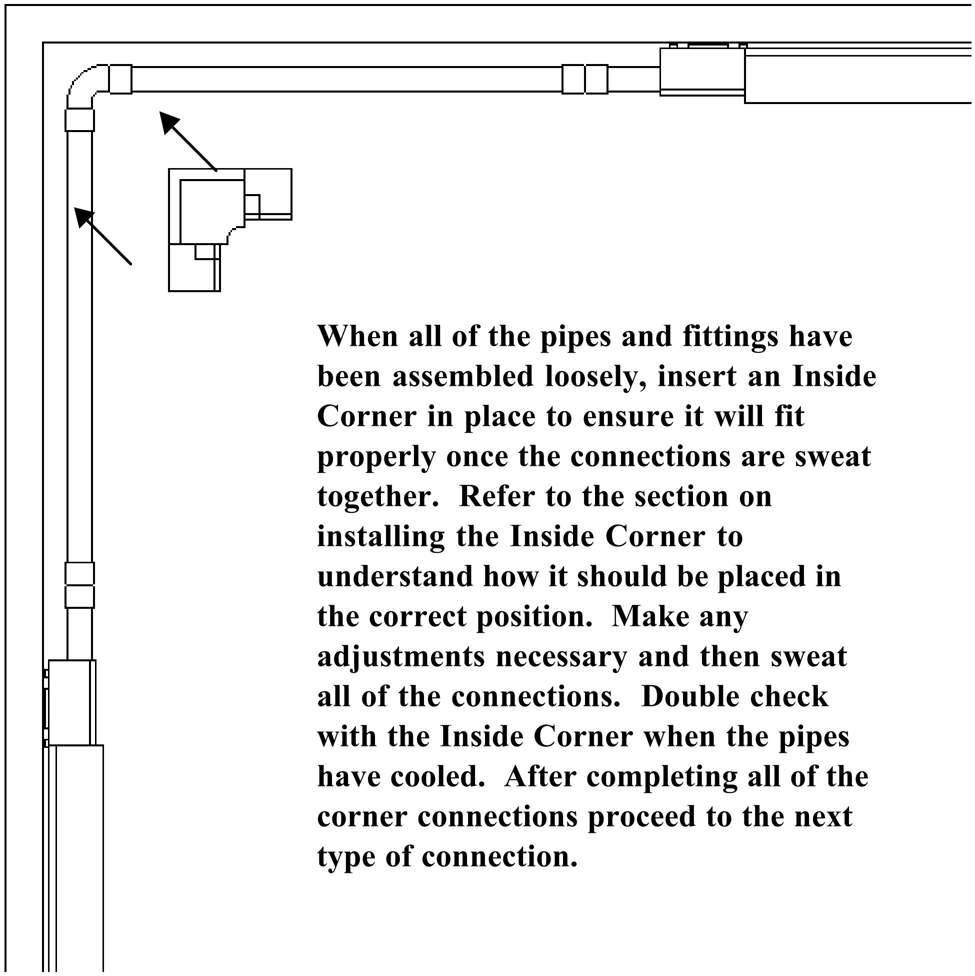
First, take measurements between both the top pipes and the bottom pipes of the heating panels. It is important to measure both the top and bottom pipes because the distance between the two may be different. Subtract $^{1}/_{16}$" from both measurements and cut a piece of $^{3}/_{8}$"copper pipe for each. Mark the wall in the places shown. Now place a $^{3}/_{8}$" Copper X Copper Coupling on each of the four heating panel pipe ends and insert the pieces of copper pipe between them. Make sure that the pipes are inserted fully into the couplings and that the bottom pipe is on the bottom and the top pipe is on the top. When the pipes and fittings have been assembled properly, the panels should be in place on the markings. Sweat the couplings in place and complete all other connections of this type. Installed properly, the connection should resemble following illustration.



The next type of connection is the 90° corner connection. This is the most critical of all of the connections. It is very important that all measurements and cuts are precise. Begin by taking measurements from the end of each of the four heating panel pipes to the wall as shown.

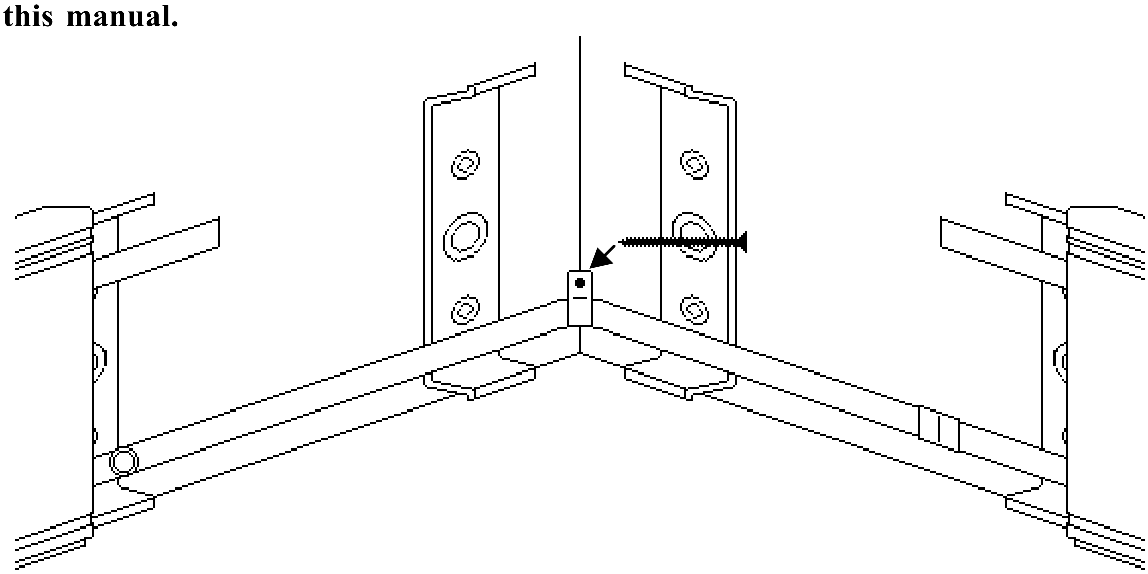


Subtract $^{7}/_{8}$" from each measurement and cut a piece of $^{3}/_{8}$" copper pipe to each of the determined lengths. Mark the cut pipes if necessary to keep track of where each of them need to be placed. Now take both of the top pipes and assemble them loosely with a $^{3}/_{8}$" Copper 90° Elbow. Then place a $^{3}/_{8}$" Copper X Copper on each end of the assembly and insert it in place onto the bottom pipes of the heating panels. Repeat the process for the top pipes.



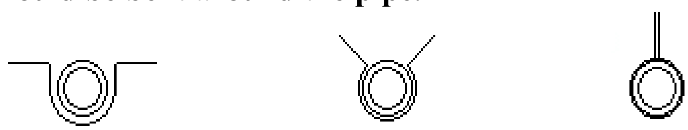
When all of the pipes and fittings have been assembled loosely, insert an Inside Corner in place to ensure it will fit properly once the connections are sweat together. Refer to the section on installing the Inside Corner to understand how it should be placed in the correct position. Make any adjustments necessary and then sweat all of the connections. Double check with the Inside Corner when the pipes have cooled. After completing all of the corner connections proceed to the next type of connection.

The forth type of connection is the alternate angle connection. It has been depicted in the drawing below as a 45° corner, but this procedure can be used for a variety of different angles. To begin, set a Filler Panel Mounting Bracket against the wall, on each side of the corner. Do not secure them at this time. The actual securing of the brackets is explained in the Mounting the Filler Panel section of this manual.

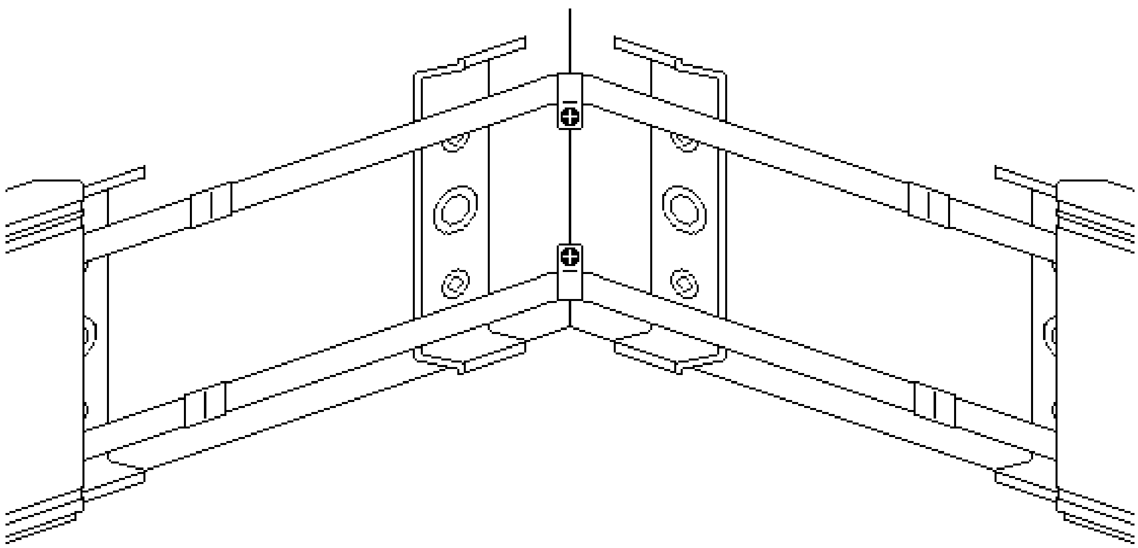


Sweat an end of a piece of soft copper pipe to a pipe of one of the heating panels using a $^{3}/_{8}$" Copper X Copper Coupling, as shown on the previous page.

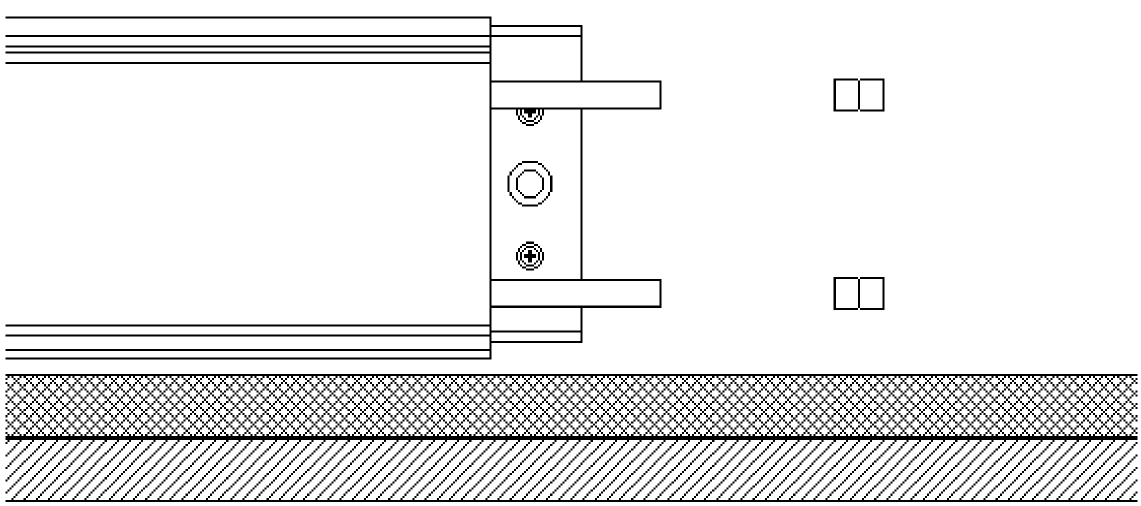
Gently, bend the pipe into the corner and secure it in place. This is done by bending a $^1/_2$" copper strap around the pipe so that both of the screw holes line up. Now insert a 2" drywall screw through the holes and screw it into the center of the corner ensuring that the pipe is parallel to the floor. The drawing below shows how the strap should be bent around the pipe.



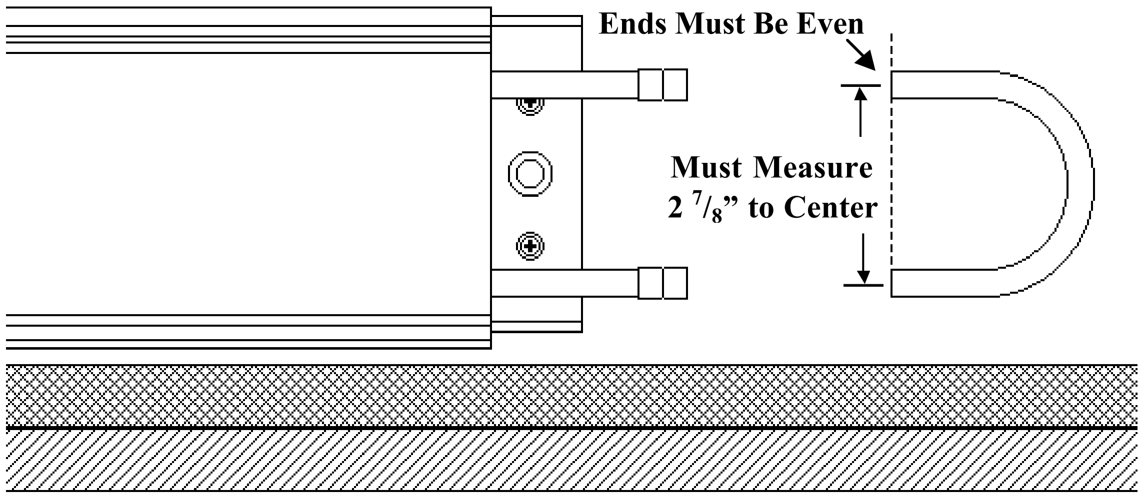
Continue by cutting the opposite end of the first pipe at the point which it meets the heating panel pipe, less $^1/_{16}$", and sweat it in place with a coupling. Repeat the process for the top pipes of the heating panel to complete the alternate angle connection. The drawing below shows how the corner should look when completed.



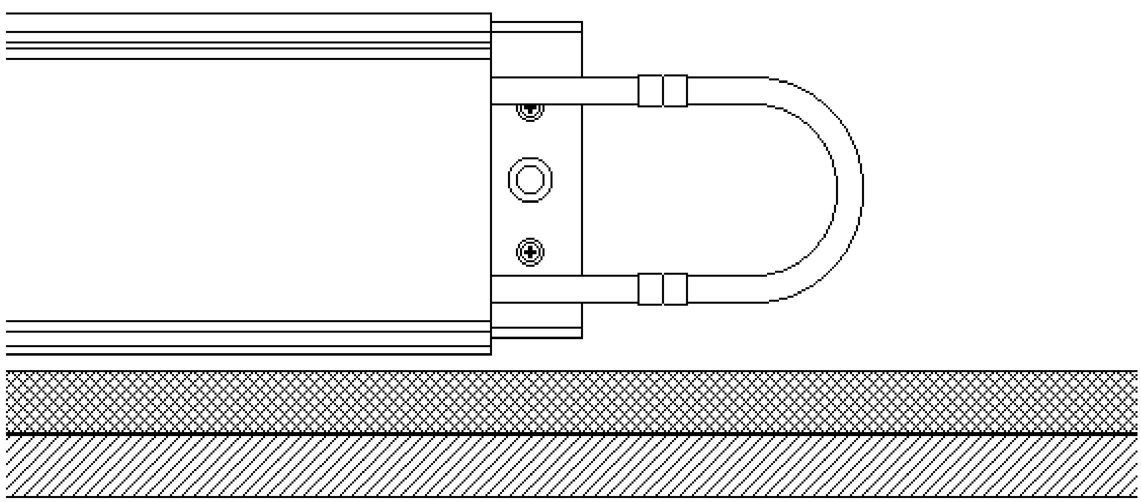
The final type of connection is the return U-bend. This directs the water from the top pipe to the bottom pipe of the heating panels to take it back to the boiler. The drawing below depicts the first step of the installation process.



Place a 3/8" Copper X Copper Coupling on the end of each of the two heating panel pipes. Now cut a 10"piece of soft copper pipe and bend it with a pipe bender so that the ends are even and measure 2 $^7/_8$" to center.



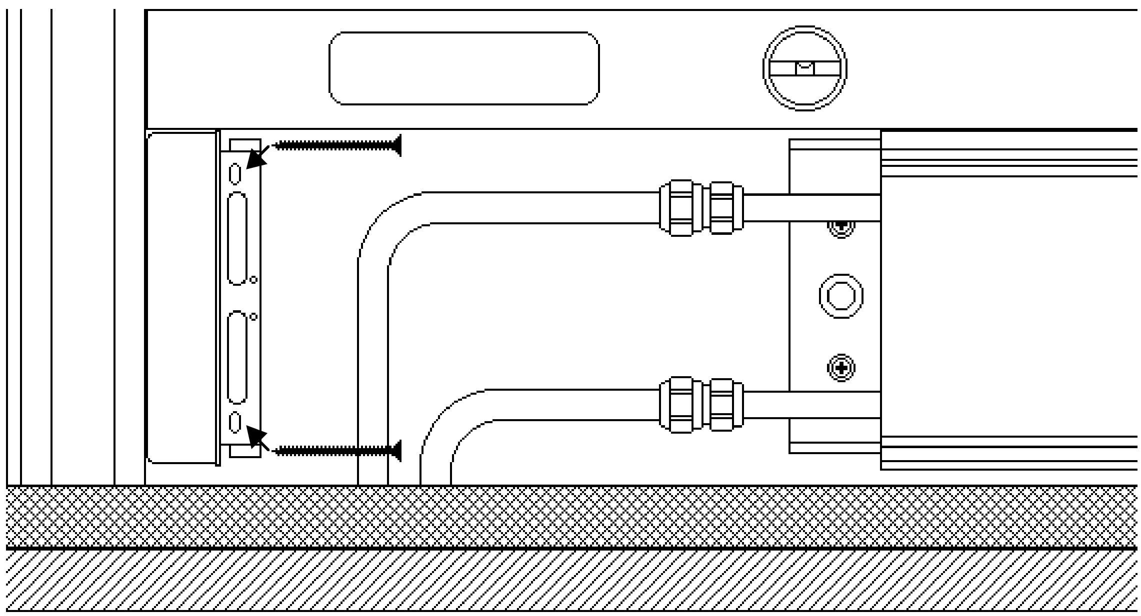
Now insert the bent piece of pipe into the 3/8" Copper X Copper Couplings that have been placed on the end of the heating panel pipes. Ensure that the bend is close enough to the wall that it will not obstruct the Filler Panel installation and sweat all of the joints. When complete the installation should resemble the illustration below.



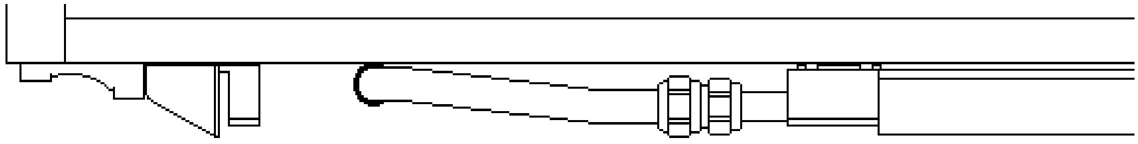
Complete the connections for the entire system and then perform a pressure test. If there are any leaks repair them and re-apply pressure to the system. When the system has maintained pressure for a minimum of 24 hours the End Caps, Inside Corners, Outside Corners and alternate Filler Panel Mounting Brackets can be installed. The installation of these components is explained in depth in the following section.

End Cap, Inside Corner and Outside Corner Installation

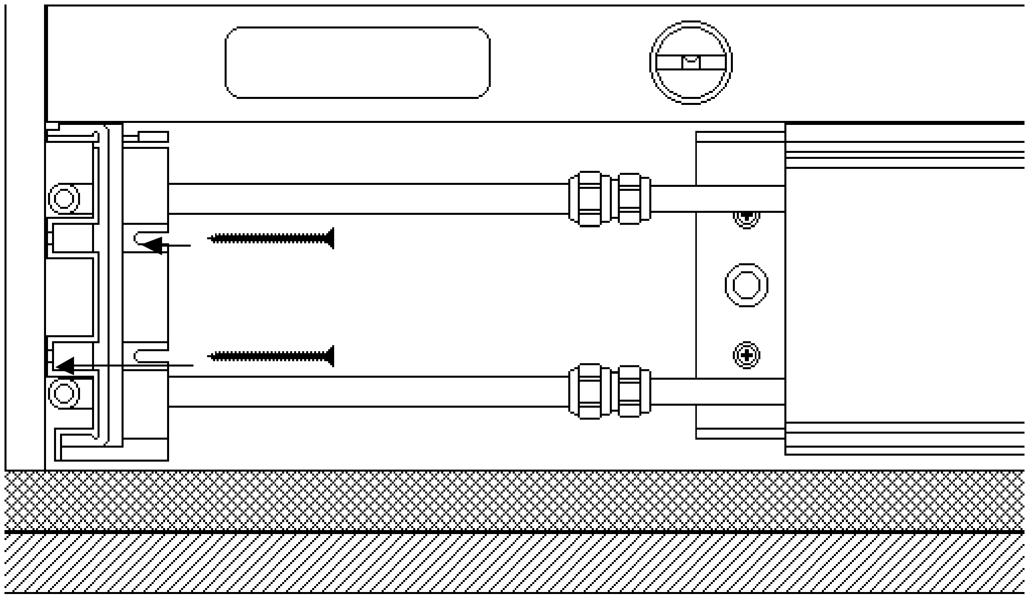
The next phase of the installation is to mount the End Caps, Inside Corners and Outside Corners. These components support the Filler Panel on the end opposite the heating panel. This section also includes instructions of how to install the Filler Panel Mounting Brackets for alternate angle and flush mount installations as well as how to install them in areas where the Filler Panel is to be used in place of the baseboard molding. Though the installation of these components are shown with a PEX connected system, the same processes should be used with a copper connected system. At this point in the installation, the Filler Panel Mounting Brackets that are placed at each end of the heating panels should already have been installed. In most cases there should be a wall stud located where these components will be placed. If for some reason there is no stud, wall anchors can be installed following the instructions in the section on Mounting the Filler Panel Brackets. The drawing below shows the installation of the End Cap against door molding. The same procedures shown should be followed to install the End Cap in corner installations as well.

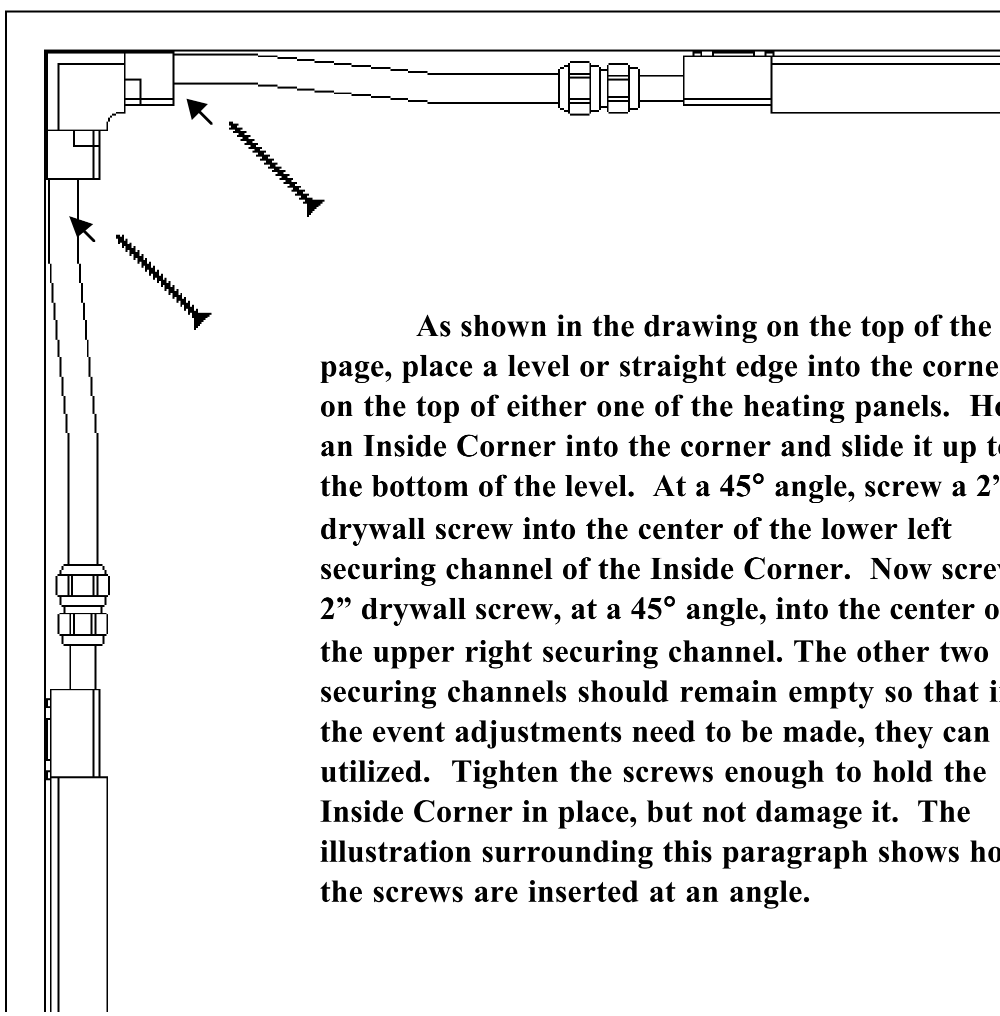


Place a level or straight edge on the top of the heating panel and up against the molding. Hold an End Cap against the molding and up to the bottom of the level. Be sure not to push the level upward, it should remain sitting flat on the top of the heating panel. Now secure the End Cap to the wall with two 2” drywall screws, each placed in the center of an oval hole, as shown. The screws should be snug enough to prevent the End Cap from moving, but not so tight that they damage the component or compress the drywall. The drawing below shows the installation of the End Cap from a top view.



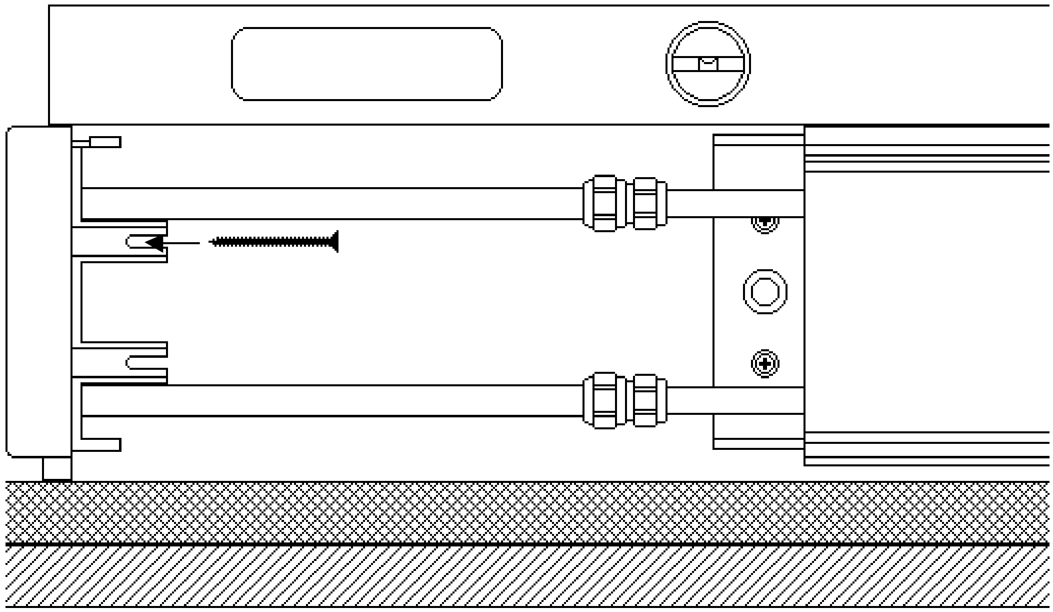
The next drawing is of an Inside Corner installation. This component can only be utilized in a 90° inside corner. Corner installations for angles other than 90° are described later in this section.

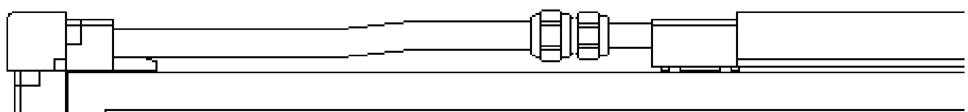


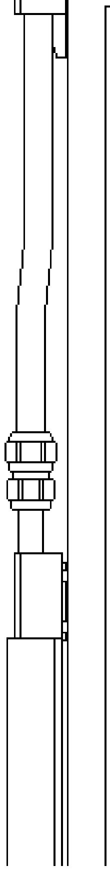


As shown in the drawing on the top of the page, place a level or straight edge into the corner, on the top of either one of the heating panels. Hold an Inside Corner into the corner and slide it up to the bottom of the level. At a 45° angle, screw a 2” drywall screw into the center of the lower left securing channel of the Inside Corner. Now screw a 2” drywall screw, at a 45° angle, into the center of the upper right securing channel. The other two securing channels should remain empty so that in the event adjustments need to be made, they can be utilized. Tighten the screws enough to hold the Inside Corner in place, but not damage it. The illustration surrounding this paragraph shows how the screws are inserted at an angle.

Install the Outside Corner in the same manor as the Inside Corner with the exception of the screws. The screws used for the Outside Corner should be screwed straight in rather than at a 45° angle.







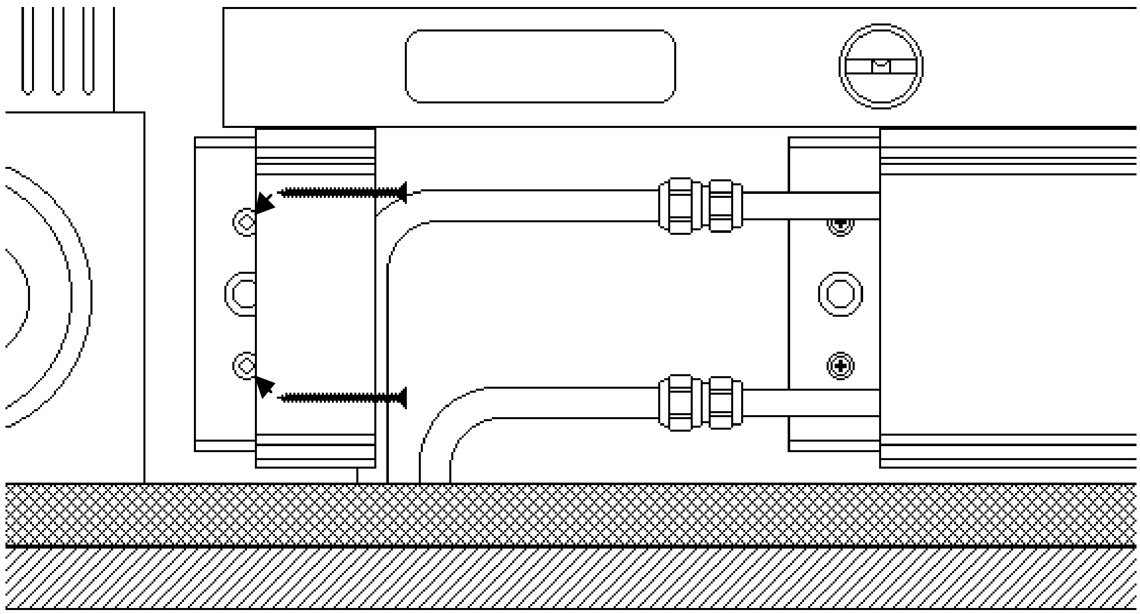
The drawing which surrounds this paragraph depicts how an Outside Corner installation should look when completed. Remember to use only two screws to mount the corner, one in the upper right securing channel and one in the lower left securing channel. Again, these screws need to be screwed straight into the wall.

Once all of the End Caps, Inside Corners and Outside Corners have been mounted in place the system is ready to accept the Filler Panel.

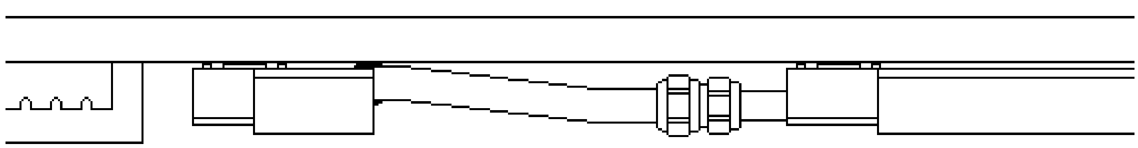
<u>**If Filler Panel Mounting Brackets are going to be used in place of End Caps or in corners other than 90º, proceed to the following section before installing the Filler Panels.**</u>

<u>Alternate Filler Panel Mounting Bracket Installation</u>

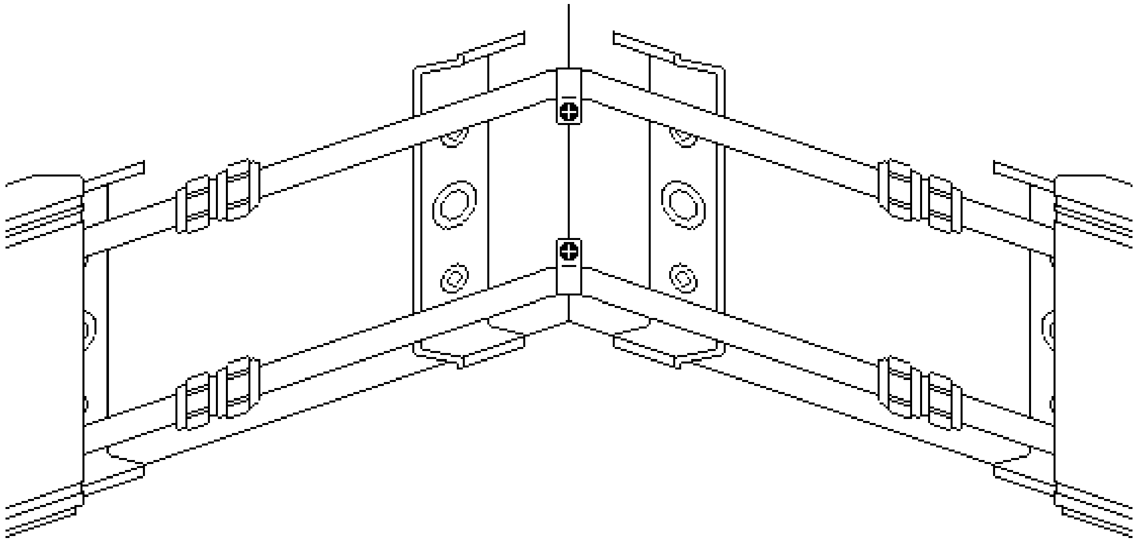
If preferred, the Filler Panel Mounting Brackets can be used in place of End Caps when the molding is thicker than 1". This will allow the Filler Panel to be flush mounted up against molding to give the system a more stylish appearance. The diagram below shows the installation process.



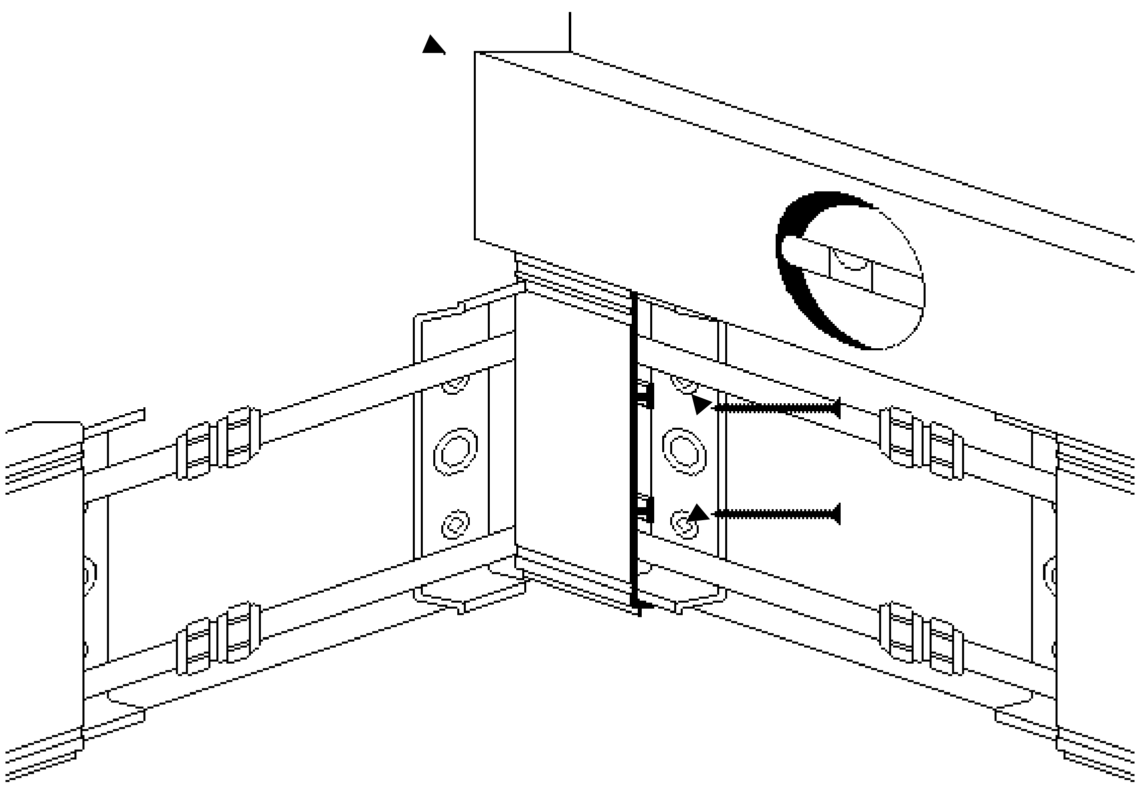
As before, place a level or straight edge on top of the heating panel. Snap a small piece of Filler Panel onto a Filler Panel Mounting Bracket so that as much of the bracket is covered as possible, with the screw holes still visible. Hold the assembly up against the wall and up to the bottom of the level. The bracket must be completely vertical, and should be approximately $^1/_2$" away from the molding. Secure the bracket in place by screwing a 2" drywall screw in the center of each screw hole. The drawing below is a top view of the installation.



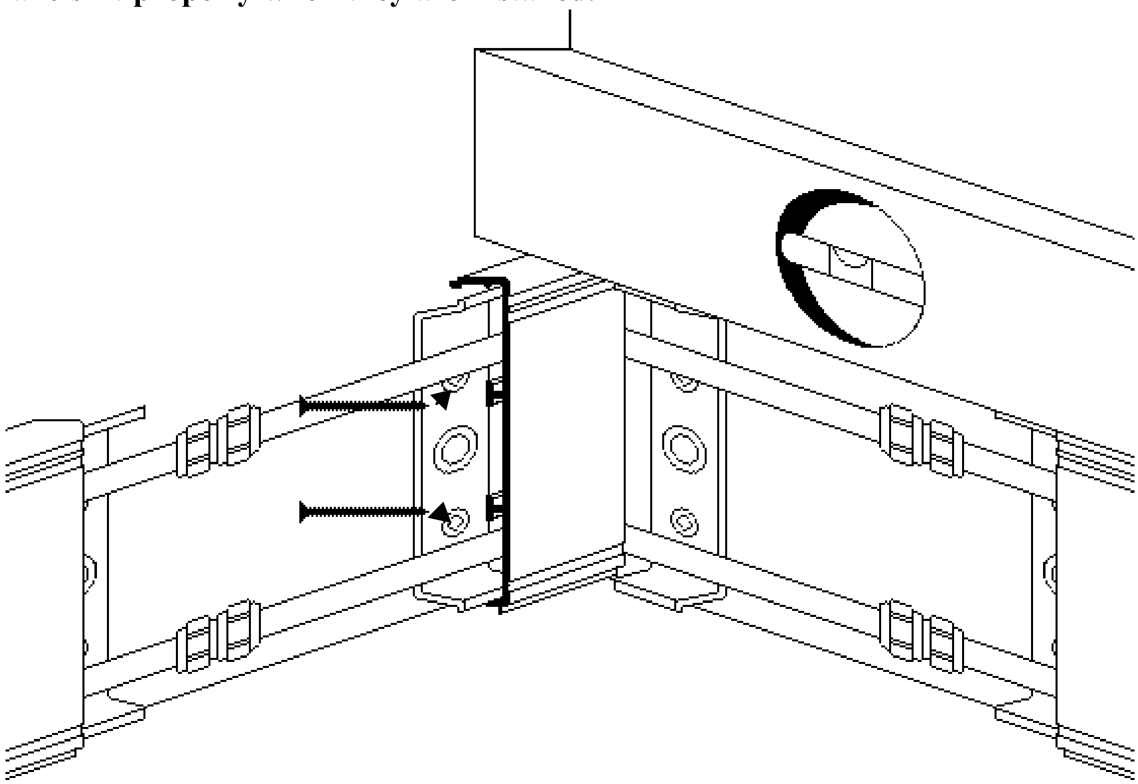
Alternate angle installations require Filler Panel Mounting Brackets also. Though the following drawing is of a 45° corner installation, as mentioned before, these same procedures can be used for most other angles as well. At this point of the installation, the PEX or copper pipe should be installed and a Filler Panel Mounting Bracket should be resting loose behind the pipes on each side of the corner as shown. Begin by placing a level or straight edge on top of one of the panels and into the corner. Now cut a small piece of Filler Panel and snap it onto the Filler Panel Mounting Bracket which is directly under the level. The piece of Filler Panel should be placed on the bracket so that as much of the bracket is covered as possible, but with the screw holes still visible.



Hold the assembly up against the wall and up to the bottom of the level. The bracket must be completely vertical, and should be approximately 1" away from the corner. Secure the bracket in place by screwing a 2" drywall screw in the center of each screw hole. If there is not a stud located where the Filler Panel Mounting Bracket needs to be placed, install wall anchors as shown in the "Mounting Slimline 2000 Heating Panels" section of this manual.



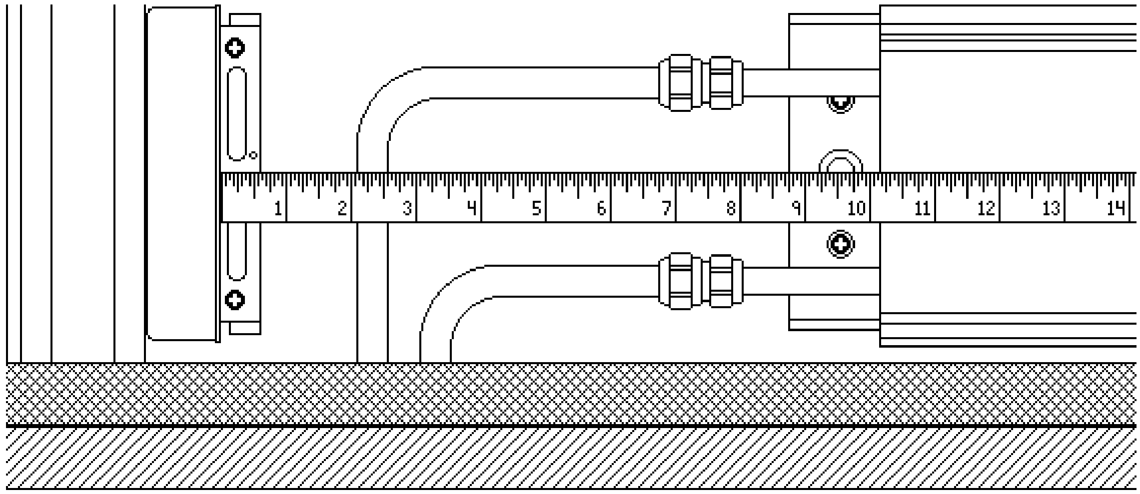
As shown in the next drawing, the level is left on top of the panel of which it was first placed. Assemble the Filler Panel Mounting Bracket and the small piece of Filler Panel as previously described. Now hold the assembly up against the wall and up to the bottom of the level. As mentioned before, the bracket must be completely vertical, and should be approximately 1” away from the corner. Secure the bracket in place by screwing a 2” drywall screw in the center of each screw hole. Install wall anchors if there is not a stud located where the Filler Panel Mounting Bracket needs to be placed. It is very important that both of the Filler Panel Mounting Brackets are mounted at the same height to ensure that the Filler Panels fit properly when they are installed.



Cutting and Installing Filler Panels

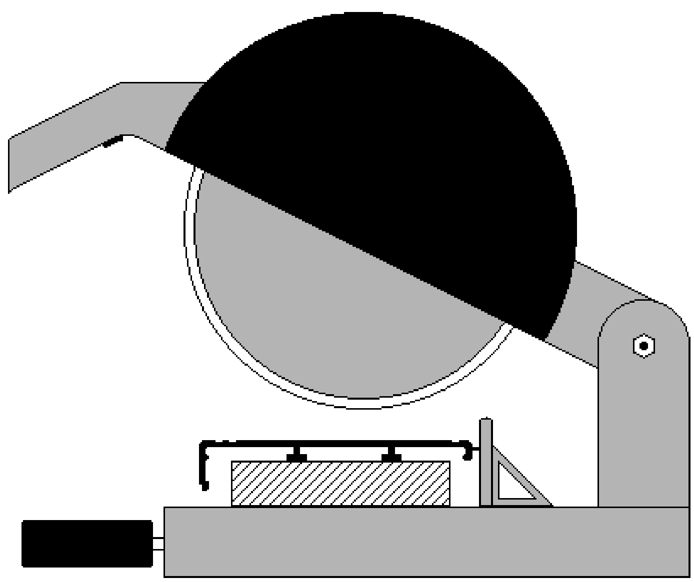
The installation of the Filler Panel is the finishing touch for the Slimline 2000 Heating Panel installation. All of the End Caps, Inside Corners, Outside Corners and Filler Panel Mounting Brackets should be installed at this point.

Begin the installation by taking measurements for all of the Filler Panels needed to complete an entire room. The measurements must be taken from the center, as shown below. If the measurements are taken from the top or bottom it may cause the Filler Panel to be cut to short.



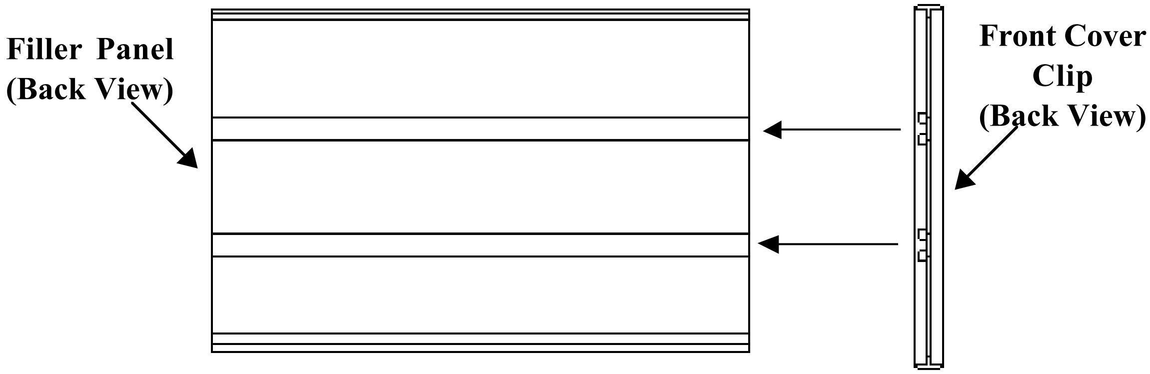
Subtract $^{3}/_{16}$" from each measurement to allow a small space between the Filler Panel and Heating Panel for expansion and contraction. The example above shows the space between the Heating Panel and the End Cap at 10 $^{5}/_{32}$". For the example the Filler Panel would be cut to 9 $^{31}/_{32}$".

Cutting the panel is done with an electric miter saw using a fine toothed carbide tipped blade. A $^{3}/_{4}$" thick by 4" wide piece of wood should be placed under the Filler Panel with the top of the panel facing upward to avoid scratching the finish. The bottom of the panel should rest against the fence of the saw. Below, the drawing indicates the proper way to place the panel on the saw.

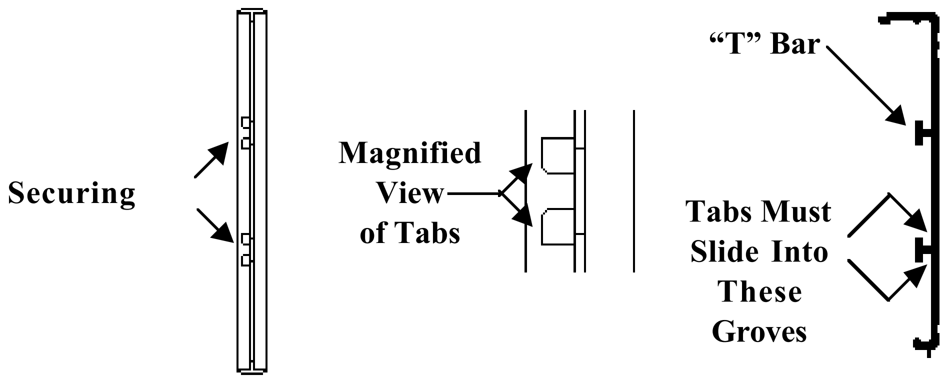


A hint to keep the blade in top condition is to use cutting wax on the blade after every 20 or 30 cuts. Remember to mark each panel after it is cut to recall where it belongs.

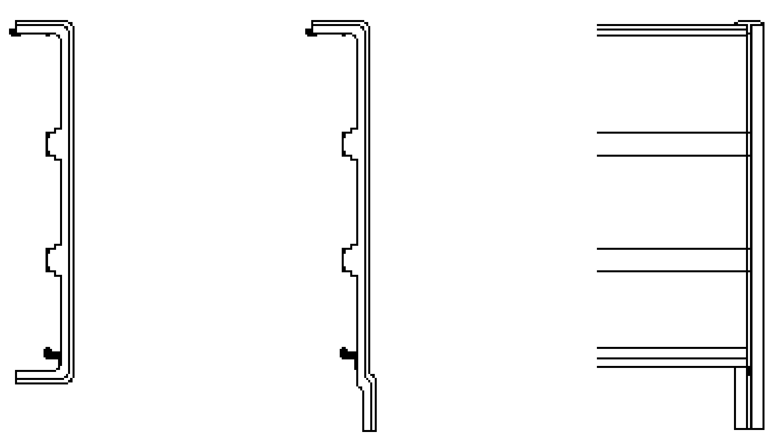
Once all of the Filler Panels for the first room have been cut to size, they may be installed. Find where each cut panel belongs and set it on the floor in the appropriate location. Now, as shown below from a back view, take one of the Filler Panels and place a Front Cover Clip on the end which will be closest to the Heating Panel when set in place. For example, in the drawing above, the clip would be installed on the right end of the Filler Panel. The Front Cover Clips are used to cover the 3/16” expansion gap between the Filler Panel and Heating Panel.



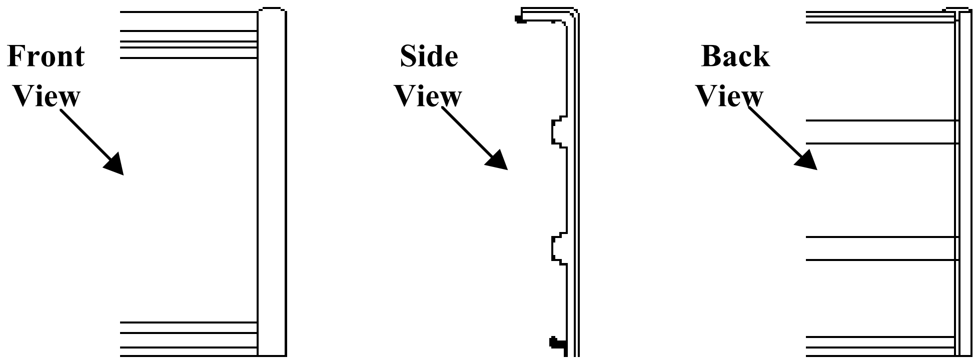
Each Front Cover Clip has two securing points and each of those points have two tabs. The two tabs must slide into the groves behind the “T” bars on the back of the Filler Panel. The drawings below illustrate the securing points and close up views of them.



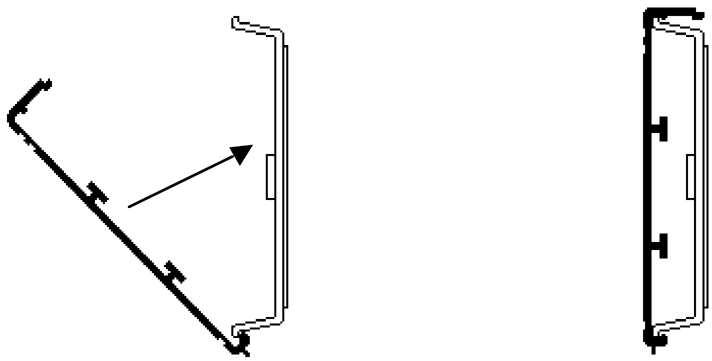
After placing the Front Cover Clip on the Filler Panel the bottom of the clip needs to be cut off. This is done by bending the bottom of the clip so that it is straight and then cutting it flush to the bottom of the Filler Panel. The cut can be made with a pair of diagonal wire cutters held parallel to the bottom of the panel. The following drawing depicts the processes of straightening and cutting the bottom of the Front Cover Clip. It will be visibly apparent if the clip is installed incorrectly.



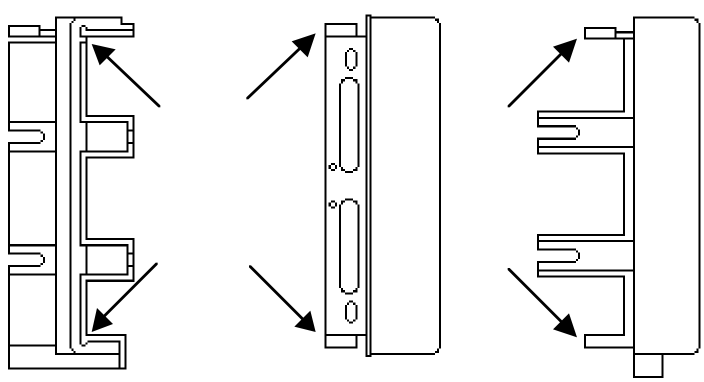
The pictures below show how the Filler Panel looks with the Front Cover Clip installed properly.



After the Front Cover Clip has been installed the Filler Panel can be set in place. This is done by holding the Filler Panel at a 45° angle and hooking the bottom lip of the Filler Panel on to the lower tab of the Filler Panel Mounting Bracket and which ever component is used at the opposite end of the Filler Panel. Now, applying slight upward pressure, swing the Filler Panel into the wall until it snaps in place on the upper tabs of the component and Filler Panel Mounting Bracket. The illustration below depicts the process described above.

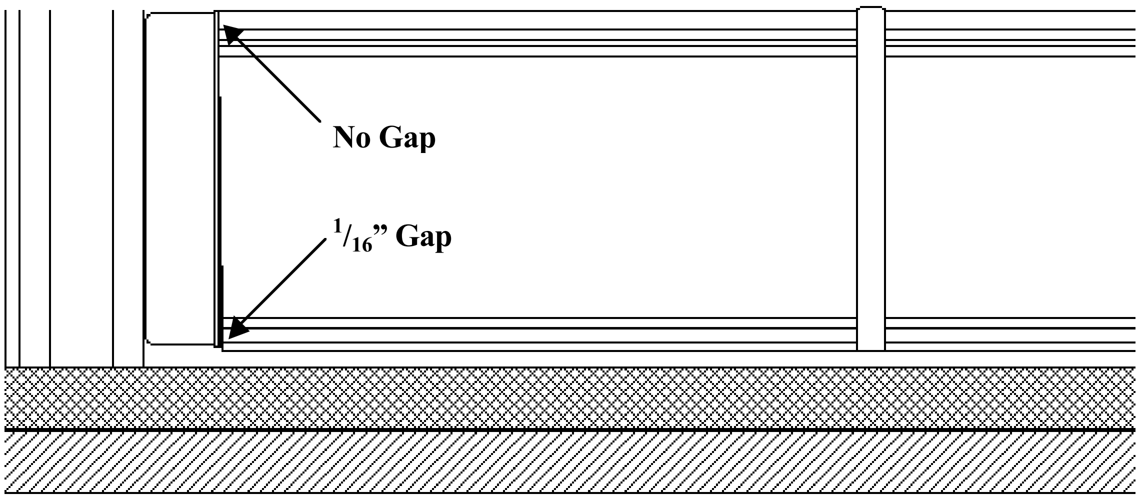


The next drawing shows arrows pointing to the upper and lower tabs of the components, which the Filler Panel snaps on to, as described above.

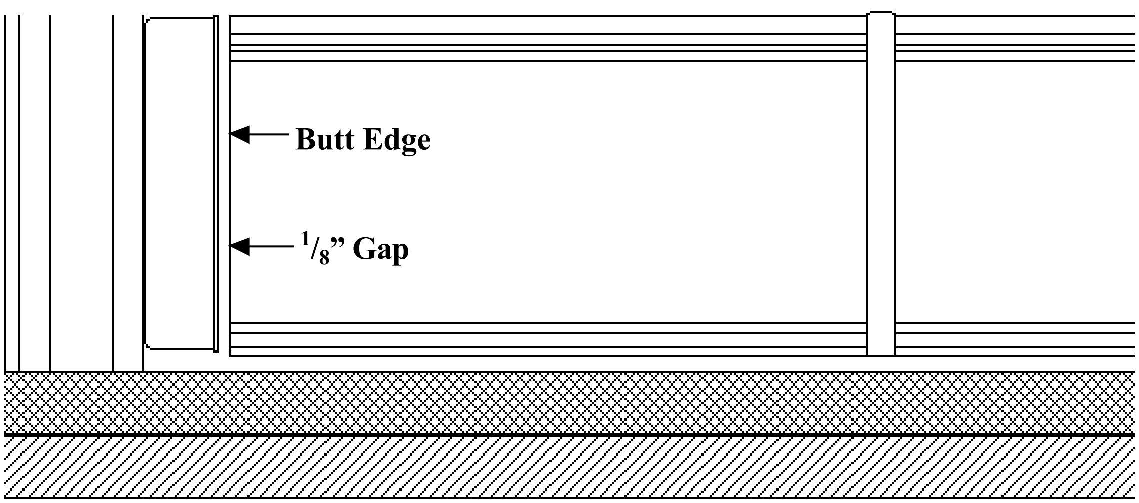


After the Filler Panel is set in place, look closely at the fit of the panel. If the edge that butts to one of the above components is uneven, the Filler Panel must be trimmed. Adjust the saw approximately .50° for every $^{1}/_{16}$” of gap. The

illustration below shows a $^1/_{16}$" gap at the bottom of where the Filler Panel meets the End Cap. The saw must be adjusted so that it trims the top of the Filler Panel. It is important to trim only $^1/_{16}$" from the panel. If done properly nothing should be trimmed from the bottom of the panel so that it remains the original length.

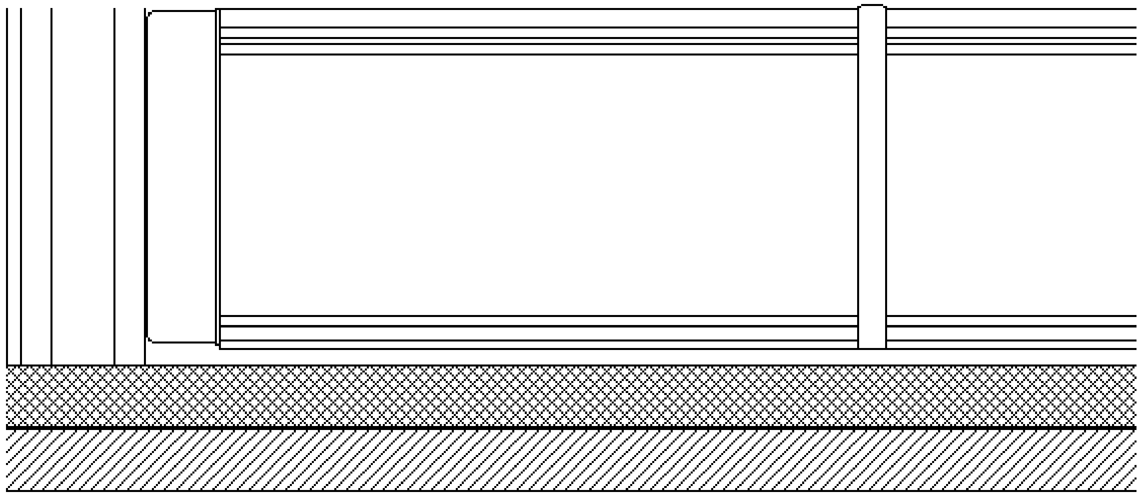


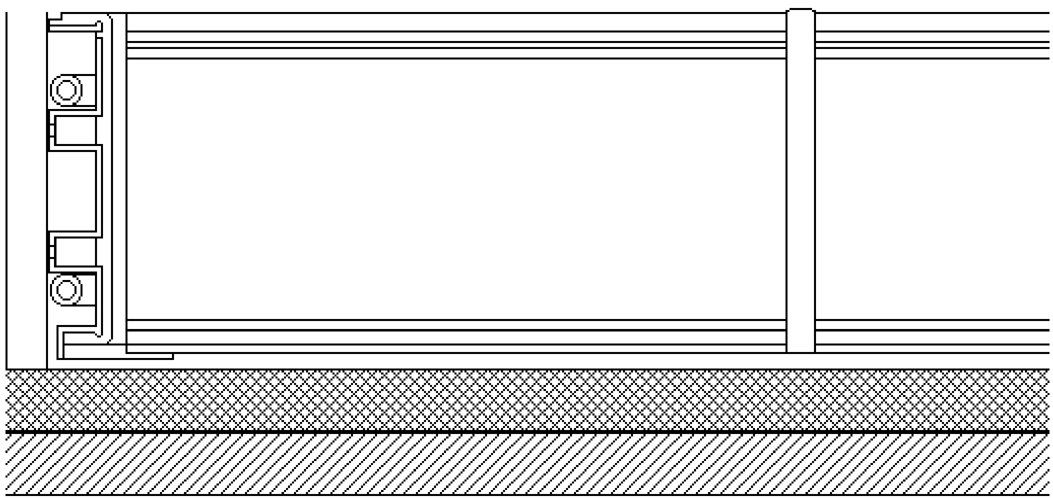
Once the panel has been trimmed snap it back in place. When the panel fits closely caulk must be applied to the butt edge. This is the edge that butts up against either an End Cap, Inside Corner, Outside Corner, molding or other Filler Panel.

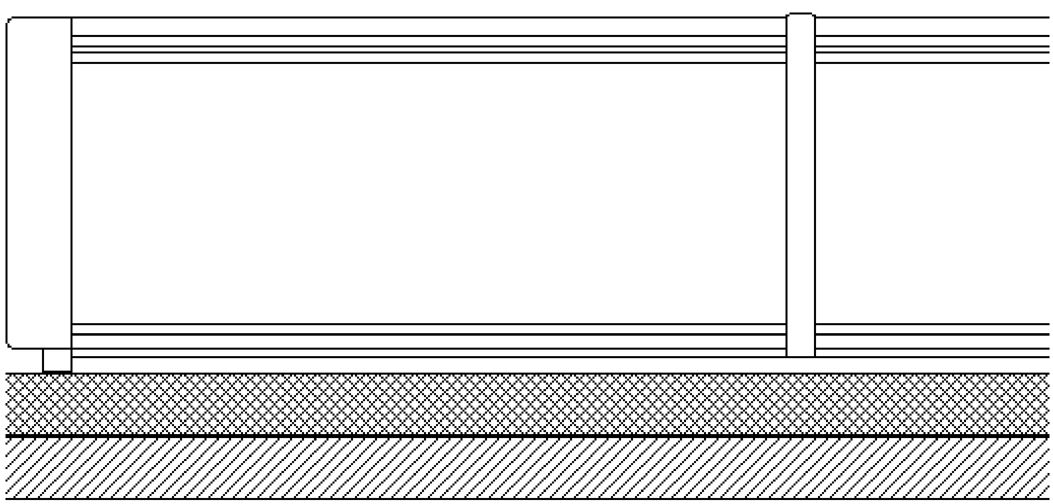


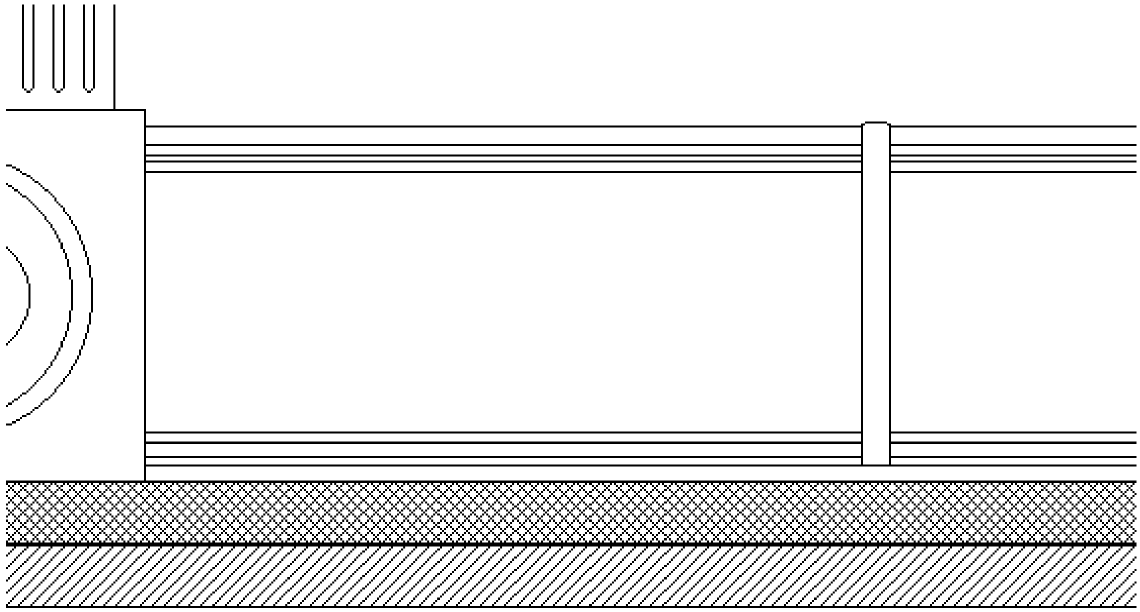
To apply the caulk, slide the Filler Panel away from where the caulk is to be applied so that the space is approximately $^1/_8$". Place a bead of caulk into the space and slide the Filler Panel back to its original position. Caulk should never be applied to the gap between the Filler Panel and Heating Panel, the Front Cover Clip is used to cover this gap. Wipe the excess caulk from the panel and proceed until all of the Filler Panels are completed.

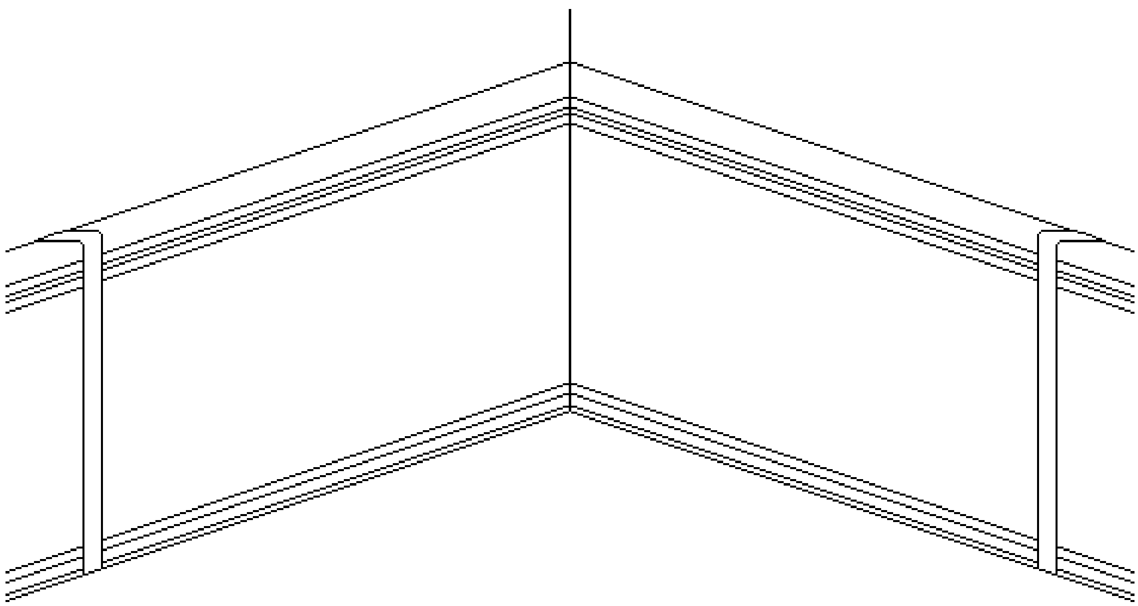
The drawings to follow show how the various types of Filler Panel installations should look when completed.







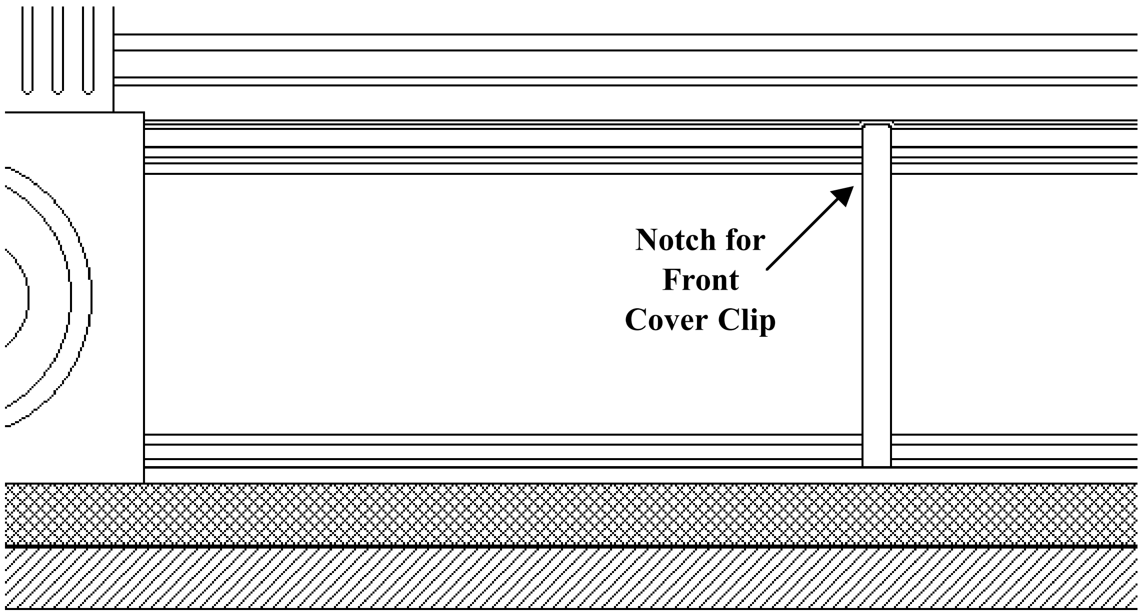




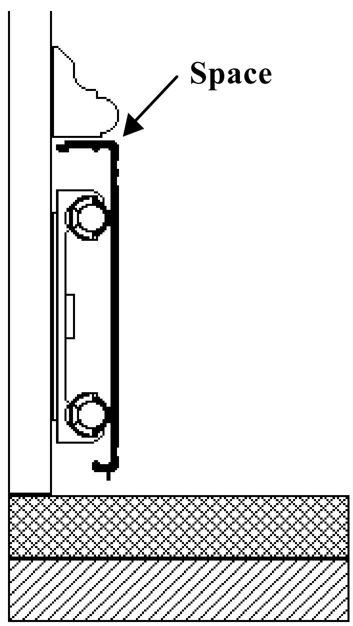
Once all of the Filler Panels have been mounted, trim molding may be installed over the heating panels. A.I.M. recommends that the system is started prior to the molding installation so that if adjustments need to be made they can be done with ease.

To install the molding, first measure and cut it to the proper length. Now place it on top of the panel and mark the molding on each side of the Front Cover Clips. Now notch the molding at the marks to allow for the Front Cover Clips. Place the molding back on top of the panels. Insert a matchbook cover between the molding and the panel directly below where the first nail will be located. Nail the molding to the wall in that spot and then remove the matchbook and insert it where the next nail will go. The object is to have a small space between the molding and the heating panels. If this space is not allowed down the entire length of the panels, severe noise will occur when the panels expand and contract.

The following drawing illustrates the molding installed.



The next drawing shows the molding installed over the heating panel from a side view. Notice the space between the two.

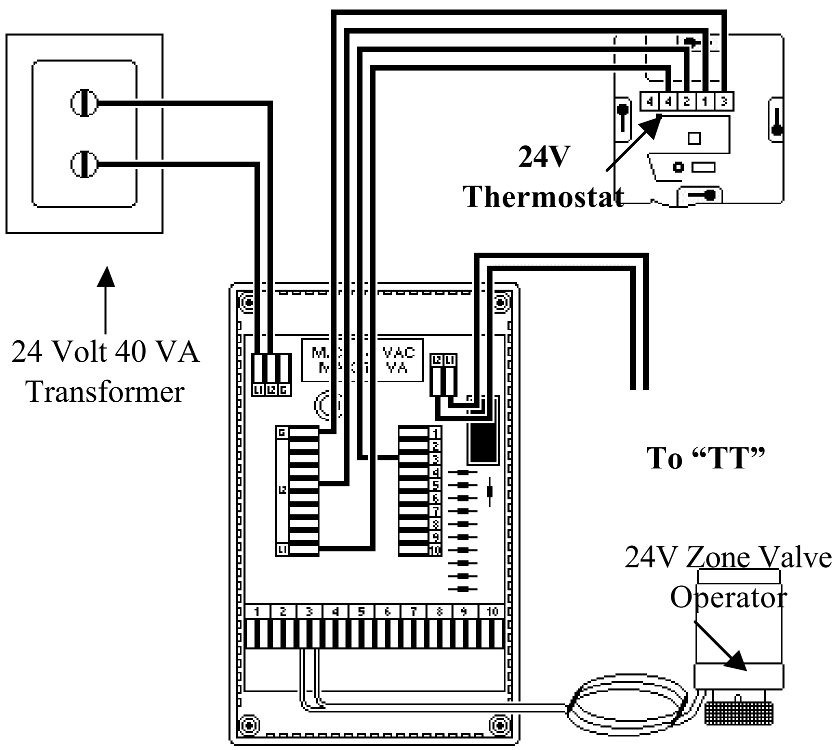


<u>Wiring the System Controls</u>

Begin by mounting the Control Box in a location near enough to the manifold so that all of the 24V Zone Valve Operator wires will reach it. The Control Box is mounted by screwing through the corners of the plastic housing into a wall stud or the plywood the manifold is mounted on. <u>Be sure the screws do</u>

not poke through the back. **Now, drill holes in the top and bottom of the plastic housing to accommodate all of the wires. Through the holes in the bottom of the Control Box, run the wires for the 24V Zone Valve Operators which it will power. Connect the wires to the bottom terminal in the Control Box in the order that they are on the manifold, from left to right. For instance, the third operator in from the left should be wired into terminal 3, as shown in the diagram. If, for example, that operator controls the Dining Room zone, the wire from the number 2 terminal of the Dining Room thermostat should be connected to number 3 on the center terminal of the Control Box. If the forth operator in also controls a zone for the Dining Room, it should be wired into the number 4 terminal to the bottom terminal in the Control Box. Since there will obviously only be one thermostat in the Dining Room, to control the number 4 operator simply install a jumper wire from the number 3 to the number 4 on the center terminal of the Control Box. If the number 5 operator also controlled the Dining Room, follow the same procedures listed above and add a jumper from number 4 to the number 5 on the center terminal of the Control Box.**

The Control Boxes can be wired so that one thermostat will operate either one or multiple 24V Zone Valve Operators. The following diagram shows the wiring procedure for the Control Box, 24V Thermostats and Zone Valve Operators.



The wiring schedule is as follows:

Thermostat	Control Box
1	L2
2	Zone
3	G
4	L1

“Zone” as indicated above, refers to the zone or area, which that thermostat will control. As shown in the previous diagram and explained earlier, the terminal block numbered 1-10, in the center of the Control Box, is where this wire should be connected.

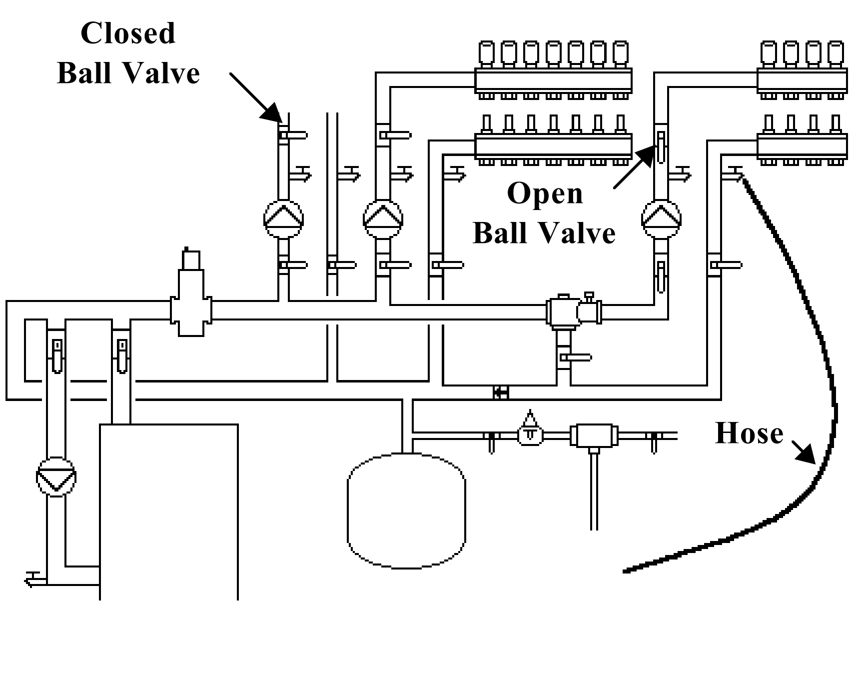
When wiring the thermostats all the wires should be corresponding. For example, if one thermostat has the blue wire connected to the number 3 terminal all the other thermostats should have the blue wire connected to the number 3 terminal.

Due to a limited amount of terminal space in the Control Box, if multiple thermostats are being used, the corresponding wires from the 1, 2, 3 and 4 terminals on each thermostat must be tied together. One additional small piece of wire is then wire capped to the multiple wires and that single wire is connected to either the G, L2 or L1 terminal of the Control Box. For example, if eight thermostats are to be connected to one Control Box, twist all of the wires from terminal number 3 together with one additional small piece of wire and wire cap them. Now take the single piece of wire and connect it to the G terminal of the Control Box.

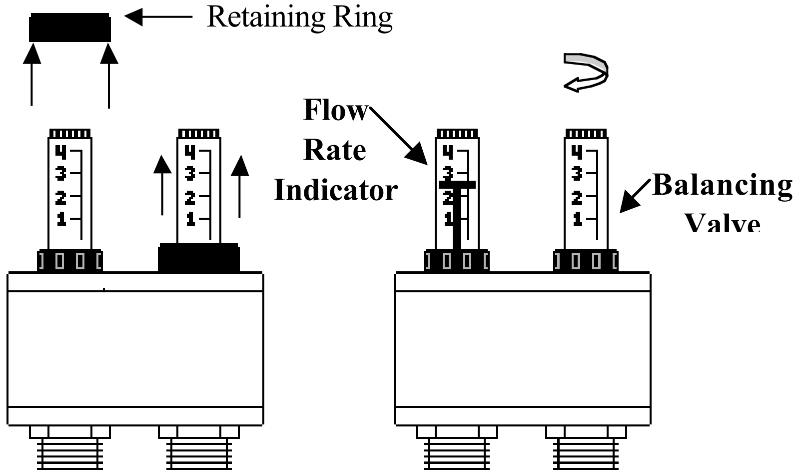
As shown in the wiring diagram on the previous page a 24 Volt 40 VA transformer is used to power the Control Box. The transformer is connected to the L1 and L2 terminals in the upper left hand corner of the Control Box. The L1 and L2 terminals on the right hand side of the Control Box are used as a switch to control either an external switching relay for a circulator or the boiler control. In both instances the wire from the Control Box should be connected to the “TT” or thermostat terminals. This will complete the system wiring.

Filling, Purging and Starting the System

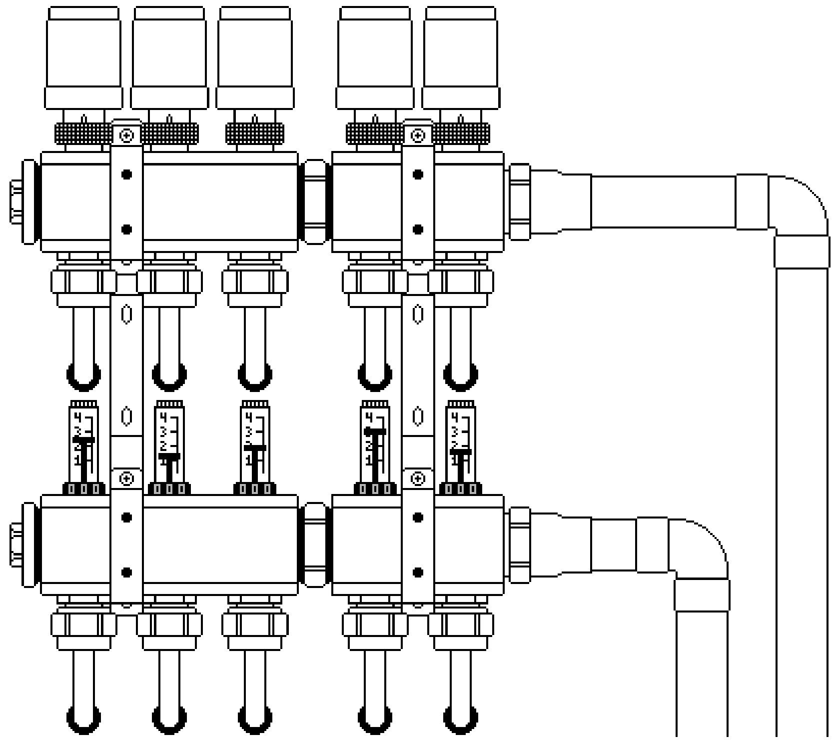
Begin by attaching a hose to the boiler drain on the return pipe of the manifold furthest from the boiler. That manifolds supply pipe and the boiler supply and return pipes should have the only open ball valves on the system. When the valves handle is perpendicular to the pipe it is open.



Now unscrew all of the 24V Zone Valve Operators until they rest loosely on top of the manifold and remove all of the retaining rings on the balancing valves by pulling upward on them. As shown below, turn the balancing valves clockwise until they are all closed.

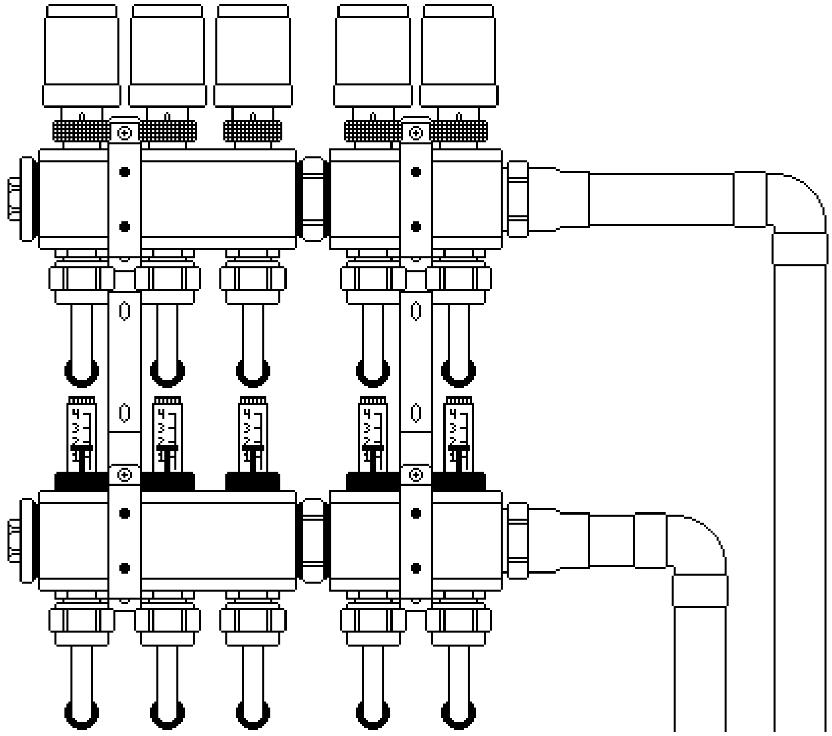


Once all of the balancing valves have been closed, open the boiler drain which has the hose attached to it. Make sure the other end of the hose is in a drain or bucket and open the ball valves on the fresh water inlet. Place the Fast Fill Valve in the "Fill" position and water will begin to flow into the system. Immediately view the gauge on the boiler. Once the pressure in the system builds to 20 p.s.i. open the balancing valve furthest away from the manifold plug. If the pressure continues to build open the next valve in. <u>Do not allow the pressure to reach 30 p.s.i. or the pressure relief valve will blow</u>. Continue to open balancing valves until the pressure evens off at approximately 20-25 p.s.i. The red Flow Rate Indicators, inside the balancing valves, will rise indicating water flow. These indicators will bounce due to air bubbles in the water. When the indicator in the first balancing valve opened has not bounced for a period of 2 minutes, close that valve and open the next valve in line at the same time. Repeat this step with each valve in line until all but the last two valve are closed. If all of the valves are open and the pressure is still climbing past 25 p.s.i., close the Fast Fill Valve. Continue to open and close the Fast Fill Valve maintaining 20-25 p.s.i. It is important to maintain as much pressure as possible without blowing the pressure relief valve. This will ensure that the majority of air will be purged from the system. The last two valves should remain open until their Flow Rate Indicators stop bouncing. Don't shut these valves. Instead, close the boiler drain which has the hose attached and immediately shut the Fast Fill Valve. Close the ball valves on the supply pipe and this manifold is now filled and purged. Repeat this process for each additional manifold until all are complete. <u>Be sure that the Fast Fill Valve is not in the "Fill" position when finished.</u>



The start-up and balancing of the system can now be performed. Begin by replacing all of the 24V Zone Valve Operators in their proper location on the manifold and turning all of the thermostats up as high as they will go. Then open all of the balancing valves and ball valves on the system. Now turn on all power supplies to the system. It is very important to follow the boiler manufactures start-up instructions at this time. Once the power is on, all of the 24V Zone Valve Operators should open within about three minutes and water should begin to circulate through the system. The Flow Rate Indicators should all be visible at this time. If an indicator is not visible after ample time has past, check the balancing valve to ensure that it is opened. If it is, remove that the 24V Zone Valve Operator from the supply manifold for that zone. Should water begin to flow, there is something faulty with how the Control Box was wired or one of the components. If water still doesn't flow there is some sort of blockage in the system that needs to be located and repaired. When all of the Flow Rate Indicators are visible they will register different rates of flow as shown in the drawing above.

To balance the system, simply select a manifold to start with. Find the zone with the least rate of flow on that manifold. Now turn the other balancing valves on that manifold clockwise until all of the Flow Rate Indicators are even. Repeat these processes with each additional manifold. When all of the manifolds are balanced, snap the retaining rings back into place and set the thermostats to the preferred settings.



The system is now fully operational. Congratulations!

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