

# TP970-72, TP970-74, TP9600, and TP9630 Pneumatic Sensors, Humidistats, and Thermostats

## INSTALLATION INSTRUCTIONS

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## INTRODUCTION

The BEFORE INSTALLATION section shows tools and accessories used during installation and calibration, dimensions of major accessories, and procedures for preparing thermostat and humidistat covers. The INSTALLATION section shows how to install thermostats, humidistats, sensors, and fittings and shows connections for one- and two-pipe applications. The CALIBRATION section describes calibration and adjustment procedures.

For information on how to remove a stat body from a stat backplate, refer to APPENDIX: BACKPLATES.

## BEFORE INSTALLATION

### Tools and Accessories

#### General

Figure 1 shows tools used for stat installation. Figure 2 shows tools used during calibration check. Figures 3 through 8 show accessories used for several mounting methods.

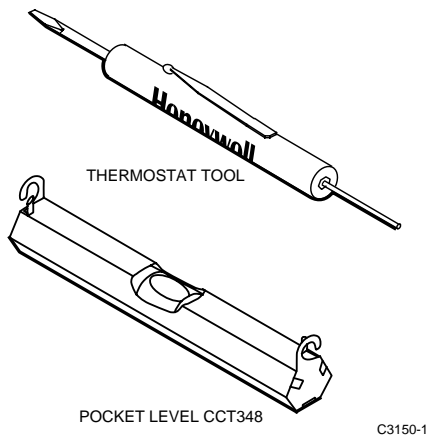


Fig. 1. Installation Tools Used for All Mounting Methods.

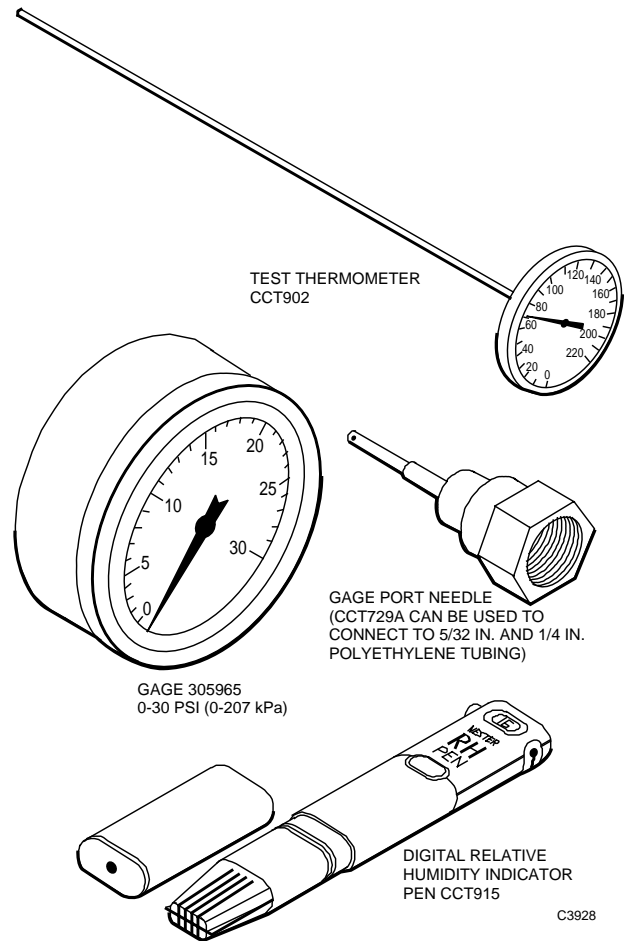


Fig. 2. Calibration Tools.

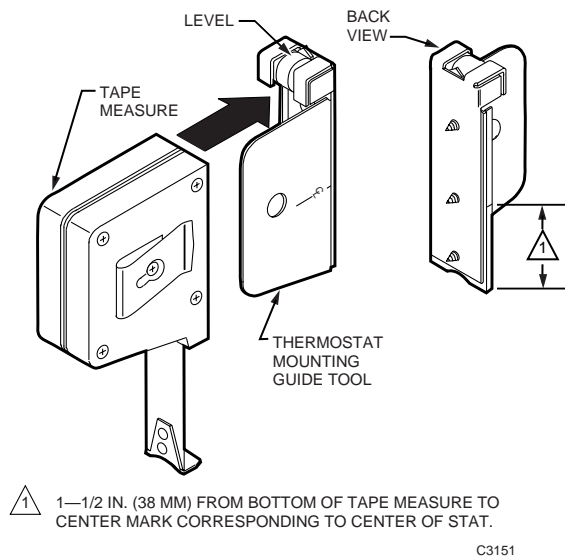
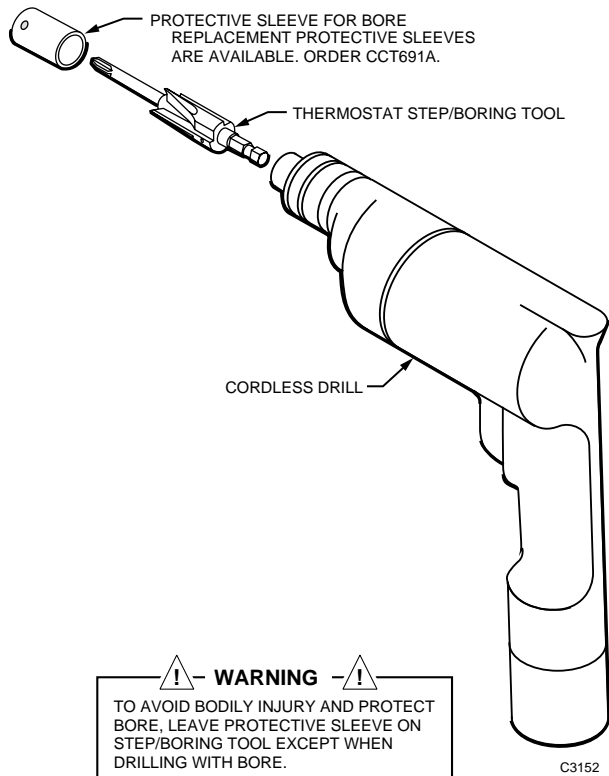
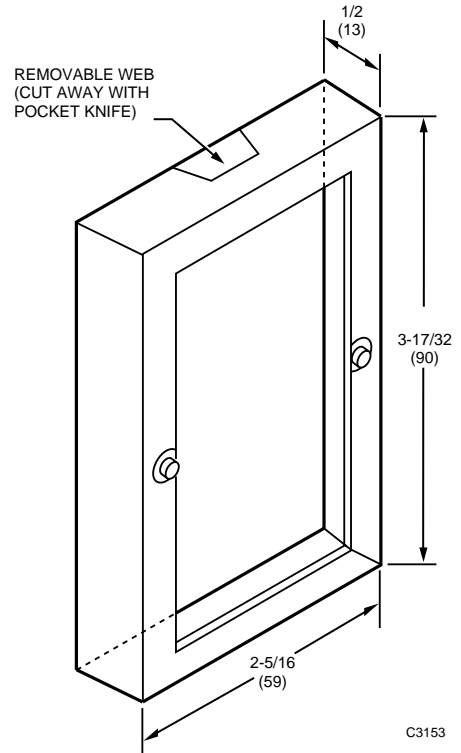


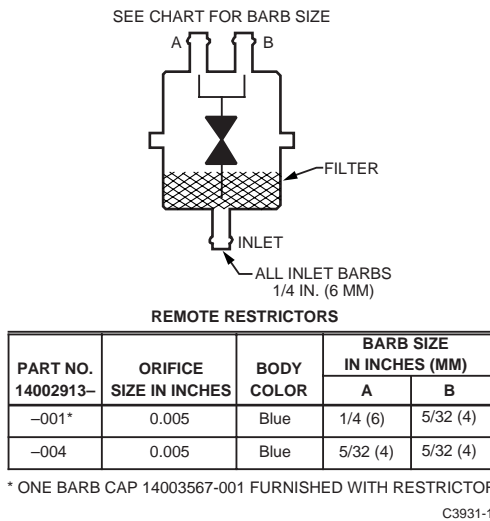
Fig. 3. Tape Measure CCT422 and Thermostat Mounting Guide Tool CCT690.



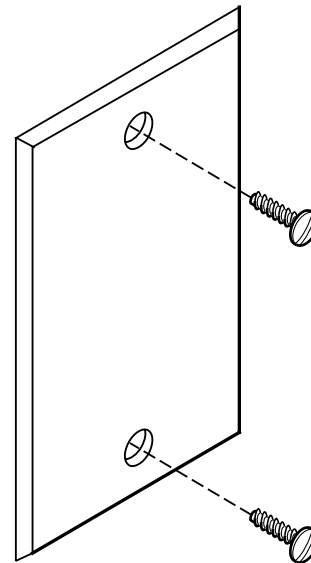
**Fig. 4. Thermostat Step/Boring Tool CCT691 and Cordless Drill CCT713.**



**Fig. 6. Wall Mounting Ring 14004458-001 for Flush or Surface Mounting to Brick or Block Wall or to Wall with Surface-Mounted Tubing.**

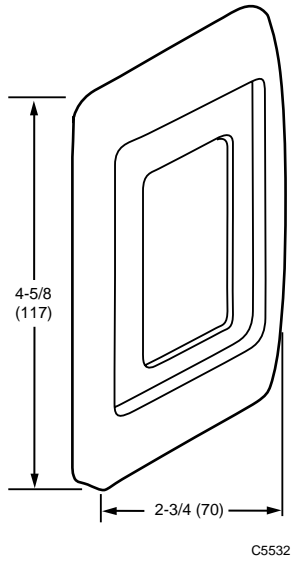


**Fig. 5. Remote Restrictors Used for Piping.**

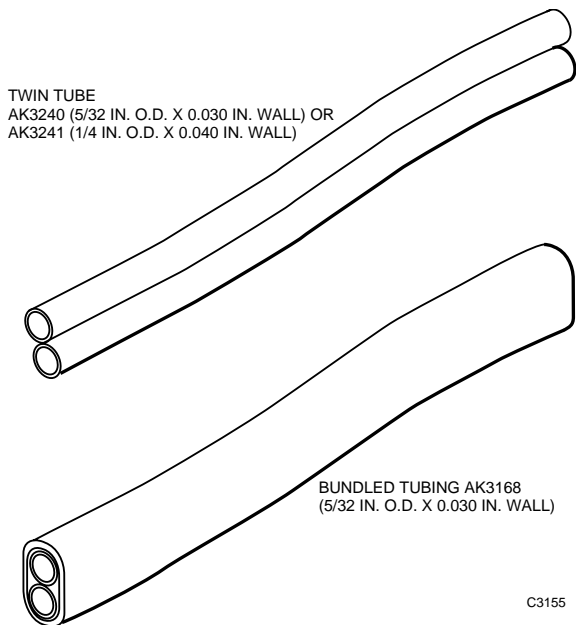


**NOTE: USE FOR APPLICATION WITH RECESSED TUBING WHEN STAT IS TO BE MOUNTED AT A LATER DATE**

**Fig. 7. Wall Plate Bag Assembly 14001905-001.**



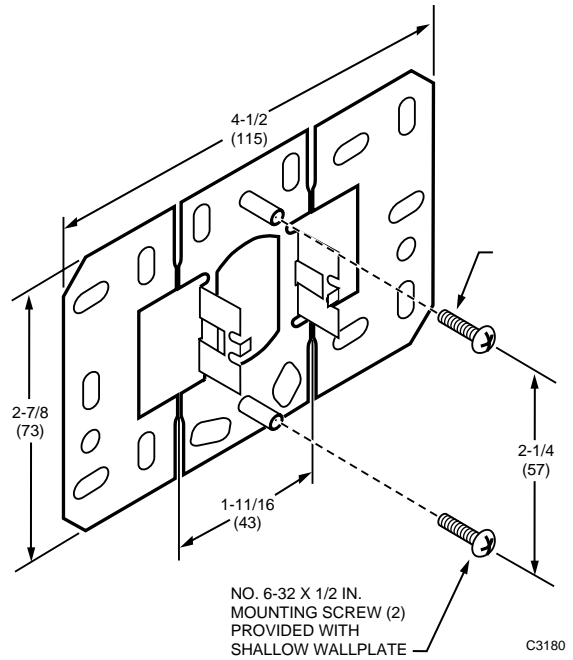
**Fig. 7A. Wall Plate Bag Assembly 14002136-004.**



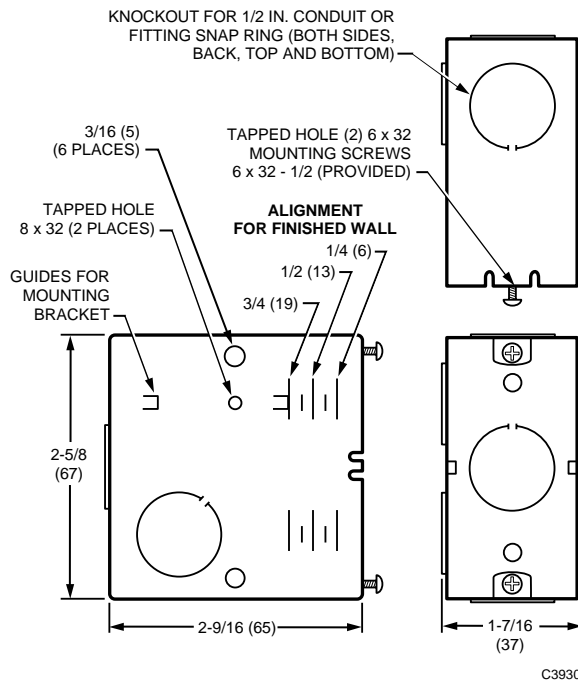
**Fig. 8. Twin Tube AK3240 (5/32 in. O.D. x 0.030 in. wall) or AK3241 (1/4 in. O.D. x 0.040 in. wall) and Bundled Tubing AK3168 (5/32 in. O.D. x 0.030 in. wall).**

**Dimensions**

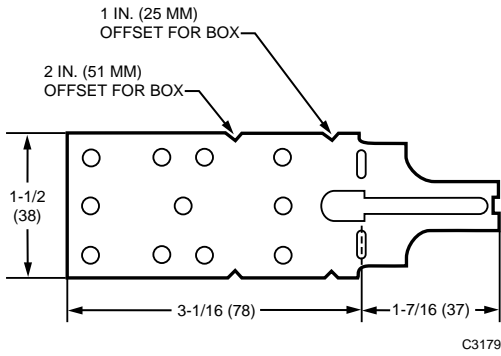
Figures 9 through 13 show dimensions of major installation accessories.



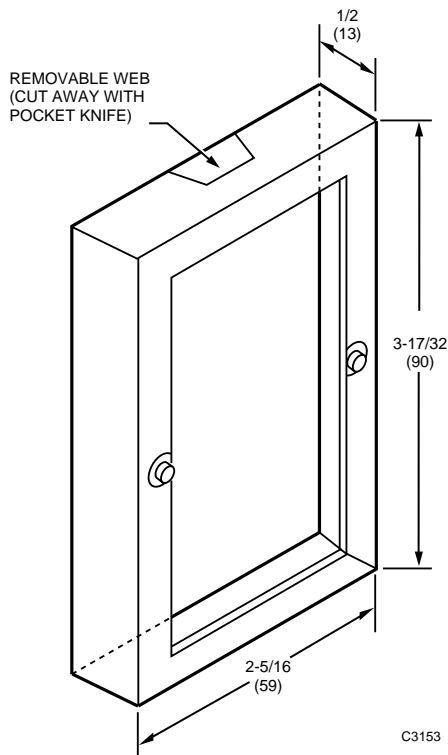
**Fig. 9. Shallow Wall Plate 14001614-001 Dimensions in Inches (Millimeters).**



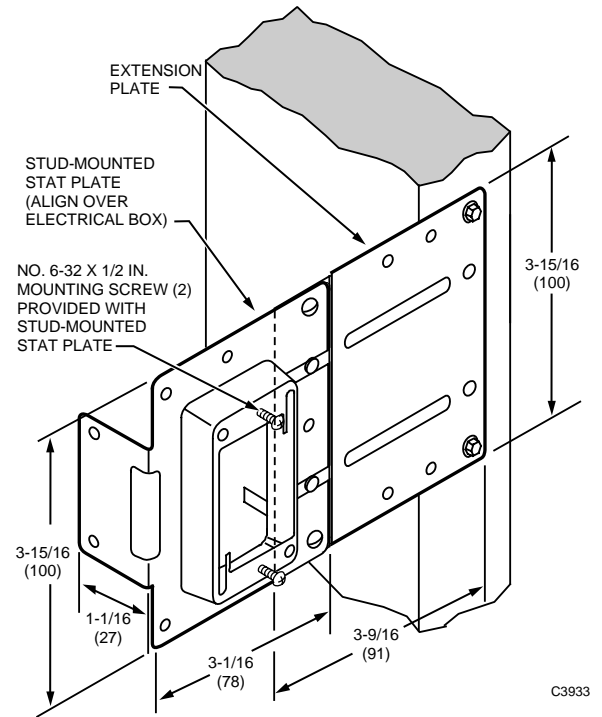
**Fig. 10. Deep Wall Box 14001355-001 Dimensions in Inches (Millimeters).**



**Fig. 11. Deep Wall Box Mounting Bracket 14001354-001**  
Dimensions in Inches (Millimeters).



**Fig. 12. Wall Mounting Ring 14004458-001**  
Dimensions in Inches (Millimeters).



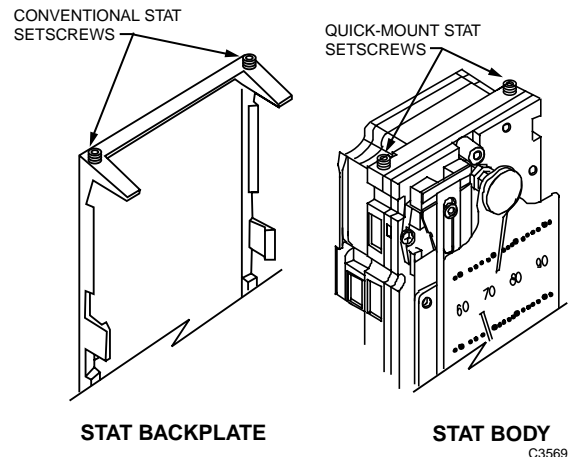
**Fig. 13. Stud-Mounted Stat Plate 14004610-001**  
and Extension Plate 14004656-001  
Dimensions in Inches (Millimeters).

## Covers

### General

This section shows how to remove and replace thermostat and humidistat covers and how to install Inserts over the setpoint and DAY/AUTO slots at the bottom of covers. This section also lists recommended paints for covers that can be painted and describes painting procedures.

Cover assembly and disassembly differs between conventional and Quick-Mount stats. On a conventional stat the cover mounts to setscrews in the backplate, while on a Quick-Mount stat the cover mounts to setscrews in the stat body (Fig. 14).



**Fig. 14. Setscrew Locations for Conventional and Quick-Mount Stats.**

To determine the cover mounting method, look at the holes at the top of the cover (Fig. 15). If the setscrews are raised against the back pair of slots (toward the wall), the setscrews are in the backplate and the stat is a conventional stat. If the setscrews are raised into the front pair of holes, the setscrews are in the stat body and the stat is a Quick-Mount stat.

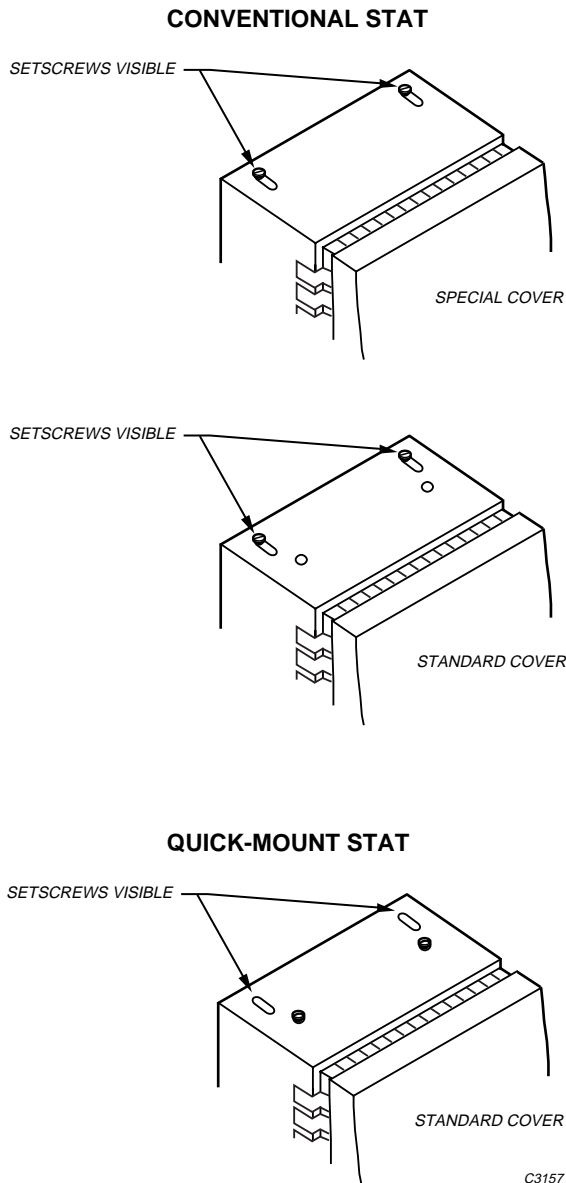


Fig. 15. Conventional and Quick-Mount Stats.

### Removing and Replacing Covers

Cover assembly/disassembly requires Thermostat Tool CCT735A (MQT735A). Use the following procedure to remove a cover:

1. Locate setscrews in cover (back pair of slots for conventional stat, front pair of holes for Quick-Mount stat).
2. Place Allen wrench end of Thermostat Tool through slot/hole and into setscrew (Fig. 16).
3. Rotate Thermostat Tool clockwise until setscrew no longer touches cover. Repeat for other setscrew.
4. Pull Cover out and down.

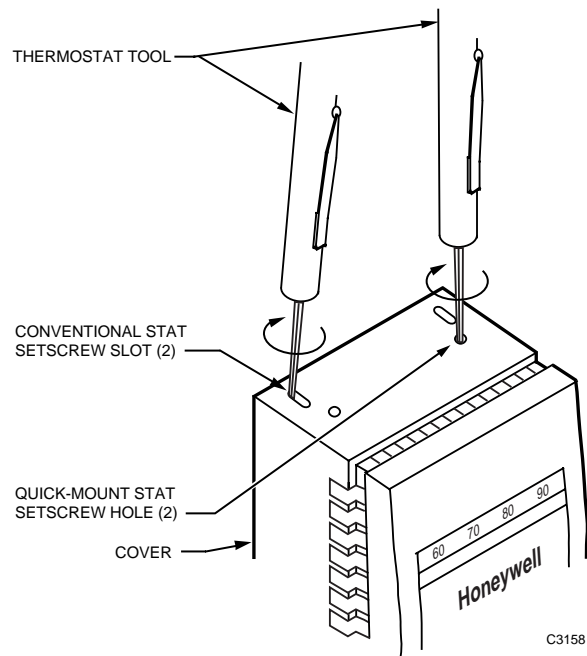


Fig. 16. Removing Cover.

Use the following procedure to replace a cover:

1. Hook slots at bottom of cover over two bottom tabs of stat (Fig. 17). Setpoint adjustment will align with setpoint slot.

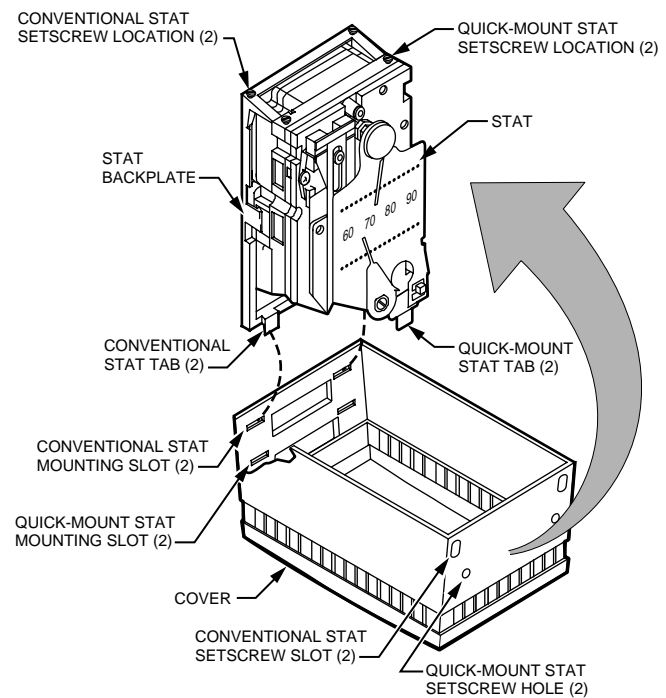


Fig. 17. Replacing Cover.

2. Swing cover up and over stat.
3. Place Allen wrench end of Thermostat Tool through setscrew slot and into setscrew.
4. Rotate Thermostat Tool counterclockwise until setscrew holds cover securely onto stat backplate (conventional stat) or stat body (Quick-Mount stat). Repeat for other setscrew.

### Installing Cover Inserts

The following Cover Inserts are available for the setpoint and DAY/AUTO lever slots on stat covers:

Part No.	Finish	Applicable Covers	Slot
14004437	-001	Satin Chrome 14004406-XXX Standard Covers*	DAY/AUTO
	-002	Beige Plastic 14004407-XXX Standard Covers*	
14004438	-001	Satin Chrome 14004406-XXX Standard Covers*	Setpoint
	-002	Beige Plastic 14004407-XXX Standard Covers*	
14004442	-001	Black 14002132-XXX Special Covers†	DAY/AUTO Setpoint

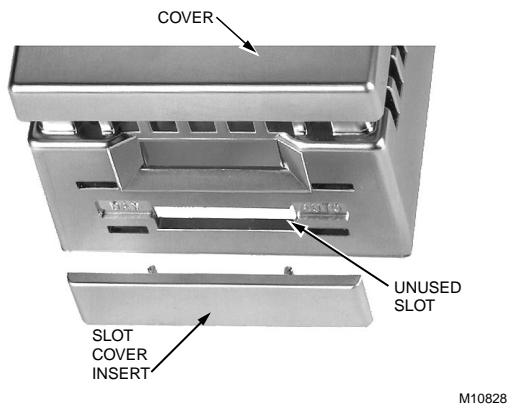
\* See HP970 and TP970 Series Standard Covers and Accessories Specification Data 77-1003.

† See HP970 and TP970 Series Standard Covers Specification Data 77-9828.

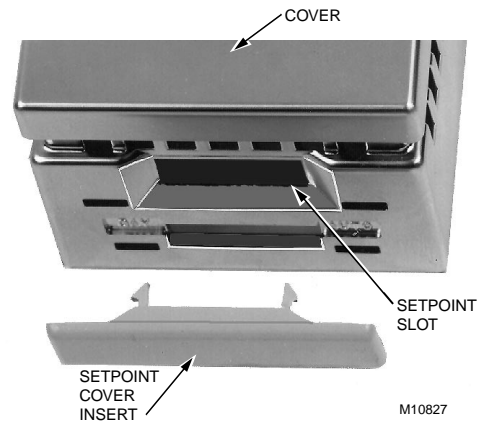
Cover Inserts are removable. Covers ship with setpoint and DAY/AUTO lever slots “open” (without Insert) or “closed” (with Insert present) as follows:

- Setpoint slot: Open or closed as ordered (see HP970 and TP970 Series Standard Covers and Accessories Specification Data 77-1003 and HP970 and TP970 Series Special Covers and Accessories Specification Data 77-9828)
- DAY/AUTO lever slot:
  - No Insert on vertical stat covers
  - Insert present on horizontal stat covers

Figures 18 and 19 show how to install Inserts.



**Fig. 18. Installing DAY/AUTO Cover Insert 14004437-001/-002.**



**Fig. 19. Installing Setpoint Cover Insert 14004438-001/-002.**

### Painting (Beige Plastic Covers Only)

Beige Plastic Covers can be painted with recommended paints before or after Covers are installed.

#### Recommended Paints

If a non-latex paint is required, use Rust-Oleum Enamel (a fish-oil type enamel). No primer is needed.

If a latex paint is required, use one of the following as a primer and follow with any latex wall paint:

- Sears Anti-Rust Enamel (a soya-alkyd type enamel in a spray can)
- True Value Tru-Test X-O Stain Primer/Sealer Stain Killer XOS-1 White (a white-pigmented, shellac type primer)

#### Painting Procedures

##### Painting Cover before Window is Installed

Order the following equipment:

- Cover Assembly 14004402-002
- DAY/AUTO Cover Insert 14004437-002 (optional)
- Setpoint Cover Insert 14004438-002 (optional)
- Window 14004405-XXX according to the following table:

1. Remove or add Inserts to Cover Assembly as required (see INSTALLING COVER INSERTS).
2. Wash Cover Assembly with mild dish detergent solution.
3. Dry with paper towel.
4. Paint with approved paint.
5. Allow to dry.
6. When Window has been assembled to Cover, disassembly may damage Window. Before installing Window, note the following:
  - a. Check that Window display is correct for job requirements.
  - b. Check Window orientation to cover. Cover setpoint and DAY/AUTO lever slots should be on the bottom (vertical mounting) or to the right (horizontal mounting).
7. Remove liner from adhesive on back of Window. Slide Window into Cover opening (Fig. 20) and press in place.

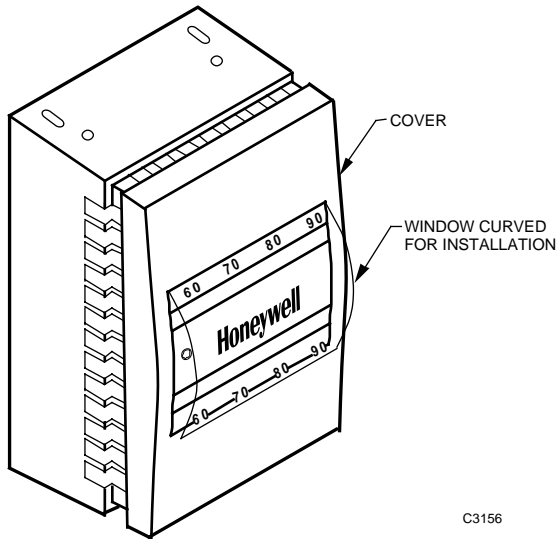


Fig. 20. Installing Window.

**Painting Cover after Window is Installed**

Order the following equipment:

- Cover Assembly 14004407-XXX (select from HP970 and TP970 Series Standard Covers and Accessories Spec Data 77-1003)
- Paint Mask 14002193-001
- DAY/AUTO Cover Insert 14004437-002 (optional)
- Setpoint Cover Insert 14004438-002 (optional)

1. Remove or add Inserts to Cover Assembly as required (see INSTALLING COVER INSERTS).
2. Wash Cover Assembly with mild dish detergent solution. Do not immerse.
3. Dry with paper towel.
4. Apply Paint Mask to window. Trim around window as needed.
5. Paint with approved paint.
6. Allow to dry.
7. Remove Paint Mask.

Window 14004405-XXX		Stat Orientation		Honeywell Logo	Display (Unit)	
Silver Background	Beige Background	Vert.	Horiz.		Setpoint	Thermometer
-001	-101	X		X	None	None
-002	-102		X	X	None	None
-003	-112	X	X		None	None
-004	-113	X			60-90 (F)	60-90 (F)
-005	-103	X		X	60-90 (F)	60-90 (F)
-006	N/A	X		X	40-70 (F)	40-70 (F)
-007	-104	X		X	15-30 (C)	15-30 (C)
-008	-106	X		X	60-90 (F)	None
-009	N/A	X		X	40-70 (F)	None
-010	N/A	X		X	15-30 (C)	None
-011	N/A	X		X	None	60-90 (F)
-012	N/A	X		X	None	15-30 (C)
-013	N/A		X		60-90 (F)	60-90 (F)
-014	N/A		X	X	60-90 (F)	60-90 (F)
-015	-105		X	X	15-30 (C)	15-30 (C)
-016	-107	X		X	20-80 (% rh)	None
-017	N/A		X	X	20-80 (% rh)	None
-018	N/A	X		X	COOLER/WARMER	None
-019	N/A	X		X	HEAT RANGE/COOL RANGE 60-90 (F)	60-90 (F)
N/A	-110	X		X	15-30 (C)	60-90 (F)
-021	N/A		X	X	40-70 (F)	40-70 (F)



## INSTALLATION

This section categorizes stat installation according to the following factors:

- Location of tubing: recessed or surface-mounted
- Type of wall: hollow-core studded, block or brick, concrete, or mullion
- Condition of wall: rough-in or finished

### Installation with Recessed Tubing

Examples of installations with recessed tubing include: hollow-core stud walls, block or brick walls, concrete walls, and mullions.

#### Hollow-Core Studded Wall

A hollow-core studded wall requires either rough-in mounting or finished-wall installation.

#### Rough-In Installation

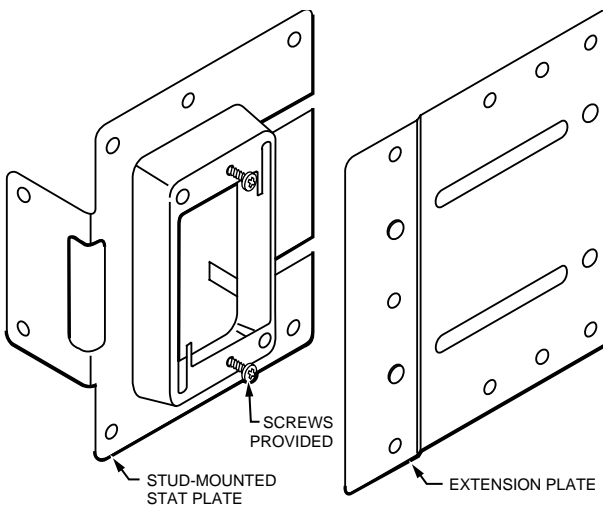
Rough-in installation is done to a stud before the wall is drywalled or to lath before the wall is plastered.

NOTE: If the wall is already drywalled or plastered, see FINISHED WALL INSTALLATION.

#### Mounting to Stud with Stud-Mounted Stat Plate

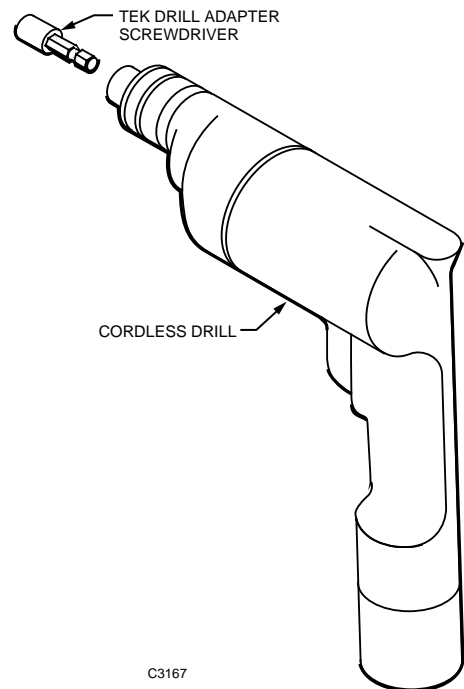
Mounting to a stud using a Stud-Mounted Stat Plate requires the following equipment:

- Stud-Mounted Stat Plate 14004610-001 (Fig. 21)
- Extension Plate 14004656-001 (optional) (Fig. 21)
- Tape Measure CCT422
- No. 8 sheet metal screws
- Cordless Drill CCT713 (Fig. 22)
- TEK Drill Adapter Screwdriver CCT240 (Fig. 22)
- No. 8 x 1/2 in. TEK Screws CCT2444 (two per stat)
- Stud Mount Box Clip CCT2642 for mounting Stud-Mounted Stat Plate to metal stud (Fig. 23) (optional)
- Thermostat Tool CCT735A (MQT735A)

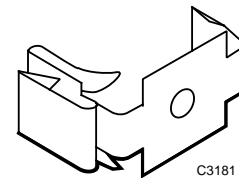


NOTE: MAXIMUM EXTENSION IS 2-3/4 IN. (70 MM) USING ONE PLATE, 5-3/8 IN. (137MM) USING TWO PLATES. C3932

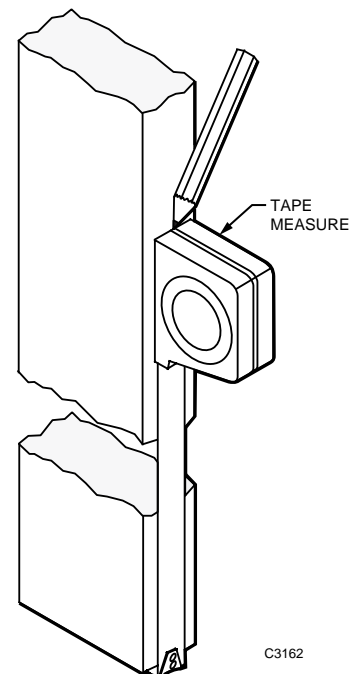
**Fig. 21. Stud-Mounted Stat Plate and Optional Extension Plate.**



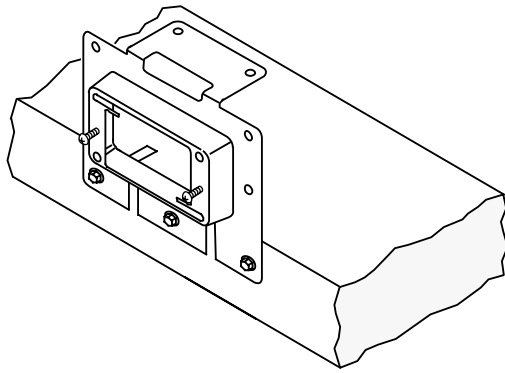
**Fig. 22. TEK Drill Adapter Screwdriver and Cordless Drill.**



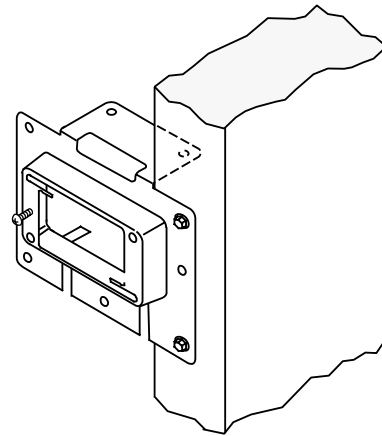
**Fig. 23. Stud Mount Box Clip.**



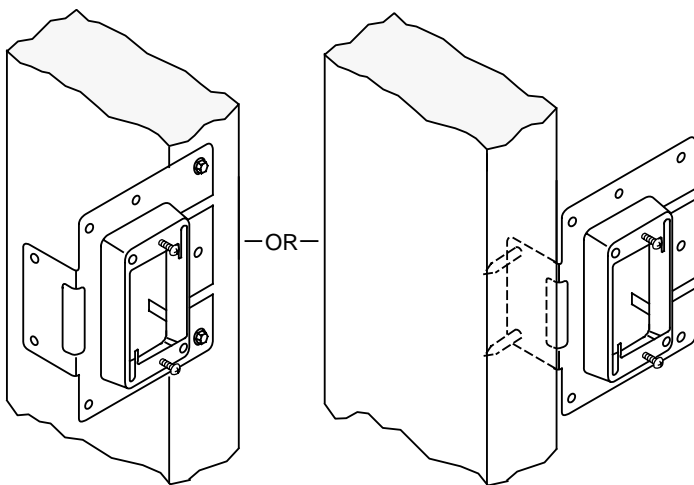
1. Measure and mark approximate stat location on stud.



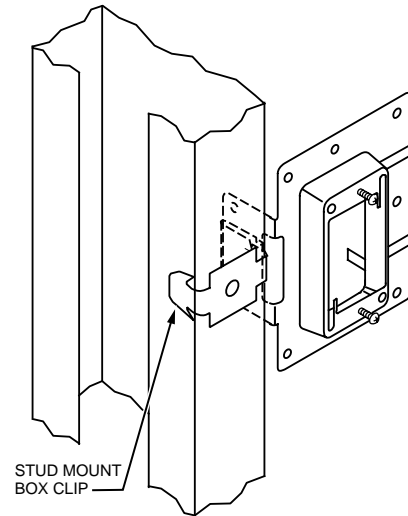
**HORIZONTAL MOUNTING TO HORIZONTAL STUD**



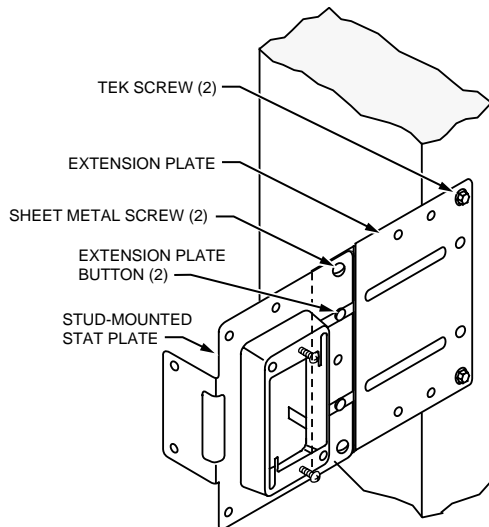
**HORIZONTAL MOUNTING TO VERTICAL STUD OR VERTICAL MOUNTING TO HORIZONTAL STUD**



**VERTICAL MOUNTING TO VERTICAL STUD**



**MOUNTING TO METAL STUD  
(REQUIRES STUD MOUNT BOX CLIP CCT2642)**



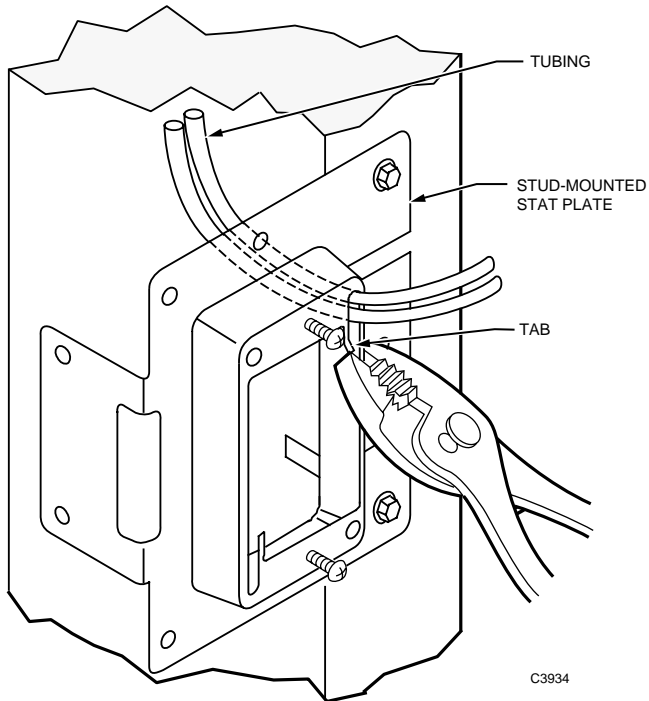
**TYPICAL MOUNTING WITH EXTENSION PLATE**

NOTE:  
TO ATTACH STUD-MOUNTED STAT PLATE TO EXTENSION PLATE:

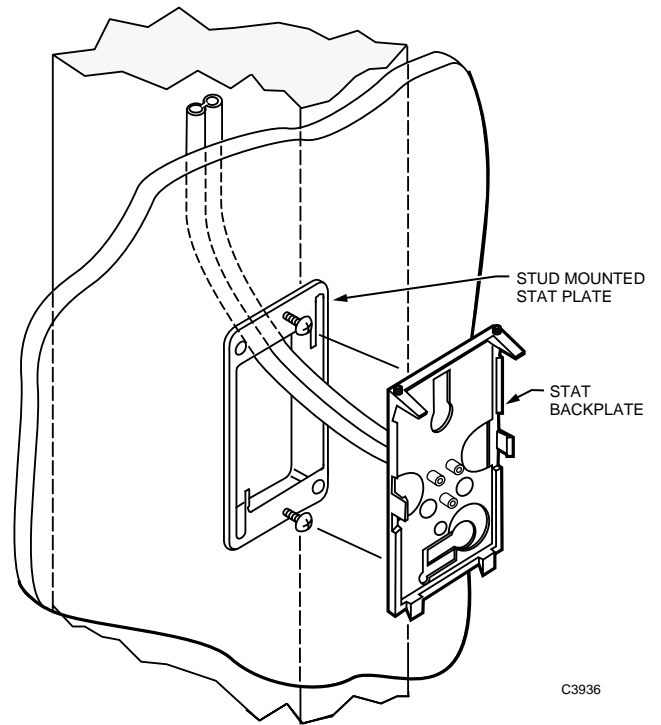
- A. FIT TWO BUTTONS ON EXTENSION PLATE INTO SLOTS ON STUD-MOUNTED STAT PLATE.
- B. ALIGN TWO OUTER HOLES AND/OR SINGLE CENTER HOLES ON TWO PLATES.
- C. FASTEN PLATES TOGETHER WITH NO. 8 x 1/2 IN. SHEET METAL SCREWS.
- D. FASTEN EXTENSION PLATE TO STUD USING NO. 8 x 1/2 IN. TEK SCREWS.

C3937

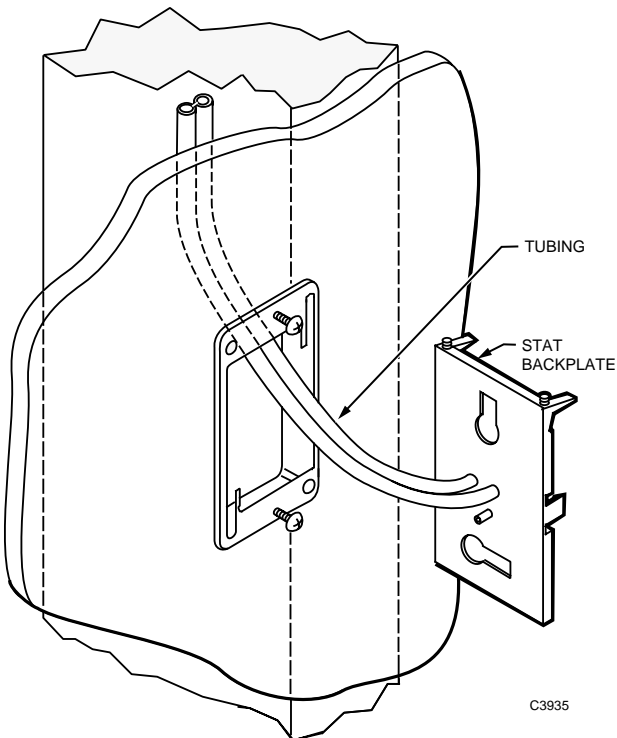
2. Attach Stud-Mounted Stat Plate, using Extension Plate if required to center stat over electrical box. Use Cordless Drill and TEK Screwdriver Drill Adapter to drive No. 8 x 1/2 in. TEK screws, or use Stud Mount Box Clip as required.



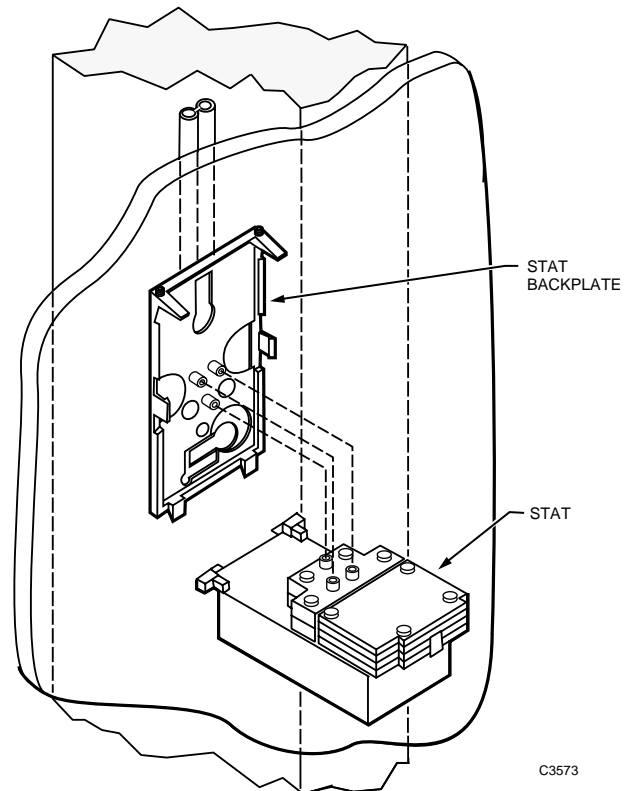
3. Fish tubing through Stud-Mounted Stat Plate. Anchor tubing in upper-right or lower-left corner of Plate by crimping Plate tab with pliers.



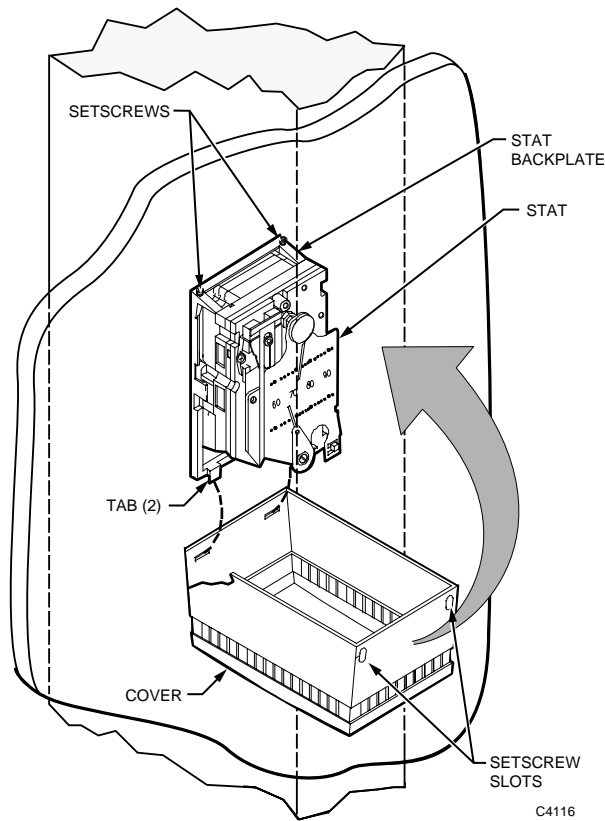
5. Hook keyhole slots of stat backplate over backed-out screws on Stud-Mounted Stat Plate. Level stat backplate and tighten screws.



4. After drywall or plaster is up, release tubing from corner of Plate. Connect tubing to barbs on stat backplate.



6. Mount stat to stat backplate.

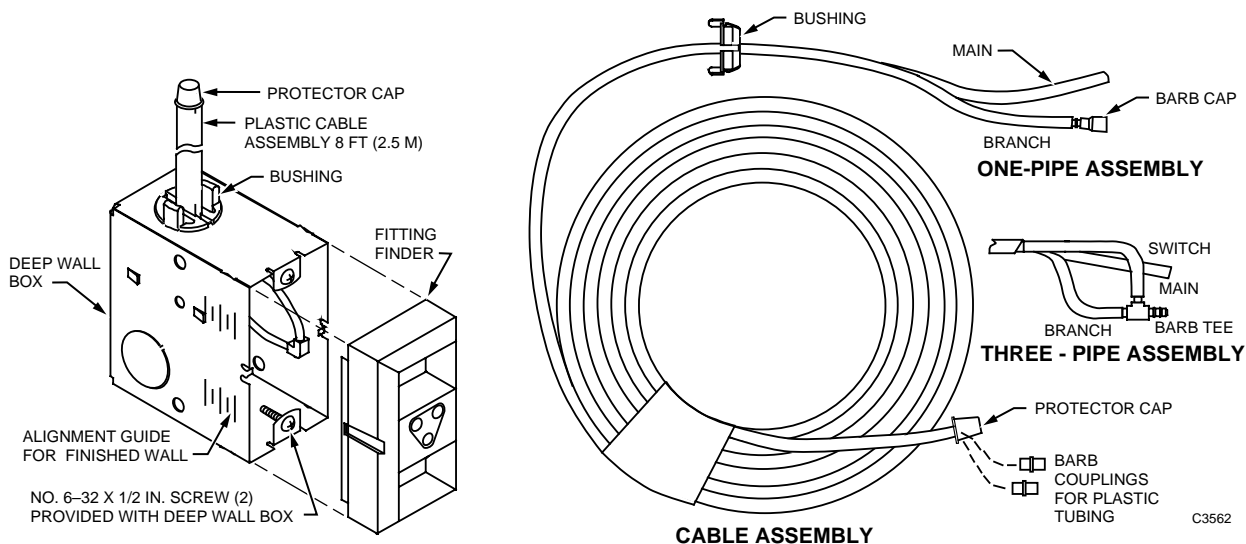


7. Hook slots on stat cover over bottom tabs on stat backplate. Swing stat cover up and over stat. Use Thermostat Tool to raise stat backplate setscrews into setscrew slots on top of cover.

**Mounting to Stud with Deep Wall Box**

Mounting to a stud using a Deep Wall Box requires the following equipment:

- Deep Wall Box Assembly 14001492-001 (includes two-pipe plastic cable assembly, see Fig. 24) or separate parts for one- and three-pipe applications as follows:
  - Deep Wall Box 14001355-001
  - Fitting Finder 14000706-001 (optional)
  - One of the following:
    - 14001491-001 one-pipe or -003 three-pipe Plastic Cable Assembly
    - or
    - 14001494-001 one-pipe, -002 two-pipe, or -003 three-pipe Copper Cable Assembly
- Barb Couplings CCT1606B (MJP1606B) (5/32 x 1/4 in.) or CCT1628B (MJP1628B) (5/32 x 5/32 in.) for plastic tubing (one, two, or three Couplings required according to application)
- Tape Measure CCT422
- Cordless Drill CCT713 (Fig. 25)
- TEK Drill Adapter Screwdriver CCT240 (Fig. 25)
- The following items according to mounting method:
  - Directly to stud:
    - Two No. 8 x 2 in. Pan Head Sheet Metal Screws CCT2310 (MVH2310)
    - or
    - Two 6d 2 in. (51 mm) nails
  - Between two studs:
    - Universal Strap CCT2630 (MVP2630) (Fig. 26)
    - Two No. 8 x 1/2 in. TEK Screws CCT2444
    - One No. 8-32 x 1/2 in. Round Head Screw CCT2410
  - Offset from stud (e.g., to center over electrical box):
    - Deep Wall Box Mounting Bracket 14001354-001
    - One No. 8-32 x 1/4 in. Round Head Screw CCT2408
    - Two No. 8 x 1/2 in. TEK Screws CCT2444
- Thermostat Tool CCT735A (MQT735A)



**Fig. 24. Deep Wall Box Assembly and Cable Assemblies.**

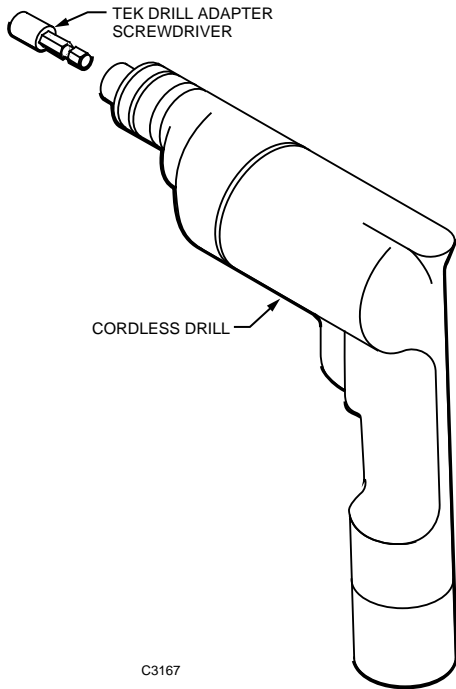


Fig. 25. TEK Drill Adapter Screwdriver and Cordless Drill.

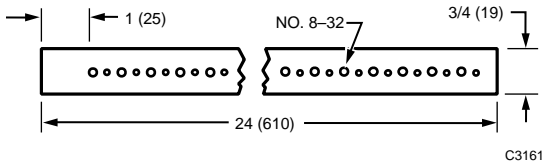
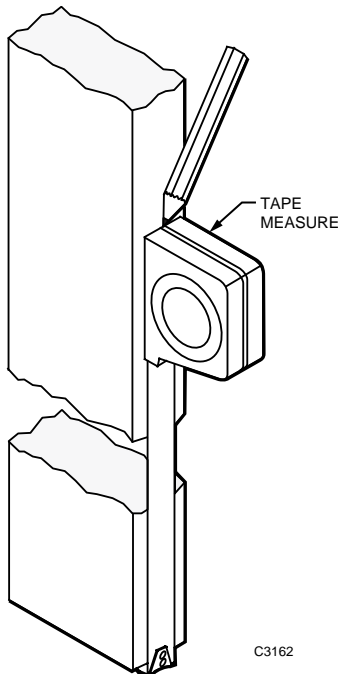
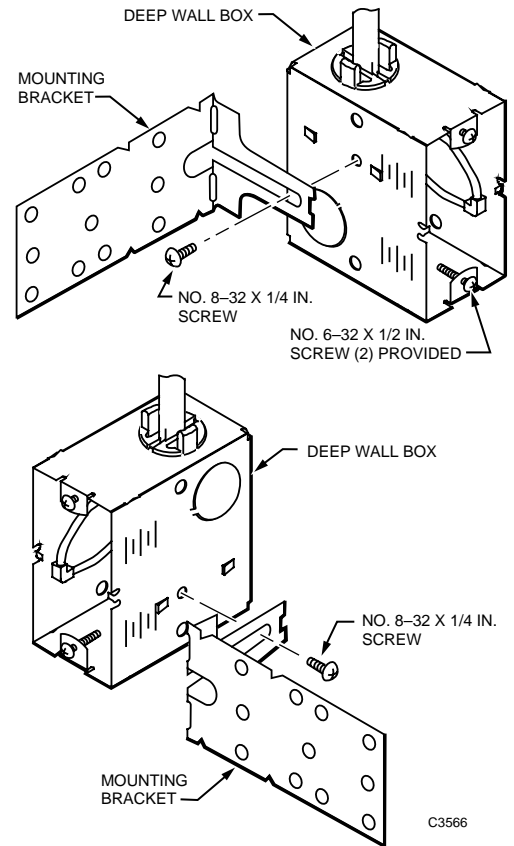


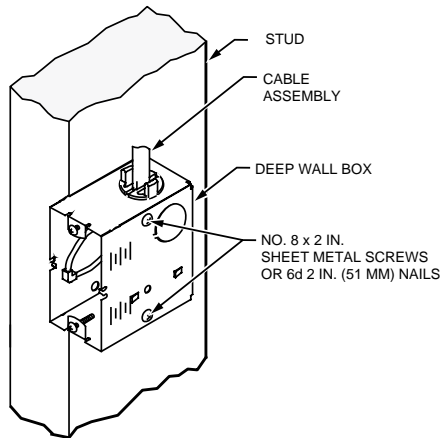
Fig. 26. Universal Strap.



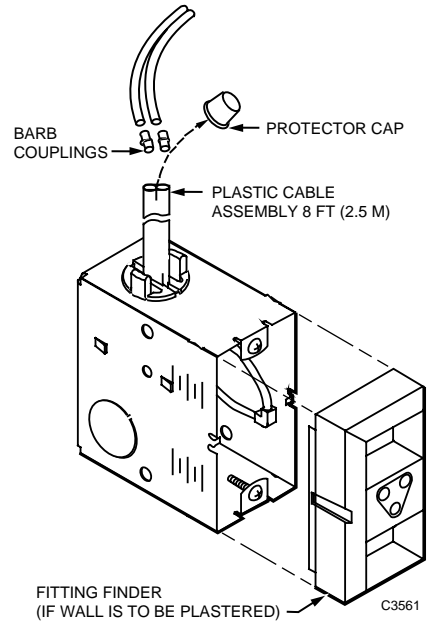
1. Measure and mark approximate stat location on stud.



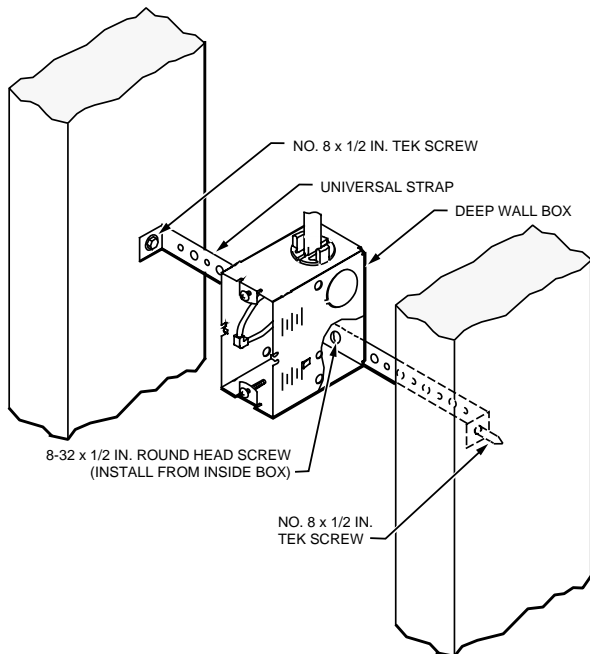
2. If offset from stud is required (e.g., to center stat over electrical box), attach Deep Wall Box to Deep Wall Box Mounting Bracket with No. 8-32 x 1/4 in. Round Head Screw.



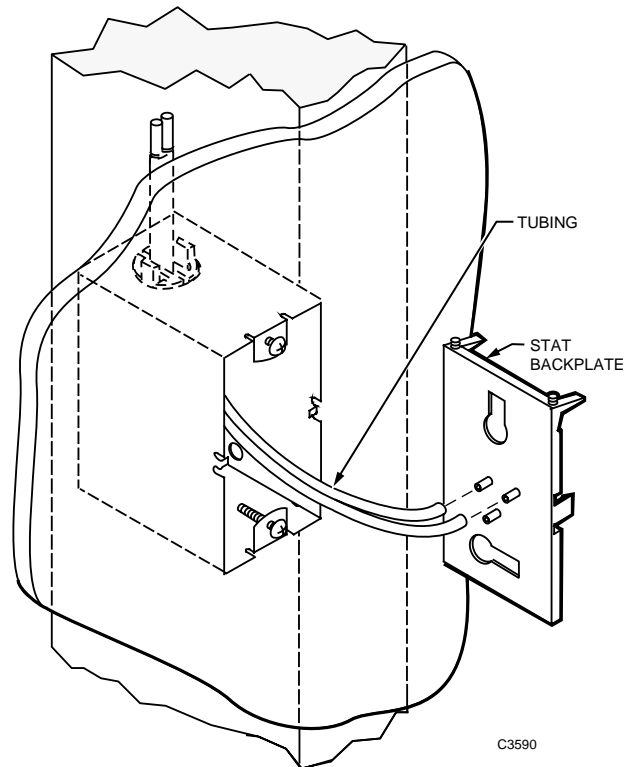
**MOUNTING DEEP WALL BOX DIRECTLY TO STUD**



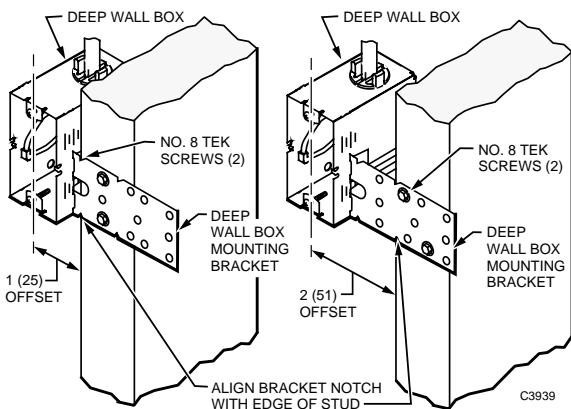
4. Remove protector cap from Cable Assembly. Attach tubing to Cable with 5/32 x 1/4 in. or 5/32 x 5/32 in. Barb Couplings. If wall is to be plastered, snap Fitting Finder onto Deep Wall Box.



**MOUNTING DEEP WALL BOX BETWEEN STUDS USING UNIVERSAL STRAP**

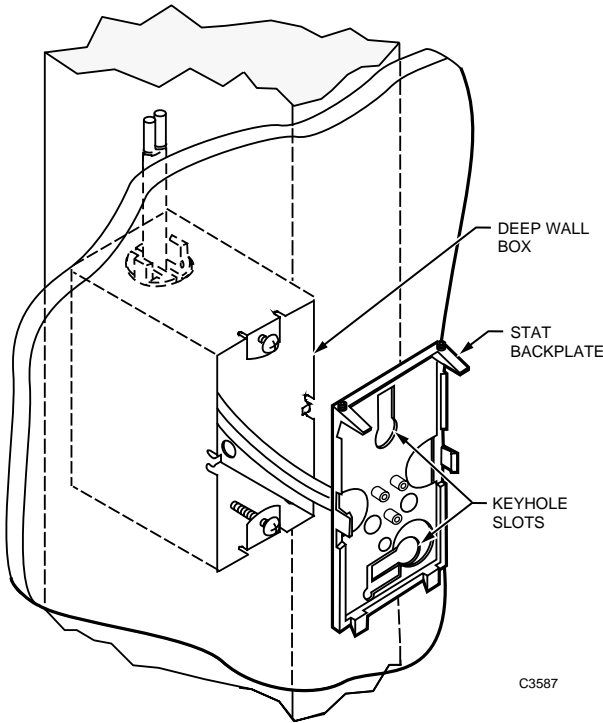


5. After drywall or plaster is up, remove Fitting Finder, if used, from box. Cut elbow from end of Cable Assembly. Connect tubing to barbs on stat backplate.

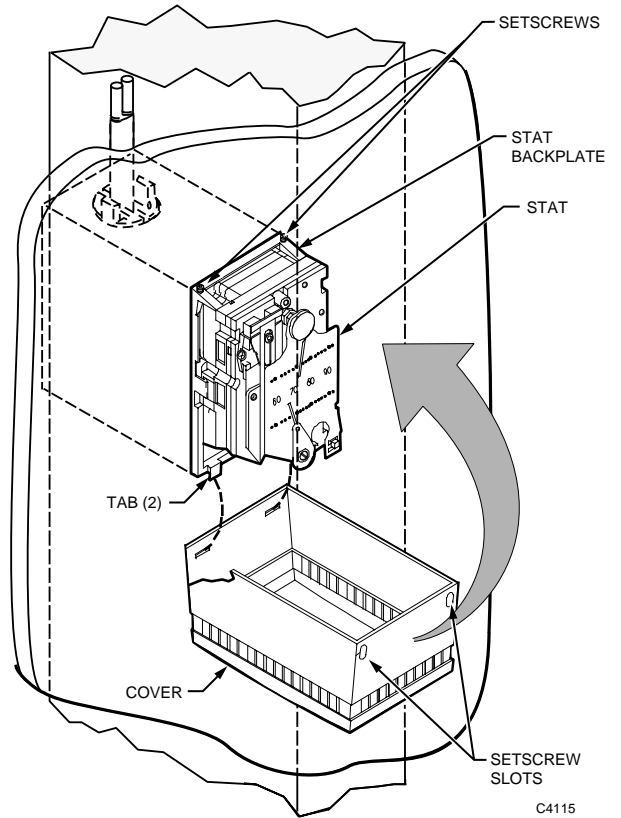


**USING DEEP WALL BOX MOUNTING BRACKET**

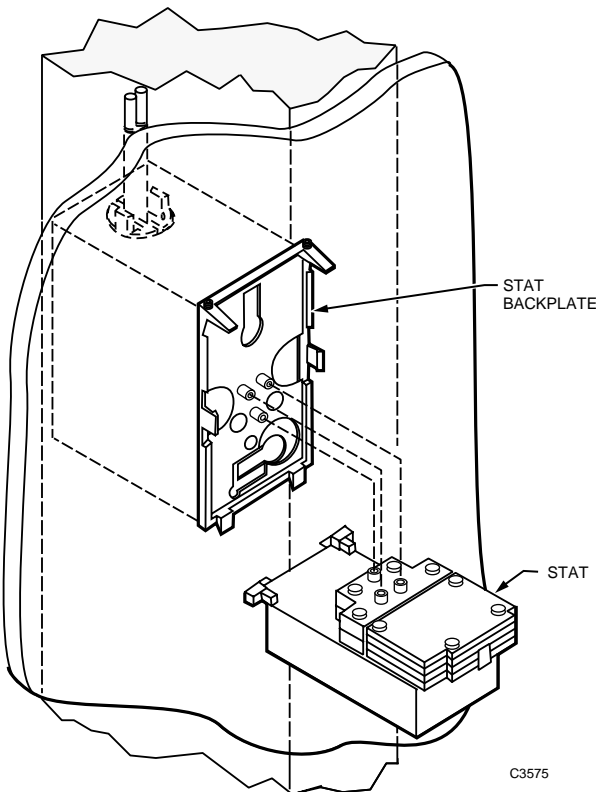
3. Mount Deep Wall Box to stud so that front of Box will be flush with finished wall.



6. Back screws out of Deep Wall Box. Hook stat backplate keyhole slots onto backed-out screws. Level stat backplate and tighten screws.



8. Hook slots on stat cover over bottom tabs on stat backplate. Swing stat cover up and over stat. Use Thermostat Tool to raise stat backplate setscrews into setscrew slots on top of cover.

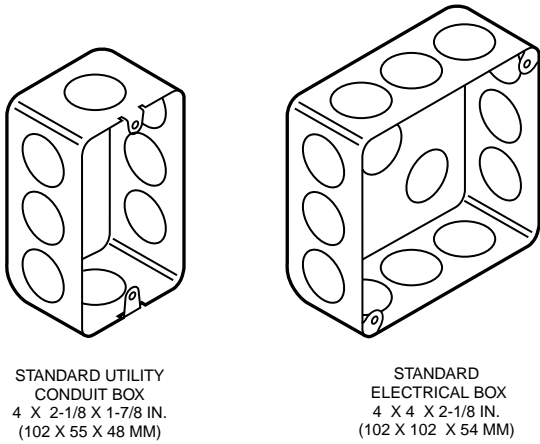


7. Mount stat onto stat backplate.

**Mounting to Stud with Standard Electrical Box**

Mounting to a stud using a standard electrical box requires the following equipment:

- Standard Utility Conduit Box CCT2967 (MVE2967) or Standard 4 x 4 in. Electrical Box CCT2960 (Fig. 27)
- One of the following (Fig. 28):
  - Plastic Cable Assembly 14001491-001 (one pipe), -002 (two pipe), or -003 (three pipe) and Barb Couplings CCT1606B (MJP1606B) (5/32 x 1/4 in.) or CCT1628B (MJP1628B) (5/32 x 5/32 in.)
  - Copper Cable Assembly 14001494-001 (one pipe), -002 (two pipe), or -003 (three pipe)
  - 1/2 in. emt conduit and 1/2 in. TW Setscrew Connector CCT2900 (MVE2900)
- Tape Measure CCT422
- No. 10 x 3 Pan Head Sheet Metal Screws CCT2317 (MVH2317) or 2-1/2 in. (64 mm) nails (two per stat)
- Stud Mount Box Clip CCT2642 for Standard Utility Conduit Box (Fig. 29)
- MFS Clip CCT2649E for Standard 4 x 4 in. Electrical Box (Fig. 29)
- If wall is to be plastered:
  - Standoff Ring 14000885-001
  - Fitting Finder 14000706-001
- Thermostat Tool CCT735A (MQT735A)

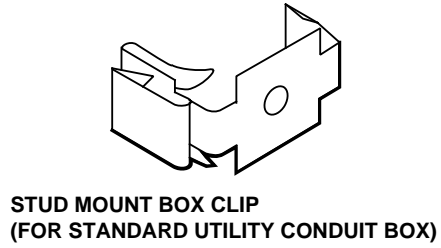


STANDARD UTILITY  
CONDUIT BOX  
4 X 2-1/8 X 1-7/8 IN.  
(102 X 55 X 48 MM)

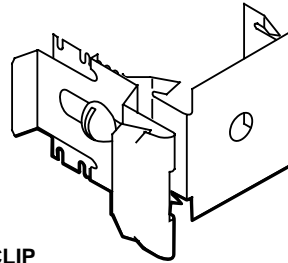
STANDARD  
ELECTRICAL BOX  
4 X 4 X 2-1/8 IN.  
(102 X 102 X 54 MM)

C3938

**Fig. 27. Standard Utility Conduit Box and Standard 4 x 4 in. Electrical Box.**



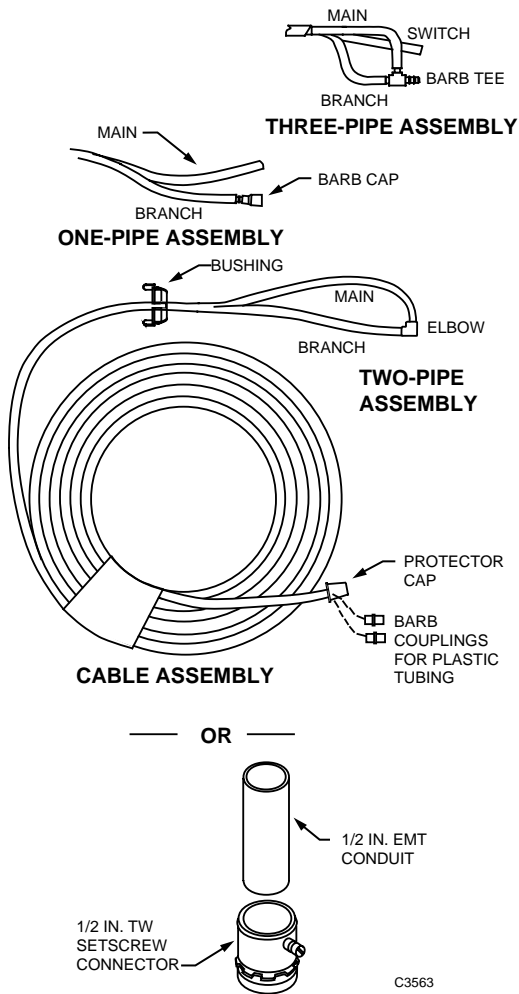
STUD MOUNT BOX CLIP  
(FOR STANDARD UTILITY CONDUIT BOX)



MFS CLIP  
(FOR STANDARD 4 X 4 ELECTRICAL BOX)

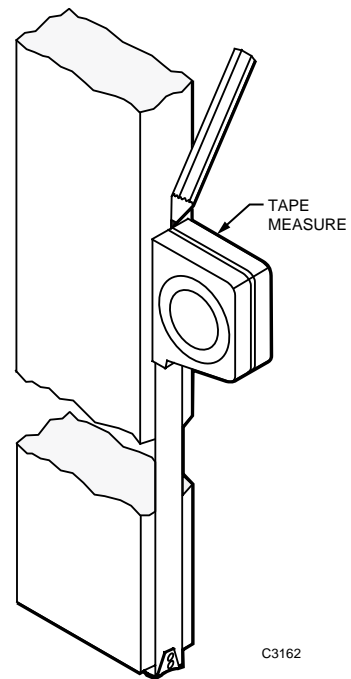
C3182

**Fig. 29. Stud Mount Box Clip and MFS Clip.**



C3563

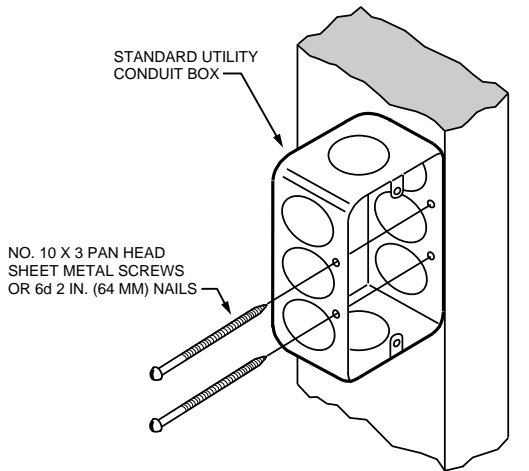
**Fig. 28. One-, Two-, or Three-Pipe Plastic or Copper Cable Assembly or 1/2 in. EMT Conduit with 1/2 in. TW Setscrew Connector.**



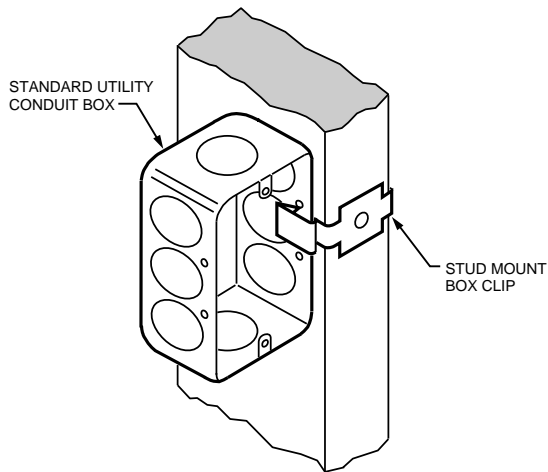
C3162

1. Measure and mark approximate stat location on stud.

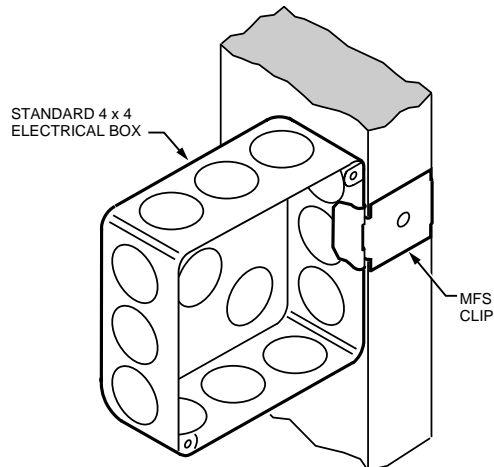




**MOUNTING STANDARD UTILITY CONDUIT BOX DIRECTLY TO STUD**



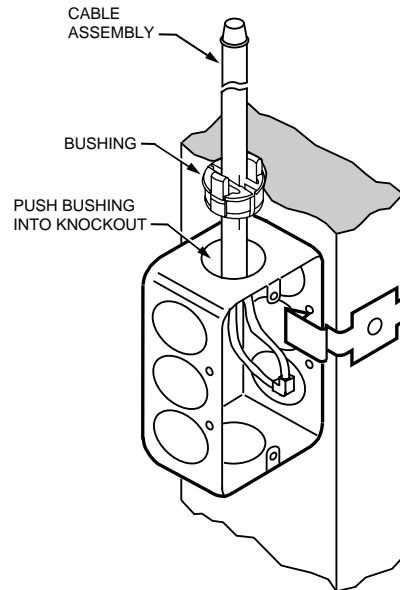
**MOUNTING STANDARD UTILITY CONDUIT BOX TO STUD USING STUD MOUNT BOX CLIP**



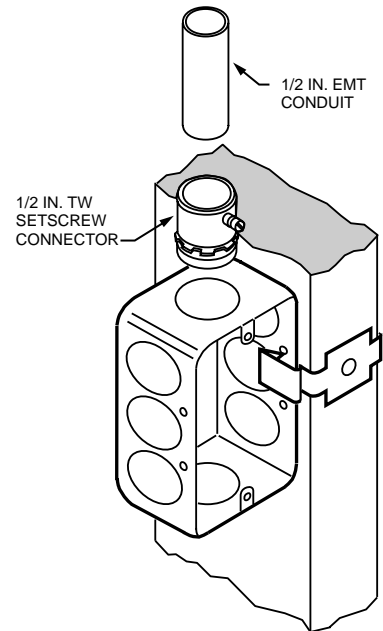
**MOUNTING STANDARD 4 x 4 ELECTRICAL BOX TO STUD USING MFS CLIP**

C3186

2. Mount box to stud.

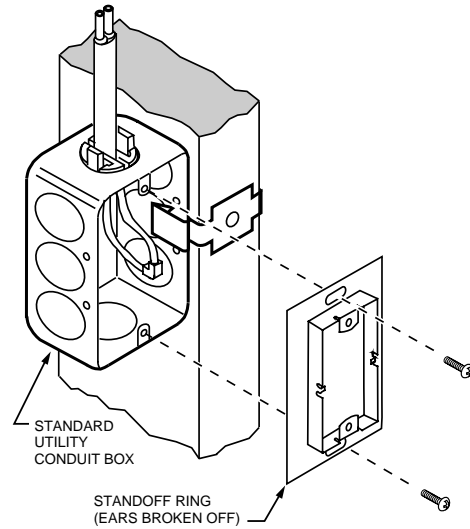
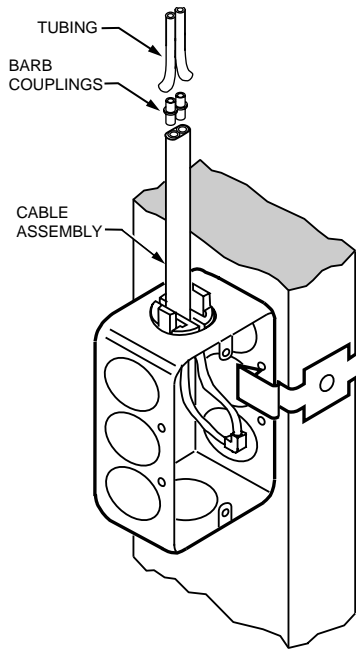


— OR —

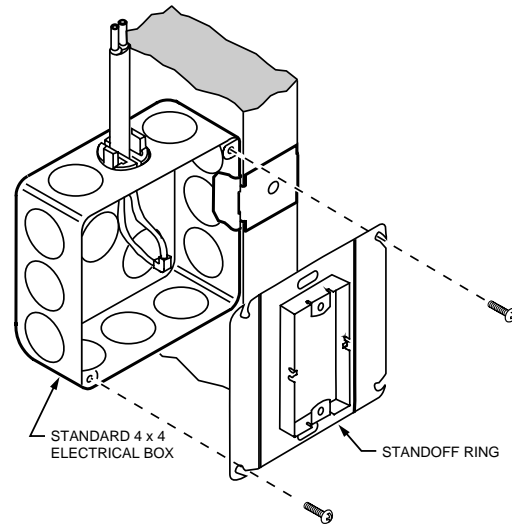
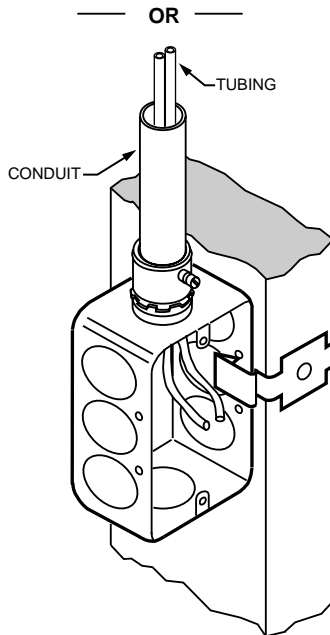


C3188

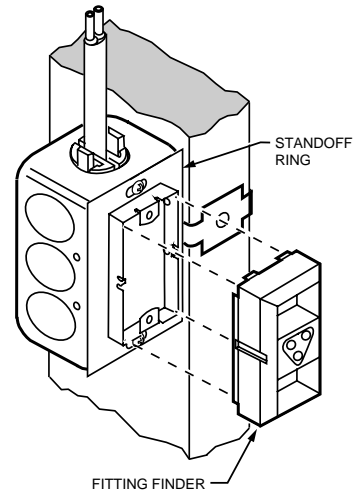
3. Place elbow end of Cable Assembly through knockout and push Cable Assembly bushing into knockout.  
 or  
 Attach 1/2 in. TW Setscrew Connector to appropriate knockout in box, place conduit into Connector, and tighten Connector setscrew.



OR



IF WALL IS TO BE PLASTERED:

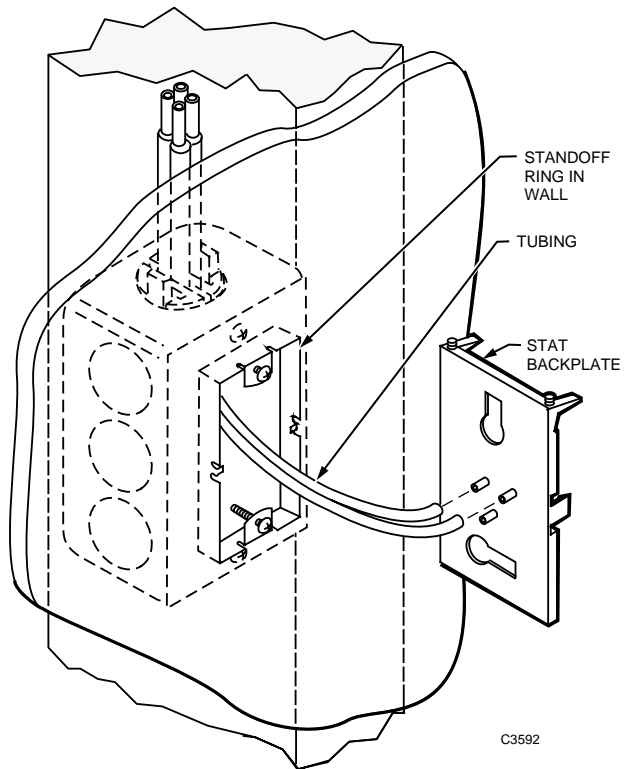


C3189

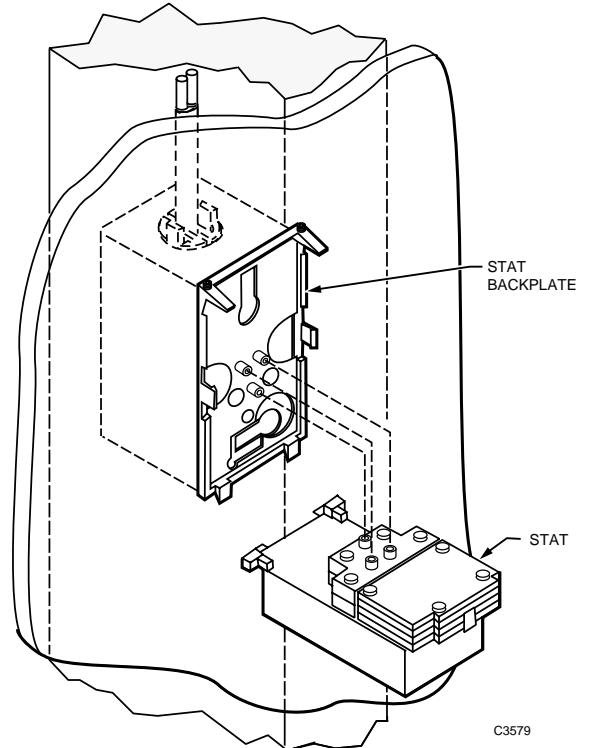
C3940

4. Remove protector cap from Cable Assembly and attach plastic tubing to Cable Assembly with 5/32 x 1/4 in. or 5/32 x 5/32 in. Barb Couplings.  
or  
Run plastic tubing through conduit.

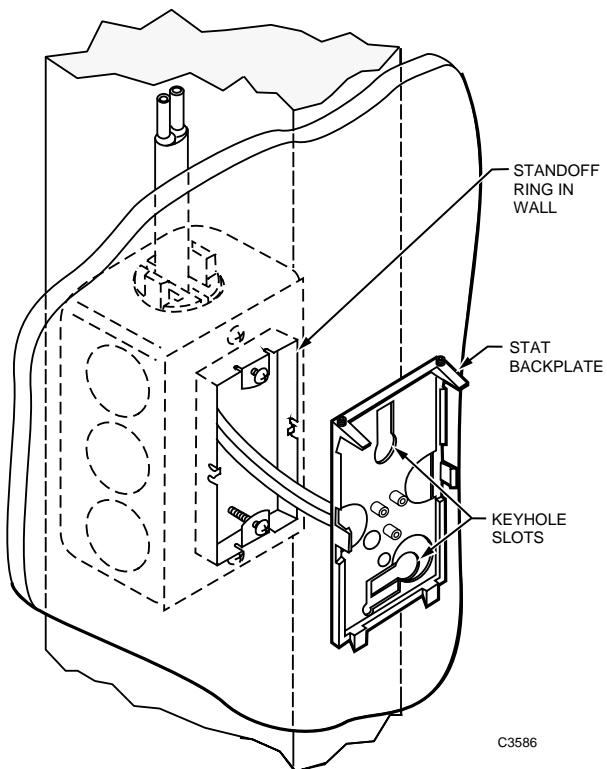
5. Mount Standoff Ring to box with screws provided. For standard utility conduit box, break ears off Standoff Ring before mounting. If wall is to be plastered, snap Fitting Finder onto Standoff Ring.



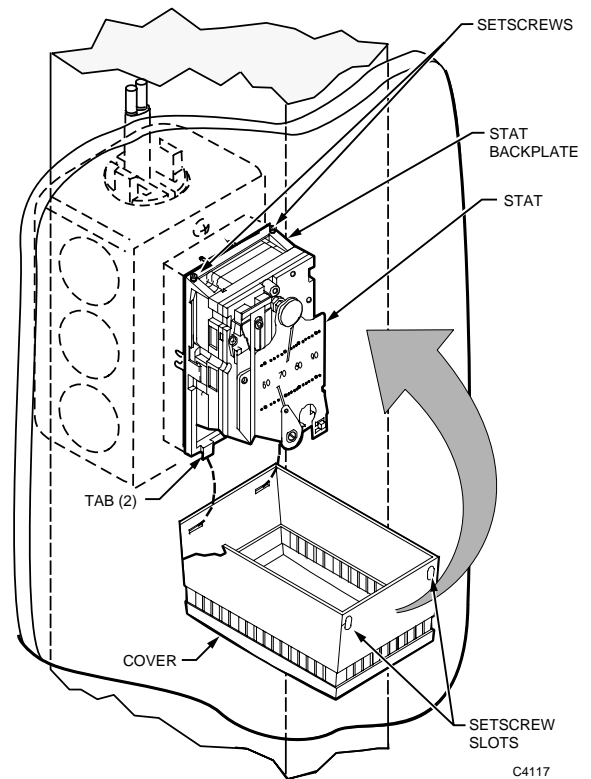
6. After drywall or plaster is up, remove elbow from end of Cable Assembly, if used. Connect tubing to barbs on stat backplate.



8. Mount stat onto stat backplate.



7. Back screws out of Standoff Ring. Hook keyhole slots of stat backplate over screws. Level stat backplate and tighten screws.



9. Hook slots on stat cover over bottom tabs on stat backplate. Swing stat cover up and over stat. Use Thermostat Tool to raise stat backplate setscrews into setscrew slots on top of cover.

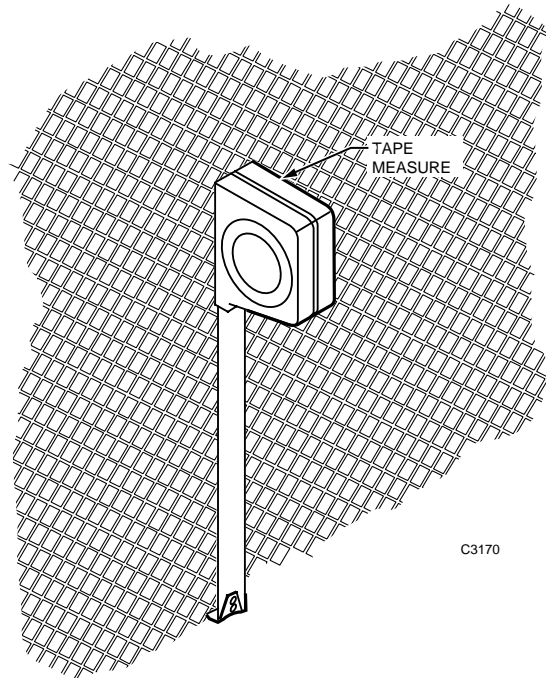
**Mounting to Lath**

Mounting to lath requires the following equipment:

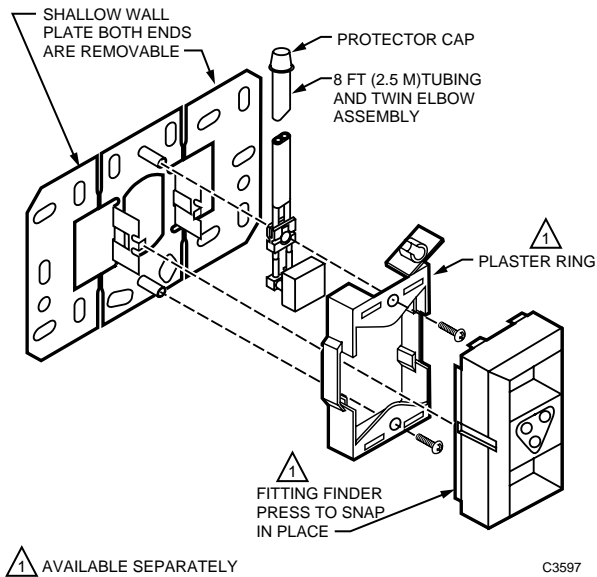
- Shallow Wall Plate Assembly 14001615-001/-002 or 14001616-001/-002 (Fig. 30). Includes the following:
  - Shallow Wall Plate 14001614-001
  - Plaster Ring 14001609-001
  - Fitting Finder 14000706-001

NOTE: Shallow Wall Plate Assembly 14001615-001 (one pipe) or -002 (two pipe) has copper tubing. Assembly 14001616-001 (one pipe) or -002 (two pipe) has 5/32 in. (4 mm) O.D. plastic tubing.

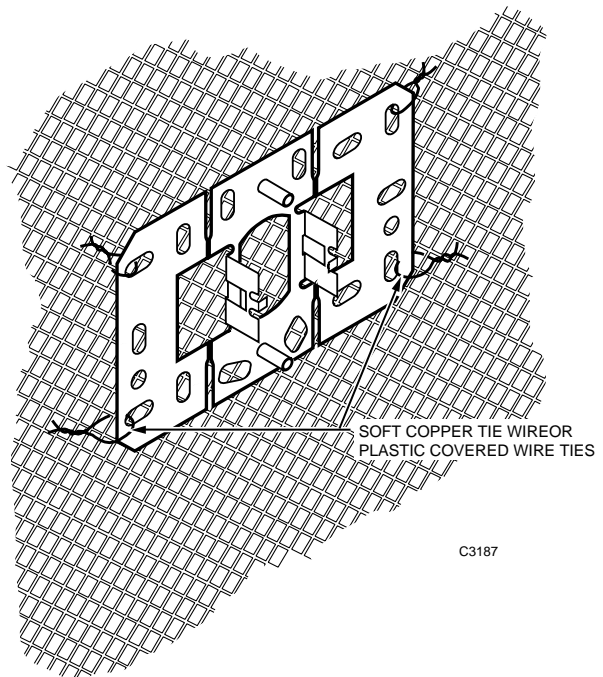
- Tape Measure CCT422
- Barb Couplings CCT1606B (MJP1606B) (5/32 x 1/4 in.) or CCT1628B (MJP1628B) (5/32 x 5/32 in.) for plastic tubing (one, two, or three Couplings required according to application)
- Soft Copper Tie Wire CCT2643 or Plastic Covered Wire Ties CCT2663 (MVE2663)
- Wall Mounting Ring 14004458-001
- Thermostat Tool CCT735A (MQT735A)



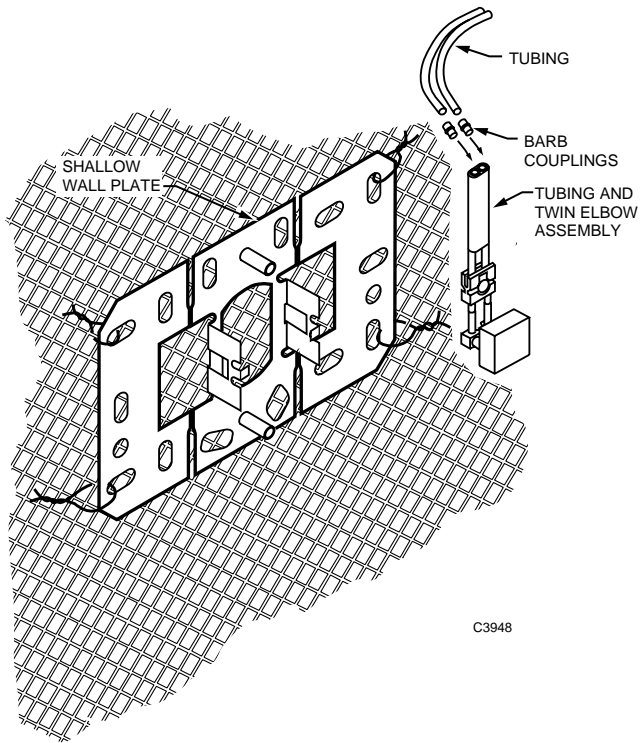
1. Measure and mark approximate stat location on lath.



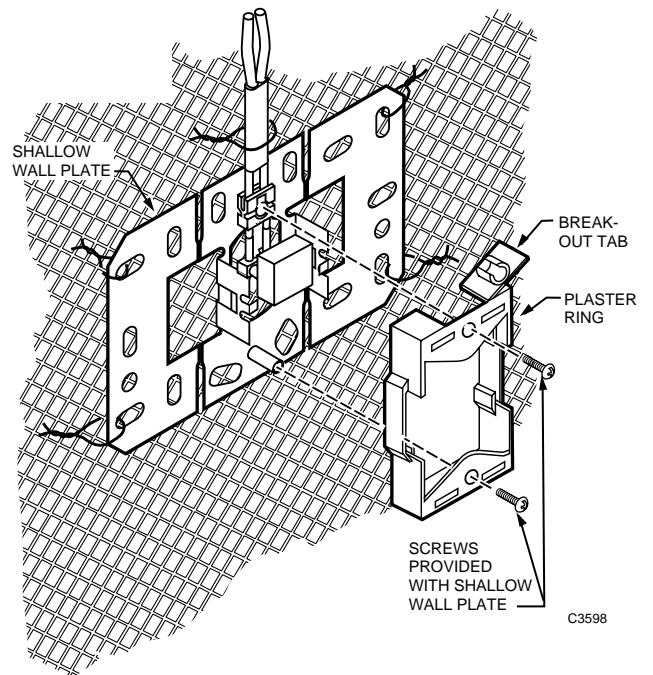
**Fig. 30. Shallow Wall Plate Assembly.**



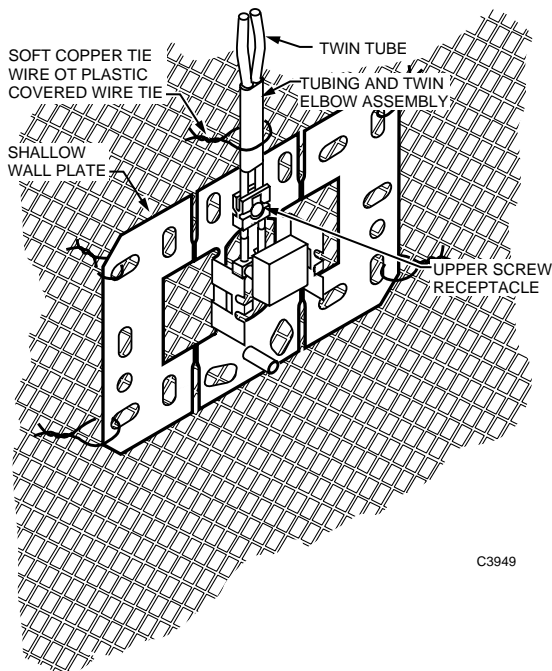
2. At approximate stat location, anchor corners of Shallow Wall Plate to lath with Soft Copper Tie Wire or Plastic Covered Wire Ties.



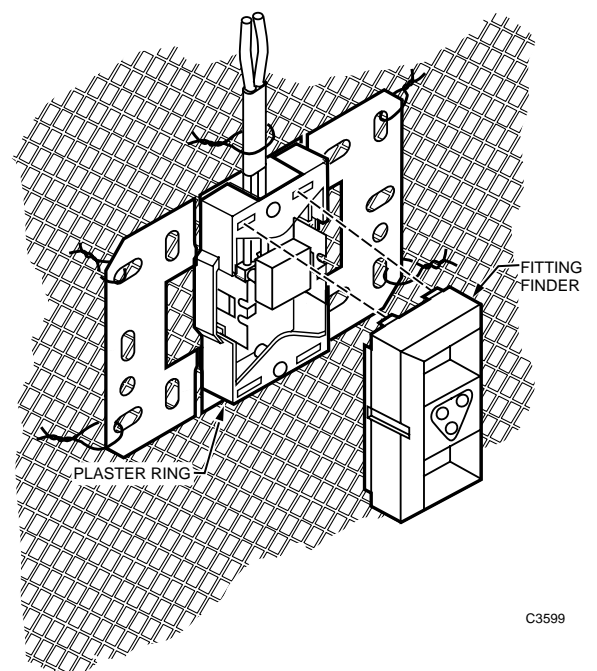
3. Connect tubing to Tubing and Twin Elbow Assembly with 5/32 x 1/4 in. or 5/32 x 5/32 in. Barb Couplings.



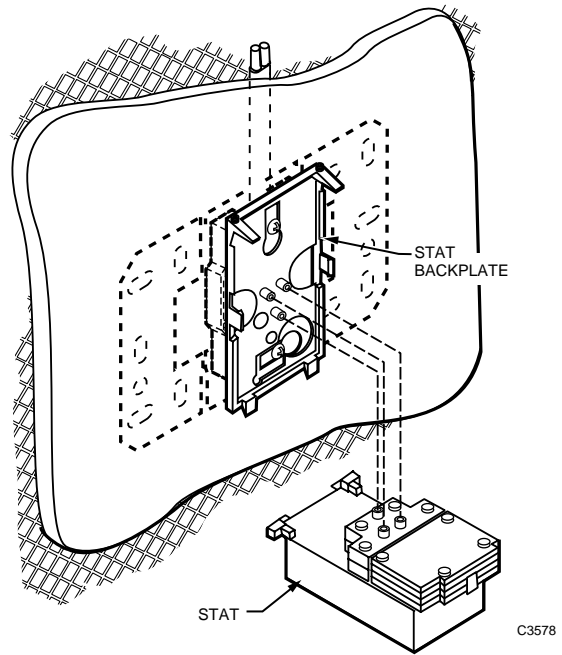
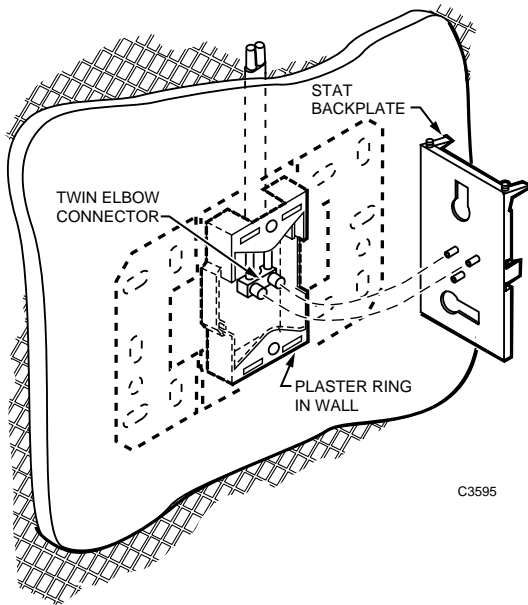
5. Remove break-out tab from top of Plaster Ring. Push Plaster Ring onto Shallow Wall Plate brackets and lower screw receptacle. Attach Plaster Ring to Shallow Wall Plate with screws provided.



4. Remove screws from screw receptacles on Shallow Wall Plate. Push Tubing and Twin Elbow Assembly onto upper screw receptacle. Anchor tubing to lath with Soft Copper Tie Wire or Plastic Covered Wire Ties.

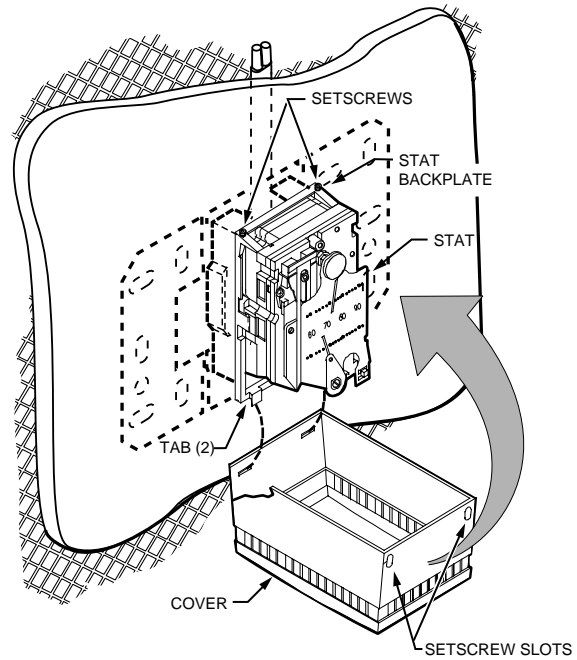
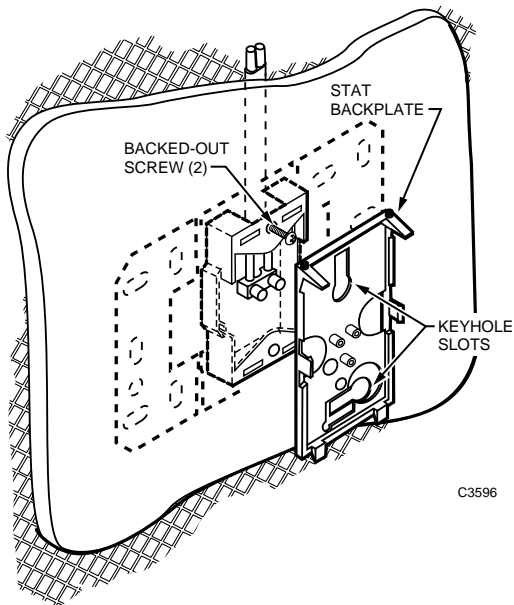


6. Snap Fitting Finder onto Plaster Ring.



7. After plaster is up, remove Fitting Finder from Plaster Ring. Remove protector from end of tubing, leaving Twin Elbow Connector. Connect Twin Elbow Connector to barbs on stat backplate.

9. Mount Stat to stat backplate.



8. Back screws out of Plaster Ring. Slip stat backplate keyhole slots over screws. Level stat backplate and tighten screws.

10. Hook slots on stat cover over bottom tabs on stat backplate. Swing stat cover up and over stat. Use Thermostat Tool to raise stat backplate setscrews into setscrew slots on top of cover.

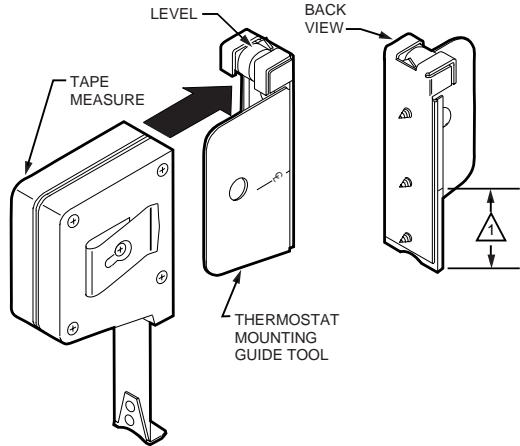
**Finished Wall Installation**

In a finished wall installation, the studs are covered with drywall or plaster and the tubing is behind the wall. Finished wall installation is done with a Quick-Mount Thermostat, anchors, or a Shallow Wall Plate.

**Quick-Mount Thermostat**

Installing a Quick-Mount Thermostat requires the following tools:

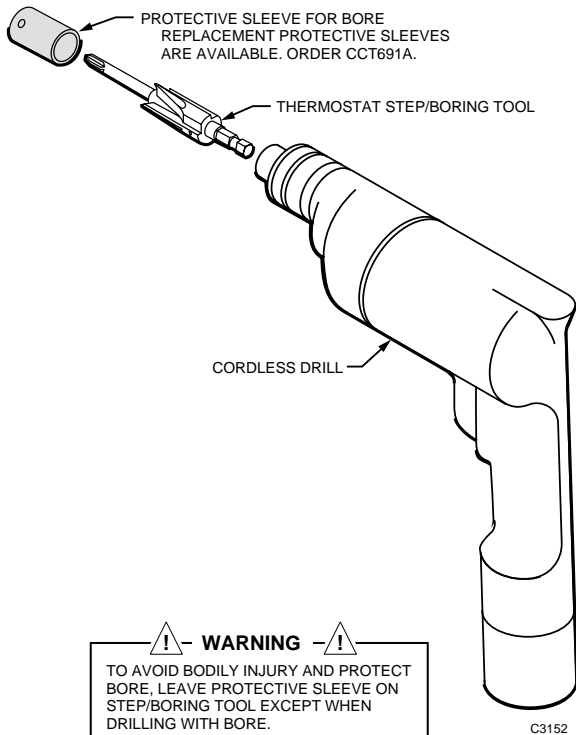
- Tape Measure CCT422 (Fig. 31)
- Thermostat Mounting Guide Tool CCT690 (Fig. 31)
- Cordless Drill CCT713 (Fig. 32)
- Thermostat Step/Boring Tool CCT691 (Fig. 32)
- Fish Chain CCT417
- Wire hook for pulling Fish Chain (see Step 3)



1 1/2 IN. (38 MM) FROM BOTTOM OF TAPE MEASURE TO CENTER MARK CORRESPONDING TO CENTER OF STAT.

C3151

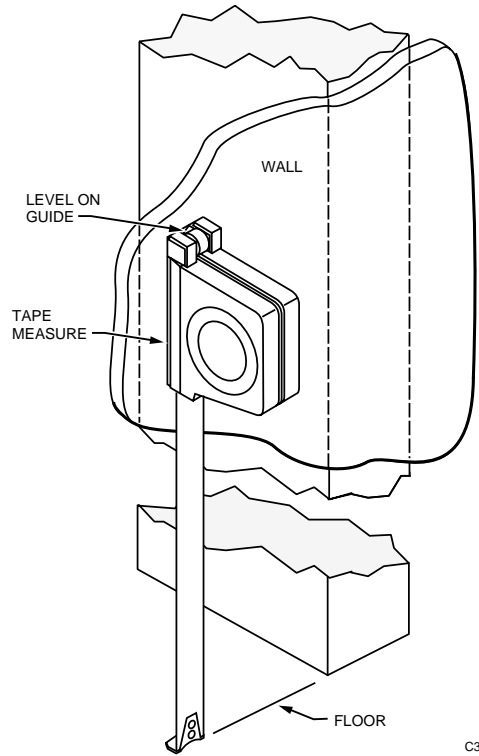
**Fig. 31. Tape Measure and Thermostat Mounting Guide Tool.**



**! - WARNING - !**  
 TO AVOID BODILY INJURY AND PROTECT BORE, LEAVE PROTECTIVE SLEEVE ON STEP/BORING TOOL EXCEPT WHEN DRILLING WITH BORE.

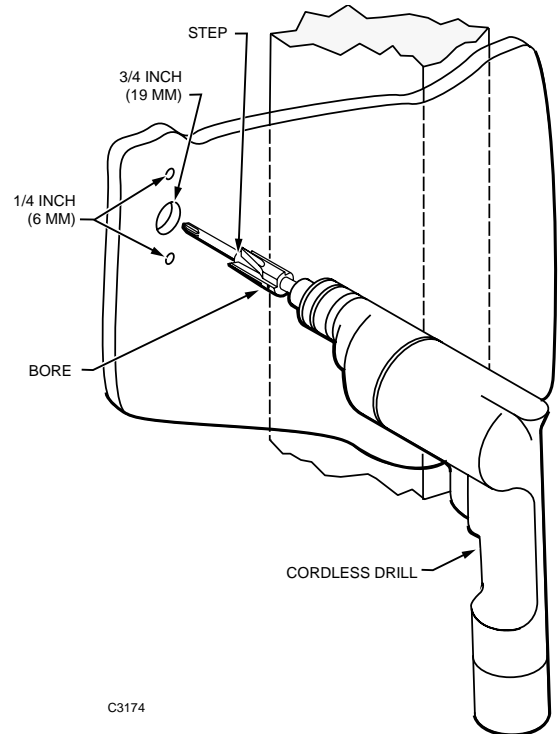
C3152

**Fig. 32. Thermostat Step/Boring Tool and Cordless Drill.**



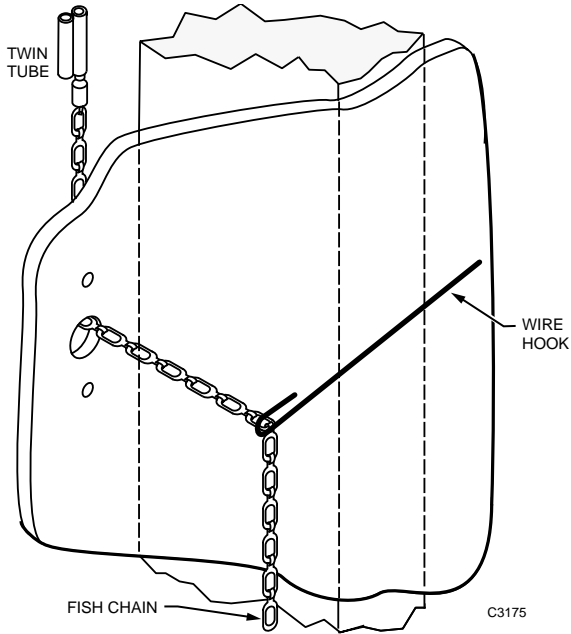
C3172

1. Measure thermostat location on wall. Use level on Mounting Guide to ensure that Mounting Guide is plumb. Tap Tape Measure to mark hole locations.

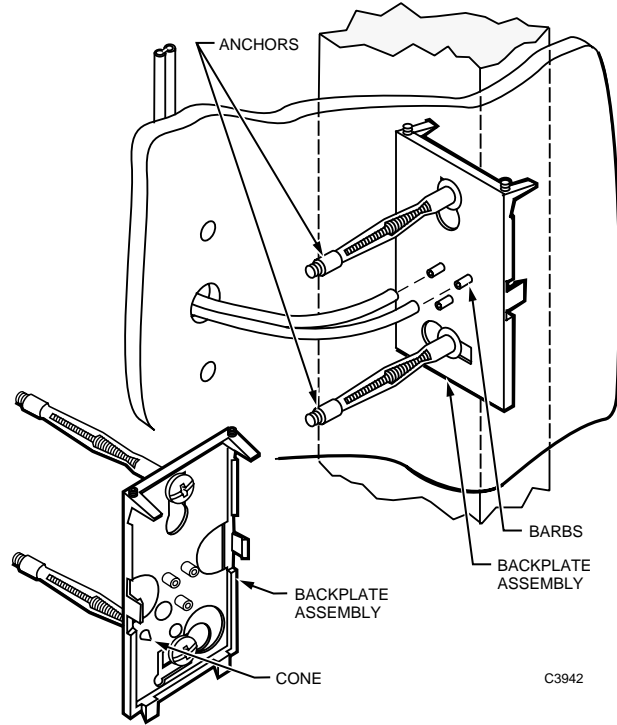


C3174

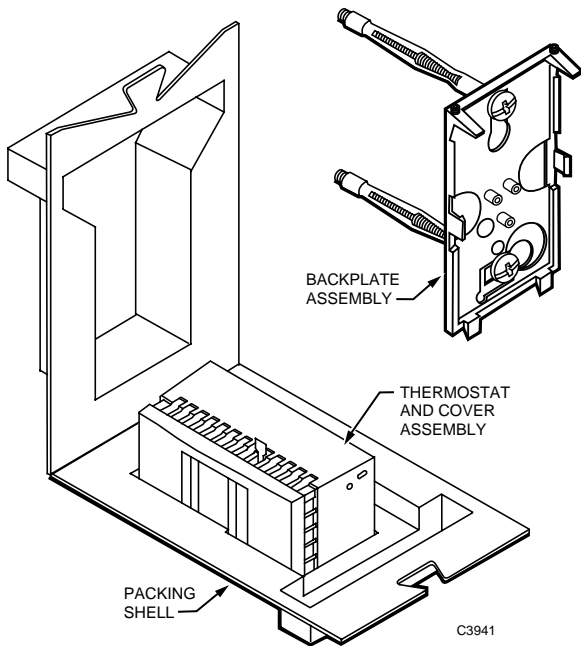
2. Drill holes where marked on wall. For top and bottom holes, drill until the step of the Thermostat Step/Boring Tool meets wall. For center hole, remove protective sleeve from bore, force Thermostat Step/Boring Tool beyond the step, and drill the hole with the bore. Replace protective sleeve over bore.



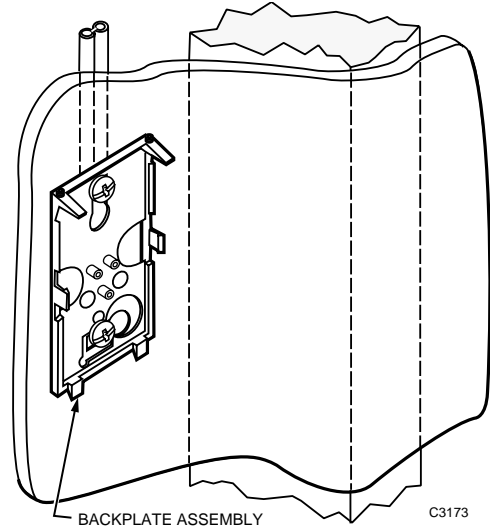
3. Use Fish Chain to fish tubing through center hole.



5. Cut tubing. Use cone on Backplate Assembly to flare cut ends of tubing. Connect tubing to barbs on Backplate Assembly.

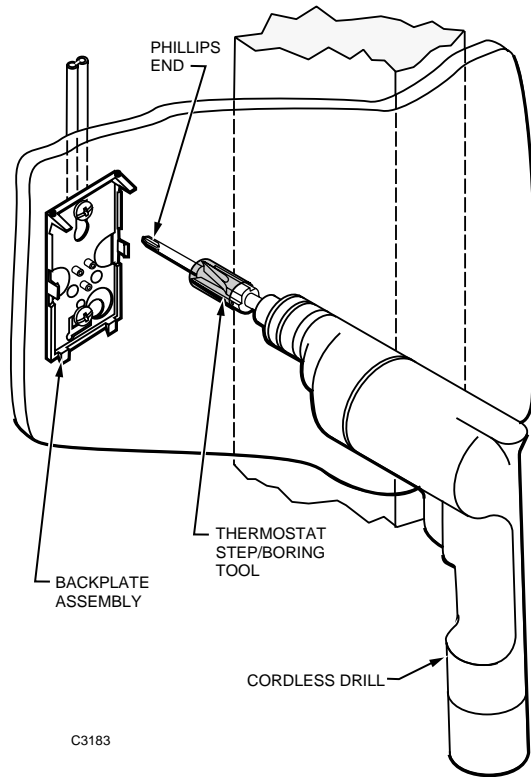


4. Remove Backplate Assembly from packing shell.



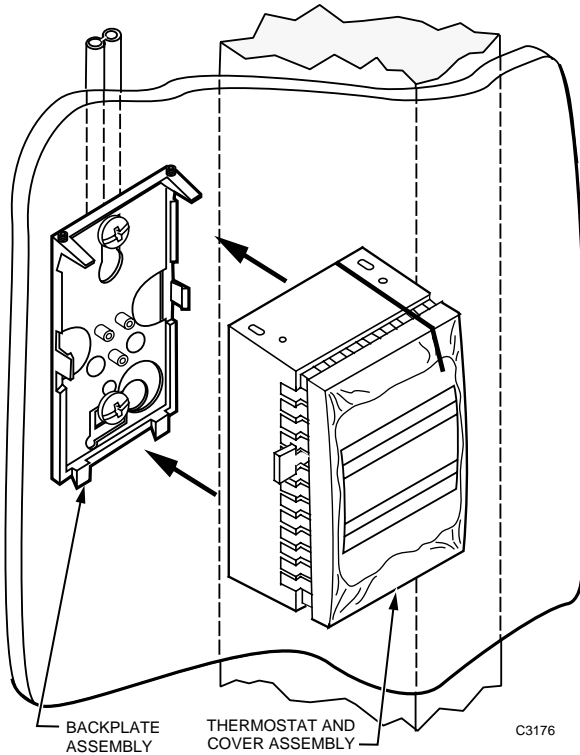
6. Place Backplate Assembly anchors through top and bottom holes.





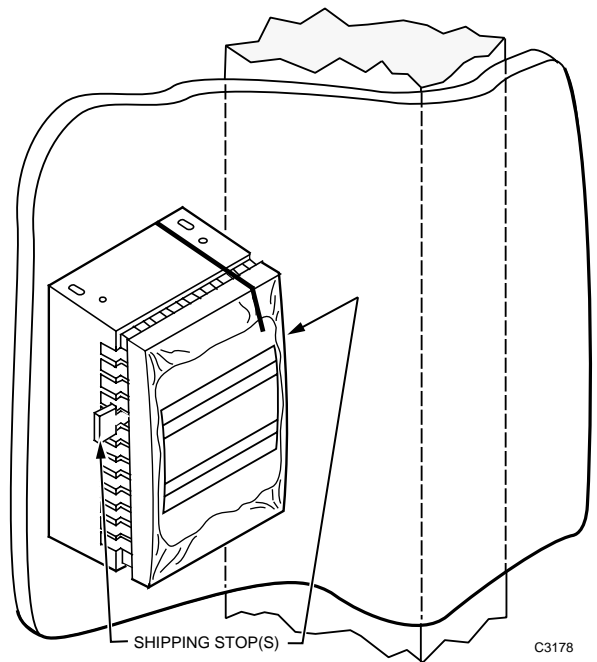
C3183

7. Hold Backplate Assembly to appear plumb. With protective sleeve over bore of Thermostat Step/Boring Tool, drive anchors with Phillips end of Tool.



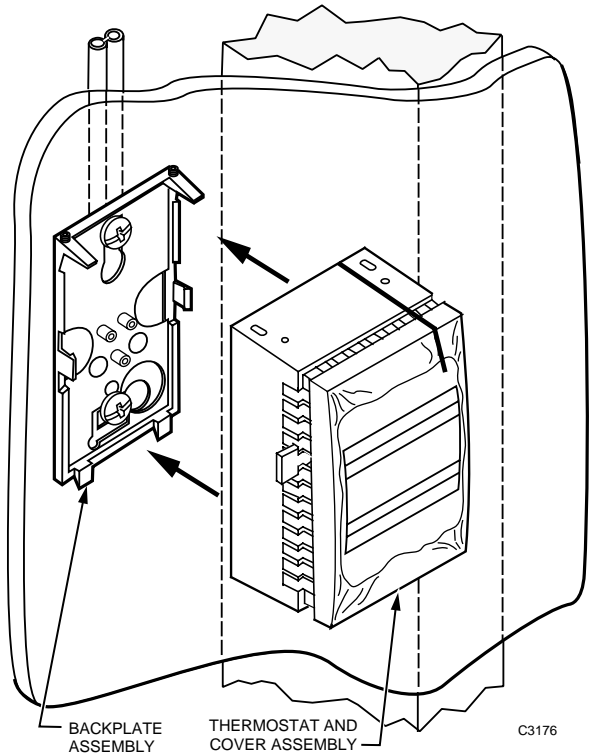
C3176

8. Remove Thermostat and Cover Assembly from packing shell. Align top of Thermostat and Cover Assembly with top of Backplate. Snap Thermostat and Cover Assembly onto Backplate Assembly.



C3178

9. Remove shipping stop(s) from Thermostat and Cover Assembly. Place packing shell and shipping stop(s) back in carton.



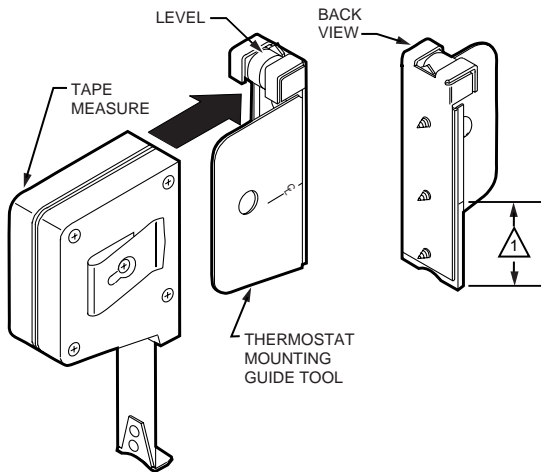
C3176

10. After painting is complete, use tear strip to remove outer paint mask. Peel off inner paint mask.

**Anchors**

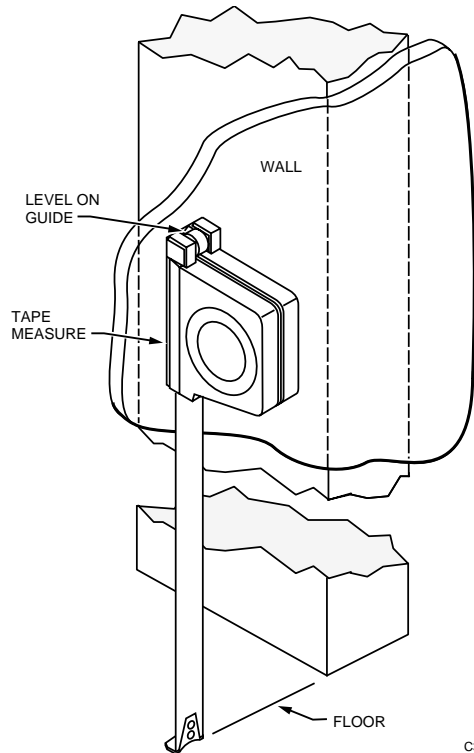
Drywall installation with anchors requires the following equipment:

- Tape Measure CCT422 (Fig. 33)
- Thermostat Mounting Guide Tool CCT690 (Fig. 33)
- Cordless Drill CCT713 (Fig. 34)
- Thermostat Step/Boring Tool CCT691 (Fig. 34)
- Fish Chain CCT417
- Wire hook for pulling Fish Chain (see Step 3)
- Molly Anchors CCT2260 (MVH2260) (2 per stat)
- Thermostat Tool CCT735A (MQT735A)



⚠ 1—1/2 IN. (38 MM) FROM BOTTOM OF TAPE MEASURE TO CENTER MARK CORRESPONDING TO CENTER OF STAT.

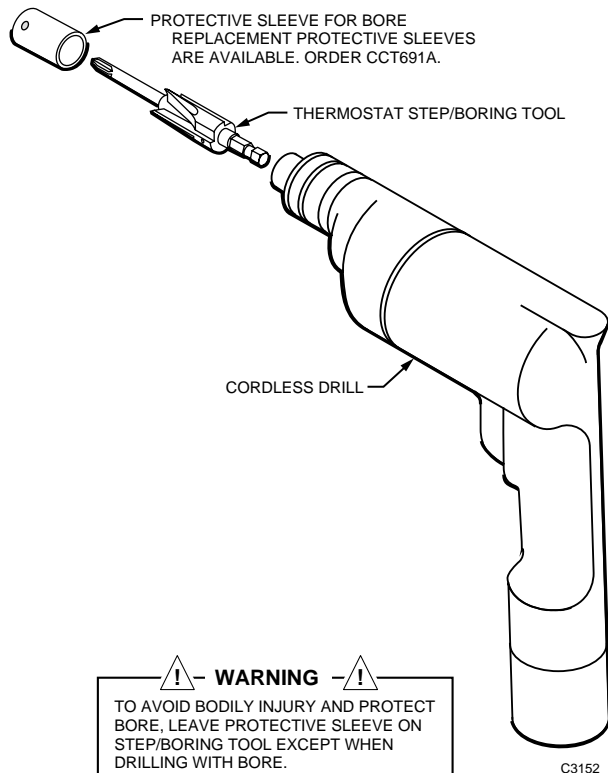
C3151



C3172

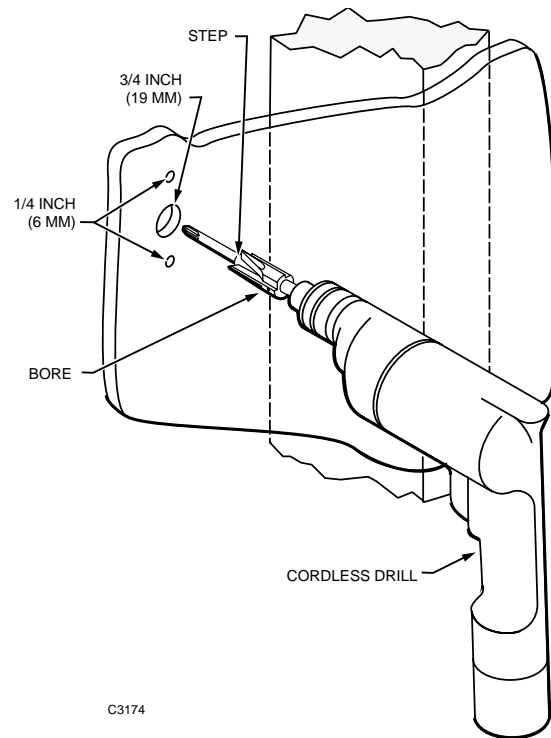
1. Measure thermostat location on wall. Use level on Mounting Guide to ensure that Mounting Guide is plumb. Tap Tape Measure to mark hole locations on wall.

**Fig. 33. Tape Measure and Thermostat Mounting Guide Tool.**



**⚠ WARNING ⚠**  
TO AVOID BODILY INJURY AND PROTECT BORE, LEAVE PROTECTIVE SLEEVE ON STEP/BORING TOOL EXCEPT WHEN DRILLING WITH BORE.

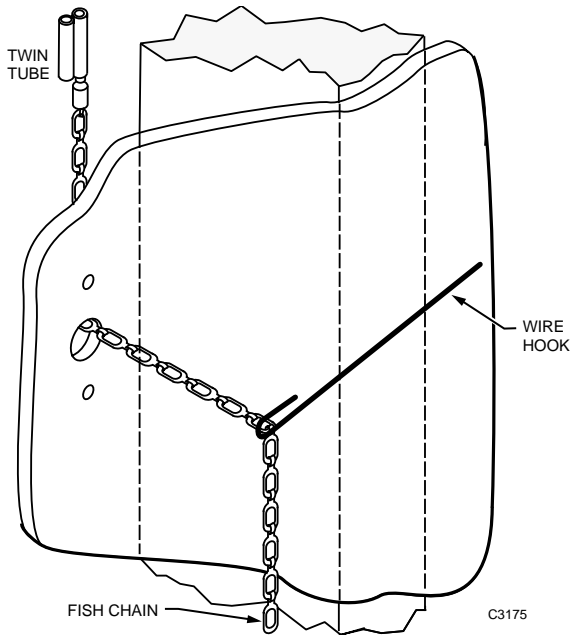
C3152



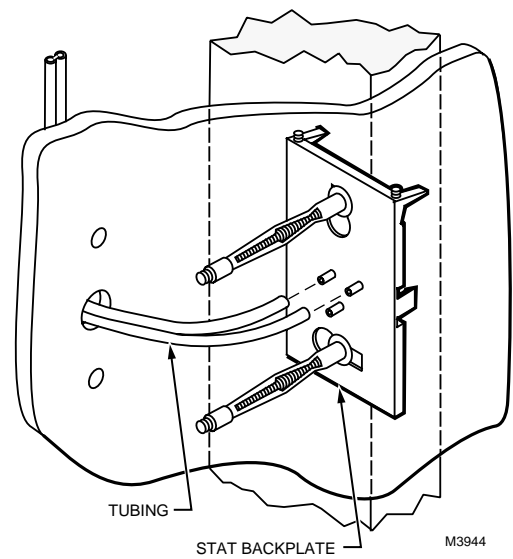
C3174

2. Drill holes where marked on wall. For top and bottom holes, drill until the step of the Thermostat Step/Boring Tool meets wall. For center hole, remove protective sleeve from bore, force Thermostat Step/Boring Tool beyond the step, and drill the hole with the bore. Replace protective sleeve over bore.

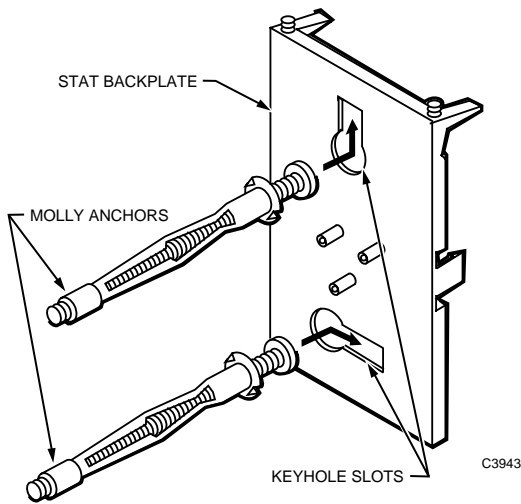
**Fig. 34. Thermostat Step/Boring Tool and Cordless Drill.**



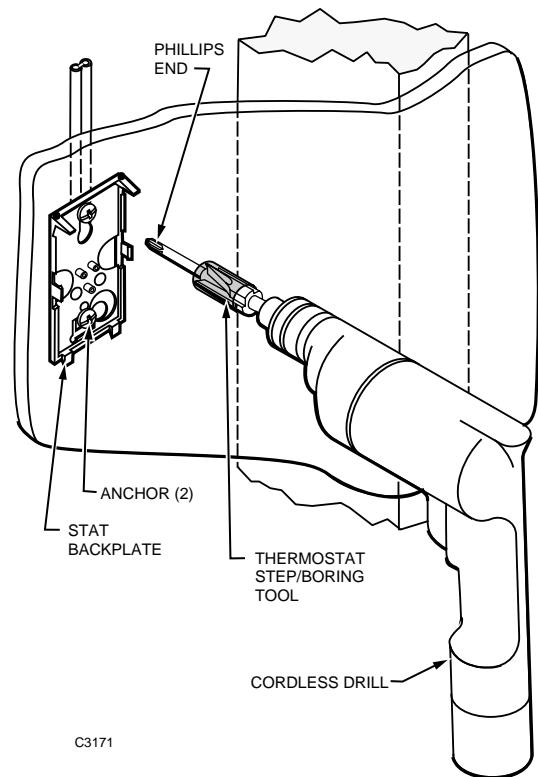
3. Use Fish Chain to fish tubing through center hole.



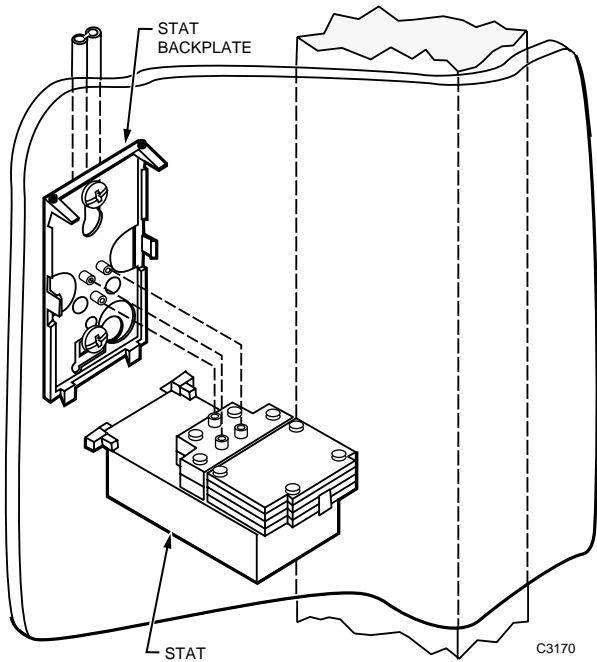
5. Cut tubing and connect to barbs on stat backplate.



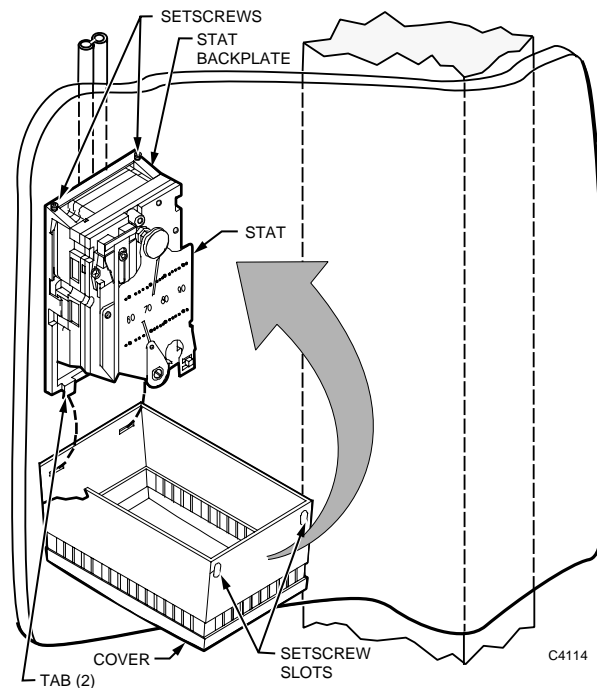
4. Push Molly anchor heads through stat backplate keyhole slots. Tighten anchors slightly to secure them to stat backplate.



6. Push anchors into holes in wall. Level backplate. With protective sleeve over bore of Thermostat Step/Boring Tool, tighten anchors with Phillips end of Tool.



7. Mount stat onto stat backplate.



8. Hook slots on stat cover over bottom tabs on stat backplate. Swing stat cover up and over stat. Use Thermostat Tool to raise stat backplate setscrews into setscrew holes on top of cover.

### Block or Brick Wall

A stat should be mounted according to the steps shown in ROUGH-IN INSTALLATION. Use the procedure in FINISHED WALL INSTALLATION only if the stat cannot be roughed in as part of the wall. If the wall is to be plastered, see INSTALLATION WITH SURFACE-MOUNTED TUBING.

### Rough-In Installation

Rough-in is done by the mason as the wall is laid. The installer hangs the stat at its approximate final location and the mason cuts the hole where needed in the block course.

Rough-in installation may require some or all of the following equipment:

- Deep Wall Box 14001355-001 (Fig. 35)
- One of the following (Fig. 36):
  - Plastic Cable Assembly 14001491-001 (one pipe), -002 (two pipe), or -003 (three pipe) and Barb Couplings CCT1606B (MJP1606B) (5/32 x 1/4 in.) or CCT1628B (MJP1628B) (5/32 x 5/32 in.)
  - Copper Cable Assembly 14001494-001 (one pipe), -002 (two pipe), or -003 (three pipe)
  - 1/2 in. emt conduit and 1/2 in. TW Setscrew Connector CCT2900 (MVE2900)
- Tape Measure CCT422
- Thermostat Tool CCT735A (MQT735A)

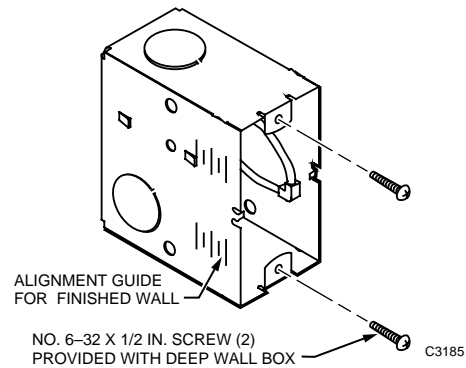
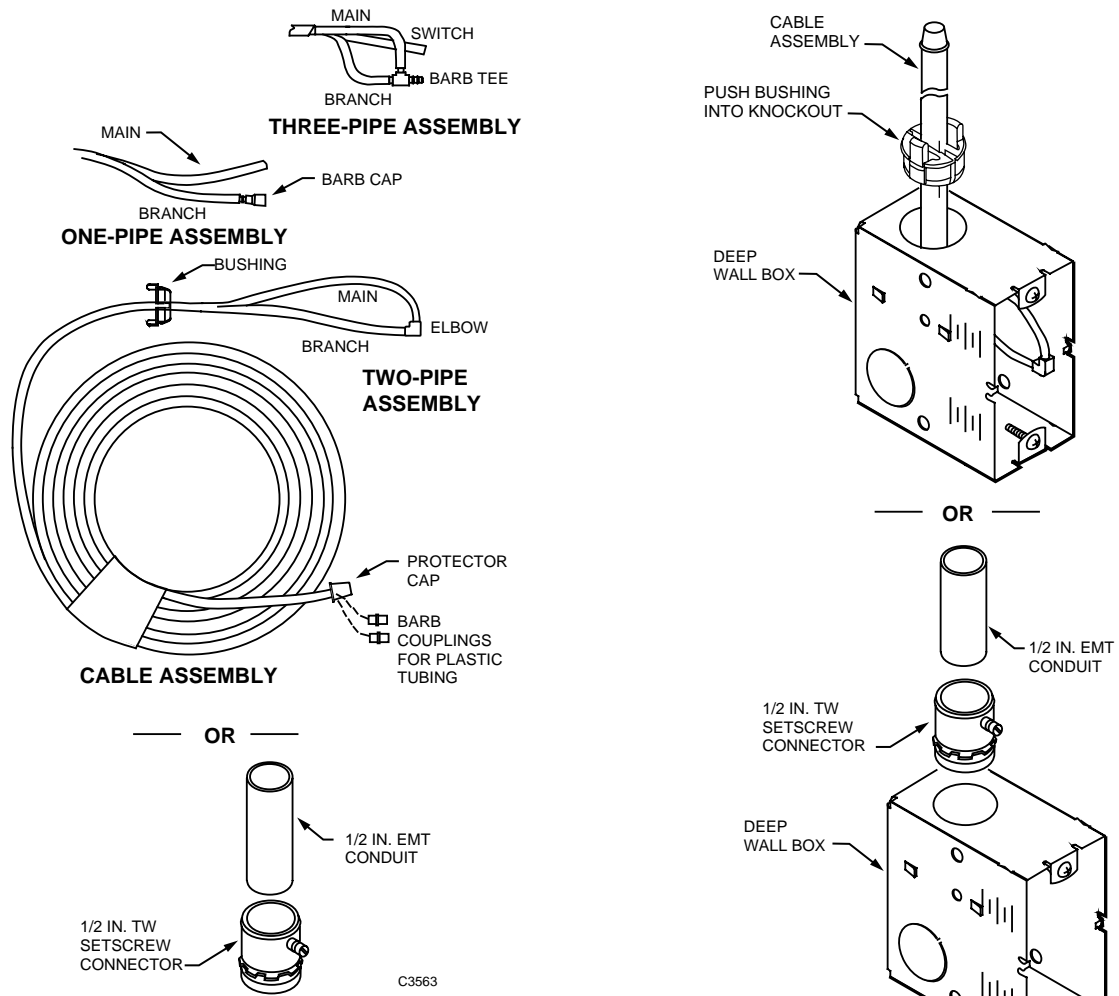
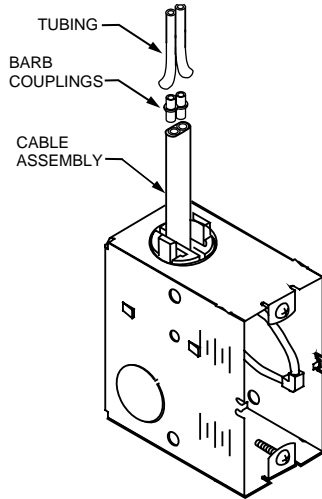


Fig. 35. Deep Wall Box.

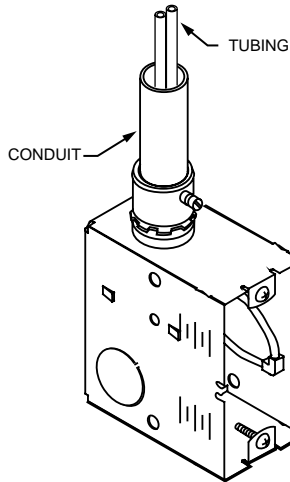


**Fig. 36. One-, Two-, or Three-Pipe Plastic or Copper Cable Assembly or 1/2 in. EMT Conduit with 1/2 in. TW Setscrew Connector.**

1. Place elbow end of Cable Assembly through knockout and push Cable Assembly bushing into knockout.  
or  
Attach 1/2 in. TW Setscrew Connector to appropriate knockout in box, place conduit into Connector, and tighten Connector setscrew.

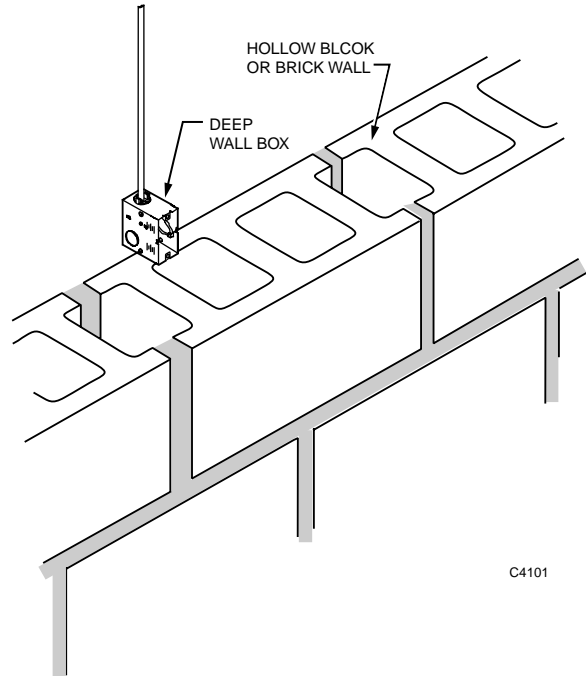


OR



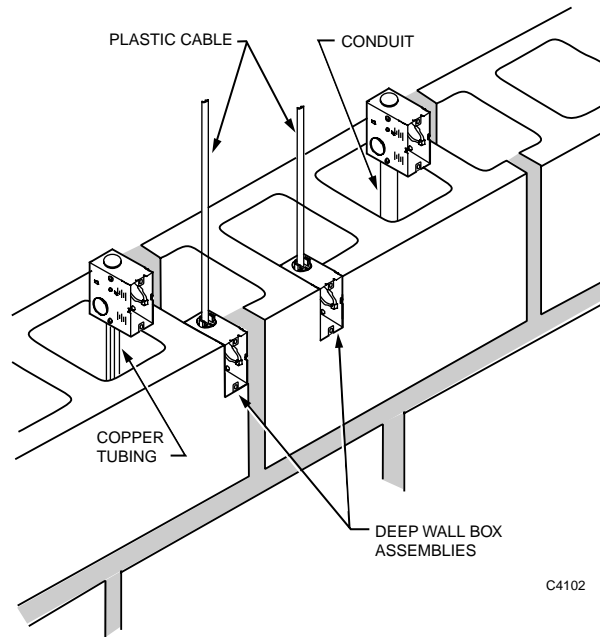
C3565

2. Remove protector cap from Cable Assembly and attach plastic tubing to Cable Assembly with 5/32 x 1/4 in. or 5/32 x 5/32 in. Barb Couplings.  
or  
Run plastic tubing through conduit.



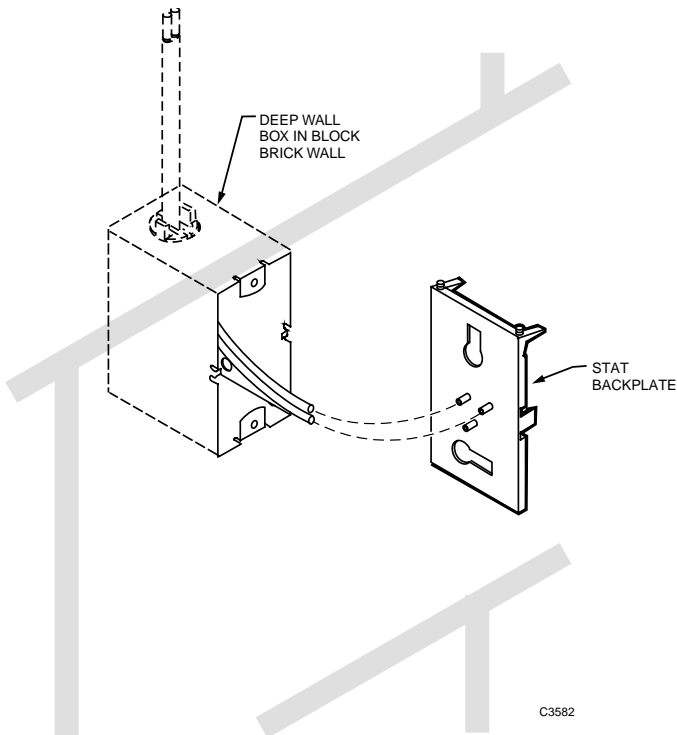
C4101

3. Measure approximate location of stat. Hang or position Deep Wall Box at measured location.

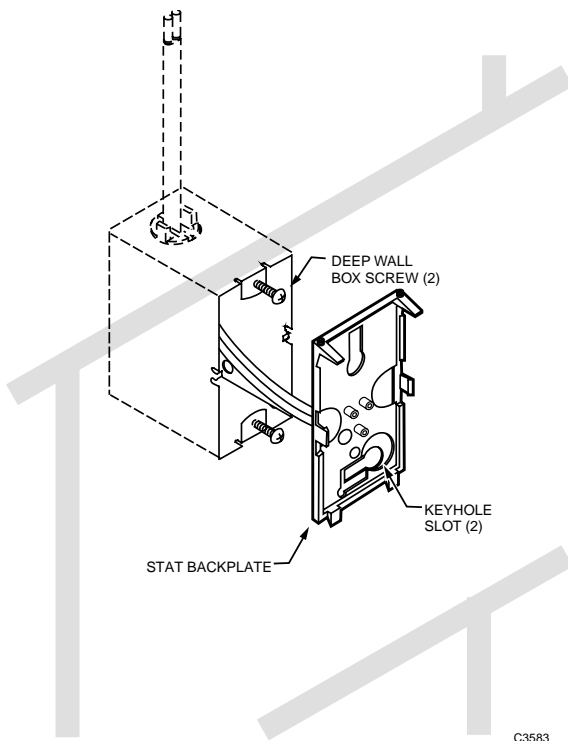


C4102

4. Mason lays block or brick course and cuts hole where indicated by stat position. Place Deep Wall Box Assembly into hole so that conduit or Cable Assembly runs through openings inside blocks or bricks.



5. If Cable Assembly is used, cut elbow from end of tubing. Connect tubing to barbs on stat backplate.



6. Back screws out of Deep Wall Box. Hook keyhole slots on stat backplate over backed out screws. Level stat backplate and tighten screws.

7. Mount stat to stat backplate.

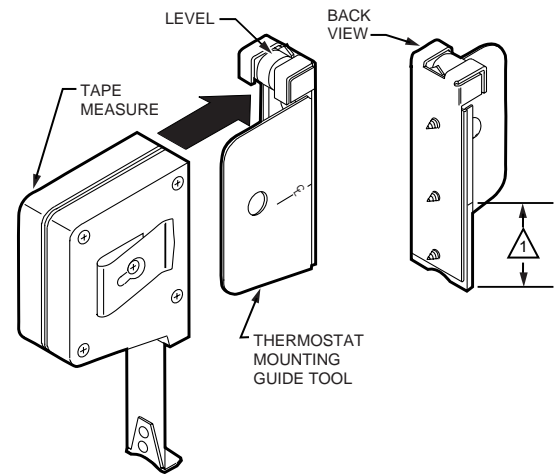
8. Hook slots on stat cover over bottom tabs on stat backplate. Swing stat cover up and over stat. Use Thermostat Tool to raise stat backplate setscrews into setscrew slots on top of cover.

**Finished Wall Installation**

This section describes finished wall installation with tubing recessed in the openings inside the block or brick. To install a stat where tubing is surface mounted, see SURFACE-MOUNTED TUBING.

Finished wall installation requires the following equipment:

- Tape Measure CCT422 (Fig. 37)
- Thermostat Mounting Guide Tool CCT690 (Fig. 37)
- Fish Chain CCT417
- Wire hook for pulling Fish Chain through wall (see Step 4)
- 1/2 in. Hammer Drill CCT717 (MQG717) (Fig. 38)
- Masonry Drills CCT773 (MQG773) (3/16-in. bit) and CCT786 (7/8-in. bit) (Fig. 38)
- 3/4 in. Plastic Screw Anchors CCT2230 (MVH2230) (2 per stat)
- No. 8 sheet metal screws (2 per stat)
- Thermostat Tool CCT735A (MQT735A)



1 1/2 IN. (38 MM) FROM BOTTOM OF TAPE MEASURE TO CENTER MARK CORRESPONDING TO CENTER OF STAT.

C3151

**Fig. 37. Tape Measure and Thermostat Mounting Guide Tool.**

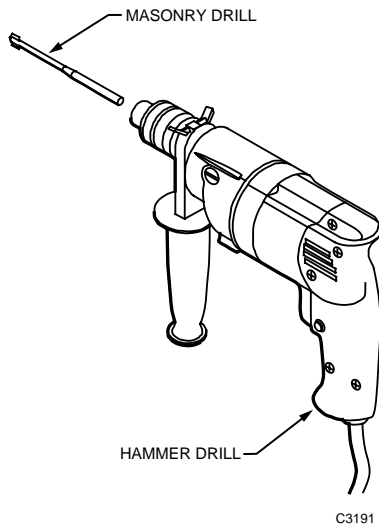
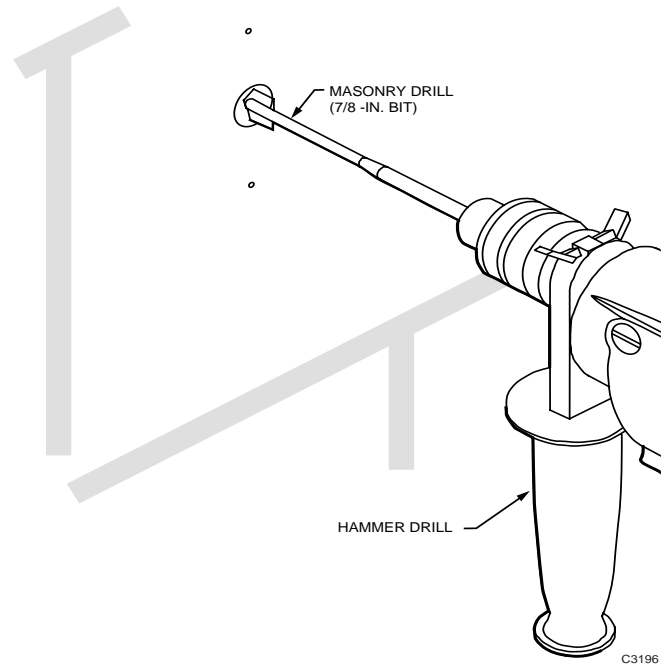
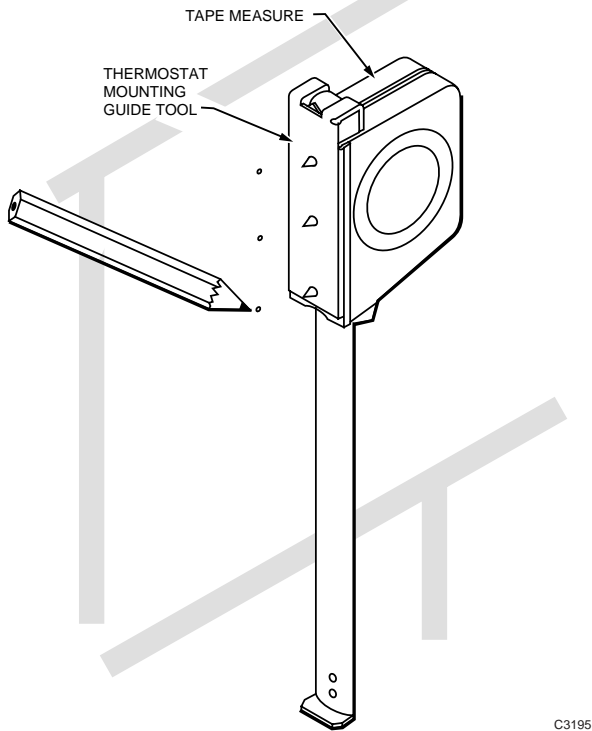


Fig. 38. Hammer Drill and 3/16-in. or 7/8-in. Masonry Drill.

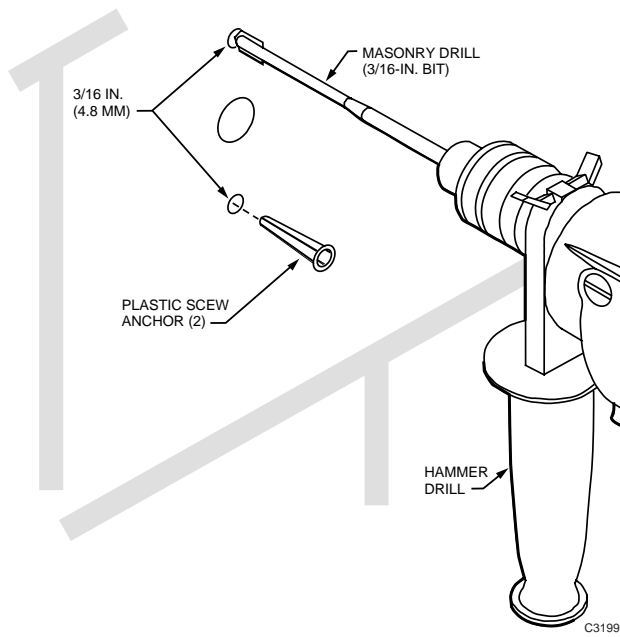


2. Use 7/8-in. Masonry Drill and Hammer Drill to Drill 7/8-in. (22.2-mm) center hole.

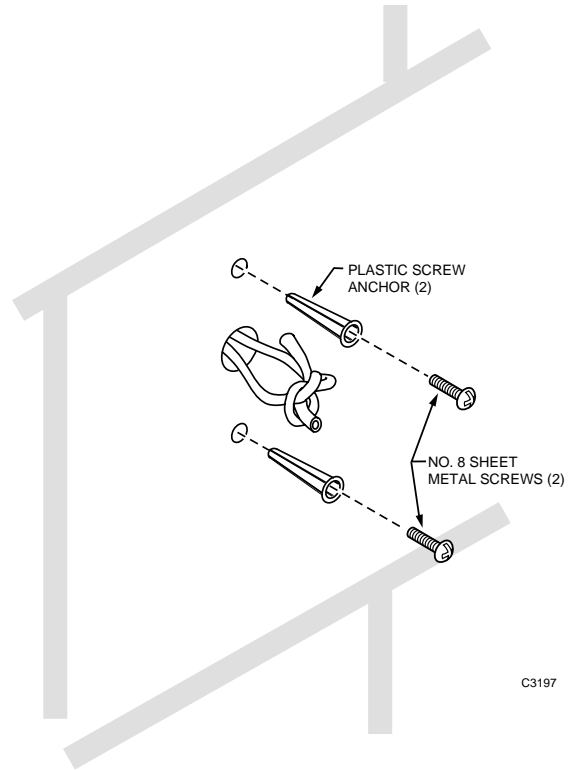


1. Measure approximate stat location on wall. Turn Tape Measure sideways and mark center, top, and bottom hole locations according to points on back of Thermostat Mounting Guide Tool.

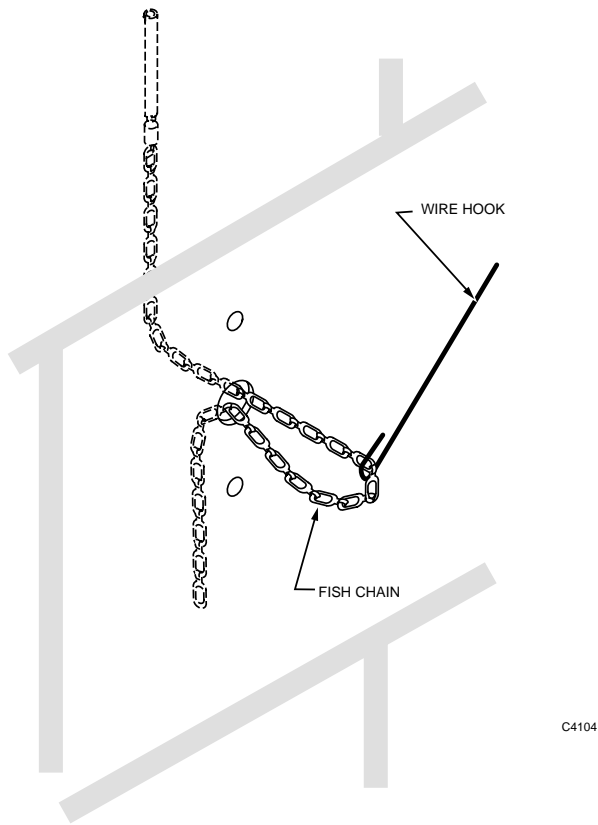




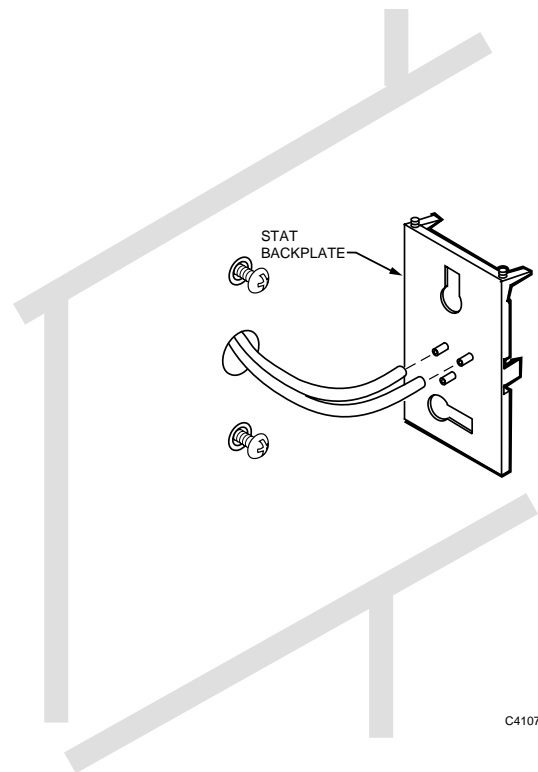
3. Use 3/16-in. Masonry Drill to drill 3/16-in. (4.8-mm) top and bottom holes.



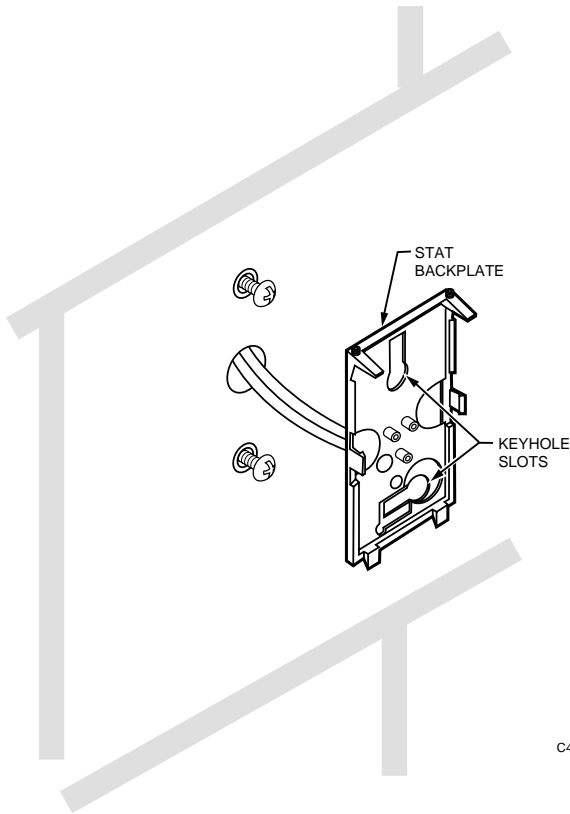
5. Knot tubing. Tap 3/4 in. Plastic Screw Anchors into top and bottom holes. Screw No. 8 sheet metal screws partway into Plastic Screw Anchors.



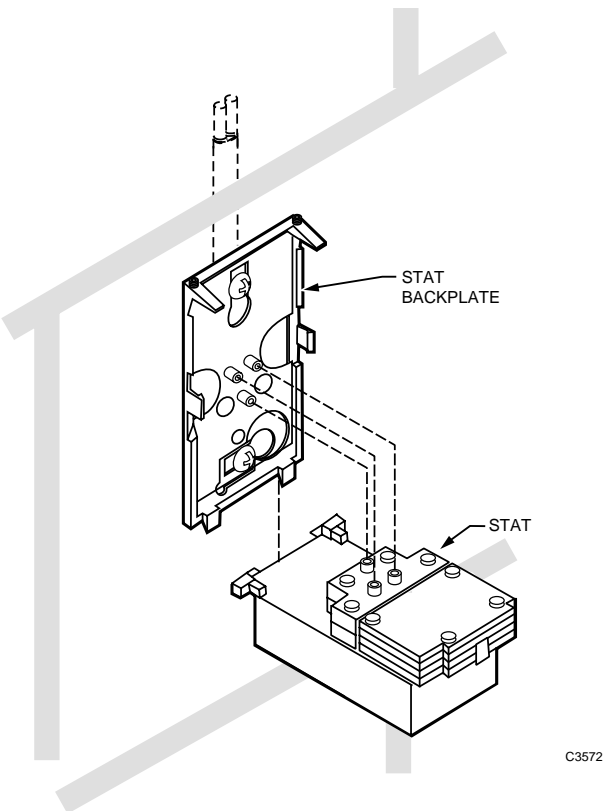
4. Use Fish Chain to fish tubing through center hole.



6. Unknot tubing and connect to barbs on stat backplate.



7. Hook keyhole slots of stat backplate over screws. Level stat backplate and tighten screws.



8. Mount stat to stat backplate.

9. Hook slots on stat cover over bottom tabs on stat backplate. Swing stat cover up and over stat. Use Thermostat Tool to raise stat backplate setscrews into setscrew slots on top of cover.

### Concrete Pour

Mounting in preparation for a concrete pour requires the following equipment:

- Deep Wall Box 14001355-001 (Fig. 39)
- One of the following (Fig. 40):
  - Plastic Cable Assembly 14001491-001 (one pipe), -002 (two pipe), or -003 (three pipe) and Barb Couplings CCT1606B (MJP1606B) (5/32 x 1/4 in.) or CCT1628B (MJP1628B) (5/32 x 5/32 in.)
  - Copper Cable Assembly 14001494-001 (one pipe), -002 (two pipe), or -003 (three pipe)
  - 1/2 in. emt conduit and 1/2 in. TW Setscrew Connector CCT2900 (MVE2900)
- Tape Measure CCT422
- Soft Copper Tie Wire CCT2643 or Plastic Covered Wire Ties CCT2663 (MVE2663)
- 2 in. Duct Tape CCT3349B
- Thermostat Tool CCT735A (MQT735A)

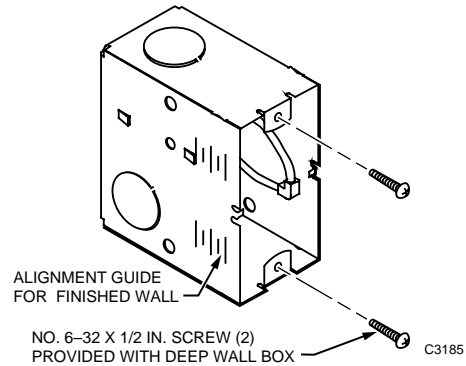
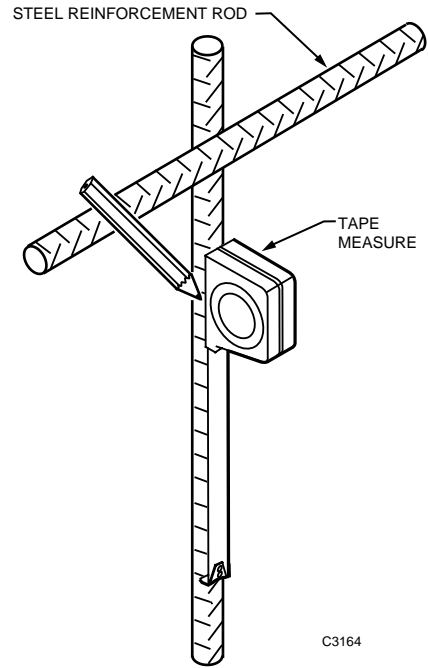
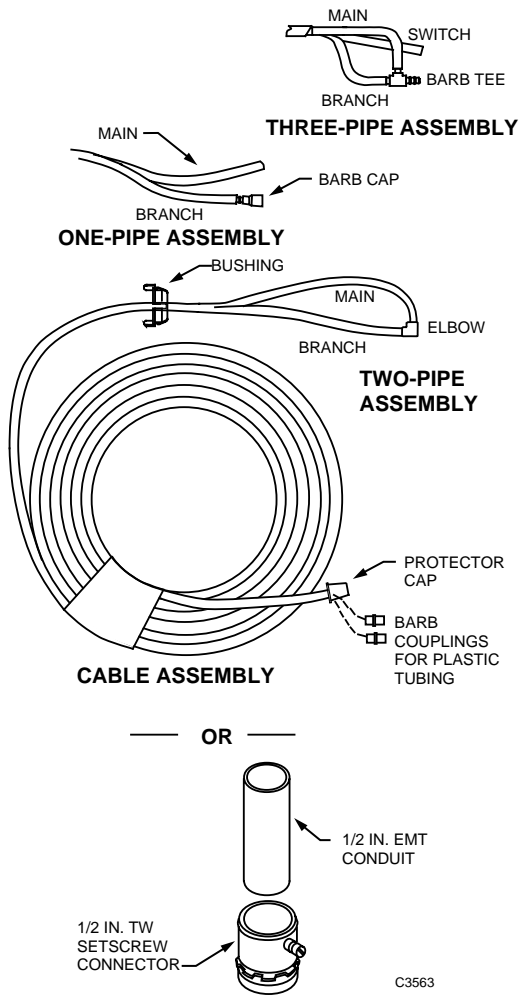
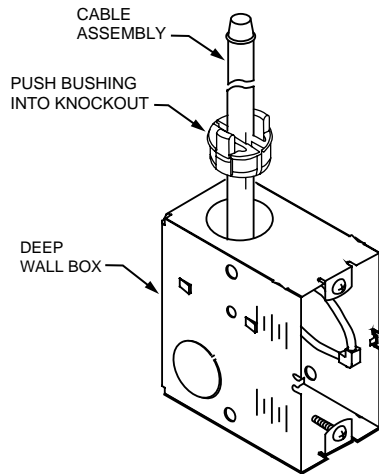


Fig. 39. Deep Wall Box.

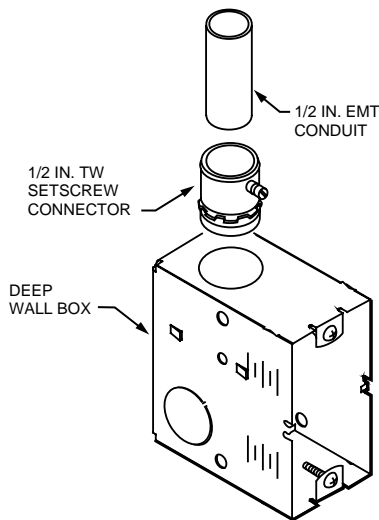


1. Measure and mark stat location on steel reinforcement rods.

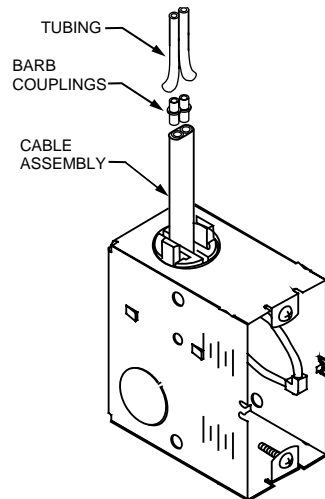
**Fig. 40. One-, Two-, or Three-Pipe Plastic or Copper Cable Assembly or 1/2 in. EMT Conduit with 1/2 in. TW Setscrew Connector.**



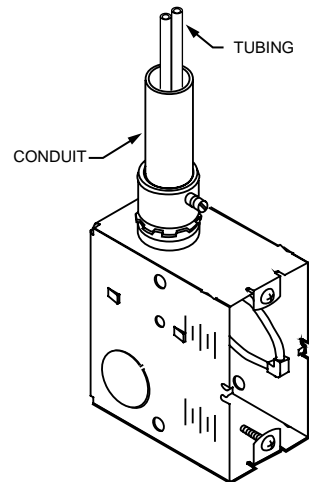
OR



C3564



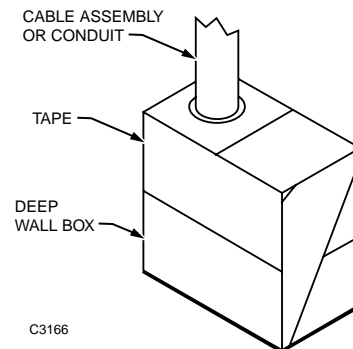
OR



C3565

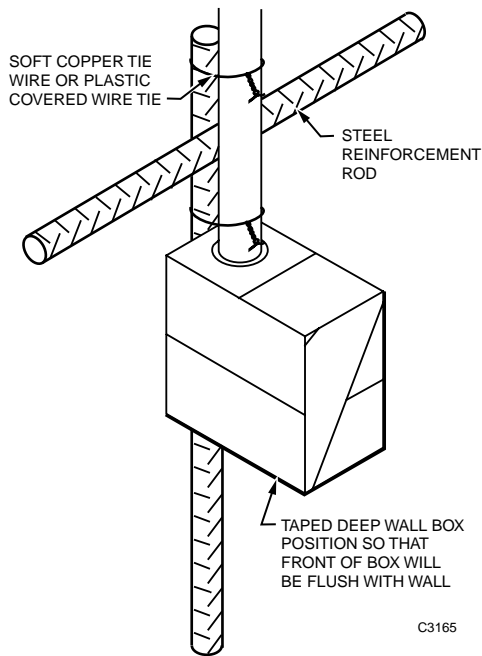
2. Place elbow end of Cable Assembly through knockout and push Cable Assembly bushing into knockout.  
or  
Attach 1/2 in. TW Setscrew Connector to appropriate knockout in box, place conduit into Connector, and tighten Connector setscrew.

3. Run plastic tubing through conduit, or remove protector cap from Cable Assembly and attach plastic tubing to Cable Assembly with 5/32 x 1/4 in. or 5/32 x 5/32 in. Barb Couplings.

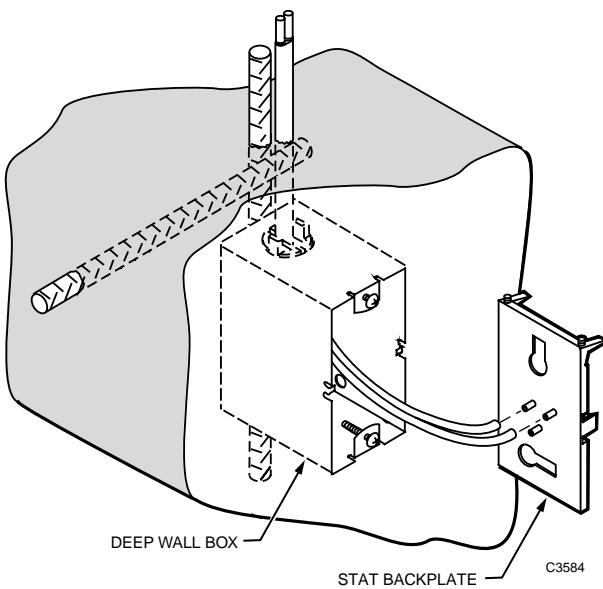


C3166

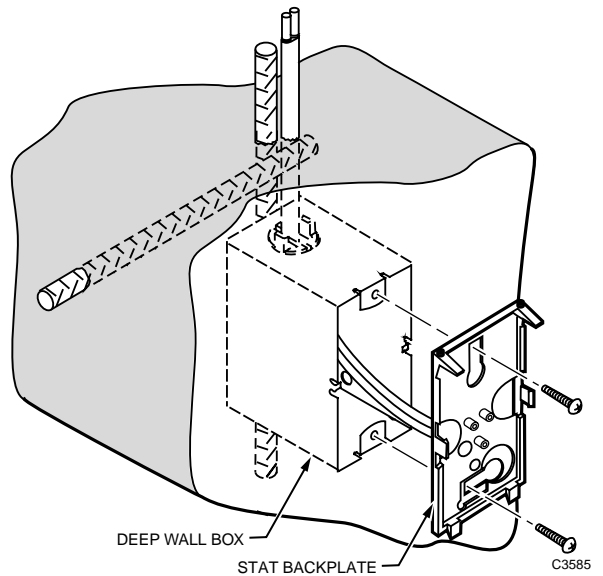
4. Wrap Deep Wall Box with 2 in. Duct Tape.



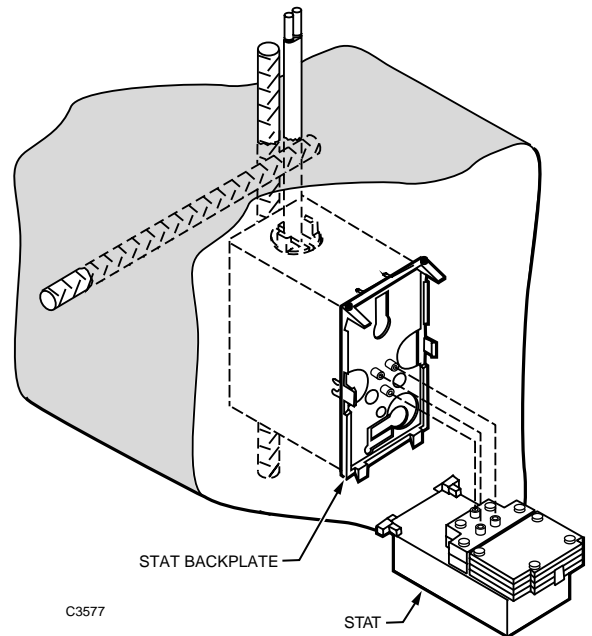
5. Attach conduit or Cable Assembly to steel reinforcement rods with Soft Copper Tie Wire or Plastic Covered Wire Ties so that front of Deep Wall Box will be flush with wall.



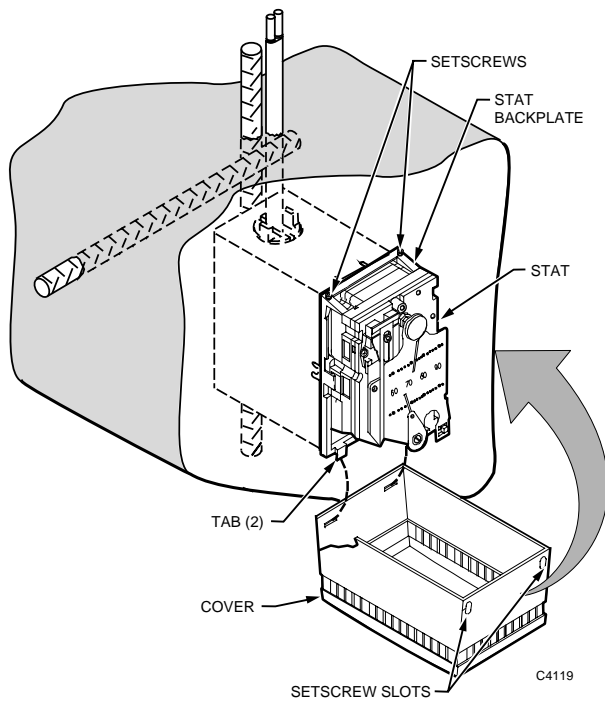
6. After concrete is poured and set, cut tape from front of Deep Wall Box. Cut elbow from Cable Assembly, if used. Connect tubing to barbs on stat backplate.



7. Back screws out of Deep Wall Box. Hook stat backplate keyhole slots onto backed-out screws. Level stat backplate and tighten screws.



8. Mount stat onto stat backplate.



- Hook slots on stat cover over bottom tabs on stat backplate. Swing stat cover up and over stat. Use Thermostat Tool to raise stat backplate setscrews into setscrew slots on top of cover.

### Mullion

Mounting to a standard metal mullion requires the following equipment:

- Tape Measure CCT422 (Fig. 41)
- Thermostat Mounting Guide Tool CCT690 (Fig. 41)
- Fish Chain CCT417
- Wire hook for pulling Fish Chain through wall (see Step 4)
- Cordless Drill CCT713 (Fig. 42)
- Uni-Bit CCT230 (Fig. 42)
- 1/8 in. High-Speed Drill Bit CCT166 (MQG166) (Fig. 42)
- No. 8 x 3/4 in. Sheet Metal Screws CCT2306 (MVH2306)
- Thermostat Tool CCT735A (MQT735A)

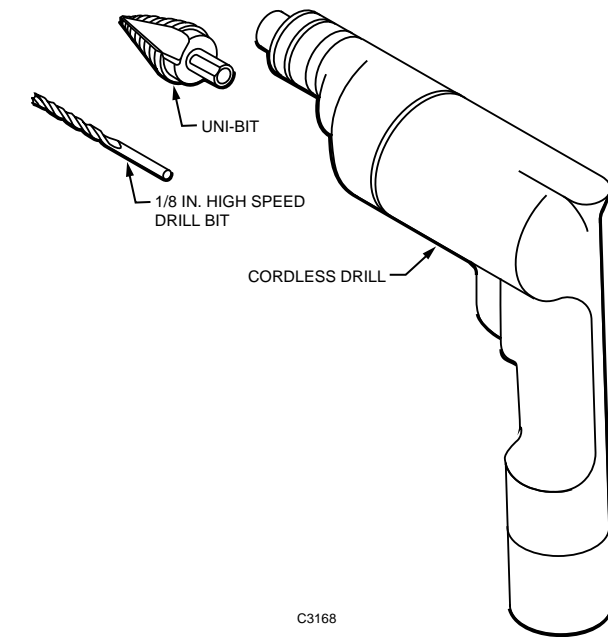
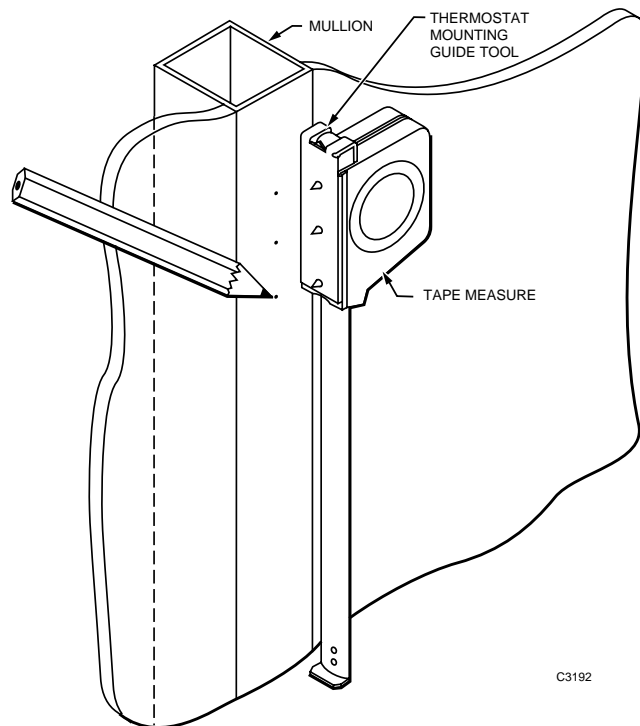
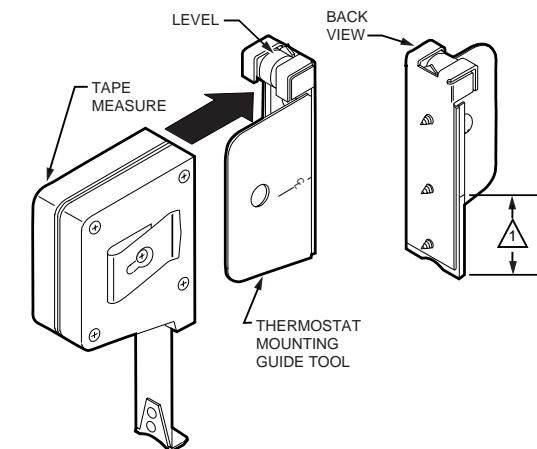


Fig. 42. Uni-Bit, 1/8 in. High-Speed Drill Bit, and Cordless Drill.

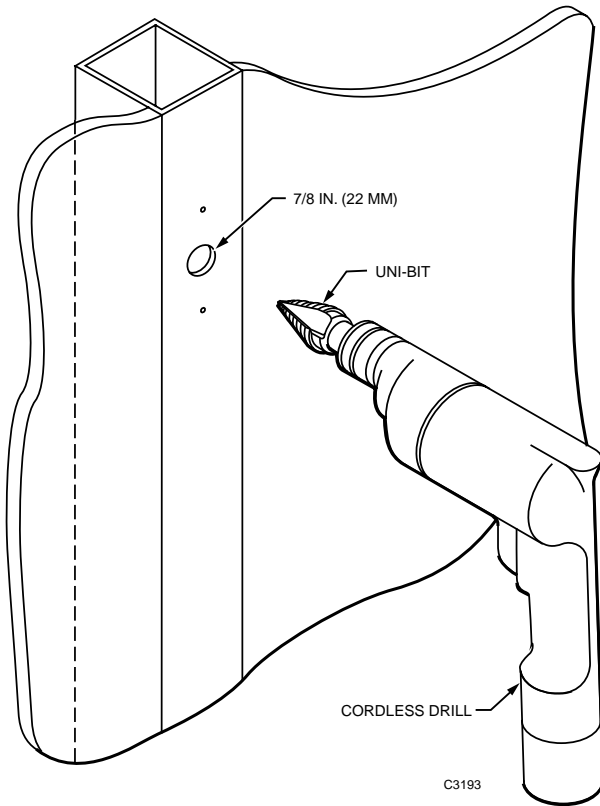


- Measure approximate stat location on mullion. Turn Tape Measure sideways and mark center, top, and bottom hole locations according to points on back of Thermostat Mounting Guide Tool.

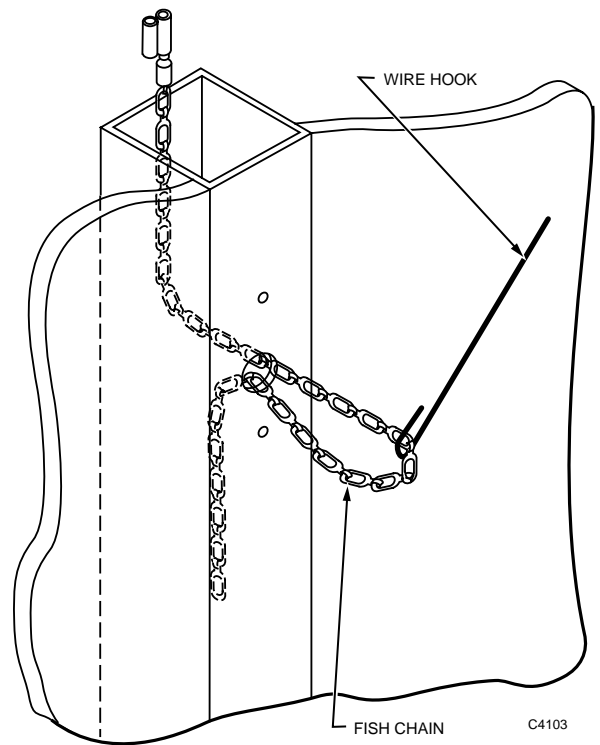


1 1-1/2 IN. (38 MM) FROM BOTTOM OF TAPE MEASURE TO CENTER MARK CORRESPONDING TO CENTER OF STAT.

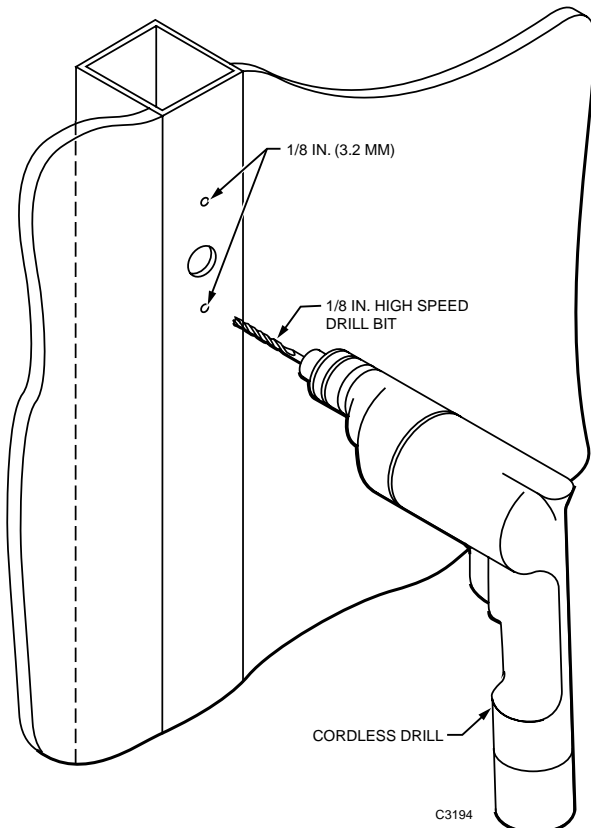
Fig. 41. Tape Measure and Thermostat Mounting Guide Tool.



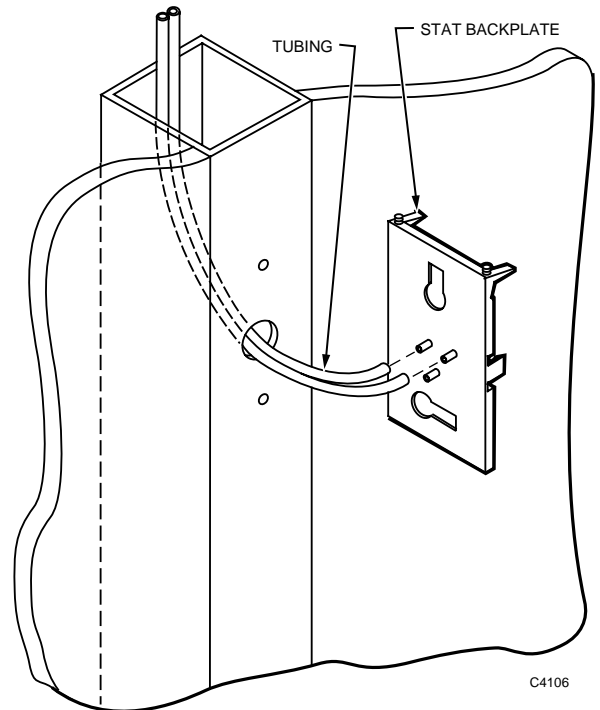
2. Use Uni-Bit and Cordless Drill to drill 7/8-in. (22-mm) center hole.



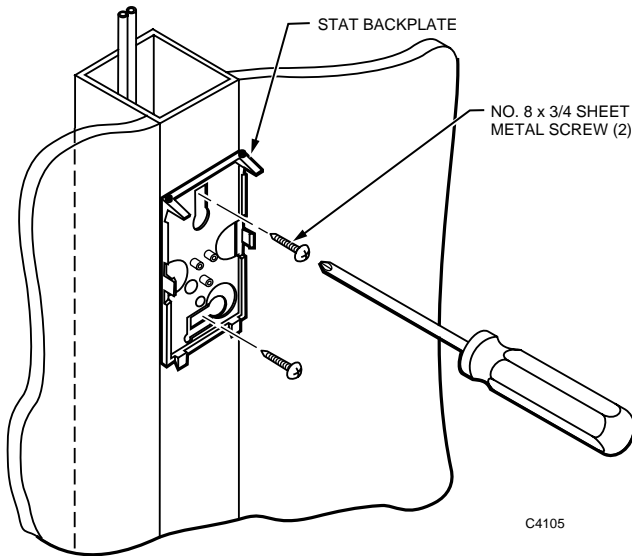
4. Use Fish Chain to fish tubing through center hole.



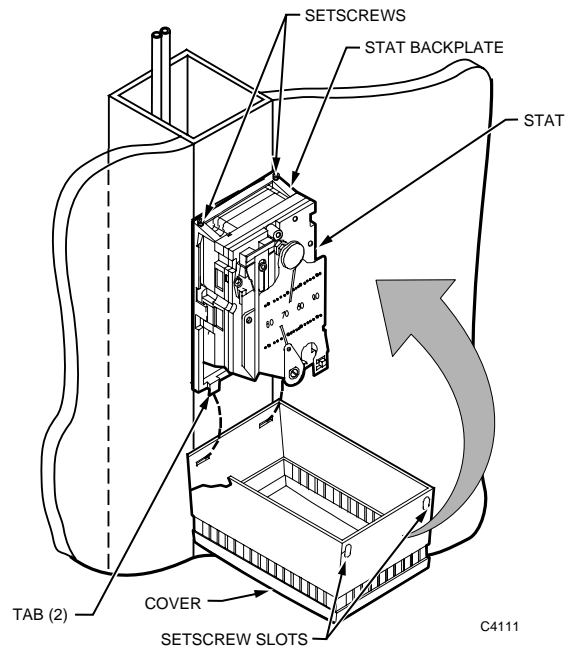
3. Use 1/8 in. High-Speed Drill Bit to drill 1/8-in. (3.2-mm) top and bottom holes.



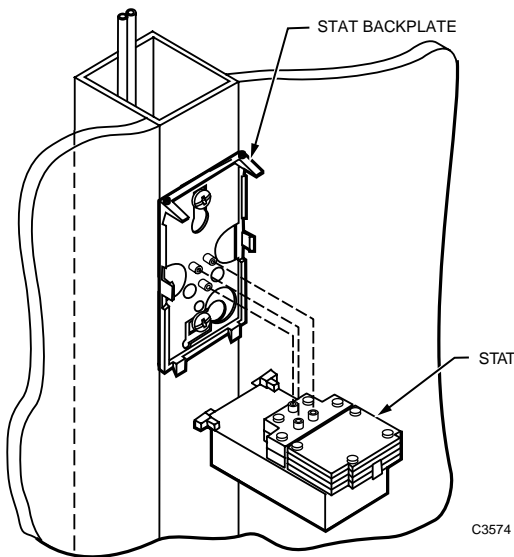
5. Attach tubing to barbs on stat backplate.



6. Position stat backplate against mullion. Level stat backplate. Screw No. 8 x 3/4 in. Sheet Metal Screws through stat backplate keyhole slots into mullion.



8. Hook slots on stat cover over bottom tabs on stat backplate. Swing stat cover up and over stat. Use Thermostat Tool to raise stat backplate setscrews into setscrew slots on top of cover.



7. Mount stat to stat backplate.

### Installation With Surface-Mounted Tubing

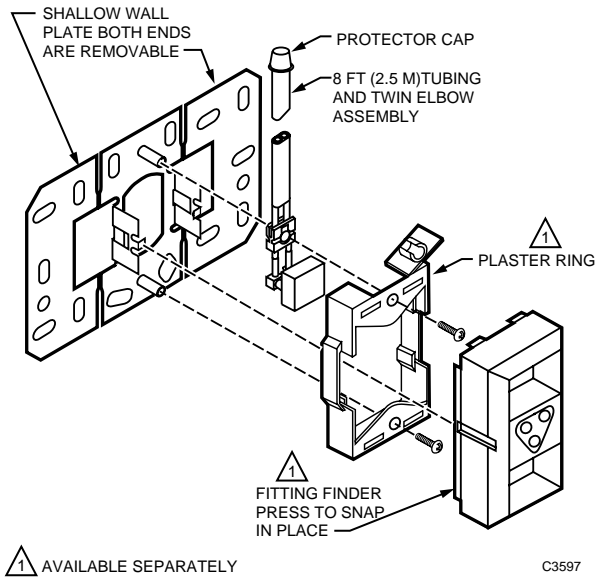
Installation with surface-mounted tubing requires the following equipment:

- Shallow Wall Plate Assembly 14001615-001/-002 or 14001616-001/-002 (Fig. 43). Includes the following:
  - Shallow Wall Plate 14001614-001
  - Plaster Ring 14001609-001
  - Fitting Finder 14000706-001

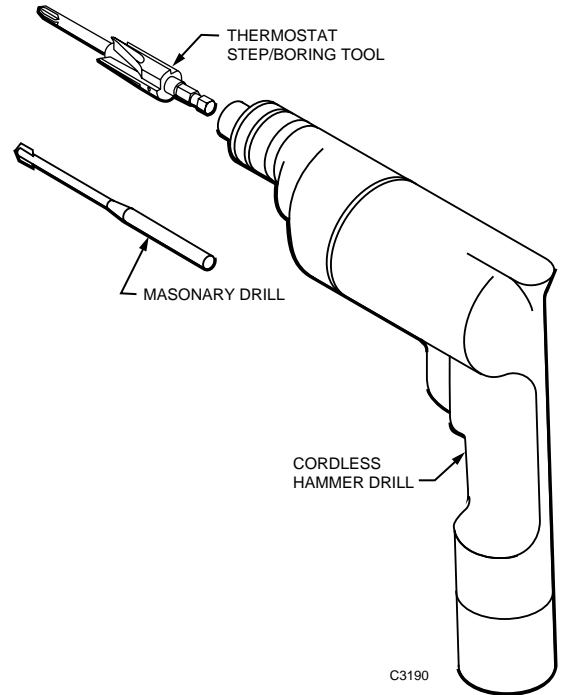
NOTE: Shallow Wall Plate Assembly 14001615-001 (one pipe) or -002 (two pipe) has copper tubing. Assembly 14001616-001 (one pipe) or -002 (two pipe) has 5/32 in. (4 mm) O.D. plastic tubing.

- Tape Measure CCT422
- Wall Mounting Ring 14004458-001 (Fig. 44)
- Cordless Hammer Drill CCT712 (MQG773) (Fig. 45)
- If wall is block, brick, or concrete:
  - Masonry Drill CCT773 (MQG773) (Fig. 45)
  - Plastic Screw Anchors CCT2230 (MVH2230) (two per stat)
  - No. 8 x 3/4 in. Sheet Metal Screws CCT2306 (MVH2306) (two per stat)
- If wall is drywall, Sheetrock, or plaster:
  - Thermostat Step/Boring Tool CCT691 (Fig. 45)
  - Molly Anchors CCT2260 (MVH2260) (two per stat)
- Pocket knife
- Thermostat Tool CCT735A (MQT735A)

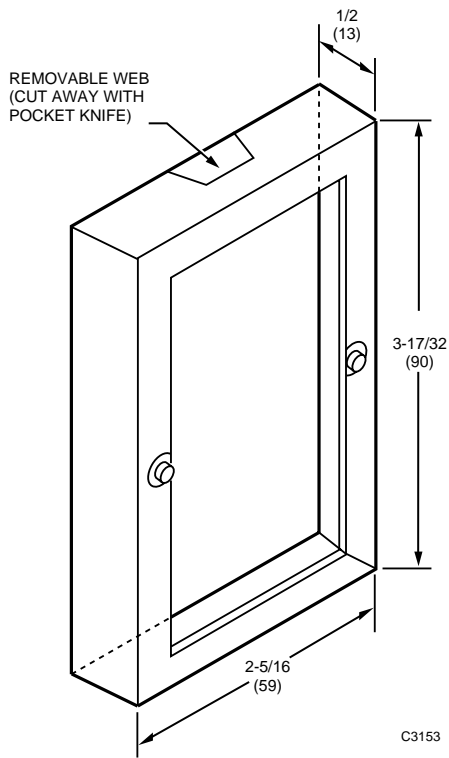




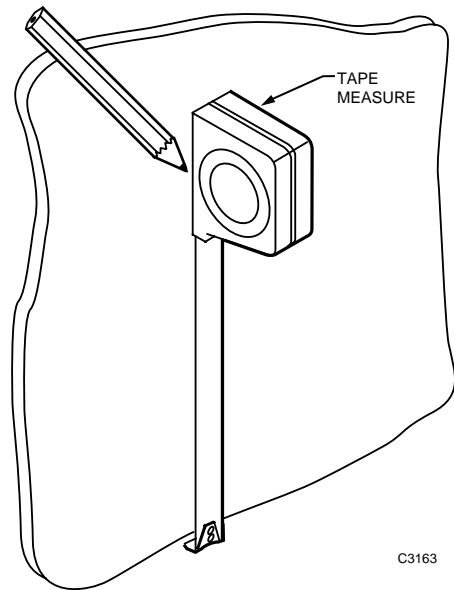
**Fig. 43. Shallow Wall Plate Assembly.**



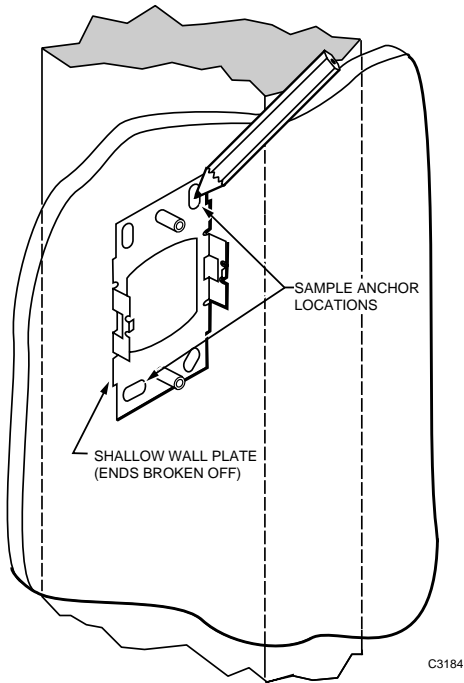
**Fig. 45. Masonry Drill, Thermostat Step/Boring Tool, and Cordless Hammer Drill.**



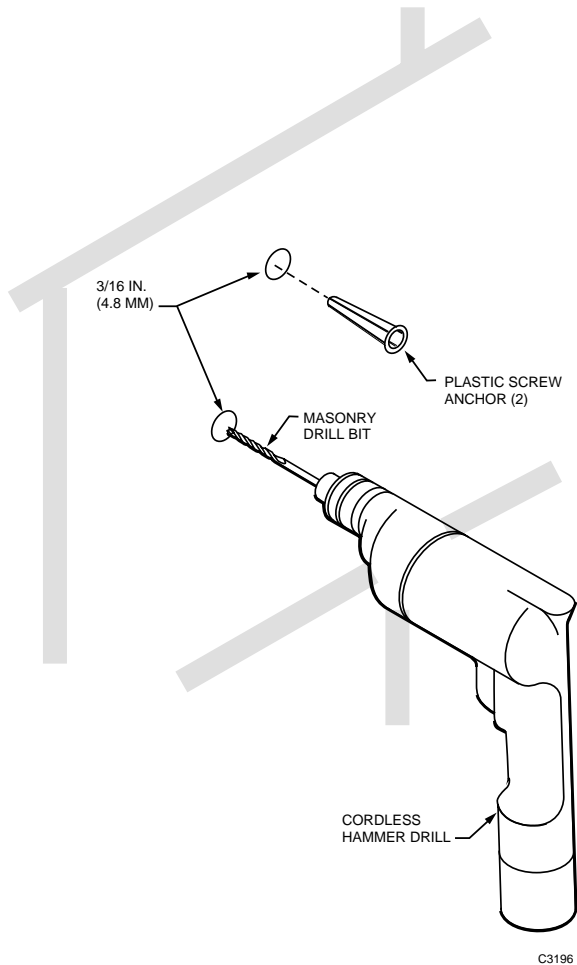
**Fig. 44. Wall Mounting Ring.**



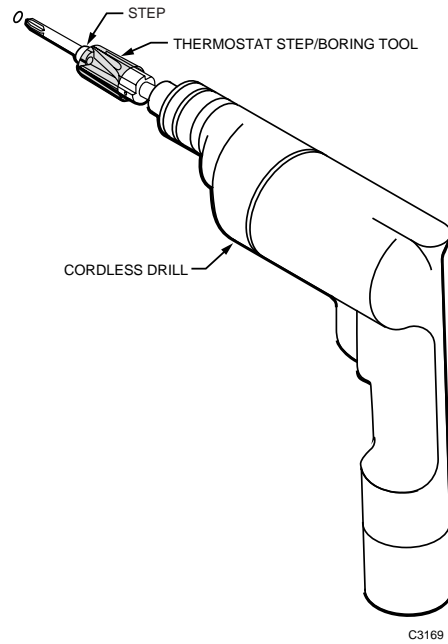
1. Measure and mark stat location on wall.



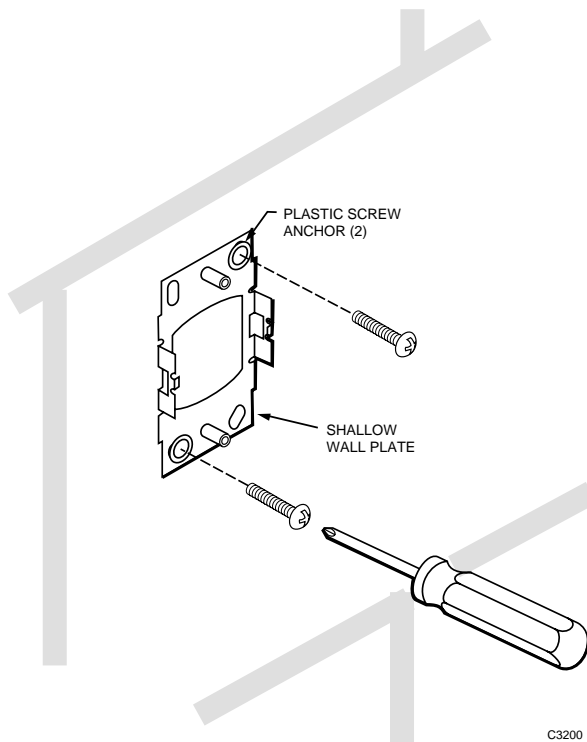
2. Break off ends of Shallow Wall Plate. Center Shallow Wall Plate over mark on wall. Mark anchor locations at two opposite corners of Shallow Wall Plate.



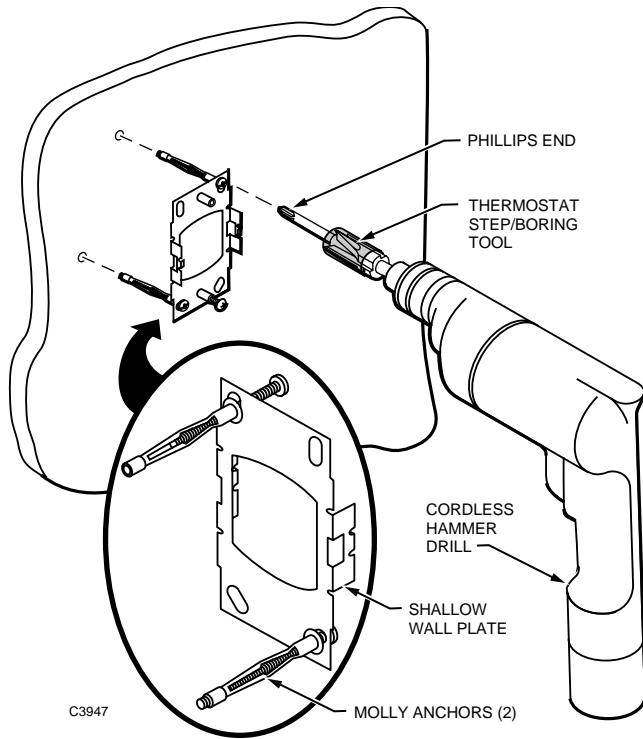
3. If wall is:  
 a. Block, brick, or concrete, use Cordless Hammer Drill and Masonry Drill to drill 3/16-in. (4.8-mm) holes where marked. Tap Plastic Screw Anchors into holes.



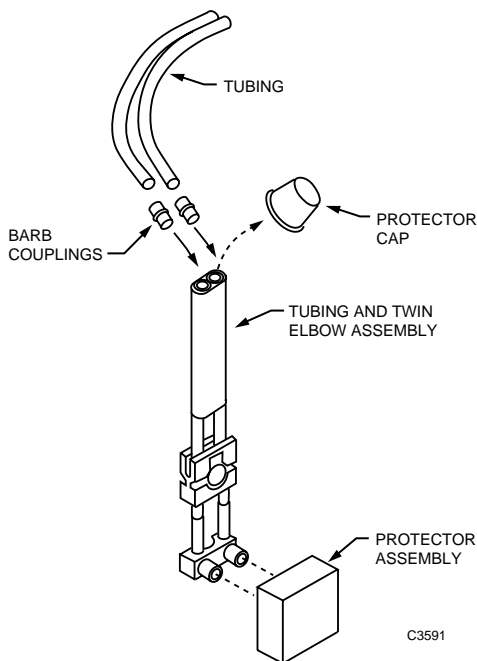
- b. Drywall, Sheetrock, or plaster, leave protective sleeve over bore of Thermostat Step/Boring Tool and use Drill and Tool to drill 1/4 in. (6 mm) holes where marked (drill up to step on Tool).



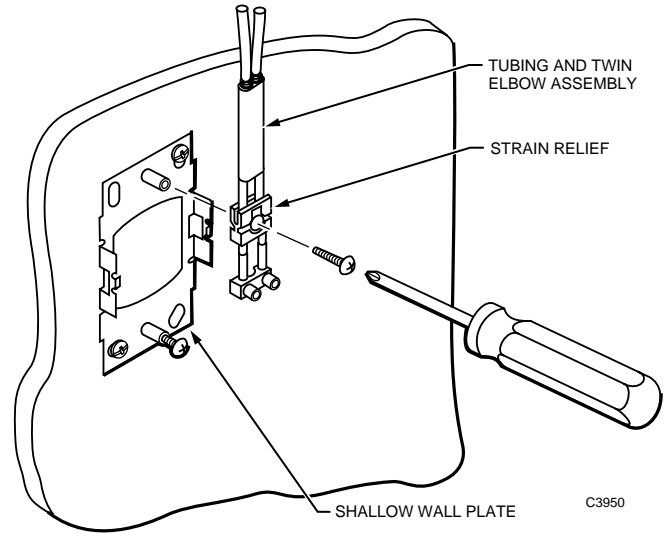
4. If wall is:  
 a. If wall is block, brick, or concrete, screw No. 8 x 3/4 in. Sheet Metal Screws through stat backplate and into Plastic Screw Anchors.



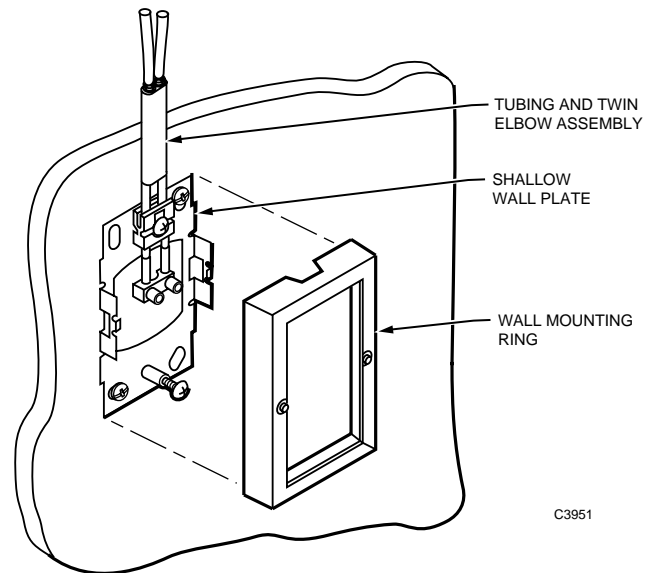
- b. If wall is drywall, Sheetrock, or plaster, disassemble Molly anchors and reassemble through appropriate corner holes of Shallow Wall Plate (see inset). Tighten anchors slightly to secure them to Shallow Wall Plate. Push anchors through holes in wall. With protective sleeve over bore of Thermostat Step/Boring Tool, use Phillips end of Tool to tighten anchors.



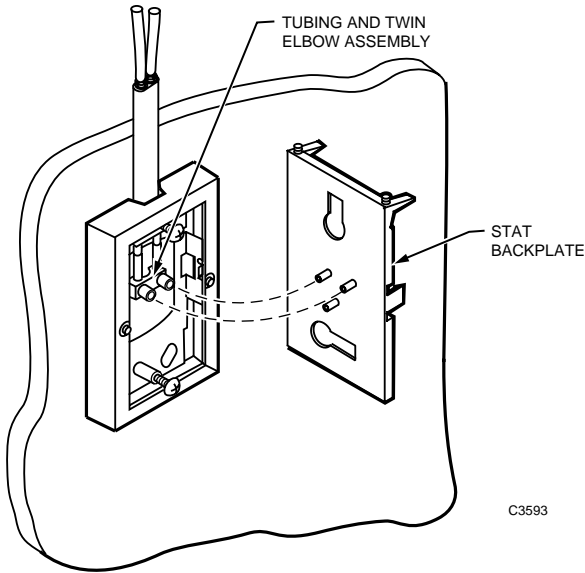
5. Remove protector cap and protector assembly from Tubing and Twin Elbow Assembly. Attach tubing.



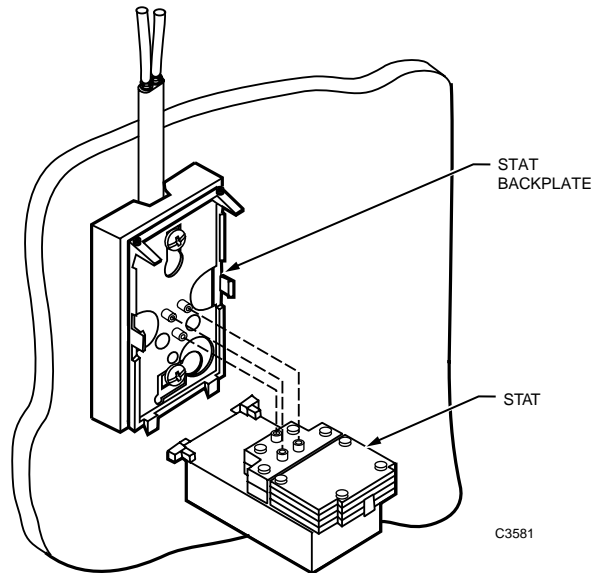
6. Remove screw from Shallow Wall Plate upper screw receptacle. Push strain relief of Tubing and Twin Elbow Assembly onto screw receptacle. Replace screw, leaving it slightly backed out. Back out bottom screw.



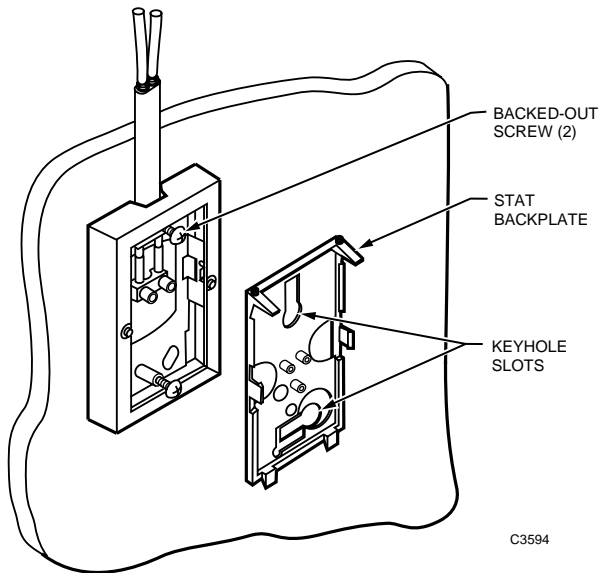
7. Use pocket knife to cut away web where indicated inside Wall Mounting Ring (see inset). Place Wall Mounting Ring over Shallow Wall Plate and Tubing and Twin Elbow Assembly.



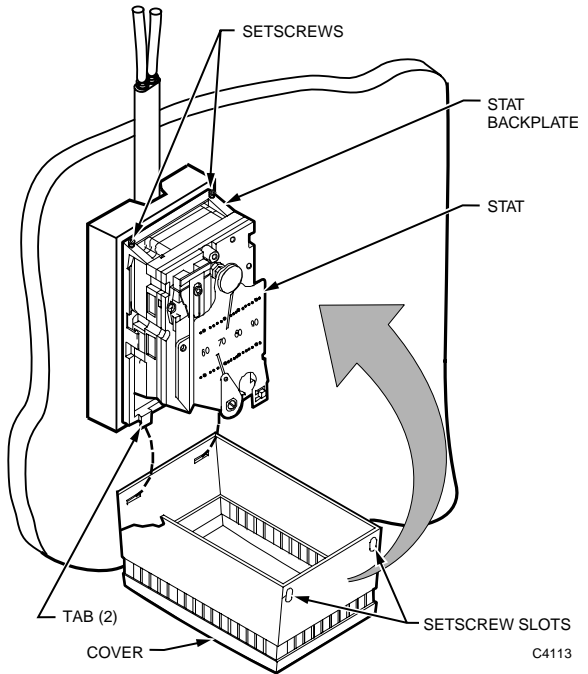
8. Connect Twin Elbow Connector to barbs on stat backplate.



10. Mount stat onto stat backplate.



9. Hook keyhole slots of stat backplate over backed-out screws. Level stat backplate and tighten screws.



11. Hook slots on stat cover over bottom tabs on stat backplate. Swing stat cover up and over stat. Use Thermostat Tool to raise stat backplate setscrews into setscrew slots on top of cover.

## Piping

Figures 46 and 47 show typical one-pipe and two-pipe applications.

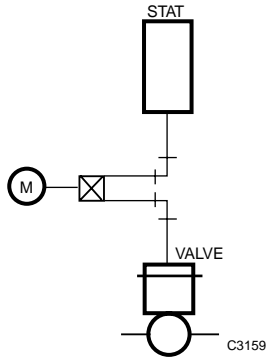


Fig. 46. Typical One-Pipe Application.

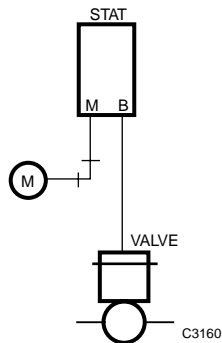


Fig. 47. Typical Two-Pipe Application.

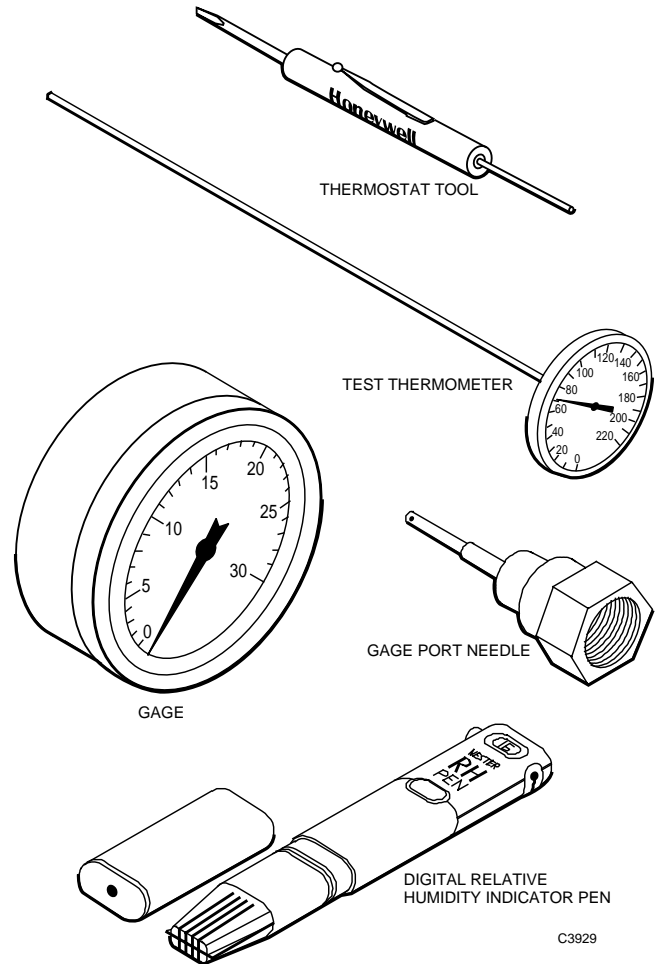


Fig. 48. Humidistat/Humidity Sensor Calibration Tools.

## CALIBRATION

### Tools Required

Calibration requires the following tools, shown in Figure 48:

- Thermostat Tool CCT735A (MQT735A)
- Gage 305965 (0 to 30 psi [0 to 210 kPa])
- Gage Port Needle CCT729 (MQP729)
- Digital Relative Humidity Indicator Pen CCT915 for humidistats and humidity sensors
- Test Thermometer CCT902 (MQT902) for thermostats and temperature sensors

### Humidistat/Humidity Sensor

#### General

After installing the humidistat, set the humidistat to the desired setpoint and let the system operate long enough to stabilize. The length of time required for stabilization depends on system response time and could be only a few minutes or as long as several hours. Verify that the system has stabilized before checking calibration.

**NOTE:** Humidistats and humidity sensors are factory calibrated and should require only a bleed-off check to ensure correct operation. The throttling range is factory set and should not require adjustment under normal operating conditions.

Figure 49 shows humidistat components.

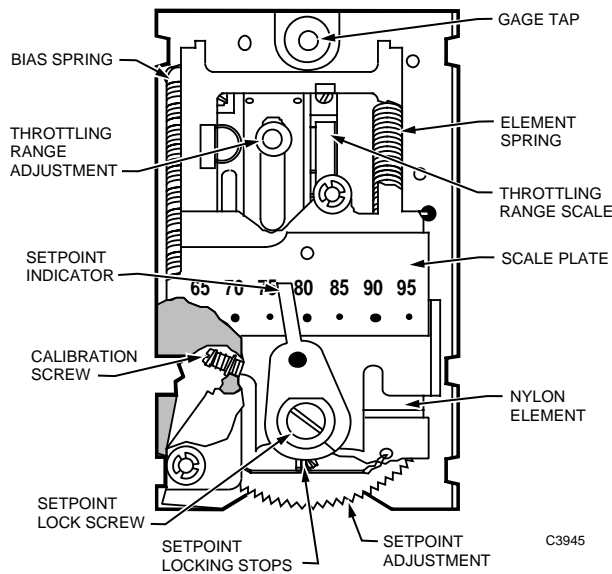


Fig. 49. Humidistat Front View, Cover Off.

### Setpoint Lock

To set the minimum and maximum setpoint, refer to Figure 49 and use the following procedure:

1. Loosen setpoint lock screw.
2. Move locking stop to desired position.
3. Tighten setpoint lock screw.
4. Move setpoint adjustment to check stop positioning.

### Throttling Range Adjustment (HP970 and HP972)

Use the following procedure if a change in the throttling range (TR) is required:

1. Slide TR indicator to desired setting on TR scale (see table).
2. Recalibrate humidistat (see RECALIBRATION).

#### Throttling Range Adjustment.

Humidistat Model	Setpoint Range (% RH)	Throttling Range Indication Lines (% RH)			
		Minimum			Maximum
HP970	12-75	3	5	10	15
HP970	65-95	3	5	10	15
HP972	15-75	8	12	20	35

### Calibration Check

#### Direct-Acting Humidistat (HP970A)

1. Use Thermostat Tool to remove humidistat cover.
2. Use Digital Relative Humidity Indicator Pen to measure actual relative humidity (rh) of space.
3. Turn setpoint indicator down 10 percent below measured rh.
4. Allow humidistat to build up branchline pressure.

5. Turn setpoint indicator up slowly.
6. If humidistat bleeds off at  $\pm 3$  percent rh of measured humidity, no further calibration is necessary. Remove Gage and replace humidistat cover.
7. If humidistat does not operate as described in Step 6, recalibrate humidistat (see RECALIBRATION).

#### Reverse-Acting Humidistats (HP970B and HP972)

1. Use Thermostat Tool to remove humidistat cover.
2. Use Digital Relative Humidity Indicator Pen to measure actual relative humidity (rh) of space.
3. Turn setpoint indicator up 10 percent above measured rh.
4. Allow humidistat to build up branchline pressure.
5. Turn setpoint indicator down slowly.
6. If humidistat bleeds off at  $\pm 3$  percent rh of measured humidity, no further calibration is necessary. Remove Gage and replace humidistat cover.
7. If humidistat does not operate as described in Step 6, recalibrate humidistat (see RECALIBRATION).

### Recalibration



## CAUTION

Humidistats are extremely sensitive. Handle humidistats carefully during recalibration.

#### HP970 and HP972

The procedure in this section assumes that a calibration check has been performed (see CALIBRATION CHECK) and that the humidistat has not operated correctly.

1. Start with main air pressure at 18 psi (124 kPa) nominal or system pressure between 13 and 18 psi (91 and 124 kPa).
2. Assemble Gage and Gage Port Needle.
3. Insert Gage Port Needle in humidistat gage tap.
4. Set humidity setpoint indicator at humidity measured during CALIBRATION CHECK procedure.
5. Turn calibration screw until Gage reads 0 psi.
6. Turn calibration screw in opposite direction until Gage reads 8 psi (55 kPa)  $\pm 1$  psi ( $\pm 7$  kPa).
7. Allow 5 to 10 seconds for HP970, 30 to 60 seconds for HP972, for complete response. Setpoint and actual rh should be within acceptable limits.
8. Repeat appropriate procedure under CALIBRATION CHECK to verify calibration.
9. Remove Gage and replace cover.
10. Adjust humidistat setpoint indicator to desired setpoint.

#### HP971 Humidity Sensor

1. Supply sensor with 18 psi (124 kPa) air through 0.007-in. internal or external restriction. The HP971A1024 (15 to 85% range) also has a 0.005-in. bleed restriction in the output line.
2. Assemble Gage and Gage Port Needle.
3. Insert Gage Port Needle in sensor gage tap (same location as humidistat gage tap shown in Fig. 49).
4. Allow sensor to acclimate to ambient conditions at least 20 minutes.
5. Use Digital Relative Humidity Indicator Pen to measure actual relative humidity (rh) of space.
6. Adjust calibration screw (same location as humidistat calibration screw shown in Fig. 49) until branchline pressure is below that specified in the following table:

% rh	Output Pressure in psi (kPa)		
	Range: 15 to 75%	15 to 85% HP971A1024*	65 to 95%
15	3.0 (21)	3.0 (21)	—
20	3.5 (24)	3.9 (27)	—
25	4.2 (29)	4.7 (32)	—
30	4.9 (34)	5.6 (39)	—
35	5.8 (40)	6.4 (44)	—
40	6.8 (47)	7.3 (50)	—
45	7.8 (54)	8.1 (56)	—
50	8.9 (61)	9.0 (62)	—
55	10.0 (69)	9.9 (68)	—
60	11.1 (77)	10.7 (74)	—
65	12.3 (85)	11.6 (80)	3.0 (21)
70	13.6 (94)	12.4 (85)	4.0 (28)
75	15.0 (103)	13.3 (92)	5.3 (37)
80	—	14.1 (97)	7.5 (52)
85	—	15.0 (103)	10.3 (71)
90	—	—	13.1 (90)
95	—	—	15.0 (103)

\* Has a 0.007-in. restriction, and a 0.05-in. bleed restriction in output line.

7. Readjust calibration screw slowly until pressure is correct  $\pm 0.5$  psi for the measured ambient humidity.
8. Remove Gage and replace cover.

## Thermostat/Temperature Sensor

### General

After installing the thermostat, set the thermostat to the desired setpoint and let the system operate long enough to stabilize. The length of time required for stabilization depends on system response time and could be only a few minutes or as long as several hours. Verify that the system has stabilized before checking calibration.

NOTE: Thermostats and temperature sensors are factory calibrated and should require only a bleed-off check to ensure correct operation. The throttling range is factory set and should not require adjustment under normal operating conditions.

Figure 50 shows thermostat components.

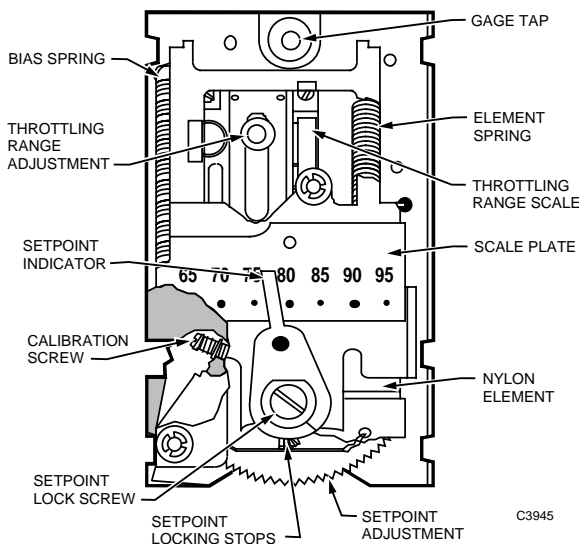


Fig. 50. Thermostat Front View, Cover Off.

## Throttling Range Adjustment

1. Use Thermostat Tool to remove cover. Assemble Gage and Gage Port Needle.
2. Insert Gage Port Needle in thermostat gage tap.
3. Slide throttling range (TR) adjustment to desired position on TR scale.
4. Mechanically check TR by moving setpoint indicator to determine difference in setpoint indication when branchline pressure reads 3 psi (21 kPa) and 13 psi (91 kPa).

NOTE: If required, turn calibration screw to adjust TR into thermostat range.

5. Reset TR to within  $\pm 2$  degrees F ( $\pm 1$  degrees C) of required setting.
6. Follow applicable procedure under CALIBRATION CHECK.

## Calibration Check

### Direct-Acting Thermostat

1. Use Test Thermometer to measure actual temperature of space.
2. Turn setpoint indicator down to 5 degrees F (2.8 degrees C) below room temperature.
3. Wait 5 to 10 seconds (30 to 60 seconds for TP973) to allow thermostat to build up branchline pressure.
4. Turn setpoint indicator up slowly.
5. If thermostat begins to bleed off between 1 degree F (0.6 degrees C) and 3 degrees F (1.7 degrees C) below room temperature, no recalibration is necessary. If recalibration is needed, see RECALIBRATION.

### Reverse-Acting Thermostat

1. Use Test Thermometer to measure actual temperature of space.
2. Turn setpoint indicator up to 5 degrees F (2.8 degrees C) above room temperature.
3. Wait 5 to 10 seconds (30 to 60 seconds for TP973) to allow thermostat to build up branchline pressure.
4. Turn setpoint indicator down slowly.
5. If thermostat begins to bleed off between 1 degree F (0.6 degrees C) and 3 degrees F (1.7 degrees C) above room temperature, no further calibration is necessary. If recalibration is needed, see RECALIBRATION.

## Recalibration

The procedures in this section assume that a calibration check has been performed (see CALIBRATION CHECK) and that the thermostat has not operated correctly.

NOTE: Thermostats have either an adhesive paper dot or an antihum spring, as shown in Figure 50. Verify that either the adhesive paper dot is in place or the antihum spring just touches the throttling plate and is not wedged against it. If the antihum spring needs adjustment, see TP970 Series Pneumatic Thermostats Service Data 75-7134.



## CAUTION

Excessive handling during calibration can heat the thermostat and cause an inaccurate reading.

**General Procedure (All Thermostats)**

1. Use Test Thermometer to measure actual temperature of space.
2. Use Thermostat Tool to remove thermostat cover. Assemble Gage and Gage Port Needle.
3. Insert Gage Port Needle into thermostat gage tap.
4. Turn setpoint adjustment until setpoint indicator reads measured room temperature.
5. Proceed to appropriate section following.

**TP970 and TP9600 Thermostats**

1. Turn calibration screw until Gage reads 0 psi.
2. Turn calibration screw in opposite direction until Gage reads 8 psi (56 kPa)  $\pm 1$  psi ( $\pm 7$  kPa).
3. Remove Gage. Set thermostat at desired temperature. Replace thermostat cover.

**TP971 and TP9610 Thermostats**

1. With main air at pressure specified for DAY operation, turn DAY calibration screw until Gage reads 0 psi.
2. Turn calibration screw in opposite direction until Gage reads 8 psi (56 kPa)  $\pm 1$  psi ( $\pm 7$  kPa).
3. With main air at pressure specified for NITE operation, rotate NITE setpoint dial until setting agrees with measured temperature.
4. Repeat Steps 1 and 2 using NITE calibration screw.
5. Remove Gage. Turn setpoint adjustment until setpoint indicator reads desired room temperature.
6. Replace thermostat cover.

**TP972 and TP9620 Thermostats**

1. With main air at pressure specified for SUMMER operation, turn SUMMER calibration screw until Gage reads 0 psi.
2. Turn calibration screw in opposite direction until Gage reads 8 psi (56 kPa)  $\pm 1$  psi ( $\pm 7$  kPa).
3. With main air at pressure specified for WINTER operation, rotate WINTER setpoint dial until setting agrees with measured temperature.
4. Repeat Steps 1 and 2 using WINTER calibration screw.
4. Remove Gage. Turn setpoint adjustment until setpoint indicator reads desired room temperature.
5. Replace thermostat cover.

**TP973 and TP9630 Room Thermostat**

Follow procedure under TP970 AND TP9600 THERMOSTATS.

**TP974 Temperature Sensor**

Field calibration is not recommended.

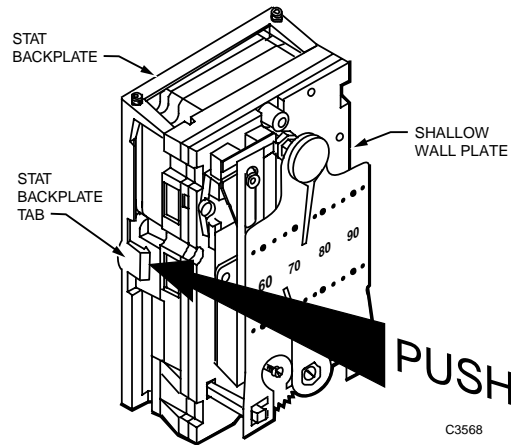
**APPENDIX: BACKPLATES**

**General**

Backplates differ between conventional and Quick-Mount stats. A conventional stat backplate has setscrews at the top and holds the stat body with tabs at the sides. A Quick-Mount stat backplate does not have setscrews and holds the stat body with tabs at the top and sides.

**Removing Stat from Conventional Backplate**

1. Move backplate tab outward (Fig. 51), using Thermostat Tool CCT735A (MQT735A) if necessary.



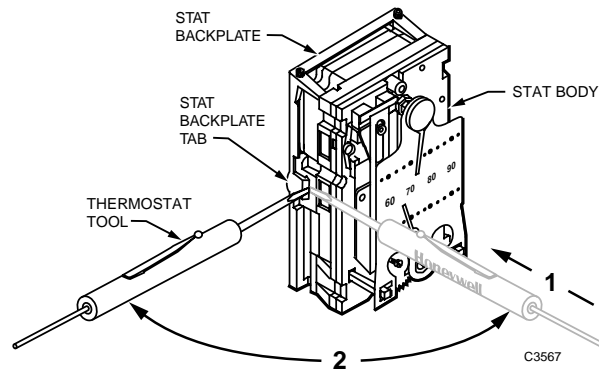
**Fig. 51. Loosening Stat Body from Conventional Backplate.**

2. Pull stat body from backplate.

**Removing Stat from Quick-Mount Backplate**

Use Thermostat Tool CCT735A (MQT735A) and the following procedure to remove a stat from a Quick-Mount backplate:

1. Insert blade of Thermostat Tool between stat body and backplate tab. Push in about 1/4 in. (Fig. 52).
2. Move Tool outward to lever stat body from backplate.



**Fig. 52. Loosening Stat Body from Quick-Mount Stat Backplate.**

3. Pull stat body from backplate.

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