Hardware and Software Installation

TRACER SUMMIT™

Version 17

BMTX-SVN01C-EN

TRANE®

Hardware and Software Installation

Tracer Summit™
Version 17

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BMTX-SVN01C-EN
June 2006

Tracer Summit Hardware and Software Installation

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Revision history

Revision	Description
BMTX SVN01B-EN October 2005	Updated BMTX parts list on page 8 for new replacement part; modified Figure 3 on page 9 to show new replacement parts; Updated Chapter 2 Modem Installation with content from 3270 3391D Installing the BMTX Modem Card Added important note regarding grounding screw. Revised Figure 9 to include arrow pointing out grounding screw.
BMTX SVN01C-EN June 2006	Deleted references to “Windows NT” and changed references from Tracer Summit Version 16 to Version 17 when appropriate. Added “Professional” to all instances of “Windows XP” and “Windows 2000.”

Note: This printed document is accurate as of its publication date. Electronic versions, available through Trane's e-library or at mytranecontrols.com, may be more current (displaying newer dates and higher revision levels).

NOTICE:

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully:

⚠WARNING

Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

⚠CAUTION

Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

CAUTION

Indicates a situation that may result in equipment damage or property damage.

The following format and symbol conventions appear at appropriate sections throughout this manual:

IMPORTANT

Alerts installer, servicer, or operator to potential actions that could cause the product or system to operate improperly but will not likely result in potential for damage.

Note:
A note may be used to make the reader aware of useful information, to clarify a point, or to describe options or alternatives.

- This symbol precedes a procedure that consists of only a single step.

Contents

Chapter 1

Tracer Summit system overview

The Tracer Summit building automation system (BAS) provides building control through a single, integrated system. A building's climate, lighting, scheduling, energy consumption, and other controllable features can all be programmed and managed by Tracer Summit. A Tracer Summit BAS consists of building control units (BCUs) and PC Workstations with Tracer Summit software. A building operator uses either a PC Workstation or the operator display (touch screen) on the building control unit (BCU) to perform system operator tasks. The PC Workstation communicates to BCUs over a dedicated Ethernet (ISO/IEC 8802-3) local area network (LAN) or on a Transmission Control Protocol/Internet protocol (TCP/IP) compatible network. Remote access to the system is available using either a modem in the BCU or an Internet connection with a Tracer Summit Web Server. The PC Workstation can communicate to multiple sites simultaneously.

The Tracer Summit system architecture is highly distributed (see Figure 1 on page 2). Control can occur at the appropriate system level to ensure integrity. The three levels of control are:

- Operator interface
- Building control
- Unit control

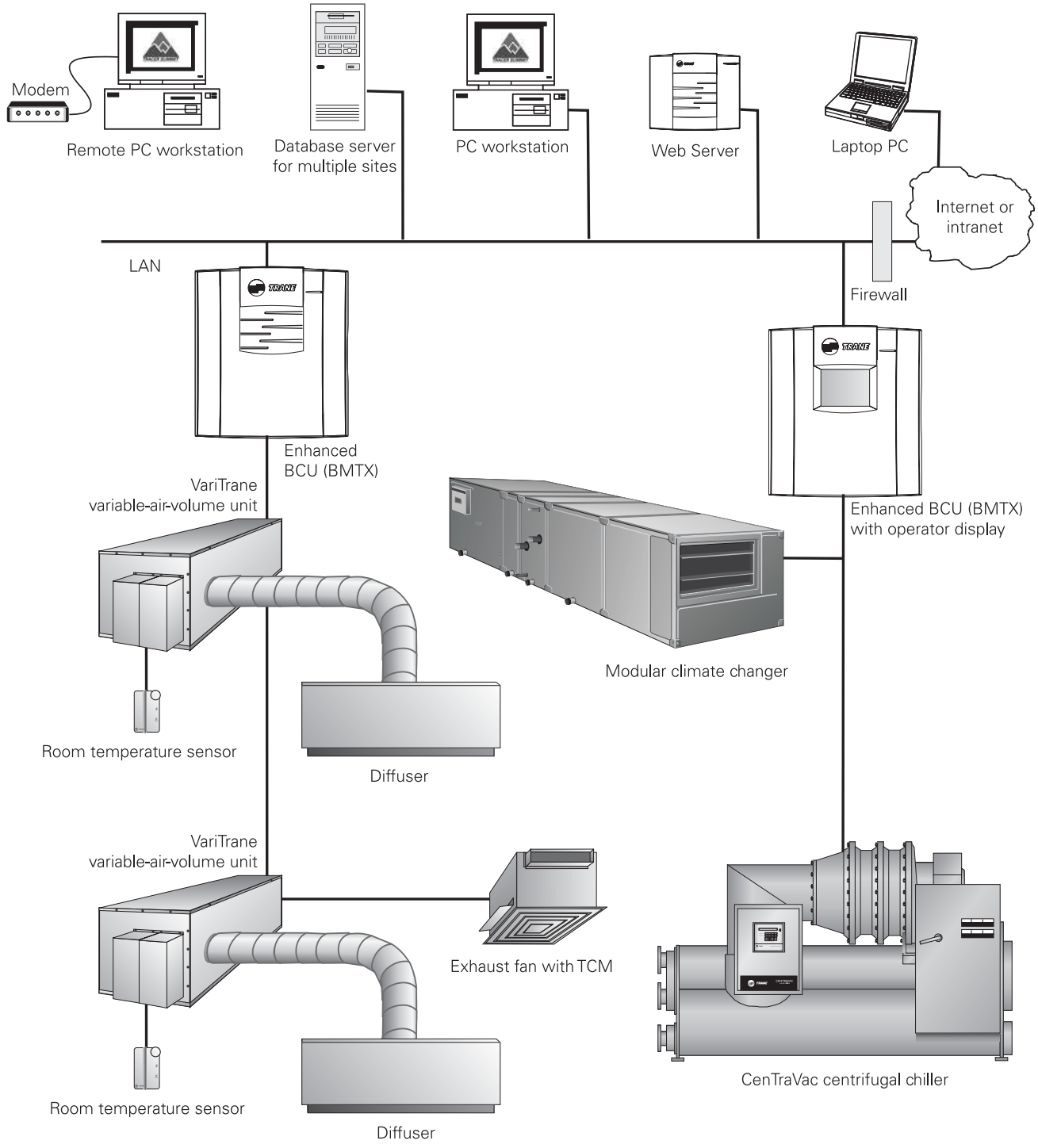
The BMTX BCU (enhanced BCU)

The information in this guide related to the BCU applies specifically to the BMTX BCU (sometimes referred to as the enhanced BCU). For information about the BMTW BCU (sometimes referred to as the modular BCU) or the BMTS BCU, see the *Tracer Summit Hardware and Software Installation guide*.

Before installation

- Be sure all items on the packing list are included and are not damaged.
- Familiarize yourself with this guide and any support literature.
- Formulate a comprehensive installation plan for the entire Tracer Summit system.

Figure 1. Example of a typical Tracer Summit system architecture



BMTX BCU components

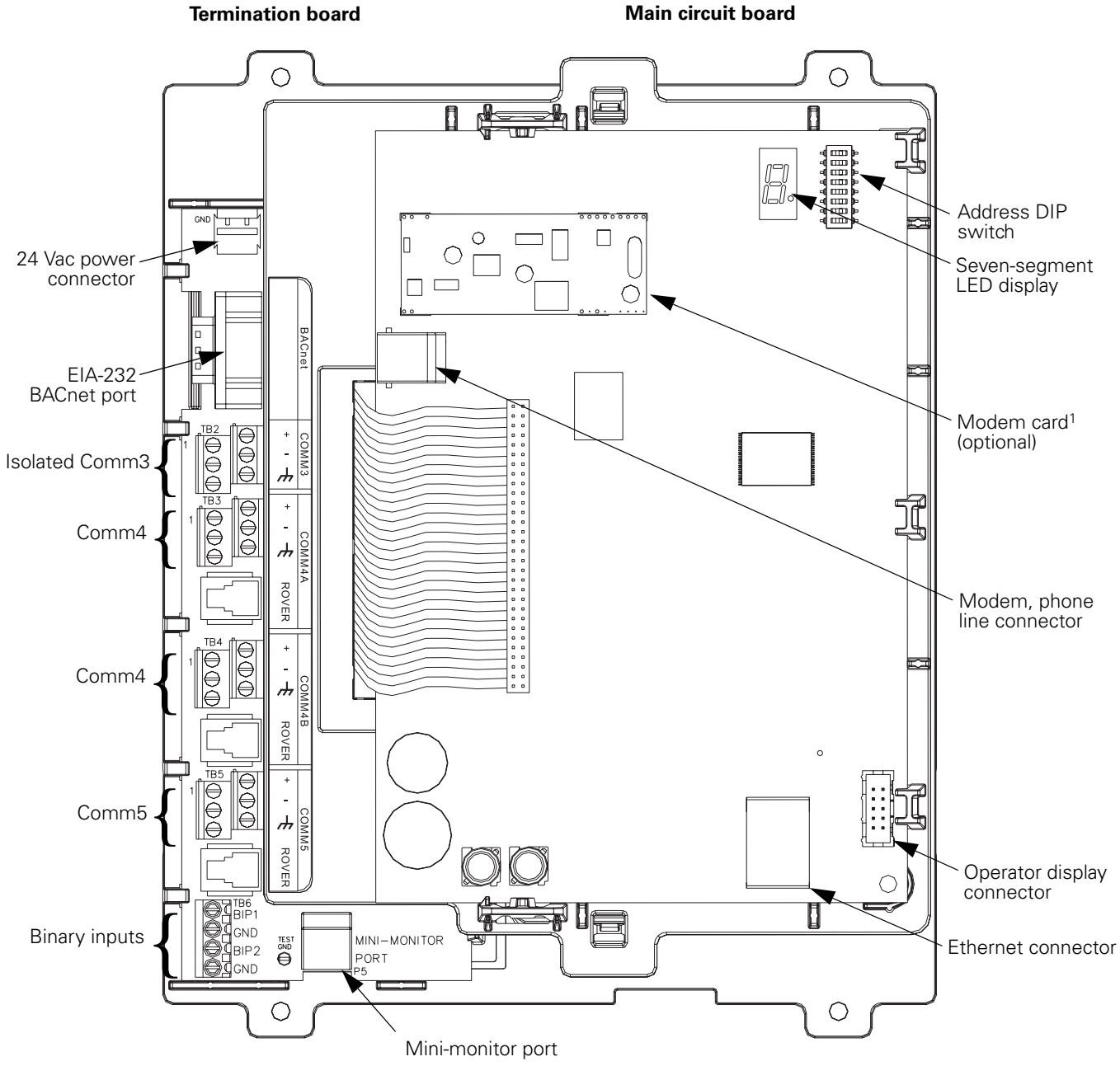
A BCU provides centralized building control through communication with unit control modules (UCMs), PC Workstations, and other BCUs to execute all application programs.

The BMTX BCU consists of a main circuit board and a termination board (see Figure 2 on page 4) both housed in a NEMA-1-rated enclosure. The components on the boards are as follows:

- A termination board connected by a ribbon cable to the BMTX BCU main board for terminal wiring of UCM communication links, 24 V power, BACnet™ serial connection, and binary inputs.
- Four UCM communication links are predefined on the BMTX BCU to support one isolated Comm3 link, two non-isolated Comm4 links, and one Comm 5 link. For more information, see Chapter 5, “UCM communication link wiring and topology.”
- The BACnet serial connection is a dedicated EIA-232 serial port.
- Two binary inputs for use as status or pulse inputs.
- Communication jacks on the termination board to allow access to the Comm4 and Comm5 links using a service tool, such as the Rover service tool.
- A mini-monitor port on the termination board for attaching a PC with a straight-through EIA-232 cable to access built-in diagnostic software. Intended for use by trained service technicians.
- A seven-segment LED display on the main board for displaying BCU operation status. LED operation and codes are described in Chapter 10, “BCU operation and communication status.”
- A DIP switch for setting the BMTX BCU address on the main board.
- A connection on the main board for attaching the optional operator display. For information about the operator display, see the *BCU Operator Display operations guide*.
- A connection on the main board for Ethernet communication.
- A connection on the main board for an on-board modem. No external modems are supported for dial-out connections.

Figure 2 shows the main circuit board and the termination board installed in the enclosure.

Figure 2. Tracer Summit BMTX BCU board components



[1] International installations that have a modem installed must also use a modem shield and cover. For more information, see Chapter 2, "Modem installation."

UCM communication links

For wiring specifications, see Chapter 5, “UCM communication link wiring and topology.” For information about specific UCMs supported by Tracer Summit systems, see Chapter 6, “UCMs supported by Tracer Summit systems.”

LAN communication links

For network wiring specifications, see Chapter 7, “Network communication.”

Remote communication requirements and specifications

The Tracer Summit BCU supports remote communication with a PC Workstation. Remote communication requirements and specifications are described in the following sections.

Communication rate

The BMTX BCU supports a maximum communication rate of 56,700 bps.

Communication protocol

Communication between the BCU and a PC Workstation is performed using the BACnet point-to-point (PTP) protocol.

BMTX BCU on-board modem

For remote communication, the on-board modem is the only modem supported (see Figure 2 on page 4). Trane reserves the right to support only specified modems, because modem specifications are subject to change. This ensures proper operation and helps facilitate technical support if communication failures occur.

A modem cover and shield are included with all modems that are ordered for international installation (a CE certification requirement).

PC Workstation modem

The Tracer Summit PC Workstation supports internal and external modems. (The resources available on any given PC Workstation will dictate the number of modems that can be connected.) As with the BMTX BCU on-board modem, Trane reserves the right to support only those modems specified. For a current list of specified modems, contact your local Trane office.

PC Workstation requirements

The following sections specify hardware and software requirements and recommendations for the PC Workstation. The hardware requirements vary depending upon which add-on packages are included with Tracer Summit software.

Hardware requirements

The minimum hardware requirements for a PC Workstation running Tracer Summit standard software by itself, or along with the optional Tracer 100/Tracker Communications Package or the Building Communications Package:

- Pentium 233 MHz processor
- 128 MB for Windows XP Professional and Windows 2000 Professional
- 2 GB hard drive space with 300 MB free space
- 32X CD-ROM needed to run the Tracer Summit Daily Operations Tutorial
- 15-inch SVGA monitor, 800 × 600 resolution, 16-bit color
- Mouse
- Keyboard
- Parallel port for printer (optional)
- 16-bit sound card with speakers

In addition, at least one of the following is required for establishing a connection:

- One PCI or ISA slot (for Ethernet or ARCNET network adapter)
- One minimum 14.4 Kbaud modem for remote workstation

The minimum hardware requirements for a PC Workstation running Tracer Summit Enterprise Management Package are as listed in the previous section for Tracer Summit standard software, with the following exceptions:

- Pentium 700 MHz processor
- 56 Kbaud modem

Software requirements

The PC Workstation must have the following software installed:

- Windows XP Professional and Windows 2000 Professional
- Internet Explorer Version 5 or higher
- Microsoft Data Access Components (MDAC) Version 2.8 Service Pack 1 or higher (this is usually automatically installed with Microsoft Windows)

Inspection upon receipt

Tracer Summit BCUs ship pre-configured from the factory based on the model number ordered. Refer to Table 3 on page 11. BCUs may include the following:

- Optional BCU operator display
- Optional modem
- All mounting accessories

The individual components are pre-installed in the BCU and are shipped in the same package. Contact Trane for further information about the BCU model number and individual part numbers. Also, see Figure 3 on page 11.

A Tracer Summit PC Workstation package includes everything to run Tracer Summit software. The package includes:

- Tracer Summit software CD
- Daily Operator Tutorial CD

Place separate orders for literature packages and for additional PC Workstations, if they are required.

When unpacking, make sure that the documentation is not lost or discarded with the packing material.

Although all items are inspected thoroughly before leaving the factory, it is important to check them when they arrive at the job site to ensure that the correct BCU panel was shipped and that no shipping damage occurred. Use the Shipping Authorization papers to verify that all items are present.

If the job site inspection reveals damage or material shortage:

1. Make the appropriate notation on the carrier's delivery receipt.
2. Immediately file a claim with the carrier and specify the extent and type of damage/shortage found.
3. Notify the appropriate Trane sales office representative.

Storage

Tracer Summit BCU panels are designed for indoor installation only. If you must store the panel at the job site before installation, make sure it is stored indoors in a controlled environment. Acceptable storage temperatures range from –50°F to 150°F (–46°C to 66°C), with a relative humidity from 10% to 90%, noncondensing.

CAUTION

Avoid equipment damage!

Store the BCU cover and logic board off site until most or all building construction is complete. Failure to do so could damage the BCU cover and logic board.

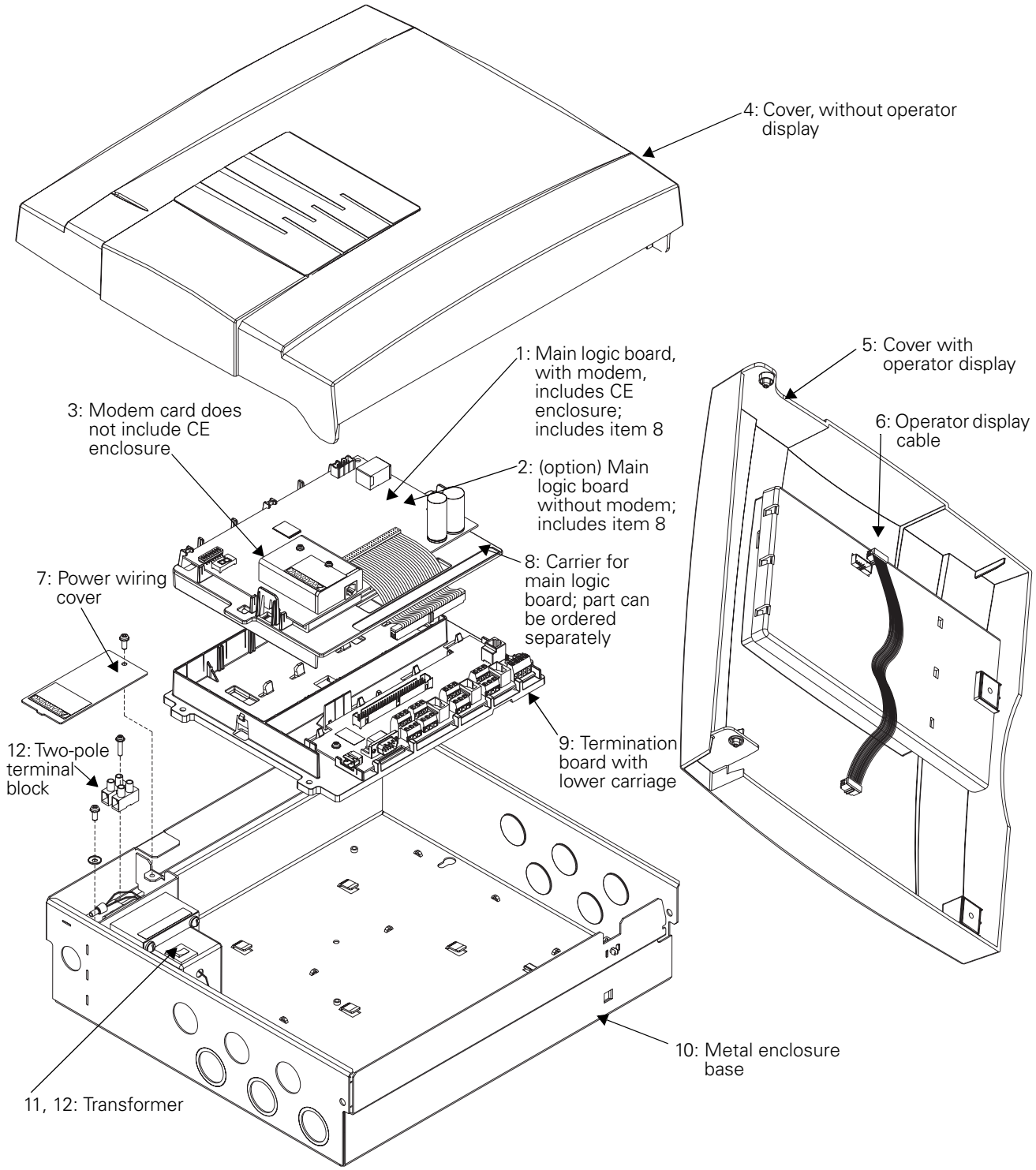
BMTX BCU parts list

Table 1 gives a complete list of BMTX BCU parts by item number. Figure 3 on page 9 illustrates each part, showing corresponding item numbers. Table 2 describes how to use a model number for ordering a BMTX BCU.

Table 1. BMTX BCU parts list

Item	Model # digit(s)	Model # options	Design revision	SVC parts mnemonic #	Service parts, GCC ordering	GCC part #	Description
1	13	1	A0	MOD01524	S3090-0525-62	50100922	BMTX main logic board, with modem (item 8 is included with this part)
2	13	0	A0	MOD01491	S3090-0510-62	50100922	BMTX main logic board, without modem (item 8 is included with this part)
3	13	1	A0	BRD02957	S3090-0409-62	41513058	On-board modem (Also available as part of item 1)
4	12	1	A0	CAB00990	S3090-0321-62	35914305	Cable for operator display
5	12	0	A0	COV03554	S3090-0484-62	31801008-B	Cover, without operator display
6	12	1	A0	COV03553	S3090-0483-62	40201224	Cover, with operator display and cable
7	All models	N/A	A0	COV03311	S3090-0309-62	31800896-R02	Power wiring cover
8	All models	N/A	A0	PNL14797	S3090-0319-62	31800902-R02	Carrier for main logic board
9	All models	N/A	A0	MOD01411	S3090-0408-62	50100923 plus 318000903	Termination board with lower carriage
10	All models	N/A	A0	PNL14789	S3090-0329-62	31800885-R03	Metal enclosure base
11	8	A	A0	TRR01279	S3090-0429-62	35805010-R03	Transformer, 120/240 Vac, 24 Vac, 76 VA
12	8	B	A0	TRR01788	S3090-0493-62	35806022-R01	Transformer, 230 Vac
13	All models	N/A	A0	BLK01013	S3090-0415-62	35601131	Two-pole terminal block

Figure 3. BMTX BCU parts



BMTX BCU model numbers

All Trane products are identified by a multicharacter model number that precisely identifies a unit according to its parts. This number is located on the BCU name plate. Its use enables installing contractors, owner/operators, and service technicians to determine components, operation, and options for a particular system. Table 2 provides a list of available model numbers. Table 3 on page 11 explains how a model number is constructed.

Table 2. List of available BMTX BCU model numbers

Description	UL listed (120 Vac)	CE marked (230 Vac)
BMTX BCU	BMTX001AAB000	BMTX001BAB000
BMTX BCU with operator display	BMTX001AAB010	BMTX001BAB010
BMTX BCU with modem	BMTX001AAB001	BMTX001BAB001
BMTX BCU with modem and operator display	BMTX001AAB011	BMTX001BAB011
BMTX BCU 120 V UL-864-UUKL	BMTX001DAB000	N/A
Description	**UL listed (24 Vac)**	**CE marked (24 Vac)**
BMTX BCU frame mount	BMTX001EAB000	BMTX001CAB000
BMTX BCU frame mount with modem	BMTX001EAB001	BMTX001CAB001

Note: The following kits are available to upgrade an old BCU to a BMTX BCU:

- 49500531 BMTX retrofit kit for MTX/BMTW BCU
- 49500534 BMTX retrofit fit or Tracer 100 with modem
- 49500535 BMTX retrofit fit for BMTX/BMTW BCU with modem
- 49500532 BMTX retrofit fit for Tracer 100

Table 3. BMTX BCU model number explanation

Model number example: BMTX001AAB000		
Digits	**Model number**	**Description**
1,2,3,4	BMTX	Tracer Summit BMTX (enhanced BCU)
5,6,7	001	Capacity
8	A B C D E	120 V 230 V, CE marked Frame mount, CE marked 120 V, UL-864-UUKL Frame mount, UL listed
9	A	Not used
10,11	B0	Design revision
12	0 1	No display Operator display
13	0 1	No modem Modem installed
Note: See Table 2 on page 10 for a complete list of available model numbers.		

Chapter 2

Modem installation

The BMTX BCU ships with the optional modem card installed, if it was ordered with the BCU. If ordered later, it needs to be installed. Refer to the following procedures for installation.

Note: A replacement service part for the BMTX main circuit board is shipped with the plastic base (top frame) already assembled. It is available with a modem (#S3090-0525-62) or without a modem (#S3090-0510-62).

Installing the modem on 120 V systems (North America)

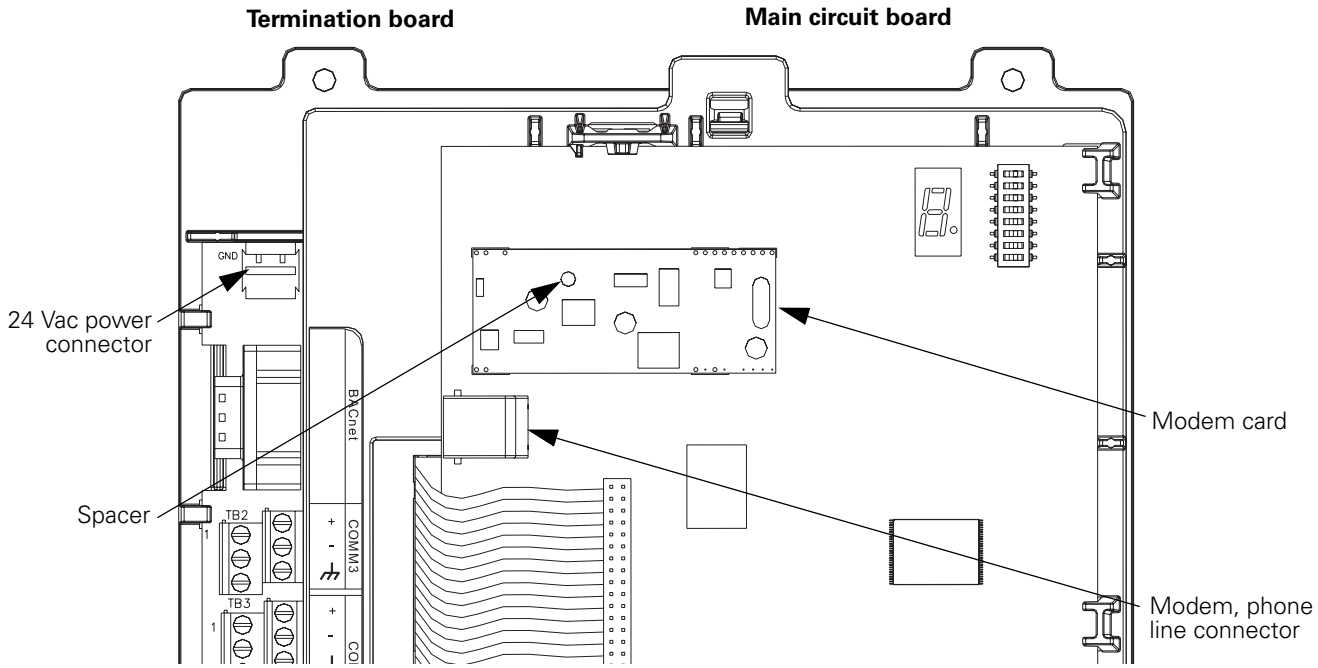
Install the modem as follows (see Figure 4 on page 14):

1. If connected, disconnect the 24 Vac power cable from the termination board.
2. On the main circuit board, press the plastic spacer into the spacer hole. You should hear the spacer snap into place.
3. Line up the spacer hole in the modem card with the spacer on the main circuit board.
4. Gently press the modem card down onto the spacer. Take care to line up all the pins on both sides of the card.

Note: One pin on the card will not mate with a socket connection.

5. Connect the modular phone cable.
6. Connect the 24 Vac power cable to the termination board.

Figure 4. BMTX BCU with modem installed on 120 V system



Installing the modem on 230 V systems (international)

Install the modem as follows (see Figure 5 on page 15 and Figure 6 on page 16):

1. If connected, disconnect the 24 Vac power cable from the termination board.
2. Remove the main circuit board by using a small, blunt object, such as a screw driver or pen, to push each of the mounting locks on the top frame away from the circuit board. The board pops out. Lift the board away from the frame.
3. Insert two of the modem cover screws into the back of the main circuit board. Secure the screws by screwing the two stand-offs onto them.
4. Set the shield in place on the top frame.
5. Replace the main circuit board by pushing the circuit board and the top frame together. You will hear a click when they lock together.
6. On the main circuit board, press the plastic spacer into the spacer hole. You should hear the spacer snap into place.
7. Line up the spacer hole in the modem card with the spacer on the main circuit board.

8. Gently press the modem card down onto the spacer. Take care to line up all the pins on both sides of the card.

Note: One pin on the card will not mate with a socket connection.

9. Line up the two holes on the modem cover with the stand-offs and gently slide the cover down over them. Screw the other two modem cover screws onto the stand-offs to secure the cover.
10. Connect the modular phone cable.
11. Connect the 24 Vac power cable to the termination board.

Figure 5. BMTX BCU with modem installed on 230 V system

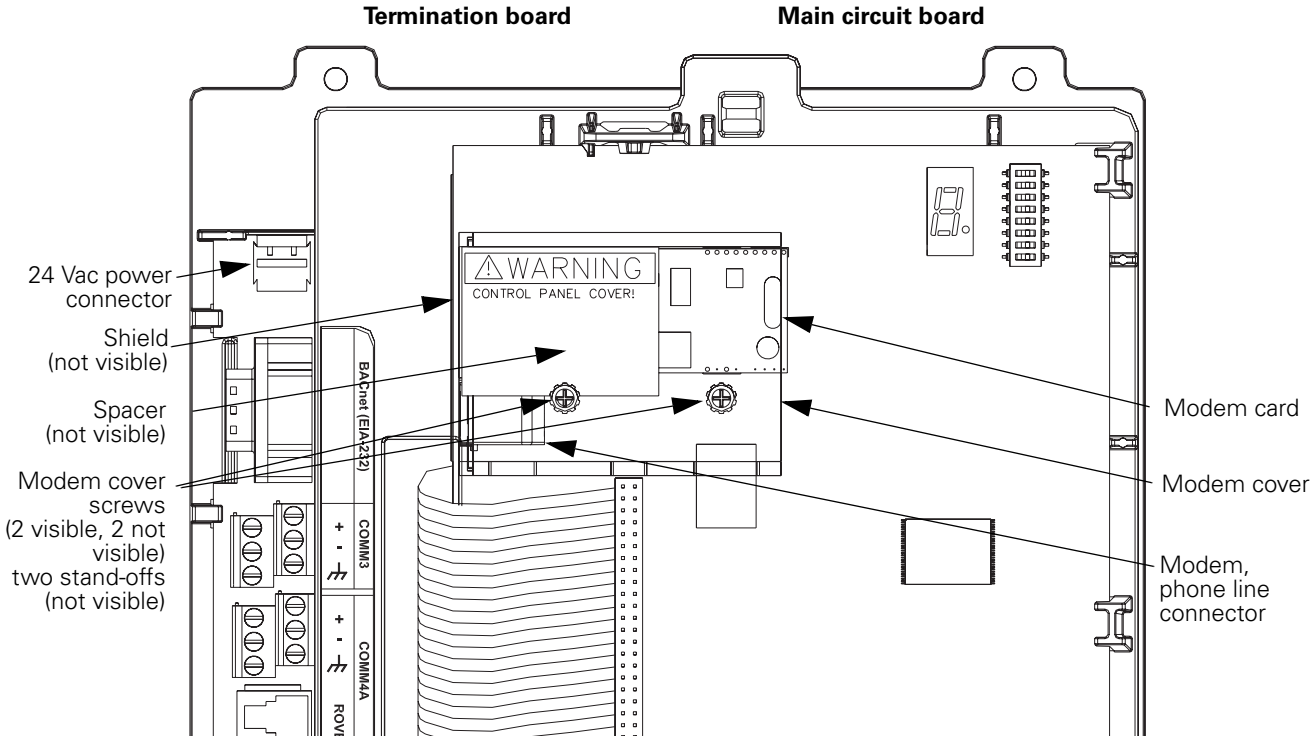
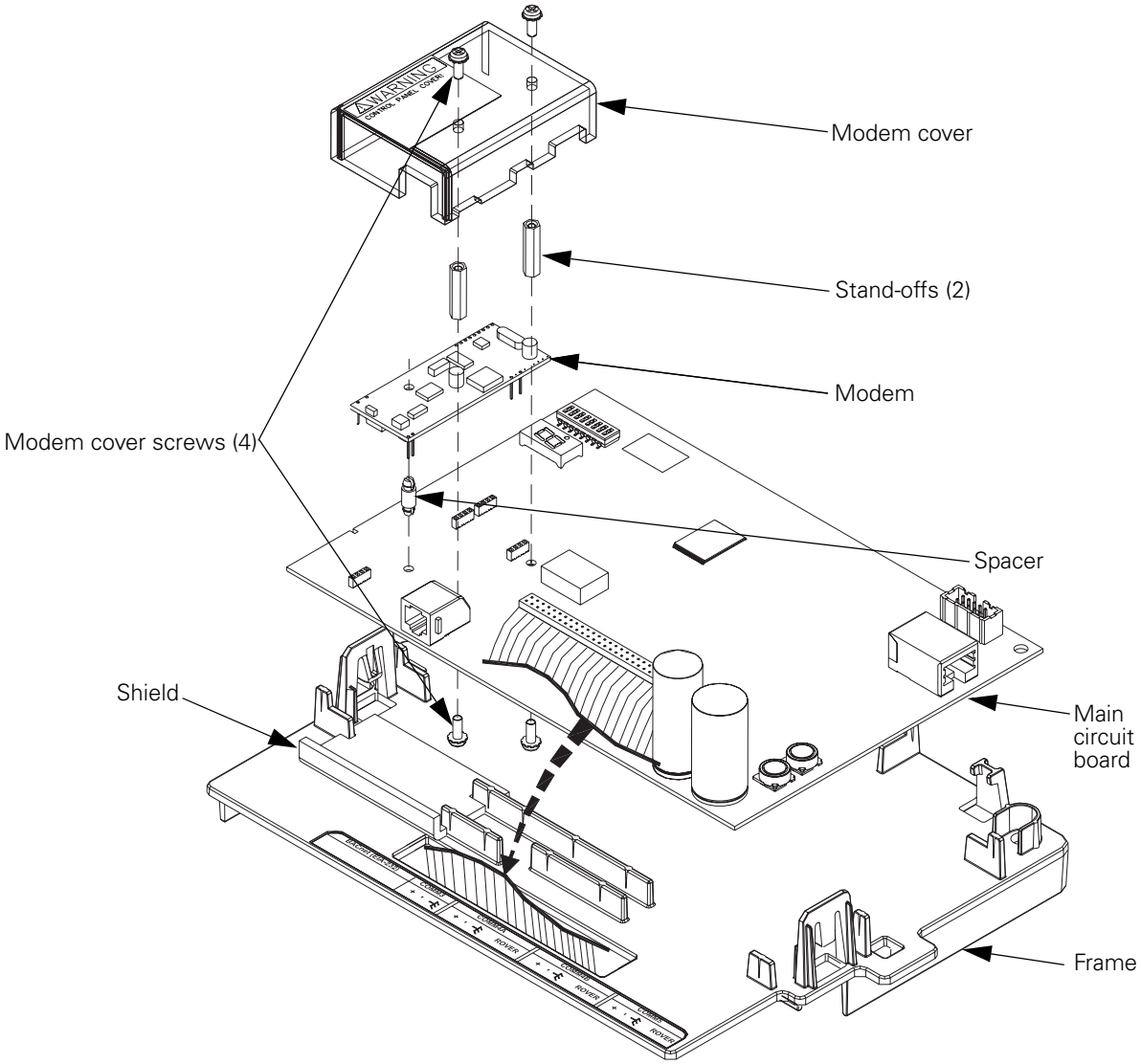


Figure 6. Exploded view of BMTX BCU showing modem installation parts for a 230 V system



Chapter 3

BMTX BCU mounting, installing, and power wiring

This chapter describes procedures for mounting, installing, and wiring ac power to the BMTX BCU.

CAUTION

Avoid equipment damage!

Install and use the BCU as specified by the manufacturer. Failure to do so may result in equipment damage.

Selecting a mounting location

Make sure that the location meets the operating environment requirements and clearance requirements described in this chapter. A BCU must be installed indoors. Trane recommends locating it:

- Near the controlled equipment to reduce wiring costs
- Where service personnel have easy access
- Where it is easy to see and to interact with the operator display
- Where public access is restricted to minimize the possibility of tampering or vandalism

CAUTION

Avoid equipment damage!

Install the BCU in a location that is out of direct sunlight. Failure to do so may cause it to overheat.

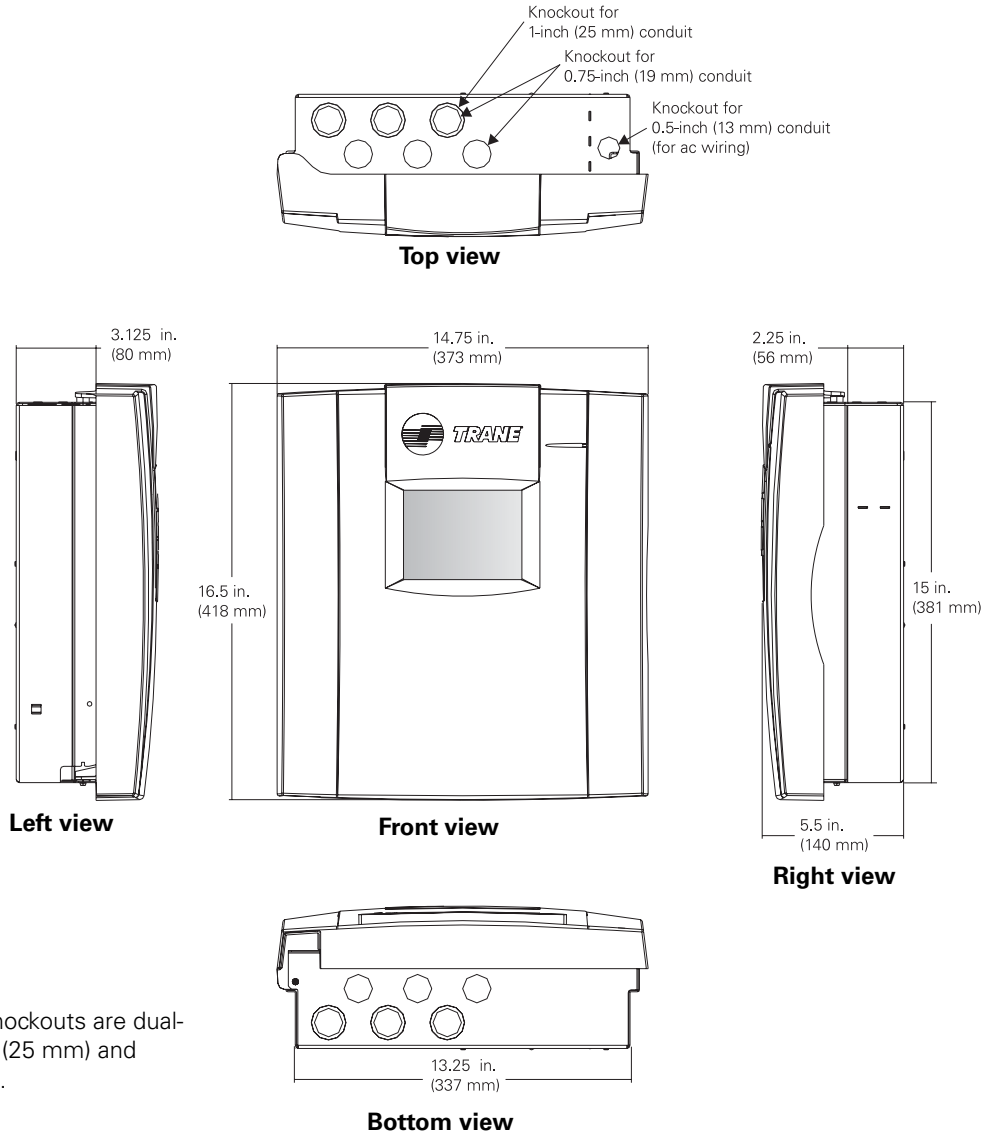
Operating environment requirements

Make sure that the operating environment conforms to the specifications listed in Table 4 on page 18. Enclosure dimensions are illustrated in Figure 7 on page 18.

Table 4. Operating environment specifications

Temperature	From 32°F to 122°F (0°C to 50°C)
Humidity	10–90% non-condensing
Power requirements	North America or other: 120 Vac or 230 Vac, 1 A maximum, 1 phase, 50 or 60 Hz
Weight	Mounting surface must be able to support 60 lb (28 kg)
Dimensions	16 ½ in. × 14 ¾ in. × 5 ½ in. (418 mm × 373 mm × 140 mm)
Altitude	6500 ft (2000 m)
Installation	Category 3
Pollution	Degree 2

Figure 7. BMTX BCU enclosure dimensions

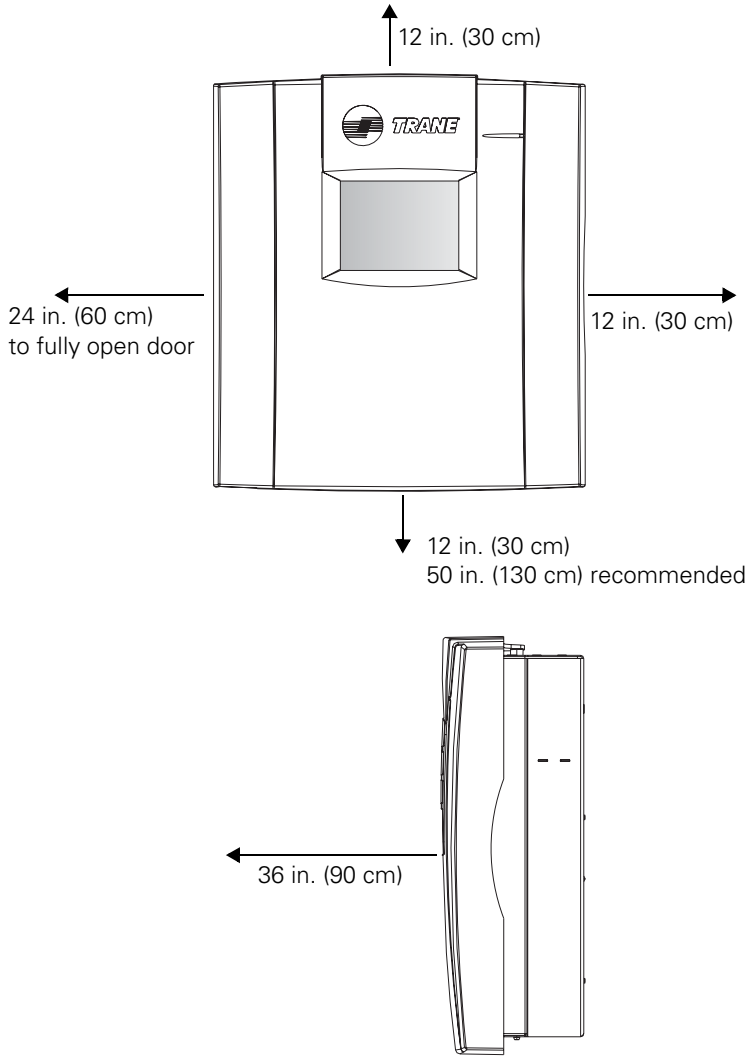


Note: Six of the twelve knockouts are dual-sized knockouts for 1-inch (25 mm) and 0.75-inch (19 mm) conduit.

Clearances

Make sure that the mounting location has enough room to meet the minimum clearances shown in Figure 8.

Figure 8. Minimum clearances for the BMTX BCU enclosure



Mounting the back of the enclosure

The back of the enclosure is shipped with the termination board installed inside it.

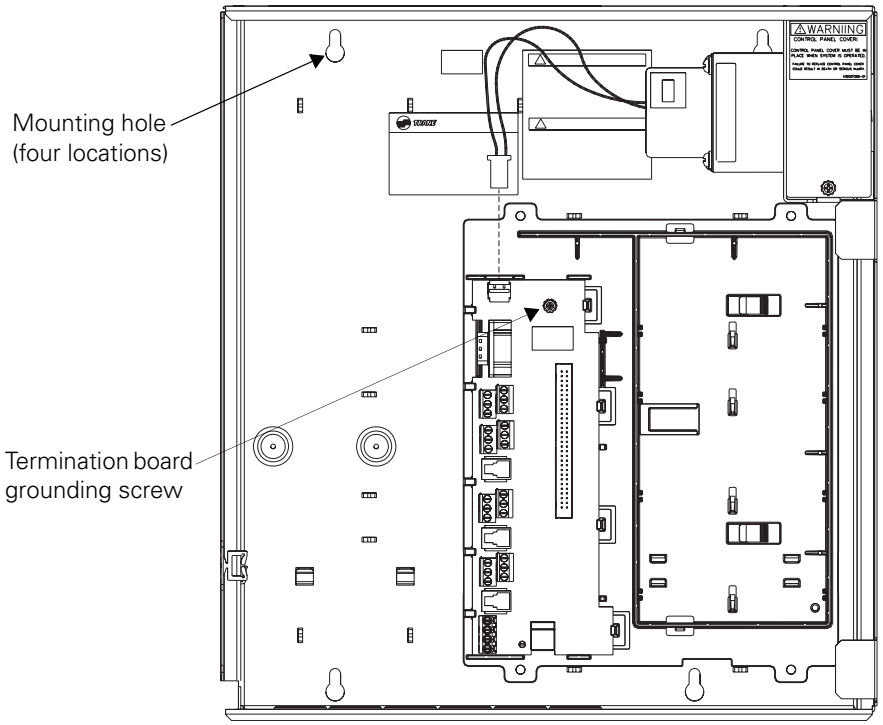
IMPORTANT

The termination board should be shipped with the grounding screw installed. Verify this by checking the location shown in Figure 9.

The enclosure door is shipped separately. If the door has already been attached to the enclosure back, remove it. To mount the back of the enclosure:

1. Using the enclosure back as a template, mark the location of the four mounting holes on the mounting surface (see Figure 9).

Figure 9. Enclosure mounting holes



2. Set the enclosure back aside and drill holes for the screws at the marked locations.

   Drill holes for #10 (5 mm) screws or #10 wall anchors. Use wall anchors if the mounting surface is dry wall or masonry.

3. Insert wall anchors if needed.
4. Secure the enclosure back to the mounting surface with the supplied #10 (5 mm) screws.

Wiring high-voltage ac power

Verifying model number for local power requirements

Table 2 on page 10 lists the available BMTX BCU models. You can find the model number on the shipping label or on the product label inside the enclosure.

IMPORTANT

Make sure that you have the correct BMTX BCU model for local power requirements.

To ensure proper operation of the BMTX BCU, install the power supply circuit in accordance with the following guidelines:

- The BCU must receive power from a dedicated power circuit. Failure to comply may cause control malfunctions.
- A disconnect switch for the dedicated power circuit must be near the controller, within easy reach of the operator, and marked as the disconnecting device for the controller.
- High-voltage power-wire conduits or wire bundles must not contain input/output wires. Failure to comply may cause the controller to malfunction due to electrical noise.
- High-voltage power wiring must comply with the National Electrical Code (NEC) and applicable local electrical codes.
- High-voltage wiring requires three-wire 120/230 Vac service (line, neutral, ground).

Note:
The transformer voltage utilization range is 98–132 Vac (120 Vac nominal) or 196–264 Vac (230 Vac nominal). The panel automatically detects whether the current is 50 or 60 cycle.

To connect high-voltage power wires:

⚠WARNING

Hazardous voltage!

Before making electrical connections, lock open the supply-power disconnect switch. Failure to do so may cause death or serious injury.

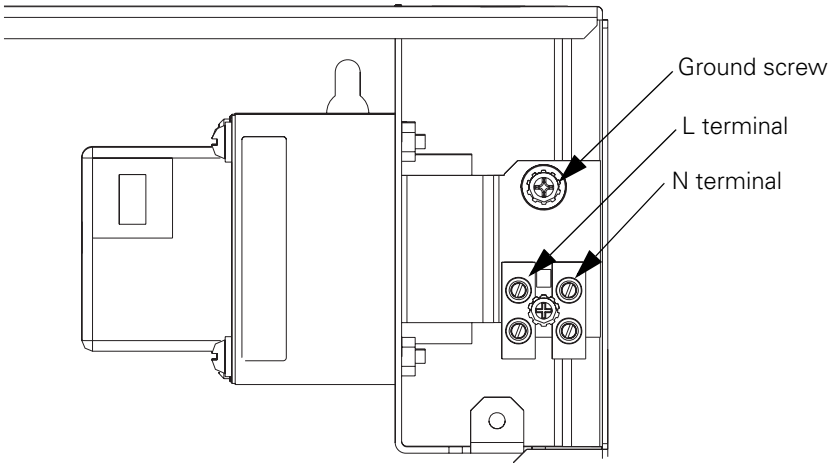
CAUTION

Use copper conductors only!

Unit terminals are designed to accept copper conductors only. Other conductors may cause equipment damage.

1. Lock open the supply-power disconnect switch.
2. At the top-right corner of the enclosure, remove the knockout for ½ in (13 mm) conduit.
3. Open or remove the enclosure door if it has already installed.
4. Inside of the enclosure at the top-right corner, remove the high-voltage area cover plate.
5. Feed the high-voltage power wire into the enclosure.
6. Connect the line wire to the L terminal as shown in Figure 10.
7. Connect the neutral wire to the N terminal.
8. Connect the green ground wire to the chassis ground screw. The ground wire should be continuous back to the circuit breaker panel.
9. Replace the cover plate.

Figure 10. AC wiring



⚠WARNING

Hazardous voltage!

The cover plate must be in place when the BCU is operating. Failure to replace the cover plate could result in death or serious injury.

10. On a label, record the location of the circuit breaker panel and the electrical circuit. Attach the label to the cover plate.

Wiring binary inputs

For binary input wiring, see Chapter 4, “BMTX BCU binary inputs.”

UCM wiring

For UCM wiring, see Chapter 5, “UCM communication link wiring and topology.”

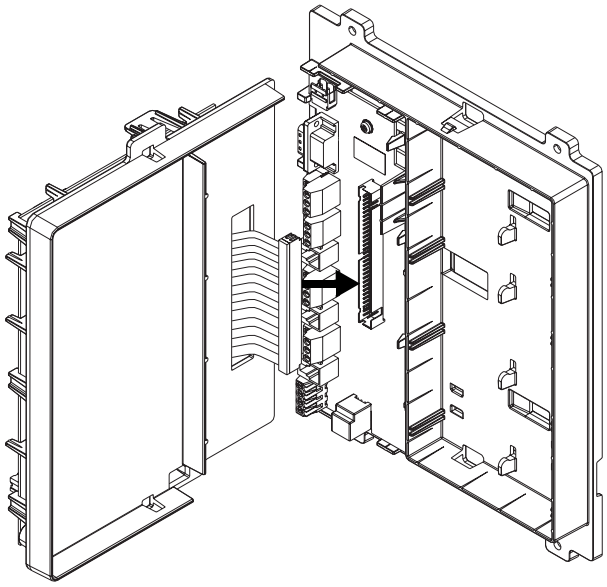
Connecting the main circuit board

The main circuit board is attached to a plastic frame. It is shipped separately. The board can be kept in the office and programmed while the back of the enclosure is mounted and the termination board, which is attached to the back of the enclosure, is wired. After programming has been completed, connect the circuit board to the termination board as shown in the following procedure.

To connect the circuit board:

1. Verify that the 24 Vac power cable is not connected to the termination board.
2. Hold the circuit board frame at a 90° angle to the back of the enclosure, as shown in Figure 11.

Figure 11. Connecting the circuit board ribbon cable



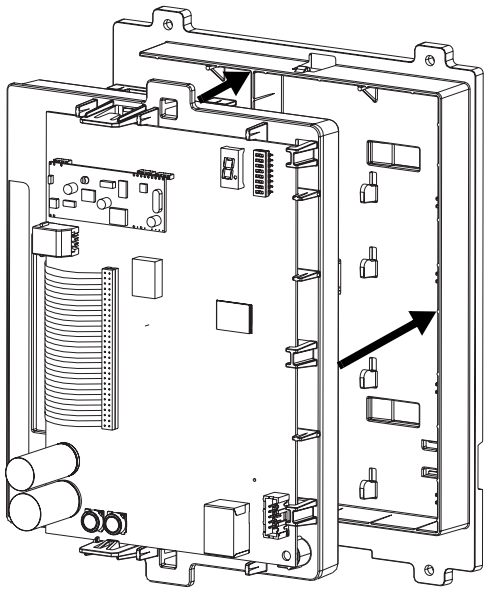
3. Connect the circuit board's 60-pin ribbon cable to the termination board's 60-pin slot.

   The connector is keyed to the slot. If you have difficulty connecting it, make sure that the key is lined up with the slot.

4. Align the snaps on the circuit board frame with the mounting locks at opposite ends of the enclosure back, as shown in Figure 12.

5. Using the tabs that are at both ends of the top frame, push the two frames together. You will hear a click when the frames connect.

Figure 12. Connecting the frames



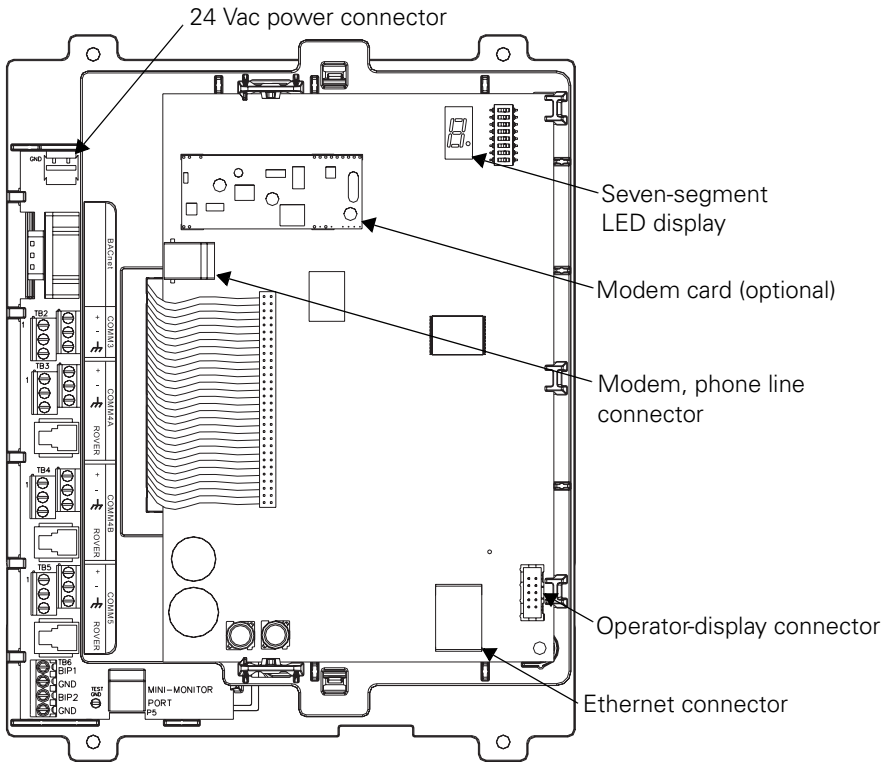
6. For controllers with an operator display, connect the operator-display cable to the circuit board. (See Figure 13 on page 25.)

7. Connect the 24 Vac power cable to the termination board. The seven-segment LED display should light up.

8. Connect the Ethernet cable to the Ethernet connector on the circuit board.

9. Connect the telephone cable to the modem connector on the circuit board.

Figure 13. Cable connector and LED display locations



Installing the door

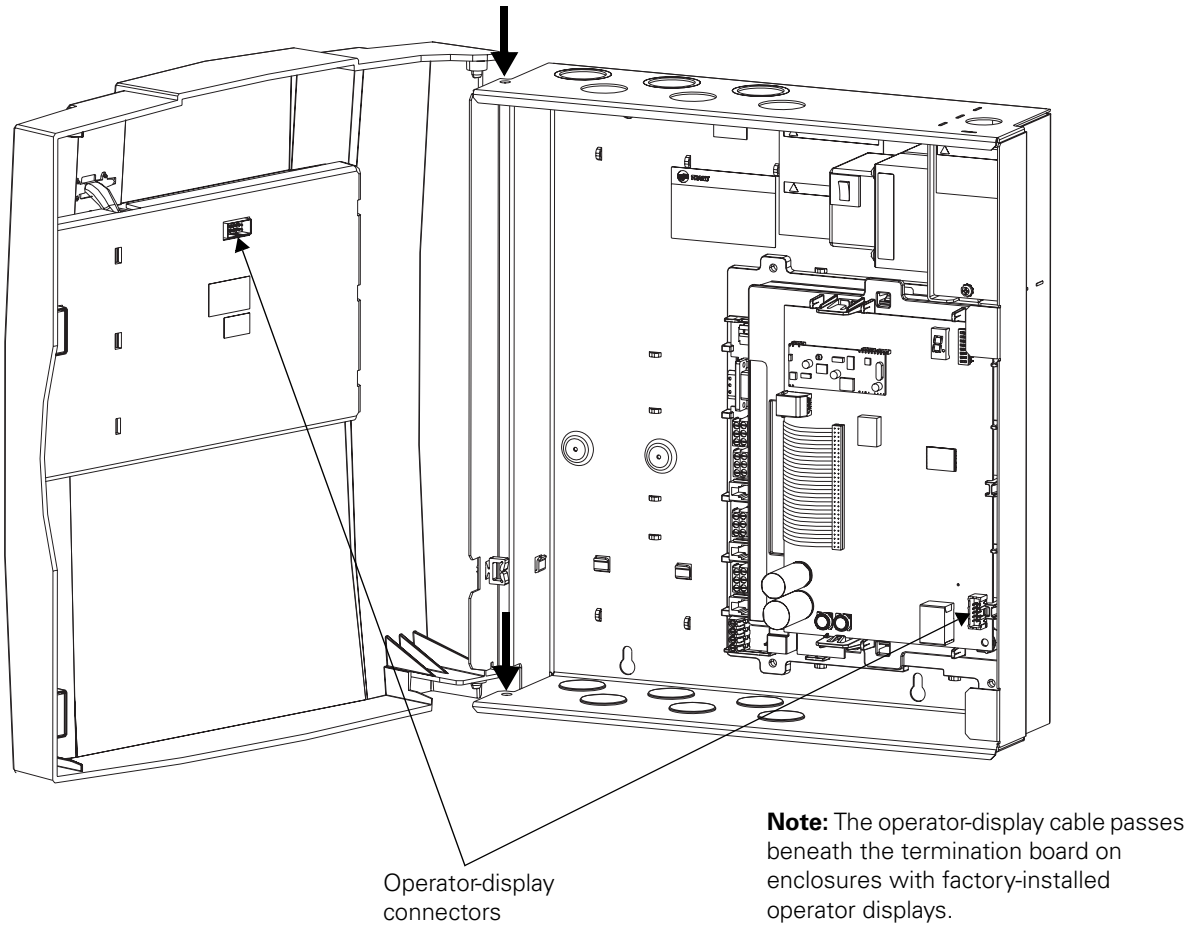
To install the enclosure door:

1. Unpack the door and check for missing or damaged parts.

   Check to make sure that the magnetic latches and touch screen (if ordered) are installed. Check for any cracks in the plastic.

2. Hold the door at a 90° angle from the enclosure back as shown in Figure 14 on page 26.
3. Align the hinge pegs on the door with the hinge holes on the enclosure.
4. Gently lower the door until it rests securely in the hinge holes.
5. Verify that the door swings freely on the hinges and that the magnetic latches hold the door securely when it is closed.
6. For doors with an operator display, connect the operator-display cable to the operator-display connector on the door (see Figure 14).

Figure 14. Installing the door



Chapter 4

BMTX BCU binary inputs

The BMTX BCU supports two binary inputs, which are wired to the termination board.

The inputs can be used for the following types of binary devices:

- Binary, including momentary contact switches (normally open), and standard (maintained) switches
- Pulse meter (water, gas, and electric)

Common devices are enthalpy switches, differential-pressure airflow switches, system shutdown switches, remote alarms, photocell, gas meters, water meters, and electrical demand meters.

All devices connected to binary inputs must be isolated and have dry, ungrounded contacts.

For pulse meter devices, the closure pulse rate may range from 0–4 Hz. On a contact closure, the minimum contact dwell time must last at least 125 ms for the closure to be recognized by the input.

For all inputs, you must create and set up the necessary objects that will provide units, calculation, and alarming to the desired input. Refer to the *System Programming* guide for creating and setting up these objects.

Input wiring guidelines

Input wiring must meet the following guidelines:

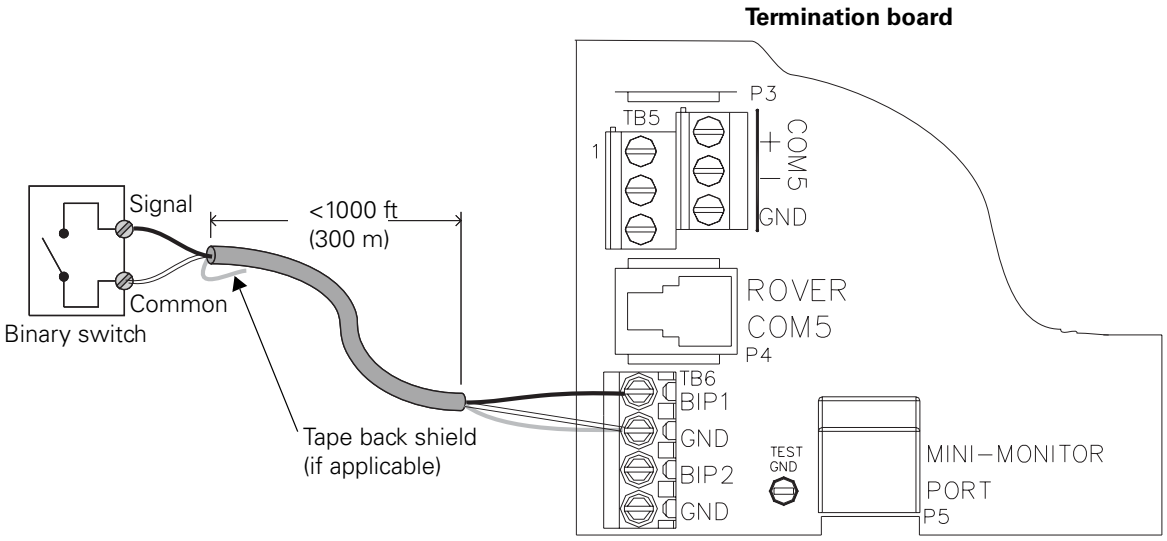
- All wiring must conform to national and local electrical codes.
- Input wiring should not exceed a length of 1,000 ft (305 m). If the recommended lengths are exceeded, the wire may pick up EMI/RFI, which might affect operation of the BMTX BCU input.
- Use only 18–22 AWG (1.02–0.643 mm^2), twisted-pair wire with stranded, tinned-copper conductors.
- Do not run input wires in the same wire bundle with high-voltage power wires. Running input wires with 24 Vac power wires is acceptable, but the input wire must be shielded.
- Terminate input wires before installing the main circuit board (see “Connecting the main circuit board” on page 23).

Wiring binary inputs

To wire a binary input, follow these procedures (refer to Figure 15):

1. Connect the signal wire to either BIP1 or BIP2 at TB6.
2. Connect the common wire to the GND terminal that is directly beneath the terminal holding the signal wire.
3. If using shielded wire, connect the shield wire to the terminal (GND) that is holding the common wire.
4. Tape the shield wire back at the input device.

Figure 15. Wiring a binary input



Check-out procedure for binary inputs

To test inputs for proper binary input operation, you need the following tools:

- Digital multimeter
- Small flat-tip screwdriver

IMPORTANT

Perform this test before providing power to the termination board or installing the main circuit board. Failure to do so will result in incorrect multimeter readings.

To check binary inputs for proper operation:

1. Make sure that the sensor is connected and powered on.
2. Set the multimeter to measure Vac, then measure the voltage across the input connections at the signal (BIP1 or BIP2) and common (GND) screw terminals.

   The measured voltage should be less than 0.1 Vac. If the voltage is greater than this, the input readings may change erratically.
3. Set the multimeter to measure Vdc, then measure the voltage across the input at the signal (BIP1 or BIP2) and common (GND) screw terminals.

   The measured voltage should be less than 0.1 Vdc. If the voltage is greater than this, the input readings may be offset.

CAUTION

Equipment damage!

Continue to step 4 only if you completed steps 2 and 3 successfully. Measuring resistance may damage the meter if the voltage is too high.

4. Set the multimeter to measure resistance. If you have completed steps 2 and 3 successfully, measure the resistance across the input.

   The resistance should be less than 200 Ω when the binary input is closed and greater than 1 kΩ when it is open.

Chapter 5

UCM communication link wiring and topology

Types of communication links

Unit control module (UCM) communication links are used to connect UCMs to the BMTX BCU. Each BMTX BCU has four communication links, which are predefined to support various communication protocols. They are:

- One isolated Comm3 link
- Two Comm4 links
- One Comm5 link

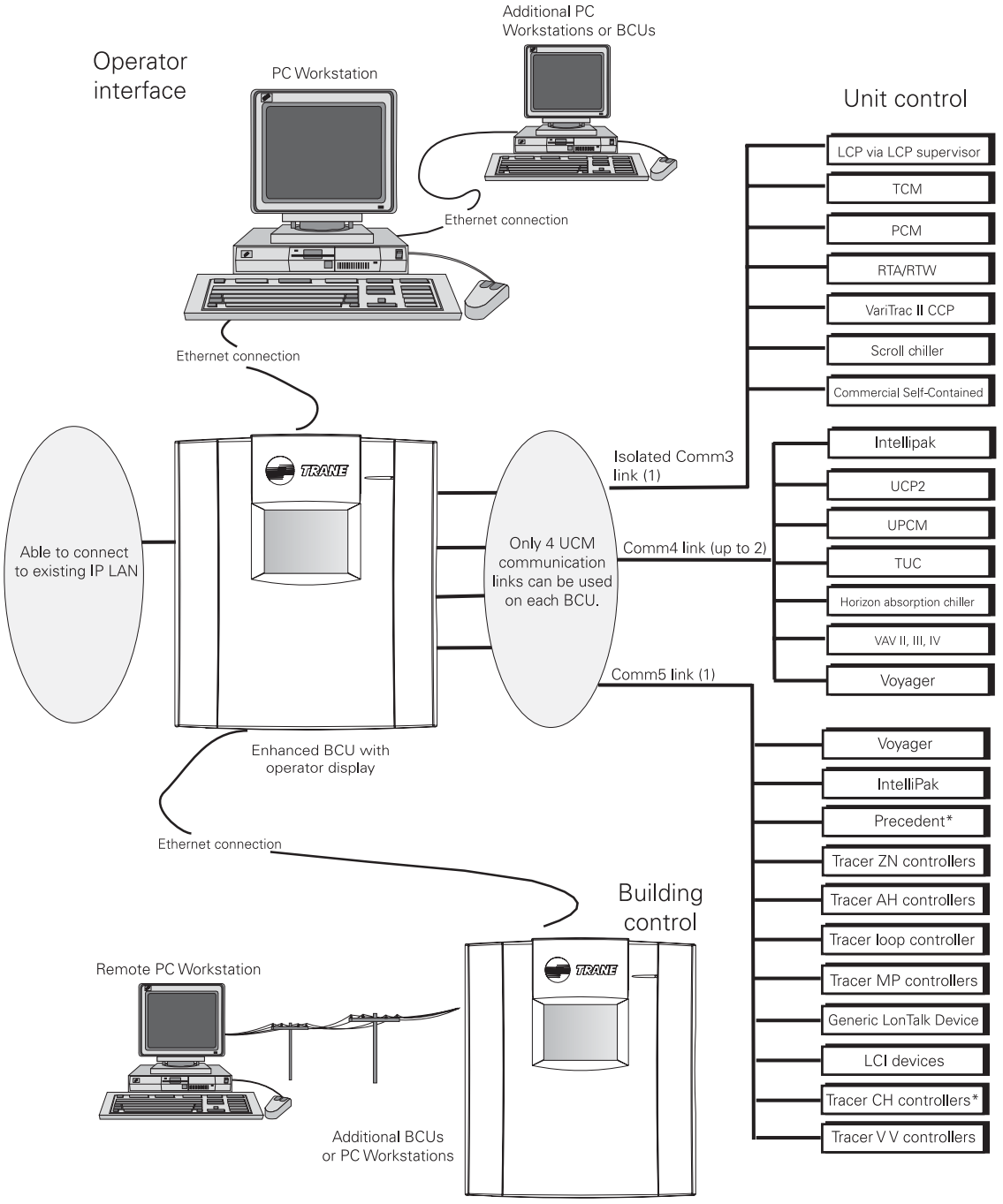
Figure 16 on page 32 shows a Tracer Summit system with representative types of supported UCMs wired to the appropriate communication link.

Note:
Part numbers listed in this chapter were current at the time of publication. Contact Trane if more information is needed to order appropriate parts.

Maximum quantity of UCMs per BMTX BCU

The quantity of each type of UCMs that BMTX BCUs can accommodate is shown in Table 5 on page 33. For information on how to determine the number of BMTX BCUs required to meet the specifications of a Tracer Summit application, see the *Building Control Unit Sizing for Version 17 Tracer Summit Systems* engineering bulletin (BAS-SLB005-EN).

Figure 16. Tracer Summit system showing supported UCMs wired to communication links



*This UCM can communicate on other links besides the one shown. See Table 1 in the T*racer Summit Software Versions* engineering bulletin (BAS-PRB006-EN) for more details.

Table 5. UCM types and quantities that can be linked to the BMTX BCU

Communication link type	UCM object	Maximum quantity of UCMs/link	Maximum quantity of UCMs/BMTX
Isolated Comm3	CSC	20	20
	LCP*	8*	8*
	PCM	30	30
	RTA-RTW	10	10
	Scroll chiller (CGA/CGW/CGAF)	10†	10
	TCM	60	60
	Trane Europe chiller	10	10
	CCP	6	6
	Voyager	32	32
Comm4	Horizon absorption chiller	10	10
	IntelliPak	20	20
	TUC	64	128
	UCP2	10	10
	UPCM	10	10
	VAV II/III/IV	63	126
	VAV wireless receiver	8	8
	Voyager	32	32
Comm5	Tracer Loop Controller	1	1
	Discharge Air Controller (DAC)**	20	20
	Tracer MP580 and Tracer MP581 controllers	20	20
	Space Comfort Controller (SCC)**	120‡	120‡
	Generic LonTalk® device (GLD)	40	40
	Chiller (Comm5)	10	10

* Requires an LCP Supervisor on each link (where LCPs are connected) to act as an interface/translator.

† Some models of CGAF chillers are currently limited to addresses 49–54, which limits the maximum number of devices per link to 6.

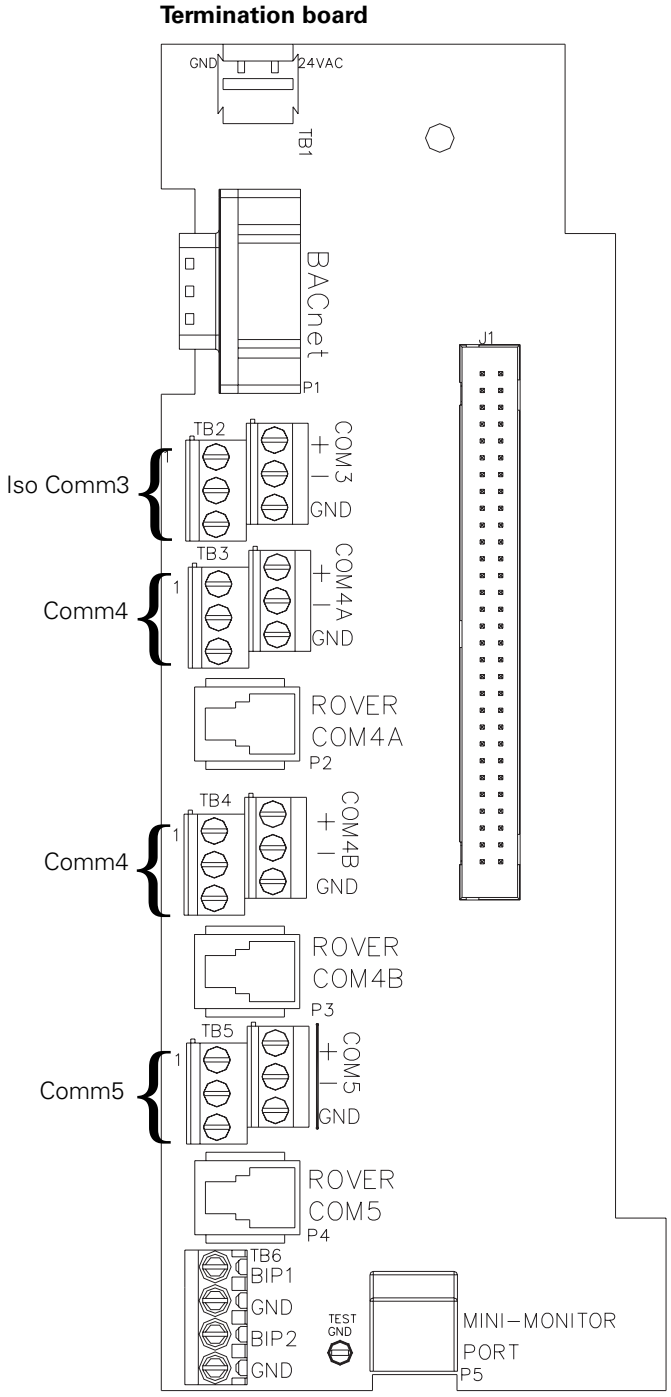
‡ A maximum of 60 devices per link can be accommodated. With a repeater, the maximum number is increased to 120.

** For a complete list of controllers, see "Comm5 UCMs" on page 56.

UCM communication link locations

Figure 17 shows the communication link wiring locations on the BMTX BCU termination board.

Figure 17. UCM communication link locations



Comm3/Comm4 wiring

A Tracer Summit Comm3 and Comm4 wiring is low voltage Class 2 and must be field-supplied and installed in compliance with NEC and local codes. The wire must be low-capacitance, 18-gauge, shielded, twisted pair with stranded, tinned-copper conductors. Wire capacitance (measured in picofarads/foot [pF/ft] or picofarads/meter [pF/m]) between conductors must be 23±2 pF/ft (72±6 pF/m). Shielded wire is recommended to prevent electrical noise interference. Approved wire suppliers can be found in the Trane Buying Group.

Fiber-optic UCM communication is also available where extreme distance, electrical noise immunity, or building-to-building communication is required (see "Fiber-optic wiring for Comm3/Comm4 links" on page 39). If fiber optics are not used for building-to-building communication, a Transtector transient protector, available from suppliers in the Trane Buying Group, is required at each building.

Comm3/Comm4 configuration requirements

Comm3 and Comm4 wiring must use one of the following configurations:

- Daisy-chain configuration (preferred), shown in Figure 18. Maximum length is 5,000 ft (1,524 ft).
- Branch configuration (not recommended), shown in Figure 19 on page 38. Maximum length is 5,000 ft (1,524 ft). The maximum number of branches is 10.

Comm3/Comm4 wiring, best practices

The following wiring practices are recommended:

- Comm4 links are polarity sensitive, so consistent wiring polarity must be maintained between devices. Although Comm3 links are not polarity sensitive, it is good practice to maintain consisting wiring polarity.
- Strip no more than 2 inches of the outer conductor of shielded cable.
- Daisy-chain configurations are preferred over branch configurations.
- Avoid sharing 24 Vac power between UCMs.
- Ensure that 24 Vac power supplies are consistently grounded. If grounds are not maintained, intermittent or failed communication could result.
- Avoid overtightening cable ties and other forms of cable wraps. It could result in damage to the wires inside the cable.
- In an open plenum, avoid running wires over or close to lighting ballasts, especially those using 277 Vac.
- Do not run communication link wiring in the same conduit or wire bundle with ac-power wires. Electrical noise may result, which can make the BCU malfunction or experience communication problems.
- Use the same wire type for all Comm3/Comm4 link wiring.

Comm3/Comm4 wiring procedure

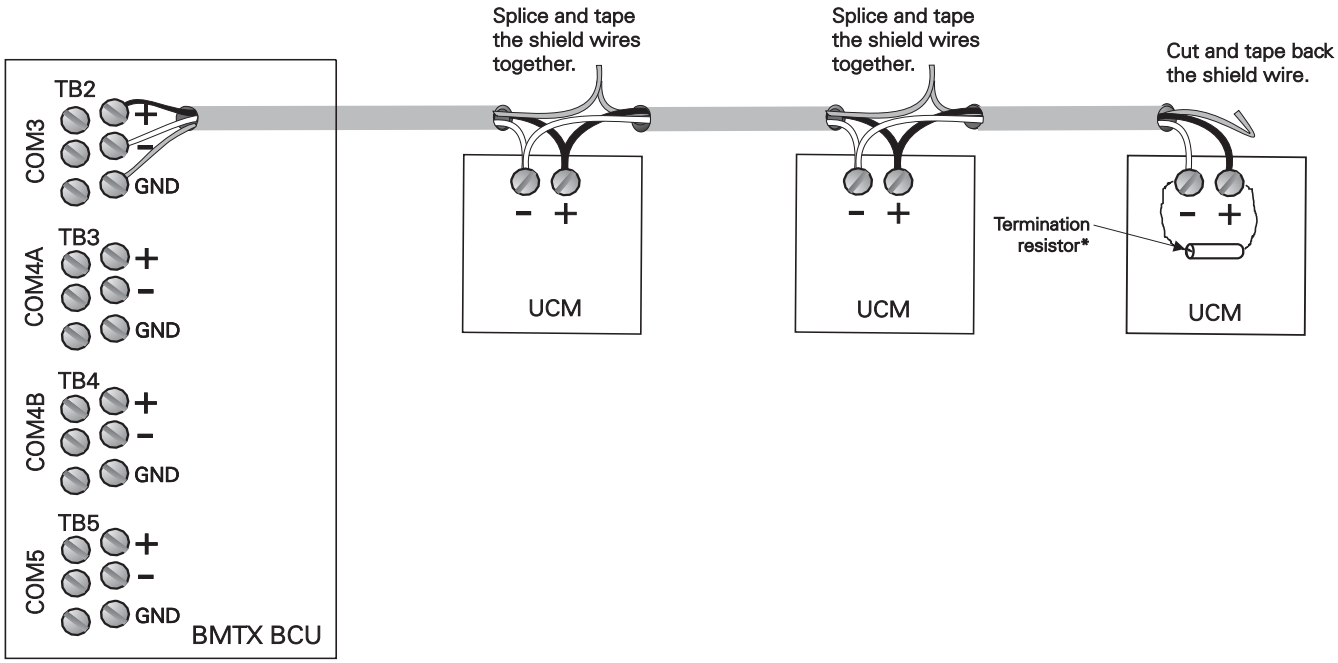
To connect communication wiring (see Figure 18 on page 37 or Figure 16 on page 37), follow this procedure. Under certain conditions, a termination resistor needs to be placed on the last devices on a Comm3 communication link. See "Resistance termination for Comm3 links" on page 39.

1. Attach one end of the communication link wiring to the BMTX BCU:
   - at TB2 for an isolated Comm3 link
   - at TB3 or TB4 for a Comm4 link
2. To provide a drain for electrical noise interference, connect the shield wire at the end of the communication link wiring to the BMTX BCU at GND:
   - at TB2 for an isolated Comm3 link
   - at TB3 or TB4 for a Comm4 link
3. Attach the other end of communication link wiring to the UCM, observing polarity (not required for Comm3, but recommended). For information about the specific UCM you are wiring, see Chapter 6, "UCMs supported by Tracer Summit systems.".

   Note:
   If polarity is reversed and the BCU is connected and configured, the yellow Comm LED on Comm4 UCMs will stay On solid. No communication will occur from the point of reversal on the link.

4. Splice the shield wire that is going to the UCM with the shield wire for the next UCM on the link. Tape to prevent connections between shield and other wires.
5. Repeat steps 3 and 4 for each UCM on the link.
6. Cut and tape back the shield at the last UCM on the link to prevent any connection between the shield and ground.

Figure 18. Daisy-chain configuration for Comm3/Comm4 wiring (Comm3 shown)



* If required (see "Resistance termination for Comm3 links" on page 39).

Figure 19. Branch configuration for Comm3/Comm4 wiring (Comm3 shown)

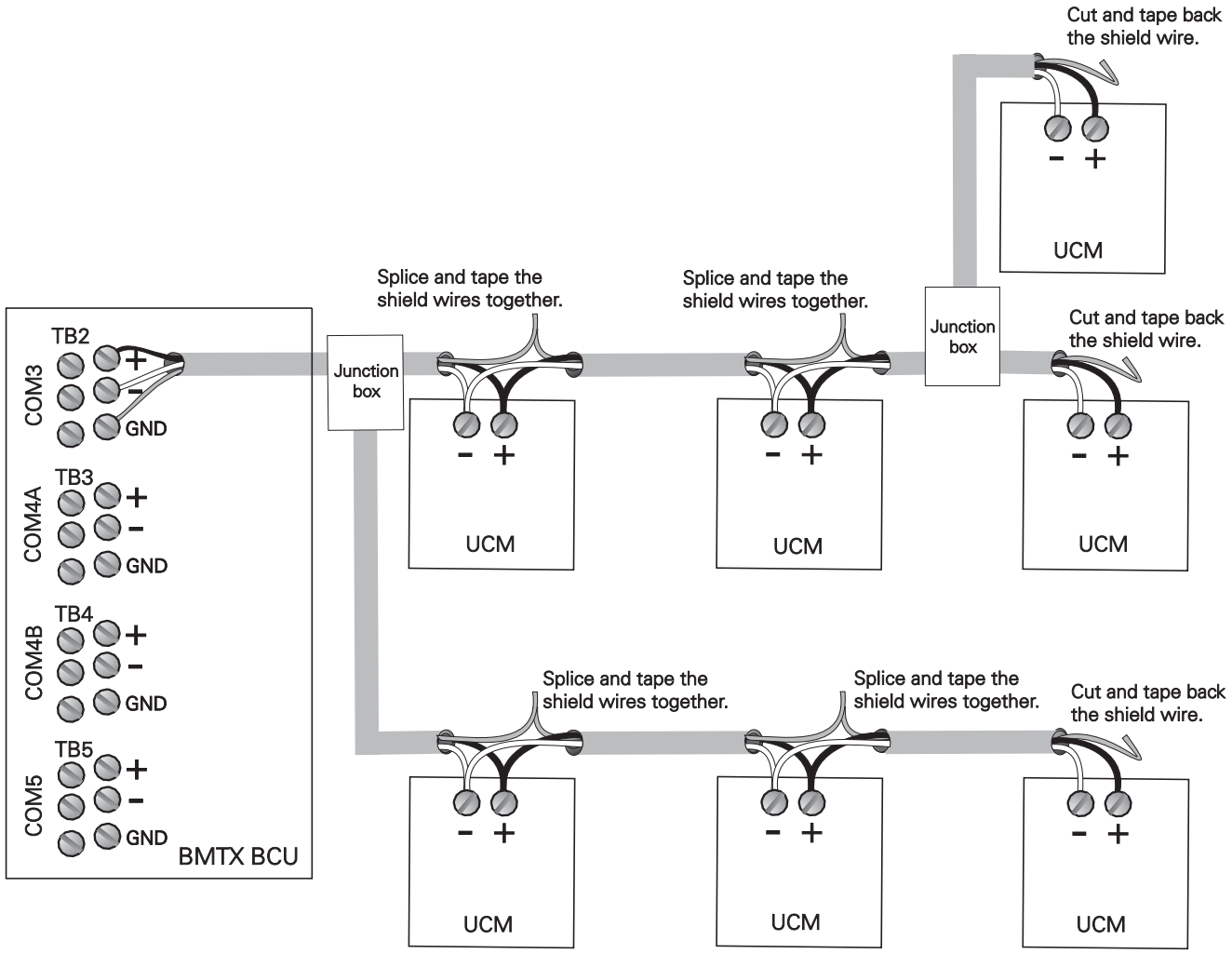


Figure Note:
For Comm3 communication, termination resistors (270–330 Ω) may be needed on the devices at the end of each branch.

Resistance termination for Comm3 links

Under certain conditions, a termination resistor needs to be placed on the last device on a Comm3 communication link. Electrical resistors drop the voltage of the current flowing through the wire so that electrical noise is absorbed. The configuration and the wire length determines whether a resistor is needed and how much resistance needs to be provided (see Table 6).

Table 6. Termination resistor placement for Comm3 links

Configuration type	Wire length	Resistance	Resistor placement
Daisy-chain	0–800 ft (0–244 m)	270–330 Ω	On the last device of link
	800–2,500 ft (244–762 m)	Not required	N/A
	> 2,500 ft (762 m)	100 Ω	On the last device of link
Branch	Any length	270–330 Ω, if needed	On the devices at the end of each branch

Fiber-optic wiring for Comm3/Comm4 links

Fiber-optic cable is used for Comm3 and Comm4 applications involving long distances, inter-building cabling, and areas with a potential for high electrical noise because there is little degradation of optic signals. The integrity of an optic signal is maintained in the presence of several sources of electrical noise, including lightning, EMI/RFI, voltage conductors, and ground loops.

Trane requires duplex, 62.5 μm core glass fiber-optic cable with ST connectors, which comes in a variety of types for specific applications, such as indoor, outdoor, burial, aerial, and duct. You can order fiber-optic cable, fiber-optic modems, ST-type crimp connectors, epoxy connectors, and other accessories from approved suppliers in the Trane Buying Group.

IMPORTANT

Trane recommends that only qualified fiber-optic technicians prepare the fiber-optic end connectors and cable run lengths. Improper methods may result in faulty communication due to signal degradation (decibel loss). The signal degradation must be less than 14 dB on each fiber.

Fiber-optic modems

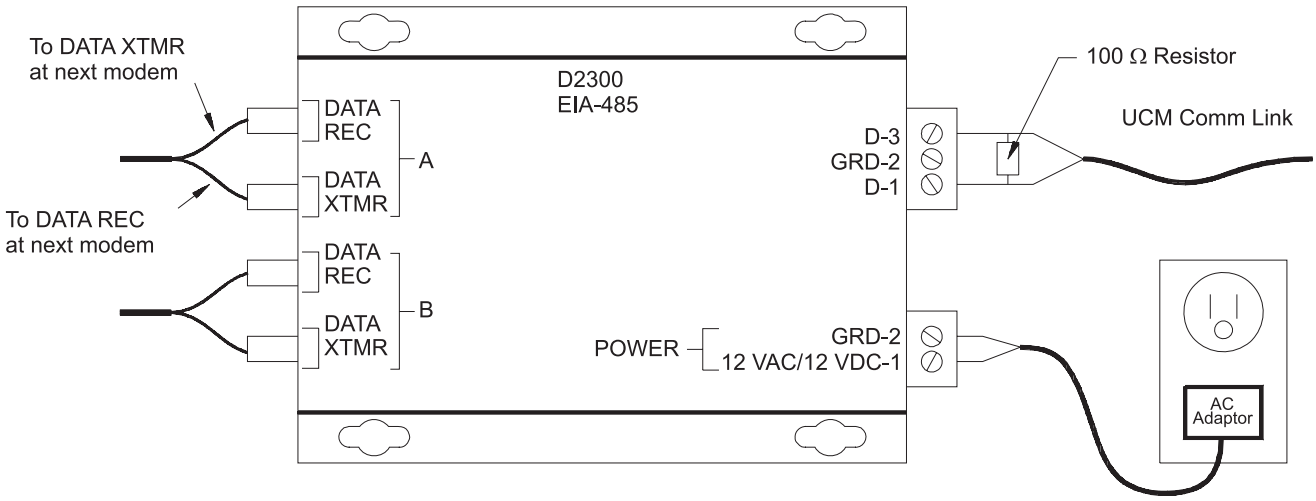
A fiber-optic Comm3 or Comm4 communication link uses EIA-485 data transceivers (IFS D1300) and EIA-485 data repeaters (IFS D2300), which are referred to as fiber-optic modems. These modems convert the electrical signals from a twisted pair of wires to optical signals, which are sent over the fiber-optic cable. At the other end, the optical signals are converted back to electrical signals and sent along the twisted pair of wires.

The D1300 has one fiber-optic port and one twisted-pair (EIA-485) port. The D2300 has two fiber-optic ports and one twisted-pair (EIA-485) port.

Each fiber-optic port has two connections, one for transmitting information and one for receiving information.

An illustration of a D2300 and the connections to it is provided in Figure 20. The D1300 looks like the D2300 shown in this figure, but it has only one fiber-optic port. The mounting and power wiring is the same for both modems.

Figure 20. EIA-485 data repeater (D2300) fiber-optic modem



To mount and wire a D1300 and/or D2300 modems on an inter-building communication link, follow these procedures (see Figure 21 on page 41):

1. In Building A, mount the modem on the wall using the four mounting screw holes on the case.
2. Connect power to the modem using the ac adapter provided with the modem. The adapter has two wires: one black with a white stripe, and one solid black. The white striped wire connects to the 12 Vac/Vdc connection on the modem, and the solid black wire connects to the ground (GRD-2) terminal.
3. Verify that a proper connection is made by plugging the ac adapter into an electrical outlet and viewing the red power LED on the left side of the modem. If the red LED does not illuminate, check the polarity of the connection and verify that the electrical outlet is powered.
4. Connect the UCM communication link and a termination resistor (if needed) to the modem as shown in Figure 20 on page 40. Connect the shield at the BCU end and tape it back at the modem end. Polarity of this connection is important only for Comm4 cards.

   Exception: In buildings that do not have a BCU, the shield from the communication link wiring must be grounded on the GRD-2 terminal between the two UCM communication link wire terminals of the fiber-optic modem. The shield wire must not touch either of the two communication wires.

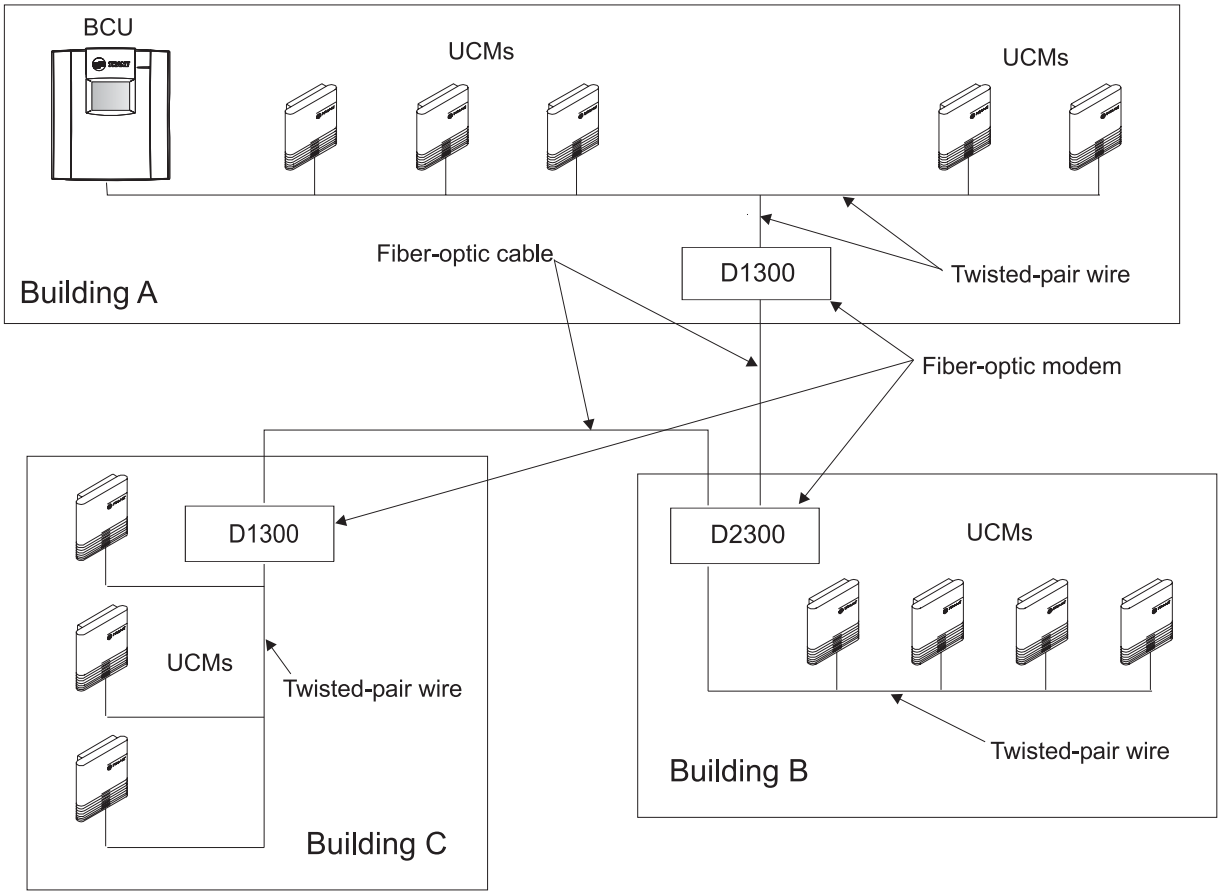
5. Connect the terminated fibers to the modem, one to DATA REC and one to DATA XTMR.
6. In Building B, mount another modem on the wall using the four mounting screw homes on the case.
7. Repeat steps 2 through 4.
8. Connect the terminated fibers that are connected to the modem in Building A to DATA REC and DATA XTMR. Make sure that the fiber going to DATA REC on the modem in the present building connects to DATA XTMR on the modem in the next building. Keep track of the polarity by recording the color of the jacket on each fiber and to which connection it goes on each building.

IMPORTANT

Fiber-optic polarity is extremely important! Make sure that the fiber connections on the fiber-optic modem are reversed at the next modem.

9. For each successive building to be wired on the communication link, repeat steps 6 through 8.

Figure 21. Typical example of inter-building fiber-optic cabling with Comm3/4 communication



Fiber-optic link signal loss budget

Every fiber-optic link has some signal loss (measured in decibels). Many factors affect decibel loss, including:

- Length of fiber-optic cable
- Transmitter optical output power
- Operating wavelength
- Fiber attenuation
- Fiber bandwidth
- Receiver optical sensitivity

The decibel loss between any two devices is based on how well the terminations or splices are made. A termination or splice can vary from 0.5–2 dB loss. A clean splice results in increased performance.

The fiber-optic modem supported by Trane has a power budget of 14 dB (D1300) or 13 dB (D2300) between 32°F and 140°F (0°C and 60°C). This is the acceptable temperature range specified for the BCU. The decibel loss for conduit-rated fiber-optic cable (P/N 400-4002) is 3.75 dB/km (1 km = 3,280 ft). Precut fiber-optic cables and professionally spliced and/or terminated cables should ensure minimal decibel loss.

To calculate the system loss, subtract the cable loss, splice loss, terminator loss, and patch panel loss from the power budget. The example below shows typical values for the UCM communication link using D1300.

power budget – system safety margin = available budget

14 dB – 3 dB = 11 dB (available budget)

available budget:	**11 dB**
cable loss:	**– 7.5 dB (1 km at 3.75 dB/km)**
allowance for splice loss:	**– 1 dB (2 at 0.5 dB)**
allowance for end connectors:	**– 1 dB (2 at 0.5 dB)**
allowance for patch panel:	**– 1 dB (2 at 0.5 dB)**
excess margin:	**= 0.5 dB**

Comm5 wiring

Tracer Summit Comm5 wiring is low voltage Class 2 and must be field-supplied and installed in compliance with NEC and local codes. For ease of installation, the recommended wire is low-capacitance, 22-gauge, Level 4, unshielded, twisted-pair. Existing sites that have already been wired with low-capacitance, 18-gauge, shielded, twisted-pair with stranded, tinned-copper conductors (Trane-approved, purple-jacketed wire) don't have to be rewired; the shielded wire will still work when it is properly terminated (see Figure 24 on page 47 for an illustration using the purple-jacketed wire).

Fiber-optic UCM communication is also available where extreme distance, electrical noise immunity, or building-to-building communication is required (see "Fiber-optic wiring for Comm5 links" on page 49).

Comm5 configuration requirements

Comm5 wiring must use a daisy-chain configuration (see Figure 18 on page 37). Maximum wire length for Comm5 is 4,500 ft (1,400 m) with no more than eight zone sensor communication stubs having a maximum 50 ft length per stub (see "Zone sensor communication stubs on Comm5 links" on page 53).

The configuration length can be extended with the use of a repeater. See "Comm5 repeater" on page 48 for specifications on the use of a repeater. See Figure 23 on page 46 for an illustration of a Comm5 wiring configuration with a repeater. The configuration consisting of two daisy chains linked by the repeater, simulates a branch configuration.

Comm5 wiring, best practices

The following wiring practices are recommended:

- Although Comm5 links are not polarity sensitive, it is good practice to keep polarity consistent throughout the site.
- Avoid sharing 24 Vac power between UCMs.
- Ensure that 24 Vac power supplies are consistently grounded.
- Avoid overtightening cable ties and other forms of cable wraps. It could result in damage to the wires inside the cable.
- In an open plenum, avoid running wires across or close to lighting ballasts, especially those using 277 Vac.
- Do not run communication link wiring in the same conduit or wire bundle with ac-power wires. Electrical noise may result, which can make the BCU experience communication link problems.
- Use the same wire type for all Comm5 link wiring, including thermostat zone sensor communication stubs.

Comm5 wiring procedure

To connect communication wiring (see Figure 22), follow this procedure.

Note:
On existing sites that use shielded wire, refer to Table 24 on page 47 for an illustration showing proper shield termination.

Termination resistors must be wired to the first and last devices on a Comm5 communication link. See “Resistance termination for Comm5 links” on page 48.

1. Attach one end of the communication link wiring to the BMTX BCU at TB5.
2. Attach the other end of communication link wiring to the first set of communication terminals on the first UCM on the link, observing polarity (not required for Comm5, but recommended). For information about the specific UCM you are wiring, see “Comm5 UCMs” on page 56.
3. Attach the wiring going to the next UCM to the second set of communication terminals on the first UCM.

   Note:
   Some Comm5 UCMs have only one set of communication terminals. In that case, attach the wiring to the same set of terminals.

4. Attach the communication wiring coming from the first UCM to the first set of communication terminals on the next UCM.
5. Repeat steps 3 and 4 for each UCM on the link.

Figure 22. Daisy-chain configuration for Comm 5 wiring

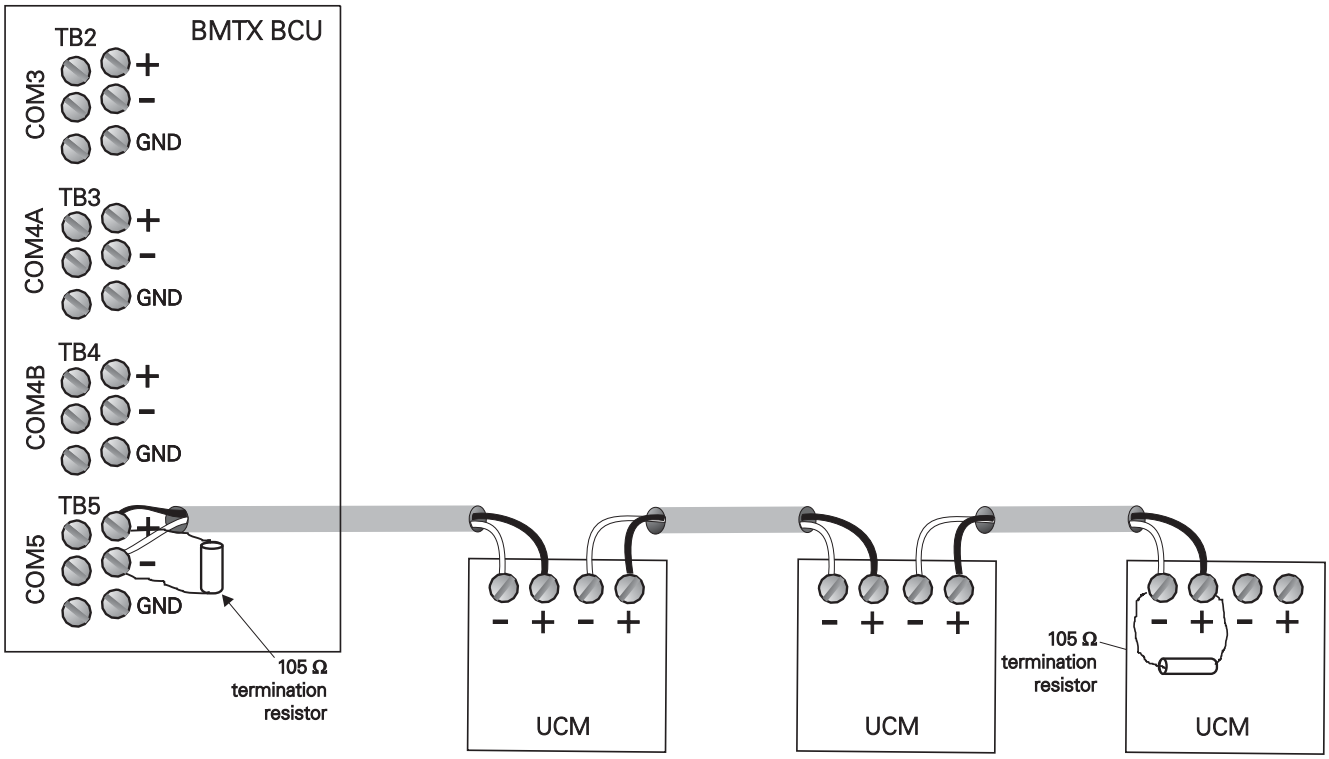


Figure 23. Daisy-chain configuration for Comm5 wiring using a repeater

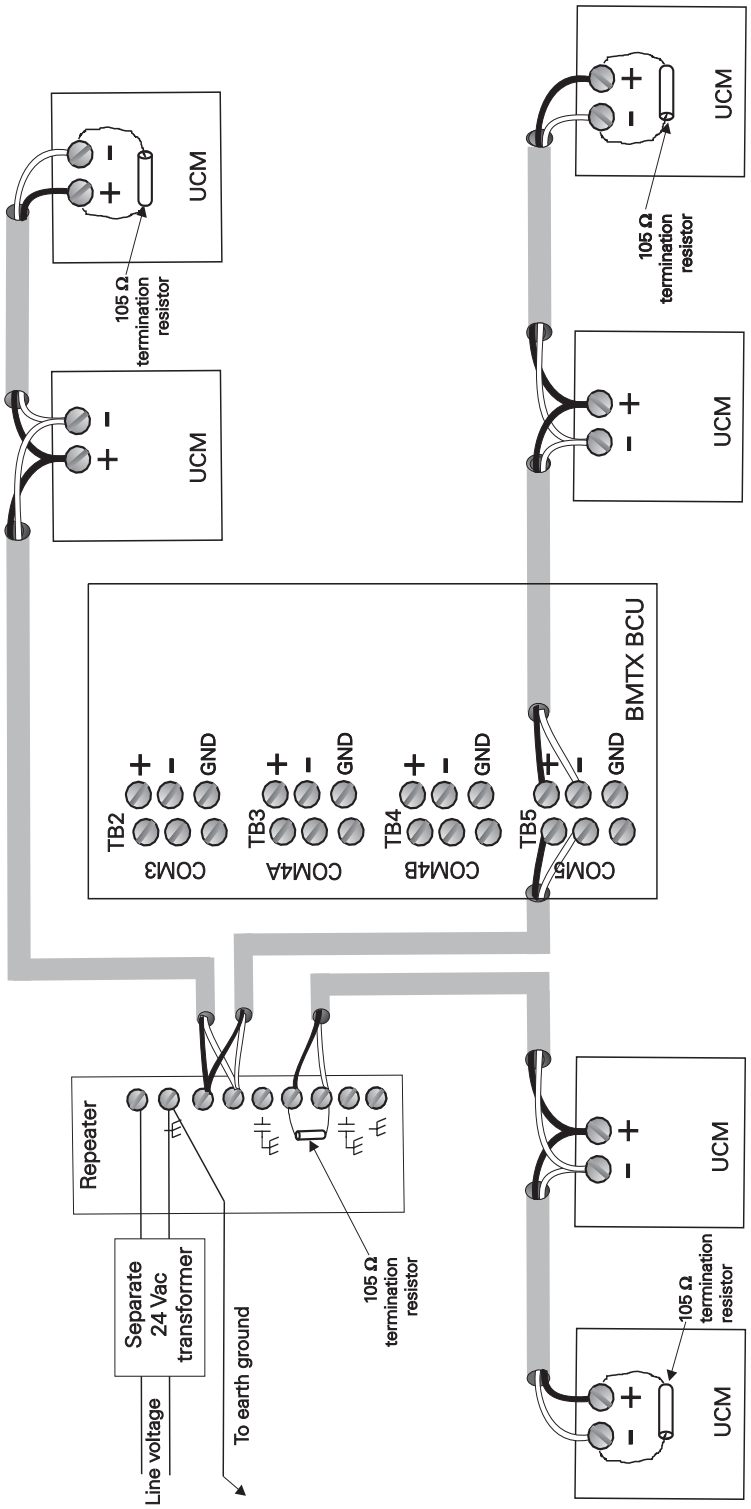


Figure Note: Each link of the configuration that is created by the repeater requires termination resistors.

Figure 24. Shield termination for existing sites using the Trane-approved, purple-jacketed, shielded wire for Comm5 links

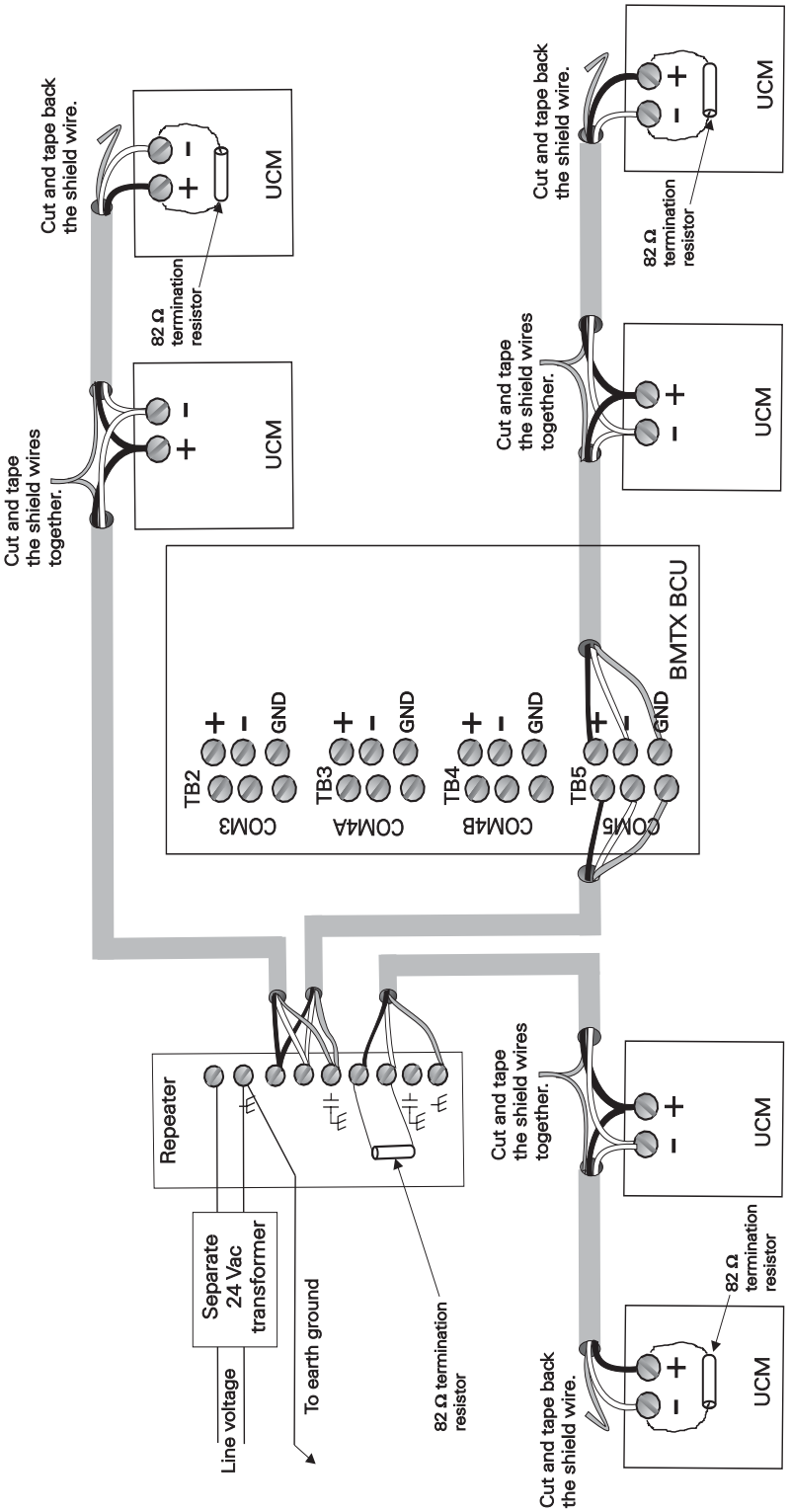


Figure Note:

- Each link of the configuration that is created by the repeater requires termination resistors.
- Shield wires entering the repeater should be connected to a terminal marked with a capacitor symbol. The entering shield wire must be connected to earth ground at the BCU.
- Shield wires leaving the repeater should be connected to the repeater terminal marked with an earth ground symbol.

Resistance termination for Comm5 links

To correctly install a Comm5 link, termination resistors are required at the first and last devices on each link. Electrical resistors drop the voltage of the current flowing through the wire so that electrical noise is absorbed. See Table 7 to determine how much resistance is needed.

Table 7. Termination resistor placement for Comm5 links

Wire length	Resistance	Resistor placement
Any	• 105 Ω, for sites using the recommended 22-gauge, Level 4 wire. • 82 Ω, for existing sites already wired with 18-gauge Trane-approved, purple-jacketed wire.	At each end of link

For correct termination placement, follow these guidelines:

- Terminate a daisy-chain configuration with a resistor at each end of the link. See Table 7 for resistance requirements.
- If a repeater is used, each link of the configuration that is created by the repeater requires termination resistors (see "Comm5 repeater" on page 48 and Figure 23 on page 46).
- Trane recommends that only one type of wire be used for the Comm5 communication link.
- A set of as-built drawings or a map of the communication wire layout should be made during installation. Any sketch of the communication layout should feature the termination resistor placement.

Comm5 repeater

The Comm5 repeater is a device that repeats and regenerates the signal on a Comm5 link. The Comm5 link goes from the BCU to the repeater and a second link segment extends from the other side of the repeater to the rest of the UCMs. The configurations on either side of the repeater should be daisy-chained. Both link segments require proper termination (see "Resistance termination for Comm5 links" on page 48).

When is the repeater required?

If any one of the following conditions exists, a repeater is required:

- If the total wire length is greater than the maximum wire run length of 4,500 ft (1,400 m).
- If more than 60 devices are connected to a link. This total does not include the BCU, the repeater, and the temporary use of the Rover service tool on the same link.
- If more than eight zone sensor communication stubs are required on a Comm5 link (see "Zone sensor communication stubs on Comm5 links" on page 53).

Repeater limitations

The repeater has several limitations:

- Only one repeater can be used on a link.
- The use of a repeater doubles the maximum allowable wire length. For example, when a repeater is used with a daisy-chain configuration, the total wire length can be 9,000 ft (2,800 m) (with half the wire length on either side of the repeater).
- The repeater is limited to 60 devices on either side of the link. The total number of devices that can be attached to a repeater is 120.
- The repeater requires a definite earth ground. The installer should be aware of this before making any power connections.

Repeater connections

Follow these guidelines when using a repeater:

- Refer to Figure 22 on page 45 (Figure 23 on page 46 for Trane-approved, purple-jacketed wire) for an example of using a repeater to create an extended daisy-chain configuration.
- Read the installation document that comes with the repeater: *Comm5 repeater installation*, #3270 3285.
- For information about terminating daisy-chain configurations, see "Resistance termination for Comm5 links" on page 48.

Fiber-optic wiring for Comm5 links

Fiber-optic cable is used for Comm5 applications involving long distances, inter-building cabling, and areas with a potential for high electrical noise because there is little degradation of optic signals. The integrity of an optic signal is maintained in the presence of several sources of electrical noise, including lightning, EMI/RFI, voltage conductors, and ground loops.

Trane requires duplex, 62.5 μm core glass fiber-optic cable with ST connectors, which comes in a variety of types for specific applications, such as indoor, outdoor, burial, aerial, and duct. You can order fiber-optic cable, fiber-optic modems, ST-type crimp connectors, epoxy connectors, and other accessories from approved suppliers in the Trane Buying Group.

IMPORTANT

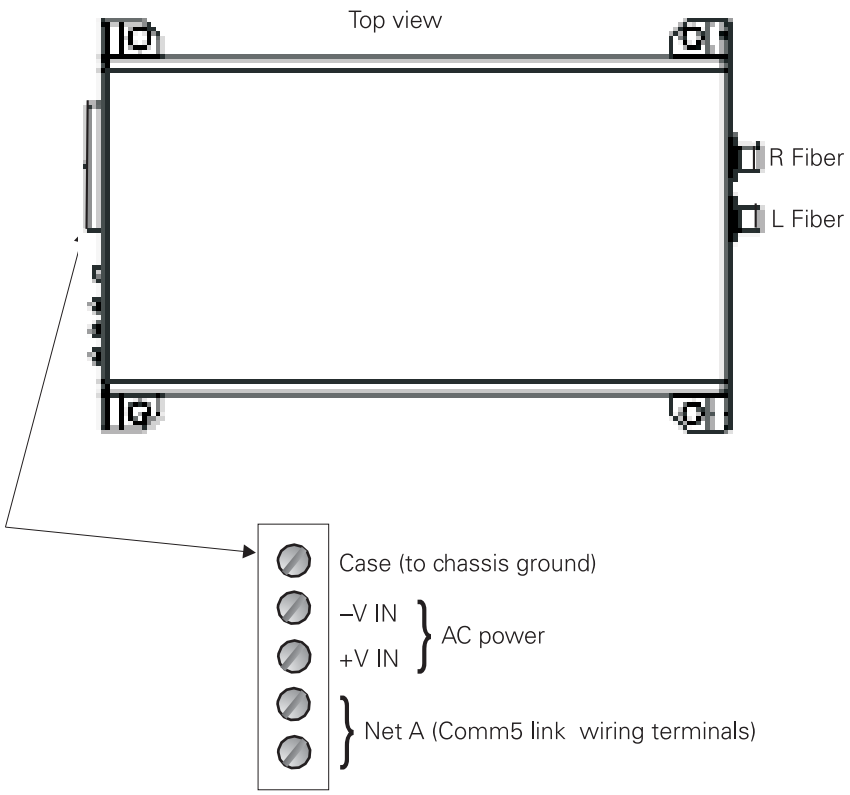
Trane recommends that only qualified and experienced fiber-optic technicians prepare the fiber-optic end connectors and cable run lengths. Improper methods may result in faulty communication due to signal degradation (decibel loss). The signal degradation must be less than 14 dB on each fiber.

Fiber-optic modems

A Comm5 media converter/repeater (CBL 75090-4) connects a LonWorks (FTT-10, 78 kb/s) twisted pair network to the LonWorks (1.25 Mb/s) fiber optic network. These devices convert the electrical signals from a twisted pair of wires to optical signals, which are sent over the fiber-optic cable. At the other end, another CBL 75090-4 is installed.

See Figure 23 for a wiring diagram of the CBL 75090-4. One one end of the modem, two fiber-optic ports allow two separate fiber optic connections (L Fiber and R Fiber). Each fiber-optic port accommodates a bi-directional fiber-optic cable (400-400x) to connect to a CBL 75090-4 at another location. The other end of the modem provides a grounding terminal (Case), ac power terminals (–V, +V), and Comm5 communication link wiring terminals (Net A).

Figure 25. Comm5 media converter/repeater (CBL 75090-4)



To mount and wire CBL 75090-4 modems on an inter-building communication link, follow these procedures (see Figure 26 on page 52):

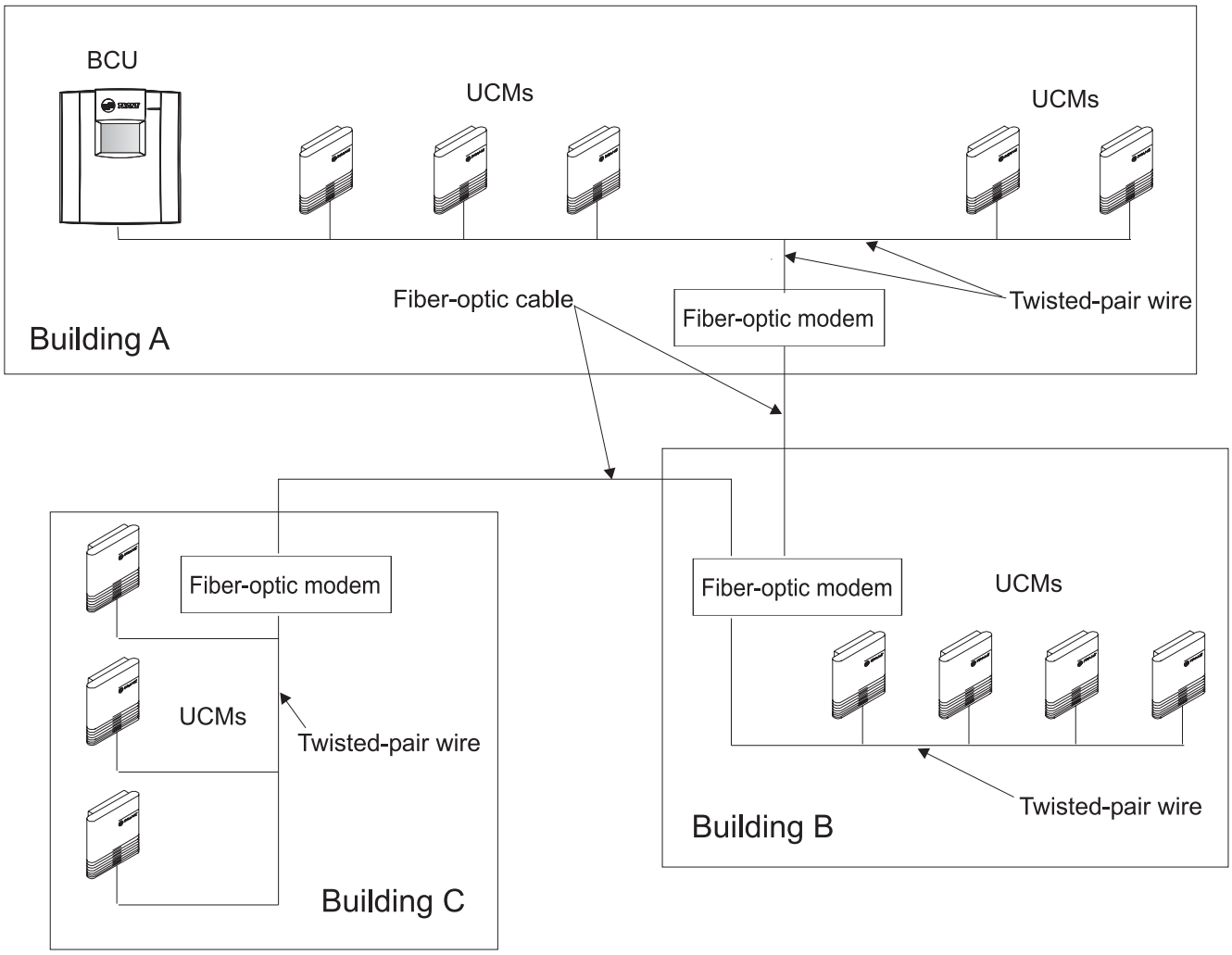
1. In Building A, mount the CBL 75090-4 on the wall using the four mounting screw holes on the case.
2. Connect chassis ground to the ground terminal (Case) on the CBL 75090-4.
3. Connect an external power supply to the –V and +V terminals on the CBL 75090-4.

Note:
The power supply, not included with the CBL 75090-4, must provide 9–28 Vac or Vdc. Typically, the current requirement is 100 mA at 24 Vdc.

4. Connect the communication link (and a termination resistor, if needed) to the Net A terminals on the CBL 75090-4.
5. Connect terminated fiber-optic cable to either L Fiber or R Fiber on the CBL 75090-4.
6. In Building B, mount another CBL 75090-4 on the wall using the four mounting screw holes on the case.
7. Repeat steps 2 through 4.
8. Connect the terminated fiber-optic cable that is connected to the CBL 750900-4 in Building A to either L Fiber or R Fiber (whichever is unused) on the CBL 75090-4 in Building B.
9. For each successive building to be wired on the communication link, repeat steps 6 through 8.

IMPORTANT
On links that use a Tracer MP580/581 controller, the buffers of the CBL76090-4 must be increased to accommodate larger messages. Contact the manufacturer for instructions.

Figure 26. Typical example of inter-building fiber-optic cabling with Comm5 communication



Fiber-optic link signal loss budget

Every fiber-optic link has some signal loss (measured in decibels). Many factors affect decibel loss, including:

- Length of fiber-optic cable
- Transmitter optical output power
- Operating wavelength
- Fiber attenuation
- Fiber bandwidth
- Receiver optical sensitivity

The decibel loss between any two devices is based on how well the terminations or splices are made. A termination or splice can vary from 0.5–2 dB loss. A clean splice results in increased performance.

The CBL 75090-4, supported by Trane, has a power budget of 14 dB between 32°F and 140°F (0°C and 60°C). This is the acceptable temperature range specified for the BCU. The decibel loss for conduit-rated fiber-optic cable is 3.75 dB/km (1 km = 3,280 ft). Precut fiber-optic cables and professionally spliced and/or terminated cables should ensure minimal decibel loss.

To calculate the system loss, subtract the cable loss, splice loss, terminator loss, and patch panel loss from the power budget. The example below shows typical values for the UCM communication link.

power budget – system safety margin = available budget

14 dB – 3 dB = 11 dB (available budget)

available budget:	**11 dB**
cable loss:	**– 7.5 dB (1 km at 3.75 dB/km)**
allowance for splice loss:	**– 1 dB (2 at 0.5 dB)**
allowance for end connectors:	**– 1 dB (2 at 0.5 dB)**
allowance for patch panel:	**– 1 dB (2 at 0.5 dB)**
excess margin:	**= 0.5 dB**

Zone sensor communication stubs on Comm5 links

The wire that runs from a zone sensor to a UCM is commonly referred to as a communication stub. Figure 27 on page 54 shows an example of communication stubs on a Comm5 link.

Comm5 links have specific limitations regarding stubs:

- A maximum of 8 stubs can be used per Comm5 link.
- The maximum length per stub is 50 ft.
- If a repeater is used, 8 stubs can be wired to either side of the repeater, increasing the maximum number of stubs to 16.

In Figure 27, the total communication link length is 100+150+100=350. In this example, the communication stubs are not included in the total length of the communication link wire. Sites that require communication at every zone sensor on the link must have their sensors wired into the communication link daisy-chain. The length of each stub must be added to the total length of the communication link wire.

The wire for the communication stub must be the same as that used for Comm5 communication link wiring: low-capacitance, 22-gauge, Level 4 unshielded, twisted-pair. Existing sites that have already been wired with low-capacitance, 18-gauge, shielded, twisted-pair with stranded, tinned-copper conductors (Trane-approved, purple-jacketed wire) will use the same wire for stubs. Thermostat wire is not allowed.

Figure 27. Communication stubs on a Comm5 link

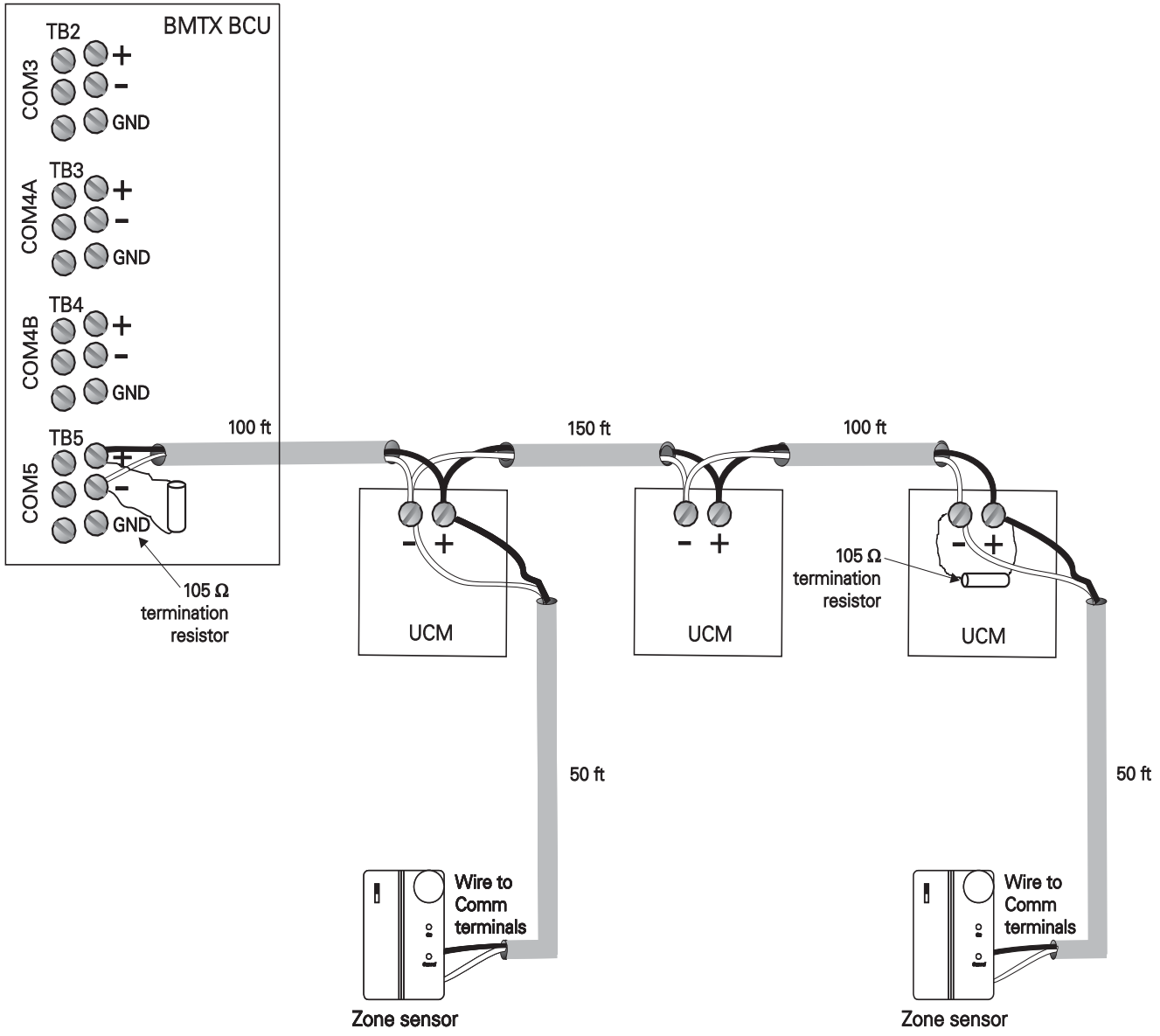


Figure Note:
In this example, the total communication link length is 100+150+100=350. The communication stubs are not included in the total length of the communication link wire because the sensors are not wired into the communication link daisy-chain.

Chapter 6

UCMs supported by Tracer Summit systems

UCMs supported by Tracer Summit systems communicate on one, or more, of the following link types:

- Isolated Comm3
- Comm4
- Comm5

Isolated Comm3 UCMs

The UCMs in the following list communicate with BCUs using the isolated Comm3 communication link. For specific information about the number of each of these types of UCMs allowed per BCU and per communication link, refer to Table 5 on page 33.

- Central control panel (CCP)
- Commercial self-contained (CSC)
- Intellipak
- IntelliPak CSC
- Lighting control panel (LCP)
- Programmable control module (PCM)
- RTA-RTW chiller interface
- Scroll chiller (CGA/CGW/CGAF) interfaces
- Thermostat Control Module (TCM)
- Trane Europe chiller interface
- Voyager rooftop unit interface

Wiring requirements

To establish wiring connections between UCM and the BMTX BCU, refer to the specifications on wire type, topology, and wiring procedures in “” on page 34. For UCM connection points, refer to literature for the specific UCM.

UCM addresses

UCMs that communicate using isolated Comm3 need to have addresses set with DIP switches or local displays. Tables with address settings and DIP switch settings are provided for some of the UCMs in this chapter. As an alternative, refer to Appendix A for a table that can be used for all DIP switch settings.

Comm4 UCMs

The UCMs in the following list communicate with BCUs using the Comm4 communication link. For specific information about the number of each of these types of UCMs allowed per BCU and per communication link, refer to Table 5 on page 33.

- Horizon absorption chiller
- Intellipak
- Intellipak CSC
- TUC
- UCP2
- UPCM
- VAV II/III/IV
- VAV wireless receiver
- Voyager rooftop unit interface

Wiring requirements

To establish wiring connections between UCM and the BMTX BCU, refer to the specifications on wire type, topology, and wiring procedures in "Comm3/Comm4 wiring" on page 35. For UCM connection points, refer to literature for the specific UCM.

UCM addresses

UCMs that communicate using Comm4 need to have addresses set with DIP switches or local displays. Tables with address settings and DIP switch settings are provided for some of the UCMs in this chapter. As an alternative, refer to Appendix A for a table that can be used for all DIP switch settings.

Comm5 UCMs

The Comm5 communication link is Trane's implementation of the LonTalk® protocol. The UCMs shown in Table 8 on page 57 communicate with BCUs using the Comm5 communication link. The table also shows the corresponding Tracer Summit objects type. The control mode configuration is given when the object type is dependent on it.

For specific information about the number of each of these types of UCMs allowed per BCU and per communication link, refer to Table 5 on page 33.

Wiring requirements

To establish wiring connections between UCM and the BMTX BCU, refer to the specifications on wire type, topology, and wiring procedures in "Comm5 wiring" on page 43. For UCM connection points, refer to literature for the specific UCM.

Table 8. Comm5 UCMs and corresponding Tracer Summit object type

Object type	Comm5 UCMs	Control mode configuration[1,2]
Chiller	LCI-C (Version 16 and higher)	N/A
Discharge Air Controller (DAC)	LCI-R (Voyager 3)	N/A
	LCI-I, IntelliPak Commercial Self-Contained (CSC)	VAV
	LCI-I, IntelliPak—Fresh Air Unit (FAU)	Constant volume
	LCI-I, IntelliPak—Roof Top Unit (RTU)	VAV
	Tracer AH540/541	Discharge air temperature
Generic LonTalk Device (GLD)	Tracer MP501 (configured as generic: temperature, pressure, flow, percent of parts per million)	Generic: temperature, pressure, flow, percent of ppm
	Tracer MP503 I/O module	N/A
	LCI-C (before Version 16)	N/A
	Other LonTalk devices such as meters, variable frequency drives, sensors, actuators	N/A
MP580/581	Tracer MP580/581	Space temperature
	Tracer MP580/581	Discharge air temperature
	Tracer MP580/581	Generic
Space Comfort Controller (SCC)	LCI-R (Voyager 3, Voyager 2, Precedent)	N/A
	LCI-V	N/A
	LCI-I, IntelliPak - Commercial Self-Contained (CSC)	Constant volume
	Tracer AH540/541	Space temperature
	Tracer MP501	Space temperature
	Tracer VV550/551	N/A
	Tracer ZN510/511	N/A
	Tracer ZN517	N/A
	Tracer ZN520/521	N/A
	Tracer ZN524	N/A
Tracer Loop Controller (TLC)	Tracer Loop Controller (TLC)	N/A

1 Configure the control mode of UCMs, either at the factory or in the field, using the Rover service tool. Configure the unit type of some UCMs, such as the Tracer CH530/531, using the TechView or another service tool.

2 N/A = Control mode does not affect the object type.

Neuron ID

Each Comm5 UCM or LonTalk® device is assigned a unique identification number called a Neuron ID. The Neuron ID replaces the UCM addresses used for Comm3 and Comm4. The Neuron ID is typically printed on a label located on the logic board of each UCM. You can view the Neuron ID from Tracer Summit when communication is established. (For more information, refer to the *Tracer Summit Programming* guide.)

Description of UCM types

Central Control Panel (CCP II) (VariTrac II)

The VariTrac system is a changeover bypass VAV system that controls the temperature and mode of individual VAV zones, and also stages the rooftop or air handler that serves the system. VariTrac systems are applied with the use of a Central Control Panel (CCP II) that provides coordination, monitoring, and diagnostics for the VariTrac zone system. The CCP II was formerly referred to as VariTrac II. Its predecessor is the VariTrac I.) It is responsible for communicating with, and the grouping of, up to 16 VAV units to determine space heating and cooling requirements, as well as for selecting the mode and number of stages for the heating and cooling unit to meet those needs.

The CCP II can function as a stand-alone system whereby mode control functions can be initiated via binary inputs from a time clock or other contact closures. The CCP II can also be controlled and monitored from an upper level system, such as Tracer Summit system, via a connection to the BCU. The CCP II uses an isolated Comm3 communication link when it is connected to the BMTX BCU.

For information about the number of CCP IIs allowed per BCU and per communication link, refer to Table 5 on page 33.

The following information summarizes the compatibility of the CCP II and VariTrac I with a Tracer Summit system:

- VariTrac I comfort managers are not compatible with a Tracer Summit system, and they cannot communicate with a Tracer Summit system.
- CCP IIs using boards with revision levels 1 to 10 cannot be upgraded to software Version 2.2. The Version 2.2 chip is only compatible in revision level 11 boards or greater.
- CCP IIs with boards manufactured prior to revision level 11 cannot communicate with a Tracer Summit system until the CCP board is replaced. Contact your local Trane sales office for instructions.
- CCP IIs using boards with revision levels 11 to 14 can be upgraded to software Version 2.2 by replacing the chip in location U-27.
- CCP IIs using boards with revision levels 15 and greater already come equipped from the factory with software Version 2.2 and are fully compatible with a Tracer Summit system.
- The approximate manufacturing dates for CCP boards are:

  February 20, 1996: The CCP II board transitioned from revision level 10 to 11. Both board revisions were available with software Version 2.1; however, the PROM chip on each board (location U-27) was physically different.

  December 22, 1997: The CCP IIs transitioned from revision level 14 to 15. The software version transitioned from 2.1 to 2.2 on the same date.

- The CCP IIs software version is shown on the label of the chip at location U-27 on the board. The revision level of the board determines whether previous software versions of the CCP can be upgraded to be compatible with a Tracer Summit system.

Wiring requirements

To establish wiring connections between the CCP II and the BMTX BCU, refer to the specifications on wire type, topology, and wire procedures in "" on page 34. Attach the communication link wiring to the CCP II at TB3-4 and TB3-5

Device addressing

Each CCP II must have a unique address on each link. CCPs can have an address from 1 through 32. The address is set with the S2 DIP switches and must match the address that was set in Site Configuration for Tracer Summit.

- For details about setting the address, refer to the CCP II literature.
- For CCP II DIP switch settings, refer to Table 9.

Table 9. CCP II DIP switch settings

UCM address	CCP II S2 DIP switch settings				
	1	2	3	4	5
1	on	OFF	OFF	OFF	OFF
2	OFF	on	OFF	OFF	OFF
3	on	on	OFF	OFF	OFF
4	OFF	OFF	on	OFF	OFF
5	on	OFF	on	OFF	OFF
6	OFF	on	on	OFF	OFF
7	on	on	on	OFF	OFF
8	OFF	OFF	OFF	on	OFF
9	on	OFF	OFF	on	OFF
10	OFF	on	OFF	on	OFF
11	on	on	OFF	on	OFF
12	OFF	OFF	on	on	OFF
13	on	OFF	on	on	OFF
14	OFF	on	on	on	OFF
15	on	on	on	on	OFF
16	OFF	OFF	OFF	OFF	on
17	on	OFF	OFF	OFF	on
18	OFF	on	OFF	OFF	on
19	on	on	OFF	OFF	on

Table 9. CCP II DIP switch settings (Continued)

UCM address	CCP II S2 DIP switch settings				
	1	2	3	4	5
20	OFF	OFF	on	OFF	on
21	on	OFF	on	OFF	on
22	OFF	on	on	OFF	on
23	on	on	on	OFF	on
24	OFF	OFF	OFF	on	on
25	on	OFF	OFF	on	on
26	OFF	on	OFF	on	on
27	on	on	OFF	on	on
28	OFF	OFF	on	on	on
29	on	OFF	on	on	on
30	OFF	on	on	on	on
31	on	on	on	on	on
32	OFF	OFF	OFF	OFF	OFF

CSC and IntelliPak CSC

Interfaces for the commercial self-contained (CSC) and IntelliPak CSC provide communication link between each CSC and the BCU. There are multiple generations of CSC UCMs. The first generation, referred to as simply CSC, communicates using isolated Comm3. The next generation, referred to as IntelliPak CSC, is based on the IntelliPak UCM platform. It communicates on an isolated Comm3 or a Comm4 link using a Tracer communication interface (TCI), and on a Comm5 link using a LonTalk communication interface (LCI-I). For specific information about the number of CSCs allowed per BCU and per communication link, refer to Table 5 on page 33.

Wiring requirements

For the TCI, attach the communication link wiring to the CSC at TB2-1 (TB2-1 is a terminal block located in the CSC control panel). Attach the the communication link wiring to the Intellipak CSC at the communication link + and – terminals. For more detailed information on wiring the CSC and the Intellipak CSC, refer to product information.

Device addressing

Each UCM on a Comm3 or Comm4 link must have a unique address that is set using a DIP switch on the CSC. For CSC address DIP switch settings, refer to Table 10 on page 61.

Each UCM on a Comm5 link has a Neuron ID that provides a unique address.

For IntelliPak CSCs, addresses are set from the front panel. Refer to the IntelliPak CSC installation, operation, and maintenance manual for details.

Table 10. CSC UCM address settings for Comm3 or Comm4

UCM address	CSC Board A5 DIP switch settings				
	SW6-1	SW6-2	SW6-3	SW6-4	SW6-5
01	OFF	OFF	OFF	OFF	on
02	OFF	OFF	OFF	on	OFF
03	OFF	OFF	OFF	on	on
04	OFF	OFF	on	OFF	OFF
05	OFF	OFF	on	OFF	on
06	OFF	OFF	on	on	OFF
07	OFF	OFF	on	on	on
08	OFF	on	OFF	OFF	OFF
09	OFF	on	OFF	OFF	on
10	OFF	on	OFF	on	OFF
11	OFF	on	OFF	on	on
12	OFF	on	on	OFF	OFF
13	OFF	on	on	OFF	on
14	OFF	on	on	on	OFF
15	OFF	on	on	on	on
16	on	OFF	OFF	OFF	OFF
17	on	OFF	OFF	OFF	on
18	on	OFF	OFF	on	OFF
19	on	OFF	OFF	on	on
20	on	OFF	on	OFF	OFF
21	on	OFF	on	OFF	on
22	on	OFF	on	on	OFF
23	on	OFF	on	on	on
24	on	on	OFF	OFF	OFF
25	on	on	OFF	OFF	on
26	on	on	OFF	on	OFF
27	on	on	OFF	on	on
28	on	on	on	OFF	OFF
29	on	on	on	OFF	on
30	on	on	on	on	OFF
31	on	on	on	on	on

GLDs: Generic LonTalk® Device

LonTalk® devices support LonTalk protocol but do not meet the LonMark™ profiles that Tracer Summit software supports, such as SCC or DAC. However, LonTalk® devices can be connected to Tracer Summit as Generic LonTalk® Device (GLD) objects. GLDs must support LonMark standard network variable types (SNVTs). The BCU integrates these devices into Tracer Summit by mapping SNVTs to standard BACnet objects (AIP, AOP, BIP, BOP). These BACnet objects can then be used in various Tracer Summit applications, such as TOD scheduling, graphics, and CPL programs.

The BCU gets the information it needs for mapping SNVTs to standard BACnet objects from an external interface file (XIF). You will need to transfer this information to the Tracer Summit PC Workstation. The XIF file is supplied by the manufacturer of the generic LonTalk® device.

Generic LonTalk® devices include: variable frequency drives (VFDs), meters, occupancy sensors, actuators, and I/O modules. Typically, these devices will be pre-configured by the original equipment manufacturer. They communicate using the Comm5 communication link.

For detailed information about generic LonTalk® devices and how they operate in Tracer Summit, refer to *Tracer Summit Connections to Non-Trane LonTalk® Devices* (BAS-PRB003-EN).

Horizon absorption chiller interface

Tracer Summit can monitor, control, and configure Horizon absorption chillers. The Horizon interface provides a Comm4 communication link between each Horizon absorption chiller and the BCU. For specific information about the number of Horizons allowed per BCU and per communication link, refer to Table 5 on page 33.

Absorption chillers manufactured in China and known by the names Dragon and Navigator also are controlled and monitored using this interface. This section refers only to the Horizon chillers, but applies to the Dragon and Navigator chillers as well unless specifically stated.

You must configure the menu items on the UCM for proper Tracer Summit operation according to Table 11.

Table 11. Horizon absorption chiller menu item configurations

Menu	Option	Description
Machine configuration	Tracer Option = Enable	The Tracer Option is installed automatically if communication with a BCU occurs.

Table 11. Horizon absorption chiller menu item configurations

Machine configuration	TCI Option = Enable	The TCI Option is installed automatically if communication with a TCI module occurs.
Operator settings	Setpoint Source Override Item = None	This allows the chiller to receive its setpoints from the BCU.

The minimum software revision numbers required for compatibility with a Tracer Summit system for each of UCM module are shown in Table 12 and Table 13 on page 63.

Table 12. Horizon chiller minimum software revision numbers

Horizon chiller module	Minimum software revision
Burner	2.0
Chiller	
Circuit	
CLD	
Purge	
Starter	
Stepper	
TCI4-Comm4	3.0

Table 13. Dragon/Navigator chiller minimum software revision numbers

Dragon/ Navigator chiller module	Minimum Software Revision
Burner	1.0
CCCLD	
Chiller	
Circuit	
Stepper	
TCI4-Comm4	

Wiring requirements

To establish wiring connections between the TCI4-Comm4 module and the BMTX BCU, refer to the specifications on wire type, topology, and wiring procedures in “Comm3/Comm4 wiring procedure” on page 36. Connect one end of the communication link wire to J3-A or J3-B on the TCI4-Comm4 module.

Device addressing

Each UCM must have a unique address on each link. On the Horizon chiller, addresses are set from the front panel. Refer to the Horizon chiller installation, operation, and maintenance manual for details.

Note:
The DIP switch block on the TCI4-Comm4 module should have DIP switches 1 and 3 in the Off position, with DIP switch 2 in the On position.

IntelliPak rooftop unit interface

Tracer Summit can monitor, control, and configure IntelliPak rooftop units. The IntelliPak UCM interface provides a communication link between the BCU and each IntelliPak. For specific information about the number of IntelliPaks allowed per BCU and per communication link, refer to Table 5 on page 33.

IntelliPaks UCMs must have an interface card installed in order to communicate with a Tracer Summit system: a Tracer communications interface (TCI) module for Comm4 links or LonTalk communication interface (LCI) for LonTalk links. The TCI module must have Version 2 software or higher.

Make sure the DIP switches and the daughter board on the TCI module are set correctly for Comm4.

Note:
The DIP switch block on the IntelliPak TCI module must have DIP switches 2 and 3 in the Off position, with DIP switch 1 in the ON position. The daughter board should be situated in the “Non-isolated Comm3 or Comm4” position.

Refer to the IntelliPak UCM installation, operation, and maintenance manual for details about confirming the configuration of the IntelliPak interface.

Wiring requirements

To establish wiring connections between the UCM and the BMTX BCU, refer to the specifications on wire type, topology, and wiring procedures in Chapter 5, “UCM communication link wiring and topology.”

Device addressing

Each UCM must have a unique address on each link. On the IntelliPak, addresses are set from the front panel. Refer to the IntelliPak installation, operation, and maintenance manual for details.

LCI: LonTalk communication interface

Add-on LonTalk communication interface (LCI) cards enable Comm5 communication between a UCM and a Tracer Summit system. They are used on various pieces of equipment such as air handlers, rooftop units, and chillers. See Table 8 on page 57 for a listing of specific LCI interfaces.

If the controller does not come configured from the factory, use the Rover service tool to configure the control mode.

Some UCMs may require other service tools to install LCI cards. At the time of printing, the only instance of this is the LCI-C on the Tracer CH530/531 controller, which requires the TechView service tool.

LCP: Lighting control panel interface

The lighting control panel (LCP) allows Tracer Summit to control building lighting circuits (typically in accordance with Time of Day schedules) and monitor physical switch and telephone inputs. The LCP allows coordination of the lighting circuit operation with other building management functions, like Time of Day scheduling.

The LCP communicates on a isolated Comm3 communication link, via the LCP Supervisor. The LCP Supervisor provides a communication interface between the LCP and the BCU. The LCP Supervisor has two serial communication links:

- The first link allows it to communicate with the Tracer Summit BCU over a twisted, shielded pair of wires.
- The second communication link allows the LCP Supervisor to communicate with the LCP panels.

The LCP Supervisor is a communication link translator and a pathway for multiple LCPs. Only one LCP Supervisor can exist on the communication link. For specific information about the number of LCPs allowed per BCU and per communication link, see Table 5 on page 33.

Wiring requirements

To establish connections between the UCM and the BMTX BCU, refer to the specifications on wire type, topology, and wiring procedures in “” on page 34. For communication wiring terminal locations and wiring procedures for the LCP, refer to lighting control panel literature.

Device addressing

Each LCP supervisor must have a unique address on the LCP communication link. The LCP supervisor address is set using a DIP switch on the LCP supervisor. The supervisor is transparent to the BCU. Each LCP UCM must also have a unique address that is set using a DIP switch on the LCP.

Assign each LCP a unique address number by setting the DIP switch labeled Options Select on the logic board. Switch positions are labeled 1 through 8. Valid LCP addresses range from 82 to 126. Press and release the reset button after setting the address of the LCP.

- For LCP supervisor address DIP switch settings, see Table 14.

For LCP address DIP switch settings, refer to Table 15 on page 68.

Table 14. LCP supervisor DIP switch settings

UCM address	DIP-1	DIP-2	DIP-3	DIP-4	DIP-5	DIP-6	DIP-7	DIP-8
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	on	OFF	OFF	OFF	OFF	OFF	OFF	OFF
2	OFF	on	OFF	OFF	OFF	OFF	OFF	OFF
3	on	on	OFF	OFF	OFF	OFF	OFF	OFF
4	OFF	OFF	on	OFF	OFF	OFF	OFF	OFF
5	on	OFF	on	OFF	OFF	OFF	OFF	OFF
6	OFF	on	on	OFF	OFF	OFF	OFF	OFF
7	on	on	on	OFF	OFF	OFF	OFF	OFF
8	OFF	OFF	OFF	on	OFF	OFF	OFF	OFF
9	on	OFF	OFF	on	OFF	OFF	OFF	OFF
10	OFF	on	OFF	on	OFF	OFF	OFF	OFF
11	on	on	OFF	on	OFF	OFF	OFF	OFF
12	OFF	OFF	on	on	OFF	OFF	OFF	OFF
13	on	OFF	on	on	OFF	OFF	OFF	OFF
14	OFF	on	on	on	OFF	OFF	OFF	OFF
15	on	on	on	on	OFF	OFF	OFF	OFF
16	OFF	OFF	OFF	OFF	on	OFF	OFF	OFF
17	on	OFF	OFF	OFF	on	OFF	OFF	OFF
18	OFF	on	OFF	OFF	on	OFF	OFF	OFF
19	on	on	OFF	OFF	on	OFF	OFF	OFF
20	OFF	OFF	on	OFF	on	OFF	OFF	OFF
21	on	OFF	on	OFF	on	OFF	OFF	OFF
22	OFF	on	on	OFF	on	OFF	OFF	OFF
23	on	on	on	OFF	on	OFF	OFF	OFF
24	OFF	OFF	OFF	on	on	OFF	OFF	OFF
25	on	OFF	OFF	on	on	OFF	OFF	OFF
26	OFF	on	OFF	on	on	OFF	OFF	OFF
27	on	on	OFF	on	on	OFF	OFF	OFF
28	OFF	OFF	on	on	on	OFF	OFF	OFF
29	on	OFF	on	on	on	OFF	OFF	OFF
30	OFF	on	on	on	on	OFF	OFF	OFF
31	on	on	on	on	on	OFF	OFF	OFF
32	OFF	OFF	OFF	OFF	OFF	on	OFF	OFF
33	on	OFF	OFF	OFF	OFF	on	OFF	OFF

Table 14. LCP supervisor DIP switch settings (Continued)

UCM address	DIP-1	DIP-2	DIP-3	DIP-4	DIP-5	DIP-6	DIP-7	DIP-8
34	OFF	on	OFF	OFF	OFF	on	OFF	OFF
35	on	on	OFF	OFF	OFF	on	OFF	OFF
36	OFF	OFF	on	OFF	OFF	on	OFF	OFF
37	on	OFF	on	OFF	OFF	on	OFF	OFF
38	OFF	on	on	OFF	OFF	on	OFF	OFF
39	on	on	on	OFF	OFF	on	OFF	OFF
40	OFF	OFF	OFF	on	OFF	on	OFF	OFF
41	on	OFF	OFF	on	OFF	on	OFF	OFF
42	OFF	on	OFF	on	OFF	on	OFF	OFF
43	on	on	OFF	on	OFF	on	OFF	OFF
44	OFF	OFF	on	on	OFF	on	OFF	OFF
45	on	OFF	on	on	OFF	on	OFF	OFF
46	OFF	on	on	on	OFF	on	OFF	OFF
47	on	on	on	on	OFF	on	OFF	OFF
48	OFF	OFF	OFF	OFF	on	on	OFF	OFF
49	on	OFF	OFF	OFF	on	on	OFF	OFF
50	OFF	on	OFF	OFF	on	on	OFF	OFF
51	on	on	OFF	OFF	on	on	OFF	OFF
52	OFF	OFF	on	OFF	on	on	OFF	OFF
53	on	OFF	on	OFF	on	on	OFF	OFF
54	OFF	on	on	OFF	on	on	OFF	OFF
55	on	on	on	OFF	on	on	OFF	OFF
56	OFF	OFF	OFF	on	on	on	OFF	OFF
57	on	OFF	OFF	on	on	on	OFF	OFF
58	OFF	on	OFF	on	on	on	OFF	OFF
59	on	on	OFF	on	on	on	OFF	OFF
60	OFF	OFF	on	on	on	on	OFF	OFF
61	on	OFF	on	on	on	on	OFF	OFF
62	OFF	on	on	on	on	on	OFF	OFF
63	on	on	on	on	on	on	OFF	OFF
64	OFF	OFF	OFF	OFF	OFF	OFF	on	OFF
65	on	OFF	OFF	OFF	OFF	OFF	on	OFF
66	OFF	on	OFF	OFF	OFF	OFF	on	OFF
67	on	on	OFF	OFF	OFF	OFF	on	OFF
68	OFF	OFF	on	OFF	OFF	OFF	on	OFF
69	on	OFF	on	OFF	OFF	OFF	on	OFF
70	OFF	on	on	OFF	OFF	OFF	on	OFF

Table 14. LCP supervisor DIP switch settings (Continued)

UCM address	DIP-1	DIP-2	DIP-3	DIP-4	DIP-5	DIP-6	DIP-7	DIP-8
71	on	on	on	OFF	OFF	OFF	on	OFF
72	OFF	OFF	OFF	on	OFF	OFF	on	OFF
73	on	OFF	OFF	on	OFF	OFF	on	OFF
74	OFF	on	OFF	on	OFF	OFF	on	OFF
75	on	on	OFF	on	OFF	OFF	on	OFF
76	OFF	OFF	on	on	OFF	OFF	on	OFF
77	on	OFF	on	on	OFF	OFF	on	OFF
78	OFF	on	on	on	OFF	OFF	on	OFF
79	on	on	on	on	OFF	OFF	on	OFF
80	OFF	OFF	OFF	OFF	on	OFF	on	OFF
81	on	OFF	OFF	OFF	on	OFF	on	OFF

Table 15. LCP address (options select) DIP switch settings

UCM address	DIP-1	DIP-2	DIP-3	DIP-4	DIP-5	DIP-6	DIP-7	DIP-8
82	OFF	on	OFF	OFF	on	OFF	on	OFF
83	on	on	OFF	OFF	on	OFF	on	OFF
84	OFF	OFF	on	OFF	on	OFF	on	OFF
85	on	OFF	on	OFF	on	OFF	on	OFF
86	OFF	on	on	OFF	on	OFF	on	OFF
87	on	on	on	OFF	on	OFF	on	OFF
88	OFF	OFF	OFF	on	on	OFF	on	OFF
89	on	OFF	OFF	on	on	OFF	on	OFF
90	OFF	on	OFF	on	on	OFF	on	OFF
91	on	on	OFF	on	on	OFF	on	OFF
92	OFF	OFF	on	on	on	OFF	on	OFF
93	on	OFF	on	on	on	OFF	on	OFF
94	OFF	on	on	on	on	OFF	on	OFF
95	on	on	on	on	on	OFF	on	OFF
96	OFF	OFF	OFF	OFF	OFF	on	on	OFF
97	on	OFF	OFF	OFF	OFF	on	on	OFF
98	OFF	on	OFF	OFF	OFF	on	on	OFF
99	on	on	OFF	OFF	OFF	on	on	OFF
100	OFF	OFF	on	OFF	OFF	on	on	OFF
101	on	OFF	on	OFF	OFF	on	on	OFF

Table 15. LCP address (options select) DIP switch settings (Continued)

UCM address	DIP-1	DIP-2	DIP-3	DIP-4	DIP-5	DIP-6	DIP-7	DIP-8
102	OFF	on	on	OFF	OFF	on	on	OFF
103	on	on	on	OFF	OFF	on	on	OFF
104	OFF	OFF	OFF	on	OFF	on	on	OFF
105	on	OFF	OFF	on	OFF	on	on	OFF
106	OFF	on	OFF	on	OFF	on	on	OFF
107	on	on	OFF	on	OFF	on	on	OFF
108	OFF	OFF	on	on	OFF	on	on	OFF
109	on	OFF	on	on	OFF	on	on	OFF
110	OFF	on	on	on	OFF	on	on	OFF
111	on	on	on	on	OFF	on	on	OFF
112	OFF	OFF	OFF	OFF	on	on	on	OFF
113	on	OFF	OFF	OFF	on	on	on	OFF
114	OFF	on	OFF	OFF	on	on	on	OFF
115	on	on	OFF	OFF	on	on	on	OFF
116	OFF	OFF	on	OFF	on	on	on	OFF
117	on	OFF	on	OFF	on	on	on	OFF
118	OFF	on	on	OFF	on	on	on	OFF
119	on	on	on	OFF	on	on	on	OFF
120	OFF	OFF	OFF	on	on	on	on	OFF
121	on	OFF	OFF	on	on	on	on	OFF
122	OFF	on	OFF	on	on	on	on	OFF
123	on	on	OFF	on	on	on	on	OFF
124	OFF	OFF	on	on	on	on	on	OFF
125	on	OFF	on	on	on	on	on	OFF
126	OFF	on	on	on	on	on	on	OFF

PCM: Programmable control module

Programmable control modules (PCMs) allow Tracer Summit to monitor and control HVAC equipment such as air handlers, chillers, pumps, and generic loads. You can also use PCMs to add generic analog and binary inputs and outputs to Tracer Summit.

You can connect PCMs to any isolated Comm3 UCM communication link on TB2. The link provides a serial communication interface between the BCU and each PCM in the system. For specific information about the number of PCMs allowed per BCU and per communication link, refer to Table 5 on page 33.

Wiring requirements

To establish wiring connections between the UCM and the BMTX BCU, refer to the specifications on wire type, topology, and wire procedures in “” on page 34.

Device addressing

Each UCM must have a unique address on each link. On the PCM, the address is set with the S2 address DIP switches. For PCM DIP switch settings, refer to Table 16.

Table 16. PCM address settings

UCM address	PCM DIP switch settings							
	S2-1	S2-2	S2-3	S2-4	S2-5	S2-6	S2-7	S2-8
1	OFF	on	on	on	on	on	OFF	OFF
2	on	OFF	on	on	on	on	OFF	OFF
3	OFF	OFF	on	on	on	on	OFF	OFF
4	on	on	OFF	on	on	on	OFF	OFF
5	OFF	on	OFF	on	on	on	OFF	OFF
6	on	OFF	OFF	on	on	on	OFF	OFF
7	OFF	OFF	OFF	on	on	on	OFF	OFF
8	on	on	on	OFF	on	on	OFF	OFF
9	OFF	on	on	OFF	on	on	OFF	OFF
10	on	OFF	on	OFF	on	on	OFF	OFF
11	OFF	OFF	on	OFF	on	on	OFF	OFF
12	on	on	OFF	OFF	on	on	OFF	OFF
13	OFF	on	OFF	OFF	on	on	OFF	OFF
14	on	OFF	OFF	OFF	on	on	OFF	OFF
15	OFF	OFF	OFF	OFF	on	on	OFF	OFF
16	on	on	on	on	OFF	on	OFF	OFF
17	OFF	on	on	on	OFF	on	OFF	OFF
18	on	OFF	on	on	OFF	on	OFF	OFF

Table 16. PCM address settings (Continued)

UCM address	PCM DIP switch settings							
	S2-1	S2-2	S2-3	S2-4	S2-5	S2-6	S2-7	S2-8
19	OFF	OFF	on	on	OFF	on	OFF	OFF
20	on	on	OFF	on	OFF	on	OFF	OFF
21	OFF	on	OFF	on	OFF	on	OFF	OFF
22	on	OFF	OFF	on	OFF	on	OFF	OFF
23	OFF	OFF	OFF	on	OFF	on	OFF	OFF
24	on	on	on	OFF	OFF	on	OFF	OFF
25	OFF	on	on	OFF	OFF	on	OFF	OFF
26	on	OFF	on	OFF	OFF	on	OFF	OFF
27	OFF	OFF	on	OFF	OFF	on	OFF	OFF
28	on	on	OFF	OFF	OFF	on	OFF	OFF
29	OFF	on	OFF	OFF	OFF	on	OFF	OFF
30	on	OFF	OFF	OFF	OFF	on	OFF	OFF

Note:
- DIP switches 7 and 8 must always be off.
- Cycle power off/on after changing settings.

RTA-RTW chiller interface

RTA-RTW UCMs allow Tracer Summit to monitor, control, and configure air-cooled chillers and water-cooled chillers. The RTA-RTW interface provides an isolated Comm3 communication link or a Comm5 communication link between the BCU and each RTA-RTW chiller. For specific information about the number of RTA-RTWs allowed per BCU and per communication link, refer to Table 5 on page 33.

Wiring requirements

To establish wiring connections between the UCM and the BMTX BCU, refer to the specifications on wire type, topology, and wiring procedures in "Comm3/Comm4 wiring procedure" on page 36 or in "Comm5 wiring procedure" on page 44. Attach the communication link wiring to the RTA-RTW UCM at TB2-1 and TB2-2 on the CSR board.

Device addressing

Each UCM must have a unique address. For RTA-RTW UCMs communication on Comm3 links, addresses are set from the front panel. Refer to the RTA/RTW installation, operation, and maintenance manual for details. For RTA-RTW UCMs communicating on Comm5 links, each CUM has a Neuron ID that provides a unique address.

Scroll chillers: U.S.-built CGA/CGW and IntelliPak (CGAF) interfaces

Interfaces for the scroll chillers CGA/CGW and IntelliPak (CGAF) provide an isolated Comm3 communication link between each scroll chiller and the BCU. For specific information about the number of scroll chillers allowed per BCU and per communication link, refer to Table 5 on page 33.

For information on scroll chillers manufactured in Europe, see “Trane Europe chiller interface” on page 77.

Wiring requirements

To establish wiring connections between the UCM and the BMTX BCU, refer to the specifications on wire type, topology, and wire specifications in “Comm3/Comm4 wiring procedure” on page 36. For the CGA/CGW, attach the end of the communication link wire to the UCM at TB2-1 and TB2-2. For the CGAF, attach the end of the communication link wire to the UCM at the comm link + and – terminals. For detailed information on wiring the CGAF, refer to CGAF-IOM-1.

Device addressing

Each UCM must have a unique address that is set using a DIP switch on the scroll chiller. For address DIP switch settings for CGA/CGWs, refer to Table 17.

For CGAFs, addresses are set from the front panel. Refer to the CGAF installation, operation, and maintenance manual for details.

Table 17. CGA/CGW address settings

UCM address	Scroll chiller DIP switch settings				
	SW6-1	SW6-2	SW6-3	SW6-4	SW6-5
33	OFF	OFF	OFF	OFF	on
34	OFF	OFF	OFF	on	OFF
35	OFF	OFF	OFF	on	on
36	OFF	OFF	on	OFF	OFF
37	OFF	OFF	on	OFF	on
38	OFF	OFF	on	on	OFF
39	OFF	OFF	on	on	on
40	OFF	on	OFF	OFF	OFF
41	OFF	on	OFF	OFF	on
42	OFF	on	OFF	on	OFF
43	OFF	on	OFF	on	on
44	OFF	on	on	OFF	OFF
45	OFF	on	on	OFF	on
46	OFF	on	on	on	OFF

Table 17. CGA/CGW address settings (Continued)

UCM address	Scroll chiller DIP switch settings				
	SW6-1	SW6-2	SW6-3	SW6-4	SW6-5
47	OFF	on	on	on	on
48	OFF	OFF	OFF	OFF	OFF
49	on	OFF	OFF	OFF	on
50	on	OFF	OFF	on	OFF
51	on	OFF	OFF	on	on
52	on	OFF	on	OFF	OFF
53	on	OFF	on	OFF	on
54	on	OFF	on	on	OFF
55	on	OFF	on	on	on
56	on	on	OFF	OFF	OFF
57	on	on	OFF	OFF	on
58	on	on	OFF	on	OFF
59	on	on	OFF	on	on
60	on	on	on	OFF	OFF
61	on	on	on	OFF	on
62	on	on	on	on	OFF
63	on	on	on	on	on

TCM: Thermostat Control Module

Thermostat Control Modules (TCMs) can provide generic inputs and outputs that are controlled directly by Tracer Summit. TCMs can also function as thermostats for air conditioning units and heat pumps. The TCM interface provides an isolated Comm3 communication link between the BCU and each TCM. For specific information about the number of TCMs allowed per BCU and per communication link, refer to Table 5 on page 33.

Wiring requirements

To establish wiring connections between the UCM and the BMTX BCU, refer to the specifications on wire type, topology, and wiring procedures in "Comm3/Comm4 wiring procedure" on page 36. Attach the communication link wiring to the TCM at TB2-1 and TB2-2.

Device addressing

Each UCM must have a unique address that is set using a DIP switch on the TCM.

- For TCM address DIP switch settings, refer to Table 18 on page 74.
- For the TCM configuration DIP switch settings for S1-7 and S1-8, refer to Table 19 on page 74.

Table 18. TCM address settings

UCM address	TCM DIP switch settings					
	S1-1	S1-2	S1-3	S1-4	S1-5	S1-6
1	OFF	on	on	on	on	on
2	on	OFF	on	on	on	on
3	OFF	OFF	on	on	on	on
4	on	on	OFF	on	on	on
5	OFF	on	OFF	on	on	on
6	on	OFF	OFF	on	on	on
7	OFF	OFF	OFF	on	on	on
8	on	on	on	OFF	on	on
9	OFF	on	on	OFF	on	on
10	on	OFF	on	OFF	on	on
11	OFF	OFF	on	OFF	on	on
12	on	on	OFF	OFF	on	on
13	OFF	on	OFF	OFF	on	on
14	on	OFF	OFF	OFF	on	on
15	OFF	OFF	OFF	OFF	on	on
16	on	on	on	on	OFF	on
17	OFF	on	on	on	OFF	on
18	on	OFF	on	on	OFF	on
19	OFF	OFF	on	on	OFF	on

Table 19. TCM configuration DIP switch settings

Programming options	TCM DIP switch settings	
	S1-7	S1-8
Slave	OFF	OFF
Air conditioning thermostat	OFF	on
Heat pump thermostat	on	OFF
Test mode	on	on

Tracer AH540 and Tracer AH541 air-handler controllers

The Tracer AH540 (factory-installed) and Tracer AH541 (field-installed) air-handler controllers monitor and control Trane air handlers. They communicate on a Comm5 communication link. The Tracer AH540/541 controller is configurable to operate in one of two air-handler temperature control modes:

- Space temperature control
- Discharge air temperature control

If configured for space temperature control, the Tracer AH540/541 controller uses the LonMark Space Comfort Controller (SCC) profile, and the Tracer Summit object type is SCC. If configured for discharge air temperature control, the Tracer AH540/541 controller uses the LonMark Discharge Air Controller (DAC) profile, and the Tracer Summit object type is DAC.

Configure the control mode, either at the factory or in the field, with the Rover service tool.

Tracer Loop Controller

The Tracer Loop Controller allows a Tracer Summit system to monitor and control water-source heat pump systems. Tracer Loop Controllers communicates on a Comm5 communication link.

Tracer MP501 controller

The Tracer MP501 controller is a configurable, multi-purpose controller used to provide direct-digital control for HVAC equipment. The Tracer MP501 communicates on a Comm5 communication link. It provides a single control loop with the following output types: 2-stage, tri-state modulating, and 0–10 Vdc analog. It communicates on a Comm5 communication link.

In SCC mode, the Tracer MP501 controls space temperature to an active setpoint. SCC mode supports the following applications:

- Heating control loop
- Cooling control loop
- Two-pipe heat/cool automatic changeover using a communicated supply water temperature value

In generic mode, the Tracer MP501 provides control flexibility in a variety of applications that do not necessarily follow a LonMark™ profile. The control loop accepts inputs of the following types: temperature, pressure, flow, percent, or parts per million (ppm). Generic mode supports many applications including:

- Fan speed control based on duct static pressure
- Pump speed control based on water differential pressure or flow
- Humidifier control based on space or duct relative humidity

Tracer MP503 I/O module

The Tracer MP503 input/output (I/O) module is a field-installed module used to monitor inputs and control binary outputs. The Tracer MP503 communicates on a Comm5 communication link, It has four universal inputs that can be configured as binary, thermistor, 0–20 mA, or 0–10 Vdc, as well as four binary outputs.

Tracer MP580/MP581 controllers

The multi-purpose Tracer MP580 (factory-installed) and Tracer MP581 (field-installed) controllers provide control for many types of HVAC equipment, including air handlers, chillers, pumps, and generic loads through the use of generic inputs and outputs. The Tracer MP580/581 controller requires customized Tracer Graphical Programming and configurations using Rover service tool software Version 5.0 or higher. It communicates on a Comm5 communication link.

The Tracer MP580/581 controller has three possible configurations: a completely generic, programmable configuration (called a No Profile configuration), a configuration conforming to the LonMark DAC profile, and a configuration conforming to the LonMark SCC profile. The DAC and SCC configurations enable the Tracer MP580/581 to use the appropriate LonMark profile to send information to and receive information from the Tracer Summit BCU, in addition to using the generic variables of the No Profile configuration. Despite the configuration names of DAC and SCC, Tracer Summit always treats the Tracer MP580/581 controller as a Tracer MP580/581 object rather than as a DAC or SCC object.

Configure the control mode, either at the factory or in the field, with the Rover service tool.

Tracer zone controllers

Tracer zone controllers monitor and control equipment such as fan coils, classroom unit ventilators, water-source heat pumps, and blower coils. Trane zone controllers include the following: factory-installed Tracer ZN524, ZN510, and ZN520 and field-installed Tracer ZN511, ZN517, and ZN521. These controllers communicate using a Comm5 communication link.

Tracer VV550/VV551 controllers

The Tracer VV550 (factory-installed) and Tracer 551 (field-installed) controllers provide digital control for variable air volume (VAV) boxes and communicate with a Tracer Summit system using a Comm5 communications link. The controller conforms to the LonMark Space Comfort Controller (SCC) profile and interfaces to Tracer Summit through the SCC object. System coordination of the Tracer VV550/551 controllers and their associated air handler is accomplished with the new VAV air system (VAS) application designed specifically for Comm5 controllers.

Trane Europe chiller interface

The Trane Europe chiller interface allows Tracer Summit to monitor and control scroll chillers equipped with scroll manager module (SMM) controllers. The interlace provides an isolated Comm3 communication link between the BCU and each SMM. These chillers are manufactured in Mirecourt, France. These include models designated as follows:

- CGAH
- CGWH
- RAUH
- CCUH
- CGCH
- CXAH
- RACH

For information on non-SMM controlled Trane Europe chiller models, contact Trane Europe. For information about the number of Trane Europe chillers allowed per BCU and per communication link, refer to Table 5 on page 33.

Wiring requirements

To establish wiring connections between the UCM and the BCU, Trane requires that you use the communications-link wiring specified in this manual. For wire selection specifications, see “” on page 34. Refer to Trane Europe chiller literature for communication link wiring connection points on the Trane Europe chiller.

Device addressing

Each UCM must have a unique address on each link. On the Trane Europe chiller, addresses are set from the front panel. Refer to the Trane Europe chiller installation, operation, and maintenance manual for details.

TUC: Terminal unit controller

Terminal unit controllers (TUCs) allow Tracer Summit to monitor and control terminal units such as fan coils, water-source heat pumps, unit ventilators, and blower coils.

You can connect TUCs to any Comm4 UCM communication link in the BCU on TB2. The link provides a serial communication interface between the BCU and each TUC in the system. For specific information about the number of TUCs allowed per BCU and per communication link, refer to Table 5 on page 33.

Wiring requirements

To establish wiring connections between the UCM and the BMTX BCU, refer to the specifications on wire type, topology, and wiring procedures in “Comm3/Comm4 wiring procedure” on page 36. Attach the communica-

tion link wire to the TUC at the ICS terminal. Refer to the TUC installation literature (EMTX-IOP-1) for connection points.

Device addressing

Each UCM must have a unique address on each link. On the TUC, the address is set with the SW1 address DIP switches, followed by a momentary short between J11 and J12. For TUC DIP switch settings, refer to Table 20.

Table 20. TUC address settings

UCM address	TUC DIP switch settings							
	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	DIP 8
33	OFF	OFF	on	OFF	OFF	OFF	OFF	on
34	OFF	OFF	on	OFF	OFF	OFF	on	OFF
35	OFF	OFF	on	OFF	OFF	OFF	on	on
36	OFF	OFF	on	OFF	OFF	on	OFF	OFF
37	OFF	OFF	on	OFF	OFF	on	OFF	on
38	OFF	OFF	on	OFF	OFF	on	on	OFF
39	OFF	OFF	on	OFF	OFF	on	on	on
40	OFF	OFF	on	OFF	on	OFF	OFF	OFF
41	OFF	OFF	on	OFF	on	OFF	OFF	on
42	OFF	OFF	on	OFF	on	OFF	on	OFF
43	OFF	OFF	on	OFF	on	OFF	on	on
44	OFF	OFF	on	OFF	on	on	OFF	OFF
45	OFF	OFF	on	OFF	on	on	OFF	on
46	OFF	OFF	on	OFF	on	on	on	OFF
47	OFF	OFF	on	OFF	on	on	on	on
48	OFF	OFF	on	on	OFF	OFF	OFF	OFF
49	OFF	OFF	on	on	OFF	OFF	OFF	on
50	OFF	OFF	on	on	OFF	OFF	on	OFF
51	OFF	OFF	on	on	OFF	OFF	on	on
52	OFF	OFF	on	on	OFF	on	OFF	OFF
53	OFF	OFF	on	on	OFF	on	OFF	on
54	OFF	OFF	on	on	OFF	on	on	OFF
55	OFF	OFF	on	on	OFF	on	on	on
56	OFF	OFF	on	on	on	OFF	OFF	OFF
57	OFF	OFF	on	on	on	OFF	OFF	on
58	OFF	OFF	on	on	on	OFF	on	OFF
59	OFF	OFF	on	on	on	OFF	on	on
60	OFF	OFF	on	on	on	on	OFF	OFF
61	OFF	OFF	on	on	on	on	OFF	on

Table 20. TUC address settings (Continued)

UCM address	TUC DIP switch settings							
	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	DIP 8
62	OFF	OFF	on	on	on	on	on	OFF
63	OFF	OFF	on	on	on	on	on	on
64	OFF	on	OFF	OFF	OFF	OFF	OFF	OFF
65	OFF	on	OFF	OFF	OFF	OFF	OFF	on
66	OFF	on	OFF	OFF	OFF	OFF	on	OFF
67	OFF	on	OFF	OFF	OFF	OFF	on	on
68	OFF	on	OFF	OFF	OFF	on	OFF	OFF
69	OFF	on	OFF	OFF	OFF	on	OFF	on
70	OFF	on	OFF	OFF	OFF	on	on	OFF
71	OFF	on	OFF	OFF	OFF	on	on	on
72	OFF	on	OFF	OFF	on	OFF	OFF	OFF
73	OFF	on	OFF	OFF	on	OFF	OFF	on
74	OFF	on	OFF	OFF	on	OFF	on	OFF
75	OFF	on	OFF	OFF	on	OFF	on	on
76	OFF	on	OFF	OFF	on	on	OFF	OFF
77	OFF	on	OFF	OFF	on	on	OFF	on
78	OFF	on	OFF	OFF	on	on	on	OFF
79	OFF	on	OFF	OFF	on	on	on	on
80	OFF	on	OFF	on	OFF	OFF	OFF	OFF
81	OFF	on	OFF	on	OFF	OFF	OFF	on
82	OFF	on	OFF	on	OFF	OFF	on	OFF
83	OFF	on	OFF	on	OFF	OFF	on	on
84	OFF	on	OFF	on	OFF	on	OFF	OFF
85	OFF	on	OFF	on	OFF	on	OFF	on
86	OFF	on	OFF	on	OFF	on	on	OFF
87	OFF	on	OFF	on	OFF	on	on	on
88	OFF	on	OFF	on	on	OFF	OFF	OFF
89	OFF	on	OFF	on	on	OFF	OFF	on
90	OFF	on	OFF	on	on	OFF	on	OFF
91	OFF	on	OFF	on	on	OFF	on	on
92	OFF	on	OFF	on	on	on	OFF	OFF
93	OFF	on	OFF	on	on	on	OFF	on
94	OFF	on	OFF	on	on	on	on	OFF
95	OFF	on	OFF	on	on	on	on	on

Table 20. TUC address settings (Continued)

UCM address	TUC DIP switch settings							
	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	DIP 8
96	OFF	on	on	OFF	OFF	OFF	OFF	OFF
Note: Momentarily short test inputs J11 and J12 after changing switch settings.								

UCP2: Centrifugal/absorption/helical rotary chiller interface

Unit Control Panels (UCP2s) allow a Tracer Summit system to monitor, control, and configure centrifugal, absorption, and helical rotary chillers. UCP2s communicate with a Tracer Summit BCU using a Comm4 link. The chiller must be equipped with a TCI Comm4 module. For specific information about the number of UCP2s allowed per BCU and per communication link, refer to Table 5 on page 33.

From the operator settings menu on the front panel of the UCP2, change the setpoint source override item to NONE to allow the Tracer Summit system control. If this setting is not changed, the Tracer Summit system can only monitor the UCP2.

Wiring requirements

To establish communication between the UCP2 and the BMTX BCU, refer to the specifications on wire type, topology, and wiring procedures in "Comm3/Comm4 wiring" on page 35.

Device addressing

Each UCM must have a unique address on each link. On the UCP2, addresses are set from the front panel. Refer to the UCP2 installation, operation, and maintenance manual for details.

UPCM: Universal Programmable Control Module

Universal Programmable Control Modules (UPCMs) allow a Tracer Summit system to monitor and control HVAC equipment such as air handlers, chillers, pumps, and generic loads. You can also use UPCMs to add generic analog and binary inputs and outputs to Tracer Summit.

UPCMs communicate on a Comm4 communication link on the BMTX BCU. The link provides a serial communication interface between the BCU and each UPCM. For specific information about the number of UPCMs allowed per BCU and per communication link, refer to Table 5 on page 33.

Wiring requirements

To establish wiring connections between the UCM and the BMTX BCU, refer to the specifications on wire type, topology, and wiring procedures in “Comm3/Comm4 wiring” on page 35. Attach the communication link wire to the UPCM at the ICS terminal. Refer to the UPCM installation literature for connection points.

Device addressing

Each UCM must have a unique address on each link. On the UPCM, the address is set with the SW1 address DIP switches.

For UPCM DIP switch settings, refer to Table 21 on page 81. DIP switch settings for BCU addresses 32 through 41 are shown in this table, but you can place UPCMs anywhere from address 32 to 100.

Table 21. UPCM address settings

UCM address	UPCM SW1 DIP switch settings						
	1	2	3	4	5	6	7
32	OFF	OFF	OFF	OFF	OFF	on	OFF
33	on	OFF	OFF	OFF	OFF	on	OFF
34	OFF	on	OFF	OFF	OFF	on	OFF
35	on	on	OFF	OFF	OFF	on	OFF
36	OFF	OFF	on	OFF	OFF	on	OFF
37	on	OFF	on	OFF	OFF	on	OFF
38	OFF	on	on	OFF	OFF	on	OFF
39	on	on	on	OFF	OFF	on	OFF
40	OFF	OFF	OFF	on	OFF	on	OFF
41	on	OFF	OFF	on	OFF	on	OFF

Note:
DIP switch SW1-8 is not used. Set it to the Off position.

VariTrane VAV UCMs

The VariTrane variable-air-volume (VAV) UCMs allow a Tracer Summit system to monitor and control all models of the VariTrane VAV boxes. The VAV UCMs are referred to as VAV II, VAV III, and VAV IV.

The Comm4 link provides a serial communication interface between the BCU and each VAV UCM in the system. For specific information about the number of VAV IIs, IIIs, or IVs allowed per BCU and per communication link, refer to Table 5 on page 33.

Wiring requirements

To establish wiring connections between the UCMs and the BMTX BCU, refer to the specifications on wire type, topology, and wiring specifications

in “Comm3/Comm4 wiring” on page 35. Attach the communication link wiring to the VAV communication link terminals. Refer to the VAV UCM literature for connection points.

Device addressing

Each UCM must have a unique address on each link. On the UCM, the address is set with the S1 DIP switch. For VAV II,VAV III, and VAV IV DIP settings, see Table 22.

Table 22. VAV II, III, and IV address settings

UCM address	VAV II, III, and IV DIP switch settings					
	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6
65	OFF	on	on	on	on	on
66	on	OFF	on	on	on	on
67	OFF	OFF	on	on	on	on
68	on	on	OFF	on	on	on
69	OFF	on	OFF	on	on	on
70	on	OFF	OFF	on	on	on
71	OFF	OFF	OFF	on	on	on
72	on	on	on	OFF	on	on
73	OFF	on	on	OFF	on	on
74	on	OFF	on	OFF	on	on
75	OFF	OFF	on	OFF	on	on
76	on	on	OFF	OFF	on	on
77	OFF	on	OFF	OFF	on	on
78	on	OFF	OFF	OFF	on	on
79	OFF	OFF	OFF	OFF	on	on
80	on	on	on	on	OFF	on
81	OFF	on	on	on	OFF	on
82	on	OFF	on	on	OFF	on
83	OFF	OFF	on	on	OFF	on
84	on	on	OFF	on	OFF	on
85	OFF	on	OFF	on	OFF	on
86	on	OFF	OFF	on	OFF	on
87	OFF	OFF	OFF	on	OFF	on
88	on	on	on	OFF	OFF	on
89	OFF	on	on	OFF	OFF	on
90	on	OFF	on	OFF	OFF	on
91	OFF	OFF	on	OFF	OFF	on
92	on	on	OFF	OFF	OFF	on
93	OFF	on	OFF	OFF	OFF	on

Table 22. VAV II, III, and IV address settings (Continued)

UCM address	VAV II, III, and IV DIP switch settings					
	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6
94	on	OFF	OFF	OFF	OFF	on
95	OFF	OFF	OFF	OFF	OFF	on
96	on	on	on	on	on	OFF
97	OFF	on	on	on	on	OFF
98	on	OFF	on	on	on	OFF
99	OFF	OFF	on	on	on	OFF
100	on	on	OFF	on	on	OFF
101	OFF	on	OFF	on	on	OFF
102	on	OFF	OFF	on	on	OFF
103	OFF	OFF	OFF	on	on	OFF
104	on	on	on	OFF	on	OFF
105	OFF	on	on	OFF	on	OFF
106	on	OFF	on	OFF	on	OFF
107	OFF	OFF	on	OFF	on	OFF
108	on	on	OFF	OFF	on	OFF
109	OFF	on	OFF	OFF	on	OFF
110	on	OFF	OFF	OFF	on	OFF
111	OFF	OFF	OFF	OFF	on	OFF
112	on	on	on	on	OFF	OFF
113	OFF	on	on	on	OFF	OFF
114	on	OFF	on	on	OFF	OFF
115	OFF	OFF	on	on	OFF	OFF
116	on	on	OFF	on	OFF	OFF
117	OFF	on	OFF	on	OFF	OFF
118	on	OFF	OFF	on	OFF	OFF
119	OFF	OFF	OFF	on	OFF	OFF
120	on	on	on	OFF	OFF	OFF
121	OFF	on	on	OFF	OFF	OFF
122	on	OFF	on	OFF	OFF	OFF
123	OFF	OFF	on	OFF	OFF	OFF
124	on	on	OFF	OFF	OFF	OFF
125	OFF	on	OFF	OFF	OFF	OFF
126	on	OFF	OFF	OFF	OFF	OFF
127	OFF	OFF	OFF	OFF	OFF	OFF

Note:
Valid VAV II, III, and IV addresses are 65 to 127.

VAV wireless receiver interface

The variable air volume (VAV) wireless receiver allows a Tracer Summit system to monitor wireless thermostats. You can connect the wireless receiver to any Comm4 communication link on TB3 or TB4. The link provides a serial communication interface between the BCU and each wireless receiver in the system. For specific information about the number of wireless receivers allowed per BCU and per communication link, refer to Table 5 on page 33.

Wiring requirements

To establish wiring connections between the UCM and the BCU, refer to the specifications on wire type, topology, and wiring procedures in "Comm3/Comm4 wiring" on page 35. The wireless receiver ships from the factory with wire terminations completed inside the receiver. The wire protruding through conduit on the back side of the unit is ready to be spliced.

Device addressing

Each UCM must have a unique address on each link. Wireless receivers can have an address from 1 through 31. The address is set with the DIP switches located on the side of the wireless receiver. For VAV wireless receiver DIP switch settings, refer to Table 23 on page 84.

Table 23. VAV wireless receiver address settings

UCM address	VAV wireless receiver DIP switch settings				
	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5
1	OFF	on	on	on	on
2	on	OFF	on	on	on
3	OFF	OFF	on	on	on
4	on	on	OFF	on	on
5	OFF	on	OFF	on	on
6	on	OFF	OFF	on	on
7	OFF	OFF	OFF	on	on
8	on	on	on	OFF	on
9	OFF	on	on	OFF	on
10	on	OFF	on	OFF	on
11	OFF	OFF	on	OFF	on
12	on	on	OFF	OFF	on
13	OFF	on	OFF	OFF	on
14	on	OFF	OFF	OFF	on
15	OFF	OFF	OFF	OFF	on
16	on	on	on	on	OFF
17	OFF	on	on	on	OFF

Table 23. VAV wireless receiver address settings (Continued)

UCM address	VAV wireless receiver DIP switch settings				
	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5
18	on	OFF	on	on	OFF
19	OFF	OFF	on	on	OFF
20	on	on	OFF	on	OFF
21	OFF	on	OFF	on	OFF
22	on	OFF	OFF	on	OFF
23	OFF	OFF	OFF	on	OFF
24	on	on	on	OFF	OFF
25	OFF	on	on	OFF	OFF
26	on	OFF	on	OFF	OFF
27	OFF	OFF	on	OFF	OFF
28	on	on	OFF	OFF	OFF
29	OFF	on	OFF	OFF	OFF
30	on	OFF	OFF	OFF	OFF
31	OFF	OFF	OFF	OFF	OFF

Note:
- DIP switches 6 and 7 are not used. Set them to the On position.
- DIP switch 8 is the Setup/Normal switch. Set it to the On/Normal position.

Voyager rooftop unit interface

Tracer Summit can monitor, control, and configure Voyager rooftop units. The Voyager interface provides a Comm5, Comm4, or isolated Comm3 communication link between the BCU and each Voyager rooftop unit. For specific information about the number of Voyagers allowed per BCU and per communication link, refer to Table 5 on page 33.

Voyager rooftop units must have an LCI-V card installed to communication on a Comm5 link. Voyager rooftop units must have a TCI-3 module installed to communicate on either an isolated Comm3 link or on Comm4 link. To configure The TCI-3 for isolated Comm3, the TCI-3 daughter board must be rotated clockwise 90° from the position used for Comm4, so that “Isolated Comm3” is at the bottom. Refer to the Trane Communication Interface (TCI-3) installation, operation, and maintenance literature for more information on configuring the TCI-3.

Wiring requirements

To establish communication between the TCI-3 and the BMTX BCU, refer to the specifications on wire type, topology, and wiring procedures in “Comm3/Comm4 wiring” on page 35. Attach the communication link wire to the TB1 SERIAL COMM (+) and (-) terminals on the TCI-3 board.

Device addressing

Each UCM must have a unique address on each link. Voyagers can have an address from 50 through 81. The Voyager address is set using DIP switches on the TCI-3 board and must match the address set in Site Configuration for Tracer Summit. Refer to the TCI-3 literature for more details about setting the address. For Voyager address DIP switch settings, refer to Table 24.

Table 24. Voyager rooftop unit UCM address settings

UCM address	TCI Board DIP switch settings				
	SW1-2	SW1-3	SW1-4	SW1-5	SW1-6
50	OFF	OFF	OFF	OFF	OFF
51	OFF	OFF	OFF	OFF	on
52	OFF	OFF	OFF	on	OFF
53	OFF	OFF	OFF	on	on
54	OFF	OFF	on	OFF	OFF
55	OFF	OFF	on	OFF	on
56	OFF	OFF	on	on	OFF
57	OFF	OFF	on	on	on
58	OFF	on	OFF	OFF	OFF
59	OFF	on	OFF	OFF	on
60	OFF	on	OFF	on	OFF
61	OFF	on	OFF	on	on
62	OFF	on	on	OFF	OFF
63	OFF	on	on	OFF	on
64	OFF	on	on	on	OFF
65	OFF	on	on	on	on
66	on	OFF	OFF	OFF	OFF
67	on	OFF	OFF	OFF	on
68	on	OFF	OFF	on	OFF
68	on	OFF	OFF	on	on
70	on	OFF	on	OFF	OFF
71	on	OFF	on	OFF	on
72	on	OFF	on	on	OFF
73	on	OFF	on	on	on
74	on	on	OFF	OFF	OFF
75	on	on	OFF	OFF	on
76	on	on	OFF	on	OFF

Table 24. Voyager rooftop unit UCM address settings (Continued)

UCM address	TCI Board DIP switch settings				
	SW1-2	SW1-3	SW1-4	SW1-5	SW1-6
77	on	on	OFF	on	on
78	on	on	on	OFF	OFF
79	on	on	on	OFF	on
80	on	on	on	on	OFF
81	on	on	on	on	on

Note:

- SW1-1 is used to enable (switch on) or disable (switch off) the normally closed High Temperature Limit Switch input (TB2 on the TCI-3 board).
- Cycle power off/on after changing switch settings.

Chapter 7

Network communication

A Tracer Summit system uses the BACnet standard protocol for communication over networks made up of Tracer Summit BCUs and PC Workstations. Tracer Summit systems support the following protocols for network communication. All of these protocols also employ the standard BACnet protocol:

- Ethernet communication: Dedicated Ethernet and Internet Protocol (IP) networks.
- ARCNET communication: A router is required for an ARCNET network to communicate with a dedicated Ethernet network or an IP network. The BMTX BCU does not support ARCNET.
- EIA-232 communication.

Note:
Part numbers listed in this chapter were current at the time of publication. Contact Trane if more information is needed to order appropriate parts.

Device IDs

Every device on a Tracer Summit system network (BCU, PC Workstation, non-Trane BACnet device) must have a device ID. For the BMTX BCU, the device ID can be set via DIP switches (S1) on the BCU main circuit board or by software (using the IP Validation utility). See Table 25 on page 90 for DIP switch settings.

The valid range for the DIP switch is 1 through 254. A DIP switch set to 255 tells the BCU to allow a software set (“softset”) device ID instead. The valid range of a softset device address is 1 through 4194303.

Trane recommends that the first BCU device start at address 01 and that all additional BCUs be incremented sequentially. For the location of the BCU address DIP switch, see Figure 2 on page 4.

Table 25. BCU device ID: DIP switch settings

Device ID	DIP switch number							
	S2-1	S2-2	S2-3	S2-4	S2-5	S2-6	S2-7	S2-8
01	OFF	on	on	on	on	on	on	on
02	on	OFF	on	on	on	on	on	on
03	OFF	OFF	on	on	on	on	on	on
04	on	on	OFF	on	on	on	on	on
05	OFF	on	OFF	on	on	on	on	on
06	on	OFF	OFF	on	on	on	on	on
07	OFF	OFF	OFF	on	on	on	on	on
08	on	on	on	OFF	on	on	on	on
09	OFF	on	on	OFF	on	on	on	on
10	on	OFF	on	OFF	on	on	on	on
11	OFF	OFF	on	OFF	on	on	on	on
12	on	on	OFF	OFF	on	on	on	on
13	OFF	on	OFF	OFF	on	on	on	on
14	on	OFF	OFF	OFF	on	on	on	on
15	OFF	OFF	OFF	OFF	on	on	on	on
16	on	on	on	on	OFF	on	on	on
255	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

Note:

- The device ID can be set from 1 to 254 using the DIP switch or 1 to 4194303 when softset. To softset the address on a BCU, set the DIP switch to 255 (all OFF), then use the IP Validation utility to edit the desired address.
- Cycle system power to reset the device ID configuration.

Ethernet communication

To operate on an Ethernet network, each Tracer Summit PC Workstation must have an Ethernet network interface card installed in it. Different BCU models can exist on the same Ethernet network (see “IP networks” on page 96 for specific limitations). The Tracer Summit software version that is required depends on the newest model of BCU that is on the network:

- A network with a BMTS BCU must be running Version 5 or higher.
- A network with a BMTW BCU must be running Version 11 or higher.
- A network with a BMTX BCU must be running Version 16 or higher.

Wiring specifications

The Ethernet port on the BMTX BCU supports only twisted-pair wire (10BaseT or 100BaseT) with RJ45 connectors. With twisted-pair wiring, one pair is used to receive data signals and the other pair is used to transmit data signals.

If a direct connection between two devices is required, use a crossover cable. If multiple devices are required to communicate, use straight-through cable with a multiport hub.

The EIA/TIA cabling standard recommends a maximum segment length of 295 ft (90 m) between the wire termination equipment in the wiring closet and the wall plate in the office. This provides 33 ft (10 m) of cable allowance to accommodate patch cables at each end of the link and signal losses in intermediate wire terminations on the link.

Note:
Cable installations must comply with both federal and local codes. Plenum-rated cable is available to meet NEC Article 725, which addresses flame resistance and smoke emission for signal cables.

IMPORTANT
Due to the high precision required when performing twisted-pair wire terminations, Trane recommends that only qualified technicians with the proper equipment handle all terminations and splicing.

Table 26 gives twisted-pair wiring distance limitations.

Table 26. Twisted-pair wire (10BaseT or 100BaseT) distance limits for Ethernet communication

Wire type	Maximum total wire length*	Minimum distance between 2 devices on a link
10BaseT or 100BaseT	328 ft (100 m)	1.64 ft (0.5 m)
* You can increase distances and the number of devices by using an Ethernet hub.		

Coaxial cable (10Base2) is not supported by the BMTX BCU. However, an Ethernet media converter (Allied Telesyn AT-MC15, available from Trane Buying Group suppliers) can be used to link existing Ethernet networks using 10Base2 to Ethernet networks that use 10BaseT.

Note:
A media converter will not change a dedicated Ethernet network to an IP network; a BACnet/IP router is needed (see "Dedicated Ethernet to IP" on page 96).

Trane recommends Cat5, 5e, or 6 cable for Ethernet network wiring.

Fiber-optics used for Ethernet communication

Fiber-optic cable can be used for networks involving long distances, inter-building cabling, and areas with a potential for electrical noise. Fiber optic signals are less susceptible to electrical noise, including lightning, EMI/RFI, voltage conductors, and ground loops. See Figure 29 on page 94 for an example of inter-building fiber-optic cabling for an IP network.

Trane requires duplex, 62.5 μm core glass fiber-optic cable with ST connectors, which comes in a variety of types for specific applications, such as indoor, outdoor, burial, aerial, and duct. You can order fiber-optic cable, fiber-optic modems, ST-type crimp connectors, epoxy connectors, and other accessories from Trane Buying Group suppliers.

IMPORTANT

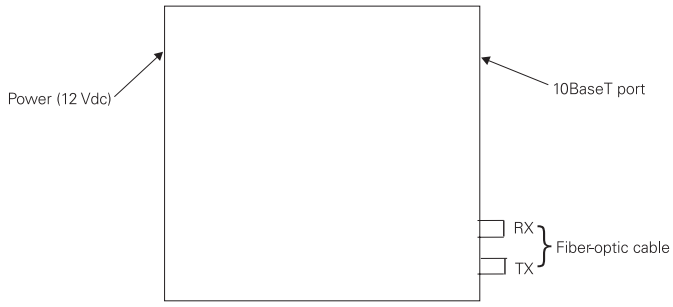
Trane recommends that only qualified and experienced fiber-optic technicians prepare the fiber-optic end connectors and cable run lengths. Improper methods may result in faulty communication due to signal degradation (decibel loss), which must be less than 14 dB on each fiber.

Fiber-optic media converter

The fiber-optic media converter that Trane supports for connecting fiber-optic cable to 10BaseT wire is Connect Air Int. W4869 (shown in Figure 28 on page 92). The fiber-optic media converter that Trane supports for connecting fiber-optic cable to 100BaseT wire is Allied Telesyn AT-MC101 XL. These devices convert the electrical signals from a twisted pair of wires to optical signals, which are sent over the fiber-optic cable. See Figure 29 on page 94 for an example of inter-building fiber-optic cabling for an IP network.

One end of the media converter provides a port for a fiber-optic cable (TX and RX). At the same end is a 10BaseT port for connecting the media converter to the BCU. At the other end is a 12 Vdc port to connect power to the media converter. See Figure 28.

Figure 28. Fiber-optic media converter/repeater for 10BaseT wire (Connect Air Int. W4869)



To wire a fiber-optic media converter on an inter-building network, follow these procedures (see Figure 29 on page 94):

1. In Building A, connect the power supply to the 12 Vdc port on media converter A1.
2. Connect the 10BaseT cable from the BCU to the 10Base T port on media converter A1.
3. Connect the terminated fibers to the fiber optic TX-RX connections on media converter A1.
4. In Building B, connect the power supply to the 12 Vdc port on media converter B1.
5. Connect the fiber-optic cables from media converter A1 to the TX-RX connections on media converter B1, observing reversed polarity.
6. If only one BCU exists on the network in Building B, connect 10BaseT cable from the BCU to the 10BaseT port on media converter B1 to complete the fiber-optic network between Buildings A and B.

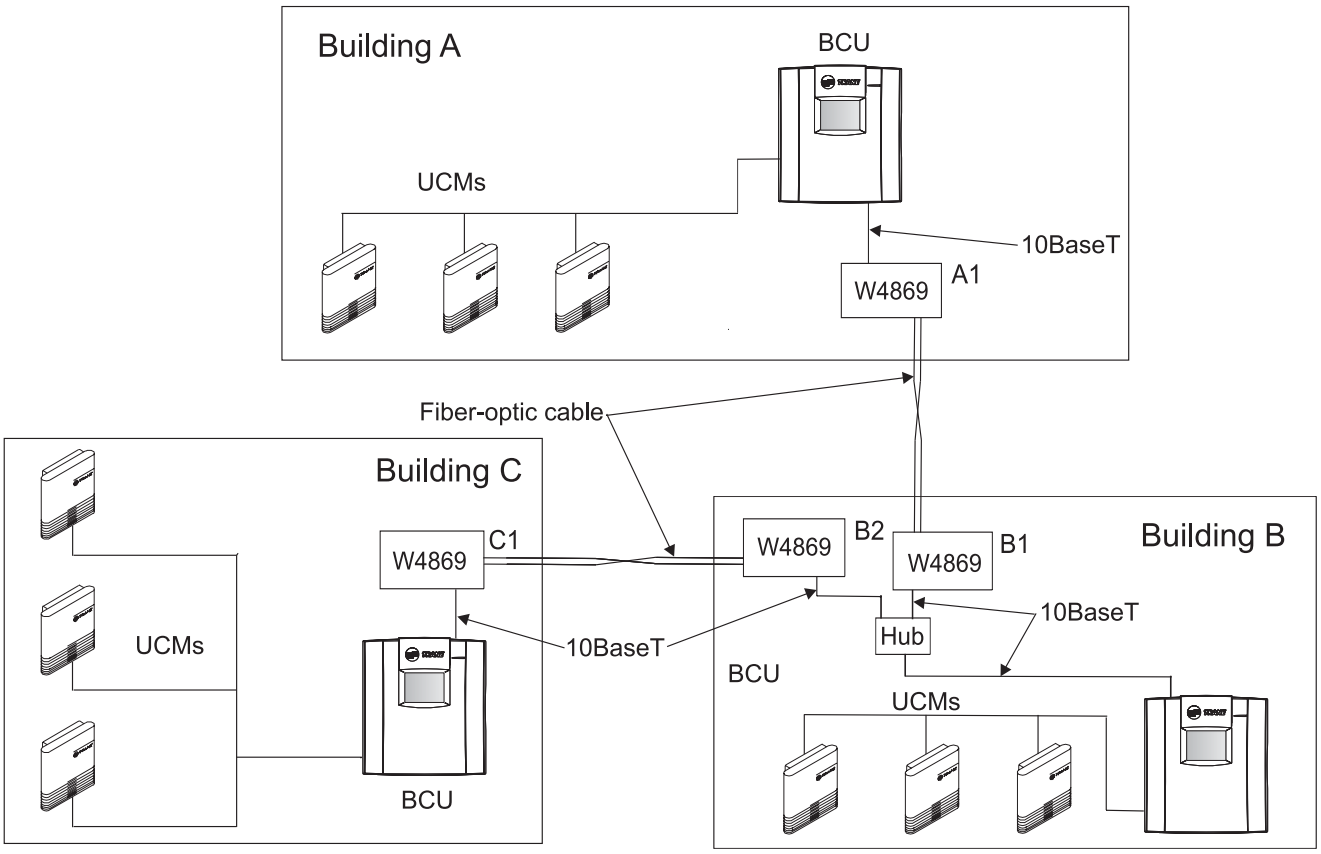
   If multiple BCUs exist within the building, connect 10BaseT cable from media converter B1 to a hub that connects the BCUs.

   If another fiber connection is desired (as shown in Figure 29 on page 94), connect 10BaseT cable from media converter B1 to a hub that connects the BCU(s), and connect 10BaseT cable from the hub to another media converter (B2).
7. Connect the power supply to the 12 Vdc port on media converter B2.
8. Connect terminated fiber-optic cables to the TX-RX connection on media converter B2.
9. Add a media converter (C1) in Building C. Connect the power supply to its 12 Vdc port.
10. Connect terminated fiber-optic cables from media converter B2 to the TX-RX connection on media converter C1, observing reversed polarity.
11. If only one BCU exists on the network in Building C (as shown in Figure 29 on page 94), connect 10BaseT cable from the BCU to the 10BaseT port on media converter C1 to complete the fiber-optic network for Buildings A, B, and C.

    If multiple BCUs exist within the building, connect 10BaseT cable from media converter C1 to a hub that connects the BCUs.

    If another fiber connection is desired, connect 10Base T cable from media converter C1 to a hub that connects the BCU(s), and connect 10BaseT cable from the hub to another media converter. Continue with steps 7–11.

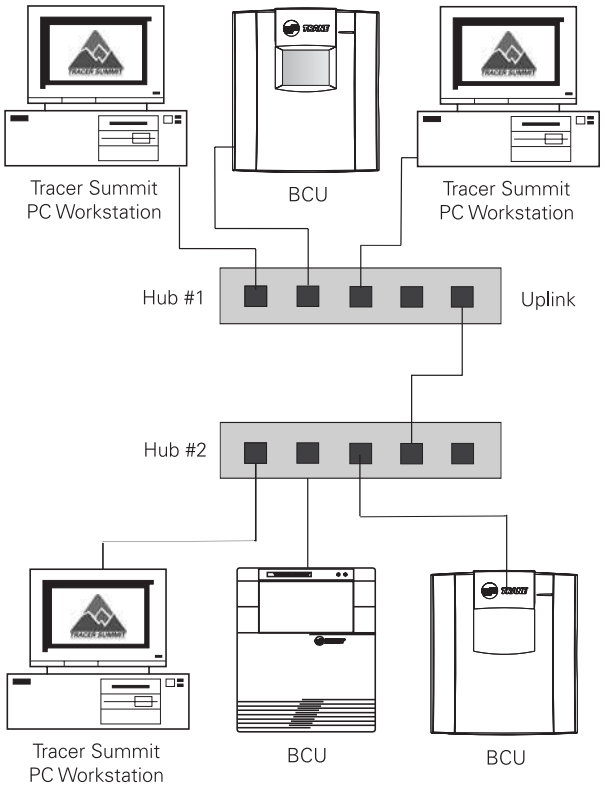
Figure 29. Example of inter-building fiber-optic cabling for an IP network



Topology

Topology refers to the physical design of a network. Networks using twisted-pair wire (10BaseT) support only a star topology, in which each of the devices on the network is connected to a hub like points of a star. A typical star topology is shown in Figure 30.

Figure 30. Typical star topology

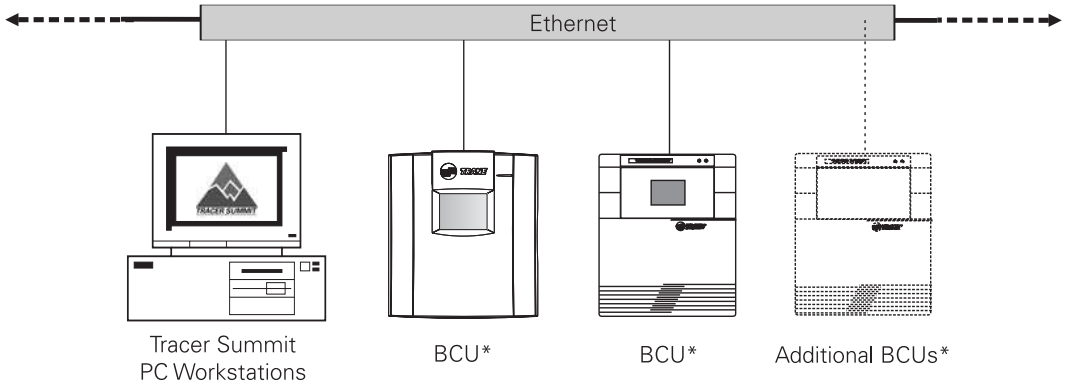


Dedicated Ethernet networks

A dedicated network has only building automation system equipment on it. An example of a dedicated Tracer Summit Ethernet network is shown in Figure 31 on page 95.

For more information on designing a dedicated Ethernet network, see *Tracer Summit for Windows and Ethernet (*BAS-EB-70).

Figure 31. Example of dedicated Tracer Summit Ethernet network



*BCUs can be a mixture of BMTX, BMTW, and BMTS.

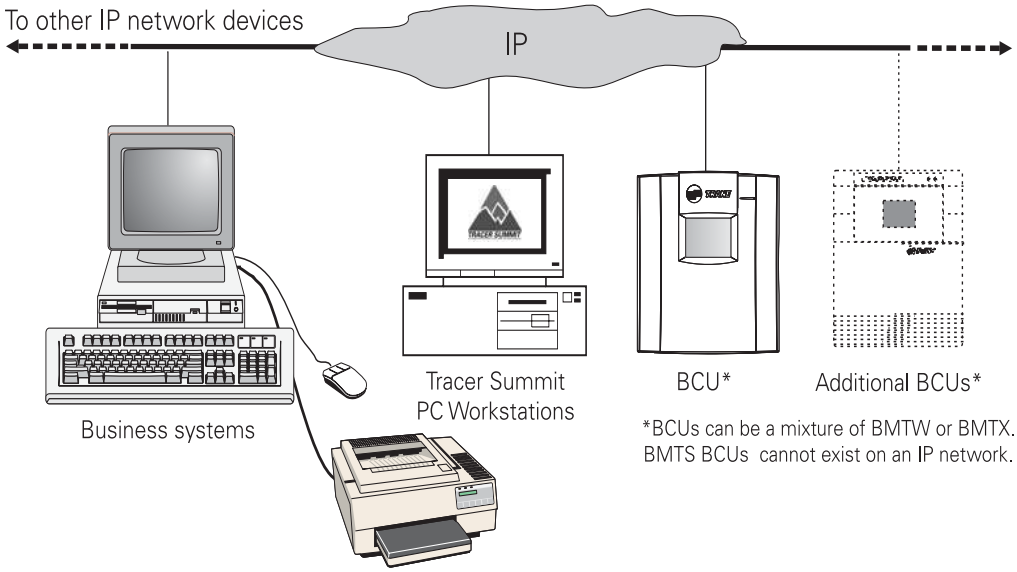
IP networks

Today, most business systems use Internet Protocol (IP) networks. A Tracer Summit system can exist on an IP network along with the other systems that a business uses. An IP network allows all applications that are on the network to be accessed from a single PC. A single IP network can exist between buildings, connecting an entire corporation or school district.

BMTX BCUs and BMTW BCUs can exist on an IP network, but BMTS BCUs cannot. An example of a Tracer Summit system on an IP network is shown in Figure 32 on page 96.

For IP installation for a Tracer Summit system, see "IP installation procedures" on page 99. For additional information on designing a BACnet/IP network, see *BACnet/IP Network Installations* (BAS-PRB004-EN).

Figure 32. Tracer Summit system on an IP network



Connecting different types of networks

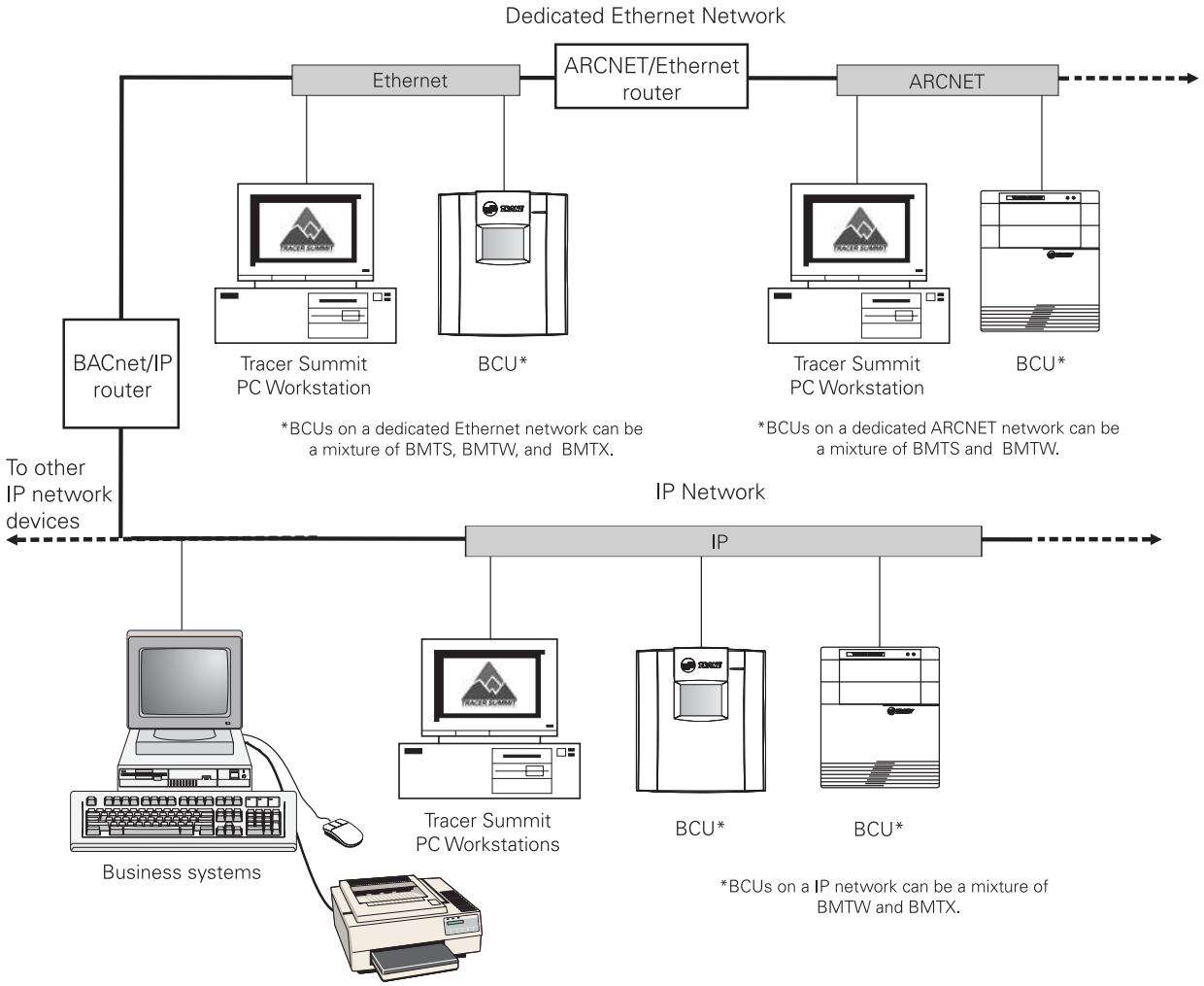
Dedicated Ethernet to IP

A dedicated Ethernet network and an IP network can be connected to communicate as a single network by using a router (part number 4950-0472) (see Figure 33).

ARCNET

ARCNET networks are wired with coaxial cable. Neither coaxial cable nor ARCNET is supported by the BMTX BCU. An ARCNET network can be connected to an Ethernet network—either dedicated or IP—with an ARCNET–Ethernet router (part number 4950-0471) to communicate as a single network (see Figure 33).

Figure 33. Tracer Summit network connected by BACnet routers



EIA-232 communication

Use EIA-232 communication for interfacing to non-Trane automation systems using the BACnet standard protocol. EIA-232 communication can be accomplished using the BACnet port on the BMTX BCU termination board (see Figure 2 on page 4).

Ethernet is not required for EIA-232 communication, but is necessary for connection of the PC Workstation for programming and setup of the BMTX BCU.

For more information on BACnet, see *Commissioning Tracer Summit BACnet Projects* (BAS-PRB002-EN).

Configuring a BACnet-compatible device

A BACnet-compatible device that communicates using an EIA-232 connection with the BCU must meet the following parameters:

- Communication at 9,600 baud
- 8 data bits, 1 stop bit, no parity
- Cable connection to the BACnet port on the BMTX BCU termination board

Specifications for EIA-232 cable connections

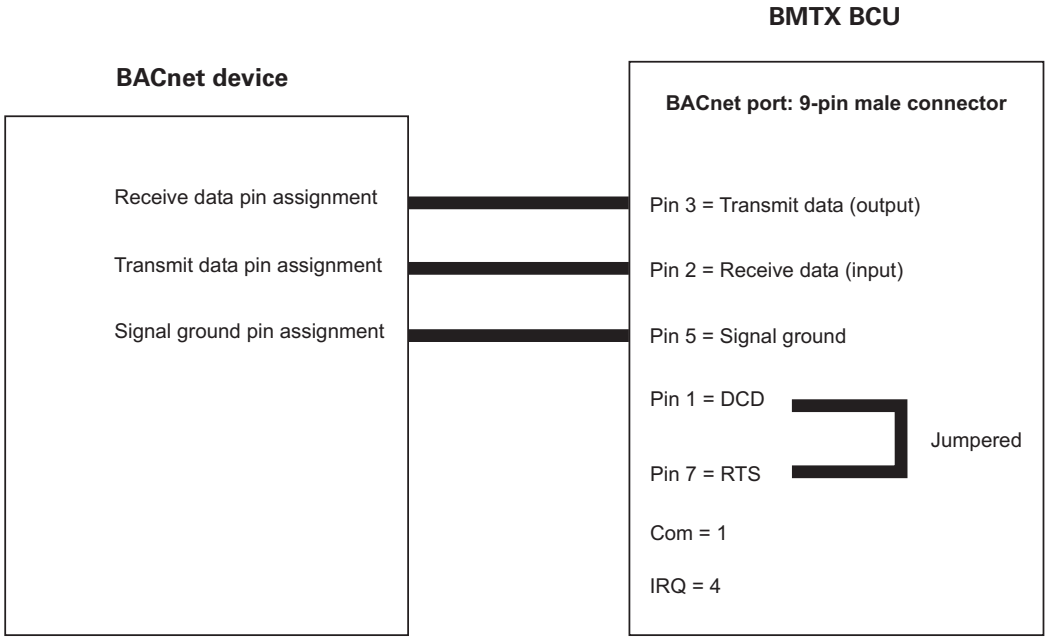
Table 27 provides specifications for the EIA-232 cable used to connect the BMTX BCU to a BACnet-compatible device.

Table 27: EIA-232 cable specifications

Specification	Description
Length	50 ft (15.24 m) maximum For longer distances use a short haul modem.
Shield	Shield the cable to comply with FCC regulations and to protect the BCU from electrical noise.

Figure 34 shows the DB-9 pin assignments for a BACnet device and a BMTX BCU.

Figure 34. DB-9 connector cable pin connections



IP installation procedures

Before attempting to install Tracer Summit on an owner's shared IP network, review *Tracer Summit BACnet/IP Network Installations (*BAS-PRB004-EN) for background information. Then follow the procedures in this section for IP installation.

Tracer Summit also has an IP Validation utility and instructions for its use located in its software. Access this utility by choosing Programs, then Tracer Summit, then Advanced, and then IP Validation.

Note:
In this section all references to the BCU refer to the BMTX BCU and the BMTW BCU. BMTS BCUs cannot operate on an IP network.

Preinstallation

Some planning is required before installing a Tracer Summit system on a shared IP network. The owner's IS staff who control the network will be able to provide most of the information that you will need to proceed. Follow these steps:

1. Meet with the owner's IS staff. Discuss where BCUs and PC Workstations will be located. They will need to provide you with the following for each BCU:
   - Permanent IP address
   - Subnet mask
   - The IP address of the IP gateway/router
   - Jacks and cabling for connection to their network
2. Request that the IS staff configure TCP/IP on each PC Workstation to be used for Tracer Summit. The configuration can be whatever is preferred by the IS staff.
3. Determine if Tracer Summit will be set up as one site or as multiple sites on the network. If it is a simple installation within one building, then it will typically be a single site. If, however, the installation will cover multiple buildings on one shared network, then each building should be set up in Tracer Summit as a separate site. This will make programming, operation, and troubleshooting of the system much easier.
4. Determine if a BACnet/IP router is required. This is typically used to connect BMTS BCUs or other non-IP BACnet devices to an IP network.
5. Create your submittal and riser diagrams showing BCUs and PC Workstations connected to the owner's network.

Programming the site

Tracer Summit sites on shared networks are programmed just like any other site. However, there is some special setup information that must be

configured so that communications can occur between different portions of the network. Follow these steps:

1. Use Tracer Summit to define the site in the Site Configuration editor.
2. From the Communications tab of the Site Configuration editor select Configure.
3. In the Site Connection Wizard select BACnet/IP.
4. If the BCU has been configured as BBMD, use Use BBMD. If not, select Use local connection.

Note:
A BACnet broadcast management device (BBMD) is used to facilitate low-level communications. On most sites, the BCU will serve as a BBMD. However, it is possible for another BACnet device, such as a BACnet/IP router, to fill this function.

5. If you have chosen Use BBMD, enter the IP address of the BCU that you will connect through.
6. Shut down Tracer Summit.
7. Start the Tracer Summit IP Validation utility. Access this utility by choosing Programs, then Tracer Summit, then Advanced, and then IP Validation.
8. Click on the Import button on the toolbar. This will allow you to read the desired site into the utility.
9. Double-click on BACnet Network to select it. From the combo box, change Network Type from Non-IP to IP.
10. For each BCU that will be on the IP network, click on the BCU's name in the tree view to select it and enter the IP configuration information provided by the owner's IS staff.
11. When all of the information is entered, select Validate from the Edit menu or click the Validate button on the toolbar. This will automatically assign one BCU on each subnet as a BBMD and create new subnets as required.
12. Save the setup information by selecting Save from the File menu or clicking on the Save button.
13. Create BCU labels by selecting Create Label File from the File menu or clicking on the Labels button. These labels contain all of the BCU IP configuration information and can be printed from any word processing program.

BCU setup

The following configuration must occur before a BCU can communicate on an IP network. Follow these steps:

1. Be sure that the BCU has an Ethernet connection and is powered up.
2. Connect a UPCM edit cable (part number 3591-4260) with the appropriate adapter (9-pin adapter: part number 3591-4262 or 25-pin

adapter: part number 3591-4263) between the serial port on your laptop and the mini-monitor port on the BCU.

3. From the IP Validation utility, open the file you created in "Programming the site" on page 99. Expand the tree view and click on the BCU that is connected.
4. Select Configure BCU from the Edit menu or click the BCU Configuration button.
5. Click the Download button.
6. Enter the Serial Port number that you are using to download the information to the BCU in the BCU Connection dialog.
7. Click the Connect button to download the configuration.
8. Place the IP configuration label, printed in step 13 of "Programming the site" on page 99, inside the BCU for future reference.
9. Repeat this process for each BCU on the network.

System checkout

Before attempting to download code and database information to BCUs, you should verify that you have network and BACnet communications in place. Communication problems can be mechanical or related to the network or to software. These steps will help you determine if communication is working properly.

1. From a PC Workstation that is currently connected to the network, start the IP Validation utility, and open the site file you created in "Programming the site" on page 99.
2. From the Edit menu select "Check BCU Comms" or click the BCU Comms button on the toolbar.
3. Click the Ping button. If the BCU is setup properly for IP communications and the owner's IP network is up, Ping will show how long it took to communicate to the BCU from your workstation. A successful test will provide a response in well under 100 ms.

Note:
If this test fails, verify that the BCU is powered and connected to the network. If so, ask the owner's IS staff to verify the connection.

4. If step 3 works properly, click the Who is button. This will send a short BACnet message to the BCU. If this message comes back properly (with a response time well under 1000 ms), then you have proven BACnet communications capabilities.

Note:
If this test fails (indicated by I Am Failed messages), first check to see if the BCU has code in it. If it does not, you will see a blinking letter –C on the seven-segment LED display (see Figure 39 on page 117 for the location of the LED).

If the BCU has code, then verify the BCU IP configuration, including addresses and all setup information. Typically, a failure results from improper BCU IP configuration. If BCU/BBMD setup checks out, then ask the owner's IS staff to verify the IP router's ability to pass UDP on the designated port.

Setting up the broadcast distribution table (BDT)

In order for communications to work across IP subnets, a table called a *broadcast distribution table* (BDT) needs to be downloaded to each BBMD in that site. The BDT lists the location of each BBMD in a site. The BDT is automatically created by the IP Validation utility, but must be manually downloaded using the Ethernet IP LAN. To download the BDT, follow these steps:

1. From a PC Workstation that is connected to the network, start the IP Validation utility by choosing Programs, then Tracer Summit, then Advanced, and then IP Validation utility.
2. Open the site file you created in "Programming the site" on page 99.
3. Select Configure BBMDs from the File menu or click the BDT Editor button.
4. Verify that all of the BBMDs for the site are listed.
5. Click Download. The table should be sent to all BBMDs. If the download is not successful, an error will appear.
6. Click Validate. If successful, BDT OK will appear under Status.
7. Exit the IP Validation utility by selecting Exit from the File menu.
8. Start Tracer Summit. The BCUs should receive their code and databases, and communications should proceed the same as for a dedicated network.

Special situations

There are several special situations that require additional configuration. These are highlighted below.

Multiple sites on a single shared network

On a larger installation, many buildings may exist on a shared network. In this case, you will typically program each building as its own site. This can be easily accommodated. Follow these rules:

- Each BCU and PC Workstation on a site will require a unique device ID. However, the device IDs may be re-used on other sites on the IP network.

- Each BBMD in a site will require a copy of the BDT for the site. The site BDT lists only the BBMDs for that site.
- When more than one Tracer Summit site resides on an IP subnet, each site should use a unique UDP port number.

BACnet/IP routers

Installations with BCUs (BMTS) or other BACnet devices that are not IP capable will require the installation of a BACnet/IP router (Ethernet: 4950-0472; ARCNET: 4950-0471). Follow these rules regarding routers:

- The BACnet devices on each side of the BACnet/IP router (the dedicated-network side and the shared-network side) require unique BACnet network numbers. Additionally, all dedicated-network BACnet devices must have the same BACnet network number and all shared-network BACnet devices must have the same BACnet network number. These numbers can be set up in site configuration.
- The router(s) will require IP configuration.

Connecting a service laptop computer to an IP network

In order to connect to an IP network, the laptop computer needs the proper IP setup information. This information can vary depending on where you connect on the network. This can be a particular challenge for laptop computers that are used as service tools. Guidelines are as follows:

- The owner's IS staff can provide details for how to connect to different locations on the network. You may need to change the IP setup information as you move around the building.
- You may wish to carry a small Ethernet hub. This will allow you to connect to the network by temporarily installing the hub between the network jack and the BCU.

Chapter 8

Installing Tracer Summit system software

You must have Microsoft Internet Explorer Version 5 or higher on your PC before you can install the Tracer Summit application.

IMPORTANT

Before installing Tracer Summit software, you must disable any anti-virus software and shutdown any firewall software running on your PC.

Refer to the following sections to install Tracer Summit on the various Windows operating systems:

- Windows XP Professional (SP1 or greater), see “Installing Tracer Summit using Windows XP Professional or Windows 2000 Professional” on page 106.
- Windows 2000 Professional (SP3 or greater), see “Installing Tracer Summit using Windows XP Professional or Windows 2000 Professional” on page 106
- If necessary, configure the BCU for BACnet/IP communications (see “Configuring BCUs for BACnet/IP communications” on page 109).
- To uninstall Tracer Summit, see “Uninstalling Tracer Summit” on page 109.

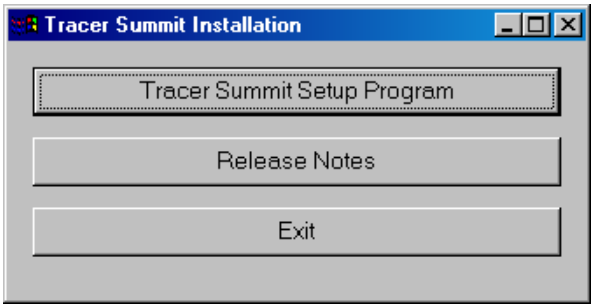
Installing Tracer Summit using Windows XP Professional or Windows 2000 Professional

You must have Internet Explorer Version 5 or higher installed on your PC before installing Tracer Summit.

To install the Tracer Summit software:

1. Close all applications and toolbars. To verify that all tasks are closed, press Ctrl-Alt-Delete and end all the tasks except for Explorer.
2. Insert the Tracer Summit for Windows CD in the CD-ROM drive of your PC. Tracer Summit automatically displays the Tracer Summit Installation screen (see Figure 35).

Figure 35. Tracer Summit Installation Screen



3. Click on the Tracer Summit Setup Program button.
4. Follow the online instructions to install the application. The installation process takes 5 to 10 minutes, depending on the speed of the PC and the amount of available memory.

Setting up network adapters

Use the following instructions to set up network adapters for either Ethernet or ARCNET.

To set up an Ethernet adapter using plug and play installation:

Follow the manufacturer's plug and play instructions for an Ethernet LAN adapter. When installation is complete, install the network adapter protocol, and then verify the adapter status.

To install a PCI, PCMCIA, or ISA ARCNET card:

1. Install the ARCNET card:
   - For PCI ARCNET cards, shut down the PC Workstation and install the PCI20 ARCNET card in an available PCI slot. Insert

the Tracer Summit software CD in the CD-ROM drive of your computer. Then, restart the computer. Follow steps 2–4.

- For PCMCIA ARCNET cards, insert the card with Windows XP Professional or Windows 2000 Professional running. Follow steps 2–4.

2. Windows XP Professional or Windows 2000 Professional Plug and Play software will detect the card and initiate the new hardware installation wizard.
3. When prompted to specify a location for the card driver, specify E:\ARC_XP. ("E" represents the drive letter for the CD-ROM drive, which may be different on your PC.)
4. Restart the PC if prompted.

Note:
The ISA ARCNET card is not supported by Windows XP Professional or Windows 2000 Professional.

Installing the network adapter protocol

The network adapter protocol is the language the computer uses to communicate over the network. How you install the network adapter protocol depends on the operating system and the adapter type.

- For Windows XP Professional or Windows 2000 Professional systems using Ethernet or ARCNET adapters on a dedicated network, Tracer Summit automatically installs support. It is only necessary to verify the adapter settings (see "Verifying network adapter status and protocol for Windows XP Professional or Windows 2000 Professional" on page 108).
- For Windows XP Professional or Windows 2000 Professional systems using Ethernet adapters on a shared network, you may need to install TCP/IP protocol (see "Installing TCP/IP protocol for BACnet/IP communications on shared Ethernet networks" below).

Installing TCP/IP protocol for BACnet/IP communications on shared Ethernet networks

Before installing TCP/IP, check the network settings for the adapter to verify that TCP/IP is not already installed on the PC Workstation. Many PC Workstations supplied by a customer already have TCP/IP protocols installed on the machines and automatically bind this protocol to an adapter when you install the adapter on the PC Workstation.

To install TCP/IP protocol on Windows XP Professional or Windows 2000 Professional:

1. From the Windows Start menu, select Settings. Then, select Control Panel.
2. For Windows 2000 Professional, double-click the Network and Dial-up Connections icon. For Windows XP Professional, double-click the

Network Connections icon. The Network and Dial-up Connections window appears.

3. Double-click the connection name that corresponds to the Ethernet adapter. The adapter status window appears.
4. Click the Properties button. The adapter Properties window appears.
5. Double-click the Internet Protocol (TCP/IP) in the component list. The Internet Protocol (TCP/IP) Properties dialog box appears.
6. Click Use the following IP address. Enter the required IP address, subnet mask, and default gateway information. (This information can be obtained from the customer's Information Systems group.)
7. Click OK to close the Internet Protocol (TCP/IP) Properties dialog box. Click OK to close the adapter Properties dialog box. Close the Local Area Connections Status dialog box.
8. Restart the computer.

Verifying network adapter status and protocol for Windows XP Professional or Windows 2000 Professional

1. From the Windows Start menu, select Settings. Then, select Control Panel.
2. For Windows 2000 Professional, double-click the Network and Dial-up Connections icon. For Windows XP Professional, double-click the Network Connections icon. The corresponding window appears.
3. Double-click the connection name that corresponds to the Ethernet or ARCNET adapter. Verify the adapter settings:
   - For dedicated Ethernet and ARCNET, Tracer Summit automatically installs support. Verify that the adapter is not bound to any other protocols.
   - For Ethernet adapters on a shared network, verify that the TCP/IP protocol is installed. Information Systems personnel who are in charge of the workstation should verify any other protocols selected.
4. Click the OK button. If you made any changes, you will need to restart the PC when prompted.

Note:
After you have set up the network adapter, you need to verify the adapter status to make sure there are no conflicts with other IRQ or I/O addresses. Windows XP Professional or Windows 2000 Professional systems automatically check for resource conflicts when you are installing new adapters.

Uninstalling Tracer Summit

1. Close all applications and any active background programs on the toolbar, such as virus protection software.
2. From the Windows Start menu, select Settings, then select Control Panel.
3. From the Control Panel, select Add/Remove Programs.
4. From the list of software programs, select Tracer Summit.
5. For Windows XP Professional or Windows 2000 Professional, click the Remove button for Windows. The uninstall utility removes the Tracer Summit files from the PC. Once it has finished, you must manually remove the Tracer Summit directory (c:\Program Files\Tracer Summit). The uninstall process is now complete.
6. Click the Remove in Tracer Summit Program Maintenance window. Click the Next button. After Tracer Summit software is removed from the hard drive, the InstallShield Wizard Completed screen appears.
7. Click Finish.

Configuring BCUs for BACnet/IP communications

When Tracer Summit is installed, the utilities necessary for BACnet/IP communications configuration are automatically installed on the PC Workstation.

To access the BACnet/IP utilities and online documentation:

1. From the Windows Start menu, select Programs, then select Tracer Summit.
2. Select Advanced to display the menu selections IP Validation (the IP tools) and BACnet IP Utilities Online Documentation.

The online documentation describes the operation of the IP tools and explains exactly how to configure your BCU for communication on shared IP Ethernet networks.

Note:
For detailed instructions on installing and configuring BACnet/IP Tracer Summit for Windows sites, refer to *Tracer Summit BACnet/IP Network Installations,* BAS-PRB004-EN.

Starting Tracer Summit software

1. Double-click the Tracer Summit icon on the desktop to display the Log On dialog box.
2. Type the following in the User Name field:

   tracer
3. Press Tab.
4. Type the following in the Password field:

   summit
5. Press Enter. Tracer Summit displays the main window.

You can now begin to use the application.

Chapter 9

Installing the Daily Operations Tutorial

To use the Tracer Summit *Focus on Your System* Daily Operations Tutorial, you must first run the tutorial installation program on your PC. After you have installed the program, tutorial buttons appear on the following Tracer Summit components:

- Schedule window
- Overrides dialog box
- Event Log window
- Chiller Plant Status window
- Reports dialog box
- Backup dialog box
- Restore Site dialog box

The tutorial buttons provide links from the Tracer Summit software to the training modules on the tutorial CD-ROM. For basic operation of the tutorial, see the *Daily Operations* guide.

To install the Daily Operations Tutorial on your PC:

1. Close all programs.
2. Insert the Daily Operations Tutorial CD into the CD-ROM drive of your PC. After a moment, the Tracer Summit Tutorial Installation Wizard will automatically start.

   If it doesn't automatically start, browse to the Setup.exe file on the CD and run it.
3. Click the Next button to continue. The Tracer Summit Tutorial Software License Agreement dialog box is displayed.
4. Read the license agreement and click Yes to accept the terms. The Microsoft Data Access installation program is initiated, and the Microsoft Data Access 2.1 dialog box is displayed.
5. Click Yes to accept the terms of the Microsoft Data Access license agreement. The Microsoft Data Access 2.1 Setup dialog box is displayed.

6. Click Continue. The setup program searches for installed data access components and then displays a setup dialog box (see Figure 36).

Figure 36. Microsoft Data Access 2.1 Setup dialog box

7. Click the computer icon button to continue the installation process. A final setup dialog box is displayed, confirming that you have successfully installed the Microsoft Data Access components (see Figure 37).

Figure 37. Microsoft Data Access 2.1 Setup dialog box

8. Select an option:
   - If your PC does not have Tracer Summit Version 17 software installed, follow steps 9 to 11 to complete installation of the tutorial program.
   - If your PC has Tracer Summit Version 17 software installed, follow steps 12 and 13.

If your PC does not have Tracer Summit V17:

9. Click OK. The Microsoft Data Access 2.1 Restart Windows dialog box is displayed.

10. Click the Restart Windows button to restart the Windows operating system. When Windows restarts, a Tracer Summit Tutorial icon is automatically placed on your Windows desktop (see Figure 38).

Figure 38. Tracer Summit tutorial icon

11. To access the tutorial outside of Tracer Summit, double-click the tutorial icon button.

If your PC has Tracer Summit V17 installed:

12. Click OK to dismiss the setup dialog box. You have now installed the Daily Operations Tutorial on your PC. A Tracer Summit Tutorial icon is automatically placed on your Windows desktop (see Figure 38).
13. To access the tutorial outside of Tracer Summit, double-click the tutorial icon.

Chapter 10

BCU operation and communication status

Light emitting diodes (LEDs) on the BMTX BCU main circuit board indicate the communication status and operation status of the BCU:

- Green and yellow LEDs indicate communication status of Ethernet, the modem, UCMs, and BACnet (see “LEDs for communication status” on page 116).
- A seven-segment LED display indicated the operation status of the BCU (see “LEDs for operation status” on page 118).

LEDs for communication status

A row of green and a row of yellow LEDs, located in the upper left corner of the main circuit board, indicate communication status between the BCU and UCMs and with BACnet.

Two green LEDs, located below the modem card, indicate modem communication status.

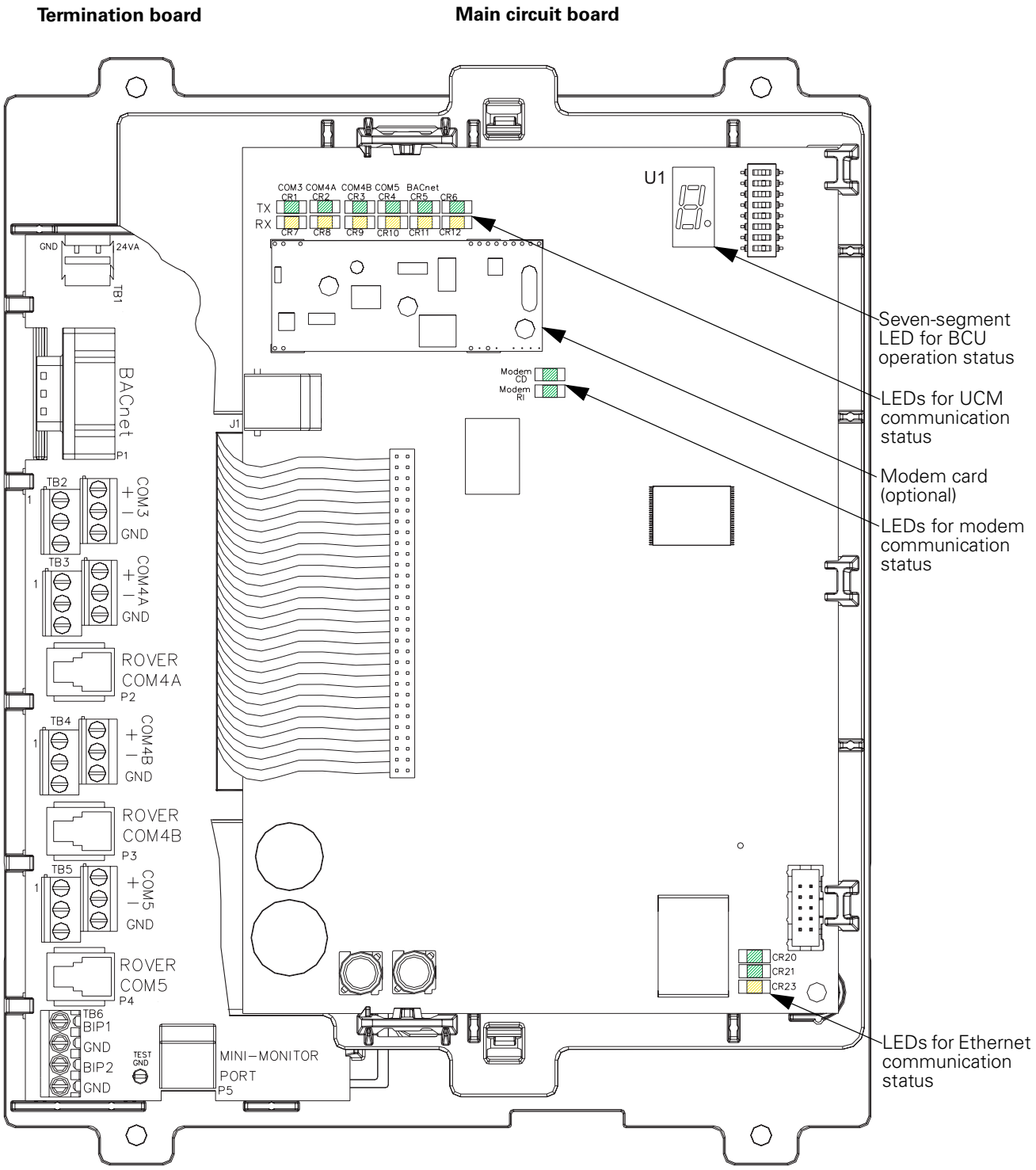
Two green LEDs and one yellow LED, located in the lower right corner of the main circuit board, indicate Ethernet communication status.

See Figure 39 on page 117 for LED locations on the BMTX BCU. See Table 28 for an explanation of their meaning.

Table 28. LED codes for communication status

Communication status of...	LED	Meaning
Comm3	CR1 (green)	Flickers during transmission of data.
	CR7 (yellow)	Flickers during reception of data.
Comm4A	CR2 (green)	Flickers during transmission of data.
	CR8 (yellow)	Flickers during reception of data.
Comm4B	CR3 (green)	Flickers during transmission of data.
	CR9 (yellow)	Flickers during reception of data.
Comm5	CR4 (green)	Flickers during transmission of data.
	CR10 (yellow)	Flickers during reception of data.
BACnet	CR5 (green)	Flickers during transmission of data.
	CR11 (yellow)	Flickers during reception of data.
Modem CD (Carrier detect)	CR13 (green)	On steady indicates that a communication session has been established between the BCU modem and the remote modem.
Modem RI (Ring indicator)	CR16 (green)	Pulsing (with the same cadence as a ringing telephone) indicates that a remote modem is calling the BCU modem.
Ethernet	CR20 (green)	Communication data rate (Off—10 Mb rate; On—100 Mb rate)
	CR21 (green)	Flickers during transmission of data.
	CR23 (yellow)	On steady indicates a valid Ethernet connection (link light). Flickers during reception of data.
Not used	CR6 (green	—
	CR12 (yellow)	—

Figure 39. LED locations on BCU main circuit board



LEDs for operation status

During BCU startup and reset operations, a sequence of codes appears on the seven-segment LED display (see Figure 39 on page 117 for its location). A decimal point appears on the seven-segment LED display at U1 when the processor is busy. The decimal point disappears when the processor is idle.

During normal operation, the decimal point will flicker, with occasional longer flashes. If the decimal point appears continuously for more than a second or two at a time, it may indicate that the BCU is overloaded. During normal operation, the BCU will also show a repeating "dancing dash" pattern on the display: bottom segment, middle segment, top segment, middle segment. See Table 29 for a complete listing of codes and their meaning.

Standard sequences of the seven-segment LED display that appear during startup and reset operations are described in "Startup sequence procedures" on page 119 and "BCU reset procedures" on page 120.

Table 29. LED codes for BCU operation status

Code	Meaning
"Dancing dash" (dashes flash one at a time)	Normal operation with program (database).
8	Processor in reset, or no functioning software. A persistent "8" means that service is required.
7	Starting boot loader
6	Searching for main code file
5	Searching for main boot loader file
4	Loading and verifying code or boot file
3	Initializing hardware
2	Testing non-volatile RAM
1	(Not used)
0	Non-volatile RAM intact after power fail. Returning to interrupted program.
-C	No code, or code is corrupt. Waiting for PC Workstation to send code.
Cd	Code being downloaded.
E	Erasing non-volatile RAM. Turn power off within 10 seconds to avoid erasing code.
EC	Erasing main code. Waiting for PC Workstation to send code.
F	Error during normal operation. Cycle power to restore normal operation.
-H	Code download complete, but DIP switches are all On. Turn off power to the BCU and set the switches to the desired device ID.
H	Displayed during start-up sequence to show high capacity (???). Also shown to indicate power fail shutdown completed. This will appear briefly when power is turned off. It may persist if there is a sustained brownout below proper operating voltage.
J	Restart due to BACnet or mini-monitor command. This should be shown for only a second or two before a reset sequence begins.
-P	No program (database). Waiting for PC Workstation to send program.
Pd	Program (database) being downloaded.
F	(Not used)

Table 29. LED codes for BCU operation status (Continued)

Code	Meaning
Serpentine figure 8 (one segment at a time)	System error. Error information has been saved to Flash File. If auto-restart is enabled, the system will restart within several minutes.
Error	System error. Error information has been saved to Flash File, and auto-restart is either not enabled or error limit has been exceeded. To restore operation, the user must either cycle power or enter a Control -C on the mini-monitor.
L	Displayed during start-up sequence to show low capacity. A persistent "L" means that no boot loader was found. Service required.
F0	(Not used)
F1	Error in non-volatile RAM. Service required.
F2	(Not used)
F12	Error while downloading code file. Service required.

Note:
All codes with more than one character will be displayed sequentially one character at a time. For example, F12 will be displayed as an F, then a 1, then a 2. The display will repeat that error code until the problem is corrected or the BCU is powered Off/On.

Startup sequence procedures

New BCU

This startup sequence is for BCUs that have not been programmed. Service may be required if a sequence occurs other than as described. Contact your local Trane representative.

8, 7, 6, 5, 4, 3, 2, –, –C, Cd

When the download of code is complete, if the BCU DIP switches are all turned on, the BCU will display –H. In this case, turn off power to the BCU and set the switches to the desired device ID, as described in "Device IDs" on page 89.

When the download of code is complete, if the BCU DIP switches are set to a valid device ID, the BCU will reset itself to verify the downloaded code. During this operation, the BCU displays the following sequence:

8, 7, 6, 4, 3, 0, H, –, –P, Pd, "dancing dash"

Programmed BCU

This startup sequence is for BCUs that were programmed previously. Service may be required if a sequence occurs other than that described.

8, 7, 6, 4, 3, 0, H, –, "dancing dash"

BCU reset procedures

If the seven-segment LED display sequence does not follow the startup sequence, it may indicate a failure of the BCU. Depending on the failure mode and the status displayed in the seven-segment LED display (see Table 29 on page 118), you may need to reset the BCU. There are four levels of reset for the BCU. In order of least to greatest impact on the BCU, the reset levels are:

1. Reset
2. Clear BCU RAM and Reset
3. Clear Database, RAM, and Reset
4. Clear Code, Database, RAM, and Reset

For detailed information about reset levels, see Table 30 on page 123.

The reset procedures are typically done by selecting BCU Reset/Restore from the Tools menu in Tracer Summit. All of the "Clear . . . Reset" procedures can also be done at the BCU as described in the following subsections.

Reset

To reset, cycle power to the BCU by unplugging and re-plugging the 24 Vac power connector at the top of the termination board.

Clear BCU RAM and reset

The BCU normally preserves the content of RAM through power failure. RAM contains the current status of all BCU object trend data, events, and alarms. In most cases, this is desirable. However, there are circumstances in which you may need to clear RAM. This is normally done from the PC Workstation, as described in the *Tracer Summit System Programming* guide. RAM can also be cleared at the BCU as follows:

1. Turn off power to the BCU.
2. Set all DIP switches to on.
3. Turn on power.
4. The LED display should show 8, then 7, and then E with the decimal point flashing.

CAUTION

If you wait longer than 10 seconds, the BCU code and database may be cleared as well as its RAM.

5. As soon as the LED display shows E with the decimal point flashing, turn off power.
6. Set the DIP switch to its proper position.
7. Turn on power. The LED display should show the following sequence:

   8, 7, 6, 4, 3, 2, H, –, "dancing dash"

Clear database, RAM, and reset

Database contains the user programmed data, which consists of all BCU objects, such as areas, VAVs, I/O, UCMs, trends, CPL, etc. (For a definition of RAM, see "BCU reset procedures" on page 120.)

In most cases, you will perform this operation from the PC Workstation, as described in the *Tracer Summit System Programming* guide. However, this can also be done at the BCU as follows:

1. Change the DIP switch S1 position 8 to Off.
2. The LED display will show the following sequence:
   J, 8, 7, 6, 4, 3, 2, H, –, –P
3. Change DIP switch S1 position 8 back to on.
4. The LED display will show the following sequence:
   J, 8, 7, 6, 4, 3, 2, H, –, –P, Pd, "dancing dash"

When the BCU has code and detects a change in DIP switches at S1, the BCU clears the current database and looks for a PC Workstation from which to download a database that matches the new device ID (corresponding to the settings at DIP switch S1).

Clear code, database, RAM, and reset

Code consists of the BCU image software, which is similar to the operating system in a PC. (For a definition of RAM, see "BCU reset procedures" on page 120.)

In most cases, you will force a BCU to accept new code from the PC Workstation, as described in the *Tracer Summit System Programming* guide. However, this can also be done at the BCU as follows:

Note:
You must have a PC Workstation connected, and that workstation must contain the appropriate version of BCU code. If the PC Workstation is not connected, the procedure will have no effect on the BCU.

1. Turn off power to the BCU.
2. Set all DIP switches to on.
3. Turn on power. The LED should display the following sequence:

   8, 7, E (with decimal point flashing for about 10 seconds), 5, 4, 3, 2, –, EC, Cd, –H, "dancing dash"
4. Turn off power and set the DIP switch to its proper position.
5. Turn on power and observe the second display sequence described in "New BCU" on page 119.

Clear Comm5 database

In a BMTX BCU (or a high-capacity BMTW BCU), a Comm5 database will be cleared if a BACnet database site name is loaded that does not match the Comm5 database site name. To force the BCU to clear its Comm5 database, perform the following actions:

1. Create dummy site with a different name than the existing Comm5 database in the BCU.
2. If the BCU is connected, you can clear the database from the BCU by using the Tools menu and BCU Reset/Restore. Or you can clear the database by using the DIP switches.
3. Immediately disconnect (either unplug Ethernet or use the Disconnect icon) so database does not automatically reload.
4. Select dummy site.
5. Reconnect to the BCU.
6. Download the dummy site to the BCU.
7. Once the BCU begins normal operation, you can clear the database again from the BCU (using either the Tools menu and BCU Reset/Restore, or the DIP switches).
8. Disconnect the BCU from the PC Workstation so the dummy database is not automatically sent again.
9. Select the real site.
10. Establish connection again to the BCU to download the real database.
11. The Comm5 database will be cleared and will need to be reconstructed.

    If the BACnet database already has assigned Neuron IDs, from the main menu select Setup, then Site Configuration. Choose the Device tab and click the Assign Neuron ID button. Install the Comm5 link as described in “Installing a Comm5 Link” in the *Tracer Summit System Programming* guide.

Table 30. Reset level descriptions for the BMTX BCU

BCU reset/restore command	Reasons to reset	Notes
Reset (same as power cycle) • Resets the processor on the selected BCU	• Initialize modem • Initialize communication links	• Temporary loss of communication with the BCU
Clear RAM and reset • Clears the RAM from the BCU and resets the BCU processor • If the BCU has a database intact, it automatically reconstructs the RAM as needed and resumed processing	• Update members in VAS (not applicable for Comm5 VAS)	Same as reset plus: • Loss of operator overrides. Values return to Tracer Summit defaults • Loss of pending alarms • No loss of Comm5 database
Clear database, RAM, and reset • Clears both the database and RAM from the selected BCU and resets the BCU processor. *Note:* To prevent download of database from secondary workstations, disconnect them from LAN before proceeding. • Clear the BCU database using the BCU reset/restore command or using DIP switch method. • Then disconnect BCU from the LAN either by removing the LAN cable or using the Disconnect button on the Toolbar. • Restore the new database to the PC workstation. • Reconnect the BCU. • Database will be automatically sent to the BCU.	• Restore a backup database from the PC workstation to the BCU. • Replace a database in the BCU.	Same as Clear RAM and Reset plus: • Takes longer to regain communication with the BCU and UCMs than a clear RAM or reset does. • If database is restoring from a backup of the site, current trend and calculation information is lost and reverts to information stored in backup.
Clear code, database, RAM, and reset • Clears all memory—code (image), database, and RAM—from the BCU and resets the BCU processor. • If the PC workstation is online, it automatically downloads the code. • Once the code is successfully downloaded, the PC workstation automatically downloads a new database.	• Required when upgrading Tracer Summit BCU image	Same as Clear Database, RAM, and Reset plus: • Code will load to a BCU that does not have an address. • If a database with a different address or site name is loaded to the BCU, the BCU Comm5 database will be cleared.
Clear Comm5 database • Happens automatically when site name in BCU changes or BCU address changes. • If the PC workstation is online, it automatically downloads the code. • Once the code is successfully downloaded, the PC workstation automatically downloads a new database.	• Used for troubleshooting problem links	• Cannot be done from a PC Workstation BCU Reset/Restore menu.
Note: For detailed instructions for the DIP switch method, refer to “BCU reset procedures” on page 120.		

Chapter 11

Troubleshooting

This troubleshooting procedure is meant to help resolve most common problems associated with a Tracer Summit BCU. Troubleshooting can generally be divided into the following categories:

- BCU does not respond
- BCU locks up
- BCU does not communicate via modem
- BCU does not communicate with UCMs

BCU does not respond

This is a general problem that can be caused by a broad range of factors. Use the following checklist for troubleshooting for this problem:

1. Verify that the BCU has the correct ac supply voltage.
2. Check for the proper device address on the BCU logic board.
3. Check that the BCU power is connected to the termination board.
4. Verify that the BCU is not set up for BACnet/IP communication is it is on a dedicated Ethernet site.
5. Verify that the BCU LEDs sequence properly on power up. (See Chapter 10, “BCU operation and communication status.”)
6. Verify that the Ethernet LEDs show normal activity, indicated by the green LED remaining steadily lit and the yellow LED flashing.
7. Check the Ethernet cable connection. Check that the correct cable type is being used.
8. Perform a Clear Code, Database, RAM, and Reset using the BCU DIP switches. Then repeat steps 5 and 6. See Chapter 8 for details.
9. If the above steps do not resolve the problem, contact a qualified Trane service technician for service.

BCU locks up

The following list describes situations that could cause the BCU to lock up:

- A building power disturbance, such as that caused by electrical storms, may affect BCU power in such a way that the BCU locks up. Cycling power again on the BCU will normally clear this up. Repeat

occurrences of this type of problem would warrant installation of an external device that protects against ac-power transients.

- If the BCU has a modem installed, a power disturbance can enter through the modem line. Cycling BCU power will normally resolve this problem. Repeat occurrences of this type of problem warrant installation of an in-line, modem-line transient protection device.
- Strong EMI/RFI interference can lock up a BCU.
- Programming the BCU (from a Tracer Summit PC Workstation) with too many UCM and program objects can overload a BCU so that, during periods of high activity, the BCU is not able to complete all tasks and goes into a "Watch Dog Timeout" sequence. To avoid this problem, make sure to estimate the BCU memory usage with the BCU sizing spreadsheet before connecting UCMs and programming the BCU. As a rule of thumb, leave at least 15% memory headroom.
- BCUs that are programmed to route alarms/events to remote Tracer Summit PC Workstations will lock up over time if the remote workstation is not available to receive dialed out alarms or is not connected periodically to harvest the alarms. Generally, this problem is most prevalent when the BCU has been programmed to route alarms/events to multiple remote PC Workstations that are not available to receive or harvest the alarms frequently enough.
- Defective modems can cause the BCU to lock up.

BCU does not communicate using modem

BCU modem communication problems fall into two general categories:

- Problems with the modem and phone line
- Problems with the BCU programming setup

Problems with the modem and phone line

The following presents guidance in proper modem configuration and phone line connection:

- Trane recommends that you use only modems supplied by Trane for use in the BCU.
- Connect a phone to the line, check for a dial tone, and verify that the phone can make and receive calls.
- An in-line transient protection device may be needed on the phone line to prevent transient electrical signals from affecting the modem.

Note:
The audible speaker on the modem is not supported by the BMTX BCU.

Problems with the BCU modem programming setup

Follow these guidelines for proper modem programming setup:

- The modem will not work at all until the BCU has been programmed to have a modem object. Verify that the BCU has a modem object.
- If the phone line goes through a local phone system within the building, additional wait times and access numbers may need to be programmed into the phone numbers being used for dial out and remote access.
- Verify that the correct phone number is being used when attempting to dial into a BCU.

BCU does not communicate with UCMs

UCM communication problems can generally be divided into two main groups:

- Communication failures on initial installation
- Communication failures that occur after initial installation

Communication failures on initial installation

Failures that occur during the initial installation can generally be traced to:

- Wiring errors, i.e., wrong polarity, shorts between conductors, open wires, bad high-resistance connections, use of wire with too high capacitance, too long total communication-link length (high resistance), wrong connections at the BCU or UCM, etc.
- Communication failures caused by nearby strong sources of EMI/RFI interference
- Incorrect UCM addresses
- Incompatible hardware or software versions of the UCM and/or of Tracer Summit
- Failure to install termination resistors where needed
- BCU site configuration not programmed correctly

Communication failures that occur after initial installation

Failures that occur after successful communication following initial installation can generally be traced to:

- Wiring problems, i.e., shorts or opens that develop from wire that is damaged from either being pulled too tightly across sharp objects or from building vibration
- Communication failures caused by nearby strong sources of EMI/RFI interference that have been added since original wiring installation

- UCM addresses reset incorrectly after UCMs have been serviced or replaced
- AC-power disturbances (lightning, welding, etc.) that enter the UCM communication link wiring and are strong enough to damage the UCM communication link and/or connected UCMs
- Failures of the termination board and/or the main circuit board
- Programming changes at the Tracer Summit PC Workstation that alter the site configuration or UCM objects.

Glossary

B

BACnet
See Building automation control network.

BCU
See Building control unit.

building automation control network (BACnet)
An interoperable protocol developed specifically for the building controls industry by ASHRAE. The American National Standards Institute named it as a standard. The BACnet protocol is best suited for system level control devices.

building control unit (BCU)
A Tracer Summit system intelligent field panel that communicates with multiple Trane UCMs.

C

CCP
Central control panel.

code
A software program, running in the BCU, equivalent to the operating system of a personal computer. It controls the physical operation of the BCU. It is different from the CPL code that a technician would write.

CSC
Commercial self-contained.

communication link
A set of wires connected from one device to another that is used to transmit information between the devices. This link is typically a twisted pair of wires for Trane building management systems.

configuration
The physical and logical elements of an information processing system, the manner in which they are organized, or both. May refer to hardware or software.

D

DAC
LonMark Discharge Air Controller profile.

database
A computer file that contains all site-specific information used by a BCU to control site operation. This file is stored in the PC Workstation and in individual BCUs on the network. In the PC Workstation, the file is named summit.mdb and is located in C:\Program Files\Tracer Summit\Database directory.

device ID
A software address assigned to Tracer Summit BCUs and PC Workstations when a site is first created. The device ID then becomes the "address" for that device and allows Tracer Summit software to successfully route messages and alarms to the device. *Syn:* instance, instance #, device instance, ID.

DIP switch
A dual inline package (DIP) switch is a set of individual switches packaged in a single assembly. The most common type has eight individual switches. Each switch can be toggled to be open or closed. For a BCU to communicate with a device, the DIP switch package of each UCM must be set to a unique address. The address is derived from the positions of the switches in the package.

E

EIA-232
Interface standard used for communications between peripheral devices and energy management systems. (Formerly known as *RS-232*.)

EMI/RFI
Electromagnetic interference/radio-frequency interference.

Ethernet
A local area network (LAN) architecture developed by Xerox Corporation that uses a baseband architecture common to modern LANs, including building automation systems. Ethernet handles about 10,000,000 b/s and can be used with almost any kind of computer. It is valid for use with Tracer Summit BACnet protocol.

G

GLD
Generic LonTalk Device.

H

HVAC
Heating, ventilating, and air conditioning.

I

Internet Protocol (IP)
The protocol within TCP/IP that governs the transmission of data. It has been adopted by ASHRAE as a means to communicate BACnet over a net-

work. It allows BACnet to pass through IP devices, such as IP system routers and over the Internet.

I/O
Input/output.

IRQ
Interrupt request.

L

LAN
See Local area network.

LED
See Light emitting diode.

light emitting diode (LED)
A semiconductor diode that emits light when a voltage is applied to it. Used in an electronic display, such as on a BCU, for diagnostic purposes.

LCP
Lighting control panel.

local area network (LAN)
A communications network linking multiple nodes.

LonTalk®
An interoperable protocol developed by the Echelon Corporation and named as a standard by the Electronics Industries Alliance (EIA-709.1). It is packaged on a Neuron chip.

M

modem
A device used to interface the components of a building management system or a terminal with a telephone line. A modem translates information from the building management panel into signals that can be transmitted over the telephone or other data communication circuits.

µs
Microsecond.

ms
Millisecond.

N

NMR
Nuclear magnetic resonance.

P

PC Workstation
Tracer Summit personal computer workstation.

pF
Picofarads.

PCM
Programmable control module.

R

RAM
Random access memory. A type of computer memory that is used to store temporary data such as operator overrides, UCM scan data, and CPL saved values. RAM is located on the BCU logic board.

S

SCC
LonMark™ Space Comfort Controller profile.

standard network variable type (SNVT)
Used to define data objects in the LonTalk® protocol. The SNVTs are organized into LonMark™ functional profiles for specific applications. The acronym is pronounced *snivit*.

T

TCM
Thermostat control module.

TUC
Terminal unit controller.

topology
The physical arrangement of cables connecting BCUs, PC Workstations, and hubs within a network. Types of topologies used for Tracer Summit include bus, star, and bus/star.

U

UCM
See Unit control module.

UCP
Unit control panel.

unit control module (UCM)
A factory-mounted, microelectronic circuit board that interfaces with a BCU to provide control and monitoring of HVAC equipment.

UPCM
Universal programmable control module.

V

VAV

Variable air volume.

Index

D

E

F

G

H

I

L

M

N

O

P

R

S

T

U

V

W

Z

Reader Response Form

Our goal is to provide accurate and efficient information to our customers. Please use this form to help us improve the quality and usability of this guide. Make copies of this form if needed.

1. In a word, how would you describe this guide?

   _____

2. Using the following scale, rate the overall quality of this guide: (Use the following scale.)

1	2	3	4	5
Dreadful				Terrific

3. How do you use this guide? (Choose one.)

   a. I read it from beginning to end.

   b. I read only the sections that pertain to my immediate needs.

   c. I read only the sections that pertain to my job.

4. How easily can you find information in this guide?

1	2	3	4	5
Not easy at all —very difficult		Moderately easy		Very easy

5. When you actually try the instructions described in this guide, how easily can you follow them?

1	2	3	4	5
I can't follow the instructions at all.		Occasionally the content is confusing		With great ease

6. How well did you understand the product *before* reading this guide?

1	2	3	4	5
Not at all		Somewhat		Thoroughly

7. How well did you understand the product *after* reading the guide?

1	2	3	4	5
Not at all		Somewhat		Thoroughly

8. The best aspect of this guide is _____

   _____

9. If we were to change one aspect of this guide, it should be _____

   _____

10. Name, e-mail address: (optional)_____

    _____

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