COMPANION 200

Installation and Maintenance

For position only

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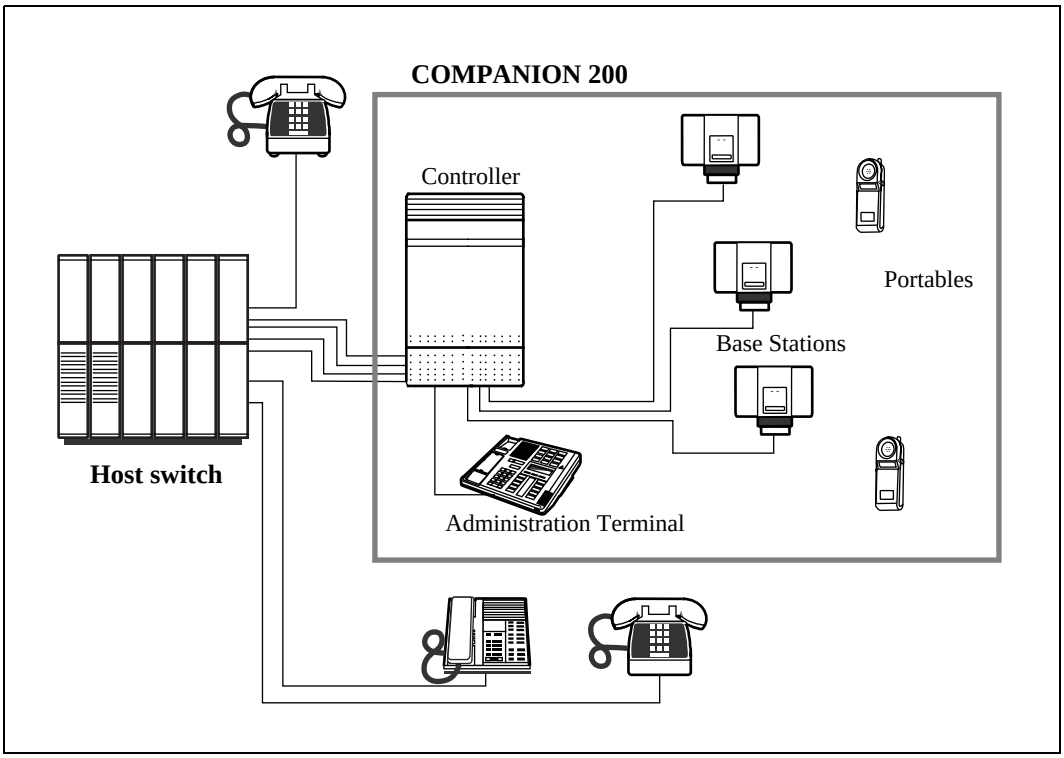
Contents

Introducing the COMPANION 200

The COMPANION 200 adds wireless capability to an existing telephone switching system, known as the host switch. The host switch may be a Private Branch Exchange (PBX) or the Public Switched Telephone Network (PSTN). The COMPANION 200 uses radio technology to transmit and receive signals between portable telephones and Base Stations connected to the COMPANION 200 Controller. The Controller connects to the existing host system by standard analog ports. To the host switch the Controller is a group of analog telephones.

Figure 1: The COMPANION 200 system



COMPANION 200 components

The COMPANION 200 has the following major components:

- COMPANION 200 Controller
- COMPANION Base Stations
- Administration Terminal
- Portable telephones (portables)

Controller

The COMPANION 200 Controller connects to the host switch with standard analog telephone lines (access lines), and to the Base Stations, the Administration Terminal, and any Remote Access Device (RAD) with Time Compression Multiplexing (TCM) ports. Support for access lines is provided by adding up to two Line Cartridges to the Controller. With Line Modules and Base Station Modules connected to Expansion Cartridges, the Controller can handle additional access lines and Base Stations.

Base Stations

The COMPANION Base Stations form a radio link to the portables. Each Base Station has two independent radios, each with two internal antennas and a connector for an external antenna. Base Stations can be powered remotely by a Remote Power Interconnect unit (RPI), or locally by a power supply that plugs into an ac outlet. The Base Station is designed to be installed indoors only. External antennas can extend coverage to areas more difficult to reach such as stairwells or tunnels. Each Base Station can support up to two radio links at a time.

Administration Terminal

A Northern Telecom M7310 terminal serves as the Administration Terminal for the COMPANION 200 system. It is used in configuration, administration, and maintenance programming sessions. It does not support either incoming or outgoing calls.

Portables

The COMPANION portables are battery-powered, pocket-sized portable telephones. The COMPANION 200 can support a maximum of 152 portables. Each portable requires one access line.

Portables can be assigned to users as their only communication terminal, or in addition to their desk (wired) telephone.

Installing the COMPANION 200

Summary

1. Prepare for the installation
2. Install the equipment
3. Program the COMPANION 200
4. Verify the installation

Preparing for the installation

The person responsible for preparing for installation of the COMPANION 200 must:

- Order the required equipment (for example, the Controller, an Administration Terminal, modules and cartridges, Base Stations, RPIs, portables, portable chargers, cables).
- Ensure the appropriate host switch hardware (for example line cards, distribution frames) has been installed.
- Ensure the needed access lines and host features are available.
- Ensure there is space on the distribution frames for the cross connections.
- Ensure the required ac outlets are available for the Base Stations that will be powered locally.
- Ensure the required wiring is available from the Base Station sites to the distribution frames.
- Ensure all the timing information about the host switch is available.
- Determine from the customer the host switch features and Class of Service (COS) that will be available on each portable as well as the desired interworking with the desk telephone (see Appendix D for more information on programming the host system).
- Ensure the appropriate host switch features have been programmed for each access line going to the COMPANION 200.

- Ensure the appropriate interworking with the wired telephones has been enabled.

Installing the equipment

The person responsible for installing the COMPANION 200 must:

- Install the COMPANION 200 Controller and all the required modules, ensuring all cartridges are properly inserted.
- Connect all the wiring from the Controller and the modules to the distribution frames.
- Install the Administration Terminal.
- Install the Base Stations and external antennas (if any) at the sites identified during the site planning, and connect the TCM and power lines from the distribution block or frames to the Base Stations.
- Power up the COMPANION 200 and verify that the time and date appear on the Administration Terminal.
- Complete the appropriate sections of the *COMPANION 200 Programming Record*.

Programming the COMPANION 200

The person responsible for programming the COMPANION 200 must:

- Program the access line characteristics (timing, dial mode, etc.) to match the host switch requirements.
- Program any external antennas on Base Station radios.
- Complete the appropriate sections of the *COMPANION 200 Programming Record*.
- Confirm that all the access lines are available for use.
- Register the portables.

Verifying the installation

The person responsible for post-installation verifying must:

- Ensure that the COMPANION 200 system is functional.
- Verify the radio coverage of the COMPANION 200.

Maintaining the COMPANION 200

Summary

1. Perform a Maintenance session
2. Troubleshoot the equipment
3. Replace faulty equipment

Performing a Maintenance session

Performing a Maintenance session can help you detect hardware failures and operational problems. Using the Administration log and the Event/Alarm log, you can determine what type of event triggered an alarm and when the alarm occurred.

Troubleshooting the equipment

Troubleshooting the equipment involves determining if the problem is with the COMPANION 200 hardware or its software.

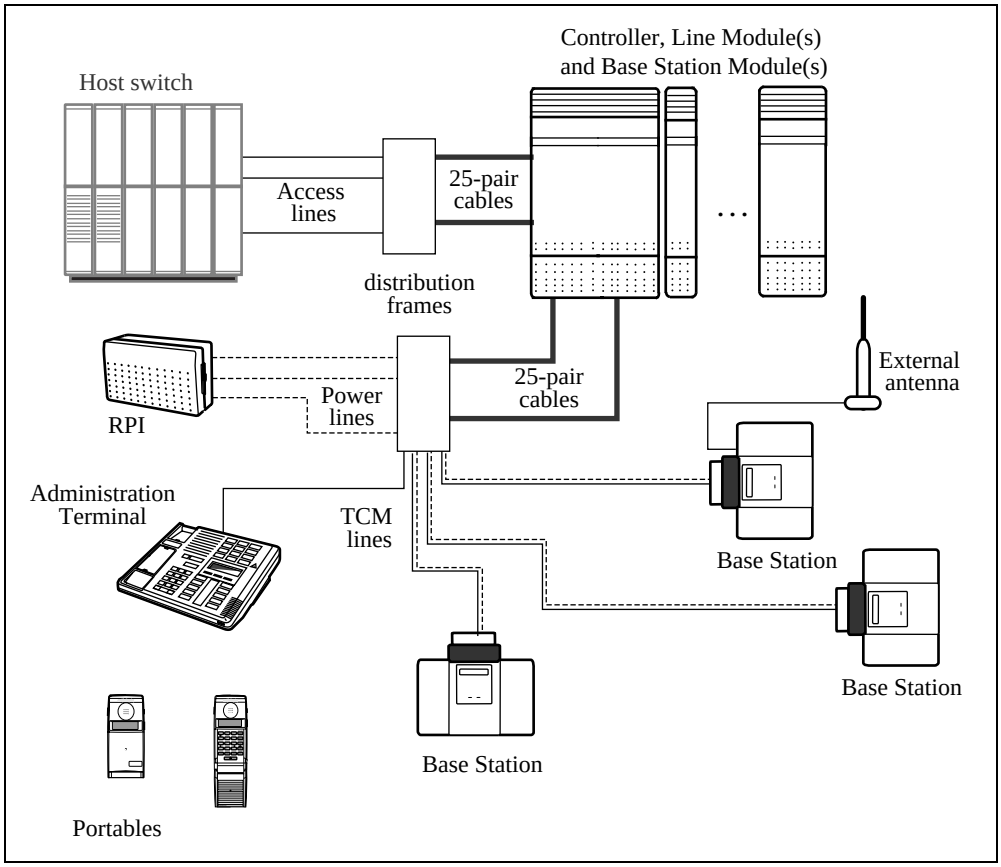
Replacing faulty equipment

Follow the steps in the section “Replacing equipment” to remove faulty equipment and to install its replacement.

Preparing for the installation

COMPANION 200 equipment

Figure 2: Equipment overview



You can install two types of COMPANION 200 equipment: required and optional. Required equipment is necessary for the operation of the system. Optional equipment expands the capacity of the system but is not necessary.

The wiring to the COMPANION 200 Controller, Line Modules and Base Station Modules is done using 25-pair cables with 50-pin female connectors at one end. The other end of these cables terminates on the distribution frames. All other wiring is done using standard twisted-pair telephone cables.

!	**Read the installation warnings and safety instructions at the end of this section before installing the equipment.**

Required equipment

The following is a list of the equipment you must install to have an operational system:

- **Controller:** the heart of the COMPANION 200 system. It provides support for Base Stations, access lines (portables), the Administration Terminal, and any Remote Access Devices. You need one Controller for each COMPANION 200 system.
- **Software Cartridge:** provides functionality to the COMPANION 200 system. The Software Cartridge plugs into the Controller.
- **Line Cartridges:** the interface between the host switch and the COMPANION 200. Line Cartridges plug into the Controller and the Line Modules. Each Line Cartridge supports up to four access lines. There are two types of Line Cartridge available: the Disconnect Supervision (DS) Analog Line Cartridge, which provides standard features, and the CLASS Line Cartridge, which provides Call Management Service (CMS) features.
- **Base Stations:** provide radio links to the portables.
- **Remote Power Interconnect units:** provide power to the Base Stations.
- **Portables:** portable telephones. They can be assigned to users in addition to, or instead of, a desk telephone (see Appendix D).
- **Administration Terminal:** you need one Administration Terminal for each COMPANION 200 system.

Optional equipment

The following is a list of the equipment you can install to expand the capacity of the COMPANION 200:

- **Line Modules:** expand user capacity. Each Line Module connects to an Expansion Cartridge with a fiber optic cable. Each Line Module holds up to three Line Cartridges.
- **Base Station Modules:** expand Base Station capacity. Each Base Station Module connects to an Expansion Cartridge with a fiber optic cable. Each Base Station Module supports 16 additional Base Stations.
- **Expansion Cartridges:** provide the interface between the Controller and the Line Modules and Base Station Modules. The Expansion Cartridges plug into the Controller.
- **Power bars:** provide power to the Line Modules and Base Station Modules.
- **External antennas:** provide radio links in areas where Base Stations cannot be installed. Each external antenna (indoor or outdoor) connects to a Base Station with a co-axial cable. When installing an outdoor external antenna, you must route the co-axial cable through a lightning surge protector.
- **Plug-top power supplies:** provide power to Base Stations not powered by an RPI.
- **COMPANION Diagnostic Software (CDS):** performs diagnostics on the operating characteristics of the system. CDS runs on a suitable personal computer (PC), and requires a RAD (Remote Access Device) to communicate with COMPANION 200. See Appendix B for RAD specifications and part number.

COMPANION 200 configurations

You can configure the COMPANION 200 system to various combinations of access lines and Base Stations to provide optimum mobility service depending on:

- The site coverage requirements.
- The number of users (portables) to be supported.
- The anticipated traffic levels and patterns.

The following charts show all possible configurations (access lines and TCM devices) for the COMPANION 200.

To determine the number of Line Cartridges, Line Modules, and Base Station Modules needed for a given configuration of access lines and TCM lines as well as the type of Expansion Cartridge required to support these modules:

1. Find the number of access lines in the top row. Each user and each RAD modem needs one access line. This tells you how many Line Modules (LM) you need.
2. To find out how many Line Cartridges you need, divide your number of access lines by 4, and round up.

   Note: The Controller can accommodate up to two Line Cartridges, and each Line Module can accommodate up to three Line Cartridges.

3. Find the number of TCM devices in the left column. Each Base Station, Administration Terminal, and RAD needs one TCM line. This tells you how many Base Station Modules (BM) you need.
4. Read down the access lines column until you cross the TCM devices row. The number in that box indicates the number of external ports needed for that configuration (a gray cell indicates an invalid combination of access and TCM lines). This tells you how many Expansion Cartridges you need. You can use any combination of 2-port and 6-port Expansion Cartridges.

   Note: Consider future expansion needs when choosing the Expansion Cartridges.

Modules and ports requirements

Table 1: Modules and ports requirements

BM = Base Station Module, LM = Line Module													
access → TCM ↓	**1-8 0 LM**	**9-20 1 LM**	**21-32 2 LM**	**33-44 3 LM**	**45-56 4 LM**	**57-68 5 LM**	**69-80 6 LM**	**81-92 7 LM**	**93-104 8 LM**	**105-116 9 LM**	**117-128 10 LM**	**129-140 11 LM**	**141-152 12 LM**
1-32 0 BM	0	1	2	3	4	5	6	7	8	9	10	11	12
33-48 1 BM	1	2	3	4	5	6	7	8	9	10	11	12	
49-64 2 BM	2	3	4	5	6	7	8	9	10	11	12		
65-80 3 BM	3	4	5	6	7	8	9	10	11	12			
81-96 4 BM	4	5	6	7	8	9	10	11	12				
97-112 5 BM	5	6	7	8	9	10	11	12					
113-128 6 BM	6	7	8	9	10	11	12						
129-144 7 BM	7	8	9	10	11	12							
145-160 8 BM	8	9	10	11	12								
161-176 9 BM	9	10	11	12									
177-192 10 BM	10	11	12										
193-208 11 BM	11	12											
209-224 12 BM	12												

Line Cartridge requirements

Number of Line Cartridges = number of access lines ÷ 4

You try it

Assume you are setting up a system for 53 users and 38 Base Stations.

You need:

- one access line per user
- one TCM line per Base Station plus one TCM line for the Administration Terminal
- Therefore, you must configure 53 access lines and 39 TCM lines.

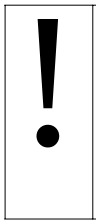
Using the charts and the equation above, you see that you need:

- four Line Modules (since 53 is between 45 and 56)
- one Base Station Module (since 39 is between 33 and 48)
- five expansionl ports (4 LMs and 1 BM), which can be one 6-port Expansion Cartridge, one 2-port and one 6-port Expansion Cartridges, or two 6-port Expansion Cartridges
- 14 Line Cartridges (53 ÷ 4 = 13.25, round up to 14).

Power bar requirements

After you have determined how many Line Modules and Base Station Modules you need for the installation, use this table to see how many power bars and additional power cords you need.

Modules	Power bars
1–3 (+ Controller)	1
4–6	2
7–10	3
11–12	4



Do not daisy chain more than two power bars.

Daisy chaining more than two power bars compromises the electrical safety of the product.

Base Station Powering

The Remote Power Interconnect unit (RPI) allows Companion Base Stations to be powered over the same type of cables that carry the TCM signals. You can also power a Base Station locally with a plug-top power supply but a plug-top power supply requires an ac outlet within 4 meters (wiring length) of the Base Station.

Each RPI output connector provides power for one Base Station using one or two pairs of wires (power pairs).

Note: The RPI also provides pass-through connectivity for the TCM signal. The TCM wires (TCM pair) from the Controller connects to an RPI input connector, and is routed to the appropriate output connector.

It is usually cheaper and more convenient to install RPIs than to provide ac outlets and plug-top power supplies for each Base Station. Using RPIs also makes it easier to add or move Base Stations if the system configuration changes. Usually, you should install RPIs in a location other than where the COMPANION Controller and Modules are to prevent power management and ventilation problems. The maximum input power requirement of the RPI is 240 W ac, or 135 W if the unit is being powered by a 48 v dc source.

Note: To enhance the integrity of the system in cases where there is more than one Base Station in a cell, you may connect the Base Stations in that cell to different RPIs.

You should power Base Stations with RPIs in all but the following circumstances:

- When Base Stations are in a separate building from the Controller, and it is not cost effective to install RPIs with these Base Stations.
- When the two-way cable dc loop resistance (including interconnections) between a Base Station and its RPI exceeds 90 ohms (for example, more than 500 meters [one way] for one pair of 0.6 mm wires)

Table 2: Maximum power cabling distance (approximate)

Wire size	Single-pair	Double-pair
0.6 mm (22 AWG)	800 m	1200 m
0.5 mm (24 AWG)	500 m	1000 m
0.4 mm (26 AWG)	350 m	700 m

Note: Remember that interconnections increase the loop resistance.

In some instances, you may want to power Base Stations with plug-top power supplies. See Appendix E for more details on installing e system in two rowsBase Stations powered by plug-top power supplies.

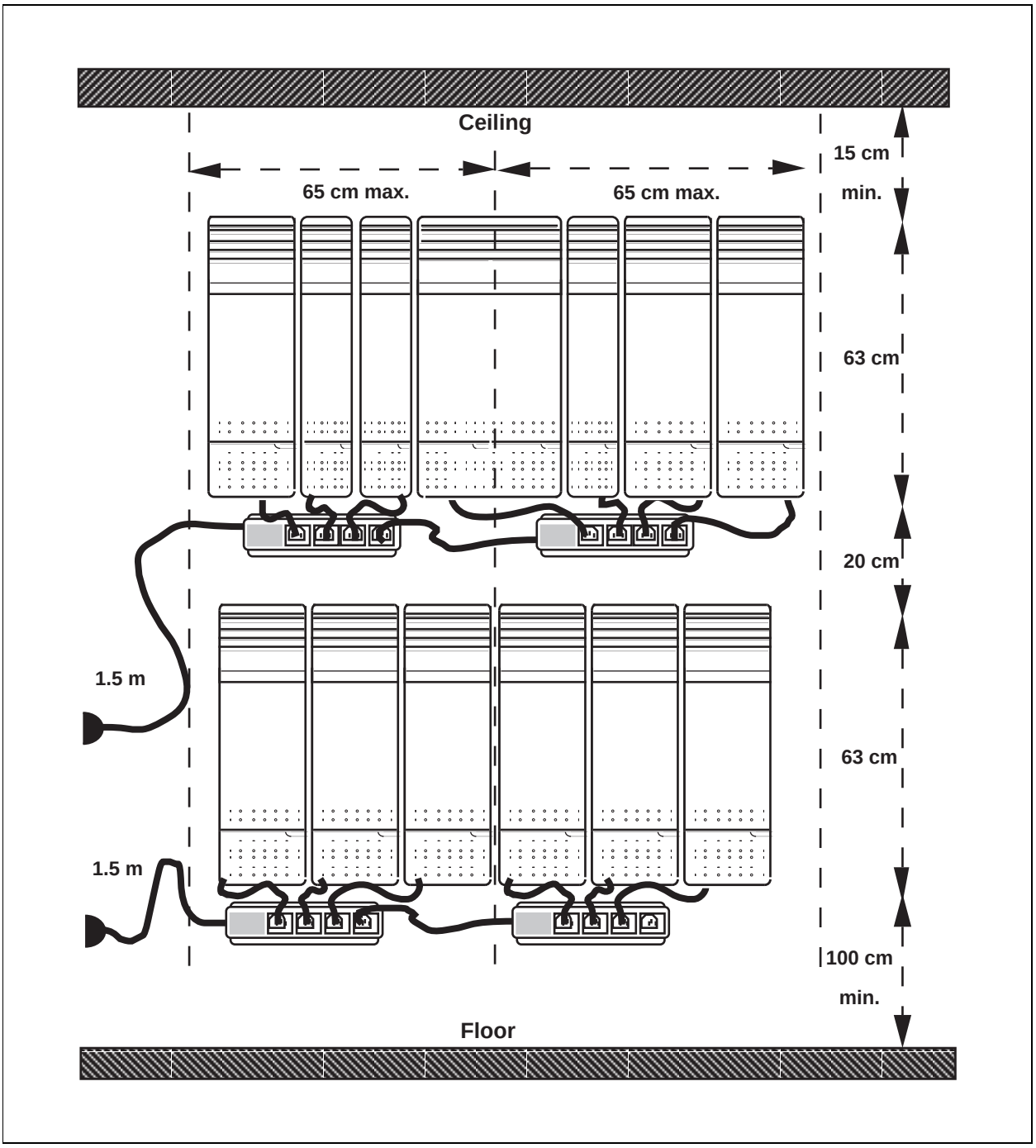
Installing the system in two rows

If vertical space is limited, install the system in two rows. See the figure, “Recommended two-row installation” and keep the following points in mind:

- Two-row installation requires two power cords to the mains outlet (maximum distance 1.5 m) and four power bars. (The power bars are shown outside the troughs in the figure. This is for the sake of clarity only).
- The longest fiber cable run from the Controller is to the bottom left and right hand modules.
- Figure 3 shows a 12 Module System with nine Line Modules and three Base Station Modules. However, the combination of Base Station and Line Modules will vary according to your requirements.
- The 130 cm horizontal distance (65 + 65 cm) shown in the figure is the maximum possible distance. The actual distance depends on the combination of Base Station and Line Modules installed.
- Center the Controller in the top row.
- Place the Base Station and Line Modules to the right and left of the Controller.
- Mount the remaining Base Station and Line Modules in the row above or below the Controller. Mount them to the left and right of a vertical line centered on the Controller to a maximum of six modules.

- The recommended distance between the rows for thermal dissipation and fiber cable connections is 15 to 20 cm.
- When you mount systems that are smaller than 12 modules, leave room for future expansion and power requirements.
- This installation does not take into account space or power requirements for the distribution blocks or RPIs.
- If you have six or less modules, install the system in a single row. Install the controller and modules as shown in the top row of figure 3 and observe the clearances shown. The clearance between the bottom of the modules and the floor should be 100 cm minimum.

Figure 3: Recommended two-row installation

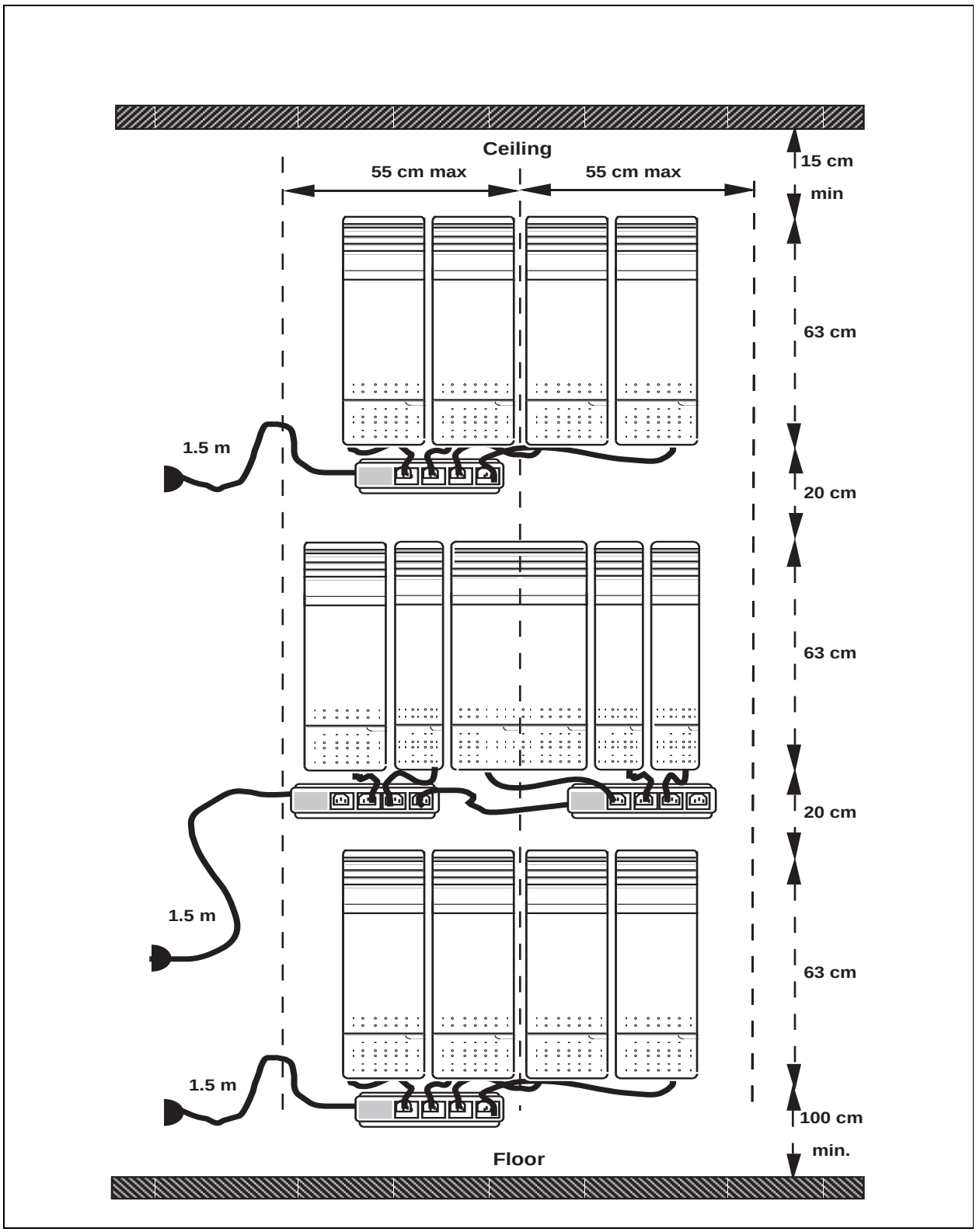


Installing the system in three rows

If horizontal space is limited, install the system in three rows. See the figure, “Recommended three-row installation”and keep the following points in mind:

- Three-row installation requires three power cords to the mains outlet (maximum distance 1.5 m) and four power bars. (The power bars are shown outside the troughs in the figure. This is for the sake of clarity only).
- The longest fiber cable run from the Controller is to the top and bottom left and right hand modules.
- The following figure shows a 12 Module System with nine Line Modules and three Base Station Modules. However, the combination of Base Station and Line Modules will vary according to your requirements.
- The 110 cm horizontal distance (55 + 55 cm) shown in the figure is the maximum possible distance. The actual distance depends on the combination of Base Station and Line Modules installed.
- Center the Controller in the top row.
- Place the Base Station and Line Modules to the right and left of the Controller to a maximum of four modules in the middle row.
- Mount the remaining Base Station and Line Modules in rows above and below the Controller. Mount them to the left and right of a vertical line centered on the Controller to a maximum of 4 modules per row.
- The recommended distance between the rows for thermal dissipation and fiber cable connections is 15 to 20 cm.
- When you mount systems that are significantly smaller than 12 modules, leave room for future expansion and power requirements.
- This installation does not take into account space or power requirements for the distribution blocks or RPIs.

Figure 4: Recommended three-row installation



Other things to consider when you are planning the installation

Ensure you have adequate wall space for the installation. If the system you are installing is likely to grow, leave enough room for it to expand.

You do not have to install the RPIs in the same room as the Controller.

You must install the Administration Terminal within 800 meters (wiring length) of the Controller.

You must install Base Station within 1200 meters (wiring length) of the Controller.

Keep in mind the power and cooling requirements for the system.

Do not connect in series (“daisy chain”) more than two power bars. Install the Controller in the middle so that the fiber cables from all the Line and Base Station Modules can reach the Controller.

Installation warnings and safety instructions

PLEASE READ THIS SECTION CAREFULLY to ensure your safety and the safe operation of the equipment.

Installation warnings

!	**To avoid electrical shock hazard to personnel or equipment damage, observe the following precautions when installing telephone equipment:** Never install telephone wiring during a lightning storm. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations. Never touch non-insulated telephone wires or terminals unless the telephone line has been disconnected at the network interface. Use caution when installing or modifying the telephone lines.

!	**Do not connect the COMPANION 200 Administration Terminal or Base Stations directly to a Central Office (CO) line interface.** Doing so may result in equipment damage.

!	**COMPANION 200 Administration Terminals and Base Stations must not be used as Off Premises Equipment, unless proper protection is provided.**

!	**Check the lightning protectors at the cable entry point to the building and pay special attention to the grounding.** Report any problems to the telephone company in writing. Because COMPANION 200 Administration Terminals and Base Stations are not lightning-protected, do not install them outside the building

Important safety instructions

When using your telephone equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons, including the following:

- Follow the warnings and instructions marked on the COMPANION 200.
- Unplug the COMPANION 200 from the ac outlet before cleaning. Use a damp cloth for cleaning. Do not use liquid cleaners or aerosol cleaners.
- Do not use any part of the COMPANION 200 near water.
- Do not place the COMPANION 200, or any part of it, on an unstable cart, stand or table. The COMPANION 200 may fall, causing serious damage to it.
- Never place any part of the COMPANION 200 near or over a radiator or heat vent.
- Never place any part of the COMPANION 200 in an enclosure unless proper ventilation is provided.

- Do not allow anything to rest on the power cord.
- Do not locate the COMPANION 200 where someone may walk on the power cord.
- To avoid fire or electrical shock, do not overload ac outlets and extension cords.
- To avoid touching dangerous voltage points or short out parts that could result in fire or electrical shock, never push objects of any kind into the COMPANION 200 slots.
- Never spill liquids of any kind on the COMPANION 200.
- To reduce the risk of electric shock, do not disassemble the COMPANION 200. When any service or repair work is required, send it to a qualified service person.
- Unplug the COMPANION 200 from the ac outlet and refer servicing to qualified service personnel under the following conditions:
  - When a power cord is damaged or frayed.
  - If the COMPANION 200 has been exposed to rain, or liquid has been spilled on any part of it (if this happens, disconnect it and then allow the COMPANION 200 to dry out to see if it still operates; do **not** open up the COMPANION 200).
  - If the housing of any part of the COMPANION 200 has been damaged.
- Do not use **any** telephone to report a gas leak in the vicinity of the suspected leak.
- **CAUTION**: To eliminate the possibility of accidental damage to cords, plugs, jacks, and other COMPANION 200 components, do not use sharp instruments during the assembly procedures.
- **WARNING**: To avoid damage to equipment, do not insert the plug at the free end of an Administration Terminal cord directly into a wall or baseboard jack.
- Slots and openings in the cabinet and the back or bottom are provided for ventilation. To protect the COMPANION 200 from overheating, do not block or cover these openings.
- This product is provided with a three-wire grounding type plug with a third (grounding) pin. This plug fits into a grounding type ac outlet only. **This is a safety feature**. If you are unable to insert the plug into the ac outlet, contact your electrician to replace your obsolete ac outlet.

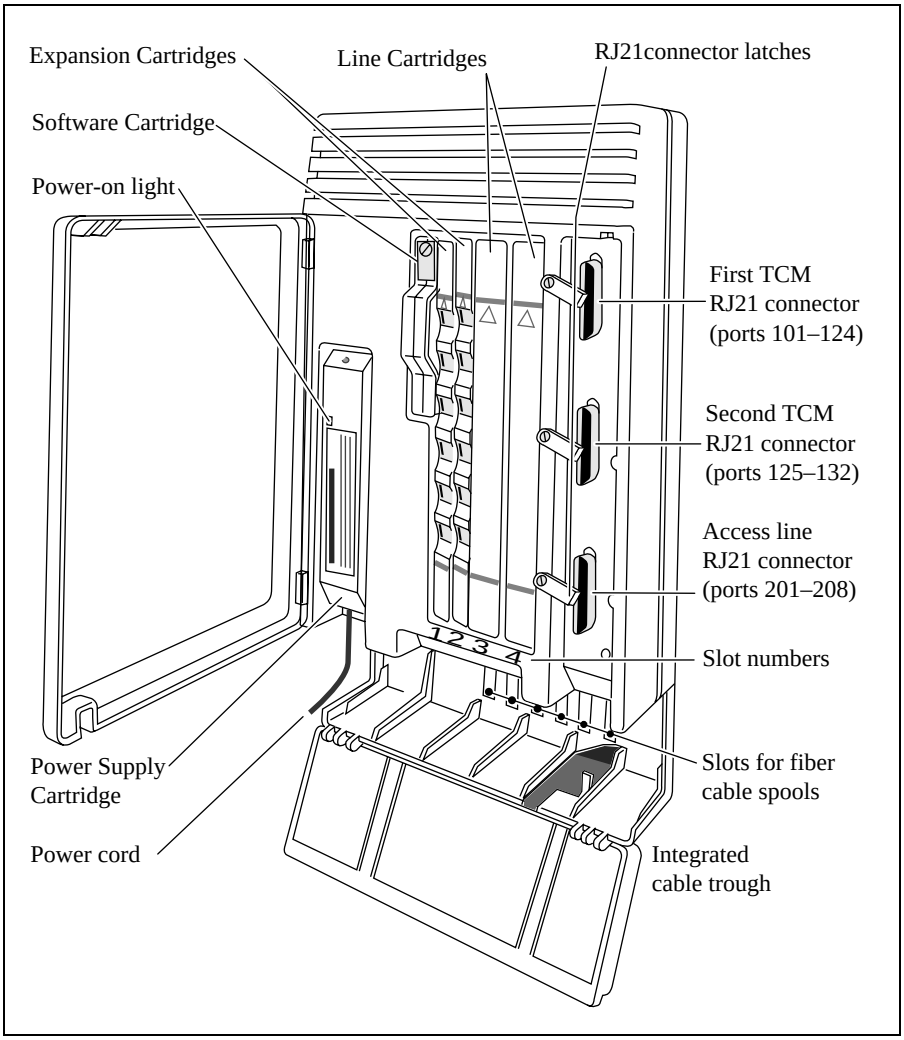
Installing the hardware

Installing the Controller

The Controller comes with a Power Supply Unit already installed. It has a detachable power cord to connect it to an ac outlet. Cables to and from the Controller are routed through the Controller's integrated cable trough. The Controller has one slot for a Software Cartridge, two slots for Expansion Cartridges and two slots for Line Cartridges.

When installing a Controller, Line Modules, and Base Station Modules in a row, install all the mounting brackets before installing the equipment. This will ensure optimum use of wall space.

Figure 5: The Controller



Summary

1. Mount the Controller.
2. Install the Software Cartridge.
3. Install the Line Cartridge(s).
4. If needed, install the Expansion Cartridge(s).

Mounting the Controller

Check that the requirements for the environment and for the power source are met (see the Technical Specifications section for specifications).

Note: Do not remove the door of the Controller during the installation.

!	**To avoid overheating, mount the Controller vertically.**

!	**Install with the power OFF.** The Controller power must remain disconnected during the installation of the system and when adding a Line Cartridge or a Software Cartridge to the controller.

To mount the Controller, follow these steps:

1. Position the mounting bracket.

   Hint: Use a level and draw a pencil line to align the mounting bracket of the Line Modules and Base Station Modules with the Controller's mounting bracket.

   Allow for the following clearance around the mounting bracket:

   Top: Leave about 15 cm of space above the screw holes of the mounting bracket. This clearance gives you enough room to lift the Controller on and off the bracket, and provides space for venting the heat from the Controller.

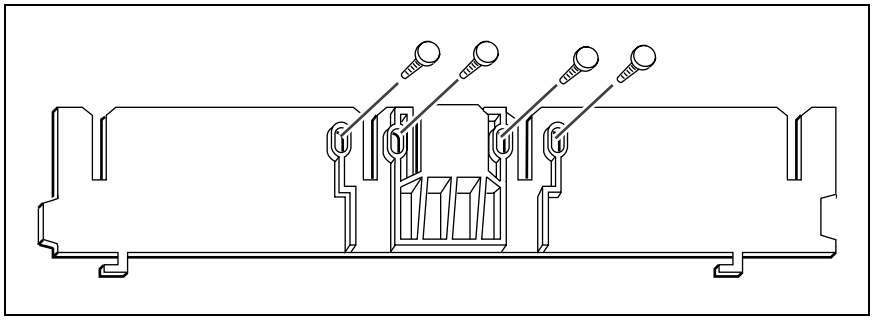
   Bottom: Leave at least 15 cm of space between the bottom of the cable trough and the floor, or any object that may block the flow of air from the bottom. This prevents the Controller from overheating.

   Left and right: Leave enough room to open the door of the Controller and to run cabling out to the side.

   Note: The space between two modules hung on the mounting brackets is approximately 3 mm.

2. Fasten the mounting bracket to the wall using four 19-mm screws as shown in the following illustration.
3. Slide the Controller down onto its mounting bracket.

Figure 6: Mounting bracket for the Controller



4. Connect the main power cord (supplied with the Controller) to the connector under the Power Supply Unit. Do **not** connect to an ac outlet yet.

Installing the Software Cartridge

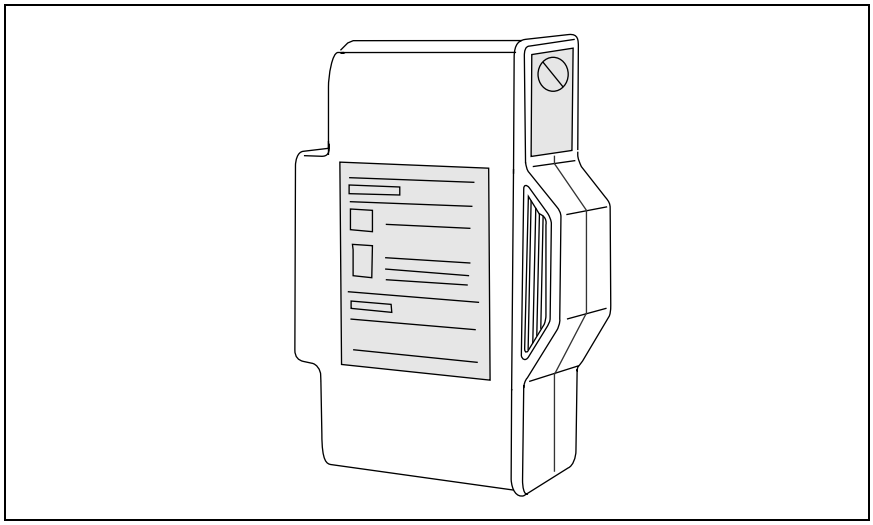
!	**Wear a Grounding Strap.** **Do not touch the connector.** The printed circuit board of the Software Cartridge is a static-sensitive device.

!	**Install with the power off.**

To install the Software Cartridge, follow these steps:

1. Hold the Software Cartridge vertically (as shown in the following illustration).
2. Insert the Software Cartridge into the Controller.

Figure 7: Software Cartridge



Installing a Line Cartridge

!	**Wear a Grounding Strap.** **Do not touch the printed circuit board or the connector.** The printed circuit board of the Line Cartridge is a static-sensitive device.

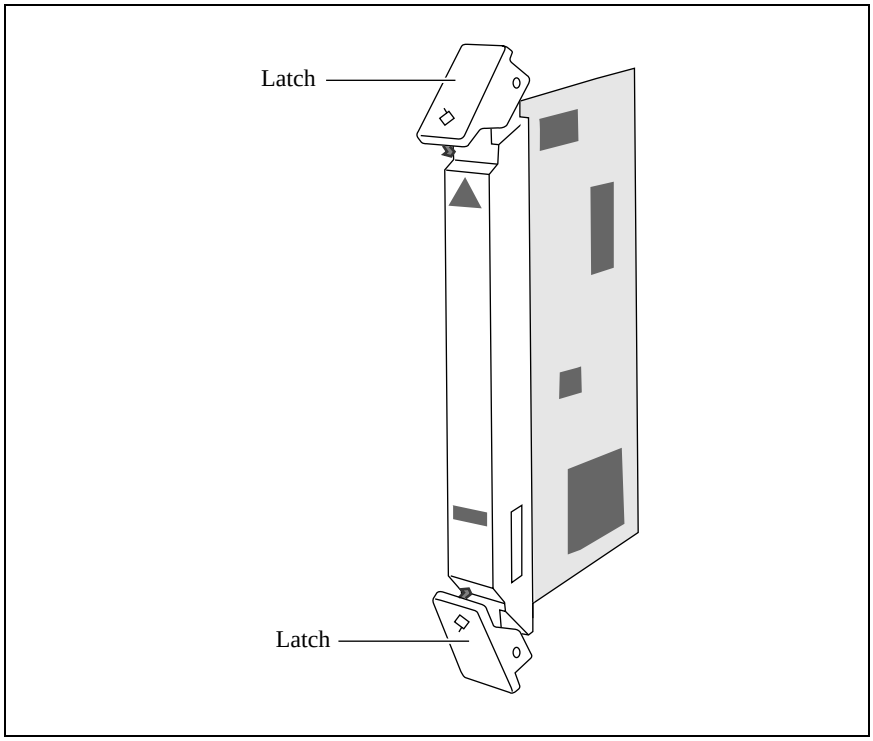
!	**Install with the power off.**

To install a Line Cartridge, follow these steps:

1. Remove the cartridge slot cover of the desired Line Cartridge slot on the Controller. Use a screwdriver at the bottom of the cartridge slot cover, where indicated by the icon, to detach the cartridge slot cover.
2. Holding it vertically, with the latches open (see the following illustration), insert the Line Cartridge in its slot. Close the latches simultaneously to align the cartridge properly.

Note: If the Controller requires only one Line Cartridge, it must be installed in slot 4.

Figure 8: Line Cartridge with latches open



Installing an Expansion Cartridge

Note: The installation procedure is the same for the 2-port and the 6-port Expansion Cartridges.

!	**Wear a Grounding Strap.** **Do not touch the printed circuit board or the connector.** The printed circuit board of the Expansion Cartridge is a static-sensitive device.

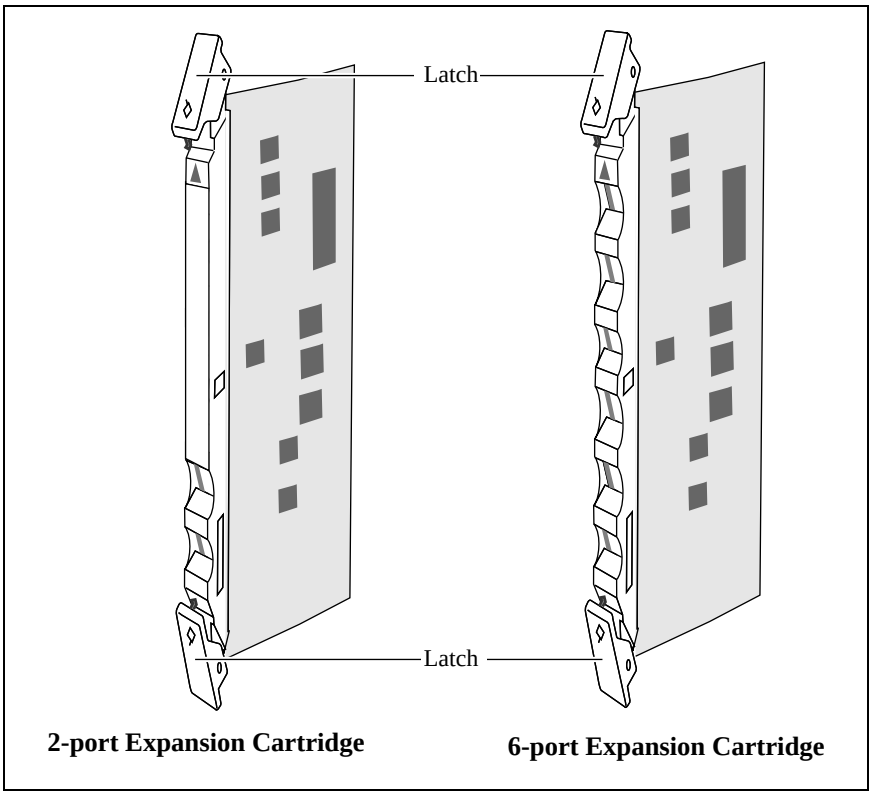
!	**Install with the power off.**

To install an Expansion Cartridge, follow these steps:

1. Holding it vertically with the latches open (see the following illustration), insert the Expansion Cartridge in its slot. Close the latches simultaneously to align the cartridge properly.

   Note: If you are using only one Expansion Cartridge, it must be installed in slot 2.

Figure 9: Expansion Cartridges with latches open

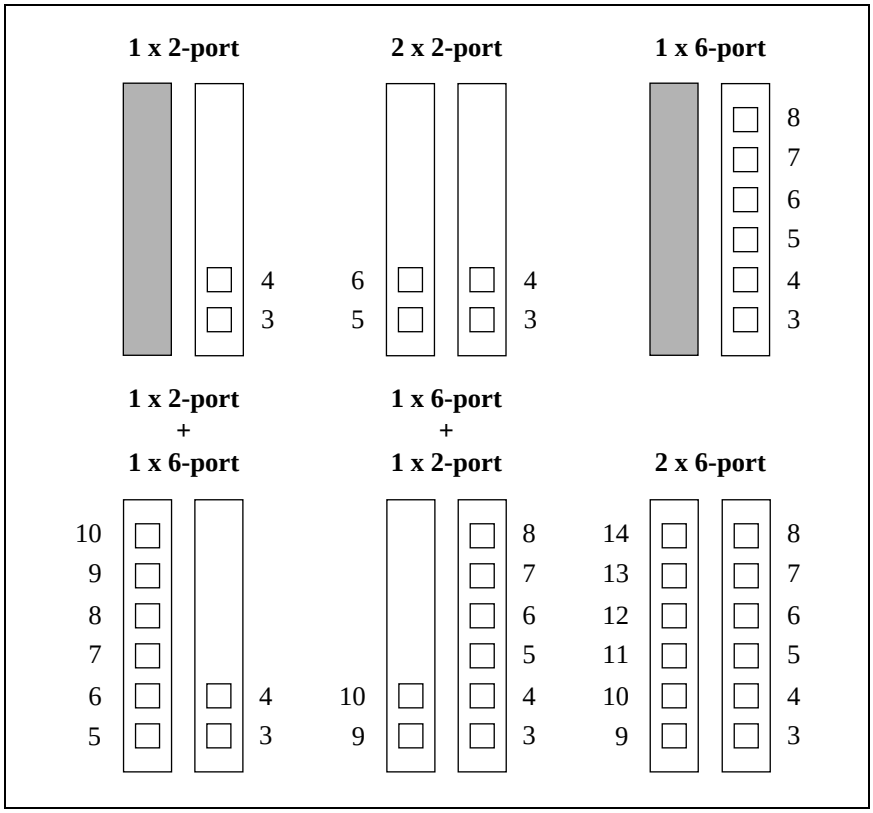


   Note: Ports 1 and 2 are internal to the Controller.

2. For each Expansion Cartridge, create your own set of labels that match the port numbers on the following illustration, *Expansion Cartridge port numbering*. When you have created the number labels, affix them to the Expansion Cartridge.

   Note: Make sure you cover the numbers that are on the Expansion Cartridge with your labels. To prevent confusion about which port number is which, the Expansion Cartridge must be labelled as shown in the following diagram.

Figure 10: Expansion Cartridge port numbering



Installing Line Modules

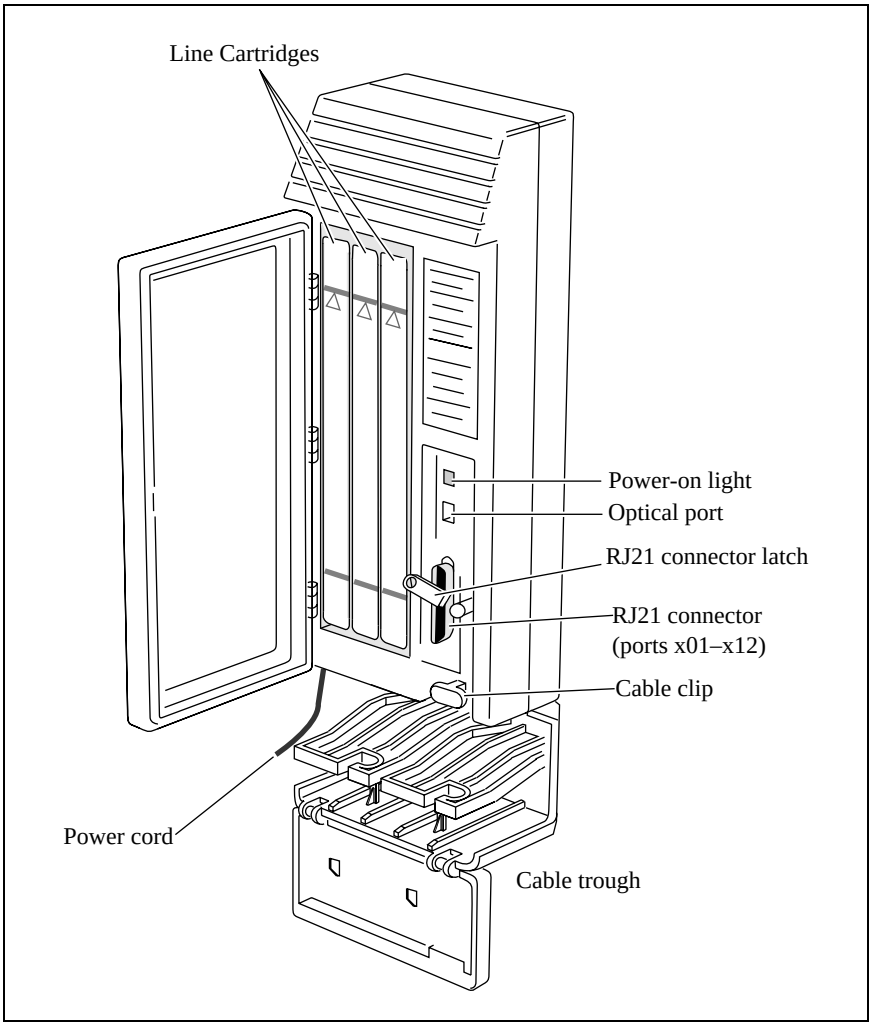
To install a Line Module, follow these steps:

1. Mount the Line Module on the wall.
2. Install the Line Cartridge(s).

The fiber cable should not be connected until the Controller, Line Module or Line Modules and Base Station Module or Base Station Modules are all installed, and the wiring is complete (see “Connecting the fiber cables”).

When you install a Controller, Line Modules and Base Station Modules in a row, you should install all the mounting brackets before you install the equipment (see step 1). This will ensure optimum use of wall space.

Figure 11: Line Module



Mounting a Line Module

When you are mounting a Line Module, ensure that you:

- Allow suitable wall space for future expansion.
- Check that the requirements for the environment and for the power source are met (see the Technical Specifications section for specifications).

Note: The Line Modules and Base Station Modules can be mounted in any order.

Note: Do not remove the door of the Line Module during the installation.

!	**To avoid overheating, mount the Line Module on the wall.**

!	**Install with the power OFF.** The Line Module power must remain disconnected during the installation of the system, and when adding a Line Cartridge to the Line Module.

To mount a Line Module, follow these steps:

1. Position the mounting bracket. Allow for the following clearance around the mounting bracket:

   Top: Leave about 15 cm of space above the screw holes of the mounting bracket. This clearance gives you enough room to lift the Line Module on and off the bracket, and provides space for venting the heat from the Line Module.

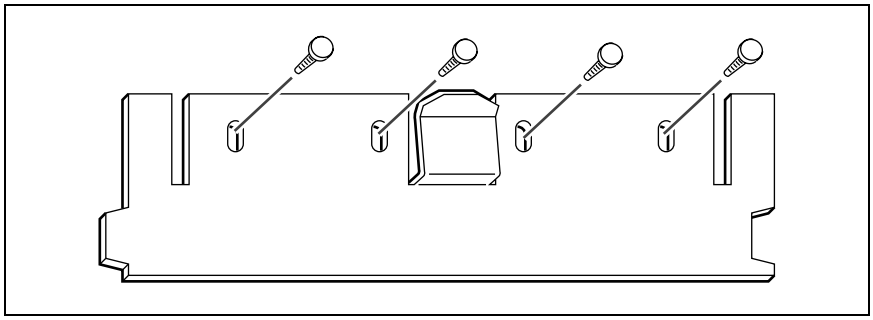
   Bottom: Leave at least 15 cm of space between the bottom of the cable trough and the floor, or any object that may block the flow of air from the bottom. This prevents the Line Module from overheating.

   Left and right: Leave enough room to open the door of the Line Module and to run cabling out to the side.

   Note: The space between two modules hung on the mounting brackets is approximately 3 mm.

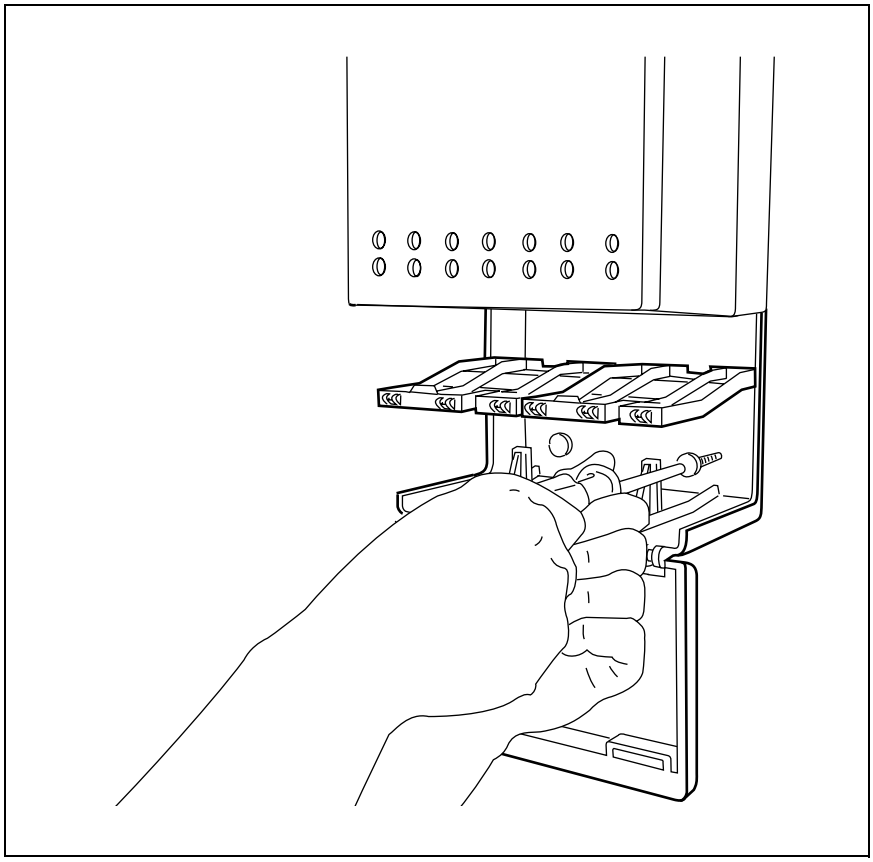
2. Fasten the mounting bracket to the wall using four 19-mm screws as shown in the following illustration.

Figure 12: Mounting bracket for the Line Module



3. Slide the Line Module down onto its mounting bracket.
4. Open the cable trough door and allow it to swing down.
5. Use two 38-mm screws to fasten the cable trough to the wall as shown in the following illustration.
6. Close the door of the cable trough. Do **not** connect power at this point.

Figure 13: Fastening the Line Module cable trough



Installing a Line Cartridge in a Line Module

Install Line Cartridges in a Line Module starting with slot 1. If you need only one Line Cartridge install it in the slot 1.

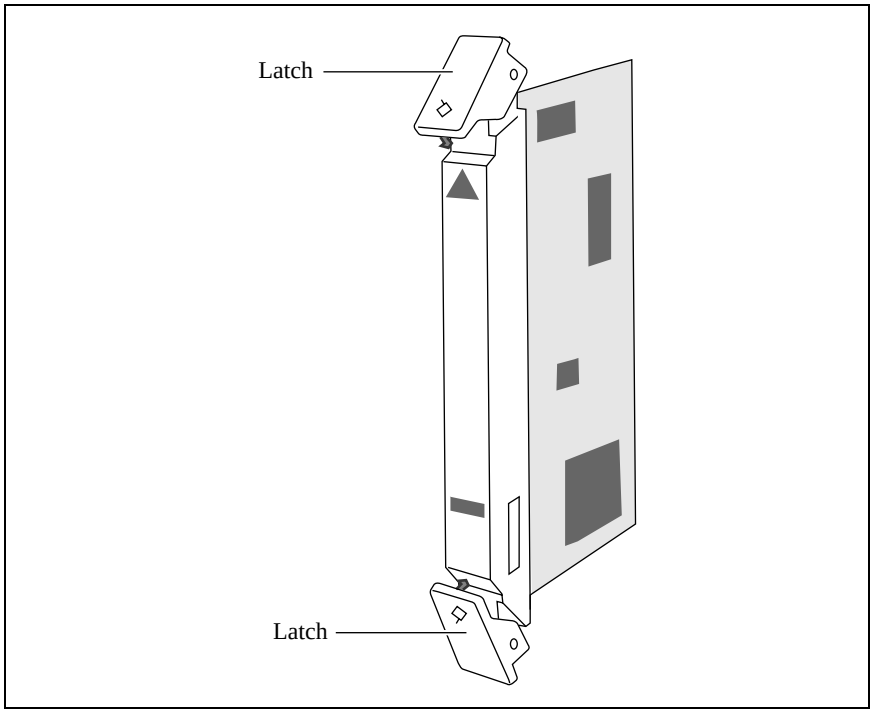
Note: This order is **not** the same as for the Controller.

Wear a Grounding Strap.

Do not touch the printed circuit board or the connector.

The printed circuit board of the Line Cartridge is a static-sensitive device.

Figure 14: Line Cartridge with latches open



1. Remove the slot cover of the desired Line Cartridge slot on the Line Module. Use a screwdriver at the bottom of the cartridge slot cover, where indicated by the icon, to detach the cartridge slot cover.
2. Hold the Line Cartridge vertically with the latches open (see illustration, “Line Cartridge with latches open”), insert the Line Cartridge in its slot. Close the latches simultaneously to align the cartridge properly.

Routing cables in the cable trough

The cable trough beneath the Line Module holds the 25-pair cables, the fiber cables, the power cords, and the power bars. The cable trough has been designed to keep the power cords and power bars separate from the 25-pair cables and fiber cables, and to allow easy access after the installation.

Place the cabling in the two shelves as described in the following chart:

In the upper shelf:	Place the 25-pair cables in the back and the fiber cables in the front. This shelf is for all 25-pair cables and fiber cables only.
In the lower shelf:	Place all power cords and power bars only.

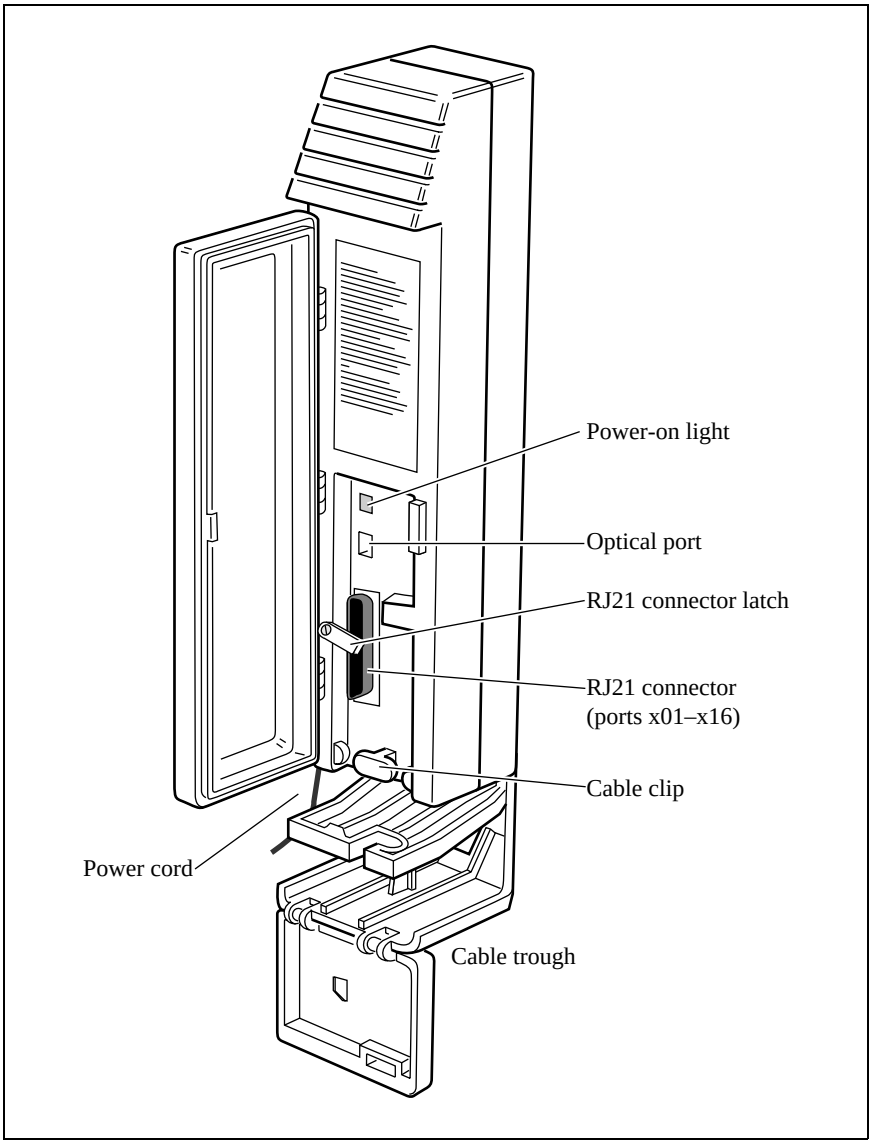
Installing Base Station Modules

The Base Station Module does not have plug-in cartridges.

Do not connect the fiber cable until the Controller, Line Module or Modules and Base Station Module or Modules are all installed, and the wiring is complete (see “Connecting the fiber cables”).

When installing a Controller, Line Modules, and Base Station Modules in a row, install all the mounting brackets before installing the equipment (see step 1). This will ensure optimum use of wall space.

Figure 15: Base Station Module



Mounting a Base Station Module

When you are mounting a Base Station Module, ensure that you:

- Allow suitable wall space for future expansion.
- Check that the requirements for the environment and for the power source are met (see the Technical Specifications section for specifications).

Note: The Controller, Line Modules and Base Station Modules can be mounted in any order.

Note: Do not remove the door of the Base Station Module during the installation.

!	**To avoid overheating, mount the Base Station Module on the wall.**

!	**Install with the power OFF.** The Base Station Module power must remain disconnected during the installation.

To mount a Base Station Module, follow these steps:

1. Position the mounting bracket.

   Allow for the following clearance around the mounting bracket:

   Top: Leave about 15 cm of space above the screw holes of the mounting bracket. This clearance gives you enough room to lift the Base Station Module on and off the bracket, and provides space for venting the heat from the Base Station Module.

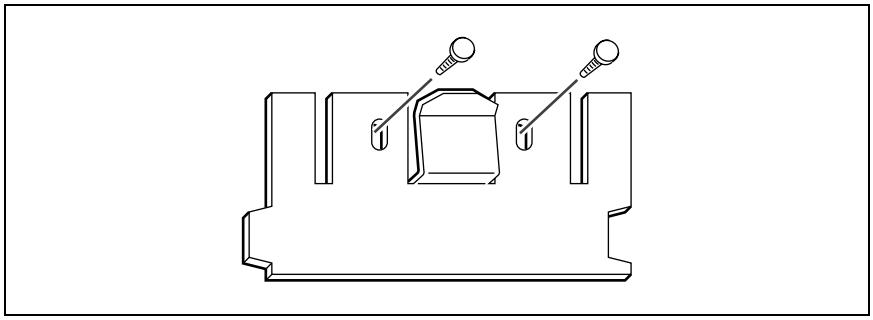
   Bottom: Leave at least 15 cm of space between the bottom of the cable trough and the floor, or any object that may block the flow of air from the bottom. This prevents the Base station Module from overheating.

   Left and right: Leave enough room to open the door of the Base Station Module and to run cabling out to the side.

   Note: The space between two modules hung on the mounting brackets is approximately 3 mm.

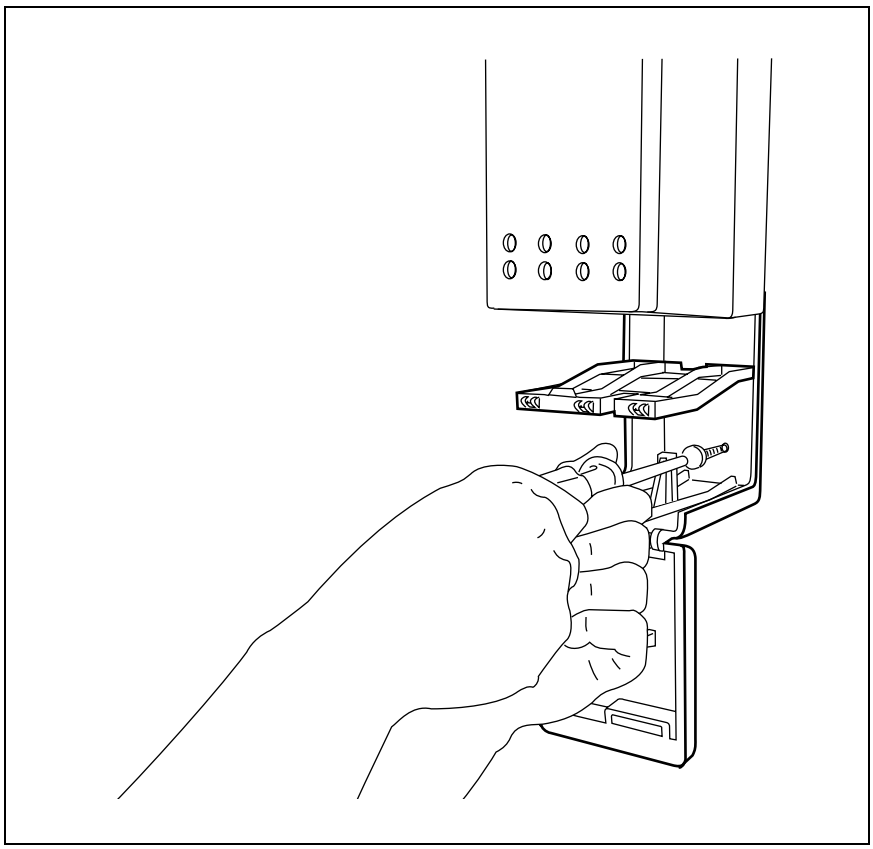
2. Fasten the mounting bracket to the wall using two 19-mm screws as shown in the following illustration.

Figure 16: Mounting bracket for the Base Station Module



3. Slide the Base Station Module down onto its mounting bracket.
4. Open the cable trough door and allow it to swing down.
5. Use two 38-mm screws to fasten the cable trough to the wall as shown in the following illustration.

Figure 17: Fastening the Base Station Module cable trough



6. Close the door of the cable trough. Do **not** connect power.

Routing cables in the cable trough

The cable trough beneath the Base Station Module holds the 25-pair cables, the fiber cables, the power cords, and the power bars. The cable trough has been designed to keep the power cords and power bars separate from the 25-pair cables and fiber cables, and to allow easy access after the installation.

Place the cabling in the two shelves as described in the following chart:

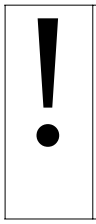
In the upper shelf:	Place the 25-pair cables in the back and the fiber cables in the front. This shelf is for all 25-pair cables and fiber cables only.
In the lower shelf:	Place all power cords and power bars only.

Installing power bars

When you install Line Modules or Base Station Modules with the Controller, you must use power bars for ac power distribution. There are two types of power bars: the main power bar, which plugs directly in the ac outlet, and the expansion power bar, which plugs into a main power bar. You can connect only one expansion power bar to a main power bar.

Use the following table to determine how many power bars you need.

Modules	**Main power bar**	**Expansion power bar**
1–3 (+ Controller)	1	0
4–6	1	1
7–10	2	1
11-12	2	2

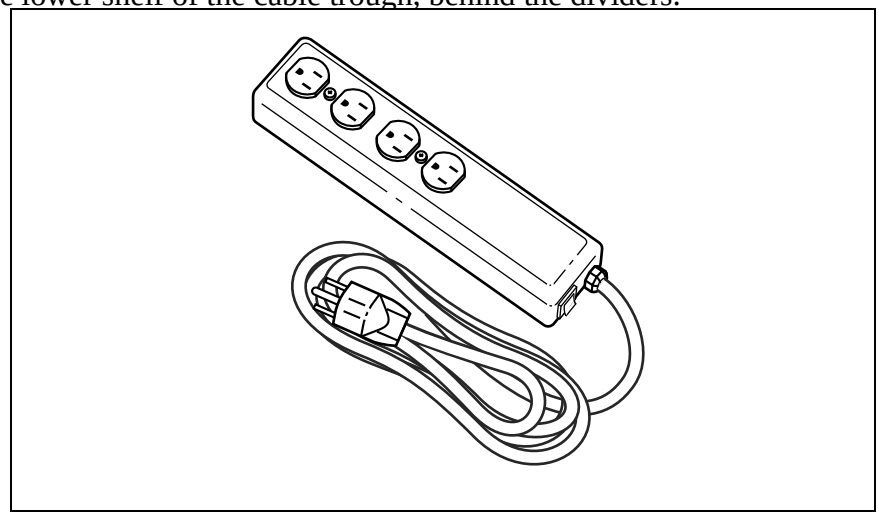


Do not daisy chain more than two power bars.

Daisy chaining more than two power bars compromises the electrical safety of the product.

Slide the power bar(s) into the lower shelf of the cable trough, behind the dividers.

Figure 18: Power bar



Use only a CSA certified power bar that provides a third-wire ground.

The ac outlet must also have a third-wire ground.

Do not plug the power cord into an ac outlet until the installation is completed.

See the section "Powering up" for instructions on powering up the system.

Note: Do not block the fiber cable spool slots in the Controller cable trough.

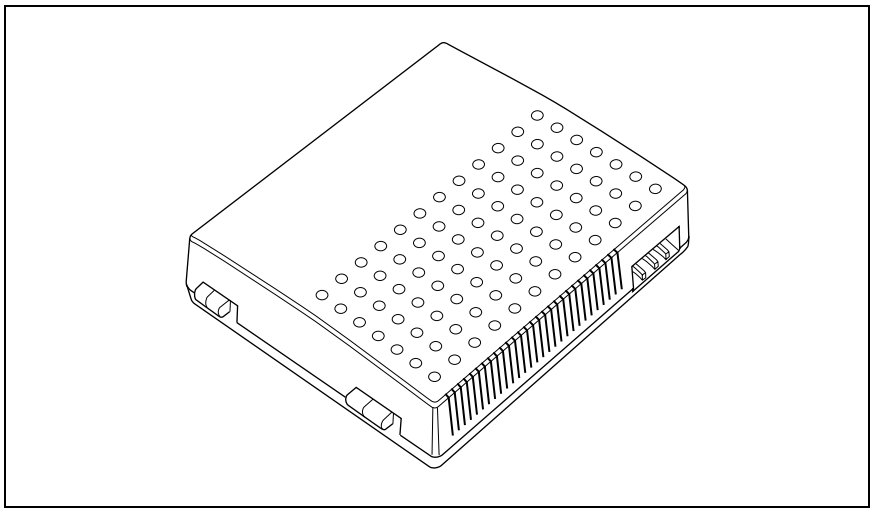
7. If there are expansion power bar(s), connect them to the main power bar(s).
8. Route the power cords from the Controller, Line Module(s) and Base Station Module(s) through the cable clips located in the lower shelf of the cable trough.
9. Plug the power cords from the Controller, Line Modules and Base Station Modules into the power bars.
10. Do **not** connect the main power bar(s) to an ac outlet until the installation of the system is complete.

Installing Remote Power Interconnect units

The Remote Power Interconnect (RPI) units must always be installed inside a building.

The ac outlet powering the RPI shall be installed near the equipment and shall be easily accessible.

Figure 19: Remote Power Interconnect unit



There are two versions of the Remote Power Interconnect unit (RPI): the RPI-8, which supports up to eight Base Stations; and the RPI-16, which supports up to 16 Base Stations. Each RPI has a connection board and either one (RPI-8) or two (RPI-16) power supply units (PSUs). The maximum input power consumption of an RPI is 750 W ac, or 135 W if the unit is powered by a 48 v dc source.

You can upgrade an RPI-8 to an RPI-16 by installing a second power supply unit to the RPI-8. See “Upgrading an RPI-8 to an RPI-16.”

To determine how many Base Stations and how many Power Supply Units (PSUs) you need for the number of Base Stations, use the following table:

Table 3: RPI Requirements

Base Stations	RPI-16 and RPI-8 required
1–8	**1** RPI-8
9–16	**1** RPI-16
17–24	**1** RPI-16 and **1** RPI-8
25–32	**2** RPI-16
33–40	**2** RPI-16 and **1** RPI-8
41–48	**3** RPI-16
49–56	**3** RPI-16 and **1** RPI-8
57–64	**4** RPI-16
65–72	**4** RPI-16 and **1** RPI-8
73–80	**5** RPI-16
81–88	**5** RPI-16 and **1** RPI-8
89–96	**6** RPI-16
97–104	**6** RPI-16 and **1** RPI-8
105–112	**7** RPI-16
113–120	**7** RPI-16 and **1** RPI-8
121–128	**8** RPI-16
129–136	**8** RPI-16 and **1** RPI-8
137–144	**9** RPI-16
145–152	**9** RPI-16 and **1** RPI-8
153–160	**10** RPI-16
161–168	**10** RPI-16 and **1** RPI-8
169–176	**11** RPI-16
177–184	**11** RPI-16 and **1** RPI-8
185–192	**12** RPI-16
193–200	**12** RPI-16 and **1** RPI-8
201–208	**13** RPI-16
209–216	**13** RPI-16 and **1** RPI-8
216–224	**14** RPI-16

Summary

To install an RPI, you must:

1. Mount the RPI.
2. Wire the RPI.

To upgrade an RPI-8 to an RPI-16, you must:

1. Power down the RPI.
2. Install the second power supply unit.
3. Wire the RPI.
4. Power up the RPI

!	**Do not power the RPI until the installation is complete.**

Mounting the Remote Power Interconnect unit

1. Position the screw holes for the RPI using the dimensions shown in the following illustration.

   To provide adequate ventilation and to prevent overheating, leave a clearance of at least 15 cm around the RPI.

   If you are mounting two RPIs, one above the other, leave a clearance of at least 30 cm between them to provide adequate ventilation and to prevent overheating.
2. Partially screw in two 4-mm, 5-cm long screws for the keyholes.
3. Open the hinged cover by levering the release catch on the right side with a screwdriver. If you wish, remove the cover by lifting it off its hinges.

Figure 20: RPI mounting holes

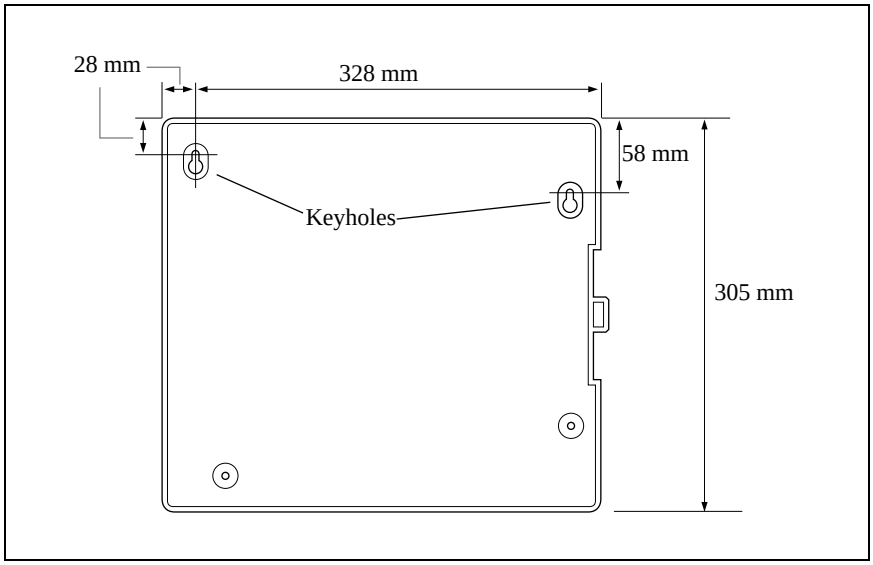
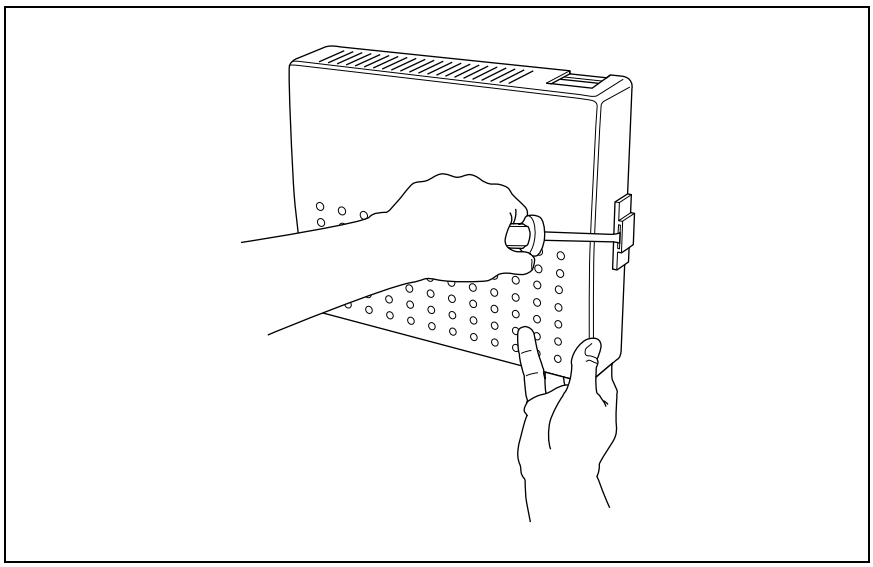


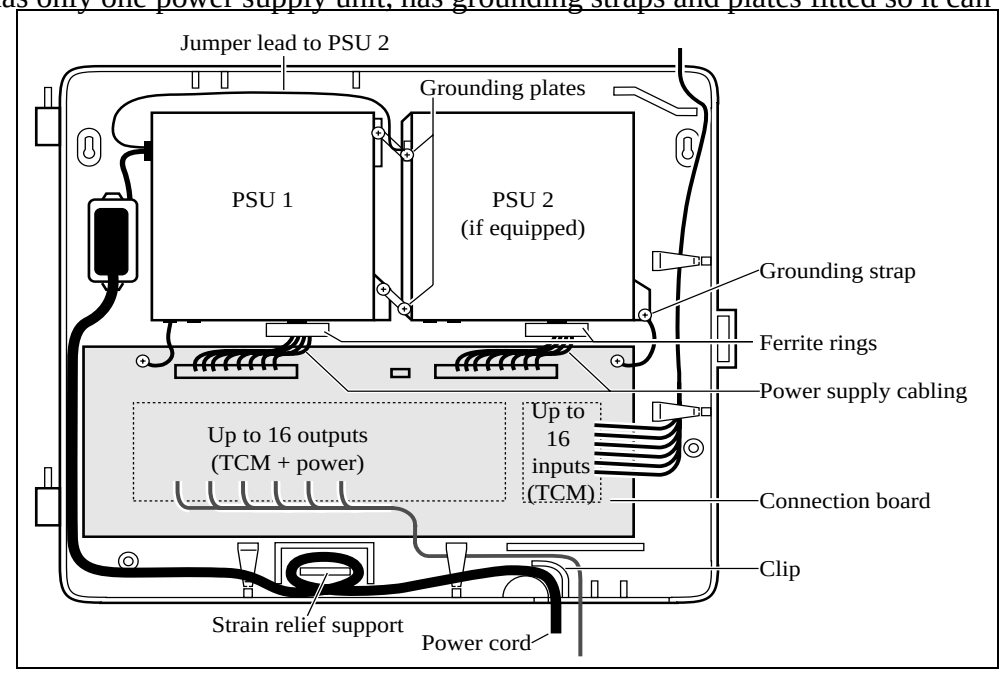
Figure 21: Opening the RPI cover



4. Hang the RPI on the two keyhole screws and tighten them.
5. Install the remaining two screws.
6. Feed in the power cord through the bottom of the RPI and route it through the clip and around the strain relief support as shown in the RPI components illustration in the following illustration.
7. Route the power cord to the input power socket just to the left of PSU 1. Connect the plug to the socket.

Upgrading an RPI-8 to an RPI-16

Figure 22: RPI components



The RPI-8, which has only one power supply unit, has grounding straps and plates fitted so it can be upgraded to an RPI-16 (see illustration "RPI components").

Unplug the RPI power cord.

Do not apply power to the RPI until its installation and wiring are complete.

To upgrade an RPI-8 to an RPI-16:

1. Unscrew the grounding straps and plates.
2. Add the second power supply unit and screw down the grounding straps, the grounding plates and the power supply unit.
3. Unplug the power supply unit cable from the connector board. Pass the cable through the ferrite ring of the power supply unit and plug it back into the connector board.
4. Connect the jumper lead from PSU 1 to the lead from PSU 2 (see illustration "RPI components").

Wiring the RPI

!	**Do not run unprotected power cables outdoors.**

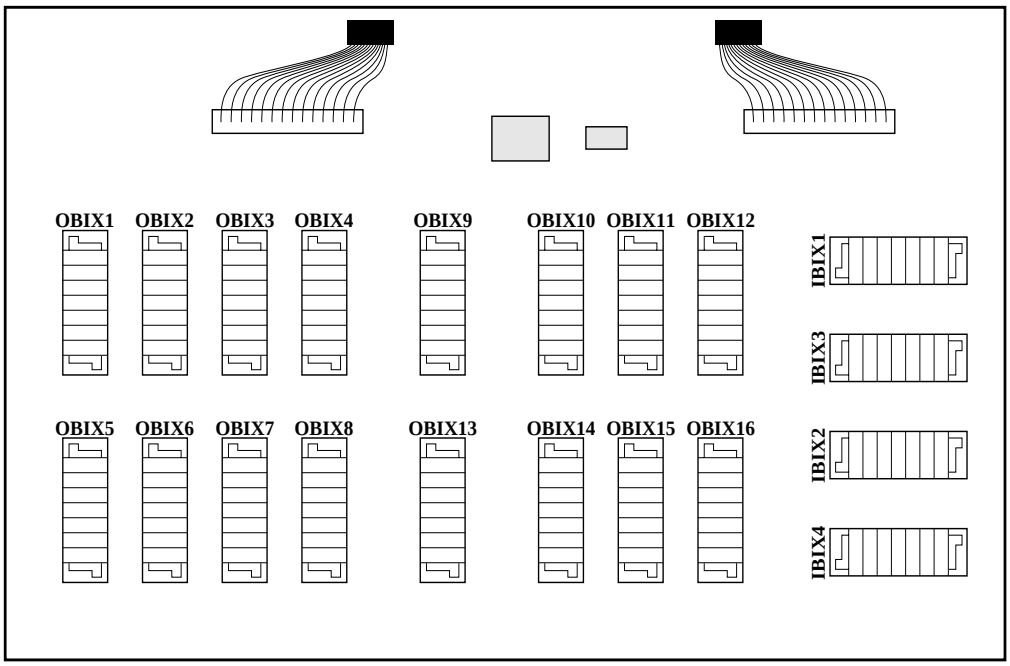
The maximum two-way dc loop resistance for power pairs **including** interconnections for each Base Station, is **90 ohms**. You will need one or two power pairs between the RPI and the Base Station, depending on the wire size of the power pairs and the distance between the Base Station and the RPI.

Table 4: Maximum power cabling distance (approximate)

Wire size	Single-pair	Double-pair
0.6 mm (22 AWG)	800 m	1200 m
0.5 mm (24 AWG)	500 m	1000 m
0.4 mm (26 AWG)	350 m	700 m

!	**When using two power pairs, ensure they are connected with the same polarity.**

Figure 23: RPI connector board

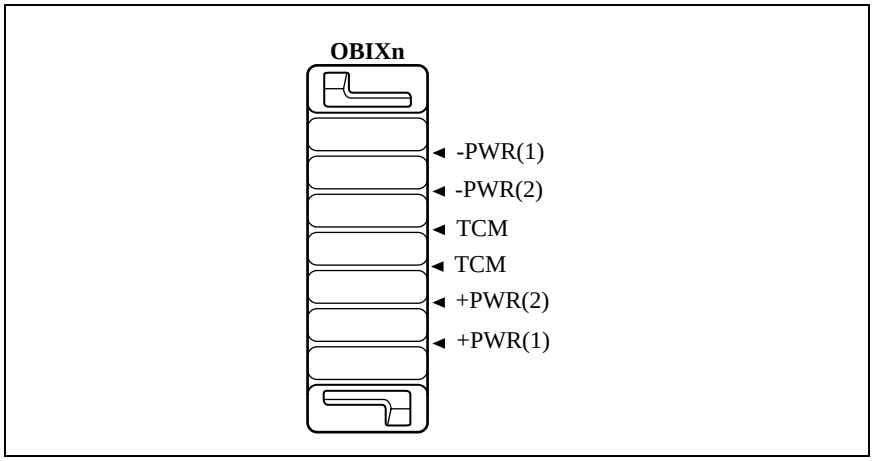


Output connections

Feed the output pairs in through the bottom of the RPI and route the pairs to the output connectors as shown in the following illustration. If only one pair is used for powering a Base Station, connect the power pair to -PWR(1) and +PWR(1). If two pairs are used to power a Base Station, connect one pair to -PWR(1) and +PWR(1), and the second pair to -PWR(2) and +PWR(2).

> **!** **Ensure both pairs have the same polarity.**
>
> Connecting two power pairs with opposing polarities may damage the Base Station and RPI.

Figure 24: Output connector pinout



Input connections

Feed the TCM input pairs from the Controller distribution frame through the top of the RPI and route the pairs to the input connectors (IBIX1 to IBIX4) as shown in the following illustration. There may be fewer than 16 input pairs in any given RPI installation.

Figure 25: Input connector pinout

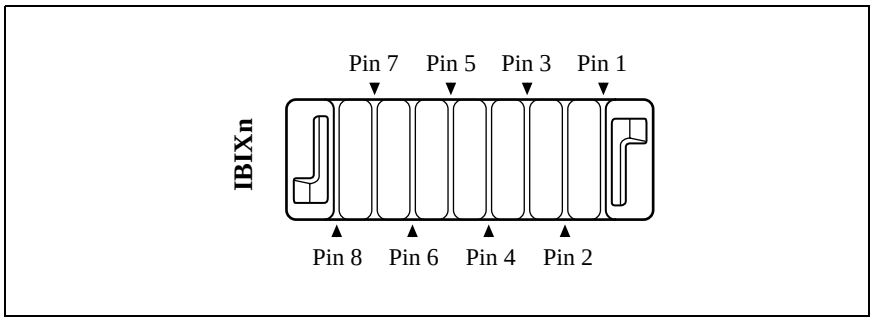


Table 5: Input wiring

Connector	Pin	Signal	Output connector
IBIX1	1, 2	TCM 1	OBIX1
	3, 4	TCM 2	OBIX2
	5, 6	TCM 3	OBIX3
	7, 8	TCM 4	OBIX4
IBIX2	1, 2	TCM 5	OBIX5
	3, 4	TCM 6	OBIX6
	5, 6	TCM 7	OBIX7
	7, 8	TCM 8	OBIX8

Table 5: Input wiring (continued)

Connector	Pin	Signal	Output connector
IBIX3	1, 2	TCM 9	OBIX9
	3, 4	TCM 10	OBIX10
	5, 6	TCM 11	OBIX11
	7, 8	TCM 12	OBIX12
IBIX4	1, 2	TCM 13	OBIX13
	3, 4	TCM 14	OBIX14
	5, 6	TCM 15	OBIX15
	7, 8	TCM 16	OBIX16

Wiring the system

Wiring the system involves two tasks:

- wiring the access lines
- wiring the TCM lines

Understanding the wiring charts

The purpose of the following wiring charts is to show the connections between the COMPANION 200 equipment (Controller, Line Modules, Base Station Modules) and the distribution frames on which the COMPANION access lines and TCM lines (Base Stations and Administration Terminal lines) terminate.

You can read either from the left or from the right. The left-hand side of the chart shows the Controller, the Line Module, or the Base Station Module end of the connection (RJ21 connector); the right-hand side indicates the distribution frame end of the connection (25-pairs). Here is a sample chart, with the explanation for the column headings following.

Table 6: Sample access line wiring chart

Pin	Port	Port name	Polarity	Wire color	LC slot
26 1	0201	Line 1	Tip Ring	White-Blue Blue-White	1
27 2	0202	Line 2	Tip Ring	White-Orange Orange-White	1

Pin: The pin number of the RJ21 connector.

Port: The internal identification number for the external connections (TCM or access lines) where:

1xx = Controller TCM ports

2xx = Controller access line ports

3xx to 12xx = Line Module or Base Station Module. The first digit indicates the Expansion Cartridge port number.

where xx = 01–08 for Controller access lines

01–12 for Line Module access lines

01–32 for Controller TCM lines

01–16 for Base Station Module TCM lines

Port name: Identification name for the port.

Polarity: Polarity of access line connections.

Wire color: The connection to the distribution frame.

LC slot: The Controller or Line Module slot in which the Line Cartridge associated with the access line is installed.

Examples

Port 0204 = 4th access line on the Controller

Port 0117 = 17th TCM connection on the Controller

Port 0510 = 10th connection on the Line Module or Base Station Module connected to port 5 of the Expansion Cartridges

Wiring the access lines

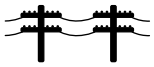
Before you begin, you need the following material:

- **Controller:** One 25-pair, 0.5 mm (24 AWG) cable with a female RJ21 connector on one end.
- **Line Modules:** For each Line Module, one 25-pair, 0.5 mm (24 AWG) cable terminated with a female RJ21 connector at one end.

Lightning protection.

Installers should check the lightning protectors at the cable entry point to the building, paying special attention to the grounding. Report any problems to the telephone company in writing.

To cross-connect the access lines to the Controller and the Line Modules, follow these steps:

1. Plug the RJ21 connector of each 25-pair cable into the access line connector on the Controller and each Line Module. This connector is identified by an icon of two telephone poles connected by telephone wires: 
2. For each RJ21 connector, turn the RJ21 connector latch so it covers the connector. Tighten the latch screw to hold the connector in place.
3. Route the 25-pair cables through the upper shelf of the cable trough to the distribution frame.

   Note: Route the 25-pair cables out of the cable trough in a bundle. Use cable ties to secure them to the wall and to support their weight. The cable ties prevent undue stress on the cable trough shelf when there are several 25-pair cables.

4. Connect the lines from the Controller to the distribution frame or frames according to the following Controller access line wiring chart.
5. Connect the lines from the Line Module(s) to the distribution frame(s) according to the following Line Module wiring chart.

Table 7: Controller access line wiring chart

Note: In the this table, lines 1 to 4 correspond to the Line Cartridge in slot 4, and lines 5 to 8 correspond to the Line Cartridge in slot 3.					
Pin	**Port**	**Port name**	**Polarity**	**Wire color**	**Line Cartridge slot**
26 1	0201	Controller line 1	Tip Ring	White-Blue Blue-White	4
27 2	0202	Controller line 2	Tip Ring	White-Orange Orange-White	4
28-29 3-4		(not used)			
30 5	0203	Controller line 3	Tip Ring	White-Slate Slate-White	4
31 6	0204	Controller line 4	Tip Ring	Red-Blue Blue-Red	4
32-33 7-8		(not used)			
34 9	0205	Controller line 5	Tip Ring	Red-Brown Brown-Red	3
35 10	0206	Controller line 6	Tip Ring	Red-Slate Slate-Red	3
36-37 11-12		(not used)			
38 11	0207	Controller line 7	Tip Ring	Black-Green Green-Black	3
39 14	0208	Controller line 8	Tip Ring	Black-Brown Brown-Black	3
40-50 15-25		(not used)			

Table 8: Line Module access line wiring chart

Pin	Port	Port name	Polarity	Wire color	Line Cartridge slot
26 1	xx01	Line Module line 1	Tip Ring	White-Blue Blue-White	1
27 2	xx02	Line Module line 2	Tip Ring	White-Orange Orange-White	1
28-29 3-4		(not used)			
30 5	xx03	Line Module line 3	Tip Ring	White-Slate Slate-White	1
31 6	xx04	Line Module line 4	Tip Ring	Red-Blue Blue-Red	1
32-33 7-8		(not used)			
34 9	xx05	Line Module line 5	Tip Ring	Red-Brown Brown-Red	2
35 10	xx06	Line Module line 6	Tip Ring	Red-Slate Slate-Red	2
36-37 11-12		(not used)			
38 13	xx07	Line Module line 7	Tip Ring	Black-Green Green-Black	2
39 14	xx08	Line Module line 8	Tip Ring	Black-Brown Brown-Black	2
40-41 15-16		(not used)			
42 17	xx09	Line Module line 9	Tip Ring	Yellow-Orange Orange-Yellow	3
43 18	xx10	Line Module line 10	Tip Ring	Yellow-Green Green-Yellow	3
44-45 19-20		(not used)			
46 21	xx11	Line Module line 11	Tip Ring	Violet-Blue Blue-Violet	3

Table 8: Line Module access line wiring chart

Pin	Port	Port name	Polarity	Wire color	Line Cartridge slot
47 22	xx12	Line Module line 12	Tip Ring	Violet-Orange Orange-Violet	3
48-50 23-25		(not used)			

6. Connect the access lines to the distribution frame. Cross-connect them to the corresponding Controller and Line Module lines according to the Controller and Line Module wiring charts.
7. Use the *COMPANION 200 Programming Record* to ensure that the correct mapping between Controller access line port, Controller access line number, distribution frame number, and host switch telephone number is recorded.

Wiring the TCM lines

Before you begin, you need the following material:

- **Controller:** Two 25-pair, 0.5 mm (24 AWG) cables with a female RJ21 connector installed at one end.
- **Base Station Modules:** For each Base Station Module, one 25-pair, 0.5 mm (24 AWG) cable with a female RJ21 connector installed at one end.

To cross-connect the Controller and Base Station Module wiring, follow this procedure:

1. Plug the RJ21 connector of each 25-pair cable into the corresponding TCM connectors on the Controller and the Base Station Module or Modules. These connectors are identified by an icon of a telephone: ☎
2. For each RJ21 connector, turn the RJ21 connector latch so it covers the connector. Tighten the latch screw to hold the connector in place.
3. Route the 25-pair cables through the upper shelf of the cable troughs to the distribution frame.

Note: Route the 25-pair cables straight out to one side of the cable trough in a bundle. Use cable ties to secure them to the wall and to support their weight. This prevents undue stress on the cable trough shelf when there are several 25-pair cables.

4. Connect the lines from the Controller to the appropriate pins on the distribution frame according to the Controller TCM wiring charts for the top and the bottom TCM RJ21 connectors chart. Base Stations can be connected to any port. Non-Base Station devices can only be connected to ports 0101 to 0105. When used, the Administration Terminal must be connected to port 0101.

Table 9: Controller TCM wiring chart (first TCM RJ21 connector)

Pin	Port	Port name	Wire color
26 1	0101	TCM 1	White-Blue Blue-White
27 2	0102	TCM 2	White-Orange Orange-White
28 3	0103	TCM 3	White-Green Green-White
29 4	0104	TCM 4	White-Brown Brown-White
30 5	0105	TCM 5	White-Slate Slate-White
31 6	0106	TCM 6	Red-Blue Blue-Red
32 7	0107	TCM 7	Red-Orange Orange-Red
33 8	0108	TCM 8	Red-Green Green-Red
34 9	0109	TCM 9	Red-Brown Brown-Red
35 10	0110	TCM 10	Red-Slate Slate-Red
36 11	0111	TCM 11	Black-Blue Blue-Black
37 12	0112	TCM 12	Black-Orange Orange-Black

Table 9: Controller TCM wiring chart (first TCM RJ21 connector)

Pin	Port	Port name	Wire color
38 13	0113	TCM 13	Black-Green Green-Black
39 14	0114	TCM 14	Black-Brown Brown-Black
40 15	0115	TCM 15	Black-Slate Slate-Black
41 16	0116	TCM 16	Yellow-Blue Blue-Yellow
42 17	0117	TCM 17	Yellow-Orange Orange-Yellow
43 18	0118	TCM 18	Yellow-Green Green-Yellow
44 19	0119	TCM 19	Yellow-Brown Brown-Yellow
45 20	0120	TCM 20	Yellow-Slate Slate-Yellow
46 21	0121	TCM 21	Violet-Blue Blue-Violet
47 22	0122	TCM 22	Violet-Orange Orange-Violet
48 23	0123	TCM 23	Violet-Green Green-Violet
49 24	0124	TCM 24	Violet-Brown Brown-Violet
50 25		(not used)	Violet-Slate Slate-Violet

Table 10: Controller TCM wiring chart (second TCM RJ21 connector)

Pin	Port	Port name	Wire color
26 1	0125	TCM 25	White-Blue Blue-White
27 2	0126	TCM 26	White-Orange Orange-White
28 3	0127	TCM 27	White-Green Green-White
29 4	0128	TCM 28	White-Brown Brown-White
30 5	0129	TCM 29	White-Slate Slate-White
31 6	0130	TCM 30	Red-Blue Blue-Red
32 7	0131	TCM 31	Red-Orange Orange-Red
33 8	0132	TCM 32	Red-Green Green-Red
34-50 9-25		(not used)	

5. Connect the lines from the Base Station Module(s) to the appropriate pins on the distribution frames according to the following Base Station Module TCM wiring chart.
6. Connect the TCM lines from the Base Stations and other TCM devices to the distribution frames. Cross-connect the TCM lines to the corresponding Controller and Base Station Module lines.
7. Use the *COMPANION 200 Programming Record* to ensure that the correct mapping between Controller TCM port, distribution frame number, and TCM device is recorded.

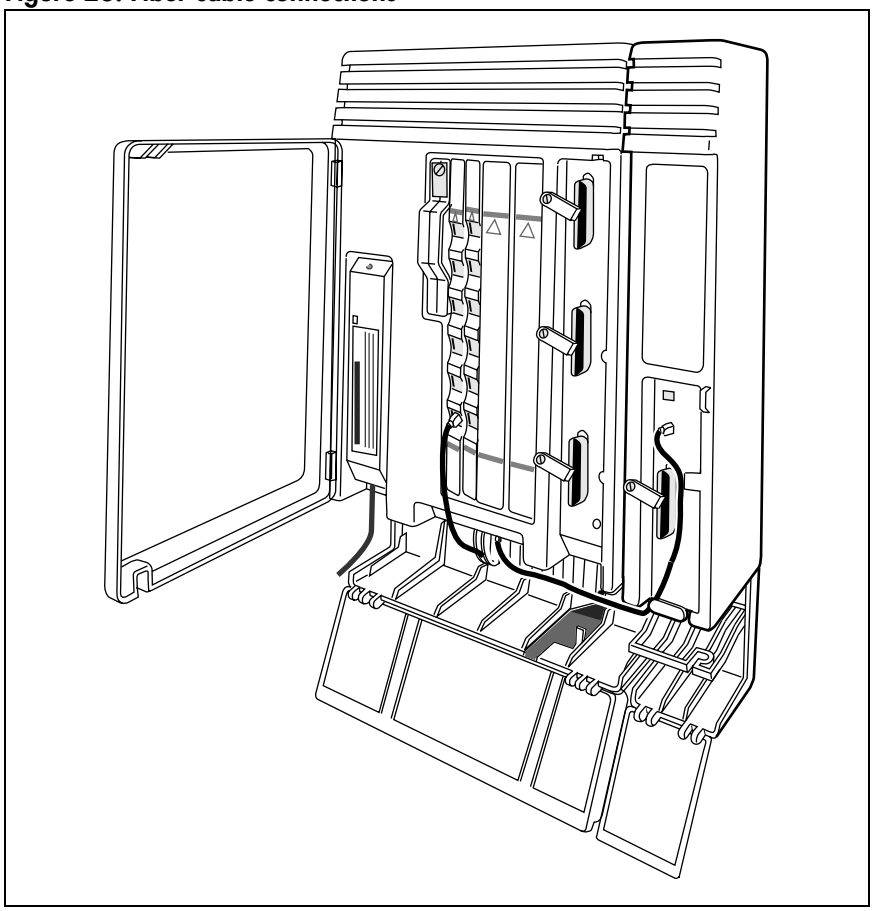
Table 11: Base Station Module TCM wiring chart

Pin	Port	Port name	Wire color
26 1	xx01	TCM 1	White-Blue Blue-White
27 2	xx02	TCM 2	White-Orange Orange-White
28 3	xx03	TCM 3	White-Green Green-White
29 4	xx04	TCM 4	White-Brown Brown-White
30 5	xx05	TCM 5	White-Slate Slate-White
31 6	xx06	TCM 6	Red-Blue Blue-Red
32 7	xx07	TCM 7	Red-Orange Orange-Red
33 8	xx08	TCM 8	Red-Green Green-Red
34 9	xx09	TCM 9	Red-Brown Brown-Red
35 10	xx10	TCM 10	Red-Slate Slate-Red
36 11	xx11	TCM 11	Black-Blue Blue-Black
37 12	xx12	TCM 12	Black-Orange Orange-Black
38 13	xx13	TCM 13	Black-Green Green-Black
39 14	xx14	TCM 14	Black-Brown Brown-Black
40 15	xx15	TCM 15	Black-Slate Slate-Black
41 16	xx16	TCM 16	Yellow-Blue Blue-Yellow
17-25 42-50		(not used)	

Connecting the fiber cables

The fiber cables connect a Line Module or Base Station Module to the Controller through the Expansion Cartridges.

Figure 26: Fiber cable connections



Fiber cables are durable, but can be damaged easily during installation, affecting the transmission of the signals. To prevent damage, observe the following precautions:

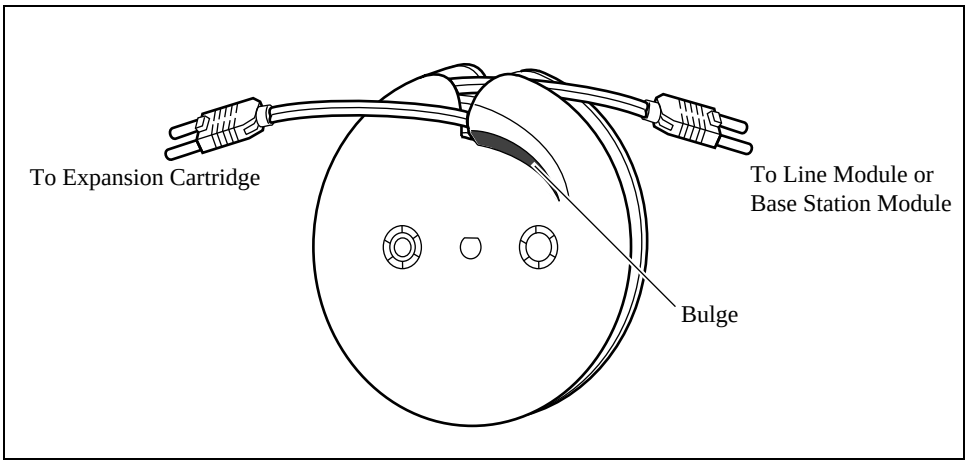
- Avoid any excessive pulling, bending, or tightening of cable ties when bundling fiber cables.
- Do not bend a fiber cables into a right-angle. Fiber cable bends must not be smaller than a 50-mm radius.
- When inserting a fiber cable into an optical port, ensure you grasp the plug, and not the fiber cable itself.
- Keep fiber cable ends and optical ports clean and dry.
- Install the fiber cales last, after the power cords and amphenol cables.
- Take care when closing the doors on the Controller that the fiber cables are not crimped.

Insert the fiber cable plug in the correct orientation.

When inserting a fiber cable plug in any optical port, ensure that the triangular hole at the base of the plug is on your left.

To help minimize damage to the fiber cable due to bending and crushing, each fiber cable comes with its own spool, as shown in the following illustration.

Figure 27: Fiber cable on spool



For the six closest modules:

1. Plug the fiber cable into the optical port in front of the Line Module or Base Station Module. Remove the optical port protector before connecting the fiber cable connector.
2. Carefully route the fiber cable down under the cable clip, through the top shelf of the cable trough, and into the Controller cable trough, unwinding the cable from the spool as needed.
3. Insert the spool in one of the Controller cable trough slots. Ensure that the bulge on the spool is not in the slot.

   Note: Do not lay the spool horizontally in the trough since this could lead to the cable being bent beyond its minimum radius.
4. Route the end of the fiber cable coming out of the bulge of the spool to the Expansion Cartridges, unwinding the cable from the spool as needed. Plug the fiber cable into the appropriate port of the Expansion Cartridges (see the "Expansion Cartridge port numbering" illustration). Remove the optical port protector before connecting the fiber cable connector.

For the six furthest modules:

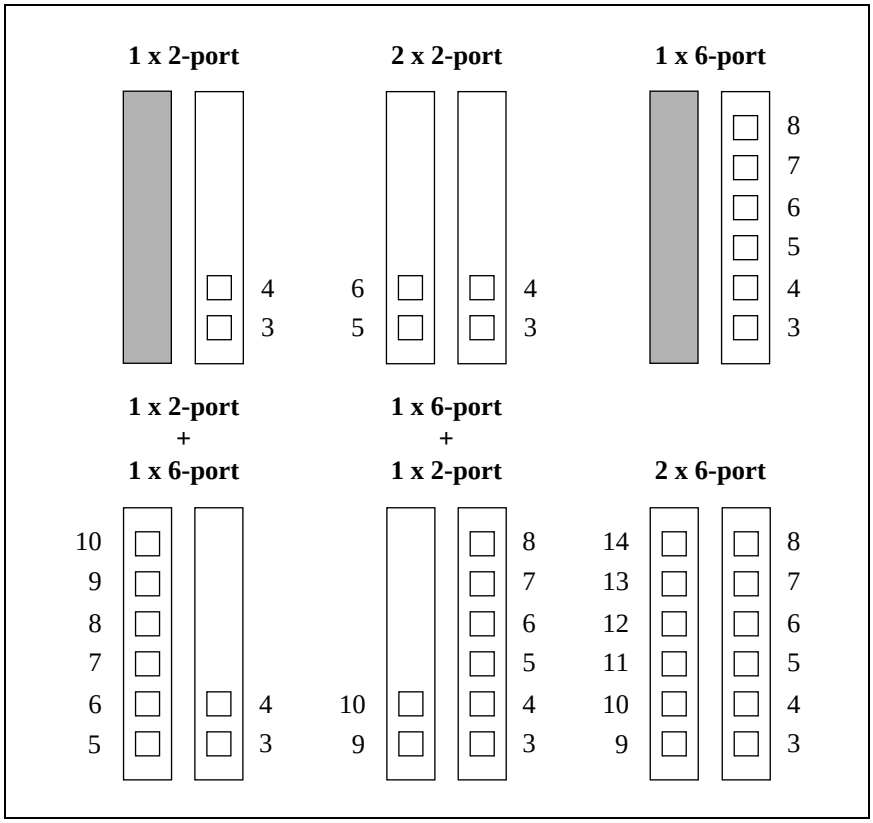
1. Plug the fiber cable into the optical port in front of the Line Module or Base Station Module. Remove the optical port protector before connecting the fiber cable connector.
2. Carefully route the fiber cable down under the cable clip, through the top shelf of the cable trough, and into the Controller cable trough, unwinding the cable from the spool as needed.
3. Route the end of the fiber cable coming out of the bulge of the spool to the Expansion Cartridges, unwinding the cable out of the spool. Plug the fiber cable into the appropriate port of the Expansion Cartridges (see the "Expansion Cartridge port numbering" illustration). Remove the optical port protector before connecting the fiber cable connector. Discard the spool.

Expansion Cartridge port numbering

Plug Line Modules from the highest available port number and work down.

Plug Base Station Modules from the lowest available port number and work up.

Figure 28: Expansion Cartridge port numbering



Installing cable trough end plates

When the Controller, Line Modules and Base Station Modules are installed and wired, you can install cable trough end plates at both ends of the cable trough corridor formed by all the cable troughs.

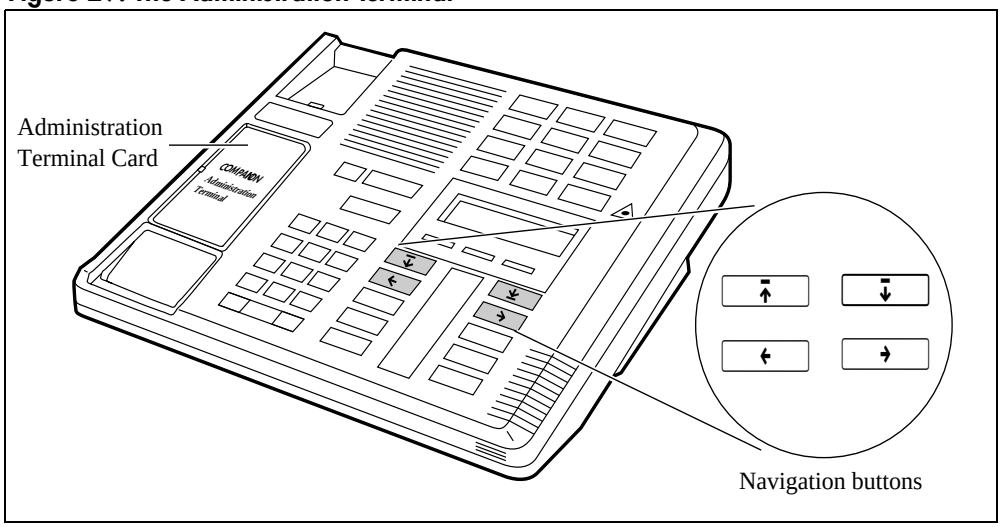
To install a cable trough end plate:

1. Slide the end plate into the external side of the cable trough corridor.
2. Close the cable trough door.

Installing the Administration Terminal

Setting up the Administration Terminal

Figure 29: The Administration Terminal



The Administration Terminal cannot be used to make or receive telephone calls.

Connecting the Administration Terminal directly to an access line or host switch line may result in equipment damage.

To install the Administration Terminal, follow these steps:

1. Remove the Administration Terminal from its box.
2. Do not attach the receiver. (You may want to discard it because the Administration Terminal cannot be used as a telephone.)
3. Place the Administration Terminal Card as shown in the illustration.
4. Remove and discard the button caps from the ten buttons below the display screen.
5. Place the navigation button caps on the top four buttons (navigation buttons), as shown in Figure 28.
6. Place the clear button caps on the bottom six buttons.
7. If you are installing the Administration Terminal on a wall, or any other vertical surface, follow the instructions in “Mounting the Administration Terminal on the wall.”

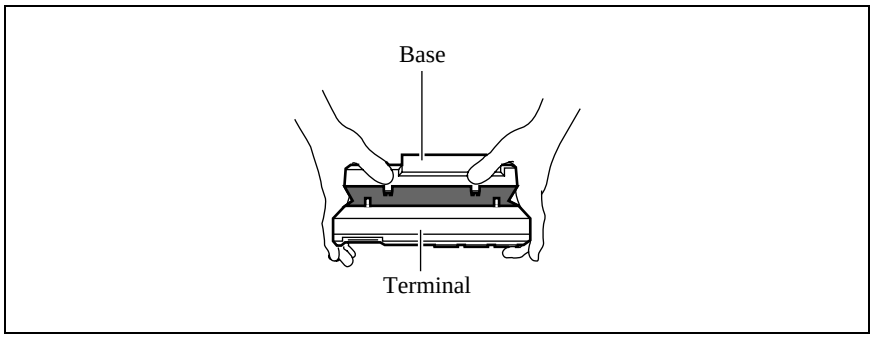
8. Connect one end of the telephone cord to the terminal marked at the back of the Administration Terminal, and the other to **port 0101** on the Controller.

Mounting the Administration Terminal on the wall

To mount the Administration Terminal on the wall, follow these steps:

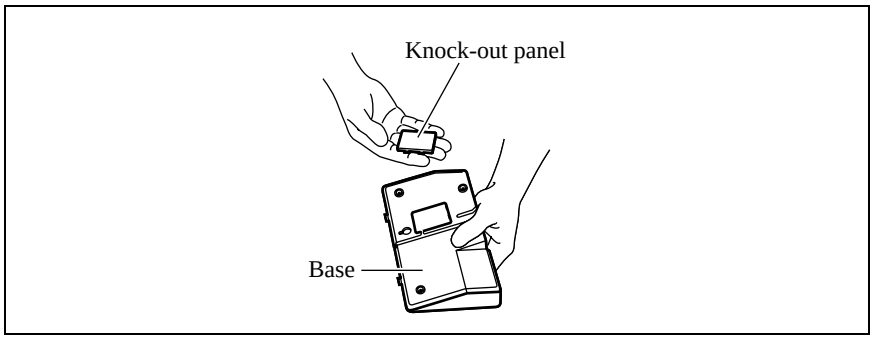
1. Remove the wall-mounting bracket from the base of the Administration Terminal. Grip the base, and with both thumbs, push on the top to pop it out.

Figure 30: Removing the Administration Terminal wall-mounting bracket



2. Use a screwdriver or similar tool to remove the center knock-out panel from the base.

Figure 31: Removing the knock-out panel



3. With the thin end up, hold the base against the wall and mark the positions of the three fixing screws.
4. Route the line cord along the guide in the base and through the knocked-out hole.
5. Screw the mounting base to the wall.
6. Connect the line cord into the terminal in the base of the Administration Terminal.

7. Tuck any spare cable into the base.
8. Plug the terminal into **port 0101** of the Controller.
9. Snap the Administration Terminal onto the base.

Installing Base Stations

The site planner records locations for Base Stations in the *COMPANION 200 Provisioning Record*. Before you install a Base Station, you must take care to locate it in the position the site planner determined.

Note: To install a Base Station powered by a plug-top power supply, see Appendix E.

Each Base Station must be installed within 1200 meters (TCM wiring length) of the Controller or Base Station Module.

To optimize seamless hand-offs, the difference in TCM wiring length between neighboring Base Stations should not exceed 300 meters.

Positioning a Base Station

Avoid installing Base Stations on large concrete or marble columns since this affects radio coverage. If possible, place the Base Station at least 1 meter from such columns. Try not to mount a Base Station where metalwork is within 16 cm of the antenna housings. Be careful not to damage existing wiring or panels.

Do not position Base Stations in ducts, plenums, or hollow spaces used to transport environmental air except where the duct, plenum or hollow space is created by a suspended ceiling having lay-in panels or tiles.

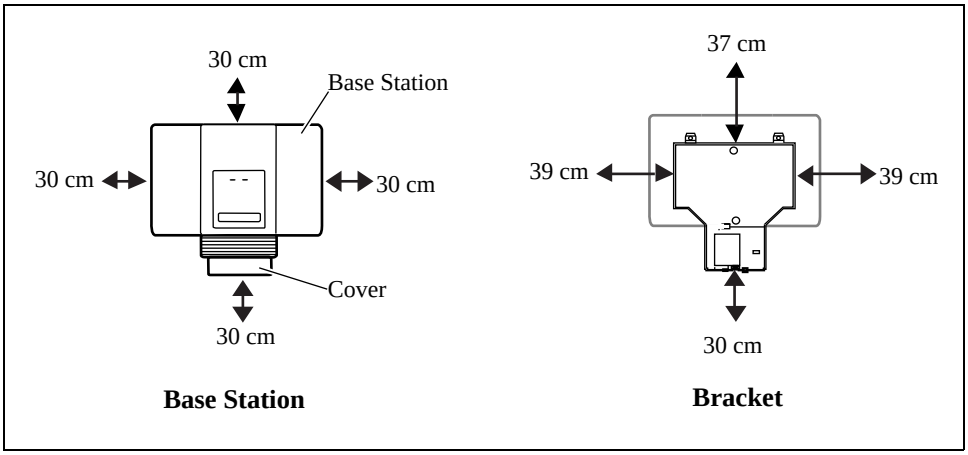
If more than one Base Station is required in one cell to meet traffic demands, mount all the Base Stations in that cell on the same mounting surface, within 1.5 meters of each other, and at least 30 cm apart.

Mounting a Base Station

Base Stations can be mounted on a wall or on a ceiling (when mounting on a wall, install it with the cover at the bottom, as shown

in the illustrations). Allow for the following clearance around the Base Station:

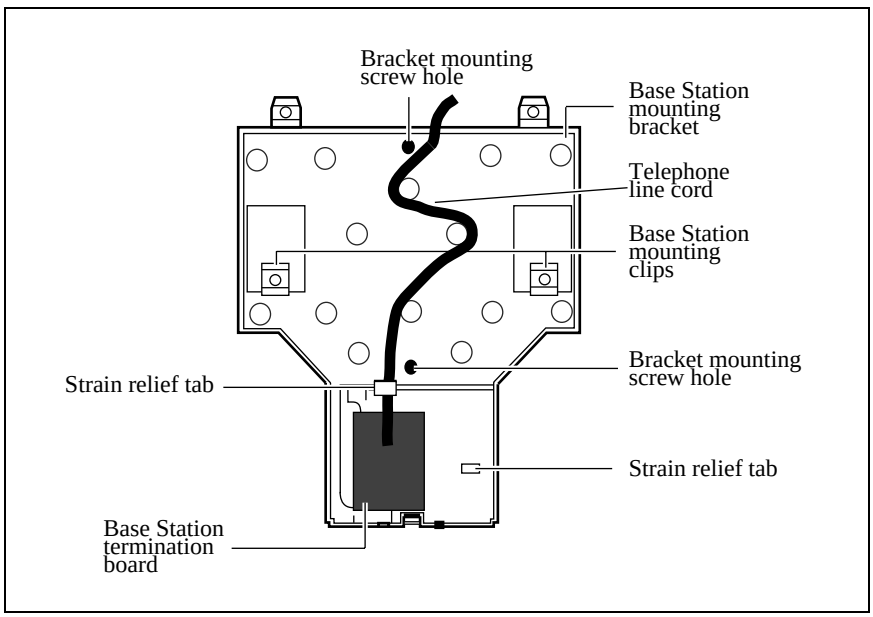
Figure 32: Clearance for the Base Station



To mount a Base Station, follow these steps:

1. Fasten the bracket into position using two screws.
2. Route the cable from the Controller through the top (or bottom) opening.
3. Wind any excess cable around the posts to secure it, then fasten it under the strain relief.

Figure 33: Base Station bracket detail

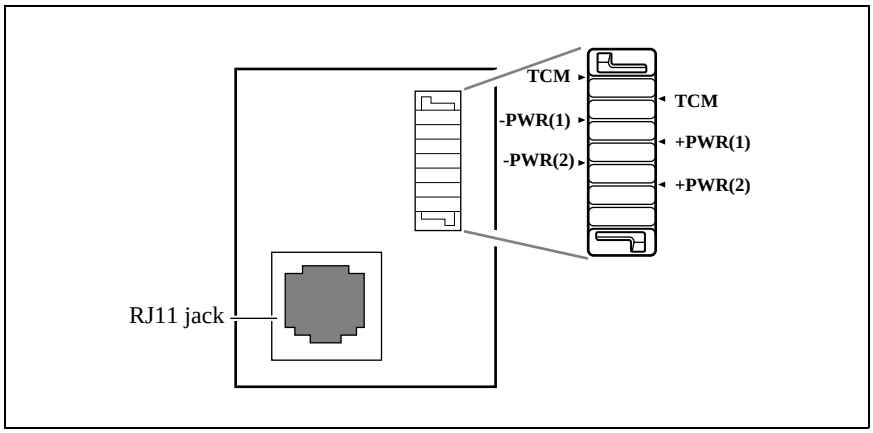


4. Connect the wires to the Krone or BIX connector on the bracket termination board as shown in the following illustration.

Note: The polarity of the TCM connections is not important. If **two** power pairs are brought in, they must be connected with the **same polarity** to the Base Station bracket termination board.

Ensure that the RPI is OFF before connecting power pairs to the Base Station.

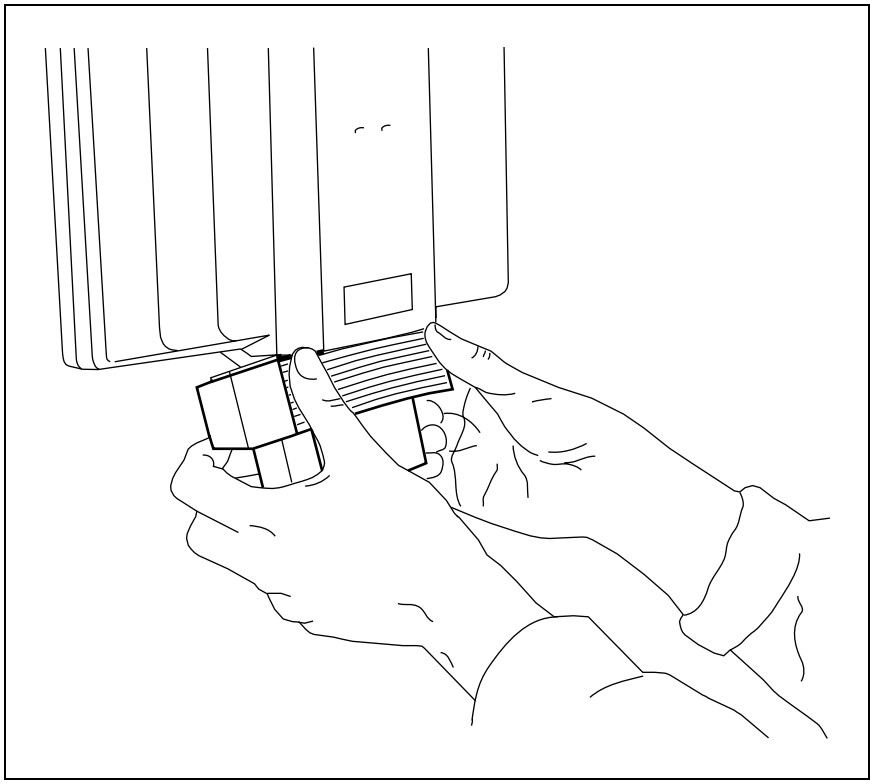
Figure 34: Bracket termination board



5. Hang the Base Station onto the bracket, snapping it into position.
6. Connect the power RJ11 jumper lead to the RJ11 jacks on the termination board and the Base Station.
7. Record the associated Controller port number in the space provided on the printed label affixed on the lower right corner of the mounting bracket.

   Note: Include the labeling information for each Base Station on the completed installation floor plans and the *COMPANION 200 Programming Record* for later reference.
8. Slide the cover onto the bracket, using the guide to position it properly. Snap it into place.

Figure 35: Sliding cover onto bracket



Installing external antennas

There are three types of external antennas:

- indoor directional
- indoor omni-directional
- outdoor omni-directional

There are separate installation procedures for each type. You must also install a lightning surge protector for each outdoor external antenna installed.

The following are requirements for installing external antennas:

- If you are installing an external antenna on a metal surface greater than 18 cm in diameter, position the antenna perpendicular to the surface.
- When running the co-axial cable inside or outside, do not to kink, stretch, or crush the cable. This will seriously affect its performance. The minimum recommended bending radius is 20 mm.

- Always ensure that the antenna is clear of any adjacent obstruction, particularly metal. If more than one external antenna is used at a cell center, they should be spaced at least 0.5 m from each other to avoid radio interference problems.
- Use RG-58/U co-axial cables to connect the antennas to the Base Stations.

Only passive antennas may be connected to the COMPANION Base Stations.

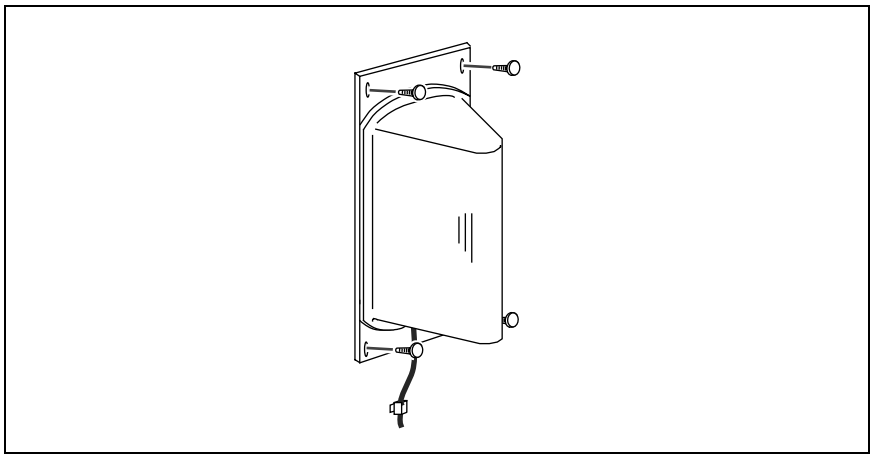
The co-axial cable connecting the external antenna to a Companion Base Station must have an impedance of 50 ohms.

Installing an indoor directional external antenna

The indoor directional external antenna comes with its own back plate for mounting. The recommended mounting height on a wall is halfway between the floor and the ceiling.

Note: For some applications (for example, a stairwell), you can mount the antenna on the ceiling.

Figure 36: Indoor directional external antenna



1. Mount the antenna using four screws.
2. To prevent undue stress on the co-axial cable, secure it to the mounting surface.
3. Connect the antenna to the appropriate Base Station radio.

   Note: The co-axial cable length must not exceed 10 m.

Installing an indoor omni-directional external antenna

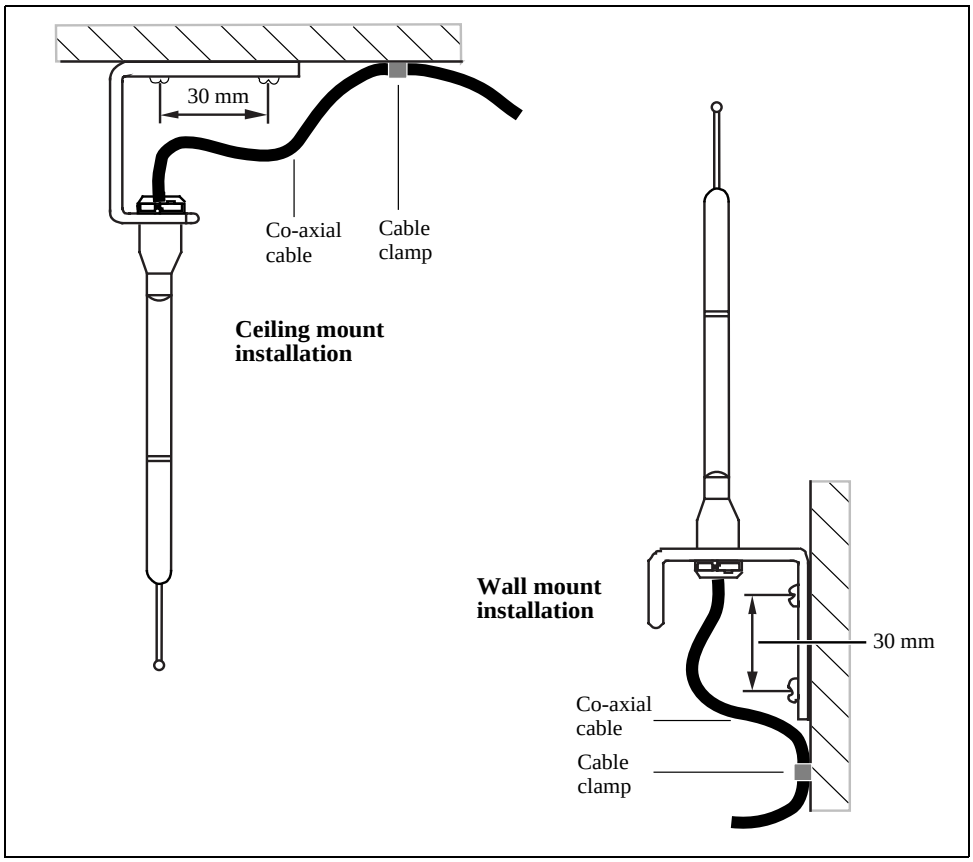
When installing an indoor omni-directional external antenna:

- Use the bracket supplied to mount the antenna on a wall or ceiling.

Note: Use of a bracket other than the one supplied may not provide the necessary clearance between the floor or wall and the antenna.

- Install the bracket so that the external antenna is vertical. The recommended mounting height on a wall is halfway between the floor and the ceiling.

Figure 37: Installing an indoor omni-directional external antenna



1. Insert the antenna in the bracket so that the antenna is vertical.
2. Mount the bracket to the wall or ceiling using two screws.

3. To prevent undue cable stress on the co-axial cable, secure it to the mounting surface with a clamp.
4. Connect the external antenna to the appropriate Base Station radio.

Note: The length of the co-axial cable must not exceed 10 m.

Installing an outdoor omni-directional external antenna

When installing an outdoor omni-directional external antenna:

- Locate the antenna on the external wall of the building.

  Note: The antenna must be mounted on a vertical surface.

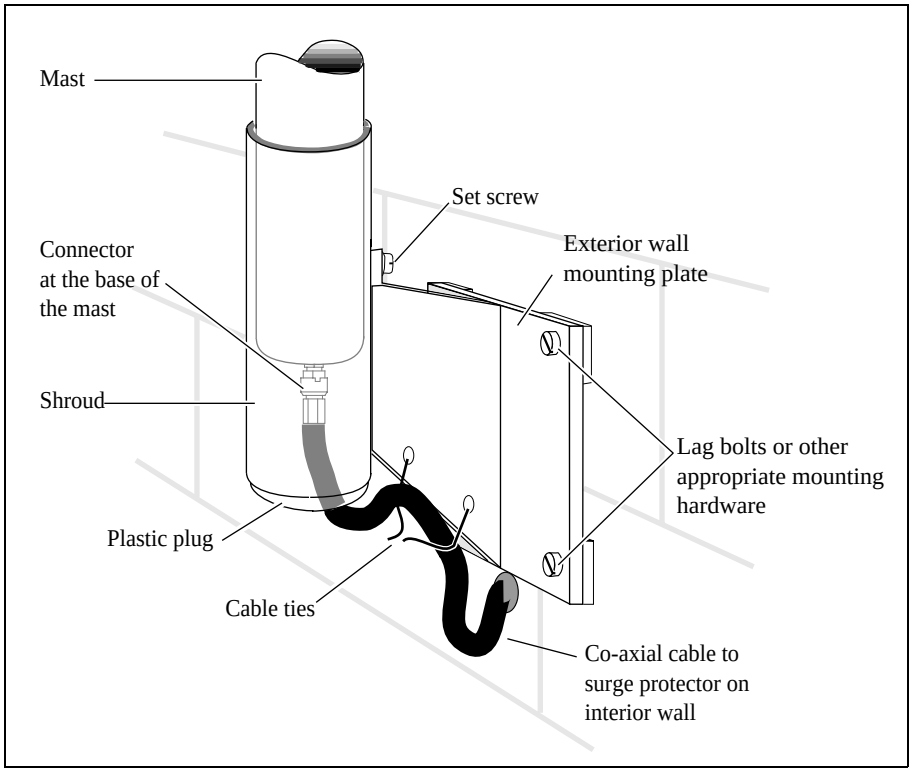
- Keep the outdoor omni-directional external antenna as close as possible to the Base Station serving it (the Base Station *must* be inside). The recommended mounting height is 4 to 5 m above ground level.
- Always install a surge protector between an outdoor omnidirectional antenna and a Base Station.

  Note: The connector on the outdoor omni-directional antenna is a TNC female connector, so you need an adapter to connect it to the standard BNC co-axial cables needed for the surge protector and the Base Station. You can also use a co-axial cable with a TNC male connector on one end and BNC male connector on the other end.

!	**Fit lightning protection to the antenna if appropriate.** See "Installing a lightning surge protector."

!	**Important points to remember:** • Do not install the external antenna or the lightning surge protector during an electrical storm. • Always turn off the Base Station power before connecting the co-axial cable of an outdoor external antenna. • Always install the antenna at the cable entry point into the building. • Connect the lightning surge protector to ground before connecting the co-axial cable.

Figure 38: Installing the outdoor omni-directional external antenna



To install an outdoor omni-directional external antenna, follow these steps:

1. Screw the antenna mounting plate vertically to the exterior wall of the building with lag bolts or other appropriate hardware as shown in the illustration, “Installing the outdoor omni-directional external antenna.”
2. Feed one end of the co-axial cable up through the bottom of the antenna shroud and attach the BNC connector to the base of the mast.
3. Slide the mast down into the shroud until it fits.
4. Rotate the mast until the threaded hole in the base of the mast is aligned with the set screw hole in the shroud, and then tighten the set screw.
5. Route the co-axial cable along the bottom edge of the plate between the shroud and the wall plate and tie the cable up.

Note: The total length of the co-axial cables from the outdoor external antenna to the Base Station must not exceed 10 m.

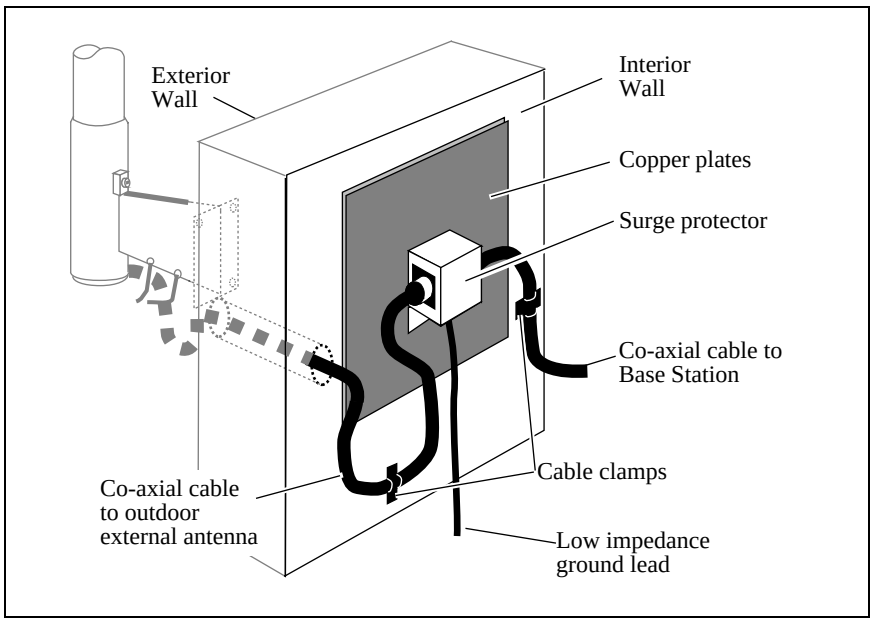
6. Insert the plastic plug into the base of the shroud to keep the weather out.
7. Feed the co-axial cable through the wall to the surge protector on the interior wall.

Installing a lightning surge protector

Install the lightning surge protector for the outdoor omni-directional antenna to protect it from electrical surges. The recommended lightning surge protector is part number A0382082. Refer to the manufacturer's installation instructions for more details on its installation. To install a lightning surge protector, follow these steps:

1. Mount the surge protector on the interior wall, shown in the following illustration, as close as possible to the entry point of the co-axial cable from the outdoor external antenna. Follow the installation instructions that come with the surge protector.

Figure 39: Installing the lightning surge protector



2. Before you connect the ground lead to the surge protector, attach it to an approved ground. The recommended wire gauge is 6 AWG (4 mm). Connect the ground lead to the building ground. **Do not connect to a ground rod or series of ground rods**. If you cannot connect the ground lead to the building ground, connect it to the building's steel (the connection should be no more than two to trhee meters. You can also connect the ground lead to the 120 Vacconduit (which is connected to the building ground), but this is **not** a preferred solution.

3. Route and connect the co-axial cable from the outdoor external antenna to the surge protector.
4. Route and connect the co-axial cable from the surge protector to the appropriate Base Station BNC connector.

Note: The total length of the co-axial cables from the outdoor external antenna to the Base Station must not exceed 10 m.

Powering up

When you have finished installing and wiring the COMPANION 200 equipment, you can power up the system:

1. Connect the power cords of the Controller (or power bars) and the Remote Power Interconnect units to the ac outlets.

   Note: Use non-switchable, third-wire ground ac outlets.

2. Verify that the green power-on lights are lit on the Controller, Line Modules, and Base Station Modules.

   a. If none of the power-on lights are lit, see “Troubleshooting power” in the troubleshooting section.

   b. If the Controller power light is not lit, see “Troubleshooting the Controller” in the troubleshooting section.

   c. If a Line Module power light is not lit, see “Troubleshooting a Line Module” in the troubleshooting section.

   d. If a Base Station Module power light is not lit, see “Troubleshooting a Base Station Module” in the troubleshooting section.

3. Verify that the indicators on the Administration Terminal flash while the system is initializing. When the system has initialized itself, a time and date appear on the display of the Administration Terminal.

   If the indicators on the Administration Terminal do not flash, or a time and date do not appear on the display, see “Troubleshooting the Administration Terminal” in the troubleshooting section.

4. When required, the system begins downloading software into all Base Stations, and the Administration Terminal display shows `BS-1 Dload Start`. Some Base Stations may not be powered up at the same time, and this message will repeat at the beginning of each download. To clear the message, press `CLEAR`. When all

the Base Station software is downloaded, the Administration Terminal shows `BS 1Dload Done`.

When the system begins the Data Re-evaluation procedure, the display shows `Re Eval in prog.`. When the re-evaluation procedure is completed, the display shows `Re Eval complete`. Clear the message using `CLEAR`.

Note: If a Base Station is removed or added while Data Re-evaluation is running, the re-evaluation procedure will take twice as long to complete.

Approximate run times for Base Station download and Data Re-evaluation are shown in the following table:

# Base Stations	Re-evaluation run time
20	6 minutes
40	14 minutes
60	19 minutes
80	23 minutes
100	28 minutes
120	32 minutes
140	34 minutes
160	41 minutes
180	45 minutes
200	49 minutes
224	54 minutes

Programming the COMPANION 200

Introduction to programming

Note: Before programming the COMPANION 200, ensure with the System Administrator or the Telecom Manager that all the appropriate programming has been completed on the host switch (see Appendix D).

Once the COMPANION 200 is installed and powered up, you must program it. This section describes programming the COMPANION 200 using the Administration Terminal. You will find a summary of Administration Terminal programming in Appendix C.

The Programming Record

Record all programming in the *COMPANION 200 Programming Record*. The Programming Record is divided into two groups of information: system-wide programming and user-specific programming. This record enables you to see at a glance all the programming that has been done, and will make it easier for you to expand your system in the future.

Programming the COMPANION 200

For the system to operate properly, you must:

- Program the appropriate information on the characteristics of all the lines coming into the COMPANION 200 from the host switch (for example, tone or pulse).
- Program the Base Station radios that have an external antenna.
- Register the portables.

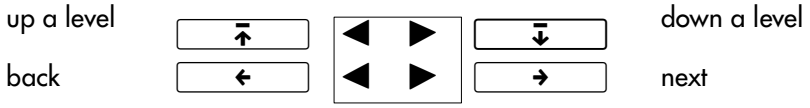
People who receive portables can customize them. This information is not included on the *COMPANION 200 Programming Record*.

The COMPANION 200 Administration Terminal

The COMPANION 200 can be programmed using an Administration Terminal. The Administration Terminal has a two-line display and three types of buttons. You cannot make or receive calls on the Administration Terminal. It is used only for system programming and maintenance.

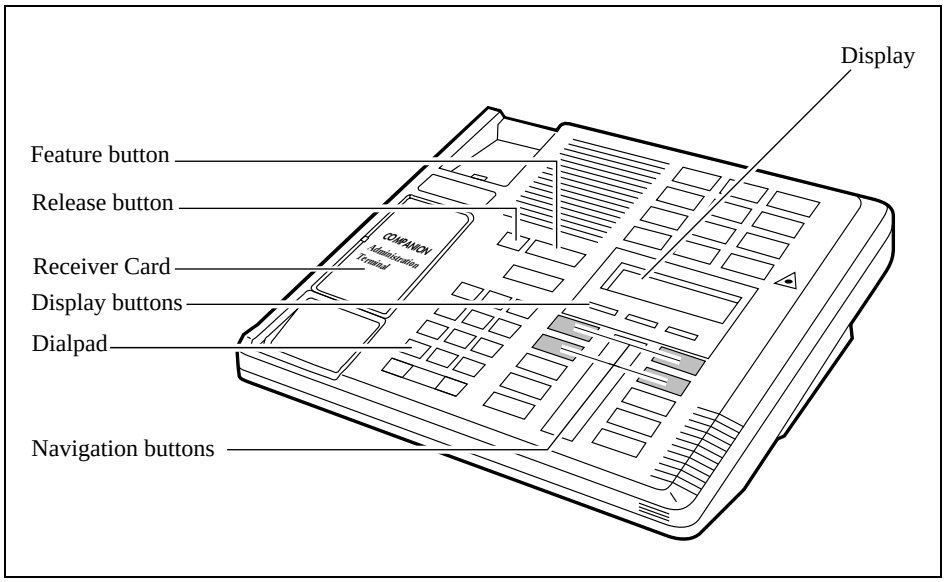
Buttons

- ***f***: Press the feature button to enter a feature operation or programming session on the Administration Terminal.
- ®: Press the release button to exit a feature operation or programming session on the Administration Terminal.
- **Display buttons**: The Administration Terminal has three display buttons directly beneath the display. During feature operation or programming, these display buttons provide options relating to the top line of text on the display. If an option is available, it is labeled on the bottom line of the display directly above the corresponding button. Display buttons are represented in this guide by underlined words in a special typeface (for example, OK).
- **Dialpad buttons**: Use the buttons on the dialpad of the Administration Terminal to enter feature codes and to select digits when you are required to enter a value. You can enter letters as well as the digits represented on the dialpad buttons when programming some features (for example, System LID).
- **Navigation buttons**: The Administration Terminal has four navigation buttons immediately below the display buttons. These navigation buttons are used to move through the various feature options and programming settings. An arrow (◀ or ▶) appears in the window beside the navigation button when it is enabled. The navigation buttons are arranged as follows:



- If the navigation buttons on your Administration Terminal do not correspond to the above arrangement, remove the button caps and replace them on the correct buttons. The buttons below the navigation buttons are not used and have been disabled.

Figure 40: Administration Terminal



Display

The Administration Terminal has a two-line display. The top line presents text to assist you during feature operation or programming. It also indicates the characters you have selected when you are required to enter a value. The bottom line presents text that labels the function of the display button directly below it.

Display language

You can choose to have the Administration Terminal display text in English or French.

Note: This feature will not work while you are in a programming session.

To select English press Feature * 5 0 1.

To select French, press Feature * 5 0 2.

Understanding alarm messages

When an alarm occurs on the COMPANION 200 system, codes are presented on the display of the Administration Terminal . These codes can be interpreted by your COMPANION 200 system supplier to detect problems affecting system operation. The Administration Terminal must be connected to port 0101 on the Controller to receive alarm messages.

This is an example of an alarm message:

```
Alarm: 52-42
TIME CLEAR
```

If an alarm message appears on the Administration Terminal's display:

1. Note the alarm code.
2. Follow the procedures in "Alarm troubleshooting" for the given alarm to determine the cause of the alarm.
3. To see when the alarm occurred, press TIME.
4. To clear the alarm, press CLEAR.

When a problem occurs, alarm codes can take up to two minutes to be displayed on the Administration Terminal. If the Controller was turned off when the failure occurred, the alarm code appears two minutes after the Controller is turned on.

Time and date

The current system time and date are displayed on the properly functioning Administration Terminal when it is idle. It is important to ensure that the time and date displayed are correct because your COMPANION 200 system uses these values when logging Maintenance messages.

Adjusting the contrast

If you find the Administration Terminal display hard to read, you can adjust the contrast.

Note: This feature will not work while you are in a Configuration, Maintenance, or Administration session.

To adjust the contrast, follow these steps:

1. Press Feature * 7 on the Administration Terminal.
2. The display will show `Contrast level` followed by the current contrast level expressed as a digit.
3. To select a new contrast level, press a dialpad number button. (0 is the lowest setting and 9 is the highest setting.) You may also press DOWN or UP to set the new contrast level.
4. When the contrast level you want is displayed, press OK.

Configuration programming

To enter Configuration programming:

1. Press Feature * * 2 6 6 3 4 4. The display shows `Password:`.

2. Enter the Installer password. The default password is 2 6 6 3 4 4 (or C O N F I G) .
3. If the password is correct, the display shows **A.Configuration**. If the password is incorrect, the display shows **Password:**. Press RETRY, and enter the password again.
4. Press [↓]. The display shows **1. Line Data**.

To end Configuration programming, press Rls .

Administration programming

To enter Administration programming:

1. Press Feature * * 2 6 6 3 4 4 . The display shows **Password:**.
2. Enter the Installer password. The default password is 2 6 6 3 4 4 (or C O N F I G).
3. If the password is correct, the display shows **A.Configuration**. If the password is incorrect, the display shows **Password:**. Press RETRY, and enter the password again.
4. Press [→]. The display shows **B.Administration**.
5. Press [↓]. The display shows 1. **Reg. Control**.

To end Administration programming, press Rls .

Changing the Installer password

To enter Configuration and Administration programming, Maintenance, and Memory Reset, you must use the Installer password. The default is 2 6 6 3 4 4 (or C O N F I G).

> **You should change the Installer password after the system is installed to protect the integrity of the settings.**
>
> To prevent unauthorized access, provide the Installer password only to selected personnel.

Record your password.

Record any password changes in the *COMPANION 200 Programming Record.* If you forget the Installer password you will not be able to enter Programming, Maintenance, Memory Reset, or System Startup.

The Installer password must have at least one digit and no more than six digits.

1. Enter Configuration programming.
2. Press [→] or [←] until the display shows `2.Miscellaneous`.
3. Press [↓]. The display shows `Link Time:` followed by the currently programmed Link time.
4. Press [→] until the display shows `Installer pswd.`.
5. Press CHANGE. The display shows `New pswd: _`.
6. Enter a new one- to six-digit Installer password. Use BKSP to correct your entry if necessary. When done, press OK. The display shows `Re enter: _`.

   Note: If you do not enter any digits and press OK, the display shows `Pswd not changed`.
7. Re-enter the digits and press OK. The display should show `Password changed`. If the display shows `Pswd not changed`, you did not enter the same password again. Go back to step 5 and repeat the process.
8. Record the new Installer password in the *COMPANION 200 Programming Record*.

Changing the Registration password

You must enter the registration password on each portable to successfully register it with the COMPANION 200 system. The default is [7] [2] [3] [4] [6] (or [R] [A] [D] [I] [O]), but you should set your own password. You can choose any combination of one to six

digits. You will find it easier to remember the password if the numbers correspond to a word.

> **You should change the Registration password after the system is installed to protect the integrity of the settings.**
>
> To prevent unauthorized access, provide the Registration password only to selected personnel.

To change the Registration password, follow these steps:

1. Enter Administration programming.
2. Press [→] or [←] until the display shows `6. Passwords`.
3. Press [↓]. The display shows `Admin. password`.
4. Press [→]. The display shows `Reg. password`.
5. Press CHANGE. The display shows `New pswd: _`.
6. Enter a new one- to six-digit Registration password. Use BKSP to correct your entry if required. Press OK. The display shows `Re-enter: _`.

   Note: If you do not enter any digits and press OK, the display shows `Pswd not changed`.
7. Re-enter the digits and press OK. The display should show `Password changed`. If the display shows `Pswd not changed`, you did not enter the same password again. Go back to step 5.
8. Record the new Registration password in the *COMPANION 200 Programming Record*.

Programming the system settings

To properly set up the system, you must change or program the following settings:

- Set the system time and date
- Set the dial mode of an access line
- Set the Link time
- Set the host switch delay
- Set the gain pad

There are also two optional system settings you can change if needed:

- System LID
- Radio antenna type

System time

Note: Program the time and date immediately after your COMPANION 200 system is operational. You will have to reprogram the time twice a year because of Daylight Savings Time. The time should also be reprogrammed if the power is OFF for more than three days.

To set the system time, follow these steps:

1. Enter Administration programming.
2. Press [→] or [←] until the display shows `5. Time and Date`.
3. Press [↓]. The display shows `Time` followed by the current system time.
4. Press CHANGE. The display shows `Hour:`, followed by the current system hour. If you don't want to change the hour, go to step 7.
5. Press CHANGE The display shows `Hour: _`.
6. Enter the hour in 12- or 24-hour format, as one or two digits.
7. Press [→]. The display shows `Minutes:`, followed by the current system minutes. If you don't want to change the minutes, go to step 10.
8. Press CHANGE. The display shows `Minutes: _`.
9. Enter the minutes as one or two digits, for example 1or 01.
10. Press [→]. If you entered an hour less than or equal to 12, the display prompts you with `AM` or `PM`. If you entered an hour greater than 12, go to step 12.
11. Press CHANGE to select AM or PM.
12. Press [→] to set the date, or [↑] twice to continue in Administration programming.

System date

Note: Program the time and date immediately after your COMPANION 200 system is operational.

To set the system date, follow these steps:

1. Enter Administration programming.
2. Press [→] or [←] until the display shows `5. Time and Date`.
3. Press [↓]. The display shows `Time`, followed by the current system time.
4. Press [→]. The display shows `Date`, followed by the current system date.
5. Press CHANGE. The display shows `Year:` followed by the current system year. If you don't want to change the year, go to step 8.
6. Press CHANGE. The display shows `Year: _`.
7. Enter the last two digits of the year.
8. Press [→]. The display shows `Month:`, followed by the current system month. If you don't want to change the month, go to step 11.
9. Press CHANGE. The display shows `Month: _`.
10. Enter the month as one or two digits between 1 and 12.
11. Press [→]. The display shows `Day:`, followed by the current system day. If you don't want to change the day, go to step 14.
12. Press CHANGE. The display shows `Day: _`.
13. Enter the day of the month as one or two digits between 1 and 31.
14. Press [→] to continue in Administration programming.

Dial mode

The dial mode of an access line can be either Tone or Pulse. Pulse is traditionally used by rotary-dial telephones. Tone, the default setting, is also known as dual-tone multi-frequency (DTMF). Dial mode must be programmed according to the requirements of the host switch (unless specified otherwise, this should be Tone). Always

record the latest signaling mode setting for each access line in the *COMPANION 200 Programming Record*.

> **If the dial mode is set incorrectly, you may not be able to make calls.**

Changing the dial mode of an access line

To change the dial mode of an access line, follow these steps:

1. Enter Configuration programming.
2. Press [→] or [←] until the display shows `1. Line Data`.
3. Press [↓]. The display shows `Show line: _`.
4. Enter the three-digit line number. The display shows `Dial mode:Tone` or `Dial mode:Pulse`.
5. Press CHANGE to change the dial mode.
6. Record the programmed dial mode for the access line in the *COMPANION 200 Programming Record*.
7. To continue in Configuration programming, press [↑] twice.

Copying dial mode settings

A COPY display button appears in the Line Data part of Configuration programming. With this button, you can copy the dial mode settings from one line to one or more other lines.

To copy dial mode settings:

1. Enter Configuration programming.
2. Press [→] or [←] until the display shows `1. Line Data`.
3. Press [↓]. The display shows `Show line: _`.
4. Press COPY. The display shows `Source: _`.
5. Enter the three-digit line number that you want to copy *from*. The display shows `Copy to line:_`.
6. Enter the three-digit line number that you want to copy to. The display shows `Copied nnn > mmm`, then `Copy to line:_`.
7. To continue copying the settings of the line selected in step 5, repeat step 6.

To choose another line to copy from, press [←] and go to step 5.

8. To continue in Configuration programming, press [↑] twice.

Link time

Link time is a Configuration programming setting that specifies the length of the break in the connection used by the host switch to activate features such as Call Transfer.

Link time setting options range from 100 ms to 1000 ms, in 100 ms increments. The default is 600 ms. You must program the Link time according to the requirements of the host switch. Always record the latest programmed Link time in the *COMPANION 200 Programming Record*.

To set the Link time, follow these steps:

1. Enter Configuration programming.
2. Press [→] or [←] until the display shows `2.Miscellaneous`.
3. Press [↓]. The display shows `Link Time:` followed by the currently programmed Link time.
4. Press `CHANGE` to loop through the setting options until the Link time you want is displayed.
5. Record the programmed Link time in the *COMPANION 200 Programming Record*.
6. To continue in Configuration, press [↑].

Host delay

Host delay (Host switch delay) is a Configuration programming setting that specifies the delay between the time an access line is selected for an outgoing call and the transmission of the dialed telephone number on that access line. This delay ensures that a dial tone is present before the dialed telephone number is transmitted.

Host delay setting options range from 200 ms to 2000 ms, in 200 ms increments. The default is 1000 ms. You must program the Host delay according to the requirements of the host switch. Always record the latest programmed Host delay in the COMPANION 200 Programming Record.

To set the Host delay, follow these steps:

1. Enter Configuration programming.
2. Press [→] or [←] until the display shows `2.Miscellaneous`.
3. Press [↓]. The display shows `Link Time`: followed by the currently programmed link time.
4. Press [→]. The display shows `Host delay:` followed by the currently programmed Host delay.
5. Press CHANGE to loop through the setting options until the Host delay you want is displayed.
6. Record the programmed Host delay in the *COMPANION 200 Programming Record*.
7. To continue in Configuration programming, press [↑].

Gain pad

Gain pad sets the transmission loss and receiving gain between the host switch and the Controller. The gain pad needed for your system depends on the loop length of the access lines from the host switch to the Controller.

1. Enter Configuration programming.
2. Press [→] or [←] until the display shows `2.Miscellaneous`.
3. Press [↓]. The display shows `Link Time` followed by the currently programmed Link time.
4. Press [→] or [←] until the display shows `Gain Pad`.
5. Press [↓]. The display shows the currently programmed gain pad (`Short Loop` or `Long Loop`).
6. Press CHANGE to change the `Gain Pad`.
7. To continue in Configuration programming, press [↑] twice.

Optional system settings

System LID

The System LID setting allows you to program the System Access Logical Identifier (System LID). The system uses this code to identify itself to portables, and the portables use it to request service from the system. The System LID must be a hexadecimal number (four characters composed of a combination of the digits 0 to 9 and

the letters A to F) between 0401 and FFFE. The default is randomly generated by the system at startup.

Note: The System LID should only be changed if an adjacent wireless system has the same System LID.

> **Changing the System LID deregisters all portables.**
>
> If you change the System LID, you will invalidate the registration of all the portables on the system. Portables will have to be re-registered before they can be used with the system.
>
> Only an Installer should change the System LID.

To change the System LID, follow these steps:

1. Enter Configuration programming.
2. Press [→] or [←] until the display shows `3. Radio Data`.
3. Press [↓]. The display shows `Re-Evaluation`.
4. Press [→]. The display shows `Radios`.
5. Press [→] until the display shows `System LID:`, followed by the currently programmed System LID.
6. Press CHANGE. The display shows `System LID:_`.
7. To enter one of these numbers, 1, 4, 5, 6, 7, 8, 9, 0, press the corresponding dialpad button.

   To enter one of the these characters, A, B, C, D, E, F, 2, 3, press the dialpad button indicated in the following table until the desired character is displayed.

Character:	Dialpad button
A, B, C, 2	2
D, E, F, 3	3

8. When you have entered the desired character, press --> to move the cursor to the next character position.
9. Repeat steps 7 and 8 until all four characters are entered. To correct a character, press <-- or --> to move the cursor back to that character, and repeat step 7.
10. Press OK. If the LID entered is valid, the display shows `LID changed`, then `System LID:`, followed by the new System LID.

If the LID entered is not valid, the display shows `LID not changed`. Go back to step 6 and repeat the process.

11. Record the new System LID in the *COMPANION 200 Programming Record*.
12. To continue in Configuration programming, press [↑].

Setting the antenna type for a radio

You must tell the system when an external antenna is installed or removed. The setting options are internal or external antenna. The default at system start up is internal. Always record the current setting in the *COMPANION 200 Programming Record.*

A radio is identified by a five-digit number. For example, the number 01121 means module 01, port 12 and radio 1.

1. Enter Configuration programming.
2. Press [→] or [←] until the display shows `3. Radio Data`.
3. Press [↓]. The display shows `Re-Evaluation`.
4. Press [→]. The display shows `Radios`.
5. Press [↓] . The display shows `Show radio:_`.
6. Enter the five-digit radio number you wish to program. The display shows `Cell Assignment`.
7. Press [→]. The display shows `Antenna Type`.
8. Press [↓]. The display shows the radio number (`nnnnn`) followed by either `internal` or `external`, depending on the current setting.
9. Press `CHANGE` to change to the other type of antenna.
10. Record the type of antenna programmed for the radio in the *COMPANION 200 Programming Record*.
11. Press [→] to change the setting of the next radio, or press [↑] four times to continue in Configuration programming.

Data Re-evaluation

When the system parameters (such as new Base Stations or change in layout) have changed significantly (as determined by the COMPANION 200 system or by the System Administrator), you must run Data Re-evaluation so that the COMPANION 200 system

can adapt to these changes and provide optimum performance. All active calls will be dropped when Data Re-evaluation begins. To minimize the effects of Data Re-evaluation on the system, you can schedule it to run at a time of your choice.

Please be aware that:

- If the system detects the need for Data Re-evaluation, you will see `Re Eval Required` on the Administration Terminal.
- Approximate run times for Data Re-evaluation are shown in the Powering up section.
- If a Base Station is removed or added while Data Re-evaluation is running, the re-evaluation procedure will take twice as long to complete.

Data Re-evaluation disables the COMPANION 200 system.

All active calls will be dropped when Data Re-evaluation begins.

Skipped or delayed Data Re-evaluation.

To avoid skipped or delayed Data Re-evaluation ensure that the system's internal clock is set to the correct time. This is particularly important after system start-up.

Running Data Re-evaluation

1. Enter Configuration programming.
2. Press [→] or [←] until the display shows `3. Radio Data`.
3. Press [↓]. The display shows `Re-Evaluation`.
4. Press [↓]. The display shows `Re-Eval status`.
5. Press [↓]. The display shows `Re-Eval required` (the COMPANION 200 system has detected a need for Data Re-evaluation), or `Re-Eval not req.` (the COMPANION 200 system did not detect the need for Data Re-evaluation), or `Re-Eval in prog.` (the COMPANION 200 system is currently running Data Re-evaluation).
6. Press `CONTINUE`. The display shows `Re-Evaluate now?`

7. If you want to run Data Re-evaluation later, press NO and see "Setting a schedule time". If you want to run Data Re-evaluation now, press YES. The display shows `Calls will drop`.

> **Data Re-evaluation cannot be canceled.**
> To exit with no impact, press [Rls] or CANCEL.

8. Press EXECUTE. The display shows `Re-Eval in prog.`.
9. Press [Rls] to exit. The display shows `Re-Eval in prog.`. Press CLEAR to remove the message.
10. When Data Re-evaluation is complete, the display shows `Re-Eval complete`. To remove the message, press CLEAR .

Scheduling Data Re-evaluation

Verifying the scheduled time

1. Enter Configuration programming.
2. Press [→] until the display shows `3. Radio Data`.
3. Press [↓]. The display shows `Re-Evaluation`.
4. Press [↓]. The display shows `Re-Eval status`.
5. Press [→]. The display shows `Re-Eval schedule`.
6. Press [↓]. The display shows the time and date for which Data Re-evaluation has been scheduled, or `Not scheduled`.
7. If the time and date displayed are OK, press [↑] three times to continue in Configuration. To schedule Data Re-evaluation or change the scheduled time, go to step 2 of "Setting a scheduled time." To cancel a scheduled Data Re-evaluation, press CANCEL.

Setting a scheduled time

Note: The system only accepts a date and time set later than the current date and time.

1. Press [↓]. The display shows `Not scheduled`.
2. Press CHANGE. The display shows `Calls will drop at set time`, then `Time` followed by the currently scheduled hour, or `0:01` if not scheduled.

3. To set the time, press CHANGE. The display shows Hour: followed by the current set hour (00 if none scheduled). If you don't want to change the time, go to step 4.
   a. Press CHANGE. The display shows Hour: _. If you don't want to change the hour, go to step c.
   b. Enter the hour in 12-hour or 24-hour format, as one or two digits.
   c. Press [→]. The display shows Minutes: followed by the current set minutes (01 if none scheduled). If you don't want to change the minutes, go to step f.
   d. Press CHANGE. The display shows Minutes: _.
   e. Enter the minutes as one or two digits.
   f. Press [→]. If you entered an hour less than or equal to 12, the display prompts you with AM or PM. If you entered an hour greater than 12, go to step 4.
   g. Press CHANGE to select AM or PM.
4. To set the date, press [→]. The display shows Date, followed by the current set date (today's date if none scheduled). If you don't want to change the date, press [↑] four times to continue in Administration.
   a. Press CHANGE. The display shows Year:, followed by the current set year. If you don't want to change the year, go to step d.
   b. Press CHANGE The display shows Year: _.
   c. Enter the last two digits of the year.
   d. Press [→]. The display shows Month:, followed by the current set month. If you don't want to change the month, go to step g.
   e. Press CHANGE. The display shows Month: _.
   f. Enter the month as one or two digits between 1 and 12.
   g. Press [→]. The display shows Day:, followed by the current set day. If you don't want to change the day, go to step 5.
   h. Press CHANGE. The display shows Day: _.
   i. Enter the day of the month as one or two digits between 1 and 31.
5. Press [↑] five times to continue in Administration.

Viewing radio and cell assignments

You can view the system's radio and cell relationships.

To view the radios in a cell:

1. Enter Configuration programming.
2. Press [→] or [←] until the display shows `3. Radio Data`.
3. Press [↓]. The display shows `Re-Evaluation`.
4. Press [→] until the display shows `Cells`.
5. Press [↓]. The display shows `Show cell:_`.
6. Enter the two-digit number (01 - 24) of the cell you want to view. The display shows `Cell radios`.
7. Press [↓]. The display shows the lowest numbered radio assigned to the cell (`nnnnn asgned`), or `No radio` if none has been assigned. To scroll through all the radios assigned to this cell, use [→] and [←] .
8. To continue in Configuration programming, press [↑] four times, or twice to continue at step 6.

To view the cell assigned to a radio:

1. Enter Configuration programming.
2. Press [→] or [←] until the display shows `3. Radio Data`.
3. Press [↓]. The display shows `Re-Evaluation`.
4. Press [→]. The display shows `Radios`.
5. Press [↓]. The display shows `Show radio:_`.
6. Enter the five-digit number of the radio you want to examine. The display shows `Cell Assignment`.
7. Press [↓]. The display shows which cell the radio is assigned to, or `nnnnn not asgned` if it has not been assigned. You can use [→] and [←] to scroll through all the radios.
8. Press [↑] four times to continue in Configuration.

Memory reset

Memory reset re-initializes the system, erasing any existing system memory and resetting it to the factory default values.

> **Only the installer should perform Memory reset.**
>
> Memory reset is for the use of the installer only. It erases all system data, and clears all active calls. The layout of your cells is part of the system data and if this data is erased, your portables won't work properly.

You must enter the Memory reset code no later than 15 minutes after the COMPANION 200 system has been powered up. If you enter the Memory reset code at any time after the 15-minute interval, you hear an error tone, and the display shows `Startup denied`. If 15 minutes have elapsed since you powered up the system, re-power the system to prepare for Memory reset.

1. Press Feature * * 7 8 2 7 8 8 7 (or * * S T A R T U P). The display shows `Password:`.
2. Enter the Installer password. The default password is 2 6 6 3 4 4 (or C O N F I G).
3. If the password is correct, the display shows `Reset Memory?`. If the password is incorrect, the display shows `Password:`. Press RETRY, and enter the password again.

> **Memory Reset will erase your system data!**
>
> Saying yes to this prompt returns all the data in your system to the factory defaults. To exit with no impact on your system data, press Rls.

4. Press YES to reset the memory. The display shows `Defaults applied`.
5. When required, the system begins downloading software into all Base Stations, and the Administration Terminal display shows `BS-1 Dload Start`. Some Base Stations may not be powered up at the same time, and this message will repeat at the beginning of each download. To clear the message, press CLEAR. When all the Base Station software is downloaded, the Administration Terminal shows `BS 1 Dload Done`.

When the system begins the Data Re-evaluation procedure, the display shows `Re Eval in prog.`. When the re-evaluation procedure is completed, the display shows `Re Eval complete`. Clear the message using CLEAR.

Note: To see approximate run times for Base Station download and Data Re-Evaluation, refer to the Powering up section.

Note: If a Base Station is turned on or off while Data Re-evaluation is running, the re-evaluation procedure takes twice as long to complete.

6. Re-program the system.

Registering the portables

Before a portable will operate, you must register it with the system. Ensure that you are within range of a COMPANION 200 Base Station when you register the portables.

Note: When you power up the Controller for the first time, or after a prolonged power failure, you can register up to eight portables on the system. The system coordinator can register additional portables after obtaining software keys for portable registration credits. For more information, see the *COMPANION Operations Guide*.

When distributing the portables, inform the users that the portables are registered and give them the corresponding slot numbers.

To register the portables, you carry out the following tasks:

- enable registration for the COMPANION 200 system
- register the portables (see your *Companion Portable Telephone Registration Instructions*)
- verify the portable operation
- disable registration for the COMPANION 200 system

Enabling and disabling registration

You must enable registration for the entire COMPANION 200 system to allow individual portables to register. The options are Yes (Y) and No (N). Yes indicates that master registration is enabled. No is the default and indicates that master registration is not enabled.

Note: To prevent interference problems with neighboring systems, set the master registration to Yes when the portables are being registered.

To enable registration, follow these steps:

1. Enter Administration programming.
2. Press [→] or [←] until the display shows `1. Reg. Control.`
3. Press [↓]. The display shows `Mstr Reg Enbl:`, followed by the currently set master registration option.
4. To change to the other setting option, press CHANGE .
5. To continue in Administration programming, press [↑] .

Verifying a portable's operation

After you register a portable, verify that

- the line number you entered during registration corresponds to the portable's telephone number
- the portable can make calls

Follow these steps:

1. Verify that the portable has a dial tone (ensure that the portable's twinned desk telephone, if any, is idle).
2. On another telephone, dial the number that maps to the registered access line.
3. If the portable rings, it is functioning properly.

   If the portable does not ring, try to register the portable again.
4. Place a call using the portable. If you are unable to place a call, follow the procedures in "Troubleshooting a portable" in the troubleshooting section.

Deregistering an access line

To register a portable on an access line number that is currently registered to another portable, or to deregister the portable assigned to that access line, you must first deregister the access line number.

Deregistration makes the access line number available for registration.

Note: You must deregister an access line number when a registered portable is replaced due to loss or breakage.

1. Enter Administration programming.
2. Press [→] or [←] until the display shows `1. Reg. Control`.
3. Press [↓]. The display shows `Mstr Reg Enbl:`, followed by the currently set master registration option.
4. Press [→]. The display shows `Line Reg. Status`.
5. Press [↓]. The display shows `Show line:_`.
6. Enter the three-digit access line number. The display shows `nnn: registered` if a portable is registered to that access line (if no portable is assigned to that access line, the display shows `available`, and you can register a portable to it).
7. Press DEREG. The display shows nnn: `available`.
8. To continue in Configuration programming, press [↑] **three** times.

Note: You can also deregister a portable from the portable itself (see your *COMPANION 200 Portable Registration Instructions*).

Verifying the installation

Verification checklist

After the system has been installed and programmed, verify that it is operating as intended. Use the following steps to complete this task.

1. Compare the programming performed (as recorded in the *COMPANION 200 Programming Record*) against the planned programming to ensure there are no errors.
2. Verify that all the devices are active (see “Checking the state of a device” in the Maintenance section).
3. For each radio, verify that its antenna setting is correct (see “Verifying a radio’s antenna setting”).
4. For each cell center in the system, verify that you can establish a connection with all the radios at that cell center.
    a. Stand in the neighborhood of the cell center and measure the Receive Signal Strength Indicator (RSSI) several times using undirected RSSI until you have connected to all the radios at that cell center (see your *COMPANION 200 Portable Telephone Registration Instructions* for instructions on measuring the RSSI).

Note:

Note: Radios are identified by five-digit numbers. The first four digits indicate the TCM port to which the Base Station is connected. The fifth digit indicates the number of the radio on the Base Station, either 1 or 2. For example, the number 03051 identifies radio 1 on the Base Station connected to TCM port 0305.

Note: You can also use directed RSSI to verify the connection to a radio (see your *COMPANION 200 Portable Telephone Registration Instructions*).

b. If you cannot establish a connection with a given radio, see "Troubleshooting a Base Station."

5. Verify call hand-off and radio coverage by walking through the entire coverage area (including stairs and elevators, if applicable) while on a call. Another method to do this is to measure the RSSI (see your *COMPANION 200 Portable Telephone Registration Instructions*) and walk from cell to cell while observing the radio number and RSSI indications on the portable display. (The RSSI value should remain at or above the cell boundary value defined in the *COMPANION Deployment Tool User Guide*).

   If a significant hole in the coverage area is found, first ensure that all the Base Stations in that area are working properly. If they are, this confirms that a gap in the coverage exists. Refer to the *COMPANION 200 Site Planning Guide* to re-deploy Base Stations to fill the gap, or add an additional cell if necessary.

6. Establish a connection with a radio and measure the RSSI level (see your *COMPANION 200 Portable Telephone Registration Instructions*). Repeat for each portable from the **same location**. Replace any portable whose reading is significantly different (about 10 dB or more) from that of the others.

   Note: For better results, choose a location close to a cell boundary and always connect to the same Base Station (disable the other radios at that cell center).

   Note: The lower the RSSI value, the weaker the signal strength. A display of - 44 is the strongest (best) possible signal strength.

Verifying a radio's cell assignment

To verify a radio's cell assignment, follow these steps:

1. Enter Configuration programming.
2. Press [→] or [←] until the display shows `3. Radio Data`.
3. Press [↓]. The display shows `Re-Evaluation`.
4. Press [→]. The display shows `Radios`.
5. Press [↓]. The display shows `Show radio:_`.
6. Enter the five-digit number of the radio you want to examine. The display will show `Cell Assignment`.
7. Press [↓]. The display shows which cell is assigned to this radio.

8. Press [↑] four times to continue in Configuration programming.

Verifying a radio's antenna setting

1. Enter Configuration programming.
2. Press [→] or [←] until the display shows `3. Radio Data`.
3. Press [↓]. The display shows `Re-Evaluation`.
4. Press [→]. The display shows `Radios`.
5. Press [↓]. The display shows `Show radio:_`.
6. Enter the five-digit radio number you wish to verify. The display shows `Cell Assignment.`
7. Press [→]. The display shows `Antenna Type.`
8. Press [↓]. The display shows the radio number (nnnnn) followed by either `internal` or `external`, depending on the current setting.
9. Press [→] to verify the antenna setting of the next radio, or [←] to verify the antenna setting of the previous radio.
10. Press [Rls] when you are done.

Maintenance

Maintenance is a COMPANION 200 software feature that helps you diagnose problems that may arise within the COMPANION 200 system. The steps for entering and ending a Maintenance session are included on this page.

This section documents maintenance of the COMPANION 200 using the Administration Terminal. You will find a summary of Administration Terminal maintenance in Appendix C.

Part of the Maintenance function is to display alarm messages. This section also explains the various alarm and event messages.

There are five Maintenance tasks you can carry out:

- Verifying the system version.
- Checking the port status.
- Checking module status.
- Checking the Event/Alarm log.
- Checking the Administration log.

Note: The Event/Alarm log and the Administration log should be verified, recorded, and erased periodically.

While running Maintenance, you can record your results in the COMPANION 200 Programming Record.

Entering a Maintenance session

To enter a Maintenance session:

1. Press Feature * * 2 6 6 3 4 4. The display shows `Password:`.

2. Enter the Installer password. The default password is 2 6 6 3 4 4 (or C O N F I G).
3. If the password is correct, the display shows `A.Configuration`. If the password is incorrect, the display shows `Password:`. Press RETRY, and enter the password again.
4. Press [→] until the display shows `C.Maintenance`.
5. Press [↓]. The display shows `1.System Version`.

Ending a Maintenance session

To end a Maintenance session, press [Rls].

Version number

To report a problem with the COMPANION 200 system, you will need to know which version of software your system is running. You should record the version number in the *COMPANION 200 Programming Record*.

To verify the software version your system is running, follow these steps:

1. Enter a Maintenance session.
2. Press [→] or [←] until the display shows `1.System Version`.
3. Press [↓]. The display shows the version number of the COMPANION 200 software.
4. To continue in Maintenance, press [↑].

Port status

The Port Status feature lets you:

- Identify any device or access line connected to the COMPANION 200. A device can be the Administration Terminal, a Base Station, or a Remote Access Device (RAD).
- Verify the version number of a device for compatibility with the system.
- Verify the state of a device or access line (for example, idle or busy).

- Disable or enable a device.
- Determine if a malfunctioning device is compatible with the COMPANION 200.
- Disable the port of a device before replacing it, which generates COMPANION 200 display messages of what you are doing on the Administration Terminal.

  Note: You cannot disable the Administration Terminal. If you try, a message is displayed and you hear an error tone.

!	**Disabling devices will interrupt service.** Disabling devices will interrupt normal COMPANION 200 service. Do not disable devices when many people are using the COMPANION 200 system.

!	**Do not disable or enable devices under the following conditions:** During the first two minutes after a Memory reset. During the first minute after connecting or disconnecting a fiber cable. Do not connect or disconnect a fiber while enabling or disabling devices. If you do so, incorrect ports may be enabled or disabled. To recover from this, disable and then enable the affected devices.

Identifying a device by its port number

To identify a device by its port number, follow these steps:

1. Enter a Maintenance session.
2. Press [→] or [←] until the display shows `2.Port Status.`
3. Press [↓]. The display shows `Show port: _`.
4. Enter the number of the port you want to examine, or press [↓] to see port 0101.
5. The display shows the port number, the device attached to the port, and the line number of the device.
6. Press [→] or [←] to continue viewing the ports, or [↑] twice to continue in Maintenance.

The following chart lists some of the device types that may appear on the COMPANION 200 device identification display:

Display	Equipment
7310	Administration Terminal
BS-1	COMPANION Base Station
RAD	COMPANION Remote Access Device

Verifying the version number of a device

To verify the version number of a device, follow these steps:

1. Enter a Maintenance session.
2. Press [→] or [←] until the display shows `2.Port Status.`
3. Press [↓]. The display shows `Show port: _`.
4. Enter the number of the port you want to examine, or press [↓] to see port 0101.
5. To verify the version of any device, or the version of the Base Station boot ROM, press VERSN. The display shows the version number of the device.
6. Press OK.
7. To verify the firmware (downloaded) version of a Base Station:
   a. Press [↓]. The display shows `Pnn 1: PROM1`.
   b. Press VERSN. The display shows the downloaded version of the Base Station.
   c. Press OK. The display shows `Pnnn: PROM1`.
8. Press [→] or [←] to continue viewing the ports, or [↑] twice to continue in Maintenance.

Checking the state of a port

Table 12: Status of devices

Display	Meaning
Busy DISABLE OK	The port is in use. Press DISABLE to disable the device.
Disabling... OK	The port is being disabled.
Enabling... OK	The port is being enabled.
Idle DISABLE OK	The port is not in use. Press DISABLE to disable the device.
Waiting for idle DISABLE OK	The port will be disabled as soon as it becomes idle. Press DISABLE to disable the device immediately.
N/A DISABLE OK	The port is not responding. Press DISABLE to disable the device.
Unequipped DISABLE OK	There is no device connected to that port. Press DISABLE to disable the device.
Disabled by user ENABLE OK	The port has been disabled by someone running a Maintenance session. Press ENABLE to enable the device.
Disabled by sys. ENABLE OK	The port has been disabled by the system. Press ENABLE to enable the device.
Not available DISABLE OK	There is no state information available. Press DISABLE to disable the port.
Disable at idle? YES CHANGE EXIT	Press YES. The device is disabled immediately after the port becomes idle.
Disable at once? YES CHANGE EXIT	Press YES. The port is disabled immediately.
Updating state..	The state of the device is being updated.

To check the state of a port, follow these steps:

1. Enter a Maintenance session.
2. Press [→] or [←] until the display shows 2.Port Status.

3. Press [↓]. The display shows `Show port: _`.
4. Enter the number of the port you want to examine, or press [↓] to see port 0101.
5. Press STATE. The display shows the current state of the port (see the chart below). If you are checking the status of a Base Station, you must choose which radio you want to check. At this point you are ready to check radio 1. To check radio 2, press >B2. To return to checking radio 1, press >B1.
6. Press [→] or [←] to continue viewing the ports, or [↑] twice to continue in Maintenance.

Disabling a device

> **Inform users before disabling a device.**
>
> Make sure that you inform users when you are going to disable their devices (or lines).

To disable a device, follow these steps:

1. Enter a Maintenance session.
2. Press [→] or [←] until the display shows `2.Port Status.`
3. Press [↓]. The display shows `Show port: _`.
4. Enter the number of the port you want to examine, or press [↓] to see port 0101.
5. Press STATE. The display shows the current state of the device.
6. Press DISABLE.
7. If the device is idle, the display shows `Disable at once?`. Press YES. The display shows `Disabling...`, then `Disabled by user`. Press [↑] twice to continue in Maintenance.

   If the device is busy, the display shows `Disable at idle?`. If you wish to disable the device immediately rather than waiting until it is no longer in use, press CHANGE. The display shows `Disable at once?`. Press YES. If the device is idle, it is disabled immediately. If it is in use, it will be disabled in one minute.

Enabling a device

To enable a device, follow these steps:

1. Enter a Maintenance session.
2. Press [→] or [←] until the display shows 2.Port Status.
3. Press [↓]. The display shows Show port: _.
4. Enter the number of the port you want to examine, or press [↓] to see port 0101.
5. Press STATE. The display shows the current state of the device.
6. Press the ENABLE key. The display shows Enabling..., then the state of the device.
7. Press [↑] twice to continue in Maintenance.

Module status

Module status lets you check the status of the Line Modules or Base Station Modules, and disable or enable them.

Module	Associated equipment
01	Controller TCM lines (Base Stations, Administration Terminal, RAD).
02	Controller access lines.
03–14	Base Station Modules (Base Stations) and Line Modules (access lines).

Checking the state of a module

To check the state of a module, follow these steps:

1. Enter a Maintenance session.
2. Press [→] or [←] until the display shows 3.Module Status.
3. Press [↓]. The display shows Show module: _.
4. Enter the module number you want to examine, or press [↓] to see the first module. The display identifies how many devices are attached to the module.

   To verify the state of a Line Cartridge, press LC. The display shows the number of lines on Line Cartridge 1. Press [→] or [←] to view the other Line Cartridges.
5. Press STATE. The display shows the state of the devices on the module (see the following chart).

6. Press [→] to view the next module, or [↑] twice to continue in Maintenance.

Table 13: State of modules

Display:	Meaning:
3 devices busy DISABLE OK	There are three devices in use that are connected to the module.
2 ports busy DISABLE OK	There are two ports in use that are connected to the module.
4 lines busy DISABLE OK	There are four lines in use that are connected to the module.
Disabling... OK	The module is being disabled.
Enabling... OK	The module is being enabled.
Waiting for idle DISABLE OK	The module will be disabled as soon as it becomes idle.
Unequipped DISABLE OK	There is no module connected to this port.
Disabled by user ENABLE OK	The module has been disabled from a Maintenance session.
Disabled by sys. ENABLE OK	The module has been disabled by the system.
Updating state..	The state of the device is being updated.

Disabling a module

Do not disable or enable modules under the following conditions:

- During the first two minutes after a Memory reset.
- During the first minute after connecting or disconnecting a fiber cable (do not connect or disconnect a fiber while enabling or disabling modules. If you do so, incorrect ports may be enabled or disabled. To recover from this, disable then enable the affected modules).

Warn users before disabling the system.

Disabling a Line Module or Base Station Module will disable all or part of the COMPANION 200 system. If you want to disable a module while people are using the COMPANION 200, you should first inform them that the system will be unavailable.

To disable a module, follow these steps:

1. Enter a Maintenance session.
2. Press [→] or [←] until the display shows `3.Module Status`.
3. Press [↓]. The display shows `Show module: _`.
4. Enter the module number you want to examine, or press [↓] to see the first module. The display identifies how many devices are attached to the module.

   To disable a Line Cartridge, press LC. The display shows the number of lines on Line Cartridge 1. Press [→] or [←] to view the other Line Cartridges.
5. Press STATE. The display shows the state of the devices on the module.
6. Press DISABLE . If the device is busy, the display shows `Disable at idle?`. If you wish to disable the device immediately rather than wait until it is no longer in use, press CHANGE. The display shows `Disable at once?`. Press YES.

Note: Disabling module 1 (Controller TCM lines) will not disable the Administration port.

The Administration Terminal displays the same messages for disabling devices and for disabling modules. For more information, see “Checking the port status.”

Enabling a module

To enable a module, follow these steps:

1. Enter a Maintenance session.
2. Press [→] or [←] until the display shows `3.Module Status`.
3. Press [↓]. The display shows `Show module: _`.
4. Enter the module number you want to examine, or press [↓] to see the first module. The display identifies how many devices are attached to the module.

   The enable a Line Cartridge, press `LC`. The display shows the number of lines on Line Cartridge 1. Press [→] or [←] to view the other Line Cartridges.
5. Press `STATE`. The display shows the state of the devices on the module.
6. Press `ENABLE` . The display shows `Enabling...`, then the state of the module.
7. To continue in Maintenance, press [↑] twice.

Checking the Event/Alarm log

With the Event/Alarm log you can:

- Check what alarms and events occurred.
- Check when alarms and events occurred.
- Check a current alarm.
- Check the number of consecutive occurrences of an event or an alarm.
- Erase the log.

> **Because the Event/Alarm log holds a maximum of 40 or 50 events, you should check and record these alarms and events periodically. Erase the log after dealing with the alarms and events.**
>
> When the log is full, important alarms are lost when new alarms of higher priority come in.

Each event is assigned a severity number. An S preceding this number (for example, S4) may appear in the event message. S1 has the lowest priority. If the Log is full, new event messages with a

higher severity number replace existing event messages of a lower severity. For this reason, check event messages at regular intervals. You can then deal with all messages before they are replaced.

Entering the Event/Alarm log

To enter the Event/Alarm log, follow these steps:

1. Enter a Maintenance session.
2. Press [→] or [←] until the display shows `4.Evnt/Alrm Log`.
3. Press [↓]. The display shows `Start of new log` or `Start of log`.
4. Use [→] or [←] to scan the alarms and events in the log (see "Understanding alarm messages" to deal with alarms).
5. To continue in Maintenance, press [↑] twice.

Checking the highest severity alarm

To check the highest severity alarm, follow these steps:

1. Enter the Event/Alarm log.
2. Press ALARM. The display shows an alarm code if there is an uncleared alarm, or `No current alarm`.
3. Press EXIT to return to the Event/Alarm log.

Checking when an alarm or event occurred

To check when an alarm or event occurred, follow these steps:

1. Enter the Event/Alarm log.
2. Use [→] or [←] to scan the alarms and events in the log.
3. Press TIME at the alarm or event whose time you want to know. The display shows the date and time that the alarm or event last occurred, then returns to the alarm.

Checking consecutive repetitions of an alarm or event

To check consecutive repetitions of an alarm or event, follow these steps:

1. Enter the Event/Alarm log.
2. Use [→] or [←] to scan the alarms and events in the log.
3. Press REPEAT at the alarm or event whose number of repetitions you want to know. The display shows the number of consecutive

times that the alarm or event occurred, then returns to the previous display.

Erasing the log

To erase the log, follow these steps:

1. Enter the Event/Alarm log.
2. Press ERASE. The display shows `Erase log?`.
3. Press YES. If no new alarms or events have been added since the list was entered, the log is erased and the display shows `Log is empty`, then `4.Evnt/Alrm Log`. If new alarms or events have been added since the list was entered, the display shows `Log has changed`.

Checking the Administration log

The Administration log lists event messages for administrative events such as system initializations, Configuration sessions in which a change was made, invalid password attempts, and password changes. By using this feature you can:

- Check what events occurred.
- Check when the events occurred.
- Check the number of consecutive occurrences of an event.
- Erase the log.

Each event is assigned a severity number. An S preceeding this number (for example, S4) may appear in the event message. S1 has the lowest priority. If the Log is full, new event messages with a higher severity number replace existing event messages of a lower severity. For this reason, check event messages at regular intervals. You can then deal with all messages before they are replaced.

Entering the Administration log

To enter the Administration log, follow these steps:

1. Enter a maintenance session.

2. Press [→] or [←] until the display shows 5.Admin Log.
3. Press [↓]. The display shows Start of new log or Start of log.
4. Use [→] or [←] to scan the events in the log.
5. To continue in maintenance, press [↑] twice.

Checking when an event occurred

To check when an event occurred, follow these steps:

1. Enter the Administration log.
2. Use [→] or [←] to scan the events in the log.
3. Press TIME at the event whose time you want to know. The display shows the date and time that the event last occurred, then returns to its previous display.

Checking the highest severity alarm

To check the highest severity alarm, follow these steps:

1. Enter the Administration log.
2. Press ALARM. The display shows an alarm code if there is an uncleared alarm, or No current alarm (see "Understanding alarm messages" to deal with the alarm).

Checking consecutive repetitions of an event or alarm

To check repetitions of an event or alarm, follow these steps:

1. Enter the Administration log.
2. Use [→] or [←] to scan the events in the log.
3. Press REPEAT at the event whose number of repetitions you want to know. The display shows the number of consecutive times that the event or alarm occurred, then returns to its previous display.

Erasing the log

To erase the log, follow these steps:

1. Enter the Administration log.
2. Press ERASE. The display shows Erase log?.
3. Press YES. If no new events have been added since the list was entered, the log is erased and the display shows Log is empty, then 5.Admin Log. If new events have been added since the list was entered, the display shows Log has changed.

Understanding alarm messages

The alarm messages are displayed on the Administration Terminal.

This is an example of an alarm message:

```
Alarm: 52-4-2
TIME CLEAR
```

Report this alarm and the time it occurred to your Installer or service representative.

Responding to an alarm code

When a problem occurs, alarm codes can take up to two minutes to be displayed on the Administration Terminal. If the Controller was turned off when the failure occurred, the alarm code appears two minutes after the Controller is turned on.

When you see an alarm code, follow these steps:

1. Record the alarm code.
2. Determine the cause of the alarm using the following chart.
3. Follow the procedures in "Troubleshooting an alarm" for the specific alarm.
4. To see when the alarm occurred, press TIME.
5. To clear the alarm, press CLEAR.

Table 14: Alarm codes

Alarm code	Meaning	Possible causes
Alarm:10	All Controller TCM lines disconnected.	The last remaining device on COMPANION 200 module 1 (port numbers 0102–0132) was removed. The 25-pair cable was disconnected from the Controller. There is an internal Controller fault.
Alarm:11	All Controller access lines disconnected.	The last remaining line on COMPANION 200 module 1 (port numbers 0201–0208) has been disconnected. The 25-pair cable was disconnected from the Controller. There is an internal Controller fault.
Alarm-23-xx	Cell xx is out of service	During the last step of re-evaluation, or after a system re-start, as the system was activating cell xx for use, it could not find a radio to serve as a CSC. This could happen only if all base stations associated with that cell became disconnected or disabled, either during re-evaluation or prior to the restart.
Alarm:33	Non-recoverable NVRAM corruption detected during restart. Cold start occurs automatically.	Incompatible ROM card was running on the CMCC. The CMCC was without power for too long. A NVRAM component has failed.

Table 14: Alarm codes (continued)

Alarm:50-xxxx	All Base Station Module TCM lines disconnected.	All the TCM lines on the Base Station Module connected to port xxxx on the Expansion Cartridges have been disconnected. The 25-pair cable was disconnected from the Base Station Module. There is an internal Base Station Module fault.
Alarm:51-xxxx	All Line Module access lines disconnected.	All the access lines on the Line Module connected to port xxxx on the Expansion Cartridges have been disconnected. The link cable was disconnected from the Line Module or the Controller. There is an internal Line Module fault.
Alarm:52-xxxxn	Line Cartridge n disconnected.	A Line Cartridge has been disconnected from the Line Module connected to port xxxx on the Expansion Cartridges.
Alarm:53-xxxxn	Internal Base Station error.	The Base Station on port xxxx has been disabled due to an internal error. If a link is active when this error occurs, the link is dropped (n identifies the Base Station radio).
Alarm:56-xxxxn	Device failure	Base Station radio or RAD has failed.
Alarm:67-xxxx	Wrong Line Cartridge.	The Line Cartridge on port xxxx is not compatible with the software.
Alarm:68-xxxx	Wrong device.	The device connected to port xxxx is not compatible with the software. There is a non-Base Station device in port xxxx.
Re-Eval Required	The COMPANION 200 has detected a need for Data Re-evaluation.	A new Base Station was added to the system. A Base Station was moved to a different port. A Base Station was replaced with a new Base Station.
Re-Eval in prog.	Normal operation.	Data Re-evaluation is running.
Re-Eval complete	Normal operation.	Data Re-evaluation is finished.
BS-1 Dload Start	Normal operation.	The Controller is downloading Base Station data.
BS-1 Dload Stop	Normal operation.	The Controller has finished downloading Base Station data.

Troubleshooting an alarm

To troubleshoot an alarm, use the following chart.

Table 15: Alarm troubleshooting

When you see this alarm:	Follow these steps:
Alarm:10	1. Verify that the 25-pair cable connector is inserted properly. 2. If there are devices connected to the Controller, check all the wiring associated with these devices. 3. Refer to the information on troubleshooting the Controller in the Troubleshooting section.
Alarm:11	1. Unplug the Controller and then replug it. 2. Verify that the 25-pair cable connector is inserted properly. 3. If the alarm persists, replace the Controller.
Alarm:23-xx	Check for the presence of the Base Station. If the Base Station is present, re-execute Data Re-evaluation. If the Base Station(s) do not appear, check the wiring and power. Replace the Base Station if it is defective. After replacement, re-execute Data Re-evaluation.
Alarm:33	Reprogram the system using the programming record. Re-register all portable telephones.
Alarm:50	1. Check to see if there is a device connected to the Base Station Module. 2. If there are no devices connected to the Base Station Module, connect one and then press CLEAR. 3. If there are devices connected to the Base Station Module, check all the wiring associated with these devices. 4. Refer to the information on troubleshooting Base Station Modules in the Troubleshooting section.
Alarm:51	1. Check to see if there is a device connected to that Line Module. 2. If there are no devices connected to the Line Module, connect one and then press CLEAR. 3. If there are devices connected to the Line Module, check all the wiring associated with these devices. 4. Refer to the information on troubleshooting Line Modules in the Troubleshooting section.
Alarm:52	1. Verify if the Line Cartridge is inserted properly. 2. Replace the Line Cartridge. 3. Replace the Line Module.
Alarm:53	1. Verify the wiring from the Base Station to the Controller. 2. Replace the Base Station.
Alarm:56-xxxxn	Fix the RAD or replace the Base Station.
Alarm:67	1. Replace the Line Cartridge with one that is compatible with the software.
Alarm:68	1. Verify that all the non-Base Station devices are connected in ports 101–105. 2. Replace the device with one compatible with the software.
Re-Eval Required	Run Data Re-evaluation (see “Data Re-evaluation” in the Programming section.

Understanding event messages

Event messages appear as items in the Administration log or the Event/Alarm log. Most of these event messages appear during normal maintenance. An installer may view the event messages to diagnose a problem in the system.

Each event is assigned a severity number. An S preceding this number (for example, S4), may appear in the event message. S1 has the lowest priority. If the Log is full, new event messages with a higher severity number replace existing event messages of a lower severity. For this reason, check event messages at regular intervals. You can then deal with all messages before they are replaced.

Table 16: Event messages

Event code	Meaning
EVT180	The tones download failed during system initialization.
EVT181	A download failed.
EVT220–081 S4	The Administration log has been cleared.
EVT221–081 S4	The Event/Alarm log has been cleared by the Administration Terminal.
EVT221–481	The Event/alarm log has been cleared.
EVT222–081 S5	The Administration Terminal enters the debugging facility that is password protected.
EVT222–481	Meridian COMPANION is accessing the debugging facility.
EVT260–0302 S8	The Controller takes the access line on port 0302 out of service because no current was detected.
EVT261–0302 S1	The access line on port 0302 is returned to service after current was detected (see EVT260).
EVT264	The CCU line detected the completion of the release handshake after it had previously failed.
EVT280	The Administration Terminal has received an event it cannot handle.
EVT281	There is a software error on the Administration Terminal.
EVT285	An address error occurred.

Table 16: Event messages (continued)

Event code	Meaning
EVT286	A bus error occurred
EVT287	The op code is not supported by the system.
EVT288	The code is trying to divide by 0.
EVT289	The code is trying to access a structure with an invalid index.
EVT290	The system is attempting to save too much information for the stack size.
EVT291	The CPU is trying to execute a privilege instruction in user mode
EVT292	The data register has overflowed and caused an exception error.
EVT293	The CPU is trying to pass control an uninitialized interrupt vector.
EVT294	The system is passing control to the level 1 interrupt auto vector
EVT295	The watchdog time-out expired.
EVT296	Problems with software regions.
EVT297	Problems in multi-tasking.
EVT298	Invalid vector.
EVT299 S1	The system is turned on after a power failure.
EVT301-1031 S5	The Base Station (on port 0103 in this case) cannot successfully receive the data image. Both radios belonging to the Base Station will be disabled. This may occur if the flash EEPROM is faulty. Two events are raised: one for the B1 channel radio (as in this case) and another for the B2 channel radio. A corresponding alarm code 53 will occur
EVT302-1031 S5	The Base Station (on port 0103 in this case) cannot be written to during data transfer. Both radios belonging to the Base Station will be disabled. The Base Station's flash EEPROM is faulty. Two events are raised: one for the B1 channel radio (as in this case) and another for the B2 channel radio. A corresponding alarm code 53 will occur.
EVT303-1031 S5	The Base Station (on port 0103 in this case) cannot be synchronized with the other Base Stations in the system. Both radios belonging to the Base Station will be disabled. The Base Station hardware is faulty. Two events are raised: one for the B1 channel radio (as in this case) and another for the B2 channel radio. A corresponding alarm code 53 will occur.

Table 16: Event messages (continued)

Event code	Meaning
EVT304-01032	A B2 channel radio (radio 2 on port 0103 in this case) cannot be synchronized with other radios because of system overload.
EVT305-01032 S5	A B2 channel radio (radio 2 on port 0103 in this case) cannot be synchronized because the B1 radio was disabled in maintenance. Both radios belonging to the Base Station (on port 0103 in this case) will be disabled. The B1 radio must be operational to synchronize both radios of the Base Station with other radios in the system. Two events are raised: one for the B1 channel radio and another for the B2 channel radio. A corresponding alarm code 53 will occur.
EVT306-01031 S5	A radio (0103-1 in this case) cannot be synchronized because there are no B2 channel radios. Both radios belonging to the Base Station (0103 in this case) will be disabled. Two events are raised: one for the B1 channel radio (as in this case) and another for the B2 channel radio. A corresponding alarm code 53 will occur.
EVT307-0109100 S5	A recoverable RIM fault has occurred. The RIM will be reset. If a link is active when this error occurs, the link is dropped. The radio (0109-1 in this case) is returned to service.
EVT307-0109101 S5	An unrecoverable RIM fault has occurred. The radio (0109-1 in this case) will be disabled and taken out of service. If a link is active when this error occurs, the link is dropped. A corresponding alarm code 53 will occur.
EVT307-0109102 S5	The built-in self-test on the Base Station has failed. The radio (0109-1 in this case) will be disabled and taken out of service. If a link is active when this error occurs, the link is dropped. A corresponding alarm code 53 will occur.
EVT308-0103 S8	The Base Station is connected to a system that supports a radio protocol that the Controller does not understand.
EVT400	System is being restarted
EVT412	The installer password has been changed. The parameter contains the extensi on number that changed the password
EVT413	The Administration password has been changed. The parameter contains the extension number that changed the password.
EVT-414	Someone tried to enter the system with an invalid installer password.
EVT-415	Someone tried to enter the system with an invalid administration password.
EVT416	Someone has initiated a Configuration programming session.
EVT417	Someone has initiated an Administration programming session.

Table 16: Event messages (continued)

Event code	Meaning
EVT419	The system time has been changed by a user.
EVT434	The register password has been changed.
EVT609	No software emulator is running.
EVT629	Timer error.
EVT832	System problem with locating portables.
EVT834	System problem with locating portables.
EVT–848–0103	Handoff failure. A few of these can occur per day as a result of normal operation. If more than ten are logged per day, further investigation is suggested.
EVT849	Synchronization error.
EVT850	Synchronization error.
EVT851	Base Station software error.
EVT858	Network manager internal software error.
EVT871	Base Station download is complete
EVT882	A re-evaluation has been initiated. Precedes the Re–eval in prog alarm in the Event/alarm log.
EVT940	A terminal is reporting an error to the maintenance software.

You should rarely see event messages other than those described above. Other messages occur when the COMPANION 200 has followed its normal recovery from an unusual combination of system events. If the same event number keeps appearing, report it to the installer or service representative.

As a result of some events, the COMPANION 200 automatically restarts itself. The following messages are associated with a system restart: 101–106, 108–112, 114–116, 118–120, 124–125, 130, 133–134, 137, 151, 223–224, 229, 266–267, 285–298, 400, 426–430, 432, 600–602, 614, 630, 803, 808, 810, 823.

Troubleshooting

General troubleshooting procedures

To carry out general troubleshooting procedures, use the following chart. The left-hand column tells you what the main task is, while the right-hand column describes the steps you must take to do the task. These procedures are most effective if you carry them out in the order they are ranked.

Main task:	**Steps to follow:**
1. Diagnose the trouble.	Ask the users for information about: •The type of problem they have experienced (related to placing or receiving calls, dropped calls or noise, or to problems with a feature). • How frequently the problems have occurred. • Where the problems have occurred. • How many portables are affected.
2. Check how a feature is being used.	A problem may have been reported because of a misunderstanding about how a feature works. Confirm that the person who reported a problem understands the intended use and operation of any feature in question.
3. Check that you can access host switch features from the COMPANION 200.	To verify if the access lines have been programmed correctly, try the host switch features on two or more portables.
4. Check for programming errors.	Check that the programming recorded in the *COMPANION 200 Programming Record* is correct for the intended operation of the system, and verify that the Configuration programming and Administration programming has been entered correctly. See the specific procedures for troubleshooting problems in this section.
5. Check wiring and hardware connections.	Check the wiring and hardware connections. Refer to procedures in "Troubleshooting the Controller hardware."
6. Check equipment defects.	If hardware is defective, replace it. If the problem requires expert advice, follow your company's procedure for obtaining assistance.

Troubleshooting power problems

If the power fails or if the COMPANION 200 system is disconnected, all Configuration and Administration data is retained for at least three days. After three days without power, you may have to perform Memory reset.

1. If none of the power-on lights are lit, verify there is power at the ac outlet.
2. If there is no power, ask the owner of the system to check with building maintenance.
3. If there is power at the ac outlet, check the fuse of the power bars.
4. Replace the modules whose power-on light is not lit.

Troubleshooting the Controller

To troubleshoot the Controller, follow these steps:

1. Check that the power cord is properly connected to a working ac outlet.
2. Check that the Software Cartridge is firmly seated in its slot.
3. If power is ON and the light indicator on the Controller is OFF, unplug the Controller and replace the power supply unit with a new one. Verify that the Controller works with the new power supply unit.
4. Unplug the Controller and replace the Software Cartridge with a new one. Verify if the Controller works with the new Software Cartridge.

Wear a Grounding Strap.

Install with the power OFF.

Never install or remove the Software Cartridge when power to the Controller is ON.

Troubleshooting the Administration Terminal

To troubleshoot the Administration Terminal, follow these steps:

1. Check that the time and date appear on the display.
2. Check the display. If the display is unreadable, ensure that the display contrast adjustment (Feature * 7) is adequate.
3. Check that power is ON in the Controller.
4. Check that the Administration Terminal is connected to port 0101.
5. Check that the Software Cartridge is installed properly in the Controller.
6. Check the 50-pin connectors at the Controller and make sure they are plugged in properly.
7. Check the 25-pair TCM cables at the distribution frame to make sure they are connected to the right ports.
8. Check the telephone wiring connections at the distribution frame to make sure the connections have been made on the appropriate connectors shown in the Installation section.
9. Verify that the wiring length between the Administration Terminal and the Controller does not exceed 800 m.
10. Replace the Administration Terminal with a working Administration Terminal. If the problem persists, see "Troubleshooting the Controller."

Note: You should find between 18 and 21 V dc across the telephone wires when the Administration Terminal is disconnected.

Troubleshooting a Line Module

To troubleshoot a Line Module, follow these steps:

1. See "General troubleshooting procedures."
2. Ensure that the Line Module is not disabled (see "Module status" in the Maintenance section).
3. Check the port status to confirm that the Line Module is visible on that port (see "Checking the state of a port" in the Maintenance section).
4. Disable then enable the Line Module (see "Module status" in the Maintenance section).

5. Check the access line by terminating a single line telephone directly on the distribution frame (or equivalent) that connects to the Line Module.

If the problem persists, follow as many of the next steps as are required to solve the problem:

1. If ac power is present and the light indicator on the Line Module is OFF, replace the Line Module.
2. Replace the fiber cable.
3. Replace the Line Cartridge.
4. Replace the appropriate Expansion Cartridge.
5. Replace the Controller.

Troubleshooting a Base Station Module

To troubleshoot the Base Station Module, follow these steps:

1. See “General troubleshooting procedures.”
2. Ensure that the Base Station Module is not disabled (see “Module Status” in the Maintenance section).
3. Check the port status to confirm that the Base Station Module is visible on that port (see “Checking the state of a port” in the Maintenance section).
4. Unplug and replug the RJ21 connector.
5. Verify the TCM connections to the Base Stations.
6. Verify the power connections to the Base Stations.
7. Disable and then enable the Base Station Module (see “Module status” in the Maintenance section).
8. If the Base Station Module is still down, power down, then power up the Controller.

If the problem persists, follow as many of the next steps as required to solve the problem:

1. If ac power is present and the light indicator on the Base Station Module is OFF, replace the Base Station Module.
2. Replace the fiber cable.
3. Replace the appropriate Expansion Cartridge.
4. Replace the Controller.

Troubleshooting a portable

When there is a problem with a portable, follow these steps:

1. Make sure the portable is compatible with the COMPANION 200 system.
2. Verify that the portable is ON and that the battery is not low.
3. Establish a radio connection to get a dial tone (ensure that the portable's twinned desk telephone [if any] is idle).
4. If no dial tone is present:
   a. Verify that the dialtone is available from the host.
   b. The portable may not be registered. Try to register the portable again (see your COMPANION 200 Portable Telephone Registration Instructions).
5. Check that the portable is using the correct registration slot.
6. Verify that the portable has been assigned the correct line number by calling it from another telephone.
7. Verify that the line to which the portable is registered is properly connected, and that it is idle (see "Checking the state of a port" in the Maintenance section).

Troubleshooting a Base Station

To troubleshoot a Base Station, follow these steps:

1. Verify that the green light is ON.
2. Verify that the red light is not solid.

   A solid red light indicates that both radios on the Base Station are busy, that the Controller is downloading data to the Base Stations, or that one or both radios have not been assigned to a cell.
3. Verify that the red light is not flashing.

   The red light flashes for about 15 seconds when a Base Station is powered up. This is normal. If the red light continues to flash, it indicates that one of the following problems may exist:
   a. The Controller or Base Station Module is not ON.
   b. The Base Station is not connected to the Controller or Base Station Module.
   c. The wiring to the Base Station is not correct.

   d. The TCM wiring length between the Base Station and the Controller (or Base Station Module) exceeds 1200 m.

   e. There is a faulty Controller, Base Station Module, or RPI.

   f. The two-way dc loop resistance of the power pairs between the Remote Power Interconnect (RPI) and the Base Station exceeds 90 ohms. Measure the loop resistance with an ohmmeter. If the resistance exceeds 90 ohms, install a second power pair, or power the Base Station with a plug-top power supply (see Appendix E).

   g. The Base Station is faulty.

4. Verify that the power cord of the RPI is properly connected to a working ac outlet. If the Base Station is powered locally, verify that the power supply is properly connected to a working ac outlet and that the power supply cable is properly connected to the Base Station power connector

5. If an external antenna is installed, verify that the external antenna co-axial cable is properly connected to the BNC connector of the Base Station and that the corresponding radio is programmed to have an external antenna (see “Radios” in the section “Programming the COMPANION 200”).

Troubleshooting an RPI

To troubleshoot an RPI, follow these steps:

1. Verify that the Controller is ON.
2. Verify that the RPI is plugged into a working ac outlet.
3. Verify that all the connections (power cord, jumper lead, input and output, etc.) to the RPI are correct and secured.
4. Verify the power cord fuse.
5. Verify the Base Stations:

   a. Verify that the green light is ON.

   b. Verify that the red light is not solid.

      A solid red light indicates that both radios on the Base Station are busy, that the Controller is downloading data into the Base Stations, or that one or both radios have not been assigned to a cell.

   c. Verify that the red light is not flashing.

The red light flashes for about 15 seconds when a Base Station is powered up. This is normal. If the red light continues to flash, it indicates that one of the following problems may exist:

- The Controller or Base Station Module is not ON.
- The Base Station is not connected to the Controller or Base Station Module.
- The Base Station radios have not been assigned to a cell.
- The wiring to the Base Station is not correct.
- The TCM wiring length between the Base Station and the Controller (or Base Station Module) exceeds 1200 m.
- The two-way dc loop resistance of the power pair(s) between the RPI and the Base Station exceeds 90 ohms. Measure the loop resistance with an ohmmeter. If the resistance exceeds 90 ohms, install a second power pair, or power the Base Station with a plug-top power supply (see Appendix E).
- There is a faulty Controller, Base Station Module, or RPI.
- The Base Station is faulty.

6. If none of the Base Stations connected to the RPI (or to one of its power supply units) is functioning correctly, replace the RPI (or power supply unit).

   Note: The left power supply unit provides power through output connectors OK1 to OK8 or OBIX1 to OBIX8, and the right power supply unit provides power through OK9 to OK16 or OBIX9 to OBIX16.

7. If only one or a few of the Base Stations seem faulty, see "Troubleshooting a Base Station."

Replacing equipment

To avoid electrical shock, observe the following precautions:

1. Unplug the power to any system element before removing it.
2. Do not remove the covers of the Controller, Line Modules, or Base Station Modules.

Controller

Wear a Grounding Strap.

Replacing the Controller takes the COMPANION 200 out of service, returns all settings to the factory defaults, and deregisters all the portables.

To replace the Controller, follow these steps:

1. Unplug the power cord from the ac outlet or power bar.
2. Open the door of the Controller.
3. Unplug the power cord from the Controller.
4. Loosen the RJ21 connector latch screws and unplug the 25-pair cables.
5. Unplug the fiber cables from the Expansion Cartridges and the modules.
6. Remove the fiber cable spools and the 25-pair cables from the cable trough.
7. If there is a power bar, unplug all the modules connected to it, and remove the power bar from the cable trough.

8. Apply gentle upward pressure to the Controller and lift it away from the mounting bracket.
9. Carefully install the new Controller onto the mounting bracket.
10. Re-install the power bar (if any) in the cable trough.
11. Remove the Software Cartridge, the Expansion Cartridges and the Line Cartridges from the old Controller and install them in the new Controller.
12. Re-connect the 25-pair cables, fiber cables, and power cord to the connectors from which they were removed.
13. Fasten the RJ21 connector latch screws.
14. Re-connect the power cord to the ac outlet or power bar.
15. Re-program the system.
16. Re-register the portables.

Controller Power Supply Unit

!	**Unplug the Controller before replacing an Power Supply Unit.**

1. Unplug the power cord from the ac outlet or power bar.
2. Unplug the power cord from the Controller.
3. Remove the screws at the top and bottom of the Power Supply Unit.
4. Remove the Power Supply Unit.
5. Insert the new Power Supply Unit.
6. Fasten the screws at the top and bottom of the Power Supply Unit.
7. Plug the power cord under the Controller.
8. Plug the power cord to the ac outlet or the power bar.

Software Cartridge

!	**Wear a Grounding Strap.** **Do not touch the printed circuit board or the connector.** The printed circuit board of theSoftware Cartridge is a static-sensitive device.

!	**Unplug the Controller before replacing a Software Cartridge.**

1. Unplug the power cord from the ac outlet or power bar.
2. Remove the Software Cartridge from its slot.
3. Holding it vertically, insert the new Software Cartridge in its slot.
4. Plug the power cord into the ac outlet.

Note: If the Base Station software version in the new Software Cartridge does not match that of one or more Base Stations, the system will download the Software Cartridge Base Station software version to those Base Stations (see “Base Station software downloading” in the section Powering up).

Line Cartridge

1. Unplug the power cord from the ac outlet or power bar.
2. With the latches open, remove the Line Cartridge from its slot.
3. With the latches open, insert the new Line Cartridge in its slot and close the two latches simultaneously to align the cartridge properly.
4. Plug the power cord into the ac outlet or power bar.

Expansion Cartridge

Wear a Grounding Strap.

Do not touch the printed circuit board or the connector.

The printed circuit board of the Expansion Cartridge is a static-sensitive device.

Unplug the Controller before replacing an Expansion Cartridge.

To replace an Expansion Cartridge, follow these steps:

1. Unplug the power cord from the ac outlet or power bar.

Note: Do not apply power to the Controller until the new Expansion Cartridge is installed, or you will have to reprogram the system.

2. With the latches open, remove the appropriate Expansion Cartridge from its slot.
3. With the latches open, insert the new Expansion Cartridge in its slot and close the two latches simultaneously to align the cartridge properly.
4. Plug the power cord into the ac outlet or power bar.

Line Module

Wear a Grounding Strap.

Replacing a Line Module will interrupt normal COMPANION 200 service.

To replace a Line Module, follow these steps:

1. Unplug the power cord from the ac outlet or power bar.
2. Open the door of the Line Module.

3. Loosen the RJ21 connector latch screw and unplug the 25-pair cable from the Line Module.
4. Unplug the fiber cable from the Line Module.
5. Remove all cables from the cable trough.
6. Remove the power bar (if any) from the cable trough.
7. Remove the cable trough screws.
8. Apply gentle upward pressure to the Line Module and lift it away from the mounting bracket.
9. Carefully install the new Line Module onto the Mounting bracket.
10. Fasten the cable trough to the wall using two 38-mm screws.
11. Re-install the power bar (if any) in the cable trough.
12. Remove the Line Cartridges from the old Line Module and install them in the new Line Module.
13. Re-connect the 25-pair cables and fiber cables to the connectors from which they were removed.
14. Fasten the RJ21 connector latch screw.
15. Re-connect the power cord to the ac outlet or power bar.

Base Station Module

!	**Wear a Grounding Strap.** **Replacing a Base Station Module will interrupt normal COMPANION 200 service.**

To replace a Base Station Module, follow these steps:

1. Unplug the power cord from the ac outlet or power bar.
2. Open the door of the Base Station Module.
3. Loosen the RJ21 connector latch screw and unplug the 25-pair cable from the Base Station Module.
4. Unplug the fiber cable from the Base Station Module.
5. Remove all cables from the cable trough.
6. Remove the power bar (if any) from the cable trough.

7. Remove the cable trough screws.
8. Apply gentle upward pressure to the Base Station Module and lift it away from the mounting bracket.
9. Carefully install the new Base Station Module onto the mounting bracket.
10. Fasten the cable trough to the wall using two 38-mm screws.
11. Re-install the power bar (if any) in the cable trough.
12. Re-connect the 25-pair cables and fiber cable to the connectors from which they were removed.
13. Fasten the RJ21 connector latch screw.
14. Re-connect the power cord to the ac outlet or power bar.

Power bar

To replace a power bar, follow these steps:

1. Unplug the power bar from the ac outlet or power bar.
2. Remove the power cords connected to the power bar.
3. Slide out the power bar.
4. Slide in the new power bar.
5. Connect the power cords to the power bar.
6. Connect the power bar to the ac outlet or power bar.

RPI

Replacing an RPI Power Supply Unit

To replace an RPI Power Supply Unit, follow these steps:

1. Unplug the RPI power cord from the ac outlet.
2. Press the release catch with a screwdriver and open the cover.
3. Disconnect the jumper lead, grounding plates, grounding strap and cable from the connection board.
4. Unscrew the power supply unit and remove it.
5. Place the new power supply unit and fasten its screws.
6. Connect the jumper lead, grounding plates, grounding strap, and cable to the connection board.

7. Close the cover.
8. Plug the RPI power cord to the ac outlet.

Note: The red light on each Base Station will flash for about 15 seconds while powering up. This is normal.

Replacing an RPI

To replace an RPI, follow these steps:

1. Unplug the RPI power cord from the ac outlet.
2. Press the release catch with a screwdriver and open the cover.
3. Disconnect the wires from the RPI.
4. Remove the two bottom screws.
5. Lift up and remove the RPI.
6. Hang the new RPI on the two top screws.
7. Install and fasten the two bottom screws.
8. Re-connect all the wires to the RPI.
9. Close the RPI cover.
10. Plug the RPI power cord to the ac outlet.

Note: The red light on each Base Station will flash for about 15 seconds while powering up. This is normal.

Administration Terminal

To replace the Administration Terminal:

1. If the Administration Terminal is mounted on a wall, remove it from its base.
2. Remove the telephone cord from the terminal marked  at the back of the Administration Terminal.
3. Plug the telephone cord in the terminal marked  at the back of the new Administration Terminal.
4. If the Administration Terminal is mounted on a wall, remove the base of the new Administration Terminal and snap the new Administration Terminal on the wall-mounted base.

Base Station

To replace a Base Station, you do not have to power down the Controller. When you replace a Base Station, no portable registration information is lost. After a short boot sequence, the Base Station should be functioning normally.

!	**Taking a Base Station out of service causes radio coverage to degrade.**

To replace a Base Station, follow these steps:

1. If the Base Station is powered locally, unplug the power supply from the ac outlet.
2. Remove the cover from the Base Station.
3. If the Base Station is powered locally, unplug the power supply connector from the Base Station.
4. If an external antenna is installed, unplug its co-axial cable from the Base Station.
5. Unplug the teledapt cable from the Base Station.
6. While holding the Base Station (to prevent it from falling), apply upward pressure to the Base Station.
7. Lift the Base Station away from the bracket.
8. Carefully install the new Base Station onto the bracket.
9. Gently press down to snap it into position.
10. Re-connect the teledapt cable to the Base Station connector.
11. Re-connect the power supply connector and external antenna co-axial cable to the connectors from which they were removed.
12. If the Base Station is powered locally, plug the power supply into the ac outlet.

    Note: The red light on each Base Station will flash for about 15 seconds while powering up. This is normal.

Appendix A: Regulatory information

Registration

This telephone system is registered with the DOC based upon compliance with CS-03. Connection of the system to the customer analog lines is made through a standard network interface jack which you can order from your telephone company.

Safety

The COMPANION 200 system conforms to the requirements of North American Regulatory Standards as specified in UL1459 Issue 2, and CSA C22.2 Number 225 M90.

Equipment attachment limitations

The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunication network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction. Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations. Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the

telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

!	**Users should not attempt to make electrical ground connections themselves.** Users should contact the appropriate electric inspection authority, or electrician, as appropriate.

Telecom Compliance

The COMPANION 200 system meets CS-03 Issue 7 requirements for loop start Central Office interface. The system includes wireless Base Stations for the purpose of this paragraph.

Telephone Company Notification

There is no need to contact your telephone company before connecting the system to the telephone network, but they may request that you provide them with the following information:

- The telephone number(s) that the system will be connected to.
- The DOC Registration Number (on the label behind the door of the Controller).
- The Load Number (on the label behind the door of the Controller).
- The jack (CA21A).
- The Service Order Code (SOC).
- The Facility Interface Code (FIC).

Rights of the Telephone Company

If the system is determined to be causing harm to the telephone network, the telephone company may discontinue your service

temporarily. If possible, they will notify you in advance. But if advance notice is not practical, you will be notified as soon as possible. You will be given the opportunity to correct the situation and you will be informed of your right to file a complaint with the DOC.

Your telephone company may make changes in its facilities, equipment, operations or procedures that could affect the proper functioning of your system. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

In the event of an equipment malfunction, all repairs will be performed by Northern Telecom Canada or one of its authorized dealers.

Radio Frequency Interference

This device complies with the DOC Canadian Radio Interference Regulations SOR475-88. Operation is subjected to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Load Number

The Load Number assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the sum of the Load Numbers of all the devices does not exceed 100. The load number of this unit is 8.

Repair facility

Contact	Northern Telecom Canada Ltd 150 Montreal-Toronto Blvd. Lachine, Quebec H8S 1B6 Dept 925

General installation warnings

Do not connect the Administration Terminal or a COMPANION Base Station directly to a Central Office (CO) line interface.

Connecting the Administration Terminal directly to a CO line may result in equipment damage.

The COMPANION 200 Administration Terminal or Base Stations must not be used as Off Premises Equipment, unless proper protection is provided.

Installers should also check the lightning protectors at the cable entry point to the building with special attention to the ground. Any problems should be reported to your telephone company in writing.

To avoid electrical shock hazard to personnel or equipment damage, observe the following precautions when installing telephone equipment:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch telephone wires that are not insulated or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying the telephone lines.

Appendix B: Technical specifications

COMPANION 200

Environment

The product is designed to be fully operational within a North American commercial office environment. In addition, the COMPANION 200 withstands the transportation and storage requirements defined in the global standard IEC-68-2.

Radiated and conducted emissions

The spurious radiated and conducted emissions from the COMPANION 200 system does not exceed the requirements for Commercial Information Technology apparatus. In Canada, this is legislated by DOC SOR 475-88, Class A.

Radiated electromagnetic immunity

The COMPANION 200 system, when subjected to an electric field of 134 dBµV (5 V/m) over a frequency range of 10 kHz to 1 GHz, modulated to 80% with a 1 kHz signal, does exhibit no performance degradation.

Conducted interference immunity

When an interference signal of 129.5 dBµV (3 V rms) is applied common-mode to any communication lead of the COMPANION system, or when an interference signal of 126 dBµV (2 V rms) is applied common-mode to ac power leads of the COMPANION 200 system, the following requirements are met:

1. The system exhibits no degradation of performance for the interference signal over a frequency range of 150 kHz to 100 MHz (modulated to 80% with a 1 kHz signal).
2. The sound pressure levels at near and far end portable is less than 55 dBSPL for the interference signal over a range of 150 kHz to 30 MHz (modulated to 80% with a 1 kHz signal).

Mechanical requirements

Vibration operational	IEC 68-2-36, test Fdb
Vibration endurance transportation	IEC 68-2-36, test Fdb
Shock fragility	IEC 68-2-29, test Eb
Unpacked drop	IEC 68-2-32, test Ec
Packaged drop	IEC 68-2-32, test Ed

Transportation methods

No special constraints need be applied to standard methods of shipment (such as air freight, truck, and rail) except for the - 40°C temperature limit.

Controller

The COMPANION 200 Controller is the nerve center of the COMPANION 200 system. On its own, it supports up to 32 Base Stations or compatible devices. With Line Cartridges, Line Modules, and Base Station Modules, it can support a maximum of 152 lines with 32 Base Stations, or a maximum of 224 Base Stations with 8 lines.

The Controller supports the following interfaces:

- 32 TCM ports
- 2 plug-in slots for the Line Cartridges
- A plug-in slot for the Software Cartridge
- Two plug-in slots for Expansion Cartridges (2-port or 6-port)
- A plug-in slot for the Power Supply Unit (installed in factory)
- An interface to ac power via an IEC-320 socket

The Controller is protected against loss of data during ac power outages of at least 3 days. The Controller is protected against high dc current flow resulting from Base Station wiring faults. A

detachable power cord with a North American ac plug is supplied with the Controller (main power cord).

Part no.	NT7B55FA-93 (A0623562)
Color	Dolphin Gray
Height (with cable trough)	63.0 cm
Width	30.0 cm
Depth	17.0 cm
Clearance (front)	34.6 cm
Clearance (top)	15.0 cm
Operating temperature range	+5°C to +40°C
Storage temperature range	+5°C to +40°C
Relative humidity	5% to 85% (without condensation)

Power Supply Unit

The Controller Power Supply Unit is a 110 V pluggable supply. It will function properly as long as the transient voltages do not exceed the values in the following table. The Power Supply Unit is installed in the Controller at the factory.

Part no.	NTAB1210 (A0405148)
Color	Dolphin Gray
Voltage (input)	110 - 127 Vac
Frequency	60 Hz
Power dissipation (max)	85 Watts (output power)

Power bar

The power bar is fitted equipped with a power cord, and is equipped with a fuse.

Part no.	NT5B56AA (A0349107)
Color	Gray

Software Cartridge

The Software Cartridge contains the software required to run the COMPANION 200.

Part no.	NT7B83AB-93 (A0623571) (English) NT7B83BB-93 (A0623572) (French)
Color	Dolphin Gray
Height	17.0 cm
Width	2 cm
Depth	13.5 cm

2-port expansion cartridge

Part no.	NTBB02GA-93 (A0404244)
Color	Dolphin Gray

6-port expansion cartridge

Part no.	NTBB06GA-93 (A0404245)
Color	Dolphin Gray

Line Cartridge

Part no. (DS Analog)	NT7B75GA-93 (A0405799)
Part no. (CLASS)	NT5B41GA-93 (A0393277)
Color	Dolphin Gray
Height	31.5 cm
Depth	13.5 cm

Line Module

Part no.	NTBB2DFC-93 (A0623565)
Color	Dolphin Gray
Voltage V ac	100-127 V ac
Frequency Hz	60 Hz
Operating temperature range	+5°C to +40°C
Storage temperature range	+5°C to +40°C
Relative humidity	5% to 85% (without condensation)
Height	63 cm with cable trough 50 cm without cable trough
Width	20 cm
Depth	17 cm

Base Station Module

The Base Station Module is protected against high dc current flow resulting from Base Station wiring faults.

Part no.	NTBB41FC-93 (A0623568)
Color	Dolphin Gray
Voltage V ac	100 - 127 Vac
Frequency Hz	60 Hz
Operating temperature range	+5°C to +40°C
Storage temperature range	+5°C to +40°C
Relative humidity	5% to 85% (without condensation)
Height	63 cm with cable trough 50 cm without cable trough
Width	10 cm
Depth	17 cm

Fiber Cable Spool

A fiber cable is included with each Line Module and Base Station Module. Each fiber cable comes pre-wound on a storage spool for proper installation.

Part no.	NTAB1167 (A0403047)
Color	Dolphin Gray
Length	2 m

RPI

The RPI power lines are protected by 3 A, 250 V anti-surge fuses.

Part no.	RPI-8: NTE002AA (A0402787) RPI-16: NTE003AA (A0402780)
Color	Dolphin Gray
Height	35.6 cm
Width	30.5 cm
Depth	7.6 cm
Input voltage	80 to 270 V ac
Input frequency	40 to 70 Hz
Output voltage	48 V dc
Output current	1.1 A (2 A short circuit)
Temperature	0 to 50°C

COMPANION Base Station

Base Station

The Base Station consists of two printed circuit boards: the Line Interface Module (LIM) and the Dual Radio Interface Module (RIM). The Base Station provides connectors for a terminating line cord, external antennas, and a power supply cord. Only passive antennas may be connected to the antenna sockets on the Base Station.

The radiated and conducted emissions of the COMPANION Base Station radios shall not exceed the requirements for digital cordless telephones as outlined in DOC RSS-130 documents. The Base

Station should not be installed in ducts, plenums, or hollow spaces which are used to transport environmental air except where the duct, plenum or hollow space is created by a suspended ceiling having lay-in panels or tiles, in accordance with CE Handbook Rule 60-402.

Part no.	NT0P30DA-93 (A0403378)
Color	Dolphin Gray
Height	20 cm
Width	32 cm
Depth	5 cm
Weight	less than 1 kg
Input voltage	12 to 50 V dc
Max. loop length (TCM)	1200 m
Max. dc loop resistance (power pairs)	90 ohms (two-way)
Temperature	+5°C to +40°C
Relative humidity	5% to 85%(condensation may occur)

Base Station plug-top power supply

If a plug-top power supply is required, use only the power supply recommended for use with the Base Station. Other usage will invalidate any approval given to this apparatus.

Part no.	A0386334
Color	Dolphin Gray
ac supply voltage	120 V
ac supply frequency	60 Hz
Sec. voltage	12 V
Sec. current	800 mA
Temperature	+5°C to +40°C
Relative humidity	5% to 85% (condensation may occur)
Height	10 cm
Width	10 cm
Depth	6 cm

External antennas

Indoor omni-directional antenna

Part no.	A0383447
Frequency range	944 to 952 MHz
Peak power rating	10 mW minimum
Peak antenna gain	2.5 dBi maximum
Polarization	vertical
Input impedance	50 ¾ nominal
Temperature	-18 °C to +55 °C
Relative humidity	5% to 95%
Length	21.0 cm maximum
Width	3.0 cm maximum
Weight	0.25 kg maximum

Indoor directional antenna

Part no.	A0383817
Frequency range	944 to 952 MHz
Peak power rating	10 mW minimum
Peak antenna gain	5 dBi maximum
Polarization	vertical
Input impedance	50 ¾ nominal
Temperature	-18 °C to +55 °C
Relative humidity	5% to 95%
Length	21.0 cm maximum
Width	8.0 cm maximum
Depth	13.0 cm maximum
Weight	0.5 kg maximum

Lightning surge protector

Part no.	A0382082
Surge capability	50 000 A (repeatable)
Turn-on threshold	600 V dc
Turn-on time	2.5 ns
Impedance	50 ohms
Operating frequency range	125 MHz to 1 GHz

Outdoor omni-directional antenna

Part no.	A0383818
Frequency range	944 to 952 MHz
Peak power rating	10 mW minimum
Peak antenna gain	4 dBi maximum
Polarization	vertical
Input impedance	50 ¾ nominal
Temperature	-50 °C to +55 °C
Humidity	0% to 100%
Length	49.0 cm maximum
Width	3.5 cm maximum
Weight	1.0 kg maximum

COMPANION 200 Administration Terminal

The COMPANION 200 Administration Terminal offers the following features:

- A two-line display
- 10 programming buttons, including three display buttons
- A dial pad

There are other keys on the Administration Terminal but they are disabled for the COMPANION 200.

Part no.	NT8B21AA-93 (A0387885)
Color	Dolphin Gray
Terminating impedance	600 ohms
Min. voltage at terminal	10 V dc
Current at telephone (idle)	45 mA nominal
Current at terminal (active)	80 mA active
Maximum loop length	800 m

Remote Access Device

The Remote Access Device (RAD) allows a personal computer (PC) running COMPANION Diagnostic Software to access the Controller. Access may be established by connecting the RAD on the customer site using a local connection, or at a remote location using standard Modem equipment.

Part no.	NT8B80AB-93 (A0372028)
Color	Dolphin Gray
Maximum loop length	30 m

Appendix C: Programming overview

A. Configuration

(Defaults are shown in **bold**)

1. Line Data
Show line: _
Dial mode: **Tone** Pulse

2. Miscellaneous
Link Time: 100 200 300 400 500 **600** 700 800 900 1000

Host delay: 200 400 600 800 **1000** 1200 1400 1600 1800 2000

Gain Pad
Short Loop Long Loop

Installer pswd.
Default: **266344** (CONFIG)
Change: (6 characters maximum)

3. Radio Data
Re-Evaluation
Re-Eval status
Re-Eval not req.
Re-Eval required
Re-Eval schedule
Not scheduled
yy-mm-dd hh:mm

Radios
Show radio:_
Cell Assignment
nnnn not asgned
nnnn in cell
Antenna Type
internal external

Cells
Show cell:_
Cell radios
No radio
Radionnnnn asgned

System LID:nnnn

B. Administration

(Defaults are shown in **bold**)

1. Reg. Control
Mstr Reg Enbl: **N** Y

Line Reg. Status
Show line:_
nnn: available registered

2. Options
Alrt mode: **echo** preset

Radio loss hdlng
Change Default
Dflt: **None** nnnnn
Change line:_
Line nnn: **None** nnnnn
2nd PBX flash: **N** Y

3. Line Names
Show line: _
Line n**nnn**

4. Caller ID
Show line: _
Line nnn: **N** Y
Display: **Name** Numbr

5. Time and Date
Time hh:mm (set accordingly)

Date dd mmm yy (set accordingly**)**

6. Passwords
Admin. password
Default: **23646** (ADMIN)
Change: (6 characters max)

Reg. password
Default: **72346** (RADIO)
Change: (6 characters max)

C. Maintenance	
1.	**System Version** SP: nnnnnnnn nnn
2.	**Port Status** Show port:_
3.	**Module Status** Show module: _
4.	**Evnt/Alrm Log** Start of new log
5.	**Admin Log** Start of new log

Appendix D: Programming the host switch

Host switch programming

Each portable on the COMPANION 200 system requires a corresponding analog line port on the host switch communication system. The host switch ports should be programmed by a qualified technician following the manufacturer's instructions.

Host switch analog line ports are programmed as though you were adding additional analog telephones. The association between an access line and a portable is made when a portable is registered with the COMPANION 200 system. Each portable can have different business features and class of service, which are established by programming the corresponding access line accordingly at the host switch. All features available to a user on a standard analog telephone are available to a portable user.

Directory number assignment

There are three types of users: those with only a portable (independent assignment), those whose wired telephone directory number is different from their portable's directory number (parallel assignment), and those whose wired telephone and portable share the same directory number (twinned assignment).

The method to use to assign a host switch extension number to a specific portable is based on the following factors:

- type of wired telephone supported
- access to host switch business features
- need for transferring a call between the portable and the wired telephone

- Need for privacy of telephone conversations.

Feature	Independent assignment	Parallel assignment	Twinned assignment		
			MADN SCA	MADN MCA	Bridge-tap
Host switch dependent	no	no	yes	yes	no
Wired telephone dependent	n/a	no	no	yes	yes
Privacy ensured	yes	yes	no	yes	no

Discuss these factors with the System Administrator to ensure that each user's requirements are considered before the method of assigning a host switch extension number to the portable is determined. The System Administrator ensures that the lines to the host switch are wired and that the host switch is programmed according to the method selected.

Independent assignment

A portable is independent when the user is assigned a portable only. The host switch directory number is assigned to the portable.

A portable that is assigned independently on the COMPANION 200 system is supported by an access line connecting the Controller to the host switch. The access line is programmed at the host switch as though it supports a standard analog telephone.

- Independent assignment can be used with any host switch.
- The portable can be given access to any host switch features available to a standard analog telephone.
- A call in progress on the portable can be continued on any other telephone by using Call Transfer, or any other similar host switch feature. The call is interrupted briefly while the feature is performed.
- Privacy of telephone conversations is ensured when independent assignment of a host switch directory number is used. Since the directory number is not shared, access to a conversation that is in progress on the portable cannot be gained through any other telephone.

Parallel assignment (separate directory numbers)

A portable and a wired telephone are assigned in parallel when the user is assigned both, and each has its own host switch directory

number. The portable has one directory number and the wired telephone has another directory number.

The portable and the wired telephone are not twinned. An incoming call only rings on the telephone whose directory number was dialed. Calls can be active on both telephones. For example, when a call is active on the portable, a second call can be made on the wired telephone. (To add a mobility feature to the wired telephone, forward calls from the wired telephone to the portable when you will be away from your desk.)

Telephones that are assigned in parallel on the COMPANION 200 system are supported by separate lines to the host switch. The portable is supported by an access line connecting the Controller to the host switch. The access line is programmed at the host switch as though it supports a single standard analog telephone. The wired telephone is wired directly to the host switch.

- Parallel assignment can be used with any host switch.
- The wired telephone can be a featured, digital telephone or an analog telephone.
- The portable and the wired telephone can be provided with different sets of host switch features. The portable is limited to the host switch features available to a standard analog telephone. Changing the feature settings of an access line will only impact the portable supported by that external line (the feature settings of the wired telephone will not change).
- A call in progress on the portable can be continued on the wired telephone by using Call Transfer or any other similar host switch feature. The call is interrupted briefly while the feature is performed. Similarly, a call in progress on the wired telephone can be continued on the portable by using an applicable host switch feature.
- Privacy of telephone conversations is ensured when parallel assignment of host switch directory numbers is used. Since the directory numbers are not shared, access to a conversation in progress on one telephone cannot be gained through the other telephone.

Twinned assignment

MADN SCA

Single Call Arrangement of Multiple Appearance Directory Number (MADN SCA) is a host switch feature that allows the assignment of the same host switch directory number to any number of lines that

are wired to the host switch. Your host switch may use another name for this feature.

Note: Verify if and how your host switch supports MADN SCA.

The Single Call Arrangement of the MADN feature can be used as a method of twinning a portable and a desk telephone. The portable and the desk telephone are assigned the same directory number when MADN SCA is used. An incoming call rings on both telephones and can be answered on either. Only one call can be active on all lines assigned to the host switch directory number. For example, when a call is active on the portable, a second call cannot be made from the twinned desk telephone.

Telephones that are twinned by MADN SCA on the COMPANION 200 system are supported by separate lines to the host switch. The portable is supported by an access line connecting the Controller to the host switch. The desk telephone is wired directly to the host switch by another line. Although there are physically two separate lines, the MADN feature allows the host switch to assign a single directory number to both lines.

- The MADN SCA feature must be available on the host switch. The feature must be able to support a standard analog telephone for the external line to the Controller.
- The desk telephone can be a featured digital telephone or an analog telephone.
- The portable and the desk telephone can be provided with different sets of host switch features. The portable is limited to the host switch features available to a standard analog telephone.
- A call in progress on a portable can be easily continued without interruption on the desk telephone to which it is twinned simply by lifting the receiver. The call on the portable can then be terminated.
- A call in progress on the desk telephone can be continued without interruption on the portable to which it is twinned simply by establishing a connection. The call on the desk telephone can then be terminated by placing the receiver in its cradle.
- Privacy of telephone conversations may *not* be ensured when MADN SCA is used. This depends on how the host switch handles MADN SCA. For example, if you are away from your desk while talking on your portable, MADN can be programmed to allow a person to listen to your conversation by picking up the receiver on your desk telephone.

MADN MCA

Multiple Call Arrangement of Multiple Appearance Directory Number (MADN MCA) is similarly to MADN SCA, but allows two active calls on that host switch directory number. For example, when a call is active on a portable, a second call can be made or received from the twinned desk telephone. Your host switch may use another name for this feature.

Bridge-tap

Bridge-tapping is another method of twinning a portable and a desk telephone. The desk telephone and the portable are assigned the same host switch directory number when bridge-tapping is used. An incoming call rings on both telephones and can be answered on either. Only one call can be active on the line assigned to the host switch directory number. For example, when a call is active on the portable, a second call cannot be made on the twinned desk telephone.

Telephones that are twinned by bridge-tapping on the COMPANION 200 system are supported by a single access line that connects the Controller to the host switch. The access line is programmed at the host switch as though it supports a standard analog telephone. The desk telephone is wired directly into this access line. Therefore, the host switch directory number assigned to the shared access line terminates at two destinations: the portable and the desk telephone.

- Bridge-tapping can be used with any host switch.
- The desk telephone must be a standard analog telephone.
- The portable and the desk telephone are provided with the same set of host switch features. Both telephones are limited to accessing the host switch features available to a standard analog telephone. Changing the feature settings of the external line will impact both the portable and the desk telephone.
- A call in progress on a portable can be easily continued without interruption on the desk telephone to which it is twinned simply by lifting the receiver. The call on the portable can then be terminated.
- A call in progress on the desk telephone can be continued without interruption on the portable to which it is twinned simply by establishing a connection. The call on the desk telephone can then be terminated by placing the receiver in its cradle.
- Privacy of telephone conversations is *not* ensured when bridge-tapping is used. Since the physical line is shared, direct access to

a conversation in progress on one telephone is available on the twinned telephone. For example, if you are away from your desk while talking on your portable, a person can listen to your conversation by picking up the receiver on your desk telephone.

Caller ID display

Caller ID display is an optional feature of COMPANION 200 that displays the name or number of callers on the portable. You must ensure that the CLASS Line Cartridges are used and that the host switch also supports this CMS feature on the access lines for which you have enabled Caller ID display. For information on enabling Caller ID display, see the *COMPANION 200 Operations Guide*.

Message waiting indication

Message waiting indication is an optional feature of the host switch that displays an icon on the portable when the user receives a message. You must ensure that the host switch supports this feature, and that CLASS Line Cartridges have been installed.

Note: When using Message waiting indication with MADN twinning, some host switches can send the message waiting indication to only one of the twinned telephones.

Appendix E: Installing Base Station plug-top power supplies

Before you can install a Base Station, you must locate it in the position determined by the site planner, as documented in the *COMPANION 200 Provisioning Record*. After you have positioned it, you can mount the Base Station.

!	**Each Base Station must be installed within 1200 m (wiring length) of the Controller or Base Station Module.** To optimize seamless hand-offs, the difference in TCM wiring length between neighboring Base Stations should not exceed 300 m.

Positioning a Base Station

Avoid installing Base Stations on large concrete or marble columns since this affects radio coverage. If possible, place the Base Station at least 1 m from such columns. Try not to mount a Base Station where metalwork is within 16 cm of the antenna housings. Be careful not to damage existing wiring or panels.

Do not position Base Stations in ducts, plenums, or hollow spaces used to transport environmental air except where the duct, plenum or hollow space is created by a suspended ceiling having lay-in panels or tiles.

If a cell requires more than one Base Station to meet traffic demands, mount all the Base Stations in that cell on the same mounting surface, within 1.5 m of each other, and at least 30 cm apart.

Note: When mounting several Base Stations in a cell, the cell size is determined by the area common to all the Base Stations for that cell.

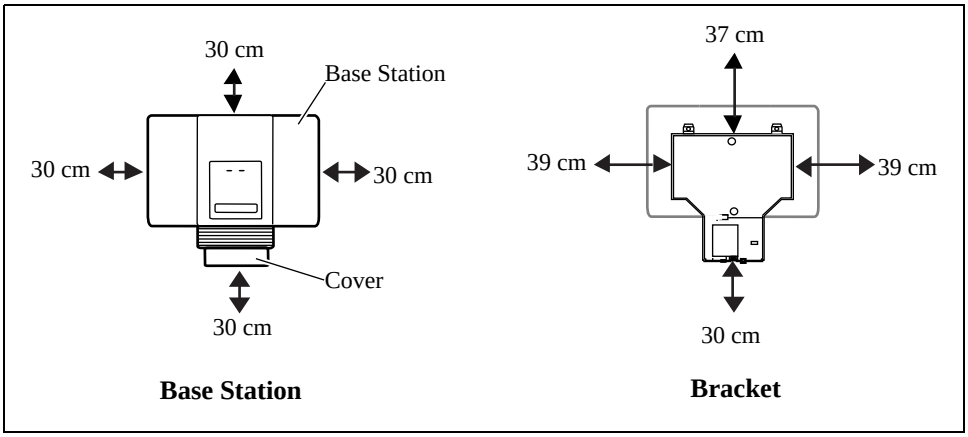
Position the Base Station within 4 m of an ac outlet, since the plug-top power supply has a 4-meter cord. Keep these points in mind:

- The power supply must be located in an area accessible to a properly grounded ac outlet.
- The input plug is part of the power supply. The only way to remove power is to disconnect the power supply.
- If you must install a new ac outlet to accommodate the power supply, ensure that the ac outlet is mounted with sufficient clearance to plug the power supply.
- If more than one Base Station is installed at a cell center, ensure that each plug-top power supply has a separate ac outlet.

Mounting a Base Station

Base Stations can be mounted on a wall or on a ceiling (when mounting on a wall, install it with the cover at the bottom, as shown in the illustrations). Allow for the following clearance around the Base Station:

Figure 41: Clearance for the Base Station

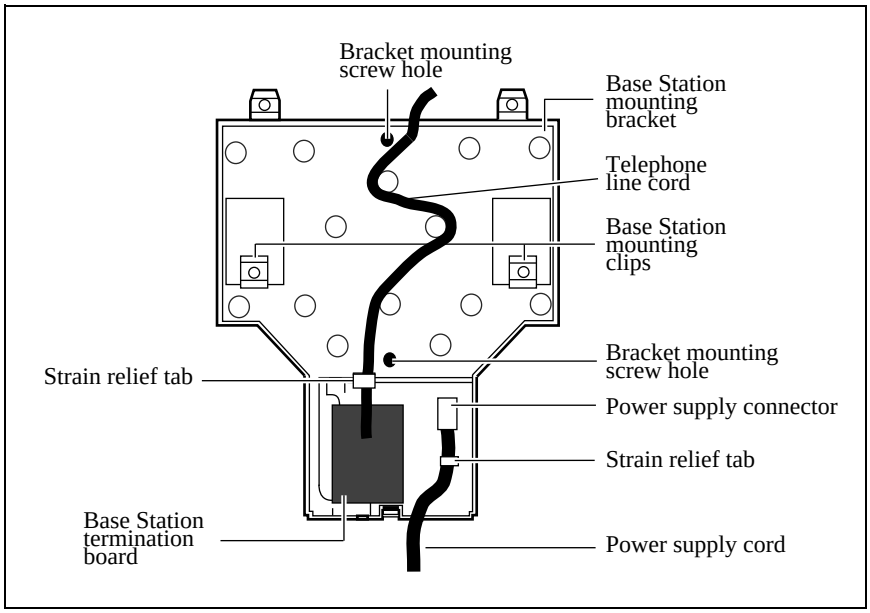


To mount a Base Station, follow these steps:

1. Fasten the bracket into position using two screws.
2. Route the power supply cord through the bottom (or top) opening and under the strain relief of the bracket.
3. Route the cable from the Controller through the top (or bottom) opening.

4. Wind any excess cable around the posts to secure it, then fasten it under the strain relief.

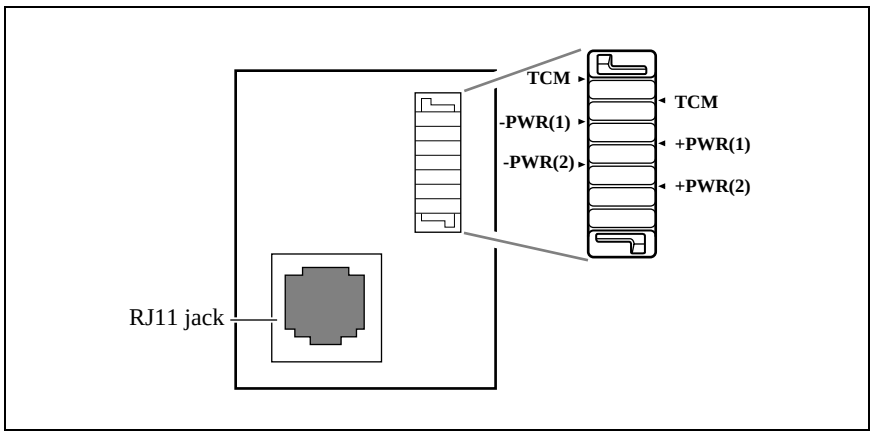
Figure 42: Base Station bracket detail



5. Connect the wires to the connector on the termination board as shown in the following illustration.

   Note: The polarity of the TCM connections is not important.

Figure 43: Bracket termination board

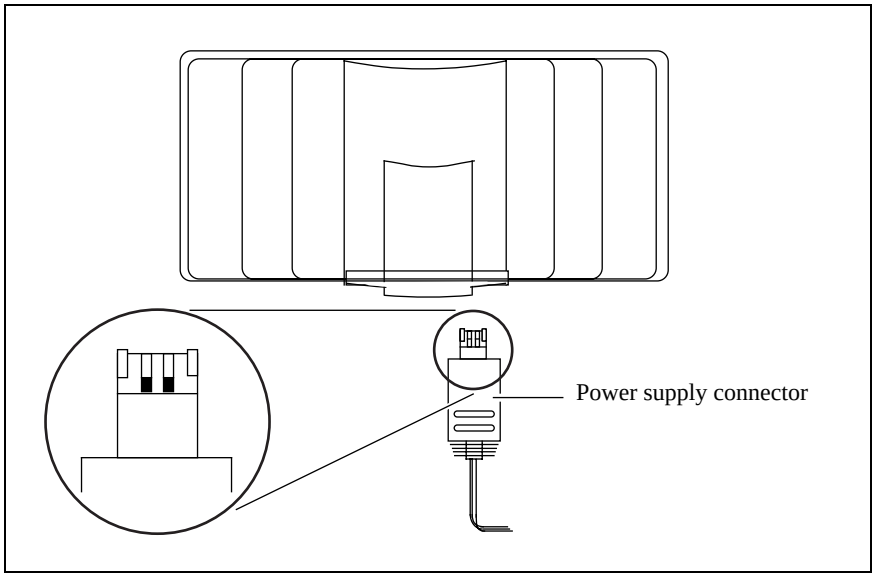


6. Mount the Base Station onto the bracket, snapping it into position.
7. Connect the power RJ11 jumper lead to the RJ11 jacks on the termination board and the Base Station.

8. Connect the power supply connector to the Base Station power connector.

> **Inserting the connector in the wrong direction may damage the plug-top power supply and the Base Stations.**
>
> Orient the power supply connector in the proper direction and push it into place securely (see the following illustration).

Figure 44: Power supply connector

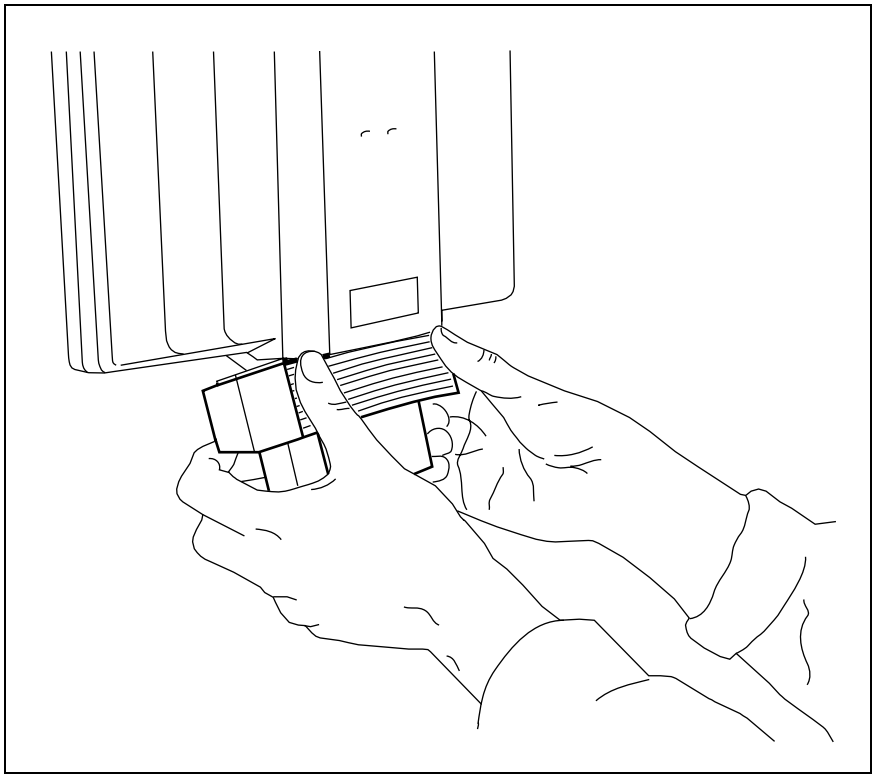


9. Plug the power supply into the ac outlet. The green light turns on and the red light flashes (if not, see "Troubleshooting a Base Station" in the troubleshooting section).
10. Record the associated Controller port number in the space provided on the printed label affixed on the lower right corner of the mounting bracket.

    Note: Include the labeling information for each Base Station on the completed installation floor plans and the *COMPANION 200 Programming Record* for later reference.

11. Slide the cover onto the bracket, using the guide to position it properly. Snap it into place.

Figure 45: Sliding cover onto bracket



List of Terms

Access line

The physical connection between the Companion system and a host system. Each access line supports one portable.

Administration log

The Administration log is a list of COMPANION 200 event messages for system initializations, configuration sessions (when a change was made), invalid password attempts, and password changes. This log holds a maximum of ten events, and should be checked and cleared periodically.

Administration programming

Setting registration permission, time and date, passwords, etc.

Administration Terminal

A Northern Telecom M7310 wired terminal used to perform administration and configuration programming, perform maintenance activities, and display alarm messages. The Administration Terminal does not support voice telephony.

Alarm code

A number that appears on the Administration Terminal display informing you of the type of fault the Controller has detected in the system.

Antenna

Base Stations have their own built-in antennas. External antennas can be used to extend radio coverage to hard-to-reach places such as tunnels or stairwells.

AWG

American Wire Gauge.

Base Station

The Base Station is the communication link between the portables and the COMPANION 200 system. Each Base Station contains two radios and connects to a TCM port at the Controller either directly or through a Base Station Module. Each Base Station can handle two portable calls simultaneously.

Base Station Module

A module mounted alongside the Controller and connected to it through an Expansion Cartridge. Each Base Station Module provides support for 16 additional Base Stations.

Bridge-tapping

A method of twinning a portable and a desk (wired) telephone. The wired telephone and the portable are assigned the same host switch telephone number when bridge-tapping is used. An incoming call rings on both telephones and can be answered on either. Only one call can be active on the line assigned to the host switch telephone number. For example, when a call is active on the portable, a second call cannot be made on the twinned wired telephone.

CDS

See Companion Diagnostic Software.

CDT

See Companion Deployment Tool.

Cell

The area covered by one or more radios in close proximity. One or more cells make up the coverage area. Cell sizes vary with layout and building architecture.

Cell boundary value

The minimum acceptable signal strength value (from a particular Base Station) specified for radio coverage. During site planning, this value is used to locate the outer edge of the coverage area for each cell (see RSSI reading).

Cell center

The location of the radios or the external antennas serving a cell. This is the point of reference for determining the cell boundary.

Cell neighbor

A cell that physically adjoins a cell.

Common Signaling Channel radio

At each cell center, one radio (the Common Signaling Channel, CSC, radio) is dedicated to locate and track portable movements. The other radios of that cell center (traffic radios) are used to establish voice connections with the portables.

Characteristics of CSC radios:

- The CSC radio will always be busy.
- You cannot measure the RSSI of a CSC radio.
- When the voice traffic in a given cell is high, the CSC radio may be used as a traffic radio.
- The CSC radios are allocated randomly at startup.
- If a CSC radio is disconnected, the system chooses another radio at that cell center to be the CSC radio.

COMPANION Deployment Tool

The COMPANION Deployment Tool (CDT) is used to map the radio coverage of a system. It is composed of a transceiver with stand and a portable. The portable used with the CDT is a standard COMPANION portable. The transceiver resembles a Base Station, but is a special purpose device and will not operate when connected to a Controller.

Companion Diagnostic Software

The Companion Diagnostic Software (CDS) provides access to real-time and historical radio performance on the COMPANION 200 system. CDS runs on a personal computer (located either on site or in a remote location), and connects to the COMPANION 200 through a Remote Access Device (RAD).

Configuration programming

Configuration programming is used by the installer to customize a COMPANION 200 system as determined by the user or the host system requirements, and to establish the basic operation of lines and Base Stations in a Companion system. Configuration allows you to change parameters such as radio data, line access, line data, etc.

Controller

The central hardware component in the Companion system. The Controller has 32 built-in TCM ports for the Base Stations, the Administration Terminal, and the Remote Access Device (if used). It can also support up to eight access lines with the addition of Line Cartridges. Its capacity can be increased by connecting Base Station

Modules and Line Modules to it through 2-port or 6-port Expansion Cartridges.

Coverage area

The area in which a portable user should be able to make and receive calls. It can include both indoor and outdoor areas, stairwells, elevators, etc. Base Stations are installed in strategic locations throughout the customer's premises creating a network of overlapping radio cells. Collectively, these radio cells are referred to as the radio coverage area.

CSC radio

See Common Signaling Channel radio.

Default

The settings for all Companion parameters when the system is first installed. Defaults are automatically assigned at system startup. Settings are changed from their default values in Configuration programming and Administration programming.

Deployment

See Site planning.

Deployment Tool

See COMPANION Deployment Tool.

Deregistration

Disabling a portable from working on a wireless system.

Directed Receive Signal Strength Indicator (RSSI) feature

The portables can show on their displays the current signal strength coming from a specified Base Station to the portable. See "Verifying the installation."

Distribution frame

Standard telephone distribution frame. This frame is used to interconnect all the components of the host system and the Companion system.

Event message

Event messages are stored in the Event/Alarm log and displayed on the Administration Terminal during a Maintenance session. They record a variety of events and activities in the COMPANION 200 system.

Event/Alarm log

The Event/Alarm log is a list of COMPANION 200 event messages and alarm codes. The Event/Alarm log holds a maximum of 20 events and should be checked and cleared regularly.

Expansion Cartridge

A cartridge that allows add-on modules to be connected to the Controller through fiber cables. There are two versions available, a 2-port and a 6-port Expansion Cartridge. Up to two Expansion Cartridges can be installed in the Controller.

External antenna

A passive radio frequency emitter connected to a Base Station radio. There are both omni-directional and directional external antennas for use with the Companion system. An external antenna can be used instead of the internal Base Station antenna to extend radio coverage to hard-to-reach places or locations where Base Stations cannot be installed.

Feature code

A sequence of numbers used to activate a Configuration or Administration session or a feature such as contrast adjustment on the Administration Terminal.

Hand-off

A hand-off occurs when an active radio link to a portable is transferred from one Base Station to another Base Station in the Companion system (that is when the user moves from one cell to another). Hand-off occurs automatically when the Controller detects that the strength and quality of the radio signal have gone below a predefined threshold.

Host switch

Either a Private Branch Exchange (PBX) or a Public Switched Telephone Network (PSTN) system to which the Companion system provides a wireless service layer.

Host switch delay

Host delay is a configuration setting that controls how long the system waits after selecting an access line for an outgoing call before transmitting the dialed telephone number on that access line. This delay ensures that a dial tone is present before the dialed telephone number is transmitted. The installer programs host delay according to the requirements of the host switch.

Installer password

A one- to six-digit password that is used to prevent unauthorized access to Programming, Maintenance, Memory reset and System Startup. The installer password can be changed in configuration programming.

LID

See System LID.

Line Cartridge

A Line Cartridge is a hardware device that is inserted into the Controller or a Line Module to provide access line connections. A Line Cartridge can provide support to up to four access lines. Up to two Line Cartridges can be installed in the Controller, and up to three can be installed in a Line Module.

Line data

In Configuration programming, this is the heading under which you assign certain settings of individual access lines.

Line Module

A module mounted alongside the Controller and connected to it through an Expansion Cartridge. Each Line Module can hold up to three Line Cartridges, and can supply up to 12 access lines to the Controller.

Line number

A three-digit number that identifies an access line. The range is 001 to 152. The total number of lines depends on how many Line Cartridges are installed.

Link

The Link signal, also known as hookswitch flash or Recall, is a temporary break in the connection between the Controller and the host system, enabling portable users to use host system features such as transfer or conferencing.

M7310 terminal

See Administration Terminal.

Maintenance

A feature you can use to diagnose problems in the COMPANION 200 system. Maintenance requires no programmable settings.

Memory reset

Memory reset is used by the installer to reset the system settings to the factory defaults.

Miscellaneous

A section heading in Configuration programming that includes a collection of system-wide settings.

Module status

There are two built-in modules in the COMPANION 200 system Controller: module 1 for Base Stations and module 2 for access lines. Other modules (numbers 3 to 14) may be connected by an Expansion Cartridges. Module status includes both the state of the Controller and the numbers of lines or Base Stations and other compatible devices in use.

Multiple Appearance Directory Number (MADN)

MADN is a host switch feature that allows the assignment of the same host switch telephone number to any number of lines that are wired to the host switch. The Single Call Arrangement (SCA) of the MADN feature can be used as a method of twinning a portable and a wired telephone. The portable and the wired telephone are assigned the same telephone number (directory number) when MADN SCA is used. An incoming call rings on both telephones and can be answered on either. Only one call can be active on all lines assigned to the host switch telephone number.

Password

A password is a specific sequence of digits entered from the Administration Terminal dialpad to gain access to COMPANION 200 operation and programming. A password is required for System Startup and Configuration programming and may be required for Administration programming.

Port number

A logical identification number for a physical TCM or access line connection to the Controller. The number of ports available depends on the type of Expansion Cartridge (if any) connected to the Controller. Ports are identified by three-digit numbers. The first digit identifies the Expansion Cartridge port to which the module is connected and the last two digits indicate the port number on that module.

Portables

The Companion portable is a battery-powered, pocket-size portable telephone. The COMPANION 200 system can support up to 152 portables depending on the number of Line Cartridges and Base Station Modules installed.

Programming

The setting of various characteristics of the Companion system. This includes system wide settings, access line, radio, and cell assignments.

Programming Record

An on-site planning and reference document. All Configuration and Administration settings should be recorded in the COMPANION 200 Programming Record.

Public network

The regular telephone network that connects most homes and businesses. This is sometimes referred to as the PSTN (Public Switched Telephone Network).

RAD

See Remote Access Device.

Radio link

A radio channel between the Base Station and the portable.

Registration

Enabling a portable to work on a wireless system. Each portable in the COMPANION 200 system must be registered with an access line.

Registration control

An Administration programming term referring to the master registration switch. When the switch is set to Y, portables can be registered in the COMPANION 200 system. The switch should be reset to N when the portables are registered.

Registration password

The Registration password prevents unauthorized users from registering portables on the COMPANION 200 system.

Remote Access Device

The Remote Access Device (RAD) allows a personal computer (PC) running Companion Diagnostic Software to access the Controller. Access may be established by connecting the RAD on the customer site using a local connection, or at a remote location using standard modem equipment.

Remote Power Interconnect

The Remote Power Interconnect (RPI) is an interface providing remote power for the Base Stations. Each RPI can power up to 8 or 16 Base Stations.

RPI

See Remote Power Interconnect.

Receive Signal Strength Indicator (RSSI) reading

The COMPANION 200 system portables can display the current signal strength coming from the Base Station to which the portable is connected. The higher the figure following the minus sign, the worse the signal.

Site planning

The process of positioning the Base Stations, antennas, and other hardware in the COMPANION 200 system to maximize coverage for the portables and minimize the number of Base Stations required for acceptable performance. See the *COMPANION Site Planning Guide* for more information on site planning.

Software Cartridge

A non-volatile memory plug-in cartridge containing the programming necessary to operate the COMPANION 200 system.

System Access Logical Identifier

See System LID.

System LID

The System Access Logical Identifier (LID) is a 4-digit number by which the system identifies itself to portable telephones and which the portable telephones use to request service from the system. Only the Installer can change the System LID.

System version

This main programming heading shows the version number of the software currently running on the Controller. The version number should also be recorded in the COMPANION 200 Programming Record.

Traffic radio

See Common Signaling Channel radio.

Twinning

An arrangement that allows a portable and a wired telephone to have the same extension number. Twinning may be accomplished through “bridge-tapping” or by administering a “multiple appearance” in the host system.

Version number.

See System version.

Index