

Installing the Hardware Infrastructure

Installing the DecisioNet RF System

This chapter describes how to install the DecisioNet hardware infrastructure. The DecisioNet hardware includes the following components:

- CBS(s)*
- CBS Power Supply(s)*
- SmarTalker and SmarTalker II tags
- Transmit and Receive Antennas*
- RS-232/RS-422 Converter
- RS-232/RS-422/RS-485 cables*

* To be installed only by NCR customer service personnel or NCR-trained personnel.

Refer to Chapter 10, "SmarTalker and Rail Installation," and/or Chapter 11, "SmarTalker II and Rail Installation," for information about tag installation.

Refer to Appendix A and Appendix B for ordering information.

Refer to Chapter 5 for Windows NT, Chapter 6 for NCR UNIX, and Chapter 7 for SCO UNIX EPL controller memory requirements.

Two types of DecisioNet System configurations are discussed in this chapter:

- Type 1 (lab) – This configuration uses one CBS.
- Type 2 (store) – This configuration uses multiple CBSs.

Technician Supply Checklist

The following table shows the tools and supplies an installation team may need to install the DecisioNet RF infrastructure.

Tool/Supply	Quantity
Cable ties	100
Chain, single jack #16	Installation dependent
Cane pole or firm, flexible rod, 6 foot (not required for Type 1 (lab) configuration)	1
Lift truck	1

Key Points to Remember During Installation

- Label all cables and document labeling for future reference.
- Neatness makes servicing the system much easier.
- Allow slack in cables, especially in receive antenna cables.
- Test the system as it is being installed. Refer to Chapter 12, “Testing the System,” for information on testing.
- Provide AC power that meets NCR requirements for the power supplies.
- It is highly recommended that the EPL infrastructure not be connected to the site’s EPL controller until the infrastructure has been completely installed and tested. For more information on testing the infrastructure and site certification, see your NCR representative and reference the following materials:
 - B005-0000-1138: *DecisioNet Support Tools Reference Guide* (document)
 - G370-1182-0000: *EPL Implementation Package for Windows 95/NT* (disk media containing the EPL RF Certification Package)
 - 497-0410343: *Site Certification/Re-Certification Process Document* (for documenting site configuration information for support purposes)
- EPL software may be installed on a portable PC or laptop to test the system before connecting it to the site’s EPL controller.

Cables Required for Installation

The following sections describe the DecisioNet System cable connections.

General Layout Instructions

The DecisioNet System general layout instructions are as follows:

- The total cable length for the entire site must not exceed the following.

Communication Protocol	Communication speed (bps)	Cable Length m (ft.)
RS-422 (RS-232/RS-422 Converter to CBS)	9,600	720 (2,362)
RS-485 (CBS to CBS)	19,200	720 (2,362)*

* The total cable length of any one CBS group that consists of one power supply and up to five CBSs must not exceed 162 m (532 ft.).

- Only NCR authorized communication cable may be used. Refer to Appendix B for detailed cable diagrams.
- Communication cables must be secured tightly with supplied locking connectors to prevent cables from coming loose.
- Up to 20 CBSs can be installed in one DecisioNet System. An RS-485 terminator must be installed on the last CBS in the line. Refer to Appendix B for a detailed diagram of the RS-485 terminator.
- If the communication cable is routed through an elevator shaft, it must be in a conduit and the conduit must be connected to the building ground.
- The minimum distance between a communication cable and a fluorescent, neon, or incandescent light is 30 cm (12 in.).

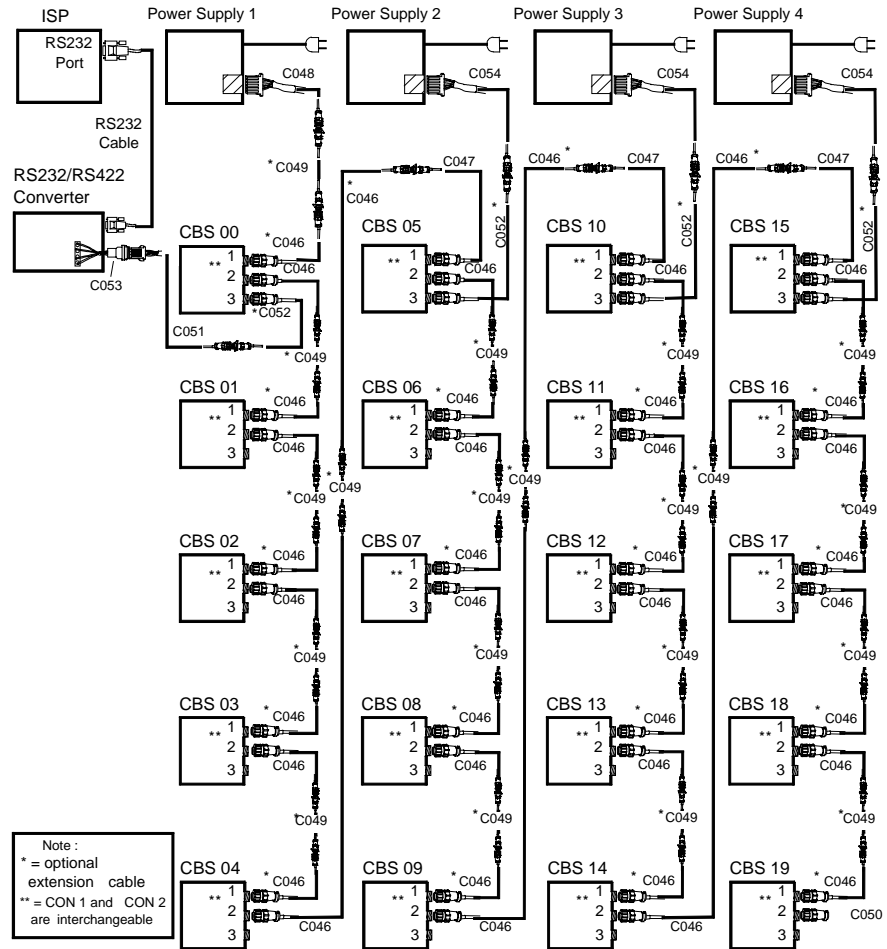
- The minimum distances between a communication cable and electrical equipment/associated power cables are as follows:

Maximum Rated Circuit Power	Unshielded Power Cables	Shielded Power Cables
1 kVA	30.5 cm (14 in.)	2.54 cm (1 in.)
2 kVA	45.7 cm (18 in.)	5.08 cm (2 in.)
5 kVA	60.9 cm (24 in.)	15.24 cm (6 in.)
Over 5 kVA	152.4 cm (60 in.)	30.48 cm (12 in.)

- Do not route communication cables outside the building.
- All communication cable connections must be protected from electrical and mechanical deterioration. The deterioration of communication cable connections due to corrosion or electrolysis, especially in a humid or corrosive atmosphere, may result in electrical noise.

System Cable Connection

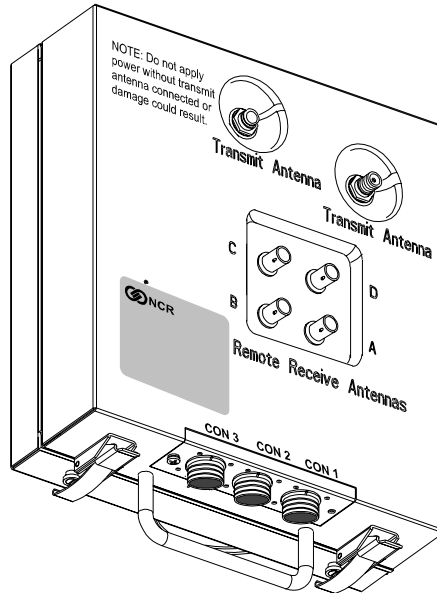
The following illustration shows an example Type 2 (store) configuration, its cable connections, and the cable numbers. Refer to the table that follows for details about each cable.



Connector Location

The CBS and power supply cable connectors are shown in the following illustrations.

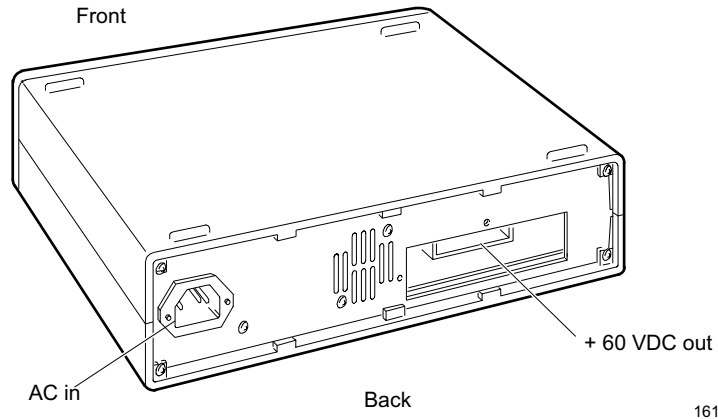
Communications Base Station



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Note: Some CBSs may have minor cosmetic differences. The indentations around the transmit antenna may be round (as shown) or may be square. Also, there is only one physical connection for the transmit antenna. The other connector location is a metal blank. Connector location depends on CBS type (7710-1000, 7710-1001, or 7710-1002). The connector is on the right, as shown in the illustration above, for the 7710-1001 and 7710-1002. The connector is on the left for the 7710-1000.

Power Supply



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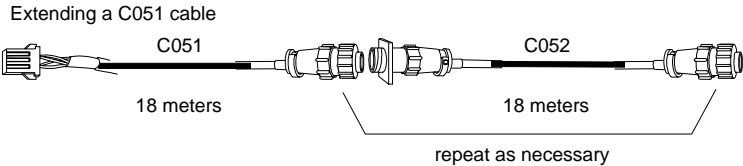
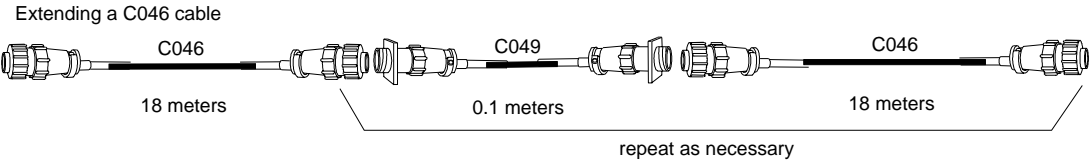
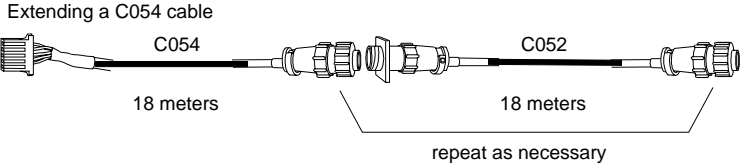
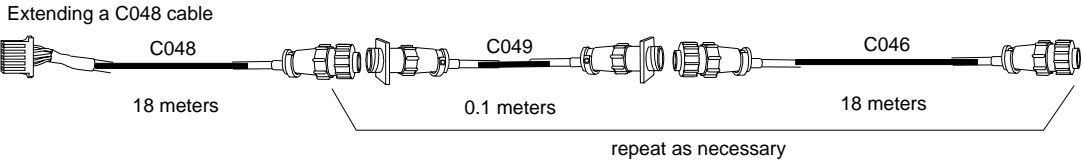
Cables

NCR supplied cables conform to type CL2P, UL subject 13-PLCC NEC 725-38(b) (3). Refer to Appendix B for detailed cable diagrams.

Cable ID Part Number	Description	Length m (ft.)	Connect From	Connect To	Comments
1424- C051 -0180 230-0134924	RS-422 Cable	18.0 (59.0)	CBS CON-3	C053	Can be extended by adding a series of C052s
1424- C048 -0180 230-0134940	RS-485/DC Cable	18.0 (59.0)	First Power Supply	Primary CBS CON-1	Can be extended by adding alternating C049s and C046s to reach the CBS.
1424- C046 -0180 230-0134922	RS-485/DC Cable	18.0 (59.0)	Any CBS CON-1	CBS CON-2 of next CBS	Can be extended by alternating C049s and C046s.
1424- C047 -9999 230-0134923	RS-485 Cable (for separating DC power)	0.2 (0.6)	CBS CON-1 of every 5th CBS	C046 from the previous CBS CON-2	
1424- C054 -0180 230-0134941	RS-422/DC Cable	18.0 (59.0)	Second, third and fourth Power Supply	CBS CON-3 of the same CBS that C047 just went to	Can be extended by adding a series of C052s
1424- C050 -9999 230-0134942	RS-485 Terminator		CBS CON-2 of last CBS in line		

Cable ID Part Number	Description	Length m (ft.)	Connect From	Connect To	Comments
1424- C053 -9999 230-0134946	RS-422 Adapter		RS-232/RS-422 Converter	CBS CON-3 of the primary CBS	Connects through a C051 and a series of C052s
1424- C049 -9999 230-0134944	RS-485/DC Extension Adapter	0.1 (0.3)	Extends C048s or C046s	Add alternating C049s and C046s to a C048 when one C048 does not reach. Use a C049 between C046s when one C046 does not reach	C048-C049- C046-C049- C046-C049- C046... C046-C049- C046-C049- C046-C049- C046...
1424- C052 -0180 230-0134945	RS-422/DC Extension Cable	18.0 (59.0)	Extends C051s or C054s.	Use one C051 or C054 and a series of C052s when one C051 or C054 does not reach.	C051-C052- C052-C052- C052 or C054-C052- C052-C052- C052
1424- C056 -0018 230-0134971	Transmit Antenna Cable	1.8 (5.9)	Transmit Antenna Connector on CBS	Transmit Antenna	Reverse thread screw on connector (TNC)
1424- C057 -0180 230-0134951	Receive Antenna Cable	18.0 (59.0)	Receive Antenna Connector A, B, C, or D on CBS	Receive Antenna	Quick disconnect connector (BNC)

The following illustrations show how cables can be extended to meet installation requirements.



Installing Primary and Secondary CBSs

The following sections describe how to prepare a CBS for installation and how to install a CBS when preparation is complete.

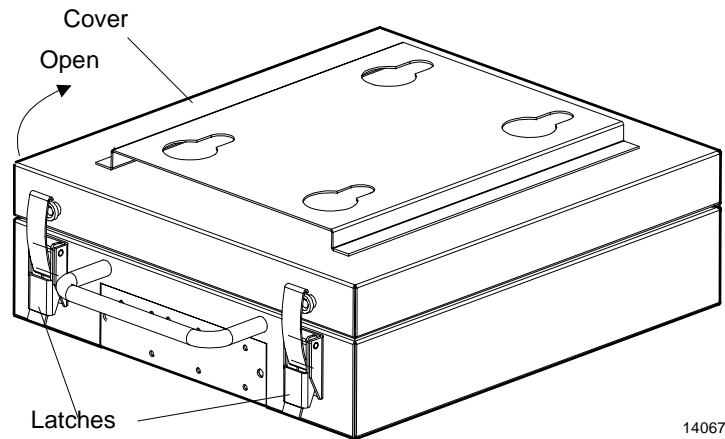
Installation Process

Install the CBSs at the same time you install the power cables, data cables, and antennas. The most efficient way to install the DecisioNet hardware is in one pass through the store.

Things to Remember

- For a dropped ceiling, use a mounting system appropriate to the ceiling type.
- For an open ceiling, mount the CBSs to the roof trusses.
- The CBS mounting system must isolate system ground from earth ground. Use only NCR CBS Mounting Bracket 7710-K300-V001.

To open the cover of the CBS, release the latches and pull the cover up.



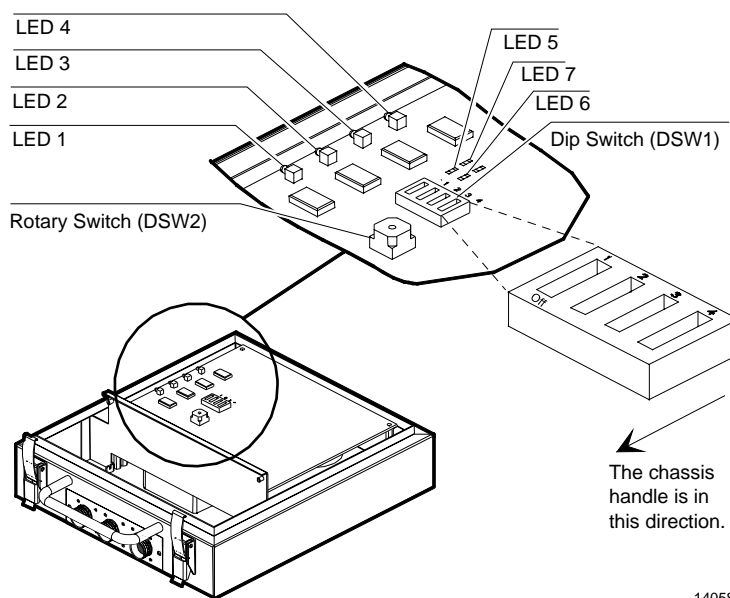
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Preparing the CBS

The CBS uses a four-position DIP switch and a ten-position rotary switch to control the following functions:

- CBS Address
- CBS Address Display
- Normal or Diagnostic start-up
- RS-422 Speed

The following illustration shows the location of DIP switch DSW1 and rotary switch DSW2.



14058

Refer to Chapter 12, "Testing the System," for information about tests that utilize the LEDs.

DIP Switch Settings

The following table shows the functions of DIP switch DSW1.

Function	Switch	Setting	Description
CBS Address (tens digit)	1	On	1
		Off	0
RS-422 Speed	2	On	4,800 bps
		Off	9,600 bps (required)
Diagnostic Switch A	3	On	Diagnostics start-up (Refer to Chapter 12, "Testing the System," for details.)
Diagnostic Switch B	4	Off	Normal start-up
		On	CBS address indication (When Switch 3 is set for normal start-up.)
	Off	Normal	

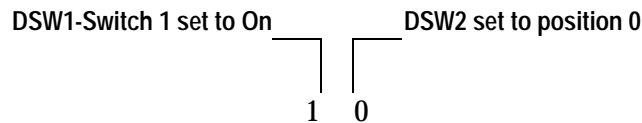
Rotary Switch Settings

The following table shows the function of rotary switch DSW2.

Function	Position	Description
CBS Address	0-9	Units digit value (decimal)

Setting the CBS Address

Set the address of each CBS before installing it in the ceiling. To set a CBS address, use DIP switch DSW1-Switch 1 for the high bit, and rotary switch DSW2 for the low nibble as shown in the following illustration where the example CBS address is 10.



Set the CBS address to 0 -19 (decimal). Each CBS must have its own unique address. The CBS addresses do not have to be sequential as they are wired. There can be unused addresses in the series as long as there are not twenty CBSs in the system.

Communication Speed

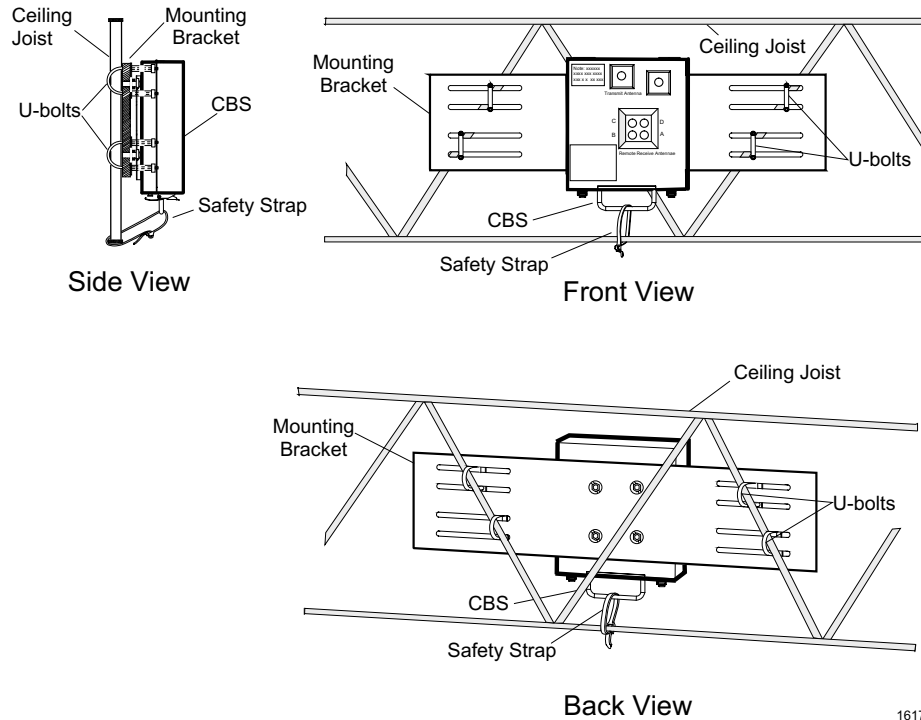
Set the RS-422 communication speed to 9,600 bps by setting DSW1-Switch 2 to the OFF position. Set the communication speed before installing the CBS in the ceiling.

Installing CBSs

Install the CBS in the ceiling using a mounting system appropriate for the ceiling type. The illustration below is for open ceilings.

Caution: DO NOT install CBSs by placing them on the ceiling tiles.

CBS Mounting System



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Caution: Provide clearance between the ceiling joist braces and CBS mounting bolts to isolate the CBS case from building ground.

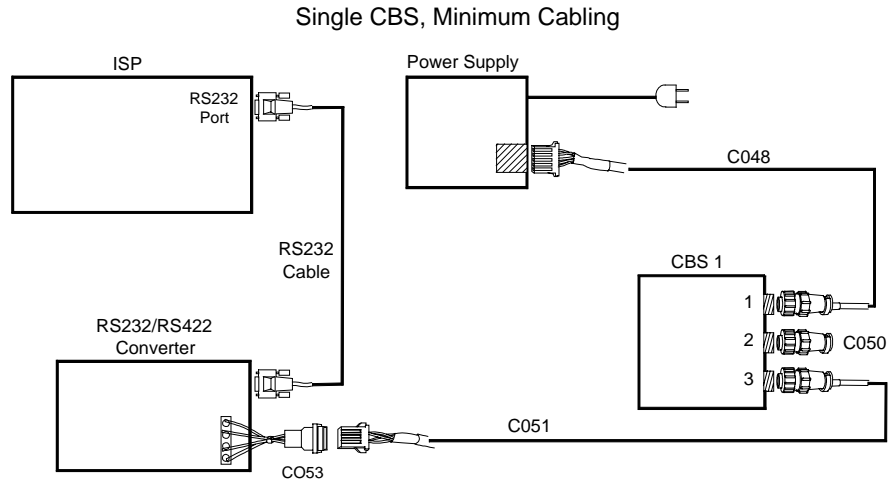
Install the mounting bracket as follows:

1. Slide the U-bolts around the ceiling joists, and then into the slots of the mounting bracket. Install the yokes, spacers if needed, and tighten the nuts.
2. Lift the CBS up to the mounting system and hook the holes in the back of the CBS case onto the carriage bolt heads.

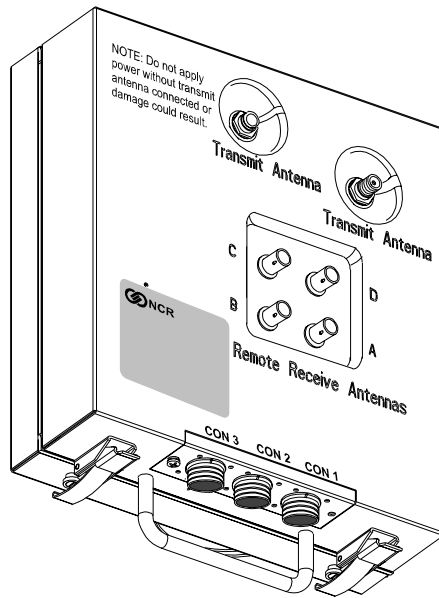
Caution: To prevent damage of the transmitter, the transmit antenna must be connected to the CBS before power is applied to the CBS.

Cable Connections for a Type 1 (Lab) Configuration

The following diagram shows the configuration of a Type 1 (lab) DecisionNet System.



The following diagram shows the CBS connector locations.

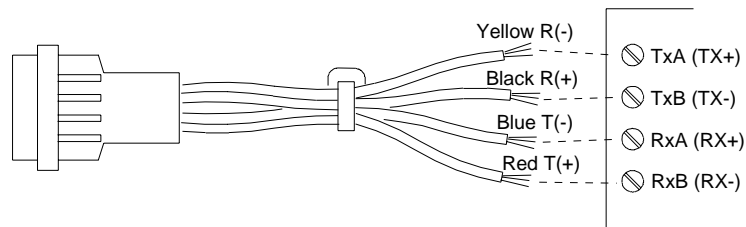


Connecting an RS-232/RS-422 Converter to the Primary CBS

The RS-232/RS-422 Converter converts the communication protocol from RS-232 to RS-422. Install the converter near the power supplies and host computer in the back office or computer room.

To install the converter, do the following:

1. Connect a standard RS-232 cable from the RS-232 port on the EPL Controller to the RS-232 port on the converter.
2. Connect the RS-422 adapter cable (C053) to the RS-422 terminal block (TB1) inside the converter as shown in the following illustration. Refer to Appendix B for a detailed diagram of the cable.



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3. Connect an RS-422 cable (C051) to the C053 cable.
4. Either connect the C051 cable to CON 3 of the CBS or add as many C052 cables as are required to meet the desired length. Then plug the last C052 cable into CON 3 of the CBS. Refer to the Single CBS, Minimum Cabling illustration in the previous section, "Cable Connections for a Type 1 (Lab) Configuration."

Converter Strapping Information

Set up the converter as follows:

	W15 Jumper	W18 Jumper	S2	XW1 DIP Switch Jumper
Use these settings with a 7710 system:	B/C (Data enabled)	Don't care	ON (terminated output)	XW1A (DCE)
Default settings (for reference only - DO NOT rely upon these):	A/B (RTS/CD enabled)	B/C (RTS enables driver)	OFF (unterminated output)	XW1A (DCE)

If you have problems making the PC to converter connection work, verify that all of your jumper settings are as shown above. If this does not work, try moving the XW1 DIP switch jumper from the XW1A (DCE) position to the XW1B (DTE) position. If that fixes the problem, then you have a null modem RS-232 cable instead of a standard modem RS-232 cable. If the system works with the alternative XW1 setting, then it is acceptable to use that setting.

Connecting Power Supplies to AC Power

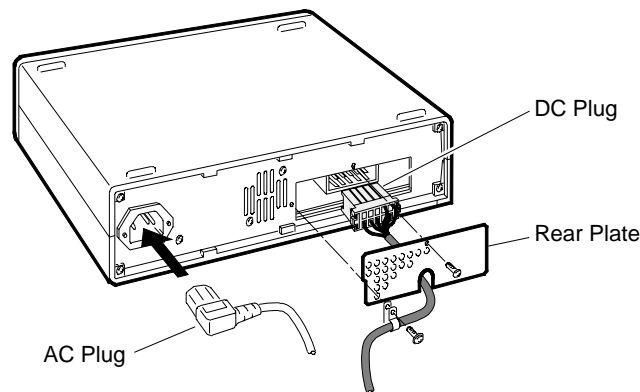
Place the power supply with the host computer system if possible. If this is not possible, you may place it nearer to the CBSs it is powering.

1. Have an electrician install new AC receptacles if needed.
2. Do not plug the power supply into the AC receptacle until steps 1 – 3 in the next section are complete.

Connecting a Power Supply to a Primary CBS

The power supply provides DC power to the CBS. To connect the power supply to the CBS do the following:

1. Remove the rear plate as shown in the following diagram. Insert the rectangular plug of an RS-485/DC cable (Cable CO48) into the DC plug located at the back panel of the power supply, and then reinstall the rear plate at the back panel of the power supply. Insert the AC power cable into the AC receptacle located on the back panel of the power supply.



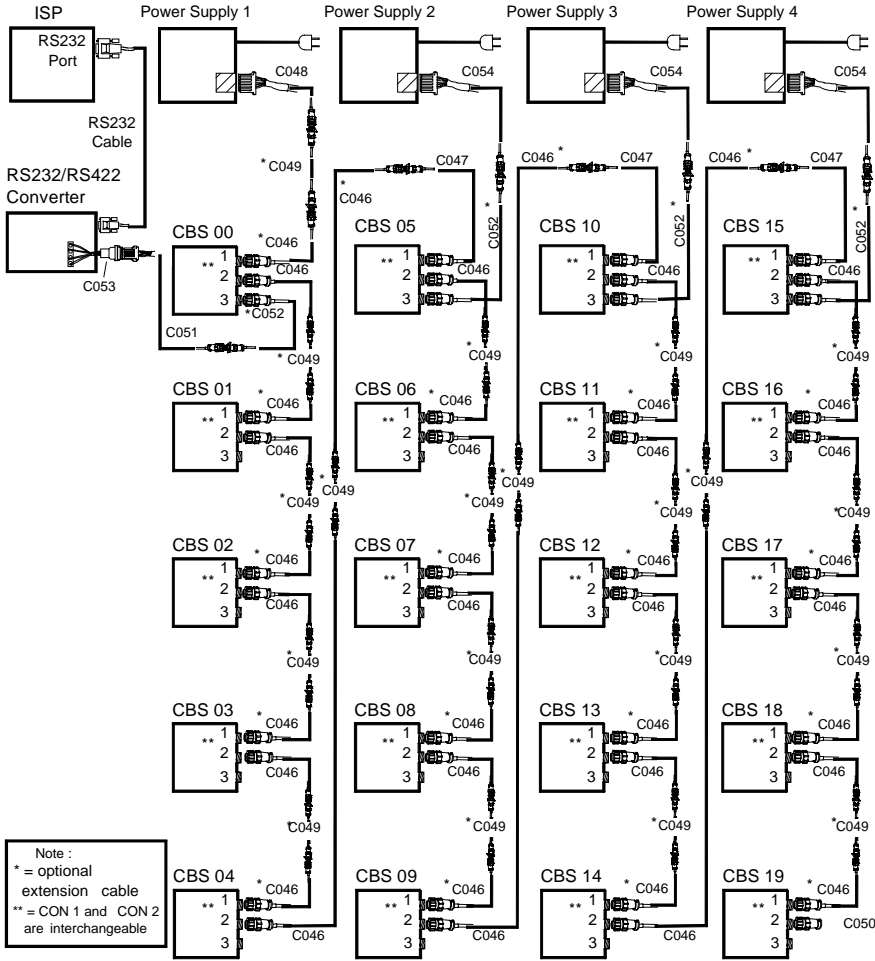
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2. Either connect C048 into CON 1 of the CBS or add as many C049 - C046 cables as are required to meet the desired length. Then plug the last C046 cable into CON 1 of the CBS. Refer to the system cable connection illustrations in the previous sections, "Cable Connections for a Type 1 (Lab) Configuration" and "Cables Required for Installation."
3. Connect the AC plug to the AC power source.

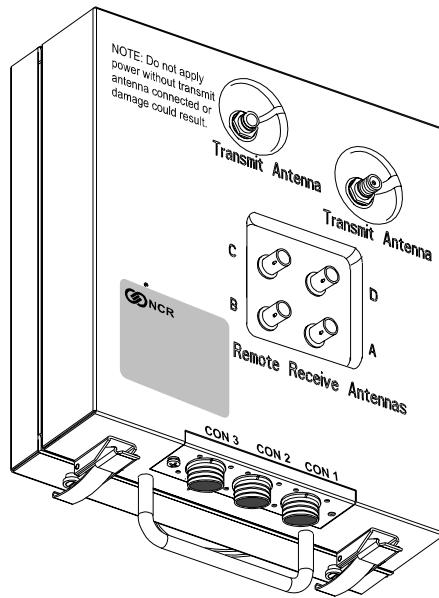
Caution: To prevent damage of the transmitter, the transmit antenna must be connected to the CBS before power is applied to the CBS.

Cable Connections for a Type 2 (Store) Configuration

The following diagram shows a typical configuration for a Type 2 (store) DecisioNet System. This configuration can be scaled down as needed for a smaller store or lab environment. Remember that one power supply can support up to five CBSs.



The following diagram shows the CBS connector locations.

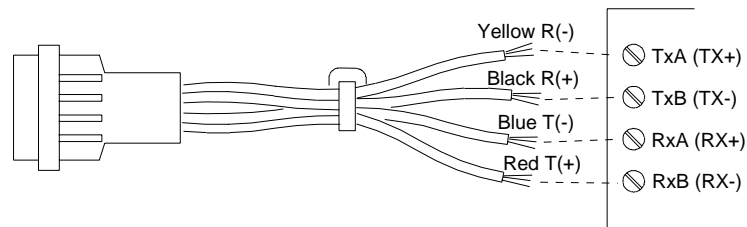


Connecting an RS-232/RS-422 Converter to the Primary CBS

The RS-232/RS-422 Converter converts the communication protocol from RS-232 to RS-422. Install the converter near the power supplies and host computer in the back office or computer room.

To install the converter do the following:

1. Connect a standard RS-232 cable from the RS-232 port on the EPL Controller to the RS-232 port on the converter.
2. Connect the RS-422 Adapter cable (C053) to the RS-422 terminal block (TB1) inside the converter as shown in the following illustration. Refer to Appendix B for a detailed diagram of the cable.



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3. Connect an RS-422 cable (C051) to the C053 cable.
4. Either connect the C051 cable to CON 3 of the CBS or add as many C052 cables as are required to meet the desired length. Then plug the last C052 cable into CON 3 of the CBS.

Note: Refer to “Cable Connections for a Type 1 (Lab) Configuration” in this chapter for converter strapping information.

Connecting Power Supplies to AC Power

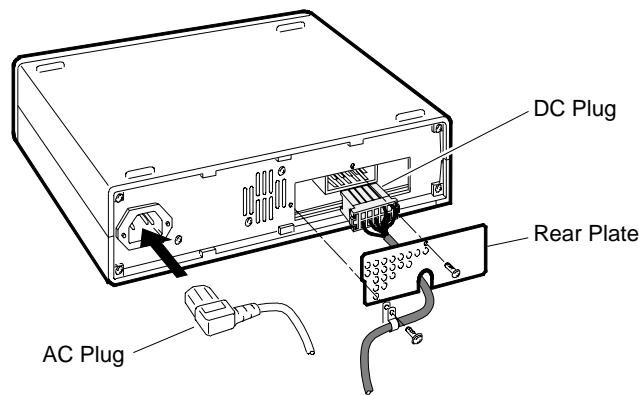
Place the power supplies in the back office with the host computer system if possible. If this is not possible, they can be placed nearer to the CBSs they are powering. You may stack the power supplies.

1. Have an electrician install new AC receptacles if needed.
2. Do not plug the power supplies into the AC receptacles until steps 1 – 3 in the next section are complete.

Connecting a Power Supply to a Primary CBS

The power supply provides DC power to the CBS. To connect the power supply to the CBS do the following:

1. Remove the rear plate as shown in the following diagram. Insert the rectangular plug of a RS-485/DC cable (Cable CO48) into the DC plug located at the back panel of the power supply, and then reinstall the rear plate at the back panel of the power supply. Insert the AC power cable into the AC receptacle located on the back panel of the power supply.



2. Either connect C048 into CON 1 of the CBS or add as many C049 - C046 cables as are required to meet the desired length. Then plug the last C046 cable into CON 1 of the CBS.

3. Connect the AC plug to the AC power source.

Caution: To prevent damage of the transmitter, the transmit antenna must be connected to the CBS before power is applied to the CBS.

Connecting a Power Supply to a Secondary CBS

To connect the power supply to the 6th (CBS 05), 11th (CBS 10), or 16th (CBS 15) secondary CBS, perform the following procedure:

1. Remove the rear plate as shown in the diagram on the previous page. Insert the rectangular plug of an RS-422/DC cable (C054) into the DC receptacle located at the back panel of the power supply, and then reinstall the rear plate at the back panel of the power supply. Connect the AC power cable to the AC connector.
2. Either connect the cable C054 into CON 3 of the CBS or add as many C052 cables as are required to meet the desired length. Then plug the last C052 cable into CON 3 of the CBS.
3. Connect the AC plug to the AC power source.

Caution: To prevent damage of the transmitter, the transmit antenna must be connected to the CBS before power is applied to the CBS.

Connecting RS-485 Cables between Secondary CBSs

The RS-485 cables connect the data (and sometimes the power) between the secondary CBSs. The secondary non-powered CBSs are connected differently from the powered CBSs. This section tells how to connect the non-powered CBSs. (On the cable diagram this is called a 485 series.) The next section tells how to connect the powered CBSs.

1. Connect an RS-485/DC cable (C046) to the RS-485 connector (CON 2) of the current CBS.

2. Either connect cable C046 to CON 1 of the next CBS or add as many C049 - C046 combination cables as are required to meet the desired length. Then connect the last C046 cable into CON 1 of the next CBS.
3. Repeat steps 1 and 2 to connect all remaining (secondary) non-powered CBSs.

Connecting RS-485 Cables between a non-powered (Secondary) CBS and a powered CBS

To install the RS-485 cables between a non-powered (5th (CSB 04), 10th (CBS 09), or 15th (CBS 14)) secondary CBS and a powered CBS (6th (CBS 05), 11th (CBS 10), or 16th (CBS 15)), perform the following procedure:

1. Connect an RS-485/DC cable (C046) to the RS-485 connector (CON 2) of the non-powered (secondary) CBS.
2. If the cable is at the desired length, go to step 3. If not, add as many C049 - C046 combination cables as are required to meet the desired length to reach the next CBS.
3. End the cable string with a DC-blocking RS-485 cable (C047) into CON 1 of the powered CBS. This cable breaks the power line in the RS-485 line so that this CBS only receives power from one power supply.

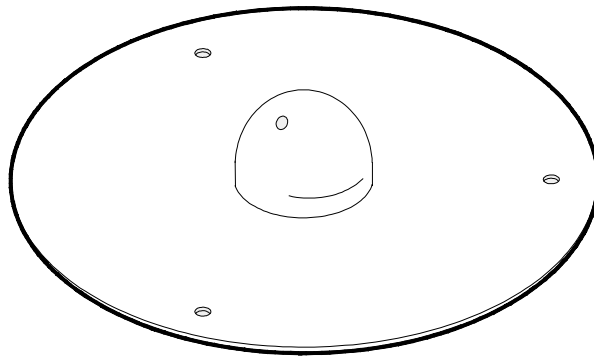
Installing CBS Antennas

Three types of CBS antennas are available:

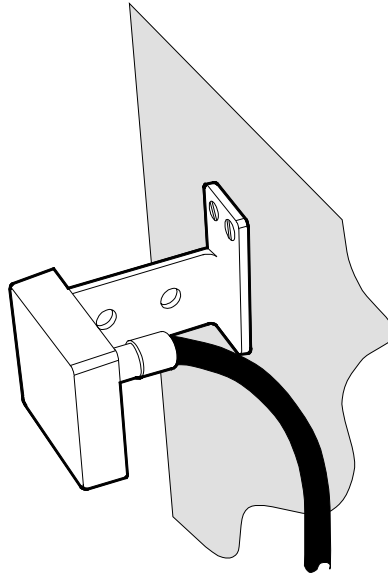
- Transmit
- Receive
- Patch (an optional receive antenna)

The transmit and receive antennas look very similar. They are the same size (a ground plane 0.3 m (12in.) in diameter and a dome 6.35 cm (2.5 in.) high), but have the following differences:

- The transmit antenna does not have a hole in the dome and it has a left-hand thread, screw-on TNC connector.
- The receive antenna has a small hole in the dome and it has a quick disconnect BNC connector.



The patch antenna is small, has its own mounting bracket, and is intended for use in a confined space such as a cooler or freezer where the large receive antenna may not fit.



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Installing Transmit and Receive Antennas

Install the antennas when installing the CBSs.

Materials Needed

- Transmit antennas
- Receive antennas
- Mounting hardware appropriate for the ceiling type

Things to Remember

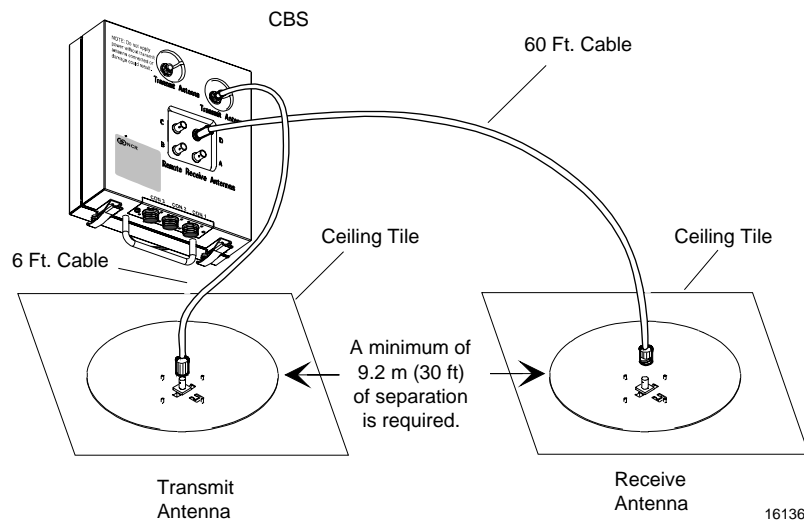
- For a dropped ceiling, mount the antennas on the ceiling tiles.
- For an open ceiling, hang the antennas from the roof trusses.

Installing an Antenna on a Ceiling Tile

To install an antenna on a ceiling tile, drill a 76 mm (3.0 in.) hole in the tile. Place the tile back in the ceiling and from above the tile, place the dome of the antenna into the hole. Use cable ties to secure the antenna cables.

Note: If the ceiling tile has an aluminum backing, remove a 0.61 m (2 ft.) diameter section of foil from around the hole, or remove all of the foil, whichever is easier.

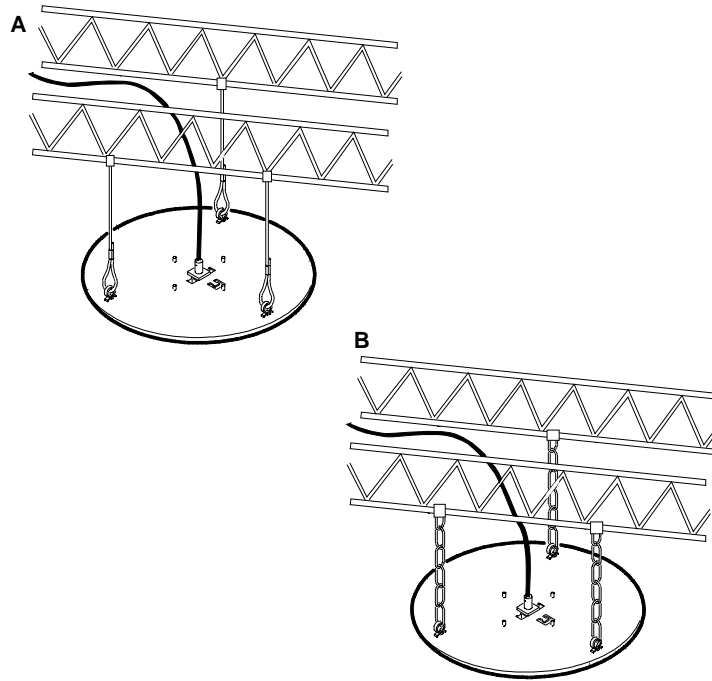
Maintain a minimum distance of 9.2 m (30 ft.) between a transmit antenna and any receive antennas connected to the same CBS.



Note: Some CBSs may have minor cosmetic differences. The indentations around the transmit antenna may be round (as shown) or may be square. Also, there is only one physical connection for the transmit antenna. The other connector location is a metal blank. Where the connector is located depends on the type of CBS (7710-1000, 7710-1001, or 7710-1002). The connector is on the right, as shown in the illustration above, for the 7710-1001 and 7710-1002. The connector is on the left for the 7710-1000.

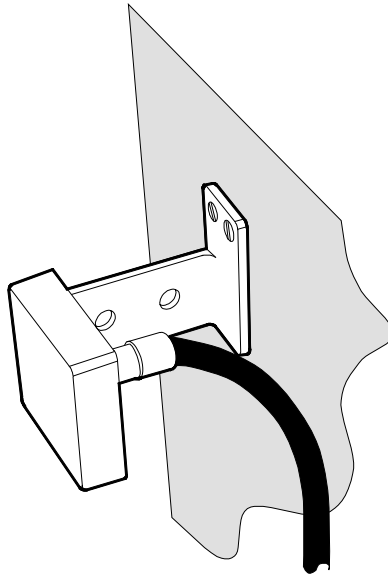
Installing an Antenna on a Roof Truss

In a location where there is no dropped ceiling, use wires or chains to hang the antenna from a roof truss as shown in the following illustrations. Do not let the antenna hang by its antenna cable.



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Installing a Patch Antenna



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The patch antenna has an attached mounting bracket with two sets of holes. It can be mounted to walls, ceilings, or other brackets. Due to the many installation possibilities, screws are not included with the antenna.

Use sheet metal screws to mount the antenna to metal walls or ceilings, such as those found inside of freezers. Use other types of screws as applicable to the mounting situation. Be careful not to over tighten the screws and damage the mounting bracket.

Consider the following when installing patch antennas:

- The patch antenna can be used throughout the store like the larger receive antenna, but due to its small size, it is more useful in confined areas. When mounting the antenna, face the front of the antenna (the side opposite the cable connector) towards the tags, with as few obstructions between it and the tags as possible.

- In a freezer, the best position is for the antenna to face down the aisle, between the shelves where the tags are and the freezer door. Place the antenna back behind the first door opening, where store items will not fall on it and it is out of the customer's view.
- Use a standard 18.29 m (60 ft.) receive cable (1424-C056-0180) to connect the CBS and the patch antenna. When running the cable within a freezer or cooler area, locate the cable on the back wall or ceiling away from the doors or customer access areas. Near the patch antenna, secure the cable with cable ties to provide strain relief for the connector and antenna bracket.