

NEC

- Complete system documentation, including a detailed *Software Manual*, is provided on the *System Document CD* packed with your system.

- For additional resources, visit our Technical Support site on the web at **208.141.100.36/ds2000**.

If upgrading from a software version prior to 02.02.14:

- Use **9803 - Initialize Distinctive Ringing** to initialize Distinctive Ringing. *Following initialization, you must reset the system or unplug and then replug each telephone.* Refer to the *Software Manual* on your *System Document CD* for more.
- Use **9804 - Initialize Caller ID Log Utility** to initialize (clear) your Caller ID logs. Refer to the *Software Manual* on your *System Document CD* for more.

- Be sure your system's hardware configuration does not exceed the System Load Factor. See *DS2000 Load Factor Calculations* on page 1-3 for more.

When installing station devices with software version 02.02.14 or higher:

- Digital station ports (on installed and programmed PCBs) *automatically* detect the type of connected device when the keyset, 2-OPX Module (both ports) or Digital Door Box is plugged in. It is no longer necessary to individually set circuit types **1801 - Extension Circuit Type**.

This software uses the following hardware default assignments:

- Slot CN1 = 16DSTU PCB (Extensions 300-315).
- Slot CN2-CN8 = Undefined.

When installing PCBs:

- After plugging in your PCBs and powering up the system, use **9902 -Slot Control** to enable the installed PCBs. See *Using Program 9902 in DS2000 to Add or Delete PCBs* in your *Quick Setup Guide* for more.

1. Installing the Cabinet

2. PCB Installation

3. Installing Extensions and Trunks

4. Optional Equipment

5. Maintenance Options and SMDR

6. Specifications and Parts

DS2000

Hardware Manual

Part No. 80000INS08
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This manual has been developed by NEC America, Inc. It is intended for the use of its customers and service personnel, and should be read in its entirety before attempting to install or program the system. Any comments or suggestions for improving this manual would be appreciated. Forward your remarks to:

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Section 1: Installing the Cabinet

System Preparation and Configuration

Unpacking

Unpack the equipment and check it against your equipment lists. Inspect for physical damage. If you are not sure about a component's function, review the Product Description Manual. Contact your Sales Representative if you have additional questions.

Have the appropriate tools for the job on hand, including: a test set, a punch down tool and a digital voltmeter.

Before Installing

Make sure you have a building plan showing the location of the common equipment, extensions, the telco demarcation and earth ground. In addition, the installation site must meet the requirements outlined in the Standard Practices Manual.

Site Requirements

The common equipment is contained in the wall-mounted Main Equipment Cabinet. Choose a central location for the cabinet that allows enough space for the equipment — and provides enough room for you to comfortably work. Figure 1-1 *4 Slot Cabinet Installation Layout* on page 1-4 and Figure 1-2 *8 Slot Cabinet Installation Layout* on page 1-5 show you *about* how much space your system requires.

System Configuration

Default Configuration

The factory installed default configuration for your DS2000 system (with software version 02.02.00 and higher) is:

- Slot CN1 = 16DSTU PCB (extensions 300-315).
- Slot CN2-CN8 = Undefined.
- Slots CN5-CN8 are only available with the 8 slot cabinet.
- After plugging in your PCBs and powering up the system, use *Program 9902 - Slot Control* to enable the installed PCBs. See *Using Program 9902 in DS2000 to Add or Delete PCBs* in your *Quick Setup Guide* for more.

DS2000 Configuration Guidelines

The total number of components you can install and connect depends on power supply capacity and the System Load Factor. Review the Configuration Guidelines table below and *DS2000 Load Factor Calculations* on page 1-3 when configuring your system.

DS2000 Configuration Guidelines
<p>4 Slot Cabinets</p> <ul style="list-style-type: none">• Do not install more than 2 16DSTU PCBs under any circumstances.• The first 16DDSTU PCB you install must be in the first slot (CN1).• You can install up to 40 extensions maximum, as follows:<ul style="list-style-type: none">(2) 16DSTU PCBs = 32 digital extensions(1) 8ASTU PCB = 8 analog extensionsTotal = 40 extensions• You can install up to 24 trunks maximum, as follows:<ul style="list-style-type: none">(3) 8ASTU PCBs = 24 analog trunks• Maximum configuration is 48 ports.• The total of all extensions and trunks cannot exceed 48.• Always use the System Load Factor table to check your system configuration.
<p>8 Slot Cabinets</p> <ul style="list-style-type: none">• Do not install more than 2 16DSTU PCBs for each power supply.• The first 16DDSTU PCB you install must be in the first slot (CN1).• You can install up to 96 extensions maximum.• You can install up to 48 trunks maximum.• The total of all extensions and trunks installed cannot exceed 104.• Maximum configuration is 104 ports.• 8 slot cabinets require A series PCBs, as follows:<ul style="list-style-type: none">CPU PCB P/N 80025^APower Supply P/N 80005^A16 DSTU Digital Station PCB P/N 80021^A8ASTU 8 Port Analog Station PCB P/N 80041^A4ASTU 4 Port Analog Trunk PCB P/N 80040^A8ATRU 8 Port Analog Trunk PCB P/N 80011^A4ATRU 4 Port Analog Trunk PCB P/N 80010^A• Always use the System Load Factor table to check your system configuration.

DS2000 Load Factor Calculations

The combination of extensions, Digital Door Boxes, 2-OPX Modules and DSS Consoles you can connect to your DS2000 system may be limited by the System Load Factor. Use the *DS2000 System Load Factor Calculations* chart to verify your system's configuration.

To check your system configuration:

1. Indicate the quantity for each item installed in the **Qty** column.
2. For each item, multiply the **Qty** times the **Load Factor** and enter the value in **Total Load**.
3. Add all the values in the **Total Load** column and enter the value in **Item 1**.
4. Determine the System Load Factor capacity of the power supplies installed in your system and enter the total in **Item 2**.
5. Compare the entry in **Item 2** to your entry in **Item 1**. **Item 1** must always be equal to or less than the entry in **Item 2**.

Do not operate your system if the System Load Factor total (Item 1) exceeds the allowable load (Item 2).

DS2000 System Load Factor Calculations			
Description	Load Factor	Qty	Total Load
16DSTU PCB	16		
4ASTU PCB	8		
8ASTU PCB	12		
110-Button DSS Console	2		
24-Button DSS Console	1		
Total DSS Consoles installed cannot exceed 4			
2-OPX Module	3		
Item 1: Total load for this configuration			
Item 2: If you have <u>one</u> power supply installed, enter 48. If you have <u>two</u> power supplies installed, enter 80. If you have <u>three</u> power supplies installed, enter 112.			
Notes:			
<ul style="list-style-type: none"> A 4 slot cabinet can only have 1 power supply. An 8 slot cabinet can have up to 3 power supplies. You <i>cannot</i> have more than two 16DSTU PCBs per power supply, regardless of System Load Factor calculations. Exceeding the System Load Factor will cause the system's power supplies to automatically shut down and/or erratic system operation. 			

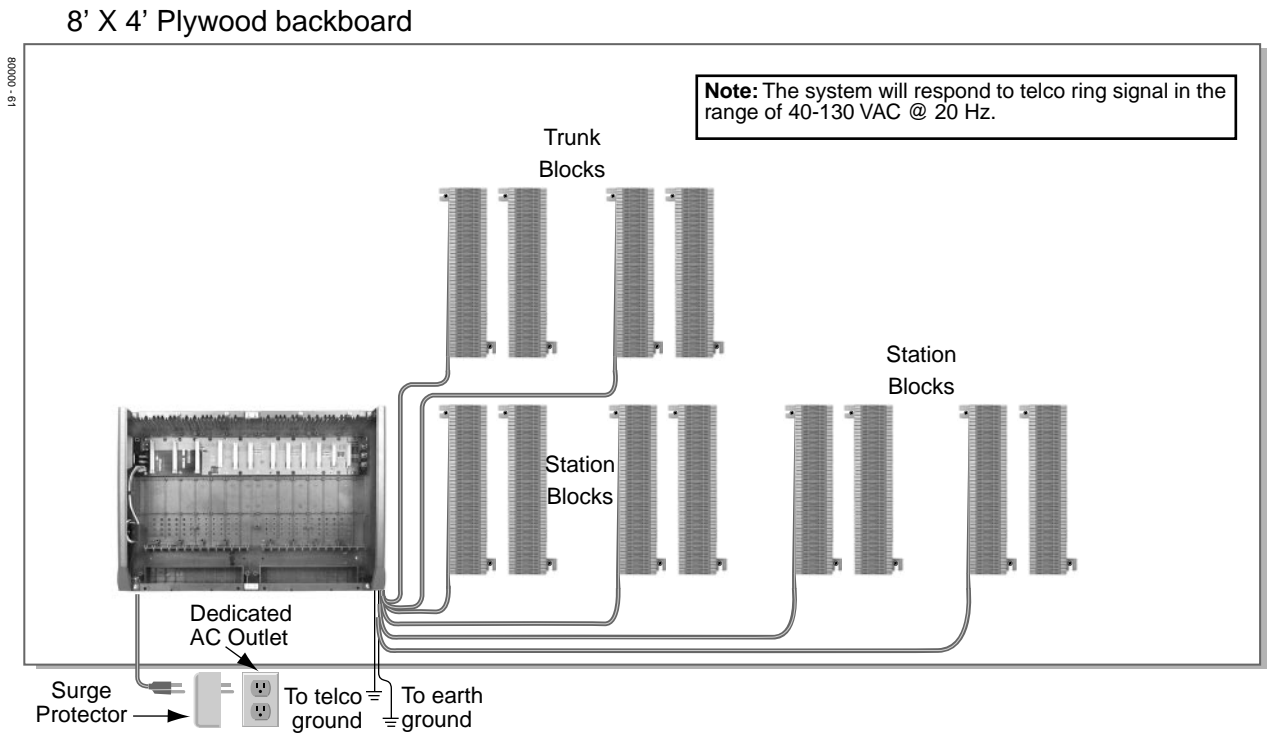


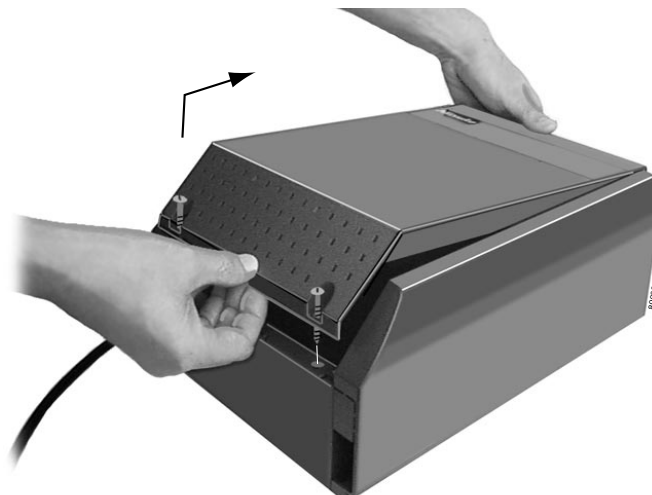
Figure 1-2: 8 Slot Cabinet Installation Layout

Removing the Cover

Before wall-mounting, remove the cover on the Main Equipment Cabinet.

To remove the cover (Figure 1-3):

1. Unscrew the two captive screws on the front of the cabinet cover.
2. Lift up slightly on the front of the cover — then gently slide the cover back to remove it.



4 Slot Cabinet Shown

Figure 1-3: Removing the Cover

Unpacking the Wall Mount Bracket

The wall mount bracket and screws (see Figure 1-4 *Wall Mount Bracket* below) are taped to the packing material in the Main Equipment Cabinet box. Unpack the wall mount bracket and mounting screws.



Figure 1-4: Wall Mount Bracket

Mounting the Wall Mount Bracket

Mount the wall mount bracket (see Figure 1-5 *Mounting the Wall Mount Bracket* below) on the MDF in a convenient location, about 12" higher than where you want the bottom of the cabinet to line up.

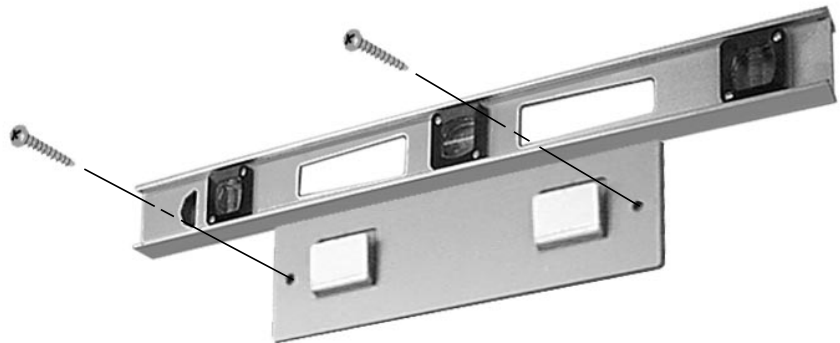


Figure 1-5: Mounting the Wall Mount Bracket

Hanging the Cabinet

To hang the cabinet:

1. Hang the Main Equipment Cabinet on the wall mount hanger as shown:
 - See Figure 1-6 *Hanging the 4 Slot Cabinet* below when hanging a 4 slot cabinet.
 - See Figure 1-7 *Hanging the 8 Slot Cabinet* below when hanging an 8 slot cabinet.
2. Using the remaining screws packed with the hanger, secure the cabinet to the plywood backboard.

1

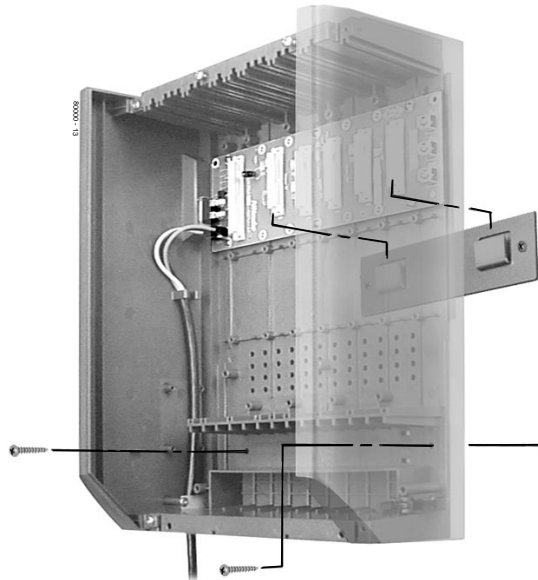


Figure 1-6: Hanging the 4 Slot Cabinet

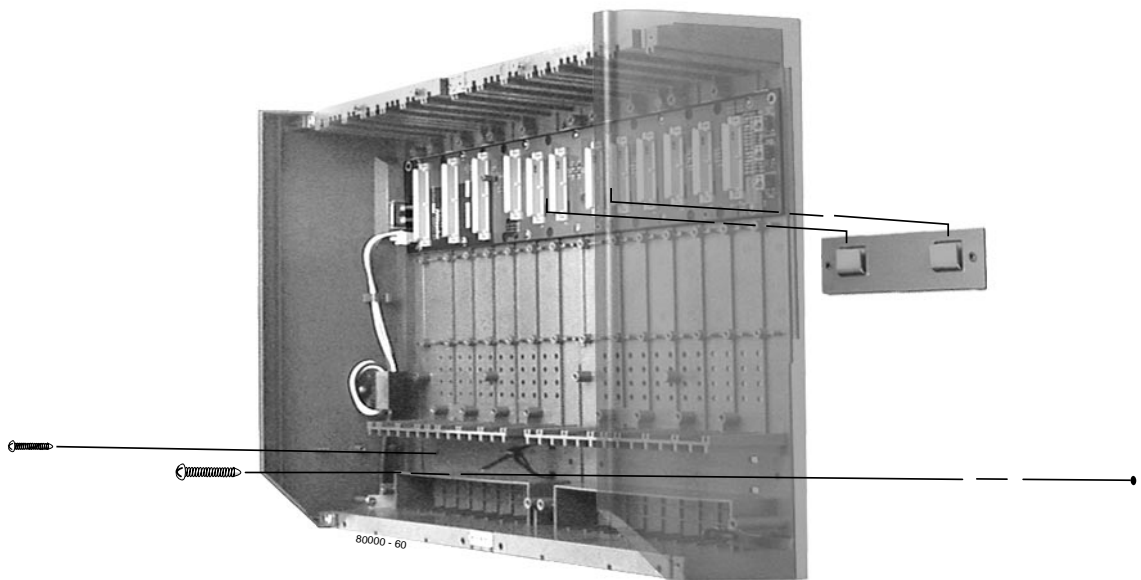


Figure 1-7: Hanging the 8 Slot Cabinet

Removing the Right Side Panel

Remove the cabinet right side panel to gain easy access to the ground lugs and system cabling. The cabinet has two ground connections: ETH (Earth Ground) and PBXG (PBX Ground).

To remove the right side panel (Figure 1-8):

1. Remove the two screws that secure the right side panel to the cabinet.
2. Carefully slide the right side panel down until it swings clear of the cabinet.

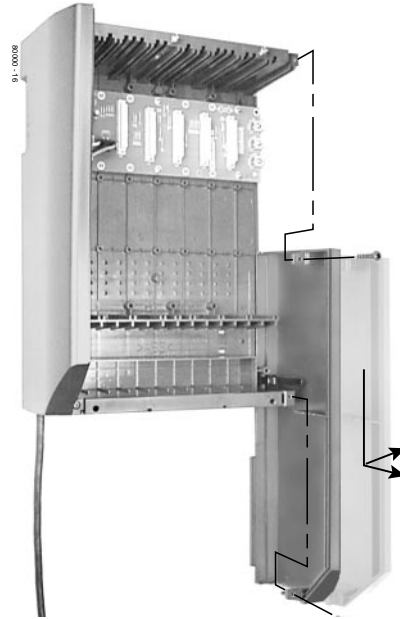


Figure 1-8: Removing the Right Side Panel

Attaching the Ground Wires

!! Important !!

You must connect your system to a known earth ground according to the following instructions.

The system provides two ground terminations. Each ground connects from the system to the ground termination using 12 AWG stranded copper wire.

- Use the ETH (Earth Ground) for safety/system ground. You **must** connect ETH to a known earth ground.
- Use the PBXG (PBX Ground) if you have trunks that require telco ground (such as ground start trunks). This ground is not required for loop start trunks.

To attach the ground wires (Figure 1-9):

1. Remove the lug on the ground connection you want to connect.
2. Follow Figure 1-10 *Installing RFI Suppressor Assemblies* on page 1-10 and run the ground wire(s) through the FRI Suppressor Assembly as shown.
3. For earth ground:
Run a ground wire from the ETH lug to a known earth ground.
- For PBX Ground:
Run a ground wire from the PBXG lug to the telco ground.
4. Crimp ring terminals as required to the ground wires.
5. Reinstall and firmly tighten the lug(s) removed in step 1 above.

Do not plug in the power cord or reinstall the right side panel until all PCB installation and cabling are complete.

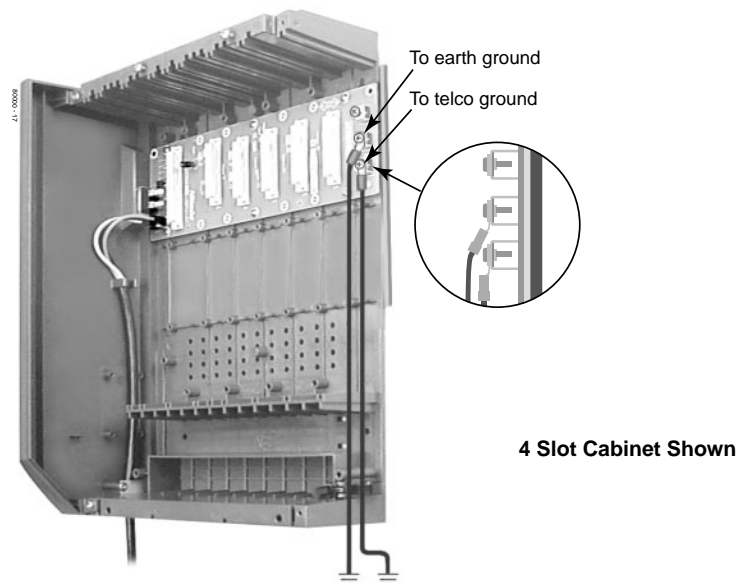
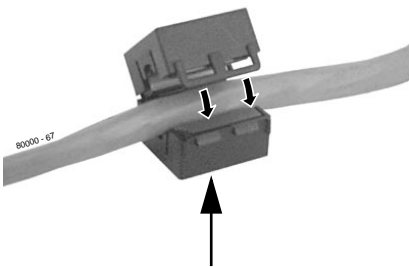


Figure 1-9: Attaching the Ground Wires

Installing RFI Suppressor Assemblies

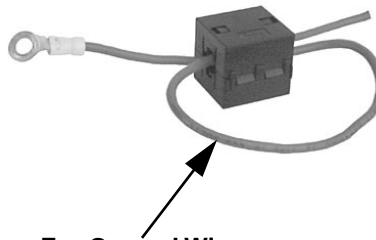
You must install RFI Suppressor Assemblies as follows (see Figure 1-10 *Installing RFI Suppressor Assemblies* below). The suppressors *must* be mounted inside the cabinet and as close to the appropriate PCB as possible.

- **For Station and Trunk Cables**
 - Only install these assemblies if you are installing **non-A** station and trunk PCBs in a 4 slot cabinet. If you have a mixture of A and non-A PCBs, you only need to install the assemblies on the non-A PCBs.
 - RFI assemblies on station and trunk cables are not required with 8 slot cabinets, since these cabinets use only **A** PCBs.
- **For Ground Wires**
 - You must install a separate RFI assembly for the ground wire(s) in all systems.
 - If your system has 2 ground wires, install them both in the same assembly.
- **For CPU Connections**
 - You must install a separate RFI assembly for the CPU mod jack and RS-232 cables in all systems. Install both cables in the same assembly.



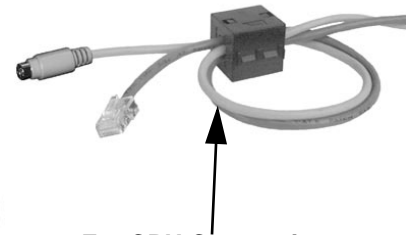
For Station and Trunk Cables

- Required only when using **non-A** station and trunk PCBs in 4 slot cabinets:
 - 16DSTU PCB P/N 80021
 - 8DSTU PCB P/N 80041
 - 4ASTU PCB P/N 80040
 - 4ATRU PCB P/N 80010
 - 8ATRU PCB P/N 80011
- Not required for 8 slot cabinets. All 8 slot cabinets must use **A** station and trunk PCBs.



For Ground Wires

- Required for all installations.



For CPU Connections

- Required on CPU mod jack and RS-232 cables for all installations.

Figure 1-10: Installing RFI Suppressor Assemblies

The power supply provides the DC power sources required to operate the system.

To install a power supply (Figure 1-11) (Figure 1-12):

1. Slide the power supply into the CN101 slot. See Figure 1-12 *Installing the Power Supply* below.
2. Using a long-shaft phillips head screwdriver, tighten the two screws that secure the power supply.

An 8 slot cabinet may require up to 3 power supplies, using slots CN101, CN102 and CN103. Refer to *System Configuration* on page 1-1 for more. Install the first supply in slot *CN101*. Install the second supply in slot *CN103*. Install the third supply in slot *CN102*.

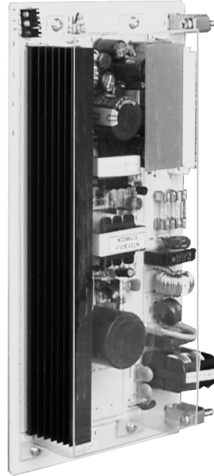
1

Figure 1-11: Power Supply

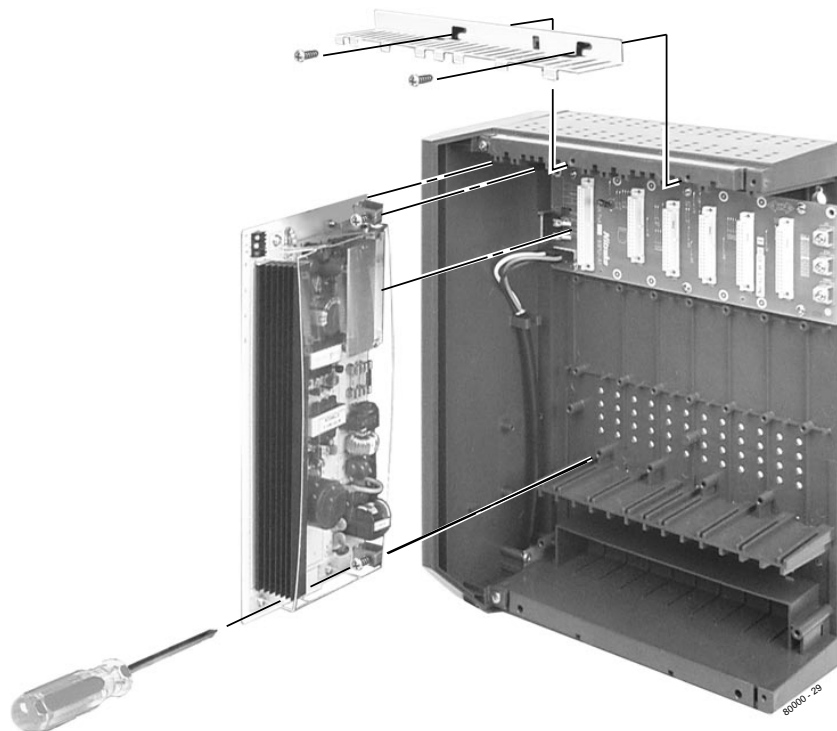


Figure 1-12: Installing the Power Supply

Section 2: PCB Installation

2

PCB Location

!! Important !!

- Install telephones connected to DSTU and ASTU PCBs as on-premise extensions only.

Where to Install the PCBs

Review *System Configuration* on page 1-1 before installing any PCBs. Always observe the System Load Factor when configuring your system.

- The CPU (Central Processing Unit) PCB must plug into slot **CN0**.
- A 16DSTU (16 Digital Station) PCB must plug into slot **CN1**.
- All other PCBs (including 16DSTU PCBs) can plug into slots **CN2-CN8**.
 - Slots CN5-CN8 are only available with the 8 slot cabinet.
 - A 4 slot cabinet can only accept two 16DSTU PCBs.
 - In an 8 slot cabinet, you can have only two 16DSTU PCBs per power supply.
- After plugging in your PCBs and powering up the system, use **9902 -Slot Control** to enable the installed PCBs. See *Using Program 9902 in DS2000 to Add or Delete PCBs* in your *Quick Setup Guide* for more.

!! Caution !!

- Do not plug in the CPU PCB hot (i.e., with the system power applied).
- You can plug in ASTU and ATRU PCBs hot as required.
- You can plug in DSTU PCBs hot provided you first disconnect the station cabling from the PCB.

Central Processing Unit (CPU) PCB

The CPU (Figure 2-1) provides:

- The system's central processing, stored program and memory for the customer's site-specific data.
- PC Interface Card.
- Conference circuits, DTMF receivers and DTMF generators.
- External music input and on-board synthesized music source.
- External paging output and associated relay.
- Real Time Clock.
- Battery for short term (14 day) backup of the customer's site-specific data.

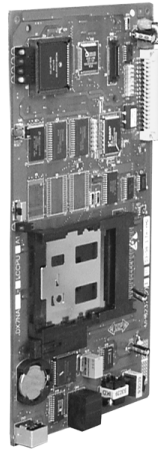


Figure 2-1: CPU PCB

Installing the CPU

The CPU PCB installs in the CN0 slot in the Main Equipment Cabinet.

To install the CPU PCB (Figure 2-2) (Figure 2-3):

1. Slide the Mode Switch to the **RUN** position.
2. Insert the battery into the battery clips.
3. Plug the CPU into slot **CN0**.

Refer to the *Section 4, Optional Equipment* for instructions on connecting the music source, External Paging, and the auxiliary relay.

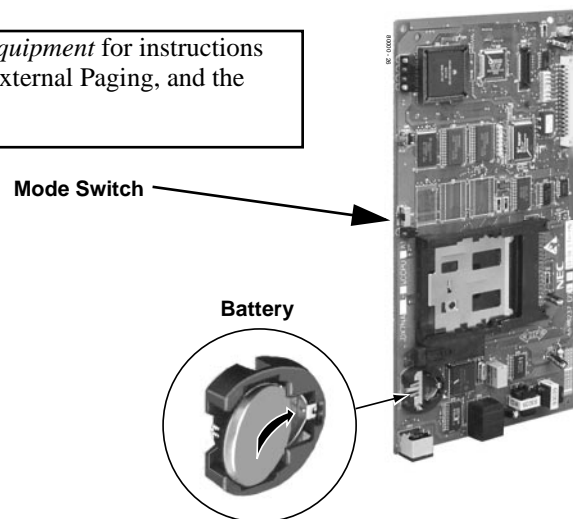


Figure 2-2: Setting Up the CPU

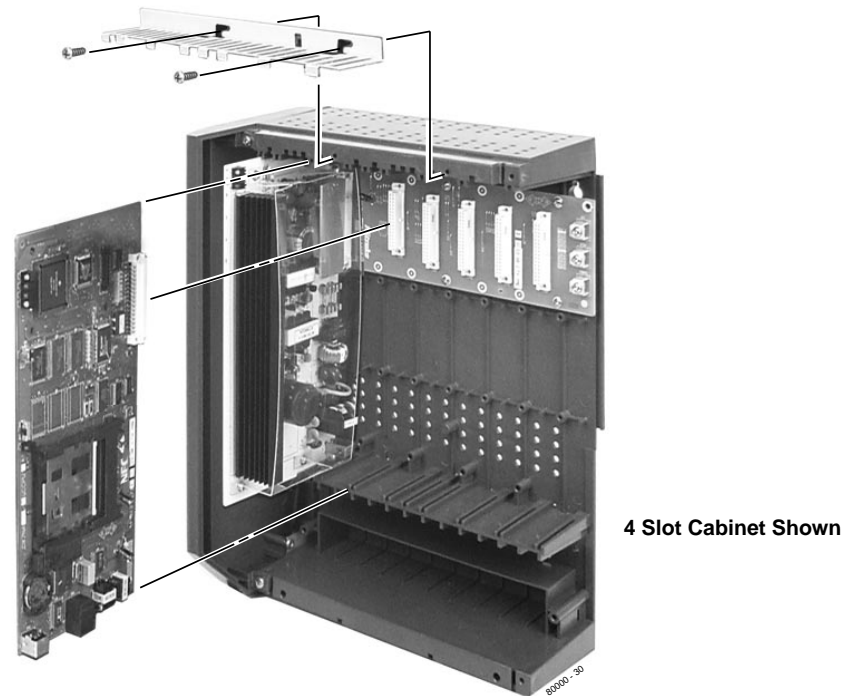


Figure 2-3: Installing the CPU

Digital Station (16DSTU) PCB

The 16DSTU provides the connection for 16 digital telephones. Refer to *Section 3, Installing Extensions and Trunks* for wiring instructions.

To install the 16DSTU PCB (Figure 2-4) (Figure 2-5):

1. Plug the 16DSTU PCB for extensions 300-315 into slot **CN1**.
2. Plug in additional 16DSTU PCBs as required. See *System Configuration* on page 1-1 for more.
3. Set the mode switch on each installed 16DSTU PCB to **RUN**.

!! Important !!

- In a 4 slot cabinet, you cannot install more than 2 16DSTU PCBs.
- In an 8 slot cabinet, you cannot install more than 2 16DSTU PCBs per power supply.

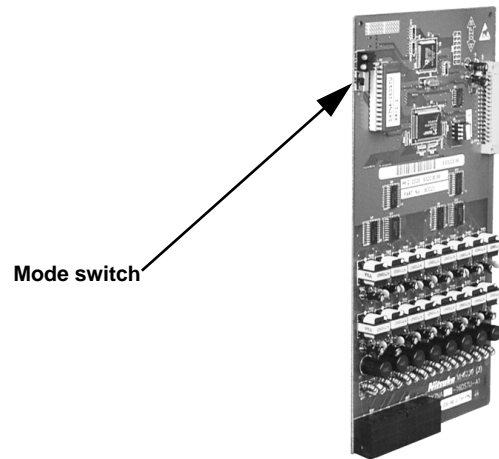
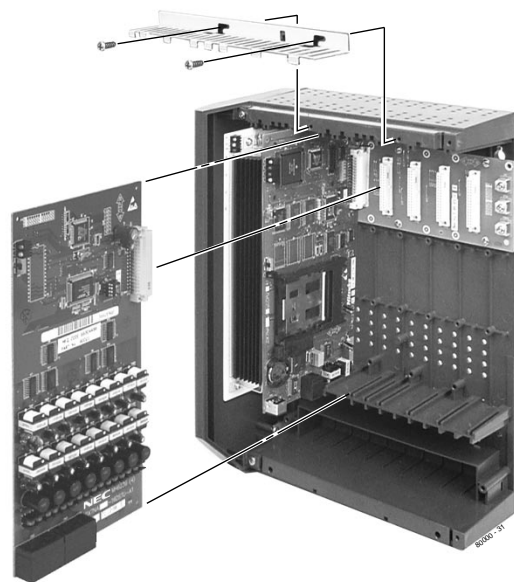


Figure 2-4: Digital Station (16DSTU) PCB



4 Slot Cabinet Shown

Figure 2-5: Installing the 16DSTU PCB

Analog Station (8ASTU and 4ASTU) PCBs

The 8ASTU PCB provides connection for 8 analog extensions. The 4ASTU PCB connects 4 analog extensions. Refer to *Section 3, Installing Extensions and Trunks* for wiring instructions.

To install the ASTU PCB (Figure 2-6) (Figure 2-7):

1. Plug in ASTU PCBs as required. See *System Configuration* on page 1-1 for more.
2. Set the mode switch on each ASTU PCB to **RUN**.

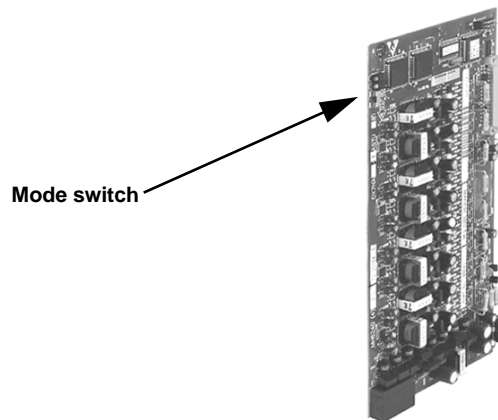


Figure 2-6: Analog Station (ASTU) PCB

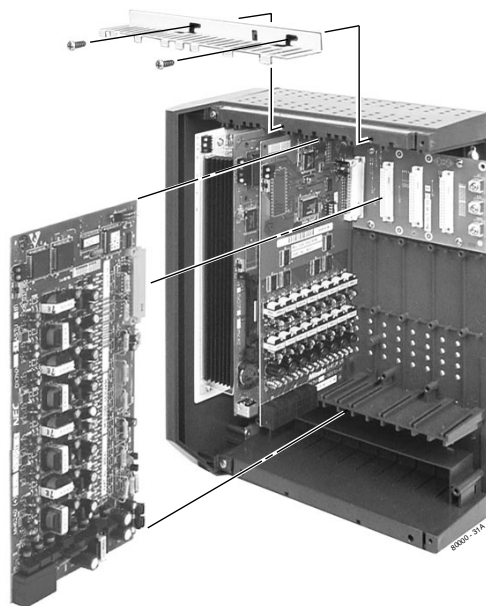


Figure 2-7: Installing the ASTU PCB

Analog Trunk (8ATRU and 4ATRU) PCBs

The 8ATRU provides connection for 8 loop start analog trunks. The 4ATRU PCB connects 4 loop start analog trunks. Refer to *Section 3, Installing Extensions and Trunks* for wiring instructions.

To install the ATRU PCB (Figure 2-8) (Figure 2-9):

1. Plug in ATRU PCBs as required. See *System Configuration* on page 1-1 for more.
2. Set the mode switch on each ATRU PCB to **RUN**.

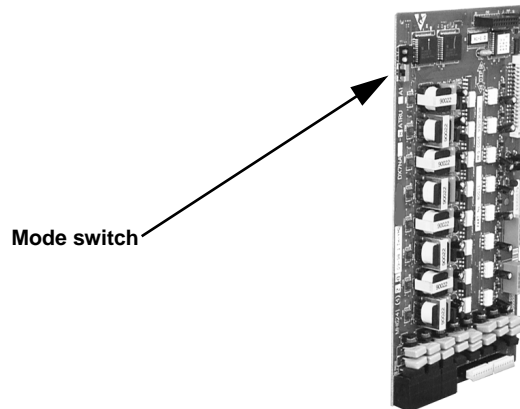


Figure 2-8: Analog Trunk (ATRU) PCB

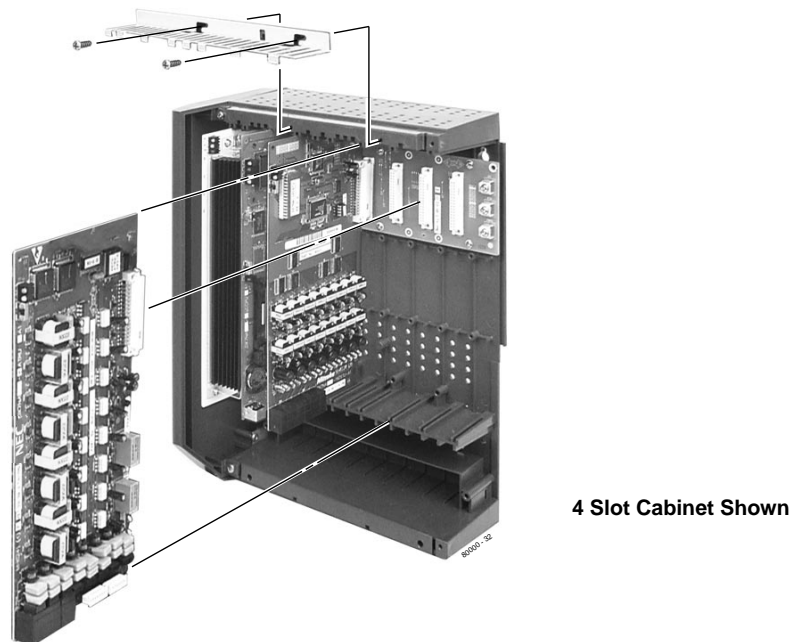


Figure 2-9: Installing the ATRU PCB

8 Circuit Caller ID Daughter Board

For Caller ID capability, install 8 circuit Caller ID PCB daughter boards (P/N 80013) on the 8ATRU PCBs (P/N 80011A). The Caller ID PCB provides Caller ID capability for all eight trunk circuits on the 8ATRU PCB. Every 8ATRU PCB in the system can have a Caller ID daughter board. If your system uses software version 02.02.14 or higher and 80010B or 80011B ATRU PCBs, DSP-based Caller ID is built in. **You do not need to install Caller ID PCB daughter boards.** Check for availability.

If you are installing Caller ID on an 8ATRU PCB in the last slot, you may have to adjust your system's ground wire connection so it won't obstruct the daughter board.

To install the daughter board (Figure 2-10):

1. Remove the metal bracket that holds the PCBs in place.
2. Remove the 8ATRU PCB.
3. Remove the headers from 8ATRU PCB connectors CN3 and CN4 and store in a safe place.
4. Align the Caller ID PCB standoffs over the holes located in the 8ATRU PCB.
Note that the CN2 connector on the Caller ID PCB should be above the CN3 connector on the 8ATRU PCB. CN3 on the Caller ID PCB should be above CN4 on the 8ATRU PCB. CN1 on the Caller ID PCB should be above CN2.
5. Push the PCB down until the standoffs snap into place.
6. Plug the 8ATRU PCB back into the system cabinet.
7. Refer to your system's *Quick Setup Guide* for additional feature information and any required system programming.

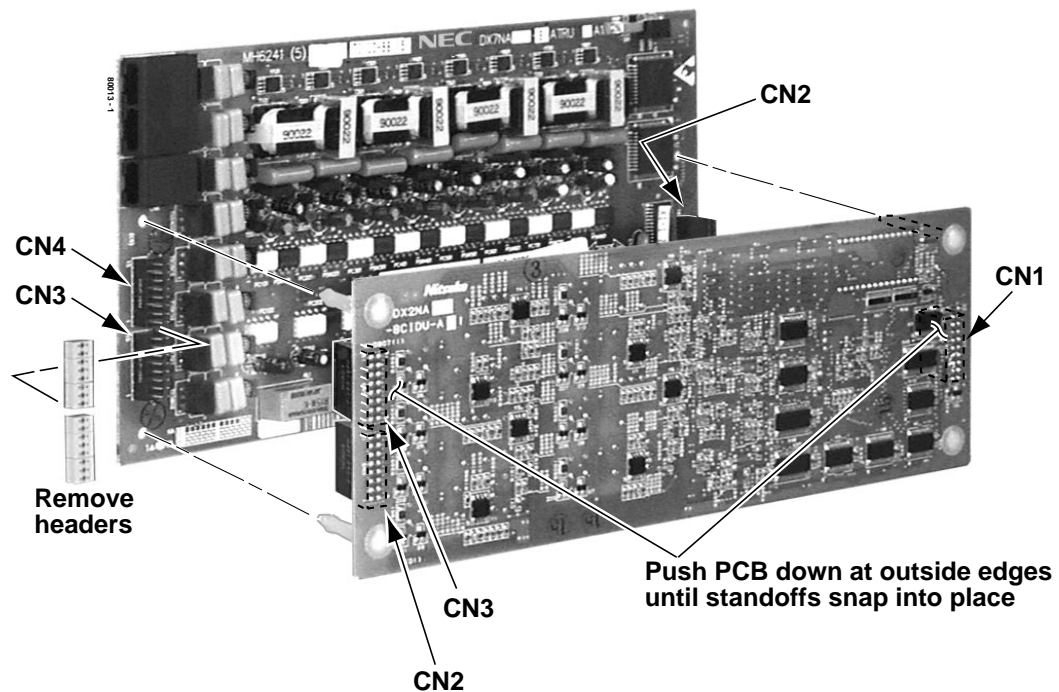


Figure 2-10: Installing the 8 Circuit Caller ID Daughter Board

4 Circuit Caller ID Daughter Board

For Caller ID capability, install 4 circuit Caller ID PCB daughter boards (P/N 92012) on the 4ATRU PCBs (P/N 80010A). The Caller ID PCB provides Caller ID capability for all four trunk circuits on the 4ATRU PCB. Every 4ATRU PCB in the system can have a Caller ID daughter board. If your system uses software version 02.02.14 or higher and 80010B or 80011B ATRU PCBs, DSP-based Caller ID is built in. **You do not need to install Caller ID PCB daughter boards.** Check for availability.

If you are installing Caller ID on a 4ATRU PCB in the last slot, you may have to adjust your system's ground wire connection so it won't obstruct the daughter board.

To install the daughter board (Figure 2-11):

If you install a P/N 92012 Caller ID PCB on an 8ATRU PCB P/N 80011A, you will get Caller ID service only on the first four PCB trunk circuits.

1. Remove the metal bracket that holds the PCBs in place.
2. Remove the 4ATRU PCB.
3. Remove the headers from 4ATRU PCB connector CN3 and store in a safe place.
4. Align the Caller ID PCB standoffs over the holes located in the 4ATRU PCB.
Note that the CN2 connector on the Caller ID PCB should be above the CN3 connector on the 4ATRU PCB. CN1 on the Caller ID PCB should be above CN2.
5. Push the PCB down until the standoffs snap into place.
6. Plug the 4ATRU PCB back into the system cabinet.
7. Refer to your system's *Quick Setup Guide* for additional feature information and any required system programming.

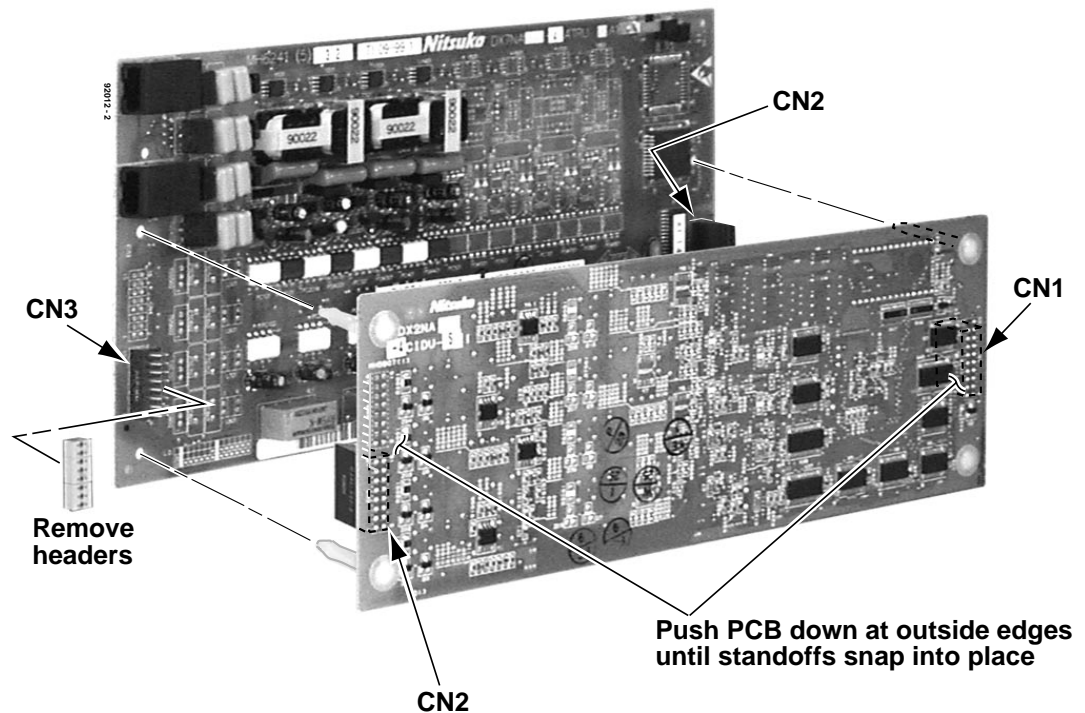


Figure 2-11: Installing the 4 Circuit Caller ID Daughter Board

Working With 8-Pin Jacks

The system uses 8-pin mod jacks to connect extensions, trunks and optional equipment. Using the Installation Cable (P/N 80892) makes it easy to connect the PCBs to standard 66M1-50 connecting blocks. These cables have six 8-pin modular jacks on one end and are unterminated on the other. In general, each cabinet needs:

- One 66M1-50 block and Installation Cable (P/N 80892) for extensions and optional equipment.
- One 66M1-50 block and Installation Cable (P/N 80892) for trunks.
- Depending on your PCB configuration and local codes, you may need an additional 66M1-50 block and Installation Cable (P/N 80892) for optional equipment.

Punching Down the Cables

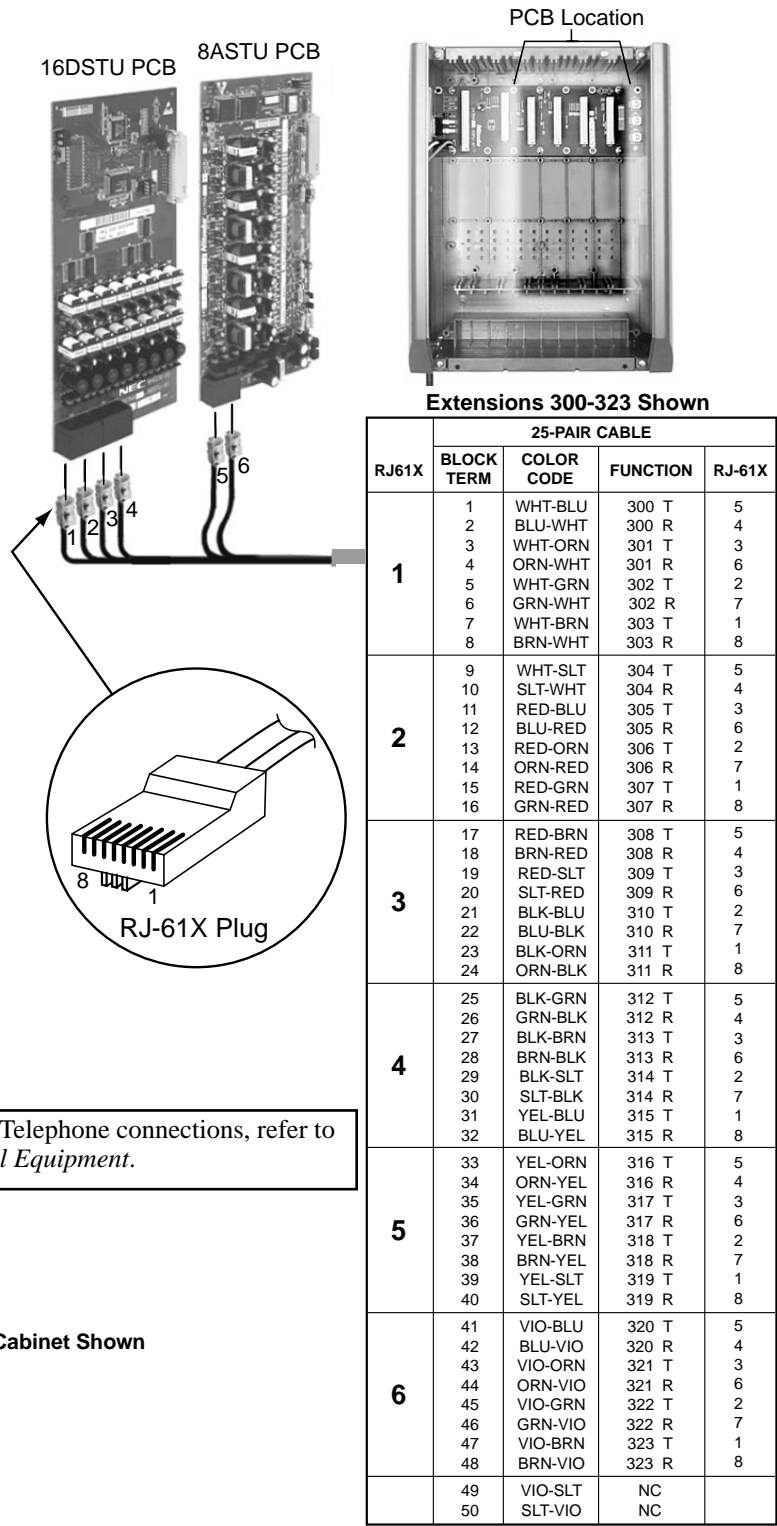
The Installation Cables have six 8-pin jacks installed on one end and are unterminated on the other. Each 8-pin jack connects 4 extensions or 4 trunks.

To punch down the cables (Figure 2-12) through (Figure 2-16):

1. For each 66M1-50 block, punch down the Installation Cable in standard color-code order.
 - Use Figure 2-12 *Connecting Extensions* on page 2-10 when connecting extensions.
 - Use Figure 2-13 *Connecting Trunks* on page 2-11 when connecting trunks.
2. After you have punched down your cables, route them through the side of the cabinet and secure them with the strain relief (Figure 2-14 *Securing the Cables* on page 2-12).
3. If you are using non-suffixed PCBs (e.g., 16DSTU PCB P/N 80021) in a 4 slot cabinet, be sure to install the FRI Suppressor Assemblies on each station and trunk cable. Follow Figure 2-15 *Installing the RFI Suppressor* on page 2-12 and snap an assembly around each 50-pin cable. **You cannot use non-suffixed PCBs in an 8 slot cabinet.**

Making Your Own Cables

If you want to make your cables (instead of using Installation Cable P/N 80892), follow the pinouts in Figure 2-16 *8-Pin (RJ61X) Jack Pinouts* on page 2-13.



For Power Failure Telephone connections, refer to Section 4, *Optional Equipment*.

Figure 2-12: Connecting Extensions

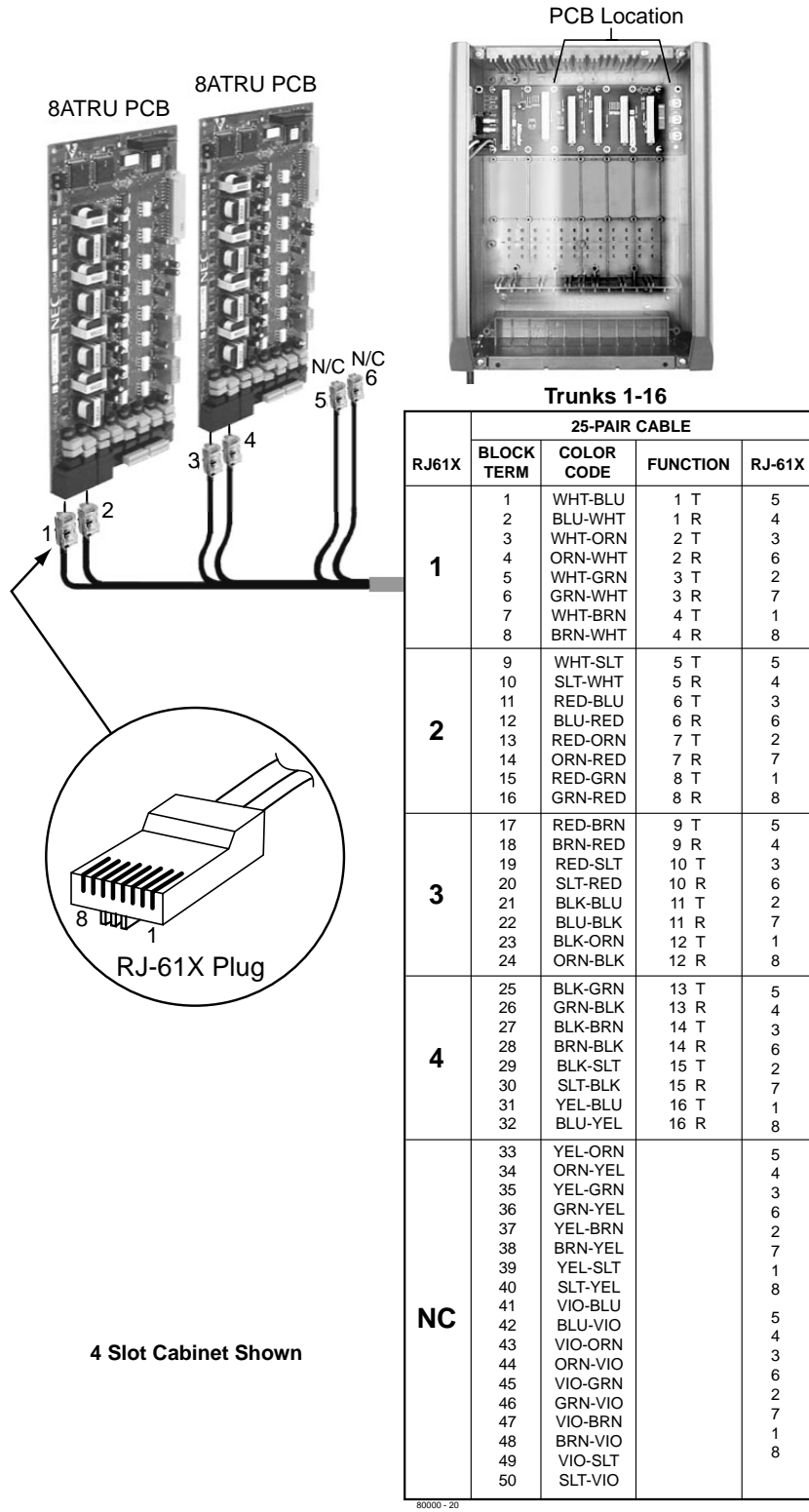


Figure 2-13: Connecting Trunks

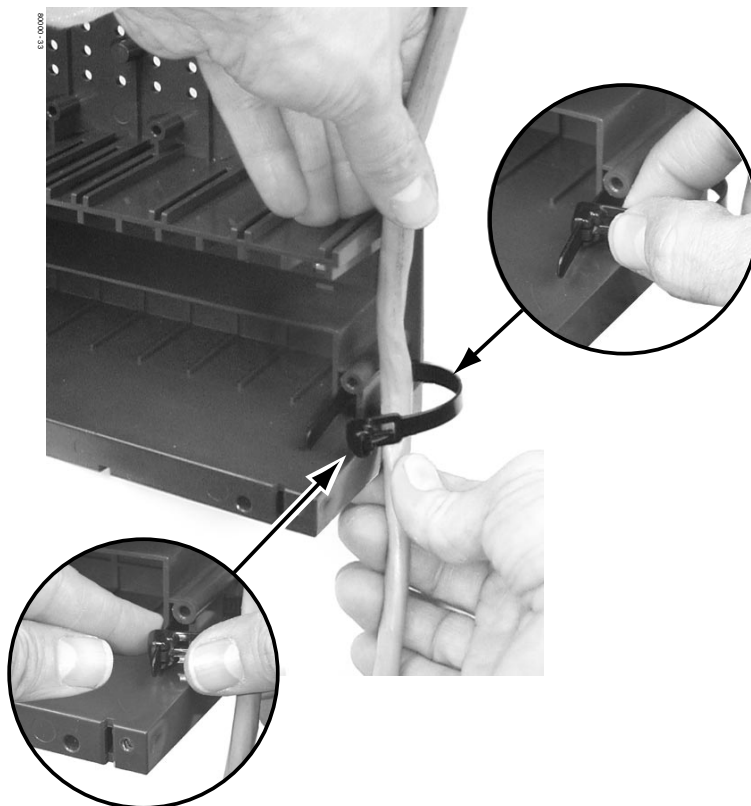


Figure 2-14: Securing the Cables

- If you are using non-suffixed PCBs in a 4 Slot Cabinet, install RFI Suppressor Assemblies on your station and trunk cables as shown below.
- The suppressors must be mounted inside the cabinet and as close to the appropriate PCB as possible.

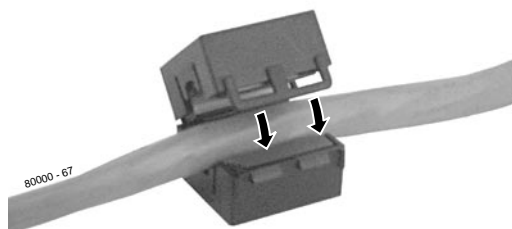


Figure 2-15: Installing the RFI Suppressor

The following products should help if you make your own cables. *The connector is generally referred to as a RJ45 connector wired in an RJ61X configuration.*

- Suttle SE-266-8K 8 Position Modular Plug (requires an SE-166 or SE-166-6 modular crimping tool).
- Hubbell BRFT4P Snap-On 8 Position Modular Plug (does not require a special crimping tool).

Check with your local supplier for other comparable products.

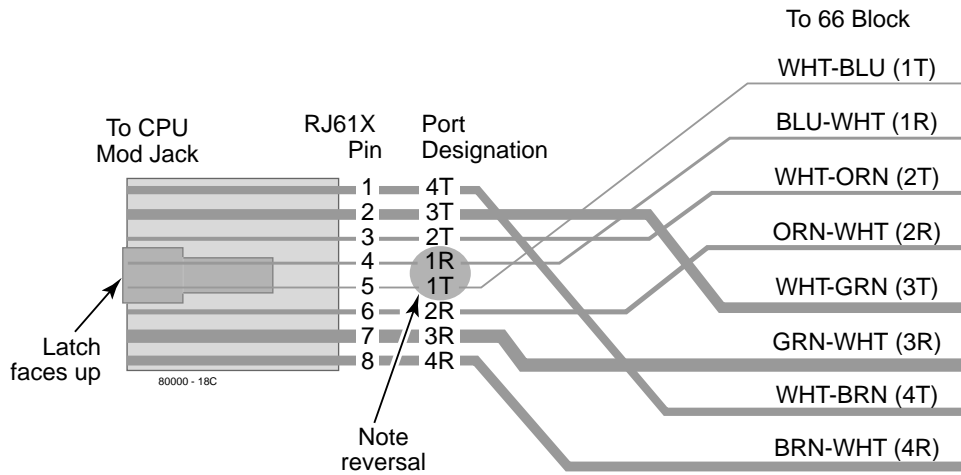


Figure 2-16: 8-Pin (RJ61X) Jack Pinouts

Section 3: Installing Extensions and Trunks

Connecting Extensions

Each 16DSTU PCB connects 16 digital extensions. Each 8ASTU PCB connects 8 analog extensions. Each 4ASTU PCB connects 4 analog extensions.

To connect extensions (Figure 3-1):

1. Using Figure 2-12 *Connecting Extensions* on page 2-10 as a guide, insert the mod jacks into the appropriate connector on the PCB.
2. Install a modular jack for each extension within 6 feet of the telephone's location.
3. For each extension, run one-pair 24 AWG station cable from the cross-connect block to the modular jack.
4. Terminate the station cable WHT/BLU - BLU/WHT leads to the RED and GRN lugs in the modular jack.
5. Back at the main equipment location, run one pair of cross-connect wire between the pins on the B block and cross-connect block to complete the connection.
6. Install bridging clips as required.

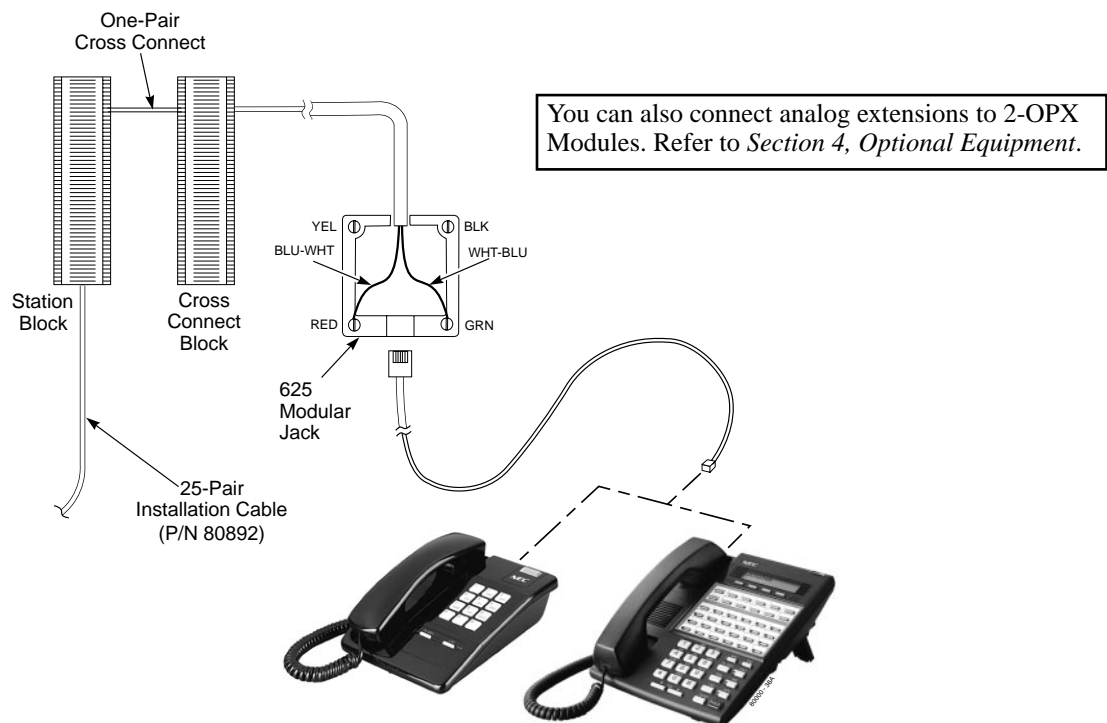


Figure 3-1: Connecting Extensions

Connecting Analog Trunks

Each 8ATRU PCB connects 8 loop start CO trunks. Each 4ATRU PCB connects 4 loop start CO trunks.

To connect analog trunks (Figure 3-2):

1. Using Figure 2-13 *Connecting Trunks* on page 2-11 as a guide, insert the mod jacks into the appropriate connector on the PCB.
2. For each trunk, run one pair cross-connect wire between the pins on the cross-connect block and the CPE (customer side) of the telco's RJ21X.
3. Install bridging clips as required.

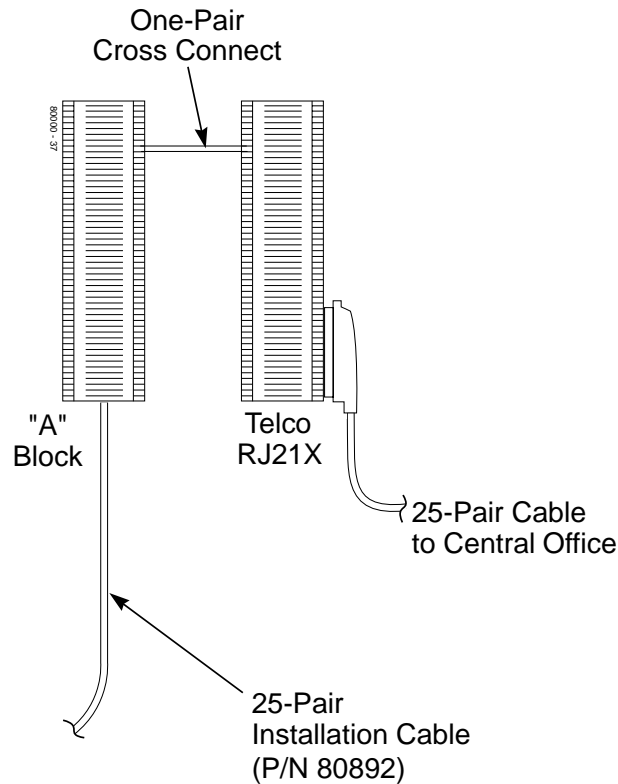


Figure 3-2: Connecting Analog Trunks

Power-Up

Now that all the PCBs you need are installed and you have cabled the system, you can now power-up. You do not need to reattach the right side panel before powering up the system. Leaving the right side panel removed makes the station and trunk cabling more accessible.

To power up the system (Figure 3-3) through (Figure 3-5):

1. Make sure the system is properly grounded and the PCB bracket is reinstalled and secured.
2. Install surge protectors in the AC outlet you intend to use for system power.
3. Plug the main cabinet's AC power cord into its surge protector.
4. Turn on the main cabinet power switch. After about 30 seconds, verify the system LEDs.

LED	Normal Power-On Status
Power Supply	<ul style="list-style-type: none"> • All three LEDs on (green)
CPU PCB	<ul style="list-style-type: none"> • Top LED flashing (slowly green)
DSTU, ASTU, and ATRU PCBs	<ul style="list-style-type: none"> • Top LED flashing (slowly green) • Bottom LED flashes (yellow) when ports on the PCB are busy. The faster the flash, the more ports are busy.

5. After verifying that the PCBs have successfully powered up, turn to *Using Program 9902 in DS2000 to Add or Delete PCBs* in your *Quick Setup Guide* to enable the PCBs in programming.

▣ indicates the LEDs normal (i.e., system OK) status.

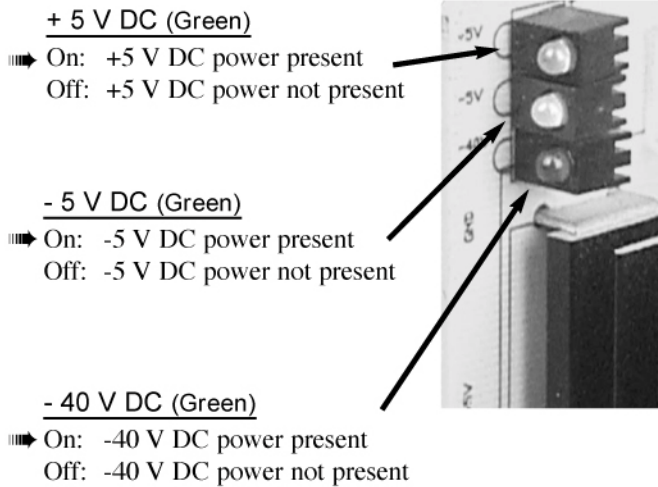


Figure 3-3: Power Supply Status LEDs

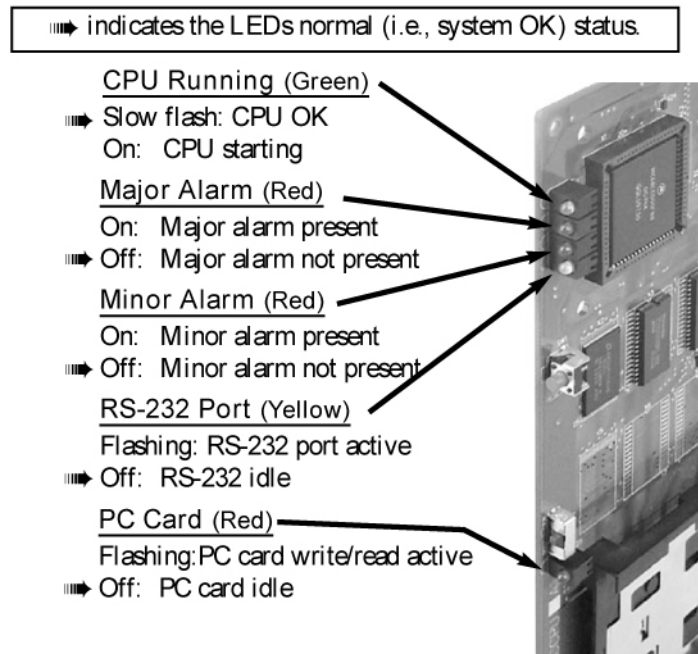


Figure 3-4: CPU Status LEDs

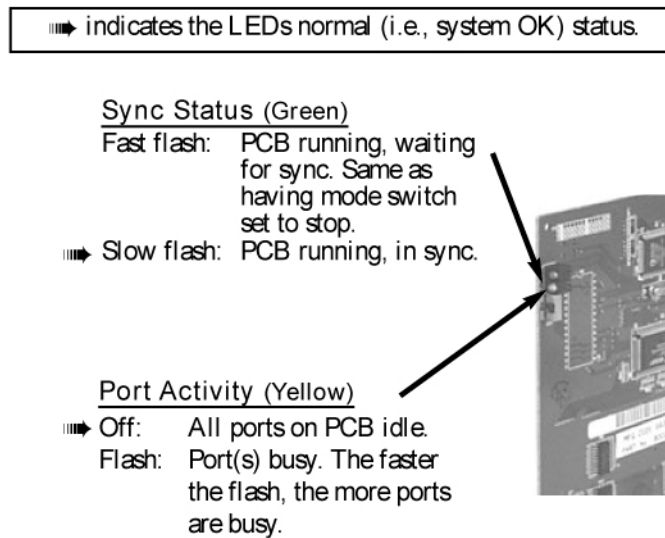


Figure 3-5: DSTU, ASTU and ATRU Status LEDs

Reinstalling the Side Panel

To reinstall the side panel (Figure 3-6):

1. Carefully realign the right side panel and slide it into position.
2. Reattach the two screws that secure the right side panel to the cabinet.

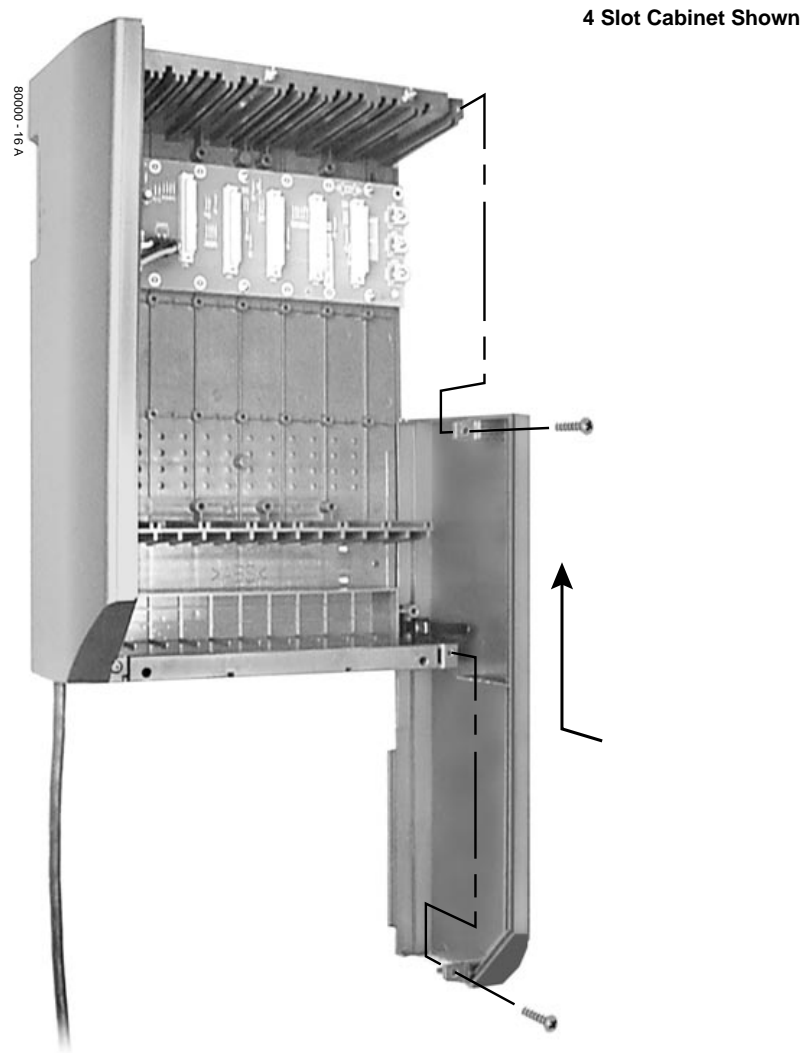
**3**

Figure 3-6: Reinstalling the Side Panel

Reinstalling the Front Cover

To reinstall the front cover (Figure 3-7):

1. Hook the tabs on the rear of the cover into their associated slots.
2. Push the front of the cover into place.
3. Screw in the two captive screws that secure the cover to the cabinet.



4 Slot Cabinet Shown

Figure 3-7: Reinstalling the Front Cover

Section 4: Optional Equipment

External Paging

Installing External Paging

The CPU provides an External Paging output. You connect the CPU Paging output to audio inputs on customer provided Paging systems. Be sure the connected Paging equipment is compatible with the following page output specifications:

External Paging Output Specifications	
Output Impedance:	600 Ohms
Output Level:	0 dBr @ 1.0 kHz

The following products should help if you make your own cables. **The connector is generally referred to as a RJ45 connector wired in an RJ61X configuration.** Check with your local supplier for comparable products.

- Suttle SE-266-8K 8 Position Modular Plug (requires an SE-166 or SE-166-6 modular crimping tool).
- Hubbell BRFT4P Snap-On 8 Position Modular Plug (does not require a special crimping tool).

To connect an External Paging amplifier (Figure 4-1):

1. Find an available connector in a station cable and make sure it is correctly punched down at the 66M1-50 block.

Follow standard color code order. Be sure the block is properly cross-connected.

2. For the connector chosen, locate pins 1T and 1R and connect the music source.
3. Plug the modular jack into the CPU modular connector.

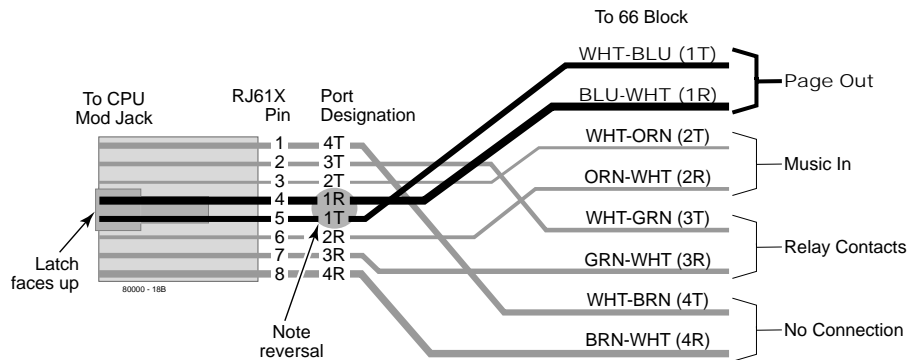


Figure 4-1: Connecting External Paging

External Paging Relay Control

An announcement broadcast into a Paging zone can additionally activate the system relay in the CPU PCB. You can assign this relay for page Relay Control or Door Box strike control, not both. Turn to *Door Box Relay Control* on page 4-4 if you want to set up the relay for Door Box strike control.

!! Important !!

Be sure the device connected to the system's relay contacts is compatible with the following specifications.

Relay Contact Specifications	
Contact Configuration:	Normally Open
Maximum Load:	60mA @ 30 VDC 10 mA @ 90 VDC
Maximum Initial Contact Resistance	50 mOhms

The following products should help if you make your own cables. **The connector is generally referred to as a RJ45 connector wired in an RJ61X configuration.** Check with your local supplier for comparable products.

- Suttle SE-266-8K 8 Position Modular Plug (requires an SE-166 or SE-166-6 modular crimping tool).
- Hubbell BRFT4P Snap-On 8 Position Modular Plug (does not require a special crimping tool).

Connecting the Relay for External Paging Control

To Connect the CPU Relay for External Paging Control (Figure 4-2)

1. Find an available connector in a station cable and make sure it is correctly punched down at the 66M1-50 block.
 - Follow standard color code order. Be sure the block is properly cross-connected.*
2. For the connector chosen, locate pins 3T and 3R and connect the device the relays will control.
3. Plug the modular jack into the CPU modular connector.

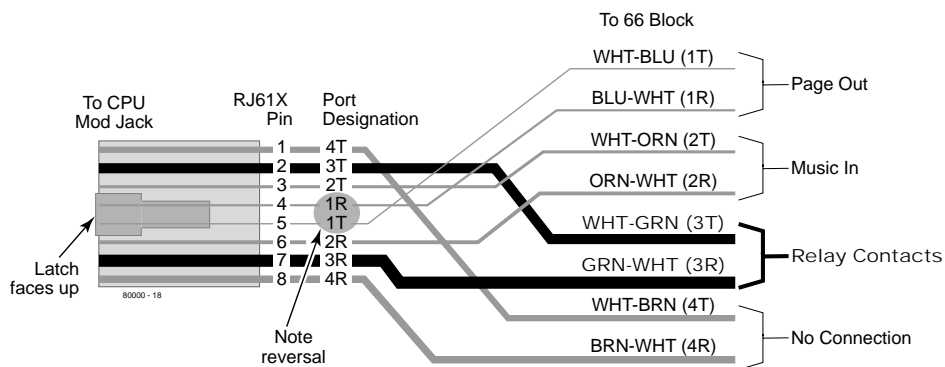


Figure 4-2: Connecting the Control Relay for External Paging

Programming the Relay for External Paging Control

- In **0201 - CPRU Relay**, to assign the CPU Relay for External Paging control, enter 2.
- In **0201 - CPRU Relay Page Zone Assignment**, enter the Page Zone (1-7) that should activate the CPU relay. Note that Zone 1 and All Call Paging announcements broadcast from the External Paging output.

Installing the Digital Door Box

The Digital Door Box (P/N 80560) is a self-contained Intercom unit typically used to monitor an entrance door. A visitor at the door can press the Door Box call button (like a door bell). The Door Box then sends chime tones to all extensions programmed to receive chimes. To answer the chime, the called extension user just lifts the handset. This lets the extension user talk to the visitor at the Door Box. The Door Box is convenient to have at a delivery entrance, for example. It is not necessary to have company personnel monitor the delivery entrance; they just answer the Door Box chimes instead.

The number of Digital Door Boxes you can install is limited by the System Load Factor. See *DS2000 Load Factor Calculations* on page 1-3 for more.

A Digital Door Box can control the CPU relay contacts. See *Door Box Relay Control* on page 4-4 for more.

The Digital Door Box is a weather-tight unit, with an operating temperature range of 0 to 45 degrees C (32 to 113 degrees F) and a relative humidity of 10-95%, non-condensing. It is not intended for outdoor installation.

Any available 16DSTU PCB port can support a Digital Door Box.

To install the Digital Door Box (Figure 4-3):

1. Snap open the Door Box case.
2. Punch down one end of a two-pair twisted station cable on the extension block as shown in Figure 4-3 *Connecting a Digital Door Box* on page 4-3.
3. Run the station cable through the hole in the back of the Door Box.
When wall mounting, use the two holes in the base of the Door Box for the mounting screws.
4. Strip the conductors back about 1/2 inch and connect to the Door Box terminals.
5. Snap the Door Box cover back onto the base.

Also see *Programming the Door Box* on page 4-4 and *Operating the Door Box* on page 4-5.

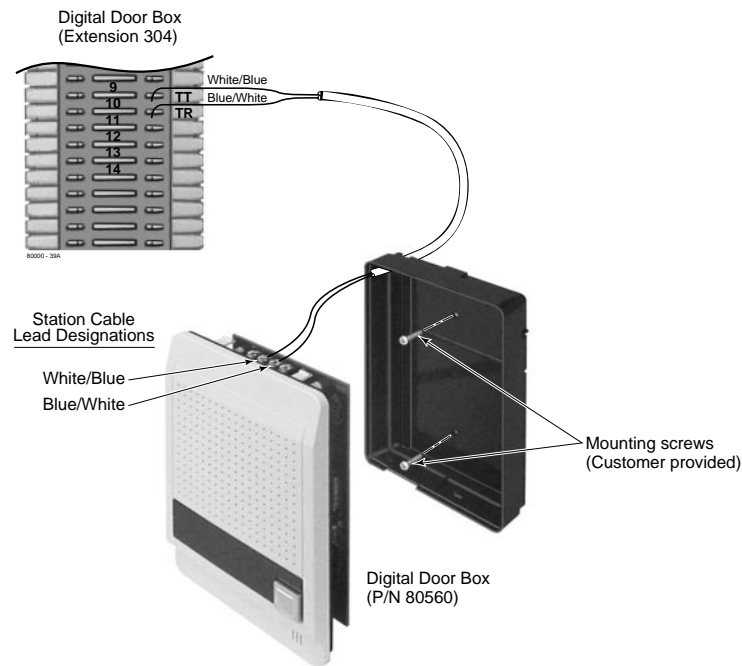


Figure 4-3: Connecting a Digital Door Box

Programming the Door Box

Door Box Setup

You must assign the circuit type and chime pattern to each installed Door Box.

- In **1801 - Extension Circuit Type**, enter 10 to assign the extension as a Door Box.
With software version 02.02.14 or higher, digital station ports (on installed and programmed PCBs) automatically detect the type of connected device when the keyset, 2-OPX Module or Digital Door Box is plugged in.
- In **1801 - Door Chime**, enter the Door Chime type.
 0 = Normal Ring Group ringing.
 1 = Low pitch chime pattern.
 2 = Mid range pitch chime pattern.
 3 = High pitch chime pattern.

If you enter Door Chime type 0 (normal ring) above, you can set up Call Coverage keys for the Ring Group. This allows extensions that are not members of the Ring Group to answer Door Box calls. Extensions with Call Coverage keys to the Door Box Ring Group can also activate the relay (see Door Box Relay Control below).

To allow the attendant to answer Door Box calls, set up a Call Coverage key for the Door Box Ring Group. This is an answer-only key, and is required because the attendant cannot be in a Ring Group to receive chimes. Also, consider giving the attendant a Hotline key to the Door Box to make calling easier.

Door Box Ringing

When a visitor at the door presses the Door Box call button, the Door Box will alert (chime) all the extensions in the Ring Group to which the Door Box belongs. For example, if the Door Box and extensions 301 and 302 are in Ring Group 1, pressing the call button alerts 301 and 302.

- In **1802 - Ring Group Number**, assign the Door Box and the extensions that should alert to the same Ring Group.
- In **0511 - Ring Group Master Extension Numbers and Names**, assign a Ring Group master number to the Ring Group assigned in the previous step.

Door Box Relay Control

Any keyset extension that receives Door Box chimes can control the CPU relay, which in turn typically enables an electric strike on an entrance door next to a Door Box. After answering the Door Box chimes, the extension user can press a FLASH or a soft key to enable the associated relay. The visitor at the door can then enter without having an employee open the entrance for them.

!! Important !!

Be sure the device connected to the system's relay contacts is compatible with the following specifications.

Relay Contact Specifications	
Contact Configuration:	Normally Open
Maximum Load:	60mA @ 30 VDC 10 mA @ 90 VDC
Maximum Initial Contact Resistance	50 mOhms

The following products should help if you make your own cables. *The connector is generally referred to as a RJ45 connector wired in an RJ61X configuration.* Check with your local supplier for comparable products.

- Suttle SE-266-8K 8 Position Modular Plug (requires an SE-166 or SE-166-6 modular crimping tool).
- Hubbell BRFT4P Snap-On 8 Position Modular Plug (does not require a special crimping tool).

Connecting the Relay for Door Box Strike Control

To Connect the CPU Relay for Door Box Control (Figure 4-4)

- Find an available connector in a station cable and make sure it is correctly punched down at the 66M1-50 block.

Follow standard color code order. Be sure the block is properly cross-connected.
- For the connector chosen, locate pins 3T and 3R and connect the device the relays will control.
- Plug the modular jack into the CPU modular connector.

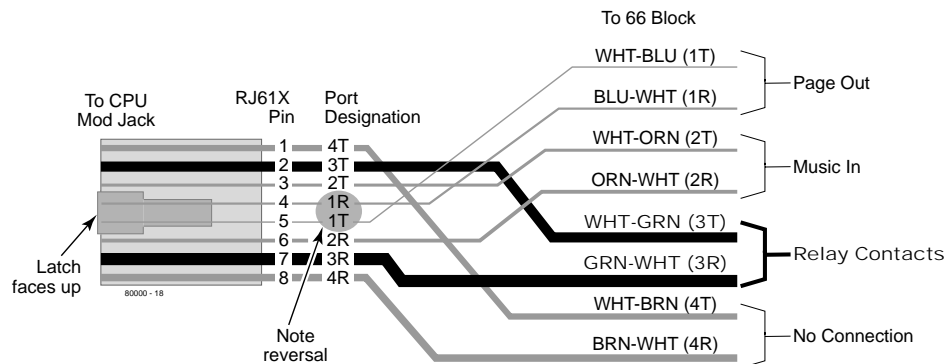


Figure 4-4: Connecting the Relay for Door Box Strike Control

Programming the Relay for Door Box Strike Control

If the relay on the CPU controls the strike for the door, the keyset that answers the Door Box chimes can remotely open and close the strike.

- In **0201 - CPRU Relay**, to assign the CPU Relay for Door Box strike control, enter 1.
- In **0401: Door Unlock Time**, enter the interval that the CPU relay should remain closed after the keyset user activates (closes) the relay. After this interval, the CPU automatically returns to its idle (open) state.
- In **1801 - Relay Owner**, enter 1 to assign the CPU PCB relay to the Door Box (see Operating the Door Box below). Enter 0 to disable the CPU PCB relay for Door Box calls.

4

Operating the Door Box

To place a call from the Door Box:

- Press the Door Box call button.
- When someone inside the building answers your call, speak toward the Door Box.

To place a call to the Door Box:

- Lift handset and press ICM.
- Dial the Door Box extension number.

To answer the Door Box chimes from a keyset:

- Lift handset or press SPK.

To control the system relay which in turn controls the door strike:

Once set up in programming, this option is available to any member of the Door Box Ring Group as well as any extension with a Call Coverage Key for the Door Box Ring Group.

- To open the relay, press FLASH key or OPEN soft key.
- To close the relay, press FLASH key again or CLOSE soft key.

Installing a Music Source

Your system provides connection for a customer provided music source. Use this music source for Background Music and Music on Hold.

Be sure the connected music source is compatible with the following music input specifications:

Music Input Specifications	
Input Impedance	10K Ohms
Output Level:	+18 dBr (± 2 dBr) @ 1.0 KHz

The following products should help if you make your own cables. *The connector is generally referred to as a RJ45 connector wired in an RJ61X configuration.* Check with your local supplier for comparable products.

- Suttle SE-266-8K 8 Position Modular Plug (requires an SE-166 or SE-166-6 modular crimping tool).
- Hubbell BRFT4P Snap-On 8 Position Modular Plug (does not require a special crimping tool).

To connect a music source (Figure 4-5):

1. Find an available connector in a station cable and make sure it is correctly punched down at the 66M1-50 block.
 - Follow standard color code order. Be sure the block is properly cross-connected.*
2. For the connector chosen, locate pins 2T and 2R and connect the music source.
3. Plug the modular jack into the CPU modular connector.

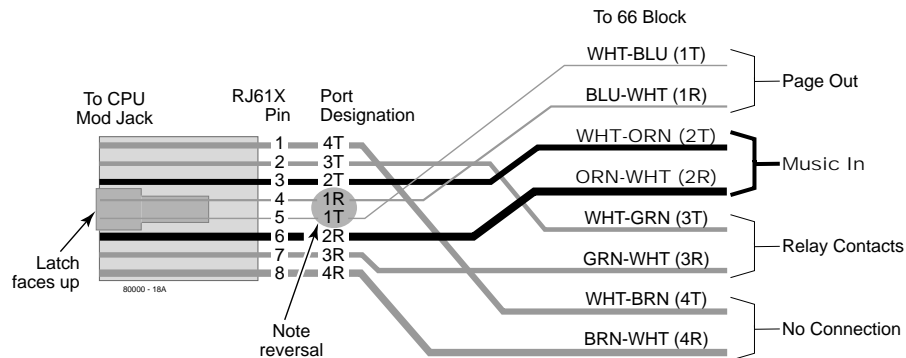


Figure 4-5: Installing a Music Source

Programming Background Music

- In **0201 - Background Music**, enter Y to enable Background Music system-wide.
- In **1802 - BGM**, enter Y to enable Background Music at the extension.

To turn Background Music on and off:

1. Do not lift the handset or press **SPK**.
2. Press **HOLD**.

Programming Music on Hold

- In **0201 - Music on Hold**, enter Y to enable Music on Hold system-wide.
- In **0201 - MOH on Transfer**, enter Y to enable Music on Hold for transferred calls.

Power Failure Cut-Through

When AC power fails, the system can automatically cut through to a Power Failure Telephone connection.

To install Power Failure Cut-Through (Figure 4-6):

1. Locate an available 8-pin jack in a trunk (A) block or station (B) block.
Local codes may prevent you from using a DDK connector on the A block for optional equipment.
2. For the 8-pin jack chosen, cross-connect the associated wire pair from the A or B block to the cross-connect block.
3. Install a modular jack for each Power Failure Telephone within six feet of the telephone's location.
4. For each Power Failure Telephone, run one-pair of 24 AWG station cable from the cross-connect block to the telephone's modular jack.
5. Terminate the station cable WHT/BLU - BLU/WHT leads to the RED and GRN lugs in the modular jack.
6. Install bridging clips as required.

To test the Power Failure Telephone:

1. Connect the power failure telephone. See the illustration below.
2. Power down the system.
3. At the Power Failure Telephone, lift the handset.
You should hear dial tone on the trunk you connected.
4. Place a test call.
If power is restored while a cut-through call is in progress, the call is maintained until the user hangs up the Power Failure Telephone.

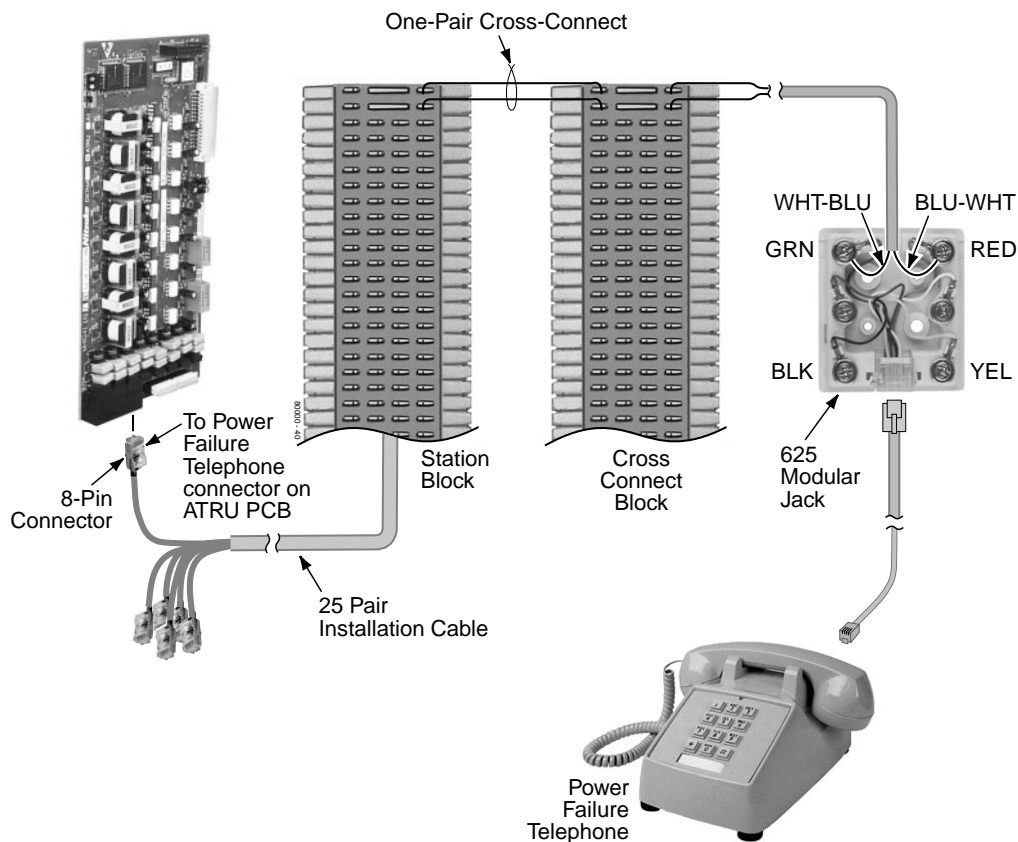


Figure 4-6: Connecting a Power Failure Telephone

Installing a DSS Console

The DSS Console gives a keyset user one-button access to extensions, trunks and system features. Keep the following in mind when installing DSS Consoles:

- You can only connect 4 DSS Consoles.
- You can only connect DSS Consoles to Super Display or 34-Button Display telephones.
- A DSS Console does not require a separate station port – it connects directly to the keyset.

To install a DSS Console (Figure 4-7) (Figure 4-8):

1. Turn the telephone upside down and remove the plastic filler plug from the DSS modular connector.
2. Plug the DSS Console's 8-pin modular line cord into the telephone's DSS connector.
3. Plug the other end of the 8-pin line cord into the DSS Console's 8-pin jack.
4. If you have a 24-Button DSS Console, attach the metal plate to both the DSS Console and telephone. See Figure 4-7 *Installing a 24-Button DSS Console* below for more.

Programming DSS Consoles

- **1801 - DSS Type**
For the extension to which you have connected the DSS Console, enter 1 for 24-button, 2 for 110-button and 0 for unassigned.
- **1801 - DSS Block Number**
For the extension to which you have connected the DSS Console, enter the number of the block that corresponds to the connected console. A block is a unique DSS Console assignment. The system provides up to 4 blocks; one for each console.
Your consoles can share the same block if you want them to have the same programming. They will still have unique Personal Speed Dial numbers, since a DSS Console uses the Personal Speed Dial for the extension to which it is attached.
- **1704 - DSS Console Key Assignment**
Program the DSS Console's keys. Refer to the *Software Manual* for additional programming details.

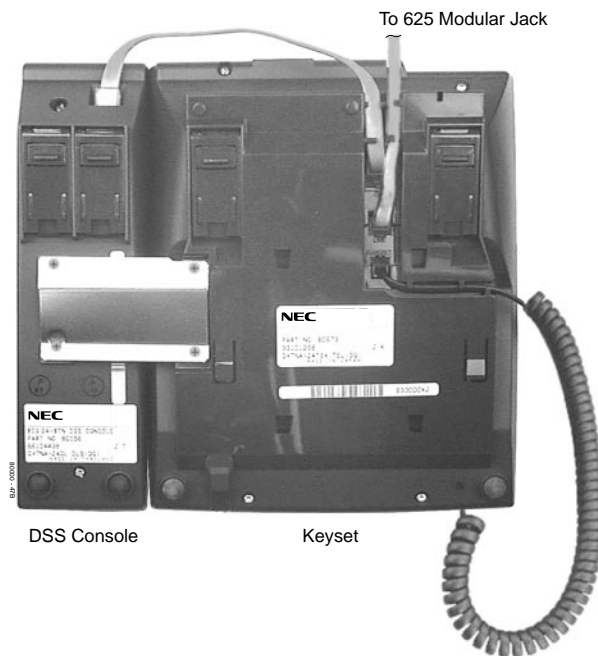


Figure 4-7: Installing a 24-Button DSS Console

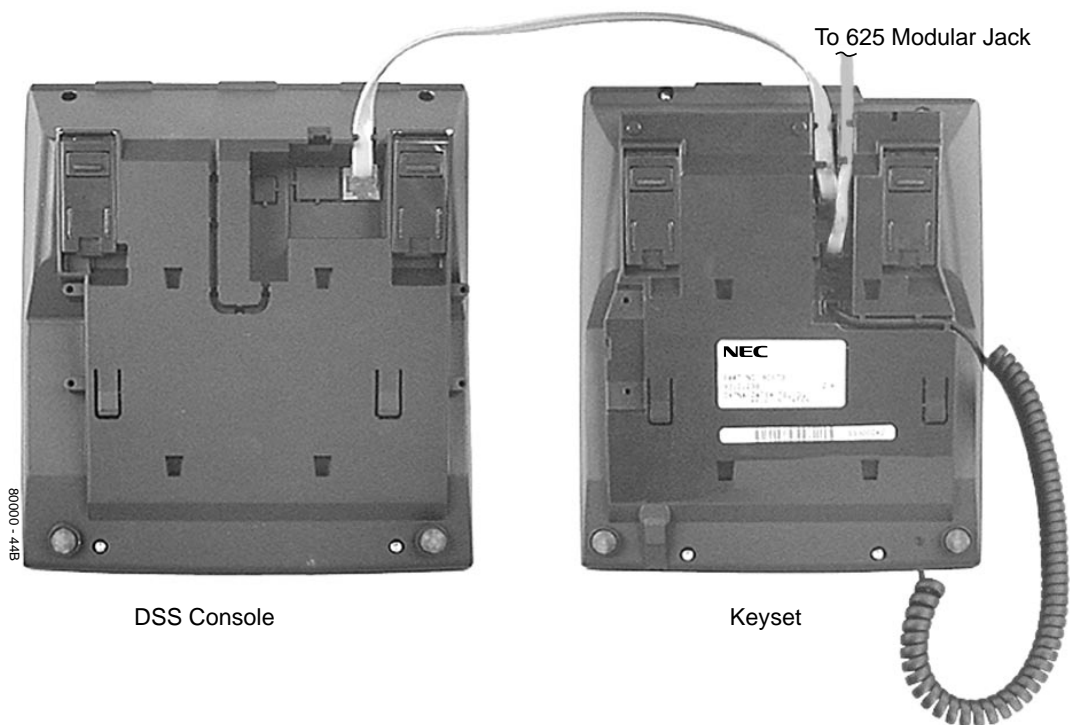


Figure 4-8: Installing a 110-Button DSS Console

Installing the 2-OPX Module

The 2-OPX Module (P/N 92177A) provides two 2500 type analog circuits for connection to on-premise 2500 type single line devices (i.e., telephones, fax machines, modems, etc.) and to telco OL13B/C OPX circuits. It uses a single digital extension circuit for the power and signaling for both analog ports.

To install a 2-OPX Module (Figure 4-9):

1. Locate an 8-pin modular connector in a trunk block or station block.
Local codes may prevent you from using a connector on the trunk block for optional equipment.
2. For the connector chosen, cross-connect the associated wire pair from the trunk or station block to the cross-connect block.
3. Install a modular jack for the 2 OPX Module within six feet of the module's location.
4. Run one-pair 24 AWG station cable from the cross-connect block to the modular jack.
5. Terminate the station cable WHT/BLU - BLU/WHT leads to the RED and GRN lugs in the modular jack.
6. Install bridging clips as required.
7. Ground the 2-OPX Module by connecting a 12 AWG ground wire from the FG lug to a known earth ground.
8. Plug a line cord into the 2-OPX unit and the 2-OPX's modular jack.

The DS1 LED on the 2-OPX Module lights steadily.

Programming 2-OPX Modules

- In **1801 - Extension Circuit Type**, assign the 2-OPX extension circuit type 21.
With software version 02.02.14 or higher, digital station ports (300-315) automatically detect the type of connected device when the keyset, 2-OPX Module or Digital Door Box is plugged in.
Each 2-OPX Module provides 2 OPX ports. The first 2-OPX extension number is the same as the port's extension number. The second 2-OPX extension number is the first port plus 201. For example, the two extension numbers for the 2-OPX Module plugged into extension 314 are 314 and 515.

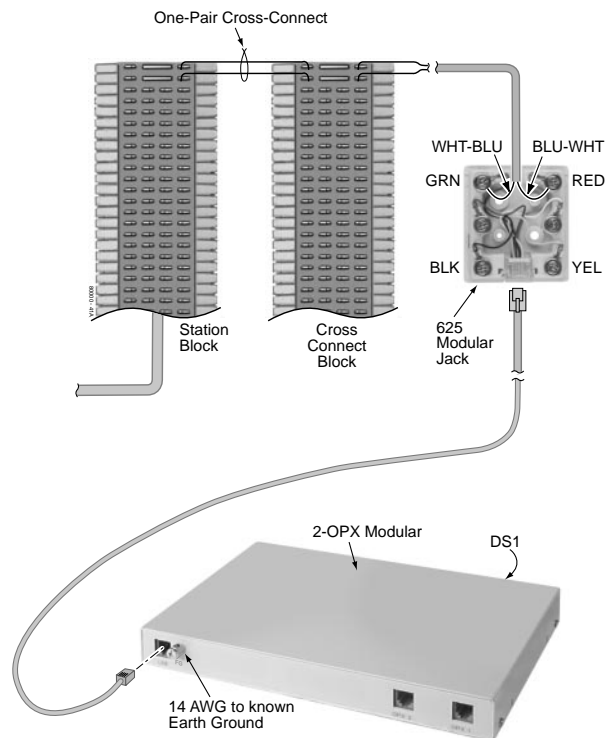


Figure 4-9: Connecting the 2-OPX Module

Wall Mounting the 2-OPX Module

To wall mount a 2-OPX Module (Figure 4-10):

1. Following the diagram below, move the screws that secure the 2-OPX Module cover from the outside holes to the inside holes. Do not tighten the screws.
2. Attach the wall mount brackets to each side of 2-OPX Module and tighten the screws.
3. With the connectors facing down, mount the 2-OPX Module to the wall using suitable customer-provided fasteners.

Use the 2-OPX Module as its own mounting template.

4. Connect the 2-OPX module as described on the previous page.

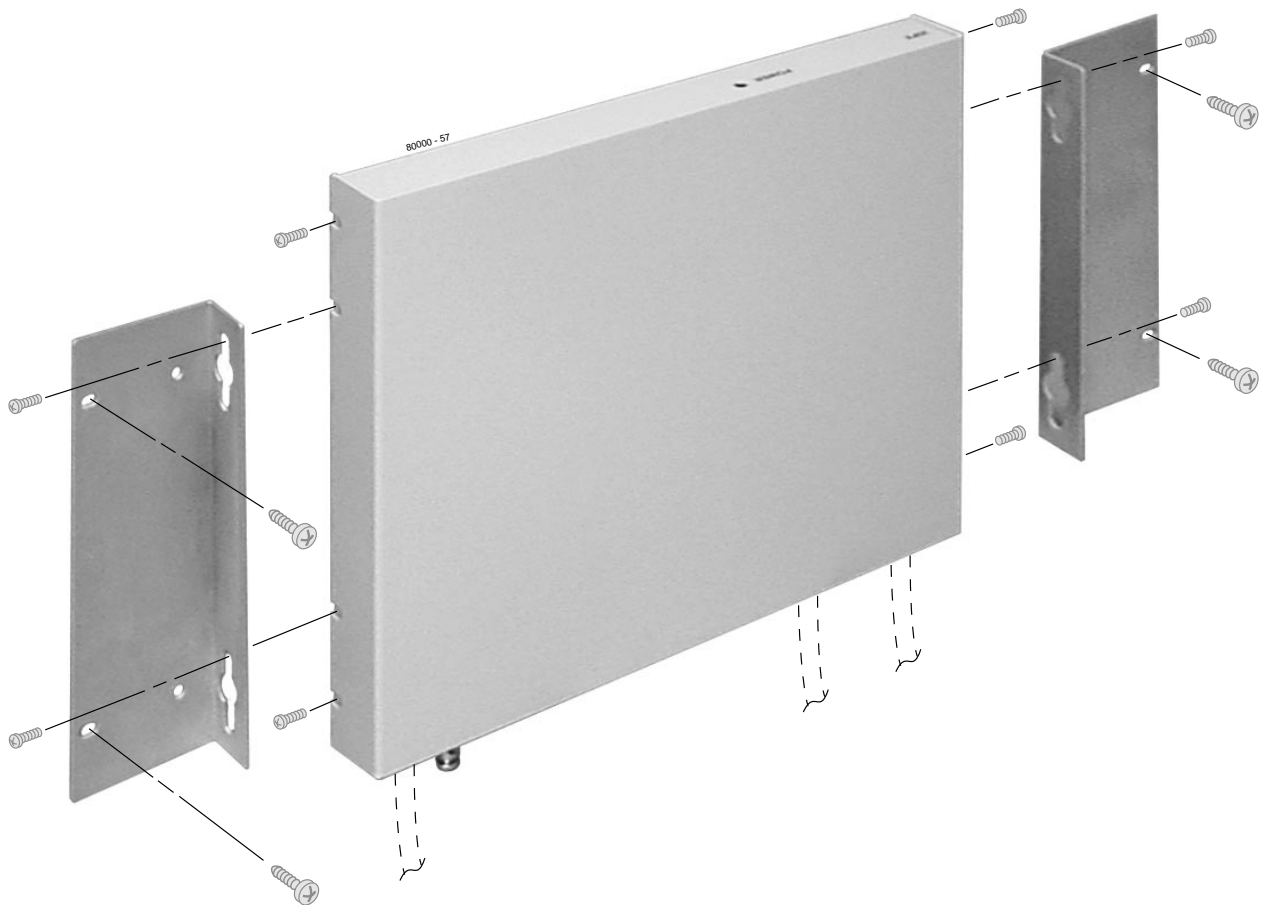


Figure 4-10: Wall Mounting the 2-OPX Module

Installing the Wall-Mount Kit

You can use a wall-mount kit to attach any key telephone to a wall. The wall-mount kit includes a mounting bracket, wall-mount screws and a handset hanger.

To Install the wall-mount handset hanger (Figure 4-11)

1. Remove the rubber plug that covers the slots for the handset hanger. Store the plug in a safe place.
2. Insert the handset hanger in the slot provided beneath the telephone's hookswitch.



Figure 4-11: Installing the Wall-Mount Hanger

Wall-Mounting a Key Telephone

To mount the telephone on the wall (Figure 4-12):

1. Using the screws provided, attach the wall-mount bracket to the wall in the desired location.
2. Plug in the telephone's modular line cord.
3. Run the telephone's line cord through one of the slots in the bottom of the wall-mount bracket.
4. Plug the line cord into the telephone's 625 modular jack.
5. Place the telephone on top of the wall-mount bracket and snap into place.

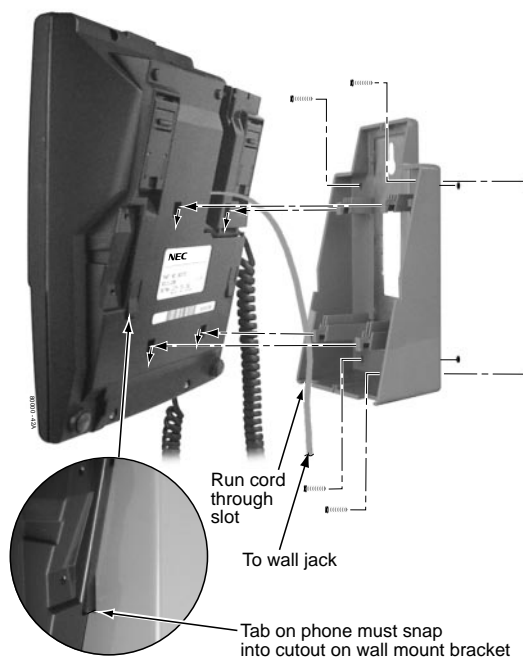


Figure 4-12: Installing the Wall-Mount Bracket

To mount the telephone on a wall plate (Figure 4-13):

1. Snap the wall-mount bracket onto the wall plate.
2. Plug the telephone's line cord into the jack in the wall plate and into the telephone.
3. Place the telephone on top of the wall-mount bracket and snap into place.

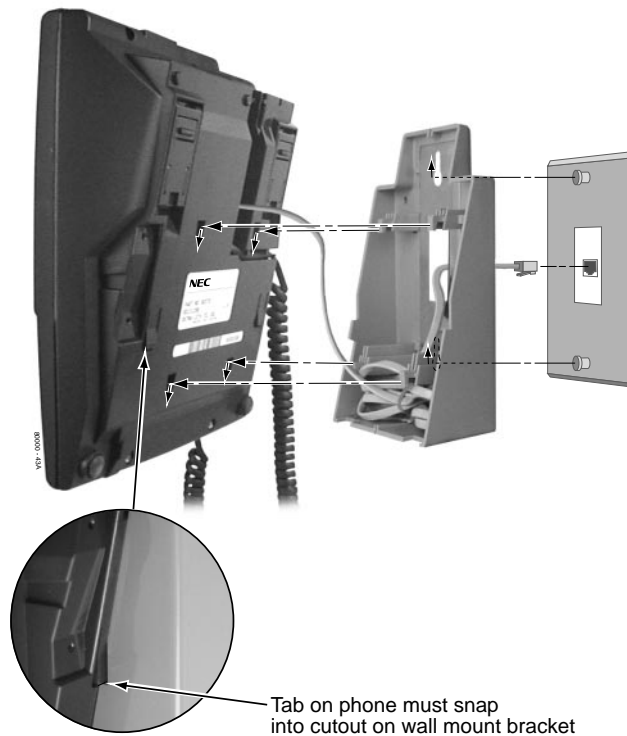


Figure 4-13: Mounting on a Wall Plate

To remove the telephone from the wall mount kit (Figure 4-14):

1. From the front of the phone, grab the tabs that secure the telephone to the wall-mount kit.
2. While pressing in the tabs, lift up the phone until it snaps clear of the wall-mount kit.

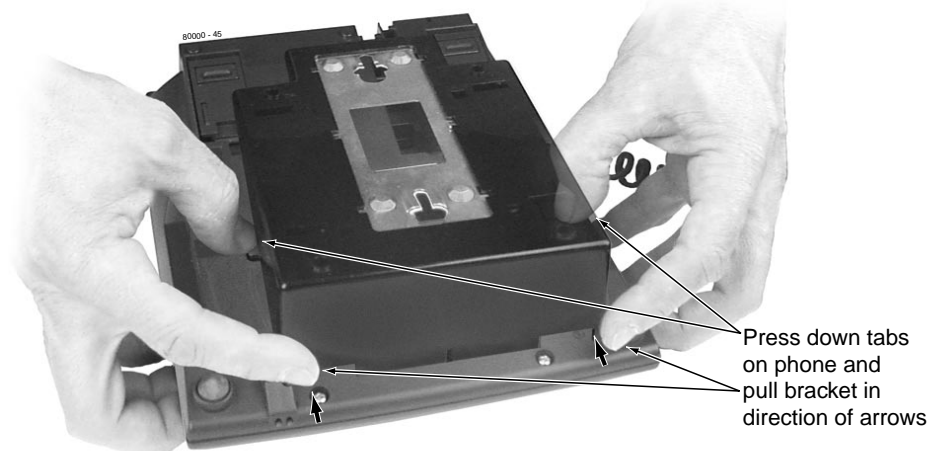


Figure 4-14: Removing the Wall-Mount Bracket

Using the Desk Stand

Each telephone has an integrated desk stand. You can extend the desk stand in one of two positions: low and high.

To use the desk stand low position (Figure 4-15):

- Flip up each telephone leg until it snaps into place.

To use the desk stand high position (Figure 4-15):

1. Flip up each telephone leg into the low position.
2. Push out the leg extender.
3. Slide the extender up, then down until it locks in place as shown below.

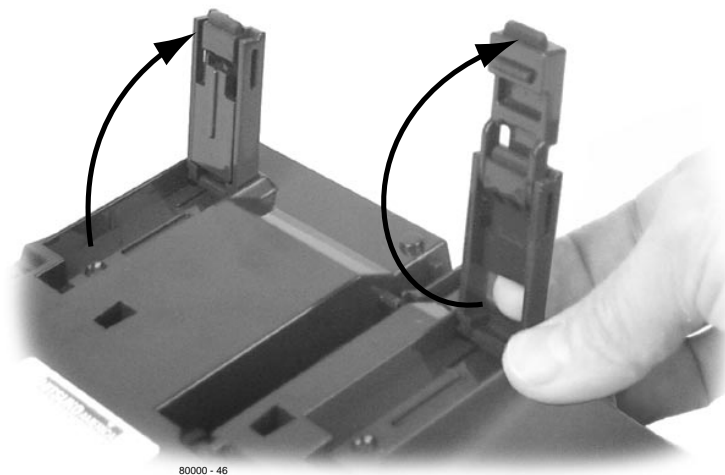


Figure 4-15: Using the Desk Stand

Installing the REJ Recording Jack

Use the REJ Recording Jack (P/N 80175) to connect a Super Display or 34-Button Display Telephone to an external tape recorder or amplifier. The REJ output is a mono sub-miniature jack which connects directly to an AUX level input. The REJ broadcasts both sides of your conversation (i.e., your voice and your caller's voice) whenever you lift your handset. The REJ does not broadcast Paging announcements or activate for Handsfree calls.

!! Caution !!

Be sure the connected audio device provides a standard AUX level input.

To install the REJ Recording Jack (Figure 4-16):

1. Unplug the telephone line cord and handset cord, and turn the telephone face down on a flat, non-abrasive surface.
2. Remove the 4 screws that secure the telephone base.
3. Separate the telephone faceplate from the telephone base.
4. On the left side of the telephone base, remove the plastic molding that covers the hole for the REJ connector. You only need to remove the top half of the molding.
5. Install the REJ as shown (with the components facing down).
6. Secure with the supplied screw.

To connect the REJ Recording Jack:

1. Route the REJ wires through the guides in the telephone base.
2. Plug the REJ cable into the connector in the telephone PCB.
The connector is keyed so you can't plug in the cable the wrong way.
3. Reassemble the telephone, plug in the handset, and reconnect the line cord.
4. Using an audio cable, connect the REJ to the amplifier's mono AUX input.
To connect to a stereo AUX input, use a commercially available mono-to-stereo splitter cable.

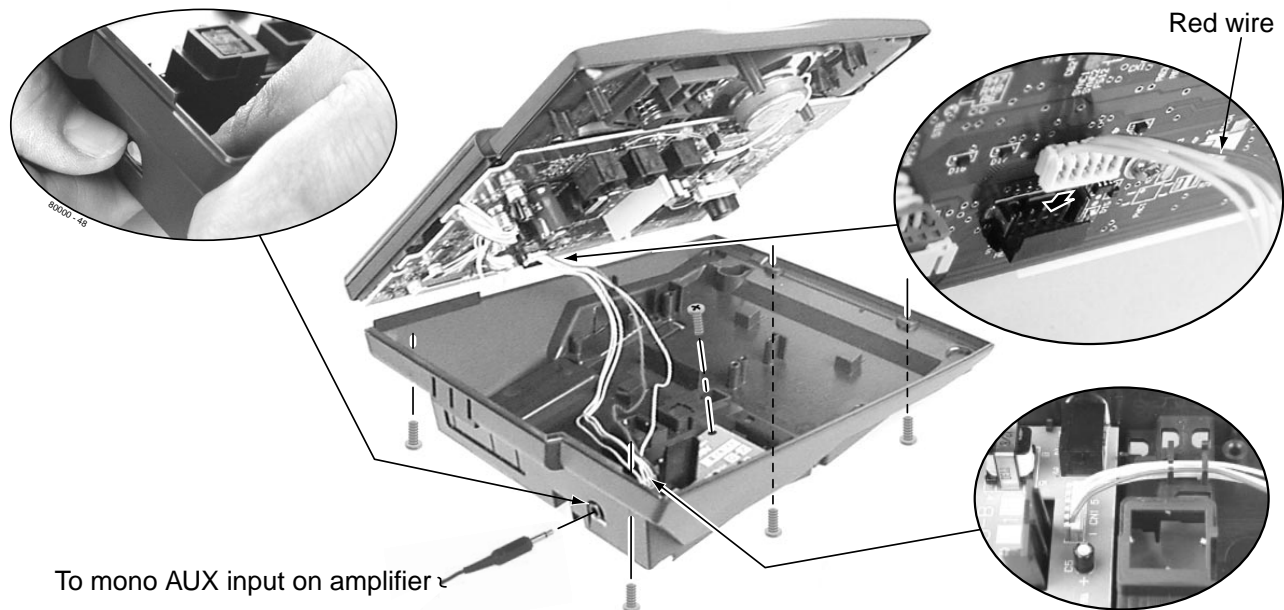


Figure 4-16: Installing the REJ

Section 5: Maintenance Options and SMDR

Backing Up Site Data

PC Card Data Base Compatibility

Keep the following PC Card data base compatibility guidelines in mind when backing up and restoring site data:

- Use Blank PC Card P/N 85880 to store up to 16 system data bases. **You cannot store data bases on PC Card with Software P/N 80051-V02.**.**.**
- All software version 02.**.** data bases in systems using CPU P/N 80025A are forward compatible (regardless of whether they are installed in a 4 or 8 slot cabinet).
- Software version 02.**.** data bases in systems using CPU P/N 80025 are not compatible with data bases using CPU P/N 80025A. This applies only to 4 slot cabinets, since you cannot use CPU P/N 80025 in an 8 slot cabinet.
- If restoring a data base from software version 02.00.00 only, the data base addresses are offset by 8. For example, a 02.00.00 data base you store in address 00 becomes address 08 in 02.04.00.
- Data bases prior to 02.00.00 are not compatible with data base versions 02.00.00 or higher. If you upgrade your system software from a version prior to 02.00.00, you must use **9999 - System Initialization** to initialize your system.
- Always review *Guidelines for Upgrading DS1000/2000 Systems to Software Version 02.02.17 or Higher* (P/N 80000UPG**) after upgrading your system.

Backing Up Site Data with a PC Card

You can use PC Card P/N 85880 to back up and restore your site data.

To use the PC Card to back up site data (Figure 5-1):

1. Insert the PC Card into the CPU.
2. Be sure the CPU mode switch is set to RUN.
3. Enter the programming mode.
*ICM + ##** + 372000 + HOLD*
4. Dial 9906 + HOLD.
You see: START?
To quit program 9906 instead, dial N + HOLD .
5. Dial Y + HOLD.
You see: 9906: DATABASE NAME
6. Enter a name for the database you want to save (up to 10 characters long).
Refer to Figure 5-2 Entering Names on page 5-3 if you need help when entering names.
Skip this step if you want to save data in an address that already has a name assigned.
7. When you are done entering the name, press HOLD.
You see the name and date of the first database stored. If no data bases are stored, you see:
9906: DB00
(empty)
8. The system assigns the name you entered in step 7 to the data base address you select below:
 - Press VOL ▲ or VOL ▼ to scroll through the addresses.
In software versions 02.00.01 and higher, there are 16 data base addresses:
DB 00 to DB 15.
 - OR
 - Skip this step to select the currently displayed data base.
9. Press HOLD.
Normally, you see
9906: SAVING
The PC Card Active LED is on during backup.
If the address you choose already has data stored in it, you see: REPLACE DB nn Y/N.
 - Press N + HOLD to back up to step 5.
 - Press Y + HOLD to proceed.*You automatically exit programming when the upload completes.*

PC Card Backup Error Messages

PC Card Backup Error Messages	
This error message:	Means this:
NO PCCARD	The PC card is not installed. <i>Install the PC card and try again.</i>
ERASE FAILED	The system could not overwrite an existing data base on the PC card. <i>Repeat the procedure. If you get the message again, try another PC card.</i>
SAVE FAILED	The system could not save data to the PC card. <i>Repeat the procedure. If you get the message again, try another PC card.</i>

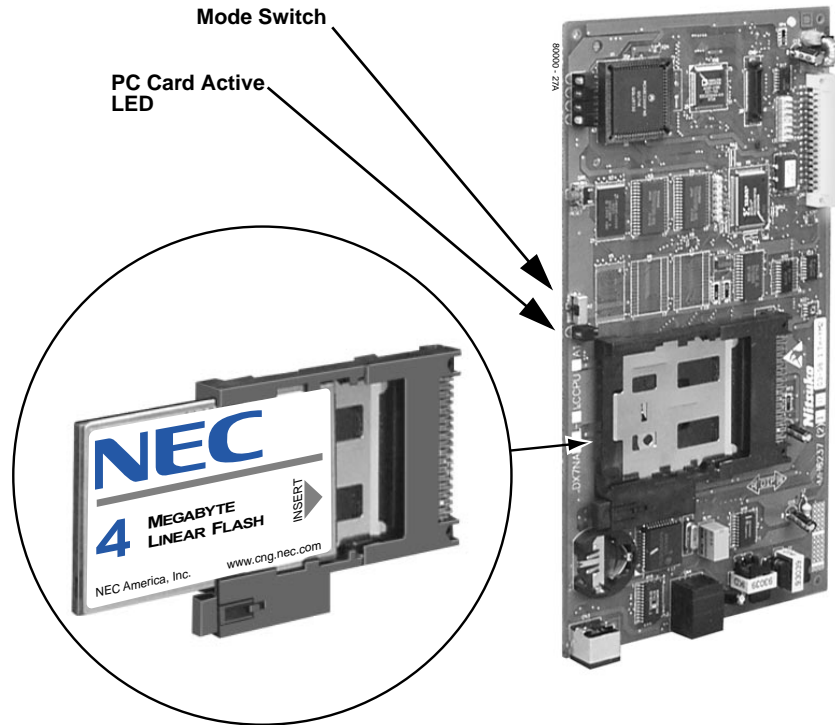


Figure 5-1: Using the PC Card

Keys for Entering Names					
Press this key:	Then one of these keys to enter the character in the white cell:				
	1	2	3	4	#
1	&	- (dash) ¹	/(backslash) ¹	' (apostrophe) ¹	1
2	A	B	C		2
3	D	E	F		3
4	G	H	I		4
5	J	K	L		5
6	M	N	O		6
7	P	Q	R	S	7
8	T	U	V		8
9	W	X	Y	Z	9
0	SPACE	:			0
*					*
#					

To enter characters in lower case (e.g., **e** instead of **E**), press **MW** before pressing the key in the first shaded column. Use **LND** to backspace over (erase) any characters you want to correct.

¹In software versions prior to 02.00.00, the codes for 1 + 2, 1 + 3, and 1 + 4 were not available.

Figure 5-2: Entering Names

Restoring Site Data from a PC Card

To use the PC Card to restore site data:

Review PC Card Data Base Compatibility on page 5-1.

1. Insert the PC Card into the CPU (See *Using the PC Card* on page 5-3).
2. Be sure the CPU mode switch is set to RUN.
3. Enter the programming mode.
ICM + ##* + 372000 + HOLD*
4. Dial 9907 + HOLD.
You see: START?
5. Dial Y + HOLD.
*You see the name and date of the first database stored. If no data bases are stored, you see:
9907: DB00
(empty)*
6. Press VOL ▲ or VOL ▼ to scroll through the data base addresses and select the one you want to restore.
In software versions 02.00.01 and higher, there are 16 data base addresses: DB 00 to DB 15.
7. When the data base you want to restore displays, press HOLD.
*The PC Card Active LED is on during restore.
You automatically exit programming when the upload completes.*

PC Card Restore Error Messages

PC Card Restore Error Messages	
This error message:	Means this:
NO PCCARD	The PC card is not installed. <i>Install the PC card and try again.</i>
NO DATABASE	There is no data stored in the data base address you selected. <i>Select another data base address and try again.</i>

Loading System Software from a PC Card

To use the PC Card to load system software (P/N 80051-V**.**.**) only (Figure 5-3):

1. Review *PC Card Data Base Compatibility* on page 5-1.
Loading new system software will automatically reload the factory installed (default) program entries.
2. Insert the PC Card into the CPU (see Figure 5-1 *Using the PC Card* on page 5-3).
3. Be sure the CPU mode switch is set to BOOT.
4. Press the reset switch on the CPU to reset the system.
The LEDs on the CPU will start to cycle.
After about 1 minute, the system will restart with the new software loaded using the factory installed (default) entries. The LEDs on the CPU will then flash normally.
5. Once the system restarts, switch the CPU mode switch to RUN.

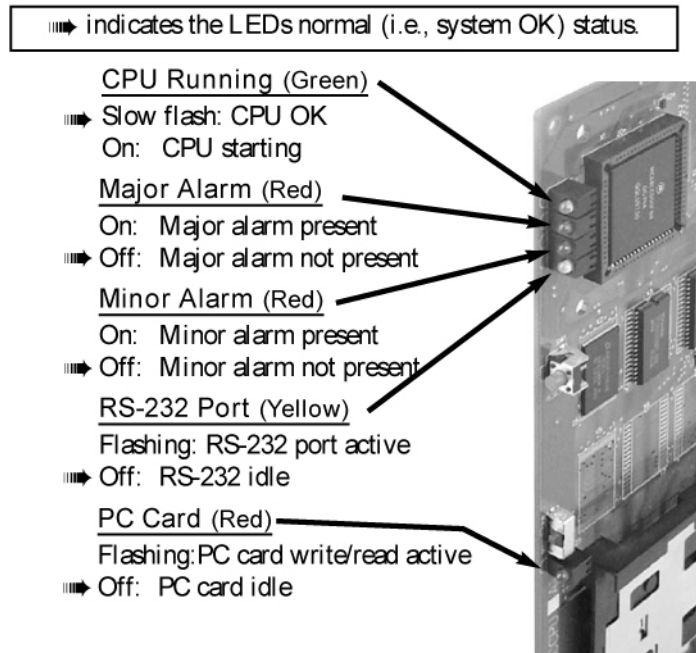


Figure 5-3: CPU Status LEDs

Installing SMDR

Station Message Detail Recording (SMDR) provides a record of the system's outside calls. Once set up in programming, SMDR automatically outputs from the RS-232 (serial) port on the CPU to a customer-provided printer, terminal or SMDR data collection device. When connecting SMDR, you can use one of the ready-made cables or make one of your own (see Figure 5-6 *Making Your Own Data Cables* on page 5-9).

You can also connect a PC to the CPU serial port to collect call history data.

To connect an SMDR device (Figure 5-4):

1. Plug the DIN end of the 8-Pin DIN to Mod-8 Cable (P/N 80893) into the CPU serial port.
2. Plug one end of the DB9 to Mod-8 Adaptor (P/N 85980) into the cable.
3. Plug the other end of the adaptor into the DB9M COM connector on the back of your PC.

The communications parameters of the CPU serial port are 38400 8 N 1 (38400 baud, eight data bits, no parity and 1 stop bit).

If you have a PC connected to collect history data, press Shift 1 to turn history on and off.

Programming SMDR

- **0301: CPU Baud Rate**
Assign the baud rate for the RS-232-C port on the CPU. The options are 0 (1200), 1 (2400), 2 (4800), 3 (9600), 4 (19200), and 5 (38400).
You can also press Ctrl Break on a PC connected to the CPU serial port to toggle through the available CPU baud rates.
- **0301: SMDR Port**
Enter 1 to enable SMDR output from the CPU RS-232-C port.
- **0301: Print SMDR Header**
Enter Y to have the beginning of the SMDR report include the column header data. Enter N to have the SMDR report only include the call data (without the header).
- **1001: Print SMDR**
Enter Y to have the SMDR report include calls on the trunk. Enter N to have the SMDR report exclude calls on the trunk.

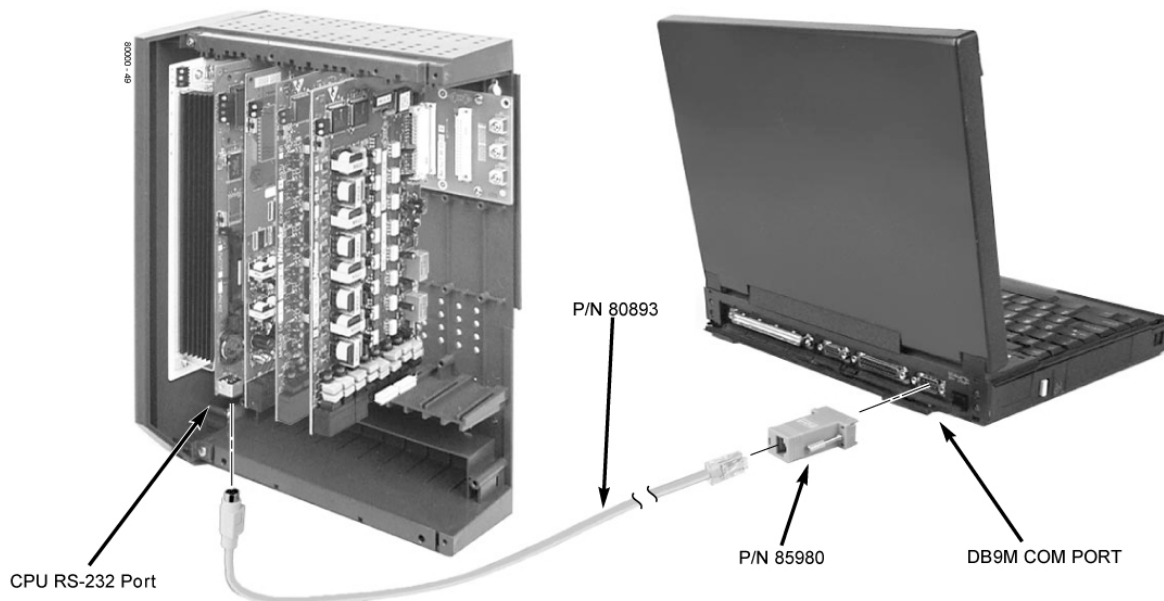


Figure 5-4: Connecting SMDR

Testing the Connection

To test the connection:

1. Open HyperTerminal on your Windows PC or laptop:
 - Click **Start + Programs + Accessories + Communications + Hypertrm.**
 - Double-click **Hyperterm.exe.**
 - Name your connection, pick an icon, and click **OK.**
2. When you see the **Connect To** screen, open the **Connect using** drop down and select **Direct to Com n** (where n is the number of the PC COM port connected to the system).
3. Click **OK** after making your selection above.
4. When you see the **COMn Properties**, set the parameters to the following:
 - **Bits per second** = 38400
 - **Data bits** = 8
 - **Parity** = none
 - **Stop bits** = 1
 - **Flow control** = none
5. Click **OK** after making your selections above.
6. Press **Enter.**
 - You may see some diagnostic data. If you press Enter again, you will see:>*
 - If you don't see anything (or garbage) on your screen, check your connections and HyperTerminal settings and try again.*
7. From the PC or laptop keyboard, press Shift 1 to enable history.
 - To verify the connection, lift the handset or use features at any telephone. History data will display on the PC or laptop screen.*
8. Once you have verified that everything is working OK, press **Shift 1** again to disable history.

Checking the System's Serial Port Settings

To check the system's serial port settings:

1. Enter the programming mode.
2. Enter **0301 + HOLD.**
3. Press **Vol ▲** until you see: **BAUD?nnnn**
4. Enter the new baud rate, if required + **HOLD.**
(0=1200, 1=2400, 2=4800, 3=9600, 4=19200, and 5=38400)
5. Press **CONF** to exit program 0301.

OR

Go to Programming SMDR below.

Note: You can press Ctrl Break on the PC connected to the system serial port to toggle through the available system baud rates.

SMDR report include calls on the trunk. Enter N to have the SMDR report exclude calls on the trunk.

Installing a Modem

You can connect a modem to the system's serial port to remotely collect history data and/or SMDR. Be aware that remotely collecting SMDR may not be advisable since the system can buffer only 50 SMDR call records.

To connect a modem (Figure 5-5):

1. Plug the DIN end of the 8-Pin DIN to Mod-8 Cable (P/N 80893) into the CPU serial port.
2. Plug one end of the DB25 to Mod-8 Adaptor (P/N 85981) into the cable.
3. Plug the other end of the adaptor into the DB25F connector on the back of your modem.
4. Following the instructions that came with your modem, connect a trunk and the modem's power supply.

To call from a PC at a remote site:

The remote PC must have a modem connected. Also, the default communications parameters of the CPU serial port are 38400 8 N 1 (38400 baud, eight data bits, no parity and 1 stop bit).

1. Using commercially available communications software, dial the phone number of the trunk connected to the modem at the telephone system site.
2. To test history, type **Shift 1** on the remote PC.

If history doesn't output correctly, press Ctrl Break on the remote PC to toggle through the available CPU baud rates.

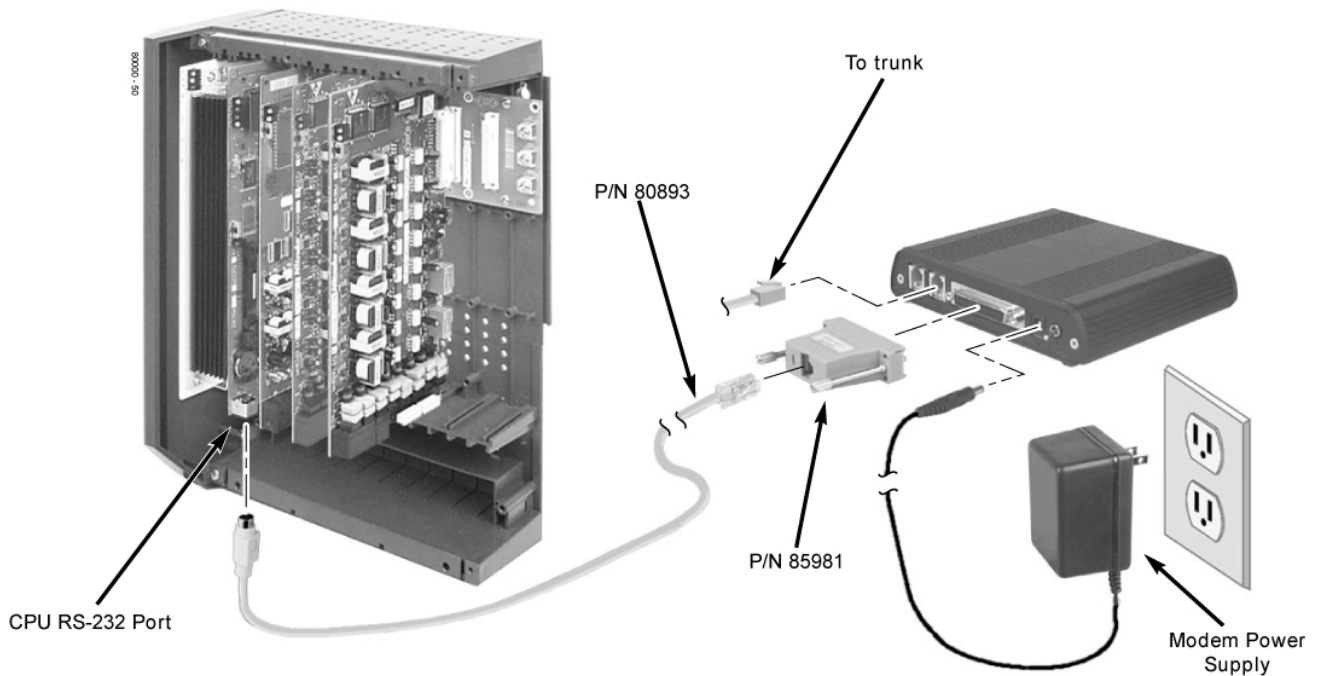


Figure 5-5: Connecting a Modem

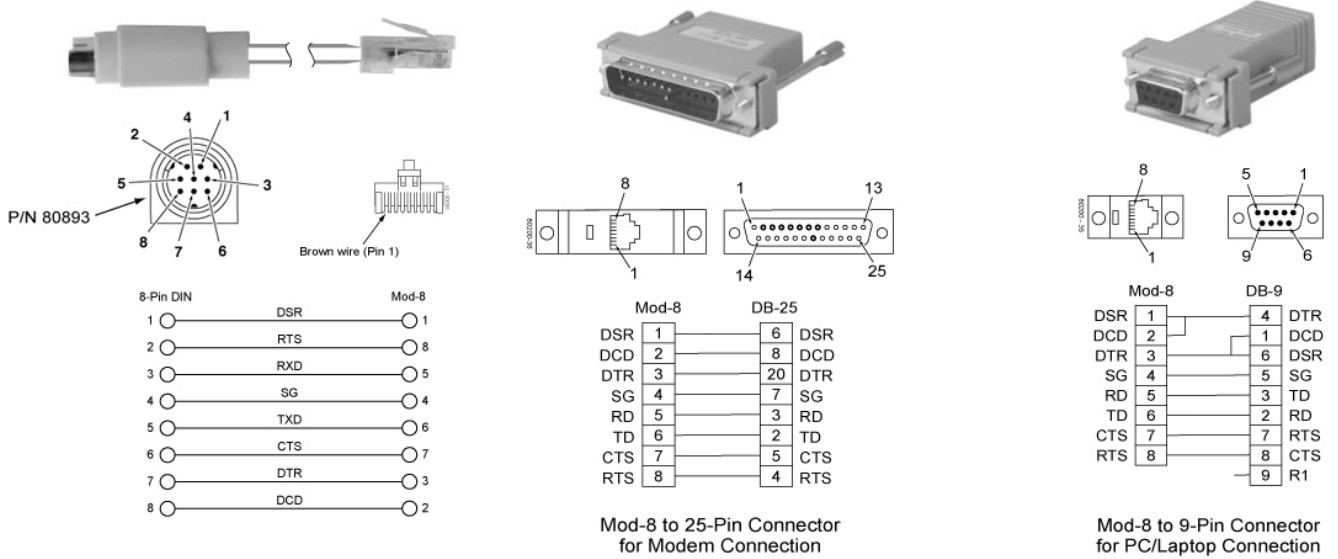


Figure 5-6: Making Your Own Data Cables

Resetting Your System

You may need to reset your system for troubleshooting purposes.

To reset your system (Figure 5-7):

1. Make sure the **MODE** switch is set to **RUN**.
2. Following the illustration below, press the red reset switch.
Your system will automatically restart.

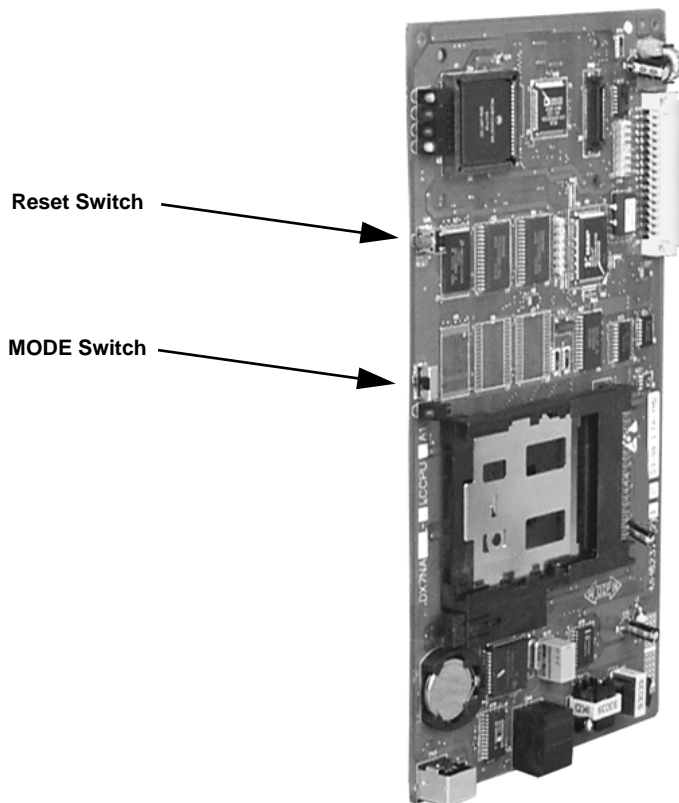


Figure 5-7: Resetting Your System

Section 6: Specifications and Parts

Specifications

System Capacities	
Cabinets:	1
Talk Timeslots (Intercom/line):	Non-blocking
Analog Trunks (CO/PBX lines):	4 Slot: 24 8 Slot: 48
Digital and/or Analog Telephones:	4 Slot: 40 8 Slot: 96
DSS Consoles:	1 max per keyset, 4 max. per system
Power Failure Telephones:	2 per ATRU PCB
Door Boxes (digital):	1 per digital station port
External Paging Zones:	1 (on CPU)
Internal Paging Zones:	8 (7 and All Call)
Page Audio Output:	1 (on CPU)
Music Input:	1 (on CPU)
Conference Circuits:	32 Conference circuits dynamically allocated, with 8 parties max per Conference. Conference circuits provided on CPU.
8ATRU Analog Trunk PCB: 4ATRU Analog Trunk PCB: 16DSTU Digital Station PCB: 8ASTU Analog Station PCB: 4ASTU Analog Station PCB:	Refer to <i>System Configuration</i> on page 1-1 for capacities.
CPU Central Processing Unit:	1
REJ Recording Jack Units:	1 max. per keyset

Environmental Requirements
<p>Meeting established environmental standards maximizes the life of the system. Refer to the <i>Standard Practices Manual</i> for further information. Be sure that the site is not:</p> <ol style="list-style-type: none"> 1. In direct sunlight or in hot, cold or humid places. 2. In dusty areas or in areas where sulfuric gases are produced. 3. In places where shocks or vibrations are frequent or strong. 4. In places where water or other fluids come in contact with the main equipment. 5. In areas near high-frequency machines or electric welders. 6. Near computers, telexes, microwaves, air conditioners, etc. 7. Near radio antennas (including shortwave).

Power Requirements
A dedicated 110 VAC 60 Hz circuit located within 7 feet of the cabinet is required.

Environmental Specifications	
Cabinet, Key Telephones and Digital Door Box	
Digital Door Box not intended for outdoor installation.	
Temperature:	0-45°C (32-113°F)
Humidity:	10-95% (non-condensing)

Electrical Specifications	
The following specifications apply to each power supply installed.	
Power Supply:	120 VAC ± 10% @ 50-60 Hz
Output Power:	91 Watts @ 100% full load
Input Current:	1.5A @ 110V
VA:	165 VA
Kwh:	.165 KwH
BTU:	563 BU
Grounding Requirements:	12 AWG copper wire

External Paging	
Output Impedance:	600 Ohm
Output Level:	0 dBr @ 1.0 KHz

Mechanical Specifications				
Equipment	Width	Depth	Height	Weight
4 Slot KSU:	10 3/4"	5 7/8"	13 11/16"	4 lbs 5 oz
8 Slot KSU	19 1/2"	5 7/8"	13 11/16"	6 lbs 12 oz
Non-display Keypad:	7 1/4"	9"	2 7/8"	1 lb 11 oz
Display Keypad:	7 1/4"	9"	2 7/8"	1 lb 12 oz
Super Display Keypad:	7 1/4"	9"	2 7/8"	2 lb
24-Button DSS Console	2 1/2"	9"	2 3/4"	9 oz
110-Button DSS Console:	7 7/8"	8 3/4"	2 3/4"	1 lb 6 oz
Digital Door Box:	4"	1 1/2"	5 3/16"	10 oz
2-OPX Module:	9 3/8"	7 3/8"	1 1/4"	3 lbs

CPU Relay Contacts	
Contact Configuration:	Normally open
Maximum Load:	60 mA @ 30 VDC 10 mA @ 90 VDC
Maximum Initial Contact Resistance:	50 mOhms

BGM/MOH Music Source Input Music input is located on the CPU PCB.	
Input Impedance:	10K Ohms
Input Level:	+18 dBr (± 2 dBr) @ 1.0 Khz

FCC Registration Information				
Model:	DX7NA-112/48 (DS2000)			
Manufacturer:	NEC Infrontia			
FCC Part 15 Registration:	Class A			
FCC Registration Number:	NIFMUL-43093-KF-E NIFMUL-43094-MF-E			
Industry Canada Certificate (DOC) Number:	854 9522 A			
Reg. Status	FIC	Mfrs. Port ID	REN	Network Jacks
Original	02LS2	80010 80011	REN 0.6B	RJ11C RJ21X
Registered	OL13A OL13B OL13C	2OPX-A 2OPX-A 2OPX-A	SOC 9.0F SOC 9.0F SOC 9.0F	RJ21X RJ21X RJ21X

Cabling Requirements			
<ol style="list-style-type: none"> Do not run station cable parallel with the AC source, telex or computer, etc. If the cables are near cable runs to those devices, use shielded cable with grounded shields or install the cable in conduit. When cables must be run on the floor, use cable protectors. Cable runs for key telephones, single line telephones, Door Boxes and 2-OPX Modules must be a dedicated, isolated cable pair. 			
Device	Cable Type	Cable Run (ft)	Notes
Key Telephone	2-wire 26 AWG	1300	
	2-wire 24 AWG	2000	
Single Line Telephone	2-wire 26 AWG	11,500	at constant 20 mA
		3150	at constant 35 mA
	2-wire 24 AWG	18,000	at constant 20 mA
		5050	at constant 35 mA
Digital Door Box	2-wire 24 AWG	29,000	at constant 20 mA
	2-wire 22 AWG	8000	at constant 35 mA
2-OPX Module	2-wire 24 AWG	2000	
		2000	
		1000	

Station Equipment	
Description	Part Number
34-Button Super Display Telephone	80673
34-Button Display Telephone	80663
22-Button Telephone	80570
22-Button Display Telephone	80573
24-Button DSS Console	80556
110-Button DSS Console	80555
Wall Mount Kit	80579
Analog Telephones (customer provided)	

Peripheral Station Equipment	
Description	Part Number
Digital Door Box	80560
2-OPX Module	92177A

Common Equipment	
Description	Part Number
4 Slot KSU	80000
8 Slot KSU	80001
DS2000 Power Supply	80005 / 80005A
Installation Cable	80892
Blank PC Card	85880
PC Card with system software preloaded (*.*.* denotes the system software level)	80051-V*.*.*.*
8-Pin DIN to Mod-8 Cable	80893
DB9 to Mod-8 Adaptor	85980
DB25 to Mod-8 Adaptor	85981
Spare KSU Hanger	80578
You must use an A (suffixed) version Power Supply in an 8 Slot Cabinet	

PCBs	
Description	Part Number
Central Processing Unit	80025 / 80025A
16DSTU Digital Station PCB	80021 / 80021A
8ASTU 8 Port Analog Station PCB	80041 / 80041A
4ASTU 4 Port Analog Station PCB	80040 / 80040A
4ATRU 4 Port Analog Trunk PCB (loop start)	80010 / 80010A
8ATRU 8 Port Analog Trunk PCB (loop start)	80011 / 80011A
4 Circuit Caller ID Daughter Board • Installs on 4ATRU PCB P/N 80010A	92012
8 Circuit Caller ID Daughter Board • Installs on 8ATRU PCB P/N 80011A	80013
You must use all A (suffix) version PCBs in an 8 Slot Cabinet	

Replacement Parts	
Description	Part Number
Handset and Cord Assembly	80150
Noise Cancelling Handset	80150NC
22 Button Clear Plastic Cover	80600-22
34 Button Clear Plastic Cover	80600-34
34 Button Super Display Clear Plastic Cover	80600-S34
110 Button DSS Clear Plastic Cover	80600-DSS
24 Button DSS Clear Plastic Cover	80600-24DSS
Directory Tray	92602
9' Handset Coil Cord	92297-9
13' Handset Coil Cord	92297-13
25' Handset Coil Cord	92297-25
7' Telephone Line Cord	82476-7
14' Telephone Line Cord	82476-14
Wall Mount Handset Clip Holder	80578
DS2000 RFI Bead Kit	88901

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