

NEC

1. Installation Basics

2. Trunk and Extension Cabling

3. Connecting Trunks and Extensions

4. Optional Equipment

5. Maintenance Options and SMDR

6. Specifications and Parts

- Additional system documentation, including a complete *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 *System Load Factor Calculations* on page 1-2 for more.

When installing telephones and other station devices:

- Digital station ports (300-315) *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**.

DS1000

Hardware Manual

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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: Installation Basics

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 *Installation Layout* on page 1-3 shows you *about* how much space your system requires.

System Configuration

Using the factory installed default configuration, your DS1000 system provides:

	Base	Expansion	Total
Trunks	3	3	6
Digital Extensions	8	8	16
Analog Extensions	4	4	8
Analog Door Boxes	1	1	2
Relays	1	1	2
Page Output	1	-	1
Music Input	1	-	1

Turn to *Installing the Expansion Board* on page 1-8 for more installing the Expansion PCB.

System Load Factor Calculations

The combination of extensions, Digital Door Boxes, 2-OPX Modules, and DSS Consoles you can connect to your system may be limited by the System Load Factor. Use the *DS1000 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. 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 of 30 (Item 2).

DS1000 System Load Factor Calculations			
Description	Load Factor	Qty	Total Load
Digital Telephone and Digital Door Box	1		
Analog Telephone	1		
Analog Door Box	0		
24-Button DSS Console	1		
110-Button DSS Console	2		
Total DSS Consoles installed cannot exceed 4			
2-OPX Module	3		
Item 1: Total load for this configuration			
Item 2: Maximum allowable load			30

Single Line Telephone REN Limitations

Please note the following when installing single line telephones:

- The total Ringer Equivalence Number (REN) per system cannot exceed 4.
- The total REN per analog port cannot exceed 4.
- Ringer Equivalence is cumulative.

With software version 02.02.00 or higher, by default all analog telephones ring simultaneously for outside calls (as do all analog telephones connected to the same port). This means you must add up all analog telephones connected to the system (including all those connected to the same port) and ensure that the total combined REN is 4 or less.

Note: A REN of 1 is the normal for an industry standard 2500 set with electromechanical ringer. Many phones with electronic ringers have significantly lower RENs.

Planning the Installation

Before installing the common equipment, you should mount a Main Distribution Frame (MDF) plywood backboard in a centrally located spot. A 1/2 sheet of plywood (4' x 4') should be more than adequate (see Figure 1-1 *Installation Layout* on page 1-3). Mount this backboard using suitable fasteners, taking care to adhere to standard installation practices and local codes.

The equipment cabinet requires a three-prong, dedicated 110 VAC 60 Hz circuit (NEMA 5-15 receptacle) located within 4 1/2' feet of the cabinet's lower left corner.

Normally, you install the extension blocks and trunk/AUX jacks to the right of the Main Cabinet.

!! Important !!

- Local codes may prohibit you from installing extensions, trunks and optional equipment in the same blocks.
- Do not plug in the 25-pair extension cable with power applied.

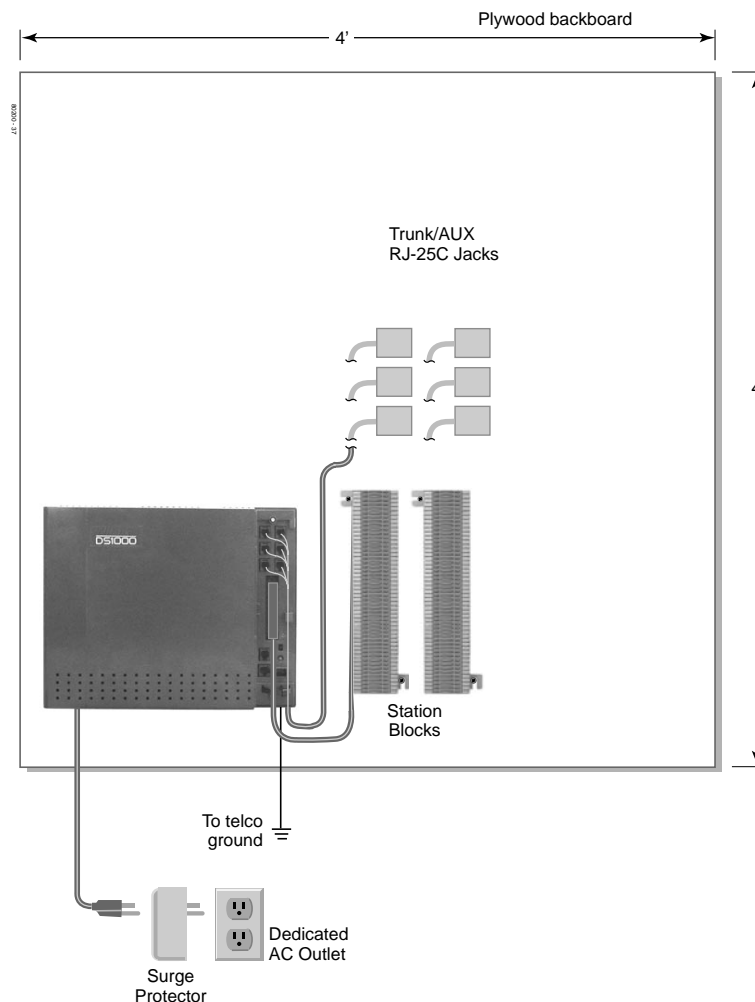


Figure 1-1: Installation Layout

Removing the Cover

You must remove the Main Equipment Cabinet cover to access the extension, trunk and auxiliary connections.

To remove the cover (Figure 1-2):

1. Slide the cover button to **OPEN**.
2. Slide the cover away from the Main Equipment Cabinet.

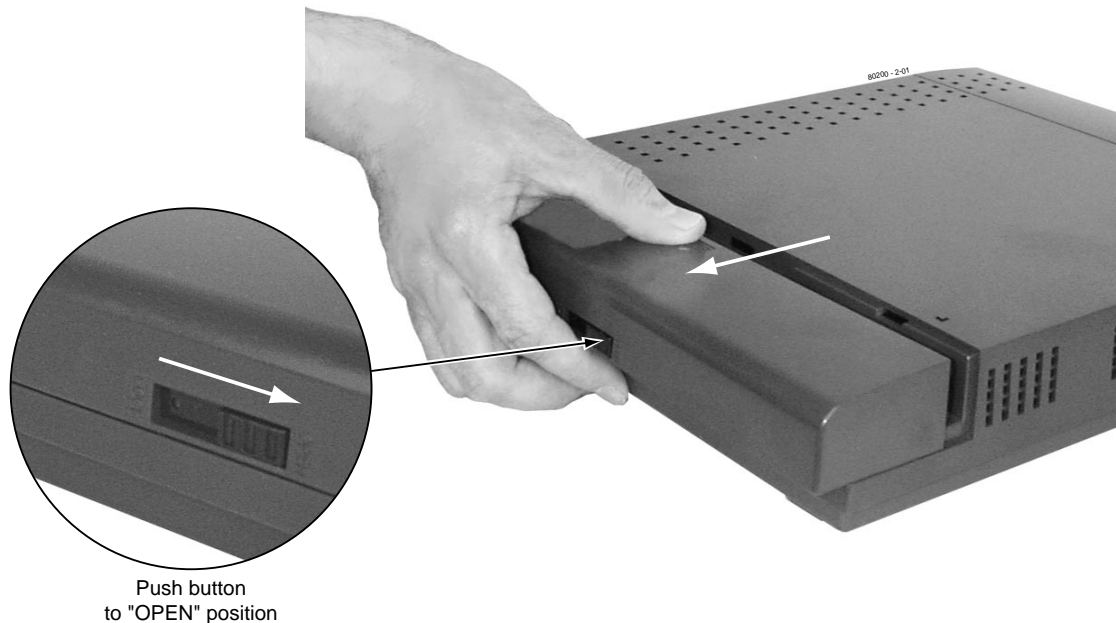


Figure 1-2: Removing the Cover

Hanging the Cabinet

To hang the cabinet (Figure 1-3):

1. Screw suitable fasteners $11 \frac{3}{16}$ " apart in a convenient location on the MDF. Be sure to leave the fasteners "backed out" about $\frac{3}{16}$ " from the MDF backboard.
2. Hang the cabinet as shown.

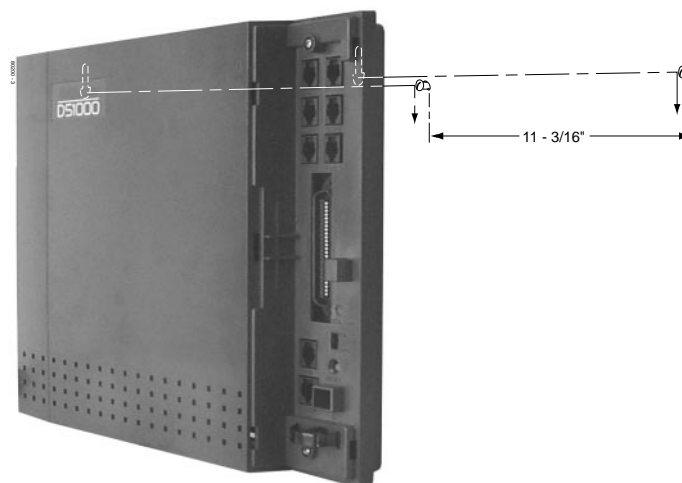


Figure 1-3: Hanging the Cabinet

Grounding the Cabinet

Attaching the Ground Wire

1

!! Important !!

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

To attach the ground wire (Figure 1-4):

1. Loosen the lug on the cabinet's ground connection.
2. Run a 12 AWG stranded copper wire from the ground lug to a known earth ground.
3. Firmly retighten the lug loosened in step 1 above.

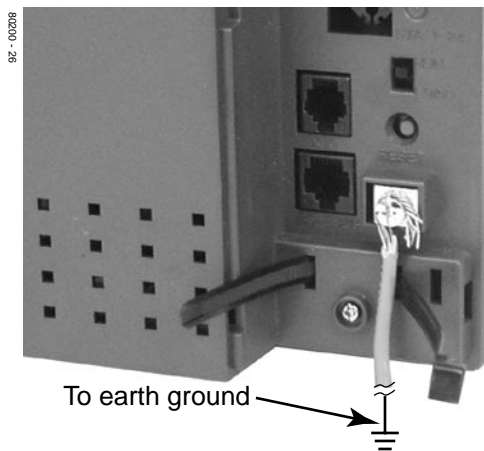


Figure 1-4: Attaching the Ground Wire

Removing the Top Panel

You must remove the top panel in order to install the system battery and Expansion Board, or to replace the power supply AC input fuses.

In the event of commercial AC power failure, the battery provides short-term backup of system memory and the system time and date (Real Time Clock). The battery will hold memory and time and date for up to 10-14 days.

The Expansion Board provides an additional 3 analog trunks, 8 digital extensions, 4 analog extensions and 1 analog door box. With the expansion board installed, the capacity of your system is 6 analog trunks, 16 digital extensions, 8 analog extensions, and 2 analog door boxes.

To remove the top panel (Figure 1-5):

1. Be sure your system's power cord is unplugged, then unscrew the 2 captive screws that secure the cabinet top panel to the base.
2. Lift up the top panel as shown below.
3. Remove the top panel.

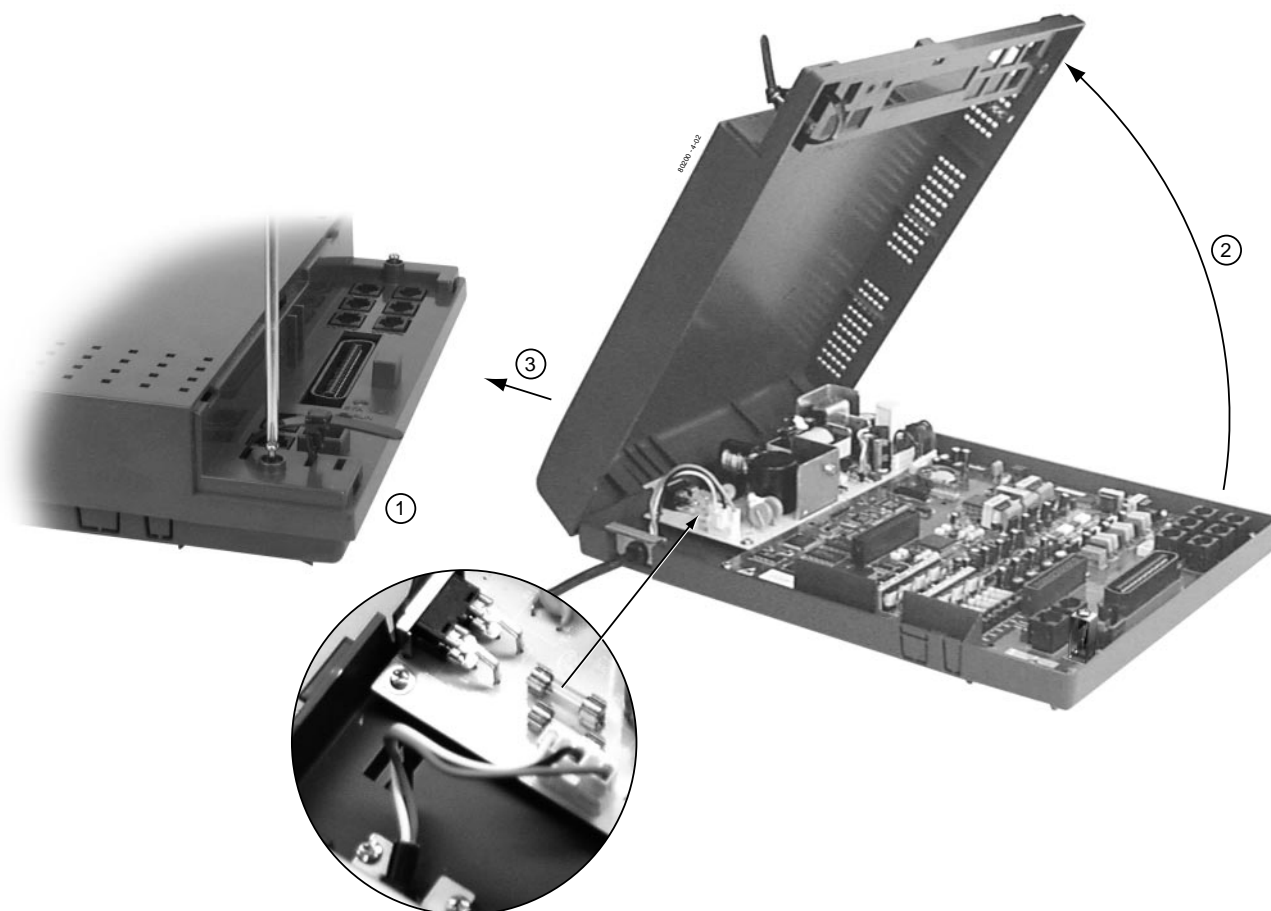


Figure 1-5: Removing the Top Panel

Power Supply AC Input Fuses

The power supply AC input fuses (see the detail in the illustration above) protect the system power supply from problems with the site's AC line. These problems can include improperly wired outlets and power surges. In normal operation, you should never need to replace the power supply AC input fuses.

To replace a fuse: (Figure 1-5):

1. Be sure your system's power cord is unplugged.
2. Using a commercially-available fuse puller, carefully remove the blown fuse(s).
3. Replace the blown fuse only with the following type:

Bussman P/N GMA3.15 3.15A @ 125 volt 5 x 20 mm
--

Installing and Replacing the Battery

To install the battery (Figure 1-6):

1. Insert the battery into the battery clips as shown below.
2. Replace and resecure the top panel.

OR

Go to *Installing the Expansion Board* on page 1-8 and install the Expansion Board.

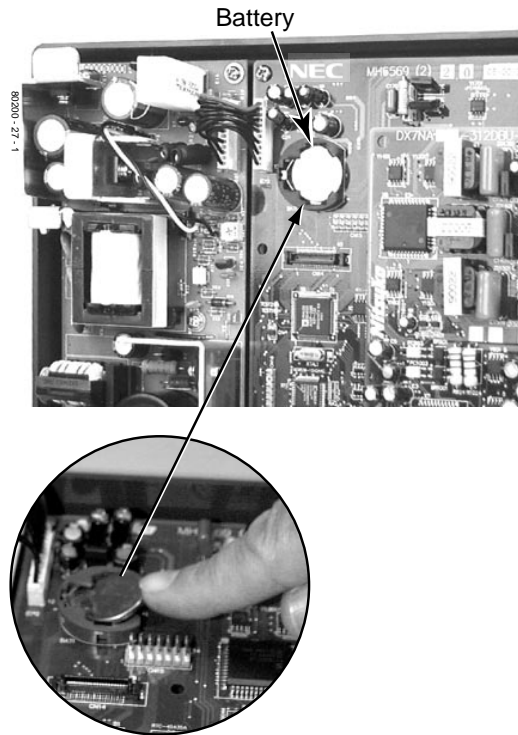


Figure 1-6: Installing the Battery

Replacing the Battery

To replace an existing battery:

You should only need to replace your battery if it fails to hold a charge (i.e., no longer backs up memory and the Real Time Clock).

1. Do not power down the system.
If you power down the system and remove the battery, programmed data and the Real Time Clock will reset to the factory-installed default settings.
2. Following Figure 1-6, gently push down on the battery and remove it.
3. Replace the battery with a Sony CR2032 3 Volt Lithium cell battery or equivalent. (This battery is not available from NEC.)
4. Verify that the system's programmed data is intact.
5. Discard the old battery.

!! Caution !!

- Take proper precautions when discarding the battery. It may be considered hazardous material in some areas.
- There is a danger of explosion if the battery is incorrectly replaced.
- Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Installing the Expansion Board

To install the Expansion Board (Figure 1-7):

1. Be sure your system's power cord is unplugged.
The Expansion Board is not hot-swappable.
2. Plug in the Expansion Board as shown below.
Be sure to snap the Expansion Board into the plastic standoffs that are supplied with the Expansion Board.
3. Replace and resecure the top panel.

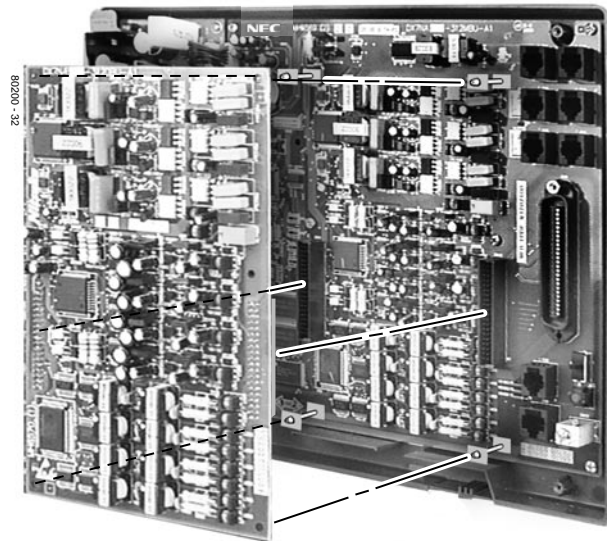


Figure 1-7: Installing the Expansion Board

Section 2: Trunk and Extension Cabling 2

Before You Start Cabling

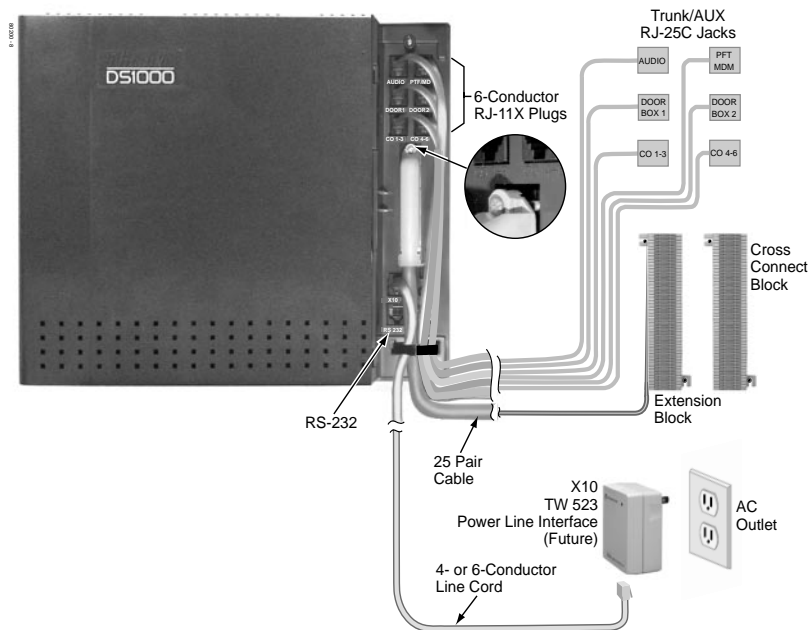
!! Important !!

- Install telephones connected to the Main Equipment Cabinet as on-premise extensions only.
- Do not plug in the 25-pair extension cable with power applied.

Reviewing the Installation Method

Your system uses a different installation method for trunk/AUX connections and extensions (Figure 2-1):

- **Trunk/AUX Mod Jacks**
You'll use up to 6 mod jacks for the trunk/AUX connections. Your telco normally provides trunks in RJ-11C, RJ-14C, or RJ-25C modular jacks.
- **Extension Blocks**
The system uses a 66M1-50 extension block and a second 66M1-50 cross connect block for connecting digital and analog extensions.



Notes:

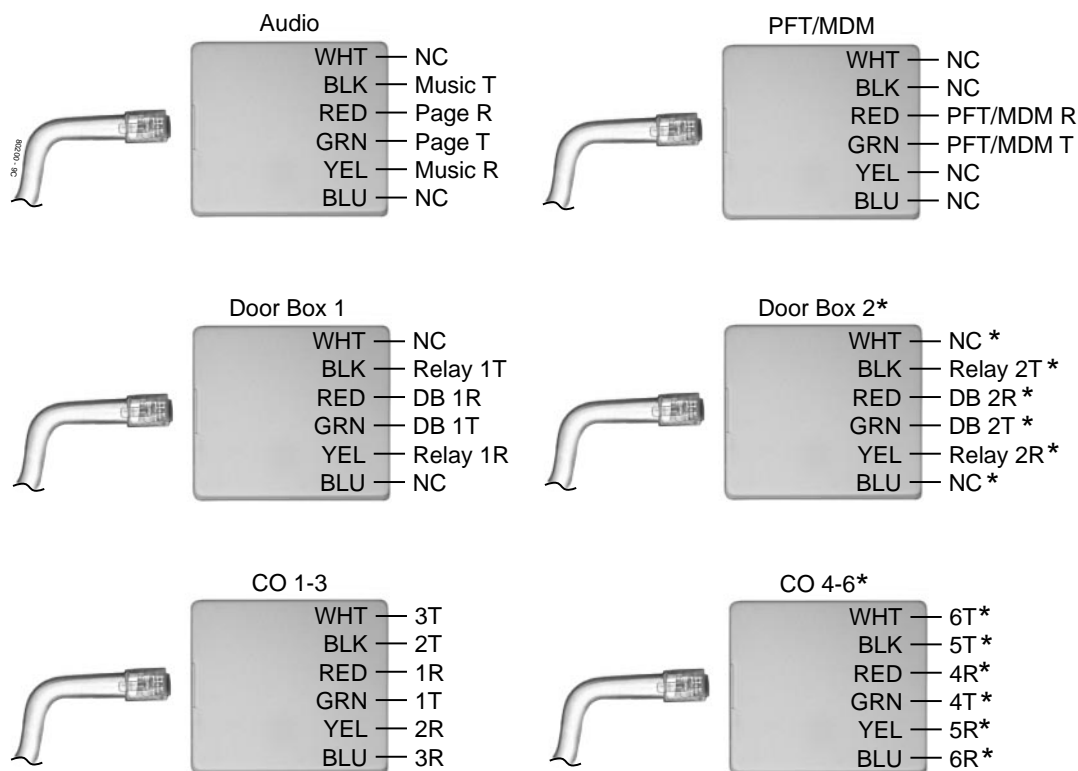
- The system will respond to telco ring signal in the range of 40-130 VAC @ 20 Hz.
- Turn to *Section 4, Optional Equipment* for more on Connecting Door Boxes, Paging, Power Failure, and 2-OPX Modules.

Figure 2-1: Installation Layout

Installing Trunk and AUX Mod Jacks

To connect to mod jacks:

1. Arrange your mod jacks trunk according to Figure 2-1 *Installation Layout* on page 2-1.
2. Using standard 6-conductor line cords, connect each mod jack to the appropriate plug in the Main Equipment Cabinet. See Figure 2-2 *Mod Jack Assignments* below.
3. Figure 2-3 *Mod Plug Pinouts* below shows the pinouts for each mod jack.



* Requires Expansion Board

Figure 2-2: Mod Jack Assignments

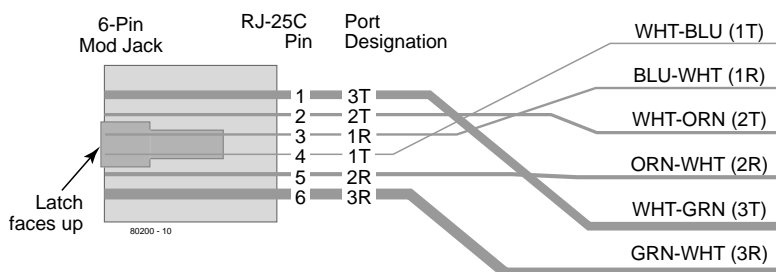


Figure 2-3: Mod Plug Pinouts

Installing the Extension Block

To connect the extension block (Figure 2-4):

1. Arrange your extension and cross-connect blocks according to the Installation Layout (Figure 2-1).
2. Following the illustration below, punch down a standard 25-pair cable on the extension block.

This cable should have a female amphenol 50-pin connector on one end and be unterminated on the other.

Extension Assignments				
	25-PAIR CABLE			
	BLOCK TERM	COLOR CODE	FUNCTION	CONN PIN
DIGITAL EXTENSIONS 300-307 (BASE)	1	WHT-BLU	300 T	26
	2	BLU-WHT	300 R	1
	3	WHT-ORN	301 T	27
	4	ORN-WHT	301 R	2
	5	WHT-GRN	302 T	28
	6	GRN-WHT	302 R	3
	7	WHT-BRN	303 T	29
	8	BRN-WHT	303 R	4
	9	WHT-SLT	304 T	30
	10	SLT-WHT	304 R	5
	11	RED-BLU	305 T	31
	12	BLU-RED	305 R	6
	13	RED-ORN	306 T	32
	14	ORN-RED	306 R	7
	15	RED-GRN	307 T	33
	16	GRN-RED	307 R	8
DIGITAL EXTENSIONS 308-315 (EXPANSION)	17	RED-BRN	308 T	34
	18	BRN-RED	308 R	9
	19	RED-SLT	309 T	35
	20	SLT-RED	309 R	10
	21	BLK-BLU	310 T	36
	22	BLU-BLK	310 R	11
	23	BLK-ORN	311 T	37
	24	ORN-BLK	311 R	12
	25	BLK-GRN	312 T	38
	26	GRN-BLK	312 R	13
	27	BLK-BRN	313 T	39
	28	BRN-BLK	313 R	14
	29	BLK-SLT	314 T	40
	30	SLT-BLK	314 R	15
	31	YEL-BLU	315 T	41
	32	BLU-YEL	315 R	16
ANALOG EXTENSIONS 316-319 (BASE)	33	YEL-ORN	316 T	42
	34	ORN-YEL	316 R	17
	35	YEL-GRN	317 T	43
	36	GRN-YEL	317 R	18
	37	YEL-BRN	318 T	44
	38	BRN-YEL	318 R	19
	39	YEL-SLT	319 T	45
ANALOG EXTENSIONS 320-323 (EXPANSION)	40	SLT-YEL	319 R	20
	41	VIO-BLU	320 T	46
	42	BLU-VIO	320 R	21
	43	VIO-ORN	321 T	47
	44	ORN-VIO	321 R	22
	45	VIO-GRN	322 T	48
	46	GRN-VIO	322 R	23
	47	VIO-BRN	323 T	49
	48	BRN-VIO	323 R	24
	49	VIO-SLT	NC	50
	50	SLT-VIO	NC	25

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Figure 2-4: Extension Assignments

Section 3: Connecting Trunks and Extensions

Connecting Trunks

3

Connecting Analog Trunks

The base system connects 3 loop start CO trunks. With the Expansion Board installed, the system provides a total of 6 loop start CO trunks.

To connect analog trunks (Figure 3-1):

1. Install additional modular jacks as required.
The telco may provide your trunks in a single RJ-25C jack or in multiple RJ-11C jacks. Review the illustration below.
2. Wire the additional modular jacks as shown.
3. Plug line cords from the telco mod jacks to the system mod jacks as shown.

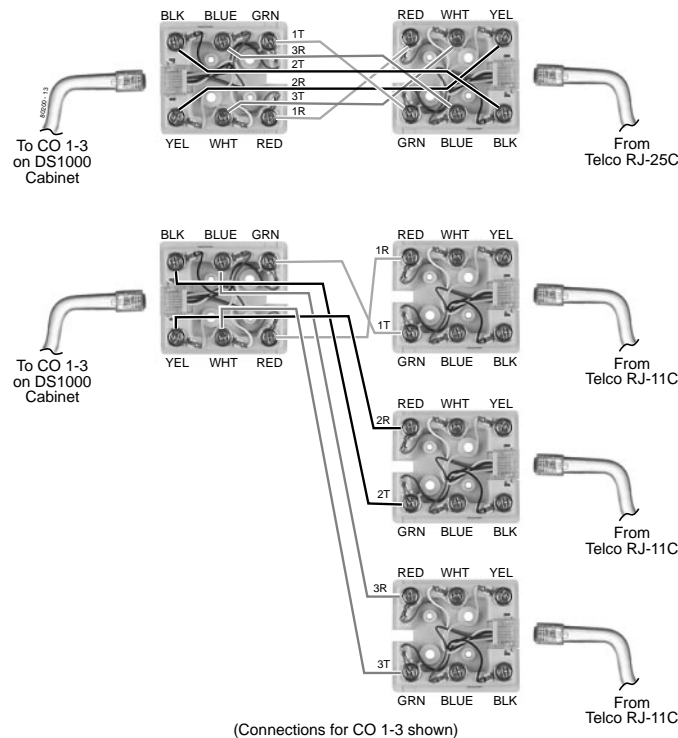


Figure 3-1: Connecting Analog Trunks

Connecting Analog and Digital Extensions

The base system connects 8 digital extensions and 4 analog extensions. With the Expansion Board installed, the system provides a total of 16 digital extensions and 8 analog extensions.

To connect extensions (Figure 3-2):

1. Install a modular jack for each extension within 6 feet of the telephone's location.
2. For each extension, run one-pair 24 AWG station cable from the cross-connect block to the modular jack.
3. Terminate the station cable WHT/BLU - BLU/WHT leads to the RED and GRN lugs in the modular jack.
4. Back at the main equipment location, run one pair of cross-connect wire between the pins on the extension block and cross-connect block to complete the connection.
5. Install bridging clips as required.

!! Important !!

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. It is no longer necessary to individually set circuit types in **1801 - Extension Circuit Type**.

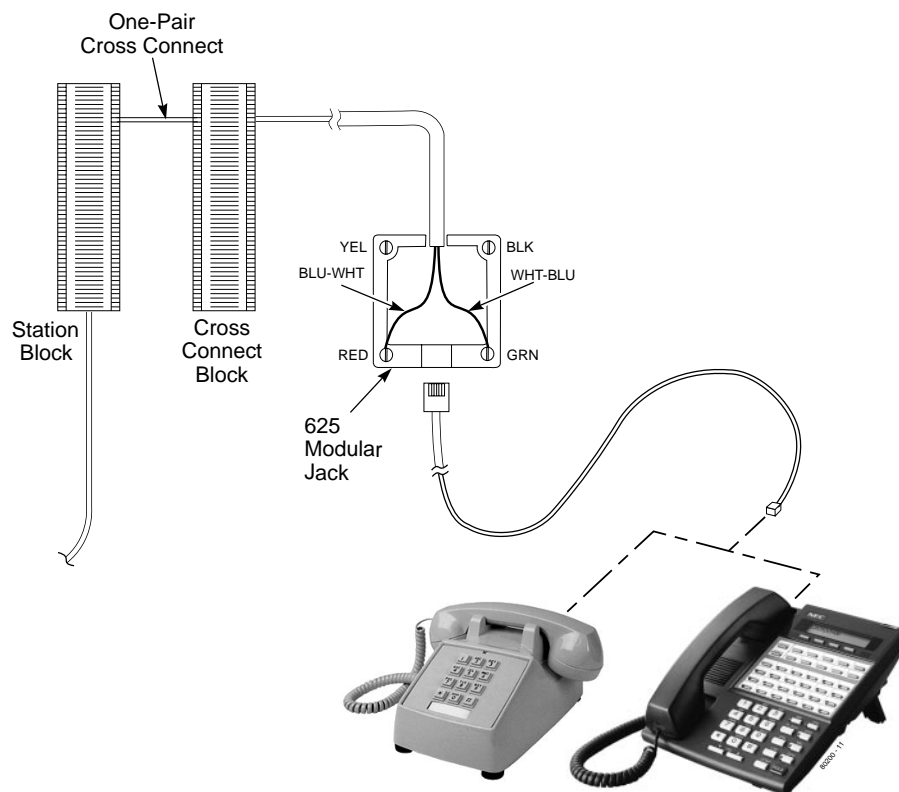


Figure 3-2: Connecting Extensions

Power Up

Now that you have cabled the system, it is time to power-up.

To power up the system (Figure 3-3) and (Figure 3-4):

1. Make sure the system is properly grounded.
2. Install a surge protector in the AC outlet.
3. Plug the main cabinet's AC power cord into its surge protector.
4. Be sure the Mode Switch is set to RUN, then turn on the cabinet's power switch.

After a brief interval, the system will start and the power LED will flash slowly (green).

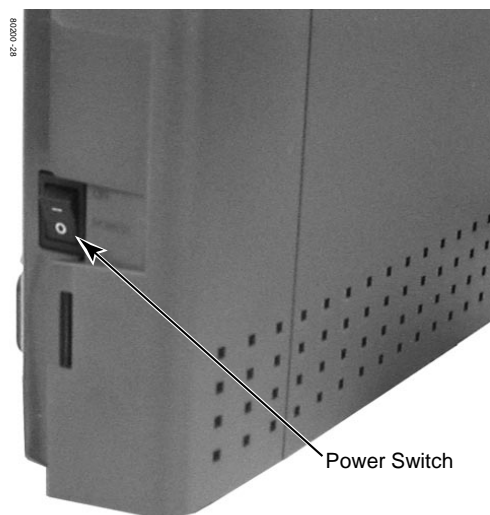


Figure 3-3: Power Switch

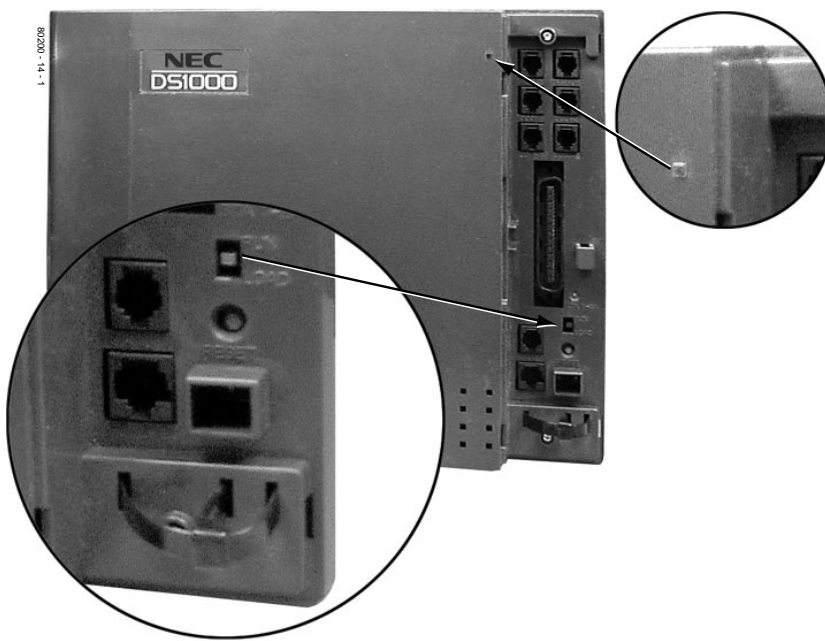


Figure 3-4: Power LED and Mode Switch

Reinstalling the Cover

Now that your cabling is complete and the system is up and running, you should reinstall the cover.

To reinstall the cover (Figure 3-5):

1. Slide the cover onto the Main Equipment Cabinet as shown.
2. Slide the cover button to LOCK.



Figure 3-5: Reinstalling the Cover

Section 4: Optional Equipment

External Paging

Installing External Paging

Your system provides an External Paging output. You connect the Paging output to audio inputs on customer provided Paging systems. Zone 1 and All Call Paging announcements broadcast from the External Paging output.

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

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

1. Connect the external Paging amplifier to the GRN and RED lugs on the Audio modular jack.
2. Plug a 6-conductor line cord into the AUDIO jack on the cabinet and into the Audio modular jack.

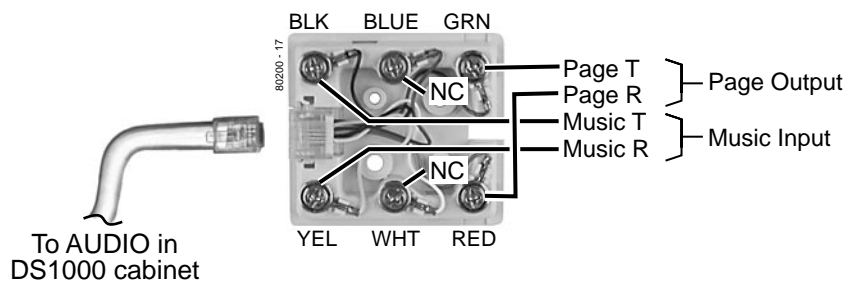


Figure 4-1: Installing External Paging

External Paging Relay Control

You can alternately use the 2 Door Box relays to control an External Paging amplifier. Figure 4-2 *Connecting an Analog Door Box* on page 4-4 shows you the location of the Door Box relays. Note that if you use a relay for External Paging Control, you cannot also use it for Door Box strike control.

!! Important !!

Be sure the devices connected to the system's relay contacts are compatible with the following specifications.

Relay Contact Specifications	
Contact Configuration:	Normally Open
Maximum Load:	0.5A @ 120 VAC 1 A @ 24 VDC
Maximum Initial Contact Resistance	100 mOhms

Connecting the Relays for External Paging Control

1. If you are using the Door 1 relays, connect the BLK and YEL lugs on the Door Box 1 modular jack to the relay that controls the External Paging system.
2. If you are using the Door 2 relays, connect the BLK and YEL lugs on the Door Box 2 modular jack to the relay that controls the External Paging system.

Programming the Relays for External Paging Control

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

Installing the Analog Door Box

Do not connect an Analog Door Box to a digital station port.

The Analog Door Box (P/N 92245) is a self-contained Intercom unit typically used to monitor an entrance door. A visitor at the door can press the Analog 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.

You can connect up to 2 Analog Door Boxes to your system. The base system provides an Analog Door Box and associated relay at extension 324. If you have the Expansion Board installed, you have a second Analog Door Box and associated relay at extension 325. Analog Door Boxes do not add to the System Load Factor.

Each Analog Door box also has an associated control relay. You can use this relay to release an electric strike on the entrance door. After answering the Door Box chimes, the extension user can press FLASH or a soft key to enable the Analog Door Box's relay, which in turn unlocks the door. Digital Door Boxes cannot control the system relays.

The Analog Door Box is a weather-tight unit, with an operating temperature range of -20 to 60 degrees C (-4 to 140 degrees F) and a relative humidity of 10-95%, non-condensing.

!! Important !!

Be sure the devices connected to the system's relay contacts are compatible with the following specifications.

Relay Contact Specifications

Contact Configuration:	Normally Open
Maximum Load:	0.5A @ 120 VAC 1 A @ 24 VDC
Maximum Initial Contact Resistance	100 mOhms

To connect an Analog Door Box (Figure 4-2):

Door Box Audio

1. Connect the GRN and RED lugs on the Door Box 1 modular jack to terminals 1 and 2 on Analog Door Box 1 (324).
2. Connect the GRN and RED lugs on the Door Box 2 modular jack to terminals 1 and 2 on Analog Door Box 2 (325).

Door Relays

1. Connect the BLK and YEL lugs on the Door Box 1 modular jack to the relay that controls the door strike associated with Analog Door Box 1 (324).
2. Connect the BLK and YEL lugs on the Door Box 2 modular jack to the relay that controls the door strike associated with Analog Door Box 2 (325).

Also see *Programming the Door Box* on page 4-5 and *Operating the Door Box* on page 4-6.

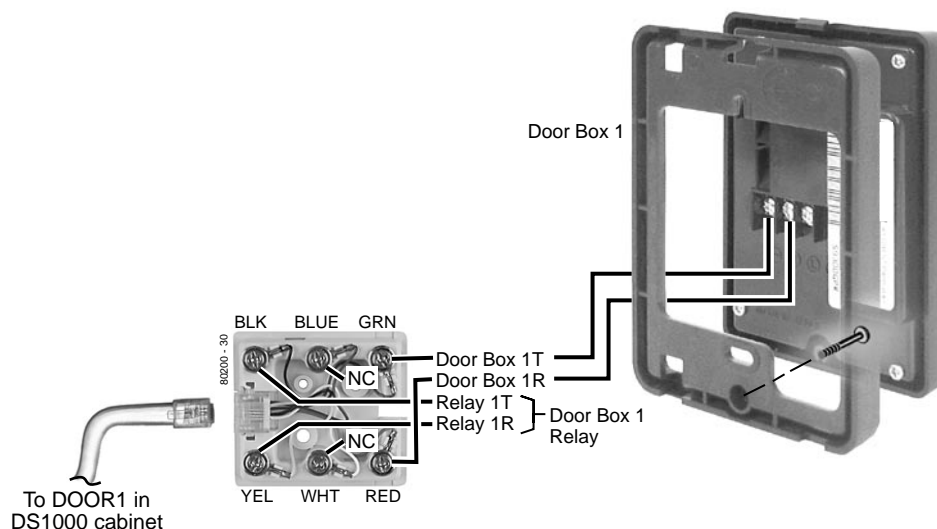


Figure 4-2: Connecting an Analog Door Box

Installing the Digital Door Box

Do not connect a Digital Door Box to an Analog Door Box port.

The Digital Door Box (P/N 80560) is a self-contained Intercom unit typically used to monitor an entrance door — similar in operation to an Analog Door Box. 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 *System Load Factor Calculations* on page 1-2 for more.

A Digital Door Box cannot control the relay contacts in the Door 1 and Door 2 connectors. All other programming and operation are identical. See *Programming the Door Box* on page 4-5 and *Operating the Door Box* on page 4-6 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 digital extension 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 4-5.
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.

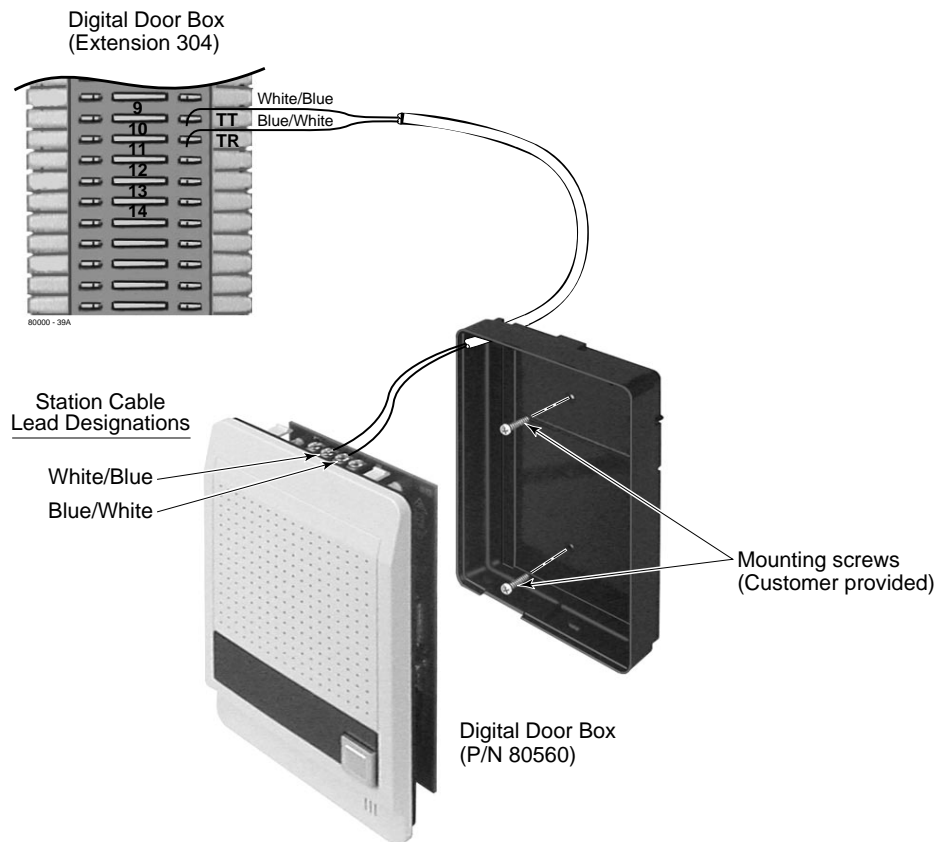


Figure 4-3: Connecting a Digital Door Box

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. (By default, this assignment is already made for the Analog Door Boxes.)
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.
- 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).

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

For Analog Door Boxes, you normally set up Door Box 1 to control the Door 1 relays, and Door Box 2 to control the Door 2 relays (see **1801 - Relay Owner** below).

- In **0201 - Door 1 Relay**, to assign the Door 1 Relay for door strike control, enter 1.
- In **0201 - Door 2 Relay**, to assign the Door 2 Relay for door strike control, enter 1.
- In **1801 - Relay Owner**, for the Door Box extension (324 or 325):
 - Enter 1 to have the Door Box control Door 1 relays.
 - Enter 2 to have the Door Box control Door 2 relays.

Operating the Door Box

To place a call from the Door Box:

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

To place a call to the Door Box:

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

To answer the Door Box chimes from a keyset:

1. 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.

1. To open the relay, press FLASH key or OPEN soft key.
2. 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 @ 1.0 KHz

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

1. Connect the music source to the BLK and YEL lugs on the Audio modular jack.
2. Plug a 6-conductor line cord into the AUDIO jack on the cabinet and into the Audio modular jack.

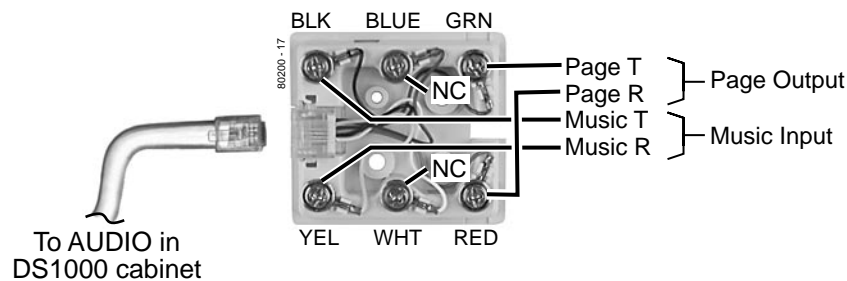


Figure 4-4: Installing a Music Source

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 4-5):

- Connect the GRN and RED lugs on the PFT/MDM modular jack to the GRN and RED lugs on the Power Failure Telephone's mod jack.

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 from trunk 1.
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.

While your system is powered up, your Power Failure Telephone is extension 316.

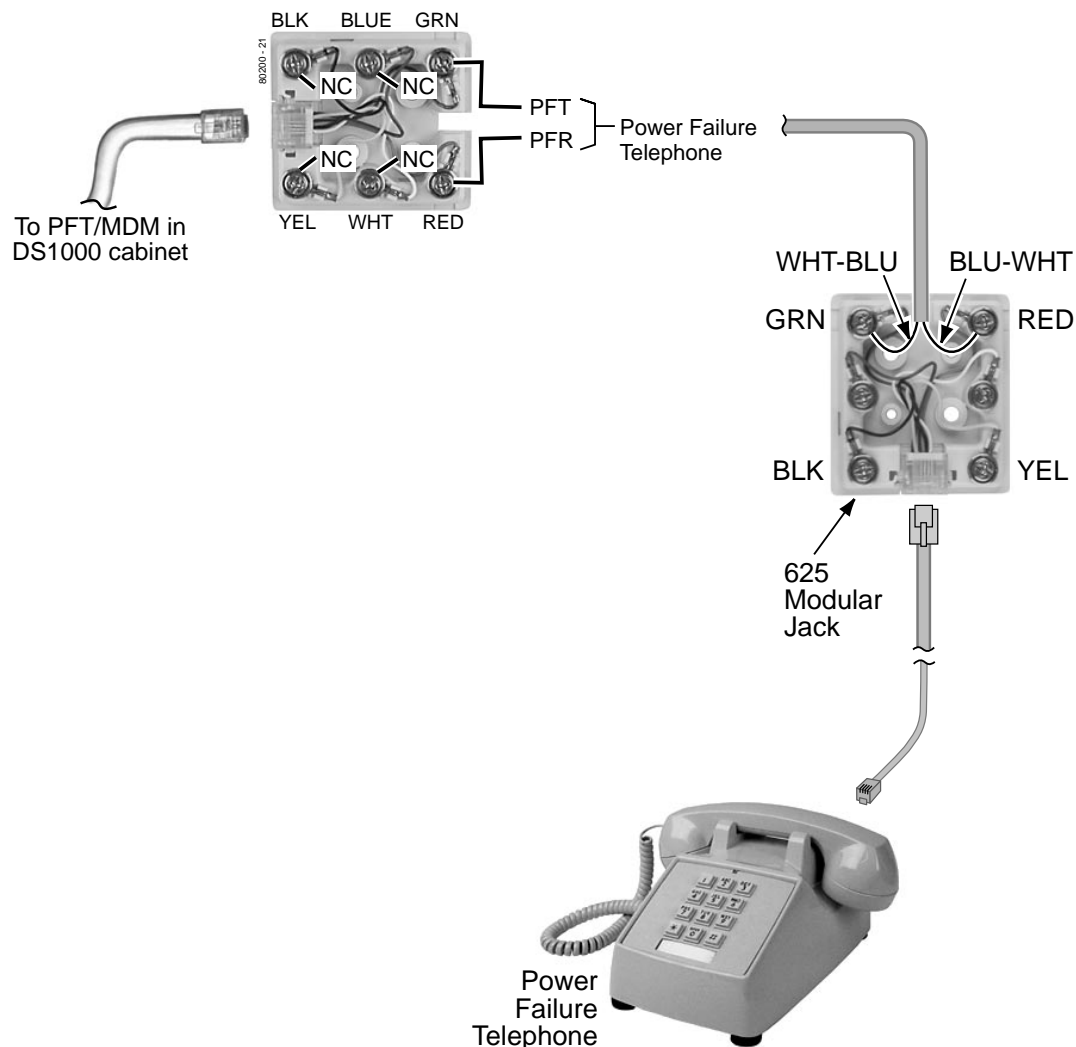


Figure 4-5: Connecting a Power Failure Telephone

Installing a DSS Console

The DSS Console gives a keyset user a Busy Lamp Field (BLF) and 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 4-6):

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 4-6 *Installing a 24-Button DSS Console* on page 4-9 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.

4

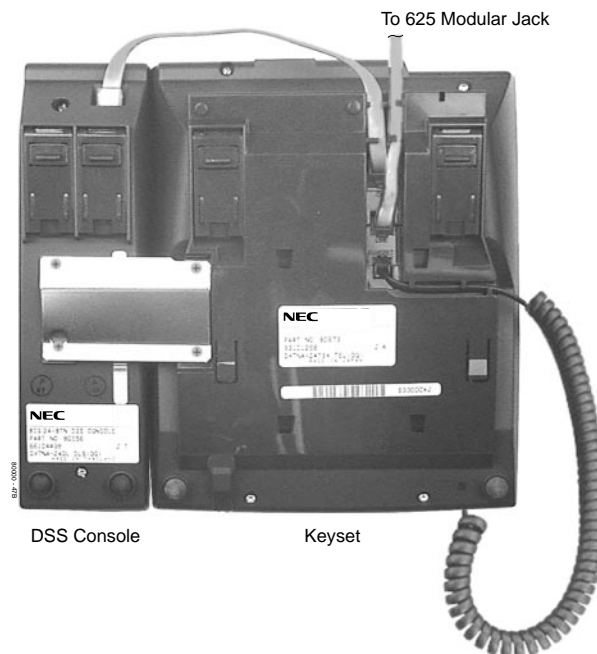


Figure 4-6: Installing a 24-Button DSS Console

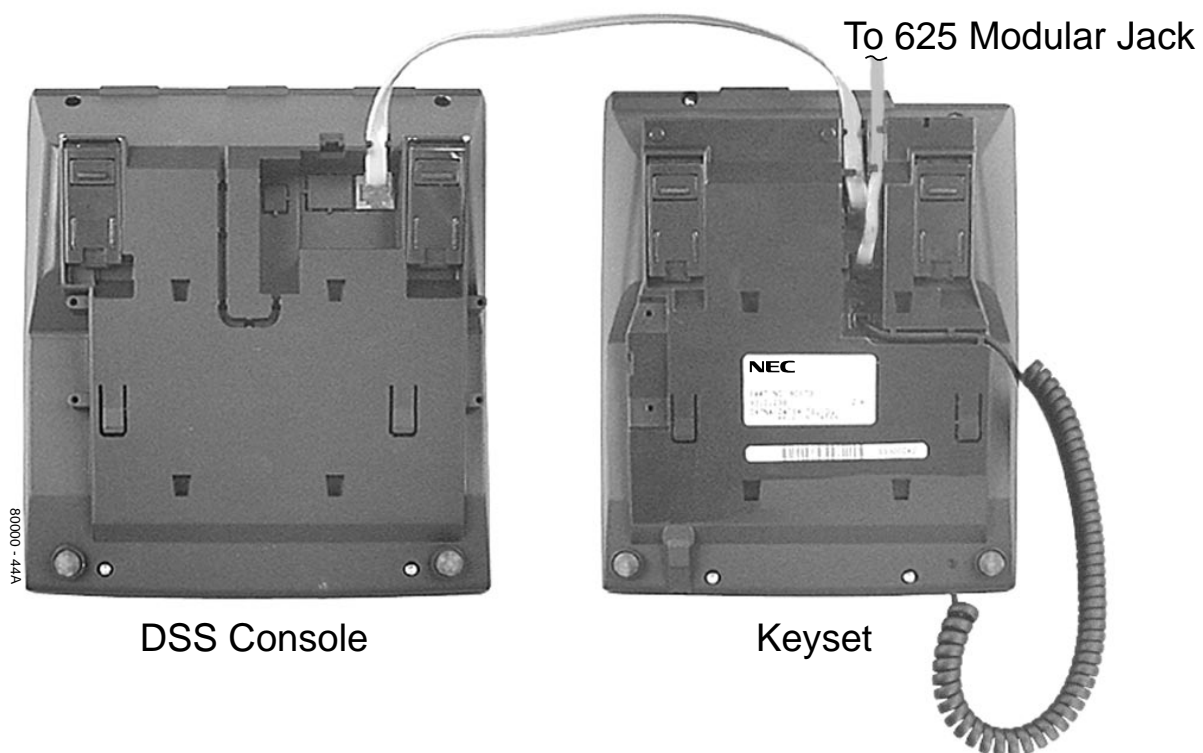


Figure 4-7: Installing a 110-Button DSS Console

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 4-8):

1. Install a modular jack for the 2 OPX Module within six feet of the module's location.
2. Run one-pair 24 AWG station cable from the cross-connect block to the modular jack.
3. Terminate the station cable WHT/BLU - BLU/WHT leads to the RED and GRN lugs in the modular jack.
4. Back at the main equipment location, run one pair of cross-connect wire between the pins on the extension block and cross-connect block to complete the connection.
5. Install bridging clips as required.
6. Ground the 2-OPX Module by connecting a 14 AWG ground wire from the FG lug on the module to a known earth ground.
7. 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.

4

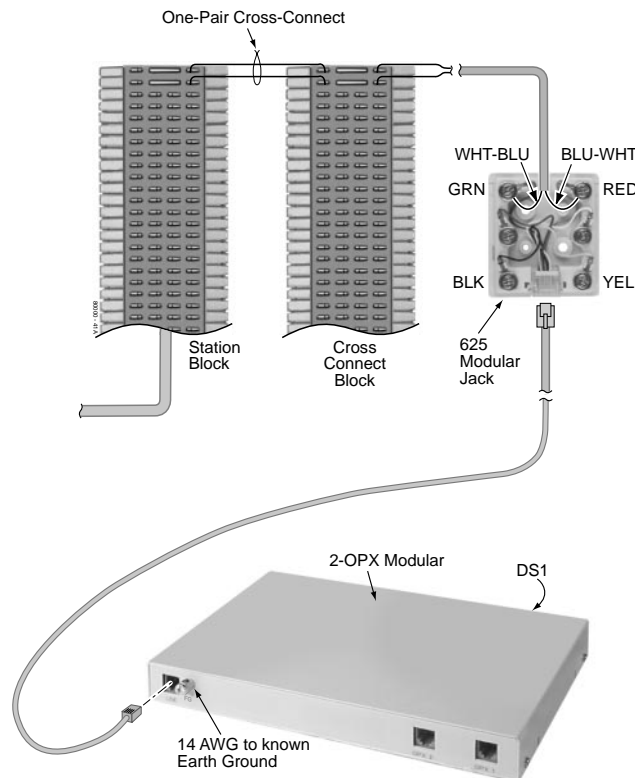


Figure 4-8: Connecting the 2-OPX Module

Wall Mounting the 2-OPX Module

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

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.

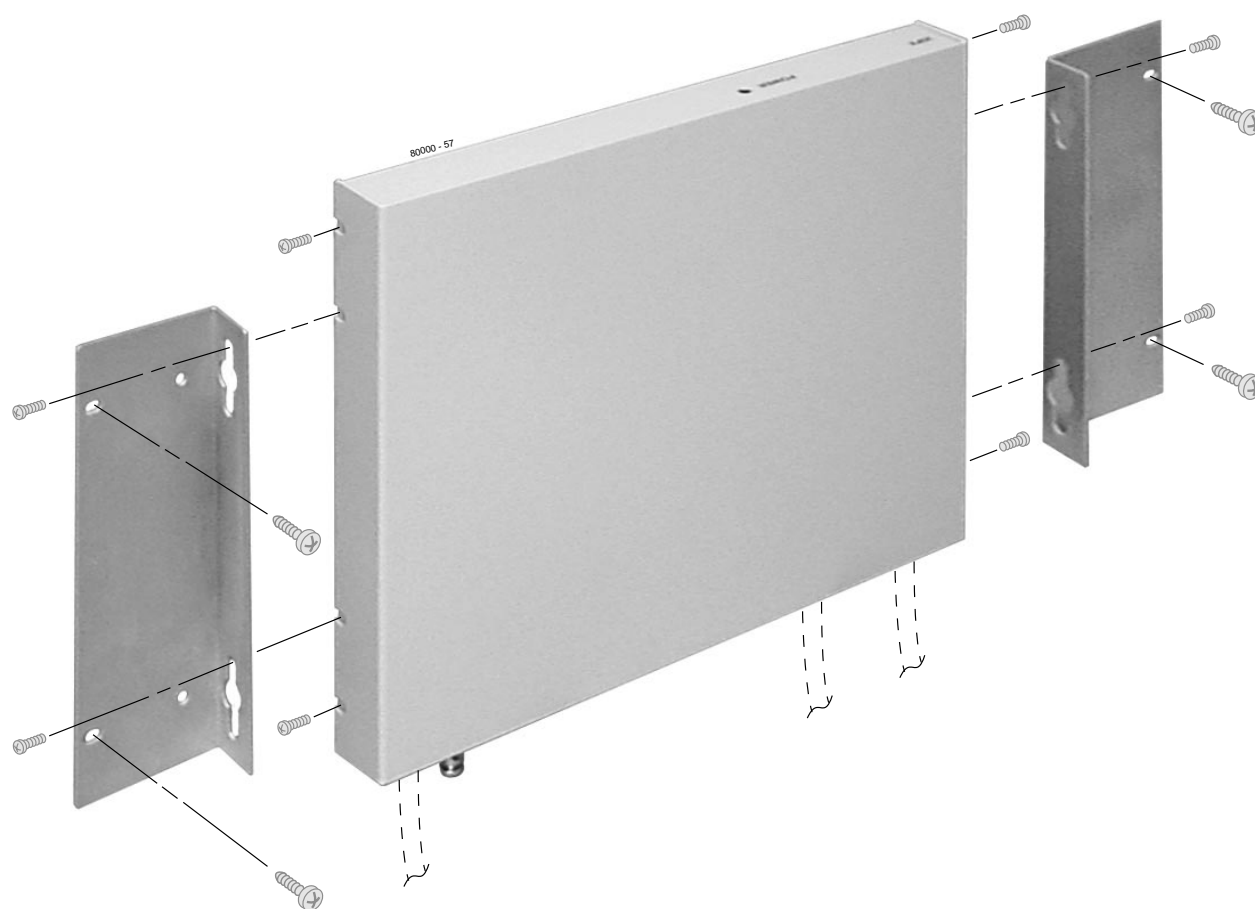


Figure 4-9: Wall Mounting the 2-OPX Module

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 4-10)

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 4-10: Installing the Wall-Mount Hanger

Wall-Mounting a Key Telephone

To mount the telephone on the wall (Figure 4-11):

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.

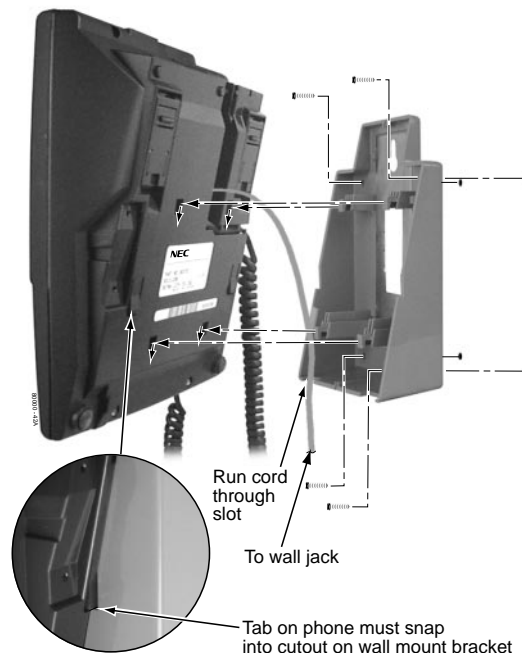


Figure 4-11: Installing the Wall-Mount Bracket

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

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.

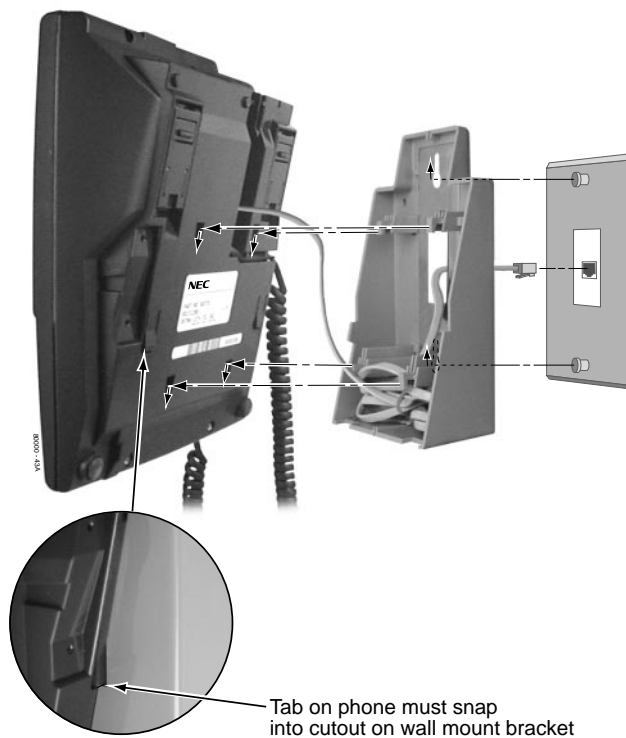


Figure 4-12: Mounting on a Wall Plate

To remove the telephone from the wall mount kit (Figure 4-13):

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.

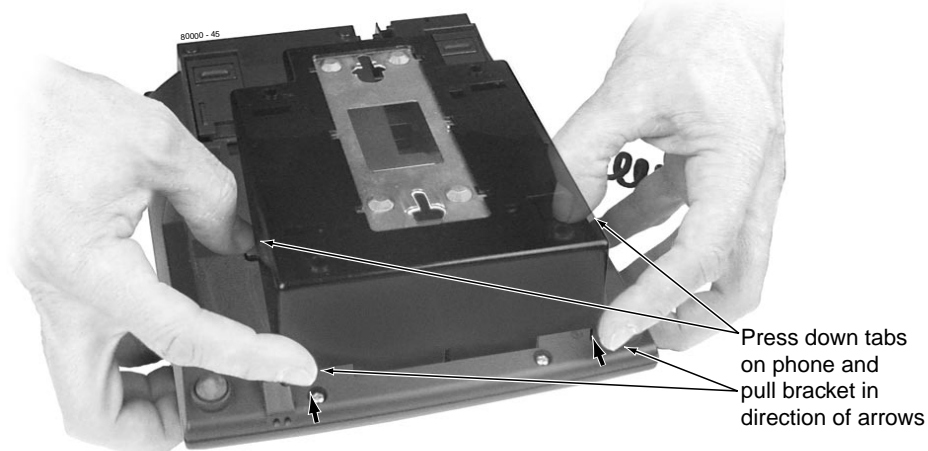


Figure 4-13: Removing the Wall-Mount Bracket

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 4-14):

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

To use the desk stand high position (Figure 4-14):

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 at right.

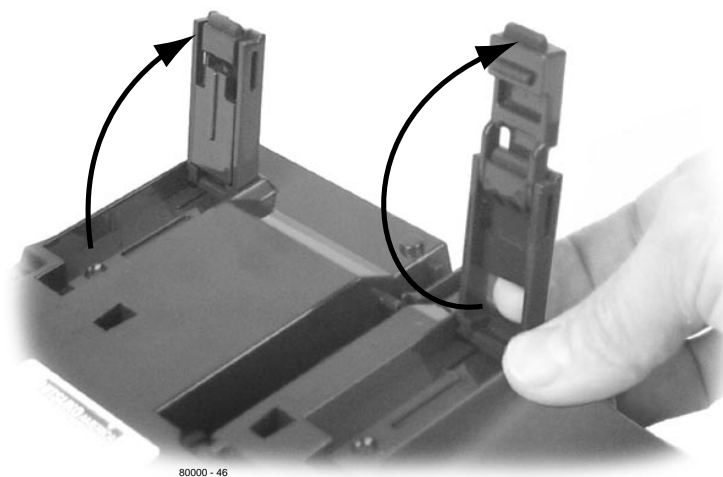


Figure 4-14: Using the Desk Stand

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 4-15):

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 REJU 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.

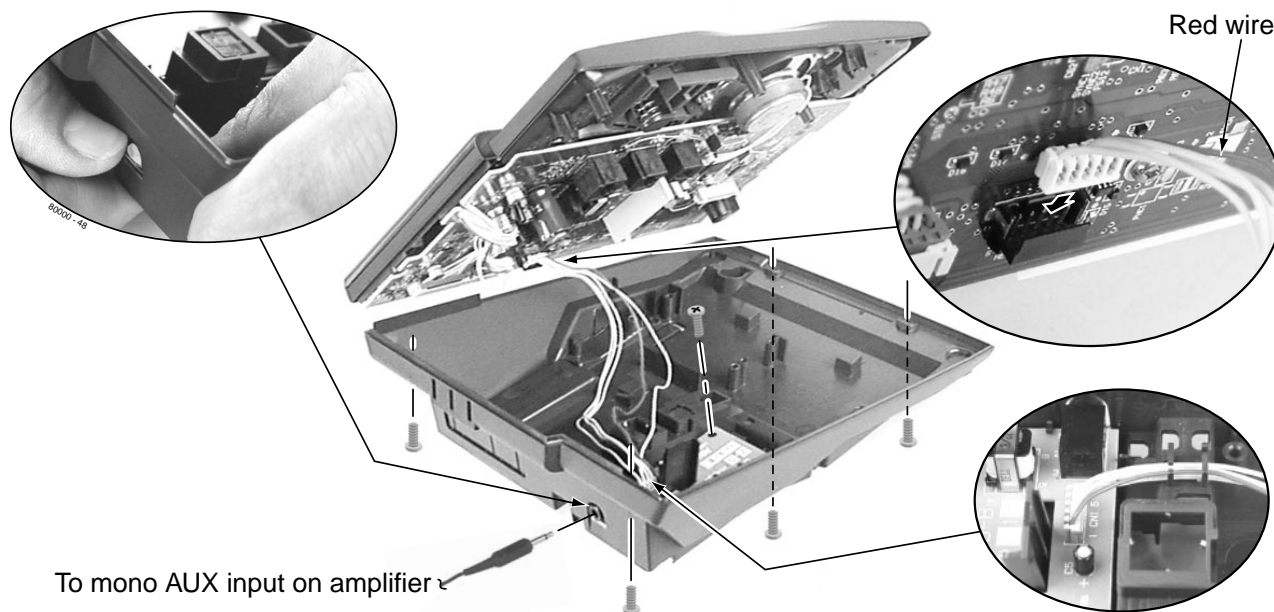


Figure 4-15: Installing the REJ

Section 5: Maintenance Options and SMDR

The Flash Utility and SMDR

Connecting a PC or Laptop

You'll need to connect a PC or laptop (running Windows 95 or higher) if you want to use the DS-Series Flash Utility, Station Message Detail Recording (SMDR), or record Call History.

- The *Flash Utility* allows you to upgrade your system software.
- *SMDR* provides a record of the system's outside calls. Once set up in programming, SMDR automatically outputs from the system's RS-232 (serial) port.
- The *Call History* provides data on system activity. Technical Support personnel can use this data to evaluate system performance.

To connect the PC or laptop to your system (Figure 5-1):

1. Plug one end of a mod-8 (standard 8 conductor) patch cord into the system's RS-232 port.
2. Plug the other end of the mod-8 patch cord into the DB9 to Mod-8 Adaptor (P/N 85980).
3. Plug the adaptor into the DB9M COM connector on the back of your PC.

The default communications parameters of the serial port are 19200 8 N 1 (19200 baud, eight data bits, no parity and 1 stop bit).

The DS-Series Flash Utility and software update files are available on the web at 208.141.100.36/ds2000.

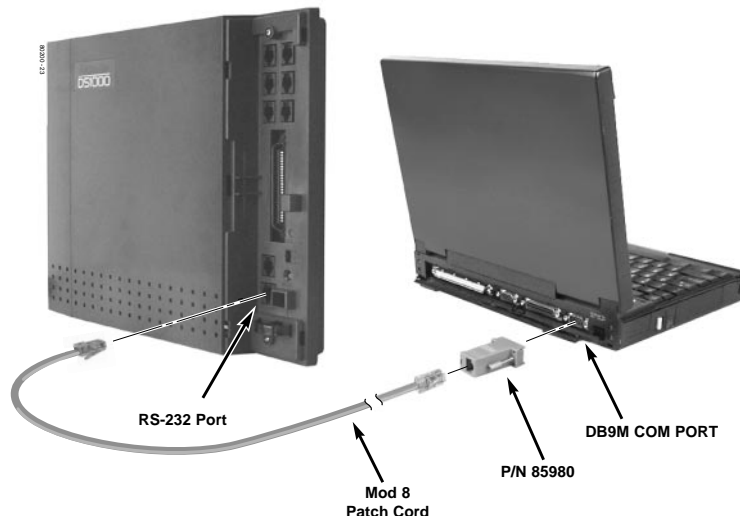


Figure 5-1: Connecting a PC or Laptop

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** = 19200
 - **Data bits** = 8
 - **Parity** = none
 - **Stop bits** = 1
 - **Flow control** = none
5. Click **OK** after making your selections above.
6. Press **Enter**.

You should 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, 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.

Programming SMDR

For additional SMDR programming options, see Station Message Detail Recording in the *Software Manual* on your *System Document CD*.

- **0301: SMDR Port**
Enter 1 to enable SMDR output from the system's 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.

Installing a Modem

You can connect a modem to the system's serial port to remotely collect history data and/or SMDR.

To connect a modem (Figure 5-2):

1. Plug one end of a mod-8 (standard 8 conductor) patch cord into the system's RS-232 port.
2. Plug the other end of the mod-8 patch cord into the DB25 to Mod-8 Adaptor (P/N 85981).
3. Plug the other end of the adaptor into the DB25F connector on the back of your modem.

The default communications parameters of the system's serial port are 19200 8 N 1 (19200 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.*

To call from a PC at a remote site:

The remote PC must have a modem connected. Also, the default communications parameters of the system's serial port are 19200 8 N 1 (19200 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.

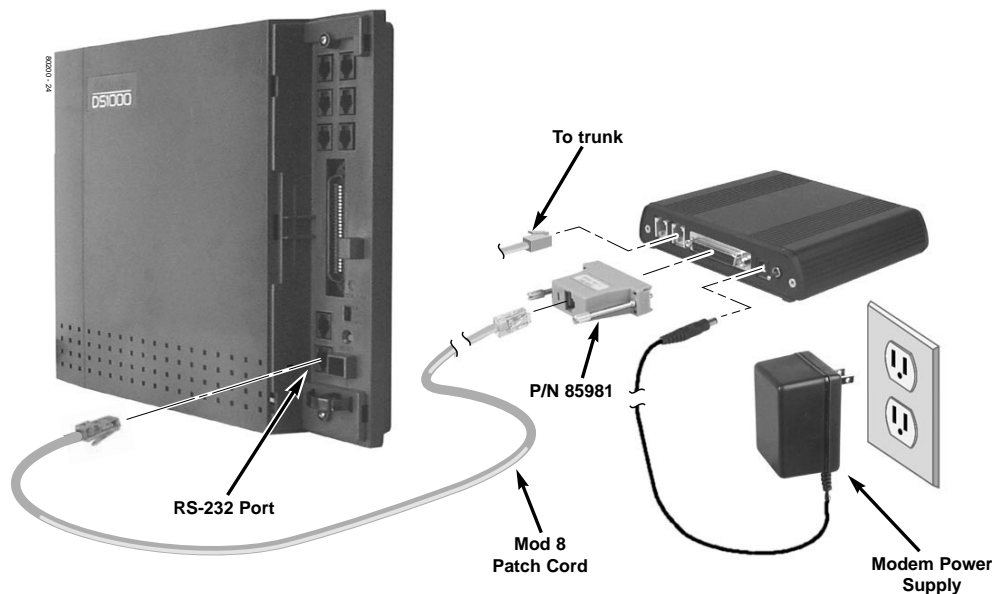


Figure 5-2: Connecting a Modem

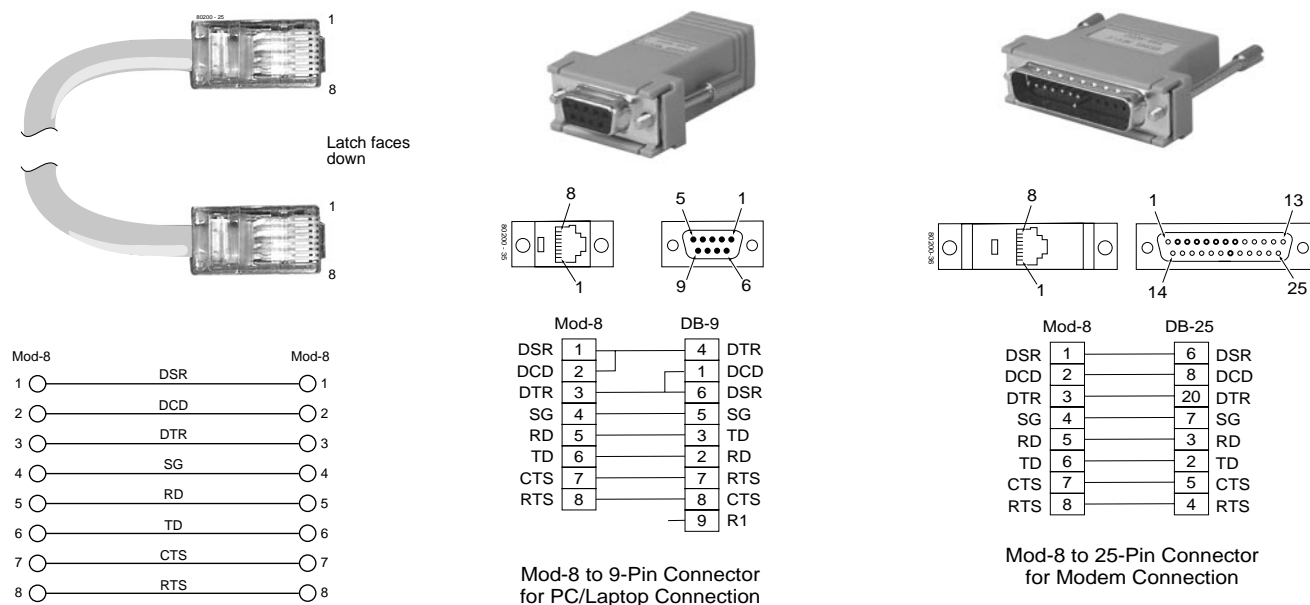


Figure 5-3: Making Your Own Data Cables

Resetting Your System

You may need to reset your system for troubleshooting purposes.

To reset your system (Figure 5-4):

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

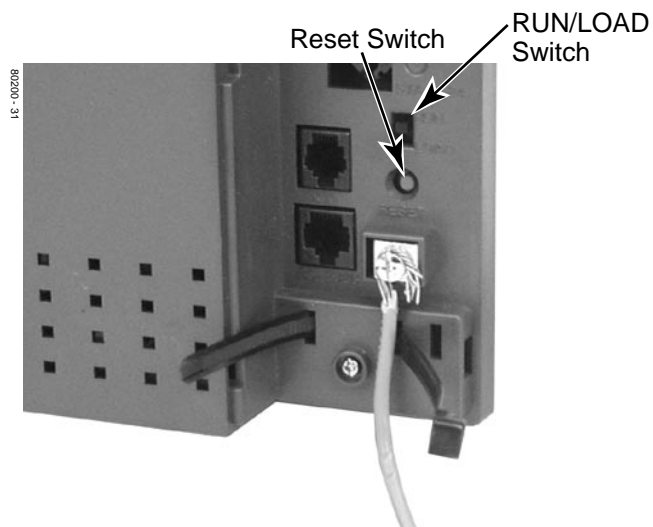


Figure 5-4: Resetting Your System

About the Database Transfer Utility

The Database Transfer Utility allows you to transfer the contents of one DS1000 system (called the source) to another DS1000 system (called the destination). All programming is transferred, including user-set options such as Personal Speed Dial, Distinctive Ringing and custom Volume/Contrast Control settings.

!! Important Notes When Upgrading or Transferring a Database !!

If upgrading or transferring a database from a software version prior to 02.02.14:

- Use the new option **9803 - Initialize Distinctive Ringing** to initialize Distinctive Ringing system-wide with a single command. *Following initialization, you must reset the system or unplug and then replug each telephone.*
- Use the new option **9804 - Initialize Caller ID Log Utility** to initialize (clear) your Caller ID logs.

Connecting the Systems

To connect the DS1000 systems for Database Transfer (Figure 5-5):

1. Be sure both systems are turned on and operating properly.
2. Check the source system programming to be sure the configuration you are going to transfer is correct.
3. Plug one end of the special Database Transfer Cable (P/N 80228) into the RS-232 port of the destination system (i.e., the system that will *receive* the new programming).
4. Plug the other end of the Database Transfer Cable (P/N 80228) into the RS-232 port of the source system (i.e., the system that currently has the programming you want to transfer).

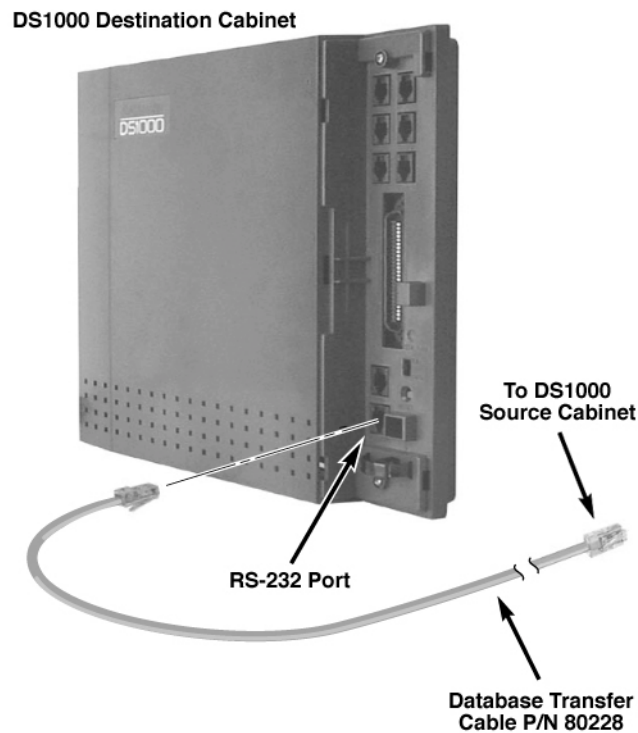


Figure 5-5: Setting Up Database Transfer

Important Database Transfer Utility Notes

- If making your own Database Transfer Cable:
 - Use standard RJ45 (8-conductor mod jack) connectors on both ends.
 - Connect the wires to the mod jack pins as follows. All other pins must be unterminated:

4 ————— 4
 5 ————— 6
 6 ————— 5

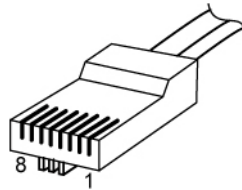


Figure 5-6: The RJ-61X Plug

- When transferring data between systems that have different software levels, use the *DS1000/2000 Upgrade Table* (P/N 80000UPG**) to verify the settings of the new options installed after upgrade.
- Using the Database Transfer Utility does not affect the system software level of either the source or destination system.
- Caller ID Logging log data is not saved between systems with dissimilar software levels. Although all Caller ID and Caller ID Logging programming will be transferred, the actual logs will not.
- The Database Transfer Utility does not transfer the Time and Date. The destination system retains its own Time and Date settings. If you want the destination Time and Date to match the source, you'll have to reprogram it in the destination.
- The Database Transfer Utility will transfer the **1801-Circuit Type** settings. However, after the transfer completes the destination system will automatically reset and auto-ID all connected station devices.

Using the Database Transfer Utility

Important: Follow these steps exactly as written.

1. Make sure the destination system is idle.
2. On the destination system, enter the programming mode.
3. Enter **9988 + HOLD**. You see: **ARE YOU SURE?**
4. Dial **9 (Y)** to begin the database transfer.
 OR
 Dial **6 (N)** to abort the procedure without transferring.
5. If you pressed **9 (Y)** in step 4, you see:
RESET SOURCE KSU... THEN PRESS HOLD KEY
6. On the source system, set the **MODE** switch to **LOAD** and press the red reset button.
The source system's Power LED turns red.
The source system's database will be unaffected by the database transfer.
7. On the destination system, press **HOLD**.
 You see: **IN PROGRESS . . .** while the data is transferring. The destination system is inoperable while Database Transfer takes place.
If you forget to press HOLD, the Database Transfer Utility will eventually abort.
8. When the Database Transfer completes, the destination system automatically resets. Once the destination system restarts, you'll normally see: **>>> TRANSFER OK**.
To clear the TRANSFER OK display, either lift and replace the telephone handset or reset the system again.
If the Database Transfer fails, you'll see >>> TRANSFER FAILED after the system resets. The destination system will restart with the default (initialized) database. All prior programming in the destination system will be lost.

If the destination system does not recover from the reset, the transfer was incomplete and the database has become corrupted. You'll need to shut the system down, pull the battery from the CPU (for about 5 minutes) and then restart the system. The default database will automatically be reinstalled.

9. When the Database Transfer completes, set the **MODE** switch on the source system back to **RUN** and press the red reset button.
10. To repeat the Database Transfer procedure, **you must** start over again from step 1.

Table below explains the Power LED flash rates that occur during Database Transfer.

Power LED Flash Rates During Database Transfer		
	Source System	Destination System
While Database Transfer is in progress:	Flashes briefly red, then flashes green.	Flashes briefly green, then alternately flashes red and green.
When Database Transfer completes:	Flashes red/green.	Flashes slowly green.

Section 6: Specifications and Parts

Specifications

System Capacities	
Cabinets:	1
Talk Timeslots (Intercom/line):	Non-blocking
Analog Trunks (CO/PBX lines):	Base: 3 Expansion: 3 Total: 6
Digital Telephones:	Base: 8 Expansion: 8 Total: 16
Analog Telephones:	Base: 4 Expansion: 4 Total: 8
Door Boxes (digital):	1 per digital station port
Door Boxes (analog):	Base: 1 Expansion: 1 Total: 2
Power Failure Telephones:	1
DSS Consoles:	1 max per keyset, 4 max. per system
External Paging Zones:	1
Internal Paging Zones:	8 (7 and All Call)
Page Audio Output:	1
Music Input:	1
Conference Circuits:	Conference circuits dynamically allocated, with 8 parties max per Conference.
REJ Recording Jack Units:	1 max. per keyset

Environmental Requirements

Meeting established environmental standards maximizes the life of the system. Refer to the *Standard Practices Manual* for further information. Be sure that the site is not:

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 4 1/2 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)

Analog Door Box

Temperature:	-20-60°C (4-140°F)
Humidity:	10-95% (non-condensing)

Electrical Specifications

Power Supply:	120 VAC \pm 10% @ 50-60 Hz
Output Power:	35 W
Input Current:	550 mA
VA:	66 VA
Kwh:	.066 Kwh
BTU:	225 BU
Grounding Requirements:	12 AWG

External Paging

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

Mechanical Specifications				
Equipment	Width	Depth	Height	Weight
Cabinet:	13 3/4"	2 1/2"	10 1/2"	4 lbs 1 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
Analog Door Box:	3 3/4"	1"	5"	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

Relay Contacts	
Contact Configuration:	Normally open
Maximum Load:	0.5A @ 120 VAC 1A @ 24 VDC
Maximum Carry Current:	2A
Maximum Switched Voltage:	120 VAC or 60 VDC
Maximum Switched Power:	60 VA or 24 W
Minimum Switched Current:	1 mA
Minimum Switched Voltage:	1 VDC
Minimum Switched Power:	0.05 mW
Maximum Initial Contact Resistance:	100 mOhms

BGM/MOH Music Source Input	
Input Impedance:	10K Ohms
Input Level:	+18 dBr (± 2 dBr) @ 1.0 Khz

FCC Registration Information				
Model:	DX7NA-624M (DS1000)			
Manufacturer:	NEC Infrontia			
FCC Part 15 Registration:	Class A			
FCC Registration Number:	NIFMUL-43095-KF-E NIFMUL-43096-MF-E			
Industry Canada Certificate (DOC) Number:	TBD			
Reg. Status	FIC	Mfrs. Port ID	REN	Network Jacks
Original	02LS2	80200	REN 0.6B	RJ11C

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 & Digital Door Box	2-wire 26 AWG	650	
	2-wire 24 AWG	1000	
Single Line Telephone	2-wire 26 AWG	8,000	at constant 20 mA
	2-wire 24 AWG	12,000	at constant 20 mA
	2-wire 22 AWG	16,000	at constant 20 mA
Analog Door Box	2-wire 24 AWG	330	
	2-wire 22 AWG	550	
2-OPX Module	2-wire 24 AWG	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
Analog Door Box	92245
2-OPX Module	92177A

Common Equipment	
Description	Part Number
DS1000 3 x 8 x 4 Cabinet	80200
DS1000 3 x 8 x 4 Expansion Board	80221
DB9 to Mod-8 Adaptor	85980
DB25 to Mod-8 Adaptor	85981
Database Transfer Cable	80228

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

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