NEC

1. Installing the Cabinet

2. PCB Installation

- To use the IntraMail enhancements provided by software versions 03.2*.** and higher, you must use the *NEC IntraMail Utility* version 1.2 to upgrade your Intra-Mail CompactFlash card. If you don't upgrade your card, the new features will not be available.
- If upgrading from version 3 software prior to 03.10.08 using telephone programming, you must reprogram the options in **1808-IntraMail Subscriber Mailbox Options**, **8005-IntraMail Master Mailbox Options**, and **8006-IntraMail Routing Mailboxes** after the upgrade.
- To avoid having to reprogram the above options, use the latest version of the DS1000/2000 System Administrator to backup and restore the site database.
- Go to http://ws1.necii.com/ds2000 to download the latest versions of the Update Utility, IntraMail Utility, System Administrator, and system software.

3. Installing Extensions and Trunks

4. Optional Equipment

5. Maintenance Options and SMDR

6. Specifications and Parts



Hardware Manual

(03.2*.**)

This manual has been developed by NEC Unified Solutions, 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:

NEC Unified Solutions, Inc. 4 Forest Parkway Shelton, CT 06484 www.necunified solutions.com

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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 1-8 and Figure 1-2 *8 Slot Cabinet Installation Layout* on page 1-9 show you *about* how much space your system requires.

Expanded Database

The Expanded Database is a new database method that provides database records (memory) for all possible extensions, trunks, Hunt Groups, Ring Groups, and Voice Mail ports. This new capability allows for:

- Automatic Slot Configuration.
- Simplified installation of Voice Mail, Hunt Groups, and Ring Groups.
- Support for built-in UltraMail and IntraMail Voice Mail
- Introduction of the DS-Series PC Program.

To understand the Expanded Database, you'll need to keep track of three things: port, station (or trunk) number, and extension number.

Port

The port is where the device you are programming connects to the system. For example, each 16DSTU PCB has 16 ports which can connect up to 16 digital telephones. Ports are numbered consecutively for each slot, and only exist when you plug in the PCB to which the device should connect.

• Station Number and Trunk Number

The station or trunk number is the element in software that keeps track of the connected devices's programming. Station and trunk numbers (and associated database records) exist for all possible devices you can connect to the system, even if you don't have any ports installed to connect them. You can't call station and trunk numbers directly - you need the associated extension numbers to do that (see below).

• Extension Numbers

Extension numbers allow you to access the stations and trunks. By default, each station and trunk number has an extension number assigned to it. You can change these assignments if you want to.

- Digital station ports have primary and secondary station numbers. The primary station's extension number is used to call the device connected to the port. The secondary station's extension number calls the second channel on 2-channel devices such as 2-OPX Modules and Digital VANGARD Voice Mail ports.

DS2000 Default Numbering

Here is how the ports, station numbers, trunk numbers, and extension numbers are initially set up.

Default Numbering in DS2000				
Stations (Telephones)	Ports	Station Numbers	Extension Numbers	
Station	Set by installed PCB	1-96	300-395	
Unassigned ¹	32	97-128	396-427	
Total Station Ports	128	-	-	

To find out the default extension number for any station number, <u>add 299</u> to the station number.
 For example, station number 1 uses extension number 300 (1 + 299).

Trunks	Ports	Trunk Numbers	Extension Numbers	
Trunk Po	rts Set by installed PCB	1-64	101-164	
Total Trunk Po	rts 64	-	-	
 To find out the default extension number for a trunk number, <u>add 100</u> to the trunk number. For example, trunk number 1 uses extension number 101 (1 + 100). 				



Default Numbering in DS2000				
Voice Mail Stations	Station N	Extension Numbers		
	201-208		500-507	
UCD Groups	Total Groups	UCD Group Master Extension Numbers		
	8	700-707		
Ring Groups	Total Groups	Ring Group Master Extension Numbers		
	8	600-	-607	

¹ Available for digital station port secondary station numbers. These are used for the second channels on 2-OPX Modules and Digital VANGARD Voice Mail.

The following table shows the port capacity of each DS2000 PCB.

DS2000 PCB Port Capacities							
РСВ	Description	Port Capacity					
Station PCBs	Station PCBs						
16DSTU PCB	16 Digital Station PCB	16 (1-16)					
4ASTU PCB	4 Analog Station PCB	4 (1-4)					
8ASTU PCB	8 Analog Station PCB	8 (1-8)					
Trunk PCBs							
4ATRU PCB	4 Analog Trunk PCB	4 (1-4)					
8ATRU PCB	8 Analog Trunk PCB	8 (1-8)					
T1 PCB	T1/E1 PCB	24 (1-24) when enabled for T1 30 (1-30) when enabled for E1					

Since the Expanded Database maintains database records for all extensions and trunks, you have the option of using **Program 9902 - Set Up Stations (DS2000)** and **Program 9903 - Set Up Trunks (DS2000)** to assign a station and a trunk PCB *to the same slot*. When you plug in an ASTU or DSTU PCB into the slot, the ports on the PCB access the associated station numbers. If you remove that PCB and plug an ATRU in its place, the ports on the ATRU PCB access the associated trunk numbers. Refer to the *Software Manual* on the *System Document CD* that came with your system for more.

DS2000

Automatic Slot Configuration

Automatic Slot Configuration automatically sets up station and trunk PCBs when you initially power up the system. This simplifies installation because you no longer have to use system programming to activate station and trunk PCBs after you plug them in.

Here's how Automatic Slot Configuration works:

- With power off, install your station and trunk PCBs. With the system powered down, install the station and trunk PCBs from left to right in the order you want your extension and trunk numbers set up.
 - Be sure to install a 16DSTU (16 Digital Station) PCB in the first slot (CN1).
 - You don't have to group your station and trunk PCBs together, although it may be more convenient to do so. For example, when setting up a 16x32 system, you can install the 2nd DSTU PCB and your two ATRU PCBs in any slot, in any order. Automatic Slot Configuration will properly handle the numbering.

• Power up the system.

On power up, the system scans the PCBs from left to right and sets up the extension and trunk numbering as follows.

- Extension numbers will begin with 300 in the first slot and increment from left to right.
- Trunk numbers will begin with 101 (starting from the first installed ATRU PCB) and will also increment from left to right.
- For example, in a 16x32, the numbering will be: 1st 16DSTU PCB = Extensions 300-315.
 2nd 16DSTU PCB = Extensions 316-331.
 1st 8ATRU PCB = Trunks 101-108.
 2nd 8ATRU PCB = Trunks 109-116.

System Configuration

DS2000 Default Configuration

Automatic Slot Configuration automatically sets up your system's PCBs when you initially power up the system. There is no longer a factory-installed default configuration, and you don't have to use system programming to activate PCBs after you plug them in. *Remember, you should always plug a 16DSTU PCB into slot CN1*.

To take full advantage of all the new features and enhancements in software version 03.**.**, always use the latest PCB versions.



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 *DS2000 Configuration Guidelines* table below and *DS2000 Load Factor Calculations* on page 1-6 when configuring your system.

DS2000 Configuration Guidelines

4 Slot Cabinets

- Do not install more than 2 16DSTU PCBs under any circumstances.
- The first 16DDSTU PCB you install must be in the first slot (CN1).
- Maximum configuration is **112 ports**.
- The total of all extensions and trunks cannot exceed **112**.
- Always use the System Load Factor table to check your system configuration.

8 Slot Cabinets

- Do not install more than 2 16DSTU PCBs for each power supply. (Install your power supplies in the following order: slot CN10<u>1</u>, slot CN10<u>3</u>, slot CN10<u>2</u>.)
- The first 16DSTU PCB you install must be in the first slot (CN1).
- The total of all extensions and trunks installed cannot exceed **112**.
- Maximum configuration is **112** ports.
- Always use the System Load Factor table to check your system configuration.

System Preparation and Configuration

DS2000

DS2000 Load Factor Calculations

The combination of trunks, extensions, 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 on the next page to verify your system's configuration. When entering data on the chart, for each installed item make entries for each *Load Type*. There are two *Load Types* to consider: 5 VDC and 40 VDC.

To check your system configuration:

- 1. Indicate the quantity for each PCB, DSS Console, and 2-OPX Module installed in the **Qty** column. *The number of keysets and single line sets does not affect the System Load Factor.*
- 2. For each item for each Load Type, multiply the **Qty** times the **Load** and enter the value in the **Total** column.

For example, two 16DSTU PCBs have a load of 6 for 5 VDC and 40 for 40 VDC.

- 3. Add up the entries in each **Total** column and enter the values in **Item 1: Load Type Totals**.
- 4. Review **Item 2: Power Supply Capacity** and determine the capacity of the power supplies installed in your system.
- 5. Compare the capacities in **Item 2** to your entries in **Item 1**. **Item 1** must always be equal to or less than the entry in **Item 2**.

Important !! Do not operate your system if the total for either Load Type exceeds the Power Supply Capacity of your installation.



System Preparation and Configuration

DS2000 System Load Factor Calculations					
	Qty	Load Type			
Description		5 VDC		40 VDC	
		Load	Total	Load	Total
СРИ РСВ	1	6	6	0	0
16DSTU PCB		3		20	
4ASTU PCB		3		5	
8ASTU PCB		5		8	
16ASTU PCB		10		17	
4ATRU PCB		4		0	
8ATRU PCB		8		0	
T1 PCB		8		0	
UltraMail PCB (FMS)		19		0	
UltraMail 2000 PCB (VMS)		0		6	
Telephones (Keysets and SLTs)		0		0	
110-Button DSS Console		0		2	
24-Button DSS Console		0		1	
2-OPX Module		0		3	
Item 1: Load Type Totals (Cannot exceed Item 2: Power Supply Capacity.)					
Item 2: Power Supply Capacity					
If you have one power supply installed, the capacity is: $5 \text{ VDC} = 4$ If you have two power supplies installed, the capacity is: $5 \text{ VDC} = 8$ If you have three power supplies installed, the capacity is: $5 \text{ VDC} = 1$			5 VDC = 40 5 VDC = 80 5 VDC = 120	40 VDC = 48 40 VDC = 80 40 VDC = 120	
Notes: • A 4 slot cabinet can only have 1 power supply					

A 4 slot cabinet can only have 1 power supply.
An 8 slot cabinet can have up to 3 power supplies. You *cannot* have more than two 16DSTU PCBs per power supply, regardless of System Load Factor calculations.

• Exceeding the allowed Load Type Total (Item 1) will cause the system's power supplies to automatically shut down and/or cause erratic system operation.

• Total DSS Consoles installed cannot exceed 4.

• The total of all station, trunk, and UltraMail ports cannot exceed 112.

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 adequate for a 4 slot cabinet (see Figure 1-1 4 Slot Cabinet Installation Layout below). A full sheet of plywood (8' x 4') should be adequate for an 8 slot cabinet (see Figure 1-2 8 Slot Cabinet Installation Layout on page 1-9). Be sure to mount the 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). The AC receptacle must be within 7 feet of the cabinet's lower left corner.

Normally, you install the extension and trunk blocks to the right of the cabinet. Telco should also install the RJ21X to the right of the cabinet.





Figure 1-1: 4 Slot Cabinet Installation Layout



8' X 4' Plywood backboard



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.





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.



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 1-14 and run the ground wire(s) through the RFI Suppressor Assembly as shown.
- 3. Crimp ring terminals as required to the ground wires.
- 4. <u>For earth ground:</u> Run a ground wire from the ETH lug to a known earth ground. <u>For PBX Ground:</u> Run a ground wire from the PBXG lug to the telco ground. <u>If your system will have a T1 Trunk PCB:</u> Run a 12 AWG jumper wire from the SG (Signal Ground) lug to the ETH (Earth Ground) lug.
- 5. Reinstall and firmly tighten the lug(s) removed in step 1 above.





Figure 1-9: Attaching the Ground Wires

RFI Suppressor Assemblies

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 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.



Figure 1-10: Installing RFI Suppressor Assemblies

Installing the Power Supply

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 1-4 for more. Install the first supply in slot $CN10\underline{1}$. Install the second supply in slot $CN10\underline{3}$. Install the third supply in slot $CN10\underline{2}$.

Important Compatibility Guidelines

- Only install Power Supply P/Ns 80005B or 80005C.
- Do not install Power Supply P/Ns 80005 or 80005A.
- You can mix P/Ns 80005B and 80005C in the same system.
 If your system uses UltraMail or UltraMail 2000, you *must*
 - install only Power Supply P/Ns 80005C.





Figure 1-11: 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 1-4 before installing any PCBs. Always observe the System Load Factor when configuring your system.

- The CPU (Central Processing Unit) PCB must plug into slot CNO.
- 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.

!! 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 PCB (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 (Sony CR2032 or NEC P/N EX0254-0040) into the battery clips.
- 3. Plug the CPU into slot **CNO**.

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

Mode Switch Battery

Figure 2-2: Setting Up the CPU



4 Slot Cabinet Shown

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 1-4 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



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 1-4 for more.
- 2. Set the mode switch on each ASTU PCB to **RUN**.

Mode switch 1



Figure 2-6: Analog Station (ASTU) PCB







16-Port Analog Station (16ASTU) PCB

The 16ASTU PCB provides connection for 16 analog extensions.

To install the 16ASTU PCB (Figure 2-8) (Figure 2-9):

- 1. Check your system configuration to be sure you do not exceed the allowable System Load Factor.
- 2. Plug the 16ASTU PCB into any available slot from **CN2-CN8**. *You should reserve* **CN1** *for a 16DSTU PCB*.
 - The PCB will auto-ID when you plug it in.
- 3. Set the mode switch on the 16ASTU PCB to **RUN**.







Figure 2-9: Installing the 16ASTU 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 2-10) (Figure 2-11):

- 1. Plug in ATRU PCBs as required. See System Configuration on page 1-4 for more.
- 2. Set the mode switch on each ATRU PCB to **RUN**.



Notes:

- The system will respond to telco ring signal in the range of 42-103 VAC @ 20 Hz.
- Telco battery must be 44-56 VDC.

Figure 2-10: Analog Trunk (ATRU) PCB



4 Slot Cabinet Shown

Figure 2-11: Installing the ATRU PCB



T1 Trunk PCB

The DS2000 T1 PCB requires system software version 03.03.00 or higher and expanded memory CPU P/N 80025B.

The T1 Trunk PCB (Figure 2-12) provides advanced digital trunking and gives the DS2000 a maximum of 24 trunks in a single PCB slot. The available T1 trunk types include:

- Loop Start and Ground Start (DTMF and Dial Pulse)
- Direct Inward Dialing (DID) Wink Start and Immediate Start (DTMF and Dial Pulse)
- E&M Tie Line Wink Start and Immediate Start (DTMF and Dial Pulse)

Notes

- Although the T1 PCB can connect directly to the telco's T1 smart jack, a separately-purchased Channel Service Unit (CSU) between the smart jack and the T1 PCB is recommended. Additionally, your telco may require a CSU.
- Normally, the T1 PCB connects to the telco's T1 smart jack or your CSU using a standard straightthrough CAT 5 cable. However, always check the documentation that came with your CSU for cabling requirements.
- The T1 PCB installs in any universal slot but slot 1.
- A commercially available T1 Tester is recommended.



Figure 2-12: T1 Trunk PCB

To install the T1 Trunk PCB (Figure 2-13) (Figure 2-14):
Set jumpers CN7 and CN9 to the T1 position.

DS2000

- 2. Plug in T1 Trunk PCBs as required. See System Configuration on page 1-4 for more.
- 3. Set the mode switch on each T1 PCB to **RUN**.
- 4. Using a standard straight-through CAT 5 cable, connect the T1 PCB RJ48C connector to the Telco Smart Jack or your Channel Service Unit.

Although the T1 PCB can connect directly to the telco's T1 smart jack, a separately purchased Channel Service Unit (CSU) between the smart jack and the T1 PCB is recommended. Additionally, your telco may require a CSU.



Figure 2-13: T1 Trunk PCB Setup





Figure 2-14: Installing the T1 Trunk PCB

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T1 PCB Leds





Figure 2-15: T1 PCB LEDs

5200

T1 Programming Summary

For more in depth feature description and programming details, refer to the following features in the DS1000/2000 Software Manual (P/N 80000SWG**): Direct Inward Dialing, T1 Trunking, and Tie Lines.

Basic Programming

• 1001 - Trunk Circuit Type

- Set the circuit type for each T1 trunk. The available types are:
 - 51 (Loop Start DTMF)
 - 52 (Loop Start DP)
 - 53 (Ground Start DTMF)
- 54 (Ground Start DP)
- 57 (DID DTMF Wink Start)
- 58 (DID DP Wink Start)
- 59 (DID DTMF Immediate Start)
- 60 (DID DP Immediate Start)
- 61 (E&M DTMF Wink Start)
- 62 (E&M DP Wink Start)
- 63 (E&M DTMF Immediate Start)
- 64 (E&M DP Immediate Start)
- 9904 T1/E1 Configuration
 - Use this option to set parameters for the T1 PCB.

Clock Control

- Default: T1 PCB is the clock master.
 - If a T1 PCB is connected to a telco T1 circuit, it is usually set as clock slave (i.e., uses the telco clock source).
 - If a T1 PCB is connected to a private T1 circuit, set the clock source according to the network configuration.
- Transmit Pulse Amplitude
 - Default: 0 (0dB), the T1 PCB is within 133' of smart jack or CSU.
- Framer Type
 - Default: ESF Extended Super Frame.
- Zero Suppression
 - Default: Enabled B8ZS.
- Number of PCM Channels
- Default: 0 All channels active. The active channels are always the lower-numbered circuits (i.e., an entry of 8 means that channels 1-8 are active).
- Loopback
 - Default: 0 No loopback options enabled.

ANI/DNIS Programming

• 1001 - Caller ID

- Enter 3 to enable ANI-based Caller ID.
- 1001 ANI/DNIS

Specify the type of ANI/DNIS Caller ID provided by your T1 trunks. The options are:

- 0 (None)
- 1 (ANI)
- 2 (*ANI*)
- 3 (*DNIS*)
- 4 (*ANI*DNIS)
- 1001 ANI Delimiter

For ANI/DNIS options 2-4 above, specify the ANI delimiter (0-9, # or *).

• 1001 - Number of ANI Digits

For ANI/DNIS option 1, specify the number of digits in the ANI number.

DID Programming (Basic)

T

- 1401 Number of DID Digits
- Specify the number of DID Digits (1-8) expected from the telco.1402 DID Translation Table
- Set up the system's DID routing.

Refer to your Software Manual for additional options for setting up DID Camp On and DID Overflow.

Tie Line Programming (Basic)

Refer to your Software Manual for additional options for setting up Tie Line trunk and operator access.

If you don't have a T1 Tester, you can alternately test Tie Line operation between two T1 PCBs in the same cabinet or facility using the cable shown below (Figure 2-16).



Figure 2-16: Connecting Two T1 PCBs Together without a Telco T1 Circuit (For Tie Line Testing)

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 2-17) through (Figure 2-21):

- For each 66M1-50 block, punch down the Installation Cable in standard color-code order.
 Use Figure 2-17 *Connecting 16DSTU Digital Station and 4/8ASTU Analog Station PCBs* on page 2-15 when connecting extensions.
 - Use Figure 2-19 Connecting 4/8ATRU Trunk PCBs on page 2-17 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 2-20 *Securing the Cables* on page 2-18).

Making Your Own Cables

If you want to make your cables (instead of using Installation Cable P/N 80892), follow the pinouts in Figure 2-21 8-Pin (RJ61X) Jack Pinouts on page 2-19.












Figure 2-19: Connecting 4/8ATRU Trunk PCBs



Figure 2-20: Securing the Cables

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 2-21: 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 2-17 *Connecting 16DSTU Digital Station and 4/8ASTU Analog Station PCBs* on page 2-15 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 2-19 *Connecting 4/8ATRU Trunk PCBs* on page 2-17 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.

Note: To connect T1 trunks, turn to T1 Trunk PCB on page 2-8.



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. The system will automatically set up the station and trunk PCBs on power up, See *Automatic Slot Configuration* on page 1-4 for more. The system will also automatically set up a station or trunk PCB when you plug it in hot.

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 a surge protector 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	• All three LEDs on (green)		
CPU PCB	• Top LED flashing (slowly green)		
DSTU, ASTU, and ATRU PCBs	 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. Verify that the PCBs have successfully powered up.

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













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.







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.



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.





External Paging Relay Control

An announcement broadcast into a Paging zone can additionally activate the system relay in the CPU PCB.

!! 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.

Additional Programming

- To adjust the External Paging ring volume:
 - In **0202 Page Ring Volume**, adjust the volume of ringing over External Paging (5=low, 6=medium, 4=high).
- To enable Background Music over External Paging:
 - In **0201 Background Music**, enter Y (9) to enable Background Music system-wide.
 - Make sure your music source is connected (see *Music Source* on page 4-4 for more).
 - In 0202 Background Music Over External Page, enter Y (9).
- To enable extension ringing over External Paging:
 - In **0202 External Page Ring Source**, enter 3 (Extension).
 - In **0202** Extension, enter the number of the extension that will ring over External Paging.
- To enable trunk ringing over External Paging:
 - In 0202 External Page Ring Source, enter 8 (Trunk).
 - In **0203 UNA Ringing Option**, specify the type of External Paging ringing for each trunk (0=None, 1=Ring always, 2=Ring at night only, 3=Delay ring).

Refer to Paging in the DS1000/2000 Software Manual (P/N 80000SWG**) for more on these features.

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 (<u>+</u> 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 4-3):

- 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 4-3: 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.
- In 1003 MOH Source, enter 1 (for external) + VOL ▲.
 You can optionally enter 2 for a low pitched internal tone; 3 for a high pitched internal tone.

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 4-4):

- 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 crossconnect block.
- 3. Install a modular jack for each Power Failure Telephone within 6 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 4-4: 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 4-5) (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 4-5 *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* on the *System Document CD* that came with your system for additional programming details.







Figure 4-6: Installing a 110-Button DSS Console

111

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.

Note: The 2-OPX Module is a discontinued item, but you may find it at some installation sites.

To install a 2-OPX Module (Figure 4-7):

- 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.
 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 6 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 14 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

The 2-OPX Module is a two-channel device that represents two station ports. The first channel is called the primary station; the second channel is called the secondary station. The primary station auto-IDs when you plug in the 2-OPX Module. It has the same station and extension number as a keyset would plugged into the same port. You must set up the secondary station in programming.

To set up the 2-OPX Module secondary station:

• In **9902** - Set Up Stations (DS2000), assign an unused station number (e.g., 97) to the 2-OPX Module secondary station. (If you use station 97, the secondary station's extension number will be 396.) Refer to 9902 - Set Up Stations (DS2000) in the Software Manual on the System Document CD that came with your system for more.

Note: You must set up the 2-OPX Module secondary station before it will function.





Wall Mounting the 2-OPX Module

To wall mount a 2-OPX Module (Figure 4-8):

- 1. Following the diagram below, switch 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 4-8: 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 4-9)

- 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 4-9: Installing the Wall-Mount Hanger

Wall-Mounting a Key Telephone

To mount the telephone on the wall (Figure 4-10):

- 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 4-10: Installing the Wall-Mount Bracket



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

- 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 4-11: Mounting on a Wall Plate

To remove the telephone from the wall mount bracket (Figure 4-12):

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





DS2000

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 4-13):
- Flip up each telephone leg until it snaps into place.
- To use the desk stand high position (Figure 4-13):
- 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 4-13: 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 can connect 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.

REJ Recording Jack Output Specifications				
Output Impedance:	200 Ohms			
Output Level (into 10K Ohm load):	Keyset volume setting $1 = -7.8 \text{ dBr}$ Keyset volume setting $7 = -5.3 \text{ dBr}$			
The REJ broadcasts both sides of the keyset conversation (i.e., the user's voice <i>and</i> the caller's voice) whenever the user lifts the handset. The REJ <i>does not</i> broadcast paging announcements or				

To install the REJ Recording Jack (Figure 4-14):

- 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:

activate for Handsfree calls.

- 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 4-14: Installing the REJ

Testing the Keyset

Use the following procedure to perform a quick operational test of a keyset.

To test a keyset:

- 1. Unplug the telephone line cord.
- 2. While pressing **HOLD**, plug the telephone back in. All the LED elements in the display will fill.
- 3. Release HOLD.
- 4. Dial **1** to test the green LEDs in the keys.
- 5. Dial **2** to test the red LEDs in the keys.
- 6. Dial **4** to turn the test tone on and off.
 - This test also shows the telephone's firmware.
- 7. Dial **8** then any other key to test the key.
- 8. Press **DND** and dial **0** to exit and restart the telephone.

Section 5: Maintenance Options and SMDR

Backing Up Site Data

PC Card Data Base Compatibility

Software version 03.**.** databases are not compatible with any prior 02.**.** versions.

Backing Up Site Data with a PC Card

You can use PC Card P/N 85880 to back up and restore your site data. *You cannot store data bases on PC Card with Software P/N 80052-V03.***.**.

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. $Dial \mathbf{Y} + \mathbf{HOLD}$.

You see: 9906: DATABASE NAME

- 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.
- 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 \blacktriangle or VOL \checkmark to scroll through the addresses.
 - There are 16 data base addresses (DB 00 to DB 15).
 - Skip this step to select the currently displayed data base.

6.

Backing Up Site Data



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 \mathbf{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 proce-</i> <i>dure. If you get the message again, try another</i> <i>PC card.</i>			
SAVE FAILED	The system could not save data to the PC card. Repeat the procedure. If you get the message again, try another PC card.			



Figure 5-1: Using the PC Card

Name Programming									
		Press a key the indicated number of times for desired character							
Key	1 Time	2 Times	3 Times	4 Times	5 Times	6 Times	7 Times	8 Times	9 Times
1	&	-	/	·	1				
2	Α	В	С	а	b	С	2		
3	D	E	F	d	е	f	3		
4	G	н	I	g	h	i	4		
5	J	К	L	j	k	I	5		
6	М	N	0	m	n	0	6		
7	Р	Q	R	S	р	q	r	S	7
8	Т	U	V	t	u	v	8		
9	W	X	Y	Z	w	x	У	z	9
0	space	:	0						
#	Not used								
*	Not used								
After selecting a letter, press a key for another letter or wait 2 seconds for the cursor to automatically advance.									
Additional Name Programming Options									
HOLD	Save nam	ne. In syste	m program	nming, HOI	LD saves a	nd exits na	ne progran	nming.	
CONF	IF Exit name programming without saving name.								
VOL Up	L Up Scroll the cursor to the left.								
VOL Dn	Scroll the cursor to the right.								
MW	Put the cursor after the last entry.								
LND	Delete the character under the cursor.								
FLASH	Delete the character to the right of the cursor.								
CLEAR	Clear the entire entry.								
CHECK	Restore t	Restore the previous entry,							

Figure 5-2: Entering Names

1.

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.

- Insert the PC Card into the CPU (See Using the PC Card on page 5-2).
- 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** \blacktriangle or **VOL** \checkmark to scroll through the data base addresses and select the one you want to restore. *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</i> <i>and try again</i> .		

Loading System Software from a PC Card

To use the PC Card to load system software (P/N 80052-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 5-2).
- 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 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.

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 \mathbf{Y} to have the SMDR report include calls on the trunk. Enter \mathbf{N} to have the SMDR report exclude calls on the trunk.





Testing the Connection

To test the connection:

- 1. Open HyperTerminal on your Windows PC or laptop:
 - Click Start + Programs + Accessories + Communications + Hyperterminal.
 - Double-click **Hyperterm.exe**.
 - Name your connection, pick an icon, and click $\ensuremath{\text{OK}}$.
- 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.

Installing a Modem

You can connect a modem (P/N 85862D/CNET CN5614XR) to the system's serial port to do remote maintenance using the System Administrator. Refer to the *PC Program User Guide* (P/N 80053INS**) for more.

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 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 5-5: Connecting a Modem


Mod-8 to 25-Pin Connector for Modem Connection

Mod-8 to 9-Pin Connector for PC/Laptop Connection

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 (Page 1 of 2)		
Cabinets:	1	
Talk Timeslots (Intercom/line):	Non-blocking	
Ports	112	
Trunks (CO/PBX lines):	64	
Digital Telephones:	4 Slot: 32 8 Slot: 96	
Analog Telephones:	4 Slot: 24 8 Slot: 56	
DSS Consoles:	1 max per keyset, 4 max. per system	
Power Failure Telephones:	2 per ATRU PCB	
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: 16ASTU Analog Station PCB: 8ASTU Analog Station PCB: 4ASTU Analog Station PCB: T1 Trunk PCB: UltraMail PCB:	Refer to <i>System Configuration</i> on page 1-4 for capacities.	



System Capacities (Page 2 of 2)

1

CPU Central Processing Unit:

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 7 feet of the cabinet is required.

Environmental Specifications

Cabinet and Key Telephones

Temperature: Humidity:

0-40°C (32-104°F) 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	

Telephone and Trunk Voltages		
Keyset Voltages		
DC voltage measured at the MDF (between tip and ring)	Minimum: 36 VDC Maximum: 44 VDC	
Minimum operating DC voltage measured at station jack (between tip and ring)	24 VDC	
4/8ASTU PCB Single Line Telephone Voltages		
DC voltage measured at the MDF (between tip and ring)	Minimum: 36 VDC Maximum: 44 VDC	
Off-hook voltage	6.5 VDC (typical – depending on telephone type and loop length)	
Ringing voltage	50-70 VAC, sinusoidal (sine wave)	
High Voltage Message Waiting	150 VDC	
REN (Ringer Equivalence) Per Port	2	
Simultaneous Ringing	Ringing cycles through the ports, ringing two ports at a time.	
16ASTU PCB Single Line Telephone Voltages		
DC voltage measured at the MDF (between tip and ring)	On-Hook Idle State Minimum: 44 VDC On-Hook Idle State Maximum: 56 VDC Off-Hook Active State: 7.5 VDC typical, depending the telephone type and loop length.	
Ringing voltage	50-65 VAC, sinusoidal (sine wave)	
High Voltage Message Waiting	95 VDC	
REN (Ringer Equivalence) Per Port	2	
Simultaneous Ringing	Ringing cycles through the ports, ringing four ports at a time.	
Trunk Voltages		
Ringing voltage	42-103 VAC @ 20 Hz	
Battery (from telco)	44-56 VDC	
External Paging		

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

DS2000

Mechanical Specifications				
Equipment	Width	Depth	Height	Weight
4 Slot KSU: 8 Slot KSU	10 3/4" 19 1/2"	5 7/8" 5 7/8"	13 11/16" 13 11/16"	4 lbs 5 oz 6 lbs 12 oz
Non-display Keyset:	7 1/4"	9"	2 7/8"	1 1b 11 oz
Display Keyset:	7 1/4"	9"	2 7/8"	1 lb 12 oz
Super Display Keyset:	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
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: $+18 \text{ dBr} (\pm 2 \text{ dBr}) @ 1.0 \text{ Khz}$		

REJ Recording Jack Output Specifications		
Output Impedance:	200 Ohms	
Output Level (into 10K Ohm load):	Keyset volume setting $1 = -7.8 \text{ dBr}$ Keyset volume setting $7 = -5.3 \text{ dBr}$	
The REJ broadcasts both sides of the keyset conversation (i.e., the user's voice <i>and</i> the caller's voice) whenever the user lifts the handset. The REJ <i>does not</i> broadcast paging announcements or activate for Handsfree calls.		



	FCC	Registration Inform	mation	
Model:			DX7NA-112/48	(DS2000)
Manufacturer:			NEC Infrontia	
FCC Part 15 Registr	ration:		Class A	
FCC Registration N	umber:		NIFMUL-43093-KF-E NIFMUL-43094-MF-E	
Industry Canada Certificate (DOC) Number:		140-9522 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
T1 PCB FCC Registration Information				
FIC	FIC Description			
04DU9-BN 1.544 Mbps Superframe format (SF) without line power				
04DU9-ISN 1.544 Mbps ANSI ESF and B8ZS without line power			ne power	

Cabling Requirements

- 1. 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.
- 2. When cables must be run on the floor, use cable protectors.
- 3. Cable runs for key telephones, single line telephones, and 2-OPX Modules must be a dedicated, isolated cable pair.

Device	Cable Type	Cable Run (ft)	Notes
Key Telephone	2-wire 26 AWG 2-wire 24 AWG	1300 2000	
Single Line Telephone	2-wire 26 AWG 2-wire 24 AWG 2-wire 22 AWG	11,500 3150 18,000 5050 29,000 8000	at constant 20 mA at constant 35 mA at constant 20 mA at constant 35 mA at constant 20 mA at constant 35 mA
2-OPX Module	2-wire 24 AWG	1000	

100

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	
2-OPX Module (Discontinued)	92177A	

Common Equipment		
Description	Part Number	
4 Slot KSU 8 Slot KSU	80000 80001	
DS2000 Power Supply	80005B or 80005C (80005C <i>required</i> for UltraMail)	
Installation Cable	80892	
Blank PC Card	85880	
PC Card with system software preloaded (**.**.** denotes the system software level)	80052-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	

DS2000

PCBs		
Description	Part Number	
Central Processing Unit	80025 <u>B</u>	
16DSTU Digital Station PCB	80021 <u>A</u>	
16ASTU 16 Port Analog Station PCB	80042	
8ASTU 8 Port Analog Station PCB	80041 <u>B</u>	
4ASTU 4 Port Analog Station PCB	80040 <u>B</u>	
4ATRU 4 Port Analog Trunk PCB (loop start)	80010 <u>B</u>	
8ATRU 8 Port Analog Trunk PCB (loop start)	80011 <u>B</u>	
T1 Trunk PCB	80061	
For UltraMail part numbers, installation, and programming, refer to the Aspire Mail and UltraMail System Guide (P/N 17710SWG**).		

Replacement Parts (Page 1 of 2)		
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	92297A-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	

Parts List



Replacement Parts (Page 2 of 2)		
Description	Part Number	
Modem (CNET CN5614XR)	85862D	
Replacement Battery for CPU PCB	EX0254-0040	

DS2000

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NEC Unified Solutions, Inc. 4 Forest Parkway, Shelton, CT 06484 Tel: 800-365-1928 Fax: 203-926-5458 www.necunifiedsolutions.com

Other Important Telephone Numbers

.203-926-5450
203-926-5444
203-926-5454
.203-925-8801
.900-990-2541
.203-926-5430
203-929-7920





February 2, 2005 Printed in U.S.A.