Nitsuko

384i

Hardware Manual

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Tips 💡

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- Specifications and Parts

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Hardware Manual

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Year 2000 Compliance

The 384i and its associated PC programming are unaffected by the date change to year 2000. The system processes the Leap Year correctly and does not require any additional upgrades or reprogramming. With software 3.07.24, the 384i uses a four-digit date code entry (e.g., 2000). Previous versions use a two-digit date code entry (e.g., 00=2000).

Section 1, INSTALLING THE MAIN AND EXPANSION CABINETS

1. Installing Cabinets

Section 1, INSTALLING THE MAIN AND EXPANSION CABINETS (cont'd)

INSTALLING THE MAIN CABINET

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.

Make sure you have appropriate tools for the job, including: a test set, a punch down tool, and a digital voltmeter.

Before Installing

Make sure you have a building plan showing common equipment, extensions, the telco demarcation, and earth ground location. The installation site must meet Nitsuko America specifications in the Standard Practices Manual (P/N N2710STD**).

Site Requirements

The system must be floor-mounted and is equipped with brackets to secure each cabinet to a wall. Ensure that enough space is available to allow the installation of expansion cabinets above the Main Cabinet.

The system requires a three-prong dedicated 110 VAC 60 Hz circuit (NEMA 5-15 receptacle) located within 7 feet of the AC receptacle. Telco should install the RJ21X to the right of the Main Cabinet. Extension blocks should be installed to the left of the Main Cabinet.

The Main Cabinet is shipped fully assembled. The following is enclosed with the Main Cabinet:
- 3 ferrite bead (3 tie wraps) packed outside the cabinet
- 4 wall-mounting brackets packed outside the cabinet
- 1 green 14AWG ground wire (factory-installed to the backplane)
- 1 red 9-stranded power cable (factory-installed to the backplane)
- 1 red 4-stranded power diagnostic cable for top cover (factory-installed to the backplane)
- 1 tie wrap (factory-installed)

INSTALLING THE MAIN CABINET

Environmental Requirements

Meeting and maintaining established environmental standards maximizes the life of the system. Be sure that the site selected for the Main Cabinet 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 placed where water or oil comes in contact with the unit.
5. In areas near high-frequency machines or electric welders.
6. Near computers, telexes, microwaves, air conditioners, etc.
7. Near radio antennas (including shortwave).

Removing the Front Cover (Figure 1-1)

1. Position the Main Cabinet on the floor near the MDF within 7 feet of the dedicated AC outlet. (Do not secure the cabinet to the wall at this time).
2. Loosen four front panel retaining screws. Remove the front panel cover of the Main Cabinet.
3. Remove the Main Cabinet rubber gaskets.

92000 - 27
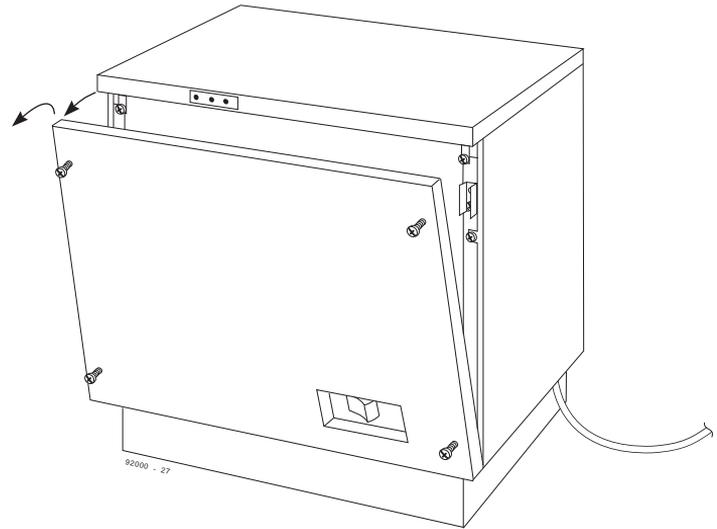
Figure 1-1 REMOVING THE FRONT COVER

INSTALLING THE MAIN CABINET

Removing the Top Cover (Figure 1-2)

1. Disconnect the top cover alarm cable.
2. Loosen the top cover retaining screws. Remove the top cover.

   When iinstalling expansion cabinet(s), this cover should be used as the top cover, as it contains the LEDs for the system alarms (see page 1-22 for information on reconnecting).

92000 - 28
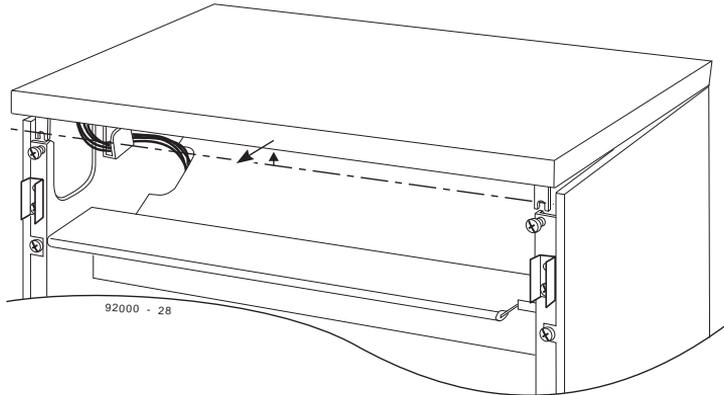
Figure 1-2 REMOVING THE TOP COVER

Removing the Side Panels (Figure 1-3)

1. Loosen upper and lower side panel retaining screws. Remove side panel covers of the Main Cabinet.
2. Remove any packing materials.

92000 - 33
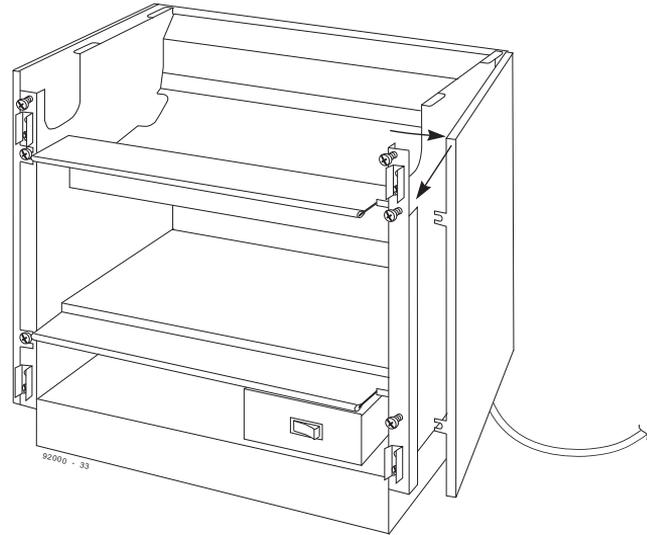
Figure 1-3 REMOVING THE SIDE PANELS

1. Installing Cabinets

INSTALLING THE MAIN CABINET

Removing the Back Cover (Figure 1-4)

The back cover needs to be removed when installing an Expansion Cabinet.

1. Remove the Main Cabinet back panel. Refer to steps 1, 2, and 3.
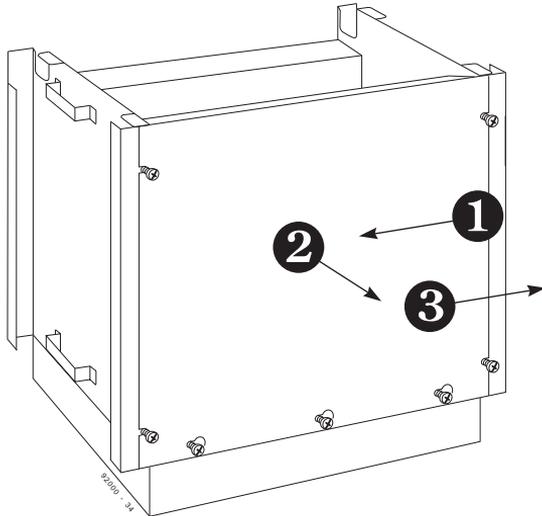
Figure 1-4 REMOVING THE BACK COVER

Securing the System to a Wall (Figure 1-5)

1. Install wall brackets on the top corners of the Main Cabinet.

Note: Wall brackets are located on the side and bracket retaining screws are located on the back of the Main Cabinet.
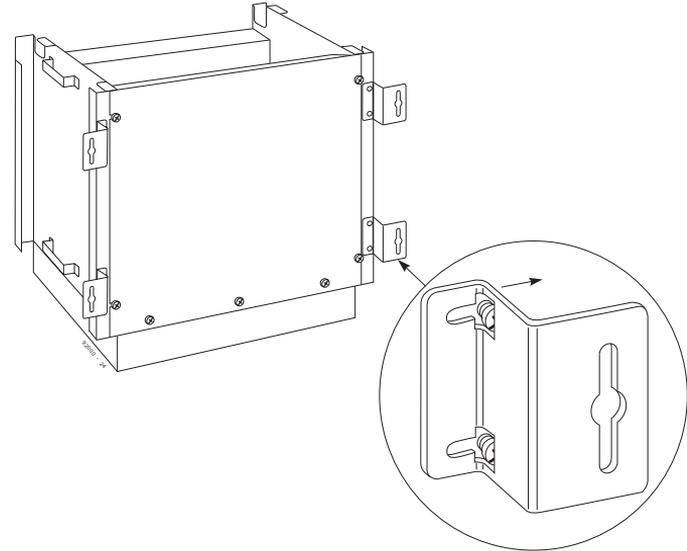
Figure 1-5 INSTALLING WALL BRACKETS

INSTALLING THE MAIN CABINET

Securing the Main Cabinet (Figure 1-6)

1. Secure the Main Cabinet to a wall using appropriate hardware.

Note: If an Expansion Cabinet is required, do not secure the Main Cabinet to the wall at this time.
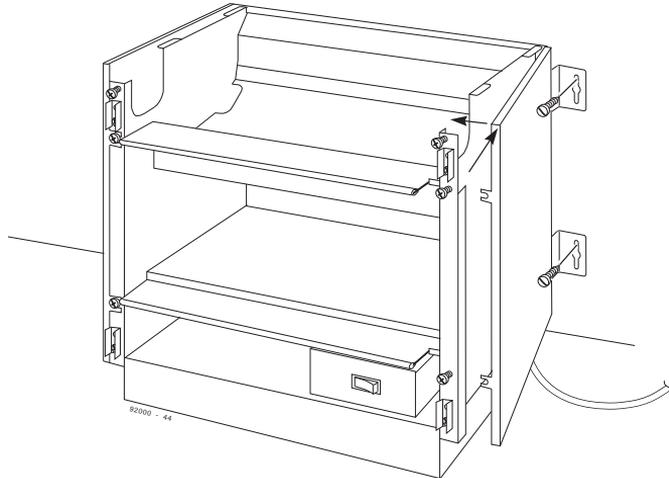
Figure 1-6 SECURING THE MAIN CABINET TO A WALL

Grounding the Main Cabinet (Figure 1-7)

1. Strap the SG (signal ground) lug to the FG (frame ground) lug using 14 AWG.
2. Strap the PBXG (CO/PBX ground start trunk ground) lug to the ETH (earth ground) lug using 14 AWG.
3. Strap the FG (frame ground) lug to the ETH (earth ground) lug using 14 AWG.
4. Ground the Main Cabinet by connecting a 14 AWG wire from the ETH lug on the right side of the Main Cabinet to a known earth ground.
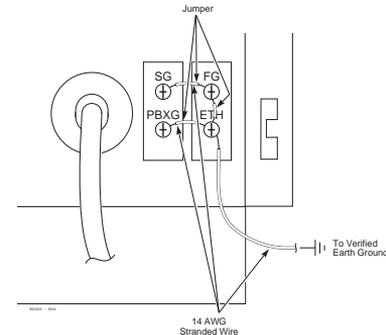
Figure 1-7 GROUNDING THE MAIN CABINET

1. Installing Cabinets

INSTALLING THE MAIN CABINET

Installing/Removing the Power Supply
(Figures 1-8 and 1-9)

The Power Supply must be installed to the right of PCB slot 7 in the Main Cabinet. Four screws secure the power supply to the Main Cabinet. Enclosed with the Power Supply:
- 1 3-stranded power cable (BLK-WHT-GRN)
- 1 6.3 amp 250 volt spare fuse

The Main Cabinet's Power Supply and the Expansion Cabinet's Power Supply are slightly different, so be sure to install the correct Power Supply in the correct cabinet (the Expansion Power Supply does not have the +5V label or LED).
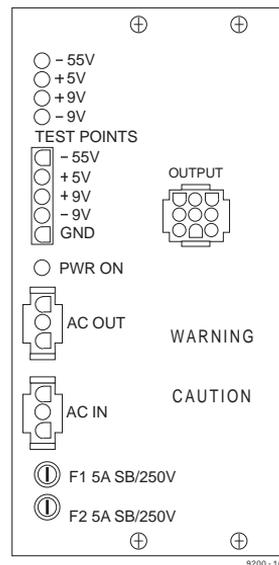
Figure 1-8 MAIN CABINET POWER SUPPLY

INSTALLING THE MAIN CABINET

To install/replace the Power Supply:

1. Unplug AC power cable from the AC receptacle. Remove the AC ring generator cable, if installed.
2. Remove the four mounting screws from the Power Supply.
3. Insert the Power Supply into the Main Cabinet and secure by re-inserting and tightening all four screws.
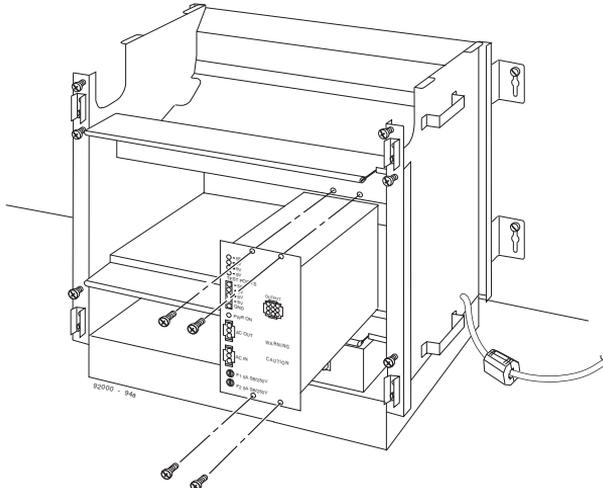
Figure 1-9 REPLACING THE MAIN CABINET POWER SUPPLY

Installing Main Cabinet Power Supply Cables
(Figure 1-10)

1. Unplug AC power cord, if necessary.
2. Plug in the red 9-conductor power cable connected from the Main Cabinet backplane connectors CN1 and CN2 to the Main Cabinet Power Supply OUTPUT connector.
3. Insert the Main Cabinet Power Supply's 3-pin to 4-pin cable (BLK,WHT,GRN) through the tie wrap on the right side of the Main Cabinet. The 3-pin cable installs to the right.

    Make sure to install the ferrite bead as indicated in Figure 1-18.

4. Plug in the Main Cabinet Power Cable's 4-conductor end to the 4-pin connector on the left side of the Main Cabinet power panel.
5. Plug in the Main Cabinet Power cable's other end (3-conductor) to the Main Cabinet Power Supply's AC IN connector.

    Make sure to install the ferrite bead as indicated in Figure 1-18.

1-9

INSTALLING THE MAIN CABINET

- − 55V
- + 5V
- + 9V
- − 9V

TEST POINTS

- − 55V
- + 5V
- + 9V
- − 9V
- GND

OUTPUT

○ PWR ON

AC OUT

AC OUT   OFF   ON

92000 - 75a
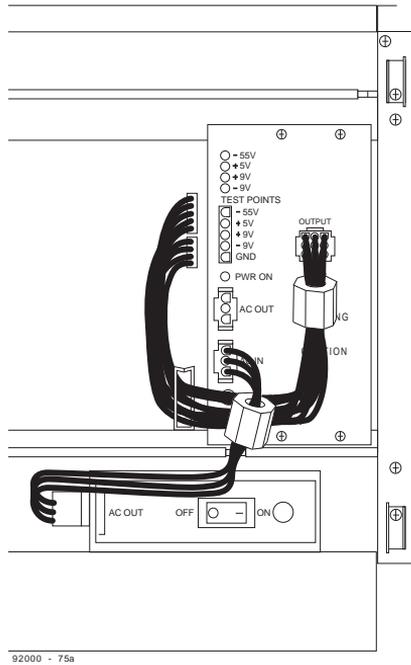
Figure 1-10 INSTALLING MAIN CABINET POWER SUPPLY CABLES

INSTALLING AN EXPANSION CABINET

Expansion Cabinet

The Expansion Cabinet requires that the power supply be installed. The Expansion Cabinet uses the top cover of the Main Cabinet.

The following is shipped with an Expansion Cabinet:
● 1 ferrite bead
● 2 wall brackets
● 3 tie wraps
● 4 cable clips

The following is shipped with an Expansion Cabinet Power Supply:
● 1 Expansion Cabinet Power Supply DC power cable (GREEN/BLACK/WHITE)
● 1 Expansion Cabinet Power Supply AC power cable (GREEN/BLACK/WHITE)
● 2 ferrite beads

The Main Cabinet's Power Supply and the Expansion Cabinet's Power Supply are slightly different, so be sure to install the correct Power Supply in the correct cabinet (the Expansion Power Supply does not have the +5V label or LED).
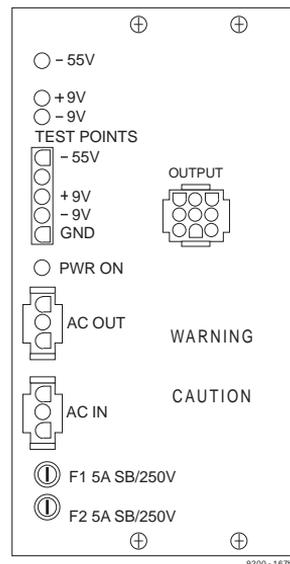
Figure 1-11 EXPANSION CABINET POWER SUPPLY

1. Installing Cabinets

INSTALLING AN EXPANSION CABINET

Before Installing an Expansion Cabinet

1. Power down the Main Cabinet.
2. Remove the Main Cabinet from the wall (if necessary).
3. Disconnect the diagnostic LED power cable from the Main Cabinet's top cover.
4. Remove the top, front, and back covers from the Main Cabinet. Refer back to Figures 1-1, 1-2, 1-3, and 1-4 if necessary.
5. Remove the front, back, and side covers of the Expansion Cabinet.

Installing an Expansion Cabinet
(Figures 1-12 and 1-13)

1. Place the Expansion Cabinet on top of the Main Cabinet.
2. Remove two screws from the top of each side panel of the Main Cabinet.
3. Loosen retaining bracket screws (4) on the Expansion Cabinet. The bracket slides into position for securing the Expansion Cabinet to the Main Cabinet. Tighten the screws.
4. Install two wall brackets on the Expansion Cabinet.

INSTALLING AN EXPANSION CABINET

(See Detail B)

(See Detail A)

(See Detail D)

(See Detail C)
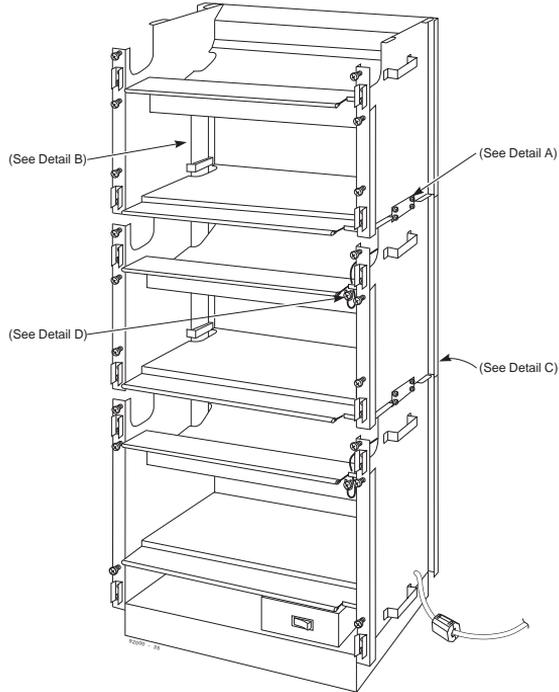
Figure 1-12 INSTALLING AN EXPANSION CABINET

92000 - 36
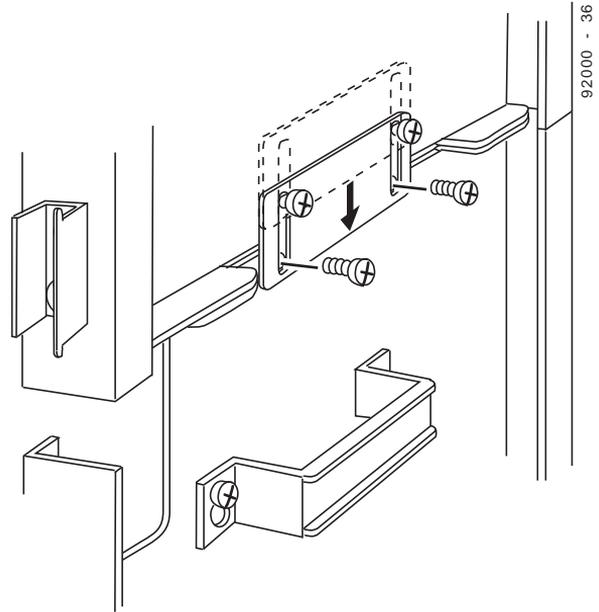
Figure 1-13 INSTALLING RETAINING BRACKETS

1. Installing Cabinets

INSTALLING AN EXPANSION CABINET

Grounding an Expansion Cabinet
(Figures 1-14 and 1-15)

    1. Route the ground wire from the back of the cabinet out through the front.
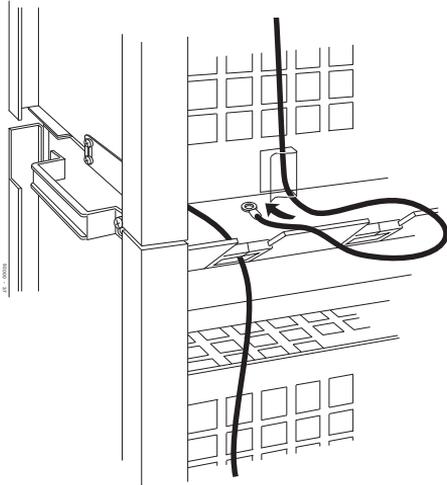
Figure 1-14 ROUTING THE GROUND WIRE

2. Connect the Expansion Cabinet ground wire to the ground lug on the front of the Main Cabinet.
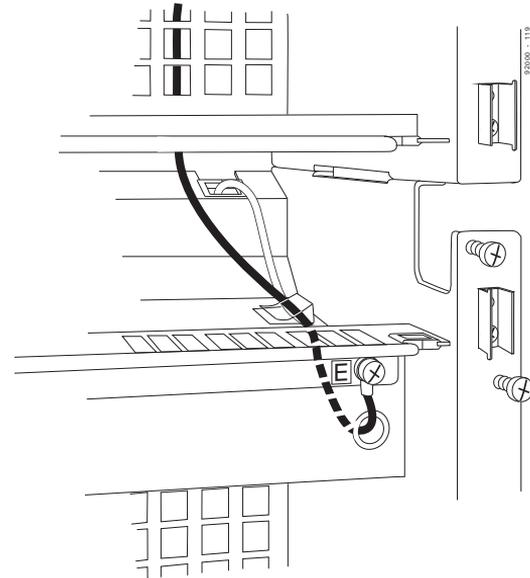
Figure 1-15 CONNECTING TO THE GROUND LUG

1-14

INSTALLING AN EXPANSION CABINET

Connecting Expansion Cabinet Filter Cables
(Figure 1-16)

1. Loosen packing from filter cables. Remove filter units (if necessary).

2. Connect filter cables from the Expansion Cabinet to the Main Cabinet with the red wire installed at the top of the connector (the white diamond shapes on the cable and connectors should line up).

> *- From the Main Cabinet, the CN8 connector plugs into the CN7 connector in the first Expansion Cabinet. The CN9 connector of the Main Cabinet plugs into the CN8 connector in the first Expansion Cabinet.*

> *- From the first Expansion Cabinet, the CN9 connector plugs into the CN7 connector of the second Expansion Cabinet. The CN10 connector of the first Expansion Cabinet plugs into the CN8 connector of the second Expansion Cabinet.*

Note: Filter cable connectors have push-in tabs to eject the filter cable if it becomes necessary to remove the filter cables.
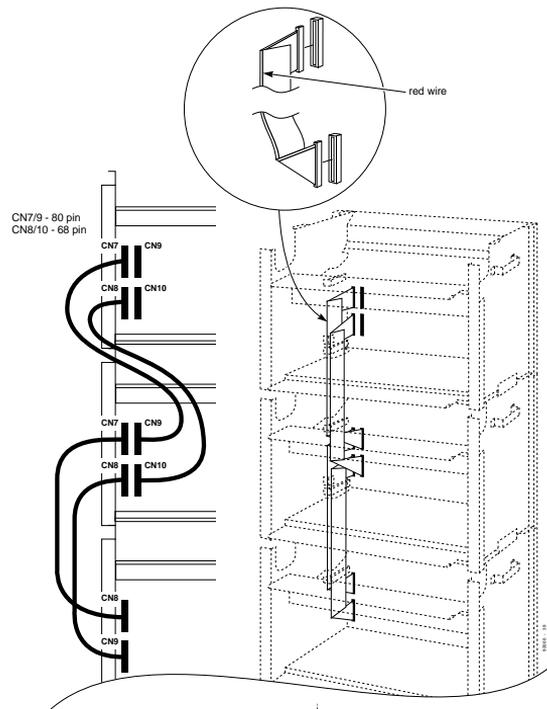
Figure 1-16 FILTER CABLING THE CABINETS   1-15

INSTALLING AN EXPANSION CABINET

Installing the Expansion Cabinet Power Supply
(Figure 1-17)

The Expansion Cabinet Power Supply is installed to the right of PCB slot 16/25 in an Expansion Cabinet. The four screws used to secure the power supply are factory-installed on the Expansion Cabinet.

The following are included with the Expansion Cabinet Power Supply:
● 1 3-stranded power cable (BLK-WHT-GRN)
● 1 6.3 amp 250 volt spare fuse

If power is turned off on the expansion cabinet's power supply, it only affects that particular cabinet. The other cabinets continue to operate normally.

To install/replace the Expansion Cabinet Power Supply:
Note: Remove the Main Cabinet's AC power cord from the AC receptacle.
1. Remove the four power supply mounting screws from the Expansion Cabinet.
2. Insert the Expansion Cabinet power supply into the Expansion Cabinet. Secure the power supply to the Expansion Cabinet by re-inserting and tightening all four screws.
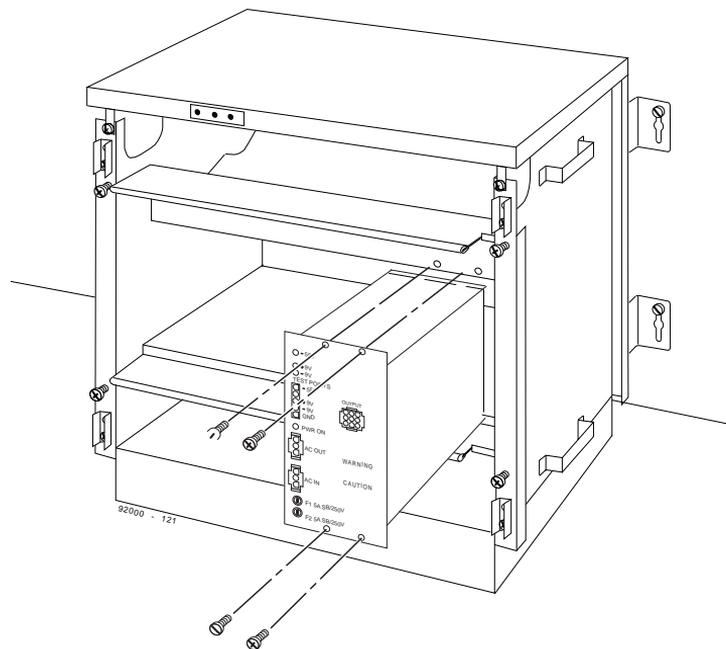
Figure 1-17 INSTALLING THE EXPANSION CABINET POWER SUPPLY 1-16

INSTALLING AN EXPANSION CABINET

Installing Expansion Cabinet Power Supply Cables (Figure 1-18)

> **Note:** Remove the Main Cabinet's AC power cord from the AC receptacle.

1. Plug in the red 9-conductor power cable connected from the Expansion Cabinet backplane connectors CN1 and CN2 to the power supply OUTPUT connector.
2. Insert the Expansion Cabinet Power Supply's 3-pin to 3-pin cable (BLK, WHT, GRN) through the tie wrap on the right side of the Expansion Cabinet.
3. Plug in the Expansion Cabinet power cable's 3-pin cable to the AC IN connector on the Expansion Cabinet power supply.
4. Plug in the Expansion Cabinet power cable's 3-connector end to the Main Cabinet power supply's AC OUT connector.
5. Install ferrite beads (2) on the Expansion Cabinet power supply power cables (see page 1-19 for further information).
6. Install Expansion Cabinet power supply cable restraint (self-stick adhesive) where needed.
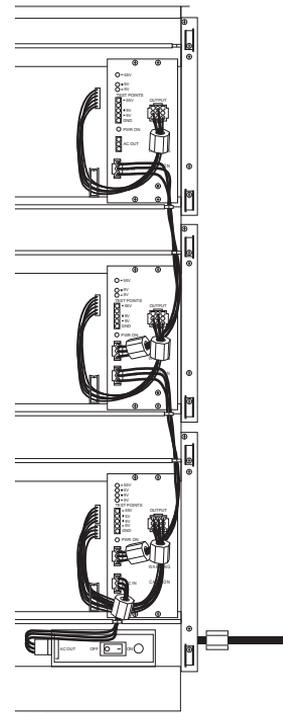
Figure 1-18 INSTALLING POWER SUPPLY CABLES 1-17

INSTALLING AN EXPANSION CABINET

Connecting the Expansion Cabinet 5V Power
Cable (Figure 1-19)

Note: Remove the Main Cabinet's AC power cord from the AC receptacle.

1. Remove the back cover from the Main Cabinet.
2. Remove the back cover from the Expansion Cabinet.
3. Connect the red 9-conductor power cable to the top 9-pin connector on the back of the Main Cabinet.
4. Connect the other end of the power cable to the lower 9-pin connector on the back of the Expansion Cabinet.
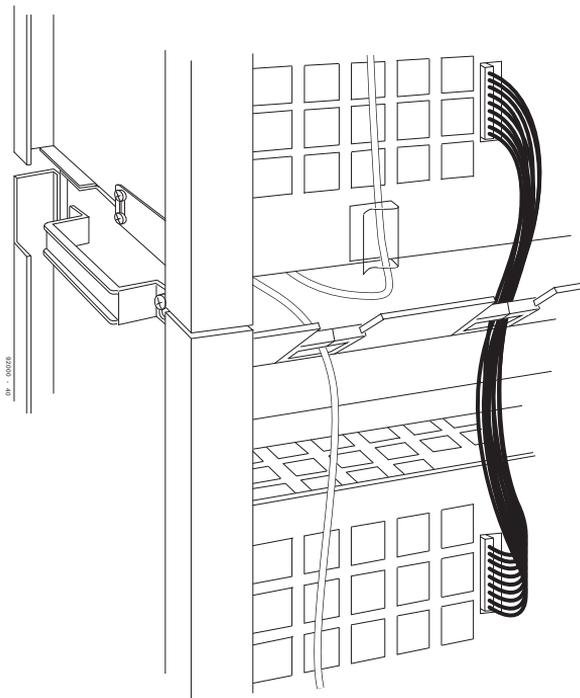
**Figure 1-19 INSTALLING EXPANSION CABINET
5V POWER CABLES**

1-18

FERRITE BEAD INSTALLATION

Ferrite Bead Installation (Figure 1-20 and 1-21)

The ferrite beads shipped with the 384i system are used to help suppress electrical interference which may affect how the system operates. For the ferrite beads to work properly, they must be installed in the correct positions on the system cables. The following information indicates the location of the ferrite bead in respect to the power supplies (main and expansion units), power cord, filter unit, CPRU, trunk PCB, and station PCBs.

Installing on Main and Expansion Power Supplies

With a fully expanded system (three cabinets), the main cabinet requires four ferrites, the first expansion cabinet requires two ferrites, and the second expansion cabinet requires one ferrite.

Ferrite Bead #1 On the main cabinet, a ferrite bead should be placed on the power cord from the AC wall outlet to the side of the cabinet, as close as possible to the cabinet.

Ferrite Bead #2 On the main cabinet, the cable from the AC OUT connector to the AC IN should have a ferrite bead placed on the AC IN end of the cable.

Ferrite Bead #3 On the main cabinet, the cable from the backplane connecting to the OUTPUT should have a ferrite bead placed on the OUTPUT end of the cable.
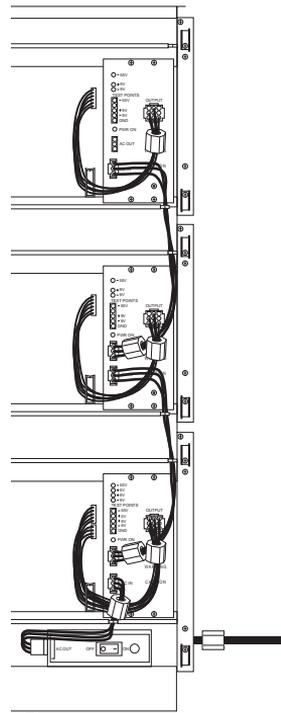
Figure 1-20 FERRITE BEADS ON CABINETS

1-19

FERRITE BEAD INSTALLATION

Ferrite Bead Installation (cont'd)

Ferrite Bead #4 On the main cabinet, the cable from AC OUT connector to the AC IN on the first expansion cabinet should have a ferrite bead placed on the AC OUT end of the cable.

Ferrite Bead #5 On the first expansion cabinet, the cable from the backplane connecting to the OUTPUT should have a ferrite bead placed on the OUTPUT end of the cable.

Ferrite Bead #6 On the first expansion cabinet, the cable from AC OUT connector to the AC IN on the second expansion cabinet should have a ferrite bead placed on the AC OUT end of the cable.

Ferrite Bead #7 On the second expansion cabinet, the cable from the backplane connecting to the OUTPUT should have a ferrite bead placed on the OUTPUT end of the cable.

Ferrite Bead Installation on Filter Units, CPRU, Trunk PCB and Station PCBs

A filter cable is shipped with each PCB as required for the system. The ferrite bead should always be placed on the end closest to the CPRU, trunk or station PCBs.

Filter PCB
(either 24 FU or 48 FU PCB)
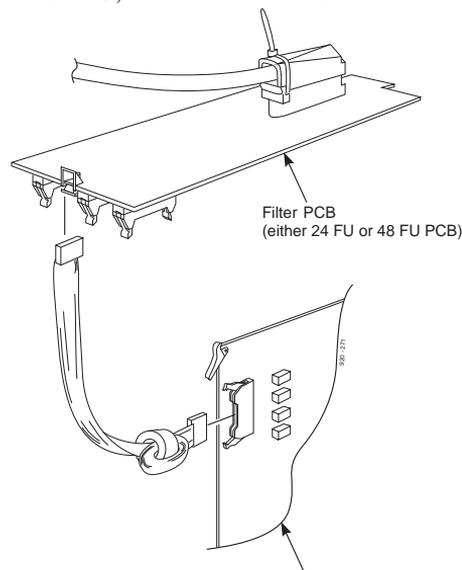
Figure 1-21 INSTALLING FERRITE BEADS ON PCBS 1-20

INSTALLING A RING GENERATOR

Installing a 90V Ring Generator (Figure 1-22)

When installing 8/16ASTU single line circuit PCBs to support the installation of 2500-type analog devices, a 90 VAC ring generator must be connected to the Main Cabinet. The ring generator must be mounted on the MDF within 4 feet of the Main Cabinet.

The ring generator cable (P/N 92111) is terminated with a 4-pin molex connector on one end and has two unterminated leads (RED/BLK) at the other end.

Note: When installing a ring generator cable to a working system, note that the ring generator's unterminated leads have 48 volts AC between them which could cause a shock if accidentally touched.

To install a ring generator:
1. Install the ring generator according to the manufacturer's instructions.
2. Busy out and remove any PCBs from slots 6 and 7 of the Main Cabinet.
3. Connect the cable's Black lead to the COM terminal of the ring generator.
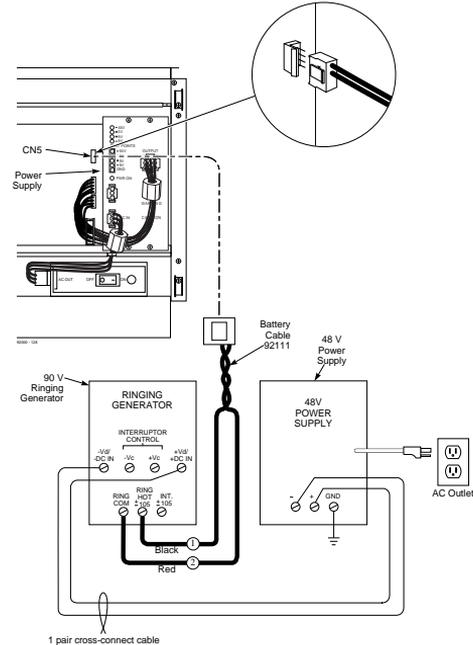
Figure 1-22 TYPICAL RING GENERATOR CONNECTIONS

1-21

INSTALLING A RING GENERATOR

Installing a 90V Ring Generator (Cont'd)

4. Connect the cable's Red lead to the +105V terminal of the ring generator.
5. Install the ring generator cable to the CN5 connector on the backplane of the Main Cabinet. The pinch on the system's ring generator cable connector faces the installer's left.
6. Power up the ring generator.
7. Install PCBs to slots 6 and 7 of the Main Cabinet, if necessary.

COMPLETING THE INSTALLATION

Reinstalling the Top Cover (Figure 1-23)

1. Connect the top cover alarm cable.

   With multi-cabinet systems, the cover from the main cabinet should be used as this cover has the LEDs for the system alarms.

2. Install the top cover. Tighten the top cover retaining screws.

92000 - 45
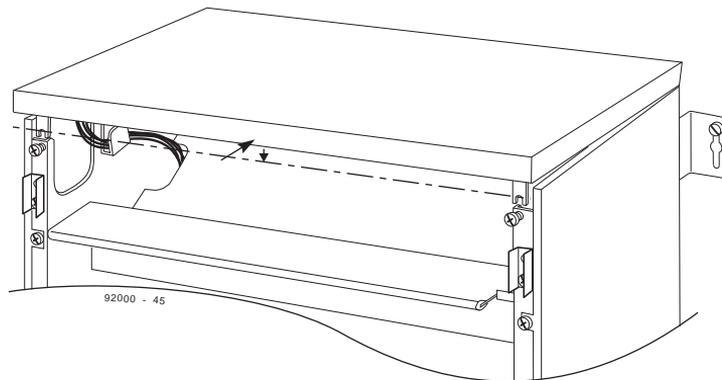
Figure 1-23 RE-INSTALLING THE TOP COVER

Section 2, PCB INSTALLATION AND STARTUP

**2. PCB Installation
and Startup**

Section 2, PCB INSTALLATION AND STARTUP (cont'd)

PCB LAYOUT

PCB Location (Figure 2-1)

Determine the slot position for each PCB. In the Main Cabinet:
- CPU slot - dedicated for the CPRU
- Slot 1 - dedicated for a 16DSTU

The Main and Expansion Cabinets:
- Slots 2-25 are universal (any type of PCB can be installed)

Use the table below to determine the PCB for each slot.

17	18	19	20	21	22	23	24	25
8	9	10	11	12	13	14	15	16
CPRU	DSTU	2	3	4	5	6	7

Order of Installing Extension PCBs

The order that the station PCBs (8ASTU/16ASTU/16DSTU) are physically inserted determines the numbering plan.

For example, with a digital station card (16DSTU) in slot #1 (ext. 301-316), when 3 additional digital station cards are installed *in the following order,* the numbering plan below applies:

Order of Install	PCB Slot #	Ext Numbers
1	1	301-316
2	2	317-332
3	4	333-348
4	3	349-364

After the initial powering up of the system, subsequent powering up or resets will not change the slot identification. System programming (Program 0006) must be performed to change the slot identification.

2. PCB Installation and Startup

PCB LAYOUT

Order of Installing Loop Start Trunk PCBs

The order that Loop Start (8ATRU) PCBs are physically inserted determines the line circuit numbering plan.

For example, if four 8ATRU's were installed in the Main Cabinet in the following order, the numbering plan below applies:

Order of Install	PCB Slot #	Line Circuits
1	4	1-8
2	5	9-16
3	7	17-24
4	6	25-32

Order of Installing Tie Line (2ATRU-EM or 4ATRU-EM) or DID (4ATRU-LD) PCBs

The order in which the 2ATRU-EM, 4ATRU-EM or 4ATRU-LD1 PCBs are installed determines the assigned line circuit number.

For example, if four 2-ATRU-EM, 4ATRU-EM or 4ATRU-LD's are installed in the Main Cabinet *in the following order,* the numbering plan applies:

Order of Install	PCB Slot #	Line Circuits
1	4	1-4
2	5	9-12
3	7	17-20
4	6	25-28

PCB LAYOUT
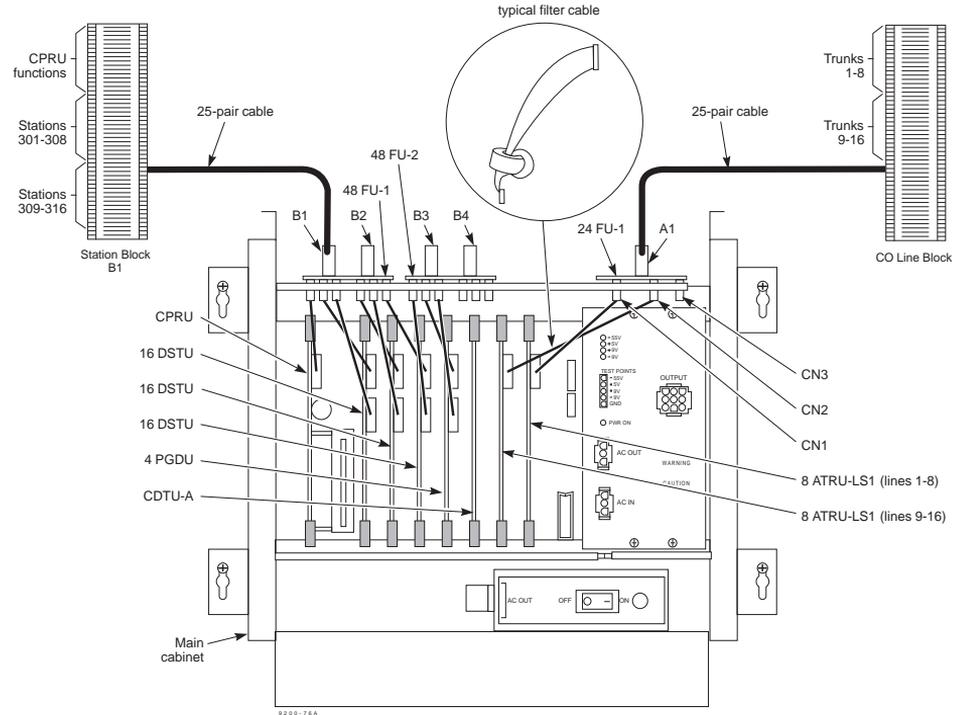
Figure 2-1 TYPICAL PCB LAYOUT

2-5

PCB INSTALLATION

Handling the PCBs

The PCBs are sensitive to static discharge. To minimize static discharge, keep PCBs in static free bags when not installed. Observe the following when installing or removing a PCB:
● Ground Main Cabinet and Expansion Cabinets
● Wear a grounded wrist strap to install/remove any PCBs
● Do not touch PCB components. Handle with white pulls.
● All PCBs can be installed hot (*except the CPRU and Message Waiting Power Supply PCB*)

"Busying out" Extension/Line PCBs

The run/block switch on extension/trunk PCBs "busies out" idle circuits. Extensions/lines cannot make a call or be called. The PCB can be pulled out without interrupting a call in progress. Calls in progress before the PCB is "made-busy" are not affected.

An extension/line PCB - PLT status LED:
● Normally flashes
● Lights steady when "made-busy" with an extension/line in use
● Goes out when the all extensions/lines are "made-busy" (idle)

Installing an Extension or Trunk PCB

To install an extension/trunk PCB with the system running:
● Set the run/block switch **DOWN**
● Insert the PCB
● Set the run/block switch **UP**. The PLT status LED starts flashing when the PCB starts processing (15 seconds).

Removing an Extension or Trunk PCB

To remove an extension/trunk PCB with the system running:
● Set the run/block switch **DOWN**
● When the PLT LED stops flashing, all extensions/trunks are idle. Remove the PCB.

Uninstalling a PCB Slot through Software

The installer can turn off (busy out) and delete (remove from software) PCB slots in the Main and Expansion Cabinets in programming for port re-numbering purposes. Deleting a PCB may effect PCB slot programming capability. Refer to Program 0006 in the Software Manual for further details.

PCB INSTALLATION

Where to Install the PCBs in a 384i System

Maximum Configuration:	128 Trunks
	256 Extensions

The system's universal architecture gives you great flexibility when installing PCBs. You can install a PCB in any slot, provided you follow the guidelines in the chart below.

Item	Description	Max.
CPRU	Central Processing Unit	1 in main cabinet
4PGDU	4 Page/Door Box	2 per system
CDTU-A	Conference/DTMF	8 per system *OR*
CDTU-B	DTMF	8 per system *OR*
CDTU-C	Conference	8 per system
4LAPBU	LAPBU Unit	1 per system
16DSTU	16 Digital Stations	16 per system
8ASTU	8 Analog Stations	15 per system *OR*
16ASTU	16 Analog Stations	15 per system
MWPS	Message Wait Power Supply	1 per system
48FU	Station Filter Unit	4 per cabinet
		12 per system
	OR	
24FU	Trunk Filter Unit	4 per cabinet
		12 per system

Item	Description	Max.
8ATRU	8 Analog/Loop Start Trunks	16 per system
ATRU-EM	E&M Tie Line Trunks	16 per system
ATRU-LD	4 DID Trunks	16 per system
ITSU	24 T1/PRI Trunks/Channels	5 per system
BRIU	2 Two-Channel BRI Circuits	16 per system
4PFTU	4 Power Failure Circuits (Installs on 8ATRU PCB)	1 per cabinet
8GSAU	Ground Start Daughter Board (Installs on 8ATRU PCB)	16 per system
8CIDU	Caller ID Daughter Board (Installs on 8ATRU PCB)	16 per system

2. PCB Installation and Startup

PCB INSTALLATION

Central Processing Unit (CPRU) PCB (Figure 2-2)

One CPRU PCB must be installed in the CPU slot in the Main Cabinet.

The CPRU provides the following:
- Eight diagnostic LEDs
- Two DIP switches - one for data loading (RAM or disk)
                    - one not used
- One relay for Night Mode Switch
- One 10-pin connector (CN2) for CPRU to 48FU connection
- One 3V lithium non-rechargeable battery - RAM backup

    The battery life is estimated to be approximately 3 years.

- One 6-pin connector for terminal programming (future)
- One MOH source "S" jumper (internal/external)
- One BGVR potentiometer for BGM volume control
- One HTVR potentiometer for MOH volume control
- One RES reset switch (warm boot)
- One factory-installed 3 1/2" disk drive for the system software disk
- One Music on Hold relay
- Background Music

CPRU - PCB

Ribbon Cable to
CPU Filter Unit

Battery Connections
(See Detail A)

Mode Switch and MOH Source
(See Detail B)

Music on Hold
Volume Control

Background Music
Volume Control

Use non-metallic
alignment tool

Reset Switch

Status LEDs
(See Detail C)

Disk Drive
(See Detail D)
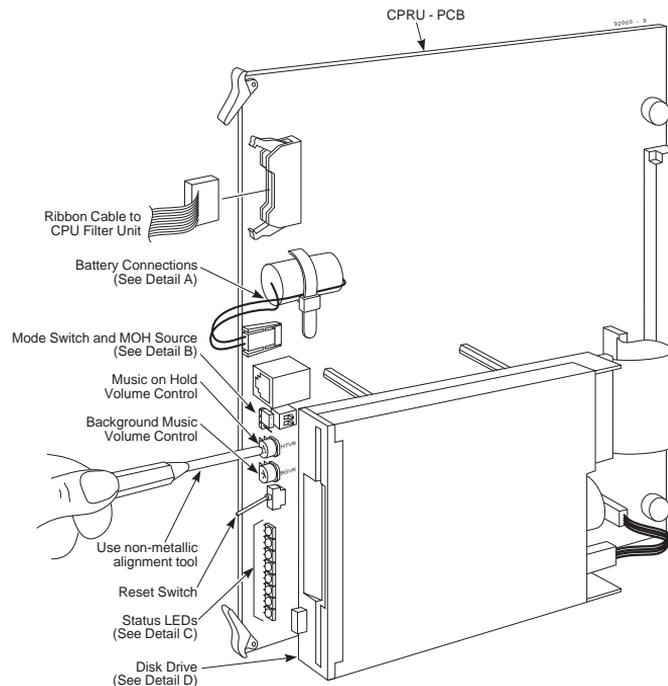
Figure 2-2 CPRU PCB

CPRU Installation (Figures 2-3 through 2-6)

1. Install the battery on the CPRU using the tie wrap.

    The tie wrap can be reused when replacing the battery.

2. Connect the battery to the BAT connector with **the red wire up** (Figure 2-3).

3. Insert the CPRU into the CPU slot in the Main Cabinet (Figure 2-4).

4. Set the MOH jumper for internal/external MOH source (Figure 2-5). Use the HTVR potentiometer to adjust MOH volume.

Note: When the S jumper is set for internal MOH, and an external MOH source is connected to the MISC block or to a 3ACI, external MOH is sent to trunks programmed to receive external MOH.
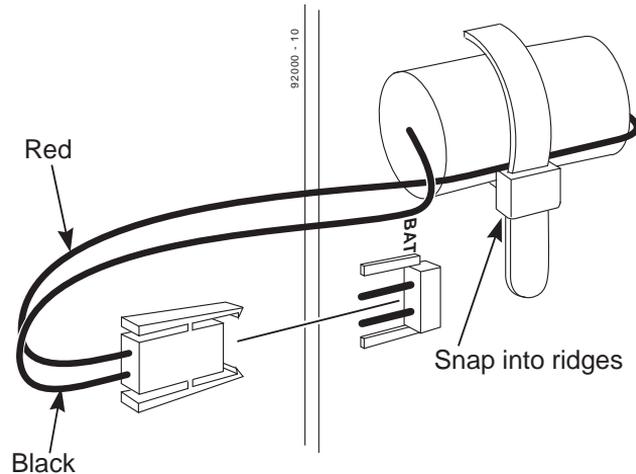
Figure 2-3 CPRU BATTERY INSTALLATION
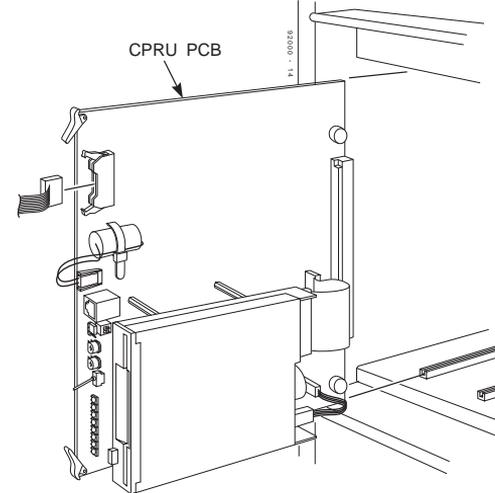
Figure 2-4 INSERTING THE CPRU

2-9

2. PCB Installation and Startup

PCB INSTALLATION

5. Set DIP switch 1 **ON** for system data and customer programming data loaded from the disk. Set DIP switch 1 **OFF** for system data from disk and customer programming data loaded from RAM.
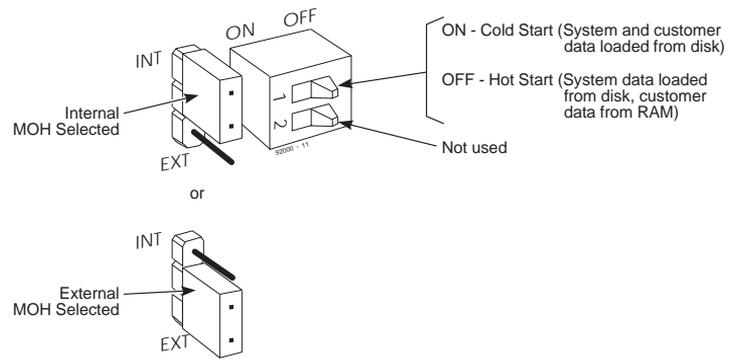
**Figure 2-5 SETTING MOH SOURCE
AND SYSTEM DATA SOURCE**

6. Insert the software disk into the disk drive (Figure 2-6).
7. Install the 10-pin to 16-pin filter cable after 48FU installation.
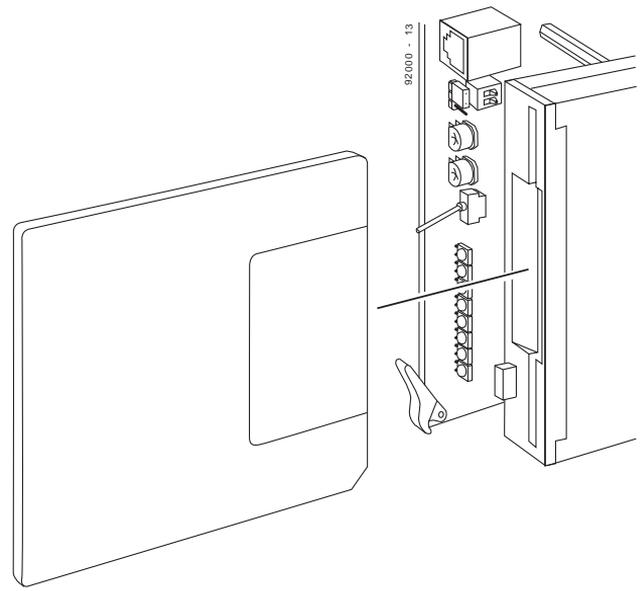
Figure 2-6 INSTALLING THE SYSTEM DISK

2-10

PCB INSTALLATION

Digital Station (16DSTU) PCB (Figure 2-7)

The 16DSTU PCB uses 16 ports and provides:
- 16 digital extension circuits
- 16 extension status LEDs
- Two 16-pin connector(s) for 48FU filter unit connection
- One PCB status LED
- One run/block switch

In order to program the system, a 16DSTU PCB must be installed in slot 1. The 16DSTU requires one universal slot, with a maximum of 16 PCB's per system.

To install a 16DSTU PCB:
1. Set the run/block switch **DOWN.**
2. Install the 16DSTU into a slot.
3. Install the 16-pin filter cable(s) after 48FU installation.
4. Set the 16DSTU run/block switch **UP**.

16 Digital Station Card

CN2

Circuits for Stations 1-8

To 48FU Filter Unit

Circuits for Stations 9-16

To 48FU Filter Unit

CN3

Status LED (Normally flashing)

RUN

Switch Up - PCB On Line

Switch Down - PCB Off Line (Blocked)

Station 1

Station 16

If LED is...	Associated Station is...
Off	Connected and idle
Flashing	Not installed
On	Off hook/BGM
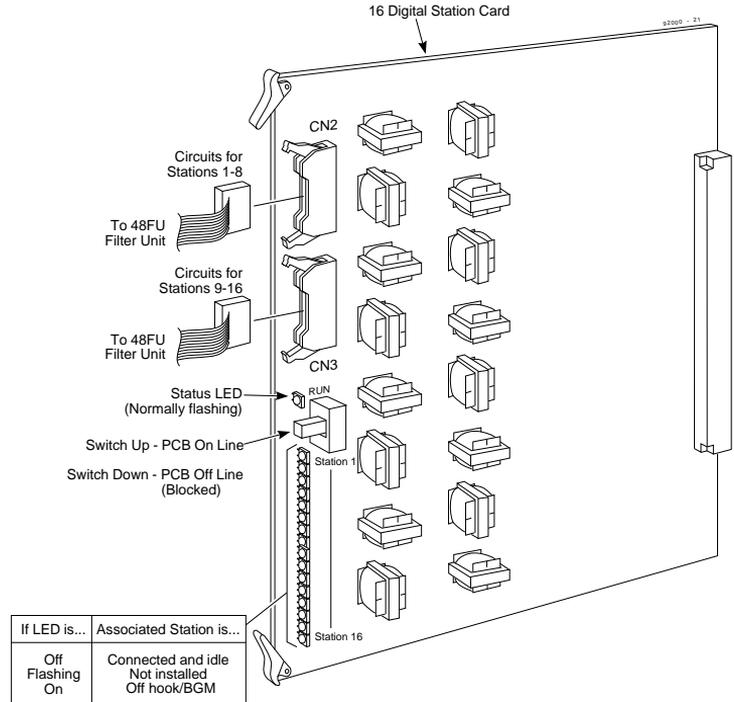
Figure 2-7 16DSTU INSTALLATION

2-11

2. PCB Installation and Startup

PCB INSTALLATION

Analog Station (8ASTU/16ASTU) PCB (Figure 2-8)

The ASTU PCB is assigned 16 ports and provides:
- 8 (8ASTU) or 16 (16ASTU) analog extension circuits
- 8 (8ASTU) or 16 (16ASTU) extension status LEDs
- one (8ASTU) or two (16ASTU) 16-pin connectors for 48FU filter unit connection(s)
- one PCB status LED
- one run/block switch

Note: The 8ASTU PCB is assigned 16 ports, but only the first 8 ports are used.

DTMF (2500 type) sets require a CDTU-A or CDTU-B in addition to a 90V AC ring generator. The ASTU is installed in a universal slot, with 15 maximum per system.

If the 16ASTU-B PCB with Message Waiting (P/N 92178) is used, a Message Waiting Power Card (P/N 92112) is required.

Installing an ASTU PCB:
1. Set the run/block switch **DOWN.**
2. Install the ASTU into the slot.
3. Install the 16-pin filter cable(s) after 48FU installation.
4. Set the ASTU's run/block switch **UP.**

Analog Station PCB

Circuits for Stations 1-8

To 48FU Filter Unit

CN2

Status LED (Normally flashing)

RUN

Switch Up - PCB On Line
Switch Down - PCB Off Line (Blocked)

Station 1   BLK

Station 8

If LED is...	Associated Station is...
Off	Connected and idle or Not installed
On	Off hook
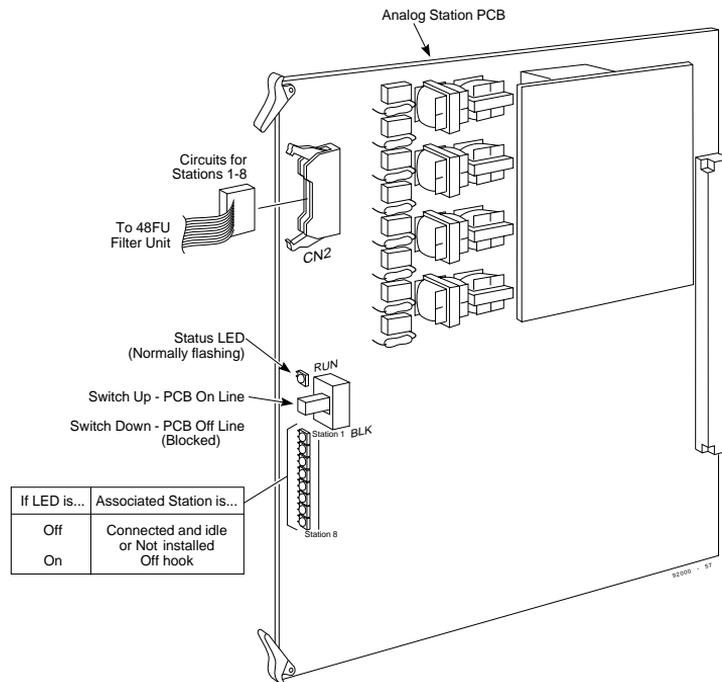
Figure 2-8 ASTU INSTALLATION

2-12

PCB INSTALLATION

Message Wait Power Supply PCB (Figure 2-9 and 2-10)

If your system uses 16ASTU-B PCBs (P/N 92178) to light message lamps on analog telephones, you need to install a Message Wait Power Supply PCB. When an analog telephone has a Message Waiting, the Message Wait Power Supply PCB provides the phone with the proper lamping voltage.

Cabinets previous to Series 2.0 require one Message Wait Power Supply PCB per cabinet. Cabinets that are 2.0 or higher require only one Message Wait Power Supply PCB, placed in any cabinet. To determine which series cabinet you have, check the 8-digit ID code on the product label. The main cabinet has the label located inside the cabinet, near the power supply. The expansion cabinets have the label on the back cover of the cabinet. The series number is the third and fourth digits in the ID code. For example, in the number 93103594, the cabinet is a Series 1.0.

WARNING: This PCB must be removed/installed with the system power turned off.
If no cabling is required in your PCB installation (e.g., using cabinets previous to Series 2.0 or in a single cabinet system for Series 2.0 or higher), turning off the system power is not required.

Installing the Message Wait Power Supply PCB:

Installing this PCB after the system is installed and operating, make sure that:
a. *Before proceeding further, make sure the switch SW1 on the CPRU is set to OFF in order to retain the current system programming.*
b. *If the power to the system is on, turn the power switch on the Main Cabinet OFF.*

1. Plug the Message Wait Power Supply PCB(s) into the system cabinet(s).
2. For cabinets previous to Series 2.0, skip to Step 4.
   For Series 2.0 cabinets or higher, if expansion cabinets are installed, remove the back covers of all the system cabinets.
3. Using the cables provided with the Message Wait Power Supply PCBs, connect the Main Cabinet (CN4 connector) to the Expansion Cabinet #1 (CN2 connector). Then, connect Expansion Cabinet #1 (CN3 connector) to Expansion Cabinet #2 (CN2 connector). Refer to Figure 2-4.
4. If the power switch on the Main Cabinet was turned off to install the PCB, you can turn the power switch to ON.

PCB INSTALLATION
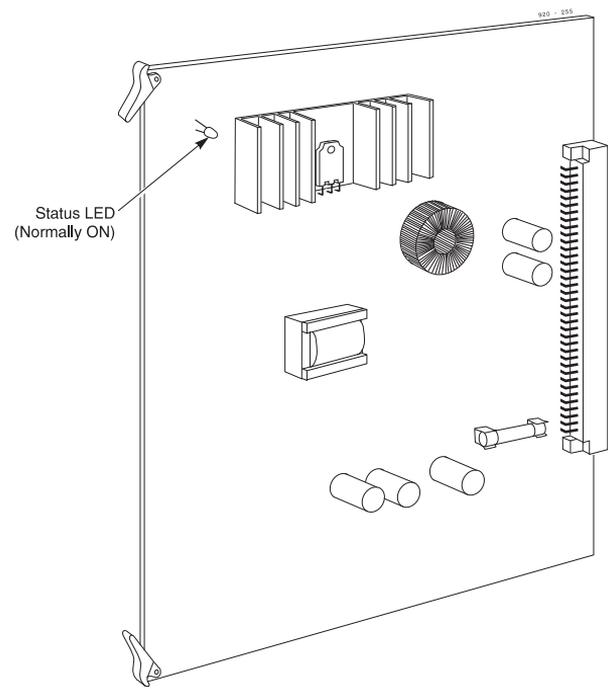
Figure 2-9   MESSAGE WAIT POWER

Status LED
(Normally ON)
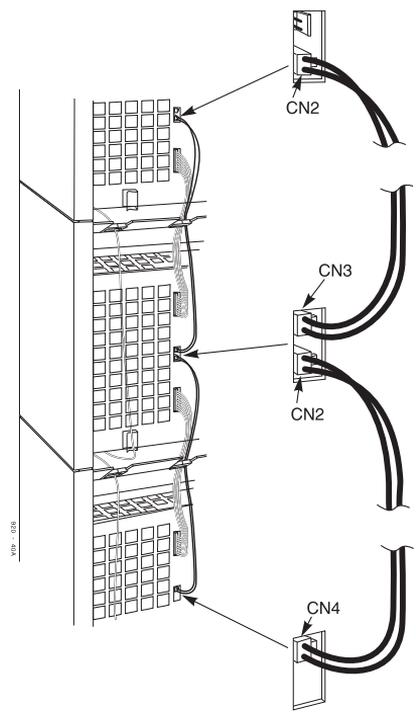
Figure 2-10   CABINET CONNECTIONS

CN2

CN3

CN2

CN4

2-14

PCB INSTALLATION

Analog Trunk (8ATRU-LS1) PCB (Figure 2-11)

The 8ATRU-LS1 PCB provides:
- 8 analog loop start line/trunk circuits
- 8 trunk status LEDs
- Six 2/3 pin jumpers for ground start, power failure operation, or Caller ID
- One 16-pin connector for 24FU filter unit connection
- One PCB status LED
- One run/block switch

With this card, one of the following daughter boards can be installed: GSAU (Ground Start), 4PFTU (Power Failure), CIDU (Caller ID). A maximum of 16 8ATRU PCB's per system is allowed.

Installing the Analog Trunk PCB:
Note: Refer to instructions for the GSAU (ground start), CIDU (Caller ID) or PFTU (power failure) PCBs if they are required before installing the 8ATRU.

1. Set the run/block switch **DOWN**.
2. Install the 8ATRU-LS1 into a slot.
   Note: Jumpers on connectors CN4 and CN5 must be installed when ground start, Caller ID, or PF operation is not required.
3. Install the 16-pin filter cable(s) after 24FU installation.
4. Set the 8ATRU-LS1 run/block switch **UP.**

Analog Trunk PCB

Circuits for Trunks 1-8

To 24FU Filter Unit

CN1

Status LED (Normally flashing)

RUN

Switch Up - PCB On Line
Switch Down - PCB Off Line (Blocked)

BLK

Trunk 1

Trunk 8

If LED is...	Associated Trunk is...
On	In use
Off	Idle
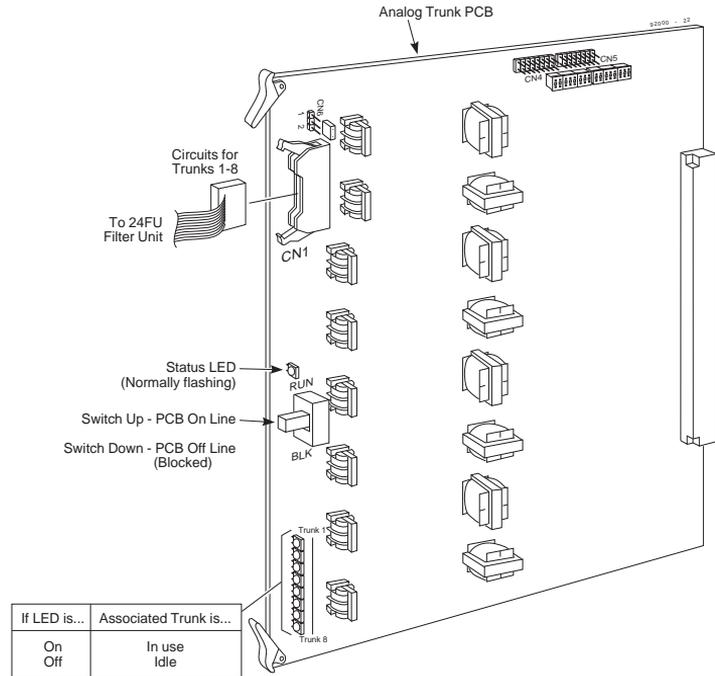
Figure 2-11 8ATRU-LS1 INSTALLATION

PCB INSTALLATION

Caller ID (8CIDU) Daughter Board (Figure 2-12)

The Caller ID daughter board allows the system to display Caller ID information. Each daughter board is installed on a 8ATRU PCB. The Caller ID PCB provides Caller ID capability for all eight trunk circuits on the 8ATRU PCB. Every 8ATRU PCB installed in the system can have a Caller ID daughter board attached. The maximum number of PCBs allowed per system is 16.

Note: With the Caller ID daughter board plugged in, the 8ATRU PCB cannot have ground start operation or be used for power failure.

To install a 8CIDU PCB:

1. Remove the filter cable from the 8ATRU PCB to be equipped with a 8CIDU (if necessary).

2. Remove the 8ATRU PCB.

3. Remove all six jumpers from connectors CN4 and CN5 from the 8ATRU PCB.

4. Align the Caller ID PCB standoffs over the holes located in the 8ATRU PCB.

The CN2 connector on the Caller ID PCB should be above the CN4 connector on the 8ATRU PCB and CN3 should be above CN5.

5. Push the PCB down until the standoffs snap into place.

6. Plug the 8ATRU PCB back into the system cabinet and reconnect the 16-pin filter cable.
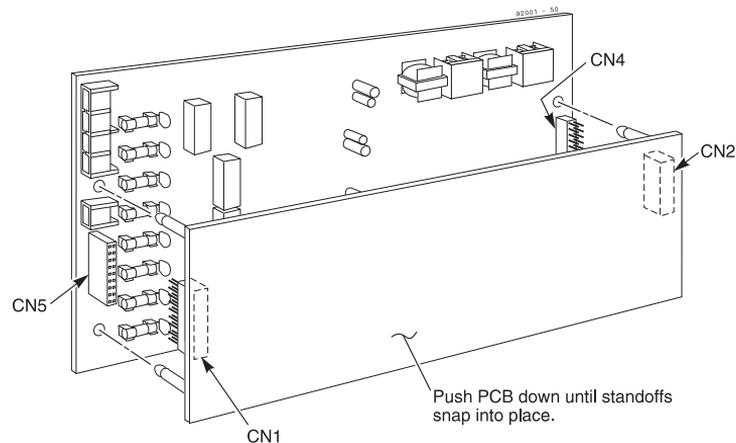
Figure 2-12 CALLER ID (8CIDU) PCB

2-16

PCB INSTALLATION

Ground Start (8GSAU) Daughter Board (Figures 2-13 and 2-14)

The GSAU PCB converts the eight loop start circuits on an 8ATRU PCB to analog ground start line/trunk circuits. Every 8ATRU in the system can have ground start operation, if desired. However, you cannot mix ground start and loop start trunks on the same 8ATRU PCB.

Note: When a GSAU PCB is installed, power failure operation and Caller ID cannot be used on that 8ATRU PCB.

Ground Start PCB Installation:
1. If the 8ATRU-LS1 is installed: Set the 8ATRU-LS1 run/block switch UP, remove the 16-pin filter cable(s) from the 8ATRU-LS1, and remove the PCB from the cabinet.
2. Remove all six jumpers from connectors CN4 and CN5 from the 8ATRU-LS1.
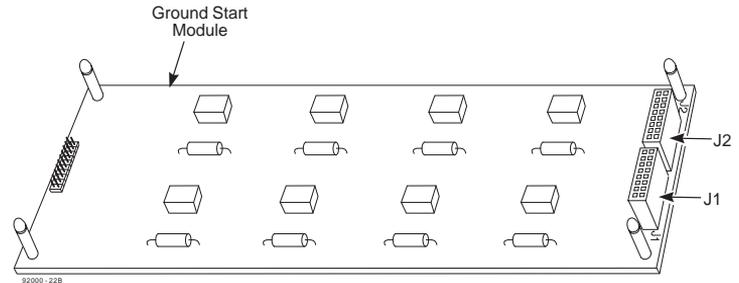
Figure 2-13 GROUND START TRUNK PCB

2-17

2. PCB Installation and Startup

PCB INSTALLATION

Ground Start (8GSAU) PCB Installation (cont'd)

3. Install the GSAU on the 8ATRU-LS1. GSAU jumper J1 (female) plugs into 8ATRU-LS1 CN4 (male). GSAU jumper J2 (female) plugs into 8ATRU-LS1 CN5 (male). GSAU jumper J3 (male) plugs into 8ATRU-LS1 CN3 (female).
4. Install the 8ATRU-LS1 into a PCB slot.
5. Set the run/block switch UP.
6. Install the filter cable to the 24FU.
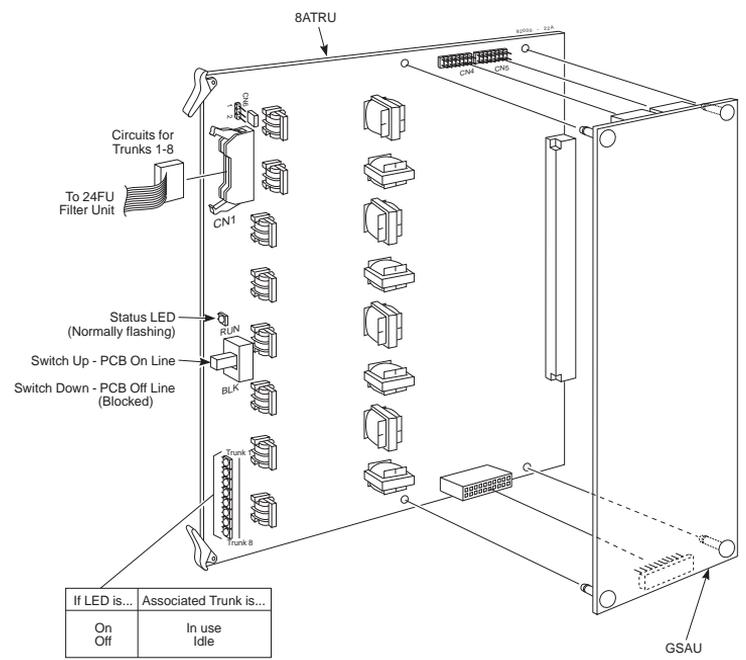
Figure 2-14 INSTALLING THE GSAU   2-18

PCB INSTALLATION

Power Failure (4PFTU) Daughter Board (Figure 2-15)

When Power Failure Transfer is needed, install 4PFTU Power Failure daughter boards. The 4PFTU is a board that plugs into an 8ATRU loop start trunk PCB. When commercial power fails, relays on the 4PFTU automatically bridge four lines from an 8ATRU to a designated 48FU PF block. The PF block must be equipped with single line telephones. When calls ring in on the trunks, they ring the analog phones directly. One 4PFTU can be installed per cabinet.

Note: When a PFTU PCB is installed, ground start operation and Caller ID cannot be used on that 8ATRU PCB.

To install the 4PFTU PCB:
1. Remove the filter cable from the 8ATRU PCB to be equipped with the 4PFTU (if necessary).
2. Remove the 8ATRU from the cabinet (if necessary).
3. Remove the 3 jumper straps from the CN4 connector on the 8ATRU.
4. Install the 4PFTU on the 8ATRU.
5. Install the 8ATRU into the cabinet.
6. Connect the 4PFTU filter to the corresponding 48FU filter unit.

7. Install the filter cable from the 8ATRU to a 24FU.
8. Install a single line set to each power failure output on the 48FU filter unit.

Power Failure Card

92000 - 59
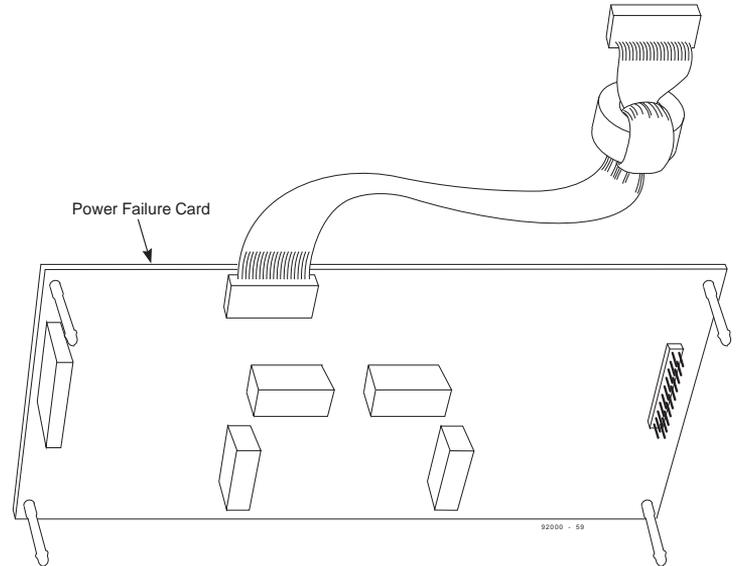
Figure 2-15 4PFTU INSTALLATION

2-19

2. PCB Installation and Startup

PCB INSTALLATION

Direct Inward Dial (DID) (4ATRU-LD1) PCB
(Figure 2-16)

The 4ATRU-LD1 DID Trunk PCB provides:
- 4 DID trunk circuits
- 4 DID trunk status LEDs
- On-board power supply
- One 16-pin connector for 24FU filter unit connection
- One PCB status LED
  One run/block switch

The 4ATRU-LD1 requires one universal slot, with 16 maximum PCBs per system. For DTMF DID service, make sure the system also has a CDTU A/B PCB installed. For each PCB installed, the system reserves 8 trunk port numbers but only provides 4 circuits.

Installing the Direct Inward Dial PCB:
1. Set the run/block switch **DOWN.**
2. Install the 4ATRU-LD1 into a slot.
3. Install the 16-pin filter cable after 24FU installation.
4. Set the run/block switch **UP.**

DID Trunk PCB
920 - 163a

Circuits for
DID Trunks 1-4

To 24FU
Filter Unit

CN2

Status LED
(Normally flashing)

RUN

Switch Up - PCB On Line

BLK

Switch Down - PCB Off Line
(Blocked)

Trunk 1

Trunk 4

If LED is...	Associated Trunk is...
On	In use
Off	Idle
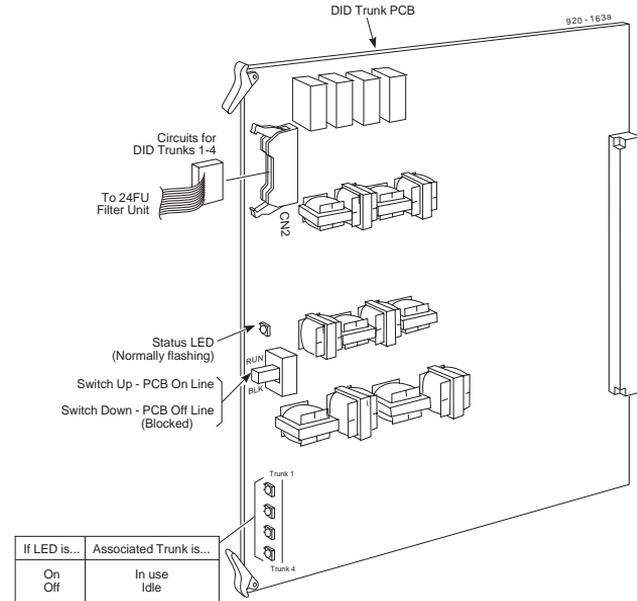
Figure 2-16 4ATRU-LD1 INSTALLATION 2-20

PCB INSTALLATION

Tie Line (2ATRU-EM) PCB (Figure 2-17)

The 2ATRU-EM Tie Line PCB (P/N 92186) supports system connections to 2-wire (four lead) TL11M tie lines. Each PCB provides:
- Four 4-circuit tie line interfaces
- One on-board power supply
- Four tie line status LEDs
- One 16-pin connector for 24FU filter unit connection
- One PCB status LED
- One run/block switch

Each 2ATRU-EM PCB interfaces 4 tie lines to the system, but uses 8 system line ports per PCB. A maximum of 16 PCBs per system is allowed, providing 64 tie line trunks. For DTMF tie line service, make sure the system also has a CDTU A/B PCB installed.

Installing the 2ATRU-EM PCB:
1. Set the run/block switch **DOWN**.
2. Install the 2ATRU-EM into a universal slot.
3. Install the 16-pin filter cable after 24FU installation.
4. Set the run/block switch **UP.**

If LED is...	Associated Trunk is...
On	In use
Off	Idle
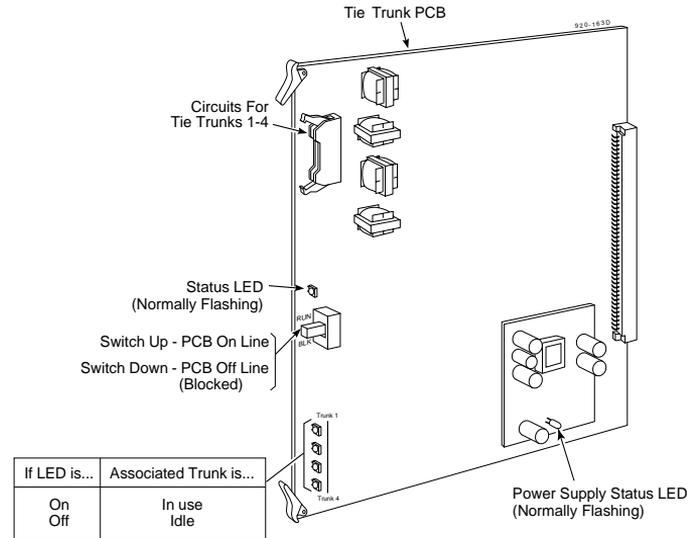
Figure 2-17 2ATRU-EM TIE LINE PCB INSTALLATION   2-21

2. PCB Installation and Startup

PCB INSTALLATION

Tie Line (4ATRU-EM) PCB (Figure 2-18)

The 4ATRU-EM Tie Line PCB (P/N 92189) supports system connections to either 2-wire (four lead) or 4-wire (eight lead) E&M signalling tie lines. Each PCB provides:
- Four 4-circuit tie line interfaces
- One on-board power supply
- Four tie line status LEDs
- Two 16-pin connector for 24FU filter unit connection
- One PCB status LED
- One run/block switch

Each 4ATRU-EM PCB interfaces 4 tie lines to the system, but uses 8 system line ports per PCB. A maximum of 16 PCBs per system are allowed, providing 64 tie line trunks. For DTMF tie line service, make sure the system also has a CDTU A/B PCB installed.

Installing the 4ATRU-EM PCB:
1. Set the run/block switch **DOWN**.
2. Set the straps for either the 2-wire or 4-wire (see Figure 2-18).
3. Set the straps for either Type 1 or Type 2 signaling.
4. Install the 4ATRU-EM into a slot.
5. Install the 16-pin filter cables after 24FU installation. See Figure 2-18 for connections (lines 3+4=top, lines 1+2=bottom).
6. Set the run/block switch **UP.**

if LED is...	Associated Trunk is...
On	In use
Off	Idle
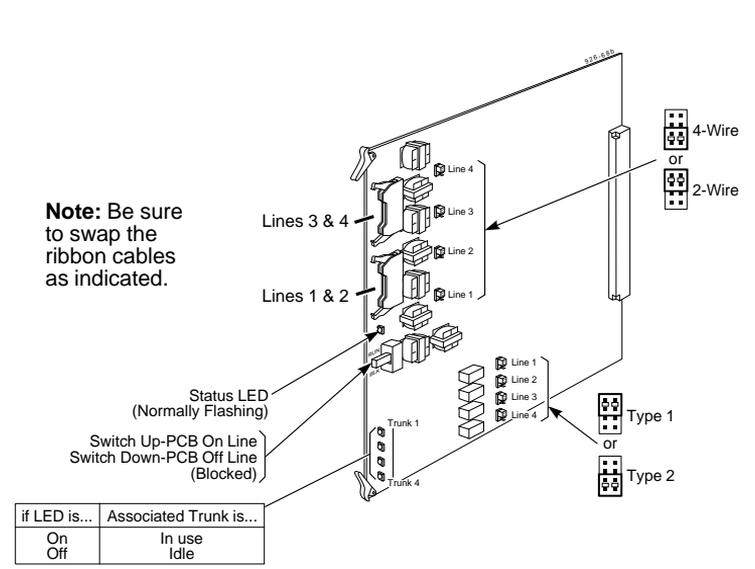
Figure 2-18 4ATRU-EM TIE LINE PCB INSTALLATION   2-22

PCB INSTALLATION

BRI (BRIU) Interface PCB (Figure 2-19 and 2-20)

Note: *For BRI, please consult with your Nitsuko Representative for availability.*

The BRI (BRIU) PCB provides two 2-channel (2B+D) circuits for connecting to ISDN BRI services. Supported BRI services are:
● Basic BRI Call Control (BCC)
● Point-to-Point BRI Terminal Connection (no daisy-chaining)
● Multipoint BRI Terminal Connection (daisy-chaining)

The BRI Interface PCB has two circuit status LEDs on the outboard edge of the card. An additional LED shows when the PCB is in or out of service. The PCB has four sets of jumpers to set the channel termination and a dip switch for selecting the function of each circuit (i.e., T-bus or S-bus).

The BRI Interface PCB connects to the network via an NT1 Network Termination. Each PCB takes up 8 trunk ports, but only the first 4 are used (the last 4 are disabled). You can install up to 16 PCBs maximum per system.

To install a BRI Interface PCB:

1. Set the switches on the BRI PCB for either S-Bus or T-Bus use.

2. Plug the BRI PCB into an available universal slot of any installed cabinet.

3. Connect an 8-pin line cord to the BRI PCB. See the figure below for the line cord connection. Connect the opposite end to the NT1 Network Termination Connection.

8-Pin Line Cord Connections

Pin 8 - Grey	Pin 1 - Brown
Pin 7 - Orange	Pin 2 - Blue
Pin 6 - Black	Pin 3 - Yellow
Pin 5 - Red	Pin 4 - Green
Pin 4 - Green	Pin 5 - Red
Pin 3 - Yellow	Pin 6 - Black
Pin 2 - Blue	Pin 7 - Orange
Pin 1 - Brown	Pin 8 - Grey

926 - 70

Figure 2-19 8-Pin Line Cord

4. Connect a line cord from the NT1 Network Termination to the telco BRI line.

5. Connect the power cord to the NT1 Network Termination unit.

2. PCB Installation and Startup

PCB INSTALLATION

NT1 Network Termination

Typical T-Bus Point-to-Point Configuration

Terminal Terminal Line

Note: The 2BTSU PCB provides four BRI ports.
These are the first four ports of the slot
position (e.g., 1-4). The last four ports
(e.g., 5-8) are not available.

To telco BRI line

- Point-to-Point Termination
(No daisy-chaining)

- Multipoint Termination
(For daisy-chaining)

8-Pin Line Cord

Circuit 1
Port 1
Port 2

Circuit 1

Circuit 2
Circuit 2
Port 3
Port 4   (Not used in
this example)

Status LED
(Normally flashing)

Switch Up - PCB On Line

Switch Down - PCB Off Line
(Blocked)

Sync LED Circuit 1
(Normally On)

Sync LED Circuit 2
(Normally On)

Circuit 1
Circuit 2

S-Bus Selected   T-Bus Selected

Figure 2-20 BRI Interface T-Bus Point-to-Point

2-24

PCB INSTALLATION

T1/PRI (ITSU) Interface PCB (Figure 2-21)

Note: *For PRI, please consult with your Nitsuko Representative for availability.*

For T1 and ISDN Primary Rate Interface (PRI) applications, install a T1/PRI Interface PCB. This PCB has a single 24-channel circuit which can be configured for either T1 trunks or PRI. The T1/PRI PCB requires system software 3.07.33 or higher and T1 firmware 9A9F or later.

If set for T1, the T1/PRI PCB gives the system 24 trunks in a single universal slot. These trunks can be one of the following:

● Loop Start
● Ground Start
● DID
● Tie Lines
● ANI/DNIS Tie Lines

T1 gives the system the advantages of advanced digital trunking as well as conserving universal slots. For example, a system with 12 loop start trunks, two tie lines and six DID trunks would use up five universal slots. With T1 all these trunks would be available in a single universal slot, freeing up four additional universal slots for stations, DTMF receivers or options like Door Boxes and External Paging.

If set for PRI, each T1/PRI PCB provides 24 PRI (23 B&D) channels and supports the following PRI services:

● Basic PRI Call Control (BCC)
● Display of incoming caller's name and number
● Routing based on the number the caller dials
● ISDN maintenance functions (e.g., In Service/Out of Service Messaging)
● Speech and 3.1 KHz audio

The T1/PRI Interface PCB also requires the CSU or CSU/DSU equipment and interconnecting cables listed below:
● T-Serve II CSU (P/N 92310)
  consisting of:
  - T-Serve II CSU (P/N 85950)
  - T-Serve II Power Supply (P/N 85951)
  - CSU/DSU RJ48-DB15 Cable (P/N 85953)
  - T1/PRI Installation Cable (P/N 92197)
  - T1/PRI Interface PCB (P/N 92190)

2. PCB Installation and Startup

PCB INSTALLATION

T1/PRI (ITSU) Interface PCB (cont'd)

OR one of the following:

- Quad Datasmart DSU (P/N 92312) consisting of:
  - Quad Datasmart DSU (P/N 85956)
  - CSU/DSU RJ48-DB15 Cable (P/N 85953)
  - T1/PRI Installation Cable (P/N 92197)
  - T1/PRI Interface PCB (P/N 92190)

OR

- Dual Datasmart DSU (P/N 92311)
  - Datasmart DSU Add/Drop Unit (P/N 85955A)
  - CSU/DSU RJ48-DB15 Cable (P/N 85953)
  - T1/PRI Installation Cable (P/N 92197)
  - T1/PRI Interface PCB (P/N 92190)

When installed, the T1/PRI Interface PCB uses the first block of 24 consecutive trunks. For example, if you have an ATRU PCB installed for trunks 1-8, the T1/PRI Interface PCB will automatically use trunks 9-32. If you have ATRU PCBs installed for trunks 1-8 and 17-24, the T1/PRI PCB will use trunks 25-48. The T1/PRI Interface PCB cannot use trunks 9-16 (even if available) since they are not part of a consecutive block of 24 trunks.

The T1/PRI PCB requires one universal slot with five maximum PCBs per system. The PCB has an in-service/out-of-service switch on the outboard edge of the card.

To install a T1/PRI Interface PCB:

1. Set the switches on the T1/PRI Interface PCB for either PRI Mode or T1 Mode.

2. Plug the T1/PRI Interface PCB into any universal slot.

   Note: PRI requires Program 0307 to be set before proceeding to the next step.

3. Set the RUN/BLOCK switch UP.

   Before proceeding, wait until the T1/PRI PCB LED starts to flash. This indicates the card is functioning correctly.

4. Connect the T1/PRI Installation Cable (P/N 92197) to the CN2 connector on the T1/PRI Interface PCB.

PCB INSTALLATION

T1/PRI (ITSU) Interface PCB (cont'd)

5. If connecting a CSU:
-- Connect the opposite end of the T1/PRI Installation Cable
to the DB-15 female connector (J4) on the CSU.
-- Connect the DB-15 female connector on the RJ48-DB15
Cable (P/N 85953) to the DB-15 male connector (P1) on
the CSU.
-- Connect the opposite end of the RJ48-DB15 cable to the
telco connection.

OR

5. If connecting a DSU:
-- Connect the opposite end of the T1/PRI Installation Cable
to the DB-15 female connector (TERMINAL) on the DSU.
-- Connect the DB-15 female connector on the RJ48-DB15
Cable (P/N 85953) to the DB-15 male connector
(NETWORK) on the DSU.
-- Connect the opposite end of the RJ48-DB15 cable to the
telco connection.
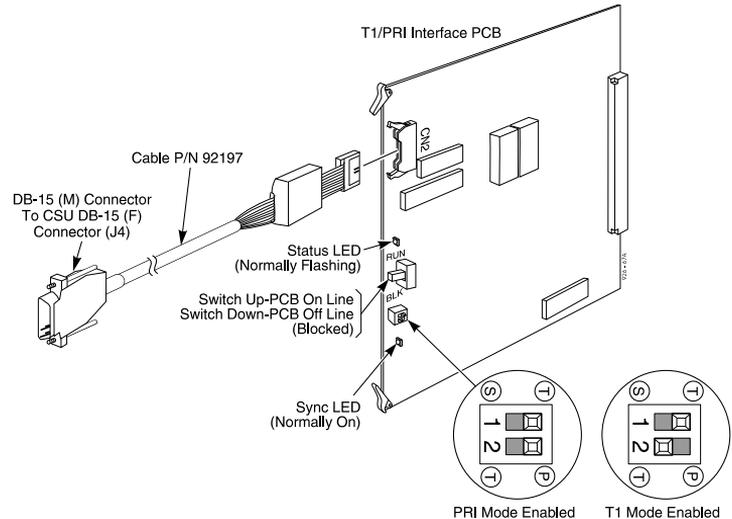
Figure 2-21 T1/PRI Interface (PRIU) PCB

2-27

PCB INSTALLATION

T1/PRI (ITSU) Interface PCB (cont'd)

T1 to T1 Cable Pin Out (Figure 2-22)

When making a cable for T1 to T1 connections, using a DB-15 female to DB-15 female cable, the pin out should be made according to the information below.

The remaining pins have no connection. This cable may only be used in tying two T1 cards together locally. It CANNOT be used to tie two T1 cards together through the central office.

The pin-out information for the T1/PRI Installation Cable (P/N 92197) is:

DB15 Pin	to	CN2 Connector Pin
1	TX Tip	5
3	RX Tip	7
9	TX Ring	6
11	RX Ring	8

The pin-out information for the RJ48-DB15 Cable (P/N 85953) is shown in Figure 2-22.

DB-15 Female Connector   DB-15 Female Connector
Pin 1   to   Pin 3
Pin 3   Pin 1
Pin 9   Pin 11
Pin 11   Pin 9

DB-15 Male Connector
(connects to DB-15 Female Connector)

T1 Card

384i System   384i System
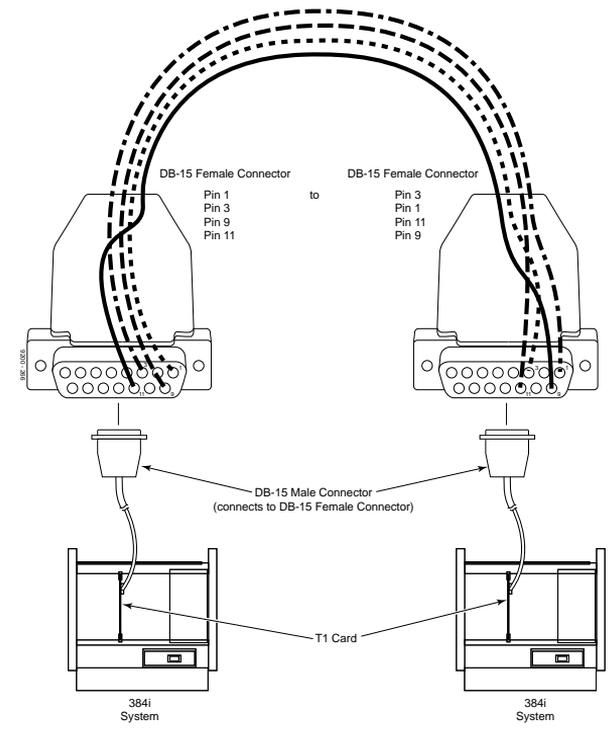
Figure 2-22 T1 to T1 Cable Pin Out

2-28

PCB INSTALLATION

Conference/DTMF Receiver (CDTU) PCB
(Figure 2-23)

The CDTU-A PCB provides:
- 16 DTMF receiver/dial tone detection circuits
- Conference circuits to allow the system to have *either* four-party or eight-party conferences
- One PCB status LED

The CDTU-B PCB provides:
- 16 DTMF receiver/dial tone detection circuits
- One PCB status LED

The CDTU-C PCB provides:
- Conference circuits to allow the system to have *either* four-party or eight-party conferences
- One PCB status LED

A total of 8 CDTU PCB's can be installed in the system.

Note: If the Conference feature is required, either the CDTU-A or CDTU-C must be used.

Installing the CDTU:
1. Install the CDTU into any slot.

**2. PCB Installation
and Startup**

Conference/DTMF
Reference (DTU) PCB

Status LED
(Normally flashing)
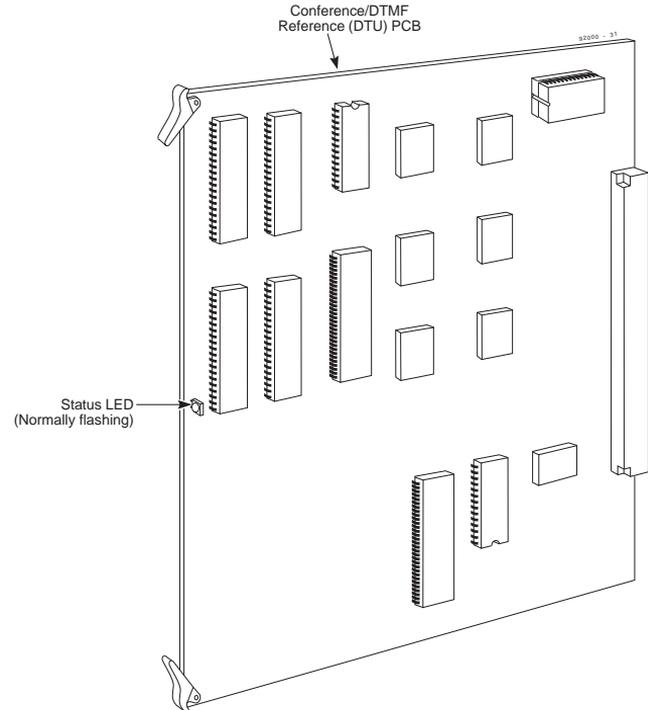
Figure 2-23 CDTU INSTALLATION

2-29

PCB INSTALLATION

Open Architecture Interface (4LAPBU) PCB
(Figure 2-24)

The 4LAPBU PCB provides Open Architecture Interface (OAI) capabilities. In addition, Caller ID output, ACD workstation options, inDepth/inDepth+ ACD/MIS systems and Hotel/Motel PMS features are supported.

To install the 4LAPBU PCB:
1. Install the 4LAPBU into a universal slot.
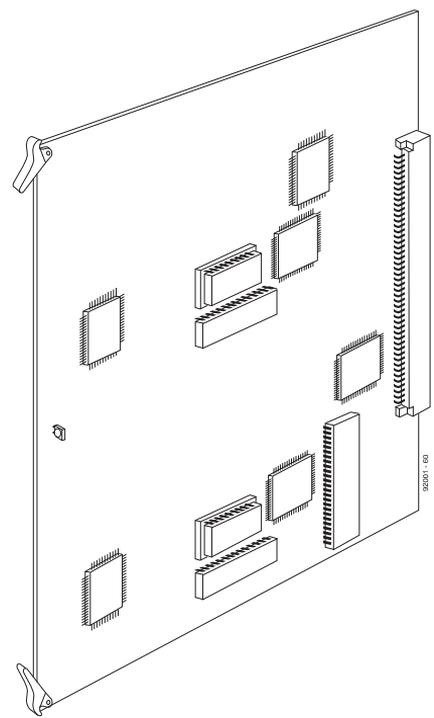
Figure 2-24 4LAPBU PCB

PCB INSTALLATION

Page/Door Box (4PGDU) PCB (Figure 2-25)

- 8 alarm/fax sensors
- 4 external page or door box circuits
- 4 potentiometers for External Page/Door Box volume control
- 4 switches to determine page/door box circuit function
- 4 dedicated dry relay contacts for page/door box operation
- Two 16-pin connectors for 48FU filter unit connection
- One PCB status LED

A maximum of two 4PGDU's can be installed in the system.

Installing the 4PGDU:

1. Set switches SW1-4 according to circuit type required.

   Note: Dip switches are read top (1) to bottom (4) upon power up. These can be switched while the system is powered up, but any changes won't take affect until the system is reset.

2. Install the 4PGDU into the slot.
3. Install the 16-pin filter cable(s) after 48FU installation.

Note: Use VR1-VR4 to adjust volume Door Box/Ext Page volume.
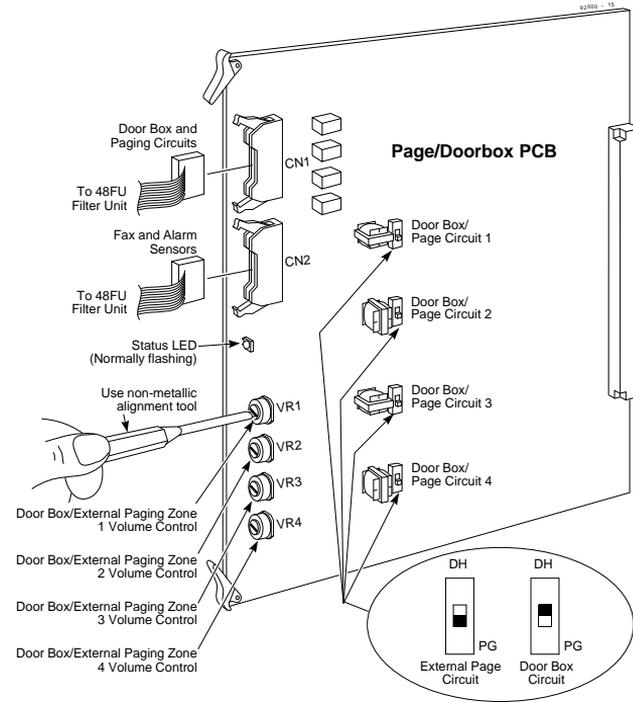
Figure 2-25 4PGDU INSTALLATION

2-31

2. PCB Installation and Startup

PCB STARTUP

Initial PCB Installation

When first installing the system:

1. Insert the CPRU PCB into the CPU slot.
2. Insert the software disk into the CPRU PCB.
3. Insert a 16DSTU PCB in slot 1 of the Main Cabinet.
4. Power up the system.
5. Set the run/block switch **UP** on the DSTU in slot 1.
6. After setting the run/block switch **DOWN** for all ASTU/DSTU PCBs, insert ASTU/DSTU PCBs in the Main Cabinet in sequential order.

   The order in which 8ASTU/16ASTU and 16DSTU PCBs are physically inserted determines the numbering plan. *The installer must install extension PCBs in order (ie; slot 1 first, slot 2 next, slot 3 next, etc.) for a sequential numbering plan.*

For example, with a 16DSTU in slot #1 (ext. 301-316), when 3 more 16DSTU PCBs are installed in the following order, the numbering plan below would apply:

Order of Install	PCB Slot #	Ext Numbers
1	1	301-316
2	2	317-332
3	4	333-348
4	3	349-364

7. Set the run/block switch **UP** on each PCB.

PCB STARTUP

Initial Installation of Trunk PCBs
When first installing the system:

1. Set the run/block switch **DOWN** on all 8ATRU, 2ATRU-EM, 4ATRU-EM / 4ATRU-LD, T1/PRI or BRI PCBs.

2. Insert all PCBs in sequential order. *The installer must install trunk PCBs in order (ie; slot 5 first, slot 6 next, slot 7 next, etc.) for a sequential numbering plan.*

Installing 8ATRU PCB's:

The order in which 8ATRU PCBs are physically inserted determines the numbering plan. For example, if four 8ATRU's are installed *in the following order,* the numbering plan below would apply:

Order of Install	PCB Slot #	Line Circuits
1	4	1-8
2	5	9-16
3	7	17-24
4	6	25-32

Installing 2ATRU-EM, 4ATRU-EM, 4ATRU-LD, or BRI PCBs

The order in which the 2ATRU-EM, 4ATRU-EM, 4ATRU-LD1, or BRI PCBs are installed determines the assigned line circuit number. Installing a 2ATRU-EM, 4ATRU-EM, 4ATRU-LD, or BRI PCB in slot 7 first provides circuits 1-4.

For example, if four 2ATRU-EM, 4ATRU-EM. 4ATRU-LD, or BRI's are installed *in the following order*, the numbering plan below would apply:

Order of Install	PCB Slot #	Line Circuits
1	4	1-4
2	5	9-12
3	7	17-20
4	6	25-28

2. PCB Installation and Startup

PCB STARTUP

Initial Installation of Trunk PCBs (Cont'd)

Installing T1/PRI PCBs

The T1/PRI Interface PCB uses the first block of 24 consecutive trunks.

For example, if you have an ATRU PCB installed for trunks 1-8, the T1/PRI PCB will automatically use trunks 9-32. If you have ATRU PCBs installed for trunks 1-8 and 17-24, the T1/PRI PCB will use trunks 25-48. The T1/PRI PCB cannot use trunks 9-16 (even if available) since they are not part of a consecutive block of 24 trunks.

3. Set the run/block switch UP on each PCB.

INSTALLING FILTER UNITS

48FU Filter Unit (Figure 2-26)

The 48FU filter unit provides:
● Six 16-pin connectors for CPRU, ASTU, DSTU, 4PFTU, and PGDU connection
● Two 50-pin amphenol-type connectors for extension, auxiliary equipment, and page/door box/alarm connection
● 48 circuit filters

Note: Only internal devices may be connected to this filter.

Filter units snap in the cabinets above the universal slots. Each cabinet accepts a maximum of 4 filter units.

48FU Installation

1. Install a 25-pair cable(s) into the 48FU amphenol connector(s).
2. Secure the 25-pair cable(s) using a tie wrap.
3. Insert the 48FU into the appropriate slot on top of the cabinet. Push the 48FU down onto the plastic standoffs.
   > *The three filter connectors on the left correspond to the amphenol connector on the left. The three filter connectors on the right correspond to the amphenol connector on the right. The first filter connector of each set on the left is for the first 8 pairs at the top of a 66 block. The second connector is for pairs 9-16 , etc.*
4. Install filter cables to CPRU, DSTU, ASTU, 4PFTU, and PGDU PCBs as needed.

Insert tab into slot.

Close ejector tabs before inserting through slots.
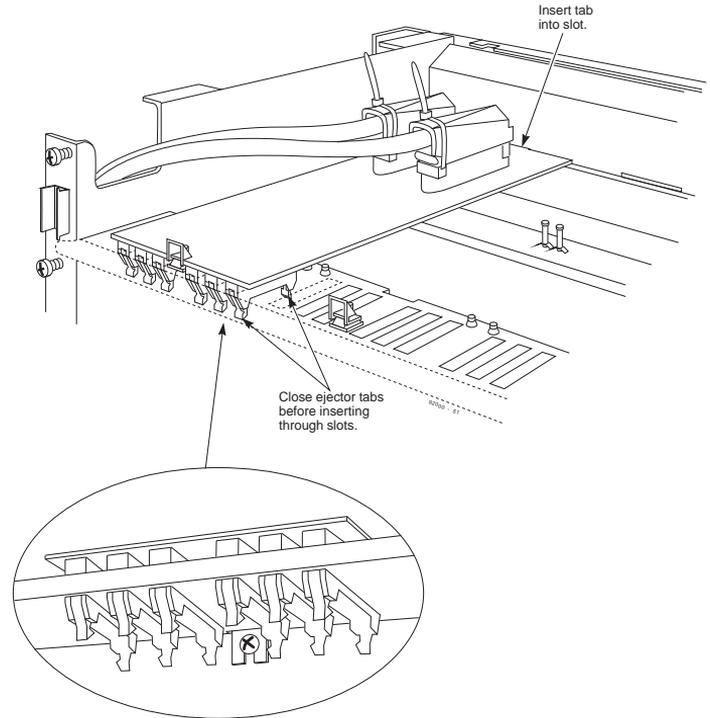
Figure 2-26 TYPICAL 48FU INSTALLATION

2-35

2. PCB Installation and Startup

INSTALLING FILTER UNITS

Removing a 48FU (Figure 2-27)

1. Remove all filter cables from the 48FU.
2. Remove amphenol cables from the 48FU.
3. Pinch the plastic standoff on each side of 48FU using needle-nose pliers.
4. Pull the board gently off the standoffs and out of the cabinet.

48FU PCB

Ferrite Bead

Ribbon Cable

4PGDU PCB
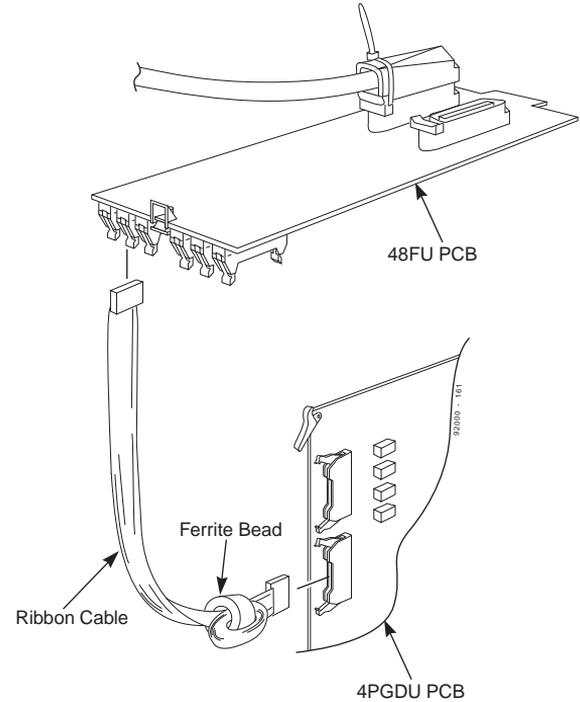
Figure 2-27 48FU FILTER CABLE INSTALLATION

INSTALLING FILTER UNITS

24FU Filter Unit (Figures 2-28 and 2-29)

The 24FU filter unit provides:
- Three 16-pin connectors for 8ATRU, 2ATRU-EM, 4ATRU-EM, or 4ATRU-LD connection
- One 50-pin amphenol connector for CO/PBX line connection
- Fuses and MOVs for secondary lightning protection for 24 circuits

Filter units snap in the cabinets above the universal slots. Each cabinet accepts four filter units.

24FU Installation:
1. Insert the 24FU into the appropriate slot on top of the cabinet. Push the 24FU down onto the plastic standoffs.
2. Install a 25-pair CO/PBX line cable into the 24FU amphenol connector.
3. Secure the 25-pair cable using a tie wrap.

Insert tab into slot.

Close ejector tabs before inserting through slots.
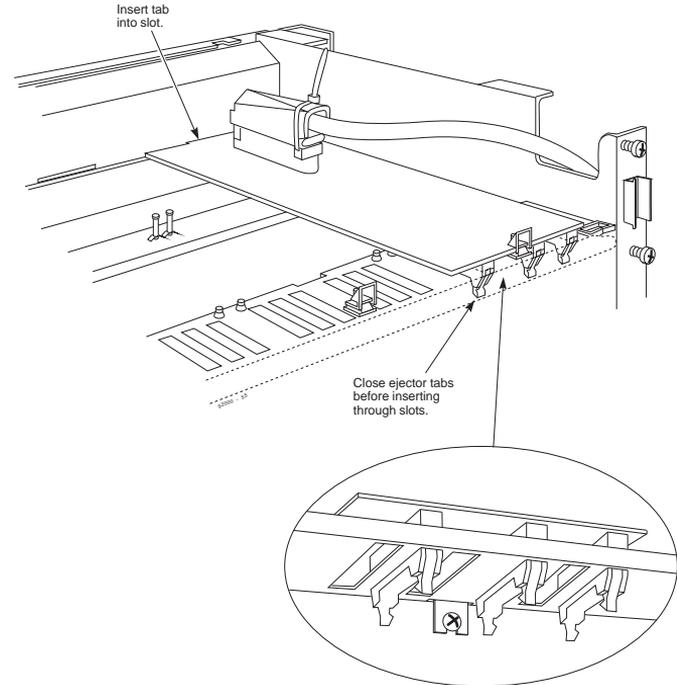
Figure 2-28 TYPICAL 24FU FILTER UNIT INSTALLATION

2. PCB Installation and Startup

INSTALLING FILTER UNITS

24FU Filter Unit (Cont'd)

4. Install filter cables to 8ATRU, 2ATRU-EM, 4ATRU-EM, and 4ATRU-LD PCBs as needed.

   The first filter connector on the left is for the first 16 ports, the second connector is for the second 16 ports, etc.

24FU PCB

Ferrite Bead

Filter Cable

92200 - 160

8ATRU PCB
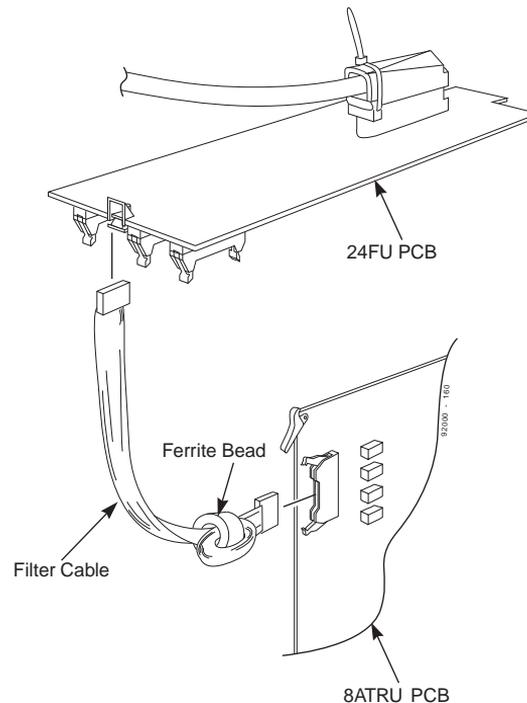
Figure 2-29 24FU FILTER CABLE INSTALLATION

SYSTEM STARTUP

System Startup

You can now power up the system and briefly check its operation. Before proceeding, be sure that:

● The common equipment is installed correctly.
● All extensions are cabled correctly.
● All earth ground and telco connections are installed correctly.
● PCBs are configured, equipped, and strapped correctly.
● The ferrite beads are installed correctly (see page 1-19).

Powering up the System

1. Install the CPRU in the CPU slot and one 16DSTU in slot 1. PCBs for slots 2-25 are not installed at this time.
2. Plug in all system telephones. A display telephone should be plugged into port 001 (extension 301).
3. Turn the AC Power Panel switch to ON. Refer to the chart at right for CPRU LED status.
4. Wait about three minutes for the system to boot. The telephone display at extension 301 will show the Time/Date and extension number when the boot sequence completes.
5. Plug in the remaining PCBs into each cabinet slot in numerical order (ie; slot 3, followed by slot 4, slot 5, etc.). This sets up the system port sequence.

MAJ	MIN	RUN	ALM1	ALM2	ALM3	ALM4	ALM5	Description
ON	ON	ON	ON	ON	ON	ON	ON	Reset state
OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	Memory Check state
OFF	OFF	ON	OFF	OFF	OFF	OFF	ON	Memory Check End
OFF	OFF	ON	OFF	OFF	OFF	ON	ON	Downloading System data
OFF	OFF	ON	OFF	OFF	ON	ON	ON	Loading Main Program
OFF	OFF	ON	OFF	ON	ON	ON	ON	Initializing Main Program
ON	ON	ON	OFF	OFF	OFF	OFF	ON	Memory Error (D-RAM)
ON	ON	ON	OFF	OFF	OFF	ON	OFF	Memory Error (S-RAM)
ON	ON	ON	ON	OFF	OFF	OFF	ON	Empty Disk
ON	ON	ON	ON	OFF	OFF	ON	OFF	Disk is not a system disk
ON	ON	ON	ON	OFF	OFF	ON	ON	Disk does not contain system information
ON	ON	ON	ON	ON	OFF	OFF	OFF	Disk I/O Error
ON	ON	ON	OFF	ON	OFF	OFF	OFF	80286 Protect Mode Error
OFF	OFF	FLASH	OFF	OFF	OFF	OFF	OFF	Normal Operating Mode

2. PCB Installation and Startup

SYSTEM STARTUP

Initial Programming (Figure 2-30)

Entering the Programming Mode

Enter the system programming mode at extension 301:

1. Press CALL1. (You hear dial tone).
2. Dial # * # *.
3. Dial the system password.

Password	Level	Tenant
12345678	2(IN)	0
0000	3(SA)	1
9999	4(SB)	1

4. Press HOLD.

Port Defaults

With the default settings, the ports are assigned as follows:

Station Ports: 1-256 (extensions 301-556)
Virtual Station
  Ports: 257-384
Trunk Ports: 1-128
DCI Ports: 1-144 (port 1 = extension 601)
3DCI Ports: 145 - 288 (ports 145-147 = extensions 645-647)
ACI Ports: 1-192
Voice Mail: extension 600
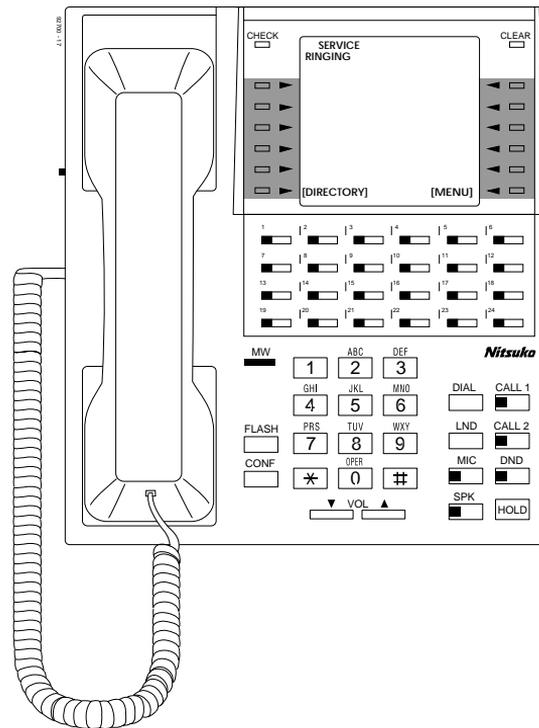
Figure 2-30 TELEPHONE KEY LAYOUT   2-40

SYSTEM STARTUP

Setting Up Extension Circuit Types

Run program 0004 to automatically set up extension circuit types. Refer to the Software Manual for programming information.

1. Dial 0004.
2. Press HOLD.
3. When you see, "Set UP? (Yes:1)," dial 1.
4. Press HOLD twice.
   > *If the system has DSS Consoles, Program 1101 must be used to define DSS extension assignments.*

Saving and Backing Up Your Configuration

When you are done programming, be sure to save the data to disk. Use the extra disk shipped with your system to make an additional backup copy.

1. Press DIAL. You see, "Data save? (Yes:1)"
2. Dial 1.
3. Press HOLD. You see, "Data Saving..." while the system is saving the data.
4. When you see "Data Save Complete!" press HOLD to exit the programming mode.

   OR

   Re-enter the programming mode and repeat from step 1 to make an additional backup copy.
5. To ensure that the system reloads your saved data on reboot or power-up, set switch SW1 on the CPRU to OFF.

Upgrading Your Software

When you need to update your system software, you can install the software and save your current configuration to disk.

1. While in the programming mode, using the older version of software, press DIAL. You see, "Data save? (Yes:1)"
2. Dial 1.
3. Press HOLD. You see, "Data Saving..." while the system is saving the data to disk.
4. When you see "Data Save Complete!" press HOLD to exit the programming mode.
5. Place the new software disk into the CPRU.
6. Enter the programming mode and press DIAL. You see, "Data save? (Yes 1)".
7. Press HOLD. You see "Data Saving..." while the system is saving the data to the new system disk.
8. When you see "Data Save Complete!" press HOLD to exit the programming mode.
9. To ensure that the system reloads your saved data on reboot or power-up, set switch SW1 on the CPRU to OFF.
10. Restart the system.

Making Test Calls

In the initial configuration:
- All Programmable Function keys are line keys (e.g., key 1 is line 1).
- All trunks are loop start DTMF.

SYSTEM STARTUP

Basic Troubleshooting

To troubleshoot extensions:

1. Check and verify extension. The voltages at the extension's modular jack should be:

Meter Lead	Jack Terminal	Voltages
Black lead to	GRN	. . . . +27 V DC
Red lead to	RED	

2. Check and verify programming. Refer to the Software Manual if necessary.
3. Check and verify extension wiring.
4. Check and verify 48FU filter unit installation.
5. Check and verify extension PCB installation.

To troubleshoot lines:

1. Check and verify each line before the system with a test set.
2. Measure loop current on each line with a digital voltmeter.
3. Check and verify programming. Refer to the Software Manual if necessary.
4. Check and verify line PCB installation.
5. Check and verify CN4/CN5 jumpers, GSAU installation, or PFTU installation.
6. Check and verify 24FU filter unit installation.
7. Check and verify 48FU filter unit cable installation.

SYSTEM STARTUP

Identifying Port Location

Port information such as PCB type, number of installation (ID), port numbers, PCB status, and individual port status can be obtained from the system. To obtain a System Report containing PCB information, a DCI must be connected to the system and equipped with a terminal.

Running program 0007 in MAINTENANCE OPTIONS prints a system PCB report. Refer to *Program 0007-System Report Port Setup* in the Software Manual.The following is a typical report:

```
                            << SYSTEM INFORMATION >>

                        03/22/93   09:49

                                    Last System Data Modify  :
                                    Last System Data Save       :

03/19/93        14:25  by  JONES TREE FARM
03/19/93        14:19  by  JONES TREE FARM

Slot Type _ _ _ _ ID Port _ _ _ _ Condition _ _ _ Note _ _ _ _ _ _ _ _ _ _ _ _ _
1 DSTU - 3B     1  001-016    Running        16 ports connected
2 DSTU - 3B     2  017-032    Running         4 ports connected
3 ASTU -16      3  033-048    Running       SPK:  4  DPN:  0  ALM:  8  FAX:8
4 PGDU          2  009-016    Running
5 ATRU - C1     1  001-008    Not Install
6 CDTU - A1                   Running
7 ATRU - L2                   Running
8 - none -
9 - none -
10 - none -
11 - none -
12 - none -
13 - none -
14 - none -
15 - none -
16 - none -
17 - none -
18 - none -
19 - none -
20 - none -
21 - none -
22 - none -
23 - none -
24 - none -
25 - none -
```

2. PCB Installation and Startup

SYSTEM STARTUP

Section 3, INSTALLING EXTENSIONS AND TRUNKS

**3. Installing
Extensions and Trunks**

INSTALLING 25-PAIR CABLES

Installing 25-Pair Cable Guides (Figure 3-1)

The Main Cabinet is equipped with two 25-pair cable guides on the right side. When installing a single cabinet system, remove the 25-pair cable guide and screws on the top right side and install it on the lower left side of the Main Cabinet.

Each Expansion Cabinet is equipped with one 25-pair cable guide on top of the right side. The first Expansion Cabinet's cable guide should remain as is.

Remove the second Expansion Cabinet's cable guide and screws and install on the top left side of the first Expansion Cabinet.

Routing 48FU 25-Pair Cables (Figure 3-1)

It is recommended to install extension blocks to the left of each cabinet to allow access to 48FU filter units, 25-pair cables, filter cables, and extension PCBs for expansion or troubleshooting. Run 25-pair cables from 48FU filter units over plastic protectors on the left side of the cabinet and through 25-pair cable guides on the lower left side of the cabinets.

Routing 24FU 25-Pair Cables (Figure 3-1)

It is recommended to install trunk blocks to the right of each cabinet to allow full access to 24FU filter units, and 25-pair cables, filter cables, and PCBs for expansion or troubleshooting. Run 25-pair cables from 24FU filter units over plastic protectors on the right side of the cabinet and through 25-pair cable guides on the lower right side of the cabinets.

Installing Extension Cross-Connect Blocks

It is also recommended to install cross-connect blocks for each of the system's major extension port device groups (16 pins). Cross-connect blocks provide an easy way to troubleshoot, determine port identification numerically, and determine port utilization.

All major extension port devices must be bridged from the cross-connect blocks to station (B) blocks in groups of eight (16 pins). Each 48FU trunk filter unit interfaces with CPRU, 8ASTU, 16ASTU, 16DSTU extension PCBs and the 4PFTU, PGDU PCBs using a 16-pin filter cable.

Install cross-connect blocks for the following 48FU interfaces:
- All digital extension circuits
- CPRU functions (ie; BGM, MOH, Night mode switch, relay 1)
- External page
- External alarms
- Data devices

3-2

INSTALLING 25-PAIR CABLES

Installing Trunk Cross-Connect Blocks

It is also recommended to install cross-connect blocks for each of the system's major trunk device groups. Cross-connect blocks provide an easy way to troubleshoot, determine port identification numerically, and determine trunk port utilization.

All major trunk port devices must be bridged from the RJ21X to trunk cross connect blocks in groups of eight (16 pins). Each 24FU trunk filter unit interfaces with 8ATRU, 2ATRU-EM, 4ATRU-EM and 4ATRU-LD trunk port PCBs using a 16-pin filter cable.

Install cross-connect from the RJ21X to the trunk cross-connect blocks for the following in groups of eight:
- analog loop start lines
- analog ground start trunks
- DID trunks (four circuits per PCB)
- Tie lines (four circuits per PCB)

Note: The system's DID trunk and tie line PCBs interface four DID or tie line circuits per PCB. The remaining four ports assigned to the trunk slot are not used.

MDF

Cable Brackets are located in same position on opposite side
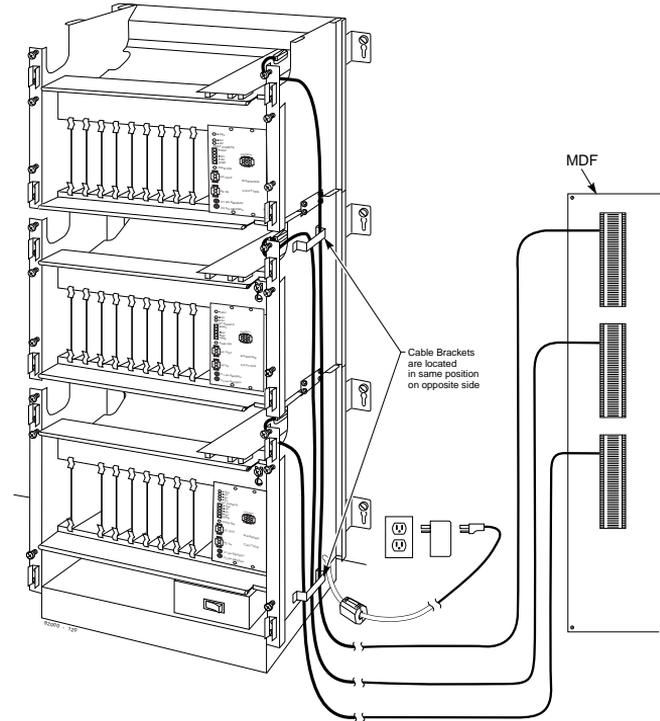
Figure 3-1 TYPICAL TRUNK CABLING LAYOUT 3-3

3. Installing Extensions and Trunks

INSTALLING EXTENSIONS

Key Extension Cabling (Figure 3-2)

Each key extension requires one-pair twisted station cable from the MDF to the modular jack. A maximum of 48 extensions can be installed per 50-pin connector on each 48FU filter unit.

To connect key station cabling:

1. Punch down one pair 24 AWG station cable for each key telephone to a cross-connect block.
2. Run one-pair cross-connect from the cross-connect block to the extension (B) block for each extension.
3. Connect the extension (B) block's 25-pair cable to the corresponding 48FU filter unit.
4. Install bridging clips on the extension (B) block.

Installing a Key Telephone (Figure 3-2)

1. Install a modular jack for each extension. The modular jack should be within six feet of the phone.
2. For each extension, run one-pair 24 AWG station cable from the cross-connect block to a modular jack. Ground the unused pair.
3. Terminate the extension leads to GRN/RED of the modular jack. Terminate the unused leads to the jack.
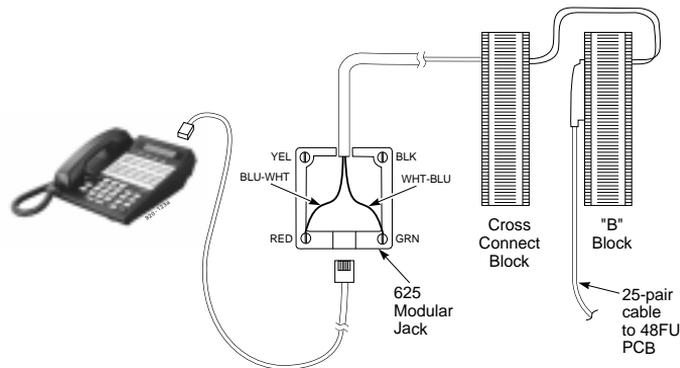
Figure 3-2 INSTALLING A KEY TELEPHONE

3-4

INSTALLING SINGLE LINE TELEPHONES

Single Line Extension Cabling (Figure 3-3)

Each single line extension requires one-pair twisted station cable from the MDF to the modular jack. A maximum of 48 extensions can be installed per 50-pin connector on each 48FU.

A 90-105 VAC ring generator must be connected to the Main Cabinet to provide ringing to single line sets.

To connect station cabling:
1. Punch down one pair 24 AWG station cable for each single line telephone to a cross-connect block.
2. Punch down cross-connect from the clips on the cross-connect block to their corresponding clips on the extension (B) block.
3. Connect the extension (B) block's 25-pair cable to the corresponding 48FU filter unit.
4. Install bridging clips on the extension (B) block.

Installing a Single Line Telephone (Figure 3-3)

To install a single line telephone:
1. Install a modular jack for each single line telephone. The modular jack should be within six feet of the phone.
2. For each extension, run one-pair 24 AWG station cable from the cross-connect block to a modular jack.
3. Terminate the extension leads to GRN/RED of the modular jack. Terminate the unused leads to the jack.
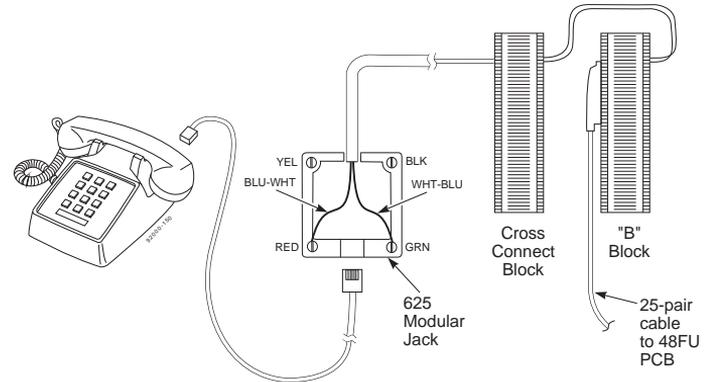
Figure 3-3 INSTALLING A SINGLE LINE TELEPHONE

**3. Installing
Extensions and Trunks**

EXTENSION CUTDOWN SHEET

Extension Cutdown Sheet Configuration
(Figures 3-4 and 3-5)

Due to the inherent flexibility of the universal PCB slot configuration, standard cutdown sheets for extension cabling do not apply.

Note: The order in which the extension PCBs (8/16ASTU, 16DSTU) are installed determines the assigned extension number.

For example, given that a 16DSTU is installed in slot #1 and uses extension numbers 301-316, if three 16DSTU or 16ASTU PCBs were installed in the Main Cabinet in the order below, the numbering plan would correspond as follows:

Order of Install	PCB Slot #	Ext Numbers
1	1	301-316
2	2	317-332
3	4	333-348
4	3	349-364

To determine extension assignments for the system cutdown, the installer must identify the following in order:

● Order of installation
● Cabinet (Main, Exp1, Exp2)
● Slot used
● PCB type (8ASTU, 16ASTU, 16DSTU, PGDU)
● 48FU filter unit
● PCB 16-pin connector (upper, lower)
● 48FU filter unit connector (1 - 6)
● Amphenol connector (B1, B2)

To determine where any group of eight extensions is installed, note the order of install, cabinet, slot, filter unit, amphenol (B) connector used, PCB connectorand PCB type.

On the following page is the extension cutdown sheet (Figure 3-4). Make as many copies as you need. Be sure to keep careful records of your installation. Refer to the sample extension cutdown sheet (Figure 3-5) if you need help completing Figure 3-4.

EXTENSION CUTDOWN SHEET

Figure 3-4

☐ MAIN	☐ EXP 1	☐ EXP 2		
☐ 48 FU1	☐ 48 FU2	☐ 48 FU3	☐ 48 FU4	
	☐ B1	☐ B2		

CONN PIN	BLOCK TERM	COLOR CODE	FUNCTION	PCB ID
26	1	WHT-BLU		——— Order Of Install
1	2	BLU-WHT		
27	3	WHT-ORN		——— Slot #
2	4	ORN-WHT		☐ 8 ASTU UPPER
28	5	WHT GRN		
3	6	GRN-WHT		☐ 16 ASTU LOWER
29	7	WHT-BRN	PLACE STICKER HERE	☐ 16 ASTU UPPER
4	8	BRN-WHT		☐ 16 DSTU LOWER
30	9	WHT-SLT		
5	10	SLT-WHT		☐ 16 DSTU UPPER
31	11	RED-BLU		☐ 4 PGDU UPPER
6	12	BLU-RED		
32	13	RED-ORN		☐ 4 PGDU LOWER
7	14	ORN-RED		☐ 4 PFTU UPPER
33	15	RED-GRN		
8	16	GRN-RED		
34	17	RED-BRN		——— Order Of Install
9	18	BRN-RED		
35	19	RED-SLT		——— Slot #
10	20	SLT-RED		☐ 8 ASTU UPPER
36	21	BLK-BLU		
11	22	BLU-BLK		☐ 16 ASTU LOWER
37	23	BLK-ORN	PLACE STICKER HERE	☐ 16 ASTU UPPER
12	24	ORN-BLK		☐ 16 DSTU LOWER
38	25	BLK-GRN		
13	26	GRN-BLK		☐ 16 DSTU UPPER
39	27	BLK-BRN		☐ 4 PGDU UPPER
14	28	BRN-BLK		
40	29	BLK-SLT		☐ 4 PGDU LOWER
15	30	SLT-BLK		☐ 4 PFTU UPPER
41	31	YEL-BLU		
16	32	BLU-YEL		
42	33	YEL-ORN		——— Order Of Install
17	34	ORN-YEL		
43	35	YEL-GRN		——— Slot #
18	36	GRN-YEL		☐ 8 ASTU UPPER
44	37	YEL-BRN		
19	38	BRN-YEL		☐ 16 ASTU LOWER
45	39	YEL-SLT	PLACE STICKER HERE	☐ 16 ASTU UPPER
20	40	SLT-YEL		☐ 16 DSTU LOWER
46	41	VIO-BLU		
21	42	BLU-VIO		☐ 16 DSTU UPPER
47	43	VIO-ORN		☐ 4 PGDU UPPER
22	44	ORN-VIO		
48	45	VIO-GRN		☐ 4 PGDU LOWER
23	46	GRN-VIO		☐ 4 PFTU UPPER
49	47	VIO-BRN		
24	48	BRN-VIO		
50	49	VIO-SLT	NOT USED	
25	50	SLT-VIO		

48 FU CN1 / 48 FU CN4 / 48 FU CN2 / 48 FU CN5 / 48 FU CN3 / 48 FU CN6

Figure 3-4 EXTENSION CUTDOWN SHEET

Figure 3-5

☑ MAIN	☐ EXP 1	☐ EXP 2		
☐ 48 FU1	☑ 48 FU2	☐ 48 FU3	☐ 48 FU4	
	☑ B1	☐ B2		

CONN PIN	BLOCK TERM	COLOR CODE	FUNCTION	PCB ID
26	1	WHT-BLU		——— Order Of Install
1	2	BLU-WHT		
27	3	WHT-ORN		——— Slot #
2	4	ORN-WHT		☐ 8 ASTU UPPER
28	5	WHT GRN		
3	6	GRN-WHT		☐ 16 ASTU LOWER
29	7	WHT-BRN	PLACE STICKER HERE	☐ 16 ASTU UPPER
4	8	BRN-WHT		☐ 16 DSTU LOWER
30	9	WHT-SLT		
5	10	SLT-WHT		☑ 16 DSTU UPPER
31	11	RED-BLU		☐ 4 PGDU UPPER
6	12	BLU-RED		
32	13	RED-ORN		☐ 4 PGDU LOWER
7	14	ORN-RED		☐ 4 PFTU UPPER
33	15	RED-GRN		
8	16	GRN-RED		

☑ 48 FU CN1 / ☐ 48 FU CN4

Station Block
☑ 48 FU2
☑ B1
☑ MAIN
☑ CN1
☑ 16 DSTU LOWER

Figure 3-5 SAMPLE EXTENSION CUTDOWN SHEET 3-7

INSTALLING CO/PBX LINES

Ground Start/Loop Start Line Cabling

Ground start trunks/loop start lines must be bridged from the telco RJ21X to a line cross-connect block (A). Each ground/loop start CO/PBX line requires one-pair cross-connect cable from the RJ21X to the line (A) block.

The A block connects to the 24FU filter unit with a 25 pair cable. The line (A) block(s) should be arranged in groups of 8 lines (16 pins) to correspond to the 24FU PCB, filter cable and PCB slot.

8ATRU-LS1	8 loop start lines
8ATRU-LS1 with a GSAU	8 ground start trunks

Installing Ground Start Trunks/Loop Start Lines
(Figures 3-6 and 3-7)

To install a ground start trunk/loop start line:
1. Punch down one pair cross-connect to the tip and ring leads for each line on the telco RJ21X CPE (customer) side of the block, (Figure 3-6).
2. Punch down the other end of the cross-connect to the line (A) block (in groups of 8 lines of the same line type).
3. Punch down a 25-pair cable to the opposite side of the line (A) block.
4. Plug a 25-pair connector into the corresponding 24FU filter unit (Figure 3-7).
5. Install bridging clips on the A block.
6. Plug in the filter cables as required.

Note: Repeat steps 1-5 for each ground start trunk/loop start line. Label cross-connect blocks A2, A3, etc.

INSTALLING CO/PBX LINES
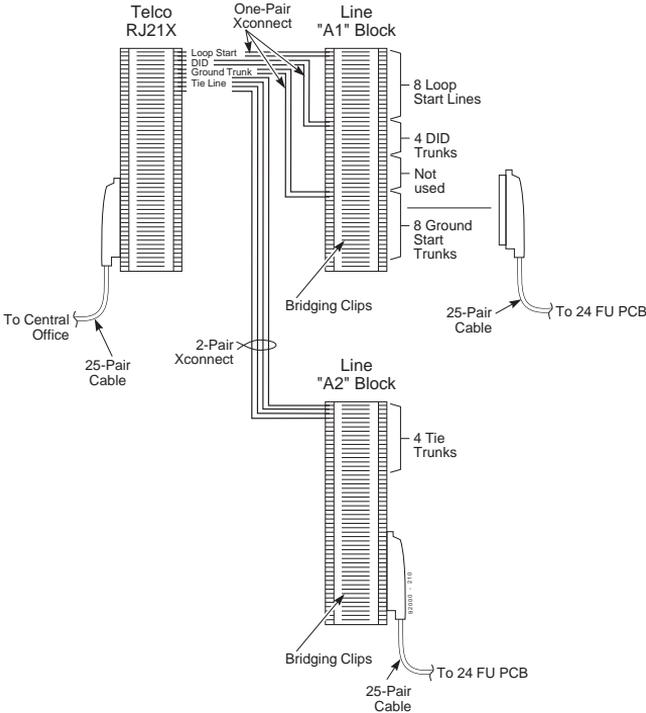
Figure 3-6 TYPICAL TRUNK/LINE INSTALLATION
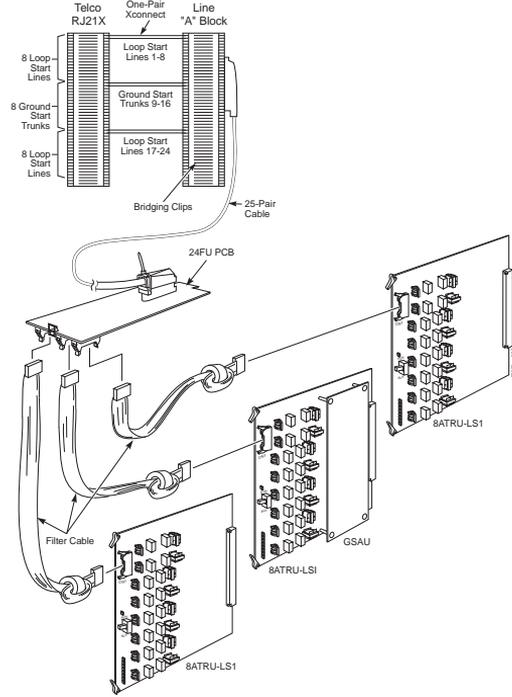
Figure 3-7 INSTALLING GROUND START TRUNK/LOOP START LINES

3-9

**3. Installing
Extensions and Trunks**

INSTALLING DID TRUNKS

DID Trunks (Figure 3-8)

Direct Inward Dialing trunks must be bridged from the telco RJ21X to a line cross-connect (A) block. Each DID Trunk requires one-pair cross-connect from the RJ21X to the line (A) block.

The A block connects to the 24FU filter unit with a 25-pair cable. The line (A) block should be arranged in groups of 4 DID trunks (8 pins) to correspond with the 24FU PCB, filter cable, and cabinet slot equipped with a 4ATRU-LD1.

Note: The 4ATRU-LD1 PCB interfaces 4 DID trunks to the system but uses 8 system line ports per PCB.

Installing DID Trunks
1. Punch down one pair cross-connect to the tip and ring leads for each DID trunk on the CPE (customer) side of the RJ21X.
2. Punch down the other end of the cross-connect to the line (A) block tip and ring leads (in groups of 4 DID trunks).
3. Punch down a 25-pair cable to the opposite side of the line (A) block.
4. Plug in a 25-pair connector to the corresponding 24FU filter unit.
5. Install bridging clips on the A block.

Note: Repeat steps 1-5 for each DID trunk. Label cross-connect blocks A2, A3, etc.
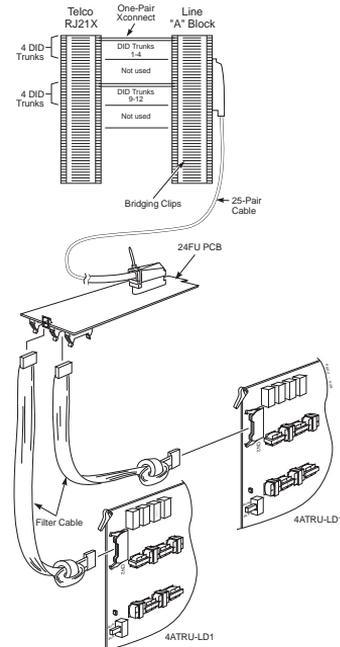
Figure 3-8 INSTALLING DID TRUNKS

3-10

INSTALLING A DID CHOKE

DID Choke (Figure 3-9)

If your central office has a high level of AC noise or if your site is experiencing excessive hum on the DID lines, this choke can be installed between the 384i and telco blocks to help to suppress the hum.

DID trunks must be bridged from the telco RJ21X to a line cross-connect (A) block. The choke is installed between these two blocks. The 4ATRU-LD PCB interfaces 4 DID trunks to the system but uses 8 system line ports per PCB.

DID Choke Installation:

1. Remove the bridging clips on the (A) block and telco block for the DID lines.
2. From the telco block, solder the Tip lead to the "3" connector on the choke.
3. From the telco block, take the Ring lead and solder it to the "1" connector on the choke.
4. From the (A) block, take the Tip 1 lead and solder it to the "4" connector on the choke.
5. Solder the Ring 1 lead from the (A) block to the "2" connector on the choke.
6. Reinstall the bridging clips as required.
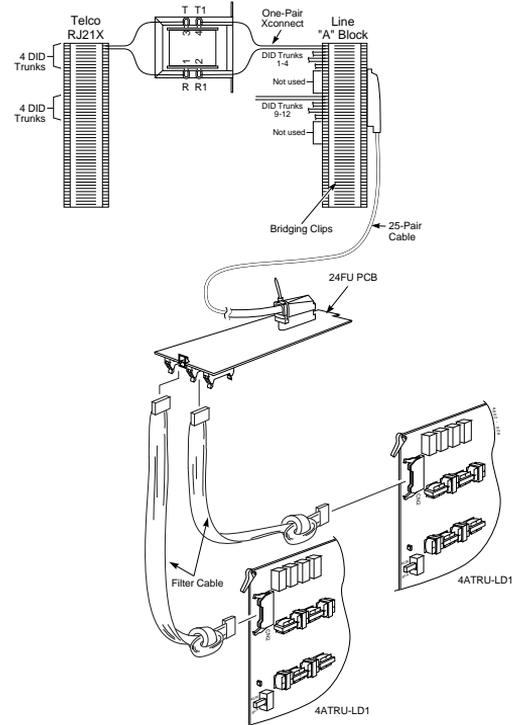
Figure 3-9 DID CHOKE INSTALLATION   3-11

**3. Installing
Extensions and Trunks**

INSTALLING TIE LINES

Tie Line: 2ATRU-EM (Figure 3-10)

Tie lines (Type I TL11M E&M 4-lead) must be bridged from the telco RJ21X to a line cross-connect (A) block. Each tie line requires two-pair cross-connect from the RJ21X to the line (A) block.

The A block connects to the 24FU filter unit with a 25-pair cable. The line (A) block must be arranged in groups of 4 tie lines (16 pins) to correspond with the 24FU PCB, filter cable, and cabinet slot equipped with a 2ATRU-EM.

Note: The 2ATRU-EM PCB interfaces 4 tie lines to the system but uses 8 system line ports per PCB.

Installing 2-wire/4-lead Tie Lines:

1. Punch down two pair cross-connect on the tip, ring, E and M leads for each tie line on the CPE (customer) side of the RJ21X.
2. Punch down the other end of the cross-connect to the line (A) block tip ring, E and M leads (in groups of 4 lines).
3. Punch down a 25-pair cable to the opposite side of the line (A) block.
4. Plug a 25-pair connector into the corresponding 24FU filter unit.
5. Install bridging clips on the A block. Label cross-connect blocks A2, A3, etc.
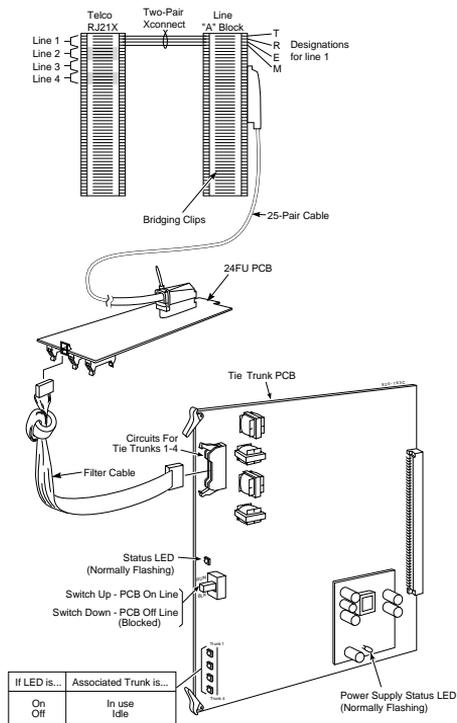
Figure 3-10 INSTALLING 2ATRU-EM TIE LINES   3-12

INSTALLING TIE LINES

Tie Line: 4ATRU-EM (Figure 3-11 and 3-12)

Tie lines (Type I/II E&M 4-lead or 8-lead) must be bridged from the telco RJ21X to a line cross-connect (A) block. Each tie line requires two-pair cross-connect from the RJ21X to the line (A) block.

The A block connects to the 24FU filter unit with a 25-pair cable. The line (A) block must be arranged in groups of 4 tie lines (32 pins) to correspond with the 24FU PCB, filter cables, and cabinet slot equipped with a 4ATRU-EM.

Note: The 4ATRU-EM PCB interfaces 4 tie lines to the system but uses 8 system line ports per PCB.

Installing 2-wire/4-lead or 4-wire/8-lead Tie Lines:
1. Punch down four pair cross-connect on the tip, ring, tip 1, ring 1, E, SB, M, and SG leads for each tie line on the CPE (customer) side of the RJ21X.
2. Punch down the other end of the cross-connect to the line (A) block tip, ring, tip 1, ring 1, E, SB, M, and SG leads (in groups of 4 tie lines).
3. Punch down a 25-pair cable to the opposite side of the line (A) block.
4. Plug a 25-pair connector into the corresponding 24FU filter unit.
5. Make sure the strapping on the 4ATRU-EM PCB is set to the proper type (2-wire or 4-wire and Type I or Type II).
6. Install bridging clips on the A block. Label cross-connect blocks A2, A3, etc.

3-13

INSTALLING TIE LINES
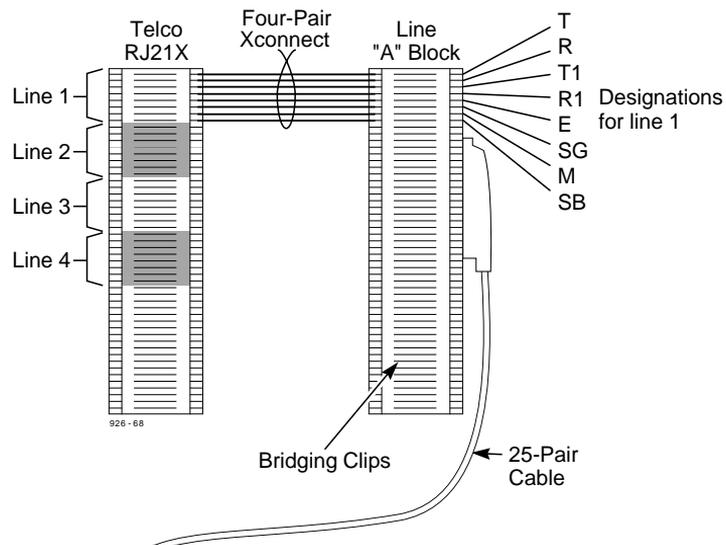
Figure 3-11 INSTALLING 4-ATRU-EM TIE LINES
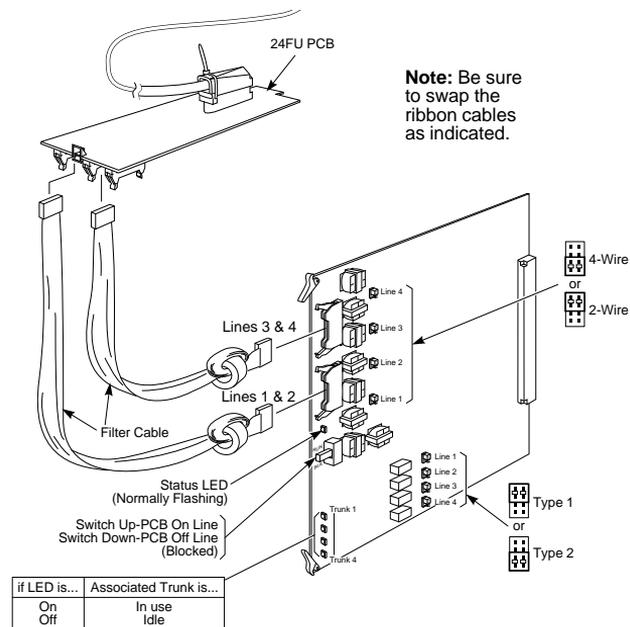
Figure 3-12 INSTALLING 4-ATRU-EM TIE LINES

LOOP BACK TESTING FOR TIE LINES

Troubleshooting Tie Lines (Figures 3-13 and 3-14)

If you're experiencing problems with your tie lines, you can set up a loop back test between the lines to make sure the tie line PCB is functioning properly.

Setting Up a Loop Back Test:

1. Set the jumpers on the tie line PCB for 4-Wire, Type 2 (jumpers must be in the down position). See Figure 3-14.
2. Punch down the tie lines as shown in Figure 3-13.
3. The following system programming must be set:
   Program 0303 must have a Type 2 Block
   Program 0412, Items 2-8 must be set to '1'
   Program 0901, Items 14-17 must be set to '5'
   Program 0901, Items 25-27 must be set to '1'
   Program 2301 must have all tie lines set to '1'
   Program 2601 must have all tie lines set to '0'

   If the tie line PCB is functioning correctly, you should now be able seize the first tie line and ring the second tie line.

4-Wire Type II Loop Back

	to	
T	to	T1
R	to	R1
T1	to	T
R1	to	R
E	to	M
M	to	E
SB	to	SG
SG	to	SB
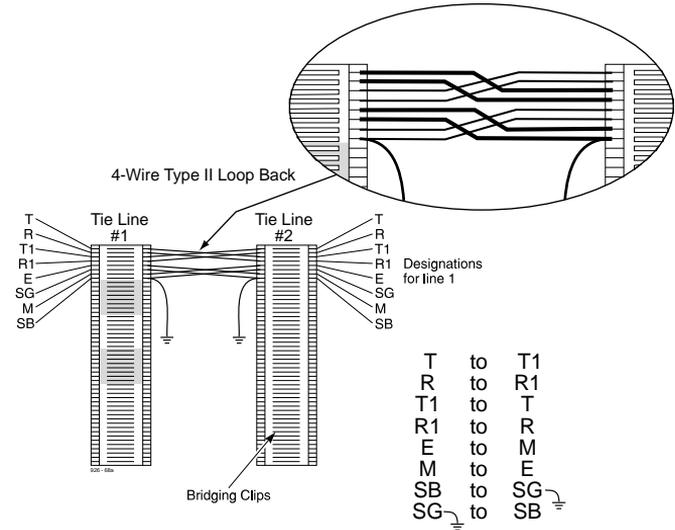
Figure 3-13 TIE LINE CONNECTIONS FOR LOOP BACK TESTING

LOOP BACK TESTING FOR TIE LINES
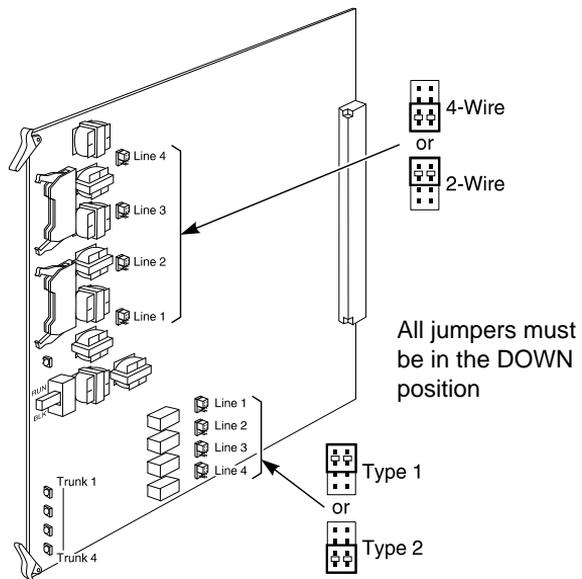
**Figure 3-14 TIE LINE PCB SETUP FOR LOOP BACK
TESTING**

LINE/TRUNK CUTDOWN SHEET

CO/PBX Line Cutdown Sheet Configuration
(Figures 3-15 and 3-16)

Due to the flexibility of the system's universal PCB slot config-
uration, standard cutdown sheets for CO/PBX line cabling do
not apply.

**Note: The order in which the 8ATRU PCBs are installed
determines the assigned line circuit number.**

For example, if four 8ATRU's are installed in the Main Cabinet
in the following order, the following numbering plan would be
in effect:

Order of Install	PCB Slot #	Line Circuits
1	4	1-8
2	5	9-16
3	7	17-24
4	6	25-32

To determine extension assignments for the system cutdown,
the installer must identify the following in order:

● Order of installation
● Cabinet (Main, Exp1, Exp2)
● Slot used
● 24FU filter unit
● 24FU 16-pin connector (upper, lower)
● 24FU filter unit connector (left, center, right)

To determine where any group of lines are installed, note the
order of install, cabinet, slot, and filter unit.

On the following page is the line cutdown sheet (Figure 3-15).
Make as many copies as you need. Be sure to keep careful
records of your installation. Refer to the sample line cutdown
sheet (Figure 3-16) if you need help completing Figure 3-15.

**3. Installing
Extensions and Trunks**

LINE/TRUNK CUTDOWN SHEET

☐ MAIN ☐ EXP 1 ☐ EXP 2
☐ 24 FU1 ☐ 24 FU2 ☐ 24 FU3 ☐ 24 FU4

A1

CONN PIN	BLOCK TERM	COLOR CODE	FUNCTION	PCB ID
				24 FU CN1
26	1	WHT-BLU		____ Order Of Install
1	2	BLU-WHT		
27	3	WHT-ORN		____ Slot #
2	4	ORN-WHT		
28	5	WHT GRN		☐ 8 ATRU-LS1
3	6	GRN-WHT	PLACE STICKER HERE	
29	7	WHT-BRN		☐ 4 ATRU-EM UPPER
4	8	BRN-WHT		
30	9	WHT-SLT		☐ 4 ATRU-EM LOWER
5	10	SLT-WHT		
31	11	RED-BLU		☐ 4 ATRU-LD1
6	12	BLU-RED		
32	13	RED-ORN		☐ 2 ATRU-EM
7	14	ORN-RED		
33	15	RED-GRN		☐ BRIU
8	16	GRN-RED		
				24 FU CN2
34	17	RED-BRN		____ Order Of Install
9	18	BRN-RED		
35	19	RED-SLT		____ Slot #
10	20	SLT-RED		
36	21	BLK-BLU		☐ 8 ATRU-LS1
11	22	BLU-BLK	PLACE STICKER HERE	
37	23	BLK-ORN		☐ 4 ATRU-EM UPPER
12	24	ORN-BLK		
38	25	BLK-GRN		☐ 4 ATRU-EM LOWER
13	26	GRN-BLK		
39	27	BLK-BRN		☐ 4 ATRU-LD1
14	28	BRN-BLK		
40	29	BLK-SLT		☐ 2 ATRU-EM
15	30	SLT-BLK		
41	31	YEL-BLU		☐ BRIU
16	32	BLU-YEL		
				24 FU CN3
42	33	YEL-ORN		____ Order Of Install
17	34	ORN-YEL		
43	35	GRN-YEL		____ Slot #
18	36	YEL-GRN		
44	37	YEL-BRN		☐ 8 ATRU-LS1
19	38	BRN-YEL	PLACE STICKER HERE	
45	39	YEL-SLT		☐ 4 ATRU-EM UPPER
20	40	SLT-YEL		
46	41	VIO-BLU		☐ 4 ATRU-EM LOWER
21	42	BLU-VIO		
47	43	VIO-ORN		☐ 4 ATRU-LD1
22	44	ORN-VIO		
48	45	VIO-GRN		☐ 2 ATRU-EM
23	46	GRN-VIO		
49	47	VIO-BRN		☐ BRIU
24	48	BRN-VIO		
50	49	VIO-SLT		NOT USED
25	50	SLT-VIO		

Figure 3-15 LINE CUTDOWN SHEET

☑ MAIN ☐ EXP 1 ☐ EXP 2
☑ 24 FU1 ☐ 24 FU2 ☐ 24 FU3 ☐ 24 FU4

A1

CONN PIN	BLOCK TERM	COLOR CODE	FUNCTION	PCB ID
				CN1
26	1	WHT-BLU		_1_ Order Of Install
1	2	BLU-WHT		
27	3	WHT-ORN		_7_ Slot #
2	4	ORN-WHT		
28	5	WHT GRN		☑ 8 ATRU-LS1
3	6	GRN-WHT	PLACE STICKER HERE	
29	7	WHT-BRN		☐ 4 ATRU-EM UPPER
4	8	BRN-WHT		
30	9	WHT-SLT		☐ 4 ATRU-EM LOWER
5	10	SLT-WHT		
31	11	RED-BLU		☐ 4 ATRU-LD1
6	12	BLU-RED		
32	13	RED-ORN		☐ 2 ATRU-EM
7	14	ORN-RED		
33	15	RED-GRN		☐ BRIU
8	16	GRN-RED		

Figure 3-16 SAMPLE LINE CUTDOWN SHEET

3-18

TESTING TELEPHONE OPERATION

The following procedures will help you determine if a problem being experienced is due to the telephone or the system. Follow the procedure for your series phone to determine if the phone is operating correctly.

926xx/922xx Series Telephones:

Automatic Test

1. Unplug the modular cord from the telephone or jack.

2. Press and hold the * key while plugging in the telephone.

3. Release the * key. The following should occur:

   a. *"Self Test in Progress" will display along with the version and date of the software release.*

   b. *All dots in the LCD are turned on for three seconds.*

   c. *Digits 0 to 3 are shifted across each column of the display.*

   d. *All the red line key LEDs should light.*

   e. *All the green line key LEDs should light.*

   f. *All the Function key LEDs and the MW lamp should light.*

   g. *The DSS key LEDs should light.*

   h. *"Manual Test" should be displayed.*

4. After the Automatic Test has completed, you can continue with the **Tone Test, Key Matrix and LED Test**, or you can quit the test procedure.

Quitting Test Mode

1. Press CALL1 then 0.

Tone Test

1. With "Manual Test" displayed on the phone, press CALL1 then 2. "Test Tone (1 KHz)" should be displayed and a 1 KHz tone should be heard through the speaker.

   Lifting the handset will mute the tone as long as the tone slide switch is not in the low volume position.

2. Press any key to return to the Manual Test mode.

Key Matrix and LED Test

1. With "Manual Test" displayed on the phone, press CALL1 then 1.

2. Press any key and its Logical Name should be displayed.

   The following chart indicates the Logical Name for each key.

3. Press CALL1 then * to return to the Manual Test mode.

3. Installing Extensions and Trunks

TESTING TELEPHONE OPERATION

926XX/922XX Series Logical Name Table

Keys	Logical Name	Keys	Logical Name
KEYPAD 0 - 9	DIAL 0 - DIAL 9	FLASH	F-07
KEYPAD *	DIAL *7	LND	F-08
KEYPAD #	DIAL #	DND	F-09
Line Keys 1 - 24	L-01 - L-24	DIAL	F-10
DSS Keys 1 - 10	D-01 - D-10	VOL. UP	F-11
CALL1	F-01	VOL. DOWN	F-12
CALL2	F-02	CLEAR	F-13
SPK	F-03	CHECK	F-14
HOLD	F-04	DIRECTORY [1]	F-15
MIC	F-05	MENU [1]	F-16
TRANS / CONF	F-06		

[1] 34-Button Super Display telephone only

i-Series Telephones:

Telephone Test

1. Unplug the modular cord from the telephone or jack.

2. Press and hold the HOLD key while plugging in the telephone.

3. Release the HOLD key.

   - All the dots in the LCD should turned on.

   - To exit the test mode at any time, press CALL1 then "0".

4. On the keypad, press "1".

   The green LEDs should light.

5. Press "2".

   The red LEDs should light, including MW, CALL1, CALL2, MIC, DND and SPK.

6. Press "4".

   A 400 Hz tone should be heard from the speaker. Press "4" to stop the tone.

TESTING TELEPHONE OPERATION

i-Series Telephones:

Telephone Test (Cont'd)

7. Press "5".

   All LCDs should go to the darkest setting.

8. Press "6".

   All LCDs should go to the lightest setting.

9. Press "7".

   "Self Test in Progress" should display as well as the phone's software version and date.

10. Press "8" then press any key on the telephone.

    - A confirmation tone should be heard and the Logical Name for the key should display. Refer to the following chart.

    - To stop the Key Test mode, press CALL1 and then "".*

11. Press CALL1 and then "0" to exit the test mode.

i-Series Logical Name Table

Keys	Logical Name	Keys	Logical Name
KEYPAD 0 - 9	DIAL 0 - DIAL 9	LND	F-08
KEYPAD *	DIAL *	DND	F-09
KEYPAD #	DIAL #	DIAL	F-10
Line Keys 1 - 24	L-01 - L-24	VOL. UP	F-11
DSS Keys 1 - 10	D-01 - D-10	VOL. DOWN	F-12
CALL1	F-01	CLEAR	F-13
CALL2	F-02	CHECK	F-14
SPK	F-03	DIRECTORY [1]	F-15
HOLD	F-04	MENU [1]	F-16
MIC	F-05	SOFT KEY 1	F-21
CONF	F-06	SOFT KEY 2	F-22
FLASH	F-07	SOFT KEY3	F-23
		SOFT KEY 4	F-24

[1] 34-Button Super Display telephone only

3-21

TESTING TELEPHONE OPERATION

Section 4, INSTALLING OPTIONAL EQUIPMENT

**4. Optional
Equipment**

Section 4, INSTALLING OPTIONAL EQUIPMENT

ALARM/FAX SENSORS

Alarm/Fax Sensor

The 4PGDU PCB provides eight alarm/fax circuits which can be programmed to detect a make or break closure from an alarm, fax machine or modem.

When a 4PGDU circuit is used for alarm . . .
An alarm detection causes the system to send a signal to stations programmed to receive the alarms. The alarm signal can also be sent to external paging speakers.

When a 4PGDU is used for fax sharing . . .
Fax sharing allows system users to share a line also used by a fax machine or modem. When a fax machine or modem is using the line, the system detects the line in use, "busies" the line, and sends "line busy" status to all stations with a line appearance. This prevents a station from accessing the line while in use by the modem or fax.

Note:
- The 4PGDU alarm/fax features require a 10-30 VDC power supply installed in series to the alarm/fax circuit.

- The sensors are polarity sensitive and require the tip and ring be connected properly. Refer to Figure 4-1.

Installing an External Alarm (Figure 4-1)

CAUTION
Be sure the requirements of the fax machine and alarm system sensors do not exceed the system specifications.
   Maximum Initial Contact Resistance: 100 mohm

---

1. Run two-conductor cross-connect cable from the 4PGDU alarm block to the 4PGDU cross-connect block for each external alarm input.
2. Terminate the other end of the cross-connect cable to the alarm tip and ring leads of the alarm system.
3. Plug the other end of the 16-pin filter cable into the 4PGDU-A1 CN1 lower 16-pin connector.
4. Plug a 16-pin filter cable into a 48FU connector.

Programming an External Alarm
1. Program the circuit to detect a make or break (Program 0306).
2. Program the stations which should receive the alarm signal.
3. Program an alarm tone for each input.

Refer to *External Alarm Sensors* in the Software Manual for additional details.

4. Optional Equipment

ALARM/FAX SENSORS

Installing an External Fax/Modem (Figure 4-1)

1. Run two-conductor cross-connect cable from the 4PGDU
   alarm block to the 4PGDU cross-connect block for each
   external fax/modem.
2. Terminate the other end of the cross-connect cable to the tip
   and ring contact closure leads of the fax machine or modem.

   *A 10-30 VDC power supply must be installed in series
   to the alarm/fax circuit.*

3. Plug the other end of the 16-pin filter cable into the
   4PGDU's CN1 lower 16-pin connector.
4. Plug a 16-pin filter cable into a 48FU connector.
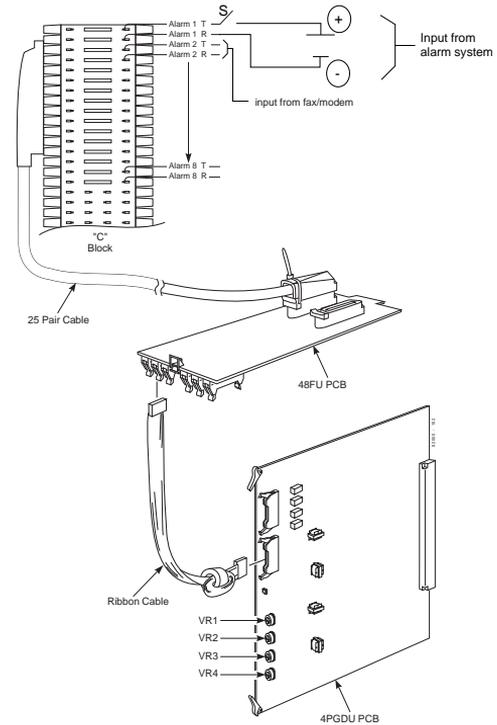
Figure 4-1 INSTALLING AN EXTERNAL ALARM   4-4

BACKGROUND MUSIC

Installing Background Music (Figure 4-2)

Background Music (BGM) sends music from a customer-provided music source to speakers in keysets. If an extension user activates it, BGM plays whenever the user's extension is idle.

The method the system uses to provide Background Music (and Music on Hold) depends on the setting of the S jumper on the CPRU, how the music source is connected, and the setting in Program 0914.

1. Run two-conductor station cable to the BGM input terminals of the MISC block.
2. Terminate the other ends of the station cable to the Background Music source output leads.
3. Set the 'S' jumper to INT (internal music source) or EXT (external music source). See Figure 2-5 on page 2-10.

Note: BGM volume is increased by turning the BGVR potentiometer on the CPRU clockwise.

Refer to *Background Music* in the software manual for additional information.
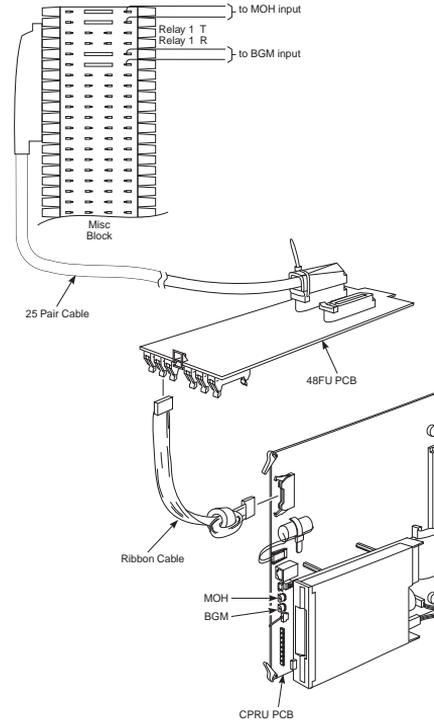
Figure 4-2 INSTALLING BACKGROUND MUSIC   4-5

**4. Optional
Equipment**

DSS CONSOLE

Using a DSS Console (Figure 4-3 and 4-4)

The DSS Console gives a keyset user a Busy Lamp Field (BLF) and one-button access to extensions, trunks and system features. The 110-Button DSS Console provides an additional 100 programmable keys, while the 24-Button DSS Console provides 24 programmable keys. The 110-Button DSS also has 10 fixed feature keys for Paging, calling Door Boxes, activating Night Service and enabling DSS Console Alternate Answer. There are also two keys that allow "shifting" between the first and second set of 100 extensions.

Keep the following in mind when installing DSS Consoles:

● **92555x DSS Consoles: ***
You can only connect DSS Consoles to Super Display or 32-Button Display telephones.
i-Series DSS Console: *
You can only connect DSS Consoles to Super Display, 34-Button, or 28-Button telephones.
*** Note: The phone styles and DSS consoles are inter-
changeable following the above restrictions.**

● A DSS Console does not require a separate station port – it connects directly to the keyset.

● The system allows a maximum of 32 DSS consoles. An extension can have a maximum of four 110-button DSS Consoles or one 24-button DSS Console. The fourth 110-button DSS Console daisy chains to the third, the third daisy chains to the second and the second daisy chains to the first. However, the second, third and fourth DSS Consoles require their own power supply.

● If an i-Series phone has a DSS Console and a DCI-L1 (analog) module installed, the DSS Console must have a separate AC/DC adapter, even if it is the only DSS connected to the phone.

For additional information, refer to *Direct Station Selection (DSS) Console* in the Software Manual.

DSS CONSOLE

Installing a DSS Console

1. **92555x DSS Consoles:**

   Turn the telephone upside down and remove the plastic filler plug from the DSS modular connector marked LINE.

   i-Series DSS Console:

   Turn the telephone upside down. With a flat-head screw-driver, *carefully* pry the plastic knockout piece *UP* from the DSS module connector marked LINE. *Do Not push this piece down into the phone as it can cause damage to the DSS connector.*
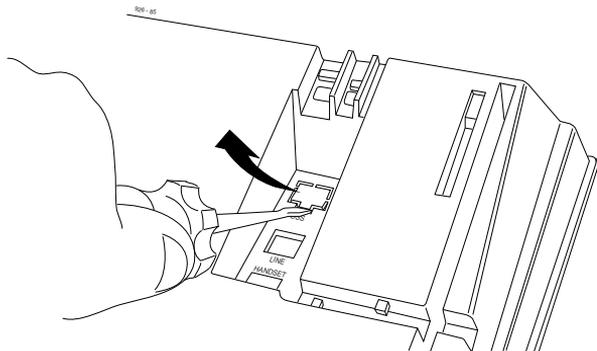
Figure 4-3 REMOVING i-SERIES KNOCKOUT

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 LINE IN connector.

   > *If daisy-chaining two 110-button consoles, connect the line cord from LINE OUT in the first DSS in the chain to LINE IN on the second DSS on the chain, from LINE OUT on the second DSS to LINE IN on the third DSS, from LINE OUT on the third DSS to LINE IN in the fourth DSS.*

4. **To program a DSS Console** . . .

   With the default settings there are no DSS Consoles assigned.

   1101 - DSS Console Extension Assignment

   Designate the extensions that have DSS Consoles connected to them.

   1103 - DSS Console Key Assignment

   Customize the functions of the DSS Console keys.

**4. Optional
Equipment**

DSS CONSOLE

Installing a DSS Console (Cont'd)
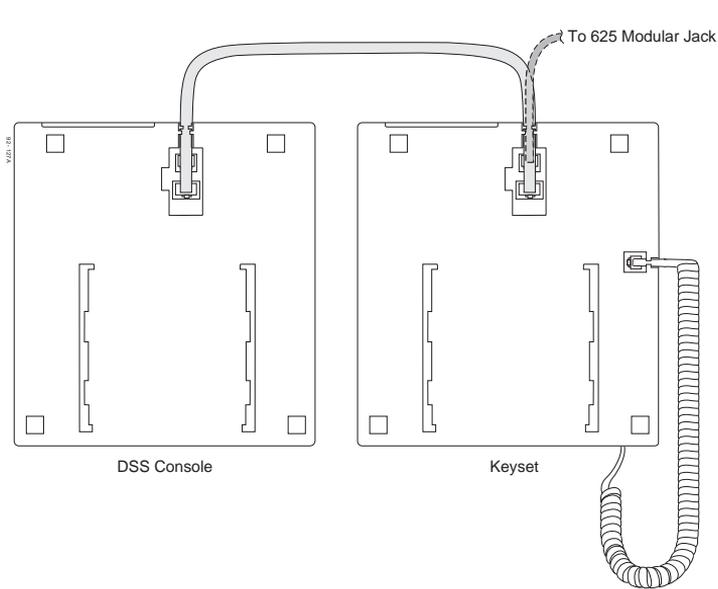
Figure 4-4 INSTALLING A DSS CONSOLE

DOOR BOX

Installing a Door Box (Figure 4-5 and Figure 4-6)

The Door Box is a self-contained Intercom unit typically used to monitor an entrance door. A visitor at the door can press the Door Box call button (like a door bell). The Door Box then sends chime tones to all extensions programmed to receive chimes.

Each 4PGDU PCB audio output can optionally support an analog Door Box. In addition, you can connect each circuit's control relay to an electric door strike. This allows an extension user to remotely activate the door strike while talking to a visitor at the Door Box. The control relays are normally open. The system can have up to eight Door Boxes.

NOTE: A 4PGDU circuit used for an analog Door Box cannot also be used for External Paging.

1. Make sure the dip switch on the 4PGDU PCB for the associated Door Box is set to DH (not PG).
2. Plug the 16-pin filter cable into the CN1 connector on the 4PGDU PCB.

3. Plug the opposite end of the 16-pin filter cable into a 48FU connector.
4. Punch down a two-conductor station cable to the corresponding terminals on the 4PGDU connecting block.
5. Terminate the other end of the station cable leads to the Door Box according to Figure 4-6. Be sure to maintain the proper polarity.
6. Install bridging clips as required.
7. Use the corresponding potentiometers, VR1-VR4, on the 4PGDU PCB to adjust the volume of the Door Box (e.g., VR1 corresponds to Door Box 1).
8. Refer to External Page Relay on page 4-27 for information on connecting the Door Box to a relay.

Note: Door Box volume is increased by turning the corresponding potentiometer clockwise.

Refer to *Door Box* in the Software Manual for additional details.

4. Optional Equipment
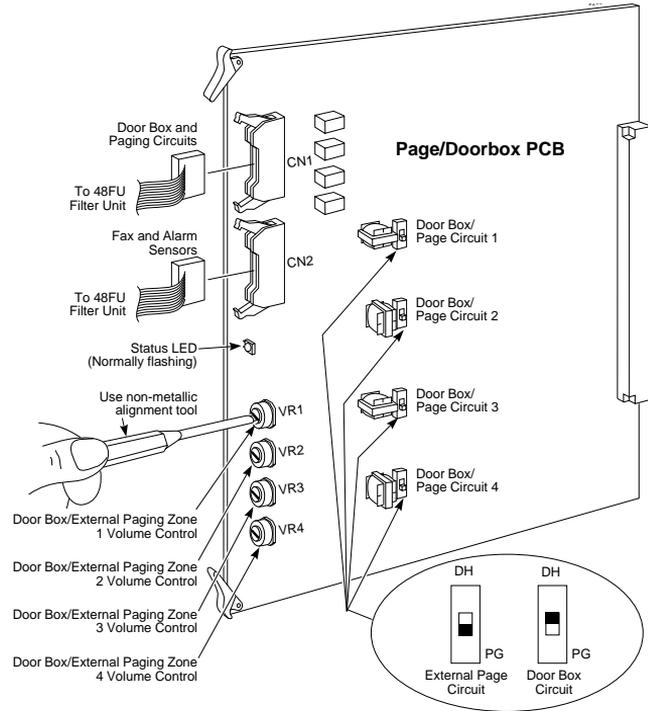
DOOR BOX

Figure 4-5 SETTING THE 4PGDU FOR A DOOR BOX
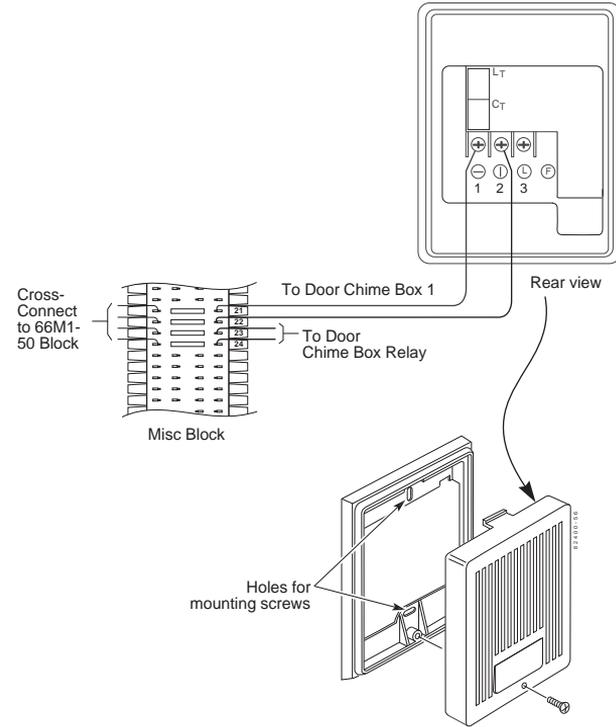
Figure 4-6 INSTALLING A DOOR BOX

4-10

VIDEO DOOR BOX

Video Door Box (Figure 4-7)

The Video Door Box is a self-contained video intercom unit typically used to monitor an entrance door. A visitor at the door can press the Video Door Box call button (like a door bell). The Video Door Box then sends chime tones to all extensions programmed to receive chimes. In addition, the person with the Monitor Phone can view the image of the visitor on their monitor. Or, they have the option of calling the Video Door Box at any time to listen to the sounds and view the image picked up by the Video Door Box.

When connected to a 4PGDU PCB, the Monitor Phone can support one Video Door Box that supports two-way conversation. In addition, up to 4 additional Video Door Boxes can be connected to the Monitor Phone, but they will ONLY function as cameras.

You can also connect each circuit's control relay to an electric door strike. This allows an extension user to remotely activate the door strike while talking to a visitor at the Door Box. The control relays are normally open. The system allows up to eight Door Boxes.

NOTE: A 4PGDU circuit used for an analog Door Box cannot also be used for External Paging.

Installing a Video Door Box

1. Make sure the switch for the associated Door Box is set to DH (not PG). Refer to Figure 4-5.
2. Plug the 16-pin filter cable into the CN1 connector on the 4PGDU PCB.
3. Plug the opposite end of the 16-pin filter cable into a 48FU connector.
4. Locate an available 2-pin connector in a miscellaneous block.
5. For the connector chosen, cross-connect the associated wire pair from the miscellaneous block to the cross-connect block.
6. Connect leads from the lugs on the Monitor Phone to the cross-connect block. Be sure to maintain the proper polarity.
7. Install bridging clips as required.
8. Connect leads from the lugs on the Monitor Phone to the Video Door Box unit. Be sure to maintain the proper polarity. When using one pair station cable, the cable length should not exceed 98 feet. If using coaxial cable, the cable length should not exceed 164 feet. Refer to the VD·E1-104 manual for further coaxial cable installation instructions.

4. Optional Equipment

VIDEO DOOR BOX

Installing a Video Door Box (Cont'd)

9. Use VR1-VR4 on the 4PGDU PCB to adjust the volume of the Door Box (e.g., VR1 corresponds to Door Box 1).
10. Refer to External Page Relay on page 4-27 for information on connecting the Door Box to a relay.

Refer to *Door Box* in the Software Manual for additional details.
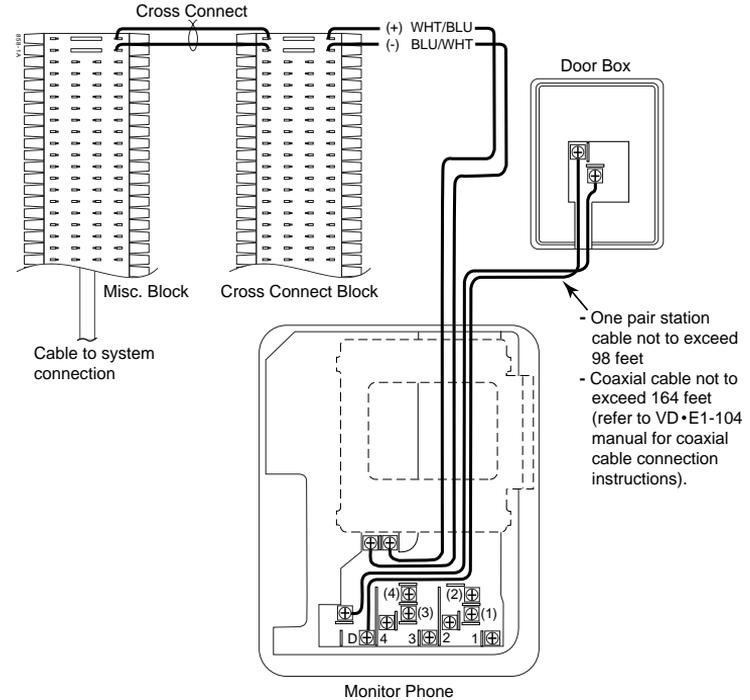
Figure 4-7 CONNECTING A VIDEO DOOR BOX

MUSIC SOURCES

Music on Hold (Figure 4-8 and 4-9)

The system can provide Music on Hold from either an internally synthesized source on the CPRU or from an external source. The external MOH can be a tuner, tape deck, CD player, etc. The CPRU's "S" jumper determines whether the source for MOH is internal or external and is used in conjunction with Program 0914 (refer to the Software Manual for further details).

In addition, up to three different external MOH sources can be installed per 3ACI. When using a 3ACI for external MOH, programming determines the MOH source for each trunk.

Refer to *Music on Hold* in the Software Manual for additional details.

Installing External Music on Hold
1. Run two-conductor station cable to the MOH input terminals of the MISC block.
2. Terminate the other ends of the station cable to the Music on Hold source output leads.

Note: MOH volume is increased by turning the HTVR potentiometer on the CPRU clockwise.

CPRU Music on Hold Contact

The CPRU provides a dry relay that activates when a call is placed on Hold. When an external MOH source is connected to the MOH relay, and a call is placed on Hold, the MOH relay is activated. This allows an external relay sensor/power supply to turn on the MOH source.

This arrangement allows the MOH source (e.g., a tape deck) to run only when a call is placed on Hold. The maximum applied voltage for the relay is 24vDC at .5A.

Using CPRU Music on Hold Contacts
1. Run two-conductor station cable to the MOH input terminals of the MISC block.
2. Terminate the other ends of the station cable to the Music on Hold source output leads.

4-13

4. Optional Equipment

MUSIC SOURCES

Figure 4-8 labels:
- EXT MOH T
- EXT MOH R
- EXT MOH RLY T
- EXT MOH RLY R
- BGM T
- BGM R
- NIGHT SW T
- NIGHT SW R
- Not Used
- Not Used
- N/A
- N/A
- N/A
- N/A
- N/A
- N/A
- Misc Block
- 25 Pair Cable
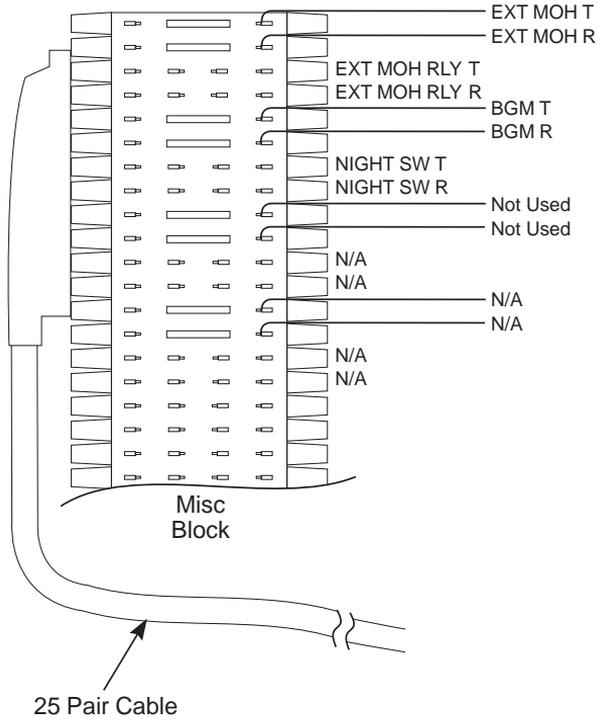
Figure 4-8 THE CPRU MISC BLOCK CUTDOWN

Figure 4-9 labels:
- 25 Pair Cable
- 48FU PCB
- Filter Cable
- MOH
- BGM
- CPRU PCB
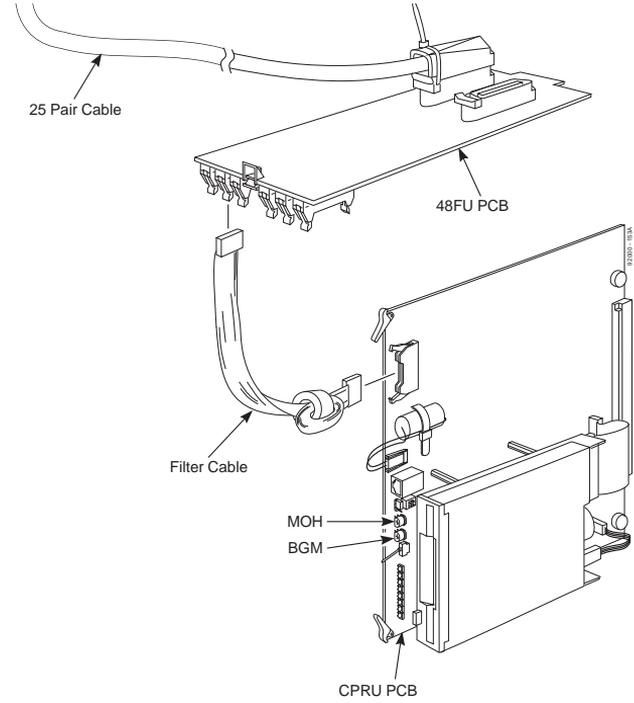
Figure 4-9 CPRU CONNECTIONS   4-14

NIGHT MODE SELECTION

Night Mode Selector Switch (Figure 4-8 and 4-9)

The Night Mode Switch relay closes when the system detects either an open or closure on the MISC block NIGHT SW terminals. System programming determines whether the contact is normally open or normally closed. Maximum 9v DC is output to the switch when open, and 5mA DC when shorted.

Refer to *Night Service* in the Software Manual for additional details.

Connecting a Night Mode Selector Switch

1. Run two-conductor station cable to NIGHT SW input terminals of the MISC block.
2. Terminate the other ends of the station cable to the night switch mechanism output leads.

4. Optional Equipment

OFF-HOOK VOICE ANNOUNCE MODULE

Off-Hook Voice Announce Module (Figure 4-10)

The Off-Hook Voice Announce Module can be installed in the Super Display (P/N 92773), 34-Button Display (P/N 92783), 28-Button (P/N 92760) or 28-Button Display (P/N 92763) telephones. Each telephone can have one DCI and an Off-Hook Voice Announce (OHVA) module. The OHVA module enables incoming voice announcements through the telephone speaker while the user is busy on a handset call. The user can respond to the second call just by speaking toward the phone, without hanging up the handset call. (With the built-in Handsfree Answerback, the phone can receive voice-announcements only when it is idle.) No additional station port is required for this module's operation.

The i-Series telephone must be a series 1.2 or higher in order to install an Off-Hook Voice Announce Module. To determine your series number, check the 8 digit number on the bottom of the telephone. The third and fourth digits should be '12' or higher. For example, with '93101598', the telephone would be a series 1.0 and would be unable to use the Off-Hook Voice Announce Module. With '93121598', the telephone would be a series 1.2 and could have an Off-Hook Voice Announce Module installed.

OFF-HOOK VOICE ANNOUNCE MODULE

Installing the OHVA Module:

1. Turn the telephone upside down and remove the directory card, if needed.
2. Remove the four screws that secure the telephone base, then remove the base from the telephone.
3. Move the SW1 switch on the phone's PCB (located near the speaker) to '2-3' position (the right hand side).
4. Plug the OHVA module into the HFCN 22-pin connector.
5. With the screw provided, secure the PCB in place.
6. Replace the telephone base and secure it with the four screws.
7. Refer to the Off-Hook Signaling feature in the system software manual (P/N 92000SWGxx) and program the feature to operate as desired for the extension.

SW1 jumper must be moved to the right.

1   3

92700 - 19
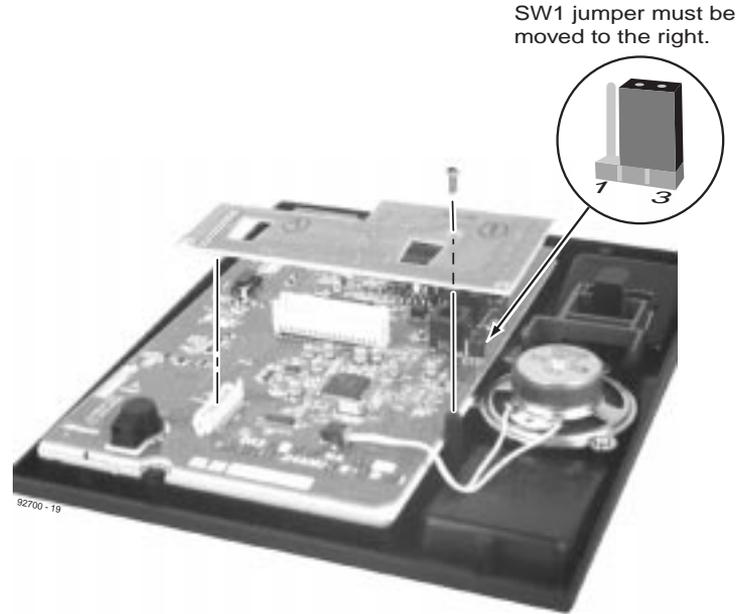
Figure 4-10 OFF-HOOK VOICE ANNOUNCE MODULE INSTALLATION

4-17

4. Optional Equipment

OPA AND VAU MODULES

OPA/VAU (Figure 4-11)

OPA/VAU provides three voice channels to allow the system to automatically answer calls on designated trunks, play a greeting, and provide dialing options to the callers. Refer to Voice Announce Unit in the Software Manual for a detailed description of OPA operation.

The three-channel OPA/VAU requires one digital extension circuit. A three-channel expansion PCB requires a second digital extension circuit.

Station Cabling for the OPA/VAU
1. Punch down one-pair 24 AWG station cable to a cross-connect block.
2. Run one-pair cross-connect from the cross-connect block to the extension (B) block.
3. Connect the (B) block's 25-pair cable to the 48FU filter unit.
4. Install bridging clips on the extension (B) block.

Installing an OPA/VAU
1. Install a modular jack within six feet of the OPA/VAU.
2. Terminate the other end of the 24 AWG station cable from the cross-connect block to the GRN/RED leads of a modular jack.

3. Plug one end of a modular line cord into the modular jack. Plug the other end into the OPA/VAU.
4. Strap jumper J3 to the 1-2 position to activate battery backup.
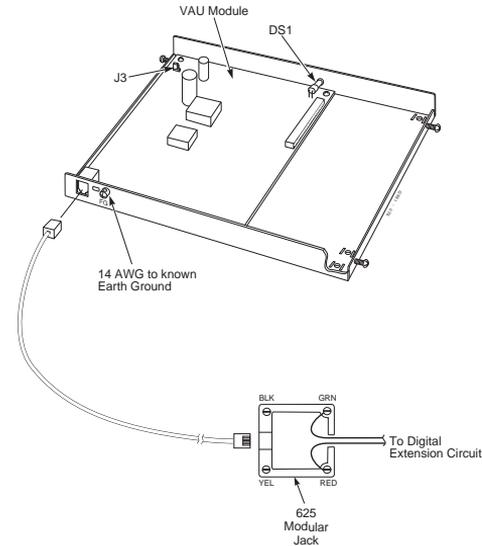
Figure 4-11 OPA/VAU INSTALLATION

OPA AND VAU MODULES

Installing an Expansion PCB (Figure 4-12)

1. Punch down one-pair station cable to a cross-connect block.
2. Run one-pair cross-connect from the cross-connect block to the extension (B) block.
3. Terminate the station cable to the BLK/YLW leads of the OPA/VAU modular jack.
4. Install bridging clips on the extension (B) block.
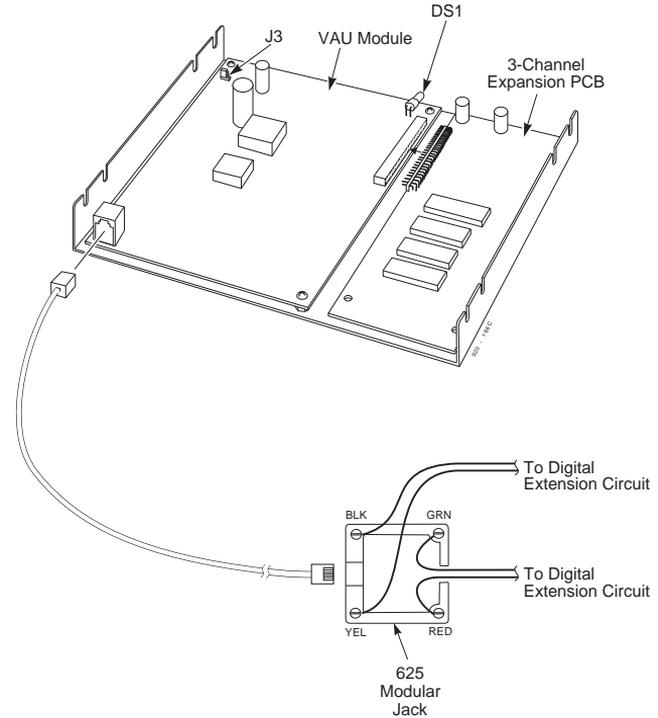
Figure 4-12 OPA/VAU EXPANSION PCB INSTALLATION 4-19

4. Optional Equipment

2-OPX MODULE

Using the 2-OPX Module (Figure 2-13)

The 2-OPX Module 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. *The 2-OPX Module must be connected to an odd port.* Although it uses a single digital extension circuit for power and signaling, the 2-OPX Module disables the next consecutive (even) port.

Refer to *Single Line Telephones* in the Software Manual for more details.

Station Cabling for the 2-OPX Module

1. Punch down 1-pair of 24 AWG station cable to an extension cross-connect block.
2. Run 1-pair cross-connect from the cross-connect block to an extension (B) block.
3. Connect the extension (B) block's 25-pair cable to a 48FU filter unit.
4. Install a modular jack for the 2 OPX Module within six feet of the module's location.
5. Run one-pair 24 AWG station cable from the cross-connect block to the modular jack.

6. Terminate the station cable WHT/BLU - BLU/WHT leads to the RED and GRN lugs in the modular jack.
7. Ground the 2-OPX Module by connecting a 14 AWG ground wire from the FG lug to a known earth ground.
8. Install bridging clips as needed
9. Plug a line cord into the 2-OPX unit and the 2-OPX's modular jack.

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

10. **To program the 2-OPX Module . . .**
    With the default settings, no 2-OPX Modules are programmed.
    0005 - Extension Circuit Type
    Program all 2-OPX Modules with circuit type 9. Enter 2 for Order Number.

    Refer to *Single Line Telephones* in the Software Manual for additional details.

2-OPX MODULE

2-OPX Module

DS1

14 AWG to known
Earth Ground

BLK   GRN

To Digital
Extension Circuit

YEL   RED

625
Modular
Jack
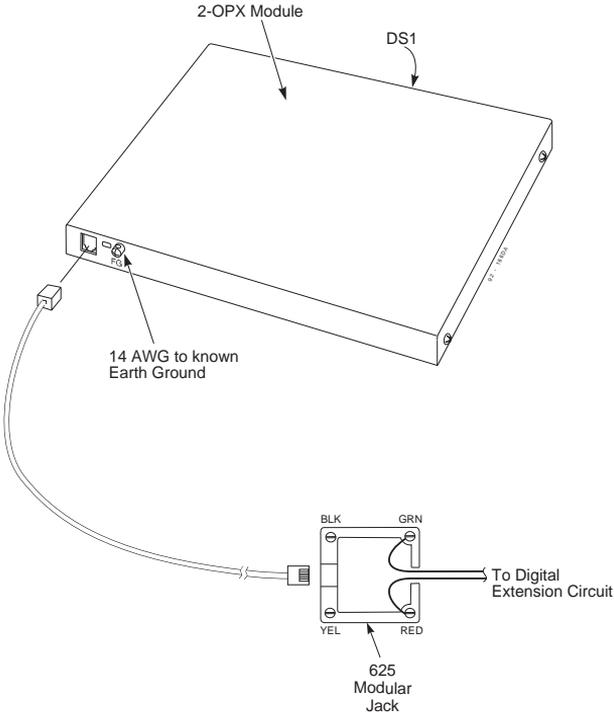
Figure 4-13 INSTALLING THE 2-OPX

**4. Optional
Equipment**

POWER FAILURE TELEPHONES

Power Failure (Figure 4-14 and 4-15)

The system allows 4 loop start lines per cabinet to be bridged to designated extensions for basic telephone service during a power failure. The power failure operation occurs during a commercial power failure, and is not affected by PCB failure. Refer to the chart below for PF cross-connections.

CO line	PF station
1	1
2	2
3	3
4	4

Note: An 8ATRU-LS1 equipped with an 8GSAU ground start or 8CIDU Caller ID PCB cannot be equipped for power failure operation. In addition, 2ATRU-EM, 4ATRU-EM and 4ATRU-LD1 PCBs cannot be configured for power failure operation.

To install a 4PFTU on an 8ATRU-LS1 for power failure operation:

1. Remove jumpers on connector CN4 on an 8ATRU-LS1.
2. Install the 4PFTU-C1 to connectors CN3/CN4 on an 8ATRU-LS1. The 4PFTU filter cable faces toward the left of the 8ATRU-LS1.
3. Connect the top filter cable on the 4PFTU to a 48FU filter unit supporting single telephones for PF operation.

Note: For PF operation, the 16-pin filter cable from the 8ASTU/16ASTU single line telephone PCB to a 48FU is not installed.

4. Connect the filter cable on the 4PFTU to a 48FU filter unit supporting single telephones for PF operation.

POWER FAILURE TELEPHONES
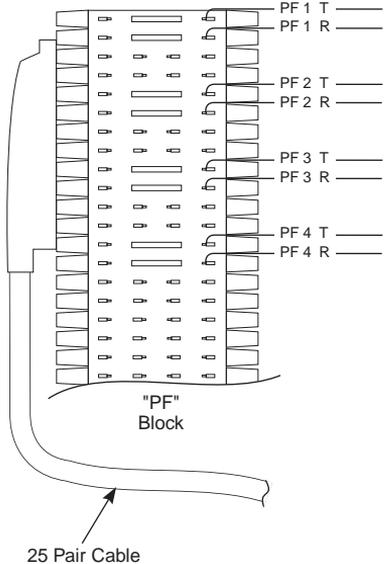
Figure 4-14 4PFTU POWER FAILURE CONNECTIONS
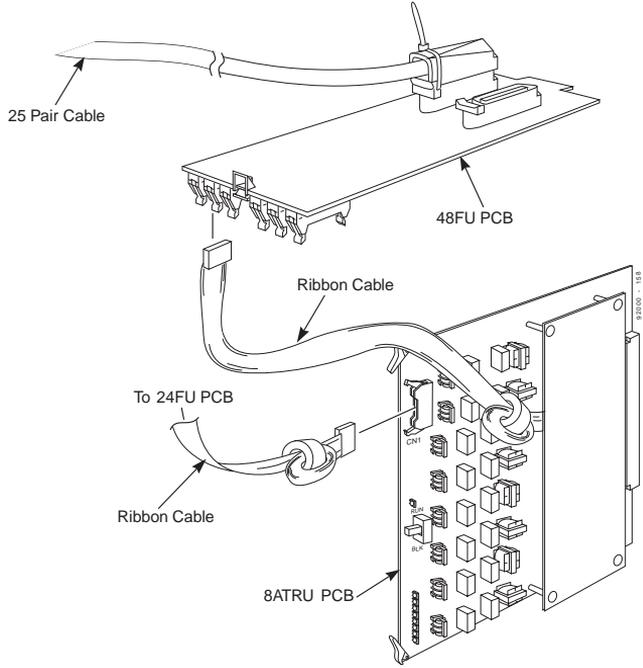
Figure 4-15 4PFTU POWER FAILURE CONNECTIONS

4-23

4. Optional Equipment

EXTERNAL PAGING

External Page (Figures 4-16, 4-17 and 4-18)

Four external page zone/door box circuits are provided by each 4PGDU installed. Each Door Chime Box/external page circuit provides a dry relay contact. Refer to *Paging, External* in the Software Manual for additional details.

Note: External paging can also be provided using a 3-ACI. Refer to page 4-28 for more on the 3-ACI Module.

Installing an External Page System
1. Set the dip switch on the 4PGDU for external paging to PG.
2. Terminate one end of a one-pair 24 AWG station cable to the PG1 T/R leads on the PGU1 block. (Up to 4 paging zones can be installed. Use PG2-PG4 T/R leads for other zones.)

3. Terminate the other end of the station cable to the tip and ring leads of the paging system.
4. Plug a filter cable into the 48FU. The ferrite bead must be placed closer to the PCB - not the 48FU filter unit.
5. Plug the other end into the upper connector on the 4PGDU.
6. Install bridging clips to the PG1 T/R leads on the PGU1 block.
7. Adjust volume to the page system using the corresponding potentiometer VR1-VR4 on the 4PGDU PCB.

Note: Page amplification is not provided by the 4PGDU PCB and must be accommodated by using an external page amplifier.

EXTERNAL PAGING
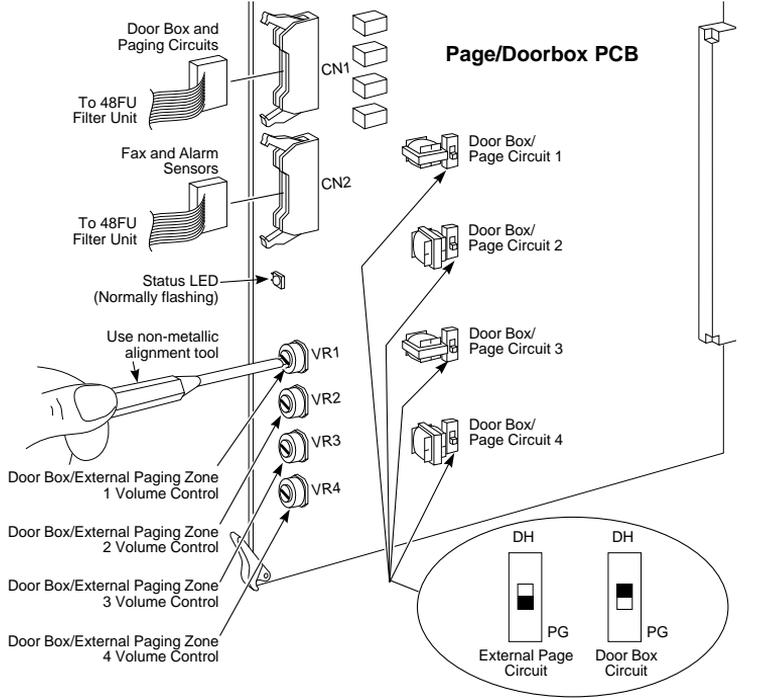
Figure 4-16 4PGDU SWITCH SETTINGS

**4. Optional
Equipment**

EXTERNAL PAGING

PG/DB 1 T
PG/DB 1 R
RLY 1 T
RLY 1 R
PG/DB 2 T
PG/DB 2 R
RLY 2 T
RLY 2 R
PG/DB 3 T
PG/DB 3 R
RLY 3 T
RLY 3 R
PG/DB 4 T
PG/DB 4 R
RLY 4 T
RLY 4 R

"C" Block

25 Pair Cable
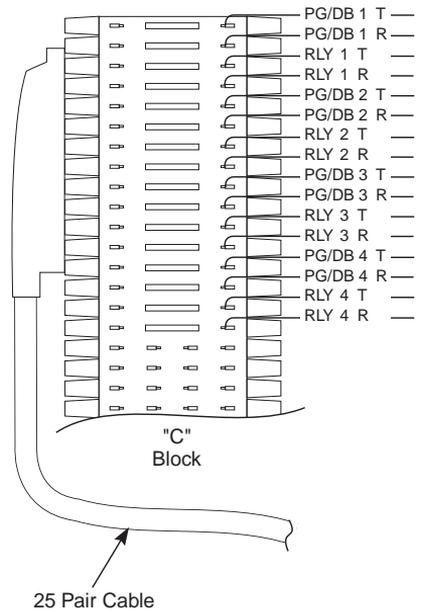
Figure 4-17 PGU BLOCK CUTDOWN

25 Pair Cable

48FU PCB

Ribbon Cable

VR1
VR2
VR3
VR4

4PGDU PCB
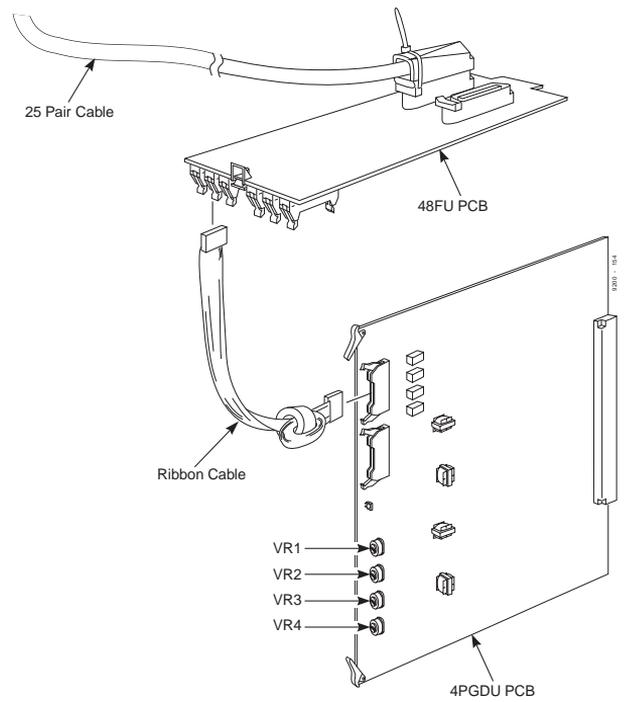
Figure 4-18 PGU CONNECTIONS

4-26

EXTERNAL PAGING AND PAGE RELAYS

External Page Relays

Four external dry contact relays are available when a 4PGDU is installed which can be used to activate ancillary devices (i.e. door unlock devices). Each Door Chime Box/external page circuit provides a dry relay contact.

Note: External page relays can be provided by a 3ACI. Refer to page 4-28 for more on the 3-ACI module.

Door Box /External Page Relay Contacts (Figures 4-16, 4-17 and 4-18)

To connect a dry contact relay device to a Door Box/External Page Relay:

1. Set a dip switch on the 4PGDU to the DH position for Door Box control. Set the dip switch on the 4PGDU to the PG position for external page control.
2. Terminate one end of a one-pair 24 AWG station cable to the RLY1 T/R leads on the PGU1 block. (Up to 4 paging zones can be installed. Use RLY2-RLY4 T/R leads for other relays.)

3. Terminate the other end of the station cable to the T/R leads of the relay sensor.
4. Plug a filter cable into the 48FU. The ferrite bead must be placed closer to the PCB - not the 48FU filter unit.
5. Plug the other end into the upper connector on the 4PGDU.
6. Install bridging clips to the RLY1 T/R leads on the PGU1 block.

Note: The relay closes when the Door Box/external page zone is called. The maximum applied voltage is 24vDC at .5A for each contact.

4-27

4. Optional Equipment

3-ACI MODULE

3-ACI (Figures 4-19 and 4-20)

The 3-ACI provides three analog ports which can be used for external Music on Hold source input or external page connection in any combination. The 3-ACI also provides a dry relay for each analog port. The 3-ACI requires one 16DSTU station circuit for operation. Refer to *Analog Communications Interface* in the Software Manual for more details.

Music on Hold
The 3-ACI provides three RCA plugs for external MOH sources (e.g. tuner, tape deck, CD player, etc.). A dry relay used with a relay sensor/power supply can be used to turn the MOH source on/off.

External Paging
The 3-ACI allows three external page systems to be connected. A dry relay used with a relay sensor/power supply can to turn the paging system on/off.

Contact Closure
The 3-ACI provides a dry relay, and when equipped with a relay sensor/power supply, closes the relay when the extension assigned to the 3-ACI software port is dialed.

Note: External paging and external relays can also be provided using a 4PDGU. Refer to External Paging on page 4-24 for more.

Installing an External Music on Hold Source
1. Connect the 3-ACI to a 16DSTU extension circuit using the modular connector provided.
2. Connect a music source to the RCA jack on the 3-ACI PCB.

Note: MOH volume is adjusted from the MOH source.
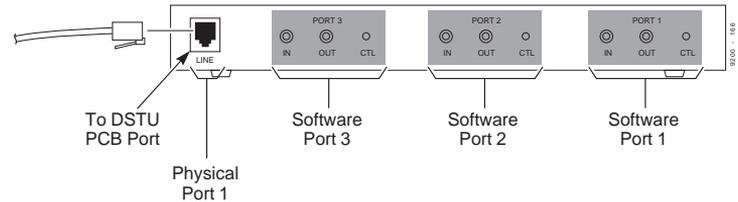
Figure 4-19 INSTALLING A 3-ACI MOH/BGM SOURCE

3-ACI MODULE

Installing an External Paging System
1. Connect the 3-ACI to a 16DSTU extension circuit using the modular connector provided.
2. Connect a paging system to the RCA jack on the 3-ACI PCB.

Note: Page volume is adjusted from the paging equipment.

Installing a Dry Contact Closure Device
1. Connect the 3-ACI to a 16DSTU extension circuit using the modular connector provided.
2. Connect a dry contact sensor/power supply to the RCA jack on the 3-ACI PCB.
3. Connect a device to the power supply side of the relay sensor.
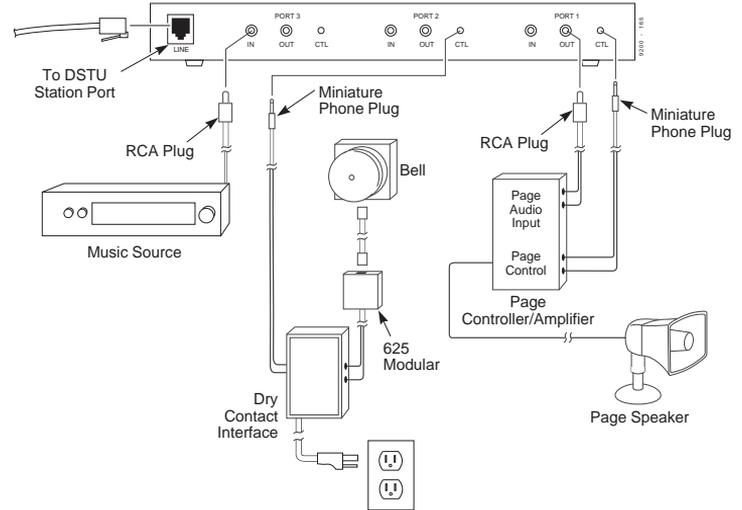
Figure 4-20 INSTALLING BGM/MOH AND EXT PAGING TO A 3-ACI

4-29

4. Optional Equipment

REJ RECORDING JACK

Using the REJ Recording Jack (Figures 4-21 - 4-25)

Use the REJ Recording Jack to connect a telephone to an external tape recorder or speaker. There are two versions of the REJ recording jack. The REJ P/N 92265 can only be connected to a Super Display Telephone (P/N 92663 or 92283x), while P/N 80175 (for the i-Series phones) can be connected to 28-, 34-Button, or Super Display i-Series phones. The REJ output is a standard RCA jack which you can connect directly to an AUX level input on a recorder or page amplifier. The REJ Jack does not use a station port.

Installing the REJ Recording Jack:

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

The handset is *always* recording, even when the handset is idle and in the cradle. This may result in recording undesired conversations.

1. Turn the telephone upside down and remove the four screws from each corner of the telephone set.

2. Lift the upper housing off of the telephone base.
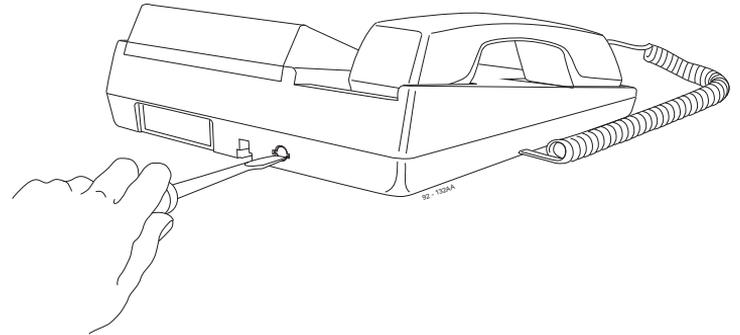
**Figure 4-21 PUNCHING OUT FOR THE REJ
(926xx SERIES and i-SERIES PHONES)**

Installing the REJ (Cont'd)
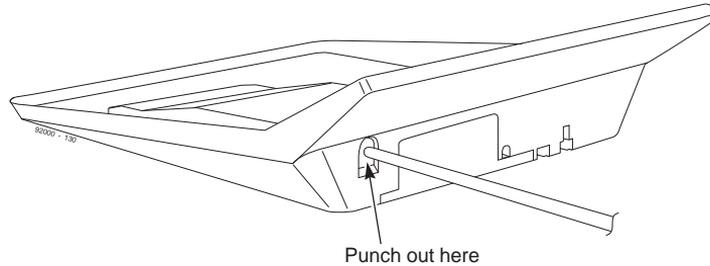
**Figure 4-22 PUNCHING OUT FOR THE REJ
(PHONE SERIES 922xx)**

3. On the side of the lower housing, use a blunt object to remove the plastic molding that covers the hole for the REJ connector.

4. Install the REJ as shown with the components facing down. Refer to Figures 4-23, 4-24, and 4-25.

5. Use the screw supplied with the REJ to secure it to the lower telephone housing.

6. Insert the connector on the REJ's cable into the matching connector on the PCB in the telephone's upper housing.

   To ensure the proper polarity, the connector is keyed (The red wire is on top on the 926/922 phones and to the left (away from the display) on the i-Series phones.)

7. Reassemble the telephone and reinsert the four screws you removed in step 1.

8. Using a standard audio cable with an RCA plug, connect the recording device to the REJ.

**4. Optional
Equipment**
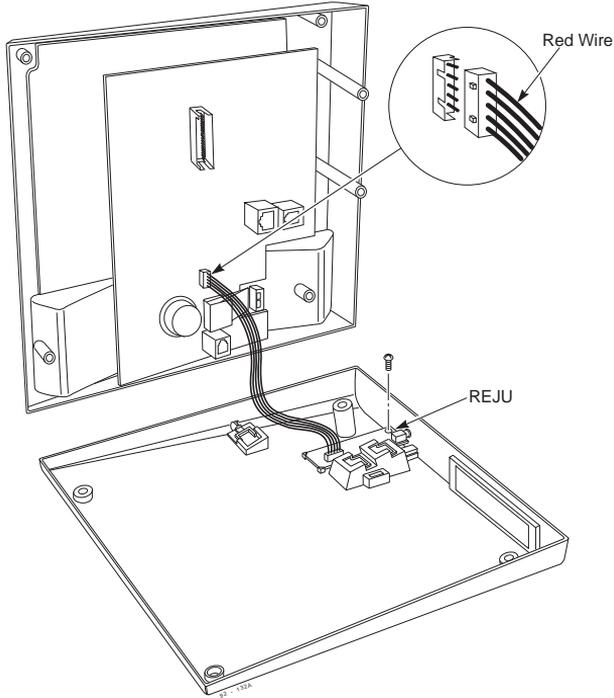
REJ RECORDING JACK

Figure 4-23 INSTALLING THE REJ (PHONE SERIES 926xx)
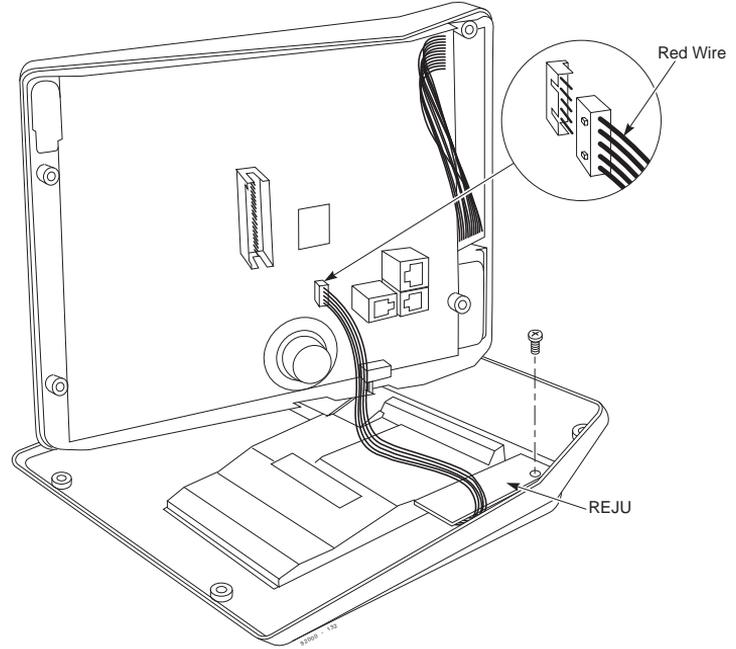
Figure 4-24 INSTALLING THE REJ (PHONE SERIES 922xx)

4-32

REJ RECORDING JACK

Red Wire

REJ
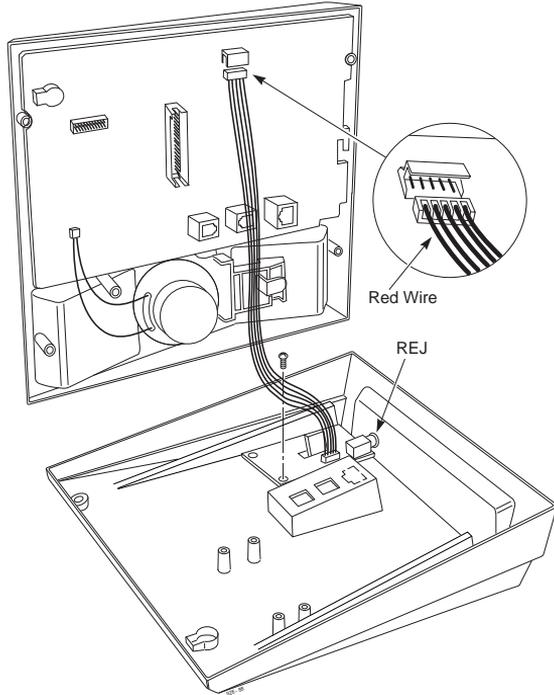
**Figure 4-25 INSTALLING THE REJ
(i-SERIES PHONES)**

**4. Optional
Equipment**

WALL-MOUNT KIT

Using the Wall-Mount Kit

Any key telephone can be equipped with a wall-mount kit for attachment to a wall. The wall-mount kit includes a mounting bracket, wall-mount screws, washer, and handset hangers. Each i-Series phone has an integrated wall/desk bracket. Optionally, you may also be able to install the bracket on the phone so that the phone can be placed on the desk. This angles the phone to provide easier viewing of the keys and the display.

Note: The wall-mount kit currently does not accommodate installing on an AT&T wall plate.

Installing the Wall-Mount Handset Hanger For 926xx Series Phones (Figure 4-26)

1. *Two different types of handset hangers may be included in your kit. To ensure that you are using the correct hanger, refer to Figure 4-26.* Insert the handset hanger in the slot provided beneath the telephone's hookswitch.

2. Remove the plastic insert beneath the hookswitch to expose the hanger screw hole.

3. Use the machine screw provided to fasten the hanger in place.

4. Replace the plastic insert.
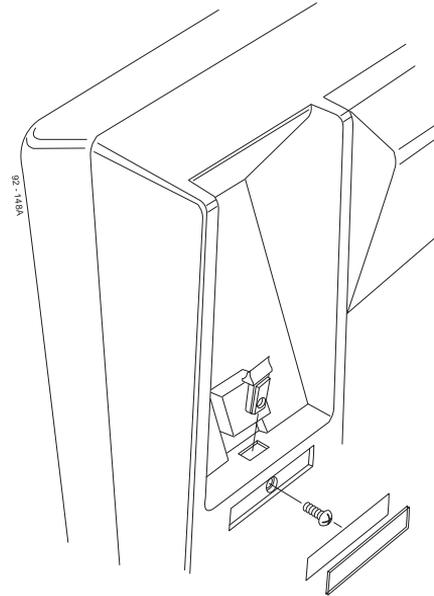
**Figure 4-26 INSTALLING THE WALL-MOUNT HANGER
(PHONE SERIES 926xx)**

4-34

WALL-MOUNT KIT

Installing the Wall-Mount Handset Hanger For 922xx Series Phones (Figure 4-27)

1. *Two different types of handset hangers may be included in your kit. To ensure that you are using the correct hanger, refer to Figure 4-27.* Insert the handset hanger in the slot provided beneath the telephone's hookswitch. Make sure the clip snaps into place.

   If necessary, use a screwdriver to remove the handset hanger.

   Note: The handset hanger must be installed as shown, with the hook pointing upward.
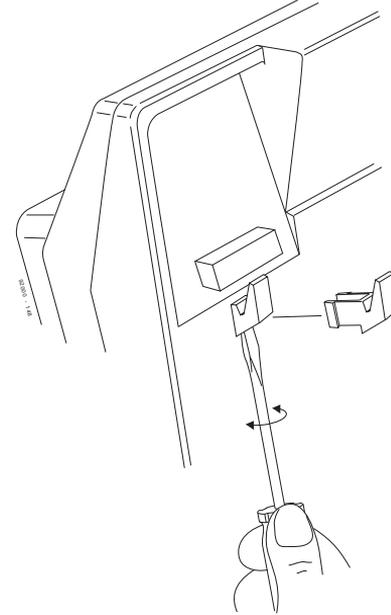
Figure 4-27 INSTALLING THE WALL-MOUNT HANGER (PHONE SERIES 922xx)

Continued on next page . . .

4. Optional Equipment

WALL-MOUNT KIT

Wall-Mounting a 926/922 Series Key Phone
(Figure 4-28)

1. **Installing Over a Wall Plate:**
   Slide the metal bracket down over the retaining screw heads on the wall plate until secure. Note that the dimpled outdents in the bracket should be against the wall.
   Installing Over a Modular Jack:
   Skip to Step 2.

2. Depending on your installation, attach the wall-mount kit's plastic bracket to either the metal bracket or directly to the wall using the screws provided.

3. Insert the telephone's line cord from the 625 modular jack through the plastic bracket into the phone. Secure the cord using the clips provided on the bracket.

4. Place the telephone on top of the plastic bracket on the clips provided.

To 625 Jack
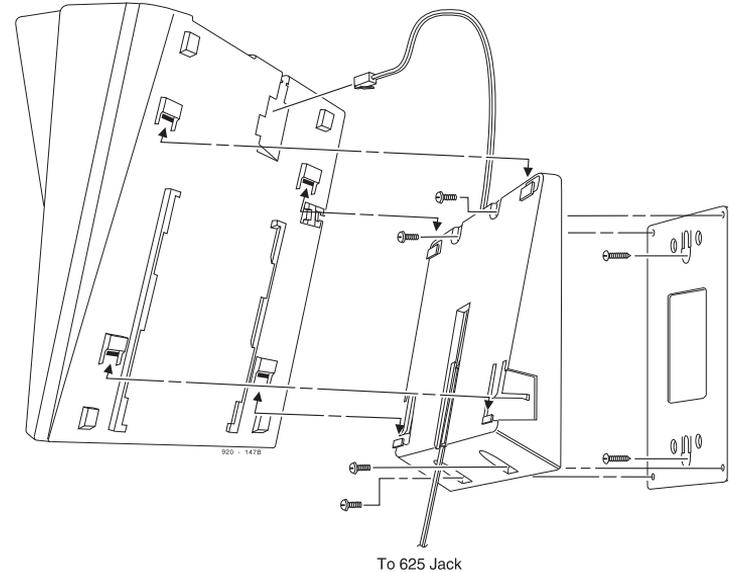
Figure 4-28 INSTALLING THE WALL-MOUNT BRACKETS (PHONE SERIES 926xx/922xx)

WALL-MOUNT KIT

Using the Desk Stand on 926/922 Series Phones
(Figure 4-29)

1. Place the rubber feet provided in the kit on the bottom of the plastic bracket. Place a rubber foot on each corner.

2. Insert the telephone's line cord from the 625 modular jack through the plastic bracket using the clips provided on the bracket.

3. Place the telephone on top of the plastic bracket on the clips provided. Slide the telephone down until it snaps into place.
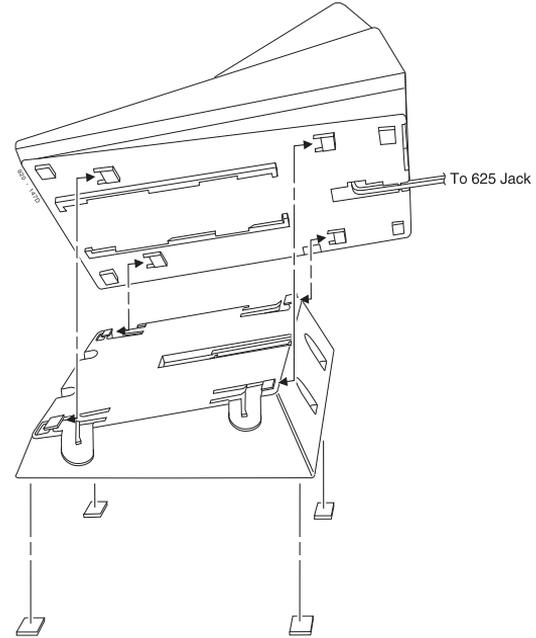
Figure 4-29 ATTACHING AS A DESK STAND (PHONE SERIES 926xx/922xx)

4. Optional Equipment

WALL-MOUNT KIT

Installing the Wall-Mount Handset Hanger For i-Series Phones (Figures 4-30 and 4-31)

1. Remove the integrated wall/desk bracket from the bottom of the phone. Refer to Figure 4-30.

   - From the top, right-hand side of the wall/desk bracket, pull up slightly until the corner lifts up.

   - Gently pull the bracket to the right and pull up. This allows the left-hand side to release.

2. Break off one of the wall-mount hookswitch tabs located on the bracket.

3. To allow for easier installation, gently push a small flat-head screwdriver in the slot below the hookswitch until the handset hanger pushes up.

   There will be a slight snap as it releases.

4. Insert the wall-mount hookswitch tab in the slot below the hookswitch. The tab should be pushed in until it's flush with the base (Figure 4-31).

Wallmount hookswitch tabs

Break off piece if **wall mounting**
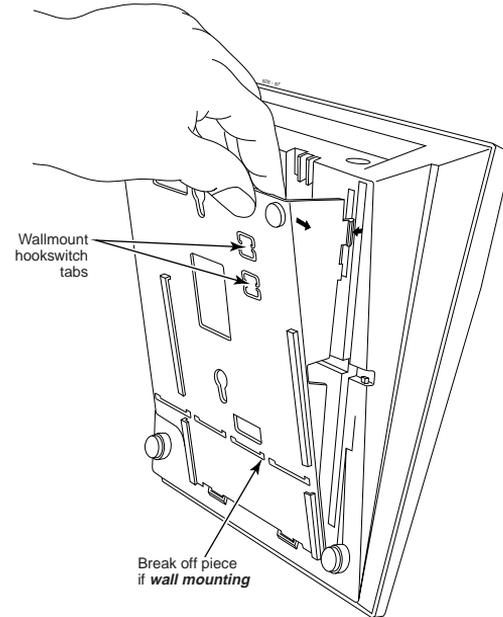
Figure 4-30 INSTALLING THE WALL-MOUNT HANGER (i-SERIES PHONES)

WALL-MOUNT KIT

Handset Hook

Flat Plastic
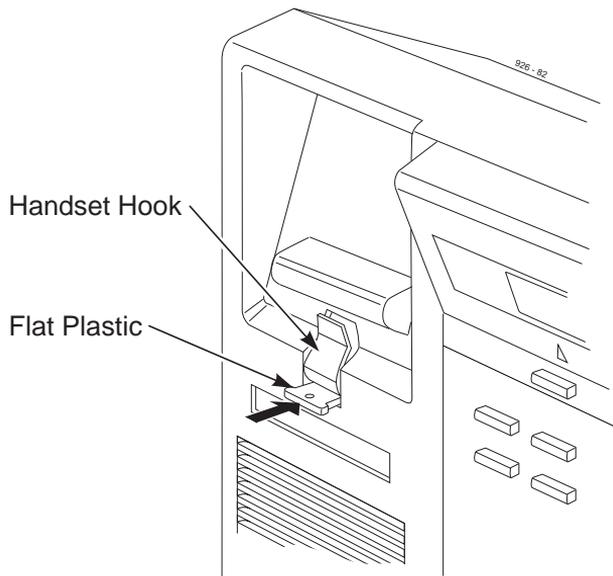
Figure 4-31 INSTALLING THE WALL-MOUNT HANGER (i-SERIES PHONES)

Wall-Mounting i-Series Phones (Figure 4-32)

1. After removing the integrated wall/desk bracket from the bottom of the phone. (Figure 4-30), break off the 1 1/2" section of the bracket as indicated in Figure 4-30 and discard this piece.

   After breaking this section off, the bracket cannot be used in the future as a desk stand.

2. Depending on your installation, attach the wall-mount kit's plastic bracket to either a metal wall plate or directly to the wall (Figure 4-32).

3. Insert the telephone's line cord from the 625 modular jack through the plastic bracket and into the phone.

4. Place the telephone on top of the plastic bracket on the hook provided.

   The hook on the bracket slides into the slot on the back of the phone.

5. Push the bottom of the phone until both the left and right sides snap into place.

   To remove the phone from the wall-mount bracket if needed, push in on the left and right sides of the bracket while lifting the phone up off the bracket.

4. Optional Equipment
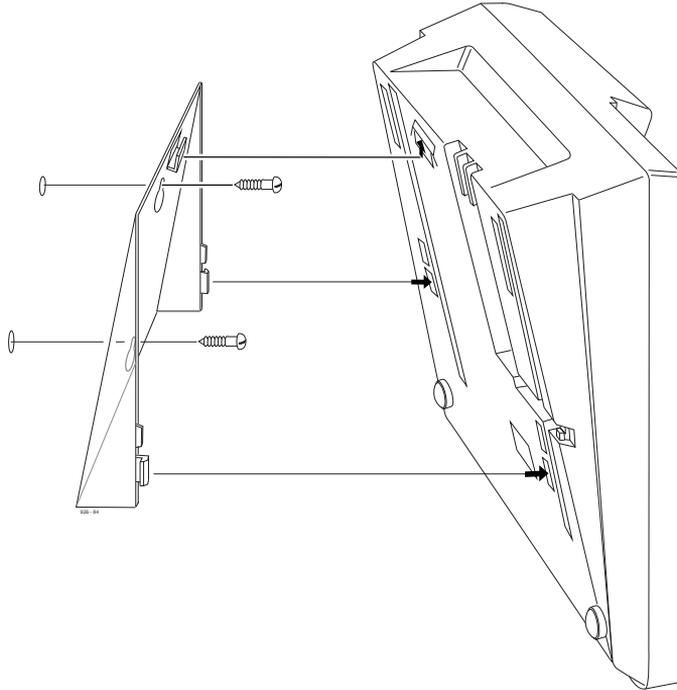
WALL-MOUNT KIT

**Figure 4-32 INSTALLING A WALL-MOUNTED PHONE
(i-SERIES PHONES)**

Using the Desk Stand on i-Series Phones (Figure 4-33)

1. Remove the integrated wall/desk bracket from the bottom of the phone. Refer to Figure 4-30.

   - From the top, right-hand side of the wall/desk bracket, pull up slightly until the corner lifts up.

   - Gently pull the bracket to the right and pull up. This allows the left-hand side to release.

2. Without releasing the bottom hooks, slide the base to the left and snap into place.

   > *To remove the desk stand, push in on the left and right sides of the bracket while lifting up the phone off the bracket.*
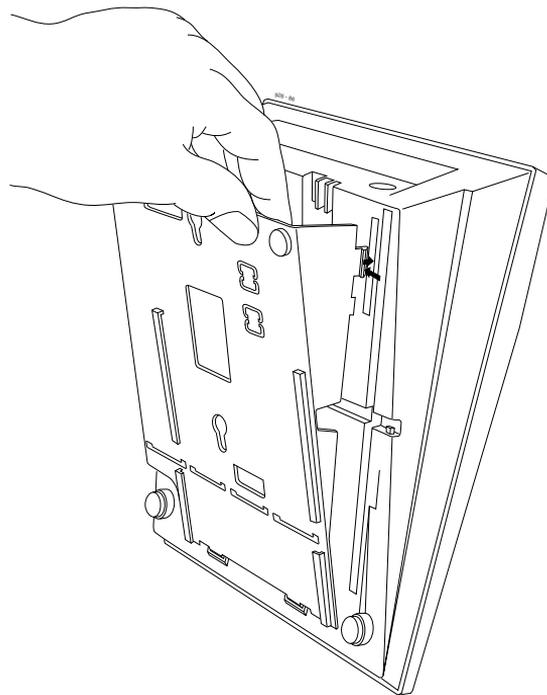
Figure 4-33 INSTALLING BRACKET AS DESK STAND (i-SERIES PHONES)

4. Optional Equipment

WALL-MOUNT KIT

Section 5, DATA AND SMDR

**5. Data and
SMDR**

DATA OVERVIEW

Data Communications (Figure 5-1)

The system provides up to 144 data device interfaces for data communications. Using data devices allows a network to share a limited number of business resources such as modems, printers, and PC's. The system's DCI devices can switch asynchronous RS-232-C data at speeds from 300 to 19.2K.

There are currently three types of data devices available: DCI-A, DCI-B and the 3-DCI Module.

DCI-A

The DCI-A is a single port data module that provides a serial RS-232-C port. The DCI-A is installed in a key telephone, but has a unique extension number. DCIs can be installed in any Super Display or 32-Button Display telephone within the P/N 926xx/922xx series of phones. With the i-Series phones (P/N 927xx), the DCI can only be installed in the Super Display, 28- or 34-button key phones. Each DCI-A requires one data (software) port, which has the same number as the DSTU station port. You can install up to 144 DCI units – one in each telephone.

DCI-B

The DCI-B is a single port data module that provides a parallel (Centronics type) port. The DCI-B is installed in a key telephone, but has a unique extension number. DCIs can be installed in any Super Display or 32-Button Display telephone within the P/N 926xx/922xx series of phones. With the i-Series phones (P/N 927xx), the DCI can only be installed in the Super Display, 28- or 34-button key phones. Each DCI-B requires one data (software) port, which has the same number as the DSTU station port. You can install up to 144 DCI units in the 384i – one in each telephone.

3-DCI Module

The 3-DCI Module is a stand-alone data module which provides three RS-232-C serial ports, each port requiring one system data (software) port. The 3-DCI derives power and signaling from one DSTU circuit. The system allows up to 48 3-DCI Modules providing 144 ports.

DATA OVERVIEW

The 3-DCI Module uses a single digital station port on a DSTU PCB. The module's data ports have the same DCI port numbers as the DSTU PCB port *and* the next two DSTU PCB ports. When you plug a 3-DCI into a DSTU port, the system disables the data capabilities for any devices connected to the next two consecutive ports. For example, if you plug a 3-DCI into port 1, you can plug in keysets in ports 2 and 3, but you cannot plug DCI units or another 3-DCI Module into ports 2 and 3. The data ports for the 3-DCI plugged into DSTU port 1 are numbered 1-3.

DCI-L1 (Future Item)

The DCI-L1 will supply two additional channels to the single channel i-Series phones.

If an i-Series phone has a DSS Console and a DCI-L1 (analog) module installed, the DSS Console must have a separate AC/DC adapter, even if it is the only DSS connected to the phone.
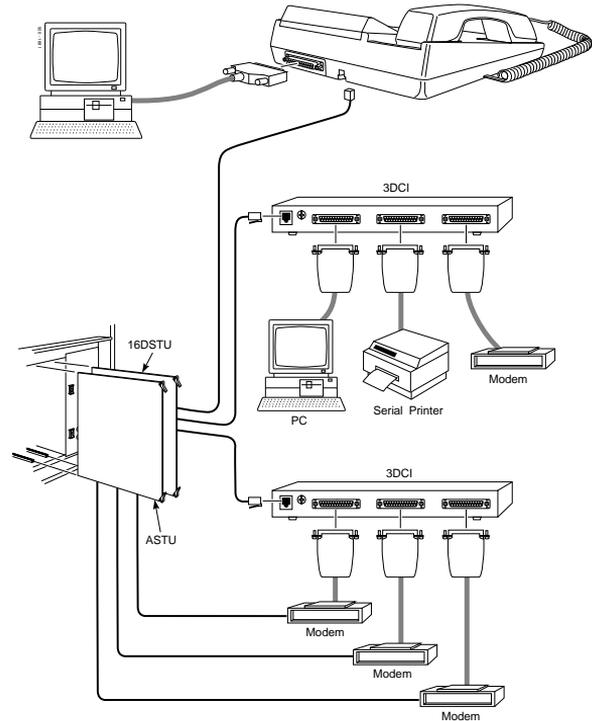
Figure 5-1 TYPICAL DATA NETWORK

5-3

DATA OVERVIEW

Physical Ports and Software Ports

DCI's use physical hardware ports and software ports. Hardware ports for a DCI-A or DCI-B use the number corresponding to the port where the device is physically connected.

Software ports are used during system programming. The software port (1-144) depends on the installation order set in Program 0005.

For most installations, assign DCI Order 1 to the first DCI Module installed and DCI Order 144 to the last DCI installed. Order 1 specifies software port 1; Order 144 specifies software port 144.

Each 3-DCI requires one physical port connected to the 16DSTU (002-256) and three software ports (145-288). The 3-DCI uses a different numbering plan also determined by Program 0005.

For most installations, 3-DCI Order 1 assigns software ports 145, 146, and 147 to the first 3-DCI-A installed. The last 3-DCI installed uses 3-DCI-A Order 48 for ports 286, 287, 288.

Device	Total Number of Physical Ports	Installation Order Numbers	Software Ports
DCI Modules	144 (in phone)	1-144	1-144
3DCI Units	48	1-48	145-288

DATA OVERVIEW

3-DCI Port Assignments (Figure 5-2)

Figure 5-2 below shows typical 3DCI-A port assignments.
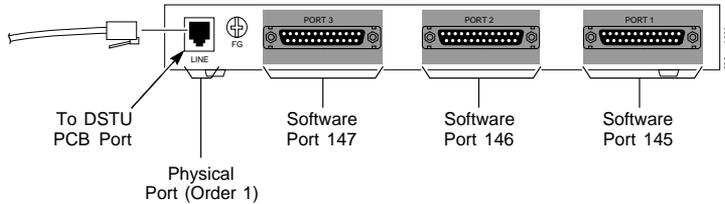
Figure 5-2 TYPICAL 3DCI-A PORT ASSIGNMENTS

Non-dedicated Modem Pooling Network
(Figure 5-3 and 5-4)

The illustration on the following page shows a typical data communications network with a 3DCI-A connected to a 16DSTU extension circuit supporting a modem. The modem is not equipped with a dedicated CO line, but can access an outside line via an 8/16ASTU PCB.

Dedicated Modem Pooling Network (Figure 5-5 and 5-6)

The illustration on page 5-7 shows a typical data communications network with a 3DCI-A connected to a 16DSTU extension circuit supporting a modem. The modem is equipped with a dedicated CO line for outside dialing purposes.

5. Data and SMDR

DATA OVERVIEW
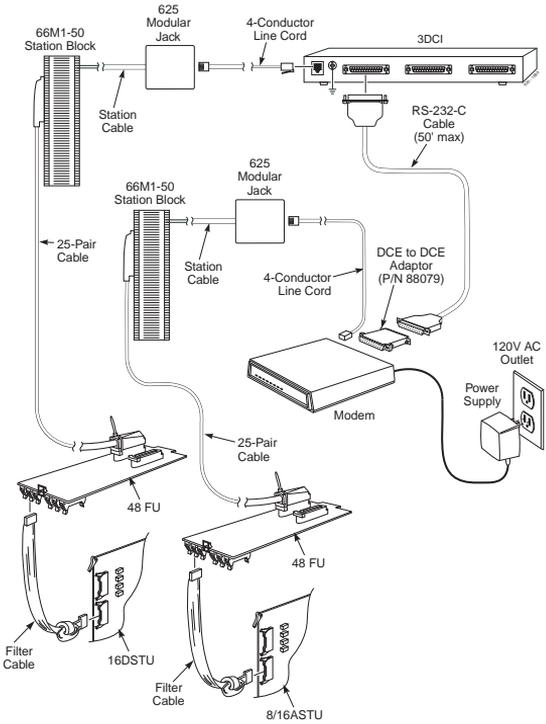
Figure 5-3 NON-DEDICATED MODEM POOLING

RS-232-C Pin Out Information

Direction of Signal Flow
(⟶ output or ⟵ input)

RS-232-C Connector	Description	DCE (3-DCI, DCI-A or Modem)	DTE (PC or Printer)
8	DCD	⟶	⟵
3	RXD	⟶	⟵
2	TXD	⟵	⟶
20	DTR	⟵	⟶
6	DSR	⟶	⟵
4	RTS	⟵	⟶
5	CTS	⟶	⟵
7	GND		

25-Pin RS-232-C Connector

13 12 11 10 9 8 7 6 5 4 3 2 1
○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
25 24 23 22 21 20 19 18 17 16 15 14

Figure 5-4 RS-232 PINOUT INFORMATION

DATA OVERVIEW
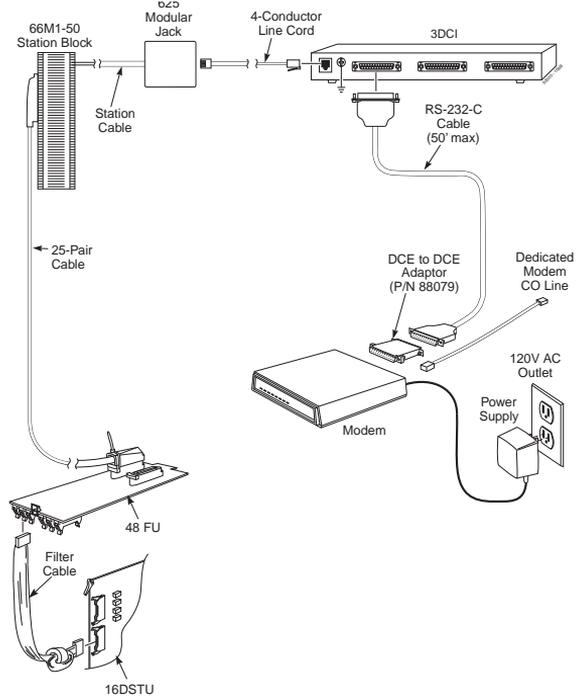
Figure 5-5 TYPICAL DEDICATED MODEM POOLING/REMOTE MAINTENANCE INSTALLATION

RS-232-C Pin Out Information

Direction of Signal Flow
(⟶ output or ⟵ input)

RS-232-C Connector	Description	DCE (3-DCI, DCI-A or Modem)	DTE (PC or Printer)
8	DCD	⟶	⟵
3	RXD	⟶	⟵
2	TXD	⟵	⟶
20	DTR	⟵	⟶
6	DSR	⟶	⟵
4	RTS	⟵	⟶
5	CTS	⟶	⟵
7	GND		

25-Pin RS-232-C Connector

13 12 11 10 9 8 7 6 5 4 3 2 1
25 24 23 22 21 20 19 18 17 16 15 14

Figure 5-6 RS-232 PINOUT INFORMATION

5. Data and SMDR

DCI-A AND DCI-B MODULES

Using the DCI-A and DCI-B Units (Figures 5-7 and 5-8)

The DCI is a single port data module (DCE port) installed in a multibutton telephone. DCIs can be installed in any Super Display or 32-Button Display telephone within the P/N 926xx/922xx series of phones. With the i-Series phones (P/N 927xx), the DCI can only be installed in the Super Display, 28- or 34-button key phones. The DCI provides the system with the ability to share common data communications resources such as printers, modems or PCs in a data network. The DCI can switch data at speeds from 300 to 19.2K baud. Refer to *Data Communications Interface* in the Software Manual for detailed Data Communications parameters.

The DCI also provides remote maintenance capability and alarm reports for the system if connected to a modem. When connected to a terminal, port identification, PCB status, and system configuration data is provided. One DCI (or 3DCI) should be installed per system for maintenance and alarm purposes.

There are two types of single port DCI devices. The DCI-A provides one RS-232-C serial port. The DCI-B provides one RS-232-C parallel port. Each DCI utilizes one data port in the system (max. 144).
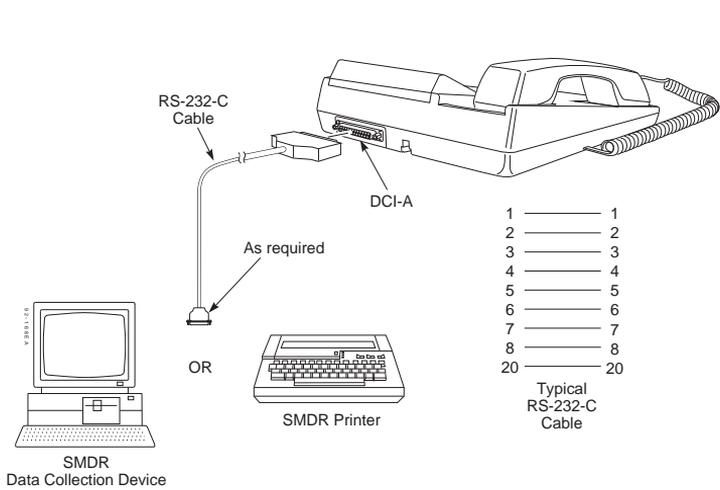
Figure 5-7 TYPICAL DCI INSTALLATION

5-8

DCI-A AND DCI-B MODULES

RS-232-C Pin Out Information

Direction of Signal Flow
(→output or ← input)

RS-232-C Connector	Description	DCE (3-DCI, DCI-A or Modem)	DTE (PC or Printer)
8	DCD	→	←
3	RXD	→	←
2	TXD	←	→
20	DTR	←	→
6	DSR	→	←
4	RTS	←	→
5	CTS	→	←
7	GND		

25-Pin RS-232-C Connector

13 12 11 10 9 8 7 6 5 4 3 2 1

○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○

25 24 23 22 21 20 19 18 17 16 15 14
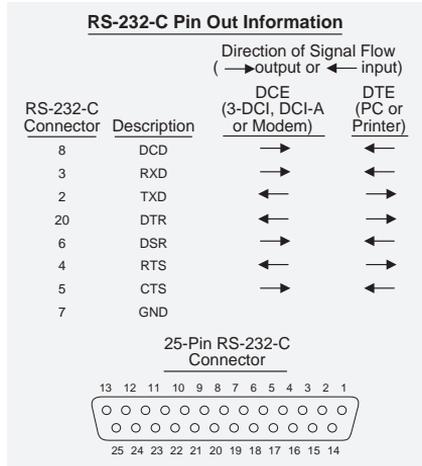
Figure 5-8 RS-232 PINOUT INFORMATION

Installing a DCI (Figures 5-9 through 5-16)

1. Turn the telephone upside down and remove the directory card.

2. Remove the screws that secure the telephone base or DCI cover, depending on the model of the phone.

3. Remove the telephone base or DCI cover.

5. Data and SMDR

DCI-A AND DCI-B MODULES

**Figure 5-9 REMOVING THE TELEPHONE BASE
(926xx and i-SERIES PHONES)**
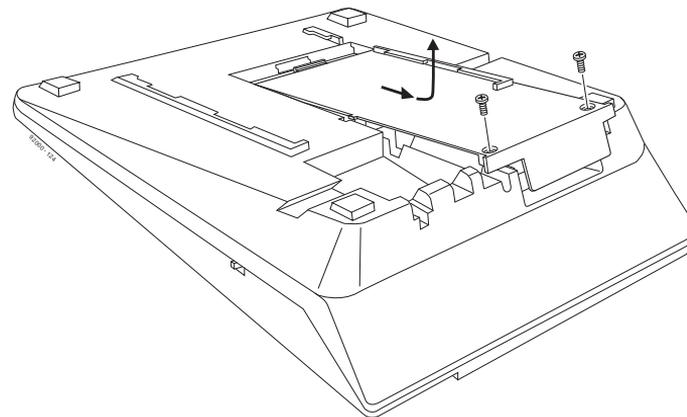
**Figure 5-10 REMOVING THE TELEPHONE BASE
(PHONE SERIES 922xx)**

Continued on next page . . .

DCI-A AND DCI-B MODULES

Installing a DCI (cont'd)

4. *If you received a spacer with your DCI:*
   Peel the adhesive backing off of the DCI spacer and attach it as shown to the DCI Module. This spacer keeps small objects from falling into the telephone.
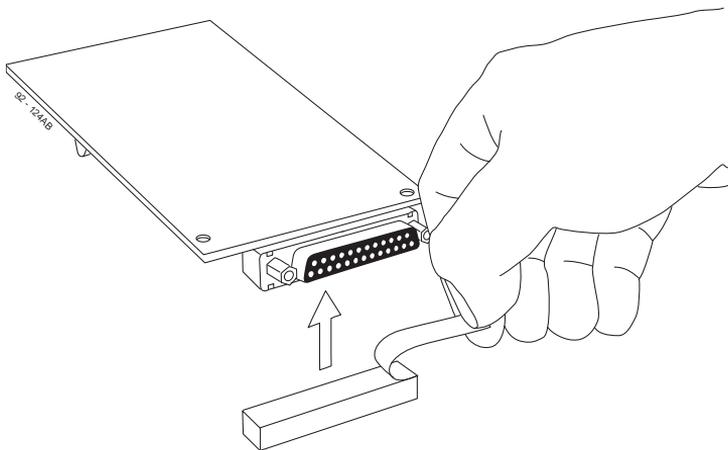
FIGURE 5-11 INSTALLING THE SPACER

For 926xx and i-Series Phones:

5. Using a flat-blade screwdriver, carefully pry out the filler piece on the telephone base. This exposes the cutout in the base.
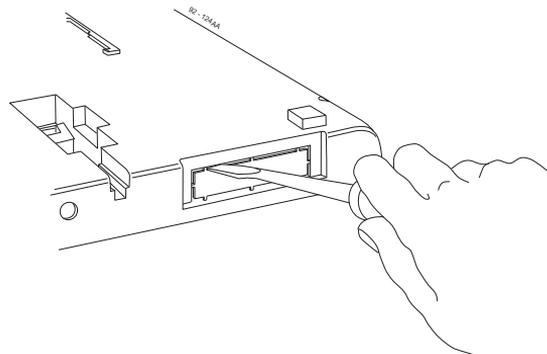
Figure 5-12 REMOVING THE FILLER PIECE

6. *926xx Phones (Figure 5-13):*
   Plug the DCI into the connector in the telephone's upper housing and secure in place with the two screws provided. Reinstall the telephone base and secure it with the four screws.

   Make sure the DCI Unit is correctly oriented in the cutout in the telephone base.

5. Data and SMDR

DCI-A AND DCI-B MODULES

Installing a DCI (cont'd)

i-Series Phones (Figure 5-14):
Screw the DCI into the telephone's base with the two screws provided. Place the base on to the upper housing, aligning the DCI connectors on both pieces. Reinstall the four screws into the base of the telephone.

7. Connect the data device to the DCI.
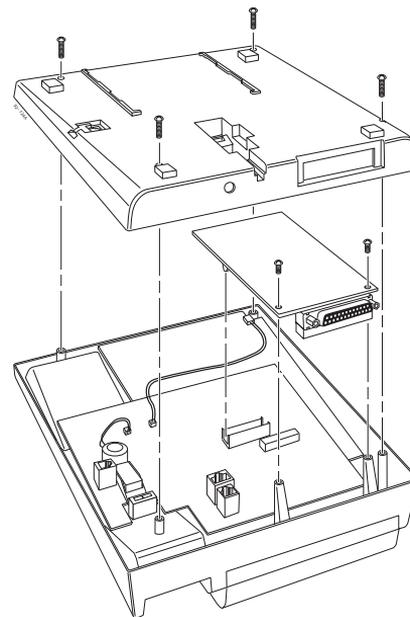
Figure 5-13 REPLACING THE COVER (926xx Phones)

DCI-A AND DCI-B MODULES

Installing a DCI (cont'd)
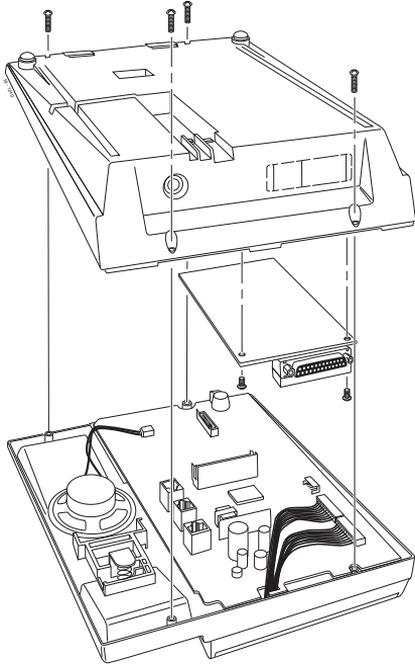
Figure 5-14 INSTALLING THE DCI (i-Series Phones)

For Phone Series 922xx:

5. Plug the DCI into the telephone's 20 pin connector on the bottom of the telephone.

6. Secure the DCI to the base by reinstalling the four screws.

7. Connect the data device to the DCI.
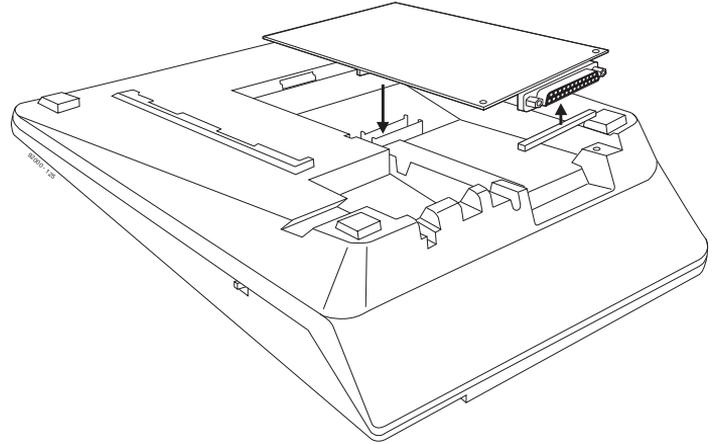
**Figure 5-15 PLUGGING IN THE DCI'S CONNECTOR
(PHONE SERIES 922xx)**

**5. Data and
SMDR**

DCI-A AND DCI-B MODULES

Installing a DCI (cont'd)
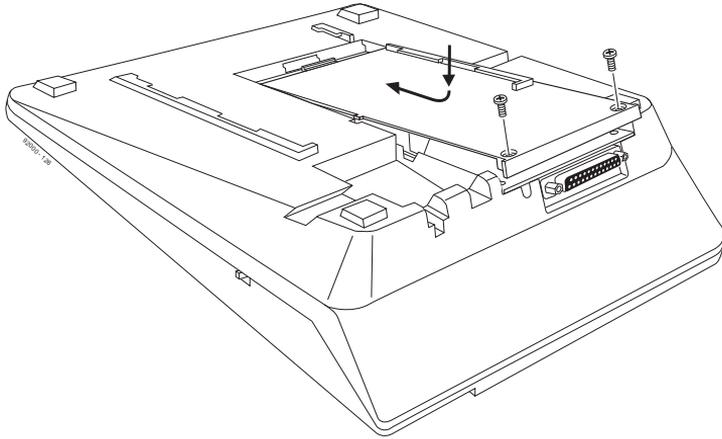
**Figure 5-16 INSTALLING THE DCI
(PHONE SERIES 922xx)**

Connecting the DCI Unit (Figure 5-17 and 5-18)

1. Locate an available DDK connector in a station (B) block.

2. For the DDK connector chosen, cross-connect the associated wire pair from the A or B block to the cross-connect block.

3. Install a modular jack for the DCI unit's telephone within six feet of the telephone's location.

4. 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.

7. Plug a line cord into the telephone and the modular jack.

8. Plug the RS-232-C cable into the data device.

> *With a DCI-A, for example, this could be a PC serial port or serial SMDR printer.*

DCI-A AND DCI-B MODULES

Connecting the DCI Unit (cont'd)
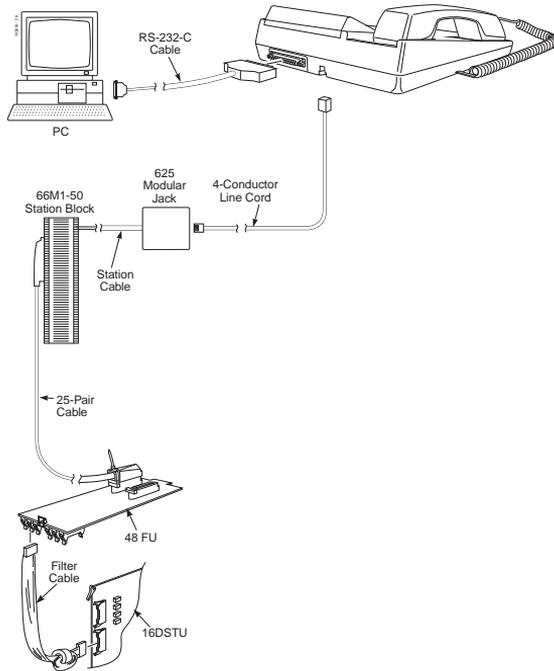
Figure 5-17 CONNECTING TO A DCI UNIT

Figure 5-18 RS-232 PINOUT INFORMATION

RS-232-C Pin Out Information

Direction of Signal Flow
(→ output or ← input)

RS-232-C Connector	Description	DCE (3-DCI, DCI-A or Modem)	DTE (PC or Printer)
8	DCD	→	←
3	RXD	→	←
2	TXD	←	→
20	DTR	←	→
6	DSR	→	←
4	RTS	←	→
5	CTS	→	←
7	GND		

25-Pin RS-232-C Connector

13 12 11 10 9 8 7 6 5 4 3 2 1

25 24 23 22 21 20 19 18 17 16 15 14

5-15

5. Data and SMDR

3-DCI MODULE

Using the 3-DCI Module (Figures 5-19 - 5-22)

The 3-DCI is a stand-alone three port data module (DCE ports). The ports function identically to the DCI-A unit and this unit provides three RS-232-C serial ports to network three different data devices. Each data device connected to the 3-DCI uses one system data port (max. 144).

The 3-DCI also provides remote maintenance capability and alarm reports for the system if connected to a modem. When connected to a terminal, port identification, PCB status, and system configuration data is provided. One 3-DCI (or a DCI-A/B) should be installed per system for maintenance and alarm purposes.

The 3-DCI module derives its power and signaling from a 16DSTU extension circuit. The 3-DCI provides one power status LED and three port status LEDs. A 3-DCI cannot be connected to a digital port

Installing the 3-DCI Module

1. Punch down one pair 24 AWG station cable for each the 3-DCI-A to a cross-connect block.
2. Run one-pair cross-connect from the cross-connect block to the extension (B) block.
3. Install a modular jack for the 3-DCI Module within six feet of the module.
4. Run one pair of 24 AWG station cable from the cross-connect block to the 3-DCI's modular jack.
5. Terminate the station cable WHT/BLU - BLU/WHT leads to the RED and GRN lugs in the modular jack.
6. Connect the B block's 25-pair cable to the 48FU filter unit.
7. Install bridging clips as required.
8. Ground the 3-DCI Module by connecting a 14 AWG ground wire from the FG lug to a known earth ground.
9. Plug a line cord into the back of the 3-DCI Module and the module's modular jack.
10. Plug the RS-232-C cables into the data device (e.g., PC serial port or serial SMDR printer.

3-DCI MODULE
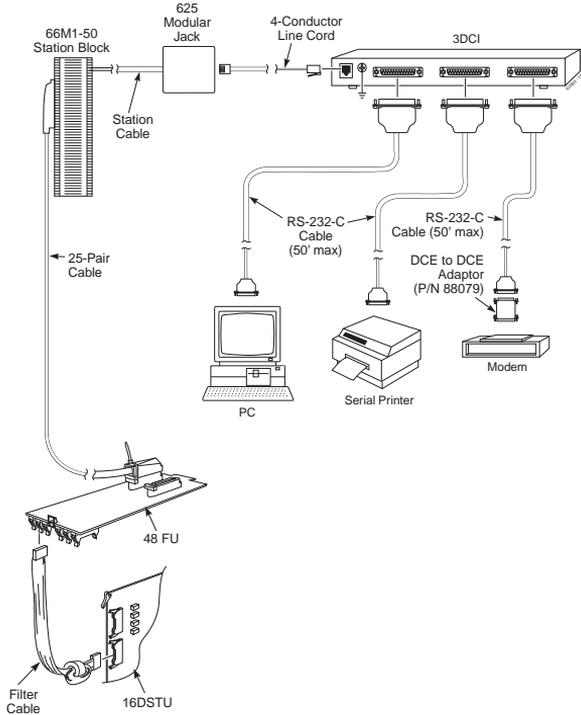
Figure 5-19 CONNECTING THE 3-DCI
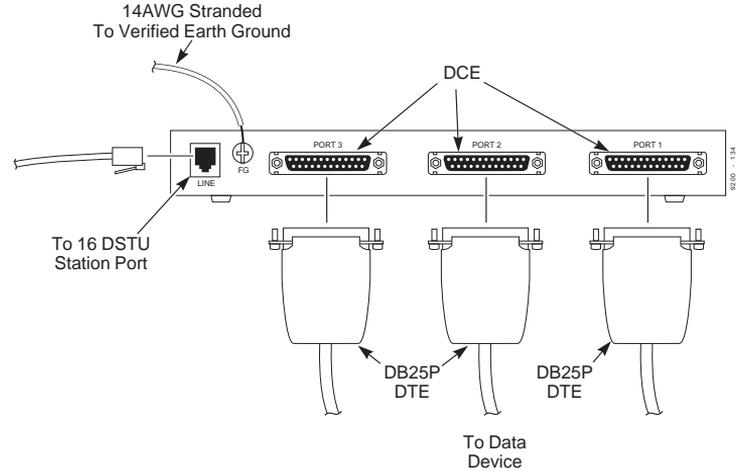
Figure 5-20 INSTALLING A 3-DCI

5-17

5. Data and SMDR

3-DCI MODULE
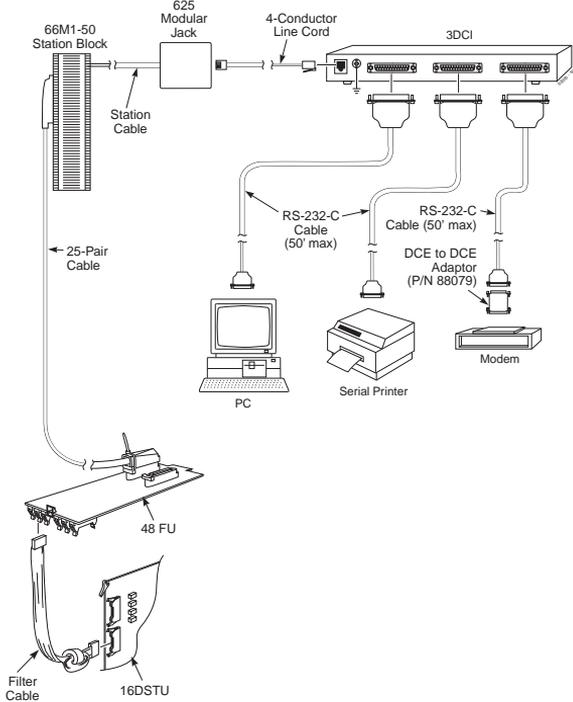
Figure 5-21 TYPICAL 3-DCI-A DATA NETWORK

RS-232-C Pin Out Information

Direction of Signal Flow
(→ output or ← input)

RS-232-C Connector	Description	DCE (3-DCI, DCI-A or Modem)	DTE (PC or Printer)
8	DCD	→	←
3	RXD	→	←
2	TXD	←	→
20	DTR	←	→
6	DSR	→	←
4	RTS	←	→
5	CTS	→	←
7	GND		

25-Pin RS-232-C Connector

Figure 5-22 RS-232 PINOUT INFORMATION

5-18

3-DCI MODULE

Basic Programming

Note: For DCI units, the data (software) port number is the same as the extension's port number. DCI Modules use the extension's port number and the next two port numbers for data (software) port numbers.

0503 - DCI Extension Number
Assign an unused extension number to each DCI data (software) port.

1006 - Programming Function Keys
Assign a data key (code 1029) at each keyset with a DCI unit.

1201 - DCI Setup
For each of the DCI sub-types (1-10 set in Program 1202), set the values for the modem S-registers (Register Type 1) and X.25 packet switching (LAPB) registers (Register Type 2).

1202 - DCI Port Type
Assign a DCI port type (1 for RS-232-C, 2 for Centronics, or 4 for DCE port [modem]) to each DCI data (software) port installed. Also, assign the sub-type (1-10 used in Program 1201) to each software port

1206 - Initialize DCI
After changing register values in Program 1201, be sure to use this program to initialize each DCI software port. *You must initialize a DCI software port before any changes made in Program 1201 will take effect.*

Programming for System and Alarm Reports

0007 - System Report Setup
If the device connected to the DCI will also be for system reports, enter the DCI software port number as the system report port number.

0008 - Alarm Report Port Setup
If the device connected to the DCI will also be for alarm reports, enter the DCI software port number as the alarm report port number.

Refer to *Data Communications Interface* (DCI) in the Software Manual for additional details.

SMDR

Using SMDR (Figure 5-23)

Station Message Detail Recording (SMDR) provides a record of the system's outside calls. Typically, the record outputs to a customer-provided printer, terminal or SMDR data collection device. Use SMDR when you need to monitor the usage at each extension and trunk.

Installing SMDR

1. Install the DCI device to be used (refer to the specific DCI information described previously).
2. Install the SMDR recording device according to the manufacturer's instructions.
3. Connect the SMDR recording device to the telephone's DCI.

Note: When using a DCI-A, a standard RS-232C 25-pin cable terminated with a 25-pin male connector is required. The DCI is configured for 2400 baud, 8 bits, no stop bits, no parity checking.

Note: When using a DCI-B, a standard Centronics 14-pin cable terminated with a 14-pin female connector is required.
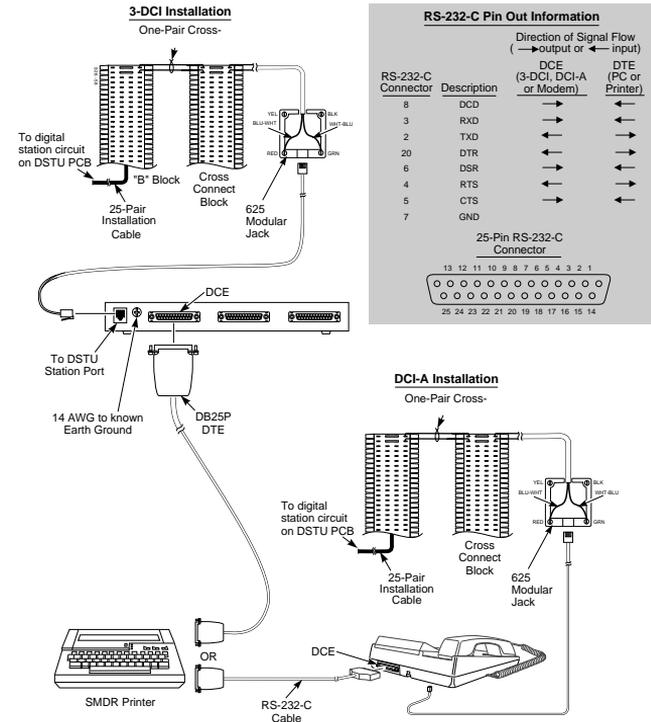
Figure 5-23 CONNECTING AN SMDR DEVICE

5-20

SMDR

Programming SMDR

Note: For DCI units, the data (software) port number is the same as the extension's port number. DCI Modules use the extension's port number and the next two port numbers for data (software) port numbers.

0404 - SMDR Options, Items 1, 2, 4-6
Set the various print options for SMDR.

0404 - SMDR Options, Item 3: SMDR Printer Output Port
Enter the software port number of the DCI port assigned to the SMDR printer.

0503 - DCI Extension Number
Assign an unused extension number to each DCI data (software) port.

0901 - Basic Trunk Port Setup (Part A), Item 13: SMDR Print Out
For each trunk, enter 0 if trunk's calls should appear on the SMDR report. Enter 1 if the trunk's calls should not appear on the SMDR report.

1008 - Basic Extension Port Setup (Part B), Item 1: SMDR Printout
For each extension, enter 1 if extension's calls should appear on the SMDR report. Enter 0 if extension's calls should not appear on the SMDR report.

1201 - DCI Setup
Set the DCI port parameters to match the SMDR device.

1202 - DCI Port Type
Assign a DCI port type (1 for RS-232-C or 2 for Centronics) to each DCI data (software) port installed. Also, assign the sub-type (1-10 used in Program 1201) to each software port.

1206 - Initialize DCI
After changing register values in Program 1201, be sure to use this program to initialize each DCI software port. *You must initialize a DCI software port before any changes made in Program 1201 will take effect.*

Refer to *Station Message Detail Recording* in the Software Manual for additional details.

SMDR

Section 6, SPECIFICATIONS AND PARTS LIST

**6. Specifications
and Parts**

SYSTEM SPECIFICATIONS

384i System Capacities

Cabinets	3 (Main and up to 2 Expansion Cabinets)	
Talk Timeslots (Intercom/line)	non-blocking	
Analog trunks (CO/PBX lines)	128*	
Digital key telephones	256*	combined
Analog single line telephones	240*	total to
DSS Console	8*	256
Conference Circuits	32 four-party or 16 eight-party	
DCI-A/B	144*	one recommended
3DCI-A Modules	48*	per system
3ACI-A Modules	64*	192
Power Failure Telephones	12	four per cabinet
VAU Modules	1	
VAU Plug-In Expansion Board	1	installs in VAU Module
Alarm Circuits	16*	
Door Box/Door Unlock Contacts	8	
Internal Page Zones	128	32 per tenant
External Page Zones	8	
Dial Tone Detector Circuits	128*	combined total
DTMF Receiver Circuits	128*	to 128
Tenants	4	

384i System Capacities

Universal PCB slots	
Main Cabinet	1-7 (Not including CPU slot)
1st Expansion Cabinet	8-16
2nd Expansion Cabinet	17-25

* NOTE: Maximum capacities above are determined by maximum PCB configuration allowed. When installing single line sets, DISA, or tie lines, CDTU-A/B circuits must be allocated for DTMF receivers. To install single line sets with CO/PBX line access, or when installing immediate-start tie lines, CDTU-A/B circuits must be allocated for dial tone detection.

384i PCB Capacities

CPU Central Processing Unit	1	ATRU-EM E&M Tie Line PCB	16
4PDGU Page/Door Box	2	4ATRU-LD DID Trunk PCB	16
CDTU-A/B/C Conference/DTMF PCB	8	8GSAU Ground Start Daughter Board (Installs on ATRU)	16
4LAPBU Open Architecture Interface	1	Caller ID Daughter Board (Installs on ATRU)	16
16DSTU Digital Station PCB	16	T1/PRI Interface PCB	5
8/16ASTU Analog Station PCB	15	BRI Interface PCB	16
Message Waiting Power Supply	1	4PFTU Power Failure Daughter Board (Installs on ATRU)	3
48FU Station Filter Unit	12	24FU Trunk Filter Unit	12
8ATRU CO Loop Start PCB	16		

SYSTEM SPECIFICATIONS

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 comes 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 seven feet of the cabinet is required. You should install a separate dedicated outlet for each cabinet.

Site Requirements

The system must be floor-mounted. Brackets secure each cabinet to a wall.

Environmental Specifications

Cabinets and Key Telephones
Temperature: 0-40°C (32-104°F)
Humidity: 20-80% (non-condensing)
Door Box
Temperature: -20-60°C (-4-140°F)
Humidity: 20-80% (non-condensing)

SYSTEM SPECIFICATIONS

Electrical Specifications

Power Supply Specifications

Parameter Full Load Specs.	Main Equip.	Expansion Cabinet 1	Expansion Cabinet 2	3 Cabinet Total
Output Power	195W	210W	210W	615W
Watts @ full load % of Total	31.8%	34.1%	34.1%	
AC Input I @ full load	2.53A	2.69A	2.69A	7.91A
VA @ 120V	304VA	323VA	323VA	950VA
Avg. Input Power @ 120V	198W	212W	212W	622W
KWh @ AC Input I x 120V	.304KWh	.323KWh	.323KWh	.950KWh
BTU KWh x 3413	1,038btu	1,102btu	1,102btu	3,242btu

Electrical Specifications

Power Supply
  110 VAC +/-10%
  @ 57/63H +/- 1HZ
  Dedicated 15 Amp circuit
  Power Requirements: 75 VA to 6A Main Cabinet
  Grounding Requirements: No. 14 AWG copper wire

External Paging

Output Impedance:	600 Ohm
Maximum Output:	+3 dBM

SYSTEM SPECIFICATIONS

Mechanical Specifications

Equipment	Width	Depth	Height	Weight
Main Cabinet	23 1/4"	13 1/4"	26 1/2"	66 lbs
Expansion Cabinet	23 1/4"	13 1/4"	15 3/4"	44 lbs
926/922 Phones:				
16/32 Button Keyset	8 5/8"	9 3/8"	3 1/4"	2 lbs 2 oz
Super Display	8 5/8"	9 3/8"	3 7/8"	2 lbs 8 oz
DSS Console	7 13/16"	8 7/8"	2 3/4"	1 lb 6 oz
Digital Single Line	6 3/4"	8 5/8"	3 3/4"	1 lb 7 oz
Door Box	4"	1 1/2"	5 3/16"	10 oz
i-Series Phones:				
22/28/34 Button Keyset	7 7/8"	9 1/4"	3 10/16"	2 lbs 4 oz
22 Button Display	7 7/8"	9 1/4"	3 10/16"	2 lbs
Super Display	7 7/8"	9 1/4"	4 1/8"	2 lbs 16 oz
110-Button DSS	7 7/8"	9 1/4"	3 3/16"	1 lb 11 oz
24-Button DSS	3 1/16"	8 7/8"	2 15/16"	11 oz
3-ACI/3-DCI/2-OPX				
Module	9 3/8"	7 3/8"	1 1/4"	3 lbs

Door Box/External Paging Contacts

Output Impedance:	600 Ohm
Output Level:	Nominal 250 mV (-10 dBm)
Maximum Output:	400 mV RMS
Configuration:	Normally open

Alarm/Fax Sensors

Maximum Initial Contact Resistance: 50 mohm
Requires a 10-30VDC power supply installed in series with the alarm/fax circuit.

BGM/MOH Music Source Input

Input Impedance:	600 Ohm
Input Level:	Nominal 250 mV (-10 dBm)
Maximum Input:	1V RMS

Inputs for MOH and BGM are located on the CPRU PCB.

SYSTEM SPECIFICATIONS

ACI Module Input/Output

Audio/Music Input

Input Impedance:	47 KOhm @ 1Khz

Audio/Paging Output

Output Impedance:	600 Ohms @ 1 KHz
Maximum Output:	+3 dBm

Relay Contacts

Configuration:	Normally Open
Maximum Contact Ratings:	30 VDC @ 60 mA
	90 VAC @ 10 mA
Maximum Initial Contact Resistance:	50 mOhms
Minimum Application Load:	1 VDC @ 1 mA

FCC Registration Information

Model:	384i
Manufacturer:	Nitsuko America
Load Number (DOC)	20
FCC Part 15 Registration:	Class A
FCC Registration Number:	1ZDTHA-75168-PF-E
(Refer to the label on the	1ZDTHA-75169-KF-E
Main Cabinet for the	1ZDTHA-75170-MF-E
FCC Registration Number.)	1ZDJPN-75220-KF-E
	1ZDJPN-75221-PF-E
	1ZDJPN-75222-MF-E

Reg. Status	MTS/WATS Interfaces	Mfrs. Port Identifier	Ringer Eq. Number	SOC	Network Jacks
Original	02LS2	4ATRU-LS1	0.9B (ac); 0.1 (dc)	---	RJ21X
Original	02LS2	8ATRU-LS1	0.9B (ac); 0.1 (dc)	---	RJ21X
Original	02GS2	8GSAU-A1	4.0B (ac)	---	RJ21X
Original	02RV2-T	4ATRU-LD1	0.0B	AS.2	RJ21X

Reg. Status	Analog Private Line Interfaces	Mfrs. Port Identifier	--- ---	SOC ---	Network Jacks
Original	TL11M	4ATRU-EM	---	9.0F	RJ2EX

SYSTEM SPECIFICATIONS

FCC DID Requirements

Federal Communications Commission DID Requirements

This equipment must operate in a manner that is not in violation of Part 68 rules. This equipment returns answer supervision to the Public Switched Network when the DID trunk is: (1) answered by the called station; (2) answered by the attendant; (3) routed to a recorded announcement that can be administered by the CPE user; (4) routed to a dial prompt.

The equipment returns answer supervision on all DID calls forwarded back to the Public Switched Telephone Network except when: (1) a call is unanswered; (2) a busy tone is received; (3) a reorder tone is received.

When ordering DID Service, provide the telco with the following information:

FCC Registration Number: 1ZDJPN-nnnnn-KF-E
DID Facility Interface Code: 02RV2-T
DID Service Order Code: 9.0F
DID Answer Supervision Code   A S.2
DID USOC Jack Type: RJ21X

FCC DID Requirements

Please note the following:
1. DID services must be purchased from the local telephone company.
2. Each 4ATRU-LD1 provides four DID trunk circuits and utilizes eight consecutive software ports. For example, a 4ATRU-LD1 providing DID circuits 9-12 uses ports 9-16.
3. Refer to the Software Manual for detailed DID description, conditions, and programming instructions.

SYSTEM SPECIFICATIONS

Cabling Requirements

1. Do not run station cable in 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, Door Boxes 3DCI-A adaptors, and 3-ACI Modules must be a dedicated, isolated cable pair.
4. The Telco RJ21X and cross-connect blocks should install to the right of the Main Cabinet. Extension blocks and cross-connect blocks should be installed to the left of the Main Cabinet.

Maximum Cable Runs

Device	Cable Type	Cable Run Length (ft)	Notes
Key Telephone,	2-wire 26 AWG	1300	
	2-wire 24 AWG	2000	
	2-wire 22 AWG	2600	
Single Line Telephone	2-wire 26 AWG	13,100	at constant 20 mA
	2-wire 24 AWG	21,000	at constant 20 mA
	2-wire 22 AWG	34,750	at constant 20 mA
Single Line Telephone	2-wire 26 AWG	6,500	at constant 35 mA
	2-wire 24 AWG	10,500	at constant 35 mA
	2-wire 22 AWG	17,400	at constant 35 mA
3-ACI Module,	2-wire 26 AWG	1300	
	2-wire 24 AWG	2000	
	2-wire 22 AWG	2600	
3-DCI Module, 2-OPX Module & VAU Module	2-wire 26 AWG	1300	
	2-wire 24 AWG	2000	
	2-wire 22 AWG	2600	
Door Box	2-wire 26 AWG	200	
	2-wire 24 AWG	330	
	2-wire 22 AWG	550	

PARTS LIST

Station Equipment

Description	Part Number
926 PHONE SERIES:	
Super Display Telephone	92663
32-Button Display Telephone	92673
32-Button Telephone	92670
16-Button Display Telephone	92573
16-Button Display Telephone (w/o One Touch)	92563
16-Button Telephone	92570
16-Button Telephone (w/o One Touch)	92560
Nitsuko 900i Digital Cordless Telephone	85456D
Digital Single Line Telephone	92550
DSS Console	92555
DSS Console Power Supply	92556
Wall-Mount Kit - Digital Single Line Telephone	92559
Wall-Mount Kit - Multibutton Telephone	92679B
Wall-Mount Kit - Super Display Telephone	92578
Wall-Mount Kit - ST4 Telephone	85409
ST4 Analog Single Line Telephone	85403B/85403W
922xx PHONE SERIES:	
Super Display Telephone	92283B/92283W
32-Button Display Telephone	92293B/92293W
32-Button Telephone	92290B/92290W

Station Equipment (Cont'd)

Description	Part Number
922xx PHONE SERIES (Cont'd):	
16-Button Display Telephone	92373C/92373W
16-Button Telephone	92370B/92370W
Digital Single Line Telephone	92550/92250W
DSS Console	92555B/92555W
DSS Console Power Supply	92556
Wall-Mount Kit -	92279
ST4 Analog Single Line Telephone	85403B/85403W
i-Series PHONES	
(Power Supply P/N 92105B or 92125B required):	
Super Display Telephone	92773
34-Button Display Telephone	92783
28-Button Display Telephone	92763
28-Button Telephone	92760
22-Button Display Telephone	92753
22-Button Display Telephone (w/o One Touch)	92750
110-Button DSS Console	92755
24-Button DSS Console	92756
DSS Console Power Supply	92556
Off-Hook Voice Announce with Handsfree Answerback Module	92765
ST4 Analog Single Line Telephone	85403B/85403W

PARTS LIST

Peripheral Station Equipment	
Description	**Part Number**
Door Box	92245
Video Door Box	85850
DCI-A (Serial Data Module)	92266B
DCI-B (Parallel Data Module)	92267
3-DCI (3-Port Data Module)	92258
Main VAU Module	92136
VAU Plug-in Expansion Board	92137
2-OPX Module	92177
3-ACI (3-Port Analog Interface)	92259
Recording Jack Module (REJ) for 926/922 phones	92265
Recording Jack Module (REJ) for *i-Series* phones	80175
TAPI Kit	92966B
14.4K BPS Fax/Modem	85862A

Common Equipment	
Description	**Part Number**
Main Cabinet	92100
Expansion Cabinet	92120
Main Power Supply	92105B
(required when using i-Series Phones)	
Expansion Power Supply	92125B
(required when using i-Series Phones)	
Ring Generator Power Supply (20 watt)	85870
90V/AC Ring Supply Cable	92111
384i Remote Programming Software	92216
Modem Kit, including:	92366
Fax/Modem (P/N 85862A)	
DCI to Modem Adapter (P/N 92268)	
Remote Programming Software (P/N 92216)	

PARTS LIST

PCBs	
Description	**Part Number**
Common Cards	
Central Processor with System Software	92130
Central Processor with System Software for PMSi	92130-PMS
4 Circuit Page/Doorbox Card	92135
4 x 4 Conference/16 DTMF	92140
DTMF Receiver Card	92145
4 x 4 Conference Card	92150
Message Waiting Power Supply PCB	92112
Trunk Interfaces	
8 Circuit C.O. Loop Start Card	92170
8 Circuit Caller I.D. Board	92188
4 Power Failure Unit	92174
8 Circuit Ground Start Board	92185
2-Wire E & M TIE Line Interface	92186
4-Wire E & M TIE Line Interface	92189
DID Interface	92187

PCBs	
Description	**Part Number**
Station Interfaces	
16 Circuit Analog Station Card	92175
8 Circuit Analog Station Card	92176
16 Circuit Analog Station Card with Message Waiting	92178
16 Circuit Digital Station Card	92180
Filter Units	
24 C.O. Filter Unit	92160
48 Station Filter	92165
T1/PRI/BRI Equipment	
T1/PRI 1 Port PCB	92190
T-Serve II CSU	85950
T-Serve II Power Supply	85951
Datasmart DSU Add/Drop Unit	85955A
CSU/DSU RJ48-DB 15 Cable (P/N 85953)	85953
T1/PRI Installation Cable	92197
Quad Datasmart DSU	85956
BRI PCB	92191

6. Specifications and Parts

PARTS LIST

Replacement Parts

922xx/926xx Series Phones:

Description	Part Number
Line Cord - 7'	82476-7
Line Cord - 14'	82476-14
Line Cord - 25'	82476-25
Handset Hanger	86152
Handset and Cord Assembly	92595
Handset and Cord Assembly (for DSL phones)	92296B
Handset Coil Cord - Black 6'	85326
Handset Coil Cord - Black 9'	85323
Handset Coil Cord - Black 13'	85324
16 Button Telephone Plastic Key Cover (w/numbers)	92600-16
24 Button Telephone Plastic Key Cover (w/numbers)	92600-24
32 Button Telephone Plastic Key Cover (w/numbers)	92600-32
16 Button Telephone Plastic Key Cover (w/o numbers)	92600A16
24 Button Telephone Plastic Key Cover (w/o numbers)	92600A24
32 Button Telephone Plastic Key Cover (w/o numbers)	92600A32

Replacement Parts

922xx/926xx Series Phones (Cont'd):

Description	Part Number
16 Button Telephone Plastic Key Cover	92600AP1-16
16 Button Designation Strip w/o one-touch	92625P1-16
16 Button Designation Strip w/one-touch (qty: 25)	92625-16
24 Button Designation Strip (qty: 10)	92625-24
32 Button Designation Strip (qty: 25)	92625-32
DSS Console Designation Strip	92605-DSS
DSS Laser Labels (qty: 10)	92625-DSS
DSS Plastic Cover	92600-DSS
Bottom Pullout Directory Tray	92601
Flying Directory Card Kit	92602
i-Series Phone Wall/Desk Mounting Bracket	92830
CPU 10 Pin Cable	92167
Station/CO Connector Cable	92169

PARTS LIST

Replacement Parts	
i-Series Phones:	
Description	**Part Number**
Handset and Cord Assembly	92297B
22 Button Telephone Plastic Key Cover	92800-22
28 Button Telephone Plastic Key Cover	92800-28
34 Button Telephone Plastic Key Cover	92800-34
110 Button DSS Plastic Key Cover	92800-DSS
Super Display Telephone Plastic Key Cover	92800-S34
DSS Designation Strip	92805-DSS
22 Button Telephone Laser Label	92825-22
28 Button Telephone Laser Label	92825-28
24 Button Telephone Laser Label	92825-34
Super Display Telephone Laser Label	92825-S34
110 Button DSS Laser Label	92825-DSS

6. Specifications and Parts