NITSUKO AMERICA

PORTRAIT
824

Hardware Manual

Section 1
Installing the Main Cabinets

Unpacking

Unpack the equipment and check it against your equipment lists. Inspect for physical damage.

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

Before Installing

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

Site Requirements

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

The common equipment cabinet requires a three-prong dedicated 117 VAC 60 Hz circuit (NEMA 5-15 receptacle) located within 6 feet of the AC receptacle. You should install the extension block to the right of the Main Cabinet. Telco should install the RJ11C to the left of the Main Cabinet.

INSTALLING THE CABINET

Removing the Cover (Figure 1-1)

To make wall-mounting easier, remove the cover on the common equipment cabinet. This allows you to use the cabinet as a mounting template.

1. Unscrew the two captive screws on the lower half of the cabinet cover.
2. Lift up the lower half of the cover — then slide the cover back slightly to remove it.
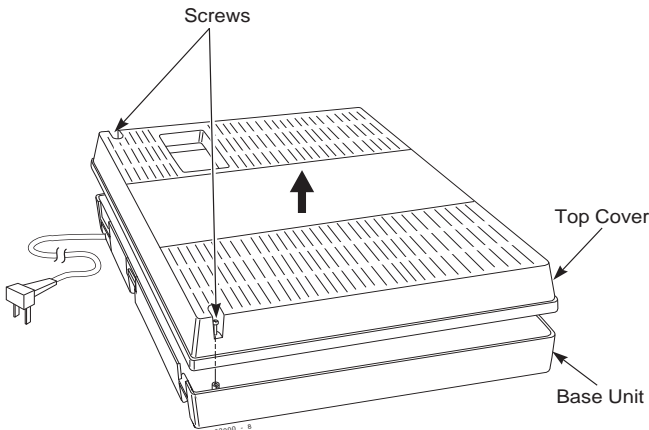
Figure 1-1 REMOVING THE COVER

Mounting the Cabinet (Figure 1-2)

1. Using suitable fasteners, mount a Main Distribution Frame (MDF) plywood backboard in a centrally located spot.
2. Hold the Main Cabinet against the MDF and mark all four mounting holes.
3. Drill the marked holes using a 1/8" drill bit.
4. Install two mounting screws (provided) in the top two holes, leaving about 3/8" shank exposed.
5. Hang the Main Cabinet on the top two screws and fasten in place.
6. Install the bottom two screws and tighten in place.
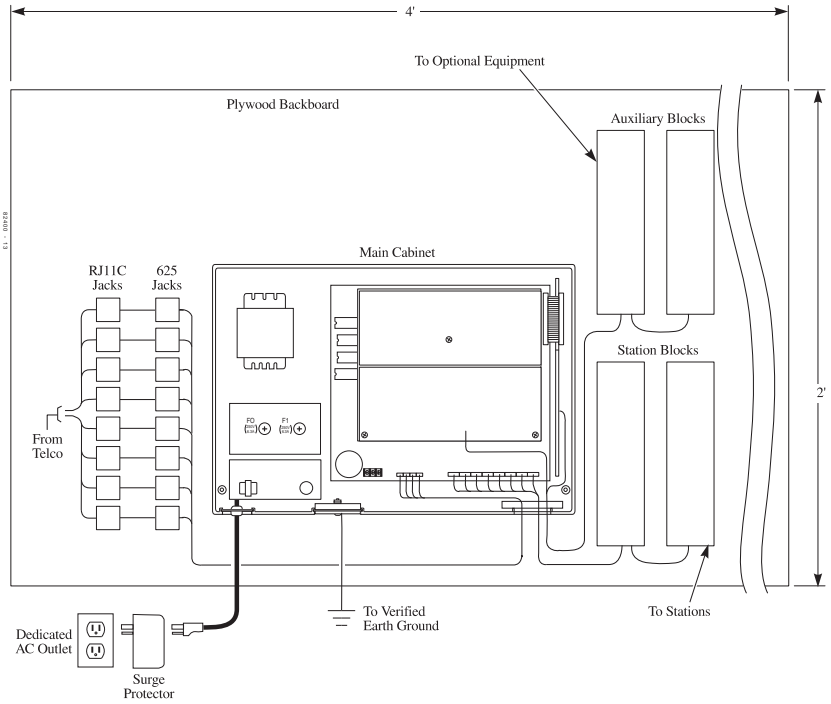
Figure 1-2 INSTALLATION LAYOUT

GROUNDING THE CABINET

Connecting the Ground Wires (Figure 1-3)

The cabinet is grounded at the ETH (Earth Ground) connection.

1. Loosen the lug on the ground connection.

2. Using a piece of 12 AWG stranded copper wire, connect the ETH to the ground connector.

3. Insert 12 AWG stranded copper wire into the grounding terminal on the outside of the cabinet. Firmly tighten the connection.

4. Connect the grounding cable to a known earth ground.
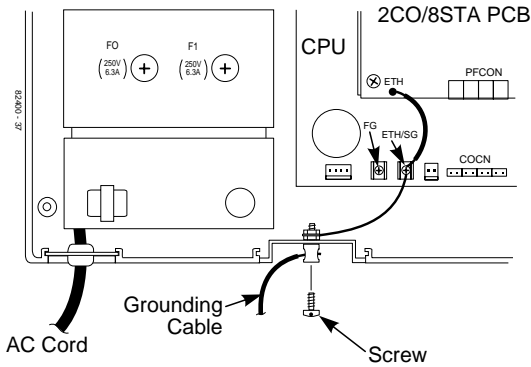
Figure 1-3 GROUNDING A CABINET

Now that your cabinet is installed and grounded, go to *Part 2: PCB Installation and Startup*.

DO NOT PLUG IN THE CABINET POWER CORD WITHOUT FIRST INSTALLING THE PCBS.

Section 2
PCB Installation and Startup

Where to Install the PCBs (Figure 2-1)

Maximum Configuration: 8 Trunks
24 Extensions
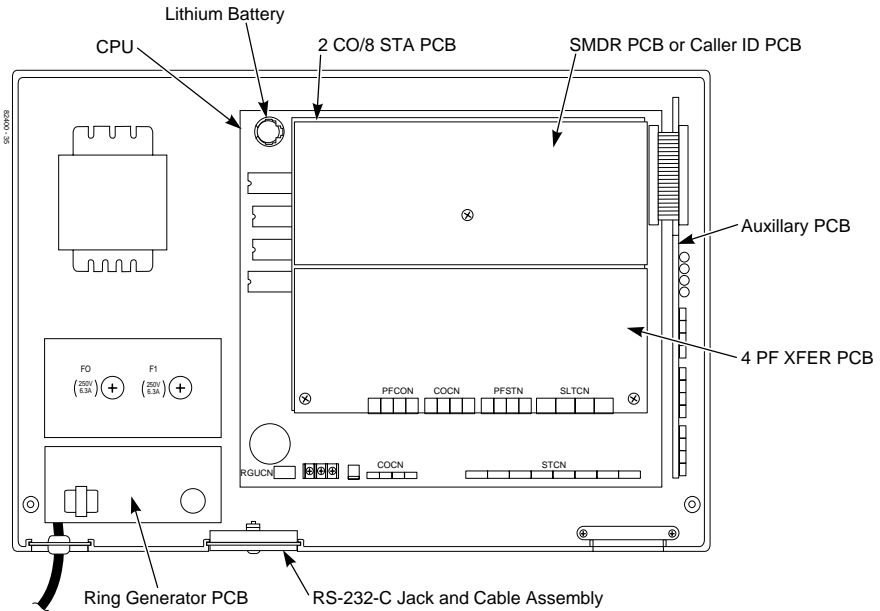
Figure 2-1 PCB LOCATION

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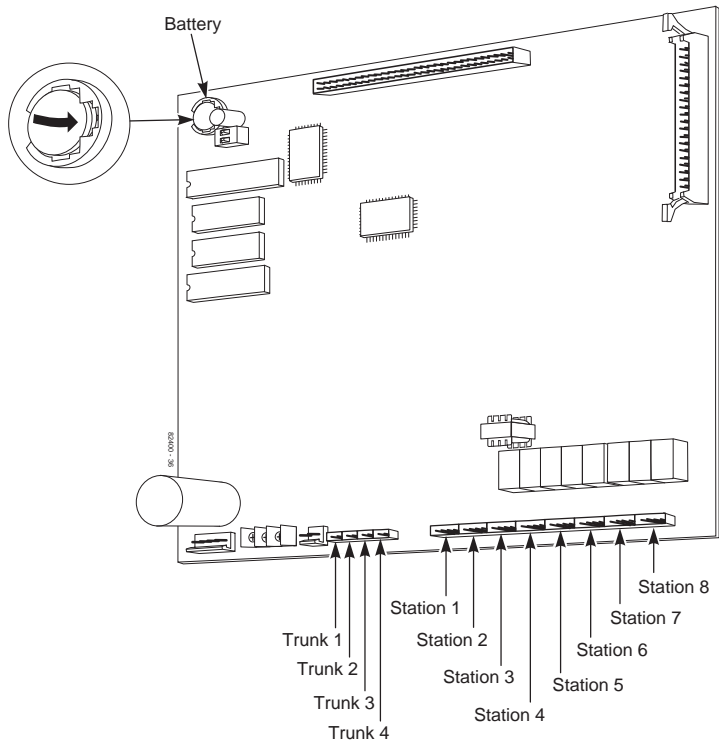
Figure 2-2 CPU PCB

The CPU PCB comes already installed in the Main Cabinet. The CPU provides:

- The system's central processing, stored program and memory for the customer's site-specific data.
- Mode switch for cold (default data) or warm (customer data) start on power-up.
- Battery for backup of the customer's site-specific data. Use only a SONY CR2032 Lithium Battery or equivalent. Replace the battery when "B" flashes on the display of the key telephones. The battery's life is between 3.5 and 7 years - depending on how often the system is powered down. The more the system's power is off, the shorter the battery's life.
- Connection points for the CO and station DDK connectors.

To prepare the CPU PCB:

1. Slide the Switch-1 (top switch) to the INT (left) position.

    This ensures that the system will load the default database on initial power-up.

2. Power the system up.

3. After the system has been powered up for a minimum of 10 seconds, insert the battery into the battery clips.

    The printing on the battery should be facing up so that it is visible when installed.

4. Slide the Switch-1 (top) to the RUN position (to the right).

Note: NEVER move the switch unless the intent is to clear all programmed memory.

Refer to *Part 4, Installing Optional Equipment* for instructions on installing Background Music and Music on Hold.

Expansion (2CO/8STA) PCB (Figure 2-3)
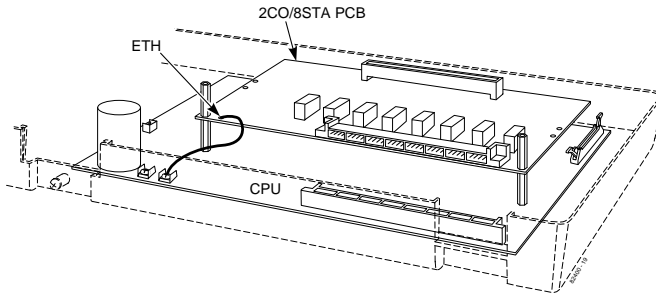
Figure 2-3 EXPANSION (2CO/8STA) PCB

The Expansion (2CO/8STA) PCB provides DDK connectors for two additional CO lines and eight additional telephones.

To install a 2CO/8STA PCB:
1. Place the 2CO/8STA PCB on top of the CPU. Align the EXPCN female connector on the bottom of the 2CO/8STA PCB over the EXPCN male connector on the PCB below. Push down firmly on the expansion PCB to ensure that the EXPCN connectors are firmly together. Using the additional spacers included with the 2CO/8STA PCB, attach the PCB to the card below.
2. Connect the green earth ground lead terminal to the ETH screw on the CPU. An earth ground is *always* required.
3. Refer to *Part 3: Installing Extensions and Trunks* for cabling instructions.
4. If installing a second Expansion PCB, simply place the card over the first PCB and repeat steps 1-3.
5. To install an Expansion PCB if an SMDR or Power Failure PCB has been previously installed:

   ● Power down the system
   ● Remove the SMDR and/or Power Failure PCB
   ● Install the Expansion PCB
   ● Reinstall the SMDR and/or Power Failure PCBs
   ● Power up the system.

Ring Generator PCB (Figure 2-4)
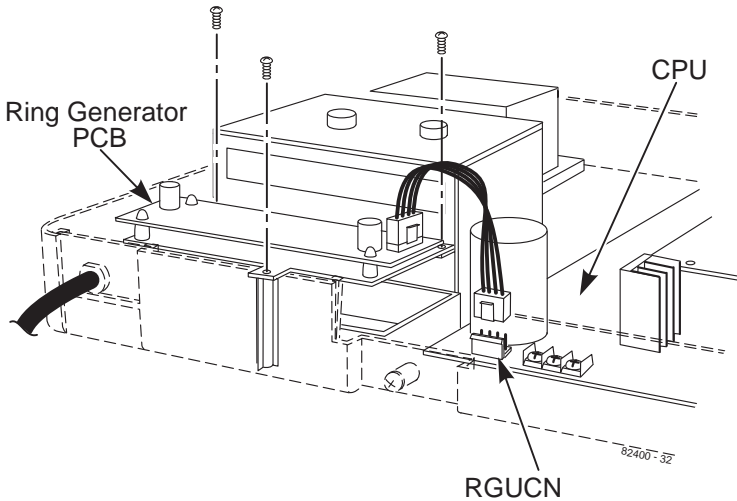
Figure 2-4 RING GENERATOR PCB

The Ring Generator PCB provides the ring generator source when connecting a single line telephone, modem, voice mail, or answering machine as a system extension. This must be installed when any single line telephones are used in the system.

To install a Ring Generator PCB:
1. Align the PCB on the left side of the Main Cabinet, below the power switch. Using the three screws provided, attach the PCB to the Main Cabinet.
2. Attach the cable from the Ring Generator PCB to the connector labeled RGUCN mounted on the CPU.

Auxiliary PCB (Figure 2-5)
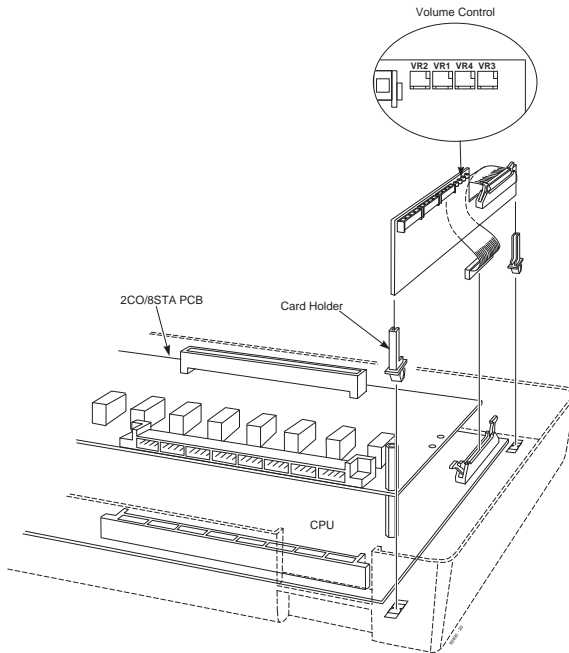
Figure 2-5 AUXILIARY PCB

The Auxiliary PCB provides:
- 2-pin DDK connectors for two External Paging Zones.
- 2-pin DDK connectors for two Door Boxes.
- 2-pin DDK connectors for two common-use relay contacts.
- 2-pin DDK connectors for Background Music source.
- 2-pin DDK connectors for Music On Hold source.

To install an Auxiliary PCB:
1. Insert the two card holders (included with the PCB) into the outer holes on the right-hand side of the Main Cabinet.
2. Insert the Auxiliary PCB into the card holders.
3. Connect the ribbon cable (included with the PCB) to the Auxiliary PCB and then to the DHUCN connector on the CPU.
4. Refer to *Part 4: Installing Optional Equipment* for more on installing Door Boxes, External Paging Equipment and Alarm Sensors.

Power Failure (4 PF XFER) PCB (Figure 2-6)
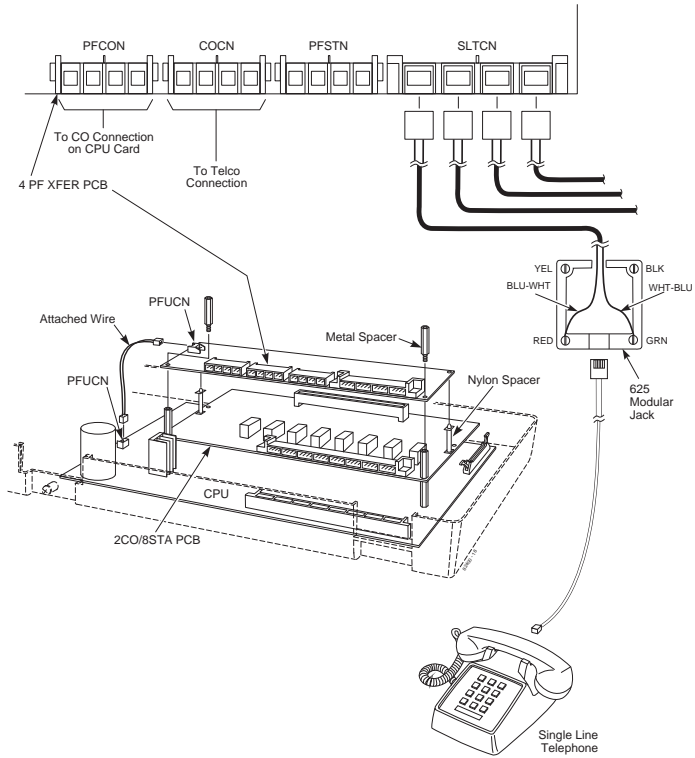
Figure 2-6 POWER FAILURE (4 PF XFER) PCB

The Power Failure (4 PF XFER) PCB provides DDK connectors for four power failure cut through circuits to four single line telephones.

To install a 4 PF XFER PCB:
1. Place the two nylon spacers included with the 4 PF XFER PCB in the lower holes in the middle of the CPU (or 2CO/8STA PCB, if installed).
2. Align the 4 PF XFER PCB over the metal and nylon spacers.
3. Using the two metal spacers included with the 4 PF XFER PCB, attach the PCB to the lower PCB.
4. Refer to *Part 4: Installing Optional Equipment* for more on installing Power Failure telephones.

SMDR PCB (Figure 2-7)

Set SW1 to the proper baud rate position by placing the jumper over the pins of the desired baud rate.

SMDR Jack and Cable Assembly

SMDR

Nylon Spacer

2 CO/8STA

CPU
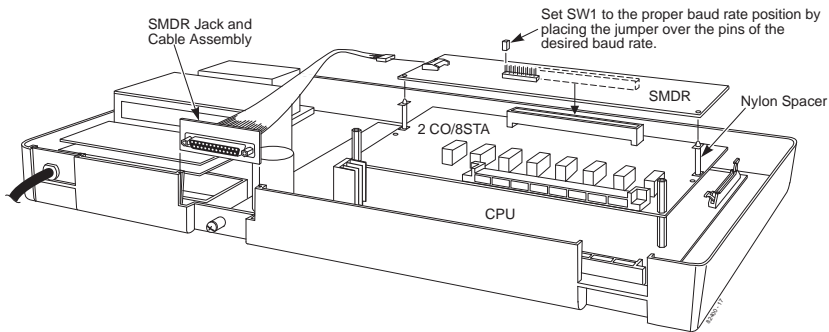
Figure 2-7 SMDR PCB

The SMDR (Station Message Detail Recording) PCB pro-
vides 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.

To install a SMDR PCB:
1. Place the two nylon spacers included with the SMDR PCB
   in the upper holes in the middle of the CPU (or 2CO/8STA
   PCB, if installed).
2. Align the SMDR PCB over the nylon spacers. Press the
   PCB into the connector labeled EXPCN on the CPU or
   2CO/8STA PCB.
3. Connect the SMDR jack and cable assembly to the Main
   Cabinet base. Insert the other end of the cable into the
   RSCN connector on the SMDR PCB.
4. Using an RS-232C cable (Figure 2-8), plug the printer into
   the SMDR jack assembly. Set the interface conditions of
   the printer as follows:
      Word length: 7 bits
      Parity bit: Even parity
      Stop bit length: 2 bits

SMDR RS-232C Cable Assembly (Figure 2-8)

To connect the SMDR and printer, an RS-232C cable is required. If you make your own cable, it must be a straight-through cable connecting pins 2, 3, 6, 7, 8 and 20. Refer to the Figure 2-8. *Note that the cable length should not exceed 50' in length.*

25 pin - 25 pin Cable
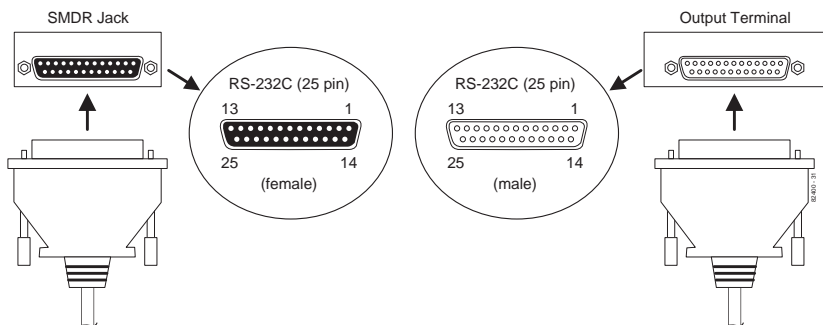
Pin No.	Description		Pin No.	Description
2	Receive Data		2	Receive Data
3	Transmit Data		3	Transmit Data
6	Data Terminal Ready		6	Data Terminal Ready
7	Signal GND		7	Signal GND
8	Request To Send		8	Request To Send
20	Data Set Ready		20	Data Set Ready

25 pin - 9 pin Cable
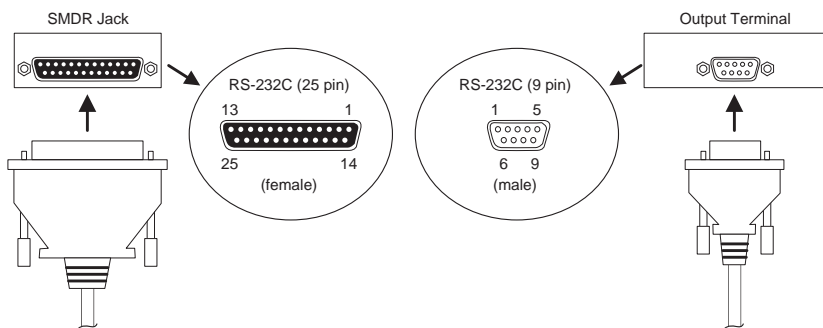
Pin No.	Description		Pin No.	Description
2	Receive Data		3	Transmit Data
3	Transmit Data		2	Receive Data
6	Data Terminal Ready		6	Data Set Ready
7	Signal GND		5	Signal GND
8	Request To Send		1	Data Carrier Detect
20	Data Set Ready		4	Data Terminal Ready

* The other Pins are not used. These Pin conditions are "Open".

Figure 2-8 RS-232C CABLE ASSEMBLY

POWERING UP THE SYSTEM

Power-Up Sequence

Now that all the PCBs you need are installed, you can power-up the system.

1. Install a surge protector in the AC outlet you intend to use for system power.
2. Plug the AC power cord for the Main Cabinet into its surge protector.

System LEDs on Power-Up

PCB	LED	Status
CPU	Processor LED	About 5 seconds after power-up, flashes quickly (red)

Section 3
Installing Extensions and Trunks

Working With DDK Connectors

The system uses DDK-type connectors for extensions, trunks and optional equipment. Using the optional DDK Installation Cables (4-pin station cable=P/N 82490, 2-pin power failure cable=82491, and 2-pin C.O. line cable=82492) makes it easy to connect the PCBs to standard 66M1-50 connecting blocks. The cables available for the system are for CO lines (one-pair), keysets (2-pair), and Power Failure Jumpers/auxiliary options (one-pair). If desired, separate DDK connectors without cable can be purchased. In general, each cabinet needs:

- Two 66M1-50 block and DDK Installation Cable for extensions.
- One 66M1-50 block and DDK Installation Cable for optional equipment
- One to eight (depending on your requirements) RJ11C modular jacks and one DDK Installation Cable for trunks.

Making Additional DDK Connectors (Figure 3-1)

To make DDK connectors, using 22 or 24 gauge solid 2-pair twisted wire for keysets or 22 or 24 gauge solid 1-pair twisted wire for CO lines, single line telephones, Power Failure Jumpers, or auxiliary functions, do the following:

1. Do not strip the wires. Insert the wires into the top piece (clear plastic) of the connector. Following the standard color code:

   > #1=White/Blue, #2=Blue/White,
   > #3=White/Orange, #4=Orange/White
   > (Ignore #3 and #4 if only using 1-pair twisted wire)

   Refer to Figure 3-4 for additional help with the color code. Make sure that the wire ends do not protrude beyond the back of the connector.

2. Place the top half of the connector over the lower half and press down or use pliers to snap together. Verify that the connector will not come apart and that all the wires are secure. Once together, these connectors will not separate without breaking.

CONNECTING BLOCKS
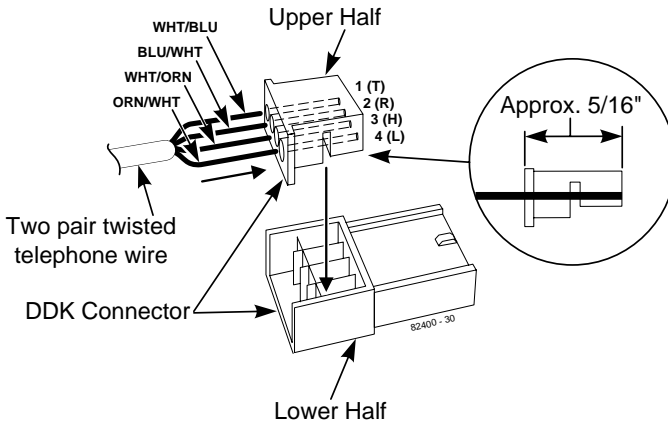
Figure 3-1 MAKING DDK CONNECTORS

Punching Down a DDK Installation Cable

The DDK Installation Cables have 4-pin DDK connectors installed on one end and are unterminated on the other.

1. For each 66M1-50 block, punch down the DDK Installation Cable in standard color-code order.

   Refer to Figure 3-3 if you need help with the color code.

2. After you have punched down your cables, route them through the bottom of the cabinet and secure them with the strain relief bar (Figure 3-2).
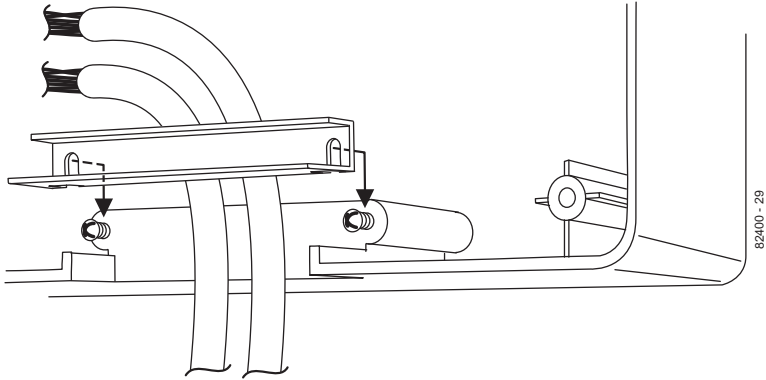
Figure 3-2 SECURING THE CABLES

25-PAIR CABLE				
CONN. PIN	BLOCK TERM.	COLOR CODE	CPU/EXPANSION PCB's (EXT. [PORTS])		FUNC.
26	1	WHT-BLU	10 (10)	22 (22)	T
1	2	BLU-WHT			R
27	3	WHT-ORN			H
2	4	ORN-WHT			L
28	5	WHT-GRN	11 (11)	23 (23)	T
3	6	GRN-WHT			R
29	7	WHT-BRN			H
4	8	BRN-WHT			L
30	9	WHT-SLT	12 (12)	24 (24)	T
5	10	SLT-WHT			R
31	11	RED-BLU			H
6	12	BLU-RED			L
32	13	RED-ORN	13 (13)	25 (25)	T
7	14	ORN-RED			R
33	15	RED-GRN			H
8	16	GRN-RED			L
34	17	RED-BRN	14 (14)	26 (26)	T
9	18	BRN-RED			R
35	19	RED-SLT			H
10	20	SLT-RED			L
36	21	BLK-BLU	15 (15)	27 (27)	T
11	22	BLU-BLK			R
37	23	BLK-ORN			H
12	24	ORN-BLK			L
38	25	BLK-GRN	16 (16)	28 (28)	T
13	26	GRN-BLK			R
39	27	BLK-BRN			H
14	28	BRN-BLK			L
40	29	BLK-SLT	17 (17)	29 (29)	T
15	30	SLT-BLK			R
41	31	YEL-BLU			H
16	32	BLU-YEL			L
42	33	YEL-ORN	18 (18)	30 (30)	T
17	34	ORN-YEL			R
43	35	YEL-GRN			H
18	36	GRN-YEL			L
44	37	YEL-BRN	19 (19)	31 (31)	T
19	38	BRN-YEL			R
45	39	YEL-SLT			H
20	40	SLT-YEL			L
46	41	VIO-BLU	20 (20)	32 (32)	T
21	42	BLU-VIO			R
47	43	VIO-ORN			H
22	44	ORN-VIO			L
48	45	VIO-GRN	21 (21)	33 (33)	T
23	46	GRN-VIO			R
49	47	VIO-BRN			H
24	48	BRN-VIO			L
50	49	VIO-SLT	No Connection		N/C
25	50	SLT-VIO			N/C

82400 - 15

☐ - Only CPU   ▨ - With one expansion PCB

▨ - With two expansion PCB's

T = Tip
R = Ring
H = High
L = Low

Figure 3-3 CONNECTING BLOCK

Station Connections (Figure 3-4)

The CPU has 4-pin DDK connectors for eight stations. Each Expansion (2CO/8STA) PCB provides for an additional eight stations. Two Expansion PCB's are allowed per system providing a total of twenty-four stations per system.

> *Refer to Part 4: Installing Optional Equipment for instructions on connecting a power failure telephone.*
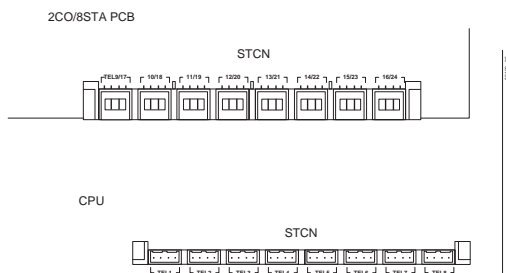
Figure 3-4 STATION CONNECTIONS

1. Following the conventional color code, insert the DDK connectors into the PCB. For example, the first eight stations in the system would have these connections:

Ext./Port	DDK Connector Pair
10	WHT-BLU / BLU-WHT / WHT-ORN / ORN-WHT
11	WHT-GRN / GRN-WHT / WHT-BRN / BRN WHT
12	WHT-SLT / SLT-WHT / RED-BLU / BLU-RED
13	RED-ORN / ORN-RED / RED-GRN / GRN-RED
14	RED-BRN / BRN-RED / RED-SLT / SLT-RED
15	BLK-BLU / BLU-BLK / BLK-ORN / ORN-BLK
16	BLK-GRN / GRN-BLK / BLK-BRN / BRN-BLK
17	BLK-SLT / SLT-BLK / YEL-BLU / BLU-YEL

Note that single line telephones only use one-pair wire (T/R). When installing a single line set, the second pair is not used (H/L).

2. Install a modular jack for each extension within six feet of the telephone's location. See Figure 3-5.

CONNECTING EXTENSIONS

3. For each keyset, run two-pair 24 AWG station cable from the cross-connect block to the modular jack. For each single line phone, run one-pair 24 AWG station cable from the cross-connect block to the modular jack.

4. Terminate the station cable to the module jack lugs:
   >WHT-BLU to GREEN lug
   >BLU-WHT to RED lug
   >WHT-ORN to BLACK lug *
   >ORN-WHT to YELLOW lug *

   * Lug not used when installing a single line phone.

5. Back at the MDF, run two pairs of cross-connect wires (or one pair of cross-connect wires for single line phones) between the pins on the B block and cross-connect block to complete the connection.

6. Install bridging clips as required.

7. After completing step 6, you should be able to place and answer calls at the extension.
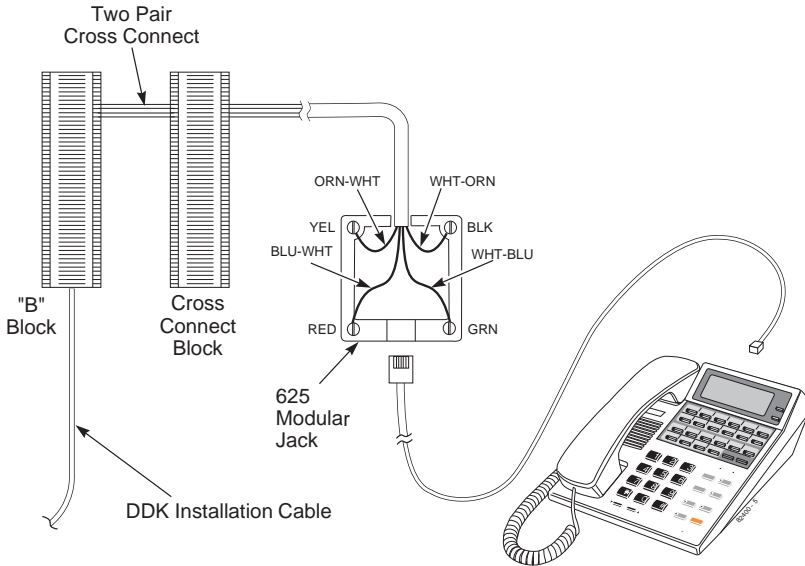
Figure 3-5 CONNECTING KEYSET TELEPHONES

One-Pair Cross-Connect

YEL
BLK
BLU-WHT
WHT-BLU
RED
GRN

"B" Block

Cross
Connect
Block

625
Modular
Jack

DDK
Connector

25-Pair DDK
Installation Cable

Single Line
Telephone
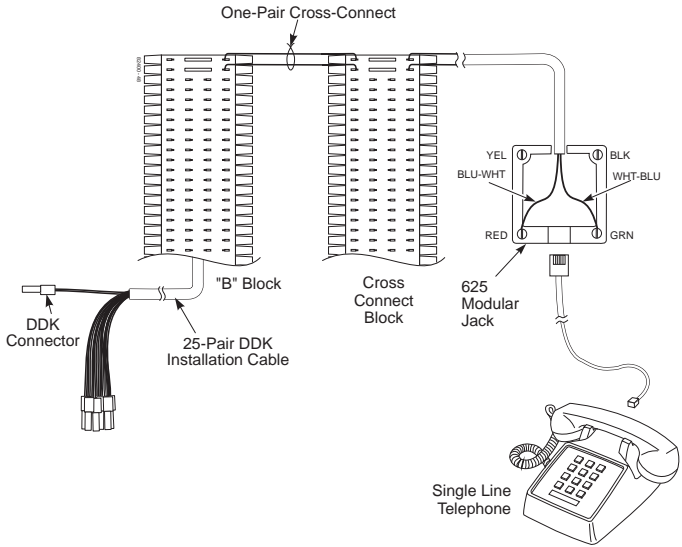
Figure 3-6 CONNECTING SINGLE LINE TELEPHONES

CONNECTING TRUNKS

Trunk Connections (Figure 3-7)

The CPU has 2-pin DDK connectors for four loop start CO trunks. Each Expansion (2CO/8STA) PCB provides an additional two CO trunk connections. Two Expansion PCB's are allowed per system providing a total of eight trunks per system.

*Refer to Part 4: Installing Optional Equipment for instructions on connecting a power failure telephone.*
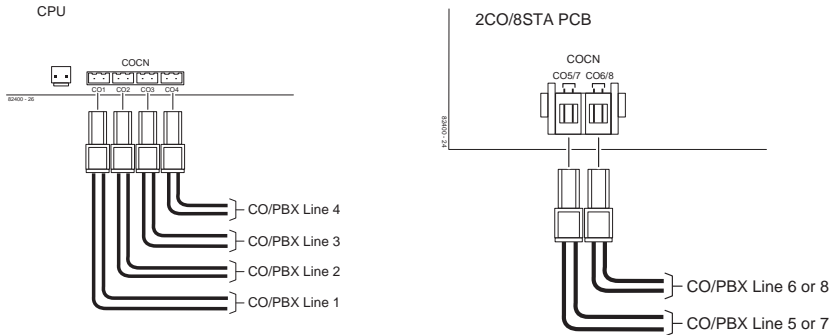
Figure 3-7 TRUNK CONNECTIONS

1. Following the conventional color code, insert the DDK connectors into the PCB. For example, the CPU would have these connections:

Trunk	DDK Connector Pair
1	WHT-BLU / BLU-WHT
2	WHT-ORN / ORN-WHT
3	WHT-GRN / GRN-WHT
4	WHT-BRN / BRN WHT

2. For each trunk, run one pair of wires from the DDK connection to a 625 modular jack, which then connects to the telco's RJ11C jacks using a standard line cord (Figure 3-8 on the following page).

3. After completing step 2, you should be able to place and answer calls over the connected trunk.
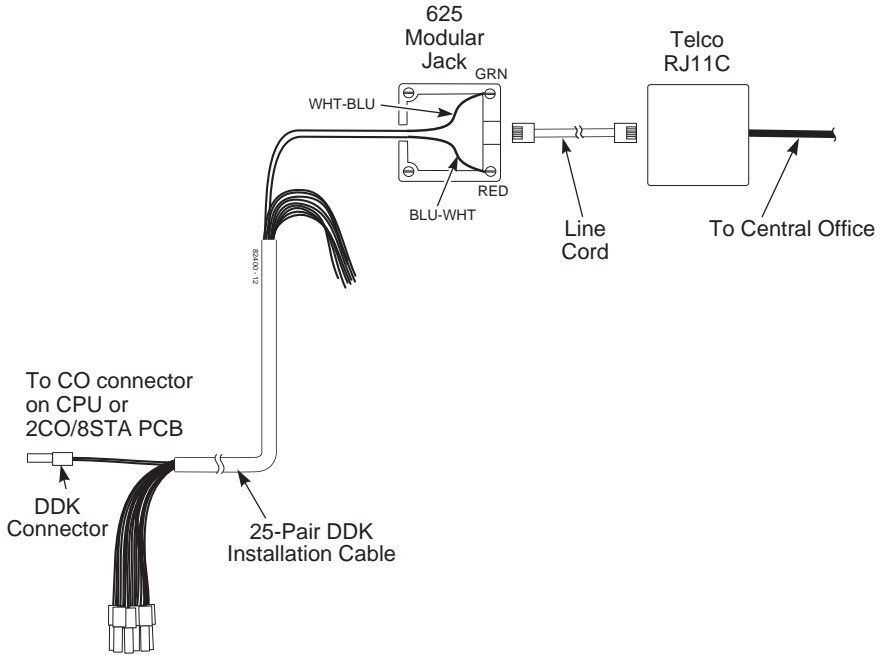
Figure 3-8 CONNECTING TRUNKS

Section 4
Installing Optional Equipment

Using External Alarm Sensors

The Auxiliary PCB provides two alarm circuits which detect a make (open) or break (closed) contact from an alarm. Programming determines if the alarm inputs require an open or closed circuit.

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.

Note: The Auxiliary PCB alarm feature can use a 10-30 VDC power supply installed in series with the alarm circuit.

Installing an External Alarm Circuit (Figure 4-1)

CAUTION

Be sure the requirements of the alarm system sensors do not exceed the system specifications.

With Internal Power: loop resistance of less than 100 Ohms
With External DC Power: 5 to 24 VDC with 0.65 mA to 4.5 mA
Note: External powered alarm sensors are polarity sensitive (see Figure 4-2). Additionally, the external power should provide current limiting.

1. Locate an available 2-pin DDK connector in an auxiliary (C) block.
2. For the DDK connector chosen, cross-connect the associated wire pair from the C block to the cross-connect block.
3. Install bridging clips as required.
4. Connect the two leads from the first external alarm to the associated terminals on the cross-connect block.
5. Plug the DDK connector into the ALM1 connector on the Auxiliary PCB.
6. Repeat steps 1-4 for the second external alarm, if required.
7. Plug the DDK connector into the ALM2 connector on the Auxiliary PCB.

Note: When using internal power to connect the dry contact of an alarm-detecting device to the system, set the SW3 switch (Alarm 1) and SW4 switch (Alarm 2) on the Auxiliary PCB to INPOW.

One-Pair Cross-Connect

Input from
alarm
system

To alarm input
on Auxiliary PCB

"C" Block

Cross
Connect
Block

DDK
Connector

25-Pair DDK
Installation Cable
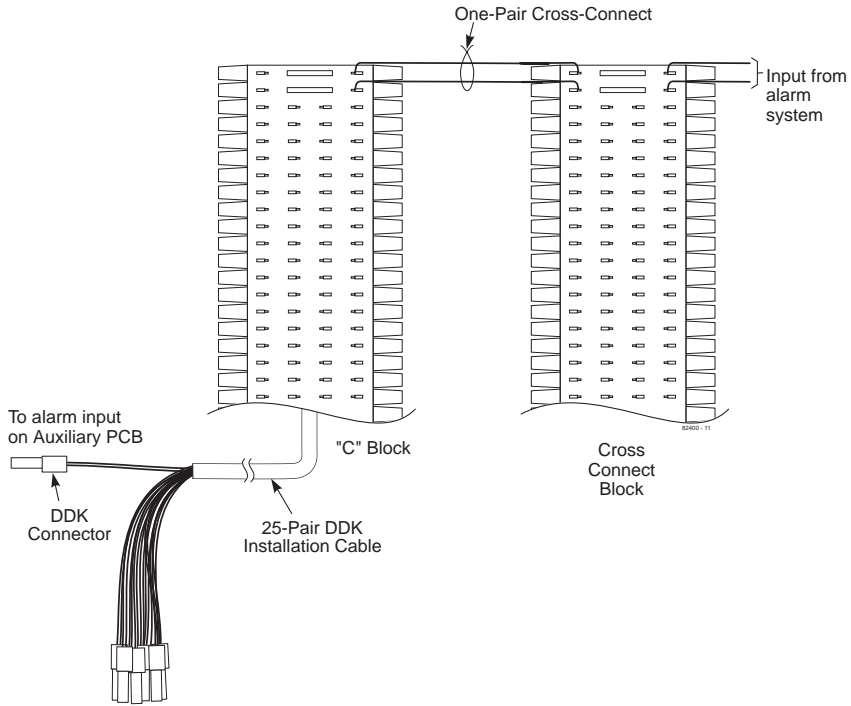
Figure 4-1 CONNECTING AN ALARM

Alarm Input 2

Alarm Input 1

CN1

CN2

RL2   RL1   ALM2 ALM1   CTR2 SPK2 CTR1 SPK1

SW4   SW3

EXPOW INPOW EXPOW INPOW

Auxiliary PCB

SW4   SW3

EXPOW INPOW   EXPOW INPOW
(ALM2)   (ALM1)

Using internal
power
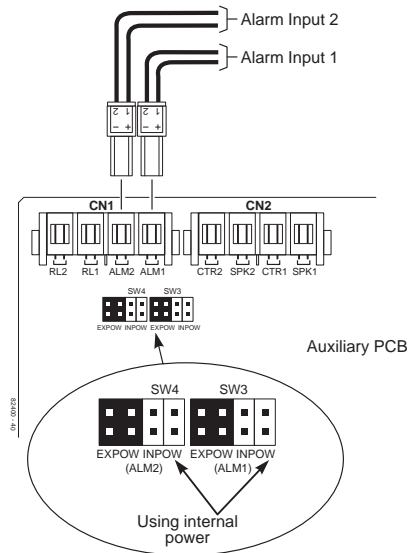
Figure 4-2 CONNECTING TO THE AUXILIARY PCB

Using Caller ID

Caller ID allows a display keyset to show an incoming caller's telephone number and/or name with the time and date on the phones display. The caller's information can be checked before answering an incoming call. The information received by the system depends upon the capabilities of your local telco.

The system requires the following:
● System Software 2.1B or higher
● Caller ID/SMDR PCB (P/N 82421)

> *This PCB is used in place of the SMDR PCB (P/N 82420) and provides both Caller ID and SMDR capability.*

● Caller ID Adaptor (P/N 82425)

> *The Caller ID Adaptor provides 8 detection circuits for Caller ID data.*

Installation (Figure 4-3)

1. Locate a clean, dry spot that is out of direct sunlight and near the Portrait KSU. The Caller ID Adaptor must be installed within 2' of the lower right side of the KSU (determined by the length of the interconnecting cable). The area should be well ventilated and the temperature should remain at a normal level.

2. Remove the cover from the Caller ID Adaptor.

3. Tack-fasten two of the four wood screws (provided) on the wall at about 8 11/16" apart. For easier installation, you can use the base as a mounting template.

4. Place the Caller ID Adaptor over the tacked screws. Fully tighten the screws and install the remaining two wood screws.

5. Remove the cover from the KSU by unscrewing the two captive screws on the lower half of the cabinet cover. Lift up the lower half of the cover -- then slide it back slightly to remove it.

6. Before proceeding further, make sure switches 1 & 2 of the CPU Mode Switch are set to the RUN position and the battery is installed in the system. This is necessary in order to retain the current system programming.

7. Unplug the AC power cord for the KSU from its surge protector.
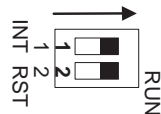
8. Set the jumpers on the Caller ID/SMDR PCB. Set jumper-SW1 to match the baud rate of the SMDR Unit. Set jumper-SW2 to the "RUN" position, this setting allows the system to use the customer's current programming.

9. Place the two nylon spacers included with the Caller ID/SMDR PCB in the upper holes in the middle of the CPU (or 2CO/8STA PCB, if installed).

10. Align the Caller ID/SMDR PCB over the nylon spacers. Press the PCB into the connector labeled EXPCN on the CPU or 2CO/8STA PCB. The PCB should then be snapped on to the spacers.

11. Connect the Caller ID cable to the CBCN connector and G terminal on the Caller ID/SMDR PCB. Connect the opposite end to the SMDCN connector and G terminal on the Caller ID Adaptor.

12. Mount the SMDR jack (RS-232 connector) to the base of the KSU. Connect the opposite end of the cable to the RSCN connector on the Caller ID/SMDR PCB.

13. Connect the FG ground on the KSU to the ETH ground connector on the Caller ID Adaptor using the green wire with spade lug ends provided.

14. With DDK connectors attached to both ends, connect a one-pair jumper from the TRCN connector on the Caller ID Adaptor to the corresponding COCN connector on either the CPU or Expansion (2CO/8STA) PCB. Repeat this step for additional CO lines.

15. For each CO trunk, run one pair of wires with DDK connectors on one end from the COCN connector on the Caller ID Adaptor to a 625 modular jack. The jack is then connected to telco's RJ11C jack using a standard line cord.

16. Replace the front cover on the KSU, and the front cover on the Caller ID Adaptor.

17. Plug the AC power cord for the KSU into its surge protector.

18. Refer to the Portrait Pocket Guide (P/N 824000PKT**) for required programming.

Set SW1 to the proper
baud rate position placing
the jumper over the pins
of the desired baud rate.

TEST   RUN

SW2

Portrait KSU

Caller ID/SMDR PCB

SMDR Jack and
Cable Assembly

CBCN

G

Nylon
Spacer

2 CO/8 STA

CPU

FG   SG   COCN

CO1   CO4

To
Telco

625
Jack

SMDCN

G

COTR8   TRCN   COTR1   CO8   COCN   CO1

ETH

Caller ID Adaptor
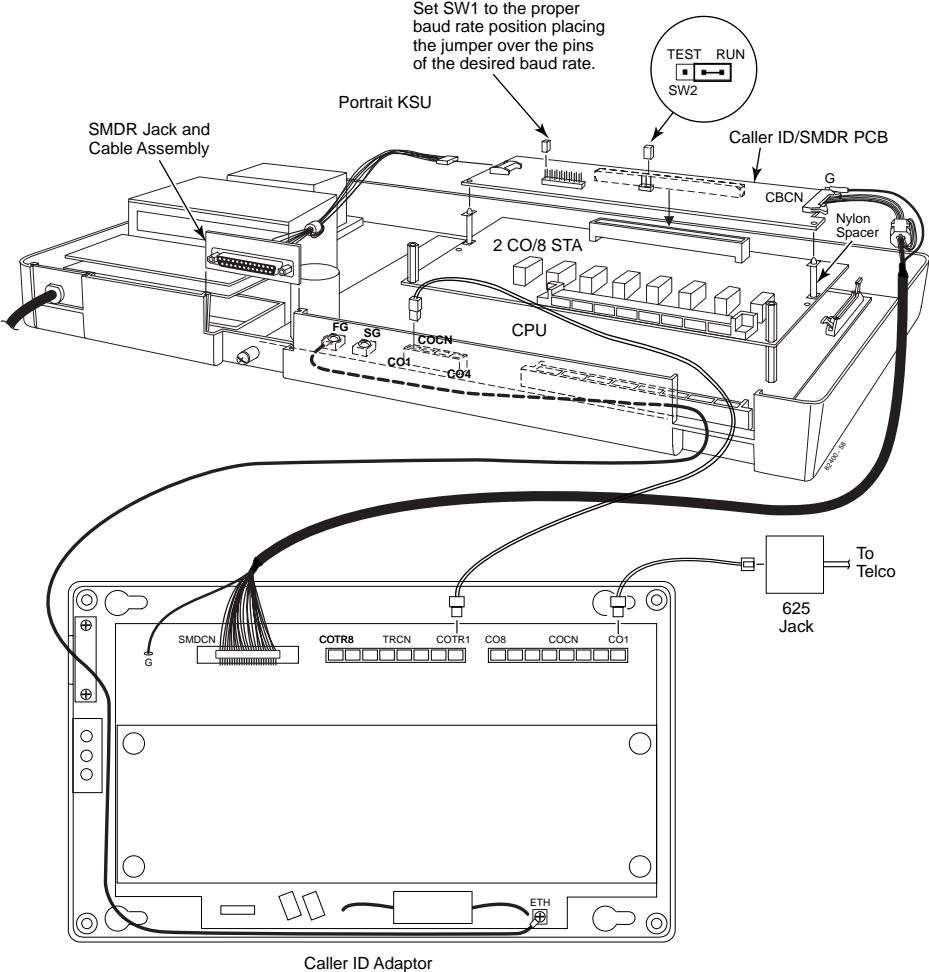
Figure 4-3 CONNECTING CALLER ID

DSS CONSOLE

Using a Direct Station Selection Console

The DSS Console gives a *display* keyset user one-button access to extensions. The system supports a maximum of 3 DSS Consoles.

Installing a DSS Console (Figure 4-4)

1. Unplug the telephone and remove the handset cord from the telephone's base.

2. Remove the four screws on the bottom of the telephone.

3. Using a knife remove the plastic piece on the base to allow space for the ribbon cable, using care not to leave any rough edges which could cause damage to the cable.

4. Insert the ribbon cable from the DSS into the CN3 connector on the PCB in the telephone.

5. Replace the bottom plate of the telephone and attach with the four screws.

Use a knife to scrape away.
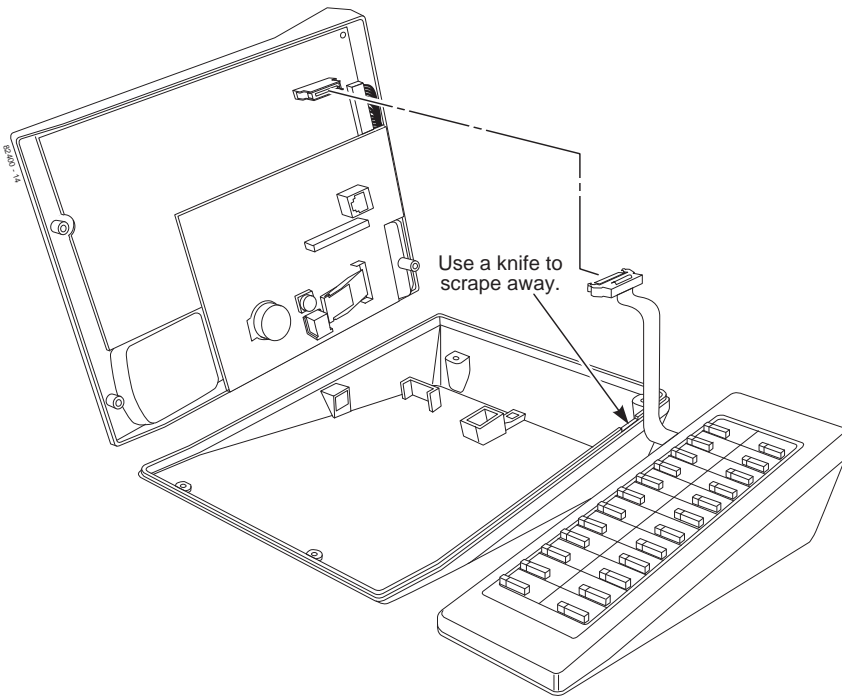
Figure 4-4 CONNECTING THE DSS CONSOLE

Using External Paging

Each Auxiliary PCB has two External Paging audio outputs and two associated control relays. The External Page zones are two way which provide for the ability to do talk back paging (no additional programming required). The audio outputs are connected to audio inputs on customer-provided paging systems. In some paging systems, you can use the control relays to automatically turn the amplifiers on and off. The control relays are normally open and close whenever a user calls the External Paging zone.

Installing External Paging and Page Relays (Figure 4-5)

CAUTION

Be sure the audio input requirements of the paging equipment are compatible with the audio output specifications of the system.

Output Impedance: 600 Ohms
Output Level: Nominal 250 mV (-10 dBm)
Maximum Output: 400 mV RMS
Minimum Initial Contact Resistance: 50 mOhms
Relay Contact: 250 mA @ 24 VDC

1. Locate an available 2-pin DDK connector in an auxiliary (C) block.

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

3. Install bridging clips as required.

4. Connect two leads to the paging system audio inputs.

5. For External Zone 1, loop the cable once through a ferrite bead (supplied with the Auxiliary PCB) then plug the DDK connectors into the Auxiliary PCB. One connector is plugged into the connector on the PCB labeled SPK1, the other goes to CTR1.

6. For External Zone 2, loop the cable once through the same ferrite bead used for External Zone 1, then plug the DDK connectors into the Auxiliary PCB. One connector is plugged into the connector on the PCB labeled SPK2, the other goes to CTR2.

7. Adjust the volume level of each External Zone. VR1 controls zone 1 (accessed by dialing 86), VR2 controls zone 2 (accessed by dialing 87).

EXTERNAL PAGING AND PAGE RELAYS
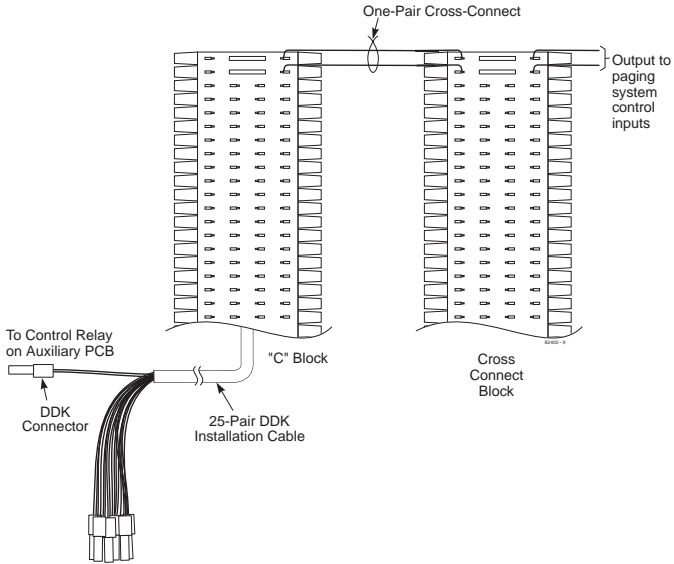
Figure 4-5 CONNECTING EXTERNAL PAGING/RELAYS
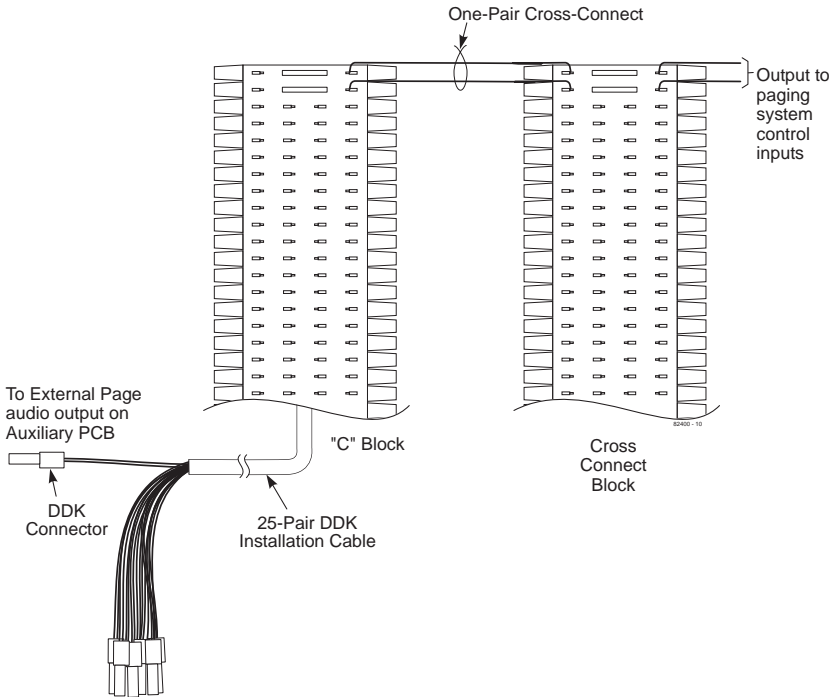
Figure 4-6 CONNECTING EXTERNAL PAGING

Ferrite bead

To Paging
or Door Box
connection

Loop each cable once
through Ferrite bead

DDK connectors
to Auxiliary PCB
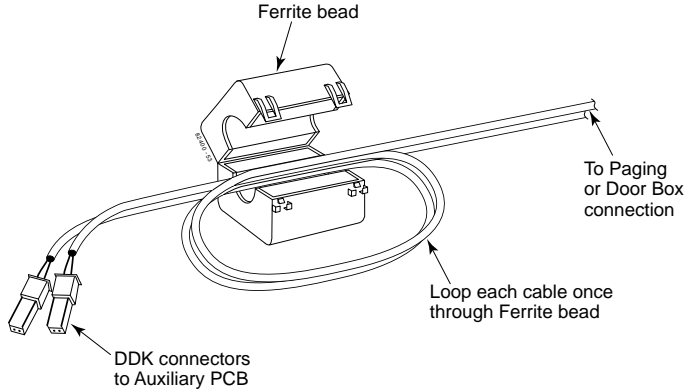
Figure 4-7 ATTACHING THE FERRITE BEAD

Paging Speaker #2

Paging Speaker #1

Amplifier

Amplifier

SPK1/SPK2: External paging audio signal output.

CTR1/CTR2: Normally open relay contacts. If a zone
is activated, the contacts close.

CN1

CN2

CN3

VR2 VR1 VR4 VR3

RL2

RL1

ALM2

ALM1

CTR2

SPK2

CTR1

SPK1

EXMOH

BGM

DH2

DH1

(SPK2)

(SPK1)

(DH2)

(DH1)
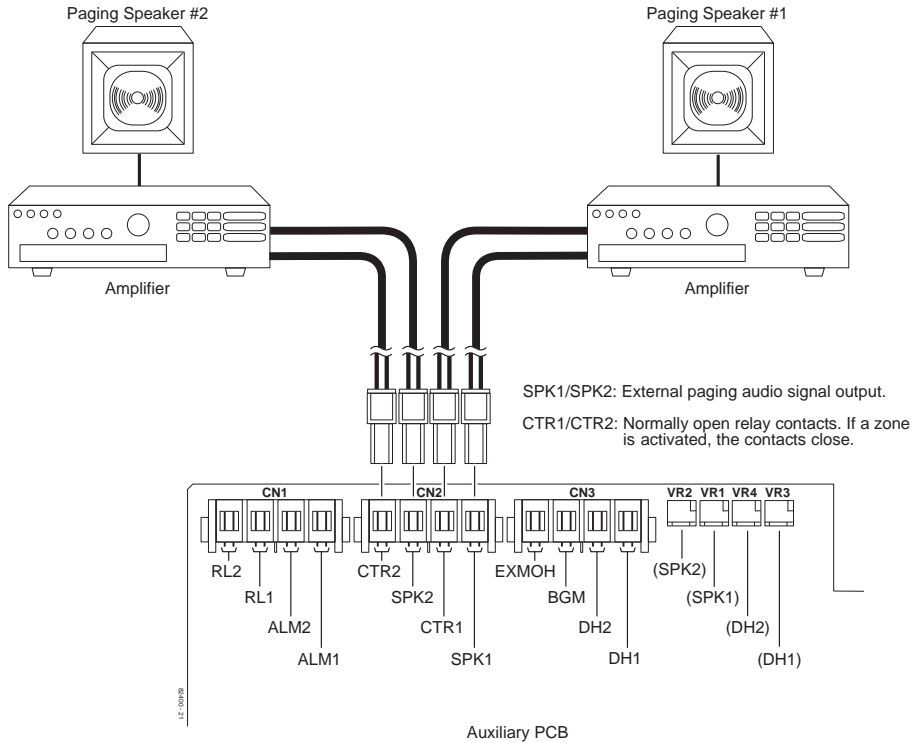
Auxiliary PCB

Figure 4-8 CONNECTING CONTROL RELAYS TO THE AUXILIARY PCB

DOOR BOX

Using the Door Box

Each Auxiliary PCB supports two Door Boxes. 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.

Installing a Door Box (Figure 4-9)

1. Locate an available 2-pin DDK connector in an auxiliary (C) block.
2. For the DDK connector chosen, cross-connect the associated wire pair from the C block to the cross-connect block.
3. Connect leads from lugs 1 and 2 on the Door Box to the cross-connect block. Be sure to maintain the proper polarity.
4. Loop the cable once through a ferrite bead (supplied with the Auxiliary PCB), then plug the DDK connector into the Door Box (1 or 2) connector on the Auxiliary PCB. The first Door Box is labeled DH1 on the PCB. The second Door Box is labeled DH2.

   If both Door Boxes are to be used, loop both cables through the same ferrite bead.
5. Install bridging clips as required.
6. Use VR3 or VR4 to adjust the volume of the Door Box. VR3 corresponds to Door Box 1, VR4 corresponds to Door Box 2.
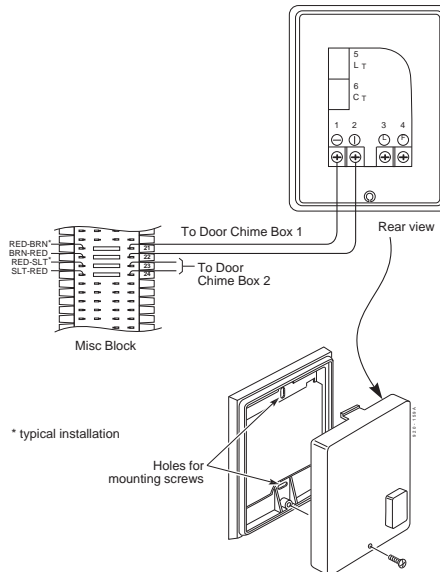
Figure 4-9 CONNECTING A DOOR BOX
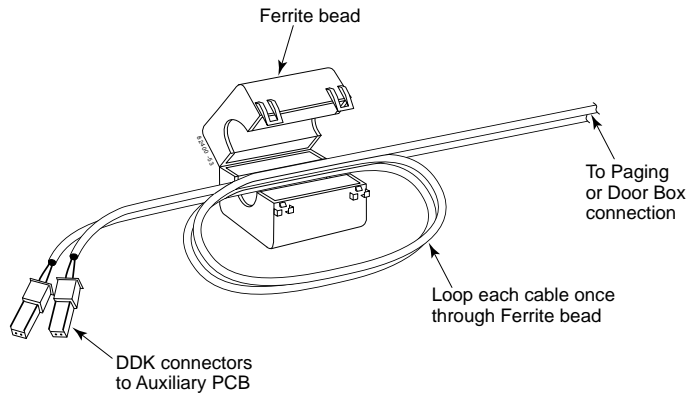
Figure 4-10 ATTACHING THE FERRITE BEAD
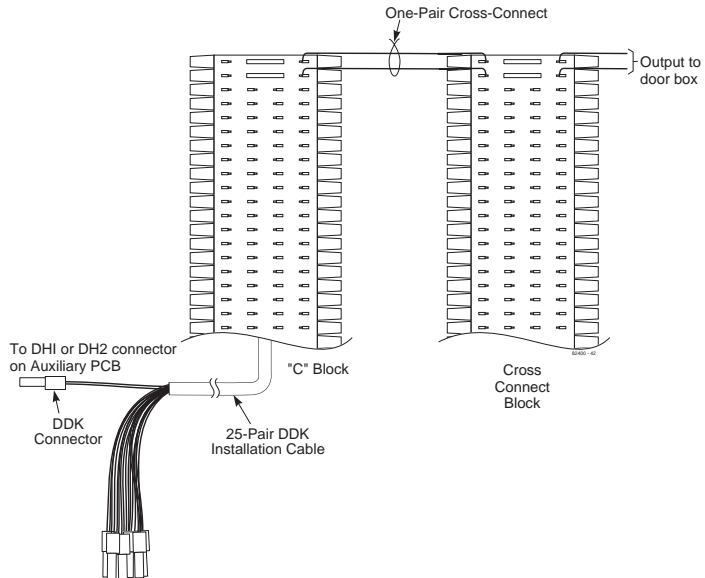
Figure 4-11 CONNECTING A DOOR BOX

DOOR BOX

Installing Door Strike Control Relays (Figure 4-12)

CAUTION
Be sure the requirements of the door strike are compatible with the control relay output specifications of the system.

Contact Configuration: Normally open

Maximum Load: 250 mA @ 24 VDC

Maximum Initial Contact Resistance: 50 mOhms

---

1. Locate an available 2-pin DDK connector in an auxiliary (C) block.

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

3. Connect two leads from the door strike to the associated terminals on the cross-connect block.

   If the door strike is a high current device, you may have to install an auxiliary relay that powers the door strike relay.

4. Plug the DDK connector into the Auxiliary PCB connector labeled RL1 or RL2. RL1 controls the door strike relay for Door Box 1, RL2 controls Door Box 2.

5. Install bridging clips as required.
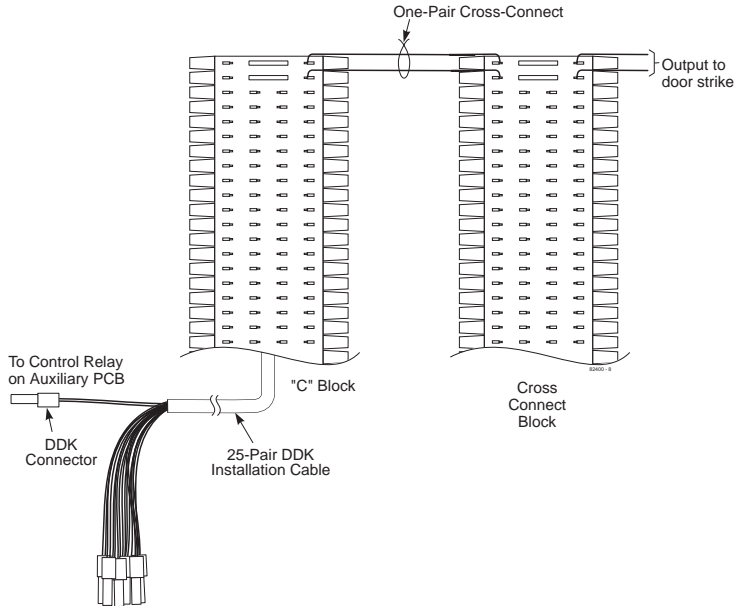
Figure 4-12 CONNECTING TO THE DOOR STRIKE
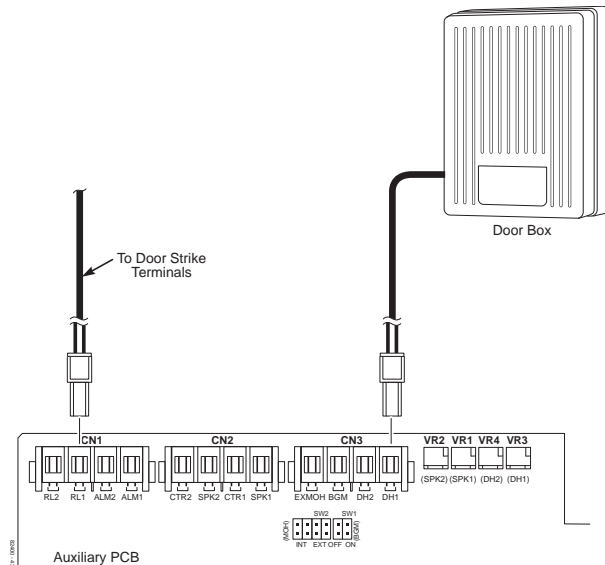
**Figure 4-13 CONNECTING DOOR BOX/DOOR STRIKE RELAYS TO THE
AUXILIARY PCB**

MUSIC SOURCES

Music on Hold and Background Music

Music on Hold (MOH) provides music to callers on Hold and calls parked in orbit. The system's default setting provides an internal (synthesized) MOH music source, or a customer-provided music source connected to the Auxiliary PCB can be used instead (see below).

Background Music sends music from a customer-provided music source (via a connector on the Auxiliary PCB) to keyset speakers.

Installing a Music Source on the Auxiliary PCB (Figure 4-14)

CAUTION
Be sure the music source is compatible with the MOH and BGM input specifications on the CPU PCB.
Input Impedance: 600 Ohm
Input Level: Nominal 250 mV (-10 dBm)
Maximum Input: 1V RMS

---

1. Locate an available 2-pin DDK connector in an auxiliary (C) block.

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

3. Connect two leads from the customer-provided music source to the associated terminals on the cross-connect block.

4. **For Music on Hold . . .**
   a. Plug the DDK connector into the EXMOH input on the Auxiliary PCB.
   b. Set the SW2 strap to the EXT position.

   If MOH not is not required (either from an external source or from the system's synthesized MOH), set the SW2 strap in the EXT position and do not plug any music source into the EXMOH input on the Page/Door Box card.

   For Background Music . . .
   a. Plug the DDK connector into the BGM input on the Auxiliary PCB.
   b. Set the SW1 strap to the ON position. If BGM is not required, set the SW2 strap to the OFF position.

5. Install bridging clips as required.

6. Adjust the volume for the MOH and BGM on the external sources.
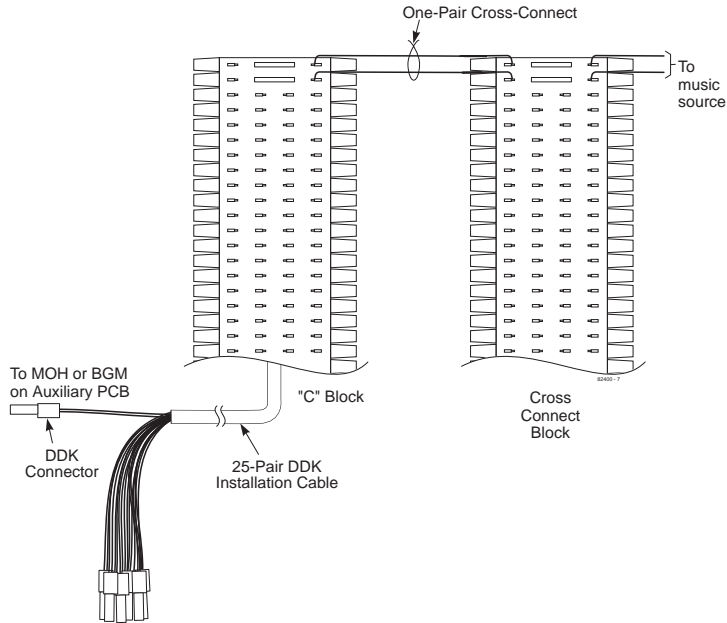
Figure 4-14 CONNECTING MUSIC SOURCES
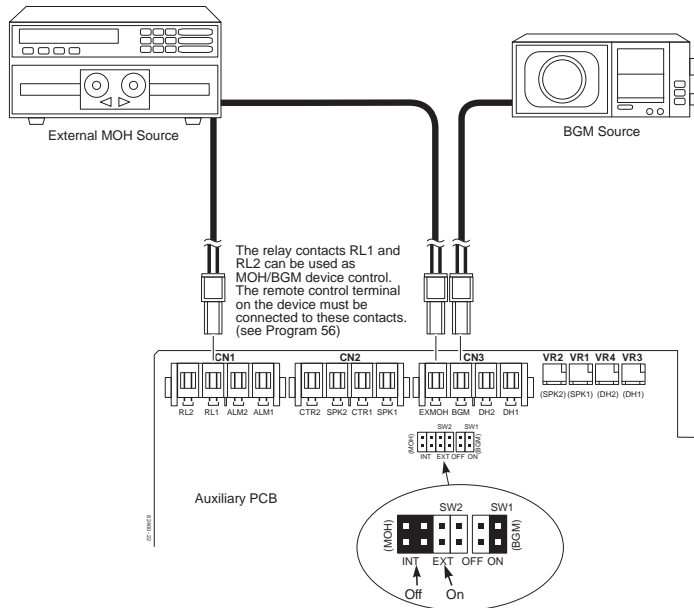
Figure 4-15 CONNECTING TO THE AUXILIARY PCB

POWER FAILURE TELEPHONES

Power Failure Cut-Through (Figure 4-16)

When system AC power fails, the 4 PF XFER PCB automatically connects up to four trunks to the Power Failure Telephones.

Installing a Power Failure Telephone

1. Plug a 2-pin DDK connector to a COCN connector on the CPU or 2CO/8STA PCB. Plug the other end into a PFCON connector on the 4 PF XFER PCB.

2. Plug a 2-pin DDK connector to a COCN connector on the 4 PF XFER PCB. Connect the other end to the 625 modular jack leading to the RJ11C telco jack.

3. Plug a 2-pin DDK connector into the SLTCN connector on the 4 PF XFER PCB. Connect the other end to the auxiliary (C) block.

4. Cross-connect the associated wire pair from the C block to the cross-connect block.

5. Install a modular jack for the Power Failure Telephone within six feet of the telephone's location.

6. Run one-pair of 24 AWG station cable from the cross-connect block to the Power Failure Telephone modular jack.

7. Terminate the station cable WHT/BLU - BLU/WHT leads to the GRN and RED lugs in the modular jack.

8. Install bridging clips as required.

9. Plug a line cord into the Power Failure Telephone and the phone's modular jack.

   No programming is required to enable the Power Failure Telephone.

To test the Power Failure Telephone:

1. Make sure the Switch-1 on the CPU PCB is set to the right side.

   This ensures that your programming and configuration is retained when you power down the system.

2. Power down the system.

3. At the Power Failure Telephone, lift the handset and place a test call.

   The call will go out on the trunk in the 4 PF XFER PCB to which the telephone is connected.

One-Pair Cross-Connect

To Power Failure
Telephone
connector on
4 PF XFER PCB

DDK
Connector

"C" Block

25-Pair DDK
Installation Cable

Cross
Connect
Block

YEL
BLU-WHT
RED

BLK
WHT-BLU
GRN

625
Modular
Jack

Power
Failure
Telephone
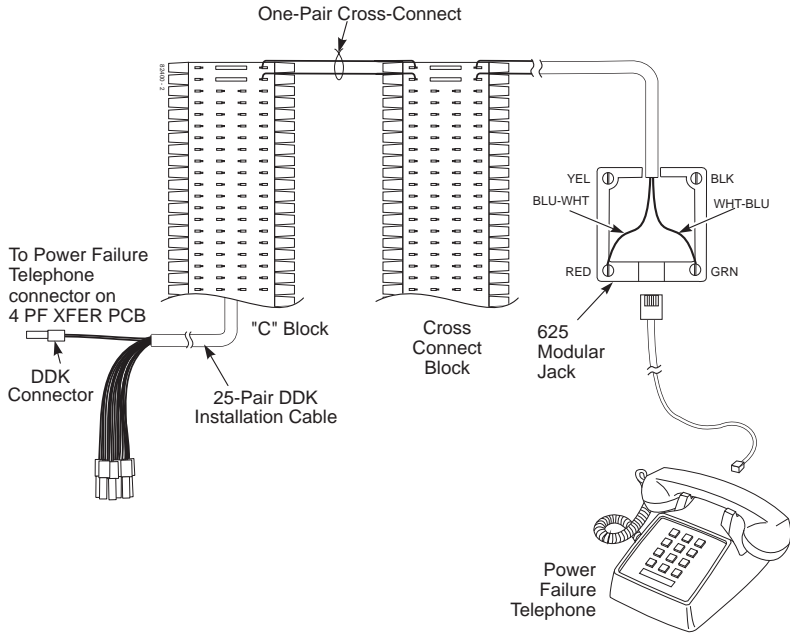
Figure 4-16 CONNECTING A POWER FAILURE TELEPHONE

PFCON
COCN
PFSTN
SLTCN

To CO Connection
on CPU Card

To Telco
Connection

4 PF XFER PCB

Attached Wire

PFUCN

PFUCN

Metal Spacer

Nylon Spacer

CPU

2CO/8STA PCB

YEL
BLU-WHT
RED

BLK
WHT-BLU
GRN

625
Modular
Jack

Single Line
Telephone
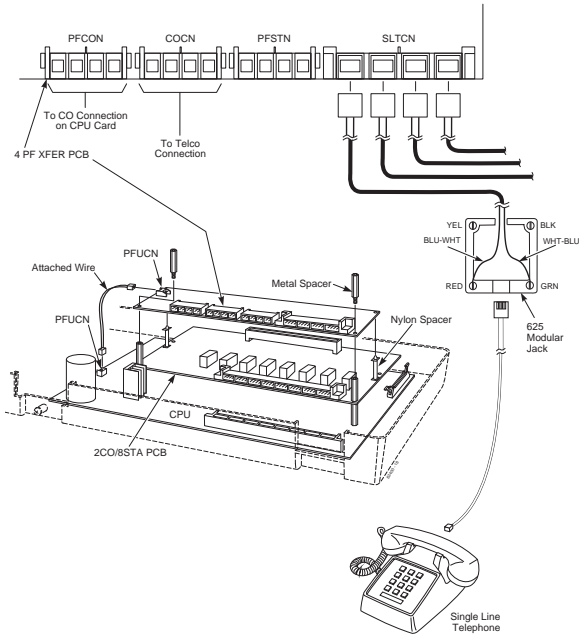
Figure 4-17 CONNECTING TO THE 4 PF XFER PCB

VOICE MAIL

Using Voice Mail

The Portrait System is compatible with the NVM-202ex, NVM-22 (P/N 17590A), and NVM-2000 Voice Mail Systems. This feature provides telephone users with comprehensive Voice Messaging and Auto Attendant capabilities. Voice Messaging ends the frustration and cost of missed calls, inaccurate written messages and telephone tag. Voice Messaging frees a company's busy receptionist and secretaries for more productive work.

The system requires the following:
● Voice Mail Interface Unit (P/N 82440)

> *Maximum of 4 Voice Mail Interface Units or 8 Voice Mail ports.*

● NVM-202ex (P/N 17670), NVM-22 (P/N 17590A), or NVM-2000 (P/N 17500 or 17510, version 7.0 or higher) Voice Mail Unit
● One of the following Portrait setups:
  Setup 1
  • Portrait 824 main cabinet (P/N 82400) with Software version 2.1B or higher and 2CO/8STA PCB (P/N 82402A)

    > *NOTE: The Voice Mail ports must be connected to the 2CO/8STA PCB (P/N 82402A).*

    > *OR*

  Setup 2
  • Portrait 824 main cabinet (P/N 82400A) with Software version 2.1B or higher

    > *NOTE: The Voice Mail ports must be connected to station ports 1-8.*

    > *OR*

  Setup 3
  • Portrait 824 main cabinet (P/N 82400A) with Software version 2.1B or higher and 2CO/8STA PCB (P/N 82402)

    > *NOTE: The Voice Mail ports must be connected to station ports 1-8.*

To confirm if your equipment can support voice mail, you can also use **Program 93 - Sub-CPU Version** in the Portrait system. The version number of the CPU (Unit 1), First Expansion PCB (Unit 2), and Second Expansion PCB (Unit 3) should be "08" or above. If the version number is "04" for any unit, the corresponding equipment can

not support the voice mail option. The following is an example of what you may see.

> Unit 1 (CPU - P/N 82400A) = 08
> Unit 2 (First Expansion PCB - P/N 82402) = 04
> Unit 3 (Second Expansion PCB - P/N 82402A) = 08

The above indicates that the CPU and Second Expansion PCB can support voice mail, but it is not supported on the First Expansion PCB. When connecting the voice mail ports, they would be connected to either the CPU or the Second Expansion PCB.

Each voice mail port uses an intercom link. The Portrait system provides six intercom links at the default setting. When the voice mail ports exceed the available intercom links (possible when using the NVM-202ex or NVM-2000), the Portrait system must be reprogrammed to allow unused line circuits to be used as intercom links. Otherwise, blocking may occur due to the lack of intercom links. This can be accomplished in Portrait **Program 45 - Intercom Link Increase**.

Installation (Figure 4-18)

1. Using a four-conductor line cord, connect the first Voice Mail port to "LINE1" on the Voice Mail Interface and the second Voice Mail port to "LINE2" on the Voice Mail Interface.

    NOTE: The two ports for each Voice Mail Interface must be from the same PCB (e.g., 7 & 8 of the CPU or 15 & 16 of the 2 CO/8 STA PCB).

2. Connect a four-conductor line cord from the Port 1 & 2 jack on the back of the Voice Mail, to the Voice Mail port on the Voice Mail Interface.

3. Refer to the Portrait Pocket Guide (P/N 82400PKT**) for required programming information.

4. Refer to the Voice Mail Manual for further programming.

System	Manual P/N	See
NVM - 22	17590INS**	Chapter 1 - Installation
		Chapter 2 - Programming
NVM-202ex	17570SWG**	Chapter 2 - Starting Up and
		Installing NVM-202ex
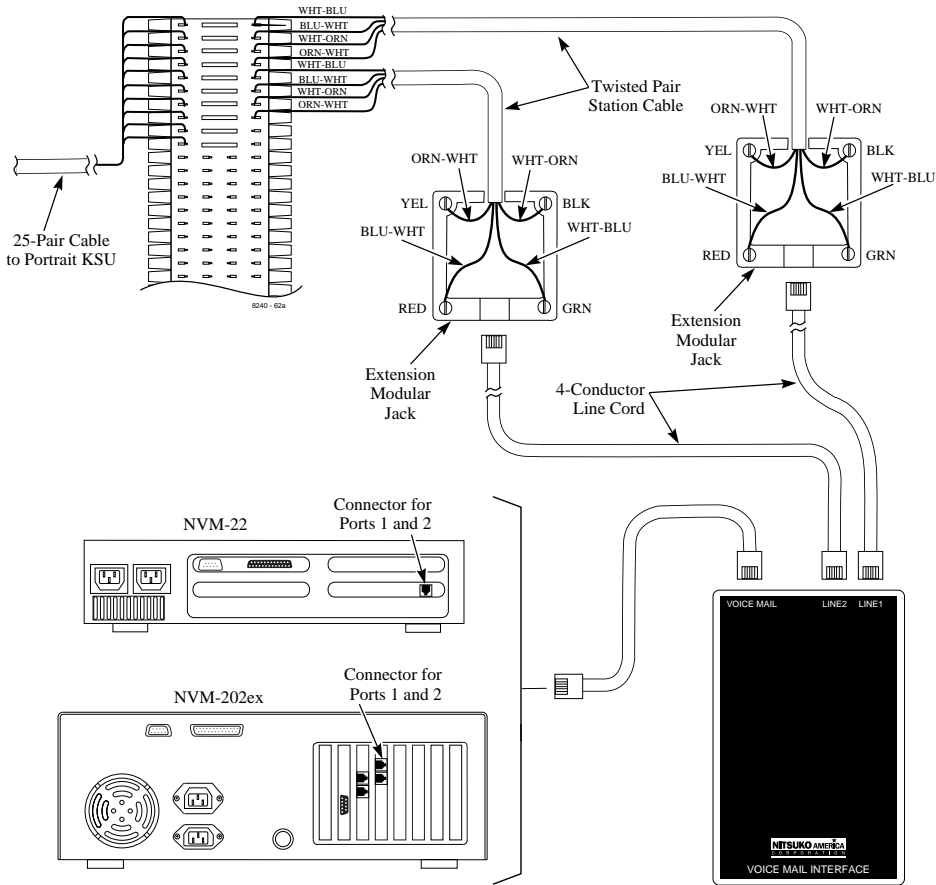
Figure 4-18 CONNECTING THE VOICE MAIL

Using the Wall-Mount Kit

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

Note: The wall-mount kit currently does not accommodate installing on a wall plate.

A telephone with a DSS console attached can not be wall-mounted.

Installing the Wall-Mount Handset Hanger (Figure 4-19)

1. Insert the handset hanger in the slot provided beneath the telephone's hookswitch.

Handset Hook
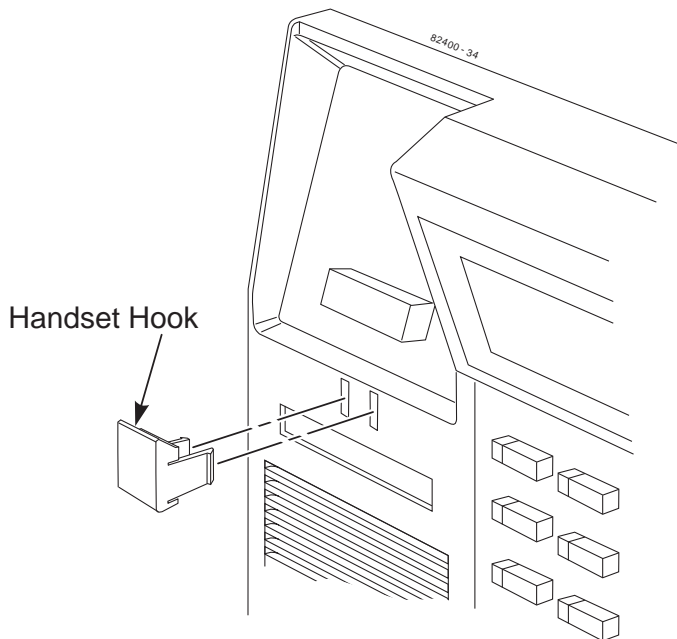
Figure 4-19 INSTALLING THE WALL-MOUNT HANGER

WALL MOUNT KIT

Wall-Mounting a Key Telephone (Figure 4-20)

1. Mount the wall-mount kit's plastic bracket in the desired location using the screws provided.

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

4. Place the telephone on top of the plastic bracket on the clips provided. Gently push the bottom of the bracket in until it snaps into the slots on the phone.
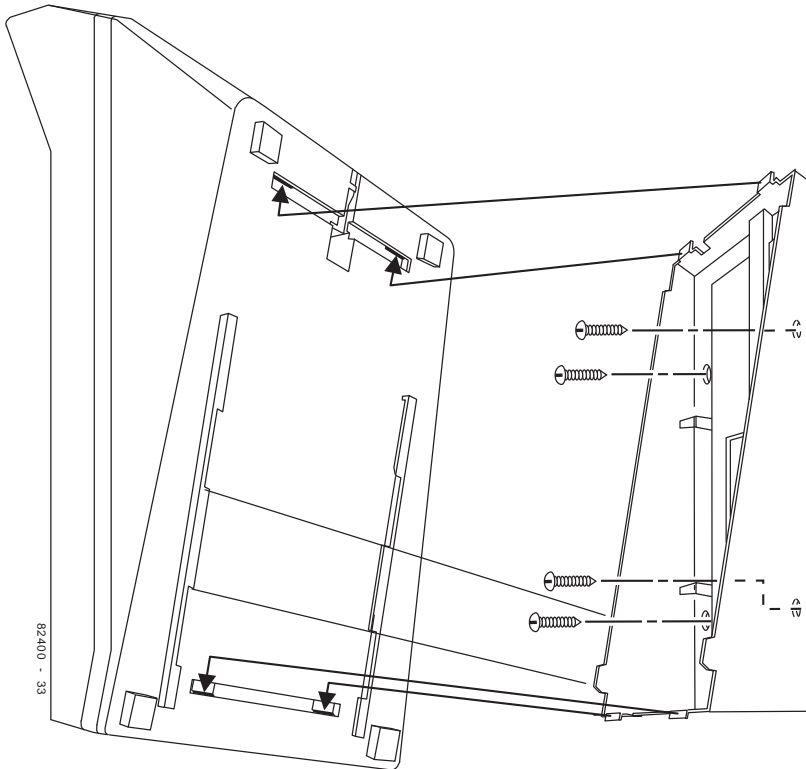
Figure 4-20 INSTALLING THE WALL MOUNT BRACKETS

Section 5
Specifications and Parts List

5. SPECIFICATIONS AND PARTS LIST

System Capacities

Alarm Sensors:	2
Analog Trunks (CO/PBX lines):	8
Cabinets:	1
Caller ID Circuits:	8
Door Boxes:	2
Door Box/Music On Hold Relays:	2
DSS Consoles:	3 max. per system
Electronic Key and/or Analog Telephones:	24
External Paging Zones:	2
Internal Paging Zones:	4
Power Failure Telephones:	4
Speed Dial, Personal:	10
Speed Dial, System:	100
Talk Timeslots (Intercom/line):	6 (expandable)
Tenant Groups:	4
Voice Mail Ports:	8

PCBs

2CO/8STA PCB:	2
Auxillary PCB:	1
CPU Central Processing Unit:	1
4 PF XFER PCB:	1
Ring Generator PCB:	1
SMDR PCB *or* Caller ID/SMDR PCB	1

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).

SPECIFICATIONS

Power Requirements

A dedicated 110 VAC 60 Hz 15 amp circuit (terminated in a NEMA 5-15R receptable) located within six feet of the cabinet is required. You should install a separate dedicated outlet for each cabinet.

Environmental Specifications

Cabinets and Key Telephones
   Temperature: 0-45°C (32-113°F)
   Humidity: 10-95% (non-condensing)

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

Electrical Specifications

Power Supply:	110 VAC ±- 10% @ 50-60 Hz 15 amp
Power Requirements:	85 VA-(max 75 W)
	.7 Amps
Grounding Requirements:	12 AWG copper wire

External Paging

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

Door Box/External Paging Contacts

Contact Configuration:	Normally open
Relay Contact:	250 mA @ 24 VDC

Alarm Sensors

Loop Resistance:	Less than 100 ohms

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 Auxillary PCB.

FCC Registration Information

Model:	Portrait 824
Manufacturer:	Nitsuko America
Load Number (DOC):	N/A
FCC Part 15 Registration:	Class A
Sample FCC Registration Number:	1ZDTHA-12345-MF-E

(Refer to the label on the Main Cabinet for the FCC Registration Number.)

Reg. Status	MTS/WATS Interfaces	Mfrs. Port Identifier	Ringer Eq. Number	SOC	Network Jacks
Original	02LS2	NX7NA-408M-A NX7E-208M	0.6B	9.0F	RJ11C

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 and Door Boxes must be a dedicated, isolated cable pair.

Device	Cable Type	Cable Run Length (ft)	Notes
Key Telephone	2-pair twisted 24 AWG	1000	
Single Line Telephone	2-wire 24 AWG	3,700	at constant 20 mA
Door Box	2-wire 24 AWG	500	

SPECIFICATIONS

Mechanical Specifications				
Type of Equipment	**Width**	**Depth**	**Height**	**Weight**
Equipment Cabinet	19"	13"	4 1/2"	11 lbs *
(* Base unit with only CPU card installed)				
22-Button Display Telephone	6 11/16"	8 11/16"	3 7/16"	1 lb 12 1/2 oz
22-Button Standard Telephone	6 11/16"	8 11/16"	3 7/16"	1 lb 10 1/2 oz
16-Button Standard Telephone	6 11/16"	8 11/16"	3 7/16"	1 lb 10 1/2 oz
24-Button DSS Console	2 1/2"	8 11/16"	2 1/2"	1/2 lb
Door Box	5.28"	4"	1.4"	1/2 lb

Station Equipment

Description	Part Number
22-Button Display Telephone (Gray)	82473
22-Button Display Telephone (White)	82473W
22-Button Standard Telephone (Gray)	82470
22-Button Standard Telephone (White)	82470W
22-Button Standard Handsfree Telephone (Gray)	82471
22-Button Standard Handsfree Telephone (White)	82471W
16-Button Standard Telephone (Gray)	82460
16-Button Standard Telephone (White)	82460W
ST4 Single Line Telephone (White)	85403W
ST4 Single Line Telephone (Black)	85403B
DSS Console (Gray)	82456
DSS Console (White)	82456W
Wall Mount Kit (Gray)	82479
Wall Mount Kit (White)	82479W
Analog Telephones (customer provided)	

Peripheral Station Equipment

Description	Part Number
Door Box	92245

Common Equipment

Description	Part Number
Cabinet (Includes CPU Central Processing Unit)	82400
Cabinet (Includes CPU Central Processing Unit) with Voice Mail	82400A

PCBs

Description	Part Number
CPU Central Processing Unit	Included in 82400
2CO/8STA PCB	82402
2CO/8STA PCB with Voice Mail	82402A
4 PF XFER PCB	82415
Auxiliary PCB	82410
Caller ID PCB	82425
Caller ID/SMDR PCB	82421
Ring Generator PCB	82405
SMDR PCB	82420

PARTS

Replacement Parts	
Description	**Part Number**
Handset (Gray)	82496
Handset (White)	82496W
Handset and Cord Assembly (Gray)	82495
Handset and Cord Assembly (White)	82495W
Handset Coil Cord - 6' (Gray)	82475-6
Handset Coil Cord - 9' (Gray)	82475-9
Handset Coil Cord - 13' (Gray)	82475-13
Handset Coil Cord - 6' (White)	82475-6W
Handset Coil Cord - 9' (White)	82475-9W
Handset Coil Cord - 13' (White)	82475-13W
Line Cord - 7' (Ash)	82476-7
Line Cord - 14' (Ash)	82476-14
Line Cord - 25' (Ash)	82476-25
Line Cord - 7' (White)	82476-7W
Line Cord - 14' (White)	82476-14W
Line Cord - 25' (White)	82476-25W
16-Button Display Telephone Plastic C.O. Cover	82488-6
22-Button Display Telephone Plastic C.O. Cover	82488-12
DSS Console Plastic Cover	82488-SDS
Top Directory Plastic Cover	82488-D
Station # Plastic Cover	92600-EN
16-Button Telephone Paper Insert	82489-6
22-Button Telephone Paper Insert	82489-12
DSS Console Paper Insert	82489-SDS
Top Directory Paper Insert	82489-D
Station # Designation Strip	92605-EN
DDK Connectors, 2 pin (qty: 25)	85993
DDK Connectors, 4 pin (qty: 25)	85995
DDK Installation Cable, 4 wire for extension connection	82490
DDK Installation Cable, 2 wire for trunk connection	82492
DDK Installation Cable, 6" 2 wire for power failure connection	82491

Replacement Parts

Description	Part Number
Flying Directory Attachment	82481
Flying Directory Paper Card & Plastic Holder Assembly	82482
Flying Directory Clear Plastic Holder	82483
Flying Directory Paper Card Insert	82484
Flying Directory Card Assembly (Kit)	82480
Consists of: (1) 82481, (1) 82482	
Bottom Directory Tray Assembly (Card & Holder)	82485
Bottom Directory Clear Plastic Card Holder	82486
Bottom Directory Paper Card	82487
Door Box/Page Ribbon Cable	82492
Ring Generator Cable	82493
SMDR Connector & Cable Assembly	82494
Music on Hold Disable Connector	82411
Wall Mount Hook	82499

PARTS

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