

**SX-50®**  
**DIGITAL PRIVATE AUTOMATIC BRANCH EXCHANGE (DPABX)**

**CONTROL SHEET – PN 9104-091-106-NA**  
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## 1.

## INTRODUCTION

### General

- 1.1 This Section contains an overall description of the SX-50® Digital Private Automatic Branch Exchange (DPABX). The SX-50 DPABX handles analog voice signals (processed digitally) and is compatible with most Private Branch Exchange (PBX) and Central Office (CO) equipment.

### Reason for Reissue

- 1.2 Section 9104-091-100-NA, General Description, has been reissued to include a description of the SUPERSET™ 410 and SUPERSET 420 telephones, the Digital Network Interface Circuit (DNIC) Line Card and the functionality provided by MS55 software.

### Section Overview

- 1.3 This Section is divided into nine Parts as described below:
1. **Introduction:** this part.
  2. **Physical Description:** describes the appearance, dimensions and circuit cards of the SX-50 system.
  3. **System Requirements:** lists the environmental and electrical requirements for system operation.
  4. **System Configuration:** lists the maximum line and trunk configurations for the SX-50 system in tabular form.
  5. **Peripheral Devices:** lists the interfacing capabilities of the SX-50 system.
  6. **Hardware Overview:** describes the system hardware.
  7. **Software Overview:** lists the software layers for system operation.
  8. **Features:** provides a list of the SX-50 system features.
  9. **Maintenance:** lists the automatic maintenance routines.



## 2.

# PHYSICAL DESCRIPTION

### General

2.1 The following items comprise the hardware of the *SX-50* system:

- Cabinet Assembly: Card Frame, Backplate and Cover
- Power Supply,
- Control Card,
- Peripheral Circuit Cards, and
- Attendant Console.

Connections to the customer-provided cross-connect field are made via standard 25-pair cables (customer-provided). The cables enter from the bottom of the Cabinet Assembly and attach to connectors on the front edge of the peripheral cards. The weight of the *SX-50* system (with a full quota of cards and no cables) is 21 kg (46 lb). Refer to Figure 2-1, Overall View of the *SX-50* System.

### Card Frame

2.2 The Card Frame supports all the required cards (the Control Card plus up to 10 peripheral cards) for system operation. The Card Frame is shown in Figure 2-2. The Power Supply unit mounts on the left side of the Card Frame. The dimensions of the Card Frame are shown in Figure 2-3; it weighs 3.25 kg (7.17 lb).

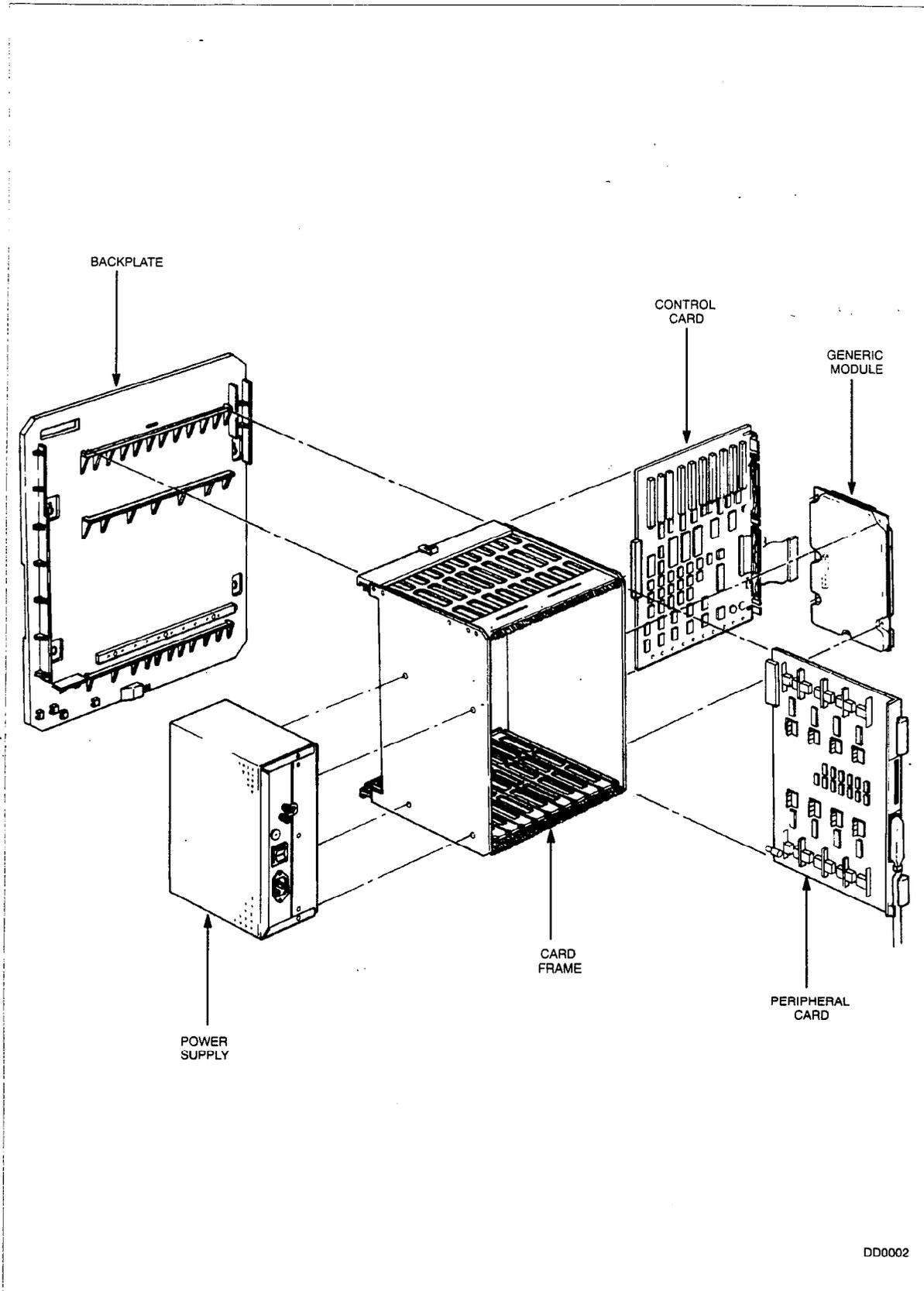
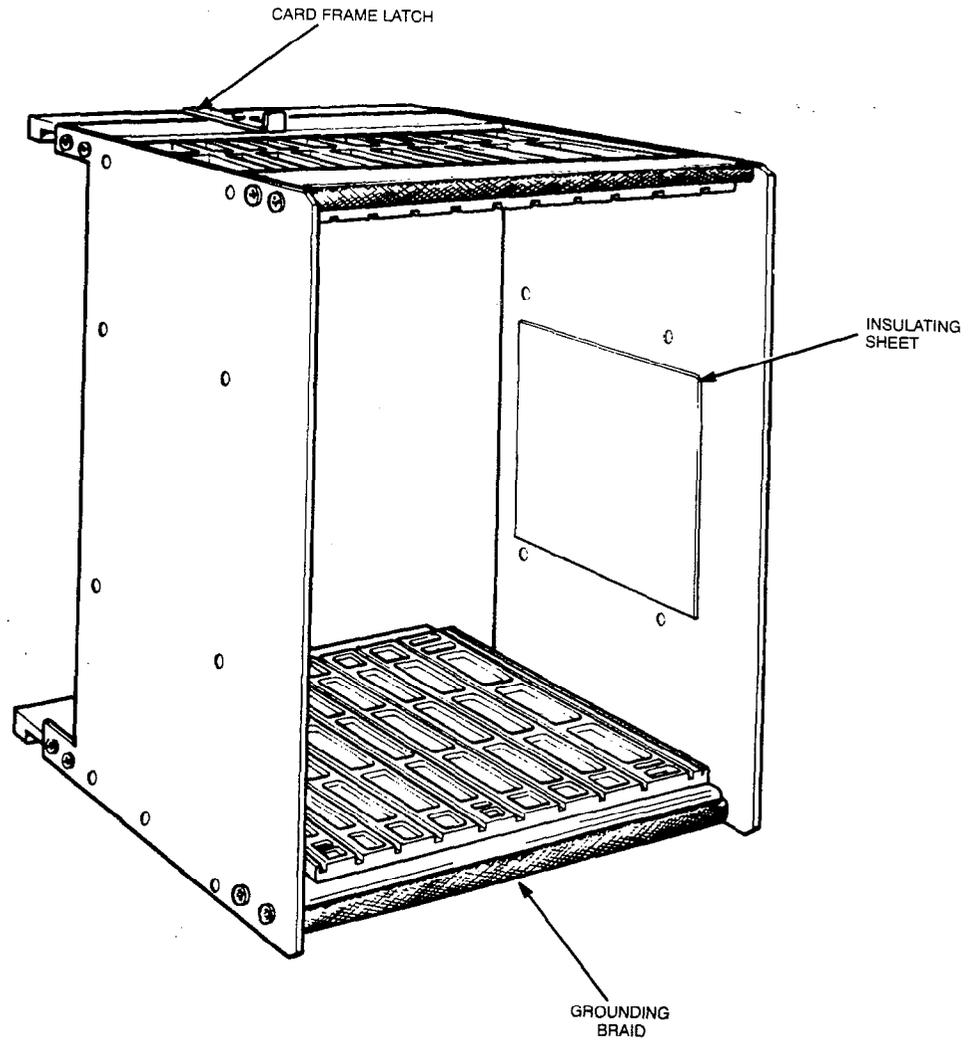
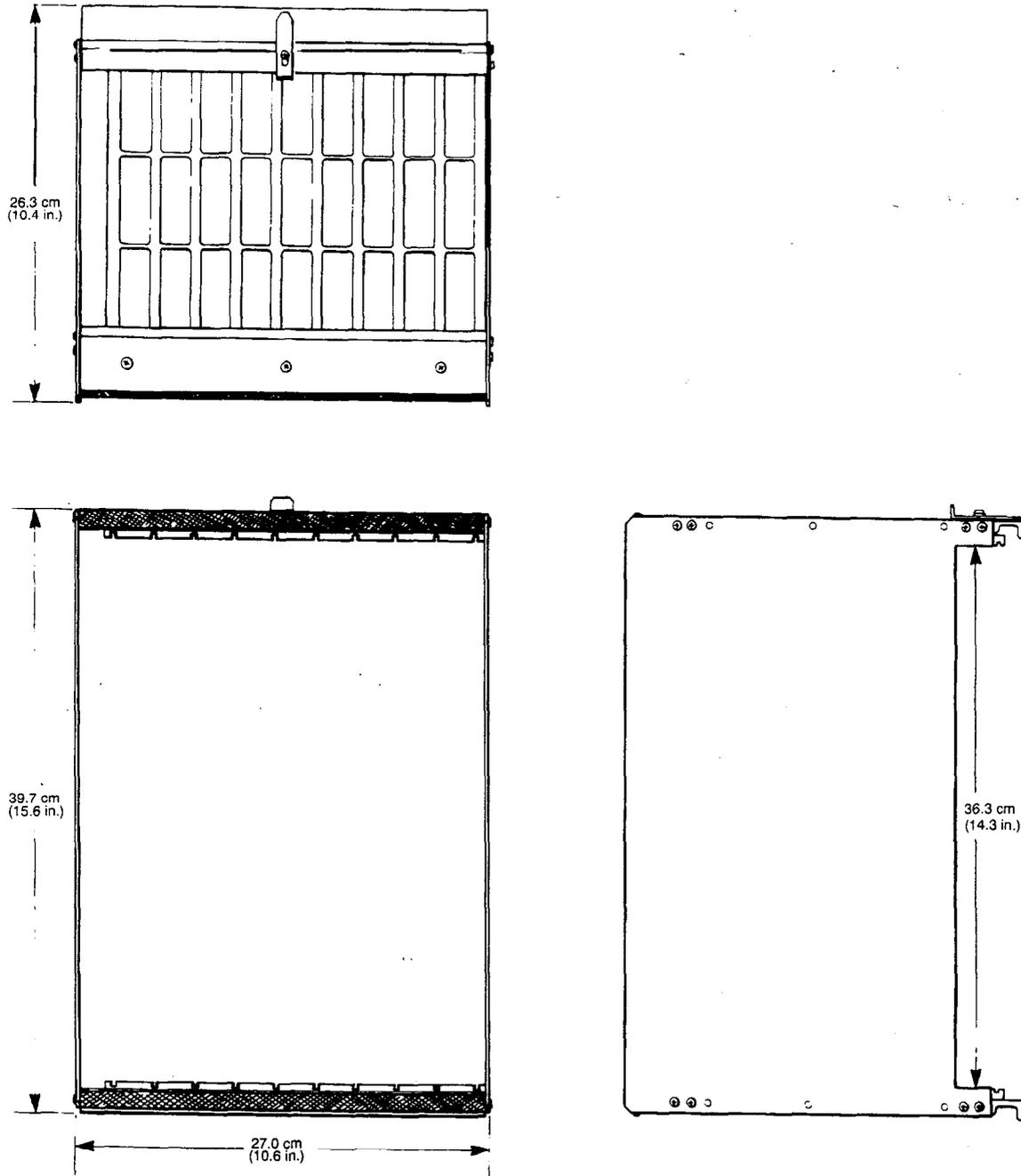


Figure 2-1 Overall View of the SX-50 System



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Figure 2-2 Card Frame



DD0021

Figure 2-3 Card Frame Dimensions

## Backplate

- 2.3 The SX-50 system is wall-mounted using the Backplate provided. The Card Frame hooks onto the upper and lower horizontal Card Frame Guides. The Card Frame Latch secures it to the top of the Card Frame. The Control Card stiffening bar locks with the guide on the Backplate and positions the Control Card for connection to the Power Supply. It also provides support for the Control Card when inserting and extracting the peripheral cards. The Backplate is also equipped with an Energy Dumping Ground (EDG) bar and cable guides. The Backplate weighs 0.97 kg (2.14 lb). Refer to Figure 2-4, Backplate for the dimensions of the Backplate.

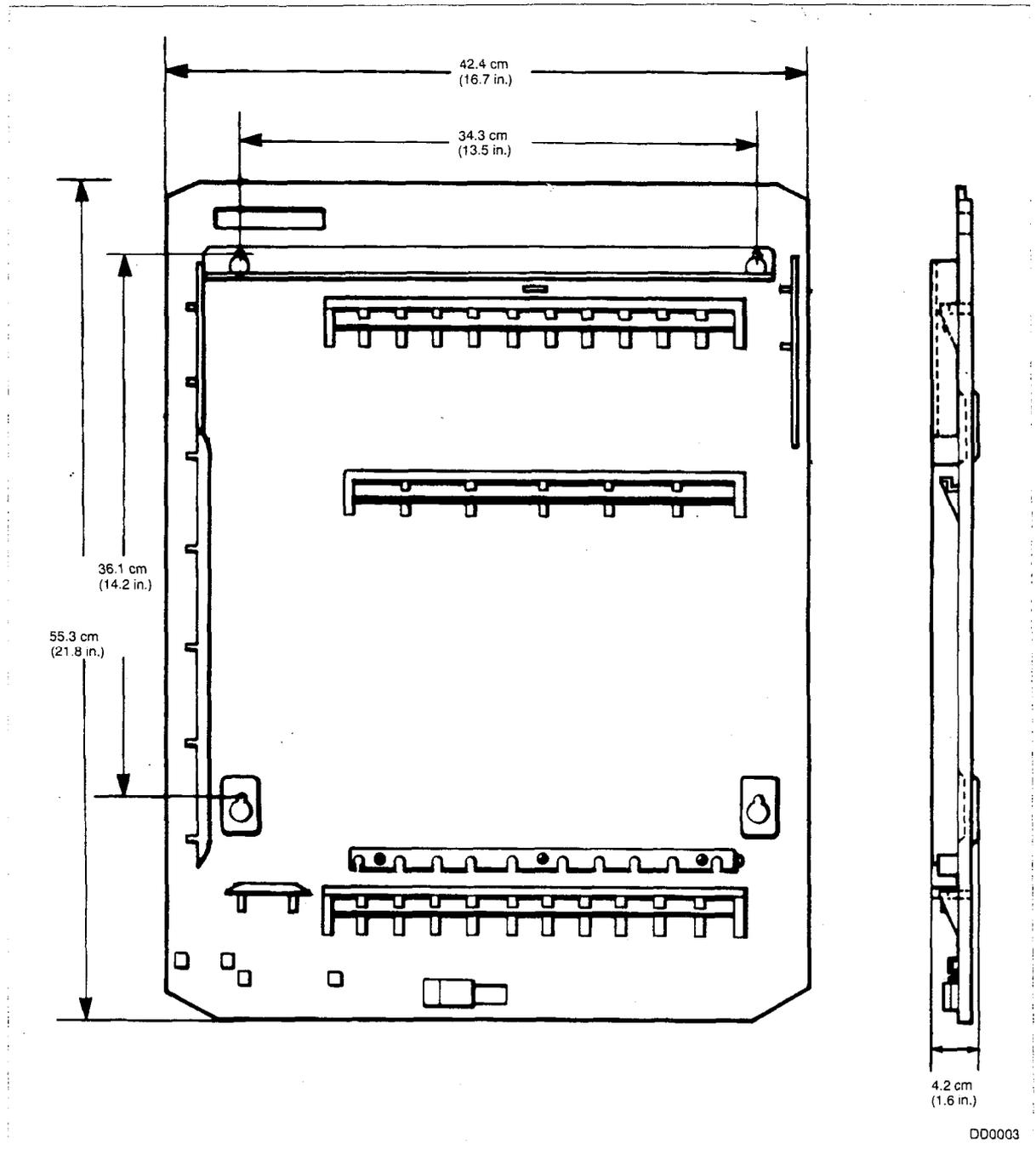


Figure 2-4 Backplate

## Cover

- 2.4 The dimensions of the impact-resistant plastic moulded Cover are shown in Figure 2-5. It weighs 2.94 kg (6.48 lb) and covers and protects the complete SX-50 system. Natural convection cools the system through vents on the top and bottom. An integral keylock prevents unauthorized access.

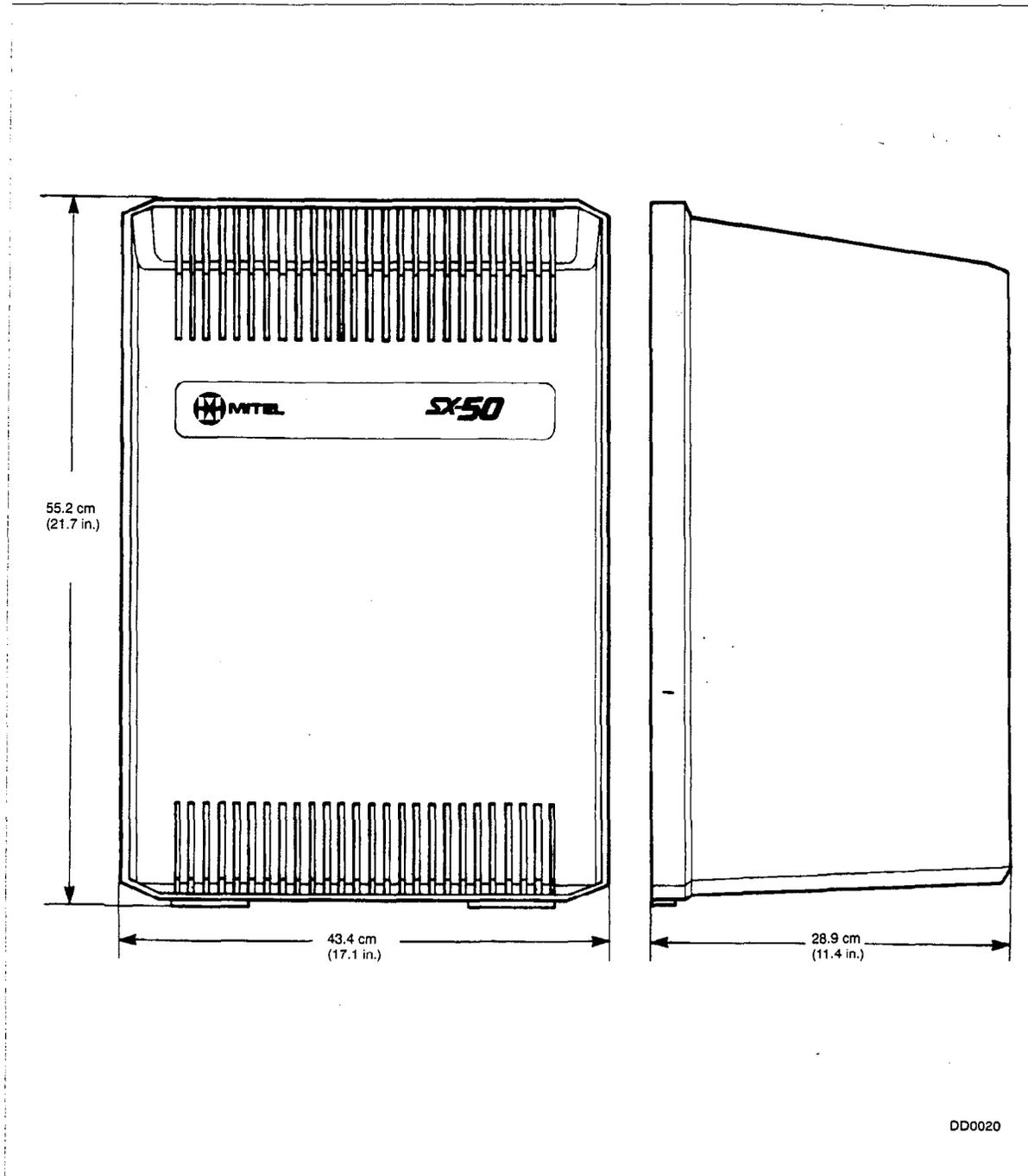


Figure 2-5 Cover

## Power Supply

- 2.5 The Power Supply unit (see Figure 2-6) mounts on the left side of the Card Frame. It is cooled by natural convection. Figure 2-7 shows the dimensions of the Power Supply. The weight of the Power Supply unit is 3.28 kg (7.2 lb). The Power Supply provides system power from a 120 Vac commercial power input. The front panel is equipped with the following: a 3-prong ac power supply input, an ON/OFF switch, a 5 Amp slow-blow fuse, and two studs. The studs are labeled as **SIG. GND.** (Signal Ground) and **CHASSIS GND.** (Chassis Ground) and are meant to be linked together at all times. There are six power rail output fuses in a recess on the left side.

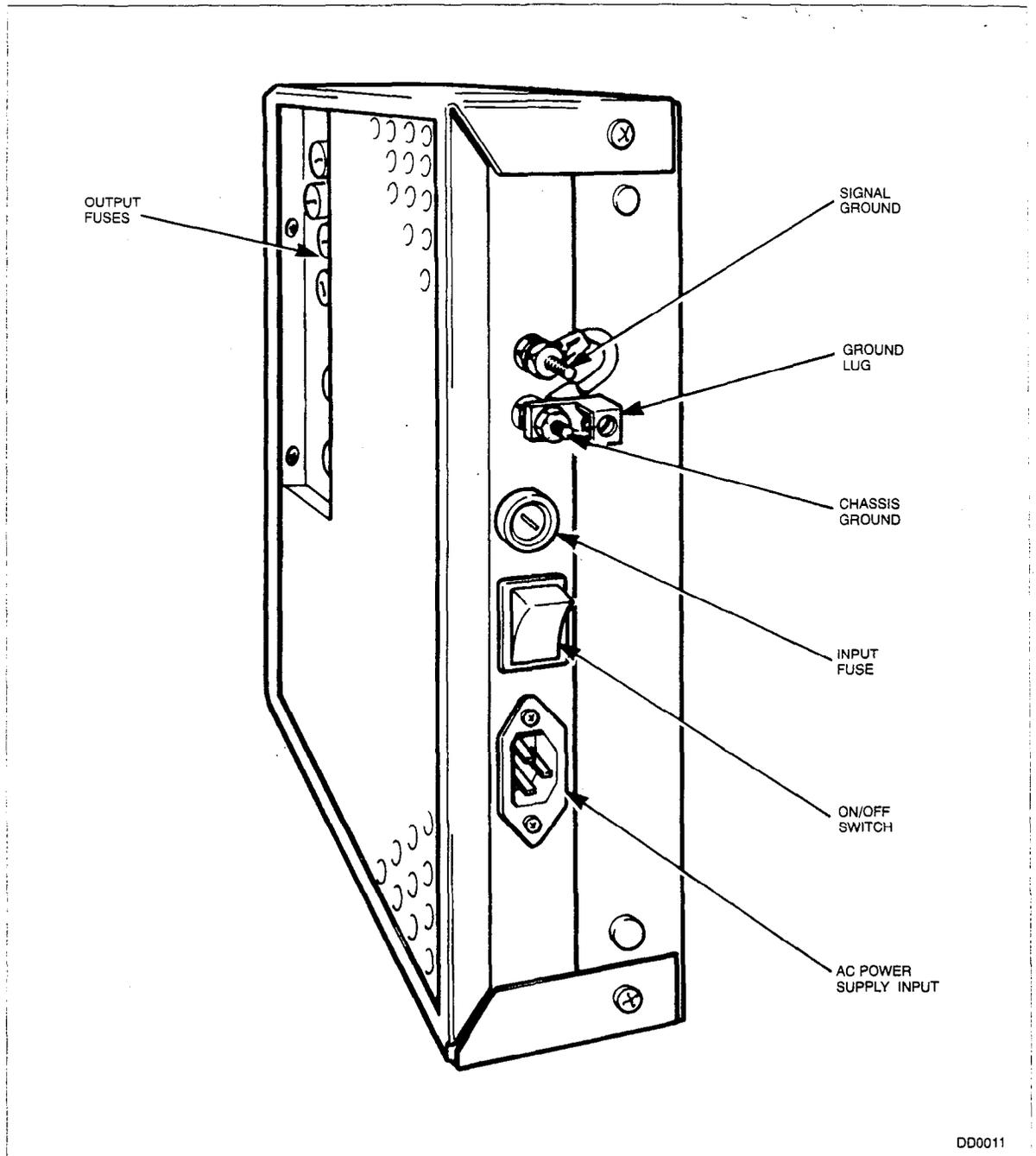
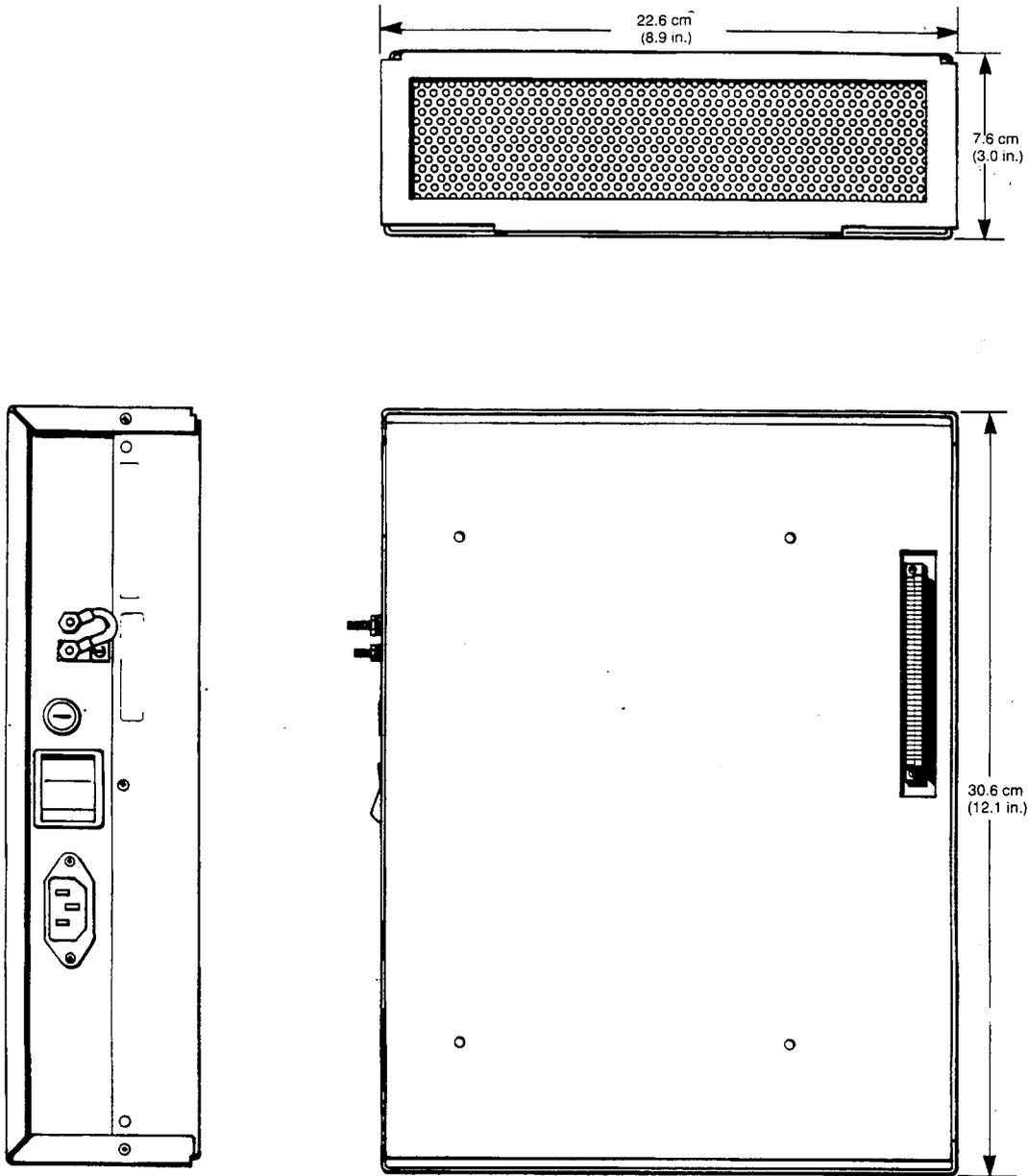


Figure 2-6 Power Supply



DD0004

Figure 2-7 Power Supply Dimensions

## Control Card

2.6 The Control Card slides into the Card Frame from the right side, parallel to the wall. It plugs directly into the Power Supply unit, forming a backplane for the peripheral cards. It contains the following hardware:

- Central Processing Unit (CPU),
- DX switching matrix (switches voice and data),
- Digital Signal Processor (tone generation, tone detection and conference circuits),
- Five DTMF receivers,
- Timing and control circuits,
- Watchdog Timer (monitors processor sanity),
- Memory Module interface,
- Peripheral card interface circuits,
- Attendant Console interface,
- RS-232C Interface,
- Night Bell output,
- 7-segment Status display,
- Status Switches.

On the front edge of the Control Card, there are 3 connectors: an RS-232C port, a console port and a Night Bell terminal block. The RS-232C port has a programmable baud rate and can be used for a printer or a recording device.

The Control Card also provides a master reset switch and a 7-segment LED status display. (Refer to Section 9104-091-350-NA, Troubleshooting Procedures and General Maintenance Information). Figure 2-10 gives the dimensions of the Control Card.

The peripheral cards can be extracted from their 64-pin DIN connectors sufficiently to allow removal and replacement of the Control Card without removing the cables.

This frees up a card slot for other cards.

## Control Card 2 (MCC2)

2.7 The Control Card 2 (MCC2) provides the same functions as the original Control Card, as well as the following:

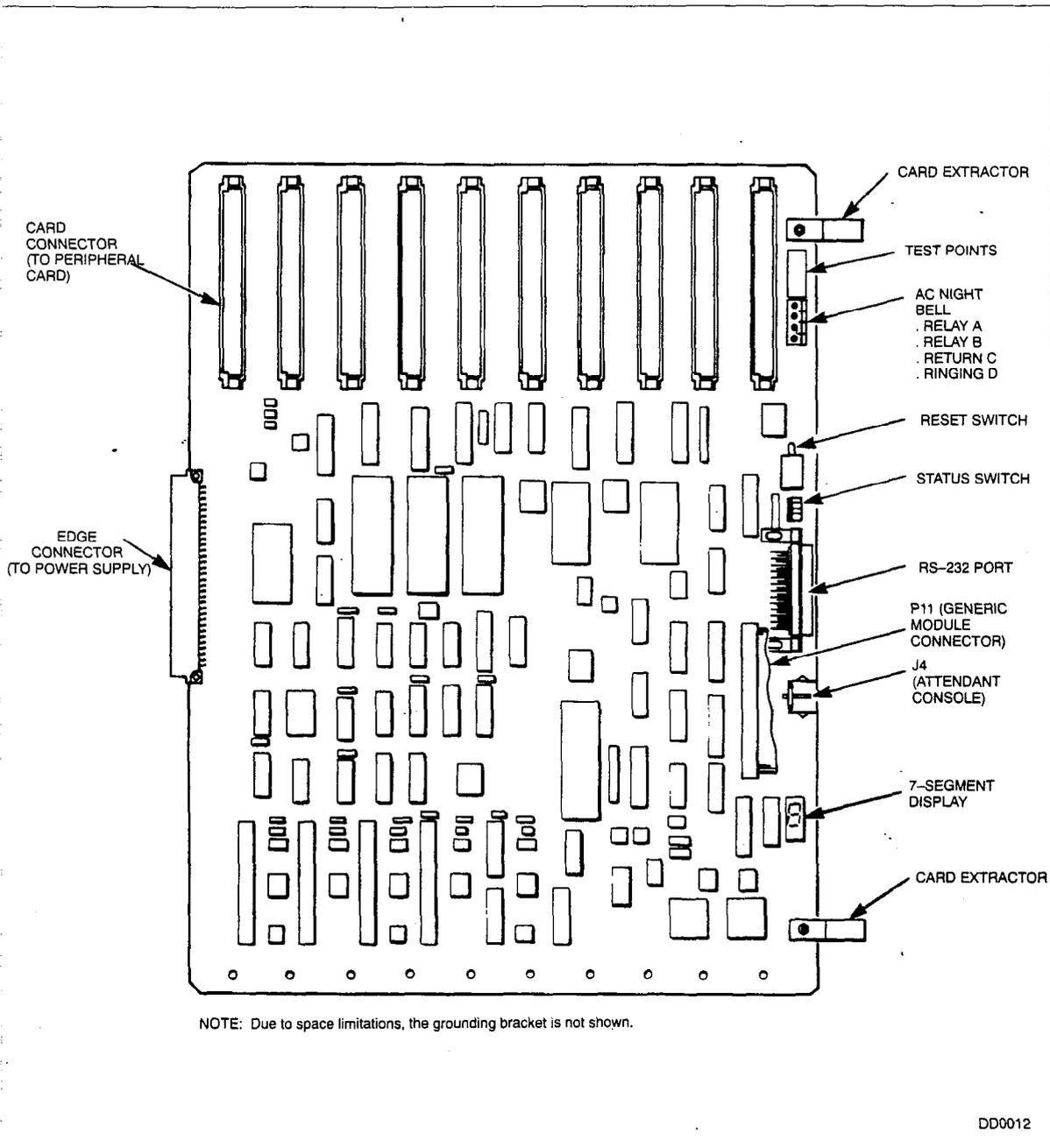
- Circuitry to provide Music on Hold and Paging, including an audio filter/amplitude limiter, analog to digital converter, paging pre-amplifier, and paging control relay.
- Circuitry to allow the card to be identified in software (post MS50).

## General Description

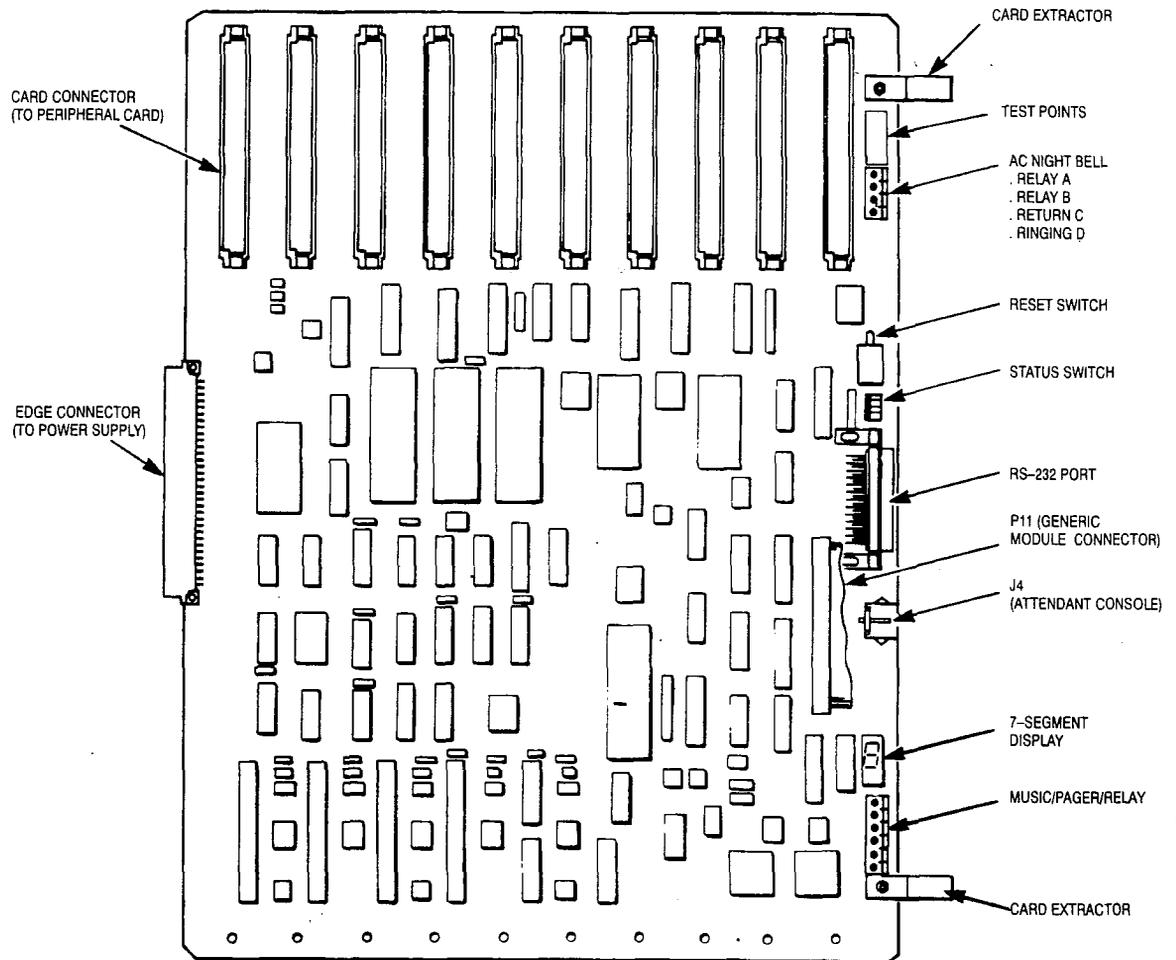
The Control Card 2 (MCC2) has a six-pin connector, similar to the Night Bell connector, on the right-hand side of the card. The Music/Pager/Relay connector allows external music and paging equipment to be connected directly to the SX-50 DPABX. Pinouts for the connector are as follows:

- Pin 6 (closest to the 7-segment display) and Pin 5 connect to a relay contact;
- Pins 4 and 3 connect to an external paging amplifier;
- Pin 2 and Pin 1 (closest to J4) connect to a music source.

Refer to Figure 2-9, Control Card 2 (MCC2) and Figure 2-10, Control Card Dimensions.



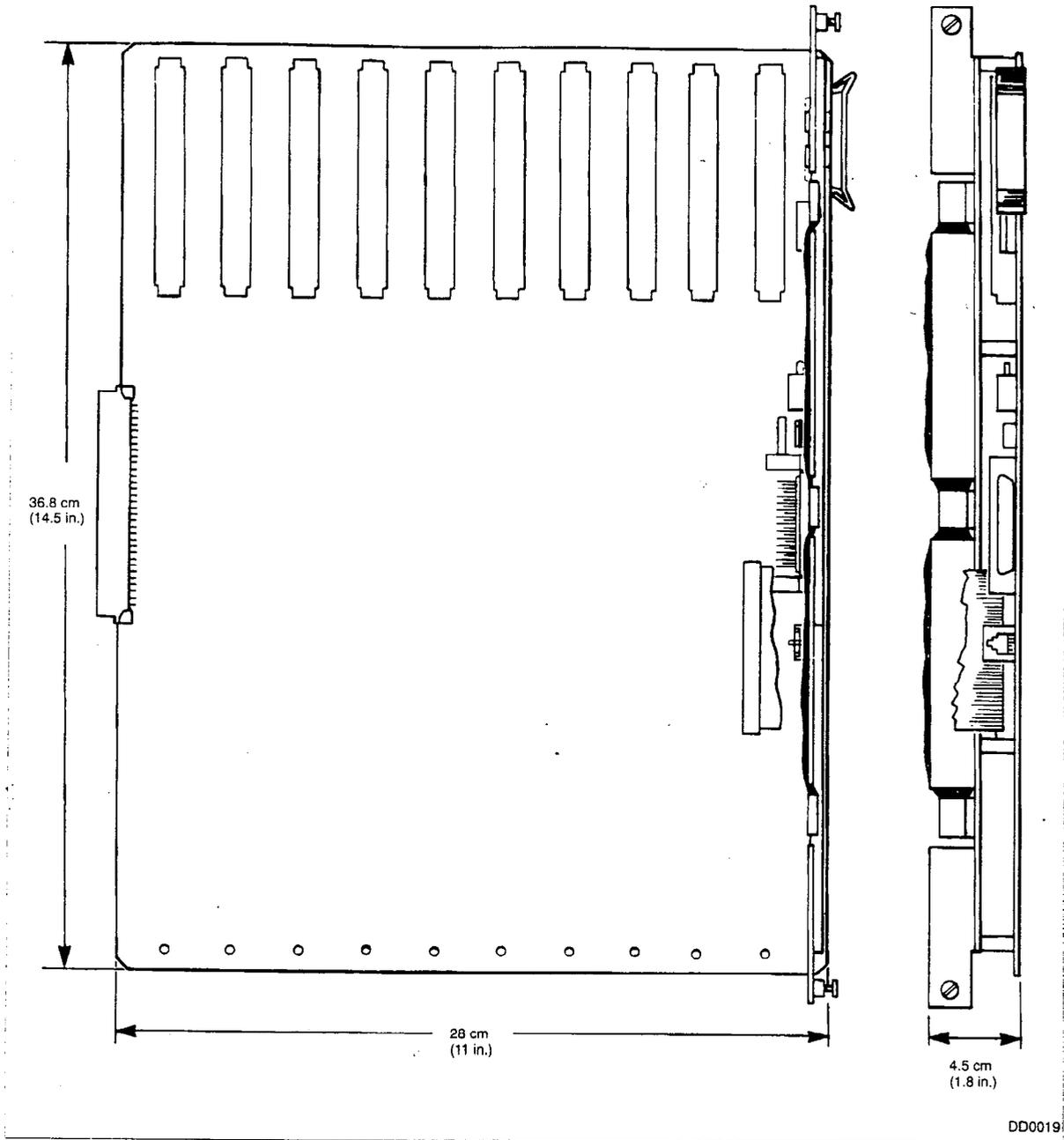
**Figure 2-8 Control Card**



NOTE: Due to space limitations, the grounding bracket is not shown.

DD0012R1

Figure 2-9 Control Card 2 (MCC2)



**Figure 2-10 Control Card Dimensions**

### Peripheral Circuit Cards

- 2.8 The SX-50 system supports up to 10 peripheral circuit cards. Located on the front edge of the circuit card is a 25-pair connector, LED displays and a plastic handle which facilitates the removal of the card from the Card Frame. A sample peripheral card is shown in Figure 2-10.

Peripheral Circuit cards are installed perpendicular to the wall. They slide into slots in the Card Frame and plug into the Control Card.

There are seven different types of peripheral cards:

- On-Premises Stations (ONS) Line Card,
- Off-Premises Stations (OPS) Line Card,
- Digital Network Interface Circuit (DNIC) Line Card,
- Control Over Voice (COV) Line Card,
- Loop Start/Ground Start (LS/GS) Trunk Card,
- Universal Card, and
- Direct Inward Dial (DID) Trunk Card.

Refer to Table 2-1, Card and Module Types, for the dimensions and weight of each card.

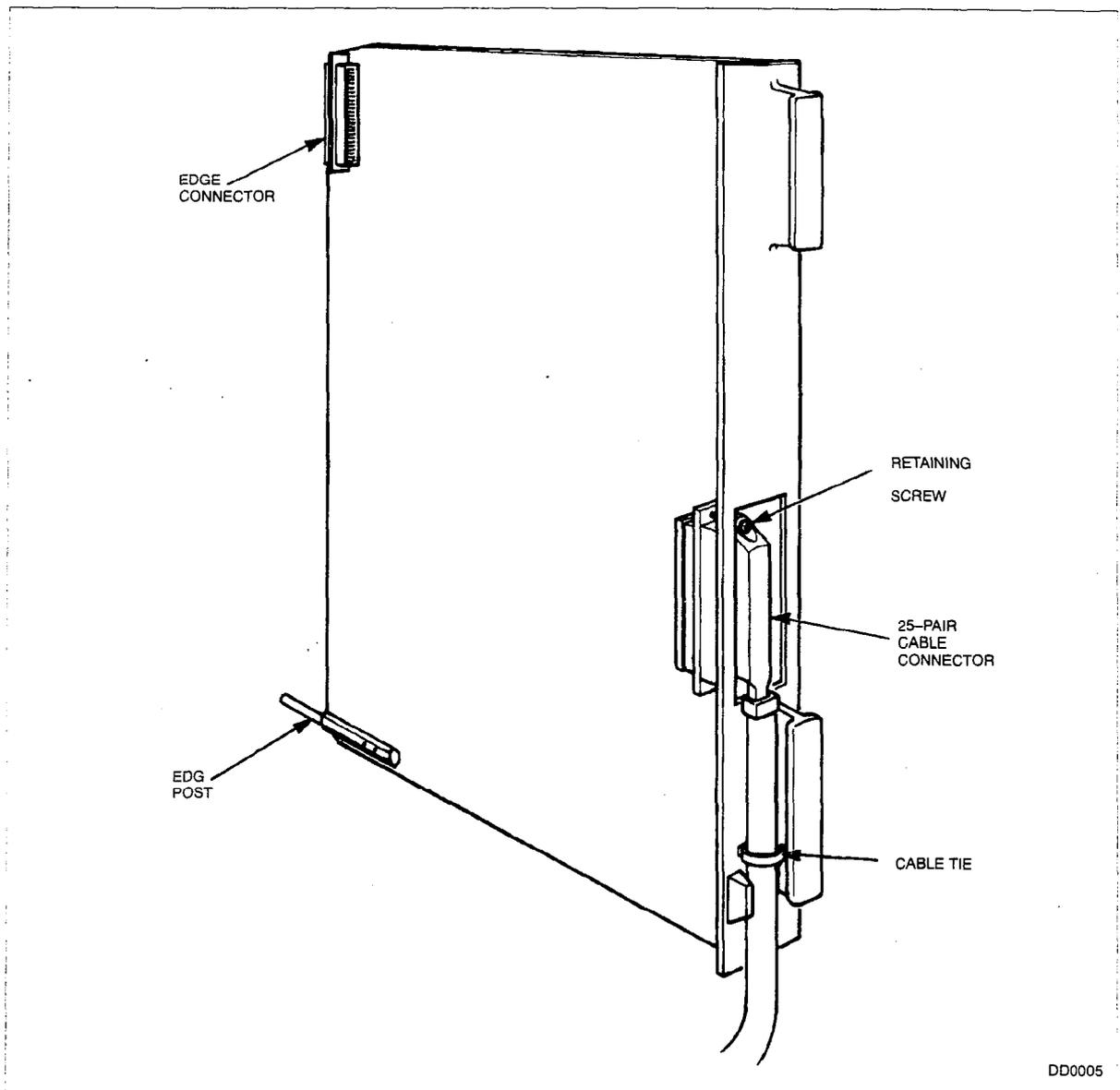
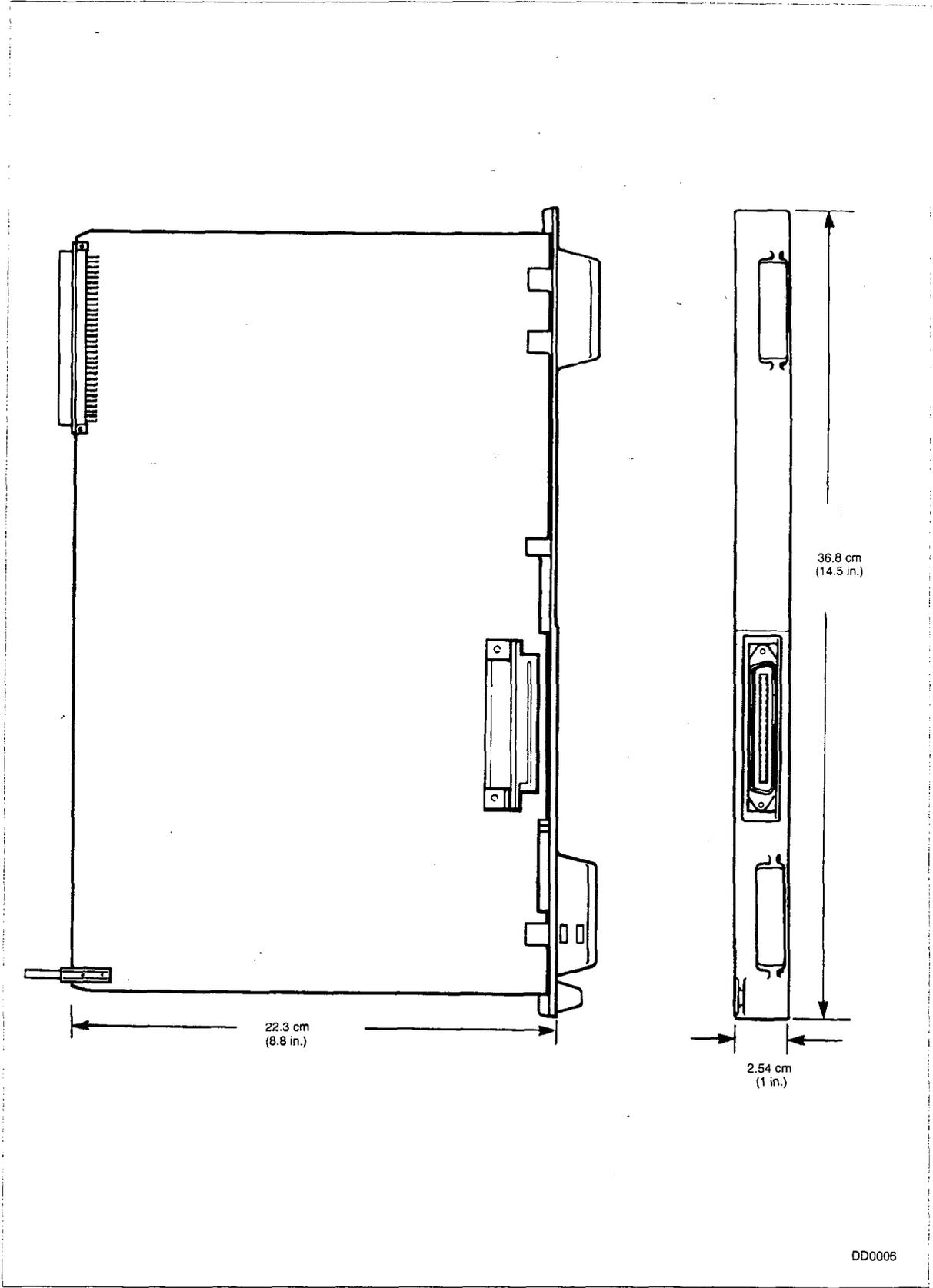


Figure 2-11 Peripheral Circuit Card

**Table 2-1 Card and Module Types**

<b>Card/Module Type</b>	<b>Dimensions</b>	<b>Weight</b>
Control Card/Control Card 2	28 cm X 40 cm (11 in. X 15.7 in.)	1.0 kg (2.2 lb)
Generic Module	22.9 cm X 14.6 cm (9 in. X 5.75 in.)	0.37 kg (1 lb)
ONS Line Card	22.3 cm X 36.8 cm (8.8 in. X 14.5 in.)	0.75 kg (1.65 lb)
OPS Line Card	22.3 cm X 36.8 cm (8.8 in. X 14.5 in.)	0.75 kg (1.65 lb)
DNIC Line Card	22.3 cm X 36.8 cm (8.8 in. X 14.5 in.)	0.75 kg (1.65 lb)
COV Line Card	22.3 cm X 36.8 cm (8.8 in. X 14.5 in.)	0.75 kg (1.65 lb)
LS/GS Trunk Card	22.3 cm X 36.8 cm (8.8 in. X 14.5 in.)	0.75 kg (1.65 lb)
DID Trunk Card	22.3 cm X 36.8 cm (8.8 in. X 14.5 in.)	0.75 kg (1.65 lb)
Universal Card	22.3 cm X 36.8 cm (8.8 in. X 14.5 in.)	0.75 kg (1.32 lb)
Music on Hold/Pager Module	8.3 cm X 14.5 cm (3.25 in. X 5.7 in.)	0.17 kg (0.37 lb)
E&M Trunk Module	8.3 cm X 14.5 cm (3.25 in. X 5.7 in.)	0.17 kg (0.37 lb)
RMATS Module	8.3 cm X 14.5 cm (3.25 in. X 5.7 in.)	0.17 kg (0.37 lb)



DD0006

Figure 2-12 Peripheral Card Dimensions

## **ONS Line Card**

- 2.9 The ONS Line Card interfaces standard rotary and DTMF telephone sets in the same building to the DPABX. There are two configurations of the ONS Line Card: eight stations or 16 stations.

Each ONS Line Card is equipped with a front edge 25-pair Connector which connects the cable to the MDF. Other major components include:

- Line Interface circuitry,
- Line protection circuits,
- Line status LEDs (one per line),
- Card status LED.

Each line circuit provides the following facilities:

- 2-wire/4-wire conversion,
- Analog-to-Digital/Digital-to-Analog conversion (^E Law),
- Line circuit status monitoring,
- Switchhook flash detection,
- DC Loop supervision and pulse-dial digit collection and
- Signaling (ringing, message waiting).

## **OPS Line Card**

- 2.10 The OPS Line Card interfaces standard rotary dial or DTMF telephone sets to the DPABX. The line circuits incorporate protective circuitry to permit connection to sets via wiring that goes outside the building housing the DPABX. Only loop resistance (maximum 1800 ohms) limits the distance possible between the SX-50 system and the telephone set.

There are two configurations of the OPS Line Card: 4 stations or 8 stations.

Each OPS Line Card is equipped with a front edge 25-pair Connector which connects the cable to the MDF. Other major components include:

- Line Interface circuitry,
- Line protection circuits,
- Line status LEDs (one per line),
- Card status LED.

Each line circuit provides the following facilities:

- Line protection circuitry,
- 2-wire/4-wire conversion,

- Analog-to-Digital/Digital-to-Analog conversion (^E Law),
- Line circuit status monitoring,
- Switchhook flash detection,
- DC Loop supervision and pulse-dial digit collection,
- Software-selectable balance networks for long or short loops, and
- Signaling (ringing, message waiting).

### **DNIC Line Card**

- 2.11 The Digital Network Interface Circuit (DNIC) Line Card supports a maximum of eight *SUPERSET 410* telephones or *SUPERSET 420* telephones.

Each DNIC Line Card is equipped with a front edge, 25-pair connector for the cable to the MDF. Other major components include:

- DNIC Line Interface circuitry,
- Line protection circuits,
- Line status LEDs (one per line),
- Card status LED.

Each line circuit provides the following facility:

- Battery feed to power the telephones.

### **COV Line Card**

- 2.12 The COV Line Card supports a maximum of 8 *SUPERSET 3* or *SUPERSET 4* telephones.

Each COV Line Card is equipped with a front edge 25-pair Connector for the cable to the MDF. Other major components include:

- *SUPERSET* Line Interface circuitry,
- UART,
- Modem,
- Line protection circuits,
- Line status LEDs (one per line),
- Card status LED.

Each line circuit provides the following facilities:

- Amplitude Shift Keyed communication with *SUPERSET 3* or *SUPERSET 4* telephones,

- Analog-to-Digital and Digital-to-Analog conversion (^E Law),
- Battery Feed to power the sets.

### **LS/GS Trunk Card**

2.13 The LS/GS Trunk Card is available with four trunk circuits or eight trunk circuits per card. Each trunk circuit provides access to a central office loop start or ground start trunk.

Each LS/GS Trunk Card is equipped with a front edge 25-pair Connector which connects the cable to the MDF. Other major components include:

- Trunk Interface circuitry,
- Line protection circuits,
- Line status LEDs (one per line),
- Card status LED.

Each trunk circuit provides the following facilities:

- Loop Start or Ground Start (software-selectable),
- Balance Network of 600 ohms or complex impedance (software-selectable),
- Tip ground detection,
- Ring Ground
- Ringing voltage detection,
- 2-wire/4-wire conversion,
- Analog-to-Digital and Digital-to-Analog conversion (^E Law),
- Forward and reverse loop current detection,
- Software-controlled outpulsing,
- Two Power Fail Transfer (PFT) circuits per card.

### **Direct Inward Dial (DID) Trunk Card**

2.14 The DID Trunk Card is available with four trunk circuits or eight trunk circuits per card. Each trunk circuit provides access to a central office DID trunk.

Each DID Trunk Card is equipped with a front edge 25-pair Connector which connects the cable to the MDF. Other major components include:

- Trunk Interface circuitry,
- Line protection circuits,
- Line status LEDs (one per line),
- Card status LED.

Each trunk circuit provides the following facilities:

- Balance Network of 600 ohms or complex impedance (software-selectable),
- Ring Ground,
- 2-wire/4-wire conversion,
- Analog-to-Digital and Digital-to-Analog conversion (^E Law),
- Forward and reverse loop current detection.

## Universal Card

2.15 The Universal Card supports a variety of peripheral functions; it is configured by attaching modules. These modules contain the circuits for E&M Trunks and RMATS. If the Control Card 2 (MCC2) is not installed, a Music on Hold/Pager module is also supported by the Universal Card. The Universal Card is equipped with a front edge 25-pair Connector for the cable to the MDF.

Each module has two vertical 32-pin female DIN connectors which mate to male connectors on the Universal Card.

Each Universal Card provides the following facilities:

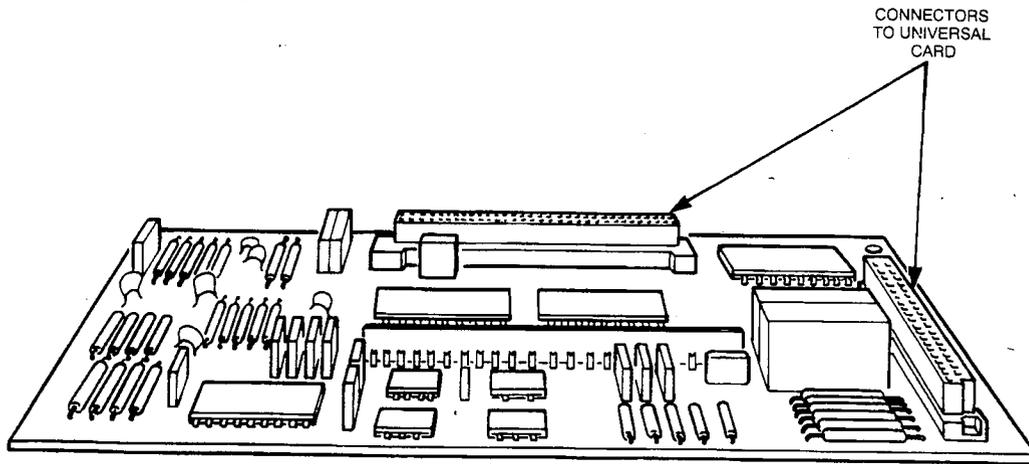
- Four module positions,
- Module activity LEDs (one per module),
- Card status LED.

## E&M Trunk Module

2.16 The E&M Trunk Module plugs into the Universal Card. It provides interface to Types 1 or 5 E&M Trunks. Refer to Figure 2-13, E&M Trunk Module and Figure 2-14, E&M Trunk Module Dimensions.

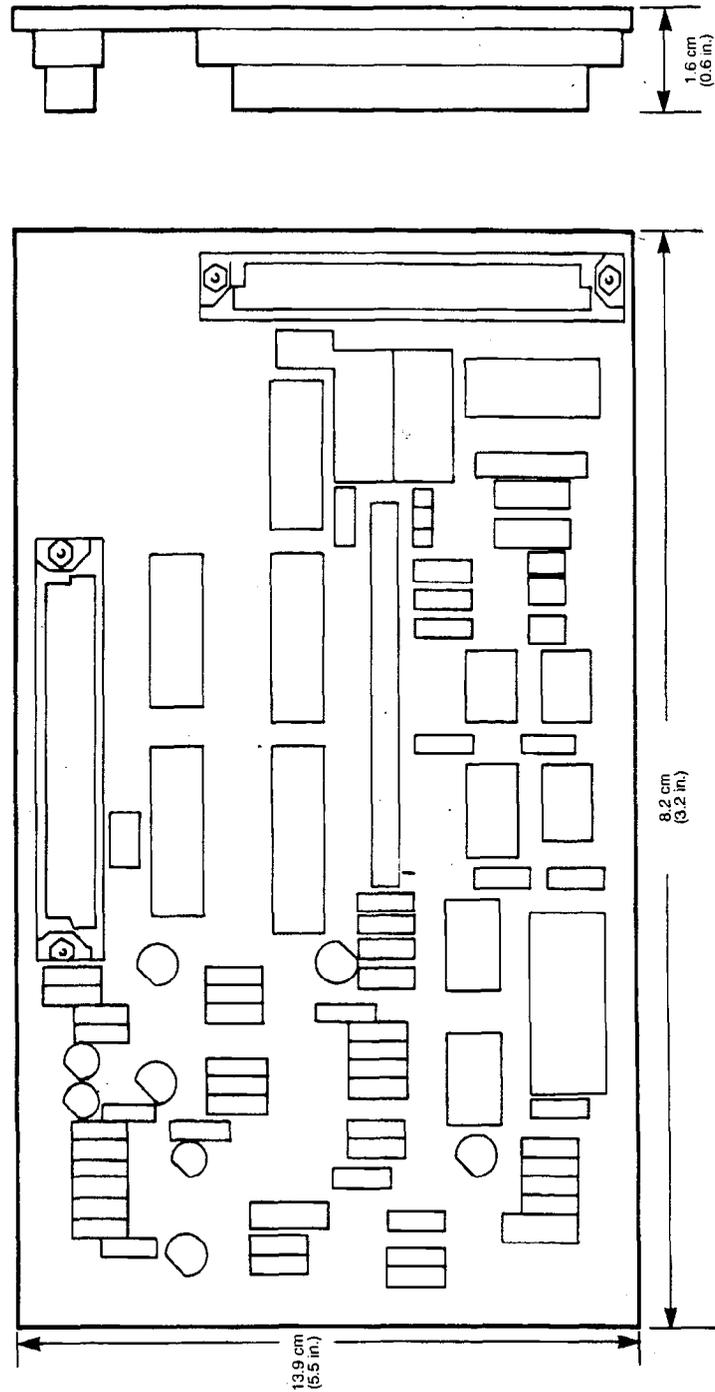
The E&M Trunk Module provides the following facilities:

- Type 1 or Type 5 signaling,
- Gain/loss plan for normal (Central Office) or satellite (PBX-to-PBX) trunks,
- 600 Ohm or Complex termination,
- 2-wire or 4-wire transmission,
- Analog-to-Digital and Digital-to-Analog conversion (^E Law),
- 4 Kbyte EPROM.



DD0013

**Figure 2-13 E&M Trunk Module**



DD0018

Figure 2-14 E&M Trunk Module Dimensions

## Music on Hold/Pager Module

2.17 The Music on Hold (MOH)/Pager Module plugs into the Universal Card. It provides the input for music on hold, a paging output and a relay switch to an external paging amplifier. Refer to Figure 2–15, Music on Hold/Pager Module and Figure 2–16, Music on Hold/Pager Module Dimensions.

The major components of the MOH/Pager Module include:

- Audio filter/amplitude limiter,
- Analog to Digital converter,
- Paging pre–amplifier,
- Paging control relay,
- 4 Kbyte EPROM.

The music input is isolated by a transformer and has an impedance of 150 ohms. The input signal should be between 50 and 200 mVrms. High frequencies are attenuated and amplitude limiting is applied when the signal exceeds 200 mVrms, as required by FCC Part 68 regulations.

The paging output is isolated by a transformer and has an impedance of less than 200 ohms. The output level feeds into a 600 ohm load and is typically –6 dBm.

The control relay contacts are rated as follows:

- maximum switching voltage –90 Vrms
- maximum carrying current –0.4 Amps.

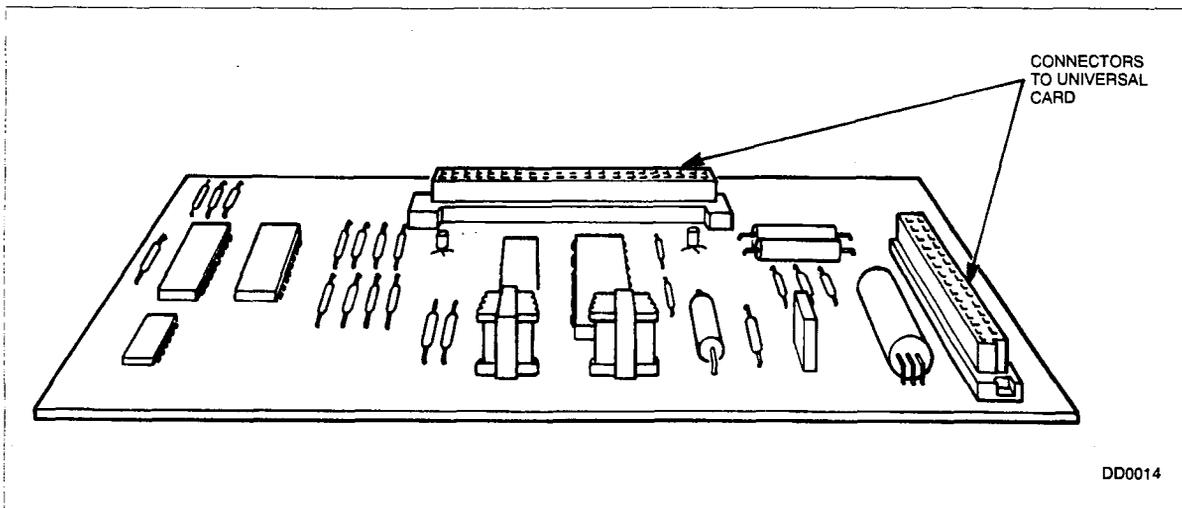
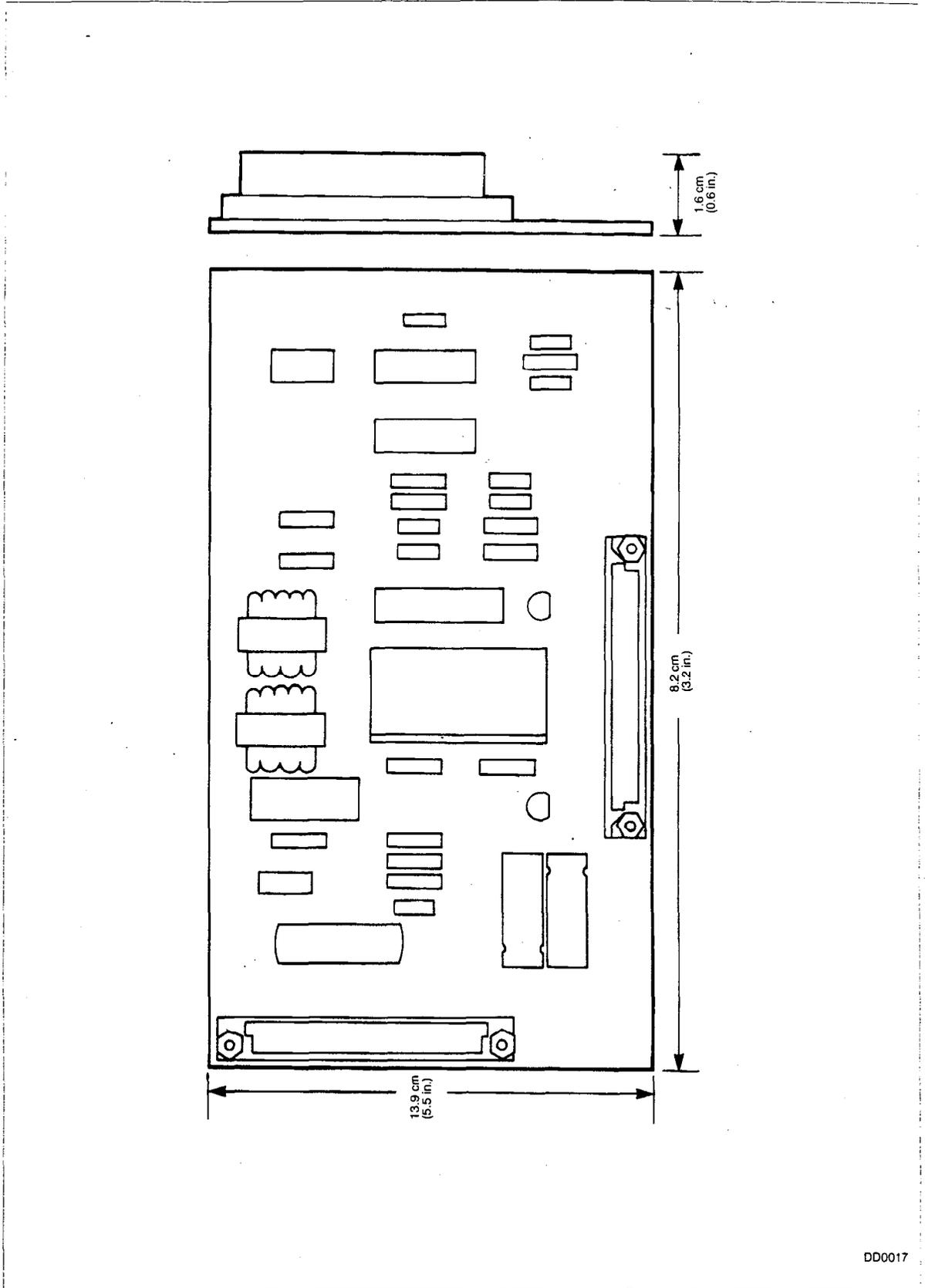


Figure 2–15 Music On Hold/Pager Module



DD0017

Figure 2-16 Music On Hold/Pager Module Dimensions

## RMATS Module

2.18 The Remote Maintenance and Test System (RMATS) Module is a modem which allows maintenance terminal access from the following:

- a station,
- a Direct-In Line,
- a DISA Trunk,
- an incoming CO trunk via the Attendant Console, or
- Flexible Night Service.

The RMATS Module is compatible with Bell 103 or CCITT V.21 standards and has the following data transfer characteristics:

- Data Rate – 300 Baud,
- Mode – Full Duplex,
- Parity – Even,
- Stop Bits – 2 bits,
- Number of Data Bits – 7 bits.

The major components of the RMATS Module include:

- Frequency Shift Key (FSK) Modem,
- UART,
- Analog-to-Digital/Digital-to-Analog converter,
- 4 kbytes EPROM.

Refer to Figure 2-17, RMATS Module and Figure 2-18, RMATS Module Dimensions.

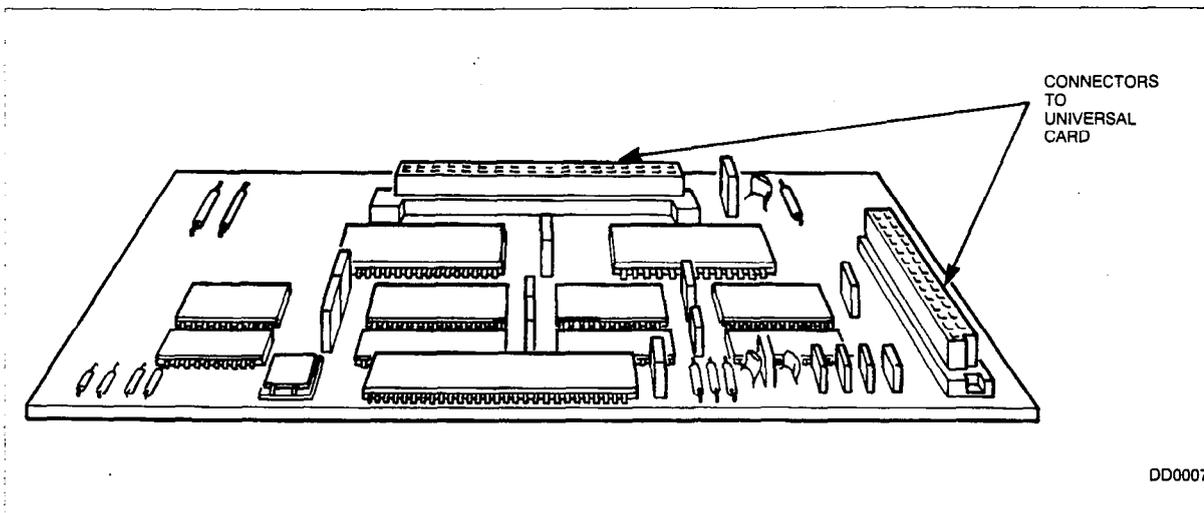


Figure 2-17 RMATS Module

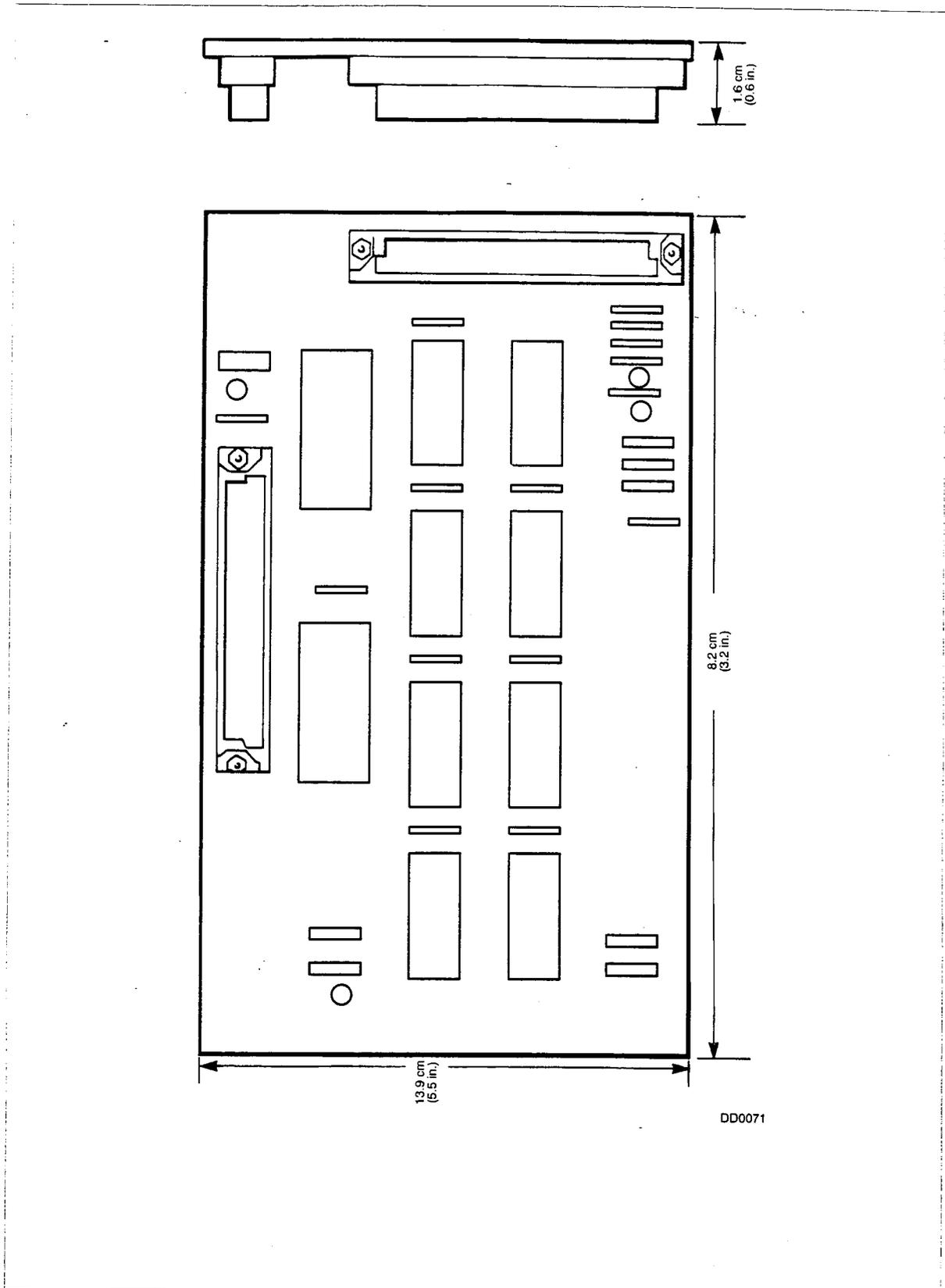


Figure 2-18 RMATS Module Dimensions

## Generic Module

2.19 The Generic Module is located on the right side of the Card Frame and connects to the Control Card via a 50 conductor ribbon cable. The Generic Module contains Erasable Programmable Read Only Memory (EPROM) which stores the system software, non-volatile RAM (NVR) for the customer database and volatile RAM (VR) which stores current call status. The NVR is battery backed by the Lithium Cell for a maximum of 4,500 hours. Refer to Figure 2-19, Generic Module and Figure 2-20, Generic Module Dimensions.

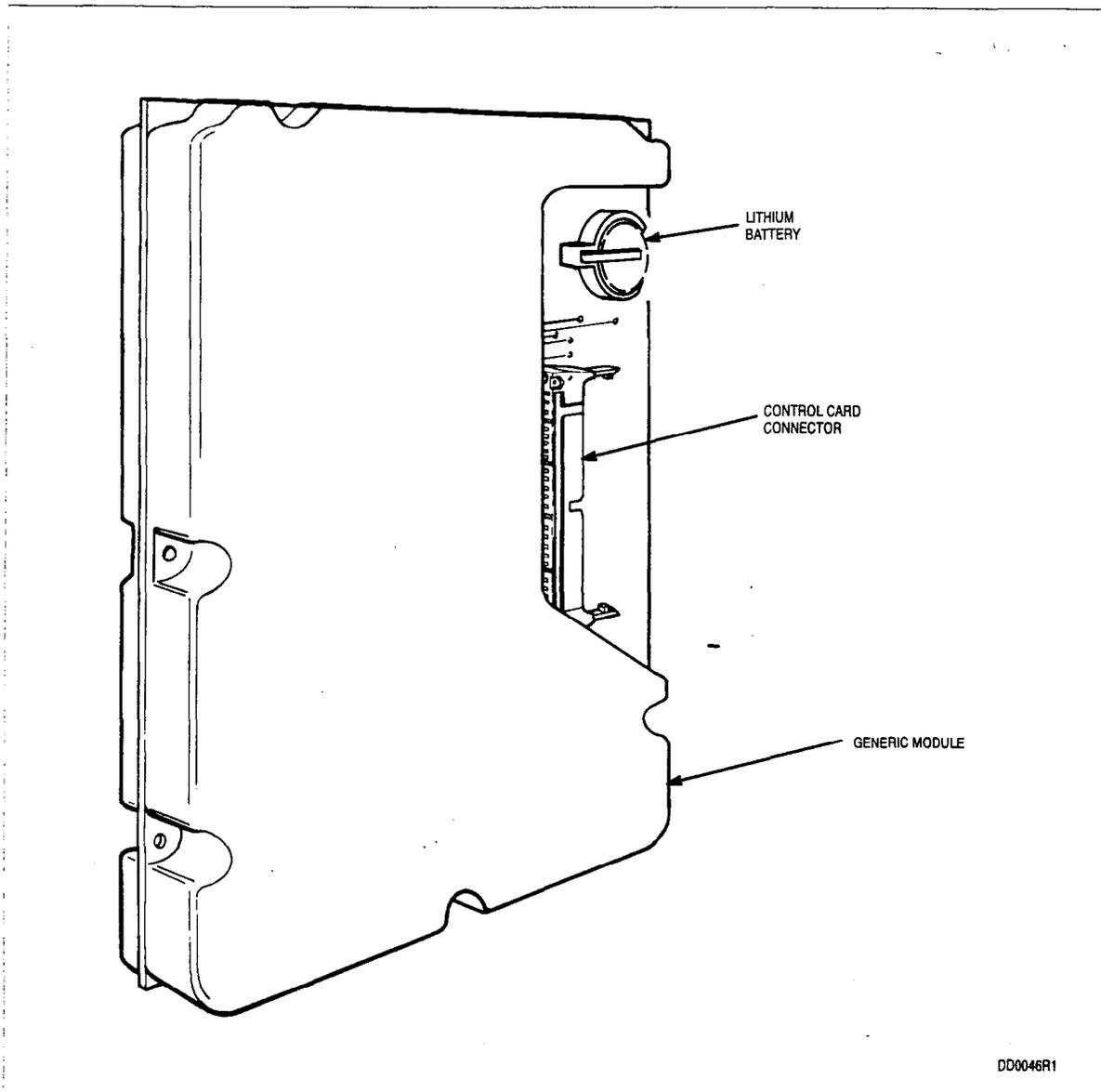
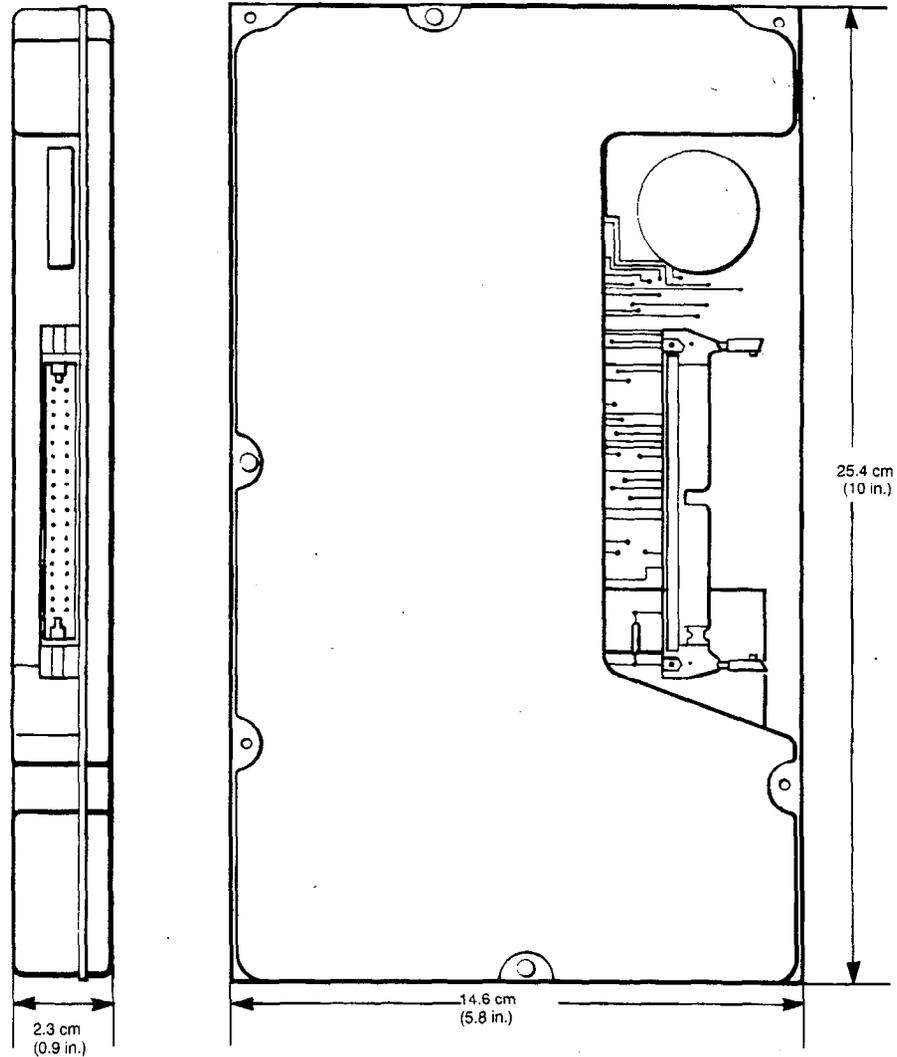


Figure 2-19 Generic Module



DD0016

Figure 2-20 Generic Module Dimensions

## Attendant Console

2.20 Connection to the DPABX is made via a 3-pair cable.

The Attendant Console has a 2 line x 40 column Liquid Crystal Display (LCD) which facilitates call processing and Customer Data Entry (CDE). The LCD guides the attendant by listing the required commands for data entry. Refer to Section 9104-091-210-NA, Customer Data Entry for details. Beneath the LCD is a row of five softkeys; they are not labeled but they perform the functions indicated above them on the LCD. The Attendant Console also has 21 hardkeys (Attendant Keys) arranged in three rows; their designations are printed above the keys. To the right of the Attendant Keys, there is a 4 row x 3 column telephone digital keypad; the keys are marked 0 to 9, ^N and ^O. To the right of these keys there is a fourth column of keys. These are used to adjust the LCD contrast and the bell volume, in conjunction with the STATUS key. The Attendant Console is shown in Figure 2-21.

The handset (or headset) plugs into the left side of the Attendant Console. Two jacks are provided allowing connection of a second handset or headset. At least one hand/headset is required for Day Service operation (the SX-50 system operates in Night Service if the hand/headset is removed; all calls are routed to a Night Inward Dial Intercept Answer Point such as the Night Bells equipment).

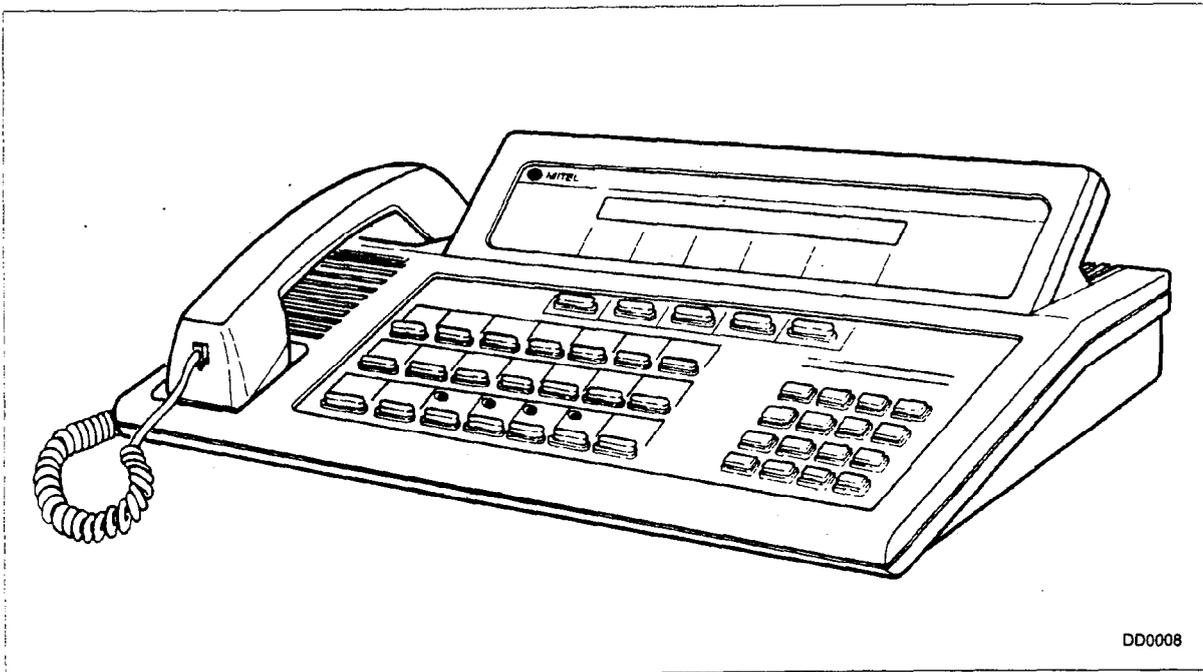


Figure 2-21 Attendant Console

## 3.

## SYSTEM REQUIREMENTS

### General

- 3.1 Table 3-1 and Table 1-1 provide the environmental and electrical requirements for SX-50 system operation. For more information, refer to Section 9104-091-180-NA, Engineering Information.

Table 3-1 Environmental Requirements		
Parameter	Metric	Imperial
Height	58.5 cm	23 in.
Width	43.2 cm	17 in.
Depth	30.5 cm	12 in.
Weight (full quota)	21 kg	46 lb
Operating temperature	0 to 40° C	32 to 104° F
Storage temperature	-40 to 60° C	-40 to 140° F
Relative humidity (noncondensing)	10 to 90%	10 to 90%

Table 3-2 Electrical Requirements	
Parameter	Value
AC Input Voltage	96 to 132 Vac
AC Input Frequency	47 to 63 Hz
AC Input Power	440 Watts rms
DC Output Power	225 Watts



## 4.

## SYSTEM CONFIGURATION

### General

4.1 The *SX-50* system supports typical PABX applications within the following limits:

Up to 160 lines, which can be:

- ONS Lines: 16 per slot, up to 160 if slots are available
- OPS Lines: eight per slot, up to 80 if slots are available
- DNIC Lines: eight per slot, up to 32 if slots are available
- COV Lines: eight per slot, up to 64 if slots are available

**Note:** The combined total number of COV and DNIC line cards must not exceed eight.

Up to 32 trunks, which can be

- LS/GS Trunks: 8 per slot, up to 32 if slots available
- E&M Trunks: 4 per slot, up to 32 if slots available
- DID Trunks: 8 per slot, up to 16 if slots available

No more than 9 Universal Cards (if slots available), total of 34 modules. Module types are:

- E&M Trunk Module
- RMAT Module (1 per system)
- MOH/Pager Module (1 per system)^N

\* An MOH/Pager Module is ignored by software when the Control Card 2 (MCC2) is installed.

### Identifying the Software Revision Level

4.2 Press the Attendant Console STATUS key once. The LCD shows the software identifier (e.g. MS55) and maintenance release number (e.g. MR0). Refer to Figure 4-1, Software Identification.



SX-50 MS55-MR0

Figure 4-1 Software Identification

## Identifying Software Without a System Console

- 4.3 To identify software without the use of a system console perform the following steps:
1. Enter the programming access code from the test line (*SUPERSET 4* and *SUPERSET 420* only).
  2. Enter command 999. The LCD display will show the software identifier.

## Card Configurations

- 4.4 Peripheral cards can be installed in slots one through ten. The *SX-50* is virtually a non-blocking DPABX. For optimum performance under heavy traffic conditions, it is suggested that the cards be installed in the following order:
1. Starting at Slot One (1) and proceeding to the right, install the DNIC Line Cards.
  2. Install the COV Line Cards immediately to the right of the DNIC Line Cards.
  3. Install the ONS or OPS Line Cards immediately to the right of the COV Line Cards.
  4. Starting at Slot Ten (10) and proceeding to the left, install the LS/GS and DID Trunk Cards.
  5. Install any Universal Cards in the remaining slots.

user can enter the number of a programmed register, with no following <CR>. The contents of that register will be immediately displayed. Again, the cursor will be at the left of the display.

Unlike the Console display, the RMATS terminal displays all 26 digits in the Digit Comparison Table and the Digit Modification Table.

There are three additional commands used for programming the Digit Modification Table digit strings. These are **P** (uppercase) for a 5-second Pause, **p** (lowercase) for a 1-second Pause, and **W** for Wait For Dial Tone.

The Time-of-Day Table, Commands 701 → 745, must be programmed in order. Refer to Section 9104-091-220-NA, Automatic Route Selection.

The backspace key is commonly used to delete ARS digit strings in Command 700. The entire digit string must be deleted by applying the backspace key while the cursor is on the "Time of Day" field (the terminal must be optioned to allow the backspace key to send <DEL>). A new Time of Day entry and a new digit string may then be reentered.

**Table 4-1 Attendant Functions**

<b>Attendant Function</b>	<b>Code</b>
Switch to Night Service	11
Switch to Day Service	12
Alarm Report Service	13
Set 12-Hour Clock	14
Set 24-Hour Clock	15
Force Release Trunk	20
Flexible Night Service	21
Display Message Register	22
Room - Room Restriction ON	23
Room - Room Restriction OFF	24
Change COS	25
Clear COS	26
Trunk Registration Meter	27
Clear All Message Waiting	29
Alarm Clear	31
Cancel Alarms and Busy-outs	32
Busy-out Trunk	41

Page 1 of 2

<b>Table 4-1 Attendant Functions (continued)</b>	
<b>Attendant Function</b>	<b>Code</b>
Busy-out DTMF Generator	42
Busy-out DTMF Receiver	43
Busy-out Dial Tone Detector	44
Change Verified Authorization Code	45
Unbusy Trunk	51
Unbusy DTMF Generator	52
Unbusy DTMF Receiver	53
Unbusy Dial Tone Detector	54
Abbreviated Dialing Entry Viewing	60
Abbreviated Dialing Entry Programming	65
Printer Options	75
Set Date	80
Alarm Print Options	90
Page 2 of 2	

<b>Table 4-2 Customer Data Entry Commands</b>	
Main Level Commands	
<b>Command</b>	<b>Function</b>
nnn<CR>	go to Command nnn
H	Help
N	go to Next command
R	display Register contents
S	display Summary of Commands
E	Exit CDE
<del>	delete data
Page 1 of 2	

## 5.

**PERIPHERAL DEVICES****General**

- 5.1 The *SX-50* system interfaces to peripheral devices using standard twisted-pair office wiring. Peripheral devices include the following:
- Rotary and DTMF Telephone Sets (Analog)
  - Trunks (Analog)
  - Electronic telephones (*SUPERSET 3*, *SUPERSET 4*, *SUPERSET 410* and *SUPERSET 420*)
  - Music-on-Hold Circuit (Analog)
  - Remote Maintenance and Test System (RMATS) modem
  - Paging Circuit (Analog)
  - Night Bells Equipment
  - Printer or Data Recording Device
  - VX Voice Processing System (Not available with MS53)
  - Attendant Console.

Figure 5-1 illustrates the peripheral devices that can be interfaced to the *SX-50* DPABX. For more information, refer to Section 9104-091-200-NA, Shipping, Receiving and Installation Information.

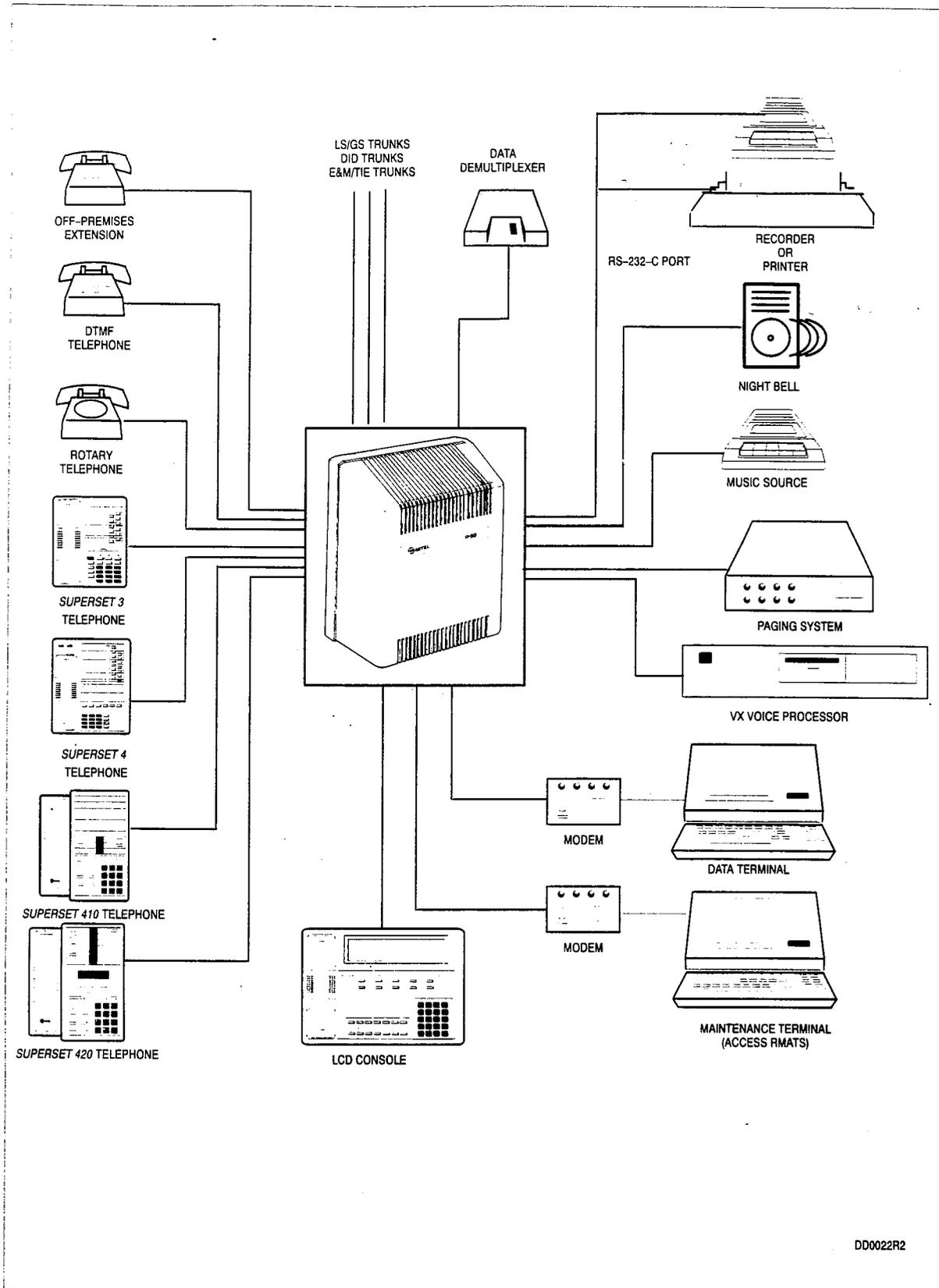


Figure 5-1 SX-50 System Peripherals

# 6.

## HARDWARE OVERVIEW

### General

6.1 The Control Card/Control Card 2 contains the common control circuitry and card slots for the 10 peripheral cards. The peripheral cards communicate with the control circuitry via a common parallel address/data bus. The control circuit includes an 8-bit microprocessor which interfaces through its address/data bus to the following:

- DX Switching Matrix
- Digital Signal Processor
- Printer Interface
- Attendant Console Interface (voice and data)
- DTMF Receivers
- I/O Interfaces
- Memory
- Music/Pager/Relay (Control Card 2 ONLY).

Refer to Figure 6-1 for the SX-50 system block diagram.

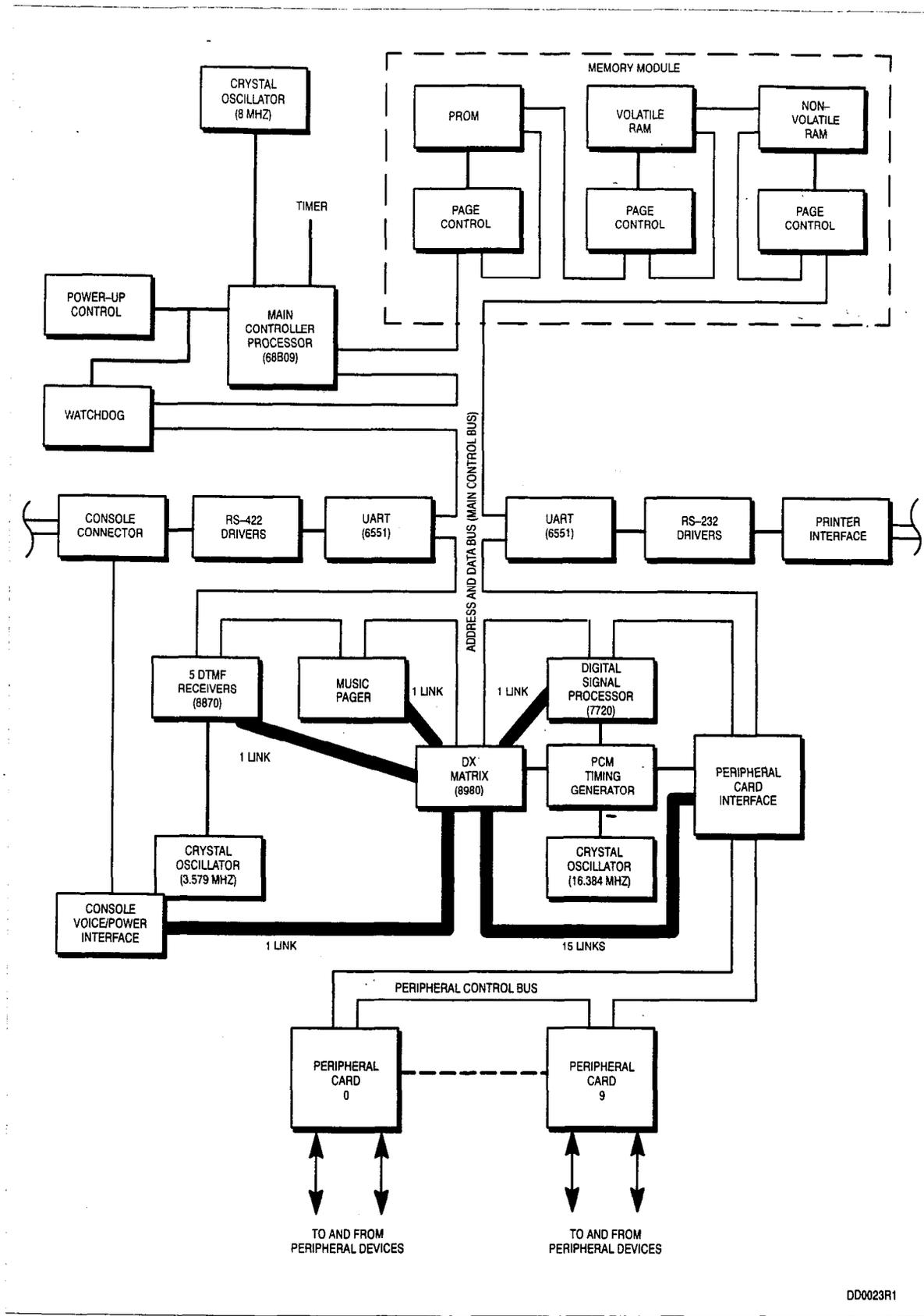
### Microprocessor

6.2 The microprocessor is driven from an 8 MHz crystal oscillator and operates on a 0.5 microsecond cycle time. The master clock drives the interrupt request (IRQ) line. The Attendant Console UART drives the fast interrupt request (FIRQ) line. The reset line (RES) is driven from three sources. The first source (power-on reset) holds the microprocessor in the reset condition until the power rails are established. The second source is the watchdog timer, which causes a reset if not accessed in a given period of time. The third source is a manual reset switch mounted on the Control Card. The reset signal is also routed to all peripheral cards.

### DX Switching Matrix

6.3 The DX switching matrix includes three DX chips and has the following bidirectional links:

- 1.5 links (48 channels) to each peripheral card
- one shared link for the digital signal processor and Attendant Console voice
- one shared link for the Attendant Console gain control and DTMF receivers.



DD0023R1

Figure 6-1 SX-50 System Block Diagram

### **Clock Signal Generation**

- 6.4 The master clock for the PCM links is 16.384 MHz. All of the other PCM clock signals are derived from this.

### **Digital Signal Processor**

- 6.5 The Digital Signal Processor (DSP) provides 8 channels of dual tone generators, 18 conference channels and one tone detector.

**Tone Generation.** The DSP generates all DTMF and call progression tones.

**Tone Detection.** The Digital Signal Processor provides two types of tone detection: dial tone and test tone. Dial tone detection is used to determine trunk readiness for outgoing calls. Test tone detection is required for background testing of channels.

### **Attendant Console Interface**

- 6.6 The Attendant Console data link uses an asynchronous serial interface. The data rate is 4800 Baud.

### **Printer Interface**

- 6.7 The printer interface also uses an asynchronous serial interface (6551). The following data rates are software-selectable: 110, 150, 300, 600, 1200, 1800, 2400, 4800 or 9600 Baud.

### **DTMF Receivers**

- 6.8 The MITEL codecs convert the PCM signals to analog and route them to the DTMF receivers. The Control Card contains 5 codec/DTMF circuits.

### **Memory**

- 6.9 All system memory (program memory and RAM) is located on the Generic Module. Refer to the Generic Module physical description in this Section.



**7.****SOFTWARE OVERVIEW****General**

7.1 The SX-50 system software operates in two independent layers as described below.

**Call Processing Layer**

7.2 The Call Processing layer monitors all system activities and implements the features that have been selected.

**Peripheral Processing Layer**

7.3 This Peripheral Processing layer controls the interconnection of all devices attached to the system and feeds status information to the Call Processing layer.



## 8.

## FEATURES

## General

- 8.1 The features contained in the SX-50 MS55 software package are listed in Table 8-1. Section 9104-091-105-NA, Features Description, provides a complete description of each feature, including special conditions and programming information.

**Attendant Features.** Attendant features can be programmed to suit the customer's application. There are 14 Programmable Function keys on the Attendant Console keyboard and 18 functions that can be assigned. Refer to Section 9104-091-210-NA, Customer Data Entry, for more information.

**Extension Features.** There are 9 Classes of Service. Each Class of Service (COS) can contain any nonconflicting mixture of features. Each extension and trunk is assigned to a COS which contains the desired features.

**SUPERSET Telephone Features.** Like stations, *SUPERSET* telephones are each assigned a Class of Service. The *SUPERSET 420* can have up to twelve line appearances; the *SUPERSET 410* can have up to six line appearances. The *SUPERSET 3* can have up to three line appearances; the *SUPERSET 4* can have up to fifteen line appearances. On *SUPERSET* telephones, unused Line Select keys can be used as Speed Dial keys. Refer to 9104-091-210-NA, Customer Data Entry, for programming information.

**English or French System Messages.** The SX-50 System provides text to the Attendant Console in English or French. Customer Data Entry is available in English only.

Table 8-1 Feature List

Attendant Features	
Alarm Indicators	Call Status Display
Attendant Access	Executive Busy Override (Console)
Attendant and Maintenance Functions	Individual Trunk Access
Attendant-Switchable COS	Message Register Audit
Attendant Tone Signaling	Message Waiting
Automatic Wake-Up	Paging
Bell Off	Room Status
Call Block	Station Calls to Attendant
Call Hold (Attendant)	Night Answer Point
Call Identification	Time Display
Call Pickup (Attendant)	Trunk Busy-Out Enable
Call Selection	Trunk Overflow Key

Page 1 of 3

**Table 8-1 Feature List  
(continued)**

<b>System Features</b>	
Abbreviated Dial	Log-in Hunt Groups
Auxiliary Attendant	Lockout Alarm
Automatic Diagnostics	Message Register Audit
Automatic Night Service	Message Registration
Automatic Ringdown Circuit	Message Waiting
Automatic Route Selection and Toll Control	Mixed Station Dialing
Automatic Station Release	Music on Hold
Background Music	Off-Premises Extensions
Behind PBX Operation	Originate-Only Extensions
Block Programming	Overflow
Break/Make Ratio and Pulse Rate	Power Fail Restart
Calibrated Flash	Power Fail Transfer (PFT)
Call Direction	Printer Port
CDE Battery Backup	Programming
Class of Service (COS)	Remote Maintenance Administration and Test System (RMATS)
Conflict Dialing	Restrictive Station Control
Consoleless Operation	Ring Group
Contact Monitor	Selectable Ringing Cadence Cycle Time
Data Dump/Load	Special DISA
Default Data	Station Message Detail Recording (SMDR) Station Transfer Security
Dictation Trunks	System Security Code Programming
Direct Inward Dial (DID) Trunks	Test Line
Direct-In Lines (DIL)	Tone-to-Pulse Conversion
Direct Inward System Access (DISA)	Trunk Answer From Any Station (TAFAS)
Discriminating Ringing	Trunk Alarm Control
Distinctive Callback Ringing	Trunk Group Overflow
DTMF or Rotary Trunk Signaling	Trunk Groups
E&M Trunks	Trunk Intercept
Flexible Night Service	Unlimited Wait for Dial Tone
French System Messages	User Security Code Programming
Hotline	Voice Mail Port *
Hunt Groups (Stations)	Wait for Dial Tone
Identified Trunk Groups	

\* Not available with MS53.

**Table 8-1 Feature List  
(continued)**

**Extension Features**

Account Codes	Executive Busy Override (Station)
Auto-Answer *	Flash for Attendant
Auto-Hold *	Flash Is Release
Auto-Line Disconnect	Handsfree Operation *
Automatic Callback – Busy	Help **
Call Duration Display **	Headset Operation **
Call Forwarding – Busy	Last Number Redial
Call Forwarding – Busy/Don't Answer	Messaging *
Call Forwarding – Don't Answer	Multi-Line Appearance
Call Forwarding – Follow Me	(Key Line and Multiple Line) *
Call Hold (Station)	Name (Extensions) *
Call Split *	New Call Tone *
Call Swap *	Paging Access
Camp-On	Personal Identification *
Clear All Features	Personal Outgoing Line *
Conference	Pickup Groups
Data Line Security	Privacy/Privacy Release **
Date/Time Display **	Speed Dial
Direct Line Select *	Transfer/Add-On/Consultation Hold
Direct Trunk Select *	Transfer Dial Tone
Display **	Traveling COS
Distinctive Dial Tone	Trunk Answer From Any Station (TAFAS)
Do Not Disturb	Trunk-to-Trunk Plus Station Conferencing

\* available on *SUPERSET* telephones only.

\*\* available on *SUPERSET 4* telephones only.



## 9.

## MAINTENANCE

### General

- 9.1 This Part briefly describes the maintenance diagnostics for the SX-50 system. These diagnostics test the operation of the system hardware such that fault isolation can be accomplished to a card or module level. For more information, refer to Section 9104-091-350-NA, Troubleshooting Procedures and General Maintenance Information.

On power-up and reset conditions, the diagnostic software (if enabled) has temporary control of the entire system. Once the system is verified and the DPABX is operational, the diagnostics run as low priority background tasks.

### Alarms

- 9.2 Alarm messages are generated by system diagnostics. They can be read at the Attendant Console or directed to a printer or data recording device.

### Types of Diagnostics

- 9.3 There are two types of diagnostic routines: Power-up Diagnostics and On-line Diagnostics.

**Power-up Diagnostics.** The power-up diagnostic routines consist of the complete set of diagnostics for the system. When enabled, they run upon system power-up. These diagnostics perform a check on the response and performance of the hardware and firmware. Any failures are reported to the LED display and the non-volatile RAM.

**On-line (Background) Diagnostics.** The on-line diagnostic routines consist of the complete set of diagnostics for the system. When enabled, they run as low priority background routines during system operation. Any failures are reported to the LED display on the Control Card, the non-volatile RAM and the console. Refer to Section 9014-091-350-NA, Troubleshooting Procedures and General Maintenance Information, for Alarm Codes and their interpretation.

### Diagnostic Test Routines

- 9.4 The Power-up Diagnostic Tests include:
- Volatile RAM Comprehensive Test \*
  - PROM Checksum Test \*

- Digital Signal Processor Test \*
- Non-Volatile RAM Checksum Test,
- Non-Volatile RAM Comprehensive Test,
- Configuration Checks.

\* If one of these tests fail, the system goes into Power Fail Transfer (PFT) Mode.

The Background Diagnostic Tests include:

- Conferencing Test,
- Console Loopback Test,
- DTMF Tone Generator Test,
- DTMF Tone Receiver Test,
- Non-Volatile RAM Checksum Test,
- PCM Channel Integrity Test,
- PROM Checksum Test,
- Scheduling Integrity Test,
- Station/Trunk Loopback Test,
- Tone Detector Test,
- Volatile RAM Read/Write Test
- Inter-DX Sanity Check.

## 2.

## CUSTOMER DATA ENTRY FORMS

### General

- 2.1 The following forms enable the installer to plan customer programming prior to actual data entry. Space is allocated to record the customer data.

This Section omits Commands which cannot be edited. Refer to Section 9104-091-350-NA, Troubleshooting Procedures and General Maintenance Information, for details. These Commands include:

- Command 980, System Status Display
- Command 981, Inter-DX Link Status Display
- Command 982, Station Status Display
- Command 983, *SUPERSET* Telephone Status Display
- Command 984, Trunk Status Display
- Command 999, Software Identity Display

### Physical Configuration

- 2.2 Form 2-1 provides space to record the placement of circuit cards and Universal Card modules in the system. Table 1-1 lists the available card and module types.

Table 2-3 enables the installer to determine quickly the equipment number of any station or trunk in the system. Many command registers require the entry of equipment numbers.

<b>Table 2-1 Card and Module Types</b>	
<b>Card/Module Type</b>	<b>Abbreviation</b>
ONS Line Card (16 Lines)	ONS 16
ONS Line Card (8 Lines)	ONS 8
OPS Line Card (8 Lines)	OPS 8
OPS Line Card (4 Lines)	OPS 4
DID Trunk Card (8 Trunks)	DID 8
DID Trunk Card (4 Trunks)	DID 4
DNIC Line Card (8 Lines)	DNIC 8
COV Line Card (8 Lines)	COV 8
LS/GS Trunk Card (8 Trunks)	LS/GS 8

<b>Table 2-1 Card and Module Types (continued)</b>	
<b>Card/Module Type</b>	<b>Abbreviation</b>
LS/GS Trunk Card (4 Trunks)	LS/GS 4
Universal Card	UNIVERSAL
• Music on Hold/Pager Module	MOH/PAGER
• E&M Trunk Module	E&M MOD
• RMATS Module	RMATS
Control Card	MCC1
Control Card 2 *	MCC2

\* Music on Hold/Pager capability requires MS53 software

## Form 2-1 Card And Module Placement

Slot Number	Card Type
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

**Note:** Slots 9 (nine) and 10 (ten) cannot be used for DNIC Line Cards.

Universal Card 1		Universal Card 2	
Module Position	Module Type	Module Position	Module Type
1		1	
2		2	
3		3	
4		4	
Universal Card 3		Universal Card 4	
Module Position	Module Type	Module Position	Module Type
1		1	
2		2	
3		3	
4		4	

### Programming Errors

- 2.3 The SX-50 system can detect certain errors made during CDE. The detection of a programming error results in a display similar to that shown in Figure 2-1, Alarm Message Format. The meaning of each code is listed in Table 2-2, Programming Error Codes.

## Exit From Error Mode

2.4 After the error code has been checked and the correct data determined, the programmer can exit the Error Mode by:

- pressing the CANCEL key on *SUPERSET 410* or *SUPERSET 420*,  
OR
- pressing the QUIT softkey on the Attendant Console,  
OR
- pressing the CANCEL softkey from the Test Line (*SUPERSET 4* Telephone),  
OR
- dialing \* # from the Test Line (DTMF set),  
OR
- flashing the switchhook twice on the Test Line (Rotary Dial set).

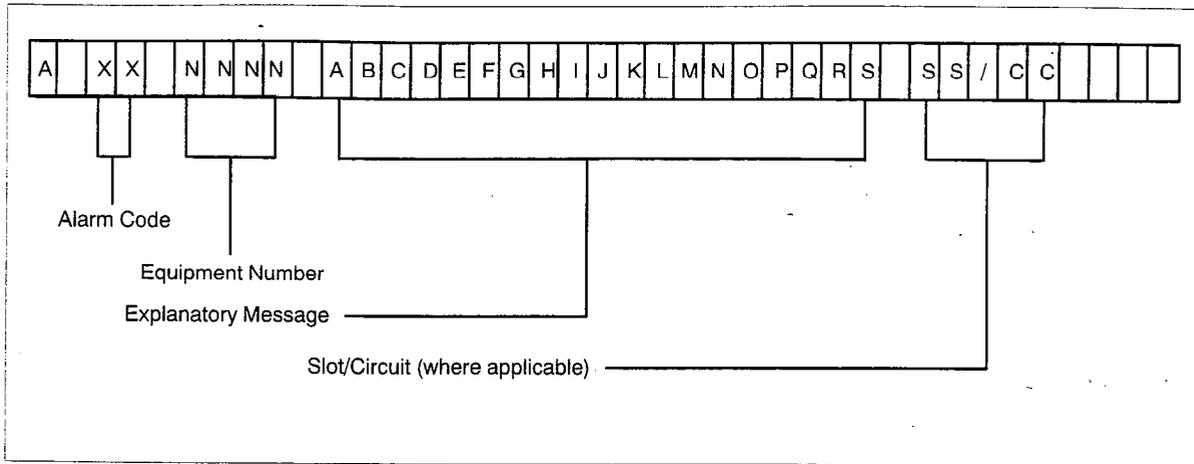
The system restores the original data and data entry begins at the start of the register.

**Table 2-2 Programming Error Codes**

Error Code	Description
E01	Illegal Command Identity
E02	Digit keyed while Access Mode Error displayed
E03	Directory Number already exists
E04	Data out of range
E05	Illegal Directory Number length
E06	Directory Number range insufficient
E07	Too many digits keyed
E08	Illegal Device range
E09	Write protected command
E10	Insufficient software package level
E11	Write protected data
E12	Data field incomplete
E13	RESERVED
E14	Maximum Limit Exceeded
E15	Hunt Groups linked into a loop; e.g, linked Hunt Group 1 to Hunt Group 6 then linked Hunt Group 6 to Hunt Group 1
E16	Duplicate assignment of Programmable Function Key
E17	Attempt to program non-idle key

**Table 2-2 Programming Error Codes  
(continued)**

Error Code	Description
E18	<i>SUPERSET</i> Telephone Prime Line Programming Error
E20	Invalid double-digit command
E21	Directory number already in Ring Group
E22	Device must be an extension
E23	ARS Busy – Calls in progress
E24	Digit String already programmed
E25	Digit String register overflow
E26	No Digit String entered
E27	Digit area is full
E28	The start time entered for this time period is earlier than or equal to the start time of the preceding period. Time periods must be entered in ascending order.
E29	The start time entered for this time period is later than the start time of the next period. Time periods must be entered in ascending order.
E30	RESERVED
E31	Attempt to program a DTS, DLS or Private Line in <i>SUPERSET</i> Telephone Programming when the trunk is not assigned to a Trunk Group. Refer to Commands 501 → 580, Trunk Programming.
E32	<i>SUPERSET 4</i> Telephone key type conflict
E33	Attempt to display System Security Code
E34	Attempt to display User Security Code
E35	Attempt to display DISA Access Code
E36	RESERVED
E37	Specified card type not found in slot position
E38	Attempt to overflow current Trunk Group
E39	Invalid Trunk Number keyed
E40	RESERVED
E41	RESERVED
E42	RESERVED
E43	Invalid base Directory Number
E44	Invalid Directory Number
E45	Contact monitor conflict. Attempted to assign as an answer point an ONS circuit programmed as a contact monitor.
E46	VAC Length Conflict. Attempted to change length of VAC before deleting all existing VACs



**Figure 2-1 Alarm Message Format**

**Table 2-3 Station Equipment Numbers**

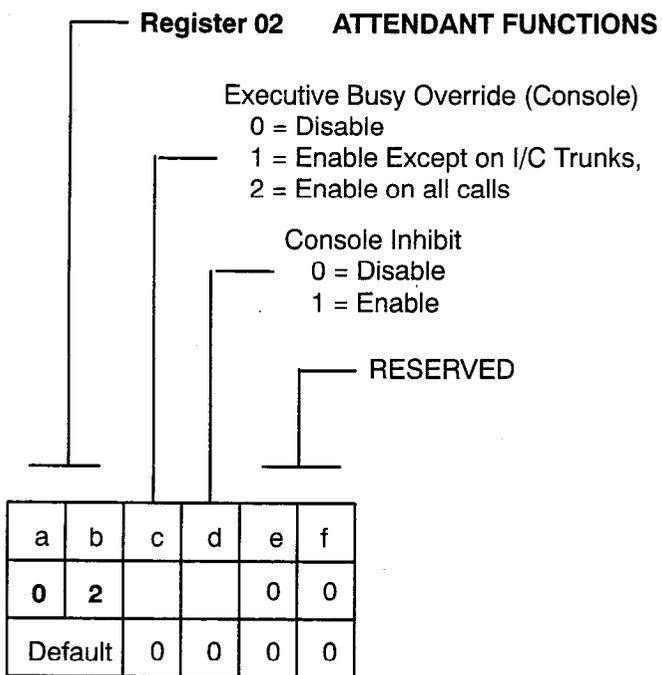
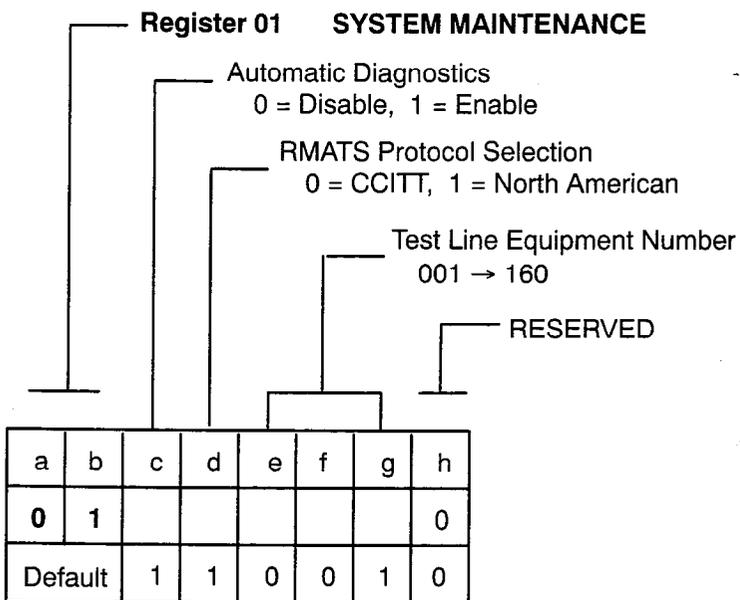
Circuit Number	Slot Number									
	1	2	3	4	5	6	7	8	9	10
01	001	017	033	049	065	081	097	113	129	145
02	002	018	034	050	066	082	098	114	130	146
03	003	019	035	051	067	083	099	115	131	147
04	004	020	036	052	068	084	100	116	132	148
05	005	021	037	053	069	085	101	117	133	149
06	006	022	038	054	070	086	102	118	134	150
07	007	023	039	055	071	087	103	119	135	151
08	008	024	040	056	072	088	104	120	136	152
09	009	025	041	057	073	089	105	121	137	153
10	010	026	042	058	074	090	106	122	138	154
11	011	027	043	059	075	091	107	123	139	155
12	012	028	044	060	076	092	108	124	140	156
13	013	029	045	061	07	093	109	125	141	157
14	014	030	046	062	078	094	110	126	142	158
15	015	031	047	063	079	095	111	127	143	159
16	016	032	048	064	080	096	112	128	144	160

*SUPERSET*/Trunk Equipment Numbers

Circuit Number	Slot Number									
	1	2	3	4	5	6	7	8	9	10
01	01	09	17	25	33	41	49	57	65	73
02	02	10	18	26	34	42	50	58	66	74
03	03	11	19	27	35	43	51	59	67	75
04	04	12	20	28	36	44	52	60	68	76
05	05	13	21	29	37	45	53	61	69	77
06	06	14	22	30	38	46	54	62	70	78
07	07	15	23	31	39	47	55	63	71	79
08	08	16	24	32	40	48	56	64	72	80

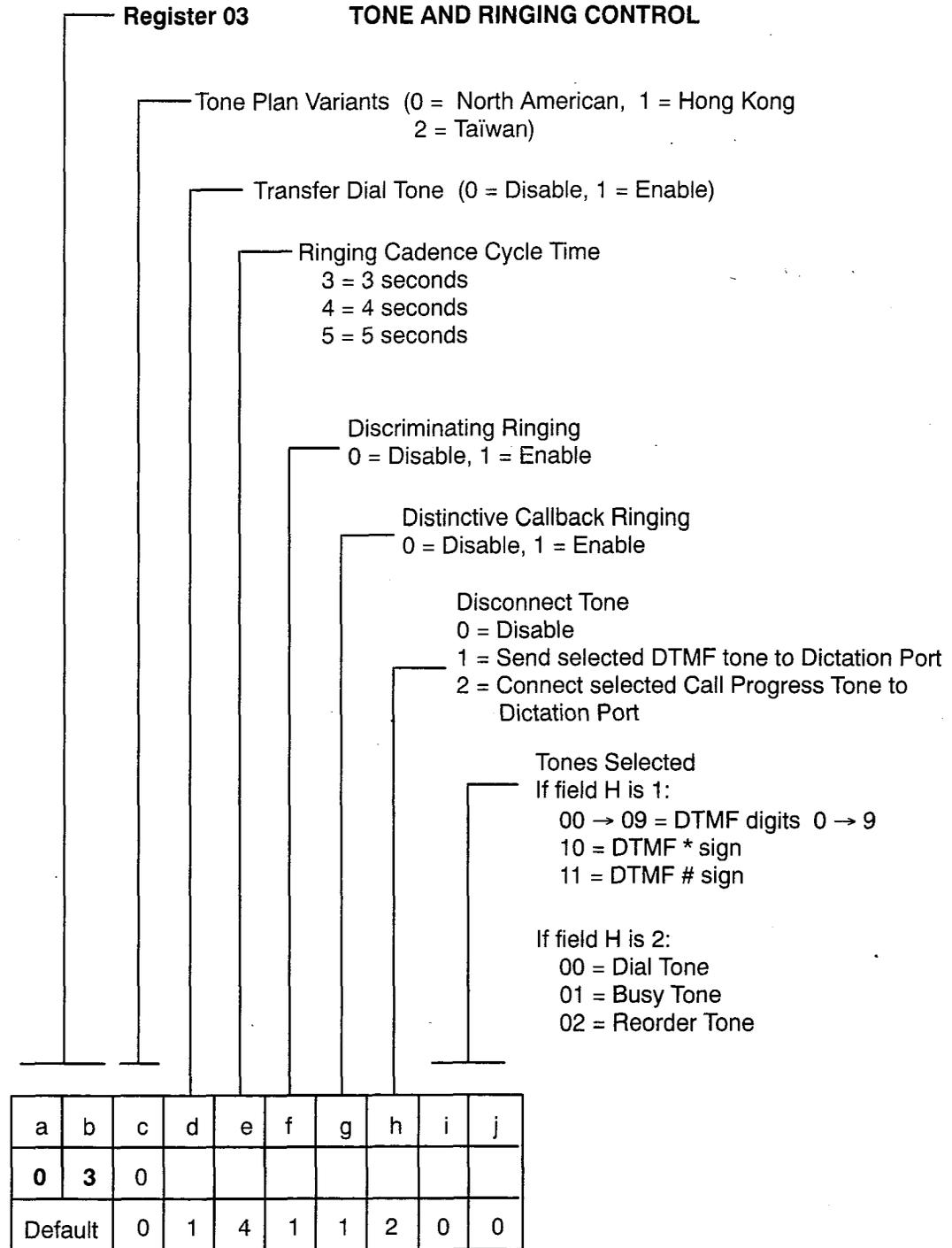
**Note:** E&M Trunks use ODD Equipment Numbers only.

**COMMAND 100- SYSTEM OPTIONS PROGRAMMING**



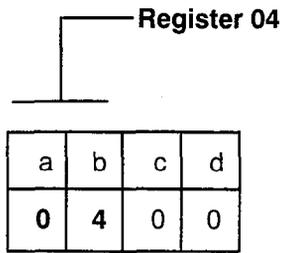
COMMAND 100

SYSTEM OPTIONS PROGRAMMING



**COMMAND 100**

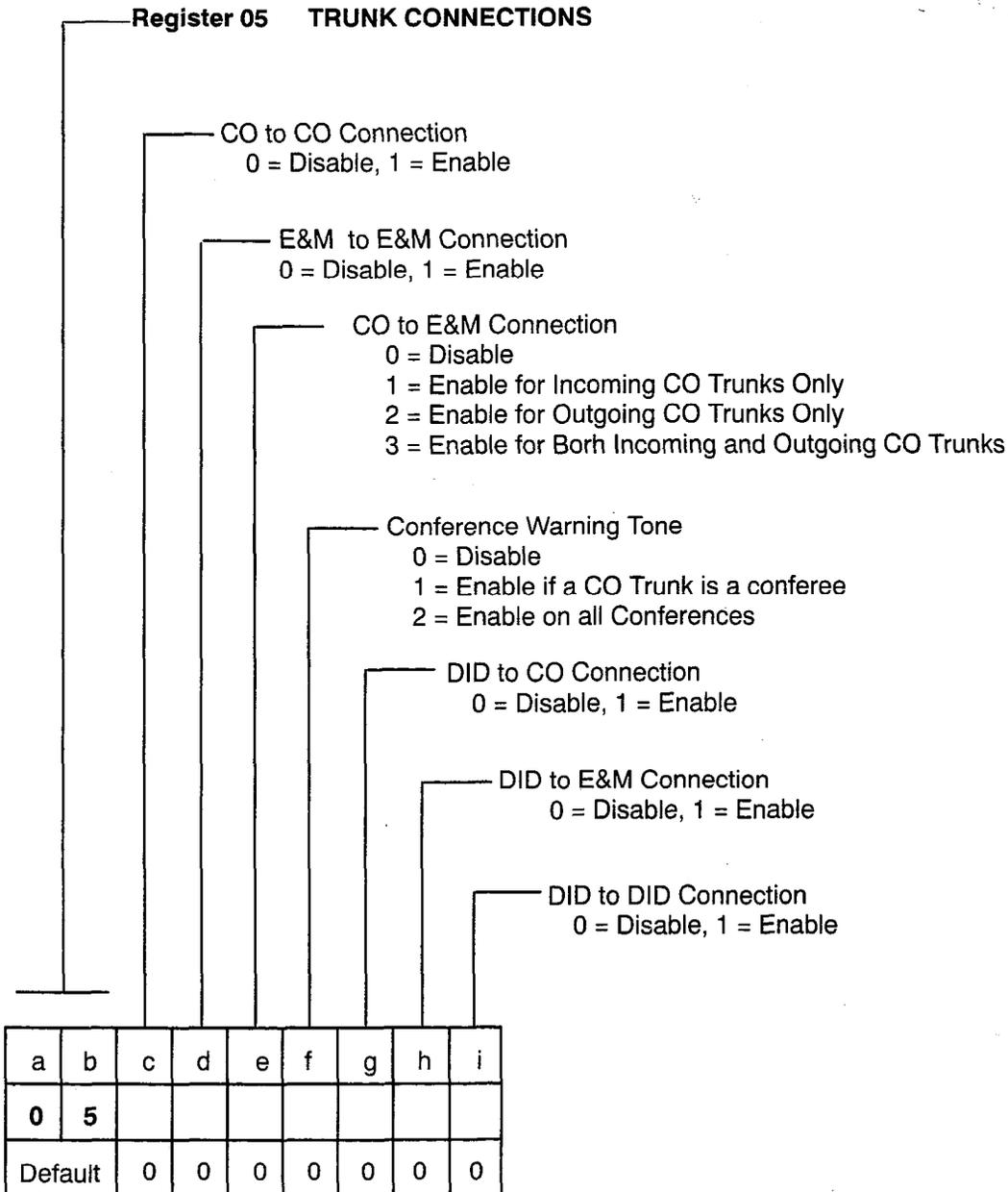
**SYSTEM OPTIONS PROGRAMMING**



Register 04 field values should not be changed.

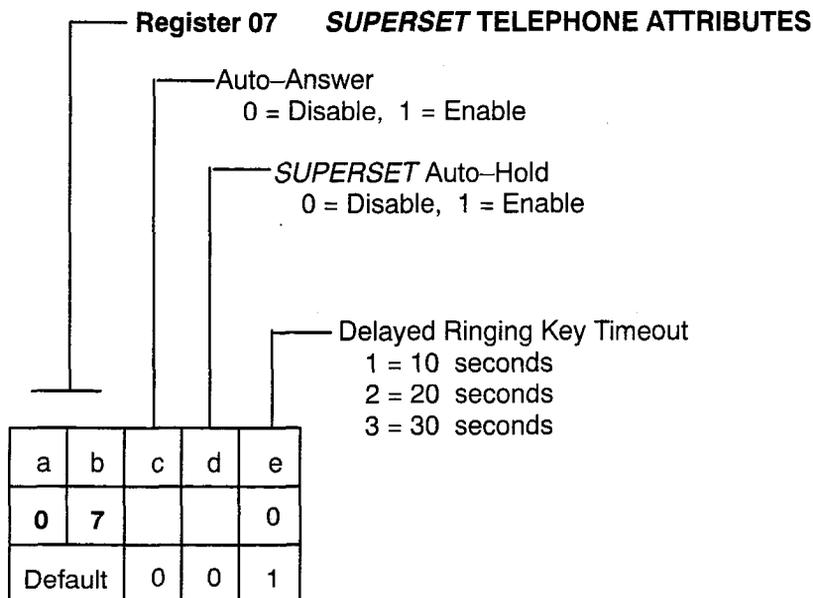
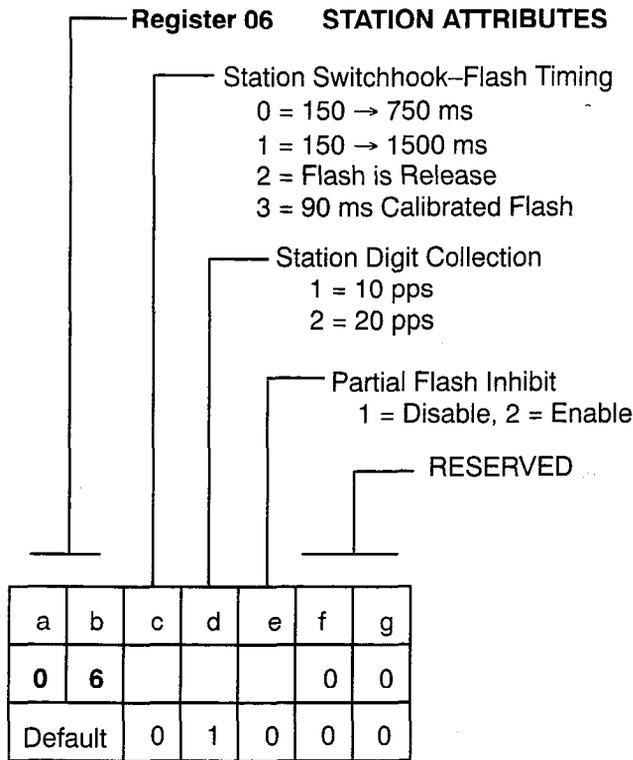
**COMMAND 100**

**SYSTEM OPTIONS PROGRAMMING**



## COMMAND 100

## SYSTEM OPTIONS PROGRAMMING



**COMMAND 100**

**SYSTEM OPTIONS PROGRAMMING**

**Register 08 OVERFLOW CONTROL**

Overflow Mode in Day Service

- 0 = Disable
- 1 = Immediate Switching to Overflow
- 2 = Automatic Switching to Overflow after Time-out
- 3 = Automatic Switching to Night Service

Overflow Mode in Night Service

- 0 = Disable
- 1 = Immediate Switching to Overflow
- 2 = Automatic Switching to Overflow after Time-out

Automatic Switch to Overflow Time-out

(1 → 7) x 10 seconds

Internal Calls to Console Routed to Overflow

- 0 = Disable
- 1 = Enable During Day Service
- 2 = Enable During Night Service
- 3 = Enable During Both Day and Night Service

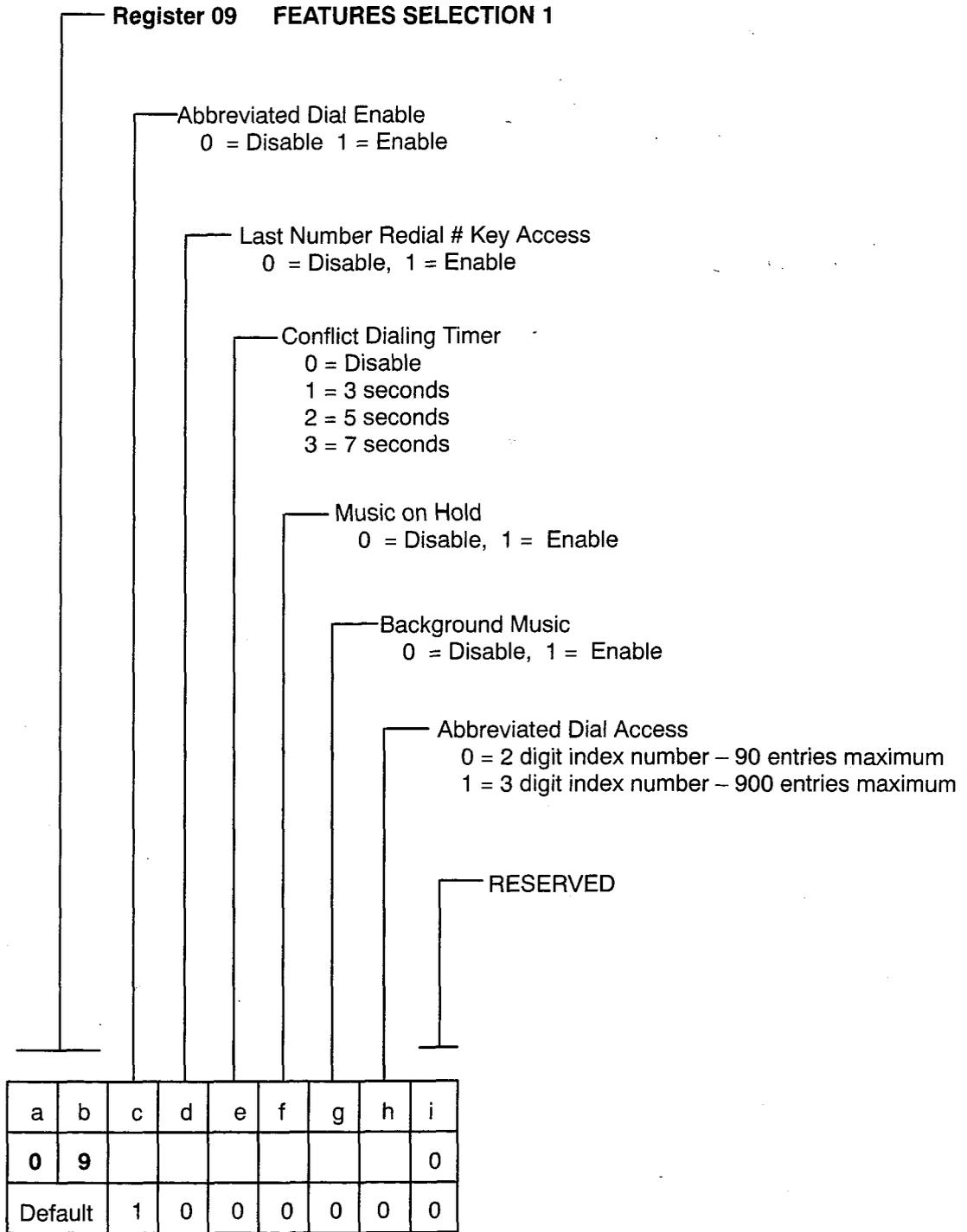
Overflow Point

- 000 = Night Bell
- 001 → 160 = Station (Equipment Number)
- 161 → 166 = Hunt Group
- 167 = Ring Group

a	b	c	d	e	f	g	h	i
0	8							
Default	2	0	3	2	0	0	0	

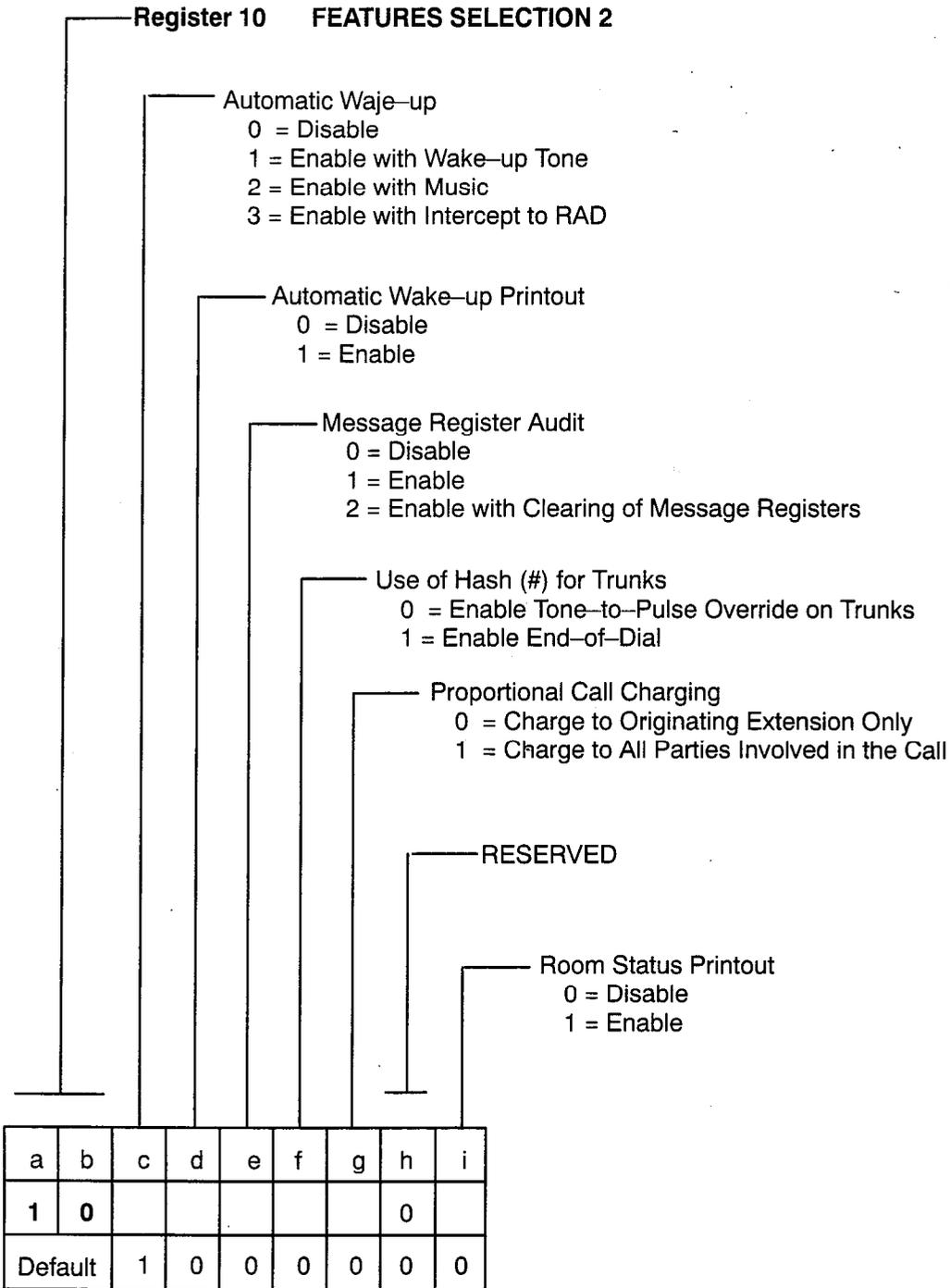
COMMAND 100

SYSTEM OPTIONS PROGRAMMING



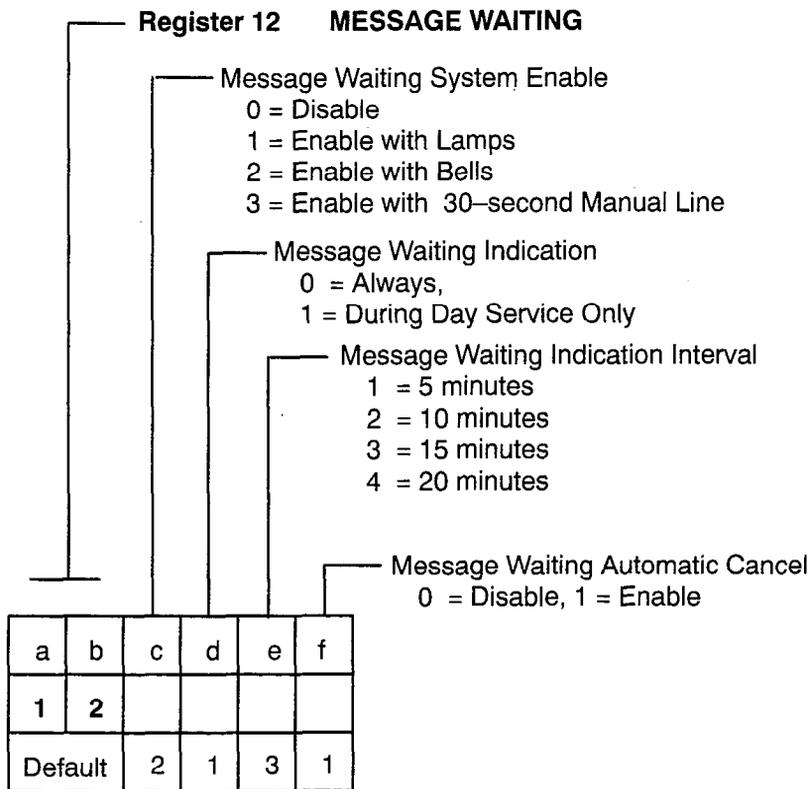
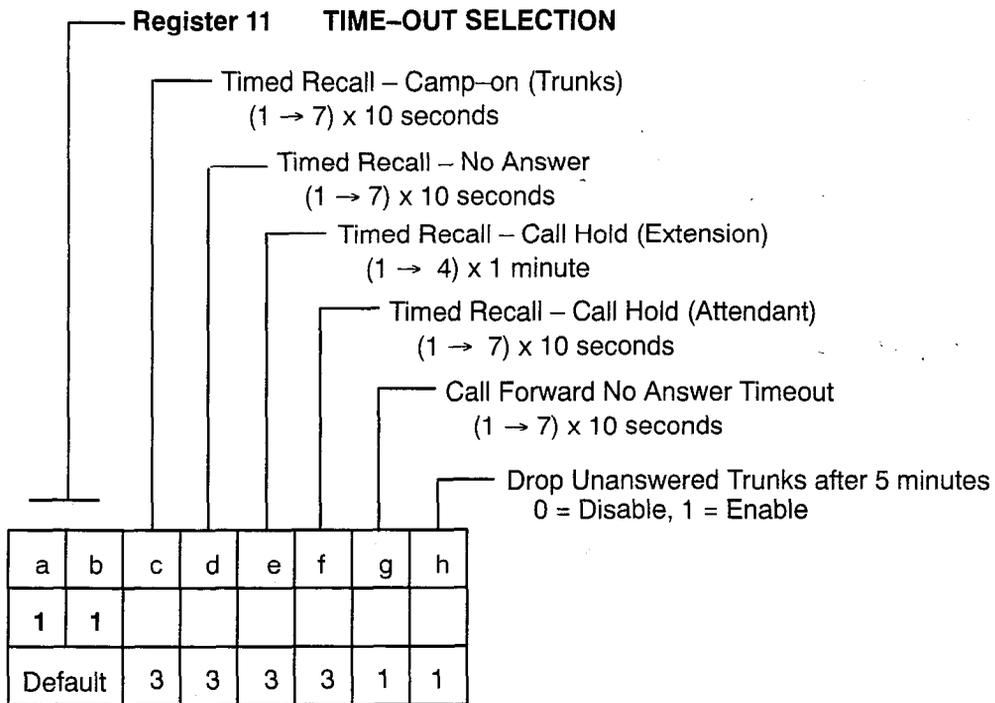
COMMAND 100 .

SYSTEM OPTIONS PROGRAMMING



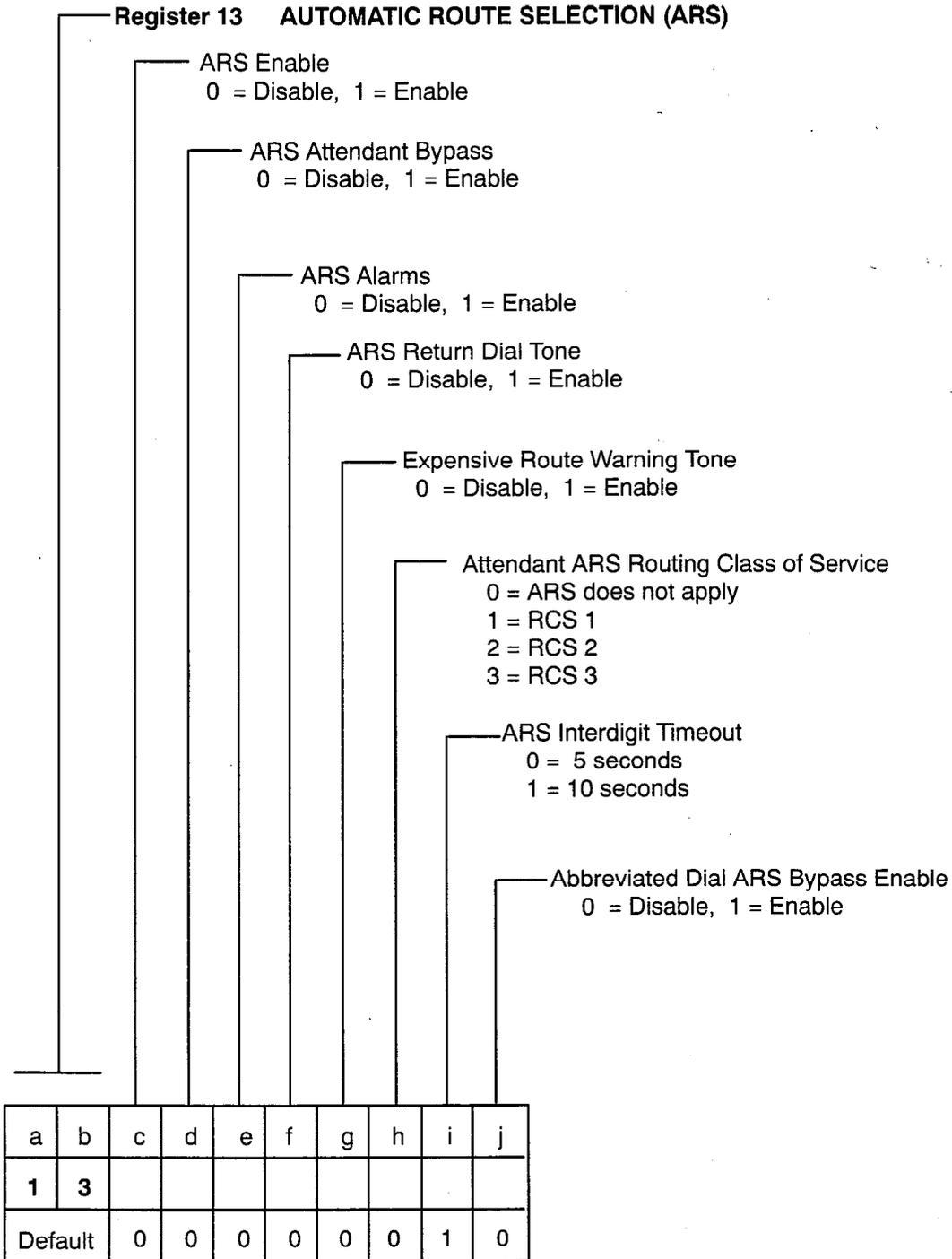
COMMAND 100

SYSTEM OPTIONS PROGRAMMING

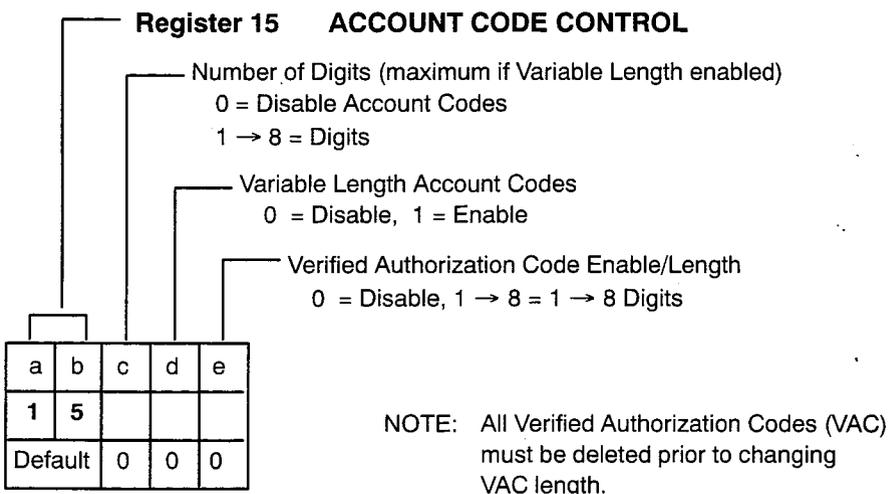
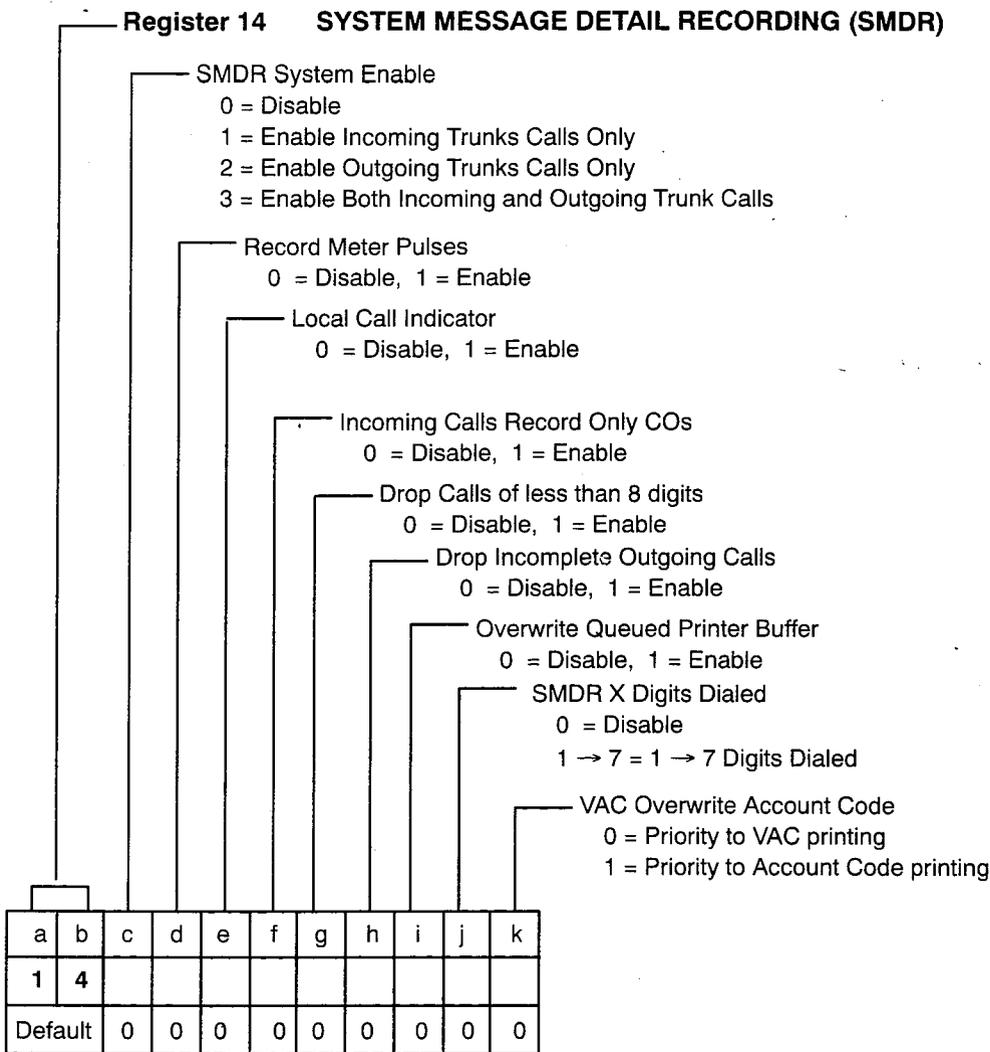


**COMMAND 100**

**SYSTEM OPTIONS PROGRAMMING**

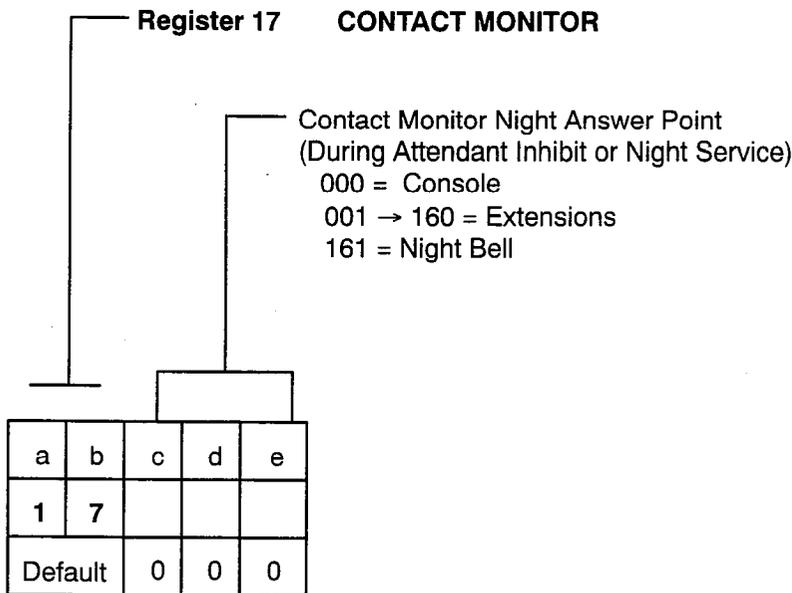
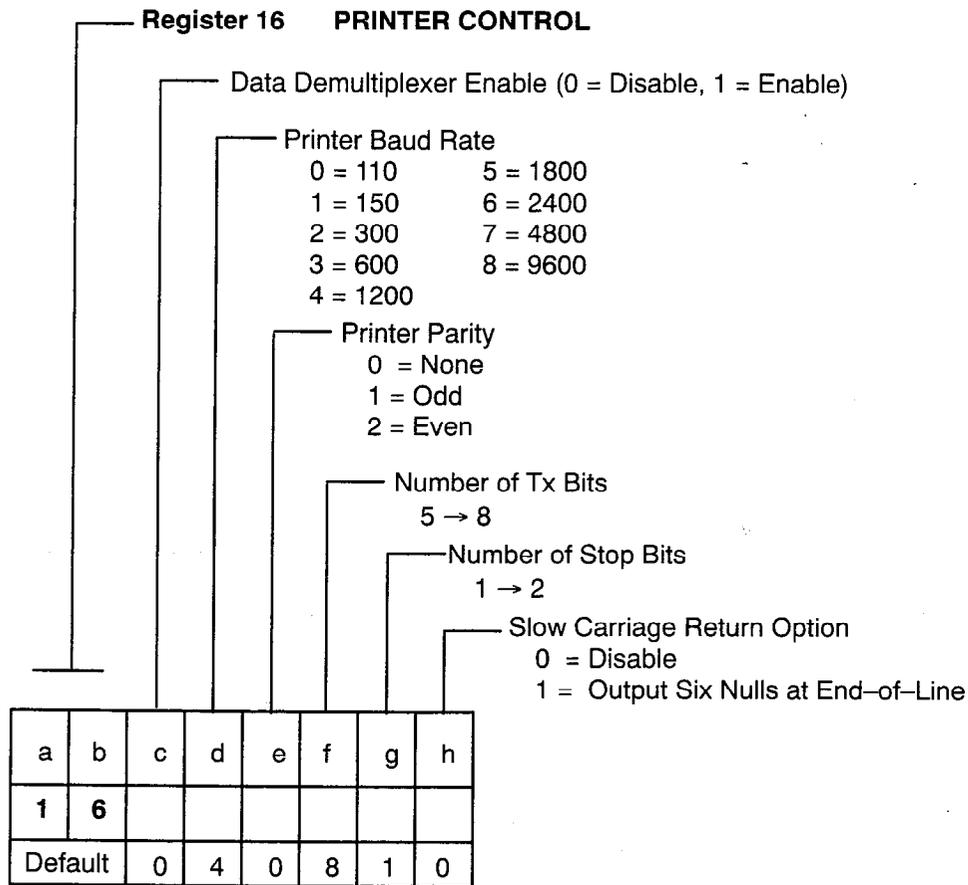


**COMMAND 100 SYSTEM OPTIONS PROGRAMMING**



**COMMAND 100**

**SYSTEM OPTIONS PROGRAMMING**



**COMMAND 110**

**FEATURE ACCESS CODE PROGRAMMING**

**Feature:**

- 01 — DIAL ACCESS TO ATTENDANT
- 02 — PAGING ACCESS
- 03 — CALL HOLD
- 04 — CALL HOLD RETRIEVE — LOCAL
- 05 — CALL HOLD RETRIEVE — REMOTE
- 06 — DIAL CALL PICKUP
- 07 — SYSTEM ABBREVIATED DIAL ACCESS
- 08 — CALL FORWARD — FOLLOW ME
- 09 — TAFAS PICKUP
- 10 — CALL FORWARD — NO ANSWER
- 11 — CALL FORWARD — BUSY
- 12 — CALL FORWARD — BUSY/NO ANSWER
- 13 — PROGRAMMING ACCESS
- 14 — ATTENDANT FUNCTIONS
- 15 — CLEAR ALL FEATURE
- 16 — CALL PARK (ATTENDANT) 1
- 17 — CALL PARK (ATTENDANT) 2
- 18 — CALL PARK (ATTENDANT) 3

**Access Code**

a	b	c	d	e	f
0	1				
0	2				
0	3				
0	4				
0	5				
0	6				
0	7				
0	8				
0	9				
1	0				
1	1				
1	2				
1	3				
1	4				
1	5				
1	6				
1	7				
1	8				

**DEFAULT VALUES**

a	b	c	d	e	f
0	1	0			
0	2	5	0		
0	3	5	1		
0	4	5	2		
0	5	5	3		
0	6	5	4		
0	7	5	5		
0	8	5	6		
0	9	5	7		
1	0	5	8		
1	1	5	9		
1	2	6	0		
1	3	7	0		
1	4	7	1		
1	5	4	4	4	
1	6	4	5	1	
1	7	4	5	2	
1	8	4	5	3	

**COMMAND 110**

**FEATURE ACCESS CODE PROGRAMMING**

Feature:

- 19 — HUNT GROUP 1 ACCESS
- 20 — HUNT GROUP 2 ACCESS
- 21 — HUNT GROUP 3 ACCESS
- 22 — HUNT GROUP 4 ACCESS
- 23 — HUNT GROUP 5 ACCESS
- 24 — HUNT GROUP 6 ACCESS
- 25 — RING GROUP ACCESS
- 26 — RMATS MODEM ACCESS
- 27 — ONS MESSAGE WTG ACTIVATE
- 28 — ACCOUNT CODE ENTRY
- 29 — Reserved
- 30 — ATTENDANT/DIRECTED CALL PICKUP
- 31 — MAIL IN ROOM
- 32 — CALLBACK SETUP
- 33 — DO NOT DISTURB
- 34 — HUNT GROUP LOGIN/LOGOUT
- 35 — DID LDN 1 ACCESS
- 36 — DID LDN 2 ACCESS
- 37 — DID LDN 3 ACCESS
- 38 — ONS MSG WTG CALLBACK
- 39 — ONS CANCEL MSG WTG
- 40 — VERIFIED AUTHORIZATION CODES
- 41 — WAKEUP FROM EXTENSION

Access Code

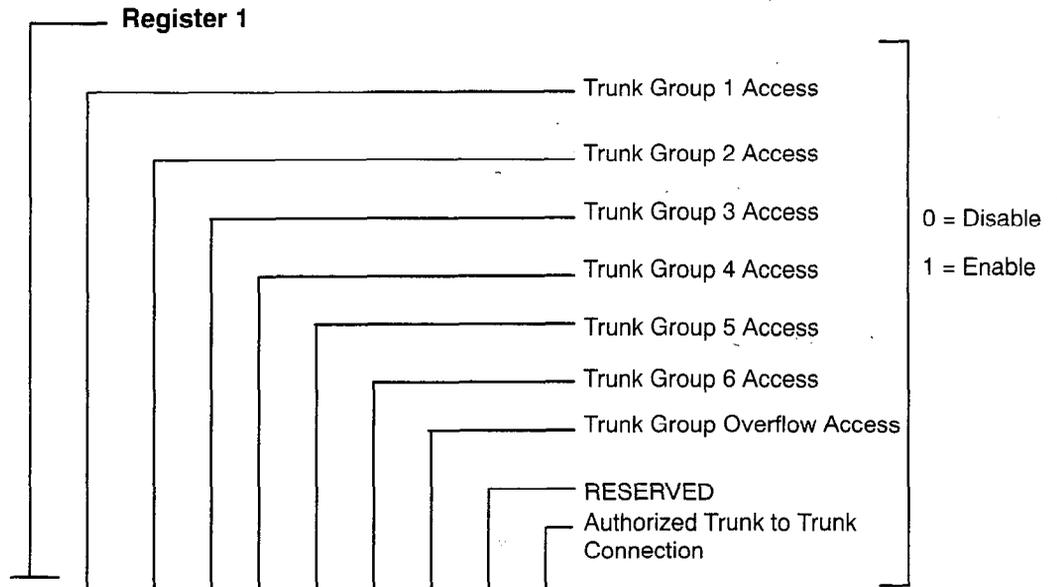
	a	b	c	d	e	f
1	9					
2	0					
2	1					
2	2					
2	3					
2	4					
2	5					
2	6					
2	7					
2	8					
2	9					
3	0					
3	1					
3	2					
3	3					
3	4					
3	5					
3	6					
3	7					
3	8					
3	9					
4	0					
4	1					

**DEFAULT VALUES**

	a	b	c	d	e	f
1	9	4	9	1		
2	0	4	9	2		
2	1	4	9	3		
2	2	4	9	4		
2	3	4	9	5		
2	4	4	9	6		
2	5	4	9	7		
2	6	4	9	8		
2	7	7	2			
2	8	7	5			
2	9	7	6			
3	0	6	1			
3	1	7	4	7		
3	2	6	2			
3	3	6	3			
3	4	6	4			
3	5					
3	6					
3	7					
3	8	6	5			
3	9	6	6			
4	0	6	7			
4	1	6	9			

COMMANDS 121 → 129

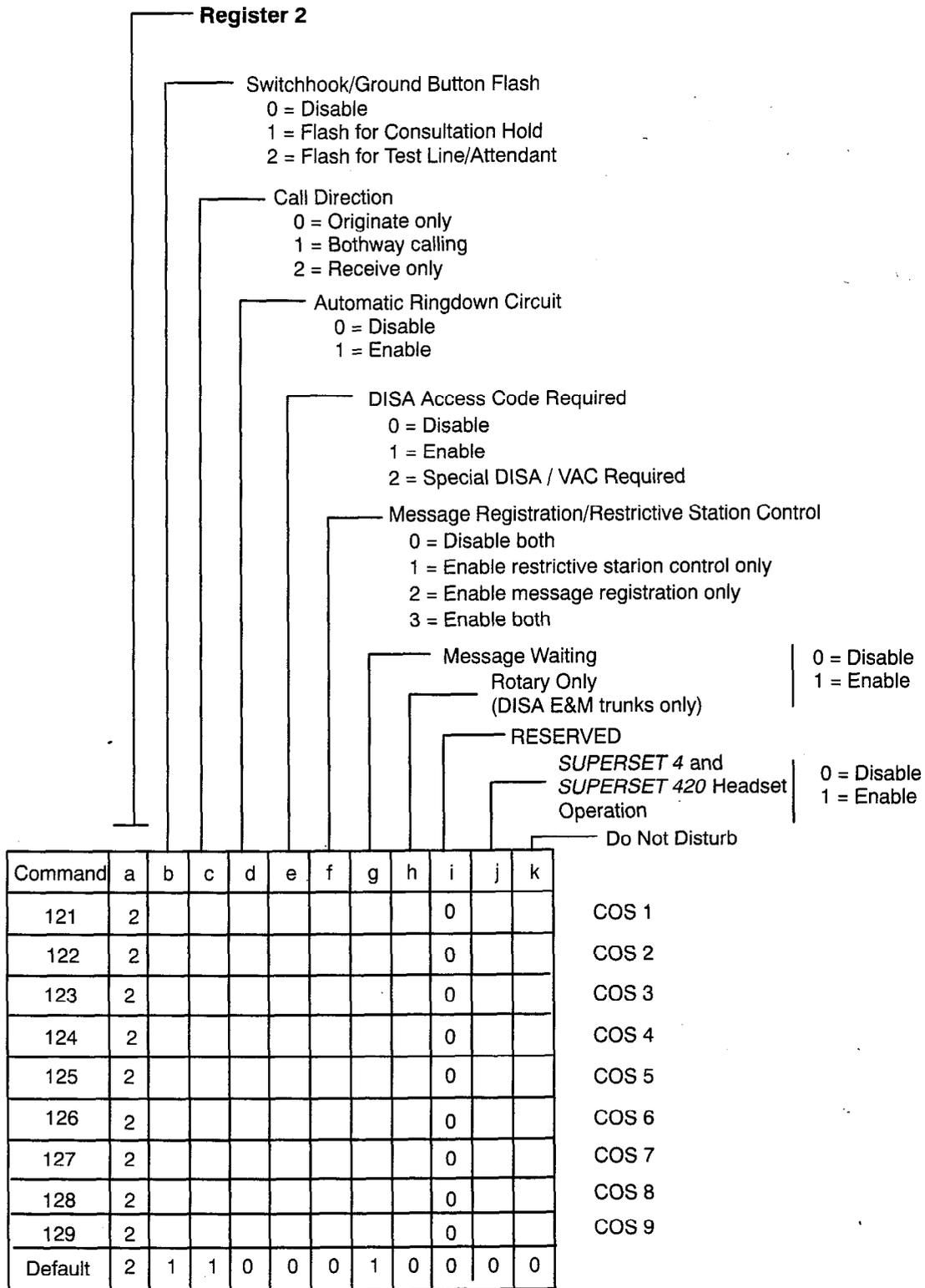
COS 1 → COS 9 PROGRAMMING



Command	a	b	c	d	e	f	g	h	i	j	
121	1										COS 1
122	1										COS 2
123	1										COS 3
124	1										COS 4
125	1										COS 5
126	1										COS 6
127	1										COS 7
128	1										COS 8
129	1										COS 9
Default	1	1	1	1	1	1	1	0	0	1	

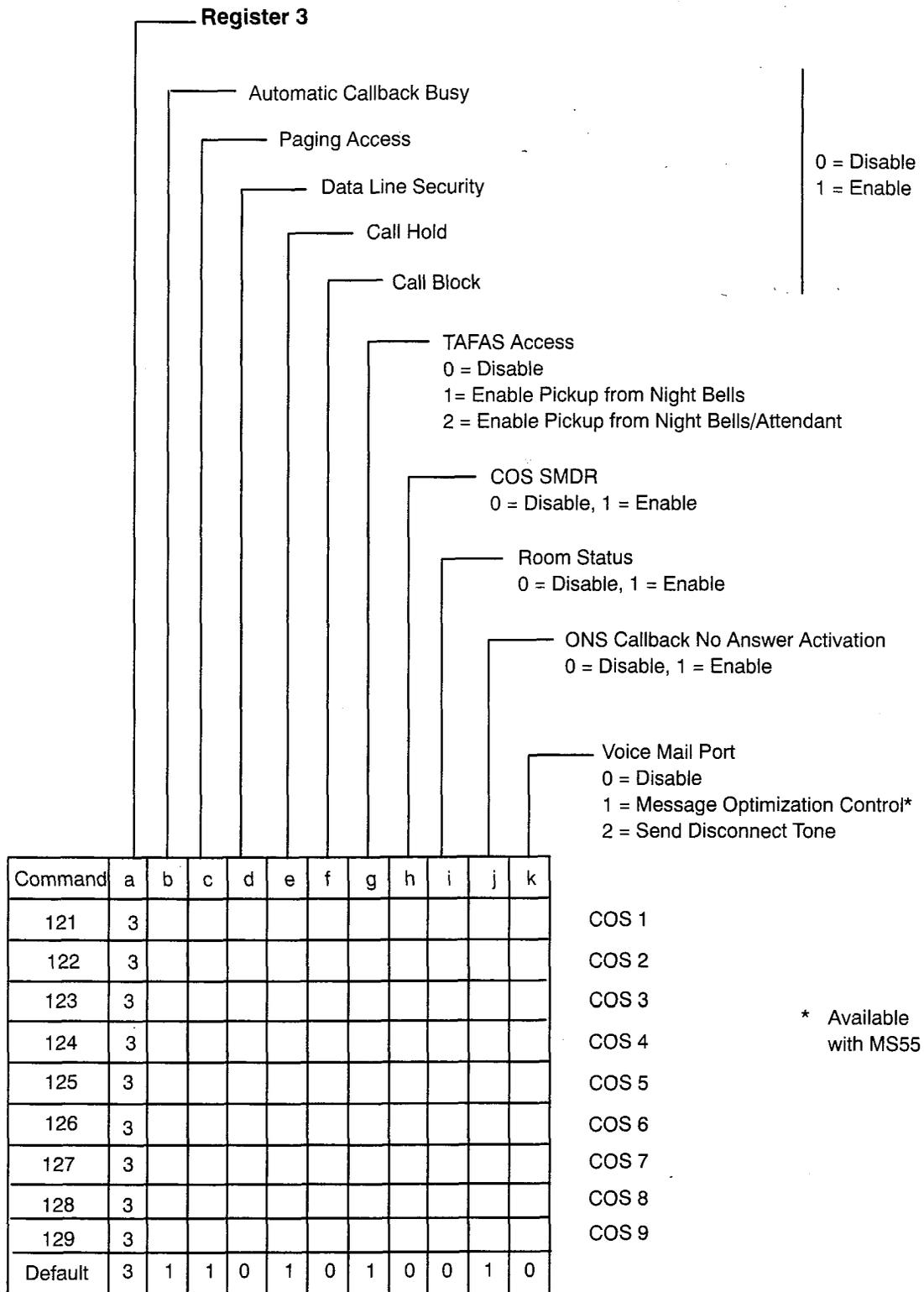
COMMANDS 121 → 129

COS 1 → COS 9 PROGRAMMING



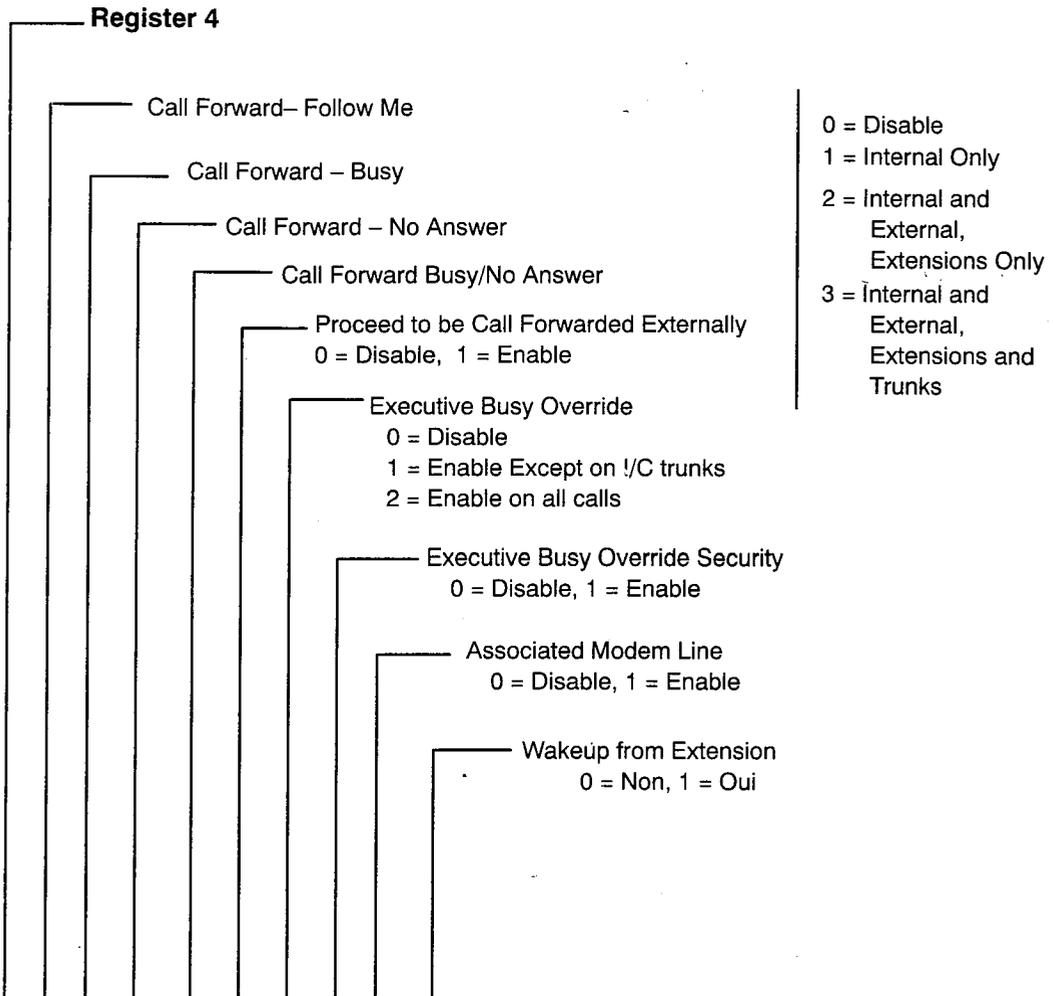
COMMANDS 121 → 129

COS 1 → COS 9 PROGRAMMING



COMMANDS 121 → 129

COS 1 → COS 9 PROGRAMMING

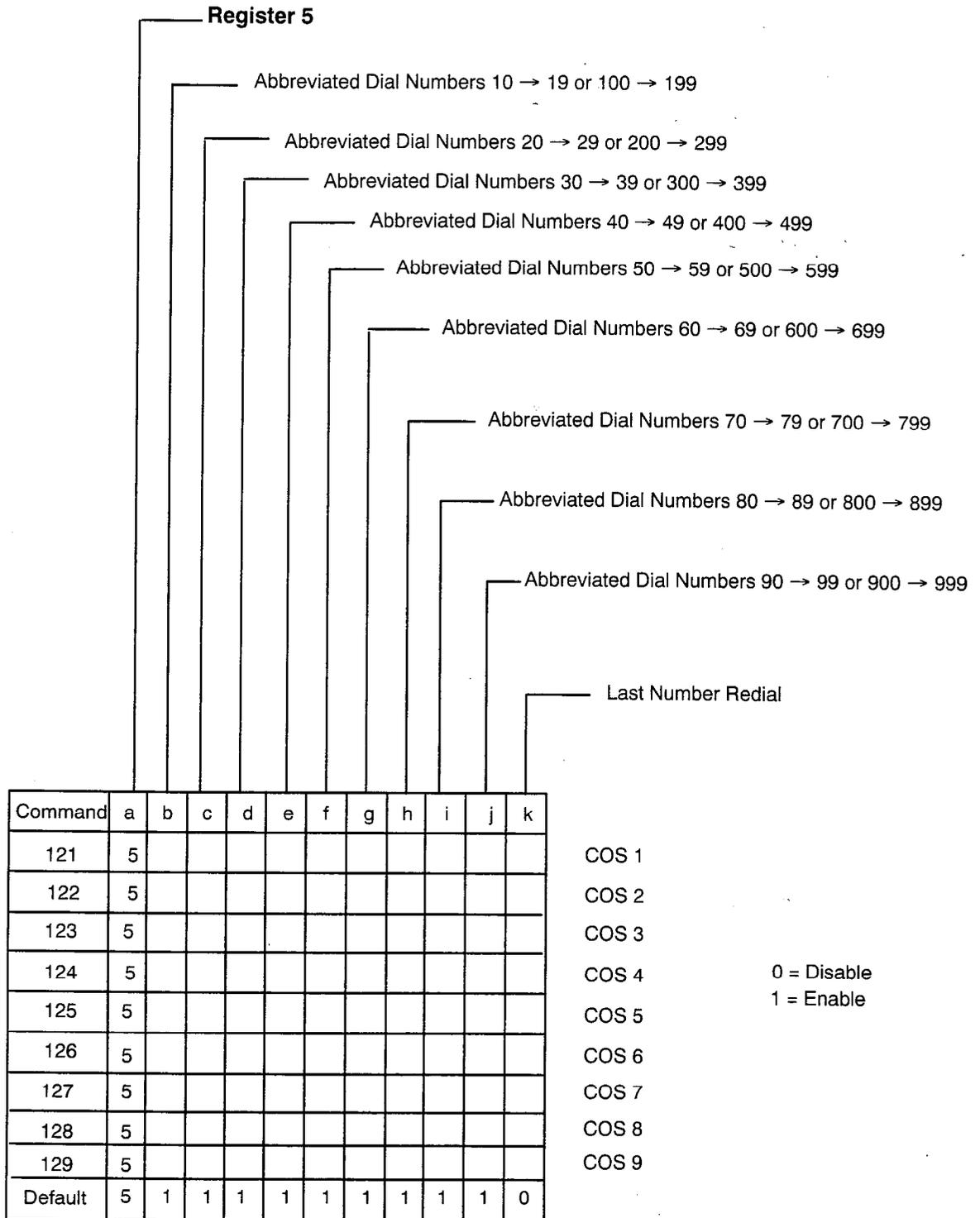


- 0 = Disable
- 1 = Internal Only
- 2 = Internal and External, Extensions Only
- 3 = Internal and External, Extensions and Trunks

Command	a	b	c	d	e	f	g	h	i	j	
121	4										COS 1
122	4										COS 2
123	4										COS 3
124	4										COS 4
125	4										COS 5
126	4										COS 6
127	4										COS 7
128	4										COS 8
129	4										COS 9
Default	4	1	1	1	1	0	0	0	0	0	

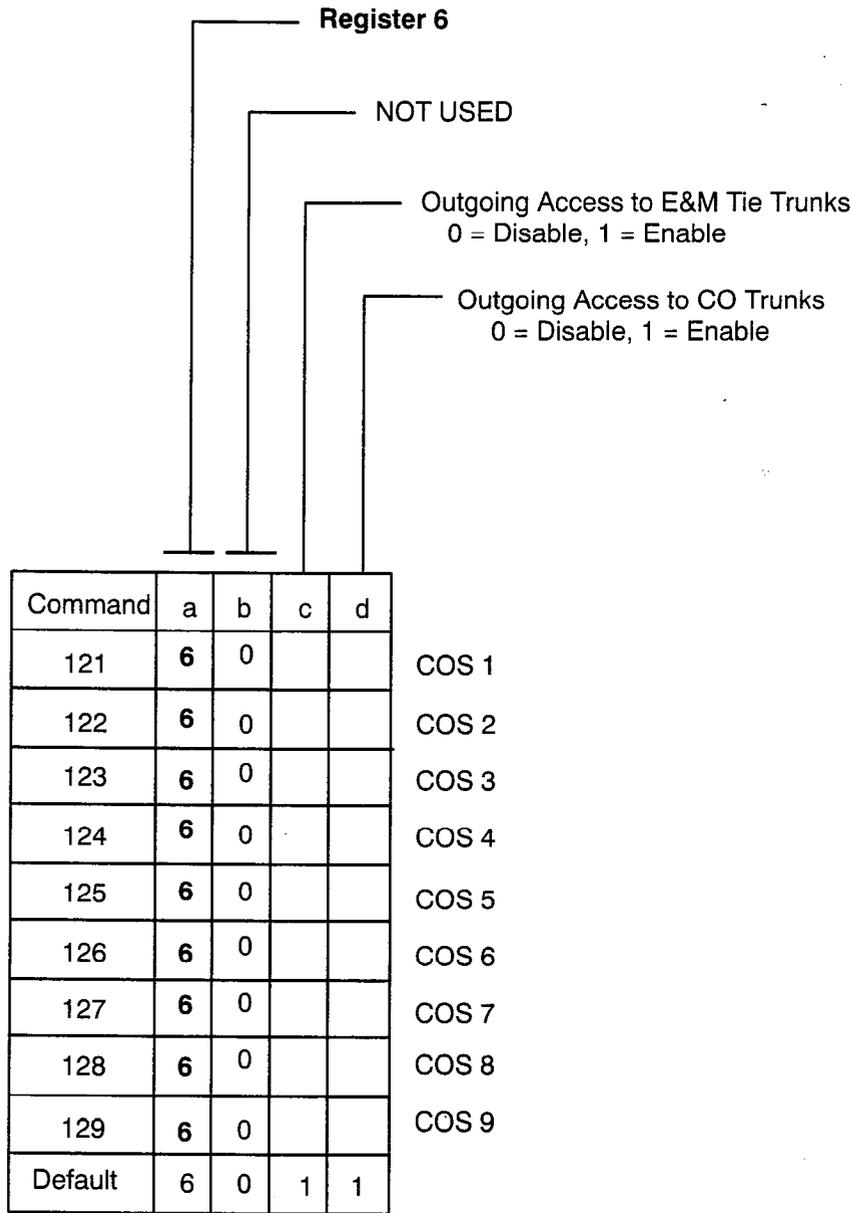
COMMANDS 121 → 129

COS 1 → COS 9 PROGRAMMING



COMMANDS 121 → 129

COS 1 → COS 9 PROGRAMMING



COMMANDS 121 → 129

COS 1 → COS 9 PROGRAMMING

Register 7

SUPERSET 4 and SUPERSET 420 Telephone Message Programming  
0 = Disable, 1 = Enable

Account Code Entry  
0 = Not allowed  
1 = Optional  
2 = Required for Toll Calls Only  
3 = Required for All Calls (Toll & Non-Toll)

Auxiliary Attendant Position  
0 = Disable, 1 = Enable

Directed Call Pickup  
0 = Disable, 1 = Enable

Directed Call Pickup Security  
0 = Disable, 1 = Enable

Hunt Group Login  
0 = Disable, 1 = Enable

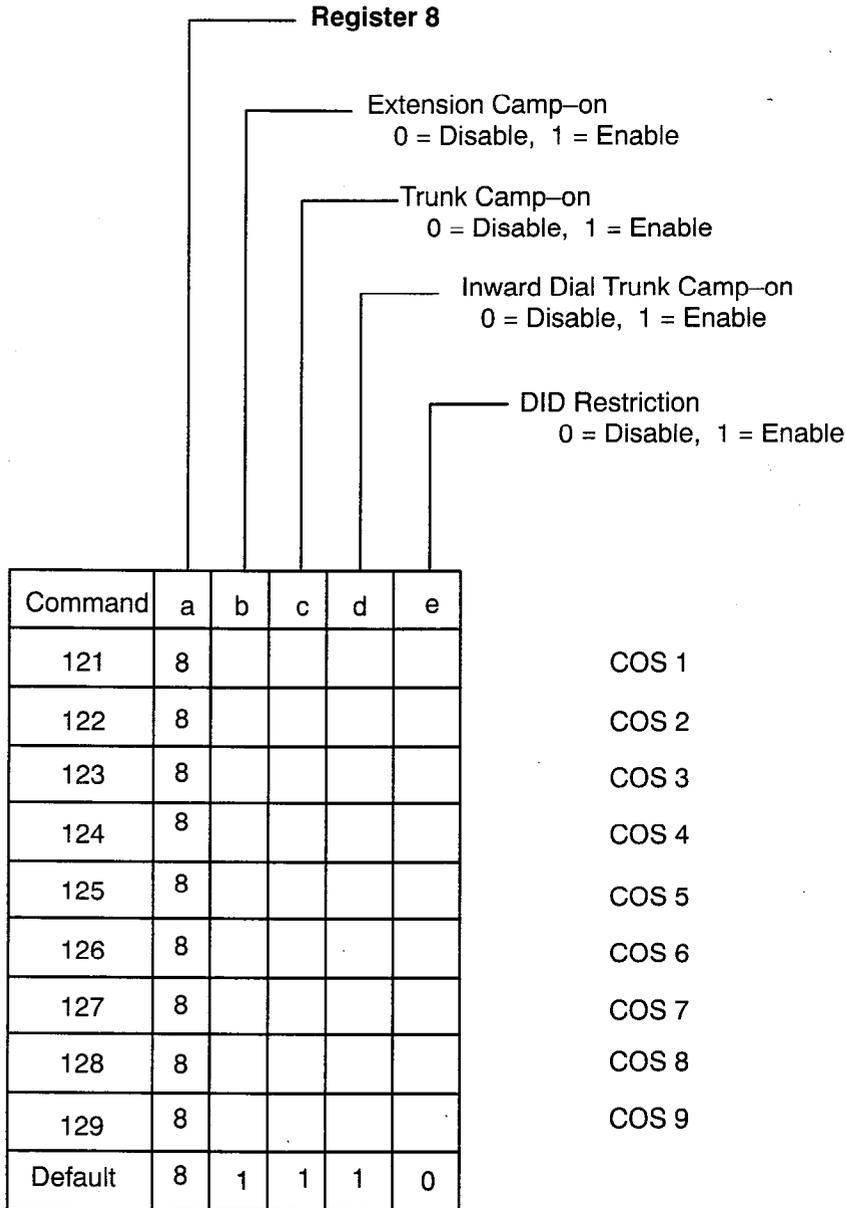
Lockout Alarm  
0 = Disable, 1 = Enable

Command	a	b	c	d	e	f	g	h
121	7							
122	7							
123	7							
124	7							
125	7							
126	7							
127	7							
128	7							
129	7							
Default	7	0	0	0	0	0	0	0

COS 1  
COS 2  
COS 3  
COS 4  
COS 5  
COS 6  
COS 7  
COS 8  
COS 9

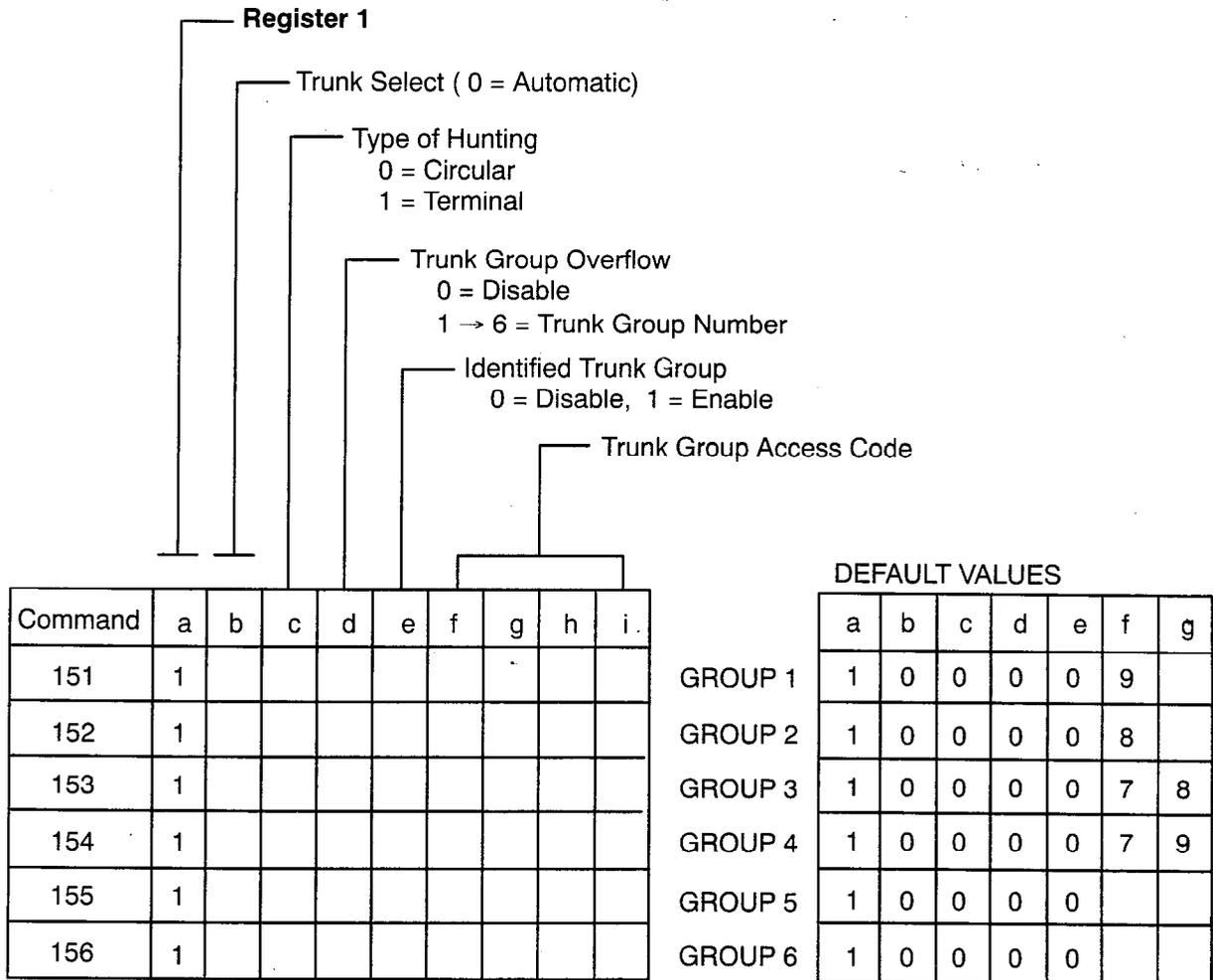
COMMANDS 121 → 129

COS 1 → COS 9 PROGRAMMING



COMMANDS 151 → 156

TRUNK GROUP PROGRAMMING



COMMANDS 151 → 156

TRUNK GROUP PROGRAMMING

Register 2

Wait for Dial Tone

- 0 = No wait, outpulse after delay
- 1 = Wait up to 5 seconds, then outpulse anyway
- 2 = Check for dial tone every 5 seconds
- 3 = Unlimited wait with detection by user

Dial Tone Detection Timing

- 0 = 120 ms required
- 1 = 40 ms required

Delay before Outpulsing (Wait for Dial Tone = 0)

- 1 → 5 seconds

Answer Supervision

- 0 = No Answer Supervision
- 1 = Supervision is Meter Pulse or Reversal
- 2 = Ignore Supervision except for Toll Restriction
- 3 = Supervision is Meter Pulse, Ignore Reversals

Restrict External Calls on REversal

- (0 = Disable, 1 = Enable)

DTMF or Rotary Outpulsing

- 0 = DTMF
- 1 = Rotary
- 2 = Rotary, Disable Outgoing Audio Until Answer
- 3 = Rotary, inhibit DTMF Until Answer

Simulate CO Dial Tone

- 0 = Disable, 1 = Enable

Trunk Group SMDR Enable

- 0 = Disable, 1 = Enable

Trunk Group Last Number Redial

- 0 = Disable, 1 = Enable

Trunk Group Manual E&M Trunk

- 0 = Disable, 1 = Enable

Command	a	b	c	d	e	f	g	h	i	j	k
151	2										
152	2										
153	2										
154	2										
155	2										
156	2										
Default	2	0	0	2	0	0	0	0	0	0	0

GROUP 1

GROUP 2

GROUP 3

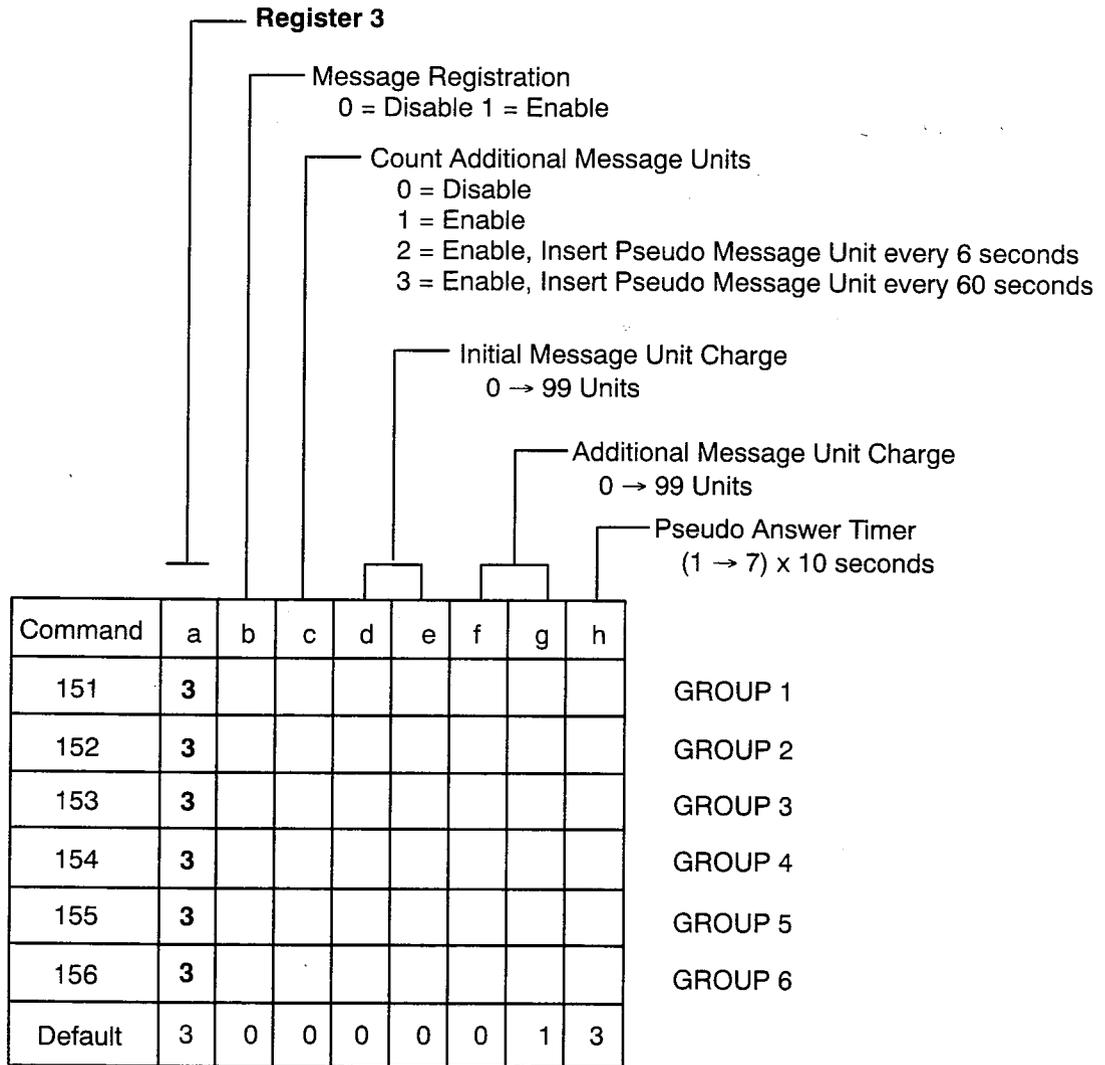
GROUP 4

GROUP 5

GROUP 6

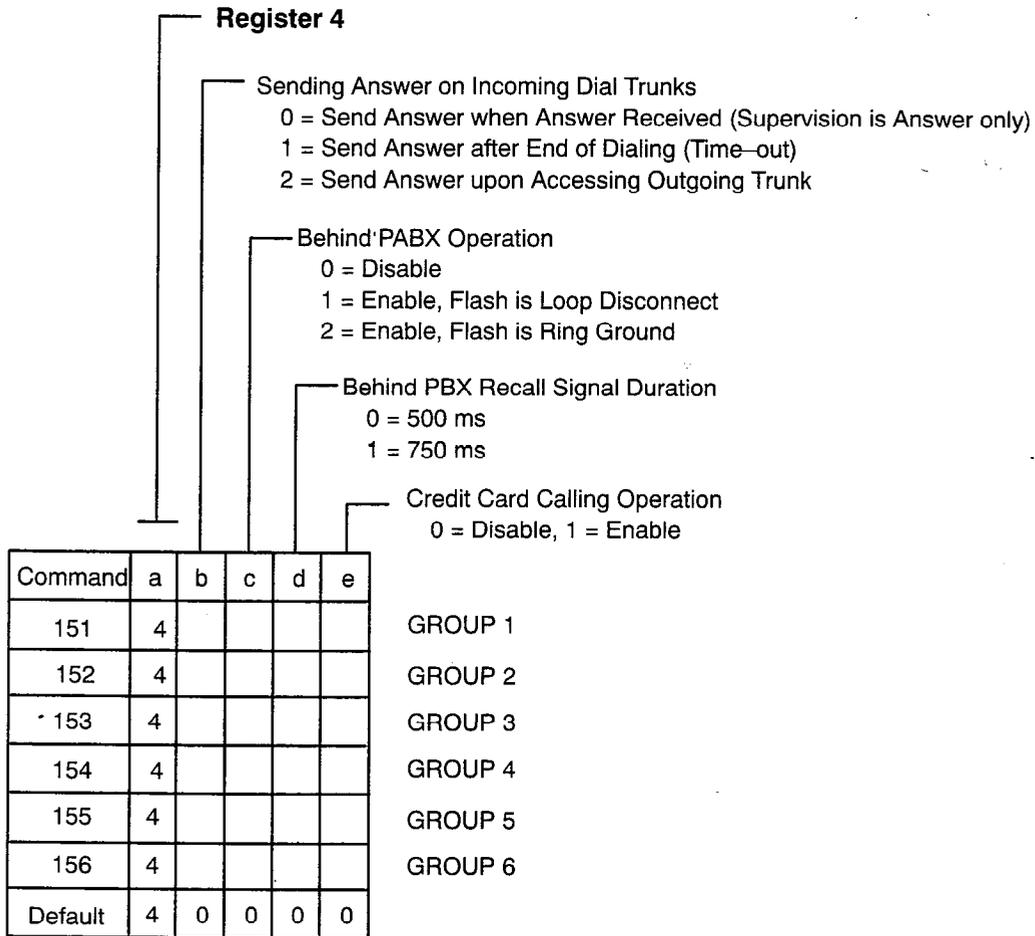
COMMANDS 151 → 156

TRUNK GROUP PROGRAMMING



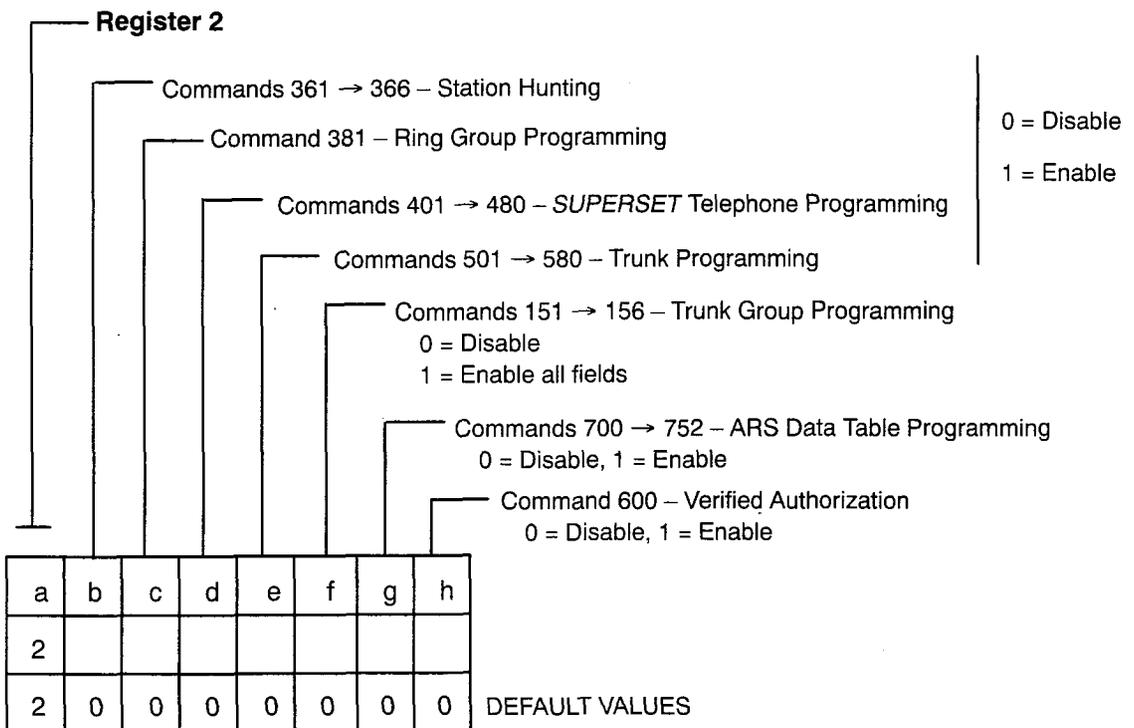
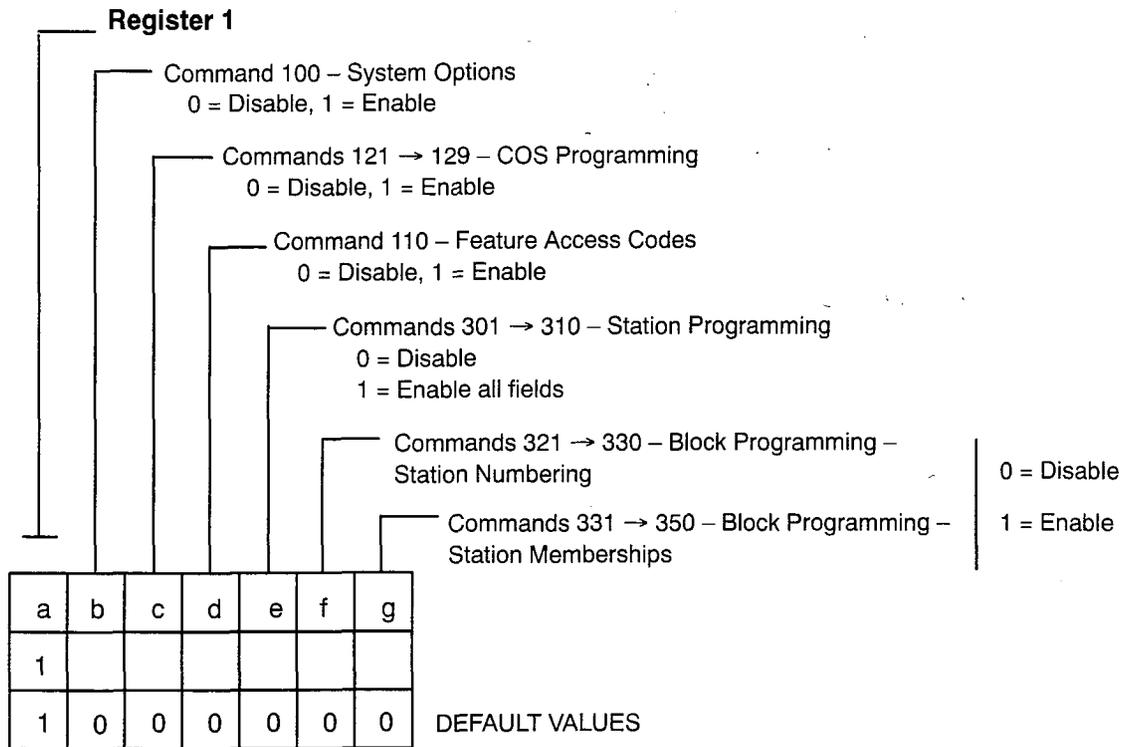
COMMANDS 151 → 156

TRUNK GROUP PROGRAMMING



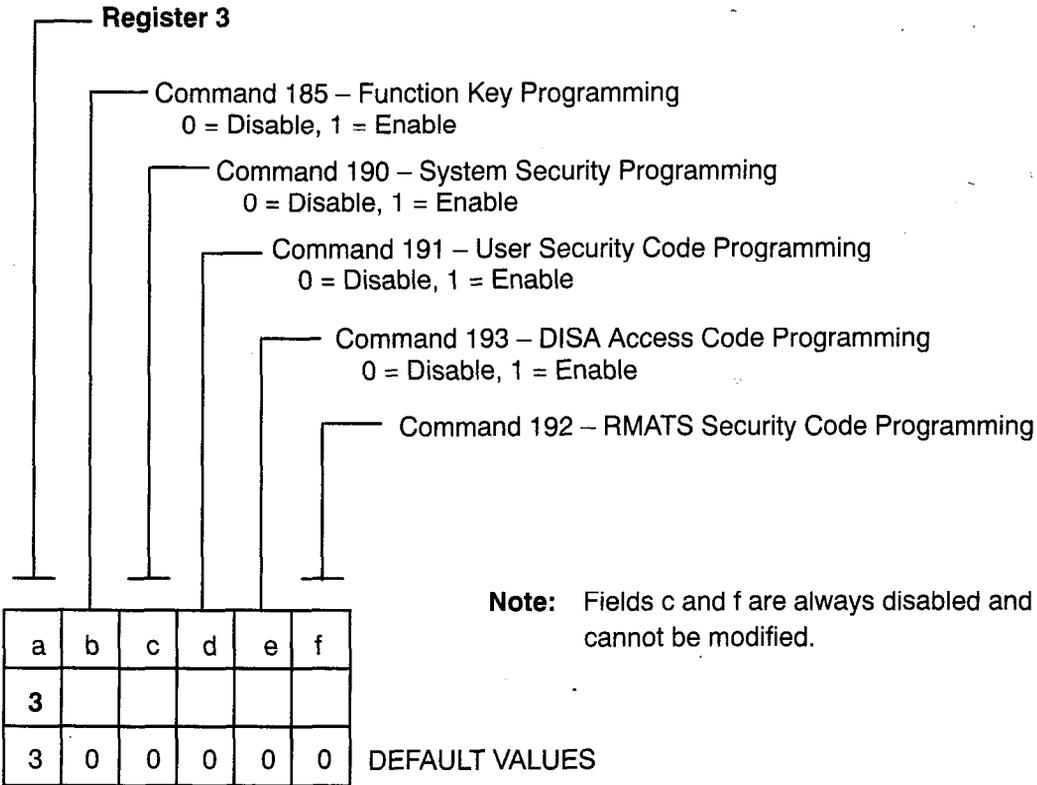
**COMMAND 180**

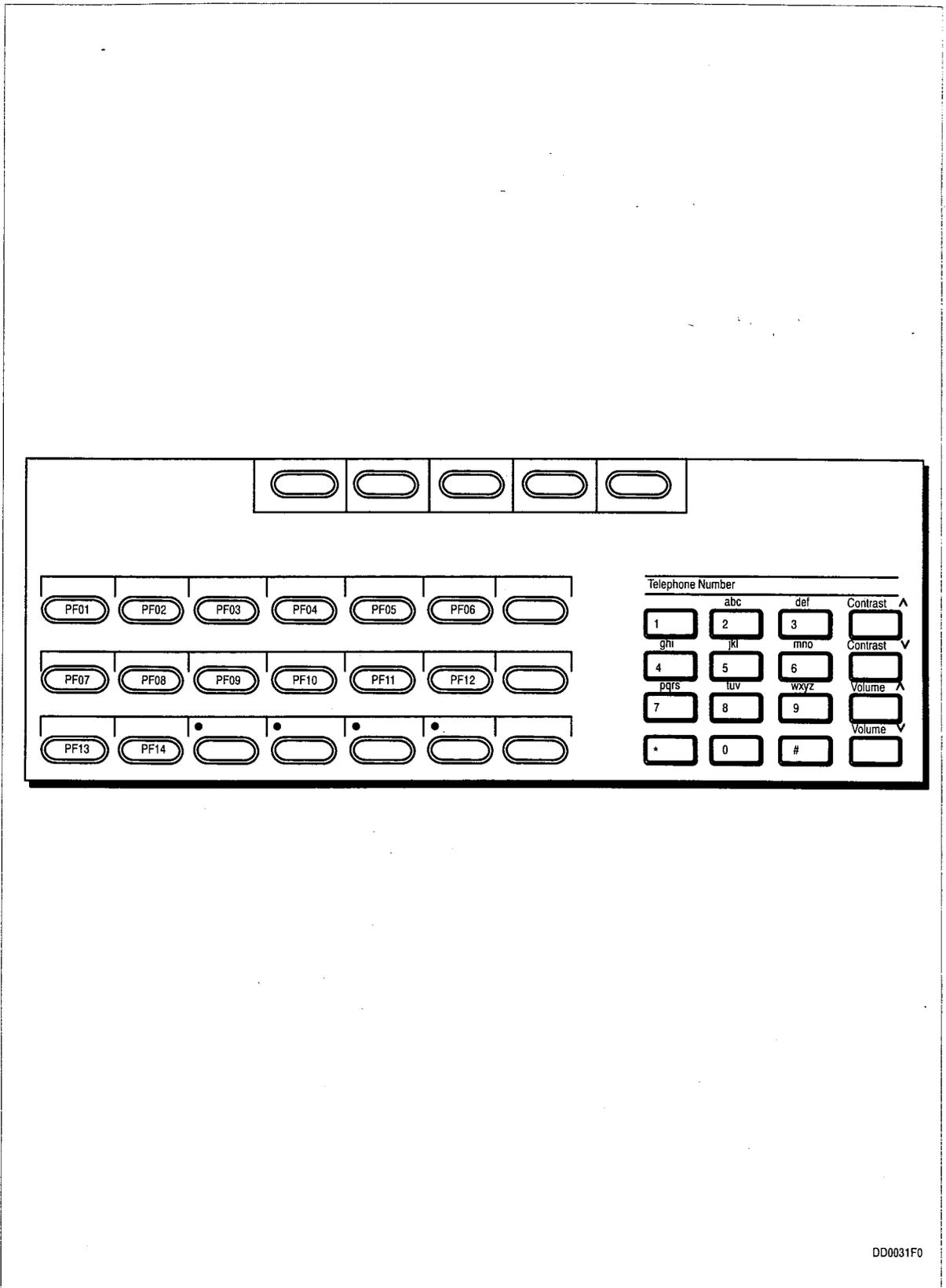
**USER PROGRAMMING ACCESS**



**COMMAND 180**

**USER PROGRAMMING ACCESS**





DD0031F0

Figure 2-2 Programmable Function Keys

**COMMAND 185**

**ATTENDANT CONSOLE FUNCTION KEY PROGRAMMING**

Key Number (1 → 14)

Key Function:

- 00 = Unassigned
- 01 = Message Registration / Restrictive Station Control
- 02 = Override
- 03 = Page
- 04 = Call Block
- 05 = TAFAS
- 06 = Automatic Wake-up
- 07 = Trunk Status
- 08 = Account Code Entry
- 09 = Message Waiting
- 10 = Function

- 11 = Mute
- 12 = Night
- 13 = Swap/Split
- 14 = Status
- 15 = Both
- 16 = Room Status
- 17 = Do Not Disturb
- 18 = Attendant Tone Signalling
- 19 = Restrict DID
- 20 = VAC Entry
- 21 = Attendant Call Pickup

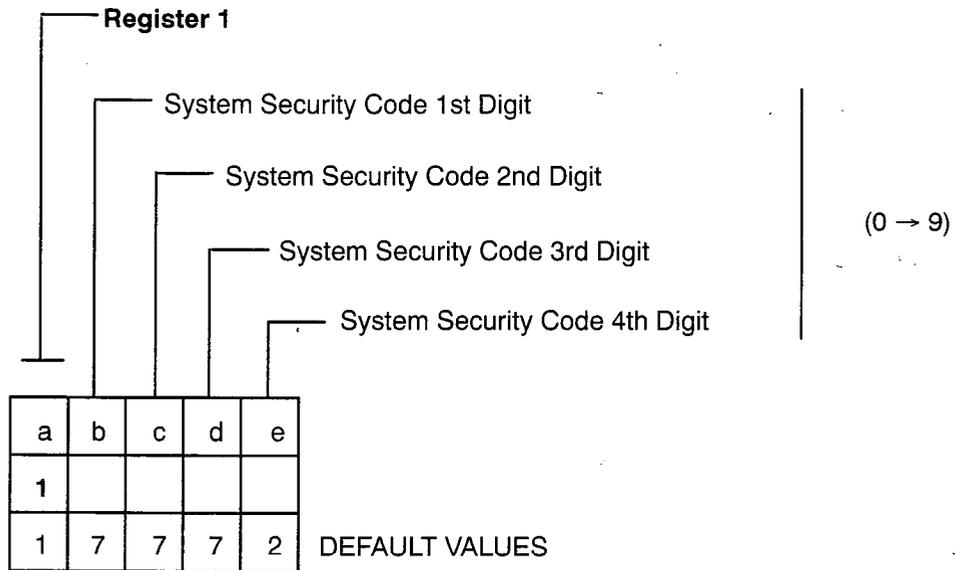
a	b	c	d
0	1		
0	2		
0	3		
0	4		
0	5		
0	6		
0	7		
0	8		
0	9		
1	0		
1	1		
1	2		
1	3		
1	4		

**DEFAULT VALUES**

a	b	c	d
0	1	1	0
0	2	1	4
0	3	0	7
0	4	0	4
0	5	0	5
0	6	0	3
0	7	0	6
0	8	0	1
1	9	0	2
1	0	0	9
1	1	1	5
1	2	1	3
1	3	1	1
1	4	1	2

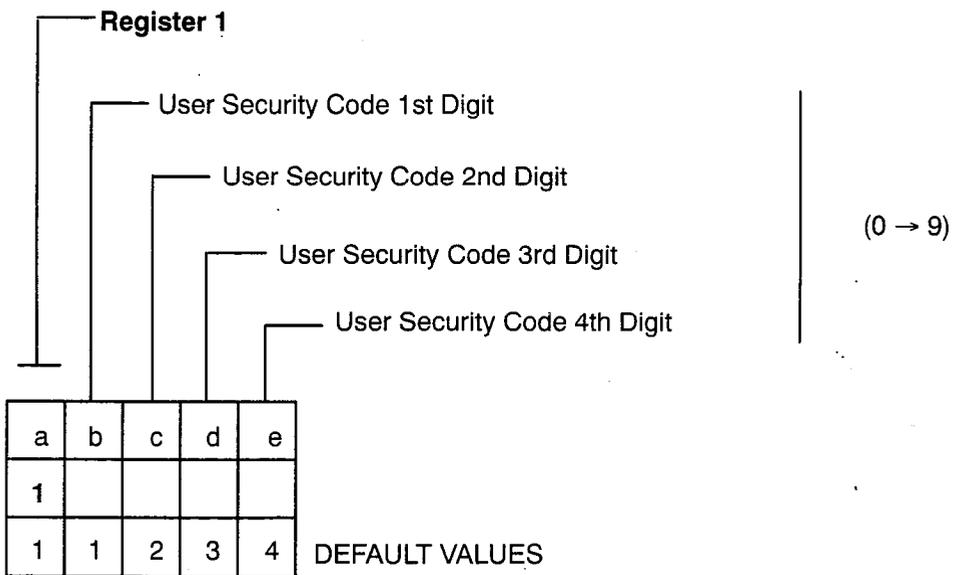
**COMMAND 190**

**SYSTEM SECURITY CODE PROGRAMMING**



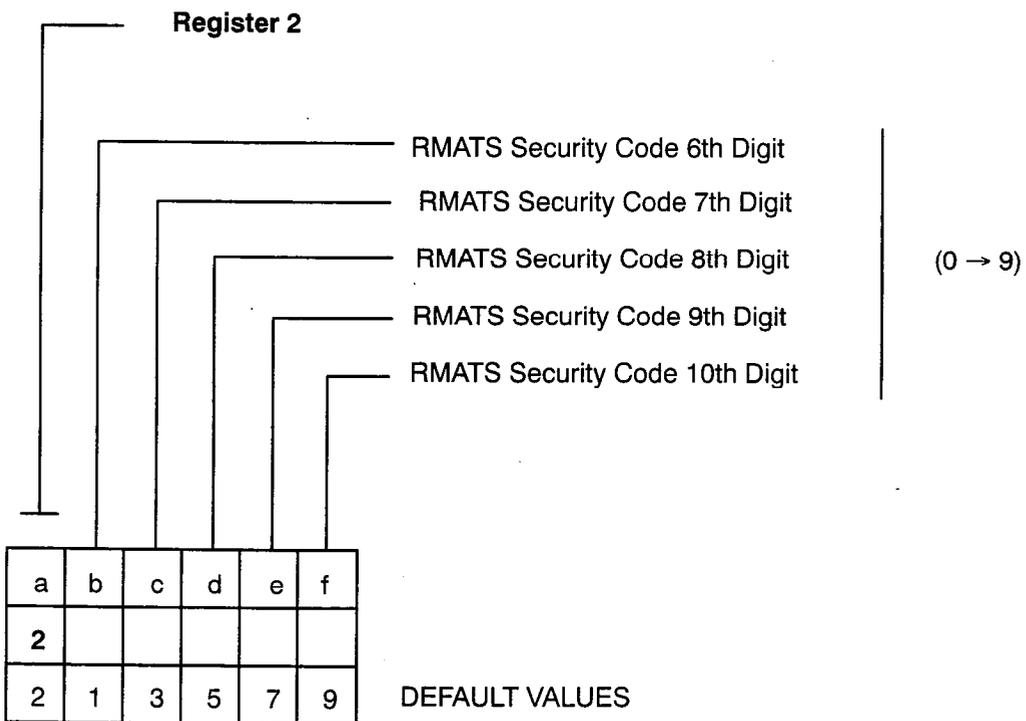
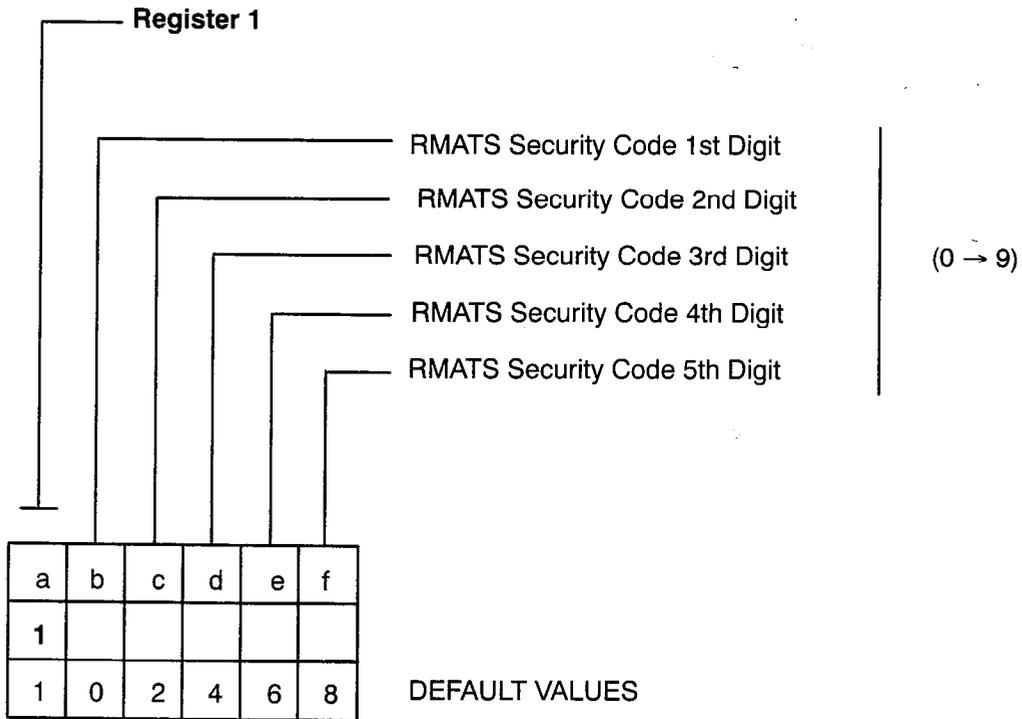
**COMMAND 191**

**USER SECURITY CODE PROGRAMMING**



**COMMAND 192**

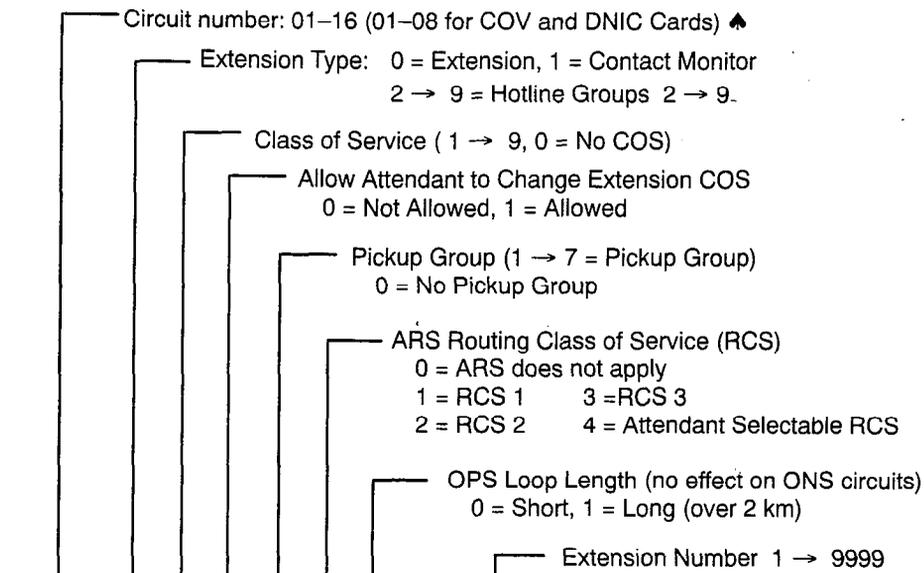
**RMATS SECURITY CODE PROGRAMMING**





**COMMAND 3: (301 → 310)**

**EXTENSION PROGRAMMING**



a	b	c	d	e	f	g	h	i	j	k	l	comment
0	1											
0	2											
0	3											
0	4											
0	5											
0	6											
0	7											
0	8											
0	9											
1	0											
1	1											
1	2											
1	3											
1	4											
1	5											
1	6											
Default	0	1	0	1	0	0						

♣ Only odd-numbered circuits are valid for OPS extensions.

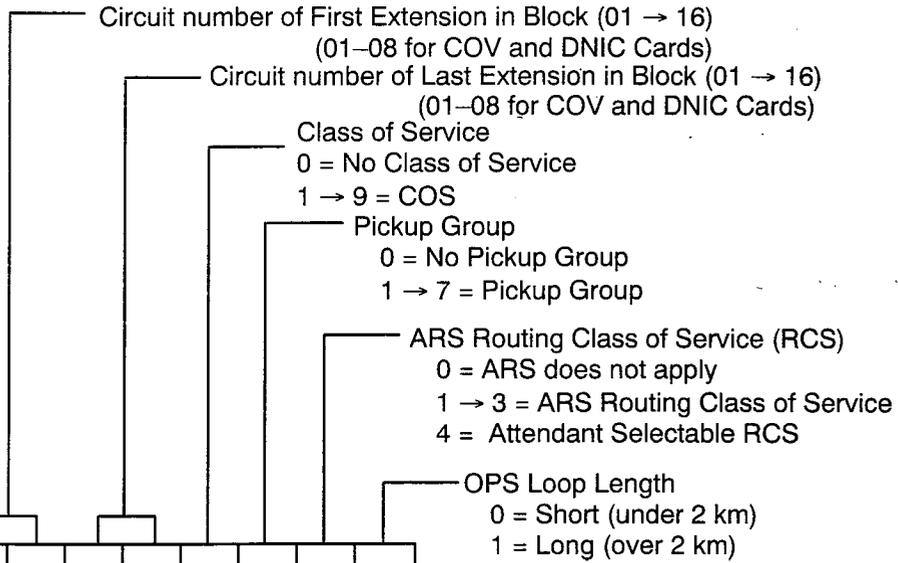
**COMMANDS 321 → 330      EXTENSION NUMBERING – BLOCK PROGRAMMING**

Command	a	b	c	d	e	f	g	h	
321									SLOT 1
322									SLOT 2
323									SLOT 3
324									SLOT 4
325									SLOT 5
326									SLOT 6
327									SLOT 7
328									SLOT 8
329									SLOT 9
330									SLOT 10
Default	0	1	0	1					

**Note:** Slots 9 (nine) and 10 (ten) not available for DNIC Telephones.

**COMMANDS 341 → 350**

**EXTENSION MEMBERSHIPS – BLOCK PROGRAMMING**

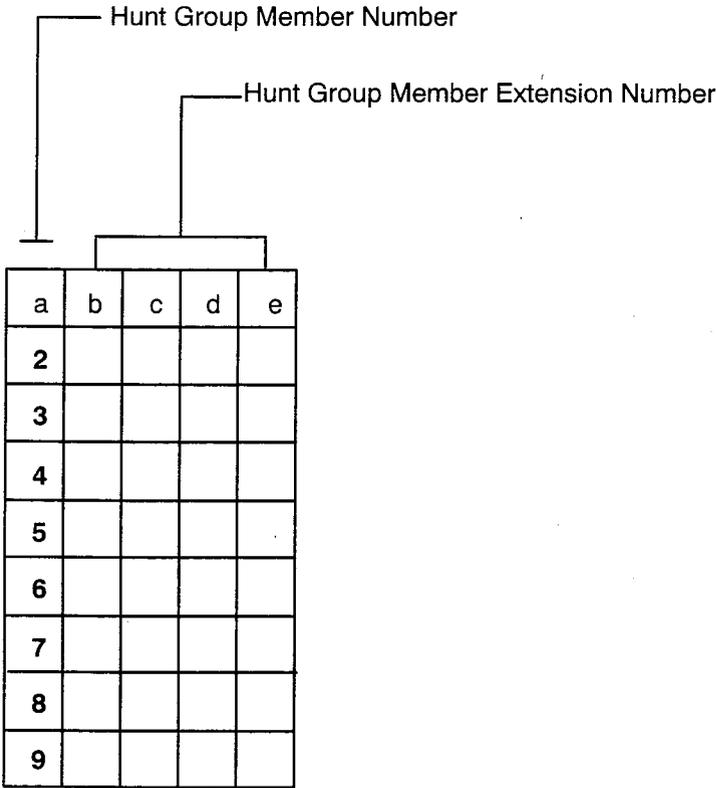
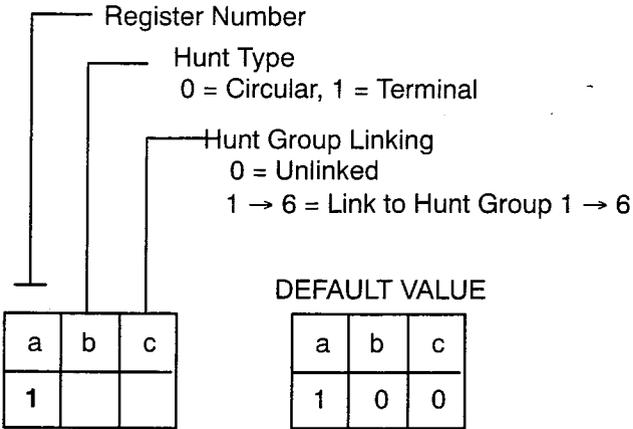


Command	a	b	c	d	e	f	g	h
341								
342								
343								
344								
345								
346								
347								
348								
349								
350								
Default	0	1	0	1	1	1	0	0

SLOT 1  
SLOT 2  
SLOT 3  
SLOT 4  
SLOT 5  
SLOT 6  
SLOT 7  
SLOT 8  
SLOT 9  
SLOT 10

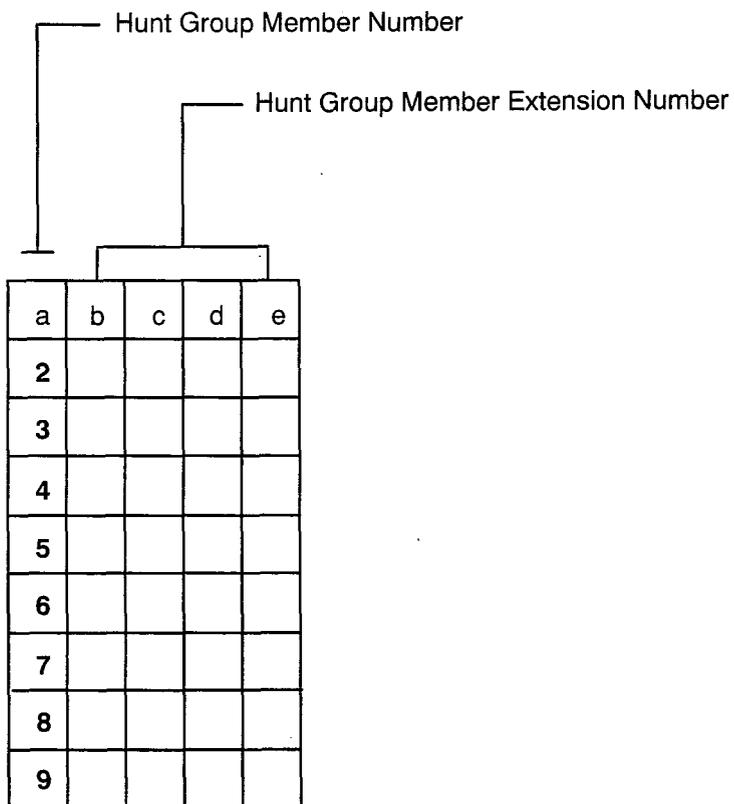
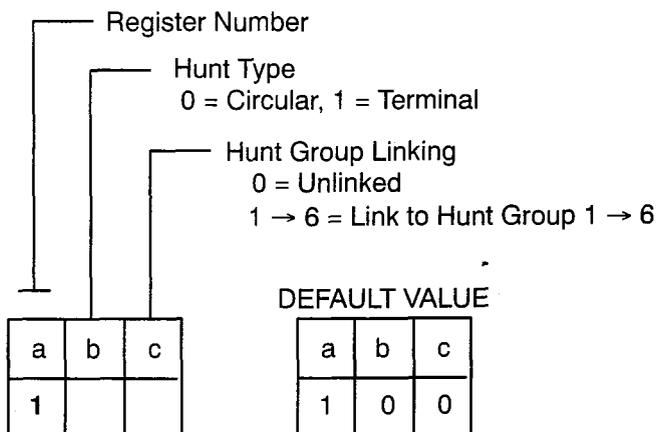
COMMAND 361

EXTENSION HUNT GROUP 1 PROGRAMMING



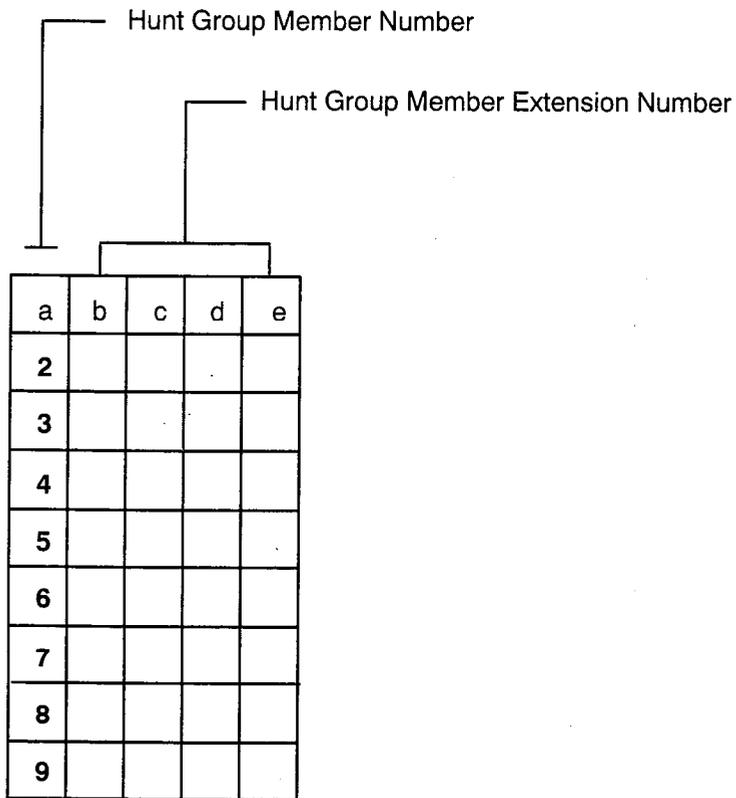
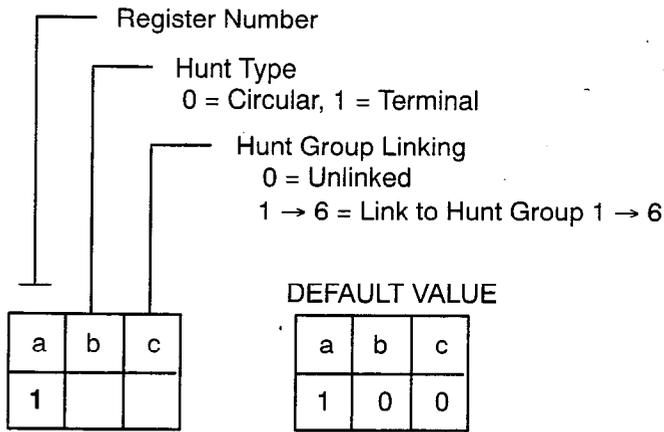
**COMMAND 362**

**EXTENSION HUNT GROUP 2 PROGRAMMING**



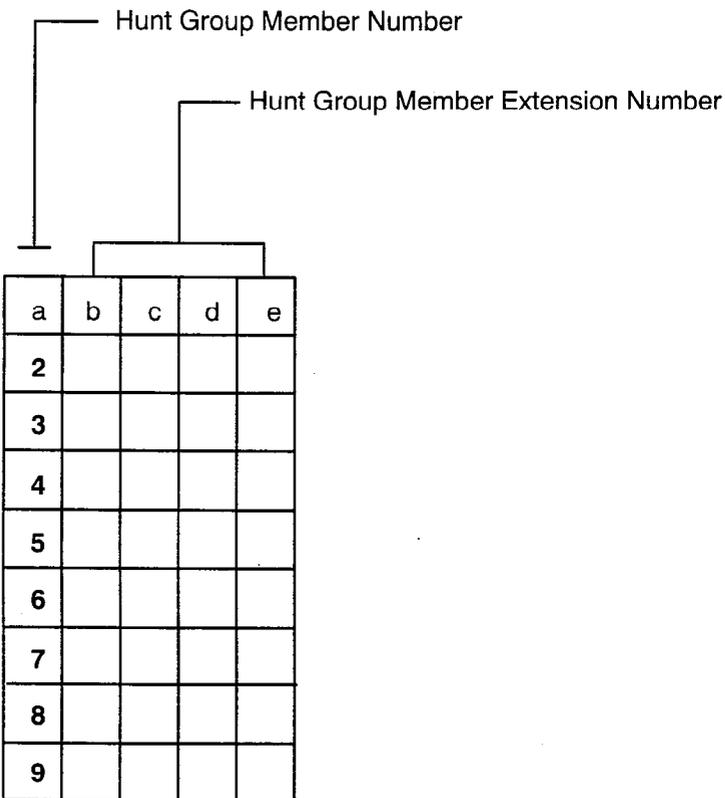
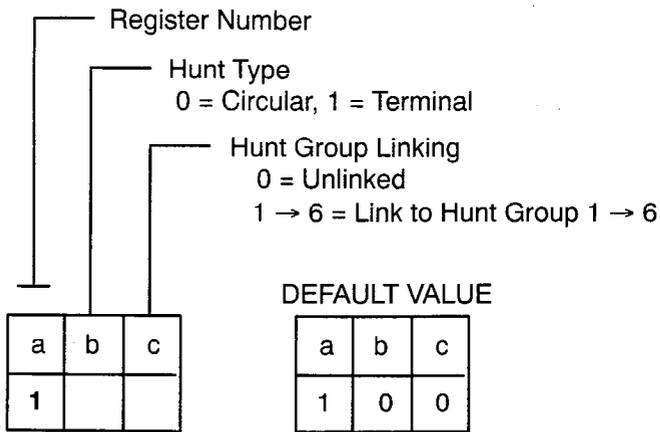
**COMMAND 363**

**EXTENSION HUNT GROUP 3 PROGRAMMING**



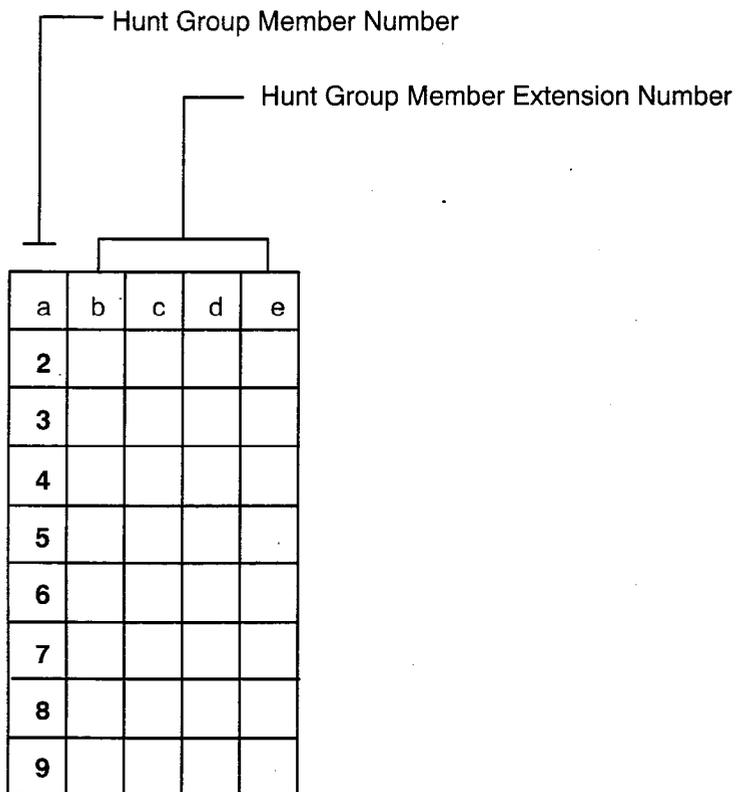
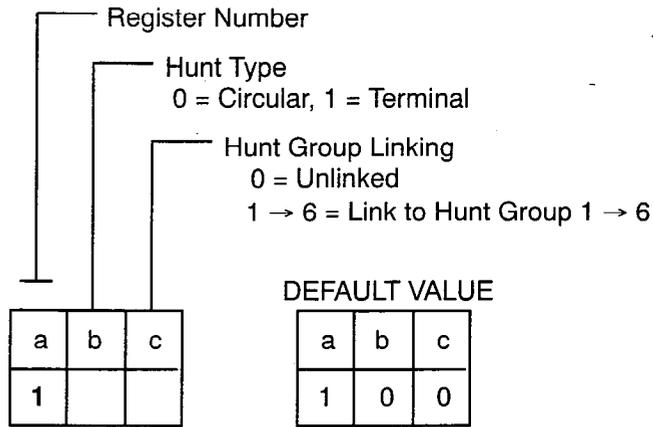
**COMMAND 364.**

**EXTENSION HUNT GROUP 4 PROGRAMMING**



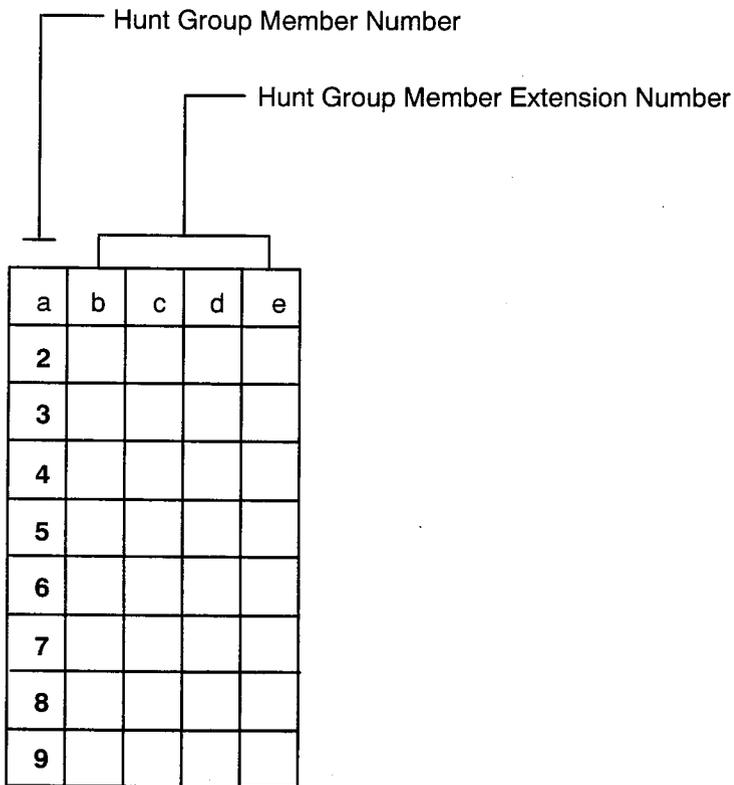
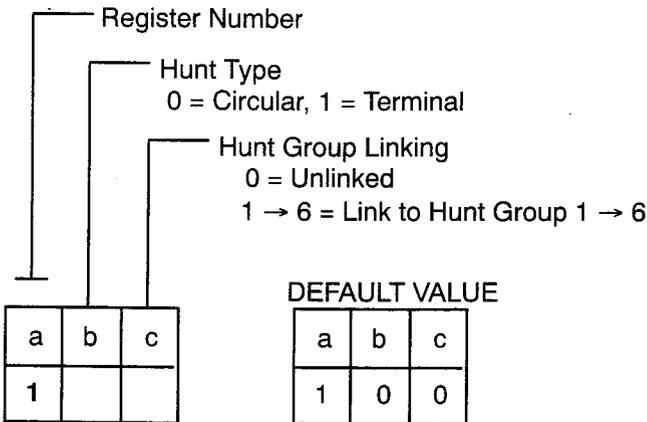
**COMMAND 365**

**EXTENSION HUNT GROUP 5 PROGRAMMING**



**COMMAND 366-**

**EXTENSION HUNT GROUP 6 PROGRAMMING**



COMMAND 381

EXTENSION RING GROUP PROGRAMMING

Ring Group Member Number

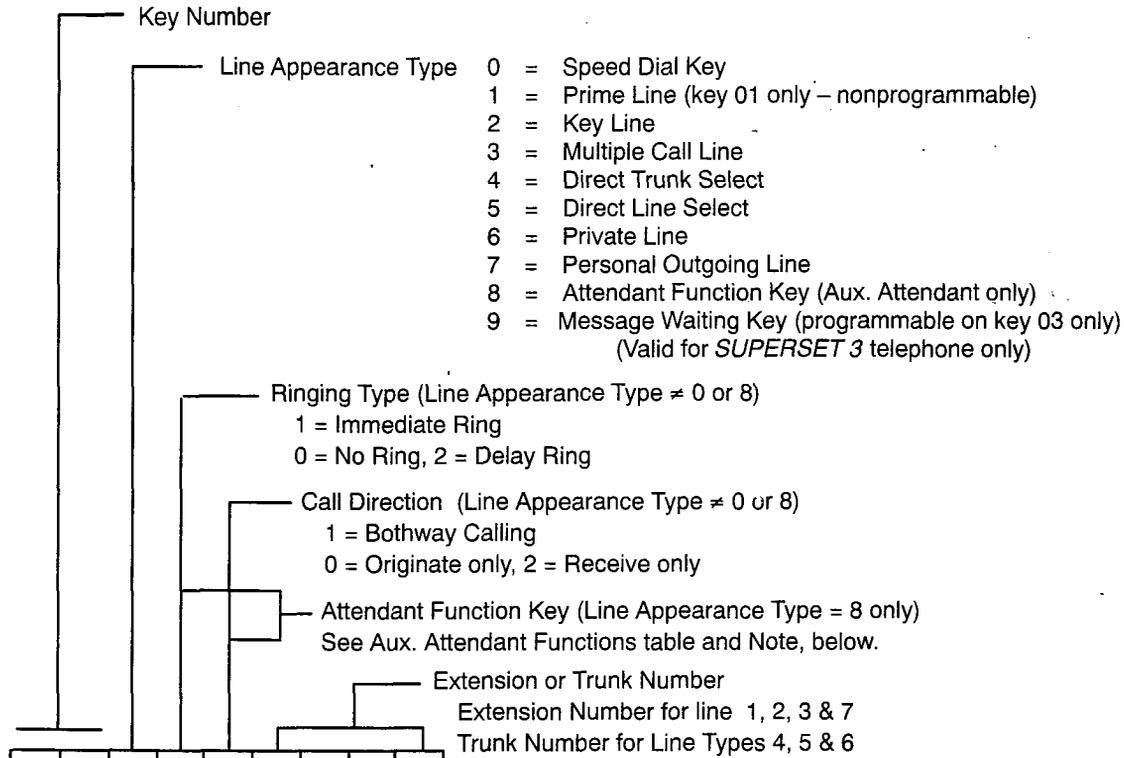
Extension Number (1 → 9999)

	a	b	c	d	e
1					
2					
3					
4					
5					
6					
7					
8					
9					

COMMAND 4 \_\_\_\_\_

**SUPERSET TELEPHONES PROGRAMMING**

EXT: \_\_\_\_\_



a	b	c	d	e	f	g	h	i
0	1	1	1	1				
0	2							
0	3							
0	4							
0	5							
0	6							
0	7							
0	8							
0	9							
1	0							
1	1							
1	2							
1	3							
1	4							
1	5							
Default	0							

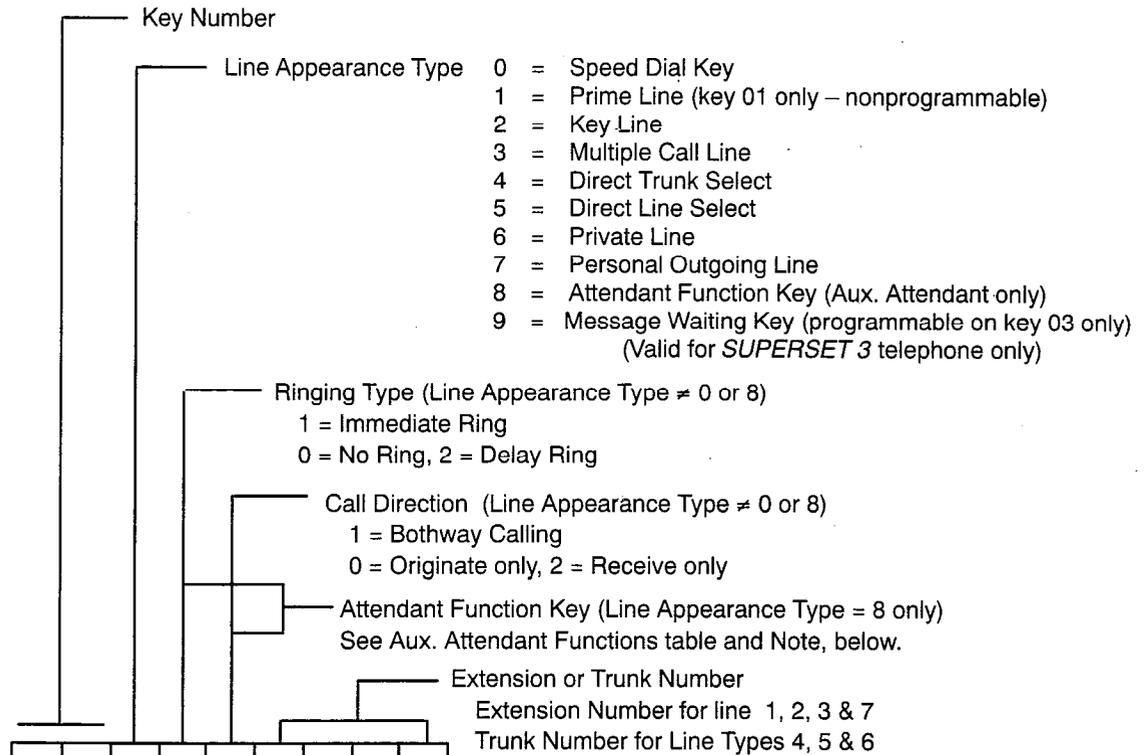
AUX. ATTENDANT FUNCTIONS	
01	= DIAL "0"
02	= DO NOT DISTURB
03	= RECALL
04	= HOLD 1
05	= HOLD 2
06	= HOLD 3
07	= LDN 1
08	= LDN 2
09	= LDN 3
10	= MESSAGE WAITING
11	= MSG REGISTER
12	= NIGHT SERVICE
13	= OVERFLOW

**Note:** A maximum of FIVE appearances of each Auxiliary Attendant function key can be programmed on the SX-50 system.

COMMAND 4

**SUPERSET TELEPHONES PROGRAMMING**

EXT: \_\_\_\_\_



a	b	c	d	e	f	g	h	i
0	1	1	1	1				
0	2							
0	3							
0	4							
0	5							
0	6							
0	7							
0	8							
0	9							
1	0							
1	1							
1	2							
1	3							
1	4							
1	5							
Default	0							

AUX. ATTENDANT FUNCTIONS	
01	= DIAL "0"
02	= DO NOT DISTURB
03	= RECALL
04	= HOLD 1
05	= HOLD 2
06	= HOLD 3
07	= LDN 1
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09	= LDN 3
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13	= OVERFLOW

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COMMAND 4 \_\_\_\_\_

**SUPERSET TELEPHONES PROGRAMMING**

EXT: \_\_\_\_\_

Key Number

Line Appearance Type

- 0 = Speed Dial Key
- 1 = Prime Line (key 01 only – nonprogrammable)
- 2 = Key Line
- 3 = Multiple Call Line
- 4 = Direct Trunk Select
- 5 = Direct Line Select
- 6 = Private Line
- 7 = Personal Outgoing Line
- 8 = Attendant Function Key (Aux. Attendant only)
- 9 = Message Waiting Key (programmable on key 03 only)  
(Valid for SUPERSET 3 and SUPERSET 410 telephones only)

Ringing Type (Line Appearance Type ≠ 0 or 8)

- 1 = Immediate Ring
- 0 = No Ring, 2 = Delay Ring

Call Direction (Line Appearance Type ≠ 0 or 8)

- 1 = Bothway Calling
- 0 = Originate only, 2 = Receive only

Attendant Function Key (Line Appearance Type = 8 only)

See Aux. Attendant Functions table and Note, below.

Extension or Trunk Number

- Extension Number for line 1, 2, 3 & 7
- Trunk Number for Line Types 4, 5 & 6

a	b	c	d	e	f	g	h	i
0	1	1	1	1				
0	2							
0	3							
0	4							
0	5							
0	6							
0	7							
0	8							
0	9							
1	0							
1	1							
1	2							
1	3							
1	4							
1	5							
Default	0							

**AUX. ATTENDANT FUNCTIONS**

- 01 = DIAL "0"
- 02 = DO NOT DISTURB
- 03 = RECALL
- 04 = HOLD 1
- 05 = HOLD 2
- 06 = HOLD 3
- 07 = LDN 1
- 08 = LDN 2
- 09 = LDN 3
- 10 = MESSAGE WAITING
- 11 = MSG REGISTER
- 12 = NIGHT SERVICE
- 13 = OVERFLOW

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COMMAND 4 \_\_\_\_\_

**SUPERSET TELEPHONES PROGRAMMING**

EXT: \_\_\_\_\_

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- 5 = Direct Line Select
- 6 = Private Line
- 7 = Personal Outgoing Line
- 8 = Attendant Function Key (Aux. Attendant only)
- 9 = Message Waiting Key (programmable on key 03 only)  
(Valid for SUPERSET 3 and SUPERSET 410 telephones only)

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Attendant Function Key (Line Appearance Type = 8 only)  
See Aux. Attendant Functions table and Note, below.

Extension or Trunk Number

- Extension Number for line 1, 2, 3 & 7
- Trunk Number for Line Types 4, 5 & 6

a	b	c	d	e	f	g	h	i
0	1	1	1	1				
0	2							
0	3							
0	4							
0	5							
0	6							
0	7							
0	8							
0	9							
1	0							
1	1							
1	2							
1	3							
1	4							
1	5							
Default	0							

**AUX. ATTENDANT FUNCTIONS**

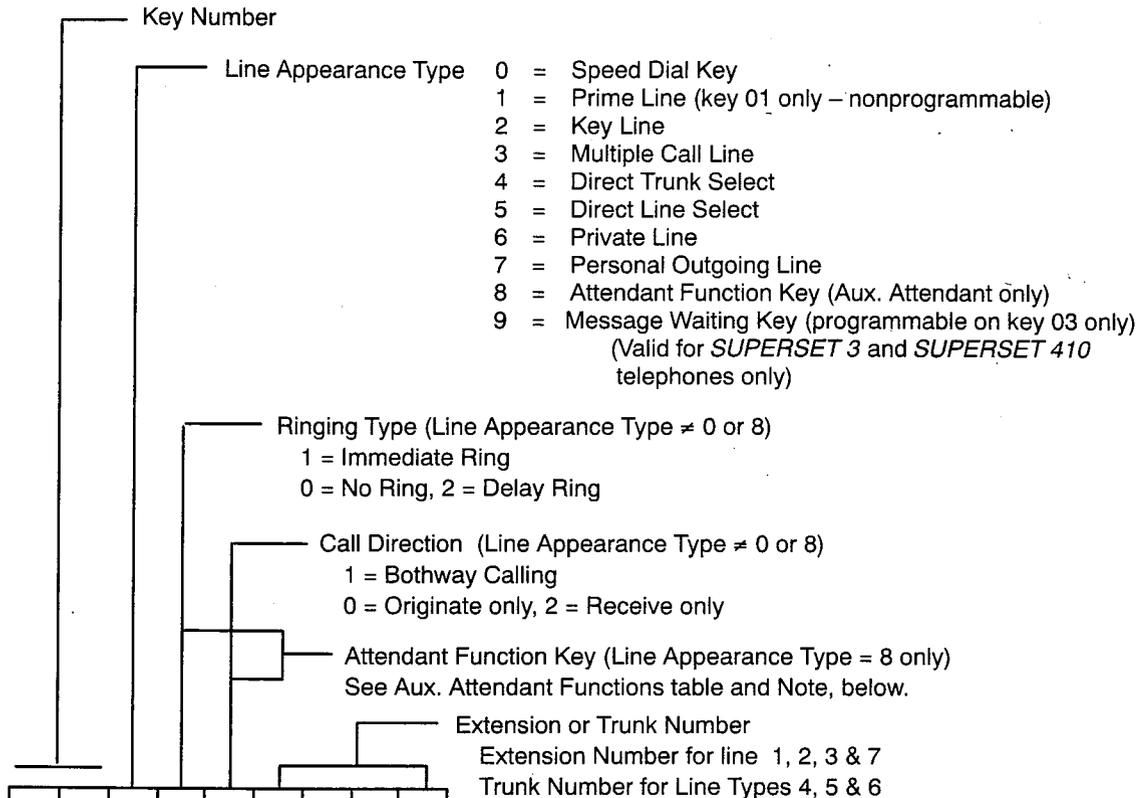
- 01 = DIAL "0"
- 02 = DO NOT DISTURB
- 03 = RECALL
- 04 = HOLD 1
- 05 = HOLD 2
- 06 = HOLD 3
- 07 = LDN 1
- 08 = LDN 2
- 09 = LDN 3
- 10 = MESSAGE WAITING
- 11 = MSG REGISTER
- 12 = NIGHT SERVICE
- 13 = OVERFLOW

**Note:** A maximum of FIVE appearances of each Auxiliary Attendant function key can be programmed on the SX-50 system.

COMMAND 4

**SUPERSET TELEPHONES PROGRAMMING**

EXT: \_\_\_\_\_



	a	b	c	d	e	f	g	h	i
0	1	1	1	1					
0	2								
0	3								
0	4								
0	5								
0	6								
0	7								
0	8								
0	9								
1	0								
1	1								
1	2								
1	3								
1	4								
1	5								
Default	0								

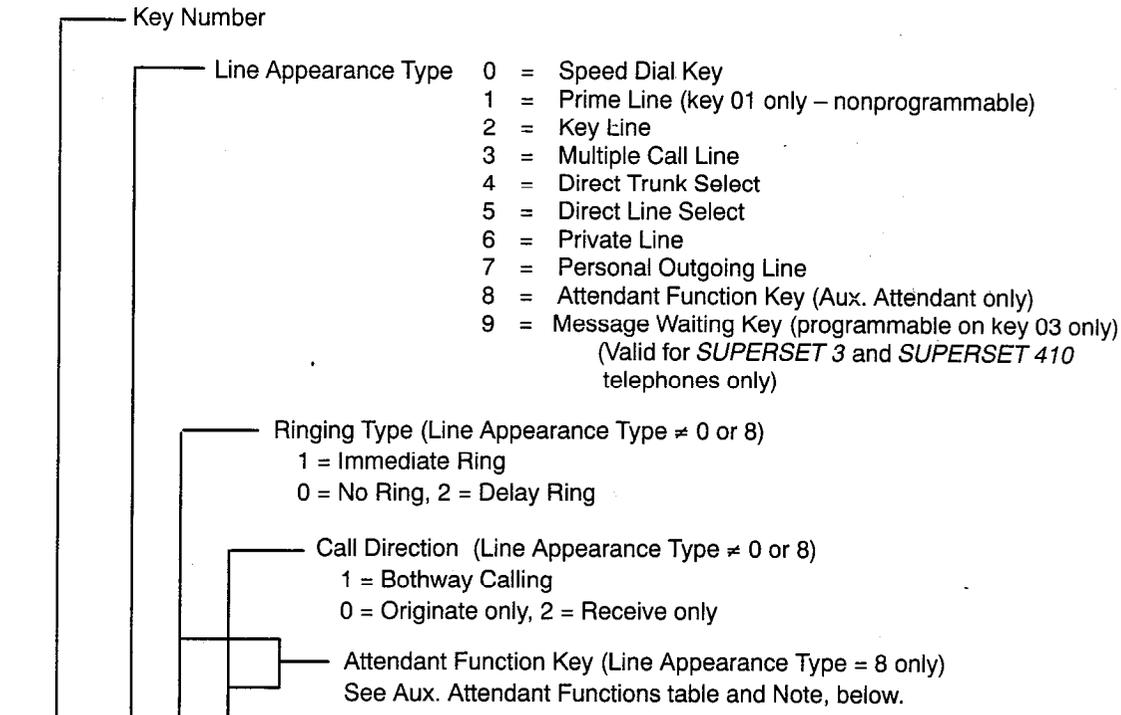
AUX. ATTENDANT FUNCTIONS	
01	= DIAL "0"
02	= DO NOT DISTURB
03	= RECALL
04	= HOLD 1
05	= HOLD 2
06	= HOLD 3
07	= LDN 1
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10	= MESSAGE WAITING
11	= MSG REGISTER
12	= NIGHT SERVICE
13	= OVERFLOW

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COMMAND 4 \_\_\_\_\_

**SUPERSET TELEPHONES PROGRAMMING**

EXT: \_\_\_\_\_



Extension or Trunk Number  
 Extension Number for line 1, 2, 3 & 7  
 Trunk Number for Line Types 4, 5 & 6

	a	b	c	d	e	f	g	h	i
0	1	1	1	1					
0	2								
0	3								
0	4								
0	5								
0	6								
0	7								
0	8								
0	9								
1	0								
1	1								
1	2								
1	3								
1	4								
1	5								
Default	0								

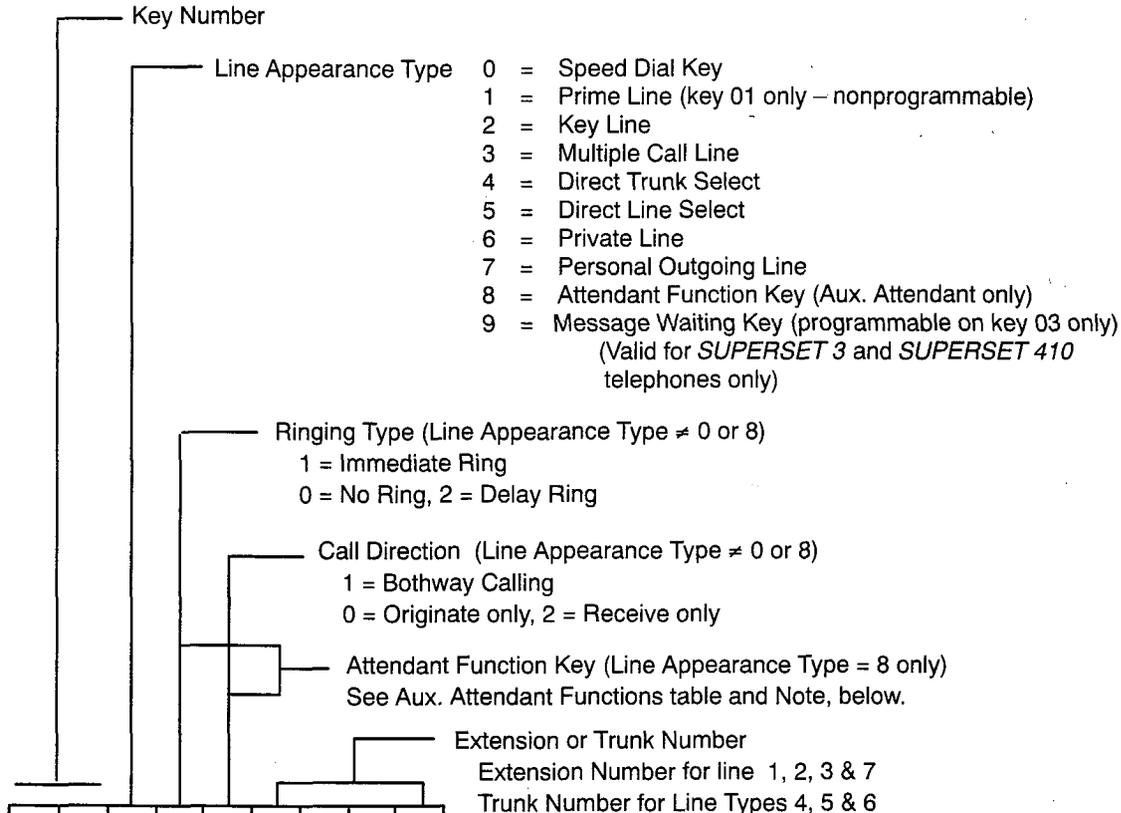
AUX. ATTENDANT FUNCTIONS	
01	= DIAL "0"
02	= DO NOT DISTURB
03	= RECALL
04	= HOLD 1
05	= HOLD 2
06	= HOLD 3
07	= LDN 1
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10	= MESSAGE WAITING
11	= MSG REGISTER
12	= NIGHT SERVICE
13	= OVERFLOW

**Note:** A maximum of FIVE appearances of each Auxiliary Attendant function key can be programmed on the SX-50 system.

COMMAND 4 \_\_\_\_\_

**SUPERSET TELEPHONES PROGRAMMING**

EXT: \_\_\_\_\_



a	b	c	d	e	f	g	h	i
0	1	1	1	1				
0	2							
0	3							
0	4							
0	5							
0	6							
0	7							
0	8							
0	9							
1	0							
1	1							
1	2							
1	3							
1	4							
1	5							
Default	0							

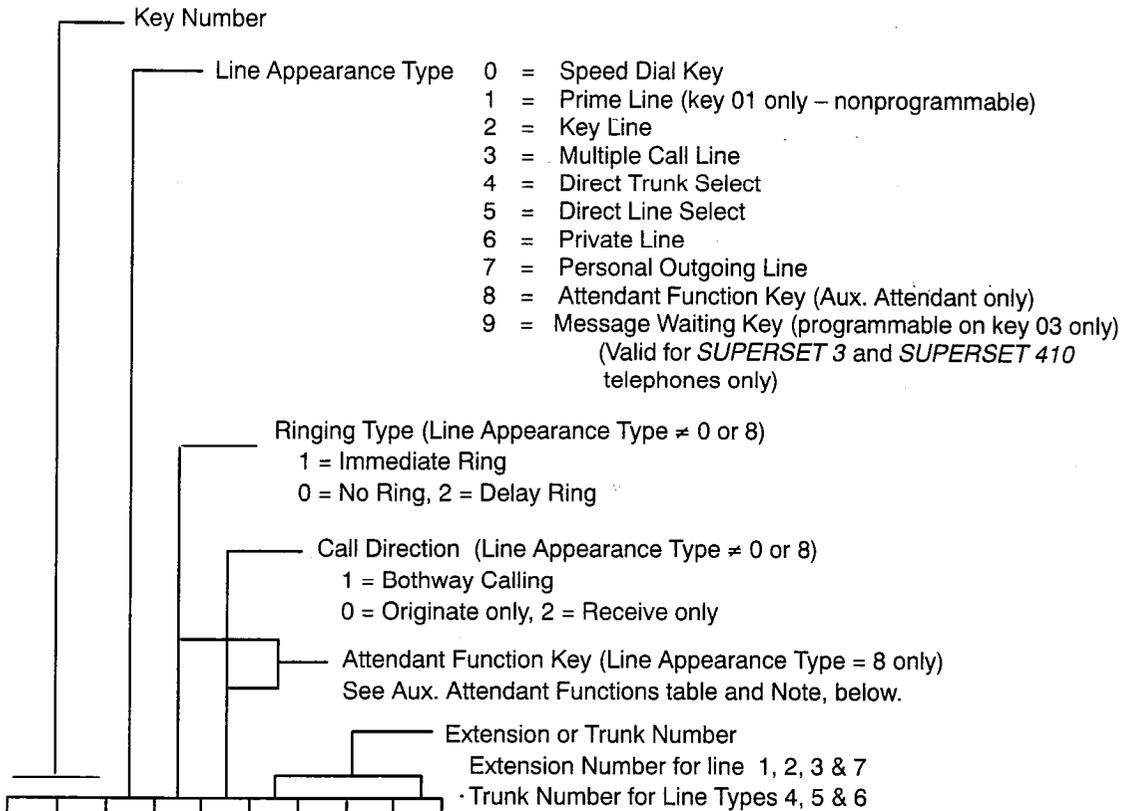
AUX. ATTENDANT FUNCTIONS	
01	= DIAL "0"
02	= DO NOT DISTURB
03	= RECALL
04	= HOLD 1
05	= HOLD 2
06	= HOLD 3
07	= LDN 1
08	= LDN 2
09	= LDN 3
10	= MESSAGE WAITING
11	= MSG REGISTER
12	= NIGHT SERVICE
13	= OVERFLOW

**Note:** A maximum of FIVE appearances of each Auxiliary Attendant function key can be programmed on the SX-50 system.

COMMAND 4

**SUPERSET TELEPHONES PROGRAMMING**

EXT: \_\_\_\_\_



a	b	c	d	e	f	g	h	i
0	1	1	1	1				
0	2							
0	3							
0	4							
0	5							
0	6							
0	7							
0	8							
0	9							
1	0							
1	1							
1	2							
1	3							
1	4							
1	5							
Default	0							

AUX. ATTENDANT FUNCTIONS	
01	= DIAL "0"
02	= DO NOT DISTURB
03	= RECALL
04	= HOLD 1
05	= HOLD 2
06	= HOLD 3
07	= LDN 1
08	= LDN 2
09	= LDN 3
10	= MESSAGE WAITING
11	= MSG REGISTER
12	= NIGHT SERVICE
13	= OVERFLOW

**Note:** A maximum of FIVE appearances of each Auxiliary Attendant function key can be programmed on the SX-50 system.

COMMANDS 501 → 580

TRUNK PROGRAMMING

TYPE: \_\_\_\_\_

**Register 1**

Trunk Group Membership (1 → 6 = Trunk Group Number) (0 = Incoming Calls Only)

Trunk Alarm Control (0 = Disable, 1 = Enable)

Trunk Hardware Type

- 0 = Short Analog CO Trunk
- 1 = Long Analog CO Trunk
- 2 = Analog Toll Office Trunk
- 3 = Analog Tie Trunk
- 4 = Satellite Tie Trunk
- 5 = Short Analog DID Trunk
- 6 = Long Analog DID Trunk

Trunk Class of Service (1 → 9)

Inward Dial Delay before Answer (8 sec)

(0 = Disable, 1 = Enable)

Note: this applies to all trunk types.

Connect to Outgoing Trunk without Third Party

0 = Disable, 1 = Enable

Inward Dialing ARS

Routing Class of Service (1 → 3)

0 = ARS does not apply

Trunk Use

- 0 = Disable
- 1 = Use as a CO
- 2 = Use as a Tie Trunk
- 3 = Used as a DID Trunk

Trunk Dialing Type

0 = DIL, 1 = DISA, 3 = DID

Command	a	b	c	d	e	f	g	h	i	j
5__	1									
5__	1									
5__	1									
5__	1									
5__	1									
5__	1									
5__	1									
5__	1									
Default	1	1	1	1	1	0	1	0	1	0
Default	1	2	1	3	1	0	1	0	2	1
Default	1	0	1	6	1	0	1	0	3	2

CO TRUNK

E&M TRUNK

DID TRUNK

COMMANDS 501 → 580

TRUNK PROGRAMMING

TYPE: \_\_\_\_\_  
SLOT: \_\_\_\_\_

Register 2

Trunk Outpulsing Break/Make Ratio

- 0 = 60/40
- 1 = 65/35
- 2 = 30/20
- 3 = 35/15

Disconnect Supervision Guaranteed?

- 0 = No, 1 = Yes

Disappearance of Reversal

- 0 = is ignored
- 1 = means disconnect

Reversal Meaning on Call Origination

- 0 = Not Incoming Call
- 1 = Incoming Call

Disconnect Timing

- 0 = 60 ms      3 = 4.0 sec
- 1 = 500 ms    4 = 10.0 sec
- 2 = 1.5 sec    5 = Disconnect Ignored

Start Type (CO Trunks)

- 0 = Loop Start
- 1 = Ground Start

Trunk Hang-up Delay (Guard) Timer

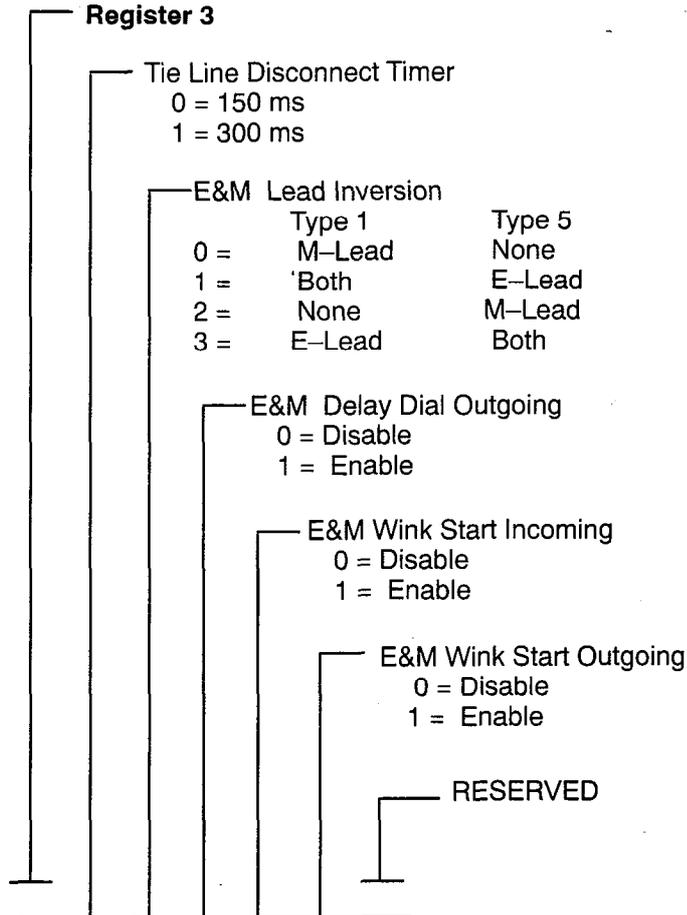
- 01 → 16 = 1 → 16 seconds

Command	a	b	c	d	e	f	g	h	i
5__	2								
5__	2								
5__	2								
5__	2								
5__	2								
5__	2								
5__	2								
5__	2								
Default	2	0	0	0	0	1	0	0	1

COMMANDS 501 → 580

TRUNK PROGRAMMING

TYPE: \_\_\_\_\_

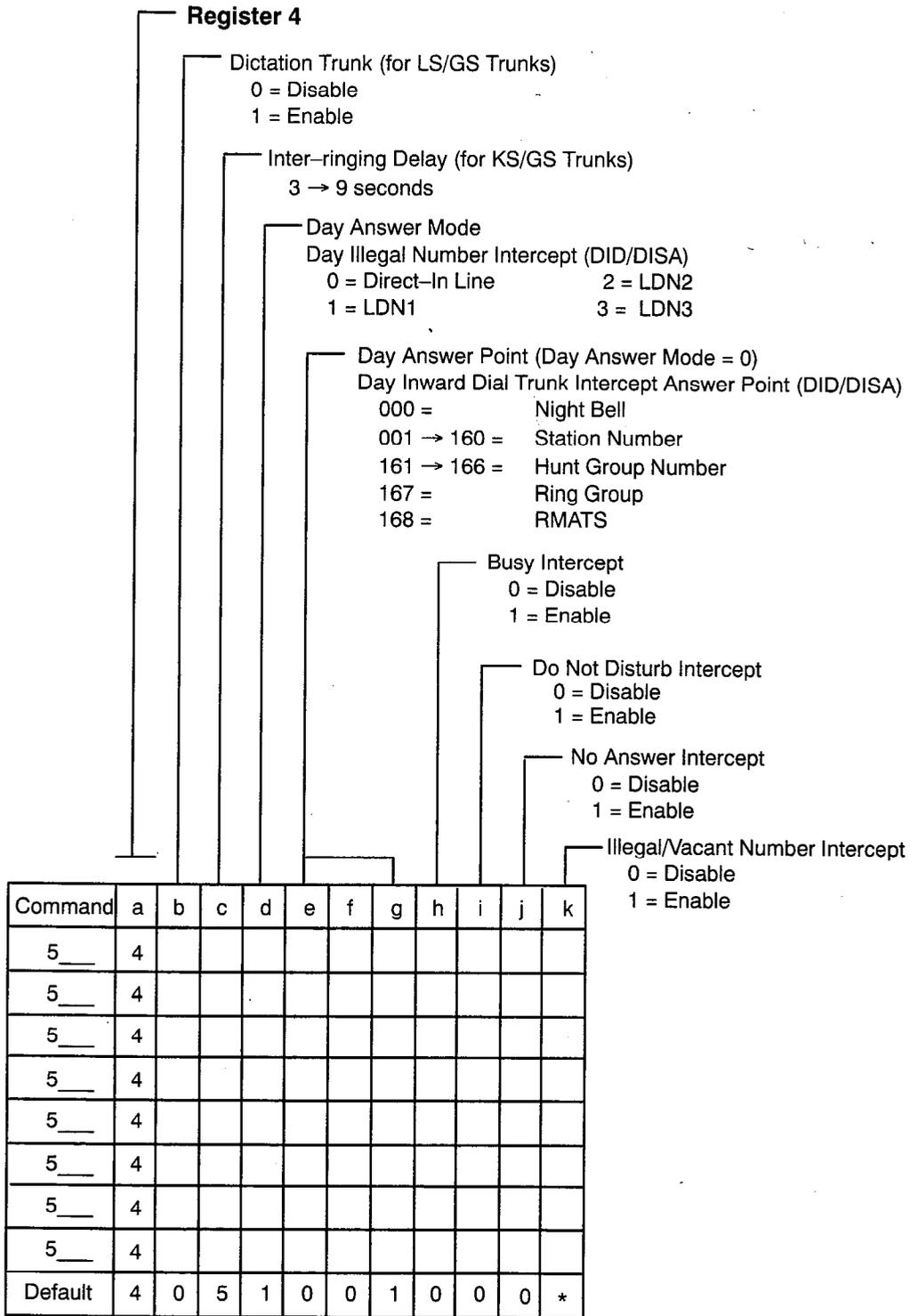


Command	a	b	c	d	e	f	g
5__	3						2
5__	3						2
5__	3						2
5__	3						2
5__	3						2
5__	3						2
5__	3						2
5__	3						2
5__	3						2
Default	3	1	2	0	0	0	2

COMMANDS 501 → 580

TRUNK PROGRAMMING

TYPE: \_\_\_\_\_



\* = 0 for CO & DID Trunks; 1 for E&M Trunks

COMMANDS 501 → 580

TRUNK PROGRAMMING

TYPE: \_\_\_\_\_

**Register 5**

Night answer Mode  
 Night Illegal Number Intercept (DID/DISA)  
 0 = Flexible Night Service  
 1 = LDN 1  
 2 = LDN 2  
 3 = LDN 3

Night Answer Point (Night Answer Mode = 0)  
 Night Inward Dial Trunk Intercept Answer Point (DID/DISA)  
 000 = Night Bell  
 001 → 160 = Station Number  
 161 → 166 = Hunt Group Number  
 167 = Ring Group  
 168 = RMATS

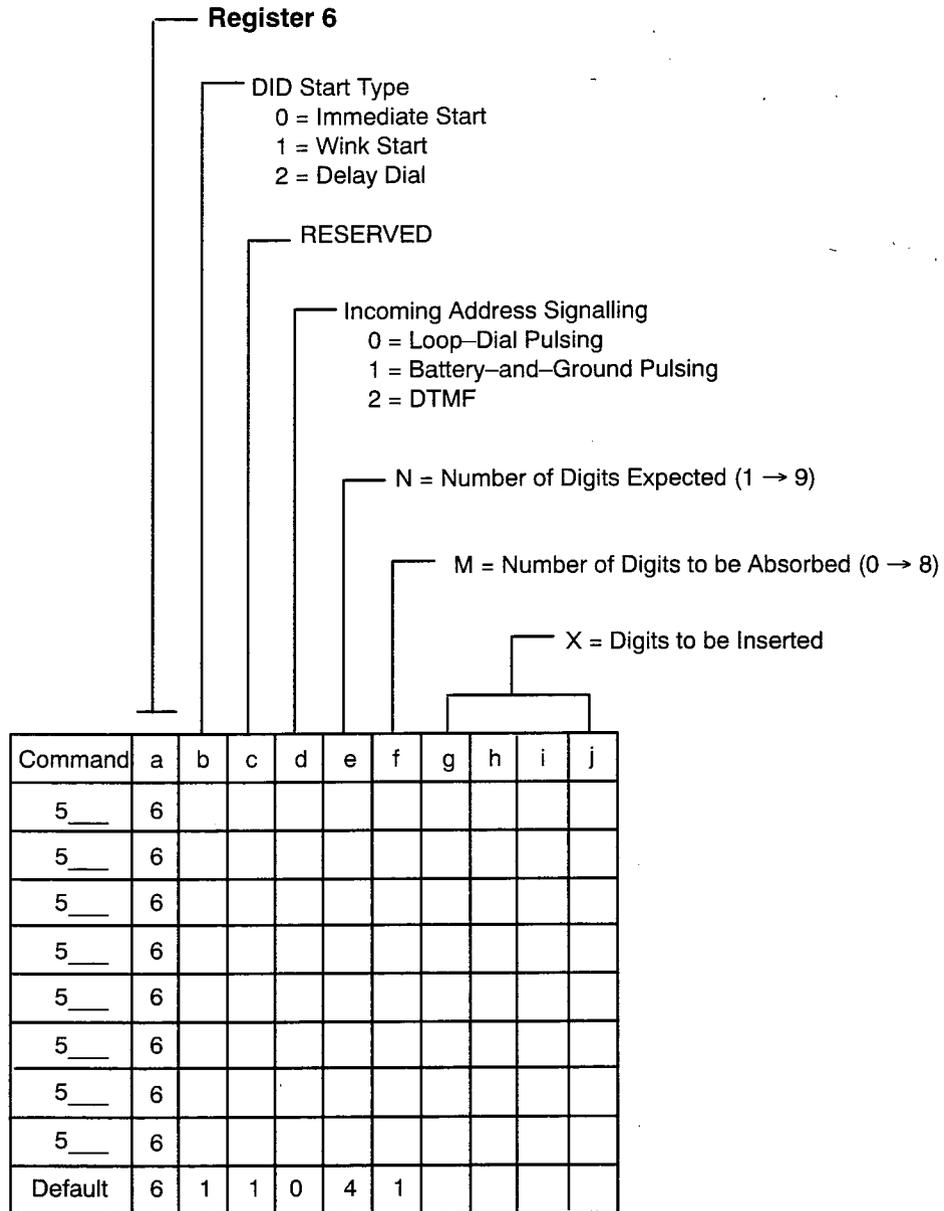
DID Night Answer Point  
 0 = Disable  
 1 = Enable

Command	a	b	c	d	e	f
5__	5					
5__	5					
5__	5					
5__	5					
5__	5					
5__	5					
5__	5					
5__	5					
Default	5	0	0	0	0	0

COMMANDS 501 → 580

TRUNK PROGRAMMING

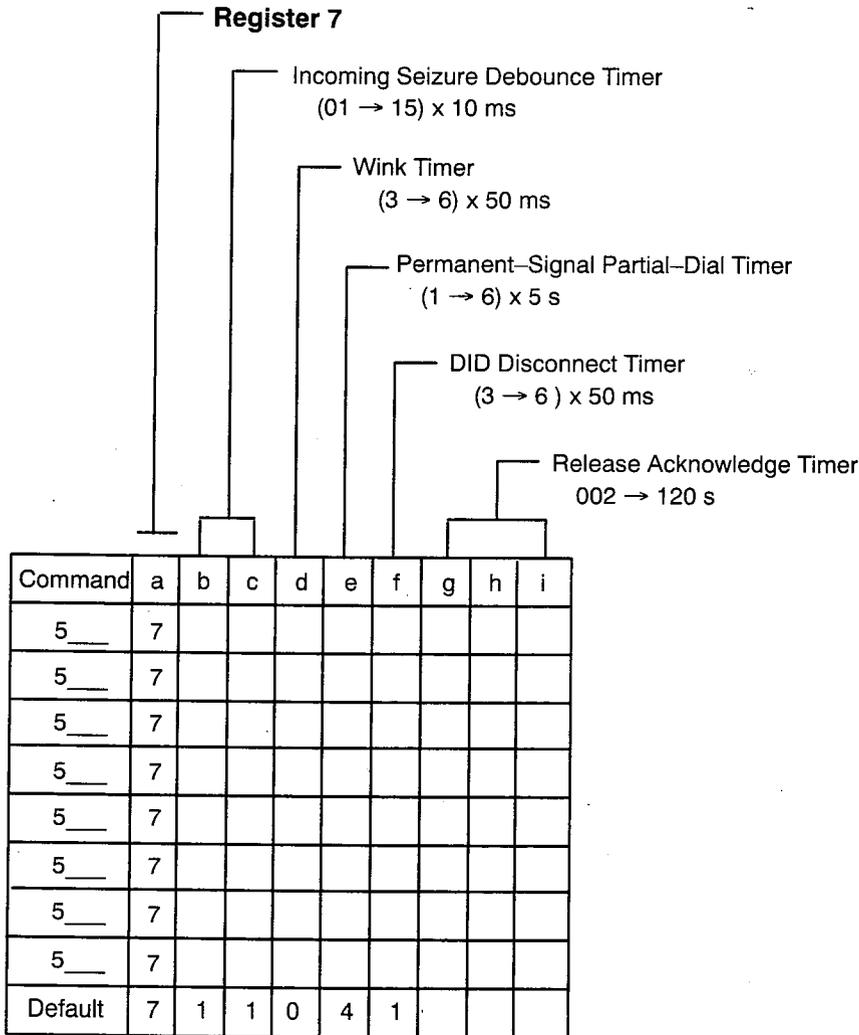
TYPE: \_\_\_\_\_



COMMANDS 501 → 580

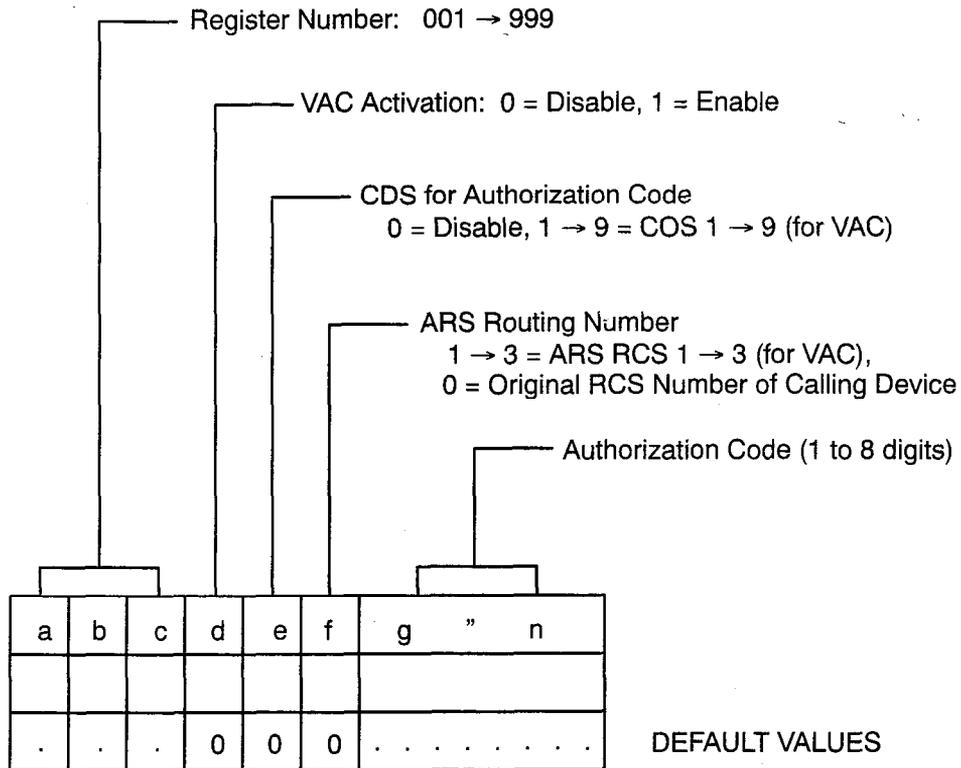
TRUNK PROGRAMMING

TYPE: \_\_\_\_\_



COMMAND 600

VERIFIED AUTHORIZATION CODE PROGRAMMING

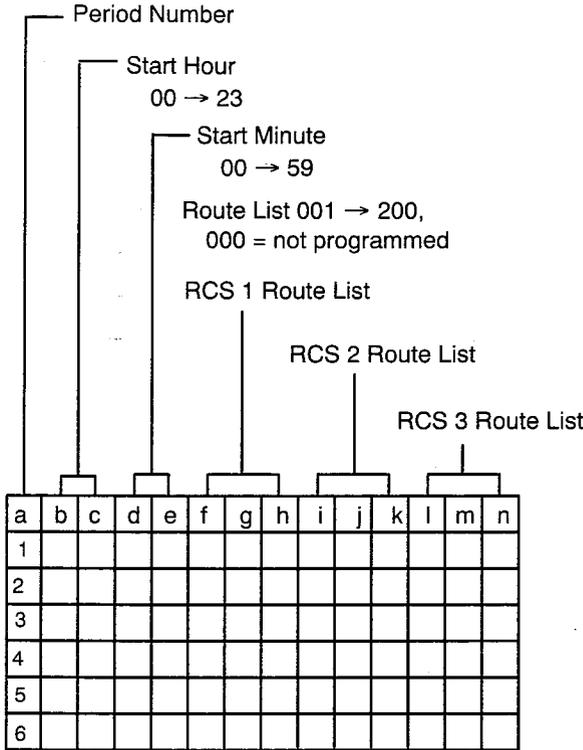




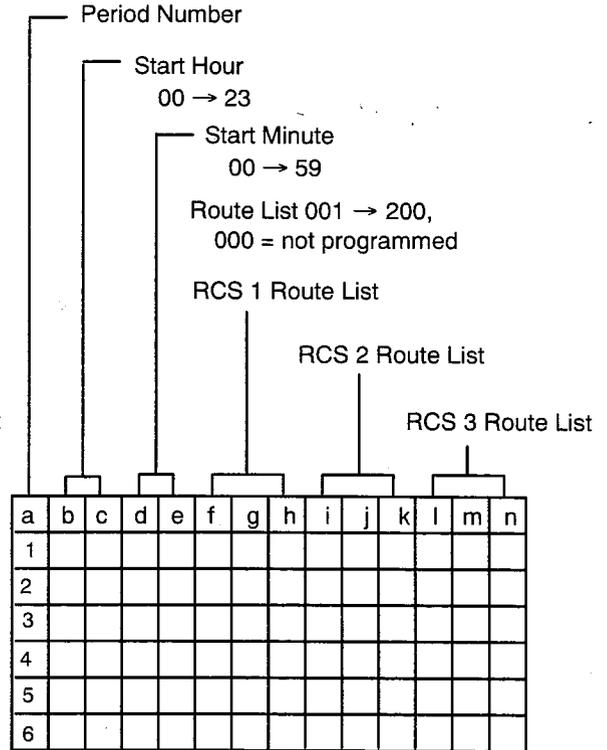
COMMANDS 701 → 745

ARS TIME-OF-DAY TABLE PROGRAMMING

COMMAND 7 \_\_\_\_



COMMAND 7 \_\_\_\_



--- 0 0 0 0 0 0 0 0 0 0

Default

--- 0 0 0 0 0 0 0 0 0 0

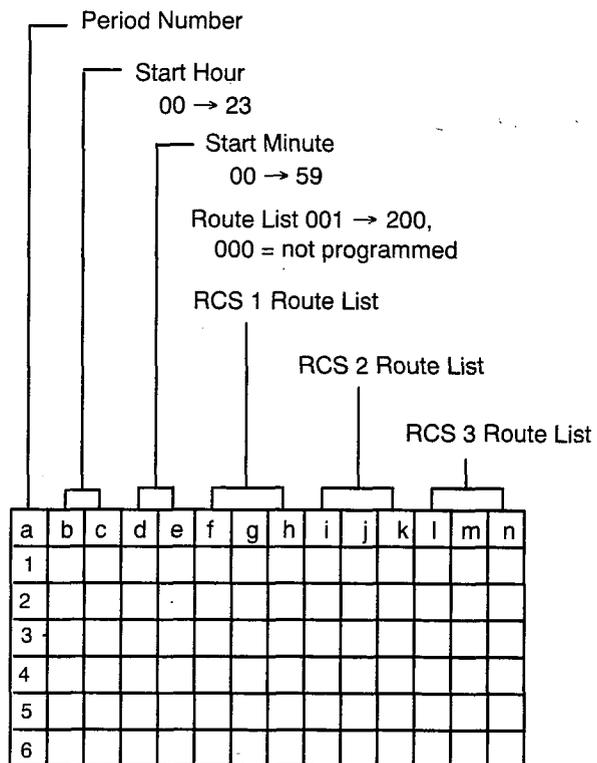
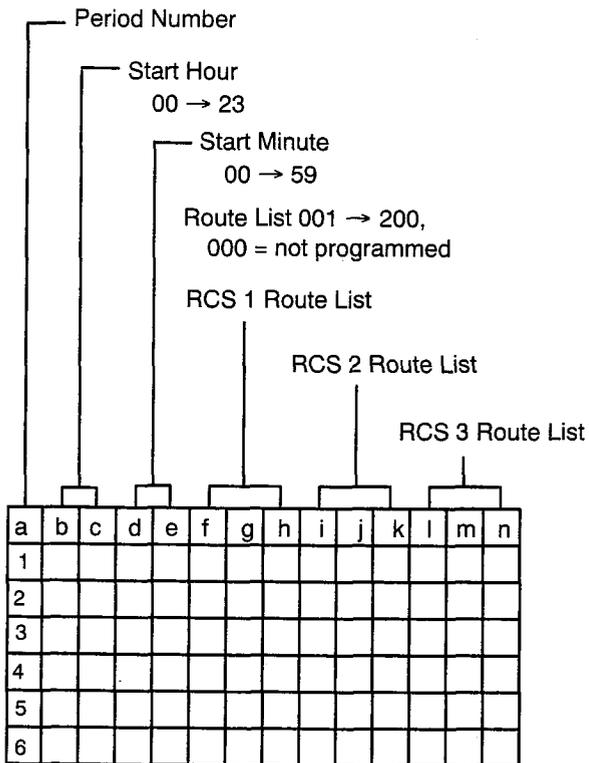
Default

COMMANDS 701 → 745

ARS TIME-OF-DAY TABLE PROGRAMMING

COMMAND 7\_\_

COMMAND 7\_\_



--- 0 0 0 0 0 0 0 0 0 0 Default

--- 0 0 0 0 0 0 0 0 0 0 Default





**SX-50® DIGITAL PRIVATE  
AUTOMATIC BRANCH EXCHANGE  
(DPABX)**

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# Features Description

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1.

## INTRODUCTION

### General

- 1.1 This Section describes the features and services the SX-50® DPABX supports with MS55 software. The selection of features is subject to minimal constraints, allowing each system to be configured to meet individual requirements of the customer.

Detailed instructions for the programming and testing of each feature are given in the following practice:

- 9104-091-210-NA, Customer Data Entry.

### Reason for Reissue

- 1.2 Section 9104-091-105-NA, Feature Description, has been reissued to include a description of the SUPERSET™ 410 and *SUPERSET 420* telephones, the Digital Network Interface Circuit (DNIC) Line Card and the functionality provided by MS55 software.



## 2.

# FEATURE INDEX

### General

2.1 Table 2-1, Feature Index, lists the programmable features of the SX-50 system and their corresponding Customer Data Entry fields.

Table 2-1 Feature Index			
Feature Name	Command	Register	Field
Abbreviated Dial	100	09	c,h
	110	13	j
	121 → 129	07	c → f
Account Codes (Note: SMDR options must be enabled; refer to SMDR in this table).	100	5	b → j
	110	15	c,d
	121 → 129	28	c → f
	751	3	h
Associated Modem Line	121 → 129	4	i
Attendant Access	110	01	h
Attendant and Maintenance Functions	110	13,14	c → f
Attendant-Switchable COS	301 → 310		e
Attendant Tone Signaling	185	01 → 14	c,d
Auto-Answer	100	07	c
Auto-Hold	100	07	d
Auto-Line Disconnect	100	03	h → j
	121 → 129	3	k
Automatic Callback	100	03	g
	110	32	c → f
	121 → 129	3	b,j
Automatic Diagnostics	100	01	c
Automatic Night Service	100	08	c,e
Automatic Ringdown Circuit	121 → 129	2	d
	301 → 310	01 → 16	c

**Table 2-1 Feature Index  
(continued)**

Feature Name	Command	Register	Field
Automatic Route Selection and Toll Control	100	13	c → j
	301 → 310	01 → 16	g
	341 → 350	01 → 16	g
	501 → 580	1	g
	700	001 → 800	d,e,g → l
	701 → 745	01 → 06	b → n
	750	001 → 200	d → o
	751	001 → 100	d → g
	752	001 → 100	d,e,g → l
Automatic Wake-Up (If a printer is required, refer to PRINT- ER in this table).	100	10	c,d
	110	41	c → f
	121 → 129	4	i
	185	01 → 14	c,d
Auxiliary Attendant	121 → 129	7	c
	301 → 310	1	d
	401 → 480		c → e
Background Music	100	09	g
Behind PABX Operation	151 → 156	1	f,g,h,i
		2	f
		4	c,d
Block Programming	321 → 330		a → h
	341 → 350		a → g
Break/Make Ratio	501 → 580	2	b
Calibrated Flash	100	06	c
Call Block	121 → 129	3	f
	185	01 → 14	c,d
Call Direction	121 → 129	2	c
Call Forwarding – Busy	110	11	c → f
	121 → 129	4	c
Call Forwarding – Busy/Don't Answer	100	11	d
	110	12	c → f
	121 → 129	4	e
Call Forwarding – Don't Answer	100	11	d
	110	10	c → f
	121 → 129	4	d
Call Forwarding – External	100	09	c
	121 → 129	4	b → f
		5	b → j
	501 → 580	2	c

**Table 2-1 Feature Index  
(continued)**

Feature Name	Command	Register	Field
Call Forwarding – Follow Me	110 121 → 129	08 4	c → f b
Call Hold (Attendant)	100 110	9,11 16 → 18	f c → f
Call Hold (Extension)	100 110 121 → 129	09 11 03 3	f e c → f e
Call Hold Retrieve	110	04,05	c → f
Call Park	100 110	11 16,17,18	f c → f
Call Pickup	110 121 → 129 185 301 → 310	06 30 7 1 → 14 01 → 16	c → f c → f e,f c,d f
Call Selection	501 → 580	4 5	d b
Call Transfer	100 121 → 129	11 2 8	c,d b c
Camp-On	100 121 → 129	11 8	c b → e
Clear All Features	110	15	c → f
Conference	100 121 → 129	11 2 8	c,d b b → e
Conflict Dialing	100	09	e
Consoleless Operation	100 110 121 → 129 501 → 580	02 08 9 3 8 4 5	d c,d,f → i c → f g b → e d → g b → e
Contact Monitor	100 301 → 310	17 01 → 16	c → e c
Data Demultiplexer	100	16	c
Data Dump/Load	100	16	d → h

**Table 2-1 Feature Index  
(continued)**

Feature Name	Command	Register	Field
Data Line Security	121 → 129	3	d
Dictation Trunk	151 → 156 501 → 580	2 4	g b
Direct-In Lines	121 → 129 501 → 580	8 4	b → e d → g
Direct Inward Dial Trunks	100 110 121 → 129 185 501 → 580	05 35 → 37 8 01 → 14 1 4 5 6 7	g → i c → f d → e c,d e,j d → k b → f b, d → j b → i
Direct Inward System Access (DISA)	121 → 129 193 501 → 580	2 01 1 4	e b,c,d e,f,h,j h → k
Direct Line Select	401 → 480		c
Direct Trunk Select	401 → 480		c
Discriminating Ringing	100	03	f
Distinctive Callback Ringing	100	03	g
Do Not-Disturb			
	110 121 → 129 185	33 2 01 → 14	c → f k c,d
E&M Trunks	151 → 156 501 → 580	1 1 2 3 4 5	f → i b,d,e,j c b → f d b
Executive Busy Override (Console)	100 185	2 01 → 14	c c,d
Executive Busy Override	121 → 129	4	g
Executive Busy Override Security	121	04	h
Flash Disable	121 → 129	2	b
Flash for Attendant	121 → 129	2	b

**Table 2-1 Feature Index  
(continued)**

Feature Name	Command	Register	Field
Flash is Release	100	06	c
Flexible Night Service	100 501 → 580	08 5	e b → e
Flexible Numbering Plan	110 151 → 156 301 → 310	01 → 41 1 01 → 16	c → f f → i i → l
Hotline	121 → 129 301 → 310	2 01 → 16	d c
Hunt Groups (Extensions) (See also LOG-IN HUNT GROUPS)	110 361 → 366	19 → 24 01 02 → 09	c → f b,c b → e
Hunt Groups (Trunks)	151 → 156	1	c
Identified Trunk Group	151 → 156 501 → 580	1 2 2	e → i b,d,e c
Incoming Call Identification	501 → 580	4 5	d b
Internal Calls to Console Night Answer Point	100	08	g,h,i
Last Number Redial	100 121 → 129 151 → 156	09 5 2	d k j
Line Appearances	100 401 → 480	7	e d
Lockout Alarm	121 → 129	7	b
Log-in Hunt Groups	110 121 → 129	34 7	c → f g
Manual Line	121 → 129 301 → 310	2 01 → 16	d c
Message Register Audit (A printer is required; refer to PRINTER in this table.)	100	10	e
Message Registration	100 121 → 129 151 → 156	10 2 2 3 01 → 14	g f e b → h c,d

Table 2-1 Feature Index  
(continued)

Feature Name	Command	Register	Field
Message Waiting	100 110 121 → 129	12 27, 38, 39 2	c → f c → f g
Messages – Advisory	121 → 129	7	b
Messages – Call Me Back	401 → 480		c
Music on Hold	100	09	f
Night/Day Switching	185	01 → 14	c,d
Off-Premises Extensions	301 → 310	01 → 16	h
Originate-Only Extensions	121 → 129	2	c
Overflow	100	08	c → i
Paging Access	110 121 → 129 501 → 580	02 3 2	c → f c c
Partial Flash Inhibit	100	06	e
Personal Outgoing Line	401 → 480		c
Pickup Groups	110 301 → 310	06 01 → 16	c → f f
Printer	100	16	c → h
Remote Maintenance Administration and Test System (RMATS)	100 110 192 501 → 580	1 26 1,2 4 5	d c → f b → f d → g b → e
Restrictive Station Control	121 → 129	2	f
Reversal Meaning	501 → 580	2	d,e
Ring Group	110 381 501 → 580	25 01 → 09 4 5	c → f b → e e,f,g c → e
Room Status	100 110 121 → 129 185 301 → 310	10 31 3 01 → 14 01 → 16	i c → f i c,d g
Selectable Ringing Cadence Cycle Time	100	03	e

**Table 2-1 Feature Index  
(continued)**

Feature Name	Command	Register	Field
Special DISA (See also TRAVELING COS)	121 → 129	2	e
	501 → 580	1	e
SMDR Credit Card Calls	151 → 156	4	e
Station Message Detail Recording (SMDR)	100	14	c → j
	121 → 129	3	h
	151 → 156	2	i
Station Switchhook-Flash Timing	100	06	c
<i>SUPERSET 3</i> and <i>SUPERSET 410</i> Telephones	100	07	c → e
	301 → 310	01 → 16	c → l
	401 → 480	01 → 15	c → i
<i>SUPERSET</i> Telephones	100	07	c → e
	301 → 310	01 → 16	c → l
	401 → 480	01 → 15	c → i
<i>SUPERSET 4</i> and <i>SUPERSET 420</i> Headset Operation	121 → 129	2	j
System Security Code Programming	190	01	b → e
Test Line	100	01	e,f,g
		08	f
		11	f
Transfer Dial Tone	100	03	d
Traveling COS	100	14	k
		15	e
	110	40	c → f
	180	2	h
	185	01 → 14	c,d
	600		a → n
Trunk Alarm Control	501 → 580	1	c
Trunk Answer From Any Station (TAFAS)	100	08	c → f
	110	09	c → f
	121 → 129	3	g
	185	01 → 14	c,d
Trunk Group Overflow	121 → 129	1	h
	151 → 156	1	d

**Table 2-1 Feature Index  
(continued)**

Feature Name	Command	Register	Field
Trunk Groups	121 → 129 151 → 156	1	b → g
		1	b → i
		2	b → k
		3	b → h
	501 → 580	4	b → e
		1	b
		2	b → i
		3	b → f
Trunk Intercepts	501 → 580	4	d → k
		5	b → f
Trunk Signaling – DTMF/Rotary Outpulsing	100	2	f
	151 → 156	2	g
Trunk-to-Trunk Plus Station Conferencing	100	05	c → i
	121 → 129	1	j
	501 → 580	1	d
		2	c
Unlimited Wait For Dial Tone	151 → 156	2	b
User Security Code Programming	180	1,2,3	b → h
	191	01	b → e
Voice Mail Port	100	8	g → i
	110	12	c
		19 → 24	c → f
	121 → 129	38,39	c → f
		2	g,k
		3	d,k
		4	g,h
		5	k
		7	d,f
	301 → 310	01 → 16	d,f
361 → 366	2 → 9	b → e	
401 → 480	15	c → e	
Wait For Dial Tone	151 → 156	2	b





### 3.

## FEATURES DESCRIPTION

### General

- 3.1 This Part contains a description of each feature the system provides. Each description contains four subparts:
- **Description** – a detailed description of the feature.
  - **Conditions** – a list of any special conditions which should be considered when selecting the feature.
  - **Programming** – the parameters which must be programmed to allow selection and operation of the feature.
  - **Operation** – a brief description of the feature operation. In a number of attendant feature operations, the \* symbol (or 71) is shown. This is known as the Attendant Function Access Code.

---

## Abbreviated Dialing

---

**Description** The SX-50 system can store frequently-used numbers of up to 32 digits each for access via Abbreviated Dial Numbers. Each Abbreviated Dial Number consists of the Abbreviated Dial Access Code and the Index Number.

The system programmer can select 2-digit or 3-digit index numbers. With 2-digit index numbers, up to 90 entries are available; with 3-digit index numbers, 900 entries are available.

Each entry contains the digit string that must be dialed to obtain the required party. Entries are programmed through the Attendant Console. Class-of-Service programming controls access from extensions.

Abbreviated Dial numbers can be programmed to bypass the Automatic Route Selection (ARS) system. This allows an ARS-restricted caller to make selected external and long distance calls using Abbreviated Dial numbers.

- Conditions**
- The Abbreviated Dialing Number consists of the Access Code (default 55) and the Index Number (10 to 99 or 100 to 999, depending on programming).
  - Each entry can have up to 32 digits including special function codes. Special function codes include:
    - \* 1 – 5 Second Pause,
    - \* 2 – Wait for Dial Tone,
    - \* 3 – Wait for manually-dialed digits; a number (1 → 9) must follow this code, indicating the number of digits to expect.
  - Special function codes each count as one digit.
  - The Special Function code \* 3 can be used only once per entry.
  - There are six groups of Abbreviated Dialing Numbers. Each group contains 10 numbers. Class of Service (COS) programming controls access to each group. By default, every COS has access to all Abbreviated Dial Numbers.
  - Changing the System Speed Dial Access (2 or 3 digits) option deletes existing Abbreviated Dial numbers.
  - If the Abbreviated Dial number's output digit string appears in the Automatic Route Selection (ARS) Digit Comparison Table, the calling set's Routing Class of Service determines call routing.
  - When Abbreviated Dial ARS Bypass is disabled, calls are subject to Automatic Route Selection restrictions. When Abbreviated Dial ARS

Bypass is enabled, calls are treated with a Routing Class of Service of 0.

- Last Number Redial is always subject to Automatic Route Selection restrictions.

**Programming** To enable access to the Abbreviated Dialing Feature:

Command 100, Features Selection 1, Register 09:

- Leave Abbreviated Dial Enable (field c) at its default value, 1 (Enable).
- Set System Speed Dial Access (field h) to 0 (2-digit index numbers) or 1 (3-digit index numbers) as required. Default is 0.

Command 100, Automatic Route Selection, Register 13:

- To allow extensions to make Abbreviated Dial calls regardless of their Routing Class of Service (RCS), set Abbreviated Dial ARS Bypass (bit j) to 1 (Enable). Default is 0 (Disable).

Command 110, Feature Access Codes, Register 07:

- Set the System Abbreviated Dialing Access Code. Default is 55. The access code can contain one, two, three or four digits.

Commands 121 → 129, COS 1 → COS 9 Programming, Register 5:

- For each Class of Service, set access to each group of 10 Abbreviated Dialing Numbers (fields b through j, 1 = enable or 0 = disable). By default, access to all groups is enabled.

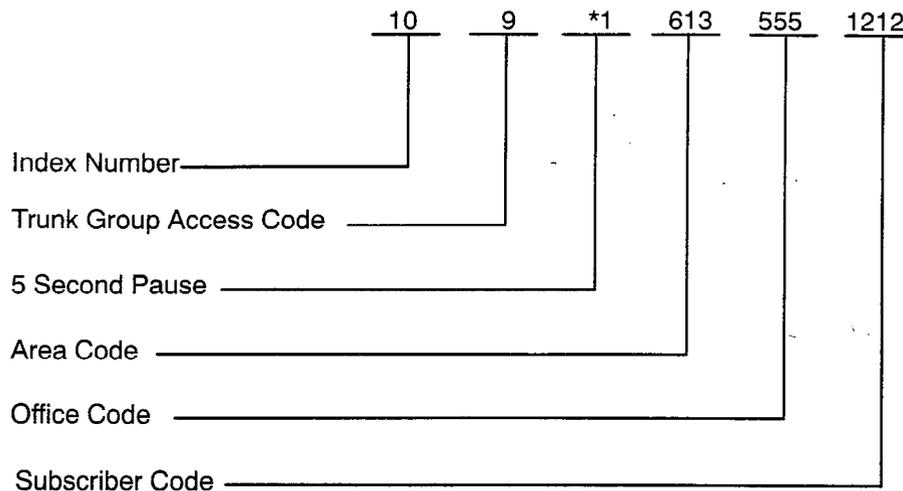
To program Abbreviated Dialing Numbers from the Attendant Console:

- Press **FUNCTION**. Dial 65. The LCD displays:

**CHANGE ABBREVIATED DIALING ENTRY?**

- Enter a valid Index Number (10 → 99 or 100 → 999) – the LCD displays the selected Index Number and a dash. If, for example, 10 was entered, the LCD displays: **10-**. Note that if a digit string is already assigned to the selected Index Number, the LCD does NOT display it.
- Enter the digit string. This new entry replaces any previous entry. The digit string can include special function codes. (See Conditions).

For example, the Attendant enters the following digit string:



- When all digits have been entered, press the **RELEASE** key – the Attendant Console returns to the idle state and the LCD displays the date and time.

To program Abbreviated Dialing Numbers from the Test Line:

- Dial **\*65**. If the Test Line is a *SUPERSET 420* or *SUPERSET 4* telephone, the LCD displays: **SET S/C NO.**
- Enter a valid Index Number (10 → 99). If the Test Line is a *SUPERSET 420* or *SUPERSET 4* telephone, the LCD displays the selected index number and a dash. If, for example, ten was entered, the LCD displays: **10-**. Note that if a digit string is already assigned to the selected index number, the LCD does NOT display it.
- Enter the digit string. This new entry replaces any previous entry. The digit string can include special function codes. (See Conditions).
- When all digits have been entered, hang-up.

To view Abbreviated Dialing Numbers at the Attendant Console:

- Since existing digit strings cannot be viewed during programming, there is a function code for viewing Abbreviated Dialing Numbers.
- Press **FUNCTION**. Dial 60. The LCD displays:  
**VIEW ABBREVIATED DIALING NUMBER ENTRY?**
- Enter the required Index Number. The LCD displays the Index Number and its associated digit string. If desired, press # to advance the display to the next entry.

For example; for the above previous digit string, the LCD displays:

**10-9\*16135551212**

- After viewing the digit string, press the **RELEASE** key – the Attendant Console returns to the idle state and the LCD displays the date and time.

To view Abbreviated Dialing Numbers at the Test Line:

- Enter the Abbreviated Dialing Number Viewing Function Code (\*60) – the LCD displays: **VIEW S/C NO.?**
- Enter the required Index Number. The LCD displays the Index Number and its associated digit string. If the entry is too long for the display, the → softkey appears. Press this key to view the remaining digits.
- If desired, press # to advance the display to the next entry. The display is the same as on the Attendant Console.
- After viewing the digit string, press the **HANG-UP** softkey – the Test Line returns to the idle state and the LCD displays the date and time.

### **Operation**

- Dial the Abbreviated Dial Access Code (Default is 55).
- Dial the Index Number. If a *SUPERSET 420* or *SUPERSET 4* telephone or the Attendant Console is used, the LCD displays the digits as they are outpulsed.
- If the dialed Index Number is out of range or has no digit string programmed, the system returns reorder tone. If the Attendant Console is used, the LCD displays **INVALID**; press **RELEASE** to return to normal operation.

---

## Account Codes

---

**Description** Typically, Account Codes are used to charge the cost of outgoing or trunk calls to departmental cost centres or special project accounts. Account codes are also used to allow calls to be billed to a client (for example, in a lawyer's or accountant's office). The Account code for a call appears on the SMDR record.

**Note:** Account Codes are non-verified (as compared to "Verified Authorization Codes" discussed in features SPECIAL DISA and TRAVELLING COS in this Section).

Account Code entry is a Class of Service Option. Account codes can be programmed as not allowed, optional, required for toll calls only, or required for all calls (toll and local).

The Account Code can be programmed as fixed length or variable length. The length (or maximum for the variable length) can be set to 1 through 8 digits.

Account codes can be entered during a call from a *SUPERSET 420* or *SUPERSET 4* telephone.

- Conditions**
- After an Account code has been entered, the extension can only make a trunk call. To make an internal call, it must first go on and off hook.
  - If a Variable Length Account Code of less than maximum length is entered, use the # character to indicate the end of the Account code. Otherwise, the system will wait for the interdigit time-out (10 seconds).
  - It is recommended that when both Account codes and Verified Authorization codes are enabled, Account Code Length be set to an odd number of digits (1,3,5 or 7) for Account codes and be set to an even number of digits (2,4,6 or 8) for Verified Authorization codes, or vice versa. This provides a method of distinguishing the two types of codes on the SMDR printout.
  - When both Account codes and Verified Authorization codes are enabled, "VAC Overwrite Billing Code" programming in Command 100, Register 14, field k, determines whether the Account code or the Verified Authorization code will be printed on the SMDR record.
  - When both Account codes and Verified Authorization codes are used during a call, the Verified Authorization code is entered before the Account code.
  - If a user is in a COS group where account codes are "Required for Toll Calls only" and the user dials an Account code during a local call, the call is connected normally.

- If Verified Authorization codes are enabled and the COS of the user specifies account codes required for all calls or for toll calls only, then the Verified Authorization codes take precedence over regular account codes. The account code may be entered for tracking purposes, but has no effect on toll access.

**Programming** Command 100, System Options, Register 14, SMDR:

- Select all of the required SMDR options as outlined in Section 9104-091-221-NA, Station Message Detail Recording (SMDR).

Command 100, System Options, Register 15, Account Code Control:

- Set Number of Digits (field c) to: 1, 2, 3, 4, 5, 6, 7 or 8 digits, as appropriate. Default is 0 (Disable). If Variable Length codes will be used, this field defines the maximum length of the code.
- If Variable Length Account Codes are required, set field d to 1 (Enable). Default is 0 (Disable).

Command 110, Feature Access Codes, Register 28:

- Assign an Access Code for Account Code Entry. Default is 75.

Commands 121 → 129, COS 1 → COS 9 Programming, Register 3:

- For each Class of Service that uses Account Codes, set COS SMDR (field h) to 1 (Enable). Default is 0.

Commands 121 → 129, COS 1 → COS 9 Programming, Register 7:

- For extensions requiring Account Codes, set Account Code Entry (field c) to 2 (Required for Toll Calls only) or 3 (Required for all Calls). For extensions that optionally can use Account Codes, set Account Code Entry (field c) to 1 (Optional). Default is 0 (Not Allowed).

**Note:** If field c is set to 3 then Register 2 must have field e set to 2.

Command 185, Function Key Programming, Register = Key Number:

- Set Function Code (fields c,d) to 08.

Command 751, ARS Digit Route Table Programming:

- Set Toll Call (field h) to 0 (Non-Toll Call) or 1 (Toll Call). Default is 0 (Non-Toll Call).

**Operation** **ONS, OPS, SUPERSET 3 and SUPERSET 410 Telephones**

To Access a Trunk via Account Code Entry:

- Dial the access code for Account Code Entry (default is 75).
- Dial the Account Code digits. If a Variable Length Account Code less than the maximum length is entered, follow it by # to avoid delay.

- Dial tone is returned.
- Access the Trunk in the normal manner (e.g., Trunk Group Access Code, Speed Call, Last Number Redial, DTS, DLS).
- Dial the directory number – when the call is completed and the extension goes on-hook, the SMDR record, including the Account Code is recorded.

#### ***SUPERSET 4* Telephones**

Before dialing:

- Dial the Account Code access code (default 75).
- Dial the account code.
- Dial # or wait for interdigit time-out.

OR

During the call:

- Press the SELECT FEATURES feature key.
- Dial 5 (feature number 5 is Account Code (5:ACC CODE)).
- Dial account code digits. The <= softkey is used to backspace and change incorrect digits. The EXIT softkey can be used to abandon account code entry.
- Press the SAVE softkey.

#### ***SUPERSET 420* Telephones**

Before dialing:

- Dial the Account Code access code (default 75).
- Dial the account code.
- Dial # or wait for interdigit time-out.

OR

During the call:

- Press the Superkey key, to select programmable features menu. The features menu title ACCOUNT CODE appears on the display.
- Press the Yes softkey, to select account code feature.
- Enter the account code number from dialpad.
- Press Save softkey, to save the account code entered.

---

**Add Held**

---

- Description** Add Held allows a *SUPERSET 4* or *SUPERSET 420* user to add to the line currently accessed, a caller held on another line.
- Conditions**
- This feature applies to *SUPERSET 4* or *SUPERSET 420* telephones only.
  - The *SUPERSET 4* and *SUPERSET 420* telephone must have at the set at least one keyline or multicall line appearance, in addition to its prime line.
- Operation**
- Establish a call.
  - Press the HOLD key to place the call on hold. The display shows **SELECT LINE**.
  - Press another Line Select key. The **ADD HELD** prompt appears. If desired, establish another call.
  - Press the **ADD HELD** softkey. The display shows **SELECT HELD LINE**.
  - Press the Line Select key associated with the call on hold. The held party is connected to the line. If there is already a conversation on the line, a 3-way conference call is established.

---

## Alarm Indicators

---

**Description** The SX-50 system continuously checks its own operation. If a malfunction is detected, then the system raises an alarm. Alarms are indicated as follows:

- The Attendant Console bell rings.
- The ALARM key LED flashes.

A console alarm (the LCD displays **CONSOLE ALARM**) indicates a malfunction within the Attendant Console. The system goes into Night Service.

Alarms can be investigated from the Attendant Console. Pressing and holding down the ALARM key (or dialing the required Attendant Function Code) displays the alarm code on the LCD.

For a full description of each alarm indication, refer to Section 9104-091-350-NA, Troubleshooting.

- Conditions**
- If the Attendant Console bell has been disabled, the alarm indicators are visual only.
  - The system can store up to eight alarm indications.

**Programming** None.

- Operation**
- To Display the Most Recent Alarm Data:
- Press the ALARM key or:
  - Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
  - Dial 13 – check the alarm code shown on the LCD and record it in the Trouble Log.
  - Press the RELEASE key. The system stores the alarm data in the system memory and cancels the alarm indication.
- To Display and Cancel the Alarm Indication at the Attendant **Console**:
- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
  - Dial 31 – The system displays the latest alarm in the queue and deletes it.
  - Press the RELEASE key.

All alarms (up to eight) held in the system memory, can be displayed sequentially and deleted in this manner. When all alarm data has been displayed and removed from the Attendant Console alarm queue, the LCD displays **NO ALARMS**. Note that although the alarms have been canceled, the equipment which caused the alarm remains busied-out.

To Cancel All Alarm Data, Alarm Indications and Busy-Outs:

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial 32 – the system cancels all alarm data, alarm indications and busy-outs.

**Note:** Attendant Function 32 will not clear busy-outs if Function 32 was performed within the preceding 60 seconds. If busy-outs do not clear in response to Function 32, wait 60 seconds and repeat the command.

---

## ARS Most Expensive Route Warning

---

- Description** ARS Programming can designate some trunk routes as expensive routes. If all other possible routes are unavailable, the user receives 4 short tones to indicate that the expensive route is being used. On a *SUPERSET 4* and *SUPERSET 420* telephone, the message **EXPENSIVE ROUTE** appears on the display.
- Conditions** None
- Programming** The ARS feature on the *SX-50* system must be programmed to provide the most expensive route warning. Refer to Section 9104-091-220-NA, Automatic Route Selection.
- Operation** If the **EXPENSIVE ROUTE** warning occurs, the user can cancel the call by hanging up within 5 seconds.

---

## Associated Modem Line

---

- Description** An Associated Modem Line (AML) allows a modem-equipped personal computer (PC) to exchange data with destinations outside the PABX, under control of the user's *SUPERSET 4* and *SUPERSET 420* telephone. Dedicated data trunks are not required.
- A COV or DNIC ( *SUPERSET 4* or *SUPERSET 420* telephone) port is associated with an ONS port. The ONS port is used as a modem line. The *SX-50* considers the *SUPERSET 4* or *SUPERSET 420* telephone voice port and modem line as two separate and distinct extensions. Each port is separately wired and can independently originate or answer calls. Four types of call are possible with an Associated Modem Line:
- Voice only (internal or external call)
  - Data only (external call)
  - Alternating Voice and Data call only (requires only one trunk)
  - Simultaneous Voice and Data (external data call, one trunk plus line or trunk for voice call)
- Conditions**
- AML must be enabled in the *SUPERSET 4* or *SUPERSET 420* telephone's COS.
  - Voice calls can be dialed from the *SUPERSET 4* or *SUPERSET 420* telephone or the PC.
  - Voice calls from the *SUPERSET 4* or *SUPERSET 420* telephone are not affected by the Associated Modem Line except that on a trunk call the SWAP or TRADE softkey appears.
  - The *SUPERSET 4* or *SUPERSET 420* telephone can originate data calls only over a trunk.
  - When engaged in a data call, the user cannot transfer or conference a voice call.
  - Both called and calling party must have modem-interfaced PC equipment with appropriate communications software.
  - An account on the database might be required for access.
  - A data call dialed from the modem line has no indication or effect on the *SUPERSET 4* and *SUPERSET 420* telephone.
  - An attempt to make a data call from the *SUPERSET 4* or *SUPERSET 420* telephone while the modem line is in use will cause the display to show **DATA BUSY**.
  - Once connected to the database, swapping the call back to the *SUPERSET 4* or *SUPERSET 420* telephone could cause the database to disconnect the call due to loss of modem carrier tone.

## Installation

Group the *SUPERSET 4* or *SUPERSET 420* telephone lines which are to have an associated data port. Each eight *SUPERSET 4* lines require a COV line card, and each eight *SUPERSET 420* lines require a DNIC line card.

In the card slot immediately to the right of each of the above COV or DNIC line cards, install an ONS line card. Each COV or DNIC Line port is associated with the corresponding ONS Line port in the next card slot. For example, COV or DNIC port 1 in slot 3 is paired with ONS port 1 in slot 4. Ports 9 through 16 on each of the ONS cards can be used for conventional rotary dial or DTMF subscriber circuits.

**Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 4:

- Set Associated Modem Line (field i) to 1 (enable). Default is 0 (disable).

## Operation ***SUPERSET 4* Telephone**

To initiate a data call from the PC:

- Dial the database number.
- When the database modem returns answer tone, the data call is established.

To initiate a data call from the *SUPERSET 4* telephone:

- Dial the database number.
- When modem answer tone is returned, press the SWAP softkey.
- Put the modem on-line.
- Press the HANG-UP softkey.

Alternating Voice And Data Call:

- Establish a voice call.
- Inform the far-end party that a data call is desired.
- The far-end party puts the modem on-line. The party initiating the data transfer uses ORIGINATE mode, the other party uses ANSWER mode.
- When carrier tone is heard on the near-end *SUPERSET 4* telephone, press the SWAP softkey. **DATA TRANSFER** appears on the *SUPERSET 4* telephone's LCD.
- Put the modem on-line.

**Note:** At each end, the modem must be on-hook when the SWAP softkey is pressed. Otherwise, the message **DATA BUSY** appears on the *SUPERSET 4*.

telephone LCD, with the CANCEL softkey. Press CANCEL to return to normal operation.

To Alternate from a data call to a voice call, at each set:

- Press the SWAP softkey or go on-hook at the modem.
- The data call terminates, conversation resumes between the *SUPERSET 4* telephones. If the handset is in its cradle, the *SUPERSET 4* telephone will be in Handsfree mode.

Simultaneous Voice And Data Calls:

From the *SUPERSET 4* telephone,

- Dial the data call number. Press SWAP, then HANG-UP.
- Go off-hook at the modem. The data call is established.
- Dial the voice call number.

OR

From the PC,

- Dial the voice call number, followed by \*. The call is transferred to the *SUPERSET 4* telephone, in Handsfree mode.
- Go on-hook at the PC for at least 4 seconds.
- Dial the data call number.

### ***SUPERSET 420* Telephone**

To initiate a data call from the PC:

- Dial the database number.
- When the database returns answer tone, the data call is established.

To initiate a data call from the *SUPERSET 420* telephone:

- Dial the database number.
- When modem answer tone is returned, press the TRADE softkey.
- Put the modem on-line.
- Press the SPEAKER key or the hook-switch.

Alternating Voice And Data Call:

- Establish a voice call.
- Inform the far-end party that a data call is desired.
- The far-end party puts the modem on-line. The party initiating the data transfer uses ORIGINATE mode, the other party uses ANSWER mode.

- When the carrier tone is heard on the near-end *SUPERSET 420* telephone, press the TRADE softkey. **DATA TRANSFER** appears on the main display of the *SUPERSET 420* telephone.
- Put the modem on-line.

**Note:** At each end, the modem must be on-hook when the TRADE softkey is pressed. Otherwise, the message **DATA BUSY** appears on the main display of the *SUPERSET 420* telephone. Press the CANCEL key to return to normal operation.

To Alternate from a data call to a voice call, at each set:

- Press the TRADE softkey or go on-hook at the modem.
- The data call terminates, conversation resumes between the *SUPERSET 420* telephones. If the handset is in its cradle, the *SUPERSET 420* telephone will be in Handsfree mode.

Simultaneous Voice And Data Calls:

From the *SUPERSET 420* telephone;

- Dial the data call number.
- Press Trade softkey, then go on-hook.
- Go off-hook at the modem. The data call is established.
- Dial the voice call number.

OR

From the PC,

- Dial the voice call number, followed by \*. The call is transferred to the *SUPERSET 420* telephone, in Handsfree mode.
- Go on-hook at the PC for at least four (4) seconds.
- Dial the data call number.

---

## Attendant Access

---

- Description** This feature automatically routes an extension that dials the Attendant Access Code to the Attendant Console; the bell rings and **DIAL0** flashes on the LCD.
- Conditions**
- Numbering Plan conflicts with the Attendant Access Code are not permitted.
  - During Night Service, calls to the Attendant can be routed to an extension assigned as the Night Answer Point. See INTERNAL CALLS TO CONSOLE NIGHT ANSWER POINT in this Section.
  - If the programmed Night Answer Point is invalid, extensions calling the attendant during night service will receive reorder tone.
  - Extension calls to the Attendant can be routed to the Overflow Point if "Internal Calls to Console Routed to Overflow" is in effect. See OVERFLOW in this Section.
- Programming** Command 110, Feature Access Codes, Register 01:
- Set the Attendant Access Code. Default is 0.
- Command 100, System Options, Register 08:
- Refer to OVERFLOW in this Section.
- Operation** To Answer a Call Routed to the Attendant:
- Press the ANSWER key (or the DIAL0 softkey); the calling extension connects to the Attendant Console. The **DIAL0** prompt disappears, unless another Dial 0 call is waiting.

## Attendant and Maintenance Functions

**Description** The Attendant and Maintenance Functions perform special operations and are implemented by dialing specific codes (or by pressing a Programmable Function key on the Attendant Console). These special functions are listed in Table 3-1.

- Conditions**
- At any time, only one of the Attendant Console, Test Line or RMATS can go into Programming Mode or perform an Attendant Function.
  - \* can be used to enter Attendant and Maintenance Functions. # can be used to enter Programming, unless it has been enabled for Last Number Redial access.
  - Functions 16, 17, 18, 19, 45, 73, 81, 82, 85, 91 and 92 are not available via RMATS.
  - Functions 45, 81, 85, 87, 91 and 92 are not available from the Auxiliary Attendant or Test Line.

**Programming** Command 110, Feature Access Codes, Registers 13 and 14:

- Assign the Programming Access Code. Default is 70.
- Assign the Attendant Function Access Code. Default is 71.

- Operation**
- Dial 71 or \* (or press the FUNCTION key).
  - Dial the required Function Code (refer to Table 3-1), and the equipment number (if necessary).
  - If function Code 31, 60 or 65 was used, press the RELEASE key on the Attendant Console or go on-hook at the Test Line.
  - Also, refer to Section 9104-091-350-NA, Troubleshooting and General Maintenance Information.

**Table 3-1 Attendant and Maintenance Functions**

Function	Code
Night Service – ON	*11
Night Service – OFF	*12
Identify Alarm and Clear	*13
Set 12-Hour Clock	*14 + 2-digit hrs, 2-digit minutes
Set 24-Hour Clock	*15 + 2-digit hrs, 2-digit minutes
Lamp Test	*16
Music ON	*17

**Table 3-1 Attendant and Maintenance Functions  
(continued)**

Function	Code
Music OFF	*18
Access Trunk by Equipment Number	*19 + Trunk Equipment Number
Trunk Emergency Release	*20 + Trunk Equipment Number
Night Answer Point	*21 + Trunk Equipment Number + new Night Answer Point Stn. No.
Message Reg/Restrictive Station Control	*22 + Extension Number
Call Block – ON	*23
Call Block – OFF	*24
Change COS	*25
Restore COS	*26
Trunk Meter	*27
Cancel All Message Waiting Indications	*29
Alarm Clear/Cancel Alarm Indications	*31
Cancel All Alarms, Alarm Indicators and Busy-Outs	*32
Busy Out Trunk	*41 + Trunk Equipment Number
Busy Out DTMF Generator	*42
Busy Out DTMF Receiver	*43 + DTMF Receiver Number
Busy Out Dial Tone Detector	*44 + Dial Tone Detector Number
Change Verified Authorization Code	*45
Unbusy Trunk	*51 + Trunk Equipment Number
Unbusy DTMF Generator	*52
Unbusy DTMF Receiver	*53 + DTMF Receiver Number
Unbusy Dial Tone Detector	*54 + Dial Tone Detector Number
View Abbreviated Dialing Numbers	*60 + index number
Program Abbreviated Dialing Numbers	*65 + index number
Program Automatic Wake-Up at an extension	*71 + Extension Number
View Automatic Wake-Up at an extension	*72 + Extension Number
Message Register Audit	*73
Printer – Suspend	*75 + *
Printer – Purge and Suspend	*75 + 0
Printer – Resume	*75 + #
Set System Date	*80 + DD-MM-YY
Room Status	*81
Room Status Printout	*82
Do Not Disturb	*85
Restrict DID	*87
Alarm Print – Automatic	*90 + 1
Alarm Print – Disable	*90 + 0
Alarm Print – Print Alarm Queue	*90 + #
English Messaging	*91
French Messaging	*92
Data Dump	*97 + System Security Code
Data Load	*98 + System Security Code
System Status Display	#980
Inter-DX Link Display	#981
Station Status Display	#982
SUPERSET Status Display	#983
Trunk Status Display	#984
Install Default Database	#998
Software Identity Display	#999

---

## Attendant–Controlled DID Restriction

---

**Description** The Attendant can bar an extension from receiving Direct Inward Dial (DID) trunk calls. If Trunk Intercept is enabled, DID calls to a restricted extension will reroute to the intercept point. If the intercept is not enabled, the DID caller receives reorder tone.

- Conditions**
- Attendant–Controlled DID Restriction applies only to extensions that can normally receive DID calls. Extensions that have DID Restriction enabled in their Class of Service can never receive DID calls.
  - Attendant–Controlled DID Restriction is not available at the Auxiliary Attendant position.
  - A DID trunk call can be transferred to a restricted extension.

- Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 8:
- Ensure DID Restriction (field e) is set to 0 (Disable). This is the default.

**Operation** To restrict DID calls to an extension:

- Press the RESTRICT DID key. If this key is not programmed, press FUNCTION or \* and dial 87.

The console display shows: **DID RESTRICTION FOR EXT–?**

- Dial the extension number. The console display shows the extension number, **DID RESTRICTED –** and **OFF** or **ON**.
- A softkey appears, ON or OFF, opposite to the current DID restriction status. To change the status, press the softkey.

**Note:** If the extension has DID Restriction enabled in its COS, the Console LCD shows **DID RESTRICTED – ON**, but there is no OFF softkey. The console cannot remove the restriction.

---

## Attendant–Switchable COS

---

**Description** The Attendant can switch extensions in one Class of Service (COS) to another Class of Service. This switch affects only the extensions in the original COS programmed to allow Attendant–controlled COS changes. When required, the Attendant can restore to their own COS all the original members of a particular Class Of Service.

**Programming** Commands 301 → 310, Extension Programming, Registers 1 → 16:

- Set Allow Attendant to Change COS (field e) to 1 (Allowed). Default is 0 (Not Allowed).

**Operation**      **Attendant Console**

To Change COS:

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial 25. Display shows **SWITCH FROM COS–?**.
- Dial the original COS number. Display adds **TO COS–?**.
- Dial the new COS number.
- Press Release. All extensions in the original COS that have Allow Attendant to Change COS enabled now take on the characteristics of the new COS.

To restore programmed COS:

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial 26. Display shows **RESTORE COS–?**.
- Dial the original COS number.
- Press Release. Attendant–originated COS changes are canceled for all extensions originally assigned to this COS.

### Auxiliary Attendant

To Change COS:

- Dial the Attendant Function Access Code (71) or \*
- Dial 25. Display shows **COS–?**.
- Dial the original COS number. Display adds **TO COS–?**.
- Dial the new COS number.

- Hang up. All extensions in the original COS that have Allow Attendant to Change COS enabled now take on the characteristics of the new COS.

To restore programmed COS:

- Dial the Attendant Function Access Code (71) or \*
- Dial 26. Display shows **RESTORE COS-?**.
- Dial the original COS number.
- Hang up. Attendant-originated COS changes are canceled for all extensions originally assigned to this COS.

---

## Attendant Tone Signaling

---

- Description** To minimize demand on the system tone generator, the Attendant Console normally does not transmit DTMF tones. This feature allows the console to transmit DTMF tones during a call, for applications such as voice mail.
- Conditions**
- When Tone Signaling is used, digits dialed at the Console do not appear on the Console LCD.
- Tone Signaling ends automatically:
- when the Attendant puts the call on hold
  - when the Attendant transfers the call
  - when either party ends the call.
- Programming** Command 185, Function Key Programming, Register = Key Number:
- Set Function Code (fields c,d) to 18.
- Operation** During a call:
- Press the TONES function key. The LCD shows **TONES ON**.
  - Send DTMF tones.
  - Press TONES function key to terminate DTMF Signaling.

---

## Auto-Answer

---

**Description** In Auto-Answer mode, the *SUPERSET 4* or *SUPERSET 420* telephone will ring once in response to an incoming call and then automatically go off-hook in Handsfree mode. (See *HANDSFREE OPERATION*). The call ends when the calling party presses the *HANG-UP* softkey on the *SUPERSET 4*, or on the *SUPERSET 420* telephone, the user presses the Speaker key.

**Conditions**

- A DID trunk can connect directly to Auto-Answer *SUPERSET 4* telephones only if it provides disconnect supervision. This must be reflected in Trunk Programming. (Commands 501 → 580, Register 2, field c = 1).

**Programming** Command 100, System Options, Register 97, *SUPERSET* Telephone Attributes:

- Set Auto-Answer System Enable (field c) to 1 (enable). Default is 0 (disable).

**Operation** ***SUPERSET 4* Telephone**

To Activate Auto-answer:

- Press the SELECT FEATURES feature key.
- Dial 3 (feature number 3 is AUTO ANS).
- Press the ON softkey.

To Deactivate Auto-answer:

- Press the SELECT FEATURES feature key.
- Dial 3 (feature number 3 is AUTO ANS).
- Press the OFF softkey.

***SUPERSET 420* Telephone**

To Activate Auto-answer:

- Press the Superkey key, to select the programmable features menu.
- Press the No softkey, to step forward to the AUTO ANSWER feature.
- Press the On softkey to activate auto answer feature.

To Deactivate Auto-answer:

- Press the Superkey key, to select the programmable features menu.
- Press the No softkey, to step forward to the AUTO ANSWER feature.
- Press the Off softkey to de-activate auto answer feature.

---

**Auto-Hold**

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- Description** Auto-Hold automatically places the current call on hold when the *SUPERSET* user presses another Line Select key. Otherwise, a call can be placed on hold only by pressing the HOLD key.
- Conditions**
- This feature applies to *SUPERSET* telephones only.
- Programming** Command 100, System Options, Register 7, *SUPERSET* Attributes:
- Set *SUPERSET* Telephone Auto-Hold (field d) to 1 (Enable). Default is 0 (Disable).
- Operation** None.

---

**Auto-Line Disconnect**

---

**Description** Single-line ports can be used to interface to both Voice Mail/Auto Attendant and Dictation systems. When an extension user exits from one of these applications, a tone is required in order to release the connection between the single line extension port and the Voice Mail/Auto Attendant or Dictation port. The tone can be programmed as either a DTMF digit or call progress tone.

For further information on the Voice Mail/Auto Attendant applications, refer to VOICE MAIL PORT in this Section.

- Conditions**
- If Lockout Alarm (see LOCKOUT ALARM in this Section) and Disconnect Tone (Commands 121 → 129, Register 3, field k, option 2) are enabled, and the Voice/Dictation Port does not hang up after 30 seconds, a Lockout Alarm is displayed on the Attendant Console or Auxiliary Attendant *SUPERSET 4* or *SUPERSET 420* telephone. If Lockout Alarm is enabled and Disconnect Tone is disabled, no tone is sent but a Lockout Alarm is displayed.
  - Message Optimization only applies to telephones interfaced by COV line cards (not DNIC).

**Programming** Commands 121 → 129, Class of Service Programming, Register 3:

- Set Voice/Dictation Port (field k) to 1 (Message Optimization Control) if a MITEL VX Voice Processing Unit is connected (with MS54 and MS55 only), or 2 (Send Disconnect Tone) if the *SX-50* DPABX is connected to another manufacturer's Voice Mail or Dictation system. Default is 0 (Disable).

Command 100, Tone and Ringing Control, Register 03:

- If 2 (Send Disconnect Tone) was selected above, set Disconnect Tone (field h) to 0 (Disable), 1 (Send Selected DTMF Tone to Dictation Port) or 2 (Send Selected Call Progress Tone to Dictation Port), as required. Default is 2.
- If DTMF Tone was selected in the above step, set Tone Selection (fields i and j) to 00 → 09 (for DTMF digits 0 → 9, 10 (for DTMF \* sign), or 11 (for DTMF # sign).
- If Call Progress Tone was selected in the above step, set Tone Selection (fields i and j) to 00 (Dial Tone), 01 (Busy Tone) or 02 (Reorder Tone). Default for fields i and j are 00.

**Operation** None.

---

## Automatic Callback

---

**Description** This feature permits an extension user encountering a busy or unanswered destination to have the call redialed automatically. A busy destination is redialed when it becomes free. An unanswered destination is redialed after its next use.

When a callback is activated, the system continuously monitors the originating extension and the destination. When both are idle, the system rings the originating extension using distinctive ringing, unless distinctive ringing is disabled. Refer to **DISTINCTIVE CALLBACK RINGING** in this Section. When the originating extension answers, the system dials the destination. If more than one callback request is active on any number, the requests are queued and serviced on a first-in, first-out (FIFO) basis.

For information on **ARS CALLEACK**, refer to Section 9104-091-220-NA, Automatic Route Selection and Toll Control.

- Conditions**
- The Automatic Callback Access Code is 6. This code is not programmable.
  - The Automatic Callback Access Code must be dialed within 10 seconds of receiving busy tone.
  - The Attendant cannot cancel an individual callback.
  - A callback always rings the originating extension; Call Forwarding and Auto Answer have no effect. Call Pickup is not allowed.
  - When the callback rings the destination, Call Forwarding has no effect but Call Pickup is allowed.
  - Automatic Callback can be activated on extensions, Hunt Groups or the Ring Group. Automatic Callback – Busy also can be activated on Trunk Groups, if ARS is not enabled.
  - Up to 16 callback requests can be active within the system at any time.
  - The originating extension can cancel the callback by dialing the Clear All Features Access Code (default 444).
  - If the two extensions involved in a callback hold a conversation (not a conference) before the callback is honoured, the system cancels the callback request automatically.
  - The system ignores duplicate callback requests (the original callback request is canceled).
  - If the called extension becomes busy before the originating extension answers a callback, the originating extension hears a busy tone. The originating extension does not need to dial the Automatic Callback Access Code as the system automatically resets the callback request.

- All callback requests are lost after recovery from a power failure.
- The Attendant Console cannot set up Automatic Callback – Busy.
- The system cancels callback requests that are not activated within 8 hours.
- When the originator does not answer a callback, the callback is canceled.
- When the destination does not answer a callback, the callback remains in effect.
- A Callback always calls an originating *SUPERSET* telephone's Prime Line, even if it was activated at one of the set's other lines.
- Callback requests on each extension, hunt group or ring group are queued and serviced in order of arrival.

**Programming** Command 100, System Options, Register 03, Tone and Ringing Control:

- Set Distinctive Callback Ringing (field g) to 1 (Enable) or 0 (Disable). Default is 1.

Command 110, Feature Access Codes, Register 32:

- Assign a Callback Setup Access Code. The default is 62.

Commands 121 → 129, COS 1 → COS 9 Programming, Register 3:

- Ensure Automatic Callback – Busy/No Answer (field b) is set to 1 (Enable). This is the default. 0 is Disable.

Commands 121 → 129, COS 1 → COS 9 Programming, Register 3:

- By default, ONS Callback No Answer Activation During Ringback (field j) is set to 1 (Enable). If this is not desired, set this field to 0 (Disable).

**Operation** ***SUPERSET 3, SUPERSET 410, ONS and OPS Telephones***

To Set Up an Automatic Callback – Busy Request:

- Dial the required extension number or Trunk Group Access Code – busy tone is returned.
- Dial the Automatic Callback Access Code (6) within 10 seconds – dial tone is returned and the extension is available for normal use.

To Set Up an Automatic Callback – No Answer Request:

- Dial the required extension number – ringback tone is returned.
- Dial the Automatic Callback Access Code (6) within 20 seconds. Dial Tone is returned. The set is available for normal use.

OR

- Go off-hook. Dial Tone is returned.

- Dial the Callback Setup Access Code (default 62). A short burst of Dial Tone is returned.
- Dial the required extension number – Dial Tone is returned.

***SUPERSET 4 and SUPERSET 420 Telephones***

To Set Up a Callback Request: -

- Dial the required destination number – the destination is busy or does not answer.
- Press the CALLBACK softkey. Dial Tone is returned. The set is available for normal use.

---

## Automatic Diagnostics

---

**Description** The SX-50 system continuously runs automatic diagnostic checks which test the following: memory, channel connections, tone receivers, tone generator, supervisory tones, dial tone detectors and channel biasing. If the automatic diagnostics detect a malfunctioning unit, the unit is busied-out and an alarm is raised. Refer to ALARM INDICATORS in this Section. For a full description of automatic diagnostics, refer to Section 9104-091-350-NA, Troubleshooting and Maintenance Procedures.

**Conditions**

- The trunk alarms can be disabled. Refer to TRUNK ALARM CONTROL in this Section.

**Programming** Command 100, System Options, Register 01, System Maintenance:

- Ensure Automatic Diagnostics (field c) is set to 1 (Enabled). This is the default. 0 is disable.

**Operation** To Display the Total Number of Busied-Out Units:

- Press the STATUS key 4 times and hold it down – the total number of busied-out units is shown on the Attendant Console LCD.
- Release the STATUS key – the LCD displays Call Processing Mode information (time, date and call waiting status).

---

## Automatic Night Service

---

**Description** When this feature is enabled, the SX-50 System switches into Night Service automatically if calls to the Attendant Console are not answered within a defined time period.

Refer to NIGHT/DAY SWITCHING in this Section.

**Conditions** None.

**Programming** Command 100, Register 08, Overflow Control:

- Set Overflow Mode In Day Service (field c) to 3 (Automatic Switching to Night Service). Default is 1 (Immediate Switching to Overflow).
- Set Automatic Switch to Overflow Timeout (field e) to 1 → 7 (10 → 70 seconds). Default is 3 (30 seconds).

---

## Automatic Ringdown Circuit

---

- Description** This feature allows an extension designated as a Ringdown Circuit to be programmed into one of 10 circuit groups. When an Automatic Ringdown Circuit extension goes off-hook, the *SX-50* system automatically dials a preprogrammed number (internal or external). There are three types of Automatic Ringdown Circuit groups, as follows:
- **Automatic Ringdown Circuit Group 0 signals the attendant.** This group acts as a Housephone. See **MANUAL LINE** in this Section for more information.
  - **Automatic Ringdown Circuit Group 1 acts as a Contact Monitor.** See **CONTACT MONITOR** in this Section for more information.
  - **Automatic Ringdown Circuit Groups 2 → 9 signal the destination programmed in Abbreviated Dial numbers 12 → 19 (102 → 109), respectively.** See **HOTLINE** in this Section for more information.
- Conditions**
- Automatic Ringdown Circuit Groups 0 and 2 → 9 require Automatic Ringdown Circuit to be enabled in their Class of Service (Commands 121 → 129, Register 2, field d).
  - Automatic Ringdown Circuit Groups 2 → 9 automatically dial the attendant if the corresponding Abbreviated Dial number (102 → 109) is invalid.
  - The flash feature is disabled on Automatic Ringdown Circuit extensions, therefore these extensions cannot place a call on hold.
- Programming**
- See **CONTACT MONITOR**, **HOTLINE** and **MANUAL LINE** in this Section.
- Operation**
- See **CONTACT MONITOR**, **HOTLINE** and **MANUAL LINE** in this Section.

---

## Automatic Route Selection and Toll Control

---

**Description** Automatic Route Selection controls the routing and connection of a call based on the number dialed, the time of day, route availability, cost and the user's toll restriction. Toll Control denies an extension the ability to make certain calls. The system activates denials on the receipt of the toll supervision, and on the actual digits dialed. For details, refer to Section 9104-091-220-NA, Automatic Route Selection and Toll Control.

**Conditions**

- Automatic Route Selection and Toll Control is dependent on:
  1. Class-of-Service Programming
  2. Trunk Group Programming
  3. Trunk Programming
  4. ARS Digit Comparison Table Programming
  5. ARS Time-of-Day Lists Programming
  6. ARS Route Priority Programming
  7. ARS Route Table Programming
  8. ARS Digit Modification Table Programming
  9. Routing Class of Service (RCS) (Extension Programming).

**Programming** • Refer to Section 9104-091-220-NA, Automatic Route Selection and Toll Control.

**Operation** None.

---

## Automatic Station Release

---

- Description** The *SX-50* system automatically releases and locks out an extension if the user exceeds any of the following time-out periods:
- **Dial Time-out.** If an extension does not dial a digit within 10 seconds of receiving dial tone, the system replaces the dial tone with reorder tone. Reorder tone is applied for a period of 20 seconds. If, during this time, the extension user flashes the switchhook, dial tone is returned to the extension immediately. After 20 seconds of reorder tone, the extension is released and locked out. The extension user must go on-hook to re-establish service.
  - **Interdigit Time-out.** If, after dialing a digit, a user fails to dial further digits within 10 seconds (the interdigit time-out period), the system releases the receiver and applies reorder tone to the extension. If the extension remains off-hook for an additional 20 seconds, the extension is released and locked out. The extension user must go on-hook to re-establish service.

For further information, refer to LOCKOUT ALARM in this Section.

**Conditions** None.

**Programming** None.

**Operation** None.

---

## Automatic Wake-up

---

**Description** This feature allows either the Attendant or an extension user to set up a wake-up alarm call that will ring the extension at a prearranged time. A special tone, music or a recorded announcement is played when the wake-up call is answered. If the call is not answered (or if the extension is busy), the call repeats two more times at 5 minute intervals. Each time, the extension rings four times.

When a 'Wake-up Intercept to RAD' is set up for an extension and the Wake-up matures, the SX-50 system calls the extension. When the extension user answers, the system calls the Recorded Announcement Device (first ONS port). The RAD answers and the extension user hears a recorded wake-up message.

**Printouts:** Every time a wake-up call is set up, changed, rung, answered or canceled, a message is printed on the printer, if it is enabled. The printer message has the following format:

**nnnn mm/dd hh:mm WU HH:MM message**

- **nnnn** – extension number
- **mm/dd** – date (month and day)
- **hh:mm** – time-of-day
- **WU** – feature (Automatic Wake-Up)
- **HH:MM** – wake-up time (24-hour clock)
- **message** – an explanation of what has occurred

The messages include **ANSWER**, **NO ANSWER x**, **BUSY x**, **SET**, **CHANGED** and **CANCELLED** where **x** is the wake-up call number (maximum of three attempts). After three unsuccessful wake-up call attempts, the wake-up call is abandoned and marked with five \* s; i.e., **NO ANSWER \*\*\*\*\***.

- Conditions**
- Do Not Disturb does not affect Wake-up calls.
  - If a wake-up call is not answered or busy it is re-tried 5 minutes later.
  - If a wake-up call is not answered on the third attempt, it is canceled and an alarm results:

**A 63 213 WAKE-UP NOT ANSWERED (example)**

- Upon system reset, the Automatic Wake-Up time resets to system clock time (to the time when the system went out of service), as opposed to real time. The extension's wake-up timer resumes counting from the time when power is restored.

- In order for a user to be able to program a wake-up request from his or her extension, Automatic Wake-Up must be enabled in system programming (Command 100, Register 10, field c) and Wake-up from Extensions must be enabled in COS programming (Commands 121 → 129, Register 4, field j).
- A maximum of one wake-up call is allowed at each extension at a time. The valid wake-up time is the LAST one set, regardless of whether the wake-up was set by the attendant or set at the extension.
- The printer has a queue for Automatic Wake-Up and SMDR reports. If this queue fills up, an alarm results:

#### **A 92 PRINTER QUEUE FULL**

The system inhibits subsequent Automatic Wake-Up calls until there is room in the queue. This could be due to a suspended printer. Refer to **PRINTER PORT** in this Section and to Section 9104-091-350-NA, Troubleshooting.

- A Recorded Announcement Device (RAD) must occupy the lowest ONS equipment number (i.e., the first programmed ONS port) in the system.
- A RAD which provides its own disconnect must be used. The *SX-50* system has no way of disconnecting the RAD.
- If the Recorded Announcement Device (RAD) is busy when the *SX-50* system calls it, the extension user is placed in a listen-only conference with the RAD.
- A maximum of 44 extensions can be in a listen-only conference with the RAD at one time.

#### **Programming** Command 100, System Options, Register 10:

- Set Automatic Wake-Up (field c) to the required signal that the extension hears upon answering the alarm call: 0 (Disable), 1 (Enable With Wake-Up Tone), 2 (Enable With Music) or 3 (Enable with Intercept to Recorded Announcement Device (RAD)). Default is 1.
- If a printout is required for each wake-up alarm, set Automatic Wake-Up Printout (field d) to 1 (Enable). Default is 0 (Disable).

Program the Printer Port, if this has not already been done. Refer to Printer Port in this Section.

To Program Wake-up from Extensions:

Command 110, Feature Access Codes, Register 41:

- Set the Wake-up From Extensions feature access code. Default is 69.

Commands 121 → 129, Class of Service, Register 4:

- For each COS group requiring Wake-up from Extension capability, set Wake-up from Extension (field j) to 1 (Enable). Default is 0 (Disable).

**Operation**

To Display the Wake-Up Call from the Attendant Console:

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 72.
- The LCD displays **VIEW WAKE-UP TIME FOR EXT-?**.

OR

- Press and hold the WAKE-UP key.
- The LCD displays **EXT NUMBER?**.
- Dial the extension number – the LCD displays the extension number, a dash, and the time in hours and minutes (nnnn-HHMM). If no time is programmed, five dashes are displayed.
- If using the WAKE-UP key, release it.

To set the Wake-Up Call from the Attendant Console:

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 71.
- The LCD displays **CHANGE WAKE-UP TIME FOR EXT-?**

OR

- Press and hold the WAKE-UP key.
- The LCD displays **EXT NUMBER?**.
- Dial the extension number requesting the wake-up call.
- Enter the wake-up time in hours and minutes (24-hour clock).
- If using the WAKE-UP key, release it.

To Set a Wake-up Call from an Extension:

- Go off-hook.
- Dial the Wake-up From Extensions access code (default is 69).
- Dial the desired wake-up time using four digits and 24-hour format (e.g., 7:00 AM is entered as 0700). If a valid wake-up time is entered, dial tone is returned. If an invalid wake-up time is entered, reorder tone is returned.

To Cancel the Wake-Up Call:

- Follow the procedure for setting the wake-up call. Enter 9999 as the wake-up time.

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## Auxiliary Attendant

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**Description** The *SX-50* System allows *SUPERSET 4* or *SUPERSET 420* telephones or Voice Mail Ports to act as enhanced Auxiliary Attendant positions. The telephone set user programs Speed Call/Line Appearance keys to act as Attendant Console Function keys. The following function keys are available:

No.	Function
01	DIAL 0
02	DO NOT DISTURB
03	RECALL
04	HOLD 1
05	HOLD 2
06	HOLD 3
07	LDN 1
08	LDN 2
09	LDN 3
10	MESSAGE WAITING
11	MSG REGISTER
12	NIGHT SERVICE
13	OVERFLOW

The Auxiliary Attendant uses the appropriate softkeys and keys of the *SUPERSET 4* or *SUPERSET 420* telephones to provide the PAGE, ANSWER, SWAP/Trade, CANCEL and RELEASE/Speaker Console functions.

The Auxiliary Attendant can also perform Customer Data Entry.

For more information on the use of Voice Mail Ports as Auto Attendant positions, refer to the documentation provided with the VX Voice Processing System.

- Conditions**
- An Auxiliary Attendant position must be a *SUPERSET 4* or *SUPERSET 420* telephone.
  - The Auxiliary Attendant should not be a member of a Pickup Group.
  - The *SUPERSET 4* or *SUPERSET 420* telephone's Prime Line is busy when the set is performing an Attendant Console Function.
  - The Auxiliary Attendant can use Attendant Function access codes, regardless of Attendant Console Function key assignments.

- If the Auxiliary Attendant is busy when a call arrives, the set will give New Call Tone, a single burst of ringing.
- Other *SUPERSET* telephones can have line appearances of the Auxiliary Attendant's prime line, but they have none of the Auxiliary Attendant functions.
- On SMDR reports, the Attendant Involved field contains an \*, and the Calling/Called Party field shows the Auxiliary Attendant prime line number.
- The telephone set user can identify the Console Function keys by using, on the *SUPERSET 4* telephone, the DISPLAY function key, and the Superkey key on the *SUPERSET 420* telephone.
- Attendant Functions 81, 82, 85, 87, 91 and 92 are not available from the Auxiliary Attendant.
- Calls answered on LDNs, DIAL 0 or Hold recalls transfer to the prime line, making room for more incoming calls.
- In order for internal and external calls to ring at the Auxiliary Attendant position, the Attendant Console must be enabled (i.e., Command 100, Register 2, field d must be set 0).
- A maximum of five appearances of each auxiliary attendant function key can be programmed on the *SX-50* system. When an attempt is made to program a sixth appearance (e.g., Dial 0 key), the error message "MAXIMUM LIMIT EXCEEDED" is returned.

**Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 7:

- Set Auxiliary Attendant Position (field d) to 1 (Enable). Default is 0 (Disable).

Commands 301 → 310, Extension Programming:

- Assign Auxiliary Attendant sets with a COS (field d) that contains no other extensions. Default is COS 1 for all sets.

### **Ringling Modes – CDE**

The Auxiliary Attendant can select the ringling type for incoming calls on a station basis. The three types of selectable ringling are: Immediate Ring, Delayed Ring or No Ring. The Recall key always rings immediately. Ringling delay timeout is programmed using Command 100, Register 7, field e.

### **Ringling Modes, from an Auxiliary Attendant *SUPERSET 4* Telephone**

- To program the ringling type, press the SELECT FEATURES key, then dial 6. The main display displays the available ringling types.
- Press the NO softkey to step through the available ringling types, then press the YES softkey when the desired ring type is shown on the display.

### **Ringing Modes, from an Auxiliary Attendant *SUPERSET 420* Telephone**

- Press the Superkey key, to select the programmable features menu.
- Press the No softkey to step forward to ATT RING TYPES feature.
- Press the Yes softkey to select ATT RING TYPES feature.
- Press the No softkey to step through the available ring types, until the desired ringing type is displayed on the display.
- Press the Yes softkey to activate the ring type displayed.

Auxiliary Attendant Function Keys can be programmed in CDE or from the Auxiliary Attendant Set. Both procedures are described below.

### **Function Keys, CDE**

Commands 401 → 480, *SUPERSET* Telephone 01 → 80 Programming, Register = Line Key Number:

- Set Line Appearance Type (field c) to 8 (Attendant Function).
- Set fields d,e to the required Attendant Function key number.

### **Function Keys, from Auxiliary Attendant *SUPERSET 4* Telephone**

- Press the PROGRAM softkey.
- Press the SELECT FEATURES key. The LCD shows **FUNCTIONS ...** for 3 seconds, then **PRESS A S/C KEY.**
- Press a Speed Call key. The adjacent LCD indicator shows a light circle in a dark square. The set display shows **DIAL FEATURE NO.**
- (To delete the current feature key without programming a new one, press CANCEL. Otherwise, continue).
- If the number is not known, use the HELP softkey to step through the features list until the desired feature appears.
- Dial the Feature Number. The LCD shows the feature number and name. If the feature is not the one desired, use the and → softkeys to step through the features list until the desired feature appears.
- Press the SAVE softkey.
- Repeat for each Console Function key desired.

### **Function Keys, from Auxiliary Attendant *SUPERSET420* Telephone**

- Press the Superkey key, to select the programmable features menu.
- Press the No softkey, to step forward to the PERSONAL KEYS feature.
- Press the Yes softkey, to select PERSONAL KEYS feature menu.
- Press a Speed Call key (Line Appearance key), to be programmed.

- Press the Change softkey. The SPEED CALL? menu prompt appears.
- Press the No softkey, to move forward to the ATT FUNC KEYS? feature.
- Press the Yes softkey. The DIAL FEATURE NO. prompt appears.
- Enter the Auxiliary Attendant function number, from the dialpad. If help is required, press the Help softkey.
- Press Save softkey, to save the number entered.
- Repeat for each Auxiliary Attendant Console Function key to be programmed.

**Operation      Answering an Incoming Call ( *SUPERSET 4* Telephone)**

The set rings. The LCD indicates the call type: RECALL, DIAL 0, LDN 1, LDN 2 or LDN 3. To answer:

- Press the ANS softkey, or
- Press the appropriate Console Function key.

To extend the call to the desired destination, use the TRANS/CONF softkey as in normal *SUPERSET 4* operation.

**Answering an Incoming Call ( *SUPERSET 420* Telephone)**

The set rings. The main display indicates the call type: RECALL, DIAL 0, LDN 1, LDN 2 or LDN 3. To answer:

- Press the Answer softkey
- Press the appropriate Console Function key.

To extend the call to the desired destination, use the Trans/Conf key as in normal *SUPERSET 420* operation.

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**Background Music**

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**Description** The SX-50 System feeds audio from the Music On Hold source to the Paging Output when there are no announcements.

**Conditions** None.

**Programming** Command 100, System Options, Register 9, Features Selection 1:

- Set Background Music (field g) to 1 (Enable). The default is 0 (Disable).

**Operation** To turn on Background Music:

- Dial 71 or \*. (Or, if at the Console, press FUNCTION).
- Dial 17.

To turn off Background Music:

- Dial 71 or \*. (Or, if at the Console, press FUNCTION).
- Dial 18.

---

## Behind PABX Operation

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**Description** Using a system in Behind PABX Operation Mode allows it to be installed as a 'slave' PABX to the customer's existing system (the host PABX) to increase its line size with a high level of transparency. This feature is accomplished by connecting a trunk circuit in the slave PABX to a line circuit of the host PABX. Established calls can now transfer back and forth between the slave PABX and the host PABX.

- Conditions**
- Identified Trunk Groups are not allowed in Behind PABX Operation.
  - All trunks involved in Behind PABX Operation must be programmed to the same Trunk Group.
  - Cannot have a unified numbering plan.
  - When transferring a call from the slave PABX to the host PABX, the extension user (upon receiving transfer dial tone), must dial the Trunk Group Access Code assigned to perform the Behind PABX Operation, then the extension number to gain access to the host PABX.
  - Toll Control must be provided by the host PABX for calls routed through the host. Behind PABX trunks must be "Toll-Allowed" in the slave PABX.

**Programming** Commands 151 → 156, Trunk Groups 1 → 6 Programming, Register 1:

- Set Behind PABX Access Code (fields f → i) (i.e., the Trunk Group Access Code).

Commands 151 → 156, Trunk Groups 1 → 6 Programming, Register 2:

- Set External Calls on Reversal (field f) to 0 (Disable) or 1 (Enable). Default is 0.

Commands 151 → 156, Trunk Groups 1 → 6 Programming, Register 4:

- Behind PABX Operation (field c) must be set to 1 (Enable, Flash is Loop Disconnect) or 2 (Enable, Flash is Ring Ground), as appropriate. Default is 0 (Disable).
- Set Behind PABX Recall Signal Duration (field d) to 0 (500 ms) or 1 (750 ms).

**Operation** • All features normally applicable to the system operate as usual.

To Consult With a Third Party in the Host PABX:

- Flash the switchhook – the call is placed on Consultation Hold.
- Dial the Trunk Group Access Code – the host PABX provides dial tone.

- Dial the number to the third party – when the call is answered, the user can consult privately.

To Add the Third Party in the Host to the Call:

- Flash the switchhook – all three parties are connected together.

To Transfer the Call to the Third Party in the Host PABX:

- Replace the handset – the original call is transferred to the third party in the host PABX.

---

## Bell Off

---

**Description** This feature enables and disables the Attendant Console bell. When the bell is disabled, incoming calls to the Attendant Console are indicated by the LCD only.

**Conditions** None.

**Programming** None.

**Operation** To Disable the Attendant Console Bell:

- Press the BELL key on the Attendant Console.
- The LCD displays the **MUTE** prompt; the bell is disabled.

To Enable the Attendant Console Bell:

- Press the BELL key.
- The **MUTE** prompt disappears from the LCD; the bell is enabled.

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## Block Programming

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- Description** The ports in each card slot can be programmed as a block to reduce the amount of data entry required. **Extension Numbering – Block Programming** assigns consecutive extension numbers to the card's ports. The programmer specifies the extension number of the extension connected to the first port and the number of active ports on the card. **COS, Pickup Group and ARS Routing Class of Service – Block Programming** assigns the same Class of Service, Pickup Group and ARS Routing Class of Service to the specified ports on the card.
- Conditions**
- Only slots one to eight can be used for DNIC line cards.
  - All extension numbers in the same block are consecutive.
- Programming** Commands 321 → 330, Slots 1 → 10, Extension Numbering – Block Programming:
- Define first active port (fields a, b) and last active port (fields c, d).
  - Assign the first extension number in the block (fields e, f, g, h).
- Commands 341 → 350, Slots 1 → 10, Extension COS, Pickup Group and ARS Routing Class of Service – Block Programming:
- Define first active port (fields a, b) and last active port (fields c, d).
  - Assign COS (field e), Pickup Group membership (field f) and ARS Routing Class of Service (field g).
  - If programming an OPS Line Card, set OPS Loop Length (field h) as appropriate. See OFF-PREMISES EXTENSIONS.
- Operation** None.

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## Break/Make Ratio

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**Description** This feature selects one of four different outpulsing ratios (break/make) for outgoing trunks. Break/make ratios of 60/40 and 66/33 are supported for trunk outpulsing. This allows the system to operate in any country by conforming to that country's outpulsing ratio.

**Conditions**

- Outpulsing ratio should meet the Central Office conditions.

**Programming** Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 2:

- Set required Trunk Outpulsing Break/Make Ratio (field b) to 0 (60/40), 1 (65/35), 2 (30/20) or 3 (35/15). Default is 0 (60/40).

**Operation** None.

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## Calibrated Flash

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**Description** Extensions access some features by a switchhook flash. Calibrated Flash enables rotary dial sets to flash by dialing the digit "1". It also permits use of DTMF sets that have a calibrated flash key. The calibrated flash time is between 50 and 140 ms (90 ms nominal).

**Conditions**

- Rotary dial set users cannot dial 1 for a calibrated flash while dialing a number. During dialing, the system interprets the '1' as a dialed digit.
- Users of DTMF sets without a Calibrated Flash key can flash the switchhook. However, a very short flash is required.

**Programming** Command 100, Register 06, Station Attributes:

- Set Station Switchhook Flash Timing (field c) to 3 (90 ms Calibrated Flash). Default is 0 (150–750 ms).

**Operation** On an established call:

- From a rotary set, dial 1 and proceed as appropriate for the feature.
- From a DTMF set, press the calibrated flash key "R" and proceed as appropriate for the feature.

---

## Call Block

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**Description** This feature inhibits calling between extensions with Call Block enabled in their COS. An attempt to place a call between two extensions with the above restriction, results in the caller receiving reorder tone. If, for example, COS 1 has Call Block enabled and COS 2 has Call Block disabled, then an extension with COS 1 cannot call another extension WITHIN THAT COS, BUT CAN CALL EXTENSIONS IN COS 2. The attendant must enable the Call Block feature from the Attendant Console. The Attendant Console LCD displays **CALL BLOCK when this feature is active**.

**Conditions**

- When Call Block is enabled, access to trunks is still allowed.
- When the CALL BLOCK key is first pressed, the system first determines if the feature has been enabled on a systemwide basis, then checks each COS to determine which extensions are affected.

**Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 3:

- Set Call Block (field f) to 1 (Enable). Default is 0 (Disable).

**Operation** **Attendant Console Key**

To Enable Call Block:

- Press the CALL BLOCK key (programmable) on the Attendant Console once; the Call Block feature is enabled.
- The LCD displays the **CALL BLOCK** prompt.

To Disable Call Block:

- Press the CALL BLOCK key again; the Call Block feature is disabled. The **CALL BLOCK** flag disappears from the LCD.

**Attendant Function**

To Enable Call Block:

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 23 – the LCD displays **CALL BLOCK**.

To Disable Call Block:

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 24 – the **CALL BLOCK** flag disappears from the LCD.

---

## Call Direction

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- Description** Each COS group can be programmed with one of three possible call direction capabilities: Originate Only, Receive Only or Bothway Calling.
- A COS group with the "Originate Only" option can originate calls but cannot receive them. A COS group with the "Receive Only" option can receive calls but cannot originate them. A COS group with the "Bothway Calling" option can originate and receive calls.
- Conditions** None.
- Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 2:
- Set Call Direction (field c) to 0 (Originate Only), 1 (Bothway Calling) or 2 (Receive Only). Default is 1 (Bothway Calling).
- Operation** None.

---

## Call Duration Display

---

- Description** When a *SUPERSET 4* or *SUPERSET 420* telephone is engaged in a trunk call, the set's LCD displays the duration of the call.
- Conditions**
- This feature applies to *SUPERSET 4* or *SUPERSET 420* telephones only.
- Programming** None.
- Operation**
- Establish a call on a trunk. The display shows the duration of the call in hours and minutes.

---

## Call Forwarding

---

**Description** This feature allows the extension user to redirect incoming calls. The calls can be redirected to the Attendant, a Hunt Group, the Ring Group, an Abbreviated Dial number or another extension. *SUPERSET* users can also redirect calls to Speed Dial numbers.

Users can forward calls to external numbers by specifying an appropriate Speed Dial or Abbreviated Dial number as the destination.

The type of forwarding selected determines under what conditions the call is redirected. The types are:

### **Call Forwarding – Follow Me (Always)**

This type of forwarding is unconditional. All calls are redirected. The forwarding destination is the only party that can call the forwarded extension while Forwarding – Follow Me is active. The extension can originate calls as normal.

A *SUPERSET 4* and *SUPERSET 420* telephone receiving this type of forwarded call displays **CFFM**: preceding the caller's name or extension number.

### **Call Forwarding – Busy**

This feature forwards all calls when the extension is busy or has Do Not Disturb in effect. While the extension is idle, it can make and receive calls normally.

A *SUPERSET 4* and *SUPERSET 420* telephone receiving this type of forwarded call displays **CFB**: preceding the caller's name or extension number.

### **Call Forwarding – No Answer**

This feature forwards all calls that are not answered within a selected time-out period. Otherwise, while the extension is idle, it can make and receive calls normally.

A *SUPERSET 4* and *SUPERSET 420* telephone receiving this type of forwarded call displays **CFNA**: preceding the caller's name or extension number.

### **Forwarding – Busy/No Answer**

This feature forwards all calls received when the extension is busy, has Do Not Disturb in effect or does not answer within a selected time-out period. While the extension is idle, it can make and receive calls normally.

A *SUPERSET 4* and *SUPERSET 420* telephone receiving this type of forwarded call displays **CFB:** or **CFNA:**, as appropriate, preceding the caller's name or extension number.

### Conditions

- Call Forwarding has no effect on callbacks.
- Call Forwarding has no effect on calls directed to an extension via hunting.
- Only one type of Call Forwarding can be active at an extension at any time. If an extension has one type of Call Forwarding active and a new Call Forwarding type is entered, the first type of Call Forwarding is canceled.
- Call Forwarding – No Answer has no effect if the *SUPERSET 4* and *SUPERSET 420* telephone is operated in Auto-answer mode.
- If an invalid number is selected as a forwarding destination, reorder tone is returned. On *SUPERSET 4* and *SUPERSET 420* telephones, the display shows **ERROR**.
- Call Forwarding does not apply if the calling extension is the party to which the call would be forwarded.
- Call Forwarding to an external destination is possible via Speed Dial or Abbreviated Dial only.
- Call Forwarding to an external destination can occur only if the caller's COS has Proceed to be Call Forwarded Externally enabled and the called party's COS has an external forwarding option enabled for the type of forwarding required.
- A call can be forwarded twice if the first forward is of the "Follow Me" or "Busy" type, and the second is of the "Don't Answer" type. Otherwise a call can be forwarded only once.

### Programming

Command 100, System Options, Register 5:

Fields c through i of the above register controls trunk-to-trunk connections. All fields default to 0 (disabled). Enable the appropriate field with a 1.

- CO to CO is field c.
- E&M to E&M is field d.
- CO to E&M is field e.
- DID to CO is field g.
- DID to E&M is field h
- DID to DID is field i

Commands 121 → 129, COS 1 → COS 9 Programming, Register 4:

Fields b through e of the above registers control Call Forwarding.

- Follow Me is field b.
- Busy is field c.
- No Answer is field d.
- Busy/No Answer is field e.

The options for these fields are:

- Disable all Call Forwarding (field = 0)
- Enable internal Call Forwarding of extension calls and trunk calls (field = 1). This is the default.
- Enable internal and external Call Forwarding of extension calls only (field = 2)
- Enable internal and external Call Forwarding of extension calls and trunk calls (field = 3)

To permit members of this Class of Service to be forwarded to external numbers:

- Set the fields b → e to 2, to forward extensions to external numbers for the type of call forwarding that applies.
- Set the fields b → e to 3, to forward extensions and trunk calls to external numbers for the type of call forwarding that applies.
- Set Proceed to be Call Forwarded Externally (field f) to 1 (Enable). Default is 0 (Disable).

Command 501–580, Trunks 01–80, Trunk Programming:

- Register 1; set Connect to Outgoing Trunk without Third Party (field g) to 1 (Enable). Default is 0 (Disable).
- Register 2; set Disconnect Supervision Guaranteed (field c) to 1 (Enable). Default is 0 (Disable).

## Operation

### **ONS, OPS, SUPERSET 3 and SUPERSET 410 Telephones**

To set up Call Forwarding:

- Lift the handset – wait for dial tone.
- Dial the access code for the desired type of forwarding.
- Dial the number to which calls are to be forwarded.
- Dial tone returns.
- Hang up – the extension is available for normal use.

To cancel Call Forwarding:

- Lift the handset – wait for dial tone.
- Dial any forwarding access code.
- Hang up – the forwarding is canceled.

### **SUPERSET 4 Telephone**

To Set Up or Modify Call Forwarding:

- With the handset on-hook, press the PROGRAM softkey.
- Press the CALL FWD softkey.
- The Features Display shows a Call Forwarding type. If the displayed type is required, press the YES softkey. If the displayed type is not required, press the NO softkey. Another Call Forwarding type is then displayed.
- If the call is to be forwarded to another extension number or the Attendant Console, dial the Call Forwarding destination. If the call is to be forwarded to an outside number, press the Speed Dial key associated with that number or dial the Abbreviated Dial number, if programmed.
- Check the Call Forwarding destination as displayed on the Features Display. If correct, press the SAVE softkey. The Call Forwarding type and destination are now stored.
- Call Forwarding is now active, and the FWD prompt is displayed as a reminder.

To correct a programming error before the SAVE softkey is pressed:

- Use the <= softkey to backspace to and clear the incorrect entry.

OR

- To cancel the entire current entry, press the EXIT softkey.

To Display the Current Call Forwarding Type and Destination:

- Press the DISPLAY feature key.
- Press the CALL FWD softkey.

The display shows **ALWAYS**, **NA**, **BUSY**, or **BUSY/NA** followed by the destination extension number. If no call forwarding is active, it displays **None ACTIVE**.

To Deactivate Call Forwarding:

- Press the SELECT FEATURES feature key.
- Dial '1' (feature number 1 is Call Forwarding (1:FWD)).
- Press the OFF softkey.

**Note:** The Clear All Features code (default 444) also can be used to deactivate Call Forwarding. Refer to **Clear All Features** in this Section.

To Reactivate Call Forwarding:

- Press the SELECT FEATURES feature key.
- Dial '1' (feature number 1 is Call Forwarding (1:FWD)).
- Press the ON softkey.

### ***SUPERSET 420 Telephone***

To Set Up Call Forwarding:

- Press the Superkey key, to select the programmable features menu.
- Press the No softkey, to step forward to the CALL FORWARDING feature.
- Press the Yes softkey, to select call forwarding feature. The display indicates NON ACTIVE.
- Press the Program softkey.
- Press the No softkey to step through the call forwarding options.
- Press the Yes softkey, to select the desired option.
- Enter the destination number or select a speed call key.
- Press the Save softkey, to activate feature.

To Modify Call Forwarding:

- Press the Superkey key, to select the programmable features menu.
- Press the No softkey, to step forward to CALL FORWARDING feature.
- Press the Yes softkey, to select call forwarding feature. The display indicates the existing call forwarding option.
- Press the Change softkey.
- Press the Program softkey.
- Press the No softkey, to step through the call forwarding options.
- Press the Yes softkey, to select the desired option.
- Enter the destination number or select a speed call key.
- Press the Save softkey, to activate feature.

To Deactivate Call Forwarding:

- Press the Superkey key, to select the programmable features menu.
- Press the No softkey, to step forward to the CALL FORWARDING feature.

- Press the Yes softkey, to select call forwarding feature. The display indicates the existing call forwarding option.
- Press the Change softkey.
- Press the Off softkey.

To Reactivate Call Forwarding:

- Press the Superkey key, to select the programmable features menu.
- Press the No softkey, to step forward to the CALL FORWARDING feature.
- Press the Yes softkey, to select call forwarding feature. The display indicates the existing call forwarding option.
- Press the Change softkey.
- Press the On softkey.

To Display the Current Call Forwarding Type and Destination:

- Press the Superkey key.
- Press the No softkey to move forward to CALL FORWARDING feature.
- Press the Yes softkey to select call forwarding feature menu. The display indicates the existing call forwarding option.

---

## Call Hold (Attendant)

---

- Description** This feature places a call on hold at one of three HOLD keys. This frees the DIAL0 or LDN softkeys where the call originally appeared. The Attendant can retrieve the call by pressing the appropriate HOLD key. An extension can pick up the call by dialing the correct Call Hold Access Code.
- Conditions**
- If Music on Hold is required (trunk calls only), a Music-on-Hold Module must be installed on the Universal Card. A Music-on-Hold module is not required if the Control Card 2 (MCC2) is installed.
- Programming** Command 100, System Options, Register 09, Features Selection 1:
- If Music on Hold is required, set Music on Hold (field f) to 1 (Enable). Default is 0 (Disable).
- Command 100, System Options, Register 11, Time-out Selection:
- Set Timed Recall – Call Hold (Attendant) (field f) to (1 → 7) x 10 seconds. Default is 3 (30 Seconds).
- Command 110, Feature Access Codes, Registers 16, 17 and 18:
- Assign Call Hold Access Codes. Default is 451 (Register 16), 452 (Register 17) and 453 (Register 18).
- Operation**
- To Place a Call on Hold:
- Answer an incoming call.
  - Press a HOLD key on the Attendant Console. The LCD indicates the hold and the appropriate Call Hold Access Code; e.g., **HELD ON-451**.
  - The Attendant can retrieve the call, unless it has been picked up, by pressing the appropriate HOLD key. The LCD displays the Call Hold Access Code when the HOLD key is pressed. The Attendant can return the call to HOLD by pressing a HOLD key.
  - The call progression information associated with the held call is removed from the LCD.
- To Pick Up a Held Call from an extension:
- Lift the handset.
  - Dial the call HOLD Access Code.
  - The extension is connected to the held party.

### **Auxiliary Attendant**

To place a call on Hold:

- Press the appropriate HOLD function key (Hold 1, Hold 2 or Hold 3). While the key is held down, the display shows the corresponding Call Park access code.
- The associated line indicator shows a dark square. If the call recalls to the set, the line indicator flashes.

To retrieve a call from Hold:

- Press the appropriate HOLD function key. The associated line indicator clears.

---

## Call Hold (Extensions)

---

**Description** This feature enables the extension user to place the current call on hold by dialing a code. The user can hang up or make other calls. All features normally active on the extension can be selected while the call is held. The held call can be retrieved locally or remotely (from a different extension) by dialing the required Call Hold Retrieve Access Code. The retrieved call can be transferred or added to form a conference. If the held call is not retrieved within the selected recall time, the holding extension is automatically recalled.

**Conditions**

- The Attendant Console cannot be put on hold.

If a held extension call is not retrieved before the Timed Recall – Call Hold time-out (see Programming), the held extension recalls the holding extension:

- If the holding extension is busy, the held extension camps on, if Extension Camp-On is enabled in its Class of Service.
- If the extension does not answer within 5 minutes, the call is dropped. Call forwarding does not apply.

If a held trunk call is not retrieved before the Timed Recall – Call Hold time-out (see Programming), the held trunk recalls the holding extension:

- If the holding extension is busy, the held trunk camps on.
- If the extension does not answer within 5 minutes, the call is dropped. Call forwarding does not apply.
- The Call Hold Retrieve (Remote) access code cannot retrieve a call held at a Multicall line appearance using the *SUPERSET* red HOLD key.

**Programming** Command 100, System Options, Register 09, Features Selection 1:

- If Music on Hold is required, set Music on Hold (field f) to 1 (Enable). Default is 0 (Disable).

Command 100, System Options, Register 11, Time-out Selection:

- Set the required Timed Recall – Call Hold (Extension) (field e) to 1, 2, 3 or 4 minutes. Default is 3 minutes.

Command 110, Feature Access Codes:

- **Register 03.** Assign the required Call Hold Access Code. Default is 51.
- **Register 04.** Assign the required Call Hold Retrieve – LOCAL Code. Default is 52.
- **Register 05.** Assign the required Call Hold Retrieve – REMOTE Code. Default is 53.

Commands 121 → 129, COS 1 → COS 9 Programming, Register 3:

- Call Hold (field e) for the holding extension must be set to 1 (Enable). Default is 1.

## **Operation**

To Place a Call on Hold:

- Originate or answer a call.
- Flash the switchhook.
- Dial the Call Hold Access Code (default is 51). Dial tone is returned. The original call is held. The holding extension can make or receive calls or access features in the normal manner.

To Retrieve a Held Call Locally (From the Holding Extension):

- Lift the handset.
- Dial the Call Hold Retrieve – LOCAL Access Code.
- The held call is returned to the holding extension.

To Retrieve a Held Call Remotely (From a Remote Extension):

- Lift the handset.
- Dial the Call Hold Retrieve – REMOTE Access Code (default is 53).
- Dial the number of the holding extension. The call is connected to the remote extension.

## ***SUPERSET* Telephones**

To Place a Call on Hold:

- Inform the caller, then press the red HOLD key.
- The call is held. A caller from within the switch receives silence; a trunk caller hears music, if provided. The holding set can select another line to make calls or access features in the normal manner, or hang up.
- The Line Status Display associated with the call on hold flashes as a reminder.

To Retrieve the Call from the holding set or from another *SUPERSET* telephone that has a key line appearance of the held line:

- Press the Line Select key associated with the call on hold.
- The call is returned to the holding set.

To Retrieve the Call Remotely (from another extension):

- Lift the handset.
- Dial the Call Hold Retrieve – REMOTE Access Code (default is 53).
- Dial the number of the holding extension.

---

## Call Pickup

---

**Description** This feature enables an extension user to answer a call ringing at another extension.

There are three types of Call Pickup: Local, Directed and Attendant. Local means to pick up a call within the same Pickup Group. There can be up to seven Pickup Groups. Directed Pickup applies to any extension within the system. Attendant Call Pickup allows an attendant to dial a code or press a preprogrammed console key to answer any ringing extension. Attendant Call Pickup is useful to retrieve a transferred call before the call recalls to the console.

A COS Option can secure extensions against Directed Call Pickup. See Programming, below.

- Conditions**
- For local Call Pickup, the extension must be assigned to the appropriate Pickup Group in CDE Programming. By default, all extensions are in Pickup Group 1.
  - Reorder tone is returned if the Call Pickup cannot be performed. This occurs if local Call Pickup is attempted on an extension in another Pickup Group, the extension has already been answered, or another extension has picked up the call.
  - An extension with a call on consultation hold cannot perform Directed Call Pickup.
  - A DISA Trunk cannot perform Directed Call Pickup.
  - The extension to be “picked up” must not have Directed Call Pickup Security enabled, be busy or be in programming mode.
  - For Attendant Call Pickup, a programmed console key replaces only the feature access code. The extension number of the ringing set must still be dialed.
  - The feature access code for Attendant Call Pickup is valid even when a console key is programmed to replace the access code.

**Programming** Command 110, Register 6, fields c → f:

- Assign a Dial Call Pickup code. The default is 54.

Command 110, Register 30, fields c → f:

- Assign a Directed Call Pickup code. The default is 61.

Commands 121 → 129, COS 1 → COS 9 Programming, Register 7:

- Set Directed Call Pickup (field e) to 1 (Enable). Default is 0 (Disable).

To secure a Class of Service against Directed Call Pickup:

- Commands 121 → 129, COS 1 → COS 9 Programming, Register 7:
- Set Directed Call Pickup Security (field f) to 1 (Enable). Default is 0 (Disable).

Assign the Extension to the Pickup Group:

Commands 301 → 310, Slots 1 → 10, Extension Programming:

Register = Port number, field d = COS, field f = Pickup Group number (1 → 7).

OR

Assign consecutive extensions to the same Pickup Group:

Commands 341 → 350, Slot 1 → 10, Extension COS, Pickup Group and ARS Routing Class of Service – Block Programming:

Register 1, fields a, b = circuit number of first extension in block, fields c, d = circuit number of last extension in block, field e = COS, field f = Pickup Group number (1 → 7).

To program an Attendant Call Pickup key:

- Assign Key Function 21 (Attendant Call Pickup) to a console key using Command 185, Attendant Console Key Programming (fields c and d).

## Operation

### **Local Pickup – ONS, OPS, SUPERSET 3 or SUPERSET 410 Telephones**

- A call is ringing at another set in the same Pickup Group.
- Lift the handset – dial tone is returned.
- Dial the Dial Call Pickup code. Default is 54.
- The other set stops ringing. The extension user is connected to the calling party.

### **Local Pickup – SUPERSET 4 or SUPERSET 420 Telephone**

A call is ringing at another set in the same Pickup Group:

- If desired, lift the handset.
- Press the PICKUP softkey.
- The other set stops ringing. The user is connected to the calling party.

### **Directed Call Pickup – All Sets**

A call is ringing at a set outside the Pickup Group.

- Lift the handset – dial tone is returned.
- Dial the Directed Call Pickup code. Default is 61.

- Dial the extension number of the ringing set. The other set stops ringing. The extension user is connected to the calling party.

### **Attendant Call Pickup (Attendant/Auxiliary Attendants only)**

A call is ringing to any extension in the SX-50 system.

- Lift the handset – dial tone is not returned to Attendant Console but is returned at Auxiliary Attendant Console.
- Dial the Directed Call Pickup feature access code (default is 61) OR press the Attendant Call Pickup console key. The LCD displays **EXT-NUMBER?**
- Dial the extension number of the ringing set. The Attendant/Auxiliary Attendant is connected to the calling party. The console displays **INVALID** and reorder tone is heard when any of the following occur: the ringing set has already been answered, an incorrect extension number was dialed, or the set has Directed Call Pickup Security enabled.

---

## Call Selection

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- Description** This feature permits the Attendant to answer calls in the order in which they arrive at the Attendant Console, or by selecting a specific call type. As calls arrive at the Attendant Console, they are queued and the LCD flashes the prompt (**LDN1**, **LDN2** **LDN3**, **DIALO** or **RECALL** associated with the call. The attendant can answer the first call in the queue by pressing the ANSWER key, or can select a call of a specific call type by pressing the key associated with the associated flashing word prompt. The SX-50 system provides five incoming call indicators to identify the following call types:
- **DIALO** – calls from extensions
  - **RECALL** – recalls
  - **LDN1**, **LDN2**, **LDN3** – incoming trunk calls
- Conditions**
- Assignment of trunks to the LDN keys is programmable. All trunks can be on one key, or they can be distributed across all three keys as required.
- Programming** Commands 501 → 580, Trunks 01 to 80, Trunk Programming, Register 4:
- Day Answer Mode (field d) should be set to 1 (LDN 1), 2 (LDN 2) or 3 (LDN 3). Field d should not be set to 0 (Direct-In Line). Default is 1.
- Commands 501 → 580, Trunks 01 to 80, Trunk Programming, Register 5:
- Night Answer Mode (field b), should be set to 1 (LDN 1), 2 (LDN 2) or 3 (LDN 3). Default is 0 (Flexible Night Service).
- Operation**
- To Answer the First Call in the Attendant Console Queue:
- Press the ANSWER key – the tone ringer stops and the word prompt associated with the call type is removed from the LCD. The LCD shows the number of the calling trunk or extension and the call waiting status decrements by one.
  - The Attendant Console is connected to the calling party.
- To Answer a Specific Call Type:
- Press the key associated with desired call type – the ringer stops and the prompt associated with the call type is removed from the LCD. The LCD shows the number of the calling trunk or extension and the call waiting status decrements by one.
  - The Attendant Console is connected to the calling party.

---

## Call Split

---

**Description** Call Split enables a *SUPERSET* telephone engaged in a conference call to split the call between the conferees. Once active, swapping can occur between the calls, or conference can be re-established.

- Conditions**
- This feature applies to *SUPERSET* telephones only.
  - A conference call must be in progress.

**Operation** ***SUPERSET 3 Telephone***

- Establish a conference call.
- Press the SWAP feature key. The first caller or called party is placed on hold, and the call continues with the second called or calling party.
- The SWAP feature key is active. (See Call Swap).
- Press the TRANS/CONF feature key. The conference call is re-established.
- Press the SWAP feature key. The second caller or called party is placed on hold, and the call continues with the first called or calling party.

***SUPERSET 4 Telephone***

- Establish a conference call.
- Press the SPLIT softkey. The first caller or called party is placed on hold, and the call continues with the second called or calling party.
- The SWAP softkey is active. (See Call Swap).
- Press the CONF softkey. The conference call is re-established.
- Press the SPLIT softkey. The second caller or called party is placed on hold, and the call continues with the first called or calling party.

***SUPERSET 420 Telephone***

- Establish a conference call.
- Press the SPLIT softkey. The first caller or called party is placed on hold, and the call continues with the second called or calling party.
- The TRADE softkey is active. (See Call Trade).
- Press the CONF softkey. The conference call is re-established.
- Press the SPLIT softkey. The second caller or called party is placed on hold, and the call continues with the first called or calling party.

---

## Call Swap/Trade

---

**Description** Call Swap/Trade permits the *SUPERSET* user to alternate between two called or calling parties. Each time the SWAP/Trade key is pressed, the current party is placed on hold while the conversation continues with the other party.

**Conditions**

- If transfer dial tone is not enabled, normal dial tone is returned.

**Operation** ***SUPERSET 3 Telephone***

- Place or receive a call at the *SUPERSET 3* telephone.
- Press the TRANS/CONF feature key – transfer dial tone is returned; the current party is held.
- Dial the second call. Conversation takes place between the *SUPERSET 3* telephone and the second party.
- Press the SWAP feature key. The second call is placed on hold, and the conversation continues with the first party.
- Each subsequent press of the SWAP feature key alternates between the two calls.

**CANCEL:**

- To terminate the call with the current party and continue conversation with the held party, press the CANCEL feature key.

***SUPERSET 4 Telephone***

- Place or receive a call at the *SUPERSET 4* telephone.
- Press the TRANS/CONF softkey – transfer dial tone is returned; the current party is held.
- Dial the second call. Conversation takes place between the *SUPERSET 4* telephone and the second party.
- Press the SWAP softkey. The second call is placed on hold, and the conversation continues with the first party.
- Each subsequent press of the SWAP softkey alternates between the two calls.

**CANCEL:**

- To terminate the call with the current party and continue conversation with the held party, press the CANCEL softkey.

***SUPERSET 410 Telephone***

- Place or receive a call at the *SUPERSET 410* telephone.

- Press the Trans/Conf key – transfer dial tone is returned; the current party is held.
- Dial the second call. Conversation takes place between the *SUPERSET 410* telephone and the second party.
- Press the Trans/Conf key. The second call is placed on hold, and the conversation continues with the first party.
- Each subsequent press of the Trans/Conf key alternates between the two calls.

**CANCEL:**

- To terminate the call with the current party and continue conversation with the held party, press the Cancel key.

***SUPERSET 420 Telephone***

- Place or receive a call at the *SUPERSET 420* telephone.
- Press the Trans/Conf key – transfer dial tone is returned; the current party is held.
- Dial the second call. Conversation takes place between the *SUPERSET 420* telephone and the second party.
- Press the TRADE softkey. The second call is placed on hold, and the conversation continues with the first party.
- Each subsequent press of the TRADE softkey alternates between the two calls.

**CANCEL:**

- To terminate the call with the current party and continue conversation with the held party, press the CANCEL key.

---

## Call Transfer

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**Description** This feature allows an extension user on an established call to transfer the call to another party.

- Conditions**
- If transfer dial tone is not enabled, normal dial tone is returned.
  - Call Transfer is not available when the set is in a conference call.
  - Flash for Consultation Hold and Flash for Attendant are mutually exclusive.
  - The transferred call can be camped onto a busy destination if camp-on is enabled.
  - A transferred call that is not answered after a programmed time-out period recalls the extension that transferred it. (See Recall).
  - A transferred trunk call that is camped-on to a busy destination recalls the extension that transferred it, after a programmed time-out period. (See Recall).

**Programming** Command 100, System Options, Register 11, Time-out Selection:

- Set Timed Recall – Camp-On (field c) to the required time; 10 through 70 Seconds. Default is 30 seconds.
- Set Timed Recall – No Answer (field d) to the required time; 10 through 70 Seconds. Default is 30 seconds.

Commands 121 → 129, COS 1 → COS 9 Programming, Register 2:

- Ensure Switchhook/Ground Button Flash (field b) is set to 1 (Flash for Consultation Hold). This is the default.

Commands 121 → 129, COS 1 → COS 9 Programming, Register 8:

- By default, extensions are allowed to camp a trunk call onto a busy extension. To disallow this, set CO Trunk Camp-On (field c) to 0.

**Operation** **ONS and OPS Sets**

On an Established Call:

- Flash the switchhook – the original call is placed on Consultation Hold.
- Dial the number of the third party. If desired, wait for the party to answer and announce the call.
- Replace the handset – the original call transfers to the third party.

***SUPERSET 3, SUPERSET 4, SUPERSET 410 and SUPERSET 420***  
**Telephones**

On an Established Call:

- Press the TRANS/CONF key – transfer dial tone is returned; the current called or calling party is held.
- Dial the desired number.
- Hang up. (If in Handsfree mode, press the SPEAKER key). This can be done while listening to ringing or busy tone, or after the call has been answered.

OR

- Press the TRANS/CONF key.
- Dial the desired number.
- Wait for the call to be answered. If the number is busy or does not answer, press the CANCEL key to return to the held call.
- Speak with the called party. This conversation is private.
- Hang up. (If in Handsfree mode, press the SPEAKER key). The called party is connected to the party on hold.

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**Camp-On**

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**Description** This feature allows a caller to indicate to a called but busy party that communication is desired. The called extension receives a 200 ms burst of 440 Hz tone (two bursts for a trunk call). If the called extension is a *SUPERSET 4* or *SUPERSET 420* telephone, its Features Display indicates that a call has camped on.

While waiting, the calling set receives Special Busy tone (350/440 Hz interrupted at 60 ipm). DID callers receive ringback tone while waiting, if DID Camp-on is enabled.

When the busy extension hangs up, it immediately rings. The calling set receives ringback tone.

- Conditions**
- The Attendant Console can camp-on a caller to an extension even if the Camp-On feature is disabled.
  - If the Camp-On feature is disabled, an attempt by an extension to camp a call on to another extension rings the trunk back to the extension that made the Camp-On attempt.
  - Camped-on internal calls do not recall.
  - A camped-on trunk call not answered within the time-out period recalls to the extension that transferred it.
  - Camp-on tone is not supplied to trunks or to extensions using paging equipment.
  - Camp-on to Paging equipment is not permitted.
  - The Camp-On feature is selected automatically when the set remains off-hook receiving busy tone for 10 seconds.
  - An extension with a COS that includes Data Security can be camped onto, but camp-on tone is not supplied.
  - An extension on hold can receive camp-on tone.
  - Camped-on callers ring the extension (when it becomes free) in the order that they camped on, but trunks have priority over extensions.
  - If Camp-On is not enabled, callers hear Busy Tone.
  - When a *SUPERSET 4* or *SUPERSET 420* set with Do Not Disturb enabled is a member of a hunt group, incoming trunk calls cannot camp on to the set. The next available set is selected for the Camp-On feature. If all members of the hunt group have Do Not Disturb enabled, Camp-On is not allowed and reorder tone is returned.

**Programming** Command 100, System Options, Register 11, Timeout Selection:

- Set Timed Recall – Camp–on (Trunks) (field c) to 1 → 7 (10 → 70 seconds). Default is 3 (30 seconds).

Command 121 → 129, COS 1 → COS 9 Programming, Register 8:

By default, camp–on is enabled for all types of callers. To disable, set the appropriate field to 0. The fields are:

- Extension Camp–on (field b)
- Trunk Camp–on (field c)
- Inward Dial Trunk Camp–on (field d)

## **Operation** ***SUPERSET 4 Telephone***

To Camp–On to a Busy Extension:

- While receiving busy tone, press the CAMP ON softkey. Remain off–hook.
- The called party hears camp–on tone. If it is another *SUPERSET 4* or *SUPERSET 420* telephone, the camped–on party’s number is displayed.
- The busy extension hangs up and immediately rings. The camped–on extension receives ringback tone.

OR

- At the busy *SUPERSET 4* telephone, the user presses the SWAP CAMP ON softkey. The camped–on party is connected.

## ***SUPERSET 420 Telephone***

To Camp–On to a Busy Extension:

- While receiving busy tone, press the Wait softkey. Remain off–hook.
- The called party hears camp–on tone. If it is another *SUPERSET 4* or *SUPERSET 420* telephone, the camped–on party’s number is displayed.
- The busy extension hangs up and immediately rings. The camped–on extension receives ringback tone.

OR

- At the busy *SUPERSET 420* telephone, the user presses the Trade softkey. The camped–on party is connected.

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## CDE Battery Backup

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**Description** The customer data that configures the *SX-50* system to the customer's requirements is held in Random Access Memory (RAM). A Lithium battery on the Generic Module supports the RAM during periods of no system power, to a total of 4,500 hours.

*SX-50* system call processing software is held in Read Only Memory (ROM). This type of memory is not affected by power failure. Call processing can start immediately after power is applied to the system.

- Conditions**
- The Lithium Battery must be installed on the Memory Module. It is shipped separately to conserve its charge. Refer to Section 9104-091-200-NA, Shipping, Receiving and Installation Information.
  - Certain precautions must be followed when using a Lithium Battery. Refer to Section 9104-091-200-NA, Shipping, Receiving and Installation Information, for these precautions.

**Programming** None.

**Operation** None.

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## Class Of Service (COS)

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- Description** The *SX-50* system defines up to nine independent Classes of Service. Each COS defines the features an extension or Inward Dial Trunk assigned that COS can access. The features that can be assigned to a COS and the field values that enable them are listed in Table 2-2. Unless otherwise shown a field value of 0 disables the feature.
- Conditions**
- There is a maximum of nine independent COS per system.
  - One COS can be assigned per extension or Inward Dial Trunk.
- Programming** Command 110, Feature Access Codes:
- Assign the required Feature Access Codes.
- Commands 121 → 129, COS Programming, Registers 1,2,3,4,5,6,7 and 8:
- COS 1 is defined by Command 121, COS 2 by Command 122, etc.
  - Assign the required features to each Class of Service.
- Commands 301 → 310, Slots 1 → 10, Extension Programming, Registers 01 → 16:
- Assign the extension a Class of Service (field d). The default is 1. The register number is the port number of that slot.
- Commands 321 → 330, Slots 1 → 10, Extension Numbering – Block Programming:
- If groups of extensions are to have consecutive numbers, then use these commands. Refer to Block Programming in this Section.
- Commands 341 → 350, Slots 1 → 10, COS, Pickup Group and ARS Routing Class of Service – Block Programming:
- If groups of extensions are to have the same COS, Pickup Group and ARS Routing Class of Service, then use these commands.
  - Refer to Block Programming in this Section.
- Commands 501 → 580, Trunks 01 to 80, Trunk Programming, Register 1:
- Set Trunk Class of Service (field e) to the required COS, 1 through 9. Default is 1.
- Operation** None.

Table 3-2 Class-Of-Service Options (Commands 121 → 129)

Register	Field	Option
Register 1	b = 1 c = 1 d = 1 e = 1 f = 1 g = 1 h = 1 j = 1	Trunk Group 1 Access Trunk Group 2 Access Trunk Group 3 Access Trunk Group 4 Access Trunk Group 5 Access Trunk Group 6 Access Trunk Group Overflow Access Authorized Trunk to Trunk Connection
Register 2	b = 1 b = 2 c = 0 c = 1 c = 2 d = 1 e = 1 e = 2 f = 1 f = 2 f = 3 g = 1 h = 1 j = 1 k = 1	Flash for Consultation Hold Flash for Test Line/Attendant Originate Only Bothway Calling Receive Only Automatic Ringdown Circuit DISA Access Code Required Special DISA / VAC Required Restrictive Station Control Message Registration Message Registration and Restrictive Station Control Message Waiting Rotary Only (For DISA E&M Trunks Only) <i>SUPERSET 4</i> or <i>SUPERSET 420</i> Headset Operation Do Not Disturb
Register 3	b = 1 c = 1 d = 1 e = 1 f = 1 g = 1 h = 1 i = 1 j = 1 k = 1 k = 2	Automatic Callback Busy/No Answer, ARS Callback Paging Access Data Line Security Call Hold Call Block TAFAS Access COS SMDR Room Status ONS Callback No Answer Activation During Ringback Voice Mail Port – Message Optimization Control (MS52, MS54, MS55) Voice Mail Port – Send Disconnect Tone
Register 4	b = 1 c = 1 d = 1 e = 1 f = 1 g = 1 h = 1 i = 1 j = 1	Call Forward – Follow Me Call Forward – Busy Call Forward – No Answer Call Forward – Busy/No Answer Proceed to Be Call Forwarded Externally Executive Busy Override Executive Busy Override Security Associated Modem Line Wake-Up from Extension

**Table 3-2 Class-Of-Service Options (Commands 121 → 129)**  
(continued)

Register	Field	Option
Register 5	b = 1	Access to Abbreviated Dial Numbers 10 → 19 or 100 → 199
	c = 1	Access to Abbreviated Dial Numbers 20 → 29 or 200 → 299
	d = 1	Access to Abbreviated Dial Numbers 30 → 39 or 300 → 399
	e = 1	Access to Abbreviated Dial Numbers 40 → 49 or 400 → 499
	f = 1	Access to Abbreviated Dial Numbers 50 → 59 or 500 → 599
	g = 1	Access to Abbreviated Dial Numbers 60 → 69 or 600 → 699
	h = 1	Access to Abbreviated Dial Numbers 70 → 79 or 700 → 799
	i = 1	Access to Abbreviated Dial Numbers 80 → 89 or 800 → 899
	j = 1	Access to Abbreviated Dial Numbers 90 → 99 or 900 → 999
	k = 1	Last Number Redial Enable
	Register 6	c = 1
d = 1		Outgoing Access to CO Trunks
Register 7	b = 1	<i>SUPERSET 4</i> or <i>SUPERSET 420</i> Telephone Programming of Message
	c = 1	Account Code Entry – Optional
	c = 2	Account Code Required for Toll Calls Only
	c = 3	Account Code Required for All Calls
	d = 1	Auxiliary Attendant Position
	e = 1	Directed Call Pickup
	f = 1	Directed Call Pickup Security
	g = 1	Hunt Group Login
h = 1	Lockout Alarm	
Register 8	b = 1	Extension Camp-on
	c = 1	CO Trunk Camp-on
	d = 1	Inward Dial Trunk Camp-on
	e = 1	DID Restriction

---

## Clear All Features

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**Description** This feature resets the features currently active on an extension.

- Conditions**
- All callbacks set up by the extension are canceled.
  - Call Forwarding is no longer in effect.
  - Do Not Disturb is no longer in effect.

**Programming** Command 110, Feature Access Codes, Register 15:

- Assign the Clear All Features Access Code. Default is 444.

- Operation**
- Lift the handset – dial tone is returned.
  - Dial the Clear All Features Access Code from the required extension – dial tone is returned.
  - All features selected at that extension are disabled.

---

## Conference

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- Description** This feature permits an extension user to place the current call on Consultation Hold and make another call. The user can converse privately with this party or form a 3-party conference.
- Conditions**
- The system supports a maximum of six 3-party conferences.
  - If Transfer Dial Tone is not enabled, normal dial tone is returned.
- Programming** None.
- Operation** **ONS or OPS Set**
- Establish an extension call.
  - Flash the switchhook – the system puts the first extension call on Consultation Hold and returns Transfer Dial Tone to the holding extension.
  - Dial the extension number of the second extension – the system sets up a 2-way conversation with the third party.
  - Flash the switchhook to connect the held extension call to the existing call and form a 3-party conference.
- SUPERSET 3 or SUPERSET 410 Telephone***
- A call is in progress:
- Press TRANS/CONF function key. Transfer Dial tone is returned.
  - Call the second party. This conversation is private. If there is no answer, or to terminate the call without conferencing, press the CANCEL function key to return to the first party.
  - Press the TRANS/CONF function key. A 3-party conference is formed.
- SUPERSET 4 Telephone***
- A call is in progress:
- Press the TRANS/CONF softkey. Transfer Dial tone is returned.
  - Call the second party. This conversation is private. If there is no answer, or to terminate the call without conferencing, press the CANCEL softkey to return to the first party.
  - Press the CONF softkey. A 3-party conference is formed.

### ***SUPERSET 420 Telephone***

A call is in progress:

- Press the Trans/Conf key. Transfer Dial tone is returned.
- Call the second party. This conversation is private. If there is no answer, or to terminate the call without conferencing, press the CANCEL key to return to the first party.
- Press the Trans/Conf key. A 3-party conference is formed.

---

**Conflict-Dialing**

---

- Description** Extensions can be programmed with 1-, 2-, 3- or 4-digit numbers with the first digits being identical, for example "523" and "5234". The system selects the shorter number if the user does not dial another digit within the time-out period or dials # to indicate the end of the number.
- It is recommended that extension numbers do not conflict with ARS digit strings or Feature Access Codes.
- Conditions** None.
- Programming** Command 100, System Options, Register 09, Features Selection 1:
- Set the Conflict Dialing Time-out (field e) to 1 (3 seconds), 2 (5 seconds) or 3 (7 seconds). Default is 0 (Disable).
- Command 301 → 310, Extension Programming
- End conflicting numbers with #.
- Operation** None.

---

## Consoleless Operation

---

**Description** The SX-50 system can operate without the use of an Attendant Console.

An Auxiliary Attendant position can provide many of the Attendant Features. Refer to AUXILIARY ATTENDANT in this Section.

- Conditions**
- All features associated exclusively with the Attendant Console or Auxiliary Attendant position are unavailable.
  - All incoming trunks must be assigned to the Night Bell or an extension. Refer to DIRECT-IN LINES, FLEXIBLE NIGHT SERVICE and INTERNAL CALLS TO CONSOLE NIGHT ANSWER POINT in this Section.
  - In this mode of operation, programming and access to Attendant Functions must be performed from the Test Line or RMATS. Refer to TEST LINE in this Section and Section 9104-091-301-NA, Remote Maintenance, Administration and Test System (RMATS).

**Programming** Command 100, System Options, Register 02, Attendant Functions:

- Console Inhibit (field d) must be set to 1 (Enable). Default is 0 (Disable).

Command 100, System Options, Register 08, Overflow Control:

- Overflow Mode In Day Service (field c) must be set to 1 (Immediate Switching to Overflow). Default is 2 (Automatic Switching to Overflow After Time-out).
- Overflow Mode in Night Service (field d) must be set to 1 (Immediate Switching to Overflow) or 2 (Automatic Switching to Overflow After Time-out). Default is 1.
- Internal Calls to Console Routed to Overflow (field f) must be set to 1 (Enable During Day Service). This is the default.
- Overflow Point (fields g, h, i) must be specified by equipment number. Default is 000 (Night Bell).

Command 110, Feature Access Codes, Register 09:

- Assign Access Code for TAFAS Pickup. Default is 57.

Commands 121 → 129, COS 1 → COS 9 Programming, Register 3:

- TAFAS Access (field g) must be set to 1 (Enable Pickup From Night Bells) or 2 (Enable Pickup From Night Bells/Attendant). Default is 1.

Commands 121 → 129, COS 1 → COS 9 Programming, Register 8:

- By default, extensions are allowed to camp a trunk call onto a busy extension. To disallow this, set CO Trunk Camp-On (field c) to 0.

Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 4:

- Day Answer Mode (field d) must be set to 0 (Direct-In Line). Default is 1 (LDN 1).
- Day Inward Dial Trunk Intercept Answer Point (fields e, f, g) must be specified. Default is 001 (Station Equipment Number 001).

Commands 501 → 580, Trunk 01 → 80, Trunk Programming, Register 5:

- Night Answer Mode (field b) must be set to 0 (Flexible Night Service). Default is 0.
- Night Inward Dial Trunk Intercept Answer Point (fields c, d, e) must be specified. Default is 000 (Night Bell).

### **Operation**

Refer to TEST LINE and AUXILIARY ATTENDANT in this Section, and Section 9104-091-301-NA, Remote Maintenance, Administration and Test System (RMATS).

---

**Contact Monitor**

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**Description** An Automatic Ringdown Circuit programmed as a Contact Monitor can be used to monitor switch contact closures. This could be used in an alarm system. The contact closure generates an alarm at the Attendant Console. During Night Service, if programmed, it will also call a Contact Monitor Night Answer point and deliver a special warning tone. See AUTOMATIC RINGDOWN CIRCUIT in this Section for more information.

- Conditions**
- An Automatic Ringdown Circuit programmed as a Contact Monitor cannot be used for an extension.
  - The alarm is not canceled if the contacts are opened.
  - A contact monitor must be an ONS set, not a *SUPERSET* telephone.

**Programming** Commands 301 → 310, Extension Programming, Registers 1 → 16:

- Set Extension Type (field c) to 1 (Contact Monitor). Default is 0 (Extension).

Command 100, Register 17, Contact Monitor:

- Set Contact Monitor Night Answer Point (fields c,d,e) to 000 (Console), 001–160 (Station Equipment Number) or 161 (Night Bell). Default is 000.

**Operation****Day Service**

The contact closes. At the Attendant Console:

- The ALARM lamp flashes and the console rings.
- Press and hold the ALARM key. The LCD shows:

**A 50 0034 CONTACT ALARM** (example).

The console stops ringing.

- Release the ALARM key.

The 4–digit number in the alarm message is the Station Equipment Number of the Contact Monitor circuit.

**Night Service with Contact Monitor Night Answer Point**

The contact closes and the alarm rings at the console. At the answer point:

- The set rings. If it is a *SUPERSET 4* telephone, the display shows **34 CONTACT** (example). The number is the Station Equipment Number of the Contact Monitor circuit.
- Go off–hook. A special warning tone is heard: 3 short bursts, 3 long bursts, 3 short bursts.
- Hang up. The alarm is canceled.

---

## Data Demultiplexer

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**Description** The Mitel Data Demultiplexer used with SX-100® and SX-200® PABX systems can be used with the SX-50 PABX. It directs the Alarm, SMDR and Hotel/Motel reports to separate printers, depending on digit identifiers the system provides.

The digit identifiers are as follows:

Alarms	0
SMDR	1
Message Registration	2
Room Status	2
Wake up	2
Data Dump	3

**Conditions**

- Refer to Section 9160-080-300-NA, Data Demultiplexer, for additional information.

**Programming** Command 100, System Options Programming, Register 16, Printer Control:

- Set Data Demultiplexer (field c) to 1 (Enable). Default is 0 (Disable).

**Operation** None.

---

## Data Dump/Load

---

**Description** The Data Dump and Load feature stores the configuration of the system on tape for future system reconfiguration. A data dump or data load uses the Printer Port (RS-232) of the SX-50 system. Therefore, the tape must be set up locally and no other features (i.e., Message Register Audit, Automatic Wake-Up or SMDR) can use the port during a data dump/load operation. The data dump can also dump onto a printer in an easily read format (refer to PRINTER PORT in this Section). The Data Dump/Load feature is accessed by using a Maintenance Function Code followed by the System Security Code. The PABX proceeds to dump (or load) the header, followed by Commands 100 to 752, one at a time. To determine if a load of data is possible, the header record is verified. If a load is not possible, the load aborts and the system raises an alarm to indicate the problem.

With MS55 Speed Call numbers are also included in a Data Dump.

### Conditions

- A Data Load halts the SX-50 system operation and resets it after the load is complete. Therefore, all calls are lost during a data load.
- To load a saved database it is necessary to load the default data first or the Data Load will not be successful.
- Data Dump and Data Load must be performed at the same speed. MITEL recommends 1200 baud or less.
- If a checksum error is detected during a load, a flashing **ERR** prompt appears beside the command number on the LCD. The system remains at this command number until it is manually reset. The complete database must be loaded again.
- When accessing the data dump or load and the Printer Port is not free, the system returns reorder tone.
- If during a data load, a read error occurs, then the load aborts, an alarm results and the system is left the way it was before the load attempt.
- The printer port baud rate for a data dump can be any of 110, 150, 300, 600, 1200, 1800, 2400, 4800 or 9600 Baud. The port and printer baud rates must match.
- The stop bits and parity bits (which are configured in Command 100, Register 16) must match those of the printer.
- Refer to Section 9104-091-350-NA, Troubleshooting, for a complete list of Error Codes that can occur during a data dump/load.
- Customer Data from pre-MS51 software cannot be loaded.

### Programming

- Refer to PRINTER PORT in this Section.

**Operation**

To Dump Data:

- Set up the tape machine at the Printer Port of the DPABX (make ready to record).
- Press the WRITE (or RECORD) button on the tape machine.
- Dial the Attendant Function Access Code (71 or \*), or press the FUNCTION key – **FUNCTION ?** is displayed on the LCD.
- Dial Attendant Function 97 (Data Dump Access Code) – **DATA DUMP** is displayed.
- Dial the System Security Code.
- The Console and Test Line LCD displays now step through each command number (i.e., **CMD 100**, **CMD 110**, etc.) until all information is dumped.
- The display returns to normal when the function is complete.

To Load Data:

- Set up the tape machine at the Printer Port of the DPABX (make ready to read).
- Dial the Attendant Function Access Code (71 or \*), or press the FUNCTION key – **FUNCTION ?** is displayed on the LCD.
- Dial Attendant Function 98 (Data Load Access Code) – **DATA LOAD** is displayed.
- Dial the System Security Code.
- When **CMD** appears, start the tape machine by pressing the PLAY button.
- The Console display now steps through each command number (i.e., **CMD 100**, **CMD 110**, etc.) until all information is loaded. All *SUPERSET 4* telephones display NO COMMUNICATION.
- The system resets when all the data has been loaded.

---

## Data Line Security

---

- Description** An extension with this feature enabled in its COS cannot receive camp-on tone. A call can be camped on to an extension with Data Line Security, but all forms of audio intrusion are prohibited.
- Conditions**
- When this feature is enabled, the extension does not receive camp-on tones.
- Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 3:
- Data Line Security (field d) must be set to 1 (Enable). Default is 0 (Disable).
- Commands 341 → 350, Slots 1 → 10, COS, Pickup Group and ARS Routing Class of Service – Block Programming:
- Block Programming can be used if a group of extensions have the same COS with Data Line Security enabled, plus the same Pickup Group and ARS Routing Class of Service.
- Operation** None.

---

**Default Data**

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- Description** The default database provides a working *SX-50* system based on the circuit cards installed at the time default data is loaded.
- Starting at the first circuit of the leftmost line card, default data assigns extension numbers consecutively, starting at 100. Card slots that do not contain an ONS, OPS, COV or DNIC line card are ignored. All extension circuits have Class of Service (COS) 1, Routing Class of Service (RCS) 0 and are in Pickup Group 1.
- All LS/GS Trunks are assigned to Trunk Group 1 with an access code of 9. All E&M Trunks are assigned to Trunk Group 2 with an access code of 8.
- Conditions** None.
- Programming** None.
- Operation**
- Load the default data as described in Section 9104-091-210-NA, Customer Data Entry.

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**Dictation Trunk**

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- Description** The *SX-50* system can connect centralized dictation equipment to a trunk to allow access and control of the equipment from the DPABX.
- Conditions**
- Older dictation equipment could require third-wire signaling.
- Programming** Commands 151 → 156, Trunk Groups 1 → 6, Programming, Register 2:
- Set DTMF or Rotary Outpulsing (field g) to 1 (Rotary), 2 (Rotary, Disable Outgoing Audio Until Answer) or 3 (Rotary, Inhibit DTMF Until Answer). Default is 0 (DTMF).
- Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 4:
- Dictation Trunks (CO Trunk) (field b) must be set to 1 (Enable). Default is 0 (Disable).
- Operation** None.

---

## DID Attendant Access

---

**Description** A DID trunk caller can call the *SX-50* Attendant on any of the LDN keys, using a directory number.

**Conditions**

- Devices other than DID trunks receive reorder tone if they dial a DID LDN access code.

**Programming** Command 110, Feature Access Codes:

- Assign the DID LDN1 Access Code to Register 35, fields c → f.
- Assign the DID LDN2 Access Code to Register 36, fields c → f.
- Assign the DID LDN3 Access Code to Register 37, fields c → f.

There are no default values for these access codes.

---

## DID Night Answer Point

---

**Description** DID trunks can be programmed to route all calls during Night Service to a Night Answer Point, regardless of digits dialed.

**Conditions**

- If a DID trunk has a Night Answer Point enabled, all calls are routed to the Night Answer Point (regardless of digits dialed), and trunk intercepts apply.

**Programming** Commands 501 → 580, Trunks 01 → 80 Programming, Register 5:

- Set Night Answer Mode (field b) to 0 (Flexible Night Service), 1 (LDN 1), 2 (LDN 2) or 3 (LDN 3). Default is 0.
- If Night Answer Mode is 0, set Night Inward Dial Trunk Intercept Answer Point (fields c → e) to
  - 000 (Night Bell Only)
  - 001 → 160 (Extension Equipment Number)
  - 161 → 166 (Hunt Group 1 → 6)
  - 167 (Ring Group) or
  - 168 (RMATS).

Default is 000 (Night Bell Only).

- Set DID Night Answer Point (field f) to 1 (Enable). Default is 0 (Disable).

---

## DID Restriction

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- Description** All extensions in a Class of Service can be barred permanently from receiving DID Trunk calls.
- Conditions**
- DID Restriction cannot be applied to ghost line appearances. Ghost line appearances are lines other than the prime line which appear only at *SUPERSET* telephones.
  - DID Trunk calls to an extension that has DID Restriction will be routed to the trunk's Illegal/Vacant Number Intercept Point. If there is no intercept point programmed, the caller receives reorder tone.
- Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 8:
- Set DID Restriction (field e) to 1 (Enable). Default is 0 (Disable).

---

## Direct-In Lines

---

- Description** This feature assigns incoming trunks to specific extensions, RMATS, the Ring Group or Hunt Groups. Incoming calls on the trunk access the selected devices directly; they need not appear at the Attendant Console.
- If the designated extension is busy when a trunk call arrives, the trunk call camps on. The extension receives camp-on tone, the trunk caller hears ringback. Call Forwarding – Busy or Follow Me also apply to Direct-In Line calls.
- If the Hunt Group is busy when a trunk call arrives, then the trunk call is camped on to the Hunt Group. Camp-on tone is heard by the extension queued to be rung next in the Hunt Group. A Hunt Group can be assigned as the Day/Night Answering Point in the Direct-In Line service. This feature is invoked by setting the Day/Night Answer Mode to Direct-In Line, and in addition, programming the equipment number of the Hunt Group in the Trunk Day/Night Answering Point.
- Conditions**
- During Night Service, Direct-In Line calls are routed as directed by the Night Answer Mode for the trunk.
  - If a Direct-In Line call is handled by the attendant as a result of a call transfer, the call recalls to the Attendant Console in the event of a timed recall. Otherwise, it recalls to the assigned device.
  - If an Originate Only extension (see Call Direction) is assigned as a Direct-In Line, incoming trunk calls to the extension will ring the Attendant on LDN1.
  - If a Direct-In Line is assigned to a Hunt Group with no valid extension numbers, then the call recalls to the Attendant Console.
  - If the extension or Hunt Group has Do Not Disturb in effect, incoming DIL calls are rerouted to LDN1.
- Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 8:
- By default, a Direct-In Line is allowed to camp on if its assigned extension is busy. To disallow this, set CO Trunk Camp-On (field c) to 0.
- Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 4:
- Day Answer Mode (field d) must be assigned as 0 (Direct-In Line).
  - Assign equipment number for a Day Inward Dial Trunk Intercept Answer Point (fields e, f, g). Valid Station Equipment Numbers are 001 → 160. Hunt Group Equipment numbers are 161 → 166 (Hunt Groups 1 → 6), 167 (Ring Group), 168 (RMATS), or 000 (Night Bell). Default is 001 (Station Equipment Number 001).
- Operation** None.

---

## Direct Inward Dial (DID) Trunks

---

**Description** Direct Inward Dialing (DID) allows subscribers on the Public Switched Network to have direct access to PABX extensions without Attendant assistance. The Central Office (CO) transmits the desired destination number to the PABX.

The trunk's Class of Service controls DID caller access to features and services.

- Conditions**
- DID trunk calls apply Discriminating Ringing to the destination set.
  - If the SX-50 system receives too few digits from a DID trunk, it returns reorder tone.
  - If the SX-50 system cannot complete the DID call due to unavailable call-handling resources or blocking, it returns reorder tone to the trunk.
  - A DID Trunk must not be a member of any Trunk Group.
  - A DID Trunk must not be programmed as a *SUPERSET* DTS or DLS line.
  - All DID calls that are terminated on an answering device will return Answer Supervision.
  - Refer to TRUNK INTERCEPTS in this Section for further conditions.

### Programming **General**

Command 100, System Options, Register 5, Trunk Connections:

- Select the following types of interconnection as required. (Set the corresponding field to 1). By default, all interconnection types are disabled. (Field is set to 0.)

CO Trunk to DID Trunk Connect (field g)  
TIE Trunk to DID Trunk Connect (field h)  
DID Trunk to DID Trunk Connect (field i)

Commands 501 → 580, Trunks 01 → 80 Programming, Register 1:

- Assign the Trunk Class of Service (field e) to 1, 2, 3, 4, 5, 6, 7, 8 or 9. Default is 1.
- Set Trunk Dialing Type (field j) to 2 (DID).

Commands 501 → 580, Trunks 01 → 80 Programming, Register 4:

- Set Day Answer Mode (field d) to 0 (Direct-In Line), 1 (LDN 1), 2 (LDN 2) or 3 (LDN 3). Default is 1.

- If Day Answer Mode is 0, set Day Inward Dial Trunk Intercept Answer Point (fields e,f,g) to 000 (Night Bell Only), 001 → 160 (Extension Equipment Number), 161 → 166 (Hunt Group 1 → 6), 167 (Ring Group) or 168 (RMATS). Default is 001.
- Set Busy Intercept (field h) to 1 (Enable) or 0 (Disable), as required.
- Set Do Not Disturb Intercept (field i) to 1 (Enable) or 0 (Disable), as required.
- Set No Answer Intercept (field j) to 1 (Enable) or 0 (Disable), as required.
- Set Illegal/Vacant Number Intercept (field k) to 1 (Enable) or 0 (Disable), as required.

Commands 501 → 580, Trunks 01 → 80 Programming, Register 5:

- Set Night Answer Mode (field b) to 0 (Flexible Night Service), 1 (LDN 1), 2 (LDN 2) or 3 (LDN 3). Default is 0.
- If Night Answer Mode is 0, set Night Inward Dial Trunk Intercept Answer Point (fields c → e) to 000 (Night Bell Only), 001 → 160 (Extension Equipment Number), 161 → 166 (Hunt Group 1 → 6), 167 (Ring Group) or 168 (RMATS). Default is 000.

Commands 501 → 580, Trunks 01 → 80 Programming, Register 6:

- Set DID Start Type (field b) to 0 (Immediate Start), 1 (Wink Start) or 2 (Delay Dial), as appropriate. Default is 1. Refer to Section 9104-091-210-NA, Customer Data Entry, for more information.
- Set Incoming Address Signaling (field d) to 0 (Loop-Dial Pulsing), 1 (Battery-and-Ground Pulsing) or 2 (DTMF), as required. Default is 0.

## Programming Digit Collection From The CO

The SX-50 system collects and modifies digits from the Central Office (CO) to determine the intended destination. The number of digits received is determined by prior arrangement with the telephone company. If this is less or more than the number of digits in the directory number, the SX-50 system can add or delete digits as appropriate. Three fields are provided to accomplish this:

- **N**: the number of digits expected from the central office (1 to 9). If a value is specified in this field, digit translation does not begin until the system receives the specified number of digits.
- **M**: the number of digits to be absorbed after the incoming trunk is seized (0 to 8).
- **X**: up to 4 digits to be inserted before the digit string.

Command 501 → 580, Trunks 01 → 80 Programming, Register 6:

- Set Digits Expected, N, (field e) to 1 → 9, as required.

- Set Digits Absorbed, M, (field f) to 0 → 8, as required.
- Assign Digits Inserted, X, (fields g → j), as required.

Command 501 → 580, Trunks 01 → 80 Programming, Register 7:

- This register sets DID Trunk Timers. If the default values do not provide proper operation, refer to Section 9104-091-210-NA, Customer Data Entry.

---

## Direct Inward System Access (DISA)

---

**Description** Direct Inward System Access (DISA) allows a trunk caller direct access to the PABX without attendant intervention. A DISA Trunk user hears one burst of ringback tone before the SX-50 system automatically answers and provides DPABX dial tone.

A 3-digit DISA Access Code or Verified Authorization Code can be required at this point. The caller must enter the code, after which DPABX dial tone is returned. If the DISA Access Code is not required, the DISA caller has access to PABX features immediately. For further details on Verified Authorization Codes, refer to SPECIAL DISA or TRAVELING COS in this Section.

- Conditions**
- DISA calls to the Attendant follow the trunk's Day Answer Mode or Night Answer Mode routing, as appropriate. The default routing is to LDN1 during Day Service, Night Bell during Night Service.
  - On some Central Offices, the DISA caller might not receive an entire cycle of ringback tone. If this occurs, enable Inward Dial Delay Before Answer. See Programming.

A DISA call cannot:

- Be executed from a rotary set
- Flash the switchhook
- Override
- Call forward
- Put on an Automatic Callback – Busy
- Be from an Identified Trunk Group.

DISA Trunks can dial access codes for the following devices only:

- Extensions
- Attendant Console
- Pager (DISA Trunk must provide Disconnect Supervision)
- Trunks (trunk-to-trunk connection conditions must be met)
- RMATS.

DISA Trunks cannot access codes for the following devices:

- TAFAS
- Feature Access Codes requiring a flash to activate
- Call Forwarding

- Attendant Console functions (except through RMATS)
- System administration (except through RMATS).

On a loop start DISA Trunk, trunk-to-trunk connections are made only if the CO provides Disconnect Supervision and is programmed accordingly.

Refer to TRUNK INTERCEPTS in this Section for further conditions.

**Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 2:

- Set DISA Access Code Required (field e) to 1 (Enable) if a DISA Access Code is required. Default is 0 (Disable).

Commands 193, DISA Access Code Programming:

- Enter the required DISA Access Code. Default is 000.

Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 1:

- Assign the Trunk Class of Service (field e) to 1, 2, 3, 4, 5, 6, 7, 8 or 9. Default is 1.
- If an Inward Dial Delay Before Answer is required, set field f to 1 (Enable, Delay 8 seconds). Default is 0 (Disable, No Delay).
- Set the Inward Dialing ARS Routing Class of Service (field h) to 1, 2 or 3. Default is 0 (ARS Does Not Apply).

Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 2:

- If the DISA Trunk is a loop-start trunk, then the CO must provide Disconnect Supervision and Disconnect Supervision Guaranteed? (field c) must be set to 1 (Yes). Default is 0 (No).
- Set Trunk Dialing Type (field j) to 1 (DISA).

Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 4:

- Set Day Answer Mode (field d) to 0 (Direct-In Line), 1 (LDN 1), 2 (LDN 2) or 3 (LDN 3). Default is 1.
- If Day Answer Mode is 0, set Day Inward Dial Trunk Intercept Answer Point (fields e,f,g) to 000 (Night Bell Only), 001 → 160 (Extension Equipment Number), 161 → 166 (Hunt Group 1 → 6), 167 (Ring Group) or 168 (RMATS). Default is 001.
- Set Busy Intercept (field h) to 1 (Enable) or 0 (Disable), as required.
- Set Do Not Disturb Intercept (field i) to 1 (Enable) or 0 (Disable), as required.
- Set No Answer Intercept (field j) to 1 (Enable) or 0 (Disable), as required.
- Set Illegal/Vacant Number Intercept (field k) to 1 (Enable) or 0 (Disable), as required.

Commands 501 → 580, Trunks 01 → 80 Programming, Register 5:

- Set Night Answer Mode (field b) to 0 (Flexible Night Service), 1 (LDN 1), 2 (LDN 2) or 3 (LDN 3). Default is 0.
- If Night Answer Mode is 0, set Night Inward Dial Trunk Intercept Answer Point (fields c → e) to 000 (Night Bell Only), 001 → 160 (Extension Equipment Number), 161 → 166 (Hunt Group 1 → 6), 167 (Ring Group) or 168 (RMATS). Default is 000.

### **Operation**

- Dial in on a DISA Trunk – the user hears one burst of ringback tone before the system answers and provides dial tone.
- Dial the 3–digit DISA Access Code (if necessary) – DPABX dial tone is returned.
- The DISA Trunk now acts like an extension and the user can now access the PABX features and outgoing trunks. \*\* To access outgoing trunks, the Authorized Trunk to Trunk Connection must be enabled (Commands 121 → 129, Register 1, field j).

---

## Direct Line Select

---

**Description** This feature enables a *SUPERSET 4* or *SUPERSET 420* user to access a specific trunk directly via a Line Select key. This line can be used for incoming or outgoing calls and can appear on several *SUPERSET* telephones. Calls on the line can be shared with other appearances of the line, using the PRIVACY RELEASE Feature ( *SUPERSET 4* ) or the Superkey key ( *SUPERSET 420* ).

- Conditions**
- The trunk must be programmed and assigned to a Trunk Group before it can be assigned as a Direct Line Select line. Refer to Section 9104-091-210-NA, Customer Data Entry.
  - A trunk assigned as a Direct Line Select (DLS) line cannot be accessed by its Trunk Group Access Code.
  - Conversations on the DLS line are private, unless the set using the line presses the PRIVACY RELEASE softkey.
  - While the DLS line is in use at one appearance, it is inaccessible (busy) at all other appearances.
  - Incoming calls on the DLS are answered in the same way as incoming calls on a Key Line.
  - A call on a DLS line cannot be transferred or conferenced, except with its other *SUPERSET* appearances.

**Programming** Commands 401 → 480, *SUPERSET* Telephone 01 → 80 Programming, Register = Line Key Number:

- Line type must be set to Direct Line Select (field c = 5).
- Set Ringing Type to Immediate (field d = 1).
- Set Call Direction to Bothway (field e = 1).
- Field f,g = trunk equipment number.

- Operation**
- Lift the handset.
  - Select appropriate (DLS) line key – dial tone is returned.

---

## Direct Trunk Select

---

- Description** This feature enables a *SUPERSET 4* or *SUPERSET 420* telephone to access a specific trunk directly via a Line Select key. This line can be used for incoming or outgoing calls and can appear on several *SUPERSET* telephones. Calls on the line can be transferred to any extension.
- Conditions**
- The trunk must be programmed and assigned to a Trunk Group before it can be assigned as a Direct Trunk Select line. Refer to Section 9104-091-210-NA, Customer Data Entry.
  - A trunk assigned as a Direct Trunk Select (DTS) line cannot be accessed by its Trunk Group Access Code.
  - If the DTS line is transferred to another extension, it remains in use (the Line Status Display shows a solid circle) and is inaccessible until that extension terminates the call.
  - Incoming calls on the DTS are answered in the same way as incoming calls on a Key Line.
  - If the *SUPERSET 4* telephone has Do Not Disturb in effect, the DTS line status indicator will flash but the set will not ring.
- Programming** Commands 401 → 480, *SUPERSET* Telephone 01 → 80 Programming, Register = Line Key Number:
- Line type must be set to Direct Trunk Select (field c = 4).
  - Set Ringing Type to Immediate (field d = 1).
  - Set Call Direction to Bothway (field e = 1).
  - Fields f,g = trunk equipment number.
- Operation**
- Lift the handset.
  - Select appropriate (DTS) line key – dial tone is returned.

---

**Display (Attendant Console LCD)**

---

<b>Description</b>	<p>The Attendant Console is equipped with a 2 line x 40 character LCD which facilitates Customer Data Entry and call handling. Refer to the Attendant Console Guide, Part Number 9104-953-101-NA, for details. In Call Processing Mode, the LCD indicates the following:</p> <ul style="list-style-type: none"><li>• <b>LDN1, LDN2, or LDN3:</b> appears on the LCD when an outside call arrives at the Attendant Console.</li><li>• <b>DIAL0:</b> flashes on the LCD when an extension calls the attendant.</li><li>• <b>RECALL:</b> flashes on the LCD when a call is returned to the Attendant Console.</li><li>• <b>FUNCTION:</b> appears on the LCD when an Attendant or Maintenance Function is performed.</li><li>• <b>MSG:</b> when paired with an extension number, this indicates there is a message waiting for that extension.</li><li>• <b>MUTE:</b> appears when the Attendant Console bell is disabled.</li><li>• <b>BELL:</b> flashes on the LCD to indicate an incoming call to the Attendant Console.</li><li>• <b>NIGHT:</b> indicates that the system is in Night Service Mode.</li><li>• <b>CALL BLOCK:</b> indicates that Call Block is active.</li><li>• <b>PAGER:</b> indicates that the Paging equipment is accessed.</li><li>• <b>OVRFL:</b> indicates that the system is in Overflow Mode.</li><li>• <b>CW:</b> indicates the number of calls waiting to be answered.</li><li>• <b>Time/Date:</b> The LCD continuously displays the time-of-day and date. Refer to TIME DISPLAY in this Section.</li><li>• <b>EQP-BSY:</b> indicates a device (e.g., a trunk) is busied out.</li></ul>
<b>Conditions</b>	None.
<b>Programming</b>	None.
<b>Operation</b>	None.

---

**Display ( *SUPERSET 4* and *SUPERSET 420* Telephones)**

---

**Description** This feature enables a *SUPERSET 4* or *SUPERSET 420* user to display on the set's Features Display:

- Speed Dial numbers.
- identities of lines appearing at the set.
- status of lines appearing at the set (e.g., on hold, in use).
- the last external number dialed manually.
- call forwarding type and destination.
- the name associated with the set.

**Conditions**

- To display a name, the set must have a name programmed.
- To display call forwarding type and destination, the call forwarding must be active.

**Operation** ***SUPERSET 4***

Press the DISPLAY feature key. Then:

- Press the Line Select/Speed Dial key for saved Speed Dial number or line identification.
- Press the REDIAL softkey for the last external number dialed.
- Press the CALL FWD softkey, for the currently active Call Forwarding type and destination.
- Press the NAME softkey, for the name associated with the set.

Press the EXIT softkey to return to normal time/date or call status display.

***SUPERSET 420***

Press the Superkey key. Then:

- Press the Line Appearance key for saved Speed Dial number or line identification.
- Select Call Forward from the menu, for the currently active Call Forwarding type and destination.
- Select Name from the menu, for the name associated with the set.

---

## Discriminating Ringing

---

**Description** This feature permits an extension user to distinguish between extension calls and trunk or attendant calls, by distinctive ringing patterns. Calls from other extensions have a ringing pattern of 1 second ON, 3 seconds OFF. Incoming trunk calls and those from the attendant have a ringing pattern of 0.25 seconds ON, 0.25 seconds OFF, 0.5 seconds ON and 3.25 seconds OFF.

**Conditions** None.

**Programming** Command 100, System Options, Register 03, Tone and Ringing Control:

- Discriminating Ringing (field f) must be set to 1 (Enable). Default is 1.

**Operation** None.

---

## Discriminating Dial Tone

---

**Description** When an extension user activates a feature which prevents the set from receiving calls, the system provides Discriminating Dial Tone (5 bursts of dial tone followed by normal dial tone) when the set goes off-hook. Features which cause Discriminating Dial Tone to be applied include:

- Call Forwarding – Follow Me (Always)
- Do Not Disturb

**Conditions** None.

**Programming** None.

**Operation**

- Set Call Forwarding – Follow Me on an extension. Refer to CALL FORWARDING – FOLLOW ME in this Section. Replace the handset.
- Lift the handset at the same extension – the system provides Discriminating Dial Tone to indicate that Call Forwarding – Follow Me is enabled at that extension.

---

**Distinctive Callback Ringing**

---

- Description** This feature permits the extension user to identify a callback call by its distinctive ringing pattern. Callback calls have a ringing pattern of 0.25 seconds ON, 0.25 seconds OFF, 0.5 seconds ON and 3.0 seconds OFF. For the *SUPERSET 3*, *SUPERSET 4*, *SUPERSET 410* and *SUPERSET 420* telephone, only the first cycle is distinctive.
- Conditions** None.
- Programming** Command 100, System Options, Register 03, Tone and Ringing Control:
- Ensure Distinctive Callback Ringing (field g) is set to 1 (Enable). This is the default. 0 is disable.
- Operation**
- Set Automatic Callback – Busy on the extension (refer to AUTOMATIC CALLBACK – BUSY in this Section) – go on-hook.
  - When the line becomes free, the system rings the originator with a distinctive callback ringing pattern.

---

## Do Not Disturb

---

**Description** The Do Not Disturb (DND) feature allows an extension user to prevent calls ringing the set. All other set functions and operation are unaffected.

The Attendant Console or Auxiliary Attendant set can apply or remove Do Not Disturb on any extension.

- Conditions**
- The Attendant or Auxiliary Attendant can set Do Not Disturb only on extensions that have Do Not Disturb enabled in their Class of Service.
  - A calling extension can override DND, if Executive Busy Override is enabled in its COS. Executive Busy Override Security does not prevent override of DND.
  - Where there are multiple appearances of a line, DND tone is returned only if ALL appearances have Do Not Disturb in effect. Otherwise, the caller receives ringback tone and appearances without DND in effect ring as normal. DND key or multicall appearances only flash their Line Status display, but can be answered.
  - If a Hunt Group member activates Do Not Disturb, the extension is treated as busy and receives no calls. If all members have Do Not Disturb activated, the caller hears Do Not Disturb Tone. *SUPERSET 4* and *SUPERSET 420* telephones display "NO DIST'B". Direct-In Line calls reroute to LDN1.
  - If a Ring Group member activates Do Not Disturb, the extension is treated as busy. If all members have Do Not Disturb activated, the first incoming call camps on to the Ring Group. It receives ringback tone. Subsequent calls receive busy tone.
  - The Night Answer Point cannot be set to a Do Not Disturb condition.

When an extension has Do Not Disturb active:

- Calls to the extension receive Do Not Disturb Tone (Dial Tone 0.5 s on, 0.5 s off). A *SUPERSET 4* and *SUPERSET 420* caller's display shows "NO DIST'B"; the Attendant sees "DND".
- If the extension is a hunt group member, it will be excluded from hunting.
- Upon going off-hook, the set user hears Discriminating Dial Tone.
- If the extension is assigned to a Direct-In Line, DIL calls reroute to LDN1.

Do Not Disturb does not affect:

- Trunk recalls
- Automatic Wake-up
- Callbacks

- Call Hold Recalls.

**Programming** Command 110, Feature Access Codes, Register 33:

- Set fields c through f to the desired access code. Default is 63.

Commands 121 → 129, COS 1 → COS 9, Register 2:

- Set Do Not Disturb (field k) to 1 (Enable). Default is 0 (Disable).

Command 185, Function Key Programming, Register = Key Number (01 → 14):

- Set Function Code (fields b,c) to 17 (Do Not Disturb).

**Operation** ***SUPERSET 3 and SUPERSET 410 Telephone and ONS or OPS Sets***

To activate Do Not Disturb:

- Lift handset. Dial tone is returned.
- Dial Do Not Disturb feature access code (default 63). A short burst of Dial Tone is returned.
- Dial 1. Distinctive Dial Tone is returned, then normal Dial Tone.
- Hang up. DND is in effect.

To cancel Do Not Disturb:

- Lift handset. Dial tone is returned.
- Dial Do Not Disturb feature access code (default 63). A short burst of Dial tone is returned.
- Dial 2. Dial tone is returned.
- Hang up. DND is canceled.

#### ***SUPERSET 4 Telephone***

To Enable Do Not Disturb:

- Press the SELECT FEATURES feature key.
- Dial '2' (feature number 2 is Do Not Disturb (2:NO DIST'B)).
- Press the ON softkey.
- The **NO DIST'B** flag appears as a reminder while Do Not Disturb is activated.

To Cancel Do Not Disturb:

- Press the SELECT FEATURES feature key.
- Dial '2'.
- Press the OFF softkey.

**Note:** *SUPERSET 4* telephone can also follow procedure given for ONS set.

### **SUPERSET 420 Telephone**

To Enable Do Not Disturb:

- Press the Superkey key.
- Press No to step to Do Not Disturb menu.
- Press the On softkey.
- The **NO DIST'B** flag appears as a reminder while Do Not Disturb is activated.
- Press the Superkey key to exit the menu.

To Cancel Do Not Disturb:

- Press the Superkey key.
- Press No to step to Do Not Disturb menu.
- Press the Off softkey.
- Press the Superkey to exit the menu.

### **Attendant**

To apply Do Not Disturb on an extension:

- Press the DO NOT DISTURB function key or dial \*85. The LCD shows **EXT-NUMBER ?**.
- Dial the desired extension number.
- Press the DND ON softkey.
- If desired, press the NEW EXT softkey to apply or remove Do Not Disturb on another extension.
- Press the EXIT softkey.

To remove Do Not Disturb on an extension:

- Press the DO NOT DISTURB function key. The LCD shows **EXT-NUMBER ?**.
- Dial the desired extension number. The LCD shows the extension number and **DO NOT DISTURB**.
- Press the DND OFF softkey.
- If desired, press the NEW EXT softkey to apply or remove Do Not Disturb on another extension.
- Press the EXIT softkey.

### **Auxiliary Attendant**

To apply or remove Do Not Disturb on an extension:

- Press the DO NOT DISTURB function key. The LCD shows **EXT NUMBER ?**.
- Dial the desired extension number. The LCD shows the extension number, **DND –** and **ON** or **OFF**.
- A softkey appears, OFF or ON, opposite to the current Do Not Disturb status. To change the status, press the softkey. To leave it unchanged, press the EXIT softkey.

---

**E&M Trunks**

---

**Description** E&M Trunk circuits are required to perform tied DPABX operations. There are several hardware characteristics programmable in Trunk Programming.

- Conditions**
- The E&M Trunk Module must be installed on the Universal Card.
  - E&M Trunks use odd equipment numbers only.
  - The E&M Trunk cannot be used as a normal CO Trunk.
  - The far-end PABX must provide Disconnect Supervision and the System Programming must reflect this condition (Trunk Programming, Commands 501 → 580, Register 2). Refer to Section 9104-091-210-NA, Customer Data Entry (CDE).
  - Refer to Section 9104-091-200-NA, Shipping, Receiving and Installation Information and Section 9104-091-180-NA, Engineering Information, for details.

**Programming** Commands 151 → 156, Trunk Groups 1 → 6 Programming, Register 1:

- Assign Trunk Group Access Code (fields f → i). Default Access Codes are 9, 8, 78 and 79 for Trunk Groups 1, 2, 3 and 4. Trunk Group 2 is default for E&M Trunks.

Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 1:

- Trunk Group Membership (field b) must be set to 0 (Incoming Calls Only) or 1 → 6 (Trunk Groups 1 → 6). Default is 2 for E&M trunks.
- Set the Trunk Hardware Type (field d) to 3 (Analog Tie Trunk) for each trunk used for E&M purposes. This is the default for E&M Trunks already installed.
- Set Trunk Class of Service (field e) to the desired COS.
- If DISA operation is desired, set Trunk Dialing Type (field j) to 1 (DISA). Default is 0 (DIL).

Commands 501 → 580, Trunk 01 → Trunk 80 Programming, Register 2:

- The far-end PBX must provide Disconnect Supervision and Disconnect Supervision Provided by CO (field c) must be set to 1 (Yes). Default is 0 (No).

Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 3:

- Set the E&M Lead Inversion (field c). For Type 1 trunks the options are 0 (M-Lead Inverted), 1 (Both Leads Inverted), 2 (No Inversions) and 3 (E-Lead Inverted). For Type 5 trunks the options are 0 (No Inversions), 1 (E-Lead Inverted), 2 (M-Lead Inverted,) and 3 (Both Leads Inverted). Default is 2.

- Set the E&M Delay Dial Outgoing (field d) to 0 (Disable) or 1 (Enable). Default is 0.
- Set the E&M Wink Start Incoming Enable (field e) to 0 (Disable) or 1 (Enable). Default is 0.
- Set the E&M Wink Start Outgoing Enable (field f) to 0 (Disable) or 1 (Enable). Default is 0.

Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 4:

- Set the Day Answer Mode (field d) to 0 (Direct-In Line), 1 (LDN1), 2 (LDN2) or 3 (LDN3).

Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 5:

- Set the Night Answer Mode (field b) to 0 (Flexible Night Service), 1 (LDN1), 2 (LDN2) or 3 (LDN3).

**Note:** There are also switches on the E&M Module which must be set appropriately. Refer to Section 9104-091-200-NA, Shipping, Receiving and Installation Information.

## Operation

Outgoing Trunks:

- Dial Trunk Group Access Code – the user is connected to the E&M Trunk.

Incoming Trunks:

- Calls arrive at a designated LDN or extension or via DISA – the call is answered as usual (refer to CALL SELECTION in this Section).

---

## Executive Busy Override (Console)

---

**Description** This feature allows an Attendant to ring a set that has Do Not Disturb activated or to enter the conversation of a busy extension.

When Executive Busy Override is used on a busy extension, all parties receive a 1 second warning tone (440 Hz), before voice contact is established. A 200 ms burst of warning tone is repeated every 6 seconds for the duration of the override.

- Conditions**
- The Attendant Console cannot manipulate the original conversation in any way.
  - The Attendant cannot override a conversation in which either party has Executive Busy Override Security or Data Line Security enabled.
  - Any extension dialing, or receiving supervisory tone cannot be overridden.
  - An extension on all types of Hold cannot be overridden.
  - A 3-way conference cannot be overridden.
  - If the overridden extension flashes the switchhook, the Attendant Console receives reorder tone.

**Programming** Command 100, System Options, Register 02, Attendant Functions:

- Executive Busy Override (Console) (field c) must be set to 1 (Enable Except On Incoming Trunks) or 2 (Enable All Calls). Default is 0 (Disable).

Commands 121 → 129, COS 1 → COS 9 Programming, Register 4:

- If Executive Busy Override is not intended on an extension, set Executive Busy Override Security (field h) to 1 (Enable). Default is 0 (Disable).

- Operation**
- Dial the extension number – busy tone is returned.
  - Press and hold down the **OVERRIDE** key; after the warning tone, the Attendant Console is connected to the call. If the extension cannot be overridden, the Attendant Console receives reorder tone and **INVALID** is displayed on the LCD display.

---

## Executive Busy Override

---

**Description** This feature allows an extension user to ring a set that has Do Not Disturb activated or to enter the conversation of a busy extension.

When Executive Busy Override is used on a busy extension, all parties receive a 0.8 second warning tone (440 Hz), before voice contact is established. A 0.2 second burst of warning tone is repeated every 6 seconds for the duration of the override.

- Conditions**
- The overriding extension cannot manipulate the original connection in any way.
  - For stations and *SUPERSET 3*, *SUPERSET 4*, *SUPERSET 410*, and *SUPERSET 420* telephones, the Executive Busy Override Access Code is 5. This code is not programmable.
  - If either extension in the overridden conversation flashes the switch-hook, the other party in the original call is placed on Consultation Hold and the overriding extension receives reorder tone.
  - If the overridden extension goes on-hook, both the other parties are dropped and receive reorder tone.
  - If the extension initiating the Executive Busy Override has a party on Consultation Hold, the held party is retrieved by flashing the switch-hook. The held party is camped on to the overridden extension if the extension initiating the Override goes on-hook (refer to CAMP-ON in this Section).
  - An extension that overrides DND on a busy set receives Busy tone. It can then override (if other conditions permit) or camp on.

An extension cannot override:

- a conversation in which either party has Executive Busy Override Security or Data Line Security enabled
- an extension speaking to the attendant, dialing, or receiving supervisory tones
- an extension on hold
- an extension with a call on hold
- a ringing extension
- an extension using RMATS
- a conference call.

**Programming** Commands 121 → 129, COS 1 → 9 Programming, Register 4:

- Enable Executive Busy Override on all calls (field g = 2) or on all calls except incoming trunk calls (field g = 1).

**Operation** ***SUPERSET 3, SUPERSET 410, SUPERSET 420, ONS and OPS Telephones***

- Dial extension number – busy tone is returned.
- Dial 5 (Executive Busy Override Access Code). After the warning tone, the extension is connected to the call. If the destination cannot be overridden, the extension receives reorder tone.

***SUPERSET 4 Telephone***

- Dial the busy extension number – busy tone is returned.
- Press the **OVERRIDE** softkey. After the warning tone the ***SUPERSET4*** telephone is connected to the call.

---

## Executive Busy Override Security

---

- Description** This feature permits the system programmer to protect extensions from Executive Busy Override. Executive Busy Override Security applies to all extensions in the Class of Service where it is enabled. Station sets and *SUPERSET 3* and *SUPERSET 410* telephones attempting to override these extensions receive reorder tone. On *SUPERSET 4* telephones, the **OVERRIDE** softkey does not appear.
- Conditions** None.
- Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 4:
- Set Executive Busy Override Security (field h) to 1 (enable). Default is 0 (disable).
- Operation** None.

---

## Flash Disable

---

- Description** This feature ignores a station if an attempt is made to select a feature by flashing the switchhook.
- Conditions**
- Any feature requiring a switchhook flash cannot be accessed if Flash Disable is enabled.
- Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 2:
- Switchhook/Ground Button Flash (field b) must be set to 0 (Disable). Default is 1 (Flash For Consultation Hold).
- Operation** None.

---

## Flash For Attendant

---

**Description** This feature allows a station user who has an established call to flash the switchhook and automatically call the Attendant Console. The call appears on the Attendant Console as a **DIALO** call. Refer to ATTENDANT ACCESS in this Section.

**Conditions**

- This feature is inoperative if the station is not involved in a 2-party call.
- Flash for Attendant and Flash for Transfer/Add-On/Consultation Hold are mutually exclusive.

**Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 2:

- Switchhook/Ground Button Flash (field h) must be set to 2 (Flash For Test Line/Attendant). Default is 1 (Flash For Consultation Hold).

**Operation** On an Established Trunk Call:

- Flash the switchhook – the station user rings the attendant; the third party is placed on Consultation Hold.
- When the attendant answers, the LCD displays the number of the calling station and the number of the held party.

---

## Flash Is Release

---

**Description** This feature assigns switchhook flash as a disconnect signal.

**Conditions** None.

**Programming** Command 100, System Options, Register 06, Station Attributes:

- Station Switchhook Flash Timing (field c) must be set to 2 (Flash Is Release). Default is 0 (150 → 750 ms).

**Operation**

- On an established call, flash the switchhook.
- The call is disconnected and dial tone is returned.

---

## Flexible-Night Service

---

**Description** This feature routes incoming trunk calls to any selected extension, Hunt Group, Ring Group, Night Bell, the Attendant Console or RMATS when the system is in Night Service. The assignment of the extension or Hunt Group to which calls are routed can be made from the Attendant Console at any time. When a trunk call arrives, if the extension or hunt group is busy, does not answer, has Do Not Disturb set or is vacant/invalid, the call is rerouted to the Night Service Trunk Intercept Point.

- Conditions**
- Only trunks programmed with a Night Answer Mode of Flexible Night Service can have the extension at which they appear changed.
  - Incoming trunk calls cannot be assigned to extensions with a COS that makes them Originate Only.
  - Refer to the Conditions of HUNT GROUP in this Section.
  - Refer to the Conditions of RING GROUP in this Section.

- Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 8:
- By default, Flexible Night Service extensions are allowed to camp a trunk call onto a busy extension. To disallow this, set CO Trunk Camp-On (field c) to 0.
- Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 5:
- Night Answer Mode (field b) must be assigned to 0 (Flexible Night Service).
  - Assign a Night Inward Dial Trunk Intercept Answer Point where calls will be routed during Night Service (fields c, d, e):
    - Station Equipment Numbers are 001 → 160
    - Hunt Group Equipment Numbers are 161 → 166
    - Ring Group is 167
    - RMATS is 168
    - Night Bell is 000.

Subsequently this assignment can be changed from the Attendant Console or Test Line.

**Operation**      **Attendant Console Key**

While the System is in Night Service:

- Press and hold down the NIGHT key.
- The LCD displays the first trunk programmed for Flexible Night Service and its Night Inward Dial Trunk Intercept Answer Point.

- If necessary, dial \* to step the display through the trunks that are equipped and programmed for Flexible Night Service.
- Release the Night key.

### **Attendant Function**

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 21 (Night Answer Point Access Code), plus the equipment number of the required trunk.
- The Night Inward Dial Trunk Intercept Answer Point can be changed by dialing another extension number, 000 for Night Bell, 161 → 166 for Hunt Group 1 → 6, 167 for Ring Group or 168 for RMATS.
- Press the RELEASE key – the system returns to normal call processing.

---

## Flexible-Numbering Plan

---

**Description** The system's numbering plan permits the user to select any combination of 1-, 2-, 3- or 4-digit numbers for Feature Access Codes, Trunk Group Access Codes and extension numbers. There is only one constraint in the selection of a numbering plan; no conflicts can exist between extension numbers and access codes, except for Automatic Callback – Busy and Executive Busy Override features.

- Conditions**
- No first digit conflicts are allowed between extension numbers and access codes, with the exception of Automatic Callback – Busy (6) and Executive Busy Override (5).
  - If a numbering conflict exists, access codes can be made blank by programming them as 00.

**Programming** Command 110, Feature Access Codes:

- Assign access codes to features (1, 2, 3 or 4 digits). Refer to Section 9108–091–210–NA, Customer Data Entry.

Commands 151 → 156, Trunk Groups 1 → 6 Programming, Register 1:

- Assign Trunk Group Access Codes (1, 2, 3 or 4 digits). (fields f, g, h, i).

Commands 301 → 310, Slots 1 → 10, Extension Programming:

- Assign required extension numbers (fields i → l) (1, 2, 3 or 4 digits).

**Operation** None.

---

## French System Messages

---

**Description**     The *SX-50* system can provide system messages in English or French.

- Conditions**
- By default, all system messages are in English.
  - Customer Data Entry, RMATS and all system printouts are available in English only.
  - The language of System Messages at *SUPERSET* telephones, including the Auxiliary Attendant, is determined by the *SUPERSET* telephone itself. It is available in a French or English model.
  - The language of System Messages at *SUPERSET 420* telephones is determined through the Superkey menu options on a set by set basis.
  - The language selected for System Messages does not affect Advisory Messages from *SUPERSET 4* or *SUPERSET 420* telephones. (See Messaging – Advisory in this Section).

**Operation**     **Attendant Console**

To Switch to French Messaging:

- Press FUNCTION or dial \* or dial 71
- Dial 92.

To return to English Messaging:

- Press FUNCTION or dial \* or dial 71
- Dial 91.

---

## Handsfree Operation

---

**Description** Handsfree Operation permits a *SUPERSET 3*, *SUPERSET 4*, *SUPERSET 410* and *SUPERSET 420* telephone users to communicate through a speaker and microphone contained within the telephone set while the handset remains on-hook. This mode can be activated during a call. It can be used on any of the lines appearing at the set.

**Conditions** None.

**Operation** ***SUPERSET 3* and *SUPERSET 4***

To Make a Call in Handsfree Mode:

- Dial the desired number. The *SUPERSET* telephone automatically goes off-hook and selects the Prime Line. If the Prime Line is busy, the Personal Outgoing Line is selected (if programmed).
- The appropriate tone (ringback, busy or reorder) is heard from the speaker.

OR

- Press the SPEAKER ON/OFF key. The Prime Line is selected. If the Prime Line is busy, the Personal Outgoing Line is selected (if programmed). Dial tone is heard from the speaker.
- Dial the desired number. The appropriate tone (ringback, busy or reorder) is heard from the speaker.

OR

- Press the appropriate Line Select key. Dial tone is heard from the speaker.
- Dial the desired number. The appropriate tone (ringback, busy or reorder) is heard from the speaker.

Adjust speaker volume as required. On *SUPERSET 4* telephones, the volume control is in the top left corner of the set. On *SUPERSET 3* telephones, there is a sliding volume control on the left side of the set.

The user can turn off the microphone to consult privately with another person near the set. Press the MIC ON/OFF key. (On *SUPERSET 3* telephones, hold the key down). On *SUPERSET 4* telephones, the **MIC ON** flag disappears from the Display.

At any time, the user can switch to normal handset operation by lifting the handset. To return to Handsfree mode, press the SPEAKER ON/OFF key and replace the handset.

To Receive a Call Handsfree:

- Press the SPEAKER ON/OFF key.

OR

- Press the Line Select key for the ringing line.

On Completion of a Call:

- Press the SPEAKER ON/OFF key. (On *SUPERSET 4* telephones, it is also possible to use the HANG-UP softkey).

### ***SUPERSET 410 and SUPERSET 420***

For handsfree calling:

- Dial the desired number without lifting the handset. The microphone indicator lights.

If you have more than one line appearance programmed for your personal keys, press the personal key that corresponds to the line you want, then dial the number.

- When the party you are calling answers, speak towards the set.

For handsfree answering:

- Press the Speaker key. The Microphone indicator lights.

To switch to a private conversation during handsfree operation:

- Lift the handset. The speaker and microphone turn off.

To return to handsfree:

- Press the Speaker key and replace the handset. The speaker and microphone turn on.

To turn the microphone off for privacy:

- Press the Microphone key, then, press the Microphone key again to turn the microphone back on.

To end a call or cancel a call in progress:

- Press the Cancel key.

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## Headset Operation – *SUPERSET* Telephones

---

**Description** The *SUPERSET 3* and *SUPERSET 4* telephones can be used with a standard handset or an approved headset. Handset or headset working mode is indicated by the appropriate Class of Service option in CDE programming. Approved headsets are:

DANAVOX

Stetomike® HMT 808  
Danavox 900–0585SS  
Danavox 808–0585SS

PLANTRONICS

StarSet® II Starmate® E–PLUS MH0230–1  
Supra® Starmate E–PLUS MH0530–1  
Supra® Binaural Starmate E–PLUS MH0531–1

**Conditions**

- A *SUPERSET 4* telephone with a headset requires slightly different procedures when using the Line and Digit Keys, the Speaker Key, the *SUPERSET 4* HANG UP softkey and when employing Auto Answer.

### Line Key Usage

Using a Line Key to originate a call from an idle *SUPERSET 4* telephone with headset results in the audio connection being made to the headset jack. All other Line Key functions are the same for both headset and handset configurations.

### Digit Key Usage

Using a Digit Key to originate an on-hook call from a *SUPERSET 4* telephone with headset results in the audio connection being made to the headset jack. All other Digit Key functions are the same for both headset and handset configurations.

### Speaker Key Usage

Use of the Speaker Key to originate or answer a call, or to change to handsfree working is the same as for the handset configuration.

When using the Speaker Key to go from handsfree to normal working in the headset configuration, the audio is switched to the headset jack without regard for the switch-hook state.

### Auto Answer – *SUPERSET 4* Telephone ONLY

In the headset configuration, if a call is answered automatically, the audio connection is made to the headset jack. In the handset configuration, the audio connection is made to the microphone and speaker.

### **HANG UP Softkey Usage – *SUPERSET 4* Telephones**

If the *SUPERSET 4* Telephone HANG UP Soft Key is used in the handset configuration, the set is not returned to the idle state and dial tone is returned. If the HANG UP Soft Key is used in the headset configuration, the set is returned to the idle state.

**Programming** Commands 121 → 129, COS 1 → 9 Programming, Register 2

- Set *SUPERSET 4* Headset Operation (field j) to 1 (Enable). Default is 0 (Disable).

---

## Help Function

---

**Description** On *SUPERSET 4* and *SUPERSET 420* telephones, a HELP softkey appears during name, message, and Speed Dial programming. On Auxiliary Attendant *SUPERSET 4* and *SUPERSET 420* telephones, a HELP softkey also appears during Function Key programming.

During name or message programming, the HELP function displays a brief reminder of how to enter alphabetic characters:

3=D, 33=E, 333=F

For more information on name or message programming, refer to the Name and Messaging – Advisory features in this Section.

During Speed Dial programming, the HELP function lists the codes that can be included in the Speed Dial entry (e.g., \*1 – 5 second pause). Use the NEXT softkey to read through the list.

Use the CANCEL softkey on the *SUPERSET 4*, or the Cancel key on the *SUPERSET 420*, to leave the Help function and return to programming.

- Conditions**
- This feature applies to *SUPERSET 4* and *SUPERSET 420* telephones only.
  - An appropriate Feature must have been selected from the Features menu.
  - The HELP feature is active only for name, message, Speed Dial and Auxiliary Attendant Function Key programming.

**Operation**      ***SUPERSET 4***

- Press the PROGRAM softkey. The display prompts the user for the feature to be programmed.
- Select the feature to be programmed (name, message, Speed Dial).
- If programming a message, enter message number.
- If programming Speed Dial, press the desired Speed Call key.
- Press the HELP softkey. Information is displayed.
- If a NEXT softkey appears, use it to display more information.
- Press the CANCEL softkey to return to programming.

***SUPERSET 420***

- Press the Superkey key.
- Press No (if necessary) until the menu to be selected appears on the main display.

- Press the Yes softkey to select the feature to be programmed. Ensure that a feature is selected in which the Help feature is available.
- Press the Help softkey.
- If the Next softkey appears, use it to display more information.
- Press the Cancel key to return to programming.

---

## Hotline

---

- Description** This feature allows an extension designated as an Automatic Ringdown Circuit to be programmed into one of 10 Hotline groups. When a Hotline extension goes off-hook, the SX-50 system automatically dials a preprogrammed number (internal or external).
- Hotline Groups 2 → 9 signal the destination programmed in Abbreviated Dial numbers 12 → 19 (102 → 109), respectively.
- See AUTOMATIC RINGDOWN CIRCUIT in this Section for more information.
- Conditions**
- Hotline Groups 2 → 9 require Automatic Ringdown Circuit to be enabled in their Class of Service (Commands 121 → 129, Register 2, field d).
  - Hotline Groups 2 → 9 automatically dial the attendant if the corresponding Abbreviated Dial number (102 → 109) is invalid.
  - The flash feature is disabled on Hotline extensions, therefore a Hotline extension cannot place a call on hold.
- Programming** Commands 121 → 129, Class of Service Programming, Register 2:
- Set Automatic Ringdown Circuit (field d) to 1 (Enable) for Hotline Groups 2 → 9.
- Commands 301 → 310, Extension Programming, All Registers:
- Set Extension Type (field c) to 2 → 9 (Hotline Groups 2 → 9). Default is 0 (Extension).
- For Hotline Groups 2 → 9, program Abbreviated Dial numbers 102 → 109 as required. Refer to ABBREVIATED DIALING in this Section.
- Operation**
- Lift handset. The call is rerouted to the preprogrammed hotline destination.

---

## Hunt Groups

---

**Description** This feature defines a group of extensions as a Hunt Group and assigns them a Hunt Group Access Code. A call to a Hunt Group connects to the first idle extension in the group. There can be a maximum of six Hunt Groups of eight extensions defined; each with a unique access code. Alternatively, Hunt Groups can be linked to form larger Hunt Groups for a maximum configuration of one group of 48 extensions. Two types of hunting are provided: Circular and Terminal Hunting.

Circular Hunting starts at the extension after the last extension in the Hunt Group to which a call was completed. Hunting performs in the sequence programmed and stops at the first idle extension found.

Terminal Hunting starts at the first extension in the Hunt Group and terminates at the first idle extension found. Hunting takes place in the order in which extensions were programmed into the Hunt Group.

A Class of Service option (Hunt Group Login) allows extensions assigned as Hunt Group members to be included or excluded from the group by dialing an access code. If a Hunt Group has no members logged in, trunk calls are rerouted to LDN1. Internal Calls receive reorder tone.

- Conditions**
- A call can camp on to a busy Hunt Group.
  - Extensions can forward to a Hunt Group, but any forwarding in effect on the extensions in that Hunt Group is ignored; i.e., calls can be forwarded once only.
  - A maximum of six independent Hunt Groups can be defined with eight directory number entries each.
  - Hunt Groups can be linked, but the last Hunt Group cannot be linked to the first Hunt Group; i.e., a closed loop of Hunt Groups cannot be formed.
  - When Hunt Groups are linked, the linked Hunt Group inherits the characteristics of the master Hunt Group.
  - An extension number can be entered more than once in any or all Hunt Groups.
  - Direct-In Lines can be directed to a Hunt Group. Refer to the Conditions detailed under DIRECT-IN LINES in this Section.
  - The Attendant cannot be assigned to a Hunt Group.
  - Invalid extension numbers assigned to a Hunt Group are ignored.
  - If a Hunt Group member has Do Not Disturb (DND) activated, the set is considered busy and does not receive calls. If all members have

DND activated, internal calls receive Do Not Disturb tone. Trunk calls go to LDN1.

- The last member to log out of a hunt group receives a short warning tone. On a *SUPERSET 4* or *SUPERSET 420* telephone the LCD shows "LAST MEMBER", followed by "HUNT GRP LOGOUT".
- If all members are logged out, internal calls to the Hunt Group receive reorder tone. Trunk calls go to LDN1.
- A trunk programmed as a Direct-In Line to a Hunt Group will ring the Attendant on LDN1 if all members are logged out.
- A *SUPERSET 4* or *SUPERSET 420* telephone can login/logout the prime line by dialing the login/logout code on any Key, Multicall or Personal Outgoing Line appearance on the set.
- Clear All Features has no effect on hunt group logins and logouts.
- A Hunt Group member's log in/log out status is restored after a power failure.

**Programming** Commands 361 → 366, Hunt Groups 1 → 6, Extension Hunt Group Programming, Register 1:

- Type of Hunting (field b) must be set to 0 (Circular) or 1 (Terminal). Default is 0.
- If the Hunt Group is linked to another Hunt Group, then assign Hunt Group Linking (field c) to one of the six Hunt Groups 1 → 6. Default is 0 (Unlinked Hunt Group).

Commands 361 → 366, Hunt Groups 1 → 6, Extension Hunt Group Programming, Registers 2 → 9:

- Assign the required extension numbers (fields b, c, d, e) in each of the eight registers for each of the Extension Hunt Groups.

Commands 110, Feature Access Codes, Registers 19 → 24:

- Assign required 1-, 2-, 3- or 4-digit Hunt Group Access Codes. Default is 491 (Hunt Group 1) → 496 (Hunt Group 6).

### Log-in Hunt Groups

Command 110, Feature Access Codes, Register 34:

- Set Hunt Group Login/Logout Access Code (fields c through f) to the desired access code. Default is 64.

Commands 121 → 129, COS 1 → COS 9 Programming, Register 7:

- Set Hunt Group Login (field g) to 1 (Enable). Default is 0 (Disable).

### Operation

- Any extension in a Hunt Group can be accessed directly by dialing the extension number. If the extension is busy, hunting does not occur.

- If an extension dials a Hunt Group Access Code in which all extensions are busy, busy tone is returned.
- If the attendant or an extension transfers a trunk call to a Hunt Group in which all extensions are busy, the trunk call camps on to the Hunt Group. The caller hears silence or (if provided), Music on Hold.

### **Log-in Hunt Groups**

To Log In:

- Lift Handset. Dial tone is returned. (This step not required at *SUPERSET* telephones).
- Dial the Hunt Group Login/Logout access code. Five bursts of dial tone are returned, followed by dial tone.
- Hang up.

To Log Out:

- Lift Handset. Dial tone is returned. (This step not required at *SUPERSET* telephones).
- Dial the Hunt Group Login/Logout access code. Dial Tone is returned.
- Hang up.

---

## Identified Trunk Group

---

- Description** When a Trunk Group has this feature enabled, the selected trunk automatically outpulses its Trunk Group Access Code. This allows a unified numbering plan to be used between DPABXs in conjunction with E&M Trunks.
- Conditions**
- When E&M Trunks are used in an Identified Trunk Group, the far-end PABX or Central Office must provide Disconnect Supervision so that both of the trunks are dropped at the end of the call.
- Programming**
- Commands 151 → 156, Trunk Groups 1 → 6 Programming, Register 1:
- Identified Trunk Group (field e) must be set to 1 (Enable). Default is 0 (Disable).
  - Assign the Trunk Group Access Code (1, 2, 3 or 4 digits) (fields f, g, h, i).
- Commands 151 → 156, Trunk Groups 1 → 6 Programming, Register 2:
- Wait For Dial Tone (field b) must be set to 0 (No Wait). This is the default.
  - Set Delay Before Outpulsing (field d) to 1 → 5 seconds.
  - Answer Supervision (field e) must be set to 1 (Supervision is Meter Pulse or Reversal). Default is 0 (No Supervision).
- Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 2:
- If the CO provides Disconnect Supervision, Disconnect Supervision Guaranteed? (field c) must be set to 1 (Yes). Default is 0 (No).
- Operation**
- Dial the Trunk Group Access Code.
  - When the trunk is successfully accessed, the Trunk Access Code and the calling extension's number are outpulsed.

---

## Immediate Line Selection

---

- Description** When a *SUPERSET* telephone goes off-hook, it immediately selects the Prime Line. If the Prime Line is busy, it selects the Personal Outgoing Line (if provided).
- Conditions**
- This feature applies to *SUPERSET* telephones only.
- Operation** If selection of the Prime Line is required (or the Personal Outgoing Line, if the Prime Line is busy), it is not necessary to lift the handset or press the **SPEAKER ON/OFF** key. Line selection is accomplished automatically when the first digit of the number is dialed.

---

## Incoming Call Identification

---

- Description** All incoming calls to the Attendant Console appear on selected keys to indicate which trunk a call is on.
- Conditions** None.
- Programming** Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 4:
- Day Answer Mode (field d) must be set to one of the following:
    - 1 = LDN1
    - 2 = LDN2
    - 3 = LDN3
- Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 5:
- Night Answer Mode (field b) must be set to one of the following:
    - 1 = Incoming calls on this trunk appear on the LDN1 softkey.
    - 2 = Incoming calls on this trunk appear on the LDN2 softkey.
    - 3 = Incoming calls on this trunk appear on the LDN3 softkey.
- Operation**
- Refer to the Attendant Console Guide, Part Number 9104-953-101-NA, for details.

---

## Individual Trunk Access

---

- Description** This feature allows the Attendant Console, Auxiliary Attendant or Test Line to access a specific trunk by equipment number for maintenance or troubleshooting purposes.
- Conditions**
- Only the Attendant Console, Auxiliary Attendant or Test Line can use Individual Trunk Access.
- Programming** None.
- Operation**
- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
  - To access a trunk by equipment number, dial Attendant Function 19 plus the Trunk Equipment Number (01 through 80). If the trunk is idle or busied-out, dial tone is returned. If the trunk is busy, busy tone is returned.
  - A busy trunk can be accessed by using Trunk Emergency Release but note that the caller will be dropped.
  - When finished, press RELEASE or CANCEL.

## Internal Calls To Console Routed to Overflow

---

**Description** This feature assigns a specific extension as the Attendant Night Answer Point for all calls directed to the Attendant Console when the system is in Night Service.

- Conditions**
- The Attendant Night Answer Point must not be designated as Originate Only.
  - Do Not Disturb is ignored in Night Answer Point operation.
  - The Night Answer Point cannot forward Console calls back to the Attendant.

**Programming** Command 100, System Options, Register 08, Overflow Control:

- Internal calls to console routed to overflow (field f) must be set to 1 (enable during day service), 2 (enable during night service) or 3 (enable during both day and night service).
- Overflow Point (fields g, h, i) must be set to 000 (Night Bell), 001 → 160 (Station Equipment Number), 161 → 166 (Hunt Group) or 167 (Ring Group). Default is 000.

**Operation** **Attendant Console Key**

- Press the NIGHT key – the **NIGHT** flag appears on the LCD.
- All calls to the Attendant Console are now routed to the selected Night Answer Point.

**Attendant Function**

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 11.
- All calls to the Attendant Console are now routed to the selected Night Answer Point.

---

## Last Number Redial

---

- Description** This feature allows an extension user to automatically redial the last number that was manually dialed on a trunk.
- Conditions**
- An Abbreviated Dial Number cannot be accessed by Last Number Redial.
  - The Last Number Redial Access Code is the Abbreviated Dialing Access Code (default 55) plus 0. At a *SUPERSET 4* telephone, press the REDIAL softkey.
  - If the # key is used for Last Number Redial, it cannot be used to access programming at the Attendant Console, Auxiliary Attendant or Test Line.
- Programming** Command 100, System Options, Register 09, Features Selection 1:
- Last Number Redial # Key Access (field d) must be set to 1 (Enable). Default is 0 (Disable).
- Commands 121 → 129, COS 1 → COS 9 Programming, Register 5:
- Set Last Number Redial (field k) to 1 (enable). Default is 0 (disable).
- Commands 151 → .156, Trunk Group 1 → Trunk Group 6 Programming, Register 2:
- Set Trunk Group Last Number Redial (field j) to 1 (enable). Default is 0 (disable).
- Operation** **ONS or OPS Sets**
- Dial System Abbreviated Dial Access Code plus 0 or press #, if enabled.
  - The last external number that was manually dialed is automatically redialed.
- SUPERSET 3* Telephone**
- Press the REDIAL feature key. The last external telephone number is dialed automatically.
- SUPERSET 4* Telephone**
- Press the REDIAL softkey. The last manually dialed external telephone number is dialed automatically. Note that the REDIAL softkey appears only after an external number has been dialed.
- To Display the Last External Number:
- Press the DISPLAY feature key followed by the REDIAL softkey.

- Press the EXIT softkey to return to the normal display.

***SUPERSET 410 and SUPERSET 420 Telephone***

- Press the Redial key. The last manually dialed external telephone number is dialed automatically.

To Display the Last External Number Dialed on the *SUPERSET 420* Telephone:

- Press the Superkey key.
- Press the Redial key.
- Press the Superkey to return to the normal display.

---

## Line Appearances – Immediate Ring, Delay Ring, No Ring

---

- Description** An **Immediate Ring** appearance rings the *SUPERSET* telephone at the same time the Line Status indicator flashes. This is typical telephone operation on incoming calls.
- A **Delay Ring** line appearance initially provides only visual indication of an incoming call. If the call is not answered after a programmed time delay (10–30 seconds), the set rings.
- A **No Ring** line appearance never rings the *SUPERSET* telephone, but the Line Status indicator flashes to indicate an incoming call.
- Conditions**
- Immediate Ring, Delay Ring or No Ring must be selected for each line appearance during Customer Data Entry.
  - A Delay Ring line appearance can answer an incoming call even if the set has not started to ring.
  - A No Ring line appearance can answer an incoming call even though the set does not ring.
  - Only Immediate Ring is allowed on the set's prime line.
- Programming** Commands 401 → 480, *SUPERSET* Telephone 01 → 80, Register = Line Key Number, field d: 0 = No Ring 1 = Immediate Ring 2 = Delay Ring
- For more information on line appearance programming, refer to Commands 401 → 480, *SUPERSET* Telephone Programming in Section 9104–091–210–NA, Customer Data Entry.
- Command 100, Register 7, System Options:
- Set Delayed Ringing Key Time–Out (field e):
    - 1 = 10 seconds
    - 2 = 20 seconds
    - 3 = 30 seconds
- Operation**
- Immediate Ring:**
- The Line Status indicator flashes and the set rings immediately in response to an incoming call.
- Delay Ring:**
- The Line Status indicator flashes immediately in response to an incoming call. The Prime Line and any other Immediate Ring appearances ring.

- After the programmed delay (10–30 seconds), if the call is not answered, the delayed ring appearance rings.

No Ring:

- When a call is received at the *SUPERSET* telephone, the flashing Line Status indicator is the only signal.

---

## Line Status Display

---

**Description** The *SUPERSET 4* Line Status Display provides information about each line that appears at the set. The symbols used are:

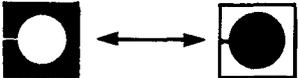
- SOLID BOX – The line is busy at this set.
- SOLID CIRCLE – The line is busy at another set.
- FLASHING BOX – The line is on hold at this set.
- FLASHING CIRCLE – The line is on hold at another set.
- ALTERNATING SQUARE/CIRCLE – There is an incoming call on this line.
- Refer to Figure 3–1, *SUPERSET 4* Line Status Display Symbols.

The *SUPERSET 410* and *SUPERSET 420* Line Status Display provides information about each line that appears at the set. The symbols used are:

- CLEAR – The line is idle.
- DISPLAY SOLID TRIANGLE – This line is busy at this set (or at another set).
- DISPLAY ALTERNATES BETWEEN SOLID AND CLEAR – Incoming call (500 ms on and 500 ms off).
- DISPLAY ALTERNATES BETWEEN SOLID AND CLEAR – Call on hold at this set or at another set (250 ms on and 250 ms off).
- Refer to Figure 3–2, *SUPERSET 410* and *SUPERSET 420* Line Status Display Symbols.

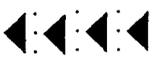
**Conditions** None.

**Operation** None.

SYMBOL	DESCRIPTION	MEANING
	NO SYMBOL IN DISPLAY	LINE IDLE
	DISPLAY ALTERNATES BETWEEN THESE TWO SYMBOLS	INCOMING CALL
	DISPLAY SOLID SQUARE	LINE BUSY AT THIS SET
	DISPLAY SOLID CIRCLE	LINE BUSY AT ANOTHER SET
	DISPLAY ALTERNATES BETWEEN SOLID AND CLEAR	CALL ON HOLD AT THIS SET
	DISPLAY CIRCLE FLASHES ON AND OFF	CALL ON HOLD AT ANOTHER SET

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Figure 3-1 SUPERSET 4 Line Status Display Symbols

SYMBOL	DESCRIPTION	MEANING
	CLEAR	LINE IDLE
	DISPLAY SOLID TRIANGLE	THIS LINE IS BUSY AT THIS SET (OR AT ANOTHER SET)
	DISPLAY ALTERNATES BETWEEN SOLID AND CLEAR	INCOMING CALL
	DISPLAY ALTERNATES BETWEEN SOLID AND CLEAR	CALL ON HOLD AT THIS SET (OR AT ANOTHER SET) *

\* FASTER FLASH RATES

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Figure 3-2 *SUPERSET 410* and *SUPERSET 420* Line Status Display Symbols

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## Lockout Alarm

---

**Description** The Lockout Alarm feature provides two capabilities to the *SX-50* system:

1. **IT PROVIDES 10 SECONDS OF DIAL TONE** – When a 2-party conversation is completed and one party hangs up, dial tone is returned for 10 seconds. This allows the remaining party to place a second call without the need to go on-hook and off-hook again.
2. **IT ALERTS THE ATTENDANT OF AN OFF-HOOK CONDITION** – If a second call is not placed within 10 seconds and the set remains off-hook, reorder tone is applied for 20 seconds. When reorder tone has been applied for 20 seconds, the set goes into a Lockout state. A lockout alarm is raised, if enabled. The lockout alarm is displayed on the Attendant Console or Auxiliary Attendant set as **A 85 XXXX LOCKED OUT 02/01**, where XXXX is the equipment number, 02 is a sample card slot and 01 is a sample station. Busy tone is returned to the set, and **LOCKED OUT** appears on its LCD display, if applicable.

The *SX-50* system can store up to eight alarm indications as described in **ALARM INDICATORS** in this Section.

**Conditions**

- Although a lockout alarm can be removed by dialing the Cancel All Alarms code (\*32), telephone operation is not restored. If the set continues to remain off-hook, no further alarms are generated.

**Programming** Commands 121 → 129, Class of Service Programming, Register 3:

- Set Voice Mail Port (field k) to 2 (Send Disconnect Tone). Default is 0 (Disable).

Commands 121 → 129, Class of Service Programming, Register 7:

- Set Lockout Alarm (field h) to 1 (Enable). Default is 0 (Disable).

**Operation** To Clear a Lockout Alarm and Restore Telephone Operation:

- Replace the handset of an ONS, *SUPERSET 3* or *SUPERSET 410* telephone.

OR

- Press any key on a *SUPERSET 4* or *SUPERSET 420* set. Although the handset may continue to be off-hook, the telephone is idle and the current date and time are displayed on the LCD.

---

## Manual Line

---

- Description** This feature allows an extension designated as an Automatic Ringdown Circuit to be programmed as a Manual Line. When a Manual Line extension goes off-hook, the SX-50 system automatically dials the Attendant.
- A manual line is typically used as a security phone or lobby phone. Dial tone is not provided. The extension receives calls normally.
- See AUTOMATIC RINGDOWN CIRCUIT in this Section for more information.
- Conditions**
- Manual Line and all features requiring call origination are mutually exclusive.
- Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 2:
- Automatic Ringdown Circuit (field d) must be set to 1 (Enable). Default is 0 (Disable).
- Command 301 → 310, Extension Programming:
- Leave Extension Type (field c) at its default value, 0 (Extension).
- Operation**
- Lift the handset – the extension rings the Attendant Console.

---

## Message Register Audit

---

**Description** When this feature is enabled, the Attendant can print out the contents of the Message Registers and optionally clear them. The printout consists of several lines. The first line is the Message Register Audit header and has the following format:

**MM/DD hh:mm ROOM REGISTER**

- **MM/DD** – month and day
- **hh:mm** – time-of-day (24-hour clock)
- **hh:mmP** – time-of-day (12 hour clock, PM).

The remaining lines are of the same format. They provide the extension number and its Message Register contents as follows: **nnnn – xxxx** (repeated four times across the page), where **nnnn** is the extension number and **xxxx** is the contents of the Message Register.

**Conditions** • A printer is required; refer to PRINTER PORT in this Section.

**Programming** Command 100, System Options, Register 10, Features Selection 2:

- Message Register Audit (field e) must be set to 1 (Enable) or 2 (Enable With Clearing of Message Registers). Default is 0 (Disable).

**Operation**

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 73.
- The system outputs the contents of the Message Registers to the printer and clears them (if enabled).

---

## Message Registration

---

**Description** This feature computes the number of trunk call units made from each extension. For each trunk call an initial charge and an additional time charge can be set. The initial charge can be enabled by a timer or a meter pulse from the CO (see *Meter Pulse Collection* feature). The additional charge can be metered by a timer, or meter pulses from the CO. The frequency of the timer is programmable. The Attendant can reset an extension's message counter.

Optionally, the system can provide proportional call charging. When a trunk call is passed from one extension to another, each extension's message register is charged for the time the extension spent on the trunk.

- Conditions**
- Restrictive Station Control should not be enabled if Room Status is enabled. Refer to Restrictive Station Control in this Section.
  - Unless proportional call charging is selected, the originating extension always gets the Message Registration charge applied even if the trunk is transferred to another extension.
  - An extension designated as a Manual Line cannot have Message Registration.
  - The maximum call count is 9998.
  - If the extension has Restrictive Station Control enabled and the count is 9998, the next attempt to make a trunk call results in reorder tone.
  - A call count of 9999 indicates the Attendant has activated Restrictive Station Control to restrict trunk calls from the extension.
  - When the Attendant resets the Message Registration counter, the existing count is deleted from the records.

**Programming** Command 100, System Options, Register 10, Features Selection 2:

- Set Proportional Call Charging (field g) to 1 (Charge to all parties involved in the call) or 0 (Charge to originating extension only), as desired. Default is 0.

Commands 121 → 129, COS 1 → COS 9 Programming, Register 2:

- Message Registration/Restrictive Station Control (field f) must be set to 2 (Enable Message Registration Only) or 3 (Enable Both). Default is 0 (Disable Both).

Commands 151 → 156, Trunk Groups 1 → 6 Programming, Register 2:

- Answer Supervision (field e) can be set to 1 (Supervision is Meter Pulse or Reversal), 2 (Ignore Supervision Except for Toll Restriction) or

3 (Supervision is Meter Pulse, Ignore Reversals). Default is 0 (No Supervision).

Commands 151 → 156, Trunk Groups 1 → 6 Programming, Register 3:

- Message Registration (field b) must be set to 1 (Enable). Default is 0 (Disable).
- If additional message units are counted, Count Additional Message Units (field c) must be set to 1 (Enable), 2 (Insert Message Unit every 6 Seconds) or 3 (Insert Message Unit every 60 Seconds). Default is 0 (Disable).
- If Initial Message Unit Charge (fields d, e) is required, specify the amount (00 → 99). Default is 00.
- If Additional Message Unit Charge (fields f, g) is required, specify the amount (00 → 99). Default is 01.
- If the trunk does not supply Answer Supervision, Pseudo Answer Timer (field h) must be set. One pseudo answer signal is generated after the selected time-out period (10 → 70 Seconds). Default is 30 seconds.

Command 185, Function Key Programming, Registers 1 → 14:

- Assign one of the Programmable Function keys (1 through 14) as MES REG key.

## Operation

### Attendant Function

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key (Console only).
- Dial Attendant Function 22.
- Dial the extension number – the LCD displays the extension number and its 4-digit Message Registration counter status.
- To clear the counter, dial 0.
- To activate Restrictive Station Control (if enabled) dial 9. The counter is set to 9999.

### Attendant Console Key

- Press the MES REG key and hold – the LCD displays **EXT-NUMBER?**.
- Dial the extension number – the LCD displays the extension number paired with its respective Message Registration counter status.
- To clear the counter, dial 0.
- To activate Restrictive Station Control (if enabled) dial 9. The counter is set to 9999.

### Auxiliary Attendant Function Key

At the Auxiliary Attendant set:

- Press the MSG REGISTER function key. The LCD shows **EXT NUMBER?**.
- Dial the desired extension number. The LCD shows the extension number and the Message Registration counter.
- If desired, dial 0 to clear the counter.
- If desired, dial 9 to prohibit trunk calls from the extension.
- To exit, press the EXIT softkey.

---

## Message Waiting

---

**Description** This feature permits the Attendant or Auxiliary Attendant to inform an extension user that there is a message waiting. The system rings the extension at the end of the selected Message Waiting Indication Interval with three short rings. (If sets with lamps are provided and programmed, the lamp flashes and the bell does not ring). If the extension is busy, the Message Waiting Indication reactivates 10 seconds after the extension becomes idle. If the extension user answers the Message Waiting Indication within 30 seconds ('Enable with 30 Second Manual Line' option), the extension automatically calls the Attendant that set the message. Extensions with messages waiting when calling the Attendant will cause **MSG** to appear on the LCD. Message Waiting can be canceled automatically, or by an Attendant.

Message waiting indication on a *SUPERSET 4* telephone is the word **MSG** flashing in the top right corner of the Features Display. This is in addition to indication by ringing (if programmed).

Message waiting indication on a *SUPERSET 410* and *SUPERSET 420* telephone is the indicator flashing beside the Message key. This is in addition to indication by ringing (if programmed).

- Conditions**
- Message Waiting indications are not lost during a power failure.
  - If 'Message Waiting With Lamps' or 'Message Waiting With Bells' is selected, the user must dial the ONS Message Waiting Callback code (default is 65), to obtain the message. If Message Waiting 'Enable With 30 Second Manual Line' is selected and the extension user answers the Message Waiting Indication within 30 seconds, the extension user is automatically directed to the attendant that set the message.
  - Each Attendant position can set only one message per extension.
  - Multiple messages can be set on an extension from different attendant or auxiliary attendant sources.
  - The Message Waiting indicator remains ON until all messages are cancelled.
  - The *SX-50* system can drive a maximum of 30 Message Waiting lamps.
  - If Message Waiting Automatic Cancel is selected, the Message Waiting indication cancels automatically when the Attendant Console answers a call from an extension with the Message Waiting feature active.
  - If bell indication of messages is used, Do Not Disturb will prevent the set from receiving this signal.

**Programming** Command 100, System Options, Register 12, Message Waiting:

- Set Message Waiting System Enable (field c) to 1 (Enable With Lamps), 2 (Enable with Bells) or 3 (Enable with 30 Second Manual Line). Default is 1.
- Set Message Waiting Indication (field d) to 0 (Always) or 1 (During Day Service Only) as required.
- Set Message Waiting Indication Interval (field e) to required time period (1 → 4) x 5 minutes. Default is 3 (15 Minutes).
- Set Message Waiting Automatic Cancel (field f) to 0 (Disable) or 1 (Enable), as desired. Default is 1 (Enable).

## Commands 121 → 129, COS 1 → COS 9 Programming, Register 2:

- Set Message Waiting (field g) in the extension's COS to 1 (Enable). Default is 1.

**Operation** **Attendant Console**

To Apply or remove Message Waiting on an extension:

- Press and hold the MESSAGE key (or MSG WTG key on a *SUPERSET 4* set). The LCD shows **EXT NUMBER?**.
- Dial the desired extension number. The LCD shows the extension number, **MSG –** and a flashing **OFF** or **ON** status.
- If required, dial 1 to set status ON, or dial 0 for OFF.
- Release the MESSAGE key.

The Attendant can also apply Message Waiting upon reaching a busy or unanswered extension. To do this:

- Press and hold the MESSAGE key. The LCD shows the extension number, **MSG –** and **ON** or **OFF**. Each time the MESSAGE key is pressed, it changes the Message Waiting status for the extension.
- Press CANCEL.

To Apply Message Waiting During a Recall:

- Press the ANSWER key or RECALL softkey – the LCD identifies the called extension and the trunk or extension that was transferred to it.
- Press and hold the MESSAGE key – the Attendant Console remains connected to the original trunk or extension and the system applies Message Waiting to the called extension. Each time the MESSAGE key is pressed, it changes the Message Waiting status for the called extension.
- Press CANCEL and RELEASE.

To cancel all Message Waiting indications from the Attendant position:

- Dial 71 or \* or press the FUNCTION key.

- Dial 29.

**Auxiliary Attendant Position from a *SUPERSET 4* or *SUPERSET 420* Telephone:**

To Apply or Remove Message Waiting on an Extension:

- Press the appropriate Message Function key (Line Appearance key). Prompt EXT NUMBER? appears on display.
- Dial extension number. Auxiliary Attendant display indicates current status of extension, MSG – ON or MSG – OFF.
- Press the On softkey to apply Message Waiting to the extension or press the Off softkey to remove Message Waiting.
- Press the Cancel key (EXIT softkey on *SUPERSET 4*).

To Apply Message Waiting after reaching a Busy or Unanswered extension:

- Press the appropriate Message Function key (Line Appearance key). Auxiliary Attendant display indicates current status of extension, MSG – ON or MSG – OFF.
- Press the On softkey to apply Message Waiting to the extension.
- Press the Cancel key (EXIT softkey on *SUPERSET 4*).

**ONS Sets**

To Apply Message Waiting on another Extension:

- Dial ONS Message Waiting Activate code (default is 72) and the destination extension number. Dial tone is returned when message has been activated.

To Respond to a Message Waiting Indication:

The Message Waiting indicator lamp flashes indicating that there is a message waiting. The set is idle. To respond to the message:

- Dial ONS Message Waiting Callback code (default is 65). The sender of first (oldest) message is dialed. If the sender does not answer the call (i.e., No Answer, Busy or Do Not Disturb), dial 65 again to call the next sender in the message queue. The Message Waiting lamp continues to flash until there are no more messages to be read.

To respond to the Next Message:

- Dial ONS Message Waiting Callback code (default is 65). The sender of the next message is dialed. Repeat until the Message Waiting indicator lamp stops flashing and reorder tone is heard, indicating that the end of the message queue has been reached.

To Cancel Message Waiting:

- If Message Waiting Automatic Cancel (Command 100, Register 12, field f) is enabled for the set, message waiting is cancelled automatically once the sender and recipient have a telephone conversation.
- If Message Waiting Automatic Cancel (Command 100, Register 12, field f) is disabled, dial the Cancel All Message Waiting Indications code (default is 66).
- If the Attendant or an Auxiliary attendant sent the message, the console can cancel the message.

## Messaging – Advisory

**Description** This feature allows a *SUPERSET 4* or *SUPERSET 420* user to display a short advisory message on the set's LCD. Other *SUPERSET 4* or *SUPERSET 420* telephones and the Attendant Console see this message on their display when they call the set.

The *SX-50* system can store 15 advisory messages. Messages 1 through 8 are preprogrammed but can be changed. *SUPERSET 4* or *SUPERSET 420* users, if their Class of Service allows it, can create messages. Messages have a maximum length of 13 characters.

Message Number	English	French
01	IN A MEETING	EN REUNION
02	ON VACATION	EN VACANCES
03	AT LUNCH	PAUSE MIDI
04	GONE HOME	A LA MAISON
05	BACK IN 5 MIN	RETOUR 5 MIN
06	OUT ON A CALL	DEPLACEMENT
07	IN TOMORROW	RETOUR DEMAIN
09	OUT OF TOWN	EN VOYAGE
09 → 15	(BLANK)	

- Conditions**
- Messages are system-wide.
  - A message currently in use cannot be changed.
  - User-programmed *SUPERSET 4* or *SUPERSET 420* advisory messages always appear in their original language.
  - An advisory message appears at the Attendant Console in the language of the *SUPERSET 4* or *SUPERSET 420* telephone that sent it.

**Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 7:

- To permit users to write messages, leave *SUPERSET 4* or *SUPERSET 420* Telephone Message Programming (field b) at its default value, 1 (Enable).

**Operation** **Activating an Advisory Message from a *SUPERSET 4* Telephone**

- Press the MSG softkey.
- Press the NEXT softkey repeatedly until the appropriate message appears, or dial the message number (01 to 15).

- Press the ON softkey.

### Canceling an Advisory Message:

- Press the MSG softkey.
- Press the OFF softkey.
- Press the EXIT softkey.

### Writing an Advisory Message:

- Press the PROGRAM softkey.
- Press the MSG softkey. The display shows:

**DIAL IN MSG NUM.**

**Note:** Messages 01 through 08 are preprogrammed as described in Table 3–3. Selecting a message number in this group overwrites the existing message.

- Dial the message number (01 to 15). The Features Display shows:  
NOW ENTER MSG.

A message can contain both numbers and letters.

Telephone keypad keys 2 through 9 and \* have letters associated with them. These are printed above each key on the keypad.

- Press the key associated with the first character in the message. The first letter for that key appears on the Display. Repeated presses on the key cycle the Display through all the characters for that key, including its number. When the displayed character is correct, press the NEXT softkey.
- Repeat the above step for the remaining characters in the message.

To enter a space, press the NEXT softkey twice.

Some punctuation is provided. For the apostrophe, press the \* key three times; for the period, press the \* key four times.

Use the ← softkey to backspace to clear an incorrect entry. To cancel the entire procedure before the message has been saved, press the EXIT softkey.

- When the message is complete, press the SAVE softkey.

### Activating an Advisory Message from a *SUPERSET 420* Telephone

To Activate a Pre-programmed Advisory Message:

- Press the Superkey key, to select the programmable features menu. Feature title CALL FORWARDING appears on display.
- Press the No softkey, to step forward to ADVISORY MSGS? feature.
- Press the Yes softkey.

- Press the Select softkey.
- Press the Next softkey until the appropriate message is displayed.
- Press the On softkey, to activate the displayed message.

To De-activate a Pre-programmed Advisory Message:

- Press the Superkey key, to select the programmable features menu. Feature title CALL FORWARDING appears on display.
- Press the No softkey, to step forward to ADVISORY MSGS? feature.
- Press the Yes softkey.
- Press the Select softkey.
- Press the Next softkey until the appropriate message is displayed.
- Press the Off softkey, to de-activate the displayed message.

To Write an Advisory Message:

- Press the Superkey key, to select the programmable features menu. The CALL FORWARDING feature appears on display.
- Press the No softkey, to step forward to ADVISORY MSGS? feature.
- Press the Yes softkey.
- Press the Program softkey. Prompt DIAL IN MESSAGE appears on the display.
- Enter from dial pad, the number of the message to be added or changed, using alphanumeric keys and direction softkeys as required. The alphanumeric key designations are:

1	!/?%	7	pqrs
2	abc	8	tuv
3	def	9	wxyz
4	ghi	0	@&\$
5	jkl	*	"_
6	mno	#	./#

**Note:** Messages 01 through 08 are preprogrammed as described in Table 3-3.

If help is required, press the Help softkey.

For telephone keypad keys having three letters associated with them, to enter the first letter associated with a key, press the key once, to enter the second letter press the key twice, to enter the third letter press the key three times, to enter the number on that key press the key four times. For keypads having four letters, to enter the fourth letter press the key four times, and to enter the number press the key five times.

- Press Save softkey to save the message entered.

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## Messaging – Call Me Back

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**Description** This feature allows a *SUPERSET 3*, *SUPERSET 4*, *SUPERSET 410* or *SUPERSET 420* telephone user to send a message to a busy or unanswered set, requesting that the called party respond to the message sender. The Message Waiting indication takes the form of:

- a flashing indicator next to the Message key on *SUPERSET 410* and *SUPERSET 420* telephones
- a flashing MSG prompt on a *SUPERSET 4* telephone
- a flashing Message Waiting key on a *SUPERSET 3* telephone
- a flashing Message Waiting lamp on an ONS set.

On *SUPERSET 4* and *SUPERSET 420* telephones, the display shows the time of the call and the caller's name, if programmed (refer to the NAME feature in this Section). Messages can be read when the set is idle or during a call.

A *SUPERSET 3* set can be programmed with its third key line appearance as a Message Waiting feature key. The Message Waiting feature key is used to send a message to another set or to respond to a Call Me Back request.

Messages can be read when the set is idle or during a call.

- Conditions**
- Messages are canceled after 24 hours.
  - A message is canceled automatically if the sender and receiver have a telephone conversation before the message is read.
  - A message is cancelled automatically if its recipient sends a message to the message sender.
  - If the Message key on a *SUPERSET 3*, *SUPERSET 410* or *SUPERSET 420* telephone is pressed when there are no messages waiting, the key is ignored.
  - Although a *SUPERSET 4* telephone can be programmed with a Message Waiting feature key, the message INVALID is displayed on the set and reorder tone is received.
  - If a Message Waiting feature key is programmed for a key other than the third key line, error message E32, "SUPERSET Key Type Conflict", appears.

**Programming** To program a Message Waiting Key for a *SUPERSET 3* telephone:

Commands 401 → 480, *SUPERSET* Telephone Programming

- Set *SUPERSET* Telephone Key Number (fields a and b) to 03. This specifies the third key line appearance.

- Set Line Appearance Type (field c) to Message Waiting Key (line type 9). When the Message Waiting Key is selected in field c, fields d → i cannot be programmed.

## **Operation**      ***SUPERSET 410***

You can leave a message if the message indicator is lit during call set up. A slowly flashing indicator while the set is idle, indicates that a message is waiting.

To leave a message at another extension:

- Press the Message key when you receive busy tone or no answer. You can do this during regular calls, as well as during call transfer and conference call operations.

To respond to a message waiting signal at your extension:

- Lift the handset.
- Press the Message key. You ring the extension of the person who left the message.

To cancel a message waiting signal when busy or there is no answer:

- Press the Message key again. You leave a message at the extension and your message indicator turns off.

## ***SUPERSET 420***

You can leave a message if the message indicator is lit during a call. A slowly flashing lamp while the set is idle, indicates a message is waiting.

The *SUPERSET 420* provides messaging information on the Main Display.

To leave a message at another extension:

- Press the Message key when you receive busy tone or no answer. You can do this during regular calls, as well as during call transfer and conference call operations.

To respond to a message waiting signal at your extension:

- Press the Message key. The Main Display shows both message particulars and message handling options. Select message handling options through softkeys.

## ***SUPERSET 4 Telephone***

To Send a Call Me Back Message:

The extension number of a busy or unanswered set is dialed.

- Press the SEND MSG softkey.

The call is terminated and dial tone is returned. The called party's set displays the flashing MSG prompt.

To Receive a Call Me Back Message:

The flashing MSG prompt in the top right of the LCD indicates a message is waiting. The set is idle. To read the message:

- Press the MSG softkey. The display indicates the number of messages to be read.
- Press the READ MSG softkey. The display shows the first message.

If there are more messages, the NEXT softkey appears. Press it to read these messages.

If the set is engaged in a call, proceed as follows:

- Press the SELECT FEATURES feature key.
- Dial 4 (feature number 4 is message (4:MSG)).
- Press the READ MSG softkey. The message appears on the display.

If there are more messages, the NEXT softkey appears. Press it to read these messages.

To Clear a Message:

- After reading the message, press the CANCEL softkey, then press the EXIT softkey.

To Respond to the Call Me Back Request:

- Press the CALL softkey. The return call is made automatically.

### ***SUPERSET 3 Telephone***

To Send a Call Me Back Message:

The extension number of a busy or unanswered set is dialed.

- Press the Message Waiting feature key.

The call is terminated and dial tone is returned. The called party's set flashes with the appropriate Message Waiting indication.

To Respond to a Call Me Back Message:

The Message Waiting feature key flashes indicating that there is a message waiting. The set is idle. To respond to the message:

- Press the flashing Message Waiting feature key or dial the ONS Message Waiting Callback code (default is 65). The sender of first (oldest) message is dialed. If the sender does not answer the call (i.e., No Answer, Busy or Do Not Disturb), press the Message Waiting feature key again to call the

next sender in the message queue. The Message Waiting feature key continues to flash until there are no more messages to be read.

To Respond to the Next Message:

- Press the flashing Message Waiting feature key or dial 65. The sender of the next message is dialed. Repeat until the Message Waiting feature key stops flashing and reorder tone is heard, indicating that the end of the message queue has been reached.

To Cancel the Call Me Back Message:

- If Message Waiting Automatic Cancel (Command 100, Register 12, field f) is enabled for the set, message waiting is cancelled automatically once the sender and recipient have a telephone conversation.
- If Message Waiting Automatic Cancel (Command 100, Register 12, field f) is disabled, dial the Cancel All Message Waiting Indications code (default is 66).
- If the Attendant or an Auxiliary attendant send the message, the console can cancel the message.

### **ONS Set**

To Send a Call Me Back Message:

- Dial the send message access code. Default is 76.
- Dial the extension to which the message is to be sent.
- Dial tone is returned, hang up.

To Respond to a Call Me Back Message:

The Message Waiting indicator lamp flashes indicating that there is a message waiting. The set is idle. To respond to the message:

- Dial the ONS Message Waiting Callback code (default is 65). The sender of first (oldest) message is dialed. If the sender does not answer the call (i.e., No Answer, Busy or Do Not Disturb), dial 65 again to call the next sender in the message queue. The Message Waiting lamp continues to flash until there are no more messages to be read.

To Respond to the Next Message:

- Dial 65. The sender of the next message is dialed. Repeat until the Message Waiting indicator lamp stops flashing and reorder tone is heard, indicating that the end of the message queue has been reached.

To Cancel the Call Me Back Message:

- If Message Waiting Automatic Cancel (Command 100, Register 12, field f) is enabled for the set, message waiting is cancelled automatically once the sender and recipient have a telephone conversation.

- If Message Waiting Automatic Cancel (Command 100, Register 12, field f) is disabled, dial the Cancel All Message Waiting Indications code (default is 66).
- If the Attendant or an Auxiliary attendant send the message, the console can cancel the message.

## Meter Pulse Collection

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**Description** Meter pulses are often used to calculate the cost of outgoing trunk calls thus allowing the call to be charged back to the originator. The system can be set up to detect and collect certain types of meter pulses sent to a trunk circuit during outgoing calls; these are then recorded in the trunk's SMDR reports. Types of meter pulses which can be detected by the PABX without additional hardware include:

- Tip-Ring reversals
- M&MM lead signalling

Refer to Practice 9104-091-200-NA, Shipping, Receiving and Installation, for location of correct leads and proper interface to the sending equipment.

Other types of meter pulses common in the telephone industry include 50 Hz, 12 kHz, and 16 kHz type pulses. Detection of these types requires the addition of an external interface which converts the pulses to a ground signal which is then applied to the M or MM lead for the LS/GS trunks (for LS/GS trunks, -48 Vdc must be applied to the other lead so that when the ground is applied to the M or MM lead, current flows through the circuit and gets detected as a pulse).

This feature is associated with the *Message Registration* feature.

**Conditions** The following conditions apply to this feature:

- The PABX can only detect and collect the types of meter pulses identified above.
- The trunk must provide answer supervision. This is counted as the first meter pulse.
- The system can record a maximum of 9998 pulses.
- Pulses are always recorded regardless of what is happening to the trunk (hold, talking etc.).

**Programming** Command 100, System Options, Register 14:

- Set Record Meter Pulses (field d) to 1 (Enable).

**Operation** As meter pulses are received, they are collected by the PABX and reported in the trunk's SMDR record. When message register is in use the station message register is incremented accordingly as meter pulses are received from the telco.

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## Microphone On/Off

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- Description** The MIC ON/OFF feature key on the *SUPERSET 4* telephone and the microphone mute key on the *SUPERSET 3* turns off the microphone during Handsfree operation to prevent transmission of local sound, or to improve reception when the set is installed in a noisy environment.
- The Microphone on the *SUPERSET 410* and *SUPERSET 420* telephones is turned on by the system software when a handsfree call is activated. Successive operation of the Microphone key toggles the microphone On and Off.
- An indicator (solid red) adjacent to the Microphone key is lit when the microphone is on.
- Conditions**
- On the *SUPERSET 4* telephone, **MIC ON** shows at the right of the display while the microphone is on.
- Operation**
- SUPERSET 3* and *SUPERSET 4* Telephones**
- Press the SPEAKER ON/OFF feature key. On *SUPERSET 4* telephones the display shows **MIC ON**.
  - Press the MIC ON/OFF feature key. The microphone is now OFF. On *SUPERSET 4* telephones the **MIC ON** indication disappears.
  - Press the MIC ON/OFF feature key again. The microphone is now ON. On *SUPERSET 4* telephones the display shows **MIC ON**.
- SUPERSET 410* and *SUPERSET 420* Telephones**
- Press the Microphone key to turn off the microphone for privacy.
  - Press the Microphone key to turn on the microphone for handsfree operation.

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## Mixed Station Dialing

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**Description** This feature permits simultaneous use of rotary and DTMF telephones on ONS Lines. The SX-50 system provides five DTMF receivers. All station features, except those requiring the user to dial \* or #, are available to both types of telephones.

**Conditions** None.

**Programming** None.

**Operation** None.

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## Multiple Line Appearances (Key Line/Multicall Line)

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**Description** The *SUPERSET 4* telephone can have up to fourteen appearances of key and/or Multicall Lines. The *SUPERSET 3* telephone can have up to two appearances of key and/or Multicall Lines. The *SUPERSET 410* telephone can have up to five appearances of key and/or Multicall Lines. The *SUPERSET 420* telephone can have up to twelve appearances of key and/or Multicall Lines.

### Key Lines

Key Lines are appearances of single line set lines, *SUPERSET* Prime Lines, or other Key Lines. A *SUPERSET 4* or *SUPERSET 420* telephone with a Key Line appearance of another set's Prime Line can answer calls destined for that set.

The same Key Line can appear on several *SUPERSET* telephones. However, there is complete privacy. When the line is in use, all other appearances of that line on other sets become busy and cannot be accessed. For another party to access a busy Key Line the call must be put on hold or the line user must activate the Privacy Release feature (*SUPERSET 4* or *SUPERSET 420* telephone only).

Key Lines can be programmed to ring the *SUPERSET* telephone immediately, after a delay, or not at all. Also, Key Lines can be programmed as incoming only or outgoing only.

### Multicall Lines

Multicall Lines are similar to Key Lines. They are appearances of single line set lines, *SUPERSET* Prime Lines, or other Multicall Lines.

The user has automatic call privacy on Multicall Lines. When someone is using a Multicall Line, anyone else with an appearance of that Multicall Line can access the line and originate a call. If a Multicall Line is placed on hold, no other appearance can take the line off hold. A *SUPERSET 4* or *SUPERSET 420* telephone can have several Multicall Lines. All other appearances of the line are free when some Multicall Lines are busy.

Multicall Lines can be programmed to ring the *SUPERSET* telephone immediately, after a delay, or not at all. Also, Multicall Lines can be programmed as incoming only or outgoing only.

- Conditions**
- An ONS or OPS line or *SUPERSET* prime line can have either Key line or Multicall line appearances, not both.
  - Only one set can use the Key line Appearance at one time.

- Operation**
- To select the Key or Multicall Line:
- Go off-hook, unless Handsfree operation is desired.
  - Press the Line Select key associated with the required line.

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## Music On Hold

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**Description** A customer-provided music source can be connected to the *SX-50* system in one of two ways: by a Music on Hold/Pager Module mounted on the Universal Card, or by the 6-pin connector jack to the Music/Pager circuit on Control Card 2 (MCC2) (MS53/MS54 software and above). Music on Hold is provided for trunk calls held by the *SUPERSET* red Hold button and the Call Hold (Attendant), Camp-On, and Call Hold (Extensions) features.

- Conditions**
- If Control Card MCC2 is not installed, a Music on Hold/Pager Module must be installed on the Universal Card.
  - If both a Music on Hold/Pager Module and the Control Card 2 (MCC2) are installed on the *SX-50* system, the Music on Hold feature is handled by the Control Card 2 (MCC2).
  - If music is not provided, trunk calls on hold hear silence.
  - Music on Hold is provided for trunk calls only.
  - Music on Hold is not provided for calls put on Consultation Hold by extensions.
  - If a channel is not available for the music channel, then the feature is temporarily disabled.
  - Only one system channel is used regardless of the number of calls placed on hold. For example, seven calls could be placed on the Music-on-Hold channel.

**Programming** Command 100, System Options, Register 09, Features Selection 1:

- Music on Hold (field f) must be set to 1 (Enable). Default is 0 (Disable).

**Operation** None.

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**Name (Extension)**

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- Description**     *SUPERSET 4* or *SUPERSET 420* users can store their names in the set for identification to other *SUPERSET 4* or *SUPERSET 420* users or the Attendant. When names are not programmed, the called and calling parties are identified on displays by the Prime Line number only.
- A name can also be stored by a *SUPERSET 4* or *SUPERSET 420* telephone for a *SUPERSET 3* or *SUPERSET 410* user. This allows the *SUPERSET 3* or *SUPERSET 410* user to be identified by name on the displays of called and calling parties.
- Conditions**     None.
- Programming**   ***SUPERSET 3* and *SUPERSET 4* Telephones**
- To Set Up or Modify a Name on a *SUPERSET 4* :
- Press the PROGRAM softkey.
  - Press the NAME softkey. The display shows  
**DIAL IN NAME**
- Telephone keypad keys 1 through 9, # and \* have characters associated with them. These are printed above each key on the keypad.
- Press the key associated with the first letter in the name. The first letter for that key appears on the Display. Repeated presses on the key cycle the Display through all the characters for that key, including its number. When the displayed character is correct, press the NEXT softkey.
  - Repeat the above step for the remaining letters in the name.
- To enter a space, press the NEXT softkey twice.
- Use the ← softkey to backspace to clear an incorrect entry. To cancel the entire procedure before the name has been saved, press the EXIT softkey.
- When the name is complete, press the SAVE softkey.
- To View the Set's Name:
- Press the DISPLAY feature key.
  - Press the NAME softkey.
  - The Features Display shows the currently saved name.
- To Program a Name for a *SUPERSET 3* Telephone:
- Connect a *SUPERSET 4* telephone at the desired *SUPERSET 3* telephone's jack.

- Program the name as described above.
- Switch the set to a *SUPERSET 3* telephone.

### ***SUPERSET 420 and SUPERSET 410* Telephones**

To Set Up or Modify a Name on a *SUPERSET 420* :

- Press the Superkey key, to select the programmable features menu. Feature title CALL FORWARDING appears on display.
- Press the No softkey, to step forward to the NAME? feature.
- Press the Yes softkey, to select NAME feature menu.
- Press the Change softkey. Prompt DIAL IN NAME appears on display.
- Enter name from dialpad keys, and use direction softkeys as required. Character designations for each dialpad key are:

1	!/?%	7	pqrs
2	abc	8	tuv
3	def	9	wxyz
4	ghi	0	@&\$
5	jkl	*	"_
6	mno	#	./#

If help is required, press the Help softkey.

For telephone dialpad keys having three additional characters associated with them, to enter the first letter associated with a key, press the key once, to enter the second character press the key twice, to enter the third character press the key three times, to enter the number on that key press the key four times. For dialpad keys having four additional characters, to enter the fourth character press the key four times, and to enter the number press the key five times.

- Press Save softkey to save the name entered.

To View the Current Name:

- Press the Softkey key, to select the programmable features menu. Feature title ACCOUNT CODE? appears on display.
- Press the No softkey to move forward to NAME feature.
- Press the Yes softkey to select NAME feature menu. The name appears on the display.

To Program a Name for a *SUPERSET 410* Telephone:

- Temporarily disconnect the *SUPERSET 410* telephone to be programmed from the telephone jack and replace it with a *SUPERSET 420* telephone.
- Program the name as described above.

- After programming is complete, remove the *SUPERSET 420* telephone from the telephone jack and reconnect the *SUPERSET 410* telephone.

**Operation**

From a *SUPERSET 4* or *SUPERSET 420* telephone, call an extension set that has an LCD display. Your number and name appear on the called party's display. If the called party has a name programmed, it appears briefly on your display.

From a *SUPERSET 3* or *SUPERSET 410* telephone, call an extension set that has an LCD display. Your name and number appear on the called party's display.

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## New Call Tone

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**Description** When a *SUPERSET* user is engaged in a call, an incoming call on another line rings with just a single burst of ringing tone. The appropriate Line Status indicator flashes.

- Conditions**
- The *SUPERSET* telephone must have at least one line appearance in addition to its prime line.
  - Delay Ring line appearances provide New Call Tone after the programmed delay.
  - No Ring line appearances provide no New Call Tone.

**Operation** None.

---

## Night/Day Switching

---

**Description** The Attendant Console, Auxiliary Attendant or Test Line can put the SX-50 system into Night or Day service.

**Conditions** None.

**Programming** **Attendant Console**

By default, the Attendant Console has Function Key 14 programmed as a NIGHT key. To program this function on some other key:

Command 185, Register = Key number:

- Set field c,d to 12.

**Auxiliary Attendant – SUPERSET 4 Telephone**

If the Auxiliary Attendant set does not have a NIGHT function key:

- Press the PROGRAM softkey.
- Press the SELECT FEATURES key. The LCD shows **FUNCTIONS...** for 3 seconds, then **PRESS A S/C KEY**.
- Press a Speed Call key. The adjacent LCD indicator shows a light circle in a dark square. The set display shows **DIAL FEATURE NO**.
- Dial 12.
- Press the SAVE softkey.

**Auxiliary Attendant – SUPERSET 420 Telephone**

- Press the Superkey key, to select the programmable features menu. The ACCOUNT CODE? feature appears on display.
- Press the No softkey, to step forward to PERSONAL KEYS? feature.
- Press the Yes softkey. Prompt PRESS A S/C KEY appears on display.
- Press a Line Appearance (Speed Call) key.
- Press the Change softkey. Prompt SPEED CALL? appears on display.
- Press the No softkey. Prompt ATT FUNC KEYS? appears on display.
- Press the Yes softkey. Prompt DIAL FEATURE NO. appears on display.
- Enter 12 from dial pad, and use direction softkeys as required. If help is required, press the Help softkey.
- Press Save softkey, to save the name entered.

## Operation      **Attendant Console**

At the Attendant Console:

- Press the NIGHT function key.

The display shows **NIGHT** if the system has switched to Night Service. Time and date are displayed if the system has switched to Day Service. Each press of the key switches the system to the opposite type of service.

If the Console has no NIGHT key programmed, follow the procedure given for the Test Line.

### **Auxiliary Attendant**

At the Auxiliary Attendant set:

- Press the NIGHT SERVICE function key (appropriate line key).

The display briefly shows **NIGHT** if the system has switched to Night Service. Time and date are displayed if the system has switched to Day Service. During Night Service, the Line Status Indicator associated with the NIGHT SERVICE key shows a black square (black triangle on *SUPERSET 410* and *SUPERSET 420* telephones). Each press of the key switches the system to the opposite type of service. The display returns to normal in 3 seconds.

If the Console or Auxiliary Attendant has no NIGHT key programmed, follow the procedure given for the Test Line.

### **Test Line**

To put the system into Night Service:

- Dial 71 or \*
- Dial 11.

To put the system into Day Service:

- Dial 71 or \*
- Dial 12.

---

## Off-Premises Extensions

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- Description** The SX-50 System supports, via the Off Premises (OPS) Line Card, the connection of standard telephone sets via wiring that goes outside the building housing the PABX. OPS extensions are otherwise similar to ONS extensions.
- Conditions** None.
- Programming** Commands 301 → 310, Extension Programming, Registers 1 → 16:
- Set Off-Premise Loop Length (field h) to 0 (Short) (under 2 Km) or 1 (Long), as required.
- Note:** Only odd-numbered circuits (registers) are valid for OPS extensions.
- Commands 341 → 350, Extension Memberships – Block Programming:
- Set Off-Premise Loop Length (field h) to 0 (Short) (under 2 Km) or 1 (Long), as required.

---

## Originate Only Extensions

---

- Description** An extension programmed with this Class Of Service (COS) option can originate calls, but cannot receive any calls. Calls dialed to this extension receive reorder tone.
- Conditions**
- Originate Only and Automatic Callback are mutually exclusive.
- Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 2:
- Set Call Direction (field c) to 0 (Originate Only). Default is 1 (Bothway Calling).
- Operation** None.

---

**Overflow**

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**Description** When the Overflow feature is activated, LDN calls or Dial 0 calls to the Attendant Console that are not answered either immediately, or within a defined time-out period, can be routed to a preprogrammed answer point, called the Overflow Point. This feature ensures that all calls directed to the Attendant Console are answered, even if the Attendant is busy.

The Overflow Point can be an extension, Night Bells, a hunt group or a ring group.

**AUTOMATIC SWITCHING TO OVERFLOW TIMEOUT:**

The Overflow Timer is used for automatic switching into overflow or night service. The timer runs whether the console is busy or not. If there are calls in the console queue, the timer restarts each time an LDN key, Dial O key, RECALL key or ANSWER key is pressed. When automatic switching to night service is selected the call is routed to the night answer point selected in trunk programming.

**Conditions**

- The call causing the system to switch into night service, remains at the console.
- Recalls are not routed to the Overflow Point unless night bells are chosen as the Overflow Point.
- An extension cannot place a call on Consultation Hold and then answer an Overflow call.
- Rerouted calls are allowed to camp on to the Overflow Point, unless the Overflow Point is a ring group.
- One Overflow Point is programmed for both day service and night service.
- If Night Bell is disabled, calls ring the Attendant Console only.
- The night bell circuit can support up to five standard ringers.
- If an extension is programmed as the Overflow Point, and the extension has Do Not Disturb enabled, Do Not Disturb is ignored. Overflow calls will ring at the set.
- If the Overflow Point has Camp On enabled, the entire console queue camps on to the Overflow Point. This queue cannot be recalled to the Attendant by restoring the system to normal service.
- If the Overflow Point does not have Camp On enabled, only the first call in the queue will ring the Overflow Point.

- If the Attendant restores the system to normal service before the console queue is emptied, the remaining calls stay in the console queue.
- TAFAS will not work unless Overflow is enabled.

**Programming** Command 100, System Options, Register 08, Overflow Control:

- Set Overflow Mode In Day Service (field c) to 1 (Immediate Switching to Overflow), 2 (Automatic Switching To Overflow After Time-out), or 3 (Automatic Switching to Night Service). Default is 2.
- Set Overflow Mode In Night Service (field d) to 1 (Immediate Switching to Overflow) or 2 (Automatic Switching to Overflow After Time-out), as desired. Default is 0.
- Set Automatic Switching to Overflow Time-out (field e) to the desired time (1 → 7 x 10 seconds). Default is 3 (30 seconds).
- To route internal calls (Dial 0) to the Overflow Point, set Internal Calls to Console Routed to Overflow (field f) to 1 (Enable During Day Service), 2 (Enable During Night Service) or 3 (Enable During Both Day and Night Service), as desired. Default is 2. A setting of 0 will allow internal calls to ring the console only.
- Assign an Overflow Point (fields g,h,i). Default is 000 (Night Bell).

**Operation** Incoming Call to Overflow Point:

- Press appropriate LDN key, DIAL 0 key, RECALL key or ANSWER key.
- Incoming calls to the Overflow Point will ring the same as DIL calls, and should be answered in the same manner.

Incoming Call to Night Bells:

- Refer to TRUNK ANSWER FROM ANY STATION (TAFAS) in this Section.

---

**Paging Access**

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**Description** Paging Access to customer-provided paging equipment is provided in one of two ways: by a Music on Hold/Pager Module mounted on the Universal Card, or by the 6-pin connector jack to the Music/Pager circuit on Control Card 2 (MCC2).

- Conditions**
- If Control Card MCC2 is not installed, a Music on Hold/Pager Module must be installed on the Universal Card.
  - If both a Music on Hold/Pager Module and the Control Card 2 (MCC2) are installed on the SX-50 system, Paging Access is handled by the Control Card 2 (MCC2). A Universal Card with a Music on Hold/Pager Module must be installed for pre MS53/MS54 software.
  - When a DISA Trunk accesses the Paging equipment, Disconnect Supervision must be provided by the CO to ensure that the DISA Trunk is dropped at the end of the page announcement.
  - The Attendant can override and disconnect any extension using the Paging equipment.

**Programming** Command 110, Feature Access Codes, Register 02:

- Assign required 1-, 2- 3- or 4-digit Paging Access Code. Default access code is 50.

Commands 121 → 129, COS 1 → COS 9 Programming, Register 3:

- Paging Access (field c) must be set to 1 (Enable). Default is 1.

Commands 501 → 580 Trunks 01 → 80, Trunk Programming, Register 2:

- Set Disconnect Supervision Guaranteed? (field c) to 1 (Yes). Default is 0 (No).

**Operation** **Attendant Console**

- Press and hold down the PAGE key – the LCD displays the **PAGER** flag and the Attendant Console is connected to the Paging equipment.
- Make the announcement.
- At the end of the announcement, release the PAGE key – the Attendant Console disconnects from the Paging equipment.

***SUPERSET 3, ONS and OPS Telephones***

- Lift the handset – dial tone is returned.
- Dial the Paging Access Code.

- Warning tone is heard – the extension is connected to the Paging equipment.
- Make the announcement.
- At the end of the announcement, replace the handset.

***SUPERSET 4 Telephone***

- Go off-hook by lifting the receiver.
- Press and hold down the PAGE softkey – the user hears a short burst of tone, and then connects to the paging system.
- Make the required announcement.
- Release the PAGE softkey. Go on-hook.

***SUPERSET 420 Telephone***

- Go off-hook, by lifting the handset.
- Press the Page softkey. The user hears a short tone, indicating that the telephone is connected to the paging system.
- Make the required announcement.
- Return the handset to the on-hook state.

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## Partial Flash Inhibit

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- Description** A switchhook bounce while hanging up can accidentally leave a trunk on consultation hold. This generates undesirable recall traffic, commonly known as “Phantom Ringback”. The Partial Flash Inhibit option prevents this; on a trunk call, a flash followed by hang-up will cause the system to drop the call.
- Conditions**
- Partial Flash Inhibit does not affect normal operation of features requiring a switchhook flash, such as Call Transfer and Call Hold.
- Programming** Command 100, System Options, Register 6, Station Attributes:
- Set Partial Flash Inhibit, (field e), to 1 (Enable). Default is 0 (Disable).
- Operation** None.

---

## Personal Outgoing Line

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- Description** This feature enables a *SUPERSET 4*, *SUPERSET 410*, or *SUPERSET 420* telephone user to access a specific trunk directly via a Line Select key. This line can be used for outgoing calls.
- Conditions**
- Conversations on the Personal Outgoing line are private, but a call on a Personal Outgoing line can be transferred, conferenced, swapped or split.
  - While the Personal Outgoing line is in use, the set is inaccessible (busy) to all other sets.
- Programming** Commands 401 → 480, *SUPERSET* Telephone 01 → 80 Programming, Register = Line Key Number:
- Line type must be set to Personal Outgoing Line (field c = 7). When the line type is set to 7, fields d → g are set automatically to 00, plus the extension number.
- Operation**
- Lift the handset.
  - Select the Personal Outgoing line key – dial tone is returned.
  - Dial the Trunk Group Access code.
  - Dial the desired access code or directory number.

---

## Pickup Groups

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**Description** This feature assigns an extension to a Pickup Group and permits the extension to answer any call directed to any extension in that Pickup Group by dialing the Dial Call Pickup Access Code.

**Conditions**

- A maximum of seven Pickup Groups are permitted per system.
- This feature cannot be originated by an extension with a call on Consultation Hold. In this case, if a pickup is attempted, then the originating extension receives reorder tone and must flash the switchhook to return to the held call.

**Programming** Command 110, Feature Access Codes, Register 06:

- Assign the Dial Call Pickup Access Code. Default is 54.

Commands 301 → 310, Slots 1 → 10, Extension Programming:

- Assign the Pickup Group (field f) (1 → 7). Default is 1 (Pickup Group 1).

**Operation**

- Refer to CALL PICKUP in this Section.

---

## Power Failure Restart

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**Description** Customer data is stored in the Random Access Memory (RAM). In the event of a commercial power failure, this data is preserved by a Lithium Battery. Refer to CDE BATTERY BACKUP in this Section. The SX-50 system automatically returns to normal operation when commercial power is restored. The correct date is maintained, however, the time flashes at the time that power went down.

**Conditions** None.

**Programming** None.

**Operation**

- Refer to the Attendant Console User Guide, PN 9104-953-101-NA.

---

## Power Failure Transfer

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- Description** Each LS/GS Trunk Card provides two Power Failure Transfer (PFT) circuits. In the event of a commercial power failure, these circuits transfer the CO trunks to extensions that were selected during the installation process. Refer to Section 9104-091-200-NA, Shipping, Receiving and Installation Information for wiring details.
- Conditions**
- Each LS/GS Trunk Card (4 Trunks or 8 Trunks) has two PFT circuits.
  - If the CO trunks are ground start trunks, the extensions must be equipped with a ground start key, or a ground start/loop converter.
  - *SUPERSET 3*, *SUPERSET 4*, *SUPERSET 410*, and *SUPERSET 420* telephones must NOT be used for power failure transfer.
- Programming** None.
- Operation** None.

---

**Printer Port**

---

**Description** An external printer can be connected to the DPABX via the RS-232 port (Printer Port). Features using the printer include:

- Room Status
- Alarms
- SMDR (programmable)
- Automatic Wake-Up (programmable)
- Message Register Audit (programmable)
- Data Dump/Load (requires System Security Code).

The SX-50 DPABX monitors RTS (pin 4) from the printer. An ON condition (+V), indicates that the printer is ready to receive data and an OFF condition (-V), indicates that the printer is not ready to receive (i.e., paper out, buffer full or no ribbon). Note that XON, XOFF and DTR are not monitored. For most applications the following configuration of pins is sufficient:

1 - 1  
3 - 3  
4 - 4  
7 - 7

However, a standard 25-pin RS-232 cable will also function properly.

**Conditions** • The printer can be suspended, released or have its queues purged by using Attendant Function 75 (refer to Operation).

**Programming** Command 100, System Options, Register 16, Printer Control:

- If a Data Demultiplexer is installed (refer to Data Demultiplexer in this Section), set Data Demultiplexer Enable (field c) to 1 (Enable). Default is 0 (Disable).
- Select the Printer Baud Rate (field d). Valid entries are: 0 = 110 Baud, 1 = 150 Baud, 2 = 300 Baud, 3 = 600 Baud, 4 = 1200 Baud, 5 = 1800 Baud, 6 = 2400 Baud, 7 = 4800 Baud and 8 = 9600 Baud. Default is 4 (1200 Baud).
- Printer Parity (field e) must be set to 0 (No Parity), 1 (Odd Parity) or 2 (Even Parity). Default is No Parity.
- Printer Number of Tx Bits (field f) must be specified as 5 → 8 Tx Bits. Default is 8 Tx Bits.
- Printer Number of Stop Bits (field g) must be specified as 1 or 2. Default is 1 stop bit.

- Printer Slow Carriage Return Option (field h) must be set to 0 (Disable) or 1 (Output 6 Nulls at End-of-Line). Default is 0.

## Operation

- Connect the printer to the RS-232 Port (Printer Port) on the Control Card/Control Card 2 (MCC2). Refer to Section 9104-091-200-NA, Shipping, Receiving and Installation Information.

### To Suspend the Printer:

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 75 and \*.
- The printer is suspended. When the printer is suspended, SMDR and Automatic Wake-Up could fill up the queues for the printer.
- If the Printer Queue is full, no trunk calls requiring SMDR are permitted and no Automatic Wake-up calls are made. Also, the system raises an alarm to indicate that the Printer Queue is full.

### To Resume Printing:

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 75 and #.
- The printer continues printing where it left off and prints records found in the Printer Queue.

### To Suspend the Printer and Purge the Queues:

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 75 and 0.
- The system purges the Printer Queue and suspends the printer.

---

## Privacy Release

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**Description** Several *SUPERSET* telephones can have appearances of the same line. However, conversations on these line appearances are private; another set with an appearance of the same line cannot enter the conversation. If required, a *SUPERSET 4* or *SUPERSET 420* telephone using the line can permit other appearances to join the conversation by activating the Privacy Release feature.

**Conditions**

- Privacy Release is effective only on *SUPERSET* line appearances. It has no effect on Executive Busy Override.

**Operation** ***SUPERSET 4* Telephones**

During an established call:

- Press the PRIVACY REL softkey.

Another *SUPERSET* user with an appearance of the same line can now enter the conversation by pressing the appropriate Line Select key.

***SUPERSET 420* Telephones**

During an established call:

- Press the Superkey key, to select the programmable features menu. The CALL FORWARDING feature appears on display.
- Press the No softkey, to step forward to the LINE PRIVACY? feature.
- Press the Yes softkey. Prompt PRIVACY RELEASE appears on display.
- Press On/Off to select state desired.

---

## Programming

---

**Description** Programming the SX-50 DPABX consists of completing the required Installation Forms, loading the Default Data and then entering the required Command Number and data from the Attendant Console, Auxiliary Attendant, Test Line or RMATS. Refer to TEST LINE in this Section.

The installer sets a System Security Code for each system installed which permits modification of the entire system database. Refer to SYSTEM SECURITY CODE PROGRAMMING in this Section. The customer can modify parts of the system database by using the User Security Code. Refer to USER SECURITY CODE PROGRAMMING in this Section.

The following is a brief description of available functions for editing the Customer Database from the Attendant Console or the Test Line. For details, refer to Section 9104-091-210-NA, Customer Data Entry.

Pressing the ENTER softkey on the Attendant Console at the Command Level accesses the Register Level.

Pressing the EXIT softkey on the Attendant Console exits CDE Mode (or Display Mode) and returns the system to Call Processing Mode. Replacing the handset at the Test Line also exits CDE Mode.

Pressing the QUIT softkey on the Test Line returns control to the Command Level when data is being displayed.

At the Command Level, pressing the FWD softkey on the Test Line or pressing the NEXT softkey on the Attendant Console advances the system to the next register in the Command. When the last register in the command is reached, the softkey no longer appears.

Pressing the → softkey on the Attendant Console moves the pointer one field location to the right.

When a programming error occurs, pressing the CANCEL softkey on the Test Line (or pressing the QUIT softkey on the Attendant Console) restores the previous contents of the register.

### Conditions

- The Programming Access Code defaults to 70 or #. However, if # is used for Last Number Redial, then 70 must be used to access Programming Mode. Refer to LAST NUMBER REDIAL in this Section.
- When the User Security Code is dialed, only the information detailed in User Programming Access (Command Number 180) can be changed.
- The user can NEVER view the System Security Code or Load Default Data (#998) when using the User Security Code.

- Refer to Section 9104–091–210–NA, Customer Data Entry, for programming details.

**Programming** • Refer to Section 9104–091–210–NA, Customer Data Entry.

**Operation** To Enter Programming Mode at the Console:

- Press the STATUS key once and hold – the LCD displays *SX–50* plus the software identity and revision levels (e.g., **MS54–MR0**).
- While holding down the STATUS key, dial the Security Code (default is 7772 for System Security Code and 1234 for User Security Code).
- If the correct code is entered, the word *SX–50* flashes.
- Release the STATUS key.
- Press # key within 10 seconds – the LCD displays **Command 100?**. The system is now in Programming Mode.

To Enter Programming Mode at the Test Line or Auxiliary Attendant:

- Press the # key. The display shows **ENTER CODE**.
- For read–only access, press the READ softkey instead of entering a security code.
- Dial the Security Code (default is 7772 for System Security Code and 1234 for User Security Code).
- If the correct code is entered, the LCD displays **Command 100?**. The system is now in programming mode.

To Exit Programming Mode:

- To exit from Programming Mode, press the EXIT softkey.

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## Recall

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**Description** The SX-50 system ensures calls that have been forwarded or put on hold are not forgotten. After a programmed time-out period, a held call or a forwarded call not yet answered recalls the last party that handled it.

A forwarded call not answered recalls the extension or Attendant that forwarded it. On the Attendant Console, the flashing RECALL softkey identifies a recall.

A forwarded Trunk call, unanswered or camped on and unanswered, recalls the extension or Attendant that forwarded it. When the Attendant Console or Auxiliary Attendant position answers a recall, its display shows the destination and the reason for the recall: no answer or busy.

Examples: Attendant Console

**TRK-33 TALK RCL BSY BILL SMITH** (busy, with programmed name)

**TRK-33 TALK RCL BSY EXT-2001** (busy, no programmed name)

**TRK-33 TALK RCL NA BILL SMITH** (no answer, with programmed name)

**TRK-33 TALK RCL NA EXT-2001** (no answer, no programmed name)

Examples: Auxiliary Attendant

**T 33 BSY 2001** (busy)

**T 33 NA 2001** (no answer)

The recall timers are as follows:

Timer	Range	Default
Timed Recall – Camp-on (Trunks)	10 → 70 seconds	30 seconds
Timed Recall – No Answer	10 → 70 seconds	30 seconds
Timed Recall – Call Hold (Extension)	1 → 4 minutes	3 minutes
Timed Recall – Call Hold (Attendant)	10 → 70 seconds	30 seconds

- Conditions**
- There is no recall for forwarded extensions that camp on to busy destinations. They remain camped-on until the destination is idle or the originator hangs up.
  - Trunk and Hold recalls ignore Do Not Disturb on extensions.

**Programming** Command 100, System Options Programming, Register 11, Time-out Selection:

- Set Timed Recall – Camp-on (Trunks) (field c) to 1 → 7 (10 → 70 seconds). Default is 3 (30 seconds).

- Set Timed Recall – No Answer (field d) to 1 → 7 (10 → 70 seconds). Default is 3 (30 seconds).
- Set Timed Recall – Call Hold (Extension) (field e) to 1 → 4 minutes. Default is 3 minutes.
- Set Timed Recall – Call Hold (Attendant) (field f) to 1 → 7 (10 → 70 seconds). Default is 3 (30 seconds).

**Operation**      None.

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## Remote Maintenance Administration And Test System (RMATS)

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**Description** RMATS provides the maintenance staff at a remote location with the ability to perform programming, Maintenance and Attendant Functions on the SX-50 system. The Attendant Console is not affected, thus the local attendant is not aware that the DPABX is being used by RMATS (unless the same facility that RMATS is currently using is used by the attendant).

- Conditions**
- Data Line Security is automatically enabled on RMATS DIL.
  - The Attendant Console can never be used to access RMATS.
  - Refer to Section 9104-091-301-NA, Remote Maintenance Administration and Test System (RMATS) for details.
  - Attendant Functions 16, 17, 18, 19, 73, 81, 82, 85, 91 and 92 are not available via RMATS.
  - The Test Line and the Console cannot access programming while RMATS is accessing programming.
  - Trunk access is not allowed during ARS programming if ARS is enabled.

**Programming** Command 100, System Options, Register 01:

- Set RMATS Protocol Selection (field d) to 0 (CCITT) or 1 (North American). Default is 1 (North American).

Command 110, Feature Access Codes, Register 26:

- Enter required RMATS Modem Access Code. Default is 498.

Command 192, RMATS Security Code Programming, Registers 1 and 2:

- Enter the required RMATS Security Code in fields b through f. Register 1 contains digits 1 through 5. Register 2 contains digits 6 through 10. Default is 0246813579.

If any trunk is used with RMATS during Day Service, program the following:

Commands 501 → 580, Trunk 01 → Trunk 80 Programming, Register 4:

- Set Day Answer Mode (field d) to 0 (Direct-In Line).
- Set Day Inward Dial Trunk Intercept Answer Point (fields e, f, g) to 168.

If a trunk is used with RMATS during Night Service, program the following:

Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 5:

- Set Night Answer Mode (field b) to 0 (Flexible Night Service).
- Set Night Inward Dial Trunk Intercept Answer Point (fields c, d, e) to 168.

**Operation**

- Refer to Section 9104-091-301-NA, Remote Maintenance Administration and Test System for a complete description.

---

## Restrictive Station Control

---

**Description** This feature temporarily restricts an extension from making outgoing trunk calls. Station-to-Station calls can be made in the normal manner, but an attempt to access a trunk results in the extension receiving reorder tone.

**Conditions**

- This feature works independently of the Room Status trunk barring feature. Restrictive Station Control does not change the room's trunk barring status (ALLOW or DENY), or vice versa. Restrictive Station Control should not be enabled if Room Status is enabled.

**Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 2:

- Message Registration/Restrictive Station Control (field f) must be set to 1 (Enable Restrictive Station Control Only) or 3 (Enable Both). Default is 0 (Disable Both).

**Operation** To Enable Restrictive Station Control:

- Dial the Attendant Function Access Code (default 71 or \*) or press the FUNCTION key.
- Dial Attendant Function 22, plus the number of the extension which requires restriction.
- Dial 9 – the LCD displays the extension number and **9999**.
- The extension is restricted.

To Disable Restrictive Station Control:

- Dial the Attendant Function Access Code (default 71 or \*) or press the FUNCTION key.
- Dial Attendant Function 22, plus the number of extension from which the restriction is being removed.
- Dial 0 – the LCD displays the extension, and **0000**.
- The extension is no longer restricted.

---

## Reversal Meaning

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- Description** This entry in Trunk Programming defines the interpretation of Tip-Ring reversal. A reversal is received from the CO and indicates answer supervision.
- Conditions**
- In all cases, reversal implies supervision from the CO.
- Programming** Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 2:
- If a reversal indicates an incoming call only, Reversal Meaning on Call Origination (field e) must be set to 1 (Incoming Call). Default is 0 (Not Incoming Call).
  - If the removal of a reversal indicates a disconnection, then set Disappearance of Reversal (field d) to 1 (means Disconnect). Default is 0 (is Ignored).
- Operation** None.

---

## Ring Group

---

- Description** This feature defines up to nine stations as a group. These stations are rung simultaneously when the group is accessed, hence the term Ring Group. The stations programmed into the Ring Group are called Ring Group members. There is only one Ring Group provided by the system and it is assigned a unique access code.
- Conditions**
- *SUPERSET* telephones cannot be members of a Ring Group.
  - The Ring Group can be assigned as a Day or Night Inward Dial Trunk Intercept Answer point (for DIL applications).
  - Call Forwarding is honoured if the station is called using its extension number; it is not honoured if the station is called via the Ring Group Access Code.
  - At any given time, there can only be one device allowed to camp on to the Ring Group when all Ring Group members are busy. In this case, a camp-on tone is applied onto the first member to indicate the situation.
  - Ensure only valid station numbers are programmed into the group. That is, ensure that there is a corresponding equipment number for that station number.
  - If a member set has Do Not Disturb enabled, the system treats it as busy.
- Programming** Command 110, Feature Access Codes, Register 25:
- Assign required 1-, 2-, 3 or 4-digit Ring Group Access Code. Default is 497.
- Command 381, Extension Ring Group Programming, Registers 1 → 9:
- Assign the required extension numbers (fields b, c, d, e) for the Ring Group in Registers 1 to 9.
- Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 4:
- If the Direct-In Line (DIL) is assigned to the Ring Group, set Day Inward Dial Trunk Intercept Answer Point (fields e, f, g) to 167 (Ring Group). Default is 001 (Station Equipment Number 001).
- Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 5:
- If the Direct-In Line is assigned to the Ring Group, set Night Inward Dial Trunk Intercept Answer Point (fields c, d, e) to 167 (Ring Group). Default is 001 (Station Equipment Number 001).

**Operation**

- All members of the Ring Group are rung when the Ring Group Access Code is dialed. Ringing is terminated when a member answers the call.
- If all members in the Ring Group are busy, the next caller camps on to the first member and hears ringback tone. Subsequent callers to the Ring Group receive busy tone (except for Direct-In Line, which routes directly to the Attendant Console).

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## Room Status

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**Description** The Room Status feature allows the Attendant Console (Reception) to view the current status of each Hotel/Motel room:

- Vacant or Occupied
- Clean or Not Clean
- Allowed or Denied trunk calls
- Maid In Room or,
- Out of Service

The maid or staff enters codes from the room extension to indicate that the room is being prepared, is available for guests or is out of service.

The front desk is responsible for:

- setting the Room Status to OCCUPIED or VACANT when appropriate.
- setting the Room Status to NOT CLEAN when appropriate.
- setting the Room Status to the appropriate level of call restrictions.
- restoring an Out of Service room to service.

Only the Attendant Console can perform these operations.

- Conditions**
- The Room Status function is not available from the Auxiliary Attendant or RMATS.
  - Room Status does not affect the Automatic Wake-up, Call Block, Message Waiting or Message Registration features.
  - After room status is enabled, all rooms show vacant/clean/deny with no maid present.
  - When a room is vacant or out of service, all calls are denied except to the Attendant. Reorder tone is returned to all denied calls.
  - Maid in Room status can be changed only from the room extension, using the Maid in Room Access Code.
  - The latest Maid in Room status entered at a room extension supercedes the previous entered status.
  - The VACANT or OCCUPIED status of the room can be changed from the Attendant Console position only.
  - Only the Attendant Console can set a room's status to NOT CLEAN.
  - Only the Attendant Console can restore an Out of Service room to service.
  - All Room Status information is retained after a power failure.

- At midnight, all OCCUPIED rooms are set to NOT CLEAN.

**Programming** Command 100, System Options, Register 10:

- Set Room Status Print Out (field i) to 1 (enable) if Room Status printout capability is required. Default is 0 (disable).

Command 110, Feature Access Codes, Register 31, Fields c,d,e,f:

- Assign a Maid In Room Access Code. Default is 747.

Commands 121 → 129, Class of Service programming, Register 3:

- Set Room Status (field i) to 1 (enable) for all sets used as hotel/motel room phones. Default is 0 (disable).

Command 185, Function Key Programming, Register = Key Number (01 → 14):

- Set Function code to 16 (Room Status).

Commands 301 → 310, Extension Programming:

- Set ARS Routing Class of Service (field g) to Attendant-Selectable RCS.

## Operation

### General

If a room is In Service, 4 states comprise its status:

- VACANT or OCCUPIED
- CLEAN or NOT CLEAN
- ALLOW or DENY (outgoing trunk calls)
- MAID or (blank)

e.g., VACANT/NOT CLEAN/DENY/MAID or OCCUPIED/CLEAN/ALLOW

**Note:** The MAID state can be changed from the room phone only.

If a room's status is OUT OF SERVICE, the 4 states described above do not apply.

If a Room Status function key is not programmed:

- Press the FUNCTION key or dial \* or dial 71
- Dial 81.

### Display or Change Status of a Room:

At the Attendant Console:

- Press the ROOM STATUS function key. The display shows **ROOM STATUS EXT - ?**.

- Enter the desired extension number. The display shows (example):

```
EXT – 1600 OCCUPIED/NOT-CLN/ALLOW
VACANT CLEAN OUT-SERV TRK-BAR NEW-EXT
```

The first 3 softkeys are opposite in state to the room's status. When pressed, a softkey changes the Room Status message to the new state and takes on the old one. For example, if the room is VACANT, an OCCUP (Occupied) softkey appears. When the softkey is pressed, the room becomes OCCUPIED and the softkey becomes VACANT.

Pressing the TRK BAR softkey causes the trunk call state to alternate between ALLOW and DENY. If the extension programming permits, the display cycles from DENY, ALLOW1, ALLOW2, ALLOW3 on subsequent key presses. This softkey appears only if the room is OCCUPIED.

To display or change the status of other rooms:

- Press the NEW EXT softkey. The display prompts for an extension number.
- Enter the desired extension number.

To exit:

- Press the CANCEL or RELEASE function keys, or
- Press the EXIT softkey (at the **EXT – ?** prompt).

#### **Print Status of All Rooms (Room Audit):**

At the Attendant Console:

- Press the ROOM STATUS function key. The display shows **ROOM STATUS EXT – ?**.
- Press the PRINT softkey.

OR

- Press the FUNCTION key, or dial \* or dial 71.
- Dial 82.

At the Auxiliary Attendant set:

- Press the FUNCTION key, or dial \* or dial 71.
- Dial 82.

The printout shows the status of all rooms (extensions with Room Status enabled in their Class of Service). Rooms are grouped by status:

- VACANT/CLEAN
- VACANT/NOT CLEAN
- OCCUPIED/CLEAN

- OCCUPIED/NOT CLEAN
- OUT OF SERVICE

If there is a maid in the room, the word "MAID" appears beside the room number.

If there is no maid in the room and the room is denied trunk access, the word DENY appears beside the room number.

The date and time appear at the top of the printout.

Example of printout:

```
15/01/89 08:00 ROOM – STATUS
VACANT/CLEAN
1100–DENY 1101–DENY 1102–DENY 1103–DENY 1104–DENY
1105–DENY 1106–DENY 1107–DENY 1108–DENY 1109–DENY
VACANT/NOT CLEAN
1300–DENY 1301–MAID 1302–DENY 1303–MAID 1304–DENY
OCCUPIED/CLEAN
1500 1501 1502 1503 1504
1505 1506 1507 1508 1509
OCCUPIED/NOT CLEAN
1600–MAID 1601 1602–MAID 1603 1604
1605–MAID
OUT OF SERVICE
1900–DENY
```

**Operation      Maid In Room**

From Room phone:

- Dial the Maid In Room access code (default is 747). A short burst of dial tone is returned.
- Enter the condition code:
  - 1 – Maid in Room
  - 2 – Maid Not in Room
  - 3 – Room Clean and Ready
  - 4 – Room Out of Service
  - 5 – Maid Exited Room/Room Clean and Ready

Dial tone is returned. (Reorder tone is returned if no entry is made within 10 seconds or if an invalid code is entered).

---

**Selectable Ringing Cadence Cycle Time**

---

- Description** This feature identifies call classifications. There are four different ringing cadences available for extensions. These four classes are:
- Internal Calls – Calls from other extensions indicated by ordinary ringing.
  - External Calls – Calls from trunks or the Attendant Console optionally indicated by ordinary ringing or distinctive ringing.
  - Message Waiting reminders.
  - Callbacks – indicated by Distinctive Callback Ringing.
- Conditions** None.
- Programming** Command 100, System Options, Register 03, Tone and Ringing Control:
- Set the Ringing Cadence Cycle Time (field e) to 3 (3 Seconds), 4 (4 Seconds) or 5 (5 Seconds). Default is 4.
- Operation** None.

---

## Speaker On/Off

---

**Description** This feature allows the *SUPERSET* user to originate or receive calls without using the handset.

- Conditions**
- On the *SUPERSET 3*, *SUPERSET 4*, *SUPERSET 410* and *SUPERSET 420* telephones, the built-in speaker and microphone are activated when the speaker is on.
  - On the *SUPERSET 3*, *SUPERSET 4*, *SUPERSET 410* and *SUPERSET 420* telephones, each time the speaker key is pressed, the telephone alternates between handset and Handsfree operation.
  - If the set is returned to handset operation with the handset on-hook, the current call is terminated and the set returns to its idle state.

**Operation** ***SUPERSET 3 Telephone***

To switch to speaker and microphone operation:

- Press the speaker key and replace the handset. The speaker and microphone turn on.

To return to a handset operation:

- Lift the handset. The speaker and microphone turn off.

***SUPERSET 4 Telephone***

To Switch to Speaker and Microphone Operation:

- Press the SPEAKER ON/OFF feature key once. The prime line is selected. The display shows **MIC ON**.

To Return to Handset Operation from Speaker Operation:

- Press the SPEAKER ON/OFF feature key again. The **MIC ON** flag disappears from the display. If the handset is off-hook, the conversation continues on the handset. Otherwise, the set is returned to an on-hook condition.

***SUPERSET 410 and SUPERSET 420 Telephones***

To switch to speaker and microphone operation:

- Press the Speaker key and replace the handset. The speaker and microphone turn on.

To return to a handset operation:

- Lift the handset. The speaker and microphone turn off.

---

## Special DISA

---

- Description** Special DISA (also known as Multiple DISA Access Codes) allows callers to gain access to their own Class of Service options or gain access to Automatic Route Selection for long distance resale. A Special DISA trunk is accessed with the caller's Verified Authorization Code (VAC), rather than the DISA access code.
- SMDR can be programmed to record the Verified Authorization Code with each incoming Special DISA trunk call. This simplifies customer billing.
- See also TRAVELING COS and ACCOUNT CODES in this Section.
- Conditions** Refer to conditions for TRAVELING COS and ACCOUNT CODES in this Section.
- Programming** Commands 501 → 580, Trunk Programming, Register 1, field e:
- Specify a Trunk Class of Service (1 → 9) for the Special DISA trunk(s). In default mode, all trunks are placed in Class of Service 1.
- Commands 121 → 129, Class of Service Programming, Register 2:
- Set DISA Access Code Required (field e) to 2 (Special DISA/VAC Required). Default is 0 (Disable). If 0 is selected, an access code is not required. If 1 is selected, the Verified Authorization Code is not required, however, the DISA access code is required. Refer to DIRECT INWARD SYSTEM ACCESS in this Section for further details.
- Operation**
- Dial the directory number of the Special DISA trunk. Ringback tone is heard, followed by dial tone.
  - Dial the assigned Verified Authorization Code. If the VAC is valid, dial tone is returned. If the VAC is invalid, the reorder tone is returned.
  - Dial the desired internal or external number, or access the desired feature, in the normal manner.

---

## Speed Dial

---

**Description** This feature permits a *SUPERSET* telephone user to save frequently used telephone numbers, and to dial these numbers by pressing a single key.

The number of Speed Call/Line Select keys available to the user depends on the number of lines appearing at the telephone. Any unused (unassigned) Line Select keys can be used to save Speed Dial numbers.

**Conditions**

- Each entry can have up to 32 digits.
- Abbreviated Dial Numbers can not be programmed as Speed Dial Numbers.

**Operation** To Set Up or Modify a Speed Dial Number on a *SUPERSET 3* Telephone:

- Press the program/save key.
- Press the desired Speed Call key.
- Dial the number to be stored.
- Press the program/save key.

Insert into the dial sequence, if required:

- \* 1 – pause five seconds.
- \* 2 – wait for dial tone.
- \* 3n – wait for manually dialled digits (n is the number of digits from 1 to 9).

To Set Up or Modify a Speed Dial Number on a *SUPERSET 4* Telephone:

- With the handset on-hook, press the PROGRAM softkey.
- Press the SPEED CALL softkey.
- Press the desired Line Select/Speed Dial key.
- Dial the number to be stored.

Insert into the dial sequence, if required:

- \* 1 – pause five seconds.
- \* 2 – wait for dial tone.
- \* 3n – wait for manually dialled digits (n is the number of digits from 1 to 9).

The speed dial number is displayed.

If correct:

- Press the SAVE softkey. The speed dial number is now saved.

To correct a programming error, use the ← softkey to backspace and clear the incorrect entry. To cancel the entire current entry, press the EXIT softkey and start over again.

To View the speed dial number on the *SUPERSET 4* Telephone:

- Press the DISPLAY feature key.
- Press the required Line Select/Speed Dial key.

The currently saved Speed Dial number is displayed. If the saved number is longer than eleven digits, an arrow (→) softkey appears. Press the → softkey to view the remaining characters.

To Set Up or Modify a Speed Dial Number on a *SUPERSET 410* Telephone:

- Press the Superkey key.
- Press the desired Line Appearance key.
- Dial the number to be stored.
- Press Superkey key to save the number entered.

To Set Up or Modify a Speed Dial Number on a *SUPERSET 420* Telephone:

- Press the Superkey key, to select the programmable features menu. Feature title CALL FORWARDING appears on display.
- Press the No softkey, to step forward to PERSONAL KEYS? feature.
- Press the Yes softkey. Prompt PRESS A S/C KEY appears on display.
- Press a Line Appearance key (Speed Call key).
- Dial the number to be stored. If help is required, press the Help softkey.
- Press Save softkey to save the number entered.

Insert into the dial sequence, if required:

- \* 1 – pause five seconds.
- \* 2 – wait for dial tone.
- \* 3n – wait for manually dialled digits (n is the number of digits from 1 to 9).

To View the Speed Dial Number on the *SUPERSET 420* Telephone:

- Press the Superkey key, to select the programmable features menu. Feature title CALL FORWARDING appears on display.
- Press the No softkey, to step forward to PERSONAL KEYS? feature.
- Press the Yes softkey. Prompt PRESS A S/C KEY appears on display.
- Press the desired Line Appearance key (Speed Call key).

The currently saved Speed Dial number is displayed. If the saved number is longer than eleven digits, an arrow (→) softkey appears. Press the → softkey to view the remaining digits.

---

**Station Message Detail Recording (SMDR)**

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- Description** Station Message Detail Recording (also known as Call Detail Recording) permits a business to analyze and control its telephone costs. Data is collected for each outgoing and/or incoming trunk call. Each call generates a call record which is available at the RS-232 Port (Printer Port) of the DPABX. This output can be connected to:
- a local printer which provides an on-line printout at the termination of each trunk call, or
  - a call accounting system, or
  - directly to a service bureau via a dedicated line for faster processing.
- Conditions**
- Refer to Section 9104-091-221-NA, Station Message Detail Recording (SMDR), for details.
- Programming** Command 100, System Options, Register 14, SMDR:
- SMDR System Enable (field c) must be set to 1 (Enable Incoming Trunk Calls Only), 2 (Enable Outgoing Trunk Calls Only) or 3 (Enable Both Incoming and Outgoing Trunk Calls). Default is 0 (Disable).
  - SMDR: Record Meter Pulses (field d) can be set to 1 (Enable). Default is 0 (Disable).
  - SMDR: Long Call Indicator (field e) can be set to 1 (Enable). Default is 0 (Disable).
  - SMDR: Incoming Calls Record Only COs (field f) can be set to 1 (Enable). Default is 0 (Disable). This field applies to DID and LS/GS trunks.
  - SMDR: Drop Calls of Less Than 8 Digits (field g) can be set to 1 (Enable). Default is 0 (Disable).
  - SMDR: Drop Incomplete Outgoing Calls (field h) can be set to 1 (Enable). Default is 0 (Disable).
  - SMDR: Overwrite Queued Printer Buffers (field i) can be set to 1 (Enable). Default is 0 (Disable).
  - SMDR X Digits Dialed (field j) can be set to 1 → 7. Default is 0 (Disable).
  - VAC Overwrite Account Code (field k) can be set to 1 (Priority to printing of Account Codes) or set to 0 (Priority to printing of Verified Authorization Codes). Default is 0.
  - Refer to Section 9104-091-221-NA, Station Message Detail Recording (SMDR), for details.

Commands 121 → 129, COS 1 → COS 9 Programming, Register 3:

- Set COS SMDR (field h) to 1 (Enable). Default is 0 (Disable).

Commands 151 → 156, Trunk Group Programming, Register 2:

- Set Trunk Group SMDR (field i) to 1 (Enable). Default is 0 (Disable).

**Operation**

- Refer to Section 9104-091-221-NA, Station Message Detail Recording (SMDR), for details.

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## Station Message Detail Recording (SMDR) – Credit Card Calls

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**Description** This feature is used to suppress the user's telephone calling card number from the SMDR printout. All assigned members of a designated trunk group(s) can make credit card calls if they are so allowed through the appropriate Class of Service (COS).

The SX-50 system has five DTMF receivers. Since each credit card call requires two receivers, only two credit card calls can be handled at one time. Other sets going off-hook when two credit card calls are being handled, will not receive dial tone if there are no receivers left. Care should be taken when using this feature.

**Note:** This CDE option should ONLY be used in conjunction with Automatic Route Selection (ARS) to ensure that only the appropriate trunks are used. Serious degradation of service could occur if this is not done.

- Conditions**
- For basic calls, when the Calling Card Service Prompt Tone (#) from the Central Office is detected, any digits dialed after the tone are not recorded for SMDR or redial nor are they displayed on *SUPERSET 4* or *SUPERSET 420* telephones or the console.
  - In a trunk group programmed with this CDE option, a second DTMF receiver is connected to the outgoing trunk seized for the basic call. The receiver is released when a # from the Central Office is detected.
  - In all other respects, the digits after the # are handled in the same manner as those encountered before the #.

### Speedcall and Redial

- No check is made for the receipt of a # in either speed call numbers (including external call forwarding) or redial.
- If a speed call number is programmed to include a telephone calling card number, the PBX does not wait for the Calling Card Service Prompt Tone (#) from the CO. However, the user can insert a delay into the speed call number to allow the prompt tone to be received.

**Programming** Commands 151 → 156, Trunk Groups 1 → 6 Programming, Register 4:

- Set Credit Card Calling Operation (bit e) to 1 (Enable). Default is 0 (Disable).

---

**Station Switchhook–Flash Timing**

---

- Description** This feature defines the minimum and maximum duration of a switchhook flash. A switchhook flash of less than the minimum flash time (150 ms) is filtered by the system and is not treated as a flash. A flash of longer than the selected flash time (750 ms or 1500 ms) is considered by the software as a disconnect. Switchhook flashes that are between the minimum flash time and the selected maximum flash timer are considered valid.
- Conditions** None.
- Programming** Command 100, System Options, Register 06, Station Attributes:
- Station Switchhook–Flash Timing (field c) can be set to 0 (150 → 750 ms), 1 (150 → 1500 ms), 2 (Flash Is Release) or 3 (90 ms Calibrated Flash). Default is 0.
- Operation** None.

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**SUPERSET 3 Telephones**

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- Description** The *SX-50* DPABX permits *SUPERSET 3* telephones to be connected providing that the COV Line Card is installed. Refer to the following section for detailed information:
- Section 9104-091-200-NA, Shipping, Receiving and Installation Information.
- Conditions**
- When programming, the *SUPERSET 3* telephone must be on-hook.
  - An auto-dial modem or an acoustic coupler cannot be connected in parallel to a *SUPERSET 3* telephone.
  - A *SUPERSET 3* telephone cannot be connected in parallel to other sets. A *SUPERSET 3* telephone cannot be connected to the Power Fail Transfer circuit.
  - A COV Line Card must be installed.
- Programming** Command 100, System Options, Register 07, *SUPERSET* Attributes:
- Set *SUPERSET* Auto-Hold (field d) to either 0 (Disable Auto-release) or 1 (Enable). Default condition is 0.
  - Set Delayed Ringing Time-out (field e) to required time; either 10, 20 or 30 Seconds. Default is 10 Seconds.
- Commands 301 → 310, Slots 1 → 10, Extension Programming, Registers 01 → 16:
- Set the required Class of Service (field d) for each set.
  - Assign a Pickup Group (field f) (1 → 7) to each set. Default is 1 (Pickup Group 1).
  - Assign an ARS Routing Class of Service (field g) (1 → 3) to each set. Default is 0 (ARS Does Not Apply).
  - Assign the required directory numbers (fields i → l) (1, 2, 3 or 4 digits) to each set.
- Commands 401 → 480, *SUPERSET* Equipment Numbers 01 → 80, *SUPERSET* Telephone Programming, Registers 01 → 15:
- Assign the required data for each *SUPERSET* telephone command number. Refer to Section 9104-091-210-NA, Customer Data Entry.
- Operation**
- Refer to *SUPERSET 3* User Guide, Part Number 9173-953-002-NA.

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**SUPERSET 4 Telephones**

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- Description** *SUPERSET 4* telephones can be connected to the *SX-50* DPABX providing that at least one COV Line Card is installed. Refer to the following section for detailed information:
- Section 9104-091-200-NA, Shipping, Receiving and Installation Information.
- Conditions**
- When programming, the *SUPERSET 4* telephone must be on-hook.
  - An auto-dial modem or an acoustic coupler cannot be connected in parallel to a *SUPERSET 4* telephone.
  - A *SUPERSET 4* telephone cannot be connected in parallel to other sets.
  - A *SUPERSET 4* telephone cannot be connected to the Power Fail Transfer circuit.
  - A COV Line Card must be installed.
- Programming** Command 100, System Options, Register 07, *SUPERSET* Telephone Attributes:
- Set Auto-Answer (field c) to either 0 (Disable) or 1 (Enable). Default is 0.
  - Set *SUPERSET* Auto-Hold (field d) to either 0 (Disable Auto-release) or 1 (Enable). Default condition is 0.
  - Set Delayed Ringing Time-out (field e) to required time; either 10, 20 or 30 Seconds. Default is 10 Seconds.
- Commands 301 → 310, Slots 1 → 10, Extension Programming, Registers 01 → 16:
- Set the required Class of Service (field d) for each set.
  - Assign a Pickup Group (field f) (1 → 7) to each set. Default is 1 (Pickup Group 1).
  - Assign an ARS Routing Class of Service (field g) (1 → 3) to each set. Default is 0 (ARS Does Not Apply).
  - Assign the required directory numbers (fields i → l) to each set.
- Commands 401 → 480, *SUPERSET* Telephone Equipment Numbers 01 → 80, *SUPERSET* Telephone Programming, Registers 01 → 15.
- Assign the required data for each *SUPERSET* telephone command number.
  - Refer to Section 9104-091-210-NA, Customer Data Entry.
- Operation**
- Refer to *SUPERSET 4* User Guide, Part Number 9104-953-007-NA.

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## ***SUPERSET 410* Telephones**

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**Description** The *SX-50* DPABX permits *SUPERSET 410* telephones to be connected providing that the DNIC Line Card is installed. Refer to the following section for detailed information:

- Section 9104-091-200-NA, Shipping, Receiving and Installation Information.

**Conditions**

- MS55 software must be installed.
- When programming, the *SUPERSET 410* telephone must be on-hook.
- An auto-dial modem or an acoustic coupler cannot be connected in parallel to a *SUPERSET 410* telephone.
- A *SUPERSET 410* telephone cannot be connected in parallel to other sets. A *SUPERSET 410* telephone cannot be connected to the Power Fail Transfer circuit.
- A DNIC Line Card must be installed.

**Programming** Command 100, System Options, Register 07, *SUPERSET* Attributes:

- Set *SUPERSET* Auto-Hold (field d) to either 0 (Disable Auto-release) or 1 (Enable). Default condition is 0.
- Set Delayed Ringing Time-out (field e) to required time; either 10, 20 or 30 Seconds. Default is 10 Seconds.

Commands 301 → 310, Slots 1 → 10, Extension Programming, Registers 01 → 16:

- Set the required Class of Service (field d) for each set.
- Assign a Pickup Group (field f) (1 → 7) to each set. Default is 1 (Pickup Group 1).
- Assign an ARS Routing Class of Service (field g) (1 → 3) to each set. Default is 0 (ARS Does Not Apply).
- Assign the required directory numbers (fields i → l) (1, 2, 3 or 4 digits) to each set.

Commands 401 → 480, *SUPERSET* Equipment Numbers 01 → 80, *SUPERSET* Telephone Programming, Registers 01 → 15:

- Assign the required data for each *SUPERSET* telephone command number. Refer to Section 9104-091-210-NA, Customer Data Entry.

**Operation**

- Refer to *SUPERSET 410* User Guide, Part Number 9114-953-001-NA.

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**SUPERSET 420 Telephones**

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- Description** The *SX-50* DPABX permits *SUPERSET 420* telephones to be connected providing that the DNIC Line Card is installed. Refer to the following section for detailed information:
- Section 9104-091-200-NA, Shipping, Receiving and Installation Information.
- Conditions**
- MS55 software must be installed.
  - When programming, the *SUPERSET 420* telephone must be on-hook.
  - An auto-dial modem or an acoustic coupler cannot be connected in parallel to a *SUPERSET 420* telephone.
  - A *SUPERSET 420* telephone cannot be connected in parallel to other sets. A *SUPERSET 420* telephone cannot be connected to the Power Fail Transfer circuit.
  - A DNIC Line Card must be installed.
- Programming** Command 100, System Options, Register 07, *SUPERSET* Attributes:
- Set *SUPERSET* Auto-Hold (field d) to either 0 (Disable Auto-release) or 1 (Enable). Default condition is 0.
  - Set Delayed Ringing Time-out (field e) to required time; either 10, 20 or 30 Seconds. Default is 10 Seconds.
- Commands 301 → 310, Slots 1 → 10, Extension Programming, Registers 01 → 16:
- Set the required Class of Service (field d) for each set.
  - Assign a Pickup Group (field f) (1 → 7) to each set. Default is 1 (Pickup Group 1).
  - Assign an ARS Routing Class of Service (field g) (1 → 3) to each set. Default is 0 (ARS Does Not Apply).
  - Assign the required directory numbers (fields i → l) (1, 2, 3 or 4 digits) to each set.
- Commands 401 → 480, *SUPERSET* Equipment Numbers 01 → 80, *SUPERSET* Telephone Programming, Registers 01 → 15:
- Assign the required data for each *SUPERSET* telephone command number. Refer to Section 9104-091-210-NA, Customer Data Entry.
- Operation**
- Refer to *SUPERSET 420* User Guide, Part Number 9115-953-001-NA.

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## System Security Code Programming

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- Description**     The System Security Code accesses the system programming which enables the programmer to modify any part of the customer database and also load default data.
- Conditions**
- When the System Security Code is entered, all data can be viewed and changed.
  - When the System Security Code is entered, the programmer has 10 seconds to press the # key and re-enter Programming Mode.
- Programming**     Command 190, System Security Code Programming, Register 1:
- Assign the required 4-digit System Security Code. Default is 7772.
- Operation**     To Enter Programming Mode:
- Press and hold the STATUS key – the LCD displays the word *SX-50*, the software identity and revision level.
  - Enter the 4-digit System Security Code. If correct, the word *SX-50* flashes on the LCD.
  - Release the STATUS key.
  - Dial # within 10 seconds – the LCD displays the **COMMAND 100?** prompt.
  - Perform programming as required.
- To Exit Programming Mode:
- Press the EXIT softkey – the system exits Programming Mode immediately.
- OR
- Press the RELEASE key – the system exits Programming Mode immediately.

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**Swap/Trade Camp-On**

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- Description** This softkey places the current call on consultation hold so the *SUPERSET 4* or *SUPERSET 420* user can talk to the camped-on party. Refer to the CAMP-ON feature in this Section for further information.
- Conditions**
- This feature is available on *SUPERSET 4* or *SUPERSET 420* telephones only.
  - Refer to the CAMP-ON feature in this Section.
- Operation** The LCD identifies the camped-on caller. To talk to this caller:
- Inform the current party and press the SWAP/Trade CAMP ON softkey. The current call is put on hold; the camped-on caller is connected to the set.
- The set now has a call in progress and a call on hold. Refer to the Swap/Trade, Conference and Call Transfer descriptions for the operation of these softkeys.

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## Test Line

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**Description** Any Station Equipment Number can be used as a Test Line to program the system or to perform all Attendant or Maintenance Functions. Use of a *SUPERSET 4* or *SUPERSET 420* telephone for the Test Line is strongly recommended. Refer to 9104-091-210-NA, Customer Data Entry, *Softkeys* for key sequences.

- Conditions**
- Test Line cannot be designated as a Manual Line.
  - The Test Line and Attendant Console cannot have simultaneous access to Programming, Attendant Functions or Maintenance Functions.
  - If the Test Line is used to program the system or to perform Attendant and Maintenance Functions, then the associated information is displayed on the *SUPERSET 4* or *SUPERSET 420* telephone.
  - Attendant Functions 81, 82, 85, 91 and 92 are not available from the Test Line.

- Programming**
- Set Status Switch 2 on the Control Card/Control Card 2 (MCC2) to Closed.

Command 100, System Options, Register 01, System Maintenance:

- Specify the Test Line Equipment Number (fields e,f,g) (001 → 160). Default is 001.

**Note:** Use the Station Equipment Number, even if the Test Line is a *SUPERSET 4* or *SUPERSET 420* telephone.

**Operation**      **Attendant Function**

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial the required Attendant or Maintenance Function Code plus the equipment number (if necessary), to perform the required Attendant or Maintenance Function.

**Programming Mode**

- Dial the Programming Access Code (70 or #).
- Test Line can now be used to program the system.

---

## Time Display

---

**Description** After initialization, the LCD on the Attendant Console continuously displays the time of day. The time is displayed as either a 12- or 24-hour clock, depending on the option-selected by the attendant.

- Conditions**
- Following a power failure, the Main Display flashes the time. The time flashes to alert the attendant to reset the clock. The clock will otherwise continue from the time the system power went out of service.
  - Time is always entered in 24-hour format, even if the 12-hour clock is selected. To convert PM times to 24-hour format, add 12 hours. (e.g., 2:30 PM = 14:30).

**Programming** None.

**Operation** **To Select the 12-Hour Clock Display:**

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 14 plus 2-digit hours and 2-digit minutes – the LCD displays **hhmm**. Example: for 6 PM, enter 14 plus 1800.

**To Select the 24-Hour Clock Display:**

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 15 plus 2-digit hours and 2-digit minutes – the LCD displays **hhmm**. Example: for 6 PM, enter 15 plus 1800.

---

## Transfer Dial Tone

---

- Description** The system returns transfer dial tone to an extension user that flashes the switchhook and places an existing call on hold. Refer to Section 9104-091-210-NA, Customer Data Entry, for details.
- Conditions** None.
- Programming** Command 100, System Options, Register 03, Tone and Ringing Control:
- Transfer Dial Tone (field d) must be set to 1 (Enable). Default is 1.
- Operation**
- Originate or answer a call.
  - Flash the switchhook.
  - The system returns transfer dial tone.

---

## Transfer Security

---

- Description** This feature prevents trunk calls from being lost due to incorrect extension handling. If a trunk call is transferred to an idle extension which does not answer, or is camped on to a busy extension and the extension does not pick up the call within the programmed time-out period, then the call automatically recalls to the extension that transferred the call. If an extension attempts to transfer a call before dialing is complete, then the call automatically recalls to the extension attempting the transfer. Refer to CAMP-ON and CALL TRANSFER in this Section.
- Conditions** None.
- Programming** None.
- Operation** None.

---

## Traveling COS

---

### Description

Traveling COS (also known as Verified Account Codes), allows users to access their own Class of Service from another extension. When a user makes outside trunk calls from stations other than their own, the *SX-50* system can be programmed to identify the user in the SMDR printout.

Verified Authorization Codes are useful to restrict trunk access and to prevent fraudulent use of outgoing trunks.

Using any extension in the *SX-50* system, a user enters the Verified Authorization Code Access code, followed by his/her own 1- to 8-digit Verified Authorization Code (VAC), as part of the dialing sequence. This changes the extension's COS and ARS RCS to the Class of Service and ARS RCS assigned in the Verified Authorization Code Table. Each time a VAC is entered by a user, it is validated and matched in the system. If the Verified Authorization Code is invalid, reorder tone is returned. The new COS and Routing COS are valid for the duration of the call.

Verified Authorization Codes can be viewed, added, deleted or modified by using CDE or by using an Attendant Function from the console.

See also SPECIAL DISA in this Section.

### Conditions

- The Verified Authorization Code Table supports a maximum of 999 codes (001 to 999).
- Verified Authorization Codes must be deleted prior to changing VAC length. If an attempt is made to change the length of a VAC, error message E46, 'VAC LENGTH CONFLICT', is generated.
- It is recommended that when both Account codes and Verified Authorization codes are enabled, Account Code Length be set to an odd number of digits (1,3,5 or 7) for Account codes and be set to an even number of digits (2,4,6 or 8) for Verified Authorization codes, or vice versa. This provides a method of distinguishing the two types of codes on the SMDR printout.
- When both Account codes and Verified Authorization codes are enabled, "VAC Overwrite Billing Code" programming in Command 100, Register 14, field k, determines whether the Account code or the Verified Authorization code will be printed on the SMDR record.
- When both Account codes and Verified Authorization codes are used during a call, the Verified Authorization code is entered before the Account code.
- The *SX-50* system automatically adds new Verified Authorization Codes into the first unprogrammed register in the VAC Table.

- If Verified Authorization codes are enabled and the COS of the user specifies that an account code is required for toll calls, or for toll calls only, then the Verified Authorization code must be used. Account codes can be optionally entered, but they do not control toll access.

**Programming** Command 100, System Options, Register 14:

- Set VAC Overwrite Billing Code (field k) to 0 (Priority to printing of VAC codes). When 1 (Priority to printing of Account Codes) is selected, and both Verified Authorization Codes and Account Codes are entered during a call, the Account Code is printed on the SMDR record. Default is 0.

Command 100, System Options, Register 15:

- Program the Verified Authorization Code Length (field e) as 1 → 8 digits. Default is 0 (Disable).

Command 110, Feature Access Code Programming, Register 40:

- Assign an access code to Verified Authorization Codes (fields c → f). Default is 67.

Command 180, User Programming Access, Register 2:

- Set Command 600: Verified Authorization Code Programming (field h) to 1 (Enable). This allows a system user to modify Command 600 in CDE. Default is 0 (Disable).

Command 185, Attendant Console Function Key Programming, Registers 01 → 14:

- Assign Key Function 20 (Verified Authorization Code Entry) to a console key (fields c and d).

Command 600, Verified Authorization Code Programming, Registers 001 → 999:

- Set VAC Activation (field d) to 1 (Enable). Default is 0 (Disable). This field is useful to temporarily disable a Verified Authorization Code without removing it from the table.
- Set COS for Authorization Code (field e) to a COS number 1 → 9. This field specifies a COS for each VAC entry (001 → 999). The COS number replaces the extension's COS number for the duration of the call. Once the call is completed, the extension reverts back to its original COS number. If this field is left blank, the extension's original COS number (1 → 9) is used for the call. Default is 0 (Disable).
- Set ARS Routing Number (field f) to a Routing Class of Service (RCS) 1 → 3. This field specifies a RCS for each VAC entry (001 → 999). The ARS Routing Number replaces the extension's RCS for the duration of the call. Once the call is completed, the extension reverts back to its original Routing Class of Service. If this field is left blank, the extension's original RCS is used for the call. Default is 0 (Disable).

- Assign a Verified Authorization Code (1 to 8 digits) in fields g → n. If the number of digits in fields g → n exceeds the number specified in Command 100, Register 15, field e, error message E07, 'TOO MANY DIGITS KEYED', is generated.

Command 121 to 129, COS 1 to COS 9 Programming, Register 7:

- For extensions using Verified Authorization codes, set Account Code Entry (field c) to 2 (Required for Toll Access Only) or 3 (Required for All Calls). Settings of 1 (Optional) or 0 (Not Allowed) will have no effect on Verified Authorization usage.

Command 751, ARS Route Table Programming:

- Set Toll Call (field h) to 0 (Non-Toll Call) or 1 (Toll Call). Default is 0 (Non-Toll Call).

## Operation

### Set

- Lift the handset. Dial tone is returned.
- Enter the Verified Authorization Code Access Code (default is 67), followed by the 1- to 8-digit Verified Authorization Code (VAC). The SX-50 system verifies the VAC in the Verified Authorization Code Table. If the VAC is valid, dial tone is returned. If the VAC is invalid, reorder tone is returned.
- Dial the digits for the desired function in the normal manner (i.e., access a trunk or a COS feature).

### Attendant Console/Auxiliary Attendant Set

Refer to the Attendant Console Guide, PN 9104-053-101-NA, for details.

---

## Trunk Alarm Control

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**Description** This option enables or disables trunk alarms on a per-trunk basis; it should be used only under adverse conditions (e.g., improper CO trunk conditions that the local telephone company cannot correct). Disabling trunk alarms does not correct improper trunk operation; it only prevents alarms from continually ringing the Attendant Console.

**Conditions** Trunk Alarm Disabled:

- There is no visual or audible indication of trunk alarms.
- A trunk alarm is not reported in the alarm queue.
- Trunks detecting improper CO conditions are not busied-out.

**Programming** Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 1:

- Set Trunk Alarm Control (field c) to 0 (Disable). Default is 1 (Enable).

**Operation** None.

---

## Trunk Answer From Any Station (TAFAS)

---

- Description** Trunk Answer From Any Station (TAFAS) routes incoming calls to a common alerting device (Night Bell). Any extension user with TAFAS Access enabled in its COS can answer the TAFAS call by dialing the TAFAS Pickup Access Code. The answering extension can use any feature normally available at that extension.
- Conditions**
- When Overflow is in effect, the Attendant Console LCD shows the word **OVRFL** on its top line. At the Auxiliary Attendant set, the line indicator associated with the OVERFLOW key shows a dark square.
- Calls can be directed to Night Bell from:
- Overflow (from the Attendant console),
  - Internal Calls To Console Routed To Overflow (a System Option),
  - Day Answer Mode or Night Answer Mode (Trunk Programming).
- See DIRECT-IN LINES and FLEXIBLE NIGHT SERVICE in this Section.
- If Enable Pickup from Night Bell/Console is enabled in a set's COS, the set can use TAFAS to answer a call ringing at the Attendant Console even though the call has not been routed to the Night Bell.
  - An extension cannot place a call on Consultation Hold and then answer a TAFAS call.
- Programming** If access to TAFAS from Overflow is desired, refer to OVERFLOW in this Section.
- Command 110, Feature Access Codes, Register 09:
- Assign TAFAS Pickup Access Code (fields c → f). Default is 57.
- Commands 121 → 129, COS 1 → COS 9 Programming, Register 3:
- TAFAS Access (field g) must be specified as 1 (Enable Pickup From Night Bells) or 2 (Enable Pickup From Night Bells/Attendant). Default is 1. 0 is Disabled. If TAFAS Access is set to 2, a call at the Attendant Console can be answered via TAFAS even before it is routed to Overflow.
- Command 100, Overflow Control, Register 08:
- Overflow point (field g, h, i) must be programmed for 000 (Night Bells).
- Operation** ***SUPERSET 420, SUPERSET 410, SUPERSET 3, ONS and OPS Telephones***

**Incoming Call routed to Night Bell:**

- The Night Bell rings.
- At extension, lift the handset and dial TAFAS Pickup Access Code (default 57).
- The extension is connected to the call.

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A call is ringing the Night Bell. To answer:

- Lift the handset – dial tone is returned.
- Press the NIGHT ANS softkey or dial the TAFAS Pickup Access code.

***SUPERSET 420 Telephone***

- Lift the handset – dial tone is returned.
- Press the TAFAS softkey or dial the TAFAS Pickup Access code.

***SUPERSET 3, SUPERSET 410, ONS or OPS Telephone***

- Dial TAFAS Pickup Access code.
- Lift the handset – dial tone is returned.

**Attendant Console**

- Dial the TAFAS Pickup Access code.

---

## Trunk Busy-Out Enable

---

**Description** This function permits the Attendant Console, Auxiliary Attendant or Test Line to busy out a selected trunk. Once busied-out, only the Attendant Console or Test Line can access the trunk, using Attendant Function 19.

**Conditions** None.

**Programming** None.

**Operation** **To Busy out a Trunk:**

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 41, plus the trunk equipment number.
- The trunk is busied-out – the LCD displays the system clock and **EQP-BSY**.

**To Unbusy a Trunk:**

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 51, plus the trunk equipment number.
- The trunk can now be accessed in the normal manner. The **EQP-BSY** flag disappears from the LCD.

OR

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 32.
- All trunk and equipment busy-outs are canceled. This function also cancels all alarms.

---

## Trunk Emergency Release

---

**Description** This feature releases occupied trunk circuits for emergency purposes. This procedure disconnects callers on the trunk and should therefore be used with caution.

**Conditions** • Trunk Emergency Release does not release a busied-out trunk.

**Programming** None.

**Operation**

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 20.
- Dial the trunk equipment number.
- The trunk is now free and can be accessed.

---

## Trunk Group Overflow

---

**Description** When this option is enabled in Trunk Group Programming, calls directed to that group route through another specified Trunk Group if all the trunks in that group are busy. The dialing extension must have access to overflow enabled in its Class of Service.

**Conditions** None.

**Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 1:

- Trunk Group Overflow Access (field h) must be set to 1 (Enable). Default is 0 for all Classes of Service.

Commands 151 → 156, Trunk Groups 1 → 6 Programming, Register 1:

- Overflow Trunk Group (field d) can be set for one of the six Trunk Groups by entering 1, 2, 3, 4, 5 or 6. Default is 0 (Disable).

**Operation** None.

---

## Trunk Groups

---

- Description** The SX-50 system can have up to six independent outgoing Trunk Groups. An extension can access all Trunk Groups specified in its COS by dialing the required access code. When a Trunk Group is accessed, an extension's toll restriction defines its dialing capabilities.
- Conditions**
- A trunk can be a member of only one Trunk Group.
  - A maximum of six Trunk Groups are available.
  - Trunk Groups are applicable for outgoing trunks only.
- Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 1:
- Assign Trunk Group Access (fields b through g). If extensions assigned to this Class of Service are allowed access to a Trunk Group, then assign the Trunk Group Access (fields b through g) as 1 (Enable). If the extensions are denied access, assign the Trunk Group Access (fields b through g) as 0 (Disable). Default is 1 for all COSs.
- Commands 151 → 156, Trunk Groups 1 → 6 Programming, Registers 1 → 4:
- Assign required parameters for each Trunk Group. Refer to Trunk Group Programming in Section 9104-091-210-NA, Customer Data Entry.
- Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 1:
- Assign Trunk Group Membership (field b) for each trunk.
- Operation** None.

---

**Trunk Intercepts**

---

- Description** DID and DISA calls to no answer, busy, DND, vacant, invalid or DID–restricted extensions can be rerouted to the console, another extension, a hunt group, the ring group or the Night Bell. There are two intercept points for each Inward Dial trunk, one for Day Service and the other for Night Service.
- Conditions**
- If there is no Illegal Number Intercept Point or it is busy, DID trunks calling vacant, invalid or DID–restricted extensions will receive reorder tone.
  - If the intercept point is busy and the Camp On feature is enabled, the DID or DISA trunk camps on to the intercept point.
  - Calls cannot be forwarded from an intercept point.
  - If a DID or DISA trunk calls a busy station that has both the Call Forward on Busy and the Busy Intercept features enabled, the trunk is routed to the Call Forward on Busy destination.
  - If a DID or DISA trunk calls a station that has Call Forwarding – Always programmed, the call follows the Call Forwarding programmed at the station.
  - When a DID or DISA trunk routes to a station that is busy, and Busy Intercept is enabled, the trunk is rerouted to the intercept point. If Busy Intercept is disabled, busy tone is returned.
  - When a DID or DISA trunk routes to a station that has Do Not Disturb set, and Do Not Disturb Intercept is enabled, the trunk is rerouted to the intercept point. If Do Not Disturb Intercept is disabled, busy tone is returned.
  - If a DID or DISA trunk routes to a station that has the No Answer Intercept, the Call Forward No Answer timer for the destination station begins timing. Once the timer expires, the trunk routes the call to the intercept point. If the station has Call Forward No Answer enabled, the No Answer Intercept has no effect. If No Answer Intercept and Call Forward are disabled, the trunk continues to ring the station.
  - When a DID or DISA trunk dials an invalid number, and Illegal/Vacant Number Intercept is enabled, the call routes to the intercept point.
  - If an intercept point answers a call, Answer Supervision is sent out on the trunk.
  - The day and night answer points (Commands 501 → 580, Register 4 and 5) which specify where non inward dial trunks are to ring, will be interpreted as intercept points for inward dial trunks.
  - Call Forwarding – Busy and Call Forwarding – No Answer override the Busy/No Answer Intercept feature.

**Programming** Commands 501 → 580, Trunks 01 → 80 Programming, Register 4:

- Set Day Answer Mode (field d) to 0 (Direct-In Line), 1 (LDN 1), 2 (LDN 2) or 3 (LDN 3). Default is 1.
- If Day Answer Mode is 0, set Day Inward Dial Trunk Intercept Answer Point (fields e,f,g) to 000 (Night Bell Only), 001 → 160 (Extension Equipment Number), 161 → 166 (Hunt Group 1 → 6), 167 (Ring Group) or 168 (RMATS). Default is 001.
- Set Busy Intercept (field h) to 1 (Enable). Default is 0 (Disable).
- Set Do Not Disturb Intercept (field i) to 1 (Enable). Default is 0 (Disable).
- Set No Answer Intercept (field j) to 1 (Enable). Default is 0 (Disable).
- Set Vacant/Illegal Number Intercept (field k) to 1 (Enable). Default is 0 (Disable) for CO and DID Trunks. Default is 1 (Enable) for E&M Trunks.

## Commands 501 → 580, Trunks 01 → 80 Programming, Register 5:

- Set Night Answer Mode (field b) to 0 (Flexible Night Service), 1 (LDN 1), 2 (LDN 2) or 3 (LDN 3). Default is 0.
- If Night Answer Mode is 0, set Night Inward Dial Trunk Intercept Answer Point (fields c → e) to 000 (Night Bell Only), 001 → 160 (Extension Equipment Number), 161 → 166 (Hunt Group 1 → 6), 167 (Ring Group) or 168 (RMATS). Default is 000.
- Ensure DID Night Answer Point (field f) is set to 0 (Disable). This is the default.

**Operation** **Attendant Console**

A DID call is rerouted to the console:

- The Console rings. An LDN softkey flashes.
- Press the LDN softkey or the ANSWER key. The display shows the trunk number and INTERCEPT.

***SUPERSET 4 Telephone***

A DID intercept call is routed to the set:

- The set rings and the display shows **INTERCEPT**.
- Answer the call. The display shows the trunk number.

---

## Trunk Registration Meter

---

**Description** The SX-50 system records meter pulses received on each trunk. These can be pulses from the Central Office or pseudo message units from system timers. The Attendant can read or clear any trunk meter at the console.

**Conditions** None.

**Programming** None.

**Operation** **Attendant Console, Auxiliary Attendant or Test Line**

To display a trunk meter:

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial 27. The display shows **METER TRUNK ?**.
- Dial the trunk number. The display shows: **75 METER 0003** (example).
- Press the CANCEL key.

To clear a trunk meter:

- While the trunk meter is displayed, dial 0.

---

## Trunk Signaling – DTMF Or Rotary Outpulsing

---

- Description** This feature automatically converts DTMF signals to dial pulse (rotary) signals where the CO trunk is not equipped to accept DTMF signals. It also converts dial pulses from rotary station sets to DTMF for DTMF trunks.
- A user can dial # to force all digits that follow to be sent as DTMF, regardless of the trunk type.
- Conditions** If DTMF or Rotary Outpulsing (field g) has been set to 1, (Rotary), both DTMF signals and rotary pulses are sent out on the trunk, as early line split is not provided. Where this double signaling can cause difficulties in digit detection, (field g) should be set to 2 (Rotary, Disable Outgoing Audio Until Answer). If the trunk does not supply answer supervision, transmit audio is enabled.
- 10 seconds after the last digit has been dialed
- OR
- immediately, if the number is followed by the digit #.
- If DTMF or Rotary Outpulsing (field g) has been set to 2, the following must also be programmed in Trunk Group Programming (Commands 151 → 156), Register 2:
- Answer Supervision (field e) must be set to 1 (Supervision is Meter Pulse or Reversal). Default is 0 (No Supervision).
- The # digit can be embedded in a Speed Call, or in an ARS Digit Modification Table Entry.
- Tone to Pulse Override can only be used from *SUPERSET* telephones, DTMF sets and from the Attendant Console.
- Programming** Command 100, System Options, Register 10, Features Selection 2:
- Set Use of Hash (#) For Trunks (field f) to 0 (Enable tone to pulse override) or 1 (Enable end of dial). The default is 0.
- Commands 151 → 156, Trunk Groups 1 → 6 Programming, Register 2:
- DTMF or Rotary Outpulsing (field g) must be set to 1 (Rotary), 2 (Rotary, Disable Outgoing Audio Until Answer) or 3 (Rotary, Inhibit DTMF Until Answer). Default is 0 (DTMF).
- Operation** None.

---

## Trunk-To-Trunk Plus Station Conferencing

---

**Description** This feature permits an extension user (involved in an established trunk call), to place the trunk on Consultation Hold and access a second trunk. The user can then converse privately with the third party or form a 3-party conference.

If the user hangs up and has "Authorized Trunk to Trunk Connection" capability enabled in his/her Class of Service, the two trunks can continue the conversation; otherwise, the two trunks are disconnected. With Authorized Trunk to Trunk Connection capability enabled, the extension user is also able to transfer (supervised or unsupervised), a trunk call to another trunk call.

- Conditions**
- The system supports a maximum of six 3-party conferences.
  - The appropriate types of trunk interconnection must be enabled in System Options, Command 100, Register 5.
  - The CO must provide Disconnect Supervision and Disconnect Supervision Guaranteed? (field c) must be set to 1 (Yes). Default is 0 (No).
  - Authorized Trunk to Trunk Connection must be enabled in the extension user's COS in order for two trunks to continue a conference once the extension user hangs up.
  - Authorized Trunk to Trunk Connection must be enabled in order for an extension user to transfer a trunk call to another trunk call.

**Programming** Command 100, System Options, Register 05, Trunk Connections:

- Enable the following types of trunk interconnection, as required. In all cases, the default is 0 (Disable). 1 is Enable.

CO-to-CO is field c  
E&M-to-E&M is field d  
CO-to-E&M is field e  
DID-to-CO is field g  
DID-to-E&M is field h  
DID-to-DID is field i

- If a warning tone is required, set Conference Warning Tone (field f) to 1 (Enable). Default is 0. This applies to CO Trunks only.

Commands 121 → 129, Class of Service Programming, Register 1:

- Set Authorized Trunk to Trunk Connection (field j) to 0 (Disable) or 1 (Enable). Default is 1.

Commands 501 → 580, Trunks 01 → 80, Trunk Programming, Register 2:

- Disconnect Supervision Guaranteed? (field c) must be set to 1 (Yes) if the CO does indeed provide supervision. Default is 0 (No).

**Operation**

- Establish a trunk call.
- Flash the switchhook – the system puts the first trunk on Consultation Hold and returns transfer dial tone to the holding extension.
- Dial the required Trunk Group Access Code and directory number – the system sets up a 2-way conversation with the third party.
- Flash the switchhook to connect the held trunk to the existing call and form a 3-party conference.

---

## Unlimited Wait For Dial Tone

---

**Description** This feature permits interconnection to extremely slow Central Offices (i.e., dial tone delays of 30 minutes). This feature seizes a trunk and holds it for an indefinite period. Upon the receipt of dial tone, the extension can outpulse the digits.

- Conditions**
- In most cases, the system Dial Tone Detectors CAN detect the dial tone provided by the Central Office. For these cases, Wait For Dial Tone must be set to 2 (Check for Dial Tone every 5 Seconds). Once dial tone is heard, a DTMF Receiver connects to the trunk. Once the detector detects the dial tone, outpulsing can begin. This condition ensures the correct operation of Toll Control.
  - In some cases, the system Dial Tone Detectors CANNOT detect the dial tone provided by the Central Office. For these cases, Wait For Dial Tone must be set to 3 (Unlimited Wait, With Detection by User). Once dial tone is heard and the switchhook is flashed (*SUPERSET* telephones must dial the digit 1), a DTMF Receiver connects to the trunk. Outpulsing can begin immediately.

**Programming** Commands 151 → 156, Trunk Groups 1 → 6 Programming, Register 2:

- Wait for Dial Tone (field b) must be set to 2 (Check for Dial Tone Every 5 Seconds) or 3 (Unlimited Wait With Detection by User). Default is 0 (No Wait).

**Operation** When Wait For Dial Tone is Set to 2:

- Go off-hook at an extension.
- Dial the Trunk Group Access Code.
- The Dial Tone Detector checks for dial tone.
- If no dial tone is detected after 5 seconds, then the Dial Tone Detector and DTMF Receiver are removed.
- The system then waits 5 seconds before connecting the Dial Tone Detector to check again for dial tone.
- The Dial Tone Detector is connected for 1.5 seconds to check for dial tone.
- If there is still no dial tone, then the system removes the Dial Tone Detector for another 5 seconds.
- This process of connecting the Dial Tone Detector 5 seconds OFF, 1.5 seconds ON intervals is continued until the system detects dial tone. At this time, the DTMF Receiver is connected.

When Wait For Dial Tone is Set to 3:

- Go off-hook at an extension.
- Dial a Trunk Group Access Code.
- Dialed digits are not outpulsed but the trunk and Dial Tone Detector remain seized.
- When dial tone is heard, flash the switchhook (*SUPERSET* telephones must dial the digit 1). The DTMF Receiver is assigned to the trunk which allows dialed digits to be outpulsed normally.

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## User Security Code Programming

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- Description** The user can perform limited programming of the system by dialing the User Security Code. This programming is possible only if the relevant System Options have been set in System Programming. Refer to User Programming Access (Command 180) in Section 9104-091-210-NA, Customer Data Entry.
- Conditions**
- If the User Security Code is entered, then all data can be viewed except the System Security Code and only the data specified by the User Programming Access can be altered.
  - The User Security Code must be different from the System Security Code to prevent user access to System Programming.
  - The User Security Code can only be changed in System Programming (i.e., using the System Security Code).
  - Default Data (#998) cannot be loaded using the User Security Code.
  - RMATS Security Code cannot be displayed.
- Programming** Command 180, User Programming Access, Registers 1, 2 and 3:
- Set the fields for the command numbers to which the user has access. By default, the user has no access to CDE registers. To change this, refer to Section 9104-091-210-NA, Customer Data Entry.
- Command 191, User Security Code Programming, Register 1:
- Assign the required 4-digit User Security Code (fields b → e). Default is 1234.
- Operation** To Enter Programming Mode:
- Press the STATUS key once and hold – the LCD displays SX-50, the software identifier and maintenance release number.
  - Enter the 4-digit User Security Code. If correct, the word SX-50 flashes on the LCD.
  - Release the STATUS key.
  - Dial # within 10 seconds – LCD displays  
**COMMAND 100?**
  - Perform programming as required.
- To Exit Programming Mode:
- Press the EXIT softkey – the system exits Programming Mode immediately.

OR

- Press the RELEASE key – the system exits Programming Mode immediately.

**Note:** Re-entry into Programming Mode via the # key, with the ability to change data, is possible for 8 seconds after EXIT.

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**Voice Mail Port**

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**Description** The VX Voice Processing system can be integrated with the *SX-50* Digital PABX through a Control Over Voice (COV) line circuit. Depending on the number of lines available on the VX Voice Server, two, four, six or eight lines are connected from the VX Voice Processing system to the *SX-50* Digital PABX. Each line assigned with a VX Voice Processing application is connected to a PABX port. These ports are called Voice Mail Ports.

Refer to Section 9150-953-003-NA, VX Voice Installation and Repair Manual for complete installation instructions.

■ **Conditions** This feature is available with MS52, MS54, and MS55 software.

**Programming Voice Mail Ports as Extensions**

Commands 301 → 310, Extension Programming:

- Assign a Class of Service Group (field d), an ARS Routing Class of Service (field g) and a telephone extension number (fields i-l) to each voice mail port.
- Set Pickup Group (field f) to 0 (No Pickup Group). VX Ports must NOT be assigned to a pickup group.

**Defining a Class of Service for Voice Mail Ports**

Commands 121 → 129, COS 1 – 9 Programming:

- Set Message Waiting (Register 2, field g) to 1 (Enable). This COS option enables Message Waiting for a Voice Mail subscriber's telephone.
- Set Do Not Disturb (Register 2, field k) to 1 (Enable). This COS option allows the Voice Mail Port to be taken out of service at the Attendant Console or Auxiliary Attendant, when required.
- Set Data Line Security (Register 3, field d) to 1 (Enable). This COS option prevents the presence of tones on the device.
- Set Voice Mail Port (Register 3, field k) to 1 (Message Optimization Control). This COS option provides special handling of the device by the *SX-50* Digital PABX.
- Set Call Forward options (Register 4, fields b → f) to 0 (Disable) as Call Forwarding is not required by this feature.
- Set Executive Busy Override (Register 4, field g) to 0 (Disable). This disallows Executive Busy Override capability for Voice Mail Ports.

- Set Executive Busy Override Security (Register 4, field h) to 1 (Enable). This prevents an override from occurring on the device.
- Set Last Number Redial Enable (Register 5, field k) to 0 (Disable). This ensures that the REDIAL prompt is not displayed on Voice Mail ports.
- Set *SUPERSET* Auxiliary Attendant Position (Register 7, field d) to 1 (Enable). This COS option allows sub-attendant features on the device.
- Set Directed Call Pickup Security (Register 7, field f) to 1 (Enable). This COS option restricts devices from picking up calls that are ringing into the VX Voice Mail hunt group.

### Programming Message Waiting

Command 100, System Options Programming:

- Set Message Waiting System Enable (Register 12, field c) to 1 (Enable with Lamps) or 2 (Enable with Bells).
- Set Message Waiting Automatic Cancel (Register 12, field f) to 0 (Disable) when using Voice Mail.

**Note:** This option is mutually exclusive and systemwide.

### Programming the Custom Call Routing/Auto Attendant Application as an Attendant Overflow Point

- Assign the Overflow Point (Register 08, fields g, h and i) with the Voice Mail Hunt Group (161 → 166). This option is used to designate the Custom Call Routing (CCR) and Auto Attendant application of the VX Voice Processing system as an attendant backup or overflow point.

### Programming the *SUPERSET* Auxiliary Attendant Function Key

Commands 401 → 480, *SUPERSET* Telephone Programming, Register 15:

It is recommended that the first two ports in the Voice Mail Port Hunt Group be programmed with a NIGHT SERVICE key. The NIGHT SERVICE key is used by the VX Voice Processing System to determine whether the SX-50 Digital PABX is in day or night service. Program key 15 as the NIGHT SERVICE key.

- Set Line Appearance Type (field c) to 8 (Attendant Function key).
- Set fields d,e to 12 (Night Service).

**Notes:** 1. A maximum of five NIGHT SERVICE keys can appear on Auxiliary Attendant sets.

2. Only the prime line or the Night Service Auxiliary Attendant function key can appear on the Voice Mail Port. The Voice Mail port's prime line must not appear on any other telephone.

### Defining a Voice Mail Port Hunt Group

Commands 361 → 366, Hunt Groups 1 → 6, Extension Hunt Group Programming, Register 1:

- Assign a Hunt Group (1 – 6) to Voice Mail.

Commands 361 → 366, Hunt Groups 1 → 6, Extension Hunt Group Programming, Registers 2 → 9:

- Assign the Voice Mail Port extension numbers (fields b, c, d, e) in Registers 2 → 9 to the Voice Mail Hunt Group.

Command 110, Registers 19 → 24 (where 19 corresponds to the hunt group defined in Command 361):

- Assign required 1–, 2–, 3– or 4–digit Hunt Group Access Codes. Default is 491 (Hunt Group 1) to 496 (Hunt Group 6).

### **Programming Alarm Capability for the VX Voice Processing System**

The SX-50 Digital PABX can be programmed to provide an alarm if the VX Voice Processing system fails. This is achieved by connecting the alarm relay contacts of the VX Voice Processor to an ONS port in the SX-50 system. Program the ONS port as a Contact Monitor (Refer to CONTACT MONITOR in this Section).

### **Programming – ONS Sets**

Command 110, Feature Access Code Programming, Registers 38 and 39:

- Assign required 1–, 2–, 3– or 4–digit Message Waiting Callback Access Code. Default is 65. When a message waiting is set on an ONS extension, this code can be used to obtain messages from the VX Voice Processing system.
- Assign required 1–, 2–, 3– or 4–digit Cancel Message Waiting Access Code. Default is 66. This allows the user at an ONS extension to cancel all message waiting indications.

### **Operation**

Refer to the documentation provided with the VX Voice Processing system.

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## Wait For Dial Tone

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- Description** This option selects the maximum period of time the system waits to receive dial tone from a trunk. Digits dialed before dial tone is received, or before the time-out period specified, are not outpulsed by the system.
- Conditions**
- Refer to Section 9104-091-220-NA, Automatic Route Selection and Toll Control Description.
  - In most cases, the dial tone provided by the Central Office can be detected by the Dial Tone Detectors within the system. In this case, Wait for Dial Tone must be set to 1 (Wait 5 Seconds). This condition ensures the correct operation of Toll Control.
- Programming** Commands 151 → 156, Trunk Groups 1 → 6 Programming, Register 2:
- Wait for Dial Tone (field b) must be specified as 0 (No Wait) or 1 (Wait 5 Seconds). Default is 0.
  - If Wait For Dial Tone is set to 0, Delay Before Outpulsing (field d) must be set to 1 → 5 seconds, as required.
  - If Wait for Dial Tone is set to 2 or 3, then refer to UNLIMITED WAIT FOR DIAL TONE in this Section.
- Operation** None.



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# Ordering Information

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1.

## INTRODUCTION

### General

- 1.1 This Practice contains the part numbers of all orderable parts of the SX-50® System for provisioning or sparing purposes.

### Reason for Reissue

- 1.2 This is the third issue of Practice 9104-091-150-NA. Changes to orderable part numbers have been incorporated. Changes from Issue 2 are indicated by change bars at the left hand side of the page.



## 2.

# ORDERING INFORMATION

### General

2.1 The ordering information is divided into the following tables:

- Table 2-1, System Configuration
- Table 2-2, Optional Parts
- Table 2-3, Replacement Parts
- Table 2-4, Documentation.

### Warranty

2.2 The MITEL *SX-50* Digital PABX is warranted against defective materials and workmanship. Equipment requiring service or repair during the warranty period must be packaged in accordance with the instructions in Practice 9104-091-200-NA, Shipping, Receiving and Installation Information and returned to the supplier. Repaired or replacement equipment is returned to the customer, post prepaid by MITEL.

**Table 2-1 System Configuration**

Description	Qty	Part Number	Comments
Basic <i>SX-50</i> System (includes cabinet, MC II and power supply)	1	9104-500-002-SA	
<i>SX-50</i> Base Package (includes basic system and console)	1	9104-500-003-SA	

**Table 2-2 Optional Parts**

Description	Qty	Part Number	Comments
SX-50 Attendant Console	1	9104-060-100-SA	
8 cct ONS Line Card	1	9104-020-003-SA	
16 cct ONS Line Card	1	9104-020-001-SA	
8 cct COV Line Card	1	9104-021-001-SA	
4 cct LS/GS Trunk Card	1	9104-030-100-SA	CSA Approved
8 cct LS/GS Trunk Card	1	9104-030-101-SA	CSA Approved
4 cct OPS Line Card	1	9104-020-100-SA	
8 cct OPS Line Card	1	9104-020-101-SA	
8 cct DNIC Line Card	1	9104-024-000-SA	
4 cct DID Card	1	9104-030-110-SA	
8 cct DID Card	1	9104-030-111-SA	
Universal Card	1	9104-040-000-SA	
E&M Trunk Module	1	9104-041-001-SA	Universal Card Required
Music-On-Hold/Page Module	1	9104-042-001-SA	Not required if an MC II Card is installed. Universal Card Required without MC II.
RMATS Module	1	9104-044-001-SA	Universal Card Required
Software Module, MS53	1	9104-011-104-SA	
Software Module, MS54	1	9104-011-105-SA	
Software Module, MS55	1	9104-011-106-SA	

Table 2-3 Replacement Parts

Description	Qty	Part Number	Comments
225W Power Supply	1	9104-001-000-SA	
Cardfile	1	9104-073-001-SA	
Cover	1	9104-071-002-SA	
Backplate	1	9104-072-001-SA	
Fuse Kit	1	9104-083-001-NA	
Power Cord	1	9104-080-001-NA	
MCC-2	1	9104-010-100-SA	Replaces 9104-010-001-SA
Lithium Battery Q745	1	9104-081-100-NA	MS50/51 (3 Prong-Type)
Lithium Battery Q745	1	9104-081-101-NA	MS53/54/55 (Clip Type)

Table 2-4 Documentation

Description	Qty	Part Number	Comments
Console Keyboard Overlay	1	9104-051-001-NA	
MS53/54 System Documentation Package	1	9104-050-103-NA	Package includes the following items:
<i>SX-50</i> Technical Practices	1	9104-091-104-NA	
<i>SUPERSET™</i> 3 User Guide	1	9104-953-006-NA	
<i>SUPERSET</i> 4 User Guide	1	9104-953-007-NA	
Extension User Guide	1	9104-953-005-NA	
Reference Card-Extension	1	9104-953-102-NA	
Reference Card- <i>SUPERSET</i> 3 telephone	1	9104-953-103-NA	
Reference Card- <i>SUPERSET</i> 4 telephone	1	9104-953-104-NA	
MS55 System Documentation Package	1	9104-050-106-NA	Package includes the following items:
<i>SX-50</i> Technical Practices	1	9104-091-106-NA	
<i>SUPERSET</i> 3 User Guide	1	9104-953-006-NA	
<i>SUPERSET</i> 4 User Guide	1	9104-953-007-NA	

Table 2-4 Documentation  
(continued)

Description	Qty	Part Number	Comments
<i>SUPERSET 410</i> Quick Reference Guide	1	9104-953-035-NA	
<i>SUPERSET 420</i> Quick Reference Guide	1	9104-953-036-NA	
<i>SUPERSET 410</i> Installation and User Guide	1	9114-953-100-NA	
<i>SUPERSET 420</i> Installation and User Guide	1	9115-953-100-NA	
Extension User Guide	1	9104-953-005-NA	
Reference Card-Extension	1	9104-953-102-NA	
Reference Card- <i>SUPERSET 3</i> telephone	1	9104-953-103-NA	
Reference Card- <i>SUPERSET 4</i> telephone	1	9104-953-104-NA	

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# Engineering Information

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1.

## INTRODUCTION

### General

- 1.1 This Section contains the basic engineering information for the SX-50® DIGITAL Private Automatic Branch Exchange (DPABX). It uses stored program control, the MITEL® Digital Transmission integrated circuit and Codec integrated circuit. This Section should be used with the following Sections:
- 9104-091-200-NA, Shipping, Receiving and Installation Procedures,
  - 9104-091-210-NA, Customer Data Entry (CDE).

### Reason for Reissue

- 1.2 Section 9104-091-180-NA, Engineering Information, has been reissued to include a description of the SUPERSET™ 410 and *SUPERSET 420* telephones, the Digital Network Interface Circuit (DNIC) Line Card and the functionality provided by MS55 software.

### Section Overview

- 1.3 This Section is divided into 10 parts as described below:
1. **Introduction:** this Part
  2. **System Characteristics:** lists the system limitations, electrical characteristics, tone plans and environmental conditions for system operation.
  3. **Power Requirements:** describes the power supply unit, the input requirements for system operation and lists the stabilized outputs of the power supply unit.
  4. **Signaling and Supervision:** describes the signaling parameters and types of signaling for system operation.
  5. **Transmission:** specifies the transmission characteristics of the SX-50 system.
  6. **Line Card Operation:** describes the operation of the ONS, OPS, COV and DNIC Line cards.
  7. **Trunk Operation:** describes the operation of the LS/GS Trunk Card, E&M Trunk Module and the DID Trunk Card.
  8. **Universal Card Modules – Operation:** describes the operation of the RMATS and Music on Hold/Pager modules. This Part also discusses the Control Card 2

(MCC2) as an alternative method of performing Music on Hold. (The E&M Trunk module is described under Trunk Operation).

9. **Digital Switching Matrix Description:** describes the pulse-code modulation, time-division multiplexing and digital switching array used in the *SX-50* system.
10. **Traffic Considerations:** provides data used in determining parameters which are traffic-dependent such as quantities of trunks required and level of traffic per line.

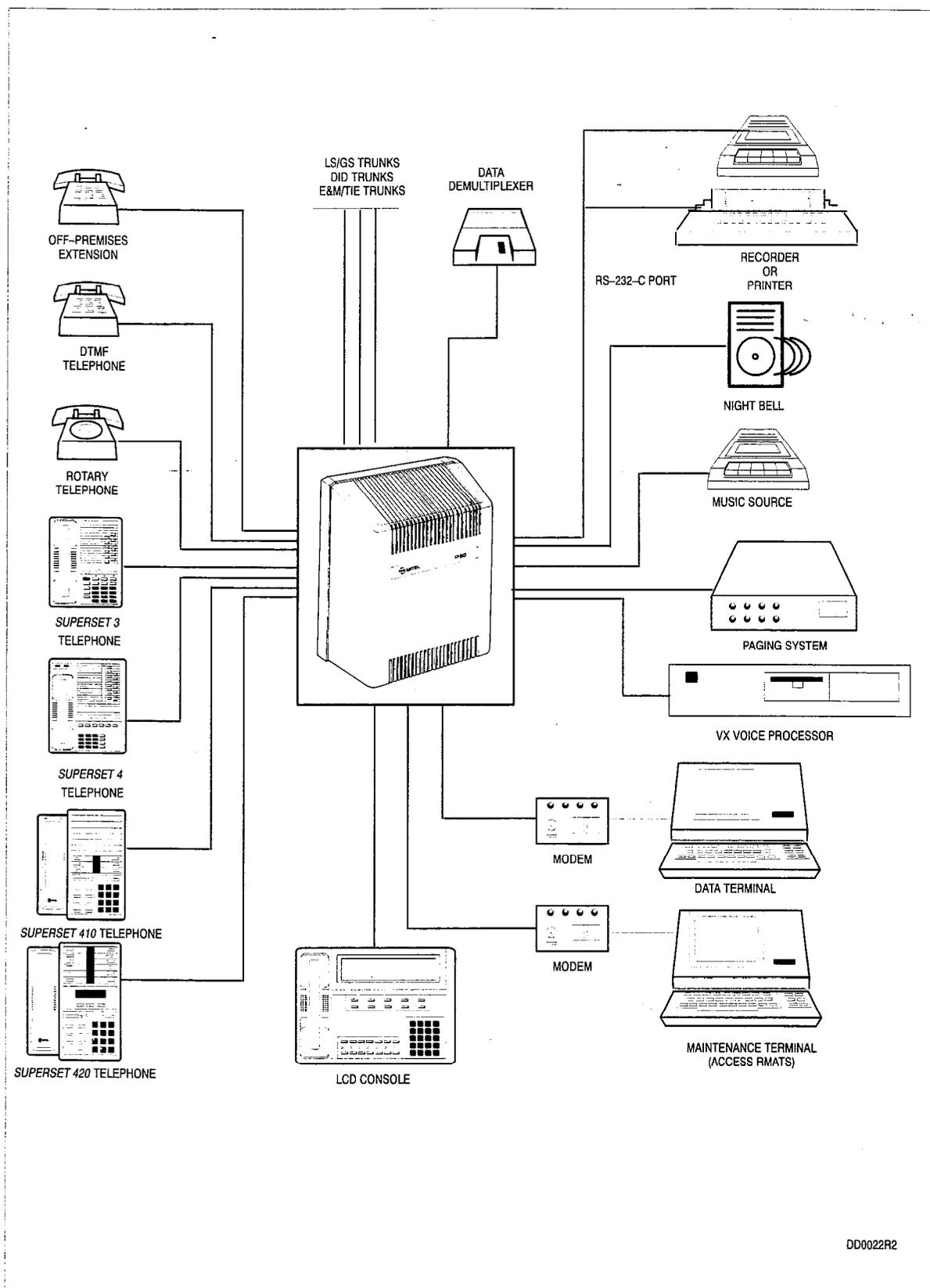
## 2.

# SYSTEM CHARACTERISTICS

### System Limitations

- 2.1 Table 1-1, System Parameters, lists the SX-50 system hardware and software operational limits.

Parameter	Maximum
Attendant Consoles	1
Call Forwards	80
Call Indications per System	30
Classes of Service	9
CO Trunks (Loop Start/Ground Start)	80
Digits per Digit String	40
DID Trunk Circuits	16
DTMF Receivers	5
E&M Trunks	32
Hunt Groups	6
Members per Hunt Group	8
Members per Pickup Group	160
Members per Ring Group	9
Message Waiting Lamps	30
Members per Trunk Group	80
Night Bells Equipment	1
ONS Line Circuits	160
OPS Line Circuits	80
Paging Zones	1
Peripheral Card Slots	10
Pickup Groups	7
Ports	160
Power Fail Transfer Circuits	2 per LS/GS card
Ring Groups	1
Simultaneous Callbacks	16
Simultaneous Calls	45
Simultaneous Camp-on Calls	20
Simultaneous Holds (Attendant)	3
Simultaneous Holds (Station)	44
Stations in parallel	5
<i>SUPERSET</i> Telephones	64
System Speed Call Numbers	900
Three-party Conferences	6
Trunk Groups	6
Trunks Assigned to Night Stations	80



DD0022R2

Figure 2-1 System Block Diagram

## Electrical Characteristics

2.2 Table 2-2 lists the electrical characteristics of the SX-50 system.

<b>Table 2-2 Electrical Characteristics</b>	
<b>Parameter</b>	<b>Detail</b>
AC Rejection	60 Hz, 180 Hz at 50 Vrms
Central Office (LS/GS) Loop Resistance Limit	1600 ohms maximum
Crosstalk	Better than 75 dB down
Dial Tone Detector Level	350/440 Hz, minimum -23 dBm
Direct Inward Dial (DID) Loop Resistance Limit	2240 ohms maximum
Distance of Console from Equipment Cabinet	200 m (656 ft) maximum (26 AWG cable)
FCC Registration Number	BN285B-16887-MF-E (U.S. - manufactured systems) BN24CK-16185-MF-E (U.K. - manufactured systems)
Heat Dissipation	1095 BTU/hour maximum
Idle Circuit Noise	20 dBmC max. lines, 23 dBmC max. trunks
Impulse Noise	0 counts above 47 dBmC for 90% of cases
Insertion Loss: Station-to-Station Station-to-Trunk	6 dB $\pm$ 0.5 dB at 1000 Hz 0.0 dB $\pm$ 0.5 dB at 1000 Hz
Leak Resistance (minimum)	15,000 ohms
Longitudinal Balance (Trunks) (See para. 5.5 )	54 dB minimum, 200 - 3400 Hz
Primary Power	96 - 132 Vac, 47 - 63 Hz, 4 A maximum
Return Loss	12 dB singing, 18 dB echo (See para. 5.4 )
Ring Trip	During silent or ringing period
Ringers per Line (maximum)	5
Ringing Voltage	75 Vrms $\pm$ 5 V, 20 Hz
Station Loop Limit - ONS	600 ohms including set at 25 mA
Station Loop Limit - OPS	2240 ohms including set at 16 mA
System Impedance	600 ohms nominal for lines 600 ohms or Complex impedance for trunks
System Traffic Capacity	575 ccs maximum

## Tone Plans – Country Variants

- 2.3 MS53 and MS54 support two new tone plans. Table 2–1 lists the tone plans for North America, Hong Kong and Taiwan. A tone plan variant is selected using CDE Command 100, Register 3, field C. Refer to Section 9104–091–210–NA, Customer Data Entry, for more information.

## Environmental Conditions

- 2.4 Table 2–4 lists the environmental conditions for the storage and transport of the SX–50 system. Table 2–5 lists the environmental conditions for the SX–50 system in operation.

## Power Fail Transfer

- 2.5 Each LS/GS Trunk Card has two power fail transfer circuits. If there is a commercial power failure or the system shuts down due to overheating or processor malfunction, the power fail transfer relays connect the Central Office Trunks to selected stations.

**Incoming Calls.** After a power fail transfer has occurred, ringing of stations for incoming calls is applied directly to the selected station line from the Central Office.

**Outgoing Calls.** After a power fail transfer has occurred, outgoing calls on a station made through a ground start CO trunk must be equipped with a ground key or Loop-to-Ground Converter (CM1470). When the ground key is pressed momentarily, a ground condition is applied to the ring side of the trunk, energizing the CO equipment. One side of the ground key must be connected to a ground and the other to the ring conductor of the station. Call origination over loop start trunks does not require the use of a ground start key.

**Table 2–3 Tone Plans – County Variants**

Tones	Country		
	North America	Hong Kong	Taiwan
<b>Do Not Disturb Tone</b>	350/440 Hz, continuous, –16 dBm	350/440 Hz, continuous, –10 dBm	380 Hz, 500 ms ON, 500 ms OFF, continuous, –10 dBm
<b>Busy Tone</b>	480/620 Hz, 500 ms ON, 500 ms OFF, –24dBm	480/620 Hz, 500 ms ON, 500 ms OFF, –10 dBm	480/620 Hz, 500 ms ON, 500 ms OFF, continuous, –10 dBm
<b>Ringback Tone</b>	440/480 Hz, 1 s ON, 3 s OFF, –19dBm	440/480 Hz, 400 ms ON, 200 ms OFF, 400 ms ON, 3 s OFF, continuous, –10 dBm	440/480 Hz, 400 ms ON, 200 ms OFF, 400 ms ON, 3 s OFF, continuous, –10 dBm

Page 1 of 2

**Table 2-3 Tone Plans – County Variants  
(continued)**

Tones	Country		
	North America	Hong Kong	Taiwan
<b>ARS Dial Tone</b>	350/440 Hz, continuous, 500 ms OFF, -16dBm	350/440 Hz, continuous, 500 ms OFF, -10 dBm	350/440 Hz, continuous, 500 ms OFF, -10 dBm
<b>Dial Tone</b>	350/440 Hz, continuous, -16 dBm	350/440 Hz, continuous, -10 dBm	380 Hz, continuous, -10 dBm
<b>Reorder Tone</b>	480/620 Hz, 250 ms ON, 250 ms OFF, -24dBm	480/620 Hz, 250 ms ON, 250 ms OFF, -10 dBm	480/620 Hz, 250 ms ON, 250 ms OFF, continuous, -10 dBm
<b>Transfer Dial Tone</b>	350/440 Hz, three bursts of 100 ms ON, 100 ms OFF, -16 dBm	350/440 Hz, three bursts of 100 ms ON, 100 ms OFF, -10 dBm	380 Hz, three bursts of 100 ms ON, 100 ms OFF, -10 dBm
<b>Campon Beep</b>	440 Hz, one burst of 200 ms ON, -20 dBm	440 Hz, one burst of 200 ms ON, -10 dBm	440 Hz, one burst of 200 ms ON, -10 dBm
<b>Trunk Campon Beep</b>	440 Hz, a single burst of 100 ms ON, 50 ms OFF, 100 ms ON, -20 dBm	440 Hz, a single burst of 100 ms ON, 50 ms OFF, 100 ms ON, -10 dBm	440 Hz, a single burst of 100 ms ON, 50 ms OFF, 100 ms ON, -10 dBm
<b>Campon Tone</b>	440 Hz, 500 ms ON, 500 ms OFF, continuous, -20 dBm	440 Hz, 500 ms ON, 500 ms OFF, continuous, -10 dBm	440 Hz, 500 ms ON, 500 ms OFF, continuous, -10 dBm
<b>Call Forward Follow Me Tone</b>	440 Hz, six bursts of 100 ms ON, 100 ms OFF, -20 dBm	440 Hz, six bursts of 100 ms ON, 100 ms OFF, -10 dBm	440 Hz, six bursts of 100 ms ON, 100 ms OFF, -10 dBm
<b>Executive Busy Override Tone</b>	440 Hz, a single burst of 800 ms ON, -20 dBm	440 Hz, a single burst of 800 ms ON, -10 dBm	440 Hz, a single burst of 800 ms ON, -10 dBm
<b>Executive Busy Override in Progress</b>	440 Hz, 200 ms ON, 6 s OFF, continuous, -20 dBm	440 Hz, 200 ms ON, 6 s OFF, continuous, -10 dBm	440 Hz, 200 ms ON, 6 s OFF, continuous, -10 dBm
<b>Wakeup Tone</b>	440 Hz, 100 ms ON, 400 ms OFF, continuous, -20 dBm	440 Hz, 100 ms ON, 400 ms OFF, continuous, -10 dBm	440 Hz, 100 ms ON, 400 ms OFF, continuous, -10 dBm
<b>ARSExpensive Route Warning Tone</b>	440 Hz, four bursts of 100 ms ON, 50 ms OFF, -20 dBm	440 Hz, four bursts of 100 ms ON, 50 ms OFF, -20 dBm	440 Hz, four bursts of 100 ms ON, 50 ms OFF, -10 dBm
<b>Trunk Conference Warning Tone</b>	440 Hz, 400 ms ON, 30 s OFF, continuous, -20 dBm	440 Hz, 400 ms ON, 30 s OFF, continuous, -10 dBm	440 Hz, 400 ms ON, 30 s OFF, continuous, -10 dBm

**Table 2-4 Environmental Conditions (Storage – Transport)**

Condition	Quantity
Temperature Range:	–40° C to +60° C (–40° F to +140° F)
Relative Humidity:	5 → 95% relative humidity, noncondensing
Vibration:	.5 G (Sinusoidal) 10 to 500 Hz
Shock:	Up to 75 cm (30 in.) drop depending on package
Low Pressure:	87 mm Hg (50,000 feet)
Temperature Shock:	–40° C to +25° C (–40° F to +77° F) in 5 minutes

**Table 2-5 Environmental Conditions (Operating)**

Condition	Quantity
Temperature Range:	0° C to 40° C (32° F to 104° F)
Relative Humidity:	10% → 90%, non-condensing

**Power Fail Transfer Reset.** The system returns to normal operation from any of the following power fail transfer conditions:

- (a) **Reset From High Temperature.** If a high temperature condition is detected (nominally 65° C (149° F)), the system switches off the power supply and enters the Power Fail Transfer Mode. When the temperature returns to normal, the system automatically returns to normal operation.
- (b) **Reset From Commercial Power Failure.** The system automatically returns to normal operation when the commercial power is restored.
- (c) **Reset From Processor Malfunction.** The system contains a watchdog timer which the system software must periodically reset as proof that the processor is functioning normally. If the timer is not reset within its time-out period, the system goes into Power Fail Transfer mode.

**Note:** Calls in progress drop when the SX-50 enters or leaves Power Fail Transfer mode. Also, upon reset, the time and date will have to be set.

## 3.

## POWER REQUIREMENTS

### Power Supply Unit

- 3.1 The power supply unit clips to the left side of the Card Frame. It is a self-contained unit providing a high level of isolation. The Control Card plugs into the Power Supply.

The SX-50 system maintains connections of established calls for all ac power interruptions lasting 100 ms or less for up to 80% traffic load conditions, at 115 volts nominal supply.

### Input Requirements

- 3.2 The SX-50 system is powered from ac commercial power. Table 3-1 lists the input supply requirements.

Table 3-1 Environmental Conditions (Operating)	
Parameter	Quantity
Voltage	96 → 132 Vac
Phase	Single
Frequency	47 → 63 Hz

### Power Supply Outputs

- 3.3 The Power Supply provides the following stabilized outputs:
- 5 V
  - -5 V
  - 12 V
  - -12 V
  - -32 V
  - -48 V
  - 75 Vac (ringing supply).



# 4.

## SIGNALING AND SUPERVISION

### General

4.1 This Part details the signaling and supervisory parameters of the SX-50 system.

### Input Signaling Parameters

4.2 **Dial Pulse.** The SX-50 system accepts and repeats Dial Pulse (DP) signals from telephone sets which have the parameters shown in Table 2-1, Dial Pulse Detection.

Table 4-1 Dial Pulse Detection		
Parameter	Minimum	Maximum
Pulse Rate (pps)	8.0	12.0
Break Duration (%)	58	64
Break Duration (ms)	53	80
Interdigit Time (seconds)	0.300	15

**DTMF Tones.** The SX-50 system accepts and repeats DTMF signals from telephone sets which have the parameters shown in Table 4-2, DTMF Tone Detection. When any of the frequencies shown in this table are present at the system input, any other single frequency (200 to 3400 Hz) must be a minimum of 40 dB lower in level. The SX-50 system can detect DTMF tones in the presence of precise dial tone at a level of -16 dBm (on a line circuit). DTMF signals must be at least 40 ms in duration.

Table 4-2 DTMF Tone Detection				
Low Tones	High Tones			
	1209	1366	1477	1633
697	1	2	3	A
770	4	5	6	B
852	7	8	9	C
941	*	0	#	D

Frequency Deviation:  $\pm 1.5\%$  maximum

Minimum Level Per Frequency: -17 dBm on line circuit

## Output Signaling Parameters

- 4.3 The SX-50 system provides make/break ratios of 60/40 and 66/33 for outpulsing on trunks. Table 4-3 lists the Dial Pulse Output characteristics. Table 4-4 lists the DTMF Tone limits.

Table 4-3 Dial Pulse Output Characteristics	
Parameter	Value
Pulse Rate	8 → 11 pps
Percent Break Ratio	58 → 64%
Interdigit Time	700 → 900 ms

Table 4-4 DTMF Tone Limits	
Parameter	Value
Frequency Deviation	±1% maximum
Signal Duration	Greater than 50 ms
Interdigit Time	Greater than 45 ms
Cycle Time (DTMF digit + interdigit time)	Greater than 93 ms
Level, Low Group	Greater than -10 dBm
Level, High Group	Greater than -8 dBm
Level, DTMF Signal	Less than 0 dBm
Level, Third Frequency	At least 40 dB below DTMF signal

## E&M Signaling

- 4.4 E&M signaling is another method of interoffice signaling. It uses two signaling leads and two or four audio leads. This method of signaling is preferred to positive-negative signaling since its operation is not impaired by differences in the earth potential.

The M lead is used for signaling from the trunk circuit; the E lead is used for signaling to the trunk circuit. As a result, signals are sent from office A to office B on the M lead of the trunk circuit in office A and arrive on the E lead of office B. Similarly, signals are sent from office B on the M lead and arrive on the E lead of office A. The E&M leads

provide all the supervisory and dial-pulse signaling required between Central Offices; the audio leads are used for DTMF signaling and audio communications.

## Terminating Conditions

4.5 The SX-50 system provides the following-line and trunk parameters:

**Station Loop – ONS :** The loop resistance, including the set, must be less than 600 ohms. The ONS Line Card provides a constant current of 25 mA when the set is off-hook. Maximum station loop length depends on the gauge of wire used. Refer to Table 4-5, Station Loop Length Vs Wire Gauge (ONS Line Card).

**Station Loop – OPS:** The OPS Line Card operates on loops of up to 2240 ohms to a minimum loop current of 16 mA. When the set is off-hook, the OPS Line Card provides a constant current of 30 mA if the station loop has less than 1200 ohms resistance, set included. Maximum station loop length depends on the gauge of wire used. Refer to Table 4-6, Station Loop Length Vs Wire Gauge (OPS Line Card).

**SUPERSET 3 and SUPERSET 4 Telephone Loop:** The SUPERSET telephone draws a current of 30 mA. Maximum station loop length depends on the gauge of wire used. Refer to Table 4-7, Station Loop Length Vs Wire Gauge (COV Line Card).

**SUPERSET 410 and SUPERSET 420 Telephone Loop:** The DNIC Line Card operates on loop lengths of up to 1000 meters, for wire gauges 19 through 26, and provides a current of 30mA.

**CO Trunk Loop:** The SX-50 system operates with CO trunks up to a maximum of 1600 ohms loop resistance.

**CO Trunk Seizure:** The SX-50 system maximum seizure dc resistance is 270 ohms at 20 mA.

**CO Trunk Resistance:** In the idle state, the resistance towards the CO from the trunk circuit is no less than 30 Kohms for ground start, and no less than 10 Megohms for loop start trunks.

**DID Trunk Loop:** The SX-50 system operates with DID trunks of up to 2240 ohms loop resistance (minimum 16 mA loop current), CO interface included. The trunk circuit provides a constant current of 30 mA if the trunk loop has less than 1200 ohms resistance. Maximum trunk loop length depends on the gauge of wire used. Refer to Table 4-8, DID Trunk Loop Length Vs Wire Gauge (DID Trunk Card).

## Loop Lengths

<b>Table 4-5 Station Loop Length vs Wire Gauge (ONS Line Card)</b>	
<b>Wire Gauge</b>	<b>Max. Station Loop Length</b>
19	9,163 m (30,000 feet)
20	7,317 m (24,000 feet)
22	4,576 m (15,000 feet)
24	2,896 m (9,500 feet)
26	1,829 m (6,000 feet)

<b>Table 4-6 Station Loop Length vs Wire Gauge (OPS Line Card)</b>	
<b>Wire Gauge</b>	<b>Max. Station Loop Length</b>
19	37.5 Km (122,900 feet)
20	29.6 Km (97,100 feet)
22	18.5 Km (60,700 feet)
24	11.5 Km (37,800 feet)
26	7.2 Km (23,700 feet)

<b>Table 4-7 SUPERSET Loop Length vs Wire Gauge (COV Line Card)</b>	
<b>Wire Gauge</b>	<b>Max. SUPERSET Loop Length</b>
19	701 m (2,300 feet)
20	549 m (1,800 feet)
22	367 m (1,200 feet)
24	229 m (750 feet)
26	152 m (500 feet)

<b>Table 4-8 DID Trunk Loop Length vs Wire Gauge (DID Trunk Card)</b>	
<b>Wire Gauge</b>	<b>Max. SUPERSET Loop Length</b>
19	41,118 m (134,900 feet)
20	32,492 m (106,600 feet)
22	20,330 m (66,700 feet)
24	12,649 m (41,500 feet)
26	7,925 m (26,000 feet)

## Ringling Generator

- 4.6 The ringing generator can ring nine circuits simultaneously. However, time-division-multiplexing of the ringing signal actually allows 27 circuits to be in the ringing state at any time. A maximum of five ringing devices can be connected to each circuit. Table 4-9 lists the ringing generator output parameters.

<b>Table 4-9 Ringing Generator Parameters</b>	
<b>Parameter</b>	<b>Quantity</b>
Frequency	20 Hz
Frequency Drift (for any input, output or temperature variation)	Less than 1 Hz
Voltage	75 Vrms $\pm$ 5 V
Waveshape	Sinusoidal with less than 5% distortion superimposed on -48 Vdc

## Time-out Periods

- 4.7 Table 4-10 lists the time-out periods for the SX-50 system.

<b>Table 4-10 Time-Out Information</b>	
<b>Time-Out Type</b>	<b>Quantity</b>
Attendant-Timed Recall (Don't Answer)	(1 $\rightarrow$ 7) x 10 s
Attendant-Timed Recall (Camp-on)	(1 $\rightarrow$ 7) x 10 s
Attendant-Timed Recall (Call Hold)	(1 $\rightarrow$ 7) x 10 s
Automatic Switching to Night Bell	Immediate OR (1 $\rightarrow$ 7) x 10 s
Callback Clear Time-out	8 hours OR 4 rings
Call Hold Recall (Station)	1 $\rightarrow$ 4 minutes
Dial Tone Time-out	10 s
Interdigit Time-out	10 s
Lockout Time-out	10 s
Ringing Time-out	5 $\rightarrow$ 5.5 minutes
Switchhook Flash	150 $\rightarrow$ 750 ms OR 150 $\rightarrow$ 1500 ms
Tip-Ground CO Acknowledgement	140 ms minimum



# 5.

## TRANSMISSION

### Transmission Characteristics

- 5.1 The insertion loss at 1004 Hz is as follows:
- Station-to-Station connection: 6 dB  $\pm$ 0.5 dB
  - Station-to-Trunk connection: 0.0 dB  $\pm$ 0.5 dB.

Transmission Plan	Frequency or Frequency Band (Hz)	Attenuation Variation w/r to 1004 Hz (dB)
Line to Line	200	0.0 to +2.5
	300 to 3000	-0.25 to +0.5
	3200	-0.3 to +0.7
Line to Trunk	200	0.0 to +2.5
	300 to 3000	-0.25 to +0.5
	3200	-0.3 to +0.7

**Note:** (+) is more loss, (-) is less loss.

The attenuation variation, relative to the 1004 Hz insertion loss, does not exceed the limits as shown in Table 5-1.

### Distortion

- 5.2 The second or third harmonic does not exceed a level of -55 dBm with a 200 or 1004 Hz signal at -10 dBm. With an input signal consisting of 900 Hz and 1004 Hz (each at -13 dBm), the RMS sum of all the intermodulation products does not exceed -45 dBm when measured at the output.

### Overload

- 5.3 The change in attenuation when the input level of a 1004 Hz signal exceeds 0 dBm is as follows:

Change in signal level	Output increase
from 0 dBm to +3 dBm	< 0.1 dB
from +3 dBm to +5 dBm	< 1.0 dB
from +5 dBm to +7 dBm	< 3.0 dB

## Return Loss

5.4 The Return Loss parameters in the talking state, Station-to-Station or Station-to-Trunk, are:

- ERL (Echo Return Loss) >18
- dB SRL (Singing Return Loss) >12 dB

## Longitudinal Balance

5.5 All connections meet the following requirements with respect to longitudinal balance:

Minimum		Maximum
<u>200 Hz</u>	<u>1000 Hz</u>	<u>3000 Hz</u>
58 dB	58 dB	54 dB

## Crosstalk Attenuation

5.6 The minimum crosstalk attenuation between any two established connections through the DPABX when both paths are correctly terminated is -70 dB. For at least 95% of all connections through the DPABX, minimum crosstalk attenuation will be -75 dB. These figures are based on a disturbing signal at 0 dBm and an applicable frequency range of 200 to 3400 Hz.

## Message Circuit Noise

5.7 The total level of all noise sources within the system does not exceed the following limits (on 95% of the connections):

- Station-to-Station –
  - <20 dBmC (message weighted)
  - <35 dBm (3 kHz flat)
- Station-to-Trunk –
  - <20 dBmC (message weighted) at station interface
  - <23 dBmC at trunk interface
  - <35 dBm (3 kHz flat).

Impulse noise in the voiceband results in zero counts above a level of 47 dBmC for 90% of all cases.

## System Impedance

5.8 System impedances are:

- 600 ohms nominal for Stations
- 600 ohms nominal for Trunks with selectable Balance Impedance of 600 ohms or Complex Impedance ( $350 \Omega$  plus  $1000 \Omega$  in parallel with  $0.21 \mu\text{F}$ ).

## Envelope Delay

5.9 The maximum envelope delay, Station-to-Station or Station-to-Trunk, is:

- 515  $\mu\text{s}$  between 400 Hz and 600 Hz,
- 320  $\mu\text{s}$  between 600 Hz and 1000 Hz,
- 150  $\mu\text{s}$  between 1000 Hz and 2600 Hz,
- 320  $\mu\text{s}$  between 2600 Hz and 3000 Hz,
- 515  $\mu\text{s}$  between 3000 Hz and 3200 Hz.



## 6.

## LINE CARD OPERATION

### ONS/OPS Line Card Operation

- 6.1 When a telephone goes off-hook, the line circuit detects the flow of loop current and signals the Main Processor on the Control Card. The processor responds by connecting a DTMF receiver to the line and sending dial tone to the set. (If the set uses pulse dialing, then the processor detects the pulses by monitoring the loop current). The user can then dial the desired number.

When a call is directed to a station, the system applies ringing voltage to the appropriate line and monitors the loop current for an off-hook condition. When the telephone is answered, the ringing voltage is removed.

When a call is ended by one of the sets going on-hook, the call is disconnected and the line returns to the idle state.

### COV Line Card Operation

- 6.2 Control information from the Control Card is converted to a 32 KHz Amplitude Shift Keyed (ASK) data stream. The audio information is acquired in PCM form from the 2 MBit/s data link, converted to analog audio and combined with the control information for transmission to the set. Conversely, the audio and ASK data signals from the set are separated and converted. The ASK data is demodulated and sent to the processor. The audio is converted to PCM and transmitted on the data link.

There is only one UART and one modem on the COV Line Card. The eight lines are time-division-multiplexed to the communication circuit. Transmission and reception are sequential, but the card receives data from the set to which it last transmitted. For example, the card receives from set A and then transmits to set B. In the next time slot it receives from set B and transmits to set C.

### DNIC Line Card Operation

- 6.3 Digital Network Interface Circuit (DNIC) Line Card communicates with a DNIC-equipped device using digital transmission techniques; a voice channel, data channel and control channel. It allows simultaneous transmission of voice and data over a single twisted pair of wires. When the DNIC line card is connected to *SUPERSET 410* and *SUPERSET 420* telephones, each telephone may be connected to a MILINK™ Data Module which can be connected to a personal computer, or similar data device. The voice operation of the telephone and data operation of the data device can function concurrently.



# 7.

## TRUNK OPERATION

### LS/GS Trunk Card Operation – Loop Start

- 7.1 To place an outgoing call, the trunk circuit places a termination across the Tip and Ring leads. The CO detects the current flow and responds with dial tone. The user can now dial digits.

The trunk circuit recognizes an incoming call when it receives ringing voltage or battery reversal from the CO. The trunk circuit responds by placing a termination across the Tip and Ring leads. The system releases the trunk by breaking the loop current, which occurs when either party goes on-hook or when the line is physically broken.

### LS/GS Trunk Card Operation – Ground Start

- 7.2 To place an outgoing call, the trunk circuit grounds the Ring lead. The CO responds by grounding the Tip lead and sending dial tone. The trunk circuit then places a termination across the Tip and Ring leads and removes the ground from the Ring lead. The CO is now ready to receive dialed digits.

The trunk circuit recognizes an incoming call when the CO grounds the Tip lead. The CO may also send ringing voltage. The trunk circuit responds by placing a termination across the Tip and Ring leads. The trunk is released when the loop current is broken. This occurs when either party goes on-hook or the line is physically broken.

### E&M Trunk Module Operation

- 7.3 Type 1 and 5 interfaces differ in the signaling applied to the E and M leads. Table 7–1 shows the switch settings for Type 1 and Type 5 interfaces. The switches are found on the E&M Trunk Module.

(a) Type 1 operation:

The E&M Module signals the off-hook condition by applying –48 volts to the M lead; the far end signals the off-hook condition by grounding the E lead. The E&M Module signals the on-hook condition by leaving the E lead open; the far end signals the on-hook condition by grounding the M lead.

(b) Type 5 operation:

The E&M Module signals the off-hook condition by grounding the M lead; the far end signals the off-hook condition by grounding the E lead. The E&M Module signals the on-hook condition by leaving the E lead open; the far end signals the on-hook condition by leaving the M lead open.

Table 7-1 E&amp;M Trunk Module Switch Settings

Function	Switches							
	1	2	3	4	5	6	7	8
Signaling Type 1 Type 5	x	x	x	x	x	1	x	x
PABX to Line Gain 3 dB -13 dB	0	x	x	x	x	x	x	x
Line to PABX Gain -4 dB -11 dB	x	0	x	x	x	x	x	x
Termination 600 $\Omega$ Complex	x	x	1	0	x	x	x	x
Transmission 2-wire 4-wire	x	x	x	x	1	x	x	x

Note: 0 = Open, 1 = Closed, x = Not Applicable.

## DID Trunk Card Operation

- 7.4 In the idle state the DID Trunk circuit applies a battery feed of -48 Vdc to the Ring lead and ground to the Tip lead.

The Central Office (CO) seizes the DID Trunk by placing a termination across the Tip and Ring leads. The SX-50 system reverses the polarity of the battery feed to acknowledge the seizure, depending on the type of supervision selected. The SX-50 system supports Immediate Dial, Delay Dial or Wink Start supervision. DTMF, loop-dial or battery-and-ground pulse dialing from the CO specifies the required extension. The battery feed remains in the reverse state for the duration of the call.

Either end can disconnect the call:

- (a) DID Circuit Disconnect:

The SX-50 DID trunk circuit reverts to forward battery feed, the idle state. The CO removes the termination. Current no longer flows in the circuit.

- (b) Central Office Disconnect:

The Central Office removes the termination. Current no longer flows in the circuit. The SX-50 DID trunk circuit returns to forward battery feed.

## 8.

## UNIVERSAL CARD MODULES – OPERATION

### RMATS Module Operation

- 8.1 The UART converts the parallel data on the Universal Card data bus to the serial format required by the modem. The output of the modem is one of two audio tones, depending on the logic level at the input. A MITEL Codec converts this to the digital audio coding used within the *SX-50* system.

Signals coming from a remote terminal's modem are first digitized by the ONS Line Card (or LS/GS Trunk Card) before routing to the RMATS Module. At the RMATS Module, the Codec converts the signal back into the analog audio tones for input to the modem. The modem outputs the corresponding serial data. The UART converts this to parallel data and transmits it on the Universal Card data bus.

### Music on Hold/Pager Module Operation

- 8.2 There are two methods of providing Music on Hold/Pager capability in the MS53 and MS54 release;
- A Music on Hold/Pager Module can be installed on the Universal Card
  - The Control Card 2 (MCC2), which incorporates the Music/Pager circuit can be installed on the *SX-50* DPABX.

For further information on the Control Card 2 (MCC2), refer to Section 9104-091-100-NA, General Information or Section 9104-091-200-NA, Shipping, Receiving and Installation.

When a Music on Hold/Pager Module is mounted on the Universal Card, the music source is connected to the *SX-50* system by a Tip/Ring pair. The installer determines which pair from the Tip and Ring Assignments table in Section 9104-091-200-NA, Shipping, Receiving and Installation.

The music input is a transformer with an impedance of 150 . The input signal should be between 50 and 500 mVrms. High frequency attenuation and amplitude limiting are applied as required by FCC rules, Part 68. The maximum input level before amplitude limiting occurs is approximately -6 dBm.

The paging output is transformer-coupled and has an impedance of less than 200 . The output level into a 600 load is typically -6 dBm.

A relay is provided to control an external paging amplifier. Its contacts are rated as follows:

- maximum switching voltage – 90 Vrms
- maximum carrying current – 0.4 Amps.



# 9.

## DIGITAL SWITCHING MATRIX DESCRIPTION

### General

- 9.1 The *SX-50* system accepts analog voice signals at its line and trunk inputs, converts them into digital signals and passes them to the Digital Switching Matrix. The method of conversion is Pulse Code Modulation (PCM). Time-Division-Multiplexing (TDM) is used to combine many signals for transmission over a few single links within the system. The signal is routed via these links to its destination – usually a line card or a trunk card – where it is reconverted to an analog signal.

### Pulse Code Modulation

- 9.2 PCM uses the following procedures:

- sampling,
- quantizing,
- encoding.

Sampling determines the amplitude of the analog signal at a point in time (actually, over a very short time period). The sampling process is repeated at a rate twice the highest frequency to be encoded. In the *SX-50* system, sampling occurs at a rate of 8 kHz, permitting accurate encoding of signals with frequency components up to 4 kHz.

Quantizing and encoding assign 8-bit binary values to each sampled amplitude. Errors occur when:

- the sample amplitude falls between two binary values,
- the sample amplitudes are below the lowest binary value.

Companding partially compensates for these errors by encoding and decoding the sample values on a non-linear scale. A given change in the level of a small signal causes a proportionately larger change in the sample's binary value than would the same change in the level of a large signal. There are two different companding scales:  $\mu$ Law and A Law.  $\mu$ Law is the North American standard; A Law is the European standard.

### Time-Division-Multiplexing

- 9.3 Time-Division-Multiplexing (TDM) transmits several channels of information over the same path by allocating a different time slot for each channel.

A Link is divided into 32 channels, each assigned a time slot. Each channel, depending on its source, may carry PCM-encoded audio or control data. The information on each channel is provided in 8-bit binary samples (bytes), as previously discussed. Since the sampling rate is 8 kHz, on any given channel a new sample is encoded every 125  $\mu$ s. During each 125  $\mu$ s period, the TDM circuitry transmits the most recent 8-bit sample from each of the 32 channels in turn. Each group of 32 samples is called a frame.

Communication on any particular channel requires that the transmission circuitry insert each sample into the correct time slot in each frame sent, and that the receiving circuitry extract the information from the correct time slot in each arriving frame.

The system bit rate can be derived as follows:

$$\begin{aligned} & 8000 \text{ frames/second} \times 32 \text{ channels/frame} \times 8 \text{ bits/channel} \\ & = 2,048,000 \text{ bits/second} \\ & = 2.048 \text{ Mbits/second.} \end{aligned}$$

## Digital Switching Array

- 9.4 The Digital Switching (DX) Array assigns 1.5 bidirectional links (48 channels) for transmitting and receiving audio, control and signaling data to and from the peripheral card.

The DX Matrix transmits 3 bytes per frame to each peripheral circuit: one PCM audio and two control bytes. One control byte adjusts the gain of the peripheral circuit; the other provides control signals for ringing and supervision.

The Digital Switching Array also assigns the following links:

- 1 link (32 channels) for receiving audio from the Console and signals from the Digital Signal Processor,
- 1 link (32 channels) for transmitting audio to the Console and to the Digital Signal Processor,
- 1 link (32 channels) for transmitting control data to the Console and audio to the DTMF Receivers.

# 10. **TRAFFIC CONSIDERATIONS**

## General

10.1 This Part provides data used in determining traffic-dependent parameters. These parameters are:

- Quantities of trunks installed.
- Level of traffic per line.
- Level of traffic per system

Reference tables assist in estimating the *SX-50* hardware requirements for a range of typical applications. Table 10-1 is used to determine the station traffic characteristics of a business. Table 10-2 provides the maximum allowable station traffic for configurations from 8 to 128 extensions, 16 to 32 trunks.

## Traffic Parameters

10.2 Traffic engineering is a statistical method used to ensure that you have provisioned your system to give the level of service to which your users are accustomed. Understanding these traffic engineering concepts is important when purchasing or configuring your PBX.

Use the traffic report figures as guidelines. Specific departments or trunks may not follow the averages of the rest of the system. This should be understood and analyzed to ensure that your system can meet the needs of all users.

The following assumptions have been provided to aid in configuring your system:

(a) Traffic patterns are approximately:

- 33% internal
- 33% outgoing
- 33% incoming

(b) Trunks are both-way, as these are most efficient for carrying traffic.

(c) Target grade of service is P.01 or the same as the level which most telephone companies provide.

To determine your average traffic levels for a particular business hour of the day, divide the number of calls for this hour by the number of telephones on your system.

- one call per hour = light traffic
- two calls per hour = medium traffic
- three calls per hour = heavy traffic

## Typical Station Traffic Characteristics

10.3 The provisioning of an *SX-50* system for a particular application depends upon the average station usage (traffic), as characterized by two parameters:

- Traffic per station (Busy Hour, Busy Day)
- Percent Trunk Traffic (versus intercom).

The traffic per station depends upon how much the average job function in the business requires the use of a telephone. For example, a regional wholesale distributor may have a large group of buyers and salespersons handling outside calls, and therefore have a relatively high traffic per station (5 → 7 ccs/station).

The division between internal intercom and trunk traffic is related to the density of telephones. For example, in professional or service industries where employees are close enough to speak to each other in person, intercom traffic is low (i.e., Trunk traffic 70% → 90%). In department stores or manufacturing sites where employee and telephone density is low, the proportion of intercom calls would be higher.

As a guideline, Table 10-1 provides typical station traffic characteristics for a number of potential *SX-50* applications. Used in conjunction with the customer's specific requirements, and Table 10-2, System Traffic, it is possible to determine the number of CO Trunks required, given the number of station sets and *SUPERSET* telephones in the system.

<i>SX-50</i> Applications	Busy Hour Traffic per Station (ccs)	% Trunk Traffic	% Trunk Traffic Incoming	% Trunk Traffic Outgoing
Hotel/Motel	1 – 2	50	20	80
Restaurant (table phones)	1 – 2	50	50	50
Nursing Home	2 – 3	50 – 70	80	20
Mobile Applications	3 – 5	10 – 50	10	90
Department Stores	3 – 6	50 – 80	90	10
Schools	3 – 5	50 – 70	70	30
Manufacturing				
– Plant	3 – 5	40 – 60	50	50
– with Sales Group	4 – 6	70 – 90	50*	50*
Professional				
– Legal	5 – 7	70 – 90	50	50
– Medical	5 – 7	80 – 90	80	20
– Engineering	5 – 7	70 – 90	50	50
– Finance	4 – 6	70 – 90	30	70
– Real Estate	5 – 8	90	30	70
– Stock Broker	9 – 10	90	70	30
– Wholesale Distributor	5 – 8	90	70	30

\* depending on application

**Table 10-2 System Traffic**  
**Maximum System Traffic per Line (CCS/Line)**

COV/DNIC*		0	8	16	24	32*	40	48	56
TRK	ONS								
16	0	—	36.0	25.3	16.8	12.6	10.1	6.5	3.9
16	16	25.3	16.8	12.6	10.1	8.4	5.9	3.9	2.3
16	32	12.6	10.1	8.4	7.2	5.5	3.8	2.5	—
16	48	8.4	7.2	6.3	5.1	3.7	2.6	—	—
16	64	6.3	5.6	4.7	3.6	2.6	—	—	—
16	80	5.1	4.4	3.5	2.7	—	—	—	—
16	96	4.2	3.4	2.7	—	—	—	—	—
16	112	3.3	2.7	—	—	—	—	—	—
16	128	2.6	—	—	—	—	—	—	—
24	0	—	36.0	36.0	21.9	13.6	8.5	5.2	2.8
24	16	31.7	22.3	15.4	10.7	7.4	4.9	3.0	—
24	32	14.9	11.7	8.8	6.5	4.6	3.0	—	—
24	48	9.3	7.5	5.8	4.3	3.1	—	—	—
24	64	6.5	5.3	4.1	3.0	—	—	—	—
24	80	4.8	3.9	3.0	—	—	—	—	—
24	96	3.7	3.0	—	—	—	—	—	—
24	112	2.9	—	—	—	—	—	—	—
32	0	—	36.0	34.7	19.3	11.5	6.9	3.8	—
32	16	29.0	20.1	13.7	9.3	6.1	3.8	—	—
32	32	13.6	10.5	7.7	5.5	3.7	—	—	—
32	48	8.4	6.7	5.0	3.6	—	—	—	—
32	64	5.8	4.6	3.5	—	—	—	—	—
32	80	4.3	3.4	—	—	—	—	—	—
32	96	3.3	—	—	—	—	—	—	—

\* Maximum number of DNIC cards allowed is 4.

1: Intra/Incoming/Outgoing ratios are: 21% : 41% : 38%

2: Intra/Incoming/Outgoing call hold times are: 88/ 175/ 135 (seconds)



**SX-50<sup>®</sup> DIGITAL PRIVATE  
AUTOMATIC BRANCH EXCHANGE  
(DPABX)**

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Shipping,  
Receiving and  
Installation

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**NOTICE**

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1.

## INTRODUCTION

### General

- 1.1 This Section contains the detailed shipping, receiving and installation procedures for the SX-50® Digital Private Automatic Branch Exchange (DPABX) with MS53 and MS54 software. The SX-50 system is compatible with most Private Branch Exchange (PBX) and Central Office (CO) equipment. Refer to Section 9104-091-100-NA, General Description, for an overall description of the SX-50 system.

### Reason for Reissue

- 1.2 Section 9104-091-200-NA, Shipping, Receiving and Installation, has been reissued to include a description of the Digital Network Interface Circuit (DNIC) Line Card and the functionality provided by MS55 software.

### Section Overview

- 1.3 This Section is divided into six parts:
1. **Introduction:** explains the organization of the Section.
  2. **Configuration Limits:** briefly describes the two physical configurations.
  3. **Shipping and Receiving Information:** includes the unpacking and inspection of the delivered items.
  4. **Installation Requirements:** lists the environmental requirements, the temperature limitations, the space requirements, location constraints and the input power requirements for the SX-50 system. Also included is a brief description of an approved ground.
  5. **Installation Procedures:** lists the procedures required to install the SX-50 system in a set of Installation Tables.
  6. **Cabling and Cross-Connections:** describes the cabling and cross-connections required for installing the SX-50 system.

### Appendices

- 1.4 There are two appendices. Appendix A details the FCC interconnection requirements and Appendix B lists the system grounding and surge protection requirements.

## Compliance with Regulatory Requirements

- 1.5 Refer to Appendix A for specifications and instructions with respect to this equipment complying with regulatory requirements.

## 2.

**CONFIGURATION LIMITS****General**

2.1 The *SX-50* system is designed to support typical PABX applications within the following limits:

Up to 160 lines, which can be

- ONS Lines : 16 per slot, up to 160 if slots are available
- OPS Lines : eight per slot, up to 80 if slots are available
- DNIC Lines: eight per slot, up to 32 if slots are available
- COV Lines : eight per slot, up to 64 if slots are available

**Note:** The combined total number of COV and DNIC line cards must not exceed eight.

Up to 80 trunks, which can be

- LS/GS Trunks : 8 per slot, up to 80 if slots available
- E&M Trunks : 4 per slot, up to 80 if slots available
- DID Trunks: 8 per slot, up to 16 if slots available

No more than 9 Universal Cards (if slots available), total of 34 modules. Module types are:

- E&M Trunk Module
- RMat Module (1 per system)
- MOH/Pager Module (1 per system)

**Note:** An MOH/Pager Module is ignored by software if the Control Card 2 (MCC2) is installed in the *SX-50* system.



### 3.

## SHIPPING AND RECEIVING INFORMATION

### General

- 3.1 Listed below are the contents of the cartons in which the *SX-50* system is shipped. Upon delivery, check all items against the order form and packaging slip. Report any discrepancies immediately.

The basic *SX-50* system is shipped in the following boxes:

- **System carton.** The carton is 51.4 cm (20.25 in.) high, 76.2 cm (30.0 in.) wide and 53.3 cm (21 in.) deep. The gross package weight is 16.00 kg (35.28 lb). (Refer to Figure 5-1, *SX-50* System Packaging).
- **Circuit cartons.** (Refer to Figure 5-2, Typical Printed Circuit Card Packaging).
- **Attendant Console carton.** The carton is 20.3 cm (8 in.) high, 41.3 cm (16.25 in.) wide and 29.2 cm (11.5 in.) deep. The total weight of the Attendant Console, including packaging, is 2.75 kg (6.06 lb.). (Refer to Figure 5-3, Attendant Console Packaging).
- **Generic Module/Lithium Battery carton.** The carton is 39.5 cm (15.5 in.) high, 31.5 cm (12 in.) wide and 5 cm (2 in.) deep. The gross package weight 0.9 kg (2.0 lb.).
- **Documentation carton.** The carton is 33 cm (13 in.) high, 33 cm (13 in.) wide and 15 cm (6 in.) deep. The gross package weight is 4.05 kg (9.0 lb.).

### System

- 3.2 The *SX-50* system carton contains the following equipment:

- Card Frame,
- Static Protection Wrist Strap
- Cover,
- Backplate,
- Power Supply,
- AC Power Cable, and
- Control Card II (MCC 2) packed in an antistatic bag.

Unpack the equipment and perform a visual inspection to ensure that:

- The Card Frame, Cover, Backplate, Power Supply and Control Card have not been damaged during shipping.
- All components are securely mounted.

## Cards

- 3.3 The Control Card II, Generic Module and the peripheral cards are packaged in antistatic bags and protected with a layer of packaging foam. Included are the repair tags and a caution notice describing static charge damage. Cards should not be unpacked before they are required for use. When required, they should be transported to the *SX-50* system location packaged in their original antistatic bags.

Inspect each card to ensure that the printed circuit board is not cracked and no damaged or loose components are apparent.

<b>CAUTION</b>
----------------

**It is recommended that Cards be handled by their edges only to avoid damage due to static electrical discharge.**

## Lithium Battery

- 3.4 Included in the Generic Module package is the Lithium battery which is wrapped separately.

## Attendant Console

- 3.5 The Attendant Console carton contains the following:

- main assembly
- handset
- handset cord, and
- Attendant Console cord.

<b>CAUTION</b>
----------------

**The Liquid Crystal Display on the Attendant Console is fragile. Do not drop the Attendant Console or subject it to any other abnormal shock. Do not apply pressure to the surface of the Liquid Crystal Display.**

## Defective Items

- 3.6 Tag any defective items and return to the supplier in accordance with accepted procedures. Refer to Section 9104-091-350-NA, Troubleshooting, for instructions on completing the Repair Tag.

## Repacking for Reshipment

- 3.7 When the *SX-50* system is shipped from one location to another, pack all items to prevent damage. Figure 5-1 to Figure 5-3 show how the equipment was originally packaged. Follow this method of packaging as closely as possible.

If the original packaging material is not available, then place the returned parts in antistatic bags, wrap in several layers of air-cushion type wrap, place in a suitable container and surround with paper to minimize movement of all items.

**WARNING****Precautions**

The Lithium battery is safe for normal use, but the following health and safety precautions must be observed:

1. Do not puncture, crush, or try to open the battery case.
2. Do not burn the battery or subject it to extremely hot temperatures; for example, by attempting to solder directly to the battery case.
3. Do not recharge batteries which are not specifically designed as rechargeable types.
4. Do not short circuit the battery terminals.
5. Always check that the battery is inserted correctly into the card.

**Leakage of Electrolyte**

Electrolyte is released if the battery is ruptured. This electrolyte, which is usually a liquid but can be a jelly or paste, is a strong BASE. The following procedures should be followed upon leakage of the electrolyte:

1. Remove the electrolyte from the equipment and clothing with water but DO NOT allow the water to contact the ruptured battery.
2. Use large quantities of water to remove the electrolyte from the skin and eyes. SEEK IMMEDIATE MEDICAL ATTENTION.

**Overheating or Venting due to Abuse**

The battery can vent a gas or overheat if abused. If this occurs:

1. Remove the Generic Module from the Card Frame.
2. Take the Generic Module to a well ventilated area and let the battery cool.
3. Remove the battery when it is cool and has stopped venting. Install a new battery.

**Disposing of Damaged or Spent Battery**

The battery does not contain any materials which have a lasting poisonous effect. However, it does contain corrosive materials which will ultimately decompose to form harmless substances. Dispose of batteries which are damaged or have been discharged to a terminal voltage of 1.0 V according to locally approved procedures for disposal of hazardous waste.



# 4.

## INSTALLATION REQUIREMENTS

### Environmental Requirements

- 4.1 The SX-50 system must be vertically mounted on a wall. The location must meet the temperature limitations, space requirements and location constraints detailed below.

### Temperature Limitations

- 4.2 The temperature and humidity limits are:
- Temperature 0° – 40° C (32° – 104° F)
  - Relative Humidity 10 – 90% (noncondensing).

### Space Requirements

- 4.3 The minimum space required for installation of the SX-50 system is shown in Figure 4-1, Space Requirements for the SX-50 System.

### Location Constraints

- 4.4 The following requirements must be met when selecting a location for the SX-50 system.

The location MUST be:

- Dry and clean
- Well ventilated

The location MUST NOT be:

- Near a sprinkler system, sweating pipes, steam pipes or steam vents
- In an area of extreme temperature changes
- Near corrosive fumes or exhaust from machinery
- Within 3 m (10 ft) of a copying machine. If there is a copying machine in the room, the room should be ventilated by an exhaust fan or the copying machine should be equipped with a filtering system.

The SX-50 system must be mounted on a backboard that measures at least 460 mm x 610 mm (18 in. x 24 in.). The material must be at least 3/4 inch plywood or equivalent. Backboard installation must conform to local building and electrical codes regarding the mounting of electrical equipment.

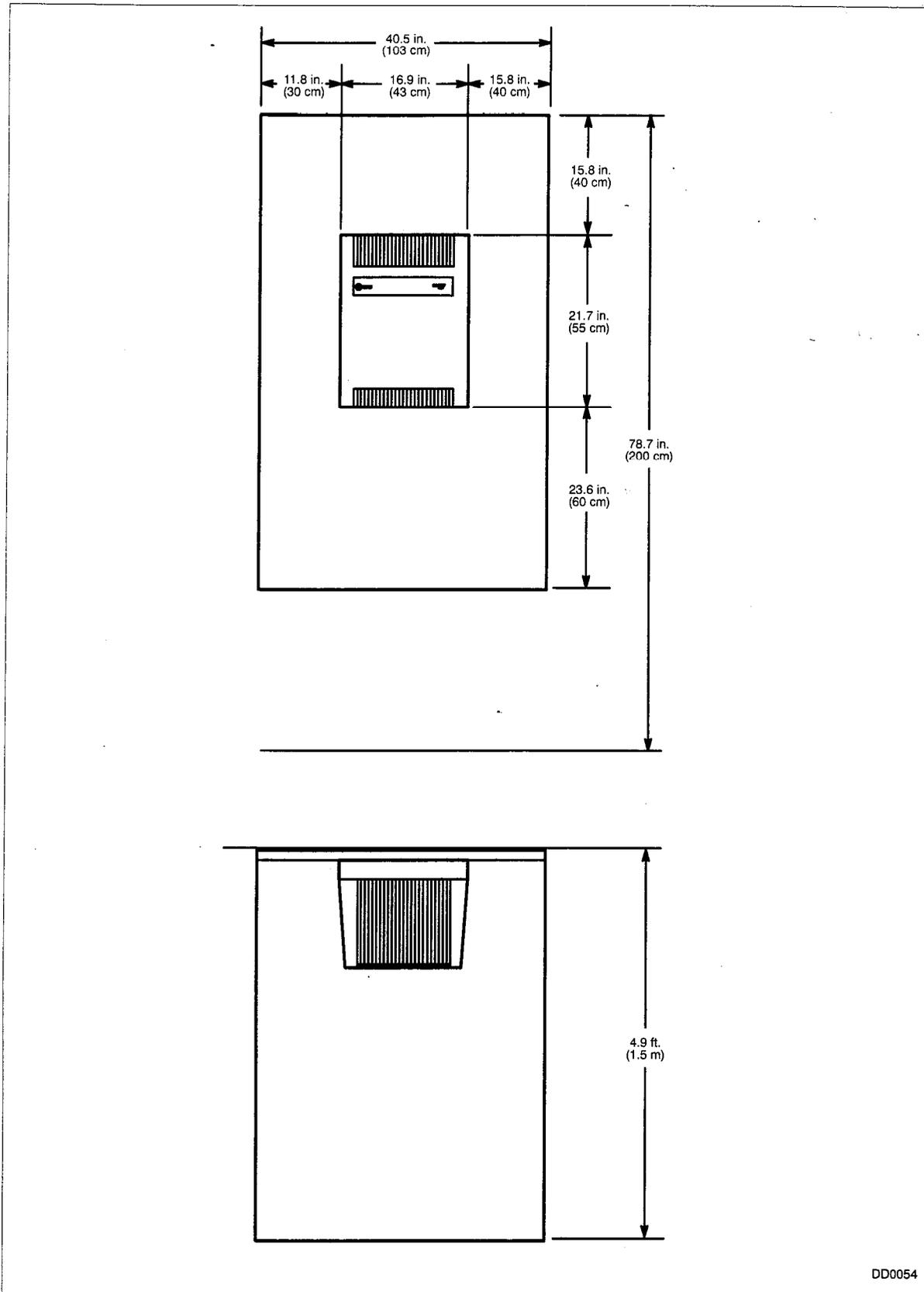


Figure 4-1 Space Requirements for the SX-50 System

## Power Supply Requirements

- 4.5 The customer must provide a dedicated single phase power receptacle, which should adhere to the following recommendations:
- 115 V, 60 Hz, fused and capable of delivering a minimum of 5 A.
  - Should be wired and fused independently from all other receptacles.
  - Must not be controlled by a switch.
  - Must be a 3–wire type, with the third wire grounded to the ground of the electrical system.
  - Should be easily accessible for the removal of the plug for maintenance.
  - Should be located to prevent accidental removal of the power cable.
  - The power cable between the Power Supply and the receptacle should not present a hazard to the subscriber.
  - A warning tag should be attached to the plug–end of the power cable to prevent accidental removal of the cable by the subscriber.
  - A warning tag should be attached to circuit–breaker–type fuses to prevent unauthorized manual operation.
  - If main power is subject to frequent fluctuations or “brown–outs”, an uninterruptable power supply with battery backup response within 50 milliseconds should be considered.

## Grounding

- 4.6 Proper grounding is essential for reliable operation. The following paragraphs outline the system grounding requirements. Refer to Appendix B, System Grounding and Surge Protection Requirements and Table 5–4, System Grounding Procedures for details.

## Equipment (Chassis) Ground

- 4.7 The following is a description of the required communications system equipment grounding practice:
- (a) All circuits common within the system derive the ground from a single ground concentration point within the Card Frame. The system ground concentration point serves all peripherals collocated with the system.
  - (b) Do not expose the system cabinet and all associated ducting hardware along with all collocated peripherals to any ground sources other than the system single point ground described above.

- (c) Do not share an enclosure or raceway between ac service wires bringing ac power to the system and any other system grounds, dc power distribution wires, or signaling wires.
- (d) All system hardware is provided with an ac fault return path to the system single point ground, which in turn is provided with a reliable path to the equipment grounding conductor (i.e., green wire ground or safety ground).
- (e) Refer to Appendix A for FCC Interconnection Requirements.
- (f) All sources of external ground (i.e., system signaling ground to the approved ground source, etc.) shall connect to the system single point ground. Providing for a system single point ground minimizes ground loops and prevents lightning from finding a path through system components.

## 5.

## INSTALLATION PROCEDURES

### General

- 5.1 The SX-50 system should be installed according to the steps detailed in the Installation Charts. A list of these charts is in Table 2-1, Installation Charts.

### Installation Charts

- 5.2 The following charts include all the information required to complete the installation of the SX-50 communications system. For programming information, refer to Section 9104-091-210-NA, Customer Data Entry.

Table 5-1 Installation Charts	
Title	Chart
Unpacking and Inspection of Equipment	Chart 5-1
Mounting Equipment	Chart 5-2
System Grounding Procedures	Chart 5-3
Card and Module Installation	Chart 5-4
System Cabling	Chart 5-5
Attendant Console Installation	Chart 5-6
Miscellaneous Equipment Installation	Chart 5-7
System Power-up and Load Default Data	Chart 5-8

### Notes of Caution

- 5.3 **Static Discharge.** Use the Static Protection Wrist Strap to prevent damage to the system electronics. It is attached to the metal sideplate of the Card Frame (refer to Figure 5-7, Static Protection Wrist Strap).

**Card Replacement.** System power must be turned off before removing the Universal card, all other peripheral cards can be removed without turning off system power.

**COV and DNIC Line Card.** DO NOT use a BUTT set to test the SUPERSET™ telephone lines. These circuits do not include a loop current detector; on-/off-hook status is signaled by data transmission only.

**Warranty Notes**

- 5.4 If any of the warranty seals on any Mitel DPABX or *SUPERSET* Telephone products are broken, Mitel reserves the right to refuse to service the equipment or to void any remaining warranty on the equipment.

If any Mitel equipment has been modified so that it is not within the manufacturer's specifications (including, but not limited to, the installation of any non-mitel parts, components, or replacement cards), Mitel reserves the right to: refuse to service the equipment; void any remaining warranty; remove and replace any non-Mitel parts found in the equipment; and to make those modifications that are necessary to return the equipment to original manufacturer's specifications.

**Chart 5-1 Unpacking and Inspection of Equipment**

Step	Action	Comments
1.	<b>Remove Equipment from Shipping Carton.</b> <ul style="list-style-type: none"> <li>• Lift the required equipment from the main assembly.</li> </ul>	Refer to Figure 5-1, <i>SX-50</i> System Packaging.
2.	<b>Inspect the Equipment.</b> <ul style="list-style-type: none"> <li>• Check equipment against the invoice.</li> <li>• Visually check equipment for damage.</li> <li>• Report any missing equipment.</li> <li>• Tag any defective items, repackage and return.</li> </ul>	
3.	<b>Remove the Required Cards and Modules.</b> <ul style="list-style-type: none"> <li>• Remove the Control Card.</li> <li>• Unpack additional peripheral cards.</li> <li>• Unpack the Generic Module.</li> </ul>	Refer to Figure 5-2, Typical Printed Circuit Card Packaging.
4.	<b>Inspect the Cards and Modules.</b> <ul style="list-style-type: none"> <li>• Check against the invoice.</li> <li>• Visually check for damage.</li> <li>• DO NOT REMOVE FROM ANTISTATIC BAG AT THIS TIME.</li> <li>• Report any missing modules or cards.</li> <li>• Tag any defective items, repackage and return.</li> </ul>	
5.	<b>Unpack Attendant Console.</b>	Refer to Figure 5-3, Attendant Console Packaging.

Page 1 of 2

**Chart 5-1 Unpacking and Inspection of Equipment  
(continued)**

Step	Action	Comments
6.	<b>Inspect Attendant Console.</b> <ul style="list-style-type: none"><li>• Check against invoice.</li><li>• Visually check for damage.</li><li>• Report any missing parts.</li><li>• Tag the defective items, repackage and return.</li></ul>	
7.	<b>Store Shipping Cartons.</b> <ul style="list-style-type: none"><li>• Store cartons for use when transporting the SX-50 system to a new site.</li></ul>	

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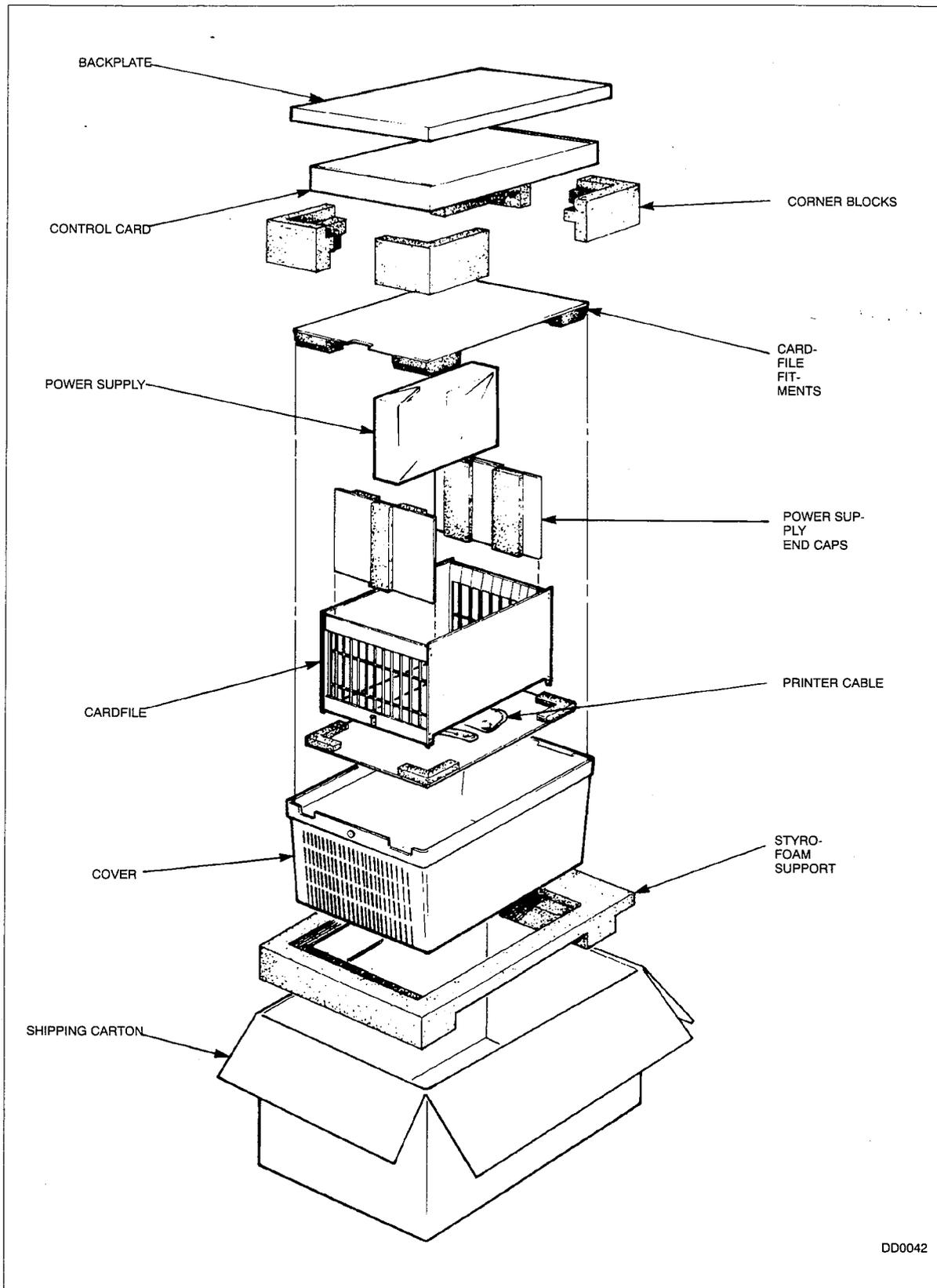
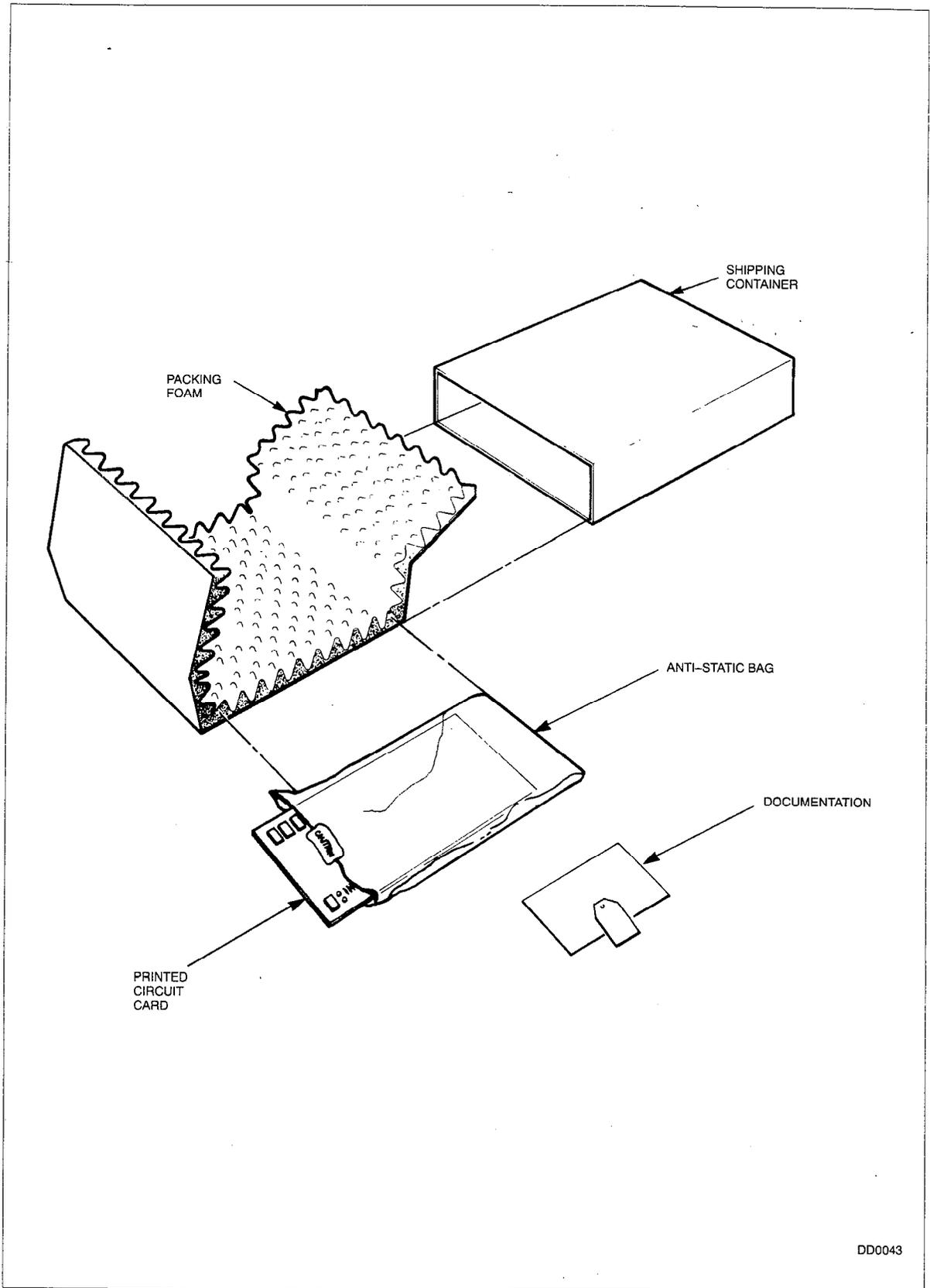
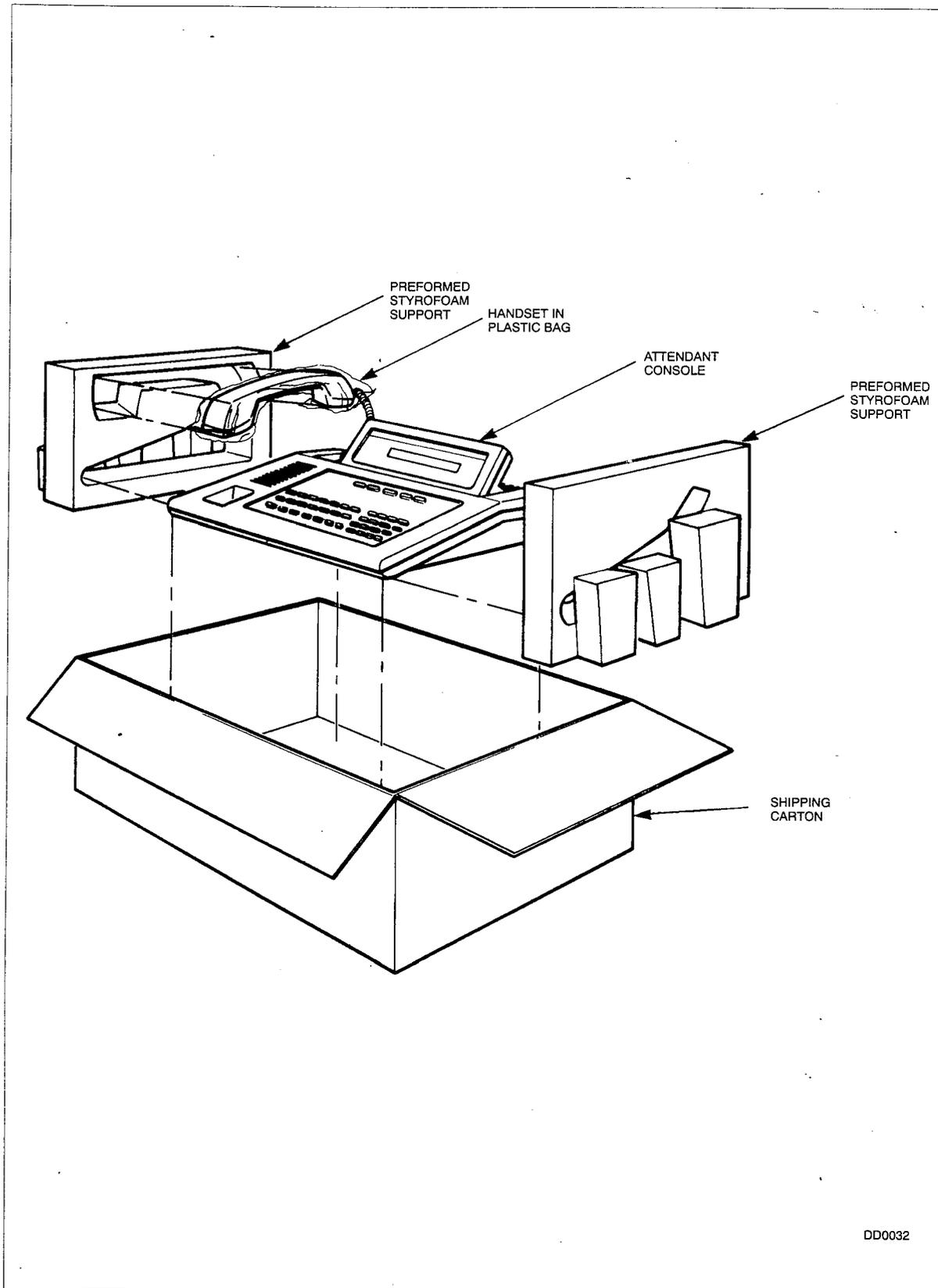


Figure 5-1 SX-50 System Packaging



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Figure 5-2 Typical Printed Circuit Card Packaging



DD0032

Figure 5-3 Attendant Console Packaging

Chart 5-2 Mounting Equipment

Step	Action	Comments
1.	<b>Mount the Backplate to the Backboard.</b> <ul style="list-style-type: none"> <li>• Use 1 1/4 inch #14 or #16 round head woodscrews.</li> <li>• Tighten securely.</li> </ul>	
2.	<b>Mount the Card Frame.</b> <ul style="list-style-type: none"> <li>• Position the Card Frame above the top Card Frame Guide.</li> <li>• Push the Card Frame towards the wall, connecting the bottom of the Card Frame with the lower Card Frame Guide.</li> <li>• Lock the Card Frame Latch into position (towards the wall) and tighten the Card Frame Latch Screw.</li> </ul>	Refer to Figure 5-4, Card Frame Installation.
3.	<b>Mount the Power Supply.</b> <ul style="list-style-type: none"> <li>• Slide the Power Supply into the Power Supply Guide from the top.</li> <li>• Attach the Power Supply to the Card Frame with the push-in fasteners (the push-in fasteners are stored in an accessory bag).</li> </ul>	Refer to Figure 5-5, Power Supply Installation.

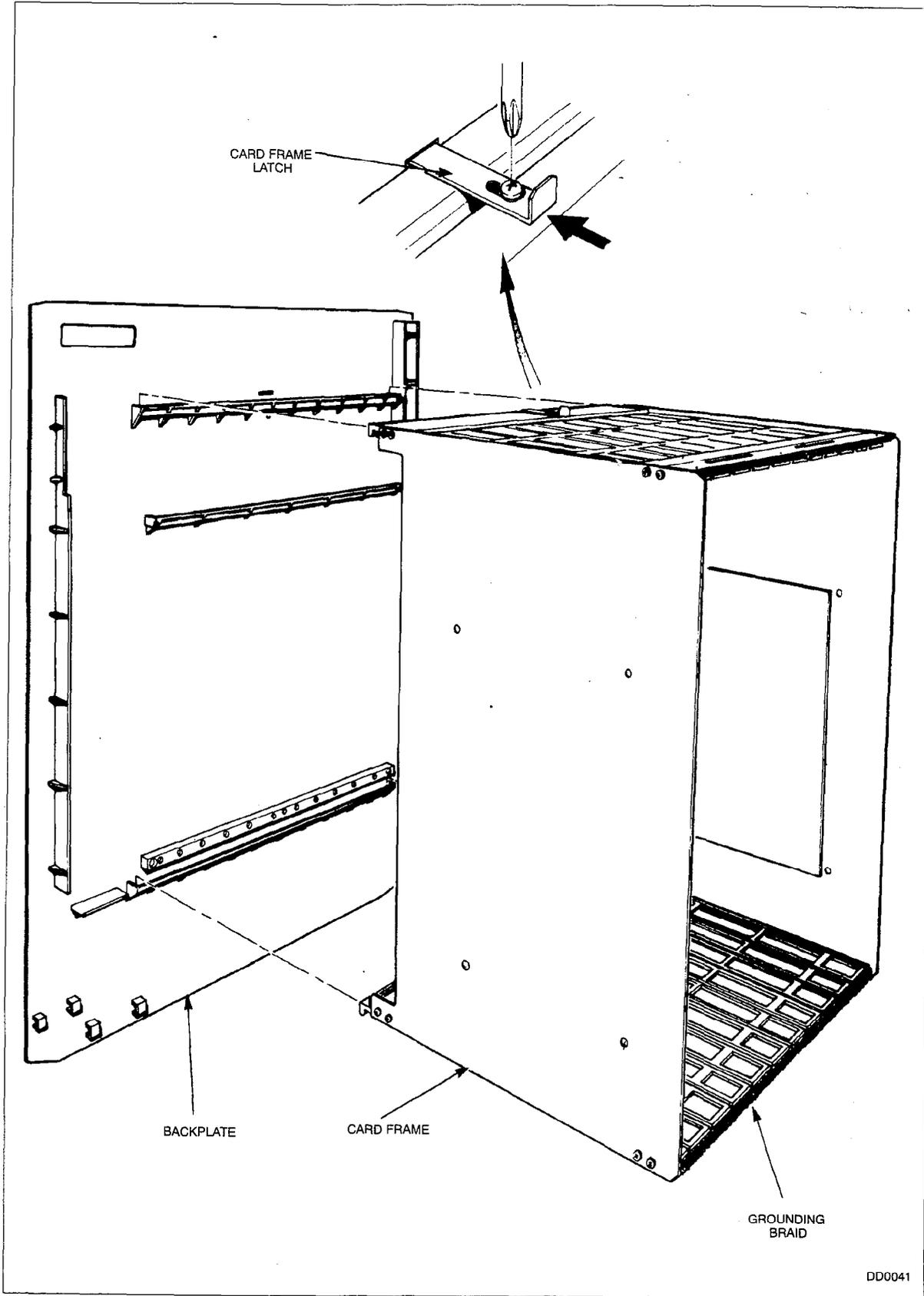
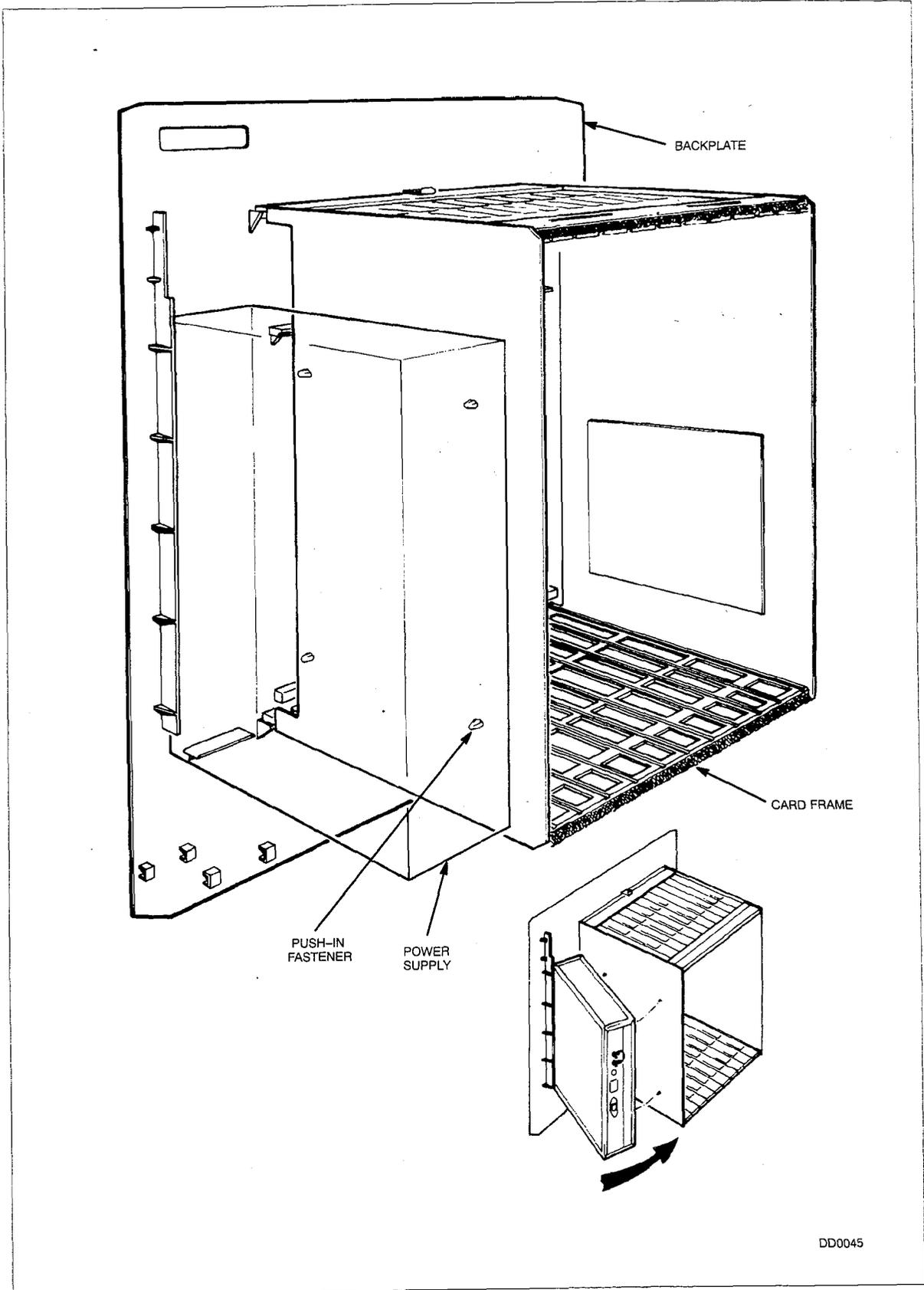


Figure 5-4 Card Frame Installation



DD0045

Figure 5-5 Power Supply Installation

Chart 5-3 System Grounding Procedures

Step	Action	Comments
1.	<p><b>Install the System Ground Wire.</b></p> <ul style="list-style-type: none"> <li>• Run a 6 AWG system ground wire from an approved ground to the <i>SX-50</i> system. DO NOT connect to system yet.</li> <li>• Refer to Appendix B for definition of approved ground.</li> </ul>	
2.	<p><b>Verify the Ground Connection.</b></p> <ul style="list-style-type: none"> <li>• Ensure <i>SX-50</i> power switch is OFF.</li> <li>• Plug the ac Line Cord into the power supply and the building ac receptacle.</li> <li>• Measure ac voltage between the <i>SX-50</i> ground lug and approved ground. If it is more than 1 volt, locate another approved ground and try again. If help is needed, consult your engineering support group.</li> <li>• Measure the resistance between <i>SX-50</i> ground lug and approved ground; it should be less than 5 ohms. If necessary, take corrective action to reduce the resistance. If help is needed, consult your engineering support group.</li> </ul>	
3.	<p><b>Ground the System.</b></p> <ul style="list-style-type: none"> <li>• Connect the System Ground Wire (6 AWG) to the Power Supply CHASSIS GND lug.</li> </ul>	Refer to Figure 5-6, <i>SX-50</i> System Grounding.
4.	<p><b>Ground the Card Frame and the EDG bar.</b></p> <ul style="list-style-type: none"> <li>• Connect a 12 AWG ground wire (supplied) to the screw on the EDG bar.</li> <li>• Carefully remove and retain the nut and lock-washer from the CHASSIS GND stud. Leave the spacer in place.</li> <li>• Place the card frame ground wire terminal on the CHASSIS GND stud.</li> <li>• Place the EDG bar ground wire terminal on the CHASSIS GND stud.</li> <li>• Secure the two ground wires on the CHASSIS GND stud with the lock washer and hex nut.</li> </ul>	

**Chart 5-3 System Grounding Procedures  
(continued)**

<b>Step</b>	<b>Action</b>	<b>Comments</b>
5.	<b>Verify System Ground Continuity.</b> <ul style="list-style-type: none"><li>• Disconnect the ac Line Cord at the Power Supply.</li><li>• Measure the resistance between the middle (ground) lead of the Line Cord and the left side of the chassis where the 12 AWG ground wire connects. The resistance must be less than 5 ohms. If it is not, recheck all ground connections.</li><li>• Connect ac Line Cord to Power Supply.</li></ul>	

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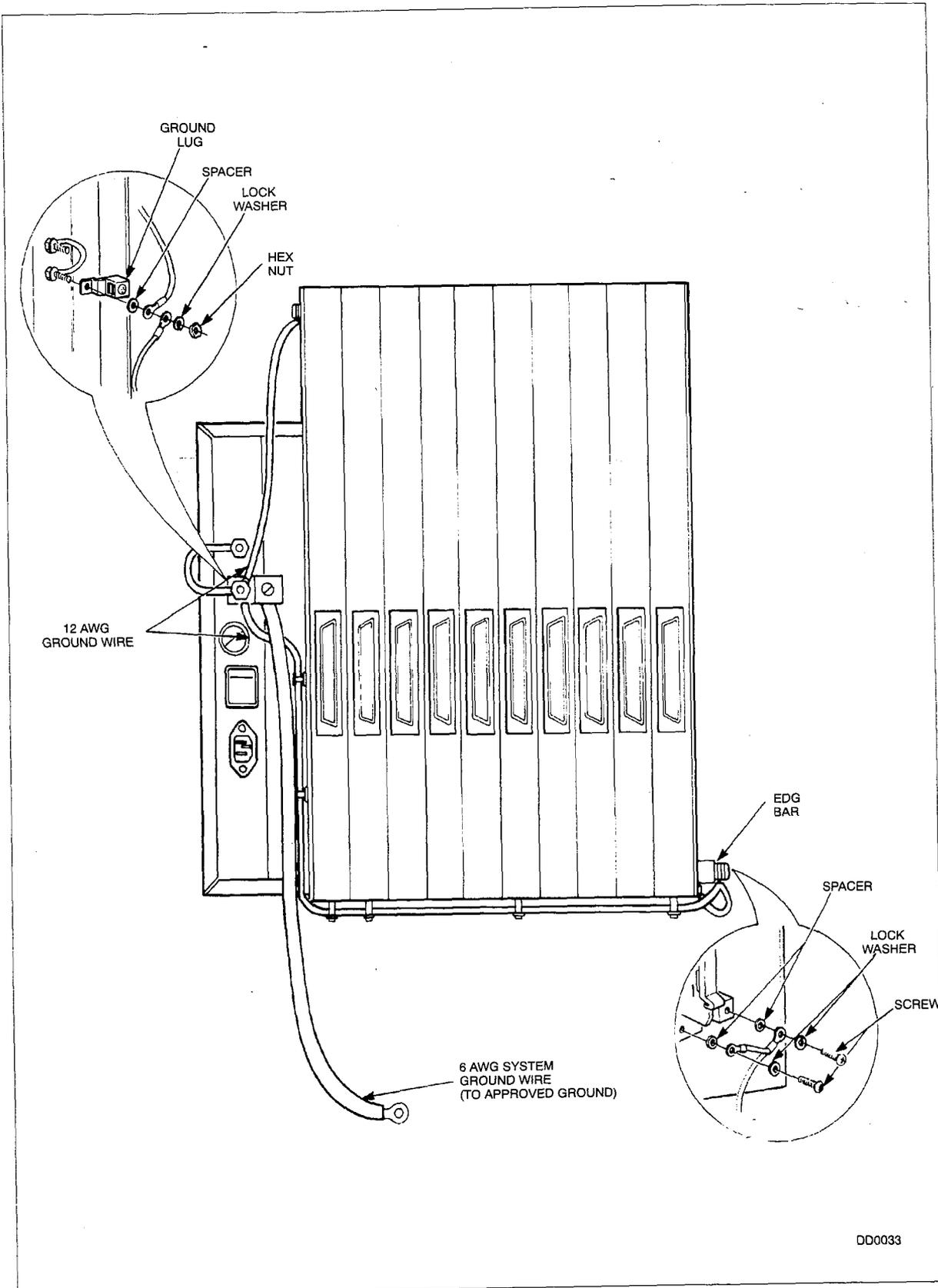
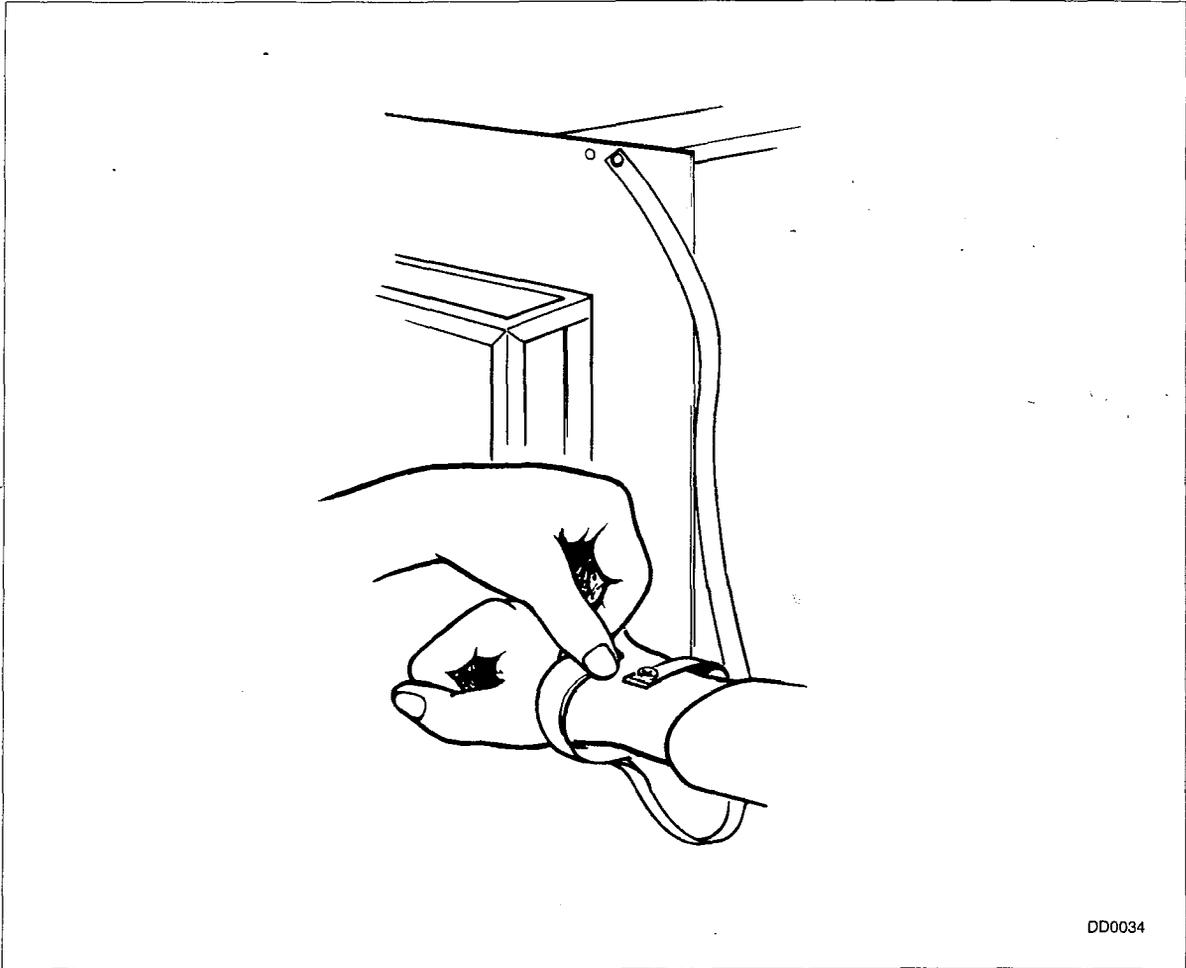


Figure 5-6 SX-50 System Grounding

Chart 5-4 Card and Module Installation

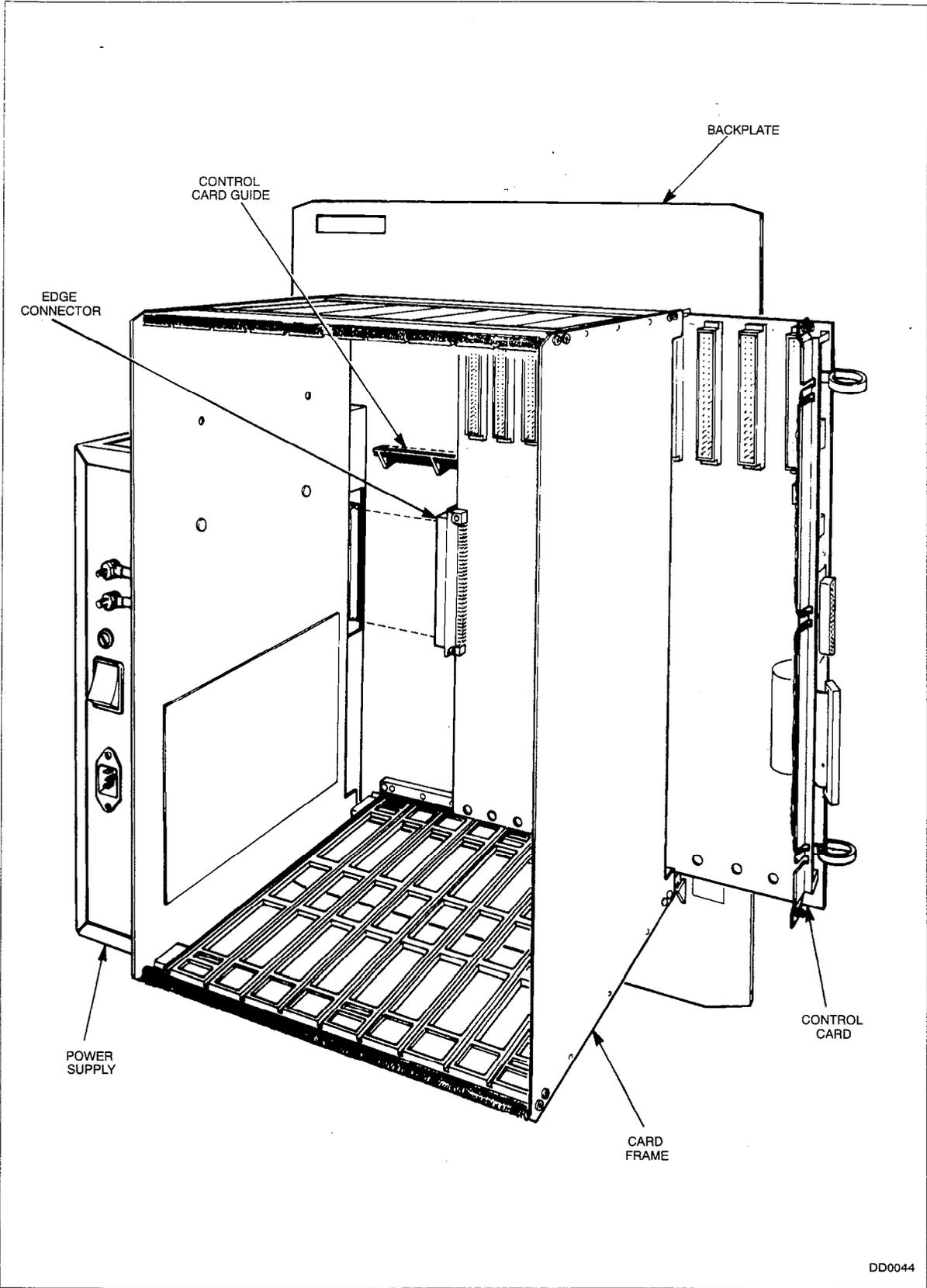
Step	Action	Comments
1.	<b>Wear Static Protection Wrist Strap.</b>	Refer to Figure 5-7, Static Protection Wrist Strap.
2.	<b>Remove the required circuit cards and modules from the antistatic bags.</b>	Refer to Figure 5-2, Typical Printed Circuit Card Packaging.
3.	<b>Install the Control Card.</b> <ul style="list-style-type: none"> <li>• Ensure that the Control Card is positioned correctly on the Backplate.</li> <li>• Ensure that the Control Card is seated properly in the Power Supply Connector.</li> <li>• Fasten the EMI bracket thumbscrews.</li> </ul>	Refer to Figure 5-8, Control Card Installation.
4.	<b>Install the Lithium Battery on the Generic Module.</b>	Refer to Figure 5-9, Battery Installation.
5.	<b>Install the Generic Module.</b> <ul style="list-style-type: none"> <li>• Attach Generic Module to Card Frame right sideplate with push-in fasteners.</li> <li>• Connect the Ribbon Cable from the Control Card.</li> <li>• Ensure the two latches on the connector are locked into position.</li> <li>• If the Control Card has a ground wire coming from near the RS-232-C connector, attach it to the Generic Module ground lug.</li> </ul>	Refer to Figure 5-10, Generic Module Installation.
6.	<b>Install required Universal Card Modules.*</b> <ul style="list-style-type: none"> <li>• Set the switches on the E&amp;M Modules to the required positions.</li> <li>• Ensure the module is seated properly into the two Module Connectors.</li> <li>• Peel off module identification label. Place it on the card faceplate beside the corresponding activity LED.</li> </ul>	Refer to Table 1-1, E&M Module Switches. Refer to Figure 5-12, Universal Card Module Installation.
7.	<b>Install the required peripheral cards.</b> <ul style="list-style-type: none"> <li>• Align the top and bottom edges of the peripheral card with the top and bottom slots of the Card Frame.</li> <li>• Insert the EDG Post through the hole in the Control Card into the EDG Bar on the Backplate.</li> <li>• Ensure that the Edge Connector on the peripheral card is seated properly in the Card Connector on the Control Card.</li> </ul>	Refer to Figure 5-11, Peripheral Card Installation.

\* A Music on Hold/Pager module is not functional when the Control Card 2 (MCC2) is installed.



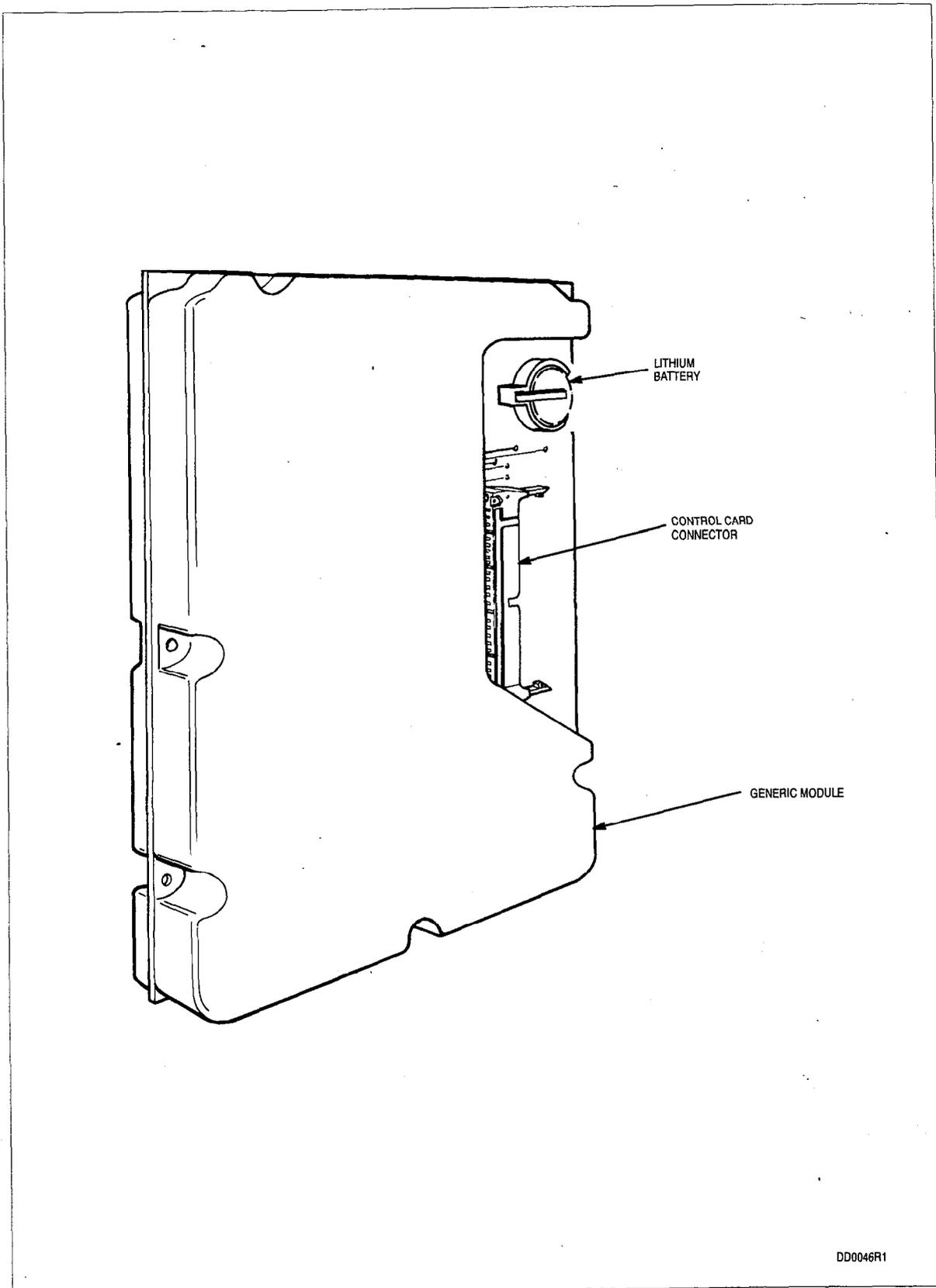
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**Figure 5-7 Static Protection Wrist Strap**



DD0044

Figure 5-8 Control Card Installation



**Figure 5-9 Battery Installation**

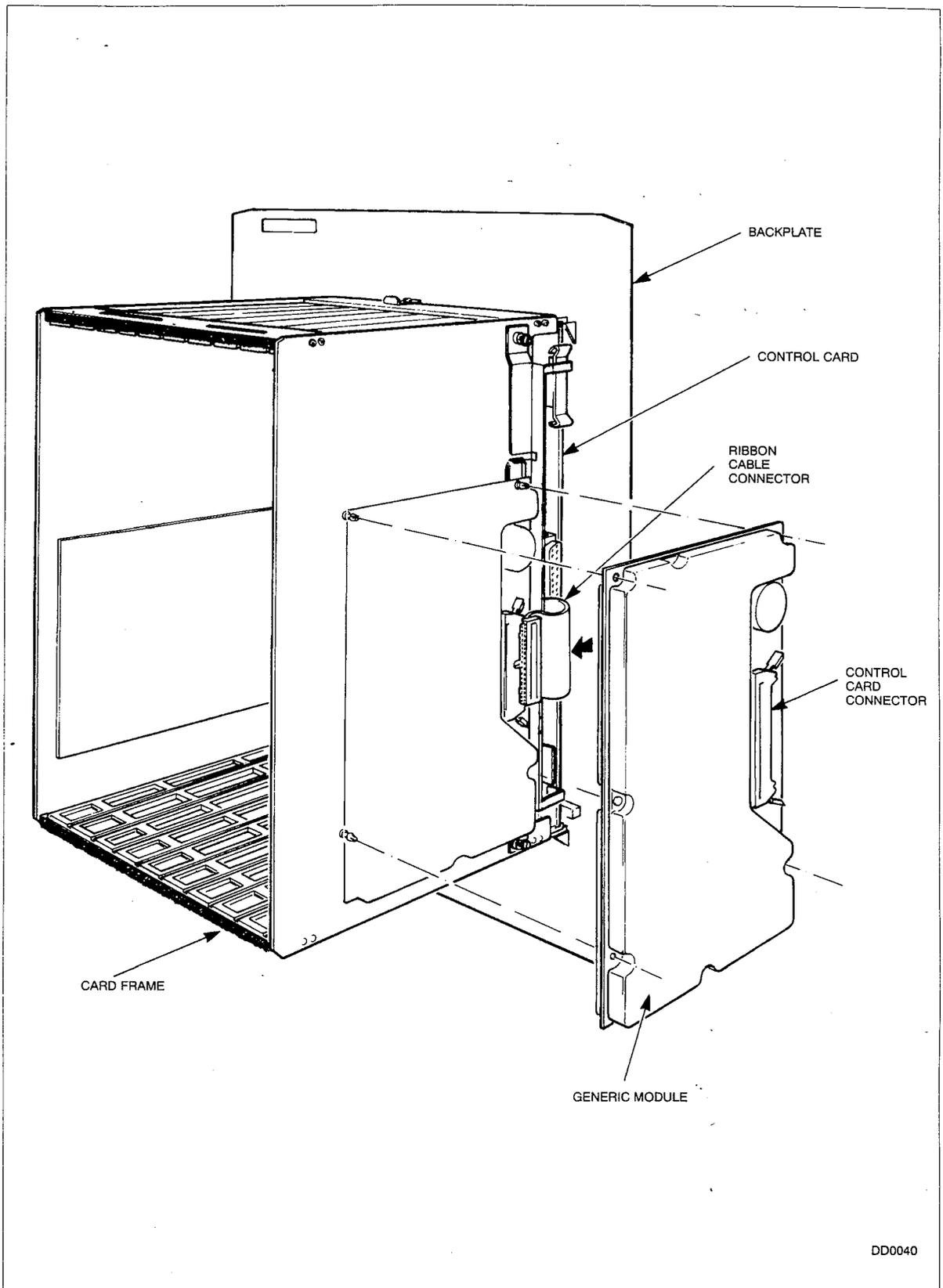


Figure 5-10 Generic Module Installation

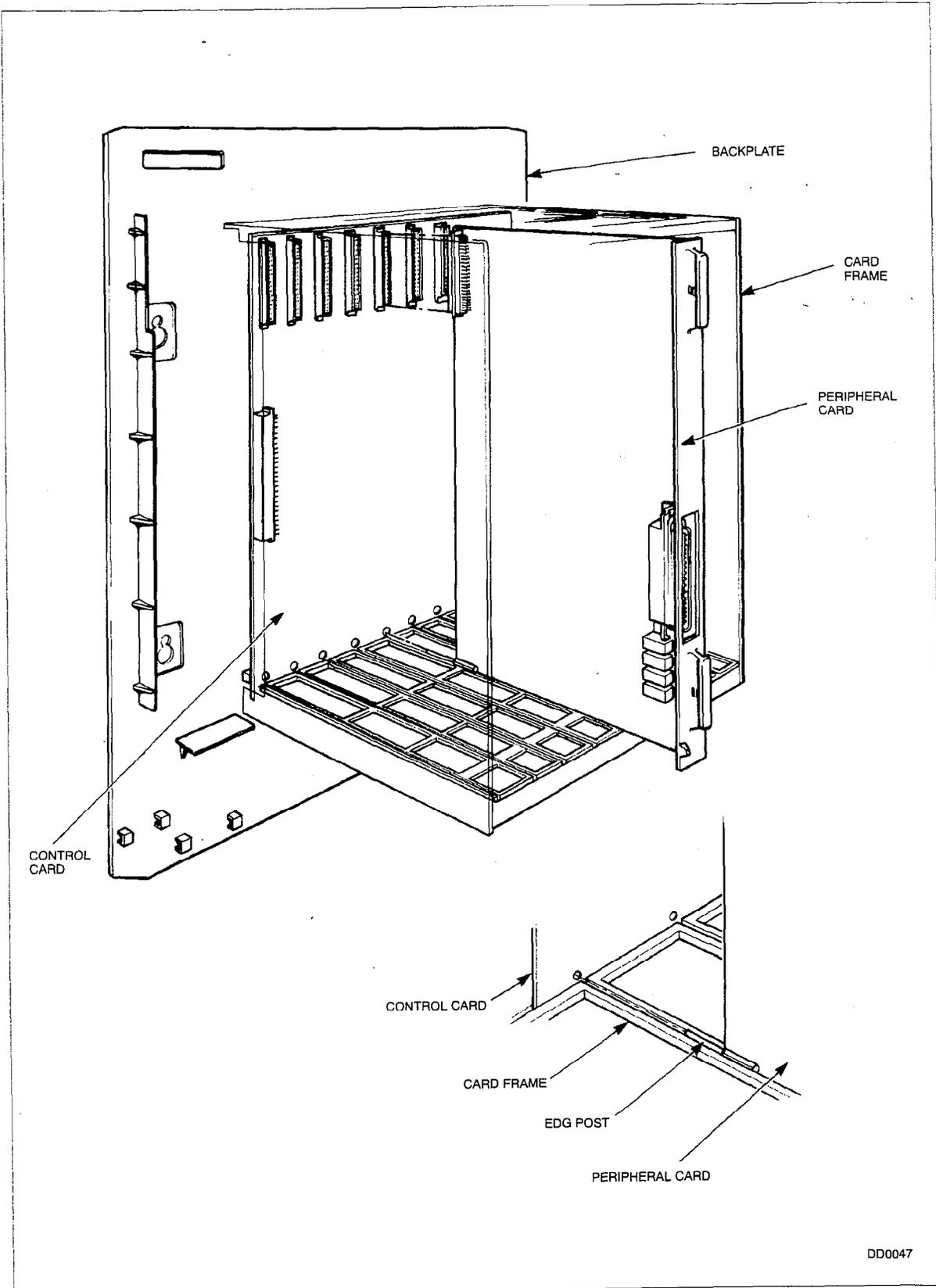
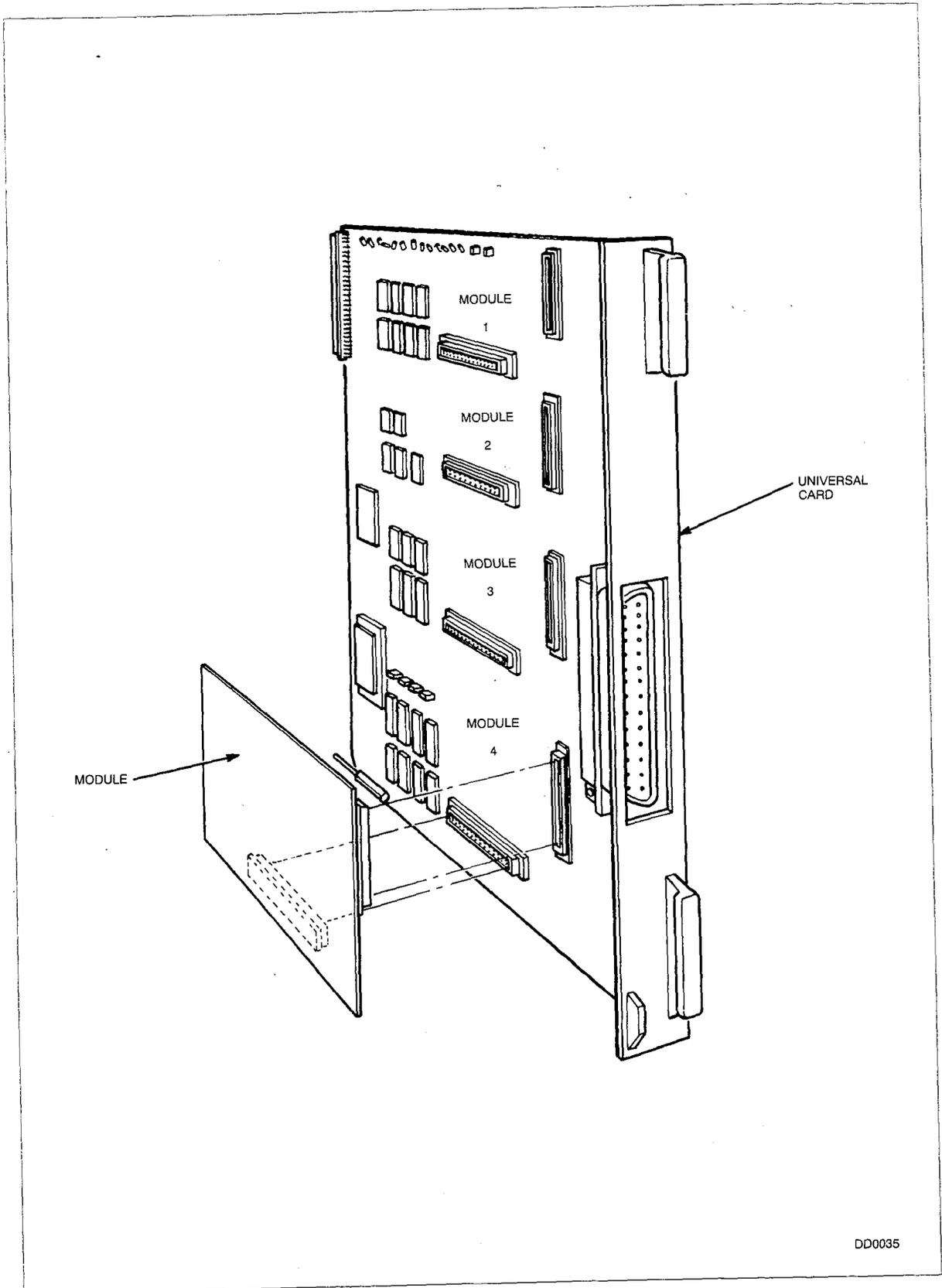


Figure 5-11 Peripheral Card Installation



DD0035

Figure 5-12 Universal Card Module Installation

Table 5-2 E&amp;M Module Switch Functions

Switch Number	Function
1	OPEN – PBX to Line = +3 dB CLOSED – PBX to Line = -13 dB
2	OPEN – Line to PBX = -4 dB CLOSED – Line to PBX = -11 dB
3	OPEN – Complex Balance Enabled CLOSED – 600 Ohm Balance Enabled
4	OPEN – 600 Ohm Balance Enabled CLOSED – Complex Balance Enabled
5	OPEN – 4-Wire Operation CLOSED – 2-Wire Operation
6	OPEN – Type 5 Signaling CLOSED – Type 1 Signaling
7	NOT USED
8	NOT USED

**Note:** The settings of Switch 3 and Switch 4 must agree. It is not possible to have both 600 Ohm Balance and Complex Balance enabled simultaneously.

Chart 5-5 System Cabling

Step	Action	Comments
1.	<p><b>Run and Identify Cables.</b></p> <ul style="list-style-type: none"> <li>Run cables from the MDF (Main Distribution Frame) to the SX-50 system.</li> <li>Connect cables in accordance with Part 6, Cabling and Cross-Connections in this Section.</li> <li>Identify each connector in accordance with Table 6-1, Tip and Ring Assignments in this Section.</li> </ul>	Refer to Figure 5-13(a), System Cabling.
2.	<p><b>Install ac Power Cord.</b></p> <ul style="list-style-type: none"> <li>Run ac Power Cord from the Power Supply to the outlet. DO NOT PLUG INTO OUTLET.</li> </ul>	

Page 1 of 2

**Chart 5-5 System Cabling  
(continued)**

Step	Action	Comments
3.	<p><b>Connect Cables to Peripheral Cards.</b></p> <ul style="list-style-type: none"> <li>• Tighten the connector retaining screws. DO NOT overtighten.</li> <li>• Dress each cable down the front of its peripheral card.</li> <li>• Attach the cable to the handle with a cable tie.</li> <li>• Route cables to the MDF via a separate Cable Guide.</li> </ul>	
4.	<p><b>Secure all Cables.</b></p> <ul style="list-style-type: none"> <li>• Tie the cables in one bundle to the rear cross-web between card slots 7 and 8 under the cardframe. Leave enough slack that cards can be withdrawn 25 mm (1"). This permits removal of the control card.</li> <li>• Tie the peripheral card cables to the Cable Guide on the Backplate.</li> <li>• Tie ac Power Cord to the other cable guide on the Backplate.</li> <li>• Route cables to the MDF. Cables should exit immediate area of system quickly and directly, preferably down and left. Tie the cables together until they branch off to individual MDF connectors.</li> </ul>	
5.	<p><b>Install the Attendant Console Cable.</b></p> <ul style="list-style-type: none"> <li>• Plug modular Attendant Console cable into J4 on the Control Card.</li> <li>• To extend the Attendant Console wiring, terminate the modular 3-metre Attendant Console Cable on the MDF and then run a SEPARATE customer-provided 6-wire cable from the MDF to the distant location. <b>Note:</b> the Attendant Console can be located a maximum of 200 metres away from the SX-50 system. Connecting wiring must be twisted pairs.</li> </ul>	Refer to Figure 5-14, Remote Attendant Console Cable Installation.

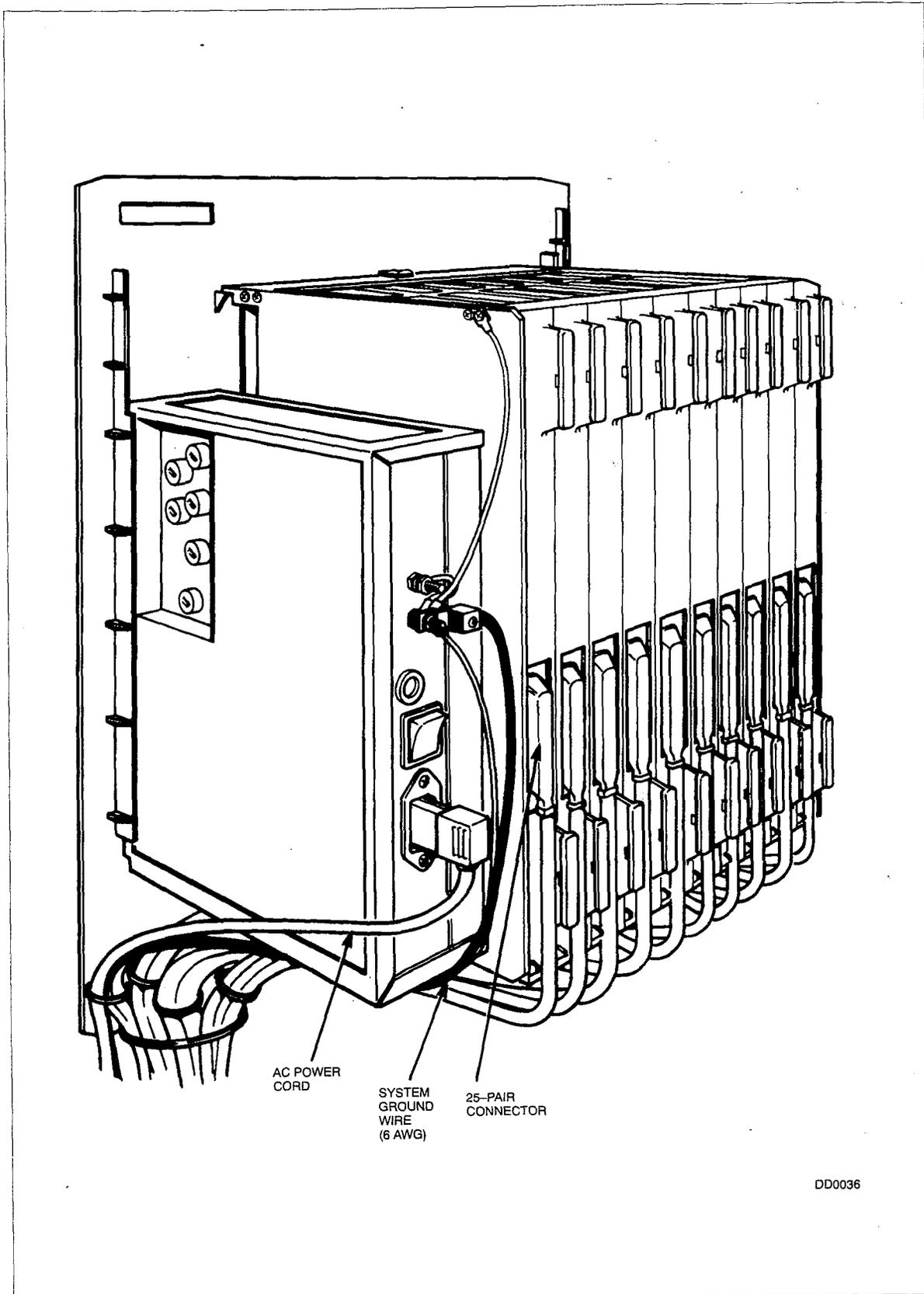


Figure 5-13(a) System Cabling

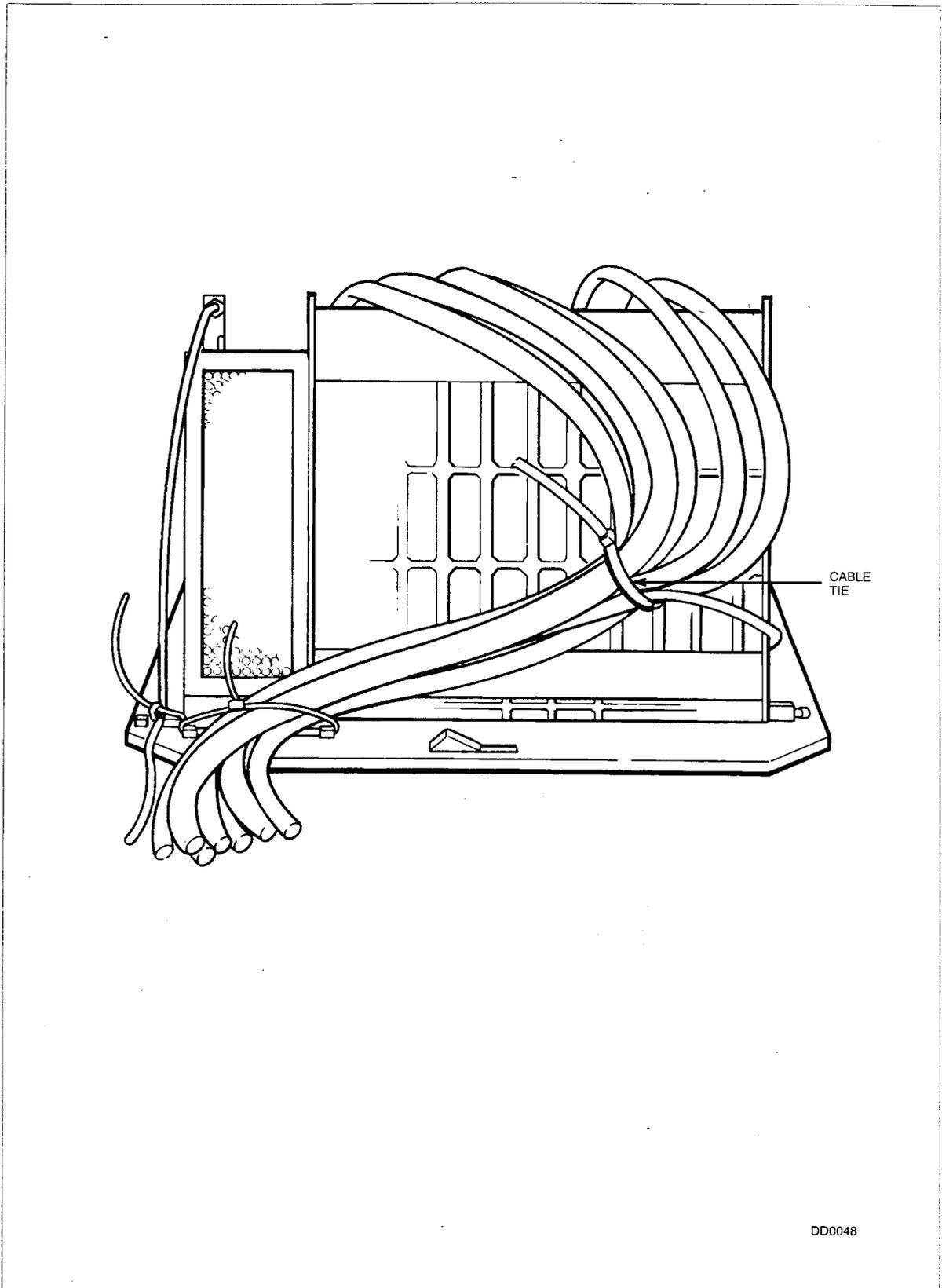
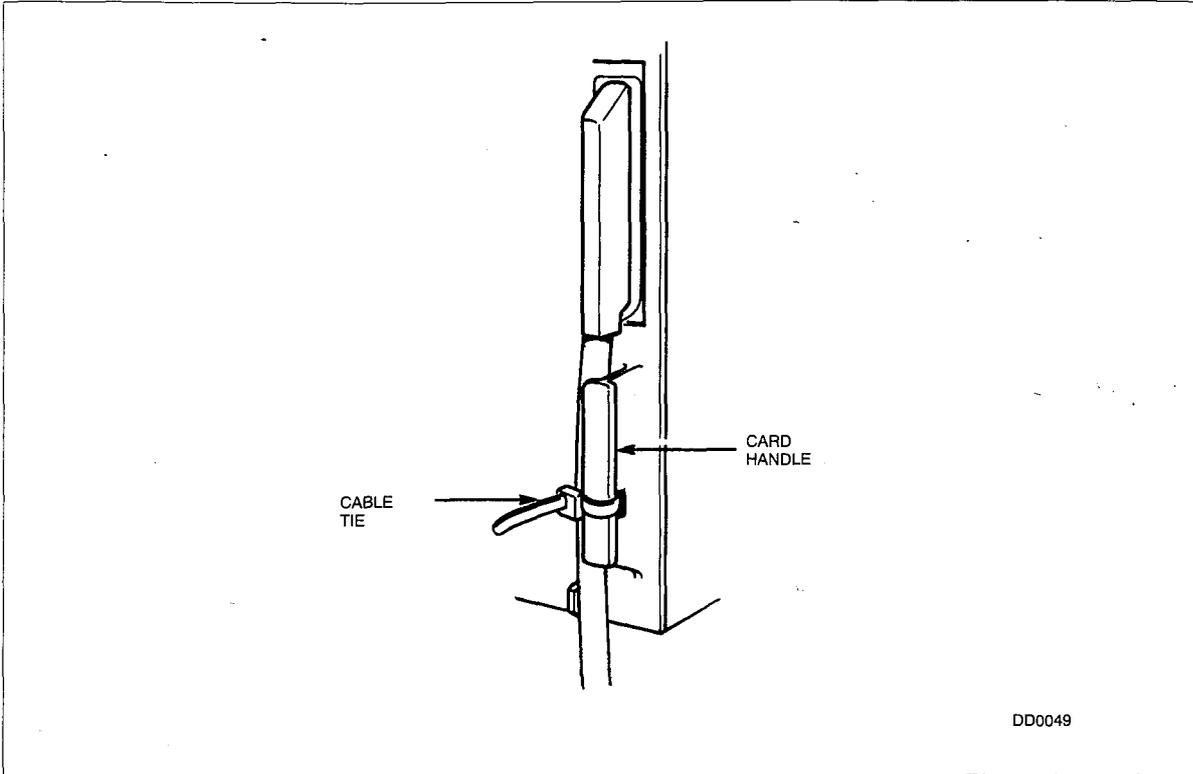
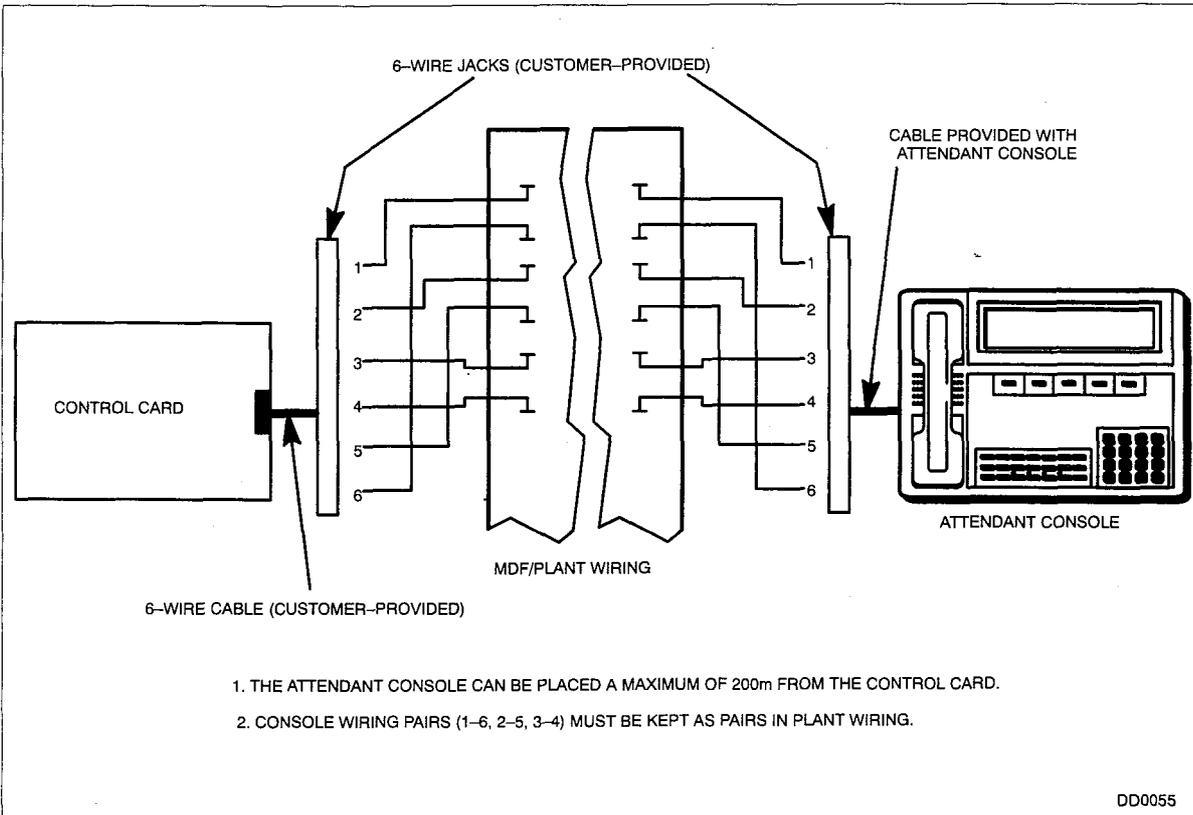


Figure 5-13(b) System Cabling



DD0049

Figure 5-13(c) System Cabling



DD0055

Figure 5-14 Remote Attendant Console Cable Installation

Chart 5-6 Attendant Console Installation

Step	Action	Comments
1.	<b>Install Cable at Attendant Console.</b> <ul style="list-style-type: none"> <li>• Insert the Attendant Console Cable into the socket. <b>Note:</b> the Attendant Console can be placed up to 200 m (218 yd.) from the SX-50 System.</li> </ul>	Refer to Figure 5-15, Cable Installation on the Attendant Console.
2.	<b>Install the Handset.</b> <ul style="list-style-type: none"> <li>• Plug one end of the Handset Cord into the Handset. Plug the other end of the Handset Cord into one of the two sockets on the left-hand side of the Console.</li> </ul>	
3.	<b>If non-default Programmable Function Key designations are to be used,</b> <ul style="list-style-type: none"> <li>• Prepare the Attendant Console feature designations for the Programmable Function Keys as required.</li> <li>• Remove Key Designation Cover: Gently bend cover to pull the upper and lower tabs out of their slots in the console housing.</li> <li>• Remove default Key Designation Card.</li> <li>• Complete and install the new Key Designation Card.</li> <li>• Replace Key Designation Cover: Gently bend cover to place both the upper and lower tabs in the slots in the console housing.</li> </ul>	Refer to Section 9104-091-210-NA, Customer Data Entry (CDE).

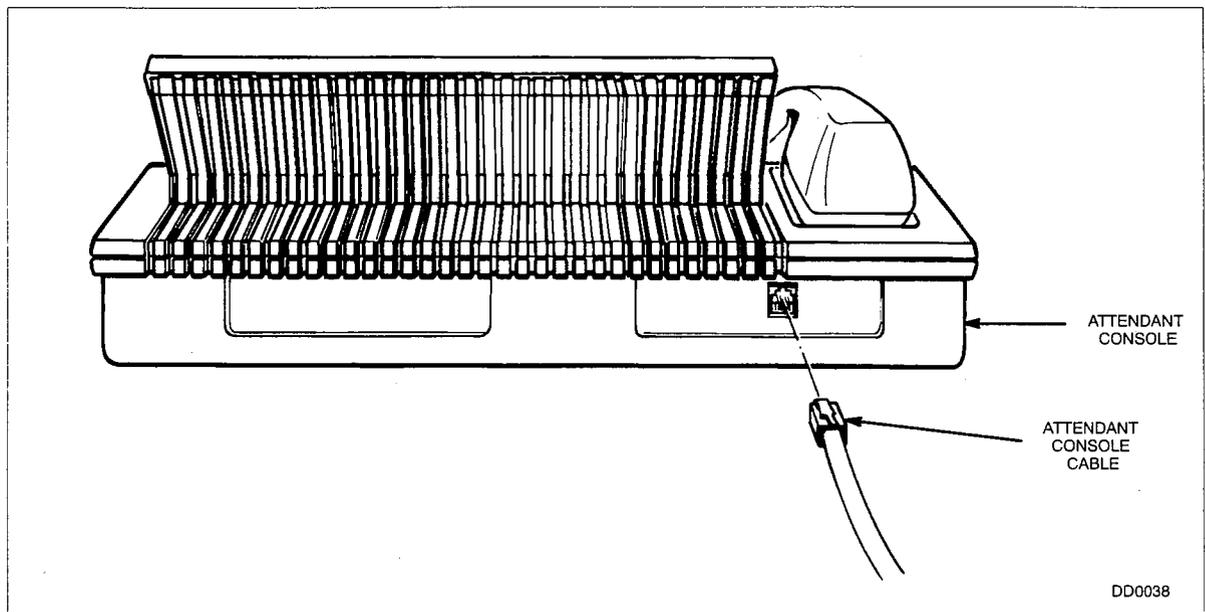
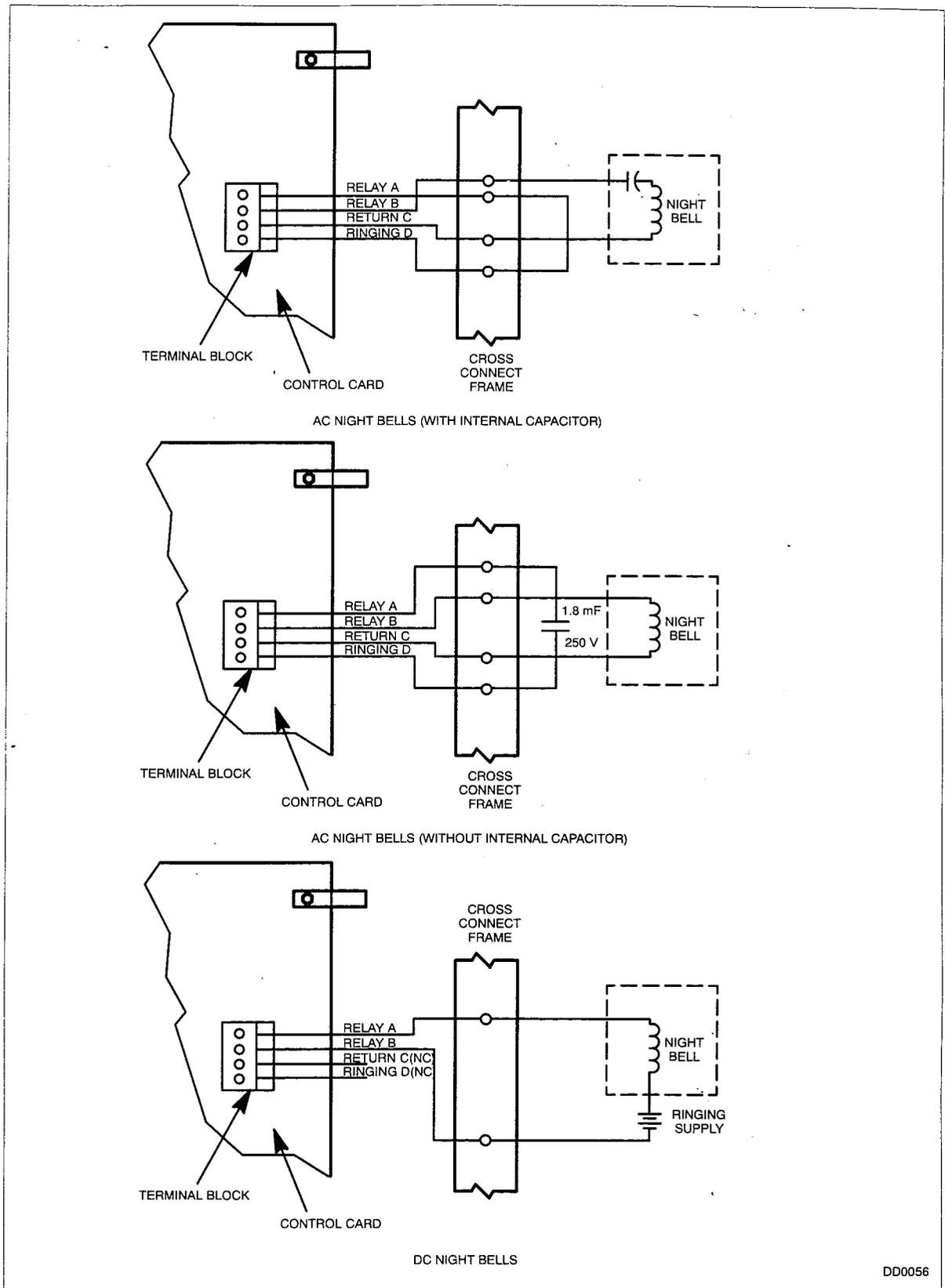


Figure 5-15 Cable Installation on the Attendant Console

Chart 5-7 Miscellaneous Equipment Installation

Step	Action	Comments
1.	<p><b>Install the Customer-provided Night Bells Equipment.</b></p> <ul style="list-style-type: none"> <li>• Connect the leads to the terminal block on the Control Card.</li> <li>• For ac Night Bells with a capacitor, terminate bell circuit between B and C. Connect terminals A and D together on the terminal block.</li> <li>• For ac Night Bells without a capacitor, terminate bell circuit between B and C. Add a 1.8 <math>\mu</math>F/250 V capacitor between terminals A and D on the terminal block.</li> <li>• For dc Night Bells with separate ringing supply, terminate one lead of the bell circuit to A. Connect ringing supply in series with bells. Terminate other lead of bell circuit to B. Terminals C and D are not used.</li> </ul>	Refer to Figure 5-16, Night Bell Connections.
2.	<p><b>Install the Customer-provided Printer.</b></p> <ul style="list-style-type: none"> <li>• Connect the printer cable to the RS-232-C Extender Cable.</li> <li>• Connect the Extender Cable to the Printer Port on the Control Card.</li> <li>• Note that the printer can be located a maximum of 15 m away from the SX-50 system.</li> </ul>	Refer to Table 5-3, Printer Port Pin Assignments.
3.	<p><b>Install the Customer-provided Paging Equipment.</b></p> <ul style="list-style-type: none"> <li>• If an MOH/Pager Module is used, mount one module per system on the Universal Card; connect the leads to the proper terminal blocks on the MDF.</li> <li>• If a Control Card 2 (MCC2) is used, connect the paging equipment directly to the terminal block on the Control Card.</li> </ul>	<p>Refer to Figure 5-12, Universal Card Module Installation. Refer to , Tip and Ring Assignments. Refer to Figure 5-17, Music/Paging Connections.</p> <p>MS53 / MS54 software or above must be used.</p>
4.	<p><b>Install the Customer-provided Music Source.</b></p> <ul style="list-style-type: none"> <li>• If an MOH/Pager Module is mounted on the Universal card, connect the music source leads to the proper terminal blocks on the MDF.</li> <li>• If a Control Card 2 (MCC2) is used, connect the music source leads directly to the terminal block on the Control Card.</li> </ul>	Refer to Figure 5-17, Music/Paging Connections.
5.	<p><b>Install the Customer-provided VX Voice Processing System.</b> (Not Available for MS53).</p>	Refer to Section 9150-953-003-NA, VX Voice Installation and Repair Manual.



DD0056

Figure 5-16 Night Bell Connections

**Table 5-3 Printer Port Pin Assignments**

Pin	Source	Assignment
1		Not Used
2	Printer	RxD (Receive Data)
3	SX-50 System	TxD (Transmit Data)
4	Printer	RTS (Request to Send)
5	SX-50 System	CTS (Clear to Send)
6		Not Used
7	Common	GND (Ground)
8 → 25		Not Used

**Table 5-4 Control Card Status Switch Functions**

Switch Number	Function
1	OPEN – Programming: Security Code Required CLOSED – Programming: No Security Code Required
2	OPEN – Test Line Disabled CLOSED – Test Line Enabled
3	NOT USED
4	OPEN – SMDR CLOSED – DEBUG (MITEL use only)

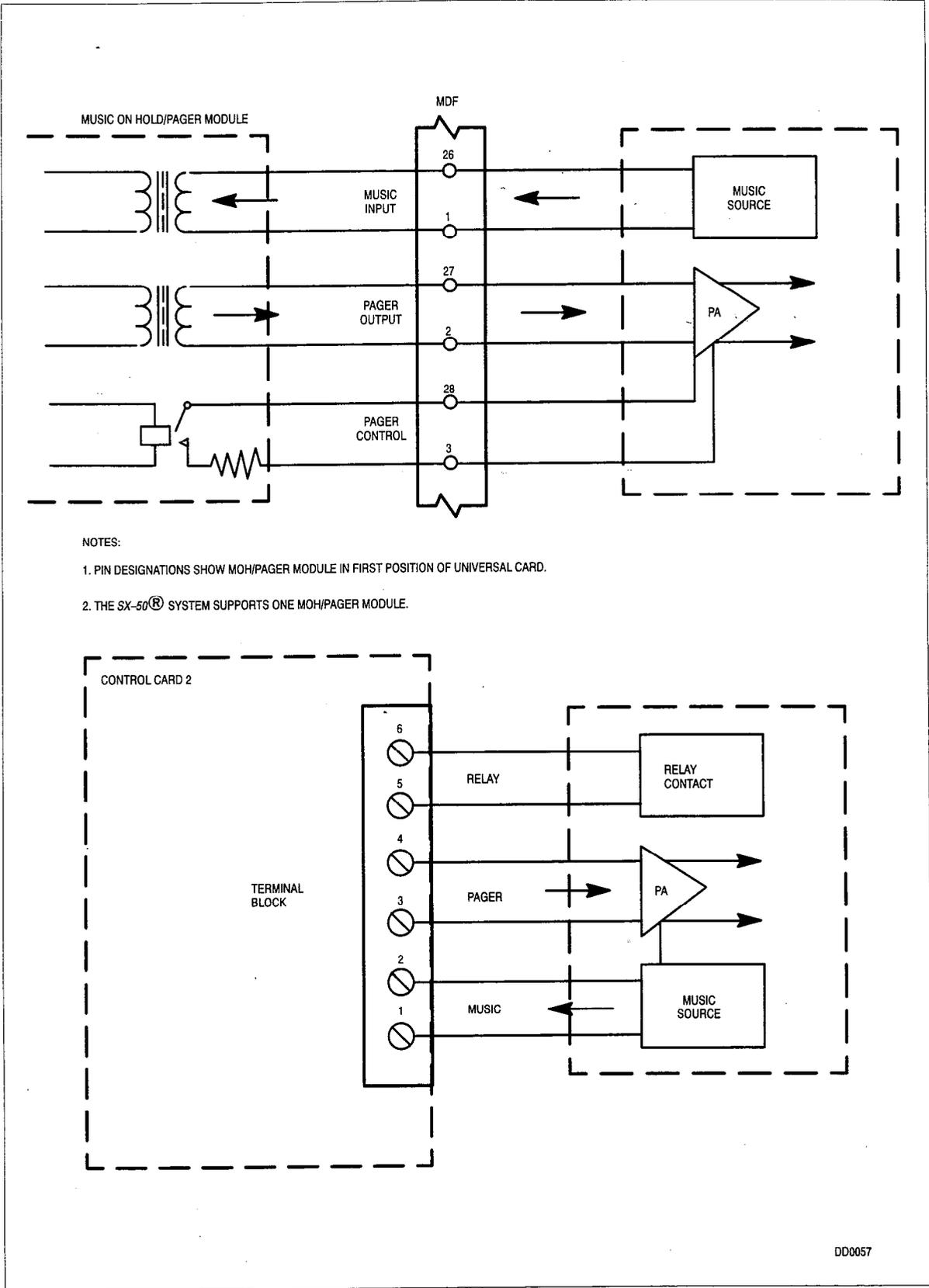
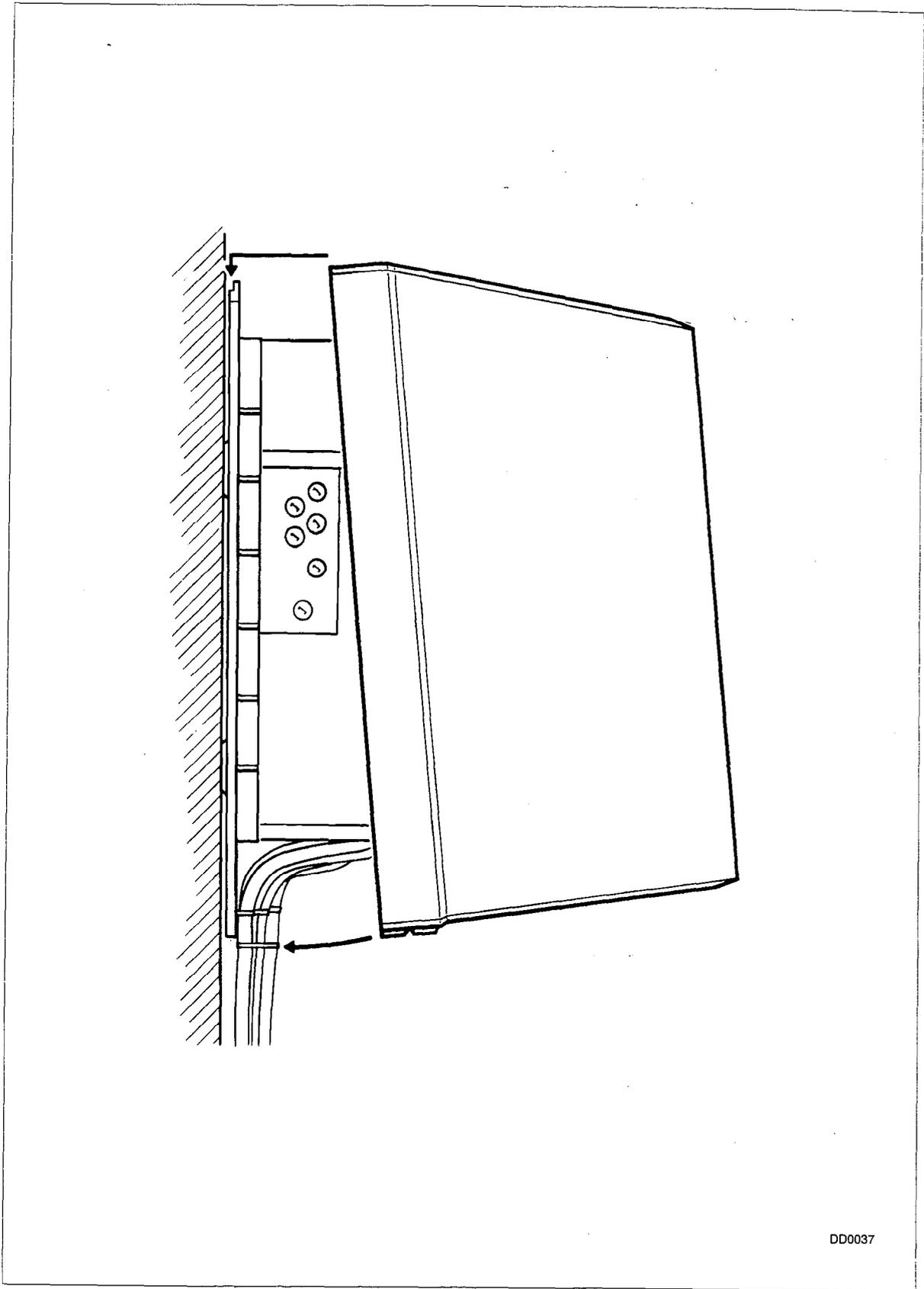


Figure 5-17 Music/Paging Connections

Chart 5-8 System Power-Up and Load Default Data

Step	Action	Comments
1.	<b>Ensure the Power Supply is OFF.</b>	
2.	<b>Plug in the ac Power Cord.</b>	
3.	<b>Set all the Control Card Status Switches to open.</b>	Refer to Table 5-4, Control Card Status Switch Functions.
4.	<b>Install Attendant Console.</b> (If required).	
5.	<b>Switch Power Supply ON.</b>	
6.	<p><b>Load Default Data.</b> Within 10 seconds after <b>?</b> appears on the Control Card LED (the Attendant Console displays <b>LOAD DEFAULT DATA?</b>)</p> <ul style="list-style-type: none"> <li>• Toggle Status Switch 1 to the CLOSED position and then back to OPEN. While the system executes the power-up diagnostics, the Control Card LED displays <b>c</b>, followed by <b>d</b>. The Attendant Console display shows <b>NO COMMUNICATION</b>. The appearance of the A character on the Control Card indicates the system has successfully loaded the default database. (The Attendant Console shows <b>DEFAULT DATA LOADED</b>). The flashing <b>0</b> on the Control Card LED indicates the system has completed the initialization process (the Attendant Console displays the default date and time).</li> </ul>	If this does not occur, refer to Section 9104-091-350-NA, Troubleshooting. If <b>0</b> does not appear on the Control Card LED, refer to Section 9104-091-350-NA, Troubleshooting.
7.	<p><b>Install the Cover.</b></p> <ul style="list-style-type: none"> <li>• Place the top part of the Cover over the top end of the Backplate.</li> <li>• Pull Cover down over Card Frame.</li> <li>• Position the cables in the slot at the bottom of the Cover.</li> </ul>	Refer to Figure 5-18, Cover Installation.
8.	<p><b>Lock the Cover.</b></p> <ul style="list-style-type: none"> <li>• The keys are located in one of the accessory bags.</li> </ul>	



DD0037

**Figure 5-18 Cover Installation**



## 6.

## CABLING AND CROSS-CONNECTIONS

### General

- 6.1 This Part details the cabling and cross-connections required for installing the SX-50 communications system.

### Telephone Set and Trunk Cabling

- 6.2 Telephone set and trunk cabling terminates on the building cross-connect terminal in the normal manner. Central Office trunk loop resistance limit is 1600 ohms.

### Cross-Connections

- 6.3 Connection between the equipment cabinet and the MDF should be made using 28 AWG connector-ended 25-pair cables. Cross-connections should be made in accordance with Table 6-1, Tip and Ring Assignments. For message registration connections refer to Figure 6-1, Message Registration Connections. For E&M trunk connection, refer to Figure 6-3, E&M Trunk Wiring.

Run jumpers using A-type 24 AWG cross-connecting cables.

### FCC Cross-Connection Frame Recommendations

- 6.4 Trunk circuits must be connected sequentially to the telephone company interface jack. The cabling requirements and limits for trunks are as detailed above. All cables connecting trunk circuit pairs must be connectorized.

### Power Failure Transfer

- 6.5 The "cut-through" relays provided can connect Central Office trunks (two trunks per LS/GS Trunk Card) to selected station lines (refer to Figure 6-2, Power Fail Transfer Connections). The sets must be compatible with the ONS Line Card and the trunk. (Note: DTMF sets can be used only if the trunks accept DTMF dialing). The relays operate under the following conditions:

**Incoming Calls.** After a power failure transfer has occurred, the Central Office applies ringing to the station for incoming calls directly to the selected station line.

**Outgoing Calls.** To place an outgoing call through a ground start CO trunk, with the system in Power Fail Transfer Mode, the station originating the call must be equipped with a ground key (i.e., CM1470). Pressing the ground key momentarily, applies a ground to the Ring side of the line, which energizes the CO equipment. One side of the

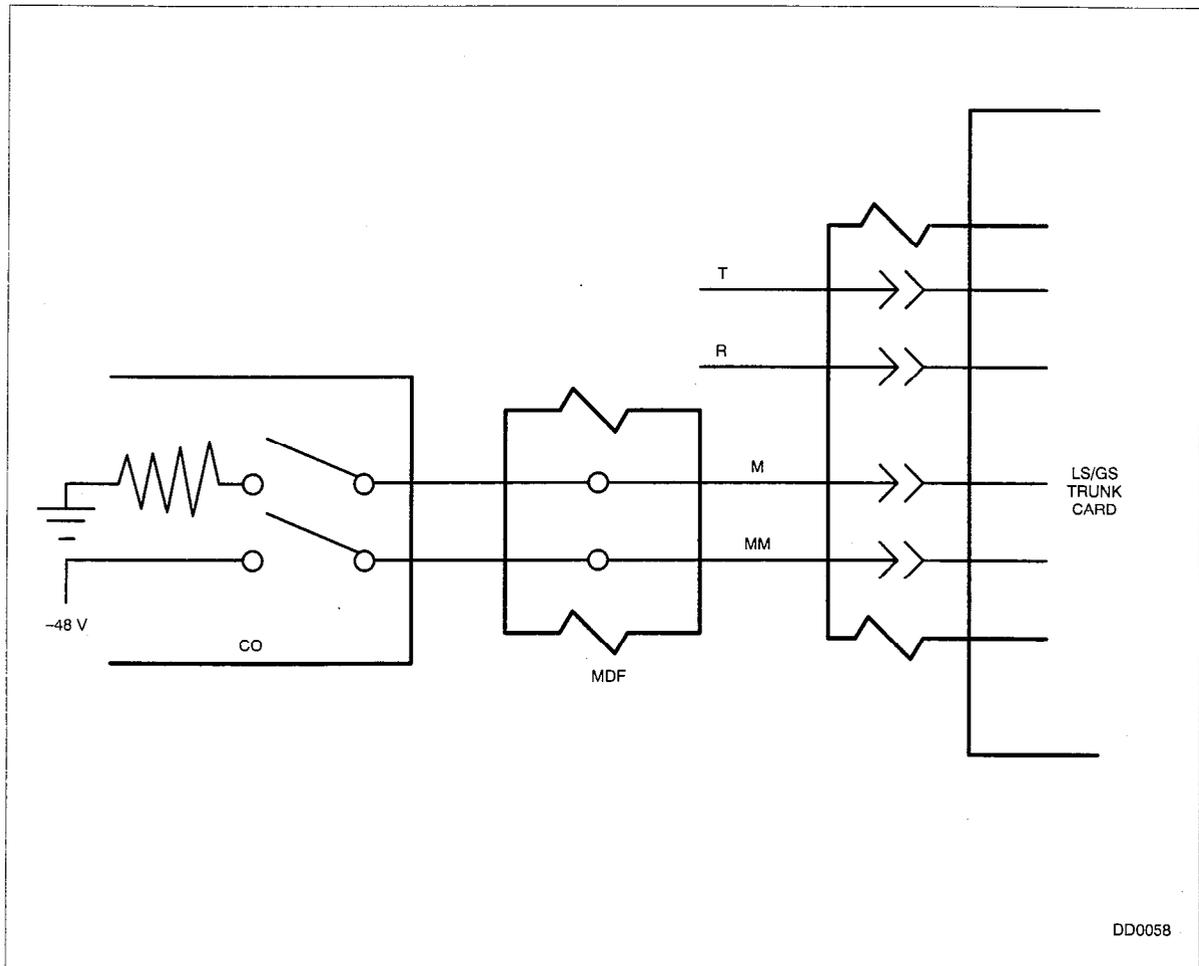
ground key must be connected to a ground and the other to the Ring conductor of the station line. Call origination over loop-start trunks does not require a ground start key.

**Table 6-1 Tip and Ring Assignments**

Pin	Pair Colour	ONS Line	COV and DNIC Line	LS/GS Trunks DID Trunks OPS Line	Universal Card Lead Designation		
					Module Position	MOH Pager*	E&M+ Trunk
26	W-BL	Tip 1	Tip 1	Tip 1	1	Music In A	Tip 1
1	BL-W	Ring 1	Ring 1	Ring 1		Music In B	Ring 1
27	W-O	Tip 2	Tip 2	MM1++		Pager Out A	TR1
2	O-W	Ring 2	Ring 2	M1		Pager Out B	RR1
28	W-G	Tip 3	Tip 3	Tip 2	2	Contact A ♦	E1
3	G-W	Ring 3	Ring 3	Ring 2		Contact B	M1
29	W-BR	Tip 4	Tip 4	MM2			
4	BR-W	Ring 4	Ring 4	M2			
30	W-S	Tip 5	Tip 5	Tip 3	3	Music A	Tip 2
5	S-W	Ring 5	Ring 5	Ring 3		Music B	Ring 2
31	R-BL	Tip 6	Tip 6	MM3		Pager Out A	TR2
6	BL-R	Ring 6	Ring 6	M3		Pager Out B	RR2
32	R-O	Tip 7	Tip 7	Tip 4	4	Contact A	E2
7	O-R	Ring 7	Ring 7	Ring 4		Contact B	M2
33	R-G	Tip 8	Tip 8	MM4			
8	G-R	Ring 8	Ring 8	M4			
34	R-BR	Tip 9	Tip 9	Tip 5	3	Music A	Tip 3
9	BR-R	Ring 9	Ring 9	Ring 5		Music B	Ring 3
35	R-S	Tip 10	Tip 10	MM5		Pager Out A	TR3
10	S-R	Ring 10	Ring 10	M5		Pager Out B	RR3
36	BK-BL	Tip 11	Tip 11	Tip 6	4	Contact A	E3
11	BL-BK	Ring 11	Ring 11	Ring 6		Contact B	M3
37	BK-O	Tip 12	Tip 12	MM6			
12	OBK	Ring 12	Ring 12	M6			
38	BK-G	Tip 13	Tip 13	Tip 7	4	Music In A	Tip 4
13	G-BK	Ring 13	Ring 13	Ring 7		Music In B	Ring 4
39	BK-BR	Tip 14	Tip 14	MM7		Pager Out A	TR4
14	BR-BK	Ring 14	Ring 14	M7		Pager Out B	RR4
40	BK-S	Tip 15	Tip 15	Tip 8	4	Contact A	E4
15	S-BK	Ring 15	Ring 15	Ring 8		Contact B	M4
41	Y-BL	Tip 16	Tip 16	MM8			
16	BL-Y	Ring 16	Ring 16	M8			
42	Y-O			Not Used			
17	O-Y			Not Used			
43	Y-G			STATION T1**			
18	G-Y			STATION R1**			
44	Y-BR			ONS LINE CARD T1			
19	BR-Y			ONS LINE CARD R1			
45	Y-S			TRUNK T1			
20	S-Y			TRUNK R1			
46	V-BL			TRUNK CARD T1			
21	BL-V			TRUNK CARD R1			
47	V-O			STATION T2			
22	O-V			STATION R2			
48	V-G			ONS LINE CARD T2			
23	G-V			ONS LINE CARD R2			
49	V-BR			TRUNK T2			
24	BR-V			TRUNK R2			
50	V-S			TRUNK CARD T2			
25	S-V			TRUNK CARD R2			

**Notes for Table 6–1, TIP AND RING ASSIGNMENTS**

- \* The *SX-50* system only supports one MOH/Pager Module and one RMATS Module. If a Control Card 2 (MCC2) is installed, an MOH/Pager Module is not required. When both a Control Card 2 and an MOH/Pager Module are installed, the system ignores the MOH/Pager Module.
- \*\* LS/GS only: Pins 43, 18 are the first lead designations for the Power Fail Transfer circuits (2 per LS/GS Trunk Card). Refer to Figure 6–2, Power Fail Transfer Connections for details.
- + For 2-Wire E&M Trunk Operation, DO NOT connect RR and TR leads. Refer to Figure 6–3 and Figure 6–4, E&M Trunk Wiring.
- ++ LS/GS only: MM Lead is the Ring Message Lead and M Lead is the Tip Message Lead. Refer to Figure 6–1, Message Registration Connections.
- ◆ When the Pager is engaged, Contact A connects with Contact B.

**Figure 6–1 Message Registration Connections**

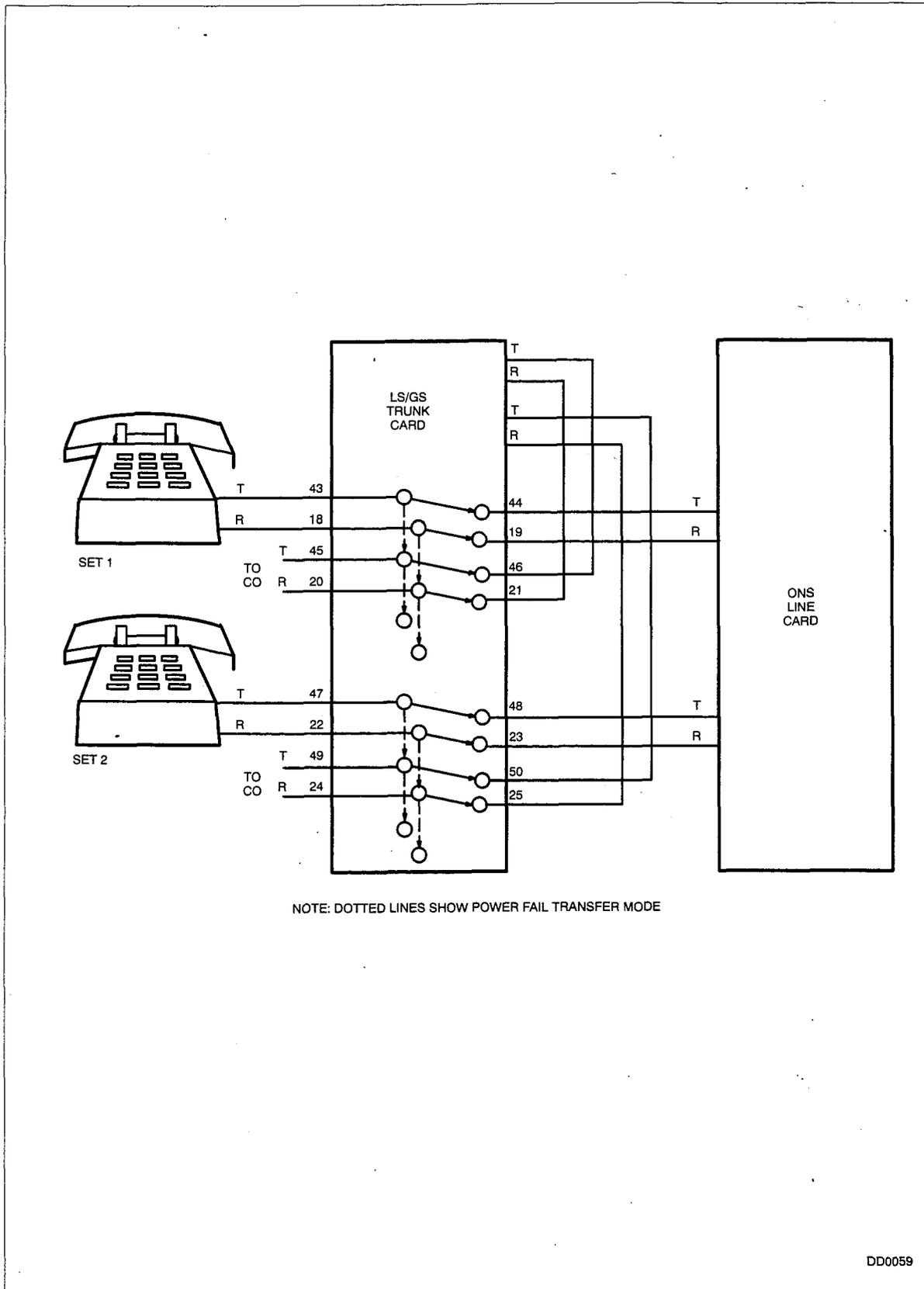
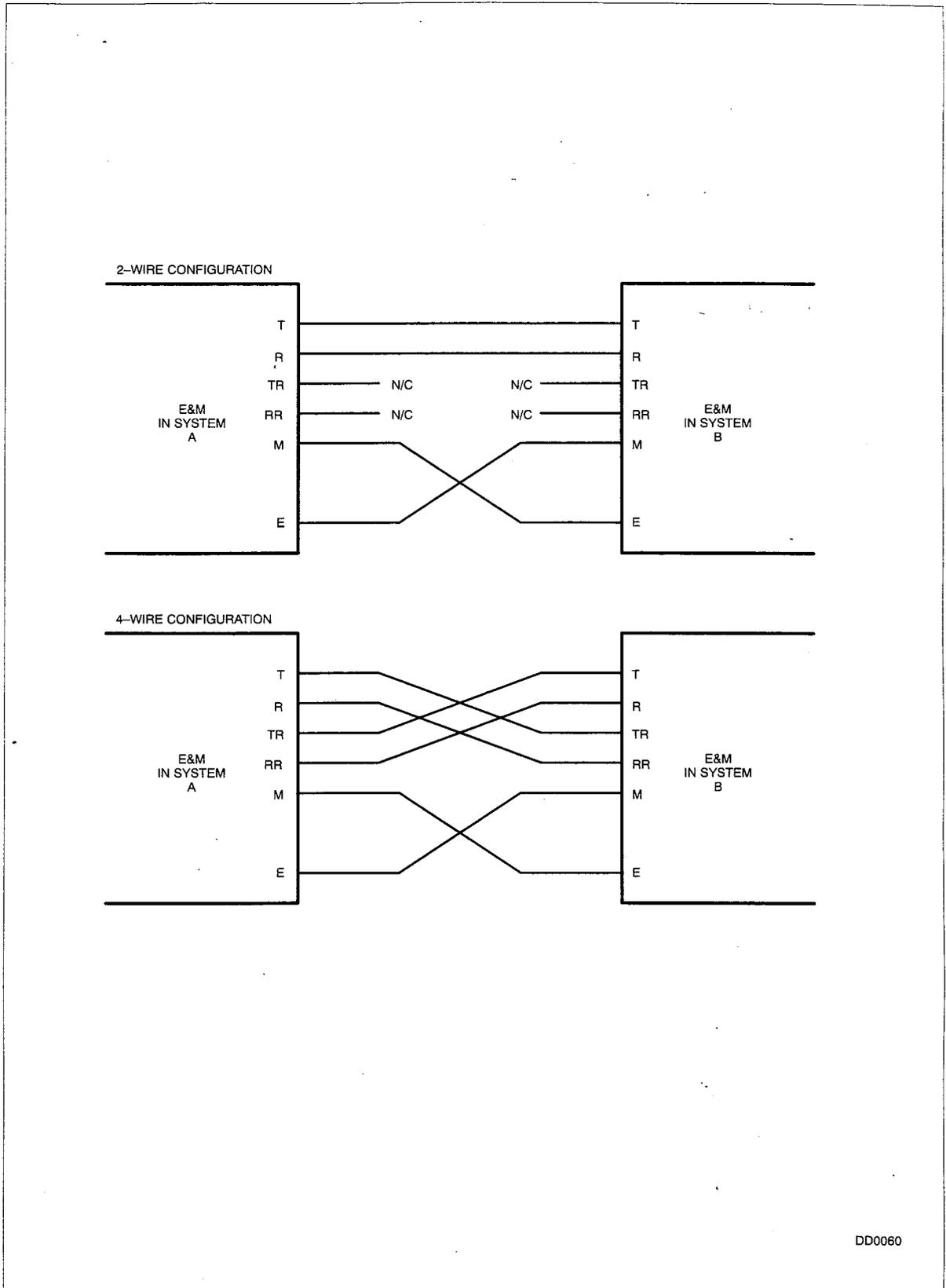
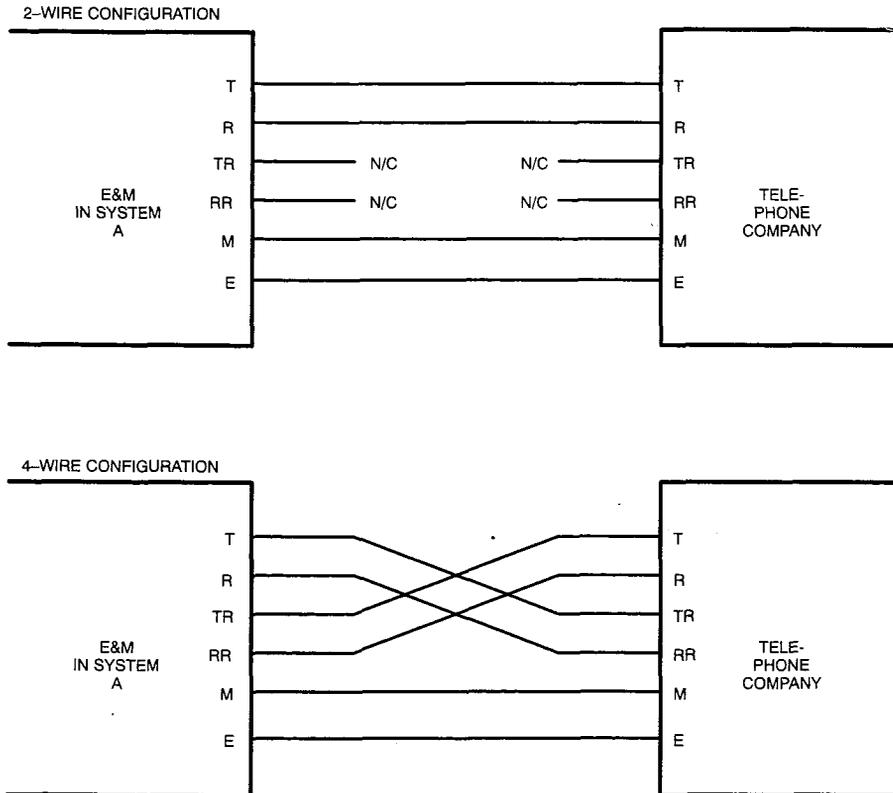


Figure 6-2 Power Fail Transfer Connections



DD0060

Figure 6-3 E&M Trunk Wiring (Back to Back)



DD0061

Figure 6-4 E&M Trunk Wiring (PABX to Telephone Company)

# Appendix A.

## FCC INTERCONNECTION REQUIREMENTS TELEPHONE COMPANY INTERCONNECTION

This equipment has been approved by the Federal Communications Commission (FCC) as not being harmful to telephone network when connected directly to the telephone lines through the standard 50-pin blue ribbon plug prescribed by the FCC Rule. This Appendix is applicable to the telephone interconnection in the United States.

### Notification

A.1 Prior to the interconnection of this equipment, the local telephone company must be notified; inform the company of the FCC-registered equipment connected to their trunks and give them the following information:

- The Communications System being connected is a MITEL Model SX-50 system.
- The 14-digit FCC Registration Number which is BN285B-16887-MF-E for systems manufactured in the United States, BN24CK-16185-MF-E for systems manufactured in the United Kingdom.
- The Ringer Equivalence Number which is 1.0B.
- The jacks or connectors required are RJ21X. (One jack is required for each group of eight trunks).
- Private line terminations are:

Circuit	Facility Interconnect	Connector/Jack
2-wire E&M Type I	TL11M	RJ2EX
4-wire E&M Type I	TL31M	RJ2GX
Loop Start CO Trunks	02LS2	RJ21X
Ground Start CO Trunks	02GS2	RJ21X
DID Trunks	02RV2-	RJ21X
OPX Lines	0L13B	RJ21X

- The OPS interfaces available with this product are registered with the FCC as being Class B.
- When programming the programmed dialer feature (i.e., Speed Dial) for emergency services (e.g., 911 or 7-digit telephone numbers), or when verifying these numbers by making test calls, please note the following: 1. Remain on the line until answered and briefly explain to the dispatcher the reason for the call before hanging up. 2. Perform such activities in the off-peak hours, such as early mornings or late evenings.

## Connection Limitations

- A.2 Due to the FCC Part 68 Rule, no connection can be made to party lines or coin telephone services.

## Network Changes

- A.3 The telephone company may make changes to its communication service. Such changes may include the change of trunk circuits, but, for such changes, the company shall provide official notification so that the operation of the DPABX service is not interrupted.

## Maintenance Limitations

- A.4 This equipment has been registered with the FCC for direct connection to the telephone network. Under the FCC Program, the user is restricted from making any changes or repairs and from performing any maintenance operations other than those specifically included in this set of MITEL Standard Practices.

Circuit cards may be removed by the user; however, replacement cards are supplied only by MITEL or its authorized agent. No field repair of circuit cards by the user is allowed.

The user is not permitted to make cabling or wiring changes within the Attendant Console. Plug-ended cables as detailed in the MITEL Standard Practices, are required for all external connections between the SX-50 system and the Main Distribution Frame (MDF).

Power Supply components and cabling can only be changed and maintained by MITEL or by an authorized agent of MITEL.

## Trouble Corrections

- A.5 System Diagnostics report most troubles and the Attendant Console LCD indicates the circuit and card that are malfunctioning. **The user can replace cards. The user should always ensure that the system power is turned OFF when replacing the the Generic Module or Universal card.**

For more complex malfunctions, MITEL or its authorized agents provide appropriate field service.

# Appendix B.

## SYSTEM GROUNDING AND SURGE PROTECTION REQUIREMENTS

This Appendix describes the basic theory of protection techniques with associated installation procedures. These techniques have proved effective in electronic equipment protection.

Reliable service from electronic switching systems can only be ensured if care is taken to protect the solid-state circuitry of the switching system from the effects of electrical surges of various kinds. Typically this electrical energy enters the switching system electronics through external connections. The three energy types are:

- AC power surges due to lightning storms, brown-outs and inductive "kicks" produced by heavy-duty electrical machinery (motors, generators, air conditioners, etc.), which may perturb the ac power supply.
- Lightning or fallen power lines can cause surges, which enter the DPABX via off-premises cables, which may be telephone company trunks or private off-premises stations (OPXs). An OPX for the purposes of this document is any pair of wires connected to the DPABX and terminated outside the building in which the DPABX is located.
- Electrostatic discharges from telephone set users, which enter the DPABX when subscribers touch telephone instruments.

### AC Power-Line Surges

- B.1 A power-line surge protector plugs into any standard 115 Vac 3-prong duplex receptacle and provides effective overvoltage protection for ac-powered DPABXs. This protector is recommended in geographic areas subject to severe lightning storms, where ac power is disrupted by inductive "kicks" (produced by heavy machinery) or where local ac transient protection is suspect. ac power surge protectors are manufactured with many clipping voltages which must be specified when ordering.

**Operation of Surge Protectors.** The surge protector can be effective for both transient overvoltage and persistent over-voltage.

- **Transient Overvoltage.** Overvoltage on either line and/or neutral (refer to Figure B-1) of the ac power breaks the gas tube arrester at a safe voltage level. The excess energy on the line or neutral shunts harmlessly to the safety ground for the duration of the transient.
- **Persistent Overvoltage.** If the overvoltage on the ac power persists, a "thermal circuit breaker" in the arrester mechanically disconnects the DPABX. When the

overvoltage ceases, and it is safe, the ac power returns, the gas tube arrester stops conducting and the thermal circuit breaker reconnects the DPABX.

**Installation.** The surge protector plugs into the standard 3-prong outlet and then provides a receptacle for the ac power cord of the DPABX. The installer should check that the 3-prong ac power receptacle has been properly wired with a safety ground. Devices are commercially available which indicate if the outlet has been wired correctly. Note that this type of surge protector can be used on ac circuits equipped with ground fault detectors; however, the ground fault detector may operate when the surge protector shunts to ground.

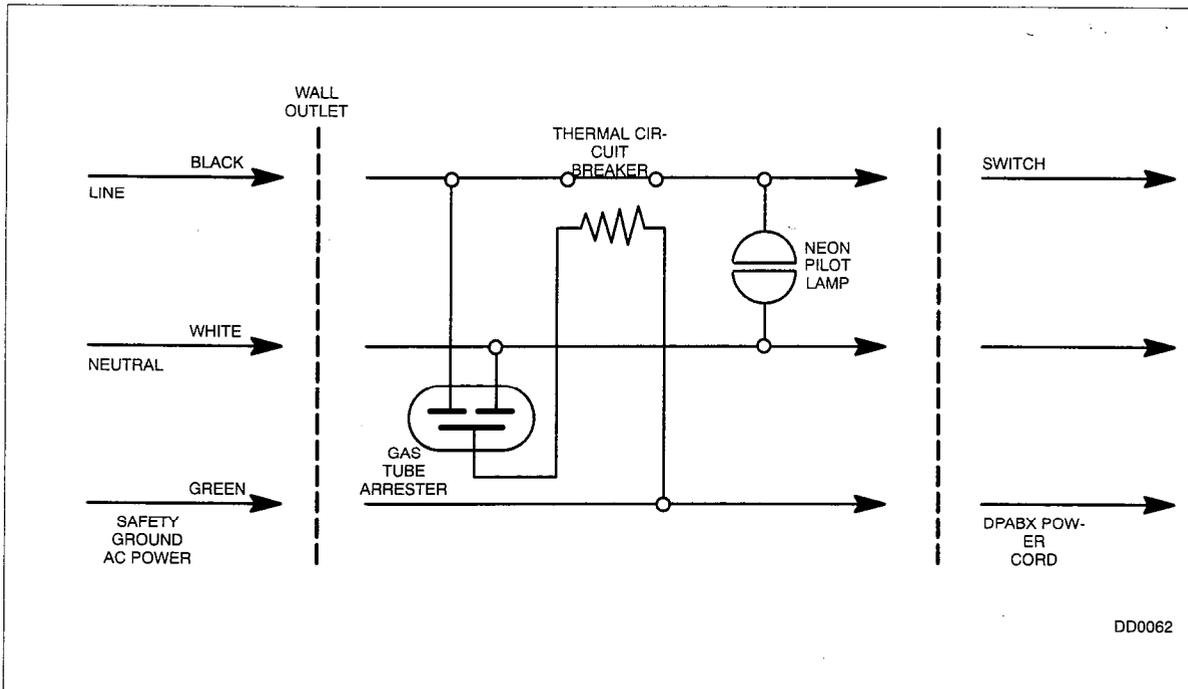


Figure B-1 Surge Protector

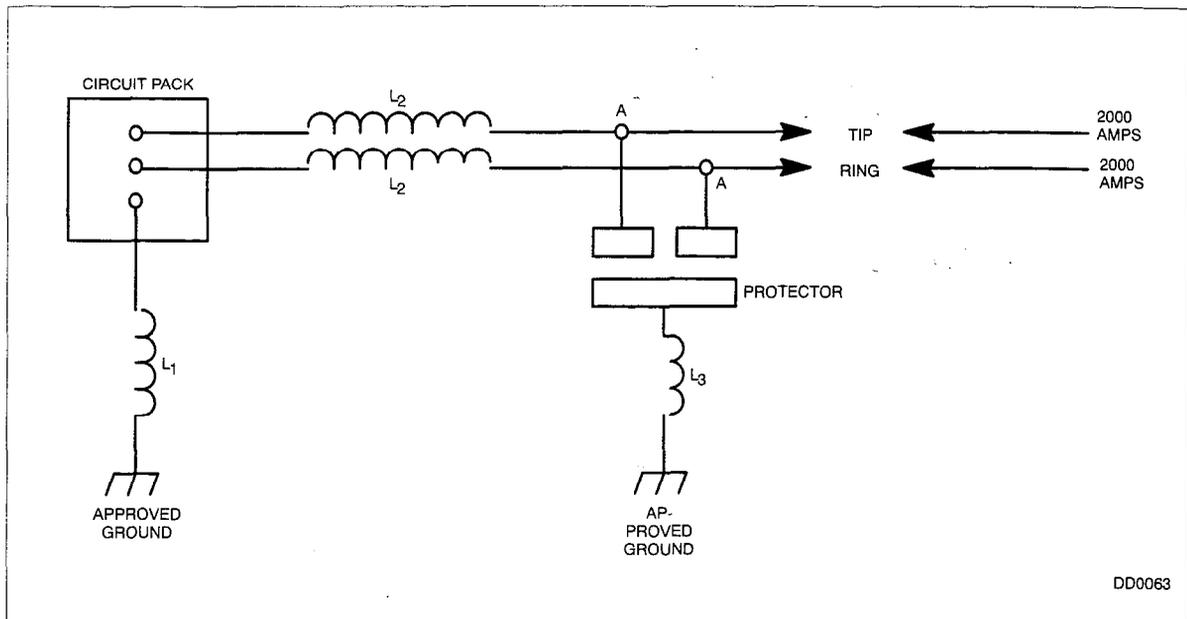
## Protection for Off-Premises Cables

B.2 Although ac power surge protection is recommended in problem areas, it is mandatory to provide protection on off-premises wiring (trunks, OPXs). Failure to ensure such protection results in unreliable DPABX service (equipment failures) and may invalidate the manufacturer's warranty.

Lightning is an atmospheric effect produced by very high voltages existing for a very short period of time. Currents produced by lightning in the earth's surface induce large currents in buried telephone cables, typically 100 amps per conductor. A small DPABX with 10 off-premises circuits (trunks or OPXs) can easily experience  $20 \times 100 = 2000$  Amps of total induced current flowing in the underground cable. Overhead cables are susceptible to direct strikes of lightning with the same results.

**Classical PABX Protection.** This type of protection uses carbon blocks or gas tube protectors installed where the off-premises wiring enters the building. Figure B-2 illustrates the equivalent circuit run-on. When the voltage at node A exceeds the

protector breakdown voltage, the protector arcs and the surge current shunts into the protector ground. For electronic DPABXs, 3-element gas tubes are recommended as they have uniform breakdown characteristics for both Tip and Ring.



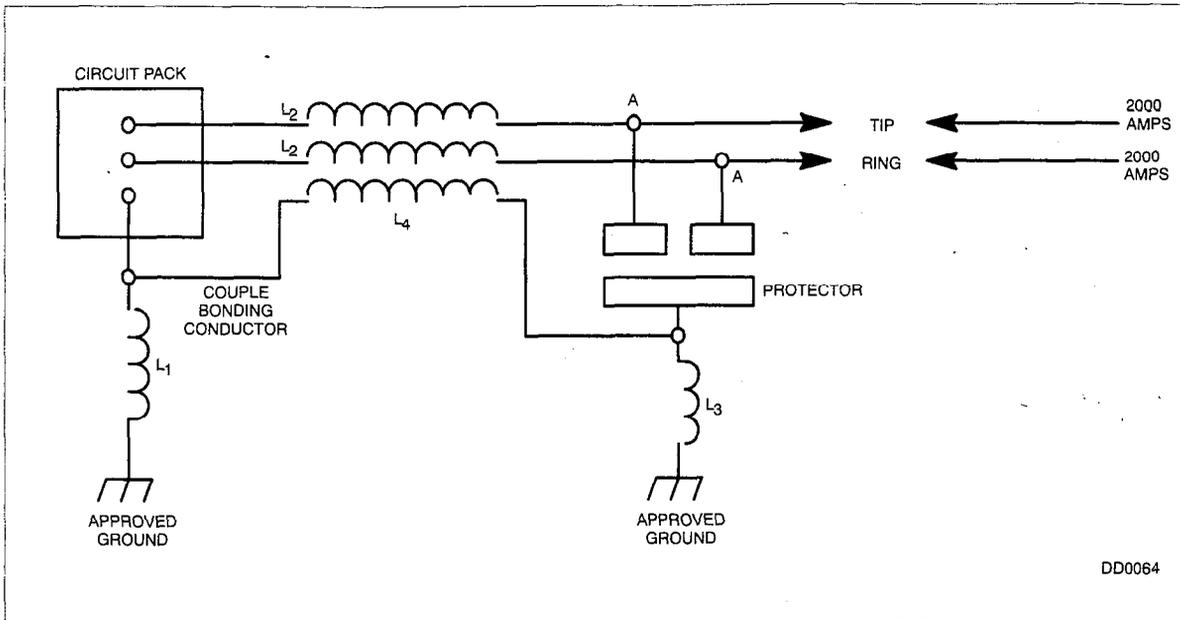
**Figure B-2 Classical Protection of Trunks/OPXs**

**Incremental Transient Protection.** This protection is not necessary for MITEL DPABXs; some installations provide incremental transient protection during the surge rise-time by using a “coupled bonding wire”. This coupled wire is usually No. 10 AWG stranded copper wire tie-wrapped in the center of off-premises cabling and bonded at both the protector ground point and the equipment ground point. Figure B-3 illustrates the equivalent circuit.

In Figure B-3, the coupled conductor develops an induced voltage in inductor L4 equal to the surge voltage developed in inductor L2. If inductors L2 and L4 are coupled as an ideal transformer, the resultant voltage across the circuit pack is zero. This provides extra protection for the circuit pack.

**Installation.** The installation procedure is critical for safe, reliable protection. Figure B-4 illustrates an installation arrangement using protector blocks, ac surge protection and coupled bonding conductors. Two important items in the installation are:

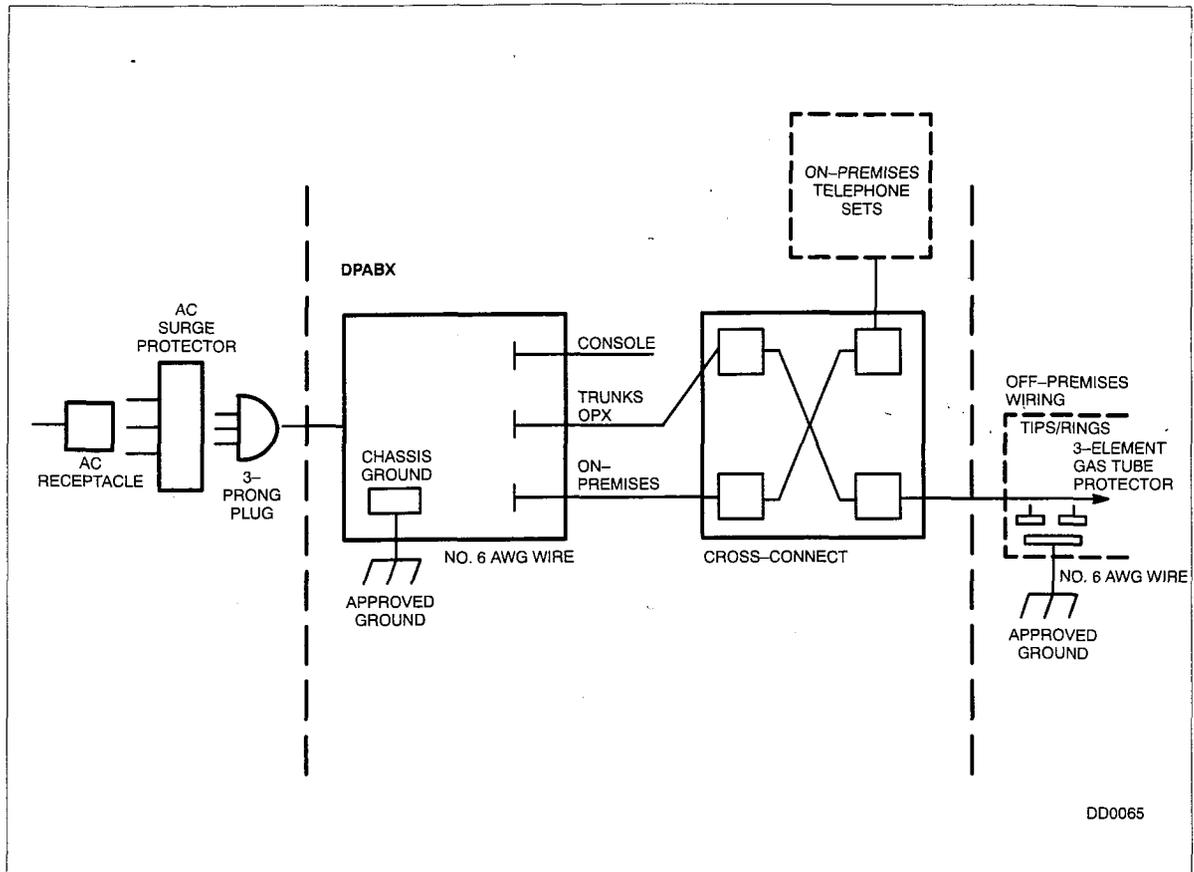
- An approved ground and
- Quality power connectors (lug-type) at ground bonding points.



**Figure B-3 Protection with “Coupled Bonding Conductor”**

The following definitions apply to the installation description:

- **Approved Ground.** A cold metallic water pipe. The cold (not hot) water pipe must have a continuous diameter of not less than 1.25 cm (0.5 in.) and be electrically connected to the street side of the water meter. Even when the water meter is metallic, a No. 6 AWG bond wire must be placed around the meter. Appropriate clamps must be used to bond the No. 6 AWG wire to the water pipe. The bond wire must be copper.



**Figure B-4 Installation of Protectors**

- **Bonded Connection.** A bonded connection implies that appropriate lug type connectors are to be used. Such connectors are sized to the wire gauge.
- **AC Ground.** The ac Ground is the green wire (safety ground) which appears at the ac duplex receptacle.
- **DPABX Chassis Ground.** The DPABX Chassis Ground is a No. 6 AWG copper wire which connects from the ground stud on the Power Supply to an approved ground (refer to Approved Ground definition in this Paragraph).
- **Protector Ground.** The Protector Ground is a No. 6 AWG copper wire which connects the ground lug on the protector to an approved ground (refer to Approved Ground definition in this Paragraph).

Once the installation has been completed, check the following:

- Ensure the presence of primary protection for trunks and OPXs. Three-element gas tubes are recommended as they provide consistent breakdown characteristics for both Tip and Ring, thus avoiding metallic voltages between Tip and Ring. Appropriate protectors are readily available from various distributors.
- Ensure that the NO. 6 AWG wire for the Protector Ground is bonded to an approved ground. The quality of this connection is important; use approved connectors. If a cold water pipe ground is used as the approved ground, then ensure that it is clean (shiny) and free of contaminants at the bonding point.

- Where possible, physically separate the off-premises cabling from the on-premises cabling where the cables meet in the building. Separate ducts or compartmentalized ducts are preferred.

**Chassis Ground Test.** This test should be done before connecting the No. 6 AWG wire to the ground lug on the Power Supply.

- Plug the DPABX ac power cord into the surge protector and the ac receptacle. It is not necessary to power up the DPABX.
- Use a good quality, calibrated digital multimeter and prepare to measure any ac voltage between the DPABX ground lug (on the Power Supply) and the approved ground (the No. 6 AWG wire connected to the cold water pipe). Set the multimeter to the highest ac voltage range and measure between the Power Supply ground lug and the approved ground. Switch the multimeter from the highest to the lowest voltage range. If voltages greater than 1.0 volt are found, stop and locate an alternative approved ground or refer the problem to an engineering support group.
- After ensuring that the voltage between the ground lug on the Power Supply and the approved ground is less than 1.0 volt, set the multimeter to the ohms scale. The meter should read less than 5 ohms. If the reading is higher than 5 ohms, stop and take steps to reduce the resistance to 5 ohms (shorten the No. 6 AWG wire and/or clean the surface of the cold water pipe) or refer the problem to an engineering support group.

### Electrostatic Protection at the Telephone Set

- B.3 If static is a problem at a specific installation site, it may be necessary to provide some protection on a per-line (telephone set) basis. Such protection is seldom necessary if the cabling between the telephone set and the DPABX is greater than 30 m (100 ft). In cases where the cables are less than 30 m (100 ft), it may become necessary to provide a 30 m (100 ft) cable loop on a per-line basis (or a MITEL Static Protection Unit, Part Number 9180-067-001-NA), between the telephone set and the DPABX.

**SX-50<sup>®</sup> DIGITAL PRIVATE  
AUTOMATIC BRANCH EXCHANGE  
(DPABX)**

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**Customer  
Data Entry  
(CDE)**

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### **NOTICE**

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# 1.

## INTRODUCTION

### General

- 1.1 After the successful mechanical installation of the SX-50® system (refer to Section 9104-091-200-NA, Shipping, Receiving and Installation Information), the system is ready for programming. This Section outlines the procedures for entering customer data, describes the programming options, and indicates the default options.

### Reason for Reissue

- 1.2 This section has been reissued to incorporate MS55 software.

### Section Overview

- 1.3 This Section is divided into five Parts:
1. **Introduction**
  2. **System Initialization:** details the initial power-up procedures and loading of default data.
  3. **Feature Index:** provides a quick reference to the command, register and field numbers that affect each feature available on the SX-50 system.
  4. **Customer Data Entry Registers:** lists the options for each field of each register.
  5. **Programming Error Codes and Messages:** lists and describes the error codes that can appear during Customer Data Entry.



## 2.

# SYSTEM INITIALIZATION AND DATA ENTRY

### Default Data

- 2.1 When the system is first installed, the default database must be loaded. Refer to Table 2-1, Initial Power-up Procedure. The default database saves programming time, as the programmer need make entries only where a deviation from the default is desired.

The default database sets up an operable telephone system when power-up is completed. Installed Line and COV card ports are assigned extension numbers in ascending order starting at 100 from the first port on the leftmost card.

When the system is reset, or is restarted after a shutdown or power failure, the customer data remains in place unless default data is loaded; only the time and date will have to be entered. Refer to Table 2-2, System Reset/Restart Procedure.

### Levels of Access

- 2.2 Status Switch 1 on the edge of the Control Card or Control Card 2 (MCC2) (see Figure 2-1 or Figure 2-2, respectively) controls whether a security code is required for programming access. It is recommended that before the cover is locked this switch be set OPEN (Security Code Required) to prevent unauthorized access to the database.

When the System Security Code is used to enter Programming Mode, the programmer can modify any part of the customer database.

When the User Security Code is used to enter Programming Mode, the user (customer) can modify only those commands specified in Command 180 (User Programming Access).

When no security code is entered, the user cannot modify the database. The user can view all of the database except the following:

- Command 190, System Security Code Programming,
- Command 191, User Security Code Programming,
- Command 192, RMATS Security Code Programming,
- Command 193, DISA Access Code Programming.

## Programming Access

- 2.3 If Status Switch 1 is CLOSED, press # (or dial 70) at the Console or Test Line. If the switch is OPEN, follow the procedure in Table 2-3, Programming Access from the Attendant Console or Table 2-4, Programming Access from the Test Line.

**Table 2-1 Initial Power-up Procedure**

**INITIAL POWER-UP AND LOAD DEFAULT DATA**

- With the system power OFF, set all the Control Card status switches OPEN. Refer to Figure 2-1, Control Card Connectors, or Figure 2-2, Control Card 2 (MCC2) Connectors.
- Switch the Power Supply ON.
- Within 10 seconds ? appears on the Control Card LED and the Attendant Console LCD shows **LOAD DEFAULT DATA?**  
Within 10 seconds, move Status Switch 1 to the CLOSED position then move it back to the OPEN position.
- The Control Card LED displays **c** for 40 seconds while the default data is loading. The display then shows **d** for 10 seconds.
- The Control Card LED briefly displays **A**, indicating the system has successfully loaded the Default Data. The display then flashes the number of alarms in the alarm queue. The idle time/date display appears on the Console LCD.
- If desired, set Status Switch 1 CLOSED to enable Programming Access without a Security Code, but remember to set the switch OPEN when data entry is complete.
- If use of a Test Line is anticipated, set Status Switch 2 CLOSED.

**Table 2-2 System Reset/Restart Procedure**

**POWER-UP WITH CUSTOMER DATABASE**

- If the Power Supply is OFF, switch it ON. If it is ON, press RESET. Refer to Figure 2-1, Control Card Connectors, or Figure 2-2, Control Card 2 (MCC2) Connectors.
- If Status Switch 1 is OPEN, within 10 seconds ? appears on the Control Card LED and the Attendant Console LCD shows **LOAD DEFAULT DATA ?**. If the switch is CLOSED, only a decimal point is displayed. In either case, wait 10 seconds.
- The Control Card LED flashes the number of alarms in the alarm queue. The idle time/date display appears on the Console LCD.

**Table 2-3 Programming Access From The Attendant Console**

**ENTER PROGRAMMING MODE FROM THE ATTENDANT CONSOLE**

**Note:** For read-only access, omit the steps involving the STATUS key.

- Press and hold down the STATUS key.
- The Attendant Console LCD displays the software identifier and maintenance release number.

SX-50 MS53-MR0

- Enter a security code (System Security Code default is 7772 and User Security Code default is 1234).\*
- The Attendant Console LCD flashes the word **SX-50** if the security code is correct.
- Release the STATUS key.
- Press # or dial 70.
- The Console LCD displays the first command number.

COMMAND 100?  
ENTER EXIT

The system is now in Programming Mode.

**EXIT PROGRAMMING MODE**

- Press the RELEASE key or the EXIT softkey.

\* If the User Security Code is entered, the system will allow access only to the Command Registers enabled in Command 180, User Programming Access.

**Table 2-4 Programming Access From The Test Line****ENTER PROGRAMMING MODE FROM THE TEST LINE**

1. Status Switch 2 on the Control Card must be CLOSED for Test Line operation.
2. It is recommended that a SUPERSET™ 4 telephone be used as a Test Line as it has an LCD display.
3. Command 100 Register 1 fields e, f, g must be programmed with the equipment number of the Test Line set. Default is 001.
  - Press # or dial 70. The *SUPERSET 4* telephone LCD displays **ENTER CODE** and the EXIT and READ softkeys. For read-only access, press the READ softkey instead of entering a security code.
  - Dial a security code (System Security Code default is 7772 and the User Security Code default is 1234).\*
  - If the code is correct, the LCD displays **COMMAND 100?** with the EXIT and the YES softkeys. The system is now in Programming Mode.

**EXIT PROGRAMMING MODE**

- Press the EXIT softkey or toggle the switchhook.

\* If the User Security Code is entered, the system will allow access only to the Command Registers enabled in Command 180, User Programming Access.

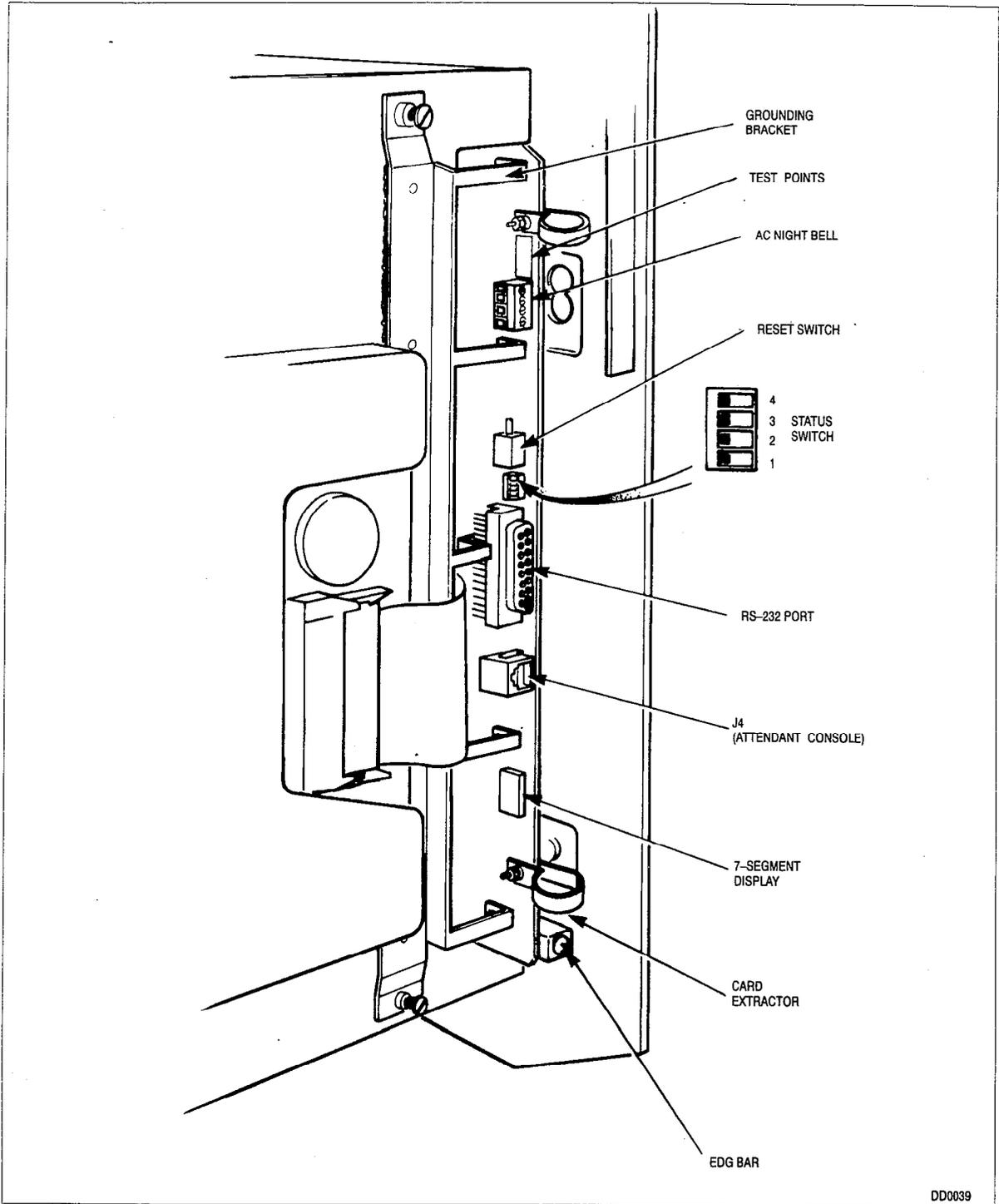


Figure 2-1 Control Card Connectors

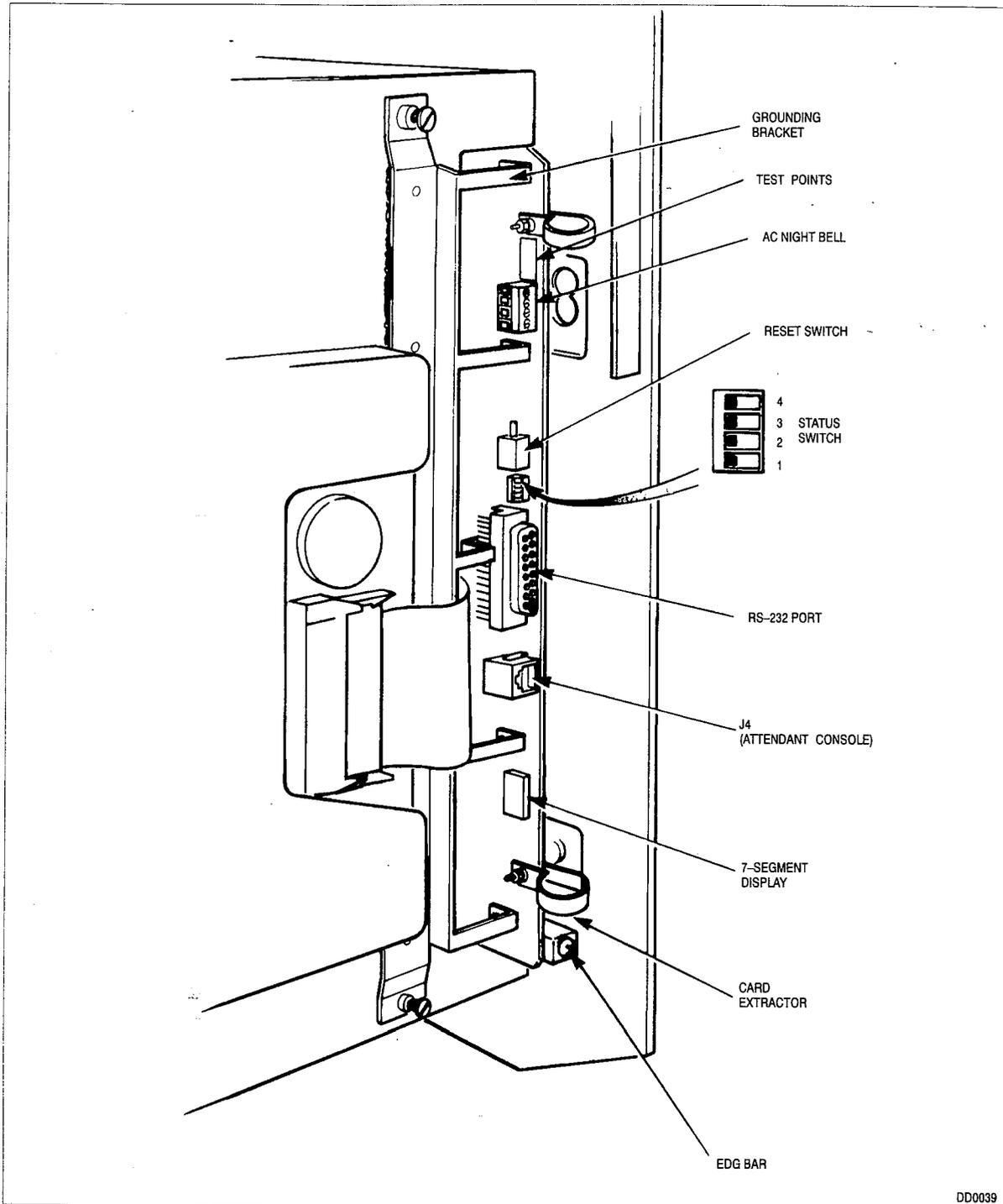


Figure 2-2 Control Card 2 (MCC2) Connectors

### Selecting the Command Number

- 2.4 At the Command Level of CDE, the LCD shows a flashing command number and question mark. Refer to Figure 2-3, Command Level Display.

COMMAND 100?	
ENTER	EXIT

**Figure 2–3 Command Level Display**

If required, dial a new command number on the telephone keypad. The display stops flashing and the QUIT softkey appears. To correct an erroneous entry or change the command number again, press QUIT.

When the required command number is displayed, press the ENTER softkey to enter Register Level.

### Selecting the Register Number

- 2.5 Upon entry to Register Level, the LCD displays the first register of the selected command, with the NEXT, QUIT, EXIT and → softkeys. The Register Number flashes. (The Register Number is the first 1 or 2 digits of the register). Refer to Figure 2–4, Register Level Display.

(a) 01000011	CMD 100 R1		
NEXT	QUIT	EXIT	→

**Figure 2–4 Register Level Display**

**Note:** If the → softkey does NOT appear, access is read-only. Reenter CDE using the appropriate Security Code.

If required, press the NEXT softkey to advance to the next register in the selected command. The NEXT softkey disappears when there are no more registers. When the required register is displayed, press the → softkey to enter Field Level.

An alternative way to select the desired register is to dial the register number on the telephone keypad. The display enters Field Level immediately.

### Changing the Field Data

- 2.6 At Field Level, the LCD shows the same display as at Register Level except:
- the NEXT softkey is replaced with the SAVE softkey
  - and,
  - the Register Number lights solidly; the entry point (the first field that can be modified) flashes.

Refer to Figure 2–5, Field Level Display.



**Figure 2–5 Field Level Display**

Dial new field data values on the telephone keypad. The lower case letter in brackets at the left of the display identifies the entry point, which flashes. The entry point advances one field for each digit dialed.

The → softkey moves the entry point to the next field without entering new data. It is not possible to backspace. If the entry point is moved past the required field, use the QUIT softkey to return to Register Level then reenter the data.

If an error message is displayed or the data entered was incorrect, use the QUIT softkey to return to Register Level. Check and reenter the data.

When the required data is displayed, press the SAVE softkey to commit the changes to the database. The display goes to Register Level on the next register in the command. If there is no such register, it returns to Command Level on the current command.

## Soffkeys

2.7 The Attendant Console, the Auxiliary Attendant and the Test Line (if it is a *SUPERSET* Telephone) display softkeys. The function name appears above the key, on the LCD, when the function is available. The softkeys are described below. Test Line softkeys, where they have a different name, appear here in parentheses.

**ENTER (YES):** Pressing the ENTER softkey at the Command Level enters the Register Level of the selected Command Number.

**EXIT:** Pressing the EXIT softkey at any level of programming exits Programming Mode.

**QUIT (CANCEL):** Pressing the QUIT softkey at Field Level (including when an error message is displayed) returns the display to Register Level. Data changes are not saved. Pressing QUIT at Register Level returns to Command Level.

**NEXT (FWD):** Pressing the NEXT softkey selects the next Command Number in a group (if at the Command Level) or the next Register Number in a group (if at the Register Level). The upper right-hand corner of the Attendant Console LCD indicates the selected Command and Register Numbers.

→: This softkey only appears if the level of access permits modification of the database. Pressing the → softkey moves the entry point one field to the right. The softkey disappears when the entry point is the last field of the register.

**SAVE:** This softkey appears at Field Level. Pressing the SAVE softkey stores the displayed data.

**(READ):** This softkey appears on the Auxiliary Attendant or Test Line during initial access to CDE. Pressing the READ softkey allows the user to read, but not modify, the database. Refer to Levels of Access and Table 2-4, Programming Access from the Test Line, in this Part for details.

Several softkeys which can appear at the console do not appear at the *SUPERSET 4/SUPERSET 420* telephones or have a different prompt. All the softkeys have equivalent key sequences:

Console Softkey	Test Line Softkey	Test Line Key Sequence
ENTER	YES	*1
NEXT	FWD♣	*2
→	→	*3
VIEW		*4
DELETE		*5
WFDT		*6
PAUSE		*7
EXIT	EXIT♦	*0
SAVE	SAVE	**
QUIT	CANCEL♦	*#

♣ If the test line is a *SUPERSET 420* the softkey will read "NEXT".

♦ These softkeys are not available on the *SUPERSET 420*.

**Note:** The VIEW, DELETE, WFDT and PAUSE softkeys are used in programming ARS. Refer to Section 9104-091-220-NA, Automatic Route Selection, for more information.



### 3.

## FEATURE INDEX

### General

3.1 Table 2-1, Feature Index, lists the programmable features of the SX-50 system and their corresponding Customer Data Entry fields.

Table 3-1 Feature Index			
Feature Name	Command	Register	Field
Abbreviated Dial	100	09	c,h
	110	13	j
	121 → 129	07	c → f
Account Codes (Note: SMDR options must be enabled; refer to SMDR in this table).	100	5	b → j
	110	15	c,d
	121 → 129	28	c → f
	751	3	h
Associated Modem Line	121 → 129	4	i
Attendant Access	110	01	h
Attendant and Maintenance Functions	110	13,14	c → f
Attendant-Switchable COS	301 → 310		e
Attendant Tone Signaling	185	01 → 14	c,d
Auto-Answer	100	07	c
Auto-Hold	100	07	d
Auto-Line Disconnect	100	03	h → j
	121 → 129	3	k
Automatic Callback	100	03	g
	110	32	c → f
	121 → 129	3	b,j
Automatic Diagnostics	100	01	c
Automatic Night Service	100	08	c,e
Automatic Ringdown Circuit	121 → 129	2	d
	301 → 310	01 → 16	c

**Table 3-1 Feature Index  
(continued)**

Feature Name	Command	Register	Field
Automatic Route Selection and Toll Control	100	13	c → j
	301 → 310	01 → 16	g
	341 → 350	01 → 16	g
	501 → 580	1	h
	700	001 → 800	d,e,g → l
	701 → 745	01 → 06	b → n
	750	001 → 200	d → o
	751	001 → 100	d → g
	752	001 → 100	d,e,g → l
Automatic Wake-Up (If a printer is required, refer to PRINTER in this table).	100	10	c,d
	110	41	c → f
	121 → 129	4	j
	185	01 → 14	c,d
Auxiliary Attendant	121 → 129	7	d
	301 → 310	1	d
	401 → 480		c → e
Background Music	100	09	g
Behind PABX Operation	151 → 156	1	f,g,h,i
		2	f
		4	c,d
Block Programming	321 → 330		a → h
	341 → 350		a → g
Break/Make Ratio	501 → 580	2	b
Calibrated Flash	100	06	c
Call Block	121 → 129	3	f
	185	01 → 14	c,d
Call Direction	121 → 129	2	c
Call Forwarding – Busy	110	11	c → f
	121 → 129	4	c
Call Forwarding – Busy/Don't Answer	100	11	d
	110	12	c → f
	121 → 129	4	e
Call Forwarding – Don't Answer	100	11	d
	110	10	c → f
	121 → 129	4	d
Call Forwarding – External	100	09	c
	121 → 129	4	b → f
		5	b → j
	501 → 580	2	c

Table 3-1 Feature Index (continued)			
Feature Name	Command	Register	Field
Call Forwarding – Follow Me	110 121 → 129	08 4	c → f b
Call Hold (Attendant)	100 110	9,11 16 → 18	f c → f
Call Hold (Extension)	100 110 121 → 129	09 11 03 3	f e c → f e
Call Hold Retrieve	110	04,05	c → f
Call Park	100 110	11 16,17,18	f c → f
Call Pickup	110 121 → 129 185 301 → 310	06 30 7 1 → 14 01 → 16	c → f c → f e,f c,d f
Call Selection	501 → 580	4 5	d b
Call Transfer	100 121 → 129	11 2 8	c,d b c
Camp-On	100 121 → 129	11 8	c b → e
Clear All Features	110	15	c → f
Conference	100 121 → 129	11 2 8	c,d b b → e
Conflict Dialing	100	09	e
Consoleless Operation	100 110 121 → 129 501 → 580	02 08 9 3 8 4 5	d c,d,f → i c → f g b → e d → g b → e
Contact Monitor	100 301 → 310	17 01 → 16	c → e c
Data Demultiplexer	100	16	c
Data Dump/Load	100	16	d → h

**Table 3-1 Feature Index  
(continued)**

Feature Name	Command	Register	Field
Data Line Security	121 → 129	3	d
Dictation Trunk	151 → 156 501 → 580	2 4	g b
Direct-In Lines	121 → 129 501 → 580	8 4	b → e d → g
Direct Inward Dial Trunks	100 110 121 → 129 185 501 → 580	05 35 → 37 8 01 → 14 1 4 5 6 7	g → i c → f d → e c,d e,j d → k b → f b → j b → i
Direct Inward System Access (DISA)	121 → 129 193 501 → 580	2 01 1 4	e b,c,d e,f,h,j h → k
Direct Line Select	401 → 480		c
Direct Trunk Select	401 → 480		c
Discriminating Ringing	100	03	f
Distinctive Callback Ringing	100	03	g
Do Not Disturb	110 121 → 129 185	33 2 01 → 14	c → f k c,d
E&M Trunks	151 → 156 501 → 580	1 1 2 3 4 5	f → i b,d,e,j c b → f d b
Executive Busy Override (Console)	100 185	02 01 → 14	c c,d
Executive Busy Override	121 → 129	4	g
Executive Busy Override Security	121	04	h
Flash Disable	121 → 129	2	b
Flash for Attendant	121 → 129	2	b
Flash is Release	100	06	c

**Table 3-1 Feature Index  
(continued)**

Feature Name	Command	Register	Field
Flexible Night Service	100 501 → 580	08 5	e b → e
Flexible Numbering Plan	110 151 → 156 301 → 310	01 → 41 1 01 → 16	c → f f → i i → l
Hotline	100 121 → 129 301 → 310	12 2 01 → 16	c d c
Hunt Groups (Extensions) (See also LOG-IN HUNT GROUPS)	110 361 → 366	19 → 24 01 02 → 09	c → f b,c b → e
Hunt Groups (Trunks)	151 → 156	1	c
Identified Trunk Group	151 → 156 501 → 580	1 2 2	e → i b,d,e c
Incoming Call Identification	501 → 580	4 5	d b
Internal Calls to Console Night Answer Point	100	08	g,h,i
Last Number Redial	100 121 → 129 151 → 156	09 5 2	d k j
Line Appearances	100 401 → 480	7	e d
Lockout Alarm	121 → 129	7	h
Log-in Hunt Groups	110 121 → 129	34 7	c → f g
Manual Line	100 121 → 129	12 2	c d
Message Register Audit (A printer is required; refer to PRINTER in this table.)	100	10	e
Message Registration	100 121 → 129 151 → 156 185	10 2 2 3 01 → 14	g f e b → h c,d
Message Waiting	100 110 121 → 129	12 27, 38, 39 2	c → f c → f g

**Table 3-1 Feature Index  
(continued)**

Feature Name	Command	Register	Field
Messages – Advisory	121 → 129	7	b
Messages – Call Me Back	401 → 480		c
Music on Hold	100	09	f
Night/Day Switching	185	01 → 14	c,d
Off-Premises Extensions	301 → 310	01 → 16	h
Originate-Only Extensions	121 → 129	2	c
Overflow	100	08	c → i
Paging Access	110 121 → 129 501 → 580	02 3 2	c → f c c
Partial Flash Inhibit	100	06	e
Personal Outgoing Line	401 → 480		c
Pickup Groups	110 301 → 310	06 01 → 16	c → f f
Printer	100	16	c → h
Remote Maintenance Administration and Test System (RMATS)	100 110 192 501 → 580	1 26 1,2 4 5	d c → f b → f d → g b → e
Restrictive Station Control	121 → 129	2	f
Reversal Meaning	501 → 580	2	d,e
Ring Group	110 381 501 → 580	25 01 → 09 4 5	c → f b → e e,f,g c → e
Room Status	100 110 121 → 129 185 301 → 310	10 31 3 01 → 14 01 → 16	i c → f i c,d g
Selectable Ringing Cadence Cycle Time	100	03	e
Special DISA (See also TRAVELING COS)	121 → 129 501 → 580	2 1	e e
SMDR Credit Card Calls	151 → 156	4	e

Table 3-1 Feature Index (continued)			
Feature Name	Command	Register	Field
Station Message Detail Recording (SMDR)	100 121 → 129 151 → 156	14 3 2	c → j h i
Station Switchhook-Flash Timing	100	06	c
<i>SUPERSET 3</i> and <i>SUPERSET 410</i> Telephones	100 301 → 310 401 → 480	07 01 → 16 01 → 15	c → e c → l c → i
<i>SUPERSET</i> Telephones	100 301 → 310 401 → 480	07 01 → 16 01 → 15	c → e c → l c → i
<i>SUPERSET 4</i> and <i>SUPERSET 420</i> Headset Operation	121 → 129	2	j
System Security Code Programming	190	01	b → e
Test Line	100	01 08 11	e,f,g f f
Transfer Dial Tone	100	03	d
Traveling COS	100 110 180 185 600	14 15 40 2 01 → 14	k e c → f h c,d a → n
Trunk Alarm Control	501 → 580	1	c
Trunk Answer From Any Station (TAFAS)	100 110 121 → 129 185	08 09 3 01 → 14	c → f c → f g c,d
Trunk Group Overflow	121 → 129 151 → 156	1 1	h d
Trunk Groups	121 → 129 151 → 156  501 → 580	1 1 2 3 4  1 2 3 4	b → g b → i b → k b → h b → e b b → i b → f b,c

**Table 3-1 Feature Index  
(continued)**

Feature Name	Command	Register	Field
Trunk Intercepts	501 → 580	4 5 6	d → k b → f c
Trunk Signaling – DTMF/Rotary Outpulsing	100 151 → 156	2 2	f g
Trunk-to-Trunk Plus Station Conferencing	100 121 → 129 501 → 580	05 1 1 2	c → i j d c
Unlimited Wait For Dial Tone	151 → 156	2	b
User Security Code Programming	180 191	1,2,3 01	b → h b → e
Voice Mail Port	100  110  121 → 129  301 → 310 361 → 366 401 → 480	8 12 19 → 24 38,39 2 3 4 5 7 01 → 16 2 → 9 15	g → i c c → f c → f g,k d,k g,h k d,f d,f b → e c → e
Wait For Dial Tone	151 → 156	2	b

# 4.

## CUSTOMER DATA ENTRY REGISTERS

### General

- 4.1 This Part details the options each CDE field controls and shows the default values. It serves as a guide for initial programming or modification to the existing database.

Those Commands which cannot be edited are omitted from this Section. Refer to Section 9104-091-350-NA, Troubleshooting Procedures and General Maintenance Information for details. These Commands include:

- Command 980, System Status Display
- Command 981, Inter-DX Link Status Display
- Command 982, Station Status Display
- Command 983, *SUPERSET* Telephone Status Display
- Command 984, Trunk Status Display
- Command 999, Software Identity Display

### Physical Configuration

- 4.2 Table 4-2 and Table 4-3 enable the installer to determine quickly the equipment number of any extension or trunk in the system. Many command registers require the entry of equipment numbers.

Card/Module Type	Abbreviation
ONS Line Card (16 Lines)	ONS 16
ONS Line Card (8 Lines)	ONS 8
OPS Line Card (8 Lines)	OPS 8
OPS Line Card (4 Lines)	OPS 4
COV Line Card (8 Lines)	COV 8
DNIC Line Card (8 Lines)	DNIC 8
LS/GS Trunk Card (8 Trunks)	LS/GS 8
LS/GS Trunk Card (4 Trunks)	LS/GS 4
DID Trunk Card (8 Trunks)	DID 8

Page 1 of 2

<b>Table 4-1 Card and Module Types (continued)</b>	
<b>Card/Module Type</b>	<b>Abbreviation</b>
DID Trunk Card (4 Trunks)	DID 4
Universal Card	UNIVERSAL
• Music on Hold/Pager Module	MOH/PAGER
• E&M Trunk Module	E&M MOD
• RMATS Module	RMATS
Control Card	MCC1
Control Card 2 *	MCC2

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\* Music on Hold/Paging capability requires MS53 software

<b>Table 4-2 Station Equipment Numbers</b>										
<b>Circuit Number</b>	<b>Slot Number</b>									
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
01	001	017	033	049	065	081	097	113	129	145
02	002	018	034	050	066	082	098	114	130	146
03	003	019	035	051	067	083	099	115	131	147
04	004	020	036	052	068	084	100	116	132	148
05	005	021	037	053	069	085	101	117	133	149
06	006	022	038	054	070	086	102	118	134	150
07	007	023	039	055	071	087	103	119	135	151
08	008	024	040	056	072	088	104	120	136	152
09	009	025	041	057	073	089	105	121	137	153
10	010	026	042	058	074	090	106	122	138	154
11	011	027	043	059	075	091	107	123	139	155
12	012	028	044	060	076	092	108	124	140	156
13	013	029	045	061	077	093	109	125	141	157
14	014	030	046	062	078	094	110	126	142	158
15	015	031	047	063	079	095	111	127	143	159
16	016	032	048	064	080	096	112	128	144	160

Table 4-3 SUPERSET/Trunk Equipment Numbers

Circuit Number	Slot Number									
	1	2	3	4	5	6	7	8	9	10
01	01	09	17	25	33	41	49	57	65	73
02	02	10	18	26	34	42	50	58	66	74
03	03	11	19	27	35	43	51	59	67	75
04	04	12	20	28	36	44	52	60	68	76
05	05	13	21	29	37	45	53	61	69	77
06	06	14	22	30	38	46	54	62	70	78
07	07	15	23	31	39	47	55	63	71	79
08	08	16	24	32	40	48	56	64	72	80

Note: E&M Trunks use ODD Equipment Numbers only.

## System Options Programming

- 4.3 The System Options commands set parameters and feature options that apply throughout the system. Likewise, the Feature Access Codes table assigns access codes available throughout the system. In both cases there are default values; the installer need only perform data entry where a change from the default value is desired.

### COMMAND 100

#### System Maintenance

a	b	c	d	e	f	g	h
0	1	1	1	0	0	1	0

a,b: Register Number

c: Automatic Diagnostics  
0 = Disable  
1 = Enable

d: RMATS Protocol Selection  
0 = CCITT  
1 = North American

e,f,g: Test Line Equipment Number 001 → 160

**COMMAND 100 System Options Programming (Cont'd)**

h: RESERVED

**Attendant Functions**

a	b	c	d	e	f
0	2	0	0	0	0

a,b: Register Number

c: Executive Busy Override (Console)  
 0 = Disable  
 1 = Enable except on I/C Trunks  
 2 = Enable on all Calls

d: Console Inhibit  
 0 = Disable  
 1 = Enable

e,f: RESERVED

**Tone and Ringing Control**

a	b	c	d	e	f	g	h	i	j
0	3	0	1	4	1	1	2	0	0

a,b: Register Number

c: Tone Plan Variants  
 0 = North American  
 1 = Hong Kong  
 2 = Taiwan

d: Transfer Dial Tone  
 0 = Disable  
 1 = Enable

e: Ringing Cadence Cycle Time  
 3 = 3 secs  
 4 = 4 secs  
 5 = 5 secs

f: Discriminating Ringing  
 0 = Disable  
 1 = Enable

**COMMAND 100 System Options Programming (Cont'd)**

- g: Distinctive Callback Ringing  
0 = Disable  
1 = Enable
- h: Disconnect Tone  
0 = Disable  
1 = Send selected DTMF tone to Dictation Port  
2 = Connect selected Call Progress Tone to Dictation Port
- i,j: DTMF / Call Progress Tone Selection  
If field H = 1  
00 → 09 = DTMF digits 0 → 9  
10 = DTMF \* sign  
11 = DTMF # sign  
If field H = 2  
00 = Dial Tone  
01 = Busy Tone  
02 = Reorder Tone

**Register 04**

a	b	c	d
0	4	0	0

These field values should not be changed.

**Trunk Connections**

a	b	c	d	e	f	g	h	i
0	5	0	0	0	0	0	0	0

- a,b: Register Number
- c: CO To CO Connection  
0 = Disable  
1 = Enable
- d: E&M To E&M Connection  
0 = Disable  
1 = Enable
- e: CO To E&M Connection  
0 = Disable  
1 = Enable for Incoming CO trunks only  
2 = Enable for Outgoing CO trunks only  
3 = Enable for both Incoming and Outgoing CO trunks

- f: Conference Warning Tone  
 0 = Disable  
 1 = Enable if a CO is a conferee  
 2 = Enable on all conferences
- g: DID To CO Connection  
 0 = Disable  
 1 = Enable
- h: DID To E&M Connection  
 0 = Disable  
 1 = Enable
- i: DID To DID Connection  
 0 = Disable  
 1 = Enable

**Station Attributes**

a	b	c	d	e	f	g
0	6	0	1	0	0	0

- a,b: Register Number
- c: Station Switchhook Flash Timing  
 0 = 150–750 ms  
 1 = 150–1500 ms  
 2 = Flash is Release  
 3 = 90 ms Calibrated Flash
- d: Station Digit Collection  
 1 = 10 pps  
 2 = 20 pps
- e: Partial Flash Inhibit  
 0 = Disable  
 1 = Enable
- f: RESERVED
- g: RESERVED

**COMMAND 100 System Options Programming (Cont'd)*****SUPERSET* Attributes**

a	b	c	d	e
0	7	0	0	1

- a,b: Register Number
- c: Auto-Answer System Enable  
0 = Disable  
1 = Enable
- d: *SUPERSET* Auto-hold  
0 = Disable  
1 = Enable
- e: Delayed Ringing Key Timeout  
1 = 10 seconds  
2 = 20 seconds  
3 = 30 seconds

**Overflow Control**

a	b	c	d	e	f	g	h	i
0	8	2	0	3	2	0	0	0

- a,b: Register Number
- c: Overflow Mode In Day Service  
0 = Disable  
1 = Immediate Switching to Overflow  
2 = Automatic Switching to Overflow after Timeout  
3 = Automatic Switching to Night Service
- d: Overflow Mode In Night Service  
0 = Disable  
1 = Immediate Switching to Overflow  
2 = Automatic Switching to Overflow after Timeout
- e: Automatic Switch To Overflow Timeout (1 → 7) X 10 seconds
- f: Internal Calls To Console Routed to Overflow  
0 = Disable  
1 = Enable During Day Service  
2 = Enable During Night Service  
3 = Enable During Both Day and Night Service

- g,h,i: Overflow Point
- 000 = Night Bell
- 001 → 160 = Station Equipment Number
- 161 → 166 = Hunt Group
- 167 = Ring Group

**Features Selection 1**

a	b	c	d	e	f	g	h	i
0	9	1	0	0	0	0	0	0

- a,b: Register Number
  - c: Abbreviated Dial Enable
    - 0 = Disable
    - 1 = Enable
  - d: Last Number Redial ^O Key Access
    - 0 = Disable
    - 1 = Enable
  - e: Conflict Dialing Timer
    - 0 = Disabled
    - 1 = 3 seconds
    - 2 = 5 seconds
    - 3 = 7 seconds
  - f: Music On Hold
    - 0 = Disable
    - 1 = Enable
  - g: Background Music
    - 0 = Disable
    - 1 = Enable
  - h: Abbreviated Dial Access
    - 0 = 2-digit index number – 90 entries maximum
    - 1 = 3-digit index number – 900 entries maximum
- Note:** When the value of this field is changed, all previous Abbreviated Dial entries are erased.
- i: RESERVED

**COMMAND 100 System Options Programming (Cont'd)****Features Selection 2**

a	b	c	d	e	f	g	h	i
1	0	1	0	0	0	0	0	0

a,b: Register Number

c: Automatic Wake-Up

0 = Disable

1 = Enable with Wake-Up tone

2 = Enable with Music

3 = Enable with Intercept to RAD

d: Automatic Wake-Up Printout

0 = Disable

1 = Enable

e: Message Register Audit

0 = Disable

1 = Enable

2 = Enable with clearing of Message Registers

f: Use Of Hash (#) For Trunks

0 = Enable Tone-to-Pulse Override on Trunks

1 = Enable End-of-Dial

g: Proportional Call Charging

0 = Charge to Originating Extension Only

1 = Charge to All Parties Involved in the Call

h: RESERVED

i: Room Status Printout

0 = Disable

1 = Enable

**COMMAND 100 System Options Programming (Cont'd)****Timeout Selection**

a	b	c	d	e	f	g	h
1	1	3	3	3	3	1	1

- a,b: Register Number
- c: Timed Recall – Camp-On (Trunks) 1 → 7 X 10 seconds
- d: Timed Recall – No Answer 1 → 7 X 10 seconds
- e: Timed Recall – Call Hold (Extension) 1 → 4 X 1 minute
- f: Timed Recall – Call Hold (Attendant) 1 → 7 X 10 seconds
- g: Call Forward No Answer Timeout 1 → 7 X 10 seconds
- h: Drop Unanswered Trunks After 5 Minutes 0 = Disable, 1 = Enable

**Message Waiting**

a	b	c	d	e	f
1	2	2	1	3	1

- a,b: Register Number
- c: Message Waiting System Enable  
0 = Disable  
1 = Enable with Lamps  
2 = Enable with Bells  
3 = Enable with 30-second Manual Line
- d: Message Waiting Indication  
0 = Always  
1 = During Day Service Only
- e: Message Waiting Indication Interval (1 → 4) X 5 minutes
- f: Message Waiting Automatic Cancel  
0 = Disable, 1 = Enable

**COMMAND 100 System Options Programming (Cont'd)****Automatic Route Selection (ARS)**

a	b	c	d	e	f	g	h	i	j
1	3	0	0	0	0	0	0	1	0

a,b: Register Number

0 = Disable

1 = Enable

c: ARS Enable

0 = Disable

1 = Enable

d: ARS Attendant Bypass

0 = Disable

1 = Enable

e: ARS Alarms

0 = Disable

1 = Enable

f: ARS Return Dial Tone

0 = Disable

1 = Enable

g: Expensive Route Warning Tone

0 = Disable

1 = Enable

h: Attendant ARS Routing Class of Service (RCS)

0 = ARS Does Not Apply

1 = RCS1

2 = RCS2

3 = RCS3

i: ARS Interdigit Timeout

0 = 5 seconds

1 = 10 seconds

j: Abbreviated Dial ARS Bypass Enable

0 = Disable

1 = Enable

**COMMAND 100 System Options Programming (Cont'd)****System Message Detail Recording (SMDR)**

a	b	c	d	e	f	g	h	i	j	k
1	4	0	0	0	0	0	0	0	0	0

a,b: Register Number

c: SMDR System Enable

0 = Disable

1 = Enable Incoming Trunks Calls Only

2 = Enable Outgoing Trunks Calls Only

3 = Enable Both Incoming and Outgoing Trunk Calls

d: Record Meter Pulses

e: Long Call Indicator

0 = Disable

1 = Enable

f: Incoming Calls Record Only COs

0 = Disable

1 = Enable

g: Drop Calls Of Less Than 8 Digits

0 = Disable

1 = Enable

h: Drop Incomplete Outgoing Calls

0 = Disable

1 = Enable

i: Overwrite Queued Printer Buffer

0 = Disable

1 = Enable

j: SMDR X Digits Dialed

0 = Disable

1 → 7 = Last 1 → 7 Digits Dialed

**Note:** This field applies to outgoing calls only.

k: VAC Overwrite Account Code

0 = Priority to VAC printing

1 = Priority to Account Code printing

**Account Code Control**

a	b	c	d	e
1	5	0	0	0

a,b: Register Number

c: Number of Digits (maximum if Variable Length enabled)  
0 = Disable Account Codes  
1 → 8 = 1 → 8 digits

d: Variable Length Account Codes  
0 = Disable  
1 = Enable

e: Verified Authorization Codes (VAC)  
0 = Disable  
1 → 8 = 1 → 8 digits

**Note:** All VACs must be deleted prior to changing VAC length.

**COMMAND 100 System Options Programming (Cont'd)****Printer Control**

a	b	c	d	e	f	g	h
1	6	0	4	0	8	1	0

a,b: Register Number

c: Data Demultiplexer Enable (0 = Disable, 1 = Enable)

d: Printer Baud Rate

0 = 110

1 = 150

2 = 300

3 = 600

4 = 1200

5 = 1800

6 = 2400

7 = 4800

8 = 9600

e: Printer Parity

0 = None

1 = Odd

2 = Even

f: Number of Tx Bits 5 → 8

g: Number of Stop Bits 1 or 2

h: Slow Carriage Return Option

0 = Disable

1 = Output Six Nulls at End-of-Line

**Contact Monitor**

a	b	c	d	e
1	7	0	0	0

c,d,e: Contact Monitor Night Answer Point

000 = Console

001 → 160 = Station Equipment Number

161 = Night Bell

**Feature Access Code Programming**

**COMMAND 110**

Feature		Access Code				
a	b	c	d	e	f	
0	1	0				DIAL ACCESS TO ATTENDANT
0	2	5	0			PAGING ACCESS
0	3	5	1			CALL HOLD
0	4	5	2			CALL HOLD RETRIEVE – LOCAL
0	5	5	3			CALL HOLD RETRIEVE – REMOTE
0	6	5	4			DIAL CALL PICKUP
0	7	5	5			SYSTEM ABBREVIATED DIAL ACCESS
0	8	5	6			CALL FORWARD – FOLLOW ME
0	9	5	7			TAFAS PICKUP
1	0	5	8			CALL FORWARD – NO ANSWER
1	1	5	9			CALL FORWARD – BUSY
1	2	6	0			CALL FORWARD – BUSY/NO ANSWER
1	3	7	0			PROGRAMMING ACCESS
1	4	7	1			ATTENDANT FUNCTIONS
1	5	4	4	4		CLEAR ALL FEATURES
1	6	4	5	1		CALL PARK (ATTENDANT) 1
1	7	4	5	2		CALL PARK (ATTENDANT) 2
1	8	4	5	3		CALL PARK (ATTENDANT) 3
1	9	4	9	1		HUNT GROUP 1 ACCESS
2	0	4	9	2		HUNT GROUP 2 ACCESS

**COMMAND 110 Feature Access Code Programming (Cont'd)**

Feature		Access Code				
a	b	c	d	e	f	
2	1	4	9	3		HUNT GROUP 3 ACCESS
2	2	4	9	4		HUNT GROUP 4 ACCESS
2	3	4	9	5		HUNT GROUP 5 ACCESS
2	4	4	9	6		HUNT GROUP 6 ACCESS
2	5	4	9	7		RING GROUP ACCESS
2	6	4	9	8		RMATS MODEM ACCESS
2	7	7	2			ONS MSG WAITING ACTIVATE
2	8	7	5			ACCOUNT CODE ENTRY
2	9	7	6			RESERVED
3	0	6	1			ATTENDANT/DIRECTED CALL PICKUP
3	1	7	4	7		MAID IN ROOM
3	2	6	2			CALLBACKUP SETUP
3	3	6	3			DO NOT DISTURB
3	4	6	4			HUNT GROUP LOGIN/LOGOUT
3	5					DID LDN 1 ACCESS
3	6					DID LDN 2 ACCESS
3	7					DID LDN 3 ACCESS
3	8	6	5			ONS MSG WAITING CALLBACK
3	9	6	6			ONS CANCEL MSG WAITING
4	0	6	7			VAC ACCESS
4	1	6	9			WAKEUP FROM EXTENSION

## Class of Service (COS) Programming

- 4.4 The Class of Service Programming commands set parameters and feature options that apply only to the devices in that COS. In all cases there are default values; the installer need only perform data entry where a change from the default value is desired. The COS Programming command numbers are 121 through 129, corresponding to COSs 1 through 9.

### COMMANDS 121 → 129      COS 1 → COS 9 PROGRAMMING

#### Register 1

a	b	c	d	e	f	g	h	i	j
1	1	1	1	1	1	1	0	0	1

- b: Trunk Group 1 Access  
0 = Disable, 1 = Enable
- c: Trunk Group 2 Access  
0 = Disable, 1 = Enable
- d: Trunk Group 3 Access  
0 = Disable, 1 = Enable
- e: Trunk Group 4 Access  
0 = Disable, 1 = Enable
- f: Trunk Group 5 Access  
0 = Disable, 1 = Enable
- g: Trunk Group 6 Access  
0 = Disable, 1 = Enable
- h: Trunk Group Overflow Access  
0 = Disable, 1 = Enable
- i: RESERVED
- j: Authorized Trunk to Trunk Connection  
0 = Disable, 1 = Enable

**COMMANDS 121 → 129 COS 1 → COS 9 Programming (Cont'd)****Register 2**

a	b	c	d	e	f	g	h	i	j	k
2	1	1	0	0	0	1	0	0	0	0

- b: Switchhook/Ground Button Flash  
0 = Disable  
1 = Flash For Consultation Hold  
2 = Flash For Test Line/Attendant
- c: Call Direction  
0 = Originate only  
1 = Bothway calling  
2 = Receive Only
- d: Automatic Ringdown Circuit  
0 = Disable  
1 = Enable
- e: DISA Access Code Required  
0 = Disable  
1 = Enable  
2 = Special DISA / VAC Required
- f: Message Registration/Restrictive Station Control  
0 = Disable both  
1 = Enable restrictive station control only  
2 = Enable message registration only  
3 = Enable both
- g: Message Waiting  
0 = Disable  
1 = Enable
- h: Rotary Only (DISA E&M trunks only)  
0 = Disable  
1 = Enable
- i: RESERVED
- j: *SUPERSET 4/SUPERSET 420* Headset Operation  
0 = Disable  
1 = Enable
- k: Do Not Disturb  
0 = Disable  
1 = Enable

**COMMANDS 121 → 129 COS 1 → COS 9 Programming (Cont'd)****Register 3**

a	b	c	d	e	f	g	h	i	j	k
3	1	1	0	1	0	1	0	0	1	0

- b: Automatic Callback Busy/No Answer  
0 = Disable, 1 = Enable
- c: Paging Access  
0 = Disable, 1 = Enable
- d: Data Line Security  
0 = Disable, 1 = Enable
- e: Call Hold  
0 = Disable, 1 = Enable
- f: Call Block  
0 = Disable, 1 = Enable
- g: TAFAS Access  
0 = Disable  
1 = Enable Pickup From Night Bells  
2 = Enable Pickup From Night Bells/Attendant
- h: COS SMDR  
0 = Disable, 1 = Enable
- i: Room Status  
0 = Disable, 1 = Enable
- j: ONS Callback No Answer  
Activation During Ringback  
0 = Disable, 1 = Enable
- k: Voice Mail Port  
0 = Disable  
1 = Message Optimization Control \*  
2 = Send Disconnect Tone

\* Available with MS54 and MS55 only

**Register 4**

a	b	c	d	e	f	g	h	i	j
4	1	1	1	1	0	0	0	0	0

- b: Call Forward – Follow Me  
 0 = Disable all Call Forwarding  
 1 = Allow forwarding of trunks or extensions to internal numbers only  
 2 = Allow forwarding of extensions only to internal or external numbers  
 3 = Allow forwarding of trunks or extensions to internal or external numbers
  
- c: Call Forward – Busy  
 0 = Disable all Call Forwarding  
 1 = Allow forwarding of trunks or extensions to internal numbers only  
 2 = Allow forwarding of extensions only to internal or external numbers  
 3 = Allow forwarding of trunks or extensions to internal or external numbers
  
- d: Call Forward – No Answer  
 0 = Disable all Call Forwarding  
 1 = Allow forwarding of trunks or extensions to internal numbers only  
 2 = Allow forwarding of extensions only to internal or external numbers  
 3 = Allow forwarding of trunks or extensions to internal or external numbers
  
- e: Call Forward Busy/No Answer  
 0 = Disable all Call Forwarding  
 1 = Allow forwarding of trunks or extensions to internal numbers only  
 2 = Allow forwarding of extensions only to internal or external numbers  
 3 = Allow forwarding of trunks or extensions to internal or external numbers
  
- f: Proceed To Be Call Forwarded Externally  
 0 = Disable  
 1 = Enable
  
- g: Executive Busy Override  
 0 = Disable  
 1 = Enable Except on Incoming trunks  
 2 = Enable On All Calls
  
- h: Executive Busy Override Security  
 0 = Disable  
 1 = Enable
  
- i: Associated Modem Line  
 0 = Disable  
 1 = Enable
  
- j: Wake Up from Extension  
 0 = Disable  
 1 = Enable

**COMMANDS 121 → 129 COS 1 → COS 9 Programming (Cont'd)****Register 5**

a	b	c	d	e	f	g	h	i	j	k
5	1	1	1	1	1	1	1	1	1	0

- b: Abbreviated Dial Numbers 10 → 19 or 100 → 199  
0 = Disable  
1 = Enable
- c: Abbreviated Dial Numbers 20 → 29 or 200 → 299  
0 = Disable  
1 = Enable
- d: Abbreviated Dial Numbers 30 → 39 or 300 → 399  
0 = Disable  
1 = Enable
- e: Abbreviated Dial Numbers 40 → 49 or 400 → 499  
0 = Disable  
1 = Enable
- f: Abbreviated Dial Numbers 50 → 59 or 500 → 599  
0 = Disable  
1 = Enable
- g: Abbreviated Dial Numbers 60 → 69 or 600 → 699  
0 = Disable  
1 = Enable
- h: Abbreviated Dial Numbers 70 → 79 or 700 → 799  
0 = Disable  
1 = Enable
- i: Abbreviated Dial Numbers 80 → 89 or 800 → 899  
0 = Disable  
1 = Enable
- j: Abbreviated Dial Numbers 90 → 99 or 900 → 999  
0 = Disable  
1 = Enable
- k: Last Number Redial  
0 = Disable  
1 = Enable

**Register 6**

a	b	c	d
6	0	1	1

- b: NOT USED
- c: Outgoing Access To E&M Tie Trunks  
0 = Disable  
1 = Enable
- d: Outgoing Access To CO Trunks  
0 = Disable  
1 = Enable

**Register 7**

a	b	c	d	e	f	g	h
7	1	0	0	0	0	0	0

- b: *SUPERSET 4/SUPERSET 420* Message Programming  
0 = Disable  
1 = Enable
- c: Account Code Entry  
0 = Not allowed  
1 = Optional  
2 = Required for Toll Calls Only  
3 = Required for all Calls (Toll & Non-Toll)
- d: Auxiliary Attendant Position  
0 = Disable  
1 = Enable
- e: Directed Call Pickup  
0 = Disable  
1 = Enable
- f: Directed Call Pickup Security  
0 = Disable  
1 = Enable
- g: Hunt Group Login  
0 = Disable  
1 = Enable

h: Lockout Alarm  
 0 = Disable  
 1 = Enable

### Register 8

a	b	c	d	e	f	g
8	1	1	1	0	0	0

b: Extension Camp-on  
 0 = Disable  
 1 = Enable

c: CO Trunk Camp-on  
 0 = Disable  
 1 = Enable

d: Inward Dial Trunk Camp-on  
 0 = Disable  
 1 = Enable

e: DID Restriction  
 0 = Disable  
 1 = Enable

## Trunk Group Programming

- 4.5 The Trunk Group Programming commands set parameters and feature options that apply only to the trunks in the Trunk Group. In all cases there are default values; the installer need only perform data entry where a change from the default value is desired. The Trunk Group Programming command numbers are 151 through 156, corresponding to Trunk Groups 1 through 6.

### Explanation of Options

**Type of Hunting – Circular, Terminal:** When a user dials a Trunk Group Access Code, the SX-50 system automatically checks each trunk in the group in order of equipment number until it finds one idle. Terminal hunting always begins at the first trunk in the group. Circular hunting starts each hunt from the trunk following the one last accessed, returning to the group's first trunk when the last one has been accessed. Circular hunting has the advantage of more even use of trunk equipment.

**Trunk Group Overflow:** If all the trunks in a Trunk Group are busy, busy tone is returned. Optionally, the SX-50 system can hunt for a trunk in another group. If all the trunks in the overflow group are busy and that group has no overflow group programmed, busy tone is returned. Overflow groups must be of the same trunk type and must be compatible in the digits required to complete any call.

**Identified Trunk Group:** After any trunk in an identified trunk group has been seized outgoing, it outpulses the trunk group access code before the digits dialed at the calling telephone. This option is applicable to some types of networking.

**Wait for Dial Tone:** Outpulsing of the dialed digits begins when dial tone is received or 5 seconds after trunk seizure, whichever is sooner. The other options are:

- dial after a programmed delay of up to 5 seconds,
- check for dial tone every 5 seconds, dial when received
- let the user listen for dial tone. The user then flashes the switchhook (or dials '1' if at a *SUPERSET* telephone).

**Supervision:** The default setting is None. This should be used on LS/GS trunks if they do not provide supervision. For an E&M trunk, set supervision to 1.

**DTMF or Rotary Outpulsing** By default, the *SX-50* system supports DTMF-only trunks; tone-to-pulse conversion is disabled. Pulse-only trunks can be supported by enabling conversion. Problems can occur on trunks that accept both DTMF and pulse dialing: both the DTMF from the calling set and the trunk circuit outpulsing reach the trunk. The *SX-50* system can be set to block all outgoing audio or just the DTMF tones during dialing.

**Manual Non-CO Trunk:** This should be enabled on E&M Trunks that ring directly at the far end Attendant (user dials Access Code only, no destination digits). This ensures a two-way audio connection is established immediately. This option also applies to LS/GS trunks that ring the Attendant of another PBX.

**Sending Answer on Incoming Dial Trunks:** Some PBXs require an answer supervision signal be sent to them to enable audio. This option applies to E&M and CO trunks.

**Behind PABX Operation:** This option permits an *SX-50* system used as a slave PABX to transmit a switchhook flash from an extension user to the main PABX through the LS/GS Trunk Card. Enable "Flash is Loop Disconnect" or "Flash is Ring Ground" as required by the host PBX.

**COMMANDS 151 → 156      Trunk Group Programming**

**Register 1**

a	b	c	d	e	f	g	h	i
1	0	0	0	0	-	-	-	-

b: Trunk Select (0 = Automatic)

c: Type of Hunting  
 0 = Circular  
 1 = Terminal

- d: Overflow Trunk Group  
0 = Disable  
1 → 6 = Trunk Group Number
- e: Identified Trunk Group  
0 = Disable  
1 = Enable
- f → i: Trunk Group Access Code  
Defaults:  
Cmd 151 = 9, Cmd 152 = 8,  
Cmd 153 = 78, Cmd 154 = 79  
Cmd 155 = blank, Cmd 156 = blank

**Register 2**

a	b	c	d	e	f	g	h	i	j	k
2	0	0	2	0	0	0	0	0	0	0

- b: Wait For Dial Tone  
0 = No wait, outpulse after delay  
1 = Wait up to 5 seconds, then outpulse anyway  
2 = Check for dial tone every 5 seconds  
3 = Unlimited wait with detection by user
- c: Dial Tone Detection Timing  
0 = 120 ms required  
1 = 40 ms required
- d: Delay Before Outpulsing 1 → 5 seconds
- Note:** Wait for Dial Tone must be set to 0.
- e: Answer Supervision  
0 = No Answer Supervision  
1 = Supervision is Meter Pulse or Reversal  
2 = Ignore Supervision except for Toll Restriction  
3 = Supervision is Meter Pulse, Ignore Reversals
- f: Restrict External Calls on Reversal (0 = Disable, 1 = Enable)
- g: DTMF or Rotary Outpulsing  
0 = DTMF  
1 = Rotary  
2 = Rotary, Disable Outgoing Audio Until Answer  
3 = Rotary, Inhibit DTMF Until Answer

- h: Simulate CO Dial Tone  
0 = Disable  
1 = Enable
- i: Trunk Group SMDR Enable  
0 = Disable  
1 = Enable
- j: Trunk Group Last Number Redial  
0 = Disable  
1 = Enable
- k: Trunk Group Manual E&M Trunk  
0 = Disable  
1 = Enable

**Register 3**

a	b	c	d	e	f	g	h
3	0	0	0	0	0	1	3

- b: Message Registration  
0 = Disable  
1 = Enable
- c: Count Additional Message Units  
0 = Disable  
1 = Enable  
2 = Enable, Insert Pseudo Message Unit every 6 Seconds  
3 = Enable, Insert Pseudo Message Unit every 60 Seconds
- d,e: Initial Message Unit Charge 00 → 99 Units
- f,g: Additional Message Unit Charge 00 → 99 Units
- h: Pseudo Answer Timer 1 → 7 X 10 seconds

**Register 4**

a	b	c	d	e
4	0	0	0	0

- b: Sending Answer On Incoming Dial Trunks  
0 = Send Answer When Answer Received  
(Supervision is Answer Only)  
1 = Send Answer After End of Dialing (Time-out)  
2 = Send Answer Upon Accessing Outgoing Trunk

- c: Behind PABX Operation
  - 0 = Disable
  - 1 = Enable, Flash is Loop Disconnect
  - 2 = Enable, Flash is Ring Ground
- d: Behind PBX Recall Signal Duration
  - 0 = 500 ms
  - 1 = 750 ms
- e: Credit Card Calling Operation
  - 0 = Disable
  - 1 = Enable

### User Programming Access

- 4.6 The User Programming Access registers determine which command registers may be modified by the system user entering CDE with the User Security Code. They do not affect installer access via the System Security Code.

#### COMMAND 180

##### Register 1

a	b	c	d	e	f	g
1	0	0	0	0	0	0

- b: Command 100, System Options
- c: Commands 121 → 129, COS Programming
  - 0 = Disable
  - 1 = Enable
- d: Command 110, Feature access Codes
  - 0 = Disable
  - 1 = Enable
- e: Commands 301 → 310, Extension Programming
  - 0 = Disable
  - 1 = Enable
- f: Commands 321 → 330, Block Programming
  - Extension Numbering
  - 0 = Disable
  - 1 = Enable
- g: Commands 341 → 350, Block Programming
  - Extension Memberships

0 = Disable

1 = Enable

**Register 2**

a	b	c	d	e	f	g	h
2	0	0	0	0	0	0	0

b: Commands 361 → 366, Extension Hunting

0 = Disable

1 = Enable

c: Command 381, Ring Group Programming

0 = Disable

1 = Enable

d: Commands 401 → 480, *SUPERSET* Telephone Programming

0 = Disable

1 = Enable

e: Commands 501 → 580, Trunk Programming

0 = Disable

1 = Enable

f: Commands 151 → 156, Trunk Group Programming

0 = Disable

1 = Enable

g: Commands 700 → 752, ARS Data Table Programming

0 = Disable

1 = Enable

h: Command 600, Verified Authorization Code Programming

0 = Disable

1 = Enable

**Register 3**

a	b	c	d	e	f
3	0	0	0	0	0

b: Command 185, Function Key Programming

0 = Disable

1 = Enable

c: Command 190, System Security Programming

0 = Disable

- d: Command 191, User Security Code Programming
  - 0 = Disable
  - 1 = Enable
  
- e: Command 193, DISA Access Code Programming
  - 0 = Disable
  - 1 = Enable
  
- f: Command 192, RMATS Security Code Programming
  - 0 = Disable

**Note:** Fields c and f are always disabled and cannot be modified.

**Attendant Console Function Key Programming****COMMAND 185**

a	b	c	d	
0	1	1	0	FUNCTION key
0	2	1	4	STATUS key
0	3	0	7	TRUNK key
0	4	0	4	CALL BLOCK key
0	5	0	5	OVERFLOW key
0	6	0	3	PAGE key
0	7	0	6	WAKE-UP key
0	8	0	1	MSG REG key
0	9	0	2	OVERRIDE key
1	0	0	9	MESSAGE key
1	1	1	5	BOTH key
1	2	1	3	SWAP key
1	3	1	1	BELL key
1	4	1	2	NIGHT key

a,b: Key Number (1→14)

c,d: Key Function:

00 = Unassigned

01 = Message Registration/  
Restrictive Station Control

02 = Override

03 = Page

04 = Call Block

05 = TAFAS Overflow

06 = Automatic Wake-up

07 = Trunk Status

08 = Account Code Entry

09 = Message Waiting

10 = Function

11 = Bell Mute

12 = Night

13 = Swap/Split

14 = Status

15 = Both

16 = Room Status

17 = Do Not Disturb

18 = Attendant Tone Signaling

19 = Restrict DID

20 = VAC Access

21 = Attendant Call Pickup

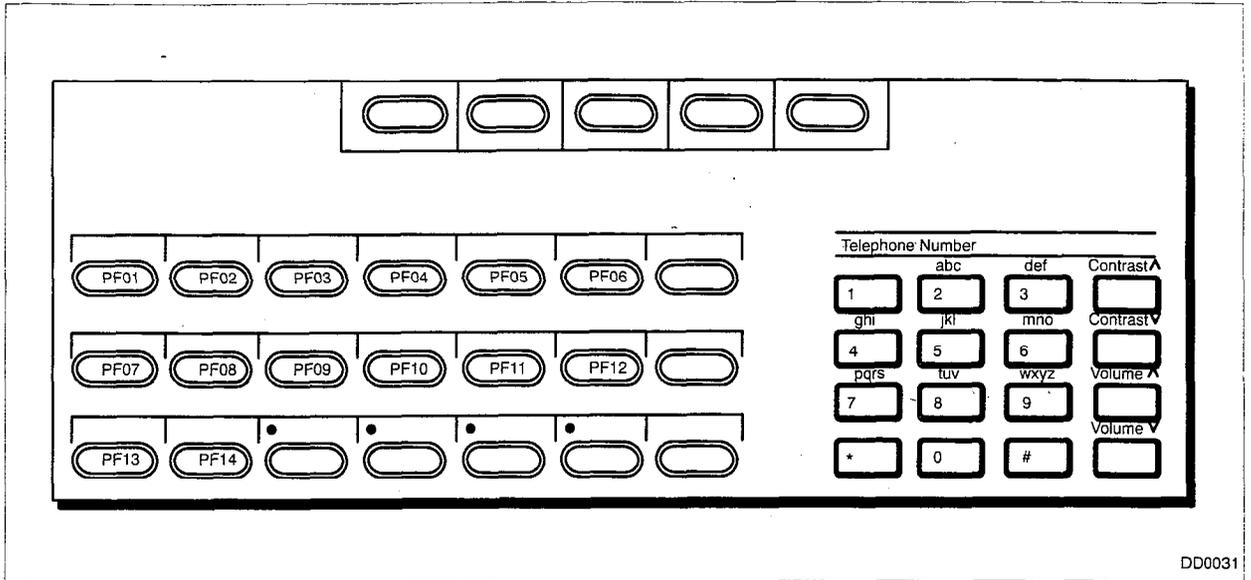


Figure 4-1 Programmable Function Keys

### System Security Code Programming

#### COMMAND 190

##### Register 1

a	b	c	d	e
1	7	7	7	2

b: System Security Code 1st Digit  
0 → 9

c: System Security Code 2nd Digit  
0 → 9

d: System Security Code 3rd Digit  
0 → 9

e: System Security Code 4th Digit  
0 → 9

### User Security Code Programming

#### COMMAND 191

##### Register 1

a	b	c	d	e
1	1	2	3	4

b: User Security Code 1st Digit  
0 → 9

c: User Security Code 2nd Digit  
0 → 9

d: User Security Code 3rd Digit  
0 → 9

e: User Security Code 4th Digit  
0 → 9

## RMATS Security Code Programming COMMAND 192

### Register 1

a	b	c	d	e	f
1	0	2	4	6	8

- b: RMATS Security Code 1st Digit  
0 → 9
- c: RMATS Security Code 2nd Digit  
0 → 9
- d: RMATS Security Code 3rd Digit  
0 → 9
- e: RMATS Security Code 4th Digit  
0 → 9
- f: RMATS Security Code 5th Digit  
0 → 9

### Register 2

a	b	c	d	e	f
2	1	3	5	7	9

- b: RMATS Security Code 6th Digit  
0 → 9
- c: RMATS Security Code 7th Digit  
0 → 9
- d: RMATS Security Code 8th Digit  
0 → 9
- e: RMATS Security Code 9th Digit  
0 → 9
- f: RMATS Security Code 10th Digit  
0 → 9

## DISA Access Code Programming

### COMMAND 193

#### Register 1

a	b	c	d
1	0	0	0

b: DISA Access Code 1st Digit  
0 → 9

c: DISA Access Code 2nd Digit  
0 → 9

d: DISA Access Code 3rd Digit  
0 → 9

**Note:** Callers on a DISA Trunk with DISA Access Code Required enabled in its Class of Service must enter the Access Code. By default, the DISA Access Code is not required and callers have immediate access to *SX-50* system features.

## Extension Programming

- 4.7 Extension Programming assigns each extension its Extension Number and Class of Service. It can also make the extension a member of a Pickup Group and assign it an ARS Routing Class of Service for trunk routing.

Extension Programming uses Commands 301 through 310. These correspond to card slots 1 through 10. Register numbers in each command correspond to card ports.

When extensions on the same line card are to have consecutive numbers, the customer data programmer can save time by using the Extension Numbering – Block Programming commands. Similarly, if extensions on the same line card are to belong to the same Class of Service, Pickup Group and ARS Routing Class of Service, the Extension Memberships – Block Programming commands are useful.

**COMMANDS 301 → 310 SLOT 1 → SLOT 10**  
**Extension Programming**

a	b	c	d	e	f	g	h	i	j	k	l
.	.	0	1	0	1	0	0	-	-	-	-

a,b: Circuit number 01 → 16 (01 → 08 for COV and DNIC Card)

**Note:** Even circuit numbers are invalid for the OPS Line Card.

- c: Extension Type  
 0 = Extension  
 1 = Contact Monitor  
 2 → 9 = Hotline Groups 2 → 9
- d: Class of Service 1 → 9  
 0 = No Class of Service
- e: Allow Attendant to Change Extension COS  
 0 = Not Allowed  
 1 = Allowed
- f: Pickup Group 1 → 7  
 0 = No Pickup Group
- g: ARS Routing Class of Service (RCS)  
 0 = ARS Does not Apply  
 1 = RCS1  
 2 = RCS2  
 3 = RCS3  
 4 = Attendant Selectable RCS
- h: OPS Loop Length (no effect on ONS circuits)  
 0 = Short (under 2km)  
 1 = Long (over 2km)
- i → l: Extension Number 1 → 9999

### Extension Numbering – Block Programming

4.8 Extension Numbering – Block Programming assigns consecutive extension numbers to extensions on the same card. These commands save time during Customer Data Entry. The installer enters the first and last port to be programmed and the first extension number.

Extension Numbering – Block Programming uses Commands 321 through 330, corresponding to card ports 1 through 10. There are no register numbers.

#### COMMANDS 321 → 330

a	b	c	d	e	f	g	h
0	1	0	1	-	-	-	-

a,b: Circuit number of First Extension in Block 01 → 16 (01 → 08 for COV and DNIC cards)

c,d: Circuit number of Last Extension in Block 01 → 16 (01 → 08 for COV and DNIC cards)

e → h: Extension Number of First Circuit in Block

## Extension Memberships – Block Programming

- 4.9 Extension Memberships – Block Programming assigns a group of extensions on a card the same Class of Service, Pickup Group and ARS Routing Class of Service. This command saves time during Customer Data Entry. The installer enters the first and last port to be programmed, the COS, the Pickup Group and the ARS Routing Class of Service.

Extension Memberships – Block Programming uses Commands 341 through 350, corresponding to card slots 1 through 10. There are no register numbers.

### COMMANDS 341 → 350

a	b	c	d	e	f	g	h
0	1	0	1	1	1	0	0

a,b: Circuit number of First Extension in Block 01 → 16 (01 → 08 for COV and DNIC cards)

c,d: Circuit number of Last Extension in Block 01 → 16 (01 → 08 for COV and DNIC cards)

e: Class of Service 1 → 9  
0 = No Class of Service

f: Pickup Group 1 → 7  
0 = No Pickup Group

g: ARS Routing Class of Service (RCS)  
0 = ARS Does not Apply  
1 = RCS1  
2 = RCS2  
3 = RCS3  
4 = Attendant Selectable RCS

h: OPS Loop Length  
0 = Short (under 2km)  
1 = Long (over 2km)

## Extension Hunt Group Programming

- 4.10 Extension Hunt Group Programming assigns extensions to Hunt Groups. The installer enters the type of hunting, the linked Hunt Group number (if any) and up to 8 extension numbers.

Extension Hunt Group Programming uses Commands 361 through 366, corresponding to Hunt Groups 1 through 6. In each command, Register 1 contains the type of hunting and linked Hunt Group number. Registers 2 through 9 contain the member extension numbers.

### COMMANDS 361 → 366

a	b	c
1	0	0

- a: Register Number
- b: Hunt Type  
0 = Circular  
1 = Terminal
- c: Hunt Group Linking  
0 = Unlinked  
1 → 6 = Link to Hunt Group 1 → 6

a	b	c	d	e

- a: Hunt Group Member Number 2 → 9
- b → e: Hunt Group Member Extension Number

## Extension Ring Group Programming

### COMMAND 381

a	b	c	d	e

- a: Ring Group Member Number 1 → 9
- b → e: Extension Number 1 → 9999

## ***SUPERSET* Telephone Programming**

- 4.11 *SUPERSET* Telephone Programming assigns the line appearances at each *SUPERSET* telephone. The installer enters the type of line appearance, the type of ringing (immediate, delayed or none), the direction of calling (originate, receive or both) and the line number.

*SUPERSET* Telephone Programming uses Commands 401 through 480. These correspond to *SUPERSET* Equipment Numbers 01 through 80. The register numbers in each command correspond to the Line Select keys. The first register is the Prime Line key. It cannot be programmed as any other type of line; nor can any of the other Line Select keys be programmed as a prime line.

When *SUPERSET* telephones on the same line card are to have consecutive prime line numbers, the customer data programmer can save time by using the Extension Numbering – Block Programming commands. Similarly, if the sets are to belong to the same Class of Service, Pickup Group and ARS Routing Class of Service, the Extension Memberships – Block Programming commands are useful.

- Notes:**
1. When Line Appearance Type 9 is selected, fields d → i are blank and cannot be programmed.
  2. If a Message Waiting key is programmed on a key other than Key number 03 (in fields a and b), an error message is returned.
  3. A maximum of five appearances of each Auxiliary Attendant function key can be programmed on the *SX-50* system.
  4. Line Appearance Type 9 is only effective on *SUPERSET* 3 Sets. Line Appearance Type 9 can be programmed on *SUPERSET* 4 Sets, but an INVALID message appears on the display when the Message Waiting key is used (since *SUPERSET* 4 Sets have a MSG prompt).

**COMMANDS 401 → 480 SUPERSET Telephone Programming**

a	b	c	d	e	f	g	h	i
.	.	*	1	1	-	-	-	-

\* 1 for Key Number 01, 0 for Keys numbered 02 → 15

a,b: *SUPERSET* Telephone Key Number

c: Line Appearance Type

0 = Speed Dial Key

1 = Prime Line (key 01 only – nonprogrammable)

2 = Key Line, 3 = Multiple Call Line

4 = Direct Trunk Select, 5 = Direct Line Select

6 = Private Line

7 = Personal Outgoing line

8 = Attendant Function Key (Auxiliary Attendant only)

9 = Message Waiting Key (programmable on key 03 only  
and valid for *SUPERSET* 3 sets only)

d: Ringing Type (Line Appearance Type 0 or 8)

0 = No Ring

1 = Immediate Ring

2 = Delay Ring

e: Call Direction (Line Appearance Type 0 or 8)

0 = Originate Only

1 = Bothway Calling

2 = Receive Only

d,e: Attendant Function Key (Line Appearance Type = 8 only)

01 = DIAL 0

02 = DO NOT DISTURB

03 = RECALL

04 = HOLD 1

05 = HOLD 2

06 = HOLD 3

07 = LDN 1

08 = LDN 2

09 = LDN 3

10 = MESSAGE WAITING

11 = MSG REGISTER

12 = NIGHT SERVICE

13 = OVERFLOW

f → i: Extension Or Trunk Number

Extension Number for line Types 1, 2, 3 & 7

Trunk Number for Line Types 4, 5 & 6

## Trunk Programming

- 4.12 The Trunk Programming commands set parameters and feature options that apply only to the particular trunk. In all cases there are default values; the installer need only perform data entry where a change from the default value is desired.

Trunk Programming uses Commands 501 through 580, corresponding to trunk equipment numbers 1 through 80.

## Trunk Options

- 4.13 The following paragraphs explain trunk options.

### Trunk Group Membership

A trunk must be a member of a trunk group to make outgoing calls or be assigned as a Direct Line Select or Direct Trunk Select line. Trunks assigned as a DLS or DTS are not accessible through the Trunk Group Access Code.

The members of a trunk group should all have the same characteristics.

### Trunk Alarm Control

A Trunk Alarm is generated if a trunk fails to return a seize acknowledgement, fails to release or has no loop current. The system busies out the trunk. By default, Trunk Alarm is enabled on every trunk. If Trunk Alarm is disabled, no alarm occurs and the trunk remains in service.

### Trunk Hardware Type

The trunk hardware options are:

- Short Analog CO Trunk – used for trunks less than 2 Km (6500 ft) from the CO.
- Long Analog CO Trunk – used for trunks more than 2 Km (6500 ft) from the CO.
- Analog Toll Office Trunk – used for trunks connected to a Toll Office.
- Analog Tie Trunk – used for E&M trunks.
- Satellite Tie Trunk – used for connection to another PBX in a Behind PBX application. Usually this is an E&M trunk.
- Short DID Trunk – used for DID Trunks less than 2 Km (6500 ft) from the CO.
- Long DID Trunk – used for DID Trunks more than 2 Km (6500 ft) from the CO.

### Trunk Class of Service

The Class of Service (COS) determines a DISA trunk's access to features and services, as defined in COS Programming.

### Connect to Outgoing Trunk without Third Party

When this feature is enabled:

- A DISA trunk can seize another trunk and make an outgoing call.
- Trunks can hold a conference without involving any party internal to the PABX (i.e. an extension or console).

The *SX-50* system will not allow trunk connections where no party provides Release Supervision. In a trunk conference, if the only party providing supervision hangs up, the conference is terminated.

#### **Inward Dial Delay Before Answer**

If this option is enabled, the *SX-50* system will let trunks ring in for 8 seconds before alerting the destination console or extension.

#### **Inward Dialing ARS Routing Class of Service**

The Routing Class of Service (RCS) determines which trunk calls the Automatic Route Selection system will permit a DISA caller to make. Refer to Section 9104-091-220-NA, Automatic Route Selection.

#### **Trunk Outpulsing Break/Make Ratio**

This field specifies the break/make ratio for rotary outpulsing. It can be set to 60/40, 65/35, 30/20 or 35/15. The North American standard is 60/40.

#### **Disconnect Supervision Guaranteed?**

If this option is set to Yes, the *SX-50* system expects disconnect signals on the trunk. If it is set to No, the system does not expect these signals, but does respond if they are received. Trunks with this option set to NO cannot be connected to each other. These trunks can conference only with an internal PABX party or a trunk that has this option set to YES.

#### **Disappearance of Reversal**

Upon seizure, some Central Offices reverse the polarity on the trunk. When the call ends, they reverse the polarity again, returning the trunk to its normal idle state. There are 2 options:

- Disappearance of Reversal is Ignored – reversal has no effect.
- Disappearance of Reversal Means Disconnect – the *SX-50* releases the trunk.

#### **Reversal Meaning On Call Origination**

If set to Incoming Call, the *SX-50* system recognizes a line reversal as an incoming seizure.

#### **Disconnect Timing**

This defines the minimum duration of a release signal the *SX-50* system will recognize.

### **Start Type**

Central Office Trunks can provide Loop Start or Ground Start service. Loop Start trunks are seized by completing the dc current path across Tip and Ring. Ground Start trunks are seized by grounding the Ring lead.

### **DID Start Type**

Depending on the serving central office, each DID trunk in the *SX-50* system can be programmed for Immediate Start, Wink Start, or Delay Dial.

**Immediate Start** is used with central offices that do not provide controlled address signaling (e.g., Step by Step offices). The *SX-50* system is ready to accept digits 65 ms after trunk seizure.

**Wink Start** is a 140 to 290 ms battery reversal the *SX-50* system sends to signal it is ready to receive digits from the Central Office.

**Delay Dial** is a battery reversal the *SX-50* system transmits towards the CO 100 to 150 ms after trunk seizure. The *SX-50* system returns the trunk to normal polarity to signal it is ready to receive digits.

### **Trunk Hang-up Delay (Guard) Timer**

This defines how long the system will wait after releasing the trunk before seizing it again for an outgoing call or allowing a new incoming call.

### **Tie Line Disconnect Timer**

This defines the minimum duration of a release signal the *SX-50* system will recognize on an E&M trunk.

### **E&M Lead Inversion**

These two fields provide the flexibility to specify the polarity of the E and M leads to match the far end connection.

### **E&M Delay Dial Outgoing**

When this option is enabled, the E&M trunk will wait for a start-dial signal from the far end before outputting digits.

### **E&M Wink Start Incoming**

When this option is enabled, upon incoming seizure the E&M trunk M lead will transmit a 200 ms off-hook (wink) signal to the far end. This tells the far end the *SX-50* system is ready to receive digits.

### **E&M Wink Start Outgoing**

When this option is enabled, the E&M trunk will wait for a 100-350 ms off-hook (wink) signal on the E lead before outputting digits. This is a signal that the far end is ready to receive digits.

### **Dictation Trunk**

If selected, this will retain the caller's DTMF receiver for the duration of the call to perform tone-to-pulse conversions. Digits can be outputted at any time during the call.

### **DID Trunk Timers**

- 4.14 Commands 501 → 580, Register 7 specify various timer intervals for each DID Trunk. The following paragraphs explain the function of each timer.

#### **Incoming Seizure Debounce Timer**

This timer specifies the minimum duration of incoming seizure signal the *SX-50* system will accept as valid. Its range is 10 ms to 150 ms in 10 ms increments.

#### **Wink Timer**

This timer selects the length of wink (off-hook) signal the *SX-50* system sends the Central Office if the trunk is programmed as wink start. The wink timer has a range of 150 ms to 300 ms in increments of 50ms. It must be set to match the CO's requirements.

#### **Permanent-Signal and Partial-Dial Timer**

This timer determines how long the *SX-50* system will wait for dialing to be completed when it receives a Permanent-Signal or Partial-Dial signal from the CO. The timer has a range of 5 to 30 seconds in increments of 5 seconds.

#### **DID Disconnect Timer**

This timer specifies the minimum duration of Central Office (CO) disconnect signal that the *SX-50* system will accept as valid. Its range is 150 ms to 300 ms in 50 ms increments. After recognizing the disconnect signal, the *SX-50* trunk circuit must return to the idle state within 700 ms of the start of the CO disconnect signal. The *SX-50* system should ignore disconnect signals less than 150 ms as the central office could open the loop for this amount of time without intending a disconnect.

#### **Release Acknowledge Timer**

The Release Acknowledge Timer has a range of 2 to 120 seconds.

**COMMANDS 501 → 580 Trunk Programming – Slots 1 → 10****Register 1**

a	b	c	d	e	f	g	h	i	j
1	*	1	@	1	0	1	0	#	%

\* 1 for CO, 2 for E&M, 0 for DID

@ 1 for CO, 3 for E&M, 6 for DID

# 1 for CO, 2 for E&M, 3 for DID

% 0 for CO, 1 for E&M, 2 for DID

- a: Register Number
- b: Trunk Group Membership 1 → 6 (0 = Incoming Calls Only)
- c: Trunk Alarm Control  
0 = Disable, 1 = Enable
- d: Trunk Hardware Type  
0 = Short Analog CO Trunk  
1 = Long Analog CO Trunk  
2 = Analog Toll Office Trunk  
3 = Analog Tie Trunk  
4 = Satellite Tie Trunk  
5 = Short Analog DID Trunk  
6 = Long Analog DID Trunk
- e: Trunk Class of Service 1 → 9
- f: Inward Dial Delay Before Answer (8 sec)  
0 = Disable, 1 = Enable
- Note:** This applies to all trunk types.
- g: Connect to Outgoing Trunk without Third Party  
0 = Disable, 1 = Enable
- h: Inward Dialing ARS Routing Class Of Service 1 → 3  
0 = ARS Does Not Apply
- i: Trunk Use  
0 = Disabled  
1 = Used as a CO  
2 = Used as an E&M Trunk  
3 = Used as a DID Trunk
- j: Trunk Dialing Type  
0 = DIL, 1 = DISA, 2 = DID

**COMMANDS 501 → 580 Trunk Programming – Slots 1 → 10  
(Cont'd)****Register 2**

a	b	c	d	e	f	g	h	i
2	0	0	0	0	1	0	0	1

- a: Register Number
- b: Trunk Outpulsing Break/Make Ratio  
0 = 60/40  
1 = 65/35  
2 = 30/20  
3 = 35/15
- c: Disconnect Supervision Guaranteed?  
0 = No  
1 = Yes
- d: Disappearance of Reversal  
0 = is Ignored  
1 = means Disconnect
- e: Reversal Meaning On Call Origination  
0 = Not Incoming Call  
1 = Incoming Call
- f: Disconnect Timing  
0 = 60 msec  
1 = 500 msec  
2 = 1.5 sec  
3 = 4.0 sec  
4 = 10.0 sec  
5 = Disconnect Ignored
- g: Start Type (CO Trunks)  
0 = Loop Start  
1 = Ground Start
- h,i: Trunk Hang-up Delay (Guard) Timer  
01 → 16 = 1 → 16 seconds

**COMMANDS 501 → 580 Trunk Programming – Slots 1 → 10  
(Cont'd)**

**Register 3**

a	b	c	d	e	f	g
3	1	2	0	0	0	2

- a: Register Number
- b: Tie Line Disconnect Timer  
0 = 150 ms  
1 = 300 ms
- c: E&M Lead Inversion
 

	Type 1	Type 5
0 =	M-Lead	None
1 =	Both	E-Lead
2 =	None	M-Lead
3 =	E-Lead	Both
- d: E&M Delay Dial Outgoing  
0 = Disable  
1 = Enable
- e: E&M Wink Start Incoming  
0 = Disable  
1 = Enable
- f: E&M Wink Start Outgoing  
0 = Disable  
1 = Enable
- g: RESERVED

**COMMANDS 501 → 580 Trunk Programming – Slots 1 → 10 (Cont'd)****Register 4**

a	b	c	d	e	f	g	h	i	j	k
4	0	5	1	0	0	1	0	0	0	*

\* 0 for CO & DID Trunks, 1 for E&M Trunks

- a: Register Number
- b: Dictation Trunk (for LS/GS Trunks)  
0 = Disable, 1 = Enable
- c: Inter-ringing Delay (for LS/GS Trunks)  
3 → 9 seconds
- d: Day Answer Mode  
Day Illegal Number Intercept (DID/DISA)  
0 = Direct-In Line  
1 = LDN 1  
2 = LDN 2  
3 = LDN 3
- e,f,g: Day Answer Point (Day Answer Mode = 0)  
Day Inward Dial Trunk Intercept Answer Point (DID/DISA)  
000 = Night Bell  
001 → 160 = Station Equipment Number  
161 → 166 = Hunt Group Number  
167 = Ring Group  
168 = RMATS
- h: Busy Intercept  
0 = Disable, 1 = Enable
- i: Do Not Disturb Intercept  
0 = Disable, 1 = Enable
- j: No Answer Intercept  
0 = Disable, 1 = Enable
- k: Illegal/Vacant Number Intercept  
0 = Disable, 1 = Enable

**COMMANDS 501 → 580 Trunk Programming – Slots 1 → 10 (Cont'd)****Register 5**

a	b	c	d	e	f
5	0	0	0	0	0

- a: Register Number
- b: Night Answer Mode  
Night Illegal Number Intercept (DID/DISA)  
0 = Flexible Night Service  
1 = LDN 1  
2 = LDN 2  
3 = LDN 3
- c,d,e: Night Answer Point (Night Answer Mode = 0)  
Night Inward Dial Trunk Intercept Answer Point (DID/DISA)  
000 = Night Bell  
001 → 160 = Station Equipment Number  
161 → 166 = Hunt Group Number  
167 = Ring Group  
168 = RMATS
- f: DID Night Answer Point  
0 = Disable  
1 = Enable

**COMMANDS 501 → 580 Trunk Programming – Slots 1 → 10  
(Cont'd)**

**Register 6**

a	b	c	d	e	f	g	h	i	j
6	1	1	0	4	1				

- a: Register Number
- b: DID Start Type  
0 = Immediate Start  
1 = Wink Start  
2 = Delay Dial
- c: RESERVED
- d: Incoming Address Signaling  
0 = Loop-Dial Pulsing  
1 = Battery-and-Ground Pulsing  
2 = DTMF
- e: **N** : Number Of Digits Expected (1 → 9)
- f: **M** : Number Of Digits To Be Absorbed (0 → 8)
- g → j: **X** : Digits To Be Inserted

**Note:** In order to change the number of 'X' digits, fields g → j must be programmed as '00'. This clears the previous entry and allows a new "Digits to be Inserted" value to be entered.

**COMMANDS 501 → 580 Trunk Programming – Slots 1 → 10  
(Cont'd)**

**Register 7**

a	b	c	d	e	f	g	h	i
7	0	2	4	3	3	0	2	0

- a: Register Number
- b,c: Incoming Seizure Debounce Timer  
(01 → 15) x 10 ms
- d: Wink Timer  
(3 → 6) x 50 ms
- e: Permanent-Signal Partial-Dial Timer  
(1 → 6) x 5 sec
- f: DID Disconnect Timer  
(3 → 6) x 50 ms
- g → i: Release Acknowledge Timer  
002 → 120 sec

## Verified Authorization Code Programming

- 4.15 Command 600 is used to program Verified Authorization codes (VAC) on the SX-50 system. Verified Authorization codes are required by the following features: Traveling COS and Special DISA. Refer to Section 9104-091-105-NA, TRAVELING COS and Section 9104-091-105-NA, SPECIAL DISA, for further details.

### COMMAND 600 VERIFIED AUTHORIZATION CODE PROGRAMMING

a	b	c	d	e	f	g → n
.	.	.	0	0	0	.....

a,b,c: Register Number 001 → 999

d: VAC Activation  
 0 = Disable  
 1 = Enable

e: COS for Authorization Code  
 0 = Disable  
 1 → 9 = COS (for VAC)

f: ARS Routing Number  
 0 = Original RCS Number of Calling Device  
 1 → 3 = Routing Class of Service (for VAC)

g → n: Authorization Code (1 to 8 digits)

## ARS Programming

- 4.16 Commands 700 through 745 and 750 through 752 apply to the SX-50 system's Automatic Route Selection package. For detailed information refer to Section 9104-091-220-NA, Automatic Route Selection.

### COMMAND 700 ARS DIGIT COMPARISON TABLE PROGRAMMING

a	b	c	d	e	f	g → l	m
.	.	.	.	.	[		]

a,b,c: Entry Number 001 → 800

d,e: Time-of-Day Table Number 01 → 45

g → l: Dialed Digits String (field scrolls to provide up to 32 digits)

### COMMANDS 701 → 745: ARS TIME-OF-DAY TABLE PROGRAMMING

a	b	c	d	e	f	g	h	i	j	k	l	m	n
.	-	-	-	-	0	0	0	0	0	0	0	0	0

a: Period Number 1 → 6

b,c: Start Hour 00 → 23

d,e: Start Minute 00 → 59

f,g,h: RCS 1 Route List  
001 → 200  
000 = not programmed

i,j,k: RCS 2 Route List  
001 → 200  
000 = not programmed

l,m,n: RCS 3 Route List  
001 → 200  
000 = not programmed

**COMMAND 750 ARS ROUTE LIST TABLE PROGRAMMING**

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
.	.	.	-	-	-	-	-	-	-	-	-	-	-	-

a,b,c: Route List Number 001 → 200

d,e,f: 1st Choice Route Number

g,h,i: 2nd Choice Route Number

j,k,l: 3rd Choice Route Number

m,n,o: 4th Choice Route

**COMMAND 751 ARS ROUTE TABLE PROGRAMMING**

a	b	c	d	e	f	g	h
.	.	.	0	0	0	0	0

a,b,c: Route Number 001 → 100

d: Trunk Group Number 1 → 6

e,f,g: Digit Modification Entry Number 001 → 100

h: Toll Calls  
 0 = Non-Toll  
 1 = Toll

**COMMAND 752 ARS DIGIT MODIFICATION TABLE PROGRAMMING**

a	b	c	d	e	f	g → l	m
.	.	.	.	.	[	- -	]

a,b,c: Digit Modification Number 001 → 100

d,e: Number of Digits to be Deleted 00 → 26

g → l: Digits to Insert (maximum of 26 digits)

# 5.

## PROGRAMMING ERRORS

### General

- 5.1 The SX-50 system can detect certain errors made during CDE. The detection of a programming error results in a display similar to that shown in Figure 5-1, Alarm Message Format. The meaning of each code is listed in Table 2-2, Programming Error Codes.

### Exit From Error Mode

- 5.2 After the error code has been checked and the correct data determined, the programmer can exit the Error Mode by:

- pressing the QUIT softkey on the Attendant Console,
- OR,
- pressing the CANCEL softkey from the Test Line (*SUPERSET* Telephone)

OR,

- dialing \*# from the Test Line (DTMF set),

OR,

- flashing the switchhook twice on the Test Line (Rotary Dial set).

The system restores the original data and data entry begins at the start of the register.

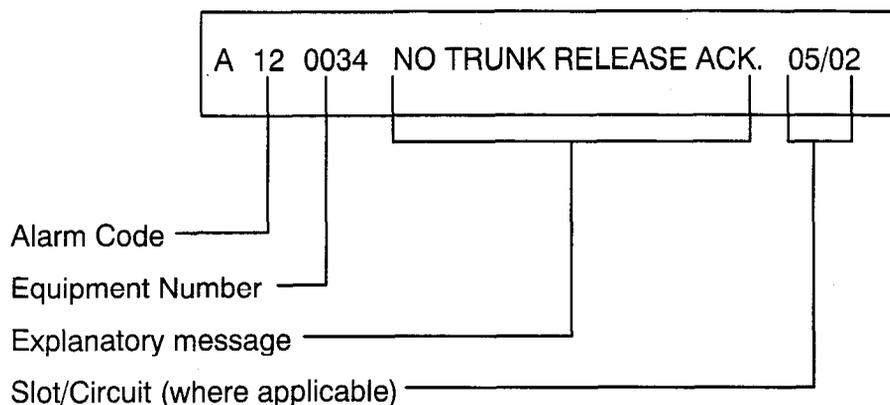


Figure 5-1 Alarm Message Format

Table 5-1 Programming Error Codes

Error Code	Description
E01	Illegal Command Identity
E02	Digit keyed while Access Mode Error displayed
E03	Directory Number already exists
E04	Data out of range
E05	Illegal Directory Number length
E06	Directory Number range insufficient
E07	Too many digits keyed
E08	Illegal Device range
E09	Write protected command
E10	Insufficient software package level
E11	Write protected data
E12	Data field incomplete
E13	RESERVED
E14	Maximum Limit Exceeded
E15	Hunt Groups linked into a loop; e.g, linked Hunt Group 1 to Hunt Group 6 then linked Hunt Group 6 to Hunt Group 1
E16	Duplicate assignment of Programmable Function Key
E17	Attempt to program non-idle key
E18	<i>SUPERSET</i> Telephone Prime Line Programming Error
E20	Invalid double-digit command
E21	Directory number already in Ring Group
E22	Device must be an extension
E23	ARS Busy – Calls in progress
E24	Digit String already programmed
E25	Digit String register overflow
E26	No Digit String entered
E27	Digit area is full
E28	The start time entered for this time period is earlier than or equal to the start time of the preceding period. Time periods must be entered in ascending order.
E29	The start time entered for this time period is later than the start time of the next period. Time periods must be entered in ascending order.
E30	RESERVED
E31	Attempt to program a DTS, DLS or Private Line in <i>SUPERSET</i> Telephone Programming when the trunk is not assigned to a Trunk Group. Refer to Commands 501 → 580, Trunk Programming.
E32	<i>SUPERSET 4</i> Telephone key type conflict

**Table 5-1 Programming Error Codes  
(continued)**

Error Code	Description
E33	Attempt to display System Security Code
E34	Attempt to display User Security Code
E35	Attempt to display DISA Access Code
E36	RESERVED
E37	Specified card type not found in slot position
E38	Attempt to overflow current Trunk Group
E39	Invalid Trunk Number keyed
E40	Invalid Auxiliary Attendant Equipment (must be a <i>SUPERSET</i> Telephone)
E41	Auxiliary Attendant not idle.
E42	Auxiliary Attendant Programming conflict.
E43	Invalid base Directory Number (Occurs when programming Commands 301 → 310).
E44	Invalid Directory Number (Occurs when programming Commands 321 → 330).
E45	Contact monitor conflict. Attempted to assign as an answer point an ONS circuit programmed as a contact monitor.
E46	VAC Length Conflict. Attempted to change length of VAC before deleting all existing VACs
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**SX-50<sup>®</sup> DIGITAL PRIVATE  
AUTOMATIC BRANCH EXCHANGE  
(DPABX)**

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# Automatic Route Selection and Toll Control

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1.

## INTRODUCTION

### General

- 1.1 This Section describes the Automatic Route Selection (ARS) feature of the SX-50® Digital Private Automatic Branch Exchange (DPABX).

### Reason for Reissue

- 1.2 This section has been reissued to incorporate MS55 software.

### Section Overview

- 1.3 This Section is divided into 7 parts as described below:
1. Introduction: this Part.
  2. Numbering Plans: describes the North American Plan.
  3. Call Routing Options: details the different types of lines available to the customer.
  4. ARS Features Description: details the ARS feature package for the SX-50 system.
  5. ARS Tables: describes the contents of the ARS Tables in the database.
  6. ARS Programming: briefly describes the operation of the ARS feature.
  7. Application Example: demonstrates the programming of the ARS feature using an example.

### Terminology

- 1.4 Throughout this Section, references are made to the **customer**, the **installation company** and the **user**. These terms are defined as follows:
- The **customer** is the owner of the SX-50 system.
  - The **installation company** is a company which MITEL has authorized to sell and install SX-50 systems. This company determines the customer's requirements and then installs and programs the system accordingly.
  - The **user** is a person who makes use of the SX-50 system through one of the system's peripheral devices (telephone sets).

The routing and connection of a trunk call via ARS is governed by route availability, cost (when more than one route exists) and the user's toll restriction. The process is transparent to the caller; the system automatically modifies the dialed digits to the requirements of the different routes.

## 2.

## NUMBERING PLANS

### General

- 2.1 The ARS feature is compatible with virtually all numbering plans employed by public networks. It is necessary to understand the numbering plan of the public network which serves the DPABX in order to make full use of the toll control application of the ARS feature.

### North American Numbering Plan

- 2.2 The numbering plan enables any subscriber in the network to be connected to any other subscriber in the network. The North American Numbering Plan assigns a unique 10-digit string to each subscriber. This digit string is as follows:



The Area Code defines a geographic telephone area; the Office Code identifies a Central Office (CO) within that area; and the Subscriber Number identifies a specific subscriber of that CO.

When the North American Numbering Plan was first introduced, the distinction between Area and Office Codes was that the second digit of an Area Code was 0 or 1 while the second digit of an Office Code was between 2 and 9. However, as the number of COs grew, it became necessary in some areas to allow Office Codes with a second digit of 0 or 1. The resulting conflict between Area and Office Codes was resolved by introducing the prefix digit 1 for all toll calls.

An increased need for additional area codes has led to the development of new dialing plans. Although the plan has not yet been introduced, it will not only allow office codes with a second digit of 0 or 1, but will also allow area codes with a second digit of 2–9.

There are numbers reserved for special services. For example, 411 is for directory assistance. These numbers do not conflict with Area or Office Codes.

The current North American Numbering Plan includes digit strings of one, three, seven, eight and 11 digits. Some examples are:

- Long Distance Toll Operator      0
- Service Number                    411
- Local Call                          592–2122

- Toll Call Within an Area 1-555-2323
- Toll Call to Another Area 1-416-555-3333.

### 3.

## CALL ROUTING OPTIONS

### General

- 3.1 Telephone companies offer a number of different methods of routing calls over the public network. These include Tie Trunks, WATS lines and Foreign Exchange Lines. Each has a different cost structure. Correct use of these trunks provides substantial savings to the user. The installation company should complete a traffic survey prior to installation to determine which routing options are best suited to the DPABX.

The Station Message Detail Recording (SMDR) feature of the *SX-50* system monitors route usage. It provides information to guide future modifications as traffic demands change. Refer to Section 9104-091-221-NA, Station Message Detail Recording (SMDR), for details.

The *SX-50* system supports the following long distance services:

- Direct Distance Dialing (DDD)
- Tie Trunk
- Foreign Exchange
- Wide Area Telephone Service (WATS)
- Other Common Carrier (OCC).

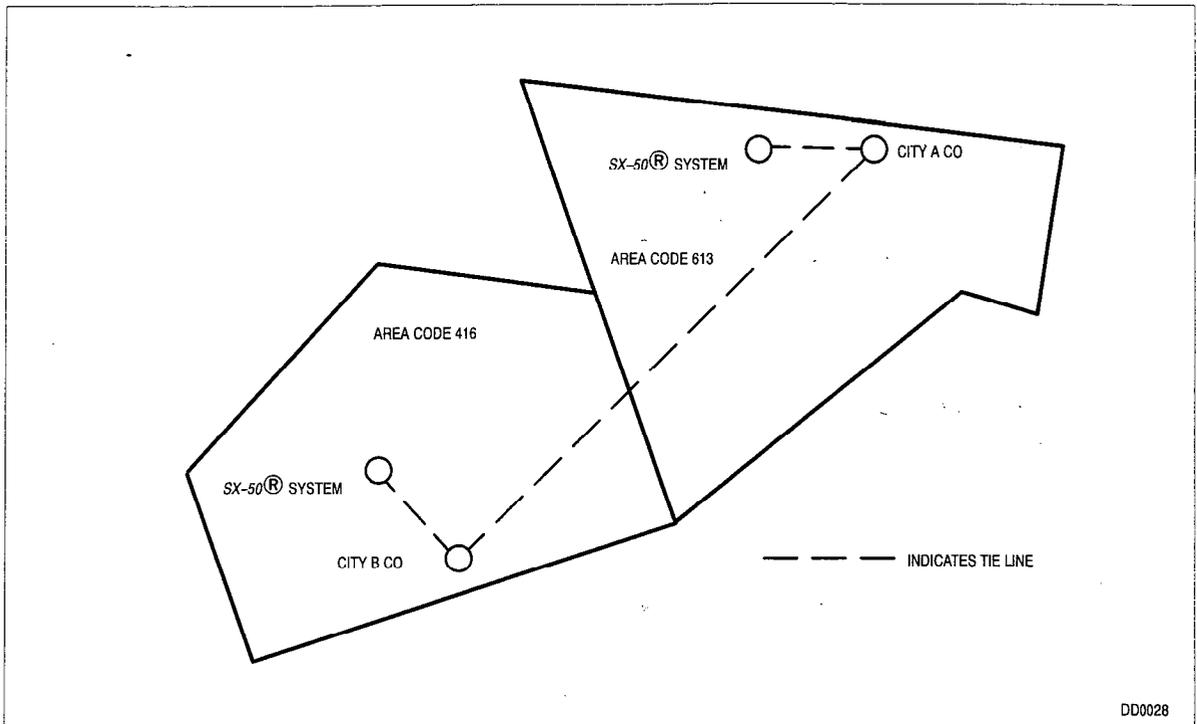
### Direct Distance Dialing

- 3.2 Direct Distance Dialing (DDD) allows telephone users to call subscribers within the home and international networks without the assistance of the operator. Connections are completed over standard trunk routes and are charged on a usage basis at a rate which varies with distance, time of day, and day of the week. DDD rates are provided in the local telephone directory, or contact the local Telephone Company for rate information not listed in the directory.

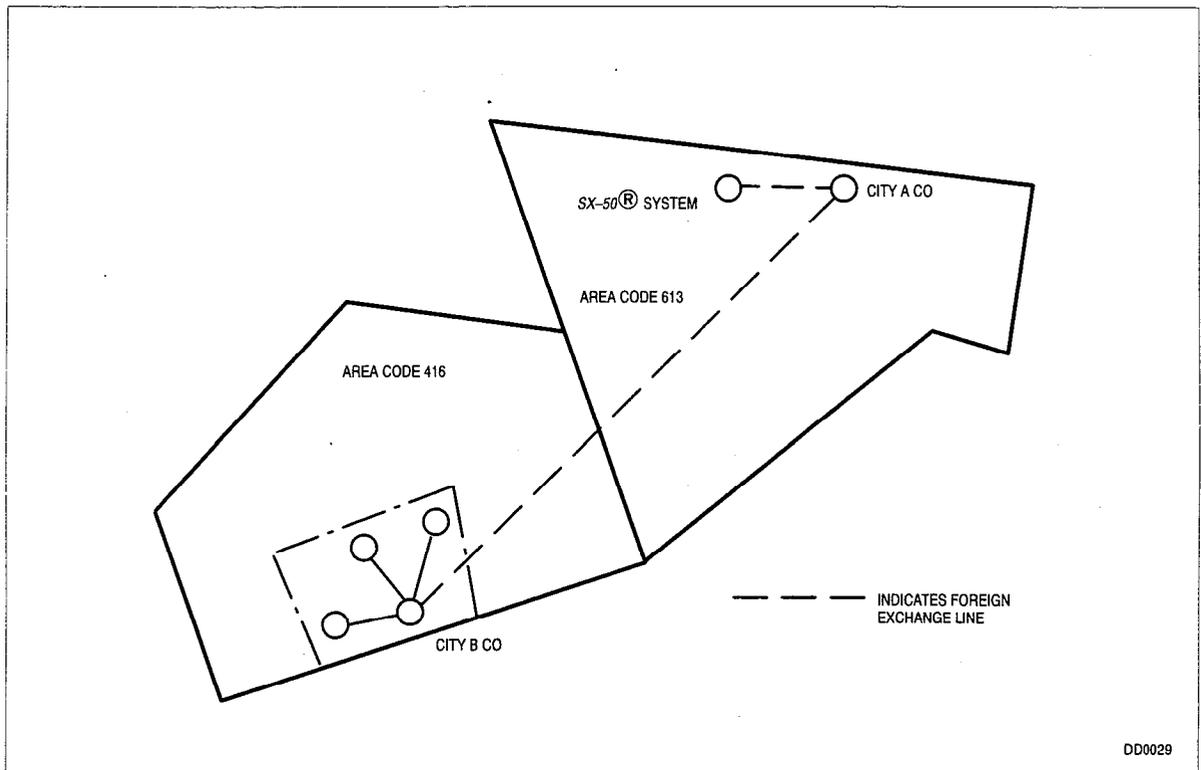
### Tie Trunk Service

- 3.3 Tie Trunk Service provides a link between two PBXs. The charge for each Tie Trunk is a flat rate based on the airline distance between the PBXs. Figure 3-1 shows a typical Tie Trunk connection between an *SX-50* system in City A, and an *SX-50* system in City B.





**Figure 3-1 Typical Tie Trunk**



**Figure 3-2 Typical Foreign Exchange Trunk**

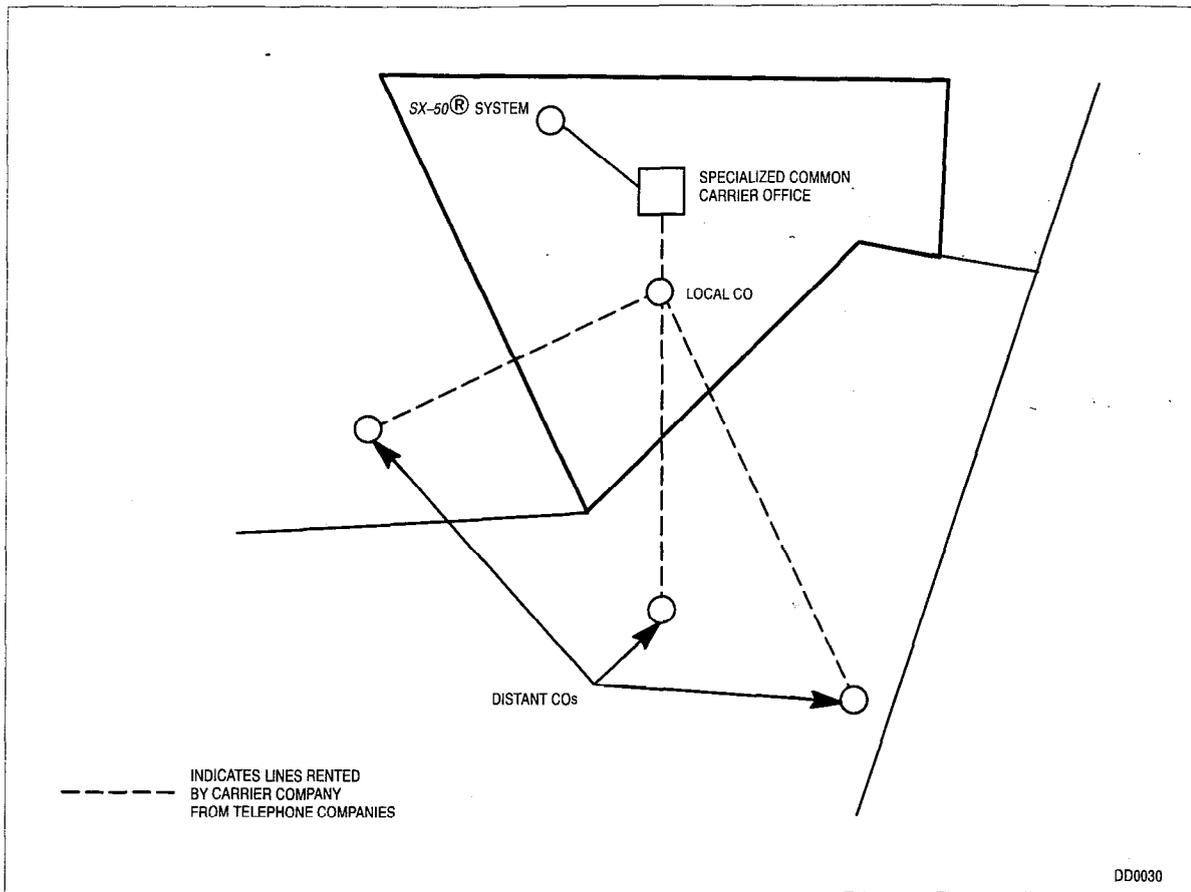


Figure 3-3 Typical OCC Arrangement

# 4.

## ARS FEATURES DESCRIPTION

### General

- 4.1 The ARS feature is an integrated software package of the *SX-50* system. When a trunk call is made, ARS automatically selects one of a programmed list of Trunk Routes, governed by route availability, cost (when more than one route exists) and the user's toll restriction. The process is transparent to the caller; the system automatically analyzes the dialed digits and modifies them to the requirements of the different routes. No special access codes are required.

The complete ARS package provides the following:

- Alternative Routing
- Selective Routing by Class of Service
- Least Cost Routing
- Toll Control
- Overlap Outpulsing
- Expensive Route Warning
- Return Dial Tone
- ARS Callback.

### Alternative Routing

- 4.2 Alternative Routing is the automatic selection of an alternative trunk Route when the first choice is busy. Routes (e.g., CO Trunks, Tie Trunks or WATS Trunks) are defined in the Route Table. Routes are accessed via Route Lists. Each list contains the first choice route number and up to three alternative route numbers.

### Selective Routing by Class of Service

- 4.3 Each user is assigned to one of three Routing Classes of Service. The Routing Class of Service determines which routes the user can access and at what times during the day. See TOLL CONTROL.

Every station capable of accessing an outgoing trunk is assigned a Routing Class of Service (RCS) in Station Programming. Inward Dial Trunks are assigned an RCS in Trunk Programming. The Attendant Console is assigned its RCS in the ARS part of System Options programming.

## Least Cost Routing

- 4.4 Least Cost Routing automatically selects the lowest cost route available for the time of day and call destination. This is achieved through Alternative Routing and Time-of-Day Programming.

Route Numbers appear in the Route List in the order in which the SX-50 system attempts to access the routes. (See ALTERNATIVE ROUTING). The routes need only be programmed in ascending order of cost to achieve Least Cost Routing.

Route lists are accessed via Time-of-Day Tables. The Time-of-Day Tables can be programmed for up to six daily time periods. Each table defines the Route List each RCS must use for each time period. A number of different Route Lists can be defined to reflect the variation in the relative cost of the routes at different times of day.

## Toll Control

- 4.5 Toll Control is an integral part of the ARS feature package. With it, the customer can restrict user access to specific Trunk Routes and/or specific directory numbers.

The ARS Routing Class of Service (RCS) of a station is analogous to its Class of Service (COS); it identifies the station as a member of a group of stations with specific trunk access and long-distance calling privileges.

Access by each RCS to Route Lists is controlled in the Time-of-Day Table. Route List 000 can be entered in the table to deny an RCS access to a particular location or directory number during a particular time period. Reorder tone will be returned to the restricted users.

An RCS also can be denied access to particular Trunk Routes. The RCS to be restricted can be referred, via the Time-of-Day Tables, to different Route Lists than the others. These Route Lists will contain only the permitted Trunk Routes for that RCS.

Trunks are seized only after the ARS process has determined the validity of the call. Because of this, false traffic is not generated at the CO (or distant PBX) by aborted seizures.

## Overlap Outputting

- 4.6 Overlap outputting minimizes the post-dialing delay the user experiences on a rotary dial trunk. (Post-dialing delay is the time between the completion of station dialing and the receipt of ringback). Outputting begins as soon as sufficient digits have been received to identify the route. The route is identified when the dialed digits uniquely match an entry in the Digit Comparison Table. The dialed digits are subject to digit modification prior to outputting. The system collects subsequent digits and outputs them.

Post-dialing delay is minimal when using a DTMF trunk.

## Expensive Route Warning Tone

- 4.7 The Expensive Route Warning Tone is returned if only the most expensive route is available. If a SUPERSET™ 4 or SUPERSET 420 telephone is used, the message **EXPENSIVE ROUTE** appears on the LCD. To avoid incurring the additional cost, the user can hang up. Refer to the paragraphs covering the ARS Route List Table in Part 5, ARS Tables in this Section for programming information.

## Return Dial Tone

- 4.8 ARS Return Dial Tone is a programmable option (refer to Part 6 of this Section). When enabled, the SX-50 system returns dial tone after the Trunk Group Access Code is dialed. This feature is reassuring to users accustomed to key systems that return Central Office dial tone when an external call is made.

## ARS Callback

- 4.9 When Automatic Route Selection indicates that all routes are busy, users can dial the callback code (6) within 10 seconds to invoke a callback. A SUPERSET user can press the CALLBACK softkey to invoke a callback.

When one of the trunks in the ARS Route List becomes available, the SX-50 PABX notifies the user with Distinctive Callback Ringing (see Section 9104-091-105-NA, DISTINCTIVE CALLBACK RINGING for more information). In addition to ringing, the CALLBACK message is displayed for SUPERSET users. Once the SUPERSET user answers the ARS Callback, the originally dialed destination number is shown on the display.

The system automatically redials the destination number after the user answers the callback. Note that ARS Callbacks can be placed on routes only, not on busy or no answer destinations.

- A maximum of one ARS Callback is allowed per extension at any given time. Submitting a new Callback cancels the previous one.
- If more than one callback is active on a given route, callbacks are queued and serviced on a first in, first out basis.
- To cancel Callbacks, dial the Clear All Features access code (default is 444).
- If a Callback is activated, the callback utilizes the least expensive route.
- ARS Callback is available only to those users with Automatic Callback enabled in their Class of Service (Commands 121 – 129, Register 3, fields b and j).
- If ARS programming is modified while ARS Callbacks are in progress, incorrect routing of the call may occur.



## 5.

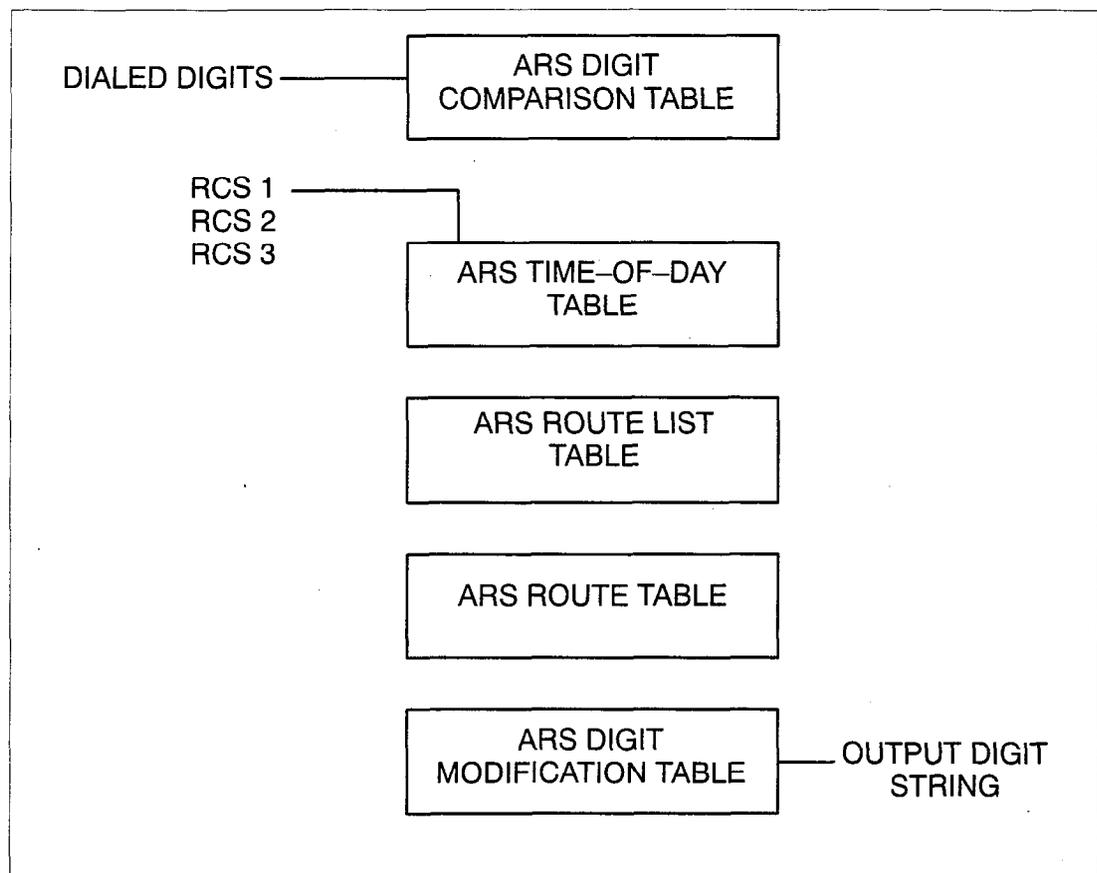
## ARS TABLES

**General**

5.1 The ARS package contains a network of tables that control the routing of trunk calls and access to trunk routes. There are five ARS tables. They are, in order of programming:

- Digit Comparison Table (800 entries)
- Time-of-Day List Table (45 entries, 6 time periods each)
- Route List Table (200 entries)
- Route Table (100 entries)
- Digit Modification Table (100 entries)

Each of the above tables refers to an entry in the next table. The flow of information through the ARS system is shown in Figure 5-1.



**Figure 5-1 ARS Table Hierarchy**

## ARS Digit Comparison Table (Command 700)

Entry Number (001 → 800) Fields a → c	Time-of-Day List (01 → 45) Fields d & e	Field f	Comparison Digit String Fields g → l	Field m
001	03	[	95922122	]
002	45	[	91416	]
003	05	[	95557964	]
...	..	[	.....	]
800		[		]

**Note:** The display shows Fields g → l. By scrolling, it can display up to 32 digits.

There is a maximum of 800 entries. The Register Number is the Entry Number. Each entry pairs a Time-of-Day List Number and a Comparison Digit String. When the dialed digit string matches one of the Comparison Digit Strings, the processing proceeds to the corresponding Time-of-Day List entry. If the dialed digit string does not match any of the Comparison Digit Strings, ARS does not handle the call; the call is routed according to the Trunk Group Access code the user dialed.

The fields which comprise the Digit Comparison Table are described below.

**Entry Number:** This is the Register Number and is not programmable. Valid entries are 001 to 800.

**Time-of-Day List Number:** This field links to the Command Numbers of the Time-of-Day Table. Valid entries are 01 to 45.

**Comparison Digit String:** This field lists the digits the system compares against the dialed digits prior to outpulsing. The digit string must begin with the Trunk Group Access Code.

Associated with this form are softkeys that perform special functions:

- **VIEW:** Pressing the VIEW softkey scrolls the digit string display one digit to the left. By repeated presses of this key, the user can view the entire 32-digit string.
- **DELETE:** Pressing the DELETE softkey deletes the digit string digits from the current position to the end of the digit string.

**ARS Time-of-Day Table (Commands 701 to 745)**

Commands 701 → 745 correspond to Time-of-Day List Numbers 01 → 45. These are referenced from the Digit Comparison Table.

TimePeriod (1 → 6) Field a	Time (Hours) (00 → 23) Fields b,c	Time (Minutes) (00 → 59) Fields d,e	Route List Numbers		
			RCS 1 Fields fgh	RCS 2 Fields ijk	RCS 3 Fields lmn
1	01	00	001	003	005
2	08	00	002	003	002
3	10	30	002	003	002
4	18	00	000	003	004
5	20	00	000	003	004
6	00	00	000	000	000

The fields which comprise the Time-of-Day Table are as follows:

**Time Period:** This nonprogrammable field represents the six possible time periods in 1 day.

**Time (Hours and Minutes):** These fields list the starting time for each Time Period. Valid entries are 00 to 23 and 00 to 59 for the Hours and Minutes respectively. A single entry indicates one time period for the day. Also, the system automatically forms a time period from the last entry to the first entry.

**Route List Numbers:** These fields list the Route List Numbers, which link this table to the next one in the hierarchy; the ARS Route List Table. Each field grouping represents the available Route List Numbers for each Routing Class of Service (RCS). Valid entries are 001 to 200 and a Route List Number defined as 000 indicates that access is denied.

**ARS Route List Table (Command 750)**

Route Selections				
Route List Number Fields a,b,c	1st Choice Route No. Fields d,e,f	2nd Choice Route No. Fields g,h,i	3rd Choice Route No. Fields j,k,l	4th Choice Route No. Fields m,n,o
001	001	002	000	000
002	001	000	000	000
003	004	003	005	000
...	...	...	...	...
200	000	000	000	000

This table contains a maximum of 200 one-line entries, each of which lists up to four Route Numbers. Valid entries are 001 to 100 and an entry of 000 indicates a nonprogrammed route. The Route Numbers are listed in the order in which they are to be tried; i.e., least expensive route to the most expensive route. The Expensive Route Warning option (enabled in Command 100, System Options, Register 13), activates when the fourth route is selected. This feature can be used even when there are fewer than four routes programmed. The expensive route is placed in the fourth column. Nonprogrammed routes (000 entries) in any of the other columns are ignored.

Route Number Fields a,b,c	Trunk Group Number (1 → 6) 0 = Not Programmed Field d	DMT Entry Number (001 → 100) 000 = Not Programmed Fields e,f,g	Toll Calls 0 = Non-Toll Field h
001	0	000	0
002	1	003	0
003	1	004	0
004	1	089	0
005	2	057	0
↓	↓	↓	↓
100			

There is a maximum of 100 entries. The Register Number is the Route Number, which is referenced from the Route List Table. A route is described by a Trunk Group and a Digit Modification Table Entry Number.

The fields which comprise the Route table are described below.

**Route (Register) Numbers:** This nonprogrammable field lists the Route Number which is referenced from the Route List Table.

**Trunk Group Number:** This field lists the selected Trunk Group for the Route. Valid entries are 1 to 6; 0 indicates a nonprogrammed route.

**Digit Modification Table Entry:** These fields list the DMT Entry Number for the Route. Valid entries are 001 to 100. An entry of 000 indicates a nonprogrammed route.

**Toll Calls:** This field is used by the Account Code Bypass feature to determine whether a call is a toll or non-toll call. Valid entries are 0 (Non-Toll Calls) or 1 (Toll Calls). Default is 0.

**ARS Digit Modification Table (Command 752)**

<b>DMT Entry Number</b> Fields a,b,c	<b>No. of Digits to Delete</b> Fields d,e	<b>Field f</b> [	<b>Digits to Insert</b> Fields g → l	<b>Field m</b> ]
001	1	[	55539331234567	]
002	1	[	1	]
003	11	[	0	]
↓		[		]
100	0	[		]

There is a maximum of 100 Digit Modification Table (DMT) entries. The Register Number is the Entry Number, which is referenced from the Route Table. Each DMT Entry defines how many digits are to be deleted from the dialed digit string and what digits are then to be added. (The first digit entered is the first deleted).

The fields which comprise the Digit Modification Table are described below.

**DMT Entry Number:** This nonprogrammable field is the DMT Entry Number.

**No. of Digits to Delete:** This field lists the number of digits the system deletes from the dialed digit string. Valid entries are 0 to 12.

**Digits to Insert:** This field lists the digits that the system prefixes to the dialed digit string after the specified digit deletion has occurred. Included in the modifying digits are the PAUSE and WAIT FOR DIAL TONE characters. The system accepts a maximum of 20 digits per DMT Entry Number.

Associated with this form are two softkeys that perform special functions:

- **VIEW:** Pressing the VIEW softkey scrolls the digit string display one digit to the left. By repeated presses of this key, the user can view the entire 20-digit string.
- **DELETE:** Pressing the DELETE softkey deletes the digit string digits from the current position to the end of the digit string.

These soft keys appear when the first digit of the digit string is entered:

- **PAUSE:** Pressing the PAUSE softkey or dialing \*7 inserts a 5-second pause in the digit string. The Attendant Console LCD shows the **P** character for each pause.
- **WFDT:** Pressing the WFDT softkey or dialing \*6 halts the outpulsing of the digit string until Dial Tone is returned. The Attendant Console LCD shows the **W** character each time the WFDT softkey is pressed.





**SX-50® DIGITAL PRIVATE  
AUTOMATIC BRANCH EXCHANGE  
(DPABX)**

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**Addendum  
Package (MR4)**

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### **NOTICE**

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## 1.

**INTRODUCTION****General**

- 1.1 After the successful mechanical installation of the SX-50® system (refer to Section 9104-091-200-NA, Shipping, Receiving and Installation Information), the system is ready for programming. This Section provides forms for the installer to record customer data. For information on programming options and access to CDE from the Console or Test Line, refer to Section 9104-091-210-NA.

**Reason for Reissue**

- 1.2 Section 9104-091-102-NA, Customer Data Entry Forms, has been reissued to include a description of the SUPERSET™ 410 and *SUPERSET 420* telephones, the Digital Network Interface Circuit (DNIC) Line Card and the functionality provided by MS55 software.



1.

## INTRODUCTION

### General

- 1.1 The Documentation Index lists the MITEL Standard Practices included in the SX-50® DPABX Communications documentation. Each practice forms a section of the system documentation. A brief description of each section is given.

### Reason for Reissue

- 1.2 This Section is reissued to incorporate MS55 modifications.

The following Section is added:

- 9104-091-150-NA, Ordering Information.



## 2.

**DOCUMENTATION****General**

- 2.1 The *SX-50* system documentation is contained in one volume. Contents are listed in Table 2-1.

**Description of Sections**

- 2.2 The content of each Section is as follows:
- (a) 9104-091-001-NA, Control Sheet, is identified by a unique part number, and identifies the issue of each standard practice contained.
  - (b) 9104-091-010-NA, The Documentation Index lists the MITEL Standard Practices included in this *SX-50* DPABX Communications System documentation.
  - (c) 9104-091-100-NA, General Description, contains a brief description of the *SX-50* system.
  - (d) 9104-091-102-NA, Customer Data Entry Forms, contains blank programming forms. This Section can also be ordered separately.
  - (e) 9104-091-105-NA, Features Description, describes the features available on the *SX-50* system. Each feature description details:
    - programming required, conditions affecting the feature, and feature operation.
  - (f) 9104-091-150-NA, Ordering Information, lists those parts which are orderable for the *SX-50* system.
  - (g) 9104-091-180-NA, Engineering Information, contains technical information relating to the *SX-50* system.
  - (h) 9104-091-200-NA, Shipping, Receiving, and Installation Information, provides the correct procedures for installation of the *SX-50* system.
  - (i) 9104-091-210-NA, Customer Data Entry, describes how to program the *SX-50* system to meet the customer's requirements.
  - (j) 9104-091-220-NA, Automatic Route Selection and Toll Control Description, contains a description of the Automatic Route Selection (ARS) and Toll Control package the *SX-50* system provides.
  - (k) 9104-091-221-NA, Station Message Detail Recording (SMDR), describes SMDR, including printer installation and system programming.

- (l) 9104-091-301-NA, Remote Maintenance and Administration Test System (RMATS), describes RMATS Module installation, system programming and RMATS operation.
- (m) 9104-091-350-NA, Troubleshooting Procedures and General Maintenance Information, describes the maintenance philosophy, features and facilities of the SX-50 system. This Section also includes the troubleshooting procedures if a problem occurs with the operation after installation and/or programming.

<b>Table 1-1 Documentation Index</b>	
<b>PN 9104-091-106-NA</b>	
<b>Section Number</b>	<b>Title</b>
9104-091-001-NA	Control Sheet
9104-091-010-NA	Documentation Index
9104-091-100-NA	General Description
9104-091-102-NA	Customer Data Entry Forms
9104-091-105-NA	Features Description
9104-091-150-NA	Ordering Information
9104-091-180-NA	Engineering Information
9104-091-200-NA	Shipping, Receiving and Installation
9104-091-210-NA	Customer Data Entry
9104-091-220-NA	ARS and Toll Control Description
9104-091-221-NA	Station Message Detail Recording (SMDR)
9104-091-301-NA	Remote Maintenance and Administration Test System
9104-091-350-NA	Troubleshooting Procedures & General Maintenance Information

**SX-50® DIGITAL PRIVATE  
AUTOMATIC BRANCH EXCHANGE  
(DPABX)**

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Customer  
Data Entry  
Forms

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# 1. INTRODUCTION TO THE ADDENDUM

## GENERAL

- 1.1 This document amends the existing documentation set for the SX-50® DPABX, PN 9104-091-106, Issue 5, March 1993.

The addendum is issued to update and correct information contained in the above specified documentation set.

## REPLACEMENT PAGE ADDENDUM INSTRUCTIONS

- 1.2 Refer to the "List of Revised Pages" and remove each page listed in sequence and replace with Revision 1.

Include "List of Revised Pages" in the front of Volume 1 of the system documentation.

List of Revised Pages		
Page	Revision Level	Date
"100 4-1"	Revision 1	August/94
"102 2-17"	Revision 1	August/94
"105 vi"	Revision 1	August/94
"105 3-32"	Revision 1	August/94
"105 3-123"	Revision 1	August/94
"105 3-139"	Revision 1	August/94
"105 3-173"	Revision 1	August/94
"105 3-178"	Revision 1	August/94
"105 A-1, A-2, A-3, A-4"	Revision 0	August/94
"200 2-1"	Revision 1	August/94
"210 4-12"	Revision 1	August/94
"220 5-6"	Revision 1	August/94
"301 4-3"	Revision 1	August/94



## 4.

**SYSTEM CONFIGURATION****General**

4.1 The SX-50 system supports typical PABX applications within the following limits:

Up to 160 lines, which can be:

- ONS Lines: 16 per slot, up to 160 if slots are available
- OPS Lines: eight per slot, up to 80 if slots are available
- DNIC Lines: eight per slot, up to 32 if slots are available
- COV Lines: eight per slot, up to 64 if slots are available

**Note:** The combined total number of COV and DNIC line cards must not exceed eight.

Up to 80 trunks, which can be

- LS/GS Trunks: 8 per slot, up to 80 if slots available
- E&M Trunks: 4 per slot, up to 32 if slots available
- DID Trunks: 8 per slot, up to 16 if slots available

No more than 9 Universal Cards (if slots available), total of 34 modules. Module types are:

- E&M Trunk Module
- RMAT Module (1 per system)
- MOH/Pager Module (1 per system)^N

\* An MOH/Pager Module is ignored by software when the Control Card 2 (MCC2) is installed.

**Identifying the Software Revision Level**

4.2 Press the Attendant Console STATUS key once. The LCD shows the software identifier (e.g. MS55) and maintenance release number (e.g. MR0). Refer to Figure 4-1, Software Identification.



SX-50 MS55-MR0

**Figure 4-1 Software Identification**

## Identifying Software Without a System Console

- 4.3 To identify software without the use of a system console perform the following steps:
1. Enter the programming access code from the test line (*SUPERSET 4* and *SUPERSET 420* only).
  2. Enter command 999. The LCD display will show the software identifier.

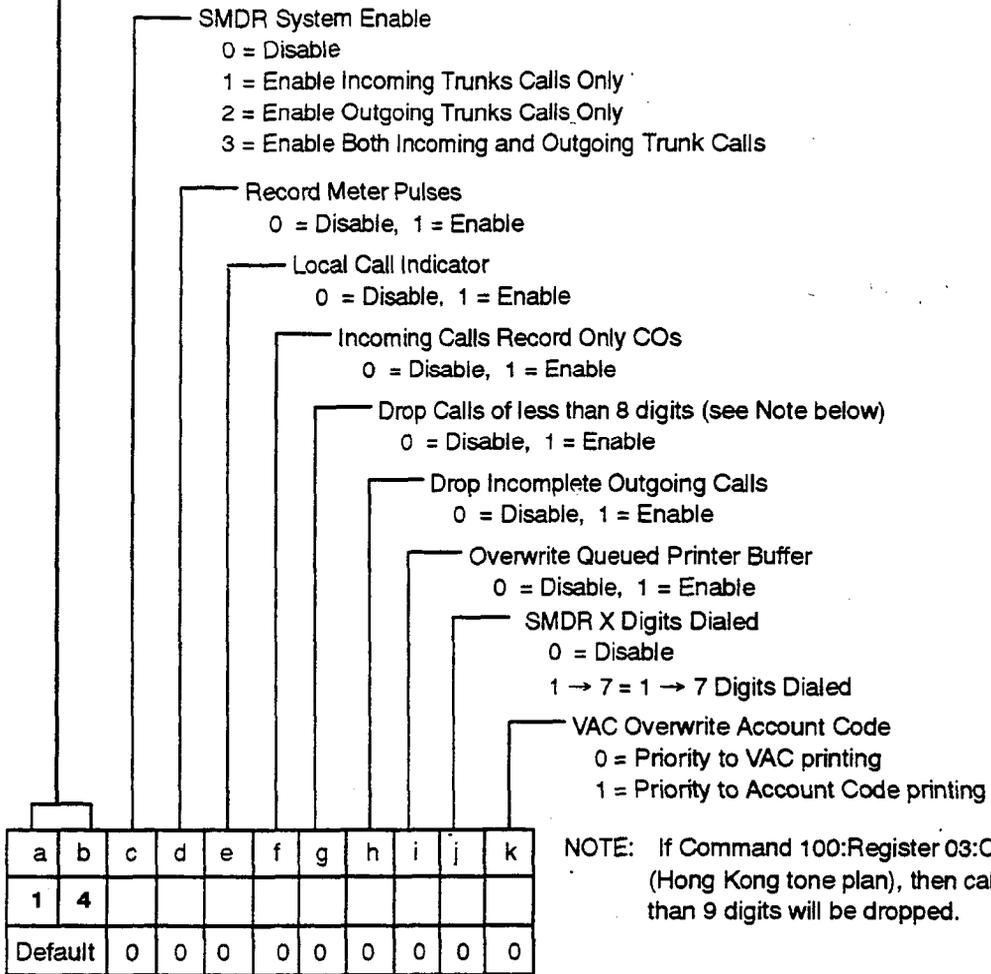
## Card Configurations

- 4.4 Peripheral cards can be installed in slots one through ten. The *SX-50* is virtually a non-blocking DPABX. For optimum performance under heavy traffic conditions, it is suggested that the cards be installed in the following order:
1. Starting at Slot One (1) and proceeding to the right, install the DNIC Line Cards.
  2. Install the COV Line Cards immediately to the right of the DNIC Line Cards.
  3. Install the ONS or OPS Line Cards immediately to the right of the COV Line Cards.
  4. Starting at Slot Ten (10) and proceeding to the left, install the LS/GS and DID Trunk Cards.
  5. Install any Universal Cards in the remaining slots.

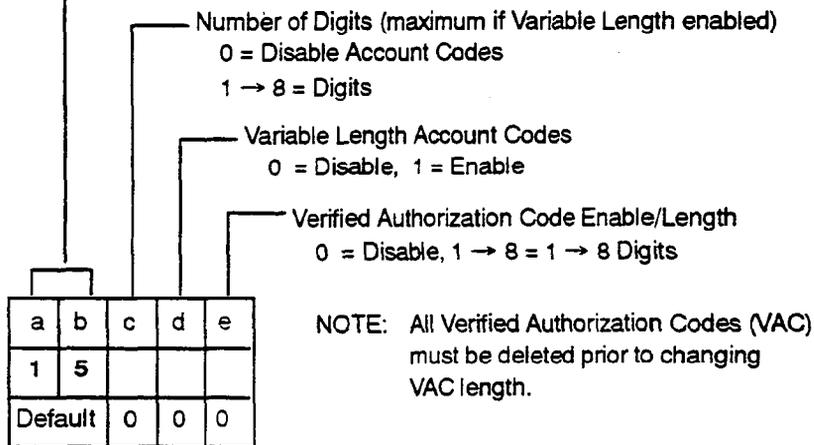
**COMMAND 100**

**SYSTEM OPTIONS PROGRAMMING**

**Register 14 SYSTEM MESSAGE DETAIL RECORDING (SMDR)**

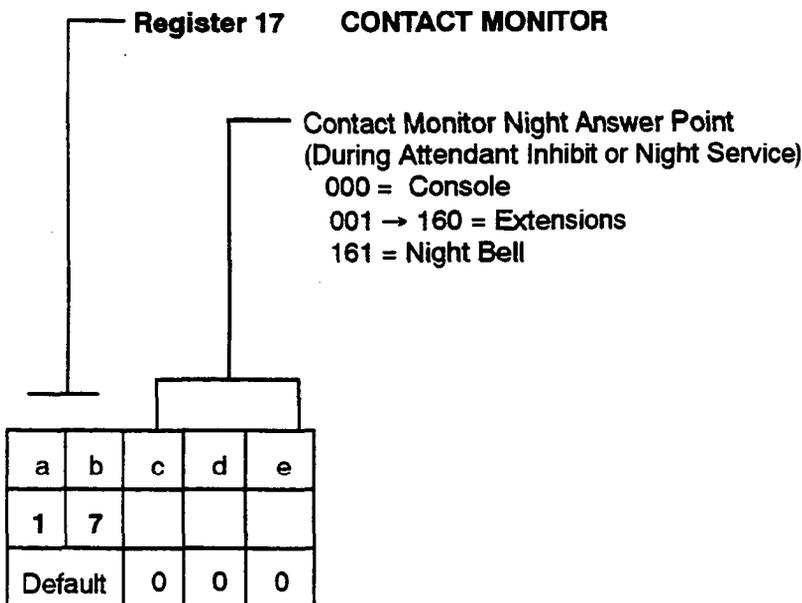
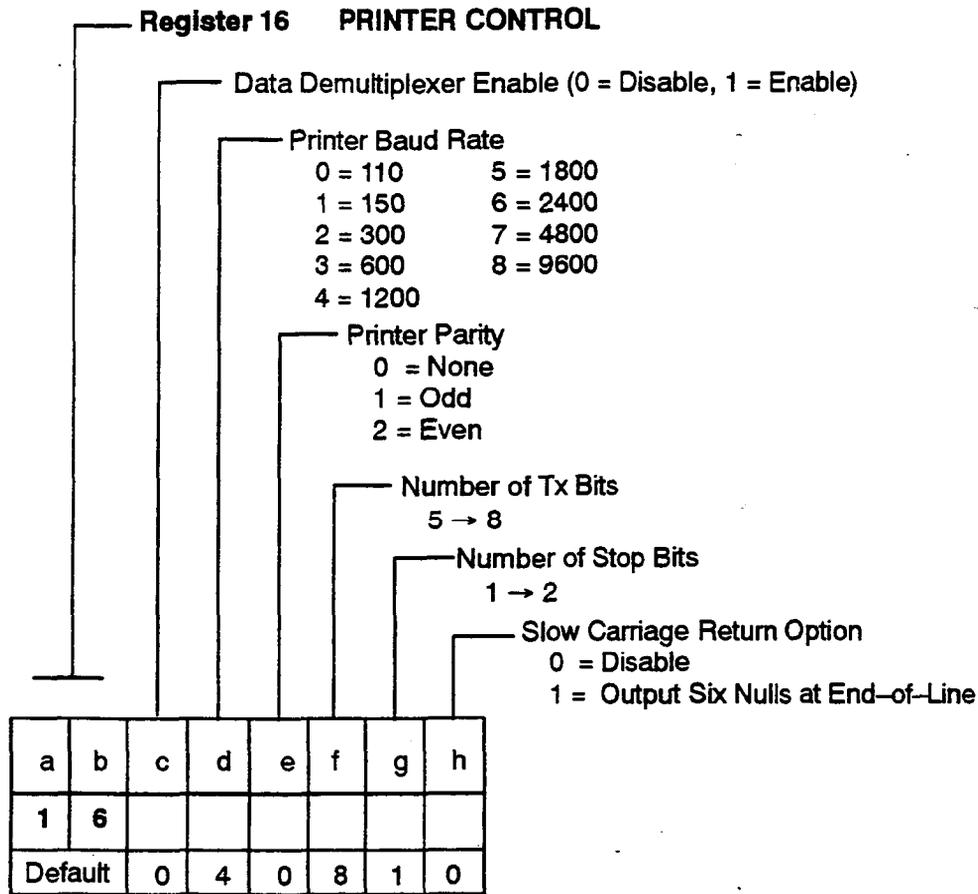


**Register 15 ACCOUNT CODE CONTROL**



**COMMAND 100**

**SYSTEM OPTIONS PROGRAMMING**



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## Automatic Ringdown Circuit

---

- Description** This feature allows an extension designated as a Ringdown Circuit to be programmed into one of 10 circuit groups. When an Automatic Ringdown Circuit extension goes off-hook, the SX-50 system automatically dials a preprogrammed number (internal or external). There are three types of Automatic Ringdown Circuit groups, as follows:
- **Automatic Ringdown Circuit Group 0 signals the attendant.** This group acts as a Housephone. See MANUAL LINE in this Section for more information.
  - **Automatic Ringdown Circuit Group 1 acts as a Contact Monitor.** See CONTACT MONITOR in this Section for more information.
  - **Automatic Ringdown Circuit Groups 2 → 9 signal the destination programmed in Abbreviated Dial numbers 12 → 19 (102 → 109), respectively.** See HOTLINE in this Section for more information.
- Conditions**
- Automatic Ringdown Circuit Groups 0 and 2 → 9 require Automatic Ringdown Circuit to be enabled in their Class of Service (Commands 121 → 129, Register 2, field d).
  - Automatic Ringdown Circuit Groups 2 → 9 automatically dial the attendant if the corresponding Abbreviated Dial number (102 → 109) is invalid.
  - The flash feature is disabled on Automatic Ringdown Circuit extensions, therefore these extensions cannot place a call on hold.
- Programming**
- See CONTACT MONITOR, HOTLINE and MANUAL LINE in this Section.
- Operation**
- See CONTACT MONITOR, HOTLINE and MANUAL LINE in this Section.

---

## Automatic Route Selection and Toll Control

---

**Description** Automatic Route Selection controls the routing and connection of a call based on the number dialed, the time of day, route availability, cost and the user's toll restriction. Toll Control denies an extension the ability to make certain calls. The system activates denials on the receipt of the toll supervision, and on the actual digits dialed. For details, refer to Section 9104-091-220-NA, Automatic Route Selection and Toll Control.

- Conditions**
- Automatic Route Selection and Toll Control is dependent on:
    1. Class-of-Service Programming
    2. Trunk Group Programming
    3. Trunk Programming
    4. ARS Digit Comparison Table Programming
    5. ARS Time-of-Day Lists Programming
    6. ARS Route Priority Programming
    7. ARS Route Table Programming
    8. ARS Digit Modification Table Programming
    9. Routing Class of Service (RCS) (Extension Programming).
  - For information on toll fraud prevention, see the appendix in this section.

**Programming** • Refer to Section 9104-091-220-NA, Automatic Route Selection and Toll Control.

**Operation** None.

---

**Hotline**

---

**Description** This feature allows an extension designated as an Automatic Ringdown Circuit to be programmed into one of 10 Hotline groups. When a Hotline extension goes off-hook, the SX-50 system automatically dials a preprogrammed number (internal or external).

Hotline Groups 2 → 9 signal the destination programmed in Abbreviated Dial numbers 12 → 19 (102 → 109), respectively.

See AUTOMATIC RINGDOWN CIRCUIT in this Section for more information.

**Conditions**

- Do not program port # 1 as a Hotline.
- Hotline Groups 2 → 9 require Automatic Ringdown Circuit to be enabled in their Class of Service (Commands 121 → 129, Register 2, field d).
- Hotline Groups 2 → 9 automatically dial the attendant if the corresponding Abbreviated Dial number (102 → 109) is invalid.
- The flash feature is disabled on Hotline extensions, therefore a Hotline extension cannot place a call on hold.

**Programming** Commands 121 → 129, Class of Service Programming, Register 2:

- Set Automatic Ringdown Circuit (field d) to 1 (Enable) for Hotline Groups 2 → 9.

Commands 301 → 310, Extension Programming, All Registers:

- Set Extension Type (field c) to 2 → 9 (Hotline Groups 2 → 9). Default is 0 (Extension).

For Hotline Groups 2 → 9, program Abbreviated Dial numbers 102 → 109 as required. Refer to ABBREVIATED DIALING in this Section.

**Operation**

- Lift handset. The call is rerouted to the preprogrammed hotline destination.

---

## Hunt Groups

---

**Description** This feature defines a group of extensions as a Hunt Group and assigns them a Hunt Group Access Code. A call to a Hunt Group connects to the first idle extension in the group. There can be a maximum of six Hunt Groups of eight extensions defined; each with a unique access code. Alternatively, Hunt Groups can be linked to form larger Hunt Groups for a maximum configuration of one group of 48 extensions. Two types of hunting are provided: Circular and Terminal Hunting.

Circular Hunting starts at the extension after the last extension in the Hunt Group to which a call was completed. Hunting performs in the sequence programmed and stops at the first idle extension found.

Terminal Hunting starts at the first extension in the Hunt Group and terminates at the first idle extension found. Hunting takes place in the order in which extensions were programmed into the Hunt Group.

A Class of Service option (Hunt Group Login) allows extensions assigned as Hunt Group members to be included or excluded from the group by dialing an access code. If a Hunt Group has no members logged in, trunk calls are rerouted to LDN1. Internal Calls receive reorder tone.

- Conditions**
- A call can camp on to a busy Hunt Group.
  - Extensions can forward to a Hunt Group, but any forwarding in effect on the extensions in that Hunt Group is ignored; i.e., calls can be forwarded once only.
  - A maximum of six independent Hunt Groups can be defined with eight directory number entries each.
  - Hunt Groups can be linked, but the last Hunt Group cannot be linked to the first Hunt Group; i.e., a closed loop of Hunt Groups cannot be formed.
  - When Hunt Groups are linked, the linked Hunt Group inherits the characteristics of the master Hunt Group.
  - An extension number can be entered more than once in any or all Hunt Groups.
  - Direct-In Lines can be directed to a Hunt Group. Refer to the Conditions detailed under DIRECT-IN LINES in this Section.
  - The Attendant cannot be assigned to a Hunt Group.
  - Invalid extension numbers assigned to a Hunt Group are ignored.
  - If a Hunt Group member has Do Not Disturb (DND) activated, the set is considered busy and does not receive calls. If all members have

DND activated, internal calls receive Do Not Disturb tone. Trunk calls go to LDN1.

- The last member to log out of a hunt group receives a short warning tone. On a *SUPERSET 4* or *SUPERSET 420* telephone the LCD shows "LAST MEMBER"; followed by "HUNT GRP LOGOUT".
- If all members are logged out, internal calls to the Hunt Group receive reorder tone. Trunk calls go to LDN1.
- A trunk programmed as a Direct-In Line to a Hunt Group will ring the Attendant on LDN1 if all members are logged out.
- A *SUPERSET 4* or *SUPERSET 420* telephone can login/logout the prime line by dialing the login/logout code on any Key, Multicall or Personal Outgoing Line appearance on the set.
- Clear All Features has no effect on hunt group logins and logouts.
- A Hunt Group member's log in/log out status is restored after a power failure.

**Programming** Commands 361 → 366, Hunt Groups 1 → 6, Extension Hunt Group Programming, Register 1:

- Type of Hunting (field b) must be set to 0 (Circular) or 1 (Terminal). Default is 0.
- If the Hunt Group is linked to another Hunt Group, then assign Hunt Group Linking (field c) to one of the six Hunt Groups 1 → 6. Default is 0 (Unlinked Hunt Group).

Commands 361 → 366, Hunt Groups 1 → 6, Extension Hunt Group Programming, Registers 2 → 9:

- Assign the required extension numbers (fields b, c, d, e) in each of the eight registers for each of the Extension Hunt Groups.

Commands 110, Feature Access Codes, Registers 19 → 24:

- Assign required 1-, 2-, 3- or 4-digit Hunt Group Access Codes. Default is 491 (Hunt Group 1) → 496 (Hunt Group 6).

### Log-in Hunt Groups

Command 110, Feature Access Codes, Register 34:

- Set Hunt Group Login/Logout Access Code (fields c through f) to the desired access code. Default is 64.

Commands 121 → 129, COS 1 → COS 9 Programming, Register 7:

- Set Hunt Group Login (field g) to 1 (Enable). Default is 0 (Disable).

**Operation**

- Any extension in a Hunt Group can be accessed directly by dialing the extension number. If the extension is busy, hunting does not occur.

- If an extension dials a Hunt Group Access Code in which all extensions are busy, busy tone is returned.
- If the attendant or an extension transfers a trunk call to a Hunt Group in which all extensions are busy, the trunk call camps on to the Hunt Group. The caller hears silence or (if provided), Music on Hold.

### **Log-in Hunt Groups**

#### **To Log In:**

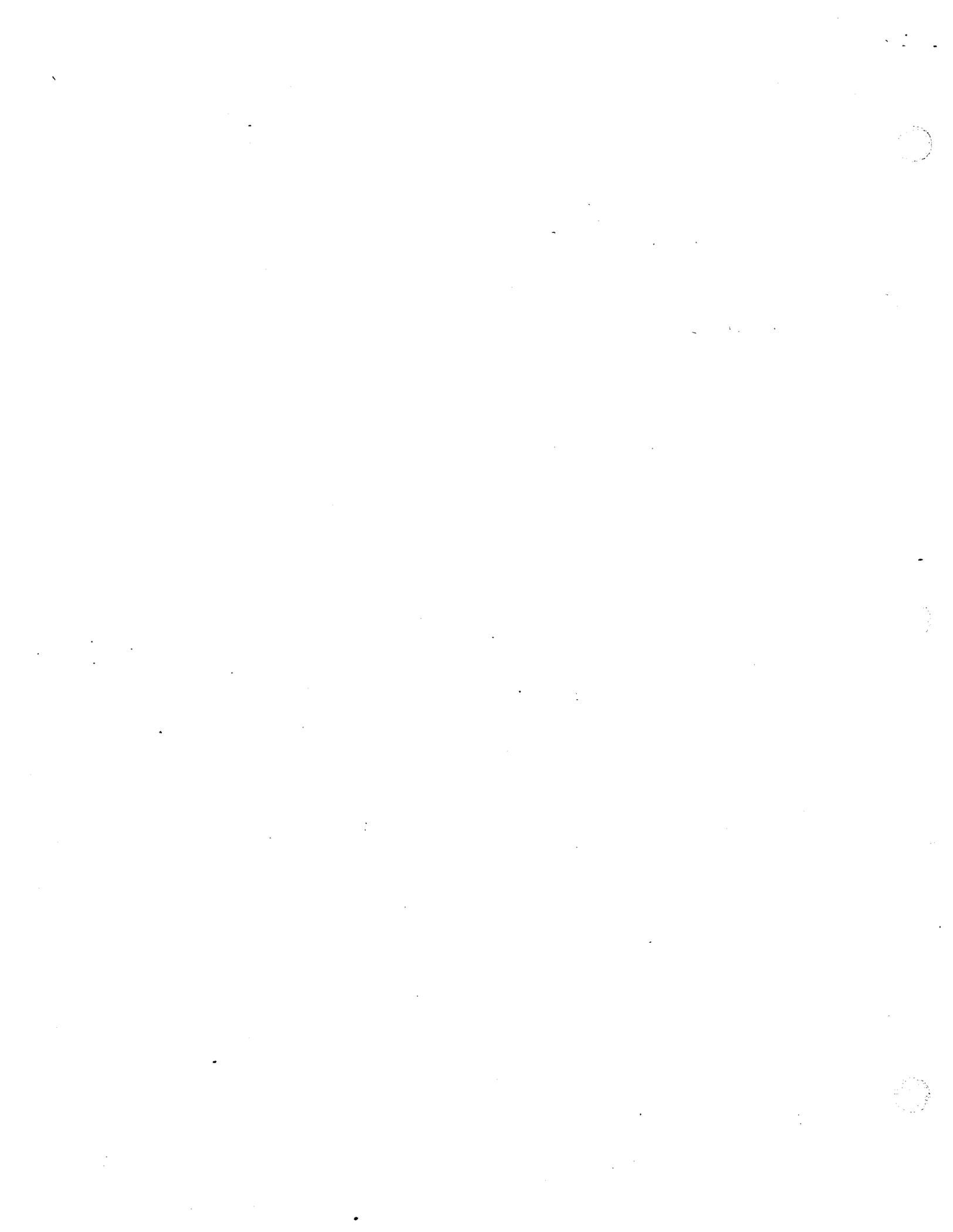
- Lift Handset. Dial tone is returned. (This step not required at *SUPERSET* telephones).
- Dial the Hunt Group Login/Logout access code. Five bursts of dial tone are returned, followed by dial tone.
- Hang up.

#### **To Log Out:**

- Lift Handset. Dial tone is returned. (This step not required at *SUPERSET* telephones).
- Dial the Hunt Group Login/Logout access code. Dial Tone is returned.
- Hang up.

## Hunt Group Rerouting

<b>Description</b>	This feature, when enabled, allows an call incoming which is transferred to a hunt group and is not answered within the programmed time, to be rerouted to a preprogrammed destination.
<b>Conditions</b>	<ul style="list-style-type: none"> <li>• The System Timed Recall No Answer timer will determine the reroute time.</li> <li>• A destination must be preprogrammed in the corresponding Abbreviated Dial number if hunt group rerouting is enabled in the Class of Service.</li> <li>• When hunt groups are linked, rerouting will follow the master hunt group.</li> <li>• If the Camp-on recall timer is less than the hunt group reroute (RNA) timer, the call will not reroute, but will recall to the originator.</li> <li>• The reroute destination can be a directory number, a hunt group or a ring group.</li> <li>• Rerouting must be enabled in the first member of the Hunt Group's COS.</li> </ul>
<b>Programming</b>	<p>Command 121–129, Class of Service Options, Register 6:</p> <ul style="list-style-type: none"> <li>• Enable Hunt Group Rerouting (field b) set to 1 (enable). Default is 0 (disable).</li> </ul> <p>Command 100, System Options, Register 11:</p> <ul style="list-style-type: none"> <li>• Select desired time, field d, 1–7 (10–70 seconds). Default is 30 seconds.</li> </ul> <p>For Hunt Groups 1–6, program Abbreviated Dial numbers 61–66 (601–606) as required. Refer to <i>Abbreviated Dial</i> in this section.</p>
<b>Operation</b>	None



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## Manual Line

---

**Description** This feature allows an extension designated as an Automatic Ringdown Circuit to be programmed as a Manual Line. When a Manual Line extension goes off-hook, the SX-50 system automatically dials the Attendant.

A manual line is typically used as a security phone or lobby phone. Dial tone is not provided. The extension receives calls normally.

See AUTOMATIC RINGDOWN CIRCUIT in this Section for more information.

- **Conditions**
- Do not program port # 1 as a Manual Line.
  - Manual Line and all features requiring call origination are mutually exclusive.

**Programming** Commands 121 → 129, COS 1 → COS 9 Programming, Register 2:

- Automatic Ringdown Circuit (field d) must be set to 1 (Enable). Default is 0 (Disable).

Command 301 → 310, Extension Programming:

- Leave Extension Type (field c) at its default value, 0 (Extension).

**Operation**

- Lift the handset – the extension rings the Attendant Console.

---

## Message Register Audit

---

**Description** When this feature is enabled, the Attendant can print out the contents of the Message Registers and optionally clear them. The printout consists of several lines. The first line is the Message Register Audit header and has the following format:

**MM/DD hh:mm ROOM REGISTER**

- **MM/DD** – month and day
- **hh:mm** – time-of-day (24-hour clock)
- **hh:mmP** – time-of-day (12 hour clock, PM).

The remaining lines are of the same format. They provide the extension number and its Message Register contents as follows: **nnnn – xxxx** (repeated four times across the page), where **nnnn** is the extension number and **xxxx** is the contents of the Message Register.

**Conditions** • A printer is required; refer to **PRINTER PORT** in this Section.

**Programming** Command 100, System Options, Register 10, Features Selection 2:

- Message Register Audit (field e) must be set to 1 (Enable) or 2 (Enable With Clearing of Message Registers). Default is 0 (Disable).

**Operation**

- Dial the Attendant Function Access Code (71 or \*) or press the **FUNCTION** key.
- Dial Attendant Function 73.
- The system outputs the contents of the Message Registers to the printer and clears them (if enabled).

---

**Personal Outgoing Line**

---

- Description** This feature enables a *SUPERSET 4*, *SUPERSET 410*, or *SUPERSET 420* telephone user to access a specific trunk directly via a Line Select key. This line can be used for outgoing calls.
- Conditions**
- Conversations on the Personal Outgoing line are private, but a call on a Personal Outgoing line can be transferred, conferenced, swapped or split.
- Programming** Commands 401 → 480, *SUPERSET* Telephone 01 → 80 Programming, Register = Line Key Number:
- Line type must be set to Personal Outgoing Line (field c = 7). When the line type is set to 7, fields d → g are set automatically to 00, plus the extension number.
- Operation**
- Lift the handset.
  - Select the Personal Outgoing line key – dial tone is returned.
  - Dial the Trunk Group Access code.
  - Dial the desired access code or directory number.

---

## Pickup Groups

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- Description** This feature assigns an extension to a Pickup Group and permits the extension to answer any call directed to any extension in that Pickup Group by dialing the Dial Call Pickup Access Code.
- Conditions**
- A maximum of seven Pickup Groups are permitted per system.
  - This feature cannot be originated by an extension with a call on Consultation Hold. In this case, if a pickup is attempted, then the originating extension receives reorder tone and must flash the switchhook to return to the held call.
- Programming** Command 110, Feature Access Codes, Register 06:
- Assign the Dial Call Pickup Access Code. Default is 54.
- Commands 301 → 310, Slots 1 → 10, Extension Programming:
- Assign the Pickup Group (field f) (1 → 7). Default is 1 (Pickup Group 1).
- Operation**
- Refer to CALL PICKUP in this Section.

---

## Power Failure Restart

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- Description** Customer data is stored in the Random Access Memory (RAM). In the event of a commercial power failure, this data is preserved by a Lithium Battery. Refer to CDE BATTERY BACKUP in this Section. The SX-50 system automatically returns to normal operation when commercial power is restored. The correct date is maintained, however, the time flashes at the time that power went down.
- Conditions** None.
- Programming** None.
- Operation**
- Refer to the Attendant Console User Guide, PN 9104-953-101-NA.

- Printer Slow Carriage Return Option (field h) must be set to 0 (Disable) or 1 (Output 6 Nulls at End-of-Line). Default is 0.

### Operation

- Connect the printer to the RS-232 Port (Printer Port) on the Control Card/Control Card 2 (MCC2). Refer to Section 9104-091-200-NA, Shipping, Receiving and Installation Information.

#### To Suspend the Printer:

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 75 and \*.
- The printer is suspended. When the printer is suspended, SMDR and Automatic Wake-Up could fill up the queues for the printer.
- If the Printer Queue is full, no trunk calls requiring SMDR are permitted and no Automatic Wake-up calls are made. Also, the system raises an alarm to indicate that the Printer Queue is full.

#### To Resume Printing:

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 75 and #.
- The printer continues printing where it left off and prints records found in the Printer Queue.

#### To Suspend the Printer and Purge the Queues:

- Dial the Attendant Function Access Code (71 or \*) or press the FUNCTION key.
- Dial Attendant Function 75 and 0 (the system purges the Printer Queue and suspends the printer).

---

## Privacy Release

---

**Description** Several *SUPERSET* telephones can have appearances of the same line. However, conversations on these line appearances are private; another set with an appearance of the same line cannot enter the conversation. If required, a *SUPERSET 4* or *SUPERSET 420* telephone using the line can permit other appearances to join the conversation by activating the Privacy Release feature.

**Conditions**

- Privacy Release is effective only on *SUPERSET* line appearances. It has no effect on Executive Busy Override.

**Operation** *SUPERSET 4* Telephones

During an established call:

- Press the PRIVACY REL softkey.

Another *SUPERSET* user with an appearance of the same line can now enter the conversation by pressing the appropriate Line Select key.

*SUPERSET 420* Telephones

During an established call:

- Press the Superkey key, to select the programmable features menu. The LINE PRIVACY? feature appears on display.
- Press the Yes softkey. The PRIVACY RELEASE prompt appears on display.
- Press On/Off to select state desired.

# Appendix A

## NOTES ON TOLL FRAUD

### General

- A.1 The *SX-50* PABX Customer Data Entry (CDE) Command registers contain programming parameters that allow for highly customized and flexible toll restriction applications. However, incomplete or careless programming can allow for the possibility of toll fraud – unauthorized toll calls by internal or external callers. *SX-50* PABX systems using Direct Inward System Access (DISA), or those interfaced with COV or ONS based voice mail/auto attendant (VM/AA) systems are susceptible to unauthorized users as well.

Precautions can be taken during programming of the *SX-50* PABX system to minimize toll call abuse.

### ARS and Digit Comparison Strings

- A.2 Toll restriction is achieved by analyzing the digits dialed by a user. Therefore, ARS digit strings form the basis of all toll control plans. ARS digit strings are programmed into comparison tables using command 700. The system will route a call by comparing the digits dialed to the digit strings in the digit comparison table and finding the closest match. If no match is found, ARS will route the call on the default trunk group dialed, since the first digit of the string must always be a valid trunk group access code.

You should be as explicit as possible with the ARS digit strings. For example, use entries of 91NX rather than simply 91, where N is a digit 2 to 9 and X is a digit 0 to 9. After all of the 91NX entries are input, enter 91 by itself at the end and do not program a route list in the time of day table associated with this entry. In this way ARS will not time-out and route the call. Time of day tables are found in CMD 701 to 745. Similarly, ten entries of the form 9X should be created to cover all local long distance dialing. More digits may be required for each entry, depending on the application.

- A.3 An effective way to ensure that calls will be blocked if the ARS digit strings are incomplete and the system cannot find a match is as follows. Use only leading digit 9 in the digit comparison table.

Program 9 as the access code for trunk group 1. Do not program any trunks in trunk group 1. Program the trunks in the trunk groups 2 through 6 as necessary. Restrict all users from all trunk group access in their class of service. When a user dials an external number resulting in a match in the digit comparison table, the call will route according to the programmed route lists. If there is no match, then the call will route on the default trunk group dialed (trunk group 1, access code "9"). However, the call will be blocked because there is no access to trunk group 1, and there are no trunks in the group.

## **"ARS Routing" Class Of Service**

- A.4 Any device in the system that can listen to dial tone such as stations, Dial-in trunks or DISA trunks, should be programmed with a Routing Class of Service (RCS). The RCS is used in the ARS time of day tables to either route or block calls depending if a route list is specified. If no route list is specified, the call is blocked. It is also possible to assign the attendant console an RCS.

## **Verified Authorization Codes**

- A.5 Verified authorization codes (VAC) are available with software Generic MS53/54 and later. A VAC can be associated with a certain COS and RCS in CMD 600. When a user dials a VAC, the device he is using acquires that COS and RCS. This can be useful in toll restriction applications such as special DISA.

**Note:** the more digits used in an account code, the more combinations possible. Therefore, it is best to use VAC codes of eight digits in length to make it less likely that unauthorized users will discover the code by trial and error.

## **DISA and Dial-In Trunks**

- A.6 A DISA application offers the greatest potential for unauthorized use by external callers. Each DISA trunk should have an RCS assigned. Consideration should be given to toll restriction for all DISA trunks. The trunk also has a class of service, and outgoing trunk access can be denied completely. Also, entry of a verified account code can be required before trunk access is allowed, or toll calling is permitted. This is possible because a COS and RCS are associated with the VAC. This functionality is known as Special DISA. A Dial-in trunk, such as an E & M tie trunk quite often presents a caller with dial tone. A Dial-in trunk should be assigned a COS and an RCS in CMD 5XX Register 1, bits E and H, so that it can be directly prevented from dialing out on another trunk. A VAC could be entered to allow specific users to acquire outgoing access.

## **ONS or COV Interfaced Voice Mail / Automated Attendant Systems**

- A.7 Toll control should be considered for any voice mail/auto attendant peripheral system that may be connected to the SX-50 PABX. Many of these types of systems perform a blind transfer based on any digit sequence dialed by the incoming trunk. This could result in long distance calls being made via the VM/AA ports if they are not toll restricted. VM/AA ports should be treated in the same manner as a regular subscriber port.

If the VM/AA system requires station ports looped back to trunk ports for message sending, there is the possibility of the incoming trunk obtaining dial tone when the VM/AA port hangs up. In software Generic MS53/54 and later, this is controlled by the "Disconnect Tone" options in CMD 100, register 3, bit h, i, and j, and in COS programming "Voice Mail Port", register 3 bit k. Any port used in this fashion should be

completely toll restricted, and should have the minimal COS options enabled. Software Generics MS50 and MS51 do not have the capability of returning dial tone when a station port hangs up.

### System Abbreviated Dial

- A.8 In the SX-50 PABX, system abbreviated dial (speed call) can be programmed to bypass ARS. By default, speed call will use ARS and therefore toll restriction can be applied based on the digit sequence. Access to abbreviated dial is controlled by COS options.

Abbreviated dial entries using manually inserted digits should be used with caution. Specifically, a speed call entry consisting entirely of manually inserted digits in the form 93XX could potentially bypass all toll restriction imposed by ARS, depending on the digits dialed. Abbreviated dial entries of this form should be avoided.

### Passwords and RMATS

- A.9 All SX-50 PABX systems that have modems connected for RMATS dial up access should have the system security code changed from the default 7772. Likewise, the RMATS security code should be changed from the default. Precautions should also be taken to prevent internal users from accessing CDE. This can be done by changing the user security code and by setting switch 1 on the control card to open (read only).



## 2.

**CONFIGURATION LIMITS****General**

- 2.1 The SX-50 system is designed to support typical PABX applications within the following limits:

Up to 160 lines, which can be

- ONS Lines : 16 per slot, up to 160 if slots are available
- OPS Lines : eight per slot, up to 80 if slots are available
- DNIC Lines: eight per slot, up to 32 if slots are available
- COV Lines : eight per slot, up to 64 if slots are available

**Note:** The combined total number of COV and DNIC line cards must not exceed eight.

Up to 32 trunks, which can be

- LS/GS Trunks : 8 per slot, up to 32 if slots available
- E&M Trunks : 4 per slot, up to 32 if slots available
- DID Trunks: 8 per slot, up to 16 if slots available

No more than 9 Universal Cards (if slots available), total of 34 modules. Module types are:

- E&M Trunk Module
- RMA Module (1 per system)
- MOH/Pager Module (1 per system)

**Note:** An MOH/Pager Module is ignored by software if the Control Card 2 (MCC2) is installed in the SX-50 system.



**COMMAND 100 System Options Programming (Cont'd)****Automatic Route Selection (ARS)**

a	b	c	d	e	f	g	h	i	j
1	3	0	0	0	0	0	0	1	0

a,b: Register Number

0 = Disable

1 = Enable

c: ARS Enable

0 = Disable

1 = Enable

d: ARS Attendant Bypass

0 = Disable

1 = Enable

e: ARS Alarms

0 = Disable

1 = Enable

f: ARS Return Dial Tone

0 = Disable

1 = Enable

g: Expensive Route Warning Tone

0 = Disable

1 = Enable

h: Attendant ARS Routing Class of Service (RCS)

0 = ARS Does Not Apply

1 = RCS1

2 = RCS2

3 = RCS3

i: ARS Interdigit Timeout

0 = 5 seconds

1 = 10 seconds

j: Abbreviated Dial ARS Bypass Enable

0 = Disable

1 = Enable

**COMMAND.100 System Options Programming (Cont'd)**

**System Message Detail Recording (SMDR)**

a	b	c	d	e	f	g	h	i	j	k
1	4	0	0	0	0	0	0	0	0	0

a,b: Register Number

c: SMDR System Enable  
 0 = Disable  
 1 = Enable Incoming Trunks Calls Only  
 2 = Enable Outgoing Trunks Calls Only  
 3 = Enable Both Incoming and Outgoing Trunk Calls

d: Record Meter Pulses

e: Long Call Indicator  
 0 = Disable  
 1 = Enable

f: Incoming Calls Record Only COs  
 0 = Disable  
 1 = Enable

g: Drop Calls Of Less Than 8 Digits (see note).  
 0 = Disable  
 1 = Enable

**Note:** If Command 100: Register 03:C is set to 1 (Hong Kong tone plan), then calls of less than 9 digits will be dropped.

h: Drop Incomplete Outgoing Calls  
 0 = Disable  
 1 = Enable

i: Overwrite Queued Printer Buffer  
 0 = Disable  
 1 = Enable

j: SMDR X Digits Dialed  
 0 = Disable  
 1 → 7 = Last 1 → 7 Digits Dialed

**Note:** This field applies to outgoing calls only.

k: VAC Overwrite Account Code  
 0 = Priority to VAC printing  
 1 = Priority to Account Code printing

**Digit Modification Table Entry:** These fields list the DMT Entry Number for the Route. Valid entries are 001 to 100. An entry of 000 indicates a nonprogrammed route.

**Toll Calls:** This field is used by the Account Code Bypass feature to determine whether a call is a toll or non-toll call. Valid entries are 0 (Non-Toll Calls) or 1 (Toll Calls). Default is 0.

ARS Digit Modification Table (Command 752)

DMT Entry Number Fields a,b,c	No. of Digits to Delete Fields d,e	Field f [	Digits to Insert Fields g → l	Field m ]
001	1	[	55539331234567	]
002	1	[	1	]
003	11	[	0	]
↓		[		]
100	0	[		]

There is a maximum of 100 Digit Modification Table (DMT) entries. The Register Number is the Entry Number, which is referenced from the Route Table. Each DMT Entry defines how many digits are to be deleted from the dialed digit string and what digits are then to be added. (The first digit entered is the first deleted).

The fields which comprise the Digit Modification Table are described below.

**DMT Entry Number:** This nonprogrammable field is the DMT Entry Number.

**No. of Digits to Delete:** This field lists the number of digits the system deletes from the dialed digit string. Valid entries are 0 to 12.

**Digits to Insert:** This field lists the digits that the system prefixes to the dialed digit string after the specified digit deletion has occurred. Included in the modifying digits are the PAUSE and WAIT FOR DIAL TONE characters. The system accepts a maximum of 20 digits per DMT Entry Number.

Associated with this form are two softkeys that perform special functions:

- **VIEW:** Pressing the VIEW softkey scrolls the digit string display one digit to the left. By repeated presses of this key, the user can view the entire 20-digit string.
- **DELETE:** Pressing the DELETE softkey deletes the digit string digits from the current position to the end of the digit string.

These soft keys appear when the first digit of the digit string is entered:

- **PAUSE:** Pressing the PAUSE softkey or dialing \*7 inserts a 5-second pause in the digit string (dialing \*8 inserts a 1-second pause). The Attendant Console LCD shows the P character for each 5-second pause, and a p character for every 1-second pause.
- **WFDT:** Pressing the WFDT softkey or dialing \*6 halts the outpulsing of the digit string until Dial Tone is returned. The Attendant Console LCD shows the W character each time the WFDT softkey is pressed.

## 6.

## ARS OPERATION

### General

- 6.1 Programming of Automatic Route Selection (ARS) requires a definition of the customer's needs and knowledge of the relative cost of the available trunk routes based on the route type, destination and time of day.

### Programming ARS

- 6.2 In general, the ARS programming process follows this plan:
1. **Determine the customer's needs.** The customer specifies which call destinations and trunk route types will be permitted to which users. On this basis, the programmer assigns the users to the three Routing Classes of Service (RCS). The RCS of the user will determine which Route List ARS selects for a particular dialed digit string. (Refer to Section 9104-091-210-NA, Customer Data Entry: Command 100, Register 13, Commands 301 → 310, Station Programming, and Commands 501 → 580, Trunk Programming, Register 1).
  2. **Determine the customer's facilities.** The programmer must know the types of trunks (e.g., Central Office, Tie Trunk, Foreign Exchange Trunk) and trunk routes (e.g., Other Common Carrier) the customer has available. (Refer to Section 9104-091-210-NA, Customer Data Entry: Commands 501 → 580, Registers 1 → 5).
  3. **Define Time Periods (i.e., when rates vary), Route Lists, Routes and Modified Digit Strings.** Refer to Section 9104-091-210-NA, Customer Data Entry:  
Commands 701 → 745 (ARS Time-of-Day Programming),  
Command 750 (ARS Route List Programming),  
Command 751 (ARS Route Programming),  
Command 752 (ARS Digit Modification Programming).
  4. **Define the Comparison Digit Strings in Command 700, ARS Digit Comparison Programming.** This digit string is most important, since it forms the link between what the user dials and which route is selected.

### ARS Table Programming

- 6.3 Complete the Digit Modification Table. This table determines which digits the system outpulses, and which digits the system absorbs. For example, if the Trunk Access Code 9 will not be outpulsed, then this table should instruct the system to absorb the leading digit 9 from any digit string. Similarly, if long-distance DDD calls are

permitted, then this table should instruct the system to insert the digit 1 into the digit string, after the digit 9 has been deleted.

Once the Digit Modification Table (DMT) has been completed, program the Route Table. For each Route, enter the appropriate Trunk Group number and the DMT Entry number that applies.

Once the Route Table has been completed, enter the Route Numbers (in the preferred order) in the Route List Table. Valid entries include 001 to 100 and a Route Number of 000 indicates a nonprogrammed route. The system accepts a maximum of four Route Numbers for each Route List Number.

Once the Route List Table has been completed, fill in the Time-of-Day Table. There are 45 Command Numbers in the Time-of-Day Table. Each one is called a Time-of-Day List. Enter the time periods and Route List numbers in the Time-of-Day Lists so that calls will be directed to the Route List that provides least cost routing for their time of day. If there is only one Time Period entered, it applies for the whole day. The Route Lists Numbers are entered in three columns; one for each Routing Class of Service. Valid Route List Numbers are 001 to 200.

When the Time-of-Day Table is complete, fill in the Digit Comparison Table. At each line (Entry Number) in the Digit Comparison Table, enter a digit string and the Time-of-Day List number that applies to the call. The following order is recommended:

1. Directory Numbers and local Office Codes,
2. Codes which provide unrestricted access to toll routes (i.e., 0 and 01),
3. Specific toll route codes,
4. Tie Trunks,
5. FX Trunks,
6. WATS Trunks,
7. Calls completed via Other Common Carriers (OCC).

## Station Programming

- 6.4 Stations are assigned an ARS Routing Class of Service in Station Programming. The default RCS of 0 exempts the station from ARS.

Commands 301 → 310, Slots 1 → 10, Station Programming:

The Register number is the Port number on the line card,

Set field g = to the ARS Routing Class of Service.

Block Programming can also be used, if stations will have consecutive numbers, the same COS and the same RCS. See BLOCK PROGRAMMING in Section 9104-091-105-NA.

## Trunk Programming

- 6.5 Like stations, Inward Dial trunks can be assigned an RCS. This is done in Trunk Programming, Commands 501 → 580, Trunks 01 → 80, Register 1, field h = RCS. An RCS of 0 (default) exempts the trunk from ARS.

## System Programming

- 6.6 Finally, ARS must be enabled at system level and the various options chosen. All the following programming is done in Command 100, System Options, Register 13:

**ARS Enable:** Set field c to 1.

**ARS Attendant Bypass:** To allow the Attendant to override ARS, set field d to 1. To operate this feature, the Attendant dials the Trunk Group Access Code (e.g., 9) followed by \*, followed by the number.

**ARS Alarms:** To enable ARS alarms, set field e to 1. This feature is useful when verifying ARS Programming. It warns that the programmer has forgotten to program one of the tables.

**ARS Return Dial Tone:** When enabled (field f = 1), the SX-50 system returns dial tone after the Trunk Group Access Code is dialed. For more information refer to ARS Features Description in this Section.

**ARS Expensive Route Warning:** When enabled (field g = 1), a warning tone is returned if ARS has selected the most expensive route. For more information refer to ARS Features Description in this Section.

**Attendant ARS Routing Class of Service:** Like any other user, the Attendant is assigned to an RCS. Field h should be set to the RCS number (1, 2 or 3). If the Attendant is to be exempt from ARS, leave field h set to 0.

**ARS Interdigit Timeout:** When this time period passes with no more digits being dialed, ARS assumes dialing is complete. By default, the timeout period is 10 seconds (field i = 1). It can also be set to 5 seconds (field i = 0).

**Abbreviated Dial ARS Bypass:** When enabled (field j = 1), Abbreviated Dial numbers are routed directly, not through ARS. This allows ARS-restricted extensions to make selected external and long distance calls via Abbreviated Dial numbers. By default, this option is disabled (field j = 0).



## 7.

## APPLICATION EXAMPLE

### General

7.1 This Part describes the planning and programming of an example ARS application.

### Scenario

7.2 The scenario begins with the first stage of ARS implementation, namely, the data collection and the ARS plan formulation stage. For the purpose of this scenario, a fictitious company is established: Ace Manufacturing Co.

The Ace Manufacturing Co. has three locations; its headquarters in CITY A, a service office in CITY B, and a plant in CITY C. Its major accounts and suppliers are in the CITY D area, and they require international telephone service. The SX-50 system in CITY A requires the ARS programming.

### Assigning Trunk Groups

7.3 In consulting the traffic studies performed by the SX-50 system installation company, it was decided that the DPABX in CITY A would be most cost-effective when connected to the public network via four Trunk Groups and an OCC link. The Trunk Groups are as follows:

- Trunk Group 1: Local Trunks,
- Trunk Group 2: Zone 2 WATS Trunks (covering Area Codes 613, 416, 705, 819 and 514),
- Trunk Group 3: CITY A-to-CITY D FX Trunk,
- Trunk Group 4: Two-way Tie Trunk to the CITY B Office,
- Trunk Group 5: Other Common Carrier account, for calls to the CITY C Plant.

The cost guidelines which apply to these Trunk Groups are:

1. Tie Trunks and FX Trunks are always less expensive than any other Trunk Group.
2. WATS is less expensive than Direct Distance Dialing during the hours of 08:00 through 18:00 Monday through Friday, and 08:00 through 12:00 hours Saturday.
3. OCC is less expensive than Direct Distance Dialing during the hours of 08:00 through 18:00 Monday through Friday and 08:00 through 12:00 Saturday.

The following Office Codes are permitted:

- CITY D: 471, 825, 678,

- CITY B: 786,
- CITY A: All Office Codes
- CITY C: 994.

Refer to Figure 7–1, Trunking Network for details.

### Assigning Routing Classes of Service

- 7.4 The employees at Ace Manufacturing Company's head office in CITY A were separated into the following Routing Classes of Service for Toll Control purposes:
- Routing Class of Service 1 (Executive): The executive level can access all Trunk Groups including the international network.
  - Routing Class of Service 2 (Management): This level can access WATS, FX, Tie, Local Trunks and the OCC office.
  - Routing Class of Service 3 (Technical Staff): This level can access the FX, Tie and Local Trunks.

### Completing the ARS Tables

- 7.5 Set the following options in Command 100, System Options, Register 13, ARS:
- ARS Enable must be set to 1 (Enable). Default is 0 (Disable).
  - ARS Attendant Bypass can be set to 1 or 0, as desired. (See ARS Features Description in this Section).
  - ARS Alarms should be set to 1 (Enable) while programming the routes. After programming, this field should be set to 0 (Disable). Default is 0.
  - ARS Return Dial Tone can be set to 0 or 1, as desired.
  - ARS Expensive Route Warning can be set to 1 or 0, as desired.
  - Attendant ARS Routing Class of Service can be set to 0 (ARS Does Not Apply), 1, 2 or 3 (Routing Classes of Service 1, 2 or 3). Default is 0.
  - ARS Interdigit Timeout can be set to 1 or 0, as desired.
  - Abbreviated Dial ARS Bypass can be set to 1 or 0, as desired.

Since ARS involves trunks and Trunk Groups (both incoming and outgoing), the commands concerning trunks and Trunk Groups (specifically, Commands 151 → 156, Trunk Group Programming and Commands 501 → 580, Trunk Programming), must be completed before filling the ARS Tables.

Specify the members for each Routing Class of Service (RCS) for each device in Commands 301 → 310, Station Programming (or in Commands 341 → 350, COS, Pickup Group and ARS Routing Class of Service – Block Programming).

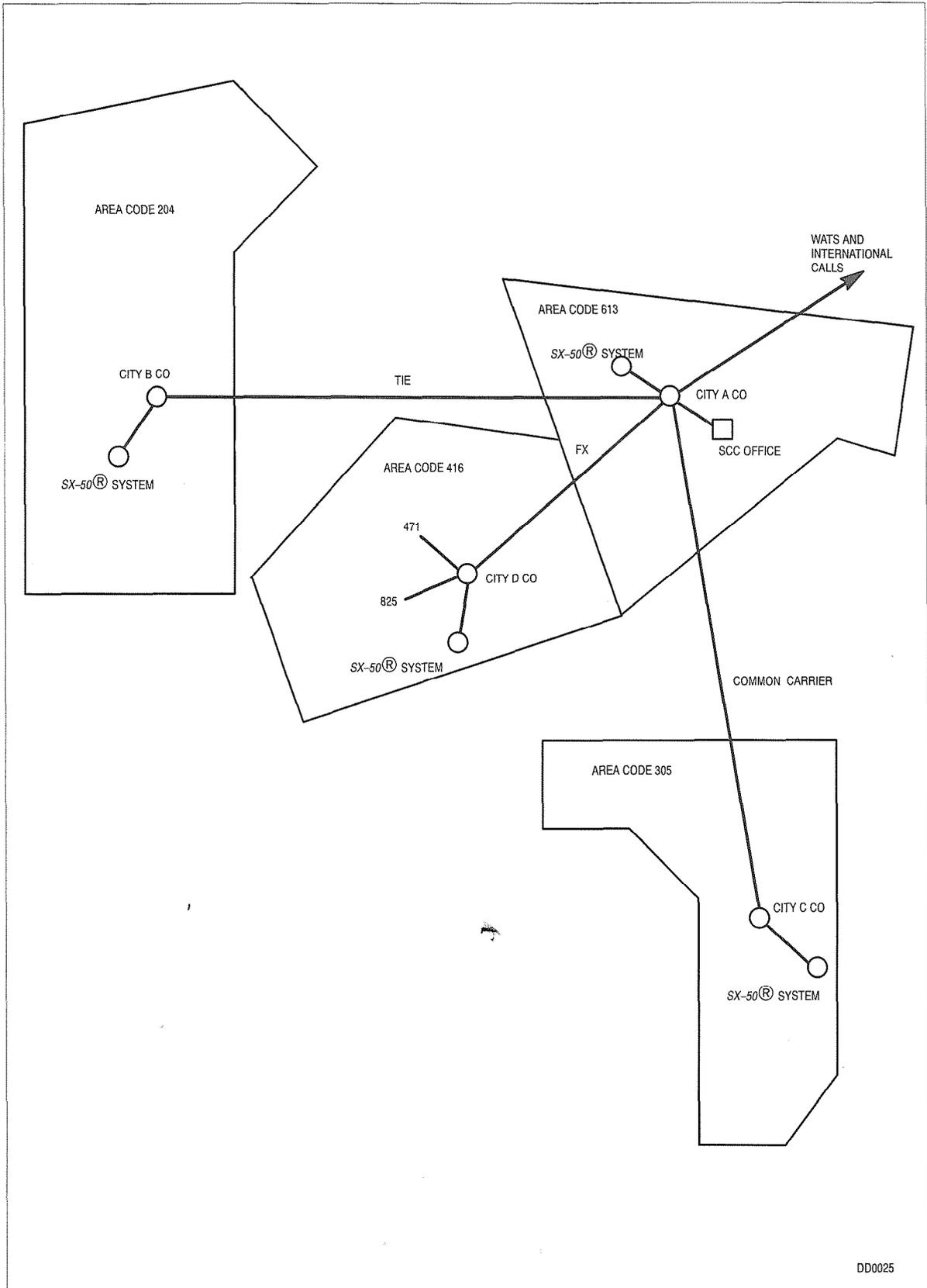


Figure 7-1 Trunking Network

Complete the Digit Modification Table. This table determines which digits the system outpulses, and which digits the system absorbs. For example, if the Trunk Access Code 9 will not be outpulsed, then this table should instruct the system to absorb the leading digit 9 from any digit string. Similarly, if long-distance DDD calls are permitted, then this table should instruct the system to insert the digit 1 into the digit string, after the digit 9 has been deleted.

Since this scenario uses the OCC Network, the Digit Modification Table instructs the system to insert the OCC number (5553933) and Account Code (1234567). The user would then dial a 10-digit telephone number (for this scenario, the office in CITY C). Digit modification need not consider the specific user-dialed digit strings, but the various dialing possibilities MUST be considered.

Valid DMT entries include 001 to 100 and an entry of 000 indicates that the dialed digit string will not be modified.

Once the Digit Modification Table has been completed, enter the DMT Entry Number into the Route Table. Complete the Route Table by entering the correct Trunk Group for each Route Number (refer to Paragraph 7.04, Assigning Trunk Groups).

Once the Route Table has been completed, enter the Route Numbers (in the preferred order) in the Route List Table. Valid entries include 001 to 100 and a Route Number of 000 indicates a nonprogrammed route. The system accepts a maximum of four Route Numbers for each Route List Number.

Once the Route List Table has been completed, enter the Route Number in the Time-of-Day Table according to the time periods (a maximum of six) which best satisfy the changing rates for the various trunk types. Valid Route List Numbers include 001 to 200 and a Time Period entry of 00:00 is considered as one time period for the whole day. The Route List Numbers are entered in three columns; one for each Routing Class of Service.

There are 45 Command Numbers in the Time-of-Day Table. Each one refers to the Time-of-Day List Number in the last ARS table: the Digit Comparison Table.

For each Time-of-Day List number, enter the digit strings in the Digit Comparison Table which are considered valid by the system; i.e., those which satisfy the customer's access to the public network. The following order is recommended:

- Directory Numbers and local Office Codes,
- Codes which provide unrestricted access to toll routes (i.e., 0 and 01),
- Specific toll route codes,
- Tie Trunks,
- FX Trunks,
- WATS Trunks and
- Calls completed via Other Common Carriers (OCC).

## Describing the Contents of the Table Network

- 7.6 The contents of the ARS tables have been completed in accordance with the requirements of the scenario. The order in which they were completed is the order in which they would normally be programmed. Refer to Figure 7–2(a), Table Network.

### Digit Modification Table

- 7.7 DMT Entry 001 is for calls on CO Trunks. These require the Trunk Group Access Code to be absorbed and the toll digit 1 to be inserted.

DMT Entry 002 is for calls made over the FX Trunk to CITY D. The Trunk Group Access Code and Area code are deleted.

DMT Entry 003 is for calls made over the Tie Trunk to CITY B. All digits dialed by the user are deleted. When the trunk is seized, the distant attendant console will ring.

DMT Entry 004 is for calls made over the WATS Trunk. The Trunk Group Access Code is deleted from the dialed digit string.

DMT Entry 005 is for calls which are completed via the OCC link. The Trunk Group Access Code is absorbed and the OCC number (5553933) and account code (1234567) are inserted.

### Route Table

- 7.8 The following are a list of Route Numbers with their associated Trunk Group Number and DMT Entry selections:

- Route 001 – Trunk Group 3 and DMT Entry 002
- Route 002 – Trunk Group 1 and DMT Entry 001
- Route 003 – Trunk Group 4 and DMT Entry 003
- Route 004 – Trunk Group 2 and DMT Entry 004
- Route 005 – Trunk Group 5 and DMT Entry 005.

### Route List Table

- 7.9 The following are a list of Route List Numbers with their associated Route Number selections in order of cost:

- Route List Number 001 – Route 003 (Tie Trunk), Route 005 (OCC), Route 004 (WATS), Route 002 (CO Trunks).
- Route List Number 002 – Route 003 (Tie Trunk), Route 005 (OCC), Route 004 (WATS).
- Route List Number 003 – Route 001 (FX Trunk), Route 002 (CO Trunks).

- Route List Number 004 – Route 001 (FX Trunk).
- Route List Number 005 – Route 001 (FX Trunk), Route 005 (OCC), Route 002 (CO Trunks).
- Route List Number 006 – Route 001 (FX Trunk) and Route 005 (OCC).

### Time-of-Day Table

- 7.10 In Command 701, only one Time Period is defined and all Routing Classes of Service are assigned the same Route List Number: 001.

In Command 702, two Time Periods have been defined. For RCS 1, both Time Periods are assigned to Route List 005. For RCS 2, calls are completed via Route List 006 between 8 AM and 6 PM; calls after 6 PM are completed via Route List 003. For RCS 3, calls are completed via Route List 003 between 8 AM and 6 PM; calls after 6 PM are not allowed.

### Digit Comparison Table

- 7.11 Entries 001 through 003 contain the complete digit strings for emergency services, repair services and directory assistance.

Entries 004 through 010 contain a cross-section of Office Codes in the CITY A area. Normally, it is likely that all Office Codes would have to be listed. These calls can only be completed over one route (i.e., local trunks). Further programming for these calls is not shown.

Entry 011 contains the complete digit string for the service office in CITY B. This call can be completed over any route except the FX Trunk. Since these routes are not time-dependent (Tie Trunks are always less expensive than DDD), this call is routed to Route List Number 001 for all time periods.

Entries 012 and 013 contain the digit strings which define toll routes to specific COs within the Area Code 416. For the purpose of this scenario, these calls can be completed over one of the following three routes: FX, OCC or CO Trunks. These routes are time-dependent (i.e., during some times OCC is less expensive than DDD and at other times DDD is less expensive). Also, RCS 2 and RCS 3 are restricted in the routes they can use at different times.

Entry 014 contains the digit string which defines the number of the plant in CITY C. Calls to this destination can be completed over two routes: OCC or DDD. The tariff structure for OCC is similar to WATS in that OCC is less expensive than DDD during business hours.



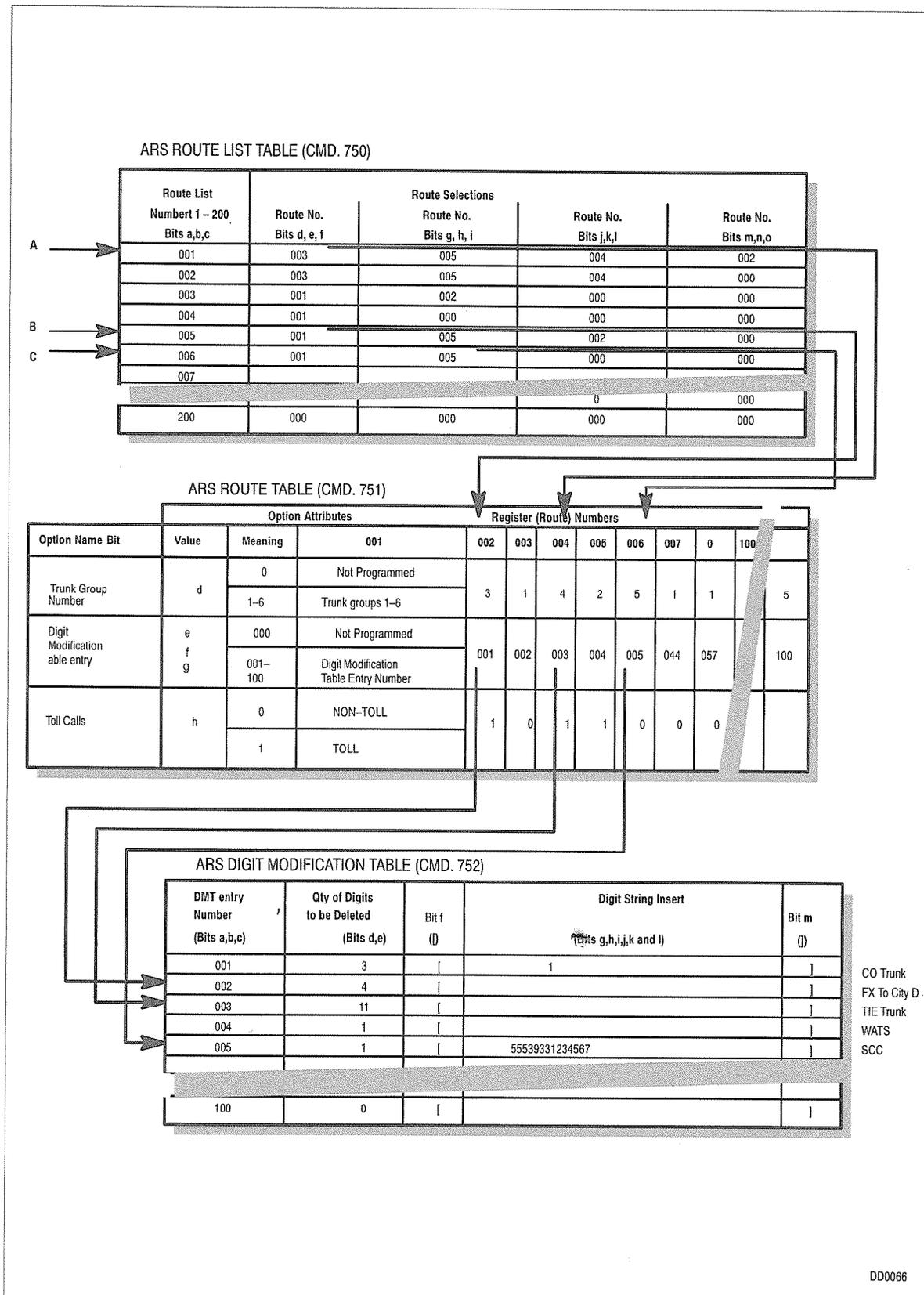


Figure 7-2(b) Table Network

**SX-50<sup>®</sup> DIGITAL PRIVATE  
AUTOMATIC BRANCH EXCHANGE  
(DPABX)**

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Station  
Message  
Detail  
Recording

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1.

## INTRODUCTION

### General

- 1.1 This Section describes the Station Message Detail Recording (SMDR) feature of the SX-50® DIGITAL Private Automatic Branch Exchange (DPABX).

### Reason for Reissue

- 1.2 This section has been reissued to incorporate MS55 software.

### Brief Description

- 1.3 Station Message Detail Recording collects data about each trunk call, outgoing and/or incoming, to facilitate analysis of telephone usage for control of costs. The call record, one 80-column line of text, is sent to the DPABX Printer Port at the completion of the call. This output can be connected to:

- a local printer, or
- a recording device, or
- a modem on a dedicated line to a service bureau.

SMDR does not log calls between stations or between the Attendant and a station.



## 2.

---

## DETAILED DESCRIPTION

Each time a trunk is seized, information about activity on the trunk is collected until the trunk is released. If more than one trunk is involved in a call, a separate record is generated for each trunk. If a station talks to a trunk, then transfers it to another station, only one call record is generated. However, the number of the second station will also appear in the record.

### Recorded Information

2.1 SMDR records provide information on the following items:

- Outgoing and Incoming calls
- Account Codes (optional)
- Verified Authorization Codes (optional)
- Digits dialed on the trunk
- Meter pulses (optional)
- Outgoing and Incoming trunk numbers
- Long calls (optional)
- Call Duration
- Time to Answer (incoming calls)
- Second station in a transfer
- Conferences and Transfers involving the trunk
- Answer supervisions
- Attendant-handled calls.

Table 2-1 summarizes each field in the SMDR data record, giving its location within the record and any symbols that are used. The paragraphs which follow describe these fields in detail.

**Long Call Indicator:** This optional field shows a “-” for calls of 5 minutes or more, but less than 15 minutes; a “%” for calls of 15 minutes or more, but less than 30 minutes; and a “+” for calls of 30 minutes or more.

**Date:** The date is reported as a 2-digit month followed by a 2-digit day.

**Start Time:** The start time of the call is shown in hours and minutes. If the system is using a 12-hour clock, a **p** follows the minutes if the time is in the PM.

**Duration of Call:** Call duration is the time from trunk seizure to trunk release. It is reported in hours, minutes and seconds.

**Calling Party:** The originator of the call is identified in this field. If the originator was a station, the number appears in the field. If the originator was a trunk, the trunk number appears, preceded by a **T** (CO trunk) or an **X** (non-CO trunk). If the Attendant originated the call, **ATT0** appears.

**Attendant Involved:** An \* in this field identifies calls originated or answered by the Attendant or Auxiliary Attendant. The field is otherwise blank.

**Trunk Group Access Code:** This field applies only to outgoing calls. For incoming calls, Time to Answer appears in this space. The trunk group access code (e.g., 9) is reported in this field.

**Time to Answer:** This field applies only to incoming calls. On outgoing calls, Trunk Group Access Code is reported in this field. The time to answer, in seconds, between trunk seizure incoming and call answer is reported in this field. The count reverts to zero after reaching 256. If the call was not answered, **\*\*\*** is shown.

**Digits Dialed on Trunk:** Up to 26 digits can be recorded, 20 digits if SMDR Record Meter Pulses is enabled. On dial-in trunk calls, this field shows the digits dialed in on the trunk. On an outgoing call, it shows the digits dialed out on the trunk. If an Identified Trunk Group was used the Trunk Group Access Code also appears because it was automatically dialed out on the trunk in front of the subscriber's dialed digits.

**Meter Pulses:** If SMDR Record Meter Pulses is enabled, the number of meter pulses received from the outgoing trunk is recorded. The Trunk Group must be programmed for Supervision is Meter Pulse or Reversal or Supervision is Meter Pulse, Ignore Reversals, as appropriate for the trunk. The maximum count is 9998.

**Call Completion Status (Outgoing):** This field reports how the outgoing call was completed. **T** indicates the call failed toll denial checking; if the trunk is programmed for Toll Reversal, **T** indicates supervision was received. If the trunk is programmed to have Answer Supervision, **A** indicates supervision received.

**Call Completion Status (Incoming):** This field reports how the incoming call was completed. **T** indicates the call was answered by TAFAS. **B** indicates the called party was busy. **E** indicates that a dial-in trunk caller dialed an invalid number and received re-order tone. **I** indicates that a DID or DISA trunk caller dialed an illegal number and was answered at the Intercept Point.

**Speed Call/Forward External:** **S** indicates the number was speed dialed; **F** indicates call was forwarded to an external number.

**Called Party:** This field shows the station number called, even if the Attendant answered the call and transferred it to the station. If the Attendant answered the call and did not transfer it, the field shows **ATT0**. On outgoing calls, the field shows the trunk number.

**Transfer/Conference:** **T** indicates transfer; **C** indicates conference. **X** indicates an unsupervised transfer.

**Third Party:** This field shows the station number to which the called party transferred the trunk call. Further transfers are not recorded.

**Account Code/Verified Authorization Code:** If the call originated within the PABX and an Account Code and/or Verified Authorization Code (VAC) was entered, the Account Code/VAC appears in this field.

**Table 2-1 Summary of SMDR Record Fields**

Columns	Name	Format	Definitions
1	Long Call	z	blank: less than 5 min - : 5 min to 14 min 59 s % : 15 min to 29 min 59 s + : 30 min or more
2-6	Date	mm/dd	mm = month (01-12) dd = day (01-31)
7		space	
8-13	Start Time	hh:mmp	hh = hour mm = minutes p = blank (AM) or P (PM), (12-hour mode)
14		space	
15-22	Duration	hh:mm:ss	hh = hours mm = minutes ss = seconds
23		space	
24-27	Calling Party	cccc or Tnnn or Xnnn or	cccc = Station Number (ATT0 = Attendant) Tnnn = Trunk Equipment Number (CO) Xnnn = Trunk Equipment Number (non-CO)
28		space	
29	Attendant Involved	f	* = Attendant Involved blank otherwise
30-33	Trunk GroupAccess Code	gggg	Outgoing calls only. On incoming calls, this field gives Time to Answer
30-33	Time to Answer	ttt	seconds (000-256)*** = call unanswered
34-59	Digits dialed	nnnn...n	1-26 digits, 20 digits if metering enabled
55-59	Meter Pulses	mmmm	number of meter pulses (0000 to 9998)
60	Call Completion Status	A or B or E, I or T	A = Answer Supervision E = caller error I = intercepted T = toll denied or TAFAS answered B = called party busy
61	Speed Call/Forward External	S or F or blank	S = number was speed dialed F = number was forwarded externally
62-65	Called Party	qqqq	same as Calling Party
66	Transfer/Conference	T, X, C or blank	T = transfer X = unsupervised transfer C = conference
67		space	
68-71	Third Party	qqqq	same as calling party
72		space	
73-80	Account Code / VAC	nnn...n	1 to 8 digits

### 3.

## INSTALLATION

Installation of Station Message Detail Recording is as follows:

- Determine the required output configuration (e.g., printer parameters).
- Connect output device (printer, data recorder or modem) to RS-232 Port using RS-232 Extender Cable. See Figure 3-1, Control Card Connections or Figure 3-2, Control Card 2 (MCC2) Connections for location of RS-232 Port.
- Program SMDR. See Part 4.

### Printer Requirements

- 3.1 The printer must have at least an 80-character line length and accept ASCII characters. Table 3-1 shows the subset of ASCII used by SMDR.

Check the list of options for each printer parameter to ensure that the printer port can be configured to match the printer.

### Printer Port Configuration

- 3.2 The programmable Printer Port can accommodate any RS-232 compatible device, such as a printer, a modem or a data recorder.

The parameters available are:

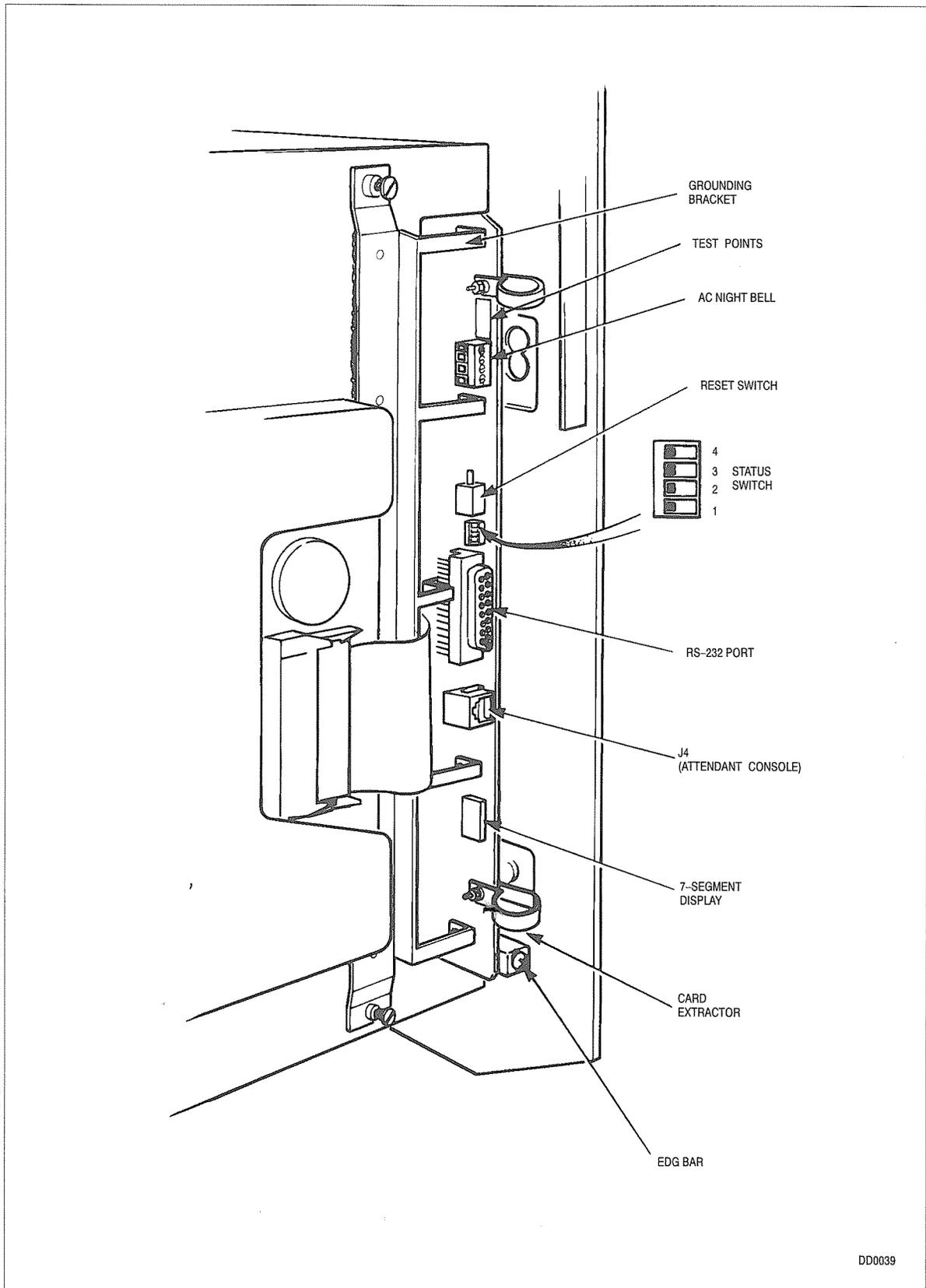
- baud rate: 110, 150, 300, 600, 1200, 1800, 2400, 4800 or 9600.
- parity: none, odd or even.
- number of Tx bits: 5, 6, 7 or 8.
- number of stop bits: 1 or 2.

The Printer Port can also accommodate a printer which requires an extra delay while it performs a carriage return. Optionally, six nulls can be transmitted following each carriage return.

See Section 9104-091-210-NA, Customer Data Entry, Command 100 Register 16 for details on setting these parameters. The default is 1200 baud, no parity, 8 Tx bits and 1 stop bit.

Table 3-1 Character Set

ASCII Value				b7 b6 b5	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1
b4	b3	b2	b1	hex	0_	1_	2_	3_	4_	5_
0	0	0	0	_0	NUL		SPACE	0		P
0	0	0	1	_1		DC1	!	1	A	Q
0	0	1	0	_2			"	2	B	R
0	0	1	1	_3		DC3	#	3	C	S
0	1	0	0	_4				4	D	T
0	1	0	1	_5			%	5	E	U
0	1	1	0	_6			&	6	F	V
0	1	1	1	_7	BELL		/	7	G	W
1	0	0	0	_8			(	8	H	X
1	0	0	1	_9			)	9	I	Y
1	0	1	0	_A	LF		*	:	J	Z
1	0	1	1	_B			+	;	K	
1	1	0	0	_C	FF		'		L	
1	1	0	1	_D	CR		-	=	M	
1	1	1	0	_E			.		N	
1	1	1	1	_F		DC1	/	?	O	



DD0039

Figure 3-1 Control Card Connections

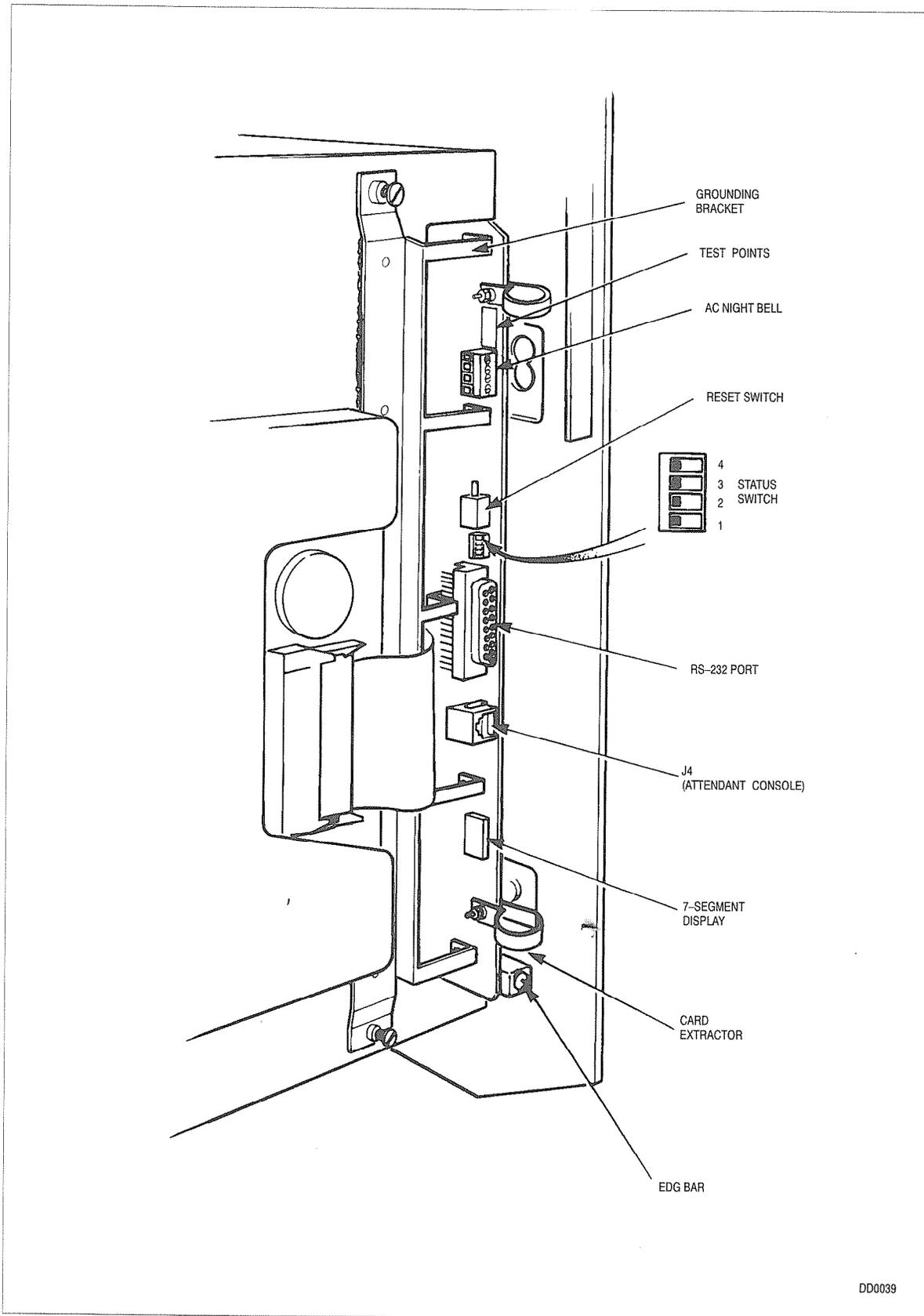


Figure 3-2 Control Card 2 (MCC2) Connections

## 4.

## PROGRAMMING

This Part describes programming options that affect Station Message Detail Recording (SMDR). See Section 9104-091-210-NA, Customer Data Entry, for further details.

### SMDR System Enable

4.1 SMDR must be enabled in System Options Programming, Command 100 Register 14. There are four options:

- disabled (field c = 0), (this is default)
- enabled for incoming trunk calls only (field c = 1)
- enabled for outgoing trunk calls only (field c = 2)
- enabled for both incoming and outgoing trunk calls (field c = 3).

SMDR must also be enabled in the Class of Service (COS) and the Trunk Group to be monitored.

Command 121 → 129, COS 1 → COS 9 Programming, Register 3:

- Set COS SMDR (field h = 1) to 1 (Enable). Default is 0 (Disable).

Command 151 → 156, Trunk Group 1 = 6 Programming, Register 2:

- Set Trunk Group SMDR (field i = 1) to 1 (Enable). Default is 0 (Disable).

### Record Meter Pulses

4.2 This option records Central Office current reversals (meter pulses) on the trunk. This applies only to outgoing trunk calls. Use of this option reduces the number of digits that can be displayed in the Digits Dialed on Trunk field of the report from 26 to 20. This option is enabled by Command 100 Register 14 field d = 1.

### Long Call Indicator

4.3 This option flags calls of longer than 5 minutes. It is enabled by Command 100 Register 14 field e = 1. A “-” indicates a call of more than 5 minutes; “%” indicates a call of more than 15 minutes; “+” indicates a call of more than 30 minutes.

### Incoming Calls Record Only COs

- 4.4 This option applies only when SMDR is enabled for incoming DID and LS/GS trunks. With this option enabled (Command 100 Register 14 field f = 1), the only incoming calls recorded are those from CO (DID and LS/GS) trunks.

### Drop Calls of Less Than 8 Digits

- 4.5 With this option selected, SMDR does not record outgoing calls in which less than eight digits were dialed on the trunk. It is enabled by Command 100 Register 14 field g = 1.

### Drop Incomplete Outgoing Calls

- 4.6 With this option selected, SMDR does not record incomplete outgoing calls. If the Trunk Group is programmed for Answer Supervision, an incomplete call is one that does not receive supervision. Otherwise, it is a call which is terminated before the 10 second interdigit time-out. This option is enabled by Command 100 Register 14 field h = 1.

### Overwrite Queued Printer Buffer

- 4.7 Output to the printer is buffered. The buffer provides temporary storage for the data to allow for a printer that is slow or temporarily out-of-service (e.g. out of paper). If printer buffer becomes full, the Overwrite queued Printer Buffer option allows SMDR to return to the start of the printer buffer and continue sending report records, overwriting the oldest records first. Otherwise, SMDR output stops and no more outgoing trunk calls can be made until there is room in the buffer to record them. This option is selected by Command 100 Register 14 field i = 1.

### X Digits Dialed

- 4.8 On outgoing calls, the last 1 to 7 digits of the dialed digit string can be replaced by Xs. Command 100, Register 14, controls this option; set field j to the number of digits to replace with X. 0 is Disable.

### VAC Overwrite Account Code

- 4.9 Verified Authorization Codes (VAC) and Account Codes share the same field in the SMDR record. When both codes are provided during a call, the SMDR printout contains the code specified by Command 100, Register 14, field k. Set field k to 1 to give priority to Account Code printing or set field k to 0 to give priority to VAC printing. Default is 0.

## 5.

# OPERATIONAL PARAMETERS

The following operational parameters should be noted when using SMDR.

### Non-Recording Conditions

- 5.1 SMDR is not active under the following conditions, even if SMDR is enabled for the Class of Service and Trunk Group involved.
- The station or attendant obtains busy tone when trying to access a trunk group. (All trunks in the group are busy.)
  - The system is in Power Fail Transfer.
  - ARS prevents the user from seizing a trunk (toll control).

### Attendant-Handled Calls

- 5.2 The following conditions apply when the attendant handles a call:
- If the attendant dials a trunk with no station or other trunk involved, the calling party is the attendant. This includes direct trunk accesses.
  - If the attendant makes an unsupervised transfer to a station, the attendant is the called party and the station appears as the third party.
  - If the attendant dials a trunk while in conversation with a station, the station is the calling party and \* appears in the Attendant Involved field.
  - If the attendant dials a trunk, then takes a station off hold and presses RELEASE, the station is the calling party and \* appears in the Attendant Involved field.

### Incoming Calls

- 5.3 When SMDR is enabled for incoming calls, the following conditions apply:
- Digits dialed on incoming DISA trunks are reported in the Digits Dialed on Trunk field. SMDR reports the call even if the dial-in trunk dials an illegal or vacant number or hangs up without completing dialing. The DISA/Access Security Code is recorded.
  - Direct-In-Lines show the station number as the called party. However, the Digits Dialed field is blank. If the trunk is connected to a Hunt Group, the station that answered the call is reported as the Called Party.

**Examples**

5.4 Table 5-1 shows examples of typical SMDR records.

**Table 5-1 Example SMDR Records**

**Example 1 – 2-PARTY OUTGOING CALL**

-06/03 11:42 00:08:29 101 9 16135922122 A T002 12345678

On June 3rd at 11:42 AM, station 101 entered VAC 12345678, dialed 9, accessed CO Trunk 2 and dialed 1-613-592-2122. The conversation lasted 8 minutes, 29 sec. Note the - Long Call indicator at the start of the line. Answer supervision was provided.

**Example 2 – ATTENDANT-HANDLED OUTGOING CALL**

01/30 03:27P 00:04:11 210 \*9 16135922122 A T005

On January 30th, station 210 asked the Attendant to make an outside call. At 3:27 PM the Attendant dialed 9, followed by 1-613-592-2122 and then pressed RELEASE. Conversation lasted 4 minutes, 11 seconds. Trunk number 5 was used and answer supervision was provided.

**Example 3 – 2-PARTY INCOMING CALL**

04/15 01:42P 00:03:55 T008 \*009 121

On April 15 at 1:42 PM, trunk 8 rang the console and asked to talk to station 121. The Attendant took 9 seconds to answer the call. The conversation lasted 3 minutes, 55 seconds.

**Example 4 – CALLED STATION TRANSFER CALL**

04/21 02:15P 00:04:53 T007 \*004 ATTOX 143

On April 21 at 2:15 PM, trunk 7 rang the console and asked to talk to station 143. The Attendant took 4 seconds to answer the call. Station 143 subsequently transferred the call to extension 110. The total time for both conversations was 4 minutes, 53 seconds.

**SX-50<sup>®</sup> DIGITAL PRIVATE  
AUTOMATIC BRANCH EXCHANGE  
(DPABX)**

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Remote  
Maintenance,  
Administration  
and Test System  
(RMATS)

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### NOTICE

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## 1.

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## INTRODUCTION

This Section describes the Remote Maintenance, Administration and Test System (RMATS) for the SX-50® DPABX. Refer to Section 9104-091-210-NA, Customer Data Entry, if additional information is needed.

### Reason for Reissue

- 1.1 This section has been reissued to incorporate MS55 software.

### Brief Description

- 1.2 RMATS allows the customer to access maintenance and customer data entry (CDE) functions from a remote location. The console is not affected unless it attempts to access Attendant Functions or CDE while RMATS is using them. Maintenance and CDE functions allow access to only one user at a time.

The equipment required at the remote end consists of a data terminal/printer and a modem. If the modem is the acoustically-coupled type, a telephone is also required.

RMATS is assigned an access code and is accessed like a station. The customer can access RMATS from an internal station or externally via the attendant or a DISA trunk.

- Security is assured by means of a 4-digit system security code, Command 190, and a 10-digit security code that RMATS requests at sign-on.



## 2.

# OPERATIONAL REQUIREMENTS

### Hardware Requirements

2.1 The *SX-50* system must have an RMATS module installed on a Universal Card.

The modem used to access RMATS must have the following characteristics:

- Bell Standard 103 or equivalent
- 300 Baud
- Even parity
- 7 data bits, 2 Stop Bits
- Full Duplex
- Originate mode.



## 3.

## INSTALLATION AND PROGRAMMING

### General

- 3.1 Install an RMATS module in any one of the four module positions on a Universal Card. Install the Universal Card in any card slot.

RMATS must be programmed at the SX-50 DPABX prior to use:

- Program RMATS Modem Access Code. Default is 498. (Command 110, Feature Access Codes, Register 26).
- Program the RMATS Security Code. Default is 0246813579. Command 192, RMATS Security Code Programming, Register 1, fields b,c,d,e,f = digits 1-5. Register 2, fields b,c,d,e,f = digits 6-10.
- Program the System Security Code, Command 190. Register 1, fields b,c,d,e = digits 0-9. Default is 7772.
- Set up Direct-In Line (DIL) access, if desired: For DIL access during day service, Commands 501 → 580, Trunks 01 → 80, Trunk Programming Register 4, field d = 0, fields e,f,g = 168. For DIL access during night service, Commands 501 → 580, Trunks 01 → 80, Trunk Programming Register 5, field b = 0, fields c,d,e = 168.
- Assign RMATS as a Night Answer Point, if desired: Press and hold the console NIGHT key. Press \* to advance the display to the required trunk. Dial the RMATS Access Code (default is 498). Release the NIGHT key.

or,

- Press the FUNCTION key or dial the Attendant Function Access Code (\* or 71).
- Dial 21 (Flexible Night Service Access Code), plus the equipment number of the required trunk. Dial the RMATS Access Code (default is 498). Press the RELEASE key.

After installation and programming, confirm RMATS access from a station within the SX-50 DPABX and from outside via a CO trunk.



## 4.

## SYSTEM OPERATION

### Methods of Accessing RMATS

#### 4.1 To access RMATS:

1. From within the DPABX, dial the RMATS Access Code.
2. Call the Attendant. Have the Attendant dial the RMATS Access Code and connect the call.
3. If a DISA trunk is programmed, use it to gain access to the DPABX and dial the RMATS Access Code.
4. If a Direct-In Line is programmed, use it to gain direct access to RMATS from outside the PABX.

### RMATS Sign-on

- 4.2 When the RMATS modem is accessed, it returns a carrier tone. When using an acoustically-coupled modem, put the handset into the modem and press the carriage return (<CR>) key within 30 seconds. A direct connect modem usually provides a light that indicates carrier detection. Press <CR> within 30 seconds.

RMATS confirms access by transmitting the word **RMATS**. It then asks for the RMATS Security Code. Type the code (default is 0246813579), followed by <CR>. If the code is incorrect, it is requested again. If it is incorrect on the third attempt, an alarm is raised at the console. No further attempts to access RMATS will be allowed until the caller hangs up.

RMATS then requests the System or User Security Code. (By default the System Security Code is 7772 and the User Security Code is 1234). If the code is incorrect, it is requested again. If it is incorrect on the third attempt, no further attempts to access RMATS will be allowed until the caller hangs up.

Prior to entry to Menu level, RMATS requests **ENTER TERMINAL TYPE**. Reply **P** for printer; **S** for terminal screen.

### Primary Selection Menu

- 4.3 The RMATS Primary Selection Menu provides access to Attendant functions or Programming functions. Type **P**, followed by <CR> for CDE Programming. Type **A**, followed by <CR> for Attendant Functions. The **E** (exit) command ends the RMATS session.

## Help Function

- 4.4 At each level of both PBX Programming and Attendant Functions menus the user can enter **H** for a list of the RMATS commands available at that level.

## Command Summary Function

- 4.5 In both PBX Programming and Attendant Functions menus, the user can enter **S** for a list of system commands. In the Attendant Functions menu a list of the available Attendant Functions is given. In the PBX Programming menu a list of the CDE Commands is given.

## Attendant Functions

- 4.6 RMATS provides access to the Attendant Functions listed in Table 1-1. While in Attendant Functions mode, the prompt is **AF>>**. Enter the command number. If more information is required, RMATS will request it. Table 4-4 shows a sample Attendant Functions session.

**Note:** During Attendant Function 60, Abbreviated Dialing Entry Viewing, a carriage return causes the system to display the next entry. To exit the function, use the escape (ESC) key.

## Customer Data Entry Function

- 4.7 RMATS also provides access to the Customer Data Entry (CDE) function. Table 4-2 shows the commands used during Customer Data Entry. Table 2-1 shows a sample Customer Data Entry session.

RMATS must be exited and disconnected to allow all programming changes to be committed to memory.

## Customer Data Entry Function – ARS

- 4.8 ARS is not accessible and outgoing calls are not possible while ARS is being programmed. Do not hang up on RMATS while the screen is displaying an ARS command or trunk calls will not be possible. Back out of ARS commands before disconnecting RMATS.

RMATS CDE operation is slightly different for commands associated with Automatic Route Selection (ARS). These are commands 700, 701 → 745, 750, 751 and 752. The differences are outlined in the paragraphs that follow.

When the user enters the Register Level, the first unprogrammed Register is displayed. The cursor is at the left of the display. Pressing <space> will cause the Register Number to be repeated below the display line and will allow programming of the register. Or, the

user can enter the number of a programmed register, with no following <CR>. The contents of that register will be immediately displayed. Again, the cursor will be at the left of the display.

Unlike the Console display, the RMATS terminal displays all 26 digits in the Digit Comparison Table and the Digit Modification Table.

There are two additional commands used for programming the Digit Modification Table digit strings. These are **P** for Pause and **W** for Wait For Dial Tone.

The Time-of-Day Table, Commands 701 → 745, must be programmed in order. Refer to Section 9104-091-220-NA, Automatic Route Selection.

The backspace key is commonly used to delete ARS digit strings in Command 700. The entire digit string must be deleted by applying the backspace key while the cursor is on the "Time of Day" field (the terminal must be optioned to allow the backspace key to send <DEL>). A new Time of Day entry and a new digit string may then be reentered.

**Table 4-1 Attendant Functions**

<b>Attendant Function</b>	<b>Code</b>
Switch to Night Service	11
Switch to Day Service	12
Alarm Report Service	13
Set 12-Hour Clock	14
Set 24-Hour Clock	15
Force Release Trunk	20
Flexible Night Service	21
Display Message Register	22
Room – Room Restriction ON	23
Room – Room Restriction OFF	24
Change COS	25
Clear COS	26
Trunk Registration Meter	27
Clear All Message Waiting	29
Alarm Clear	31
Cancel Alarms and Busy-outs	32
Busy-out Trunk	41
Busy-out DTMF Generator	42

<b>Table 4-1 Attendant Functions (continued)</b>	
<b>Attendant Function</b>	<b>Code</b>
Busy-out DTMF Receiver	43
Busy-out Dial Tone Detector	44
Change Verified Authorization Code	45
Unbusy Trunk	51
Unbusy DTMF Generator	52
Unbusy DTMF Receiver	53
Unbusy Dial Tone Detector	54
Abbreviated Dialing Entry Viewing	60
Abbreviated Dialing Entry Programming	65
Printer Options	75
Set Date	80
Alarm Print Options	90
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<b>Table 4-2 Customer Data Entry Commands</b>	
Main Level Commands	
<b>Command</b>	<b>Function</b>
nnn<CR>	go to Command nnn
H	Help
N	go to Next command
R	display Register contents
S	display Summary of Commands
E	Exit CDE
<del>	delete data
Page 1 of 2	

**Table 4-2 Customer Data Entry Commands  
(continued)**

Command	Function
Register Level Commands	
H	Help
R	display all Registers for this command
N	go to Next register
E	Exit register level
C	Cancel register change
<Space>	leave field unchanged
<CR>	save register, display next register
Page 2 of 2	

**Table 4-3 Sample Rmats Programming Session – Customer Data Entry**

Step	Input Action	Terminal Display
1.	Access the remote SX-50 DPABX. Select P from Primary Selection Menu.	SYSTEM OPTIONS CMD 100 >>
2.	Enter 501<CR>	TRUNK PROGRAMMING CMD 501 >>
3.	Enter <CR>	A B C D E F G H I J 1 0 1 0 0 0 1 0
4.	Enter 1<sp><sp>1<sp>1<sp>	1 1 1
5.	Enter <CR>	A B C D E F G H I J 2 0 0 0 1 1 4

**Table 4-4 Sample Rmats Programming Session – Attendant Functions**

Step	Input Action	Terminal Display
1.	Access the remote SX-50 DPABX. Select A from Primary Selection Menu.	ATTENDANT FUNCTIONS AF >>
2.	Enter 11<CR>	AF >>11 SWITCH TO NIGHT SER- VICE *FUNCTION COMPLETE*
Page 1 of 2		

**Table 4-4 Sample Rmats Programming Session – Attendant Functions  
(continued)**

Step	Input Action	Terminal Display
3.	Enter 41<CR>	AF >>41 BUSY OUT TRUNK SERVICE TRUNK TO BUSY OUT ?
4.	Enter 15	*FUNCTION COMPLETE*
5.	Enter E<CR>	AF >>E PRIMARY SELECTION MENU P PROGRAMMING FUNCTIONS A ATTENDANT FUNCTIONS E EXIT >>
6.	Enter E<CR>	>>E RMATS LOGOFF

**SX-50<sup>®</sup> DIGITAL PRIVATE  
AUTOMATIC BRANCH EXCHANGE  
(DPABX)**

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# Troubleshooting Procedures and General Maintenance Information

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### NOTICE

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1.

## GENERAL

This Section contains information to assist troubleshooting of the *SX-50*® DPABX (Digital Private Automatic Branch Exchange). The *SX-50* system is itself the most important tool in the troubleshooting process. It contains an array of diagnostic tests and equipment status displays to assist maintenance personnel.

### Reason for Reissue

- 1.1 This section has been reissued to incorporate MS55 software.

### Basic Troubleshooting Philosophy

- 1.2 This Section uses the following approach to determining the cause of a malfunction:
  - ACQUIRE relevant information (i.e., who experiences the problem, when, and what they are trying to do)
  - CLARIFY problem (which features, equipment involved)
  - CONFIRM the problem through testing
  - ISOLATE the problem by tests of suspect equipment
  - CORRECT the problem
  - DOCUMENT the problem.

### Control Card Nomenclature

- 1.3 Unless otherwise stated, the operation and use of the Control Card and the Control Card 2 (MCC2) are identical, therefore this Section refers to them collectively as the "Control Card".



## 2.

## STATUS AND ALARM INDICATORS

### Line Status LEDs

- 2.1 Each line or trunk circuit has an associated red status LED on the front face of the circuit card. The *SX-50* cover must be removed to see these displays. See Table 1-1 and Figure 2-1.

Table 2-1 Circuit Status Led Indications	
LED Indication	Meaning
ON – steady	Line: phone off-hook Trunk: trunk seized
Rapid flashing	Rotary dial outpulsing.
Slow flashing	Circuit busied out Check alarm queue

### Card Status LEDs

- 2.2 Each card has a green status LED on its front face located just above the red circuit status LEDs. The *SX-50* cover must be removed to see these displays. See Table 2-2 and Figure 2-1.

Table 2-2 Card Status Led Indications	
LED Indication	Meaning
OFF	Card not recognized (Check insertion)
ON – steady	Card recognized Diagnostic tests passed
Flashing	Fault detected on card (Check alarm queue)

## Control Card 7-Segment Display

- 2.3 The Control Card has a red 7-segment display near the lower right edge. See Figure 2-2 and Figure 2-3. The display normally shows a flashing 0. The SX-50 cover must be removed to see this display. See Figure 2-1.

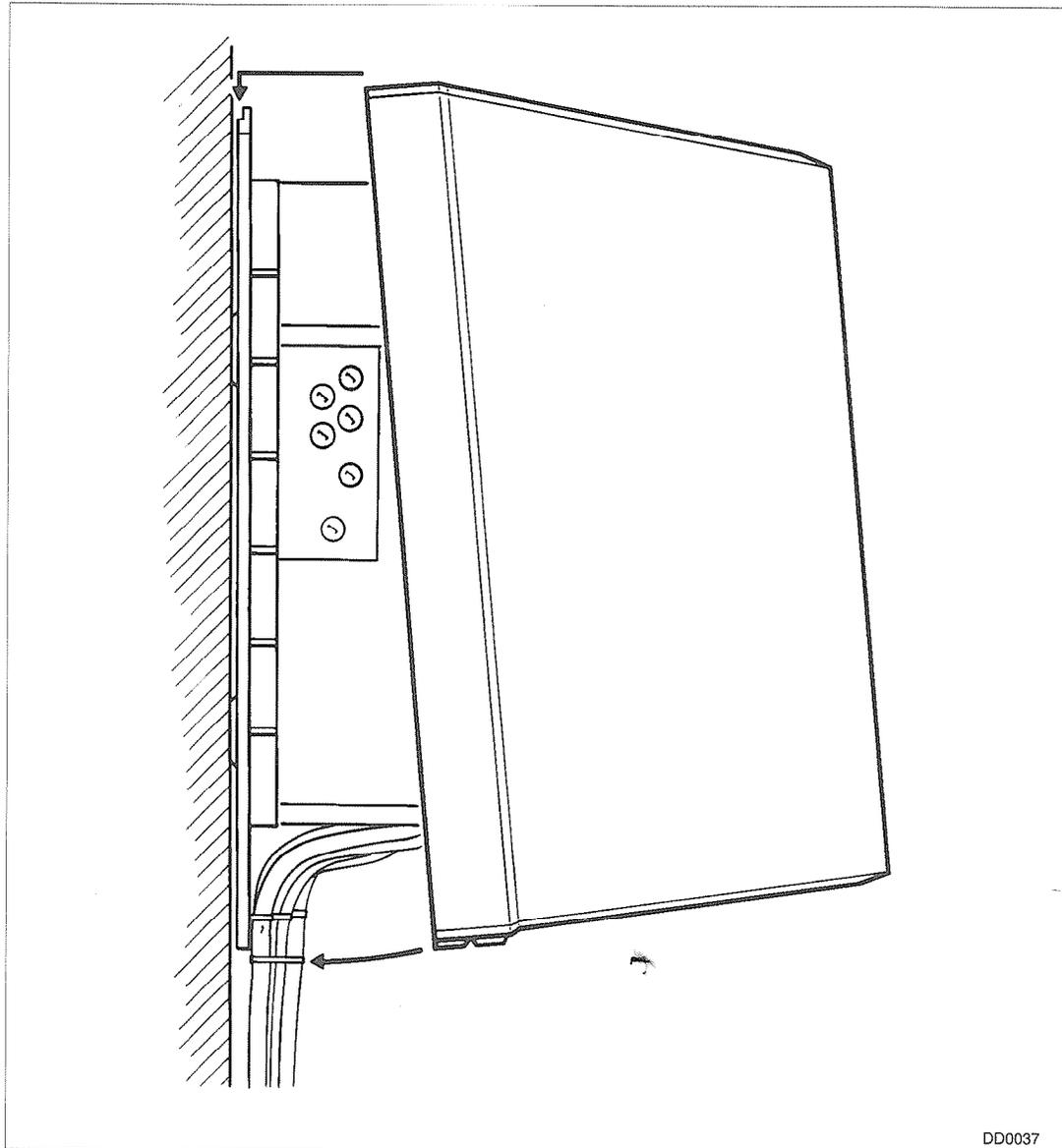


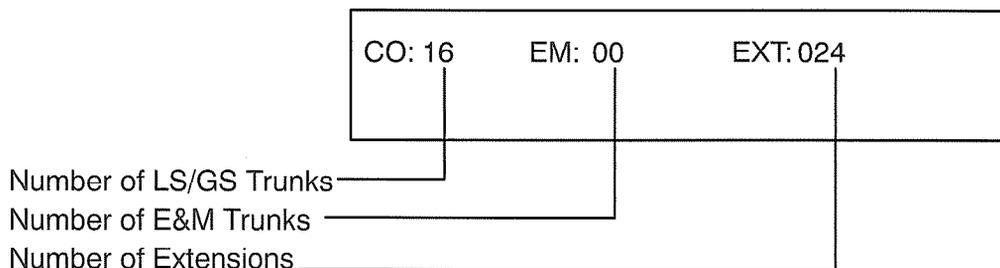
Figure 2-1 Cover Installation

## Console STATUS Key

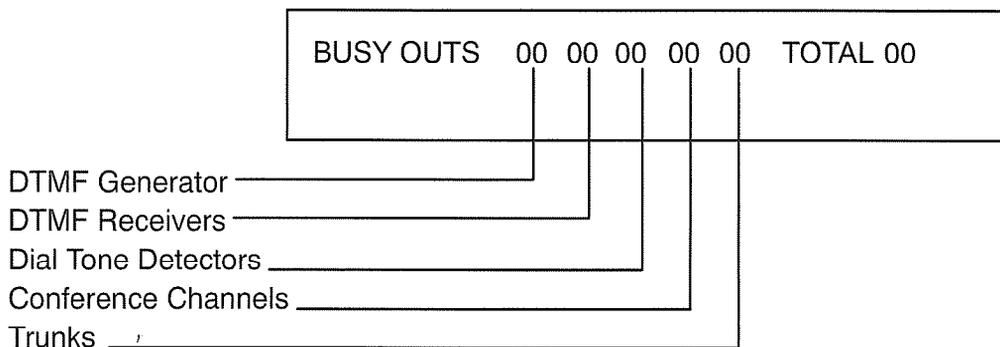
- 2.4 The Console STATUS key provides the following functions on successive keypresses:
- Software identity – name and maintenance release number.
  - Engineering Control Information.

- Configuration – the number of LS/GS Trunks, E&M Trunks and Extensions connected to the system, but not necessarily programmed. See Table 2–3.
- Busy-outs for different equipment types (See Table 2–4).
- Bell volume and LCD contrast adjustment, LED test.
- LCD Display test.

**Table 2–3 Console Status Key Configuration Display**



**Table 2–4 Console Status Key Busy-out Display**



## Alarm Indicators

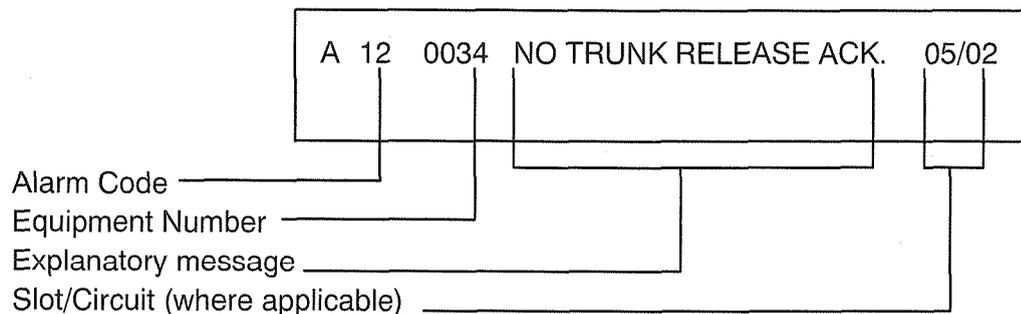
2.5 There are three alarm indicators:

- ALARM LED on console
- Console bell
- 7-segment status display on Control Card.

### Alarm LED on Console

The flashing alarm LED indicates that the system diagnostics software is reporting an alarm. Read alarm message by holding the ALARM key depressed.

**Table 2-5 Alarm Message Format**

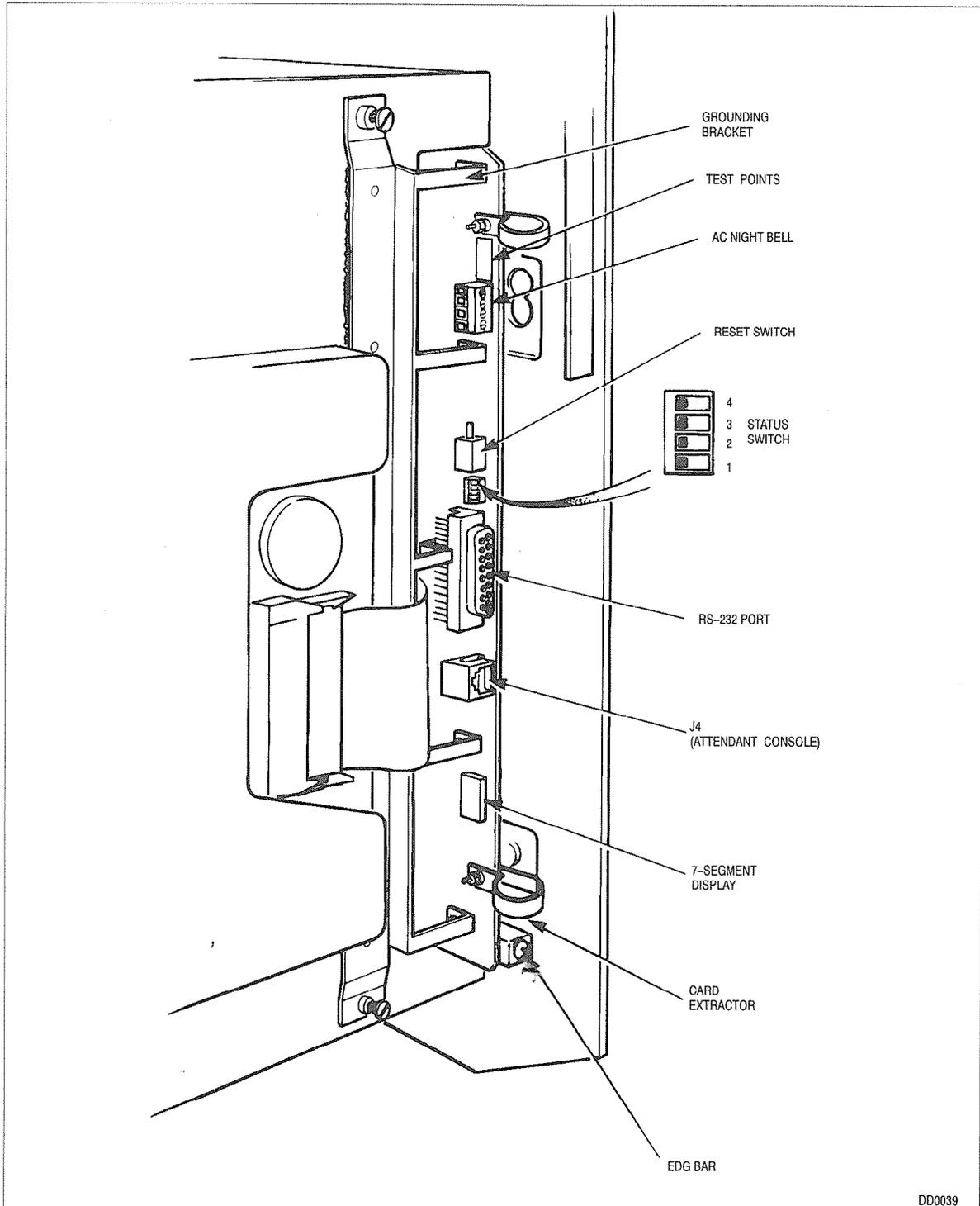


**Console Bell**

The console bell sounds whenever an alarm is generated. If the bell has been muted, the word BELL flashes on the LCD display. The bell stops when the ALARM key is pressed to read the alarm message.

**7-segment Status Display**

The 7-segment Status Display LED is located at the right edge of the Control Card, under the cover. A flashing digit shows the number of alarms in the alarm queue. 0 is displayed if there are no alarms. After a power-up or reset the display can show a steadily lit digit. This is an alarm code. Only codes 3, 4 or 5 indicate a fatal alarm which prevents the system from functioning. (See Table 4-4, Troubleshooting – Alarm Codes).



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Figure 2-2 Control Card Connectors, Switched and Display

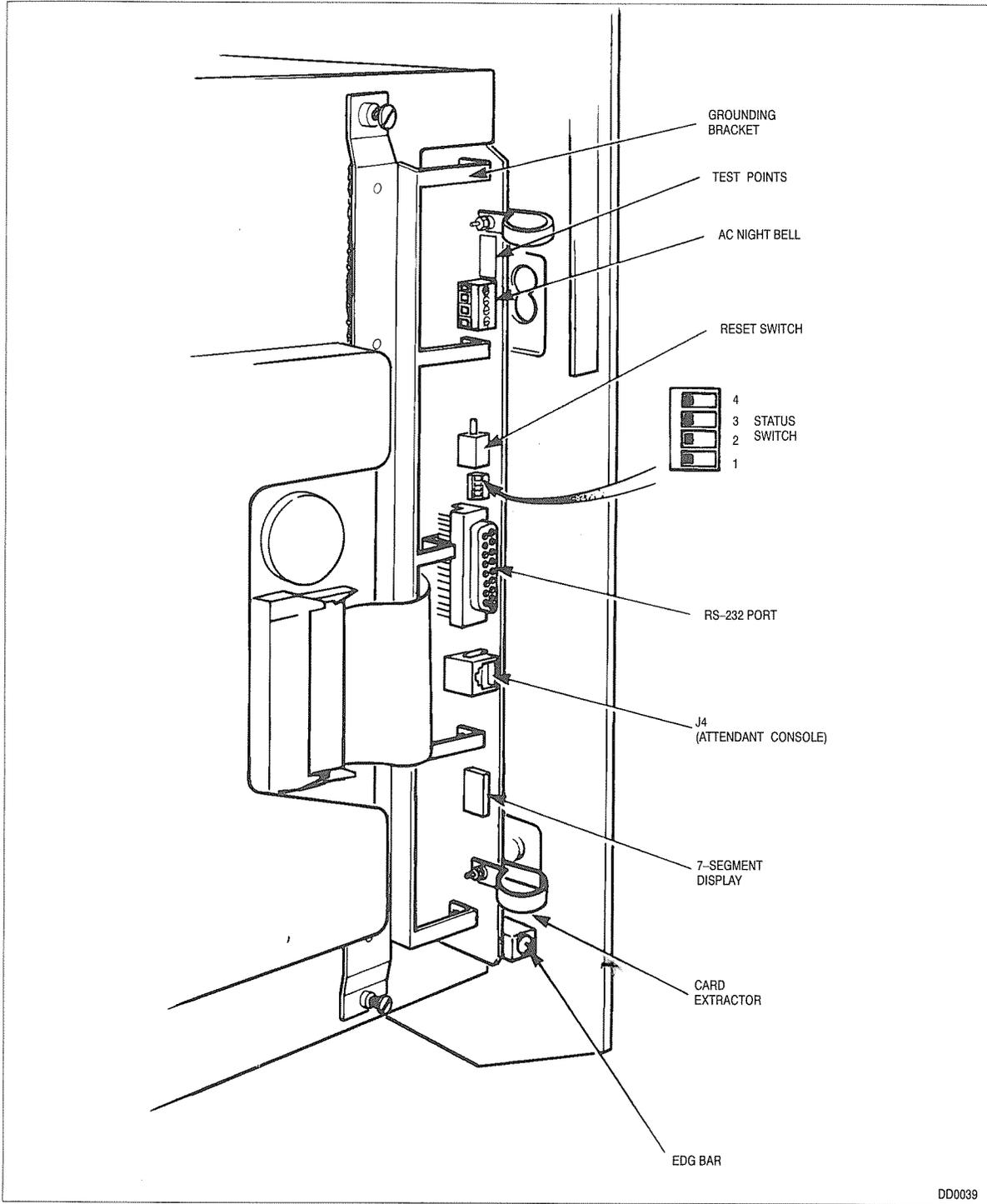


Figure 2-3 Control Card 2 (MCC2) Connectors, Switches and Display

### 3.

## SELF-DIAGNOSTIC TEST

### Power-up Diagnostics

- 3.1 Volatile RAM, PROM checksum and signal processor diagnostics are performed at system startup. A memory or signal processor failure is indicated by displaying a fatal error code on the Control Card 7-segment LED. This code identifies the failing component type (RAM, PROM or signal processor).

If a fatal error is detected at startup, the system does not attempt to complete the startup sequence, but remains in the power fail transfer mode until reset.

### Background Diagnostics

- 3.2 Diagnostic tests are carried out as a background task while the system is running, unless they are disabled. Background diagnostics can be enabled or disabled in CDE; enabled is default.

The diagnostics tests run cyclically, with a 10 second delay before the first test is started. The tests may be restarted at any point in the cycle by Maintenance Function \*32. This feature code also unbusies any equipment currently busied out.

If the *SX-50* software detects a signal processor error after startup, the signal processor is re-initialized and re-programmed. During this time, background diagnostics are disabled. If a signal processor re-initialization takes place during a diagnostics test which relies on the signal processor, any errors detected are ignored.

See Table 4-4 for a detailed list of the alarm codes and messages that diagnostics can generate.

Diagnostics make no attempt to correlate test results. Maintenance personnel must interpret the alarms generated by diagnostics tests when troubleshooting. To a large extent, diagnostics test interrelated pieces of hardware, so that a failure in one area may cause tests of other areas to fail. As an example, if the master DX chip fails, then all tests relying on DX paths will fail; i.e., inter-DX, tone detection, conferencing, DTMF receiver, console and line/trunk diagnostics.

### Memory Test Diagnostics

- 3.3 Volatile RAM checkerboard test and fixed and paged PROM checksum tests are carried out early during system startup. No volatile RAM is used in the startup sequence until the volatile RAM test is successfully completed.

RAM and PROM checksum tests are also carried out as background tasks while the system is running.

Paged non-volatile RAM checksum tests (similar to PROM checksums) are made as part of the set of background diagnostics tests. If a write to a non-volatile RAM is made while it is being checksummed then the test is aborted.

Failed memory components are only alarmed once. The alarm message (background diagnostics only) identifies which page of PROM, volatile or non-volatile RAM is bad, from which the defective memory chip can be identified.

### **Tone Detector Diagnostics**

- 3.4 Tone detector diagnostics consist of checking proper reception of a single test tone from a tone generator looped through the main DX chip to the tone detector. The total received energy and the energy around the detection frequency are checked. The received energy must be within 20% of the known transmitted energy in both cases.

### **Tone Generator Diagnostics**

- 3.5 Tone generator diagnostics consist of connecting a tone detector to the system DTMF tone generator for each of the DTMF digits 1,5,9,#. The tone detector is run twice on each digit, with centre frequency detection at each of the two frequency components of the DTMF digit in turn. The total received energy, and the energy around the detection frequency must be within 20% of the expected energy.

### **DX Chip Diagnostics**

- 3.6 Inter-DX link operation is verified by allocating inter-DX channels which are not currently in use between the main DX chip and the other two DX chips.

A data byte (changed for each test) is output from the channel under test on the master DX chip. This channel is looped back to connect to itself at the other DX chip. The data byte is then read back on the master DX chip from data memory and checked.

If an error occurs, the test is retried once. If it fails again, an alarm report for that link is generated. Further channel failures on the link are not alarmed. All channels which fail the test remain busied-out until the SX-50 DPABX is restarted. If 70 out of the possible 96 channels become busied-out, the test is no longer run.

### **Console Diagnostics**

- 3.7 Console diagnostics are run if the tone generator is operational and the console is in the idle state. The console codec is put into analog loopback mode and a test tone from the tone generator is routed through the codec into the tone detector. The total

received energy, and the energy around the test tone frequency must both be within 20% of the known transmitted test tone energy. A console loopback error is generated if the console fails its loopback test.

### Line/Trunk Diagnostics

- 3.8 Line/trunk diagnostics are run if the tone detector is operational. Line and trunk cards are scanned for circuits in the idle state. The codec for each idle circuit is placed into analog loopback mode and a test tone from the tone generator is routed through the codec into the tone detector. The total received energy, and the energy around the test tone frequency must both lie within 20% of the known transmitted test tone energy.

Lines and trunks which fail the loopback tests cause an alarm. Line or trunk circuits that have failed the loopback test are not retested until diagnostics are restarted. Failed trunks are busied-out.

### Conferencing Diagnostics

- 3.9 Conferencing diagnostics are run if the tone detector is operational. A high amplitude tone is sent through the first of the three conference input channels, a low amplitude tone through the second channel, and silence through the third channel. The diagnostics tone detector is used to ensure that the second loudest and quiet output channels receive the high amplitude tone, and the loudest channel receives the low amplitude tone. If a 3-party conference test fails, an alarm is generated, and the conference circuit is busied-out.

### DTMF Receiver Diagnostics

- 3.10 The diagnostics tone generator is used to route each of the 12 DTMF tone pairs (0-9,\*,#) through each of the five DTMF receivers via the master DX chip. Correct detection of each digit is verified. Each DTMF receiver is tested in turn, provided it is not being used for call processing.

If a failure is detected, the test is retried after 1 second. If the test fails again, the DTMF Receiver is suspect. However, the test is repeated on another DTMF Receiver to verify that tones are reaching the receivers. If this second receiver passes, the first receiver is busied-out and an alarm is generated; otherwise the failure is ignored. If a second receiver is not available, the first receiver is busied-out and an alarm is generated.

DTMF receivers are not tested if they are currently allocated by call processing, however all receivers which have not been busied-out will eventually be tested, even if there is some delay before a period of sufficiently quiet system activity such as nighttime. There is a maximum number of DTMF receivers that diagnostics are allowed to busy out.

The early line split hardware is also tested. If the test fails, an alarm is generated to warn that early line split hardware is not functioning correctly; the DTMF receiver is not busied-out.

### Scheduling Diagnostics

- 3.11 The integrity of the system scheduling queues is checked by ensuring that each slot-based device which 'exists' (has been recognized by the system) is on a scheduling queue. The converse is also checked; i.e., that no devices are scheduled which have not been recognized by the system.

If a fault is detected then an alarm identifying the offending device is sent to the console. The exception to this is if data load is active, in which case the device will have been purposefully removed from the scheduling queues to reduce CPU load. Any alarms generated by this test indicate a serious system malfunction.

## 4.

## TROUBLESHOOTING PROCEDURES

This Part presents procedures to help the field service engineer/installer analyze and troubleshoot problems based on the symptoms and any alarm codes that may have been generated.

### Static Protection

- 4.1 Handle circuit cards by their edges only and wear a ground strap properly connected to the card frame.

### Confirmation of Problem Cause

- 4.2 If a card has been replaced and the problem has been solved, the original card should be retried during a low traffic period to confirm that it was at fault.

### Documentation

- 4.3 Card repair tags should always be completed, giving as much detail as possible about the symptoms of the problem. See Appendix C for a description of the Mitel Repair Tag. The system Trouble Log should be filled out in detail and kept on-site.

### Removal and Replacement of Circuit Cards

- 4.4 When replacing a card, ensure the grounding post at the lower rear edge of the card engages the Energy Dumping Ground bar through the hole provided in the Control Card.

**CAUTION**

Do not install Universal Card under power.

### Troubleshooting Procedure Tables

- 4.5 If the system is completely inoperative, go to Table 4-1. Otherwise, begin at Table 4-3, Information Collection and Preliminary Checks. From there, proceed to Table 2-1, Troubleshooting – Alarm Codes if there are alarms raised, or to one of the equipment troubleshooting charts to work from symptoms.

Follow the procedures one line at a time until the problem is solved. Generally, each step covers a less likely and more serious cause for the problem. For example, procedures call for a check of the wiring before they call for the replacement of a card.

**Table 4-1 Troubleshooting – System Completely Inoperative**

Symptom	Procedure
No lights or display.	Check power supply fuses. (Six on left side, one near switch). Ensure that power switch is ON and is lit. Ensure the power cord is firmly seated at both ends. Check power at outlet. Check power at MCC test points.
Control Card Status LED shows steady number other than 0 or 8.	Refer to Table 2-1, Troubleshooting – Alarm Codes.
Control Card Status LED shows a letter or 8.	Turn off power. Reseat Generic Module connector. Turn on power.
Control Card Status LED shows 0, but there is no callprocessing activity.	Reset. Check programming.

**Table 4-2 Fuses**

Fuse Identification	Current Rating	Voltage Rail Affected
Front Panel	5A	120 AC
F2	15A	+5
F3	3A	-5
F5	5A	-32
F6	3A	+12
F7	3A	-12
F8	3A	-48

**Note:** Note: All fuses have 250 Volt rating.

Table 4-3 Information Collection and Preliminary Checks

Step	Action
1.	Talk to Attendant and users to obtain information about the problem, such as: <ul style="list-style-type: none"> <li>• What is the user trying to do when the problem occurs?</li> <li>• Do all users experience this problem?</li> <li>• Is the problem continuous or intermittent?</li> <li>• Does the problem occur during any particular period of the day?</li> </ul>
2.	Inspect Console Display for: <ul style="list-style-type: none"> <li>• System reset: Flashing clock display date: AUG-25 Night</li> <li>• Alarms</li> <li>• Busied-out equipment, Call Block</li> </ul>
3.	Note adverse environmental conditions, such as: <ul style="list-style-type: none"> <li>• Low humidity</li> <li>• Static easily generated</li> <li>• System located near heat, photocopier</li> <li>• Room temperature above 29°C or below 0°C.</li> </ul>
4.	Fill out Trouble Log.
5.	Turn off system power. Check the following: <ul style="list-style-type: none"> <li>• System grounding</li> <li>• Seating of cable connectors</li> <li>• Seating of cards</li> <li>• Seating of Generic Module connector</li> <li>• Seating of Console connector</li> <li>• Cross-connect wiring</li> </ul>
6.	Re-apply power. Check the following: <ul style="list-style-type: none"> <li>• Control Card status LED (under cover near bottom right of card) reads <b>0</b></li> <li>• Off-hook stations receive dial tone</li> <li>• The clock can be set to the correct time</li> <li>• There are no alarms (wait 20 minutes)</li> </ul>

**Table 4-4 Troubleshooting – Alarm Codes**

<b>Code</b>	<b>Category</b>	<b>Cause</b>	<b>Procedure</b>
01	Power-up diagnostics.	Failed non-volatile RAM test.	Reset system. If alarm persists, replace Generic Module.
02	Power-up or automatic diagnostics.	Checksum error in non-volatile RAM test.	Reload default data, reprogram. If alarm persists, replace Generic Module.
03	Automatic diagnostic tests.	Failure in read/writetest of non-volatile RAM.	Clear alarm. If alarm persists, replace Generic Module.
04	Automatic diagnostic tests.	Checksum error in Peripheral Processor PROM.	Clear alarm. If problem persists, replace Generic Module.
05	Automatic diagnostic tests.	Signal Processor failure.	Replace Control Card.
10	Trunk Condition. (No loop current).	Open line. Slow Central Office. Incorrect programming of loop/ground start. (See Appendix B). Trunk card malfunction.	Check trunk by direct access from Attendant console. Check programming. Try another trunk card. Follow Table 4-5.
11	Trunk Condition. (No seize acknowledge).	Same as above.	Same as above.
12	Trunk Condition. (No release acknowledge).	Central Office interface problem. Incorrect programming of loop/ground start. (See Appendix B). Tip and Ring reversed. Trunk card problem.	Check programming. Check wiring. Try another trunk card. If fault persists, contact the telephone company.
13	Station Condition.	Ring ground fault.	Check wiring.
20	Automatic diagnostic test.	DX Channel Error on Inter-DX Link.	Reset system. If error recurs, replace Control Card.
21	Automatic diagnostic test.	Dial tone detector failed test and has been busied-out.	Follow Peripheral Equipment Troubleshooting Procedure, Table 4-7.
22	Automatic diagnostic test.	Station has failed a loopback test.	Reset system. Reseat Line Card. Check for bent pins on card DIN connector. If error recurs, replace Line Card.
23	Automatic diagnostic test.	Three-party conference circuit failed test.	Reset system. If error recurs, change Control Card.

**Table 4-4 Troubleshooting – Alarm Codes  
(continued)**

<b>Code</b>	<b>Category</b>	<b>Cause</b>	<b>Procedure</b>
24	Automatic diagnostic test.	DTMF Receiver failed test and has been busied-out.	Follow Peripheral Equipment Troubleshooting Procedure, Table 4-7.
25	Automatic diagnostic test.	Early Line Split hardware failure.	Follow Peripheral Equipment Troubleshooting Procedure, Table 4-7.
26	Automatic diagnostic test.	DTMF Generator failed and was busied out.	As above.
27	Automatic diagnostic test.	Trunk failed loopback test and is busied out.	Reset system. Reseat Trunk Card. If error recurs, replace Trunk Card.
28	Automatic diagnostic test.	Console has failed a loop-back test.	Check console wiring. Replace console. If problem persists, replace Control Card.
29	Automatic diagnostic test.	Device is not being scheduled correctly.	Report occurrence in Trouble Log. Include details of device, time and operations when alarm occurred.
30	Customer Data Entry.	Attempt to enter CDE data value outside of allowed range.	Refer to Section 9104-091-210-NA, Customer Data Entry (CDE), for valid data range. Correct entry.
40	Hardware error.	Console dead due to hardware failure.	Reset system. Try another console. Replace Control Card.
41	Hardware error. (Card rejected).	Card is invalid or exceeds system limit for card type.	Check card type limits.
42	Hardware error.	Universal Card has failed.	Reset system. Try another Universal Card.
60	Customer Data Entry.	An error has occurred during data load.	Retry data load.
61	Hardware error.	Communication with printer not possible.	Check connections, data transmission parameters. Ensure printer is ready. Try another printer.
62	Attendant message.	Printer queue is full.	Use Alarm Print (*90#) command at console.

**Table 4-4 Troubleshooting – Alarm Codes  
(continued)**

Code	Category	Cause	Procedure
63	Attendant message.	Automatic Wake-up call has not been answered for the third time.	Ensure extension bell works.
80	ARS	Time-of-Day table not programmed.	Program Time-of-Day table. Ensure trunk group access codes are programmed in Digit Comparison Table.
81	ARS	Route Priority table not programmed.	Program Route Priority table.
82	ARS	ARS Route List not programmed.	Program Route List.
83	ARS	Digit Modification Table not programmed.	Program Digit Modification Table.
84	ARS	Selected trunk group programmed for manual dial tone verification.	Change Trunk Group programming.
85	Attendant message.	Set is locked out.	Clear alarms (*32). Replace the set's handset.
86	Attendant message.	Recorded Announcement Device port has not disconnected after 5minutes.	Clear alarms (*32). If problem persists, replace RAD.
90	System Advice.	A software error has occurred.	Report in Trouble Log. Include details of time and operations at time of alarm.
93	RMATS	3 incorrect entries for RMATS security code.	Check security code.

Table 4-5 Trunk Interface Problems

Problem	Procedure
Dropped calls.	<p>Trunk programming: Reversal Meaning should be set to 0 unless a special application requires otherwise. (CMD 500 + equipment number Reg. 2 field e = 0).</p> <p>Trunk programming: Disconnect Timing should be increased one step at a time until calls no longer drop. (CMD 500 + equipment number Reg. 2 field f).</p> <p>Check Toll Control Programming.</p> <p>Check for low loop current on trunk.</p>
Phantom calls	<p>Trunk programming: Reversal Meaning should be set to 0 (CMD 500 + trunk number Reg. 2 field e = 0). Check Trunk Programming Loop/Ground Start setting. CMD 500 + trunk number Reg. 2 field g 0=loop 1=ground.</p>
Fading audio, slow or no dial tone.	<p>Disconnect trunk at MDF and test with a telephone set (DTMF or rotary, as required by trunk). Test both outgoing and incoming calls. Test loop current. See Appendix A for method. The current should be between 23 mA and 65 mA.</p> <p>Test loop resistance. Resistance should not exceed serving CO's maximum.</p> <p>Contact telephone company if current or resistance readings are out of tolerance. Corrective measures such as Loop Extenders and/or Voice Frequency Repeaters could be required.</p>
No access.	<p>Check trunk programming, particularly loop/ground start and hardware type.</p> <p>Check seating of cable connectors.</p> <p>Check cross-connect connections for errors, broken wires, debris.</p> <p>Disconnect trunk at MDF and test with a telephone set (DTMF or rotary, as required by trunk). Test both outgoing and incoming calls.</p> <p>Replace trunk card. Ensure cable connected securely.</p>

Table 4-6 Station Troubleshooting

Problem	Procedure
No dial tone.	<p>Ensure that the station number has been programmed.</p> <p>Ensure that station's COS is not 0. Check COS programming.</p> <p>Check telephone set, cabling, line card.</p>
Cannot break dial tone (DTMF sets).	<p>Check for busied-out DTMF receivers.</p> <p>If CO dial tone cannot be broken:</p> <p>Ensure that CO is not rotary only. If it is, tone-to-pulse conversion must be enabled in Trunk Group programming. (CMD 151-156 Reg. 2 field g = 1, 2 or 3).</p> <p>Check Trunk Group programming. Wait for dial tone should be set to 5 seconds. (CMD 151-156 Reg. 2 field b = 1)</p> <p>Refer to Trunk Interface Troubleshooting.</p>

**Table 4-6 Station Troubleshooting  
(continued)**

Problem	Procedure
Cannot ring stations.	If all stations are affected, but programming is correct, replace power-supply (contains ringing supply). Ensure that station's COS is not 0. Ensure calling station is not programmed as receive only. Ensure called station is not programmed as originate only. Ensure Call Forwarding is not activated on this set. Try a different telephone set.
Call drops when switch-hook flash performed.	Ensure user performs switchhook flash correctly. Increase flash timing to 150 ms min., 1.5 s max. (CMD 100 Reg. 6 field c = 1). Ensure, however, that this does not cause a problem when flashing while connected to a trunk.
Page 2 of 2	

**Table 4-7 Peripheral Equipment Troubleshooting**

Problem	Procedure
Alarm 21 – Dial Tone Detector Failure.	Busy out the remaining tone detectors. Unbusy failed tone detector. Attempt trunk call where Wait for Dial Tone is programmed. If alarm recurs, replace Control Card.
Alarm 24 – DTMF Receiver Failed.	Busy out the other three DTMF receivers. Unbusy failed receiver. Attempt a call from a station. If an alarm is raised or there is no dial tone, replace Control Card.
Alarm 26 – DTMF Generator Failed.	Unbusy DTMF Generator, clear alarm. Attempt a trunk call from the console. If alarm is generated or outpulsing is heard, replace Control Card.
No response at console.	From Test Line, check that system is <b>not</b> programmed for consoleless operation. (Command 100 Register 2 field d must be 0). Try another console. Try another Control Card.

## 5.

**TROUBLESHOOTING AIDS****Maintenance-related Attendant Functions****Access Trunks by Equipment Number (\*19 + Trunk Number)**

- 5.1 This function connects the Attendant Console to the selected trunk. If the trunk is idle or busied-out, CO dial tone is received. If the trunk is in use, busy tone is received.

**Alarm – Cancel All Alarms and Busy-outs (\*32)**

The Alarm LED turns off, all stored alarm messages are erased and all busied-out equipment is restored to normal operation.

**Note:** Attendant function 32 will not clear busy-outs if function 32 was performed within the preceding 60 seconds. If busy-outs do not clear in response to function 32, wait 60 seconds and repeat the command.

**Alarm – Identify and store (\*13)**

The alarm message is displayed. The ALARM LED stops flashing and remains lit; the console bell stops ringing.

**Alarm – Display alarm from log and delete (\*31)**

The alarm message is displayed and then deleted. Display begins with the active alarm, if there is one, or the last alarm message in the memory. Subsequent uses of this command display and delete the older messages in the memory. When the last alarm message has been read, NO ALARMS is returned.

**Alarm – Print Buffer (\*90)**

This command controls the printing of the alarm messages in the memory. The system asks **PRINT ALARM BUFFER OPTION ?**. 1 enables printing as alarms are raised. 0 disables printing. A reply of # prints all the alarms, regardless of enable/disable setting.

**Busy-out Dial Tone Detector (\*44)**

The system asks **DIAL TONE DETECTOR TO BUSY OUT ?**. Reply 1, 2, 3 or 4.

**Busy-out DTMF Generator (\*42)**

The DTMF Generator is busied-out. Diagnostics tests that use the DTMF Generator are bypassed. Dialing originating in the *SX-50* system (e.g., Abbreviated dialing) is performed by outpulsing.

**Busy-out DTMF Receiver (\*43)**

The system asks **DTMF RECEIVER TO BUSY OUT ?**. Reply 1, 2, 3, 4 or 5.

**Busy-out Trunk (\*41)**

The system asks **TRUNK TO BUSY OUT ?**. Reply with equipment number. Trunk will be available only through the Access Trunk by Equipment Number command. The associated trunk status LED flashes slowly.

**Data Dump (\*97)**

The display shows **DATA DUMP**. Printing will not begin until the System Security Code (default 7772) has been entered.

**Data Load (\*98)**

The display shows **DATA LOAD**. Loading will not begin until the System Security Code (default 7772) has been entered. Data is loaded at a rate of up to 1200 Baud through the RS-232 port.

**Lamp Test (\*16)**

The ALARM LED and the three HOLD LEDs light. The display shows **LAMP TEST**. Press **RELEASE** or **CANCEL** to end test.

**Printer (\*75)**

The system asks **PRINT OPTION ?** A reply of \* suspends printing. 0 purges printer. # allows printer to resume.

**Trunk Forced Release (\*20)**

The system asks **FORCED RELEASE FOR TRUNK ?**. Reply with equipment number. This command should be used with care, as it cuts off any call in progress on the trunk.

**Unbusy Dial Tone Detector (\*54)**

The system asks **DIAL TONE DETECTOR TO FREE ?** Reply 1, 2, 3 or 4.

**Unbusy DTMF Generator (\*52)**

The DTMF Generator is available for normal access and diagnostics.

**Unbusy DTMF Receiver (\*53)**

The system asks **DTMF RECEIVER TO FREE ?** Reply 1, 2, 3, 4 or 5.

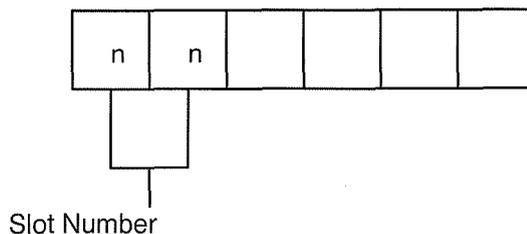
**Unbusy Trunk (\*51)**

The system asks **TRUNK TO FREE ?**. Reply with equipment number. Actual release, indicated by trunk status LED being turned off, may not occur for another 45 seconds. The trunk will then be idle and accessible.

Table 5-1 Maintenance-Related Attendant Functions

Attendant Function	Code
Access Trunk by Equipment Number	*19
Alarm – Cancel all alarms and Busy-outs, Clear indications	*32
Alarm – Display alarm from log and delete	*31
Alarm – Identify and store	*13 or ALARM key
Alarm – Print buffer (0 to disable, 1 to enable, # to print)	*90
Busy-out Dial Tone Detector (1-4)	*44
Busy-out DTMF Generator	*42
Busy-out DTMF Receiver (1-5)	*43
Busy-out Trunk	*41
Data Dump (system security code required)	*97
Data Load (system security code required)	*98
Lamp Test	*16
Printer (* to suspend, 0 to purge, # to resume)	*75
System Status – Software Identity	STATUS key
Trunk Forced Release	*20
Unbusy Dial Tone Detector (1-4)	*54
Unbusy DTMF Generator	*52
Unbusy DTMF Receiver	*53
Unbusy Trunk	*51

## COMMAND 900 UNIVERSAL CARD RESET



When the 'RESET' softkey is pressed, the Universal Card in the slot indicated is reset. This command has no effect on other card types.

**Note:** Key sequence '\*4' is equivalent to 'RESET'.

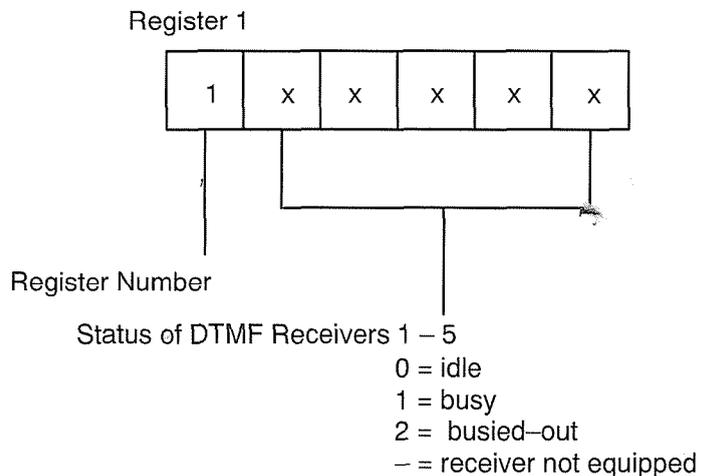
### Maintenance Equipment Status Display Functions

5.2 The SX-50 system includes the following functions to allow maintenance personnel to examine the status of different parts of the system equipment.

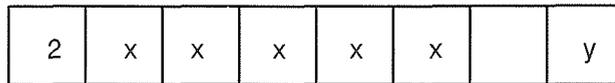
Table 5-2 Maintenance Equipment Status Display Functions	
Maintenance Equipment Status Display Function	Code
System Status	#980
Inter-DX Link Status Display	#981
Station Status Display	#982
<i>SUPERSET</i> Status Display	#983
Trunk Status Display	#984
Install default database	#998

#### COMMAND 980 – SYSTEM STATUS DISPLAY

System Status Display shows the status of Dial tone detectors, the Tone Generator, DTMF Receivers and diagnostic tests.



Register 2



Register Number

Status of Dial Tone Detectors 1 – 4

- 0 = idle
- 1 = busy
- 2 = busied-out

Status of Tone Generator

- 0 = idle
- 1 = busy
- 2 = busied-out

Register 3



Register Number

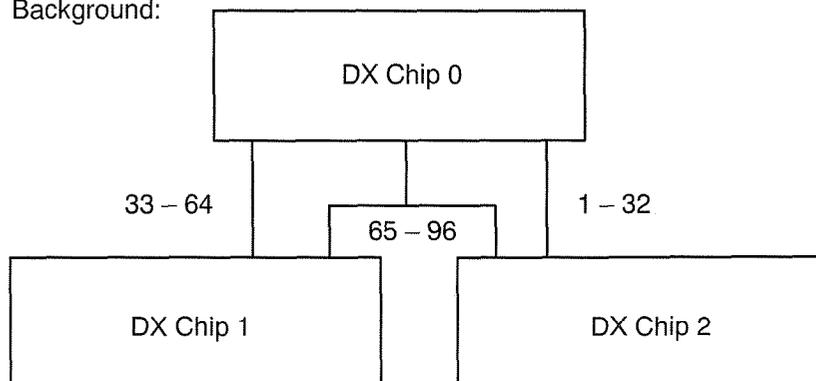
Current Diagnostic Test:

- 0: No test is running
- 1: PROM checksums
- 2: Volatile RAM test
- 3: Non-volatile RAM checksums
- 4: Scheduling diagnostics
- 5: DX diagnostics
- 6: Tone detector diagnostics
- 7: Tone generator diagnostics
- 8: DTMF receiver diagnostics
- 9: Tone detector diagnostics
- 10: Conference diagnostics
- 11: Tone detector diagnostics
- 12: Console diagnostics
- 13: Tone detector diagnostics
- 14: Line/trunk diagnostics
- 15: Inter-DX Lockup Diagnostics

### COMMAND 981 – INTER-DX LINK STATUS DISPLAY

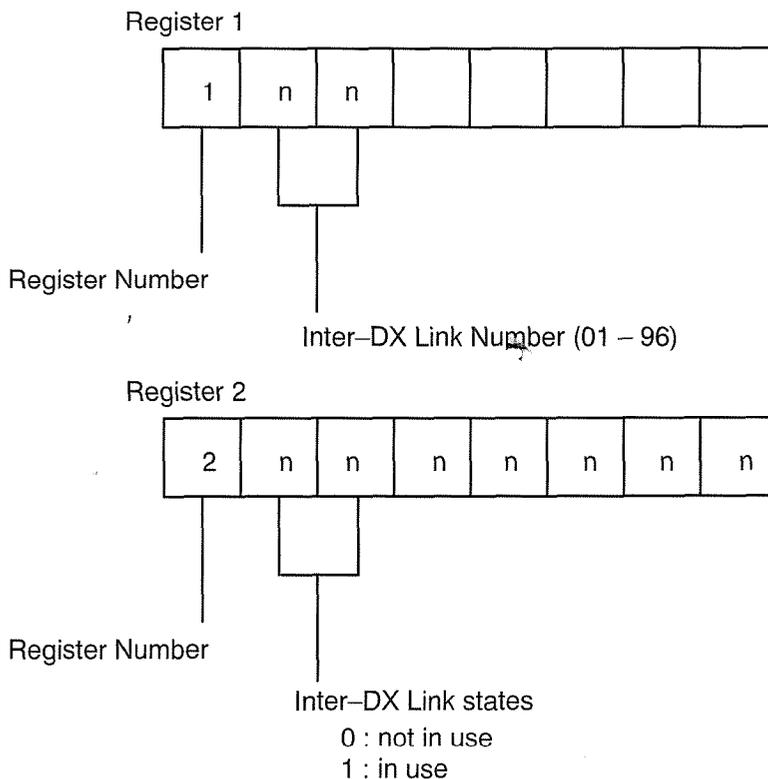
This command provides status information on the Inter-DX chip connection links.

Background:



- Links 1–32 connect chips 0 and 2.
- Links 33–64 connect chips 0 and 2.
- Links 65–96 connect chips 0 and 1 or 0 and 2.

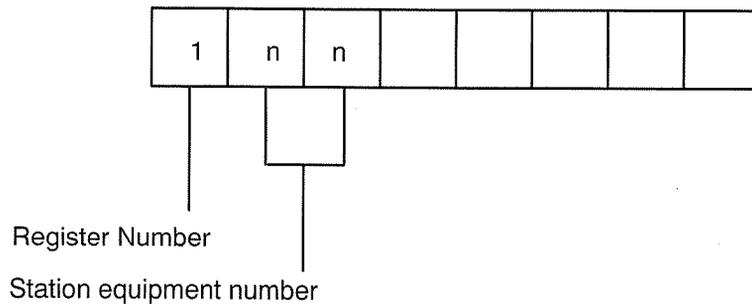
- Devices in slots 1 and 2 use DX 0.
- Devices in slots 3,4,5 and 6 use DX 1.
- Devices in slots 7,8,9 and 10 use DX 2.



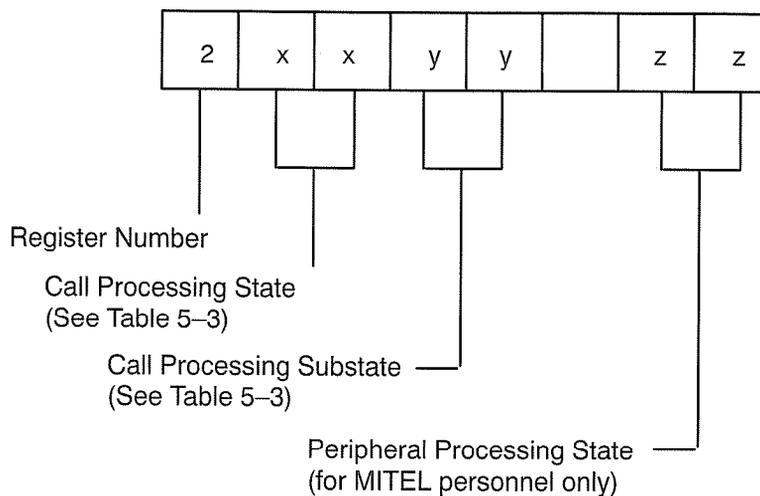
Inter-DX Link states are stored in bytes, so the display shows eight links at a time. The state of the Inter-DX Link actually requested identifies itself by flashing.

**COMMAND 982 – STATION STATUS DISPLAY**

Register 1

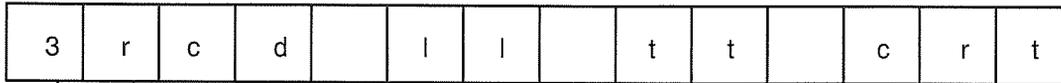


Register 2



**COMMAND 982 – STATION STATUS DISPLAY (CONT'D)**

Register 3



Register Number

DTMF Receiver (1-5)

Conference circuit (1-6)

Dial Tone Detector (1-4)

Inter-DX Link Number (1-4)

Source Tone ID

ID	Tone Type
00	QUIET
01	BUSY
02	RING BACK
03	DIAL TONE
04	REORDER
05	TRANSFER DIAL TONE
06	STATION CAMP-ON
07	TRUNK CAMP-ON
08	DISCONNECT (not used)
09	CAMPED-ON BUSY
10	CALL FORWARD FOLLOW ME DIAL TONE
11	EXECUTIVE BUSY OVERRIDE SIGNAL
12	DIAL TONE PROMPT
13	BEHIND PBX DIAL TONE
14	AUTOMATIC WAKE-UP TONE

Codec Function Control

- 0 : Normal Filter/Codec Operation
- 1 : Digital Loopback
- 2 : Analog Loopback
- 3 : Power Down

Codec Receive Filter Gain

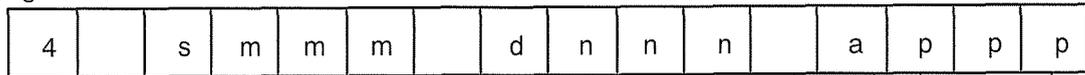
- 0-7 = 0, -1, -2, -3, -4, -5, -6, -7

Codec Transmit Filter Gain

- 0-7 = 0, +1, +2, +3, +4, +5, +6, +7

COMMAND 982 – STATION STATUS DISPLAY (CONT'D)

Register 4



Register Number

Source Device Type  
(T, E, S, L, R, B, O, H ?)

Source Device Equipment Number

Destination Device Type (T, E, S, L, R, B, O, H ?)

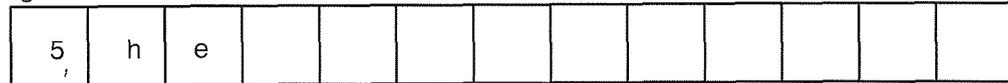
- Device Types:
- T Trunk
  - E Extension
  - S SS3 or SS4
  - L trunk group (Level 9)
  - R Ring group
  - B night Bell
  - O Operator (console)
  - H Hunt group
  - ? not known

Destination Device Equipment Number

Auxiliary Device Type (T, E, S, L, R, B, O, H ?)

Auxiliary Device Equipment Number

Register 5

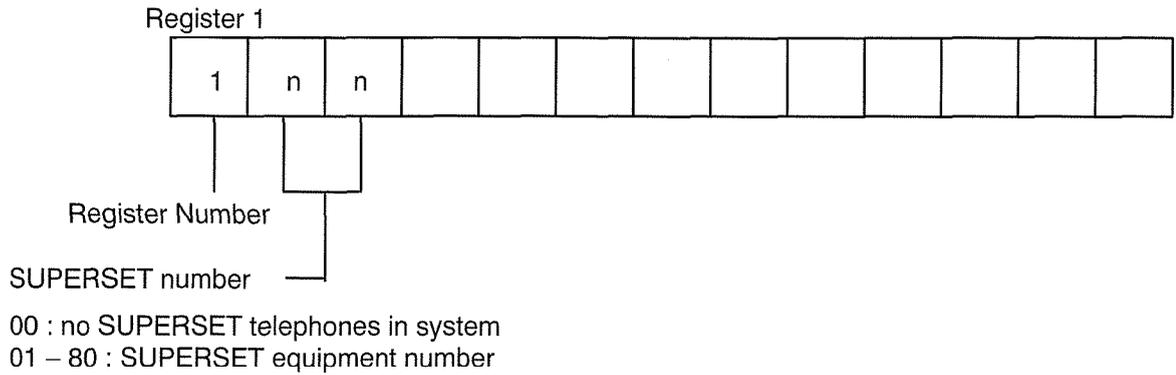


Register Number

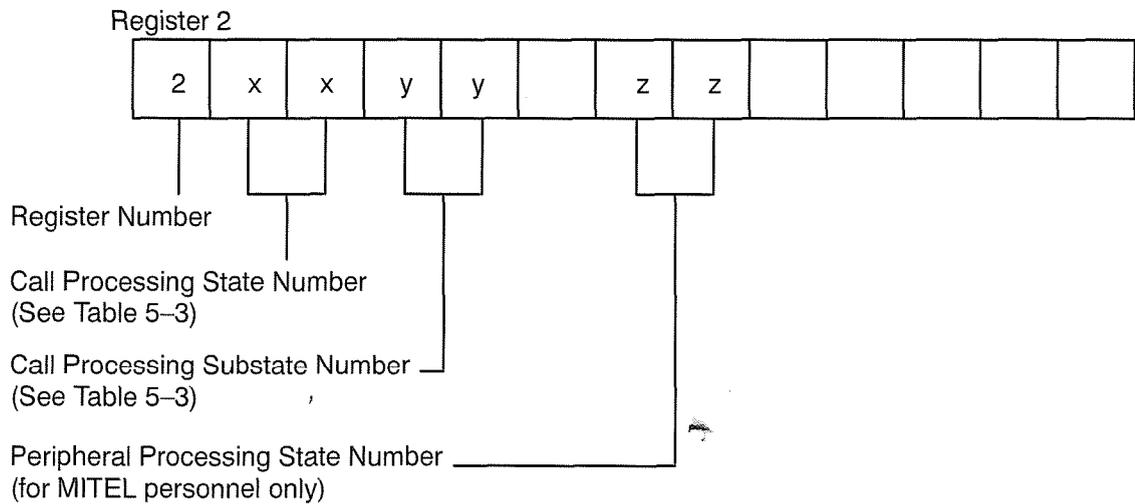
Station Condition  
0 = on-hook  
1 = off-hook

European Ground Button  
0 = down  
1 = up

**COMMAND 983 – SUPERSET STATUS DISPLAY**

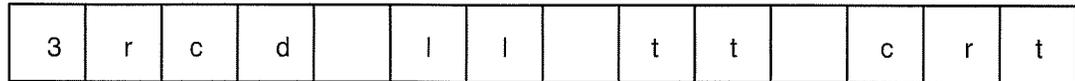


When this command is initially entered, it displays the lowest *SUPERSET 4* equipment number currently programmed.



**COMMAND 983 – SUPERSET STATUS DISPLAY (CONT'D)**

Register 3



Register Number

DTMF Receiver (1-5)

Conference circuit (1-6)

Dial Tone Detector (1-4)

Inter-DX Link Number (1-4)

Source Tone ID

ID	Tone Type
00	QUIET
01	BUSY
02	RING BACK
03	DIAL TONE
04	REORDER
05	TRANSFER DIAL TONE
06	STATION CAMP-ON
07	TRUNK CAMP-ON
08	DISCONNECT (not used)
09	CAMPED-ON BUSY
10	CALL FORWARD FOLLOW ME DIAL TONE
11	EXECUTIVE BUSY OVERRIDE SIGNAL
12	DIAL TONE PROMPT
13	BEHIND PBX DIAL TONE
14	AUTOMATIC WAKE-UP TONE

Codec Function Control

- 0 : Normal Filter/Codec Operation
- 1 : Digital Loopback
- 2 : Analog Loopback
- 3 : Power Down

Codec Receive Filter Gain

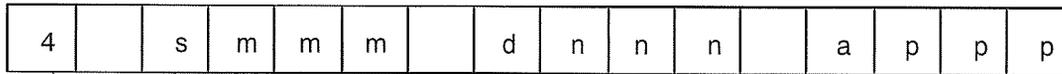
- 0-7 = 0, -1, -2, -3, -4, -5, -6, -7

Codec Transmit Filter Gain

- 0-7 = 0, +1, +2, +3, +4, +5, +6, +7

**COMMAND 983 – SUPERSET STATUS DISPLAY (CONT'D)**

Register 4



Register Number

Source Device Type  
(T, E, S, L, R, B, O, H ?)

Source Device Equipment Number

Destination Device Type (T, E, S, L, R, B, O, H ?)

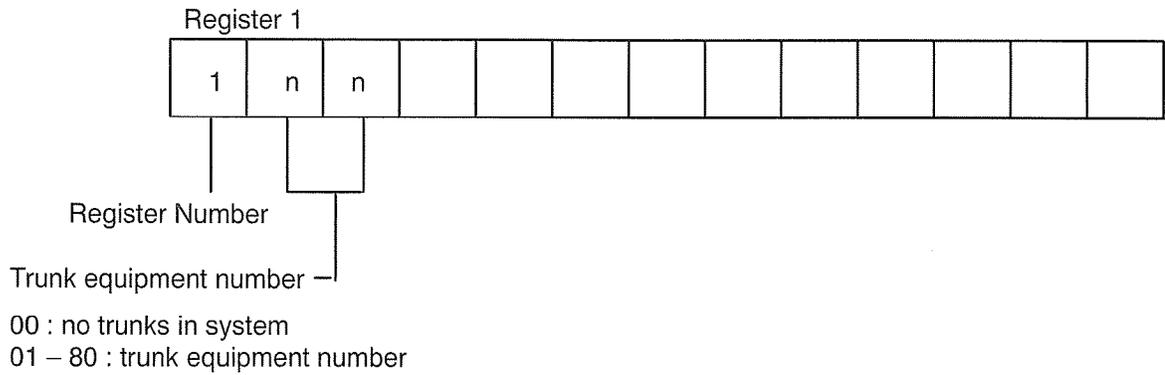
- Device Types:
- T Trunk
  - E Extension
  - S SS3 or SS4
  - L trunk group (Level 9)
  - R Ring group
  - B night Bell
  - O Operator (console)
  - H Hunt group
  - ? not known

Destination Device Equipment Number

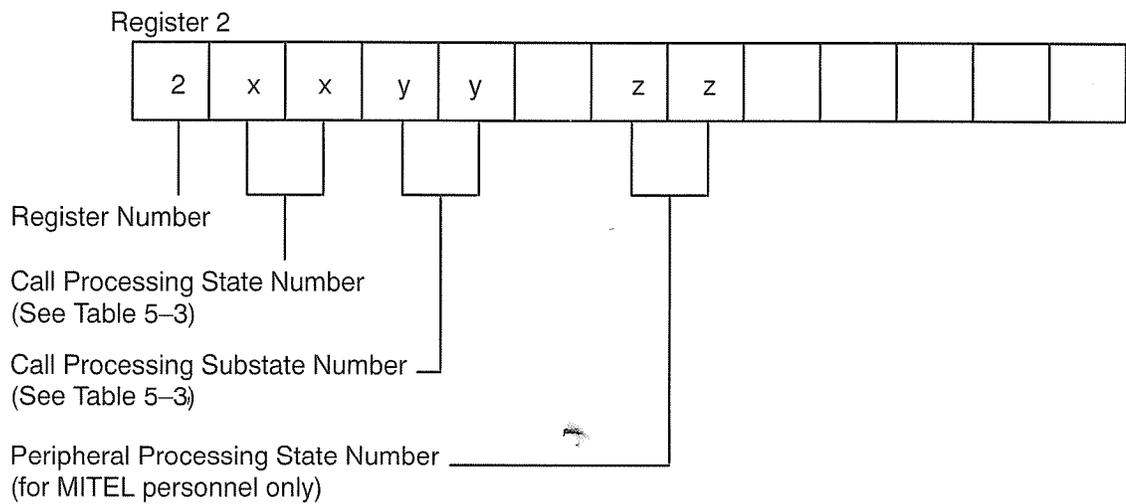
Auxiliary Device Type (T, E, S, L, R, B, O, H ?)

Auxiliary Device Equipment Number

**COMMAND 984 – TRUNK STATUS DISPLAY**

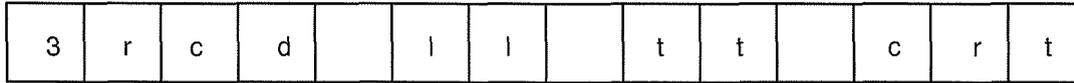


When this command is initially entered, the lowest installed trunk equipment number is displayed.



**COMMAND 984 – TRUNK STATUS DISPLAY (CONT'D)**

Register 3



Register Number

DTMF Receiver (1-5)

Conference circuit (1-6)

Dial Tone Detector (1-4)

Inter-DX Link Number (1-4)

Source Tone ID

ID	Tone Type
00	QUIET
01	BUSY
02	RING BACK
03	DIAL TONE
04	REORDER
05	TRANSFER DIAL TONE
06	STATION CAMP-ON
07	TRUNK CAMP-ON
08	DISCONNECT (not used)
09	CAMPED-ON BUSY
10	CALL FORWARD FOLLOW ME DIAL TONE
11	EXECUTIVE BUSY OVERRIDE SIGNAL
12	DIAL TONE PROMPT
13	BEHIND PBX DIAL TONE
14	AUTOMATIC WAKE-UP TONE

Codec Function Control

- 0 : Normal Filter/Codec Operation
- 1 : Digital Loopback
- 2 : Analog Loopback
- 3 : Power Down

Codec Receive Filter Gain

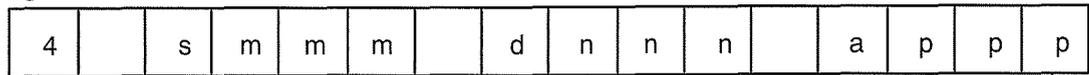
- 0-7 = 0, -1, -2, -3, -4, -5, -6, -7

Codec Transmit Filter Gain

- 0-7 = 0, +1, +2, +3, +4, +5, +6, +7

**COMMAND 984 – TRUNK STATUS DISPLAY (CONT'D)**

Register 4



Register Number

Source Device Type  
(T, E, S, L, R, B, O, H ?)

Source Device Equipment Number

Destination Device Type (T, E, S, L, R, B, O, H ?)

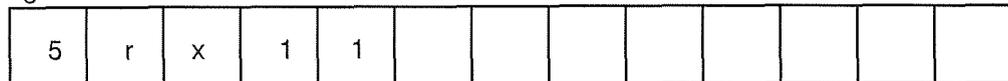
- Device Types:
- T Trunk
  - E Extension
  - S SS3 or SS4
  - L trunk group (Level 9)
  - R Ring group
  - B night Bell
  - O Operator (console)
  - H Hunt group
  - ? not known

Destination Device Equipment Number

Auxiliary Device Type (T, E, S, L, R, B, O, H ?)

Auxiliary Device Equipment Number

Register 5



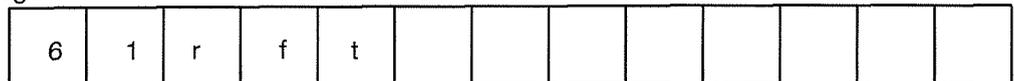
Register Number

Ringing Voltage  
0 = High amplitude AC  
detected on Tip & Ring

RESERVED

External Ground  
(Message Registration)  
0 = not grounded  
1 = grounded

Register 6



Register Number

RESERVED

Reverse Current Condition  
(not applicable during ringing)  
0 = absent, 1 = present (Tip more negative than Ring)

Tip Ground Condition  
0 = not grounded  
1 = present (from CO)

Forward Current Condition  
0 = absent  
1 = present (from CO)

**Table 5-3 Call Processing State and Substate Codes**

Code	State	Substates
01	Idle	14 Wait for line Select (SUPERSET Telephone)
02	Waiting for a Receiver	
03	Signaling	see Signaling SUBSTATES below
04	Busy	15 Busy Override
05	Reorder	
06	Camped on	16 Swap/call Forward
07	Held	
08	Waiting for Answer	2E Auto-answer
09	Talk	2B Wait for trunk Release
0A	Message Waiting	2C Wait for connection
0B	Calling Back	2D Connected
0C	Trunk Signaling	
0D	Automatic Wake-up	
0E	Announcement	
0F	Message Register Audit	
10	Special Set Hard Hold	
11	SMDR	
12	Wake up Printer Queue	

Signaling Substates	
19	System Administration
1A	Console Functions
1B	Direct Trunk Select
1C	Hold W Voice Indication
1D	Call Hold Pickup
1E	Super Functions
1F	Waiting for DISA Access Code
20	Behind PBX Special Substate
21	Speed Call Set Up
22	Manual Digits Into Speed Call Num
23	Select Trunk Substate
24	Add Held Trunk Signaling
25	Wait for Dial Tone Detector
26	Wait For Dial Tone
27	Wait For Manual Dial Tone Indication
28	Get Receiver
29	Trunk Dialing
2A	Delay Dialing

# Appendix A.

## LOOP CURRENT MEASUREMENT

### General

A.1 There are two methods for measuring loop current:

1. In-line measurement
2. Voltage conversion measurement.

The in-line method is the most accurate. The voltage conversion method can be used where it is undesirable or not possible to break the loop.

**In-Line Method.** Proceed as follows:

1. Open either the Tip or Ring lead by removing one of the bridge clips at the MDF.
2. Connect the ammeter leads where the bridge clip was removed, restoring the loop circuit.
3. Read the current when dial tone is present and on a completed call.

**Voltage Conversion Method.** This method is not as accurate as an in-line measurement. Proceed as follows:

1. Connect a voltmeter across Tip and Ring.
2. Read the voltage when dial tone is present and on a completed call.
3. Divide the voltage reading by 250 (the typical resistance seen between Tip and Ring under these conditions).



## Appendix B.

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### LOOP-START/GROUND-START CHECK

#### General

- B.1 This test allows maintenance personnel to determine whether a trunk is a loop-start or ground-start circuit using only a Butt Set and a grounding lead. Proceed as follows:
1. Locate the trunk circuit at the MDF.
  2. Remove the bridge clips to disconnect the trunk from PABX.
  3. Connect the Butt Set across CO Tip and Ring.
  4. Go off-hook at the Butt Set. If dial tone is returned, CO trunk is loop-start.
  5. If no dial tone is returned, momentarily ground the Ring lead while remaining off-hook at the Butt Set. If dial tone is returned, CO trunk is ground-start.
  6. If there is still no dial tone, repeat the above step, but ground the Tip lead instead. If dial tone is returned, CO trunk is ground-start, but Tip and Ring are reversed.



# Appendix C.

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## THE MITEL REPAIR TAG

### General

- C.1 Any card or any other device found faulty must be returned with a Mitel Repair Tag (see Figure C-1). The following information must be included on the repair tag:
1. The date on which the device was returned.
  2. The location of the installation.
  3. The company name.
  4. The product name (e.g., *SX-50*).
  5. The system serial number.
  6. The software generic (e.g., **MS55-MR0-00-E01.4**).
  7. The software revision (e.g., *MS55-MR0-00-E01.4*).
  8. The assembly part number of the item being returned.
  9. The assembly serial number of the item being returned.
  10. Any pertinent alarm/error displays.
  11. A brief description of the symptoms of the problem.
  12. Indicate whether the fault occurred during installation, or while the system was in service.
  13. Include on the back of the repair tag any further information that could be useful (e.g., location of system relative to other office equipment, recent power outages or storms).

