

[®]MICOM *3270* type 3

3270 BSC PAD

User's Manual

Stock Number 800-1391-1a

MICOM[®]

MICOM *BITX* type 3

3270 BSC PAD

User's Manual

Stock Number 800-1391-1a

WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with this manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

If radio frequency interference is encountered after installation of the equipment, necessary corrective measures are required to reduce this interference. Information about recommendations for such measures can be obtained from the manufacturer. Contact MICOM Corporate Headquarters for assistance.

March 1987

Copyright © MICOM Systems, Inc. 1986, 1987
All rights reserved

No part of this publication may be copied without
written permission from MICOM Systems, Inc.

RELEASE NOTICE

1. Selection 3 of software switch group SYS3 should be set to OFF:
 - ON = Future product support
 - OFF = MB3-3270 BSC PAD configuration

2. In this manual, detailed information about IBM products is given to illustrate the functionality of MICOM's 3270 Bisynchronous (BSC) Packet Assembler/Disassembler (PAD). Every effort has been made to ensure accuracy, but the reader should always refer to IBM product manuals for complete, detailed information on IBM products.



THANK YOU FOR CHOOSING THE MICOM BOX Type 3 3270 BSC PAD

The MICOM BOX Type 3 3270 BSC PAD, a member of MICOM's family of intelligent data communications products, is designed to help you get the most out of your IBM network.

This User's Manual, in turn, is designed to help you get the most out of your new MICOM BOX Type 3 3270 BSC PAD by giving you all the information you need to use it effectively.

WARRANTY

MICOM provides a warranty for this 3270 BSC PAD, as described on the Warranty Page. Information about equipment repair by MICOM Customer Service is also on the Warranty Page.

Because it is likely that your unit will be damaged if you ship it in other than the original shipping materials, you should retain these materials and use them whenever you ship your unit.

PUBLICATION CHANGE REQUEST

At the end of this manual, there is a postage-paid comment form for you to use if you think of an improvement to (or find a mistake in) the manual.

NOTICE

Specifications, tolerances, and design characteristics described in this manual are subject to change without notice.

TRADEMARKS

MICOM, MICOM BOX, FEATUREPAK, and INSTANET are trademarks of MICOM Systems, Inc.

Compro is a trademark of Computer Professionals, Inc.

Comten is a trademark of NCR Corporation.

IBM is a trademark of International Business Machines Corporation.

SAFETY WARNING

Always observe standard safety precautions during installation, operation, and maintenance of this product. To avoid the possibility of electrical shock, be sure to disconnect the power cord from the power source before you remove the power supply fuse or perform any repairs.

WARRANTY

MICOM warrants that the equipment delivered shall be free from defective material and workmanship for a period of 1 year from the date of delivery of equipment when given normal, proper and intended usage, and agrees to repair or replace, without cost, any part manufactured by MICOM provided that:

- (a) MICOM is promptly notified upon discovery that the equipment is defective;
- (b) The equipment is returned prepaid to the MICOM plant from which the equipment was shipped; and
- (c) MICOM's examination of the equipment shall disclose that any defect was not caused by accident, misuse, neglect, alteration, improper installation, unauthorized repair or improper testing.

MICOM may, in its sole discretion, elect to repair or replace the equipment, in which event MICOM shall have a reasonable time to make repairs or to replace the equipment. MICOM will return the equipment freight prepaid.

THE PROVISIONS OF THIS WARRANTY ARE IN LIEU OF ANY OTHER WARRANTY, WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL (INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), AND MICOM'S LIABILITY ARISING OUT OF THE MANUFACTURE, SALE, OR SUPPLYING OF THE EQUIPMENT OR ITS USE, WHETHER BASED UPON WARRANTY, CONTRACT, NEGLIGENCE, PRODUCTS LIABILITY OR OTHERWISE, SHALL NOT EXCEED THE ORIGINAL COST TO THE BUYER OF THE EQUIPMENT. IN NO EVENT SHALL MICOM BE LIABLE TO THE BUYER OR ANY OTHER PERSON OR ENTITY FOR UNINTENDED OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS OR USE DAMAGES) ARISING OUT OF THE MANUFACTURE, SALE OR SUPPLYING OF THE EQUIPMENT.

MICOM warrants all repairs or upgrades performed at its factory location or performed by MICOM Customer Service for a period of 90 days after completion.

HOW TO GET YOUR EQUIPMENT FIXED BY MICOM CUSTOMER SERVICE

MICOM's Customer Service offers a wide range of support functions, including complete factory repair for both in-warranty and out-of-warranty equipment.

Before returning any equipment, please contact MICOM Customer Service or your local Distributor. In the U.S.A. and Canada, call MICOM's Customer Service Hotline (800) 833-3282. In all other countries, contact your local MICOM Distributor.

A Customer Service engineer will answer warranty-related questions, discuss your specific equipment problems, and — when necessary — give you shipping instructions for returning equipment to MICOM for repair. To return a product for service or repair, you *must* obtain a Return Authorization number from MICOM Customer Service.

When you do call Customer Service, it will be very helpful to know the PROM set number of the unit malfunctioning. You can easily determine this information by looking at the label on the bottom of the FEATUREPAK cartridge.

Shipping charges must be prepaid.

PREFACE

PURPOSE

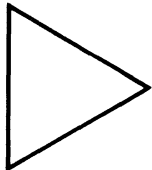
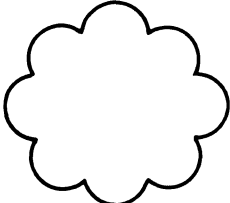
This manual provides information on the installation, configuration, and operation of MICOM's 3270 Bisynchronous (BSC) Packet Assembler/Disassembler (PAD). The 3270 BSC PAD allows devices in an IBM 3270 BSC environment to communicate with each other through a cost-reducing, X.25-compatible packet-switching network.

AUDIENCE

This manual is meant for the network administrator who is familiar with the IBM 3270 BSC Protocol, and who has had experience in using IBM or IBM-compatible equipment. Familiarity with the 3270 Display System Protocol (DSP) is also assumed. In addition, it is not within the scope of this manual to provide the reader with detailed information on the CCITT Recommendation X.25. If you want more information on any of these topics, refer to the suggested reading list that is provided in paragraph 1.5.

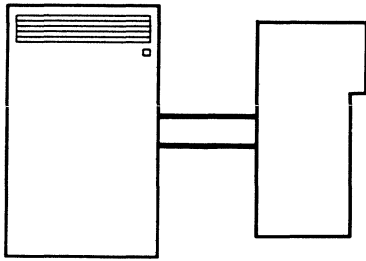
GRAPHICS CONVENTIONS

The following graphics symbols may be used throughout this manual to represent network equipment.

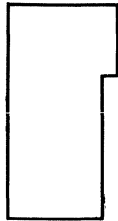
<u>Symbol</u>	<u>Description</u>
	MICOM PAD. Where needed, labels define the type of PAD, that is, HPAD, TPAD, or asynchronous PAD. (Refer to section 1 for descriptions of the HPAD and TPAD.)
	X.25 Public Data Network (PDN)

Symbol

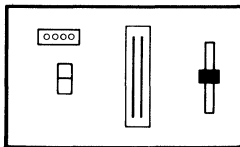
Description



IBM 3705 front-end processor that is channel attached to a mainframe



IBM 3270 BSC front-end processor (mainframe not shown)



IBM 3274 cluster controller. Wherever this is shown, you can substitute a 3271 or a 3276.



IBM 327x cluster controller with attached devices. This symbol is used instead of the previous (3274) symbol due to space limitations in complex network diagrams. When numbering appears along with this symbol (40, C1, C2, and so on), it represents poll addresses.



IBM 327x display station (synchronous terminal)



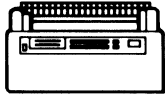
Asynchronous (ASCII) terminal



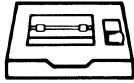
Personal computer

Symbol

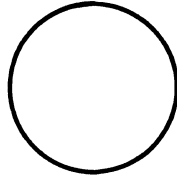
Description



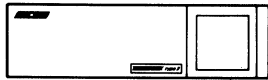
IBM 3287 printer



ASCII printer



MICOM X.25 packet switch



MICOM protocol converter



MICOM Data PABX



Modem



Modem-sharing unit



Screen display

ORGANIZATION

This manual contains six sections and five appendixes.

- SECTION 1 **PRODUCT OVERVIEW** gives a general description of the PAD's components and characteristics. In addition, it contains a suggested reading list.
- SECTION 2 **INSTALLATION AND SOFT SWITCH CONFIGURATION** gives instructions on installing the PAD and configuring its software (soft) switches to meet your operating requirements.
- SECTION 3 **THEORY OF OPERATION** provides information on the internal operation of the PAD. In addition, it shows sample applications (network layouts).
- SECTION 4 **USING THE COMMAND FACILITY** describes how to use the PAD's Command Facility to configure BSC lines and devices, to gather PAD performance statistics, and so on.
- SECTION 5 **TPAD USER INTERFACE** gives information on placing calls through the network, on clearing calls, and so on. It also includes a list of cause and diagnostic codes.
- SECTION 6 **DIAGNOSTICS AND TROUBLESHOOTING** provides information on the PAD's indicators and provides some guidelines for troubleshooting problems.
- APPENDIX A **CONFIGURATION SHEETS** contains configuration worksheets that can be used when configuring BSC lines and devices.
- APPENDIX B **ASCII CHART** is a reference guide that is provided for your convenience. It is especially helpful when you define the profile for the Command port device.
- APPENDIX C **ASCII-TO-EBCDIC CODE CONVERSION TABLE** is an additional reference guide.
- APPENDIX D **HIGH-SPEED OPTIONS** describes the PAD's V.35 and X.21 high-speed X.25 link interface options. These options include a special FEATUREPAK cartridge and a V.35 or X.21 daughterboard for the link (composite) interface. Installation and upgrade procedures included in this appendix are intended for the experienced communications technician.
- APPENDIX E **COMMAND PORT USER INTERFACE** provides information on placing asynchronous calls from the PAD's local Command port. This appendix also includes tables of X.28 commands and PAD service signals.

CONTENTS

Paragraph	Topic	Page
SECTION 1 - PRODUCT OVERVIEW		
1.1	ORDERING INFORMATION	1-5
1.2	PHYSICAL COMPONENTS	1-7
	Base Module	1-8
	Enclosure	1-8
	Touch Panel	1-8
	Indicators	1-9
	FEATUREPAK Cartridge	1-9
	Power Supply	1-9
1.3	SUMMARY OF PAD CHARACTERISTICS	1-10
	General Characteristics	1-10
	BSC Line Support Characteristics	1-11
	X.25 Link Characteristics	1-11
1.4	PHYSICAL SPECIFICATIONS	1-12
1.5	SUGGESTED READING LIST	1-13
SECTION 2 - INSTALLATION AND SOFT SWITCH CONFIGURATION		
2.1	SELECTING THE INSTALLATION LOCATION	2-1
2.2	INSTALLATION	2-1
	Applying the Indicator Strip to the Base Module	2-1
	Installing and Removing a FEATUREPAK Cartridge	2-2
	Installing the PAD	2-3
2.3	TOUCH PANEL	2-11
	Configuring the PAD for Operation	2-11
	Configuring the X.25 Trunk	2-12
	Configuring EIA Control-Signal Bias	2-14
	How the PAD Stores Operating Parameters	2-15
	How to Operate the Touch Panel	2-15

CONTENTS

Paragraph	Topic	Page
SECTION 3 - THEORY OF OPERATION		
3.1	X.25 SUPPORT	3-1
	The X.25 Connection	3-2
	Trunk Parameters	3-2
	Virtual Circuits	3-4
	Trunk Out-of-Order	3-5
	Effect of Reestablishing Trunk Operation	3-6
	Packet Description	3-6
	Billing and Accounting	3-7
	Trunk Password Protection	3-8
	Addressing	3-8
3.2	SYNCHRONOUS DEVICE SUPPORT	3-9
	Central Processing Units	3-9
	Communications Control Units	3-12
	BSC Line Support in the Communications Control Unit	3-13
	Access Methods	3-13
3.3	ASPECTS OF THE BSC PROTOCOL	3-18
	General and Specific Polls	3-18
	Selects	3-18
	Printer Support	3-20
3.4	DISPLAY SYSTEM PROTOCOL	3-20
	Read and Write Commands	3-21
	Delays	3-22
3.5	CALLING PROCEDURES	3-23
	Determining Whether to Use CRM1, CRM2, or CRM3	3-23
	Connection Request Mode 1	3-26
	Connection Request Mode 2	3-29
	Connection Request Mode 3	3-30
	BSC Connection Diagnostics	3-32
	Automatic Call Clearing	3-32
3.6	APPLICATIONS	3-33
	Public BSC Networks	3-33
	Private BSC Networks	3-36
3.7	ATM SUPPORT	3-39

CONTENTS

Paragraph	Topic	Page
SECTION 4 - USING THE COMMAND FACILITY		
4.1	PURPOSE OF THE COMMAND FACILITY	4-1
4.2	SETTING UP THE PAD	4-2
4.3	ACCESSING THE COMMAND FACILITY	4-2
	Using the Dedicated Command Port	4-3
	Using the Network	4-4
4.4	LOGGING ONTO THE COMMAND FACILITY	4-5
	Command Facility Menu	4-7
	Selecting a Command Facility Menu Function	4-8
4.5	CONFIGURATION	4-8
	Guidelines and Notational Conventions	4-12
	Configuring BSC Lines	4-13
	Defining the Devices Attached to the PAD	4-16
	Configuring the X.25 Trunk	4-26
	Configuring the Switched Virtual Circuits	4-30
	Configuring Address IDs	4-31
	Enabling the Command Port to Receive Call Accounting and Events Data	4-38
	Defining Device Profiles	4-39
	Defining the Output Intervals for Periodic Statistics Reporting	4-52
	Defining Screen Formats	4-53
	Setting the PAD's Software (Soft) Switches	4-57
4.6	X.25 TRUNK CONTROL	4-60
	Checking the Status of the Trunk	4-60
	Using the Trunk Down Command	4-60
	Using the Trunk Up Command	4-60
4.7	DISPLAYING AND RESETTING PERFORMANCE STATISTICS	4-61
4.8	SYSTEM RESET	4-64
4.9	LOGGING OUT OF THE COMMAND FACILITY	4-65

CONTENTS

Paragraph	Topic	Page
SECTION 5 - TPAD USER INTERFACE		
5.1	COMMAND SCREEN	5-1
	Placing a Call	5-2
	Clearing a Call	5-5
	Sending Test Request Data	5-5
	Resuming a Call	5-5
	Checking Connection Status	5-6
5.2	CAUSE AND DIAGNOSTIC CODES	5-7
SECTION 6 - DIAGNOSTICS AND TROUBLESHOOTING		
6.1	SELF TEST	6-1
6.2	DIAGNOSTIC TOOLS OFFERED BY THE PAD	6-1
6.3	INDICATORS	6-2
6.4	TROUBLESHOOTING	6-4
APPENDIXES		
A	CONFIGURATION WORKSHEETS	A-1
B	ASCII CHART	B-1
C	ASCII-TO-EBCDIC CODE CONVERSION TABLE	C-1
D	HIGH-SPEED OPTIONS	D-1
D.1	INSTALLING A PAD WITH A HIGH-SPEED X.25 LINK	D-2
D.2	UPGRADING A STANDARD RS-232-C X.25 LINK TO HIGH-SPEED	D-3
D.3	PIN ASSIGNMENTS FOR HIGH-SPEED LINKS	D-8
D.4	CABLING	D-10

CONTENTS

Paragraph	Topic	Page
APPENDIXES (continued)		
E	COMMAND PORT USER INTERFACE	E-1
E.1	PLACING AN OUTGOING ASYNCHRONOUS CALL	E-1
E.2	X.28 COMMANDS	E-3
E.3	PAD SERVICE SIGNALS	E-6
INDEX		

FIGURES

Figure	Title	Page
1-1	The MICOM BOX Type 3	1-1
1-2	Typical BSC Network Without PADs	1-3
1-3	Typical BSC Network With PADs	1-4
1-4	Model Numbers for the MB3-3270 BSC PAD	1-6
1-5	Locations of the Physical Components	1-7
2-1	The Indicator Strip Applied to the Base Module	2-2
2-2	FEATUREPAK Cartridge Removal and Installation	2-3
2-3	Rack-Mount Installation	2-4
2-4	Connectors on the Back of the Enclosure	2-5
2-5	Example of System Cabling	2-7
2-6	Pin Assignments	2-8
2-7	Touch Panel	2-16
2-8	Using the SYS1 Key to Set Operating Parameters	2-18
2-9	Using the SYS2 Key to Set Operating Parameters	2-19
2-10	Using the SYS3 Key to Select EIA Control-Signal Bias	2-20
3-1	Remote and Local Attachments of Equipment	3-10
3-2	Network With TCU	3-11
3-3	Network With CCU	3-12
3-4	BTAM Example	3-14
3-5	TCAM Example	3-16
3-6	VTAM Example	3-17
3-7	Example of a General Poll and a Select	3-19
3-8	General Flow of a Select Across an X.25 Network	3-20
3-9	General Flow of Host Read Commands Across a PDN	3-21
3-10	Basic CRM1 Network	3-27
3-11	CRM1 Network With Multiple Hosts	3-28
3-12	Typical CRM2 Network	3-30
3-13	Typical CRM3 Network	3-31
3-14	Supporting Asynchronous Devices in a BSC Network	3-34
3-15	Accessing Hosts With and Without Integral DSP Support	3-35
3-16	Accessing Multiple Hosts Through a Packet Switch	3-37
3-17	Low-Cost Private Network	3-38
4-1	Local and Remote Access to the Command Facility	4-2
4-2	Command Facility Menu	4-7
4-3	Configure Menu	4-9
4-4	Prompts Related to Items on the Configure Menu	4-10
4-5	Logical and Physical Device Configurations	4-17
4-6	Device Menu	4-18
4-7	Sample Mnemonics Display	4-31
4-8	Connection Request Mode 1	4-34
4-9	Connection Request Mode 3	4-36
4-10	Sample Call Accounting Record	4-39
4-11	MICOM's Command Screen 1	4-54
4-12	MICOM's Command Screen 2	4-54

FIGURES

Figure	Title	Page
4-13	Screen Definitions Configuration Menu	4-55
4-14	Trunk Control Menu	4-60
4-15	Performance Statistics Menu	4-61
4-16	Format of the Performance Statistics Report	4-61
4-17	System Reset Menu	4-64
5-1	MICOM's Command Screen 1	5-1
5-2	MICOM's Command Screen 2	5-2
6-1	Indicators	6-2
A-1	Worksheet for BSC Line Configuration	A-2
A-2	Worksheet for Device Configuration	A-3
D-1	Opening and Closing the Enclosure	D-4
D-2	The Base Module With Standard Daughterboards	D-5
D-3	Configuring a High-Speed Daughterboard as DTE or DCE	D-6
D-4	High-Speed Daughterboard Holes and Connectors	D-7
D-5	V.35 DCE Shielded Cable for Connection to a DTE Device	D-11
D-6	V.35 DTE Shielded Cable for Connection to a DCE Device	D-12
D-7	X.21 DCE Shielded Cable for Connection to a DTE Device	D-13
D-8	X.21 DTE Shielded Cable for Connection to a DCE Device	D-14

TABLES

Table	Title	Page
2-1	Correlation of Soft Switch Selections to Indicators	2-17
3-1	Comparison of Connection Request Modes	3-24
4-1	Logon Prompts	4-6
4-2	BSC Line Configuration Prompts	4-14
4-3	Modify Device Function Prompts	4-19
4-4	Trunk Configuration Prompts	4-26
4-5	SVC Configuration Prompts	4-30
4-6	Address ID Configuration Prompts	4-32
4-7	Command Port Prompts	4-38
4-8	Profile Prompts	4-40
4-9	Screen Definitions Prompts	4-55
4-10	Soft Switch Configuration Prompts	4-58
4-11	Definition of the PAD Performance Statistics Report	4-62
5-1	Cause and Diagnostic Codes Associated With Cleared Calls	5-8
6-1	PAD Indicators	6-3
6-2	Troubleshooting	6-4
D-1	High-Speed Daughterboard Upgrade Kits	D-2
D-2	Composite Pin Assignments -- X.21 to a DTE Device	D-8
D-3	Composite Pin Assignments -- X.21 to a DCE Device	D-8
D-4	Composite Pin Assignments -- V.35 to a DTE Device	D-9
D-5	Composite Pin Assignments -- V.35 to a DCE Device	D-9
E-1	Set and Read Parameters Commands	E-4
E-2	Miscellaneous Commands	E-5
E-3	PAD Service Signals	E-6
E-4	Reset Service Signals	E-7

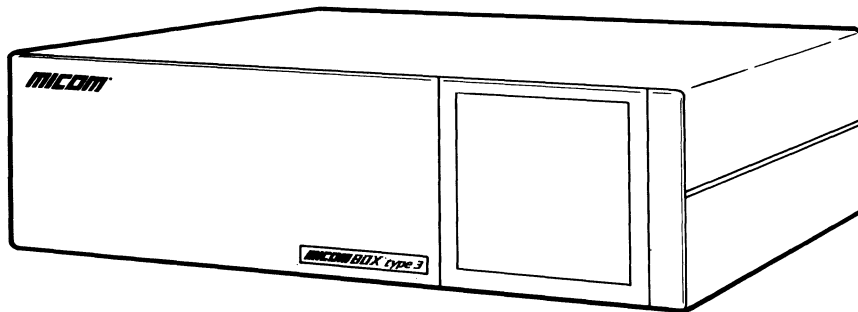
SECTION 1
PRODUCT OVERVIEW

This section first gives you a brief introduction to the MICOM BOX Type 3 (MB3) 3270 Bisynchronous (BSC) Packet Assembler/Disassembler (PAD). Following the introductory paragraphs are descriptions on:

- How to order the MB3-3270 BSC PAD
- Physical components
- PAD characteristics
- Physical specifications

This section concludes with a suggested reading list.

The unit shown in figure 1-1 is the MB3. It can support a variety of data communications applications. This manual describes the 3270 BSC PAD application. Throughout this manual, the MB3-3270 BSC PAD will be referred to most often as the PAD.



MI-1387-1a-01

Figure 1-1. The MICOM BOX Type 3

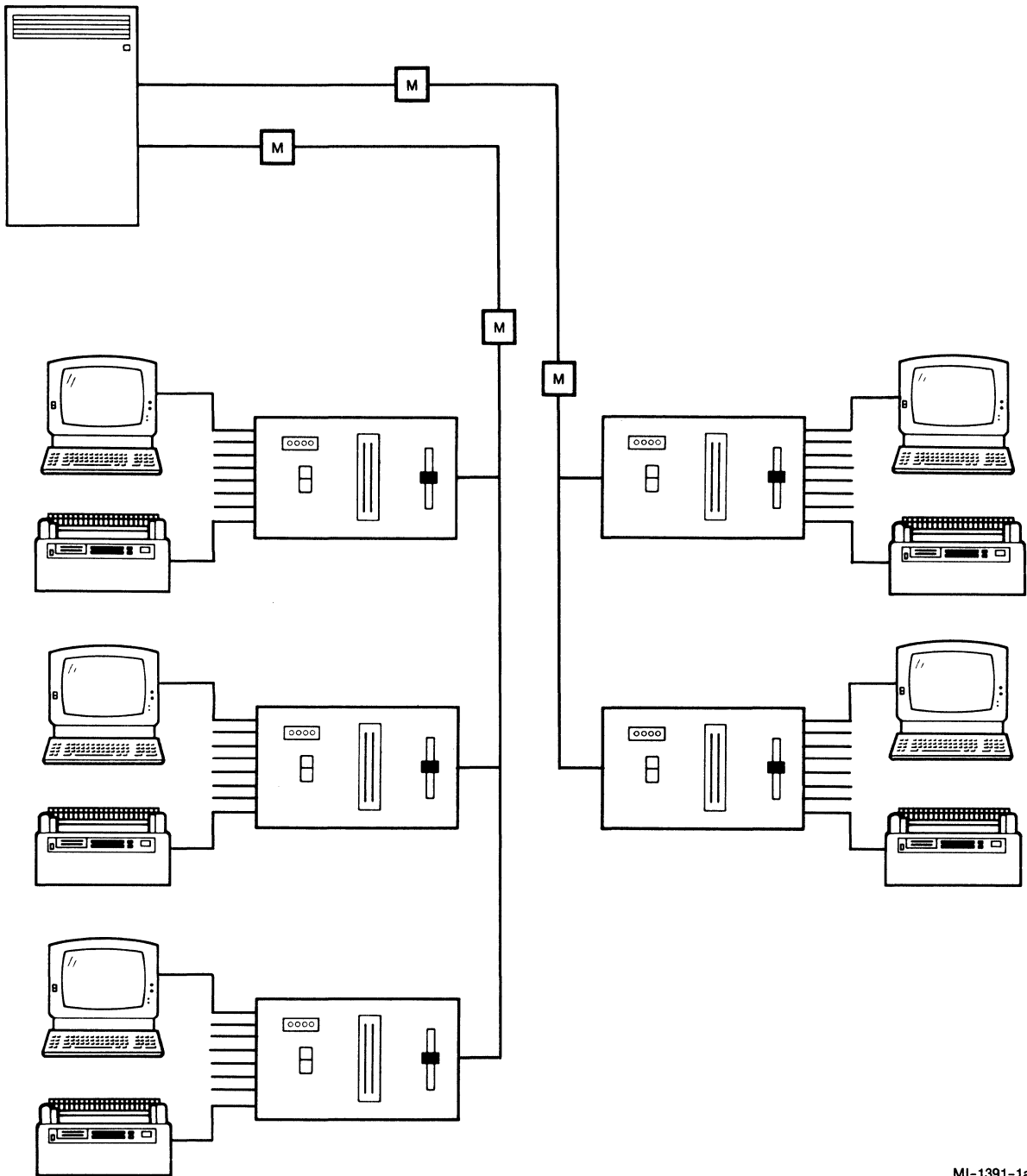
The PAD enables 3270 bisynchronous devices connected to it to interface with CCITT X.25-compatible Packet Data Networks (PDNs). One PAD can concentrate the data from up to 64 devices onto a single X.25 access line, thereby reducing communications costs.

NOTE: The initials PDN are used in this manual to represent a Packet Data Network, which may be public or private.

Figure 1-2 shows a typical BSC network without PADs, while figure 1-3 shows a typical BSC network with PADs. As illustrated in figure 1-3, the typical BSC network with PADs has one PAD acting as a Terminal PAD (TPAD) and one PAD acting as a Host PAD (HPAD). In this network:

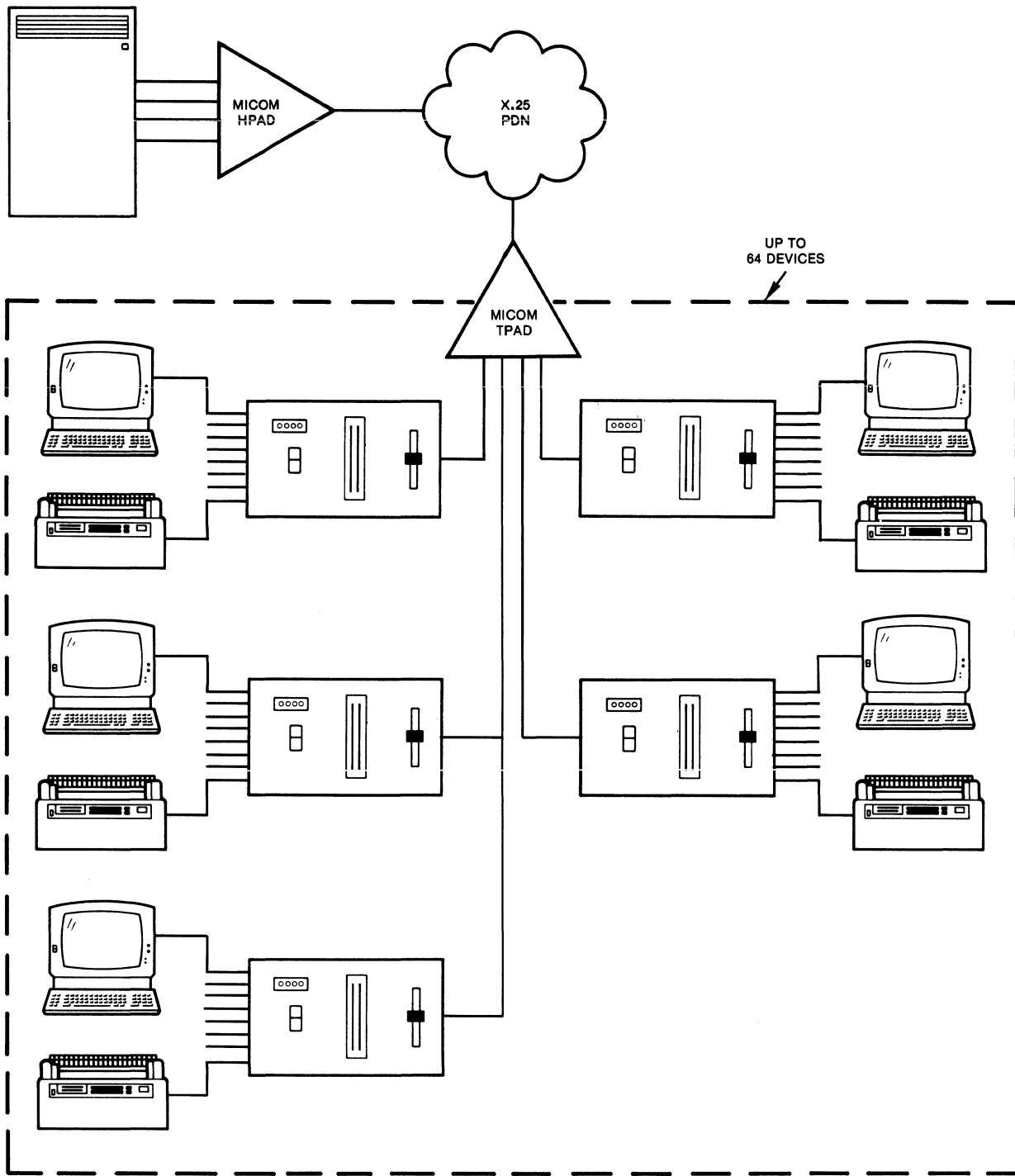
- The TPAD has 3270 cluster controllers connected to it. To those cluster controllers, the TPAD appears to be a synchronous host computer. That is, the TPAD polls the cluster controllers and receives their poll responses.
- The HPAD has a synchronous host computer or a front-end processor (FEP) connected to it. To the host or the FEP the HPAD appears to be a 3270 cluster controller. That is, when it is polled by the host computer, the HPAD sends the polling responses to the host that would normally be sent by a cluster controller.

NOTE: The HPAD shown in figure 1-3 is not required in installations where 3270 Display System Protocol (DSP)/X.25 support is provided at the host site. For example, DSP host software is available in at least two software packages: Comten and Compro (refer to paragraph 3.6.1).



MI-1391-1a-13

Figure 1-2. Typical BSC Network Without PADS



MI-1391-1a-14

Figure 1-3. Typical BSC Network With PADS

The PAD is fully configurable to meet the operating requirements of CCITT-compatible X.25 PDNs. It conforms to the 1980 CCITT Recommendations X.25 and X.121. The PAD also conforms to the required elements of the 3270 DSP.

The BSC protocol supported is the IBM 3270. IBM (or IBM-compatible) hardware types supported include 3271 BSC cluster controllers, and 3274 or 3276 cluster controllers configured for BSC. These controllers may have any of the following devices connected to them, using Category A coaxial cables:

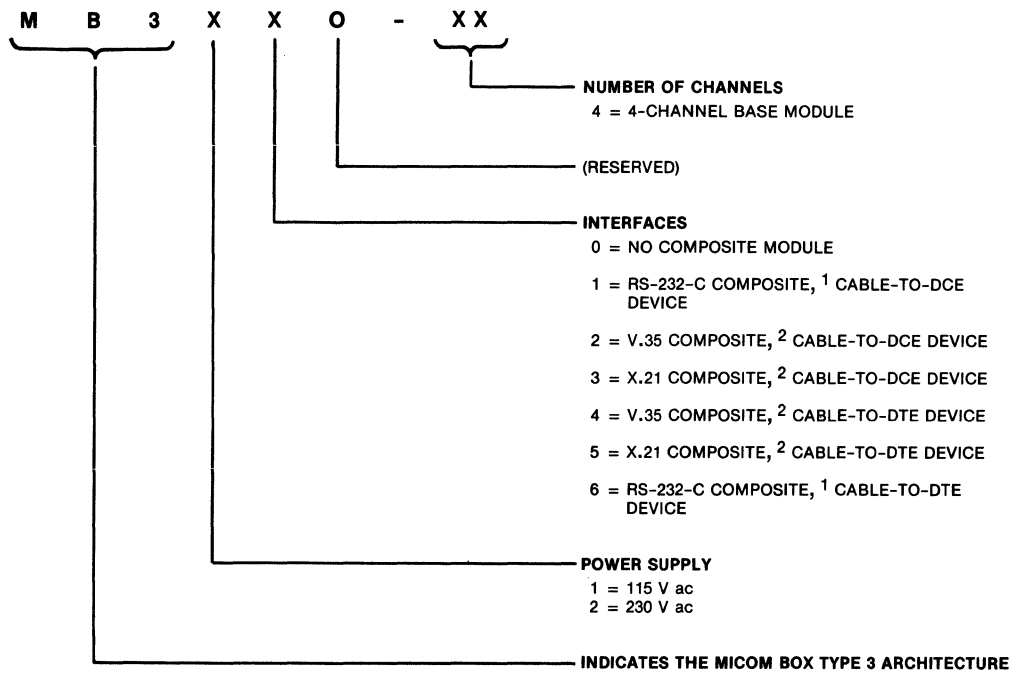
- 3278 or 3279 display stations (or any type that may attach to a 3270 BSC cluster controller)
- 328x family of printers

The PAD includes a user-friendly Command Facility that can be accessed locally through an asynchronous terminal attached to the PAD, or remotely from an asynchronous terminal attached to any PAD in the network (refer to paragraph 4.3). Using the Command Facility, you can configure a set of parameters for each BSC line, thereby allowing the PAD to handle different types of BSC devices that are connected to it. Additionally, you can configure trunk-related parameters that let the PAD communicate with different kinds of PDNs.

1.1 ORDERING INFORMATION

The PAD is available with either a standard RS-232-C X.25 link (described in the body of this manual) or with an optional X.21 or V.35 high-speed interface for the X.25 link (described in appendix D). Figure 1-4 provides model numbers for the various hardware units.

Order the software by specifying the model number of the appropriate FEATUREPAK cartridge (refer to paragraph 1.2.5). As shown in figure 1-4, the MB3-BSC-STD FEATUREPAK cartridge is appropriate for a PAD with a standard (RS-232-C) X.25 link; the MB3-BSC-HS FEATUREPAK cartridge must be ordered for a PAD with a high-speed (V.35 or X.21) X.25 link.



¹ REQUIRES THE STANDARD FEATUREPAK CARTRIDGE, MB3-BSC-STD
² REQUIRES THE HIGH-SPEED FEATUREPAK CARTRIDGE, MB3-BSC-HS

MI-1391-1a-61

Figure 1-4. Model Numbers for the MB3-3270 BSC PAD

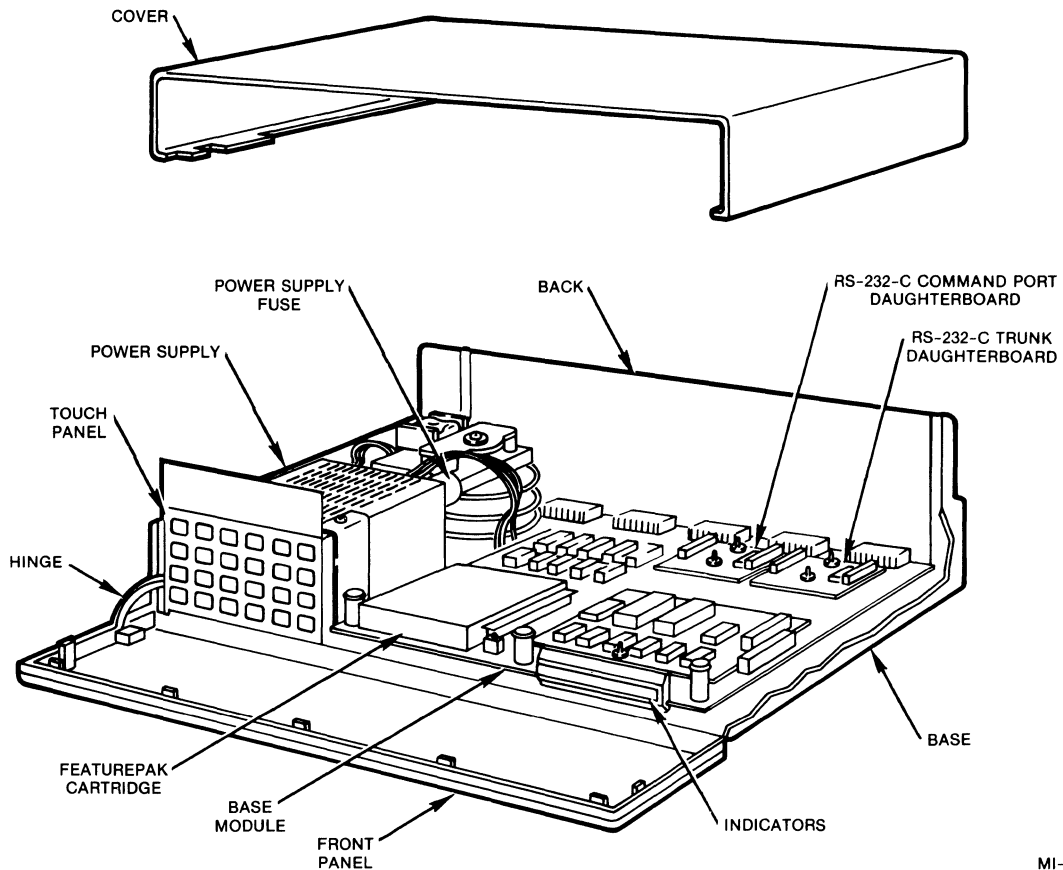
1.2 PHYSICAL COMPONENTS

The PAD's physical components include the following:

- Base module
- Enclosure (base, cover, front panel, back)
- Touch Panel
- Indicators
- FEATUREPAK cartridge
- Power supply

Each component is described in a paragraph that follows. The components are illustrated in figure 1-5.

An optional Rack-Mount Upgrade Kit (MB-RMK-1) is available for installing the PAD in a 19-inch-wide rack (refer to paragraph 2.2.3).



MI-1391-1a-15

Figure 1-5. Locations of the Physical Components

1.2.1 Base Module

The base module is a circuit board that contains the logic and support circuitry necessary for operation. It is called the base module, the MICOM BOX Type 3 Communications Control Module (MB3-CCM), or the CCM. The CCM includes the following:

- Four synchronous channels (lines) to allow for the connection of synchronous devices
- One asynchronous channel to allow for the connection of a dedicated, asynchronous Command port terminal
- One Composite port that is used to connect the PAD to the PDN
- A Z80B microprocessor running at 6 MHz
- 256 K of RAM, which is used as a data buffer
- 8 K of CMOS RAM, which is used for storage of configuration data that determines the operation of the PAD
- A lithium battery that provides standby power for the CMOS RAM
- The slot for the FEATUREPAK cartridge
- Two RS-232-C daughterboards that provide interface circuitry for the trunk (the X.25 link) and the Command port

1.2.2 Enclosure

The enclosure consists of a base, a cover, a front panel, and the back. The base, which interlocks with the cover, holds the major components. The movable, translucent front panel swings open for access to the inside of the unit. The front panel can be removed by opening it all the way and then gently pushing in on the hinges while lifting the front panel up. The back consists of one panel which is attached to the CCM, and blank panels, which are installed above the CCM.

1.2.3 Touch Panel

The Touch Panel is located behind the front panel. The membrane surface of the panel is sectioned into 24 keys. The Touch Panel may be used to configure some of the PAD's operating parameters, and to reset the PAD (refer to paragraph 2.3).

1.2.4 Indicators

The indicators are also located behind the front panel and are labeled with their abbreviated names. They display the operating status of the unit, or they may be used with the Touch Panel keys. When a unit is plugged into a power outlet, some indicators will go ON and will be visible through the front panel.

1.2.5 FEATUREPAK Cartridge

CAUTION: To avoid possible damage to the CCM from static discharge, be sure to touch the PAD's metal enclosure before reaching for the FEATUREPAK cartridge.

The FEATUREPAK cartridge (MB3-BSC-STD or MB3-BSC-HS) is inserted into an opening behind the front panel (see figure 1-5). The cartridge contains the system software.

The software includes, but is not limited to, the following features:

- Support of the IBM 3270 BSC Protocol
- Support of all the required elements of the 3270 DSP
- Support of the 1980 CCITT Recommendations X.3, X.25, and X.121
- Configuration of operating parameters using the Command Facility (refer to section 4)

1.2.6 Power Supply

A multi-output ac power supply is installed for you prior to shipment. The input voltage is 115 V ac or 230 V ac and 50 to 60 Hz. Output voltages are +5, +12, and -12 V dc.

Prior to shipment, the power supply is set for the voltage specified in the model number (see figure 1-4), and an appropriate fuse is installed.

1.3 SUMMARY OF PAD CHARACTERISTICS

The following paragraphs summarize the general, BSC line support, and X.25 trunk characteristics of the PAD.

1.3.1 General Characteristics

The PAD includes the following general characteristics:

- X.25-compatible with all MICOM asynchronous PADs, synchronous PADs, and packet switches
- Compatible with IBM 3270 BSC Protocol
- Support of up to sixteen 3271, 3274, or 3276 cluster controllers
- Support of up to 64 devices
- Compatible with 1980 CCITT Recommendations X.3, X.25, and X.121
- Compatible with the required elements of the 3270 DSP, as specified in the 3270 Display System Protocol document listed in paragraph 1.5
- Four BSC lines (point-to-point or multidrop), one asynchronous Command port, and one X.25 Composite port
- Dedicated Command port and a user-friendly Command Facility
- Configuration parameters stored in separate memory and protected by a backup battery in case there is a power failure
- X.25 facilities supported
 - Closed user group
 - X.25 packet size negotiation
 - Reverse charging
 - Packet window size negotiation
- Extensive call control capabilities
 - Full X.121 addressing
 - Abbreviated addressing using preconfigured mnemonics
 - Autocall feature for printers
 - Call User Data (CUD) subaddressing for BSC lines and Command Facility
 - X.121 subaddressing (for Command Facility only)
- Default configurations upon power-up

- Compact tabletop enclosure and rack-mount versions
- Modular design that facilitates configuration and servicing
- FEATUREPAK cartridge for ease of firmware installation

1.3.2 BSC Line Support Characteristics

The PAD includes the following BSC line support characteristics:

- All the BSC lines are independently configurable through the Command Facility.
- Each BSC line may be configured as Data Communications Equipment (DCE) or Data Terminal Equipment (DTE).
- Each BSC line may be configured to support TPAD or HPAD requirements.
- If a BSC line is configured as DCE, the clock may be set for speeds from 300 to 9600 bps.
- Each BSC line may be independently configured for Temporary Text Delays (TTDs), Negative Acknowledgments (NAKs), and Enquiries (ENQs). This flexibility allows devices with different operating requirements to be attached to the same PAD.

1.3.3 X.25 Link Characteristics

The PAD includes the following characteristics on the X.25 link to the PDN:

- Compatible with 1980 version of Recommendation X.25 LAPB/HDLC operation
- Operates at speeds up to 19.2 kbps with an external clock, or up to 9600 bps with the internal clock; operates at speeds up to 72 kbps with an optional V.35 or X.21 high-speed link (refer to appendix D)
- Configurable X.25 link parameters
 - Frame window (K)
 - Packet window (W)
 - Acknowledgment timer (T1)
 - Number of retransmissions (N2)
 - Assurance timer (Assr Timer)
 - Packet size
 - Segment size
- Configurable logical group and channel numbers
- Full support of Q-bit, M-bit, and D-bit as defined by CCITT Recommendations

1.4 PHYSICAL SPECIFICATIONS

Operating Environment

32 to 114°F (0 to 45°C)
0 to 95 percent relative humidity (noncondensing)

Power

115/230 V ac \pm 10 percent, 50 to 60 Hz

Size

Standalone:

15-1/2 inches (39.4 cm) wide
4-1/2 inches (11.4 cm) high
11-3/4 inches (29.8 cm) deep
Weight: 8 pounds (3.6 kg)

Rack-Mounted with Upgrade Kit MB-RMK-1:

19 inches (48.3 cm) wide
5-1/4 inches (13.3 cm) high
11-1/2 inches (29.2 cm) deep

Storage Temperature

-40 to 158°F (-40 to 70°C)

Emissions Control

Complies with FCC Part 15, Subpart J, Class A, for control of radio-frequency interference.

Status Displays

The base module has 12 indicators.

Lithium Battery

Located on the base module, the battery supplies power to CMOS RAM for an accumulated power-down life of two years. The user life of the battery is four years (not rechargeable).

1.5 SUGGESTED READING LIST

The following publications contain detailed information on topics that are beyond the scope of this manual:

- CCITT 1980 Recommendation X.25 (as amended at Geneva, 1980)
- Micro7400 Protocol Converter User's Manual (MICOM stock number 800-1225)
- MICOM BOX Type 3 X.25 Asynchronous PAD User's Manual (MICOM stock number 800-1387)
- MICOM BOX Type 3 X.25 Packet Switch User's Manual (MICOM stock number 800-1390)
- Protocol Converter Buyer's Guide (this can be ordered from MICOM)
- 3270 Display System Protocol -- Telecom Canada, GTE, and Tymnet, Second edition, June 1983

The following are IBM documents:

- 3274 Control Unit Description and Programmer's Guide (GA23-0061)
- General Information -- Binary Synchronous Communications (GA27-3004)
- IBM 2701 Data Adapter Unit Component Description (GA22-6864) -- refer specifically to the section on the Synchronous Data Adapter -- Type II
- IBM 2703 Transmission Control Components Description (A27-2703) -- refer specifically to the section on BSC capabilities
- Introduction to the IBM 3704 and 3705 Communications Controller (GA27-3051)

SECTION 2

INSTALLATION AND SOFT SWITCH CONFIGURATION

This section provides the experienced communications technician with the information needed to install the PAD and configure the software (soft) switches in preparation for operation.

NOTE: Be sure to save the shipping materials. In the unlikely event that the unit needs to be shipped back to MICOM, there is the possibility that your unit will be damaged if it is shipped without packing it in its original shipping materials.

2.1 SELECTING THE INSTALLATION LOCATION

The PAD has specific size, ventilation, and cabling requirements. The following list contains information that will guide you in your selection of a location:

- Take into account the size of the enclosure (including the space needed for the rear connectors): 15-1/2 inches (39.4 cm) wide, 4-1/2 inches (11.4 cm) high, and 14 inches (35.6 cm) deep.
- The air vents on the bottom of the enclosure must always be kept clear of obstructions. Do not place the unit on paper or on any material that can be moved by suction; it could seal off the intake vent.
- All cables that are used to connect terminals and external modems to the PAD must be shielded and cannot be longer than 50 feet (15.2 meters).
- External cables must be disconnected from the rear connectors before the removal of the module is attempted.
- The distance from the back of the enclosure to the ac power supply wall outlet should not exceed 6 feet (1.8 meters).

2.2 INSTALLATION

Instructions are included for the following:

- Applying the indicator strip
- Installing and removing a FEATUREPAK cartridge
- Installing the PAD

2.2.1 Applying the Indicator Strip to the Base Module

An indicator strip accompanies the base module. It contains BSC line numbers and status indicators. The strip has an adhesive backing.

Peel off the tape from the back of the indicator strip and press the strip onto the front of the module. Figure 2-1 shows the location of the indicator strip after it has been applied to the base module.

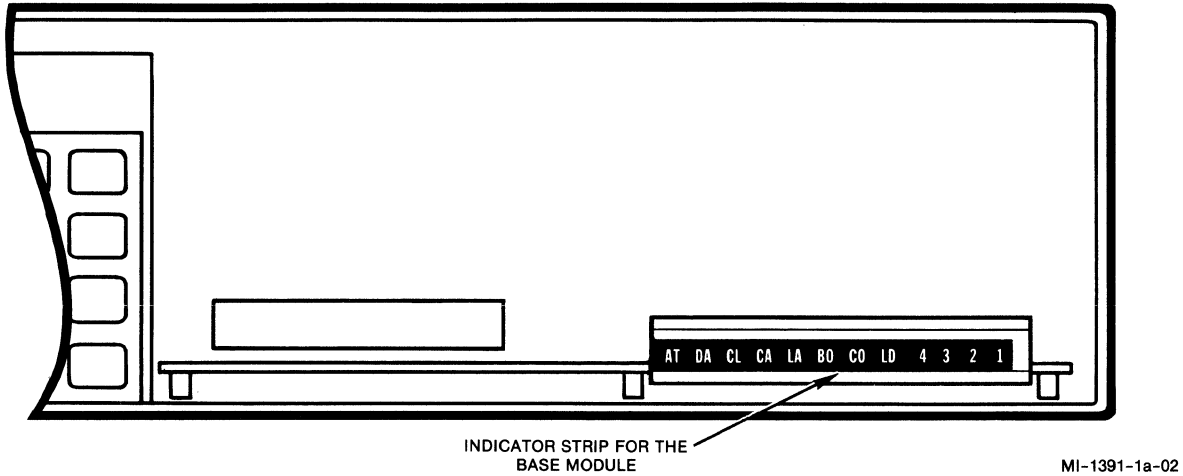


Figure 2-1. The Indicator Strip Applied to the Base Module

2.2.2 Installing and Removing a FEATUREPAK Cartridge

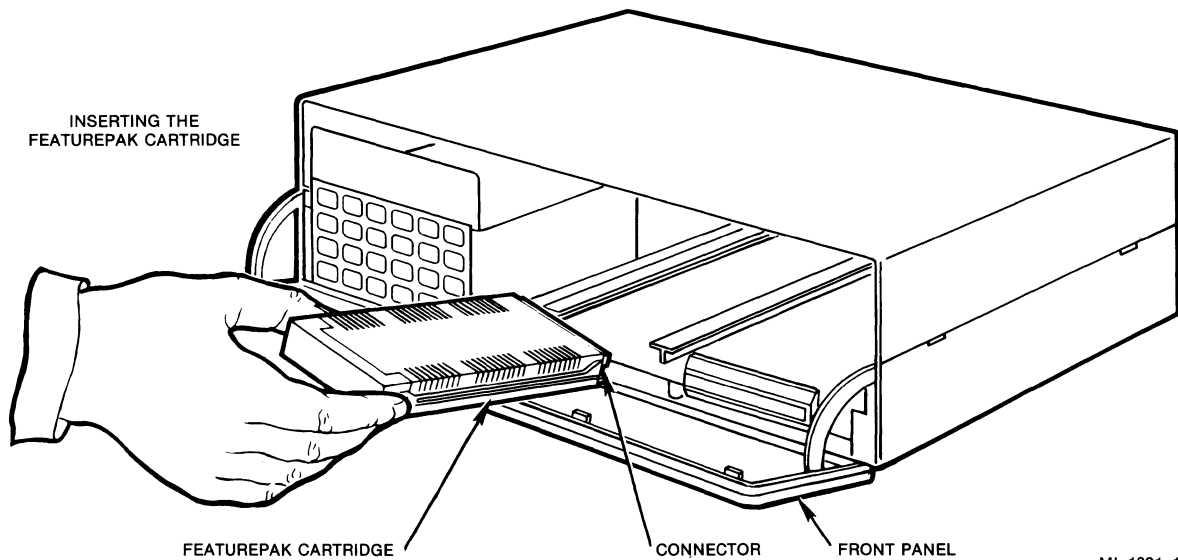
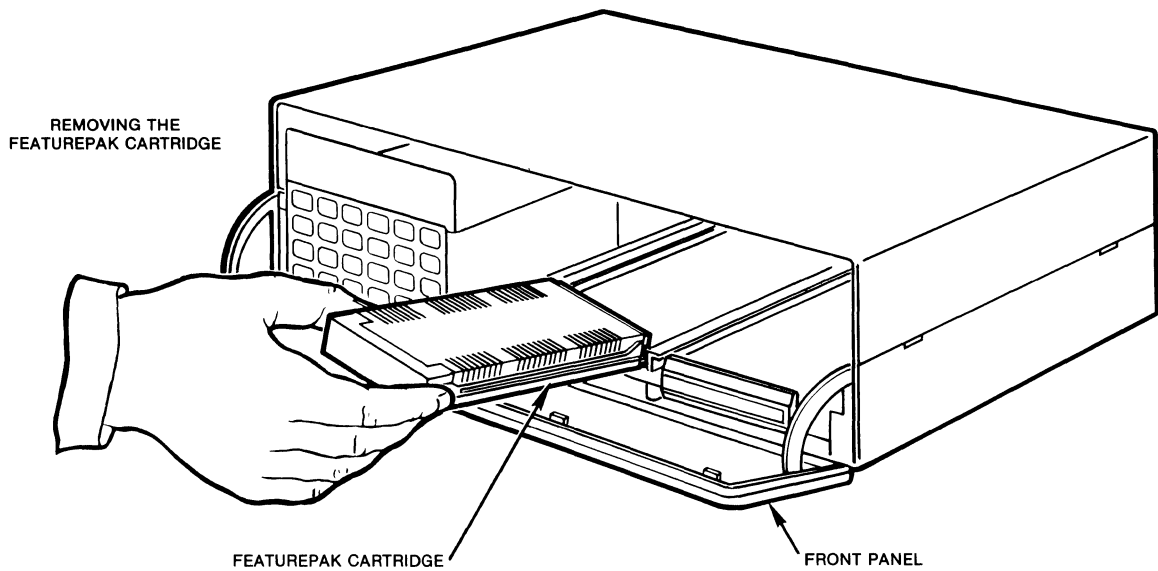
CAUTION: To avoid possible damage to a module from static discharge, be sure to touch the PAD's metal enclosure before coming into possible contact with a module or before installing or removing a FEATUREPAK cartridge.

The receptacle for the FEATUREPAK cartridge is located behind the front panel (see figure 2-2). To access the receptacle, pull the top edge of the panel out and down.

To install, insert the FEATUREPAK cartridge into the receptacle, with the edge connector going in first. Tracks on the cartridge will mesh with slides inside the unit. The cartridge will slide in easily until the connector pins meet the box's internal socket. Then, with a fair amount of pressure, push the cartridge so that the pins of the connector feel firmly seated. This will ensure the proper connection of the cartridge.

To remove, grip the cartridge firmly on the sides and pull with a fair amount of force to dislodge the connector. Then lift the front of the cartridge over the edge of the front panel.

CAUTION: During shipping and handling, the FEATUREPAK cartridge should always be stored in its anti-static bag in its accessory box compartment and should not be kept in the unit.



MI-1391-1a-03

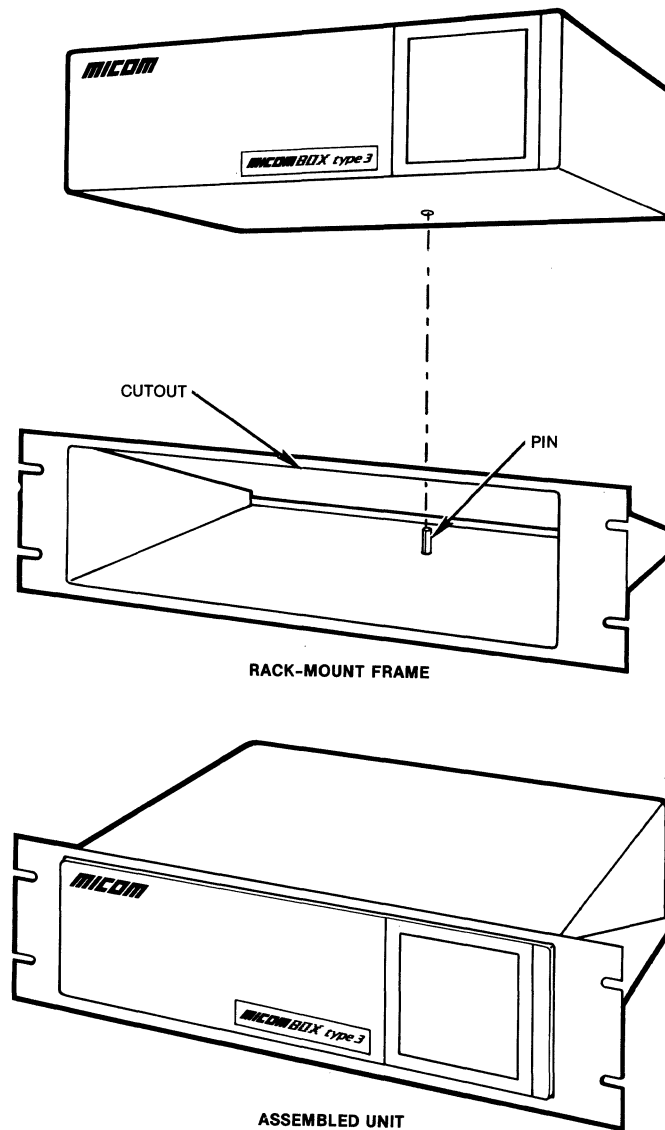
Figure 2-2. FEATUREPAK Cartridge Removal and Installation

2.2.3 Installing the PAD

The PAD can be installed either as a standalone or as a rack-mount. Each type of installation is described in the following paragraphs.

Place the standalone unit on a tabletop or shelf. Allow enough space for cover removal, handling connectors on the back, opening the front panel, and unobstructed air flow (refer to paragraph 2.1).

For a rack-mount installation, use a standalone unit with an optional Rack-Mount Upgrade Kit MB-RMK-1 (see figure 2-3). Mount the standalone unit in the standard 19-inch-wide rack included in the kit. Installation instructions are also included in the kit.



MI-1391-1a-04

Figure 2-3. Rack-Mount Installation

System connections are normally made using MICOM cables. However, user-provided cables may also be used (see the NOTE that follows). Connect these cables to the connectors located on the back of the enclosure (see figure 2-4).

NOTE: Some equipment connected to the PAD does not require a shielded enclosure and shielded cables in compliance with the FCC Rules and Regulations, Part 15/J. When this is the case, it may be necessary to use a filtered connector between the PAD and such equipment. This will provide the safeguards as required by FCC. Contact MICOM Customer Service for correct filter application.

The system connections to be made when installing the unit are:

- Channel (BSC line) interface
- Composite interface
- Command port
- Power (ac)

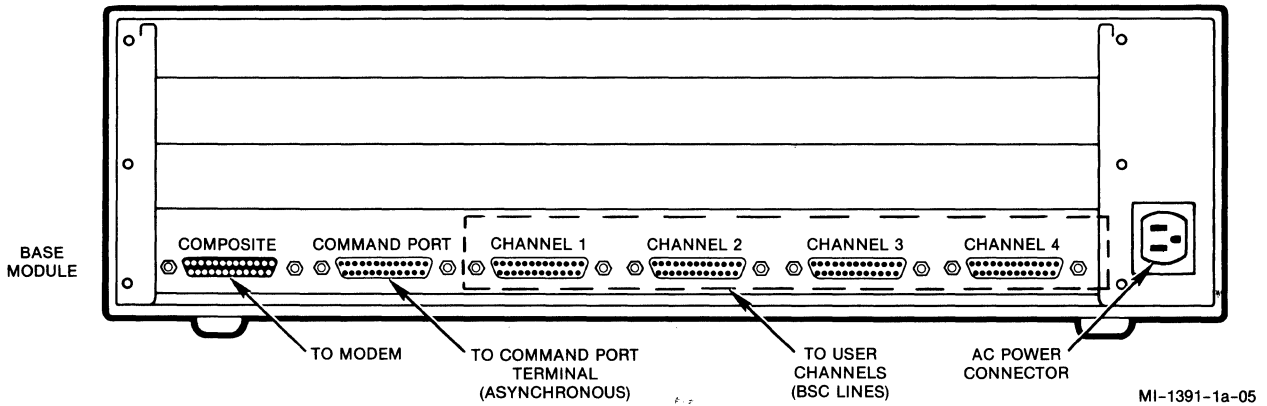


Figure 2-4. Connectors on the Back of the Enclosure

2.2.3.1 System Cabling

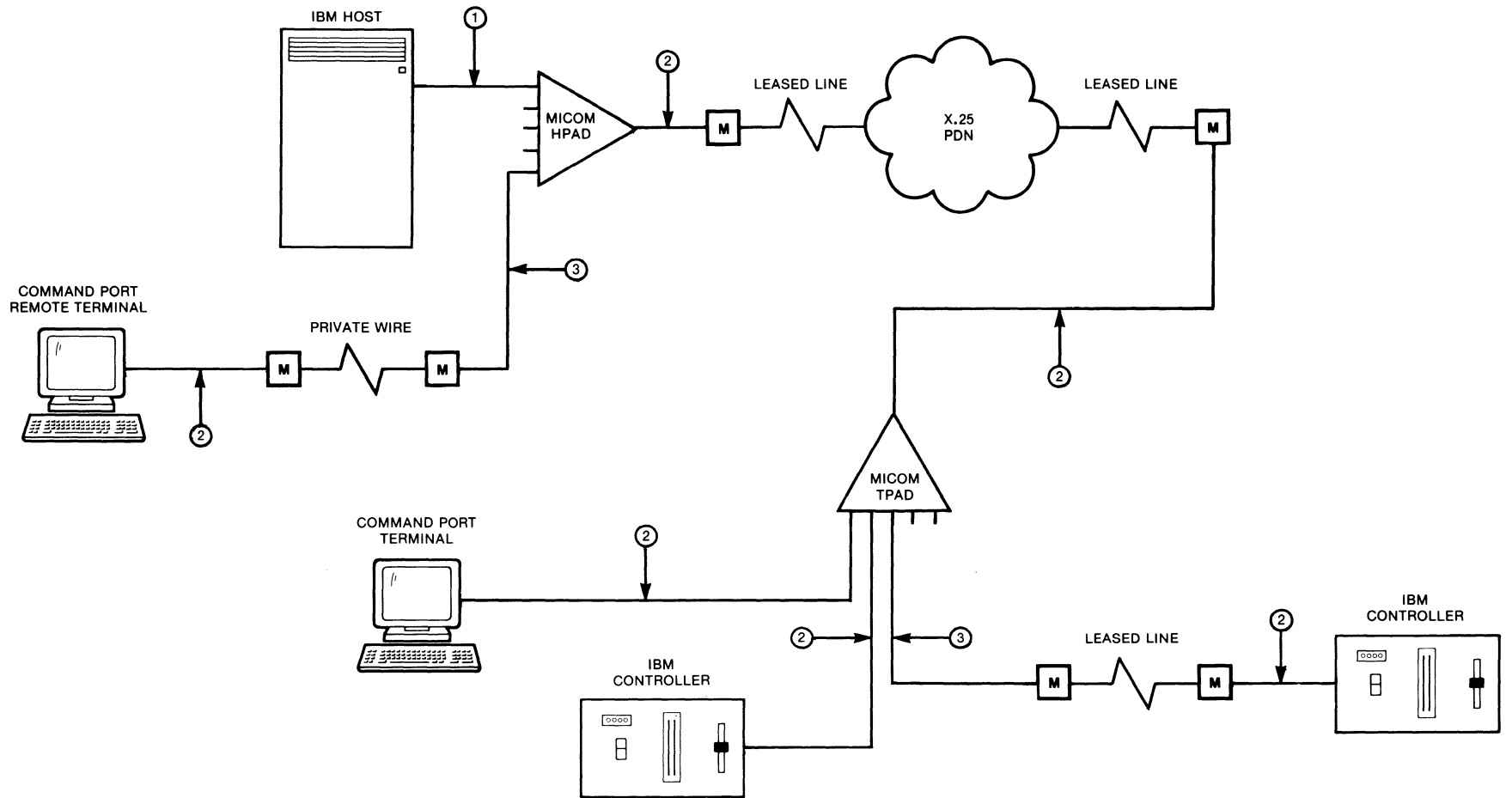
System connections are normally made using MICOM cables. If other cables are used, they must be shielded and must not be longer than 50 feet (15.2 meters). (Refer to the NOTE in paragraph 2.2.3 for special cases where a filtered connector is used.) The MICOM cables are as follows:

<u>Name</u>	<u>MICOM Part Number</u>	<u>Connections</u>
Unique Straight	100-2645-xx	Channel (BSC line), Command port
Straight	100-2200-xx	Channel (BSC line), Command port, Composite
Crossover	100-2219-xx	Channel (BSC line), Command port

NOTE: The unique straight cable is identical to the straight cable, except that it has a male connector on each end. The straight cable has a male connector on one end and a female connector on the other end.

Figure 2-5 shows cabling in a typical system arrangement. For cable pin assignments, see figure 2-6. All system connections are described in the following paragraphs.

CAUTION: To prevent errors caused by induced noise, do not operate the PAD with open-ended cables connected to the interface connectors. The other ends of the cables must be connected to devices.

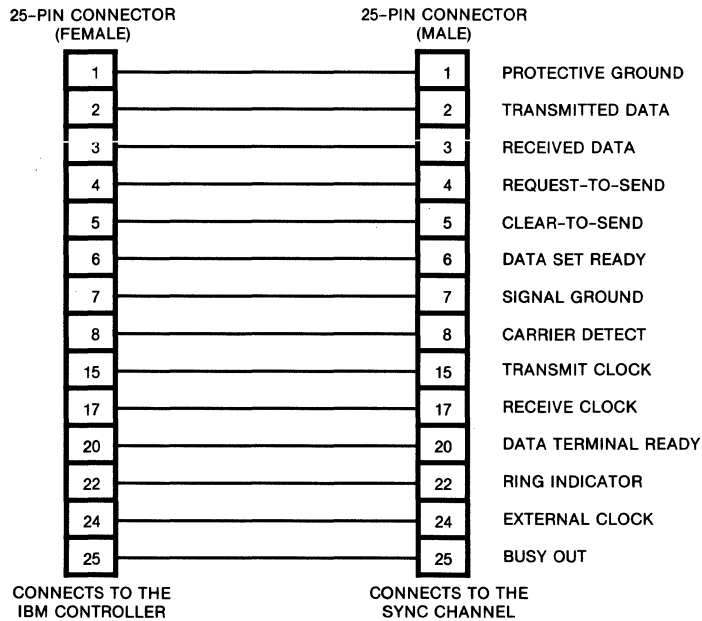
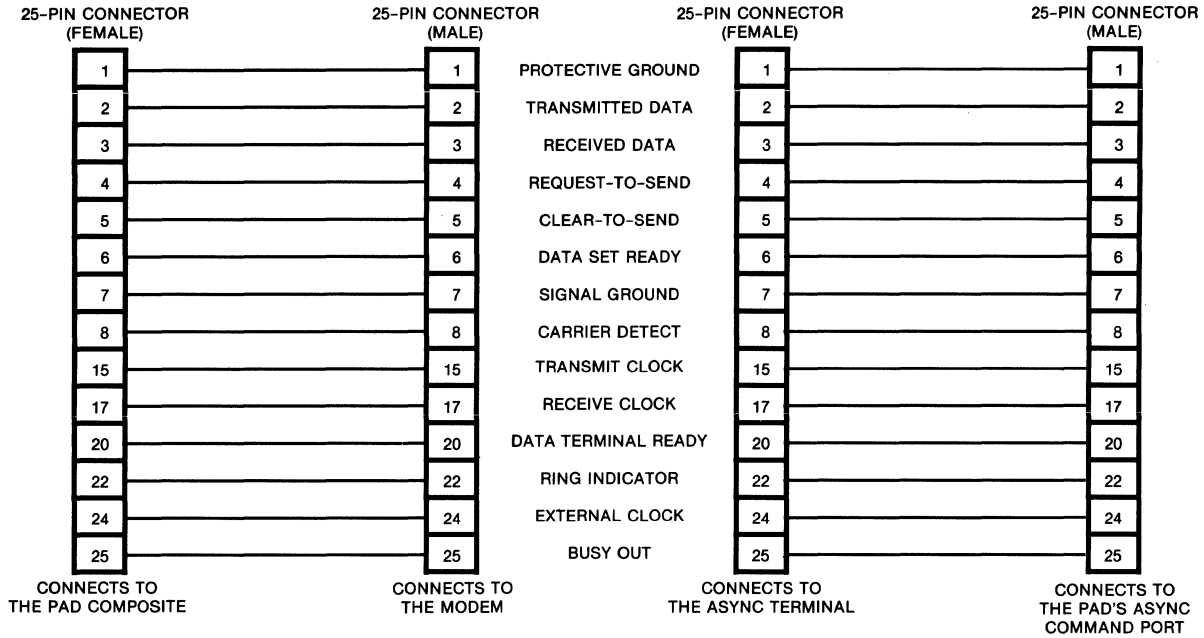


LEGEND:

- ① = UNIQUE STRAIGHT CABLE WITH A MALE CONNECTOR ON EACH END (MICOM PART NUMBER 100-2645-XX)
- ② = STRAIGHT CABLE WITH A MALE CONNECTOR ON ONE END AND A FEMALE CONNECTOR ON THE OTHER (MICOM PART NUMBER 100-2200-XX)
- ③ = CROSSOVER CABLE WITH A MALE CONNECTOR ON EACH END (MICOM PART NUMBER 100-2219-XX)

Figure 2-5. Example of System Cabling

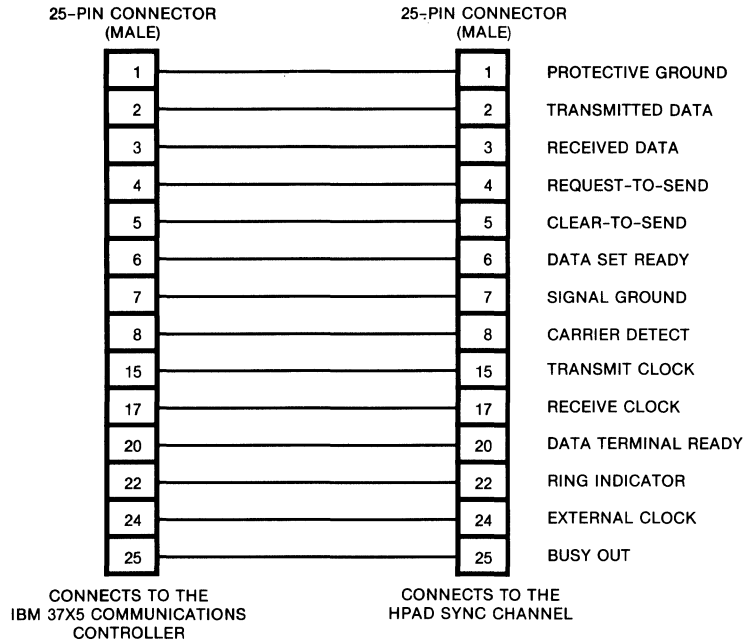
STRAIGHT CABLE
(MICOM PART NUMBER 100-2200-XX)



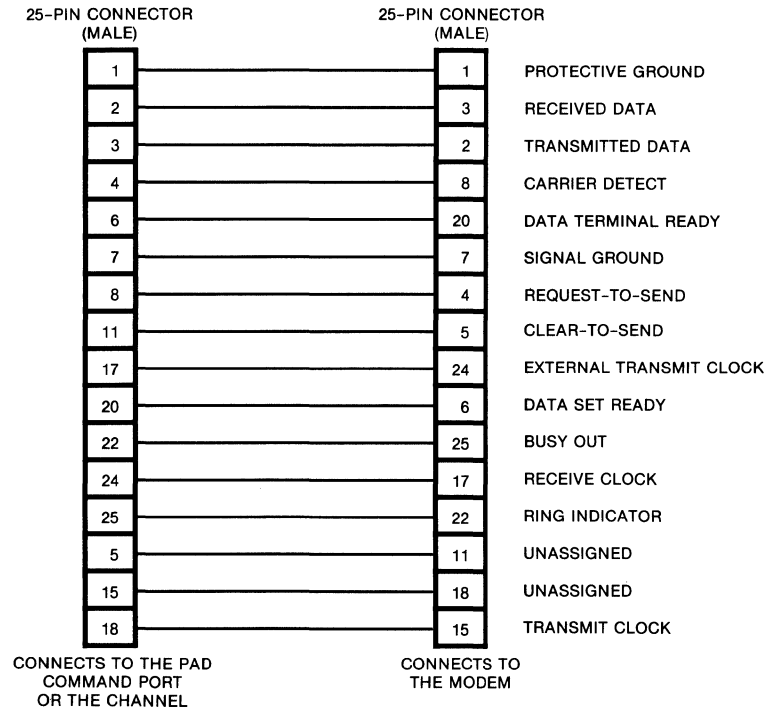
MI-1391-1a-11
(1 OF 2)

Figure 2-6. Pin Assignments

UNIQUE STRAIGHT CABLE
(MICOM PART NUMBER 100-2645-XX)



CROSSOVER CABLE
(MICOM PART NUMBER 100-2219-XX)



MI-1391-1a-11
(2 OF 2)

Figure 2-6. Pin Assignments (continued)

2.2.3.2 BSC Line Interface Connections

Either a user-provided cable or the MICOM cable may be used to connect your IBM controller or IBM computer port (DTE) to a line connector on the back of the unit.

NOTE: Connectors labeled CHANNEL 1 through CHANNEL 4 on the back of the unit are the connectors for BSC lines 1 through 4, respectively.

Use either a shielded cable not longer than 50 feet (15.2 meters) or one of the following MICOM shielded cables (listed in order of MICOM's preference). Pin assignments for these cables are shown in figure 2-6.

- Unique straight cable (MICOM part number 100-2645-xx)
- Straight cable (MICOM part number 100-2200-xx)
- Crossover cable (MICOM part number 100-2219-xx)

The unique straight cable and the straight cable have identical circuit pin assignments. The only difference between the two cables is that the unique straight has two male connectors, while the straight has one male and one female connector. In figure 2-6, the three examples of the straight cable are used to show it connected to different equipment.

The crossover cable is used to connect to an external modem. Unlike a straight cable (where conductors are directly connected pin for pin), a crossover cable switches (crosses over) the pins so that a DCE can communicate with a DCE.

2.2.3.3 Composite Interface Connection

Connect an external modem to the connector on the back of the unit labeled COMPOSITE (see figure 2-4). Use either a shielded cable not longer than 50 feet (15.2 meters) or MICOM's shielded straight cable, part number 100-2200-xx (see figures 2-5 and 2-6).

2.2.3.4 Command Port Connection

Connect an asynchronous terminal to the connector on the back of the unit labeled COMMAND PORT (see figure 2-4). Once the connection is made, this terminal is dedicated for use with the PAD Command Facility. Use a shielded cable not longer than 50 feet (15.2 meters), or use either MICOM's shielded unique straight cable (part number 100-2645-xx) or shielded straight cable (part number 100-2200-xx). See figures 2-4 through 2-6.

2.2.3.5 Power Supply Connection

Using the MICOM power cord, plug its female connector into the ac power connector on the back of the unit (see figure 2-4). Plug the connector on the other end of the cord into the ac power supply wall outlet. Some indicators on the PAD will go ON (refer to section 6 for descriptions of the indicators).

2.3 TOUCH PANEL

Before you first use your PAD, you must ensure that its trunk parameters are set to allow it to operate in the X.25 BSC network. You can check/change these operating parameters by accessing the PAD's Command Facility through an asynchronous terminal connected to the PAD's local Command port (refer to section 4). Or, you can use the Touch Panel to perform this function.

The Touch Panel configuration described in paragraph 2.3.1 allows you to configure the PAD's X.25 trunk parameters so that the PAD can become active on the X.25 network. Once the PAD's network address has been configured (refer to paragraph 4.5.4), a remote asynchronous terminal can be used to access the Command Facility and complete the configuration of the PAD.

2.3.1 Configuring the PAD for Operation

Included in the initial configuration of the PAD are the following:

- Configuration of the X.25 trunk (refer to paragraph 2.3.2)
- Configuration of the EIA control-signal bias (refer to paragraph 2.3.3)

If you do not perform the initial configuration, your PAD may not operate properly. The steps that follow tell you how to perform the initial configuration using the Touch Panel. If you prefer, you can use a local asynchronous terminal (refer to section 4 for instructions).

1. Set the selections within each soft switch group (SYS1, SYS2, and SYS3) to the required ON or OFF settings (refer to paragraph 2.3.5 for instructions). The PAD will store your new ON or OFF settings in CMOS. Make sure you set selection 4 in soft switch group SYS1 to ON (this will cause the PAD to be Cold started upon a reset; see step 2).
2. Press both Reset keys on the Touch Panel to reset the PAD. The PAD will read your new ON or OFF settings from CMOS into RAM. Upon completion of the reset, the PAD will automatically set selection 4 in soft switch group SYS1 to OFF (the Warm start setting).

3. With the Touch Panel configuration completed, you can proceed to configure other operating parameters as described in section 4. After you complete each configuration procedure, the PAD will store the values in CMOS. After configuring those parameters, reset the PAD again (this will be a Warm start reset; see step 2). The PAD will read these parameter values from CMOS into RAM, without overwriting the configuration you performed in step 1.
4. With the Touch Panel and other operating parameters configured and present in RAM, your PAD will be ready for operation.

For more information on how the PAD stores the operating parameters or on how to operate the Touch Panel, refer to the following paragraphs:

- Parameter storage, paragraph 2.3.4
- Operation of the Touch Panel, paragraph 2.3.5

2.3.2 Configuring the X.25 Trunk

Paragraphs 2.3.2.1 through 2.3.2.5 give brief descriptions of the trunk parameters that you can check/change using the Touch Panel.

2.3.2.1 X.25 Trunk -- DCE or DTE

The X.25 software level provides a DCE or DTE appearance. This is not related to the physical (electrical) interface. The PDN is normally a DCE. Therefore, the PAD is normally set as a DTE (OFF). Refer to paragraph 2.3.5, SYS1, and check the setting of selection 8.

2.3.2.2 X.25 Trunk -- Cold/Warm Start

The PAD can be set for a Cold or a Warm start reset (refer to paragraph 2.3.5, SYS1, selection 4). The main difference between a Cold and Warm start reset is in the PAD's handling of factory-default values (see figure 4-4 for a list of these values).

The PAD performs a Cold start reset when one of the following occurs:

- The PAD detects a CMOS failure during initialization.
- A user sets selection 4 of SYS1 to ON and then presses both Reset keys on the Touch Panel; or a user selects Cold Start from the System Reset menu.

In the case of a CMOS failure, the PAD reinstates all factory-default values, including the values for SYS1, SYS2, and SYS3.

In the case of a user-initiated Cold start reset, the PAD reinstates all factory-default values, excluding the values for SYS1, SYS2, and SYS3. For example, it would replace a user-configured password with the factory-default password (MX25), but it would not reinstate the factory-default value for SYS1. The user-initiated Cold start reset is used in the following cases:

- To reinstate factory-default values (except for SYS1, SYS2, and SYS3)
- To put some user-configured values into effect (see the NOTE that follows and refer to paragraph 4.5)

When selection 4 of SYS1 is set to OFF, the PAD performs a Warm start reset when one of the following occurs:

- A user presses both Reset keys on the Touch Panel; or a user selects Warm Start from the System Reset menu.
- The PAD is powered OFF and then ON, or there is a power failure.

In all of these cases, the PAD does not reinstate any factory-default values. In the case of the user-initiated Warm start reset, the PAD saves and puts into effect user-configured values. In the case of a power OFF/ON or a power failure, the PAD retrieves the configured values that it last saved.

Following a Cold start reset, the PAD automatically reverts to its Warm start setting (OFF).

NOTE: User-configured settings for some of the trunk parameters take effect only during a Cold start reset. These parameters are:

- Subaddressing, paragraph 2.3.2.4
- Logical group number, paragraph 2.3.2.5

Make sure you have these parameters set properly before you configure other parameters (follow the steps in paragraph 2.3.1). Otherwise you will have to perform a Cold start reset to put these parameters into effect. Doing so will cause other parameters to be reset to factory-default values.

2.3.2.3 X.25 Trunk -- Clock

Because connection to a PDN is typically via a modem (leased-line), clocking is normally provided externally. However if this is not the case, you can set the PAD to provide clocking. Refer to paragraph 2.3.5, SYS1, and check the setting of selection 2.

When the PAD provides clocking (selection 2 of SYS1 is OFF), the clocking speed is fixed at 9600 bps. When clocking is provided externally (selection 2 of SYS1 is ON), the PAD supports speeds up to 19.2 kbps.

2.3.2.4 X.25 Trunk -- Subaddressing

The subaddress determines which BSC line an incoming call is to be routed to. Your PAD supports Call User Data (CUD) subaddressing for BSC lines, and either CUD or X.121 subaddressing for the Command Facility. When configuring subaddressing for the Command Facility, you must ensure that both ends of the virtual circuit use the same type of subaddressing.

Refer to paragraph 2.3.5, SYS2, and check the setting of selection 5. See the NOTE in paragraph 2.3.2.2.

2.3.2.5 X.25 Trunk -- LGN

When the PAD receives an incoming call packet, it checks several items before it accepts the call. The incoming call must have an LGN that matches the PAD's LGN. For example, if you wish to access the PAD's Command Facility from a remote terminal, you must make sure that the PAD's LGN matches the LGN of the remote PAD.

Most PADs have an LGN of 0 or 1. The United Kingdom uses an LGN of 4.

Refer to paragraph 2.3.5, SYS2, and check the settings of selections 1 through 4. See the NOTE in paragraph 2.3.2.2.

2.3.3 Configuring EIA Control-Signal Bias

A bias is set on the input EIA control signals (RTS, DTR, and Unassigned). When the input EIA control signals are not terminated by a device attached to the PAD, the bias ensures that the PAD will recognize these signals as being in a specific state. As such, the signals are not left floating and subject to noise.

The EIA bias control setting for the PAD is normally OFF (inactive/low). This is the required setting for normal PAD operations. When bias control is set to OFF, the PAD will recognize an inactive EIA signal when one of the following conditions exists:

- There is no connection to the signal.
- The attached device asserts that the signal is inactive.

In some cases, you may have to change the bias control setting to ON (active/high). For example, if your IBM cluster-controller-to-PAD cables do not provide DSR or DTR, you must set bias control to ON to enable the IBM cluster controllers to place or receive calls.

When bias control is set to ON, the PAD will recognize an active EIA signal when one of the following conditions exists:

- There is no connection to the signal.
- The attached device asserts that the signal is active.

Whether bias control is set to ON or to OFF, the PAD will always recognize the state asserted by the attached device when there is a connection to the signal.

The EIA bias control setting of OFF is correct and recommended for most PAD applications. However, if you need to change the bias control setting, the Touch Panel allows you to configure BSC lines 1 through 4 (as well as the Command and Composite ports) to be biased ON. Refer to paragraph 2.3.5, SYS3, and check the setting of selection 1.

2.3.4 How the PAD Stores Operating Parameters

Operating parameters that you set using the Touch Panel (or the Command Facility) are stored in battery-backed, nonvolatile CMOS (the battery is not rechargeable).

When a CMOS failure condition is detected by the MB3 software during system initialization, or if a battery-low condition is detected, the CA indicator will go ON.

The PAD places new configuration data into the CMOS area as the data is entered. However, the PAD operation is not affected by the new configuration until a Warm start reset is performed. A Cold start reset is required in some cases (see the NOTE in paragraph 2.3.2.2).

2.3.5 How to Operate the Touch Panel

As described in paragraph 2.3.1, you must perform initial checking/changing of operating parameters in a new PAD before you use it. You can use an asynchronous terminal or the Touch Panel to perform this function.

You use the Parameter and Value keys of the Touch Panel to set the PAD's X.25 operating parameters (see figure 2-7).

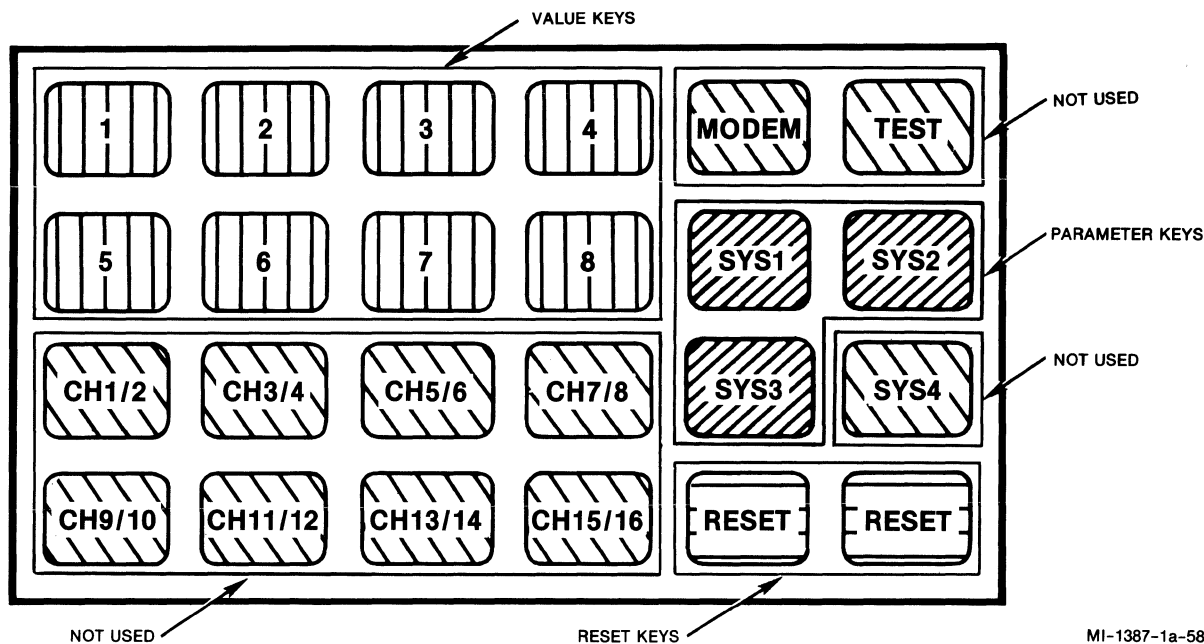


Figure 2-7. Touch Panel

The PAD's Touch Panel is used with the base module indicators to simplify the setting of PAD operating parameters. You press a Parameter key (SYS1, SYS2, or SYS3) that corresponds to the PAD's SYS1, SYS2, or SYS3 soft switch group. The PAD is then in its Configure mode. The PAD's base module indicators then show whether selections within that soft switch group are currently set to ON or to OFF.

The Touch Panel is located behind the front panel of the PAD. To access the keys, you pull the top edge of the front panel out and down.

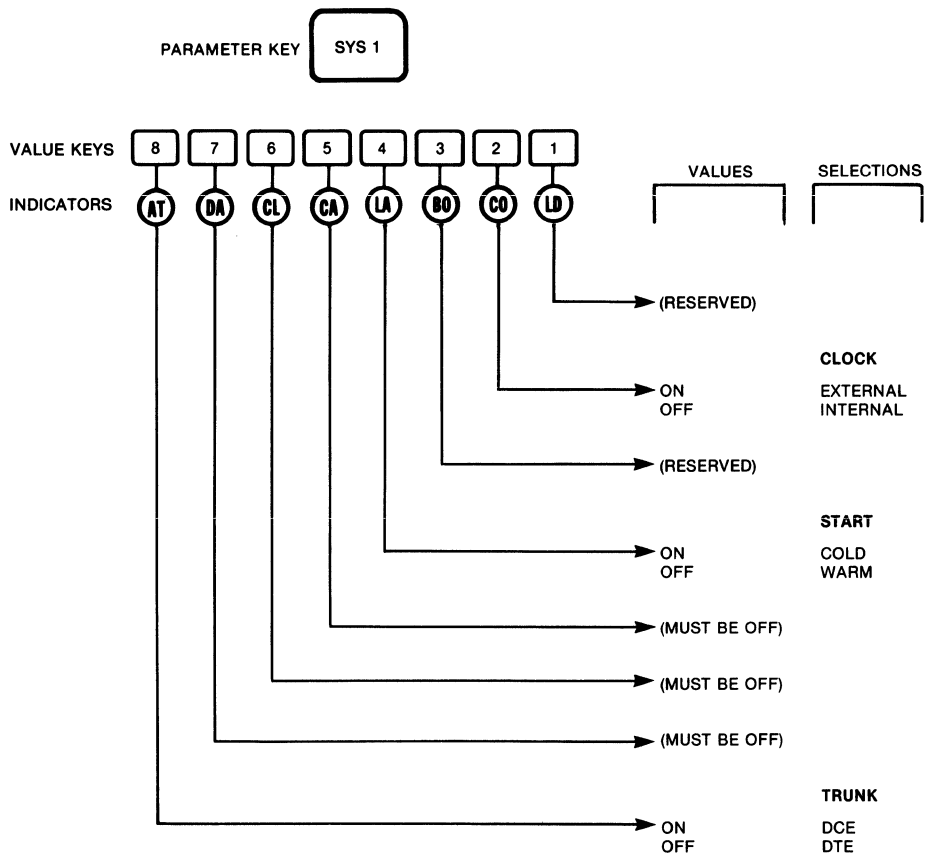
1. Touch either the SYS1 or SYS2 key to select a group of operating parameters (see figure 2-8 for the SYS1 group, or figure 2-9 for the SYS2 group). Touch the SYS3 key if you wish to change the EIA control-signal bias (refer to paragraph 2.3.3 and see figure 2-10). After you touch one of these keys, the indicators will show the current settings of the selections.

Also, after you touch SYS1, SYS2, or SYS3, a 20-second timer is started. If another SYS key or a Value key is touched, the timer is restarted to 20 seconds. If the timer expires, the indicators revert back to their normal state; they reflect system status and BSC line activity (see table 6-1), rather than the current status of operating parameters.

2. Touch the keys labeled 1 through 8 to make specific selections from the group of parameters (SYS1, SYS2, or SYS3) you have just selected. Repeated touching of one of these keys toggles the corresponding value between OFF and ON. The indicators will show the new status (ON or OFF). The correlation of selections to indicators is shown in table 2-1.
3. Touch both Reset keys simultaneously to reset the PAD and store the current selection values. During a reset, the PAD's base module indicators should be ON.

Table 2-1. Correlation of Soft Switch Selections to Indicators

Indicator	Selection
LD	1
CO	2
BO	3
LA	4
CA	5
CL	6
DA	7
AT	8



MI-1391-1a-07

Figure 2-8. Using the SYS1 Key to Set Operating Parameters

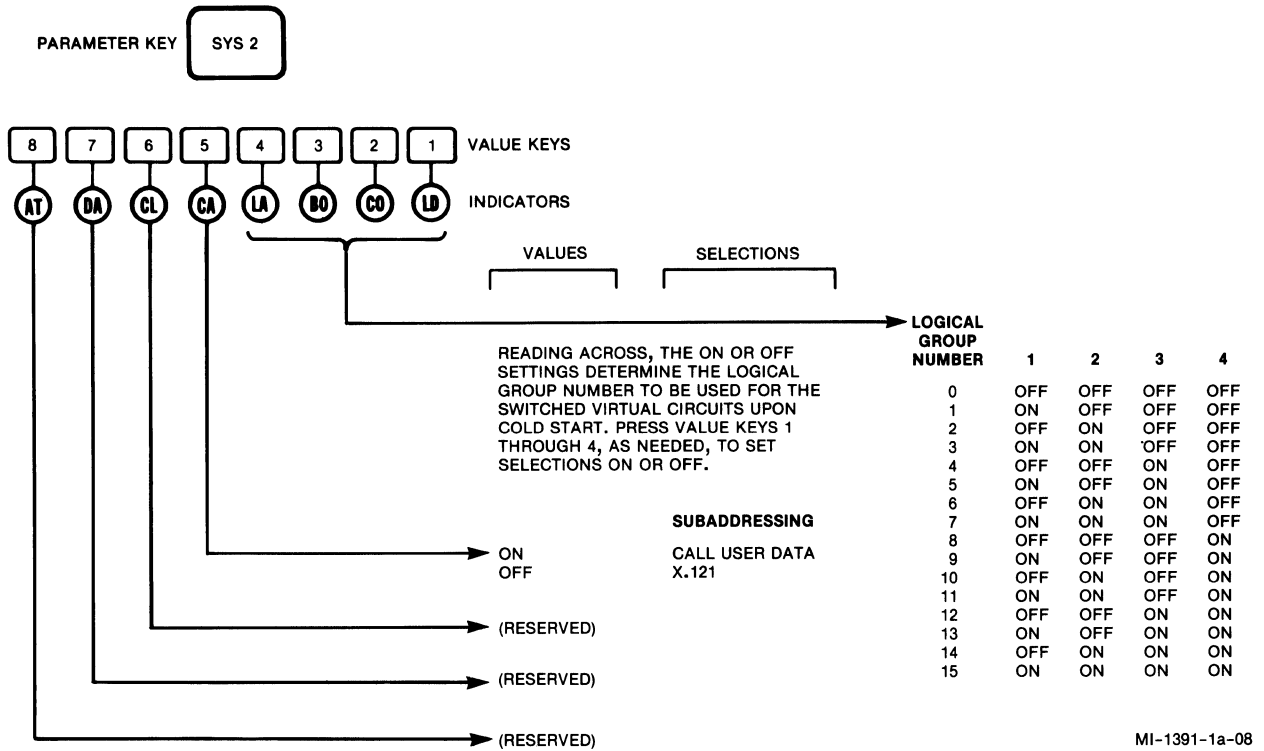
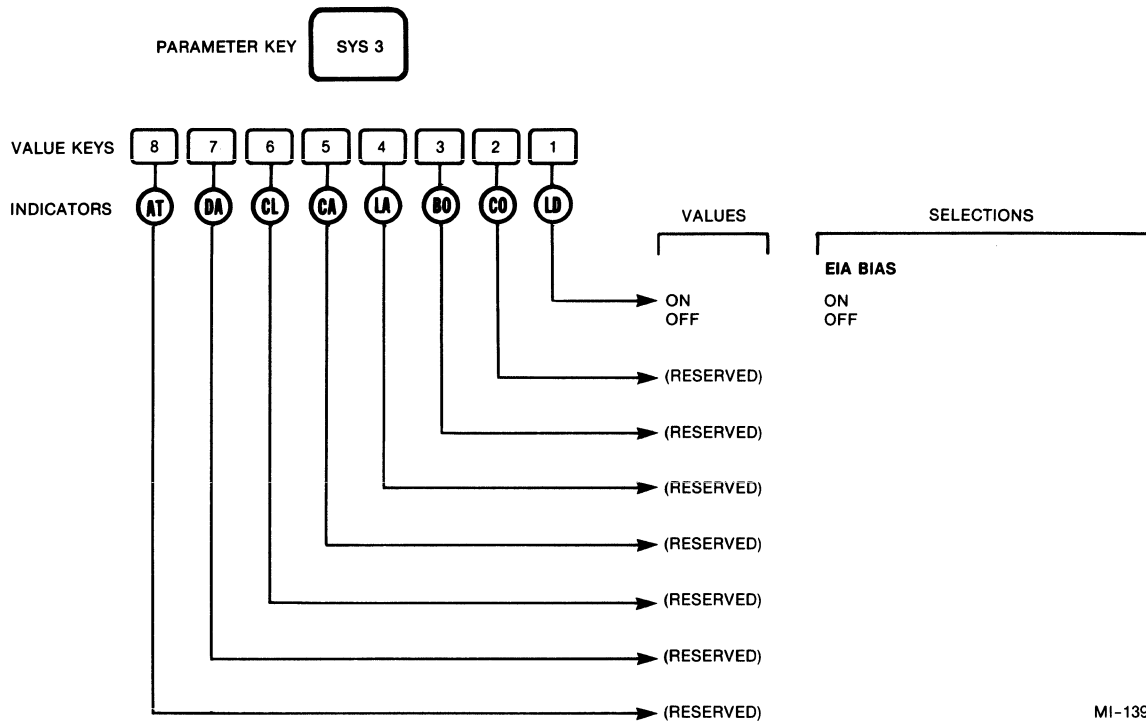


Figure 2-9. Using the SYS2 Key to Set Operating Parameters



MI-1391-1a-09

Figure 2-10. Using the SYS3 Key to Select EIA Control-Signal Bias

SECTION 3

THEORY OF OPERATION

This section will be helpful when you:

- Plan the initial installation of the PAD
- Examine what happens when you migrate from a classic BSC network to a network that uses packet-switching technology
- Consider possible BSC applications used over a packet-switching network

This section covers the following operational areas:

- X.25 support
- Physical channel connection/EIA handling
- Synchronous device support
- 3270 BSC Protocol support
- 3270 Display System Protocol (DSP) support
- Calling procedures
- ATM support

Because of the interrelationships that exist between these operational areas and the way you configure the PAD, the text in this section includes references to paragraphs in section 4.

3.1 X.25 SUPPORT

Packet-switching networks provide connection for the synchronous equipment user via a dedicated X.25 access line.

In order to use the X.25 access line, synchronous equipment users must connect by using equipment which complies with the Recommendation X.25 as adopted by the CCITT. The MICOM PAD fully supports this requirement.

The MICOM PAD will normally be used as an in-house PAD when a user has BSC mainframes or 3270 cluster controllers that must be interfaced to an X.25 Packet Data Network. However, the PAD can also be used for an extension to the backbone PDN to offer dedicated line access, providing 4-to-1 remote concentration of the BSC lines.

Because IBM's 3270 BSC Protocol was not designed to provide the security required for dial-in or switched access, it is recommended that the security requirements for each host application involved be carefully reviewed.

In summary, the MICOM PAD is a very cost-effective system when it is desirable to:

- Introduce the advantages of X.25 and packet-switching networks to the IBM 3270 BSC environment
- Add user-switching capabilities to a nonswitching BSC network

3.1.1 The X.25 Connection

The PAD uses a full-duplex, point-to-point circuit as a physical transmission path to the PDN or to other equipment that adheres to the X.25 procedures defined by CCITT.

While some networks and equipment still support older link access procedures, the MICOM PAD supports the most current LAPB procedures with the more efficient HDLC format. Therefore, be sure that the X.25 access link to which the PAD is to be connected is defined for LAPB-HDLC operation.

A PAD is usually set to exhibit an X.25 DTE logical appearance on the X.25 trunk, because the majority of X.25 backbone equipment has a DCE appearance. When interconnecting the PAD to some types of network equipment, the PAD may have to be set up to operate as an X.25 DCE. This can be achieved by setting a single soft switch (refer to paragraph 2.3.2.1).

In addition to the DTE or DCE logical appearance setting, the PAD allows you to tune the trunk parameters (frame window, packet window, and so on) to match the characteristics of the X.25 network (refer to paragraph 3.1.2).

3.1.2 Trunk Parameters

The PAD supports the following trunk parameters.

<u>Parameter</u>	<u>Description</u>
K	<p>This parameter is known also as the frame or HDLC window. It indicates the maximum number of information frames that can be unacknowledged at any given time on the trunk between the PAD and the network.</p> <p>The factory setting is 7.</p>
T1	<p>The T1 timer protects against loss of frames between the PAD and the network. Both sides of the circuit must have the same timer value.</p> <p>The factory setting is 5.</p>

<u>Parameter</u>	<u>Description</u>
N2	<p>This parameter specifies the allowable number of times an unacknowledged frame can be retransmitted before the trunk is reset.</p> <p>The factory setting is 10.</p>
Assr Timer	<p>The Assr Timer ensures the functionality of the trunk. When no activity is detected on the trunk for the duration specified by this timer, the PAD uses the X.25 link-assurance procedure. If the link-assurance procedure detects a trunk failure (or if a system reset occurs), the PAD actively attempts to bring the trunk up using an SABM/UA sequence.</p> <p>The factory setting for the Assr Timer is 15 seconds. (If the timer is set to 0, the link-assurance procedure is disabled, and the PAD will not initiate an SABM/UA sequence if a system reset occurs.)</p>
W	<p>This parameter indicates the maximum number of packets that can be unacknowledged at any given time for each of the PAD's established X.25 calls.</p> <p>The factory setting is 2.</p>
Packet Size	<p>The packet size defines the maximum number of characters that the PAD will insert into a network-bound packet or will expect in an in-bound packet.</p> <p>The factory setting is 7.</p>
Segment Size	<p>The PAD maintains a segment counter for networks that use the segment, instead of the packet or character, as the chargeable unit. This parameter is not vital to the trunk operation; rather, it represents a user convenience.</p> <p>The factory setting is 6.</p>

If you need to change any of the factory settings of the trunk parameters, refer to paragraph 4.5.4.

3.1.3 Virtual Circuits

The most striking feature of packet switching is its ability to have virtual circuits (also referred to as logical channels). This means it is possible to support multiple, simultaneous communications sessions with only one physical connection: the X.25 trunk.

It is important to select the number and type of virtual circuits to achieve optimum use of the PDN and the X.25 trunk. The number of virtual circuits dictates the number of simultaneous sessions that can be supported over the X.25 trunk. This number can be less than, equal to, or greater than the number of physical devices attached to the PAD.

Although the PAD supports only switched virtual circuits (SVCs) over the X.25 trunk, permanent virtual circuit (PVC) operation can be simulated by the PAD using SVCs.

The factory setting for SVCs is 2. The number of SVCs should be set to the actual number of physical devices (user terminals and printers) attached to the PAD plus two. For example, for 64 physical devices, the number of SVCs would be 66.

Switched Virtual Circuit

An SVC is required for each simultaneous virtual call. A virtual call is set up dynamically when one device (one user) attached to the PAD needs to communicate with another device connected to the PDN.

The network identifies each SVC with a unique logical group number (LGN) and logical channel number (LCN). The permissible values are: 0 through 15 for the LGN and 0 through 255 for the LCN. The total number of SVCs you can define must not exceed 66 (the maximum number of physical devices, plus 2). Refer to paragraph 4.5.5.

Typically, the PDNs differentiate between the various types of virtual circuits by the appropriate allocation of the LGN.

- You must configure all LGNs and LCNs assigned to you for operating SVCs. This information is provided by the PDN.
- It is recommended that you subscribe to SVCs which have both incoming and outgoing call capabilities.
- If your PAD is connected to the French TRANSPAC Network or to equipment with functionality similar to TRANSPAC, you must configure the LGN and the LCN of one of the SVCs to 0.
- Do not configure more circuits than you have subscribed to. The PAD can be set to ignore calls or to restart the trunk when it detects an incoming call over an undefined circuit (see the description of the In Call prompt in table 4-4). This condition results in performance degradation.

- When a user places a call, the PAD will use the highest numbered, free logical channel defined for SVC operation. This is true only if the PAD is configured as a DTE; if the PAD is configured as a DCE, it will use the lowest numbered, free logical channel. As a DCE, the network's incoming call uses the lowest numbered, free logical channel. If you configure more logical channels than subscribed to, the network will clear the PAD's call requests and indicate a local procedure error.

3.1.4 Trunk Out-of-Order

The following paragraphs describe the PAD's response to a physical or a logical trunk disconnection. Also described is the effect of a trunk disconnection on the PAD's BSC lines.

3.1.4.1 Physical Disconnection

Temporary Failure

The PAD will sustain a loss of DCD or DSR signals up to the length of time specified by the following formula:

$$2 \times N2 \times T1 + \text{Assr Timer value}$$

Based on the default parameters settings, this value is equivalent to 115 seconds.

Permanent Failure

If the link-assurance procedure is enabled (that is, the Assr Timer trunk parameter is non-zero) and fails, the PAD will clear all switched virtual calls in progress. The clear service signal will contain the appropriate cause and diagnostic codes indicating a trunk failure (see table 5-1).

The PAD's LD indicator will go ON. Also:

- All cluster controllers attached to the BSC lines will continue to be polled by the TPAD. All cluster controllers in the HPAD will continue to respond to host polls.
- Attempts to place calls from the PAD while the link is down will cause the calls to be cleared. The PAD will display the appropriate cause and diagnostic codes.

3.1.4.2 Logical Disconnection

Temporary Failure

When the PAD enters the disconnected phase because of protocol errors or internal malfunctions, it will automatically try to reestablish operation by continually transmitting the Disconnect (DISC) command, and then wait for a UA response to resume frame and packet level reestablishment procedures.

Using a Command

If the trunk is logically disconnected by the Trunk Down command (refer to paragraph 4.6.2), the PAD will be in a disconnected phase until the Trunk Up command (refer to paragraph 4.6.3) is issued using the Command Facility.

3.1.4.3 Effect of Trunk Failure on Channels

There is no physical effect on the synchronous BSC lines or the asynchronous Command port if the trunk fails.

3.1.5 Effect of Reestablishing Trunk Operation

After reestablishing trunk operation, the PAD will not attempt to reconnect the calls that were dropped. An exception to this is when the PAD provides autocall support to a device. For example, if a host has a print job ready, the host Select of the printer may cause the HPAD to initiate an automatic reconnection.

Because IBM's 3270 BSC Protocol was not designed to be used in a dial-in or switching environment, the host applications are not usually designed to treat an accidental disconnection as a potential security violation. Refer to paragraph 3.5.1 for information on the best way to configure the BSC PADs.

3.1.6 Packet Description

All data transmitted over the X.25 trunk is in packet form. The PAD does not change or rearrange data received from a device. It simply assembles received characters into packets and disassembles received packets into characters.

Networks normally support information in packets containing up to 128 bytes of user data. However, some networks are capable of handling a larger packet size. For example, the normal arrangement for the Canadian DATAPAC Network is 256-byte packets. The PAD can support 128- or 256-byte packets for both incoming and outgoing packets (see table 4-4).

3.1.6.1 Number of Characters in a Packet

The number of characters in a packet is variable, depending on the amount of data sent to the PAD by the BSC device. The PAD will forward a packet to the network every time it receives an End-of-Block (EOB) character (the user presses the Aid or Enter key), or as soon as it receives 256 bytes.

When the PAD receives 256 bytes without detecting an EOB character, it will begin forwarding data into the network with the M-bit set.

3.1.6.2 Packet Window

The packet window is a mechanism that is used to restrict the number of packets that the network or the PAD can accept on any logical channel at any given time. The size of the window refers to the maximum number of transmitted packets that have not been acknowledged at any given time. Allowable packet window values are 2 through 7 (see table 4-4).

A window size of 2 is the PAD default value and is satisfactory for most BSC applications. In certain circumstances, a different size may be desirable. Some networks offer a permanent arrangement to support a window size of 2 through 7. Other networks that support an extended Call Request format require that each call be coded with the Window Size Negotiation facility. The PAD can be configured to automatically code each call request with a Window Size Negotiation facility (see table 4-4). The value of the window size will be the same as configured for the trunk window parameter.

3.1.6.3 M-Bit Support

The MICOM PAD will set the M-bit in full packets under the following conditions:

- Depending on packet size configuration (128 or 256 bytes), the PAD will wait for the 129th or 257th character.
- For the Command port, if the PAD receives the 129th or 257th character before receiving a data-forwarding character (carriage return), each packet (except the last packet) will be transmitted with the M-bit set.

NOTE: Incoming packets are forwarded to the BSC device as they arrive, with no special M-bit treatment.

3.1.7 Billing and Accounting

The MICOM BSC PAD provides complete billing and accounting information by end-user device. This is possible because each end user's call over the network is on a separate SVC. Billing and accounting are valuable when it is necessary to monitor network usage, or to verify periodic network service charges.

3.1.8 Trunk Password Protection

You can protect your PAD against unauthorized access by defining a trunk password (see table 4-4). Specifically, this means that call requests from the network for your PAD must have the proper password in the Call User Data (CUD) field.

For asynchronous calls (to the Command Facility) and when X.121 subaddressing is enabled, the password must be in octets 5 through 8 of the 16-octet CUD field. If the Call User Data method of subaddressing is enabled, the trunk password must be in octets 7 through 10. Typically, the caller has no control over octets 1 through 4.

For BSC calls, the password occupies the last four octets of the CUD field. The specific four octets vary, depending on what else is in the CUD field. For example, with 10 octets the password would reside in octets 7 through 10.

A caller's failure to include the proper password will result in the PAD rejecting the call with a diagnostic code equal to 133.

3.1.9 Addressing

The PAD supports the CCITT Recommendation X.121, the universal numbering scheme for addressing devices. This numbering scheme ensures that a device on a public Packet Data Network can be accessed using the same address from anywhere in the world.

A device is defined as any addressable entity connected to the network using an X.25 access line. Each device, such as a MICOM PAD and other X.25 equipment, is assigned a network address. The X.121 numbering plan specifies an address of up to 15 digits with the following structure:

- International prefix. This is a one-digit prefix required by some networks to determine that the called address belongs to another network.
- Data Network Identification Code (DNIC). This is a four-digit code that uniquely identifies the public Packet Data Network to which the called device is connected. Examples of DNICs are:

Telenet = 3110
Tymnet = 3106

- Network Terminal Number (NTN). This is an up-to-10-digit number that is assigned by the public Packet Data Network authority to identify a particular X.25 device in the network.

The MICOM PAD fully supports encoding of the X.121 address structure for both incoming and outgoing calls.

3.2 SYNCHRONOUS DEVICE SUPPORT

Mainframe sites that support IBM's 3270 BSC Protocol may have varying configurations of hardware and applications software, yet the 3270 BSC support requirements remain constant, with only minor exceptions. The following paragraphs discuss aspects of the host site and BSC operation that are involved with the introduction of MICOM X.25 PADS and packet-switching technology.

3.2.1 Central Processing Units

There are numerous types of IBM Central Processing Units (CPUs) that are installed at customer sites around the world. These are also known as mainframes or host computers.

Ranging in size from medium to large, these IBM CPUs include:

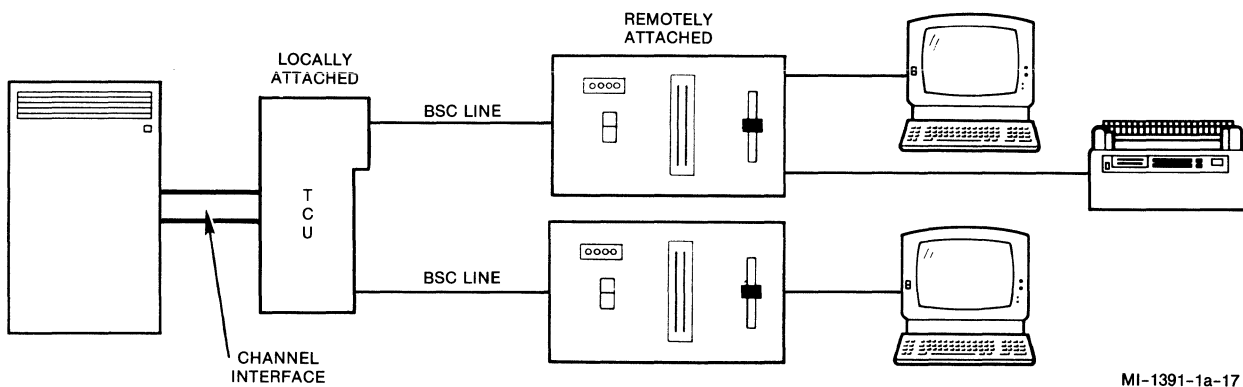
- Medium 4300s (4331, 4361, and 4381)
- Large System 360
System 370
3030 series
3090 Sierra

All the CPUs listed can support software applications tailored for 3270 BSC access. IBM equipment which utilizes a CPU's capabilities may be classified into two categories: remote or local.

Remote and Local Equipment

Remote equipment is able to access the mainframes through an IBM communications controller with RS-232/V.24 connections. When adding a PDN and MICOM PADS to a BSC network, it is the remote clusters that can benefit from X.25 connections (see figure 3-1).

Local equipment (for example, a tape drive, a disk drive, or a local cluster controller) is channel attached directly to the mainframe, and generally does not provide opportunities for the use of MICOM 3270 BSC PADS.



MI-1391-1a-17

Figure 3-1. Remote and Local Attachments of Equipment

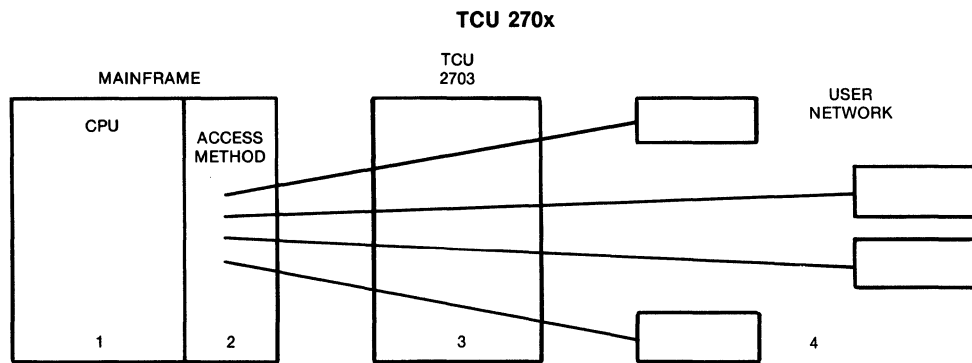
3.2.2 Teleprocessing Control Units

The interface between the mainframe and the remotes was originally provided by the 270x family of Teleprocessing Control Units (TCUs). The TCU connects locally to the CPU using channel attachments. Functions of the TCU, among other things, include:

- Detecting and performing various data link control functions for remote devices
- Checking for transmission errors from remote devices

Figure 3-2 shows a typical network with a TCU. The following numbered paragraphs relate to the numbers 1 through 4 in figure 3-2.

1. A portion of the mainframe's CPU time is devoted to responding to the network demands.
2. The access method has logical control over all BSC lines.
3. The TCU 2703 exerts physical control over the attached BSC lines.
4. The number of lines in the user network is restricted to the number of lines available from the access method.



MI-1391-1a-48

Figure 3-2. Network With TCU

All TCU functions are hardware defined; a TCU configuration change requires rewiring by an IBM Customer Engineer (C.E.).

MICOM's 3270 BSC PAD works with all TCUs.

3.2.3 Communications Control Units

Some sites still provide remote communications support with 270x TCUs, although most sites today have the 3704, 3705, or 3725 Communications Control Units (CCUs) installed (MICOM's 3270 BSC PAD works with all CCUs). For a 37xx CCU to provide BSC support, it must run an IBM software product called Emulation Program (EP), which makes the 37xx simulate the 270x TCU.

Figure 3-3 shows a typical network with a CCU. The following numbered paragraphs relate to the numbers 1 through 5 in figure 3-3.

1. The mainframe's CPU is not significantly affected by the network demands.
2. The access method spends more time processing messages and less time controlling the BSC lines.
3. The access method communicates with the remote BSC devices over a single channel to the 3705.
4. The 3705 exerts physical and logical control over the BSC network.
5. The size of the BSC network can be larger. The limit is the communications capacity of the 3705, not the number of lines available in the CPU.

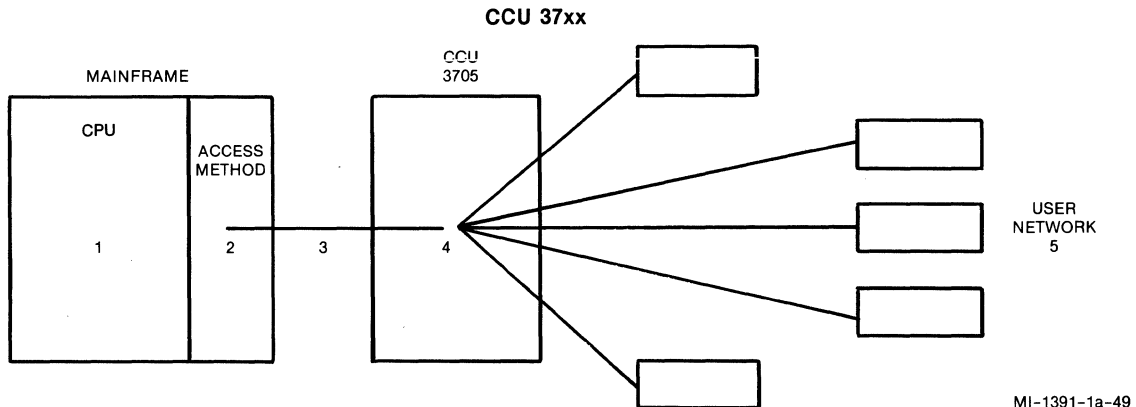


Figure 3-3. Network With CCU

3.2.4 BSC Line Support in the Communications Control Unit

In many cases, a CCU may be required to support both BSC and SNA. Another IBM software product called Partitioned Emulation Program (PEP) provides the CCU with both EP, for BSC support, and Network Control Program (NCP), for SNA support.

An advantage that CCUs with EP or PEP installed have over the older TCUs is that network configuration changes (that is, line type, line speed, and so on) may be programmed instead of hardwired. Thus, any required configuration change may be made by the network programmer; an on-site visit by an IBM C.E. is not required.

EP is used only with Basic Telecommunications Access Method (BTAM) and non-ACF (Advanced Communications Function) Telecommunications Access Method (TCAM).

PEP is used with ACF/VTAM (Virtual Telecommunications Access Method) and ACF/TCAM.

EP and PEP both support BSC and asynchronous protocols. The MICOM 3270 BSC PAD is used with the 3270 BSC Protocol only. The MICOM asynchronous PAD may provide asynchronous device support for IBM mainframes with IBM's Network Terminal Option (NTO) software.

3.2.5 Access Methods

IBM has introduced a variety of access methods over the years. These include BTAM, TCAM, ACF/TCAM, VTAM, ACF/VTAM, and others. MICOM's 3270 BSC PAD supports all of these access methods.

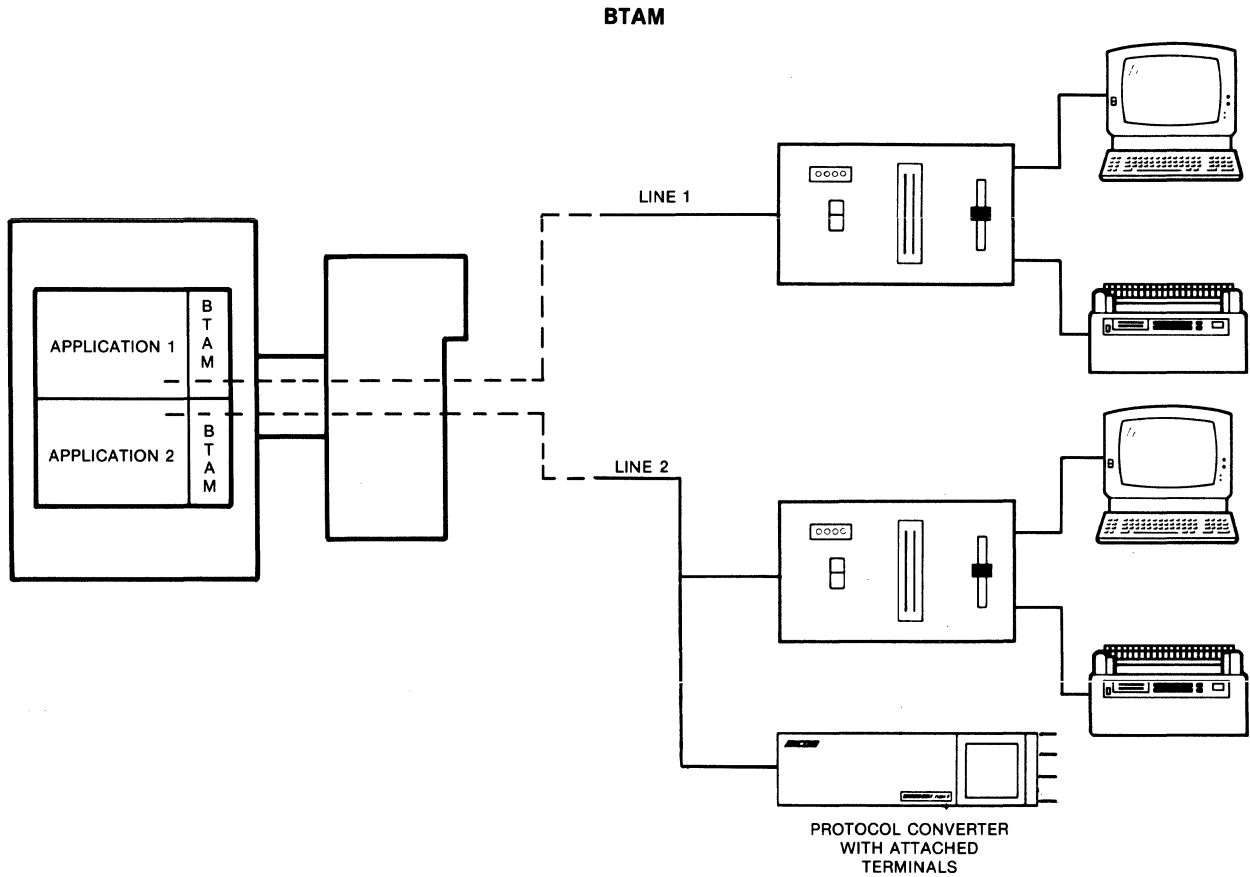
A brief description of these access methods is made here, because it will be demonstrated later the advantages that packet switching can bring to a BSC network.

3.2.5.1 BTAM

BTAM was developed by IBM in the 1960s, and is still widely used today in BSC environments.

BTAM supports BSC and asynchronous protocols. However, the application programs on the mainframe still have to conform to BSC protocol details. For example, the applications must know about polling and error recovery, among other things.

The major limitation of BTAM is that each communications line, or RS-232 link, can only access one BTAM application at a time. In other words, all users on a given BSC line must all access a single application program. As shown in figure 3-4, users on line 1 are restricted to application 1; users on line 2 are restricted to application 2.



LINE 1 USERS CAN CONNECT ONLY TO APPLICATION 1.

LINE 2 USERS CAN CONNECT ONLY TO APPLICATION 2.

MI-1391-1a-18

Figure 3-4. BTAM Example

Another limitation of BTAM is related to the IBM equipment environment itself. Because each communications line is always attached to the same cluster controllers, and because the same devices are always attached to the same cluster controllers (a classic nonswitching environment), BTAM does not provide or cause any error recovery when a BSC controller sends an Intervention Required (IR) status for a specific device (a device malfunctions or is disconnected when in a session). When the terminal is repaired or reconnected and the remote cluster controller clears the IR status with a Device End (DE), the status of the reconnected user (or a newly connected user over a PDN) is completely host-application dependent. Thus, after reconnection one of the following may occur:

- The user may receive a signon screen (that is, the host application detected the disconnection and logged off the prior user).
- The user may be at the point in the application where the prior user was disconnected (that is, the host application did not do anything when the prior user was disconnected).

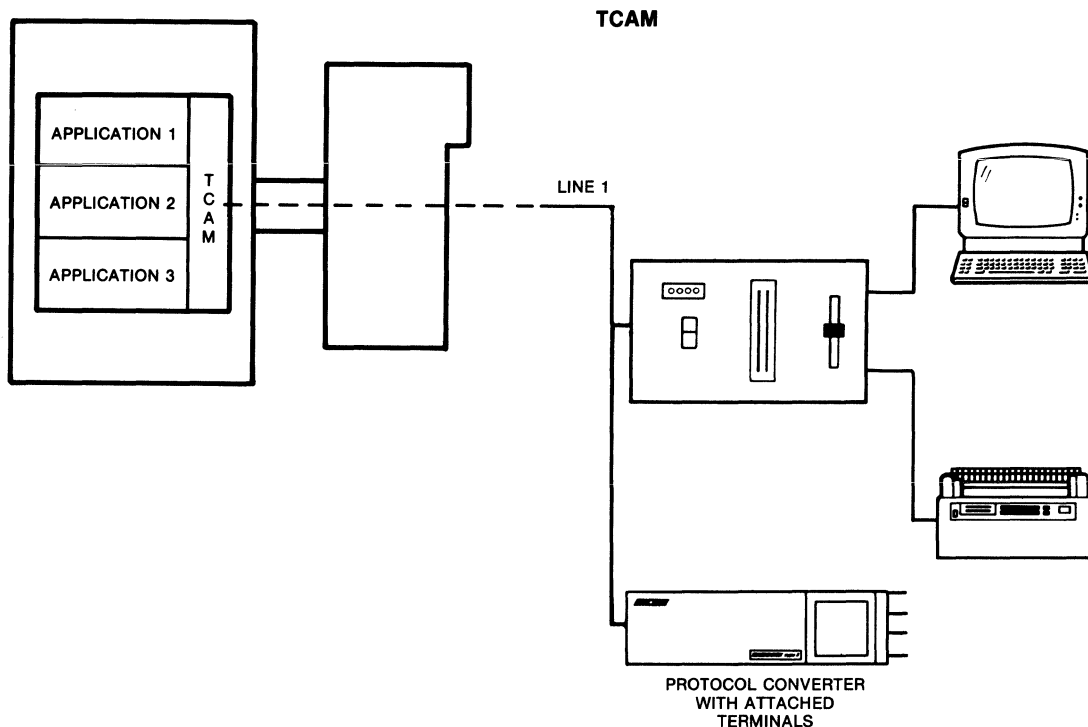
3.2.5.2 TCAM

In the early 1970s, IBM introduced TCAM as a new access method. The original version of TCAM supported BSC and asynchronous protocols. A later release, ACF/TCAM also supports SNA protocols.

One characteristic that distinguishes TCAM from other access methods is the way that TCAM uses the BSC Reverse Interrupt (RVI) to control input from the cluster controllers. MICOM's 3270 BSC PAD fully supports this TCAM characteristic.

Several other characteristics distinguish TCAM from BTAM. Among them are:

- TCAM is responsible for polling and managing the network, insulating the application programs from having to directly support the device dependent functions.
- When applications or users transmit data through TCAM, it is queued onto disk. TCAM processes the queued requests sequentially, delivering the data to the application or device.
- TCAM provides line sharing between applications. Thus, users on a communications line may access any one of a set of application programs on a single host (see figure 3-5).



LINE 1 USERS CAN CONNECT TO ONE OF A SET OF APPLICATIONS (APPLICATION 1, 2, 3, AND SO ON).

MI-1391-1a-19

Figure 3-5. TCAM Example

3.2.5.3 VTAM

The introduction in 1974 of IBM's VTAM program provided support for the new IBM SNA/SDLC architecture. Since many IBM customers elected to stay with their BSC applications indefinitely, the release of VTAM also offered BSC support.

Since VTAM/NCP (Network Control Program) was intended to support an SNA/SDLC network, the BSC interface requirement had to be provided by installing PEP. The newer BSC application programs, influenced by VTAM's comprehensive approach to communications problems, often include some method of dealing with devices that return the operator IR status.

Two of the important features that VTAM/NCP provides for BSC support are:

- VTAM provides line sharing between applications, subject to PEP limitations (see figure 3-6).
- NCP is responsible for polling and network control, leaving the mainframe more free for application-related processing.

BSC line support on a CCU with NCP will always have these components:

- 37x5 CCU (not a 27x5 TCU)
- NCP on the CCU, controlling
- PEP, also on the CCU
- VTAM on the mainframe, or ACF/TCAM on the mainframe

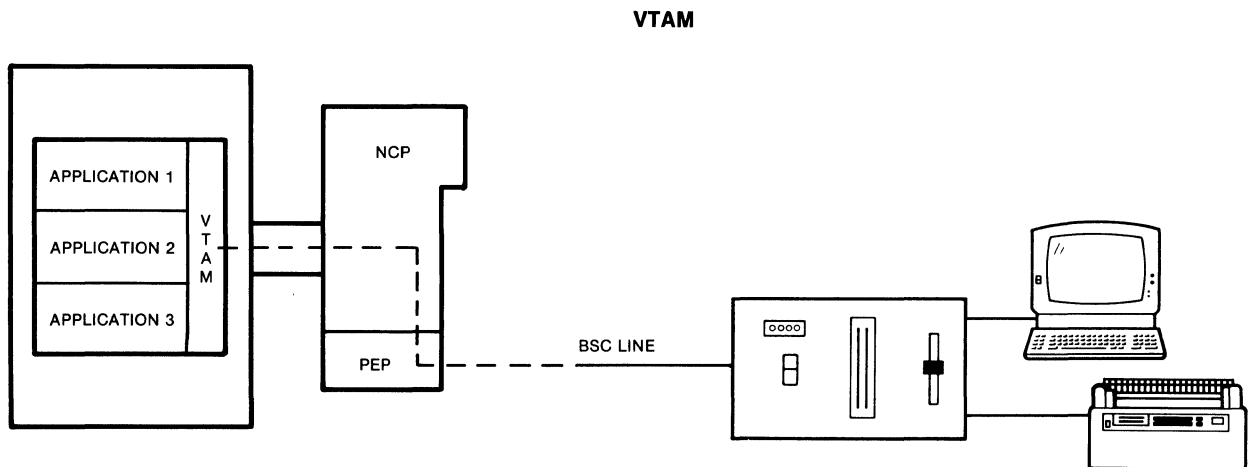


Figure 3-6. VTAM Example

MI-1391-1a-20

3.3 ASPECTS OF THE BSC PROTOCOL

The BSC protocol is a polling protocol that supports multiple devices on a line. A poll or response must always occur within three seconds, or the BSC line times out. Polling occurs in one of two formats: General or Specific. After polling activities, the host often issues a Select.

Refer to chapter 4 of the 3274 Control Unit Description and Programmer's Guide (IBM publication GA23-0061-2) for a complete discussion of the BSC protocols.

3.3.1 General and Specific Polls

The following illustrates a General poll (GP) to a specific cluster:

(xx)(xx)(7F)(7F)(2D), where the first two bytes [(xx)(xx)] of the sequence are the cluster address, and (7F) is a nonspecific device address. If the cluster has no requests/outstanding status, it returns an End of Transmission (EOT).

Example: 40407F7F2D is a General poll for cluster address 40.

The following illustrates a Specific poll (SP) for a specific cluster and specific device:

(xx)(xx)(yy)(yy)(2D), where the first two bytes [(xx)(xx)] of the sequence are the cluster address, and the next two bytes [(yy)(yy)] are the device address. If the device has no requests/outstanding status, the cluster returns an EOT.

Example: C1C140402D is a Specific poll for cluster C1, device 40.

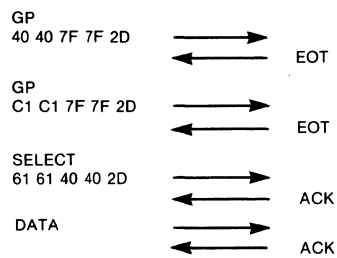
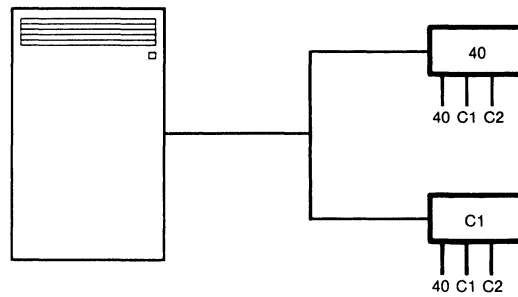
3.3.2 Selects

When the host wishes to send data to a device, it sends a Select first, to determine if the specific device is ready to accept data. The following illustrates a Select:

(xx)(xx)(yy)(yy)(2D), where the first two bytes [(xx)(xx)] are the cluster address, generally plus hex 20. (There are two exceptions in the BSC protocol: address C1 has a Select of 61, and address 50 has a Select of F0.) The next two bytes [(yy)(yy)] are the specific device address. If the device is ready to accept data, the cluster returns a positive acknowledge (ACK).

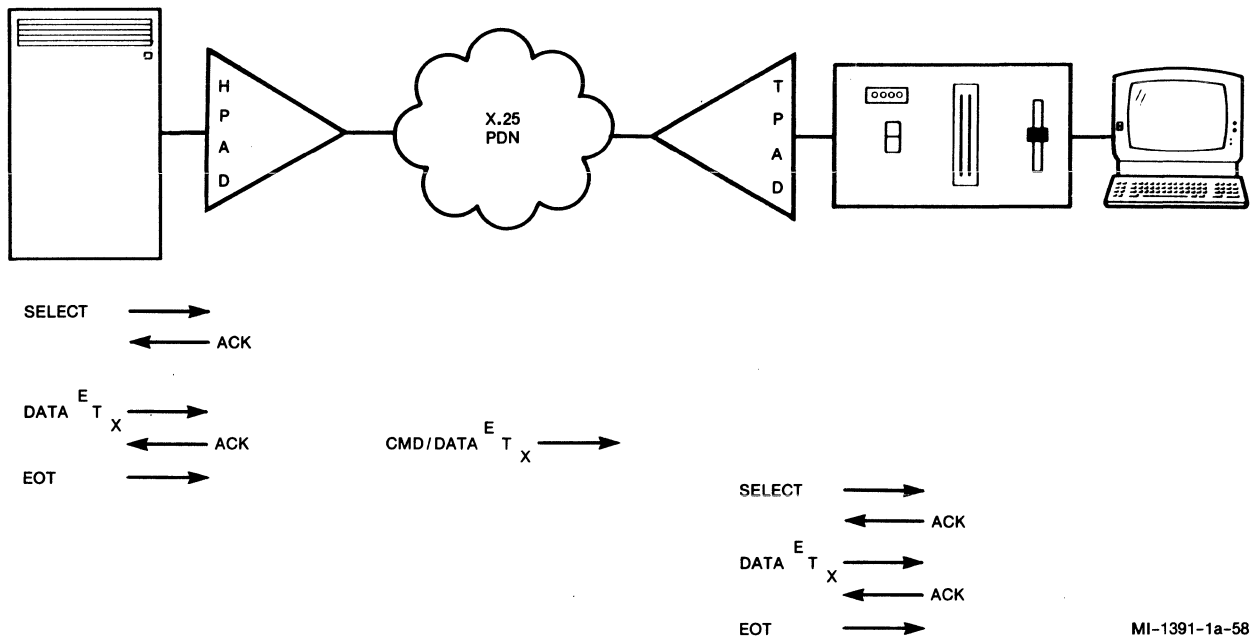
Example: E2E24040 is a Select for cluster C2, device 40.

An example of a General Poll and a Select are shown in figure 3-7. An example of a Select across an X.25 network is shown in figure 3-8.



MI-1391-1a-21

Figure 3-7. Example of a General Poll and a Select



MI-1391-1a-58

Figure 3-8. General Flow of a Select Across an X.25 Network

3.3.3 Printer Support

When a user requests a printout from the host, a print job is queued by the host. When the host is ready to output the print data, it usually sends a Specific poll to the user-specified printer. If the printer is ready, the host selects it, and then the print job begins.

The MICOM HPAD can be configured so that when it receives a Select for a printer, it places a call to a predefined destination address across the network. Refer to paragraphs 4.5.3 and 4.5.6 for details on device and mnemonic configuration.

3.4 DISPLAY SYSTEM PROTOCOL (DSP)

The Display System Protocol (DSP) for 3270 BSC devices is a public standard created by Telecom of Canada, GTE, and Tymnet. MICOM's 3270 BSC PAD implements all required elements of the DSP as defined in the second edition of the DSP document (June 1983).

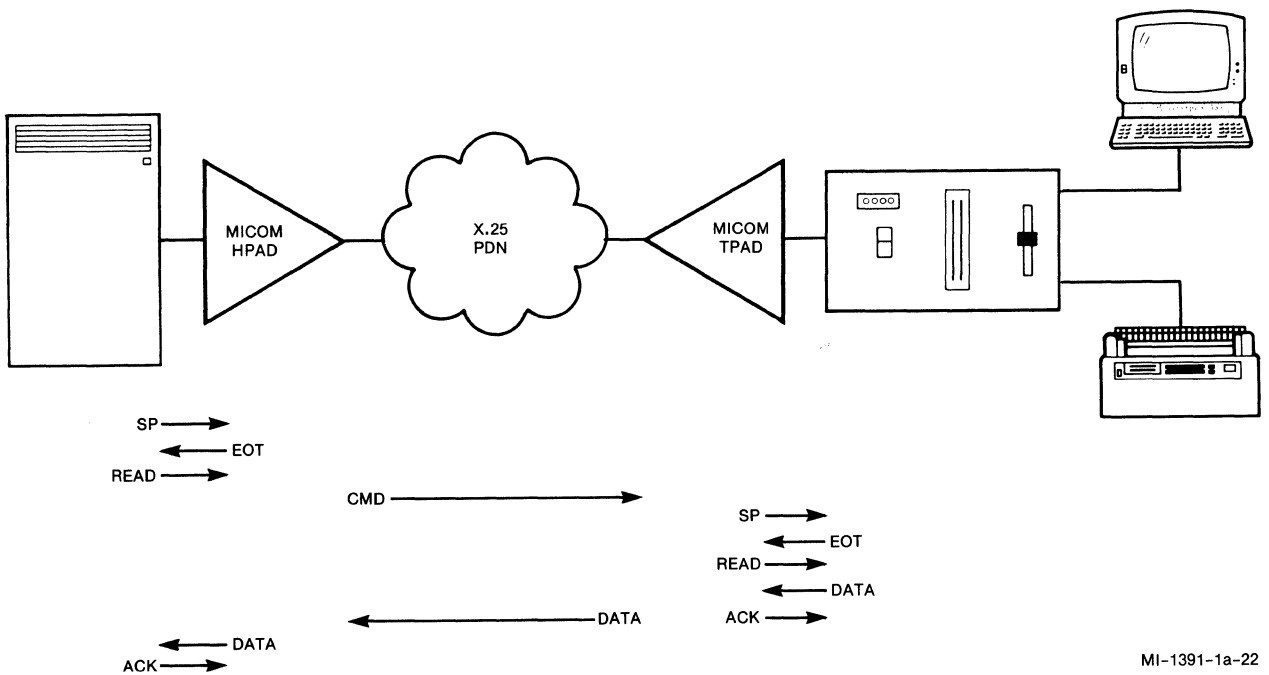
The DSP defines how IBM's 3270 BSC Protocol is handled across an X.25 PDN. Specifically, some BSC commands require an immediate response, which is difficult to guarantee over a packet-switching network. The DSP addresses this issue. Also, the DSP addresses how a connection (call) should be made, and defines a plan to control switching in a classic nonswitching network.

3.4.1 Read and Write Commands

The host application sends data to BSC devices by issuing a Write or Erase/Write command. The host application may request data from a device by issuing a Read or Read/Modified command.

It is important that cluster controllers respond to host commands within three seconds to avoid a line timeout. When a packet-switching network is between the host and the BSC cluster controller (as shown in figure 3-9), it is usually not possible for the cluster controller to receive, process, and have the host receive the cluster controller's response within three seconds.

The DSP provides a method for the PADs to delay responses while the requested data is sent across a network. For example, when the host issues a Read command, the MICOM HPAD is able to make temporary responses to the host, allowing the remote cluster controller enough time to get its response across the network and to the HPAD, which then forwards it to the host. Refer to paragraph 4.5.2 for instructions on configuring HPAD lines.



MI-1391-1a-22

Figure 3-9. General Flow of Host Read Commands Across a PDN

3.4.1.1 Read Commands and VM Hosts

A special case exists for IBM hosts that are Virtual Machine (VM) based. A VM host does not have a monitoring program to determine if it is ready to accept data from remote devices. Occasionally a VM host may not have input buffers available to store new data from the remote devices. In this case, it will discard that data and issue a Read command. Thus, VM hosts that are under load tend to issue a higher number of Read commands over a network, with the result that overall network efficiency may be affected.

MICOM's 3270 BSC PAD supports all types of Read commands.

3.4.1.2 Write Commands and Pipelining

Efficient support of the Write command can be achieved over a packet-switched network. If the PAD were to buffer all of the Write data before forwarding it (to the network from the HPAD or to the cluster controller from the TPAD), the presentation of the data to the user would ultimately be delayed. In fact, delays over the network could be two to three times the expected amount. Therefore, MICOM has implemented a proprietary method for faster data delivery to display terminals, known as Pipelining.

3.4.2 Delays

There are two important types of delay factors inherent in a BSC/X.25 packet-switched network. They are network delays and application delays.

Application delay is measured from the time a user transaction enters the host to when a response is received from the host (network performance has no relationship to an application delay).

Network delay is measured from the time the PAD receives the user transaction to when the PAD outputs a transaction response, less the application delay.

3.5 CALLING PROCEDURES

The DSP defines various types of calling procedures (referred to as Connection Request Modes, or CRMs) which provide either security or switching and application access flexibility. The decision on which type of CRM to use for each host application should be made by the network designer (for detailed information on CRMs, refer to the 3270 Display System Protocol manual listed in paragraph 1.5).

After a PAD initiates a call, the CRM in effect determines how the receiving PAD will connect the call (refer to paragraphs 4.5.6 and 5.1.1). MICOM's 3270 BSC PAD supports CRM1, CRM2, and CRM3 (refer to paragraphs 3.5.1 through 3.5.4). See table 3-1 for a comparison of these CRMs.

Once a call is established, the TPAD provides connection diagnostics and automatic call clearing capabilities (refer to paragraphs 3.5.5 and 3.5.6, respectively).

3.5.1 Determining Whether to Use CRM1, CRM2, or CRM3

The following subparagraphs summarize the major questions that the network designer should address when determining which CRM is appropriate for a given network application.

Does the Host Application Recognize the End of Session?

A user accesses a host application by logging onto the host system with a user name and password. To access a host application over a packet-switching network, the user must first place a call over the network from the TPAD to the HPAD.

After completing all application tasks, the user in the packet-switching BSC network normally logs off the host application and then clears the call. However, sometimes the call gets cleared while the user is still logged onto the application. When this happens, the MICOM HPAD notifies the host of the disconnection by sending an IR status. (In the case of autocalls, the HPAD notifies the host of the disconnection by sending a DE.)

If the host application can recognize the IR status, then accidental disconnects are not a problem. In this case, CRM3 is preferred because it offers greater application-switching flexibility.

If the host application cannot recognize the IR status, then accidental disconnects are a problem. In this case, CRM1 or CRM2 should be used because both of these provide control over who calls the host application.

Table 3-1. Comparison of Connection Request Modes

	CRM1	CRM2	CRM3		
Destination Line Number or Application ID	Source provides Any valid line number or application ID	Source provides Any valid line number or application ID	Source provides Any valid line number or application ID		
Destination CUA	Source provides Must be same as calling CUA	Source provides Any valid CUA	Source provides Any valid CUA	Destination assigns Any valid CUA	Destination assigns Any valid CUA
Destination DVA	Source provides Must be same as calling DVA	Source provides Any valid DVA	Destination assigns Any valid DVA	Destination assigns Any valid DVA	Source provides Any valid DVA
NOTE: CUA stands for Control Unit Address. DVA stands for Device Address.					

Does the User Need to be Guaranteed Access to a Host Application at Any Time?

It is critical for some users that their transaction requests be processed with minimal delays. For these users, calling several times to reach an application is not acceptable. An example is the user of a point-of-sale terminal.

If it is necessary to guarantee access to a host application, then CRM1 or CRM2 should be used. These CRMs allow host access by a user base to be controlled in a predetermined manner.

If the users do not require guaranteed or immediate access to a host application, then the use of CRM3 is recommended. By allowing a greater number of users to access a limited resource, the efficiency of the overall network is increased. CRM3 can also be used to provide a rotary at the HPAD, allowing incoming calls to be connected on an as-available basis.

Does the Host Application Require Security or Information on Who the User Is?

Some applications are particularly sensitive, and, due to that fact, security is a primary concern. Although host applications have a level of security via user IDs and passwords, there is another level of security provided by defining who is physically allowed to access the applications. Put another way, it may be important that a host application be available only to a limited set of specific, predefined end users. In this situation, clearly the advantages of end-user switching are not appropriate.

If security or application knowledge of the end user is required, then CRM1 or CRM2 should be used. These CRMs allow the network designer to place specific controls on who can call which applications. In this way, the required level of application-access security is provided.

If security or application knowledge of the end user is not important, then CRM3 may be used. In this case, the network designer does not have to be concerned with who calls which applications. Configuration of the network is made easier by providing a more general method for user access to host applications.

The following paragraphs contain brief descriptions and examples for each type of CRM.

3.5.2 Connection Request Mode 1

The various unique characteristics of a classic BSC network (such as always-available applications, application security, and so on) can be emulated when a PDN is used to provide remote user access to the BSC host. The following guidelines are suggested when configuring the TPAD and HPAD:

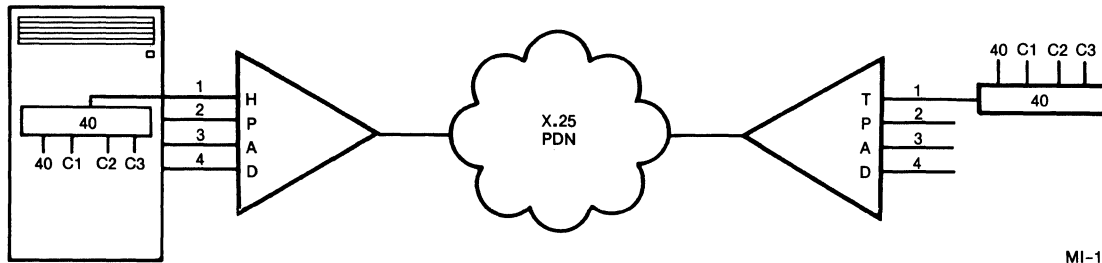
- Remote BSC devices are configured for calling using mnemonics (refer to paragraphs 4.5.3 and 4.5.6).
- A trunk password is defined (optional; refer to paragraph 4.5.4).
- CRM1 is specified for the mnemonics (refer to paragraph 4.5.6).
- Only one end user (or a limited set of end users) can call each destination application address.
- A closed user group (CUG) is created (optional; refer to paragraph 4.5.6).

Under the preceding conditions, a user may call only one destination address per mnemonic and may connect to only one application and device. The X.25 BSC networks shown in figures 3-10 and 3-11 are examples of networks where each end user calls a unique destination application address. In other words, if a destination HPAD address could be called by an uncontrolled set of end users, that network implementation would not retain the characteristics of a classic BSC network.

More security could be provided by assigning a CUG number to the BSC users within a group of TPADs and HPADs. This is helpful in the case of public networks, where there may be uncontrolled access to destination addresses by the general network user population.

In addition to providing network security, the network shown in figure 3-11 allows each network user to switch from one host to another, a capability not provided by native BSC networks.

CRM1

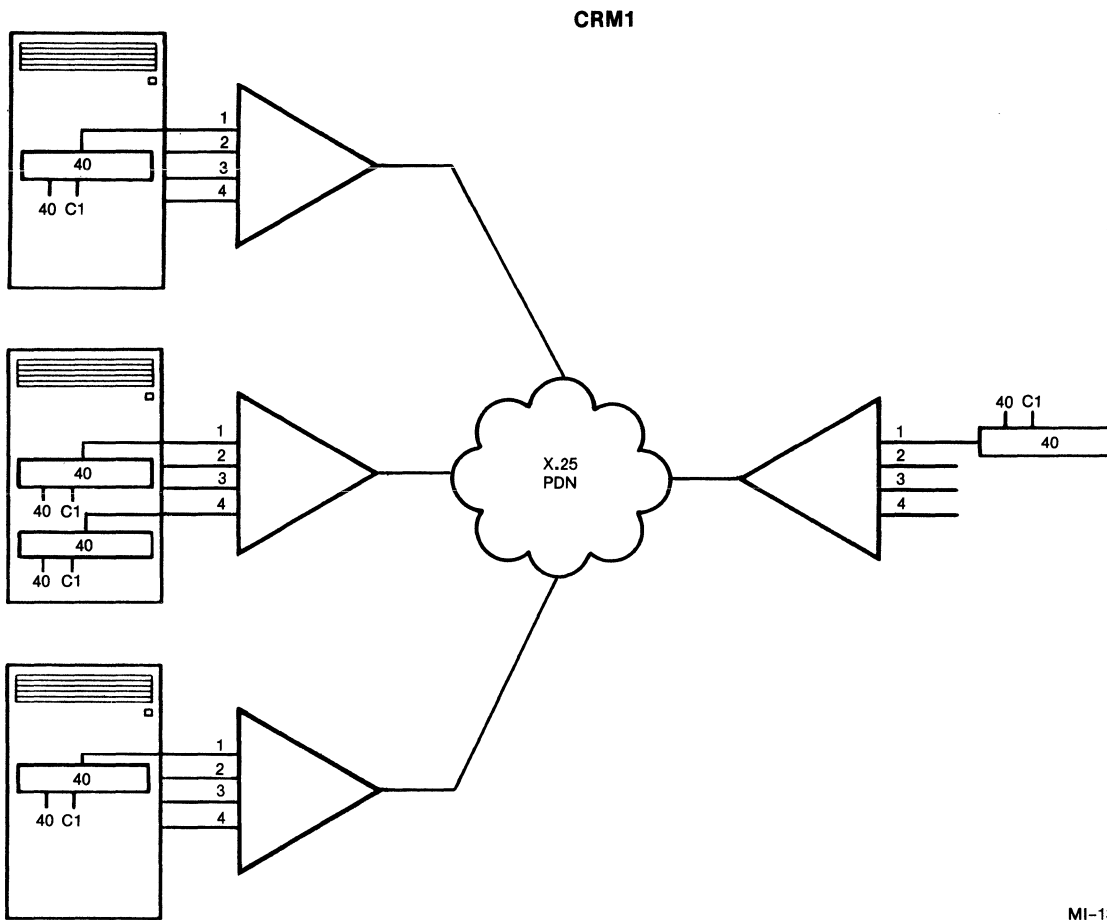


MI-1391-1a-55

Figure 3-10. Basic CRM1 Network

Example Related to Figure 3-10

0140C1 on the TPAD specifies application ID 01. The HPAD connects the call to 0140C1.



MI-1391-1a-54

Figure 3-11. CRM1 Network With Multiple Hosts

Examples Related to Figure 3-11

Example 1: 014040 on the TPAD specifies application ID 01. The call can be connected by any of the HPADs to 014040.

Example 2: 0140C1 on the TPAD specifies application ID 04. The middle HPAD connects the call to 0440C1.

Unlike the classic BSC network shown in figure 3-10, the network shown in figure 3-11 can provide application switching for the end user. This network implementation differs from a classic BSC network. That is, if other users on this TPAD (lines 2, 3, and 4), or users served by another TPAD, are allowed to call the same application/destination address, then one of the following occurrences are possible:

- In the event of disconnection prior to the user logoff, another end user may call the same destination and find the application still active from the prior user.
- Applications may have the ability to queue responses to a user. If a response is queued, and the user logs off, the next user to log on may receive the queued response.

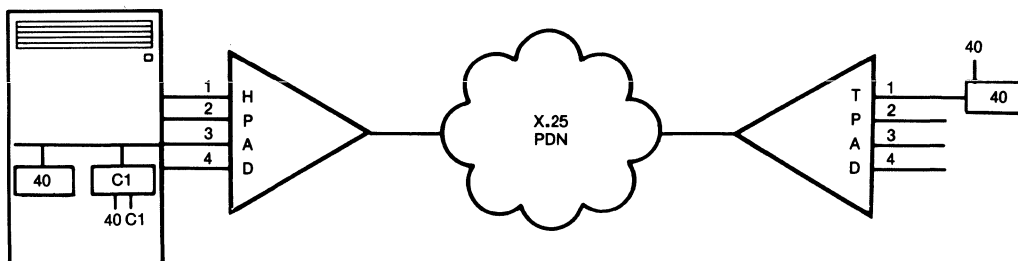
For these reasons, the incorporation of packet switching in a BSC network should be designed to avoid these problems for critical host applications. Refer to paragraph 3.5.1 for information on selecting the correct CRM.

3.5.3 Connection Request Mode 2

CRM2 is similar to CRM1, in that its primary function is for use in networks where BSC application security is an important consideration. Unlike CRM1, CRM2 does not require the cluster controller and device addresses to be the same for both the calling and the called addresses (however, the device parameters must match for the calling and called devices; refer to paragraph 4.5.3). Instead, the source PAD specifies the desired application ID, cluster controller, and device (which may or may not be the same as its own application ID, cluster controller, and device). This is an advantage if the remote network configuration differs from the host gen; by using CRM2, a re-gen of the host may be avoided. See figure 3-12 and the example that follows it.

CRM2 can also be used to allow a host application to be device specific. For example, one 3278-5 definition (a terminal with a large screen) at the host site can support a number of 3278-5s at remote locations (on a contention basis) without requiring reconfiguration of the BSC host to account for the additional physical devices, assuming that security is not an issue.

CRM2



MI-1391-1a-52

Figure 3-12. Typical CRM2 Network

Example Related to Figure 3-12

014040 on the TPAD can call 03C1C1 (as long as the device parameters match).

3.5.4 Connection Request Mode 3

Unlike CRM1 and CRM2, CRM3 focuses on network flexibility. With CRM3, users can connect to a wide variety of host applications. Instead of the source PAD always providing all specific connection information, the destination PAD can determine the best way to connect the call (see table 3-1).

With CRM3, the destination PAD compares the configured device information (display/printer, color, format size, and character set) with the device information in the CRM3 Call Request packet. The call is accepted if a device can be found that is available and has matching parameters to those in the CRM3 Call Request packet.

CRM3 is a versatile solution for an expanding BSC network. That is, the BSC host does not have to be re-genned to match a growing or changing physical BSC network. The flexibility provided by CRM3 allows the new users of the network to access host applications, without having to coordinate the addition of the new users with a predefined host-site generation schedule.

For examples of how calls are connected using CRM3, see figure 3-13 and the examples that follow it.

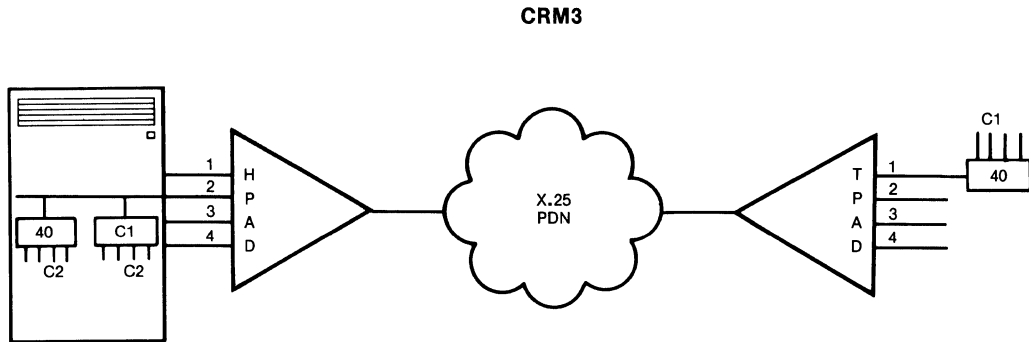


Figure 3-13. Typical CRM3 Network

Examples Related to Figure 3-13

- Example 1: 0140C1 on the TPAD specifies application ID 02. The destination PAD finds the first available matching device on line 2, and connects the call.
- Example 2: 0140C1 on the TPAD specifies application ID 02 and cluster controller C1. The destination PAD goes to line 2, finds cluster controller C1, and connects the call to the first available matching device on that cluster controller.
- Example 3: 0140C1 on the TPAD specifies application ID 02 and device C2. The destination PAD goes to line 2, checks all the cluster controllers on that line for the first available matching device with address C2, and connects the call to that device.

3.5.5 BSC Connection Diagnostics

The TPAD provides a way for a user at a device to determine the device connection on the host side of the virtual circuit. This is a powerful diagnostic tool to use when troubleshooting BSC network problems.

Refer to paragraph 5.1.5 for instructions on using this diagnostic tool.

3.5.6 Automatic Call Clearing

The PAD provides several automatic methods for clearing calls, which are described in paragraphs 3.5.6.1 and 3.5.6.2.

3.5.6.1 Data Inactivity Timeouts

The TPAD includes a configurable data inactivity timer. When this timer is enabled, the TPAD automatically clears a call for a device (terminal or printer) when it detects no data activity for the period of time specified by this timer.

See table 4-3 in paragraph 4.5.3 for instructions on configuring the inactivity timer.

3.5.6.2 BSC Cluster Controller Timeouts

The PAD includes two nonconfigurable, automatic timeout methods related to BSC polling. One method pertains to the HPAD, and the other pertains to the TPAD.

The HPAD monitors host polls to cluster controllers. If it detects no polling for five minutes to a cluster controller, the HPAD:

- Clears any calls in progress for that cluster controller
- Accepts no new calls for that cluster controller

When the host begins polling that cluster controller, the HPAD automatically reactivates the cluster controller and subsequently accepts calls for it.

The TPAD polls cluster controllers. If a cluster controller does not respond to a TPAD poll, the TPAD goes into a slow-poll state. If the cluster controller does not respond after two more polls (in the slow-poll state), the TPAD:

- Clears any calls in progress for that cluster controller
- Accepts no new calls for that cluster controller
- Continues to slow poll that cluster controller

When the cluster controller responds to the slow poll, the TPAD again accepts calls for it.

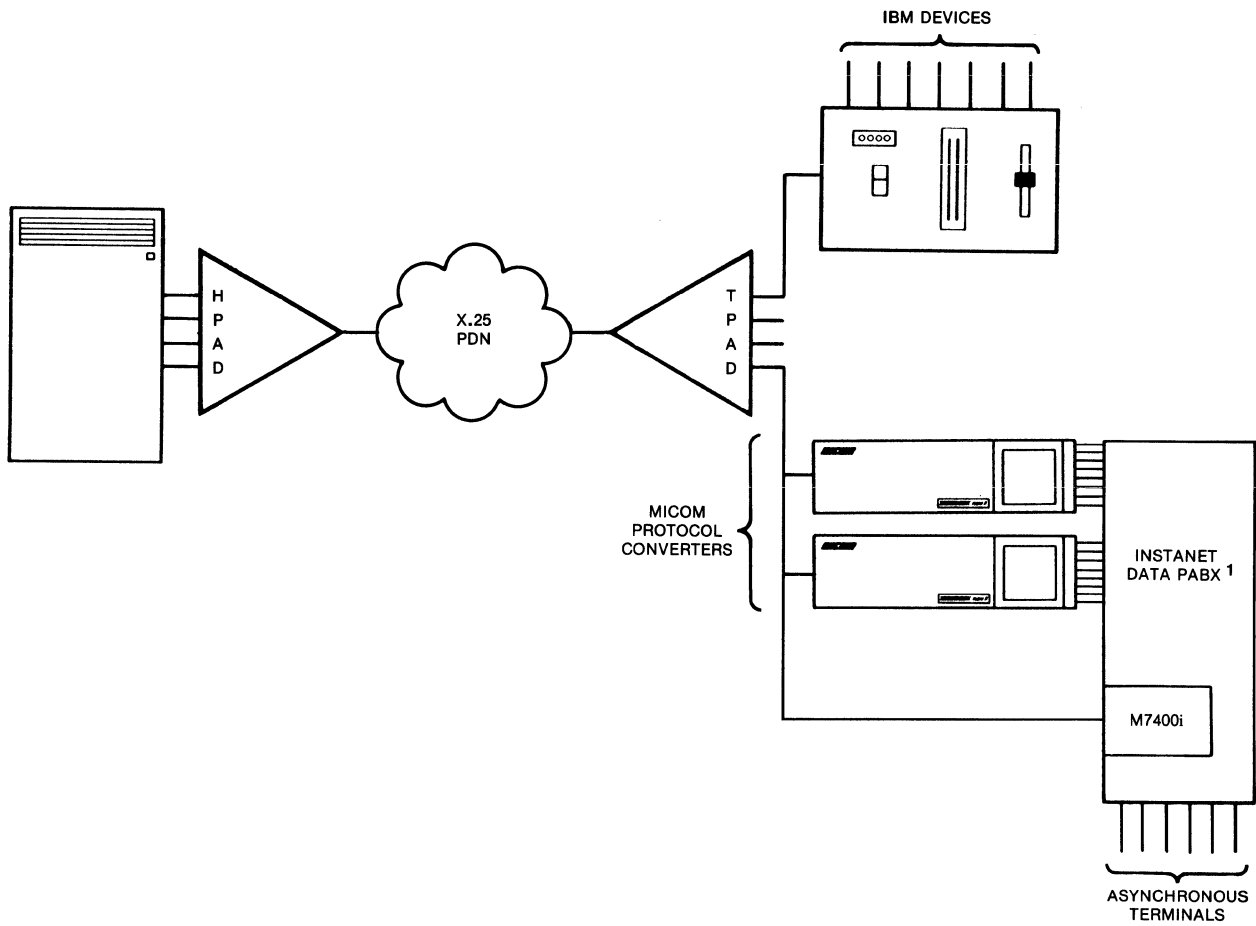
3.6 APPLICATIONS

The sample applications that follow show BSC PADs in both public and private networks. These are only sample applications; your actual network design may be different.

3.6.1 Public BSC Networks

Figures 3-14 and 3-15 show sample applications of public BSC networks with PADs.

The first application (see figure 3-14) shows how the introduction of a MICOM INSTANET Data PABX, a MICOM M7400i (7400 Data PABX Integral Module), and MICOM protocol converters provides support of asynchronous devices in a 3270 BSC network. Asynchronous terminals attached to the INSTANET Data PABX can call the BSC host. This is made possible by the protocol converters or by the M7400i. Of course, the IBM (synchronous) devices can call the BSC host directly through the PADs.



¹THE FOLLOWING MICOM DATA PABX MODELS SUPPORT MICOM'S PROTOCOL CONVERTER AND M7400i:

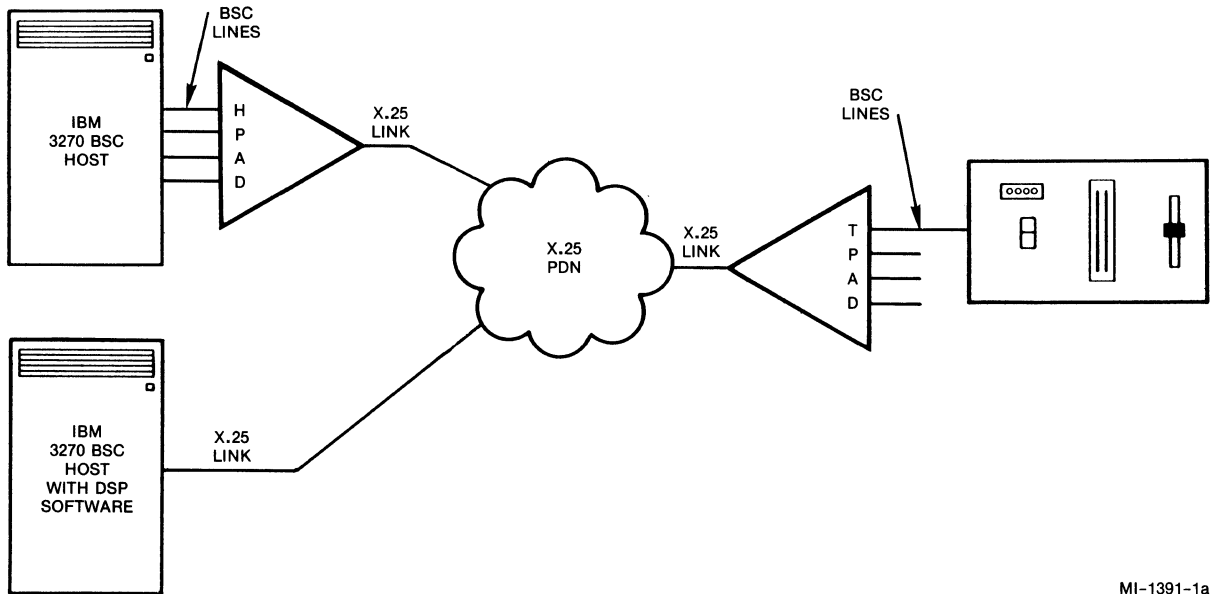
- INSTANET6000 DATA PABX SERIES 40
- INSTANET6600 DATA PABX
- Micro600 DATA PABX

MI-1391-1a-56

Figure 3-14. Supporting Asynchronous Devices in a BSC Network

The second application (see figure 3-15) shows the difference between accessing a BSC host with integral DSP support and accessing a BSC host without integral DSP support. A MICOM 3270 BSC PAD is required to access a BSC host without integral DSP support (the PAD provides the DSP support). This is not the case for the BSC host with integral software providing DSP support.

NOTE: Examples of DSP host software are the Comten and Compro offerings. MICOM's 3270 BSC PAD is compatible with both software packages.



MI-1391-1a-57

Figure 3-15. Accessing Hosts With and Without Integral DSP Support

3.6.2 Private BSC Networks

Figures 3-16 and 3-17 show sample configurations of private BSC networks with MICOM's PADs and the MICOM packet switch. The packet switch provides the packet-switching capabilities that are otherwise provided by the PDN.

Figure 3-16 shows how a MICOM packet switch facilitates access to multiple BSC hosts. Devices connected to the 3270 BSC controllers shown in figure 3-16 can access either of the two BSC hosts.

Figure 3-17 depicts a low-cost, pilot network based on three MICOM PADs and a MICOM packet switch. With the MICOM packet switch and individually configured BSC lines, devices connected to the 3270 BSC controllers shown in figure 3-17 can access any of the three BSC hosts. As user requirements increase, this network can easily be expanded with the addition of PADs, packet switches, and possibly connection to a PDN.

SMALL PRIVATE NETWORK (A)

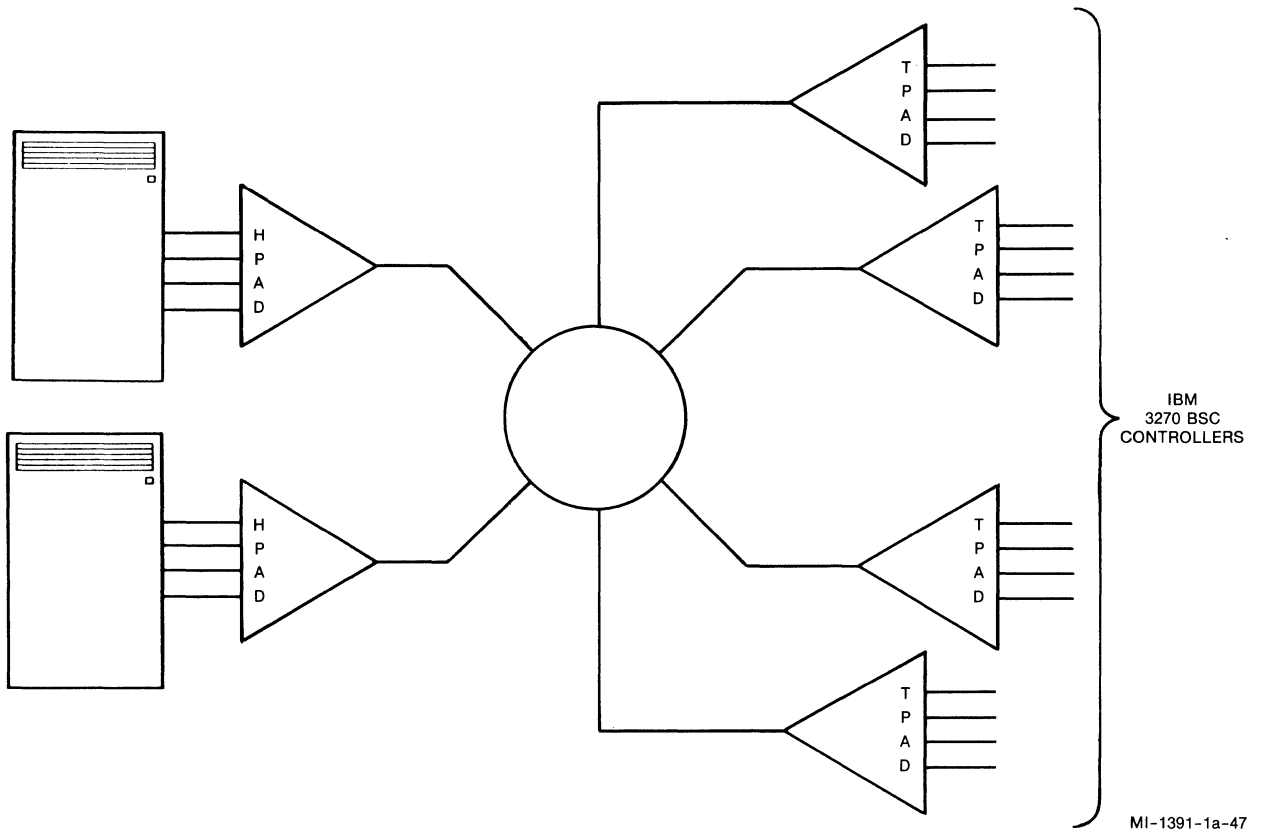
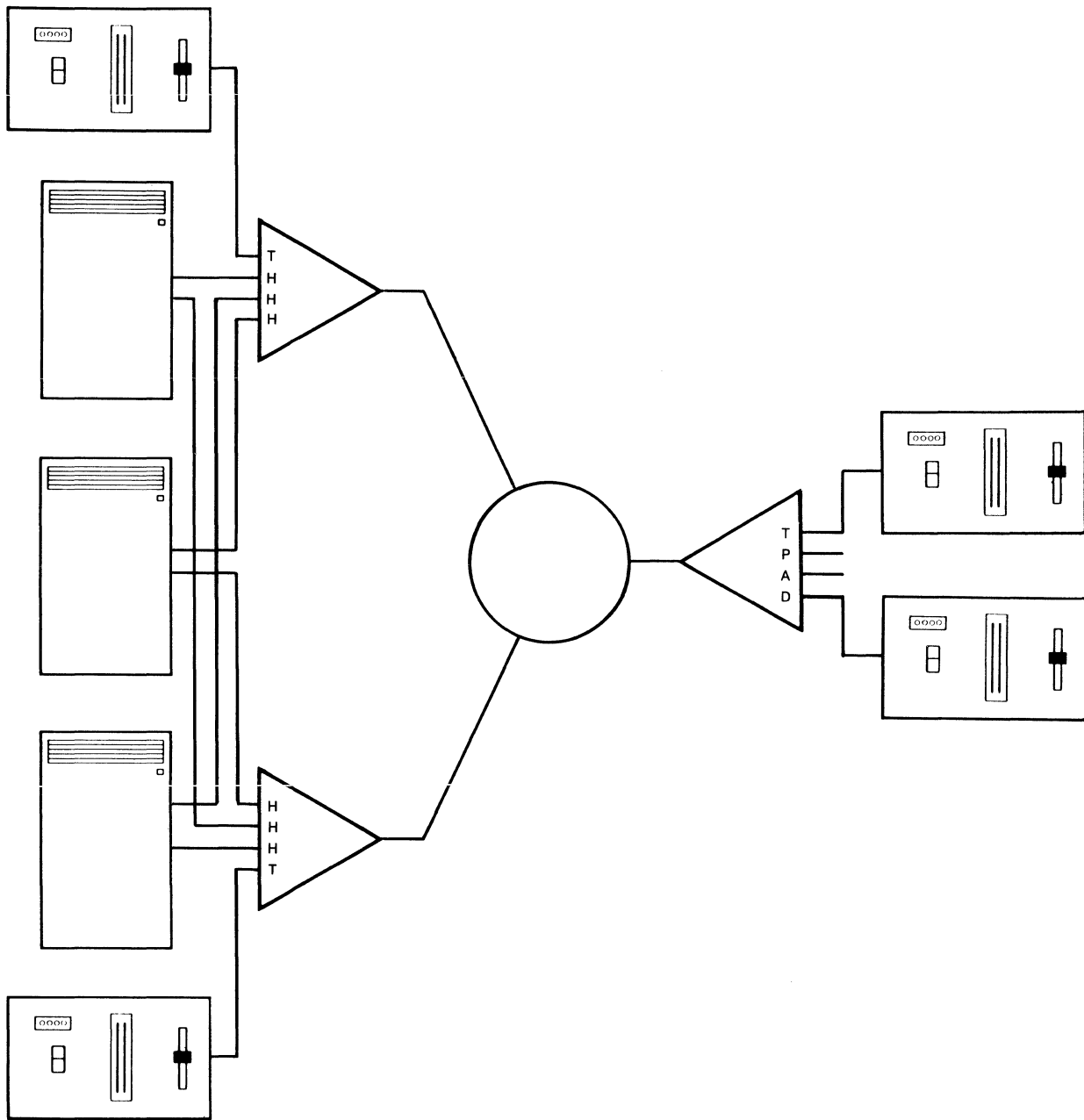


Figure 3-16. Accessing Multiple Hosts Through a Packet Switch

SMALL PRIVATE NETWORK (B)



LEGEND:



MI-1391-1a-45

Figure 3-17. Low-Cost Private Network

3.7 ATM SUPPORT

More and more people want to make automated banking transactions using Automated Teller Machines (ATMs). For these people, network transparency is a requirement; that is, there must be no evidence of an X.25 network between them and the host.

Taking this into account, MICOM has developed an ATM option for the TPAD. When a device is configured in the TPAD as an ATM (refer to paragraph 4.5.3), the TPAD reacts in the following ways:

- When the ATM is ready (that is, it responds to a Select command from the TPAD), the TPAD automatically calls the host, using a preconfigured mnemonic. CRMs 1, 2, and 3 are all supported.
- The TPAD never outputs the Command screen to the ATM (refer to paragraph 5.1).
- The TPAD never outputs the Call Cleared message to the ATM.

The TPAD also reacts differently to a link down situation, when an ATM is involved. That is, if the X.25 link goes down while an ATM-to-host call is in progress, the TPAD performs the following steps:

1. It clears the call.
2. When the link comes back up, the PAD issues a Select command to the ATM.
3. When the ATM is ready (that is, it responds to the TPAD's Select command), the TPAD automatically calls the host.

All of this special handling by the TPAD makes it appear to the ATM user that there is a direct connection between the ATM and the host.

SECTION 4

USING THE COMMAND FACILITY

4.1 PURPOSE OF THE COMMAND FACILITY

The PAD's Command Facility is a powerful, user-friendly software tool that lets you perform administrative and management functions. These functions include the following:

- Configuration allows you to select the parameter values that meet the requirements of your specific application. In an effort to anticipate your requirements, MICOM ships the PAD with some factory-default configurations. Among other things, configuration can be used to:
 - Customize the BSC line parameters, and enable or disable BSC lines
 - Add, modify, or delete device configurations, and display lists of devices
 - Customize the trunk parameters
 - Modify signon information
 - Set up the Command port to receive call-accounting information and define the intervals for the periodic output of performance statistics
- Trunk Control allows you to enable, disable, or check the status of the line that connects the PAD to the PDN (the X.25 trunk).
- Performance Statistics lets you request the output of PAD-performance statistics to the Command port. In addition, this function allows you to reset all PAD statistics.
- System Reset lets you initiate a total reset of the PAD. It is used to activate configuration changes. Following a system reset, you must login to re-access the Command Facility. There are two types of system resets (the type is user-selectable): Cold start and Warm start.
- Logout lets you exit from the Command Facility. Password protection then prohibits unauthorized access to the Command Facility.

This section first introduces you to PAD setup procedures. It then informs you on how to access and log onto the Command Facility. Detailed, step-by-step descriptions of each Command Facility function are also included in this section.

4.2 SETTING UP THE PAD

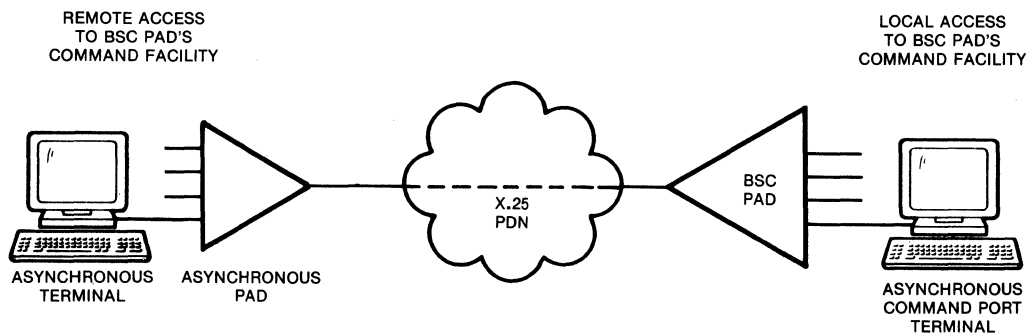
Before you try to establish any kind of communications with the PAD, review the following checklist:

1. The power is ON.
2. The indicators show normal status (see table 6-1). The CA indicator may be FLASHING, indicating that the configuration memory contains factory settings. In addition, if you have not connected your PAD to the X.25 PDN, the LD indicator will be ON, indicating an X.25 link-down condition.
3. The soft switch settings reflect your requirements (see figures 2-8 through 2-10). For example, check the setting of the soft switch selection that determines whether the X.25 link (trunk) has a DTE or a DCE appearance.

4.3 ACCESSING THE COMMAND FACILITY

You can access the Command Facility locally using an asynchronous terminal that is attached to the PAD's Command port. Once the PAD's network address has been configured (refer to paragraph 4.5.4), it is also possible to access the Command Facility remotely, in either of the following ways:

- From an asynchronous terminal attached to any channel of an asynchronous PAD in the network (see figure 4-1)
- From an asynchronous terminal attached to the Command port of a 3270 BSC PAD in the network



MI-1391-1a-64

Figure 4-1. Local and Remote Access to the Command Facility

4.3.1 Using the Dedicated Command Port

You can access the PAD's dedicated Command port using direct RS-232-C connections or private-wire modems. Access the Command port as follows:

1. Set your asynchronous terminal to full-duplex, and use a data transmission rate not greater than 9600 bps, with 7 ASCII-coded bits per character and any parity setting.
2. Log on by entering one carriage return (CR), a period, and another CR (CR underscored represents a user-entered carriage return). That is, the character sequence is: CR.CR

This enables the Command port to detect your terminal's speed and parity settings. (The Command port supports autobaud and autoparity recognition.)

3. You will be greeted with the following Herald message and X.28 service prompt (*). If the Herald message and the service prompt do not appear, enter BREAK and then reenter the logon character sequence (see step 2).

```
mb3-3270 bsc pad channel 0
```

*

4. Once the Herald message and the service prompt are displayed, you may perform one of the following functions:
 - Access the Command Facility of the local PAD by entering two CRs.
 - Access the Command Facility of a remote PAD by placing an outgoing call (refer to appendix E). This allows you to configure and control the remote PAD from the local PAD. However, you cannot receive calls on the asynchronous terminal that is connected to the Command port.
5. The local or remote PAD will prompt you for the Command Facility password. The factory-set password is MX25, but you can create your own password (refer to the instructions in paragraph 4.4). The factory-set password is reinstated following a Cold start reset.
6. Once you have entered the Command Facility password and the PAD has displayed the Command Facility menu, you can use one of the following methods to disconnect from the Command Facility:
 - Power-off your PAD.
 - Select item 5 (logout) from the Command Facility menu.
 - Perform a Warm start reset of the PAD.

NOTE: Remote access to the Command Facility has a higher priority than local access. Therefore, you will not receive the Herald message or be able to log onto the Command Facility if a remote caller is currently engaged in a session with the Command Facility. In addition, if you are connected to the Command port and a remote caller establishes a connection to the Command Facility, you will be disconnected.

On the other hand, if you place an outgoing call from the Command port as described in the preceding step 4, a remote caller who attempts to access the Command Facility while your call is in progress will be cleared with a diagnostic code of 133.

4.3.2 Using the Network

You can place a call to the Command Facility from an asynchronous device attached to any PAD in the network (refer to paragraph 4.3). Access the Command Facility from the network as follows:

1. Assign a value of 4 to the X.3 Parameter 13 (on the calling PAD).
2. When entering the address, take care to use the correct subaddress (class). It should always be 99 (unless the factory default has been changed, as described in paragraph 4.5.7).
3. If your X.25 call does not connect to the 3270 BSC PAD's Command Facility, confirm that the 3270 BSC PAD's soft switch selections are set to meet the requirements of the PDN and the calling PAD (refer to paragraph 2.3).
4. Once your connection to the Command Facility is confirmed with a com (or equivalent) service signal, enter a CR.
5. The PAD will prompt you for your password. The factory-set password is MX25, but you can create your own password (refer to the instructions in paragraph 4.4). The factory-set password is reinstated following a Cold start reset.
6. Once you have entered the Command Facility password and the PAD has displayed the Command Facility menu, you can disconnect from the Command Facility by clearing the call (enter clr).

4.4 LOGGING ONTO THE COMMAND FACILITY

To log onto the Command Facility, you must have the key to the Command Facility: the password. If you wish, you may change the factory-set password (see the CAUTION that follows). Following the correct entry of the password, the Command Facility displays the software version, the time, and the date. The time and/or the date can be changed if necessary. The prompts that relate to the logon procedure are described in table 4-1.

CAUTION: If you forget your new password after logging out, you will not be able to access the Command Facility. Then you will have to perform a Cold start reset of the PAD to restore the factory-default password (MX25). A Cold start reset restores ALL factory defaults (except for SYS1, SYS2, and SYS3), overwriting all the values that you assigned to the PAD. To avoid having to perform a Cold start reset, you should make a note of the new password.

Table 4-1. Logon Prompts

Prompt	Description and Data Entry Instructions
password	<p>The password field always consists of four characters. The factory-default password is MX25 (with MX in uppercase).</p> <p>To change a password, enter the current password, a space, the new password, and then a <u>CR</u>.</p>
version:m907-nnnn-aa	<p>The version identifier m907-nnnn-aa refers to the operating software, where:</p> <p style="padding-left: 40px;">aa represents the revision level of software nnnn</p> <p>The version identifier cannot be changed.</p>
date:mm-dd-yy	<p>The date is displayed in a month, day, year sequence. If you need to change the date, enter the new date in the format:</p> <p style="padding-left: 40px;">month-day-year</p> <p>Be sure to use a minus sign (-) or a colon (:) to separate the entries. If the displayed date is correct, just enter a <u>CR</u>.</p>
time:hh:mm:ss	<p>The time is displayed with a 24-hour clock. For example, 2 p.m. is 14:00:00.</p> <p>If you need to change the time, enter the new time in the format:</p> <p style="padding-left: 40px;">hours:minutes:seconds</p> <p>Be sure to use a colon (:) or a minus sign (-) to separate the entries. If the displayed time is correct, just enter a <u>CR</u>.</p>

After you respond to the Time prompt, the Command Facility menu will be displayed.

NOTE: Additional security is provided when you make a plus sign (+) part of the password. Once a part of the password, the plus sign disables local access to the Command Facility (that is, access through the local Command port); the Command Facility can only be accessed remotely.

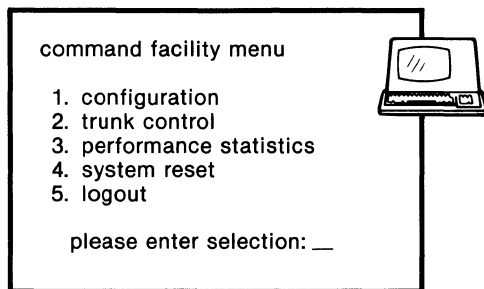
To make a plus sign part of the password, you must place a remote call to the Command Facility. You cannot perform this function from the local Command port.

4.4.1 Command Facility Menu

Once you have completed the logon procedure, you will be presented with the Command Facility menu. The menu consists of clear descriptions of each of the available functions (see figure 4-2). You can invoke any of the Command Facility functions by making a selection.

Subsequent menus and data entry prompts guide you through the various administrative functions. This approach greatly simplifies PAD configuration and management tasks, because you do not have to memorize special commands or complex syntax.

The paragraphs that follow describe each selection on the Command Facility menu in detail.



MI-1391-1a-31

Figure 4-2. Command Facility Menu

4.4.2 Selecting a Command Facility Menu Function

To select a function from the Command Facility menu, key in the associated number and enter a CR. If you should make an error in your selection before entering a CR, simply backspace and reenter the correct number. You can exit the Command Facility menu by selecting item 5 from the menu.

4.5 CONFIGURATION

As mentioned at the beginning of this section, MICOM ships the PAD with factory-default configuration values. You can change these values to meet your requirements, using the Configuration function of the Command Facility.

Parameter values that you enter during configuration using the Command Facility are stored in the PAD's nonvolatile configuration memory (CMOS). However, be aware that factory-default parameters are copied from the FEATUREPAK cartridge back into CMOS, overwriting your entries:

- If you reset or power-on the PAD, with the Cold/Warm start selection ON (selection 4 of soft switch group SYS1)
- If the PAD resets itself and detects a checksum error or a battery-low condition

NOTE: For the following Command Facility configuration functions, values that you enter do not take effect until you perform a Warm start reset (refer to paragraphs 2.3.2.2 and 4.8):

- BSC Line
- Device
- Screen Definitions
- Soft Switches
- SVC
- Trunk

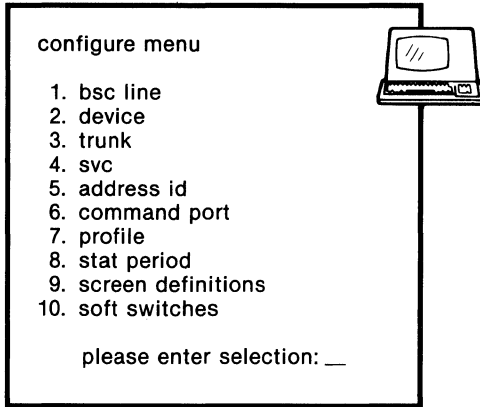
For the following Command Facility configuration functions, values that you enter do not take effect until you perform a Warm start reset or you toggle the electrical signals on the Command port:

- Command Port
- Profile
- Stat Period

For the following Command Facility configuration function, values that you enter take effect immediately (that is no reset or signal toggling is required):

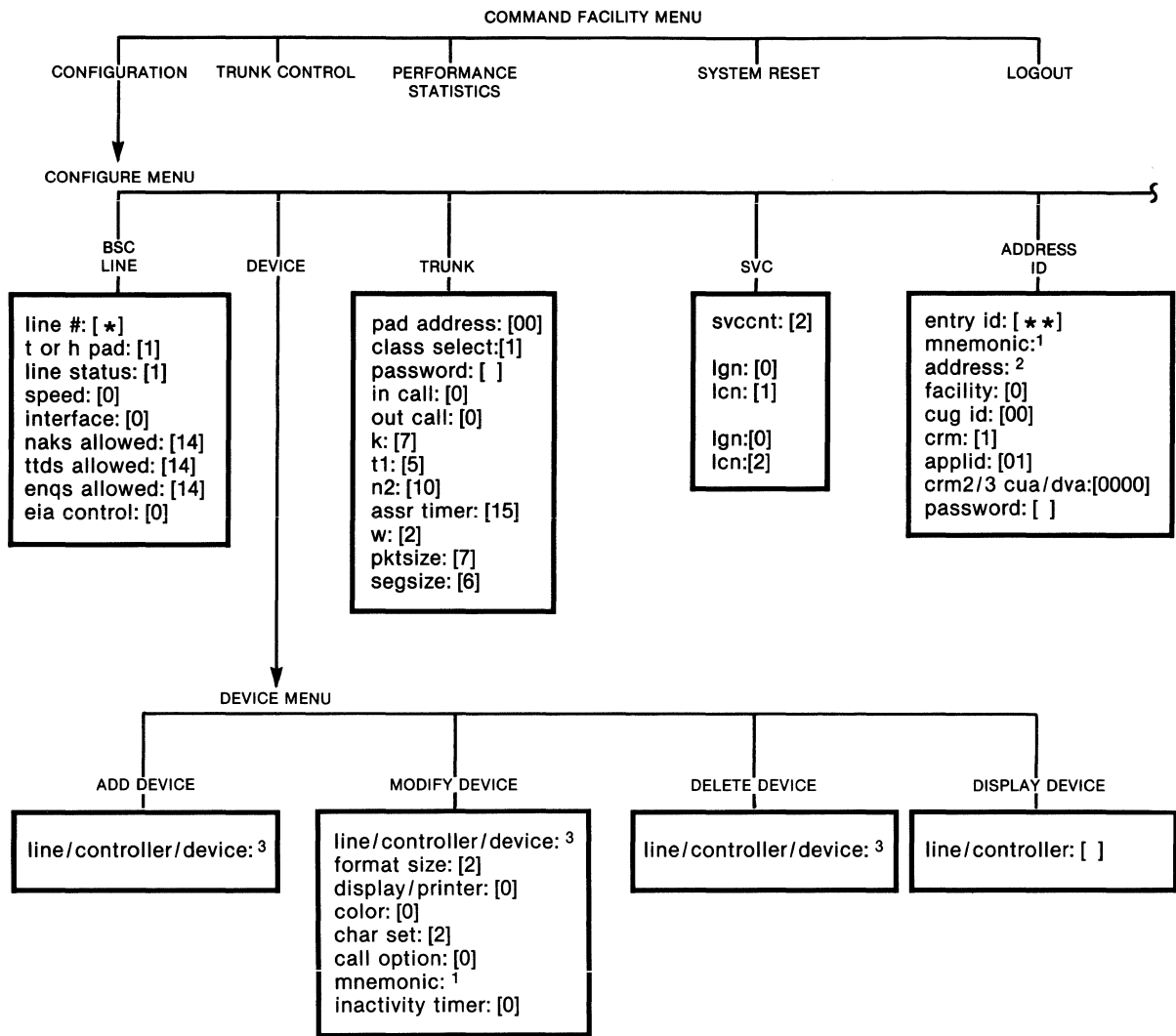
- Address ID

All of the PAD's Configuration options are listed on the PAD's Configure menu (see figure 4-3). The prompts that relate to each Configure menu item are shown in figure 4-4. Where applicable, the factory-set default values are shown in figure 4-4 (refer to the appropriate paragraph in this section for the meanings of these default values).



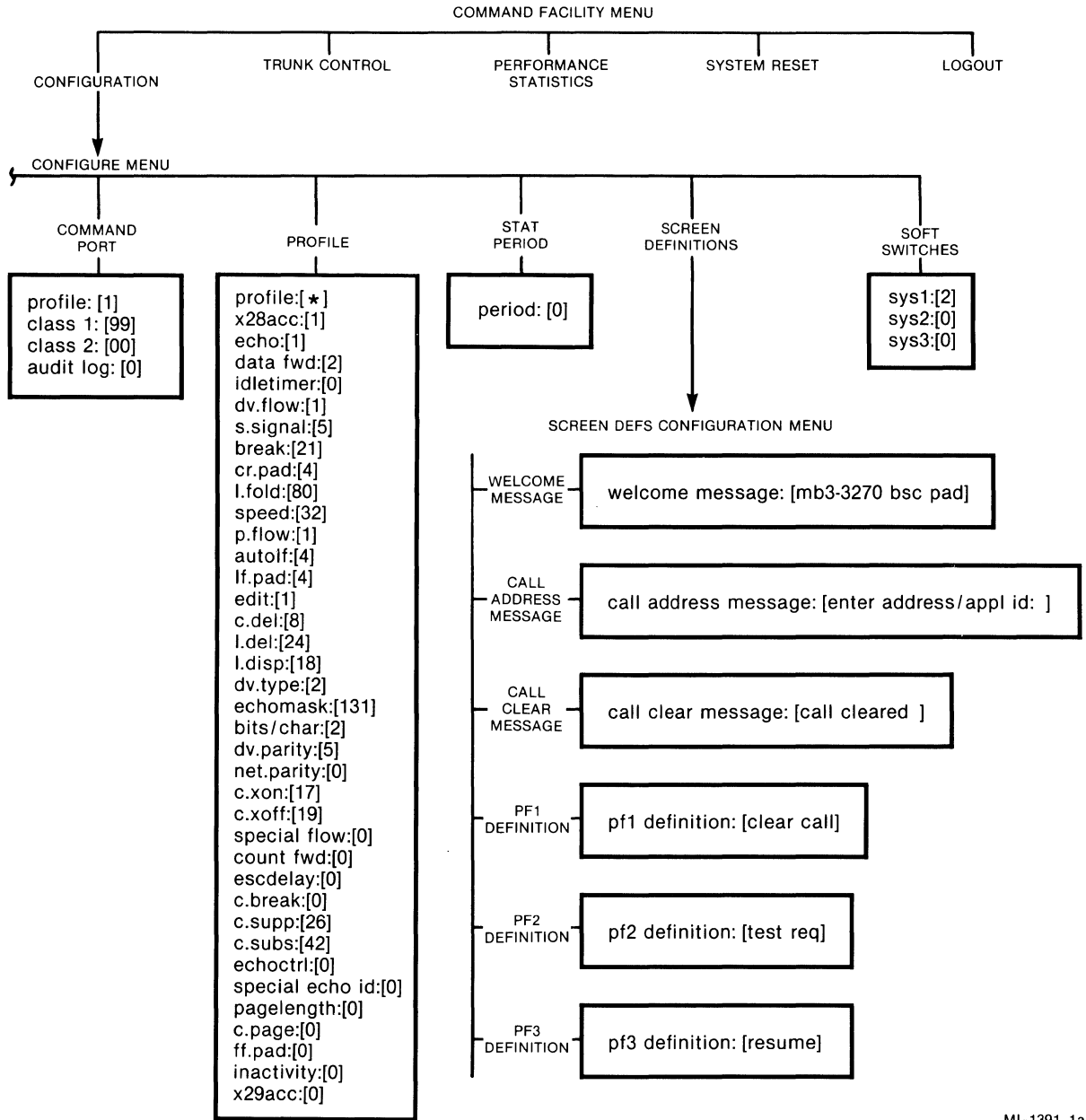
MI-1391-1a-32

Figure 4-3. Configure Menu



1 PAD DISPLAYS 8 ASTERISKS (★)
 2 PAD DISPLAYS 15 ASTERISKS (★)
 3 PAD DISPLAYS 6 ASTERISKS (★)

Figure 4-4. Prompts Related to Items on the Configure Menu (1 of 2)



MI-1391-1a-23
(2 of 2)

Figure 4-4. Prompts Related to Items on the Configure Menu (2 of 2)

4.5.1 Guidelines and Notational Conventions

Advancing Through the Prompts

For each Command Facility function, this manual lists and describes all of the prompts that the PAD displays. For every prompt, there are data entry instructions. For consistency, all of the prompts are shown in lowercase letters, although your terminal may display them in uppercase.

Once you enter a prompt sequence, you must complete it; otherwise, the values you have entered will not be retained. For example, if you change a speed value while configuring a BSC line and then enter Ctrl-C and a CR, the PAD redisplay the Configure menu without storing the change. To make sure that the PAD stores your entry of a new value, you must respond to each prompt that follows in that data entry sequence until the PAD displays the message:

done

As you advance through a prompt sequence:

- Enter a CR after each response to a prompt.
- Enter a CR if you want to accept the value currently displayed and simply want to continue to the next prompt.
- Press the backspace key or enter Ctrl-H to move the cursor left one position and delete the character at that position (Ctrl-H may be used if your keyboard has no backspace key).
- Enter a CR if you want to exit from the Configure menu back to the Command Facility menu.
- Enter Ctrl-C and CR when you want to exit a data prompt sequence and return to the menu from which you are working. When entered, the PAD will display the message: aborted.
- Enter control characters using the two-character sequence ^X, where ^ (ASCII hexadecimal 5E) is a caret character, and X is the character required (for example, Ctrl-G, or bell, is entered as ^G).

Input Errors

There are two types of errors that will cause the PAD to display the message: error.

- Out-of-Range Error. You have entered a character outside the range of possible values.
- Consistency Check Error. You have entered a character that is logically inconsistent with some other character already entered.

Notational Conventions

There are several time-saving notational conventions that are used in this section. They allow minimal repetition of procedural steps in each description. The conventions are as follows:

- The symbol for a user-entered carriage return is CR (for a carriage return that is transmitted without user entry, the symbol is a nonunder-scored CR). The key-cap legend for the CR key may vary from terminal to terminal.
- Some commands require you to hold down the Control key while you press another key. Commands such as these are documented as:

Ctrl-key name

For example, Ctrl-R means "hold down the Control key while you press the R key." If a keyboard does not have a Control key, use the Alt key.

- A prompt may show a value enclosed in brackets: []. This is the factory-set default value.
- A prompt may include one or more asterisks (*). This means that there is no value currently stored for a given parameter. The number of asterisks indicates the length of the field.

Example: line #: *

This prompt asks you to enter the number of the BSC line to be defined. The single asterisk indicates that the number has not been entered and, when it is entered, it must be one digit.

4.5.2 Configuring BSC Lines

This configuration function lets you define the characteristics of each of the individual BSC lines. Configuration items include line speed, interface type (DCE or DTE), and so on. In addition, this function lets you enable, disable, and check the status of the individual BSC lines.

To perform this configuration option, select item 1 (bsc line) from the Configure menu. The prompts that relate to this function are described in table 4-2.

Table 4-2. BSC Line Configuration Prompts (continued)

Prompt	Description and Data Entry Instructions
interface:[0]	<p>This value determines whether the PAD will receive external clocking, or will provide clocking on this BSC line.</p> <p>Enter one of the following values:</p> <p>0 = DCE (PAD provides clocking) 1 = DTE (PAD is clocked externally)</p> <p>If you enter a 0 (DCE), and you are connecting the PAD to a DTE device, you use a straight cable. If you enter a 1 (DTE), and you are connecting the PAD to a DCE device, you must use a crossover cable. Refer to paragraph 2.2.3.1 for information on MICOM cables.</p>
naks allowed:[14]	<p>An IBM parameter, this is the number of Negative Acknowledgments (NAKs) that the HPAD can send to the host while the HPAD is waiting for the TPAD's response to a host Read command.</p> <p>Enter a value in the range 0 through 255. Make sure that this number is at least one less than the maximum number of NAKs allowed by the host's configuration. Many hosts have a default of 15 NAKs. The exact configuration of your host can be obtained from the BSC network administrator.</p> <p>This parameter may be ignored if you are configuring a TPAD line.</p>
ttds allowed:[14]	<p>An IBM parameter, this is the number of Temporary Text Delays (TTDs) to be sent by the TPAD to a cluster controller when host data is delayed through the PDN.</p> <p>Enter a value in the range 0 through 255. Make sure that this number is at least one less than the maximum number of TTDs allowed by the cluster controller. Many cluster controllers have a default threshold of 15 TTDs before they go into error recovery.</p> <p>This parameter may be ignored if you are configuring an HPAD line.</p>

Table 4-2. BSC Line Configuration Prompts

Prompt	Description and Data Entry Instructions
line #:[*]	<p>This is the number of the BSC line that you want to configure. This number corresponds to a physical line that is attached to the PAD.</p> <p>Enter a value in the range 1 through 4.</p>
t or h pad:[1]	<p>This value determines whether the BSC line will meet TPAD or HPAD requirements.</p> <p>Enter one of the following values:</p> <p>0 = TPAD 1 = HPAD</p>
line status:[1]	<p>The value you enter causes the BSC line to be enabled or disabled. When you disable a BSC line, you put it out of service, thereby prohibiting all activities for cluster controllers and devices on that line. Enabling a BSC line puts it back in service and allows polling activities to resume.</p> <p>The status of a BSC line can be determined by checking the current setting (0 or 1) of this line status parameter.</p> <p>Enter one of the following values:</p> <p>0 = Disable 1 = Enable</p>
speed:[0]	<p>This value represents the speed (in bps) as determined by the PAD's internal clock.</p> <p>Enter one of the following values:</p> <p>0 = 9600 1 = 4800 2 = 2400 3 = 1200 4 = 300</p> <p>The speed affects the operation of the PAD even if the clocking is done externally. The rate selected is used by the PAD to determine flow control thresholds across the PDN. In general, assign the speed based on the highest-expected operating line speed.</p>

Table 4-2. BSC Line Configuration Prompts (continued)

Prompt	Description and Data Entry Instructions
enqs allowed:[14]	<p>An IBM parameter, this is the number of Enquiries (ENQs) that the HPAD can send to the host while the HPAD is waiting for the TPAD's response to a host Read command. The HPAD sends NAK delays before it starts sending ENQ delays.</p> <p>Enter a value in the range 0 through 255. Make sure that this number is at least one less than the maximum number of ENQs allowed by the host configuration. Many hosts have a default of 15 ENQs. The exact configuration of your host can be obtained from the BSC network administrator.</p> <p>This parameter may be ignored if you are configuring a TPAD line.</p>
eia control:[0]	<p>For a TPAD line, this value determines whether the PAD will provide constant or variable DCD, and whether it will toggle DTR/DSR. For an HPAD line, this value determines whether the PAD will provide constant or variable DCD.</p> <p>Enter one of the following values:</p> <ul style="list-style-type: none"> 0 = Variable DCD; DTR/DSR toggle disabled 1 = Variable DCD; DTR/DSR toggle enabled 2 = Constant DCD; DTR/DSR toggle disabled 3 = Constant DCD; DTR/DSR toggle enabled

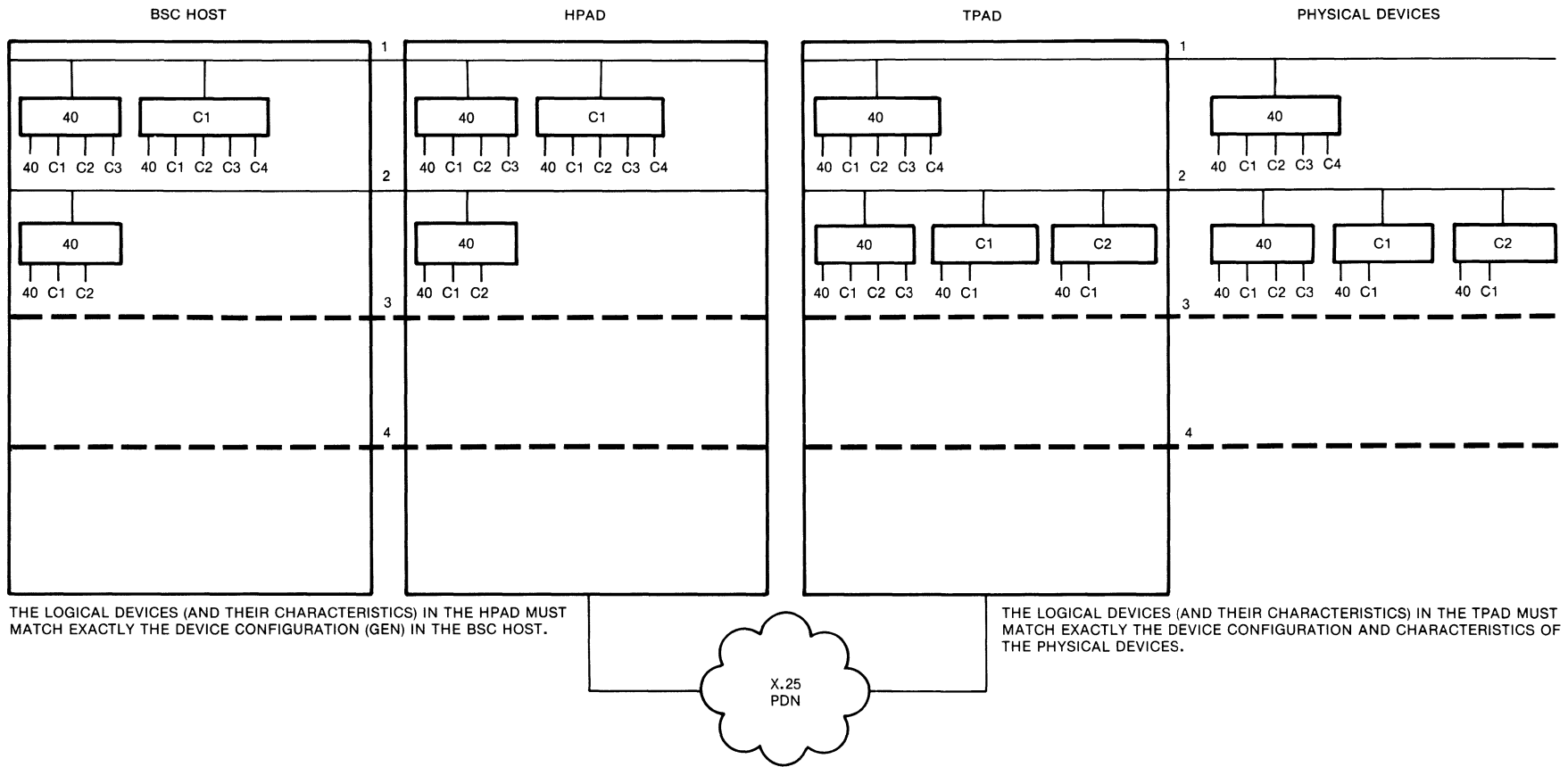
4.5.3 Defining the Devices Attached to the PAD

The configuration of the PAD includes a logical map of all the devices that are associated with it (see figure 4-5). The Device configuration function lets you add, delete, or change device definitions (to change the map). In addition, this function allows you to display a list of all devices associated with a specific cluster controller, or to display a list of all cluster controllers associated with a BSC line.

NOTE: When configuring the TPAD, the logical map of cluster controllers and devices must be an exact duplicate of the physical network (the cluster controllers and devices) attached to it.

When configuring the HPAD, the logical map of cluster controllers and devices must be an exact duplicate of the host computer's network.

The TPAD and HPAD logical maps do not have to match each other.



THE LOGICAL DEVICES (AND THEIR CHARACTERISTICS) IN THE HPAD MUST MATCH EXACTLY THE DEVICE CONFIGURATION (GEN) IN THE BSC HOST.

THE LOGICAL DEVICES (AND THEIR CHARACTERISTICS) IN THE TPAD MUST MATCH EXACTLY THE DEVICE CONFIGURATION AND CHARACTERISTICS OF THE PHYSICAL DEVICES.

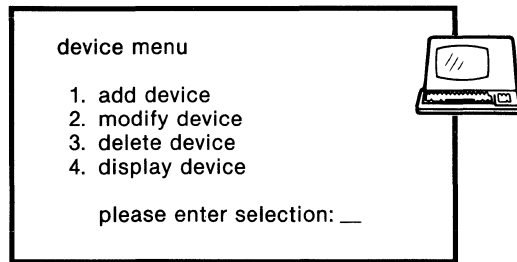
LEGEND:
 - - - = BSC LINE WHERE ATTACHED DEVICES ARE IMPLIED

Figure 4-5. Logical and Physical Device Configurations

You may define up to 64 devices to be associated with a PAD. The PAD maintains a counter of its cluster controllers and devices, and displays an error message if you attempt to add a 65th device.

There is no PAD menu for the configuration of cluster controllers. When you add a device, the PAD automatically associates it with an existing controller or creates a new controller for it.

To access the Device configuration option, select item 2 (device) from the Configure menu. The PAD displays the Device menu (see figure 4-6). The following subparagraphs describe each item on this menu.



MI-1391-1a-35

Figure 4-6. Device Menu

Add Device

When you select item 1 (add device) from the Device menu, the PAD displays the following prompt:

```
line/controller/device:[*****]
```

This defines the number of the device you are adding, the number of the cluster controller to which it connects, and the number of the BSC line to which the cluster controller connects.

A typical entry might be 014040, where:

01 = BSC line 1

40 = The poll address of the first cluster controller on the BSC line

40 = The poll address of the first device on the cluster controller

After you enter the data and a CR, the PAD displays the following message to indicate that the add is completed:

```
done
```

It then redisplay the Configure menu.

To define the characteristics of the device you just added, you must redisplay the Device menu and select item 2 (modify device). The Modify Device function is described in the following subparagraph.

Modify Device

A device must be added before it can be modified (refer to the previous procedure). When you select item 2 (modify device) from the Device menu, the PAD displays the prompts described in table 4-3.

Table 4-3. Modify Device Function Prompts

Prompt	Description and Data Entry Instructions
line/controller/device:[*****]	<p>This defines the number of the device you are modifying, the number of the cluster controller to which it connects, and the number of the BSC line to which the cluster controller connects.</p> <p>A typical entry might be 014040, where:</p> <ul style="list-style-type: none">01 = BSC line 140 = The poll address of the first cluster controller on the BSC line40 = The poll address of the first device on the cluster controller
format size:[2]	<p>This defines the screen size. For a Connection Request Mode 3 (CRM3) call, the HPAD uses this value in call matching to determine whether or not to accept the call for this device. (Refer to paragraph 3.5.4 for a description of CRM3.)</p> <p>Enter one of the following values:</p> <ul style="list-style-type: none">0 = 480 characters (12 x 40)1 = 960 characters (12 x 80)2 = 1920 characters (24 x 80)3 = 2560 characters (32 x 80)4 = 3440 characters (43 x 80)5 = 3564 characters (27 x 132)

Table 4-3. Modify Device Function Prompts (continued)

Prompt	Description and Data Entry Instructions
display/printer:[0]	<p>This defines the device as either a display or a printer. For a CRM3 call, the PAD checks this value to determine whether or not to accept the call.</p> <p>Enter one of the following values:</p> <p>0 = Display 1 = Printer</p> <p>Typically, a display call originates from a TPAD, and a printer call originates from an HPAD.</p>
color:[0]	<p>This defines a display-type device as either supporting or not supporting color (extended attributes). For a CRM3 call, the HPAD uses this value in call matching to determine whether or not to accept the call for this device.</p> <p>Enter one of the following values:</p> <p>0 = No color is supported 1 = Color is supported</p>
char set:[2]	<p>This defines the character set that is used by the device. For a CRM3 call, the PAD uses this value in call matching to determine whether or not to accept the call for this device.</p> <p>Enter one of the following values:</p> <p>0 = None 1 = APL 2 = Text 3 = APL and text</p>

Table 4-3. Modify Device Function Prompts (continued)

Prompt	Description and Data Entry Instructions
call option:[0]	<p>The value you enter determines how the PAD will handle incoming and outgoing calls for this device.</p> <p>Enter one of the following values (do not enter any value that is reserved):</p> <ul style="list-style-type: none"> 0 = Enable incoming calls 1 = Long Form calls 2 = Abbreviated calls 4 = ATM support 8 = Autocall on enter/select 16 = Reserved 32 = Incoming calls barred 64 = Auto-append Reverse Charging facility 128 = Reserved xxx = Combination of values

Table 4-3. Modify Device Function Prompts (continued)

Prompt	Description and Data Entry Instructions
call option:[0] (continued)	<p>Entering a value of 4 (by itself or in combination with other values) causes the TPAD to have the following characteristics, which are appropriate for Automated Teller Machine (ATM) applications:</p> <ul style="list-style-type: none"> • When the BSC ATM is ready (that is, it responds to the TPAD's Select command), the TPAD automatically calls the host, using a preconfigured mnemonic (see the description of the Mnemonic prompt). • The TPAD never outputs the Command screen to the ATM (refer to paragraph 5.1). • The TPAD never outputs the Call Cleared message to the ATM. • If the X.25 link goes down, the TPAD waits for the link to come back up and then it automatically calls the host, using the preconfigured mnemonic (assuming the BSC ATM is ready). <p>Refer to paragraph 3.7 for more information on the PAD's ATM call option.</p>

Table 4-3. Modify Device Function Prompts (continued)

Prompt	Description and Data Entry Instructions
call option:[0] (continued)	<p>Entering a value of 8 (by itself or in combination with other values) causes one of the following results:</p> <ul style="list-style-type: none"> • When a user at a TPAD device presses the Enter key, the TPAD searches for a preconfigured mnemonic (see the description of the Mnemonic prompt). If it finds the mnemonic, the TPAD automatically places a call to the address (typically of a display) associated with that mnemonic. • Upon receiving a host Select command that includes a mnemonic, the HPAD searches for a preconfigured mnemonic (see the description of the Mnemonic prompt). If it finds the mnemonic, the HPAD places a call to the address (typically of a printer) associated with that mnemonic.
mnemonic:[*****]	<p>This is the mnemonic that is used by the TPAD or HPAD when placing outgoing calls (see the description of the Call Option prompt).</p> <p>Enter two through eight characters. The first character must be alphabetic (to distinguish a mnemonic address from a Long Form address, which always begins with a digit); the remaining characters may be alphabetic or numeric. If this mnemonic does not match any of the mnemonics stored in the PAD's configuration, no call can be placed.</p>

Table 4-3. Modify Device Function Prompts (continued)

Prompt	Description and Data Entry Instructions
inactivity timer:[0]	<p>This is the device inactivity timer. The TPAD clears a call for this device (terminal or printer), when it detects no data activity for the period of time specified by this timer.</p> <p>Enter a value in the range 0 through 240, where:</p> <p style="padding-left: 40px;">0 = Inactivity timer disabled 1-240 = Inactivity timer period (in minutes)</p>

Delete Device

When you select item 3 (delete device) from the Device menu, the PAD displays the following prompt:

line/controller/device:[*****]

This defines the number of the device you want to delete, the number of the cluster controller to which it connects, and the number of the BSC line to which the cluster controller connects.

There are three possible delete procedures:

- To delete a specific device on a specific controller, enter six characters. A typical entry might be 0140C1, where:

01 = BSC line 1

40 = The poll address of the first cluster controller on the BSC line

C1 = The poll address of the second device on the cluster controller

- To delete all devices on a specific controller, enter four characters. A typical entry might be 0140, where:

01 = BSC line 1

40 = The poll address of the first cluster controller on the BSC line

- To delete all controllers on a specific BSC line, enter two digits. A typical entry might be 01, where 01 equals BSC line 1.

After you enter a selection, the following message is displayed to indicate that the delete is completed:

done

Display Device

When you select item 4 (display device) from the Device menu, the PAD displays the following prompt:

```
line/controller:[]
```

This defines the number of the BSC line and the number of the cluster controller.

Typical entries might be:

- 0140, where:

01 = BSC line 1

40 = The poll address of the first cluster controller on the BSC line

The PAD displays a list of all devices defined on cluster controller 40 on BSC line 1.

- 01, where 01 equals BSC line 1

The PAD displays a list of all cluster controllers on BSC line 1.

4.5.4 Configuring the X.25 Trunk

With this configuration function, you can define the parameters of the X.25 trunk. These include parameters at the link, frame, and packet levels. To initiate this function, select item 3 (trunk) from the Configure menu. The prompts that relate to this function are described in table 4-4.

Table 4-4. Trunk Configuration Prompts

Prompt	Description and Data Entry Instructions
pad address:[00]	<p>This is the network address of the PAD. It can be obtained from the network administrator.</p> <p>Enter up to 15 digits (enter at least 1 digit).</p>
class select:[1]	<p>This determines how the PAD looks at an incoming call's address field to determine where to route the call. The PAD supports Call User Data (CUD) subaddressing for BSC lines, and either CUD or X.121 subaddressing for the Command Facility. For the Command Facility, the subaddressing method must be the same on both ends of the virtual circuit.</p> <p>Enter one of the following values:</p> <ul style="list-style-type: none">0 = CUD1 = X.1212 = Class selection disabled
password:[]	<p>This lets you protect your PAD from unauthorized access by defining a trunk password. A caller's failure to include this password would cause the PAD to reject the call.</p> <p>Enter four ASCII characters.</p>

Table 4-4. Trunk Configuration Prompts (continued)

Prompt	Description and Data Entry Instructions
in call:[0]	<p>This determines how the PAD handles a call coming in on the trunk from the network.</p> <p>Enter one of the following values (do not enter any value that is reserved):</p> <ul style="list-style-type: none"> 0 = None of the following in call options are enabled. 1 = PAD accepts reverse-charged calls 2 = Trunk password required by PAD 4 = Reserved 8 = PAD allows use of LGN = 0 and LCN = 0 16 = PAD sends Restart packet if incoming call is on undefined logical channel xx = Combination of values

Table 4-4. Trunk Configuration Prompts (continued)

Prompt	Description and Data Entry Instructions
out call:[0]	<p>This determines how the PAD handles a call going out on the trunk to the network.</p> <p>Enter one of the following values (do not enter any value that is reserved):</p> <ul style="list-style-type: none"> 0 = PAD inserts the calling address in Call Request packets 1 = PAD does not insert the calling address in Call Request packets 2 = PAD appends originating BSC line number (01, 02, 03, or 04) to the calling address. It appends 00 if the Command port originated the call. This information can be used by the destination party to identify the calling party on your PAD. 4 = PAD uses CCITT 1980 Call Accept packet with option fields 8 = PAD issues all calls with Reverse Charging facility 16 = PAD issues all calls with Packet Size Negotiation facility 32 = PAD issues all calls with window negotiation facility xx = Combination of values
k:[7]	<p>This is the frame window. Its value determines the maximum number of information frames that can be unacknowledged at any given time on the trunk.</p> <p>Enter a value in the range 1 through 7.</p>
t1:[5]	<p>This is the T1 timer time-out value that protects against the loss of frames between the PAD and the network. Both sides of the circuit must have the same timer value. The value is in seconds.</p> <p>Enter a value in the range 1 through 15.</p>

Table 4-4. Trunk Configuration Prompts (continued)

Prompt	Description and Data Entry Instructions
n2:[10]	<p>This determines the maximum number of times that an unacknowledged frame can be retransmitted before the trunk is reset.</p> <p>Enter a value in the range 1 through 20.</p>
assr timer:[15]	<p>This is the link assurance timer value. The PAD uses the link assurance procedure when it detects no activity on the X.25 link (trunk) for the duration set by this timer. The value is in seconds.</p> <p>Enter 0 to disable the timer, or enter a value in the range 1 through 255. When the timer is enabled, its value must be greater than the value of t1.</p>
w:[2]	<p>This is the packet window size. This value determines the maximum number of packets that can be unacknowledged at any given time for each of the PAD's established X.25 calls.</p> <p>Enter a value in the range 2 through 7.</p>
pktsize:[7]	<p>This is the packet size. This value determines the maximum number of characters that the PAD will insert in a network-bound packet or will expect in an inbound packet.</p> <p>Enter one of the following values:</p> <p style="padding-left: 40px;">7 = 128-byte packets 8 = 256-byte packets</p>
segsize:[6]	<p>This is the segment size (some networks use the segment instead of the packet or character as the chargeable unit).</p> <p>Enter one of the following values. It is recommended that the segment size does not exceed the packet size.</p> <p style="padding-left: 40px;">4 = 16-byte segments 5 = 32-byte segments 6 = 64-byte segments 7 = 128-byte segments 8 = 256-byte segments</p>

4.5.5 Configuring the Switched Virtual Circuits

With this configuration function you can define the settings for the logical group numbers (LGNs) and logical channel numbers (LCNs). You can do this for each switched virtual circuit (SVC) selected.

The total number of SVCs selected cannot exceed the total number of physical devices plus 2 (that is, 66 SVCs for a 64-device PAD). By defining more SVCs than the number of devices (for example, 66 instead of 64), you guarantee access to the PAD's Command Facility from the network.

To initiate the SVC function, select item 4 (svc) from the Configure menu. The prompts that relate to this function are described in table 4-5.

Table 4-5. SVC Configuration Prompts


Prompt	Description and Data Entry Instructions
svccnt:[2]	This is the total number of SVCs. This value determines the number of times that the PAD will display the next two prompts (LGN and LCN). That is, if you retain the default (2), the PAD will display the next two prompts twice. Enter a value in the range 0 through 66.
lgn:[0]	This is the LGN part of the SVC. This value must be compatible with your network. Enter a value in the range 0 through 15.
lcn:[1]	This is the LCN part of the SVC. This value must be compatible with your network. Enter a value in the range 0 through 255.

4.5.6 Configuring Address IDs (Mnemonics)

With this configuration function, you can define up to 64 eight-character mnemonics to be associated with autocalling channels or for use in abbreviated addressing. One uses autocalling or abbreviated addressing to routinely make calls to the same application, or to restrict a user to calling a specific application. As an example, the 64 mnemonics provide for autocalls to 16 different HPADs of up to 4 BSC lines each, for a total of 64 application addresses. In addition, when an HPAD receives a printer Select command from an attached host, it can place a call to the remote printer using a preconfigured mnemonic.

As part of mnemonic definition, this function allows you to define the destination address (in the CCITT X.121 format) and the BSC line number (application ID) related to each mnemonic. Also part of this function is the assignment of a Connection Request Mode (CRM) to each mnemonic. Each time you select this configuration function, before prompting you for entries, the Command Facility displays all mnemonics that are already defined (see figure 4-7 for a sample display). The PAD displays eight asterisks (*) for mnemonics that are not yet defined.

NOTE: Typically, TPAD outbound calls are for terminals, and HPAD outbound calls are for printers.

mnemonic:- 01:la2	02:ny1	03:mpls	04:ny2	
05:*****	06:la4	07:houston	08:*****	
09:dmoines	10:seatac	11:*****	12:denver	
13:*****	14:*****	15:dc	16:sanfran2	
17:dallas	18:chicago1	19:la1	20:*****	
21:philli	22:kcity	23:atlanta	24:miami	
25:tokyo	26:*****	27:detroit	28:stlouis	
29:*****	30:*****	31:*****	32:*****	
33:*****	34:chicago7	35:toronto	36:atlanta2	
37:honolulu	38:*****	39:dallas2	40:mpls2	
41:rock	42:*****	43:*****	44:copenhgn	
45:london	46:juneau	47:portland	48:*****	
49:*****	50:topeka	51:sandiego	52:*****	
53:paris	54:*****	55:munich	56:*****	
57:*****	58:*****	59:*****	60:*****	
61:*****	62:*****	63:*****	64:*****	

MI-1391-1a-36

Figure 4-7. Sample Mnemonics Display

To initiate the Address ID function, select item 5 (address id) from the Configure menu. The PAD displays defined mnemonics as shown in figure 4-7. The prompts that relate to this function are described in table 4-6.

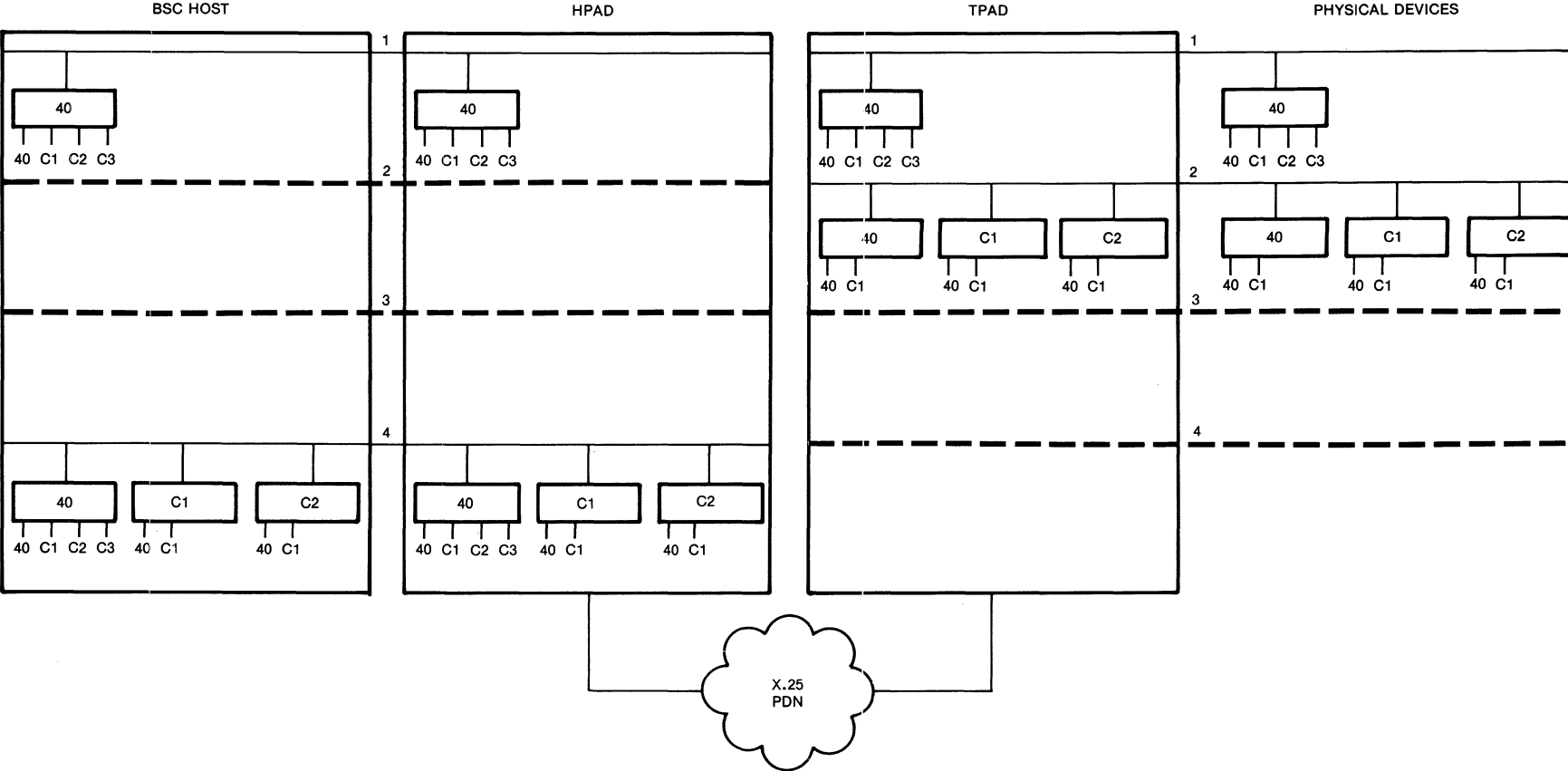
Table 4-6. Address ID Configuration Prompts

Prompt	Description and Data Entry Instructions
entry id:[**]	<p>This is the entry number of the mnemonic you wish to define.</p> <p>Enter a value in the range 1 through 64.</p>
mnemonic:[*****]	<p>This is the mnemonic itself. These characters represent an actual called address. For example, H1 may represent host 1, or NY may represent an application at a New York location.</p> <p>Enter two through eight characters. The first must be an alphabetic character (to distinguish a mnemonic address from a Long Form address, which always begins with a digit); the remaining characters may be alphabetic or numeric.</p>
address:[*****]	<p>This is the actual network address of the application. When you place a call using the related mnemonic, the call goes to this address.</p> <p>Enter up to 15 digits (enter at least 1 digit). Use the X.121 format.</p>
facility:[0]	<p>The value you enter determines which X.25 facilities (if any) are to be included in Call Request packets.</p> <p>Enter one of the following values (do not enter any value that is reserved):</p> <ul style="list-style-type: none"> 0 = No facilities 1 = Reverse Charging facility 2 = Reserved 4 = Closed User Group facility 8 = 128-byte packet negotiation xx = Combination of values

Table 4-6. Address ID Configuration Prompts (continued)

Prompt	Description and Data Entry Instructions
cug id:[00]	<p>This is a two-digit number that is used to identify a closed user group.</p> <p>Enter a two-digit number in the range 00 through 99, if allowed by the Facility prompt.</p>
crm:[1]	<p>This value defines which Connection Request Mode (CRM) is to relate to this mnemonic. Refer to the 3270 Display System Protocol manual listed in paragraph 1.5 for information on CRMs. Refer to section 3 of this manual for sample applications.</p> <p>Enter one of the following values:</p> <ul style="list-style-type: none"> 1 = CRM1 2 = CRM2 3 = CRM3 <p>Typically you assign CRM1 or CRM2 if network security is your primary objective, and CRM3 if network flexibility is your primary objective.</p> <p>CRM1 is a fixed-class CRM, where the source PAD provides the Control Unit Address (CUA) and Device Address (DVA) of the call originator. The line number (or application ID) may be any valid value (the range is 1 through 4 for MICOM PADs). See figure 4-8 for an example.</p> <p>Looking at figure 4-8, a user at cluster controller 40, device 40, on BSC line 1 of the TPAD can connect to cluster controller 40, device 40, on any BSC line of the HPAD. That is, the BSC line number does not matter as long as the CUAs and DVAs match.</p>

CONNECTION REQUEST MODE 1



LEGEND:
----- = BSC LINE WHERE ATTACHED DEVICES ARE IMPLIED

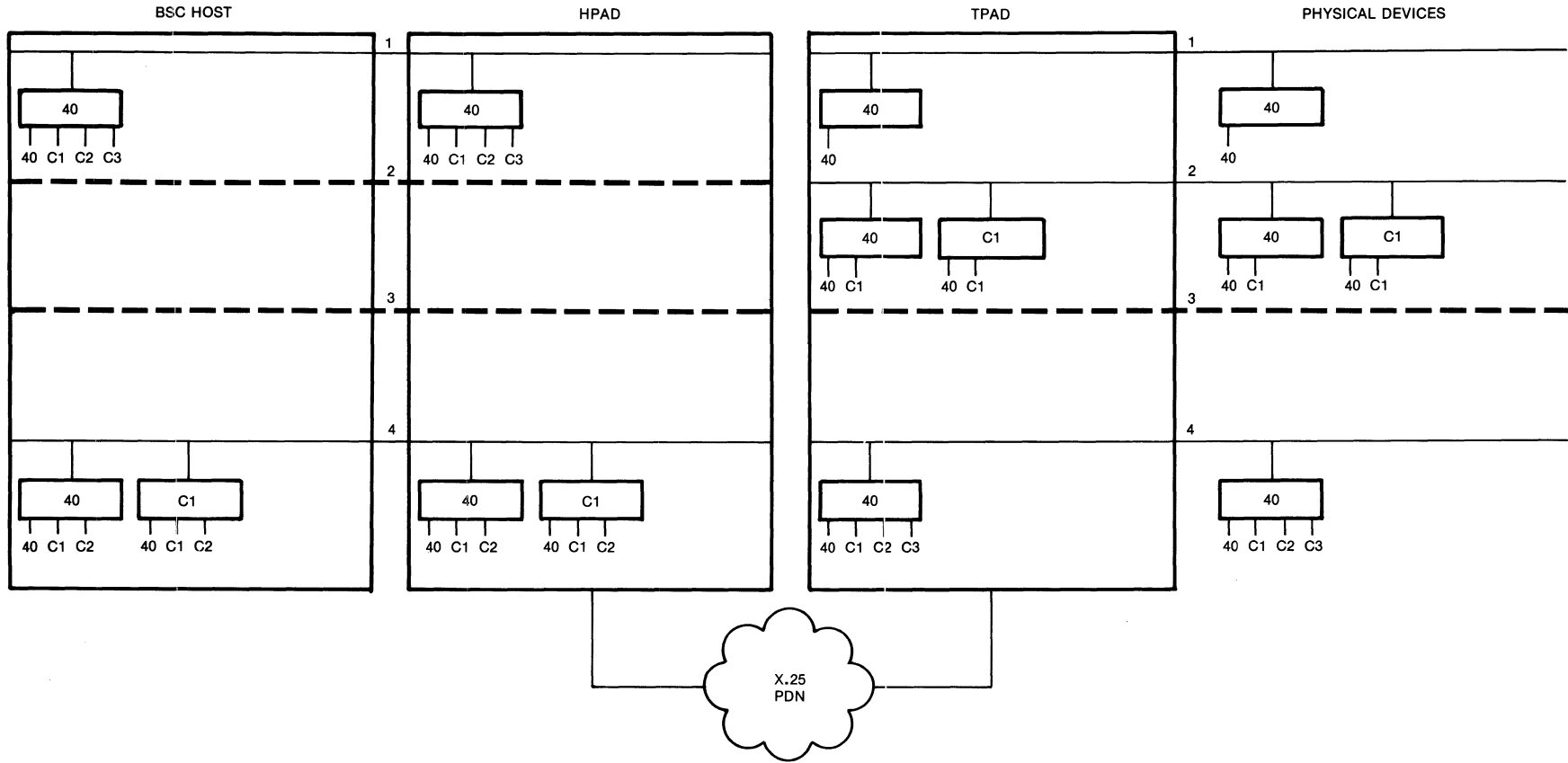
MI-1391-1a-38

Figure 4-8. Connection Request Mode 1

Table 4-6. Address ID Configuration Prompts (continued)

Prompt	Description and Data Entry Instructions
crm:[1] (continued)	<p>CRM2 is a specific-class CRM, where the source PAD provides the line number (or application ID), CUA, and DVA.</p> <p>CRM3 is a nonspecific class CRM. The source PAD provides the line number (or application ID); the CUA and DVA are assigned by the destination PAD. The source PAD has the option of specifying either the CUA or DVA, but not both.</p> <p>Looking at figure 4-9, a user at cluster controller 40, device 40, on the TPAD can be connected by the HPAD to any cluster controller that has a device 40, or to any device that is associated with a cluster controller 40. CRM3 is especially beneficial when physical devices are added to a TPAD, but it is not convenient to add them to the HPAD's logical configuration.</p>
applid:[01]	<p>This is the BSC line number of the specific application.</p> <p>For connections to MICOM PADs, enter a value in the range 01 through 04. For connections to non-MICOM PADs, enter a value in the range 00 through 99.</p>
crm2/3 cua/dva:[0000]	<p>This value specifies the destination CUA and/or DVA. Ignore this prompt if you specified CRM1 for the CRM prompt.</p> <p>If you specified CRM2 for the CRM prompt, you must enter both the CUA and the DVA (for example, C240).</p> <p>If you specified CRM3 for the CRM prompt, you may specify either the CUA or the DVA; or you may specify 00 for both the CUA and the DVA. Valid entries are as follows, where xx represents a specific entry and 00 represents any available CUA or DVA:</p> <p style="margin-left: 40px;">xx00 00xx 0000</p>

CONNECTION REQUEST MODE 3



LEGEND:
 - - - - = BSC LINE WHERE ATTACHED DEVICES ARE IMPLIED

MI-1391-1a-39

Figure 4-9. Connection Request Mode 3

Table 4-6. Address ID Configuration Prompts (continued)

Prompt	Description and Data Entry Instructions
password:[]	This is the network password. Enter four ASCII characters.

4.5.7 Enabling the Command Port to Receive Call Accounting and Events Data

With this configuration function you can enable or disable the Command port to receive call accounting and events data (that is, you enable or disable the Command port as an audit log).

To initiate this configuration function, select item 6 (command port) from the Configure menu. The prompts that relate to this function are described in table 4-7.

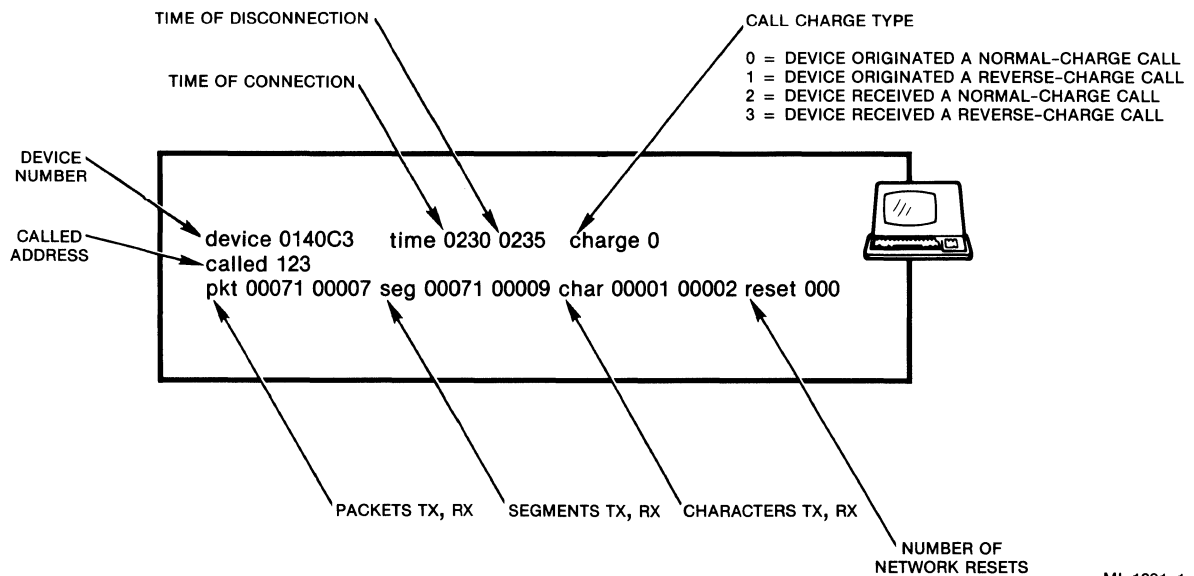
Table 4-7. Command Port Prompts

Prompt	Description and Data Entry Instructions
profile:[1]	<p>This value represents the device profile to be associated with the Command port. If desired, you can have two unique device profiles defined (for example, one for a terminal and one for a printer). However, only one may be associated with the Command port at one time.</p> <p>Enter one of the following values:</p> <ul style="list-style-type: none">1 = Device Profile 12 = Device Profile 2 <p>Refer to paragraph 4.5.8 for a list of the parameters associated with a device profile.</p>
class 1:[99]	<p>This is the first class ID (the subaddress) of the PAD's Command Facility. This value must be used by a remote caller who wishes to access the Command Facility.</p> <p>Enter a value in the range 00 through 99, where:</p> <ul style="list-style-type: none">00 = Access to the Command Facility from the network not allowednn = Any two digits other than 00
class 2:[00]	Reserved
audit log:[0]	Enter 0 to disable or 1 to enable the output of call accounting and events data to the Command port.

When enabled, the Command port receives events information such as the following (hh:mm represents the time the event took place, in hours and minutes):

```
trunk up      hh:mm
trunk down   hh:mm
```

Also when enabled, the Command port receives call accounting records for all calls handled by the PAD. A record is generated upon the conclusion of a call. A sample call accounting record is shown in figure 4-10.



MI-1391-1a-37

Figure 4-10. Sample Call Accounting Record

4.5.8 Defining Device Profiles

With this configuration function, you can define two unique device profiles (1 and 2). Each profile contains all 20 parameters defined in the 1980 CCITT Recommendation X.3, plus additional MICOM-enhanced parameters. You assign a device profile to the Command port to adapt it to specific equipment you want to connect.

The factory-set profile values shown in figure 4-4 are for device profile 1 (terminal profile). The factory-set values for device profile 2 (printer) are identical except for Parameter 19, Dv.Type. Parameter 19 is factory set to 2 (video display) for device profile 1 and to 1 (hard copy device) for device profile 2.

To initiate this configuration function, select item 7 (profile) from the Configure menu. The prompts that relate to this function are described in table 4-8. The prompts are listed in ascending parameter number order.

NOTE: In table 4-8, an asterisk (*) following a prompt is used throughout to indicate the parameters that must not be assigned the same value. This asterisk does not actually appear on the screen.

Table 4-8. Profile Prompts

Prompt	Description and Data Entry Instructions
profile:[*]	<p>This entry tells the PAD which of the two profiles you are about to configure.</p> <p>Enter a value of 1 or 2.</p>
x28acc:[1]*	<p>Parameter 1 defines the character to be interpreted by the PAD as the X.28 mode access character (see the preceding NOTE).</p> <p>Enter a value in the range 0 through 126, where:</p> <p style="padding-left: 40px;">0 = Access to X.28 mode not allowed</p> <p style="padding-left: 40px;">1 = Access to X.28 mode allowed with Ctrl-P</p> <p style="padding-left: 40px;">2-126 = Decimal value of ASCII character that is used to access X.28 mode</p>
echo:[1]	<p>Parameter 2 tells the PAD to echo or to not echo characters it receives from the Command port.</p> <p>Enter one of the following values:</p> <p style="padding-left: 40px;">0 = Echo disabled</p> <p style="padding-left: 40px;">1 = Echo enabled</p>

Table 4-8. Profile Prompts (continued)

Prompt	Description and Data Entry Instructions
data fwd:[2]	<p>Parameter 3 defines the character(s) that causes the PAD to forward a packet.</p> <p>Enter one of the following values to specify the data forwarding character(s):</p> <ul style="list-style-type: none"> 0 = No data forwarding (however, data will still be forwarded upon detection of a <u>CR</u>, unless you also disable editing by assigning a value of 0 to Parameter 15) 1 = All alphanumeric characters 2 = <u>CR</u> 4 = ESC, BEL, ENQ, or ACK 8 = DEL, CAN, or DC2 16 = EOT or ETX 32 = HT, LF, VT, or FF 64 = Other characters in the first two columns of the ASCII chart not specified by the preceding values (refer to appendix B) <p>xxx = Combination of values</p>
idletimer:[0]	<p>Parameter 4 defines how much idle time the PAD will let pass before forwarding data. Note that the PAD does not forward data upon expiration of the idletimer when editing is enabled (Parameter 15 is set to a value of 1).</p> <p>Enter a value in the range 0 through 255, where:</p> <ul style="list-style-type: none"> 0 = Idletimer disabled 1-255 = Value of idletimer, in .05-second increments (that is, the maximum is 12.75 seconds)

Table 4-8. Profile Prompts (continued)

Prompt	Description and Data Entry Instructions
dv.flow:[1]	<p>Parameter 5 specifies whether or not the PAD uses XON/XOFF flow control for the attached device.</p> <p>Enter one of the following values:</p> <p>0 = PAD does not use XON/XOFF flow control 1 = PAD uses XON/XOFF flow control</p>
s.signal:[5]	<p>Parameter 6 defines which messages and/or service prompts the PAD outputs to the Command port.</p> <p>Enter one of the following values:</p> <p>0 = PAD outputs no messages or service prompts 1 = PAD outputs messages only 4 = PAD outputs service prompts only 5 = PAD outputs both messages and service prompts</p>
break:[21]	<p>Parameter 7 defines what the PAD does upon detecting a BREAK from the attached device.</p> <p>Enter one of the following values, to specify what action the PAD is to take upon detecting a BREAK:</p> <p>0 = Takes no action 1 = Sends an Interrupt packet 2 = Sends a Reset packet 4 = Sends an Indication of Break message 8 = Escapes to X.28 mode 16 = Discards output to the device xx = Combination of values</p>
cr.pad:[4]	<p>Parameter 9 (Parameter 8 is not configurable) defines how many null (padding) characters the PAD outputs after it transmits a CR to the attached device.</p> <p>Enter a value in the range 0 through 127, where:</p> <p>0 = No padding characters to be sent 1-127 = Number of padding characters to be sent after a CR</p>

Table 4-8. Profile Prompts (continued)

Prompt	Description and Data Entry Instructions
1.fold:[80]	<p>Parameter 10 defines how many characters the PAD outputs to the attached device before automatically inserting a CR (before linefolding occurs).</p> <p>Enter a value in the range 0 through 255, where:</p> <p style="padding-left: 40px;">0 = Linefolding disabled</p> <p style="padding-left: 40px;">1-255 = Number of characters that trigger linefolding</p>
speed:[32]	<p>Parameter 11 defines the data rate of the Command port channel.</p> <p>Enter one of the following values. Entering a value of 11, or any other value not included in the following list, results in a PAD error message at the conclusion of the Profile configuration function. The speeds listed are in bps.</p> <p style="padding-left: 40px;">0 = 110 1 = 134.5 2 = 300 3 = 1200 4 = 600 5 = 75 6 = 150 7 = 1800 8 = 200 9 = 100 10 = 50 12 = 2400 13 = 4800 14 = 9600 32 = Autobaud (110-9600, except 134.5)</p>
p.flow:[1]	<p>Parameter 12 defines whether or not the attached device uses XON/XOFF to flow control the PAD.</p> <p>Enter one of the following values:</p> <p style="padding-left: 40px;">0 = Device cannot exercise flow control over PAD</p> <p style="padding-left: 40px;">1 = Device can exercise flow control over PAD using XON/XOFF</p>

Table 4-8. Profile Prompts (continued)

Prompt	Description and Data Entry Instructions
autolf:[4]	<p>Parameter 13 defines when the PAD inserts a linefeed (LF) character into the data stream upon detection of a CR.</p> <p>Enter one of the following values:</p> <ul style="list-style-type: none"> 0 = No LF insertion 1 = LF after CR from remote DTE 2 = LF after CR to remote DTE 3 = LF after CR from or to remote DTE 4 = LF after CR when echoing 5 = LF after CR to device when echoing, or when remote DTE sends CR 6 = LF when echoing or transmitting CR 7 = LF after all CRs
lf.pad:[4]	<p>Parameter 14 defines how many null (padding) characters the PAD outputs after it transmits an LF character to the attached device.</p> <p>Enter a value in the range 0 through 127, where:</p> <ul style="list-style-type: none"> 0 = No padding characters transmitted 1-127 = Number of padding characters transmitted after LF
edit:[1]	<p>Parameter 15 allows or prohibits the use of the editing characters defined by Parameters 16, 17, and 18.</p> <p>Enter one of the following values:</p> <ul style="list-style-type: none"> 0 = Editing disabled 1 = Editing enabled

Table 4-8. Profile Prompts (continued)

Prompt	Description and Data Entry Instructions
c.del:[8]*	<p>Parameter 16 defines the ASCII character that the device uses to request a character deletion.</p> <p>Enter a value in the range 0 through 127 (the decimal value of the ASCII character).</p>
l.del:[24]*	<p>Parameter 17 defines the ASCII character that the device uses to request a line deletion.</p> <p>Enter a value in the range 0 through 127 (the decimal value of the ASCII character).</p>
l.disp:[18]*	<p>Parameter 18 defines the ASCII character that the device uses to request the display of the current line.</p> <p>Enter a value in the range 0 through 127 (the decimal value of the ASCII character).</p>
dv.type:[2]	<p>Parameter 19 specifies the device type so that the PAD knows how to handle the editing control signals.</p> <p>Enter one of the following values:</p> <ul style="list-style-type: none"> 1 = Hard copy device 2 = Video display device

Table 4-8. Profile Prompts (continued)

Prompt	Description and Data Entry Instructions
echomask:[131]	<p>Parameter 20 allows echoing of selected characters when Parameter 2, Echo, is enabled.</p> <p>Enter one of the following values:</p> <ul style="list-style-type: none"> 0 = No characters are echoed. 1 = Alphanumeric characters are echoed. 2 = CR is echoed. 4 = ESC, BEL, ENQ, and ACK are echoed. 8 = DEL, CAN, and DC2 are echoed. 16 = ETX and EOT are echoed. 32 = HT, LF, VT, and FF are echoed. 64 = All other control characters in columns 1 and 2 of the ASCII chart are echoed (refer to appendix B) 128 = All remaining characters are echoed. xxx = Combination of values
bits/char:[2]	<p>Parameter 100 specifies the number of bits per character, excluding the parity bit.</p> <p>Enter one of the following values:</p> <ul style="list-style-type: none"> 0 = 5 bits 1 = 6 bits 2 = 7 bits 3 = 8 bits

Table 4-8. Profile Prompts (continued)

Prompt	Description and Data Entry Instructions
dv.parity:[5]	<p>Parameter 101 specifies the parity the PAD uses in communicating with the attached device.</p> <p>Enter one of the following values:</p> <ul style="list-style-type: none"> 0 = Transparent parity 1 = Space 2 = Mark 3 = Even 4 = Odd 5 = Autoparity, as determined by autobaud sequence
net.parity:[0]	<p>Parameter 102 specifies the parity the PAD uses over the X.25 trunk (the network).</p> <p>Enter one of the following values:</p> <ul style="list-style-type: none"> 0 = Pass data as received 1 = Space 2 = Mark 3 = Even 4 = Odd
c.xon:[17]*	<p>Parameter 103 specifies the value to be used for the XON signaling character (see Parameters 5 and 12). This parameter is especially useful for terminals (such as Hewlett-Packard) that use nonstandard XON values.</p> <p>Enter a value in the range 0 through 127, where:</p> <ul style="list-style-type: none"> 0 = PAD ignores value 1-127 = Decimal value of the XON ASCII character

Table 4-8. Profile Prompts (continued)

Prompt	Description and Data Entry Instructions
c.xoff:[19]*	<p>Parameter 104 specifies the value to be used for the XOFF signaling character (see Parameters 5 and 12). This parameter is especially useful for terminals (such as Hewlett-Packard) that use nonstandard XOFF values.</p> <p>Enter a value in the range 0 through 127, where:</p> <p style="padding-left: 40px;">0 = PAD ignores value 1-127 = Decimal value of the XOFF ASCII character</p>
special flow:[0]	<p>Parameter 105 specifies whether the attached device can exercise flow control using Request-to-Send (RTS), or whether the PAD can exercise flow control using Clear-to-Send (CTS). The value entered always applies to both the Data Transfer mode and the Command mode.</p> <p>Enter one of the following values:</p> <p style="padding-left: 40px;">0 = None 1 = Device can flow control PAD with RTS 2 = PAD can flow control device with CTS 4 = PAD issues BEL character to device in CTS flow control x = Combination of values</p>
count fwd:[0]	<p>Parameter 106 specifies data forwarding based on a character count rather than on a packet count. This parameter can be used for block mode devices. The PAD ignores this parameter if editing is enabled (the value of Parameter 15 is 1).</p> <p>Enter a 0 or a value in the range 8 through 255 (do NOT enter a value in the range 1 through 7):</p> <p style="padding-left: 40px;">0 = No data forwarding based on character count 8-255 = Number of characters that trigger data forwarding</p>

Table 4-8. Profile Prompts (continued)

Prompt	Description and Data Entry Instructions
escdelay:[0]	<p>Parameter 107 specifies the length of time that the PAD is to wait before forwarding an escape (ESC) sequence. This enables the forwarding of an ESC sequence in a single packet. This parameter can be used to allow the terminal on the Command port to activate its local printer.</p> <p>Enter a 0 or a value in the range 4 through 255 (do NOT enter a value in the range 1 through 3):</p> <p>0 = No special handling of ESC sequences</p> <p>4-255 = The forwarding delay time after the PAD receives an ESC sequence (selected in .05-second increments). For example, enter a value of 5 to specify 0.25 seconds.</p>
c.break:[0]*	<p>Parameter 108 defines a regular character key to be interpreted by the PAD as a BREAK key. This is most useful for keyboards not equipped with BREAK keys.</p> <p>Enter a value in the range 0 through 127, where:</p> <p>0 = Normal BREAK key</p> <p>1-127 = Decimal value of the ASCII character to be interpreted by the PAD as the BREAK key</p>
c.suppress:[26]*	<p>Parameter 109 defines the character to be used by the device for temporary echo suppression (see Parameter 110).</p> <p>Enter a value in the range 0 through 127, where:</p> <p>0 = Temporary echo suppression disabled</p> <p>1-127 = Decimal value of the ASCII character to be used to trigger temporary echo suppression</p>

Table 4-8. Profile Prompts (continued)

Prompt	Description and Data Entry Instructions
c.subs:[42]*	<p>Parameter 110 defines the substitution character to be displayed when echo is suppressed. This character is then displayed unless it is masked by Parameter 20.</p> <p>Enter a value in the range 0 through 127, where:</p> <p style="padding-left: 40px;">0 = No substitution character is echoed.</p> <p style="padding-left: 40px;">1-127 = Decimal value of the ASCII character to be used as the substitution character</p>
echoctl:[0]	<p>Parameter 111 configures the PAD to emulate host computer handling for both character input and output.</p> <p>Enter one of the following values:</p> <p style="padding-left: 40px;">0 = Device input priority</p> <p style="padding-left: 40px;">1 = No priority</p> <p style="padding-left: 40px;">2 = Computer output priority</p> <p style="padding-left: 40px;">4 = Synchronize local field with incoming data-formatting screens</p> <p style="padding-left: 40px;">x = Combination of values</p> <p>When you enter 0, the PAD is configured to hold output that is destined for a terminal until it detects one of the following conditions:</p> <ul style="list-style-type: none"> • Data forwarding • No keying activity for the period of time specified by Parameter 4 <p>Entering 0 prevents corruption of a user's data entry screen.</p> <p>When you enter 1, the PAD is configured not to hold output.</p>

Table 4-8. Profile Prompts (continued)

Prompt	Description and Data Entry Instructions
echoctrl:[0] (continued)	<p>When you enter 2, the PAD is configured to immediately forward data to a device and then re-echo any previously accumulated data.</p> <p>When you enter 4, the PAD is configured to support data input on formatted data entry screens.</p>
special echo id:[0]	<p>Parameter 112 allows or disallows the use of special echo characters.</p> <p>Enter a value of 0 (values 1 through 3 are reserved for future use).</p>
pagelength:[0]	<p>Parameter 113 defines the number of lines per page (the page length) for autopaging (see Parameter 114).</p> <p>Enter a value in the range 0 through 255, where:</p> <p style="padding-left: 40px;">0 = No autopaging 1-255 = Number of lines per page</p>
c.page:[0]*	<p>Parameter 114 defines the end-of-page character to be used with Parameter 113 to trigger autopaging.</p> <p>Enter a value in the range 0 through 127, where:</p> <p style="padding-left: 40px;">0 = Character is ignored 1-127 = Decimal value of the ASCII character that triggers autopaging</p>
ff.pad:[0]	<p>Parameter 115 causes the PAD to output a specific number of null (padding) characters following the transmission of a formfeed (ff) character to the device.</p> <p>Enter a value in the range 0 through 127, where:</p> <p style="padding-left: 40px;">0 = No formfeed padding 1-127 = Number of padding characters that follow a formfeed character</p>

Table 4-8. Profile Prompts (continued)

Prompt	Description and Data Entry Instructions
inactivity:[0]	<p>Parameter 116 causes the PAD to clear a call based on an inactivity period.</p> <p>Enter a value in the range 0 through 255, where:</p> <p style="padding-left: 40px;">0 = No clearing on inactivity</p> <p style="padding-left: 40px;">1-255 = Inactivity timer period, in 1-minute increments</p>
x29acc:[0]*	<p>Parameter 117 specifies the character that enables the entry of X.29 commands.</p> <p>Enter a value in the range 0 through 127, where:</p> <p style="padding-left: 40px;">0 = X.29 access not allowed</p> <p style="padding-left: 40px;">1-127 = Decimal value of the ASCII character that enables X.29 access</p>

4.5.9 Defining the Output Intervals for Periodic Statistics Reporting

With this configuration function, you define how often the PAD is to output the Performance Statistics report (refer to paragraph 4.7 for information on this report). This report is intended for output to a printer. You must log out of the Command Facility before the PAD can output periodic statistics.

NOTE: In addition to periodic output, you can request output of the Performance Statistics report on demand, using the List Statistics command (refer to paragraph 4.7).

To define the output intervals for periodic statistics, select item 8 (stat period) from the Configure menu. The following prompt is displayed:

```
period:[0]
```

Enter a 0 to disable periodic statistics reporting. Otherwise, enter a value in the range 1 through 6, where each value represents an increment of 10 minutes. That is:

- 1 = 10 minutes
- 2 = 20 minutes
- 3 = 30 minutes
- 4 = 40 minutes
- 5 = 50 minutes
- 6 = 60 minutes

The value you enter (1 through 6) specifies the number of minutes between reports. After each periodic report, the PAD resets all counters to 0.

It is recommended that you keep the Performance Statistics reports in a sequential notebook. Doing so provides you with a record of network growth and usage patterns. In addition, the reports can be helpful when you are troubleshooting a network problem.

4.5.10 Defining Screen Formats

MICOM has designed two generic Command screens for display terminals attached to TPAD lines. Each factory-set screen contains signon information (a welcome message), an error message field, function key fields, and an address/application ID field. Each screen is user modifiable using the Screen Definitions function (item 9 on the Configure menu).

MICOM's Command Screen 1, shown in figure 4-11, applies to terminals with screen sizes of:

- 24 by 80 (1920 characters)
- 32 by 80 (2560 characters)
- 43 by 80 (3440 characters)
- 27 by 132 (3564 characters)

MICOM'S Command Screen 2, shown in figure 4-12, applies to terminals with screen sizes of:

- 12 by 40 (480 characters)
- 12 by 80 (960 characters)

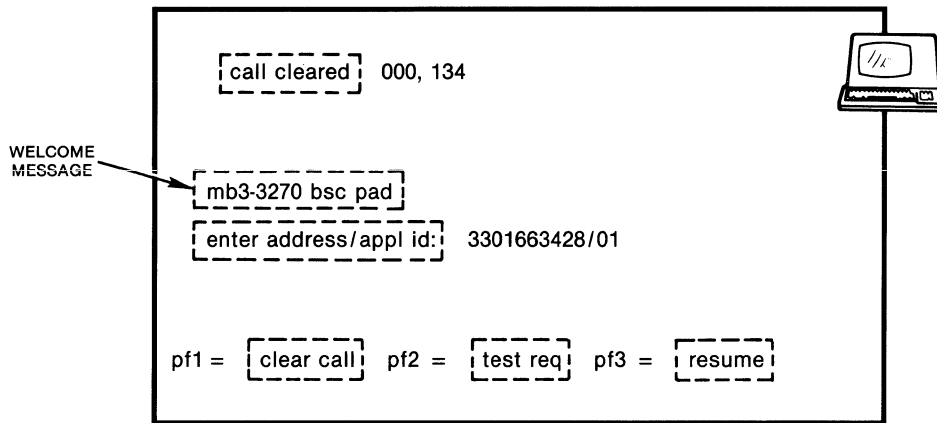
NOTE: The format of the Command screen is identical for terminals with screen sizes of 1920, 2560, 3440, and 3564 characters. That is, the screen text is centered vertically to the upper 24 lines and horizontally to the leftmost 80 columns.

This paragraph gives instructions on how to modify the Command screens to meet your own requirements (for example, for corporate logos, unique messages, or foreign language requirements). For instructions on using a TPAD Command screen to place calls, clear calls, and so on, refer to section 5.

To reinstate MICOM's default Command screen, use the Screen Definitions function described in this paragraph, or perform a Cold start reset of the PAD (before you perform a Cold start reset, see the CAUTIONS in paragraph 4.8).

NOTE: Color and special attributes are not supported for the Command screen.

You modify the Command screens from any ASCII terminal. The PAD performs the necessary translation from ASCII to EBCDIC. The fields that you can modify are enclosed within broken lines in figures 4-11 and 4-12. These figures also show sample addresses and call cleared codes.

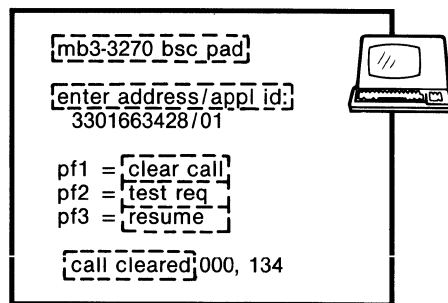


LEGEND:

[] = USER-MODIFIABLE FIELDS

MI-1391-1a-40

Figure 4-11. MICOM's Command Screen 1



LEGEND:

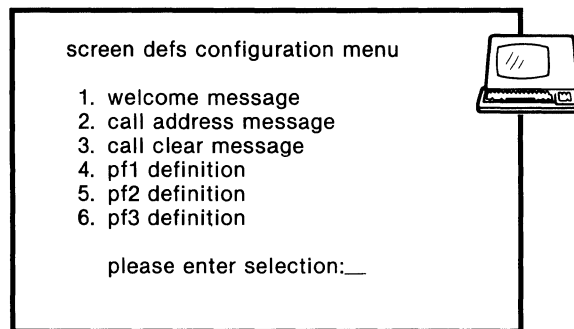
[] = USER-MODIFIABLE FIELDS

MI-1391-1a-41

Figure 4-12. MICOM's Command Screen 2

To initiate the Screen Definitions function, select item 9 (screen definitions) from the Configure menu. The PAD displays the Screen Definitions Configuration menu shown in figure 4-13. Enter one of the values (1 through 6) listed on the menu to select the item you wish to modify. The PAD displays a prompt and the currently stored text for the item you select. Table 4-9 describes the prompt related to each menu item.

NOTE: Each field has a fixed starting position on the screen. To center new text within a field, enter the correct number of space characters before entering your new text.



MI-1391-1a-42

Figure 4-13. Screen Definitions Configuration Menu

Table 4-9. Screen Definitions Prompts

Prompt	Description and Data Entry Instructions
welcome message:[mb3-3270 bsc pad]	This prompt lets you modify the currently stored welcome message. Enter up to 54 characters for MICOM's Command Screen 1 or up to 40 characters for MICOM's Command Screen 2.
call address message: [enter address/appl id:]	This prompt lets you modify the currently stored message which appears on the Command screen to request data entry. Enter up to 32 characters for Command Screen 1 or 2.

Table 4-9. Screen Definitions Prompts (continued)

Prompt	Description and Data Entry Instructions
call clear message:[call cleared]	<p>This prompt lets you modify the message that appears when a call is cleared.</p> <p>Enter up to 20 characters for Command Screen 1 or 2.</p>
pf1 definition:[clear call]	<p>This prompt lets you modify the currently stored description of PF1 which appears on the Command screen.</p> <p>Enter up to 16 characters for Command Screen 1 or 2.</p>
pf2 definition:[test req]	<p>This prompt lets you modify the currently stored description of PF2 which appears on the Command screen.</p> <p>Enter up to 16 characters for Command Screen 1 or 2.</p>
pf3 definition:[resume]	<p>This prompt lets you modify the currently stored description of PF3 which appears on the Command screen.</p> <p>Enter up to 16 characters for Command Screen 1 or 2.</p>

4.5.11 Setting the PAD's Software (Soft) Switches

As described in paragraph 2.3, you can set some of the PAD's operating parameters using the Touch Panel. This paragraph explains how to use the Command Facility to set the same operating parameters.

Within each soft switch group (SYS1, SYS2, and SYS3), there are selections (see figures 2-8 through 2-10). In the Command Facility, each selection has a numerical value. That is:

- Selection 1 = 1
- Selection 2 = 2
- Selection 3 = 4
- Selection 4 = 8
- Selection 5 = 16
- Selection 6 = 32
- Selection 7 = 64
- Selection 8 = 128

If you enter a numerical value (by itself or in combination with other values), the PAD turns the related soft switch selection ON. If you do not enter a value, the related selection is OFF.

For example, entering a value of 8 (by itself or in combination with other values) for the SYS1 prompt causes the PAD to be Cold started upon a reset (see table 4-10). On the other hand, if you do not enter a value of 8 (by itself or in combination with other values), the PAD will be Warm started upon a reset.

To use the Command Facility to set operating parameters, select item 10 (soft switches) from the Configure menu. The prompts that relate to this function are described in table 4-10. Refer to paragraph 2.3 for more detailed information on the soft switch selections.

Table 4-10. Soft Switch Configuration Prompts

Prompt	Description and Data Entry Instructions																														
sys1:[2]	<p>This prompt relates to the SYS1 soft switch group. Enter a value or a combination of values from the following list. Entering a value of 0 turns all selections OFF.</p> <table border="1"> <thead> <tr> <th data-bbox="391 457 475 485"><u>Value</u></th> <th data-bbox="565 457 727 485"><u>If Entered</u></th> <th data-bbox="805 457 1029 485"><u>If Not Entered</u></th> </tr> </thead> <tbody> <tr> <td data-bbox="423 520 440 548">1</td> <td colspan="2" data-bbox="695 520 821 548">Reserved</td> </tr> <tr> <td data-bbox="423 583 440 611">2</td> <td data-bbox="516 583 760 646">External device provides clock</td> <td data-bbox="805 583 1029 674">PAD's internal clock provides clock</td> </tr> <tr> <td data-bbox="423 709 440 737">4</td> <td colspan="2" data-bbox="695 709 821 737">Reserved</td> </tr> <tr> <td data-bbox="423 772 440 800">8</td> <td data-bbox="516 772 716 863">PAD is Cold started upon reset</td> <td data-bbox="805 772 997 863">PAD is Warm started upon reset</td> </tr> <tr> <td data-bbox="407 898 440 926">16</td> <td colspan="2" data-bbox="537 898 1013 926">This value may not be entered.</td> </tr> <tr> <td data-bbox="407 961 440 989">32</td> <td colspan="2" data-bbox="537 961 1013 989">This value may not be entered.</td> </tr> <tr> <td data-bbox="407 1024 440 1052">64</td> <td colspan="2" data-bbox="537 1024 1013 1052">This value may not be entered.</td> </tr> <tr> <td data-bbox="407 1087 456 1115">128</td> <td data-bbox="516 1087 748 1157">X.25 trunk has DCE appearance</td> <td data-bbox="805 1087 1029 1157">X.25 trunk has DTE appearance</td> </tr> <tr> <td data-bbox="407 1192 456 1220">xxx</td> <td colspan="2" data-bbox="597 1192 932 1220">Combination of values</td> </tr> </tbody> </table>	<u>Value</u>	<u>If Entered</u>	<u>If Not Entered</u>	1	Reserved		2	External device provides clock	PAD's internal clock provides clock	4	Reserved		8	PAD is Cold started upon reset	PAD is Warm started upon reset	16	This value may not be entered.		32	This value may not be entered.		64	This value may not be entered.		128	X.25 trunk has DCE appearance	X.25 trunk has DTE appearance	xxx	Combination of values	
<u>Value</u>	<u>If Entered</u>	<u>If Not Entered</u>																													
1	Reserved																														
2	External device provides clock	PAD's internal clock provides clock																													
4	Reserved																														
8	PAD is Cold started upon reset	PAD is Warm started upon reset																													
16	This value may not be entered.																														
32	This value may not be entered.																														
64	This value may not be entered.																														
128	X.25 trunk has DCE appearance	X.25 trunk has DTE appearance																													
xxx	Combination of values																														

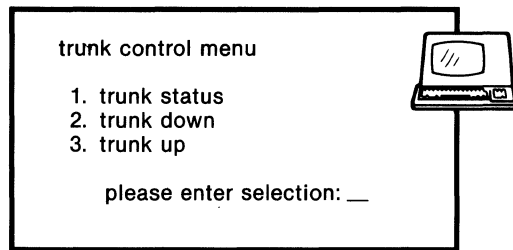
Table 4-10. Soft Switch Configuration Prompts (continued)

Prompt	Description and Data Entry Instructions																					
sys2:[0]	<p>This prompt relates to the SYS2 soft switch group. Enter a value or a combination of values from the following list. Entering a value of 0 turns all selections OFF.</p> <table border="1"> <thead> <tr> <th data-bbox="480 468 565 495"><u>Value</u></th> <th data-bbox="610 468 769 495"><u>If Entered</u></th> <th data-bbox="881 468 1105 495"><u>If Not Entered</u></th> </tr> </thead> <tbody> <tr> <td data-bbox="480 531 565 621">1, 2, 4, or 8</td> <td data-bbox="610 531 769 621">(LGN-see selections 1 through 4 in figure 2-9.)</td> <td data-bbox="881 531 1105 621"></td> </tr> <tr> <td data-bbox="480 657 529 684">16</td> <td data-bbox="610 657 834 846">Call User Data subaddressing (for BSC lines or Command Facility)</td> <td data-bbox="881 657 1105 783">X.121 subaddressing (for Command Facility only)</td> </tr> <tr> <td data-bbox="480 882 529 909">32</td> <td data-bbox="610 882 769 909"></td> <td data-bbox="881 882 1105 909">Reserved</td> </tr> <tr> <td data-bbox="480 945 529 972">64</td> <td data-bbox="610 945 769 972"></td> <td data-bbox="881 945 1105 972">Reserved</td> </tr> <tr> <td data-bbox="480 1008 529 1035">128</td> <td data-bbox="610 1008 769 1035"></td> <td data-bbox="881 1008 1105 1035">Reserved</td> </tr> <tr> <td data-bbox="480 1071 529 1098">xxx</td> <td colspan="2" data-bbox="610 1071 1105 1098">Combination of values</td> </tr> </tbody> </table>	<u>Value</u>	<u>If Entered</u>	<u>If Not Entered</u>	1, 2, 4, or 8	(LGN-see selections 1 through 4 in figure 2-9.)		16	Call User Data subaddressing (for BSC lines or Command Facility)	X.121 subaddressing (for Command Facility only)	32		Reserved	64		Reserved	128		Reserved	xxx	Combination of values	
<u>Value</u>	<u>If Entered</u>	<u>If Not Entered</u>																				
1, 2, 4, or 8	(LGN-see selections 1 through 4 in figure 2-9.)																					
16	Call User Data subaddressing (for BSC lines or Command Facility)	X.121 subaddressing (for Command Facility only)																				
32		Reserved																				
64		Reserved																				
128		Reserved																				
xxx	Combination of values																					
sys3:[0]	<p>This prompt relates to the SYS3 soft switch group. Enter a value of 1 if you wish to set the EIA bias ON for BSC lines 1 through 4, the Command port, and the Composite port (refer to paragraph 2.3.3 for more information). Do not enter any of the following values, which are reserved: 2, 4, 8, 16, 32, 64, and 128.</p> <p>Entering a value of 0 turns all SYS3 selections OFF.</p>																					

4.6 X.25 TRUNK CONTROL

Item 2 (trunk control) on the Command Facility menu allows you to enable or disable the PAD's X.25 link (trunk). You can also display the status (up or down) of the trunk.

When item 2 is selected from the Command Facility menu, the PAD displays the Trunk Control menu shown in figure 4-14. Each menu item is described in the paragraphs that follow the figure.



MI-1391-1a-43

Figure 4-14. Trunk Control Menu

4.6.1 Checking the Status of the Trunk

When you select item 1 (trunk status) from the Trunk Control menu, the PAD displays the current status (up or down) of the trunk.

4.6.2 Using the Trunk Down Command

The Trunk Down command is initiated by selecting item 2 (trunk down) from the Trunk Control menu. This causes the trunk to be logically disconnected (if the trunk is already down, the Trunk Down command has no effect). After you enter the Trunk Down command, the PAD's Link Down (LD) indicator comes ON (see table 6-1).

You can bring the trunk back up using one of the following methods:

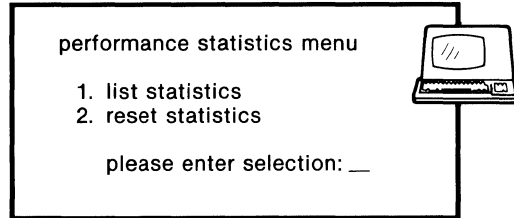
- Enter the Trunk Up command (refer to paragraph 4.6.3)
- Reset the PAD (refer to paragraph 4.8)

4.6.3 Using the Trunk Up Command

The Trunk Up command is initiated by selecting item 3 (trunk up) from the Trunk Control menu. The PAD will immediately attempt to bring the trunk back up (if the trunk is already up, the Trunk Up command has no effect). Once the trunk is back up, the PAD's LD indicator goes OFF (see table 6-1).

4.7 DISPLAYING AND RESETTING PERFORMANCE STATISTICS

You may review PAD performance statistics on demand. You may also reset these statistics. To perform either of these functions, select item 3 (performance statistics) from the Command Facility menu. The PAD displays the Performance Statistics menu shown in figure 4-15.



MI-1391-1a-44

Figure 4-15. Performance Statistics Menu

When you select item 1 (list statistics) from the Performance Statistics menu, the PAD displays the Performance Statistics report shown in figure 4-16 and described in table 4-11. This report provides you with packet- and frame-level statistics, information on call activity (for example, the number of accepted calls), and buffer-usage information. To exit back to the Command Facility menu, enter a CR.

```

mb3-3270 bsc pad statistics                                time: HH:MM:SS    date: MM:DD:YY

packet level      tx      rx      frame level      tx      rx
-----
data packets     XXXXX   XXXXX   link disc        XXX    XXX
data segments    XXXXX   XXXXX   link reset       XXX    XXX
character(X100)  XXXXX   XXXXX   retransmissions  XXX    XXX
channel reset    XXX     XXX     timeouts         XXX
flow control     XXXXX   XXXXX   flow control     XXX
frame errors     XXX
link down        XXX

call activity     tx      rx      buffer usage
-----
accepted call    XXX     XXX     global flow control  XXXXX
rejected call    XXX     XXX     buffer utilization   XX %
active call      XXX
    
```

MI-1391-1a-62

Figure 4-16. Format of the Performance Statistics Report

NOTE: The Performance Statistics report can also be generated periodically by the PAD using the Command port (refer to paragraph 4.5.9).

Table 4-11. Definition of the PAD Performance Statistics Report

Counter	Range of Values	Description
Data Packets	0 to 65,535	This is the number of data packets received and transmitted over the X.25 trunk.
Data Segments	0 to 65,535	This is the number of data segments received and transmitted over the X.25 trunk. A segment is a defined fraction of the packet size. It can be 16, 32, 64, 128, or 256 octets.
Character (x100)	0 to 65,535	This is the number of data characters the PAD received or transmitted over the X.25 trunk.
Channel Reset	0 to 255	This is the number of Reset packets received and transmitted over the X.25 trunk.
Flow Control	0 to 65,535	This is the combined number of RNR packets transmitted and window blocks experienced without receipt of packet-transmission authorization.
Link Disc	0 to 255	This is the number of times a PAD sent or received a disconnect frame. The LINK DISC (TX) counter counts how many times the PAD initiated a DISC/UA sequence. The receive counter counts how many times the network initiated a DISC/UA sequence.
Link Reset	0 to 255	This is the number of times the PAD performed an SABM/UA sequence.
Retransmissions	0 to 255	This is the number of frames retransmitted because of CRC errors or T1 expirations. This is added to the number of frames.
Timeouts	0 to 255	This is the number of times the T1 timer expired.
Flow Control	0 to 255	This is the number of RNR frames received or transmitted.

Table 4-11. Definition of the PAD Performance Statistics Report
(continued)

Counter	Range of Values	Description
Frame Errors	0 to 255	This is the number of times the PAD received bad frame check sequences (CRC).
Link Down	0 to 255	This is the number of times the link assurance procedure failed. Bringing the link down using the Trunk Down command (refer to paragraph 4.6.2) does not increment this counter.
Accepted Call	0 to 999 *** indicates counter overflow	(TX) This is the number of times the PAD received a Call Accept packet in response to a Call Request packet. (RX) This is the number of times the PAD sent a Call Accept packet in response to an incoming call packet.
Rejected Call	0 to 999 *** indicates counter overflow	(TX) This is the number of times the PAD received a Clear Indication packet in response to a Call Request packet. (RX) This is the number of times the PAD sent a Clear Request packet in response to an incoming call packet.
Active Call	0 to 255	This is the number of SVCs now in use. It includes all SVCs in call setup, data transfer, and clear-pending states.
Global Flow Control	0 to 65,535	This is the number of times the PAD exercised flow control because the buffer utilization exceeded 62.5 percent.
Buffer Utilization	00 to 99	Total buffer use (Instantaneous) = $\frac{\text{Total Number of Buffers in Use} \times 100}{\text{Total Buffer Pool Size}}$

When you select item 2 (reset statistics) from the Performance Statistics menu, the PAD displays the following:

are you sure?(y/n)

Type Y to reset all performance statistics to zero (except for buffer utilization, which has a minimum value of 01 percent).

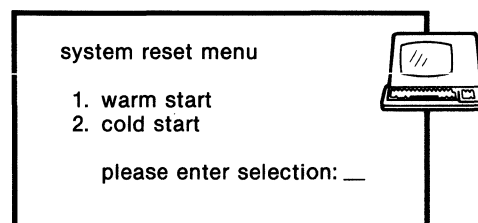
Type N to display the Command Facility menu without resetting statistics.

4.8 SYSTEM RESET

The Command Facility System Reset function lets you simulate the action of a hardware reset switch, thus causing PAD reinitialization. You can specify a Warm start or a Cold start reset using the Command Facility function.

CAUTION: Both Warm and Cold start resets cause the X.25 trunk and all BSC lines to be reset. Before initiating a system reset, you should advise each network user with an active session to terminate the session. Failure to do so can result in a premature end of each session.

To initiate a system reset, select item 4 (system reset) from the Command Facility menu. The PAD displays the System Reset menu shown in figure 4-17.



MI-1391-1a-59

Figure 4-17. System Reset Menu

When you select item 1 (warm start) from the System Reset menu, the PAD displays the following:

are you sure?(y/n)

Type Y to initiate the Warm start reset. Type N to display the Command Facility menu without resetting the PAD.

You should initiate a Warm start reset of the PAD after you make configuration changes using the Command Facility. The Warm start reset activates your changes (refer to paragraph 4.5).

When you select item 2 (cold start) from the System Reset menu, the PAD displays the following:

are you sure:(y/n)

CAUTION: A Cold start reset restores factory-default values to PAD parameters. None of your configuration data (except for the SYS1, SYS2, and SYS3 configuration data) can be recovered following a Cold start reset. If you are uncertain about performing a Cold start reset, do NOT do it.

Type Y to initiate the Cold start reset. Type N to display the Command Facility menu without resetting the PAD.

4.9 LOGGING OUT OF THE COMMAND FACILITY

To log out of the Command Facility, select item 5 (logout) from the Command Facility menu.

Logging out:

- Allows the periodic output of the Performance Statistics report
- Makes the Command Facility accessible only to authorized users

SECTION 5

TPAD USER INTERFACE

As a TPAD terminal user you need to know how to use the PAD to place calls over the PDN to a host application. This section tells you how to use the PAD-provided Command screen to:

- Place a call to a host application
- Clear a call in progress
- Send Test Request data to a host system
- Resume a call that you inadvertently interrupted
- Check connection status

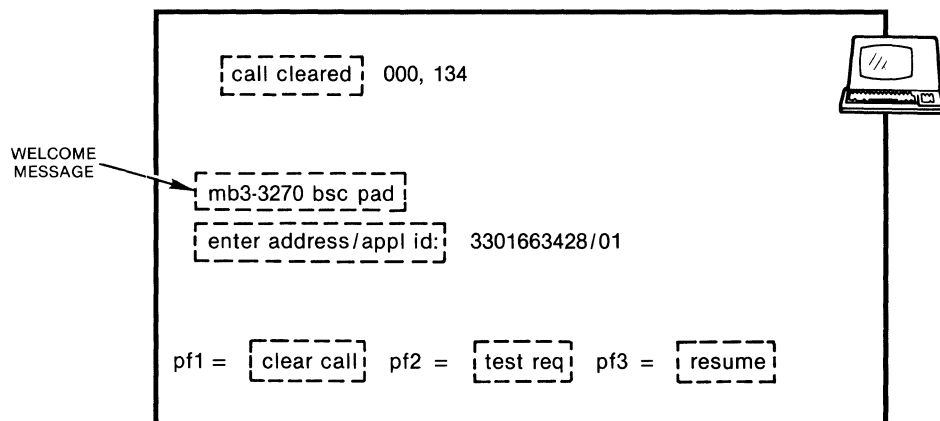
In addition, this section describes the cause and diagnostic codes that may be transmitted to you if a call is cleared.

5.1 COMMAND SCREEN

The TPAD displays its Command screen when a 3270 terminal (connected to a cluster controller) is powered on (refer to paragraph 5.1.1.4 for an exception to this). Of course the BSC line must be enabled and configured properly, and the PAD's configuration must include this 3270 terminal and cluster controller (refer to section 4).

NOTE: Another way to display the Command screen is to press the Test Req key on your 3270 keyboard.

MICOM's Command Screens 1 and 2 are shown in figures 5-1 and 5-2. If you modified these screens, as described in paragraph 4.5.10, the text shown within broken lines in figures 5-1 and 5-2 may be different. In terms of usage, the two Command screens are identical; MICOM provides both of them to accommodate different screen sizes (refer to paragraph 4.5.10).

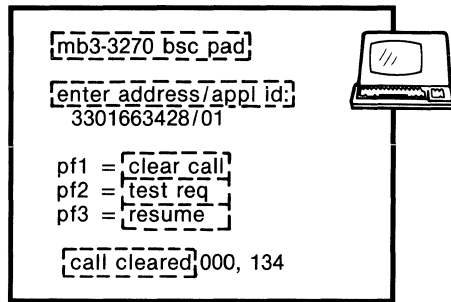


LEGEND:

[] = USER-MODIFIABLE FIELDS

MI-1391-1a-40

Figure 5-1. MICOM's Command Screen 1



LEGEND:

[] = USER-MODIFIABLE FIELDS

MI-1391-1a-41

Figure 5-2. MICOM's Command Screen 2

The paragraphs that follow describe the functions that are available to you from the Command screen. A null interface (for ATM applications) is also available, where display of the Command screen is suppressed (refer to paragraph 5.1.1.4).

5.1.1 Placing a Call

You will use the Command screen most frequently for placing calls. Depending on the configuration of your device (refer to paragraph 4.5.3), you may use one of the following calling methods:

- Long Form
- Abbreviated
- Autocall
- ATM

5.1.1.1 Long Form Calling Method

The Long Form calling method provides you with the ability to specify a destination X.121 address and applicable Connection Request Mode (CRM). Some capabilities available with the Abbreviated calling method (refer to paragraph 5.1.1.2) are not available with the Long Form calling method.

When using the Long Form calling method, you are required to enter the full destination address (in the X.121 format). This address can be from 1 to 15 digits long. If you enter an application ID, it can be 2 or 6 digits. If you do not enter an application ID, the PAD assigns an application ID value that is equal to the BSC line number to which your device is attached.

A sample Long Form address is shown in figures 5-1 and 5-2. This sample address has 10 digits, plus a 2-digit application ID. As shown, you must enter a slash (/) between the address and the application ID.

When you use the Long Form calling method, you may use CRM1, CRM2, or CRM3 (see table 3-1 for a comparison of CRMs). The PAD determines which CRM to use based on your entry. For example:

- 1234 = CRM1, where the application ID is equal to the BSC line number to which your device is attached.
- 1234/01 = CRM1, where the destination is application ID (BSC line) 01.
- 1234/014040 = CRM2, where the destination is application ID (BSC line) 01, cluster controller 40, and device 40.
- 1234/014000 = CRM3, where the destination is application ID (BSC line) 01, cluster controller 40. The call can be connected to any device on cluster controller 40 on BSC line 01, as determined by the called PAD.
- 1234/010040 = CRM3, where the destination is application ID (BSC line) 01, device 40. The call can be connected to device 40 on any cluster controller on BSC line 01, as determined by the called PAD.
- 1234/010000 = CRM3, where the destination is application ID (BSC line) 01. The cluster controller and device are not specified. The call can be connected to any device on any cluster controller on BSC line 01, as determined by the called PAD.

As shown in the preceding examples, CRM1 allows you to enter an application ID of two digits, or to not enter any application ID at all. However, with CRM1, you cannot enter a six-digit application ID. When you do not enter any application ID, the PAD assumes CRM1 and obtains the application ID value from the BSC line number to which your device is attached. When you enter a two-digit application ID, it must be equal to 01, 02, 03, or 04 (the BSC line number of the destination MICOM PAD) when you are calling a MICOM PAD. The application ID may be different if you are calling non-MICOM equipment.

With CRM2 or CRM3, the application ID must be equal to six digits, where the first two are the BSC line number, the third and fourth are the cluster controller number (CUA), and the fifth and sixth are the device number (DVA). With CRM3, the CUA and/or the DVA may be all zeroes. With CRM2, the exact CUA and DVA must be specified.

5.1.1.2 Abbreviated Calling Method

With the Abbreviated calling method, you enter a two-to-eight-character mnemonic that was previously configured in the PAD and associated with your device (refer to paragraphs 4.5.3 and 4.5.6). Your entry in the Enter Address/Appl ID field is simplified. In addition to the mnemonic configuration, your device has to be configured for abbreviated calling (refer to paragraph 4.5.3).

When you use this calling method, the type of CRM and the destination of your call are fixed (you define everything in Address ID configuration, as described in paragraph 4.5.6). For example, you might enter the previously configured mnemonic:

H1

This mnemonic might be configured as follows:

- Network address 12345
- Application ID 02
- CRM2
- Cluster controller 40, device C1

You would simply type H1 in the Enter Address/Appl ID field and press the Enter key. Then the PAD would automatically place the call, based on the configuration of mnemonic H1.

5.1.1.3 Autocall Calling Method

The Autocall calling method closely resembles the Abbreviated calling method. The difference is that you press the Enter key with the Enter Address/Appl ID field blank. That is, you do not even enter a mnemonic before pressing the Enter key.

This calling method is ideal for devices that always call the same destination. As with the Abbreviated calling method, a preconfigured mnemonic must be associated with this calling device. In addition, this device must be configured for Autocall on Enter/Select. (Refer to paragraphs 4.5.3 and 4.5.6.)

When you press the Enter key using this calling method, the PAD searches for the mnemonic associated with your device. It then automatically places the call, based on the configuration (network address, application ID, and so on) of that mnemonic.

5.1.1.4 ATM Calls

A user of an ATM does not want to see the Command screen or any other evidence of an X.25 network. Therefore, when a device is configured in the TPAD as an ATM, the TPAD does not send the Command screen to the device. This null user interface gives the appearance of a direct connection between the ATM user and the host.

Refer to paragraph 3.7 for more information on the PAD's ATM call option and to paragraph 4.5.3 for instructions on configuring an ATM device in the TPAD.

5.1.2 Clearing a Call

The Command screen simplifies the process of clearing a call in progress. You perform two functions:

- Press the Test Req key to display the Command screen.
- Press the PF1 key to clear the call in progress.

5.1.3 Sending Test Request Data

This PAD function lets you send Test Request data to a host. The interpretation of this data is dependent upon the operating system of that host.

You can send Test Request data only when the Command screen is displayed. For example, if you are in the middle of a call, you must first press the Test Req key on your 3270 keyboard to display the Command screen. With the Command screen displayed, you then press the PF2 key to send the Test Request data to the host system.

5.1.4 Resuming a Call

If you inadvertently press the Test Req key on your 3270 keyboard while a call is in progress, you can resume the call with a single keystroke.

As mentioned previously, pressing the Test Req key (intentionally or unintentionally) causes the PAD to display the Command screen. With the Command screen displayed, you simply press PF3 to resume the call that you accidentally interrupted.

5.1.5 Checking Connection Status

From the TPAD command screen, you can enter a status command to determine which device you are currently connected to on the host side of the virtual circuit. This is a powerful tool for troubleshooting in the BSC network.

The status command is entered in the Enter Address/Appl ID field as follows:

#s

After you enter this command and press the Enter key, the TPAD displays one of the following connection status records on the last line of your terminal. The status record tells you which host device (if any) you are connected to. In the following examples, 014040 always represents your application ID, CUA, and DVA on the TPAD.

- 014040 02C140 = A connection to host device 02C140.
- 014040 = No connection to a host device.
- 014040 00C140 = An HPAD-initiated call (the application ID is equal to 00; see the NOTE that follows). You are connected to host CUA C1 and DVA 40.
- 014040 000000 = A connection to a non-MICOM HPAD which has not implemented the Circuit Enable message.

NOTE: There is a DSP limitation related to the connection status record. If a call was host-originated, the TPAD displays an application ID of 00. However, the TPAD still displays the exact host CUA and DVA.

5.2 CAUSE AND DIAGNOSTIC CODES

The PAD may transmit certain cause and diagnostic codes to your terminal when a call is cleared. These codes might be displayed:

- In response to one of your entries
- In response to a network action
- In response to a remote destination action

Table 5-1 lists and describes all of the cause and diagnostic codes associated with cleared calls. These are always used in reference to virtual circuits.

NOTE: These codes may also be displayed at an asynchronous terminal that is attached to the PAD's Command port. Refer to appendix E for information on additional codes and service signals that might be displayed at this terminal.

Table 5-1. Cause and Diagnostic Codes Associated With Cleared Calls

Cause Code	Diagnostic Code	Explanation
000	000 ¹	Remote MICOM HPAD cleared the call
	133 ¹	Facilities requested are not allowed
	134 ¹	Device connected to requested line is not ready at the remote MICOM HPAD
	135	Call is cleared by local TPAD as a result of a trunk restart
	136	Trunk is down
	137	Undefined mnemonic used in Abbreviated or Autocall call
	138	There is no free logical channel on your TPAD.
	nnn	Generated by other X.25 equipment
001	xxx	Number is busy
003	xxx	Invalid facility request
005	xxx	Network congestion
009	xxx	Out of order
011	xxx	Access barred
013	xxx	Not obtainable
017	xxx	Remote procedure error
019	xxx	Local procedure error
025	xxx	Reverse charging not subscribed
033	xxx	Incompatible destination
021	xxx	TPAD has cleared the call following the receipt of an Invitation to Clear packet from the HPAD.
<p>LEGEND:</p> <p>xxx = Network-dependent code. Consult your network directory for the significance.</p> <p>nnn = Destination DTE code</p> <p>¹The value may have a different significance when generated by non-MICOM equipment.</p>		

SECTION 6

DIAGNOSTICS AND TROUBLESHOOTING

A Self Test and indicators are provided for diagnostics and troubleshooting. Also, the PAD's Performance Statistics report helps you to foresee problems before they actually cause a trunk-out-of-service condition. All of these diagnostic tools are described in paragraphs 6.1 through 6.3. In addition, paragraph 6.4 provides guidance for an experienced technician who is troubleshooting the PAD, in the unlikely event that an out-of-service condition does occur.

6.1 SELF TEST

The PAD executes a Self Test at system initialization and any time the system is reset. The Self Test checks the operation of all system memory. When power is first turned on, or when both Reset keys on the Touch Panel are pressed, the system status display flashes momentarily. At the conclusion of the Self Test, a number of indicator states are possible (refer to paragraph 6.3).

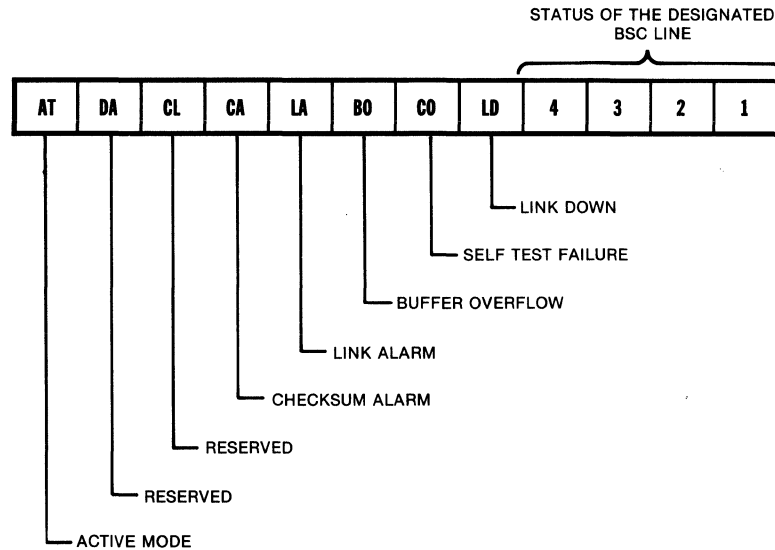
6.2 DIAGNOSTIC TOOLS OFFERED BY THE PAD

The PAD offers you many levels of diagnostics, including:

- The Performance Statistics report, which can be generated on demand or at fixed, user-selectable intervals. This report is available through the Command Facility (refer to paragraph 4.7). In using this report for diagnostic purposes, pay particular attention to the following statistics:
 - Link disc
 - Link reset
 - Retransmissions
 - Timeouts
 - Frame errors
 - Link down
- Commands which let you list or reset performance statistics and reset the PAD (refer to paragraphs 4.7 and 4.8)
- Indicators which reflect system status and BSC line activity (refer to paragraph 6.3)

6.3 INDICATORS

After the PAD is powered on, the indicators are visible through the front panel (see figure 6-1). When you press a Touch Panel key to configure the PAD's soft switches, the indicators monitor the configuration (refer to paragraph 2.3.5 and see table 2-1). During normal operation of the PAD, the indicators monitor system status and polling/data transmission activity on the BSC lines. The significance of each indicator is described in table 6-1.



MI-1391-1a-24

Figure 6-1. Indicators

NOTE: During normal PAD operation, the AT indicator is ON and all other indicators are OFF (except the BSC line indicators, which may be FLASHING or ON). During configuration of the soft switches, the indicators reflect the soft switch settings (see table 2-1).

If all indicators are ON, the PAD is in a constant reset condition (call MICOM Customer Service). If all indicators are OFF, there is no power to the unit, or there is an undefined problem. See table 6-2 to determine the nature of the problem.

Table 6-1. PAD Indicators

Indicators	ON	OFF	FLASHING
AT Active Mode	Normal operation	Undefined problem	Undefined problem
DA (Not used)	Undefined problem	Normal operation	Undefined problem
CL (Not used)	Undefined problem	Normal operation	Undefined problem
CA Checksum Alarm	CMOS or battery problem	Normal operation	Cold start performed ¹
LA Link Alarm	Undefined problem	Normal operation	Retransmission on link (to PDN)
BO Buffer Overflow	PAD is discarding data	Normal operation	Over 62.5 percent buffer utilization
CO Self Test Failure	When CA is also ON and AT is also OFF, it indicates a bad FEATUREPAK cartridge. ² When CA and AT are also OFF, it indicates a RAM error.	Normal operation	A fault is detected in the CMOS RAM.
LD Link Down	Link (to PDN) is down	Normal operation	Undefined problem
1, 2, 3, 4 BSC Line Activity	Constant polling activity and/or data transmission	BSC line is inactive	Normal state for polling activity and/or data transmission
<p>¹When the CMOS memory becomes corrupted, the PAD will automatically reload the factory-set configuration values into CMOS, regardless of the Cold/Warm start soft switch setting.</p> <p>²If the FEATUREPAK cartridge is corrupted, the status of the indicators is random; they may all be FLASHING (call MICOM Customer Service).</p>			

6.4 TROUBLESHOOTING

Table 6-2 lists a few problems that you might experience, and provides some items for the experienced technician to check.

Table 6-2. Troubleshooting

Problem	Probable Cause	Items to Check
<p>The unit does not operate when power is applied (fan does not operate).</p>	<p>Loss of power</p>	<p>Remove power cord plug from wall outlet for about two minutes. Reinsert plug in outlet. This resets the PAD's power supply (tripped by a voltage surge).</p> <p>After disconnecting the power supply, test the fuse (see figure 1-5). Replace the fuse, if necessary, and investigate the cause of failure.</p> <p>Test the ac wall outlet.</p>
<p>The unit does not operate when power is applied (fan is operating, but the indicators do not go ON).</p>	<p>The problem is in the base module or power supply.</p>	<p>Simultaneously touch both Reset keys on the Touch Panel. If the AT indicator is still OFF, replace the base module or call MICOM Customer Service.</p> <p>Reseat the outside connectors of the base module.</p> <p>Test the base module by trying a spare module in its place.</p> <p>Test the power supply by trying a spare power supply in its place.</p>
<p>All the indicators are ON.</p>	<p>The system is in a constant reset condition.</p>	<p>Make sure that the FEATUREPAK cartridge is installed properly. If all indicators are still ON, replace the base module or call MICOM Customer Service.</p>

Table 6-2. Troubleshooting (continued)

Problem	Probable Cause	Items to Check
The AT indicator is OFF.	Undefined	Simultaneously touch both Reset keys on the Touch Panel. If the AT indicator is still OFF, replace the base module or call MICOM Customer Service.
The CO indicator is FLASHING.	Fault condition in the base module CMOS RAM	Replace the base module or call MICOM Customer Service.
The AT and CA indicators are OFF; the CO indicator is ON.	Fault condition in the base module RAM	Replace the base module or call MICOM Customer Service.
The CO and CA indicators are ON. The AT indicator is OFF.	Fault condition in the FEATUREPAK cartridge	Replace the FEATUREPAK cartridge. Replace the base module or call MICOM Customer Service
The CO indicator is ON; other indicators may be ON or FLASHING.	Hardware problem in the base module	Simultaneously touch both Reset keys on the Touch Panel. If the CO indicator is still ON, replace the base module or call MICOM Customer Service.
The LD indicator is ON.	Link is down	Call MICOM Customer Service.
The BO indicator is ON.	High error rate on the link caused a buffer overflow	Check the base module LA indicator. LA FLASHING indicates retransmissions.
The CA indicator is FLASHING.	The CMOS RAM is corrupted, and the PAD is reloading factory-set configuration values into CMOS.	Under normal conditions, the CA indicator keeps FLASHING, unless you change factory-set values. If you change the factory-set values and the CA indicator continues to FLASH, check the value of the Cold/Warm start selection of soft switch group SYS1 (see figure 2-8).

Table 6-2. Troubleshooting (continued)

Problem	Probable Cause	Items to Check
The BO and CO indicators are ON.	Problem with FEATUREPAK cartridge	Call MICOM Customer Service.

APPENDIX A

CONFIGURATION WORKSHEETS

The following configuration worksheets may be used when you are configuring BSC lines and devices. You should prepare these worksheets and keep extra copies for future reference. See figure A-1 for the BSC line configuration worksheet. Figure A-2 contains four worksheets of 16 devices each to be used during device configuration.

BSC LINE NUMBER	TPAD OR HPAD 0 = TPAD 1 = HPAD	LINE SPEED TABLE 1	INTERFACE 0 = DCE 1 = DTE	NUMBER OF NAKS ALLOWED 0-255	NUMBER OF TTDS ALLOWED 0-255	NUMBER OF ENQS ALLOWED 0-255	EIA CONTROL TABLE 2
1							
2							
3							
4							

VALUE	LINE SPEED (IN bps)
0	9600
1	4800
2	2400
3	1200
4	300

VALUE	DESCRIPTION
0	Variable DCD; DTR/DSR toggle disabled
1	Variable DCD; DTR/DSR toggle enabled
2	Constant DCD; DTR/DSR toggle disabled
3	Constant DCD; DTR/DSR toggle enabled

MI-1391-1a-27

Figure A-1. Worksheet for BSC Line Configuration

DEVICE NUMBER	BSC LINE NUMBER	CLUSTER CONTROLLER POLL CHARACTER	DEVICE POLL CHARACTER	DISPLAY OR PRINTER	DISPLAY:		CHARACTER SET	MNEMONIC	CALL OPTION	INACTIVITY TIMER
					—FORMAT SIZE	—COLOR				
	1-4	TWO HEXA-DECIMALS	TWO HEXA-DECIMALS	0 = DISPLAY 1 = PRINTER	TABLE 3	TABLE 3	TABLE 3	2-8 ALPHA-NUMERICS	TABLE 4	0-240
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										

TABLE 3 — DEVICE CHARACTERISTICS		
FORMAT SIZE (IN NUMBER OF CHARACTERS)	COLOR	CHARACTER SET
0 = 480	0 = No Color	0 = None
1 = 960	1 = Color	1 = APL
2 = 1920		2 = Text
3 = 2560		3 = APL and Text
4 = 3440		
5 = 3564		

TABLE 4 — CALL OPTIONS	
VALUE	DESCRIPTION
0	Enable Incoming Calls
1	Long Form Calls
2	Abbreviated Calls
4	ATM Support
8	Autocall on Enter or Select
16	Reserved
32	Incoming Calls Barred
64	Auto Append Reverse Charge Facility
128	Reserved
xxx	Combination of Values

MI-1391-1a-28
(1 OF 4)

Figure A-2. Worksheet for Device Configuration (1 of 4)

DEVICE NUMBER	BSC LINE NUMBER	CLUSTER CONTROLLER POLL CHARACTER	DEVICE POLL CHARACTER	DISPLAY OR PRINTER	DISPLAY:		CHARACTER SET	MINEMONIC	CALL OPTION	INACTIVITY TIMER
					—FORMAT SIZE	—COLOR				
	1-4	TWO HEXA-DECIMALS	TWO HEXA-DECIMALS	0 = DISPLAY 1 = PRINTER	TABLE 3	TABLE 3	TABLE 3	2-8 ALPHA-NUMERICS	TABLE 4	0-240
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
32										

FORMAT SIZE (IN NUMBER OF CHARACTERS)	COLOR	CHARACTER SET
0 = 480	0 = No Color	0 = None
1 = 960	1 = Color	1 = APL
2 = 1920		2 = Text
3 = 2560		3 = APL and Text
4 = 3440		
5 = 3564		

VALUE	DESCRIPTION
0	Enable Incoming Calls
1	Long Form Calls
2	Abbreviated Calls
4	ATM Support
8	Autocall on Enter or Select
16	Reserved
32	Incoming Calls Barred
64	Auto Append Reverse Charge Facility
128	Reserved
xxx	Combination of Values

MI-1391-1a-28
(2 OF 4)

Figure A-2. Worksheet for Device Configuration (2 of 4)

DEVICE NUMBER	BSC LINE NUMBER	CLUSTER CONTROLLER POLL CHARACTER	DEVICE POLL CHARACTER	DISPLAY OR PRINTER	DISPLAY:		CHARACTER SET	MNEMONIC	CALL OPTION	INACTIVITY TIMER
					-FORMAT SIZE	-COLOR				
	1-4	TWO HEXA-DECIMALS	TWO HEXA-DECIMALS	0 = DISPLAY 1 = PRINTER	TABLE 3	TABLE 3	TABLE 3	2-8 ALPHA-NUMERICS	TABLE 4	0-240
33										
34										
35										
36										
37										
38										
39										
40										
41										
42										
43										
44										
45										
46										
47										
48										

TABLE 3 — DEVICE CHARACTERISTICS		
FORMAT SIZE (IN NUMBER OF CHARACTERS)	COLOR	CHARACTER SET
0 = 480	0 = No Color	0 = None
1 = 960	1 = Color	1 = APL
2 = 1920		2 = Text
3 = 2560		3 = APL and Text
4 = 3440		
5 = 3564		

TABLE 4 — CALL OPTIONS	
VALUE	DESCRIPTION
0	Enable Incoming Calls
1	Long Form Calls
2	Abbreviated Calls
4	ATM Support
8	Autocall on Enter or Select
16	Reserved
32	Incoming Calls Barred
64	Auto Append Reverse Charge Facility
128	Reserved
xxx	Combination of Values

Figure A-2. Worksheet for Device Configuration (3 of 4)

MI-1391-1a-28
(3 OF 4)

DEVICE NUMBER	BSC LINE NUMBER	CLUSTER CONTROLLER POLL CHARACTER	DEVICE POLL CHARACTER	DISPLAY OR PRINTER	DISPLAY:		CHARACTER SET	MNEMONIC	CALL OPTION	INACTIVITY TIMER
					—FORMAT SIZE	—COLOR				
	1-4	TWO HEXA-DECIMALS	TWO HEXA-DECIMALS	0 = DISPLAY 1 = PRINTER	TABLE 3	TABLE 3	TABLE 3	2-6 ALPHA-NUMERICS	TABLE 4	0-240
49										
50										
51										
52										
53										
54										
55										
56										
57										
58										
59										
60										
61										
62										
63										
64										

FORMAT SIZE (IN NUMBER OF CHARACTERS)	COLOR	CHARACTER SET
0 = 480	0 = No Color	0 = None
1 = 960	1 = Color	1 = APL
2 = 1920		2 = Text
3 = 2560		3 = APL and Text
4 = 3440		
5 = 3564		

VALUE	DESCRIPTION
0	Enable Incoming Calls
1	Long Form Calls
2	Abbreviated Calls
4	ATM Support
8	Autocall on Enter or Select
16	Reserved
32	Incoming Calls Barred
64	Auto Append Reverse Charge Facility
128	Reserved
xxx	Combination of Values

Figure A-2. Worksheet for Device Configuration (4 of 4)

MI-1391-1a-28
(4 OF 4)

APPENDIX B

ASCII CHART

CONTROL		NUMBERS SYMBOLS		UPPER CASE		LOWER CASE	
NUL 0	DLE 16	SP 32	O 48	@ 64	P 80	\ 96	p 112
SOH 1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113
STX 2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114
ETX 3	DC3 19	# 35	3 51	C 67	S 83	c 99	s 115
EOT 4	DC4 20	\$ 36	4 52	D 68	T 84	d 100	t 116
ENQ 5	NAK 21	% 37	5 53	E 69	U 85	e 101	u 117
ACK 6	SYN 22	& 38	6 54	F 70	V 86	f 102	v 118
BEL 7	ETB 23	' 39	7 55	G 71	W 87	g 103	w 119
BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120
HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121
LF 10	SUB 26	* 42	: 58	J 74	Z 90	j 106	z 122
VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123
FF 12	FS 28	, 44	< 60	L 76	\ 92	l 108	| 124
CR 13	GS 29	- 45	= 61	M 77	] 93	m 109	} 125
SO 14	RS 30	. 46	> 62	N 78	^ 94	n 110	~ 126
SI 15	US 31	/ 47	? 63	O 79	_ 95	o 111	RUBOUT (DEL) 127

KEY

<p>NAK 21</p>

ASCII character
decimal

MT-000-01

(

1



APPENDIX C

ASCII-TO-EBCDIC CODE CONVERSION TABLE

The table on the next page defines what ASCII hexadecimal values must be output by a terminal to generate the desired EBCDIC hexadecimal value in the PAD. In this table, the first hexadecimal value is in the top row, and the second hexadecimal value is in the first column on the left.

A United States ASCII chart is included as a reference (refer to appendix B). Correspondences between ASCII hexadecimal values and displayed ASCII characters vary in different character sets. Likewise, EBCDIC characters shown on this chart may vary. However, the ASCII-to-EBCDIC hexadecimal translation will always be the same.

ASCII-to-EBCDIC Code Conversion Table

	2	3	4	5	6	7
0	40 SP	F0 0	7C @	D7 P	79 '	97 p
1	5A !	F1 1	C1 A	D8 Q	81 a	98 q
2	7F "	F2 2	C2 B	D9 R	82 b	99 r
3	7B #	F3 3	C3 C	E2 S	83 c	A2 s
4	5B \$	F4 4	C4 D	E3 T	84 d	A3 t
5	6C %	F5 5	C5 E	E4 U	85 e	A4 u
6	50 &	F6 6	C6 F	E5 V	86 f	A5 v
7	7D ,	F7 7	C7 G	E6 W	87 g	A6 w
8	4D (	F8 8	C8 H	E7 X	88 h	A7 x
9	5D)	F9 9	C9 I	E8 Y	89 i	A8 y
A	5C *	7A :	D1 J	E9 Z	91 j	A9 z
B	4E +	5E ;	D2 K	4A ¢	92 k	C0 {
C	6B ,	4C <	D3 L	E0 \	93 l	6A ;
D	60 -	7E =	D4 M	4F l	94 m	D0 }
E	4B •	6E >	D5 N	5F ¬	95 n	A1 ~
F	61 /	6F ?	D6 O	6D —	96 o	

MT-1404-1a-01

APPENDIX D

HIGH-SPEED OPTIONS

The MB3-3270 BSC PAD is available with either an X.21 or a V.35 high-speed X.25 link. When either of these options is installed, the X.25 link (composite) is capable of speeds up to 72 kbps.

CCITT Recommendations V.35 and X.21 describe the electrical characteristics of the respective link. V.35 supports a variety of V.35 interface types, which are frequently used for telephone company applications. X.21 supports the X.21 interface. In addition, X.21 electrical characteristics are identical to those required for the RS-442 and V.36 interface types.

The PAD's high-speed X.25 link option consists of:

- Either a V.35 or an X.21 interface daughterboard, and related cable, for the Composite port.
- The high-speed FEATUREPAK cartridge MB3-BSC-HS. This FEATUREPAK cartridge supports the X.21 or V.35 link and activates the Direct Memory Access (DMA) daughterboard. (The DMA daughterboard is present on all units, but is passive unless the high-speed FEATUREPAK cartridge is installed.)

The PAD can be ordered initially with a high-speed link (see figure 1-4 for model numbers), or the standard unit can be easily upgraded in the field. To upgrade a standard PAD to high-speed, you order the high-speed FEATUREPAK cartridge (MB3-BSC-HS) and a kit which contains a high-speed daughterboard and related cable (see table D-1).

As shown in table D-1, you order a daughterboard that is already configured as DTE or DCE. MICOM then provides you with the appropriate cable. This simplifies ordering and upgrading procedures.

Table D-1. High-Speed Daughterboard Upgrade Kits

Kit Number	Contents of Kit
MBK-V35-to-DTE	One V.35 daughterboard configured as DCE One 15-foot V.35 DCE cable, for connection to a DTE device (MICOM part number 100-2785)
MBK-V35-to-DCE	One V.35 daughterboard configured as DTE One 15-foot V.35 DTE cable, for connection to a DCE device (MICOM part number 100-2784)
MBK-X21-to-DTE	One X.21 daughterboard configured as DCE One 15-foot X.21 DCE cable, for connection to a DTE device (MICOM part number 100-2795)
MBK-X21-to-DCE	One X.21 daughterboard configured as DTE One 15-foot X.21 DTE cable, for connection to a DCE device (MICOM part number 100-2794)

In addition to one of the preceding upgrade kits, the high-speed FEATUREPAK cartridge (MB3-BSC-HS) is required for the upgrade.

NOTE: The installation and upgrade procedures that follow are intended for the experienced communications technician.

D.1 INSTALLING A PAD WITH A HIGH-SPEED X.25 LINK

PADs that are initially ordered with a high-speed link are shipped with an X.21 or V.35 high-speed daughterboard already factory installed on the base module. An X.21 or V.35 daughterboard can also be installed in the field (refer to paragraph D.2).

Installation of a high-speed PAD is identical to that of a standard unit (refer to section 2), with two exceptions:

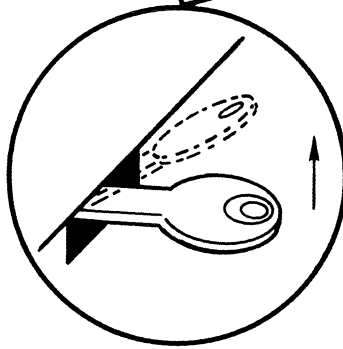
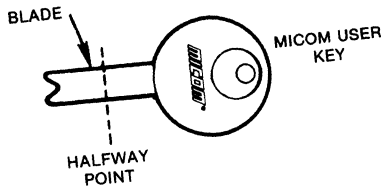
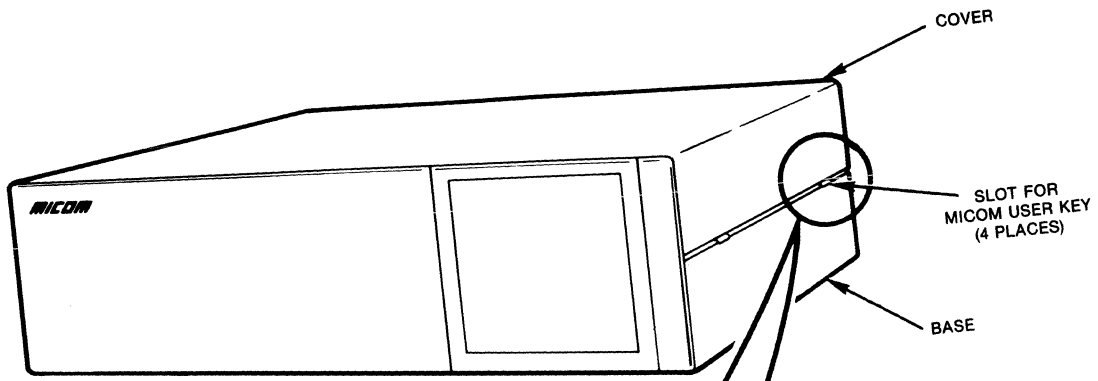
- The cable used for the link varies. Refer to paragraph D.4 for information on cabling an X.21 or V.35 high-speed X.25 link.
- The X.21 and V.35 daughterboards come preconfigured as DCE or DTE (see table D-1). If you need to change the configuration, you can do so by means of a header and a four-position strap block. (The standard RS-232-C daughterboard is hard-wired as a DTE.) For information on changing the configuration of an X.21 or V.35 daughterboard, see figure D-3. If you change this configuration, make sure you also change the cable (refer to paragraph D.4).

D.2 UPGRADING A STANDARD RS-232-C X.25 LINK TO HIGH-SPEED

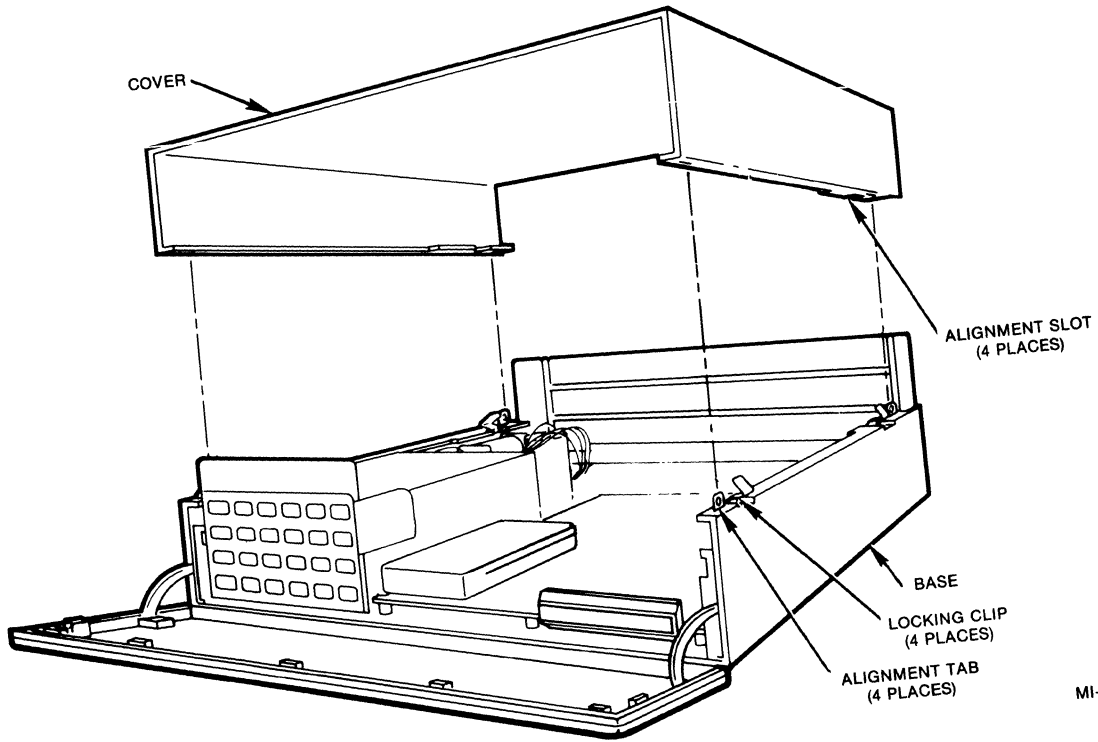
A standard RS-232-C X.25 link can be easily upgraded to high-speed in the field. The procedure basically consists of removing the standard RS-232-C daughterboard (and related cable) for the Composite port and installing either an X.21 or V.35 daughterboard (and related cable) in its place. The standard FEATUREPAK cartridge must also be exchanged for a high-speed FEATUREPAK cartridge. Instructions are provided in the following procedures.

Removing the Standard RS-232-C Daughterboard:

1. Remove all power to the unit.
2. Open the unit as follows. Release the four locking clips on the sides of the enclosure using the MICOM User Key that is provided with the equipment (a flat-head screwdriver with a 1/4-inch blade may also be used). Insert the User Key blade not more than halfway in one of the slots on the base (see figure D-1). Pry the cover up to release the clip. Repeat this procedure for each of the remaining three slots to release their clips. Lift the cover off when all four clips are released.
3. Locate the standard RS-232-C daughterboard for the Composite port on the base module (see figure D-2). The daughterboards are attached to the base module by means of threaded standoffs and nuts. Use a nut driver to remove the nuts.
4. Two female connectors on the daughterboard mate with two male connectors on the base module. Being very careful not to bend or break any pins, lift the daughterboard from one side and then the other with your hand, gradually lifting the daughterboard off the base module connector pins. Store the daughterboard in a static-sensitive bag (or equivalent).



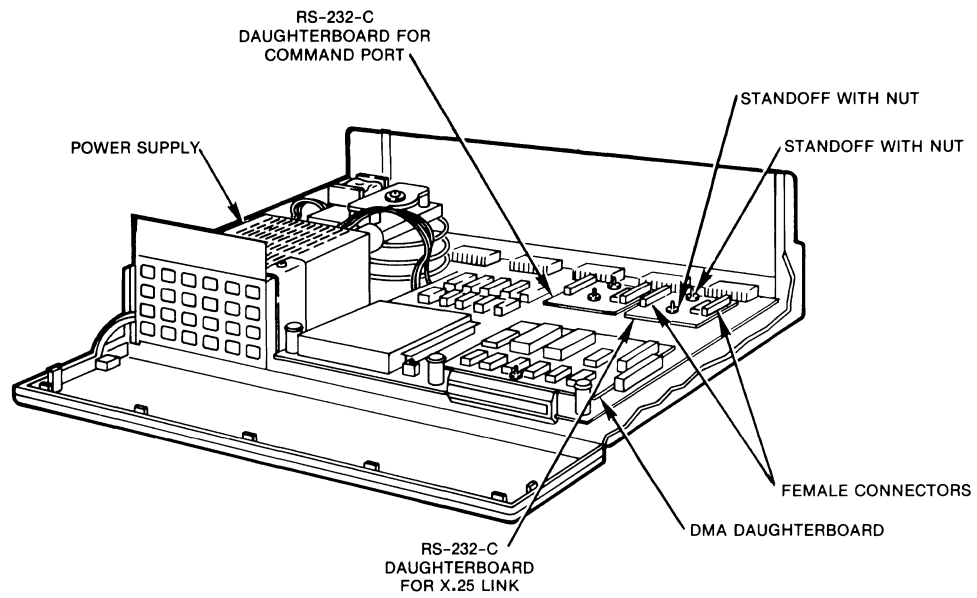
INSERT MICOM USER KEY APPROXIMATELY HALF OF BLADE LENGTH
LIFT TO REMOVE COVER



MI-1391-1a-01

Figure D-1. Opening and Closing the Enclosure

800-1391-1a



MI-1387-1a-38

Figure D-2. The Base Module With Standard Daughterboards

Configuring a High-Speed Daughterboard as DCE or DTE:

5. The high-speed X.21 and V.35 daughterboards are configured as DTE or DCE by means of a header and a four-position strap block. Daughterboards are shipped with strap blocks in the DTE or DCE position, depending on how you order them (see table D-1). If you need to change a configuration, remove the strap block and reinstall it in the other position (see figure D-3).

NOTE: If you change the configuration of a daughterboard, make sure you install the correct cable. For example, if you install the strap block in the DCE position on a V.35 daughterboard, make sure you also install a V.35 cable that is meant to connect to a DTE device.

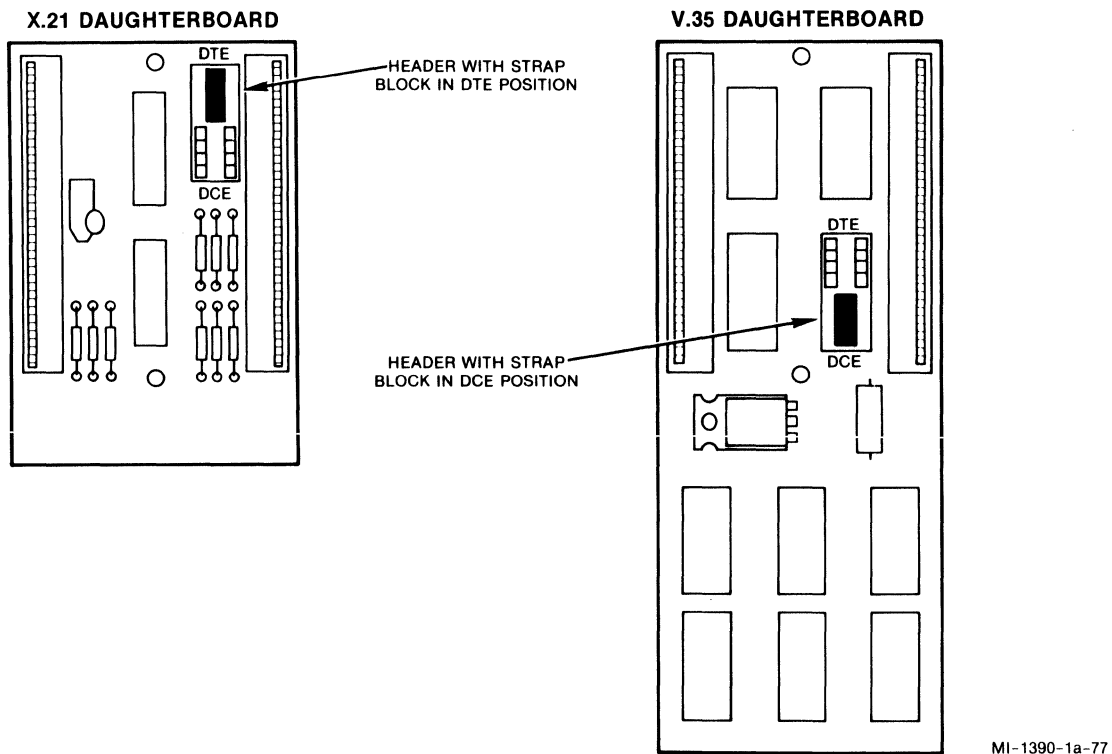
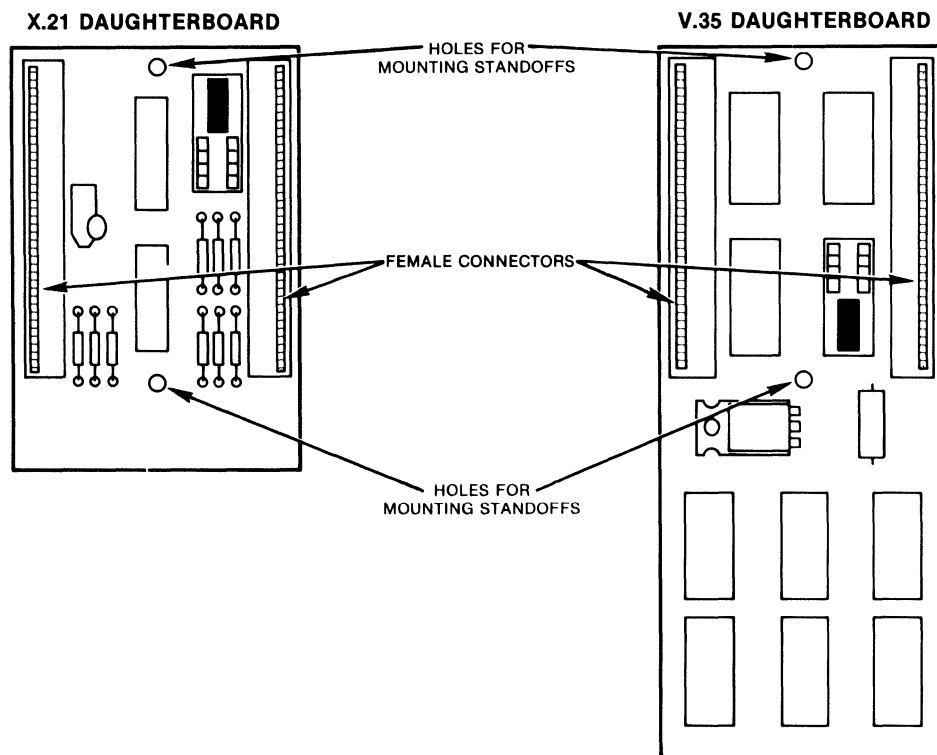


Figure D-3. Configuring a High-Speed Daughterboard as DTE or DCE

Installing a High-Speed X.21 or V.35 Daughterboard:

6. Position the high-speed X.21 or V.35 daughterboard on the base module, aligning the holes in the daughterboard with the base module standoffs (see figure D-4). The male connector pins on the base module will then align with the female connector on the daughterboard. Being careful that the alignment is correct and that pins are not being bent or broken, press the daughterboard down with your hand until it is fully seated on the base module.
7. Reinstall the nuts on the standoffs. Tighten the nuts with either your fingers or a nutdriver.
8. Close the unit as follows. Identify the front of the cover (see the stamp on the underside of the cover). Place the cover over the base. Align the front of the cover with the front of the base. Align the four slots in the cover edges with the tabs on the base edges (see figure D-1). Press the cover down over the alignment tabs. The locking clips will lock the cover in place.
9. Remove the standard FEATUREPAK cartridge and install the high-speed FEATUREPAK cartridge (refer to paragraph 2.2.2 for instructions on FEATUREPAK cartridge installation).



MI-1390-1a-78

Figure D-4. High-Speed Daughterboard Holes and Connectors

D.3 PIN ASSIGNMENTS FOR HIGH-SPEED LINKS

Pin assignments for the Composite port vary when a high-speed daughter-board is configured as DTE or DCE and the appropriate cable is connected. Tables D-2 and D-3 list pin assignments for DTE and DCE X.21 links, and tables D-4 and D-5 list pin assignments for DTE and DCE V.35 links. These pin assignments are provided for the benefit of customers who wish to create their own cables.

MICOM offers DTE X.21 and V.35 cables and DCE X.21 and V.35 cables in high-speed daughterboard kits, as shown in table D-1. Refer to paragraph D.4 for information on the individual MICOM cables.

Table D-2. Composite Pin Assignments -- X.21 to a DTE Device

Connector Pin Number	Assigned Signal
9	Transmitted Data B
24	Transmitted Data A
15	Signal Timing A
8	Indication B
7	Signal Ground
6	Control A
2	Received Data A
4	Signal Timing B
20	Control B
18	Indication A
3	Received Data B

Table D-3. Composite Pin Assignments -- X.21 to a DCE Device

Connector Pin Number	Assigned Signal
9	Received Data B
24	Received Data A
15	Signal Timing A
8	Control B
7	Signal Ground
6	Indication A
2	Transmitted Data A
4	Signal Timing B
20	Indication B
18	Control A
3	Transmitted Data B

Table D-4. Composite Pin Assignments -- V.35 to a DTE Device

Connector Pin Number	Assigned Signal
9	Send Data B
24	Send Data A
22	Serial Clock Transmit External A
15	Serial Clock Transmit A
20	Data Set Ready
7	Signal Ground
18	Clear-To-Send
2	Received Data A
10	Received Line Signal Detect
13	Ring Indicator
12	Local Test
17	Serial Clock Transmit External B
23	Serial Clock Receive A
8	Request-To-Send
6	Data Terminal Ready
5	Serial Clock Receive B
4	Serial Clock Transmit B
3	Received Data B

Table D-5. Composite Pin Assignments -- V.35 to a DCE Device

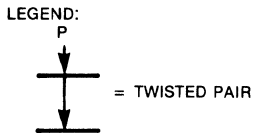
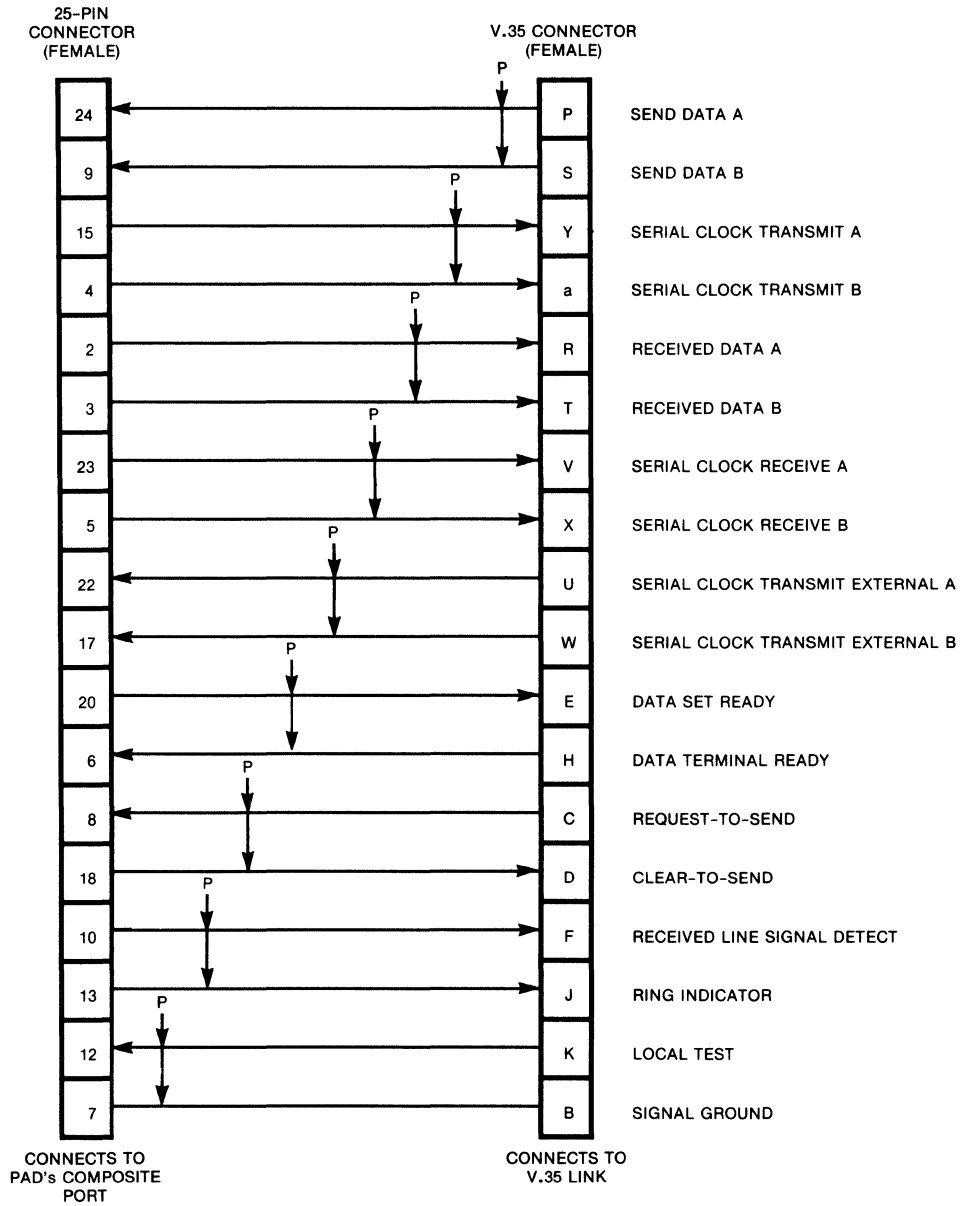
Connector Pin Number	Assigned Signal
9	Received Data B
24	Received Data A
23	Serial Clock Transmit A
22	Serial Clock Receive A
20	Data Terminal Ready
7	Signal Ground
10	Request-To-Send
2	Send Data A
8	Received Line Signal Detect
13	Local Test
12	Ring Indicator
5	Serial Clock Transmit B
15	Serial Clock Transmit External A
16	Clear-To-Send
6	Data Set Ready
4	Serial Clock Transmit External B
17	Serial Clock Receive B
3	Send Data B

D.4 CABLING

MICOM offers two V.35 cables and two X.21 cables. Each cable is 15 feet in length, shielded, and has a 25-pin female connector at one end for connection to the PAD's male Composite port. The connector at the other end varies with the interface. Figures D-5 through D-8 provide diagrams for each cable.

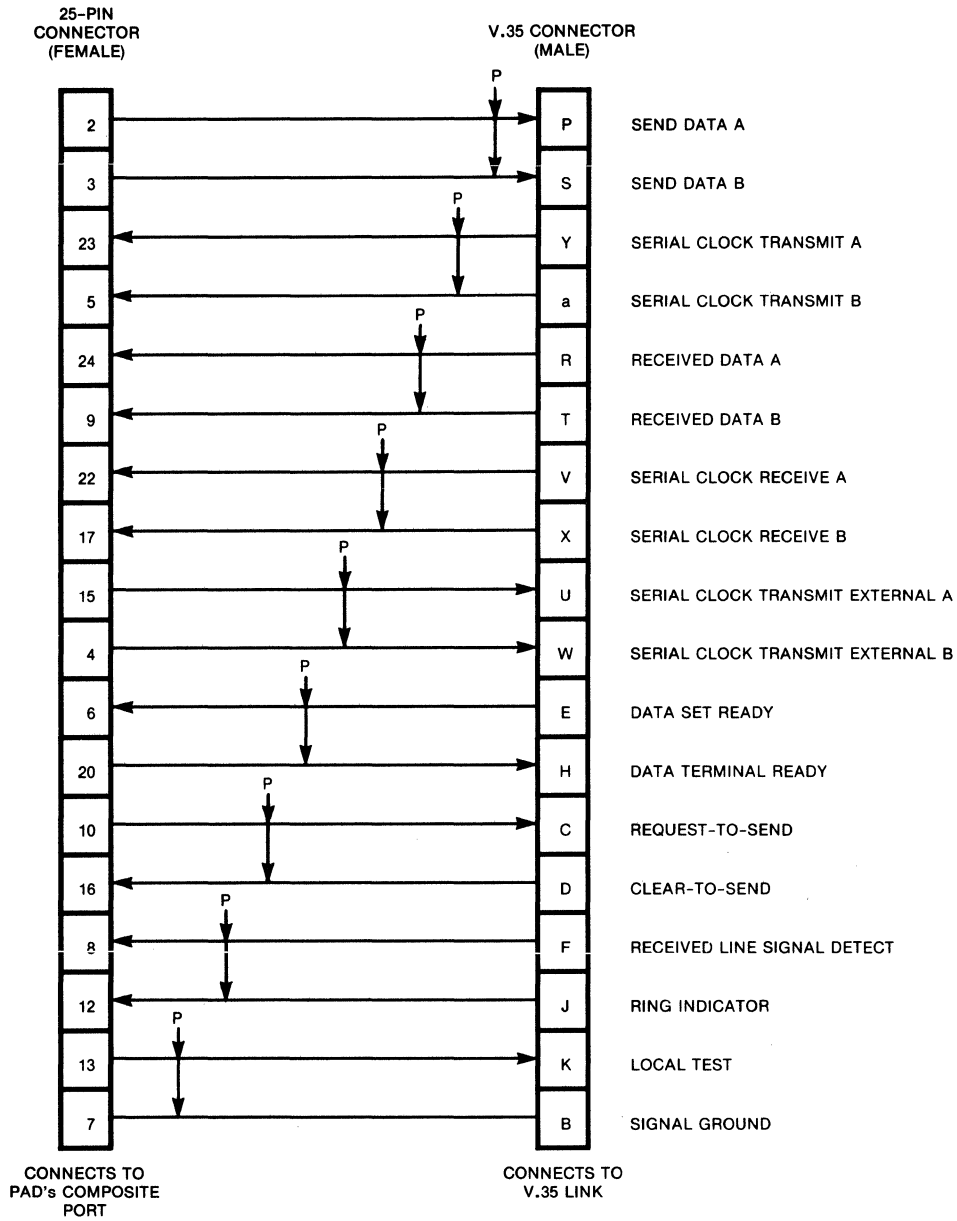
<u>MICOM Part Number</u>	<u>Cable Description</u>
100-2785	V.35 DCE, for connection to a DTE device
100-2784	V.35 DTE, for connection to a DCE device
100-2795	X.21 DCE, for connection to a DTE device
100-2794	X.21 DTE, for connection to a DCE device

NOTE: The Composite connector pin assignments for X.21 and V.35 links are listed in tables D-2 through D-5 for the benefit of customers who wish to create their own cables.



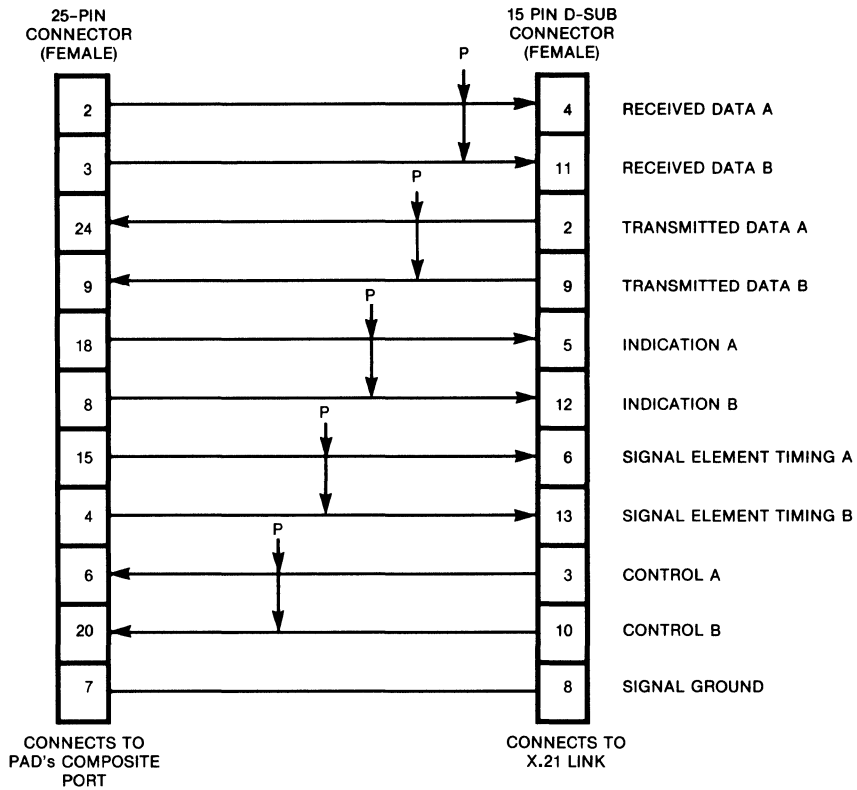
MI-1387-2a-63

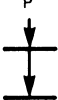
Figure D-5. V.35 DCE Shielded Cable (MICOM part number 100-2785) for Connection to a DTE Device



MI-1387-2a-64

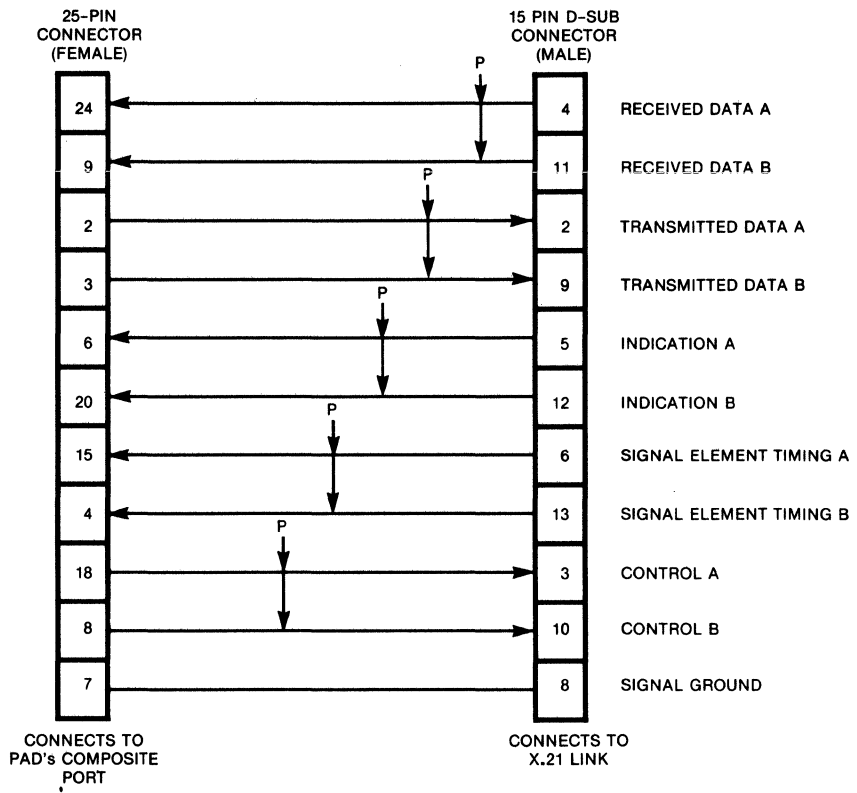
Figure D-6. V.35 DTE Shielded Cable (MICOM part number 100-2784) for Connection to a DCE Device

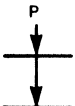


LEGEND:
 P

 = TWISTED PAIR

MI-1387-2a-65

Figure D-7. X.21 DCE Shielded Cable (MICOM part number 100-2795) for Connection to a DTE Device



LEGEND:
 = TWISTED PAIR

MI-1387-2a-66

Figure D-8. X.21 DTE Shielded Cable (MICOM part number 100-2794) for Connection to a DCE Device

APPENDIX E

COMMAND PORT USER INTERFACE

This appendix tells you how to make asynchronous calls from the PAD. You can make asynchronous calls if you have an asynchronous terminal connected to the PAD's Command port. This allows you to call, for example, the Command Facility of a remote PAD.

Also included in this appendix is reference material on the CCITT Recommendation X.28, which defines the interchange of commands and responses between a PAD and an attached asynchronous terminal. This appendix provides tables of X.28 commands. For detailed information on the X.28 Recommendation, refer to the X.28 portion of the CCITT documentation.

Finally, this appendix includes tables of PAD service signals, including reset service signals.

E.1 PLACING AN OUTGOING ASYNCHRONOUS CALL

To place an outgoing call from an asynchronous terminal connected to the PAD's Command port, you are required to enter the standard X.28 Call Connect Request command to establish a virtual call. The format of the command must be one of the following, where brackets [] indicate required entries, and parentheses () indicate optional entries:

```
[c ](facility codes-) [network address] (/subaddress) (#protocol ID)
(*call user data)
```

```
[con](facility codes-) [network address] (/subaddress) (#protocol ID)
(*call user data)
```

The only difference between the two formats is that, in the first, you enter the letter c followed by a space, and, in the second, you enter the three letters con (not followed by a space). Use the method that is easier for you.

The valid entries in each field of the Call Connect Request command are as follows:

- [c] or [con]. C followed by a space, or con, tells the PAD this is an X.28 Call Connect Request command.
- (facility codes-). Facility codes are optional entries. If included, they may consist of one or more of the following Facility Indication codes:

```
R = Reverse charging
P = 128-byte packet size negotiation
D = Throughput class negotiation
Gxx = Closed user group xx
```

NOTE: If you wish to enter a facility for which there is no Facility Indication code, you can use the free-form method. The PAD supports both CCITT (X.25) facilities and network-specific (national) facilities. The format for X.25 facilities is as follows:

`$Xcc=pp:pp:....pp`

For national facilities, the format is as follows:

`$Ncc=pp:pp:....pp`

In both formats, the letters cc represent the hexadecimal code for the specific facility, and the letters pp designate the hexadecimal code for the facility parameter field.

For example, to include the Window Size Negotiation facility in a Call Connect Request command, where the window size is equal to 7 on both the transmitting and receiving ends, you would type the following (1234 is a sample network address):

`C $X43=07:07-1234`

When present, national facilities must follow X.25 facilities.

Individual facility codes (whether they are Facility Indication or free-form codes) must be separated by commas in the Call Connect Request command. Also, the facility field must be terminated with a hyphen (-).

- [network address]. The address field entry is required in the Call Connect Request command. It specifies the network address of the destination device. It can be up to 15 digits long (you must enter at least 1 digit).
- (/subaddress). The subaddress is not required. It can be included if the network address entry is 13 digits or less. If included, the subaddress must be 2 digits to specify additional routing associated with the destination address. For example, if you wanted to access the Command Facility of a remote PAD, you would enter the digits 99 (assuming the factory-default class ID had not been modified).
- (#protocol ID). The protocol ID field entry is optional. If included, it must be preceded by a pound sign (#). The protocol ID can be up to 8 hexadecimals.
- (*call user data). The call user data field entry is optional. If included, it must be preceded by an asterisk (*). Call user data can be up to 12 characters and can have any value.

NOTE: If you do not want the PAD to echo the call user data field, follow the asterisk with the echo suppression character defined in Parameter 109 of the device profile.

The following is an example of a Call Connect Request command that includes a closed user group, a network address, a subaddress, a protocol ID, and call user data:

```
C G12-12345678/01#01000000*Hello
```

E.2 X.28 COMMANDS

When you establish a connection between the Command port terminal and the PAD, the PAD transmits the Herald message and X.28 service prompt (*) to indicate that a successful connection has been established, and to let you know that you are in X.28 mode.

At this point you can enter two CRs to access the Command Facility of the PAD to which you are connected (refer to section 4), you can place an outgoing call (as described in paragraph E.1), or you can enter any of the X.28 commands that are described in tables E-1 and E-2.

You can use the commands listed in table E-1 to set and read (examine) PAD parameter values. If you modify parameters using the Set commands, the values you enter will be in effect for the duration of the calling session only. When you clear the current call, the original values assigned to the parameters will be restored.

Table E-1. Set and Read Parameters Commands

Purpose	Command Format	PAD Response
To examine the current value of specified parameters	PAR?nnn.....nnn nnn = 1 thru 20, 100 thru 117	parnnn:yy,.....nnn:yyy nnn =:parameter reference number yyy =:associated value
To examine the current value of all parameters associated with the Command port	PAR?	parnnn:yyy,....nnn:yyy nnn =:parameter reference number yyy =:associated value of a parameter
To modify existing parameter values and read new values	SET?nnn:yyy,...nnn: yyy	parnnn:yyy,...nnn:yyy
To modify parameter values; PAD does not read (display) new values as with SET?	SETnnn:yyy,...nnn: yyy	CR and LF characters
To assign a device profile to the Command port	PROF n (n=1 or 2)	CR and LF characters
<p>NOTES:</p> <p>All commands must be terminated with a <u>CR</u> or a + character.</p> <p>The values of the following parameters cannot be modified:</p> <ul style="list-style-type: none"> • Parameter 11 (speed) • Parameter 100 (bits per character) • Parameter 101 (device parity) -- can be modified, but not set to autoparity • Parameter 117 (X.29 access character) 		

The miscellaneous commands listed in table E-2 allow you to send instructions to the network and/or to your PAD. Before you enter one of these commands, be sure you understand the possible effects of the command. In table E-2, each portion of the PAD response is shown in parentheses.

Table E-2. Miscellaneous Commands

Purpose	Command Format	PAD Response
To request communications status	STAT	(herald message) (channel 0) (CR, LF) (free or engaged) (CR, LF) (X.28 prompt)
To clear a virtual call	CLR	(clr conf) or (clr err) -- in the case of local procedure error
To reset a virtual call	RESET	(CR, LF) (X.28 prompt)
To transmit an Interrupt packet to the remote device	INT	(CR, LF) (X.28 prompt)
To exit X.28 Command mode and return to Data Transfer mode	<u>CR</u> or PAD X.28 access character	...

E.3 PAD SERVICE SIGNALS

The PAD may transmit certain messages, called service signals, to your Command port terminal. The service signals may be displayed for any of the following reasons:

- In response to one of your entries
- In response to a network action
- In response to a remote destination action

Table E-3 describes the general service signals that you might encounter (for example, during a call connect sequence). Table E-4 lists the reset cause and diagnostic codes that the PAD might display when a call is prematurely disconnected. Included in a reset service signal is a cause mnemonic, which indicates the reason the reset condition occurred. In some cases, a diagnostic code is also displayed to provide additional information relative to the reset condition.

(For a list of cause and diagnostic codes related to cleared calls, see table 5-1.)

Table E-3. PAD Service Signals

PAD Service Signal	Explanation
clr (cause mnemonic) (diagnostic code)	See table 5-1.
reset (cause mnemonic) (diagnostic code)	See table E-4.
err	An illegal X.28 command
com	The call is established.
*	PAD detected the X.28 access character (typically Ctrl-P)
data lost	PAD discarded data because of buffer overflow
not found	Device profile requested by Prof command is unavailable
edit line too long	Edit buffer overflow. Enter CR twice to recover from this error condition.
inactivity time out	Call has been cleared because of the inactivity timer

Table E-4. Reset Service Signals

Cause Mnemonic	Diagnostic Code	Explanation
dte	xxx	DTE-originated reset
rpe	xxx	Remote procedure error
err	xxx	Local procedure error
nc	xxx	Network congestion
inc	xxx	Incompatible destination
nnn	xxx	Generated by non-MICOM X.25 equipment
<p>LEGEND:</p> <p>nnn = Value not defined for SVC reset</p> <p>xxx = Network-dependent diagnostic code. Consult your network directory for the meaning.</p>		

INDEX

A

- Abbreviated calls 1-10
 - Configuring address IDs (mnemonics) 4-31
 - Configuring devices 4-21
 - Placing 5-4
- Access methods 3-13
 - BTAM 3-13
 - TCAM 3-15
 - VTAM 3-16
- Address ID (mnemonic) configuration 4-31
- Addressing 3-8
 - Abbreviated 4-21
 - Autocall 4-21
 - Long Form 4-21
- Applications 3-33
 - Private networks 3-36
 - Public networks 3-33
- ASCII chart B-1
- ASCII-to-EBCDIC code conversion table C-2
- Asynchronous calls E-1
- Auto calls 1-10
 - Configuring address IDs (mnemonics) 4-31
 - Configuring devices 4-21, 4-23
 - Placing 5-4
- Automated teller machine (ATM) support 3-40, 5-5
 - Configuring devices as ATMs 4-21, 4-22

B

- Base (CCM) module 1-7, 1-8
- Billing and accounting 3-7, 4-39
- BSC line 1-10, 1-11
 - Cabling 2-5, 2-10
 - Configuration 1-11, 4-13
 - Configuration worksheets A-2
 - Configuring EIA control-signal bias 2-15
 - EIA control 4-16
 - Enquiries (ENQs) 4-16
 - Interface (DCE or DTE) 4-15
 - Negative Acknowledgments (NAKs) 4-15

B (continued)

- Speed 4-14
- Status 4-14
- Temporary Text Delays (TTDs) 4-15
- BSC protocol 1-5, 1-9, 1-10, 3-6, 3-18
 - Enquiries (ENQs) 4-16
 - General polls 3-18
 - Negative Acknowledgments (NAKs) 4-15
 - Printer support 3-20
 - Select across an X.25 network 3-20
 - Selects 3-18, 3-20
 - Specific polls 3-18, 3-20
 - Temporary Text Delays (TTDs) 4-15
- BTAM 3-13

C

- Cables 2-4, 2-5
 - Cabling example 2-7
 - High-speed D-8, D-10
 - Pin assignments (RS-232-C) 2-8
 - Pin assignments (V.35) D-9
 - Pin assignments (X.21) D-8
- Call accounting 4-38
 - Enabling Command port to receive call-accounting information 4-38
 - Sample record 4-39
- Calling procedures 3-23
 - Automatic call clearing 3-32
 - Clearing calls 5-5
 - Connection diagnostics 3-32, 5-6
 - CRMs 3-23
 - Placing asynchronous calls E-1
 - Placing synchronous calls 5-2
 - Resuming a call 5-5
- Cause and diagnostic codes 5-7
- CCITT recommendations 1-1, 1-5, 1-9, 1-10, 3-1, D-1, E-1
- Central Processing Units (CPUs) 3-9
- Characteristics of the PAD 1-10
 - BSC line 1-11

C (continued)

- General 1-10
- X.25 link (trunk) 1-11
- Clearing calls 3-23
 - Automatic call clearing 3-32
 - Cause codes related to cleared calls 5-8
 - Using the Command screen 5-5
- Clocking 2-13, 4-58
- Closing the PAD's enclosure D-7
- Cold start reset 2-12, 2-13, 4-58, 4-64, 4-65
 - To put user-configured values into effect 2-13, 4-8
- Command Facility 1-5, 4-1
 - Accessing another PAD's Command Facility 4-3
 - Accessing locally 4-3
 - Accessing remotely 4-2, 4-4
 - Configuration of the PAD 4-1
 - Disconnection 4-3, 4-4
 - Logging onto 4-5
 - Logging out of 4-65
 - Menu 4-7, 4-8
 - Password 4-3, 4-5, 4-6, 4-7
 - Subaddress 4-38
- Command port 1-8, 1-10
 - Cabling 2-5, 2-10
 - Commands E-3
 - Device profiles 4-38, 4-39
 - Enabling receipt of call-accounting and events data 4-38
 - Service signals E-6
 - To access Command Facility 4-3
 - User interface E-1
- Command screen 4-53, 4-54, 5-1
 - Clearing calls 5-5
 - Defining 4-53, 4-55
 - Displaying 5-1, 5-5
 - Placing calls 5-2
 - Resuming calls 5-5
 - Screen Definitions Configuration menu 4-55
 - Sending Test Request data 5-5
- Communications Control Units (CCUs) 3-12, 3-13, 3-17
- Composite port 1-8, 1-10
 - Cabling 2-5, 2-10

C (continued)

- High-speed D-1
- Configuration 4-1
 - Address IDs (mnemonics) 4-31
 - Advancing through the prompts 4-12
 - BSC lines 4-13
 - Command port 4-38
 - Command screen 4-53
 - Device profiles 4-39
 - Devices 4-16, 4-18, 4-19
 - Input errors 4-12, 4-18
 - Menu 4-9
 - Software switches 4-57
 - Statistics reporting intervals 4-52
 - Switched virtual circuits (SVCs) 4-30
 - Using the Command Facility 4-1, 4-8
 - Using the Touch Panel 2-11
 - Worksheets A-1
 - X.25 trunk 4-26
- Connection Request Modes (CRMs) 3-23, 4-31, 4-33, 4-35
 - CRM1 3-26
 - CRM2 3-29
 - CRM3 3-30, 4-19, 4-20
 - Determining which CRM to use 3-23
 - In Long Form calls 5-3

D

- Date and time configuration 4-6
- Daughterboards 1-8
 - Configuring high-speed as DCE or DTE D-6
 - High-speed upgrade kits D-2
 - Replacing RS-232-C with X.21 or V.35 D-3, D-7
 - RS-232-C 1-8, D-3
 - V.35 D-1, D-3
 - X.21 D-1, D-3
- Default values 4-8, 4-10, 4-11
- Delays in network 3-22
- Device 4-1
 - Adding 4-18
 - Configuration 4-16, 4-18

D (continued)

- Configuration worksheets A-3
- Deleting 4-24
- Displaying configured devices 4-25
- Menu 4-18
- Modifying 4-19
- Device profiles for Command port
 - 4-38, 4-39
 - Configuration 4-40
- Devices supported by PAD 1-5, 1-10
- Diagnostics and troubleshooting 6-1
 - Cause and diagnostic codes related to cleared calls 5-7, 5-8
 - Connection diagnostics 3-32, 5-6
 - Indicators 6-2
 - Self Test 6-1
 - Troubleshooting 6-4
- Display System Protocol (DSP) 1-2, 1-5, 1-9, 1-10, 3-20
- CRMs 3-23
- Related to Read and Write commands 3-21

E

- EIA control 2-14, 4-16
 - In BSC line configuration 4-16
 - Signal biasing 2-14, 2-16, 2-20, 4-59
- Enclosure 1-7, 1-8

F

- Facilities 1-10
 - In abbreviated calls 4-32, 4-33
 - In asynchronous calls E-1
 - In device configuration 4-21
 - In incoming calls 4-27
 - In outgoing calls 4-28
- FEATUREPAK cartridge 1-5, 1-7, 1-8, 1-9, 1-11
 - High-speed D-1, D-2, D-3, D-7
 - Installation 2-2
- Front panel removal 1-8

H

- Herald message 4-3
- High-speed options D-1
 - Cabling D-10
 - Installing high-speed PAD D-2
 - Upgrading PAD to high-speed D-2, D-3
- HPAD 1-2
 - Configuring BSC line for HPAD requirements 4-14

I

- IBM hardware supported by PAD 1-5
- Inactivity timer 3-32
 - Configuration 4-24
- Incoming calls 4-27
- Indicators 1-7, 1-9
 - Applying the base module indicator strip 2-1
 - Descriptions 4-2, 4-60, 6-2, 6-3
 - Related to Touch Panel configuration 2-16, 2-17
- Installation 2-1
 - Cabling 2-5
 - FEATUREPAK cartridge 2-2
 - High-speed link D-2
 - Selecting location for PAD 2-1

L

- Logging onto the Command Facility 4-5, 4-6
- Logging out of the Command Facility 4-1, 4-65
- Logical channel numbers 3-4, 3-5
 - In SVC configuration 4-30
- Logical group numbers 2-13, 2-14, 3-4
 - In SVC configuration 4-30
- Long Form calls 5-2
 - Configuring device 4-21
 - Placing 5-2, 5-3

M

Mnemonics 1-10
Associated with a device 4-23
Defining 4-31, 4-32
Display 4-31

N

Network address 2-11, 3-8, 4-2
Configuring PAD's 4-26
Networks 3-33
Private 3-36
Public 3-33

O

Opening the PAD's enclosure D-3
Ordering information 1-5
FEATUREPAK model numbers 1-5
Hardware model numbers 1-6
Outgoing calls 4-28

P

Packet 3-6, 3-7
Forwarding by PAD 3-7
Sizes 4-29
Window 3-7
Packet Data Network (PDN) 1-1, 1-5
Packet switches in BSC network 3-36
Packet switching 3-1, 3-4
Password 3-8, 4-3
Command Facility 4-3, 4-5, 4-6, 4-7
Network 4-37
Trunk 3-8, 4-26
Physical components 1-7
Physical specifications 1-12
Polling 3-18
Power supply 1-7, 1-9
Connection 2-5, 2-11
Printer support 3-20

R

Rack-mount installations 1-7, 2-4
Read commands 3-21, 3-22
Across a PDN 3-21
Related to VM hosts 3-22
Reading list 1-13
Resetting the PAD 2-17, 4-64
Using the Command Facility 4-1, 4-64
Using the Touch Panel 2-17

S

Screen definitions 4-53
Selects 3-18, 3-19
Across an X.25 network 3-20
Service signals E-6
Clear 5-8
Miscellaneous E-6
Reset E-7
Setting up the PAD 4-2
Software switch groups 2-18, 2-19, 2-20
Configuration using the Command Facility 4-57
Configuration using the Touch Panel 2-11, 2-16
Startup configuration of the PAD 2-11
Statistics 4-1
Listing at periodic intervals 4-52
Listing on demand 4-61
Performance Statistics menu 4-61
Resetting 4-64
Statistics report 4-61, 4-62, 6-1
Configuring periodic output intervals 4-52
Displaying 4-61
Subaddressing 2-13, 2-14, 4-26, 4-38, 4-59
Switched virtual circuits (SVCs) 3-4
Configuration 4-30
Synchronous device support 3-9
Access methods 3-13
CCUs 3-12
CPUs 3-9
Remote and local equipment 3-10
TCUs 3-11

T

TCAM 3-15
Teleprocessing Control Units
(TCUs) 3-10
Test Requests 5-1
 Sending via Command screen 5-5
Touch Panel 1-7, 1-8, 2-11
 Accessing 2-16
 Configuration of EIA control-signal
 bias 2-14
 Configuration of X.25 trunk 2-12
 How to operate 2-15
 Reset of PAD 2-17
TPAD 1-2
 Command screen 5-1
 Configuring BSC line for TPAD
 requirements 4-14
 User interface 5-1
Trunk (also see X.25 link) 1-5
 Clocking 2-13
 Commands 3-6
 Configuration 2-12, 4-26
 Control 4-1, 4-60
 Failure 3-5, 3-6
 Incoming call handling 4-27
 Interface (DCE or DTE) 2-12, 4-58
 Outgoing call handling 4-28
 Out-of-order 3-5
 Parameters 1-11, 3-2, 3-3
 Password 3-8, 4-26, 4-27
 Reestablishing operation 3-6
 Status 4-60
 Trunk Down command 3-6, 4-60
 Trunk Up command 3-6, 4-60

V

V.35 interface 1-5, D-1
 Cables D-11, D-12
 Pin assignments D-9
Virtual circuits 3-4
VTAM 3-16

W

Warm start reset 2-12, 2-13, 4-58,
4-64, 4-65
 To put user-configured values into
 effect 2-13, 4-8
Welcome message (TPAD) 4-53
 Defining 4-55
Write commands 3-21, 3-22

X

X.21 interface 1-5, D-1
 Cables D-13, D-14
 Pin assignments D-8
X.25 link (also see Trunk) 1-5, 1-11
 Assurance timer 4-29
 High-speed 1-11, D-1
X.25 support 1-5, 1-10, 1-11, 3-1
 Addressing 3-8
 Packet description 3-6
 Trunk parameters 3-2
 Virtual circuits 3-4
 X.3 parameters 4-39
 X.121 addressing 3-8
 X.28 commands E-1, E-3



PUBLICATION CHANGE REQUEST

A message to our readers: we try to make our product manuals as accurate, complete, and easy to use as possible. If you have an improvement to suggest (or find an error in this manual), **LET US KNOW:**

- a. Fill in the four sections below.
- b. Staple any marked-up pages to this side of request form.
- c. Fold entire package in thirds—so that the MICOM address shows.
- d. Staple package shut.
- e. Fill in your return address in the space provided on both sides of this request form.
- f. Drop in mail box.

MANUAL IDENTIFICATION (take from the title page of your manual)

EQUIPMENT COVERED (take model number from silver tag on unit) _____

DATE OF MANUAL _____ STOCK NUMBER _____

PROBLEM *

SUGGESTED SOLUTION *

READER IDENTIFICATION

NAME AND TITLE _____ DATE _____

ADDRESS _____ TELEPHONE () _____

* The best way to help us identify and correct the problem you discovered is to attach marked-up copies of the affected pages.

Thank you for taking the time and making the effort to fill in this request. We will review and respond to your request by return mail.

MICOM Technical Publications

MICOM Form No 1077b



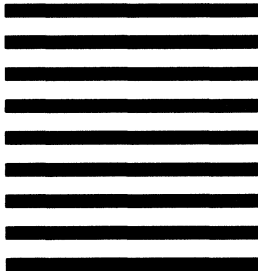
Fold Here

From: _____



**NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES**

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 906 SIMI VALLEY, CA 93062



POSTAGE WILL BE PAID BY ADDRESSEE

MICOM Systems, Inc.
ATTENTION: Publication Change Control
4100 Los Angeles Avenue
P.O. Box 8100
Simi Valley, CA 93062-8100



Fold Here

NOTES

NOTES



MICOM Systems, Inc. • 4100 Los Angeles Ave • PO Box 8100 • Simi Valley, CA 93062-8100