CDCNET
Product Descriptions

CONTROL DATA

Hardware, Software, and Cabling Information

60460590

CDCNET

Product Descriptions

Hardware, Software, and Cabling Information

This product is intended for use only as described in this document. Control Data cannot be responsible for the proper functioning of undescribed features and parameters.

Publication Number 60460590

Manual History

Revision	System Version	Date
A	Describes CDCNET products for CDCNET versions 1.0 through version 1.2.	January, 1987
B	Describes CDCNET products for CDCNET versions 1.2 through version 1.3.	February, 1988
C	Describes CDCNET products for CDCNET versions 1.2.5 through 1.4.	September, 1988
D	Describes CDCNET products for CDCNET versions 1.4 through 1.5.1	December, 1989
E	Describes CDCNET products for CDCNET versions 1.5.2 and 1.5.3	January, 1991

This manual is revision E, printed in January 1991. This edition obsoletes all previous editions. Three new chapters have been added. These chapters contain data sheets for each optional software product.

Chapter 3 contains data sheets for the base system software products.

Chapter 4 contains data sheets for the TCP/IP software products.

Chapter 5 contains data sheets for the OSI software products.

The existing data sheets for the hardware products were updated to match the new software data sheet format.

Various other miscellaneous changes have been made throughout the manual.

Contents

About This Manual 7

Audience 7
Organization 7
Conventions 8
Companion Manual 8
Products and Trademarks 9
Disclaimer 10
Related CDCNET Manuals 11
Additional Related Documents 16
Ordering Manuals 16
Submitting Comments 17
Central Software Support Hotline .. 17

Introduction to CDCNET 1-1

Distributed Communications 1-1
An Open System Architecture 1-2
Major Hardware Components of CDCNET 1-2
Major Software Components of CDCNET 1-8
How to Order CDCNET Software Products 1-14
Documentation 1-18

Hardware Product Descriptions ... 2-1

Device Interface (DI) Components . 2-1
IEEE 802.3 Network Components . 2-6
Accessories 2-6
Data Sheets 2-6
Base Device Interface (DI) Cabinet Assembly 2-7
Main Processor Board (MPB) 2-11
Improved Performance Main Processor Board (MPB-II)........ 2-13
System Main Memory (SMM) Board......................... 2-15
4 M-Byte System Main Memory (SMM4) Board 2-17
Private Memory Module (PMM) .. 2-19
Mainframe Channel Interface (MCI) Board 2-21
Ethernet Serial Channel Interface (ESCI) Board 2-23
Communications Interface Module (CIM)......................... 2-25
4-Port RS-232-C Line Interface Module (LIM).................. 2-27
4-Port RS-232-C LIM Cables 2-29
8-Port RS-232 Asynchronous Line Interface Module (LIM).......... 2-31
8-Port RS-232 Asynchronous LIM Cables......................... 2-33
RJ45/DB25 Connector Adapters .. 2-35
RS-449 Line Interface Module (LIM).......................... 2-37
RS-449 LIM Cables 2-39
X.24 Line Interface Module (LIM).......................... 2-41
X.24 LIM Cables 2-43
Unit Record Line Interface Module (URI).................. 2-45
URI LIM Cables 2-47
URI Adapter Cable 2-49
V.35 Line Interface Module (LIM).......................... 2-51
V.35 LIM Cables 2-53
Integrated Communications Adapter (ICA).................. 2-55
3-DI Cabinet 2-57
DI Enclosure Table 2-59
IEEE 802.3 Transceiver Interface Cables......................... 2-61
IEEE 802.3 Transceiver 2-63
IEEE 802.3 Transceiver Tap 2-65
IEEE 802.3 Multiplexer 2-67
IEEE 802.3 Repeater 2-69
IEEE 802.3 Coaxial Cable Splice Kit........................... 2-71
IEEE 802.3 Coaxial Cable Terminator Kit 2-73
IEEE 802.3 Coaxial Cable 2-75
Maintenance Console Option (MCO)......................... 2-77
CDCNET Maintenance Kit 2-79

Base System Software Products Description....................... 3-1

Base System Software Data Sheets.......................... 3-4
CDCNET High Speed HDLC 3-7
CDCNET Interactive Asynchronous Terminal Passthrough..................... 3-9

CDCNET Mode 4A/4C Protocol Support 3-11
CDCNET Network Management Station 3-13
CDCNET Network Service Access Control 3-15
CDCNET Network Transfer Facility 3-17
CDCNET Network Validation 3-19
CDCNET NJEF 3-21
CDCNET Remote Line Monitor .. 3-23
CDCNET X.29 PAD Server (X.25 PAD) 3-25
CDCNET X.3 PAD Gateway 3-27
CDCNET 3270 BSC Terminal Support 3-29

TCP/IP Software Product Descriptions **4-1**

TCP/IP Data Sheets 4-4
CDCNET Domain Name Resolver 4-7
CDCNET NIS/VE 4-9
CDCNET NQS/VE 4-11
CDCNET NLM/VE 4-13
CDCNET NFS/VE 4-15
CDCNET TCP/IP/FTP/TELNET (SMTP/VE) 4-17

OSI Software Product Descriptions **5-1**

OSI Data Sheets 5-4
CDCNET FTAM/VE 5-5
CDCNET OSI TP0/CONS 5-7
CDCNET X.400 MHS Interface ... 5-9

Network Configurations **6-1**

Network Configuration Examples .. 6-1

Cabling Information **7-1**

Building Networks 7-1
Connecting Device Interfaces and Hosts 7-2
Connecting IEEE 802.3 LAN Components 7-3
Connecting Terminal Devices to DIs 7-13

Glossary **A-1**

CDCNET Product/Equipment Cross-Reference **B-1**

PTT Approval Data **C-1**

PTT Approval Data for the RS-232-C/V.24 LIM (2612-1) C-1
PTT Approval Data for the V.35 LIM (2617-1) C-12
PTT Approval Data for the RS-449 LIM (2610-1) C-21

Index **Index-1**

Figures

1-1. CDCNET Distributed Communications Approach 1-1
1-2. IEEE 802.3 LAN Components ... 1-5
2-1. Device Interface 2-3
2-2. DI Logic Boards 2-4
4-1. Control Data's TCP/IP Architecture: DI and NOS/VE Software 4-2
4-2. Control Data's TCP/IP Architecture: DI and NOS Software 4-3
5-1. CDCNET Implementation of the OSI Reference Model 5-1
5-2. CDCNET OSI Software in a NOS/VE Environment 5-2
5-3. CDCNET OSI Software in a NOS Environment 5-3
6-1. Minimum Configuration with a Single Host, an MTI, and User Terminals 6-2
6-2. Minimum Configuration with a Single Host, an IEEE 802.3 Trunk, and User Terminals 6-3
6-3. Typical Configuration with a Single Host, One MDI, an IEEE 802.3 Trunk, Two TDIs, and User Terminals 6-4
6-4. Minimum Configuration with Two Hosts and an IEEE 802.3 Trunk 6-5

6-5. Typical Configuration with Two Hosts, Two MDIs, an IEEE 802.3 Trunk, Four TDIs, and User Terminals 6-6
6-6. Large Configuration With Multiple Hosts and Multiple Networks 6-7
6-7. Large Configuration of 240 Terminals 6-8
6-8. CYBER 930 Connections to a TCP/IP Workstation 6-9
6-9. CYBER Host Connections to TCP/IP Using IEEE 802.3 Trunks... 6-9
6-10. CYBER Host and User Terminal Connections to TCP/IP via Defense Data Network (DDN).. 6-10
6-11. NFS Connection to CDCNET Using a TCP/IP Gateway 6-11
6-12. OSI Multivendor Connectivity . 6-12
7-1. Channel Cable and Connection to DI 7-2
7-2. Basic LAN Configuration 7-4
7-3. IEEE 802.3 Transceiver and Tap 7-8
7-4. Cable Network Using a Single Multiplexer 7-9
7-5. Cable Network Using Cascaded Multiplexers 7-10
7-6. Cableless Network Using a Single Multiplexer 7-11
7-7. Cableless Network Using Cascaded Multiplexers 7-11
7-8. 4-Port RS-232-C LIM Connector 7-25
7-9. 2612-1xx Cable Pin Assignments 7-26
7-10. 2612-5xx/7xx Cable Pin Assignments 7-27
7-11. 2612-6xx Cable Pin Assignments 7-28
7-12. RJ45 Modular Connector Pin Assignments 7-32
7-13. RJ45 Pin Configuration 7-33
7-14. 2618-11 Connector Adapter Pin Assignments 7-33
7-15. 2618-21 Connector Adapter Pin Assignments 7-34
7-16. 2618-31 Connector Adapter Pin Assignments 7-34
7-17. 2618-5x Connector Adapter Pin Assignments 7-34
7-18. 2610-1xx Cable Pin Assignments 7-37
7-19. 2610-5xx Cable Pin Assignments 7-38
7-20. X.24 LIM Connector 7-40
7-21. 2611-1xx Cable Pin Assignments 7-41
7-22. 2613-1xx Cable Pin Assignments 7-45
7-23. 2613-2xx Cable Pin Assignments 7-46
7-24. 2613-301 Winchester Adapter Cable Pin Assignments 7-48
7-25. V.35 LIM Connector 7-53
7-26. 2617-1xx and 2xx Cable Pin Assignments 7-54
7-27. 2617-5xx Cable Pin Assignments 7-55
C-1. 4-Port RS-232-C LIM Grounding Scheme.................. C-2
C-2. Australian Post Office Timing Example (RS-232-C)................ C-3
C-3. Software Timing Flow of RS-232-C Interchange Circuits C-4
C-4. Dial-In Sequence to an RS-232-C/V.24 LIM Via a 212A Modem.......................... C-9
C-5. Disconnect Sequence C-10
C-6. RS-232-C/V.24 Maximum Cable Length.......................... C-11
C-7. V.35 LIM Grounding Scheme .. C-13
C-8. Australian Post Office Timing Example (V.35)................... C-14
C-9. Software Timing Flow of V.35 Interchange Circuits............... C-15
C-10. V.35 Waveforms and Voltage Levels (Min-Nom-Max)............. C-18
C-11. V.35 LIM (2617-1) to Modem Cable (2617-1xx) Wiring Diagram.. C-20
C-12. RS-449 LIM Grounding Scheme C-22
C-13. Australian Post Office Timing Example (RS-449).................. C-23
C-14. Software Timing Flow of RS-449 Interchange Circuits........ C-24
C-15. RS-422-A Data Signaling Rate Versus Cable Length C-33
C-16. RS-422-A Data Signaling Rate or Cable Length Versus Risetime .. C-34

Tables

3-1. Base System Software Data Sheets 3-4
4-1. TCP/IP Layer Functions 4-4
4-2. TCP/IP Data Sheets 4-4
5-1. OSI Data Sheets 5-4
7-1. Ethernet Coaxial Cables (CL2) .. 7-4
7-2. Ethernet Coaxial Cables (CL2P) 7-4
7-3. Transceiver Interface Cables (CL2 for 2630-3 Transceivers) 7-6
7-4. Transceiver Interface Cables (CL2P for 2630-3 Transceivers) 7-6
7-5. Transceiver Connector Pin Assignments 7-7
7-6. LIM Connectability for DTE Configurations in General 7-14
7-7. LIM Connectability for Specific DTE Configurations 7-16
7-8. LIM Connectability for DCE Configurations in General 7-18
7-9. LIM Connectability for Specific DCE Configurations 7-20
7-10. 4-Port RS-232-C LIM Cables (CL2) 7-21
7-11. 4-Port RS-232-C LIM Cables (CL2P) 7-23
7-12. RS-232-C CCITT Signals Supported 7-24
7-13. 8-Port RS-232 Asynchronous LIM Cables (CL2) 7-29
7-14. 8-Port RS-232 Asynchronous LIM Cables (CL2P) 7-30
7-15. 8-Port RS-232 Asynchronous LIM Cable Adapters 7-31
7-16. RS-232-C Signals Supported ... 7-32
7-17. RS-449 LIM Cables (CL2) 7-35
7-18. RS-449 LIM Cables (CL2P) ... 7-35
7-19. RS-449 Signals Supported 7-36
7-20. X.24 LIM Cables (CL2) 7-39
7-21. X.24 LIM Cables (CL2P) 7-39
7-22. X.24 Signals Supported 7-39
7-23. URI LIM Cables (CL2) 7-42
7-24. URI LIM Cables (CL2P) 7-42
7-25. Centronics Signals Supported . 7-43
7-26. Data Products Signals Supported 7-44
7-27. V.35 LIM Cables (CL2) 7-50
7-28. V.35 LIM Cables (CL2P) 7-51
7-29. V.35 Signals Supported 7-52
B-1. CDCNET Product/Equipment Cross-Reference B-2
C-1. Data Set 212A Customer Options C-5
C-2. RS-232-C Interchange Circuit Voltage Levels C-8
C-3. V.35 Interchange Circuit Voltage Levels C-16
C-4. Pin Assignments for 37-Position Connector C-25
C-5. RS-449 Interchange Circuit Voltage Levels C-27
C-6. RS-449 Interchange Circuits ... C-30
C-7. Equivalency Table C-31

About This Manual

This manual provides reference information for the CDC® Control Data Distributed Communications Network (CDCNET). CDCNET comprises a family of Control Data Corporation's hardware and software network products. When you use CDCNET, you can connect many of your computer-related resources into one or more data processing networks.

Audience

This manual is a reference manual, planning document, and training supplement for customers who own or are interested in owning CDCNET products, and for Control Data personnel who use or work on CDCNET.

This manual, however, is not the only source of CDCNET product information for planning and configuring your CDCNET network. Your Control Data sales representative has the knowledge, documentation, and tools to assist you in designing networks and in ordering components. For example, your Control Data representative has a CDCNET product configurator to translate your network requirements into a configured product list.

Organization

Chapter 1 describes CDCNET hardware and software components at the system level. It also describes the documentation that Control Data furnishes with CDCNET.

Chapter 2 describes functional and physical capabilities of individual CDCNET hardware products. It also contains a data sheet for each hardware product.

Chapter 3 describes the base system software and provides a data sheet for each optional base system software product.

Chapter 4 describes the TCP/IP software and provides a data sheet for each optional TCP/IP software product.

Chapter 5 describes the OSI software and provides a data sheet for each optional OSI software product.

Chapter 6 illustrates hypothetical CDCNET configurations for using CDCNET hardware and software.

Chapter 7 describes the network connections: the CYBER-host channel, Ethernet, RS-232-C, RS-449, URI, V.35, and so on. It also assists the user in selecting the right terminal cables by identifying the cables to be used with various terminals and situations.

Appendix A provides a glossary of acronyms and terms commonly used when describing CDCNET hardware and software.

Appendix B lists CDCNET products in order of product numbers and gives the equivalent Control Data equipment numbers for users who require this information.

Appendix C contains the PTT approval data for the RS-232-C/V.24 LIM, the V.35 LIM, and the RS-449 LIM.

Conventions

- The terms "module," "logic board," "board," and "card" are sometimes used interchangeably in this manual or other CDCNET manuals. These terms refer to any of the printed circuit board assemblies that have logic components installed; that is, the Main Processor Board, memory boards, I/O boards, and Line Interface Modules.

- The terms "Ethernet" and "IEEE 802.3" are sometimes used interchangeably in this and other CDCNET manuals.

  - The term "Ethernet," as in "Ethernet component," means the component is compatible with the design documented in the Ethernet Specification. The Ethernet Specification was developed cooperatively by Xerox Corporation, Intel Corporation, and Digital Equipment Corporation, and is used throughout the industry as a local area network standard.

  - The term "IEEE 802.3" refers to the ANSI/IEEE standard 802.3 and ISO/DIS standard 8802/3, which are based on the Ethernet specification.

- The term K bytes means 1024 bytes throughout this manual.

- The term M bytes means 1,024,000 bytes throughout this manual.

Control Data's CDCNET products and components used in network applications are compatible with both the ANSI/IEEE 802.3 standard and the ISO/DIS 8802/3 Standard.

Companion Manual

The CDCNET Conceptual Overview is a companion to this manual. Since it discusses CDCNET in conceptual terms, it does not attempt to define which particular CDCNET configurations, products, and features are currently available and which ones will follow in subsequent releases. The Conceptual Overview does, however, provide you with a broad view of CDCNET so that you can understand the theoretical nature of this family of products.

Products and Trademarks

Control Data products documented in this manual are: CYBER 18-xx, CYBER 70, CYBER 120, CYBER 170, CYBER 180, IST-II, IST-III, 533-1, 536-1, 713-10, 721, 722, 722-30, 751, 752, 753, 790, 840A, 840S, 845S, 850A, 855S, 860A, 870A, 910, 920, 960, 990E, 992, 994, 995E, and 6000.

The following products of other companies are documented in this manual:

Anderson Jacobson, Incorporation: 832

Apple: LaserWriter M0156

Avanti Communications Corporation: 2200, 2300 LADs

Bell: 103J, 113C, 113D, 201C-LID, 212A, 303, 306

CDI: 1203

Data 100: 78

Digital Equipment Corporation: Decwriter I/II, VT-100

DTC: 300

Gandalf Data Incorporation: LDS-260

Harris Corporation: 1200

Hazeltine Corporation: Esprint II, 1510, 2000

IBM Corporation: 360-20

Lier Siegler: ADM21

Motorola Incorporation: 68000, 68010 microprocessors

Tektronix, Incorporation: 4010, 4014, 4109, 4114, 4115

Teletype Corporation: M33, M35, M38, M40-2, M43

TI: Silent 700

Zenith Electronics Corporation: Z-19, Z-29, Z-150

Trademarks documented in this manual are:

Ethernet, XNS are trademarks of Xerox Corporation

Macintosh and LaserWriter are trademarks of Apple Computer, Incorporated

Network File System (NFS) is a trademark of Sun Microsystems, Incorporated

Plexiglas is a trademark of Rohm and Haas Company

System Network Architecture (SNA) is a trademark of IBM Corporation

Teflon is a trademark of Dupont

X.PC is a trademark of TYMNET, Incorporation

Disclaimer

Products are intended for use only as described in this manual. Control Data is not responsible for the proper operation of undescribed features, undefined parameters, or customer modifications.

Related CDCNET Manuals

Manual Abstracts

Following is a brief description of each CDCNET manual.

Conceptual Overview	Discusses CDCNET in conceptual terms. It provides a broad view of CDCNET that explains the theoretical nature of this product. It does not attempt to define which particular product capabilities and features are currently available and which ones will follow in subsequent releases.
Product Descriptions	Provides reference, planning, and training information for customers who own or are interested in owning CDCNET products, and for Control Data personnel who use or work on CDCNET. The manual describes hardware and software products, provides information on how to select and use various types of network cables, and provides network configuration examples.
Terminal Interface	This is the primary manual for end-users who use interactive terminals to access computer services connected to CDCNET. The manual explains general terminal interface concepts, terminal commands and attributes, and connection attributes. For the advanced user, site administrator, and network analysts it also covers more advanced topics such as virtual and transparent modes, resolving communications problems, and the various terminal protocols supported by CDCNET.
Access Guide	This online manual guides the novice user through the process of accessing and using computer services through CDCNET. It includes procedures for connecting, disconnecting, and managing connections; displaying and changing terminal attributes; and terminal user exception processing. The more experienced user can find additional related information in the CDCNET Terminal Interface manual.
TCP/IP Programming Interfaces and Applications	Describes how to access the utilities that implement the TCP/IP protocols through CDCNET. The manual assumes the user is familiar with CDCNET terminal and connection attributes; knows the service title to access; and has some working knowledge and understanding of TCP/IP protocols.
Batch Device User Guide	Describes how to operate batch devices connected to CDCNET. It assumes the user is familiar with NOS and/or NOS/VE operating systems and with CDCNET access to these operating systems. The manual defines the concepts of I/O stations and provides the procedures for defining and controlling these stations. The online manual is available with NOS/VE and NOS operating systems.

Hardware Installation and Troubleshooting	Contains hardware installation procedures and troubleshooting guidelines for CDCNET hardware products and associated I/O cables. The manual is intended for individuals who install and check out CDCNET hardware products, operate them, add options to them, and maintain them.
Configuration Guide	Documents how to configure CDCNET software after it is installed on an operating system, and describes the responsibilities of the CDCNET network administrator. This manual also documents the Manage CDCNET Configuration Utility (MANCC), a utility for creating and editing files defining a CDCNET network.
DI Dump Analyzer	This manual is an online version of the DI Dump Analyzer section of the CDCNET Network Operations and Analysis manual. The manual is for CDCNET analysts who are familiar with Control Data host computer operating system concepts and operations. The manual describes how to use information from the Analyze CDCNET Dump (ANACD) utility to help troubleshoot network problems. Available with NOS/VE only.
Network Operations and Analysis	This manual documents how to monitor, control, and reconfigure CDCNET using the CDCNET Network Operator Utility (NETOU). The Network Operations section walks an operator through operations concepts, basic and advanced operations activities, and elementary troubleshooting decisions. The Network Analysis section describes the tools and methods used to analyze CDCNET performance including: instructions for using the CDCNET DI Dump Analyzer, a list of DI reset codes, a map of fixed address memory, and definitions of important system data structures. The NPA section of the manual provides information on how to generate various types of NPA reports and provides examples and descriptions of all NPA reports.

Diagnostic Messages	This manual is for network operators, network analysts, and programmers. The manual provides sorted lists of diagnostic messages and command responses issued by the CDCNET software. The primary sorted list of diagnostic messages describes the event causing each message and the appropriate user action. The primary sorted list of command responses describes the event causing the command response. Secondary sorted lists of diagnostic messages and command responses provide a cross reference of diagnostic message number and command response number to the CDCNET software products that issue the messages or command responses. The printed version of this manual is no longer available. However, a copy of the messages file can be printed on site. Available with both NOS/VE and NOS operating systems.
Commands	This manual contains all of the CDCNET Operator/Analyst commands. This manual is intended for operators, systems analysts, support engineers, and other experienced users.
CDCNET Network Management Station	This manual documents how to install, configure, and operate the CDCNET Network Management Station. The manual is for CDCNET operators and aministrators having previous experience as a UNIX system administrator.

Manual History

Not all sites find it convenient or expedient to install each new version and PSR level of CDCNET software. This presents a problem in maintaining sets of manuals that reflect installed software when later versions of CDCNET software are available but not installed. The following CDCNET Manual History table helps users to assemble and maintain the appropriate documentation by indicating which manual revisions support each release of CDCNET.

Manual/Audience Matrix

The CDCNET Manual/Audience matrix helps site planners, administrators, and users to determine their CDCNET documentation needs. The matrix categorizes each manual according to its type: overview, reference, tutorial, and so on. It then defines the audience of each manual in general terms: customer, end-user, LAN installer, and so on. Sites may have different audience designations for their audience, or may combine user functions.

CDCNET MANUAL HISTORY
RELEASE 1.3 - 1.5.3

CDCNET MANUALS	CDCNET RELEASE DATE/VERSION/PSR LEVEL					
	APR. '88 R1.3 L700	DEC. '88 R1.4 L716	JUN. '89 R1.4.2 L727	DEC. '89 R1.5.1 L739	JUN. '90 R1.5.2 L750	JAN. '91 R1.5.3 L765
	MANUAL REVISION					
CONCEPTUAL OVERVIEW 60461540	-	-	-	-	C	-
PRODUCT DESCRIPTIONS 60460590	B	C	-	D	-	E
TERMINAL INTERFACE 60463850	D	E	-	F	G	-
ACCESS GUIDE (ONLINE NOS) CDCNETA	X	X	-	X	-	-
ACCESS GUIDE (ONLINE NOS/VE) CDCNET_ACCESS	X	X	-	X	X	-
TCP/IP APPLICATIONS 60000214	B	C	D	E	F	G
BATCH DEVICE USER GUIDE 60463863	D	E	-	F	-	G
BATCH DEVICE USER GUIDE (ONLINE NOS/VE) CDCNET_BATCH	X	X	-	X	-	X
BATCH DEVICE USER GUIDE (ONLINE NOS) CDCNETB	X	X	-	X	-	-
HARDWARE INSTALLATION AND TROUBLESHOOTING 60000348	*	A	-	B	-	-
CONFIGURATION GUIDE 60461550	E	F	-	G	H	J
DI DUMP ANALYZER (ONLINE NOS/VE) ANACD		A	-	B	-	-
NETWORK OPERATIONS AND ANALYSIS 60461520	E	F	-	G	H	J
DIAGNOSTICS MESSAGES (ONLINE NOS) CNETMSG	X	X	X	X	X	X
DIAGNOSTICS MESSAGES (ONLINE NOS/VE) CDCNET_MSGS	X	X	X	X	X	X
CDCNET COMMANDS 60000414				A	B	C
CDCNET NETWORK MANAGEMENT STATION 60000568						A

M05352

NOTES:

- MANUAL NOT AFFECTED BY THE RELEASE.

* RELEASES SUPPORTED BY LAN INSTALLATION MANUAL, DI INSTALLATION AND CHECKOUT MANUAL, AND TROUBLESHOOTING GUIDE.

X INDICATES ONLINE MANUAL WAS UPDATED FOR THAT RELEASE.

SHADED BOXES INDICATE THE LATEST REVISION LEVEL FOR THE MANUAL.

CDCNET MANUAL/AUDIENCE MATRIX

CDCNET MANUALS	MANUAL TYPE	Customer	End-User	LAN Installer	Customer Engineer	Network Operator	CE Support Engineer	Network Analyst	Site Administrator	Programmer
Conceptual Overview	Overview	■			■		■	■	■	■
Product Descriptions	Reference	■			■		■	■	■	■
Terminal Interface	User Guide		■			■	■	■		■
Access Guide	User Guide		■				■	■		
TCP/IP Programming Interface and Applications	Reference		■		■		■	■	■	■
Batch Device User Guide	User Guide		■				■	■		
Hardware Installation And Troubleshooting	Maintenance	■		■	■	■	■	■		
Configuration Guide	Ref./Tutorial					■	■	■	■	
DI Dump Analyzer	Ref./Tutorial				■	■	■	■		
Commands	Reference				■	■	■	■	■	■
Network Operations And Analysis	Ref./Tutorial					■	■	■	■	
Diagnostics Messages	Reference				■	■	■	■	■	■
CDCNET Network Management Station	Ref./Tutorial				■	■	■	■	■	

M05353

Additional Related Documents

The following non-Control Data documents provide detailed information related to network standards and specifications that apply to current CDCNET products.

- ANSI/IEEE Standard 802.3 and ISO/DIS Standard 8802/3 for Local Area Networks: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications. Available from ANSI, 1430 Broadway, New York, NY, 10018.
- CCITT X.24 Recommendations: A list of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE). Available from National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA, 22161.
- CCITT X.25 Recommendations: Defines the interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode on public data networks. Available from National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA, 22161.
- CCITT V.35 Recommendations: An electrical standard established by the CCITT for interconnection of equipment operating above 20 K bps. Available from National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA, 22161.
- CCITT V.24 Recommendations: A list of definitions for interchange circuits between data terminal equipment and data circuit-terminating equipment. Available from National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA, 22161.
- EIA RS-232-C Standard: An electrical standard established by the Electrical and Electronic Industries Association (EIA) for the interconnection of equipment. Available from EIA, 2001 Eye Street, NW, Washington, D.C., 20006.
- EIA RS-449 Standard: An electrical standard established by the Electrical and Electronic Industries Association (EIA) for the interconnection of equipment. Available from EIA, 2001 Eye Street, NW, Washington, D.C., 20006.
- NEC NFPA 70: National Electrical Code. Available from National Fire Protection Association, Batterymarch Park, Quincy MA 02269.

Ordering Manuals

Control Data manuals are available through Control Data Sales Offices or from:

Control Data
Literature and Distribution Services ARHLDS
4201 Lexington Avenue N.
St. Paul, MN 55126-6198

You can also call (612)482-3800 or (612)482-3801, or FAX your enquiry to (612)482-3813. (If you are a Control Data employee, use the Controlnet number 235-3800, 235-3801, or 235-3813.)

Submitting Comments

Control Data welcomes your comments about this manual. Your comments may include your opinion of the usefulness of this manual, your suggestions for specific improvements, and the reporting of any errors you have found.

You can submit your comments on the comment sheet on the last page of this manual. If the comment sheet has already been used, you can mail your comments to:

Control Data
Technical Publications ARH219
4201 Lexington Avenue N.
St. Paul, MN 55126-6198

You can also submit your comments through SOLVER, an on-line facility for reporting problems. To submit a documentation comment through SOLVER, do the following:

1. Select `Report a new problem or change in existing PSR` from the main SOLVER menu.

2. Respond to the prompts for site-specific information.

3. Select `Write a comment about a manual` from the new menu.

4. Respond to the prompts.

Please indicate whether or not you would like a written response.

Central Software Support Hotline

Control Data's Central Software Suppport maintains a hotline to assist you if you have trouble using our products. If you need help not provided in the documentation, or find the product does not perform as described, call us at one of the following numbers. A support analyst will work with you.

From the USA and Canada: (800) 345-6628

From other countries: (612) 482-3434

Introduction to CDCNET 1

Distributed Communications 1-1

An Open System Architecture 1-2

Major Hardware Components of CDCNET 1-2
CDCNET Host 1-2
CDCNET DI 1-3
Integrated Communications Adapter (ICA) 1-4
IEEE 802.3 LAN Components 1-4
Terminal Devices 1-5
Network Cables 1-7

Major Software Components of CDCNET 1-8
Layer Software 1-9
Management Entities (ME) 1-11
Interfaces to Other Architectures 1-12
Terminal Interface Programs (TIPs) 1-13
Types of Network Communications 1-14
Network Administration and Management Software 1-14

How to Order CDCNET Software Products 1-14
Software Licenses 1-15
Ordering CDCNET Software 1-16
Software Products Data Sheets 1-17

Documentation 1-18

Introduction to CDCNET 1

This chapter introduces you to CDCNET at a system level and gives a brief description of the major functional components and the interconnections between these components. Chapter 2 describes the individual hardware products and chapters 3, 4, and 5 describe the software products that make up these major components.

Distributed Communications

CDCNET (Control Data Distributed Communications Network) is a family of compatible hardware and software network products. You use CDCNET to connect your host computer systems, user terminals, workstations, personal computers, and unit record devices into data processing networks. These networks can range in size from a single, simple local network, to concatenated networks that consist of smaller networks linked together by communications lines that span long distances.

CDCNET uses a distributed communications approach to networking. This approach distributes the major network communications functions to small communications processors, called device interfaces (DIs), throughout the network. You interconnect various DIs in a localized area with a 10-megabit IEEE 802.3 system or equivalent as the medium. CDCNET is more than a Local Area Network (LAN); it uses LAN technology as only one part of the solution.

When you use CDCNET to interconnect your network products, all of the network resources (host computers, terminal devices, and CDCNET DIs) are available to all of your users.

Figure 1-1 illustrates the CDCNET distributed communications approach.

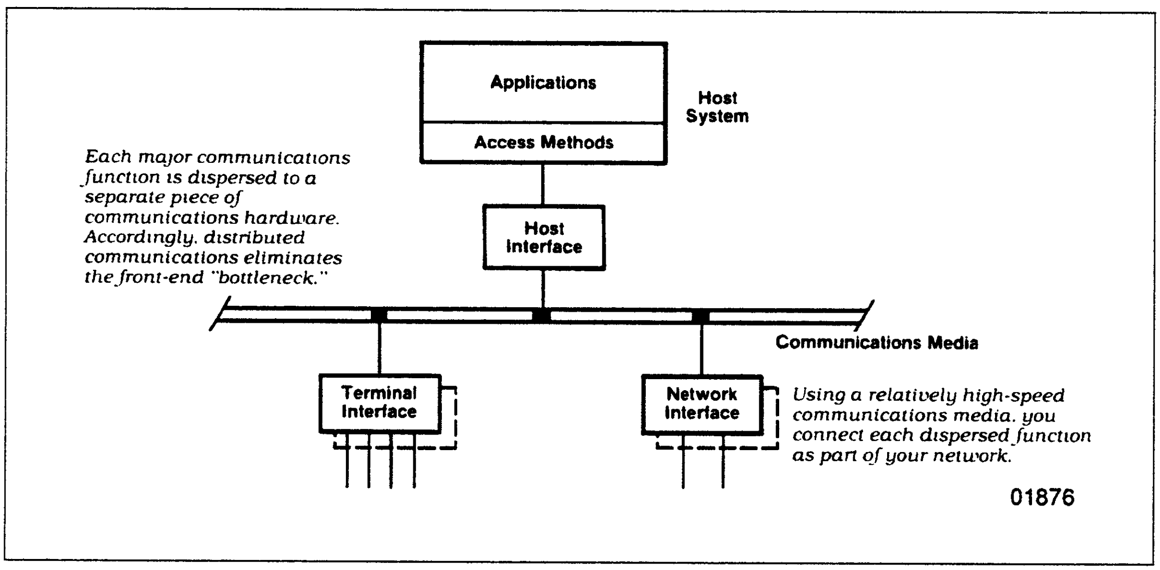

Figure 1-1. CDCNET Distributed Communications Approach

An Open System Architecture

CDCNET enables you to create a computer network in which you can exchange information and transfer jobs between computer products manufactured by many different suppliers. Such multivendor connectivity is an essential element of the Transparent Computing Environment (TCE) being developed by Control Data. Transparent computing is an environment in which you will be able to solve most computing problems and run applications without having to know where the processing power comes from, what information was necessary, or what equipment is required.

Multivendor connectivity is possible because CDCNET is an open system architecture based on the International Standards Organization's (ISO) Open System Interconnection (OSI) reference model. An open systems implementation and distributed communications provide an environment to accommodate international standards as they evolve and are endorsed by the Corporation for Open Systems (COS). Future releases of CDCNET, therefore, will focus on further connectivity improvements, offering fully-integrated, OSI-compatible solutions to satisfy heterogeneous networking and communications systems needs.

Major Hardware Components of CDCNET

A CDCNET network can consist of a CYBER host, one or more CDCNET DIs, IEEE 802.3 local area network components, and user terminal devices. The following paragraphs summarize the major hardware components required to build your CDCNET network.

CDCNET Host

In order to establish a network using CDCNET, you must have at least one CDCNET host. The host system hardware is not part of the CDCNET product but it runs the host-based CDCNET software which is installed as part of the NOS/VE or NOS operating system. Thus, the CDCNET host is any Control Data computer system capable of running NOS/VE or NOS.

Hereinafter, the host computer systems will be referred to by their operating system name: either NOS/VE or NOS. For example: NOS/VE host or NOS host.

For additional information about host system hardware and host operating systems, refer to the appropriate host computer and operating system documentation. CDCNET software is introduced later in this section of the manual.

CDCNET DI

The major hardware component of CDCNET is the DI. The DI is a communications processor that can be configured in a variety of ways. These configurations are referred to as DI variants. CDCNET uses the DIs to distribute major communications functions throughout the network. Control Data offers the following DI variants to perform commonly required network functions. Each DI has a specific combination of removable logic boards and software modules suited to its unique networking task.

Mainframe DI (MDI)	The MDI enables data to be transmitted between a 12-bit CYBER host channel and an IEEE 802.3 network.
Terminal Device Interface (TDI)	The TDI enables you to connect terminal devices to an IEEE 802.3 network.
Network Device Interface (NDI)	The NDI provides access from CDCNET to other networks by using two types of connections. In one, it connects a remote CDCNET to a local CDCNET using medium speed links such as High-Level Data Link Control (HDLC). In this case, the NDI acts as a relay unit in an essentially unified network. Alternatively, the NDI software may contain a special gateway to connect CDCNET to an outside network based on other architectures. Examples are X.25 virtual circuits, public data networks (PDN), and Defense Data Networks such as MILNET and ARPANET.
Mainframe/Terminal Device Interface (MTI)	The MTI is a combination MDI and TDI that enables you to connect terminal devices directly to a CYBER host without using a LAN. Essentially, the MTI is an entry-level unit that may be used when a site has only a few terminal devices and they are all located within approximately 50 m (164 ft) of the CYBER host. As your site adds to and disperses its network hardware, and eventually adds the IEEE 802.3 network capability, you can reconfigure the MTI into an MDI and TDI by using an MTI conversion kit.
Remote Terminal DI (RTI)	The RTI functions as a remote terminal device concentrator, where at least one line must be connected to a dedicated HDLC link (4800 bps to 64 K bps). The HDLC link may be an RS-232, RS-449, or V.35 line.

Integrated Communications Adapter (ICA)

One or two ICAs are available with the CYBER 930 and 932. An ICA enables data to be transferred between the 16-bit Integrated Controller Interface (ICI) host channel and an IEEE 802.3 network.

IEEE 802.3 LAN Components

You use IEEE 802.3 components to connect your DIs into a LAN. Control Data LAN components are compatible with both the IEEE 802.3 standard and ISO/DIS 8802/3 standard.

The essential components of the LAN are the IEEE 802.3 trunk, IEEE 802.3 transceivers, and trunk terminators.

IEEE 802.3 trunk	A coaxial cable that interconnects DIs.
IEEE 802.3 transceivers	Provide the mechanical and electrical connection between the DIs and the IEEE 802.3 trunk.
Trunk terminators	Electrical components that terminate the IEEE 802.3 trunk in its characteristic impedance. A terminator must be installed on each end of the trunk. The Control Data IEEE 802.3 trunk products are provided with the necessary terminators.

In addition to these essential LAN components the following supplemental components are available:

Repeater	Extends the network service area beyond the normal 500 m (1640 ft). Repeaters are installed in series with the IEEE 802.3 trunk.
Multiplexer	Used to connect multiple DIs to a single transceiver (optional).
Splice kit	Used to repair a faulty trunk or to add an additional length of trunk.

Figure 1-2 shows the how these IEEE 802.3 components are used. All of these components are available for purchase and installation by Control Data; however, you may choose to install your own LAN components as long as they meet the IEEE 802.3 Standard. Chapter 2 describes LAN components in further detail.

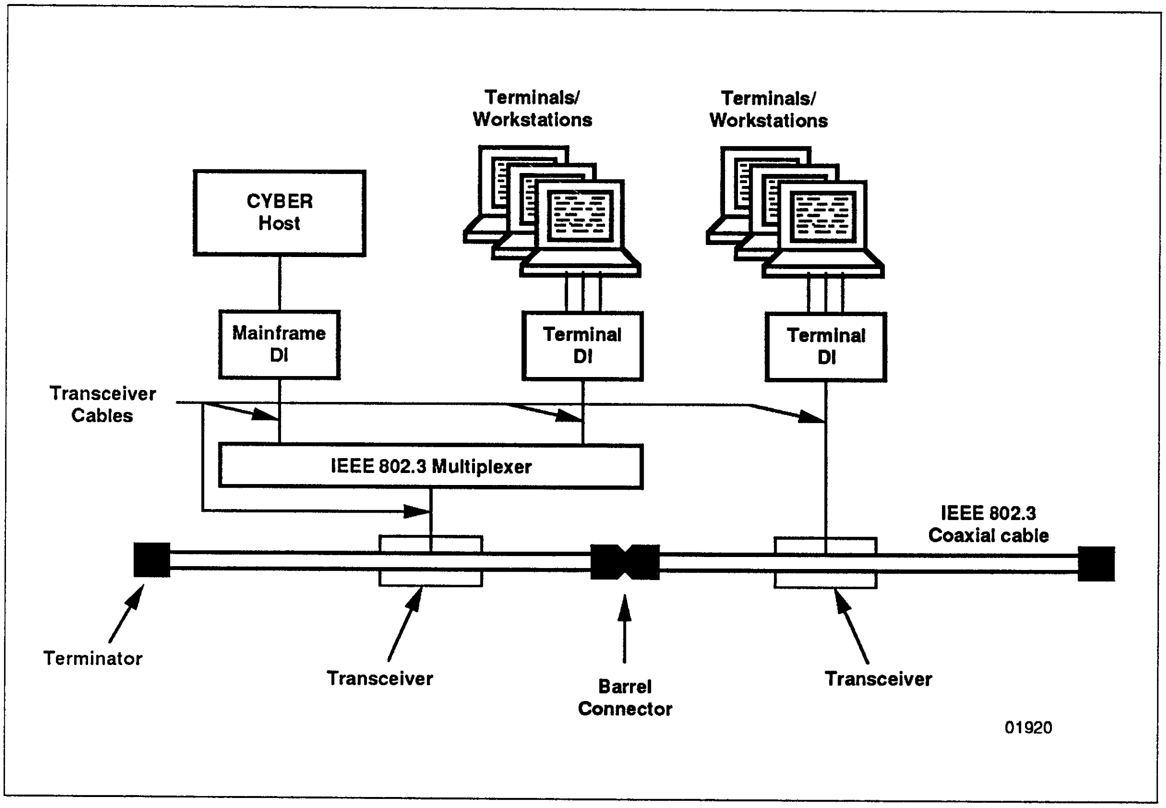

Figure 1-2. IEEE 802.3 LAN Components

Terminal Devices

The term terminal devices, as used in this manual, refers to both intelligent and nonintelligent terminals, workstations, personal computers, and unit record devices. Asynchronous interactive terminals, asynchronous printers, and batch terminals with a synchronous HASP interface are all supported.

Terminal devices are normally connected directly to a DI using appropriate RS-232 or RS-449 communication lines; however, you may use modems and a phone line connection if you choose.

CDCNET supports terminal devices such as those in the following list. Not all terminals are supported with every version of CDCNET.

Refer to chapter 7 for cabling information. Otherwise, no additional information about these terminals is provided in this manual. Refer to the appropriate terminal manual.

Asynchronous Terminals:

Teletype Corporation M33
Teletype Corporation M35
Teletype Corporation M38
DTC 300
TI Silent 700
CDI 1203
Anderson Jacobson, Inc. 832
Digital Equipment Corporation Decwriter II or III
CDC 713-10
Tektronix, Inc. 4010
Tektronix, Inc. 4014
Tektronix, Inc. 4105
Tektronix, Inc. 4109
Tektronix, Inc. 4114
Tektronix, Inc. 4115
Teletype Corporation M40-2
Hazeltine Corporation 1510
ADDS Viewpoint
IBM 3151
Macintosh
CDC 751/752/753
CDC 721
CDC 722
CDC IST II
CDC IST III
Digital Equipment Corporation VT-100, VT-103, VT-220, VT-240, VT-320
Lier Siegler/ADM21
Zenith Electronics Corporation Z-19, Z-29
PC Compatible, PC, PS, XT, AT
CDC 790

Asynchronous Printers:

Apple LaserWriter M0156
CDC 533-1, 536-1, 537 (Line Printer)

Asynchronous Emulators for PC Compatibles:

Connect 1.x
ASCII-Pro
Crosstalk XVI, MK4

HASP Emulators:

IBM Corporation 360-20
Harris Corporation 1200
Barr HASP
Data 100 78
CDC CYBER 18-xx
CDC CYBER 120

3270 BSC:

CDC 721-405
Zenith 151/161 PC with CLEO 3200 emulator
Micom 7408

TCP/IP Workstations:

CYBER 910-500
SUN 3/50, 3/60, 3/80, 3-86, 3/160, 4/110

Mode 4A/C:

CDC CYBER 18-xx with Mode 4A/C controlware
CDC 714-30 with Mode 4C

Unit Record Devices:

Control Data 585 or 587 printer with Data Products interface

Network Cables

Network cables are any of the external cables connected to a DI or to a CYBER host. They include host channel cables, IEEE 802.3 transceiver cables, and the communication lines used to connect your terminal devices to the DI.

Channel cables	Connect the MDI or MTI to one of the 12-bit channels on the CYBER host. These cables are standard 20-m (65-ft) CYBER I/O channel cables and are provided with the Mainframe Channel Interface (MCI) board (refer to individual product descriptions in chapter 2).
IEEE 802.3 transceiver cables	Connect the MDIs, TDIs, and ICAs to an IEEE 802.3 transceiver (or to a multiplexer which optionally may be connected to a transceiver). These cables come in various lengths and must be ordered as individual products.
Terminal device communication lines	Connect the TDI or MTI to your terminal devices. Cables are available for RS-232-C/V.24, RS-449/V.11 and V.10, X.24, and V.35 electrical interfaces. Cables are available in various functional configurations, and several lengths with a choice of a male or female connector to the user device. Cable adapters are available for some cable products. Cables and adapters must be ordered as individual products.

Chapter 7 tells you how to build networks using these cables, describes the connections in detail, and provides guidelines for selecting terminal device cables.

Major Software Components of CDCNET

CDCNET architecture is based on the International Standards Organization (ISO) Open System Interconnection (OSI) reference model. CDCNET software implements several ISO OSI standards.

Depending upon which operating system is being used by your CYBER host computer, CDCNET software either resides entirely within your CDCNET DIs or is dispersed among your hosts, your DIs, and your ICAs.

Major components of CDCNET software include:

Layer Software	CDCNET layer software allows terminals, applications end users, applications software, and host computer systems to exchange information through a set of peer protocols and services.
Management Entities (MEs)	CDCNET MEs perform tasks related to the operation and management of the network.
Gateways to Non-CDCNET Systems	Software components that enable CDCNET users to access other hosts and networks not supported by CDCNET.
Terminal Interface Programs (TIPs)	CDCNET software that resides in a terminal device interface and enables terminals/workstations that employ specific terminal protocols to communicate in CDCNET networks.
Base System Software	Resident in CDCNET DIs only, this base system software establishes an operational environment within a DI. It helps initialize the DI; acts as its executive routine; detects, isolates, and resolves DI malfunctions; and manages the DI's online diagnostics.
ICA Software	Resident in CYBER host ICAs and in the peripheral processor in the host computer, this software establishes an operational environment within an ICA. It helps initialize the ICA; acts as its executive; detects, isolates, and resolves ICA malfunctions; and manages the ICA's online diagnostics.

Layer Software

The layer software provides the functions needed to support communication between computer systems, terminals, applications, and end users connected to CDCNET.

The software contains the following layers:

Host Application layer (Layer 7)

The CDCNET Application layer includes the following entities:

- Mail/VE (X.400 Message Handling System, MHS)
- File Transfer, Access, and Management (FTAM/VE)

These entities are present only in the NOS/VE host.

Presentation layer (Layer 6)

The CDCNET Presentation layer includes the ISO OSI Presentation entity. It is present only in the NOS/VE host and is packaged with the OSI application FTAM/VE.

Session layer (Layer 5)

The CDCNET Session layer includes the following entities:

- CDCNET Proprietary Session entity

  The CDCNET Proprietary Session entity supports pre-OSI interface and gateway software, and applications. It resides in each DI, ICA, and NOS/VE host.

- ISO OSI Session entity

  The ISO OSI Session entity supports the OSI Session service. It is present only in the NOS/VE host.

Transport layer (Layer 4)

The CDCNET Transport layer provides OSI Transport service using class 4 and class 0 Transport protocols. Transport service provides end-to-end reliable data transfer.

Transport class 4 protocol uses the Connectionless Network Service (CLNS). Transport class 0 protocol uses the Connection Oriented Network Service (CONS).

Network layer (Layer 3B)

The CDCNET Network layer includes the following entities:

- OSI Connectionless Mode Network Service (CLNS)

  CLNS provides connectionless mode datagram network service. It receives outgoing data from its users (for example, Transport layer) and uses the Routing ME's services to determine the path to reach its destination. It uses the services of the Intranet layer to transmit the data on the appropriate medium to its final destination.

- OSI Connection Mode Network Service (CONS)

  CONS provides connection mode network service. This service includes creation and release of a Network layer connection as well as transmission of user data on this connection.

Intranet layer (Layer 3A)

The CDCNET Intranet layer serves as an interface layer between the Network layer on one side and the Link layer entities for different media on the other side. One of its basic functions is to provide a generic, or a media-independent, interface to the Network layer so it can transmit and receive data on different media to which a CDCNET system may be connected.

The Intranet layer also maintains outgoing queues for the different media to which a given system is connected. It monitors the amount of data queued for each medium and translates it into a congested or uncongested status. It informs the relevant higher layer software whenever the congestion status for a medium changes.

The Intranet layer also provides the IEEE 802.2 Logical Link Control (LLC) class 1 and class 2 services.

Data Link layer (Layer 2)

This layer ensures error-free transfer of data. It is identical to OSI model layer 2, and is composed of the following software components:

- Mainframe Channel Interface (MCI) Stream Service Routines (SSR).

- Ethernet Serial Channel Interface (ESCI) SSR.

- High-Level Data Link Control (HDLC) SSR.

- IEI SSR

  Loaded into an ICA, this software interfaces with the IEI driver and performs the same functions as the ESCI SSR performs in a DI.

Physical layer (Layer 1)

The CDCNET Physical layer provides the electrical, mechanical, and procedural interfaces that enable a DI, ICA, or host to interconnect with particular network communications media as well as terminal lines.

Management Entities (ME)

This group contains the following software components, which are responsible for performing tasks related to the operation and management of the network.

Initialization ME	Performs two major functions whenever a CDCNET DI is powered on or its reset switch is activated: • Broadcasts a software load request through a network. • The Dependent Initialization ME sends the reset code to the Independent Initialization ME which uses the reset code and information in the exception file to determine if a dump is necessary.
Routing ME	Creates, updates, and manages the internal tables that the network uses to route data from a source to a particular destination. It determines the most efficient path available between these locations. The CDCNET software also includes commands and command processors to define routes to non-CDCNET OSI networks.
Directory ME	Maintains a directory of titles and associated addresses. They are used to keep track of the CDCNET software components residing in the network. This directory is maintained so that requests for particular software functions or network services can be directed to the software that can satisfy the request.
File Access ME	Enables DIs and CDCNET-compatible hosts to access and manipulate files stored on other systems residing in a CDCNET network.
Command ME	Lets network operators monitor, control, and maintain CDCNET networks by issuing commands from either operator consoles or interactive consoles.
Log ME	Records log messages received from CDCNET software components on a log file residing on a host computer system.
Alarm ME	Delivers alarm messages received from CDCNET software components. The messages are to be displayed at the consoles/terminals maintained by network operators, or written to a host-resident file.
Clock ME	Synchronizes the DI system clocks within the catenet.

Interfaces to Other Architectures

When a network communicates with computer resources that do not support CDCNET, CDCNET interface software and/or gateways must reside in those CDCNET DIs or CDCNET-compatible hosts directly interfacing with these non-CDCNET entities.

CDCNET interface software relies on existing protocols and services defined by national or international standards as well as common industry usage. These currently available protocols/services let CDCNET DIs and CDCNET-compatible hosts communicate with:

- Terminals/workstations
- Networks interconnecting CDCNET LANs with remotely located CDCNET networks
- NOS hosts that do not support CDCNET

When no standard protocols or services are available to support communications with a non-CDCNET entity, special CDCNET software interfaces called "gateways" are necessary.

These interfaces include:

- Interface to NOS hosts
- Interface to X.25 Networks
- Interface to Foreign Mainframes via X.25
- Interface to TCP/IP TELNET, FTP, and SMTP[1]
- Interface to NFS via TCP/IP[1]
- Interface to MHS/X.400 (Mail/VE)
- Interface to other async services (for example, dialout modems)

1. Optional software; priced separately.

Terminal Interface Programs (TIPs)

The network software can support many kinds of terminals. This ability is provided by special programs called Terminal Interface Programs (TIPs).

A TIP exists for each major protocol. Each TIP performs similar functions, such as: translating character codes used by the terminal into codes used by the host software with which you are communicating, collecting character-by-character input into lines of input to send to the host, and so forth.

CDCNET software includes TIPs supporting the following protocols:

- Asynchronous
- X.25 Async TIP (X.29 PAD Server)[2]
- HASP TIP
- X.3 PAD[2]
- HDLC
- Mode 4A/4C[2]
- X.PC Asynchronous or X.PC over X.25
- URI/585 TIP
- 3270 Bisynchronous (BSC) TIP[2]
- High Speed HDLC (256-K bits or multiple 64-K baud)[2]
- Network Job Entry Facility (NJEF) (NOS only)[3]
- Network Transfer Facility (NTF) (NOS/VE only)[3]

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2. Optional software; priced separately.
3. Optional software; priced separately; offered by Professional Services.

Types of Network Communications

The ultimate objective of the CDCNET layer software, interface software, and gateways is to enable the computer-related resources in your network to communicate in a variety of ways:

Application-to-application communications	Enables application programs executing on different hosts to exchange application-specific data, such as file transfer data.
Terminal-to-application interactive communications	Enables terminals accessing your network to exchange interactive and batch data with applications software that executes on a host (without being concerned about the protocols employed by these terminals.)

Network Administration and Management Software

CDCNET includes software that enables the site to monitor the network, detect/isolate network problems, control network operations, and perform network maintenance and reconfigurations.

How to Order CDCNET Software Products

Control Data sales representatives are available for consultation and to assist you in configuring and ordering your CDCNET system. Furthermore, your representative can use the Control Data product configurator to verify the features and capabilities of CDCNET. It is helpful during this process, however, if you are already familiar with how Control Data licenses and distributes CDCNET software.

This section first defines the types of licenses under which Control Data distributes CDCNET software and documentation. Then, since ordering CDCNET software depends on the type of host or hosts that connect to your network, this section indicates when the CDCNET software is included with the host operating system software and when it must be ordered separately.

Software Licenses

You may order software from Control Data under one of two licensing agreements: the standard system software license or the distributed system software license.

Standard system software license (SSSL)	A license for the release level of the software product at the time of delivery of the software product, without any future support, for use on the mainframe model number and serial number specified. This use must be according to the conditions of the Use Group as specified on the Customer Order Form. A separate software license is required for each mainframe installed by the customer.
Distributed system software license (DSSL)	A license granted for either a one-time or recurring charge, which provides the right for the customer's designated support location to copy and distribute software products and, as available, support service elements furnished to the designated support location by Control Data for use on the specific "eligible" designated processor. A designated processor is eligible for DSSL when the customer has ordered identical software products or equivalent products for use on two or more designated processors located within the United States. For international customers, the designated processors must be located within the same country. "Customer" as used in this definition means the same company listed on the face page of the Agreement and that company must have financial and technical control of all designated processors.

One copy of the software product on a machine-readable medium and one copy of the documentation are furnished to the customer for ordered software products. The CDCNET product is released in binary format only. When Control Data specifies magnetic tape as the medium, you must specify the packing density and track option (7 track/9 track) on the Customer Order Form. When Control Data delivers software products via electronic transmission (when available), you must provide information to Control Data to permit distribution to your machine.

Ordering CDCNET Software

How you order the CDCNET software depends upon which host computers connect to your network or networks and, in the case of dual-state host computers, which operating system, NOS or NOS/VE, maintains the network connection.

NOS 2 Only Host

Although the CDCNET software is considered to be a separate product under NOS, new NOS 2 customers can receive it by ordering the NOS 2 Basic or Commercial Package.

Existing NOS 2 customers may order the NOS CDCNET software product separately.

CDCNET enables sites currently employing Control Data 255x products running the Communication Control Program (CCP) to configure the network to coexist with CDCNET DIs. These customers may also order the CDCNET product separately.

NOS/VE Only Host

The NOS/VE license includes the CDCNET software. It is not necessary to order CDCNET separately.

Dual-State Host

A dual-state host runs both the NOS and NOS/VE operating systems. If the connection to CDCNET is being made only through NOS/VE, it is not necessary to order CDCNET separately since the NOS/VE license includes the CDCNET software. However, if a NOS connection to CDCNET is also required, you should talk to your sales representative about whether to order a software package including the CDCNET NOS software or to order it separately.

Software Products Data Sheets

Data sheets have been provided to assist you in ordering CDCNET software products. Data sheets provide an overview of each optional software product. The data sheets for CDCNET software products are located in three separate chapters.

- Chapter 3 contains the base system software product descriptions.
- Chapter 4 contains the TCP/IP software product descriptions.
- Chapter 5 contains the OSI software product descriptions.

Documentation

A documentation kit is provided that contains the basic set of manuals needed to install, operate, and troubleshoot your CDCNET network. The kit also includes a videotape that demonstrates how to configure, install, and check out the DI hardware. The video tape is not provided with the software product. The tape is available in the formats listed below. Instructions for ordering CDCNET documentation are in the preface.

Tape Format	Publication Number	Tape Format	Publication Number
VHS	60463090	3/4 in UMATIC/PAL	60000141
BETA	60463870	VHS/SECAM	60000136
3/4 in UMATIC	60463880	BETA/SECAM	60000137
VHS/PAL	60000139	3/4 in UMATIC/SECAM	60000138
BETA/PAL	60000140		

The following manuals are in the kit:

Manual Title	Publication Number
CDCNET Product Descriptions (this manual)	60460590
CDCNET Batch Device User Guide	60463863
CDCNET Commands	60000020
CDCNET Configuration Guide	60461550
CDCNET Network Operations and Analysis	60461520
CDCNET Hardware Installation and Troubleshooting	60000348
CDCNET Terminal Interface	60463850
CDCNET Network Configuration Utility (NETCU) Summary Card	60000269

The following is a list of product numbers of documentation kits. Note that the product number is determined both by the format of the video tape included in the kit and by the type of software licensing agreement.

Video Tape Format	Product Numbers: Standard System Software License	Product Numbers: Distributed System Software License
VHS	N260-81	N261-81
VHS/PAL	N260-84	N261-84
VHS/SECAM	N260-87	N261-87
BETA	N260-82	N261-82
BETA/PAL	N260-85	N261-85
BETA/SECAM	N260-88	N261-88
3/4 in UMATIC	N260-83	N261-83
3/4 in UMATIC/PAL	N260-86	N261-86
3/4 in UMATIC/SECAM	N260-89	N261-89

Hardware Product Descriptions 2

Device Interface (DI) Components 2-1

IEEE 802.3 Network Components 2-6

Accessories 2-6

Data Sheets 2-6

Base Device Interface (DI) Cabinet Assembly 2-7
Physical Description 2-7

Main Processor Board (MPB) 2-11
Physical Description 2-11

Improved Performance Main Processor Board (MPB-II) 2-13
Physical Description 2-13

System Main Memory (SMM) Board 2-15
Physical Description 2-15

4 M-Byte System Main Memory (SMM4) Board 2-17
Physical Description 2-17

Private Memory Module (PMM) 2-19
Physical Description 2-19

Mainframe Channel Interface (MCI) Board 2-21
Physical Description 2-21

Ethernet Serial Channel Interface (ESCI) Board 2-23
Physical Description 2-23

Communications Interface Module (CIM) 2-25
Physical Description 2-25

4-Port RS-232-C Line Interface Module (LIM) 2-27
Physical Description 2-27

4-Port RS-232-C LIM Cables 2-29
Physical Description 2-30

8-Port RS-232 Asynchronous Line Interface Module (LIM) 2-31
Physical Description 2-31

8-Port RS-232 Asynchronous LIM Cables 2-33
Physical Description 2-33

RJ45/DB25 Connector Adapters 2-35
Physical Description 2-35

RS-449 Line Interface Module (LIM) 2-37
Physical Description 2-37

RS-449 LIM Cables 2-39
Physical Description 2-39

X.24 Line Interface Module (LIM) 2-41
Physical Description 2-41

X.24 LIM Cables 2-43
Physical Description 2-43

Unit Record Line Interface Module (URI) 2-45
Physical Description 2-46

URI LIM Cables 2-47
Physical Description 2-47

URI Adapter Cable 2-49
Physical Description 2-49

V.35 Line Interface Module (LIM) 2-51
Physical Description 2-51

V.35 LIM Cables 2-53
Physical Description 2-53

Integrated Communications Adapter (ICA) 2-55
Physical Description 2-55

3-DI Cabinet 2-57
Physical Description 2-57

DI Enclosure Table 2-59
Physical Description 2-59

IEEE 802.3 Transceiver Interface Cables 2-61
Physical Description 2-61

IEEE 802.3 Transceiver 2-63
Physical Description 2-63

IEEE 802.3 Transceiver Tap 2-65
Physical Description 2-65

IEEE 802.3 Multiplexer 2-67
Physical Description 2-67

IEEE 802.3 Repeater 2-69
Physical Description 2-69

IEEE 802.3 Coaxial Cable Splice Kit 2-71
Physical Description 2-71

IEEE 802.3 Coaxial Cable Terminator Kit 2-73
Physical Description 2-73

IEEE 802.3 Coaxial Cable 2-75
Physical Description 2-75

Maintenance Console Option (MCO) 2-77
Physical Description 2-77
Modems Supported 2-78

CDCNET Maintenance Kit 2-79
Physical Description 2-79

Hardware Product Descriptions 2

This chapter describes the CDCNET hardware products currently available and planned for CDCNET configurations. This information will help you understand the functional and physical features of individual products and how these products are used in various combinations to establish your CDCNET network. The product descriptions include configuration guidelines as well as functional and physical information.

CDCNET hardware falls into the following general categories:

- Device Interface (DI) Components
- IEEE 802.3 Network Components
- Accessories

Table B-1 in appendix B contains a complete list of current CDCNET hardware products in order of product number.

Device Interface (DI) Components

The primary CDCNET hardware element is the device interface (DI). The DI (figure 2-1) is a small communications processor that provides an input/output (I/O) interface between elements that reside in a communications network. The DI's main function is to receive data from a source device and translate the data into a format compatible with the destination device.

Because CDCNET distributes major communications functions throughout the network, different types or "variants" of DIs are defined to perform these functions. These variants use the same basic cabinet, main processor, and system memory but use different combinations of I/O boards to tailor the hardware to the network task. Each variant also has a unique set of software modules that is downline loaded from the host.

Control Data offers individual logic boards and cables to configure the following DI variants:

- Mainframe DI (MDI)
- Terminal DI (TDI)
- Mainframe/Terminal DI (MTI)
- Network DI (NDI)
- Remote Terminal DI (RTI)

The logic boards are installed in DI cabinet assemblies to produce the DI variant into which the appropriate software is loaded.

DI variants are based on a common, generic hardware architecture that includes the following components:

Cabinet assembly

The DI cabinet assembly is the skeleton on which each DI variant is based by configuring it with the appropriate hardware and software modules. The basic DI cabinet contains an internal system bus (ISB), a power supply, batteries, cooling fans, cabinetry, the main backpanel with space for up to eight main logic boards, and the line interface backpanel with space for up to eight line interface modules (LIMs).

Main logic boards

The main logic boards shown in figure 2-2 are used in the various DI configurations. They are plugged into the main backpanel and communicate over the internal system bus. Refer to the CDCNET Configuration Guide for guidelines on configuring memory boards into DIs. The main logic boards include:

- Main processor board (MPB or MPB-II)
- Memory boards
  - System main memory (SMM or SMM4) board
  - Private memory module (PMM); not used with MPB-II
- I/O interface boards
  - Mainframe channel interface (MCI) board
  - Ethernet serial channel interface (ESCI) board
  - Communications interface module (CIM)

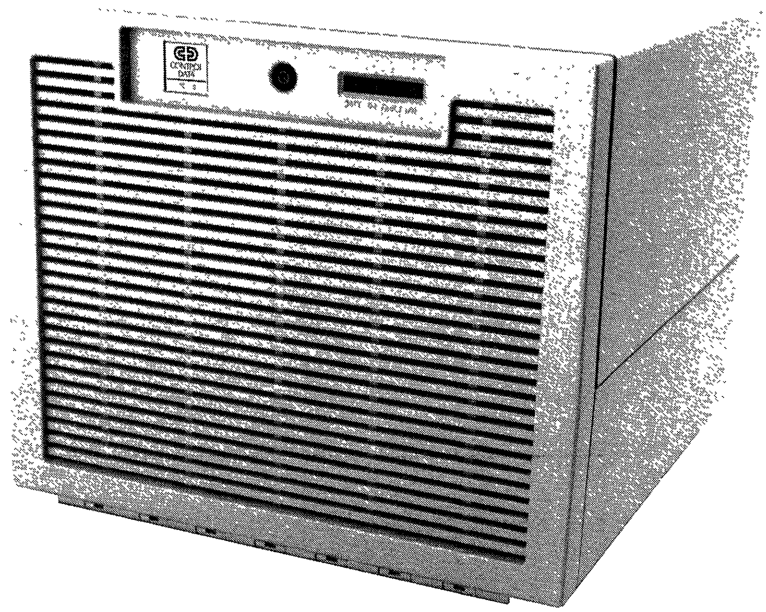

Figure 2-1. Device Interface

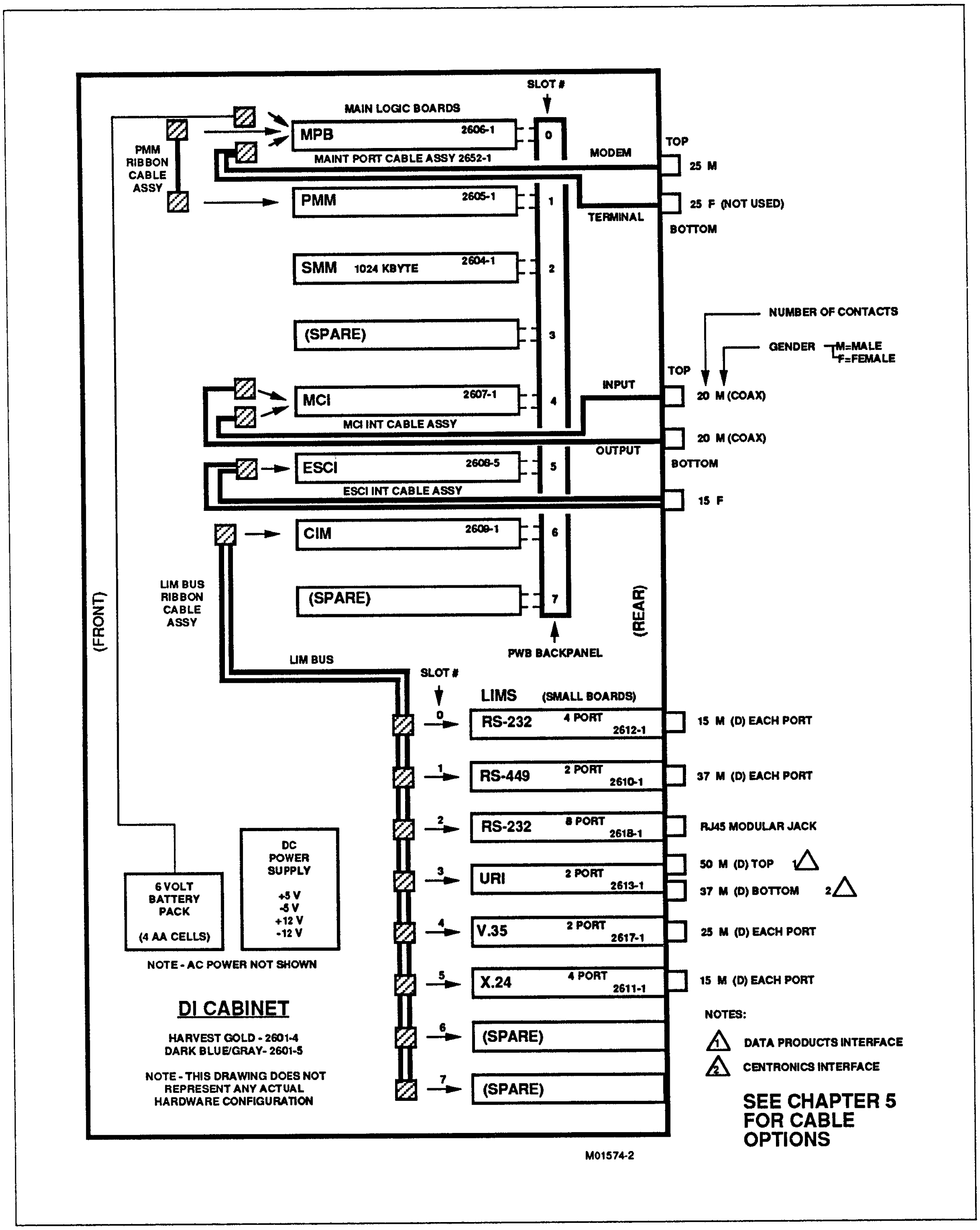

Figure 2-2. DI Logic Boards

Line Interface Modules (LIMs)

The LIMs, also shown in figure 2-2, provide the physical and electrical interface between the communications interface module (CIM) and the user terminal devices. A LIM presents a DTE interface at its connector. Through use of CDCNET direct connect cables, a DCE or DTE interface can be presented to the connecting device.

The LIM boards are physically smaller than the main logic boards and are installed in the LIM backpanel from the back of the DI cabinet (main boards are installed from the front).

Up to eight 2- or 4-port LIMs may be installed in a DI and be driven by one CIM. Up to eight 8-port LIMs may be installed in a DI, but only six LIMs (48 lines) may be driven by one CIM. LIMs are numbered from 0 through 7; slot positions are labeled on the front of the cabinet.

The CIM/LIM cable, sometimes called the LIM bus, has eight LIM connectors. LIM connectors do not have to be installed contiguously; unused connectors do not affect operation.

The available LIMs are:

- 4 serial port RS-232-C LIM
- 8 serial port RS-232-C LIM (asynchronous only)
- 4 serial port X.24 LIM (hardware only; not supported by software)
- 2 serial port RS-449 LIM
- 2 8-bit parallel port unit record interface (URI) LIM
- 2 serial port V.35 LIM

LIM cables

The external cables associated with the LIMs are:

- RS-232-C cables for 4- or 8-port LIMs
- RS-449 cables
- X.24 cables
- V.35 cables
- URI cables

Configuration and installation of DIs is always done on site by a Control Data Customer Engineer or customers trained by Control Data. The CDCNET Hardware Installation and Troubleshooting guide provides complete procedures for configuring and installing DIs.

DIs should not be placed on the floor. Place DIs on a table or shelf or in a cabinet. Control Data offers two device interface enclosures as options.

IEEE 802.3 Network Components

IEEE 802.3 network components enable you to connect your MDIs, TDIs, and NDIs into a local area network using IEEE 802.3 high-speed coaxial cable. Control Data components are compatible with both the IEEE 802.3 standard and ISO/DIS 8802/3 Standard. Components currently available include:

- IEEE 802.3 transceiver interface cables
- IEEE 802.3 transceiver and tap
- IEEE 802.3 multiplexer
- IEEE 802.3 repeater
- IEEE 802.3 cable splice kit
- IEEE 802.3 cable terminator kit
- IEEE 802.3 coaxial cable (two types)

Accessories

CDCNET accessories include products that assist you or your service representative in maintaining and using your network. Accessories include:

- Maintenance Console Option
- CDCNET Maintenance Kit

Data Sheets

This section contains a data sheet for each optional CDCNET hardware product. The data sheet provides the product number(s), overview, physical description, and functional description of the hardware product.

To learn more about CDCNET products, contact your local Control Data sales office or write:

Control Data
Computer Products Marketing
P.O. Box 0
HQW10H
Minneapolis, MN 55440-4700 U.S.A.

Base Device Interface (DI) Cabinet Assembly

Product Numbers 2601-4 Harvest gold
2601-5 Dark blue/gray

Figures 1 and 2 show the front and rear view of the major components of the base DI cabinet including the power supply, batteries, cooling fans, main backpanel, and the line interface module backpanel.

Physical Description

Physical Specifications:

Height: 359 mm (13.75 in)

Width: 430 mm (17 in)

Depth: 465 mm (18.3 in)

Weight: 15.9 kg (35 lb) - Cabinet only

Power:

Each DI requires a separate 1-phase 15-A circuit.

CAUTION

Facility electricians should be aware that the DIs use switching power supplies. A characteristic of this type of power supply is that the neutral current in the facility 3-wire line that feeds the wall box may be as high as 1.73 times the line current. The facility 3-wire neutral line must be large enough to handle this current. When measuring the current on the 3-wire lines, a true RMS meter must be used because of the distorted current waveform.

Power consumption, steady state, maximum:

60 Hz, 120 V ac, 1-phase 0.6 kVa or

50 Hz, 240 V ac, 1-phase 0.6 kVa

Circuit breaker:

60 Hz, 120 V ac, 1-phase 15 A or

50 Hz, 240 V ac, 1-phase 7.5 A

Power cord length:

60 Hz, 120 V ac 2 m (80 in) or

50 Hz, 240 V ac 2.5 m (100 in)

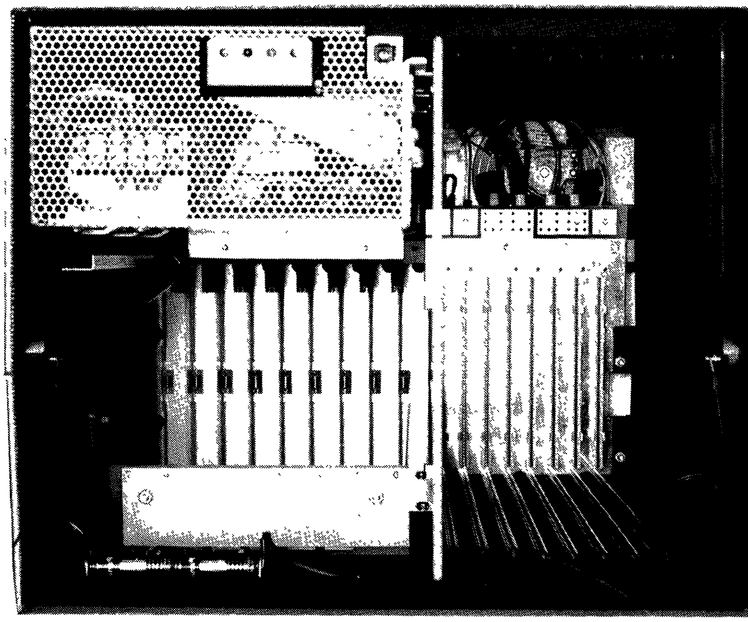

Figure 1. DI Cabinet, Front

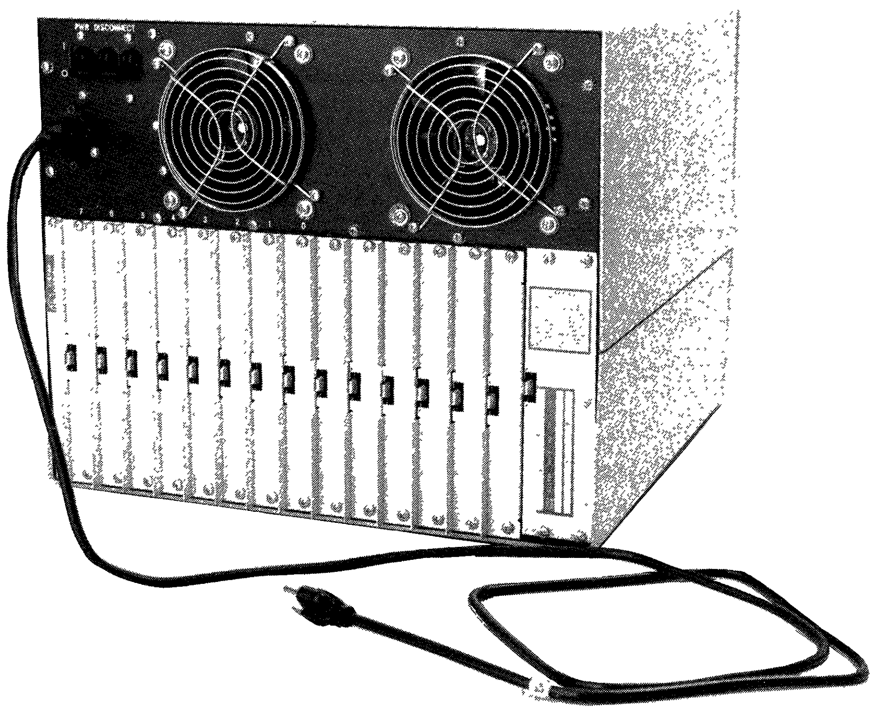

Figure 2. DI Cabinet, Rear

Environmental Considerations:

Type of cooling: Dual internal fans

Source of cooling: Room air

Heat rejection rate, maximum: 369 W (1260 Btu/hr)

Permissible range of room relative humidity: 20% to 80%

Operating temperature:

Maximum: 40.0°C (104°F)

Recommended: 22.2°C (72°F)

Minimum: 10.0°C (50°F)

Storage Temperature:

Maximum: 60.0°C (140°F)

Minimum: –40°C (–40°F)

Dew Point Limitation: 26.1°C (79°F)

Acoustic Noise Level: The DI is classified as a Category 2 Equipment as defined in the American National Standards (ANSI) S1.29. Category 2 Equipment is intended for installation in large offices or retail stores, and includes data processing systems (that are not in special computer rooms) serving several local or remote workstations. Therefore, the DI should not be installed in private offices or other small areas.

Main Processor Board (MPB)

Product Number 2606-1

Every DI board set includes one main processor board (MPB or MPB-II). The MPB generates primary processing power for the DI software.

This board includes a Motorola 68000 microprocessor that supports the following:

- 16 K bytes of random access memory (RAM) with parity.
- 16 K bytes of read only memory (ROM) with checksum. This ROM includes diagnostics, loader, and debug code.
- Battery-backed, real-time clock and calendar.
- 32-MHz oscillator that provides a 16-MHz clock for the DI's internal system bus (ISB).
- A 16-bit status register that indicates such conditions as low battery, temperature warning, temperature shutdown, and low ac power.
- A deadman timer that resets the DI when a hang condition occurs.

In addition to the 16 K of RAM on the MPB, a Motorola 68000 extension bus enables the MPB to access an additional 128 K bytes of RAM. This optional RAM product is called the private memory module (PMM).

Physical Description

The MPB product (figure 1) consists of a single logic board, which is installed in slot 0 of the main backpanel. The front edge of the board has a set of DIP switches and a toggle switch that are used for configuration and maintenance activities. There is also a set of LEDs that monitor power and diagnostic testing. The CDCNET Hardware Installation and Troubleshooting guide contains detailed switch and indicator information.

A single connector on the lower front edge of the MPB is used to connect both the battery cable and the optional maintenance port cable assembly. The batteries provide backup power for 4 K of MPB RAM. The maintenance port cable assembly allows an RS-232-C ASCII terminal or modem to connect directly to the MPB for certain installation and troubleshooting activities. This assembly is available as a product option, called the Maintenance Console Option, that mounts on the back of the DI cabinet.

The PMM is connected to the front of the MPB with a short ribbon jumper cable supplied with the PMM.

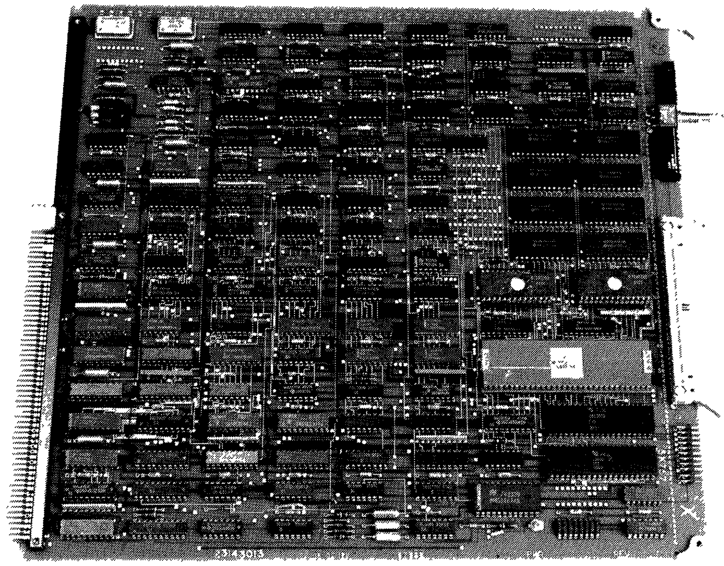

Figure 1. Main Processor Board (MPB)

Improved Performance Main Processor Board (MPB-II)

Product Number 2602-1

The MPB-II is a high-performance processor board with improved speed and functionality. It may be used in place of the MPB (product number 2606-1) with CDCNET version 1.5.1 and later versions. When an MPB-II is used in a DI instead of an MPB, the optional private memory module (PMM) cannot be used to improve MPB RAM performance. The MPB-II includes onboard private memory and a Motorola 68030 microprocessor that support the following:

- 512 K bytes of RAM.
- 48 K bytes of electronically erasable programmable read only memory (EEPROM).
- 32-MHz oscillator to provide a 16-MHz clock for the DIs internal system bus (ISB). This clock is divided by 2 to produce an 8-MHz clock for the internal control bus (ICB) interrupt counter.
- 20-MHz oscillator to provide a 10-MHz clock to the ISB Interface and for a timing reference for other modules in the DI system.
- Six 16-bit local status registers.
- Small computer systems interface (SCSI) that supports a single-ended SCSI bus (not supported by software).
- External reset interface (ERI).
- Deadman timer that resets the DI in case of a software failure.

Physical Description

The MPB-II (figure 1) consists of a single logic board, which is installed in slot 0 of the main backpanel. The front edge of the board has a set of DIP switches and a toggle switch that are used for configuration and maintenance activities. There is also a set of LEDs that monitor power and diagnostic testing. The CDCNET Hardware Installation and Troubleshooting guide contains detailed switch and indicator information.

A SCSI connector on the front edge of the MPB-II provides an 8-bit parallel interface that meets the ANSI X3.131-1986 standard. The interface has a 50-pin male connector for use with a 5-conductor ribbon cable assembly.

An RS-232-C serial data interface connector is also located on the front edge of the MPB-II. This interface has an 18-pin male connector that allows an RS-232-C ASCII terminal or modem to connect directly to the MPB-II for certain installation and troubleshooting activities. It mates with the MPB maintenance cable (MCO) provided in the CDCNET maintenance kit (product number 2653-2).

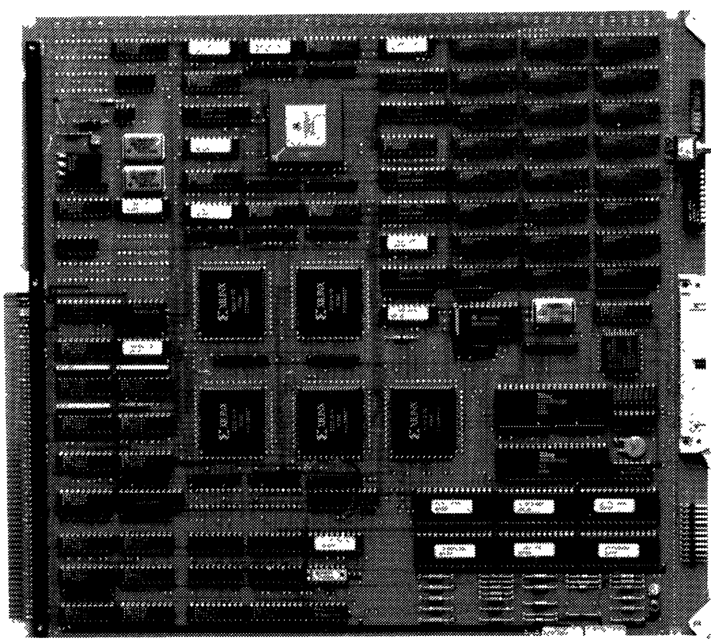

Figure 1. Improved Performance Main Processor Board (MPB-II)

System Main Memory (SMM) Board

Product Number 2604-1

The SMM board contains 1024 K bytes of DI system memory. All DIs contain at least one SMM, however, certain DI configurations use additional SMM boards to improve performance.

The maximum transfer time for an SMM read cycle is 312.5 ns (625 ns for a read cycle with corrected error). The maximum transfer time for a write cycle is 312.5 ns (625 ns for a byte write). The SMM incorporates single-error correction/double-error detection (SECDED). The format of the 1024 K-board is two banks of 256 K x 22 bits and the starting address is defined by the DI main processor during initialization.

Physical Description

The SMM product (figure 1) consists of a single logic board that is plugged into the main backpanel. SMM boards may be installed in any slot (except 0) but are usually in slot 2, 3, or 4. Note that slot 0 is always reserved for the MPB and, if a PMM is installed, it must be in slot 1.

The SMM board includes an online/offline toggle switch and an error indicator on the front edge of the board.

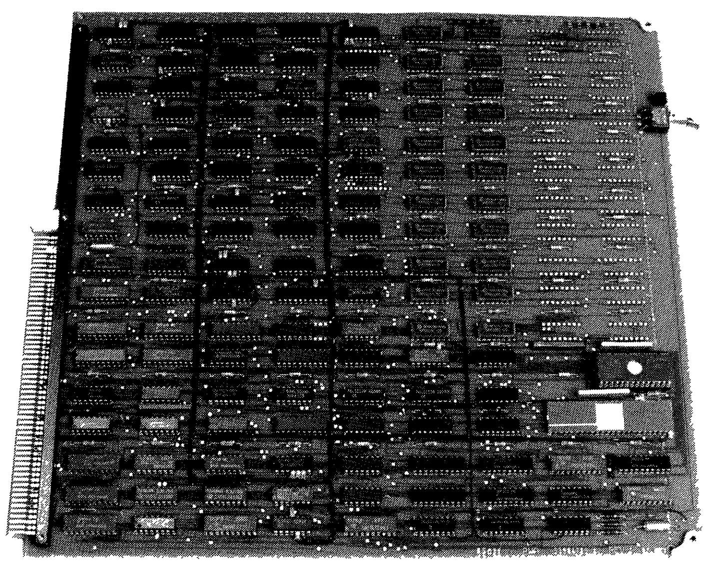

Figure 1. System Main Memory (SMM) Board

4 M-Byte System Main Memory (SMM4) Board

Product Number 2604-2

When a DI requires additional RAM memory to support network software products, you can replace the SMM board or boards with one or more SMM4 boards with CDCNET version 1.5.1 or later. However, a mixture of SMM and SMM4 boards in a single DI is not supported.

Each SMM4 board contains 4 M bytes of RAM. The SMM4 also includes byte SECDED, ROM, and other associated logic that makes it functionally equivalent to an SMM.

Should a single memory bank fail, the SMM4 is software-degradeable to 2 M bytes.

The maximum transfer time during an SMM4 read cycle is 312.5 ns. The maximum transfer time for a byte write cycle is 312.5 ns.

Physical Description

The SMM4 product (figure 1) consists of a single logic board that is plugged into the main backpanel. A maximum of three SMM4 boards per DI may be installed starting in any slot (except 0) but are usually in slots 1, 2, or 3. Note that slot 0 is always reserved for the MPB.

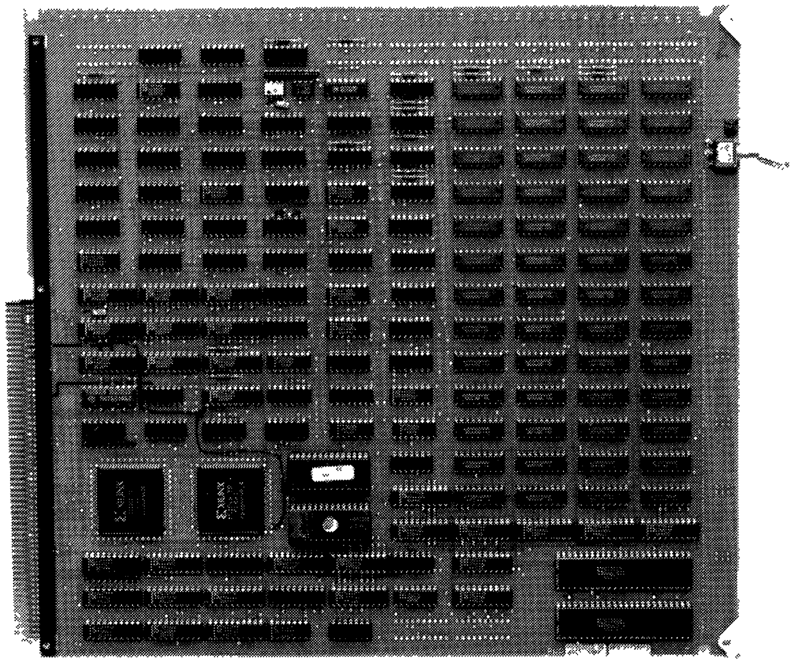

Figure 1. 4 M-Byte System Main Memory (SMM4) Board

Private Memory Module (PMM)

Product Number 2605-1

This product is an optional 128 K byte memory board that is used in applications requiring increased DI throughput. The MPB uses the PMM as an extension of its own 16 K RAM. This increased RAM reduces the number of MPB accesses to the SMM memory (which is shared by other logic boards). Maximum PMM transfer rates are 140 ns for a read cycle and 180 ns for a write cycle.

NOTE

The PMM cannot be used with the MPB-II.

Physical Description

The PMM product (figure 1) consists of a logic board and a jumper cable that connects to the MPB. Only one PMM is permitted per DI and it is always installed in slot 1. An LED on the front edge of the board indicates board failure.

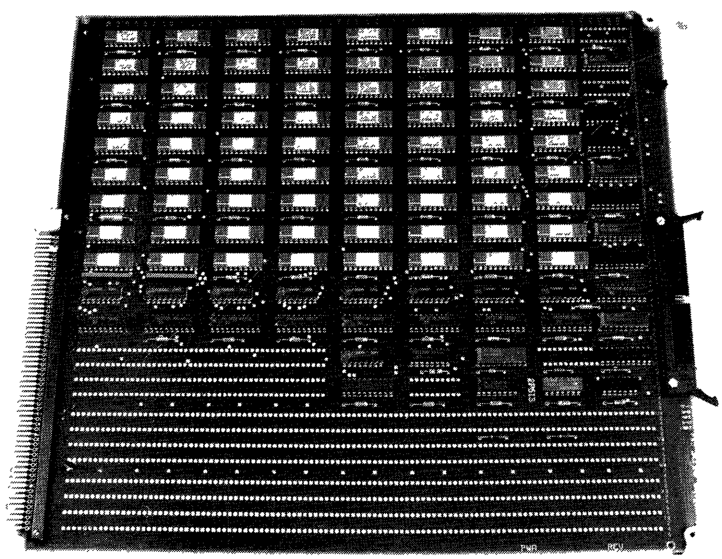

Figure 1. Private Memory Module (PMM)

Mainframe Channel Interface (MCI) Board

Product Number 2607-1

The MCI interfaces a 12-bit CYBER channel to the DI internal system bus. The MCI supports chained direct memory access and onboard ROM containing bootstrap code, diagnostics, and checksum circuitry.

NOTE

The pass-on/pass-back feature supported by some products connected to a CYBER channel is not available on CDCNET DIs. This means that the channel cables from the host to the DI cannot be "daisy chained" to another device.

Physical Description

The MCI product (figure 1) includes the MCI board, a pair of channel I/O cables, and an internal cable assembly. The internal cable assembly includes a connector plate that mounts on the back of the cabinet and has two connectors for the channel cables. The other end of the cable plugs into the front of the board. CDCNET version 1.0 software allows only one board per DI; version 1.2 and later allow two boards per DI. Boards are usually installed in slots 6 and 7.

The MCI has DIP switches to enable/disable channel parity and to select the board as a boot source (this means that the host can load DI software through the board). Two fault indicators are used to indicate local (board) or remote (channel) errors.

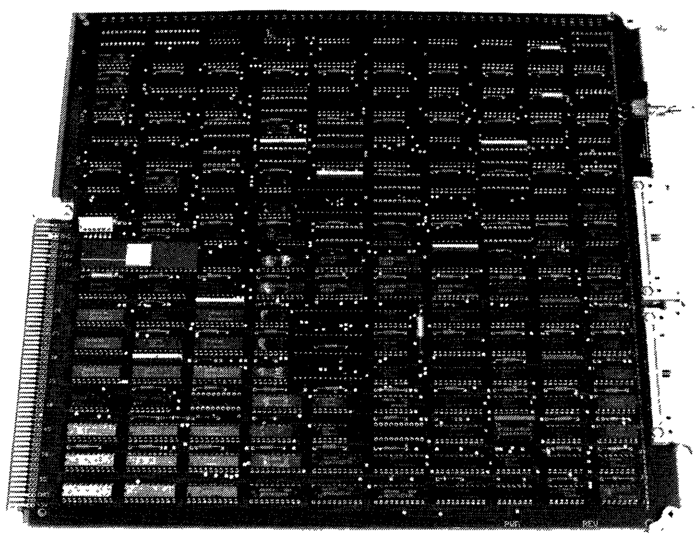

Figure 1. Mainframe Channel Interface (MCI) Board

Ethernet Serial Channel Interface (ESCI) Board

Product Number 2608-5

The ESCI board is the interface between the DI internal system bus and an IEEE 802.3 trunk.

ESCI features includes:

- Motorola 68000 microprocessor
- 16 K bytes of ROM
- 32 K bytes of RAM
- Ethernet controller chip
- Ethernet serial interface chip

The ROM contains code to enable downline loading of network software across an IEEE 802.3 trunk and self-test diagnostics.

Physical Description

The ESCI product (figure 1) consists of a logic board and a cable assembly. The board supplies power to the IEEE 802.3 transceiver. The cable assembly has a connector plate that mounts on the back of the cabinet and connects to the IEEE 802.3 transceiver cable. The other end of the internal cable plugs into the front of the ESCI board. The connection to the IEEE 802.3 cable is through a 15-pin female connector. See chapter 7 for transceiver and transceiver cable connector pin assignments.

A toggle switch on the front of the board selects online/offline operation and a configuration switch enables/disables the board as a boot source. Local and remote fault indicators light if a board error (local) or a transceiver error (remote) is detected.

Up to three ESCI boards may be installed in a single DI with CDCNET version 1.2 or later.

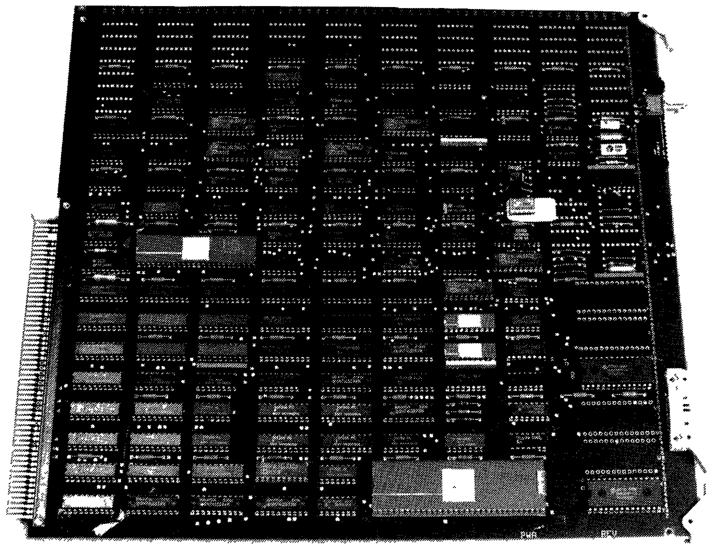

Figure 1. Ethernet Serial Channel Interface (ESCI) Board

Communications Interface Module (CIM)

Product Number 2609-1

The CIM performs all protocol and message handling functions for communications lines. The CIM can support from 2 to 48 asynchronous lines. Support of HASP workstations depends on data rates and workloads. For example, the CIM can support up to 16 HASP workstations at 9600 bps, but only 8 at 19.2 K bps. The CIM can support one 256-K bps trunk or three 64-K bps trunks. The CIM supports a maximum of 48 lines.

If both asynchronous and HASP terminals are connected to one DI, two CIMs are required for CDCNET version 1.2 and earlier.

The CIM includes:

- One Motorola 68000 microprocessor
- 24 K bytes of RAM
- 16 K bytes of ROM that includes code to run self-test diagnostics

Physical Description

The CIM product (figure 1) consists of a logic board and a flat cable assembly called the LIM bus which connects to the Line Interface Modules (LIMs). The LIMs, in turn, are connected to the user terminal devices.

A maximum of three CIMs can be installed per DI for CDCNET version 1.2 or later. CIMs are usually installed in slots 3, 4, or 5.

A toggle switch on the front of the board selects online/offline operation and a configuration switch enables/disables the board as a boot source. Local and remote fault indicators light if a board error (local) or a LIM error (remote) is detected.

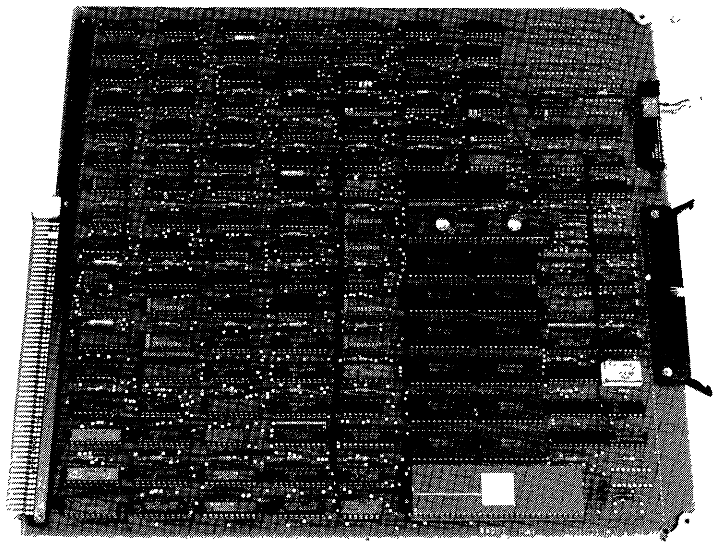

Figure 1. Communications Interface Module (CIM)

4-Port RS-232-C Line Interface Module (LIM)

Product Number 2612-1

The 4-Port RS-232-C LIM provides four channels of full-duplex serial data plus the synchronous and asynchronous control signals specified by EIA RS-232-C revision D and CCITT V.24. (Refer to chapter 7 for RS-232/V.24 cable/signal details). Up to eight 4-port RS-232 LIMs can be installed per DI.

All LIMs have VLSI line controllers and support the following features.

- Transmit/receive rates of 50 bps to 38.4 K bps asynchronous or to 64 K bps synchronous
- Parity: odd, even, or off
- Eight bits per character
- High-Level Data Link Control (HDLC) cyclical redundancy check (CRC) and flag recognition/generation
- LEDs for Fault, Transmit, and Receive indications

Physical Description

The 4-Port RS-232 LIM (figure 1) consists of a single logic board that is plugged into the LIM backpanel. Each LIM receives power from the backpanel and exchanges data with the CIM over the LIM bus.

The LIM has four 15-pin subminiature male D-type connectors for connecting to terminal devices. See chapter 7 for pin assignments.

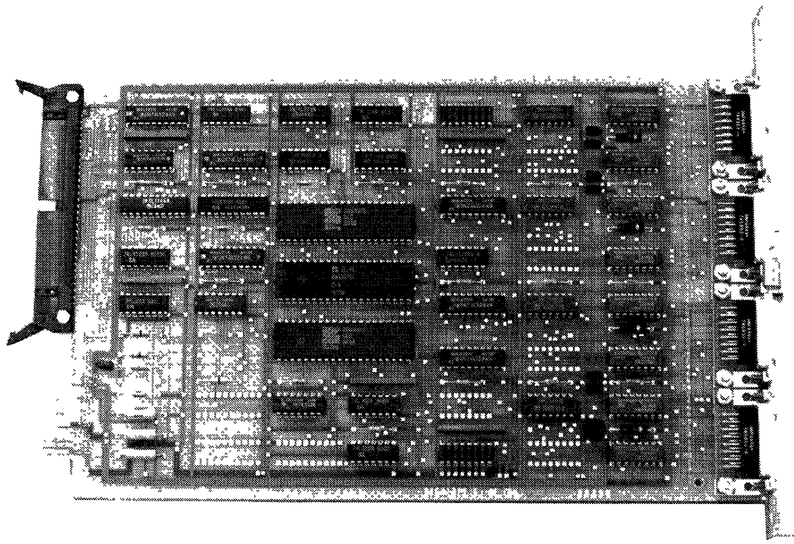

Figure 1. 4-Port RS-232-C Line Interface Module (LIM)

4-Port RS-232-C LIM Cables

Product Numbers

CL2	CL2P	Length
2612-108	-	3.1 m (10 ft)
2612-123	-	7.6 m (25 ft)
2612-148	2612-149	15.2 m (50 ft)

Connect one port of the 4-Port RS-232-C LIM to all modems/data sets and to most other data circuit terminating equipment (DCE) devices that require a male cable connector.

CL2	CL2P	Length
2612-508	-	3.1 m (10 ft)
2612-523	-	7.6 m (25 ft)
2612-548	2612-549	15.2 m (50 ft)

Connect one port of the 4-Port RS-232-C LIM to most terminals and other data terminal equipment (DTE) devices requiring a female cable connector.

CL2	CL2P	Length
2612-608	-	3.1 m (10 ft)
2612-623	-	7.6 m (25 ft)
2612-648	2612-649	15.2 m (50 ft)

Connect one port of the 4-Port RS-232-C LIM to those terminal devices (DTEs) that use hardware flow control (Request to Send, Clear to Send) and require a female cable connector.

CL2	CL2P	Length
2612-708	-	3.1 m (10 ft)
2612-723	-	7.6 m (25 ft)
2612-748	2612-749	15.2 m (50 ft)

Connect one port of the 4-Port RS-232-C LIM to terminals and other DTE devices requiring a male cable connector. Used with Control Data V/X and V/TTY terminals.

CL2	CL2P	Length
2612-808	–	3.1 m (10 ft)
2612-823	–	7.6 m (25 ft)
2612-848	2612-849	15.2 m (50 ft)

Connect one port of the 4-Port RS-232-C LIM to terminal devices (DTEs) that use hardware flow control (Request to Send, Clear to Send) and require a male cable connector.

Connect one port of the 4-Port RS-232-C LIM to DCE and DTE devices.

Physical Description

Cables (figure 1) share the following characteristics:

- 15-pin subminiature D-plug (female) that plugs into the LIM receptacle.
- 25-pin RS-232-C/V.24 D-type connector that connects to the user terminal device. The outer dimensions of the connector shell are 15.75 mm (0.620 in) by 53.04 mm (2.088 in).
- Lengths of 3.1, 7.6, or 15.2 m (10, 25, or 50 ft).

Class 2 cables (CL2) and class 2 plenum cables (CL2P) meet requirements of article 725, paragraph 38b of the National Electrical Code (NEC) NFPA 70.

Chapter 7 provides additional information that will help you select the right cable or build your own cables.

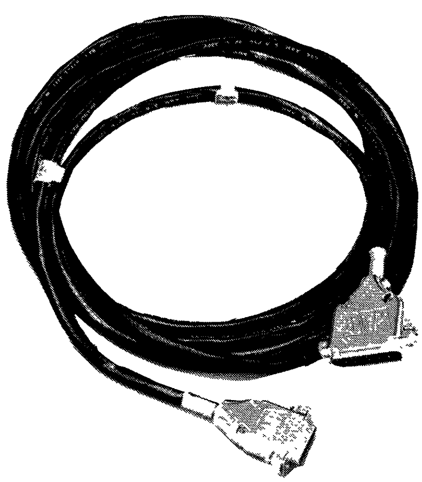

Figure 1. 4-Port RS-232-C LIM Cable

8-Port RS-232 Asynchronous Line Interface Module (LIM)

Product Number 2618-1

The 8-Port RS-232-C Asynchronous LIM (figure 1) provides for eight interface channels of full-duplex serial data plus the asynchronous control signals specified by RS-232-C revision D and CCITT V.24. (Refer to chapter 7 for RS-232/V.24 cable/signal details). Up to eight 8-Port RS-232 LIMs can be installed per DI. Up to six LIMS (48 lines) may be driven by one CIM.

All LIMs have VLSI line controllers and support the following features.

- Transmit and receive rates for 50 bps to 19.2 K bps, asynchronous only
- Parity: odd, even, or off
- Eight bits per character

Physical Description

The 8-Port RS-232 LIM consists of a single logic board that is plugged into the LIM backpanel. Each LIM receives power from the backpanel and exchanges data with the CIM over the LIM bus.

The LIM has eight RJ45 modular keyed female connectors for connecting to terminal devices. Different RJ45 to 25-pin adapters allow the LIM to be used for DTE or DCE. See chapter 7 for pin assignments.

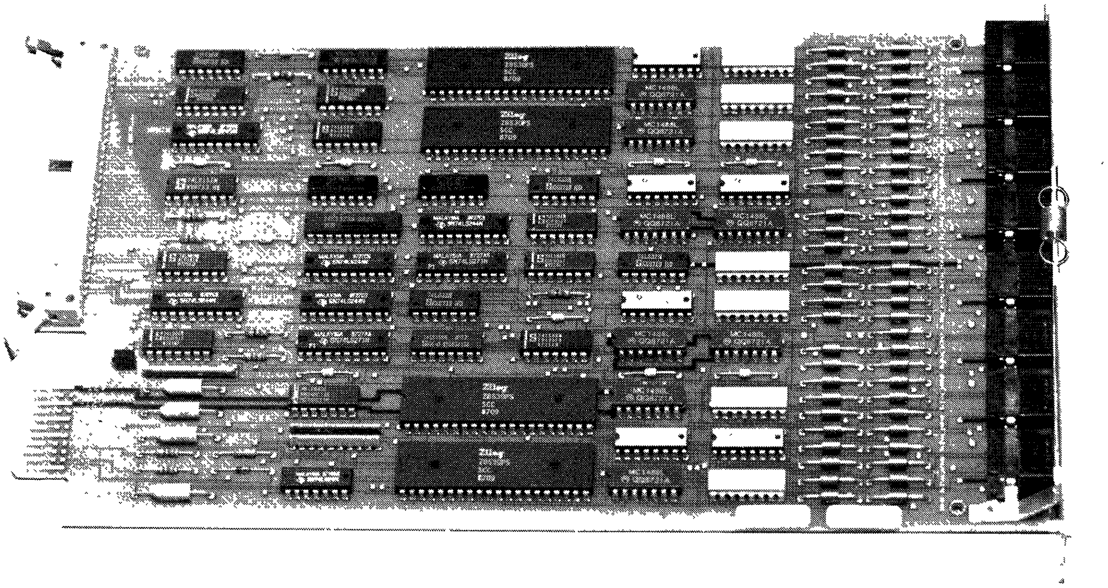

Figure 1. 8-Port RS-232 Asynchronous Line Interface Module (LIM)

8-Port RS-232 Asynchronous LIM Cables

Product Numbers

CL2	CL2P	Length	Type
2618-112	-	4.2 m (14 ft)	Unshielded
2618-123	-	7.6 m (25 ft)	Unshielded
2618-148	2618-149	15.2 m (50 ft)	Unshielded
2618-198	2618-199	60 m (200 ft)	Unshielded
2618-212	-	4.2 m (14 ft)	Shielded
2618-223	-	7.6 m (25 ft)	Shielded
2618-248	2618-249	15.2 m (50 ft)	Shielded
2618-398	2618-399	60 m (200 ft)	Shielded

Connect one port of the 8-Port RS-232 LIM to DCE and DTE devices that require an 8-pin RJ45 male connector. RJ45 modular-to-EIA-25-pin adapters (product 2618-xx) must be used at the DTE/DCE end of these cables.

NOTE

Shielded RS-232-C Asynchronous LIM cables (product numbers 2618-212, -223, -248, and -398) are required for VDE applications.

Physical Description

Cables share the following characteristics:

- 8-wire, 0°-phased, modular cord
- RJ45 nonkeyed male connectors at both ends
- Lengths of 4.2, 7.6, 15.2, or 60 m (14, 25, 50, or 200 ft)

The RJ45 connectors on the unshielded cables (figure 1) have 8 pins; the connectors on the shielded cables (figure 2) have 9 pins, one of which is connected to the shield.

Class 2 cables (CL2) and class 2 plenum cables (CL2P) meet requirements of article 725, paragraph 38b of the National Electrical Code (NEC) NFPA 70.

Chapter 7 provides additional information that will help you select the right cable and connector adapters or build your own cables.

Figure 1. 8-Port RS-232-C Asynchronous LIM Cables (Unshielded)

Figure 2. 8-Port RS-232-C Asynchronous LIM Cables (Shielded)

RJ45/DB25 Connector Adapters

Product Numbers	2618-11	LIM to DCE adapter for use with modems/data sets and other DCE devices that require a male connector and that use DCE flow control, DCD disconnect, and Make Busy.
	2618-21	LIM to DCE adapter for use with modems/data sets and other DCE devices that require a male connector and that use DCE flow control, DSR disconnect, and Make Busy.
	2618-31	LIM to DCE adapter for use with modems/data sets and other DCE devices that require a male connector and that use both DCD and DSR disconnect.
	2618-50	LIM to DTE adapter for use with terminal devices that require a female connector and that use hardware or software flow control.
	2618-51	LIM to DTE adapter for use with terminal devices that require a male connector and that use hardware or software flow control.

Adapt the 8-Port Asynchronous LIM cable connector for use with DTE and DCE devices requiring a 25-pin connector.

CAUTION

When using non-Control Data cables, use only 0°-phased RS-232-C Asynchronous LIM cables with these modular adapters. Do not use 180°-phased cables. Use of 180°-phased cables will cause improper operation and may damage connected equipment.

Physical Description

The RJ45/DB25 adapter (figure 1) has an RJ45 female connector on one end and either a male or female DB25 connector on the other end.

See chapter 7 for pin assignments.

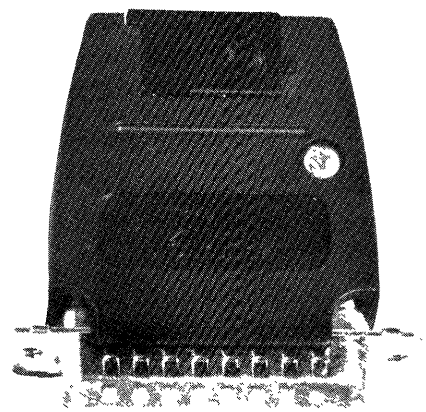

Figure 1. RJ45/DB25 Connector Adapter

RS-449 Line Interface Module (LIM)

Product Number 2610-1

The 2-Port RS-449 LIM (figure 1) provides the link to two terminal (DTE) or modem (DCE) RS-449 serial communications lines. It provides for two channels of full-duplex serial data plus significant parallel data/status circuitry for modem control.

Up to eight LIMs can be installed per DI and all eight LIMs can be controlled by one CIM.

RS-449 LIM features are as follows:

- Electrical interface: RS-422/CCITT V.11 or RS-423/CCITT V.10.
- Data rate: Transmit and receive rates from 50 to 38.4 K bps asynchronous when using internal clock. Up to 256 K bps full duplex (FDX), synchronous when using external clock.
- External/internal clock.
- Asynchronous/synchronous line modes.
- Eight bits per character.
- Parity: odd, even, or off.
- High-Level Data Link Control (HDLC) cyclical redundancy check (CRC) and flag recognition/generation in synchronous mode.
- Auto echo and loop-back.
- Interrupt (vectors, enable).
- Mark or space idle.
- LEDs for Fault, Transmit, and Receive indications.

Physical Description

The RS-449 LIM consists of a single logic board that is plugged into the LIM backpanel. Each LIM receives power from the backpanel and exchanges data with the CIM over the LIM bus.

The LIM has two 37-pin male connectors for connecting to terminal devices. See chapter 7 for pin assignments.

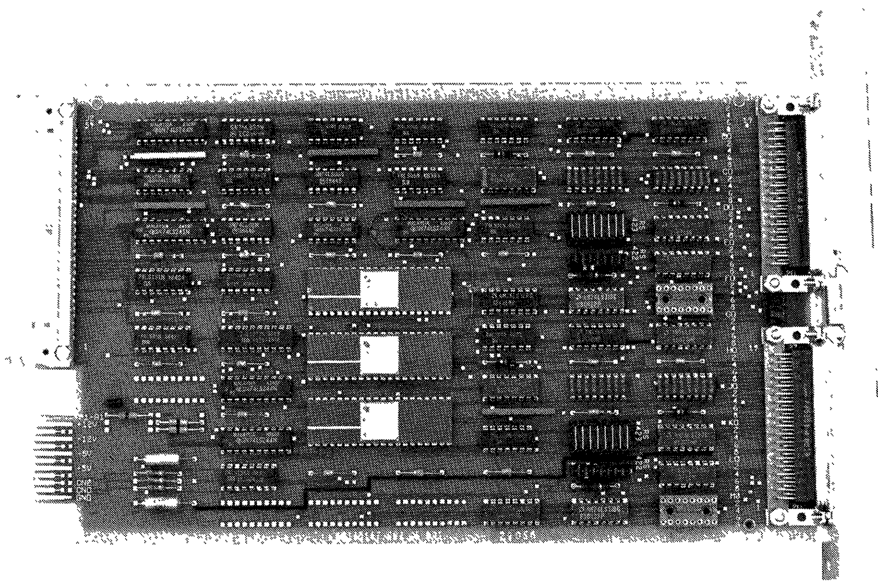

Figure 1. 2-Port RS-449 Line Interface Module (LIM)

RS-449 LIM Cables

Product Numbers

CL2	CL2P	Length
2610-123	-	7.6 m (25 ft)
2610-148	2610-149	15.2 m (50 ft)
2610-188	2610-189	58 m (190 ft)

These products connect an RS-449 LIM to a modem/data set or other DCE device that requires a male connector.

CL2	CL2P	Length
2610-523	-	7.6 m (25 ft)
2610-548	2610-549	15.2 m (50 ft)
2610-588	2610-589	58 m (190 ft)

These products connect an RS-449 LIM to a terminal or other DTE device that requires a female connector.

Connect an RS-449 LIM to a DCE or DTE device.

Physical Description

These RS-449 cables (figure 1) have the following characteristics:

- 37-pin subminiature D-plug (female) that connects to the LIM receptacle (male)
- 37-pin subminiature D-plug to user device
- Lengths of 7.6, 15.2, or 58 m (25, 50, or 190 ft)

Class 2 cables (CL2) and class 2 plenum cables (CL2P) meet requirements of article 725, paragraph 38b of the National Electrical Code (NEC) NFPA 70.

Chapter 7 provides additional information that will help you select the right cable or build your own cables.

Figure 1. RS-449 LIM Cable

X.24 Line Interface Module (LIM)

Product Number 2611-1

The X.24 LIM provides four independent X.24 (DTE) ports. Up to eight LIMs can be installed per DI and can be controlled by one CIM.

NOTE

Currently the X.24 interface is a hardware-only feature; not supported by communications software.

X.24 LIM features include:

- Transmit/receive rates of 50 bps to 38.4 K bps asynchronous and 64 K bps synchronous with external clock
- External/internal clock
- Asynchronous/synchronous line modes
- Eight bits per character
- Parity: odd, even, or off

Physical Description

The X.24 LIM (figure 1) consists of a single logic board that is plugged into the LIM backpanel. Each LIM receives power from the backpanel and exchanges data with the CIM over the LIM bus.

The LIM has four 15-pin subminiature male D-type connectors for connecting to terminal devices. See chapter 7 for pin assignments.

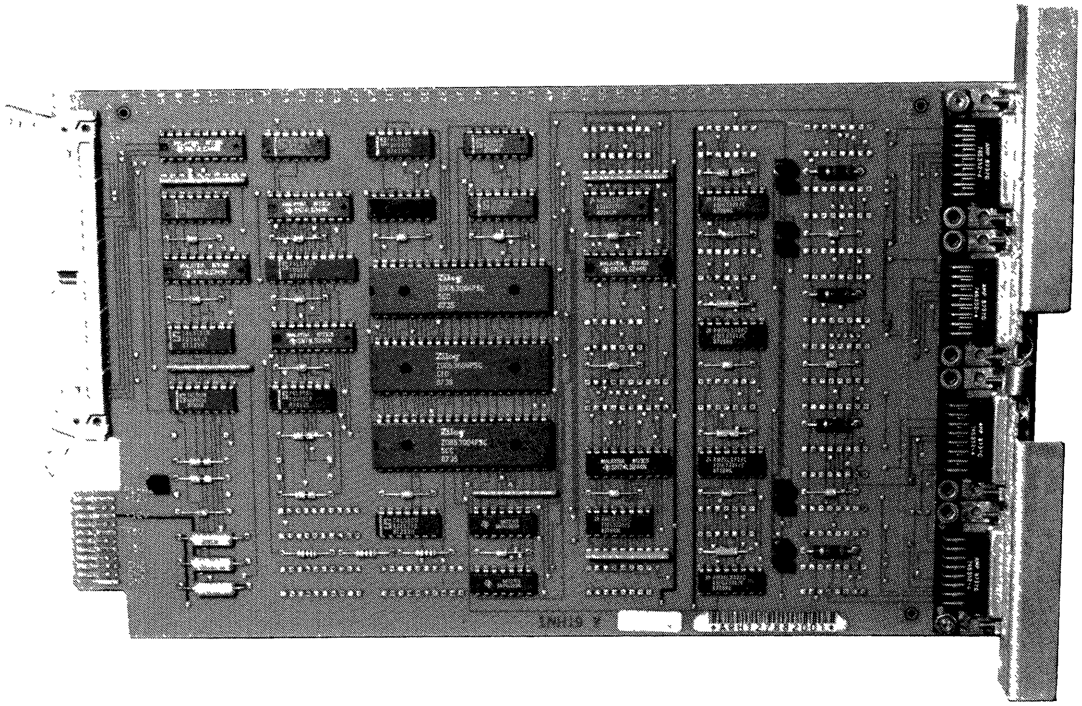

Figure 1. X.24 Line Interface Module (LIM)

X.24 LIM Cables

Product Numbers

CL2	CL2P	Length
2611-123	-	7.6 m (25 ft)
2611-148	2611-149	15.2 m (50 ft)
2611-188	2611-189	58 m (190 ft)

Connect one port of the 4-port X.24 LIM to DCE devices.

Physical Description

Cables (figure 1) share the following characteristics:

- 15-pin subminiature D-plug (female) that plugs into the LIM receptacle
- 15-pin subminiature D-plug (male) that plugs into the user device
- Lengths of 7.6, 15.2, or 58 m (25, 50, or 190 ft)

Class 2 cables (CL2) and class 2 plenum cables (CL2P) meet requirements of article 725, paragraph 38b of the National Electrical Code (NEC) NFPA 70.

Chapter 7 provides additional information that will help you select the right cable or build your own cables.

Figure 1. X.24 LIM Cable

Unit Record Line Interface Module (URI)

Product Number 2613-1

The URI LIM (figure 1) provides a parallel interface for the operation of a character or line printer.

The LIM has two connectors for connecting to 8-bit parallel devices. The two basic printer interfaces supported are:

- Data Products long line interface
- Centronics interface

The Data Products long line interface operates up to 150 m (492 ft) from the printer.

The Centronics interface operates up to 7.6 m (25 ft) from the printer.

NOTE

Current CDCNET printer support software does not use the Centronics interface.

The URI LIM drives one printer at a time.

The LIM features are as follows:

- LIM bus interface
- Parity generator/checker for LIM bus (8-bit odd parity)
- Serial communications controller
- Two counter/timer parallel I/O units
- Data Products long line interface
- Centronics TTL interface
- Parity generator for printer interface

Physical Description

The URI LIM consists of a single logic board that is plugged into the LIM backpanel. Each LIM receives power from the backpanel and exchanges data with the CIM over the LIM bus.

The LIM has two connectors for connecting to 8-bit parallel devices. See chapter 7 for pin assignments.

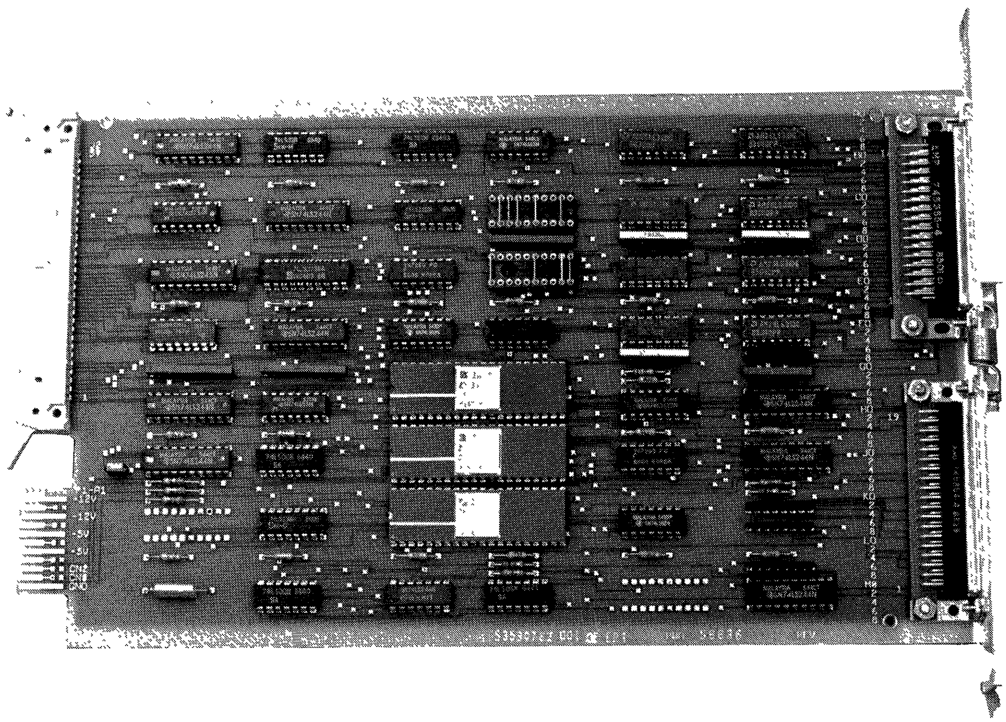

Figure 1. Unit Record Line Interface Module (URI)

URI LIM Cables

Product Numbers

CL2	Length
2613-123	7.6 m (25 ft)
2613-148	15.2 m (50 ft)

URI to Centronics cables connect the URI LIM to Centronics interface requiring a 36-pin male D-type connector.

CL2	CL2P	Length
2613-223	–	7.6 m (25 ft)
2613-248	2613-249	15.2 m (50 ft)
2613-297	2613-298	30.4 m (100 ft)

URI to Data Products cables connect the URI LIM to Data Products equipment using the Data Products long-line interface and requiring a 50-pin male D-type connector. This cable is used with the Control Data 585 line printer using the Data Products long-line interface.

Connect a URI LIM to Centronics or Data Products equipment.

Physical Description

The 2613-1xx Centronics cables have:

- 37-pin female D-type connector that plugs into the bottom LIM receptacle
- 36-pin male D-type connector at the printer end
- Lengths of 7.6 or 15.2 m (25 or 50 ft)

The 2613-2xx Data Products cables (figure 1) have the following characteristics.

- 50-pin female D-type connector that plugs into the top LIM receptacle
- 50-pin male D-type connector at the printer end
- Lengths of 7.6, 15.2, or 30.4 m (25, 50, or 100 ft)

Class 2 cables (CL2) and class 2 plenum cables (CL2P) meet requirements of article 725, paragraph 38b of the National Electrical Code (NEC) NFPA 70.

Figure 1. URI to Data Products Cable

URI Adapter Cable

Product Number

CL2	Length
2613-301	0.91 m (3 ft)

URI (Winchester) adapter cable. This cable mates with the 50-pin male D-type connector on the Data Products LIM cable to provide a connection to printers requiring a 50-pin female D-type Winchester connector.

Physical Description

This cable has the following characteristics:

- 50-pin female D-type connector that plugs into the LIM Data Products cable (2613-2xx)
- 50-pin female D-type connector at the printer end
- Length of 0.91 m (3 ft)

Chapter 7 provides additional information that will help you select the right cable or build your own cables.

V.35 Line Interface Module (LIM)

Product Number 2617-1

The V.35 LIM (figure 1) provides the physical link for two data terminal equipment (DTE) or data circuit-terminating equipment (DCE) serial communications lines.

V.35 features include:

- Data rate: Transmit and receive rates from 50 to 38.4 K bps asynchronous. Up to 72 K bps full duplex, synchronous when using external clock.
- External/internal clock.
- Asynchronous/synchronous line modes.
- Eight bits per character.
- Parity: odd, even, or off.

The LIM supports two independent full duplex user ports.

Physical Description

The V.35 LIM consists of a single logic board that is plugged into the LIM backpanel. Each LIM receives power from the backpanel and exchanges data with the CIM over the LIM bus.

The LIM has two 25-pin subminiature D-type connectors for connecting to terminal devices. See chapter 7 for pin assignments.

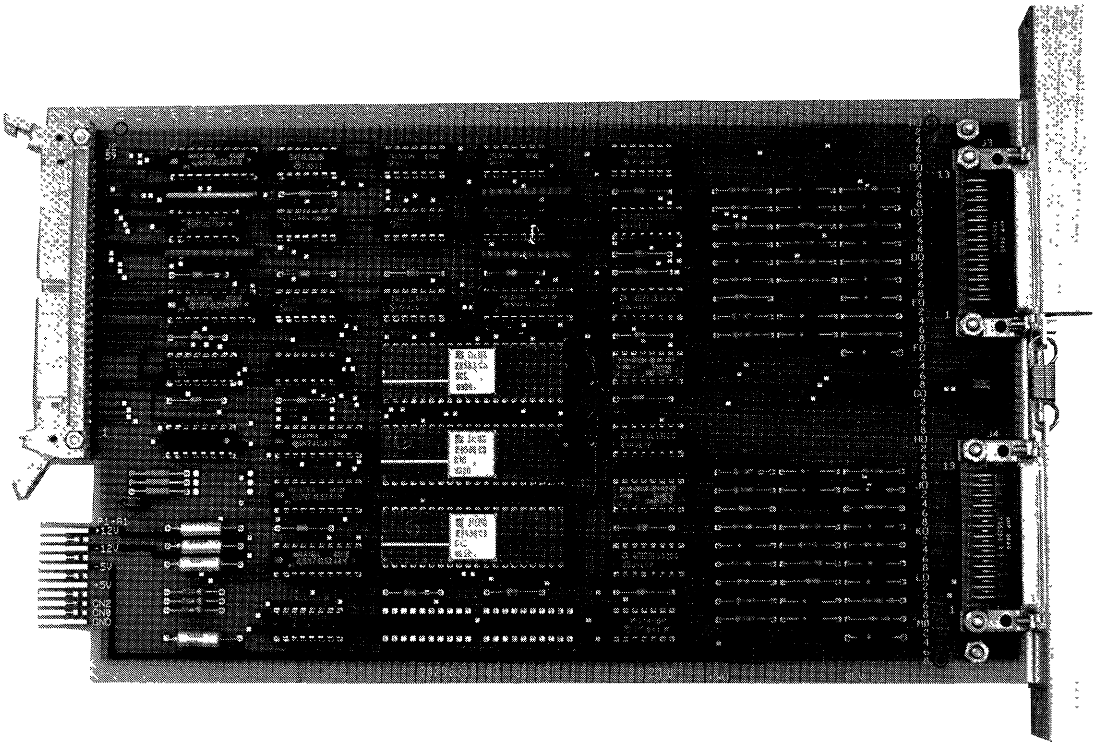

Figure 1. 2-Port V.35 Line Interface Module (LIM)

V.35 LIM Cables

Product Numbers

CL2	CL2P	Length
2617-108	-	3.1 m (10 ft)
2617-123	-	7.6 m (25 ft)
2617-148	2617-149	15.2 m (50 ft)

Connect the LIM to a modem/data set or other DCE devices that require a 34-pin male cable connector (ISO 2593) with 0.060-in diameter pins and single lead jackscrew connector locking mechanism.

CL2	CL2P	Length
2617-208	-	3.1 m (10 ft)
2617-223	-	7.6 m (25 ft)
2617-248	2617-249	15.2 m (50 ft)

Connect the LIM to modem/data set or other DCE devices that require a 34-pin male cable connector with 0.040-in diameter pins and spring clip with guide arm connector locking mechanism.

CL2	CL2P	Length
2617-508	-	3.1 m (10 ft)
2617-523	-	7.6 m (25 ft)
2617-548	2617-549	15.2 m (50 ft)

Connect the LIM to a terminal or other DTE devices that require a 34-pin female cable connector for 0.060-in diameter pins, and single lead jackscrew connector locking mechanism..

Connect the V.35 LIM to a DCE or DTE device.

Physical Description

These V.35 cables (figure 1) have the following characteristics:

- 25-pin subminiature D-plug (female) that plugs into the LIM receptacle (male)
- 34-pin plug that connects to the user modem
- Lengths of 3.1, 7.6, or 15.2 m (10, 25, or 50 ft)

Class 2 cables (CL2) and class 2 plenum cables (CL2P) meet requirements of article 725, paragraph 38b of the National Electrical Code (NEC) NFPA 70.

Chapter 7 provides additional information that will help you select the right cable or build your own cables.

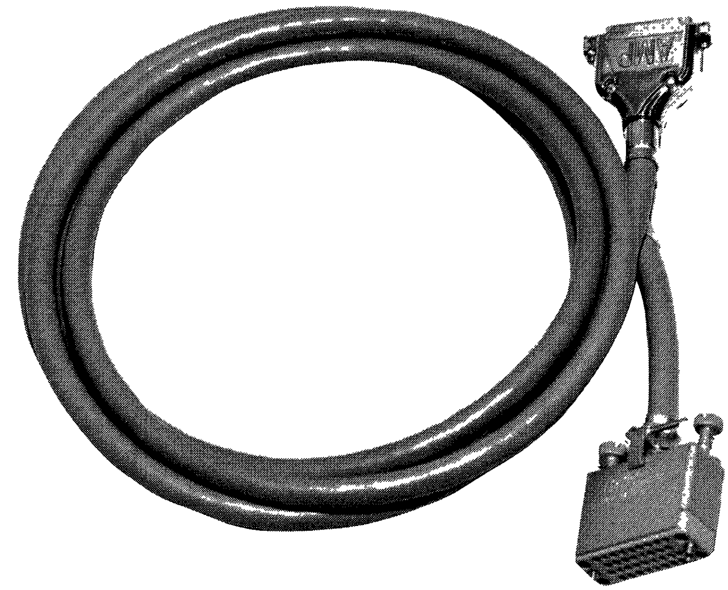

Figure 1. V.35 LIM Cables

Integrated Communications Adapter (ICA)

Product Number 2629-2

The Integrated Communications Adapter (ICA) provides a connection between a 16-bit Integrated Controller Interface (ICI) channel and a single IEEE 802.3 trunk.

The ICA supports up to 10 M bits transfer rate at the IEEE 802.3 interface and up to 10 M bytes at the ICI interface.

Physical Description

The ICA (figure 1) is a single logic board that is installed in and receives power from the CYBER 930 or 932 mainframe. The board includes:

- Motorola 68010 microprocessor
- Ethernet controller chip
- Ethernet serial interface chip
- DMA controller chip
- 16 K bytes of EEPROM
- 512 K bytes of SRAM
- 2 M bytes of DRAM

A standard IEEE 802.3 transceiver cable connects the ICA to an IEEE 802.3 transceiver or multiplexer. A 15-pin D-type connector is provided for connecting the transceiver cable.

NOTE

The transceiver cable must be ordered separately.

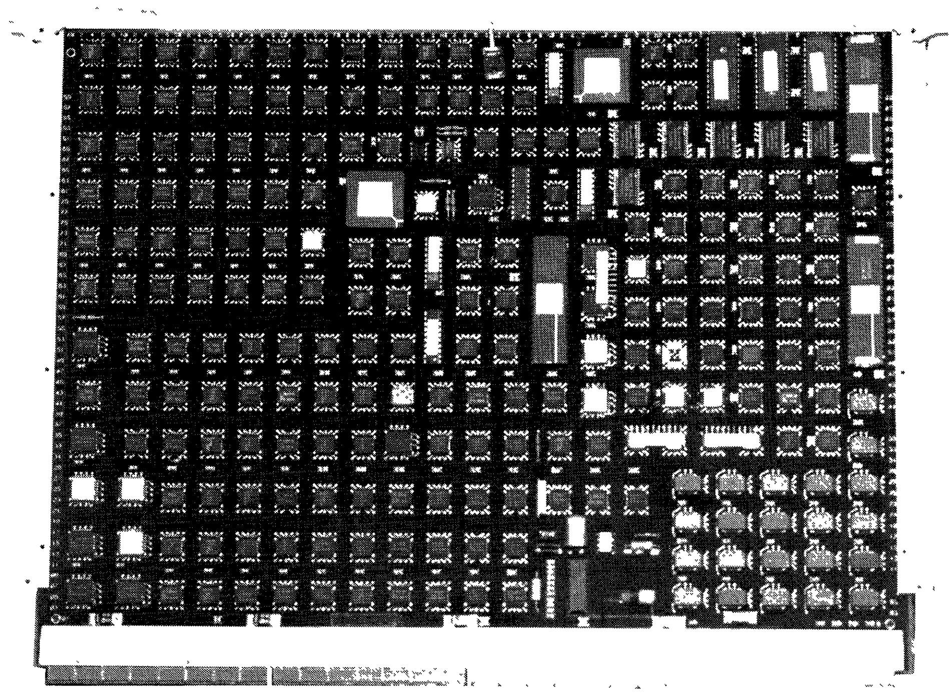

Figure 1. Integrated Communications Adapter (ICA)

3-DI Cabinet

Product Numbers 2650-1 (120 V ac, 60 Hz)
2650-2 (240 V ac, 50 Hz)

The 3-DI Cabinet (figure 1) consists of a rack with mounting hardware for up to three DIs and an IEEE 802.3 Multiplexer. The enclosure has both a front door and back door for convenient access. The Plexiglas insert in each door enables easy viewing of the DI cabinet indicators.

The enclosure includes:

- Power strip
- Three cable trays
- Three mounting trays for DIs
- Standard RETMA 19-in mounting rails

Physical Description

Physical Specifications:

Height: 1.5 m (5 ft)

Width: 740 mm (29.5 in)

Depth: 740 mm (28.5 in)

Weight: Approximately 116 kg (258 lb)

NOTE

This enclosure requires a 20-A facility circuit breaker and uses a 20-A power plug and cord. Ensure that your site has the proper mating wall socket (Hubbell 5632, NEMA 5-20R or equivalent) to accommodate this power connector.

Power:

60 Hz, 120 V ac, 20 A

50 Hz, 240 V ac, 16 A

Wall socket required:

Hubbell 5632, NEMA 5-20R, or equivalent (120 V ac).
Siemens 5UB3-210 (Control Data Part No. 94260200) or equivalent 3-pole 3-wire outlet (16 A, 250 V ac).

Power cord length:

60 Hz, 120 V ac, 2 m (80 in)

50 Hz, 240 V ac, 2.5 m (100 in)

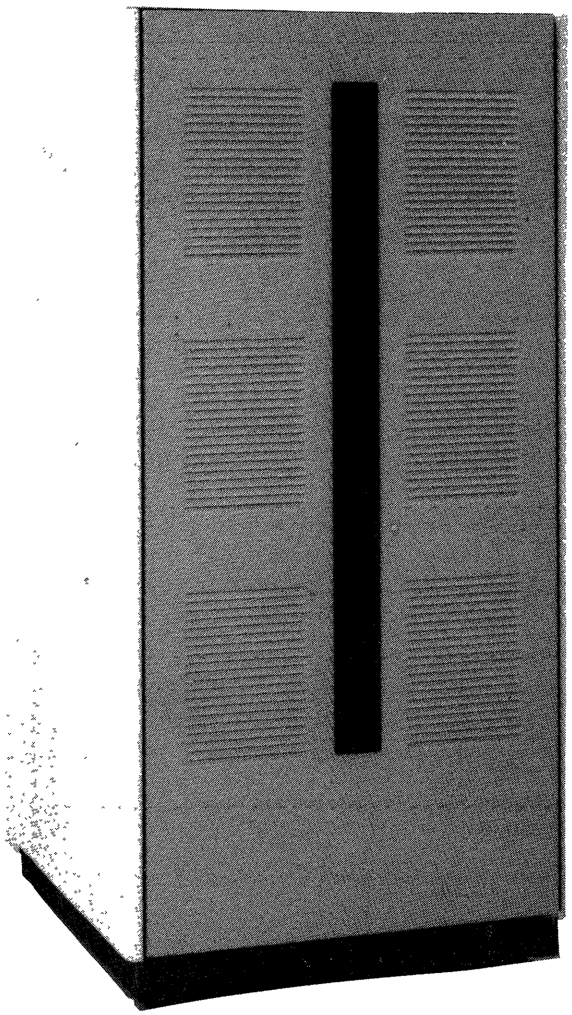

Figure 1. 3-DI Cabinet

DI Enclosure Table

Product Number 2651-1

The single-DI enclosure table (shown with DI installed, figure 1) is a desk-style unit with space for one DI. It has rear access for cable installation. No power distribution is supplied.

The cabinet is black with a mar-resistant walnut color top that can be used for work space.

Physical Description

Physical Specifications:

Height: 676 mm (27 in)

Width: 752 mm (30 in)

Depth: 752 mm (30 in)

Weight: Approximately 38 kg (85 lb)

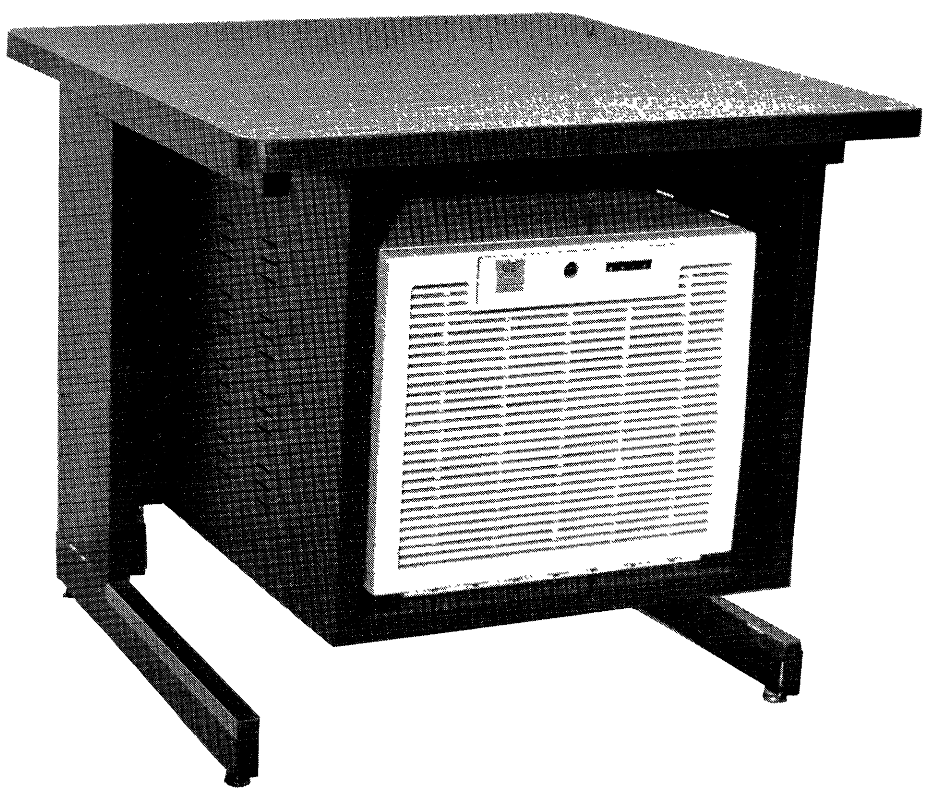

Figure 1. DI Enclosure Table

IEEE 802.3 Transceiver Interface Cables

Product Numbers

CL2	CL2P	Length
2608-114	2608-216	5 m (16.4 ft)
2608-131	2608-233	10 m (32.8 ft)
2608-163	2608-265	20 m (65.6 ft)
2608-198	2608-200	50 m (164 ft)

The IEEE 802.3 transceiver interface cable (figure 1) connects an ICA or an ESCI in a DI to a transceiver or IEEE 802.3 multiplexer to allow access to the network. Normally, a single cable is used to connect the device interface to a transceiver on the LAN segment cable. Four standard lengths of cable allow adequate flexibility in the design and layout of the network.

Theoretically, multiple lengths of interface cable could be chained together, like extension cords, but each additional connector degrades reliability and performance. If chaining is deemed necessary to meet an unusual layout requirement, two lengths of cable may be chained, but a single length is preferred. Chaining of more than two lengths is not recommended.

Physical Description

All transceiver cables have the following characteristics:

- Impedance: 78 ohms differential
- Shielding: Foil over each pair and overall
- Conductors: Four twisted pair
- Connectors: 15-pin D subminiature, one male with locking post, one female with slide lock

Class 2 cables (CL2) and class 2 plenum cables (CL2P) meet requirements of article 725, paragraph 38b of the National Electrical Code (NEC) NFPA 70.

See chapter 7 for transceiver cable pin assignments, part numbers, and equipment numbers.

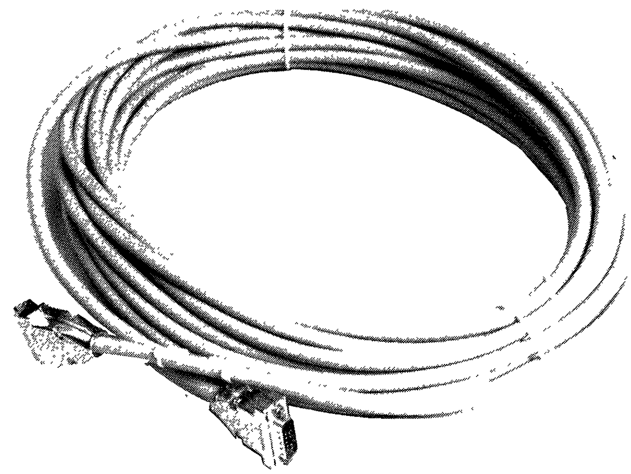

Figure 1. IEEE 802.3 Transceiver Interface Cable

IEEE 802.3 Transceiver

Product Number 2630-3

The IEEE 802.3 transceiver (figure 1) is a standalone device for modulating serial digital data received from the ESCI board onto the baseband frequency used with the IEEE 802.3 coaxial cable.

An IEEE 802.3 transceiver cable connects the transceiver to the ESCI board in the DI or to an ICA. A nonintrusive tap (product 2630-4) connects the transceiver to the IEEE 802.3 trunk without cutting through the coaxial cable center conductor.

Transceivers may be installed, removed, or moved to another location on the trunk without interrupting network operations.

Transceiver features include:

- Receiver section
- Transmit section
- Collision detector
- Five LEDs to assist in detecting network problems
- Power supply
- Heartbeat (SQE) test (user-configurable to permit enabling or disabling)

The transceiver is compatible with ISO/DIS 8802/3 specifications and IEEE 802.3 standard for 10 Mbps medium access units. The transceiver meets FCC Class A and B limits and UL 910 and NEC 725-2(b) for installation in air-handling spaces.

Physical Description

The IEEE 802.3 transceiver is a device that connects directly to the coaxial cable via a nonintrusive tap. It contains electronics to receive and send encoded signals on the cable. Five LEDs assist the network troubleshooter in locating node and network problems.

The transceiver has one 15-pin male connector for connecting a transceiver cable. See chapter 7 for connector pin assignments.

Physical Specifications:

Height: 9.65 cm (3.8 in)

Width: 8.89 cm (3.5 in)

Depth: 4.45 cm (1.75 in)

Weight: 397 g (14 oz)

Environmental Considerations:

Nonoperating temperature: –20 to +90°C (–4 to 194°F)

Operating temperature: 5 to 55°C (41 to 131°F)

Operating humidity: 5 to 95% noncondensing

Power Requirements:

10.0 to 15.0 V dc 500 mA maximum

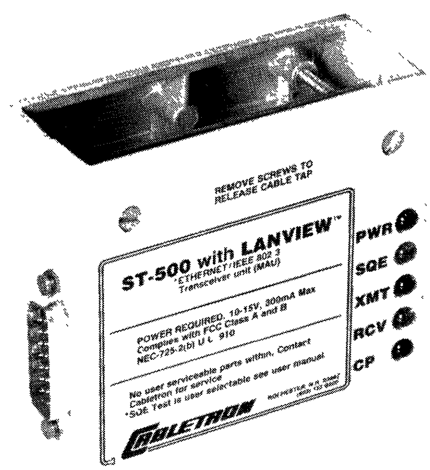

Figure 1. IEEE 802.3 Transceiver

IEEE 802.3 Transceiver Tap

Product Number 2630-4

The IEEE 802.3 transceiver tap (figure 1) connects the IEEE 802.3 transceiver (product 2630-3) to the IEEE 802.3 trunk without cutting through the coaxial cable center conductor.

Physical Description

Each tap assembly includes a clamp section and a cable bed section, two braid picks, a center probe, and a protective dust cover. The tap can be used with either PVC or Teflon cable without adaptation.

The Control Data maintenance kit (product 2653-2) includes a cable-tap tool kit for installing the tap.

Tap Size:

Height: 4.5 cm (1.75 in)

Width: 8.2 cm (3.25 in)

Depth: 3.2 cm (1.25 in)

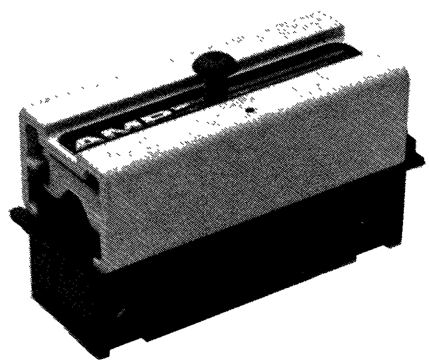

Figure 1. IEEE 802.3 Tap

IEEE 802.3 Multiplexer

Product Number 2631-2

The IEEE 802.3 multiplexer (figure 1) provides a simple and flexible method of grouping up to eight IEEE 802.3 LAN services for connecting them to each other or to an IEEE 802.3 trunk cable.

The multiplexer provides eight ports for connection of external data processing equipment and one port for connection to a transceiver. Each port implements:

- Transmit
- Receive
- Collision functions
- Heartbeat (SQE) option

The connection to an IEEE 802.3 coaxial cable is made through an IEEE 802.3 transceiver. If the transceiver is not present, the unit automatically self-configures to operate without the IEEE 802.3 cable. Cableless networks of up to 100 m (328 ft) in diameter can be configured. When used in this way, the multiplexer fully simulates the functions of a transceiver and its operation is transparent to the connected equipment.

Multiplexers may be connected in series (cascaded) if more than eight ports are required. Refer to Connecting Multiplexers in chapter 7 for additional information about using multiplexers.

The multiplexer meets ISO/DIS 8802/3 and IEEE 802.3 standards.

Physical Description

The IEEE 802.3 multiplexer is fully enclosed with sheet metal for wall or 19-in shelf mounting or for free-standing use. Front panel lamps indicate internal and transceiver power, packet activity, and loopback status.

Physical Specifications:

Height: 7.5 cm (2.9 in)

Width: 43.0 cm (16.9 in)

Depth: 26.0 cm (10.2 in)

Environmental Considerations:

Ambient temperature: 0 to 40°C (32 to 104°F)

Humidity: 10 to 95% noncondensing

Power Requirements:

Power inlet: IEC 320

Fuse protection: Double pole 1 A antisurge for 110 - 120 V; 0.5 A antisurge for 220 - 240 V

Mains operation: 98 - 132 V ac or 198 - 264 V ac at 50 - 60 Hz

Power consumption: 50 VA maximum.

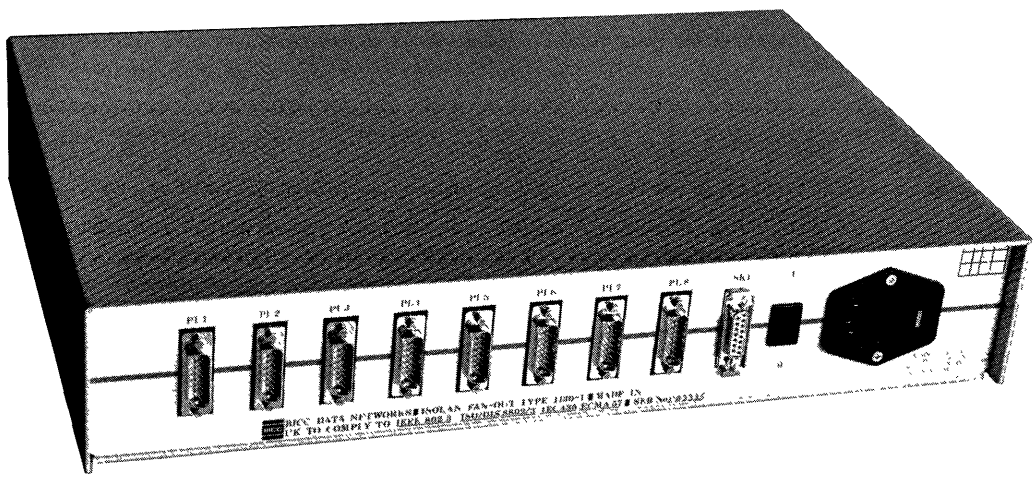

Figure 1. IEEE 802.3 Multiplexer

IEEE 802.3 Repeater

Product Number 2632-1

The IEEE 802.3 repeater (figure 1) provides the means of connecting together two segments of a local baseband 10 Mbps CSMA/CD network in compliance with IEEE 802.3 standards. It thereby extends the network beyond one 500-m (1640-ft) length of coaxial cable.

The repeater is connected to each segment of IEEE 802.3 coaxial cable via a transceiver cable and a transceiver. To comply with IEEE 802.3 standards, transceivers without Heartbeat (SQE) test must be used.

The repeater performs the following functions:

- Links IEEE 802.3 segments together.
- Transmits retimed data packets between segments.
- Regenerates preamble.
- Extends collision fragments.
- Automatically partitions and reconnects the network in the event of a segment failure.
- Allows for manual partitioning for segment servicing or for reconfiguration.

Refer to Connecting a Repeater to Transceivers in chapter 7 for additional information about using repeaters.

The repeater meets ISO DIS 8802/3 and IEEE 802.3 standards.

Physical Description

The repeater is fully enclosed with sheet metal for wall or 19-in shelf mounting or for free-standing use. Front panel lamps indicate internal power, packet activity, and partitioning of port 1 and port 2.

Physical Specifications:

Height: 7.5 cm (2.9 in)

Width: 43.0 cm (16.9 in)

Depth: 26.0 cm (10.2 in)

Environmental Considerations:

Ambient temperature: 0 to 40°C (32 to 104°F)

Humidity: 10 to 95% noncondensing

Power Requirements:

Power inlet: IEC 320

Fuse protection: Double pole 1 A antisurge for 110 - 120 V; 0.5 A antisurge for 220 - 240 V

Mains operation: 98 - 132 V ac or 198 - 264 V ac at 50 - 60 Hz

Power consumption: 50 VA maximum.

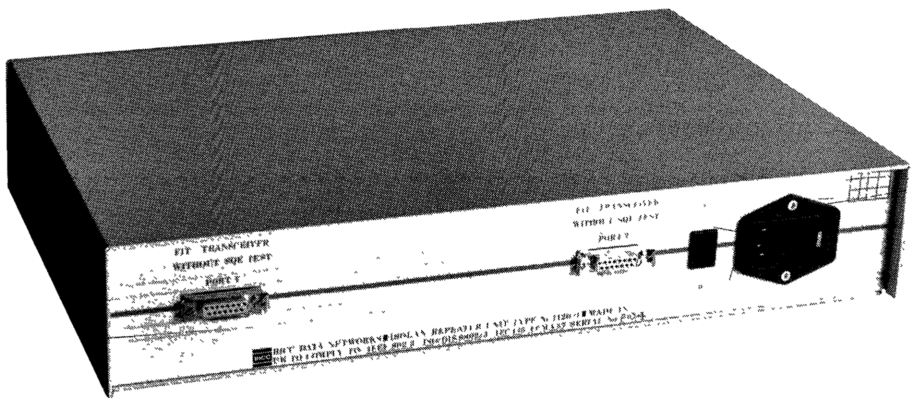

Figure 1. IEEE 802.3 Repeater

IEEE 802.3 Coaxial Cable Splice Kit

Product Number 2633-1

The IEEE 802.3 cable splice kit is used to repair faulty coaxial cables, to shorten cables, or to add lengths of cable.

Barrel connectors are used to repair or add to IEEE 802.3 coaxial cable. The barrel connector threads into the end connectors on the two coaxial cable sections.

Sleeving is provided for ensuring electrical insulation. No metallic part of the connectors should be left exposed.

Physical Description

The kit (figure 1) contains:

- Two N-type male plug cable connectors
- One N-type female barrel connector
- 12 in of 0.75-in diameter insulation sleeving

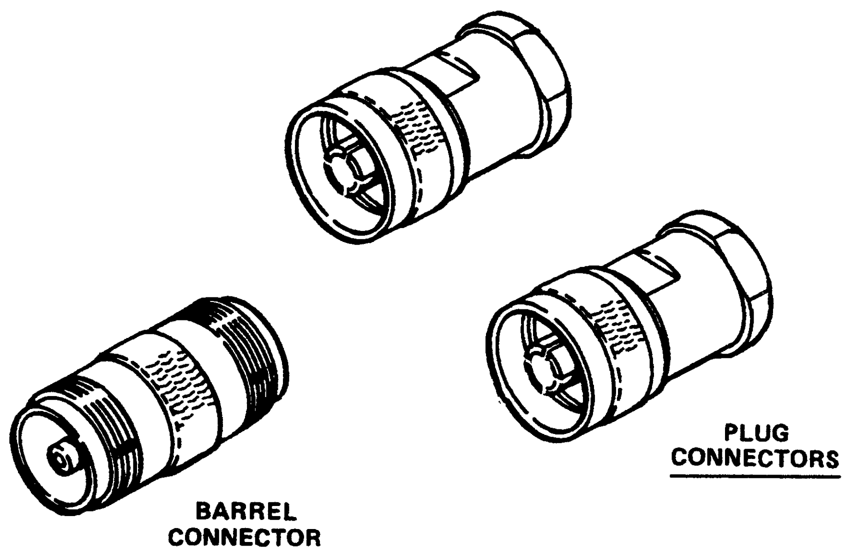

Figure 1. IEEE 802.3 Coaxial Cable Splice Connectors

IEEE 802.3 Coaxial Cable Terminator Kit

Product Number 2633-2

The IEEE 802-3 coaxial cable terminator kit contains terminators and related hardware for terminating each end of a coaxial cable with a characteristic impedance load of 50 ohms. The kit also contains grounding clamps and wire for grounding the segment cable.

Sleeving is provided for ensuring electrical insulation. No metallic part of the connectors or terminators should be left exposed.

Physical Description

The kit (figure 1) contains:

- Two N-type 50-ohm terminators
- Two N-type male plug cable connectors
- 24 in of 0.75-in diameter insulation sleeving
- 36 in of 16-gauge solid copper wire
- Two 3/8-in grounding clamps

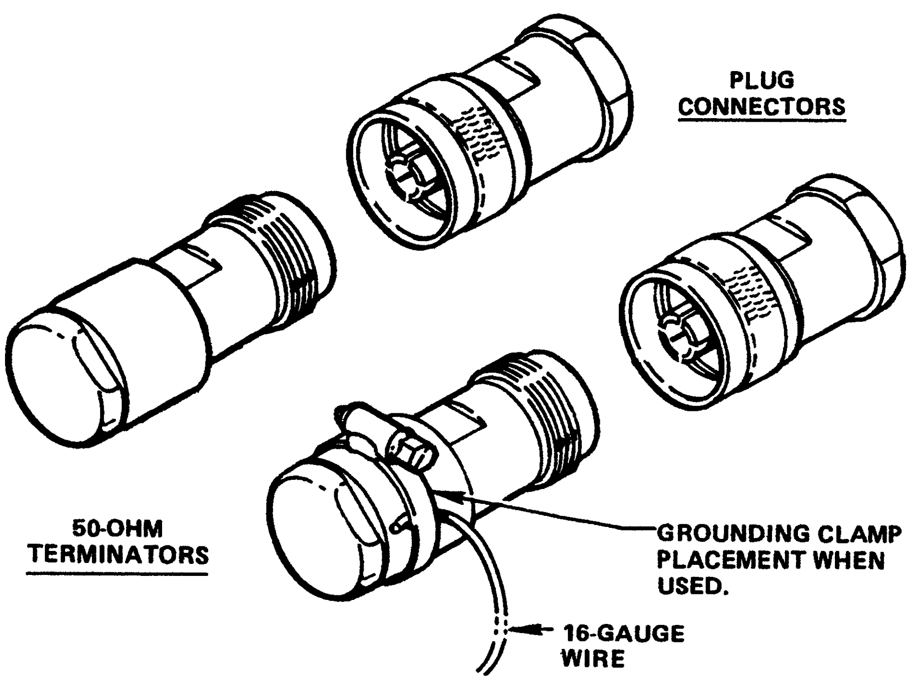

Figure 1. IEEE 802.3 Coaxial Cable Terminator Kit (Terminators, Connectors, and Clamp)

IEEE 802.3 Coaxial Cable

Product Numbers

CL2	CL2P	Length
2635-21	2634-23	23.4 m (76.8 ft)
2635-68	2634-70	70.2 m (230.3 ft)
2635-115	2634-117	117 m (383.9 ft)
2635-498	2634-500	500 m (1640.4 ft)

CDCNET uses IEEE 802.3 coaxial cable as the transmission medium for Local Area Network (LAN) implementations. (The IEEE 802.3 cable is also referred to as the trunk or trunk cable and individual lengths of cable are called segments.)

Physical Description

The trunk cable is a constant impedance coaxial transmission line that is used to interconnect the network devices via transceivers.

Class 2 cables (CL2) and class 2 plenum cables (CL2P) meet requirements of article 725, paragraph 38b of the National Electrical Code (NEC) NFPA 70.

Control Data coaxial cable segments are available in four standard lengths. Lengths are determined using the following ISO/DIS relationship:

$$\text{Segment length} = \frac{\text{Cable propagation delay}}{\text{Data bit rate}} N$$

Where: N = odd integer (1, 3, 5, 7 . . . 21)
Tolerance = ± 0.5m

Example:

$$\frac{(0.78)3 \times 10^8}{(2)5 \times 10^6} 3 = 70.2\text{m}$$

Barrel connectors are used to join sections of cable up to a maximum of 500 m (1640 ft). If cable lengths of over 500 m are required, a repeater which regenerates the signal can be installed in series with the cable.

Control Data coaxial cables are provided with a terminator installed at each end. Network devices are connected to the cable via a transceiver that taps into the cable.

Physical characteristics include:

- High immunity to electrical noise.
- Cable is premarked for correct transceiver placement every 2.5 m (8.2 ft).
- Network can be extended or reconfigured easily by using barrel connectors and/or repeaters.
- Transceivers can be added, removed, or moved to another location on the trunk without cutting the cable or interrupting network operation.
- Control Data cable sections come with N-type connectors and 50-ohm terminators installed on each end.

Control Data coaxial cables conform to IEEE 802.3 cable specifications provided in chapter 7. Chapter 7 also provides part and equipment numbers.

Maintenance Console Option (MCO)

Product Number 2652-1

The MCO (figure 1) allows an RS-232-C ASCII terminal or modem to be connected directly to the Main Processor Board (MPB). Once connected, the terminal (or modem connected to a remote terminal) can write to/read from and execute code in the MPB memory. This port is also commonly used to install and verify the DI system identification number during installation or troubleshooting procedures.

CAUTION

The MCO port is not a user terminal port. Only experienced Control Data Customer Engineers and Network Analysts (Control Data or customer) should be allowed access to this port during normal operation.

Any display or printer type terminal with the following characteristics may be used with the MCO.

- RS-232-C ASCII interface
- Asynchronous mode
- 7 bits with 1 stop bit
- Even parity
- Baud rate: 300, 1200, or 9600
- Data terminal equipment (DTE) or data communications equipment (DCE) operation

NOTE

The maintenance port is configured to operate as a DTE. If the terminal you are using is also a DTE (no DCE connector), you must use a modem eliminator (null modem) cable to connect the terminal to the port.

Physical Description

The MCO consists of a cable with a single connector on one end that plugs into the MPB, and a plate with two connectors on the other end that attaches to the back of the cabinet. (The bottom connector is not used at this time.) The RS-232-C cable required to connect the terminal or modem to the DI is not supplied.

Modems Supported

The modems used with the maintenance console option must conform to IEEE 802.3.

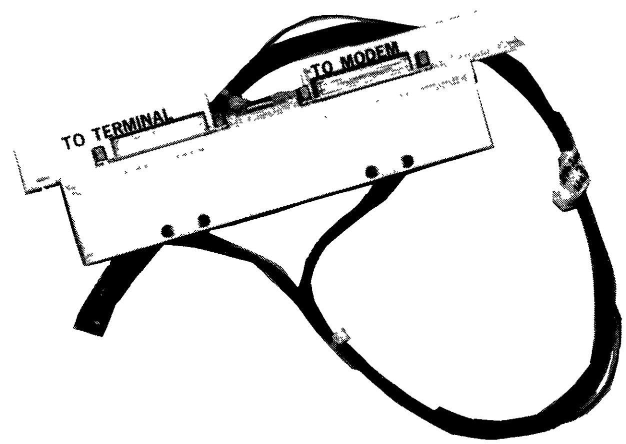

Figure 1. Maintenance Console Option (MCO)

CDCNET Maintenance Kit

Product Number 2653-2

This kit is available to customers who perform their own installation and CDCNET maintenance.

Physical Description

The kit contains:

- One 3/16-in Allen drive tool for locking and unlocking the DI cabinet door.
- One static control wrist strap used for working with logic boards.
- One cable-tap tool kit for installing the IEEE 802.3 transceiver and tap (product no. 2630-3). This kit (figure 1) contains a 1/8-in Allen wrench and a hand tool. The hand tool has a drill bit at one end for drilling holes in the coaxial cable and a socket wrench at the other end for tightening the center probe of the tap.
- One RS-232-C loop-back connector for testing 4-Port RS-232-C LIM/modem circuits.
- One RS-449 loop-back connector for testing RS-449 LIM/modem circuits.
- One X.24 loop-back connector for testing X.24 LIM/modem circuits.
- One V.35 loop-back connector for testing V.35 LIM/modem circuits.
- One URI Centronics loop-back connector for testing the Centronics circuits of the URI LIM.
- One URI Data Products loop-back connector for testing the Data Products circuits of the URI LIM.
- One RS-232 Asynchronous loop-back connector for testing 8-Port RS-232-C Asynchronous LIM/modem circuits.
- Console (MCO) cable for directly connecting a terminal to the MPB.

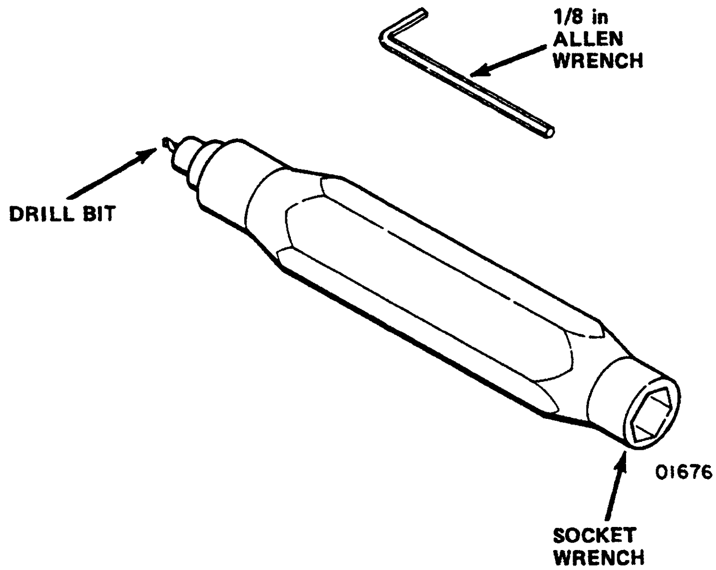

Figure 1. IEEE 802.3 Cable-Tap Tool Kit

Base System Software Product Descriptions 3

Base System Software Data Sheets 3-4

CDCNET High Speed HDLC 3-7

CDCNET Interactive Asynchronous Terminal Passthrough 3-9

CDCNET Mode 4A/4C Protocol Support 3-11

CDCNET Network Management Station 3-13

CDCNET Network Service Access Control 3-15

CDCNET Network Transfer Facility 3-17

CDCNET Network Validation 3-19

CDCNET NJEF 3-21

CDCNET Remote Line Monitor 3-23

CDCNET X.29 PAD Server (X.25 PAD) 3-25

CDCNET X.3 PAD Gateway 3-27

CDCNET 3270 BSC Terminal Support 3-29

Base System Software Products Description 3

This chapter describes the features and functions of the CDCNET base system software which is an implementation of the ISO reference model. This chapter also contains data sheets that provide an overview of each available optional software product.

Control Data is continually adding new capabilities to CDCNET. Therefore, be sure you are using the most recent CDCNET Product Description manual and check with your Control Data representative for any near-term features that may not yet be described in this manual.

Base system software creates and maintains the system environment in a CDCNET device interface (DI). Without it, the system's management entities (MEs) and layer software could not function.

Resident in a DI, the base system software provides the following functions:

System Initialization

The initialization process accommodates a first-time load as well as the needs of restoring a failed system to its operational state. CDCNET system initialization is a distributed process requiring the services of another, operational system.

Executive

The Executive offers procedures letting users share the system's available processing and memory resources efficiently. It is the core of the DI software.

The specialized services that the Executive provides to its users are:

- Task management
- Memory management
- Message management
- Queue management
- Timer management

Statistics Management

The CDCNET Statistics Manager (CSM) acts as a bridge between commands requesting statistics collection and the software actually collecting the statistics. CSM services include:

- Service Access Point (SAP) management
- Statistics collection
- Statistics reporting

Status Management

Status management involves:

- Monitoring the state and status of CDCNET hardware devices
- Acquiring and releasing hardware devices
- Accessing and updating the hardware device status tables
- Retrieving information

Tree (Table) Management

Several of the layers and MEs in a DI logically connect a user and either a correspondent or a service. It does so by using random access tables that are organized and accessed according to a balanced, binary tree solution. This solution provides relatively fast access to any table entry.

Online Loader

The Online Loader provides a method for dynamic loading and deloading of software modules within an operational system.

Failure Management

Failure management has three important functions:

- Failure detection
- Failure reporting
- Failure recovery

Device Manager

The Device Manager (DVM) is responsible for the interface between CDCNET's physical and data link layers (layers 1 and 2, respectively). By controlling access to the intelligent peripheral boards (IPs), the DVM provides its users with a single, common mechanism for reaching the physical I/O layer, and ensures that no two users are assigned to the same port. DVM's users include Stream Service Routines (SSRs) and Terminal Interface Programs (TIPs).

Lower Layer Access Software

This software resides in a NOS/VE host and the MDI or integrated communications adapter (ICA) connected to it. It allows the host-resident entities to obtain the lower layer services present in the MDI or ICA.

This software includes the following components:

- Channel Connection Entity (CCE)
- System Management Access Agent and Provider (SMAP)
- Transport Access Agent and Provider (TAP)
- Network Access Agent and Provider (NAP)

Base system software features include:

- A URI (Unit Record Interface) TIP (terminal interface program) that provides transparent access to non-Control Data devices attached to a CDCNET URI. The URI TIP supports both character and line printers using URI protocol. The protocol is managed by the network, and user action is not necessary. The URI TIP also supports UNIX access to a URI.
- The basic X.25 functionality that provides access to PDNs for transfer of files and other packet level activity. This feature also supports the X.PC protocol.
- An asynchronous TIP that provides asynchronous terminal support.
- Synchronous HDLC support, provided by the base HDLC protocol, that supports up to 64 K bps for communication trunk transfers.
- A HASP TIP that supports HASP batch terminals.

Base System Software Data Sheets

Data sheets containing an overview of each optional base system software product and it's product number(s) are included in this chapter. The data sheets are arranged in alphabetical order.

Table 3-1. Base System Software Data Sheets

Data Sheet	Product Number
CDCNET High Speed HDLC	N261-03 (NOS) N261-04 (NOS/VE)
CDCNET Interactive Asynchronous Terminal Passthrough	N261-23 (NOS) N261-24 (NOS/VE)
CDCNET Mode 4A/4C Protocol Support	N261-13 (NOS) N261-14 (NOS/VE)
CDCNET Network Management Station	N261-91 (NOS/VE)
CDCNET Network Service Access Control	N261-05 (NOS) N261-06 (NOS/VE)
CDCNET Network Transfer Facility	WxxxP-141 WxxxP-142
CDCNET Network Validation	N261-07 (NOS) N261-08 (NOS/VE)
CDCNET NJEF	Dxxx-350 Dxxx-352 DxxxP-008
CDCNET Remote Line Monitor	N261-52 (NOS/VE)
CDCNET X.29 PAD Server (X.25 PAD)	N261-15 (NOS) N261-16 (NOS/VE)
CDCNET X.3 PAD Gateway	N261-17 (NOS) N261-18 (NOS/VE)
CDCNET 3270 BSC Terminal Support	N261-11 (NOS) N261-12 (NOS/VE)

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VAX is a trademark of Digital Equipment Corp.

Network File System (NFS) is a trademark of Sun Microsystems, Inc.

Open Network Computing Service (ONC) is a trademark of Sun Microsystems, Inc.

To learn more about CDCNET products, contact your local Control Data sales office or write:

Control Data
Computer Products Marketing
P.O. Box 0
HQW10H
Minneapolis, MN 55440-4700 U.S.A.

CDCNET High Speed HDLC

Provides High Speed HDLC Support Up to 256 K bps

The High Speed HDLC (High-Level Data Link Control) provides multiple high speed HDLC line support. It allows a CIM to support up to three HDLC lines, each operating at 64 K bps, or one HDLC trunk operating at 128 K bps or 256 K bps.

The High Speed HDLC is the International Standards Organization's (ISO) bit-oriented protocol for the data link layer of the Open Systems Interconnection (OSI) reference model.

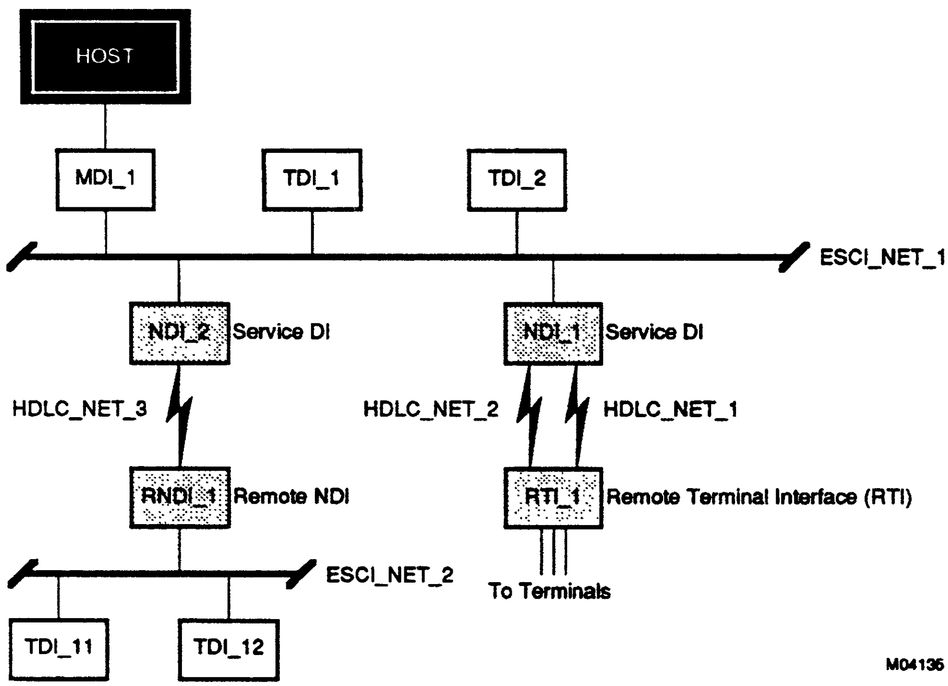

Figure 1. HDLC Network

The High Speed HDLC consists of the following two drivers:

- HDLC256
- HDLC3X64

The HDLC256 driver supports one line at 128 K bps or 256 K bps with a dedicated CIM. Line speeds of 128 K bps or 256 K bps are referred to as fractional T1. Fractional T1 can also be obtained by leasing digital T1 lines and an on-site digital multiplexer (DAX).

The HDLC3X64 driver supports one to three HDLC lines at up to 64 K bps per line with a dedicated CIM. The lowest line speed it supports is based on the maximum message size.

Remote DI initialization is supported by both drivers. However, initialization at speeds above 64 K bps requires setting a switch on the CIM board.

The High Speed HDLC provides you with the following major advantages:

- Less transmission time per frame which provides better response time, higher single connection bandwidth, and higher aggregate bandwidth.
- The HDLC3X64 driver with one CIM supporting three 56 K bps lines or three 64 K bps lines is more economical than a normal HDLC driver with three CIMs.
- The HDLC256 with a single line at higher speed is more economical and provides less transmission time per frame than multiple 64 K bps lines.

CDCNET Interactive Asynchronous Terminal Passthrough

Allows Asynchronous Ports to Connect to Other Asynchronous Ports

Interactive Asynchronous Terminal Passthrough allows asynchronous devices on one port (clients) to establish connections to asynchronous devices on other ports (servers), providing the other ports are configured for passthrough access.

The Interactive Asynchronous Terminal Passthrough provides an interactive passthrough/outcall gateway as shown in figure 1, that enables the following two major functions:

- Interactive terminal passthrough
- Device outcall

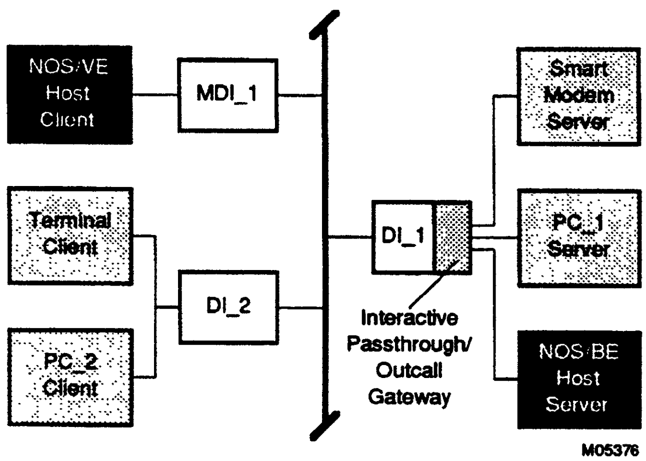

Figure 1. Interactive Asynchronous Terminal Passthrough

The terminal passthrough function of the gateway allows an asynchronous interactive terminal user to establish a connection to an asynchronous device which is configured as a passthrough server. For example, the client terminal shown in figure 1 can connect to any of the server devices shown. The server device could be a terminal; modem; microcomputer; or non-CDCNET host such as NOS/BE, VAX, or IBM.

With terminal passthrough, terminal traffic passes through the CDCNET network transparently and the two devices interface to each other as if they were directly connected. Terminal passthrough also supports connections to a modem with dial-out capability.

The device outcall function allows application programs to connect to asynchronous devices configured as device outcall servers. For example, an application program in the host shown in figure 1 can establish a connection to any of the server devices shown. The device on the other line could be a terminal; modem; microcomputer; or non-CDCNET host such as NOS/BE, VAX, or IBM.

Once a device outcall connection is established, communications proceed as though the terminal had initiated the connection. Desktop/VE, as shown in figure 2, is an example of a NOS/VE application that uses device outcall.

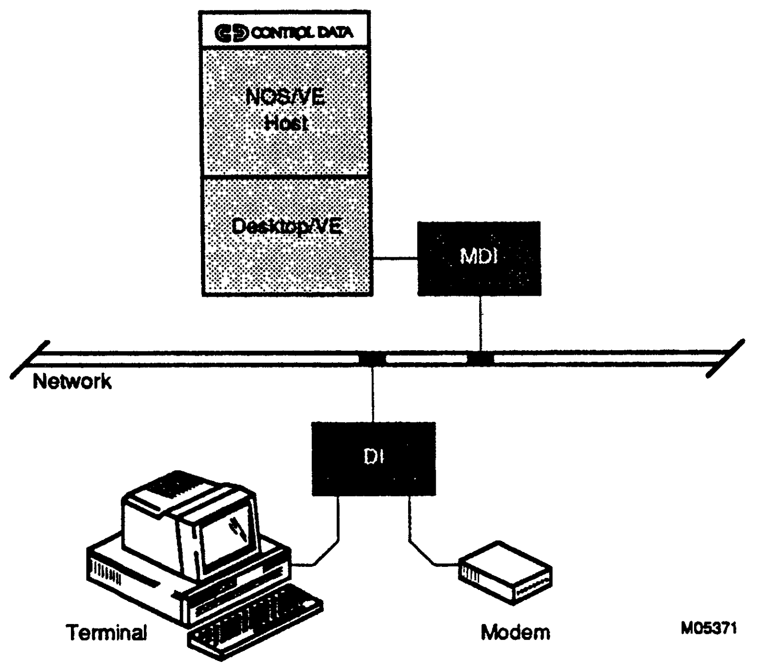

Figure 2. Device Outcall Application

CDCNET Mode 4A/4C Protocol Support

Supports Two-Way Alternate Communications

The CDCNET Mode 4A/4C TIP allows synchronous terminals using the Mode 4 protocol to communicate with NOS and NOS/VE hosts via CDCNET. Mode 4 protocol is a data communications protocol supporting two-way alternate communications (messages may be sent in either direction but not both directions at the same time).

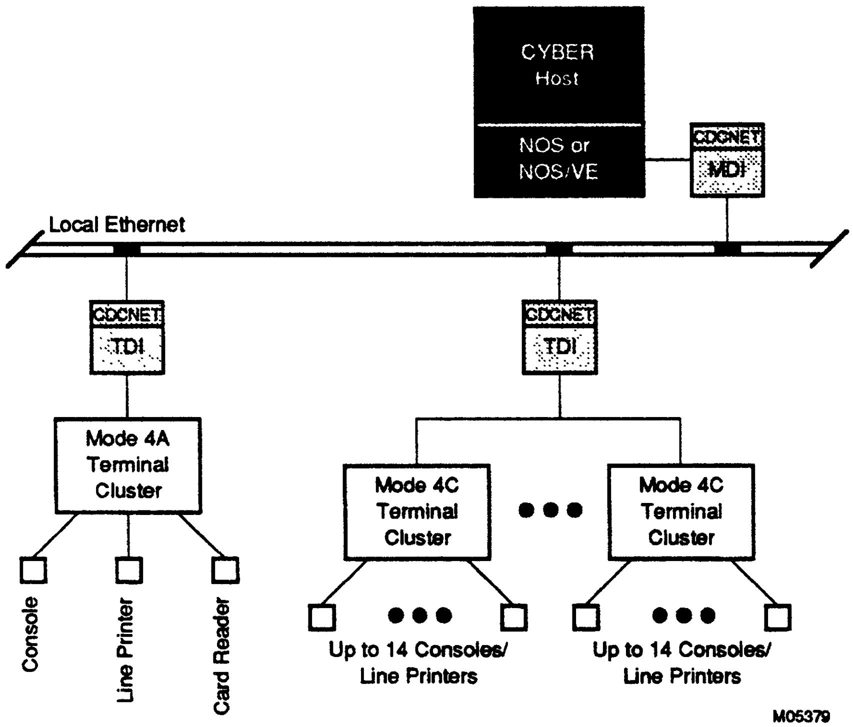

Figure 1. Mode 4A/4C Terminal Support

Two types of Mode 4 terminals are supported by the Mode 4 protocol as implemented by the MODE4TIP:

- Mode 4A terminals
- Mode 4C terminals

Mode 4A terminals consist of a group of several clusters each having one console, a line printer, and a card reader. Each terminal cluster must have one console device, and can have one optional card reader and one optional line printer. Mode 4A terminals include the CDC 200UT, CDC 731, CDC 732, CDC 734, and equivalent terminals on a cluster.

Mode 4C terminals consist of several clusters of consoles and line printers. Each terminal cluster must have at least one console and can have up to 14 additional optional devices. These optional devices can be either consoles or line printers. Mode 4C terminals include the CDC 711, CDC 714, and equivalent terminals.

The CDCNET MODE4TIP supports the following features:

- Synchronous line speeds from 1200 through 19 K bps
- Multiple terminal clusters on the same communications line
- Automatic recognition of code set, ASCII or BCD
- Virtual terminal protocol (VTP) for console devices
- Batch terminal protocol (BTP) for card readers and printers.
- Normal and transparent input/output mode for console devices
- /*STAB (START_BATCH) command for switching Mode 4A terminals from interactive mode to batch mode
- Status request and device polling
- Blank compression (mode 4A only) and trailing blank truncation to printer devices.
- Interleaved card reader and printer data for mode 4A terminals.

CDCNET Network Management Station

Network Management for a UNIX-Based Platform

The CDCNET Network Management Station (CNMS) manages CDCNET without the use of a CYBER mainframe. CNMS performs many of the functions that a CYBER system performs such as DI initialization, configuration, operational control, and logging.

The basic CNMS executes on a Control Data 4000 Series computer system (CD 4000) or a Sun Workstation. For example, figure 1 illustrates how the CNMS can be configured into a network. In this illustration the CD 4000, with CNMS installed, can replace or back up the NOS/VE system for CDCNET operations. On the remote Ethernet, the Sun CNMS system performs as a standalone CDCNET operations station.

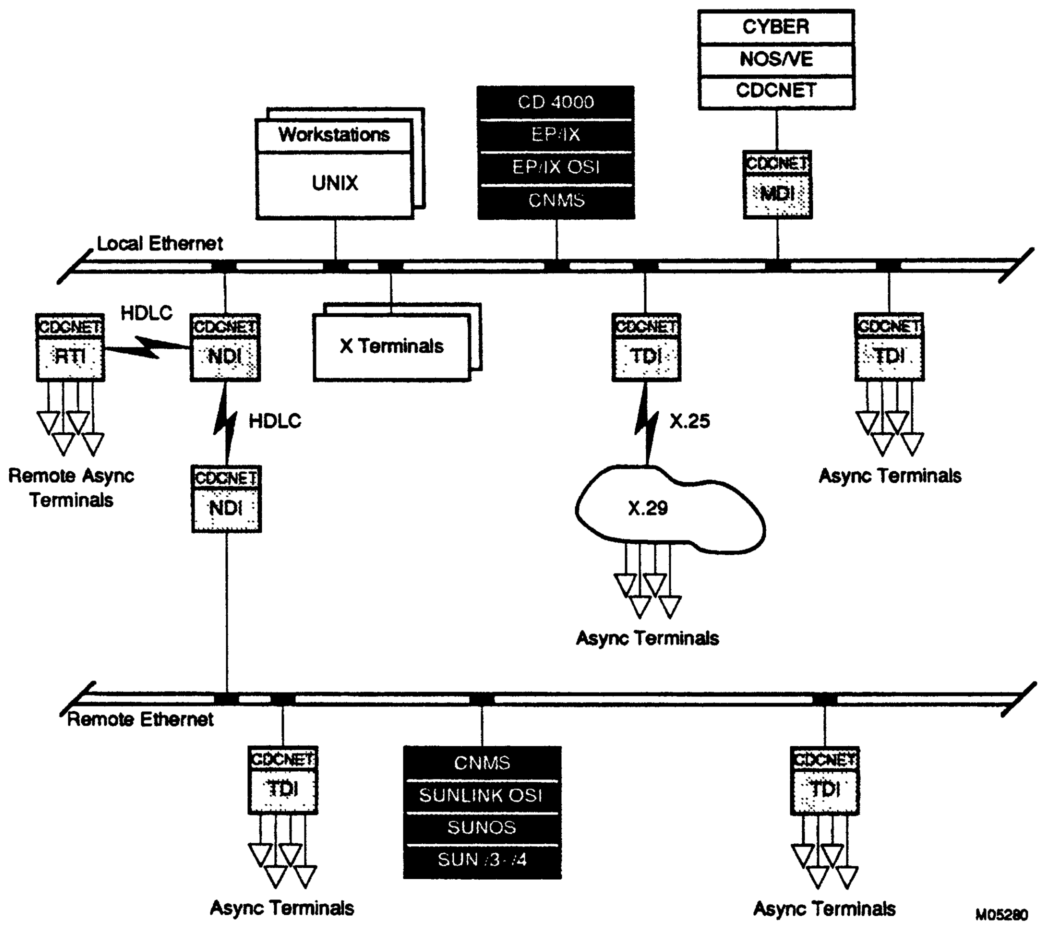

Figure 1. CNMS Network Configuration

CNMS provides you with the following major advantages:

- It extends the use of CDCNET to the CD 4000.
- It reduces the use of CYBER mainframe resources.
- It shortens the load time of DIs on a remote Ethernet.

CNMS resides on a UNIX-based platform. The basic CNMS executes on a CD 4000 with EP/IX 1.3.1 and OSI access end directory R4xx-320 installed or a SUN-3/60, SUN 3/80, or SUN-4/200 Workstation with SunOS 4.0 and SunLink OSI 6.0.

Figure 2 shows the CNMS installed in a UNIX host. CNMS software is shown in the shaded area; the unshaded areas are the OSI components used by CNMS.

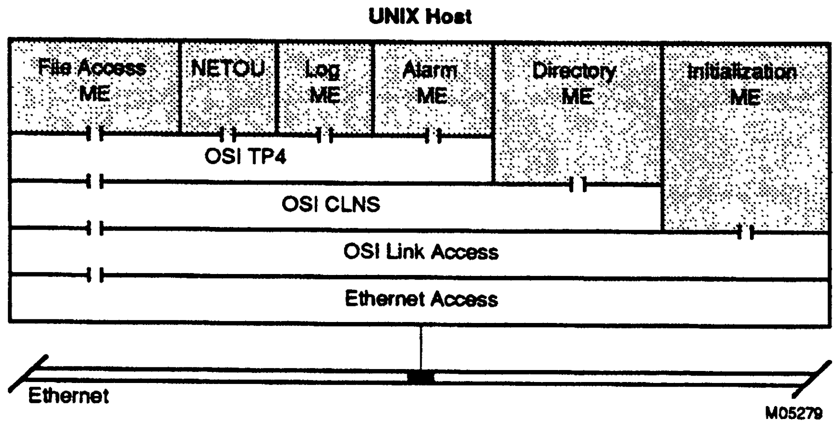

Figure 2. CNMS Protocol Stack

CNMS removes the need for network operation functions to be CYBER-resident. CNMS provides the following functions:

- It initiates operation of the CDCNET DIs by loading and dumping appropriate software from its local file system.
- It enables system administrators to configure the network so that new network elements like terminals, printers, Ethernets, and HDLC lines can be added and existing elements can be deleted or modified dynamically.
- It enables system administrators to monitor the network for alarms and other warning messages.
- It provides a local repository for the log information that CDCNET generates so that administrators can review network performance, locate potential bottlenecks, and anticipate operational problems without using host resources.

CDCNET Network Service Access Control

Restricts Service Access to Selected Networks

Network Service Access Control allows you to restrict the services that can be accessed across different network solutions. You can define service access restrictions either during network configuration or after configuration by using separate Network Operator commands.

You can restrict services in both directions (incoming and outgoing) over network solutions. Incoming Service Access defines the servers that can be accessed coming in via the network solution. Outgoing Service Access defines the servers that may be accessed going out via the network solution.

For example, figure 1 shows two separate networks (ESCI_NET_1 and ESCI_NET_2) linked by NDI_1 and NDI_2. For this example, you require File Transfer Access and Interactive Access between all points of the two networks and you want ESCI_NET_1 to perform network management and batch support for the entire network. To obtain these services, you would configure NDI_1 with incoming service of batch support, file transfer, interactive, and network management. The outgoing service for NDI_2 is configured as file transfer only.

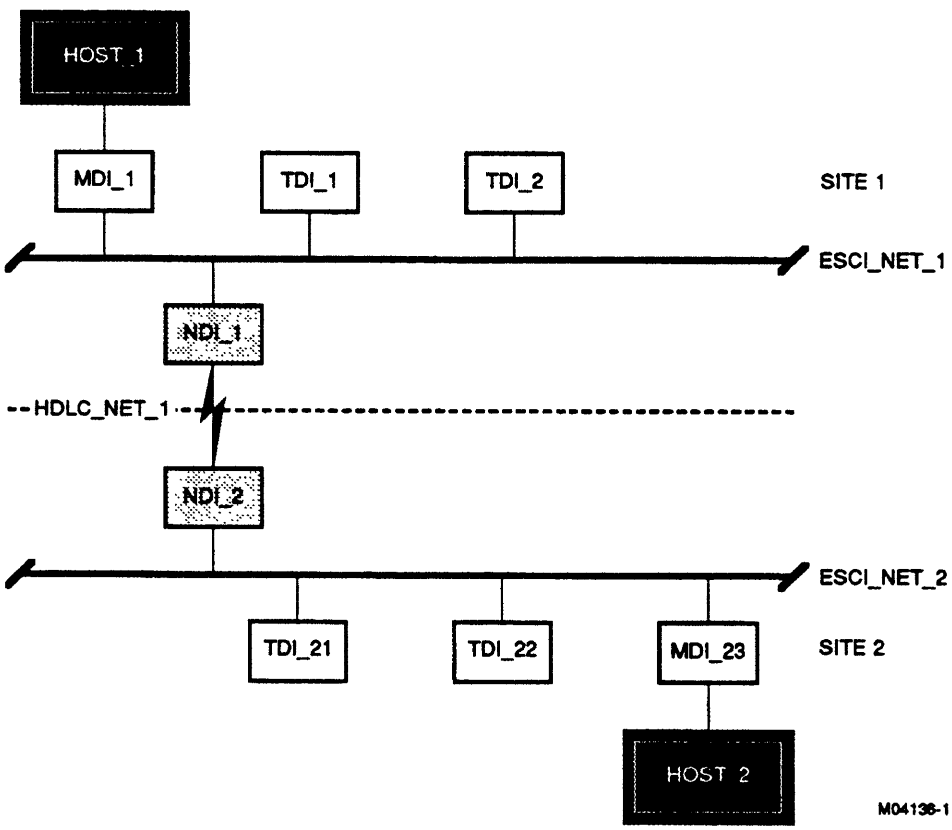

Figure 1. Network Service Access Control Example

The types of services that can be restricted with Network Service Access Control include the following:

- Applications, including any service not identifiable by the keywords batch support, interactive, file_transfer, and network_management.
- All batch input and output services, including batch control facility, batch job submittal, and batch output.
- All interactive services that support terminal user access.
- All file transfer services that support user file and queue file transfers.
- Network management functions, including alarm, clock, command, file, validation, and log services.

CDCNET Network Transfer Facility

Provides NJE Capabilities and HASP Workstation Features for CYBER NOS/VE

Network Transfer Facility (NTF) provides Network Job Entry (NJE) capabilities and HASP workstation features for CYBER NOS/VE systems using CDCNET.

NTF supports IBM NJE protocol and HASP multileaving protocol for communications between hosts. NJE networks provide a fully symmetric queue file transport facility between any two host mainframes in the network. HASP networks provide access to hosts by emulating one or more HASP workstations. NTF can operate in NJE and HASP modes simultaneously while supporting line speeds up to 64 K bps.

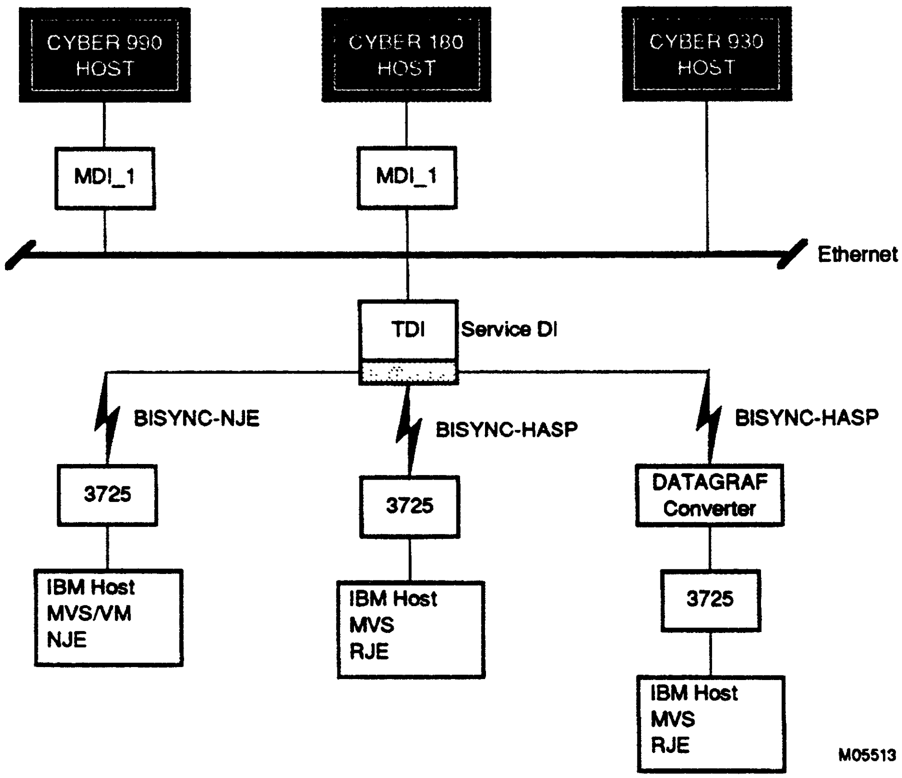

Figure 1. Network Transfer Facility Example

NTF supports multiple connections within the same remote system. These multiple connections may be spread across many DIs or contained in a single DI. NTF provides automatic load leveling across multiple links.

Input/output/punch files, operator commands, and messages are multileaved over binary synchronous (BSC) trunk connections between hosts. This method permits full use of trunk bandwidth for all active data streams and prevents connection resources from being monopolized by a single data source.

IBM-compatible operator commands and messages may originate from any host within the network and may be passed on to any other host.

NTF provides an interface to Mail/VE allowing BITNet mail to be sent and received using Mail/VE.

CDCNET Network Validation

Provides System Security Through Passwords

Network Validation provides system security by requiring users to enter a valid username and password to use CDCNET. The username and password are in addition to login requirements for NOS/VE or other hosts.

Network Validation is configured on a DI-by-DI basis. However, you can turn validation on or off any line serviced by the Asynchronous TIP, X.25 Asynchronous TIP, or Telnet TIP. For example, figure 1 shows two TDIs. You may choose to configure TDI_1 for Network Validation but not TDI_2. Terminal users on TDI_1 would then have to log in to the network in order to access CDCNET (unless network validation was turned off on their particular port).

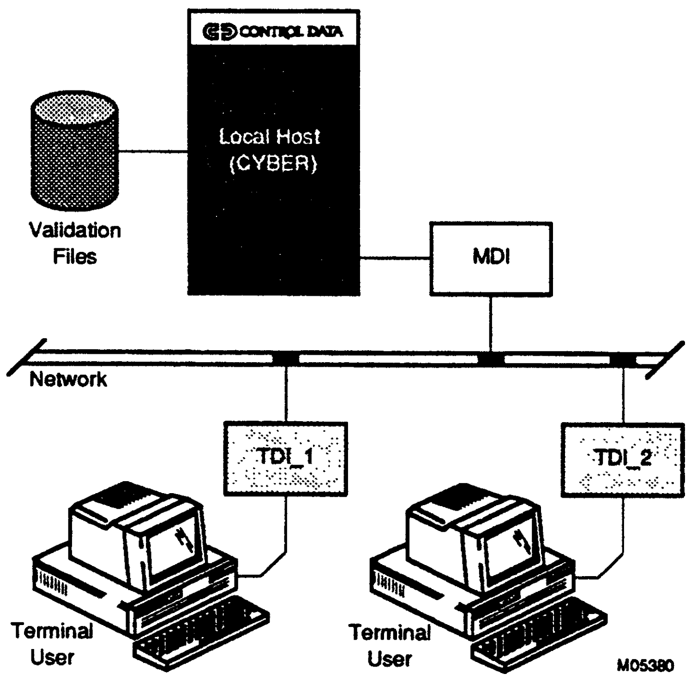

Figure 1. Network Validation Example

On a line configured for Network Validation, the DI prompts for a username and password before processing any user commands or executing any terminal user procedures. Terminal support software in the DI compares the entered and encrypted password with the encrypted password stored for the username in the validation file. If the two passwords match, the user is accepted and normal processing continues.

If the passwords do not match or the user does not have a password, the DI returns an error response and prompts the user to try again. This cycle repeats until either the proper password is entered, the retry limit is reached, or the connection times out.

The Network Validation feature also stores information on how network resources are being used. A network administrator can obtain this information from log messages and Network Performance Analyzer (NPA) reports.

CDCNET NJEF

Provides Access to an NJE Subsystem

NJEF is the Bisynchronous Network Job Entry Facility that supports IBM's Network Job Entry (NJE). NJEF allows remote mainframe computers using the IBM's NJE protocol to access the job entry subsystem on a NOS host. These remote mainframes may be IBM, Control Data, VAX, or other systems.

The remote mainframes are connected to the NOS host via a TDI. The mainframes connect to the TDI via a communication line connected to a LIM (Line Interface Module). Line speeds between the remote mainframe and the TDI may be from 1200 through 56 K bps. The line protocol used is the multileaving protocol using Binary Synchronous Communications (BSC).

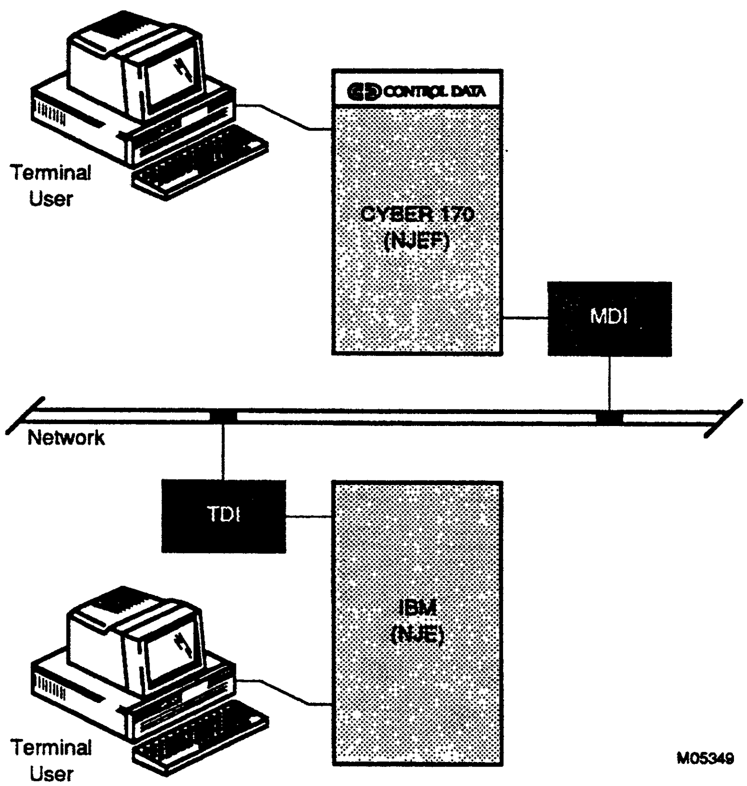

Figure 1. NJEF to NJE Connection

NJEF consists of two components; NJE, which is host-resident and the Terminal Interface Program (TIP) BSCNJEFTIP which is DI-resident. NJEF performs the following functions:

- Interfaces to standard IBM hardware.
- Interfaces to other CYBER hosts operating with NJEF.
- Provides a queue file gateway to a Remote Host Facility (RHF) network.

CDCNET Remote Line Monitor

Monitors LIM Port Activity

The NOS/VE Remote Line Monitor monitors LIM (Line Interface Module) port activity. The NOS/VE Remote Line Monitor records and/or displays all received and transmitted characters on a LIM and port that are using ASYNC and/or HASP protocols.

The Remote Line Monitor provides a series of screen displays similar to figure 1 that contain a set of function key options. The function keys allow you to manipulate the screen display options in order to control line monitoring and evaluate data.

```
                        REMOTE LINE MONITOR             Lines 1 to 19 of 19
_____________________________________________________________________________
-
        FUNCTION KEYS                          CURRENT SETTINGS
   -----------------------------          ------------------------------

   MAINTENANCE                            Monitored System = AHR_TDI_300784
                                          Monitored Lim    = 3
    SF1 to - Setup                        Monitored Port   = 1
     F1 to - Manage files
                                          Forward Timer  = 2000
   MONITORING
                                          Line Protocol  = ASYNC
     F2 to - Record
     F3 to - Display                      Display Format = ASCII
     F4 to - Display and Record
                                          Display Width  = 80
   ANALYSIS

     F7 to - Format and Edit
     F8 to - Edit                         { Use Setup to change settings. }

    Setup
f1  FilMgt f2 Record f3 Dis  f4 DisRec f5 HELP f6 Quit f7 FormEd f8 Edit
```

Figure 1. Main Menu

For example, when the Remote Line Monitor starts, it displays a Main Menu screen (figure 1) containing a title for the Remote Line Monitor and a set of function keys. To initiate a Remote Line Monitor session, press the Setup (Shift F1) function key and a Setup screen similar to the one shown in figure 2 is displayed.

The Setup screen provides a means for you to specify the values displayed on the screen. Values set on this screen are saved until changed, including between Remote Line Monitor sessions.

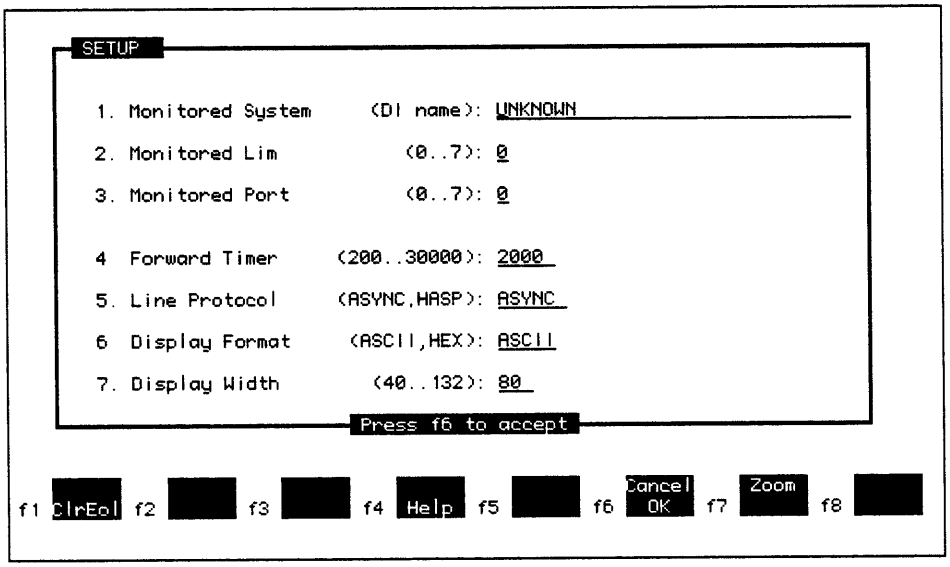

Figure 2. Remote Line Monitor Setup Screen

The following table describes the values of the settings on the Setup screen.

Value	Description
Monitored System	The name of the monitored DI.
Monitored LIM	The LIM number on the DI with the the monitored port.
Monitored Port	The port number on the LIM.
Forward Timer	The time period, specified in milliseconds, used by the Remote Line Monitor TIP.
Line Protocol	The protocol in use on the monitored line.
Display Format	The format in which monitored data is displayed.
Display Width	The maximum number of columns of formatted data displayed.

CDCNET X.29 PAD Server (X.25 PAD)

Allows Asynchronous Terminals to Access CDCNET Through an X.29 PAD

The X.25 Asynchronous protocol allows asynchronous interactive terminal users to access CDCNET either by a Public Data Network (PDN) that supports the X.29 PAD (Packet Assembly/Dissassembly) facility or by terminals operating in X.25 mode.

CDCNET supports the X.25 asynchronous protocol through an X.25 Asynchronous Terminal Interface Program (TIP). The X.25 TIP conforms to both CCITT Recommendation X.25 1980 and 1984 standards, which are part of the ISO/OSI model.

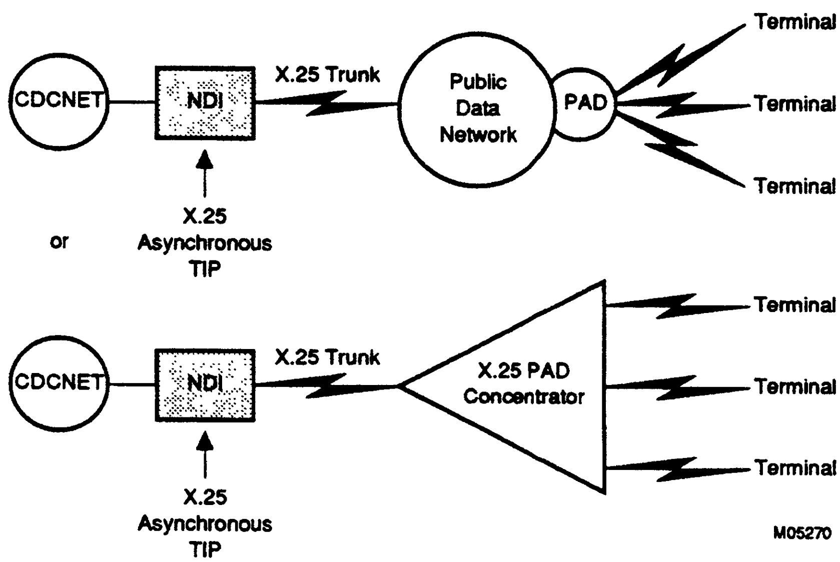

Figure 1. X.29 PAD (X.25 Asynchronous TIP)

X.25 is a packet-switching protocol. So that terminals can communicate using this protocol, data from the terminal must be assembled into packets that conform to the protocol, and output to the terminal must be disassembled for use by the terminal. This function is performed by the X.29 PAD.

The X.25 Asynchronous TIP works with the PAD to manage the terminal-to-application communications. The X.25 Asynchronous TIP performs the validation of X.25 facilities in determining acceptance or rejection of an incoming call. It accesses and sets PAD parameters and performs character formatting/conversion.

CDCNET X.3 PAD Gateway

Provides Asynchronous Terminal Connections to Foreign Applications

The X.3 PAD gateway allows asynchronous terminal users to access an X.25 service or a remote DTE (Data Terminal Entry) on an X.25 public data network (PDN) with CDCNET. Users can be physically connected anywhere on the network and access the gateway via CDCNET.

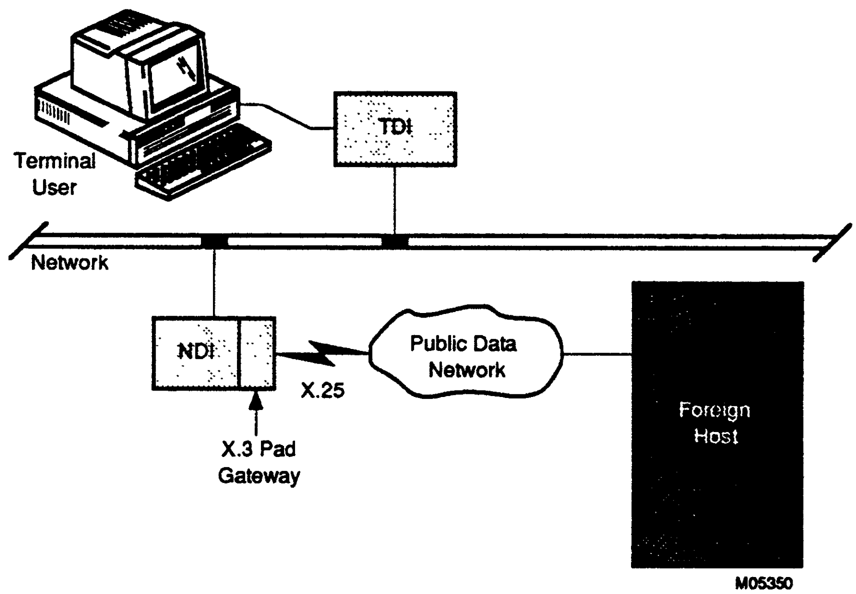

Figure 1. X.3 PAD

The X.3 PAD gateway provides a mapping of X.3 PAD parameters to the CDCNET-defined terminal attributes. The gateway has the following two operating modes:

- Gateway command mode
- Data transfer mode

The gateway command mode allows you to communicate with the X.3 PAD gateway. Once in command mode, the gateway also supports various X.28 PAD commands.

The data transfer mode allows you to communicate interactively through the gateway with a remote DTE. Once in data transfer mode, the gateway passes data transparently between the asynchronous terminal and the remote DTE.

Once the X.25 connection has been established, you can manage the connection from your terminal. The following functions can be performed from your terminal in either gateway command mode or data transfer mode:

- Changing gateway connection attributes
- Switching between gateway modes
- Deleting a gateway connection

CDCNET 3270 BSC Terminal Support

Supports the IBM 3270 Information Display System

The 3270 BSC (Binary Synchronous Communications) Terminal Support is a terminal interface program that provides support for the IBM 3270 Information Display System via multipoint BSC lines. As shown in figure 1, the 3270 TIP supports up to 32 multidropped clusters of up to 32 devices (interactive terminals and printers) on each line.

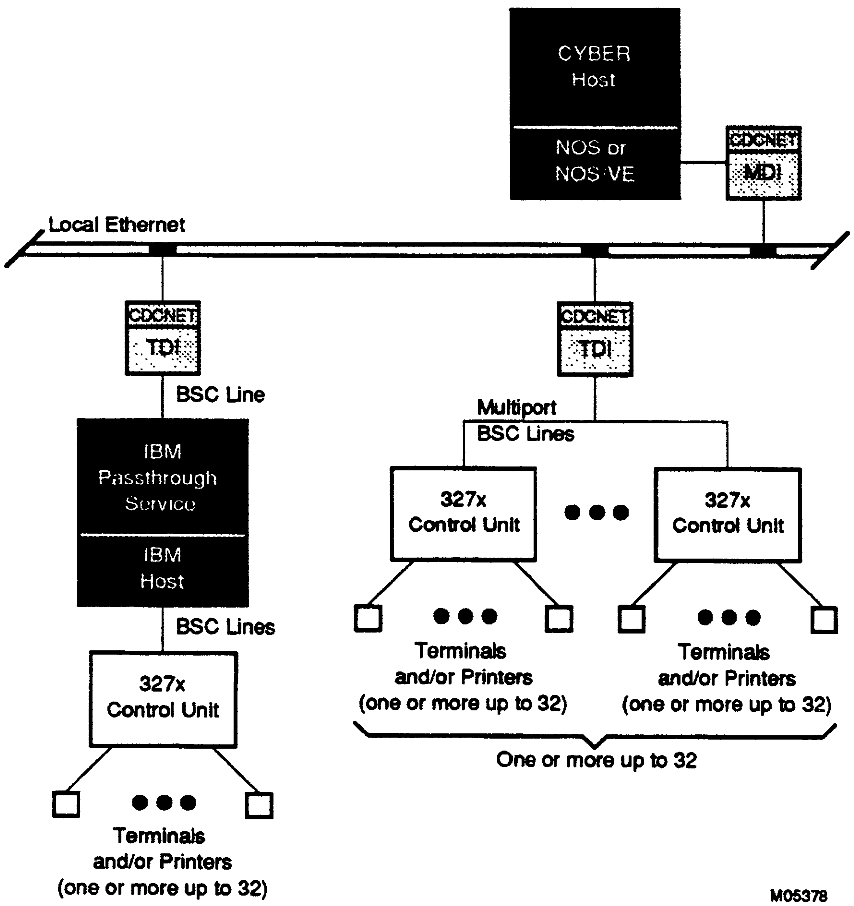

Figure 1. 3270 BSC Terminal Support

As shown in figure 1, your 3270 display station can be configured in two different ways depending upon the site's hardware and software requirements. Some display stations connect directly to the network; others go through an IBM passthrough service before connecting to the network. Once connected to CDCNET, they may communicate with either NOS or NOS/VE.

The 3270 Bisynchronous TIP allows 3271, 3272, 3274, 3275, 3276, and 3277 control units to connect directly to CDCNET. This allows communication with a CDCNET TDI over dedicated or dial-up lines using the centralized multipoint BSC protocol. The 3270 Bisyncronous TIP supports line speeds up to 9600 bps.

TCP/IP Software Product Descriptions 4

TCP/IP Data Sheets 4-4

CDCNET Domain Name Resolver 4-7

CDCNET NIS/VE 4-9

CDCNET NQS/VE 4-11

CDCNET NLM/VE 4-13

CDCNET NFS/VE 4-15

CDCNET TCP/IP/FTP/TELNET (SMTP/VE) 4-17

TCP/IP Software Product Descriptions 4

This chapter describes the features and functions of the CDCNET Transmission Control Protocol/Internet Protocol (TCP/IP) interface software. This chapter also contains data sheets that provide an overview of each optional TCP/IP software product.

TCP/IP is a suite of protocols that support the ARPANET community. TCP/IP protocols are required within CDCNET to connect to Internet and TCP/IP workstations. The TCP/IP protocol executes in the device interfaces (DIs).

The TCP/IP interface software configuration includes the following Department of Defense (DOD) protocols:

ARP	Address Resolution Protocol
EGP	Exterior Gateway Protocol
IP	Internet Protocol
ICMP	Internet Control Message Protocol
TCP	Transmission Control Protocol
TELNET	Teletype Network Protocol
UDP	User Datagram Protocol

Under NOS/VE, the TCP/IP Communication Device provides access to CYBER-resident NOS/VE TCP/IP applications, such as File Transfer Protocol (FTP), Trivial File Transfer Protocol (TFTP), Simple Mail Transfer Protocol (SMTP), and the Network File System (NFS). Under NOS, the TCP/IP Gateway provides services to CYBER-resident NOS TCP/IP applications, such as FTP.

Figures 4-1 and 4-2 illustrate the TCP/IP protocol stack architecture implemented by Control Data in a DI, and in NOS/VE and NOS hosts. The externalization of TCP/IP software features is different on NOS/VE and NOS.

Figures 4-1 and 4-2 use the following abbreviations:

ESCI SSR	Ethernet Serial Channel Interface Stream Service Routine
HDLC SSR	High Level Data Link Control Stream Service Routine
IAF	Interactive Facility
IPAM	Internet Protocol Access Method
LAPB SSR	Link Access Procedures Balanced Stream Service Routine
NAM	Network Access Method
RPC/XDR	Remote Procedure Call/External Data Representation
X.25 PL	X.25 Packet Level

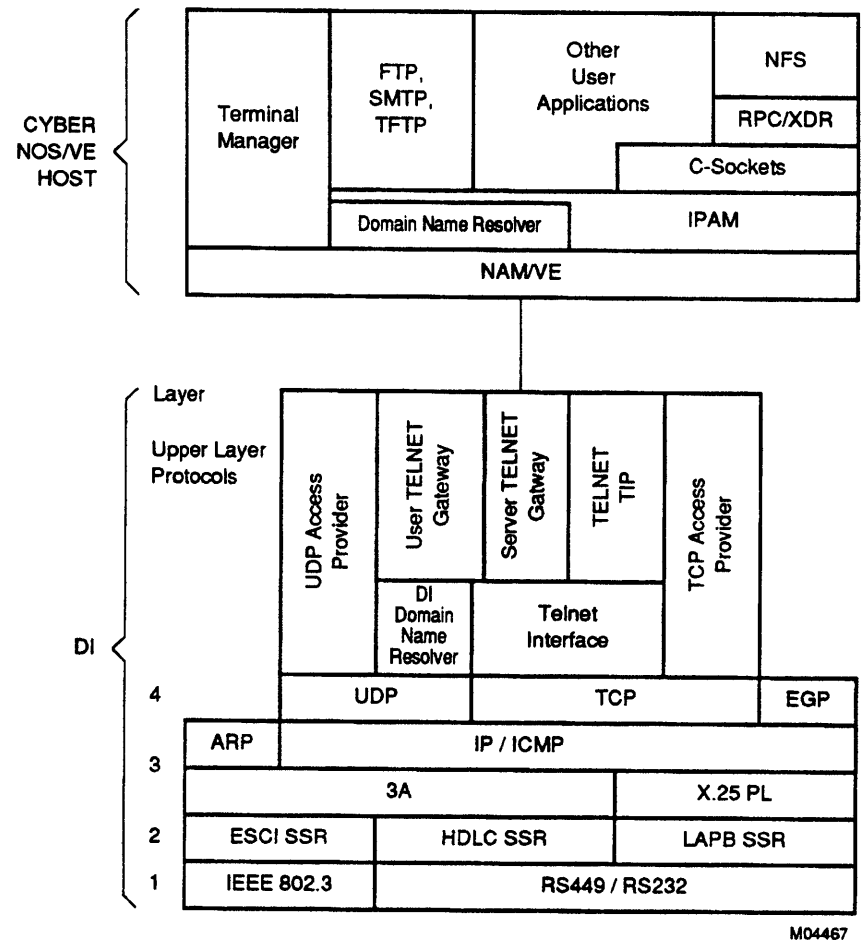

Figure 4-1. Control Data's TCP/IP Architecture: DI and NOS/VE Software

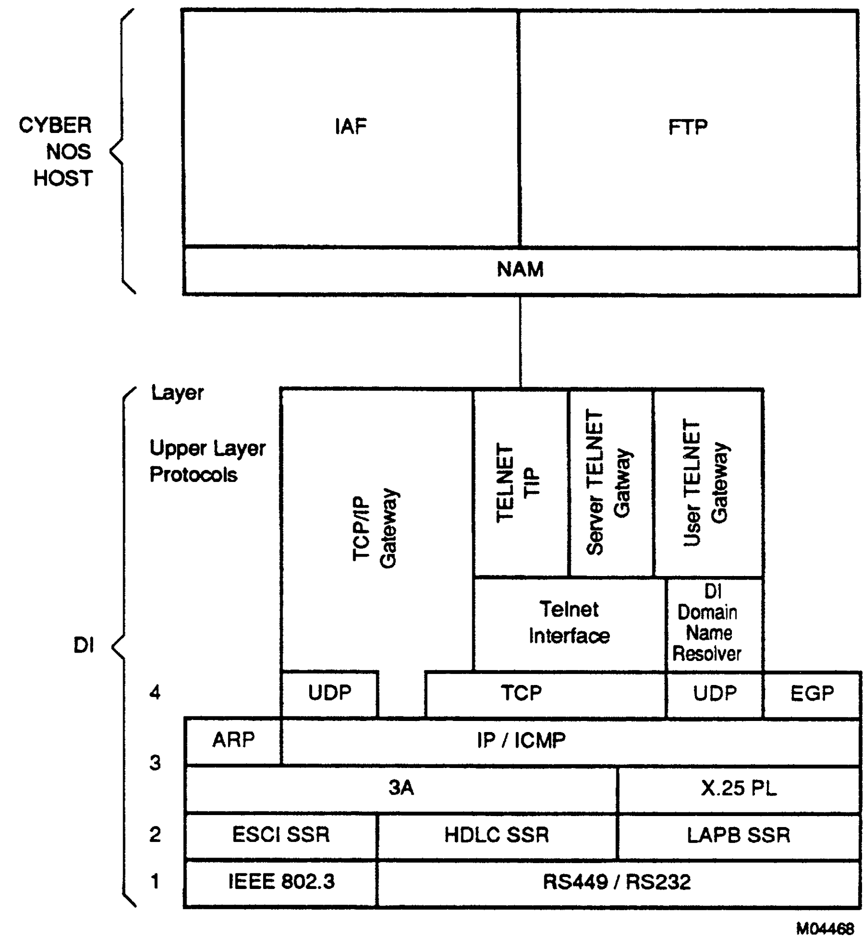

Figure 4-2. Control Data's TCP/IP Architecture: DI and NOS Software

The TCP/IP protocol stack layers shown in figures 4-1 and 4-2 provide the following services:

Table 4-1. TCP/IP Layer Functions

Layer	Function
Lower Layers (Layers 1, 2, 3, and 3A)	Required over a wide-area network (WAN), such as ARPANET or MILNET, for the X.25 services:
IP Layer	IP is a connectionless datagram-oriented protocol that provides services to transport layer protocols such as TCP and UDP.
TCP Layer	TCP provides connection-oriented services that are reliable, ordered, full-duplex, and flow-controlled to upper layer protocols (ULP) such as TELNET.
UDP Layer	UDP provides datagram-oriented services that are unreliable (connectionless), but low overhead, to upper layer protocols such as NFS.
Upper Layer Protocols	The upper layer protocols supported include FTP and TFTP file transfer protocols, TELNET service protocol, SMTP mail transfer service, and NFS file service.

TCP/IP Data Sheets

Data sheets containing an overview of each optional TCP/IP software product and it's product number(s) are included in this chapter. The data sheets are arranged in alphabetical order.

Table 4-2. TCP/IP Data Sheets

Data Sheet	Product Number
CDCNET Domain Name Resolver	N261-44 (NOS/VE)
CDCNET NIS/VE	N261-40 (NOS/VE)
CDCNET NQS/VE	N261-90 (NOS/VE small CYBER) N261-92 (NOS/VE large CYBER)
CDCNET NLM/VE	N261-38
CDCNET NFS/VE	N261-26 (NOS/VE small CYBER) N261-28 (NOS/VE large CYBER)
CDCNET TCP/IP/FTP/TELNET (SMTP/VE)	N261-19 (NOS class 3 lower CYBER) N261-20 (NOS/VE lower CYBER includes SMTP) N261-21 (NOS class 3 upper CYBER) N261-22 (NOS/VE upper CYBER includes SMTP)

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Open Network Computing Service (ONC) is a trademark of Sun Microsystems, Inc.

Yellow Pages is a registered trademark in the United Kingdom of British Telecommunications PLC.

To learn more about CDCNET products, contact your local Control Data sales office or write:

Control Data
Computer Products Marketing
P.O. Box 0
HQW10H
Minneapolis, MN 55440-4700 U.S.A.

CDCNET Domain Name Resolver

For Specifying Domain Names Instead of IP Addresses

The Domain Name Resolver allows users to specify domain names instead of IP addresses when referencing TCP/IP hosts. TCP/IP hosts normally have symbolic domain names in addition to their IP addresses. Although hosts use IP addresses to address one another, users typically find it easier to specify domain names.

The Domain Name Resolver consists of the following two separate parts (figure 1):

- Host Domain Name Resolver
- DI Domain Name Resolver

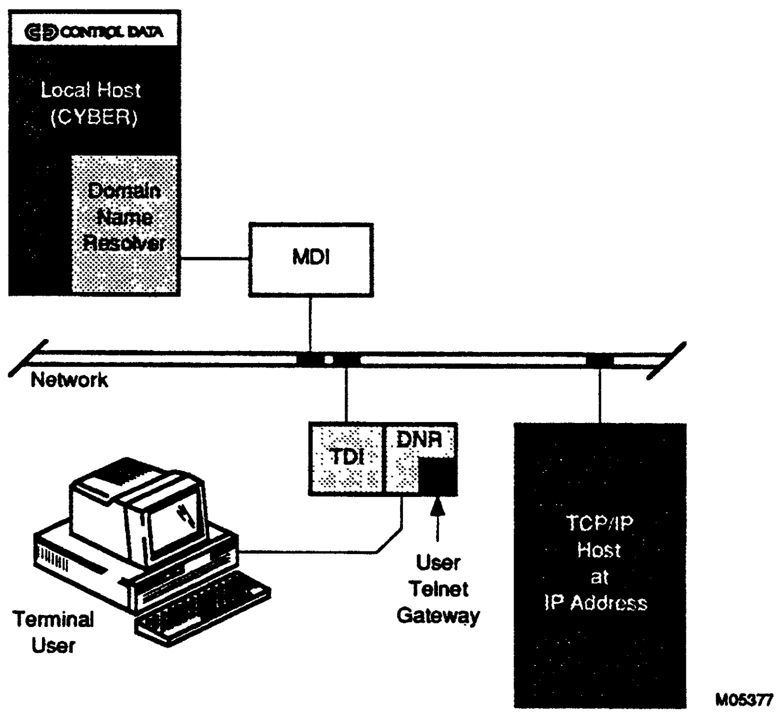

Figure 1. Domain Name Resolver

The DI Domain Name Resolver is configured at the DI. It allows users to specify domain names instead of IP addresses when referencing TCP/IP hosts.

The host Domain Name Resolver contains a configuration file that provides the local domain name and the addresses of default domain name servers. The file contains the Domain Name Resolver configuration directives domain and nameserver.

When a user specifies a domain name, the DI resolver sends a request to the host resolver. The host resolver translates the name into the corresponding IP address. The DI uses the IP address to establish a connection with the desired TCP/IP host.

The domain directive declares the name of the local administrative domain. When the host Domain Name Resolver procedures need to get information about a name (a simple domain label), the host resolver procedures automatically append the domain name declared in the domain directive before querying a Domain Name server. This relieves users from having to specify full domain names when making queries about local hosts.

The order in which the nameserver directives occur is significant. The host resolver procedures query the first name server declared. If that Domain Name server fails to respond, the host Domain Name Resolver procedures query the second Domain Name server declared. If that one fails to respond, the host Domain Name Resolver procedures query the third one, and so on.

The syntax for the NOS/VE Domain Name Resolver configuration file matches the syntax of a UNIX Domain Name Resolver configuration file. As a result, Domain Name Resolver configuration files may be copied freely between UNIX hosts and NOS/VE hosts.

CDCNET NIS/VE

Provides a Network Information Service

NIS/VE (Network Information Service/Virtual Environment) administers and provides read access to replicated network-wide databases used to replace administrative files. NIS/VE (formerly known as SUN Yellow Pages) also provides a directory service that eliminates duplicate user names, user IDs, or host names which could cause addressing problems.

NIS/VE facilitates centralized management and maintenance of the common, domain-specific, administrative files. NIS/VE is supported only through the communication device. It is not supported on the TCP/IP gateway. NIS/VE conforms to the NIS specification from Sun Microsystems, Inc.

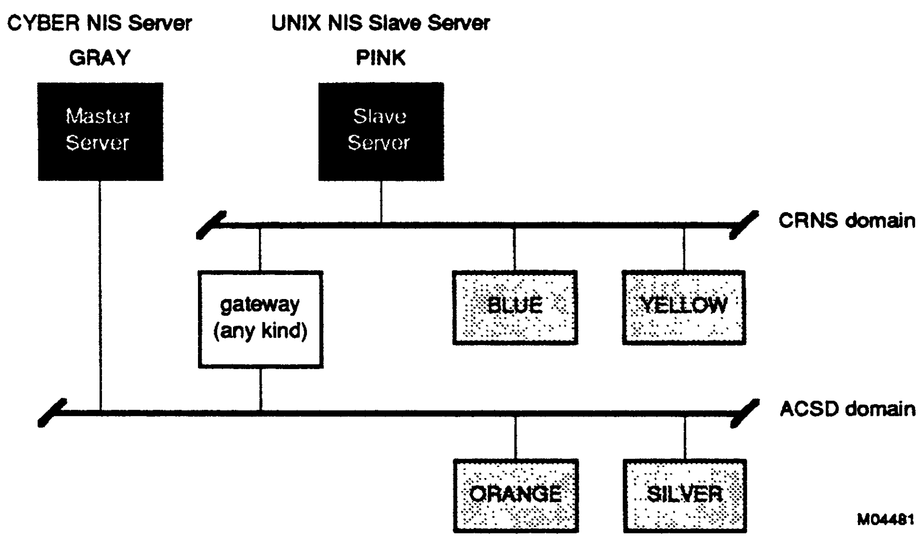

Figure 1. NIS Master Server and Slave Server

A set of NIS/VE database servers provides a lookup service. For example, figure 1 shows two file servers, GRAY (CYBER master server) and PINK (workstation slave), serving a network of workstations. NIS/VE supports the NIS master server, NIS slave server, and NIS client functions.

NIS/VE maintains a set of files (NIS maps) that NIS client machines can query as a database. All NIS maps are replicated on the different systems (NIS servers). NIS maps can exist on several servers, but the NIS maps are identical on all servers. Only the master NIS server can update NIS maps.

CDCNET NQS/VE

Provides Batch Capabilities on UNIX Systems

NQS/VE (Network Queuing System/Virtual Environment) provides access to and from the UNIX Network Queuing System (NQS). This access provides a batch capability for script execution and routing of scripts across the network.

With NQS/VE, you can submit a script on NOS/VE and run it on UNIX, or you can submit a script on UNIX and run it on NOS/VE.

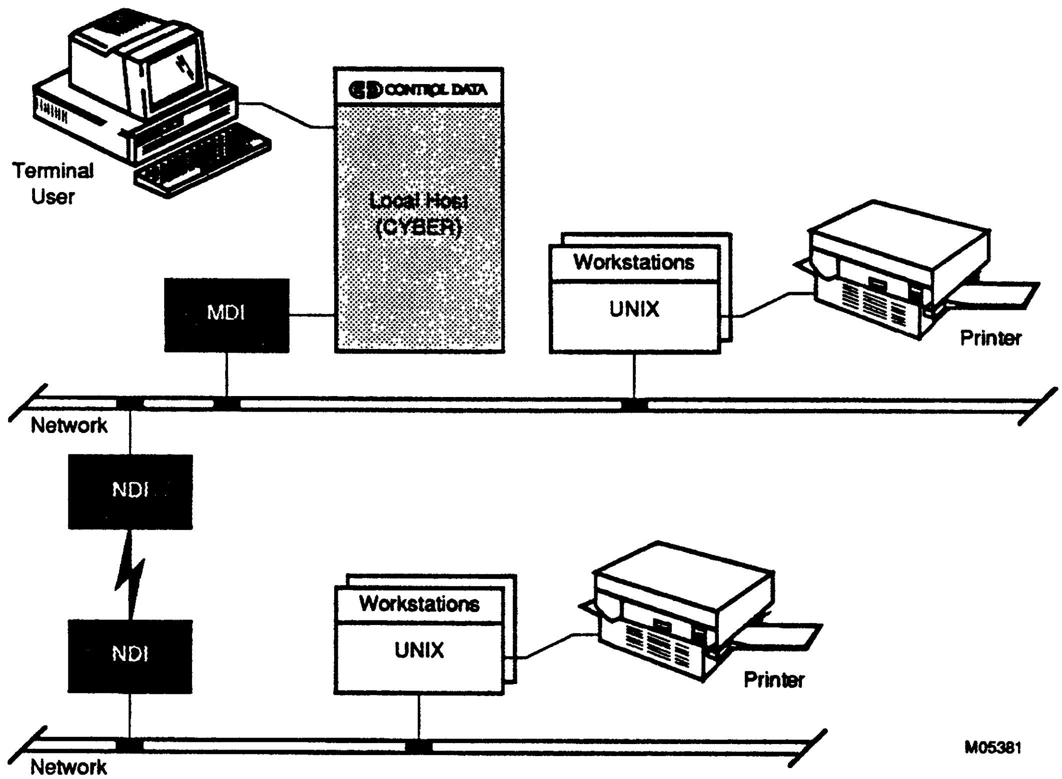

Figure 1. Network Queuing System

NQS/VE provides a set of user commands and system programs that allow you to perform the following tasks:

- Submit and return a job to a UNIX queue.
- Queue a script from UNIX and execute it as a NOS/VE job.
- Terminate a job on a UNIX queue.
- Display the status of a UNIX queue.

For example, a NQS/VE submit request command allows you to submit requests from one workstation and process the requests from a different workstation. You can use this command to send a print request from the CYBER host to a printer attached to either UNIX workstation shown in figure 1.

During execution of this request, you can use the NQS/VE display status command to monitor the status of your request. You may also use the NQS/VE terminate command to halt execution of the request any time prior to completion.

NQS/VE uses Mail/VE to notify users when it cannot transfer a job or return the job's output.

CDCNET NLM/VE

Provides File and Record Locking

NLM/VE (Network Lock Manager/Virtual Environment) provides file and record locking using TCP/IP protocols in the CDCNET network. Locking prevents multiple processes (running on the client) from modifying the same file at the same time, and allows cooperative processes to synchronize access to shared files.

NLM/VE conforms to the SunOS 4.0 Network Lock Manager (NLM). PCNFS version 3.01 is required for an MS-DOS system to use the NLM/VE file locking services.

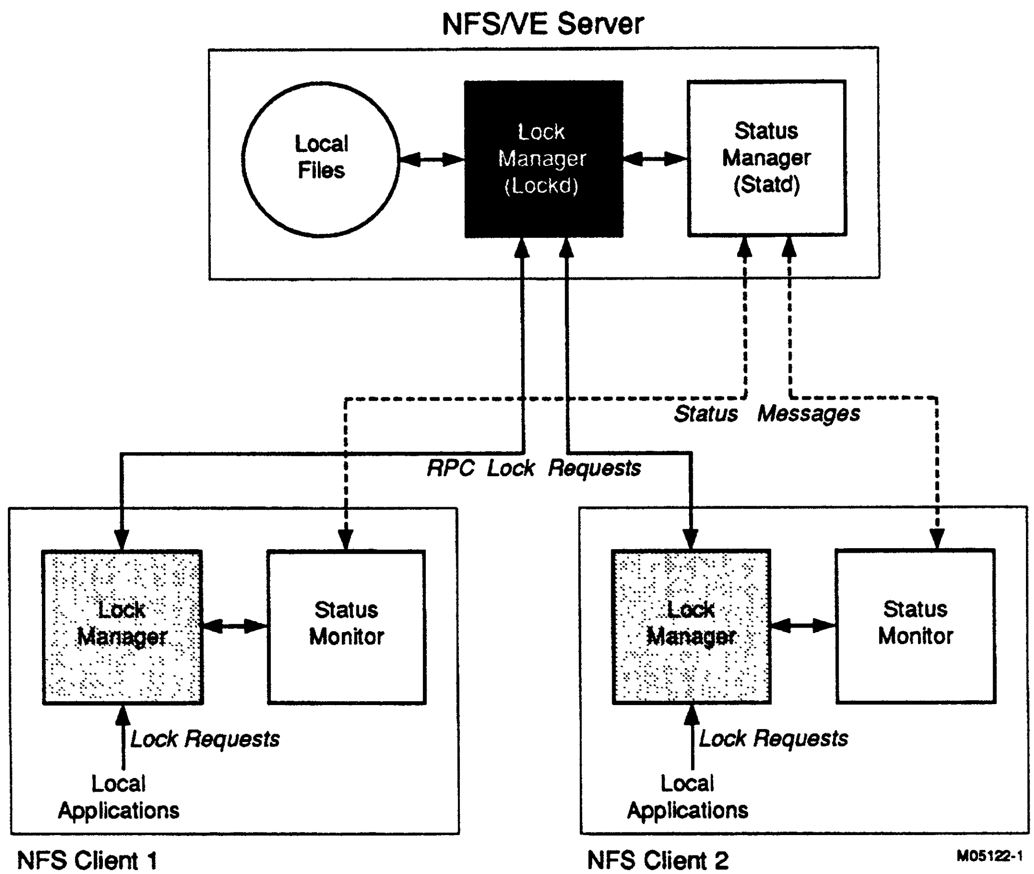

Figure 1. NFS Lockd and NLM/VE Locking Service

Lockd is the network service Remote Procedure Call (RPC) daemon that handles lock requests from client lock managers. When NLM/VE receives a remote lock request from a machine that doesn't have a lock registered, it sends a status request to the status monitor (*statd*) for that machine.

Statd watches the status of registered machines for all network lock activity. If one of the machines is rebooted for any reason, *statd* notifies *Lockd* that the machine is again operational.

CDCNET NFS/VE

Provides File Sharing Capabilities

NFS/VE (Network File System/Virtual Environment) provides file server support for the NFS version 2.0 protocol developed by Sun Microsystems, Inc. This support allows any NOS/VE system to act as a file server for client systems with the NFS version 2.0 protocol client functions installed. Limited client support is also provided by the Virtual File System Operator Utility (VFSU) segment of NFS/VE.

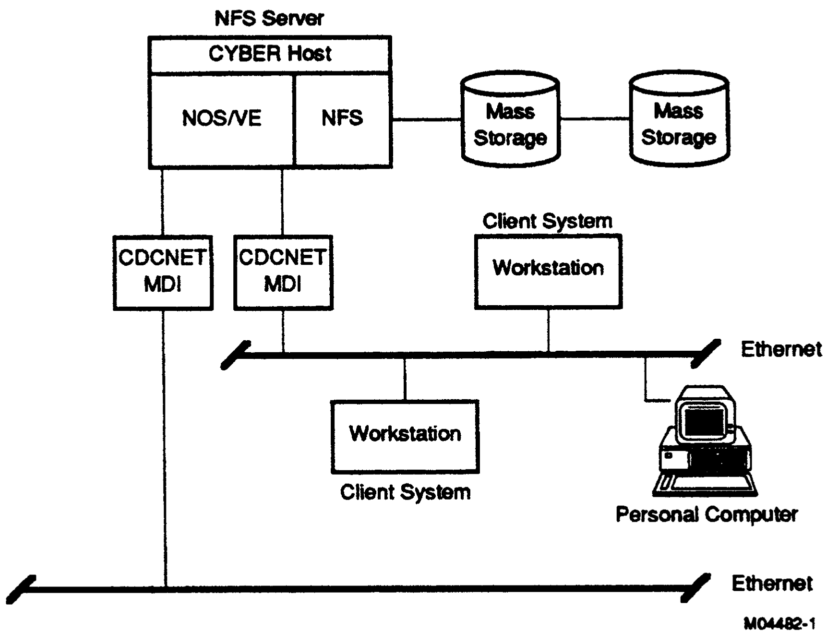

Figure 1. Implementation of NFS/VE on CDCNET

Using NFS/VE, you can write or edit a program on your workstation, and store and execute the program on a CYBER without moving the file between the workstation and the CYBER.

You may take advantage of significantly more disk storage space on a CYBER than on your PC by storing a large database on CYBER, and allowing a number of your colleagues to access it from different PCs and workstations. As an owner of a file or directory, you can restrict access to the file or directory.

NFS/VE also includes the Virtual File System (VFS). VFS is a NOS/VE Segment Access File that contains an NFS file system. It is a parallel service of NFS/VE and can be mounted and used like a UNIX file system. It supports UNIX style filenames, hard links, and directory renaming. It provides faster access for certain NFS operations. A virtual file system allows up to 2 gigabytes of disk storage space, up to 65,536 files and directories, and handles a block size of 8192 bytes.

Because VFS is a virtual file system that operates independently of the NOS/VE file system, you do not have to know or use the technical aspects of the NOS/VE file system. Instead, you can use UNIX style file commands and mechanisms for file management.

You can manage files using NOS/VE VFSU. VFSU accesses files on remote NFS server systems. The primary purpose of VFSU is to move files between the virtual file system and the real file system. VFSU can also be used as an NFS client utility to access remote NFS server systems (CYBER or otherwise). VFSU can be used on the same system as VFS, or any CYBER system connected through CDCNET.

CDCNET TCP/IP/FTP/TELNET (SMTP/VE)

Supports Connections to Internet and TCP/IP Workstations

The TCP/IP/FTP/TELNET (SMTP/VE) software product is a set of Transmission Control Protocol/Internet Protocol (TCP/IP) protocols that support the ARPANET community. TCP/IP protocols are required within CDCNET to connect to Internet and TCP/IP workstations.

The protocols provided by this software product include the following:

- FTP (File Transfer Protocol)
- Telnet
- TFTP (Trivial File Transfer Protocol)
- SMTP/VE (Simple Mail Transfer Protocol for NOS/VE)

FTP protocol is Internet-defined and specifies file transfers to and from connected TCP/IP hosts. FTP supports FTP Client and FTP Server protocols. The FTP Client executes on the local host and the associated FTP Server executes on the remote host.

FTP Client protocol lets CYBER users access file systems on remote hosts. FTP Server protocol lets users on remote hosts access CYBER file systems. A remote host can be any host system that supports the FTP protocol. Most implementations of TCP/IP support the FTP protocol.

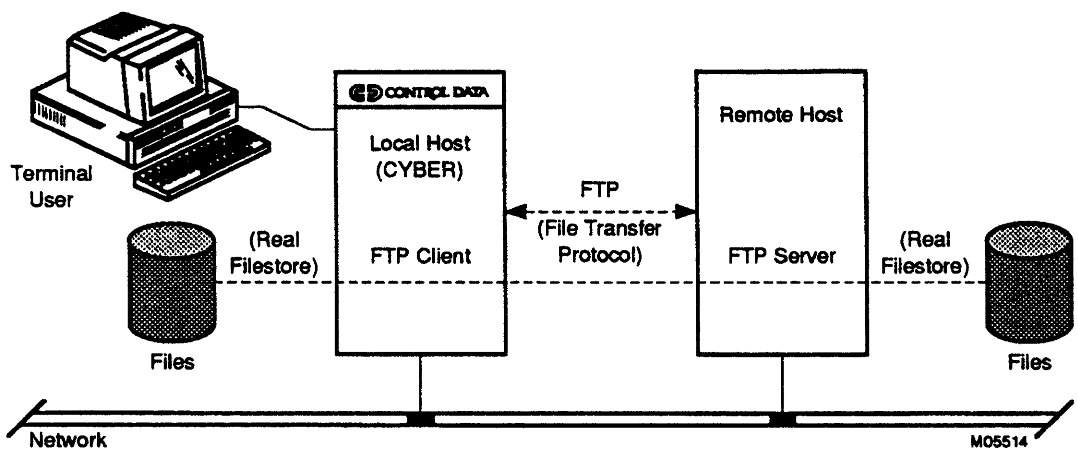

Figure 1. Transferring Files Using the CYBER FTP Client

Using FTP/VE or FTP/NOS, you can access directories and files on a remote host and perform common operations, such as list and change working directories, list files at various levels, transfer files, and rename directories and files.

Telnet protocol lets any user on a host connected to a TCP/IP network access any other host that also supports the Telnet protocol. Using Telnet, users can log in to a remote system and use the remote system as if it were a local host. There are no special lines or dialup ports required.

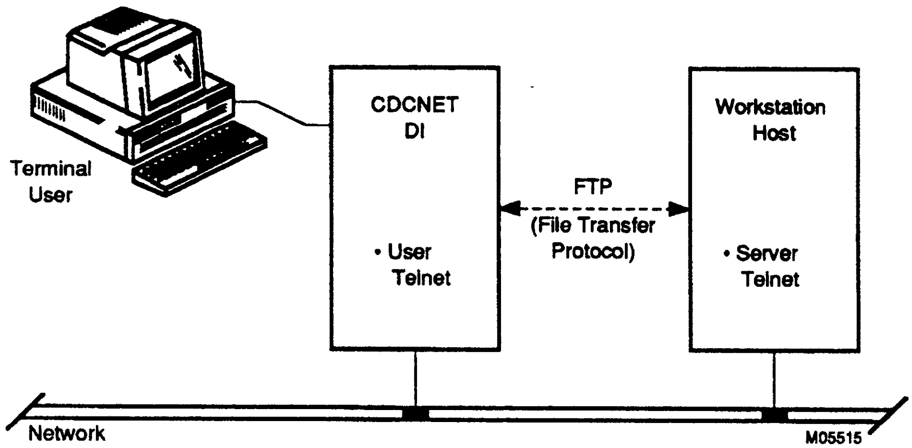

Figure 2. CDCNET User Telnet Connection Model

There are two hosts (or one host and one terminal server) involved in a Telnet connection.

The user's host (or terminal server) is the Telnet Client. The Telnet Client converts input data from the user's terminal device into Network Virtual Terminal (NVT) input data, and converts NVT output data into output data for the user's terminal device.

The remote host (a Telnet TIP or Server Telnet gateway) is the server. The Telnet Server converts NVT input data from the network into the host format, and converts host format output data into NVT output data for the user's terminal device.

The TFTP/VE utility uses TCP/IP Trivial File Transfer Protocol (TFTP) on NOS/VE hosts to transfer files to and from TCP/IP hosts connected to the same network.

TFTP/VE uses connectionless User Datagram Protocol (UDP) as the transport protocol. TFTP/VE includes both Client and Server interfaces.

TFTP Client interfaces provide access from CYBER hosts to file systems on remote hosts. TFTP Server interfaces provide access from remote hosts to the CYBER file system.

The host with the TFTP Client is the local host, and the host with the associated TFTP Server is the remote host. A remote host is any host system that supports the TFTP protocol.

You must first enter the TFTP/VE Client command utility to do any TFTP operations whether you are doing an interactive CYBER session or executing a CYBER batch job. You can then enter appropriate TFTP commands to the the TFTP/VE Client to do the desired operation.

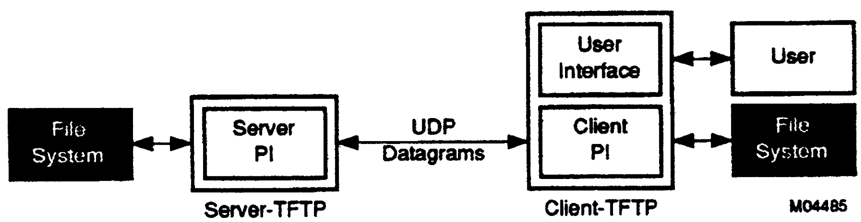

Figure 3. TFTP Service

In figure 3, the TFTP Client and Server communicate using UDP datagrams. The only commands that operate between the Client and Server are file read and file write. The only file security is enforced on the host file system by file access permissions.

The TFTP Client starts the transfer request by sending a request datagram to the TFTP Server. If the Server grants the request, the file is sent in fixed-length blocks of 512 bytes. Each block must be acknowledged with an ackowledgement packet before the next packet is sent. A data packet of less than 512 bytes signals the end of the transfer. Retransmissions of lost, garbled, or out-of-sequence datagrams are used to ensure data integrity. Errors are signaled by sending an error datagram. Most errors terminate the file transfer because error datagrams are neither acknowledged nor retransmitted.

SMTP/VE protocol supports mail transfer between a NOS/VE mail application and TCP/IP connected hosts (figure 4). SMTP/VE transmits mail over the TCP/IP network. The mail application delivers incoming messages to local mailboxes and provides a user interface to access SMTP/VE services. The mail application communicates with SMTP/VE using the NOS/VE batch mail queue to send and receive mail messages.

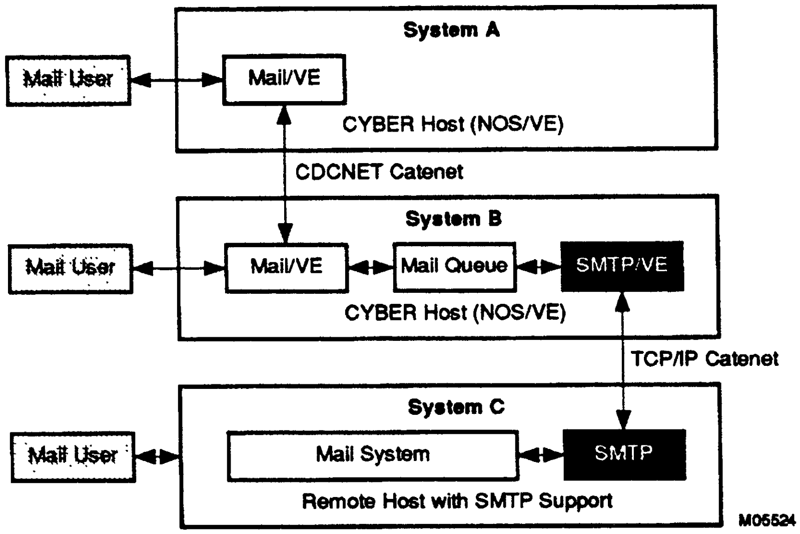

Figure 4. SMTP Using Mail/VE

The Control Data electronic mail application Mail/VE Version 2 supports transferring RFC 822 formatted messages using SMTP/VE over the TCP/IP networks.

SMTP/VE offers the following mail services to a NOS/VE mail application:

- Send messages to connected hosts.
- Receive messages from connected hosts.
- Verify a user on a connected host.
- Expand a mail list on a connected host.
- Support verify mail user requests from connected hosts.
- Support expand mail list requests from connected hosts.

OSI Software Product Descriptions 5

OSI Data Sheets ... 5-4

CDCNET FTAM/VE ... 5-5

CDCNET OSI TP0/CONS ... 5-7

CDCNET X.400 MHS Interface ... 5-9

OSI Software Product Descriptions 5

This chapter describes the features and functions of the CDCNET Open System Interconnection (OSI) software products currently available. This chapter also contains data sheets that provide an overview of each optional CDCNET OSI software product.

Control Data has developed its network architecture using the seven-layer OSI reference model. CDCNET implements the ISO OSI standards for all seven layers. CDCNET also includes proprietary software for those areas, such as network management, for which the ISO OSI standards are still being defined.

In essence, CDCNET augments the OSI model by supporting interface software and gateways which allow data to be exchanged both within concatenated networks (where more than one interconnecting communications medium is implemented) and within networks containing systems that do not support the OSI model or CDCNET.

Figure 5-1 shows how Control Data currently adopts the OSI model within CDCNET.

OSI Model

LAYER	NAME	
7	Application Layer	MANAGEMENT FUNCTIONS
6	Presentation Layer	
5	Session Layer	
4	Transport Layer	
3	Network Layer	
2	Data Link Layer	
1	Physical Layer	

CDCNET

LAYER	NAME			
7 & 6	CDCNET Higher Layers (PTF, QTF, Terminal Manager)	FTAM/VE (NOS/VE only)	Mail/VE (NOS/VE only)	MANAGEMENT FUNCTIONS
5	CDCNET Session	OSI Session (NOS/VE only)		
4	Transport Layer OSI Transport - Class 4			
3B	OSI CLNS			
3A	Intranet			
2	Data Link Layer • MCI SSR • ESCI SSR • HDLC SSR			
1	Physical Layer			

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Figure 5-1. CDCNET Implementation of the OSI Reference Model

The software residing in a host computer running NOS differs significantly from software residing in a host running NOS/VE.

Computer systems running NOS/VE contain host-resident CDCNET software that performs the functions of layers 5, 6, and 7 of the OSI reference model. This host software also includes management entities (MEs) to perform network management tasks. Figure 5-2 shows where components of the CDCNET OSI software reside in a NOS/VE environment.

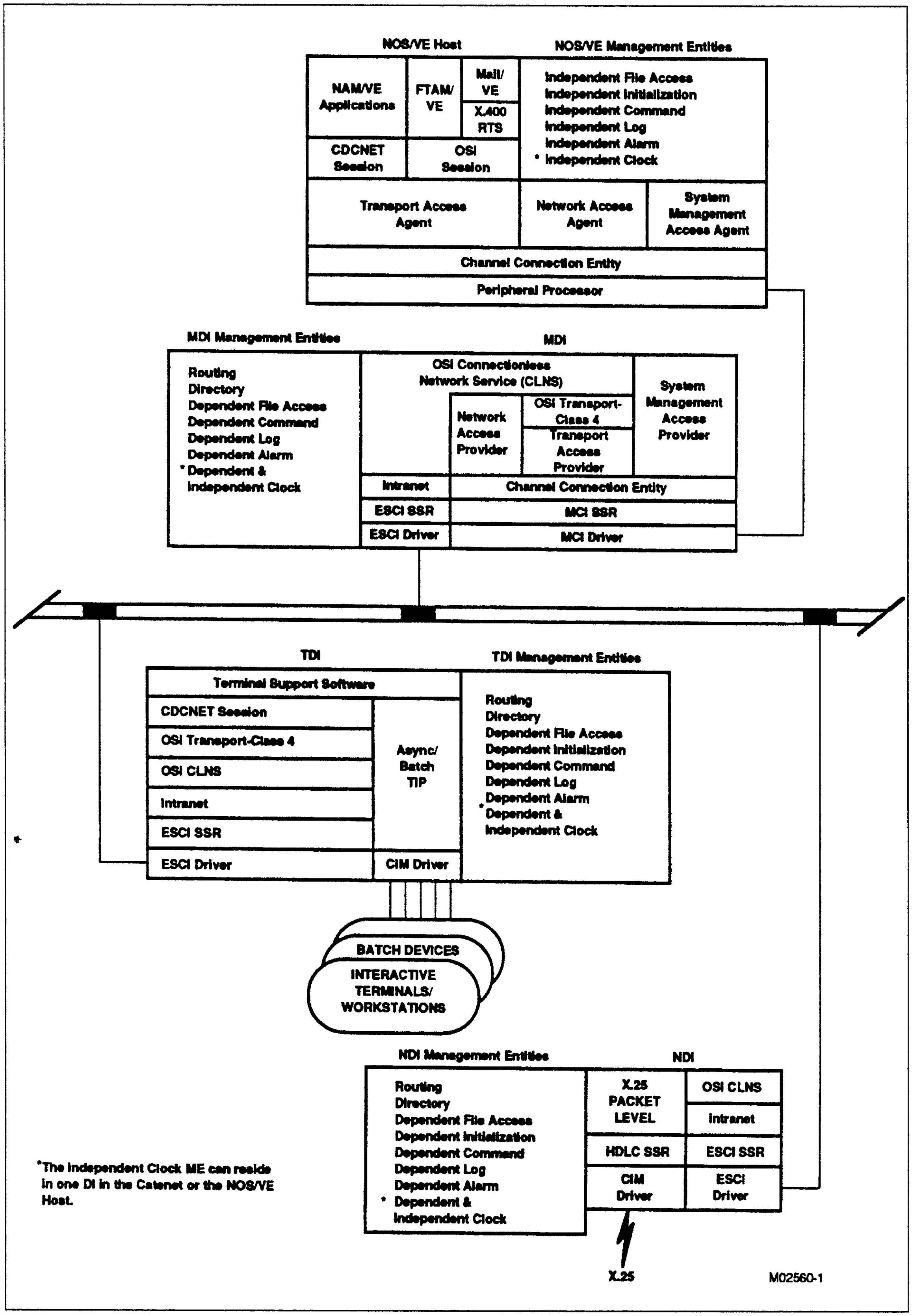

Figure 5-2. CDCNET OSI Software in a NOS/VE Environment

Computer systems running NOS require that their connected mainframe DIs (MDIs) contain special gateway software to provide the CDCNET layer protocols and services (as well as CDCNET management entities). Figure 5-3 shows where components of CDCNET OSI software reside in a NOS environment.

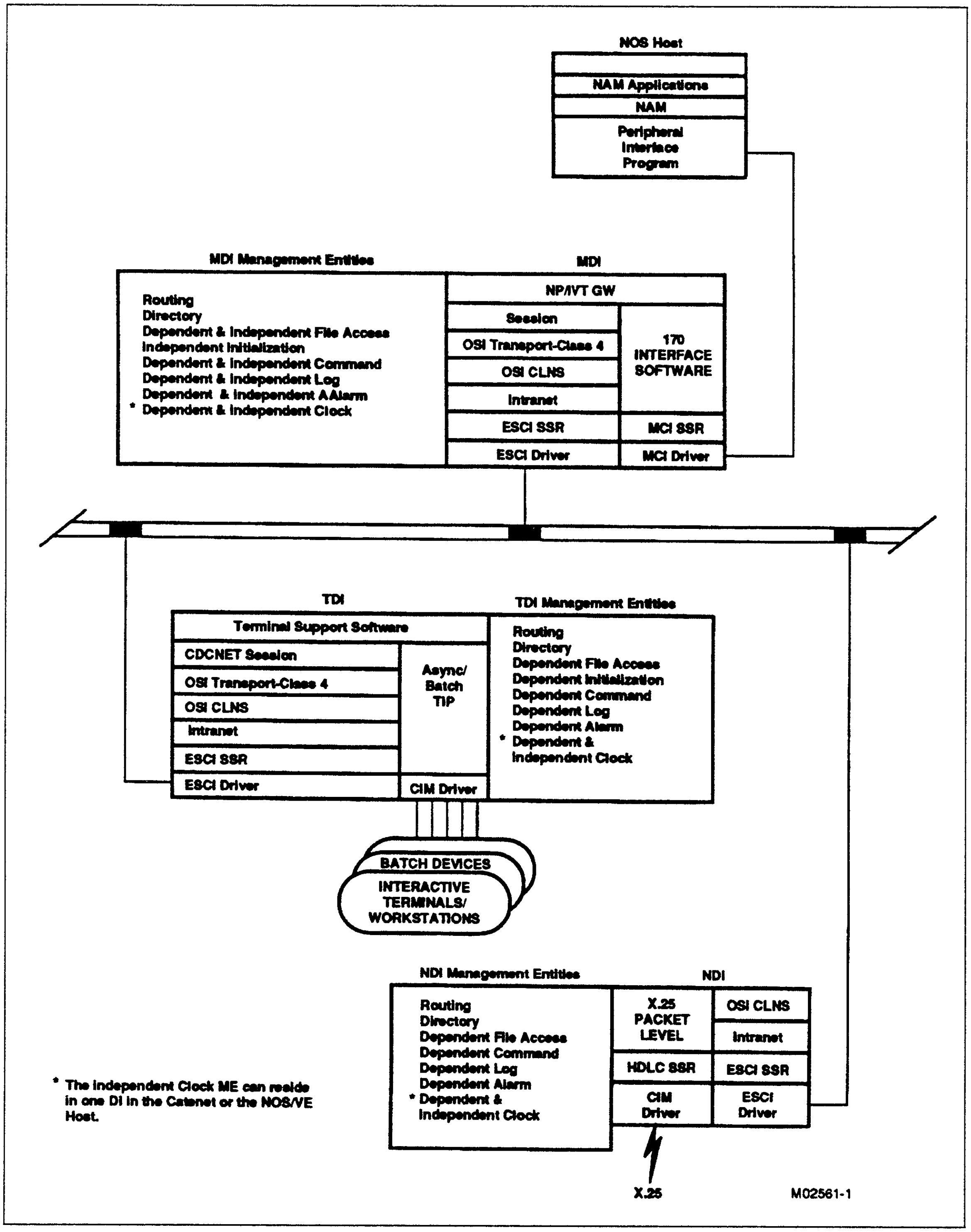

Figure 5-3. CDCNET OSI Software in a NOS Environment

OSI Data Sheets

Data sheets containing an overview of each optional OSI software product and it's product number(s) are included in this chapter. The data sheets are arranged in alphabetical order.

Table 5-1. OSI Data Sheets

Data Sheet	Product Number
CDCNET FTAM/VE	N261-32 (NOS/VE for small CYBERs) N261-34 (NOS/VE for large CYBERs)
CDCNET OSI TP0/CONS	N261-36 (NOS/VE)
CDCNET X.400 MHS Interface	N261-30 (NOS/VE)

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Control Data
Computer Products Marketing
P.O. Box 0
HQW10H
Minneapolis, MN 55440-4700 U.S.A.

CDCNET FTAM/VE

File Transfer, Access, and Management Facility for Remote Systems

FTAM/VE is the File Transfer, Access, and Management facility based on the Open Systems Interconnection (OSI) standard, ISO 8571 for FTAM. FTAM/VE complies with GOSIP Version 1.0.

FTAM/VE allows open systems interconnection for file users who want to transfer, access, or manage files on a remote system. FTAM/VE supports the transfer of files to and from remote systems; the display of file attribute information; and the changing of file attributes, such as the filename.

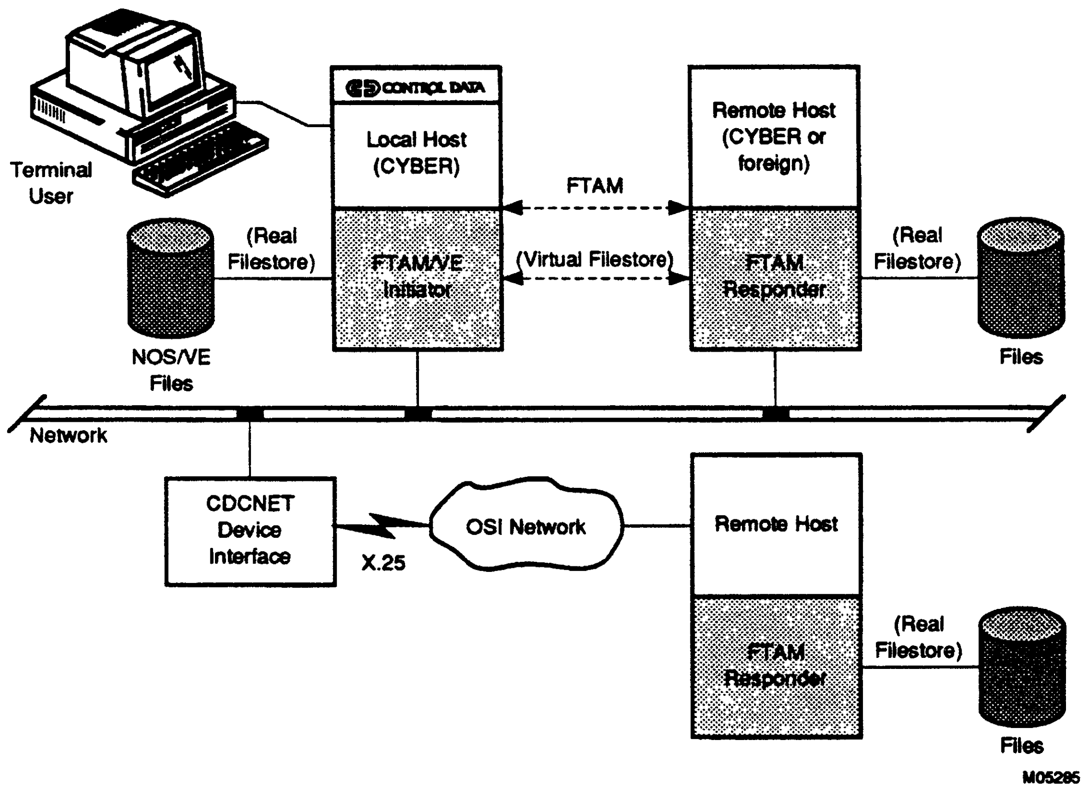


Figure 1. FTAM/VE File Transfer from a Remote Host

The FTAM/VE user interface is implemented as a NOS/VE command utility that executes in the user's job. The command interface is easy to use and is similar in form to the well known File Transfer Protocol (FTP) command interface. With the command utility, the user can transfer and manage files between a local FTAM/VE host and a remote host that supports FTAM.

FTAM/VE provides error diagnostics that display information exchanged between the local NOS/VE host and the remote FTAM host.

FTAM/VE can be used over the standard product which is the Transport Class 4, the ConnectionLess Network Service (CLNS), and Ethernet or HDLC. Also, it can be used over Transport Class 0, the Connection Oriented Network Service (CONS), and X.25. In either case, a complete OSI stack is used to perform the transfer.

FTAM/VE supports the storage attribute group and any file-naming convention for remote files.

The supported FTAM/VE documents include the following:

Document Type	Constraint Set	Filestore Actions	Access Contexts
FTAM-1	FTAM unstructured (text)	Read, replace, extend	Unstructured all data units (UA)
FTAM-2	FTAM sequential flat (binary)	Read, insert	Unstructured all data units (UA), flat all data units (FA)
FTAM-3	FTAM unstructured (text)	Read, replace, extend	Unstructured all data units (UA)
FTAM-4	FTAM sequential flat (binary)	Read, insert	Unstructured all data units (UA), flat all data units (FA)

The supported FTAM/VE functional units and service classes include the following:

Functional Units	Transfer Service Class	Management Service Class	Transfer/ Management Service Class	Description
Kernel	X	X	X	Regime establishment/termination, file selection/deselection
Read	X	NA	X	Transfer of data from responder to initiator
Write	X	NA	X	Transfer of data from initiator to responder
Limited file management	X	X	X	File creation, deletion, reading of attributes
Enhanced file management	X	X	X	Changing of attributes
Grouping	X	X	X	Grouping of service primitives in a single exchange

CDCNET OSI TP0/CONS

Communications Support for Multiple Hosts over X.25 PDN Systems

OSI TP0/CONS (TransPort class 0/COnnection mode Network Service) supports communications between multiple CYBER and/or foreign hosts over an X.25 Public Data Network (PDN). TP0/CONS protocol is based on the Open Systems Interconnection (OSI) standards ISO 8073, 8348, 8881, 8878, and 8208. It supports both the 1980 and 1984 X.25 PDN standards.

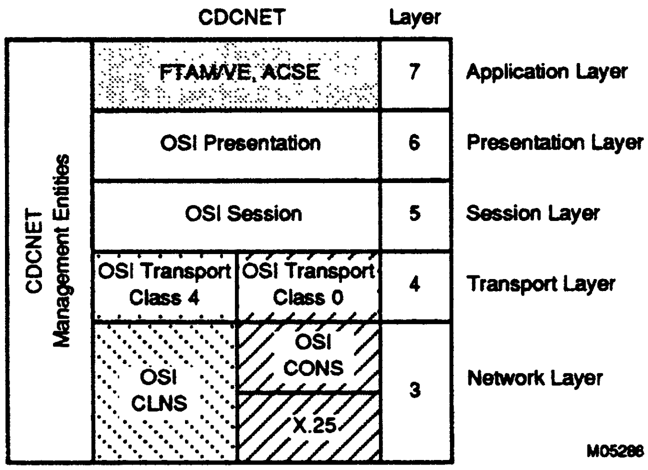


Figure 1. OSI TP0/CONS Protocol Stacks

TP0/CONS follows the standard routing procedure. Network service access point (NSAP) addresses identify non-CDCNET systems to CDCNET and next-hop information identifies boundary systems that can be used to reach the non-CDCNET system.

A Non-CDCNET System, also called a foreign host, refers to a system with an NSAP address prefix different from the one currently used by the DIs in the network. When using the NSAP address to define routing, you do not have to include the entire address, but you must include enough bytes to define the address as unique.

TP0/CONS can be used over Ethernet, HDLC, or X.25 networks. Currently only DIs connected to X.25 PDNs may be used as boundary systems when foreign hosts are included in the network.

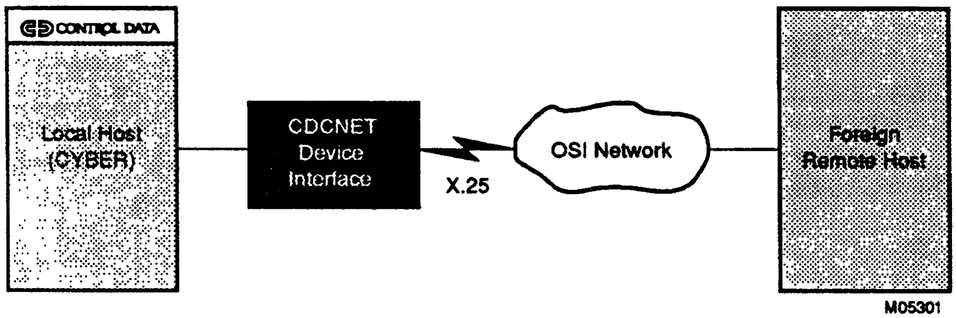


Figure 2. TP0/CONS Link to Foreign Host over an X.25 PDN

CDCNET X.400 MHS Interface

Message Handling Service for X.400 Systems

The X.400 MHS (Message Handling Service) Interface is the Reliable Transfer Service (RTS) of the OSI 1984 CCITT X.400 Standard for Message Handling Systems. The X.400 MHS Interface allows the exchange of electronic mail with remote X.400 systems on the network.

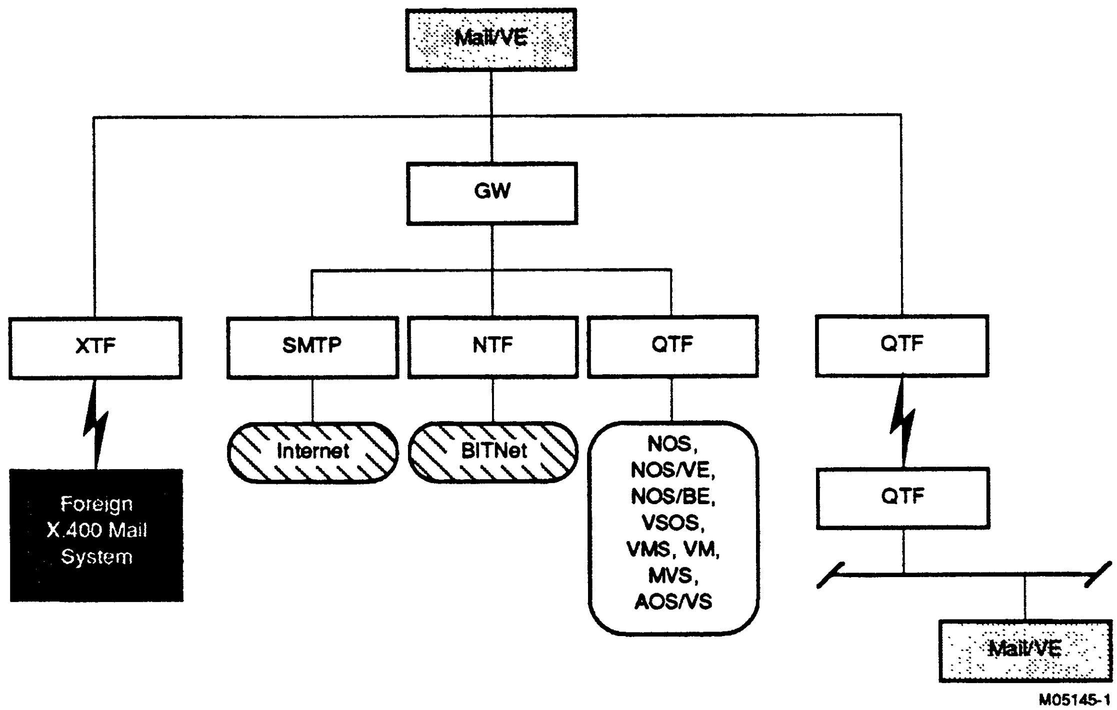


Figure 1. X.400 MHS Mail/VE Architectural Overview

The X.400 MHS Interface combines the X.400 Transfer Facility (XTF) and Mail/VE to form the message handling service. Mail/VE provides multihost mail transfer, X.400 message handling, and a gateway that allows transfer to Network Job Entry (BITNet/EARN) and Simple Mail Transport Protocol (ARPA Internet) networks.

Mail/VE provides the User Agent and Message Transfer Agent (MTA), and XTF provides the Reliable Transfer Service (RTS).

The Mail/VE User Agent provides both a line-oriented (procedural) interface and a screen-oriented interface to X.400 services. The Mail/VE MTA provides routing and local mail delivery services. The User Agent utility executes in the user's job, while the MTA executes as a separate NOS/VE job.

The XTF provides interconnection over either TransPort class 4/ConnectionLess Network Service (CLNS) on Ethernet or HDLC or TransPort class 0/Connection Oriented Network Service (CONS) on an X.25. In either case a complete OSI protocol stack is used.

The Mail/VE Gateway can convert mail from the X.400 format to the RFC822 format or from the RFC822 format to the X.400 format. The results are routed to Internet or Bitnet networks using Simple Mail Transfer Protocol (SMTP) or Network Transfer Facility (NTF).

Network Configurations 6

Network Configuration Examples 6-1

Network Configurations 6

This chapter shows typical CDCNET network configurations ranging in complexity from the minimum, entry level system to more complex combinations of networks. Chapter 7 provides details related to the connections used between CDCNET products.

The network capabilities depend both upon the hardware available and the features supported by specific versions of CDCNET software.

The variety of communications capabilities now available under the CDCNET OSI architecture provide multivendor connectivity. Figures 6-9 through 6-12 illustrate CDCNET support for multivendor connectivity.

Network Configuration Examples

The following pages contain a variety of network examples. Your Control Data representative has special tools, such as the Control Data product configurator, to assist you in designing a workable network incorporating the latest available CDCNET products, features, and capabilities.

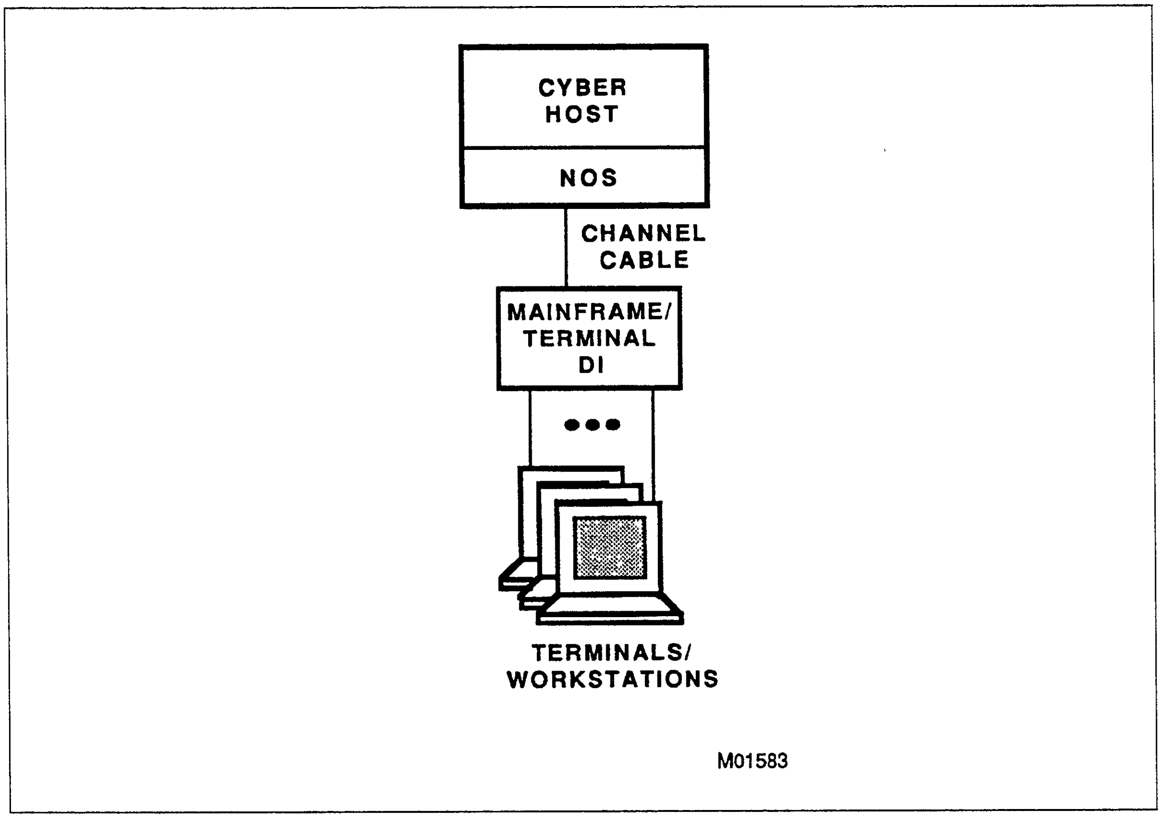


Figure 6-1. Minimum Configuration with a Single Host, an MTI, and User Terminals

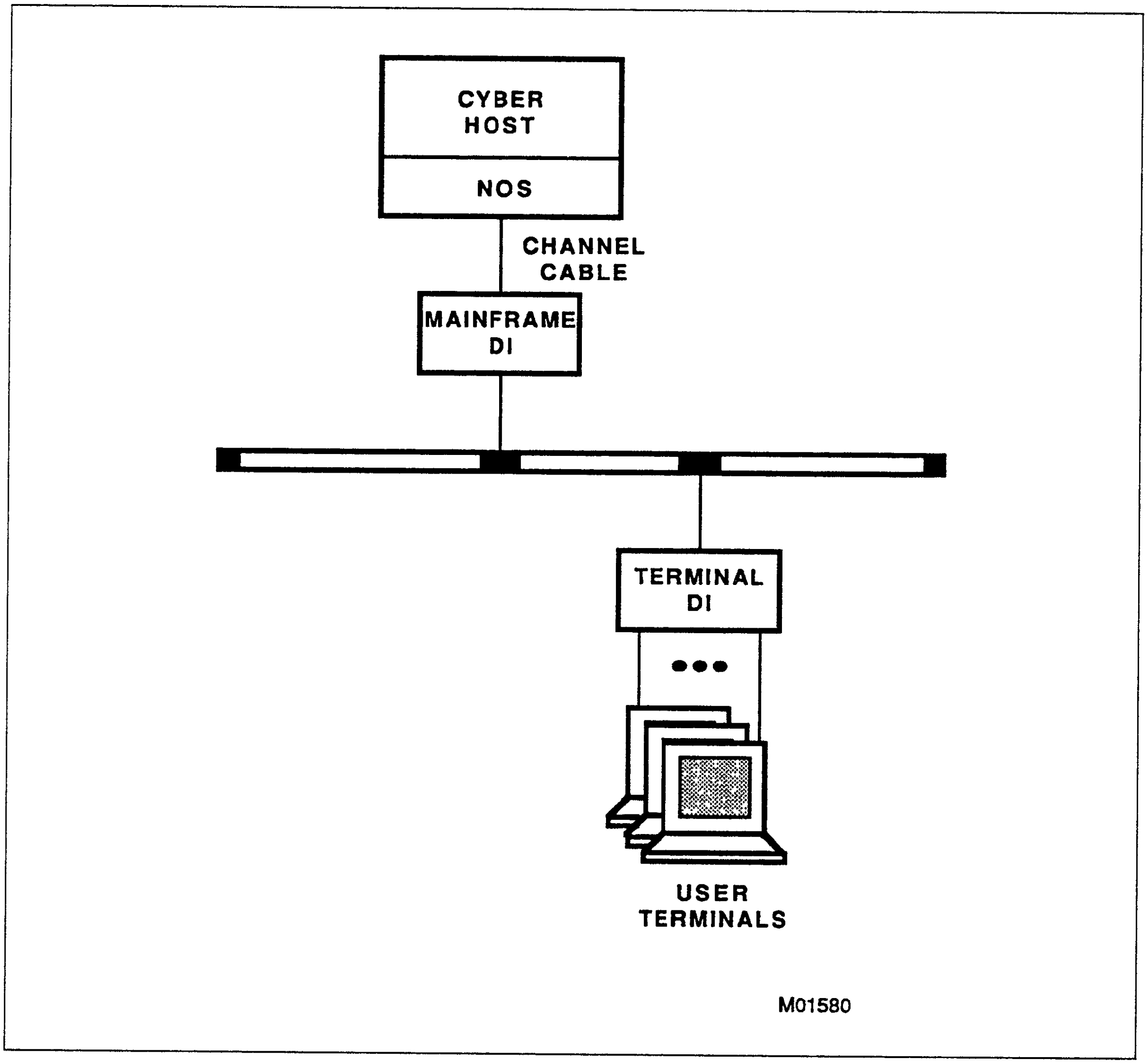


Figure 6-2. Minimum Configuration with a Single Host, an IEEE 802.3 Trunk, and User Terminals

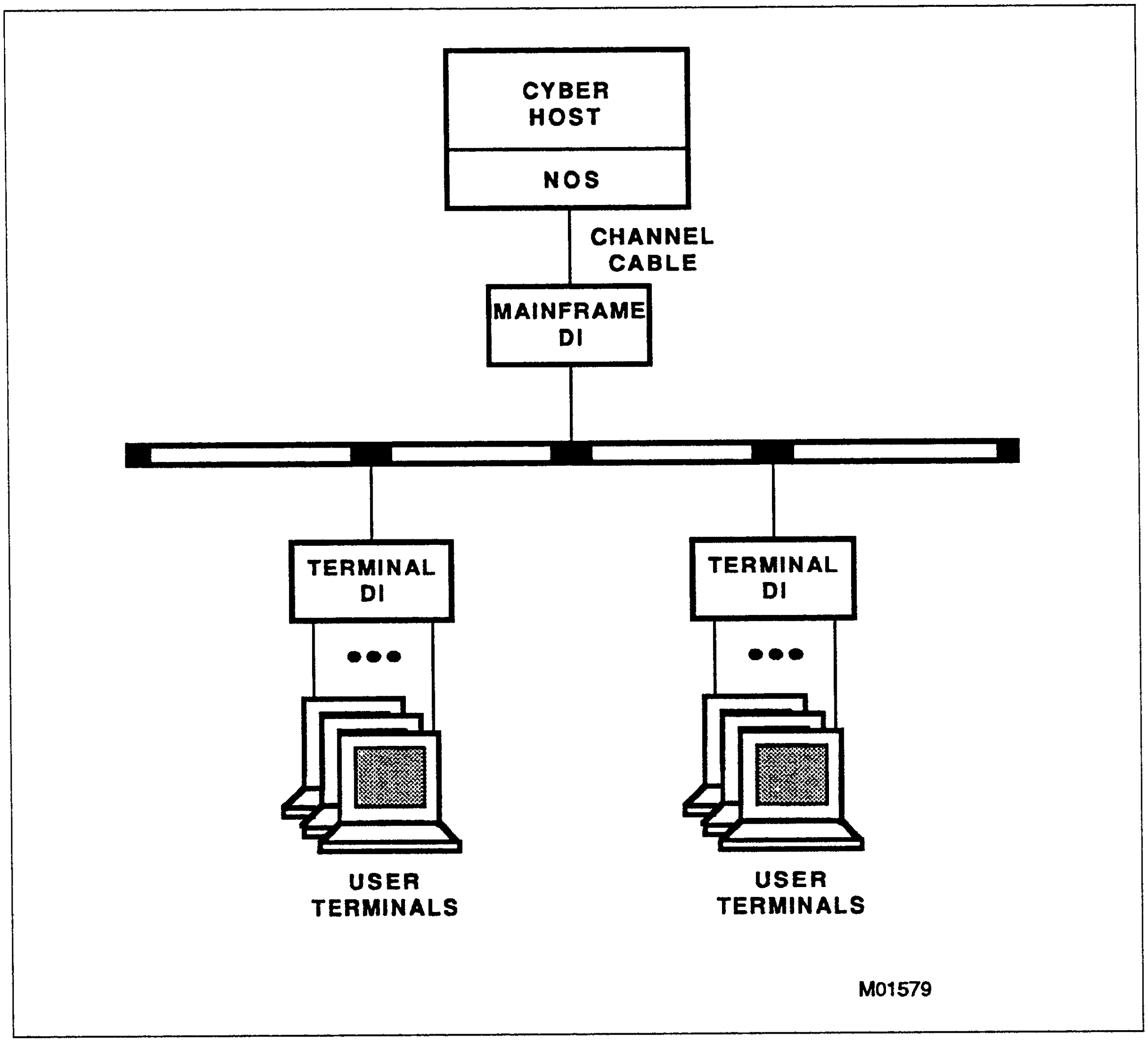


Figure 6-3. Typical Configuration with a Single Host, One MDI, an IEEE 802.3 Trunk, Two TDIs, and User Terminals

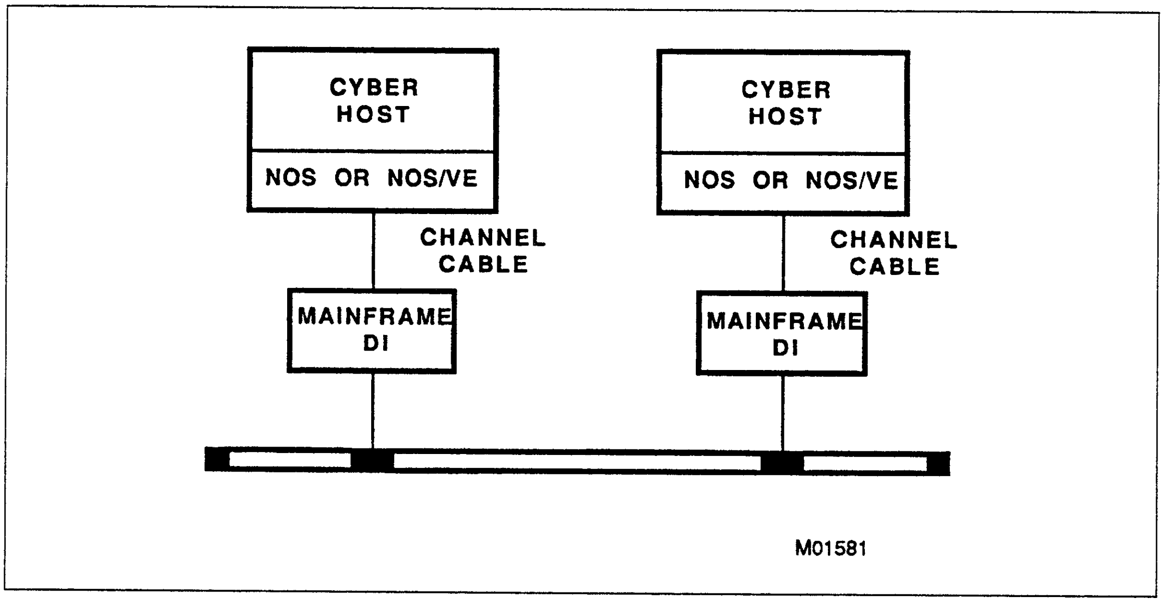


Figure 6-4. Minimum Configuration with Two Hosts and an IEEE 802.3 Trunk

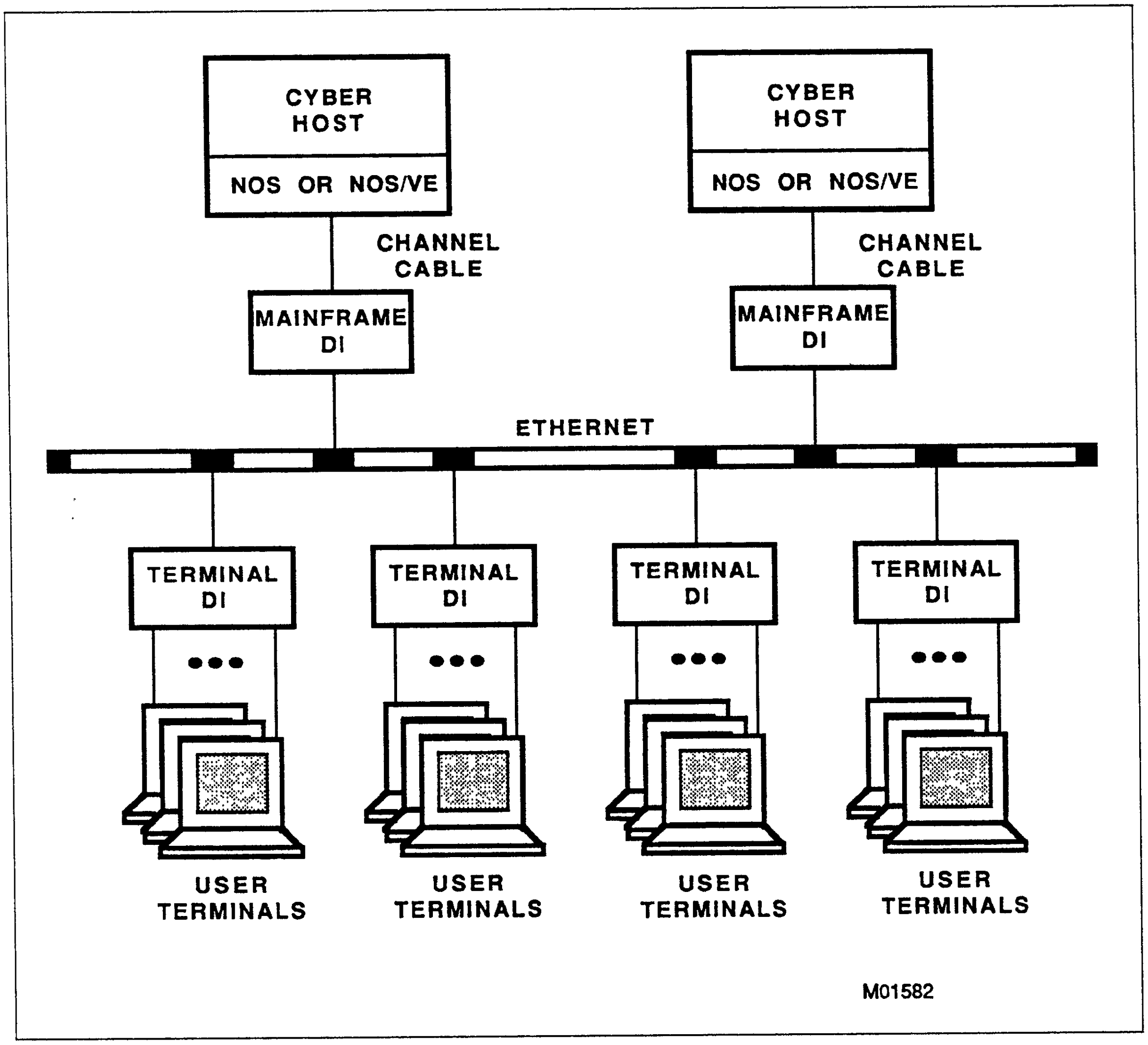


Figure 6-5. Typical Configuration with Two Hosts, Two MDIs, an IEEE 802.3 Trunk, Four TDIs, and User Terminals

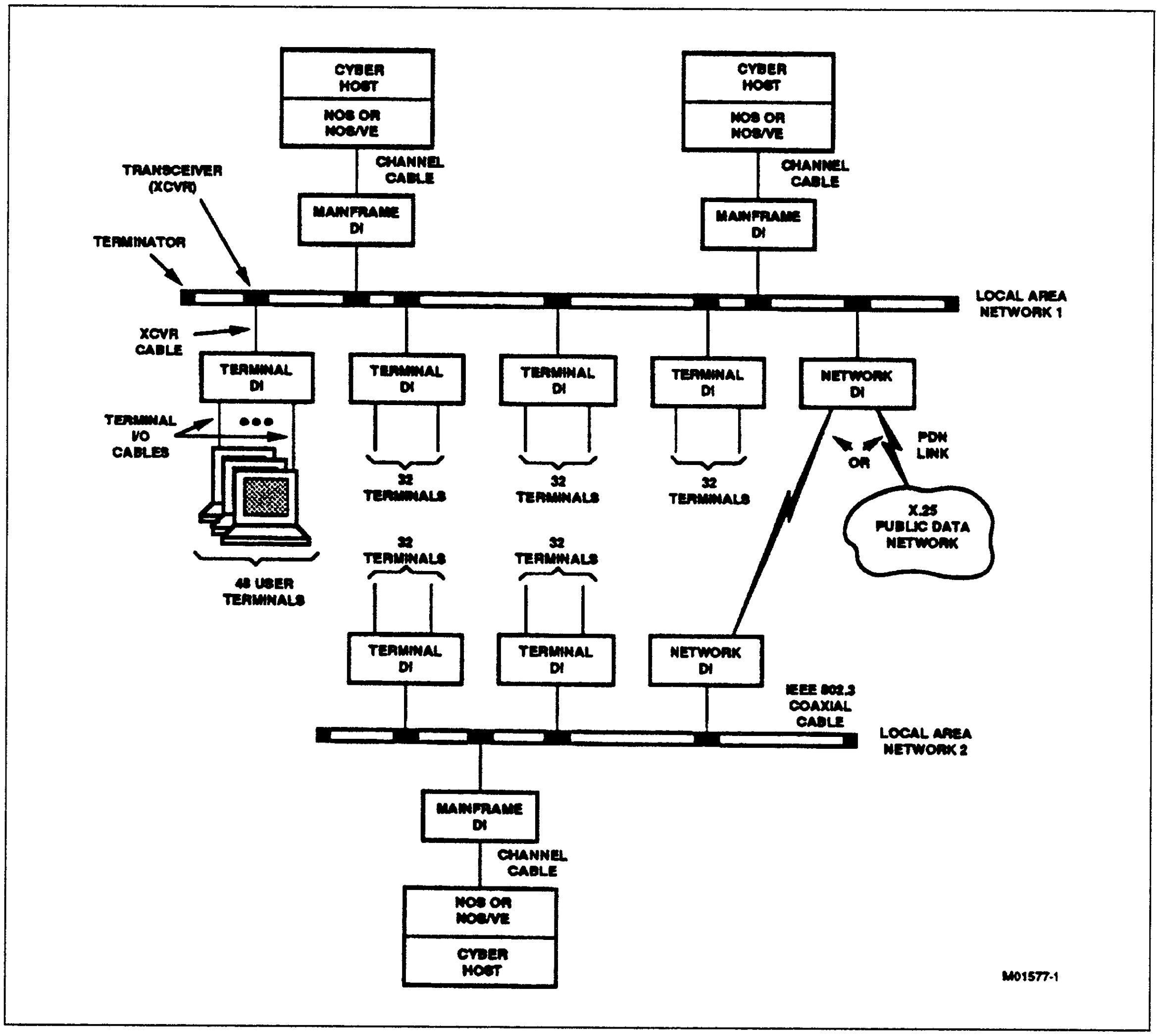


Figure 6-6. Large Configuration With Multiple Hosts and Multiple Networks

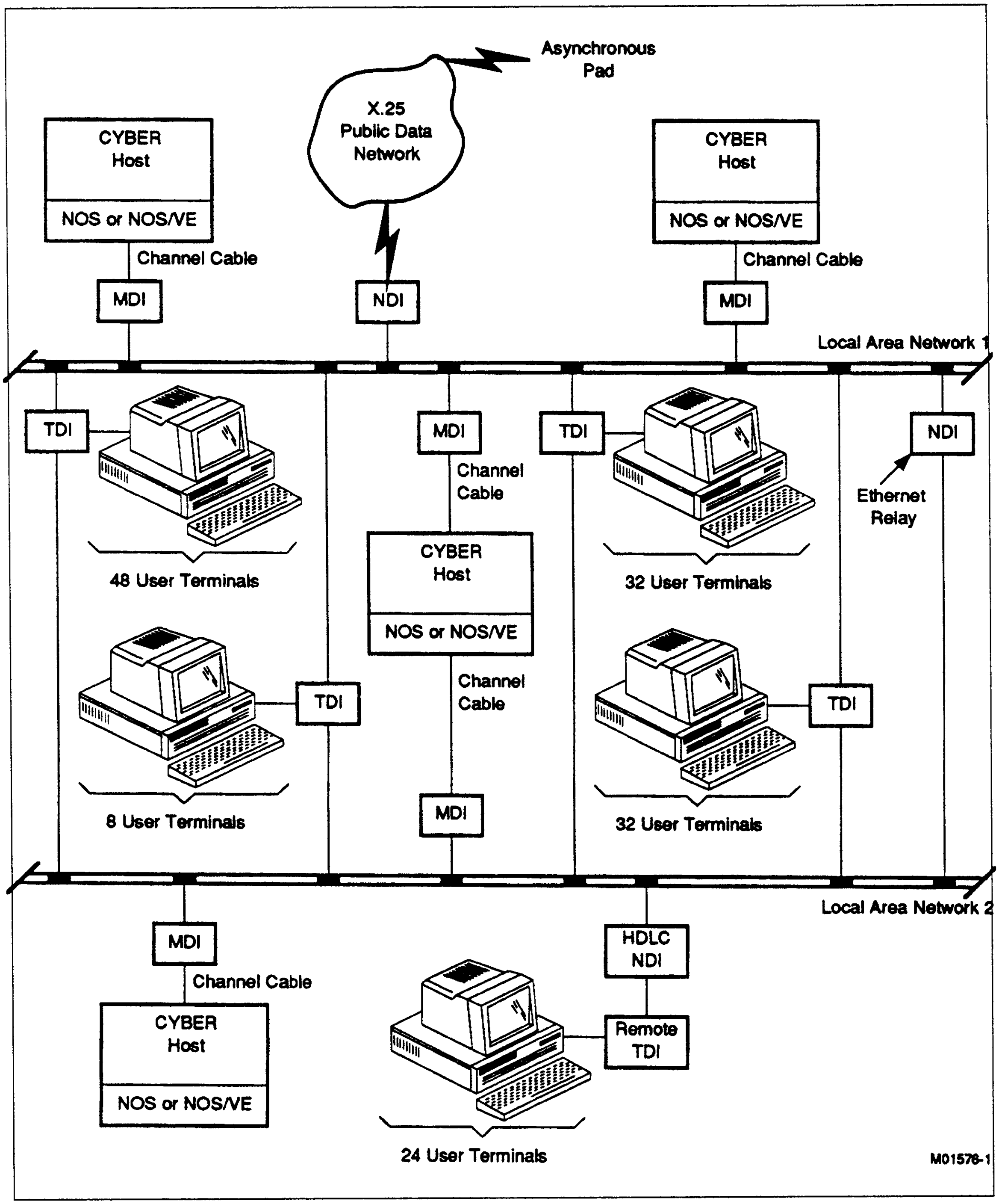


Figure 6-7. Large Configuration of 240 Terminals

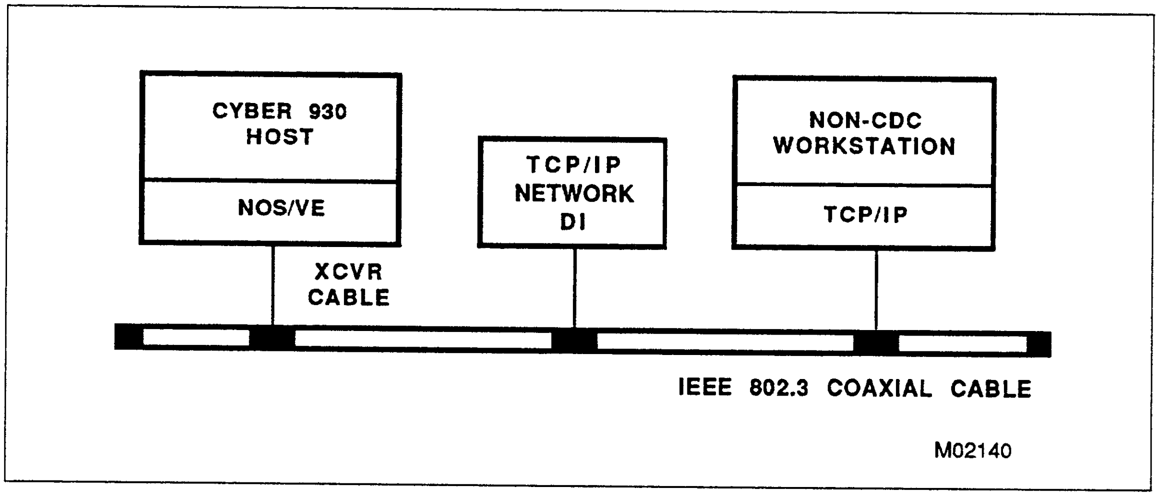


Figure 6-8. CYBER 930 Connections to a TCP/IP Workstation

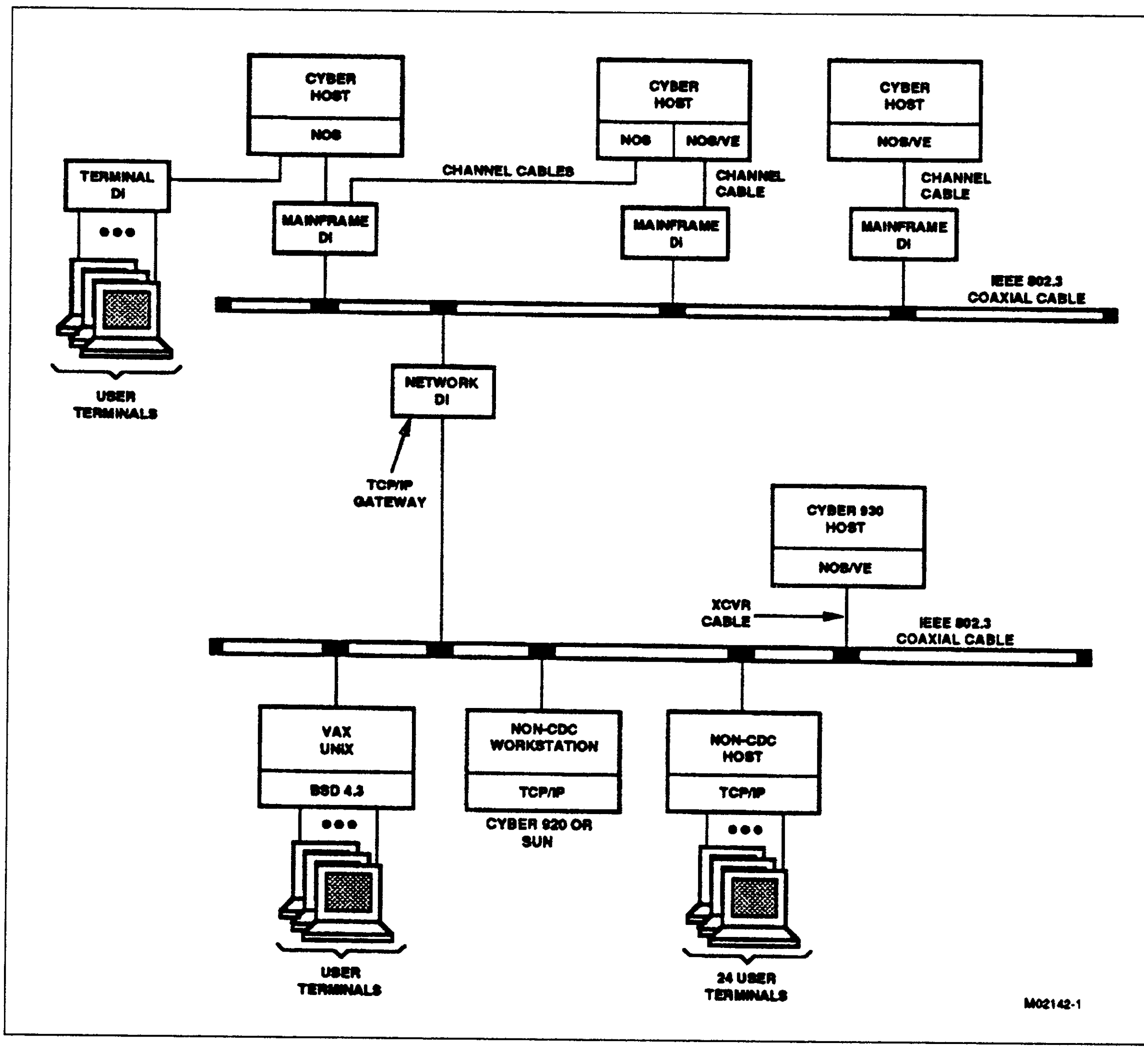


Figure 6-9. CYBER Host Connections to TCP/IP Using IEEE 802.3 Trunks

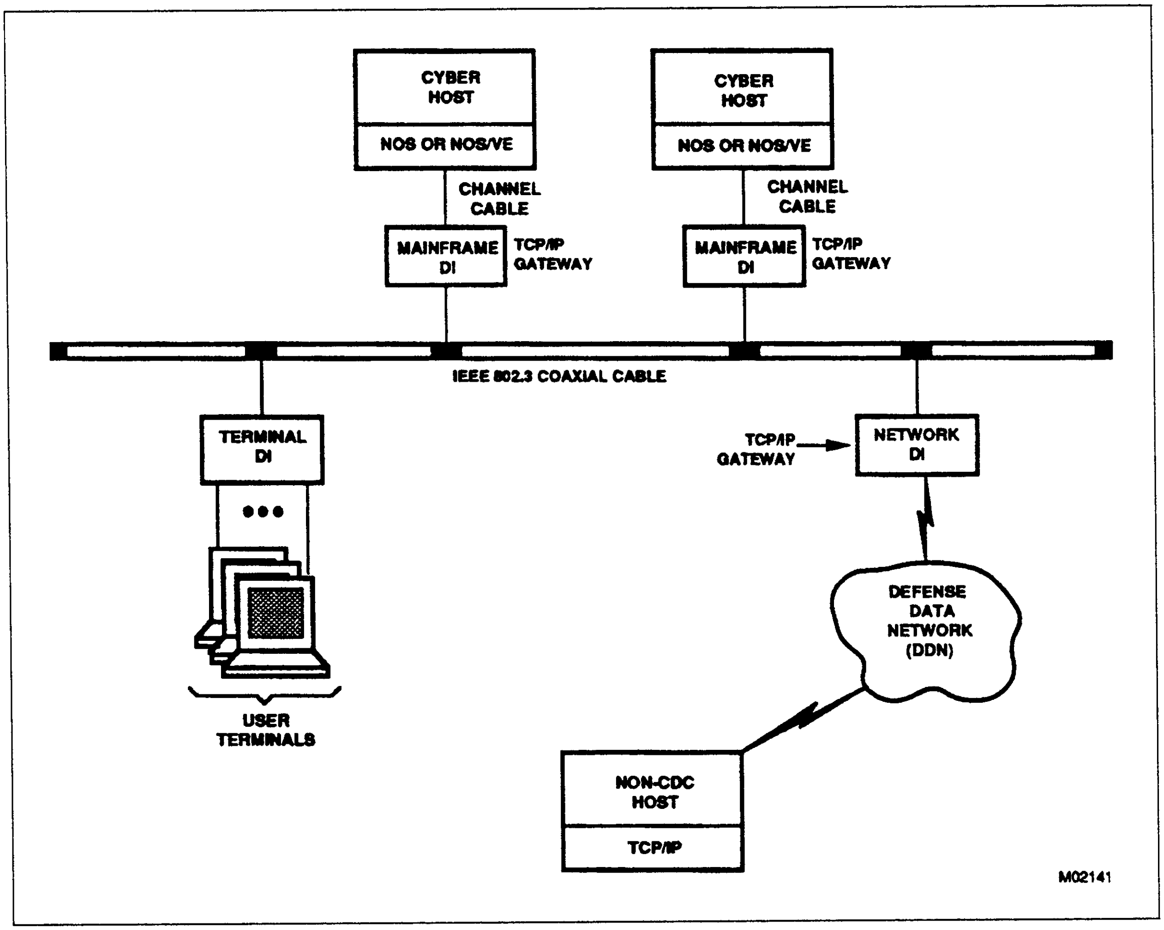


Figure 6-10. CYBER Host and User Terminal Connections to TCP/IP via Defense Data Network (DDN)

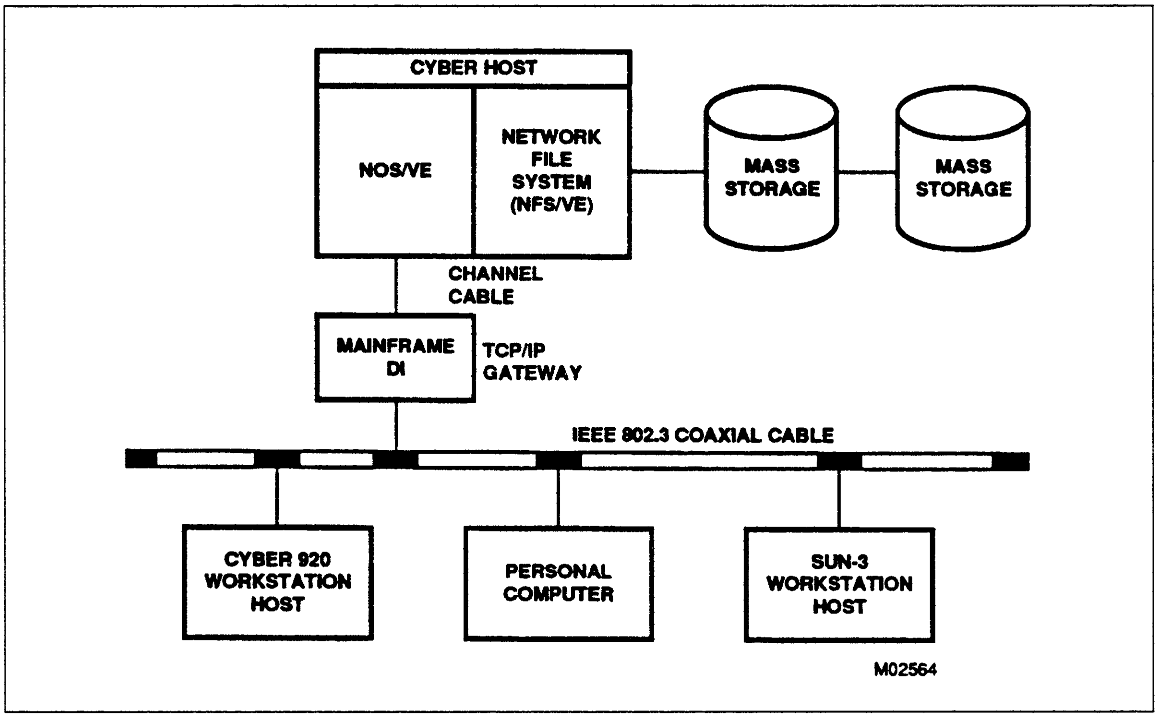


Figure 6-11. NFS Connection to CDCNET Using a TCP/IP Gateway

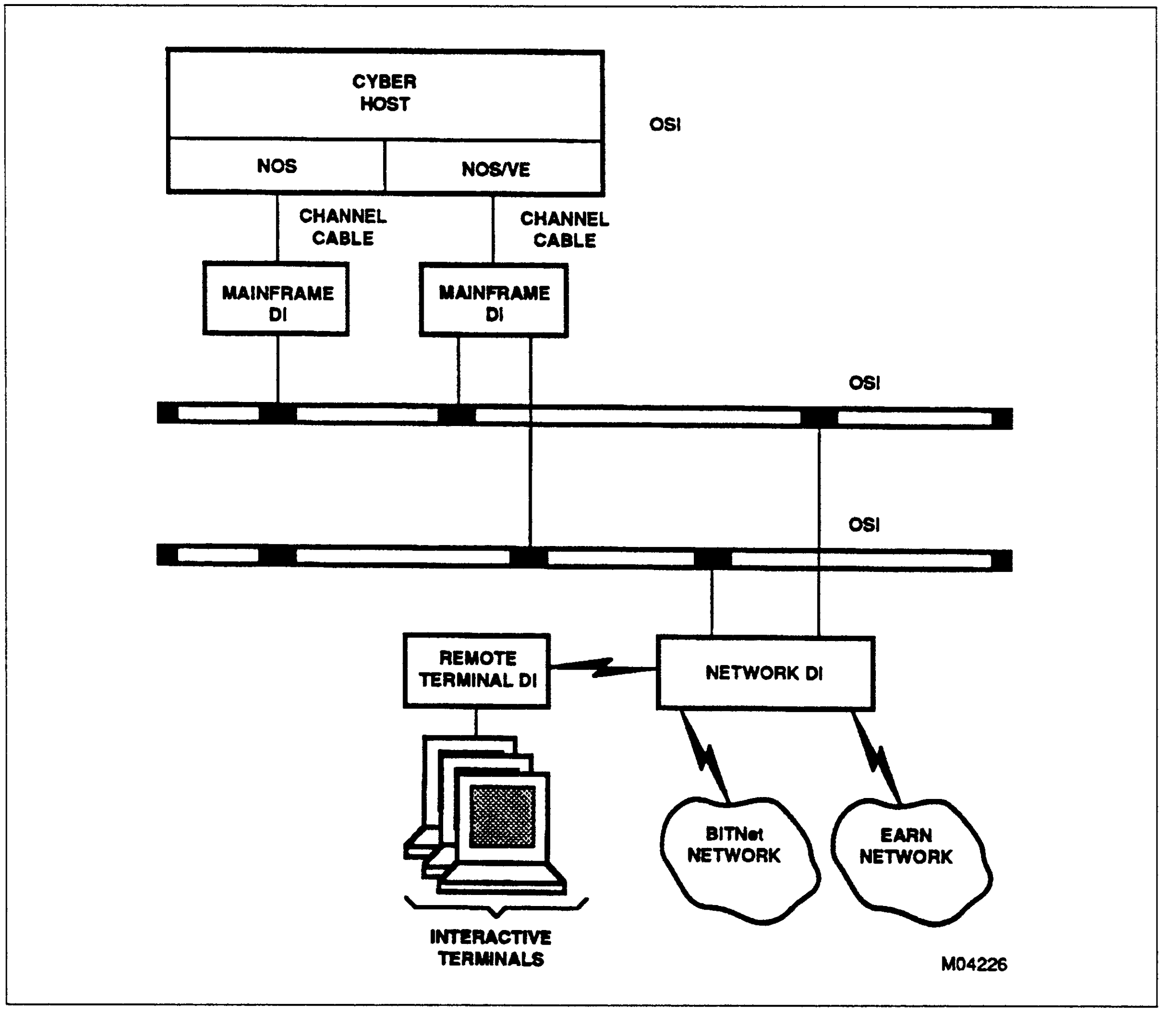


Figure 6-12. OSI Multivendor Connectivity

Cabling Information 7

Building Networks 7-1

Connecting Device Interfaces and Hosts 7-2

Connecting IEEE 802.3 LAN Components 7-3
IEEE 802.3 Coaxial Cable 7-5
Connections Using Transceiver Interface Cables 7-6
Connecting a Transceiver to IEEE 802.3 Network 7-7
Connecting a DI to a Transceiver 7-9
Connecting Multiplexers 7-9
Connecting a Repeater to Transceivers 7-12

Connecting Terminal Devices to DIs 7-13
Selecting the Right LIM Cable 7-14
4-Port RS-232-C LIM Cable Information 7-21
RS-232-C CCITT Signals Supported 7-24
Pin Assignments for the 4-Port RS-232-C LIM 15-Pin Connector 7-25
LIM-to-Modem (DCE) Pin Assignments (RS-232-C) 7-26
LIM-to-Terminal (DTE) Pin Assignments (RS-232-C) 7-27
LIM-to-Terminal with Hardware Flow-Control Pin Assignments (RS-232-C) ... 7-28
8-Port RS-232 Asynchronous LIM Cable Information 7-29
RS-232-C Signals Supported 7-32
Pin Assignments for LIM RJ45 Modular Connector 7-32
LIM-to-Modem (DCE) Pin Assignments (RS-232-C Asynchronous) 7-33
LIM-to-Terminal (DTE) Pin Assignments (RS-232-C Asynchronous) 7-34
RS-449 LIM Cable Information 7-35
RS-449 Signals Supported 7-36
LIM-to-Modem (DCE) Pin Assignments (RS-449) 7-37
LIM-to-Terminal (DTE) Pin Assignments (RS-449) 7-38
X.24 LIM Cable Information 7-39
X.24 Signals Supported 7-39
Pin Assignments for X.24 LIM 15-Pin Connector 7-40
LIM-to-Modem (DCE) Pin Assignments (X.24) 7-41
URI LIM Cable Information 7-42
Centronics Signals Supported 7-43
Data Products Signals Supported 7-44
URI LIM-to-Centronics Equipment Pin Assignments 7-45
URI LIM-to-Data Products Equipment Pin Assignments 7-46
Winchester Adapter Cable Pin Assignments 7-48
V.35 LIM Cable Information 7-50
V.35 Signals Supported 7-52
Pin Assignments for the V.35 LIM 25-Pin Connector 7-53
V.35 LIM-to-Modem (DCE) Pin Assignments 7-54
V.35 LIM-to-Terminal (DTE) Pin Assignments 7-55

Cabling Information 7

This chapter describes how to select the various types of communications media to physically connect hosts, terminals, workstations, and CDCNET DIs into networks. The chapter first reviews the general concepts of connecting local area networks (LANs) and concatenated networks (catenets) and then describes the following connections in more detail.

Connection	Media Used
MDI or MTI to host	Channel cables
MDI to IEEE 802.3 trunk	Transceiver cable, transceiver, and IEEE 802.3 trunk
ICA 16-bit ICI channel to IEEE 802.3 trunk	Transceiver cable, transceiver, and IEEE 802.3 trunk
IEEE 802.3 trunk to IEEE 802.3 trunk	Transceivers, transceiver cables, repeater
TDI to terminal device	RS-232-C, RS-449, X.24, URI, or V.35 LIM cables

Chapter 6 includes network illustrations implementing all of these connections.

Building Networks

The various types of communications media enable you to physically connect hosts, terminal devices, and CDCNET DIs into networks. In general terms, the kind of networks you will build can be classified as local networks or concatenated networks.

Local Network

When you maintain hosts, terminals, workstations, and CDCNET DIs in a relatively concise geographic area, you establish a local network. Specifically, you use a single IEEE 802.3 coaxial trunk and at least two DIs to connect your resources. In the vast majority of cases, this network will be confined to a single building (although it can extend beyond a building to include other adjacent or nearby buildings).

Concatenated Networks

Many organizations need to connect computing resources that reside in geographically separated locations. To do this, you first use an IEEE 802.3 trunk to build local area networks for large concentrations of resources that are reasonably close together. Then, you use an HDLC or X.25 virtual circuits connection to concatenate these local networks into an overall network. This concatenated network is sometimes referred to as a catenet.

The X.25 or HDLC connection uses either an RS-232, RS-449, or V.35 electrical interface and may be directly connected or modem-connected to a dedicated or leased line or public data connection. In CDCNET terminology, the IEEE 802.3 trunk and the X.25 or HDLC connection are referred to as network solutions.

Essentially, you build CDCNET networks at two basic levels.

1. You connect hosts, terminals, workstations, and modems to CDCNET DIs.
2. You connect CDCNET DIs using an IEEE 802.3 coaxial trunk as the network solution. You use transceivers and transceiver cables to connect DIs to the trunk.

At the first level, you connect CYBER hosts to mainframe DIs (MDIs) or mainframe terminal DIs (MTIs) by attaching the MDI or MTI's mainframe channel interface (MCI board) to a 12-bit host channel using channel cables. CYBER host computers using an ICA do not require an MDI. You then connect terminals and workstations, which have appropriate industry-standard connectors to one of the following: to terminal DIs (TDIs) using Control Data RS-232/V.24, RS-449/V.11 and V.10, X.24, or V.35 cables; or to modems for remote access.

At the second level, you connect CDCNET DIs using IEEE 802.3 coaxial cable and IEEE 802.3-compatible components.

You use IEEE 802.3 transceivers to tap into the IEEE 802.3 coaxial trunk and run transceiver cables from the DIs to the transceivers.

Connecting Device Interfaces and Hosts

The channel cables you use to connect an MDI or MTI to most CYBER hosts are standard Control Data 12-bit channel cables. The cables are provided as input/output pairs and are 20 m (65 ft) long. The channel end of the cables connects to any of the CYBER channels (communication channel); the DI end plugs into a connector plate on the back of the DI cabinet (figure 7-1). These cables are included as part of the Mainframe Channel Interface product, or the MDI or MTI board set. CYBER hosts using an ICA connect to transceivers directly using transceiver cables.

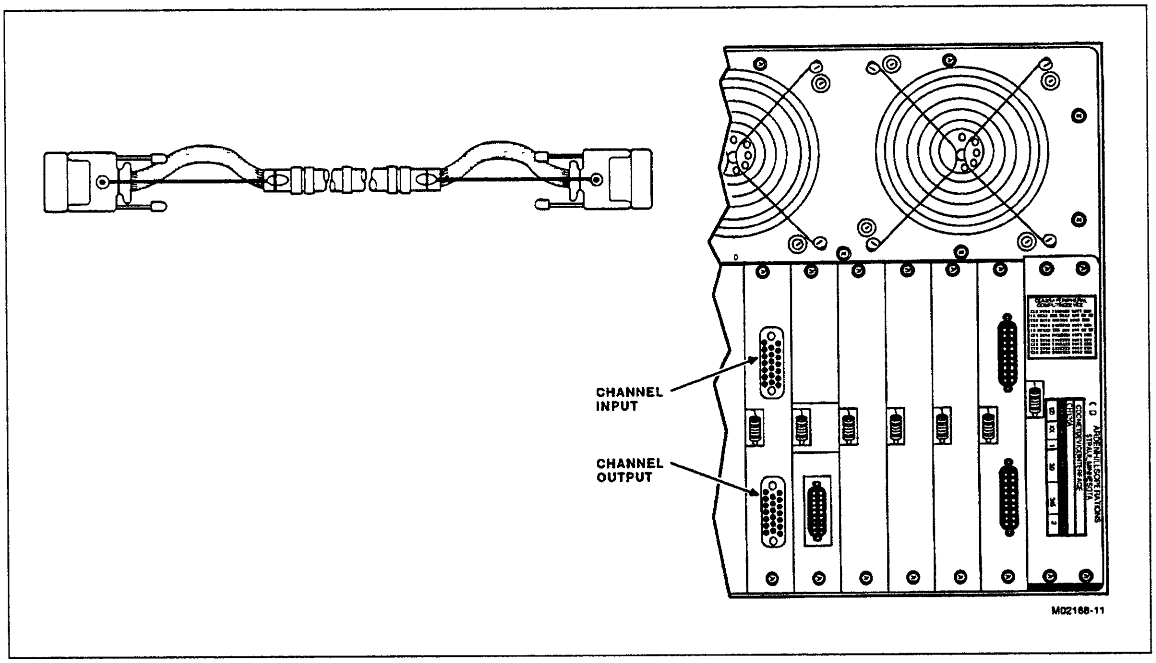


Figure 7-1. Channel Cable and Connection to DI

Connecting IEEE 802.3 LAN Components

All Control Data IEEE 802.3 components are IEEE 802.3 and ISO/DIS 8802/3-compatible. Customers may install their own LAN or contact a Control Data representative for a recommended installation company for IEEE 802.3 LAN installation.

You use two types of cables when constructing an IEEE 802.3 LAN:

Ethernet coaxial cable — The transmission medium for the LAN; also referred to as the trunk. Individual lengths are called segments. Connects network devices via transceivers.

Transceiver interface cable — Connects the following components:

- DIs to transceivers or multiplexers
- ICAs to transceivers
- Multiplexers to transceivers
- Repeaters to transceivers

All of these connections are shown in figure 7-2.

NOTE

Other forms of IEEE 802.3-compatible media, such as fiber optics or a microwave link, may be used in some applications. Consult your Control Data representative for information.

Control Data segment cables come in four standard lengths and are provided with a terminator installed at each end. Tables 7-1 and 7-2 provide product, equipment, and part numbers.

Choose either CL2 (table 7-1) or CL2P (table 7-2) cables, depending on your installation. The CL2 (class 2) and and CL2P (class 2 plenum) cables meet the requirements of article 725, paragraph 38b of the National Electrical Code (NEC).

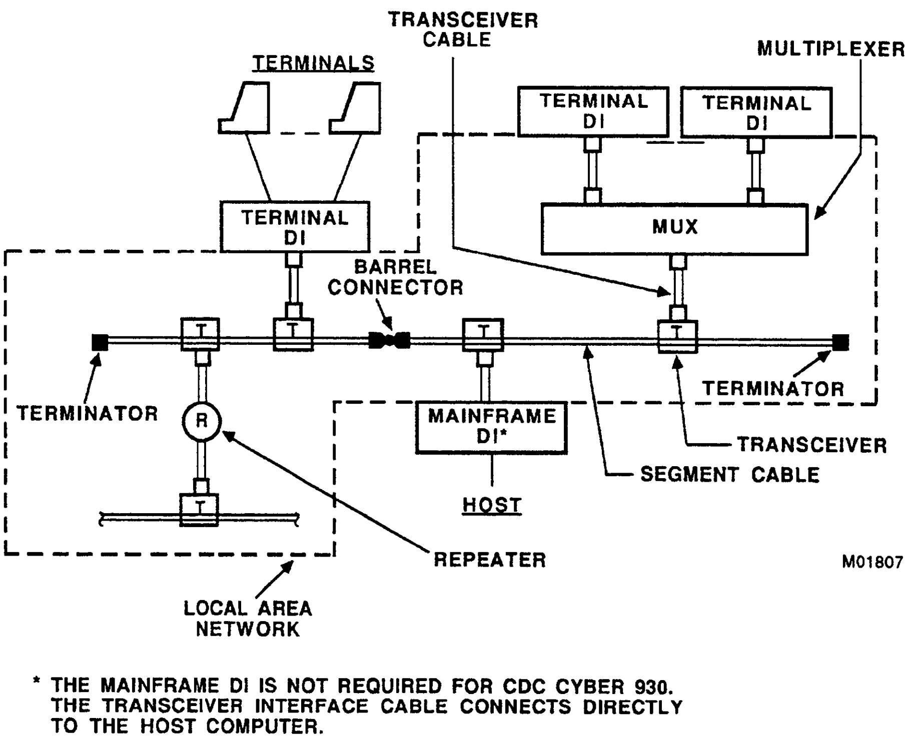


Figure 7-2. Basic LAN Configuration

Table 7-1. Ethernet Coaxial Cables (CL2)

Product Number	Equipment Number	Part Number	Description
2635-21	YA303-E	10302985	23.4 m (76.8 ft)
2635-68	YA303-F	10302986	70.2 m (230.3 ft)
2635-115	YA303-G	10302987	117 m (383.3 ft)
2635-498	YA303-H	10302988	500 m (1640.5 ft)

Table 7-2. Ethernet Coaxial Cables (CL2P)

Product Number	Equipment Number	Part Number	Description
2634-23	YA304-A	53590834	23.4 m (76.8 ft)
2634-70	YA304-B	53590835	70.2 m (230.3 ft)
2634-117	YA304-C	53590836	117 m (383.3 ft)
2634-500	YA304-D	53590837	500 m (1640.5 ft)

IEEE 802.3 Coaxial Cable

The coaxial cable that connects your local area network's DIs comes in segmented cables of up to 500 m (1640 ft) maximum. If possible, you should use a cable segment that is one homogeneous cable. If you must create a cable segment using smaller sections, you should obtain those sections from the same manufacturer and lot number. If you must use uncontrolled cable sections (mixed manufacturers or lot numbers) to create a longer segment, the length chosen should be such that reflections do not have a high probability of adding in phase. Therefore, cable lengths that are odd integral multiples of half-wave lengths at 5 MHz are recommended. Typically, these are lengths of 23.4, 70.2, and 117 ±0.5 m (76.8, 230.3, and 383.3 ft ±19.5 in).

The following detailed coaxial cable information is primarily for customers who are planning to install their own network or already have a network and need to determine if it meets IEEE 802.3 specifications.

The coaxial (segment) cable specified for IEEE 802.3 LAN use is a special coaxial cable that has an average characteristic impedance of 50 ± 2 ohms when measured in accordance with MIL-STD C17E and IEEE Standard 802.3.

The cable must conform, at a minimum, to the following requirements:

- Solid-copper center conductor, 0.08555 ± 0.0005 in diameter.
- Foamed-core dielectric material.
- Inside diameter of innermost shield, 0.242 in minimum.
- Outer shield of 90% or greater tinned copper braid with an outside diameter of 0.326 ± 0.007 in.
- Outside diameter of jacket must be 0.365 in minimum to 0.415 in maximum.
- Concentricity such that the center conductor is within 0.020 in of its ideal concentric position with respect to the jacket.
- Jacket must be marked with annular rings spaced 2.5 m ± 5 cm apart in a color contrasting with the jacket background color.
- Maximum cable length of 500 m (1640.5 ft).
- Attenuation: 6.0 dB/500 m (1640.4 ft at 5 MHz) and 8.5 dB/500 m (1640.4 ft at 10 MHz)
- Propagation Velocity: 0.77 c.
- Cable must meet applicable flammability criteria and local codes for the installed environment.
- The loop resistance of any coaxial cable segment, including any connectors, shall not exceed 5 ohms. Transceivers, which require severing the cable as the connecting means, must be included in the loop resistance measurement.
- All cable connectors shall be N-series 50-ohm constant impedance types. An isolation method must be provided to ensure that the connector shells do not make contact with any building metal, or other unintended conductor.

Connections Using Transceiver Interface Cables

The transceiver interface cable connects a DI or ICA to a transceiver or IEEE 802.3 multiplexer to allow access to a network. The cable also connects a multiplexer or repeater to a transceiver for access to a network.

Tables 7-3 and 7-4 show the transceiver interface cables that are available from Control Data for use with 2630-3 transceivers.

Choose transceiver interface cables from either table 7-3 (CL2) or table 7-4 (CL2P), depending on your installation. The CL2 (class 2) and CL2P (class 2 plenum) cables meet the requirements of article 725, paragraph 38b of the National Electrical Code (NEC) NFPA 70.

Table 7-3. Transceiver Interface Cables (CL2 for 2630-3 Transceivers)

Product Number	Equipment Number	Part Number	Description
2608-114	YA329-E	10303272	5.0 m (16.4 ft)
2608-131	YA329-F	10303273	10.0 m (32.8 ft)
2608-163	YA329-G	10303274	20.0 m (65.6 ft)
2608-98	YA329-H	10303275	50.0 m (164 ft)

Table 7-4. Transceiver Interface Cables (CL2P for 2630-3 Transceivers)

Product Number	Equipment Number	Part Number	Description
2608-216	YA328-A	22120970	5 m (16.4 ft)
2608-233	YA328-B	22120971	10 m (32.8 ft)
2608-265	YA328-C	22120972	20 m (65.6 ft)
2608-200	YA328-D	22120973	50 m (164 ft)

Transceiver connector pins are assigned as shown in table 7-5.

Table 7-5. Transceiver Connector Pin Assignments

Pin		Use
3	DO-A	Data Out circuit A
10	DO-B	Data Out circuit B
11	DO-S	Data Out circuit Shield
5	DI-A	Data In circuit A
12	DI-B	Data In circuit B
4	DI-S	Data In circuit Shield
7	CO-A	Control Out circuit A
15	CO-B	Control Out circuit B
8	CO-S	Control Out circuit Shield
2	CI-A	Control In circuit A
9	CI-B	Control In circuit B
1	CI-S	Control In circuit Shield
6	VC	Voltage Common[1]
13	VP	Voltage Plus[1]
14	VS	Voltage Shield
Shell	PG	Protective Ground (Conductive Shell)

1. Voltage Plus and Voltage Common use a single twisted pair in the cable.

Connecting a Transceiver to IEEE 802.3 Network

Transceivers enable you to attach cables to an IEEE 802.3 trunk without cutting through the coaxial cable center conductor. Basically, you install transceiver taps by drilling through the jacket and the shield of the IEEE 802.3 coaxial cable, and then tapping into the coaxial cable center conductor. Then, you screw the tap probe into the tap body until the probe contacts the center conductor. The two braid terminators penetrate the cable jacket to provide a positive ground.

Subsequently, you can move these taps. Because these taps are nonintrusive, you can install them without interrupting the operation of your CDCNET LAN. Figure 7-3 illustrates how the transceiver appears after it has been tapped into an IEEE 802.3 coaxial cable.

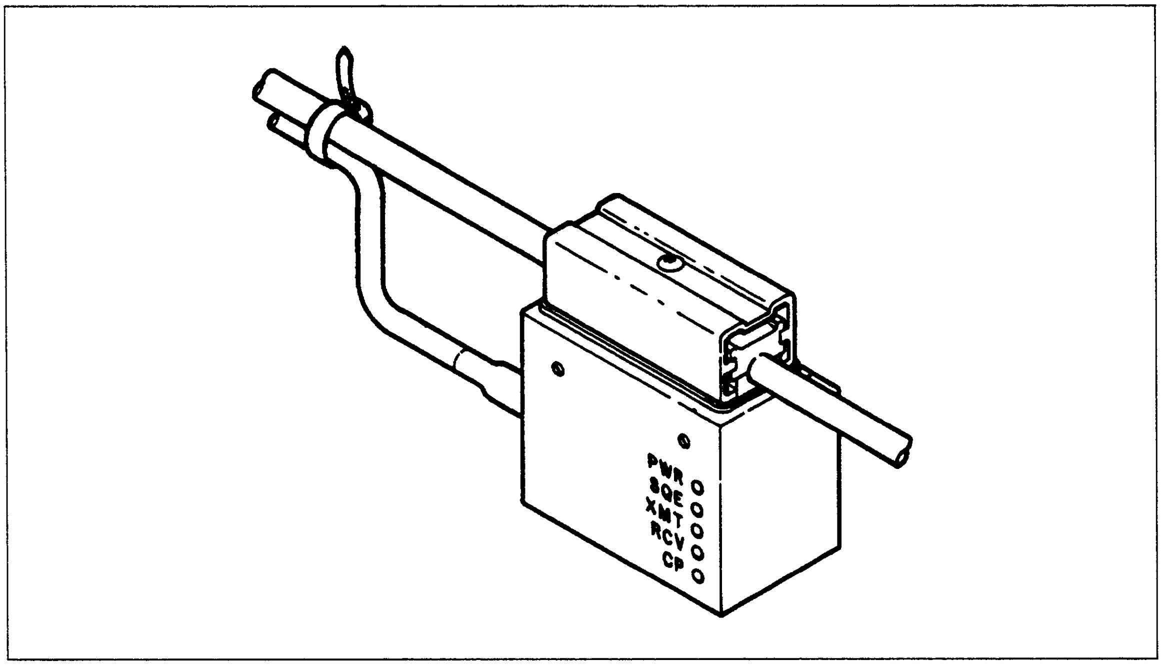


Figure 7-3. IEEE 802.3 Transceiver and Tap

Connecting a DI to a Transceiver

The simplest way to connect a CDCNET DI to an IEEE 802.3 coaxial trunk is to run a transceiver interface cable from the DI's Ethernet serial channel interface (ESCI board) directly to an IEEE 802.3 transceiver. In turn, the transceiver taps into the IEEE 802.3 coaxial cable.

Connecting Multiplexers

You can also install IEEE 802.3 multiplexers in a CDCNET network to enable up to eight CDCNET DIs to share access to an IEEE 802.3 transceiver (see figure 7-4). Depending on the complexity of your LAN, these multiplexers can reduce network costs by decreasing the number of transceivers you purchase and by cutting costs associated with installing transceiver taps.

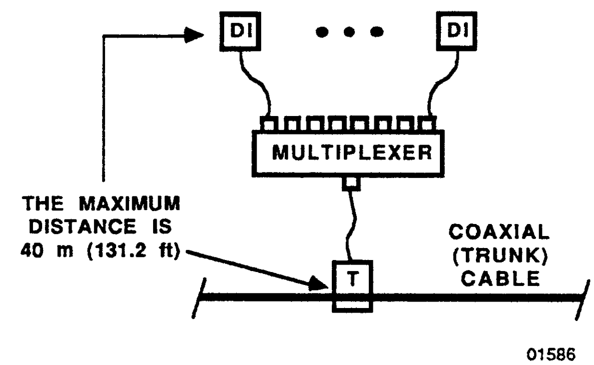


Figure 7-4. Cable Network Using a Single Multiplexer

The ANSI/IEEE 802.3 (ISO/DIS 8802/3) standards allow you to achieve even greater economy by cascading multiplexers; that is, by connecting multiplexers together serially. When multiplexers are connected in this way, the maximum distance as measured by the total cable length between the transceiver and any DI cannot exceed 50 m (164 ft). Figure 7-5 shows an example of a cable network using cascaded multiplexers. Refer to the standards for additional information about cascading multiplexers. You use transceiver interface cables to connect cascaded multiplexers.

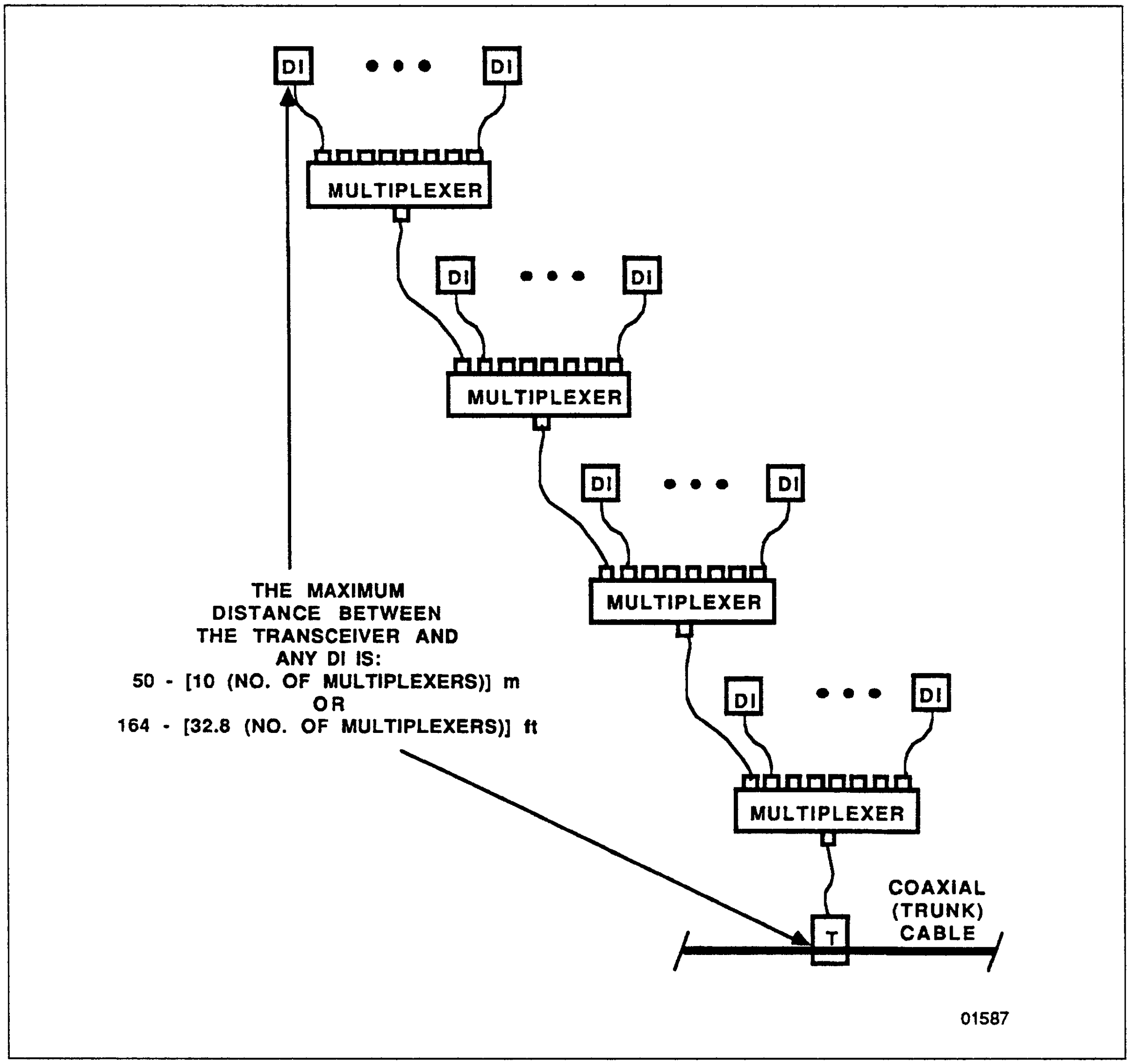


Figure 7-5. Cable Network Using Cascaded Multiplexers

Alternatively, you can use a multiplexer to connect DIs, omitting use of the IEEE 802.3 trunk as shown in figure 7-6.

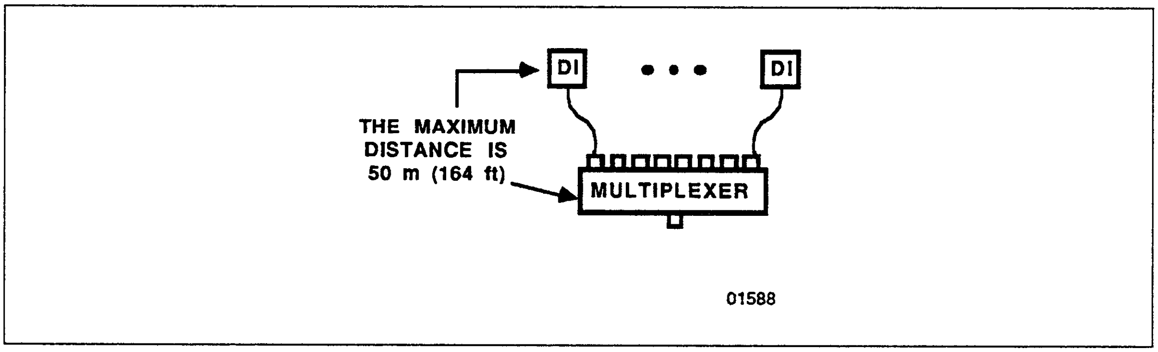


Figure 7-6. Cableless Network Using a Single Multiplexer

You can also cascade multiplexers in a cableless network. In this configuration, the maximum distance as measured by the total cable length between any two DIs cannot exceed 1000 m (3280 ft). Figure 7-7 shows an example of a cableless network using cascaded multiplexers.

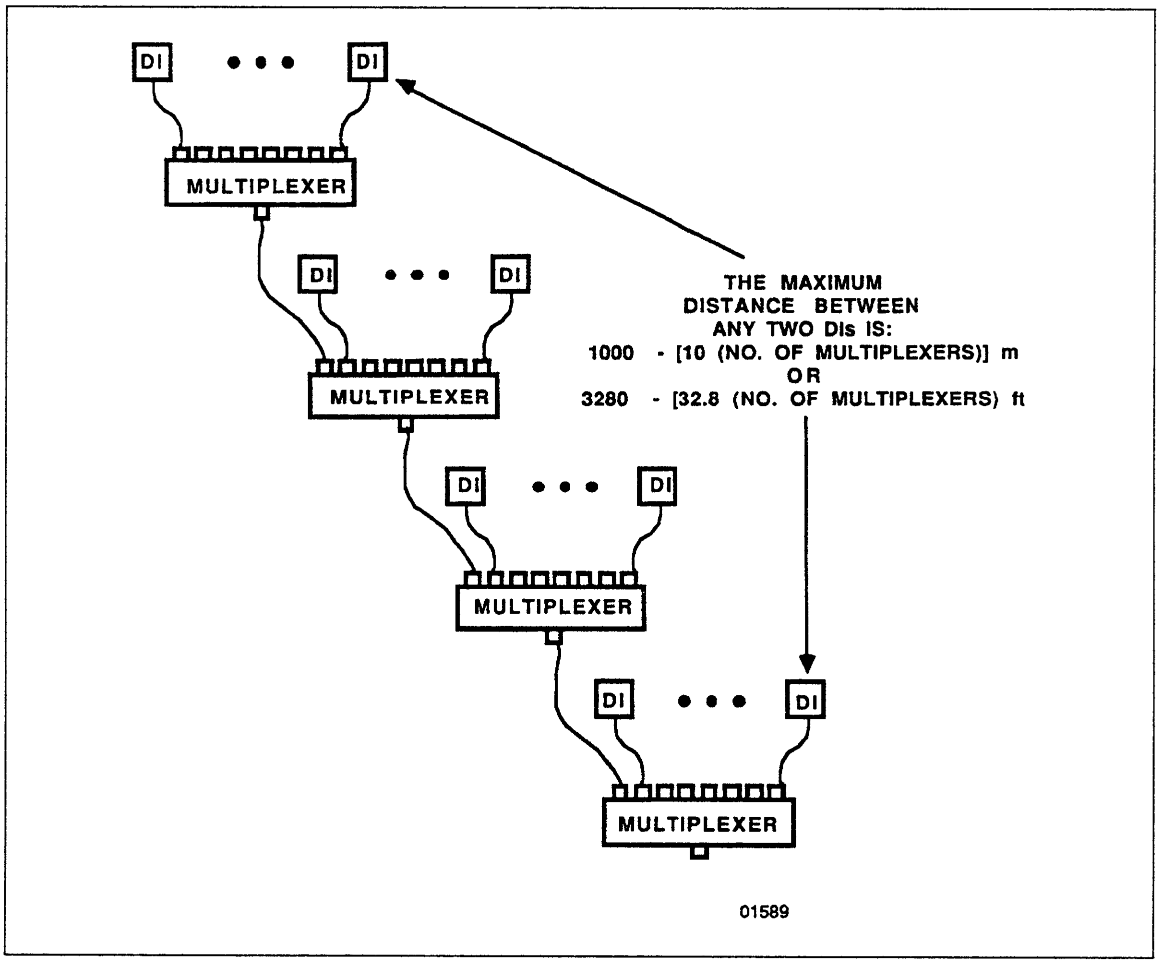


Figure 7-7. Cableless Network Using Cascaded Multiplexers

You use transceiver interface cables to connect DIs to the multiplexer whether or not the multiplexer connects to a transceiver which has access to an IEEE 802.3 trunk.

You connect the multiplexer to a single transceiver using a transceiver interface cable. DIs connected to a multiplexer behave exactly as if they were individually connected to the IEEE 802.3 trunk using multiple transceivers.

Connecting a Repeater to Transceivers

A repeater regenerates signals on a trunk cable so that signals can travel to another trunk cable. When connecting a transceiver to a repeater, CDCNET requires you to disable Heartbeat (SQE). A repeater, two transceiver interface cables, and two transceivers are used for the connection. This combination of components is sometimes referred to as a repeater set.

To link trunk cables together, you first attach a transceiver to each of the two trunk cables you want to connect. Then, you attach the two transceiver interface cables between the repeater and the transceivers.

Connecting Terminal Devices to DIs

This section provides information about the cables you use to connect your terminal devices to the DI Line Interface Modules (LIMs). There are various Control Data standard types of cables that cover the majority of devices. However, in some cases, adapters and/or special wiring might be required. The following information will help you determine if the standard cables will work on your equipment or if special cables/adapters are required. The information is presented in the following order:

- Selecting the right LIM cable
- CDCNET 4-Port RS-232-C LIM cable information including:

  RS-232-C signals supported

  RS-232-C signal/pin definitions for CDCNET cables
- CDCNET 8-Port RS-232 Asynchronous LIM cable information including:

  RS-232-C signals supported

  RS-232-C signal/pin definitions for CDCNET cables
- CDCNET RS-449 LIM cable information including:

  RS-449 signals supported

  RS-449 signal/pin definitions for CDCNET cables
- CDCNET X.24 LIM cable information including:

  X.24 signals supported

  X.24 signal/pin definitions for CDCNET cables
- CDCNET URI LIM cable information including:

  Centronics signals supported

  Data Products signals supported

  Signal/pin definitions for CDCNET cables
- CDCNET V.35 LIM cable information including:

  V.35 signals supported

  V.35 signal/pin definitions for CDCNET cables

Selecting the Right LIM Cable

Table 7-6 shows LIM connectability for Data Terminal Equipment (DTE) configurations in general. Interactive Terminal Passthrough can be used with all specified asynchronous connectivity options.

Table 7-6. LIM Connectability for DTE Configurations in General

Terminal Equipment/Situation	LIM Type	LIM Product Number	Cable and Adapter Product Numbers[1]
DTE with male connector using hardware flow control, and RS-232-C as the electrical interface.	4-Port RS-232-C	2612-1	2612-6xx
	8-Port RS-232-C	2618-1	2618-1xx 2618-50
DTE with male connector using software flow control, and RS-232-C or CCITT V.24 as the electrical interface.	4-Port RS-232-C	2612-1	2612-5xx
	8-Port RS-232-C	2618-1	2618-1xx 2618-50
DTE with female connector using hardware flow control, and RS-232-C or CCITT V.24 as the electrical interface.	4-Port RS-232-C	2612-1	2612-8xx
	8-Port RS-232-C	2618-1	2618-1xx 2618-51
DTE with female connector using software flow control, and RS-232-C or CCITT V.24 as the electrical interface.	4-Port RS-232-C	2612-1	2612-7xx
	8-Port RS-232-C	2618-1	2618-1xx 2618-51
IBM 3270 controller support Synchronous or Asynchronous without hardware flow control.	4-Port RS-232-C	2612-1	2612-5xx
	8-Port RS-232-C	2618-1	2618-1xx 2618-50

1. xx roughly indicates the cable lengths in feet. Refer to the product list in appendix B or to the cable product descriptions in chapter 2 for specific product numbers and lengths.

(Continued)

Table 7-6. LIM Connectability for DTE Configurations in General *(Continued)*

Terminal Equipment/Situation	LIM Type	LIM Product Number	Cable and Adapter Product Numbers[1]
IBM 3270 controller support. Asynchronous only with hardware flow control.	4-Port RS-232-C	2612-1	2612-6xx
	8-Port RS-232-C	2618-1	2618-1xx 2618-50
Printer (DTE) with Centronics interface.	URI	2613-1	2613-1xx
Printer (DTE) with Data Products long-line interface.[3]	URI	2613-1	2613-2xx[2]
DTE with male connector using RS-449, RS-422/V.11, or RS-423/V.10 as the electrical interface.	RS-449	2610-1	2610-5xx
DTE with male connector having 0.060-in diameter pins, and using CCITT or AT&T V.35 as the electrical interface.	V.35	2617-1	2617-5xx
DCE with female connector conforming to ISO 4903-1980(E) and CCITT X.24.[3]	X.24	2611-1	2611-1xx

1. xx roughly indicates the cable lengths in feet. Refer to the product list in appendix B or to the cable product descriptions in chapter 2 for specific product numbers and lengths.

2. Some connections may require the URI adapter cable (2613-301).

3. This hardware is not supported by CDCNET software.

Table 7-7 shows LIM connectability for specific DTE configurations. Interactive Terminal Passthrough can be used with all specified asynchronous connectivity options.

Table 7-7. LIM Connectability for Specific DTE Configurations

Terminal Equipment/Situation	LIM Type	LIM Product Number	Cable and Adapter Product Numbers[1]
Control Data 790 Digital Equipment Corporation Decwriter I/II (male connector option) Digital Equipment Corporation VT-100 Hazeltine Corporation 2000 PC Compatible (Zenith Electronics Corporation Z-150) Tektronix, Inc. 4014, 4109, 4114, 4115 Teletype Corporation M43 Zenith Electronics Corporation Z-19, Z-29, Z-150.	4-Port RS-232-C 8-Port RS-232-C	2612-1 2618-1	2612-6xx 2618-1xx 2618-50
Control Data CYBER 120 (HASP), BARR, HASP, PC Products.	4-Port RS-232-C	2612-1	2612-5xx
Apple Macintosh with A9C0314 cable	4-Port RS-232-C	2612-1	2612-5xx
Control Data 533-1, 536-1, 713-10 721, 722-30, 751, 752, 753, IST II Digital Equipment Corporation Decwriter I/II (female connector option) Hazeltine Corporation Esprint II.	4-Port RS-232-C 8-Port RS-232-C	2612-1 2618-1	2612-8xx 2618-1xx 2618-51
Control Data CYBER 18-xx (HASP), Control Data 537 printer.	4-Port RS-232-C	2612-1	2612-7xx
IBM 3274 controller support. Synchronous without hardware flow control.	4-Port RS-232-C	2612-1	2612-5xx,

1. xx roughly indicates the cable lengths in feet. Refer to the product list in appendix B or to the cable product descriptions in chapter 2 for specific product numbers and lengths.

(Continued)

Table 7-7. LIM Connectability for Specific DTE Configurations *(Continued)*

Terminal Equipment/Situation	LIM Type	LIM Product Number	Cable and Adapter Product Numbers[1]
IBM 3274 controller support. Synchronous with hardware flow control.	4-Port RS-232-C	2612-1	2612-6xx
Centronics 353 printer.	URI	2613-1	2613-1xx
Control Data 585 printer, Centronics PB1600 printer with Data Products long-line interface.	URI	2613-1	2613-2xx[2]

1. xx roughly indicates the cable lengths in feet. Refer to the product list in appendix B or to the cable product descriptions in chapter 2 for specific product numbers and lengths.

2. Some connections may require the URI adapter cable (2613-301).

Table 7-8 shows LIM connectability for general Data Circuit-Terminating Equipment (DCE) configurations. All DCE equipment is assumed to have female connectors. No accommodation has been made for DCE equipment with male connectors. Interactive Terminal Passthrough can be used with all specified asynchronous connectivity options.

Table 7-8. LIM Connectability for DCE Configurations in General

Terminal Equipment/Situation	LIM Type	LIM Product Number	Cable and Adapter Product Numbers[1]
DCE with female connector using DCE flow control and DCD disconnect, and using RS-232-C or CCITT V.24 as the electrical interface.	4-Port RS-232-C	2612-1	2612-1xx
	8-Port RS-232-C	2618-1	2618-1xx 2618-11
DCE with female connector using DCE flow control and DSR disconnect, and using RS-232-C or CCITT V.24 as the electrical interface.	4-Port RS-232-C	2612-1	2612-1xx
	8-Port RS-232-C	2618-1	2618-1xx 2618-21
DCE with female connector using DCE flow control and Non-Data Caller, and using RS-232-C or CCITT V.24 as the electrical interface.	4-Port RS-232-C	2612-1	2612-1xx
	8-Port RS-232-C	2618-1	2618-1xx 2618-31
DCE with female connector using DCE flow control, DCD disconnect, and modem Make-Busy, and using RS-232-C or CCITT V.24 as the electrical interface.	8-Port RS-232-C	2618-1	2618-1xx 2618-11
DCE with female connector using DCE flow control, DSR disconnect, and modem Make-Busy, and using RS-232-C or CCITT V.24 as the electrical interface.	8-Port RS-232-C	2618-1	2618-1xx 2618-21

1. xx roughly indicates the cable lengths in feet. Refer to the product list in appendix B or to the cable product descriptions in chapter 2 for specific product numbers and lengths.

(Continued)

Table 7-8. LIM Connectability for DCE Configurations in General *(Continued)*

Terminal Equipment/Situation	LIM Type	LIM Product Number	Cable and Adapter Product Numbers[1]
DCE with female connector using DCE flow control, Non-Data Caller, and modem Make-Busy, and using RS-232-C or CCITT V.24 as the electrical interface.	8-Port RS-232-C	2618-1	2618-1xx 2618-31
DCE with female connector using RS-449, RS-422/V.11, or RS-423/ V.10 as the electrical interface.	RS-449	2610-1	2610-1xx
DCE with female connector for 0.060-in diameter pins, with single lead jackscrew connector locking mechanism, and using CCITT or AT&T V.35 as the electrical interface.	V.35	2617-1	2617-1xx
DCE with female connector for 0.040-in diameter pins, with spring clip and guide pin connector locking mechanism, and using CCITT or AT&T V.35 as the electrical interface.	V.35	2617-1	2617-2xx

1. xx roughly indicates the cable lengths in feet. Refer to the product list in appendix B or to the cable product descriptions in chapter 2 for specific product numbers and lengths.

Table 7-9 shows LIM connectability for specific DCE configurations. All DCE equipment is assumed to have female connectors. No accommodation has been made for DCE equipment with male connectors. Interactive Terminal Passthrough can be used with all specified asynchronous connectivity options.

Table 7-9. LIM Connectability for Specific DCE Configurations

Terminal Equipment/Situation	LIM Type	LIM Product Number	Cable and Adapter Product Numbers[1]
Bell 103J, 113C, 113D, 212A, 201C-LID.	4-Port RS-232-C	2612-1	2612-1xx
	8-Port RS-232-C	2618-1	2618-1xx 2618-11
European Public Telephone and Telegraph (PTT) modems in which the Non-Data Caller is not a problem.	4-Port RS-232-C	2612-1	2612-1xx
	8-Port RS-232-C	2618-1	2618-1xx 2618-21
European Public Telephone and Telegraph (PTT) modems in which the Non-Data Caller is a problem.	4-Port RS-232-C	2612-1	2612-1xx
	8-Port RS-232-C	2618-1	2618-1xx 2618-31
Avanti Communications Corp. 2200 and 2300 LADDs.	RS-449	2610-1	2610-1xx
Gandalf Data Inc. LDS-260 Bell 303, 306 CCITT modems in Australia, England and Japan.	V.35	2617-1	2617-1xx
CCITT modems in France and Switzerland.	V.35	2617-1	2617-2xx

1. xx roughly indicates the cable lengths in feet. Refer to the product list in appendix B or to the cable product descriptions in chapter 2 for specific product numbers and lengths.

4-Port RS-232-C LIM Cable Information

Tables 7-10 and 7-11 provide product, equipment, and part number information for 4-port RS-232-C LIM cables.

When ordering, choose cables from either table 7-10 (CL2) or table 7-11 (CL2P), depending on your installation. The CL2 (class 2) and CL2P (class 2 plenum) cables meet the requirements of article 725, paragraph 38b of the National Electrical Code (NEC) NFPA 70.

Table 7-10. 4-Port RS-232-C LIM Cables (CL2)

Product Number	Equipment Number	Part Number	Description
			Connect one port of the 4-Port RS-232-C LIM to all modems/data sets and most other DCE devices requiring a male cable connector.
2612-108	TN108-D	10303212	3 m (10 ft)
2612-123	TN108-E	10303213	7.6 m (25 ft)
2612-148	TN108-F	10303214	15.2 m (50 ft)
			Connect one port of the 4-Port RS-232-C LIM to most terminals and other data terminal equipment (DTE) devices requiring a female cable connector.
2612-508	TN109-D	10303216	3 m (10 ft)
2612-523	TN109-E	10303217	7.6 m (25 ft)
2612-548	TN109-F	10303218	15.2 m (50 ft)
			Connect one port of the 4-Port RS-232-C LIM to DTEs that use hardware flow control and require a female cable connector.
2612-608	TN472-D	10303219	3 m (10 ft)
2612-623	TN472-E	10303220	7.6 m (25 ft)
2612-648	TN472-F	10303221	15.2 m (50 ft)

(Continued)

Table 7-10. 4-Port RS-232-C LIM Cables (CL2) *(Continued)*

Product Number	Equipment Number	Part Number	Description
			Connect one port of the 4-Port RS-232-C LIM to terminals and other DTE devices requiring a male cable connector.
2612-708	YA305-D	10303246	3 m (10 ft)
2612-723	YA305-E	10303247	7.6 m (25 ft)
2612-748	YA305-F	10303248	15.2 m (50 ft)
			Connect one port of the 4-Port RS-232-C LIM to DTEs that use hardware flow control and require a male cable connector.
2612-808	YA306-D	10303249	3 m (10 ft)
2612-823	YA306-E	10303250	7.6 m (25 ft)
2612-848	YA306-F	10303251	15.2 m (50 ft)

Table 7-11. 4-Port RS-232-C LIM Cables (CL2P)

Product Number	Equipment Number	Part Number	Description
			Connect one port of the 4-Port RS-232-C LIM to all modems/data sets and most other data circuit-terminating equipment (DCE) devices requiring a male cable connector.
2612-149	TN108-G	10303208	15.2 m (50 ft)
			Connect one port of the 4-Port RS-232-C LIM to most terminals and other data terminal equipment (DTE) devices requiring a female cable connector.
2612-549	TN109-G	10310042	15.2 m (50 ft)
			Connect one port of the 4-Port RS-232-C LIM to DTEs that use hardware flow control and require a female cable connector.
2612-649	TN472-G	10310043	15.2 m (50 ft)
			Connect one port of the 4-Port RS-232-C LIM to terminals and other DTE devices requiring a male cable connector.
2612-749	YA305-G	10310048	15.2 m (50 ft)
			Connect one port of the 4-Port RS-232-C LIM to DTEs that use hardware flow control and require a male cable connector.
2612-849	YA306-G	10310049	15.2 m (50 ft)

Refer to the product description in chapter 2 of this manual for additional functional and physical information about these cables.

RS-232-C CCITT Signals Supported

The RS-232-C signals shown in table 7-12 are supported by the 4-Port RS-232-C LIM.

Table 7-12. RS-232-C CCITT Signals Supported

Outputs		Inputs	
TxD	Transmit Data	RxD	Receive Data
TxC[1]	Transmit Clock	RxC[1]	Receive Clock
RTS	Request To Send	TxCE[1]	Transmit Clock (external)
DTR	Data Terminal Ready	CTS	Clear To Send
		DCD	Data Carrier Detect
		DSR	Data Set Ready
		RI[2]	Ring Indicator

1. Used for synchronous operation only.

2. Wired but not supported by modem cable.

Pin Assignments for the 4-Port RS-232-C LIM 15-Pin Connector

This information is necessary only if you want to build or modify your own cable and plug it directly into the LIM. Refer to figure 7-8 for pin locations on the LIM connector, type DB15-P.

```
In/Out    CCITT    Signal      Pin          Signal   CCITT    In/Out

Ground    102      SG--------   8
                                  15 ------- CTS     106      In
Out       113      TxC-------   7
                                  14 ------- RI      125      In
In        115      RxC-------   6
                                  13 ------- TxCE    114      In
In        109      DCD-------   5
                                  12-------- (*)
In        104      RxD-------   4
                                  11-------- DSR     107      In
Out       108/2    DTR-------   3
                                  10-------- RTS     105      Out
Out       103      TxD-------   2
                                   9-------- (*)
Shield    101      FG--------   1

NOTES:

*Reserved, do not use.

Nominal signal voltages are:

  Output:  +10 V = ON = Space = "0"
           -10 V = OFF = Mark = "1"
           Maximum voltage is ±15 V

  Input:   More positive than +3 V = ON = Space = "0"
           More negative than -3 V = OFF = Mark = "1"

Unconnected inputs are interpreted as OFF.
```

Figure 7-8. 4-Port RS-232-C LIM Connector

LIM-to-Modem (DCE) Pin Assignments (RS-232-C)

The 2612-1xx is a standard RS-232-C modem cable with a 25-pin male plug on the modem end. Pin assignments are shown in figure 7-9.

LIM Plug 15-Pin (P1)				User Plug 25-Pin (P2)		
In/Out	Signal	Pin (P1)		Pin (P2)	Signal	In/Out
Shield	FG	1	----------	1	FG	Shield
Out	TxD	2	----------	2	TxD	In
In	RxD	4	----------	3	RxD	Out
Out	RTS	10	----------	4	RTS	In
In	CTS	15	----------	5	CTS	Out
In	DSR	11	----------	6	DSR	Out
Gnd	SG	8	----------	7	SG	Gnd
In	DCD	5	----------	8	DCD	Out
Reserved		9		9	Reserved	
Reserved		12		10	Reserved	
				11	Spare	
				12	SDCD	Out
				13	SCTS	Out
				14	STxD	In
In	TxCE	13	----------	15	TxCE	Out
				16	SRxD	Out
In	RxC	6	----------	17	RxC	Out
				18	Spare	
				19	SRTS	In
Out	DTR	3	----------	20	DTR	In
				21	SQ	Out
In	RI	14	----------	22	RI	Out
				23	SRS	In/Out
Out	TxC	7	----------	24	TxC	In
				25	Spare	

Figure 7-9. 2612-1xx Cable Pin Assignments

LIM-to-Terminal (DTE) Pin Assignments (RS-232-C)

These null modem cables, 2612-5xx and 2612-7xx, connect to a DTE device. The 2612-5xx has a 25-pin female plug on the user end and the 2612-7xx has a 25-pin male plug on the user end. A null modem cable must be used because the LIM and terminal are both DTEs. If two DTEs are connected with a standard cable, they both use the same pins for outputs and inputs. For example, they both try to use pin 2 to transmit data and pin 3 to receive data. A null modem cable internally reverses the transmit/receive pins (and some others). Pin assignments for the 25-pin plug are shown in figure 7-10.

LIM Plug 15-Pin (P1)					User Plug 25-Pin (P2)		
In/Out	Signal	Pin (P1)			Pin (P2)	Signal	In/Out
Shield	FG	1	-------------------------------------		1	FG	Shield
In	RxD	4	-------------------------------------		2	TxD	Out
Out	TxD	2	-------------------------------------		3	RxD	In
Out	RTS	10	Tied to 15	Tied to 5	4	RTS	Out
In	DCD	5	Tied to 11		5	CTS	In
Out	DTR	3	-------------------------------------		6	DSR	In
Gnd	SG	8	-------------------------------------		7	SG	Gnd
In	CTS	15	-------------------------------------		8	DCD	In
Reserved		9			9	Reserved	
Reserved		12			10	Reserved	
					11	Spare	
					12	SDCD	In
					13	SCTS	In
					14	STxD	Out
In	TxCE	13	Tied to 6	Tied to 17	15	TxCE	In
					16	SRxD	In
Out	TxC	7	-------------------------------------		17	RxC	In
					18	Spare	
					19	SRTS	Out
In	DSR	11	-------------------------------------		20	DTR	Out
					21	SQ	In
In	RI	14			22	RI	In
					23	SRS	In/Out
In	RxC	6	-------------------------------------		24	TxC	Out
					25	Spare	

Figure 7-10. 2612-5xx/7xx Cable Pin Assignments

LIM-to-Terminal with Hardware Flow-Control Pin Assignments (RS-232-C)

The 2612-6xx and 2612-8xx are null modem cables similar to the 2612-5xx and 2612-7xx, but with added hardware flow-control wiring. The 2612-6xx cable has a 25-pin female plug on the user end that connects to a DTE device, and the 2612-8xx has a male plug for this purpose. Pin assignments for the 25-pin plug are shown in figure 7-11.

LIM Plug 15-Pin (P1)				User Plug 25-Pin (P2)		
In/Out	Signal	Pin (P1)		Pin (P2)	Signal	In/Out
Shield	FG	1	----------------------------	1	FG	Shield
In	RxD	4	----------------------------	2	TxD	Out
Out	TxD	2	----------------------------	3	RxD	In
In	CTS	15	----------------------------	4	RTS	Out
Out	RTS	10	----------------------------	5	CTS	In
In	DSR	11	Tied to 5 Tied to 8	6	DSR	In
Gnd	SG	8	----------------------------	7	SG	Gnd
Out	DTR	3	----------------------------	8	DCD	In
Reserved		9		9	Reserved	
Reserved		12		10	Reserved	
				11	Spare	
				12	SDCD	In
				13	SCTS	In
				14	STxD	Out
In	TxCE	13	Tied to 6 Tied to 17	15	TxCE	In
				16	SRxD	In
Out	TxC	7	----------------------------	17	RxC	In
				18	Spare	
				19	SRTS	Out
In	DCD	5	----------------------------	20	DTR	Out
				21	SQ	In
In	RI	14		22	RI	Out
				23	SRS	In/Out
In	RxC	6	----------------------------	24	TxC	Out
				25	Spare	

Figure 7-11. 2612-6xx Cable Pin Assignments

8-Port RS-232 Asynchronous LIM Cable Information

Tables 7-13 and 7-14 provide product, equipment, and part numbers for shielded and nonshielded 8-port, RS-232-C LIM cables. The tables also contain information on the cable adapters that are required for some applications. Table 7-15 provides product, equipment, and part numbers for cable adapters for use with these cables.

When ordering, choose cables from either table 7-13 (CL2) or table 7-14 (CL2P), depending on your installation. The CL2 (class 2) and CL2P (class 2 plenum) cables meet the requirements of article 725, paragraph 38b of the National Electrical Code (NEC) NFPA 70.

Table 7-13. 8-Port RS-232 Asynchronous LIM Cables (CL2)

Product Number	Equipment Number	Part Number	Description
			These cables connect one port of an 8-Port RS-232-C asynchronous LIM directly to a DTE or DCE device, which is equipped with a connector adapter, or connects to an interconnecting RJ45-compatible wall plate. They can also connect a DTE or DCE device, which is equipped with a connector adapter, to an interconnecting RJ45-compatible wall plate.
			Unshielded cables:
2618-112	YA333-J	51917932	4.2 m (14 ft)
2618-123	YA333-K	51917933	7.6 m (25 ft)
2618-148	YA333-L	51917934	15.2 m (50 ft)
2618-198	YA333-M	51917935	60.8 m (200 ft)
			Shielded cables; required for VDE applications:
2618-212	YA333-N	51917936	4.2 m (14 ft)
2618-223	YA333-P	51917937	7.6 m (25 ft)
2618-248	YA333-R	51917938	15.2 m (50 ft)
2618-398	YA333-S	51917939	60.8 m (200 ft)

Table 7-14. 8-Port RS-232 Asynchronous LIM Cables (CL2P)

Product Number	Equipment Number	Part Number	Description
			These cables connect one port of an 8-Port RS-232-C asynchronous LIM directly to a DTE or DCE device, which is equipped with a connector adapter, or connects to an interconnecting RJ45-compatible wall plate. They can also connect a DTE or DCE device, which is equipped with a connector adapter, to an interconnecting RJ45-compatible wall plate.
			Unshielded cables:
2618-149	YA333-T	51917940	15.2 m (50 ft)
2618-199	YA333-U	51917941	60.8 (200 ft)
			Shielded cables; required for VDE applications:
2618-249	YA333-V	51917942	15.2 m (50 ft)
2618-399	YA333-W	51917943	60.8 m (200 ft)

Refer to the product descriptions in chapter 2 for additional functional and physical information about these cables and adapters.

Table 7-15. 8-Port RS-232 Asynchronous LIM Cable Adapters

Product Number	Equipment Number	Part Number	Description
2618-11	YA324-A	22108952	Used with 8-Port RS-232 cables to connect one port of the 8-Port RS-232-C Asynchronous LIM to modems/data sets and other DCE devices that require a male connector, and use DCE flow control and DCD disconnect.
2618-21	YA324-B	22108953	Used with 8-Port RS-232 cables to connect one port of the 8-Port RS-232-C Asynchronous LIM to modems/data sets and other DCE devices that require a male connector, and use DCE flow control and DSR disconnect.
2618-31	YA324-C	22108954	Used with 8-Port RS-232 cables to connect one port of the 8-Port RS-232-C Asynchronous LIM to modems/data sets and other DCE devices that require a male connector, that use both DCD and DSR disconnect.
2618-50	YA324-D	22108958	Use with 8-Port RS-232 cables to connect one port of the 8-Port RS-232-C LIM to DTEs that use hardware or software flow control and require a female cable connector.
2618-51	YA324-E	22108959	Used with 8-Port RS-232 cables to connect one port of the 8-Port RS-232-C LIM to DTEs that use hardware or software flow control and require a male cable connector.

RS-232-C Signals Supported

The RS-232-C signals shown in table 7-16 are supported by the 8-Port RS-232 Asynchronous LIM.

Table 7-16. RS-232-C Signals Supported

Outputs		Inputs	
TxD	Transmit Data	RxD	Receive Data
RTS	Request To Send or Make Busy, depending on cable and software	CTS	Clear To Send
DTR	Data Terminal Ready	DCD	Data Carrier Detect
CN	Make Busy		

Pin Assignments for LIM RJ45 Modular Connector

This information is necessary only if you want to build or modify your own cable and plug it directly into the 8-Port RS-232-C Asynchronous LIM. Refer to figures 7-12 and 7-13 for pin locations on the LIM connector.

In/Out	Signal	Name	Pin
--	FG	Frame Ground	S1 *
Out	CN	Make Busy	1
In	DCD	Data Carrier Detect	2
Out	DTR	Data Terminal Ready	3
--	SG	Signal Ground	4
In	RxD	Received Data	5
Out	TxD	Transmit Data	6
Out	RTS	Request to Send	7
In	CTS	Clear to Send	8

* No connection on unshielded cables.

Figure 7-12. RJ45 Modular Connector Pin Assignments

CAUTION

Pin damage to the FG pin may occur when using non-Control Data cables.

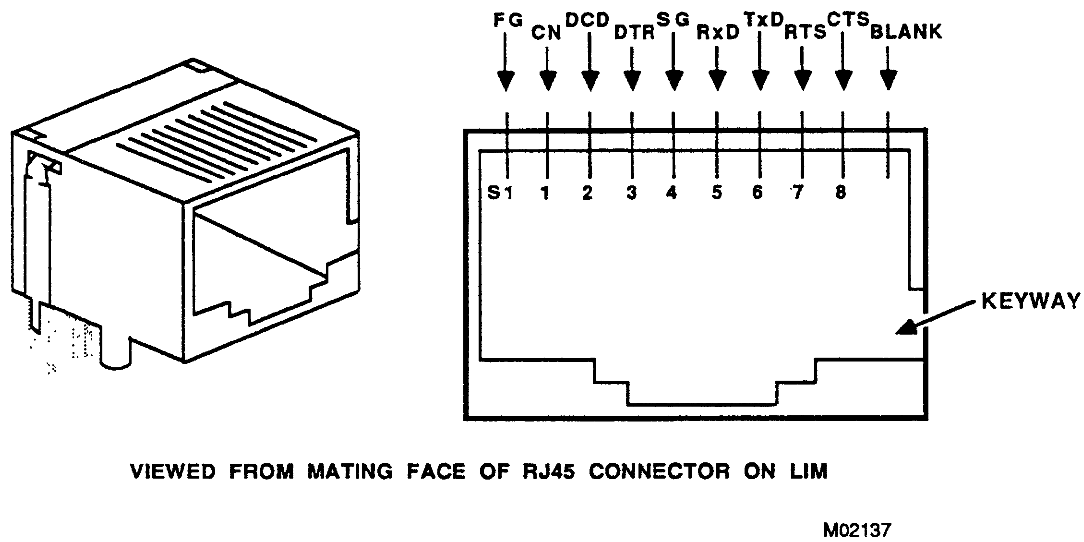


Figure 7-13. RJ45 Pin Configuration

LIM-to-Modem (DCE) Pin Assignments (RS-232-C Asynchronous)

The 2618-11, -21, and -31 connector adapters for use with DCE devices have an 8-pin plug (which is equivalent to the LIM plug) on one end, and a 25-pin plug on the other. Adapter pin assignments are shown in figures 7-14, 7-15, and 7-16.

LIM Plug 8-Pin (P1)				User Plug 25-Pin (P2)		
In/Out	Signal	Pin (P1)		Pin (P2)	Signal	In/Out
Out	CN	1	------------------	25	CN	IN
In	DCD	2	------------------	8	DCD	Out
Out	DTR	3	------------------	20	DTR	In
Gnd	SG	4	------------------	7	SG	Gnd
In	RxD	5	------------------	3	RxD	Out
Out	TxD	6	------------------	2	TxD	In
Out	RTS	7	------------------	4	RTS	In
In	CTS	8	------------------	5	CTS	Out

Figure 7-14. 2618-11 Connector Adapter Pin Assignments

```
  LIM Plug  8-Pin (P1)                User Plug 25-Pin (P2)
In/Out  Signal   Pin (P1)           Pin (P2)  Signal   In/Out

Out       CN       1 ----------------->25      CN       In
In        DCD      2 <------------------ 6     DSR      Out
Out       DTR      3 ------------------>20     DTR      In
Gnd       SG       4 ------------------- 7     SG       Gnd
In        RxD      5 <------------------ 3     RxD      Out
Out       TxD      6 ------------------> 2     TxD      In
Out       RTS      7 ------------------> 4     RTS      In
In        CTS      8 <------------------ 5     CTS      Out
```

Figure 7-15. 2618-21 Connector Adapter Pin Assignments

```
  LIM Plug  8-Pin (P1)                User Plug 25-Pin (P2)
In/Out  Signal   Pin (P1)           Pin (P2)  Signal   In/Out

Out       CN       1 ----------------->25      CN       In
In        DCD      2 <------------------ 6     DSR      Out
Out       DTR      3 ------------------>20     DTR      In
Gnd       SG       4 ------------------- 7     SG       Gnd
In        RxD      5 <------------------ 3     RxD      Out
Out       TxD      6 ------------------> 2     TxD      In
Out       RTS      7 ------------------> 4     RTS      In
In        CTS      8 <------------------ 8     DCD      Out
```

Figure 7-16. 2618-31 Connector Adapter Pin Assignments

LIM-to-Terminal (DTE) Pin Assignments (RS-232-C Asynchronous)

The 2618-50 and 2618-51 connector adapters for use with DTE devices have an 8-pin plug (which is equivalent to the LIM plug) on one end, and a 25-pin plug on the other. Adapter pin assignments are shown in figure 7-17.

```
  LIM Plug  8-Pin (P1)                                      User Plug 25-Pin (P2)
In/Out  Signal   Pin (P1)                                 Pin (P2)  Signal   In/Out

Out       CN       1                                        N/C
In        DCD      2 <--------------------------------------20      DTR      Out
Out       DTR      3 ------------------|-------------------> 6      DSR      In
Gnd       SG       4 ------------------|-------------------- 7      SG       Gnd
In        RxD      5 <-----------------|-------------------- 2      TxD      Out
Out       TxD      6 ------------------|-------------------> 3      RxD      In
Out       RTS      7 ------------------|-------------------> 5      CTS      In
In        CTS      8 <-----------------|-------------------- 4      RTS      Out
                                       |-------Tied to 6--> 8      DCD      In
```

Figure 7-17. 2618-5x Connector Adapter Pin Assignments

RS-449 LIM Cable Information

Tables 7-17 and 7-18 provide product, equipment, and part numbers for RS-449 LIM cables.

When ordering, choose cables from either table 7-17 (CL2) or table 7-18 (CL2P), depending on your installation. The CL2 (class 2) and CL2P (class 2 plenum) cables meet the requirements of article 725, paragraph 38b of the National Electrical Code (NEC) NFPA 70.

Table 7-17. RS-449 LIM Cables (CL2)

Product Number	Equipment Number	Part Number	Description
			Connects an RS-449 LIM to a modem/data set or other DCE device.
2610-123	TN101-D	10303200	7.6 m (25 ft)
2610-148	TN101-E	10303201	15.2 m (50 ft)
2610-188	TN101-F	10303202	58 m (190 ft)
			Connects an RS-449 LIM to a terminal or other DTE device.
2610-523	TN102-D	10303203	7.6 m (25 ft)
2610-548	TN102-E	10303204	15.2 m (50 ft)
2610-588	TN102-F	10303205	58 m (190 ft)

Table 7-18. RS-449 LIM Cables (CL2P)

Product Number	Equipment Number	Part Number	Description
			Connects an RS-449 LIM to a modem/data set or other DCE device.
2610-149	TN101-G	10303206	15.2 m (50 ft)
2610-189	TN101-H	10303207	58 m (190 ft)
			Connects an RS-449 LIM to a terminal or other DTE device.
2610-549	TN102-G	10310038	15.2 m (50 ft)
2610-589	TN101-H	10310039	58 m (190 ft)

Refer to the product description in chapter 2 of this manual for additional functional and physical information about these cables.

RS-449 Signals Supported

The RS-449 signals shown in table 7-19 are supported by the 2-port RS-449 LIM.

Table 7-19. RS-449 Signals Supported

Outputs		Inputs	
SD[1]	Send Data	RD[1]	Receive Data
TT[1]	Terminal Timing	RT[1]	Receive Timing
RS[1]	Request To Send	ST[1]	Send Timing
TR[1]	Terminal Ready	CS[1]	Clear to Send
IS	In Service	RR[1]	Receiver Ready
NS	New Signal	DM[1]	Data Mode
SF/SR	Sel Freq/Sig Rate	IC	Incoming Call
LL	Local Loopback	SQ	Signal Quality
RL	Remote Loopback	SI	Signal Rate Indicator
SS	Select Standby	TM	Test Mode
SC	Send Common	SB	Standby Indicator
RC	Receive Common		

1. Differential signals.

LIM-to-Modem (DCE) Pin Assignments (RS-449)

The 2610-1xx cable is a standard RS-449 modem cable with a 37-pin male plug on the modem end. Pin assignments are shown in figure 7-18.

LIM Plug In/Out	LIM Plug Signal	Pin (P1)		Pin (P2)	Modem Plug Signal	Modem Plug In/Out
Shield		1	------------------------------------	1		Shield
In	SI	2	------------------------------------	2	SI	Out
Spare		3	------------------------------------	3	Spare	
Out	+SD	4	------------------------------------	4	+SD	In
In	+ST	5	------------------------------------	5	+ST	Out
In	+RD	6	------------------------------------	6	+RD	Out
Out	+RS	7	------------------------------------	7	+RS	In
In	+RT	8	------------------------------------	8	+RT	Out
In	+CS	9	------------------------------------	9	+CS	Out
Out	LL	10	------------------------------------	10	LL	In
In	+DM	11	------------------------------------	11	+DM	Out
Out	+TR	12	------------------------------------	12	+TR	In
In	+RR	13	------------------------------------	13	+RR	Out
Out	RL	14	------------------------------------	14	RL	In
In	IC	15	------------------------------------	15	IC	Out
Out	SF/SR	16	------------------------------------	16	SF/SR	In
Out	+TT	17	------------------------------------	17	+TT	In
In	TM	18	------------------------------------	18	TM	Out
Gnd	SG	19	------------------------------------	19	SG	Gnd
In	RC	20	------------------------------------	20	RC	Out
Spare		21	------------------------------------	21	Spare	
Out	-SD	22	------------------------------------	22	-SD	In
In	-ST	23	------------------------------------	23	-ST	Out
In	-RD	24	------------------------------------	24	-RD	Out
Out	-RS	25	------------------------------------	25	-RS	In
In	-RT	26	------------------------------------	26	-RT	Out
In	-CS	27	------------------------------------	27	-CS	Out
Out	IS	28	------------------------------------	28	IS	In
In	-DM	29	------------------------------------	29	-DM	Out
Out	-TR	30	------------------------------------	30	-TR	In
In	-RR	31	------------------------------------	31	-RR	Out
Out	SS	32	------------------------------------	32	SS	In
In	SQ	33	------------------------------------	33	SQ	Out
Out	NS	34	------------------------------------	34	NS	In
Out	-TT	35	------------------------------------	35	-TT	In
In	SB	36	------------------------------------	36	SB	Out
Out	SC	37	------------------------------------	37	SC	In

Figure 7-18. 2610-1xx Cable Pin Assignments

LIM-to-Terminal (DTE) Pin Assignments (RS-449)

The 2610-5xx cable is a standard RS-449 terminal cable with a 37-pin female plug on the modem end. Pin assignments are shown in figure 7-19.

```
          LIM Plug                                           Terminal Plug
In/Out    Signal    Pin (P1)                             Pin (P2)   Signal    In/Out

Shield                 1 ------------------------------------  1     Shield
In         SI          2 ------------------------------------ 16     SE/SR    Out
Out        SF/SR      16 ------------------------------------  2      SI      In
Out        +SD         4 ------------------------------------  6      +RD     In
Out        -SD        22 ------------------------------------ 24      -RD     In
In         +RD         6 ------------------------------------  4      +SD     Out
In         -RD        24 ------------------<----------------- 22      -SD     Out
Out        +TT        17 ------------------>--------------+--  8      +RT     In
In         +ST         5 --↓ *                         * ↑--  5      +ST     In
In         +RT         8 --+---------------<----------------- 17      +TT     Out
Out        -TT        35 ------------------>--------------+-- 23      -ST     In
In         -ST        23 --↓ *                         * ↑-- 26      -RT     In
In         -RT        26 --+---------------<----------------- 35      -TT     Out
Out        +RS         7 ------------------>----------------- 13      +RR     In
Out        -RS        25 ------------------>----------------- 31      -RR     In
In         +RR        13 ------------------<-----------------  7      +RS     Out
In         -RR        31 ------------------<----------------- 25      -RS     Out
Out        +TR        12 ------------------>--------------+-- 11      +DM     In
In         +CS         9 --↓ *                         * ↑--  9      +CS     In
In         +DM        11 --+---------------<----------------- 12      +TR     Out
Out        -TR        30 ------------------>--------------+-- 29      -DM     In
In         -CS        27 --↓ *                         * ↑-- 27      -CS     In
In         -DM        29 --+---------------<----------------- 30      -TR     Out
Out        LL         10 ------------------>----------------- 18      TM      In
In         TM         18 ------------------<----------------- 10      LL      Out
Out        RL         14 ------------------>----------------- 15      IC      In
In         IC         15 ------------------<----------------- 14      RL      Out
Out        IS         28 ------------------>----------------- 33      SQ      In
In         SQ         33 ------------------<----------------- 28      IS      Out
Out        SS         32 ------------------------------------ 36      SB      In
In         SB         36 ------------------------------------ 32      SS      Out
Out        SC         37 ------------------------------------ 20      RC      In
In         RC         20 ------------------------------------ 37      SC      Out
Gnd        SG         19 ------------------------------------ 19      SG      Gnd
Spare                  3        <---(no connection)--->        3     Spare
Spare                 21        <---(no connection)--->       21     Spare
Out        NS         34        <---(no connection)--->       34      NS      Out
* Jumper wire.
```

Figure 7-19. 2610-5xx Cable Pin Assignments

X.24 LIM Cable Information

Tables 7-20 and 7-21 provide product, equipment, and part numbers for X.24 LIM cables.

When ordering, choose cables from either table 7-20 (CL2) or table 7-21 (CL2P), depending on your installation. The CL2 (class 2) and CL2P (class 2 plenum) cables meet the requirements of article 725, paragraph 38b of the National Electrical Code (NEC) NFPA 70.

Table 7-20. X.24 LIM Cables (CL2)

Product Number	Equipment Number	Part Number	Description
			Connects an X.24 LIM to a modem or other DCE device.
2611-123	TN107-D	10303209	7.6 m (25 ft)
2611-148	TN107-E	10303210	15.2 m (50 ft)
2611-188	TN107-F	10303211	58 m (190 ft)

Table 7-21. X.24 LIM Cables (CL2P)

Product Number	Equipment Number	Part Number	Description
			Connects an X.24 LIM to a modem or other DCE device.
2611-149	TN107-G	10310040	15.2 m (50 ft)
2611-189	TN107-H	10310041	58 m (190 ft)

Refer to the product description in chapter 2 of this manual for additional functional and physical information about these cables.

X.24 Signals Supported

The subset of X.24 signals shown in table 7-22 are supported by the X.24 LIM.

Table 7-22. X.24 Signals Supported

Outputs		Inputs	
T	Transmit (Data)	R	Receive (Data)
C	Control	I	Indicator
		S	Signal Element Timing (Clock)

Outputs from the LIM are differential. The nominal voltage for the outputs is 0 to +5 V. Inputs to the LIM are differential and require (typically) a minimum of 200 mV (0.2 V) difference in voltage between the input leads for proper operation.

Pin Assignments for X.24 LIM 15-Pin Connector

This information is necessary only if you want to build or modify your own cable and plug it directly into the LIM. Refer to figure 7-20 for pin locations on the LIM connector, type DB15-P.

```
In/Out         Signal              Pin                  Signal

Ground         GA    -----------   8
                                      15  -----------   (*)
Out            (*)   -----------   7
                                      14  -----------   (*)
In             +S    -----------   6
                                      13  -----------   -S
In             +I    -----------   5
                                      12  -----------   -I
In             +R    -----------   4
                                      11  -----------   -R
Out            +C    -----------   3
                                      10  -----------   -C
Out            +T    -----------   2
                                       9  -----------   -T
Shield         G     -----------   1

Notes:

*Reserved, do not use.
```

Figure 7-20. X.24 LIM Connector

LIM-to-Modem (DCE) Pin Assignments (X.24)

The 2611-1xx cable is a standard X.24 modem cable with a 15-pin male plug on the modem end. Pin assignments are shown in figure 7-21.

LIM Plug					Modem Plug	
In/Out	Signal	Pin (P1)		Pin (P2)	Signal	In/Out
Shield	G	1	------------------------------	1		Shield
Out	+T	2	------------------------------	2	+T	In
Out	-T	9	------------------------------	9	-T	In
In	+R	4	------------------------------	4	+R	Out
In	-R	11	------------------------------	11	-R	Out
In	+S	6	------------------------------	6	+S	Out
In	-S	13	------------------------------	13	-S	Out
Out	+C	3	------------------------------	3	+C	In
Out	-C	10	------------------------------	10	-C	In
In	+I	5	------------------------------	5	+I	Out
In	-I	12	------------------------------	12	-I	Out
Ground	GA	8	------------------------------	8	GA	Ground
Reserved		7	------------------------------	7	Reserved	
Reserved		14	------------------------------	14	Reserved	
Reserved		15	------------------------------	15	Reserved	

Figure 7-21. 2611-1xx Cable Pin Assignments

URI LIM Cable Information

Tables 7-23 and 7-24 provide product, equipment, and part numbers for URI cables.

When ordering, choose cables from either table 7-23 (CL2) or table 7-24 (CL2P), depending on your installation. The CL2 (class 2) and CL2P (class 2 plenum) cables meet the requirements of article 725, paragraph 38b of the National Electrical Code (NEC) NFPA 70.

Table 7-23. URI LIM Cables (CL2)

Product Number	Equipment Number	Part Number	Description
			URI to Centronics cable.
2613-123	TN484-C	10303222	7.6 m (25 ft)
2613-148	TN484-D	10303223	15.2 m (50 ft)
			URI to Data Products cable.
2613-223	TN485-D	10303232	7.6 m (25 ft)
2613-248	TN485-E	10303233	15.2 m (50 ft)
2613-297	TN485-F	10303234	30.4 m (100 ft)
2613-301	TN486-B	10303242	Winchester adapter cable, 0.91 m (3 ft).

Table 7-24. URI LIM Cables (CL2P)

Product Number	Equipment Number	Part Number	Description
			URI to Centronics cable.
2613-249	TN485-G	10310045	15.2 m (50 ft)
2613-298	TN485-H	10310046	30.4 m (100 ft)

Refer to product descriptions in chapter 2 of this manual for additional information about these cables.

Centronics Signals Supported

The Centronics signals shown in table 7-25 are supported at the Centronics port of the URI LIM.

Table 7-25. Centronics Signals Supported

Outputs		Inputs	
PAR	Parity	PAR	Parity
DB1-DB8	Data bits 1-8	+5	+5 V OK
STR	Strobe	LD	Light Detect
IP	Input Prime	CP	Compressed Pitch
		PO	Paper Out
		BUSY	Busy
		125KHZ	125 KHz OK
		FLT	Fault
		SEL	Select
		ACKIN	Acknowledge Input

Current CDCNET printer support software does not use the Centronics interface.

Data Products Signals Supported

The Data Products signals shown in table 7-26 are supported at the Data Products port of the URI LIM.

Table 7-26. Data Products Signals Supported

Outputs		Inputs	
PAR	Parity	PAR	Parity
DB1 - DB8	Data bits 1 through 8	PE	Parity Error
PI	Paper Instruction	CP	Compressed Pitch
BCLR	Buffer Clear	T0	Band Ident 0
STR	Strobe	T1	Band Ident 1
		EFU	VFU Verify
		PM	Paper Moving
		VR	VFU Ready
		TOF	Top-of-Forms
		BOF	Bottom-of-Forms
		+5	+5 V OK
		GND	Ground
		IV	Interface Verify
		RDY	Ready
		OL	On Line
		DMD	Demand

URI LIM-to-Centronics Equipment Pin Assignments

The 2613-1xx cable is a standard Centronics printer cable with a 36-pin male plug on the printer end. Pin assignments are shown in figure 7-22.

LIM Centronics Plug 37-pin (P1)				User Plug 36-pin (P2)	
In/Out	Signal	Pin (P1)	Pin (P2)	Signal	In/Out
In	SEL	13	13	SEL	Out
		14	14		
In	ACKIN	10	10	ACKIN	Out
		29	28		
Out	STR	1	1	STR	In
		20	19		
Out	DB1	2	2	DB1	In
		21	20		
Out	DB2	3	3	DB2	In
		22	21		
Out	DB3	4	4	DB3	In
		23	22		
Out	DB4	5	5	DB4	In
		24	23		
Out	DB5	6	6	DB5	In
		25	24		
Out	DB6	7	7	DB6	In
		26	25		
Out	DB7	8	8	DB7	In
		27	26		
Out	DB8	9	9	DB8	In
		28	27		
In	125KHZ	15	15	125KHZ	Out
		16	16		
In/Out	PAR/LD	34	33	PAR/LD	In/Out
		35	34		
Out	IP	32	31	IP	In
		31	30		
In	+5	18	18	+5	Out
In	GND	17	17	GND	Out
In	BUSY	11	11	BUSY	Out
		30	29		
In	CP	36	35	CP	Out
		37	36		
In	PO	12	12	PO	Out
In	FLT	33	32	FLT	Out

Figure 7-22. 2613-1xx Cable Pin Assignments

URI LIM-to-Data Products Equipment Pin Assignments

The 2613-2xx cable is a standard Data Products printer cable with a 50-pin male plug on the printer end. Pin assignments are shown in figure 7-23.

LIM Data Products Plug 50-pin (P1) In/Out	Signal	Pin (P1)		User Plug 50-pin (P2) Pin (P2)	Signal	In/Out
In	RDY	22	------------------------------	22	RDY	Out
		6	------------------------------	6		
In	OL	21	------------------------------	21	OL	Out
		5	------------------------------	5		
In	DMD	23	------------------------------	23	DMD	Out
		7	------------------------------	7		
Out	STR	38	------------------------------	38	STR	In
		37	------------------------------	37		
Out	DB1	19	------------------------------	19	DB1	In
		3	------------------------------	3		
Out	DB2	20	------------------------------	20	DB2	In
		4	------------------------------	4		
Out	DB3	1	------------------------------	1	DB3	In
		2	------------------------------	2		
Out	DB4	41	------------------------------	41	DB4	In
		40	------------------------------	40		
Out	DB5	34	------------------------------	34	DB5	In
		18	------------------------------	18		
Out	DB6	43	------------------------------	43	DB6	In
		42	------------------------------	42		
Out	DB7	36	------------------------------	36	DB7	In
		35	------------------------------	35		
Out	DB8	28	------------------------------	28	DB8	In
		44	------------------------------	44		
In	IV	46	------------------------------	46	IV	Out
		45	------------------------------	45		
In	TOF	24	------------------------------	24	TOF	Out
		8	------------------------------	8		
In	BOF	25	------------------------------	25	BOF	Out
		9	------------------------------	9		
In	EFU	47	------------------------------	47	EFU	Out
		33	------------------------------	33		
In	T0	50	------------------------------	50	T0	Out
		32	------------------------------	32		
In	T1	49	------------------------------	49	T1	Out
		16	------------------------------	16		
In/Out	PAR	29	------------------------------	29	PAR	In/Out
		13	------------------------------	13		
Out	BCLR	31	------------------------------	31	BCLR	In
		15	------------------------------	15		
In	+5	12	------------------------------	12	+5	Out
In	GND	39	------------------------------	39	GND	Out

Figure 7-23. 2613-2xx Cable Pin Assignments

(Continued)

(Continued)

LIM Data Products Plug 50-pin (P1)					User Plug 50-pin (P2)	
In/Out	Signal	Pin (P1)		Pin (P2)	Signal	In/Out
In	PM/VR	48	------------------------------	48	PM/VR	Out
		17	------------------------------	17		
In	PM/VR	26	------------------------------	26	PM/VR	Out
		10	------------------------------	10		
In	PE	27	------------------------------	27	PE	Out
		11	------------------------------	11		
Out	PI	30	------------------------------	30	PI	In
		14	------------------------------	14		

Figure 7-23. 2613-2xx Cable Pin Assignments

Winchester Adapter Cable Pin Assignments

The 2613-301 cable is a standard Data Products to Winchester adapter cable with a a 50-pin D-subminiature female plug on one end and a 50-pin Winchester female plug on the printer end. Pin assignments are shown in figure 7-24.

Data Products Plug 50-pin (P1)				User Plug 50-pin Winchester (P2)		
In/Out	Signal	Pin (P1)		Pin (P2)	Signal	In/Out
In	RDY	22	------------------------------	CC	RDY	Out
		6	------------------------------	EE		
In	OL	21	------------------------------	y	OL	Out
		5	------------------------------	AA		
In	DMD	23	------------------------------	E	DMD	Out
		7	------------------------------	C		
Out	STR	38	------------------------------	j	STR	In
		37	------------------------------	m		
Out	DB1	19	------------------------------	B	DB1	In
		3	------------------------------	D		
Out	DB2	20	------------------------------	F	DB2	In
		4	------------------------------	J		
Out	DB3	1	------------------------------	L	DB3	In
		2	------------------------------	N		
Out	DB4	41	------------------------------	R	DB4	In
		40	------------------------------	T		
Out	DB5	34	------------------------------	V	DB5	In
		18	------------------------------	X		
Out	DB6	43	------------------------------	Z	DB6	In
		42	------------------------------	b		
Out	DB7	36	------------------------------	n	DB7	In
		35	------------------------------	k		
Out	DB8	28	------------------------------	u	DB8	In
		44	------------------------------	w		
In	IV	46	------------------------------	v	IV	Out
		45	------------------------------	x		
In	TOF	24	------------------------------	S	TOF	Out
		8	------------------------------	U		
In	BOF	25	------------------------------	M	BOF	Out
		9	------------------------------	P		
In	EFU	47	------------------------------	e	EFU	Out
		33	------------------------------	h		
In	T0	50	------------------------------	d	T0	Out
		32	------------------------------	f		
In	T1	49	------------------------------	a	T1	Out
		16	------------------------------	c		
In/Out	PAR	29	------------------------------	z	PAR	In/Out
		13	------------------------------	BB		

Figure 7-24. 2613-301 Winchester Adapter Cable Pin Assignments

(Continued)

(Continued)

Data Products Plug 50-pin (P1)				User Plug 50-pin Winchester (P2)		
In/Out	Signal	Pin (P1)		Pin (P2)	Signal	In/Out
Out	BCLR	31	------------------------------	A	BCLR	In
		15	------------------------------	H		
In	+5	12	------------------------------	HH	+5	Out
In	GND	39				
In	PM/VR	48	------------------------------	FF	PM/VR	Out
		17	------------------------------	DD		
In	PM/VR	26	------------------------------	W	PM/VR	Out
		10	------------------------------	Y		
In	PE	27	------------------------------	r	PE	Out
		11	------------------------------	t		
Out	PI	30	------------------------------	p	PI	In
		14	------------------------------	s		

Figure 7-24. 2613-301 Winchester Adapter Cable Pin Assignments

V.35 LIM Cable Information

Tables 7-27 and 7-28 provide product, equipment, and part numbers for V.35 LIM cables.

When ordering, choose cables from either table 7-27 (CL2) or table 7-28 (CL2P), depending on your installation. The CL2 (class 2) and CL2P (class 2 plenum) cables meet the requirements of article 725, paragraph 38b of the National Electrical Code (NEC) NFPA 70.

Table 7-27. V.35 LIM Cables (CL2)

Product Number	Equipment Number	Part Number	Description
			Connects a V.35 LIM to a modem/data set or other DCE devices that require a 34-pin male cable connector with 0.060-in diameter pins and single lead jackscrew connector locking mechanism.
2617-108	TN490-D	10303243	3 m (10 ft)
2617-123	TN490-E	10303244	7.6 m (25 ft)
2617-148	TN490-F	10303245	15.2 m (50 ft)
			Connects the LIM to modem/data set or other DCE devices that require a 34-pin male cable connector with 0.040-in diameter pins and spring clip with guide arm connector locking mechanism.
2617-508	YA326-D	10317223	3 m (10 ft)
2617-523	YA326-E	10317224	7.6 m (25 ft)
2617-548	YA326-F	10317225	15.2 m (50 ft)
			Connects the LIM to a terminal or other DTE devices that require a 34-pin female cable connector for 0.060-in diameter pins used with single lead jackscrew connector locking mechanism.
2617-208	YA327-D	10317226	3 m (10 ft)
2617-223	YA327-E	10317227	7.6 m (25 ft)
2617-248	YA327-F	10317228	15.2 m (50 ft)

Table 7-28. V.35 LIM Cables (CL2P)

Product Number	Equipment Number	Part Number	Description
			Connects a V.35 LIM to a modem/data set or other DCE devices that require a 34-pin male cable connector with 0.060-in diameter pins and single lead jackscrew connector locking mechanism.
2617-149	TH490-G	10310047	15.2 m (50 ft)
			Connects the LIM to modem/data set or other DCE devices that require a 34-pin male cable connector with 0.040-in diameter pins and spring clip with guide arm connector locking mechanism.
2617-549	YA326-G	10310050	15.2 m (50 ft)
			Connects the LIM to a terminal or other DTE devices that require a 34-pin female cable connector for 0.060-in diameter pins used with single lead jackscrew connector locking mechanism.
2617-249	YA327-G	10310051	15.2 m (50 ft)

The 2617-1xx cable converts the 25-pin subminiature D-type male connector on the LIM to the V.35 standard 34-pin rectangular male connector (ISO 2593) with jack screws.

Refer to the product description in chapter 2 of this manual for additional functional and physical information about these cables.

V.35 Signals Supported

The RS-232-C signals shown in table 7-29 are supported by the V.35 LIM.

Table 7-29. V.35 Signals Supported

Outputs		Inputs	
TxD	Transmit Data	RxD	Receive Data
TxC	Transmit Clock	RxC	Receive Clock
RTS	Request To Send	TxCE	Transmit Clock (external)
DTR	Data Terminal Ready	CTS	Clear To Send
		DCD	Data Carrier Detect
		DSR	Data Set Ready
		RI	Ring Indicator

Pin Assignments for the V.35 LIM 25-Pin Connector

This information is necessary only if you want to build or modify your own cable and plug it directly into the LIM. Refer to figure 7-25 for pin locations on the LIM connector, type DB25-P.

```
In/Out     CCITT     Signal      J3/J4 Pin    Signal   CCITT   In/Out

In         115       RxC(B)----  13
                                   25 ---
In         114       TxCE(B)---  12
                                   24 ------- TxC(A)   113     Out
                           ---   11
                                   23 ---
                           ---   10
                                   22 ------- RI (*)   125     In
                           ---    9
                                   21 ---
In         109 (*)   DCD-------   8
                                   20 ------- DTR (*)  108/2   Out
Ground     102       SG--------   7
                                   19 ------- TxC(B)   113     Out
In         107 (*)   DSR-------   6
                                   18 ---
In         106 (*)   CTS-------   5
                                   17 ------- RxC(A)   115     In
Out        105 (*)   RTS-------   4
                                   16 ------- RxD(B)   104     In
In         104       RxD(A)----   3
                                   15 ------- TxCE(A)  114     In
Out        103       TxD(A)----   2
                                   14 ------- TxD(B)   103     Out
Shield     101       FG--------   1
```

NOTES:

Viewed from mating face of 25-pin subminiature D male connector mounted on a V.35 LIM circuit board.

Pins with no signal names are unused (not connected).

Signals with (A) or (B) suffix are balanced differential pairs.

* Indicates standard bipolar RS-232 signal level:

```
   Output:  +10 V = ON = Space = "0"
            -10 V = OFF = Mark = "1"
            Maximum voltage is ±15 V
```

Figure 7-25. V.35 LIM Connector

V.35 LIM-to-Modem (DCE) Pin Assignments

The 2617-1xx and 2xx are standard modem cables with a 34-pin male plug on the modem end. Pin assignments are shown in figure 7-26.

```
  LIM Plug 25-Pin (P1)                               User Plug 34-Pin (P2)
In/Out   Signal    Pin (P1)                        Pin (P2)  Signal    In/Out

Shield   FG          1 -------------------------- A        FG        Shield
Out      TxD(A)      2 -------------------------- P        TxD(A)    In
In       RxD(A)      3 -------------------------- R        RxD(A)    Out
Out      RTS         4 -------------------------- C        RTS       In
In       CTS         5 -------------------------- D        CTS       Out
In       DSR         6 -------------------------- E        DSR       Out
Gnd      SG          7 -------------------------- B        SG        Gnd
In       DCD         8 -------------------------- F        DCD       Out
Reserved             9 -------------------------- f
Reserved            10 -------------------------- g
Reserved            11
In       TxCE(B)    12 -------------------------- a        TxCE(B)   Out
In       RxC(B)     13 -------------------------- X        RxC(B)    Out
Out       TxD(B)    14 -------------------------- S        TxD(B)    In
In       TxCE(A)    15 -------------------------- Y        TxCE(A)   Out
In       RxD(B)     16 -------------------------- T        RxD(B)    Out
In       RxC(A)     17 -------------------------- V        RxC(A)    Out
          (*)       18
Out       TxC(B)    19 -------------------------- W        TxC(B)    In
Out       DTR       20 -------------------------- H        DTR       In
          (*)       21
In        RI        22 -------------------------- J        RI        Out
          (*)       23
Out       TxC(A)    24 -------------------------- U        TxC(A)    In
          (*)       25

* = Not used.
```

Figure 7-26. 2617-1xx and 2xx Cable Pin Assignments

V.35 LIM-to-Terminal (DTE) Pin Assignments

The 2617-5xx are standard modem cables with a 34-pin female plug on the terminal end. Pin assignments are shown in figure 7-27.

```
  LIM Plug 25-Pin (P1)                              User Plug 34-Pin (P2)
In/Out  Signal   Pin (P1)                        Pin (P2)  Signal   In/Out

Shield  FG          1 -------------------------- A      FG        Shield
Out     TxD(A)      2 -------------------------- R      RxD(A)    Out
In      RxD(A)      3 -------------------------- P      TxD(A)    In
Out     RTS         4 -------------------------- F      DCD       Out
In      CTS         5 ----Tied to 4
In      DSR         6 -------------------------- H      DTR       In
Gnd     SG          7 -------------------------- B      SG        Gnd
In      DCD         8 -------------------------- C      RTS       In
Reserved            9              Tied to C---- D      CTS       Out
Reserved           10
Reserved           11
In      TxCE(B)    12 -------------------------- W      TxC(B)    In
In      RxC(B)     13 ----Tied to 12
Out      TxD(B)    14 -------------------------- T      RxD(B)    Out
In      TxCE(A)    15 -------------------------- U      TxC(A)    In
In      RxD(B)     16 -------------------------- S      TxD(B)    In
In      RxC(A)     17 ----Tied to 15
         (*)       18              Tied to a----X      RxC(B)    Out
Out      TxC(B)    19 -------------------------- a      TxCE(B)   Out
Out      DTR       20 -------------------------- E      DSR       Out
         (*)       21
In       RI        22                            J      RI        Out
         (*)       23              Tied to Y----V      RxC(A)    Out
Out      TxC(A)    24 -------------------------- Y      TxCE(A)   Out
         (*)       25

* = Not used.
```

Figure 7-27. 2617-5xx Cable Pin Assignments

Appendixes

Glossary A-1

CDCNET Product/Equipment Cross-Reference B-1

PTT Approval Data C-1

Glossary A

A

A-to-A

Refer to Application-to-Application.

Access Method

The method of determining which device has access to the transmission medium at any instant. CSMA/CD is an example of an access method.

ACK

Refer to Acknowledge Character (ACK).

Acknowledge Character (ACK)

1. A transmission control character transmitted by a station as an affirmative response to the station with which the connection has been set up.
2. A transmission control character transmitted by a receiver as an affirmative response to a sender. An acknowledge character may also be used as an accuracy control character.
3. Refer to Negative Acknowledge Character (NAK).

Acoustic Coupler

The device on some modems, that physically holds a telephone handset in two rubber cups. The cups house a small microphone and speaker that "talk" and "listen" to the telephone handset.

Address Resolution Protocol (ARP)

A TCP/IP protocol used for mapping IP addresses to Ethernet addresses.

American National Dictionary for Information Processing (ANDIPS)

An X3 Technical Report published by the Computer and Business Equipment Manufacturers Association (CBEMA), rather than the American Standards Institute (ANSI).

American Standard Code for Information Interchange (ASCII)

A standard code, using a coded character set consisting of 7-bit coded characters (8 bits including parity check), used for information interchange among data processing systems, data communication systems, and associated equipment. The ASCII set consists of control characters and graphic characters.

ANACD

Refer to Analyze_CDCNET_Dump.

Analyze_CDCNET_Dump (ANACD)

The name of the device interface dump analysis program.

ANDIPS

Refer to American National Dictionary for Information Processing.

Application Layer

Layer 7 of the OSI architecture (not described in detail by the ISO). This layer provides services that directly support user and application tasks, and provides system management functions.

Application-to-Application (A-to-A)

Can refer to either a type of link between two OSI layers, or a type of network processing:

1. An application-to-application link is an end-to-end link between an application layer of one system and the application layer of another for the exchange of information.

2. Application-to-application network processing that enables data to be exchanged between applications programs executing on different host computers or workstations.

ARP

Refer to Address Resolution Protocol.

ARPANET

A Defense Data Network (DDN) developed by the Defense Advanced Research Projects Agency. ARPANET supports research and development projects funded by the Department of Defense.

ASCII

Refer to American Standard Code for Information Interchange.

Asynchronous Printer

A printer connected by an asynchronous line and CDCNET to a host that prints output from the host. Asynchronous printers connected to NOS hosts are supported by the CDCNET interactive interface and the NOS application Printer Support Utility (PSU). Asynchronous printers connected to NOS/VE hosts are supported by the CDCNET batch interface and the NOS/VE Status and Control Facility and Batch Transfer Facility.

Asynchronous TIP

The terminal interface program (TIP) that configures terminal devices and establishes terminal attributes for a generic, asynchronous terminal connected to a device interface. The asynchronous TIP resides in a device interface that is configured to support asynchronous terminals.

Asynchronous Transmission

Data transmission in which each information character, or byte, is individually synchronized using start and stop bits.

B

Base System Software

Software that provides an operating system environment for CDCNET software in device interfaces. Base system software resides in every device interface.

Batch Device

Individual devices in an I/O station controlled by batch services and protocols and used for batch input and/or output. Examples of batch devices include card readers, line printers, card punches and plotters.

Batch Mode

A mode of execution where a job is submitted and processed as a unit without intervention from the user.

Batch Transfer Protocol (BTP)

Control Data's terminal-to-application protocol that enables batch terminals to perform remote job entry with hosts executing NOS or NOS/VE.

Batch Transfer Service (BTS)

Control Data's terminal-to-application protocol that enables batch terminals to perform remote job entry with hosts executing NOS or NOS/VE.

Baud

Data transmission speed expressed as the reciprocal of the time duration of the shortest signal element in a transmission. Used to indicate the number of discrete conditions or signal events per second.

Baudot Code

A code for the transmission of teleprinter data in which five bits represent one character, usually with one start, and one or two stop bits included.

Bisynchronous Protocol

Binary synchronous protocol; a byte-oriented communications protocol that supports the OSI data link layer.

Bit

Binary digit. A bit has the value of either 0 or 1.

In the pure binary numeration system, either of the digits 0 or 1. Synonymous with binary digit.

BITNet

An economical, low speed network (meaning Because It's Time Network). It consists of mainframe computers (primarily IBM) interconnected by 9600 bps leased lines. The network, developed by City University in New York, connects univesities across the country and attaches to the European network, EARN.

Bits Per Second (bps)

A data transmission rating that expresses the flow of the smallest units of information per unit of time. Refer also to Baud.

bps

Refer to Bits Per Second.

BSC3270 TIP

A terminal interface program that provides support for the IBM 3270 Information Display System. The 3270 Bisynchronous TIP allows 3271, 3274, 3275, and 3276 control units to connect directly to CDCNET in order to communicate with a CDCNET terminal device interface (TDI) over dedicated or dial-up lines using the centralized multipoint Binary Synchronous Communication protocol. The 3270 TIP Bisynchronous supports up to 32 multi-dropped clusters of up to 32 devices on each line.

BTP

Refer to Batch Transfer Protocol.

BTS

Refer to Batch Transfer Service.

Bus

1. (ANDIPS) One or more conductors used for transmitting signals or power.
2. A hardware arrangement in which processors and storage components are attached to a shared transmission medium.

Byte

1. (ISO) A binary character string operated upon as a unit and usually shorter than a computer word.
2. (ISO) A group of contiguous bits. Unless prefixed (for example, a 6-bit byte), the term implies 8-bit groups. An 8-bit byte is sometimes called an octet. When used for encoding character data, a byte represents a single character.

C

Carrier

A continuous frequency capable of being modulated or impressed with a signal.

Carrier Sense Multiple Access/Collision Detect (CSMA/CD)

A communications protocol that performs the following three functions:

1. Carrier sense enables a communications medium or communications processor to detect any traffic currently active in a network circuit.
2. Multiple access enables a communications medium or communications processor to send a message whenever it senses that the circuit is not busy.
3. Collision detect enables a communications medium or communications processor to sense when a collision occurs on a circuit between data transmitted from different sources. When a collision is detected, the data transmission stops, and the transmitting sources wait for a preset interval before beginning their transmissions again.

Catenet

Refer to Concatenated Network.

CCITT

Refer to Consultative Committee of International Telephone and Telegraph.

CDCNET

Refer to Control Data Distributed Communications Network.

CDCNET Network Management Station (CNMS)

A CDCNET software product that manages a CDCNET network from a UNIX-based platform. CNMS eliminates the need for a NOS/VE mainframe in a CDCNET network.

CDCNET OSI Software

CDCNET software that implements COS-endorsed OSI standards for the OSI reference model.

CDCNET Proprietary Software

CDCNET software that architecturally resembles the Xerox Networking System (XNS), which was based on an early interpretation of the OSI reference model.

CDCNET Statistics Manager (CSM)

The CDCNET Statistics Manager provides a bridge between commands that request statistics collection and the software that actually collects the statistics.

Channel

The physical link or logical path between a Mainframe Device Interface (MDI) and the network host computer, or between an Integrated Communication Adapter (ICA) and the Integrated Controller Interface (ICI) in the network host computer.

Channel Access

Refer to Carrier Sense Multiple Access/Collision Detect.

Channel Allocation

1. A technique that determines how much channel capacity each device interface can have.
2. Ensures that the channel capacity is used in the most efficient manner.
3. Divides the channel bandwidth to allow the most efficient use of the channel capacity.

Character

Any alphabetic, numeric, or special symbol that can be encoded. This term applies to the graphic characters for a terminal input or output device and to the encoded control characters used by the terminal. Within Control Data hardware, a character is a coded byte of data, such as a 6-bit display code (NOS only) or 7-bit ASCII code.

CIM

Refer to Communications Interface Module.

CLNS

ConnectionLess Network Service.

CNMS

Refer to CDCNET Network Management Station.

Coaxial Cable

A transmission cable that provides large bandwidth and high data/low error rates. This cable contains a central carrier wire surrounded by fine copper mesh and/or an aluminum sleeve.

Common Carrier

Any organization that provides communication transmission services to the general public.

Common Transport Interface (CTI)

A software component of the OSI Transport Bridge that lets the CDCNET Session layer use either the Generic Transport or the OSI Transport.

Communication Channel

A path established to switch or route messages from source to destination.

Communications Interface Module (CIM)

The logic board within a CDCNET device interface that controls transmissions between the line interface module (LIM) bus and the internal system bus (ISB).

Computer Network

A linked collection of data processing and communications equipment.

Concatenated Network (Catenet)

A communications network composed of more than one type of communications medium (more than one network solution); often established when it is necessary to interconnect a local area network (LAN) with other resources (for example, another local area network, or geographically remote computer-related resources). Also called a catenet.

CONS

Connection Oriented Network Service

Consultative Committee of International Telephone and Telegraph (CCITT)

An organization chartered by the United Nations to develop and publish international standards for the communications industry.

Contention

A condition on a communications medium in which two or more stations try to transmit at the same time. Data communications protocols contain logic to resolve a contention condition.

Control Data Distributed Communications Network (CDCNET)

1. The collection of compatible hardware and software products offered by Control Data to interconnect computer resources into distributed communications networks.

2. A network that is interconnected by Control Data Network Architecture (CDNA)-compatible hardware and software products.

Corporation for Open Systems (COS)

A coalition of computer industry suppliers and users. COS's goal is to achieve the level of standardization necessary for creating a global network in which products will interconnect with each other, regardless of who makes or sells them.

COS

Refer to Corporation for Open Systems.

CPC

CDCNET Product Configurator

CRC

Refer to Cyclic Redundancy Check.

CSM

Refer to CDCNET Statistics Manager.

CSMA/CD

Refer to Carrier Sense Multiple Access/Collision Detect.

CTI

Refer to Common Transport Interface.

Cyclic Redundancy Check (CRC)

A check code transmitted with blocks of data. This code is used by several protocols.

D

DARPA

Defense Advanced Research Projects Agency.

Data Circuit-Terminating Equipment (DCE)

1. In a data station, the equipment that provides the signal conversion and coding between the data terminal equipment (DTE) and the line in a data station. The DCE may be separate equipment or an integral part of the DTE or of intermediate equipment. The DCE may perform other functions that are normally performed at the network end of the line.

2. The hardware that links data terminating equipment (DTE) to communications media. Data communications equipment is normally a modem or modem equivalent (data set).

Data Communication

The interchange of data messages from one point to another over communications channels.

Data Link

An error-checked communications pathway between device interfaces over a physical medium. Data link protocol frames messages for transmission. The integrity of received messages is checked. Data link manages access to and use of the medium, and ensures proper sequencing of transmitted data.

Data Set

A hardware interface that transforms analog to digital data and the converse. A data set is a modem capable of using telephone lines.

Data Terminal Equipment (DTE)

1. That part of a data station which serves as a data source, data sink, or both.
2. Data communications equipment that allows human interaction with the databases and operations of a network.

DCE

Refer to Data Circuit-Terminating Equipment.

DCNS

Refer to Distributed Communications Network Software.

DDN

Refer to Defense Data Network.

Dedicated Line

A communication line that permanently connects a terminal to a device interface. Contrast with Switched Line.

Defense Data Network (DDN)

A packet-switching network provided by the Department of Defense (DOD) to meet its current and projected data communication requirements. It is based upon the Defense Advanced Research Projects Agency Network (ARPANET), an existing operational network.

Demodulation

The process of retrieving an original data signal from a modulated carrier wave.

Device Interface Components

Hardware and software modules that contribute to the device interface's communication control functions.

Device Interface (DI)

The communications processor that Control Data offers as its CDCNET hardware product. Also called a CDCNET device interface.

Device Manager (DVM)

A set of routines responsible for the interface between CDCNET's physical and link layers (layers 1 and 2, respectively).

DI

Refer to Device Interface.

Diagnostic

1. Software and/or microcode that isolates failing hardware/software components within a CDCNET device interface.
2. A message indicating a malfunction within a CDCNET device interface or one of its related communications media.

Dial-up Line

A communications circuit created by dialing a destination over a common carrier's switched lines.

DIS

Draft International Standard.

Distributed Communications Network Software (DCNS)

The software that executes in a device interface as part of the CDCNET product.

DOD

Department of Defense.

Domain Name Resolver

A collection of application interfaces that communicate with domain name servers to supply information about network resources. Allows users to specify domain names instead of IP addresses when referencing TCP/IP hosts.

DRAM

Dynamic random access memory.

DTE

Refer to Data Terminal Equipment.

Dump Analyzer

CDCNET troubleshooting software that enables communications support analysts to review detailed memory dumps generated by malfunctioning CDCNET device interfaces. Refer to Analyze_CDCNET_Dump (ANACD).

Duplex

1. In data communication, pertains to an independent transmission that alternates one way at a time.
2. Refer to Full Duplex.

DVM

Refer to Device Manager.

E

EARN

Refer to European Academic Research Network.

Echoplex

A procedure in which the receiving station automatically retransmits each character received so that the sender may verify the correctness of his transmission. This process usually occurs on asynchronous full-duplex communication lines; however, not all terminals on full-duplex communication lines are capable of echoplex operation.

EEPROM

Electronically erasable programmable read-only memory.

EIA

Electrical and Electronic Industries Association.

ESCI

Refer to Ethernet Serial Channel Interface.

Ethernet

A baseband local area network protocol developed by the Xerox Corporation. CDCNET supports an Ethernet-compatible network.

Ethernet Serial Channel Interface (ESCI)

The logic board within a CDCNET device interface that controls transmissions between an Ethernet (IEEE 802.3) transceiver and the internal system bus (ISB) of the device interface.

European Academic Research Network (EARN)

This network, which connects European universities and research laboratories, attaches to the American network, BITNet.

F

FCS

Refer to Frame Check Sequence.

FDX

Refer to Full Duplex.

Fiber Optic Link

An interconnection method that provides a means for routing the network through hazardous environments or between buildings.

File Transfer, Access and Management Protocol (FTAM)

The portion of the OSI model that is concerned with manipulating identifiable bodies of information, such as those stored in filing systems or passed as a whole between communicating application processes.

File Transfer Protocol (FTP)

1. The Control Data application-to-application protocol that enables applications programs executing on a NOS or NOS/VE host to exchange information with applications programs that execute on other NOS or NOS/VE hosts.

2. TCP/IP protocol that provides the file transfer server and user functions.

Frame

A group of bits that includes the message and address information. A frame contains a block of data. The frame is the basic communication unit used in device-interface-to-device-interface communications, and provides high data density over data-grade lines, as well as data assurance.

Frame Check Sequence (FCS)

The cyclic redundancy check (CRC) character that is transmitted at the end of a frame.

FTAM

Refer to File Transfer, Access and Management Protocol.

FTAM/VE

Control Data's implementation of the file transfer, access, and management protocol. Refer to FTAM.

FTAM/VE Initiator

The file service entity that issues the request for connection and thereby functions as a client.

FTAM/VE Responder

The file service entity that responds to a request for connection and thereby functions as a server.

FTP

Refer to File Transfer Protocol.

Full Duplex (FDX)

Simultaneous independent transmission in both directions. Also called Duplex. Contrast with Half Duplex.

G

Gateway

A software interface between systems with different architectures and protocols.

H

Half Duplex (HDX)

In data communication, pertains to an independent transmission that alternates one way at a time. Contrast with Full Duplex.

Handshaking

The exchange of codes for the control of a data connection.

Hardware

1. (ISO) Physical equipment as opposed to programs, procedures, rules, and associated documentation.

2. Electronic circuitry and its housing, including cabinetry, power hook-up, and cooling system.

HASP

Refer to Houston Automatic Spooling Program.

HDLC

Refer to High-Level Data Link Control.

HDX

Refer to Half Duplex.

Hertz (Hz)

A unit of electrical frequency equal to one cycle per second.

High-Level Data Link Control (HDLC)

The International Standards Organization's (ISO) bit-oriented protocol for the data link layer of the Open Systems Interconnection (OSI) reference model.

Host

Refer to Host Computer.

Host Computer

A mainframe computer system, connected to a communications network, which provides primary services, such as database access, user application execution, or program compilation. For CDCNET, a host computer provides network support functions, including maintenance of device interface load files. Also called a host.

Host Operating System

The host containing applications and maintenance software available to the device interface.

Houston Automatic Spooling Program (HASP)

A job control protocol for transmitting data processing files and jobs between certain models of computers.

Hz

Refer to Hertz.

I

I/O

Input/Output.

I/O Station

A logical grouping of batch devices into a single named unit for routing jobs and files to the batch devices and for controlling the devices. Devices belonging to an I/O station may all connect to the same line, to several lines on one device interface, or to lines distributed among several device interfaces.

IAF

Refer to Interactive Facility.

ICA

Refer to Integrated Communications Adapter.

ICA Ethernet Interface (IEI)

The IEI is the I/O subsystem in the ICA that interfaces to the Ethernet.

ICI

Integrated Controller Interface.

ICMP

Internet Control Message Protocol

IEEE

Refer to Institute of Electrical and Electronics Engineers.

IEEE 802.3

A subset of IEEE 802 that defines line protocol and media access technology for local area networks that use a bus employing CSMA/CD.

IEI

Refer to ICA Ethernet Interface.

IGP

Interior Gateway Protocol

Institute of Electrical and Electronics Engineers (IEEE)

The IEEE Computer Society promotes cooperation and exchange of technical information among its members. Through conferences, committee work, publications, and other information exchanges, the IEEE has established several data processing standards (for example, the IEEE standard 802).

Integrated Communications Adapter (ICA)

A hardware device that interconnects a single 16-bit Integrated Controller Interface (ICI) channel of a host computer with CDCNET. The ICA is installed in the CYBER 930 series host computer mainframe.

Interactive Asynchronous Terminal Passthrough

Software utility that provides a gateway for asynchronous ports to establish connections with other asynchronous ports.

Interactive Facility (IAF)

The network applications software that supports interactive access and conversational timesharing on NOS.

Interface

A mechanism that enables the exchange of data between two dissimilar resources in a communications network.

Interface Software

CDCNET software that enables a CDCNET network to exchange information with a host or network that employs a noncompatible architecture. This exchange capability is accomplished via existing industry-standard protocols and interfaces.

Internal System Bus (ISB)

The circuit within a CDCNET device interface that relays signals between the logic boards of the device interface.

International Standards Organization (ISO)

A worldwide standards group similar in function to the American National Standards Institute (ANSI). ANSI is a member of International Standards Organization.

Internet

A collection of networks and gateways that use the TCP/IP protocols and act as a single network.

Internet Daemon (INETD)

A TCP/IP server application that runs on a NOS/VE host and acts as an overall controller of Internet servers. INETD allows Internet servers, such as FTP, SMTP, and customer-designed Internet servers, to be processed automatically on a NOS/VE system.

Internet Protocol Access Method (IPAM)

A TCP/IP library of routines that provide services to the applications.

Internet Protocol (IP)

A term used in DDN networks that refers to a connectionless, point-to-point protocol corresponding to the CDCNET Internet layer. This protocol is required for connection to MILNET, ARPANET, and TCP/IP workstations.

Internet Protocol Static Routing (IPSR)

A TCP/IP protocol that contains the tables used by DI-resident Department of Defense (DOD) applications.

IP

Refer to Internet Protocol.

IPAM

Refer to Internet Protocol Access Method.

IPSR

Refer to Internet Protocol Static Routing.

ISB

Refer to Internal System Bus.

ISO

Refer to International Standards Organization.

IVT

Interactive Virtual Terminal.

L

LAN

Refer to Local Area Network.

LAPB

Refer to Link Access Procedure, Balanced.

Layer Software

CDCNET software that performs the network functions defined by the OSI reference model.

Leased Line

A communications line reserved for the exclusive use of a leasing customer. Also called private line.

LED

Light-emitting diode.

LIM

Refer to Line Interface Module.

Line Interface Module (LIM)

A smaller logic board within a CDCNET device interface that enables the device interface to be attached to terminal, workstation, and unit record equipment lines.

Link

1. Any specified relationship between two device interfaces in a network, or a communication path between two device interfaces, or a data link.
2. The communications path between two device interfaces. Also called a line, channel, or circuit.

Link Access Procedure, Balanced (LAPB)

A standard interface protocol implementing the physical, link, and network levels of the OSI reference model as defined by CCITT Recommendation X.25 for packet-switched public data networks. LAPB provides an essentially error-free channel, using a system of acknowledgments, error detection, and retransmission.

Local Area Network (LAN)

A privately owned communications network that interconnects computer-related resources. Typically, the resources interconnected by this network are confined to a relatively concise geographic area, such as a single building.

Logic Board

A printed circuit board with data storage and/or processing components installed; sometimes called a board, card, or module.

Logical Circuit

Refer to Virtual Circuit.

Loopback Test

A failure management test that checks the integrity of a hardware element by sending data through the element and back again.

M

Mail/VE

A multihost electronic mail system based on the 1984 CCITT X.400 Standard for Message Handling Systems.

Mail/VE Gateway

The software that supports the exchange of mail between Mail/VE and Mail systems on Internet and BITNet/EARN networks.

Main Processor Board II (MPB-II)

Processor board containing a high performance architecture consisting of MC68030 32-bit processor and 512 K bytes of local onboard memory.

Main Processor Board (MPB)

The logic board within a CDCNET device interface that provides the primary processing power for the device interface.

Mainframe Channel Interface (MCI)

An optional logic board within a CDCNET device interface that connects the device interface to a 12-bit CYBER host channel.

Mainframe Device Interface (MDI)

The CDCNET device interface variant that interconnects a 12-bit channel of host computers operating under NOS or NOS/VE with an Ethernet (IEEE 802.3) local area network.

Mainframe/Terminal Device Interface (MTI)

The CDCNET device interface variant that interconnects 12-bit NOS and NOS/VE host computers with terminals, workstations, and unit record equipment without requiring a local area network.

Maintenance Console Option (MCO)

An optional CDCNET product that allows an RS-232-C ASCII terminal or modem to be connected directly to the main processor board (MPB) for test purposes.

Maintenance Software

Software designed to perform system tests and diagnostics. All CDCNET maintenance software is onboard and online.

Manage CDCNET Configuration (MANCC) Utility

A CDCNET host utility for NOS that helps create, edit, and display CDCNET configuration files.

Management Entity (ME)

CDCNET software that performs network management functions. CDCNET supports various MEs to perform specific network tasks.

MANCC

Refer to Manage CDCNET Configuration Utility.

Mark

Presence of a signal. Equivalent to a binary one condition. CDCNET does not support mark parity processing (parity bit always set to one) for asynchronous terminals.

MCI

Refer to Mainframe Channel Interface.

MCO

Refer to Maintenance Console Option.

MDI

Refer to Mainframe Device Interface.

ME

Refer to Management Entity.

Message Handling System (MHS)

An OSI protocol for electronic store/forward messaging.

MHS

Refer to Message Handling System.

MILNET

A Defense Data Network (DDN) evolved from ARPANET that supports operational communication requirements.

Mode 4

A data communications protocol, consisting of variants 4A, 4B, and 4C. The Mode 4 protocol supports two-way alternate communications (where messages may be sent in one direction or another, but not in both directions simultaneously) on switched or dedicated synchronous lines within a line speed range of 1200 to 19200 bits-per-second.

The CDCNET Mode 4 terminal interface program supports the 4A and 4C variants of the Mode 4 protocol.

Modem

(ISO) A functional unit that modulates and demodulates signals. One of the functions of a modem is to enable digital data to be transmitted over analog transmission facilities. Modem is a contraction of modulator-demodulator.

Modulation

A message signal that is impressed on a carrier signal and transmitted at another signal frequency.

MPB

Refer to Main Processor Board.

MPB-II

Refer to Main Processor Board II.

MTI

Refer to Mainframe/Terminal Device Interface.

Multiplexer (MUX)

Equipment that enables a site to concentrate data transmission between multiple slower-speed devices (such as terminals and workstations) and a higher-speed channel. For example, a multiplexer can concentrate data being transmitted between multiple terminals and a host computer by using a local area network.

Multiplexing

1. (ISO) In data transmission, a function that permits two or more data sources to share a common transmission medium such that each data source has its own channel.
2. The division of a transmission facility into two or more channels.

MUX

Refer to Multiplexer.

N

N-Connector

A type of coaxial cable connector that is used on the segment cable of the local area network (LAN).

NAK

Refer to Negative Acknowledge.

NAM

Refer to Network Access Method.

NAM/VE

Refer to Network Access Method/Virtual Environment.

NBS

National Bureau of Standards.

NDI

Refer to Network Device Interface.

Negative Acknowledge (NAK)

A control code indicating that a character or block was not received properly.

NETOU

Refer to Network Operator Utility.

Network

An interconnected set of host computers, terminals, workstations, and unit record equipment. Refer also to Local Area Network and Concatenated Network.

Network Access Method (NAM)

The access method that resides under NOS; allows host-based network applications programs to exchange information with communications networks.

Network Access Method/Virtual Environment (NAM/VE)

The access method that resides under NOS/VE; allows host-based network applications programs to exchange information with communications networks.

Network Architecture

A set of functional layers in which each layer performs a specific set of functions and services; together, the layers interact to provide total, end-to-end network operation. Each layer uses a protocol and has its relationship with other layers defined.

Network Control Layer

The third layer in the International Standard Organization (ISO) architecture. Controls the flow of messages between nodes by addressing messages, setting up the path between communication nodes, and routing messages across nodes.

Network Device Interface (NDI)

The standard CDCNET device interface variant that transfers data between networks (for example, between two local area networks; between a local area network and a communications line; or between a local area network and a public data network).

Network File System (NFS)

A software product of Sun Microsystems, Inc. that allows a variety of machines and operating systems to share files.

Network File System/Virtual Environment (NFS/VE)

The Control Data version of Network File System (NFS) which is licensed by Sun Microsystems, Incorporated. NFS/VE executes in the NOS/VE host.

Network Information Service (NIS)

Administration and read access service to replicated network-wide databases used to replace administrative files such as /etc/hosts. It also provides a directory service that eliminates duplicate user names, user IDs, or host names.

Network Job Entry Facility (NJEF)

The network applications software that supports IBM's Network Job Entry (NJE) protocol on NOS.

Network Lock Manager

System V-style advisory file and record locking service. Locking prevents multiple processes (on the client) from modifying the same file at the same time. It also allows cooperative processes to synchronize access to shared files.

Network Operating System (NOS)

The software that controls data processing and storage in a CYBER 170 mainframe or a CYBER 180 mainframe (running NOS only or dual-state). CDCNET files stored and processed in CYBER 170 mainframes, such as configuration and boot files, network log files, and CDCNET host applications, are run under the Network Operating System.

Network Operating System/Virtual Environment (NOS/VE)

The software that controls data processing and storage in CYBER 180 mainframes. CDCNET files stored and processed in CYBER 180 mainframes, such as configuration and boot files, network log files, and CDCNET host applications, are run under the Network Operating System/Virtual Environment.

Network Operator Utility (NETOU)

A group of programs residing on a host computer and in a (NOS) mainframe device interface or mainframe terminal interface connected to the mainframe. NETOU allows a network operator to access, monitor, control, and configure a CDCNET from the host console or a remote terminal. Using NETOU, network operators can send CDCNET operations commands to specific device interfaces or to all the device interfaces in the network.

Network Performance Analyzer (NPA)

The CDCNET software utility that generates statistical reports based on its analysis of the network log file or generates event/error reports based on log messages in the network log file.

Network Products Gateway

A gateway that allows information transfer between CDCNET and a non-CDNA host such as a NOS host. File transfers between NOS hosts over CDCNET require Network Products gateways to be defined in the MDIs connected to the hosts.

Network Products (NP)

Programs that run under NOS in a host mainframe to allow data and computer applications to be transmitted from the mainframe through a computer network. Network Products include Network Access Method (NAM) and Network Definition Language (NDL). Network Products and CDCNET have different architectures. For hosts to send data through CDCNET, the Mainframe Device Interfaces connected to the mainframes must have gateways to translate between Network Products and CDCNET protocols.

Network Products Terminal Gateway

A gateway that allows both interactive and remote batch terminal users to connect to a NOS host through CDCNET (by specifying the appropriate service title on the CREATE_CONNECTION command). There are two parts to the NP Terminal gateway: the Interactive Virtual Terminal gateway (IVT gateway) and the Remote Batch Facility gateway (RBF gateway). The batch gateway is dependent on the interactive gateway. If a network configuration is going to support terminal connections to NOS, the MDI or MTI connected to the NOS host must contain an NP Terminal gateway.

Network Queue System (NQS)

A management batch capability on UNIX systems that queues and defers the processing of requests. A request could be the printing of a file or the running of a batch job.

Network Service Access Control

Capability that restricts services that can be accessed across different network solutions.

Network Solution

A communications medium over which data is transmitted between interconnected network resources, and which uses CDCNET protocols. In OSI terminology, a network solution is also referred to as a subnet. A network solution differs from other communications lines because it is shared by multiple network resources (it is not solely dedicated to the handling of data transmissions between a single pair of network resources). Network solutions differ from trunks because they can carry network management traffic such as log and alarm messages.

Network Validation

A system security feature requiring users to enter a valid username and password to use CDCNET. The username and password are in addition to normal login requirements.

NFS

Refer to Network File System.

NFS/VE

An optional NOS/VE CDCNET product that implements NFS on a CYBER host computer.

NIS

See Network Information Service.

NJEF

Refer to Network Job Entry Facility.

NOS

Refer to Network Operating System.

NOS/VE

Refer to Network Operating System/Virtual Environment.

NP

Refer to Network Products.

NPA

Refer to Network Performance Analyzer.

NQS

See Network Queue System.

NVT

Refer to TELNET Network Virtual Terminal.

O

Octet

An 8-bit byte.

Onboard

ROM-resident; for example, the self-test diagnostics in the device interface.

Online Diagnostics

Optional diagnostics for the device interface that can be executed while the device interface is connected to and operating as part of the CDCNET.

Open System Interconnection (OSI)

The International Standards Organization's (ISO's) reference model for network processing. This model is based on a network architecture that segregates network functions into seven layers.

OSI

Refer to Open System Interconnection.

P

Packet

A group of binary digits, including data and control elements, switched and transmitted as a data unit by communications networks. The packet's data, control signals, and error-control information are arranged in a specific format. Different types of networks use different sizes of packets.

Packet Assembly/Disassembly (PAD)

(ISO) A functional unit that enables data terminal equipments (DTEs) not equipped for packet switching to access a packet-switched network.

PAD

Refer to Packet Assembly/Disassembly.

Parallel Port

An I/O port that transmits bits of data (usually a byte) simultaneously. Contrast with Serial Port.

Parallel Transmission

A method of transmission in which each bit within a unit of information (usually a byte) is sent simultaneously on a single channel. Contrast with Serial Transmission.

Parity Check

An error detection method in which an extra bit is added to data to make the number of 1s in each grouping of bits either always odd (for odd parity), or always even (for even parity).

PBX

Refer to Private Branch Exchange.

PDN

Refer to Public Data Network.

Physical Link

Layer 1 of the Open System Interconnection (OSI) model. Defines the electrical and mechanical aspects of interfacing to a physical medium for transmitting data, as well as setting up, maintaining, and disconnecting physical links. Includes a software device driver for each communications device, and the hardware (interface devices, modems, and communications lines).

PMM

Refer to Private Memory Module.

Point-to-Point Connection

A network configuration in which a connection is established between two device interfaces.

Port

The physical connection on the device interface through which data is transferred to/from the device interface. Each port is numbered and supports a single communication line.

Printer Support Utility (PSU)

The network applications software that supports standalone CDCNET printers on NOS.

Private Branch Exchange (PBX)

A manual or dial exchange, connected to the telephone network, located on a customer's premises and operated by the customer's employees.

Private I/O Station

An I/O station that is used to submit and receive jobs and output files only for the user that is operating the station.

Private Line

Refer to Leased Line.

Private Memory Module (PMM)

An optional device interface board with 128K bytes of static RAM dedicated to the main processor board (MPB) for code execution.

Protocol

A set of conventions that must be followed to achieve complete communications between the computer-related resources in a network. A protocol can reflect the following:

1. A set of pre-defined coding sequences, such as the control byte envelopes added to (or removed from) data exchanged with a terminal.
2. A set of data addressing and division methods, such as the block mechanism used between a network application program and Network Access Method.
3. A set of procedures that control communications, such as the supervisory message sequences used between a network application program and Network Access Method.

PSU

Refer to Printer Support Utility.

PTT

Public Telephone and Telegraph.

Public Data Network (PDN)

A commercial packet-switching network that supports the communications interface described in CCITT protocol X.25.

Public I/O Station

An I/O station that is used to submit and receive files from many users simultaneously. The operator that controls a public I/O station does not own the files read from or sent to the I/O station.

PVC

Polyvinyl chloride.

PWB

Printed wiring board.

Q

QTF/PTF

Refer to Queue Transfer Facility/Permanent File Transfer Facility.

Queue Transfer Facility/Permanent File Transfer Facility (QTF/PTF)

The network applications software that supports file transfer on NOS and NOS/VE.

Quicklook

A process whereby maintenance software is selected to run in a minimum amount of time. This is usually done by varying parameters such as section selection.

R

RAM

Random access memory.

RBF

Refer to Remote Batch Facility.

Read-Only Memory (ROM)

A data storage device. Storage with contents that can be altered only under certain circumstances. Storage that cannot be written over. Also permanent storage.

Real Time Clock (RTC)

A time-of-day clock maintained by the CDCNET device interfaces.

Redundancy

1. In a protocol, the portion of the total characters of bits that can be eliminated without any loss of information.

2. Multiplicity of pathways between two device interfaces in a network or catenet, resulting in increased communications reliability.

Remote Batch Facility (RBF)

The network applications software that supports remote batch processing (remote job entry) on NOS.

Remote Line Monitor

Displays and/or records all received and transmitted characters on a LIM and port supported by the standard CDCNET CIM firmware and that use protocols defined for Remote Line Monitor.

Remote Terminal Interface (RTI)

The CDCNET device interface variant that functions as a remote line concentrator for RS-232-C lines.

Repeater

A network device that extends the network service beyond one 500-meter (1639.3-ft) length of segment cable.

ROM

Refer to Read-Only Memory.

RS-232-C

An Electrical and Electronic Industries Association (EIA) standard that describes the interface between terminals or other Data Terminal Equipment (DTE) and modems or other Data Communications Equipment (DCE) employing a serial binary interchange.

RS-422/423

1. Electrical and Electronic Industries Association Level 1 standards for Data Terminal Equipment (DTE) that regulate the physical link between Data Communications Equipment (DCE).

2. Electrical and Electronic Industries Association standards designed to replace RS-232. RS-422 defines electrical characteristics of a balanced interface. RS-423 defines electrical characteristics of an unbalanced interface.

RS-449

1. A physical interface standard for data communications used with high speeds and long communication lines.

2. A newer standard than RS-232-C, also used for serial communications. Eventually meant to replace RS-232-C, but backward compatibility is specified in RS-449.

RTC

Refer to Real Time Clock.

RTI

Refer to Remote Terminal Interface.

S

SAP

Refer to Service Access Point.

SDLC

Refer to Synchronous Data Link Control.

SECDED

Single error correction double error detection.

Segment Cable

Refer to Coaxial Cable.

Serial Port

An I/O port that transmits data out one bit at a time. Contrast with Parallel Port. RS-232-C is a common serial-signaling protocol.

Serial Transmission

1. The sequential transmission of the bits constituting an entity of data over a data circuit.

2. In data communication, transmission at successive intervals of signal elements constituting the same telegraph or data signal. The sequential elements may be transmitted with or without interruption, provided they are not transmitted simultaneously. For example, telegraph transmission by a time-divided channel.

3. A method of data transmission in which each bit of information is sent sequentially on a single channel. Contrast with Parallel Transmission.

Service Access Point (SAP)

An exchange point between the services of two adjacent Control Data Network Architecture (CDNA) layers.

Simple Mail Transfer Protocol (SMTP)

In DDN networks, the mail transfer service and interface to the local mail facility. Also known as RFC822.

SMM

Refer to System Main Memory.

SMM4

A 4 M byte version of the SMM (see System Main Memory).

SMTP

Refer to Simple Mail Transfer Protocol.

SNA

Refer to Systems Network Architecture.

SNA3270 TIP

A terminal interface program that provides IBM 3270 Information Display System users access to CDCNET through an SNA network.

SRAM

Static random access memory.

SSR

Refer to Stream Service Routine.

Stream Service Routine (SSR)

Software that implements Control Data's Network Architecture layer 2 (the data link layer). A stream service routine enables communication over a specific type of network solution.

Switched Line

A communication line connected with one device interface, but able to be connected to any one of several terminals via a switching mechanism, such as a dialed telephone line. Contrast with Dedicated Line.

Sync Character

A character sent from a transmitting station for the purpose of synchronizing the clocks in the transmitting and receiving stations.

Synchronous Data Link Control (SDLC)

Bit-oriented data link control protocol developed by International Business Machines (IBM).

Synchronous Transmission

Transmission in which the data characters are transmitted at a fixed rate with the transmitter and receiver synchronized.

System Main Memory (SMM)

A device interface board containing dynamic RAM accessible by all interfaces and the resident main processor board (MPB).

Systems Network Architecture (SNA)

IBM standard defining the layers and layer protocols to be used within an IBM network.

T

T-to-A

Refer to Terminal-to-Application.

TCE

Refer to Transparent Computing Environment.

TCP

Refer to Transmission Control Protocol.

TCP/IP

Refer to Transmission Control Protocol/Internet Protocol.

TDI

Refer to Terminal Device Interface.

TDP

Refer to Terminal Definition Procedure.

TELNET

TCP/IP Teletype Network Protocol.

TELNET Network Virtual Terminal (NVT)

A TCP/IP protocol that provides presentation layer services for other application protocols. TELNET NVT protocol is roughly equivalent to VTP in the ISO model. It establishes connections and controls interactive virtual circuits.

Terminal Definition Procedure (TDP)

An optional configuration file that defines a terminal device or devices connected to a line whenever the line becomes active. A TDP can be used to define a terminal device that differs from the default terminal device type defined by the TIP that controls the line.

Terminal Device Interface (TDI)

The CDCNET device interface variant that interconnects terminals, workstations, and unit record devices with an Ethernet local area network.

Terminal Interface Program (TIP)

A program that provides an interface for terminals connected to a device interface supporting terminals. TIPs provide default line and terminal configurations. Optional terminal definition procedures (TDPs) and terminal user procedures (TUP) can be used to define terminals having attributes that differ from those provided by the TIP's defaults.

CDCNET software that resides in terminal device interfaces (TDIs) and enables terminals/workstations that employ specific terminal protocols (such as async, HASP, and IBM 3270) to communicate in CDCNET networks.

Terminal-to-Application (T-to-A)

A type of network processing that enables the exchange of data between applications programs that reside on host computers and user terminals or workstations. In this case, protocol conversions occur so that transmitted data is understood both at the host and at the terminal or workstation.

Terminal User Procedure (TUP)

An optional configuration file that defines attributes of terminals and connections. A TUP can be used to define attributes for a particular terminal model or a group of terminals. A TUP for a terminal is executed when the communication line from the terminal to the supporting device interface becomes active.

TIP

Refer to Terminal Interface Program.

TP0

See Transport Class 0.

Transceiver

A hardware device that is used to interconnect network devices.

Transceiver Interface Cable

A multiwire cable used to connect a transceiver to a network device.

Transmission Control Protocol/Internet Protocol (TCP/IP)

The name given to a suite of protocols that support the ARPANET community. TCP/IP protocol implementation is required within CDCNET for connectability to Defense Data Networks (MILNET or ARPANET) and to workstations that use TCP/IP.

Transmission Control Protocol (TCP)

A term used in DDN networks that refers to an end-to-end, connection-oriented protocol corresponding to the CDCNET Transport layer. This protocol is required for connection to MILNET, ARPANET, and TCP/IP workstations.

Transmission Media

Provides the physical channel used to interconnect device interfaces in a network.

Transparent Computing Environment (TCE)

A computing environment under development by Control Data containing four product elements: seamless interface, multivendor connectivity, cohesive software architecture, and integrated information management.

Transparent Mode

Transmission of binary data with the recognition of most control characters suppressed. When such a transmission occurs between a service and a terminal, the Network Access Method does not convert data to or from display code, and the terminal interface program (TIP) does not edit the character stream or convert the characters to or from 7-bit ASCII code. When no parity is in effect for the terminal and transparent mode transmission occurs, all eight bits of the character byte can be used to represent characters in 256-character sets (such as EBCDIC).

Transport Class 0 (TP0)

Protocol used in conjunction with connection mode network service (CONS) to support communications between multiple CYBER and/or foreign hosts over an X.25 public data network (PDN).

Tree

The relationship of network components to one another, the diagram of which is in the form of a tree and depicts branching from an original point.

Trunk

A logical definition of a line and the communications software that allows the line to carry data between communications controllers. These controllers could be device interfaces or devices for other networks. Trunks going to other networks, such as DECNET or SNA, are not recognized as network solutions.

Trunk Cable

Refer to Coaxial Cable.

TUP

Refer to Terminal User Procedure.

U

UDP

See User Datagram Protocol.

UL

Underwriters Laboratory

Unit Record Device

A peripheral device (for example, a line printer, card reader, or card punch) whose unit of input/output corresponds to a logical record on a host computer.

Unit Record Interface (URI)

A Line Interface Module (LIM)-type peripheral circuit board that interfaces with the LIM bus and is used with the Communications Interface Module (CIM). The URI provides an 8-bit parallel interface for the operation of character or line printer. The URI includes all necessary drivers, receivers, timing, and control circuitry to drive one printer at a time.

UNIX

An operating system first developed at Bell Laboratories in the late 1960s. Because UNIX is written in the higher-level programming language C and makes few assumptions about the architecture of the computer on which it runs, it is easily ported to different computer systems. UNIX is a trademark of AT&T Bell Laboratories.

URI

Refer to Unit Record Interface.

User Datagram Protocol (UDP)

A layer of TCP/IP interface software. UDP provides datagram-oriented services that are unreliable (connectionless), but low overhead, to upper layer protocols such as Domain Name resolver and server and NFS.

V

V.35

CCITT standard for the physical interface between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) operating above 20 K bps.

Variant

A CDCNET device interface configured to perform a particular network function.

Virtual Circuit

A connection between a source and a receiver in a network that may be realized by different circuit configurations during data transmission. Also called a logical circuit.

Virtual Terminal Protocol (VTP)

Control Data's terminal-to-application protocol enabling terminals/workstations to perform interactive processing on NOS or NOS/VE hosts.

VLSI

Very large scale integration.

Voice Grade Channel

A channel used for speech transmission usually with an audio frequency range of 300 through 3400 Hz.

VTP

Refer to Virtual Terminal Protocol.

W

Wideband Modem

A modem that operates over 9600 bps.

Workstations

Microcomputers that can both execute user applications software and enable end users to access host computers to perform batch processing, interactive processing, or distributed processing.

X

X.PC

An asynchronous data communications protocol that improves the networking capabilities of personal computers. It also allows users to have multiple active virtual circuits.

X.21

CCITT standard for the physical interface between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) used for synchronous operation in an X.25 packet-switching network.

X.25

The Consultative Committee of International Telephone and Telegraph (CCITT) standard for the interface between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) in an X.25 packet-switching network.

X.25 Asynchronous TIP

Also known as X.29 PAD, this is a CDCNET feature that allows asynchronous terminals to access CDCNET either by a Public Data Network (PDN) that supports the X.3 Packet Assembly/Dissassembly (PAD) facility or by the terminals operating in X.25 mode.

X.25 Gateway

A gateway used to transfer data from a host connected to CDCNET to a host in another network at the other end of the X.25 circuit. The X.25 gateway allows host-to-host (A-to-A) connections to take place over an X.25 circuit. A-to-A connections over X.25 circuits are provided by the Network Products applications.

X.25 Interactive Terminal Gateway

Also known as X.3 PAD gateway, a gateway that allows asynchronous terminal users connected to CDCNET to connect to foreign hosts via an X.25 link. Refer to X.3 PAD.

X.29 PAD

A CDCNET feature that allows asynchronous terminals to access CDCNET either by a Public Data Network (PDN) that supports the X.3 Packet Assembly/Dissassembly (PAD) facility or by the terminals operating in X.25 mode.

X.3 PAD

A gateway that allows asynchronous terminal users connected to CDCNET to connect to foreign hosts via an X.25 link. Terminals connected via the Async TIP, X.PC TIP, X.25 Async TIP, or Server Telnet gateway are able to use this gateway. The X.25 addressing needed to access a foreign host can be configured in the gateway or specified by the terminal user.

X.400 Mail System

An electronic mail system that conforms to the internationally-accepted standards described in the X.400-430 CCITT Draft Recommendations on Message Handling Systems. For example, Mail/VE is an X.400 mail system.

X.75

CCITT standard that defines a gateway interface for terminal and transit control signalling on international circuits used between packet-switched data networks. X.75 specifies procedures for connecting public X.25 packet networks through a gateway interface.

Xerox Network System (XNS)

Provides an efficient way of connecting devices to Ethernet LANs and internetworking through gateways.

XNS

Refer to Xerox Network System.

3

3270 Bisynchronous TIP

A terminal interface program that provides support for the IBM 3270 Information Display System. The 3270 Bisynchronous TIP allows 3271, 3274, 3275, and 3276 control units to connect directly to CDCNET in order to communicate with a CDCNET terminal device interface (TDI) over dedicated or dial-up lines using the centralized multipoint Binary Synchronous Communication protocol. The 3270 TIP Bisynchronous supports up to 32 multi-dropped clusters of up to 32 devices on each line.

CDCNET Product/Equipment Cross-Reference

B

Table B-1 lists the external product numbers, internal equipment numbers, and descriptions for hardware products currently available for CDCNET configurations. Control Data part numbers for field-replaceable parts are listed in the Parts Data chapter of the CDCNET Hardware Installation and Troubleshooting manual.

Table B-1. CDCNET Product/Equipment Cross-Reference

Product Number	Equipment Number	Nomenclature
2601-4	GH121-A GH120-B	Device Interface (DI) cabinet, harvest gold, 50 Hz, 240 V ac (GH121-A) or 60 Hz, 120 V ac (GH120-B).
2601-5	GH121-B GH120-C	Device Interface (DI) cabinet, dark blue gray, 50 Hz, 240 V ac (GH121-B) or 60 Hz, 120 V ac (GH120-C).
2602-1	AC117-A	Main Processor Board (MPB-II).
2604-1	DY225-A	System Main Memory Board (SMM), 1024 K bytes.
2604-2	BS236-A	System Main Memory Board (SMM), 4 M bytes.
2605-1	DY232-A	Private Memory Module (PMM), 128 K bytes, and jumper cable.
2606-1	DY245-A	Main Processor Board (MPB).
2607-1	DY226-A	Mainframe Channel Interface Board (MCI), a pair of channel I/O cables, and an internal cable assembly.
2608-5	DY227-B	Ethernet Serial Channel Interface Board (ESCI) and cable assembly.
2608-114	YA329-E	802.3 Transceiver interface cable, CL2, 5 m (16.4 ft).
2608-131	YA329-F	802.3 Transceiver interface cable, CL2, 10 m (32.8 ft).
2608-163	YA329-G	802.3 Transceiver interface cable, CL2, 20 m (65.6 ft).
2608-98	YA329-H	802.3 Transceiver interface cable, CL2, 50 m (164 ft).
2608-216	YA328-A	802.3 Transceiver interface cable, CL2P, 5 m (16.4 ft).
2608-233	YA328-B	802.3 Transceiver interface cable, CL2P, 10 m (32.8 ft).
2608-265	YA328-C	802.3 Transceiver interface cable, CL2P, 20 m (65.6 ft).

(Continued)

Table B-1. **CDCNET Product/Equipment Cross-Reference** *(Continued)*

Product Number	Equipment Number	Nomenclature
2608-200	YA328-D	802.3 Transceiver interface cable, Teflon (recommended), 50 m (164 ft).
2609-1	DY228-A	Communications Interface Module (CIM) and cable assembly.
2610-1	DY230-B	2-Port RS-449 LIM.
2610-123	TN101-D	RS-449 LIM to modem (DCE), 37-pin male plug to user device, 7.6-m (25-ft) CL2 cable.
2610-148	TN101-E	RS-449 LIM to modem (DCE), 37-pin male plug to user device, 15-m (50-ft) CL2 cable.
2610-149	TN101-G	RS-449 LIM to modem (DCE), 37-pin male plug to user device, 15-m (50-ft) CL2P cable.
2610-188	TN101-F	RS-449 LIM to modem (DCE), 37-pin male plug to user device, 58-m (190-ft) CL2 cable.
2610-189	TN101-H	RS-449 LIM to modem (DCE), 37-pin male plug to user device, 58-m (190-ft) CL2P cable.
2610-523	TN102-D	RS-449 LIM to terminal (DTE), 37-pin female plug to user device, 7.6-m (25-ft) CL2 cable.
2610-548	TN102-E	RS-449 LIM to terminal (DTE), 37-pin female plug to user device, 15-m (50-ft) CL2 cable.
2610-549	TN102-G	RS-449 LIM to terminal (DTE), 37-pin female plug to user device, 15-m (50-ft) CL2P cable.
2610-588	TN102-F	RS-449 LIM to terminal (DTE), 37-pin female plug to user device, 58-m (190-ft) CL2 cable.
2610-589	TN102-H	RS-449 LIM to terminal (DTE), 37-pin female plug to user device, 58-m (190-ft) CL2P cable.
2611-1	DY234-A	4-Port X.24 LIM.
2611-123	TN107-D	X.24 LIM to modem (DCE), 15-pin male plug to user device, 7.6-m (25-ft) CL2 cable.
2611-148	TN107-E	X.24 LIM to modem (DCE), 15-pin male plug to user device, 15.2-m (50-ft) CL2 cable.
2611-149	TN107-G	X.24 LIM to modem (DCE), 15-pin male plug to user device, 15.2-m (50-ft) CL2P cable.
2611-188	TN107-F	X.24 LIM to modem (DCE), 15-pin male plug to user device, 58-m (190-ft) CL2 cable.

(Continued)

Table B-1. CDCNET Product/Equipment Cross-Reference *(Continued)*

Product Number	Equipment Number	Nomenclature
2611-189	TN107-H	X.24 LIM to modem (DCE), 15-pin male plug to user device, 58-m (190-ft) CL2P cable.
2612-1	DY229-B	4-Port RS-232-C/V.24 LIM.
2612-108	TN108-D	4-Port RS-232-C LIM to modem (DCE), 25-pin male plug to user device, 3-m (10-ft) CL2 cable.
2612-123	TN108-E	4-Port RS-232-C LIM to modem (DCE), 25-pin male plug to user device, 7.6-m (25-ft) CL2 cable.
2612-148	TN108-F	4-Port RS-232-C LIM to modem (DCE), 25-pin male plug to user device, 15-m (50-ft) CL2 cable.
2612-149	TN108-G	4-Port RS-232-C LIM to modem (DCE), 25-pin male plug to user device, 15-m (50-ft) CL2P cable.
2612-508	TN109-D	4-Port RS-232-C LIM to terminal (DTE), 25-pin female plug to user device, 3-m (10-ft) CL2 cable.
2612-523	TN109-E	4-Port RS-232-C LIM to terminal (DTE), 25-pin female plug to user device, 7.6-m (25-ft) CL2 cable.
2612-548	TN109-F	4-Port RS-232-C LIM to terminal (DTE), 25-pin female plug to user device, 15-m (50-ft) CL2 cable.
2612-549	TN109-G	4-Port RS-232-C LIM to terminal (DTE), 25-pin female plug to user device, 15-m (50-ft) CL2P cable.
2612-608	TN472-D	4-Port RS-232-C LIM to terminal (DTE) with flow control, 25-pin female plug to user device, 3-m (10-ft) CL2 cable.
2612-623	TN472-E	4-Port RS-232-C LIM to terminal (DTE) with flow control, 25-pin female plug to user device, 7.6-m (25-ft) CL2 cable.
2612-648	TN472-F	4-Port RS-232-C LIM to terminal (DTE) with flow control, 25-pin female plug to user device, 15-m (50-ft) CL2 cable.
2612-649	TN472-G	4-Port RS-232-C LIM to terminal (DTE) with flow control, 25-pin female plug to user device, 15-m (50-ft) CL2P cable.
2612-708	YA305-D	4-Port RS-232-C LIM to terminal (DTE) 25-pin male plug to user device, 3-m (10-ft) CL2 cable.
2612-723	YA305-E	4-Port RS-232-C LIM to terminal (DTE) 25-pin male plug to user device, 7.6-m (25-ft) CL2 cable.

(Continued)

Table B-1. CDCNET Product/Equipment Cross-Reference *(Continued)*

Product Number	Equipment Number	Nomenclature
2612-748	YA305-F	4-Port RS-232-C LIM to terminal (DTE) 25-pin male plug to user device, 15-m (50-ft) CL2 cable.
2612-749	YA305-G	4-Port RS-232-C LIM to terminal (DTE) 25-pin male plug to user device, 15-m (50-ft) CL2P cable.
2612-808	YA306-D	4-Port RS-232-C LIM to terminal (DTE) with flow control, 25-pin male plug to user device, 3-m (10-ft) CL2 cable.
2612-823	YA306-E	4-Port RS-232-C LIM to terminal (DTE) with flow control, 25-pin male plug to user device, 7.6-m (25-ft) CL2 cable.
2612-848	YA306-F	4-Port RS-232-C LIM to terminal (DTE) with flow control, 25-pin male plug to user device, 15-m (50-ft) CL2 cable.
2612-849	YA306-G	4-Port RS-232-C LIM to terminal (DTE) with flow control, 25-pin male plug to user device, 15-m (50-ft) CL2P cable.
2613-1	DY246-A	2-Port Unit Record Interface (URI) LIM.
2613-123	TN484-C	URI to Centronics, 36-pin male plug, 7.6-m (25-ft) CL2 cable.
2613-148	TN484-D	URI to Centronics, 36-pin male plug, 15.2-m (50-ft) CL2 cable.
2613-223	TN485-D	URI to Data Products, 50-pin male plug, 7.6-m (25-ft) CL2 cable.
2613-248	TN485-E	URI to Data Products, 50-pin male plug, 15.2-m (50-ft) CL2 cable.
2613-249	TN485-G	URI to Data Products, 50-pin male plug, 15.2-m (50-ft) CL2P cable.
2613-297	TN485-F	URI to Data Products, 50-pin male plug, 30.4-m (100-ft) CL2 cable.
2613-298	TN485-H	URI to Data Products, 50-pin male plug, 30.4-m (100-ft) CL2P cable.
2613-301	TN486-B	Winchester adapter CL2 cable, 0.91 m (3 ft).
2617-1	DY261-A	2-Port V.35 LIM.
2617-108	TN490-D	V.35 LIM to modem (DCE), 34-pin male plug to user device, 3-m (10-ft) CL2 cable. Plug has 0.060-in diameter pins and single lead, jackscrew connector locking mechanism.

(Continued)

Table B-1. CDCNET Product/Equipment Cross-Reference *(Continued)*

Product Number	Equipment Number	Nomenclature
2617-123	TN490-E	V.35 LIM to modem (DCE), 34-pin male plug to user device, 7.6-m (25-ft) CL2 cable. Plug has 0.060-in diameter pins and single lead, jackscrew connector locking mechanism.
2617-148	TN490-F	V.35 LIM to modem (DCE), 34-pin male plug to user device, 15-m (50-ft) CL2 cable. Plug has 0.060-in diameter pins and single lead, jackscrew connector locking mechanism.
2617-149	TN490-G	V.35 LIM to modem (DCE), 34-pin male plug to user device, 15-m (50-ft) CL2P cable. Plug has 0.060-in diameter pins and single lead, jackscrew connector locking mechanism.
2617-208	YA327-D	V.35 LIM to modem (DCE), 34-pin male plug to user devices, 3-m (10-ft) CL2 cable. Plug has 0.040-in diameter pins and spring clip with guide pin connector locking mechanism.
2617-223	YA327-E	V.35 LIM to modem (DCE), 34-pin male plug to user devices, 7.6-m (25-ft) CL2 cable. Plug has 0.040-in diameter pins and spring clip with guide pin connector locking mechanism.
2617-248	YA327-F	V.35 LIM to modem (DCE), 34-pin male plug to user devices, 15-m (50-ft) CL2 cable. Plug has 0.040-in diameter pins and spring clip with guide pin connector locking mechanism.
2617-249	YA327-G	V.35 LIM to modem (DCE), 34-pin male plug to user devices, 15-m (50-ft) CL2P cable. Plug has 0.040-in diameter pins and spring clip with guide pin connector locking mechanism.
2617-508	YA326-D	V.35 LIM to terminal (DTE), 34-pin female plug to user devices, 3-m (10-ft) CL2 cable. Plug is for 0.060-in diameter pins.
2617-523	YA326-E	V.35 LIM to terminal (DTE), 34-pin female plug to user devices, 7.6-m (25-ft) CL2 cable. Plug is for 0.060-in diameter pins.
2617-548	YA326-F	V.35 LIM to terminal (DTE), 34-pin female plug to user devices, 15-m (50-ft) CL2 cable. Plug is for 0.060-in diameter pins.

(Continued)

Table B-1. CDCNET Product/Equipment Cross-Reference *(Continued)*

Product Number	Equipment Number	Nomenclature
2617-549	YA326-G	V.35 LIM to terminal (DTE), 34-pin female plug to user devices, 15-m (50-ft) CL2P cable. Plug is for 0.060-in diameter pins.
2618-1	DY267-A	8-Port RS-232 Asynchronous LIM.
2618-11	YA324-A	8-Port RS-232 Asynchronous LIM cable adapter for modems (DCE) that require a 25-pin male connector, and use DCE flow control and DCD disconnect.
2618-21	YA324-B	8-Port RS-232 Asynchronous LIM cable adapter for modems (DCE) that require a 25-pin male connector, and use DCE flow control and DSR disconnect.
2618-31	YA324-C	8-Port RS-232 Asynchronous LIM cable adapter for modems (DCE) that require a 25-pin male connector, and use both DCD and DSR disconnect.
2618-50	YA324-D	8-Port RS-232 Asynchronous LIM cable adapter for terminals that use hardware or software flow control and require a 25-pin female cable connector.
2618-51	YA324-E	8-Port RS-232 Asynchronous LIM cable adapter for terminals (DTE) that use hardware or software flow control and require a 25-pin male cable connector.
2618-112	YA333-J	8-Port RS-232 Asynchronous LIM cable (unshielded CL2), 4.2 m (14 ft).
2618-123	YA333-K	8-Port RS-232 Asynchronous LIM cable (unshielded CL2), 7.6 m (25 ft).
2618-148	YA333-L	8-Port RS-232 Asynchronous LIM cable (unshielded CL2), 15.2 m (50 ft).
2618-149	YA333-T	8-Port RS-232 Asynchronous LIM cable (unshielded CL2P), 15.2 m (50 ft).
2618-198	YA333-M	8-Port RS-232 Asynchronous LIM cable (unshielded CL2), 60.8 m (200 ft).
2618-199	YA333-U	8-Port RS-232 Asynchronous LIM cable (unshielded CL2P), 60.8 m (200 ft).
2618-212	YA333-N	8-Port RS-232 Asynchronous LIM cable (shielded CL2), 4.2 m (14 ft).
2618-223	YA333-P	8-Port RS-232 Asynchronous LIM cable (shielded CL2), 7.6 m (25 ft).

(Continued)

Table B-1. CDCNET Product/Equipment Cross-Reference *(Continued)*

Product Number	Equipment Number	Nomenclature
2618-248	YA333-R	8-Port RS-232 Asynchronous LIM cable (shielded CL2), 15.2 m (50 ft).
2618-249	YA333-V	8-Port RS-232 Asynchronous LIM cable (shielded CL2P), 15.2 m (50 ft).
2618-398	YA333-S	8-Port RS-232 Asynchronous LIM cable (shielded CL2), 60.8 m (200 ft).
2618-399	YA333-W	8-Port RS-232 Asynchronous LIM cable (shielded CL2P), 60.8 m (200 ft).
2629-2	GK431-A	Integrated Communications Adapter (ICA).
2630-3	TN111-B	IEEE 802.3 transceiver.
2630-4	YA331-A	IEEE 802.3 transceiver tap block.
2631-2	TN112-C	IEEE 802.3 multiplexer, 120/240 V ac, 50/60 Hz.
2632-1	TN114-B	IEEE 802.3 repeater, 120/240 V ac, 50/60 Hz.
2633-1	YA302-A	IEEE coaxial cable splice kit.
2633-2	YA301-A	IEEE coaxial cable terminator kit.
2634-23	YA304-A	IEEE 802.3 (Ethernet) coaxial cable, CL2P, 23.4 m (76.8 ft) with terminators.
2634-70	YA304-B	IEEE 802.3 (Ethernet) coaxial cable, CL2P, 70.2 m (230.3 ft) with terminators.

(Continued)

Table B-1. CDCNET Product/Equipment Cross-Reference *(Continued)*

Product Number	Equipment Number	Nomenclature
2634-117	YA304-C	IEEE 802.3 (Ethernet) coaxial cable, CL2P, 117 m (383.8 ft) with terminators.
2634-500	YA304-D	IEEE 802.3 (Ethernet) coaxial cable, CL2P, 500 m (1640.5 ft) with terminators.
2635-21	YA303-E	IEEE 802.3 (Ethernet) coaxial cable, CL2, 23.4 m (76.8 ft) with terminators.
2635-68	YA303-F	IEEE 802.3 (Ethernet) coaxial cable, CL2, 70.2 m (230.3 ft) with terminators.
2635-115	YA303-G	IEEE 802.3 (Ethernet) coaxial cable, CL2, 117 m (383.8 ft) with terminators.
2635-498	YA303-H	IEEE 802.3 (Ethernet) coaxial cable, CL2, 500 m (1640.5 ft) with terminators.
2650-1	GH486-A	Three-DI Cabinet, 120 V ac, 60 Hz.
2650-2	GH486-B	Three-DI Cabinet, 240 V ac, 50 Hz.
2651-1	GH487-A	DI Enclosure Table.
2652-1	TN113-B	Maintenance Console Option.
2653-2	YA332-A	CDCNET Maintenance Kit.

PTT Approval Data C

This appendix contains the PTT approval data for the RS-232-C/V.24 LIM (2612-1), the V.35 LIM (2617-1), and the RS-449 LIM (2610-1).

PTT Approval Data for the RS-232-C/V.24 LIM (2612-1)

The 4-Port RS-232-C LIM complies with the EIA Electrical Interface Standard RS-232-C and with the CCITT Electrical Interface Standard V.24. The following general information applies to this LIM.

Data Channel Signaling Rate: 0 through 128000 bits/second (software configurable).

Backward Channel Signaling Rate: Not supported.

Modem Types Supported: Bell 103X/113X, 212A, 201C-LID or equivalents. Avanti 2200 LADD for 56000 bits/second operation.

Type of Line: Private line or switched line.

Transmission Modes: Full-duplex asynchronous or full-duplex synchronous.

Received Data is ignored when Carrier is off.

Grounding

Protective Earth (Protective Ground [101]) is not directly connected to Common Return (Signal Ground [102]) at the LIM/cable line of demarcation. Protective Ground (Earth Ground) is directly connected to DC Common (Signal Ground) in the DI power distribution scheme. When using a Control Data Standard Product RS-232 cable (2612-1xx/2612-5xx/2612-6xx), the cable shield is electrically connected to Protective Ground via the DI/LIM retainer plate, and to circuit 101 (Pin 1) at the RS-232 LIM connector. This connects Protective Ground (101) to Signal Ground (at the LIM/Cable line of demarcation) via a 100-ohm resistor.

Figure C-1 depicts this grounding scheme. The figure shows only one of the four ports.

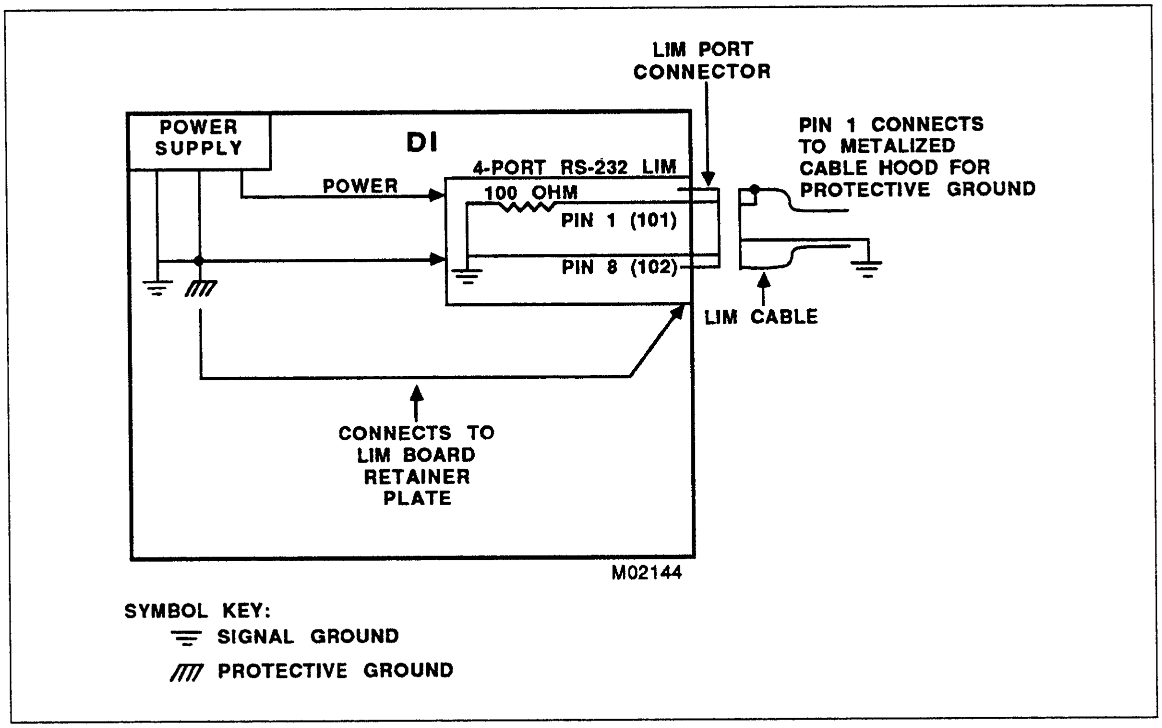


Figure C-1. 4-Port RS-232-C LIM Grounding Scheme

Timing of Interchange Circuits (RS-232-C)

Figures C-2 and C-3 show actual interchange circuit timing using a Bell 212A auto-answer modem. Table C-1 lists the modem options selected for the test.

A: DSR ON to RTS ON ≤0 s. DTR and RTS enter the ON state simultaneously, regardless of DSR state (see flow diagram, figure C-3).

B: RTS OFF to DTR OFF = 0 s. DTR and RTS negated (OFF) simultaneously (see flow diagram, figure C-3).

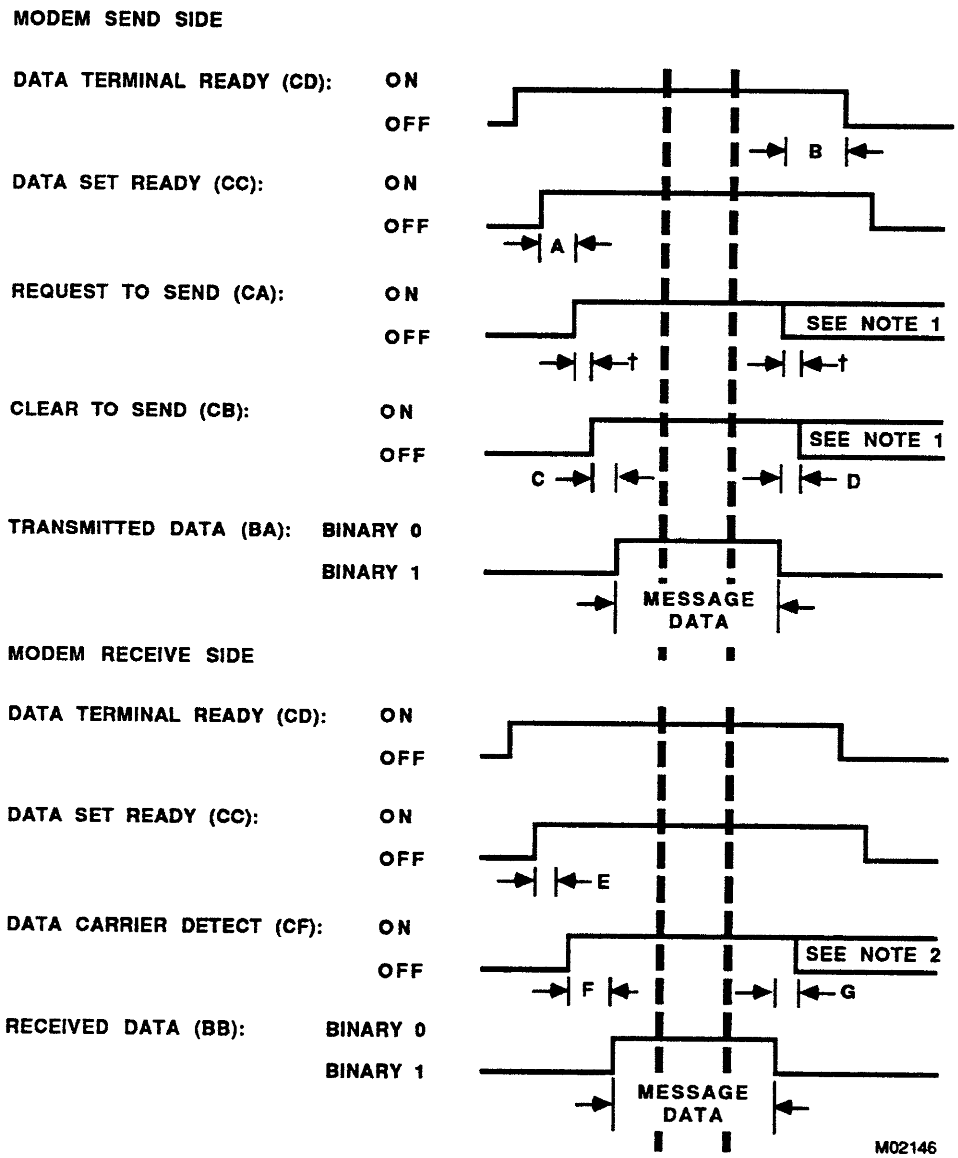
C: CTS ON to start of data transmission (BA space) ≥ 400 ms.

E: DSR ON to DCD ON = Modem-dependent (not a critical parameter; DCD is ignored unless DSR is also active.)

F: DCD ON to start of received data active (BB space) ≥ 0 s. Modem/user-dependent; a function of when the remote user begins transmitting data.

G: End of received data active (BB mark) to DCD OFF ≥ 0 s.

Figure C-2 depicts typical timing and interchange circuit relationships of the RS-232-C LIM (2612-1) as required by the Australian Post Office, Engineering Works Division.



NOTES:

† RTS/CTS DELAY IS MODEM-DEPENDENT; USUALLY USER SELECTABLE; NOT A CRITICAL PARAMETER.

1 WITH FULL DUPLEX CONNECTIONS, RTS/CTS WILL NOT ENTER THE OFF STATE UNLESS THE LIM PORT IS TAKEN OFF LINE, OR A RESET, OR A LOSS OF DCD/DSR OCCURS. THE LIM OPERATES IN FULL DUPLEX MODE ONLY.

2 TIME G IS A FUNCTION OF THE USER DISCONNECT TIME AT A REMOTE DCD, AND DEPENDENT ON THE LOCAL/REMOTE MODEM TYPE AND DESIGN. DATA IS IGNORED IF DCD IS OFF.

Figure C-2. Australian Post Office Timing Example (RS-232-C)

Figure C-3 depicts the software flow of the interchange circuit's Constant Carrier Input/Output.

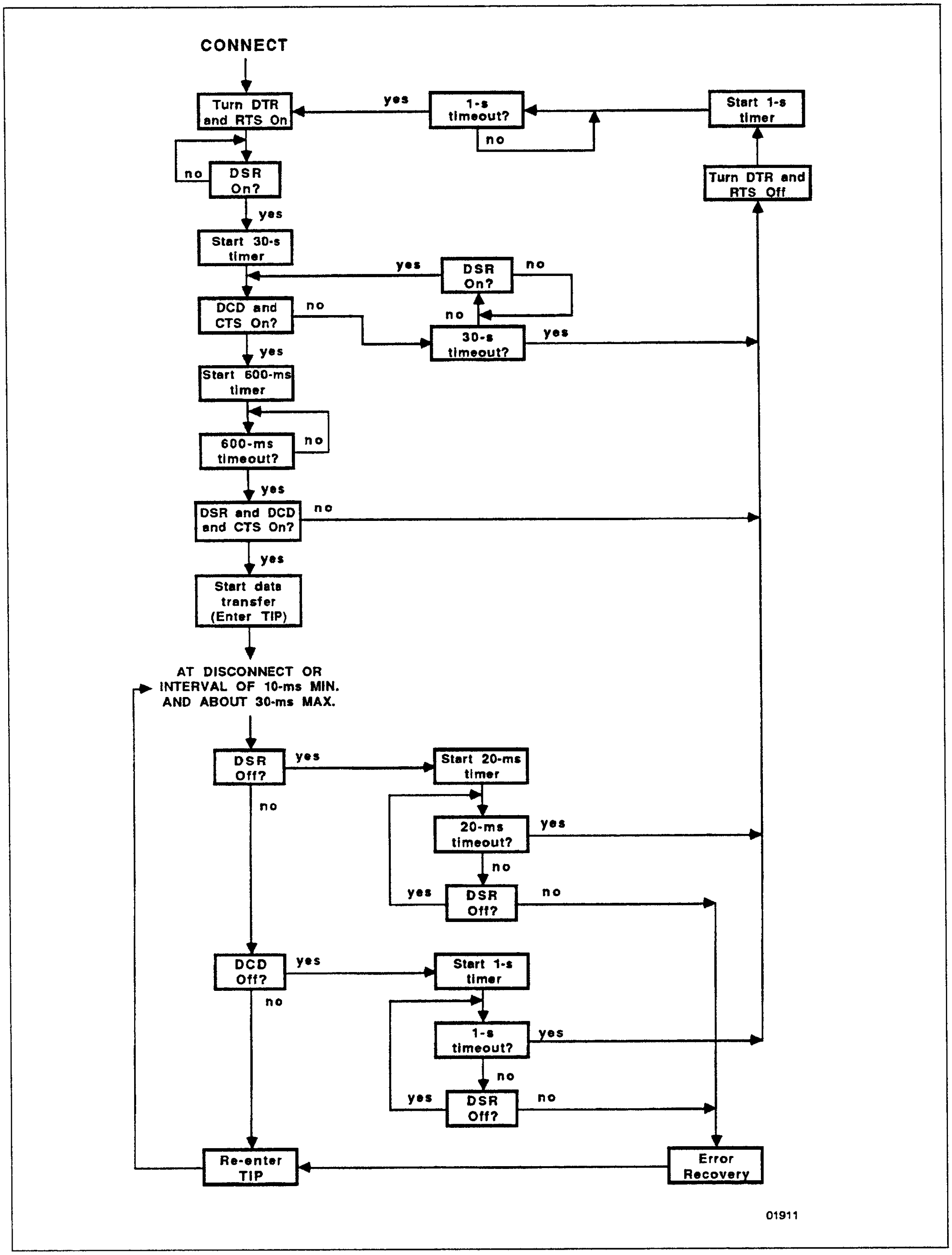


Figure C-3. Software Timing Flow of RS-232-C Interchange Circuits

Table C-1. Data Set 212A Customer Options

Feature	Choice	X	Description
CC Indication for Analog Loop	On		CC circuit on during AL test
	Off	X	CC circuit off during AL test
Speed Control	Interface		CH circuit controls speed
	HS Button	X	HS button controls speed
Interface Controlled Make Busy/Analog Loop	In		AL/Make Busy controlled by CN circuit or AL button
	Out	X	AL/Make Busy controlled only by AL button; CN internally held off
Transmitter Timing	Internal	X	1200 bps transmitter driven by internal clock
	External		1200 bps transmitter driven by DA circuit
	Slave		1200 bps transmitter driven by receive clock (DD)
1200 BPS Operation	Asynchronous/ Start-Stop	X	Character-oriented operation in the high-speed mode
	Synchronous		Bit-synchronous operation in the high-speed mode
Character Length	9 Bit		Character format is 9 bit for 1200 bps asynchronous/start-stop operation
	10 Bit	X	Character format is 10 bit for 1200 bps asynchronous/start-stop operation
Receiver Responds to Digital Loop	In	X	Digital loop can be remotely activated in the high-speed mode
	Out		No response to remote request for a digital loop
Interface Controlled Remote Digital Loop	In		RL circuit enabled to activate remote digital loop
	Out	X	RL Circuit not connected to interface

(Continued)

Table C-1. Data Set 212A Customer Options *(Continued)*

Feature	Choice	X	Description
Loss of Carrier Disconnect	In	X	Call is dropped if loss of carrier occurs
	Out		Loss of carrier does not drop call
Receive Space Disconnect	In	X	Call is dropped if steady space is received
	Out		Space signal has no effect on data set
CB and CF Indications	Common	X	CB circuit is turned off whenever CF circuit goes off
	Separate		CB Circuit is not affected by CF circuit
Send Space Disconnect	In	X	Steady space transmitted before disconnecting
	Out		No space transmitted before disconnecting
Automatic Answer	In	X	Unattended answer if CD circuit is on
	Out		No response to ringing indication
Answer Mode Indication-CE	On		Circuit CE remains on after call is answered
	Off	X	Circuit CE turns off after call is answered
Speed Mode	High		Data can cross interface only in the high-speed mode
	Dual	X	Data can cross interface in both speed modes
Interface Speed Indication	In		Circuit CI indicates speed mode
	Out	X	Circuit CI disconnected from interface
CN and TM Assignments	CN25, TM NC	X	CN on pin 25, TM not connected
	CN18, TM NC		CN on pin 18, TM not connected
	CN18, TM25	X	CN on pin 18, TM on pin 25
Signal Ground to Frame Ground Connection	In	X	Protective Ground and Signal Ground tied together
	Out		No connection between Protective Ground and Signal Ground

Power Supply Overvoltage Protection

Power Supply Specifications:	+12 V dc Maximum Voltage = +15.75 V dc +12 V dc Range = +13.2 to +15.75 V dc Typical Maximum = +13.46 V dc
	-12.V dc Minimum Voltage = -15.75 V dc -12 V dc Range = -13.2 to -15.75 V dc Typical Minimum = -14.94 V dc

NOTE

The DI Power Supply has been VDE Certified.

Table C-2 specifies the voltage levels (typical) measured at the 25-pin connector of the RS-232-C LIM.

Table C-2. RS-232-C Interchange Circuit Voltage Levels

25-Pin Connector	Circuit Name	EIA	CITT	Voltage Levels (Typical)	Additional Information
Pin 1	Protective Ground	AA	101	From GND	100 ohms to circuit 102
Pin 2	Transmitted Data	BA	103	±12 V	
Pin 3	Received Data	BB	104	±12 V	
Pin 4	Request to Send	CA	105	±12 V	Flow Control
Pin 5	Clear to Send	CB	106	±12 V	Flow Control
Pin 6	Data Set Ready	CC	107	±12 V	
Pin 7	Signal Ground	AB	102	GND	
Pin 8	Data Carrier Detect	CF	109	±12 V	
Pins 9-14					Not supported (no connection) by the LIM
Pin 15	Tx Timing-DCE Source	DB	114	±12 V	Selectable
Pin 16					No Connection
Pin 17	Rx Timing-DCE Source	DD	115	±12 V	Selectable
Pins 18-23					Not supported (no connection) by the LIM
Pin 20	Data Terminal Ready	CD	108.2	±12 V	
Pin 24	Tx Timing-DTE Source	DA	113	±12 V	Selectable
Pin 25	No Connection at This Time				Modem Option-CN

Absolute Voltage Threshold Generator/Receiver Limits

Receiver Type	Manu-facturer	Threshold Min/Max	Driver Type	Manufacturer	Tolerance Max Out
75154	TI	+3 V/+25 V -3 V/-25 V	1488	Motorola	+13.75 V -13.75 V

The maximum driver output voltages are based on the ±12 V dc power supply overvoltage limits and maximum tolerable chip output levels (levels of a terminated output). The driver output minimum voltages are +7.0 V dc and -7.0 V dc.

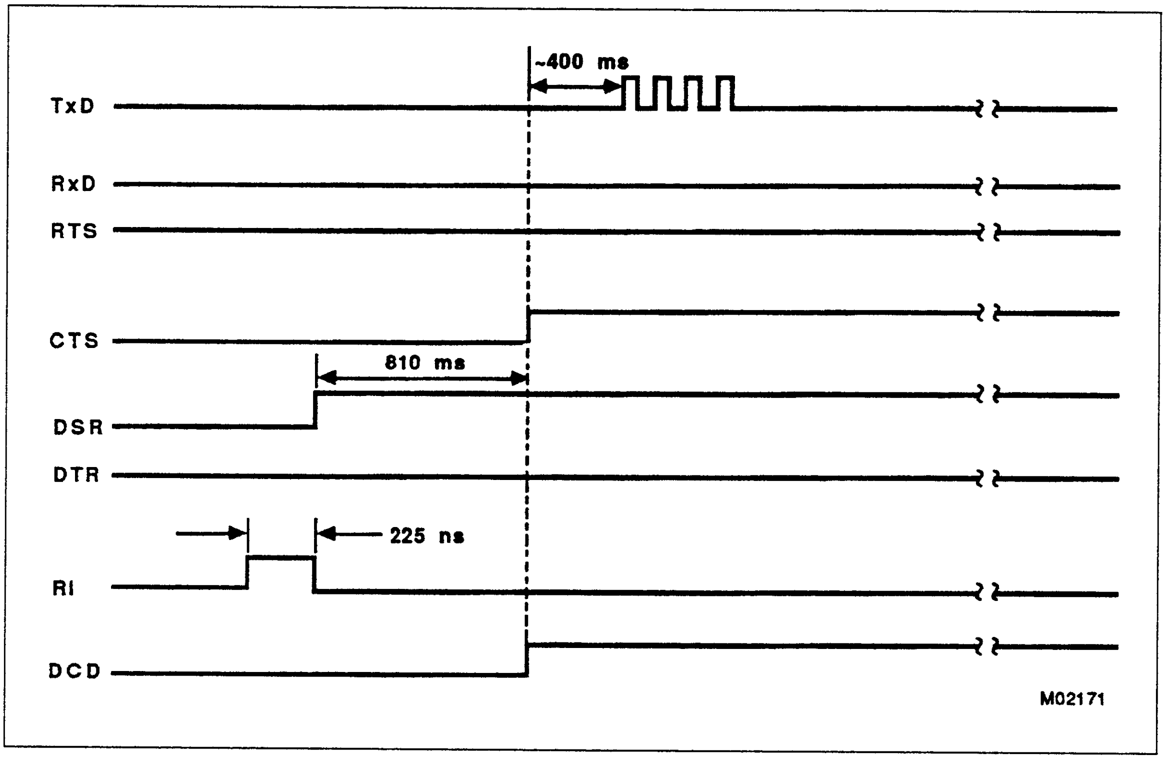


Figure C-4. Dial-In Sequence to an RS-232-C/V.24 LIM Via a 212A Modem

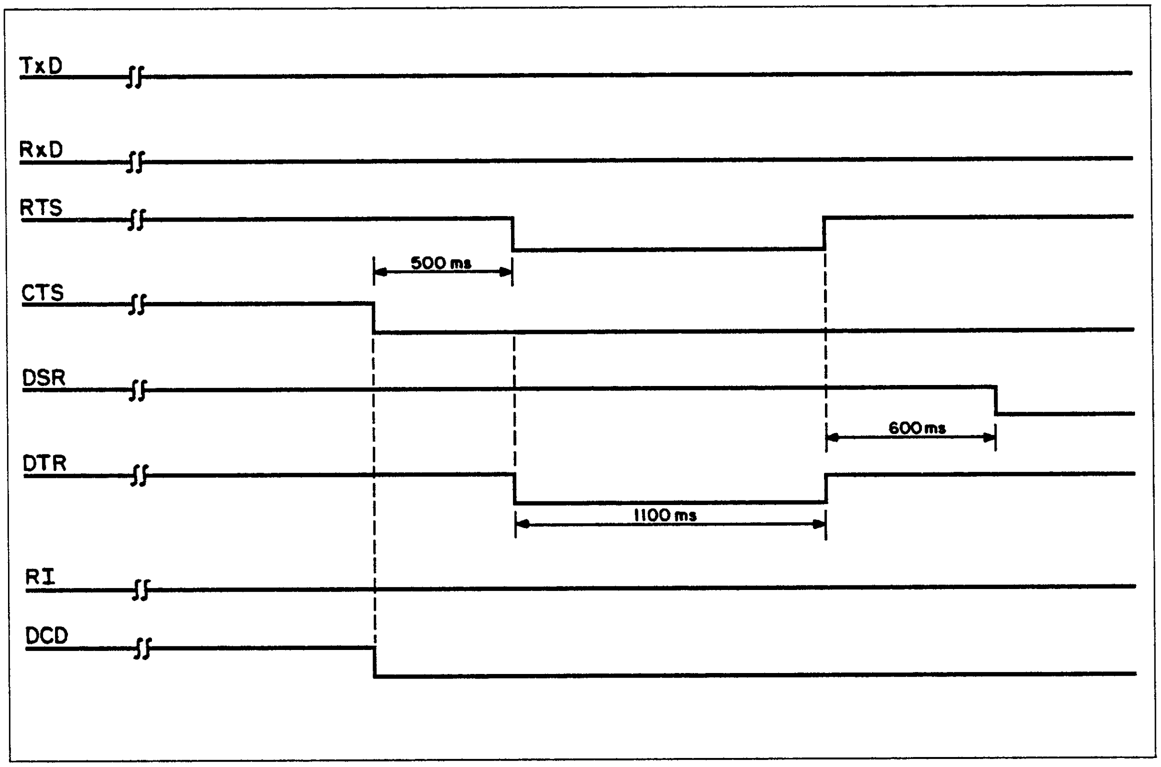


Figure C-5. Disconnect Sequence

Maximum Cable Length

See figure C-6 for RS-232-C/V.24 maximum cable lengths. Control Data standard product cables are available in 10-, 25-, and 50-ft lengths at 33 picofarads/ft. Refer to appendix B for product and equipment numbers of these cables.

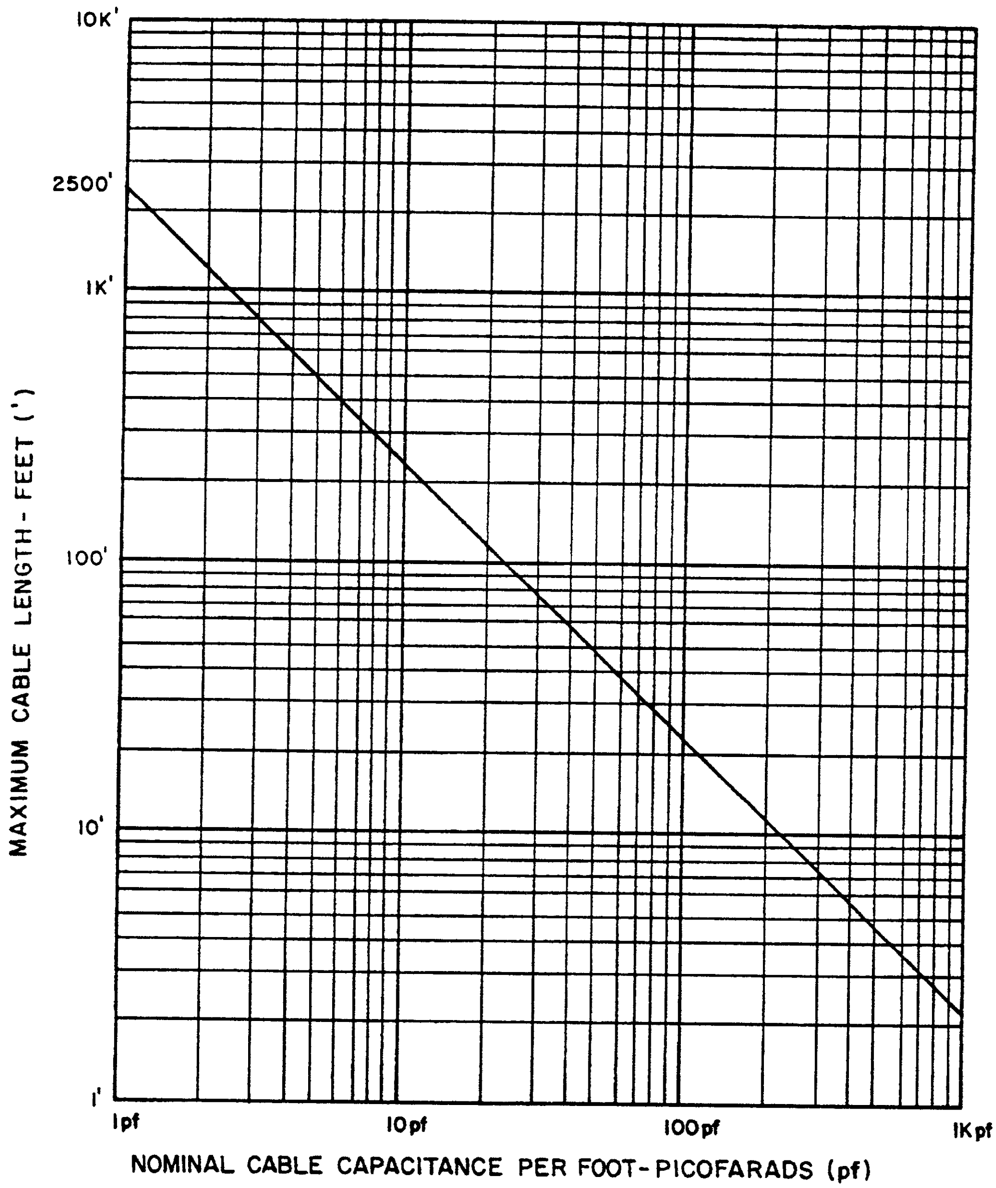


Figure C-6. RS-232-C/V.24 Maximum Cable Length

PTT Approval Data for the V.35 LIM (2617-1)

The V.35 LIM complies with the CCITT Electrical Interface Standard V.35 (Recommendation V.35, 1976).

Data Channel Signaling Rate: 0 through 128000 Bits/second (software-configurable).

Backward Channel Signaling Rate: Not supported.

Modem Types supported: Gandalf LDS-260 or equivalent.

Type of Line: Private line/leased line (per V.35); Switched line (V.35 LIM supports the optional DTR signal [108/2]).

Transmission Modes: Full-duplex asynchronous or full-duplex synchronous.

Received Data is ignored when Carrier (109) is off.

Grounding

Protective Earth (Protective Ground [101]) is not directly connected to Common Return (Signal Ground [102]) at the LIM/cable line of demarcation. Protective Ground (Earth Ground) is directly connected to DC Common (Signal Ground) in the DI power distribution scheme. When using a Control Data Standard Product V.35 cable (2617-1xx/2617-5xx/2617-2xx), the cable shield is electrically connected to Protective Ground via the DI/LIM retainer plate, and to circuit 101 (Pin 1) at the V.35 LIM connector. This connects Protective Ground (101) to Signal Ground (at the LIM/Cable line of demarcation) via a 100-ohm resistor.

Figure C-7 depicts this grounding scheme. The figure shows only one of the two ports.

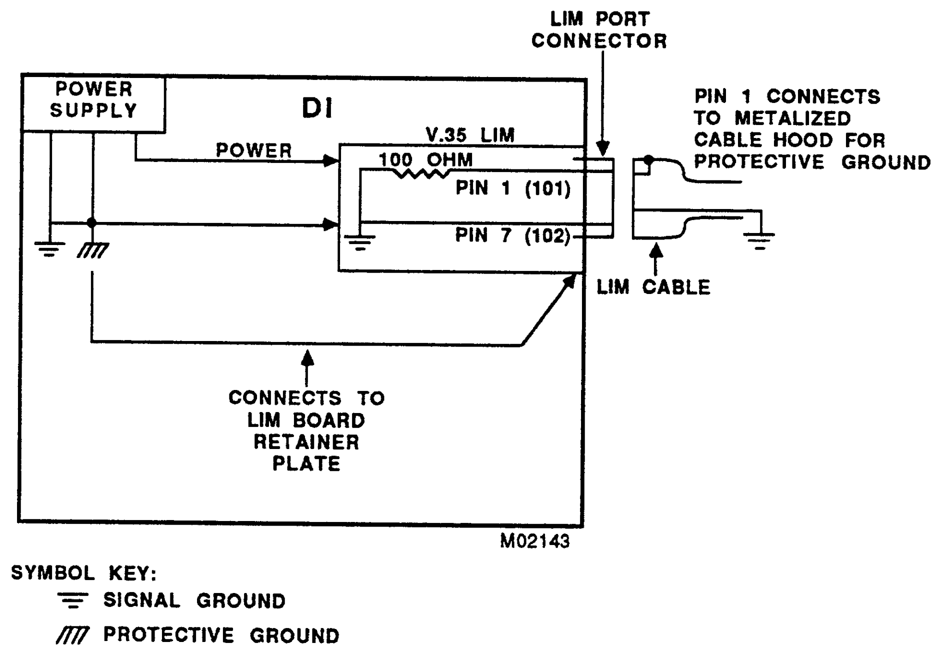


Figure C-7. V.35 LIM Grounding Scheme

Timing of Interchange Circuits

Figures C-8 and C-9 show actual interchange circuit timing using a Bell 212A auto-answer modem.

A: DSR ON to RTS ON ≤ 0 s. DTR and RTS enter the ON state simultaneously as shown in the flow diagram (figure C-9) regardless of DSR state.

B: RTS OFF to DTR OFF = 0 s. DTR and RTS negated (OFF) simultaneously as shown in the flow diagram (figure C-9).

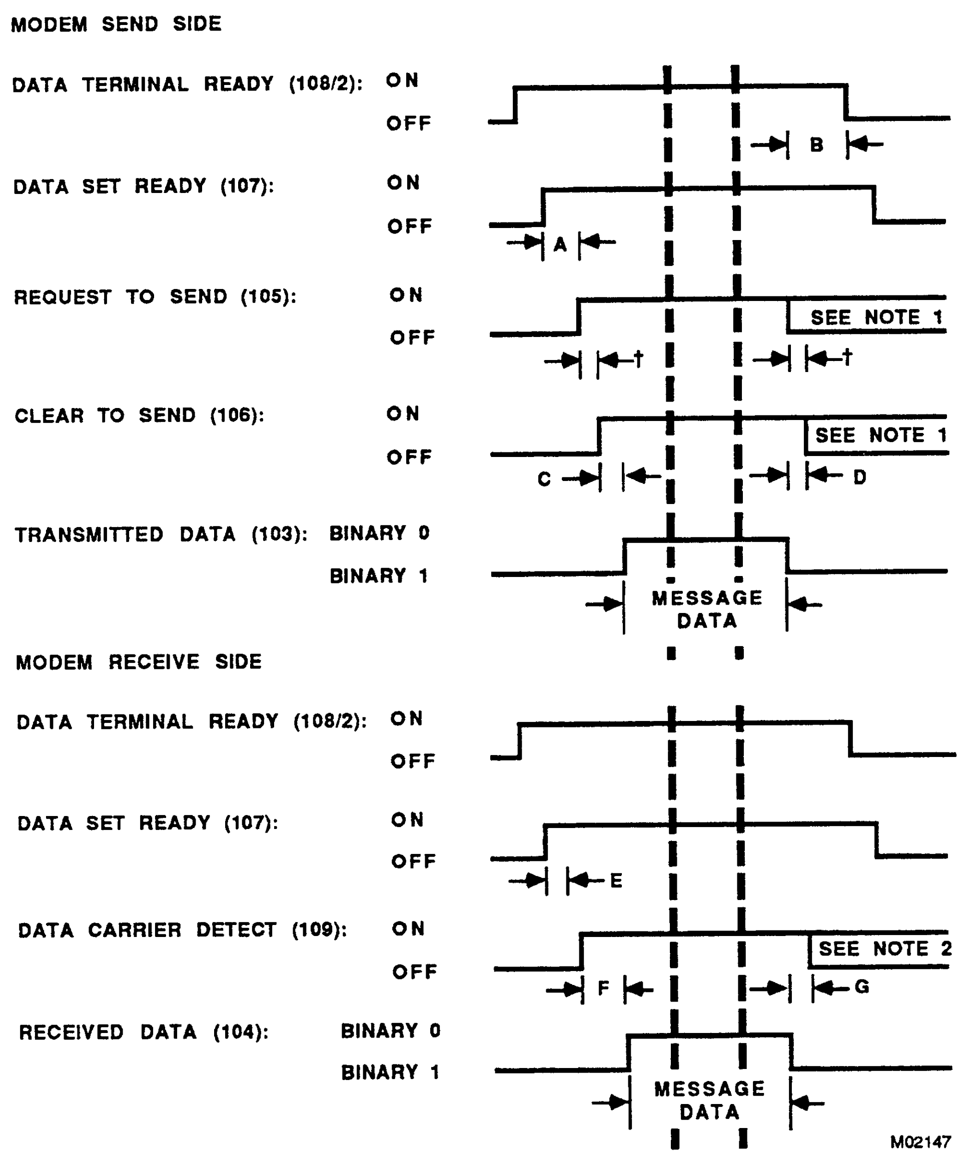
C: CTS ON to start of data transmission (103 space) ≥ 400 ms.

E: DSR ON to DCD ON = Modem-dependent (Not a critical parameter; DCD is ignored unless DSR is also active.)

F: DCD ON to start of received data active (104 space) ≥ 0 s. Modem/user-dependent; a function of when the remote user begins transmitting data. (Not a critical parameter for proper V.35 LIM operation.)

G: End of received data active (104 mark) to DCD OFF ≥ 0 s.

Figure C-8 depicts typical timing and interchange circuit relationships of the V.35 LIM (2617-1) as required by the Australian Post Office, Engineering Works Division.



NOTES:

† RTS/CTS DELAY IS MODEM-DEPENDENT; USUALLY USER SELECTABLE; NOT A CRITICAL PARAMETER.

1 WITH FULL DUPLEX CONNECTIONS, RTS/CTS WILL NOT ENTER THE OFF STATE UNLESS THE LIM PORT IS TAKEN OFF LINE, OR A RESET, OR A LOSS OF DCD/DSR OCCURS. THE LIM OPERATES IN FULL DUPLEX MODE ONLY.

2 TIME G IS A FUNCTION OF THE USER DISCONNECT TIME AT A REMOTE DCD, AND DEPENDENT ON THE LOCAL/REMOTE MODEM TYPE AND DESIGN. DATA IS IGNORED IF DCD IS OFF.

Figure C-8. Australian Post Office Timing Example (V.35)

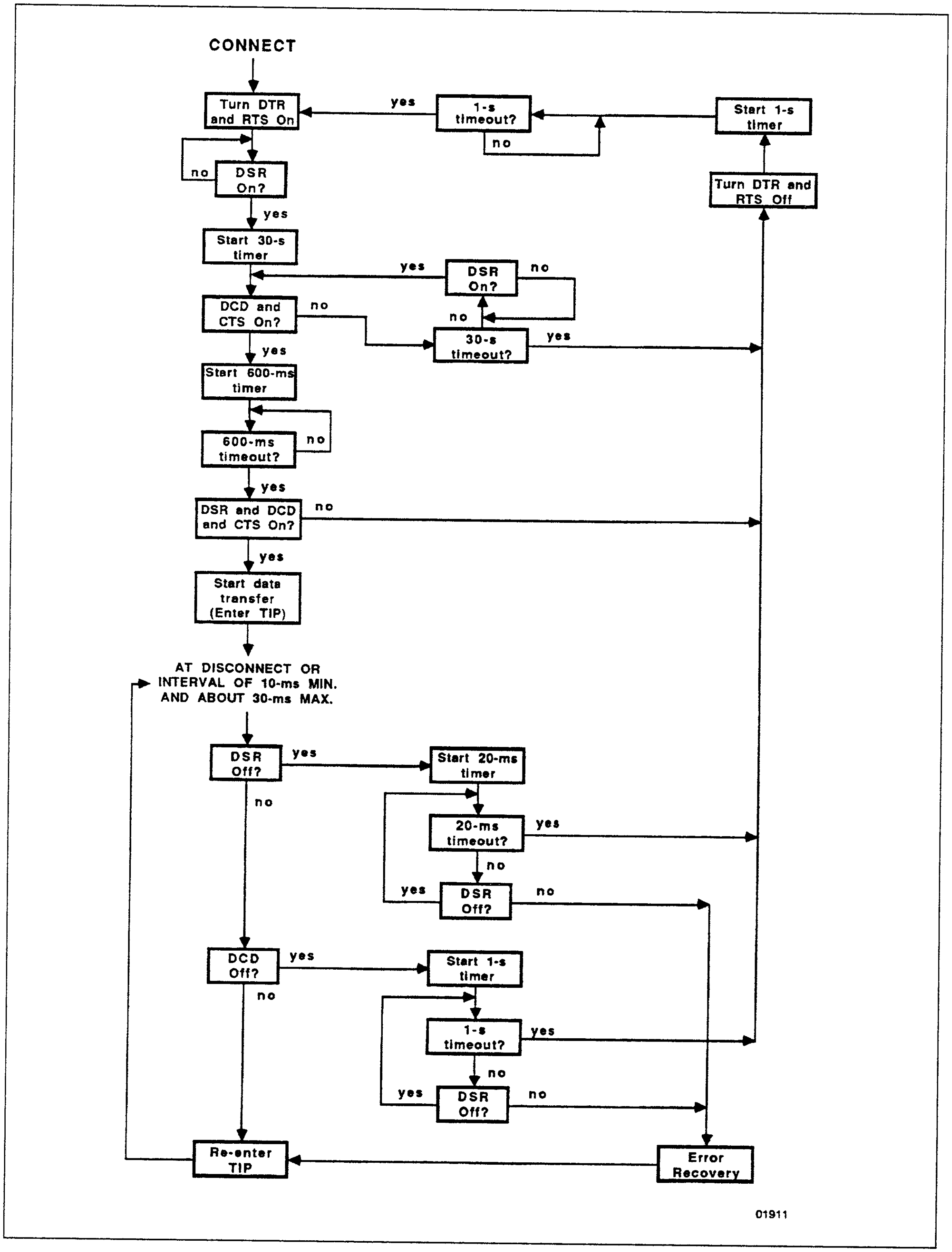


Figure C-9. Software Timing Flow of V.35 Interchange Circuits

Power Supply Overvoltage Protection

Power Supply Specifications:	+5 V dc Maximum Voltage = +7.00 V dc +6.25 ±0.75 V dc Typical Maximum = +6.11 V dc
	-5 V dc Minimum Voltage = -7.00 V dc -6.25 ±0.75 V dc Typical Minimum = -6.55 V dc
	+12 V dc Maximum Voltage = +15.75 V dc +12 V dc Range = +13.2 to +15.75 V dc Typical Maximum = +13.46 V dc
	-12 V dc Minimum Voltage = -15.75 V dc -12 V dc Range = -13.2 to -15.75 V dc Typical Minimum = -14.94 V dc

NOTE

The DI Power Supply has been VDE Certified.

Table C-3 specifies voltage levels (typical) measured at the 25-pin connector of the V.35 LIM; figure C-10 depicts these levels. The waveforms shown in figure C-10 apply to Clock and Data signals only.

Table C-3. V.35 Interchange Circuit Voltage Levels

25-Pin Connector on LIM	Circuit Name	ISO 2593-1973 (E) Pin	CCITT No.	Voltage Levels (Typical)	Additional Information
Pin 1	Protective Ground	A	101	Shield	100 ohms to circuit 102
Pin 2	Transmitted Data A-wire	P	103	V.35	See figure C-10
Pin 3	Received Data A-wire	R	104	V.35	
Pin 4	Request to Send	C	105	±12 V dc	V.28 levels
Pin 5	Ready for Sending	D	106	±12 V dc	V.28 levels
Pin 6	Data Set Ready	E	107	±12 V dc	V.28 levels
Pin 7	Signal Ground	B	102	SG	100 ohms to circuit 101
Pin 8	Rec. Line Sig. Det.	F	109	±12 V dc	V.28 levels
Pins 9-11					No connection

(Continued)

Table C-3. V.35 Interchange Circuit Voltage Levels *(Continued)*

25-Pin Connector on LIM	Circuit Name	ISO 2593-1973 (E) Pin	CCITT No.	Voltage Levels (Typical)	Additional Information
Pin 12	Transmit Timing B-wire	AA	114	V.35	DCE Source
Pin 13	Receive Timing B-wire	X	115	V.35	
Pin 14	Transmitted Data B-wire	S	103	V.35	
Pin 15	Transmit Timing A-wire	Y	114	V.35	DCE Source
Pin 16	Received Data B-wire	T	104	V.35	
Pin 17	Receive Timing A-wire	V	115	V.35	
Pin 18					No connection
Pin 19	Tx Timing from LIM (B)	W	113	V.35	DTE Source
Pin 20	Data Terminal Ready	H	108/2	±12 V dc	V.28 levels
Pin 21					No connection
Pin 22	Calling Indicator	J	125	±12 V dc	V.28 levels
Pin 23					No connection
Pin 24	Tx Timing from LIM (A)	U	113	V.35	DTE Source
Pin 25					No connection

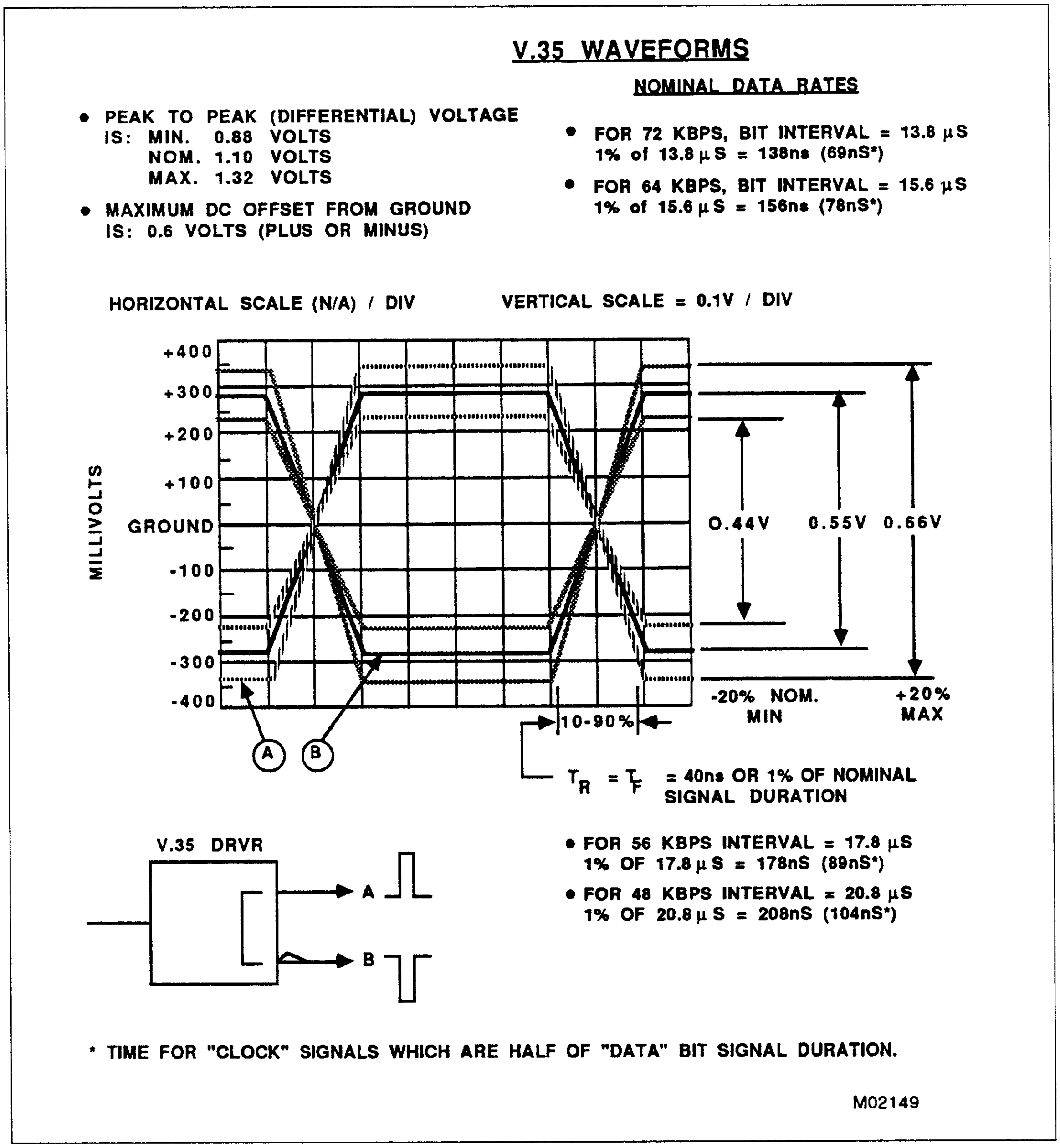


Figure C-10. V.35 Waveforms and Voltage Levels (Min-Nom-Max)

Absolute Voltage Threshold Generator/Receiver Limits

Receiver Type (RS-422/ V.11)	Manu-facturer	Threshold Min/Max	Driver Type (RS-422/ V.11)	Manu-facturer	Tolerance Max Out
26LS32	AMD	-0.2/+0.2 -25 V/+25 V	26LS31	AMD	+ 5.50 Vdo

The maximum driver output voltage is based on the ±5 V dc power supply overvoltage limit and maximum tolerable chip output levels (levels of an unterminated output).

Receiver Type (RS-232/ V.28)	Manu-facturer	Threshold Min/Max	Driver Type (RS-232/ V.28)	Manu-facturer	Tolerance Max Out
75154	TI	+3 V/+25 V -3 V/-25 V	1488	Motorola	<+15.75 Voc >-15.75 Voc

These voltages are based on the ± 12 V dc power supply overvoltage limit and maximum tolerable chip output levels (levels of an unterminated output).

The 1488 driver output minimum voltages are +7.0 and -7.0 V dc.

The driver output minimum voltages for RS-422 using a 26LS31 into a 100-ohm load are:

Voh = +2.5 V dc (minimum); +3.2 V dc (typical).
Vol = +0.5 V dc (maximum); +0.32 V dc (typical).

The driver output voltage for RS-422 using a 26LS31 with V.35 impedance matching is ±0.44 V dc differential with 0.6 V dc offset (see figure C-10).

NOTE

1. Vdo is the Differential Open Circuit Voltage
2. Voc is the Open Circuit Voltage
3. Voh is Voltage Output High
4. Vol is Voltage Output Low

Cable Lengths and Wiring

Standard products (2617-1xx/2617-5xx/2617-2xx) include cable lengths of 10, 25, and 50 ft. These cables have a characteristic impedance range from 82 to 110 ohms per each individual twisted pair (100 ohm nominal). Propagation delay per each twisted pair is nominally 1.7 ns/ft. Refer to appendix B for product and equipment numbers of these cables.

Figure C-11 depicts the cable wiring scheme between the 25-pin V.35 LIM connector and the V.35 DCE 34-pin ISO 2593-1973(E) connector.

```
 LIM Plug 25-Pin (P1)                              User Plug 34-Pin (P2)
In/Out  Signal   Pin (P1)                        Pin (P2)  Signal   In/Out

Shield   FG        1 -------------------------- A       FG       Shield
Out      TxD(A)    2 -------------------------- P       TxD(A)   In
In       RxD(A)    3 -------------------------- R       RxD(A)   Out
Out      RTS       4 -------------------------- C       RTS      In
In       CTS       5 -------------------------- D       CTS      Out
In       DSR       6 -------------------------- E       DSR      Out
Gnd      SG        7 -------------------------- B       SG       Gnd
In       DCD       8 -------------------------- F       DCD      Out
Reserved           9 -------------------------- f
Reserved          10 -------------------------- g
Reserved          11
In       TxCE(B)  12 -------------------------- a       TxCE(B)  Out
In       RxC(B)   13 -------------------------- X       RxC(B)   Out
Out        TxD(B) 14 -------------------------- S       TxD(B)   In
In       TxCE(A)  15 -------------------------- Y       TxCE(A)  Out
In       RxD(B)   16 -------------------------- T       RxD(B)   Out
In       RxC(A)   17 -------------------------- V       RxC(A)   Out
           (*)    18
Out        TxC(B) 19 -------------------------- W       TxC(B)   In
Out        DTR    20 -------------------------- H       DTR      In
           (*)    21
In         RI     22 -------------------------- J       RI       Out
           (*)    23
Out        TxC(A) 24 -------------------------- U       TxC(A)   In
           (*)    25

* = Not used.
```

Figure C-11. V.35 LIM (2617-1) to Modem Cable (2617-1xx) Wiring Diagram

PTT Approval Data for the RS-449 LIM (2610-1)

The RS-232-C LIM complies with the EIA Electrical Interface Standard RS-449 (November 1977) and with the CCITT Electrical Interface Standard V.10 and V.11. The following general information applies to this LIM.

Data Channel Signaling Rate: 0 through 128000 bits/second (software configurable).

Backward Channel Signaling Rate: Not supported.

Modem Types Supported: Avanti 2200/2300 LADDs of equivalent.

Type of Line: Private line or switched line.

Transmission Modes: Full-duplex asynchronous or full-duplex synchronous.

Received Data (RD) is ignored when Carrier (RR) is off.

Grounding

Protective Earth (Protective Ground [101]) is not directly connected to Common Return (Signal Ground [102]) at the LIM/cable line of demarcation. Protective Ground (Earth Ground) is directly connected to DC Common (Signal Ground) in the DI power distribution scheme. When using a Control Data Standard Product RS-449 cable (2610-1xx/2610-5xx), the cable shield is electrically connected to Protective Ground via the DI/LIM retainer plate, and to circuit 101 (Pin 1) at the RS-449 LIM connector. This connects Protective Ground (101) to Signal Ground (at the LIM/Cable line of demarcation) via a 100-ohm resistor.

Figure C-12 depicts this grounding scheme.

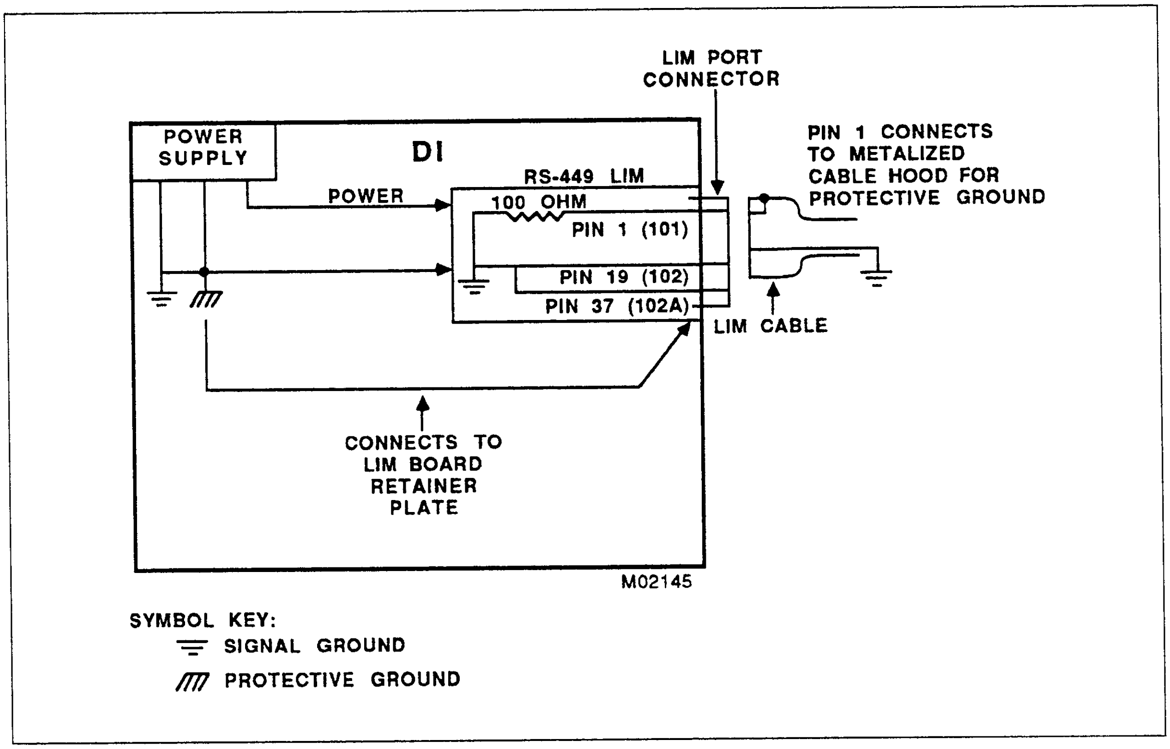


Figure C-12. RS-449 LIM Grounding Scheme

Timing of Interchange Circuits

Figures C-13 and C-14 show actual interchange circuit timing using a Bell 212A auto-answer modem.

A: DM ON to RS ON ≤0 s. TR and RS enter the ON state simultaneously, regardless of DM state (see flow diagram, figure C-14).

B: RS OFF to TR OFF = 0 s. TR and RS negated (OFF) simultaneously (see flow diagram, figure C-14).

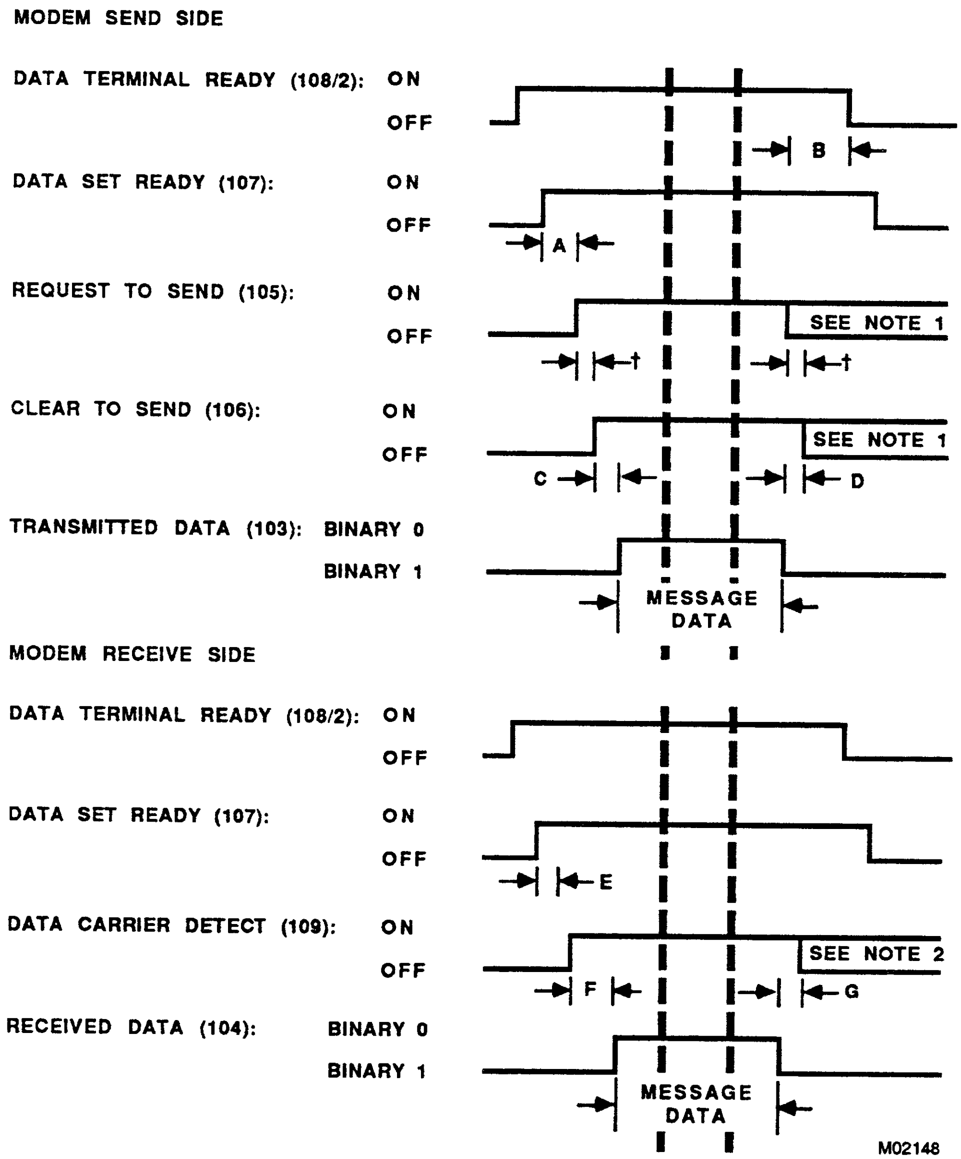
C: CS ON to start of data transmission (BA space) ≥ 400 ms.

E: DM ON to RR ON = Modem-dependent (not a critical parameter; RR is ignored unless DM is also active.)

F: RR ON to start of received data active (BB space) ≥ 0 s. Modem/user-dependent; a function of when the remote user begins transmitting data.

G: End of received data active (BB mark) to RR OFF ≥ 0 s.

Figure C-13 depicts typical timing and interchange circuit relationships of the RS-449 LIM (2610-1) as required by the Australian Post Office, Engineering Works Division.



NOTES:

† RTS/CTS DELAY IS MODEM-DEPENDENT; USUALLY USER SELECTABLE; NOT A CRITICAL PARAMETER.

1 WITH FULL DUPLEX CONNECTIONS, RTS/CTS WILL NOT ENTER THE OFF STATE UNLESS THE LIM PORT IS TAKEN OFF LINE, OR A RESET, OR A LOSS OF DCD/DSR OCCURS. THE LIM OPERATES IN FULL DUPLEX MODE ONLY.

2 TIME G IS A FUNCTION OF THE USER DISCONNECT TIME AT A REMOTE DCD, AND DEPENDENT ON THE LOCAL/REMOTE MODEM TYPE AND DESIGN. DATA IS IGNORED IF DCD IS OFF.

Figure C-13. Australian Post Office Timing Example (RS-449)

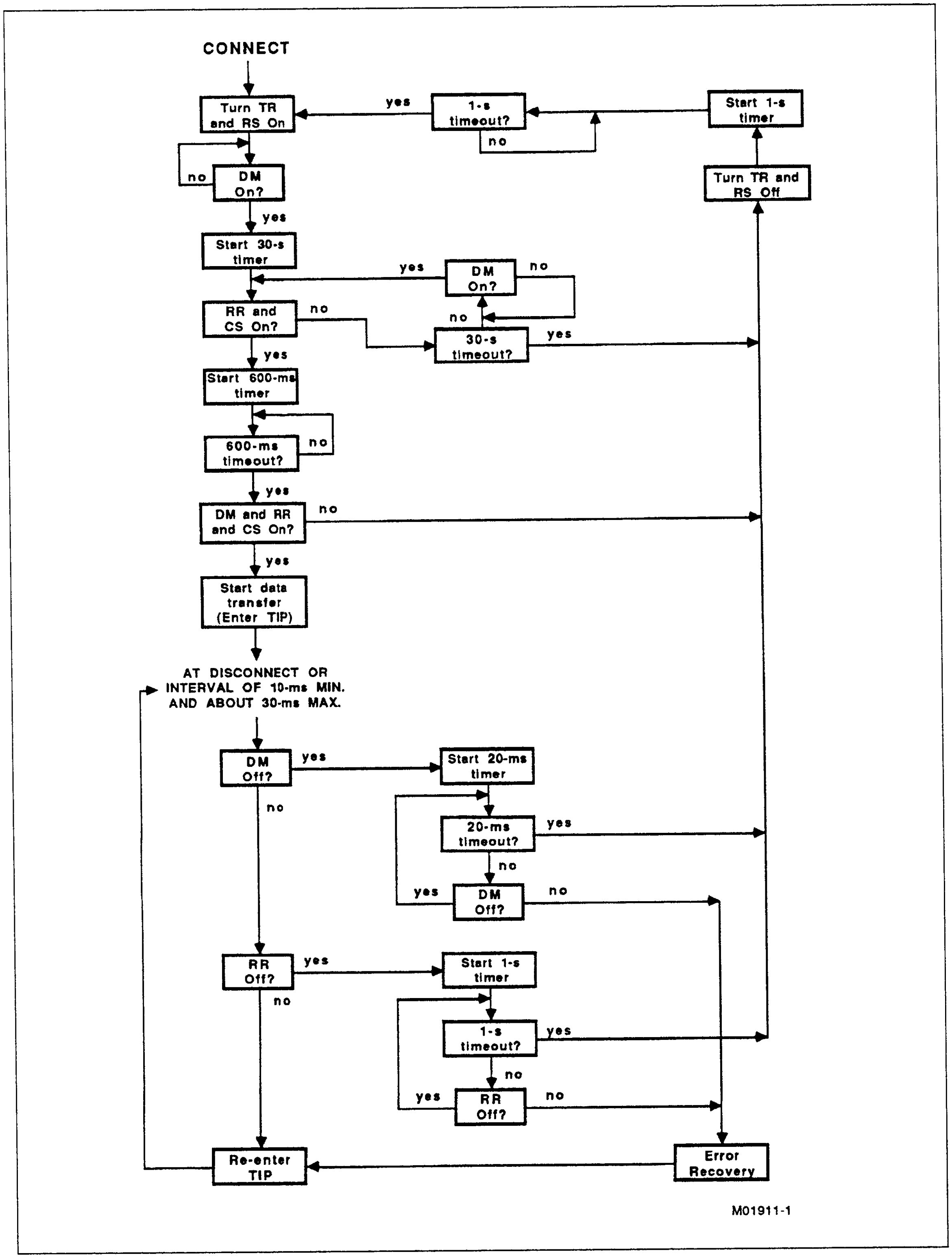


Figure C-14. Software Timing Flow of RS-449 Interchange Circuits

Cable Lengths and Wiring

Table C-4 depicts the RS-449 37-position pin assignments. Table C-5 defines the RS-449 interchange circuits in conjunction with the definitions in table C-4.

Table C-7 is an RS-232 (V.28)/RS-422 (V.11)/RS-423 (V.10) equivalency table.

NOTE

The cable information provided in tables C-4 through C-7 and figures C-15 and C-16 is extracted from the "EIA Standard RS-449, General Purpose 37-Position and 9-Position Interface for Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange, November 1977, Engineering Department Electronic Industries Association" 2001 Eye Street, N.W., Washington, D.C. 20006.

Table C-4. Pin Assignments for 37-Position Connector

First Segment Assignment			Second Segment Assignment				Direction	
Contact Number	Circuit	Interchange Points′	Contact Number	Circuit	Interchange Points′	Circuit Category	To DCE	From DCE
1	Shield	-						
2	SI	A-A′	20	RC	C-B′	II		X
3	Spare		21	Spare				
4	SD	A-A′	22	SD	B/C-B′	I	X	
5	ST	A-A′	23	ST	B/C-B′	I		X
6	RD	A-A′	24	RD	B/C-B′	I		X
7	RS	A-A′	25	RS	B/C-B′	I	X	
8	RT	A-A′	26	RT	B/C-B′	I		X
9	CS	A-A′	27	CS	B/C-B′	I		X
10	LL	A-A′	28	IS	A-A′	II	X	
11	DM	A-A′	29	DM	B/C-B′	I		X
12	TR	A-A′	30	TR	B/C-B′	I	X	
13	RR	A-A′	31	RR	B/C-B′	I		X
14	RL	A-A′	32	SS	A-A′	II	X	
15	IC	A-A′	33	SQ	A-A′	II		X
16	SF/SR+	A-A′	34	NS	A-A′	II	X	
17	TT	A-A′	35	TT	B/C-B′	I	X	
18	TM	A-A′	36	SB	A-A′	II		X
19	SG	C-C′	37	SC	C-B′	I	X	

+ Circuit SF and circuit SR share the same contact number.

Power Supply Overvoltage Protection

Power Supply Specifications:	+5 V dc Maximum Voltage = +7.00 V dc +6.25 ±0.75 V dc Typical Maximum = +6.11 V dc
	-5 V dc Minimum Voltage = -7.00 V dc -6.25 ±0.75 V dc Typical Minimum = -6.55 V dc

NOTE

The DI Power Supply has been VDE Certified.

Table C-5 lists the interchange circuit voltage levels. Voltage levels stated assume an unterminated driver output. Category I voltages are RS-422/V.11 signal definitions. Category II voltages are RS-423/V.10 signal definitions.

NOTE

The symbols 0&+5 represent voltage swings between approximately 0 V dc and +5 V dc (V.11 typical values).

The symbols +&-5 represent voltage swings between approximately +5 V dc and -5 V dc (V.10 typical values).

Table C-5. RS-449 Interchange Circuit Voltage Levels

37-Pin Connector	Circuit Name	Category	CCITT No.	Voltage Levels (Typical)	Additional Information
Pin 1	Shield		101	From GND	100 ohms to circuit 102
Pin 2	Signaling Rate Ind.	II	112	+&-5	
Pin 3	Spare				No connection
Pin 4	Send Data (A)	I/II	103	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 5	Send Timing (A)	I/II	114	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 6	Receive Data (A)	I/II	104	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 7	Request to Send (A)	I/II	105	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 8	Receive Timing (A)	I/II	115	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 9	Clear to Send (A)	I/II	106	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 10	Local Loopback	II	141	+&-5	
Pin 11	Data Mode (A)	I/II	107	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 12	Terminal Ready (A)	I/II	108/2	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 13	Receiver Ready (A)	I/II	109	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 14	Remote Loopback	II	140	+&-5	
Pin 15	Incoming Call	II	125	+&-5	
Pin 16	Select Freq. Sign. Rate	II	126/111	+&-5	SF/SR share pin
Pin 17	Terminal Timing (A)	I/II	113	0&+5/+&-5	V.11 or V.10 LIM selectable

(Continued)

Table C-5. RS-449 Interchange Circuit Voltage Levels *(Continued)*

37-Pin Connector	Circuit Name	Category	CCITT No.	Voltage Levels (Typical)	Additional Information
Pin 18	Test Mode	II	142	+&-5	
Pin 19	Signal Ground		102		100 ohms to circuit 101
Pin 20	Receive Common		102b		Sig. Gnd. input
Pin 21	Spare				No connection
Pin 22	Send Data (B)	I/II	103	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 23	Send Timing (B)	I/II	114	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 24	Receive Data (B)	I/II	104	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 25	Request to Send (B)	I/II	105	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 26	Receive Timing (B)	I/II	115	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 27	Clear to Send (B)	I/II	106	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 10	Local Loopback	II	141	+&-5	
Pin 28	Terminal in Service	II	N/A	+&-5	
Pin 29	Data Mode (B)	I/II	107	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 30	Terminal Ready (B)	I/II	108/2	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 31	Receiver Ready (B)	I/II	109	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 32	Select Standby	II	116	+&-5	
Pin 33	Signal Quality	II	110	+&-5	
Pin 34	New Signal	II	N/A	+&-5	

(Continued)

Table C-5. RS-449 Interchange Circuit Voltage Levels *(Continued)*

37-Pin Connector	Circuit Name	Cate- gory	CCITT No.	Voltage Levels (Typical)	Additional Information
Pin 35	Terminal Timing (B)	I/II	113	0&+5/+&-5	V.11 or V.10 LIM selectable
Pin 36	Standby Indicator	II	117	+&-5	
Pin 37	Send Common		102a		100 ohms to circuit 101

Absolute Voltage Threshold Generator/Receiver Limits

Receiver Type (RS-422/423)	Manu- facturer	Threshold Min/Max	Driver Type (RS-422/423)	Manu- facturer	Tolerance Max Out
26LS32	AMD	-0.2/+0.2 V -25/+25 V Absolute Maximum	26LS31	AMD	+5.50 Vdo
			26LS29	AMD	+6.00 Voc -6.00 Voc

The threshold voltages shown are the differential input voltages.

The maximum driver output voltages are based on the ±5 V dc power supply overvoltage limits and maximum tolerable chip output levels (levels of an unterminated output).

The driver output minimum voltages for RS-422 using a 26LS31 into a 100-ohm load are:

Voh = +2.5 V dc (minimum); +3.2 V dc (typical).
Vol = +0.5 V dc (maximum); +0.32 V dc (typical).

The driver output minimum voltages for RS-423 using a 26LS29 into a 450-ohm load are:

Vo = +3.6 V dc (minimum); +4.1 V dc (typical).
Vo = -3.6 V dc (minimum); -4.12 V dc (typical).

NOTE

1. Vdo is the Differential Open Circuit Voltage
2. Voc is the Open Circuit Voltage
3. Voh is Voltage Output High
4. Vol is Voltage Output Low

Table C-6. RS-449 Interchange Circuits

Circuit Mnemonic	Circuit Name	Circuit Direction	Circuit Type
SG	Signal ground	–	Common
SC	Send common	To DCE	
RC	Receive common	From DCE	
IS	Terminal in service	To DCE	Control
IC	Incoming call	From DCE	
TR	Terminal ready	To DCE	
DM	Data Mode	From DCE	
SD	Send data	To DCE	Data
RD	Receive data	From DCE	(Primary channel)
TT	Terminal timing	To DCE	Timing
ST	Send timing	From DCE	(Primary channel)
RT	Receive timing	From DCE	
RS	Request to send	To DCE	Control
CS	Clear to send	From DCE	(Primary channel)
RR	Receiver ready	From DCE	
SQ	Signal quality	From DCE	
MS	New signal	To DCE	
SF	Select frequency	To DCE	
SR	Signaling rate selector	To DCE	
SI	Signaling rate indicator	From DCE	
SSD	Secondary send data	To DCE	Data
SRD	Secondary receive data	From DCE	(Secondary channel)
SRS	Secondary request to send	To DCE	Control
SCS	Secondary clear to send	From DCE	(Secondary channel)
SRR	Secondary receiver ready	From DCE	
LL	Local loopback	To DCE	Control
RL	Remote loopback	To DCE	
TM	Test mode	From DCE	
SS	Select standby	To DCE	Control
SB	Standby indicator	From DCE	

Table C-7. Equivalency Table

RS-449		RS-232C		CCITT Recommendation V.24	
SG	Signal ground	AB	Signal ground	102	Signal ground
SC	Send common			102a	DTE common
RC	Receive common			102b	DCE common
IS	Terminal in service				
IC	Incoming call	CE	Ring indicator	125	Calling indicator
TR	Terminal ready	CD	Data terminal ready	108/2	Data terminal ready
DM	Data mode	CC	Data set ready	107	Data set ready
SD	Send data	BA	Transmitted data	103	Transmitted data
RD	Receive data	BB	Received data	104	Received data
TT	Terminal timing	DA	Transmitter signal element timing (DTE source)	113	Transmitter signal element timing (DTE source)
ST	Send timing	DB	Transmitter signal element timing (DCE source)	114	Transmitter signal element timing (DCE source)
RT	Receive timing	DD	Receiver signal element timing	115	Receiver signal element timing (DCE source)
RS	Request to send	CA	Request to send	105	Request to send
CS	Clear to send	CB	Clear to send	106	Ready for sending
RR	Receiver ready	CF	Received line signal detector	109	Data channel received line signal detector
SQ	Signal quality	CG	Signal quality detector	110	Data signal quality detector
NS	New signal				
SF	Select frequency			126	Select transmit frequency
SR	Signaling rate selector	CH	Data signal rate selector (DTE source)	111	Data signaling rate selector (DTE source)
SI	Signaling rate indicator		Data signal rate selector (DCE source)	112	Data signaling rate selector (DCE source)

(Continued)

Table C-7. Equivalency Table *(Continued)*

RS-449		RS-232C		CCITT Recommendation V.24	
SSD	Secondary send data	SBA	Secondary transmitted data	118	Transmitted backward channel data
SRD	Secondary receive data	SBB	Secondary received data	119	Received backward channel data
SRS	Secondary request to send	SCA	Secondary request to send	120	Transmit backward channel line signal
SCS	Secondary clear to send	SCB	Secondary clear to send	121	Backward channel ready
SRR	Secondary receiver ready	SCF	Secondary received line signal detector	122	Backward channel received line signal detector
LL	Local loopback			141	Local loopback
RL	Remote loopback			140	Remote loopback
TM	Test mode			142	Test indicator
SS	Select standby			116	Select standby
SB	Standby indicator			117	Standby indicator

See figure C-15 for RS-422/V.11 maximum cable length and figure C-16 for RS-423/V.10 maximum cable length. Control Data standard products (2610-1xx and 2610-2xx) are available in cable lengths of 10, 50, and 190 ft. These cables have a characteristic impedance range from 82 to 110 ohms per each individual twisted pair (100 ohms nominal). Propagation delay per each twisted pair is nominally 1.7 ns/ft. Refer to appendix B for product and equipment numbers of these cables.

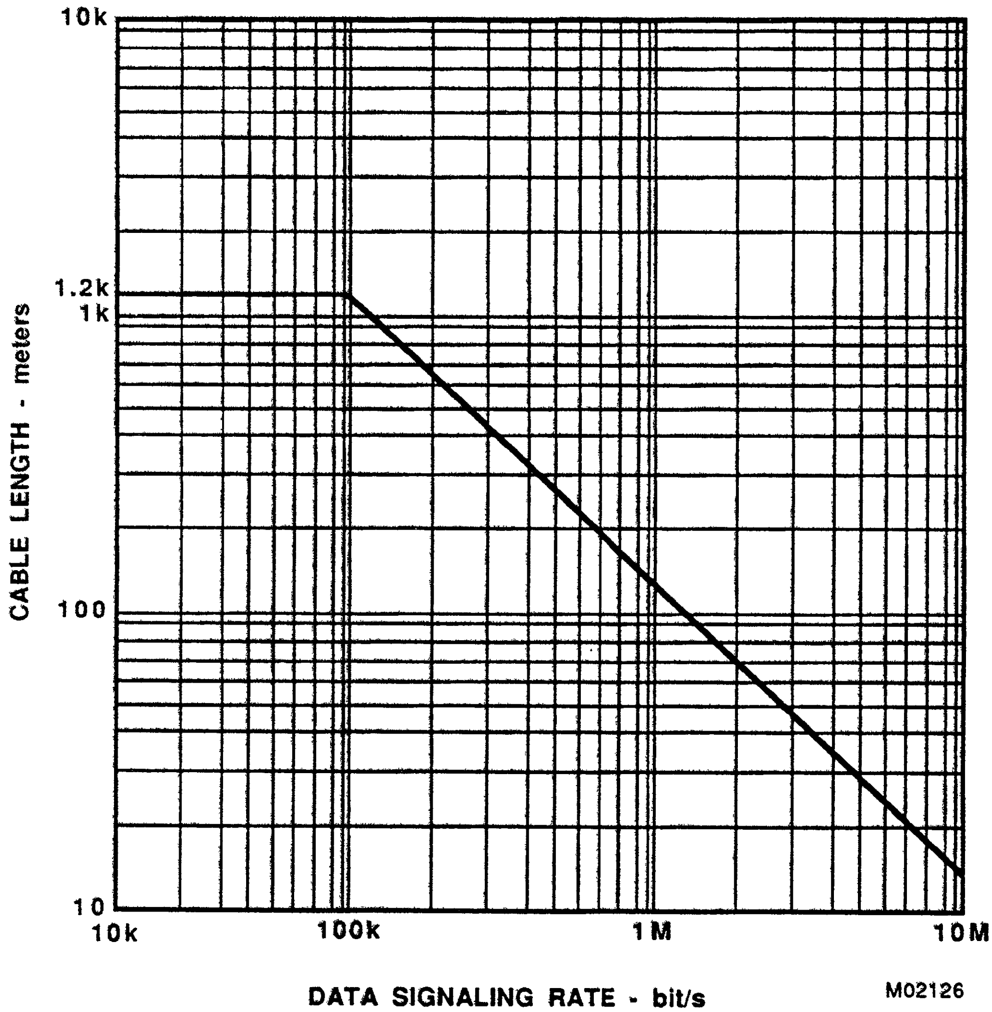


Figure C-15. RS-422-A Data Signaling Rate Versus Cable Length

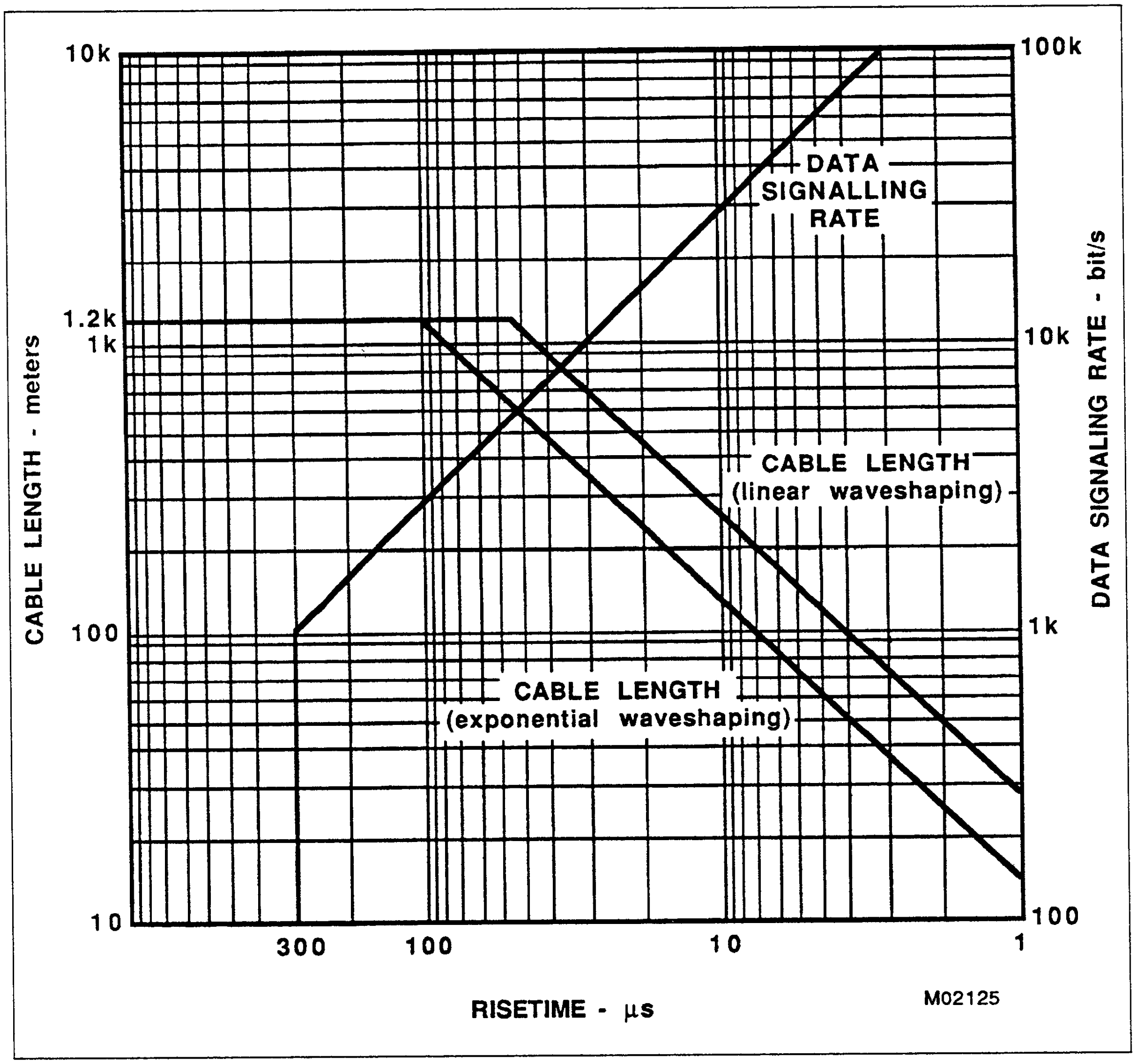


Figure C-16. RS-422-A Data Signaling Rate or Cable Length Versus Risetime

Index

A

A-to-A 1-14
Accessories 2-6
Alarm ME 1-11
Application-to-application communications (A-to-A) 1-14
Approval data (see PTT approval data)

B

Backpanel
  LIM 2-2
  Main 2-2
Base device interface (DI) cabinet assembly data sheet 2-7
Base system software
  Data sheets 3-4
  Description 1-8
  Functions 3-1
  Product numbers 3-4
Building networks 7-1

C

Cable-tap tool kit 2-65
Cables
  Channel 7-2
  CIM/LIM 2-5
  Ethernet coaxial 7-3
  IEEE 802.3 coaxial 7-5
  IEEE 802.3 coaxial data sheet 2-75
  IEEE 802.3 transceiver interface data sheet 2-61
  LIM (see LIM cables)
  Network 1-7
  RS-449 LIM data sheet 2-39
  Transceiver interface 7-6
  URI adapter data sheet 2-49
  URI LIM data sheet 2-47
  V.35 LIM data sheet 2-53
  X.24 LIM data sheet 2-43
  4-port RS-232-C LIM data sheet 2-29
  8-port RS-232 asynchronous LIM data sheet 2-33
CDCNET 1-1
CDCNET proprietary session entity 1-9
Channel cables 7-2
CIM data sheet 2-25
CIM/LIM cable 2-5
CLNS 1-10
Clock ME 1-11
Coaxial cable (see IEEE 802.3 coaxial cable)
Command ME 1-11
Communications interface module (CIM) data sheet 2-25
Concatenated networks 7-1
Connection mode network service (CONS) 1-10
Connectionless mode network service (CLNS) 1-10
CONS 1-10
Control Data Distributed Communications Network (CDCNET) 1-1
Corporation for Open Systems (COS) 1-2
COS 1-2

D

Data sheets, hardware
  Base device interface (DI) cabinet assembly 2-7
  CDCNET maintenance kit 2-79
  Communications interface module (CIM) 2-25
  DI enclosure table 2-59
  Ethernet serial channel interface (ESCI) board 2-23
  IEEE 802.3 coaxial cable 2-75
  IEEE 802.3 coaxial cable splice kit 2-71
  IEEE 802.3 coaxial cable terminator kit 2-73
  IEEE 802.3 multiplexer 2-67
  IEEE 802.3 repeater 2-69
  IEEE 802.3 transceiver 2-63
  IEEE 802.3 transceiver interface cables 2-61
  IEEE 802.3 transceiver tap 2-65
  Improved performance main processor board (MPB-II) 2-13
  Integrated communications adapter (ICA) 2-55
  Main processor board (MPB) 2-11
  Mainframe channel interface (MCI) board 2-21
  Maintenance console option (MCO) 2-77
  Private memory module (PMM) 2-19
  RJ45/DB25 connector adapters 2-35
  RS-449 LIM cables 2-39
  RS-449 line interface module (LIM) 2-37
  System main memory (SMM) board 2-15
  Unit record line interface module (URI LIM) 2-45
  URI adapter cable 2-49
  URI LIM cables 2-47
  V.35 LIM 2-51
  V.35 LIM cables 2-53
  X.24 LIM cables 2-43
  X.24 line interface module (LIM) 2-41

3-DI cabinet 2-57
4 M-byte system main memory (SMM4) board 2-17
4-port RS-232-C LIM cables 2-29
4-port RS-232-C line interface module (LIM) 2-27
8-port RS-232 asynchronous LIM cables 2-33
8-port RS-232 asynchronous line interface module (LIM) 2-31
Data sheets, software
Domain name resolver 4-7
FTAM/VE 5-5
High speed HDLC 3-7
Interactive asynchronous terminal passthrough 3-9
Mode 4A/4C protocol support 3-11
Network information service 4-9
Network management station 3-13
Network queuing system 4-11
Network service access control 3-15
Network transfer facility 3-17
Network validation 3-19
NFS/VE 4-15
NJEF 3-21
Remote line monitor 3-23
TCP/IP/FTP/TELNET (SMPT/VE) 4-17
TP0/CONS 5-7
X.MHS interface 5-9
X.29 PAD 3-25
X.3 PAD 3-27
3270 BSC terminal support 3-29
DCE connectability 7-15
Device interface (DI) 1-1
Device manager 3-2
DI
Cabinet assembly 2-2
Components 2-1
Connecting to terminal devices 7-13
Description 1-1
Enclosure table data sheet 2-59
Logic boards 2-3
Variants 2-1
Directory ME 1-11
Documentation
Kit 1-18
Video tape 1-18
Domain name resolver data sheet 4-7
DTE connectability 7-14

E

Enclosure table data sheet 2-59
ESCI board data sheet 2-23
Ethernet coaxial cable 7-3
Ethernet serial channel interface (ESCI) board data sheet 2-23
Executive 3-1

F

Failure management 3-2
File access ME 1-11
File transfer, access, and management facility (FTAM/VE) 5-5
File transfer protocol (FTP) 4-17
Foreign host 5-7
FTAM/VE data sheet 5-5
FTP 4-17

G

Gateway
Definition 1-12
Interactive passthrough/outcall 3-9
To non-CDCNET systems 1-8
X.3 PAD 3-27

H

Hardware components
DI 1-3
Host 1-2
Summary 1-2
Hardware data sheets 2-6
Hardware equipment numbers B-1
Hardware product numbers B-1
HDLC 1-3
HDLC, high speed data sheet 3-7
High-level data link control (HDLC) 1-3
High speed HDLC data sheet 3-7
Host 1-2
How to order CDCNET software products 1-14

I

ICA 1-4
IEEE 802.3 cable-tap tool kit 2-65
IEEE 802.3 coaxial cable
Data sheet 2-75
Installation information 7-5
IEEE 802.3 coaxial cable splice kit data sheet 2-71
IEEE 802.3 coaxial cable terminator kit data sheet 2-73
IEEE 802.3 LAN
Connecting networks 7-1
Description 1-1
IEEE 802.3 LAN components
Multiplexer 1-4
Repeater 1-4
Splice kit 1-4
Terminators 1-4
Transceivers 1-4
Trunks 1-4

IEEE 802.3 multiplexer
Cascading 7-9
Connecting 7-9
Connecting to a cableless network 7-11
Data sheet 2-67
IEEE 802.3 repeater
Connecting to transceivers 7-12
Data sheet 2-69
IEEE 802.3 transceiver
Connecting to repeaters 7-12
Data sheet 2-63
IEEE 802.3 transceiver interface cable
Connecting LAN components 7-3
Data sheet 2-61
Types available 7-6
IEEE 802.3 transceiver tap
Data sheet 2-65
Description 7-7
Improved performance main processor board (MPB-II) data sheet 2-13
Initialization 1-11
Integrated communications adapter (ICA) 1-4
Integrated communications adapter (ICA) data sheet 2-55
Interactive asynchronous terminal passthrough data sheet 3-9
Interactive passthrough/outcall gateway 3-9
Internal system bus (ISB) 2-11
International Standards Organization (ISO) 1-2
ISB 2-11
ISO 1-2
ISO OSI session entity 1-9

L

LAN (see IEEE 802.3 LAN)
Layer software
Data link layer (layer 2) 1-10
Description 1-9
Host application layer (layer 7) 1-9
Intranet layer (layer 3A) 1-10
Network layer (layer 3B) 1-10
Presentation layer (layer 6) 1-9
Session layer (layer 5) 1-9
Transport layer (layer 4) 1-9
Licenses, software 1-15
LIM
RS-232-C CCITT signals supported 7-24
RS-449 data sheet 2-37
URI data sheet 2-45
V.35 data sheet 2-51
X.24 7-39
X.24 data sheet 2-41
4-port RS-232-C data sheet 2-27
8-port RS-232 asynchronous data sheet 2-31
LIM backpanel 2-2
LIM bus 2-5
LIM cables
External 2-5
Selecting the right LIM cable 7-14
URI 7-42
V.35 7-50
X.24 7-39
4-port RS-232-C cables (CL2P) 7-23
4-port RS-232-C (CL2) 7-21
8-port RS-232 7-29
Line interface module (LIM) 2-5
Local area network (LAN) 1-1
Local network 7-1
Log ME 1-11
Logic boards
LIM 2-5
Main 2-2
Lower layer access software 3-2

M

Mail/VE
Description 4-20
X.400 MHS 5-9
Main backpanel 2-2
Main logic boards 2-2
Main processor board (MPB) data sheet 2-11
Mainframe channel interface (MCI) board data sheet 2-21
Mainframe device interface (MDI) 1-3
Mainframe terminal device interface (MTI) 1-3
Maintenance console option (MCO) data sheet 2-77
Maintenance kit data sheet 2-79
Management entity (ME) 1-8
MCI board data sheet 2-21
MDI 1-3
ME 1-8
Mode 4A/4C protocol support data sheet 3-11
MPB-II 2-13
MTI 1-3
Multiplexer (see IEEE 802.3 multiplexer)
Multivendor connectivity 1-2

N

NDI 1-3
Network
Building 7-1
Concatenated 7-1
Local 7-1
Network cables 1-7
Network configuration examples 6-1

Network device interface (NDI) 1-3
Network file system (NFS/VE) data sheet 4-15
Network information service (NIS/VE) data sheet 4-9
Network job entry facility (NJEF) data sheet 3-21
Network lock manager (NLM) data sheet 4-13
Network management station data sheet 3-13
Network Operating System (NOS) 1-2
Network Operating System/Virtual Environment (NOS/VE) 1-2
Network queuing system (NQS/VE) data sheet 4-11
Network service access control data sheet 3-15
Network transfer facility data sheet 3-17
Network validation data sheet 3-19
NFS/VE data sheet 4-15
NIS/VE data sheet 4-9
NJEF data sheet 3-21
NOS 1-2
NOS/VE 1-2
NQS/VE data sheet 4-11

O

Online loader 3-2
Open system interconnection (OSI) 1-2
OSI
  Data sheets 5-4
  Description 1-2
OSI software components
  NOS 5-3
  NOS/VE 5-1
OSI software product numbers 5-4

P

PDN 1-3
Physical layer (layer 1) 1-10
PMM data sheet 2-19
Private memory module (PMM) data sheet 2-19
Product/equipment cross-reference B-1
Product numbers
  Base system software 3-4
  Hardware B-1
  OSI software 5-4
  TCP/IP software 4-4
PTT approval data
  RS-449 LIM (2610-1) C-21
  V.35 LIM (2617-1) C-12
  4-port RS-232-C LIM C-1
Public data networks (PDN) 1-3

R

Remote line monitor data sheet 3-23
Remote terminal device interface (RTI) 1-3
Repeater (see IEEE 802.3 repeater)
RJ45/DB25 connector adapters data sheet 2-35
Routing ME 1-11
RS-449 LIM cables data sheet 2-39
RS-449 LIM (2610-1), PTT approval data C-21
RS-449 line interface module (LIM) data sheet 2-37
RTI 1-3

S

Selecting the right LIM cable 7-14
Simple mail transfer protocol for NOS/VE (SMPT/VE) 4-17
SMM board 2-15
SMM4 data sheet 2-17
SMPT/VE 4-17
Software components 1-10
Software products
  How to order 1-14
  Licenses 1-15
Statistics management 3-1
System initialization 3-1
System main memory (SMM) board data sheet 2-15

T

T-to-A 1-14
TCE 1-2
TCP/IP
  Data sheets 4-4
  Description 4-1
TCP/IP/FTP/TELNET (SMPT/VE) data sheet 4-17
TCP/IP protocol stack
  Architecture 4-1
  IP layer 4-4
  Lower layers (1, 2, 3, and 3A) 4-4
  TCP layer 4-4
  UDP layer 4-4
  Upper layer protocols 4-4
TCP/IP software product numbers 4-4
TDI 1-7
Telnet 4-18
Terminal device interface (TDI) 1-7
Terminal devices 1-5
Terminal interface program (TIP) 1-13
Terminal-to-application communications (T-to-A) 1-14
TFTP/VE 4-19

TIP
BSCNJEFTIP 3-21
Description 1-13
Mode 4A/4C 3-11
Supported protocols 1-13
Telnet 4-18
URI 3-3
X.25 Asynchronous 3-25
3270 Bisynchronous 3-29
TP0/CONS data sheet 5-7
Transceiver interface cable (see IEEE 802.3 transceiver interface cable)
Transmission control protocol/internet protocol (TCP/IP) 4-1
Transparent computing environment (TCE) 1-2
Transport class 0/connection mode network service (TP0/CONS) 5-7
Tree (table) management 3-2

U

Unit record line interface module (URI) data sheet 2-45
URI LIM
Adapter cable data sheet 2-49
Cable information 7-42
Data sheet 2-45
URI LIM cables data sheet 2-47
URI TIP 3-3

V

V.35 LIM
Cable information 7-50
PTT approval data C-12
V.35 LIM cables data sheet 2-53
V.35 line interface module (LIM) data sheet 2-51
VFS 4-16
Video tape 1-18
Virtual file system (VFS) 4-16

W

Winchester adapter cable 7-48

X

X.24 LIM 7-39
X.24 LIM cable installation information 7-39
X.24 LIM cables data sheet 2-43
X.24 line interface module (LIM) data sheet 2-41
X.25 asynchronous protocol 3-25
X.29 asynchronous protocol 3-25
X.29 PAD server data sheet 3-25
X.3 PAD gateway data sheet 3-27
X.400 MHS interface data sheet 5-9

3

3-DI cabinet data sheet 2-57
3270 BSC terminal support data sheet 3-29

4

4 M-byte system main memory (SMM4) data sheet 2-17
4-port RS-232-C (CL2P) 7-23
4-port RS-232-C LIM cables data sheet 2-29
4-port RS-232-C LIM data sheet 2-27
4-port RS-232-C LIM, PTT approval data C-1

8

8-port RS-232 asynchronous LIM cables data sheet 2-33
8-port RS-232 asynchronous LIM data sheet 2-31

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