HP AdvanceNet

HP 2335A
X.25/84 Multiplexer

Reference Manual

Computer Museum

HEWLETT PACKARD

Notice

The information contained in this document is subject to change without notice.

History

Edition 1   July 1990

Edition 2   November 1990

This Reference Manual (02335-90021) is based largely on the Reference Manual for the previous version of the HP 2335A (02335-90001), of which the last edition was the 2nd Edition, dated May 1989.

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For research and education purposes only.

RFI

For the United States

Federal Communications Commission (FCC)

The U.S. Federal Communications Commission (in 47 CFR 15.818) has specified that the following notice be brought to the attention of the users of this product.

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

For the German Federal Republic

Funkentstörung Deutschland **Herstellerbescheinigung**

Hiermit wird bescheinigt, daß das Gerät

HP 2335A

in Übereinstimmung mit den Bestimmungen von **Postverfügung** 1046/84 funkentstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

Wird das Gerät innerhalb einer Anlage betrieben,

■ so muß bei Inanspruchnahme der Allgemeinen Genehmigung FTZ 1046/84 die gesamte Anlage der o.g. Genehmigung entsprechen.

■ die mit einer FTZ-Serienprüfnummer gekennzeichnet ist, und für die eine Betriebsgenehmigung vorliegt oder beantragt wird, so sind in der Regel keine weiteren Schritte notwendig.

Voraussetzung für die Einhaltung der betreffenden Bestimmungen ist die Verwendung von geschirmten Kabeln. Diese sind vom Betreiber bereitzustellen.

Manufacturer's Declaration

This is to certify the equipment, part number HP 2335A, is in accordance with the Radio Interference Requirements of Directive FTZ 1046/1984. The German Bundespost was notified that this equipment was put into circulation, the right to check the series for compliance with the requirements was granted.

If this equipment is to be operated with a system,

– and if the general license is being claimed, the complete system has to comply with the General Licensing requirements.

– which has its own FTZ-Serial-License, and for which an operating license has been granted or requested, usually no further steps are necessary.

Compliance with applicable regulations depends on the use of shielded cables. These are to be provided from the user.

For UK Only

1. Interconnection directly, or by way of other apparatus, of ports marked "WARNING, CONNECT ONLY APPARATUS COMPLYING TO BS6301 TO THESE PORTS" with ports not so marked may produce hazardous conditions on the network and advice should be obtained from a competent engineer before such a connection is made.

2. WARNING, CONNECT ONLY APPARATUS COMPLYING WITH BS6301 TO THE DATACOM PORTS.

3. Connection to the network must be disconnected before the equipments power plug is removed.

4. Connection to the network must not be hard-wired.

For Japan

この装置は，第一種情報装置（商工業地域において使用されるべき情報装置）で商工業地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会（VCCI）基準に適合しております。

従って，住宅地域またはその隣接した地域で使用すると，ラジオ，テレビジョン受信機等に受信障害を与えることがあります。

取扱説明書に従って正しい取り扱いをして下さい。

Safety Considerations

This product and related documentation must be reviewed for familiarization with safety markings before operation.

Safety Symbols

⚠️ Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the product against damage.
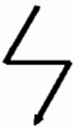
Indicates hazardous voltages.

Indicates earth (ground) terminal. This symbol is sometimes used in the manual to indicate circuit common connected to a grounded chassis.

Warning The warning sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in injury. Do not proceed beyond a warning sign until the indicated conditions are fully understood and met.

Caution The caution sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

Servicing

Warning   Any servicing, adjustment, maintenance, or repair of this product must be performed only by qualified personnel.

General

Warning   SAFETY EARTH GROUND - The HP 2335A is a safety class I product and is provided with a protective earthing terminal. An uninterruptible safety ground must be provided from the main source to the product input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, the product must be made inoperative and must be secured against any unintended operation.

Reader Comment Sheet

HP 2335A X.25/84 Multiplexer
Reference Manual
02335-90021 Edition 2 (November 1990)

We welcome *your* evaluation of this manual. Your comments and suggestions help us to improve our publications. Please answer "Yes" or "No" to these questions, and explain your answers below under "Comments", using additional pages if necessary.

- Is this manual technically accurate?   Yes ☐   No ☐

- Did we include all the information you needed?   Yes ☐   No ☐

- Are the illustrations and tables accurate and useful?   Yes ☐   No ☐

- Are the concepts and wording easy to understand?   Yes ☐   No ☐

- Is the format of the manual convenient in size, arrangement, and readability?   Yes ☐   No ☐

Comments:

Mail to:

The Network Usability Manager (GND),
Hewlett-Packard Company,
Grenoble Networks Division,
38053 GRENOBLE Cedex 9,
France

Date:

Thank you for your feedback.

From (Name, Company, Address), or attach your business card:

Preface

Scope of HP 2335A Reference Manual

The HP 2335A Reference Manual provides all the information necessary to configure, operate, and troubleshoot the HP2335A. For installation instructions and advice on specific configurations, see the *HP 2335A User's Guide* (02335-90022).

Contents Overview

Chapter 1: Introduction

Chapter 1 provides a general description of the HP 2335A, its Packet Assembler/Disassembler and statistical multiplexer functions and an introduction to X.25 networks.

Chapter 2: X.25 Network Subscription

Chapter 2 is intended as a quick reference guide and checklist when subscribing to an X.25 network.

Chapter 3: Configuration

Chapter 3 provides all the information necessary to configure the HP 2335A with the synchronous communication protocol parameters, the asynchronous (device) port profiles and the required facilities.

Chapter 4: Operation

Chapter 4 describes how to operate the HP 2335A, including how to make and clear a connection.

Chapter 5: Using the Test Port

Chapter 5 describes how to access the HP 2335A test port, reconfigure the unit on-line, obtain line statistics, perform communications testing, and execute a remote reset.

Chapter 6: Upgrades

Chapter 6 describes how to install an add-on modem adapter and a new set of ROMs.

Chapter 7: Troubleshooting

Chapter 7 provides the information necessary to establish the existence of a malfunction and recommends the appropriate action if the fault is verified.

Chapter 8: Options, Cables, and Other Accessories

Chapter 8 provides information on the HP 2335A's product structure, and associated part numbers.

Appendix A: Quick Reference Guide

Appendix A is a quick reference guide to the HP 2335A's modes and commands. It is also provided as a separate card (02335-90017).

Appendix B: Error and Diagnostic Codes

Appendix B explains various error and diagnostic codes.

Appendix C: HP2335A/CCITT X.25 comparison.

Appendix C provides a comparison between the implementation of X.25 (at level 3) in the HP 2335A and the CCITT X.25 Recommendation.

Appendix D: X.25 Network International Numbering Plan

Appendix D provides details of the national and international addressing of public X.25 networks.

Appendix E: ASCII Character Set

Appendix E provides the complete ASCII Character Set or International Alphabet #5.

Appendix F: Reference Documentation

Appendix F is a brief guide to other relevant reference documentation.

Appendix G: Glossary of Terms and Abbreviations

Appendix G provides explanations of the terms and abbreviations used in this manual.

HP X.25 Networking

The HP 2335A forms just a part
of HP's offering in the field of
X.25 networking.

Figure 1 shows HP 2335As
accessing, across a public X.25
network, various hosts:
HP3000/XLs on a LAN (local
area network) via a DTC
(Datacommunications and
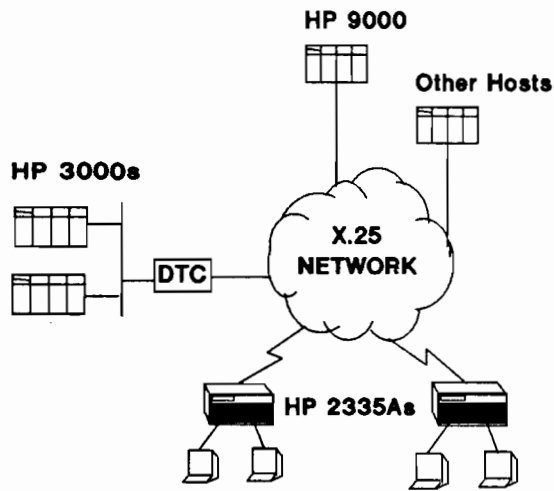Terminal Controller), HP 9000s,
or other computers.

Figure 2 shows HP's Model 45
multi-protocol switch,
concentrating serial access to an
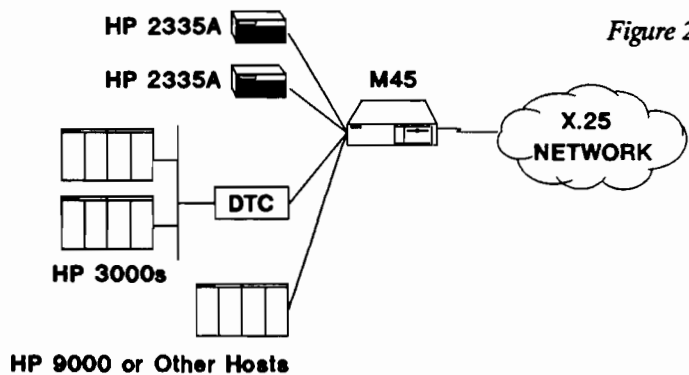X.25 network for an HP 2335A
PAD and various X.25 system
links.

Figure 3 shows an HP PPN
(Private Packet Network). It is
based on a range of X.25 switches
and a suitable management
system. Such a network can
transport any X.25 packets (HP
or non-HP), as it conforms to
X.25 level 3 standards, and can
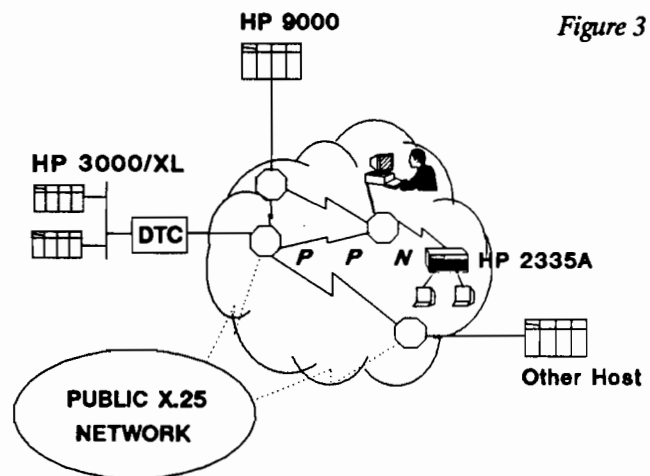connect with a public X.25
network.

**Notice that HP 2335As can be
used in *all* the networks shown.**

Table of Contents

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Introduction

This Reference Manual applies to the following versions of the HP 2335A:

- Product version HP 2335A X.25/84 (implementation of CCITT 1984 recommendations for X.25 and X.3).

- Firmware version 6.0 (or later).

- Software version 30.xx (or later).

The HP 2335A

The HP 2335A:

- is both an X.25 PAD (packet assembler/disassembler) and an X.25 statistical multiplexer.

- offers access to an X.25 network, or operates across a leased line.

- can concentrate up to 16 asynchronous devices, such as terminals or printers, onto a single line.

- can, in particular, be used in association with an HP Model 45 switch, as part of the HP PPN (Private Packet Network).

- is an "open box", in the sense that it can access both public and private X.25 networks, and can connect to Hewlett-Packard, Digital Equipment Corporation, and other host computers.

Each HP 2335A has two types of link: a synchronous link and 4 to 16 asynchronous links.

Synchronous Link

The synchronous link is that between a local HP 2335A and either a remote HP 2335A or a remote host computer. The link may be across:

- a leased line.

- a public X.25 network.

- a private X.25 network, for example the HP Private Packet Network (PPN).

Where the synchronous link uses a public X.25 network, the communication across the network is in packet-mode format, which complies with the CCITT X.25 1984 recommendations. See "X.25 Network Description" below and appendix C, "HP 2335A/CCITT X.25 Comparison". The link will always be via a pair of modems, which may be under the control of the X.25 network.

For the synchronous link, the HP 2335A supports line speedsof up to 64 kbps via an RS-232-C interface, using the cable supplied with the HP 2335A (part number 02333-60008).

Asynchronous Links

For the asynchronous links, the HP 2335A supports line speeds of between 75 bps and 19200 bps.

Each port on the asynchronous side of the HP 2335A (up to 16 ports in all) can have one of two basic configurations:

- a PAD configuration.

- a CAS (computer access support) configuration.

Default options for each of these configurations are included in the HP 2335A, so that you can assign a single default to all asynchronous ports, and then change individual port configurations if necessary.

PAD Configuration

The PAD configuration is used when an asynchronous character-mode device, such as a terminal, a PC, a printer, or a plotter, is to be connected to the HP 2335A. Throughout this manual, when the word "device" is used, it means any one of these types of device.

CAS Configuration

The CAS configuration is used when a host computer is to be connected to the HP 2335A. The host could be:

- an HP 3000, an HP 9000, or an HP1000.

- various Digital Equipment Corporation Vax computers (see *HP 2335A User's Guide* for details).

For other non-HP computers, check with your HP sales representative, or with the suppliers of the non-HP equipment.

Network Configurations

There are two basic types of network configuration for the HP 2335A:

- a statistical multiplexer configuration, where there is a pair of HP 2335As: one on each side of an X.25 network or leased line.

- a PAD configuration (sometimes referred to as a cluster controller configuration), where an HP 2335A provides X.25 access to an X.25 network on the device side, but where the X.25 access on the remote side is provided by the host computer.

Statistical Multiplexer Configuration

(1): PUBLIC LEASED LINE (MODEM LINK) OR PRIVATE LINE (MODEM OR MODEM ELIMINATOR)

(2): ASYNCHRONOUS LINK

P : POINT-TO-POINT ASYNCHRONOUS ACCESS
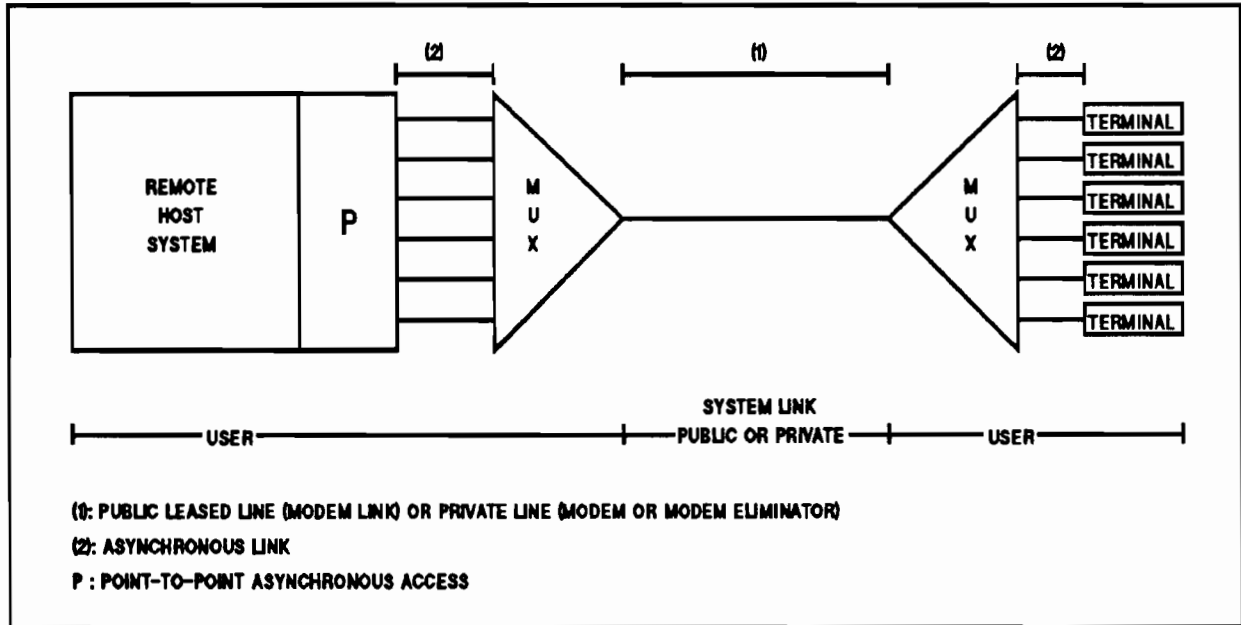
Figure 1-1   Statistical Multiplexer Configuration

A statistical multiplexer is used to lower the cost of terminal connection to a computer system. It combines (multiplexes) multiple data paths into one physical path consisting of logically discrete data streams. Conversely, it separates (demultiplexes) the combined stream back into individual data paths.

The statistical multiplexer allocates portions of the high speed link only to terminals actually transmitting data, thus allowing a more efficient use of the link.

A special feature of the HP 2335A allows use of the X.25 protocol with the statistical multiplexer configuration. Under these circumstances the system link shown in figure 1-1 could be any X.25 packet switching network.

PAD Configuration
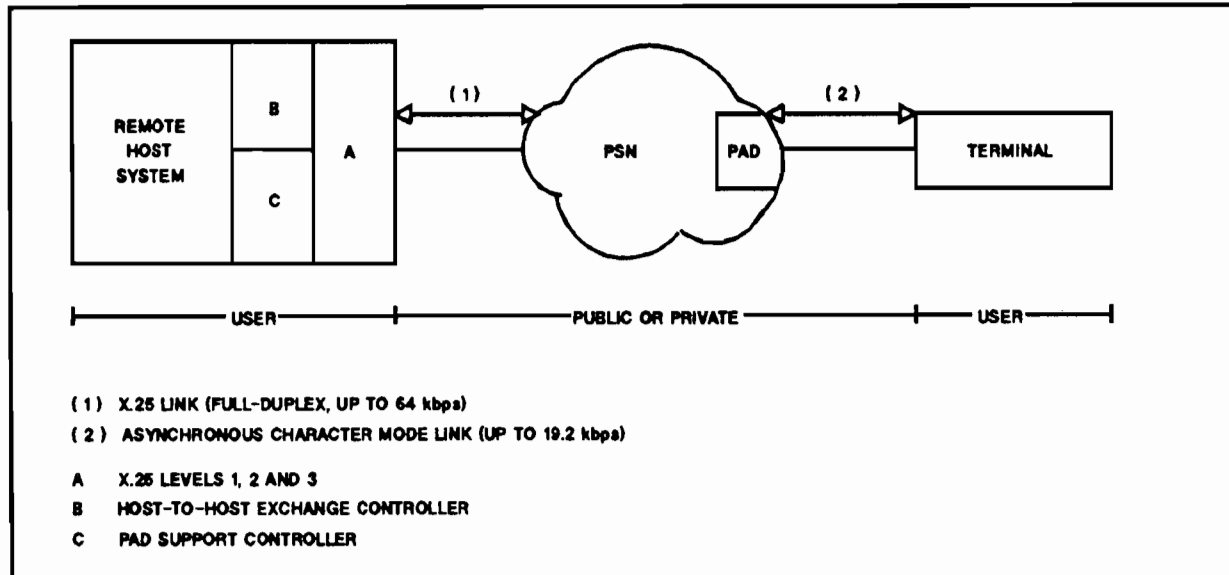
Figure 1-2   Public PAD Configuration

A PAD (Packet Assembler/Disassembler) provides an interface between the RS-232-C protocol of an asynchronous terminal and the X.25 protocol required to access an X.25 network.

The PAD responds to signals from the terminal which request connection (switched virtual circuit) or disconnection across the X.25 network and will generate the appropriate **Call Set up** and **Clear Request** packets to establish/terminate communication.

Once a virtual circuit has been established the PAD accumulates data characters coming from the terminal and assembles them into X.25 data packets for transmission across the X.25 network to the remote DTE. Conversely, the PAD disassembles X.25 data packets coming from the remote DTE, via the X.25 network, into a character stream for transmission to the terminal.

The PAD's operating mode is under the control of a specific set of parameters (X.3). These parameters define specific characteristics of the terminals (devices) or actions that the remote DTE wants the PAD to perform on receipt of particular input (e.g. a **BREAK**) from the terminal.

Any complete set of PAD parameter values is called a "PAD profile". After an initial PAD profile has been set, PAD parameter values may be changed with PAD commands from either the remote DTE (X.29 commands) or the local terminal (X.28 commands), as shown in figure 1-4.

A public PAD is one which resides in the X.25 network.

The alternative is to connect asynchronous devices to an X.25 network via an external private PAD, such as the HP 2335A. This type of connection offers many advantages including a higher baud rate (up to 19.2 kbps between the asynchronous device and the PAD; up to 64 kbps between the PAD and the X.25 network, via an RS-232-C interface) and the ability to originate and receive calls (important for printers and plotters).

X.25 Networks
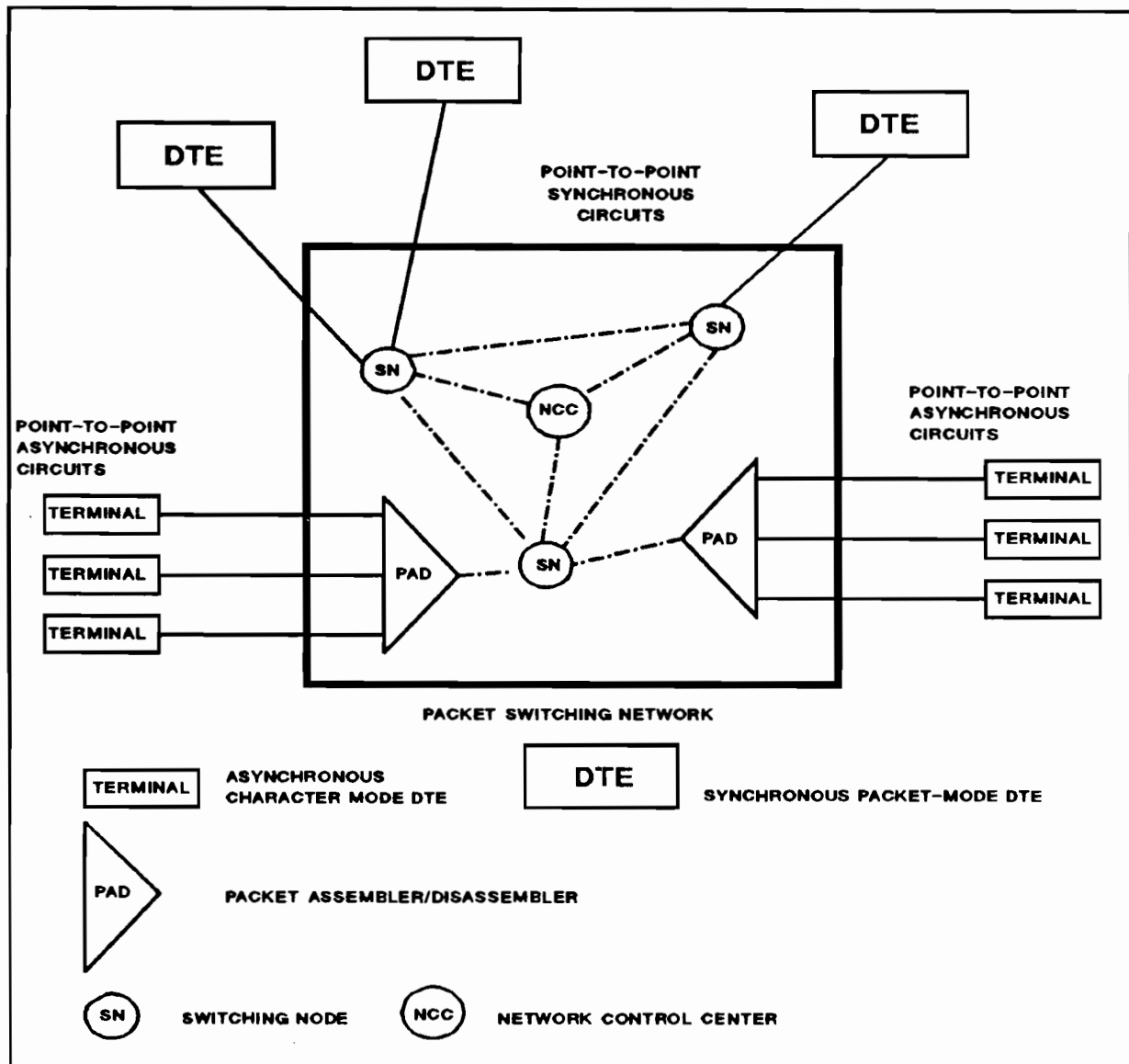
Figure 1-3   X.25 Network

An X.25 network is a telecommunications system that can be privately owned or can be a public service.

- A privately owned X.25 network, such as the HP Private Packet Network (HP PPN), can be used for company wide data communications. This solution offers the advantage that addressing, security and the redundancy of data links are managed and controlled from within the company itself. For further information on the HP PPN please contact your Hewlett-Packard Sales Representative, or order the *HP AdvanceNet Specification Guide* (part number 5956-4144).

- A public X.25 network is a type of Public Data Network (PDN) and is also known as a Value Added Network (VAN). Examples of X.25 networks are TELENET and TYMNET in the U.S., PSS in the U.K., DATANET 1 in Holland, DATEX-P in Germany and TRANSPAC in France. These and other nationwide public X.25 networks are linked via international "gateways" to provide connections between X.25 networks throughout the world.

An X.25 network consists of many geographically dispersed, high speed switching centers (known as switching nodes) which dynamically route data "traffic" along the path (or "virtual circuit") that is most likely to minimize the overall transmission time (see figure 1-3). Should a path become congested or fail, then the data is automatically re-routed. X.25 networks also perform error checking, with automatic re-transmission if any data corruption occurs.

Within the X.25 network, the data is transmitted in "packets" each of which has a header providing control and address information. The data packets from many users are dynamically interleaved over shared network facilities and routed to their destinations. This enables X.25 networks to offer a very fast store and forward response time and give precedence to high priority data.

X.25 is the name of the CCITT (Consultative Committee on International Telephone and Telegraph) Recommendation for the interface protocol used to access an X.25 network. It does not define how X.25 networks should operate, but is part of a "layered structure" that includes other recommendations such as the X.3, X.21 bis, X.28 and X.29 Recommendations.

Data Terminal Equipment (DTE) such as computers and programmable terminal controllers may be connected directly to the network using point-to-point synchronous circuits and the X.25 protocol (see figure 1-3).

DTEs not capable of implementing this protocol, such as workstations, personal computers, printers, etc., must be connected to the network through a Packet Assembler/Disassembler (PAD). The PAD forms packets from the asynchronous data from the terminals and sends them over the network to the appropriate destination using additional protocols (X.3, X.28, X.29).
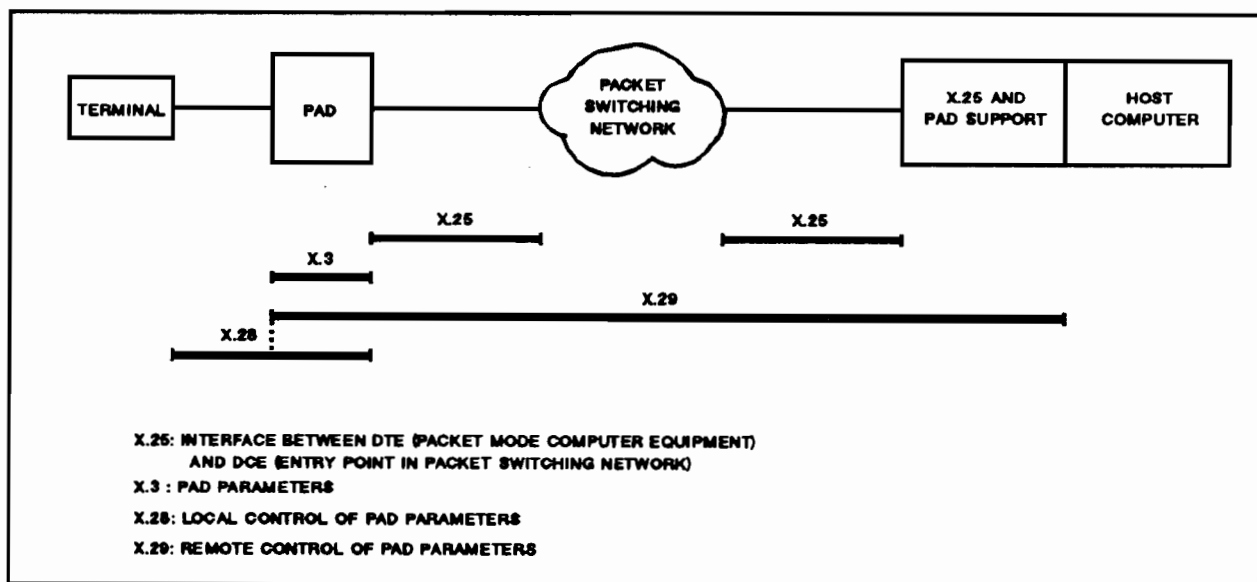

Figure 1-4 PAD-Related CCITT Recommendations

For further details on X.25 networks and the X.25 recommendations refer to the HP publication *X.25: The PSN Connection* (part number 5958-3402). Note that, to the HP 2335A, the X.25 network is a "black box" and its internal operation can generally be ignored by the user.

Leased Line

Leased lines are a very efficient means of exchanging large amounts of traffic between sites which are geographically close to each other. However in most countries the available leased lines are managed by the PTTs and are a very expensive solution particularly when applied to international communications. Countries such as the United States and the United Kingdom offer leased lines which are much cheaper, but in practice the leased line solution does not offer enough flexibility, when compared with an X.25 network, because the user can only be connected to one remote computer.

X.25 Network versus Leased Line

In an X.25 network, bandwidth is only allocated (and charged for) when a user is actively transmitting data. X.25 networks can also provide for connection between multiple host computers and multiple sites, whereas leased line or dial-up telephone lines (using modem links) can only connect one host to one site.

X.25 networks are a cheaper alternative to leased or dial-up lines for "moderate" data volumes, as charges are normally based on a flat monthly connection fee plus incremental charges based mainly on the volume of data. Thus the charges are independent of transmission time (except when connected to the PAD of a public X.25 network; see "PAD Description" above) and distance.

PPN Solution

User access via a Private Packet Network offers the advantage of added control for large numbers of users and higher system reliability. With the HP PPN this added control provides the flexibility to configure the network with the desired redundancy, permits Network Control Management, and offers the freedom to add more switching nodes as the network evolves.

HP PPN

As a PAD, the HP 2335A is part of a wide family of HP wide-area networking products which includes HP PPN (Hewlett-Packard Private Packet Network), HP's solution to company-wide networking requirements. The HP PPN product family (see figure 1-5) includes a full range of networking products for the design and management of private X.25 multi-vendor networks, as follows:

- A range of X.25 switching nodes (Models 60, 70, and 80), which provide a network with routing functions onto backbone links; they also record calls and collect statistics.

- The Model 45 multi-protocol X.25 switch, which can be easily connected with or without dedicated network management.

- A Network Control Processor, based on an HP 9000 series 300 computer, which manages central and distributed databases, coordinates administrative functions, and performs other service functions for the network.
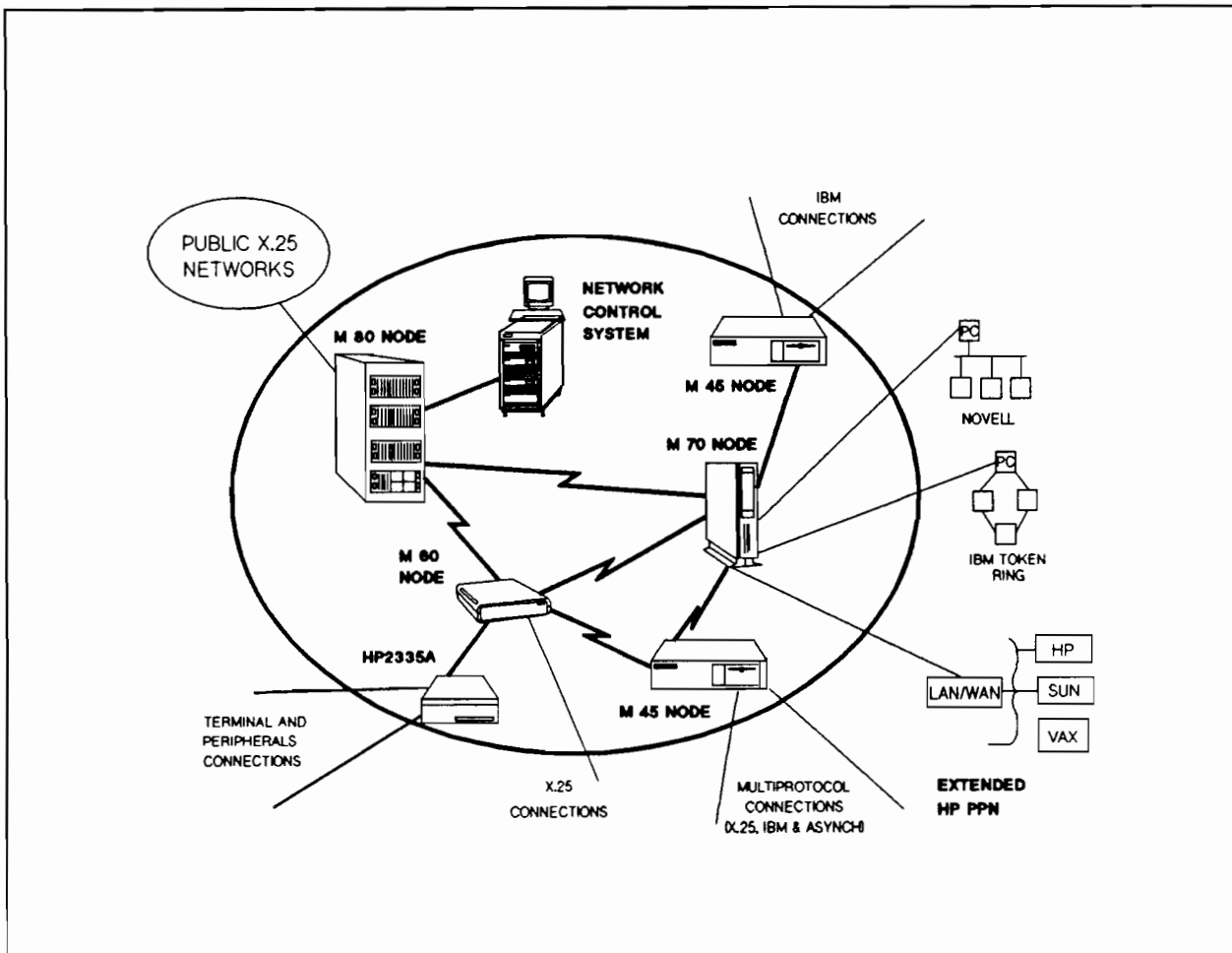
Figure 1-5 HP Private Packet Network

- A Network Operator Console, which allows the network operator to manage and control the network through menu-driven screen displays and report format structures.

- Access products for non-X.25 systems.

HP Network Support offers a full range of support services covering design, installation, operation, maintenance, and servicing of an X.25 network.

For more details on the full range of HP's wide-area network offerings, consult the HP AdvanceNet Specification Guide (part number 5956-4144), or contact your local HP sales office (addresses and telephone numbers are given at the back of this manual).

HP 2335A Solution
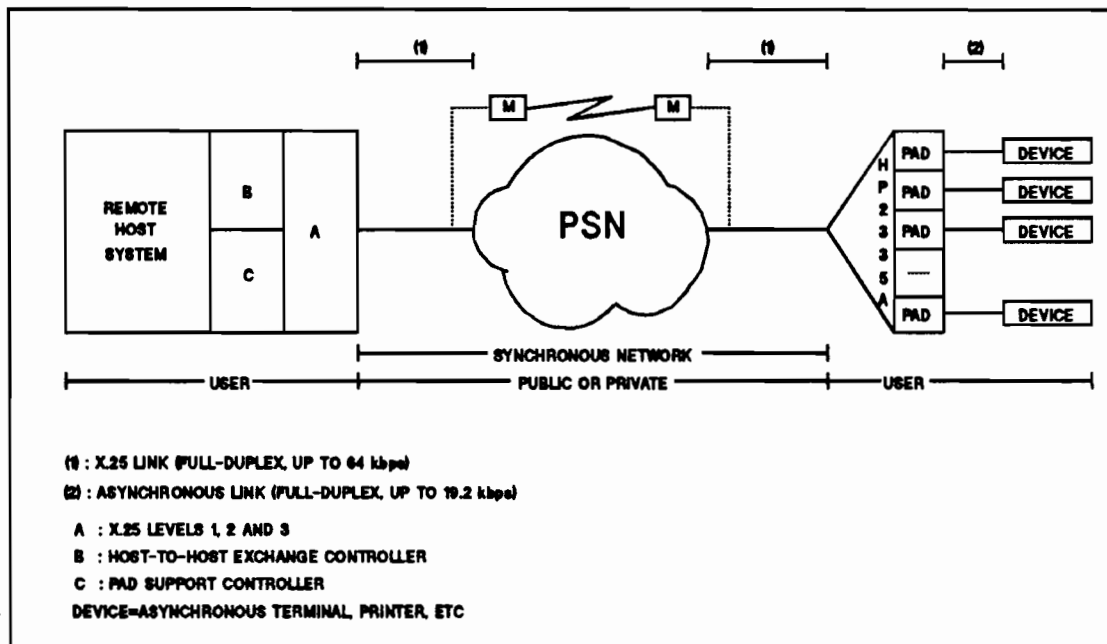
Figure 1-6   HP2335A in X.25 PAD Configuration

For asynchronous devices (such as terminals and printers), the HP 2335A operates as an external private PAD, communicating across the network using X.25 synchronous protocols. For most applications the HP 2335A-to-synchronous link is entirely transparent to the local device, which responds as if it is communicating directly with the remote host computer.

The HP 2335A permits high line speeds (up to 64 kbps on the X.25 line via an RS-232-C interface, and up to 19.2 kbps on the device lines) and reduces the connection cost for each device.

The HP 2335A combines in one product all the advantages of a private PAD and a statistical multiplexer:

■ Direct connection of up to 16 point-to-point asynchronous devices to an X.25 network.

■ Multiple, selectable host system connections.

■ Single connection to the X.25 network.

■ Statistical multiplexing.

■ High terminal-connection baud rate.

■ Capability to receive calls (important for printers).

■ Lower connection costs per device.

Additional Capabilities
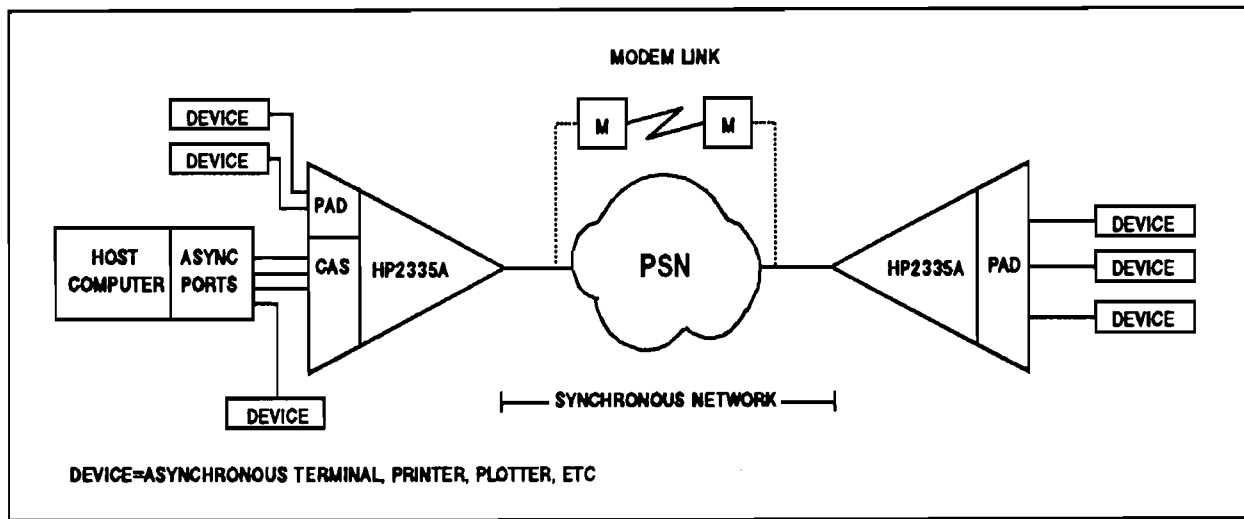
Figure 1-7   HP2335A in X.25 PAD and CAS Configuration

For computer systems which are not X.25-compatible, the HP 2335A offers a CAS (Computer Access Support) facility (see figure 1-7). For an X.25 network, the HP 2335A acts as an external PAD, communicating across the network using X.25 protocols. On the host computer side, the HP 2335A simulates a terminal (using an asynchronous RS-232-C interface); so the local host computer system assumes that it is communicating directly with the remote terminal(s), and not via the HP 2335A and X.25 network.

Figure 1-7 shows the HP 2335A capability to provide CAS in parallel with the PAD function. It must be noted that for the host computer to communicate with devices connected to the same HP 2335A the X.25 network must first be accessed, as local switching is not available.

The CAS feature allows the access to computer point-to-point asynchronous ports to be shared and to be connected to many terminals calling from a PAD (public or private). The transparency of the data communication link depends on the type of application and the PAD. Using another HP 2335A as a remote, private PAD (as shown above) will always provide the maximum transparency for any given application.

The CAS feature is important for non-X.25 computer systems and for personal computer data communication.

HP 2335A additional capabilities include:

■ Support of all CCITT X.3 parameters plus additional HP proprietary PAD parameters.

■ User-defined PAD profiles.

■ Flow control flexibility (X-ON/X-OFF, ENQ/ACK or no handshake).

■ Symbolic name addressing of the remote host computer allowing simple user access. (This feature is now called abbreviated addressing.)

■ Automatic dial and port disable facilities.

■ Reverse charging request and acceptance.

- NUI (Network User Identification).

- Support of call redirection and redirection notification.

- Hunt group.

- Acceptance of extended clear format.

- Acceptance of extended address facility.

- User-defined private user group suppresses the need to use a costly X.25 network closed user group facility.

- Statistical information on X.25 data transfer accuracy.

- Configurations held in non-volatile RAM enabling automatic recovery from power failure and unattended operation.

HP 2335A General Description

The HP 2335A is in a cabinet measuring 325mm wide x 153mm high x 260mm deep and is compatible with rack models 92211M, 92211L, and 92211R, which are the same as, for example, an HP 3000 (micro 3000) and HP 9000 (series 300). For details of the rack-mount kit for the HP 2335A, see the appropriate appendix of the *HP 2335A User's Guide* (02335-90022).

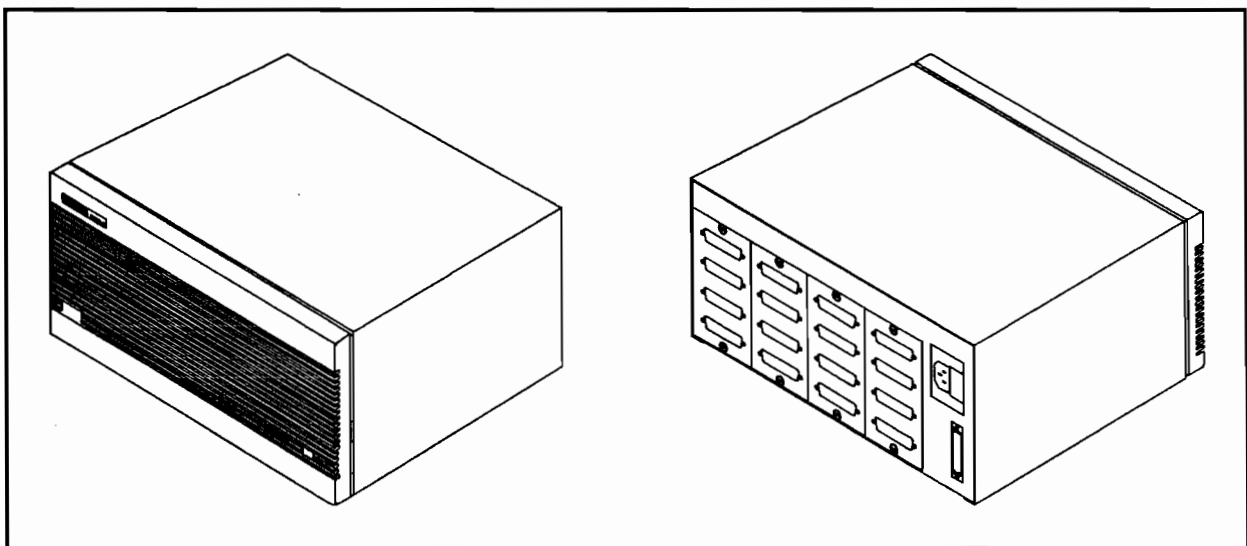Alternatively the cabinet can be placed on a shelf or desk-top.

Figure 1-8 Front and Rear Views of the HP2335A

optional modem adapters   mandatory modem adapter

asynchronous
port numbers   synchronous port
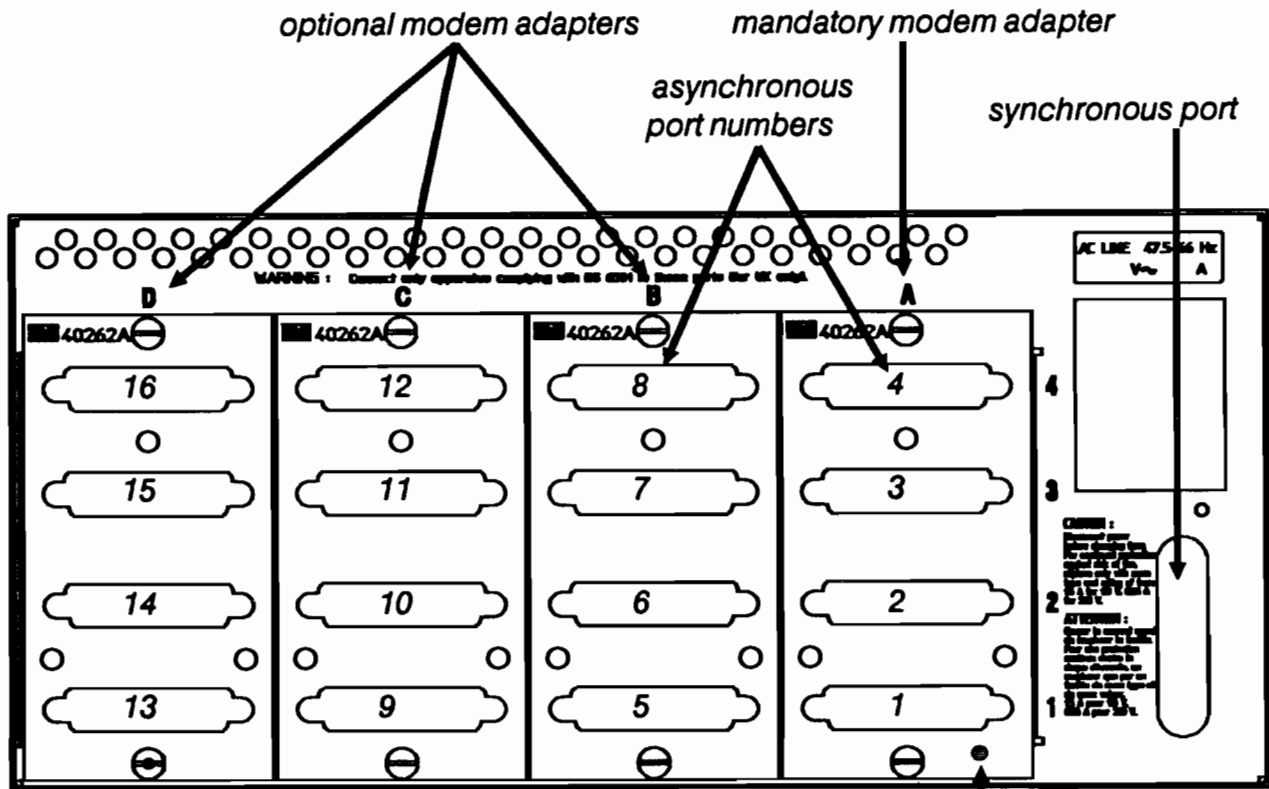
Figure 1-9   Port Referencing

mandatory modem
adapter securing screw

Front Panel Description

At the front of the unit is the ON/OFF switch and two indicators. The yellow light indicates X.25 level 2 readiness for Level 3 exchanges; the green light indicates power-on. A fold-down panel covers a Reset push-button, a number of DIP switches used to select the mode of operation (self-test and certain configuration procedures), and a row of 21 LED status indicators. This fold down panel hinges on its bottom edge and can be opened by gently pressing down on the two tabs and lowering the panel.

Rear Panel Description

A fixed panel on the rear of the HP 2335A incorporates the line input, fuse holder, and the 25-pin male sub-miniature D-connector used to connect the HP 2335A to either the X.25 network or another synchronous communications line. Alongside this fixed panel will be at least one, and up to four, modem adapters. The first adapter (A) must always be in place and should only be removed by qualified HP personnel. The other three adapters can be removed by following the instructions in chapter 6.

Modem Adapter Description

A modem adapter (HP40262A or HP40262B) consists of four ports which are 25-pin, female, subminiature D-connectors suitable for connection to RS-232-C asynchronous terminals. Flow control and data rate is defined individually for these connectors and according to the profiles defined in the HP 2335A. Using these

adapters the HP 2335A can be connected directly to modems, printers, VDTs and other terminal devices supporting RS-232-C asynchronous communications.

For configuration purposes, the ports are referenced according to figure 1-8, "HP 2335A Port Referencing". It is essential that modem adapter A (ports A1 to A4) is always in place, as local configuration of the HP 2335A is possible only via port A1.

When the HP 2335A is supplied with less than four modem adapters blanking panels are fitted to cover the unused positions.

Operation

The HP 2335A is an automatic unit providing interfacing between the connected asynchronous devices and any public/private synchronous network (X.25 network or modem link) employing the X.25 protocol.

It does not require an operator but must initially be configured with the synchronous network and asynchronous device(s)' communication parameters (e.g. baud rate, window size etc.). The communication parameters are stored in permanent (non-volatile) memory and are retained if the power supply is switched OFF.

For detailed information on how to configure the HP 2335A with these parameters refer to Chapter 3, "Configuration".

The device communication parameters may be subsequently changed from a local or remote device as described in Chapter 4, "Operation".

Typical Connections

The HP 2335A provides one RS-232-C port for connection to the synchronous network and up to 16 RS-232-C ports for asynchronous connections.

Synchronous Network Connection

The HP 2335A is connected to an X.25 network through a full-duplex synchronous modem which is normally installed and supported by the X.25 network. The HP 2335A is connected to the X.25 network modem using the RS-232-C cable supplied with the HP 2335A. The HP 2335A-to-modem link conforms with the CCITT X.21bis Recommendation while the communication protocols used are those defined in the X.25 Recommendation (for accessing an X.25 network).

Alternatively, the HP 2335A can communicate with a remote host computer system over a synchronous network comprising a pair of full-duplex synchronous modems connected via a leased, switched or digital line. In this case the telephone line quality MUST match that required by the modems.

Asynchronous Connections

The HP 2335A can accommodate up to four modem adapters, with each adapter providing four ports for connection to asynchronous devices/computer ports.

Up to 16 asynchronous, RS-232-C, point-to-point devices such as terminals, personal computers, printers, plotters, etc. may be connected directly, or via asynchronous modems, to the HP 2335A. For cabling information, see chapter 8.

The HP 2335A enables a non-X.25 computer system to be connected to an X.25 network (or any synchronous network which supports X.25 protocols) by connecting its asynchronous ports to the asynchronous ports of the HP 2335A. Using the CAS (Computer Access Support) facility, the HP 2335A emulates an asynchronous terminal for the host computer and provides the X.25 interface for the synchronous network.

In this case, the HP 2335A must be configured with a special CAS/PAD profile and all the remote terminals (or devices) requiring computer access must be connected to the synchronous network through a PAD (preferably another HP 2335A).

For further information on CAS and HP 2335A asynchronous connections refer to Chapter 3, "Configuration".

Modem Adapter

Each Modem Adapter is connected to the unit's main PCB via a single 48-pin connector. The Modem Adapter can also be ordered as an add-on to an installed HP 2335A (see chapter 8). Refer to Chapter 6 for installation information.

Each Modem Adapter is fitted with four 25-pin female connectors (sub D type ISO 2110) and all signals comply with the EIA RS-232-C and CCITT V.24/V.28 Recommendations. The HP 2335A supports the transmit and receive data signals plus the 5 main control signals: RTS, CTS, DTR, DSR and DCD.

Network Compatibility

The HP 2335A is compatible with most public X.25 networks. Contact your local HP representative for an up-to-date list of X.25 networks for which the HP 2335A has been certified. HP provides full product support for the HP 2335A when used with any certified X.25 network.

Some X.25 networks need the sub-address requirement to be specified at subscription time in order that the X.25 network can recognise any sub-address in an incoming call to the HP 2335A. For further details on configuring network parameters in the HP 2335A refer to Chapter 3, "Configuration". The HP 2335A may also be used in a private network, such as the HP Private Packet Network, consisting of other HP 2335As, HP1000s and/or HP 3000s, using the X.25 protocol over modem (or modem eliminator) links.

The network type must be specified when configuring the HP 2335A.

Options, Accessories, and References

For details of the HP 2335A product options, accessories and replacement modules, see chapter 8. For further details contact the nearest HP Sales and Support Office (as listed at the back of this manual).

For details of related reference documentation, see appendix F.

2

X.25 Network Subscription

Introduction

This chapter is a brief guide to help the user choose parameter values and facilities when subscribing to an X.25 network. The required subscription parameters vary from one X.25 network administration to another, so if a parameter which is shown as "user choice" does not appear on a subscription form it signifies that the X.25 network uses a defined value. The parameter values supplied and facilities requested at subscription time must be carefully selected in order that the subsequent X.25 network connection is cost-effective for the user's applications. Refer to the X.25 network authority for further information. The supplied subscription parameters must be recorded (or a copy of the subscription form kept) as this information is essential when initially configuring the HP 2335A and for any subsequent modifications to the configuration. The X.25 Level 1 to 3 parameters and supported X.25 network facilities are detailed in chapter 3, "Configuration", with reference to configuration of the HP 2335A. For more detailed information refer to the HP publication *X.25: The PSN Connection* (part number 5958-3402).

Warning   **The HP 2335A must be configured with all the required X.25 parameters and facilities in accordance with the values subscribed for with the X.25 network authority. Facilities that are subscribed for must be configured in the HP 2335A.**

Subscription Checklist

The tables on the next two pages provide a quick reference to establish for which parameters and facilities you must subscribed for with a X.25 network. Note that the HP 2335A proprietary facilities are also listed in the table on page 2-3 and that you should not subscribe for them with the X.25 network. Some of the parameters and facilities shown in the tables have supporting information which may be found in this chapter.

Parameter	Advice
X.25 LEVEL 1	
Line Speed	Use HP 2335A default value (supplied by the modem).
Physical Link	Not subscribed. Use HP 2335A default value (X.21 bis).
X.25 LEVEL 2	
Network Type	Not subscribed.
Frame Window	User choice. Recommended value 7.
Timer T1	Use the X.25 network defined value. Refer to line speed.
Retry Counter N2	Not subscribed.
Equipment Type	Use HP 2335A default value (LAP-B DTE).
I Frame	Not subscribed. Use HP 2335A default value (131 bytes).
X.25 LEVEL 3	
Local Address	Use the X.25 network defined value.
Window Size IN	Use the X.25 network defined value.
Window Size OUT	Use the X.25 network defined value.
Throughput IN/OUT	User choice. Refer to line speed.
Max Pkt Size IN	Use HP 2335A default value (128).
Max Pkt Size OUT	Use HP 2335A default value (128).
Number of PVCs	User choice. See under "Level 3 Parameters".
First PVC	User choice. See under "Level 3 Parameters".
Last PVC	User choice. See under "Level 3 Parameters".
No. of SVCs IN	User choice. See under "Level 3 Parameters".
First PVC	User choice. See under "Level 3 Parameters".
Last PVC	User choice. See under "Level 3 Parameters".
No. of SVCs 2-Way	User choice. See under "Level 3 Parameters".
First PVC	User choice. See under "Level 3 Parameters".
Last PVC	User choice. See under "Level 3 Parameters".
No. of SVCs OUT	User choice. See under "Level 3 Parameters".
First PVC	User choice. See under "Level 3 Parameters".
Last PVC	User choice. See under "Level 3 Parameters".

Facilities	X.25 Network Subscribed?	HP 2335A Supported?
Network User Identification	User choice	Yes
Call Redirection	User choice	Yes
Call Redirection Notification	User choice	Yes
Hunt Group	User choice	Yes
Extended Clear Format	User choice	Yes
Packet/Window Size Negotiation	User choice	Yes
Throughput Negotiation	User choice	Yes
Reverse Charging Acceptance	User choice	Yes
D-Bit	User choice	Yes
Incoming Calls Barred	User choice	Yes
Outgoing Calls Barred	User choice	Yes
Automatic D-Bit Modification		No
Fast Select		No
Packet Retransmission		No
Ext. Packet Seq. Numbering		No
RPOA Selection		No
PVC Associated Ports	Not necessary	Yes
Callable Port Pools	Not necessary	Yes
Local User Group	Not necessary	Yes
Symbolic Remote Address	Not necessary	Yes
(Abbreviated Address)		
Messages	Not necessary	Yes
Automatic Dial	Not necessary	Yes

Level 1 Parameters

Line Speed

The HP 2335A will support line speeds of up to 64 kbps, via an RS-232-C interface, the timing signals being provided by the modem. Some networks may offer a choice of physical link and in this case the X.21bis interface MUST be selected. For further information on Level 1 parameters refer to chapter 3, "Configuration".

Level 2 Parameters

The three parameters which must be subscribed at this level are as follows:

Frame Window

The recommended value for this parameter is 7.

Timer T1

It is recommended that the value for this parameter be in the range of 1000 to 3000 milliseconds, according to the line speed.

Equipment Type

The equipment type is always "LAP-B DTE" for an HP 2335A connected to an X.25 network. For further information on Level 2 parameters refer to chapter 3, "Configuration".

Level 3 Parameters

Note Local Address. When subscribing with certain X.25 networks the user *must* request the use of sub-addressing at subscription time.

The parameters which must be subscribed at Level 3 are as follows:

Window Size In/Out

The "window size in" and "window size out" parameters are subscribed parameters for most X.25 networks. Some X.25 networks use a default value of 2 for these parameters and the user cannot subscribe for a different value.

The recommended "window size in" parameter and "window size out" parameter value is 2.

Note If you subscribe to PSS (UK) and you choose a window size other than two, you must also subscribe for and configure for window and packet size negotiation.

Throughput In/Out

The parameter values selected must be less than or equal to the line speed selected (see chapter 3, "Configuration").

Maximum Packet Size In/Out.

The HP 2335A default value (128) must be selected for both the "in" and "out" parameter values.

PVCs AND SVCs

The user must first determine the number of PVCs that are required, if any. A PVC is a permanent "association" between a local and remote DTE. The number of SVCs that are required and whether they will be used for initiating calls, receiving calls or both initiating and receiving calls, must then be determined. The simplest solution is to subscribe for the required number of 2-way SVCs. Alternatively the SVCs can be split into the required number of each category according to the Logical Channel Number assignment rules detailed in chapter 3, "Configuration".

In order to have full access to the HP 2335A Remote Test Port at least one incoming SVC plus one outgoing SVC or two 2-way SVCs are required.

For further information on Level 3 parameters refer to chapter 3, "Configuration".

When the HP 2335A is to be used in an X.25 statistical multiplexerx configuration, it is recommended that any printer-connected device ports are assigned PVCs, or, if assigned SVCs, that they are configured with the ADL facility (on the CAS side).

Facilities

The optional user facilities which may be provided by the various X.25 networks are shown in the first section of the Subscription Checklist, on page 2-3. The facilities which are supported by the HP 2335A may be requested by the user at X.25 network subscription time. Some of these facilities will be in effect on all virtual circuits (VCs) at all times; others may be requested on a per-call basis. You should *not* subscribe with the the X.25 authority for those facilities listed in the Subscription Checklist which are not supported by the HP 2335A. The supported facilities which when subscribed for are effective on all VCs are as follows:

- Packet Size Negotiation

- Window Size Negotiation

- Throughput (class) Negotiation

- Reverse Charging Acceptance

- D-Bit (end-to-end acknowledgment)

- Network User Identification

- Call Redirection

- Call Redirection Notification

- Hunt Group

The only supported facilities which need to be requested on a per-call basis are as follows:

- Reverse Charging Request

- X.25 Network Closed User Group (CUG) Access

Note that the HP 2335A offers a facility called a Local User Group (LUG) which can eliminate the expense and the need to subscribe for a CUG with the X.25 network, see chapter 3, "MSG, SRA, LUG & POOL Configuration".

To summarize, if a facility is *not* required do *not* subscribe for it. Except when negotiation facilities are required (to negotiate a defined X.25 network parameter value to the HP 2335A default parameter value) the only recommended facility to subscribe for is the Reverse Charging Acceptance facility when this is required.

3

Configuration

Introduction

This chapter deals with the various aspects of the configuration of the HP 2335A, including:

■ Selecting a Default Configuration.

■ Entering Configuration Mode.

■ Synchronous Network Configuration.

■ MSG, SRA, LUG, & Pool Configuration.

■ Asynchronous Ports Profile Configuration.

■ Automatic Dial Assignment.

■ List Command.

■ PAD Parameters.

■ Configuration Examples.

The HP 2335A must be configured for communication across the synchronous network (X.25 parameters), and for communication with the connected asynchronous devices or computer ports (PAD parameters).

These communication parameters are initially defined using one of two available default configurations. After initial selection the chosen default configuration is automatically saved in non-volatile (permanent) memory so that the HP 2335A does not require re-configuration each time it is powered-on.

Should the user require a configuration other than the default configurations, the modifications can be made either off-line (i.e. when not communicating with the synchronous network or devices), or by using the on-line diagnostic facility. Any modifications to the configuration are saved automatically in the non-volatile (permanent) memory.

On-line modification of a default configuration is performed using one of the connected terminals, and using the on-line access to the configuration in diagnostic mode.

Off-line modification of a default configuration (required to make changes to the X.25 parameters of the configuration) is normally performed using a terminal which is directly connected to the HP 2335A device port A1 (refer to "Preparation", later in this chapter). Alternatively the off-line modification may be performed

from a remote location by connecting the remote terminal to the HP 2335A device port A1 via a pair of asynchronous modems and a telephone line (see "Remote Off-Line Configuration", later in this chapter).

During the off-line modification procedure, he HP 2335A may be physically connected to the synchronous network and the asynchronous devices as required, except that port A1 is normally connected to the terminal from which you are modifying the configuration.

Selecting a Default Configuration

Procedure

The HP 2335A has two default configurations, which enable it to be put into operation very quickly. These default configurations are intended to be used in a Statistical Multiplexer Connection over a leased line, with little or no alteration. They can also be used as a basis for all other configurations, the additional information required being added without the need to re-enter all the existing information.

To use either of the two default configurations in the HP 2335A, they must first be selected by using the DIP switches, which are located at the front of the module. If the devices to be connected to the HP 2335A have asynchronous device ports (for example terminals, printers, etc.) then the default PAD configuration is required. However, if the devices to be connected to the HP 2335A have asynchronous system ports (for example DTC or ATP ports) then the default CAS configuration is required.

A default configuration of the HP 2335A may be selected by simply setting the DIP switches, as given below, and performing a power-on. This will result in the default configuration being down-loaded into the CMOS RAM. A listing of the default parameters (for both PAD and CAS) is given in "Configuration Listing" later in this chapter.

Note   The default configuration will be downloaded only if *no other* user configuration already exists. **In other words, the only circumstance in which you can use the DIP switches to select a default configuration is when you switch on the HP 2335A for the very first time.** Thereafter, you can return to the same default configurations via the DEF-PAD and DEF-CAS commands (see chapter 3, "Configuration").

To set the HP 2335A default PAD configuration, the DIP switches must be set as follows and a power-on performed.

```
DIP Switch: A   B   C   D   E   F   G   H       1 = up (on)

Setting:    0   0   0   1   0   0   0   0       0 = down (off)
```

To set the HP 2335A default CAS configuration, the DIP switches must be set as follows and a power-on performed.

```
DIP Switch: A   B   C   D   E   F   G   H       1 = up (on)

Setting:    0   0   0   1   1   0   0   0       0 = down (off)
```

In both cases the HP 2335A performs the power-on test, and downloads the selected default configuration.

When the green READY LED is on, set all switches down. The HP 2335A is now configured for use as a statistical multiplexer over a leased line.

If a configuration listing is required or the default configuration needs to be modified then refer to "Entering Configuration Mode" and onwards.
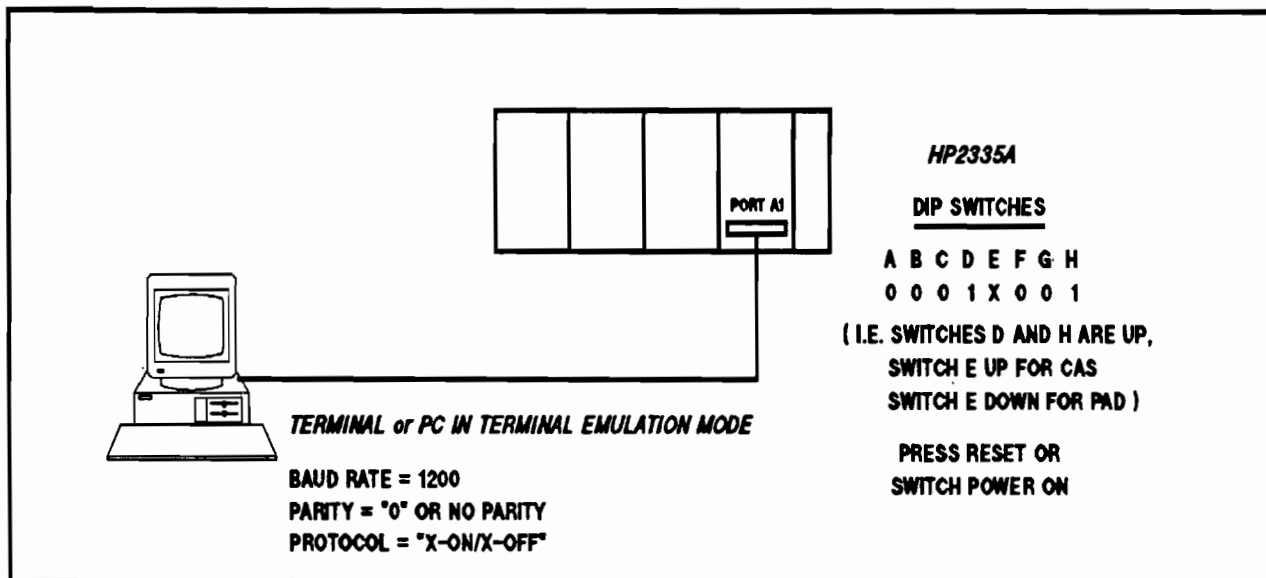
Entering Configuration Mode

Figure 3-1   Summary of Local Off-Line Configuration

Preparation

The HP 2335A should be prepared for off-line configuration as follows:

1. Connect an HP character mode interactive terminal to device port A1. All other asynchronous devices may remain connected as required. The synchronous network may remain connected as required.

2. Set the terminal as follows:
   - BAUD RATE - 1200 baud.
   - DATA BITS - 7 or 8.
   - PARITY - set for 0 or no parity.
   - X-ON/X-OFF Handshake - ENABLED.
   - FULL DUPLEX.
   - REMOTE mode.
   - Automatic Line Feed - DISABLED.
   - CHARACTER mode (BLOCK mode OFF).

3. To modify the Default Configurations, set the DIP switches as follows:

   a. For PAD:

   ```
   DIP Switch: A   B   C   D   E   F   G   H        1 = up (on)

   Setting:    0   0   0   1   0   0   0   1        0 = down (off)
   ```

   b. For CAS:

   ```
   DIP Switch: A   B   C   D   E   F   G   H        1 = up (on)

   Setting:    0   0   0   1   1   0   0   1        0 = down (off)
   ```

4. To re-configure the HP 2335A (i.e. modify an existing configuration), set the HP 2335A to configure mode by setting the DIP switches as follows:

   ```
   DIP Switch: A   B   C   D   E   F   G   H        1 = up (on)

   Setting:    x   x   x   0   0   0   0   1        0 = down (off)

                                                    x = either
   ```

Notes   When the HP 2335A is in configure mode only port A1 is enabled and it is pre-configured at 1200 baud.

For Germany only. If you have an HP40262B modem adapter installed in slot A (that is if you bought the HP 2335A with option G23 for connection to modems in Germany), then you need an additional cable (HP40219A) to connect the modem adapter to the standard cable.

Procedure

To enter configure mode, simply press the reset push-button (or if the HP 2335A is switched OFF, switch it ON). This causes:

1. The power-on test to be performed, as described in Chapter 7, "Troubleshooting".

2. If the power-on test is successful, the HP 2335A enters the configure mode and the LEDs illuminate as follows:

   ```
   LED:    A   B   C   D   E        1 = on

   MODE:   1   b   b   0   0        0 = off

                                    b = blinking on and off
   ```

   In addition, while the HP 2335A is being configured LED A will be ON (illuminated) as only port A1 is recognized while the HP 2335A is in configure mode. If the LEDs are not like this, then refer to chapter 7, "Troubleshooting".

3. The HP 2335A automatically provides the initial off-line configuration listing as shown in "Configuration Listing". If the HP 2335A has previously been configured, then the off-line configuration listing provides the HP 2335A current configuration.

The off-line configuration message lists the configuration in the following order:

- The HP 2335A-to-Synchronous Network (X.25) configuration (see HSA).

- The HP 2335A-to-Device (X.3 parameters) configuration (see ASG). This shows the "profile" assigned to each port.

- The hardware installed in the HP 2335A. This details the ROMs fitted on the main PCB, and is followed by Modem Adapter information. Note that no data will be displayed if a Modem Adapter is not fitted in the associated position (e.g. slot D). The same indication is given for Modem Adapter types HP40262A and HP40262B.

4. The HP 2335A then provides an asterisk (*) prompt and waits for the user's configuration command. For a list of the configuration commands see "Configuration Commands" later in this chapter.

Remote Off-Line Configuration
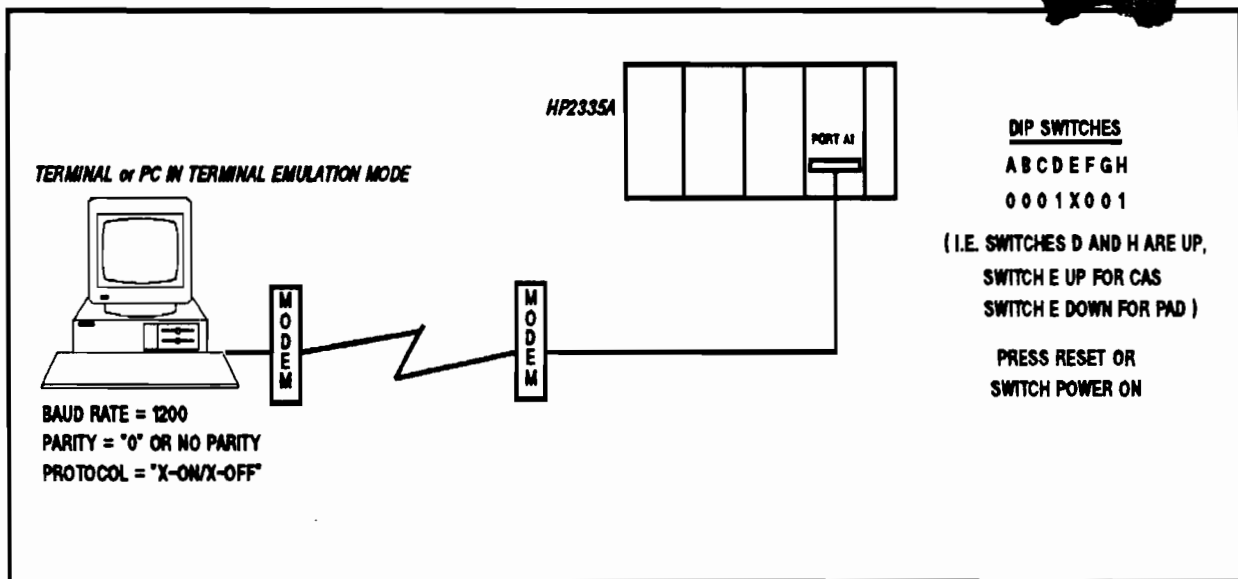
Figure 3-2   Summary of Remote Off-Line Configuration

The off-line configuration may be performed remotely by connecting a terminal to port A1 of the HP 2335A via a telephone line and two full duplex, asynchronous modems (at 1200 baud) as shown in figure 3-2. An operator is required at the HP 2335A location to perform certain simple actions (DIP switch setting, power-on/reset and reading the LEDs).

This is an important feature as it enables, for example, an experienced operator to perform off-line configuration of any HP 2335A located at a remote site (branch offices) without leaving the company headquarters.

Once communication is established between the terminal and the HP 2335A, the preparation and configuration procedure is the same as for local HP 2335A configuration.

Configuration Listing

Below is an example of an initial configuration listing, as it would appear on screen.

```
                    HP PAD  Rev 30.xx CONFIGURATION
HSA
HP PAD    CONFIGURATION X25 LEVEL I
          ----------------------------------
          -PHYS. LINK    : X.21bis DTE       -EXT. SPEED     : 19200
          -LINE SPEED    : Supplied by the modem-MODEM TIMER  : 6000  ms
          ----------------------------------
HP PAD    CONFIGURATION X25 LEVEL II
          ----------------------------------
          -NETWORK TYPE  : NET.0             -EQUIP. TYPE    : LAP-B DTE
          -FRAME WINDOW  : 7                 -TIMER  T1      : 3000  ms
          -RET. CNT N2   : 20                -I-FRAME        : 131 bytes
          ----------------------------------
HP PAD    CONFIGURATION X25 LEVEL III
          ----------------------------------
          -LOCAL ADORESS : 00
          -WIND. SIZE IN : 2                 -WIND. SIZE OUT: 2
          -THROUGHPUT IN : 19200             -THROUGHPUT OUT: 19200
          -PACK. SIZE IN : 128               -PACK. SIZE OUT: 128
          -FIRST  PVC    : 1                 -LAST   PVC     : 3
          -FIRST  SVC IN :                   -LAST   SVC IN  :
          -FIRST  2W SVC : 16                -LAST   2W SVC  : 17
          -FIRST  SVC OUT:                   -LAST    SVC OUT:
          -D-BIT         : NO
          -PKT.NUMBERING : 8
          -FAC. SUPPORTED: PKT.SZ  WIND.SZ  THO.PT  RV.CGA  1984 Fac
          -PVC ASSOC. PRT: 1:A2, 2:A3, 3:A4
          ----------------------------------
HP PAD    CONFIGURATION X25 LEVEL LUG
          ----------------------------------
          -REMOTE ADDRESS
          ----------------------------------
HP PAD    CONFIGURATION X25 LEVEL SRA
```

```
------------------------------------
-REMOTE ADDRESS
-1) 01 ------ REM_ADDR
-2) 17 ------ RDIAG
------------------------------------
```

HP PAD CONFIGURATION: PORT POOLS

```
------------------------------------
-First  port pool: From -- to --
-Second port pool: From -- to --
-Third  port pool: From -- to --
------------------------------------
```

ASG

Assignment for each port

```
     .    1    2    3    4
     D    1    1    1    1
     C    1    1    1    1
     B    1    1    1    1
     A    1    1    1    1
     -----------------------------
CPU     02335-xxxxx
SC-D
SC-C
SC-B
SC-A   02335-xxxxx  .  02335-xxxxx  .  RS232MOD4 ports
```

Note   If the default CAS profile has been selected, the differences that will be seen in the listing are given below:

HP PAD   CONFIGURATION X25 LEVEL II

```
---------------------------------
-NETWORK TYPE  : DCE,0        -EQUIP. TYPE  : LAP-B DCE
-FRAME WINDOW  : 7            -TIMER  T1    : 3000  ms
-RET. CNT N2   : 20           -I-FRAME      : 131 bytes
---------------------------------
```

```
ASG

  Assignment for each port


    .   1    2    3    4

    D   71   71   71   71

    C   71   71   71   71

    B   71   71   71   71

    A   71   71   71   71

        -----------------------------
```

In the example :

■ Only one modem adapter (for four channels) has been fitted.

■ Certain parameters in X.25 Level 1 to Level 3 are pre-selected and cannot be changed by the user. Details of these parameters are given in "X.25 Configuration Levels" later in this chapter.

■ The part numbers adjacent to "CPU" refer to the CPU ROM fitted on the main PCB (i.e. the current firmware revision).

■ The parameters SC-D, SC-C, SC-B and SC-A refer to the serial ROM revisions for each of the Modem Adaptors fitted in slots D, C, B and A respectively, at the back of the HP 2335A.

Note   The default PAD configuration also includes one pre-defined Automatic Dial assignment (ADL), which is assigned to port A1. If the HP 2335A is used with an X.25 network this ADL assignment must be disabled, or the Symbolic Remote Address (SRA) modified. To do this refer to "Automatic Dial Assignment" and "MSG, SRA, LUG & Pool Configuration" respectively, both later in this chapter.

Configuration Commands

In configure mode the HP 2335A provides a current (or an initial) configuration listing, followed by an asterisk (*) prompt which allows the user to enter one of the following primary commands :

Primary Command	Function
HSA	To configure the synchronous network parameters.
ASG	To assign a profile for an asynchronous port.
UDP	To create a user-defined profile for an asynchronous port.
ADL	To assign automatic dial for an asynchronous port.
DEF-PAD	To define the HP 2335A as a default PAD.
DEF-CAS	To define the HP 2335A as a default CAS.
LIST	To list the synchronous network parameters.
HELP	To display a brief explanation of each command (like this table).

- Press ↵ after each command.
- HSA, ASG, UDP and ADL each have a subset of secondary commands.
- To return to the *, press ↵ again.

The configuration listing displayed on entering configure mode is identical to that displayed in response to the command LIST. Similarly, the main configuration levels (e.g. X.25 Level 3) are listed in the same way by using the corresponding HSA : LIST command (e.g. HSA : LIST3) as detailed in "HSA User Commands" later in this chapter.

Note   Editing is allowed during off-line configuration; the character delete and line delete characters are "Backspace" and "Control-X" respectively.

Help Commands

A help facility is incorporated into the HP 2335A, and it can be accessed from anywhere within the interactive operation. In the configuration mode it is accessed by entering HELP in response to the configure asterisk (*) prompt. The help facility takes the form of screens which give information on available commands, and the associated syntax.

Synchronous Network Configuration

Introduction

The HP 2335A-to-synchronous network data communication parameters defined by default are intended for use in a statistical multiplexer configuration via a leased line. If the HP 2335A is to be used in any other configuration then the parameters must be modified to correspond with that configuration.

To modify the HP 2335A-to-synchronous network data communication parameters, the procedure is as follows:

1. Place the HP 2335A in Configure mode (* prompt).

   Access to the configure mode in off-line mode is detailed in "Preparation and Procedure".
   Access to the configure mode in the on-line mode is detailed in chapter 4, "PAD Command Signals" (for local access) and chapter 5, "On-line Diagnostic Mode" (for remote access).

2. Enter the primary command HSA.

   This command allows the user to modify all the X.25 parameters (Levels 1, 2 and 3) and is also used for configuring the messages (including a test port password), Symbolic Remote Address (SRA), Local User Group (LUG) and Port Pool (POOL) facilities.

HSA User Commands

The following HSA secondary user commands are available once the "HSA:" prompt has been obtained:

HSA Command	Function
LEVEL1	To configure X.25 level 1 parameters.
LEVEL2	To configure X.25 level 2 parameters.
LEVEL3	To configure X.25 level 3 parameters.
MSG	To configure internal messages.
SRA	To define abbreviated addresses.
LUG	To define local user groups
POOL	To define port pools.
LIST1	To list X.25 level 1 parameter values.
LIST2	To list X.25 level 2 parameter values.
LIST3	To list X.25 level 3 parameter values.
LISTMSG	To list internal messages.
LISTSRA	To list abbreviated addresses.
LISTLUG	To list local user groups.
LISTPOOL	To list port pools.

- Press ↵ after each command.
- To return to the HSA: prompt, press ↵ again.
- To return to the * prompt from the HSA: prompt, press ↵ again.

Note that the first seven of the above HSA secondary commands are used for parameter configuration/definition while the LIST commands are used simply to list the configured parameters.

Configuration Procedure

Once the HSA: prompt has been obtained as described in "Synchronous Network Configuration", "Introduction", the appropriate HSA secondary commands must be entered to configure the X.25 levels and facilities in the order shown later in "Configuration Dialogue". Certain configuration parameters (e.g. packet size) are pre-configured in the HP 2335A. The HP 2335A does not provide a prompt for these parameters and they cannot be changed by the user.

The HP 2335A responds to each secondary command by displaying a series of configuration parameter prompts (questions), providing a new prompt each time the user inputs a valid response (value) until the configuration cycle is complete. Note that the configuration can only be set in the sequence shown and that all responses must be terminated and correctly assigned values validated by pressing the terminal's ↵ key. Thus if a parameter value has to be changed then the complete sequence (e.g. Level III) must be repeated.

When entering a value to a parameter question, the Backspace key (or Cancel) may be used to correct an error. If a configuration parameter is entered with a syntax error then the HP 2335A responds with the following message: "Unknown command. For help, enter HELP."

If the HP 2335A is being configured for the first time the default PAD configuration will be the one being modified, unless the HP 2335A has already been defined as a default CAS. When modifications are being

made, any parameter (except virtual circuits) that does not need to be changed can be kept by simply pressing the terminal's ↵ key which validates the existing parameter value. When assigning virtual circuits, a carriage return (Cr) (generated by pressing ↵) in response to a prompt (question) means that there are no virtual circuits of the defined type.

X.25 Levels 1 to 3 are implemented according to the X.25 1984 recommendations. Details of the X.25 Level 1 to 3 parameters and user facilities are detailed in "X.25 Configuration Levels". For details of the HP 2335A Messages (MSG), Symbolic Remote Address (SRA), Local User Group (LUG) and Port Pool (POOL) facilities refer to "MSG, SRA, LUG & POOL Configuration", later in this chapter.

The values and responses selected when configuring the HP 2335A synchronous network communication parameters *must* match those defined at the remote location (e.g. the other HP 2335A in a statistical multiplexer configured non-X.25 network) or subscribed for with the X.25 network authority. Differences between PAD and CAS HP12335As form an exception here. The only exceptions to this rule are those parameters (eg. network type) which vary between standard PAD and CAS configurations.

When all the levels and facilities have been configured, it is recommended to check that all parameter values have been correctly assigned by using the relevant LIST secondary command detailed in "HSA User Commands" above.

Configuration Dialogue

A specification of the HP 2335A's configuration dialogue starts on the next page.

To retain the default values, simply press ↵ .

Level 1 Configuration

At the prompt ...	You may enter ...	Comments
HSA:	LEVEL1 ↵	
Mod. signals timer?	1000 to 10000↵	Specify value for the modem signals timer, in milliseconds. *Default 6000.*
Ext. speed?	4800, 9600, 19200, 48000, or 64000 ↵	Specify the baud rate to be supplied on pin 24 of the synchronous network connector (RS-232-C), in bps. *Default 19200.*
HSA:		

Level 2 Configuration

At the prompt ...	You may enter ...	Comments
HSA:	LEVEL2 ↵	
NTK type?		Specify the type of network ...
	TEL ↵	For TELENET.
	NTS,XX ↵	For X.25 networks without sub-address.
		Note: XX represents the number of digits of the called address in a call request (excluding sub-address).
	NET,XX ↵	For all other X.25 networks or where the HP 2335A is a DTE in a non-X.25 network configuration.
	NBS,XX ↵	National Bureau of Standards compatible.
	DCE,XX ↵	For non-X.25 network configurations where the HP 2335A is a DCE.
		Default for a PAD configuration: NET,0 *Default for a CAS configuration: DCE,0*
Frame window?	1, 2, 3, 4, 5, 6, 7 ↵	Specify the window size at frame level (parameter k). *Default 7.*
Timer T1?	1000 - 30000↵	Specify the frame timeout in milliseconds. *Default 3000.*
HSA:		

Level 3 Configuration

At the prompt ...	You may enter ...	Comments
HSA:	LEVEL3 ↵	
Local Address?	nnnnnnnnnnnnnss ↵	Specify the local network address of the HP 2335A (up to 13 digits) + relative sub-address base (two digits). *Default 00.*
Throughput In?	75, 150, 300, 600, 1200, 2400, 4800, 9600, 19200 ↵	Specify the throughput class in (03 to 11). Must be < = line speed. *Default 19200.*
Throughput Out?	75, 150, 300, 600, 1200, 2400, 4800, 9600, 19200 ↵	Specify the throughput class out (03 to 11). Must be < = line speed. *Default 19200.*
Window Size In?	1, 2, 3, 4, 5, 6, 7 ↵	Specify the window size from the network to the HP 2335A. *Default 2.*
Window Size Out?	1, 2, 3, 4, 5, 6, 7 ↵	Specify the window size from the HP 2335A to the network. *Default 2.*
Def/Mod VC Table?	YES or NO ↵	Define or Modify Virtual Circuit Table? *Default No (go to "Use X.25 Facilities?").*
First PVC?	↵	Go to "First SVC IN?" (see below).
	n ↵	Specify the first PVC to start at LCN = n; n is X.25 network-assigned or is user-defined in a private link. *Default 01.* If 16 PVCs have been defined, next prompt is "First SVC In?" (see below).
		See figure 3-3.
Last PVC?	n1 ↵	Specify the last PVC to be at LCN = n1 (up to 16 PVCs). *Default is number of installed ports minus 1.*
First SVC In?	↵	Go to "First 2W SVC" (see below).
	n2 ↵	Specify the first SVCIn to start at LIC = n2 (LCN < n2 < 4096)
Last SVC IN?	n3 ↵	Specify the last SVC In to be at HIC = n3 (LIC < n3 < 4096)
First 2W SVC?	↵	Go to "First SVC Out?"
	n4 ↵	Specify the first 2W SVC to start at LTC = n4 (HIC < n4 < 4096). *Default 16.*
Last 2W SVC?	n5 ↵	Specify the last 2W SVC to be at HTC = n5 (LTC < n5 < 4096). *Default 17.*
First SVC Out?	↵	Go to Use "X.25 Facilities?" (see below).

	n6 ↵

Specify the first SVC Out to start at LOC = n6 (HTC < n6 < 4096)

Last SVC Out?	n7 ↵

Specify the last SVC Out to be at HOC = n7 (HTC < n7 < 4096)

Use X.25 facilities?	YES or NO ↵

Specify if the HP 2335A is to use X.25 facilities? *Default No*. If No, then you will exit Level 3 dialogue if VC table has not been modified or if no PVCs have been defined. Otherwise you will go to "PVC Ass Port?" (see below).

1984 fac?	YES or NO ↵

Specify if the X.25 1984 facilities are to be used (NUI, call redirection, call redirection notification, hunt group, and extended clear format). *Default No*.

Neg Packet Size?	YES or NO ↵

Specify if HP 2335A is to negotiate packet size on each call. *Default No*.

Neg Window Size?	YES or NO ↵

Specify if HP 2335A is to negotiate window size on each call. *Default No*.

Neg Throughput?	YES or NO ↵

Specify if HP 2335A is to negotiate throughput class on each call. *Default No*.

Rev. Char. Acc?	YES or NO ↵

Specify if HP 2335A is to accept reverse charge calls. *Default No*.

D Bit?	YES or NO ↵

Specify if HP 2335A is to use end-to-end acknowledgement on each call. *Default No*.

PVC Ass Port?	pn ↵

Asked only if PVCs are defined and repeated for each PVC (up to 16). Specify the port associated with each PVC.
p = A, B, C or D
n = 1, 2, 3 or 4

HSA:	

Message Configuration

At the prompt ...	You may enter ...	Comments
HSA	MSG ↵	
PAD Msg Header?	"xxxxxxxxxx" ↵	Specify the PAD Message Header (up to ten characters) displayed before a PAD message (CLR or RESET).
	Ctrl-W ↵	Press Ctrl-W for no message.
	↵	Press ↵ to keep the existing message
Welcome Message?	"xxxxxxxxxxxxxxxxxxxx" ↵	Specify the PAD Identification Service Signal (up to 20 characters) displayed on power-on or reset in RUN mode.
	Ctrl-W ↵	Press Ctrl-W for no message.
	↵	Press ↵ to keep the existing message. *Default is "Enter your address".*
Password?	"xxxxxxxxxx"	Specify the password for the test port (up to ten characters).
	Ctrl-W	Press Ctrl-W for no message.
	↵	Press ↵ to keep the existing password.
HSA:		

Symbolic Remote Address Configuration

Note   This is also referred to as the abbreviated address facility.

At the prompt ...	You may enter ...	Comments
HSA:	SRA ↵	
Call limited to SRA?	Y or N ↵	Specify if calls are to be limited to SRA.

Note that if you enter Y here, but define no SRAs, then no outgoing calls will be allowed.

Add or Clear?	AD or CL ↵	Specify if you want to add to the SRA list (AD), or clear the entire list (CL). CL prompts for new inputs.
SRA?	"ssssssss" ↵	Specify the symbolic name of remote DTE to be added to the list (up to eight characters). s = any character in IA5 cols 2 to 7 except:

'
+
Cr

To exit, simply press ↵ .

Remote Address Ass.?	"nnnnnnnnnnnnnnn" ↵	Specify the remote DTE address which is associated with the symbolic name (up to 15 digits); n = 0 to 9. The SRA prompt is then repeated. Up to 16 SRAs can be defined.

Defaults:
01) 13809748201 <— REM_ADDR
02) 13809748217 <— RDIAG

HSA:

Local User Group Configuration

At the prompt ...	You may enter ...	Comments
HSA:	LUG ↵	
Add or Clear?	AD or CL ↵	Specify if you want to add to the LUG list (AD), or clear the entire list (CL). CL prompts for new inputs.
Remote Address?	"nnnnnnnnnnnnnnn" ↵	Specify the remote DTE address to be added to the list (up to 15 digits); $n = 0$ to 9, or X. X = don't care value. The prompt is repeated, to define up to 16 filters.

Simply press ↵ to exit.

HSA:	

Port Pool Configuration

At the prompt ...	You may enter ...	Comments
HSA:	POOL ↵	
Mod. first port pool?	n ↵	Specify the HP 2335A port number (eg. A1) for the first port in the first pool
	↵	Press ↵ to exit and clear all port pools.
Last port?	n1 ↵	Specify the HP 2335A port number for the last port in the first pool.
Mod. second port pool?	n2 ↵	Specify the HP 2335A port number for the first port in the second pool.
	↵	Press ↵ to exit and clear all remaining pools.
Last port?	n3 ↵	Specify the HP 2335A port number for the last port in the second pool.
Mod. third port pool?	n4 ↵	Specify the HP 2335A port number for the first port in the third pool.
	↵	Press ↵ to exit and clear the third pool.
Last port?	n5 ↵	Specify the HP 2335A port number for the last port in the third pool.

Note that there must be no overlaps, and that:

$$n < n1 < n2 < n3 < n4 < n5$$

The system responds:

```
HP PAD CONFIGURATION:  PORT POOLS

    ----------------------------------------------------------------
    - First port pool      :     From n  to n1
    - Second port pool     :     From n2 to n3
    - Third port pool      :     From n4 to n5
    ----------------------------------------------------------------

HSA:
```

X.25 Configuration Levels

For default values, see the specification of the configuration dialogue in the previous section.

X.25 LEVEL 1

X.25 Level 1 defines the physical, electrical and handshake characteristics between the HP 2335A and the synchronous network. At Level 1 there are two user selectable parameters and two pre-selected parameters. These are as follows.

User Selectable Parameters

MODEM SIGNALS TIMER

This parameter specifies the maximum time period that the HP 2335A waits after a synchronous line drop before considering that the line is down. The time that may be specified for the modem signals timer must be in the range of 1000 to 10000 milliseconds (smallest change = 10 milliseconds).

EXTERNAL SPEED

This user-selectable parameter value is for the external line speed. The following external line speeds are available:

- 4800 bps
- 9600 bps
- 19200 bps
- 48000 bps
- 64000 bps

When connected to an X.25 network or a synchronous modem, the HP 2335A will support any line speed up to 64000 bps as the timing signals are provided by the modem.

Where the HP 2335A is required to provide a timing signal, the internal clock (on pin 24) provides speeds according to the configured external speed value. An example of this situation could be a private X.25 network using direct (modem suppressor) cable connections.

Pre-selected Parameters

PHYSICAL LINK

The pre-selected parameter value for the physical link is always X.21bis DTE for the HP 2335A.

LINE SPEED

The value for the line speed is provided by the synchronous modem. The HP 2335A supports all line speeds between 110 bps and 64000 bps.

X.25 LEVEL 2

The HP 2335A implements LAP-B (Link Access Protocol - Balanced) at Level 2 as described in the CCITT X.25 Recommendation. The Level 2 parameters define the link level protocol between the HP 2335A and the synchronous network.

User Selectable Parameters

NETWORK TYPE

This parameter identifies the type of synchronous network to which the HP 2335A can be connected. The synchronous network may be an X.25 network or a private X.25 network. When configuring the HP 2335A, the network types fall into five categories:

TEL	TELENET (U.S.A.) only.
NTS,XX	For all X.25 networks which do not support sub-addresses.
NET,XX	For ALL other networks (X.25 networks or modem-link networks) where the HP 2335A is a DTE (see Note below).
NBS,XX	For use with networks compatible with the National Bureau of Standards.
DCE,XX	For non-X.25 network networks only; when the HP 2335A is a DCE (see Note 3 below)

where XX represents the number of digits of the called address in an incoming call.

Use the following checklist of the more common networks to determine the network type:

Country	Network	Network Type
-	HP PPN	NET, 12
Canada	Datapac	NET,8
US	Telenet	TEL
US	Tymnet	NET,10
US	DDN	NBS,XX
Belgium	DCS	NET,7
Finland	Datapak	NET,10
France	Transpac	NET,0
Germany	Datex-P	NET,9
Netherlands	Datanet 1	NET,7
Norway	Datapak	NET,10
Sweden	Datapak	NET,10
Switzerland	Telepac	NET,8
UK	PSS	NET,12

Notes:

1. Check with your local HP representative both to be sure for which of the above networks the HP 2335A is currently certified and to enquire about any other networks.

2. The HP 2335A supports two digits of sub-address (sub-address of the called or calling port) and if it is to be used with an X.25 network which does not support sub-addressing then NTS,XX must be specified as the network type.

3. When a statistical multiplexer configuration (non-X.25 network) is used, one HP 2335A is configured as DCE,XX (computer side, default CAS) and the other as NET,XX (workstation side, default PAD); where XX is the number of digits (without sub-address) that must be entered to call the HP 2335A. Thus with XX = 0 (recommended for statistical multiplexer configurations, and included in the default) then only a sub-address needs to be entered to be connected to a specific port of the called HP 2335A.

For further information on the HP 2335A main and sub-addresses refer to the X.25 Level 3 parameter "Local Address" and appendix D.

Note that certain X.25 networks will not accept a calling address in a call request packet. In this case XX must be configured with a value of 0. (e.g. TRANSPAC).

FRAME WINDOW (Parameter K)

The frame window parameter allows the user to select the number of outstanding, sequentially numbered, unacknowledged information frames (I-Frames) that can occur between the HP 2335A and the synchronous network (the DTE and the DCE).

All the frames are sequentially numbered from 0 to 7 (modulo 8); thus the maximum value for this parameter is 7 and the minimum is 1.

Recommended Choice: Specify a value of 7.

TIMER T1

This parameter specifies the maximum amount of time that the HP 2335A should wait for a frame to be acknowledged before initiating the recovery procedure. The time that may be specified for timer T1 must be in the range of 1,000 to 30,000 milliseconds (smallest change = 10ms). It should not be set too short in relation to the line speed as the throughput may be degraded due to unnecessary re-transmission when the line is heavily loaded. Use the following minimum values, according to the line speed, as a guide when defining the timer T1 parameter :

LINE SPEED	TIMER T1
4800 bps	3000 ms
19200 bps	1000 ms
48000bps	1000 ms
64000bps	1000 ms

Pre-Selected Parameters

RET. CNT N2 (Re-try Count N2)

The value of N2 specifies the maximum number of transmissions and retransmissions of a frame that will be attempted following the lapse of timer T1 (N2 includes the initial transmission). *The HP 2335A automatically sets the value of N2 to 20.*

EQUIPMENT TYPE

When the HP 2335A (or a host computer system) is connected to a public X.25 network it is always acting as a LAP-B DTE and a physical DTE (Data Terminal Equipment), the LAP-B DCEs and physical DCEs (Data Circuit Terminating Equipment) being components of the X.25 network itself. *Thus the HP 2335A equipment type is always LAP-B DTE (Link Access Protocol - Balanced, Data Terminal Equipment)* when the it is connected to a public X.25 network.

The only exception is when one HP 2335A is acting as a LAP-B DCE (the other HP 2335A is the LAP-B DTE) in a statistical multiplexer non-X.25 network. In this case the Network Type must be defined as DCE,XX enabling the HP 2335A to recognize that it is acting as a LAP-B DCE.

The HP 2335A automatically sets the equipment type to LAP-B DTE unless the Network Type is defined as DCE,XX in which case it is automatically set to LAP-B DCE.

I-FRAME

The I-FRAME parameter fixes the maximum number of bytes in the information field of a packet and therefore depends directly upon the maximum length of the user data fields transmitted across the link. The maximum user data field length is the packet size parameter defined at Level 3.

As the HP 2335A maximum user data field size is fixed at 128 bytes, plus a packet overhead of 3 bytes, *the I-FRAME parameter value is automatically set to 1048 bits (or 131 bytes).* Incoming call packets are within this size as the HP 2335A does not support the Fast Select facility.

Note that the configuration listing displays the I-FRAME parameter value in bytes, not in bits.

X.25 LEVEL 3

X.25 Level 3 defines the packet level protocol and specifies procedures for establishing a call, transferring data and structuring data into packets.

User Selectable Parameters. (HSA: LEVEL3)

The user selectable parameters are as follows.

LOCAL ADDRESS

When the HP 2335A is connected to an X.25 network it is assigned a main (local) address on the network. The "local address" of the HP 2335A may be up to 13 digits in length plus two digits for defining the relative sub-address of the HP 2335A device ports. The configured "Local Address parameter" may thus be up to 15 digits long. Refer to Appendix D for details of local addresses assigned by the various X.25 networks.

The HP 2335A sub-addressing feature enables a remote DTE calling the HP 2335A local address to establish a virtual circuit with a device connected to a specific device port. If the call is made without a sub-address, then a

virtual circuit will be established with the first available free port (i.e. a port not engaged on an SVC) in the first callable port pool (if defined). The device ports start at A1 to A4, then B1 to B4, C1 to C4 and D1 to D4 in this order.

The format of the sub-address is two digits following the called HP 2335A local address. When configuring the local address parameter, the relative sub-address for the device ports *must* be defined by adding a two digit number (in the range 00 to 99) to the local address assigned by the X.25 network.

Note   If the sub-address is not specified then the HP 2335A will take the last two digits of the local address assigned by the X.25 network, as the device port relative sub-address. The relative sub-address can be 00 in most cases.

An example is shown on the next page.

For example, if the local address parameter is defined as: 13809754340 (a TRANSPAC address), then the relative sub-address is 40. To call the first port (A1), the caller must enter the following address: 13809754341 (40 + 1). To call the first pool port the address is: 13809754340 or 138097543 and to call the test port the address is: 13809754357 (40 + 17).

Note that sub-address "00" is supported as a "don't care" value when the relative sub-address base is 00 and the HP 2335A will respond as if no sub-address is provided.

The test port (relative sub-address + 17) may be accessed by a remote host computer to obtain HP 2335A statistical information (e.g. line quality).

By defining callable port pools it is possible to restrict the available ports when a call is received without a sub-address. By defining a local user group (LUG) it is possible to restrict access to the HP 2335A (local address) to only those remote DTEs defined in the LUG. The HP 2335A device ports may be disabled for outgoing and incoming calls by using the disable feature of the ADL facility.

In a non-X.25 network only the relative sub-address base needs to be entered as the local address parameter (see "X.25 LEVEL 2", "Network Type").

Sub-address ...	Used for ...
00	Relative sub-address

01	Port A1
02	Port A2
03	Port A3
04	Port A4

05	Port B1
06	Port B2
07	Port B3
08	Port B4

09	Port C1
10	Port C2
11	Port C3
12	Port C4

13	Port D1
14	Port D2
15	Port D3
16	Port D4

17	Test port
00 or no address	First pool port
18	Second pool port
19	Third pool port

THROUGHPUT CLASS (Throughput In and Out)

The throughput is the total data transferred per second and is a characteristic associated with a virtual circuit. The throughput class is a fixed data transfer rate in bps (bits per second) and is dependent on the transmission line speeds, packet and window sizes and the X.25 network's internal operation.

The throughput must always be less than or equal to the line speed (in and out) and in most cases the maximum value compatible with the line speed should be used. The throughput in and out must be specified at configuration time. The available rates and associated throughput classes are as follows:

Throughput (bps)	Class
75	03
150	04
300	05
600	06
1200	07
2400	08
4800	09
9600	10
19200	11
48000	12
64000	(no class defined)

The HP 2335A configured value is defined in bits per second and not as a throughput class reference.

Note   On some X.25 network international gateways it is sometimes necessary to reduce the throughput class in order to establish a virtual circuit but this is normally done automatically by the X.25 network.

WINDOW SIZE (W) IN/OUT

The window size in and window size out parameters allow the user to select the maximum number of unacknowledged sequential packets that may be outstanding at any given time and the necessary amount of packet buffering. The window size in (from the remote host computer or remote HP 2335A to the local HP 2335A) and the window size out (from the local HP 2335A to remote host computer or the remote HP 2335A) must be specified; the available sizes are 1 to 7.

When connected to a public X.25 network, a value of 2 is recommended for the window size in and the window size out parameters.

Note   If you subscribe to PSS (UK) and you choose a window size other than two, you must also subscribe for and configure for window and packet size negotiation.

When using the HP 2335A in a private (modem or modem-eliminator link) network, a window size in and out of between 2, 3, or 4 is recommended.

DEFINE/MODIFY VIRTUAL CIRCUIT TABLE

A virtual circuit (VC) is a bi-directional logical data path between two DTEs (e.g. between an HP 2335A and a remote host computer). The HP 2335A may be connected to up to 16 VCs at any time (one per device port); 17 if the Test Port of the HP 2335A is also being accessed. Up to 95 virtual circuits can be allocated, consisting of a maximum of 16 permanent virtual circuits (PVCs) and the required number of switched virtual circuits (SVCs).

A permanent virtual circuit (PVC) is a fixed "association" between two DTEs that does not require call establishing or clearing procedures. When connected to an X.25 network, the HP 2335A must be configured with the PVCs that have been subscribed for with the X.25 network authority. For private (modem or modem eliminator link) networks the required number of PVCs (up to 16) have simply to be configured in the HP 2335A.

For full test port access at least one two-way or one incoming and one outgoing SVC must be subscribed for (if used with an X.25 network) and configured in the HP 2335A, and at least one port left free to use it.

A switched virtual circuit (SVC) is a temporary "association" between two DTEs that is initiated when a call is established, and is maintained until a Clear Request is sent by either DTE. X.25 networks normally subdivide SVCs into three categories: SVCs defined as "IN" can only receive incoming calls, SVCs defined as "OUT" can only make (originate) outgoing calls and SVCs defined as "2W" (2 way) can both originate and receive calls. Note that once a call is established it is full-duplex in all cases.

A virtual circuit is identified by a Logical Channel Number (LCN) which starts at 1 (0 with some X.25 networks) and can go up to 4095. The X.25 Recommendation specifies that LCNs must be assigned to virtual circuits as shown in figure 3-3.

With a statistical multiplexer (non-X.25 network) configured network any number of VCs (up to 95) may be configured according to the user's requirements. When the HP 2335A is to be used with an X.25 network only the VCs subscribed for must be configured in the HP 2335A. Note that if no VCs are configured then the user is unable to exit the VC table definition of the configuration dialogue.

The LCNs are assigned to VCs as shown in figure 3-3. No "gaps" may exist within a VC category. However, gaps may exist between PVCs and SVCs or between SVC categories to allow for future expansion. The virtual circuits must be assigned LCNs as shown in figure 3-3, where the first circuit in any category corresponds to the "lowest" numbered (eg. n4) and the last circuit corresponds to the "highest" numbered (eg. n5) virtual circuit in that category.

Note   In a non-X.25 statistical multiplexer network, the PVCs must have the same LCN at both ends and be associated with the correct port at each end (see "PVC associated port").

```
             LCN              FUNCTION

  LPC      n ( 0 or 1 )      First PVC
              |
              ↓
  HPC        n1              Last PVC

  LIC        n2              First one-way incoming SVC ┐
              |                                         │
              ↓                                         ↓
  HIC        n3              Last one way incoming SVC                DCE ( or PSN )
                                                                       ASSIGNMENT
  LTC        n4              First two-way SVC
              |
              ↓                                                      ↑
  HTC        n5              Last two-way SVC
                                                                       DTE ( or HP2335A )
  LOC        n6              First one-way outgoing SVC                ASSIGNMENT
              |
              ↓
  HOC        n7 ( < 4096 ) Last one-way outgoing SVC       ↑
```
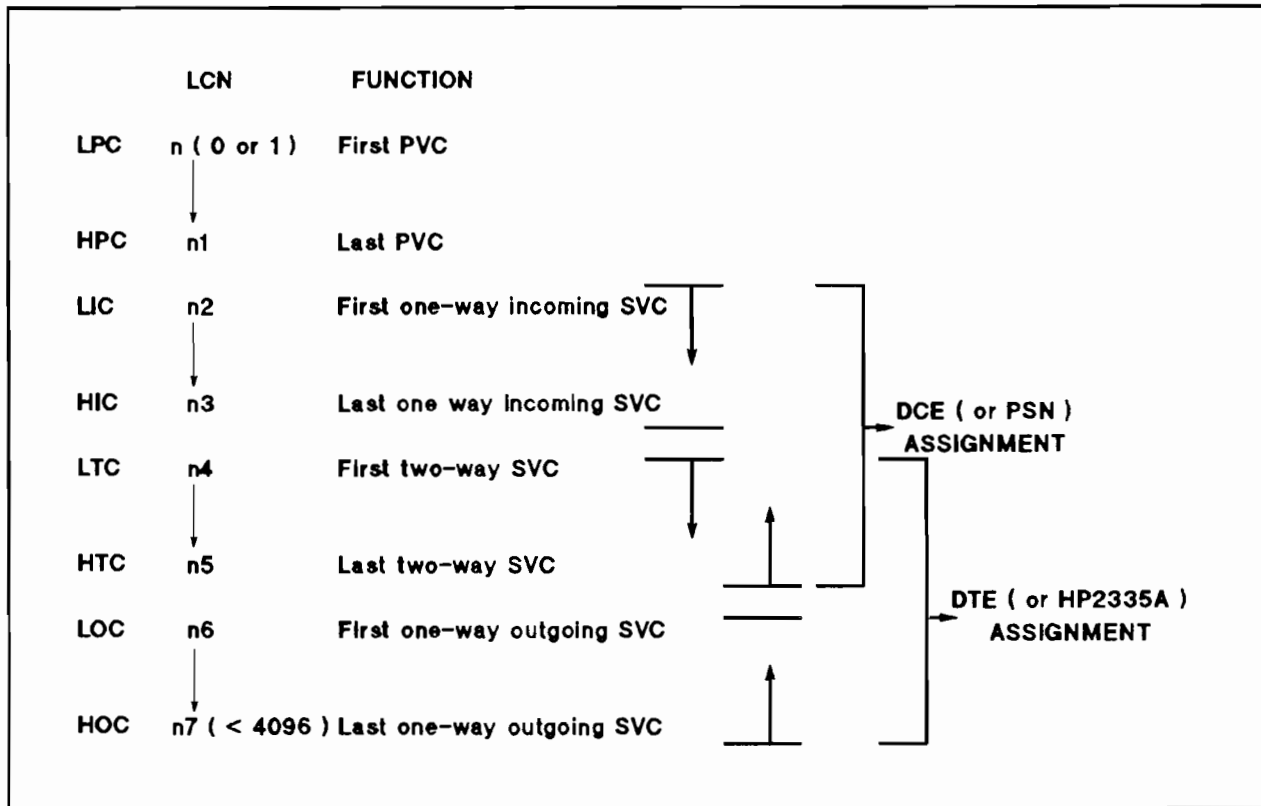
Figure 3-3 Virtual Circuit Assignment

When connected to an X.25 network, the HP 2335A is the DTE and the X.25 network is the DCE. With reference to figure 3-3, note that the DTE virtual circuit assignment shown means that when a device which is connected to the HP 2335A wants to make a call (i.e. establish a one-way outgoing VC or a two-way VC) the virtual circuit will be established on the first free VC in the required category, starting from the highest down to the lowest numbered. Similarly when a virtual circuit is to be established for an incoming call to the HP 2335A, the DCE (or X.25 network) virtual circuit assignment shown means that the VC established (i.e. one-way incoming or two-way VC) will be the first free VC starting from the lowest up to the highest numbered in the required category.

When the HP 2335A is connected to a remote host computer via a direct modem (or modem eliminator) link, the remote host computer must be configured as the DCE and the DTE/DCE virtual circuit assignment behavior will be as described above.

For a statistical multiplexer configured (non-X.25) network, one HP 2335A is configured as the DCE and the other as the DTE. The virtual circuit assignment behavior is again identical to that described above and corresponds to whether the HP 2335A is the DTE or the DCE.

Note   When the HP 2335A is to be used in a statistical multiplexer configuration, it is recommended that any printer-connected device ports are either assigned PVCs or are configured with the ADL facility (see "Automatic Dial Assignment") if SVCs are to be used.

NUI (NETWORK USER IDENTIFICATION)

NUI is a facility whereby the HP 2335A may provide information on the user to the network. The network may use this information for security, billing, or other network management functions. It is one of the X.25 1984 facilities. If you subscribe to these facilities with the X.25 network, you must respond YES to the question "1984 fac?" in the Level 3 dialogue.

CALL REDIRECTION

Call redirection is a facility whereby calls may be redirected if the receiving device is busy or out of order. It is another one of the X.25 1984 facilities. If you subscribe to these facilities with the X.25 network, you must respond YES to the question "1984 fac?" in the Level 3 dialogue.

CALL REDIRECTION NOTIFICATION

Call redirection notification is a facility whereby information is added to an incoming call to tell the receiving device that the call has been redirected. It is another one of the X.25 1984 facilities. If you subscribe to these facilities with the X.25 network, you must respond YES to the question "1984 fac?" in the Level 3 dialogue.

HUNT GROUP

Hunt group is a facility for redirecting calls across a group of HP 2335A-device interfaces. It is another one of the X.25 1984 facilities. If you subscribe to these facilities with the X.25 network, you must respond YES to the question "1984 fac?" in the Level 3 dialogue.

EXTENDED CLEAR FORMAT

Extended clear format is not one of the X.25 1984 facilities, but is a requirement which goes hand-in-hand with the call redirection notification facility (see above). It is an extension to the format of the "clear" packet.

NEGOTIATE PACKET SIZE, WINDOW SIZE & THROUGHPUT CLASS

These facilities enable the HP 2335A to negotiate the packet size, window size and throughput class with an X.25 network. In cases where the X.25 network default values for these parameters differ from those of the HP 2335A the negotiate facility for the relevant parameter(s) should be subscribed for with the X.25 network and configured in the HP 2335A.

While the HP 2335A only supports a maximum user data field size of 128 bytes (pre-selected parameter : Packet Size), the throughput class and the window size are user-selectable within the range specified in the X.25 Recommendation and may simply be configured in the HP 2335A accordingly. If window or packet size negotiation is requested, a call is established after the incoming and outgoing window/packet sizes are negotiated. Throughput class negotiation follows the same negotiation procedure unless a Selection PAD command signal requests it, in which case the negotiated value will override the HP 2335A configured value.

The capability of the HP 2335A to negotiate these parameters enables conflicting default parameter values (between the HP 2335A and the X.25 network) to be resolved. For example, an X.25 network with a default maximum user data field size of 256 bytes can be negotiated down to the HP 2335A maximum size of 128 bytes.

Note that negotiation facilities are not required and should not be configured for private (non-X.25) networks.

REVERSE CHARGING ACCEPTANCE (Rev. Char. Acc?)

This facility must be subscribed for with the X.25 network authority and configured in the HP 2335A if reverse charge calls are to be accepted. It is identical to telephone "collect" calls in that the user at the HP 2335A local address is billed for received calls requesting reverse charging. This facility is only available when the HP 2335A is to be used with an X.25 network.

D-BIT

This refers to a particular bit (the Delivery Confirmation bit) in the packet header. It is a procedure, available on some X.25 networks, for end-to-end acknowledgment of data packets. If required, this facility must be subscribed for with the X.25 network and configured in the HP 2335A; it is then effective on all calls (SVCs and PVCs).

With local acknowledgment (D-bit disabled), the X.25 network acknowledges the received packet before transferring it to its destination; i.e. D-bit set to "0".

With end-to-end acknowledgment (D-bit enabled), the X.25 network transfers a packet to its destination and the receiving device returns an acknowledgment (via the X.25 network) to the caller; i.e. D-bit set to "1".

The D-bit must be supported (and subscribed for) by any called remote DTE. The D-bit should be set to "0" for statistical multiplexer (non-X.25) configured networks.

PVC ASSOCIATED PORTS (PVC Ass. Port?)

This parameter is only selectable when PVCs have been defined as it enables the user to specify the HP 2335A device port assigned to each PVC. Note that the "PVC Ass. Port?" prompt is repeated until all the PVCs have device ports assigned to them.

Note that PVCs are assigned to the device ports starting at the lowest numbered LCN.

Pre-Selected Parameters

The fixed value parameters are as follows:

PACKET SIZE

This parameter specifies the maximum number of user data bytes in a packet. The HP 2335A uses a fixed value (in and out) of 128 bytes which is recommended and used by most X.25 networks.

The "M-bit" (more data bit) in the packet control field is automatically set if the user data is contained in more than one packet.

PACKET NUMBERING

Sequential packet numbering is used to ensure the correct transmission of all packets. The control field of each packet contains the packet's identification number (i.e. the packet's sequential number, $P(S)$) and also contains the "next packet expected to be received" number $P(R)$, which is used to authorize/acknowledge data packets.

All the packets in a call are sequentially numbered 0, 1, 2, 3,..., n; which is then repeated 0, 1, 2, .., n etc. The standard value of n is 7 (modulo 8).

MSG, SRA, LUG & POOL Configuration

Message Configuration (HSA: MSG)

The HP 2335A can have three types of message defined as follows:

PAD MESSAGE HEADER (PAD Msg Header?)

The PAD message header prompt allows the user to specify a message which is displayed before any PAD message defined in the X.28 Recommendation (e.g. the CLR or RESET characters). The configured message can be from 1 to 10 characters long, or press *CONTROL* W ↵ if no message is required. An existing message is kept by pressing ↵ .

Note   Experienced users may wish to enter (or list) an escape sequence or command as the PAD message header (applicable to all PAD messages). If this is required the terminal must be in display function mode to prevent the command or escape sequence being executed.

WELCOME MESSAGE

The welcome message prompt allows the user to specify a message for the PAD Identification Service Signal. The message can be from 1 to 20 characters long and is displayed before the prompt at power-on, or, reset when the HP 2335A is in RUN mode. If no message is required simply press *CONTROL* W ↵ . An existing message is kept by pressing ↵ .

PASSWORD

The password prompt allows the user to specify a password to restrict access to the HP 2335A Test Port and to local on-line modification to the configuration using the LDIAG facility. The password is displayed only while being defined and listed only in response to the HSA secondary command LISTMSG. The password may be from 1 to 10 characters in length. If no password is required simply press Control-W ↵ . To keep an existing password press ↵ .

To gain access to the Test Port the password must be entered correctly, once the COM message provided by the HP 2335A PAD has been obtained on the terminal screen (see the X.25 Level 3 Local Address parameter for the Test Port address). If the password is entered incorrectly then the call is cleared.

Symbolic Remote Address Configuration (HSA: SRA)

Note   The symbolic remote address facility is also called the abbreviated address facility.

This is an optional HP 2335A facility which is provided in order to prevent numbering errors in called addresses. Up to 16 symbolic addresses may be defined as follows:

CALL LIMITED TO SRA? (YES - NO)

The call limited to SRA prompt allows the user to specify whether or not outgoing calls are limited to the remote addresses on the SRA list.

ADD OR CLEAR (AD - CL)

The Add or Clear prompt enables the user to specify whether the SRA list is to be defined/added to or completely redefined. Clear will clear ALL the SRAs and then prompt for new inputs.

SYMBOLIC REMOTE ADDRESS (SRA?)

The symbolic remote address prompt allows the user to define the symbolic name associated to the remote DTE address. It can be up to 8 characters long and must be entered by pressing the terminal's ↵ key; the HP 2335A then prompts for the remote address associated to the defined symbolic name.

Note   A symbolic name can contain any character in the International Alphabet #5 or ASCII character set (see Appendix E) except "," " + " and "Cr" (see "Configuration Dialogue" earlier in this chapter). The space and backspace characters are treated but are not significant in an SRA definition.

ASSOCIATED REMOTE ADDRESS (Remote Address Ass.?)

This prompt is obtained once a symbolic name has been entered and allows the user to specify the remote DTE address associated to the symbolic name. The address (including optional sub-address) can be up to 15 digits long and must be entered by pressing the terminal's ↵ key; the HP 2335A will then prompt the user for the next SRA. To exit SRA definition simply press ↵ in response to the SRA prompt. When 16 SRAs have been defined the HP 2335A automatically exits the SRA definition dialogue.

Note that The HP 2335A does not check for identical symbolic names.

Notes   If the reply to the "CALL LIMITED TO SRA?" question is "YES", and no SRAs are defined, ALL outgoing calls will be cleared. The LISTSRA secondary command should be used to ensure that if calls have been limited to SRAs, SRAs do actually exist.

The LISTSRA secondary command should be used to ensure that less than 16 SRAs are defined before attempting to add another SRA to the list. When 16 SRAs are defined and the ADD command is used, an "ERR" error message is displayed on the terminal screen. To redefine other SRAs the user must clear and redefine the complete SRA list.

Local User Group Configuration (HSA: LUG)

This is an optional HP 2335A facility that enables the HP 2335A to only accept calls from addresses which match one of up to 16 defined filters, all other calls being cleared; this is equivalent to an input filter. It is set up by the user specifying the address of the remote device (the address being included in the call from the device). The address may include up to 15 numeric characters, with "X" as a "don't care" value and a maximum of 16 filters may be defined. To exit the LUG definition simply press ↵ in response to the LUG prompt. When 16 LUGs have been defined the HP 2335A automatically exits the LUG definition mode.

Once the LUG is defined the access is restricted as follows:

1. The number of digits of the calling address (including sub-address) must equal the number of digits of the filter.

2. The digits defined as "X" (don't care) in the filter provide a place holder for the equivalent digit of the calling address.

3. The HP 2335A will try to match the calling address with all the defined filters and if no match is found the call is cleared.

Note   When the calling address contains a sub-address the LUG filter must be carefully defined and it is recommended that the "X" (don't care) place holder is used for the last two digits.

ADD OR CLEAR (AD - CL?)

The Add or Clear prompt enables the user to specify whether the LUG list is to be defined/added to or completely redefined. Clear will clear ALL the LUG filters and then prompt for new inputs.

REMOTE ADDRESS

The remote address prompt enables the user to specify the remote calling address of the LUG member. It may be up to 15 digits long ("X" = don't care) and must be entered by pressing the terminal's ↵ key; the HP 2335A then prompts again for the next remote address (up to 16 can be defined). To exit LUG definition simply press the terminal's ↵ key in response to the prompt.

Note   The LISTLUG secondary command should be used to ensure that less than 16 LUG filters are defined before attempting to add another filter to the LUG list. When 16 LUG filters are defined and the ADD command is used an "ERR" error message is displayed on the terminal screen. To redefine other LUG filters the user must clear and redefine the complete LUG list.

It is recommended that the LISTSRA and LISTLUG secondary commands are used before any modification to the SRA or LUG lists.

Port Pool Configuration (HSA: POOL)

This is an optional HP 2335A facility which allows the creation of up to three groups of HP 2335A device ports which can be accessed by incoming calls. This feature is particularly important when output devices (e.g. printers) are connected to the HP 2335A and when the HP 2335A is used for Computer Access Support (CAS). If a call is received without a sub-address (or with the relative sub-address base value), then a virtual circuit is established with the first free device port in the first port pool. Thus this can be used to prevent a simple terminal being called inadvertently when no sub-addressing is provided.

A call may be established according to the following rules:

■ If an incoming call is received without any sub-address (or with the relative sub-address base value), then the call will be directed to the first free port of the First Callable Port Pool. If no port pool has been defined, or all of the ports are engaged, the call is rejected with CLR DTE 0.

■ If an incoming call is received with the sub-address 18 (or the relative sub-address base value + 18), the call will be directed to the first free port in the second port pool. If all of these ports are engaged (or the pool has not been defined) the call is cleared.

■ If an incoming call is received with the sub-address 19 (or the relative sub-address base value + 19), the call will be directed to the first free port in the third port pool. If all of these ports are engaged (or the pool has not been defined) the call is cleared.

■ If the incoming call is received with a valid sub-address then the call is established with the corresponding device port if it is free or else the incoming call is cleared.

Note that calls that are received with an invalid (non-existent) sub-address are cleared.

Device ports that are assigned to PVCs cannot be accessed through the Callable Port Pools and if included in the ranges of port pools they are listed but are not considered part of any of the port pools. Thus the device port(s) which are specified by the user to be included in any of the port pools must not be assigned to PVCs.

Note   The HP 2335A does not include non-existent ports or ports assigned to PVCs in any of the port pools. Each callable port pool must be defined by the user. Each port pool must be independent, as a port cannot be used by more than one port pool.

You may still dial directly to a particular port within a pool.

Asynchronous Ports Profile Configuration

Introduction

The HP 2335A functions as a Packet Assembler/Disassembler (PAD) providing an Interactive Terminal Interface (ITI) in accordance with the 1984 CCITT X.3 Recommendation. The 22 PAD parameters defined in the recommendation are referred to as "Standard X.3 Parameters". The HP 2335A also supports 25 additional "local parameters" which provide greater control and more capabilities for the PAD, and PAD Support functions. Note that 8 of the 25 local parameters are reserved and cannot be modified. The PAD parameters are detailed in "Pad Parameters" later in this chapter.

The parameters define specific characteristics of the asynchronous devices or actions that the PAD must take on receipt of a particular input (e.g. a BREAK) from a terminal.

A PAD "Profile" is a defined set of values for the 47 standard X.3 and local parameters. A total of 9 pre-defined profiles (Basic Defined Profiles or BDPs) are available in the HP 2335A in order to meet the requirements of standard device interfacing and for use as an initial standard profile set for creating User Defined Profiles (UDPs). A total of 5 pre-defined UDPs are also available, and these can be modified or even deleted (except profile #100 which can only be modified) by the user. Each device must be assigned a PAD profile in the HP 2335A by using the ASG user command (see "ASG User Command" and "Profile Assignment Procedure"). Note that when the asynchronous, point-to-point port(s) of a non-X.25 host computer are connected to the HP 2335A, the HP 2335A is viewed as a terminal by the host computer. This is referred to as a "CAS/PAD" or simply "CAS" and a "CAS/PAD" profile must be assigned to the corresponding HP 2335A device ports.

For non-standard applications/device interfacing the user may create a "User Defined Profile" (UDP) or modify an existing UDP using the UDP command (see "UDP User Command" and "UDP Definition Procedure").

The HP 2335A features an automatic dial (or auto-call) facility which performs the call (SVC) establishment procedure to the remote address defined for each device. Up to 16 devices can be assigned automatic dial by using the ADL user command (see "Automatic Dial Assignment") and each device may have one remote address (a Symbolic Remote Address) assigned to it.

The LIST command is detailed in "List Command", and typical configuration examples are given in "Configuration Examples" at the end of this chapter.

The word "terminal" when used in this section refers generally to any asynchronous device (display terminal, printer, plotter, etc.).

ASG Command

The ASG command is used to assign PAD or CAS/PAD profiles to the HP 2335A asynchronous ports.

Note   A remote PAD profile does not need to be assigned by the user because it is automatically downloaded by the associated CAS/PAD profile.

The procedure requires the HP 2335A to be prepared as described in "Entering Configuration Mode : Preparation", and to be in configure mode as described in "Entering Configuration Mode : Procedure", both near the start of this chapter.

Using an interactive terminal connected to device port A1 (in off-line mode) or any connected terminal (in on-line mode) the port profile assignments may be set using the ASG command:

At the prompt ...	You enter ...
*	ASG ↵

The HP 2335A then enters the port profile assignment mode and displays on the terminal the following user prompt:

ASG:

Once the ASG prompt is obtained, PAD or CAS/PAD profiles may be assigned to device ports as described in "Profile Assignment Procedure". The following secondary user commands are then also available for use:

At the prompt ...	You may enter ...	Comments
ASG:	LIST ↵	To list the current assignment values.
	↵	To exit assignment mode.

Note that if any secondary command not shown above is entered at the ASG level then it is rejected with an "Unknown command, type HELP for more information...". Entering a ↵ (or Cr) in response to the ASG: prompt enables the user to exit the profile assignment mode and returns the Configure asterisk (*) prompt.

Profile Assignment Procedure

Once the ASG: prompt has been obtained as described in "ASG User Command", the user may assign a PAD (or CAS/PAD) profile to each of the HP 2335A asynchronous ports. A profile must be selected for each port and each port must then be assigned its correct profile. This is to configure the PAD according to its function and the specific asynchronous device (or computer port) characteristics.

Several Basic Defined Profiles (BDPs) and pre-defined User Defined Profiles (UDPs) are available in the HP 2335A as an initial standard profile set (see "PAD Profiles"). These pre-defined profiles may be assigned to

a port or may be modified by the user in order to create a User Defined Profile (UDP) in the HP 2335A. Refer to "UDP User Command" for details of the UDP command and "UDP Definition Procedure" for the UDP definition procedure.

Note that any profile which is assigned to a port must be defined in the HP 2335A. If a profile is specified which has not been defined, then it is rejected with an "ERR" error message. The HP 2335A default configurations provide BDP #1 assigned to all ports (default PAD), or BDP #71 assigned to all ports (default CAS).

The selected profiles are assigned to the ports as follows:

Syntax	**Explanation**
ASG:pn[,pn[,...]..]]:m↵	Assign profile m to port number pn, where pn may have the following format: pn = p[n] with p = {A|B|C|D} and the optional n = {1|2|3|4}.

Example

At the prompt ...	You may enter ...	**Comments**
ASG:	A,B1:21 ↵	To assign profile #21 to ports A1, A2, A3, A4, B1.

It is recommended that once profile assignment is complete it is verified by entering the LIST command.

Refer to the BDP and UDP tables at the end of this section for details of the parameter values of the profiles described in this section.

Some UDPs are described in this section because of their utility but they are *not* defined in the HP 2335A. They have been tested and can be defined by using the UDP commands. In the following tables, pre-defined UDPs are denoted by (d). Refer to UDP "User Command" and UDP "Definition Procedure" for details.

All BDPs are defined for an asynchronous device/computer port speed of 9600 bps.

There are **three** types of profile according to the way the HP 2335A's port is to be used:

Standard PAD	For a port which is to be connected to an asynchronous device such as a terminal, PC or printer.

CAS/PAD	For a port which is to be connected to a host computer.

Remote PAD	For a port which is to be connected to a device, but whose profile is to be downloaded automatically by the CAS/PAD port on the host-side HP 2335A with which it is associated.

HP 2335A as a Standard PAD

Non-HP devices normally use the standard X.3 PAD profile (profile 1). The local parameters are defined to provide additional capabilities for HP devices and host computers.

Profile Number	Use
1 (BDP)	**Standard PAD (CCITT 1984 X.3).** All the character-mode and HP block-mode applications supported by the HP 2335A working with terminals using XON/XOFF flow control.
2 (UDP)	**St'dard PAD (no modem signals).** As Profile 1, but with modem signals disabled.
21 (BDP)	**Standard printer.** To connect the HP 2335A in cluster controller configuration to support printers
22 (BDP)	**HP CRTs PAD.** All the character-mode and HP block-mode applications for the HP 2335A working with HP terminals using XON/XOFF flow control and ENQ/ACK protocol.

HP 2335A as a CAS/PAD (Computer Access Support)

In order to provide CAS the HP 2335A must be as transparent as possible. When a PAD calls a remote host computer through a CAS/PAD, the CAS/PAD sends a specific set of X.3 and local parameters to configure the calling PAD. Thus every CAS/PAD profile has an associated profile for the remote PAD.

Only profiles 51, 61, 71, 73 and 75 are defined in the HP 2335A. Profiles 72 and 74 are shown because of their utility (e.g. profile 72 is required to support EDIT/1000 on the HP1000) and if required they can be created together with their associated remote PAD profiles (142 and 144) by using the UDP command.

Note   A Remote PAD (associated to CAS/PAD) profile must be defined in the HP 2335A before its associated CAS/PAD profile.

When the "break" function is required, the "break" character must be entered twice. It may, however, be necessary to enter the "break" character more than twice as the characters sent may not be sensed immediately.

Profile Number (and associated remote profile no.)	**Use**
51 (BDP) (101)	**CAS/PAD (working with a remote public PAD).** Supports full duplex transmission between a CAS/PAD and a public PAD supporting only the first eleven X.3 parameters.
61 (BDP) (121)	**CAS/PAD (working with a public PAD).** Supports full duplex transmission between a CAS/PAD and a public PAD supporting only the first twelve X.3 parameters.
71 (BDP) (141)	**HP3000 CAS/PAD.** Supports full duplex transmission (including block mode) between an HP 2335A PAD and CAS/PAD for the HP3000. Supports HP terminals and printers.
72 (UDP) (142)	**HP1000 CAS/PAD.** Supports full duplex transmission and EDIT/1000 between (including block mode) between an HP 2335A PAD and CAS/PAD for the HP1000.
73 (UDP) (d) (143)	**CAS/PAD (transparent).** Supports full duplex transparent transmission (binary transfers) between an HP 2335A PAD and CAS/PAD.
74 (UDP) (144)	**HP3000 CAS/PAD (X.25 network).** HP3000 CAS/PAD profile for use with X.25 networks. Supports full duplex transmission (excluding block mode) with local echo controlled by the HP 2335A PAD (see local parameter 14), for HP terminals only. Note that passwords are displayed. For block mode applications use profile 71.
75 (UDP) (d) (141)	**HP1000 CAS/PAD.** Supports full duplex transmission (including block mode) with modem signals disabled between the HP 2335A PAD and CAS/PAD for the HP3000.

(d) = pre-defined profile

Remote PAD Profiles

A remote PAD profile is not assigned to a port by the user. It is automatically downloaded across the network by a called port with a CAS/PAD profile. The downloaded profile therefore re-configures the standard PAD profile which was already assigned to the port.

Only profiles 101, 121, 141 and 143 are defined in the HP 2335A; profiles 142 and 144 must be created using the UDP command. A user defined CAS/PAD profile (e.g. profile 72) will follow the same behavior as the BDP (e.g. profile 71) from the initial standard profile set that it was created from (e.g. profile 72 will send 19 parameters of its associated remote PAD profile 142).

These profiles are used only in statistical multiplexer and X.25 statistical multiplexer configured networks where the CAS/PAD sends a SET & READ control packet (X.29) containing a specific set of parameters as follows:

- CAS/PAD profile 51 sets 7 parameters of profile 101 (parameters 1, 2, 3, 4, 5, 7 and 8).

- CAS/PAD profile 61 sets 8 parameters of profile 121 (parameters 1, 2, 3, 4, 5, 7, 8 and 12).

- CAS/PAD profile 71 sets 19 parameters of profile 141 (X.3 parameters 1, 2, 3, 4, 5, 7, 8, 12 and 15. Local parameters 2, 3, 4, 5, 8, 9, 13, 18, 19 and 22).

Note that when using profile 143 the "break" character is used for escape from data transfer.

Profile Number	Use
101 (BDP)	Remote PAD is a standard PAD (eleven X.3 parameters).
121 (BDP)	Remote PAD is a standard PAD (twelve X.3 parameters).
141 (BDP)	Remote PAD is an HP 2335A (X.3 and local parameters).
142 (UDP)	Remote PAD to support EDIT/1000 (HP1000).
143 (UDP) (d)	Remote PAD supports full duplex transmission.
144 (UDP)	Remote PAD is an HP 2335A (X.3 and local parameters).

(d) = pre-defined profile

BASIC DEFINED PROFILES (BDPs)

A "-" means original profile parameter not modified.

Profile:	1	21	31	51	61	71	101	121	141
X.3 PARAMETERS									
01 Esc Data Transfer	1	0	1	0	0	0	1	1	1
02 Echo	1	0	1	0	0	0	0	0	0
03 Data Forwarding	2	0	2	0	0	127	0	0	127
04 Idle Timer	0	10	0	1	1	0	1	1	0
05 HP 2335A Xon/Xoff	1	0	1	1	1	1	1	1	1
06 PAD messages	5	0	5	0	0	0	-	-	-
07 Break processing	21	0	21	0	0	0	21	21	21
08 Discard output	0	0	0	0	0	0	0	0	0
09 Cr padding	0	0	0	0	0	0	-	-	-
10 Line folding	0	0	0	0	0	0	-	-	-
11 Baud Rate	14	14	14	14	14	14	-	-	-
12 Device Xon/Xoff	1	1	1	1	1	1	-	1	1
13 Lf insertion	0	0	0	0	0	0	-	-	-
14 Lf padding	0	0	0	0	0	0	-	-	-
15 Editing mode	1	0	1	0	0	0	-	-	0
16 Backspace char.	8	8	8	8	8	8	-	-	-
17 Line delete char.	24	24	24	24	24	24	-	-	-
18 Line display char.	0	0	0	0	0	0	-	-	-
19 Service signals	2	2	2	2	2	2	-	-	-
20 Echo mask	128	128	128	128	128	128	-	-	-
21 Parity checking	0	0	0	0	0	0	-	-	-
22 Page wait	0	0	0	0	0	0	-	-	-
LOCAL PARAMETERS (accessed with parameter 0: value 13)									
01 Parity specifications	0	0	0	0	0	0	-	-	-
02 Read specifications	0	0	0	0	0	0	-	-	0
03 Read trigger	0	0	17	0	0	0	-	-	0
04 End of Record	0	0	0	0	0	0	-	-	0
05 Alternate EOR	0	0	0	0	0	0	-	-	0
06 Data compaction	0	0	0	0	0	0	-	-	-
07 Reserved	128	128	128	128	128	128	-	-	-
08 Subsys break char.	0	0	25	0	0	0	-	-	25
09 Subsys break proc.	0	0	64	0	0	0	-	-	64
10/11/12 Reserved	0	0	0	0	0	0	-	-	-
13 Line Delete Msg	3	3	1	3	3	3	-	-	1
14 Echo & modem sign.	2	2	2	2	2	4	-	-	-
15 Auto speed	0	0	0	0	0	0	-	-	-
16/17 Reserved	0	0	0	0	0	0	-	-	-
18 Read count MSB	63	63	63	0	0	0	-	-	8
19 Read count LSB	255	255	255	128	128	128	-	-	255
20 Async. mod. timer	50	50	50	0	0	0	-	-	-
21 Reserved	0	0	0	0	0	0	-	-	-
22 Write mode Enq Ack	64	64	88	64	64	96	-	-	92
23 Line size	1	1	1	1	1	1	-	-	-
24 Std PAD or CAS/PAD	0	0	0	101	121	141	-	-	-
25 Reserved	0	0	0	0	0	0	-	-	-

USER DEFINED PROFILES (UDPs)

UDPs marked * are pre-defined in the HP 2335.

Profile:	2*	72	73*	74	75*	100*	142	143*	144
X.3 PARAMETERS									
01 Esc Data Transfer	1	0	0	0	0	0	0	0	1
02 Echo	1	0	0	0	0	1	0	0	1
03 Data Forwarding	2	127	127	127	127	2	127	127	2
04 Idle Timer	0	0	0	0	0	0	0	0	0
05 HP 2335A Xon/Xoff	1	1	0	1	1	1	1	0	1
06 PAD messages	5	0	0	0	0	0	-	-	-
07 Break processing	21	0	0	0	0	0	8	8	21
08 Discard output	0	0	0	0	0	0	0	0	0
09 Cr padding	0	0	0	0	0	0	-	-	-
10 Line folding	0	0	0	0	0	0	-	-	-
11 Baud Rate	14	14	14	14	14	3	-	-	-
12 Device Xon/Xoff	1	0	0	0	1	1	0	0	1
13 Lf insertion	0	0	0	0	0	4	-	-	-
14 Lf padding	0	0	0	0	0	0	-	-	-
15 Editing mode	1	0	0	0	0	1	0	0	1
16 Backspace char.	8	8	0	8	8	8	-	-	-
17 Line delete char.	24	24	0	24	24	24	-	-	-
18 Line display char.	0	0	0	0	0	0	-	-	-
19 Service signals	2	2	2	2	2	2	-	-	-
20 Echo mask	128	128	128	128	128	128	-	-	-
21 Parity checking	0	0	0	0	0	0	-	-	-
22 Page wait	0	0	0	0	0	0	-	-	-

LOCAL PARAMETERS (accessed with parameter 0: value 13)

	2*	72	73*	74	75*	100*	142	143*	144
01 Parity specifications	0	0	0	0	0	0	-	-	-
02 Read specifications	0	0	1	0	0	0	0	0	0
03 Read trigger	0	0	0	0	0	0	0	0	0
04 End of Record	0	0	0	0	0	43	0	0	0
05 Alternate EOR	0	0	0	0	0	0	0	0	0
06 Data compaction	0	0	0	0	0	0	-	-	-
07 Reserved	128	128	128	128	128	128	-	-	-
08 Subsys break char.	0	0	0	0	0	0	25	0	25
09 Subsys break proc.	0	0	0	0	0	0	64	0	64
10/11/12 Reserved	0	0	0	0	0	0	-	-	-
13 Line Delete Msg	3	0	0	3	3	3	1	1	1
14 Echo & modem sign.	8	0	4	4	8	0	-	-	-
15 Auto speed	0	0	0	0	0	0	-	-	-
16/17 Reserved	0	0	0	0	0	0	-	-	-
18 Read count MSB	63	0	0	0	0	0	8	0	12
19 Read count LSB	255	128	128	128	128	128	255	128	255
20 Async. mod. timer	50	0	0	0	0	0	-	-	-
21 Reserved	0	0	0	0	0	0	-	-	-
22 Write mode Enq Ack	64	96	69	96	96	84	92	69	92
23 Line size	1	1	1	1	1	1	-	-	-
24 Std PAD or CAS/PAD	0	142	143	144	141	0	-	-	-
25 Reserved	0	0	0	0	0	0	-	-	-

UDP User Command

The UDP primary user command is used to create or modify User Defined Profiles (UDPs). The HP 2335A has several pre-defined Basic Defined Profiles which can be used for many standard applications, but certain configurations require special sets of parameters to be defined (e.g. auto-speed, auto-parity or different flow control mechanisms). A good knowledge of the standard X.3 and local parameters is required to avoid creating erroneous UDPs.

To enter UDP level the HP 2335A must initially be prepared as described in "Entering Configuration Mode: Preparation", and be in configure mode as described in "Entering Configuration Mode: Procedure".

At the prompt ...	You enter ...
*	UDP ↵

The HP 2335A then enters the UDP mode and prompts you for:

```
Prof. number?
```

The profile number that should be entered in response to the prompt is the number of the UDP to be created or modified (the HP 2335A can determine the associated BDP number, if any, which is the reference for modifications). If a BDP number is entered the HP 2335A will reject it with an "ERR" error message.

There are three types of profile available:

- **PAD PROFILES:** 1 < UDP number < 51

    The UDP number must not be one of the 3 Basic Defined Profiles (i.e. BDPs #1, #21 and #31).

    1 < UDP number < 21 (using BDP #1).
    21 < UDP number < 31 (using BDP #21).
    31 < UDP number < 51 (using BDP #31).

- **CAS/PAD PROFILES:** 51 < UDP number < 100

    The UDP number must not be one of the 3 Basic Defined Profiles (i.e. BDPs #51, #61 and #71).

    51 < UDP number < 61 (using BDP #51).
    61 < UDP number < 71 (using BDP #61).
    71 < UDP number < 100 (using BDP #71).

- **REMOTE PAD (associated to CAS/PAD) PROFILES:** 101 < UDP number < 161

    The UDP number must not be one of the 3 Basic Defined Profiles (i.e. BDPs #101, #121 and #141).

    101 < UDP number < 121 (using BDP #101).
    121 < UDP number < 141 (using BDP #121).
    141 < UDP number < 161 (using BDP #141).

The UDP definition capability of the HP 2335A means that a wide range of PAD (and CAS/PAD) functions and device (computer port) interfacing can be accommodated. A simple situation where a UDP should be defined is where the HP 2335A as a standard PAD is to interface a supported printer which operates at 2400 bps. The PAD profile for a printer is BDP #21, but in this profile the baud rate (X.3 parameter #11) has a value of 14 or 9600 bps (see the UDP table at the end of the last section and parameter #11 in "Standard X.3 Pad Parameters"). A UDP can be created from BDP #21 by modifying this parameter to a value of 12 or 2400 bps (refer to "UDP Definition Procedure"). In this case the UDP number that should be entered must be greater than 21 and less than 31.

Note   In order to define a CAS/PAD profile, its remote PAD profile must be defined first with reference to local parameter #24 (see under "PAD Parameters" later in this chapter).

Once the UDP number is entered (enter the number and press ↵), the HP 2335A enters UDP level and displays the "free space" for parameter definition, the defined profiles and the UDP: prompt. The user may then use the secondary commands available at UDP level as described next.

UDP Definition Procedure

At the prompt ...	You may enter ...	Comments
UDP:	LIST ↵	List all the defined profiles and number of modifiable parameters.
UDP:	DEL X ↵	Delete profile number X.
UDP:	SET p:v[,p:v[,...]] ↵	Modify the profile where: p = parameter v = value
UDP:	SET? p:v[,p:v[,...]] ↵	Modify the profile *and display the parameters*, where: p = parameter v = value
UDP:	PAR? ↵	Display the profile before or after modification.
UDP:	↵	Saves the created/modified UDP.

The UDP is not defined in the HP 2335A until the UDP level is exited (UDP: ↵). Up to 30 UDPs may be defined in the HP 2335A according to the available memory "free space" (see LIST command).

Note   A UDP must not be modified back to its base values if it is assigned to a device port. If this occurs an "ERR" error message is displayed and one parameter must then be modified in order to exit UDP level and de-assign (using the ASG command) the UDP.

DEL Command

This command is used to delete a defined UDP. It cannot be used to delete a BDP and if this is attempted the HP 2335A will display an "ERR" error message. The "DEL X" command ("X" is the profile number) updates the "free space" indication obtained on entering UDP level or listed with the LIST command at UDP level.

When any profile (including remote profiles) is assigned to a port, or a CAS profile, it cannot be deleted. Thus the profile to be deleted must be de-assigned from the device port first (using the ASG command).

Note   Profile #100 must NOT be deleted, as it is reserved for off-line configuration and terminal loop back testing.

SET Command

The SET command permits the user to modify a BDP or a defined UDP in order to create a new UDP or re-define an existing one. One or several profile parameters may be changed by using the SET command with the parameter numbers and the values to be modified. The BDP or UDP from which the new UDP is being created remains unchanged unless the same UDP number is used (it is then being modified) or it is deleted using the DELete command. The format of the SET command is: "SET" followed by the parameter number, a colon and then the new value to be set. If more than one "parameter:value" is to be modified then the "parameter:value" couples must be separated by a comma.

- If a parameter number is not given then the parameter value remains the same value as the BDP or the defined UDP being modified.

- If one parameter number or one value is invalid then a PAR n:INV message (or PAR 0:13, n:INV message for local parameters) will be displayed, where n is the parameter number. All other parameters will set.

- The SET command size is limited to 128 characters.

- The local parameters are accessed through parameter number 0 and parameter value 13 decimal.

  For example: SET 2:0, 4:1, 5:0, 0:13, 2:0 (The space character is optional.)

  This sets parameter #2 to value 0, parameter #4 to value 1, parameter #5 to value 0 and local parameter #2 to value 0.

Note that this command does not update the "free space" indication obtained on entering UDP level or listed with the LIST command at UDP level. If the SET command is entered without parameters/values then all previous modifications to the UDP are cancelled (UDP parameter values are reset to the original values at the time UDP level was entered).

SET? Command

The SET? command is identical to the SET command but also lists the new values of the modified parameters. Note that this command does not update the "free space" indication obtained on entering UDP level or listed with the LIST command at UDP level. If the SET? command is entered without parameters/values then all previous modifications to the UDP are cancelled (UDP parameter values are reset to the original values at the time UDP level was entered).

PAR? Command

This command enables the user to list all of the parameters of a defined profile. Simply enter PAR? (then press ↵). The HP 2335A PAD then lists the parameters, as in this example:

```
                    PROFILE PARAMETERS
        X3 parameters                Local parameters
   01_ Esc data transfer    001   01_ Parity specifications     000
   02_ Echo                 001   02_ Read specifications       000
   03_ Data forwarding      002   03_ Read trigger              000
   04_ Idle timer           000   04_ End of record            000
   05_ HP 2335A Xon/Xoff     001   05_ Alternate EOR            000
   06_ PAD messages         005   06_ Data compaction          000
   07_ Break processing     021   07_ Error message to HOST    128
   08_ Discard output       000   08_ Sub sys break char.      000
   09_ Cr padding           000   09_ Sub sys break process.   000
   10_ Line folding         000   13_ Line delete message      003
   11_ Baud rate            014   14_ Modem signals behavior   008
   12_ Device Xon/Xoff      001   15_ Auto speed & auto parity 000
   13_ Lf insertion         000   18_ Read bytecount MSB       063
   14_ Lf padding           000   19_ Read bytecount LSB       255
   15_ Editing mode         001   20_ Async. modem sig. timer  000
   16_ Backspace char.      008   22_ Write specifications     064
   17_ Line delete char.    024   23_ HP 2335A bytecount(*256) 001
   18_ Line display char.   000   24_ Remote assoc. prf. (CAS) 000
   19_ Service signals      002
   20_ Echo mask            128
   21_ Parity checking      000
   22_ Page wait            000
```

The parameter values given in this example are for Profile #2.

LIST Command

This command lists all of the profiles (BDPs & UDPs) defined in the HP 2335A and the amount of "free space" available for defining additional profiles.

For example:

```
-PROFILE NUMBER : XXX              -FREE SPACE : 43 parameters
-EXISTING PROFILES: 1,2,21,31,51,61,71,73,75,100,101,121,141,143.
```

The "free space" displayed corresponds to the number of parameters that can be modified and profiles that can be saved. One parameter "space" is required to define each modified parameter and one is required to save the

UDP itself. Thus if a UDP is to be defined by the modification of only one parameter then two parameter "spaces" are required (one for the modified parameter and one to save the profile).

If the "free space" is exceeded when defining UDPs then an error message is displayed. If this occurs, one existing profile must be deleted to provide more "free space" in order to save the profile being created. Alternatively, the profile being created can be restored to its original values (the BDP base) by using the SET or SET? commands, without parameters. If the UDP level is exited at this time then the profile being created is deleted automatically to prevent duplication of BDPs.

If a UDP is modified back to its BDP base then the UDP is automatically deleted (if not assigned) when UDP level is exited. A LIST command will show this. If the profile is assigned to a port then a different profile must be assigned (using the ASG command) in order that the original profile can be deleted.

Carriage Return Command

The Carriage Return command (↵) is used to exit the UDP level. If an "ERR" error message is displayed after entering this command, then look at the "free space" to see if there is enough space in the memory to define the profile. If this occurs then a profile must be deleted by using the "DEL" command to provide space for the new profile.

Automatic Dial Assignment

ADL User Command

In order to establish a connection (SVC) when making a call to a remote DTE, the address of the remote DTE must be entered. To simplify the calling procedure the HP 2335A has a Symbolic Remote Address (SRA) facility (see "MSG, SRA, LUG & POOL Configuration") which enables the user to enter a simple symbolic name (associated to the required remote DTE address) to establish the connection. The user may select the defined SRAs which are to be provided with the Automatic Dial (ADL) facility. When the ADL facility is selected the HP 2335A performs the necessary call procedure to establish an SVC using the SRA associated to the port. The call procedure is performed when the PAD is "ready".

When asynchronous devices (or computer ports) are connected to the HP 2335A and the modem control signals are monitored, a device port is "ready" (i.e. modem signals are ON) as soon as the device is powered-on (local connection) or as soon as the modem link is established (modem connection).

If no SRAs are defined an ADL assignment is not possible. An SRA is identified for ADL assignment by its numerical position in the SRA list. The LISTSRA command will show the allocated numbers.

Note that the ADL facility can be used on the HP 2335A in both CAS and PAD configurations.

ADL Assignment Procedure

Once the required SRAs have been defined and the HP 2335A is in configure mode (asterisk * prompt), the ADL primary user command may be entered to assign automatic dial to the selected device ports. The syntax of the ADL command is as follows:

At the prompt ...	You may enter ...	Comments
ADL:	pn[,pn[,...]..]]:m ↵	Assign SRA number m to port number pn, where: p = {A|B|C|D} n (optional) = {1|2|3|4}
ADL:	pn[,pn[,...]..]]:- ↵	De-assign ADL from port number pn.
ADL:	LIST ↵	List ADL assignment.
ADL:	↵	Exit ADL level.

In order to list the ADL assignment to the device ports the secondary user command LIST may be entered in response to the ADL: prompt. To exit the ADL level, entering a ↵ (Carriage Return) returns the configure asterisk (*) prompt.

Device Port Disabling

The ADL command can be used to disable a specified device port and consequently disable any incoming calls to that port (the calls are cleared). This function is achieved by using the " ! " symbol of the ADL syntax.

For example, to disable/re-enable device port A3:

At the prompt ...	You would enter ...	Comments
ADL:	A3:! ↵	Disables port A3.
ADL:	A3:- ↵	Re-enables port A3.
ADL:	LIST ↵	Displays the ADL assignment, as follows:

```
Assignment for each port


      .    1    2    3    4
      D    -    -    -    -
      C    -    -    -    -
      B    -    -    -    -
      A    -    -    !    -
```

The listing shows port A3 disabled.

Note	The port disable only becomes effective only after resetting the HP 2335A or after a disconnection between the device and the HP 2335A.

LIST Command

The LIST command permits the user to list the complete HP 2335A configuration including the software on the installed ROMs. The command may be entered when the HP 2335A is in CONFIGURE mode in response to the asterisk prompt. Note that the ADL assignment and defined Messages are NOT listed at this level.

The messages cannot be displayed at this level as they may contain escape sequences such as terminal reset or clear display and access to the test port password must also be restricted.

DEF-PAD Command

The DEF-PAD command defines the HP 2335A as a default PAD. It has the same effect as setting the DIP switches to the default PAD setting when switching on the HP 2335A for the first time.

The default PAD configuration provides straightforward packet assembly/disassembly for terminal connections to leased lines, and is the basis for configuring terminal connections to X.25 networks. It is therefore the normal default to use for an HP 2335A on the **device side** of a network. This includes a PAD whose asynchronous ports are are to be assigned a remote PAD (associated with CAS/PAD) profile. For an explanation of the latter, see earlier in this chapter under "Asynchronous Ports Profile Configuration".

The default parameters for the **synchronous port** are listed in appendix A of the *HP 2335A User's Guide*.

All the **asynchronous ports** are assigned Profile 1. Profile 1 is a BDP and its parameters are listed earlier in this chapter, under "Asynchronous Ports Profile Configuration", and in appendix C of the *HP 2335A User's Guide*.

Caution	When you enter the DEF-PAD command, you lose all previously specified configuration parameters for all the HP 2335A's ports (synchronous and asynchronous).

DEF-CAS Command

The DEF-CAS command defines the HP 2335A as a default CAS. It has the same effect as setting the DIP switches to the default CAS setting when switching on the HP 2335A for the first time.

The default CAS configuration provides PAD facilities *plus* the facility of downloading configurations to a remote PAD. It is therefore the normal default to use for an HP 2335A on the **host side** of a network.

The default parameters for the **synchronous port** are listed in appendix A of the *HP 2335A User's Guide*.

All the **asynchronous ports** are assigned Profile 71. Profile 71 is a BDP and its parameters are listed earlier in this chapter, under "Asynchronous Ports Profile Configuration", and in appendix C of the *HP 2335A User's Guide*.

Caution   When you enter the DEF-CAS command, you lose all previously specified configuration parameters for all the HP 2335A's ports (synchronous and asynchronous).

PAD Parameters

Using the provisions stated in the X.3, X.28 and X.29 Recommendations, in addition to the 22 standard X.3 parameters the HP 2335A features proprietary parameters referred to as "local parameters" which provide increased capabilities. These parameters are accessed using a separation mechanism (parameter reference = 0, parameter value = 13) for SET, READ and SET & READ commands.

There are 25 "local parameters" of which the following 9 are reserved and cannot be modified: #7, #10, #11, #12, #16, #17, #21, #23 and #25.

Standard X.3 PAD Parameters

Parameter #1: Escape From Data Transfer

This function allows the terminal to initiate an escape from the data transfer state in order to send PAD commands.

Value (decimal)	Action
0	Escape not possible.
1	Escape with DLE (ctrl-P).
32 to 126	Escape with the defined character.

Whenever possible, the defined character is the Data Forwarding Signal for any data just entered and is sent with the data as the Data Forwarding Signal.

Entering the "escape from data transfer" character twice will add it once in the data buffer (it is echoed to the terminal) and the PAD stays in the "data transfer" state. Any line delete character following the "escape from data transfer" character will return the PAD to the data transfer state.

When the "escape from data transfer" state is entered the following parameters are forced to the values shown below:

Value	Action
Parameter #2 = 1	Echo is ON.
Parameter #3 = 2	"Cr" and " + " are the data forwarding signals.
Parameter #4 = 0	Idle timer is OFF.
Parameter #15 = 1	Editing is ON. (If Par. #16 is not 0, backspacing is enabled. If Par. #17 is not 0, line deleting is enabled.)

In all cases the ENQ/ACK flow control mechanism for data transfer is maintained (when defined).

This parameter is modifiable using X.28 and X.29 PAD commands.

Parameter #2: Echo

The Echo parameter enables all the characters received from the terminal to be transmitted back to the terminal as well as being processed by the HP 2335A.

Value (decimal)	Action
0	No echo.
1	Echo.

The DC2/ACK/X-ON/X-OFF characters if enabled as flow control characters are not echoed. A defined escape from data transfer character, if enabled, is not echoed.

This parameter is modifiable using X.28 and X.29 PAD commands.

Parameter #3: Selection Of Data Forwarding Signals

This parameter allows the selection of a defined set of character(s) received from the terminal to be recognized by the HP 2335A as an indication to terminate the input sequence and forward the block of data to the host.

Value (decimal)	Bit #	Action
0		No data forwarding character.
1	0	A-Z, a-z, 0-9.
2	1	CR (carriage return).
4	2	ESC or BEL or ENQ or ACK.
8	3	DEL or CAN or DC2.
16	4	ETX or EOT.
32	5	HT or LF or VT or FF.
64	6	All characters from IA #5 columns 0 and 1 not included in above and the DEL character.
127	-	All the characters are data forwarding.

Possible values: all possible combinations in the range 0 to 127.

The data forwarding character defined here is sent to the host as the last byte of the buffer.

Note   Values 0 or 1 are accepted for Bit #0 but they have no action. When parameters #16 and #17 are defined, the defined DEL and CAN characters cannot be considered as the data forwarding signal. If Local Parameter #22 has a value of 32 then it has priority over this parameter including value 4 (Bit #2 set).

This parameter is modifiable using X.28 and X.29 PAD commands.

Parameter #4: Selection Of Idle Timer Delay

This parameter enables the HP 2335A PAD to terminate the assembly of a packet and forward it when the time interval between successive characters received from the terminal exceeds a selected value.

Value (decimal)	Action
0	No time-out is required.
1 to 255	Indicate the value of the delay in twentieths (1/20) of a second.

This parameter is modifiable using X.28 and X.29 PAD commands.

Parameter #5: Flow Control Of Incoming Data By The HP 2335A.

This parameter enables the HP 2335A to control the flow of data from the terminal to the PAD. The HP 2335A indicates whether it is ready to accept characters from the terminal by transmitting special characters. These characters are used to switch the terminal transmission on and off.

Value (decimal)	Action
0	X-ON/X-OFF not used.
1	Use of X-ON (DC1) and X-OFF (DC3).

If X-OFF is not recognized by the device, the HP 2335A will keep on sending it until its memory overflows.

This parameter is modifiable using X.28 and X.29 commands.

Parameter #6: Suppression Of PAD Messages.

This parameter allows all PAD output messages to the terminal to be suppressed.

Value (decimal)	Bit #	Action
0		No PAD messages.
1	0	PAD messages are transmitted to the terminal.
4	2	PAD prompt character "@" is used in command state.

Possible values: 0, 1, 5 (1 + 4).

The standard BDPs for terminal applications have a parameter value of 5.

This parameter is modifiable using X.28 and X.29 commands.

Parameter #7: Break Processing

This parameter specifies the processing that should be performed by the PAD upon receipt of a break signal.

Value (decimal)	Bit #	Action
0		Nothing.
1	0	Interrupt.
2	1	Reset.
4	2	Indication of a break is forwarded.
8	3	Escape from data transfer state.
16	4	Discard output to the terminal.

Possible values: 0, 1, 2, 8, 21 (1 + 4 + 16).

When a break is processed and this parameter has a value of 21 an X.29 Indication of Break packet is forwarded to the remote host computer with a parameter #8 Discard Output value of 1.

If a break signal is received while the HP 2335A is in an X-OFF received state, it will set to the X-ON state (except when parameter #7 = 8).

When parameter #7 = 8 and an "escape from data transfer" character is entered, the data packet (if any) is forwarded with the "escape from data transfer" character as the last byte (except when parameter #1 = 0).

When parameter #7 = 8 and parameter #1 = 0, the data packet (if any) is forwarded with "null" as the last data byte. If "break" is entered twice the HP 2335A PAD sends an INTerrupt packet in order that a remote CAS/PAD can output a BREAK signal to the associated host computer asynchronous port connection (the data packet, if any, is not forwarded).

This parameter is modifiable using X.28 and X.29 PAD commands.

Parameter #8:Discard Output

This parameter is used in break processing and directs the HP 2335A PAD to discard user data instead of transmitting it to the terminal.

Value (decimal)	Action
0	Normal delivery to the terminal.
1	Discard output.

All data, including PAD messages, are discarded when this parameter is set to 1.

This parameter is modifiable using X.28 and X.29 PAD commands.

Parameter #9: Padding After Carriage Return.

This parameter provides for automatic insertion of padding characters in the character stream transmitted to the terminal after a Carriage Return character. This is to enable the printing mechanism of the (teletype) terminal to perform the Carriage Return function correctly. The padding character is NUL.

Value (decimal)	Action
0	No CR padding.
1 to 7	Indicate the number of padding characters to be generated by the HP 2335A.

This parameter is modifiable using X.28 and X.29 PAD commands.

Parameter #10: Line Folding

This parameter provides for automatic insertion of the appropriate terminator in the character string transmitted to the terminal. The maximum number of characters per line may be defined.

Value (decimal)	Action
0	No line folding.
1 to 255	Indicate the number of characters per line.

Note   The parameter value is accepted but no action is taken.

This parameter is modifiable using X.29 PAD commands only.

Parameter #11: Baud Rate

This parameter indicates the baud rate at which the terminal (device) is operating.

Value (decimal)	Baud Rate (bps)
0	110
2	300
3	1200
4	600
5	75
6	150
12	2400
13	4800
14	9600
15	19200

This parameter is modifiable using X.28 and X.29 PAD commands.

Parameter #12: Flow Control Of Outgoing Data From The HP 2335A.

This parameter provides for flow control between the HP 2335A and the terminal. The terminal indicates that it is ready to accept characters from the HP 2335A by transmitting X-ON and X-OFF characters.

Value (decimal)	Action
0	No flow control.
1	Use X-ON/X-OFF characters.

The X-ON and X-OFF characters are not transmitted to the Host during ASCII transfer and are not considered as data forwarding signals even when parameter #3 = 126 or 127. If an X-OFF character happens to be received by the HP 2335A after the last character of the output sequence then only either X-ON or a logical break will be considered as a resume output condition (Break has no action on the flow control if parameter #7 = 8).

This parameter is modifiable using X.28 and X.29 PAD commands.

PARAMETER #13: Line feed Insertion

This parameter provides for automatic insertion of a line-feed character after any carriage return character in the data stream transmitted to/from the terminal or echoed to the terminal. It applies in both the "data transfer" and "escape from data transfer" states.

Value (decimal)	Bit #	Action
0		No line-feed insertion.
1	0	Values 0 or 1 are accepted but they have no action.
2	1	Insert line-feed after carriage return in the data stream from the terminal.
4	2	Insert line-feed after carriage return as echo to the terminal.

Possible values: 0, 1, 4, 5 (1 + 4).

This parameter is modifiable using X.28 and X.29 PAD commands.

Parameter #14: Padding After Line Feed

This parameter provides for automatic insertion of padding characters in the character stream transmitted to the terminal after a Line Feed character. This allows for the printer mechanism of the terminal (teletype) to perform the Line Feed operation correctly. The padding character is "NUL".

Value (decimal)	Action
0	No LF padding.
1 to 7	Indicate the number of padding characters to be generated by the HP 2335A.

This parameter is modifiable using X.28 and X.29 PAD commands.

Parameter #15: Editing

This parameter provides for character delete, line delete and line display editing functions in the HP 2335A for the terminal. These functions apply in both the data transfer state and the "escape from data transfer" state (command state).

Value (decimal)	Action
0	No editing.
1	Editing during ASCII data transfer.

When a character input is larger than the line size, the corresponding packets are forwarded to the network. The editing functions are transparent for the host system within the line size. Once the line size is reached, the editing characters are stored and transmitted to the host computer system when the read size is reached, or a data forwarding signal is received.

Only one line delete character is forwarded, subsequent ones being processed locally (within the line size). The "line delete character" is forwarded in the packet with the M-bit set to 1. The line size is fixed to 256 bytes. This is modifiable using either an X.28 or an X.29 PAD command.

Parameter #16: Character Delete (Backspace)

This parameter provides for character deletion. It enables the user to delete the last character entered at the terminal. The effect on-screen depends on the value of parameter #19.

Value (decimal)	Action
0	No character delete available.
1 to 127	Define the character delete.

For character delete to be effective in data transfer mode, parameter #15 must be set to 1.

When the delete character is defined here, it cannot be used as the data forwarding signal (see parameter #3).

This parameter is modifiable using X.28 and X.29 PAD commands.

Parameter #17: Line Delete (Cancel)

This parameter provides for line deletion. It enables the user to delete the last line entered at the terminal. Upon receipt of the line delete character the HP 2335A will output parameter #13 (Line delete PAD service signal).

Value (decimal)	Action
0	No line delete available.
1 to 127	Define the line delete.

For line delete to be effective in data transfer mode, parameter #15 must be set to 1.

When the cancel character is defined here, it cannot be used as the data forwarding signal (see parameter #3).

This parameter is modifiable using X.28 and X.29 PAD commands.

Parameter #18: Line display

A value is accepted for this parameter but no action is taken. as a default, it is set to 0.

This parameter is modifiable using X.28 and X.29 commands.

Parameter #19: Service Signals

This parameter specifies the response of the HP 2335A to an editing character (character delete, line delete, or line display) entered on the terminal in command mode.

Value (decimal)	Action
0	No editing.
1	Editing for printing terminals.
2	Editing for display terminals.

This parameter is modifiable using X.28 and X.29 PAD commands.

Parameter #20 : Echo Mask

This parameter theoretically specifies whether the PAD echoes certain characters to the terminal. However, in the case of the HP 2335A, the value of this parameter is meaningless as this functionality is implemented via local parameters #2 and #22.

This parameter is modifiable using X.28 and X.29 PAD commands.

Parameter #21: Parity Checking

In combination with local parameter #1, this parameter specifies the HP 2335A's parity checking function. Parameter #21 specifies whether there is or is not to be parity checking. Local parameter #1 specifies the type of parity checking.

Value (decimal)	Action
0	No parity checking.
3	Check and generate parity.

This parameter is modifiable using X.28 and X.29 PAD commands.

Parameter #22 : Page Wait

In the context of the HP 2335A, this parameter is meaningless and therefore can be set to any value.

HP 2335A Local PAD Parameters

Local Parameter #1: Parity

This parameter allows the user to specify the parity used for transmission between the HP 2335A and the terminal/host computer port.

Value (decimal)	Action
0	No parity (8 bits).
1	Odd parity (parity + 7 bits). The parity bit *is* checked by the HP 2335A upon receipt of characters.
3	Even parity (parity + 7 bits). The parity bit *is* checked by the HP 2335A upon receipt of characters.
5	No parity ("1" + 7 bits).
7	No parity ("0" + 7 bits).
9	Odd parity (parity + 7 bits). The parity bit is *not* checked by the HP 2335A upon receipt of characters.
11	Even parity (parity + 7 bits). The parity bit is *not* checked by the HP 2335A upon receipt of characters.

For values 1 and 3, the parity bit of the characters transmitted between the terminal (device) and the HP 2335A are checked and an error message is sent to the terminal when the parity bit is not set correctly. When Parity is selected, the HP 2335A is handling 7-bit data octets and the remote host computer receives characters with the parity bit set to 0.

The configured parity must be the same for both the HP 2335A and the terminal/host computer port.

This parameter is modifiable via X.28 or X.29.

Local Parameter #2: Read Mode

This parameter allows the user to specify the handshake protocol used between the HP 2335A and the terminal.

Value (decimal)	Bit #	Action
1	0	0 ASCII read character mode. 1 Binary mode.
2	1	0 Read with type ahead allowed. 1 Read trigger is required for each read.
4	2	0 No action. 1 Read trigger command.
32	5	0 No action. 1 Line block mode handshake (DC1,DC2-Cr).
64	6	0 No action. 1 Page block mode handshake (DC1-DC2-DC1) and disable Cr (as terminator) until completion.

Possible values: 0, 1, 96(32 + 64), 98 (2 + 32 + 64), 102 (2 + 4 + 32 + 64).

This parameter is used in conjunction with standard parameter #5 (flow control) and local parameter #22 (write mode) to define the handshake protocol to be used. Providing that the parameter values are compatible, the HP 2335A accepts any parameter combinations.

If page block mode handshake is enabled (bit 6 set), then the HP 2335A checks for read completion upon receipt of DC2. If the DC2 is an EOR (see Loc. Par. #4 End of Record) or if the idle timer delay expires (see X.3 par. #4) then the DC2 signal is forwarded to the remote host computer.

If Bit 5 is set (may be a line block mode), the HP 2335A will start a two character timer (minimum 15 ms) and waits for a read trigger (Loc. Par. #3) if the DC2 signal has been forwarded to the remote host computer. If Bit 5 is reset or the timer expires before receipt of a Cr character, then an internal buffer is allocated for page block mode.

The HP 2335A sends a DC1 signal to the terminal, if in type ahead mode, or waits for a read trigger command from the remote host computer (X.29 SET command with Local par. #2 = 4) before sending the DC1 if the terminal is not in type ahead mode.

The HP 2335A receives data until the EOR (Cr is disabled as a terminator) or the byte count is exhausted (see local parameters #18 and #19) and then forwards it to the remote host computer.

Setting the local parameter #2 value to 64 and local parameter #22 to a value of 4 provides for the "PAD - CAS/PAD" configuration where the PAD has control over the selection of block mode or character mode input and handshaking. If Bit 6 is reset then DC2 is processed as a standard character.

If a binary read is selected the HP 2335A disables an ENQ/ACK handshake automatically for the duration of the read. Block-mode inputs are under the "control" of an automatic read timer and must complete within this timer value or else the read will end and data forwarded as it is . The value of the timer depends on the requested block-mode size and the baud rate.

This parameter can be modified using an X.29 command only.

Local Parameter #3: Device Read Trigger

This parameter allows the user to specify the character that the HP 2335A should use to trigger a read on the device.

Value (decimal)	Action
0	No trigger character.
1 to 255	Defines the character to act as a read trigger. (Should be DC1 - decimal 17 for HP devices.)

Note   Do not use value 17 in a remote PAD (associated with CAS/PAD) profile when local parameter #22 has Bit #2 set (HP block mode incompatibility).

This parameter can be modified using either an X.28 or an X.29 command.

Local Parameter #4: EOR (End of Record)

This parameter allows the selection of a character received from the terminal to be recognized by the HP 2335A as an indication to terminate the input sequence and forward the block to the host.

Value (decimal)	Action
0	No EOR.
1 to 255	Defines the EOR character.

The EOR character is sent to the host as the last byte of the buffer.

This parameter can be modified using an X.29 command only.

Local Parameter #5: Alternate EOR

This parameter allows the selection of a character received from the terminal to be recognized by the HP 2335A as an indication to terminate the input sequence and forward the block to the host.

Value (decimal)	Action
0	No Alternate EOR.
1 to 255	Defines the Alternate EOR character.

The Alternate EOR character is sent to the host as the last byte in the buffer.

This parameter can be modified using an X.29 command only.

Local Parameter #6: Data Compaction

This parameter allows the user to select data compaction by the suppression of redundant characters. The user is also able to select the special character to be used by the data compaction process.

Value (decimal)	Action
0	No data compaction.
1	Enable data compaction function with decimal 128 as special character.
2 to 255	Data compaction enabled with special character defined.

The data compaction feature is incompatible with binary mode, and is disabled during binary write and read. In data compaction mode the HP 2335A is not transparent to the defined special character and the character will be discarded. Data may be lost if data compaction is not configured on both sides of the synchronous connection.

If the data compaction facility is used, Local Parameter #6 must have the same value in the CAS profile (71 - 99) and in the PAD profile (1 - 50). This parameter is NOT downloaded by the CAS profile.

This parameter is modifiable using an X.29 command only.

Local Parameter #7: Reserved

This parameter is reserved, and should be always set to 128. Do not change it.

Local Parameter #8: Define Subsystem Break Character

This parameter allows the user to select a character to provide subsystem break capability.

Value (decimal)	Action
0	No subsystem break.
1 to 255	Defines the subsystem break character.

If a subsystem break signal is received while the HP 2335A is in the X-OFF received state, the interface will go to the X-ON state.

This parameter is modifiable using an X.29 command only.

Local Parameter #9: Subsystem Break Processing

This parameter allows the selection of the operation of the HP 2335A after the receipt of a subsystem break (normally Ctrl. Y, value = 25) from the terminal.

Value (decimal)	Bit #	Action
0		Character defined in Loc. Par. #8 is discarded.
4	2	Indication of break is forwarded.
16	4	Discard output to terminal.
64	6	Terminate current input.

Possible values: 0, 64, 84 (4 + 16 + 64).

This parameter is modifiable using an X.29 command only.

Local Parameter #13: Line Delete PAD Service Signal

In the context of the HP 2335A, this parameter is meaningless.

This parameter is modifiable using X.28 and X.29 PAD commands.

Local Parameter #14: Local Echo And Modem Signal Control

This parameter allows the user to specify if the HP 2335A should control local echo upon receipt of "esc :" and "esc ;".

Value (decimal)	Bit #	Action
0		Do not control echo.
1	0	Echo may be controlled by "esc:" (on) and "esc;" (off).
2	1	Upon receipt of a Clear an HP 2335A PAD will drop its modem signals.
4	2	CTS and DCD are true only if communication is established.
8	3	Disables modem behavior on the Modem Control Adapter Card.

Possible values: 0, 1, 2, 3, 4, 5, 8, 9 (8 + 1).

Bit #2 is only available on a CAS profile and is only applicable to SVCs. If Bit #3 is set then the modem signals are set but no action is taken when the DTE drops the RTS and DTR signals. For details of modem signals behavior, see under "Cables" in chapter 8.

This parameter is modifiable using X.28 or X.29 commands.

Local Parameter #15: Auto Speed And Auto Parity

This parameter allows the user to specify if the HP 2335A should set the auto speed function.

Value (decimal)	Bit #	Action
0		No auto speed (speed is defined by Std Par. #11) and no auto parity.
1	0	Auto speed enabled.
4	2	Auto parity enabled. Possible values: 0, 1, 5 (1 + 4).

If value 1 is selected; when the baud rate is found, Std Par. #11 (baud rate) is updated. When a set and read X.28 PAD command sets this parameter to 1, the PAD service signal is discarded. If value 4 is selected the terminal parity is determined automatically and local parameter #1, bits 0 and 1 are updated. Auto-parity must be used for ODD or EVEN parity only and must be specified with the auto speed.

On any device port having auto speed or auto parity enabled a ↵ (Cr) character must be repeatedly entered until the reception of a Welcome message (in the case of SVCs) or the system prompt (in the case of PVCs). If auto speed/auto parity is enabled in the profile of an ADL assigned device port, then a Carriage Return (Cr) character must be sent to the HP 2335A PAD (by pressing the terminal's ↵ key) in order that the speed/parity can be sensed and set in RUN mode. Once the speed/parity is set, the ADL call procedure is performed to establish the virtual circuit and the PAD data transfer state is then entered. Thus values 1 and 5 must not be selected for CAS ports.

This parameter is modifiable using X.28 or X.29 commands.

Local Parameter #18: Read Length - Most Significant Byte

This parameter allows the user to specify the maximum number of bytes that the HP 2335A should accept for subsequent read requests. When the byte count is reached the HP 2335A forwards the data to the host (no special indication is provided in this buffer; the length is the read length specified by the host). This parameter is also used to determine the maximum size of a block mode transfer (the size being limited by local parameters #18 *and* #19).

Value (decimal)	Action
0 < = n < 16000	Read byte count (defined in 2 bytes).

Possible values: 0 to 16000.

Examples:
- To set the maximum block size to 64, set parameter #18 to 16000 and parameter #19 to 0.
- To set the maximum block size to 12, set parameter #18 to 3000 and parameter #19 to 0.

If a memory overflow occurs on a very large block mode transfer then the read length must be increased on the port profile.

This parameter is modifiable using an X.29 command only.

Local Parameter #19: Read Length - Least Significant Byte

Refer to local parameter #18.

The user maximum block mode screen size = 128 x (local parameter #18 + local parameter #19).

This parameter is modifiable using an X.29 command only.

Local Parameter #20: Asynchronous Modem Signals Timer

This parameter allows the user to specify a modem signals timer to allow for modem signal fluctuations on asynchronous connections.

Value (decimal)	Action
0	No timer.
1 to 255	Indicate the value of the timer in hundredths (1/100) of a second.

This parameter can be modified using X.28 or X.29 PAD commands.

Local Parameter #22: Write Specification

This parameter permits the CAS/PAD in a "PAD - CAS/PAD" configuration to define the write mode. The write mode may be ASCII or binary with hard or soft pre-empt. With hard pre-empt the HP 2335A will output data as soon as it is received: with a soft pre-empt the HP 2335A waits for a started read (at least one byte received from the device) to complete before commencing data output.

Value (decimal)	Bit #	Action
0	-	0 = ASCII write. 1 = Binary write.
2	1	0 = Hard pre-empt. write. 1 = Soft pre-empt. write.
4	2	0 = No action. 1 = Automatic read/write mode.
8	3	0 = All the ACKs are discarded. 1 = Send all the ACKs (not waiting).
16	4	0 = No ENQ/ACK handshake. 1 = ENQ/ACK handshake is enabled.
32	5	0 = No ACK response to ENQ handshake. 1 = ACK response to ENQ handshake enabled.
64	6	0 = Half duplex transmission. 1 = Full duplex transmission.

Possible values:

> 0
> 16
> 20 (4 + 16)
> 24 (16 + 8)
> 32
> 64
> 69 (64 + 4 + 1)
> 84 (64 + 16 + 4)
> 88 (64 + 16 + 8)
> 92 (64 + 16 + 8 + 4)
> 96 (64 + 32)

If set to 32, this parameter will have priority over parameter #3 (including when set to value 4 (bit 2 set)).

When the HP 2335A receives an ENQ sent by a host computer on a CAS port, it sends an ACK back and then lets the ENQ in the buffer pass through to the network.

When the HP 2335A receives a ENQ coming from the network, it lets the ENQ go to the terminal and resets its own ENQ mechanism (if the ENQ/ACK protocol is enabled).

In conjunction with standard parameter #12, this parameter defines the protocol that should be used to write on the device. If the device does not provide an ACK response to an ENQ, after 10 seconds the HP 2335A will assume a positive answer and resume output.

Note	Binary write and binary read must be used with caution. The pre-defined UDPs #73 and #143 are provided for binary transfer. The control-P BIN ↵ command must be used to switch to the profile just before binary transfer and the Break ASC ↵ command to switch back once the transfer is complete.

When the ENQ/ACK handshake is enabled (an ASCII transfer with Bit #4 set) the ACK character received by the HP 2335A is processed according to Bit #3.

If the ENQ character happens to be added by the HP 2335A after the last character of the output sequence (not monitored by the HP 2335A), then either an ACK or a logical break will be considered as an Acknowledgment. (There is no action upon receipt of a break if parameter #7 = 8.)

If value 4 is selected in conjunction with a local parameter #2 value set to 64 then this provides the PAD, of a "PAD - CAS/PAD" configuration, with control in the selection of block mode or character mode input and handshaking.

If a DC2 (page block-mode) or DC2-Cr (line block-mode) or DC2-Cr-Lf (line block-mode with auto Lf on) sequence is received the necessary buffer space is reserved while the sequence is sent to the remote host computer. Upon block-mode acknowledgment (DC1) or (data DC1) and a buffer space ready condition, the data (if any) is delivered to the terminal with the flow control mechanism (if any) enabled. Then when a DC1 is delivered, the block-mode input is "active" until the data forwarding condition is met (idle timer or RS or Cr, etc.).

If one of the above sequences is not received a standard character mode input is performed.

This parameter is modifiable using an X.29 command only.

Local Parameter #23: Character Mode Line Size

This function allows the HP 2335A to return a data buffer to the remote host computer before any completion condition (EOR or byte count exhausted) occurs. When the remote host computer receives a buffer corresponding to the size defined by this parameter it recognizes that more data is to follow (the read is not completed as defined) and the M-bit is set to 1. This is to ensure that the HP 2335A does not buffer too many bytes when working in character mode.

Value (decimal)	Action
n	Indicate the HP 2335A line size divided by 256 (in characters).

The HP 2335A will force this parameter to a value of 1 and will reject any attempt to modify it.

The user data is broken down into a buffer size equal to n times 256 bytes. The first line size buffer is edited (character delete and line delete having been processed properly by the HP 2335A) but subsequent buffers may have character delete and line delete characters in them which must be processed by the remote host. The HP 2335A still processes the byte count correctly, including processing of all backspaces and deletes encountered and will complete the read when the byte count is finished.

This parameter is not modifiable using X.28 or X.29 commands.

Local Parameter #24: Standard PAD or CAS/PAD Selection

This parameter allows the user to define whether the HP 2335A is to follow the standard PAD or the CAS/PAD behavior.

Value (decimal)	Action
0	Standard PAD.
n	CAS/PAD ("n" refers to the profile to load in the remote calling PAD).
	Note: n = 0 or 100 < n < 161

The profile to be downloaded to the remote calling PAD is defined by the parameter value "n" in the profile. This defines the set of modifications to be sent to the remote PAD according to the CAS/PAD profile. A value of "n" (non-zero) is only accepted on CAS profiles (71 < profile < 100).

The Remote PAD (associated to CAS/PAD) profile that is to be downloaded to the calling PAD is defined at the HP 2335A CAS/PAD location.

This parameter is not modifiable using X.28 or X.29 commands.

PAD Parameter Processing Sequence

The actions of different parameters on the characters received from a terminal are tested and taken serially. There is an implicit priority in the order of processing the flow of input data which overrides any defined set of parameters. Thus if two parameters should act on a character, only one action is taken.

The parameter processing order is as follows:

1. ENQ/ACK - ACK/ENQ of Local parameter #22, value 16-32.

2. X-ON then X-OFF of X.3 parameter #12, value 1.

3. Subsystem break of Local parameters #8 and #9.

4. Escape character of Local parameter #14, value 1.

5. Pad recall signal of X.3 parameter #1.

6. DC2 character of Local parameter #2, value 64.

7. Delete character of X.3 parameters #15 and #16.

8. Delete line of X.3 parameters #15 and #17.

9. Line display of X.3 parameters #15 and #18.

10. Data forwarding condition of X.3 parameter #3.

Note   **Idle timer of X.3 parameter #4.** The idle timer condition is processed whenever a timeout condition is reached.

Configuration Examples

Starting on the next page are the configuration details for the following three examples:

1. Non-X.25 statistical multiplexer

2. X.25 statistical multiplexer

3. X.25 PAD

Example 1: Non-X.25 Network Statistical Multiplexer Configuration

This example makes use of the HP 2335A Default Configurations, as described in "Selecting A Default Configuration". In this case the DEF-PAD and DEF-CAS commands are used (See "Configuration Listing"). Any required modifications can be made as described in "Entering Configuration Mode: Preparation".

Configuration For The Device-side HP 2335A

At the prompt ...	You would enter ...	Comments
*	DEF-PAD ↵	Define the HP 2335A as a default PAD.
*	LIST ↵	List the current configuration, as below:

```
HSA
HP PAD   CONFIGURATION X25 LEVEL I

        ---------------------------------------------------------------
        -PHYS. LINK    : X.21bis DTE        -EXT. SPEED    : 19200
        -LINE SPEED    : Supplied by the modem-MODEM TIMER : 6000  ms
        ---------------------------------------------------------------

HP PAD   CONFIGURATION X25 LEVEL II

        ---------------------------------------------------------------
        -NETWORK TYPE  : NET,0              -EQUIP. TYPE   : LAP-B DTE
        -FRAME WINDOW  : 7                  -TIMER   T1    : 3000  ms
        -RET. CNT N2   : 20                 -I-FRAME       : 131 bytes
        ---------------------------------------------------------------

HP PAD   CONFIGURATION X25 LEVEL III

        ---------------------------------------------------------------
        -LOCAL ADDRESS : 00
        -WIND. SIZE IN : 2                  -WIND. SIZE OUT: 2
        -THROUGHPUT IN : 19200              -THROUGHPUT OUT: 19200
        -PACK. SIZE IN : 128                -PACK. SIZE OUT: 128
        -FIRST  PVC    : 1                  -LAST  PVC     : 7
        -FIRST  SVC IN :                    -LAST  SVC IN  :
        -FIRST  2W SVC : 16                 -LAST  2W SVC  : 17
        -FIRST  SVC OUT:                    -LAST   SVC OUT:
        -D-BIT         : NO
        -PKT.NUMBERING : 8
        -FAC. SUPPORTED:
        -PVC ASSOC. PRT: 1:A2, 2:A3, 3:A4, 4:B1, 5:B2, 6:B3, 7:B4
        ---------------------------------------------------------------

HP PAD   CONFIGURATION X25 LEVEL LUG

        ---------------------------------------------------------------
        -REMOTE ADDRESS
        ---------------------------------------------------------------
```

```
HP PAD   CONFIGURATION X25 LEVEL SRA

     ------------------------------------------------------------------

     -01) 01 <---- REM_ADDR

     -02) 17 <---- RDIAG

     ------------------------------------------------------------------

HP PAD  CONFIGURATION: PORT POOLS

     ------------------------------------------------------------------

     -First  port pool:  From -- to --

     -Second port pool:  From -- to --

     -Third  port pool:  From -- to --

     ------------------------------------------------------------------


ASG

     Assignment for each port


     .    1    2    3    4

     D    1    1    1    1

     C    1    1    1    1

     B    1    1    1    1

     A    1    1    1    1

     ------------------------------------------------------------------

CPU    02335-xxxxx

SC-D

SC-C

SC-B

SC-A   02335-xxxxx   .   02335-xxxxx   . RS232MOD4 ports
```

Configuration For The Host-side HP 2335A

At the prompt ...	You would enter ...	Comments
*	DEF-CAS ↵	Define the HP 2335A as a default CAS.
*	LIST ↵	List the current configuration, as below:

```
HSA
 HP PAD   CONFIGURATION X25 LEVEL I

         ------------------------------------------------------------------
         -PHYS. LINK    : X.21bis DTE        -EXT. SPEED    : 19200
         -LINE SPEED    : Supplied by the modem-MODEM TIMER   : 6000  ms
         ------------------------------------------------------------------

 HP PAD   CONFIGURATION X25 LEVEL II

         ------------------------------------------------------------------
         -NETWORK TYPE  : DCE,0              -EQUIP. TYPE   : LAP-B DCE
         -FRAME WINDOW  : 7                  -TIMER  T1     : 3000  ms
         -RET. CNT N2   : 20                 -I-FRAME       : 131 bytes
         ------------------------------------------------------------------

 HP PAD   CONFIGURATION X25 LEVEL III

         ------------------------------------------------------------------
         -LOCAL ADDRESS : 00
         -WIND. SIZE IN : 2                  -WIND. SIZE OUT: 2
         -THROUGHPUT IN : 19200              -THROUGHPUT OUT: 19200
         -PACK. SIZE IN : 128                -PACK. SIZE OUT: 128
         -FIRST  PVC    : 1                  -LAST  PVC     : 7
         -FIRST  SVC IN :                    -LAST  SVC IN  :
         -FIRST  2W SVC : 16                 -LAST  2W SVC  : 17
         -FIRST  SVC OUT:                    -LAST   SVC OUT:
         -D-BIT         : NO
         -PKT.NUMBERING : 8
         -FAC. SUPPORTED:
         -PVC ASSOC. PRT: 1:A2, 2:A3, 3:A4, 4:B1, 5:B2, 6:B3, 7:B4
         ------------------------------------------------------------------

 HP PAD   CONFIGURATION X25 LEVEL LUG

         ------------------------------------------------------------------
         -REMOTE ADDRESS
         ------------------------------------------------------------------

 HP PAD   CONFIGURATION X25 LEVEL SRA

         ------------------------------------------------------------------
          -01) 01 <---- REM_ADDR
          -02) 17 <---- RDIAG17
         ------------------------------------------------------------------
```

```
HP PAD  CONFIGURATION: PORT POOLS

        -----------------------------------------------------------------

        -First  port pool:  From -- to --
        -Second port pool:  From -- to --
        -Third  port pool:  From -- to --

        -----------------------------------------------------------------


ASG

        Assignment for each port


        .    1    2    3    4

        D   71   71   71   71

        C   71   71   71   71

        B   71   71   71   71

        A   71   71   71   71

        -----------------------------------------------------------------

CPU     02335-xxxxx

SC-D

SC-C

SC-B

SC-A    02335-xxxxx  .  02335-xxxxx  .  RS232MOD4 ports
```

Example 2: X.25 Statistical Multiplexer Configuration

Note   The X.25 Statistical Multiplexer configuration is similar to the Default Statistical Multiplexer configuration used in the previous example, and can be created using the default configurations as a starting point. Therefore only the changes need to be entered in the dialogue. The following example details the dialogue to accomplish some sample changes.

Configuration For The Device-side HP 2335A

At the prompt ...	You would enter ...	Comments
*	DEF-PAD ↵	Define the HP 2335A as a default PAD.
*	HSA ↵	Go into HSA mode.
HSA:	LEVEL1 ↵	Select Level 1 parameters.
Mod. signals timer?	↵	
Ext. speed?	64000↵	Change the line speed to 64000 bps, from the default 19200.
HSA:	LIST1 ↵	List the Level 1 configuration, as below:

```
HP PAD   CONFIGURATION X25 LEVEL I

----------------------------------------------------------------
    -PHYS. LINK    : X.21bis DTE        -EXT. SPEED   : 64000
    -LINE SPEED    : Supplied by the modem-MODEM TIMER  : 6000  ms
----------------------------------------------------------------
```

At the prompt ...	You would enter ...	Comments
HSA:	LEVEL2 ↵	Select Level 2 parameters.
NTK type?	NET,9↵	Change the network type to NET, 9 (for Datex-P in Germany) from the default NET, 0.
Frame window?	↵	
Timer T1?	1600 ↵	
HSA:	LIST2 ↵	List the Level 2 configuration, as follows:

```
HP PAD   CONFIGURATION X25 LEVEL II
    ------------------------------------------------------------------
    -NETWORK TYPE  : NET,9         -EQUIP. TYPE  : LAP-B DTE
    -FRAME WINDOW  : 7             -TIMER  T1    : 1600  ms
    -RET. CNT N2   : 20            -I-FRAME      : 131 bytes
    ------------------------------------------------------------------
```

At the prompt ...	You would enter ...	Comments
HSA:	LEVEL3 ↵	Select Level 3 parameters.
Lcl addr.?	45611000333 ↵	
Thrput in?	9600 ↵	
Thrput out?	9600 ↵	
Wind sz in ?	↵	
Wind sz out?	↵	
Def mod vc tbl.?	YES ↵	
Fst pvc?	1 ↵	
Lst pvc?	4 ↵	
Fst svc in?	6 ↵	
Lst svc in?	8 ↵	
Fst 2w svc?	10 ↵	
Lst 2w svc?	17 ↵	
Fst svc out?	↵	
Use X.25 facilities?	YES ↵	
1984 fac?	YES ↵	
Neg pk sz?	YES ↵	
Neg wd sz?	NO ↵	
Neg thrput?	YES ↵	
Rev. char. acc?	YES ↵	
D-bit?	NO ↵	

Ass. pvc?	A2 ↵
Ass. pvc?	A3 ↵
Ass. pvc?	B1 ↵
Ass. pvc?	C4 ↵
HSA:	LIST3 ↵

List the Level 3 configuration, as below:

```
HP PAD   CONFIGURATION X25 LEVEL III
----------------------------------------------------------------
-LOCAL ADDRESS : 45611000333
-WIND. SIZE IN : 2              -WIND. SIZE OUT: 2
-THROUGHPUT IN : 9600           -THROUGHPUT OUT: 9600
-PACK. SIZE IN : 128            -PACK. SIZE OUT: 128
-FIRST  PVC   : 1               -LAST   PVC    : 4
-FIRST  SVC IN : 6              -LAST   SVC IN  : 8
-FIRST  2W SVC : 10             -LAST   2W SVC  : 17
-FIRST  SVC OUT:                -LAST    SVC OUT:
-D-BIT        : NO
-PKT.NUMBERING : 8
-FAC. SUPPORTED: PKT.SZ  WIND.SZ  THO.PT  RV.CGA  1984 Fac
-PVC ASSOC. PRT: 1:A2, 2:A3, 3:B1, 4:C4
----------------------------------------------------------------
```

At the prompt ...	You would enter ...	Comments
HSA:	SRA ↵	Define the symbolic remote addresses.
Call limited to SRA?	NO ↵	
Add or Clear?	CLEAR ↵	
Sra?	REM_ADDR ↵	
Remote Addr Ass.?	13802066601 ↵	
Sra?	RDIAG ↵	
Remote Addr Ass.?	13802066617 ↵	
Sra?	↵	
HSA:	LISTSRA ↵	List the SRA configuration, as follows:

```
HP PAD   CONFIGURATION X25 LEVEL SRA

---------------------------------------------------------------------
  -REMOTE ADDRESS
  -01) 13802066601 <---- REM_ADDR
  -02) 13802066617 <---- RDIAG
---------------------------------------------------------------------
```

Configuration For The Host-side HP 2335A

At the prompt ...	You would enter ...	Comments
` * `	`DEF-CAS ↵`	Define the HP 2335A as a default CAS.
` * `	`HSA ↵`	Go into HSA mode.
`HSA:`	`LEVEL1 ↵`	Select Level 1 parameters.
`Mod. signals timer?`	`↵`	
`Ext. speed?`	`64000↵`	Change the line speed to 64000 bps, from the default 19200.
`HSA:`	`LIST1 ↵`	List the Level 1 configuration, as below:

```
HP PAD   CONFIGURATION X25 LEVEL I

---------------------------------------------------------------------
  -PHYS. LINK    : X.21bis DTE          -EXT. SPEED    : 64000
  -LINE SPEED    : Supplied by the modem-MODEM TIMER   : 6000  ms
---------------------------------------------------------------------
```

At the prompt ...	You would enter ...	Comments
`HSA:`	`LEVEL2 ↵`	Select Level 2 parameters.
`NTK type?`	`NET,9 ↵`	Change the network type to NET, 9 (for Datex-P in Germany) from the default DCE, 0.
`Frame window?`	`↵`	
`Timer T1?`	`1600 ↵`	
`HSA:`	`LIST2 ↵`	List the Level 2 configuration, as follows:

```
HP PAD   CONFIGURATION X25 LEVEL II
         ----------------------------------------------------------------
         -NETWORK TYPE  : NET,9        -EQUIP. TYPE   : LAP-B DCE
         -FRAME WINDOW  : 7            -TIMER  T1     : 1600  ms
         -RET. CNT N2   : 20           -I-FRAME       : 131 bytes
         ----------------------------------------------------------------
```

At the prompt ...	You would enter ...	Comments
HSA:	LEVEL3 ↵	Select Level 3 parameters.
Lcl addr.?	45611000333 ↵	
Thrput in?	9600 ↵	
Thrput out?	9600 ↵	
Wind sz in ?	↵	
Wind sz out?	↵	
Def mod vc tbl.?	YES ↵	
Fst pvc?	1 ↵	
Lst pvc?	4 ↵	
Fst svc in?	↵	
Fst 2w svc?	5 ↵	
Lst 2w svc?	17 ↵	
Fst svc out?	↵	
Use X.25 facilities?	YES ↵	
1984 fac?	YES ↵	
Neg pk sz?	NO ↵	
Neg wd sz?	NO ↵	
Neg thrput?	NO ↵	
Rev. char. acc?	YES ↵	
D-bit?	NO ↵	
Ass. pvc?	A1 ↵	
Ass. pvc?	A2 ↵	

Ass. pvc?	A3 ↵
Ass. pvc?	A4 ↵
HSA:	LIST3 ↵

List the Level 3 configuration, as below:

```
HP PAD   CONFIGURATION X25 LEVEL III
--------------------------------------------------------------------
-LOCAL ADDRESS : 45611000333
-WIND. SIZE IN : 2             -WIND. SIZE OUT: 2
-THROUGHPUT IN : 9600          -THROUGHPUT OUT: 9600
-PACK. SIZE IN : 128           -PACK. SIZE OUT: 128
-FIRST  PVC   : 1              -LAST  PVC     : 4
-FIRST  SVC IN :               -LAST  SVC IN  :
-FIRST  2W SVC : 5             -LAST  2W SVC  : 17
-FIRST  SVC OUT:               -LAST   SVC OUT:
-D-BIT        : NO
-PKT.NUMBERING : 8
-FAC. SUPPORTED: RV.CGA   1984 Fac
-PVC ASSOC. PRT: 1:A1, 2:A2, 3:A3, 4:A4
--------------------------------------------------------------------
```

At the prompt ...	You would enter ...	Comments
HSA:	SRA ↵	Define the symbolic remote addresses.
Call limited to SRA?	NO ↵	
Add or Clear?	CLEAR ↵	
Sra?	REM_ADDR ↵	
Remote Addr Ass.?	13809748201 ↵	
Sra?	RDIAG ↵	
Remote Addr Ass.?	13809748217 ↵	
Sra?	↵	
HSA:	LISTSRA ↵	List the SRA configuration, as follows:

```
HP PAD   CONFIGURATION X25 SRA
--------------------------------------------------
-REMOTE ADDRESS
-01) 13809748201 <---- REM_ADDR
-02) 13809748217 <---- RDIAG
--------------------------------------------------------------------
```

At the prompt ...	You would enter ...	Comments
HSA:	UDP ↵	Enter UDP mode.

Prof number?	144

```
-PROFILE NUMBER : 144          -FREE SPACE : 43 parameters
-EXISTING PROFILES:  1,2,21,31,51,61,71,73,75,100,101,121,141,143
```

At the prompt ...	You would enter ...	Comments
UDP:	SET 2:1, 3:2, 13:0, 15:1, 0:13, 4:30, 5:13, 14:1, 18:12	

UDP:	PAR?

```
                        PROFILE PARAMETERS
```

X3 parameters		Local parameters	
01_ Esc data transfer	001	01_ Parity specifications	---
02_ Echo	001	02_ Read specifications	096
03_ Data forwarding	002	03_ Read trigger	000
04_ Idle timer	000	04_ End of record	030
05_ HP 2335A Xon/Xoff	001	05_ Alternate EOR	013
06_ PAD messages	---	06_ Data compaction	---
07_ Break processing	021	07_ Error message to HOST	---
08_ Discard output	000	08_ Sub sys break char.	025
09_ Cr padding	---	09_ Sub sys break process.	064
10_ Line folding	---	13_ Line delete message	001
11_ Baud rate	---	14_ Modem signals behavior	---
12_ Device Xon/Xoff	001	15_ Auto speed & auto parity	000
13_ Lf insertion	---	18_ Read bytecount MSB	012
14_ Lf padding	---	19_ Read bytecount LSB	255
15_ Editing mode	001	20_ Async. modem sig. timer	---
16_ Backspace char.	---	22_ Write specifications	---
17_ Line delete char.	---	23_ HP 2335A bytecount(*256)	---
18_ Line display char.	000	24_ Remote assoc. prf. (CAS)	---
19_ Service signals	002		
20_ Echo mask	128		
21_ Parity checking	000		
22_ Page wait	000		

At the prompt ...	You would enter ...	Comments
UDP:	↵	

| Prof number? | 74↵ | |

-PROFILE NUMBER : 74   -FREE SPACE : 43 parameters
-EXISTING PROFILES: 1,2,21,31,51,61,71,73,75,100,101,121,141,143,144

At the prompt ...	You would enter ...	Comments
UDP:	SET 12:0, 0:13, 24:144	

| UDP: | PAR? | |

PROFILE PARAMETERS

X3 parameters		Local parameters	
01_ Esc data transfer	000	01_ Parity specifications	000
02_ Echo	000	02_ Read specifications	000
03_ Data forwarding	127	03_ Read trigger	000
04_ Idle timer	000	04_ End of record	000
05_ HP 2335A Xon/Xoff	001	05_ Alternate EOR	000
06_ PAD messages	000	06_ Data compaction	000
07_ Break processing	000	07_ Error message to HOST	128
08_ Discard output	000	08_ Sub sys break char.	000
09_ Cr padding	000	09_ Sub sys break process.	000
10_ Line folding	000	13_ Line delete message	003
11_ Baud rate	014	14_ Modem signals behavior	004
12_ Device Xon/Xoff	000	15_ Auto speed & auto parity	000
13_ Lf insertion	000	18_ Read bytecount MSB	000
14_ Lf padding	000	19_ Read bytecount LSB	128
15_ Editing mode	000	20_ Async. modem sig. timer	000
16_ Backspace char.	008	22_ Write specifications	096
17_ Line delete char.	024	23_ HP 2335A bytecount(*256)	001
18_ Line display char.	000	24_ Remote assoc. prf. (CAS)	144
19_ Service signals	002		
20_ Echo mask	128		
21_ Parity checking	000		
22_ Page wait	000		

At the prompt ...	You would enter ...	Comments
UDP:	↵	

| Prof number? | ↵ | Exit UDP mode. |

Example 3: X.25 PAD Configuration

Note	The X.25 PAD configuration can be created using the Default PAD as a starting point. In this way, only the required changes need to be entered in the dialogue. The following example details the dialogue to accomplish some sample changes.

At the prompt ...	You would enter ...	Comments
*	DEF-PAD ↵	Define the HP 2335A as a default PAD.
*	HSA ↵	Go into HSA mode.
HSA:	LEVEL1 ↵	Select Level 1 parameters.
Mod. signals timer?	↵	
Ext. speed?	64000 ↵	Change the line speed to 64000 bps, from the default 19200.
HSA:	LIST1 ↵	List the Level 1 configuration, as below:

```
HP PAD   CONFIGURATION X25 LEVEL I

--------------------------------------------------------------------
-PHYS. LINK    : X.21bis DTE        -EXT. SPEED    : 64000
-LINE SPEED    : Supplied by the modem-MODEM TIMER : 6000  ms
--------------------------------------------------------------------
```

At the prompt ...	You would enter ...	Comments
HSA:	LEVEL2 ↵	Select Level 2 parameters.
NTK type?	NET,9↵	Change the network type to Net, 9 (for Datex-P in Germany) from the default Net, 0 (for Transpac in France).
Frame window?	↵	
Timer T1?	1600 ↵	
HSA:	LIST2 ↵	List the Level 2 configuration, as below:

```
HP PAD   CONFIGURATION X25 LEVEL II

--------------------------------------------------------------------
-NETWORK TYPE  : NET,9        -EQUIP. TYPE   : LAP-B DTE
-FRAME WINDOW  : 7            -TIMER  T1     : 1600  ms
-RET. CNT N2   : 20           -I-FRAME       : 131 bytes
--------------------------------------------------------------------
```

At the prompt ...	You would enter ...	Comments
HSA:	LEVEL3 ↵	Select Level 3 parameters.
Lcl addr.?	45611000333 ↵	
Thrput in?	9600 ↵	
Thrput out?	9600 ↵	
Wind sz in ?	↵	
Wind sz out?	↵	
Def mod vc tbl.?	YES ↵	
Fst pvc?	1 ↵	
Lst pvc?	4 ↵	
Fst svc in?	6 ↵	
Lst svc in?	8 ↵	
Fst 2w svc?	10 ↵	
Lst 2w svc?	17 ↵	
Fst svc out?	↵	
Use X.25 facilities?	YES	
1984 fac?	YES ↵	
Neg pk sz?	YES ↵	
Neg wd sz?	NO ↵	
Neg thrput?	YES ↵	
Rev. char. acc?	YES ↵	
D-bit?	NO ↵	
Ass. pvc?	A2 ↵	
Ass. pvc?	A3 ↵	
Ass. pvc?	B1 ↵	
Ass. pvc?	C4 ↵	
HSA:	LIST3 ↵	List the Level 3 configuration, as below:

```
HP PAD   CONFIGURATION X25 LEVEL III

------------------------------------------------------------------

-LOCAL ADDRESS : 45611000333
-WIND. SIZE IN : 2                       -WIND. SIZE OUT: 2
-THROUGHPUT IN : 9600                    -THROUGHPUT OUT: 9600
-PACK. SIZE IN : 128                     -PACK. SIZE OUT: 128
-FIRST  PVC    : 1                       -LAST  PVC     : 4
-FIRST  SVC IN : 6                       -LAST  SVC IN  : 8
-FIRST  2W SVC : 10                      -LAST  2W SVC  : 16
-FIRST  SVC OUT: 17                      -LAST   SVC OUT: 17
-D-BIT        : NO                       -PKT.NUMBERING : 8
-FAC. SUPPORTED: PKT.SZ    THO.PT RV.CGA  1984 Fac
-PVC ASSOC. PRT: 1:A2, 2:A3, 3:B1, 4:C4

------------------------------------------------------------------
```

At the prompt ...	You would enter ...	Comments
HSA:	MSG ↵	Define internal message.
PAD Mess header?	"Login: " ↵	
Welcome message?	" " ↵	
Password ?	"HP 2335A" ↵	
HSA:	LISTMSG ↵	

```
HP PAD   CONFIGURATION X25 LEVEL IV

------------------------------------------------------------------

-WELCOME MESSAGE         :           -PASSWORD   : HP 2335A
-PAD MESS. HEADER        : Login:

------------------------------------------------------------------
```

At the prompt ...	You would enter ...	Comments
HSA:	LUG ↵	Define the Local User Group 'members'.
Add or Clear?	ADD ↵	
Remote addr?	138020555 ↵	
Remote addr?	138020555XX ↵	
Remote addr?	75XX20XXXX ↵	
Remote addr?	↵	

HSA:	LISTLUG ↵

List the LUG configuration

```
HP PAD   CONFIGURATION X25 LUG
-----------------------------------------------------------------------
-REMOTE ADDRESS
-01) 138020555
-02) 138020555XX
-03) 75XX20XXXX
-----------------------------------------------------------------------
```

Note   The Xs in the remote address serve as place holders.

At the prompt ...	You would enter ...	Comments
HSA:	SRA ↵	Define the symbolic remote addresses.
Call limited to SRA?	NO ↵	
Add or Clear?	CLEAR ↵	
Sra?	USA ↵	
Remote Addr Ass.?	0311030300044 ↵	
Sra?	GRENOBLE ↵	
Remote Addr Ass.?	138020666 ↵	
Sra?	↵	
HSA:	LISTSRA ↵	List the SRA configuration, as below:

```
HP PAD   CONFIGURATION X25 LEVEL SRA
-----------------------------------------------------------------------
-REMOTE ADDRESS
-01) 0311030300044 <---- USA
-02) 138020666 <---- GRENOBLE
-----------------------------------------------------------------------
```

At the prompt ...	You would enter ...	Comments
HSA:	POOL ↵	Define the port pools.

Mod. first port pool?		
First port?	A3 ↵	
Last port?	C2 ↵	
Mod. second port pool?		
First port?	↵	

```
HP PAD  CONFIGURATION: PORT POOLS

-----------------------------------------------------------------

-First  port pool:  From A3 to C2

-Second port pool:  From -- to --

-Third  port pool:  From -- to --

-----------------------------------------------------------------
```

At the prompt ...	You would enter ...	Comments
*	ASG ↵	Enter profile assignment mode.
ASG:	LIST ↵	List the profile assignment.

```
Assignment for each port


    .    1    2    3    4


    D    1    1    1    1
    C    1    1    1    1
    B    1    1    1    1
    A    1    1    1    1
```

At the prompt ...	You would enter ...	Comments
ASG:	B,C1:2 ↵	Select profile #2 for ports B1 to B4 and C1.
ASG:	LIST ↵	List the profile assignment again.

```
Assignment for each port

.     1   2   3   4

D     1   1   1   1
C     2   1   1   1
B     2   2   2   2
A     1   1   1   1
```

At the prompt ...	You would enter ...	Comments
ASG:	↵	Exit profile assignment mode.
*	ADL ↵	Enter automatic dial assignment mode.
ADL:	LIST ↵	List the SRA assignment.

```
Assignment for each port

.     1   2   3   4

D     -   -   -   -
C     -   -   -   -
B     -   -   -   -
A     1   2   2   -
```

At the prompt ...	You would enter ...	Comments
ADL:	A1:2 ↵	Automatic dial for A1 with SRA #2.
ADL:	A2:- ↵	Disable automatic dial for port A2.
ADL:	LIST ↵	List the SRA assignment again.

```
Assignment for each port

.     1   2   3   4

D     -   -   -   -
C     -   -   -   -
B     -   -   -   -
A     2   -   2   -
```

Configuration Examples

At the prompt ...	You would enter ...	Comments
ADL :	↵	Exit automatic dial assignment mode.

4

Operation

Introduction

This chapter describes how to operate the HP 2335A and how the HP 2335A PAD is controlled from either a local or a remote terminal. The description is divided into the following topics:

- The HP 2335A physical controls (i.e. the LEDs, DIP switches and reset push-button switch) are detailed in "LEDs And Switches ", together with a description of how to enter run mode and obtain display information on the LEDs.

- "Making And Clearing A Connection" describes how to enter the PAD command and data transfer states and how to establish and terminate a connection (make and clear a call).

- "Local Control Of The HP 2335A PAD (X.28)" describes how to control the HP 2335A PAD from a local terminal by using standard X.28 commands and service signals.

- "Remote Control Of The PAD (X.29)" is included for reference purposes and describes how an HP 2335A PAD is controlled remotely by the PAD support software using X.29 PAD commands.

In case of difficulty during operation the user should refer to chapter 7, "User Troubleshooting", which provides user troubleshooting information.

LEDs and Switches

Mounted at the front of the HP 2335A on the main PCB are the Reset push-button switch, eight DIP switches, 21 small LEDs (Light Emitting Diodes) and 2 larger LEDs. A description of the uses of these features is given below.

Reset Push-button switch

The Reset push-button switch is used to reset the HP 2335A to the "power-on" state. This enables the HP 2335A to be initialised without having to power-off and then power-on again.

DIP Switches

The eight DIP switches are used as follows:

- To select the initial default configuration.

- Switches ABC enable the user to select the data displayed on the LEDs. These switches are sensed at all times after power-on (except if switches DEFGH are set to 00100) and are interpreted in different ways according to the operating mode of the HP 2335A.

- Switches DEFGH are sensed only at power-on or when the HP 2335A is initialised by pressing the Reset push-button switch. These switches are used primarily to select the HP 2335A operating mode. They are also used to select the diagnostic test to be performed.

LEDs

The 21 LEDs and the two larger LEDs are used as follows:

- The green LED [a], on the far left, and the large green LED on the right have the same purpose. Both are extinguished during execution of the self diagnostic tests and when the HP 2335A is halted due to an error. They are continuously lit when the HP 2335A is in either the run or configure mode, and operating correctly, and flash to signal the end of a diagnostic test.

- The LED [e] and the larger yellow LED are functionally equivalent, both are used to indicate that X.25 Level 2 (link level) data communication is established.

- LEDs [b] to [e] and [1] to [16] illuminate according to the HP 2335A mode of operation.

Entering Run Mode

In run mode a connected asynchronous device can communicate with a remote DTE (host computer) via the HP 2335A and the synchronous network.

Preparation

Before run mode can be entered the HP 2335A must be configured either with a default configuration or, if required, a default configuration which has been modified.

Procedure

To enter run mode the DIP switches must first be set as follows:

```
DIP Switch: A  B  C  D  E  F  G  H        1 = up (on)

Setting:    0  0  0  0  0  0  0  0        0 = down (off)
```

The HP 2335A can then be powered-on (or if already ON then press the Reset push-button switch for initialisation) and it will perform the standard Power-On Test and enter run mode if the test is successful. If the test is unsuccessful or if there is a synchronous network configuration error then the HP 2335A will halt and indicate the error on the LED display. In run mode, LEDs [a] to [e] illuminate as follows:

```
LED:    A  B  C  D  E        1 = on

MODE:   1  b  b  1  1        0 = off

                             b = blinking on and off
```

Note   LED [a] is continuously lit and LEDs [b] and [c] blink alternately. LED [d] is continuously lit as soon as the CTS and DSR signals are received from the synchronous network modem, indicating that X.25 Level 1 is established. LED [e] is continuously lit as soon as X.25 Level 2 (Link Level) data communication is established.

With the DIP switches set as shown above LEDs [1] to [16] provide a port recognition display indicating when each device port is "ready". If the LED display fails to provide a "ready" indication as expected for a required device port then refer to chapter 7, "User Troubleshooting".

In run mode, LEDs [1] to [16] display information specified by the position of the DIP switches ABC. There are four settings available as follows:

Setting 1

```
DIP Switch: A  B  C  D  E  F  G  H        1 = up (on)

Setting:    0  0  0  0  0  0  0  0        0 = down (off)
```

LEDs and Switches

This setting provides a LED display of asynchronous port recognition with each LED lit when its corresponding port is "ready". A port is not ready until speed/parity is sensed (by entering the Carriage Return character) if auto speed/parity is selected in the port profile. When the modem signals are monitored the port is "ready" when DTR and RTS are on.

The LEDs are associated with the asynchronous device ports as follows:

```
LED:    1   2   3   4     5   6   7   8     9   10  11   12    13  14  15  16

Port:   A1  A2  A3  A4    B1  B2  B3  B4    C1  C2  C3   C4    D1  D2  D3  D4
```

Setting 2

```
DIP Switch: A   B   C   D   E   F   G   H      1 = up (on)

Setting:    0   1   0   0   0   0   0   0      0 = down (off)
```

This setting provides an LED indication of the virtual circuit (VC) activity on the HP 2335A device ports. Each LED is lit when a VC is established on its corresponding port; the LED blinks (ON/OFF) rapidly when data is being transferred. The LEDs correspond to the device ports as shown above.

Setting 3

```
DIP Switch: A   B   C   D   E   F   G   H      1 = up (on)

Setting:    1   1   1   0   0   0   0   0      0 = down (off)
```

This setting provides an LED indication of frame level activity. LEDs [1] to [8] display the corresponding frame receive (next expected frame) sequence numbers N(R) (0 to 7) and LEDS [9] to [16] display the corresponding frame send sequence numbers N(S) (0 to 7).

Setting 4

```
DIP Switch: A   B   C   D   E   F   G   H      1 = up (on)

Setting:    1   1   0   0   0   0   0   0      0 = down (off)
```

This setting provides an LED indication of the amount of HP 2335A internal buffer memory available. The 16 LEDs provide a bar graph display where:

All LEDs ON	100% of memory is available
All LEDs OFF	100% of memory is full
One LED ON	6.25% of memory is available

Making and Clearing a Connection

Introduction

When a call is made an SVC is established between the devices (or computer ports) at the called and the calling addresses. When the call is terminated the SVC is cleared. The HP 2335A must normally be in the PAD command state to establish, or clear, an SVC, and in the PAD data transfer state when communication is established. Thus in operation, the HP 2335A is in either the PAD command state or the PAD data transfer state.

In the PAD data transfer state a virtual circuit is established between the calling DTE (e.g. the user's terminal) and the remote DTE (e.g. the remote host computer) enabling data to be transferred. In the PAD command state the user may enter X.28 PAD commands from the terminal to control the HP 2335A PAD and perform the functions shown in Table 4-1 (e.g. establishing an SVC).

Operation

Once run mode has been entered, the synchronous network is operational (X.25 Levels 1, 2 and 3 set) and the required device ports are "ready", the HP 2335A PAD will perform as follows:

- A virtual circuit is established and the PAD data transfer state is entered for all devices connected to device ports which have either a PVC or the ADL automatic dial facility assigned to them.

- The PAD command state is entered for all devices connected to device ports without PVCs or the ADL facility assigned to them.

Note   **When planning to establish SVCs in a statistical multiplexer configuration between a host computer and a remote output device (for example a printer or a plotter), you must take special care.**

It is recommended that you use the ADL (automatic dial) facility.

With termtypes 18 or 22 on the host, you will need to assign the ADL on the device side, and use an HP40220A cable between the host and the device port on the host-side HP 2335A. When the device is switched on, the ADL on the device-side HP 2335A will dial the system's printer/plotter port. The SVC will remain until the device is switched off or the modem signals dropped.

With termtype 26 on the host, you will need to assign the ADL on the host side, and use an HP40221A cable between the host and the device port on the host-side HP 2335A.

Do *not* assign the ADL on both sides.

Making A Call (Establishing an SVC)

To establish an SVC the HP 2335A must be in the PAD command state and be displaying the PAD selection command signal prompt (an " @ ") at the terminal.

An X.28 PAD selection command signal can then be entered in order to make a call (establish an SVC). When making a call the "one-way outgoing" and "two-way" SVCs are used and the HP 2335A will establish the call on the first free SVC in the required category. Note that if a "one-way outgoing" SVC is used the communication will be full duplex once the call is established and that any outgoing (or 2 way) SVC can be used as the remote address is specified in the selection command.

Only non-PVC assigned ports can establish an SVC.

When entering a PAD selection command, editing is enabled in order to be able to use the character delete (normally backspace) and line delete (normally control-X) characters.

Syntax for X.28 Selection Command for X.25 Networks

```
[R,] [G<cug_id>,] [E<extension>,] [N<nui_info>] [-]<called_address>, [D<call_user_data>] [P<password>]
```

You may enter the optional fields (in square brackets above) in any order.

Field	Mandatory/Optional	Comments
R	Optional	Request reverse charging.
,	Mandatory if R entered	Delimiter.
G	Optional	Request access to X.25 network Closed User Group (CUG).
cug_id	Mandatory if G entered	CUG identification. 0 to 99.
,	Mandatory if G entered	Delimiter.
E	Optional	Called address extension identifier.
extension	Mandatory if E entered	Called address extended string.
,	Mandatory if E entered	Delimiter.
N	Optional	Request NUI (Network User Identifier) facility. You may request this only if 1984 facilities have been requested in the Level 3 configuration.
nui_info	Mandatory if N entered	NUI information. Length and details depend on the network. Up to 16 digits.
-	Mandatory if G, E, or N entered	Facility field separator.

Field	Mandatory/Optional	Comments
called address	Mandatory	Called address. Up to 15 digits. May include sub-address as last two digits.
	Alternative to address	Symbolic remote address (SRA). Up to 8 characters.
	Alternative to address	Abbreviated TELENET type network address: area code (3 digits) local address (1 to 4 digits) sub-address (2 digits) (optional) Note that for TELENET type networks only, the address is expanded automatically (zeros filled) into X.121 format in the call request packet.
.	Mandatory if D or P to be entered	Delimiter.
D	Optional	Call user data field identifier.
call_user_data	Mandatory if D entered	User data field (up to 12 characters.)
P	Optional	Password identifier.
password	Mandatory if P entered.	Password (up to 12 characters.)

Syntax for PAD Selection Command with No X.25 Network

To establish an SVC on a modem-link synchronous network (non-X.25 network) once the PAD command prompt " @ " is obtained, simply enter the sub-address (or SRA) of the required remote device port, followed by the Call User Data (if any) and then the ↵ (Cr) character.

```
<called_address>[,D<call_user_data>]
```

Field	Mandatory/Optional	Comments
<called address>	Mandatory	Called sub-address. Up to 15 digits.
	Alternative to address	Symbolic remote address (SRA). Up to 8 characters.
.	Mandatory if D to be entered	Delimiter.
D	Optional	Call user data field identifier
call user data	Mandatory if D entered.	Call user data (up to 12 characters).

Once the SVC is established the connected PAD service signal "COM" is displayed followed by the remote host computer prompt enabling a session to be established. Note that a ↵ (Cr) character may need to be entered after "COM" is displayed to obtain the remote host computer prompt.

Clearing a call (Clearing an SVC)

Clearing an SVC requires the HP 2335A to be in the PAD data transfer state.

The HP 2335A will switch temporarily from the PAD data transfer state to the PAD command state when the data transfer escape character is entered. The data transfer escape character (normally DLE or control-P) is defined in X.3 parameters #1 and #7. The HP 2335A will then forward the previous data input (if any) and return the PAD command prompt " @ " to the user.

If the next characters entered are:

- CLR ↵   - The CLR PAD command signal followed by a (Cr) carriage return character clears the SVC. The HP 2335A PAD responds with a "CLR CONF" service signal and PAD command prompt " @ " which are displayed at the terminal. The HP 2335A is then in PAD command state and the call is cleared.

- ↵ (Cr) or " + "   - The PAD command terminator returns the HP 2335A to the PAD data transfer state.

- Control-P - The DLE character (or defined character in X.3 par. #1) returns the HP 2335A to the PAD data transfer state and one "escape from data transfer" character (the DLE) is stored in the buffer as data.

- If any other character is entered (except character and line delete) then the input is buffered until a ↵ (Cr) or " + " terminator is entered.

Note   When a terminal has an SVC with a remote host computer which uses modem control signals to establish/terminate a session, or an X.25 PAD configuration is used, then terminating the session will also clear the SVC.

Example

Here is an example of a dialogue which establishes and then clears an SVC:

To start...	Comments
Power-on/Reset	Initialises HP 2335A (1st time only). (If auto speed/parity are selected in the port profile then press ↵.)

The system responds..

HP 2335A ON TRANSPAC	PAD identification signal (user defined welcome message)

At the prompt ...	You would enter ...	
@	R-138123456 ↵	Selection PAD command. (Reverse Charge requested to called address 138123456.)
COM		Connected PAD service signal. (Call is accepted and SVC established.)
:	HELLO USER.ACC,GROUP ↵	You may need to press ↵ to get the prompt (consult your computer system operator). You will then need to log on; the example shown is for an HP3000 MPE operating system. After the session, log off, for example by entering BYE on an HP3000 MPE operating system.
	CONTROL-P ↵	Escape from PAD data transfer state.
@	CLR ↵	PAD command prompt. CLR clears the SVC.
CLR CONF		Clear confirmation service signal.
@		PAD command prompt is returned.

Local Control of the HP 2335A PAD (X.28)

The X.28 Recommendation defines the interface between the asynchronous DTE (terminal) and the PAD and the commands that may be used to control the PAD locally. The HP 2335A PAD may be in either the data transfer state or the PAD command state. When in the PAD command state any data exchanged between the terminal and the PAD is not transferred to the remote DTE.

Whenever a PAD command signal is sent from the terminal to the PAD it responds by returning a PAD service signal which is displayed at the terminal. An example of a PAD response is the connected PAD service signal "COM". If a VC cannot be established or it is prematurely cleared then the PAD provides a clearing service signal "CLR" and indicates the reason for the clear (e.g. OCC = remote DTE occupied (busy), DER = remote DTE out of order, NA = Closed User Group violation).

Note   Whenever a PAD service signal is described as being delivered to the asynchronous DTE
(terminal) the action is only effected if the value of X.3 parameter #6 is not 0.

The operation of the PAD depends on the current values of assigned PAD profile parameters. Initially the
PAD parameter values are those defined in the assigned port profile at the time a selection PAD command
signal is sent.

PAD Command signals are provided for the following:

- Establishing and clearing an SVC

- Selection of pre-defined PAD profiles

- Selection of individual PAD parameter values

- Requesting the current PAD parameter values to be displayed

- Entering local diagnostic mode

- Entering Binary mode

- Entering ASCII mode

- Sending an INTerrupt

- Requesting VC status information

- Resetting a VC

The PAD service signals are provided in the following categories:

- Network status (specific to HP 2335A)

- PAD identification (user defined)

- Virtual circuit status

- Acknowledgment of PAD command signals

- Profile information (parameters and values)

- HP 2335A PAD operation

PAD Command Signals

PAD Command	PAD Service Signal Sent in Response	Function

* non-standard .X.28

PAD Command	PAD Service Signal Sent in Response	Function
Selection PAD command signal	COM or CLR xxx	To establish an SVC.
SET	Acknowledgement	Temporarily to set/change parameter values.
SET?	PAR (lists parameters and their vaues), or INV (invalid)	Temporarily to set/change parameter values and display them.
PAR?	PAR (lists parameters and their values), or INV (invalid)	To request the values of specified parameters.
PROF	Acknowledgement	Temporarily to set the PAD parameters to new defined profile value.
STAT	FREE, or ENGAGED	To request status information on a port.
DIAL*	COM, CLR xxx, or no symbolic address	To redial the SRA assigned to user's port.
LDIAG*	HP 2335A displays diagnostic menu	To enter local diagnostic mode.
CLR	CLR CONF or CLR ERR	To clear an SVC.
RESET	Acknowledgement	To reset a VC.
INT	Acknowledgement	To transmit an interrupt packet.
RPROF*	Acknowledgement	To request remote CAS/PAD to use temporarily the specified profile.
BIN*	RPROF DONE	To enter binary mode.
ASC*	RPROF DONE	To enter ASCII mode.
HELP*	HELP menu	To provide help!

The PAD command signals together with the type of PAD service signals that are sent in response are as follows:

Selection Command

The selection command allows a user connected to a non-PVC assigned port to establish an SVC with a specific remote DTE. When all the SVCs dedicated to outgoing calls (one-way outgoing and 2 way SVCs) are engaged, a virtual circuit congestion exists. If a selection command is then received the PAD will respond with a CLR PAD service signal. The format of the service signal for virtual circuit congestion is:

```
CLR VCC
```

Symbolic Remote Addressing may be used in the selection command. For details of the selection command format refer to "Making And Clearing A Connection".

SET Command

The SET command enables the user to temporarily change one or several parameter values by including the parameter numbers and the values to be modified.

The command format is normally SET followed by the parameter number, a colon and then the new value to be set. If more than one "parameter:value" is to be modified then the "parameter:value" couples must be separated by a comma.

- If a parameter number is not given then the parameter value remains the same value as that defined in the profile.

- If one parameter number or one value is invalid then all parameters excluding the erroneous one will set, and a PAR n:INV error message given (where n is the parameter number with an erroneous value).

- The SET command size is limited to 128 characters.

- The local parameters are accessed through parameter #0 set at value 13 which acts a a separator.

Example:

```
SET 2:0, 4:1, 5:0, 0:13, 1:1 ⏎ (space character is optional)
```

This sets parameter #2 to value 0, parameter #4 to value 1, parameter #5 to value 0 and local parameter #1 to value 1.

The SET command only sets the new parameter values temporarily as each parameter changes back to its original profile value when the SVC is cleared or when the HP 2335A is reset if the command is used over a PVC. If the SET command is entered without parameter(s)/value(s) then the original assigned profile parameter values are reset.

SET? Command

The SET? command is identical to the SET command but also displays the new values of the modified parameters.

PAR? Command

The PAR? command enables the user to list one, several or all of the current parameter values of the assigned profile. To list all of the profile parameters simply enter PAR? (then press ↵). Alternatively enter the command PAR? followed by the parameter number(s). If more than one parameter value is required the parameter numbers must be separated by a comma. Note that the PAR? command size is limited to 128 characters.

The format of the PAR? command is as follows:

```
PAR? 2, 4, 54, 0, 22 ↵  (space character is optional)
```

The "0" acts as a separator between X.3 parameters and local parameters. (For a checklist of which are X.3 and which are local parameters, see the UDP and BDP tables in chapter 3, under "Asynchronous Port Profile Cofiguration".

The HP 2335A PAD then responds by providing a listing, the format of which is: "PAR" followed by a list of parameter numbers and the corresponding requested values. Note that parameter number 0 set at a value of 13 is a separator indicating that the parameters which follow are local parameters.

The parameter/value listing in response to a PAR? command is as follows:

```
PAR 2:1, 4:0, 54:INV, 0:13, 22:64
```

In this example the value of a non-existent standard X.3 parameter number 54 has been requested and the INValid response is listed.

PROF (Profile) Command

The PROF command enables the user to set temporarily the PAD profile parameters to the values of a defined PAD profile (i.e. a profile numbered less then 51). If the requested profile is not defined in the HP 2335A, it responds with an "ERR" error PAD service signal. The command must be followed by the profile identifier.

The format of the standard profile selection PAD command signal is:

```
PROF nn ↵
```

where nn = the profile identifier

Once the PROF command is entered the HP 2335A changes the values of the parameters (where required) and sends an acknowledgment PAD service signal. The parameters change back to the original profile values when the SVC is cleared, or when the HP 2335A is reset, if the command applies to a PVC.

STAT (Status) Command

The STAT command allows the user to request the status of the VC at the PAD interface (for that port).

The format of the status PAD command is:

    STAT ↵

The PAD service signals sent in response are as follows:

    FREE XX   (if no VC is established)

    ENGAGED XX (if a VC is established)

where XX = the port designator (e.g. A2 = panel A, port 2).

DIAL Command

This command can only be used if there is no previously established connection. The DIAL command allows the user to re-dial the Symbolic Remote Address assigned to his port (by ADL assignment). If no SRA is assigned, a "No Symbolic Remote Address" message is displayed on the users terminal.

LDIAG Command

This command can be used only if there is no previously established connection. The LDIAG command allows the user to collect information on the synchronous line and port status. It also allows local access to the HP 2335A configuration.

The LDIAG commands are:

STAT1[,R]	To display (and reset) level 1 statistics.
STAT2[,R]	To display (and reset) level 2 statistics.
STATP	To display port status.
STATL[,R]	To display bandwidth utilization Tx and Rx mode.
RESET pn	To reset the port.
RESET HP PAD	To reset the HP 2335A.
CONF	To access configuration mode.
HELP	To display help.
EXIT	To return to control mode.

When a port enters diagnostic mode it becomes unavailable for incoming calls, and these are rejected with CLR DTE 0. In the case of a problem on the line, or if the device drops its modem signals while in LDIAG mode, the port will revert to the PAD Command state. Once the LDIAG command has been entered, it must be followed by the internal password. For security reasons the HP 2335A does not prompt for this password, and if it is not entered correctly the user will return to the PAD Command state. Note that the echo is disabled while the password is being entered.

Once the correct password has been entered a menu of the commands is displayed. If a password has not been assigned (default case), this menu is displayed on entering the LDIAG command.

STAT1[,R] Sub-Command

The STAT1 sub-command allows the user to access the line drop counter, which is used to determine the quality of the synchronous line. The counter sums the number of line drops, a drop being defined as the synchronous line dropping its modem signals for a time less than the modem signals timer value (defined in the Level 1 configuration).

The counter also sums the number of line failures, a failure being defined as the synchronous line dropping its modem signals for a time greater than the modem signals timer value. This information is displayed in the following format:

```
Number of line drops     : 00000
Number of line failures  : 00000
```

The counters are displayed on 5 digits, and can have values from 00000 to 65535. The reset option (STAT1,R) resets the counters once they have been read.

STAT2[,R] Sub-Command

The STAT2 sub-command enables the user to collect X.25 Level 2 statistics, which are displayed in the following format:

```
Number of I frames received        : 00000
Number of RR frames received       : 00000
Number of RNR frames received      : 00000
Number of REJ frames received      : 00000
Number of FRMR frames received     : 00000
Number of receiver overruns        : 00000
Number of bad FCS                  : 00000
Number of aborted frames received  : 00000
```

The option STAT2,R will reset the counters after they have been displayed.

STATP Sub-Command

The STATP sub-command allows the user to check the port status. This information is displayed in the following format:

```
        HP PAD port status


    .  1   2   3   4

    D  -   -   -   -
    C  H   L   H   H
    B  E   E   H   H
    A  E   E   E   E
```

where:

- A port has the status "H" if the modem signals DTR and RTS are high.

- A port has the status "L" if the connected device does not supply the correct modem signals.

- A port has the status "E" when it is engaged. When a PVC is selected, and the modem signals are high, the E status is permanently displayed. When "-" is displayed, the device adapter panel is not installed.

STATL[,R] Sub-Command

The STATL sub-command allows the user to view the bandwidth utilization in both transmit and receive modes. The HP 2335A collects the number of characters in each frame in both transmit and receive mode (including the two bytes of FCS and one flag) during a two second period.

The collected information is then displayed as shown in Figure 4-1.
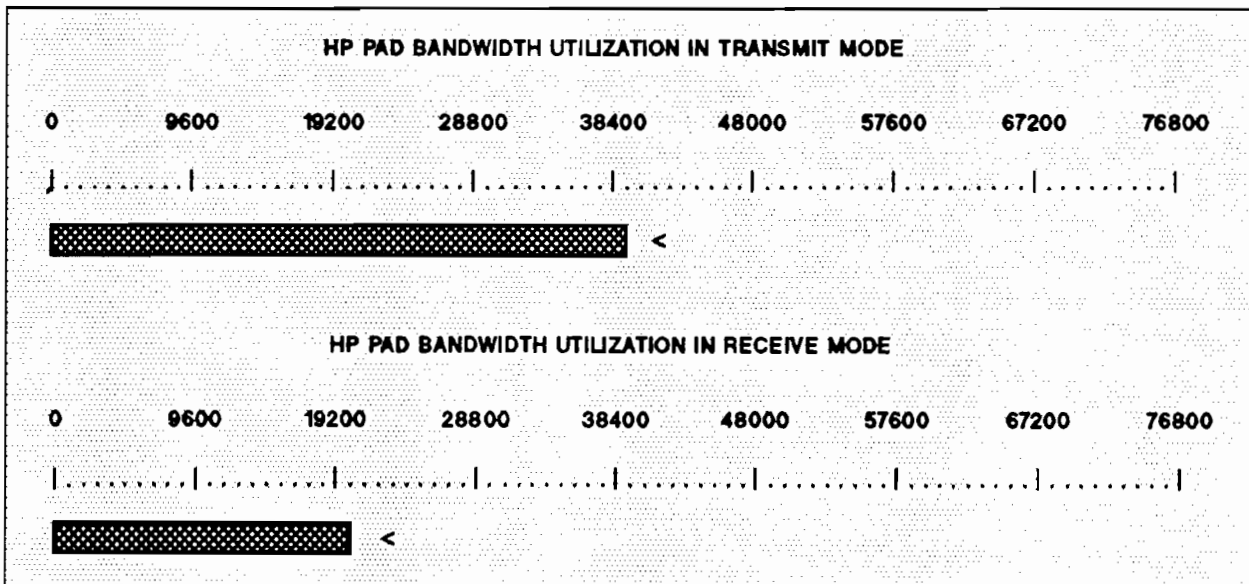
Figure 4-1   Bandwidth Utilization (in bps)

The symbol ' < ' on the display indicates the maximum bandwidth utilization ever reached.

The sub-command STATL,R also displays the bandwidth utilization, but in addition it resets the maximum bandwidth utilization indicators (<).

Note   Because the STATL sub-command uses the HP inverse video feature it can be displayed only on certain terminals, eg. HP262x or HP239x.

RESET pn Sub-Command

The RESET pn sub-command allows the user to reset locally a specific port on the HP 2335A.

The syntax of the sub-command is as follows:

    RESET pn ↵

where pn is the port to reset [p = {A|B|C|D} and n = {1|2|3|4}]

If the port number is valid, the message "Reset done!!!" is displayed. If the port number is considered as invalid, the message "Invalid port number..." is displayed.

A port number is considered invalid if any of the following is true:
- The syntax of pn is incorrect.
- The device adapter panel containing that port number is not installed.
- The port number pn is the users port number.

The RESET sub-command resets the internal parameters of the specific port and downloads the assigned profile. Modem signals will be dropped in accordance with local parameter #14. In the case of SVCs, the connection will be cleared. If the Xon/Xoff protocol is enabled (parameter #5 = 1) and auto-speed is disabled, a DC1 is sent to the connected device (asynchronous side).

In the case of a reset on a PAD port in PVC connection, the assigned profile is downloaded and a RESET DTE 0 followed by RESET DTE 127 (if the connected device has its modem signals up) sent to the CAS or PAD support. On the reception of RESET DTE 127 the CAS will send the remote associated profile to adapt the initial profile. The port is then ready for operation.

In the case of a reset on a CAS port in PVC connection, the assigned profile is downloaded and a RESET DTE 0 is sent to the PAD port. On the reception of this the PAD sends a RESET DTE 127 to the CAS. The CAS will then send the remote associated profile to adapt the initial profile. The port is then ready for operation.

RESET HP PAD Sub-Command

This sub-command allows the user to reset the HP 2335A in on-line mode. A complete power-on test sequence is executed, causing all dynamic memory to be reset. Note that the CMOS RAM contents are not reset, leaving the original configuration intact.

CONF Sub-Command

The CONF sub-command allows the user access to the HP 2335A local configuration. This local access allows the user to list and modify the configuration while still in on-line mode. All the off-line commands are available, including the HELP facility. When the user has finished modifying the configuration, the EXIT command will return the HP 2335A to diagnostic mode (LDIAG > prompt). Note that the configuration can only be accessed by one user at a time, and if the configuration is being accessed by another user (locally or remotely) the message "WARNING: Configuration being accessed..." is given.

Note   The virtual circuit table cannot be modified in on-line mode, and the DEF-PAD and DEF-CAS commands should *not* be used.

In on-line mode the "Def/Mod VC Table?" prompt in the dialogue for Level 3 configuration is replaced by "WARNING: the VC table cannot be modified in on-line mode". This prevents communication problems which could be caused by an on-line modification to the VC table.

Warning   Care must be taken when modifying certain X.25 parameters. For example, if a negotiation facility which is not subscribed for with the X.25 network is configured in the HP 2335A then the next call will be rejected by the X.25 network.

EXIT Sub-Command

This sub-command allows the user to exit from the local diagnostic mode and return to the PAD command state. On execution of this sub-command the PAD command prompt " @ " is returned.

CLR (Clear) Command

This command can only be used when a connection is established on the corresponding port. The CLR command enables the user to clear an SVC and the PAD responds by sending a clear confirmation PAD service signal.

At the prompt ...	You enter ...	Comments
	Control-P	
@	CLR ↵	
CLR CONF		Clear confirmation signal

If the CLR command is entered on a PVC then the PAD will respond with an "ERR" error message.

RESET Command

The RESET PAD command allows the user to reset an established VC.

At the prompt ...	You enter ...	Comments
	Control- P	
@	RESET ↵	
RESET CONF		Reset confirmation PAD service signal.

INT (Interrupt) Command

This command can only be used when a connection is established on the corresponding port. The INT command may be used to send an interrupt packet from the HP 2335A PAD to the remote DTE. The format of the interrupt command is:

At the prompt ...	You enter ...	Comments
	Control-P	
@	INT ↵	

The only acknowledgment PAD service signal for an interrupt command is a "Cr Lf Cr" which results in the terminal cursor moving down by one line.

RPROF Command

This command can only be used when a connection is established on the corresponding port. RPROF is a non-standard X.28 command that enables the user to request a remote HP 2335A CAS/PAD to use temporarily a new profile specified by the "nn" profile identifier following the command. The profile transmitted to the remote CAS/PAD using the RPROF command (e.g. UDP #74) will automatically download the necessary parameters in X.29 packet format to temporarily re-define the local PAD profile using a "PAD associated to CAS/PAD" profile (e.g. UDP #144). As new parameter values can be temporarily set at each end of the synchronous link using the RPROF command, this command provides the versatility required when, for example, the mode of data transfer needs to be changed.

At the prompt ...	You enter ...	Comments
	CONTROL P	
@	RPROF nn ↵	nn = the profile identifier. Must be between 51 and 99.

Note   Only a remote HP 2335A with a CAS/PAD profile on the target port will be able to execute this function completely.

If the command is entered incorrectly this will result in an "ERR" message. If entered correctly, the local PAD responds with an acknowledgment service signal. The remote action of the command will result in an acknowledgment PAD service signal from the remote CAS/PAD having the following format:

```
RPROF DONE
```

If the required CAS/PAD profile is not defined in the remote HP 2335A (it can be defined using the UDP command), then the RPROF command will be rejected by the remote CAS/PAD and an error message will be displayed as follows:

```
NOT FOUND
```

The RPROF command only sets the new profile parameters temporarily as each parameter changes back to its original profile value when the SVC is cleared, or when the HP 2335A is reset if the command is used over a PVC.

Note that the RPROF command can be used only when the remote PAD is an HP 2335A.

BIN Command

This command must be used in the PAD data transfer state. The BIN command enables the user to enter binary mode, in order to access binary applications or carry out binary transfers. The command BIN is equivalent to the command Control-P RPROF 73 ↵, and therefore profile 73 is required (in an unmodified state) on the remote PAD.

At the prompt ...	You enter ...	Comments
	Control-P	
@	BIN ↵	
RPROF DONE		Acknowledgment.

Caution   The user must be aware that the BIN command uses the pre-defined UDP 73 profile. Any modifications to this profile may affect the operation of this function.

ASC Command

This command must be used in the PAD data transfer state. The ASC command enables the user to exit binary mode and return to ASCII mode, with the original profile assigned to the CAS/PAD HP 2335A.

The ASC command can take one of two forms, depending on whether the HP 2335A is in Binary or ASCII mode.

If the HP 2335A is in Binary mode the format of the command is as follows:

At the prompt ...	You enter ...	Comments
	(BREAK)	That is, press the Break key.
θ	ASC ↵	
RPROF DONE		Acknowledgement.

If the HP 2335A is in ASCII mode the format of the command is as follows:

At the prompt ...	You enter ...	Comments
	Control-P	
θ	ASC ↵	
RPROF DONE		Acknowledgement.

#RDIAG Command

This command is used to call a remote test port using the pre-defined Symbolic Remote Address RDIAG (unless it has been modified). It is not a PAD command, but it is used in the PAD command state after escaping from the PAD data transfer state, if it is enabled. This command, and its associated sub-commands, are explained in more detail in chapter 5, "Using The Test Port".

PAD Service Signals

PAD Message Header

The PAD message header is an HP 2335A user facility which enables the user to define, during configuration, a message which will be output before any PAD service signal. The PAD message header may comprise terminal escape sequences to reset the terminal or clear the display.

Network Status Service Signal

If X.25 Level 3 cannot be established then a network status service signal is displayed, the format of which is as follows:

    NETWORK DOWN

PAD Identification Service Signal

The format of the PAD identification service signal is identical to the format of the welcome message defined during off-line configuration of the HP 2335A. It can comprise up to 20 ASCII characters (except control-W which is used to disable the PAD identification service signal).

Note that the welcome message is not sent to PVC assigned device ports.

Incoming Call Service Signal

The format of an incoming call service signal is as follows:

```
nnnnnnnnnnnnnn R D Gnn dddddddddddd COM
```

Field	Mandatory / Optional	Comments
n ... n	Mandatory	Calling DTE address block.
R	Optional	Reverse charging request.
D	Optional	End-to-end acknowledgement request.
Gnn	Optional	Closed user group access request.
d ... d	Optional	Call user data field.
COM	Mandatory	Connected PAD service signal.

Connected PAD Service Signal

The connected PAD service signal indicates that the call is accepted and the VC is established. It is displayed as follows:

```
COM
```

Clear Indication PAD Service Signals

If a call (SVC establishment) is unsuccessful the PAD will indicate the reason for the clear in the clear indication PAD service signal. When X.3 parameter #6 (PAD messages) is set to a value of 1 or 5 then a clear indication PAD service signal may be sent to the device (terminal) and the HP 2335A enters the PAD command state. The format of a clear indication PAD service signal is:

```
CLR
```

This is followed by one of the following clear indications:

CONF	Confirmation of CLR command.
DTE	The remote DTE has cleared the SVC.
OCC	The remote DTE is occupied (busy).
INV	Invalid facility request field.

NC	Network congestion.
DER	The remote DTE/network is out of order or remote DTE/network has restarted.
NA	Connection not permitted (X.25 network CUG).
NP	Not obtainable.

RPE	Remote procedure error.
ERR	Local procedure error.
RPO	RPOA out of order.
RCA	Reverse charge acceptance not subscribed by the remote DTE.

INC	Incompatible destination address.
VCC	All outgoing (and 2 way) SVCs are engaged (non-std X.28).

The clear indication PAD service signals may have a numeric diagnostic cause code. For details of the diagnostic cause codes see appendix B.

Note   If the X.25 network or the remote DTE performs a restart on an established SVC or stops communication, then the HP 2335A PAD sends a clear PAD service signal with a DER cause indication to every port not assigned to a PVC. A ↲ (Cr) character must then be entered and the PAD will respond with a network status service signal, if the network is not operational. When the network is operational (X.25 Levels 1, 2 and 3 set) the PAD identification service signal (HP 2335A defined WELCOME message) is displayed and the HP 2335A enters the PAD command state.

Reset PAD Service Signal

When a restart occurs on PVCs, or when the network is down, the reset PAD service signal followed by a DER (restart) cause indication is displayed as follows:

```
RESET DER
```

This indicates that the remote DTE/network is out of order or has restarted.

Local Control of the HP 2335A PAD (X.28)

When the network is operational (X.25 Levels 1, 2 and 3 set) a reset PAD service signal is displayed as follows:

```
RESET NOP
```

This indicates that the PVC is now operational.

When a PVC is established for the first time (see "Making And Clearing A Connection") the RESET NOP service signal is displayed to indicate that the PVC is operational.

When in the PAD command state the user may reset a VC by entering the RESET PAD command (see "PAD Command Signals"). The HP 2335A then responds by providing the following acknowledgment PAD service signal:

```
RESET CONF
```

Other cause indications that may follow the reset PAD service signal are as follows:

DTE	The remote DTE has performed a reset.
DER	The remote DTE is out of order.
RPE	Remote procedure error.
ERR	Local procedure error (network reset).

LPE	Local procedure error (PAD reset).
NC	Network congestion.
RDO	Remote DTE operational.
NOP	Network operational.

INC	Incompatible destination.

Status PAD Service Signal

The status PAD service signal is provided as an acknowledgment to the status PAD command. The format of the acknowledgment is as follows:

```
FREE XX     (if no VC is established)

ENGAGED XX  (if a VC is established)
```

where XX = the port designator (e.g. A2 = panel A, port 2).

Acknowledgment PAD Service Signals

These PAD service signals provide acknowledgment when a command (e.g. an INTerrupt) is entered. They are as follows:

■ **PROF Command**

A profile change following this command is acknowledged by the cursor moving down one more line. Alternatively, the PAD service signal:

    ERR

means a local procedure error: the requested profile is not found (not defined in HP 2335A).

■ **RPROF Command**

A profile change following this command is acknowledged with the following PAD service signal:

    RPROF DONE

Alternatively, the PAD service signal:

    NOT FOUND

means that the requested profile is not found (not defined in remote HP 2335A).

■ **SET? and PAR? Commands**

These commands are acknowledged with the parameter value PAD service signal providing a listing as follows:

    PAR n:v, n:v, n:INV

where:

   n = parameter number
   v = parameter value
   INV = invalid request

■ **INT Command**

The acknowledgment of this command is simply a "Cr Lf Cr" sent to the asynchronous device (terminal); the terminal cursor returns and moves down the screen by one line.

Remote Control of the HP 2335A (X.29)

Introduction

CCITT X.29 Recommendation defines the interaction between a PAD and a packet mode DTE (e.g. another HP 2335A) by which the PAD parameters and behavior may be controlled remotely across the synchronous network (or X.25 network).

As the user has no direct interface with X.29 commands except through their action on, or setting of, the HP 2335A, the information provided in this section is included for reference purposes only.

X.29 Implementation

Packet Formats

X.29 control information is sent across the synchronous network (or X.25 network) in X.25 packet format in either call packets or data packets which are identified to indicate X.29 content.

In a call packet the first four bytes (octets) of the Call User Data Field form the Protocol Identifier Field and setting the first byte (byte 1) to 1 indicates that the packet is a PAD message. A data packet is a PAD Message packet where the Q-Bit in the packet header (bit 8 of byte 1) is set to 1 and it then contains only X.29 control information.

The packet formats are as shown in Figures 4-2 and 4-3. For further information refer to the CCITT X.1 to X.29 Recommendations. (See appendix F).

Incoming Calls on a CAS/PAD

When an incoming call occurs on a CAS/PAD, it must perform some specific actions. First, it supports the remote calling PAD and then it sends a SET & READ of the "remote PAD associated to CAS/PAD" parameters to the remote PAD, the defined values of which are compatible with the CAS/PAD profile.

Upon completion of this phase the call is either maintained or canceled if there are problems with the remote PAD.

The CAS/PAD will clear an SVC or reset a PVC upon a PAD error message condition (e.g. if a public PAD makes a call to an HP 2335A CAS/PAD with BDP #71).
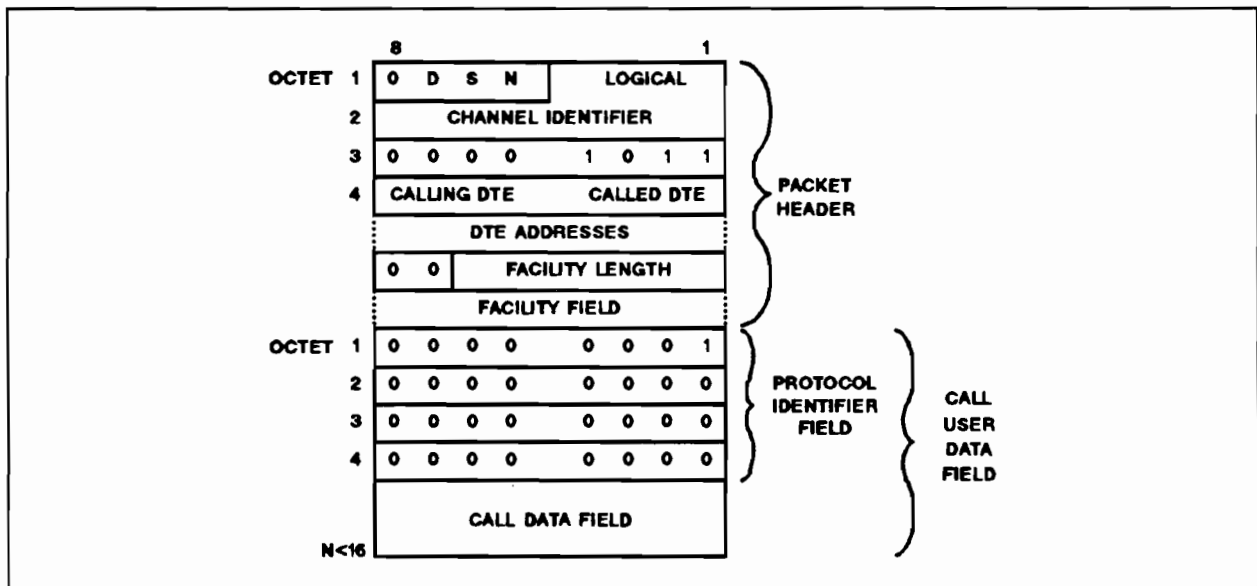
Figure 4-2 PAD Call Packet Format
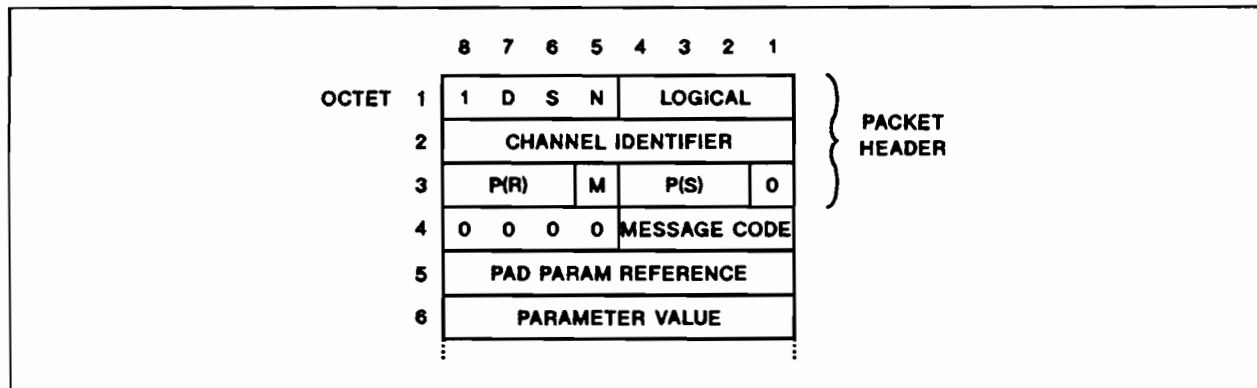
Figure 4-3 PAD Message Packet Format

Implementation of X.29 PAD Commands

The X.29 PAD commands and responses which can be transmitted or received by a standard PAD or CAS/PAD are as follows:

PAD

Receive	**Transmit**
Set	Parameter indication
Set & Read	Indication of break
Read	Error message
Invitation to clear	

CAS/PAD

Receive	Transmit
Parameter indication	Set
Indication of break	Set & Read
Error message	

Note   If an error message is received by a CAS/PAD then this results in a Clear for an SVC, and a Reset for a PVC.

Packet Forwarding Conditions

Packets are forwarded from a PAD upon receipt of a Parameter Indication message, Indication of Break message, Invitation to Clear message, Error message or in the event of any other data forwarding condition.

Packets are forwarded from a CAS/PAD upon receipt of a SET, SET & READ or READ message, an Invitation to Clear message or in the event of any other data forwarding condition.

PAD Control Procedures

Procedure for Read, Set, Set & Read of PAD Parameters

The current values of PAD parameters may be changed (SET) and/or read by transmitting to the PAD a SET, READ, or SET & READ PAD message.

When the PAD receives a SET, READ, or SET & READ PAD message, any data previously received will be delivered to the terminal (device) before taking the action defined in the PAD message. The arrival of one of these PAD messages is taken as a data forwarding condition.   ,

The PAD responds to a valid READ or SET & READ PAD message by transmitting a parameter indication PAD message with the parameter field containing a list of the numbers and current values (after modification) of the PAD parameters to which the PAD message received referred. Note that the PAD does not return a parameter indication message in response to receiving a valid SET PAD message.

Both the PAD and the CAS/PAD will send the "SET X.3 parameter #8 to 0" PAD message upon receipt of an Indication of Break PAD message. This is in order to resume output to the remote asynchronous device (terminal), assuming it is in discard mode.

The CAS/PAD will send a SET & READ PAD message and receive the parameter indication message on receipt of an incoming call on a SVC or, alternatively, a Reset occurring on a PVC. The CAS/PAD outputs a Break command signal to the asynchronous DTE upon receipt of an INTerrupt packet.

PAD message sent from the DTE		Action upon the PAD's parameters	Corresponding parameter indication PAD message transmitted to the DTE
Type	Parameter field		
SET	None	Reset all the implemented X.3 parameters to their initial profile values	None
	List of selected parameters with the desired values	Set selected parameters to given values a) if no error b) PAD falls to modify some parameters	a) none b) List these invalid parameters with the error bit set
SET & READ	None	Reset all the implemented X.3 parameters to their initial profile values	List all the implemented X.3 parameters, and their initial values
	List of selected parameters with the desired values	Set selected parameters to given values	List of these parameters with new values
READ	None	None	List all implemented X.3 parameters with their current values
	List of selected parameters	None	List of these parameters with their current values

Table 4-1   PAD Response to Various PAD Messages

The PAD's response to a SET, READ and SET & READ PAD message is shown in Table 4-1 and the PAD message code identification is as follows:

```
PAD Message Type              Message Code

                         bits  4  3  2  1
Set PAD parameters             0  0  1  0
Read PAD parameters            0  1  0  0
Set & read PAD parameters      0  1  1  0
Parameter indication           0  0  0  0
Invitation to clear            0  0  0  1
Indication of break            0  0  1  1
Error                          0  1  0  1
```

Procedure for Invitation to Clear

The Invitation to Clear PAD message is used to request the PAD to clear the virtual call, after transmission to the terminal of all previous data.

The Clear indication packet, which is transmitted by the PAD after delivery of the last character to the terminal has a clearing cause field set to DTE clearing.

Upon receipt of an invitation to clear on a PVC, the PAD sends an X.29 error message to the remote DTE.

Interrupt and Discard Procedures

If X.3 parameter #7 is set to 21, the PAD transmits an interrupt packet with all bits of the interrupt user data field set to 0 followed by an Indication of Break PAD message to indicate that the PAD, at the request of the terminal, is discarding the user sequences received. The PAD message contains an indication in its parameter field that X.3 parameter #8 has been set to 1 (discard output).

Before resuming data transmission to the PAD, the response to the Indication of Break PAD message is a SET PAD message, indicating that X.3 parameter #8 should be set to 0 (normal data delivery). The CAS/PAD provides this function.

If a PAD receives an Indication of Break PAD message which contains a parameter field as described above, it responds by sending a SET PAD message indicating that X.3 parameter #8 should be set to 0. If a PAD receives an Indication of Break PAD message which does not contain a parameter field, it will not respond to the packet mode DTE. When the PAD transmits an INTerrupt packet after receipt of an INTerrupt or Break PAD command signal from the asynchronous device, if X.3 parameter #7 is set to 1 then the interrupt user data field is coded 1.

If the PAD receives an INTerrupt packet it is confirmed in accordance with the CCITT X.25 Recommendation. The PAD does not transmit the contents of the interrupt user data field to the asynchronous device and it disregards the values.

Reset Procedures

The reset procedures used are those defined in the CCITT X.25 Recommendation. The resetting procedure has the effect of resetting the value of X.3 parameter #8 to 0 (normal data delivery). The current values of all other PAD parameters are not affected.

PAD Error Handling Procedures

If the PAD receives a SET, READ, or SET & READ PAD message containing an invalid PAD parameter the PAD will return the X.29 error message.

Possible reasons for an invalid PAD parameter are as follows:
- The parameter does not exist.
- The parameter corresponds to a user facility which is not supported.
- The parameter is a "read only" parameter.
- The requested parameter value is invalid.
- The parameter follows an invalid parameter separator.

The PAD transmits an error PAD message containing the message code of an invalid PAD message received under the following conditions:

- If the PAD receives an unrecognisable message code.
- If the parameter field following a recognisable message code is incorrect or incompatible with the message code.
- If the parameter field following a recognisable message code has an invalid format.

Note   The PAD transmits an error PAD message if a PAD message containing less than 8 bits is received. If the PAD receives an error PAD message it does not respond with a PAD message of any type.

5

Using the Test Port

Introduction

The HP 2335A Test Port provides the following primary functions:

- Access to on-line diagnostic facility.

- On-line modification of the HP 2335A configuration.

- Local and remote HP 2335A port reset.

- Local and remote HP 2335A reset.

- Communications testing (text re-transmission).

- Listing of HP 2335A installed firmware (ROM part numbers).

- Display of X.25 Levels 1 and 2 statistical information.
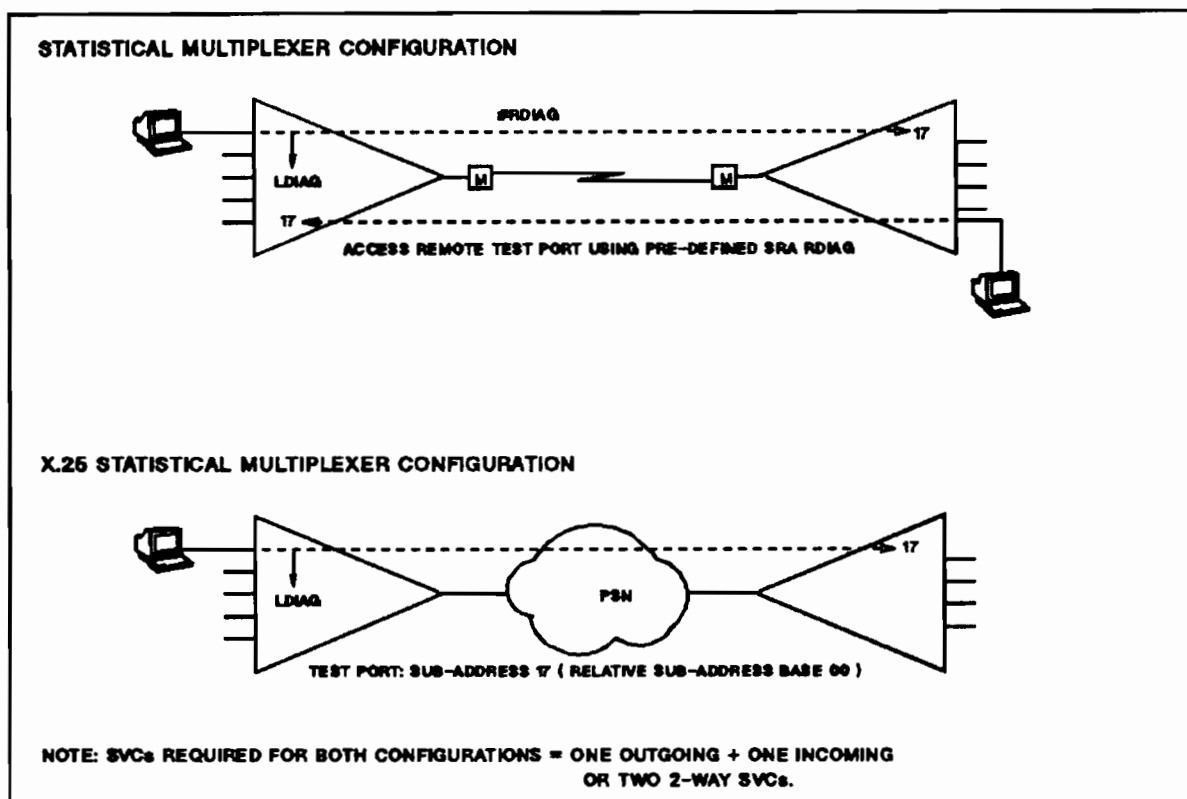
Figure 5-1   HP2335A Test Port Access

Accessing the Test Port

Local Test Port

See Figure 5-1.

The HP 2335A local test port may be accessed when the unit is operating online, i.e. in run mode. The HP 2335A must be in the PAD command state (@ prompt) for the terminal accessing the test port. For an HP 2335A configured as a CAS the terminal must be connected to port A1.

To access the local test port, enter LDIAG:

At the prompt ...	You enter ...	Comments
@	LDIAG ↵ PASSWORD ↵	

The HP 2335A then displays the diagnostic menu. For a complete description of LDIAG, its associated sub-commands and their syntax refer to chapter 4, "PAD Command Signals".

Note   If you are planning to use the test port of a *new* HP 2335A on the host side of a network (where all or most of its ports are to be connected to computer ports), then read this note first.

When switching on a new HP 2335A on the host side of a network, you will probably want to set the DIP switches to the CAS option, so that profile 71 (for computer ports) is assigned automatically as the default for all ports. However, to use the test port of an HP 2335A, you need to connect a terminal to port A1. Profile 1 (for standard terminals) therefore needs to be assigned to port A1.

For this reason, assigning the CAS default via the DIP switches actually assigns a temporary profile 1 to port A1, even though an on-screen list would tell you that profile 1 had been assigned. Profile 1 stays assigned to port A1 until either you change it using the ASG command, or a "clear" signal is sent to this HP 2335A, re-assigning profile 71.

During this "window", when port A1 has profile 1, you may use both the local and remote test ports, as explained in this chapter. However, the important thing to remember is that when you exit from a remote test port, the remote HP 2335A sends a "clear" signal to the local HP 2335A, thus re-assigning profile 71 to port A1 and making the terminal connected to it unusable.

So, before accessing the test port of a remote HP 2335A, make sure that you have finished any terminal-based work on the local HP 2335A, or else assign profile 1 permanently to port A1.

Remote Test Port

The test port in a remote HP 2335A may be accessed only when the unit is operating on-line, i.e. in RUN mode. The local HP 2335A (or public PAD) must be in PAD command state (@ prompt) for the terminal (device) used to access the test port in order that an SVC can be established with the remote test port sub-address. The PAD profile used when accessing the remote test port is the profile assigned to the calling device (port).

Note   At least one incoming, plus one outgoing SVC, or two 2-way SVCs must be configured in the HP 2335A (and subscribed for if used with an X.25 network) in order to access the remote test port.

If the HP 2335A is connected in a statistical multiplexer configuration over a leased line the remote test port may be accessed by using the pre-defined Symbolic Remote Address (SRA) RDIAG. This automatically establishes an SVC with the remote test port.

Note that with statistical multiplexer configured networks, in order to establish an SVC with the remote HP 2335A test port, the SRA RDIAG can be entered once the PAD command prompt (@) is obtained.

At the prompt ...	You enter ...	Comments
@	#RDIAG ↵ PASSWORD ↵	

The HP 2335A then responds:

```
Welcome to the test port [Enter <ESC U> for a user interface]
```

If the HP 2335A is connected to an X.25 network the remote test port may be accessed by entering the PAD selection command with the HP 2335A remote address and the test port sub-address. Alternatively, the RDIAG SRA can be modified.

The HP 2335A test port sub-address is always the defined relative port sub-address plus 17. Thus if the relative port sub-address is defined as 00 then the test port sub-address is 17, as shown in the following example:

At the prompt ...	You would enter ...	Comments
@	13845678917 ↵	PAD selection command. Relative port sub-address = 00.

COM

Once the SVC is established (COM) the echo is disabled and the HP 2335A waits for the correct test port password (defined during a previous off-line or on-line configuration, see chapter 3, "MSG, SRA, LUG & Pool Configuration") to be entered. If the password is entered incorrectly then the SVC is cleared automatically. If the password is entered correctly then the HP 2335A provides an acknowledgment by displaying the following message on the users terminal:

```
Welcome to the test port [Enter <ESC U> for a user interface]
```

After the welcome message has been displayed the echo is re-enabled. The test port does not provide a prompt. The user is then recommended to enter the escape sequence ESC U ↵ which then enters the HP 2335A into diagnostic mode, provides a menu of available commands and displays the RDIAG > prompt. Alternatively for more direct access an escape sequence (i.e. control sequences headed by the ASCII escape character, decimal 27) can be entered, as below:

Escape Sequence	HP 2335AResponse	Explanation
ESC U	Displays diagnostic menu	HP 2335A enters on-line diagnostic mode.
ESC C	Configuration listing	HP 2335A enters on-line configuration mode.
ESC S	Displays port status	HP 2335A provides a port status display.
ESC E	None	HP 2335A performs a reset (as power-on)
ESC Rpn	Reset done !!! or invalis port number	HP 2335A resets port pn, where p = A or B or C or D, and n = 1 or 2 or 3 or 4.
text ESC d	text	HP 2335A retransmits the text as it has been received. (Text = 1 to 127 bytes.)
ESC *s^	HP 2335A Rev 30.xx	Software version identification.

Escape Sequence	HP 2335AResponse	Explanation (cont'd)
ESC /xOR	ROM part numbers	HP 2335A lists the installed ROM part numbers.
ESC /xOP	Level 1 statistical info	Read and reset Level 1 statistics.
ESC /xOS	Level 1 statistical info	Read Level 1 statistics.
ESC /x1P	Level 1 statistical info	Read and reset Level 2 statistics.
ESC /x1S	Level 1 statistical info	Read Level 2 statistics.

Note that only one escape sequence can be entered at any one time. If an escape sequence is entered incorrectly it is discarded by the test port and no error message is provided.

In order to exit from the test port the SVC must be cleared in the normal way, i.e. the data transfer escape character (normally DLE or control-P) or the EXIT command must be entered to return the PAD command prompt " @ " followed by the CLR PAD command (CLR ↵) to clear the SVC.

On-Line Remote Diagnostic Mode

To enter on-line remote diagnostic mode, enter ESC-U either once communication with the remote test port is established, or once the remote test port has completed the action of a previously entered escape sequence. Note that no prompt is provided by the test port in test port mode.

On entering remote diagnostic mode the diagnostic menu is displayed and the RDIAG prompt " RDIAG > " is given.

The sub-commands available from RDIAG are exactly the same as those available from LDIAG - see chapter 4, "LDIAG Command".

Configuration Mode

To enter on-line configuration mode the use of the CONF command from the Diagnostic Mode menu is recommended. Alternatively enter ESC-C either once communication with the remote test port is established (see chapter 2, "Subscription Checklist") or once the test port has completed the action of a previously entered escape sequence. Note that no prompt is provided by the test port in test port mode.

On entering on-line configuration mode the HP 2335A configuration is listed in the same way as in off-line configuration mode (see chapter 2, "Remote Off-line Configuration") and the configure asterisk prompt (*)" is then displayed. The configuration commands available are the same as those available during off-line configuration (see chapter 3, "Configuration").

There is one additional command, EXIT, which is used to exit on-line configuration mode and return the user to the RDIAG > prompt.

Caution   The "Def/Mod VC Table?" prompt in the dialogue for Level 3 configuration is replaced by "WARNING: the VC table cannot be modified in on-line mode". This prevents communication problems which could be caused by an on-line modification of the VC table.

Caution   Care must be taken when modifying certain X.25 parameters. For example, if a negotiation facility which is not subscribed for with the X.25 network is configured in the HP 2335A then the next call will be rejected by the X.25 network.

Because the HP 2335A is operating on-line (i.e. in run mode) when on-line modification of the HP 2335A configuration is made using the test port, the time when the modification(s) becomes effective depends upon the parameter (or facility) being modified. The parameters/facilities which are available and the time when modifications to them become effective are as follows:

X.25 Levels 1, 2 & 3 and the LUG, MSG & SRA Facilities

Any modifications made to any of the above are effective (in HP 2335A memory) as soon as the sub-level (e.g. Level 2) is exited. For example, if the "window size out" parameter is modified then the new value is used from the moment Level 3 configuration is exited. A modification to the LUG list is effective for the next incoming call.

ADL Facility

If the ADL configuration is modified then it is effective in HP 2335A memory as soon as the ADL sub-level is exited. The new automatic dial address assigned to a device port will then be used when the device (terminal) connected to the ADL assigned device port is powered off/on; when the HP 2335A is RESET (locally using the reset push-button switch, or remotely using the test port (see "Remote Reset of the HP 2335A" later on this chapter), or after a CLEAR (CLR).

ASG Profile Assignment

When a BDP or a new UDP is assigned to a port, the time it becomes effective depends upon the type of profile, the state of the port (i.e. free or engaged) and whether or not it has a PVC assigned to it.

PAD Profile

- *If the port is engaged on an SVC* then the new assigned profile is effective after the SVC is cleared (i.e. after a CLR ⏎ is entered).

- *If the port is free (no SVC established)* the new profile is downloaded when the user exits the ASG level.

- *If the port has a PVC assigned to it* then the new profile is effective following a RESET (performed locally using the Reset push-button switch, the Reset/port in diagnostic mode or remotely using the test port (see Remote Reset of the HP 2335A later in this chapter).

- *If the port is engaged on an SVC or a PVC* the data transfer escape character (normally DLE or control-P) may be entered to return temporarily to the PAD command state so that the PROF command can be entered. If the port is free (no SVC established or PVC assigned) then it is already in the PAD command state. The new profile assignment can then be made effective by entering the PROF (X.28) command with or without the device port/profile reference. The recommended method is to enter the PROF command without the port/profile reference.

CAS/PAD Profile

- *If the port is engaged on an SVC* then the new assigned profile is effective after the SVC is cleared (i.e. after a CLR ↵ is entered).

- *If the port is free (no SVC established)* the new profile is downloaded when the user exits the ASG level.

- By entering PAD command state the new profile assignment can be made effective by entering the RPROF nn command where "nn" is the profile reference which *must* be specified.

Remote PAD (associated to CAS/PAD) Profile

- *If the port is engaged (SVC established)* then enter the data transfer escape character (normally DLE or control-P) to return to the PAD command state and use the RPROF nn command to make the new CAS profile assignment effective. This CAS profile will then download the Remote PAD (associated to CAS/PAD) profile.

- *If the port is free* then the new profile assignment is effective for the next call (next SVC to be established).

- *If the port has a PVC assigned to it* then the new profile is effective following a RESET (performed locally using the Reset push-button switch, the Reset/port in diagnostic mode or remotely using the test port (see "Remote Reset of the HP 2335A" later in this chapter).

Use of the RPROF nn command as detailed above is recommended for PVC assigned ports.

Escape Sequences

For the more experienced user the HP 2335A provides a more direct access to certain functions when use is made of the escape sequences listed earlier in this chapter. Less familiar users should gain access to the functions via the on-line and configuration menus as detailed above.

Note   When you are entering escape sequences the terminal must be in display function mode so that the escape sequence is sent and not executed by the terminal.

Port Status

The HP 2335A test port provides a port status display when the " ESC S " escape sequence is entered (see table 5-1) followed by a ⏎ (Cr) character. The test port must be accessed as detailed in "Accessing The Test Port", and be in test port mode (i.e. no prompt) when the escape sequence is entered.

The HP 2335A gives a display of the ports' status, from port A1 to port D4 in sequence, displaying:
- **H** if the modem signals DTR and RTS are high.
- **L** if the device does not provide the correct modem signals.
- **E** if the modem signals DTR and RTS are high and the port is engaged.
- **-** if the adapter corresponding to the port is not fitted.

Port Reset of the HP 2335A

Any (or all) of the HP 2335A ports may be reset locally or from a remote location through the HP 2335A test port.

Once communication is established with the remote HP 2335A test port (see "Accessing The Test Port"), a port reset may be performed by entering the " ESC Rpn" escape sequence (see Table 5-1). Note that pn is the port number to be reset where p = {A|B|C|D} and n = {1|2|3|4}. This is followed by a ⏎ (Cr) character.

For example, to reset port A3 enter:

```
ESC RA3 ⏎
```

Another escape sequence may then be entered or communication with the remote test port can be cleared as detailed in "Accessing The Test Port".

Remote Reset of the HP 2335A

The HP 2335A may be reset (initialized in the same way as using the Reset push-button or performing a power-off/on locally) from a remote location through the HP 2335A test port.

Once communication is established with the remote HP 2335A test port a reset may be performed by entering the " ESC E " escape sequence (see table 5-1) followed by a ⏎ (Cr) character.

Another escape sequence may then be entered or communication with the remote test port can be cleared as detailed in "Accessing The Test Port".

HP 2335A Communications Test

A remote HP 2335A test port can be accessed to provide a communications test between the local and the remote HP 2335A locations by re-transmitting a text input back to the terminal (device) exactly as it is received at the remote location.

Once communication is established with the remote HP 2335A test port the text to be re-transmitted (comprising up to 127 characters) may be entered followed by the " ESC d " escape sequence (see Table 5-1 HP 2335A Test Port Escape Sequences) and a ⏎ (Cr) character.

The remote HP 2335A will then re-transmit the text, exactly as it is received, back to the terminal (device). Another escape sequence may then be entered or communication with the remote test port can be cleared as detailed in "Accessing The Test Port".

HP 2335A Identification & Statistics

Equipment Type Identification

The HP 2335A test port provides an equipment type identification when the " ESC *s ^ " escape sequence is entered (see Table 5-1) followed by a ↵ (Cr) character. The test port must be accessed as detailed in "Accessing The Test Port", and be in test port mode (i.e. no prompt) when the escape sequence is entered.

The HP 2335A identifies the equipment type by displaying the "HP 2335A Rev 28.XX" message. Another escape sequence may then be entered or communication with the remote test port can be cleared.

Firmware Identification

The HP 2335A test port provides an installed firmware identification by displaying the part numbers of the ROMs (Read Only Memory) in response to entering the "ESC /x0R" escape sequence (see Table 5-1) followed by a ↵ (Cr) character. The test port must be accessed as detailed in "Accessing The Test Port", and be in test port mode (i.e. no prompt) when the escape sequence is entered.

Up to twelve ROM part numbers are stored in the memory buffer, each ROM has a part number which is 12 characters long and is displayed in the following format:

"xxxxx-xxxxx "

Only the Modem Adaptors fitted at the time of the last configuration are listed otherwise no indication is displayed for either the ROM or the adaptor and a space is displayed at the corresponding position in the part number list. Where an adaptor has been fitted, and has been configured, the display will show the part number of the ROM, this information is listed in the following order and in a manner which allows compatibility with the HP 2334A :

CPU ROM (same ROM number four times), followed by the serial ROMs (same ROM number two times) fitted for the installed Modem Adaptors A, B, C and D (4 Channels each), SER ROM 0, SER ROM 1, SER ROM 2, SER ROM 3 respectively.

After the ROM part numbers have been listed another escape sequence may be entered or communication with the test port can be cleared.

X.25 Level 1 Statistics

The X.25 Level 1 statistical information is held in a buffer of 11 bytes organized into 2 decimal words (5 decimal ASCII coded digits per word) separated by 1 space character (ASCII 20H).

Each word contains a statistical value and these are listed in the following order:

1. Number of line drops.

2. Number of line failures.

The above statistical information is displayed on entering either the "ESC /x0P" or "ESC /x1P" escape sequence (see the list of escape sequences earlier in this chapter) followed by a ↵ (Cr) character. The "ESC /x1P" escape

sequence allows the user to read the statistical information without resetting the counters while the "ESC /x0P" escape sequence will display the current values and then reset both counters to zero.

Note   On counter overflow, the counter is reset.

For example:

You enter ...	The HP 2335A responds ...	Comments
ESC/x1P ↵	00015 00002	Means 15 line drops and 2 line failures.

Note that, a line drop is defined as the synchronous line dropping its modem signals for a time less than the modem signals timer value. A line failure is defined as the synchronous line dropping its modem signals for a time greater than the modem signals timer.

X.25 Level 2 Statistics

The X.25 Level 2 statistical information is held in a buffer of 65 bytes organized in 11 decimal words (5 decimal ASCII coded digits per word) separated by 10 "space" characters (ASCII 20H).

Each word contains a statistical value and these are listed in the following order:

1. Number of I-frames received.
2. Number of RR-frames received.
3. Number of RNR-frames received.
4. Number of REJ-frames received.
5. Number of FRMR-frames received.
6. Number of receiver overruns.
7. Number of frames received with bad FCS.
8. Number of aborted frames received.
9. Number of times hunt mode entered.
10. Number of receiver buffer overflow conditions.
11. Number of frames received with incorrect addressing.

The above statistical information is displayed on entering either the "ESC /x0S" or "ESC /x1S" escape sequence (see under "Remote Test Port" above) followed by a ↵ (Cr) character. The "ESC /x1S" escape sequence allows the user to read the statistical information without resetting the counters while the "ESC /x0S" escape sequence will display the current values and then reset all the counters to zero.

Note   On counter overflow, the counter is reset.

For example:

You enter ...	The HP 2335A responds ...	Comments
ESC/x1S↵	00529 00218 00001 00000 00000 00000 00000 00000 00748 00000 00000	Means 529 I-frames, 218 RR-frames, 1 RNR-frame, 748 hunt modes)

6

Installing Add-Ons and Disassembling the HP 2335A

This chapter explains how to:

■ install an add-on modem adapter to the HP 2335A (other than in slot A, which is not customer-installable).

■ disassemble and re-assemble the HP 2335A, in order to change the CPU, the PROMs, or the power supply assembly (HP customer engineer only).

Installing an Add-On Modem Adapter

The HP 2335A X.25 Statistical Multiplexer may operate with 1, 2, 3, or 4 modem adapters on the backplane, providing respectively 4, 8, 12, or 16 device ports. The minimum deliverable configuration for the HP 2335A is with one modem adapter already installed in slot A (see figure 6-1), the other slots being covered by blanking panels.

The HP 40262A or HP 40262B is an add-on modem adapter, giving you four more device ports. It connects directly with the main CPU printed circuit board of the HP 2335A.

Note   The HP 40262B modem adapter is intended for use only where a device port is to be connected to a modem in Germany, using an HP 40222A cable. In this case, you will need an HP 40219A cable between the modem adapter and the standard cable. (See under "Cables" in chapter 8.)

Otherwise, you should have an HP 40262A modem adapter. As the installation procedures are identical, any reference in this section to the HP 40262A applies equally to the HP 40262B.

You must install any add-on modem adapters for the HP 2335A in the following sequence:

Modem Adapter	Position (see figure 6-1)	Total Device Ports Available
Minimum	Already installed in slot A	4
First add-on	Install in slot B	8
Second add-on	Install in slot C	12
Third add-on	Install in slot D	16

Installation

To install an HP 40262A modem adapter, you need only a flat-blade screwdriver.

Caution   Handle all HP 2335A components with care, and do not knock them nor allow them to be contaminated by dirt or liquids.

When installing or removing modem adapters, use anti-static handling procedures.

Never remove the modem adapter already installed in slot A.

---

1. Switch off the HP 2335A, disconnect it from the power supply, and place it on a suitable surface giving you clear access to the rear panel.

2. Unscrew and remove the appropriate blanking panel from the rear panel of the HP 2335A (from slot B, C, or D).

3. Hold the add-on modem adapter by its metal panel, and carefully slide it into the vacated slot, so that the adapter's 48-way connector mates with the connector at the bottom, on the main printed circuit board of the HP 2335A.
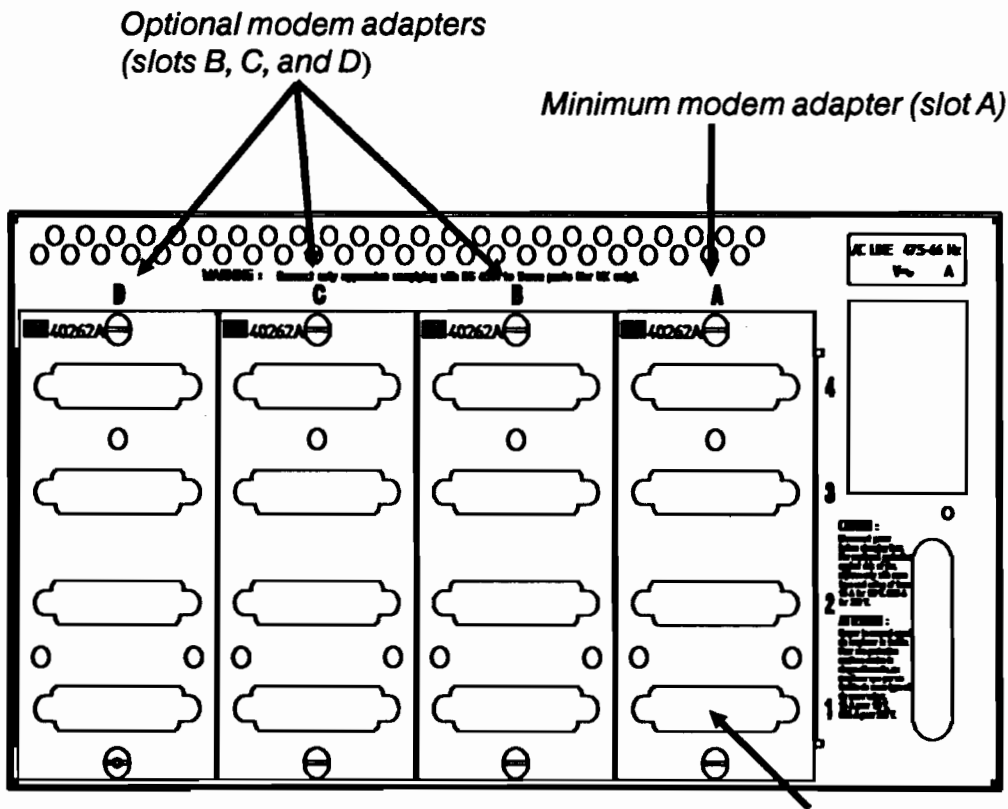
Figure 6 - 1   HP2335A Rear Panel   *Port A1*

4. Gently press the metal panel to ensure that the connectors completely engage.

5. Secure the adapter in position by tightening the locking screws at the top and bottom of the metal panel.

6. If necessary, cover any unused slot positions by replacing the blanking panels. This is to meet RFI regulations, and to ensure the correct operation of the ventilation system.

7. Remount the HP 2335A on its site, table, or rack, and then reconnect it to the power supply (but do not switch it on yet).

8. Now follow the procedures explained below, in order to update the HP 2335A's configuration.

Updating the HP 2335A's Configuration

Chapter 3 explains how to configure the asynchronous device ports.

Port profiles will already have been assigned to all 16 ports, *regardless of how many port connections were physically available*, ie. how many modem adapters were installed at the time. However, in order to use the new ports made available by the new modem adapter, we recommend the following procedure, which uses the offline configuration mode.

Note   If you do *not* intend to modify an X.25 network subscription, ie. do *not* intend to use extra PVCs or SVCs on the newly available ports, then you could go through steps 4 to 7 in *online* configuration mode, from the @ prompt, via the LDIAG and CONF commands, to the * prompt.

---

1. Open the front flap of the HP 2335A and set the DIP switches as follows for offline configuration:

   ```
   Switch: A B C D E F G H

   Setting: 0 0 0 0 0 0 0 1

   (0 = down   1 = up)
   ```

2. Connect a terminal to port A1, with the baud rate set to 1200 bps. For full details of the required terminal configuration, see chapter 3, in particular the section entitiled "Entering Configuration Mode".

3. Switch on the HP 2335A.

4. After the HP 2335A has listed the current configuration on the terminal, it will prompt you with an asterisk (*), indicating that you are in configuration mode.

5. Enter ASG.

6. Enter LIST. This lists the profiles currently assigned to all 16 device ports.

   These profiles may have been derived entirely from the defaults supplied with the HP 2335A (profile 1 for PAD configurations; profile 71 for CAS configurations), or may have been subsequently modified.

7. For each newly available port, assign the profile appropriate to the device which you intend to connect to that port, *even if this means re-assigning the profile already displayed against the port by the LIST command.* You may need to create new UDPs (user-defined profiles).

   For a listing of the parameters of the HP 2335A's BDPs (basic defined profiles) and the standard UDPs, see appendix C of *The HP 2335A User's Guide* (02335-90022).

   For an explanation of how to create UDPs and how to assign profiles, see chapter 3, in particular the section entitiled "Asynchronous Ports Profile Configuration".

8. If you intend to assign a virtual circuit to any of the newly available ports, or increase the number of virtual circuits, then you must update the virtual circuit table.

   For an explanation of how to do this, see chapter 3, in particular the section entitled "X.25 Level 3".

   Remember that, if your HP 2335A is connected to an X.25 network, then in order to add new virtual circuits, you will probably need to negotiate a new contract with the X.25 network authority.

Note   Notice that the above procedure does *not* advise you to reset *all* the HP 2335A's port profiles to one of the default configurations. If, however, you really *do* want to reset all the port profiles to either the PAD default or the CAS default, then (after reading the warning below), at the configuration asterisk (*), enter DEF-PAD or DEF-CAS respectively.

Caution   Beware that, when you use the DEF-PAD or DEF-CAS commands, you lose any modifications which you have already made to the configuration of the HP 2335A, whether to the synchronous network configuration or to the configuration of the device ports.

Note   Do not try to use the PAD and CAS DIP-switch settings to reset the profile assignments, as these are effective only when *first* switching on the HP 2335A. This is a security feature, to protect you from accidentally losing any modifications which you have already made to the configuration of the HP 2335A.

Disassembling the HP 2335A

Note   This task is to be undertaken only by qualified HP customer engineers. In the event of anyone else undertaking it, the product's warranty will automatically be invalidated.

How to Replace the CPU Card or the PROMs (HP customer engineer only)

You will need:

- a flat-blade screwdriver.
- a T10 TORX screwdriver.
- an IC extractor tool.
- an IC insertion tool.
- a correctly earthed anti-static wrist strap.

You may need to follow this procedure if, for example, you have to replace the PROMs with an upgraded set.

1. Since replacing the old PROMs involves losing the current configuration of the HP 2335A, make sure that you have a note of:
   - All the current parameters, both the synchronous (X.25) parameters and asynchronous (profile) parameters. Appendix E of the *HP 2335A User's Guide* is provided as a checklist for user-defined profile parameter values.
   - All MSGs (messages).
   - All SRAs (symbolic remote addresses).
   - All LUG (local user group) filters.
   - All port pools.
   - All ADLs (automatic dial assignments).

2. Switch off the HP 2335A.

3. Disconnect all HP 2335A's cables: the device cables, the synchronous cable, and the power cable. Make sure that the cables are clearly labeled, so that you can easily replace them.

4. Place the HP 2335A on a flat, clean surface, with access to the rear of the box.

5. Make sure that you have followed standard anti-static procedures before continuing.

6. Using a flat-blade screwdriver, unscrew the eight captive screws from the four panels on the rear of the HP 2335A (either modem adapter panels or blanking panels), as shown in figure 6-2. Make a note of which panel goes in which position, so that you can replace them in the same positions.

7. Remove the three panels from slots B, C, and D, taking care not to damage the printed circuit on the back of modem adapter panels.

8. Using a T10 TORX screwdriver, unscrew the extra screw on the panel in slot A, and remove the panel, taking similar care with the printed circuit on the back.

Captive screws
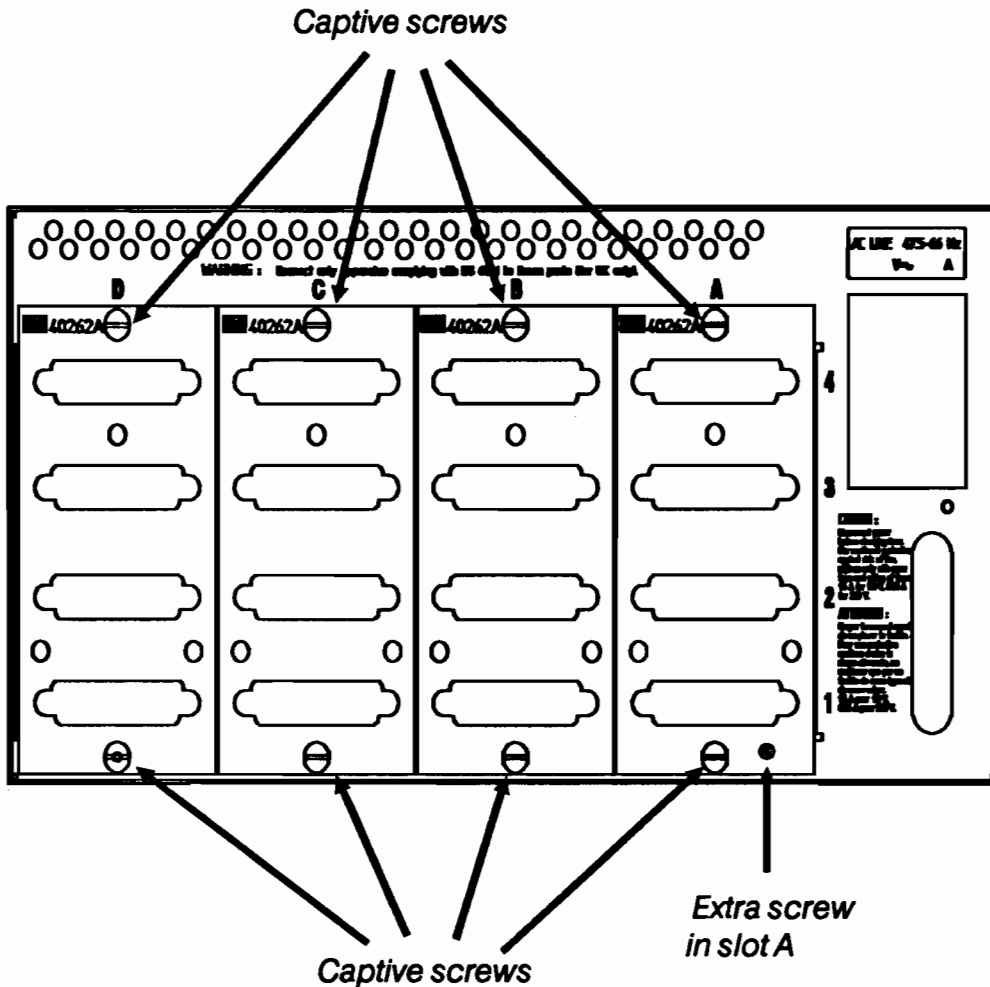
Figure 6 - 2   Removing the panels from the HP2335A

Captive screws

Extra screw
in slot A

9. The CPU card is now clearly visible towards the bottom of the cabinet. Carefully slide it out and place it on a clean anti-static surface. If you are simply replacing the whole CPU card, you can go on to step 12, now using the new card.

10. If you are replacing the PROMs, turn the CPU card so that the four serial connectors are away from you and the connector to the power supply is towards you. The CPU PROM is located in socket XU31 on the right of the card. The four serial PROMs are located in sockets XU38, 40, 42, and 44 in a line across the middle of the card.

11. Using the IC extractor and insertion tools, replace all five old PROMs with the five new PROMs. The four serial PROMs are all the same. Remember that the PROMs should be positioned so that the small cut-out on the back of the PROM is at the same end as the small cut-out marked on the card by the socket. Make sure that each new PROM is pressed firmly into place, and that the pin legs have been neatly inserted into their sockets.

12. Turn the CPU card round so that the serial connectors are again facing you. Place it in the guide rail inside the HP 2335A's cabinet, and carefully slide it back in. Push it firmly home.

13. Screw all four panels back into position, using the two hooks on the lower part of each panel to clip it onto the CPU card.

14. Remember to replace the extra screw in slot A with the T10 TORX screwdriver.

15. Return the HP 2335A to its position, and, with the exception of port A1, reconnect the synchronous and device cables to their correct ports (as previously marked).

16. Connect a terminal to port A1, as explained in chapter 3, under "Entering Configuration Mode", so that you will be able to configure the HP 2335A.

17. Reconnect the power supply, but do not yet switch on.

18. Referring again to chapter 3, set the DIP switches for the appropriate default configuration (since it is now as though you were about to switch on the HP 2335A for the first time.)

19. Switch on the HP 2335A.

20. Reconfigure the HP 2335A, as explained either in chapter 3 of this *Reference Manual* or in the chapter of the *User's Guide* relevant to a particular configuration.

21. Disconnect the terminal from port A1 (unless that is the device normally connected to that port), and reconnect the normal device to that port.

22. Set all DIP switches down (off) for normal operation in command mode.

23. Reset the HP 2335A.

How to Replace the Power Supply Assembly (HP customer engineer only)

The HP 2335A's power supply assembly includes the power unit, the on/off switch, the fuse holder and the synchronous port. To replace it, you will need a cross-blade screwdriver.

1. Since replacing the power supply assembly involves losing the current configuration of the HP 2335A, make sure that you have a note of:
   - All the current parameters, both the synchronous (X.25) parameters and asynchronous (profile) parameters. Appendix E of the *HP 2335A User's Guide* is provided as a checklist for user-defined profile parameter values.
   - All MSGs (messages).
   - All SRAs (symbolic remote addresses).
   - All LUG (local user group) filters.
   - All port pools.
   - All ADLs (automatic dial assignments).

2. Switch off the HP 2335A.

3. Disconnect all HP 2335A's cables: the device cables, the synchronous cable, and the power cable. Make sure that the cables are clearly labeled, so that you can easily replace them.

4. Place the HP 2335A on a flat, clean surface, with access to the front panel.

5. Lower the flap covering the front panel by pressing down on the two tabs and pivoting it forwards.

6. Using a cross-blade screwdriver, unscrew the two cross-head screws which you can see on the left and right of the LEDs.

7. Lift the whole of the front panel upwards and remove it. You can now see the power supply assembly. It is on the left of the front panel.

8. Unscrew the five securing screws from the power supply. One is on the rear panel, between the synchronous port and the fuse-holder. The other four are on the front of the box. They are the screws at the very edges of the power supply assembly, and not the ones (six in all) in the middle.

9. Remove the power supply assembly. To do this, ease it forwards. If it is a little stiff, you can push on the fuse holder at the back.

10. To insert a new power supply assembly, slide it gently into the box from the front, with the on/off switch towards you.

11. Replace the four screws at the front and the one at the back.

12. Clip the front panel back on the box, by engaging the four wide clips near the top of the panel, and then pushing it downwards.

13. Replace the two screws to secure the front panel.

14. Lift the flap back into position.

15. Return the HP 2335A to its position, and, with the exception of port A1, reconnect the synchronous and device cables to their correct ports (as previously marked).

16. Connect a terminal to port A1, as explained in chapter 3, under "Entering Configuration Mode", so that you will be able to configure the HP 2335A.

17. Reconnect the power supply, but do not yet switch on.

18. Referring again to chapter 3, set the DIP switches for the appropriate default configuration (since it is now as though you were about to switch on the HP 2335A for the first time.)

19. Switch on the HP 2335A.

20. Reconfigure the HP 2335A, as explained either in chapter 3 of this *Reference Manual* or in the chapter of the *User's Guide* relevant to a particular configuration.

21. Disconnect the terminal from port A1 (unless that is the device normally connected to that port), and reconnect the normal device to that port.

22. Set all DIP switches down (off) for normal operation in command mode.

23. Reset the HP 2335A.

7

Troubleshooting

Introduction

This chapter provides the troubleshooting information and procedures required in the event of a HP 2335A malfunction, to determine if there exists a defective assembly. Once the user has established the existence of a defect the local HP Sales and Service Office should be contacted.

The troubleshooting information is presented on three levels:

Preliminary Troubleshooting

This information is intended to verify:
- correct HP 2335A installation.
- HP 2335A power supply fuse.

User Troubleshooting

This information is intended for the user in order to verify the operation of the HP 2335A hardware using the "Power On" and "Switches" test procedures.

Main Troubleshooting

This information is not intended for the user, as it enables complete, and therefore more advanced, troubleshooting to be performed, in some cases requiring the use of test equipment not supplied to the user. These tests include:
- self-diagnostic tests.
- terminal loop back tests, to verify asynchronous communications.
- modem loop back tests, to verify synchronous communications.

It is recommended that the procedure as described in "Preliminary Troubleshooting" is followed as a first step in any troubleshooting session.

Tables 7-1 and 7-2, at the end of this chapter, are provided as additional fold-out guides to the troubleshooting procedures.

Warning   The power unit contains high-voltage components. Use extreme caution and do not touch any exposed parts when performing the troubleshooting procedures. Failure to observe these precautions may cause serious injury.

Preliminary Troubleshooting

Introduction

The following preliminary troubleshooting should be performed in the order shown:

1. Check that the HP 2335A site is correctly prepared, i.e. check all the cabling and verify the operation and setting of associated equipment (eg. modem(s)) according to the manufacturer's instructions (see User's Guide, chapter 2, "Installing The HP 2335A").

2. Verify the HP 2335A installation (see User's Guide, chapter , "Installing The HP 2335A").

3. Check the HP 2335A power supply fuse following the procedure outlined below under "Fuse Checking". In the event that the power supply fuse blows repeatedly call your nearest HP Sales and Service office.

Fuse Checking

The line input fuse for the HP 2335A is located at the rear of the unit at the top right corner close to the power input socket. The HP 2335A line fuse should be checked as follows:

1. Disconnect the power cord from the HP 2335A.

2. Using a flat blade screwdriver open the small plastic door which can be found immediately to the left of the power input socket.

3. Withdraw the fuse by squeezing the fuse and pulling it rearwards.

4. Examine the fuse condition and ensure that it is correctly rated for the operating voltage. The fuse ratings are as follows:
   - 0.75 AT/250 V (i.e. 0.75 Amps, timelag = slowblow) for a 230 Volt line supply.
   - 1.5 AT/250 V (i.e. 1.5 Amps, timelag = slowblow) for a 115 Volt line supply.

5. Fit a fuse of the correct rating as necessary.

The fuse value is normally marked at one end of the fuse.

User Troubleshooting

This section provides troubleshooting information for a user experiencing or suspecting abnormal behavior of the HP 2335A during operation. This may occur in the following situations:

- While operating the HP 2335A (i.e. entering run mode or in configuration mode).

- At a connected terminal when trying to establish communication with a remote host computer.

- At a connected terminal with communication (a virtual circuit) already established.

The first thing to check is the LED display and DIP switch settings, making a cross - reference to the DIP switch settings and LED error indications detailed in "LED Display".

When a terminal is being used (e.g. during Configuration or in Run mode) and it is not responding (e.g. no prompt or welcome message is displayed on the screen) then refer to "No Response From The Terminal".

Warning   Prior to a reset of the HP 2335A ensure that all users have cleared their sessions. To avoid resetting the HP 2335A perform all tests which do not require a reset and if the problem persists then call your local HP Sales and Service Office.

If communication (i.e. a virtual circuit) cannot be established with the remote host computer then refer to "Virtual Circuit Status".

The error messages that can occur when the HP 2335A is operating are detailed in "HP 2335A PAD Operation Error Messages".

If a connection (VC) is established and an application that is to run on the remote host computer does not execute properly then the PAD profile assigned to the connected port must be verified. For details of the PAD profiles and their assignment refer to chapter 3, "Configuration". Note that verification may also be necessary on the remote host computer configuration.

LED Display

The conventions used in this section to explain the LED display are as follows:

- The DIP switches are named:

  ABCDEFGH

- The LEDs are named:

  a b c d e 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

- The indications used are:

		DIP Switches	LED Display
1	means	up / open	LED on
0	means	down / closed	LED off
X	means	don't care	don't care
B	means		blinking

With Any DIP Switch Setting

```
A B C D E F G H
X X X X X X X X
```

After Power On Or Reset

```
a  b c d e   1 2 3 4   5 6 7 8   9 10 11 12   13 14 15 16
0  0 0 0 1   X X X X   X X X X   X  X  X  X    X  X  X  X


a  b c d e   1 2 3 4   5 6 7 8   9 10 11 12   13 14 15 16
0  0 0 1 0   X X X X   X X X X   X  X  X  X    X  X  X  X


a  b c d e   1 2 3 4   5 6 7 8   9 10 11 12   13 14 15 16
0  0 1 1 1   0 1 1 1   X X X X   0  0  0  0    0  0  0  0
```

Any of the above indicates a hardware fault. Contact the nearest HP Sales and Service office.

```
a  b c d e   1 2 3 4   5 6 7 8   9 10 11 12   13 14 15 16
0  1 0 0 0   0 0 0 0   0 0 0 0   0  0  0  0    0  0  0  0
```

The above indicates an invalid switch setting. Proceed as follows:

1. Set the DIP switches to a valid position i.e. either run mode or configuration mode as detailed later in this section, and RESET the HP 2335A.

2. If the LED display remains the same after resetting, select SWITCH TEST and RESET the HP 2335A.

At Any Time

```
a  b c d e   1 2 3 4   5 6 7 8   9 10 11 12   13 14 15 16
0  1 0 0 1   X X X X   X X X X   X  X  X  X    X  X  X  X
```

The above indicates that an HP 2335A software failure is detected. Record the pattern displayed on LEDs 1 to 16. Check the DIP switch setting and reset the HP 2335A. Contact the nearest HP Sales and Service office and provide details of the problem including the pattern displayed on the LEDs.

With DIP Switches Set for Configuration Mode

```
A B C D E F G H
0 0 0 0 0 0 0 1

(at power-on or reset)
```

```
a   b c d e    1 2 3 4    5 6 7 8    9 10 11 12    13 14 15 16
0   0 1 1 1    1 0 0 1    0 0 0 1    0  0  0  0     0  0  0  0
```

The above indicates that:

■ *either* an adapter for slot A is missing (this being required for configuration.),

■ *or*, if this this is not true, then a hardware fault is detected; contact the nearest HP Sales and Service office.

With DIP Switches Set for Run Mode

```
A B C D E F G H
X X X 0 0 0 0 0

(at power-on or reset)
```

```
a   b c d e    1 2 3 4    5 6 7 8    9 10 11 12    13 14 15 16
0   0 1 1 1    1 0 1 1    0 1 1 0    0  0  0  0     0  1  1  1
```

The above indicates that there is no X.25 configuration. Go to configuration mode.

```
a   b c d e    1 2 3 4    5 6 7 8    9 10 11 12    13 14 15 16
0   0 1 1 1    1 0 0 1    0 0 0 1    0  0  0  0     1  X  X  X
```

The above indicates that too many PVCs are configured. Go to configuration mode.

Available LED Display In Run Mode

```
a  b c d e
1  B B X X
```

- LEDs b and c *blink* when the operating system is *up*.

- LED d is *on* when the X.25 level 1 is *up* (i.e. Data Carrier Detect RS-232/V.24 signal from the synchronous modem is on).

- LED e is *on* when the X.25 level 2 is *up* (i.e. is in data transfer mode, allowing level 3 communication (VC) to be established).

Run Mode: Port Ready

If the DIP switches are set at:

```
A B C D E F G H
0 0 0 0 0 0 0 0

(at power-on or reset)
```

then LEDs 1 to 16 reflect the physical status of the corresponding asynchronous ports (from LED 1 for port A1 to LED 16 for port D4), as follows:

- The LED is *on*:

  - if the asynchronous device connected to that port is *on*. Modem signals used :- Speed sense and parity sense, if configured.

  - continuously if the port has been configured to operate without modem signals (3-wire cable), by the use of the local parameter #14 (set to 8) in the assigned port profile.

- The LED is *off*:

  - if the asynchronous device connected to that port is "not seen" (modem signals not provided) by the HP 2335A. Refer to "No Response From The Terminal".

  - if parity/speed sense has not been performed (if configured through local parameter #15 of the corresponding port profile).

  - if no modem adapter is in the corresponding slot

For example:

```
1 2 3 4   5 6 7 8   9 10 11 12   13 14 15 16
0 1 1 0   1 0 1 0   0  0  0  1    0  0  0  0
```

Slots A, B and C are fitted with Modem Adapter cards and the links between the HP 2335A and devices connected to ports A2, A3, B1, B3 and C4 are ready for data transmission.

Slot D is either empty or none of the ports D1 to D4 are ready.

Run Mode: Virtual Circuit Status

If the DIP switches are set at:

```
A B C D E F G H
0 1 0 0 0 0 0 0
```

then LEDs 1 to 16 are *on* when the corresponding asynchronous ports (from LED 1 for port A1 to LED 16 for port D4) have a virtual circuit established.

For example:

```
1 2 3 4   5 6 7 8   9 10 11 12   13 14 15 16
0 1 1 0   0 1 1 0   0  0  1  0    0  0  0  0
```

Virtual circuits are established for ports A2, A3, B2, B3 and C3.

Run Mode: Free Memory

If the DIP switches are set at:

```
A B C D E F G H
1 1 0 0 0 0 0 0
```

then LEDs 1 to 16 are used as a bar graph to display the percentage of free memory.

For example:

```
1 2 3 4   5 6 7 8   9 10 11 12   13 14 15 16
1 1 1 1   1 1 1 1   1  1  1  1    1  1  0  0
```

14/16 = 87.5 % of memory is free.

Run Mode: X.25 Level 2 Activity

If the DIP switches are set at:

```
A B C D E F G H
1 1 1 0 0 0 0 0
```

then LEDs 1 to 8 show the N(R) counter, and LEDs 9 to 16 show the N(S) counter. A lit LED propagates between 1 and 8 as N(R) cycles between 0 and 7. A lit LED propagates between 9 and 16 as N(S) cycles between 0 and 7.

For example:

```
1 2 3 4   5 6 7 8   9 10 11 12   13 14 15 16
0 0 1 0   0 0 0 0   0  0  0  1    0  0  0  0
```

$N(R) = 2, N(S) = 3$.

No Response from the Terminal

When a connected terminal is not responding (e.g. no PAD command prompt or no host computer prompt on a terminal connected to a PVC or with the ADL facility assigned) the following points must be checked:

- That the HP 2335A is operational and in run mode (see chapter 4, "Entering Run Mode").

- That the terminal is powered-on.

- That the terminal is connected to the correct HP 2335A device port.

- That the connecting cable between the HP 2335A and the terminal is correctly fitted.

- That the fitted cable is suitable for the application. Note that the Modem Adapter requires a terminal modem cable to monitor the modem control signals. If the device cannot provide modem control signals for the HP 2335A, then the modem control behavior must be disabled in the profile for that HP 2335A device port (see local parameter #14).

- When the HP 2335A and the terminal are connected via an asynchronous modem link, both asynchronous modems must be verified as operational.

- That the terminal datacomm configuration is correct for speed, parity, and flow control enabled.

  These values must match those defined in the profile assigned to the port (e.g. speed 9600 bps, parity set to 0, ENQ/ACK and X-ON/X-OFF flow control enabled are the correct settings for BDP #1).

  The terminal "mode" must also be checked: Block Mode OFF, Auto Linefeed OFF and Remote ON.

  The "port ready" state can be verified with the run mode LED display; refer to "LED Display".

If the above checks do not provide a solution to the malfunction call the nearest HP Sales and Support office.

Virtual Circuit Status

When a call cannot be established or received on a SVC or when a PVC connection is failing, the following actions can be performed:

- Check the PAD service signal (see "PAD Service Signals").

- Determine whether the problem occurs on one (or more) specific HP 2335A port or if it affects all the device ports.

- If the problem occurs on all ports then check the synchronous network link (see "LED Display" to verify network link status). Check that the modem is powered-up and check that the remote host/device is operational (if necessary, check with the X.25 network or modem vendor).

- If the symptom occurs on all or most ports then verify that the HP 2335A synchronous network configuration conforms with the X.25 network subscription and/or the remote HP 2335A configuration (Stat Mux configuration). Refer to chapter 3.

- Check the configured network type and local address.

- Check the PVC and SVC Subscription/Configuration/Assignment; verify the Callable Port Pool definition.

- Check the facilities Requested/Subscribed/Configured (eg. when Reverse Charging is requested on an outgoing call, check the remote facilities subscribed).

For example : An incorrect VC assignment (shifted by one) or not enough outgoing SVCs will affect some ports only. Configuring the HP 2335A with a non-subscribed facility will affect all the device ports.

If the above checks do not provide a solution to the malfunction call the nearest HP Sales and Support office.

HP 2335A PAD Operation Error Messages

Some PAD messages are specific to the HP 2335A and are sent to a device (terminal) when an error occurs on the communication link between the HP 2335A and the connected device.

Possible PAD messages are as follows:

<u>"FRAMING ERROR"</u>

A null pattern is not recognised as a valid break character.

- Input a character sequence followed by a ↵ (Cr) character and verify that the sequence is echoed back correctly.

- Check the terminal/cabling/HP 2335A (the power supply may be defective or the line voltage incorrect.)

"PARITY ERROR"

The HP 2335A verified the parity on the port connection (see X.3 parameter #21 and local parameters #1) and a parity error occurred.

■ Check the terminal parity configuration (against X.3 parameter #21 and local parameters #1) and reconfigure the terminal parity if required.

■ Check the connection between the terminal and the HP 2335A.

"HP 2335A MEMORY OVERFLOW / DATA LOSS"

The flow control of the terminal by the HP 2335A must be checked. The terminal must be able to support and be configured for X-ON/X-OFF flow control and X.3 parameter #5 must be set to a value of 1.

If the above check does not provide a solution to the malfunction call the nearest HP Sales and Support office.

Main Troubleshooting

Introduction

The troubleshooting information detailed here goes beyond that which would normally be required by a user, principally because some of the tests require the use of test equipment which the user may not possess.

HP 2335A malfunctions are isolated by performing one, or more, of the self-tests. Each self test is selected by a defined setting of the DIP switches and the test results are displayed on the 21 LEDs mounted on the CPU PCB, behind the fold down front panel.

TEST SELECTION

The eight DIP switches mounted on the CPU PCB allow a particular self test to be selected. The DIP switch settings for each test (not required for the power-on test) are shown over the page. When the setting of only four of the eight DIP switches is shown (e.g. switches EFGH or ABCD), the position of the other switches will not affect the selected test.

The reset push-button (also mounted at the front of the CPU PCB) enables the selected test to be initialized without having to power-off and power-on the HP 2335A. The DIP switches and reset push-button are described in chapter 4, "LEDs, DIP And Reset Switches".

```
                        DIP Switch Settings
                        A B C D E F G H
    TEST MODE
        Power-on        X X X X X X X X
        Switch test     0 0 0 0 0 0 1 1
    SELF-DIAGNOSTICS
        Modem Adapter A     0 0 0 1 0 1 0 0
        Modem Adapter B     0 0 1 0 0 1 0 0
        Modem Adapter C     0 0 1 1 0 1 0 0
        Modem Adapter D     0 1 0 0 0 1 0 0
        Synchronous network 0 1 0 1 0 1 0 0
        Extended RAM test   0 1 1 1 0 1 0 0
        All diagnostics     1 0 0 0 0 1 0 0
    TERMINAL
        Loop-back mode      X X X X 0 1 0 1
    MODEM
        Loop-back mode      0 0 0 0 0 1 1 0
```

Troubleshooting

Note that the self-tests stop execution at the first error detected and the error is then displayed on the LEDs.

TEST CONNECTORS

The following test connectors are required when performing the troubleshooting procedure:

- Minimum of four (up to 16) test connectors for the Modem Adapter ports - part number 40299-60005.

- One test connector for the Synchronous Network Adapter Card port - part number 02333-60006.

TROUBLESHOOTING PROCEDURE

The complete range of tests available for troubleshooting on the HP 2335A are listed in this section along with expected results and action to be taken in the event that a malfunction is indicated.

Power-on Test

Purpose

At each power-on (or when the reset push-button is pressed) the HP 2335A automatically performs a self test that checks the operation of the CPU's microprocessor, RAMs, ROMs, DMA, internal bus circuitry and the modem adapters.

Preparation

To perform the power-on test either switch-on the HP 2335A or if the equipment is already on then press the reset push-button, the test is done irrespective of the DIP switch settings.

Results

A successful power-on self test causes the event sequence detailed below, which lasts approximately twenty seconds:

1. All of the 21 LEDs to be *on* for one second, then *off* for one second.

2. Then each LED will individually illuminate, starting at LED [a] and going through to LED [16] (i.e. one lit LED travels from left to right).

3. The self tests are then performed with LEDs [d] or [e] *on*.

4. Provided that no other test has been selected on the DIP switches the final LED display will be LED [a] remains ON and, LEDs [b] and [c] blinking alternately.

Action

If the results detailed above are not displayed on the LEDs replace the CPU PCB and repeat the power-on test. If this next test does not produce the LED display detailed above replace the power supply and repeat the power-on test.

<div align="center">Switch Test</div>

Purpose

The switches test verifies the operation of the DIP switches on the CPU board which are used to select the operating mode of the HP 2335A.

Preparation

Set the DIP switches for the switch test as described in "Main Troubleshooting: Test Selection", then press the reset push-button (or switch the HP 2335A *on*).

Results

Subsequent to the automatic power-on test the LEDs [9] to [16] provide a visual display of the status of the DIP switch settings. This is displayed as follows, an LED is *on* when the corresponding DIP switch is open (1) and *off* when the corresponding DIP switch is closed (0). To verify the test, the position of any of the switches can be changed with an immediate corresponding change in the LED display.

Action

If the results detailed above are not displayed on the LEDs replace the CPU PCB and repeat the switch test.

<div align="center">Self-Diagnostic Test: Modem Adapters</div>

Purpose

This self test is a closed-loop diagnostic of each modem adapter which is fitted.

Preparation

Plug a test connector on each port of the modem adapter [A] (i.e. use one connector, part number 40299-60005, on each of the four ports A1, A2, A3, A4.) Then select the modem adapter self diagnostic test by setting the DIP switches as described in "Main Troubleshooting: Test Selection". Press the reset push-button (or switch *on* the HP 2335A).

Result

Subsequent to the automatic power-on self test, LED [a] illuminates for approximately one second after each pass of the test, the test will continue repeatedly for as long as the power is ON and the test conditions are unchanged. At the same time LED [c] is lit continuously, all other LEDs are extinguished.

Action

If the results detailed above are not displayed on the LEDs replace the CPU PCB and repeat the above test.

The above procedure should be repeated for all the fitted modem adapters taking care to change the DIP switch settings, as detailed in "Introduction", according to the modem adapter to be tested.

Note   If a test connector is not fitted a failure will be detected and the failed port number is displayed on the corresponding LEDs, between [13] and [16] respectively.

Self-Diagnostic Test: Synchronous Network Interface

Purpose

The synchronous network interface closed loop self tests data, control and timing circuits. It verifies that the HP 2335A can perform synchronous transmit and receive operations (8 bytes are transmitted and subsequently received and verified in synchronous mode at all baud rates).

Preparation

Plug a test connector (part number 02333-60006) in the synchronous network connector port. Select the synchronous network closed loop self diagnostic test on the DIP switches as described in "Main Troubleshooting: Test Selection", then press the reset push button or switch on the HP 2335A.

Results

A successful test lasts for 1 minute 45 seconds, including the automatic power-on self-test. During this time LED [a] illuminates for approximately one second after each pass of the test. LED [c] is continuously lit, LEDs [b], [d], and [e] blink continuously. All other LEDs are off.

Action

If the results detailed above are not displayed on the LEDs replace the CPU PCB and repeat the above test.

Self-Diagnostic Test: All Diagnostics

Purpose

When the individual closed loop self diagnostic tests have been successfully performed this "all diagnostics" test should be done, it repeats the following tests; extended RAM test, modem adapter diagnostics and synchronous network diagnostic test.

Preparation

Fit test connectors (part number 40299-60005) to all of the fitted modem adapter ports (max. of 16), and one test connector (part number 02333-60006) to the synchronous network port. Set the DIP switches as described in "Main Troubleshooting: Test Selection" and press the reset push button, or switch on the HP 2335A.

Main Troubleshooting

Results

If no failure is detected, and after the automatic power-on self-test has completed, the following sequence will be seen:

1. LED [c] is lit, LEDs [b], [d], [e] are blinking (all other LEDs are off)

2. LED [c] is lit and all other LEDs are off.

3. LED [c] is lit and LED [a] illuminates for approximately one second after each pass of the complete test.

The above sequence will be repeated continuously until the positions of the DIP switches are changed.

Action

If the results detailed above are not displayed on the LEDs replace the CPU PCB and repeat the above test.

Terminal Loop-Back Test

Purpose

This test causes a message to be sent from the HP 2335A to the devices which enables data entered at a connected terminal to be echoed back to the terminal, thereby checking the HP 2335A-to-device communications. The HP 2335A may be connected to the synchronous network as required during the terminal loop back test.

Preparation

Connect the asynchronous terminals/devices to the HP 2335A modem adapter ports, then select the terminal loop back test setting the DIP switches as described in "Main Troubleshooting: Test Selection".

Note that the terminal loop-back test uses a pre-selected data communication configuration. Consequently, the test will only function correctly on devices set to operate as described below:

1. Switch *on* all the terminals (devices) and then set them to operate as follows:
   - Remote (i.e. on-line).
   - Full duplex.
   - Parity - parity bit always "0".
   - Baud rate 1200 bps.
   - Automatic line feed *off*.
   - Local echo *off*.
   - Handshake *enabled* that is:
     ■ ENQ/ACK enabled, or
     ■ X-ON/X-OFF enabled as available on the terminal (device).
   - Character mode.

2. After having set the devices as described above press the reset push-button (or if the HP 2335A is switched *off*, switch it *on*). This causes the following:

   a. The power-on test to be performed.

   b. If the power-on test is successful, the terminal loop-back test is performed, that is LED [a] is *on*, LEDs [b] and [c] are blinking and LEDs [d] and [e] are *off*. In addition (if the test is successful) LEDs [1] to

[16] illuminate as data is received from the corresponding device port (i.e. LED 1 corresponds to device port A1).

If the LEDs do not illuminate as described above then refer to "Action" below.

c. The HP 2335A sends the following message to all the attached terminals (devices):

```
Cr Lf Lf HP PAD LOOP-BACK TEST FEATURE ENABLED Cr Lf Lf
```

Ensure that this message is displayed on *all* the terminals (devices).

d. Then at each terminal, enter any data followed by a ⏎ (Cr character). Since the off-line loop back configuration enables the echo of terminal data, all of the characters transmitted by a terminal are echoed back to it. i.e. the HP 2335A echoes each character as it is typed. When the terminal's ⏎ key is pressed (Cr character entered) the HP 2335A transmits the line of data back to the terminal.

A maximum of 128 characters at a time are read by the test program before a Cr is generated and they are echoed back to the terminal.

Note   If the terminal does not support ENQ/ACK handshaking and the line typed contains more than 80 characters, then the HP 2335A waits 10 seconds after the 80th character before continuing.

Action

If the messages are correctly displayed on the terminal (device) then the HP 2335A-to-device communications may be assumed to be correct. The HP 2335A-to-synchronous network data communications may then be checked as described in "Modem Loop-Back Test".

If either no message or a corrupt message is displayed, then the HP 2335A-to-device communications are incorrect. If this occurs:

1. Check the integrity of all connections.

2. Check that the correct cables have been used.

3. Check terminal operation, eg. by performing a self-test.

4. Check terminal (device) settings.

5. Check the HP 2335A configuration.

6. Then repeat the terminal loop-back test.

The terminal loop-back test (and off-line configuration) uses profile #100, the main characteristic of which is the terminal speed, 1200 bps as standard, however this speed can be changed therefore ensure that the terminal is matched to the current terminal speed stored by the profile. It may be modified using the UDP command (see chapter 3, "UDP User Command") to use 9600 bps as terminal speed.

Modem Loop-Back Test

The modem loop-back test can be performed only with modems having a loop-back capability.

Purpose

This test ensures that the HP 2335A-to-synchronous modem connection is operating correctly. The HP 2335A will continuously transmit a binary test pattern which is then echoed back to the HP 2335A by the local modem. The HP 2335A performs a check to verify that the received pattern is the same as the transmitted pattern.

Preparation

The modem loop-back test can only be performed with modems having a loop back capability. Before starting, ensure that the HP 2335A's configuration is correct for the connected modem (baud rate, transmission mode, etc.). Plug the synchronous network cable connector (part number 02333-60008) into the synchronous network port, and plug the other end of the cable into the local synchronous modem. Set the local synchronous modem to enable the local modem loop back capability (Refer to the X.25 network authority or modem manufacturer's instructions.). Set the DIP switches for the modem loop-back test as described in "Main Troubleshooting: Test Selection", and press the reset push-button or if the HP 2335A is off switch it on.

Results

If the power-on test is successful, the modem loop-back test is performed. The test is stopped if a transmission error is detected, in which case refer to Action below. If no error occurs within several minutes then the HP 2335A-to-synchronous modem communications are operating correctly.

During the test, LED [a] is normally extinguished but blinks at the end of each test cycle (i.e. when the received data matches the transmitted data), LEDs [c] and [d] are *on* and LEDs [b] and [e] are *off*. In addition, LEDs [1] to [16] remain off.

The test may then be repeated under the following conditions:
- With communication between the local and remote modems established.
- With the local modem set for normal operations and the remote modem set to enable an analog loop-back.

If the test is successful, the HP 2335A-to-host computer data communication may then be tested; refer to the host computer system software literature for details of this test.

Action

If any errors are detected then the test is stopped, LED [a] is extinguished and LEDs [b] to [16] continuously display an error code. If this occurs it indicates that the HP 2335A-to-synchronous modem data communication is operating incorrectly and the following checks should be made:

1. Check the modem strapping.

2. Check the modem operation.

3. Check the cabling and connections, i.e. run the self diagnostics test (synchronous network interface) with a test connector (part number 02333-60006) on the end of the modem cable.

4. Then repeat the modem loop-back test. If the fault still occurs replace the CPU PCB and repeat the test.

TESTS	TEST SEQUENCE	DESCRIPTION	SUGGESTED ACTION 2	3
Power-on test	Visual chek of the LEDs (1)	All the LEDs are ON for 1 second, then a lit LED i:	eplace CPU PCA	Replace CPU ROM
	CPU ROM test (2)	ROM CRC checking	eplace CPU PCA	
	CPU microprocessor test (3)	The microprocessor exec	eplace CPU ROM	
	CPU RAM test (4)	Dynamic RAM and CMC		
	CPU DMA test (5)	DMA check		
	CPU ROM test (6)	ROM CRC and compatib	eplace CPU PCA	
	CPU timer test (7)	Program and check Coun		
	Internal bus and Device Interfaces test (8)	Device interface PCA det		
	(9)	A write operation is perfc interface PCAs		
	(10)	A read operation is perfo interface PCAs		
	(11)	Serial ROM CRC checkir		
	(12)	Device interface micropr		
	(13)	Device interface RAM te:		
	(14)	Serial ROM CRC and co	eplace CPU PCA	
	(15)	Check 600 Hz timer		
	(16)	Device adapter detection		
	Switch setting check (17)	Is the switch setting valid	un the switch test	
Switch test		Switch states are displaye		
Self diagnostics	Closed-loop diagnostics of the device interface PCAs	A data pattern is sent and connector should be plug		
	Closed-loop diagnostics of Synchronous Network adapter slot A	The appropriate test conr plugged-in to test data, cc		
	Extended test on RAM	Data patterns are written RAM on CPU PCA		
Terminal loopback		The HP 2335A sends ba terminals, a LED illumin device port is fitted with a	heck terminal operation	Check HP 2335A configuration
Modem loopback		A test pattern is transmitt the Synchronous Networ	heck Synchronous Network onfiguration	Check communication line and modem

Table 7-1   Troubleshooting Test Sequence

(Continued . . .)

R READOUT			SUGGESTED ACTION		
7 8	9 10 11 12	13 14 15 16	1	2	3
1 0	0 0 0 0	0 1 1 1	No configuration		
1 0	0 0 0 0	1 0 0 0	Bad configuration, too many PVCs declared		
0 1	0 0 0 0	0 0 0 0	Card missing in slot A for configuration		
ct code*	0 0 0 0	0 0 0 0	Replace PCA		
2 B3 B4	C1 C2 C3 C4	D1 D2 D3 D4			
2 B3 B4	C1 C2 C3 C4	D1 D2 D3 D4			
unt of memory available					
X X	X X X X	X X X X N(S)			
X X	X X X X	X X X X	Record LED [1] to [16] display, and contact the nearest HP service office		

OF

a
A

No

AC
a
0
0
0
0
1
0
0
0
0

ER
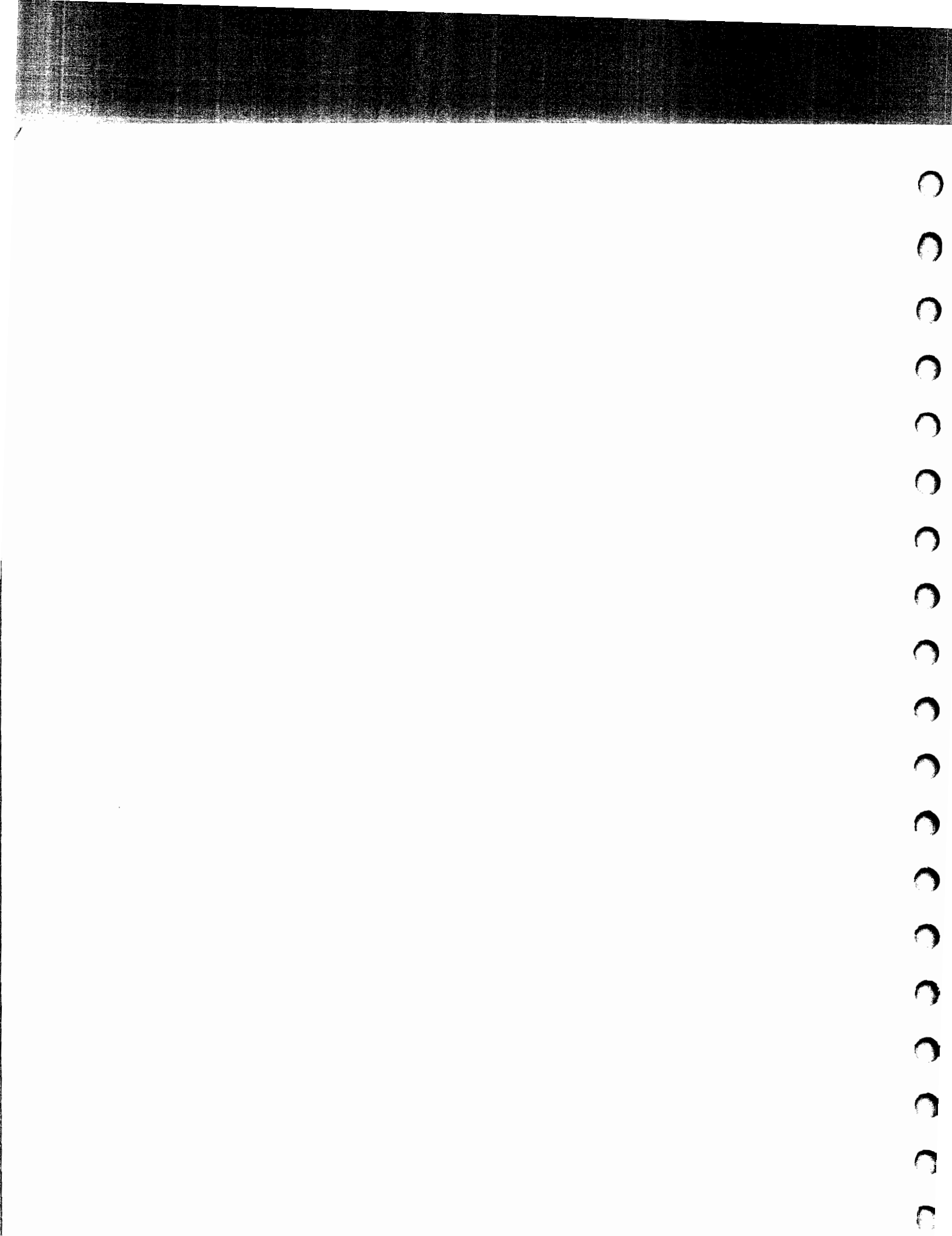
Options, Cables and other Accessories

Options

The standard HP 2335A includes:

- Setting for 115 V ac line supply
- Power cable
- Cable to connect HP 2335A synchronous port to modem (02333-60008)
- HP 2335A Reference Manual (this manual) (02335-90021)
- HP 2335A User's Guide (02335-90022)
- HP 2335A Quick Reference Guide (02335-90017)

The product options when ordering an HP 2335A are:

Option	Description
015	Setting for 220 V ac line supply
123	Four-port modem adapter
G23	Four-port modem adapter for connection to modems in Germany
263	19-inch rack-mount kit

Ordering Parts

To order parts and accessories for the HP 2335A, address the order to your local HP Sales and Service office. These are listed at the end of this manual. The following information should be included with the order:

- The HP 2335A model number (including options and accessories) and full serial number as shown on the product identification label.

- The HP part number of the parts required as shown in the tables in this chapter.

- A parts description, as shown in the tables in this chapter.

Accessories

You may order separately the following accessories for the HP 2335A:

Part Number	Accessory Description
02335-90021	HP 2335A Reference Manual (this manual)
02335-90022	HP 2335A User's Guide
02335-90017	HP 2335A Quick Reference Guide
02333-60006	Synchronous loopback hood.
5181-2030	Asynchronous loopback hood (4 required).
2110-0360	Fuse 250 V / 0.75 A (220 V operation)
2110-0059	Fuse 250 V / 1.5 A (115 V operation)
-	HP 40263A rack-mount kit for the HP 2335A

For the part numbers of the latest CPU PROMs for the HP 2335A, see your local HP sales representative.

Exchange Modules

Exchange modules are replacements for returned defective modules. The available exchange modules for the HP 2335A are listed below.

These exchange modules are available from Support Material Organization under the "Board Exchange Program". The Hewlett-Packard Customer Service Engineer can exchange a defective module by a replacement module at the prevailing exchange rate. Contact your local HP Sales and Service Office for details.

Exchange Part Number	New Part Number	Component Description
02335-69001	02335-60001	CPU PCA (excluding ROMs)
not available	02335-60002	4-port modem adapter
not available	02335-60003	4-port modem adapter (Germany)
not available	02335-60004	Power supply

Cables

HP 2335A to Synchronous Network

In all cases, use the cable supplied with the HP 2335A (part number 02333-60008).

HP 2335A to Asynchronous Devices

The HP 2335A uses only pins 1 through 8, plus 20. The following male-to-male 5-metre HP cables are all suitable for HP terminals, PCs, printers, and plotters:

> HP 13242M (with European modems)
> HP 13242N (with US modems)
> HP 40234A
> HP 40242M

Note for Germany only. When connecting an HP 40262B modem adapter (HP 2335A option G23) *to a modem* in Germany, use an HP 40222A cable. When connecting an HP 40262B modem adapter (HP 2335A option G23) *directly to a terminal*, use an extra cable (HP 40219A) between the HP 2335A and the "standard" cable quoted in the above list.

HP 2335A to Host Computers

- *HP 2335A to HP 3000 MPE V Computer Systems*

Use either an HP 40221A or HP 40220A cable.

Note for remote printers or plotters. When connecting remote printers or plotters, the termtype on the host affects the cable required. With termtypes 18 or 22 on the host, use an HP40220A; with termtype 26, use an HP40221A. For an explanation of the reasons, see the note in chapter 4, under "Making and Clearing a Connection". Note also that the HP40221A cable is asymmetrical; make sure that you connect the end marked "System Side" to the ATP/ADCC port.

- *HP 2335A to HP 3000 MPE XL Computer Systems Via a DTC*

For DTC terminal ports, use an HP 30062B. For US modems, the HP 40221A is an alternative.

For DTC printer ports, use either an HP 40221A or HP 40220A cable.

Note for remote printers or plotters. See above.

- *HP 2335A to HP 1000 Computer Systems*

Use either an HP 40221A or HP 40220A cable.

Note for remote printers or plotters. See above.

■ *HP 2335A (Option 123) to HP 9000 Computer Systems*

Use a cable, length up to 15 metres (50 feet), with the following pin-outs:

HP 9000 25-pin Male   *HP 2335A 25-pin Male*

1	←─/ /───────→	1
2	←──────────→	3
3	←──────────→	2
4	←──────────→	8
6	←──────────→	20
7	←──────────→	7
8	←──────────→	4
20	←──────────→	6
22	←──────────→	5
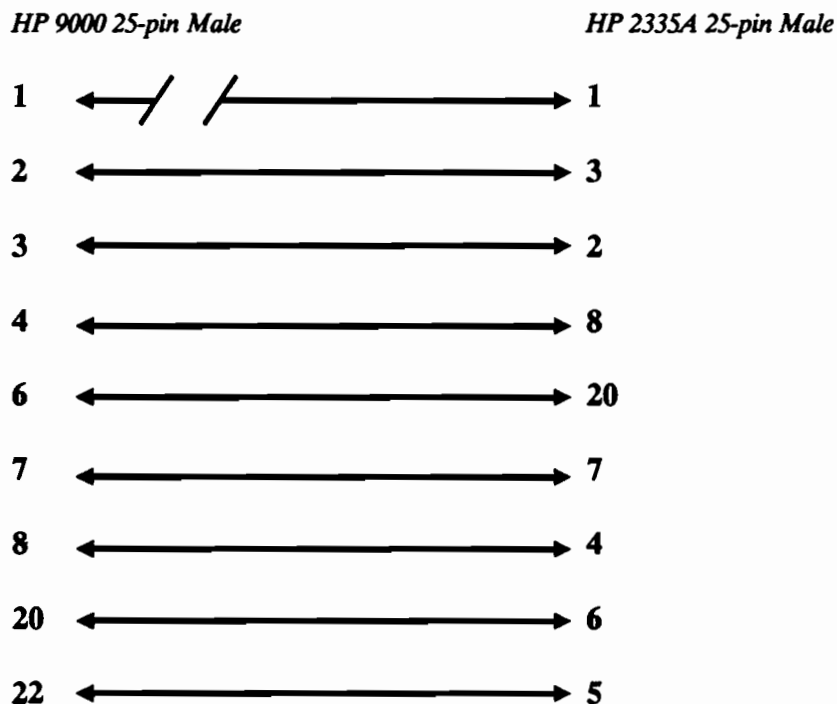
Note that pin 1 should be connected only at the HP 2335A end, and not at the HP 9000 end. This is to avoid possible ground loop problems. Note that cables HP 40233A and HP 92219Q are equivalent to the above, except that pin 1 is connected end-to-end and, in the case of HP 92219Q, pin 23 is also connected end-to-end.

■ *HP 2335A (Options 123) to Digital Equipment Corporation Devices and Systems*

Not all Digital RS-232-C type cables support modem signals, so use only the following cables, which do support modem signals:

    BC22F
    BCC14
    BCC04

DEC423 type cables may also be used. They use an RJ-11 connector with six signals. To connect such a cable to an HP 2335A's asynchronous port, use an H8571-F adapter (a Digital product).

Device Port Signals for HP 2335A Option 123 (02335-60002)

Connector Pin No. (CCITT V.24)	Function	Connector Pin Function
1 (101)	Protective Ground	Shield Ground
2 (103)	Transmit Data (TX)	Input
3 (104)	Receive Data (RX)	Output
4 (105)	Request to Send (RTS)	Input
5 (106)	Clear to Send (CTS)	Output
6 (107)	Data Set Ready (DSR)	Output
7 (102)	Signal Ground	Signal Ground
8 (109)	Data Carrier Detect (DCD)	Output
9-19 (-)	Not Connected	-
20 (108.2)	Data Terminal Ready (DTR)	Input
21-25 (-)		-

Signals Behavior

The HP 2335A device signals exhibit one of the following three types of behavior according to the type of configuration and connection:

Behavior 1   The DCD and CTS stay continously on.

Behavior 2   The DCD and CTS stay continously on unless the communication is terminated (SVC cleared) by either the X.25 network or the remote DTE. If this occurs, the HP 2335A will drop these signals for five seconds to enable computer upper level software to terminate the session when the HP 2335A is used in a CAS configuration.

Behavior 3   For SVCs, the DCD and CTS are set on only if a VC is established, and will be reset (off) if an SVC is cleared. For PVCs, the DCD and CTS on the CAS/PAD side follow the modem signals of the device connected on the PAD side.

A PAD configuration may have Behavior 1 or 2 (default 2).

A CAS configuration may have Behavior 2 or 3 (default 3).

The modem behavior can be suppressed on a port by setting local parameter #14 as appropriate in the port profile (see chapter 3).

A

Quick Reference Guide

Below is a Quick Reference Guide to the HP 2335A's:

- commands.

- DIP switches.

- modes.

A separate copy of the Quick Reference Guide is supplied with each HP 2335A as a pocket-sized card.

It is by no means a complete guide to the HP 2335A! You should refer to the relevant chapters, in both this manual and the User's Guide, for complete instructions and warnings.

HP 2335A QUICK REFERENCE GUIDE

DIP		
0001	0001	(PAD)
0001	1001	(CAS)
0000	0001	(OTHER)

Command Mode (DIP 0000 0000)

@
- (Address) → Ctrl-P
- #SRA
- DIAL
- #RDIAG
- LDIAG
- PAR?
- SET[?]
- STAT
- CLR
- RESET
- INT
- PROFnn
- RPROFnn
- BIN
- ASC
- HELP

Data Transfer Mode

- STAT1[,R]
- STAT2[,R]
- STATP
- STATL[,R]
- RESET pn
- RESET HP PAD
- CONF → *
- HELP
- EXIT

Configuration Mode

- HSA
  - LEVEL1
  - LEVEL2
  - LEVEL3
  - MSG
  - SRA
  - LUG
  - POOL
  - LIST1
  - LIST2
  - LIST3
  - LISTMSG
  - LISTSRA
  - LISTLUG
  - LISTPOOL
  - HELP
- ASG
  - (Profiles)
  - LIST
- UDP
  - (Profile No.)
- ADL
  - (Assignments)
  - LIST
- DEF-PAD
- DEF-CAS
- LIST
- HELP

- DEL
- SET
- PAR
- LIST

Synch-ronous Link

Asynch-ronous Devices

See Reference Manual, chapter 5, "On-Line Remote Diagnostics Mode", for warnings on using the configuration commands via the CONF command.

Part number of this card: 02335-90017

Error and Diagnostic Codes

The following codes are generated by the network and may appear in octet 4 of DIAGNOSTIC and octet 5 of RESTART INDICATION, RESET INDICATION, and CLEAR INDICATION packets.

Diagnostics	Bits								Decimal
	8	7	6	5	4	3	2	1	
No additional information	0	0	0	0	0	0	0	0	0
Invalid P(S)	0	0	0	0	0	0	0	1	1
Invalid P(R)	0	0	0	0	0	0	1	0	2
	0	0	0	0	1	1	1	1	15
Packet type invalid	0	0	0	1	0	0	0	0	16
For state r1	0	0	0	1	0	0	0	1	17
For state r2	0	0	0	1	0	0	1	0	18
For state r3	0	0	0	1	0	0	1	1	19
For state p1	0	0	0	1	0	1	0	0	20
For state p2	0	0	0	1	0	1	0	1	21
For state p3	0	0	0	1	0	1	1	0	22
For state p4	0	0	0	1	0	1	1	1	23
For state p5	0	0	0	1	1	0	0	0	24
For state p6	0	0	0	1	1	0	0	1	25
For state p7	0	0	0	1	1	0	1	0	26
For state d1	0	0	0	1	1	0	1	1	27
For state d2	0	0	0	1	1	1	0	0	28
For state d3	0	0	0	1	1	1	0	1	29
	0	0	0	1	1	1	1	1	31
Packet not allowed	0	0	1	0	0	0	0	0	32
Unidentifiable packet	0	0	1	0	0	0	0	1	33
Call on one way logical channel	0	0	1	0	0	0	1	0	34
Invalid packet type on a permanent virtual circuit	0	0	1	0	0	0	1	1	35
Packet on unassigned logical channel	0	0	1	0	0	1	0	0	36
Reject not subscribed to	0	0	1	0	0	1	0	1	37
Packet too short	0	0	1	0	0	1	1	0	38
Packet too long	0	0	1	0	0	1	1	1	39
Invalid general format identifier	0	0	1	0	1	0	0	0	40
Restart or registration packet with nonzero in bits 1 to 4 of octet 1, or bits 1 to 8 of octet 2	0	0	1	0	1	0	0	1	41
Packet type not compatible with facility	0	0	1	0	1	0	1	0	42
Unauthorized interrupt confirmation	0	0	1	0	1	0	1	1	43
Unauthorized interrupt	0	0	1	0	1	1	0	0	44
Unauthorized reject	0	0	1	0	1	1	0	1	45
	0	0	1	0	1	1	1	1	47
Timer expired	0	0	1	1	0	0	0	0	48
For incoming call	0	0	1	1	0	0	0	1	49
For clear indication	0	0	1	1	0	0	1	0	50
For reset indication	0	0	1	1	0	0	1	1	51
For restart indication	0	0	1	1	0	1	0	0	52
	0	0	1	1	1	1	1	1	63

Diagnostics	Bits								Decimal
	8	7	6	5	4	3	2	1	
Call set-up problem	0	1	0	0	0	0	0	0	64
Facility code not allowed	0	1	0	0	0	0	0	1	65
Facility parameter not allowed	0	1	0	0	0	0	1	0	66
Invalid called address	0	1	0	0	0	0	1	1	67
Invalid calling address	0	1	0	0	0	1	0	0	68
Invalid facility/registration length	0	1	0	0	0	1	0	1	69
Incoming call barred	0	1	0	0	0	1	1	0	70
No logical channel available	0	1	0	0	0	1	1	1	71
Call collision	0	1	0	0	1	0	0	0	72
Duplicate facility requested	0	1	0	0	1	0	0	1	73
Non zero address length	0	1	0	0	1	0	1	0	74
Non zero facility length	0	1	0	0	1	0	1	1	75
Facility not provided when expected	0	1	0	0	1	1	0	0	76
Invalid CCITT-specified DTE facility	0	1	0	0	1	1	0	1	77
	0	1	0	0	1	1	1	1	79
Miscellaneous	0	1	0	1	0	0	0	0	80
Improper cause code from DTE	0	1	0	1	0	0	0	1	81
Not aligned octet	0	1	0	1	0	0	1	0	82
Inconsistent Q bit setting	0	1	0	1	0	0	1	1	83
	0	1	0	1	1	1	1	1	95
Not assigned	0	1	1	0	0	0	0	0	96
	0	1	1	0	1	1	1	1	111
International problem	0	1	1	1	0	0	0	0	112
Remote network problem	0	1	1	1	0	0	0	1	113
International protocol problem	0	1	1	1	0	0	1	0	114
International link out of order	0	1	1	1	0	0	1	1	115
International link busy	0	1	1	1	0	1	0	0	116
Transit network facility problem	0	1	1	1	0	1	0	1	117
Remote network facility problem	0	1	1	1	0	1	1	0	118
International routing problem	0	1	1	1	0	1	1	1	119
Temporary routing problem	0	1	1	1	1	0	0	0	120
Unknown called DNIC	0	1	1	1	1	0	0	1	121*
Maintenance action (see Note 4)	0	1	1	1	1	0	1	0	122
	0	1	1	1	1	1	1	1	127
Reserved for network specific diagnostic information	1	0	0	0	0	0	0	0	128
	1	1	1	1	1	1	1	1	255

The following codes may appear in octet 5 (the cause field) of the supervisory packets CLEAR INDICATION, RESET INDICATION, and RESTART INDICATION.

CLEAR INDICATION

	8	7	6	5	4	3	2	1
					Bits			
DTE originated	0	0	0	0	0	0	0	0
DTE originated (a)	1	x	x	x	x	x	x	x
Number busy	0	0	0	0	0	0	0	1
Out of order	0	0	0	0	1	0	0	1
Remote procedure error	0	0	0	1	0	0	0	1
Reverse charging acceptance not subscribed	0	0	0	1	1	0	0	1
Incompatible destination	0	0	1	0	0	0	0	1
Fast select acceptance not subscribed	0	0	1	0	1	0	0	1
Ship absent	0	0	1	1	1	0	0	1
Invalid facility request	0	0	0	0	0	0	1	1
Access barred	0	0	0	0	1	0	1	1
Local procedure error	0	0	0	1	0	0	1	1
Network congestion	0	0	0	0	0	1	0	1
Not obtainable	0	0	0	0	1	1	0	1
RPOA out of order	0	0	0	1	0	1	0	1

RESET INDICATION

	8	7	6	5	4	3	2	1
DTE originated	0	0	0	0	0	0	0	0
DTE originated (b)	1	x	x	x	x	x	x	x
Out of order	0	0	0	0	0	0	0	1
Remote procedure error	0	0	0	0	0	0	1	1
Local procedure error	0	0	0	0	0	1	0	1
Network congestion	0	0	0	0	0	1	1	1
Remote DTE operational	0	0	0	0	1	0	0	1
Network operational	0	0	0	0	1	1	1	1
Incompatible destination	0	0	0	1	0	0	0	1
Network out of order	0	0	0	1	1	1	0	1

RESTART INDICATION

	8	7	6	5	4	3	2	1
Local procedure error	0	0	0	0	0	0	0	0
Network congestion	0	0	0	0	0	0	1	1
Network operational	0	0	0	0	0	1	1	1
Registration/cancellation confirmed (c)	0	1	1	1	1	1	1	1

(a) - *When bit 8 is set to 1, the bits represented by Xs are those included by the remote DTE in the clearing or restarting cause field of the clear or restart request packet, respectively.*

(b) - *When bit 8 is set to 1, the bits represented by Xs are those indicated by the remote DTE in the resetting cause field (virtual calls and PVCs) or the restarting cause field (PVCs only) of the reset or restart request packet, respectively.*

(c) - *May be received only if the optional on-line facility registration facility is used.*

C

HP 2335A/CCITT X.25 Comparison

The implementation of X.25 (Level 3) in the HP 2335A closely follows the 1984 CCITT X.25 Recommendation. The Recommendation is contained in a document, known as the "red book". The document's full title is:

INTERNATIONAL TELECOMMUNICATION UNION
CCITT

VOLUME VIII - FASCICLE VIII.3
DATA COMMUNICATION NETWORKS: INTERFACES
RECOMMENDATIONS X.20-X.32

Printed in Switzerland
ISBN 92-61-02321-5

This appendix lists the sections of the X.25 Recommendation where the HP 2335A does not comply, and also the reason why. Only the sections in the red book describing X.25 (Level 3) are considered.

- The term "we" in this appendix refers to the HP 2335A, as described in this manual.

- We may act as DCE (when connected to a private non-PSN network) and as DTE (when connected to a PSN or a private non-PSN network).

Note   Section and paragraph numbers indicated are those of the 1984 CCITT X.25
                Recommendations. Paragraphs not listed here are implemented without any change.

Section 3: Description of the Packet Level DTE/DCE Interface

Note that we require the data fields of packets to contain an integral number of octets.

3.2 Basic structure of packets

We support all packet types indicated in Table 14/X.25 except DTE REJ.

3.4.1 Diagnostic packet

Incoming diagnostic packets are ignored. We do not send diagnostic packets. SECTION 4 Procedures for Virtual Circuit Services.

Section 4: Procedure for Virtual Circuit Services

4.1.2 Call Request Packet

The called and calling addresses are always inserted in the current network format.

4.1.3 Incoming Call Packet

Called and calling addresses are always inserted.

4.1.6 Call Collision

We follow the Recommendation when a Call Request and an Incoming Call are transmitted simultaneously on the *same* virtual circuit.

4.1.11 Call Progress Signals

We do not issue any Call Progress Signals.

4.3.2 User Data Field Length of Data Packets

We only support the maximum length 128. We support negotiation of maximum length on a per call basis, but we always respond with 128.

Note that the user data field *must* contain an integral number of octets.

4.3.3 Delivery Confirmation Bit

We accept Call Request/Incoming Call packets with the D-bit either set or not set. We have an option to indicate if we must issue Call Request/ Incoming Call packets with the D-bit set or not set.

4.3.4 More Data Mark

- Packets issued:
  - We only set the M-bit to 1 in full data packets.
  - We always set the M-bit to 0 in the last data packet (of a sequence).

- Packets received:
  - The M-bit must *not* be set in the last packet of a sequence.

Note that, when acting as DCE, we do not have to do any packet recombination.

4.3.6 Qualifier bit

We support the qualifier bit, with the following restrictions:

- In data packets received:
  - At the most, 128 bytes of data.
  - The M-bit must be set to 0 (i.e. one packet sequence only).

- In data packets issued:
  - At the most, 128 bytes of data.
  - The M-bit will always be set to 0 (i.e. one packet sequence only).

4.4.1.1 Numbering of Data Packets

Modulo 8 sequence numbering is supported. Extended packet numbering (Modulo 128) is not yet supported.

4.4.1.2 Window Description

The standard window size is 2. We support other values between 1 and 7. A value other than the default may be selected for each Permanent Virtual Circuit (PVC). We support negotiation with default value as first value.

4.4.1.3 Flow Control Principles

A P(S) sequence error is regarded as a local procedure error which causes a resetting (with diagnostic = 1).

Note that the HP 2335A does not send RNR packets.

4.4.1.4 Delivery Confirmation

Whatever the setting of the D-bit, we always send an immediate RR package for each data packet received.

4.4.1.6 Receive Not Ready (RNR) Packets

The HP 2335A never sends RNR packets.

Section 5: Packet Formats.

5.1.11 General Format Identifier

The HP 2335A does not support Modulo 128 Packet Numbering. Bits 6 and 5 of octet 1 must always be set to "01".

Section 5: Packet Formats.

5.2.1 Call Request and Incoming Call Packets

- Issued by the HP 2335A:
    - Called and calling address are always inserted.
    - The facility length field is always inserted (even if zero).
    - The facility field is present if facilities are used.
    - The HP 2335A inserts 4 bytes containing 01H, 00H, 00H, 00H, then a maximum of 12 bytes (user dependent), as Call User Data field.

- Received by the HP 2335A:
    - We display on the user's terminal a message with Calling Address, CUG and Reverse Charging, if received, and the Call User Data bytes (bytes 5 to 16 of data field).
    - We ignore bytes 1 to 4 and the bytes after byte 16, but we accept the call even if the Call User Data field is too long.

5.2.2 Call Accepted and Call Connected Packets

In Call Accepted/Call Connected packets issued by HP 2335A:
    - Calling and Called addresses are *not* inserted.
    - The facility length is always inserted.

5.2.3 Clear Request and Clear Indication Packets

- Issued by the HP 2335A:
    - We always insert a diagnostic field (cf Annex 5).
    - We always set the cause field to 0.

- When received by the HP 2335A:
    - We always accept these packets even if they are too long or short.
    - We list the cause and diagnostic received but do not process them.
    - If omitted, the diagnostic is listed as 0.
    - If omitted, the cause is listed as 0 (and we do not consider the packet as too short).

5.2.4 DTE and DCE Clear Confirmation Packets

- Issued by the HP 2335A:
    - Only three bytes; no user data inserted.

- Received by the HP 2335A:
    - User data, if any, is ignored (i.e. the packet is accepted even if too long).

5.4.2 DTE and DCE Receive Not Ready (RNR) Packets

We do not issue RNR packets, but we accept them.

5.4.3 Reset Request and Reset Indication Packets

- Issued by the HP 2335A:
    - We always insert a cause and a diagnostic.
    - We always set the cause to 0.

■ Received by the HP 2335A:
  - We accept them even if they are too long or too short.
  - We list the cause and diagnostic received, but we do not process them.
  - If omitted, the diagnostic is listed as 0.
  - If omitted, the cause is listed as 0 (and we do not consider the packet as too short).

5.4.4 DTE and DCE Reset Confirmation Packets

We accept them even if they are too long (but we only process the first three bytes).

6.6.1 Restart Request and Restart Indication Packets.

■ Issued by the HP 2335A:
  - We always insert a cause and a diagnostic.
  - We always set the cause to zero.

■ Received by the HP 2335A:
  - We always accept them even if they are too long or too short.
  - We list the cause and diagnostic received, but we do not process them.
  - If omitted, the diagnostic is listed as 0.
  - If omitted, the cause is listed as 0 (and the packet is not considered as too short).

5.5.2 DTE and DCE Restart Confirmation Packets

We always accept them even if they are too short or too long.

5.6 Diagnostic Packets

We do *not* issue Diagnostic packets. We accept them, but they will be ignored.

5.7 Packets Required for Optional User Facilities.

5.7.1 DTE Reject (REJ) Packet

We do not issue Reject packet. If we receive one, we shall reset the Virtual Circuit (VC).

Section 6: Procedures and Formats for Optional User Facilities.

6.2 Extended Packet Sequence Numbering

We do not support this facility.

6.4 Packet Retransmission

We do not support this facility.

Section 6: Procedures and Formats for Optional User Facilities.

6.5 Incoming Calls Barred

When we are connected to a public network, we have nothing special to do to support this facility. In a private network, the same effect can be obtained by using only one-way logical channels outgoing.

6.6 Outgoing Calls Barred

Same as 7.1.5 (except use one-way logical channel incoming).

6.7 One-way Logical Channel Outgoing

We support this facility.

6.8 One-way Logical Channel Incoming

We support this facility.

6.10 Nonstandard Default Window Sizes

We support this facility.

6.11 Default Throughput Classes

We support this facility. Different values may be selected for each direction of transmission.

6.14.1 Closed User Group

We support this facility. If a CUG number is coded in a received Call Request/Incoming Call packet, we simply display it for user information.

6.14.2 Closed User Group with Outgoing Access

We support this facility as a special case of 7.1.9/7.1.11 Closed User Group with Incoming Access. We always support this, since we ignore CUG numbers in received Call Request/Incoming Call packets. (We just print it for user information).

6.15.1 Bilateral Closed User Group

We do not support this facility. (We shall ignore it in received Call Request/Incoming Call)

6.15.2 Bilateral Closed User Group with Outgoing Access

We do not support this facility.

6.16 Fast Select Facility

We do not support the fast select facility. However, we accept the following packets even if they are too long: call accepted; incoming call; call request; call accepted.

6.17 Fast Select Acceptance

Not supported.

6.18 Reverse Charging Request

Supported.

6.19 Reverse Charging Acceptance

Supported.

6.21 Network User Identification

Supported.

6.23 RPOA Selection

We do not support this facility. (We shall ignore it in received Call Request/Incoming Call).

6.25 Call redirection

Supported.

6.27 Call Redirection Notification

Supported.

6.24 Hunt Group

Supported.

Section 7: Formats for Facility Fields and Registration Fields

7.2.2.1 Flow Control Parameter Negotiation

Supported.

Note that we support different window and packet sizes for each direction of transmission.)

7.2.2.1.1 Coding for Packet Sizes

We support the value 7, ie. $2^7 = 128$.

7.2.2.1.2 Coding for Window Sizes

We support values from 1 to 7. Values 8 to 127 are not supported.

7.2.2.2 Coding of Throughput Class Negotiation Facility

We support this facility. Note that we always accept the values indicated either in Call Request/Incoming Call or in Call Accepted/Call Connected packets. We support the indicated coding for values from 75 to 19200.

7.3.2.6 Non-standard Default Packet Sizes

Supported.

Annex A Range of Logical Channels

We support all logical channel numbers from 0 to 4095.

We support gaps between logical channel numbers assigned to the various groups of channels (i.e., PVCs, one-way incoming SVCs, etc.). However there must be no gaps in the range of numbers assigned to one particular group.

(Note 6) When acting as DTE, our search algorithm tries to select first a one-way outgoing channel (starting with the highest numbered one); if none is in the ready state, we then try to select a two-way channel (starting with the highest numbered one).

Annex C Actions Taken on Receipt of Packets

Note on Table C-3/X.25: we do not detect all the error conditions listed in Note 4.

Annex D Packet Level DCE Time-Outs and DTE Time-Limits

Whether acting as DCE or DTE, the HP 2335A follows the recommendations defined in Table D-2/X.25 (DTE Time-Limits) and not by Table D-1/X.25 (DCE Time-Outs).

We do not implement retry counters. When we reach a time-out limit we retransmit the same packet.

Annex E Diagnostic Codes

We do not use all the codes listed in this Annex. However, when we use a particular code it corresponds to the CCITT explanation.

D

X.25 Network International Numbering Plan

The international numbering of the CCITT X.121 Recommendation permits the identification of a called country as well as a specific public network in the country. The number of digits used to describe this is the same for all countries. The national data number assigned to each DTE is unique within a particular network and is also unique on a worldwide basis.

The 10 digit numeric character set 0 to 9 is used.

A Data Network Identification Code (DNIC) is assigned to each network. It is composed of 4 digits: a Data Country Code (DCC) and a network digit to identify a specific data network or service in the country. The first digit of the DNIC (DCC) is limited to 2-7.

A DTE when called from another country must be the addressed by its international data number composed of DNIC or DCC plus the Network Terminal Number (NTN) or National Number (NN).

Thus the International Data Number IDN =

   DNIC + NTN or DCC + NN

where:

   NTN is the number used to call a DTE within the network.

   NN is the number used to call a DTE within the country.

An International Data Number has a maximum size of 14 digits.

With a DNIC of 4 digits or a DCC of 3 digits the NTN is 10 digits maximum and the NN is 11 digits maximum.

In the case of international outgoing calls an additional prefix digit is required to signal the international access.

Sub-Addressing

The HP 2335A will provide the port corresponding sub-address (2 digits) in a call request packet when this facility is supported by the network.

The HP 2335A will process the sub-address (2 digits) when this is provided (and supported by the network).

Sub-Addressing

BELGIUM

DCC = 206

DCS

DCC = 206

NN = saaayyy

7 digits:

1 for service
3 for the area code
3 for local address

- Incoming call

  7 digits of NN for called address field (network type = NET,7)

  Sub-address: 2 digits possible after NN

  e.g. 2220333xx

- International outgoing call with prefix = 0 + IDN

  e.g. 02080038020333 for a call on Transpac.

- Internal outgoing call with NN

  e.g. 2220333 for a call within DCS.

FRANCE

DCC = 2080

TRANSPAC

DNIC = 2080

NTN = aayyyyyy

8 digits:

2 for the area code,
6 for local address.

- Incoming call

   No digits for called address field (network type = NET,0)

   Sub-address : 2 digits possible in called address field, i.e. "xx" (Transpac does not send the called address to called DTE).

- International outgoing call with prefix = 0 + IDN

   e.g. 0311030300333 for a call on Telenet.

- Internal outgoing call with prefix = 1 + NTN

   e.g. 138020333 for a call within Transpac.

GERMANY

DCC = 262

DATEX-P

DCC = 262

NN = ssaaaaayyyyy

11 digits:

2 for service code (45 for standard X.25)
4 for the area code
5 for local address (including a 2 digit sub-address).

- Incoming call

    11 digits of NN for called address (network type = NET,9).

    Sub-address: 2 digits, included in NN.

    In an incoming call, the HP 2335A considers the last two digits as the sub-address.

    In an outgoing call, the HP 2335A provides the sub-address of the calling port.

- International outgoing call with prefix = 1 + IDN

    e.g. 12080038020333 for a call in France on Transpac (call without sub-address).

- Internal outgoing call with no prefix + NN

    e.g. 45611000333 for a call within Datex-P (sub-address in this example = 33).

Note   When a line is subscribed for with DATEX-P the number of sub-address digits required must be specified.

NETHERLANDS

DCC = 204

DN1

DCC = 204

NN = saaayyy

7 digits:

1 for service identification (1 is X.25)
3 for the area code
3 for local address

- Incoming call

    7 digits of NN for called address field (network type = NET,7)

    Sub-address: 2 digits possible after NN

    e.g. 1325333xx

- International outgoing call with prefix = 0 + IDN

    e.g. 02080380200333

- Internal outgoing call with NN

    e.g. 1432333

SWITZERLAND

DCC = 228

TELEPAC

DCC = 228

NN = saanyyyy

8 digits:

1 for service (X.25 is 4)
2 for area code
1 for node in area
4 for local address.

■ Incoming call

8 digits of NN for called address field (network type = NET,8)

Sub-address: 3 digits possible after NN (2 accepted on HP 2335A)

e.g. 46811333xxx

■ International outgoing call with prefix = 0 + IDN

e.g. 0311030300333

■ Internal outgoing call with NN

e.g. 47911333

UNITED KINGDOM

DCC = 234

PSS

DNIC = 2342

NTN = aaanyyyy

8 digits:

3 for area code
1 for node in area
4 for local address.

- Incoming call

12 digits of IDN for called address field (network type = NET,12).

Sub-address: 2 digits possible after IDN

e.g. 234273700333xx

- International outgoing call with IDN

e.g. 208038020333

- Internal outgoing call with IDN

e.g. 234273417333

Sub-Addressing

UNITED STATES

DCC = 310 or 311

TELENET

DNIC = 3110

    NTN = aaayyyyy

    8 digits: 3 for the area code, 5 for the local address.

- Incoming call

    12 digit IDN for called address field (Network type = TEL)

    Sub-address : 2 digits possible after IDN.

        e.g. 311040800333xx

- International outgoing call with IDN

    e.g. 2080038020333 for a call on Transpac.

- National outgoing call with IDN

    e.g. 3106054333 for a call on Tymnet.

- Internal outgoing call with IDN

    e.g. 311030300333 for a call within Telenet.

UNITED STATES (cont'd)

TYMNET

DNIC = 3106

NTN = sxxxxx

6 digits:

1 for service (must be 0)
5 for the host address.

■ Incoming call

10 digits IDN for called address field (network type = NET,10)

Sub-address : 0 to 4 digits after the IDN (2 accepted on the (HP 2335A).

e.g. 3106054333xx

■ International outgoing call with IDN

e.g. 2080038020333 for a call on Transpac.

■ National outgoing call with IDN

e.g. 311030300333 for a call on Telenet.

■ Internal outgoing call with IDN

e.g. 3106054333 for a call within Tymnet.

E

ASCII Character Set

b4	b3	b2	b1		b7=0 b6=0 b5=0 / 0	b7=0 b6=0 b5=1 / 1	b7=0 b6=1 b5=0 / 2	b7=0 b6=1 b5=1 / 3	b7=1 b6=0 b5=0 / 4	b7=1 b6=0 b5=1 / 5	b7=1 b6=1 b5=0 / 6	b7=1 b6=1 b5=1 / 7
0	0	0	0	0	NUL	(TC7) DLE	SP	0	@	P	`	p
0	0	0	1	1	(TC1) SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	(TC2) STX	DC2	"	2	B	R	b	r
0	0	1	1	3	(TC3) ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	(TC4) EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	(TC5) ENQ	(TC8) NAK	%	5	E	U	e	u
0	1	1	0	6	(TC6) ACK	(TC9) SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	(TC10) ETB	'	7	G	W	g	w
1	0	0	0	8	(FE0) BS	CAN	(	8	H	X	h	x
1	0	0	1	9	(FE1) HT	EM	)	9	I	Y	i	y
1	0	1	0	10	(FE2) LF	SUB	*	:	J	Z	j	z
1	0	1	1	11	(FE3) VT	ESC	+	;	K	[	k	l
1	1	0	0	12	(FE4) FF	FS	,	<	L	\	l		
1	1	0	1	13	(FE5) CR	GS	–	=	M	]	m	t
1	1	1	0	14	SO	RS	.	>	N	^	n	~
1	1	1	1	15	SI	US	/	?	O	_	o	DEL

F

Reference Documentation

For further details on the CCITT (Consultative Committee on International Telephone and Telegraph) X.3, X.25, X.28 and X.29 Recommendations refer to the CCITT X.1 TO X.29 Recommendations, available from:

- Secretariat General, Union Internationale des Telecommunications,
  Place des Nations,
  CH-1211 GENEVE 20, Switzerland

For an introductory guide to data communications see the HP publication:

- *TOURING DATACOMM*
  part number 5957-4622.

For an explanatory guide to the CCITT X.25 Recommendation refer to the HP publication:

- *X.25: THE PSN CONNECTION*
  part number 5958-3402.

The following guides provide additional information when using the HP 2335A with HP1000, HP3000, and HP9000 computer systems:

- *HP 2335A USER'S GUIDE*
  part number 02335-90022.

- *HP1000 DATA COMMUNICATION PRODUCT GUIDE*
  part number 5953-7494.

- *DSN/X.25/1000 REFERENCE MANUAL*
  part number 91751-90002.

- *DSN/X.25/1000 ADVANCED GUIDE*
  part number 91751-90003.

- *HP3000 DATA COMMUNICATION PRODUCT GUIDE*
  part number 5953-7444.

- *HP3000 COMMUNICATIONS HANDBOOK*
  part number 30000-90105.

- *DSN/X.25/3000 REFERENCE MANUAL*
  part number 32191-90001.

- *NS X.25 3000/V LINK GUIDE*
  part number 24405-90002.

- *HP-UX CONCEPTS AND TUTORIALS*
  part number 97089-90053

- *HP-UX SYSTEM ADMINISTRATOR MANUAL*
  part number 98597-90060 for the 200/300 Series and 92453-90004 for the 800 Series.

Glossary of Abbreviations

A	ADCC	Asynchronous Data Communications Controller
	ADL	Automatic Dial Assignment Command
	ASCII	American Standard Code For Information Interchange
	ASG	PAD Profile Assignment Command
	ATC	Asynchronous Terminal Controller
	ATP	Advanced Terminal Processor
B	BDP	Basic Defined Profile
	Bps	Bits per second
C	CAS	Computer Access Support
	CCITT	Consultative Committee on International Telephone and Telegraph
	CLR	Clear
	CMOS	Complimentary Metal-oxide Semi-conductor
	CONF	Conference
	CPU	Central Processing Unit
	CRC	Cyclic Redundancy Check
	CRT	Cathode Ray Tube
	CSA	Canadian Safety Agency
	CTC	Counter/Timer Circuit
	CTS	Clear To Send
	CUG	Closed User Group
	Cr	Carriage Return
D	D-BIT	Delivery Confirmation Bit
	DC1	Device Control One
	DC2	Device Control Two
	DCC	Data Country Code
	DCD	Data Carrier Detect

	DCE	Data Circuit-terminating Equipment
	DLE	Data Link Escape
	DMA	Direct Memory Access
	DNIC	Data Network Identification Code
	DSR	Data Set Ready
	DTE	Data Terminal Equipment
	DTR	Data Terminal Ready
E	EIA	Electronic Industries Association
	EOR	End Of Record
	ERR	Error
F	FCS	Frame Check Sequence
	FTZ	Fermeldetechnisches Zentralamt
H	HIC	Highest Incoming Circuit
	HOC	Highest Outgoing Circuit
	HPC	Highest Permanent Circuit
	HSA	High-speed Synchronous Adapter
	HTC	Highest Two-way Circuit
	Hz	Hertz (cycles per second)
I	I	Information Frame
	IA#5	International Alphabet #5
	IDN	International Data Number
	IEC	International Electrotechnical Commission
	INC	Incompatible (destination address)
	INP	Intelligent Network Processor
	INT	Interrupt (command)
	INV	Invalid
	I/O	Input/Output
	ISO	International Standards Organization
	ITI	Interactive Terminal Interface
K	kbps	kilobits per second
	K (parm)	Frame Window

L	LAP-B	Link Access Procedure Balanced
	LCN	Logical Channel Number
	LED	Light Emitting Diode
	LIC	Lowest Incoming Circuit
	LOC	Lowest Outgoing Circuit
	LPC	Lowest Permanent Circuit
	LPE	Local Procedure Error
	LSB	Least Significant Byte
	LSI	Large Scale Integrated Circuit
	LTC	Lowest Two-way Circuit
	LUG	Local User Group
M	Modem	Modulator/Demodulator
	MSB	Most Significant Byte
	MSG	Message (command)
	MUX	Multiplex(er)
N	N1	Maximum number of bits in an I-frame
	N2	Retry counter
	NA	No Access
	NC	Network Congestion
	NCC	Network Control Center
	NN	National Number
	NOP	Network Operational
	NP	Not Permitted (obtainable)
	N(R)	Frame Receive Sequence Number
	N(S)	Frame Send Sequence Number
	NTN	National Terminal Number
	NUI	Network User Identification
O	OCC	Occupied Octet - Eight Bit Byte
P	P(R)	Receive Packet Number
	P(S)	Send Packet Number
	PAD	Packet Assembler/Disassembler

	PAR	Parameter (command)	
	PBX	Private Branch Exchange	
	PCA	Printed Circuit Assembly	
	PCB	Printed Circuit Board	
	PDN	Public Data Network	
	PIO	Parallel Input/Output (controller)	
	PPN	Private Packet Network	
	PROF	Profile (command)	
	PSN	Packet Switching Network	
	PVC	Permanent Virtual Circuit	
Q	Q-BIT	Qualifier Bit	
R	RAM	Random Access Memory	
	RCA	Reverse Charge Acceptance	
	RNR	Receive Not Ready	
	ROM	Read-only Memory	
	RPE	Remote Procedure Error	
	RPO	RPOA Out Of Order	
	RPOA	Recognized Private Operating Agency	
	RPROF	Remote Profile (command)	
	RR	Receive Ready	
	RS-232-C	EIA (Serial Binary) Interface Standard	
	RTS	Request To Send	
	RX	Receive	
S	SER	Serial	
	SET	Set Parameter Command	
	SIO	Serial Input/output (controller)	
	SN	Select Network	
	SRA	Symbolic Remote Address (Abbreviated Address)	
	STAT	Status (command)	
	SVC	Switched Virtual Circuit	
T	T1	Timer	
	TX	Transmit	

U	UART	Universal Asynchronous Receiver/Transmitter
	UDP	User Defined Profile
	UL	Underwriters' Laboratories
	UV-EPROM	Ultra-Violet Erasable Programmable Read-only Memory
V	VAN	Value Added Network
	VC	Virtual Circuit
	VCC	Virtual Circuit Congestion
	VDE	Verband Deutcher Elektrotecniker

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