Connect iQ 400 User Guide

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USER GUIDE

ISO 9008

Preface

Overview

This User Guide provides the information needed to install and use the Teltrend CONNECT iQ 400 Series. There are currently three variants of the CONNECT iQ 400:

- CONNECT iQ 420 that supports two data ports
- CONNECT iQ 440 that supports two data ports and two voice ports
- CONNECT iQ 460 that supports two data ports and four voice ports

Structure

The chapters cover the following topics:

- ***Chapter 1 Product Description*** - gives an overview of the iQ 400 series of products
- ***Chapter 2 CONNECT iQ 400 Series Installation*** - describes how to install and connect an iQ 400 unit
- ***Chapter 3 Overview of Operation*** - provides basic operation and configuration
- ***Chapter 4 Information, Tips and How to....*** - supplies information about facilities and features
- ***Chapter 5 Advanced Configuration*** - provides more advanced configuration information
- ***Chapter 6 Security Passwords***- describes the iQ 400 Series security features
- ***Chapter 7 Configuration Commands*** - gives details of the configuration commands
- ***Chapter 8 Flash Loader*** - lists features of the flash loader
- ***Chapter 9 Autodial*** - describes the autodial facility
- ***Chapter 10 X.25/TPAD Commands***
- ***Chapter 11 Asynchronous to Synchronous PPP***
- ***Chapter 12 Network Protocols*** - gives information about protocols supported
- ***Chapter 13 AT Command Set*** - lists the AT commands
- ***Chapter 14 S-Registers*** - lists all the special registers
- ***Chapter 15 Trouble Shooting*** - describes common problems and outlines their causes
- ***Chapter 16 X.21 Call Control*** - details the X.21 call control procedures
- ***Chapter 17 V.25bis Call Control*** - details the V25.bis call control procedures
- ***Chapter 18 PBX Operation Analogue Ports*** - gives detailed configuration and use information for the analogue ports
- ***Chapter 19 Approval Requirements*** - lists statutory approvals and standards
- ***Chapter 20 Port Cables and Interfaces*** - describes the cable specifications
- ***Chapter 21 Quick Reference*** - provides a quick command reference
- ***Chapter 22 ISDN Bulletin Board Service*** - gives details of the Bulletin Board service
- ***Appendix A System Tones*** - describes the tones generated by the system

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1 Product Description

This User Guide covers the Teltrend CONNECT iQ 400 Series.

1.1 CONNECT iQ 400 Series

The features supported by the CONNECT iQ 400 Series include:

- Two DTE ports with independently selectable X.21, V.24, V.35 and RS-449 interfaces
- Access to the two B channels of an ISDN Basic Rate Interface
- Synchronous data transfer over a B channel at speeds from 9.6 Kbps to 64 Kbps, including 56 Kbps as used in North America
- Asynchronous data transfer over a B channel at speeds from 2.4 Kbps to 38.4 Kbps
- CCITT V.110 rate adaptation protocol to allow speeds of less than 64Kbps to be carried over the 64Kbps B channels of the ISDN
- Configuration Port for configuration from a dumb terminal or a Personal Computer
- Access to the configuration handler within a remote Terminal Adaptor from a local Terminal Adaptor using an ISDN B channel
- Three level system of access security to prevent unauthorised users from tampering with the configuration via the Configuration Port or via remote management
- Utilisation of the ISDN supplementary services such as subaddressing, CLIP, MSN and DDI to decide if an incoming call is destined for itself or another Terminal adaptor

1.1.1 Front Panel

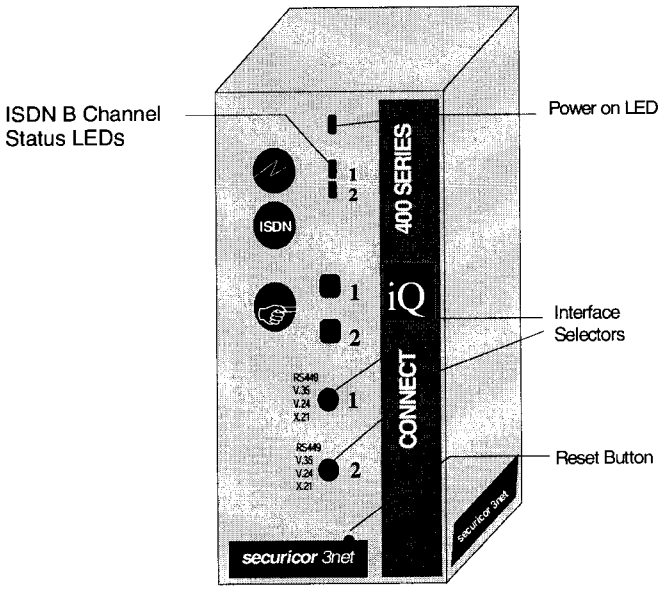

Figure 1 iQ 400 Series Front Panel

LED	Colour	Function
Power On	Red	Shows that mains power is connected
ISDN B Channel Status 1 ISDN B Channel Status 2	Tricolour: Orange/ Green/ Red	Orange = Busy Port in use but end-to-end connection not established Green = Connected Incoming call connected Red = Answered Outgoing call answered

Table 1 iQ 460 Front Panel LEDs

Switches and Buttons	Function
Data Port Manual Operation Switches	Used for manual operation. Answers incoming calls if the port is configured for manual operation and enables outgoing calls if remote address is configured.
Interface Selector Switches	Switches the port between these interfaces: X.21 V.24 V.35 RS-449
Reset Button	Reset clears all calls and returns the unit to its initial power up settings. Saved configuration changes are retained, but unsaved changes are lost.

Table 2 iQ 460 Front Panel Switches and Buttons

1.1.2 Back Panel

See section 18.3 Back Panel for a description of the back panel.

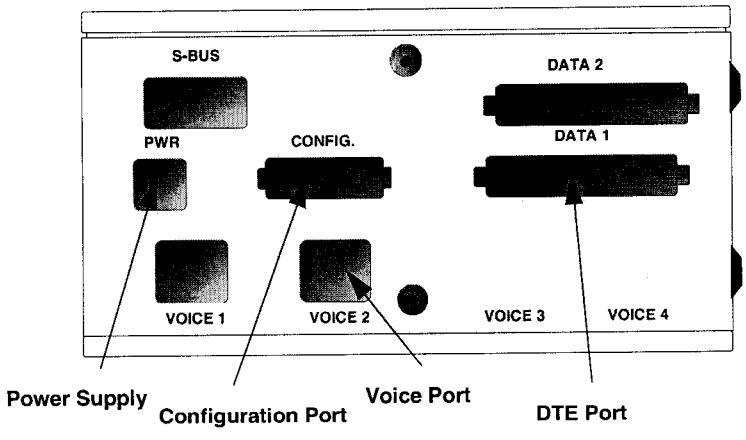

Figure 2 iQ 440 Back Panel

Model	Connection	Number	Connector
420	DTE Ports	2	25-pin D (Female)
	Configuration Port	1	9-pin D (Female)
	ISDN	1	RJ-45 ISDN
	Power Supply	1	2.1mm DC Jack
440	DTE Ports	2	25-pin D (Female)
	Configuration Port	1	9-pin D (Female)
	ISDN	1	RJ-45 ISDN
	Power Supply	1	2.1mm DC Jack
	Voice Ports	2	RJ-11
460	DTE Ports	2	25-pin D (Female)
	Configuration Port	1	9-pin D (Female)
	ISDN	1	RJ-45 ISDN
	Power Supply	1	2.1mm DC Jack
	Voice Ports	4	RJ-11

Table 3 iQ 400 Connections

1.2 Attaching Analogue Equipment

Each port has a standard RJ-11 telephone socket that provides a Tip and Ring A/B pair. In UK operation it also provides master socket capability and can support equipment with a REN (Ring Equivalence Number) of up to three. Each port can ring up to three devices (telephones, fax machines or modems) connected as main equipment or as extensions to the main equipment.Analogue equipment can be attached directly to the socket or the port can be used to provided one or more extension sockets.

2 CONNECT iQ 400 Series Installation

2.1 Connection to the ISDN Network

Each unit is supplied with a cable having an RJ-45 plug on both ends. The rear panel is provided with an 8 way RJ-45 socket labelled S-BUS. Either plug can be inserted into the rear panel socket. Connect the other plug to the ISDN Line Termination Unit or to an extension box connected to the LTU. If required, the unit can be connected to the ISDN Line with up to seven other ISDN terminal devices.

2.2 Connecting DTE (Data Terminal Equipment)

Select the required DTE interface(s) via the rotary switches accessible from the front panel of the CONNECT iQ 400 Series and connect the unit to the DTE apparatus as shown in Figure 3.

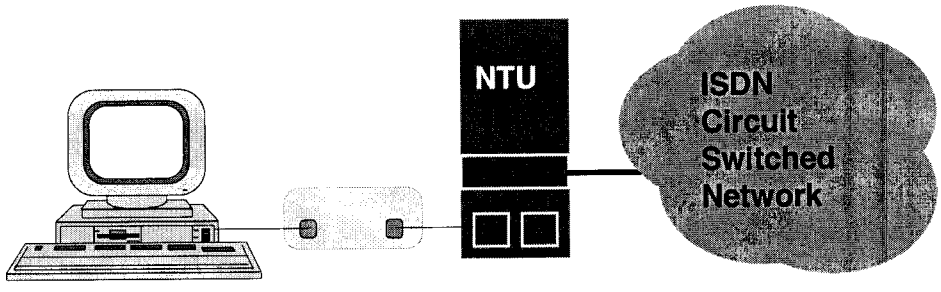

Figure 3 DTE Connection

2.3 Connecting the Configuration Port

The rear panel has a 9-pin connector labelled CONFIG. *Chapter 20 Port Cables and Interfaces* gives a full description of the pin connections. A standard Personal Computer or a dumb terminal can be connected to this port allowing configuration settings to be entered. The Configuration Port uses the following asynchronous serial parameters by default:

Speed	9600 bits/sec
Char size	8 bits
Parity	None
Stop bits	1

2.4 Connecting the Power Cable

Ensure the integrity of the protective earthing by only connecting the power supply to a power socket that has a protective earth contact.

1. Connect the power supply cable to the DC jack socket on the rear panel.
2. Plug the power supply into the mains supply using the IEC lead supplied.
3. When the mains power is connected, the red power LED on the front panel lights. After a short delay, the start up message and the Port 1 prompt appears on the terminal connected to the Configuration Port.

3 Overview of Operation

The ports on the CONNECT iQ 400 Series are accessible from the back of the unit. The CONNECT iQ 420 has three ports:

1. User Port 1
2. User Port 2
3. An internal Remote Management Port

These ports are configured via a fourth port called the Configuration port.

The user ports are the (DTE) ports.

The third port is internal to the unit and has no physical connector but is accessible via the Configuration port. The third port, when configured, can access a remote unit over the ISDN B Channel and pass configuration and management information between the two units. The third port provides the same functionality as the local configuration port including security access level and password controls.

With a terminal connected to the Configuration Port and the Terminal adaptor powered on, the copyright notice and firmware version numbers are displayed. Immediately following this the command prompt for the current port is displayed as shown below:

>1<

The number enclosed within the angled brackets indicates the port that is currently being addressed. Some commands entered refer to this port only, while others act globally for all ports present.

To configure Port 2, enter either of the following commands at the command prompt and press the **<Enter>** key of the configuring terminal:

2 or **TWO**

The command prompt 1 is replaced by the command prompt 2 to signify that all port specific commands now refer to Port 2.

The internal Remote Management Port is always Port 3. To access this port enter the command:

3 or **THREE**

The >1< command prompt is replaced by the >3< command prompt to signify that all port specific commands now refer to the Remote Management Port. For further details of Remote Management, see *Chapter 5 Advanced Configuration.*

Once communication has been established, you can view the majority of port settings by entering the command:

SHOW ALL

Command line instructions can be typed in either upper or lower case characters. The only exception is subaddress information, which is case sensitive. The command line interpreter only uses the first three characters of each command word, so the above command can be typed as:

SHO ALL

An example of the response to the show all command is shown below. The settings shown are the default settings.

The first section of the display shows general information applicable to all ports present. This information is global and can be configured from any port prompt including the Remote Management Port.

The display shown below is for a data only CONNECT iQ 420 Series. It does not show the analogue ports.

```
(C) TELTREND LTD - VER NNNN AND DATE.
UNIT NAME =
CURRENT HIGHEST ACCESS LEVEL = 3
CLID CHECKING DISABLED
ACCESS CODES:
LEVEL 3 = NOT SET; LEVEL 2 = NOT SET; LEVEL 1 = NOT SET
******** PORT 1 ********
PORT SETTING = V.24 ASYNCHRONOUS
******** PORT 2 ********
PORT SETTING = V.24 ASYNCHRONOUS
******** PORT 3 ********
PORT SETTING = MANAGEMENT ASYNC
```

To display the ports specific settings the following command must be entered against each port. For example, type **2** or **two** to switch to Port 2, then enter:

```
SHOW PORT

******** PORT 2 ********
PORT SETTING=V.24 ASYNCHRONOUS ONLINE FLOW CONTROL=REMOTE
CALL CONTROL = AT COMMAND *** MANUAL DIAL ENABLED ***
SYNC: SPEED = 64K
ASYNC: SPEED = 9K6: DATA BITS = 8: STOP BITS = 1: PARITY = NONE
CHANNEL = ANY: ANSWER MODE = MANUAL: ANSWER DELAY = 0
REMOTE ADDRESS = : SUBADDRESS =
LOCAL ADDRESS = : SUBADDRESS =
```

Similarly against Port 3 the following is displayed:

```
******** MANAGEMENT PORT ********

PORT SETTINGS = MANAGEMENT ASYNC
SPEED = 9K6:  CHAN = ANY
LOCAL ADDRESS =: SUBADDRESS =
REMOTE ADDRESS =: SUBADDRESS =
```

3.1 Making Outgoing Calls

There are a number of ways to make outgoing calls using the CONNECT iQ 400 Series:

- Manually, from the Configuration Port
- Using the DTR circuit and a stored number
- Using Hayes AT Commands through the DTE ports. (V.24 interface only - see *Chapter 13 AT Command Set* for details)
- Using V.25bis Call Control procedures through the DTE ports. See *Chapter 17 V.25bis Call Control* for details of V.25bis Call Control
- Using X.21 Call Control through the DTE ports. See *Chapter 16 X.21 Call Control* for X.21 Call Control details

The simplest way to make an outgoing call is from the configuration port using the DIAL command. For example, to call the telephone number 0123456789:

DIAL 0123456789

The front panel push buttons on the CONNECT iQ 400 Series can also be used to make calls. First, store a remote address (telephone number) for the port using the SET REMOTE ADDRESS command:

SET REMOTE ADDRESS 0123456789

This command is port specific, so different remote numbers can be stored for each port. To call the remote number simply press the front panel button corresponding to the port.

3.2 Answering Incoming Calls

The Teltrend Terminal adaptors can be configured to automatic answer or manual answer.

When set up for manual answer you can answer an incoming call by issuing a command through the Configuration Port or use the ATA command through an Async configured DTE port (an Async port requires DTR asserted before a call can be received). You can also use the CONNECT iQ 400 Series push buttons to answer the call.

You can configure the Automatic answer mode from the Configuration Port using the command:

SET ANSWER AUTO

With the V.24 interface selected, use the ATS command to configure automatic answer mode from the DTE port. The S0 register must not be set to 0. The DTE ports function exactly as a modem. An incoming call with register S0 set to 1 causes the unit to answer the call after 1 ring.

If the S0 register is set to a value of 100 or greater, the port answers immediately, without any delay.

NOTE: When using the Hayes AT commands through the DTE ports, the AT&W command saves any settings changed to the non volatile memory. A unit reset or power loss loses the changes.

3.3 Ending Incoming or Outgoing Calls

Calls can be ended from the Configuration Port using the HANGUP command and from the DTE ports using the appropriate AT command. V.25bis Call Control procedures can also end a call providing the relevant DTE port settings have been selected. You can also end calls on the CONNECT iQ 400 Series using the front panel push buttons.

4 Information, Tips and How to....

This section provides information and tips on selected topics. It also guides the user through some of the setup routines when configuring the Terminal adaptor's facilities and features.

4.1 Automatic CLI Information

It is possible to obtain the CLI number for an incoming call across the V.24 interface automatically when configured for asynchronous (or asynchronous dial synchronous connect) calls and the port is set for AT commands. The port provides the CLI in the following format:

RING,0127661000

The CLI is appended to the RING message given as the AT Command indication of an incoming call. This message is repeated approximately once per second until the call is answered or rejected. The call can be answered by sending ATA or rejected without answering by sending ATH.

If the incoming call does not have a CLI field, then the following message is sent:

RING,NO CLI

The feature is enabled by default, but the standard RING only message is displayed without the CLI information if special option 16 is set through the configuration port.

This is done using the command:

SET OPTION 16

To see if the option is set, enter the following command through the command port:

SHOW OPTION 16

This command provides the following output:

OPTION SET = 1000 0000 0000 0000

The 1 in the 16th position indicates that the special option is set, and no CLI information is appended to the RING message. This option is port specific.

4.2 X.21 Call Control

To set a port into the X.21 Call Control mode, the port must be set up as an X.21 port, using the rotary switches. The port is then set up for X.21 Call Control using the command:

SET CALL CONTROL X21

In this mode, the use of manual call setup is prohibited since the DTE interface may not be in a state where it can make or clear calls manually.

To reset the following command is used:

SET CALL CONTROL NONE

A detailed explanation on how X.21 Call Control operates can be found in *Chapter 16 X.21 Call Control.*

4.3 Hardware Diagnostic Mode

Type the following command to enter diagnostic mode:

TEST 501

The following information is displayed when the test starts:

- Firmware version number
- ISDN Layer 1 chip name and version number
- DTE Port 1 rate adaption module version number
- DTE Port 2 rate adaption module version number

The test then writes and reads back random numbers to the non volatile RAM and displays its status.

WARNING: This action forces the unit to revert to the factory default settings. The test then flashes the Channel 1 and Channel 2 LEDs through red, green, and orange to verify their correct operation.

A message is displayed requesting that one of the front panel push buttons is pressed to test it. The same message is displayed again so that the second push button can be tested.

4.4 ISDN Line Status

When a STATUS command is entered at the command prompt, the response shows the port status followed by the last reported status of the ISDN line. The ISDN line status is based on the TA seeing some activity from the PTT equipment at the telephone exchange.

Immediately after power up of the TA and prior to any calls being received or made the status reads:

RESET - F1

After a call has been attempted or a call has been notified to the unit, the line becomes active. The status message reads:

ACTIVATED - F7

Occasionally the PTT equipment automatically deactivates the line if there has been no activity. The status reads:

INACTIVE - F3

This does not signify a faulty line, only that there is no line activity. However if a call is attempted and the status does not change to:

ACTIVATED - F7

then there may be a line fault, a local cabling fault or an ISDN lead problem. Check that the ISDN cable is correctly plugged into the Network Terminating Unit (NTU) supplied by the Service Provider or into the TA itself.

PENDING ACT - F4
SYNCHED - F6
LOST FRAMING - F8

These status messages are all temporary states which eventually return to either:

INACTIVE - F3 or
ACTIVATED - F7

4.5 Disabling DTR Dial

When a port is set as a V.24 port, the initiation of an outgoing call by raising DTR can be inhibited. Even if the remote address is configured, the port does not initiate an outgoing call when DTR is asserted. To inhibit DTR use the command:

SET OPTION 15

In this case, even if the remote address is configured, the port does not initiate an outgoing call when DTR is asserted. This facility can be cleared by entering:

CLEAR OPTION 15

Alternatively, the Hayes command AT&D0 can be used. The command internally clamps the DTR circuit high, preventing DTR call initiation. It also allows incoming asynchronous calls to be accepted when there is no terminal present Use the command AT&D2 to re-enable the DTR change feature.

4.6 Port Speed Switching

The DTE ports accept any synchronous or asynchronous call and switch to the speed of the incoming call. When the incoming call has finished, the unit reverts to the configured speed. Outgoing calls always operate at the configured speed.

The accepted synchronous speeds are:

9K6, 19K2, 48K, 56K, and **64K.**

The accepted asynchronous speeds are:

2K4, 4K8, 9K6, 19K2, and **38K4.**

4.7 Spurious Command Error Messages

When using remote management from a local device to a remote device, enter the command:

SET MONITOR DISABLED

at the local unit. This prevents the monitor system sending any spurious messages to the remote device. Failure to do this results in a stream of >ERROR< messages from the remote unit.

4.8 Port Cause Fail Indications: Simplified Cause Mode

To allow the command port to be utilised by user programs for the control of the DTE ports, a simplified form of the monitor output is available which feeds indicators to the user program in the following format:

ZZ <SPACE> X <SPACE> YYY <0X0D> <0X0A>

ZZ	is the identifier for the beginning of the string and is actually composed of the two uppercase Z characters
X	is the port number 1 or 2
YYY	is the call termination value in decimal characters, which may consist of one, two or three characters

The string is followed by the usual prompt.

To enable the simplified cause values, enter the following command:

SET GLOBAL OPTION 1

It is also recommended that the following command is entered in order to prevent the normal monitor messages from being sent to the user program

SET MONITOR DISABLED

4.9 Making Outgoing Calls at 56K: AT Commands

4.9.1 Asynchronous Dial Synchronous Connect Mode

Ports configured as Asynchronous Dial Synchronous Connect can be forced to be rate adapted at 56K if the Hayes AT command string is ended in a # character.

The # character separating the address and subaddress is still valid. An example is:

ATD1234567#ABC#

This causes a call to be made as a 56K rate adapted call to the telephone number 1234567 with subaddress abc.

4.9.2 X21 Call Control

Ports using X21 Call Control can also force an outgoing call to be a V.110 rate adapted at 56K if the Hayes AT command string is ended in a # character. The example is the same as above:

ATD1234567#ABC#

5 Advanced Configuration

5.1 Introduction

Figure 4 shows a CONNECT iQ 420 (E) with both DTE ports attached to a single ISDN line and communicating with two remote DTE ports. If the remote DTE labelled A wishes to communicate with the local DTE B and the remote DTE labelled C wishes to communicate with the local DTE labelled D. Then the subaddressing facility must be used to identify the specific port.

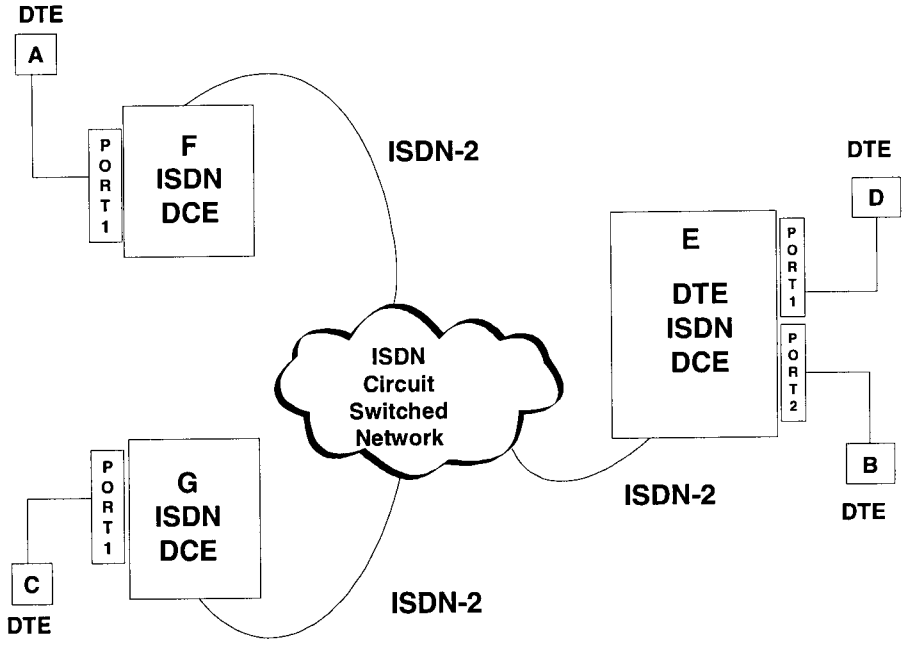

Figure 4 Both DTE Ports Attached to Single ISDN Line

5.2 Identifying Ports Using Subaddress

A calling terminal can send a subaddress identifier to the called terminal. A subaddress can be any alphanumeric character string up to 24 characters in length (the BT ISDN-2 service only guarantees to pass six characters). The called terminal (in this case the unit labelled E) decides which of its two ports the call is to be routed to, depending on the received subaddress matching one of the two local subaddresses. The twin port unit labelled E must be configured with the following commands, starting from Port 1:

SET LOCAL SUBADDRESS ABC1

where abc1 has been chosen as the subaddress for the port labelled D (subaddress information is case sensitive).

To change the port being configured to Port 2, input:

2

Configure Port 2 with its chosen subaddress:

SET LOCAL SUBADDRESS ABC2

Having configured the local subaddress values, the remote subaddress values in the single port units must be configured. Enter the following command for the unit labelled F:

SET REMOTE SUBADDRESS ABC1

Similarly for the unit labelled G:

SET REMOTE SUBADDRESS ABC2

Note that the use of subaddress information not only allows us to distinguish between two ports in a single unit, but also multiple ports in multiple units attached to the same ISDN line.

In addition, because the subaddress sent from the caller to the called terminal must match the subaddress configured into the called terminal, a basic form of security access can be achieved. Incoming calls which do not have the correct subaddress are not allowed to connect to the port. Other forms of access security are discussed later.

WARNING: The use of the subaddress facility is dependent on your Service Provider. ***If the local and remote ISDN lines do not have the subaddress facility enabled on them, DO NOT set a local subaddress on the local unit.*** The local subaddress acts as an access password. If a subaddress is not passed to the unit with an incoming call, the call is NOT accepted.

5.3 Identifying Ports Using Bearer Channel

The Basic Rate ISDN service can have either one or two addresses (telephone numbers) associated with each line. If a twin port unit is connected to an ISDN line with two addresses, each port may be tied to a specific address and, therefore, B Channel.

If a port in a unit is associated with a particular B channel it does not answer an incoming call on the other B channel, and it always uses the same B channel when making an outbound call. On an ISDN line where two numbers are used to address individual B channels each port must be associated with a particular B channel.

NOTE: Some countries do not have telephone numbers tied to specific channels so the B Channel cannot be used to identify the port. Holland is an example of this practice.

On an ISDN line where only a single number is used to address both B channels the ports must not be associated with a particular channel but assigned to ANY channel. The commands to associate a port with a particular channel and to associate a port with any channel are:

SET CHANNEL 1
SET CHANNEL 2
SET CHANNEL ANY

See CHANNEL section 7.7 for details.

5.4 Identifying Ports Using Called Number

When an ISDN line is requested from the Service Provider with Multiple Subscriber Number facility (MSN), multiple units with single or multiple ports can be individually accessed using the different addresses (telephone numbers) provided by the Service Provider. Each MSN ISDN line is supplied with 10 different addresses. Each local unit has one of these addresses configured as its local address. The incoming address (called party number) is matched with the unit/ports local address before the call is actioned, if not the call is ignored.

If a unit does not have a local address configured then that unit is available to answer any of the incoming calls.

5.5 Remote Management Access

The Terminal adaptors may be remotely configured and managed over an ISDN B Channel.

To distinguish between incoming data transfer calls and Remote Management calls, the management calls use a unique type of call value. Remote Management is not currently available across all international links as the type of call is not transferred by the Service Provider.

The Remote Management Port is always Port 3. To access it, enter the command:

3

From this port dial a remote unit using, for example, the DIAL command:

DIAL 0123456789

where 0123456789 represents the address (telephone number) of the remote unit. If the call is successful the response is:

>3< REMOTE CONNECTION ESTABLISHED

R>1<

All command prompts from the remote unit are preceded by the letter **R,** as shown above. Once the Remote Management call is established you may enter commands as though you are directly connected to that unit's Configuration Port. To hang up, you must enter the HANG command from port R3.

NOTE: When a remote management connection is made no front panel port LEDs are illuminated.

5.6 Call Progress Monitoring

The SET MONITOR command enables call progress to be monitored from a connected configuration terminal. This facility may be useful during system testing. See S-Registers section 14 for a table of ISDN call termination messages. To use the command enter:

SET MONITOR ENABLED

5.7 High Layer Capability

High Layer Capability information may be used by your Service Provider. It may be included in an outgoing call setup message using one of the following commands:

SET APPLICATION TYPE NONE

SET APPLICATION TYPE DATA

SET APPLICATION TYPE TIMELINK

NOTE: Timelink HLC is used only in Australia.

If set, it can be used to filter incoming calls. A call is accepted if it arrives with a matching HLC type or without any HLC type. It is rejected if it arrives with a different HLC type.

NOTE: Not all Service Providers transparently pass the HLC information over the network.

---

6 Security Passwords

A three level security system allows users with different levels of responsibility to access different levels of configuration commands. If a single password is required to prevent any unauthorised access, only the Level 1 password need be set. The **SHOW ALL** command displays the current settings of the security levels and the current level to which access has been granted.

6.1 Command Port Access

If a password has been set for a particular access level the display shows that fact. Below is shown the display that is seen if a password is set for Level 1, but not yet entered to allow access:

Current Highest Access Level = 0
Level 3 Access Code = Not Set
Level 2 Access Code = Not Set
Level 1 Access Code = Set

The default setting has no passwords configured and access to all levels of configuration is allowed.

If a TA is being configured remotely over an ISDN B channel, the access levels are reset when the call is terminated.

6.2 Incoming Call Security

There are two methods of preventing unauthorised access from the ISDN network to a port on a TA.

The first uses a subaddress identifier which is sent transparently from the calling Terminal adaptor port to the called Terminal adaptor port. If the incoming subaddress identifier does not match the subaddress identifier configured in the called port's local subaddress value, the call is ignored and does not connect. In this instance the subaddress can be considered to be a password to allow acceptance of the incoming call. Subaddressing is an optional facility. Contact your Service Provider for more information.

The second method of preventing unauthorised access uses the Calling Line Identity Presentation (CLIP) facility. This is also an optional facility.

The called ISDN line must have the CLIP facility enabled by the Service Provider. The CLIP facility notifies the called unit of the identity of the calling line when the incoming call arrives. The TA can store up to 20 different Calling Line Identities (CLI) in non volatile memory. Each stored CLI can be associated with a particular port(s), can be associated with all ports in the case of the CONNECT iQ 400 Series or disabled so that it remains in store but is not used for comparison purposes.

The following commands allow a CLI to be configured so that only a call originating from the ISDN line with the given address is accepted by the called port. To configure the CLI as stored CLI number 1:

SET CLI 1 012345678

If the command is entered properly the TA responds with the updated CLI value, and shows the current port usage of that CLI:

1 = 012345678: 1 = PORT NOT SET

The CLI value must contain only the numeric characters 0-9 with no spaces or separator characters. The TA does not require the full address to be stored in the CLI area. If the stored CLI value did not contain the local area code, 0123 in this example, but only the actual local number 45678, then the TA matches it to an incoming CLI of 012345678.

If the stored CLI and the incoming CLI are not of equal sizes the length of the shorter value determines the number of characters to be matched. The configuration of CLI values is a global command, and can be carried out from any port prompt.

To associate a stored CLI with a port, use the command:

SET CLI 1 PORT 2

If the command is entered correctly the TA responds:

1 = 012345678: 1 = Port 2

The use of CLI identity checking can be globally disabled. To disable the CLI checking facility, use the command:

SET CLI DISABLED

To enable the CLI checking facility, use the command:

SET CLI ENABLED

WARNING: The CLIP facility is an option which may not be available from your Service Provider. If the local ISDN line does not have the CLIP facility enabled, DO NOT enable CLI checking. If a call is received without a valid Calling Line Identity, the call is not accepted.

---

7 Configuration Commands

There are two types of configuration commands, Port Specific and Global. Port Specific commands affect only the port to which the current command line prompt refers. Global commands can be actioned when the command prompt shows any port is currently being configured.

Commands are also grouped into four access levels to allow users with different levels of responsibility access to different configuration commands. Commands in access level 0 are always available, those in access levels 1, 2 and 3 are password protected. Passwords may be set using the SET PASSWORD command. Access levels are nested so, for example, a password set for level 2 must be entered before a configuration command in either level 2 or level 3 can be used.

The configuration commands may have a prefix, Clear, Set or Show associated with them followed by optional keywords and parameters. Certain commands are only applicable to a particular port interface and are shown against the command type (for example port specific V.24 only).

The command line interpreter only uses the first three characters of each command, prefix and keyword, so the command **CLEAR OPTION 02** can also be entered as **cle opt 2**

7.1 ALL

Global Command

7.1.1 SHOW ALL

Access Level: 0

The **SHOW ALL** command displays the general global information for each port. To display the port setting use the show port command.

7.2 ANSWER

Port Specific

7.2.1 ANSWER

Access Level: 0

This command connects an incoming call to the current port as indicated by the prompt >1< or >2<. If there is no incoming call this command is ignored and an error message issued.

7.2.2 SET ANSWER

Access Level: 1
Parameters: manual | automatic
Default: manual

The **SET ANSWER** command specifies how an incoming call is answered. For each DTE port the answer mode can be **MANUAL** or **AUTOMATIC**.

When a synchronous DTE port is set to **AUTOMATIC,** incoming calls are answered automatically. When set to manual, the port waits for an **ANSWER** command.

An asynchronous DTE port set to **AUTOMATIC** alerts the connected DTE to the incoming call by toggling the RI circuit and answers the call after a delay period (see section 7.3.1). When set to manual the RI circuit is toggled and RING transmitted to the DTE every 1.25 seconds, pending an ATA command (as for modems).

Example:

```
SET ANSWER AUTO
```

In manual mode the Ans delay is reset to 0.

7.2.3 SHOW ANSWER

Access Level: 0

The **SHOW ANSWER** command displays the current answer mode.

7.3 ANSWER DELAY

Port Specific

7.3.1 SET ANSWER DELAY

Access Level: 1
Parameters: 0-255 (rings)
Default: 0 or 1

The **SET ANSWER DELAY** command specifies the time delay before an asynchronous incoming call is answered. If the answer delay is set to a value other than zero the answer mode is set to **AUTOMATIC**. This command corresponds with the Hayes AT command register S0, used to count the number of rings that are signalled across the DTE interface.

If the answer delay is set to a value of 100 or greater, the call is answered immediately with no delay.

Example:

```
SET ANSWER DELAY 5
```

Default = 0 when Ans Mode is set to manual

Default = 1 when Ans Mode set to Automatic

7.3.2 SHOW ANSWER DELAY

Access Level: 0

This command displays the current delay values entered with the **SET** command.

7.4 APPLICATION TYPE

Port Specific

7.4.1 SET APPLICATION TYPE

Access Level: 1
Parameters: none | data | voice | timelink |semiperm

The **SET APPLICATION TYPE** command is used to instruct the port to issue the HLC (High Layer Capability) element for that type of application on all outgoing calls. It also causes the port to filter incoming calls based on the HLC supplied in the incoming call. If the network does not supply a HLC, the call is accepted regardless of the application type set in the port

Parameter	Action
None	System default
Data	Corresponds to the HLC element OSI X.200
Voice	Corresponds to the HLC element for voice calls
Timelink	Option is only used in Australia
Semiperm	Australia only, must also have Local Address configured

Table 4 Set Application Type Command Parameters

Example:

```
SET APP TYPE DATA
```

7.4.2 SHOW APPLICATION TYPE

Access Level: 0

The **SHOW APPLICATION TYPE** command displays the current settings.

Example:

```
SHO APP
```

7.5 ASYNC

Port Specific V.24 only

7.5.1 SET ASYNC DATA

Access Level: 1
Parameters:7 | 8
Default: 8

The **SET ASYNC DATA** command specifies the number of data bits per character for the current DTE port.

Example:

```
SET ASYNC DATA 7
```

7.5.2 SET ASYNC PARITY

Access Level: 1
Parameters: mark | space | odd | even | none
Default: none

The **SET ASYNC PARITY** command specifies the parity check used by the current DTE port. The default value is none.

Example:

```
SET ASYNC PARITY ODD
```

7.5.3 SET ASYNC SPEED

Access Level: 1
Parameters: 2K4 | 4K8 | 9k6 | 19K2 | 38K4
Default: 9K6

The **SET ASYNC SPEED** command specifies the speed of the current DTE port. These ports are not currently autobauding. The command is not applicable to an RS449 configured port.

Example:

```
SET ASYNC SPEED 19K2
```

7.5.4 SET ASYNC STOP

Access Level: 1
Parameters: 1|2
Default: 1

The **SET ASYNC STOP** command specifies the number of stop bit per character for the current DTE port

Example:

```
SET ASYNC STOP 2
```

7.5.5 SHOW ASYNC

Access Level: 0

This command displays the current set parameters as follows:

ASYNC: Speed = 9k6: Data Bits = 8: Stop Bits = 1: Parity = None.

7.6 CALL CONTROL

Port Specific

7.6.1 SET CALL CONTROL

Access Level: 2
Parameters: I AT I V25 HDLC I X.21 I none

This command specifies Hayes AT command or V.25bis Call Control for the current DTE port. The none parameter disables all forms of call control through the current DTE port - calls may only be made or cleared from the front panel buttons or from a configuration terminal.

Note that although the V25 sync and async options are recognised they are not currently implemented. The default value is AT Call Control.

Example:

```
SET CALL CONTROL AT
```

7.6.2 SHOW CALL CONTROL

Access Level: 0

The **SHOW CALL CONTROL** command displays the current call control mode.

Example:

```
SHOW CALL CONTROL
```

7.7 CHANNEL

Port Specific

7.7.1 SET CHANNEL

Access Level: 2
Parameters: one (1) | two (2) | any

The **SET CHANNEL** command specifies the ISDN bearer channel that is used by the current port when making outgoing calls or when performing checks on incoming calls. If a port has its channel set to use channel 1 and an incoming call is presented on bearer 2, the port ignores the call.

WARNING: On a two port system you are not prevented from setting the channel to be the same on both ports. This prevents both ports from initiating or receiving calls simultaneously.

7.7.2 SHOW CHANNEL

Access Level: 0

The **SHOW CHANNEL** command displays the current channel status.

Example:

```
SHOW CHANNEL
```

7.8 CLI

Port Specific/Global

7.8.1 SET CLI

Port Specific

Access Level: 2
Parameters:1-20 CLI value1-20
Port 1 - x[1] | all | neither | enabled | disabled

[1] Where x = the maximum number of ports on the unit.

There are three forms of the **SET CLI** command. The first assigns a Calling Line Identity to one of 20 CLI stores. The second form assigns a CLI store to one of the ports, or cancels a previous port assignment. The third form enables or disables the CLI checking facility.

Examples:

```
SET CLI 1 01276681212
SET CLI 2 PORT 2
```

or

```
SET CLI 12 PORT ALL
SET CLI ENABLED
```

7.8.2 CLEAR CLI

Global Access Level: 3
Parameters: 1 - 20 (CLI store to clear)| port Y | all

The **CLEAR CLI** command deletes the contents of the CLI store referred to by the parameter. The CLI usage for that store is reset to port not set.

Example:

```
CLEAR CLI 12
```

In addition the assignments of CLI values to ports can be cleared on a per port basis using the following example where Y is the port number:

Example:

```
CLEAR CLI 12 PORT Y
```

7.8.3 SHOW CLI

Global
Access Level: 0
Parameters: use

The **SHOW CLI** command displays the CLI list with associated phone numbers. If the optional parameter use is entered the corresponding list of CLI associated ports is displayed. There are 20 possible numbers in the CLI list. Each entry in the list can be associated with any of the ports: DTE Port 1, DTE Port 2, the Remote Management Port (Port 3), or with all 3 ports.

Example:

```
SHOW CLI
```

7.9 DEFAULT

Port Specific

7.9.1 SET DEFAULTS

Access Level: 3

The **SET DEFAULTS** command resets the configuration of the current DTE port to the factory defaults. The command not only resets the parameters immediately associated with the current port, it also ensures that any configured CLI values do not apply to the current port. Note that CLI values are not deleted, only an association between a port and a CLI is removed.

7.10 DIAL

Port Specific
Access Level: 1
Parameters: address, subaddress

The **DIAL** command attempts to establish a connection to the remote address (and optional remote subaddress) specified. The address and subaddress must be separated by the character #. No spaces are permitted in the address or subaddress. If the address or subaddress are not supplied, the unit dials using a stored remote address and subaddress if available.

The example command dials the remote telephone number 01234567 and passes the subaddress Port 1 to the called terminal.

Example:

```
DIAL 01234567#PORT1
```

7.11 FILTER

Port specific

7.11.1 Set Filter

Access Level: 1
Parameters: disabledlenabled

The **SET FILTER DISABLE** command allows the DCE speed to be set to 56K, but still lets the unit accept an incoming data call that signals itself as a 64K data call, but is in fact a V.110 56K rate adapted call.

This scenario is often encountered on international calls, originating from the USA, where no subaddress, CLI or other call type information is passed across the International link.

Parameter	Action
Disabled	Allows 56K to be accepted
Enabled	Resets to filter out the 56K

Table 5 Set Filter Command Parameters

Example:

```
SET FILTER DISABLED
```

NOTE: If the call filter is **disabled** it is shown on the Show All screen adjacent to the port number.

7.12 FLOW CONTROL

Port Specific, V24 & V35

7.12.1 SET FLOW CONTROL

Access Level: 2
Parameters: local | remote | none (V.35 ports only) Default: remote

This command determines whether RTS/CTS flow control operates remotely, from DTE to DTE across an ISDN connection, or locally between the port and the local DTE.

Example:

SET FLOW CONTROL LOCAL:

7.13 GLOBAL OPTION

Global

7.13.1 SET GLOBAL OPTION

Access Level: 2
Parameters: 01

Parameter	Action
01	Enables simplified cause mode

Table 6 Set Global Option Command Parameters

The remaining options are reserved for future use.

Example:

SET GLOBAL OPTION 01 gives
Global Option Set = 0000 0000 0000 0001

where the 1 in the 1st position indicates that the special option is set. 1 is the only permitted value although values from 1 to 16 can be entered.

7.13.2 CLEAR GLOBAL OPTION

Access Level: 3
Parameters: 01

Clears the parameters set by the set global option command.

Example:

CLEAR GLOBAL OPTION 01

7.14 HANGUP

Port specific
Access Level: 0

The **HANGUP** command clears any outstanding call, whether incoming or outgoing, connected or alerting.

7.15 HELP

Access Level: 0

Command	Action
HELP	Lists the valid primary commands available
SET HELP	Lists the valid primary commands used with the SET prefix
CLEAR HELP	Lists the valid primary commands used with the CLEAR prefix
SHOW HELP	Lists the valid primary commands used with the SHOW prefix

Table 7 Help Commands

7.16 LOAD

Global
Access Level: 0

The **LOAD** command forces the unit to load a new version of the firmware. All active calls are abandoned and the link layer is closed. The command prompts for confirmation before being actioned and can be cancelled by entering an **N** or **n** to this prompt.

7.17 LOCAL

Port specific

7.17.1 SET LOCAL

Access Level: 2
Parameters: address, subaddress

The **SET LOCAL** command stores the address and/or subaddress of the current DTE port. A local address can only contain numeric characters 0 to 9; no spaces or separators are allowed. The local subaddress parameter can consist of any alphanumeric character. The current implementation of ISDN in the UK restricts the number of characters in a subaddress to six.

The local address and subaddress can be used to filter incoming calls to the terminal. If the ISDN line is configured to use Multiple Subscriber Numbering (MSN) each port may be assigned a different local address and only incoming calls to the correct number are passed to the port. If there is no local address configured, call filtering on called address is not used. If the called and calling ISDN lines have the subaddress facility configured, a subaddress may be passed transparently from the calling terminal to the called terminal.

If a local subaddress is configured, the incoming subaddress is checked for compatibility with the configured local subaddress. Incoming calls with subaddress values that do not match are ignored by the called terminal. If the local subaddress is not configured, no compatibility checking based on called subaddress is performed.

Examples:

```
SET LOCAL ADDRESS 0813218765
SET LOCAL SUBADDRESS XABC
```

7.17.2 CLEAR LOCAL

Access Level: 3
Parameters: address, subaddress

The **CLEAR LOCAL** command deletes the local address or subaddress for the current port. If address or subaddress are not quoted, both are cleared.

Example:

```
CLEAR LOCAL SUBADDRESS
```

7.17.3 SHOW LOCAL

Access Level: 0

This command displays the local and subaddress for the current port.

Example:

```
SHOW LOCAL
```

7.18 LOOP

Port Specific

7.18.1 SET LOOP

Access Level: 1
Parameters: 2 | 3

The **SET LOOP** command establishes data loopback paths within the unit for testing purposes. Two loops can be established within each port of the unit. Loop two is used to loop back the B channel from the ISDN line. This is normally used to verify that the datalink established across the ISDN is free from error. This loop can only be established AFTER a call has been connected, and is automatically cleared when the call is ended. Loop three is used to test the connection between the port and the DTE.

Example:

```
SET LOOP 3
```

7.19 MONITOR

Global

7.19.1 SET MONITOR

Access Level: 1
Parameters: enabled | disabled | engineer | X21| line

The **SET MONITOR** command allows monitoring of the Network Call Control signalling and the DTE Call Control signalling through the command port. It also displays who is calling before the call is answered using the CLI.The parameters are explained in the table below.

Parameter	Effect
Enable	Turns on the general monitor information
Disable	Turns off all set parameters and all screen logging
Engineer	Captures the Layer 3 call control in HEX format
Line	Allows the user to view the activation states of the ISDN line. Usually when calls are active the line is in the 'ACTIVATED - F7' state. If a call is attempted and the line state does not reach 'F7', then there is a line or cable fault
PPP	Displays the PPP LCP and IPCP negotiation packets decoded according to RFC 1661
X.21	Shows the call states when X.21 Call Control is being used
X.25	Displays the X.25, PAD and TPAD call status messages

Table 8 Set Monitor Command Parameters

Example:

```
SET MONITOR ENABLED
SET MONITOR ENGINEER
```

7.20 NAME

Port Specific

7.20.1 SET NAME

Access Level: 3
Parameters: name

The **SET NAME** command stores a name for the unit in non volatile memory. The name may be up to 10 characters in length and consist of any alphanumeric characters. Its primary use is to identify the unit when under remote management. **This command may only be used from Port 3,** the Remote Management Port.

Example:

```
NAME LONDON_X1
```

7.20.2 CLEAR NAME

Access Level: 3

The **CLEAR NAME** command deletes the name of the unit.

Example:

```
CLEAR NAME
```

7.20.3 SHOW NAME

Access Level: 0

The **SHOW NAME** command displays the identity of the unit.OPTION

Port Specific

7.21 OPTION

7.21.1 SET OPTION

Access Level: 2
Parameters: 1-16

The **SET OPTION** command is used to activate one of the following options for a specific port:

Parameter	Action
01	DSR clamped ON
02	DSR follows DTR
03	(AVTA only) Disables pulse dialling option
04	DCD clamped ON
05	CTS follows RTS
06	Reserved
07	Reserved
08	Reserved
09	Reserved
10	Not used
11	DCD follows DSR when using V25bis call control
12 - 14	Not Used
15	Disables DTR Dial
16	When set from the configuration port the standard RING only message is displayed without the CLI information

Table 9 Set Option Command Parameters

Example:

SET OPTION 16 displays:

Port Option Set	= 1000 0000 0000 0000
Global Option Set	= 0000 0000 0000 0000

The 1 in the 16th position indicates that the special option is set.

7.21.2 CLEAR OPTION

Access Level: 3
Parameters: 1-16

This command clears the parameters set by the **SET OPTION** command.

Example:

CLEAR OPTION 16

7.21.3 SHOW OPTION

Access Level: 0

The **SHOW OPTION** command displays the port and global options in the following format:

Port Option Set	= 1000 0000 0000 0000
Global Option Set	= 1000 0000 0000 0000

7.22 PASSWORD

Global
Access Level: 0
Parameters: 1-3 (access level)

The **PASSWORD** primary command is used to enter a code word to match against the access code word stored for a particular access level. Note that as access levels are nested, access to all lower levels must be permitted before access to a higher level is allowed. The example gains access to Level 3 using the access code codex.

Example:

PASSWORD 3

Response:

ENTER PASSWORD > Q Q Q Q
CONFIRM PASSWORD > Q Q Q Q

7.22.1 SET PASSWORD

Access Level: 3
Parameters: 1-3 (access level)

The **SET PASSWORD** command stores a password for the specified access security level. Setting a password for a particular level of security determines if that level of security is effective or not. If all three levels of password are not set, full access to any configuration parameter is allowed from the connected configuration terminal. Access rights to all security levels are automatically reset if the configuration terminal is disconnected from the unit. The command prompts for confirmation before being actioned. It can be cancelled by entering an N or n to this prompt.

Example:

SET PASSWORD 1
ENTER PASSWORD > Q Q Q Q
CONFIRM PASSWORD > Q Q Q Q

7.22.2 CLEAR PASSWORD

Access Level: 3
Parameters: 1-3 (access level)

The **CLEAR PASSWORD** command deletes the password for the given access level. The command requires that highest level of security has been granted before the passwords can be changed. The example command clears the contents of the access Level 1 password and force its status to **not set**.

Example:

CLEAR PASSWORD 1

7.22.3 SHOW PASSWORD

Access Level: 3

The **SHOW PASSWORD** command displays the currently configured passwords.

Example:

```
SHOW PASS
```

7.23 PORT

Port Specific, V.24 only

7.23.1 SET PORT

Access Level: 3
Parameters: sync I async I sync dial I X.25I restricted I permanent I ppp

The **SET PORT** command specifies the port interface (sync or async) that is presented to the DTE. The DTE port interface can be set to any of the following modes:

SYNCHRONOUS

In this mode the port accepts synchronous data only and provides clocks to the attached DTE. The DTE can initiate and terminate calls using the assertion and deassertion of the DTR circuit or by synchronous call control protocol.

ASYNCHRONOUS

In this mode the port only accepts asynchronous data. The port obeys the AT command set.

SYNCHRONOUS DIAL

In this mode the port accepts asynchronous data when there is no end to end connection present. A call may be initiated by the attached DTE using AT commands. When the call connects to the remote destination the port automatically switches to synchronous mode and provides clocks. The call can be cleared by deasserting DTR on the DTE port. Note that there is a delay between connecting and monitoring the status of the DTR. This delay enables the user to disconnect from an asynchronous DTE and reconnect to a synchronous DTE without the call being cleared through the dropping of DTR. See *section 14.14, S Register 25.*

Example:

```
SET PORT SYNC DIAL
```

X25

This allows access to the TPAD application which communicates across the X.25 network.The X.25 communications protocol must be enabled on the port. This is done via:

```
SET PORT X25
```

NOTE: The X.25 protocol is only available on Port 1.

RESTRICTED

In this mode the port only accepts synchronous data and provides clocks to the attached DTE. The DTE can initiate and terminate calls using the assertion and deassertion of the DTR circuit or by synchronous call control protocol.

The users application is responsible for ensuring that the MSB of each byte is set to zero in this mode.

PERMANENT

The port must be set to synchronous or asynchronous when using this command. This command configures the data port for a B channel connection with no signalling on the D channel. If the previous channel configuration was ANY, this command selects B1 as the default channel. You can change this channel selection using the SET CHANNEL command (see *section 7.7.1*).

Example:

```
>1<
SET PORT SYNC PERMANENT

******** Port 1 ********
Port Setting = V.24 Sync  Online Flow Control = Remote
Call Control = Off **** Permanent B Chan Connection ****
Synch Speed = 64k
Chan = 1  :  Connection Status = Disabled
Application = None : Rate Adaption = V.110
```

SET PERMANENT [ENABLE I DISABLE]

This command enables and disables the physical connection.

Example:

```
>1<
SET PER ENABLED
Connection Status = Enabled
```

PPP

This command sets the port to PPP mode.

Example:

```
SET PORT PPP
```

7.24 REMOTE

Port Specific

7.24.1 SET REMOTE

Access Level: 2
Parameters: address, subaddress

The **SET REMOTE** command specifies the address and/or subaddress of the remote unit port. The address parameter instructs the system that the following characters constitute the address (telephone number) of the remote port, the subaddress parameter that the following characters form the subaddress of the remote port. An address can only contain the alphanumeric characters 0 to 9; no spaces or separator characters are allowed. A subaddress can consist of any alphanumeric character. When the remote address is set the user can then initiate a call to the remote unit by issuing the 'DIAL' command without the associated number.

NOTE: The current implementation of the ISDN restricts the number of characters in a subaddress to 6 (six).

Examples:

```
SET REMOTE ADDRESS 0713659875
```

7.24.2 CLEAR REMOTE

Access Level: 3
Parameters: address, subaddress

The clear remote command deletes the remote address or subaddress used by the current port. If address or subaddress are not quoted, both are cleared.

Example:

```
CLEAR REMOTE ADDRESS
```

7.24.3 SHOW REMOTE

Access Level: 0

The **SHOW REMOTE** command displays the remote address and subaddress for the current port.

Example:

```
SHOW REMOTE
```

7.25 RESET

Global

Access Level: 0

The **RESET** command forces the unit to perform a software reset. All active calls are abandoned and the link layer is closed. The command prompts for confirmation before being actioned and can be cancelled by entering an N or n to this prompt.

7.26 SAVE

Global

Access Level: 0

The **SAVE** command saves the current configuration in non-volatile memory. The message:

Type SAVE To Write To NVRAM

is output as a reminder each time the configuration is changed. It is only necessary to use this command on completion of a sequence of changes.

7.27 SECURE

Global

Access Level: 0

The **SECURE** command allows the user to manually reset the access level to prevent unauthorised users from using the command port. If there are any passwords set and the user has subsequently provided the password in order to gain access, then this command clears the current access rights for the command port.

7.28 SPEED

Port Specific

7.28.1 SET SPEED

Access Level: 2
Parameters: 9K6 | 19K2 | 48K | 56K | 64K

The **SET SPEED** command specifies the synchronous data rate of the current port. When an outgoing call is made to a remote unit, the current setting of the port speed is sent to the remote unit. The port switches to the speed of the incoming call unless the FILTER command is set to disable.

Example:

```
SET SPEED 64K
```

7.29 STATUS

Port Specific

Access Level: 0

The **STATUS** command displays the status of the current port. The returned value can be one of:

- Normal
- Alerting
- Connecting
- Online
- Dormant
- Busy
- Synched

This is followed by the ISDN status message (Table 10 on page 7-21) plus a link status display (Table 11 on page 7-22.)

Example

```
RESET - F1
INACTIVE - F3
PENDING_ACT-F4
UNSYNCH-F5
SYNCH-F6
ACTIVATED-F7
TRANSMIT-F7.1
LOST_FRAM-F8
```

Status	Significance
Normal	The current port is in the normal state. ISDN is not being used
Alerting	The current Port has received an incoming call and is currently awaiting user intervention before connecting or rejecting the call
Connecting	The current port is currently occupied with a call which is either awaiting an answer by the remote unit, or is attempting to connect the call end to end
Online	The current port has successfully made and connected an outgoing call over the ISDN, or has successfully received and answered an incoming call. Data transfer is occurring, or can occur, over the ISDN
Dormant	Indicates that the hardware associated with this port is being used by the unit for a remote management call. The port appears dormant to the attached DTE. No response to call control commands is sent to the attached DTE

Table 10 ISDN Status Messages

Busy	This transitory state notifies the attached user that the port is either busy setting up a call but has not yet contacted and alerted the remote unit, or the unit is busy clearing a call that has failed or been terminated
Synched	This state is transitory. A port is in this state when the call has connected end to end, but the DTE ports have not been connected through to the B channels

Table 10 ISDN Status Messages

Code	Link Status
F1	Deactivate state
F3	Link disconnected, or the unit has never made a call or received a call
F4	The terminal adaptor is transmitting flags and receiving flags waiting for the L2 status message to go to Active state
F5	Signal received is unsynchronised
F6	Signal synchonised
F7	Normal active link
F7.1	Frame synchronisation lost and waiting for resynchronisation by INFO 2 or INFO 4 or deactvcation by INFO 0
F8	

Table 11 Link Status Display

7.30 VERSION

Global

7.30.1 SHOW VERSION

Access Level: 0

This command displays the product version and date information.

7.31 ONE | TWO | THREE

Global

7.31.1 ONE

Access Level: 0
Shortform: 1

The one command changes the port assignment to Port 1. If Port 1 is already selected this command has no effect.

7.31.2 TWO

Access Level: 0
Shortform: 2

The two command changes the port assignment to Port 2. If Port 2 is already selected this command has no effect.

7.31.3 THREE

Access Level: 0
Shortform: 3

The three command changes the port assignment to the Remote Management Port (RMP). If the RMP is already selected this command is ignored.

8 Flash Loader

The latest version of MIDAS + hardware provides a FLASH memory based firmware upgrade facility. This facility allows the latest MIDAS + / CONNECT iQ 400 firmware to be placed into the unit without having to open the unit. This facility does NOT operate online, as the unit could experience permanent loss of functionality if the unit loses power during the download.

The Flash Loader is invoked by either:

- Resetting the unit with the two front panel push buttons held in
- Entering the LOADER command (applies to later units with the PAK firmware)

The new firmware is an ASCII file containing Intel HEX data. The file can be downloaded to the unit using any PC based comms program that supports ASCII file transfer. (See *Chapter 22 ISDN Bulletin Board Service* for details of our new bulletin board service for downloading firmware.)

WARNING: Set the line pacing and character pacing in the comms package to 0 delay to ensure a fast download. Also, set up the comms program for RTS/CTS flow control. If these parameters are not set, the loading time will increase dramatically.

When the unit is rebooted with the two buttons held in, the attached terminal running at 9600 bps displays the following string:

Flash Loader, <Help> for help ->

Type **HELP** to provide the following information:

CONNECT iQ 400 Flash Loader.

The following commands are available:

Command	Action
<Checksum>	Display the checksum of the firmware ROM
<Exit>	Exit from the loader
<Load>	Load new card firmware from a file. When prompted, use an ASCII file transfer to upload the file
<Save>	Saves the card firmware to a file. When prompted, use an ASCII file transfer to download to a file
<Verify>	Verifies the card firmware to a file. When prompted, use an ASCII file transfer to upload the file
<9600Baud>	Sets the control port to 9600 baud, the DTE also needs to be set to 9600 baud
<38400Baud>	Sets the control port to 38400 baud, the DTE also needs to be set to 38400 baud

Table 12 Flash Loader Commands

All these commands can be abbreviated to the first three characters.

If the PC that is being used to download the new firmware is capable of supporting 38400 bps operation, use this option to improve the download time.

It is advisable you use the SAVE command to save the old version of firmware prior to loading the new firmware onto the unit. This ensures that the unit can continue to be used even if the new firmware file has been corrupted in some way and fails to work when loaded into the unit.

8.1 CONNECT iQ 400 Loader Program

The Connect iQ loader program allows new versions of firmware with new features or bug fixes to be loaded into the CONNECT iQ 400, without using replacement proms.

It is a self contained software module, that is not replaced as part of a normal firmware update.

8.1.1 Using the Loader

To use the loader you will require:

- A compatible PC running a terminal emulation package such as Procomm
- A 9 way serial cable
- A CONNECT iQ 400
- A new version of firmware in Hex file format

8.1.2 Starting the Loader

This can be done from the configuration device by typing the following:

LOADER

the CONNECT iQ 400 will prompt

Are You Sure (y/n) ?

If you respond **Y** the CONNECT iQ 400 will run the loader.

As an alternative to the above, hold down buttons 1 and 2, and press the concealed reset button.

The loader then gives the following message;

CONNECT iQ 400 Flash Loader, <Help> for help ->

8.2 Changing Loader Asynch Speed

There is a choice of two speeds to run the loader asynch comms at. Using 38k4 the loader will take about 8 minutes to transfer the firmware, or at 9k6 the loader will take half an hour to transfer the firmware. (These time estimates assume that character and line pacing are turned off at the PC end. Either of these will increase data transfer times. If PC overflows during save operation try using line pacing first, as character pacing will be more costly in data transmission terms.)

For 9k6 baud type:

9600BAUD

For 38k4 baud type:

38400BAUD

The unit will then respond,

Press a key when DTE speed has been changed

At this point you should change speed on your terminal emulation program, and press enter.

NOTE: Earlier versions (pre 1.1) of the loader program malfunction if the ISDN line is connected during upload or download operation. For these versions the ISDN line must be disconnected during these operations.

8.3 Saving Old Firmware

Before replacing the existing firmware, it is highly recommended to use SAVE to create a fall back hex file. This can be reinstated if the new version has a problem.

Commence the save by typing

SAVE

Select the download option on your terminal emulator (often PGDN), and provide the terminal emulator with a save filename.

Start file download now, then press <RETURN> or press <A> to abort at one-time.

As the save runs you will get a screen dump, a sample of which is shown below;

:0200000280007C

:20000000EA173270D3FFFFFFFFFFFFFFFFFFFFFFFE93370D3EA3370D3EB3370D3EC3370D3F3

:20002000ED3370D3EE3370D3EF3370D3ED2F70D3F23370D3F33370D3F43370D30F3470D374

:200040002A3470D39B3470D3C93470D3CA3470D3CB3470D3CC3470D3CD3470D3CE3470D35E

The screen dump should run for many thousands (~30k) of lines. (The above sample is truncated.) If you wish to test the validity of this save use the VERIFY command.

8.4 Loading New Firmware

To start the load type at the loader prompt;

LOAD

The CONNECT iQ 400 will then await transmission of the hex file.

On the PC select the upload option, choose ASCII format, and enter the path and name of the hex file to be uploaded.

The firmware hex file will typically be 30,000 lines long, and will take at least 7 minutes to upload. When it completes you will see the following message:

LOAD OK

Once the upload has completed press the concealed reset, and wait for the unit to save the new firmware to its non volatile memory.

8.5 Verifying New Firmware

Verify will compare to firmware currently in the CONNECT iQ 400 with a reference hex file. It can be used to check hex files that have been saved correctly from the iQ 400, or to check that firmware has been correctly loaded.

To run verify type

VERIFY

You will then be prompted to upload the hex file that is to be compared with the current iQ 400 firmware.

Upload the firmware file to verify now

Uploading file

Verifying ...

Verify OK

If the verify detects a difference the following error is reported in this format;

Verify failed at line 2 error No. 12, abort the upload then press <CTRL Z>

8.6 Display Checksum

Checksum will provide a quick confidence test on the current firmware. To display the checksum of the control firmware type:

CHECKSUM

The unit will then respond:

Calculating checksum

Rom checksum is CDC2

8.7 Terminating the Loader Program

To exit, type:

EXIT

This will reboot the unit, and will run whatever firmware is now loaded.

8.7.1 Error Codes

The loader program reports errors as numbers. The predefined errors are defined below.

Error	No	Explanation
VERIFY	0	Status
PROGRAM	1	Status
ERASE	2	Status
PENDING	3	Status
VALID	4	Status
CHECKSUM_ERROR	5	s3 record has bad checksum
RECORD_ERROR	6	s3 record has colon missing
DEVICE_FAILED	7	No recognised flash device seen
ERASE_FAILED	8	Flash sector erase failed
PROGRAM_FAILED	9	Flash byte re-program failed readback
INVALID_FILE	10	Not used
VERIFY_ERROR	12	Verify memory block failed
ABORT_ERROR	13	Not used
COMMAND_ERROR	14	Not used
ADDRESS_ERROR	15	s3 record has invalid address
Line timeout		Asynch. line has been idle for 15 seconds

Table 13 Flash Loader Error Codes

9 Autodial

9.1 DTR Autodial

A new feature has been added to the V.24, V.35 and RS449 ports. This feature allows the presence of DTR from the DTE to determine if a call should be established and maintained to a remote destination configured in the remote address location.

If the call should fail at any time, the Terminal adaptor will redial the remote end and continue to dial the remote end until the call is connected again.

The commands to enable and disable this feature on a port are shown below.

NOTE: the call is only made if the remote address is configured.

SET AUTODIAL ENABLEDsets the feature active

SET AUTODIAL DISABLEDdisables the feature

9.2 Command Autodial

A new feature has been added to the X.21 ports. This feature allows the presence of the COMMAND from the DTE to determine if a call should be established and maintained to a remote destination configured in the remote address location.

NOTE: This cannot operate at the same time as X.21 Call Control

---

If the call should fail at any time, the Terminal adaptor will redial the remote end, and continue to dial the remote end until the call is connected again.

The commands to enable and disable this feature on a port is shown below.

NOTE: The call will only be made if the remote address is configured.

SET AUTODIAL ENABLEDsets the feature active

SET AUTODIAL DISABLEDdisables the feature

10 X.25/TPAD Commands

Several new commands have been added to the firmware to allow access to the TPAD application which communicates across the X.25 network.

The X.25 communications protocol must be enabled on the port. Enable X.25 on the port by typing in the command:

SET PORT X25

NOTE: The X.25 protocol is only available on Port 1.

Once X.25 has been enabled, the following fundamental parameters are required:

Parameter	Set-up Command	Values
Network User Addresses	SET X25 LOCAL NUA 1234	Up to 15 digits
Logical Channel Information	SET X25 CHANNEL 1024 1279	Range from 1 to 4095
X.25 Interface Type	SET X25 INTERFACE DTE	One of DTE/DCE. (Defaults to DTE passive used for BT cardway)
User Identification	SET X25 NUI TEST_HOST	Alphanumeric string up to a maximum of 32 characters

Table 14 X.25 Setup Commands

All other information required for TPAD access is supplied by the terminal equipment. The Network User Address and logical channel range are supplied by the network provider and the Network User Identification string is assigned by the remote facility provider.

The only specific TPAD control provided is the checksum control. For most connections it does not need to be enabled and by default it is disabled. It can be enabled, if required, using

SET X25 TPAD CHECKSUM ENABLED

10.1 Example Port Setting

```
>1<
******** Port 1 ********
Port Setting = V.24 X25  Online Flow Control = Local
Call Control = AT Command  ******** Manual Dial Enabled ********
Async:Speed = 9K6:Data Bits = 8:Stop Bits = 1:Parity = None
Chan = Any:Ans Mode = Manual:Ans Delay=0
Application = None:Rate Adaption = None
Remote Address= :Subaddress=
Local Address= :Subaddress=  Autodial = Disabled
Local NUA = 12345
Remote NUA =
Logical Chan Range = 1024 to 1279
Interface Type = DTE Passive
NUI = test_host
X29 disabled
X25 Tpad Checksum = Disabled
>1<
```

10.2 X.25 Debug Information

The debug information demonstrates successful completion of various stages of the call setup and data transfer.

To enable debugging type:

SET MONITOR X25

You will see the following output:

>1<set mon enable

>1<set mon x25

Port 2 Incoming Call From :-220

>1< Port 1 B-Channel Allocated

>1< Port 1 B-Channel Allocated

>1< Port 1 Far End Alerting

>1< Port 1 Speed = 38K4

>1< X25: LAPB and L3 Ready

TPD: Call Issued

X25: Making Call

PAD: Call Confirm

TPD: Data Sent

TPD: Data Received

TPD: Call Cleared by User

X25: Call Cleared by User

PAD: Clear Confirm

X25: LAPB and L3 Closed

Port 1 B-Channel Disconnected

>1< Port 1 Call terminated

In the example, the TPD prefix refers to TPAD actions, the PAD prefix refers to PAD actions and the X25 prefix refers to X.25 actions.

Prefix and Message	Action
TPD: Call Issued	TPAD has received call data and sent the call request to the X.25 stack
TPD: Data Sent	TPAD has sent formatted data
TPD: Data Received	TPAD has received correctly formatted data
PAD Prefix Message	PAD Action
PAD: Call Confirm	PAD has received an X.25 call confirmation
PAD: Clear Confirm	PAD has received an X.25 clear confirmation
PAD Prefix Message	PAD Action
PAD: Call Confirm	PAD has received an X.25 call confirmation
PAD: Clear Confirm	PAD has received an X.25 clear confirmation
X25 Prefix Message	X.25 Action
X25: LAPB and L3 Ready	X.25 layers 2 & 3 initialised
X25: Making Call	X.25 Call request issued
X25: Call Cleared by User	X.25 Clear request issued
X25: LAPB and L3 Closed	X.25 layers 2 & 3 disconnected

Table 15 X.25 Prefixes and Messages

11 Asynchronous to Synchronous PPP

PPP is an Internet standard for communication over synchronous and asynchronous communications links. The CONNECT iQ 400 allows for the conversion of PPP frames from synchronous format to asynchronous format and vice versa.

This functionality is especially useful for extending a LAN environment over ISDN to a remote machine running the desired LAN protocol(s) over PPP or direct connection to the Internet, without the need for specialised hardware on the remote system.

Other more generic advantages are:

- Fully compliant PPP implementation (RFC1662 & RFC1172)
- Support for asynchronous data rates from 9600 baud through to 38400 baud
- Interconnectivity to any third party product running PPP over ISDN
- Debugging capabilities (local & remote) available
- Easy configuration on the CONNECT iQ 400
- Dial-on-Data capability for reduced line charges and virtual session capability

To use PPP the local PC attached to the CONNECT iQ 400 requires communications software which supports PPP over an asynchronous connection. The destination ISDN device is a central site router or Internet provider, which must also be capable of running PPP over the synchronous ISDN connection. A typical configuration is shown in Figure 5.

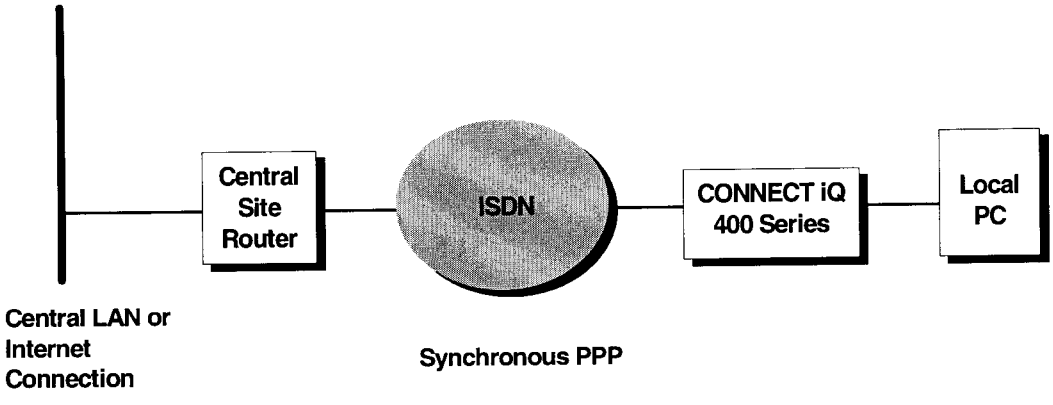

Figure 5 Typical PPP Configuration

11.1 Configuring CONNECT iQ 400 for PPP

The communicating systems have the controls for PPP parameters, so the configuration on the CONNECT iQ 400 is very simple. The CONNECT iQ 400 controls essentially give the user a PPP data path to run the protocol over.

Note: Before you start configuration ensure that hardware CTS/RTS flow control is enabled on the local PC.

To configure the unit for PPP type the following on the configuration port:

SET PORT PPP

To show the effects of setting the port into a different mode type:

SHOW PORT

You will see the following output:

********** Port 1 **********

Port Setting = V.24 PPP Online Flow Control = Local

Call Control = AT Command * Manual Dial Enabled *****

Async:Speed = 38K:Data Bits = 8:Stop Bits = 1:Parity = None

Chan = Any:Ans Mode = Manual:Ans Delay = 0

Application = None:Rate Adaption = None

Remote Address = : SubAddress =

Local Address = : SubAddress =

PPP timeout = 10

There are equivalent AT commands for PPP operation to allow PPP to be used directly from modem initialisation strings used with remote access packages.

The commands to perform this are:

AT%A2=95
AT&V

The output from the AT&V commands shows all the parameters of the current active profile, but the PPP specific parameters are listed in the Switched Call Type section:

ACTIVE PROFILE:

E1 F0 Q0 V1 &M0 &X0 &D2 &L0 &R0 &C1 &S0

S00:000 S01:000 S02:043 S03:013 S04:010 S05:008

S10:014 S12:050 S21:000 S22:000 S23:004 S24:000

S25:005 S26:001 S27:004 S103:000 S106:000 S109:015

CALLED IDENTITIES:

S101=

S107=

LOCAL IDENTITIES:

S100=

S102=

REMOTE IDENTITIES:

S104=

S105=

TELEPHONE NUMBERS:

S108=

&Z0=

SWITCHED CALL TYPE:

%A2=095

%P1=010

NOTE: The PPP specific sections are shown in bold

11.2 Troubleshooting a PPP Connection

To verify the operation of a PPP connection the following command can be used to display debug information:

SET MONITOR ENABLE

After this command has been issued the following status messages are displayed during the course of a PPP session:

PPP: Call Connect - Negotiating PPP

PPP: LCP Complete

PPP: ACCM negotiated**

PPP: IPCP Complete**

PPP: Call Disconnected

** Optional output depending on configuration

The **only** PPP parameter setting that the CONNECT iQ 400 rejects is the Maximum Receive Unit size. If this parameter value is too large then the following output is seen during the PPP session:

PPP: MRU rejected

To solve this problem set the Maximum Receive Unit value on the offending equipment to a value less than 1530 bytes.

A further command to display a RFC formatted list of negotiation packets exists:

SET MONITOR PPP

To understand the output requires a detailed knowledge of RFC 1661

11.3 PPP Negotiated Parameters

To display the PPP negotiated parameters type:

SHOW PPP

The following information is displayed:

PPP ACCM = 00FFFFFF

PPP Magic Local = 00A1F681Magic Remote = 5474D0346

The ACCM value represents a mask of the control characters (characters from 0 through 31) mapped for asynchronous transmission. In the example above all characters in the range 0 through 23 will be mapped when transmitted asynchronously). The magic numbers displayed indicate the unique identifiers used in echo requests/replies and link quality reporting in the PPP LCP protocol.

11.4 Parameters for PPP Link Setup

The Parameters for PPP link configuration are essentially self negotiating and with most PPP implementations the defaults supplied with the communication software generally work. Some manual intervention may be required if the negotiation time for the link setup is of special interest.

The documentation with the communications software will detail the PPP parameters supported and the various options available.

11.5 Network Protocols Supported

Using PPP as a communications link protocol is not useful in its own right. To perform useful communications between two systems a network layer protocol is required. By far the most popular is TCP/IP.

Other network layer protocols supported are:

- NETBEUI
- NETBIOS
- DECnet
- AppleTalk
- IPX

Essentially any network layer protocol supported by the PPP protocol can be used with the asynchronous to synchronous PPP conversion software. The only potential problem is when timing windows in network protocols are violated because of the slow speed of the asynchronous link relative to a LAN environment where the actual protocol may have been designed to run. Some bridging protocols may exhibit this behaviour.

11.6 Parameters for IP Link Setup

To configure the TCP/IP protocol on the local PC the following parameters are required:

IP Address	(Mandatory)
IP Mask	(Mandatory)
Domain Name Server	(Optional)
Domain Name	(Optional)

Table 16 IP Setup Parameters

The mandatory parameters are essential to make your remote system visible on the local network. Primitive tools can be used to verify the existence of the system on the network, such as ping.

The optional parameters are needed for more complicated operations such as World Wide Web access.

At the central site the same basic information will be required but extra setup maybe required for:

- Multiple interfaces, for example both synchronous and LAN interfaces will be required for LAN access
- Routing information, to allow access to the synchronous interface from the LAN

These parameters will be discussed in more detail in the communications access software documentation.

11.7 Dial-on-Data for PPP on the CONNECT iQ 400

The CONNECT iQ 400 has an extended feature to allow Dial-on-Data for TCP\IP connections. This functionality allows the synchronous PPP (over ISDN) connection to be disconnected after a set period of inactivity and re-established again once there is activity on the local PC.

To enable this feature type the following on the configuration port:

SET PPP TIMEOUT XXX

The equivalent AT command is:

AT%P1 = XXX

Where XXX is the timeout in seconds ranging from 0 to 254 seconds.

To disable the Dial-on-Data feature, type one of the following:

CLEAR PPP TIMEOUT

SET PPP TIMEOUT 0

The equivalent AT command is:

AT%P1 = 0

11.8 Troubleshooting Dial-on-Data

To get information about the Dial-on-Data status of the CONNECT iQ 400 type the following command on the configuration port:

SHOW PPP

This command displays the negotiated parameters normally, but when Dial-on-Data has been activated then information about the Dial-on-Data timer is also displayed. The output will be:

PPP ACCM = 00FFFFFF

PPP Magic Local = 00A1F681 Magic Remote = 5474D0346

PPP Time Remaining = 85

PPP Data Timeout = 99

The time remaining field displays the number of seconds before the synchronous connection will be disconnected (if there is no further data transfer). The data timeout displays the actual setting of the Dial-on-Data cyclic timer.

When the Dial-on-Data timeout has actually occurred then the following output is the result of the same command:

PPP ACCM = 00FFFFFF

PPP Magic Local = 00A1F681Magic Remote = 5474D0346

PPP Timeout

PPP Data Timeout = 99

11.9 Restrictions of Use on the CONNECT iQ 400 Platform

The implementation of asynchronous to synchronous PPP on the CONNECT iQ 400 has the following limitations:

- PPP is only available on data port **1**
- Hardware flow control **must** be enabled on the local PC
- Software flow control is **not** available
- Maximum data rate is 38400 baud
- Dial-on-Data can only be used with the **TCP/IP** protocols
- Dial-on-Data **cannot** be used with dynamic IP address allocation

- Dial-on-Data will **not** function if CHAP password authorisation is enabled
- Dial-on-Data will not function if PPP LCP echo requests are issued at regular intervals on the ISDN line
- PPP connections can only be disconnected by lowering DTR signal or issuing the correct PPP link terminate sequence. +++ATH will **not** hang up a PPP connection

12 Network Protocols

12.1 Protocol Selection

The CONNECT iQ 400 Series supports software selectable protocol for D-channel signalling.

12.1.1 SET NET

First change the protocol from the default EuroISDN.

Use the **SET NET [option]** command to select the signalling protocol, then use the **SAVE** and **RESET** commands.

Format

SET NET [OPTION]

Valid options are:

Option	Description
EUR	Euro / Etsi
ATT	USA, AT&T Exchange, 5ESS Custom protocol (see 12.1.2 SET SPID)
DMS	USA, DMS100, Northern Telecom Exchanges (see 12.1.2 SET SPID)
US1	USA, National ISDN - 1 (see 12.1.2 SET SPID)
HOL	ETSI with Dutch / Holland variations
AUS	Australian
NTT	Nippon Telecom (Japan)
EIR	ETSI with Eire variations
ISR	Israel
FRA	France, VN3 protocol

Table 17 Set Net Options

12.1.2 SET SPID

The US networks (DMS100 and NISDN-1) require a Service Provider ID (SPID) to be set within the Terminal Adaptor before the adapter can be used. A SPID must be entered for each B channel. SPIDs are issued to the customer by the service provider. They generally consist of the full telephone number of the B channel, including the area code, with several digits added on the end. SPIDs have a minimum of nine digits.

Enter a SPID from the command port using the command format:

Format

SET SPID [N] [SPID_NUMBER] [DIRECTORY_NUMBER] [BEARER_TYPE]

N = B Channel

SPID_NUMBER = Assigned by Service Provider

DIRECTORY_NUMBER = Assigned by Service Provider

BEARER_TYPE = Select from VOICE, DATA or ANY

13 AT Command Set

This chapter defines the Hayes AT command set recognised by the Teltrend Terminal adaptors.

Each DTE port can be in one of two states, online or command. In the online state all input from the DTE is sent transparently out on the line interface, and all input from the line interface is passed transparently to the DTE. In the command state the port monitors the bytes incoming from the local terminal in search of a valid AT command sequence.

The following Hayes command strings are arranged in alphabetical order. Command strings are prefixed by the character sequence AT or at. Subsequent characters may be upper or lower case.

In this chapter all commands and dial modifiers are in upper case. Note however that sub-address entries are case sensitive. The AT sequence prefixes all commands, other than the repeat command A/ and the online escape sequence +++.

13.1 AT

This command causes the port to respond with OK if it is in command mode waiting to make or receive a call.

13.1.1 ATA Answer

This command causes the port to answer an incoming call if present. If no incoming call is present at the port the ERROR result code is given.

13.1.2 A/ Last Command Repeat

The port does not clear its buffer until the AT of the next command is typed. Entering A/ (with no CR) causes the current command line to be executed again. Neither the AT prefix nor command terminator is necessary.

13.1.3 ATD Dial

This command is the primary method of originating a data call. The Dial command has a considerable number of possible operands. Some of these operands are commands that may be issued in conjunction with the command (secondary dial commands), whereas others are dial information or dial modifiers. A list of valid dial information characters and modifiers are given below along with their individual descriptions.

Dial information

Valid dial information characters are 0 to 9 @ ( ) - * and space. The only information characters are 0 - 9, the other dial string characters are allowed to improve readability but, except for the space character, count against the maximum 40 character buffer count.

Example:

ATD (081) 123-4567

Dial Modifiers

Certain additional characters may be inserted into the dial string to effect the dial command. These are known as Dial Modifiers and are listed below:

Modifier	Action	Effect
,	Comma calibrated pause	(Ignored by port)
;	Return to command mode	(Ignored by port)
!	Hookflash	(Ignored by port)
/	One Eighth second pause	(Ignored by port)
W	Wait for secondary dial tone	(Ignored by port)
S	Dial stored telephone number	
L	Re-dial the last dialled telephone number	
#	Sub-address follows	

Table 18 Dial Command Modifiers

To dial a telephone number stored previously by the use of an AT&Z command, the dial stored number modifier is used in the command format: **ATDS=0**

A sub-address can be added to the called number in an outgoing call dial string using the # separator. The example shows an outgoing call to the address 01234567 and called sub-address ABC.

ATD01234567#ABC

13.1.4 ATE Command State Echo

Parameters: 0, 1
Default: 1

This command toggles character echo on/off when in command mode:

Parameter	Effect
0	Command echo off
1	Command echo on

Table 19 AT State Echo Command Parameters

13.1.5 ATH Hook

Although no hook relays as such exist within the module, this command is valid. ATH or ATH0 perform an unconditional hang-up of the current call. This command is normally used in conjunction with the +++ escape sequence.

13.1.6 ATI Product Identity Code

Parameter: 3

This command displays the copyright notice and the version number in the same manner as the show version command through the Configuration Port. If any parameter value other than 3 is used, the product code 248 is displayed.

Example:

ATI3

13.1.7 ATQ Quiet

Parameters: 0, 1
Default: 0

This command toggles command responses on/off:

Parameter	Effect
0	Return result codes
1	Do not return result code

Table 20 At Quiet Command Parameters

Example:

```
ATQ1
```

13.1.8 ATS S Register Commands

Parameters: see below

S registers allow the storage of numeric configuration parameters in a manner compatible with the Hayes command set S registers. Additional S registers, numbered from 100 upwards, allow the storage of alpha- numeric strings. The contents of an S register may be displayed using commands of the form ATSxxx and changed using commands of the form ATSxxx=yyy, where xxx is the S register and yyy is the new value (*See S-Registers on page 14-1*).

Examples:

```
ATS4?
ATS4=12
```

13.1.9 ATV Verbose Command Response

Parameters: 0, 1
Default: 1

This command toggles command response between numeric codes and text while in command mode.

Parameter	Response
0	Numeric command response
1	Text command response

Table 21 AT Verbose Command Parameters

Port Responses

The Hayes command set lists a set of responses to commands. These responses can be in one or two forms: an ASCII result code, or an ASCII text message.These are listed in Table 22.

Result	Message
0	OK
1	Connect
2	Ring
0	No Carrier
1	Error
5	Ringing
7	Busy
8	No Answer
10	Connect 2400
11	Connect 4800
12	Connect 9600
14	Connect 19200
28	Connect 38400
100	Connect 48000
101	Connect 56000
102	Connect 64000

Table 22 Hayes Command Responses

13.1.10 ATX9 Display CLI

Parameters: 0, 1
Default: 1

This command toggles the display of the CLI after the RING response. The setting can be displayed with the **&V** command.

Parameter	Response
0	CLI display enabled
1	CLI display suppressed

Table 23 AT Display CLI Command Parameters

Example:

ATX9 = 0

13.1.11 ATZ Reset Command

This command resets the port and recalls all the default settings for the various configurable parameters. This command only resets the port at which it is entered.

13.1.12 AT&C DCD Option

Parameters: 0, 1
Default: 1

This command is factory set at one and indicates that the unit is pre-configured so that Data Carrier Detect (DCD) is on only when suitable data is present.

Default is displayed with the &V command. (See Table 9 on page 7-14 for details.)

Note: This option is **NOT** applicable to X.25 or PPP operation.

13.1.13 AT&D DTR Options

Parameters: 0, 2
Default: 2

This command determines response to the presence or absence of DTR (Data Terminal Ready) on the DTE interface according to the parameter used. (See Table 9 on page 7-14 for details.)

Parameter	Action
0	DTR interface circuit ignored; forced to DTR ON internally;
2	Selects normal DTR operation. When DTR is lowered the port clears an existing call if present, return to the command state and ignore incoming calls.

Table 24 AT DTR Command Parameters

Example:

AT&D0

Note: This option is **NOT** applicable to X.25 or PPP operation.

13.1.14 AT&F Select Default Configuration

Parameters: 0, 1

This command causes the default configuration to be restored. All stored numbers are cleared.

Parameter	Action
0	Restores default, retains asynchronous speed setting.
1	Restores default and reconfigures asynchronous speed to 9K6.

Table 25 AT Select Default Configuration Parameters

Many applications issue the AT&F command in their initialisation string. Teltrend Terminal adaptors do not autobaud, so parameter '0' is recommended since some applications could cause communications to be lost.

13.1.15 AT&L Dial-Up

Parameters: non selectable
Default: 0

This command is factory set at zero and indicates that the unit is pre-configured for dial-up operation.

Is displayed with the &V command.

13.1.16 AT&M Synchronous or Asynchronous Mode

Parameters: 0, 1, 2
Default: 0

Parameter	Action
0	Asynchronous dial and connection.
1	Asynchronous dial, synchronous connection, DTR controlled clear.
2	DTR controlled call establishment, synchronous connection, DTR controlled cleardown.

Table 26 AT Mode Command Parameters

&M0 places the module in asynchronous mode where all incoming and outgoing calls are asynchronous data calls. Calls can be established using the **D DIAL** command and cleared using the escape sequence followed by the **ATH** command, or by using DTR controlled cleardown.

&M1 places the module into a mode in which call setup and answering is performed as though the call was asynchronous, except that once connected a synchronous link is established at the configured synchronous speed. Call cleardown is by DTR control only.

&M2 places the adaptor into synchronous mode. In this mode the full 64Kbps on the ISDN is available, but a third party synchronous controller is required. Call cleardown is by DTR control only. Note that when the &M2 command is used AT commands are no longer recognised. The DTE port must be reconfigured or the module powered off and on to restore the &M0 or &M1 setting.

Example:

AT&M2

See S25 in *Chapter 14 S-Registers* and *Section 13.1.25 AT%A2 Set Port.*

13.1.17 AT&Q Synchronous or Asynchronous Mode

Parameters: 0, 1, 2
Default: 0

This command is identical to the AT&M command.

13.1.18 AT&R RTS and CTS Options

Parameters: 0, 1
Default: 0

This command is factory set at zero and indicates that the unit is pre-configured so that CTS follows RTS. This can only be used when local online flow control is enabled.

Default is displayed with the &V command.

Note: This option is **NOT** applicable to X.25 or PPP operation.

13.1.19 AT&S DSR Option

Parameters: 0, 1
Default: 0

This command is factory set at zero and indicates that the unit is pre-configured so that Data Set Ready (DSR) is always asserted. It is displayed with the &V command.

Note: This option is **NOT** applicable to X.25 or PPP operation.

13.1.20 AT&V View Settings

This command displays the port configuration, profiles and identities stored in the unit. It includes the contents of the additional S registers numbered from 100 upwards that contain specific ISDN information.

13.1.21 AT&W Save Active Configuration

This command saves the current port configuration parameters in non volatile memory.

13.1.22 AT&X Transmit Clock Signal

Parameters: non selectable
Default: 0

This command is factory set to zero and indicates that the unit derives the transmit clock signal internally.

Default is displayed with the &V command

13.1.23 AT&X9 Display CLI Information

Parameters: 0, 1

This command controls display of the CLI information. 0 disables the information display and 1 enables the display. The X9 parameter controls display of information on the AT ring indication. It is usually used with PPP

13.1.24 AT&Z Store Dial Number

Parameters: telephone number to be stored

This command stores a dial string of up to 23 characters.

Examples:

AT&Z = 01234 . . .

13.1.25 AT%A2 Set Port

Parameters: 0, 1, 25, 95, 98, 99

This command configures the CONNECT iQ 400 port.

Parameter	Action
0	Synchronous mode
1	Restricted synchronous mode
25	X.25 mode
95	PPP mode
98	Asynchronous dial synchronous connect mode
99	V.110 rate adapted asynchronous mode

Table 27 AT Set Port Command Parameters

13.1.26 AT%B7=1–4095

This command sets the X.25 lower channel range. The range set by this command must be lower than the range set by the AT%B8=1–4095 command. See Table 13 for information about X.25 logical channels.

13.1.27 AT%B8=1–4095

This command sets the X.25 upper channel range. The range set by this command must be higher than the range set by the AT%B7=1–4095 command. See Table 13 for information about X.25 logical channels.

13.1.28 AT%P1=0–255 Set PPP Timeout

This command will disconnect a synchronous PPP connection over ISDN after a period of inactivity and re-establish it once there is activity on the local PC. The inactivity timeout is incremented in seconds.

13.1.29 AT%P2=1/0 TPAD Checksum Mode

Parameter	Action
0	Checksum disabled
1	Checksum enabled

Table 28 AT Select TPAD Checksum Mode Parameters

14 S-Registers

14.1 Introduction

A series of S Registers for each port contain many of the port's variable parameters and allow an alternative method of port configuration. Additional S registers, numbered from 100 upwards, have been provided to further exploit the potential of ISDN. The ATS command is used to access these registers, using the command forms ATSn? and ATSn=.

For example: ***ATS4?*** displays the contents of register 4 and ***ATS4=12*** places 12 in register 4.

14.2 S0 Selects Ring to Answer

Parameters: 0-255
Default: 0

Value: >100 = Answer Immediately

This register allows the call to be answered by the receiving port after a pre-set delay following receipt of the incoming call notification. Note that ringing current is not present on an ISDN line; the assertion/deassertion of the DTE interface ring indicator circuit and the return of the RING response is achieved using internal timers.

14.3 S1 Count of Rings Received

The S1 register records the number of rings that occur when the S0 register is in auto-answer mode, i.e. when S0 contains a value greater than 0.

14.4 S2 Escape Sequence Character

Parameters: 0-255
Default: 43

S2 defines an ASCII escape character in decimal used by a port to exit from the online state. The default escape character is + (ASCII 43).

14.5 S3 Carriage Return Terminator Character

Parameters: 0-255
Default:13

S3 defines the ASCII carriage return character in decimal. Reception of the carriage return character causes the contents of the command buffer to be processed.

14.6 S4 Line Feed Character

Parameters: 0-255
Default: 10

S4 defines the ASCII line feed character in decimal. This character is sent by the port following a carriage return when the Result Codes are being displayed in text format (see *section 13.1.9 ATV Verbose Command Response*). The value in register S4 can be zero (null character) but the function cannot be disabled.

14.7 S5 Backspace Character

Parameters: 0-255
Default: 8

S5 defines the ASCII backspace character in decimal. When a port receives this character it is echoed back to the command screen. In the case of 8, this results in the cursor being moved one character to the left. The previous character (the character before the backspace was sent) received by the port is now deleted from the port buffer. The port then sends a space character (32) to the command screen, erasing the character to be deleted, followed by another backspace character to reposition the cursor correctly.

14.8 S10 V.110 Synchronous Loss Time-Out

Parameters: 0-255
Default: 14

Time-out values in the S10 register are measured in 1/10th of a second. When synchronisation of the V.110 rate adaptation frames is lost, this register is used to delay the clearing of the call while the port attempts to re-synchronise with the remote port. The default setting is 1.4 seconds.

14.9 S12 Escape Sequence Guard Time

Parameters: 0-255
Default: 50

Guard Time values in the S12 register are measured in 1/50th of a second and define the length of time that must post-fix a valid escape sequence. By default the characters +++ can be sent to the port while it is online. For the port to recognise this as an escape sequence it requires by default a further 1 second of silence. This second of silence (when no characters are sent to the port) is called the guard time. The guard time allows +++ to be transmitted as a valid part of a communication sequence without it being interpreted as an escape sequence, thereby placing the port in Command (Local) mode.

Note The time delay between each + character may not exceed the guard time for +++ to be accepted as a valid escape sequence.

14.10 S21 Asynchronous Parity

Parameters: 0-4
Default: 0

This register sets the parity type of the characters exchanged across the DTE-DCE interface:

Parameter	Parity
0	None
1	Space
2	Odd
3	Even
4	Mark

Table 29 Asynchronous Parity Parameters

14.11 S22 Asynchronous Stop Bits

Parameters: 0-1
Default: 0

This register sets the number of stop bits used in characters exchanged across the DTE - DCE interface.

Parameter	Stop bits
0	1 stop bit
1	2 stop bits

Table 30 Asynchronous Stop Bit Parameters

14.12 S23 Data Port Configuration

Parameters: 0-4
Default: 2

This register sets the asynchronous data rate of the port in bits per second:

Parameter	Data Rate
0	2400
1	4800
2	9600
3	19200
4	38400

Table 31 Data Port Configuration Parameters

14.13 S24 Asynchronous Data Width

Parameters: 0-1
Default: 0

This register value defines the number of data bits expected by the port:

Parameter	Data Width
0	8 bits
1	7 bits

Table 32 Asynchronous Data Width Parameters

14.14 S25 DTR Detection

Parameters: 0-255
Default: 5

When the Port is operating in synchronous mode 1 (&M1 setting), the value assigned to register S25 specifies the duration that the port waits after a connection has been made, before examining the DTR circuit. This allows the port to ignore an on/off transition of DTR and gives sufficient time to disconnect the port from the asynchronous terminal used to dial and attach it to a synchronous terminal, without dropping the call and forcing the port back into the asynchronous command mode. The value of S25 is measured in full seconds.

14.15 S26 RTS to CTS Interval

Parameters: 0-255
Default: 1

This register specifies the delay interval before CTS is turned on after an off/on transition of RTS. This value only takes effect when the &R0 command option has been selected and applies to synchronous modes 2 and 3 only (&M1 and & M2 settings.)

14.16 S27 Synchronous Speed Configuration

Parameters: 0-4
Default: 4

This register is used to specify the user data rate in AT&M1 and AT&M2 modes in bits per second:

Parameter	Speed
0	9600
1	19200
2	48000
3	56000
4	64000

Table 33 Synchronous Speed Configuration Parameters

14.17 S100 Local Address

Parameters: 0-9 digits

This register contains the string of ASCII digits 0 - 9 which represent the telephone number associated with the port. On lines configured for MSN this string is used to check against the incoming called number (if present) in order to verify the identity of the called terminal. If this check succeeds the call is accepted.

14.18 S101 Incoming Called Address

This is a read only register containing the called address from the last call to arrive at the terminal. This register can be read when an incoming call is alerting the user, and various actions can be taken prior to answering the call.

14.19 S102 Local Subaddress

Parameters: Up to 23 characters

This register contains the ASCII character string that gives the subaddress of the port. If configured, the subaddress of the port is sent to the called terminal when an outgoing call is made by the terminal. Currently, the UK's BT ISDN-2 service only allows the first six characters to be sent end to end: if more than six characters are entered they are truncated by the network.

14.20 S103 Port Channel

Parameters: 0-2
Default: 0

This register is used to tie a port to a channel, indicating the channel to use for outgoing calls. If this register is not defined any channel may be requested when call establishment is performed:

Parameter	Channel
0	Any Channel
1	Channel B1
2	Channel B2

Table 34 Port Channel Parameters

14.21 S104 Originating Line Address

This is a read only register and contains the telephone number of the calling station (if available). It remains in the register until another call is received. If an address is not presented with an incoming call then the register is cleared.

14.22 S105 Originating Line Subaddress

This is a read only register and contains the subaddress of the calling station (if available). It remains in the register until another call is received. If the subaddress is not presented with an incoming call then the register is cleared.

14.23 S106 Call Termination Cause

This register stores the reason for a call termination as presented to the port by the network. When a call is finally cleared, the termination cause is placed as an ASCII string in this register. It remains in the register until another incoming call is received or an outgoing call is made, at which point it is set to the default value zero awaiting the termination reason for the current call.

The BT ISDN-2 service provides an ASCII text message in the form *AA*text#. Both the call termination cause codes and their corresponding text messages are listed in the table at the end of this chapter. Note that some cause codes apply to more than one text message.

14.24 S107 Incoming Called Subaddress

This is a 'read only' register that contains the called subaddress from the last call to arrive at the terminal, if the remote unit attached a subaddress to the dial string.

14.25 S108 Remote Subaddress

Parameters: Up to 23 characters

This register contains the subaddress of the terminal to be called. If present, this subaddress is appended to the dial string stored by the Hayes AT&Z command whenever an ATDS command is used. Note that if a subaddress is contained in an ATD command dial string it overrides any subaddress stored in this register.

NOTE: In the UK, the current implementation of the BT ISDN-2 Service restricts the number of characters transmitted across the network to 6 and truncates additional ones.

14.26 S109 Application Type

Parameters: xx
Default: 15

This register can be used to configure the application type. The options are:

Parameter	Option
02	Data - corresponds to the HLC element OSI X.200
15	None
16	Timelink - Australia only
17	Semiperm - Australia only, must have a Local Address configured

Table 35 Application Type Command Options

14.27 ISDN Message Text

ISDN Message Text *AA*text#	ISDN Cause
Access Barred	63
Acknowledgement	31
Cleared	16, 41
Call Rejected	21
Error	95, 100, 111
Facility Not Registered	41
Incompatible Terminal	88
Line Out Of Service	27
Network Busy	42
No Reply	18
Not Allowed	29
Number Busy	17
Number Incomplete	90
Number Unobtainable	1, 21, 63, 88
Remote Error	111
Restricted Access	41
Service Temporarily Unavailable	41
Service Termination	41
Terminal Unavailable	21
User Has Changed Number	22

Table 36 ISDN Message Codes and Text

15 Trouble Shooting

Many of the problems that can arise when using Teltrend Terminal adaptors may be attributable to incorrect installation and configuration. Most configuration problems can be found and corrected from the Configuration Port or remotely using the remote configuration option.

15.1 Configuration Port Does Not Respond

1. Check if the CONNECT iQ 400 Series unit is receiving power and the internal power supply is operating correctly by checking that the POWER LED on the front panel is illuminated when the power is first applied.
2. Check the configuration terminal has the following settings:

Speed	9600 Bits/Sec
Char size	8 Bits
Parity	NONE
Stop bits	1

Table 37 Configuration Port Settings

3. Check the configuration cable is wired correctly to suit both the terminal and the unit. If in doubt consult the Configuration Port Interface Pinout insection 20.6 iQ 400 Series Configuration Port Interface.

15.2 Configuration Port Returns Garbled Messages

Check the configuration terminal is set up with the correct parameters as in Step 2 above.

15.3 Manual Push Buttons Fail to Establish a Call

1. If the port LED does not show orange when the button is pressed, check that the port has a remote address configured.
2. If the port LED illuminates momentarily but then goes out, check that the unit is connected to the ISDN terminating unit supplied by your ISDN Service Provider.
3. If the unit is connected to the ISDN terminating unit, check the service status of the calling and called ISDN lines by dialling the respective telephone numbers from a standard analogue telephone. Some line faults are reported to you by an audio announcement of LINE OUT OF SERVICE. If you receive this type of announcement contact your ISDN Service Provider.
4. If the port LED illuminates for 5 or more seconds and then goes out, check the status of the remote terminal. The incoming call may be ignored for reasons of compatibility with Calling Line Identity, subaddress, bearer channel, etc. To ensure that this is not the problem, at the called terminal clear the local address value, the local subaddress value, set the channel value to Any.
5. If the port interface selected is V.24 ensure that both local and remote port settings are identical. A port configured to be synchronous will not respond to an incoming call from an asynchronous port.
6. If there are any Calling Line Identities configured, ensure that the calling terminals telephone number(s) are present in the list. To be thoroughly sure that this is not the problem, clear all CLI settings.

15.4 All Methods of Making an Outgoing Call Fail

Check steps 2, 3, and 4 in Section 15.3 on page 15-2.

15.5 No Response is Seen to Incoming Calls

1. Check that the port settings (asynchronous/synchronous) are the same for both ports
2. Ensure that if a local subaddress is configured the subaddress facility is present on the ISDN lines of both ends. (Check with your ISDN Service Provider). Also ensure that the calling terminal has the same subaddress configured in the Remote Subaddress store
3. If there are any CLI values configured check that the calls are not being rejected because of the CLI check by disabling the CLI checking
4. Enable call monitoring with the SET MONITOR command
5. If using V.25bis Call Control, see *Chapter 17 V.25bis Call Control*

16 X.21 Call Control

This chapter contains information on the X.21 Call control procedures employed by the Terminal adaptor. Use the following description in conjunction with the Address Call Sequence chart and the Call Control Status diagram in this chapter.

Before being able to either initiate a call or accept a call the DCE and DTE must both indicate a ready state by signalling (I=off, Rx=1) and (C=off, Tx=1) respectively.

16.1 Making an Outgoing Call

1. A DTE requests a network connection (a call request) by signalling a continuous zero condition on the Tx line while holding the control line ON i.e. (C, Tx) goes from (OFF, 1) to (ON, 0)
2. The DCE responds to this call request by indicating Proceed to Select on the indicate and receive lines. The DCE does this by keeping the indicate line OFF and transmitting a continuous + (ASCII character 43) on the receive line. Whenever a sequence of characters is transmitted by either the DCE (on Rx) or the DTE (on Tx) the sequence must begin with two or more SYNC characters (ASCII 16) for synchronisation purposes.
3. Once the DTE has detected the proceed to select signal it begins to send the selection signals, that is the telephone number to be dialled (also referred to as the remote address). Again the DTE must precede the character sequence with two or more SYNC characters. The end of the telephone number is defined by a + character (ASCII 43). It is permissible for the DTE to insert SYNC characters within the telephone number sequence.

   After detecting the remote address termination character from the DTE the DCE begins to establish a connection over the network to the given address. During this call establishment stage the DCE signals DCE waiting by keeping the indicate line OFF and transmitting the SYNC character continuously on the receive line. That is (I, Rx) goes from (off, SYNC SYNC +++++...) to (off, SYNC SYNC SYNC...)
4. After sending the telephone number the DTE also goes into a state of DTE waiting by signalling (on, 1).

NOTE: The sequence described so far is for an address call, where the DTE sends the remote address to the DCE.

However, if on receiving the proceed to select signal from the DCE the DTE immediately signalled DTE waiting, bypassing the selection sequence stage, it means that a direct call needs to be made. In this case the DCE uses an internally configured number to establish a connection.

---

5. Once the DCE has established a connection to the remote site it signals ready for data to the DTE (on, 1), and on receiving this signal the DTE begins transmitting data.
6. If the local DTE now wishes to clear the call then it informs the DCE by causing the control line to go from ON to OFF and by transmitting a continuous 0 on the transmit line. This is the DTE clear indication signal.

7. The DCE must now respond with DCE clear confirmation by switching its indicate and receive lines from (on, data) to (off, 0).
8. The DCE continues signalling DCE clear confirmation while it is clearing the call down from the network; however as soon as the call has been terminated it informs the DTE by signalling its ready state (off, 1). On detecting the DCE ready signal from the DCE, the DTE also begins to signal its ready condition. The DCE is now back in its original state and is able to initiate another call (or receive an incoming call).

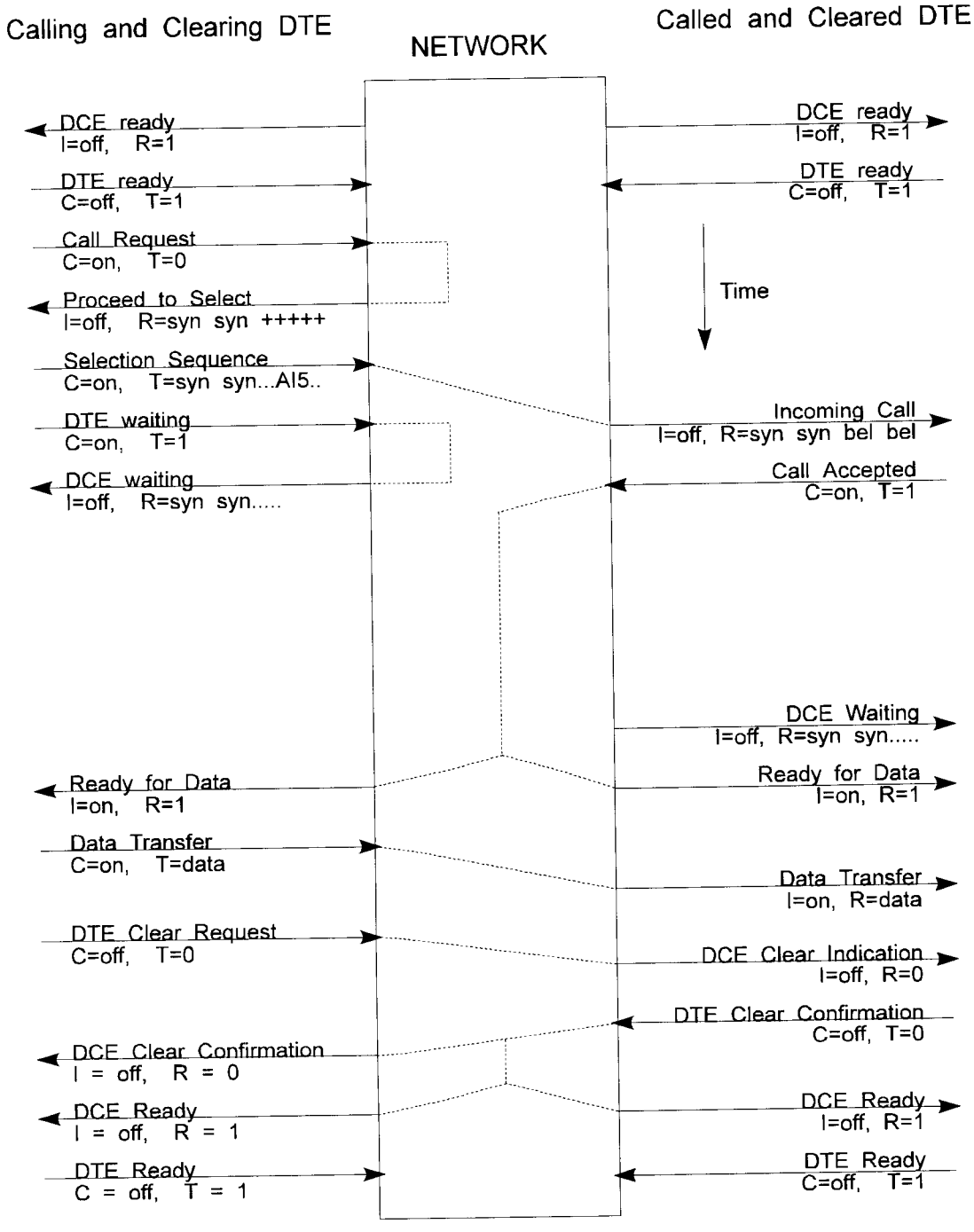

Figure 6 X.21 Address Call Sequence

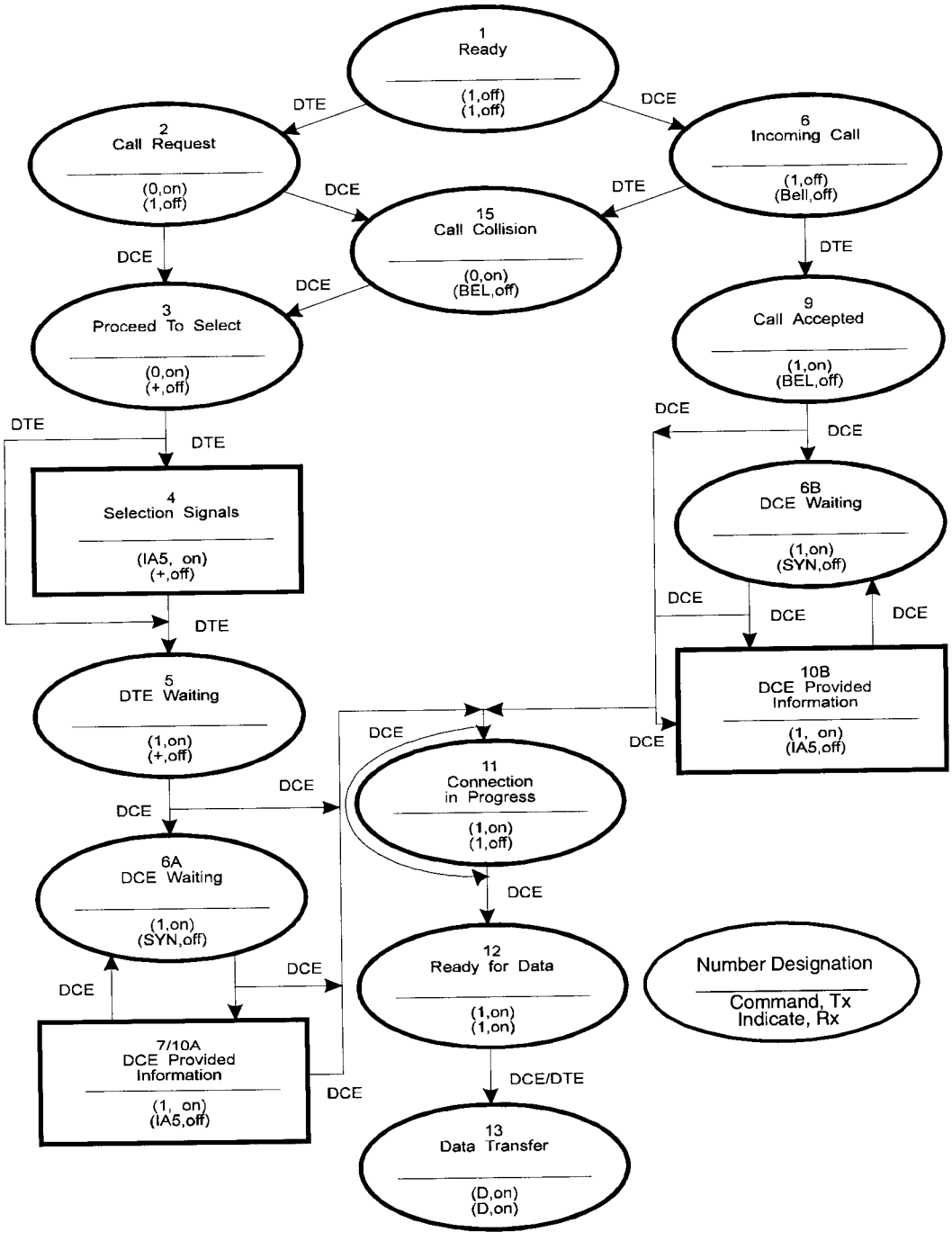

Figure 7 Call Control Status

16.2 Receiving an Incoming Call

1. The DCE informs the DTE of an incoming call from the network by signalling OFF on the indicated line and transmitting a continuous BEL character (ASCII 7) on the receive line, preceded by a minimum of two SYNC characters. That is (I, Rx) goes from ready (off, 1) to (off, sync sync bel bel...)
2. The DTE on receiving the incoming call signal, and wishing to accept the call, responds with (on, 1) on the (C, Tx) lines
3. Once the DCE detects call accepted from the DTE it stops its incoming call signal and instead gives a DCE waiting signal. That is (I, Rx) goes from (off, sync sync bel bel...) to (off, sync sync...). During this DCE waiting time the DCE is making a connection to the network
4. As soon as the end-to-end link is established the DCE indicates ready for data to the DTE by signalling (on, 1), and the DTE begins transmitting its data
5. If the remote unit that initiated the link now clears the call (i.e. it hangs up) then the DCE informs the DTE by causing the indicate line to go from ON to OFF and by transmitting a continuous 0 on the receive line. This is the DCE clear indication signal
6. The DTE must now respond with DTE clear confirmation by ceasing to transmit data and instead send its control and transmit lines from (on, data) to (off, 0)
7. On detecting the DTE clear confirmation signal from the DTE, the DCE goes back into its ready state where it is again able to receive another incoming call or initiate an outgoing call. Also, on receiving (off, 1) on (I, Rx) the DTE starts to signal its ready condition to the DCE

17 V.25bis Call Control

V.25bis is a CCITT standard which defines a protocol for the support of automatic calling and/or answering equipment on the Public Switched Telephone Network (PSTN) using the 100-series interchange circuits. The 100-series interchange circuits are those normally found in an RS-232 connection.

V.25bis can be used to make an Addressed Call or a Direct Call. With an addressed call the DTE and the Terminal adaptor communicate using a specific set of commands and responses, whereas with direct call there is no form of communication and calls are made and accepted by the DTE raising a hardware signal (Data Terminal Ready, DTR).

With a direct call the Terminal adaptor must be pre-configured with a telephone number and with the correct operating speed before it is connected to the DTE, but with an addressed call the Terminal adaptor can be provided with this information at the time of the call request by the DTE.

With the addressed call mode of operation the commands and the responses to and from the DCE can be sent as an HDLC frame, depending on how the Terminal adaptor has been configured.

17.1 Addressed Call

17.1.1 Making an Outgoing Call

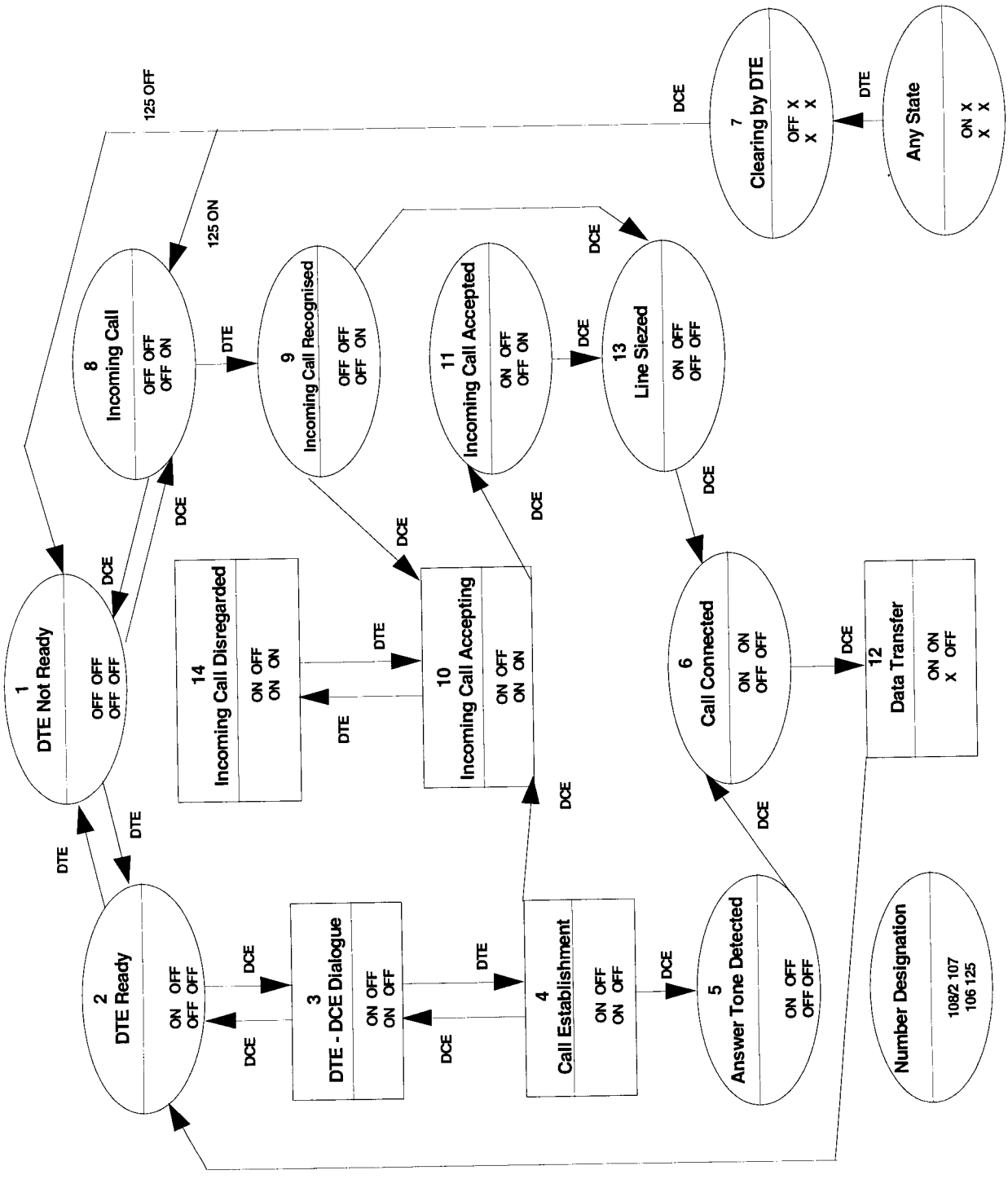

Figure 8 V.21bis Addressed Call Outgoing Call States

The states displayed in the diagram are as follows:

1. ***STATE = DTE Not Ready.*** When the DTE is not ready to either receive or make a call or enter into dialogue with the Terminal adaptor, DTR remains OFF.
2. ***STATE = DTE Ready.*** The DTE signals DTR ON when it is ready to communicate with the Terminal adaptor.
3. ***STATE = DTE-DCE Dialogue.*** The Terminal adaptor shows that it is able to communicate with the DTE by signalling CTS ON.
4. ***STATE = Call Establishment.*** The DTE initiates a call set-up by issuing a call request command.
5. ***STATE = Answer Tone Detected.*** When the remote begins to alert, the Terminal adaptor signals CTS OFF and issues a ***call connecting*** indication to the DTE.
6. ***STATE = Call Connected.*** Once an end-to-end connection has been established the Terminal adaptor signals DSR ON, to indicate that the DTE can begin sending data.
7. ***STATE = Clearing DTE.*** The DTE is able to clear a call at any time by signalling DTR OFF.
8. ***STATE = Data Transfer.*** On seeing DSR raised the DTE begins transmitting data, and the Terminal adaptor signals CTS ON.

17.1.2 Answering an Incoming Call

1. ***STATE = DTE Not Ready.*** When the DTE is not ready to either receive or make a call or enter into dialogue with the Terminal adaptor, DTR remains OFF.
2. ***STATE = DTE Ready.*** The DTE signals DTR ON when it is ready to communicate with the Terminal adaptor.
3. ***STATE = DTE-DCE Dialogue.*** The Terminal adaptor shows that it is able to communicate with the DTE by signalling CTS.
4. ***STATE = Incoming Call Accepting.*** The DCE signals to the DTE that an incoming call has been detected by issuing an incoming ***call indication*** and signalling RI ON.
5. ***STATE = Incoming Call Accepted.*** The DTE may reject the call by turning DTR OFF or by issuing a ***disregard incoming*** call command. If the DTE does not respond within two seconds the incoming call is automatically answered, or if the DTE issues a ***connect incoming call*** command the call is answered immediately. The DCE signals CTS OFF and issues a ***call connecting*** indication to show that it is in the process of accepting the incoming call.
6. ***STATE = Line Seized.*** When the B-channel is seized by the DCE it signals RI OFF.

6. ***STATE = Call Connected.*** On an end-to-end connection being established the DCE signals DSR ON.

12. ***STATE = Data Transfer.*** On seeing DSR raised the DTE begins transmitting data, and the Terminal adaptor signals CTS ON.

17.2 Direct Call

The states displayed in Figure 9 are listed following the diagram.

17.2.1 Making an Outgoing Call

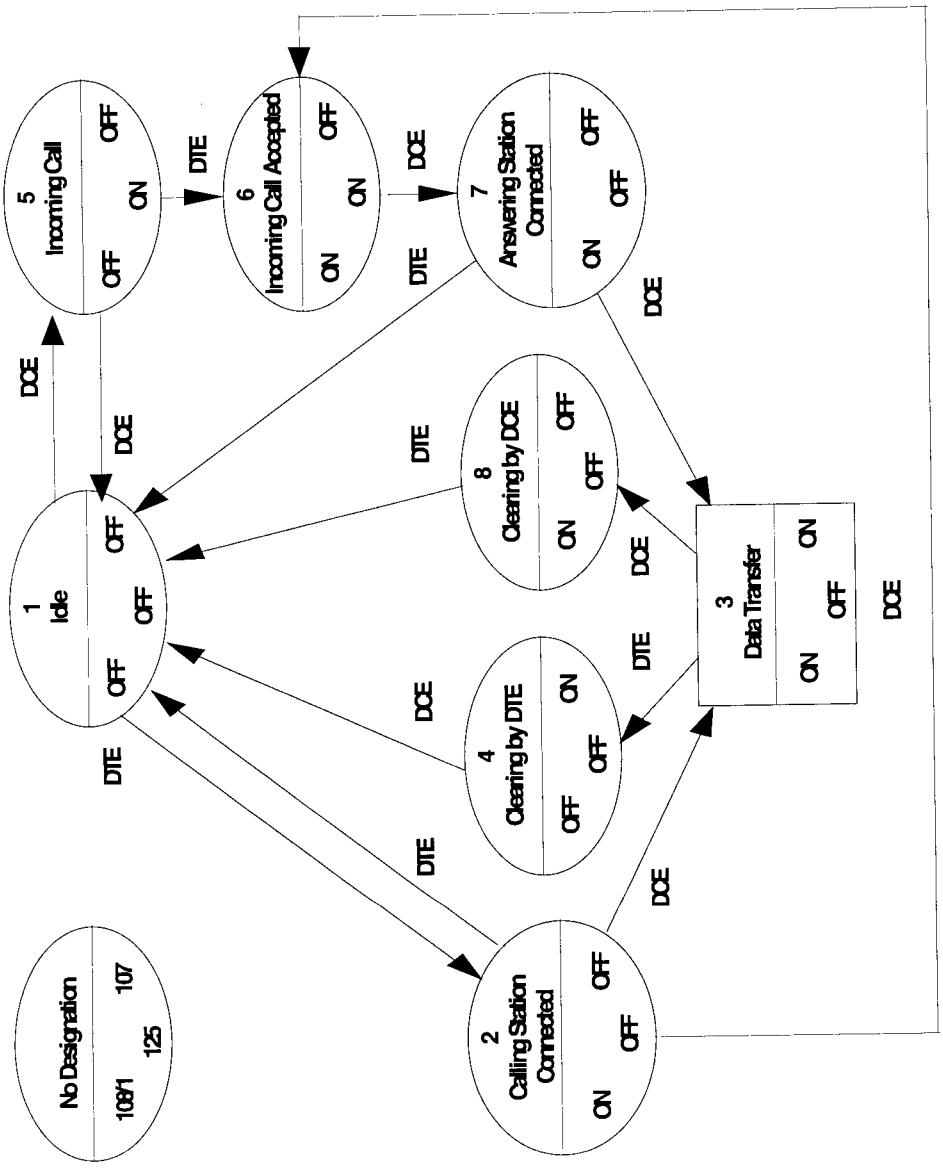

Figure 9 V.21bis Direct Call Outgoing Call States

1. ***STATE = Idle.*** The DCE must have been pre-configured with a telephone number.
2. ***STATE = Calling Station Connected.*** The DTE signals DTR ON.
3. ***STATE = Data Transfer.*** When the DCE has established an end-to-end connection it signals DSR ON.

4. ***STATE = Clearing by DTE or Idle.*** The DTE can abort the call at any time by signalling DTR OFF.
5. ***STATE = Clearing by DCE.*** The DCE indicates a clearing of the call by signalling DSR OFF.

17.2.2 Answering an Incoming Call

6. ***STATE = Incoming Call.*** The DCE signals RI ON whenever it detects an incoming call.
7. ***STATE = Incoming Call Accepted.*** If the DTE does not want to accept the call it holds DTR OFF until the network drops the call. The DTE answers the call by signalling DTR ON.
8. ***STATE = Answering Station Connecting.*** The DCE in turn, signals RI OFF.
9. ***STATE = Data Transfer.*** Once an end-to-end connection has been established the DCE signals DSR ON.
10. ***STATE = Clearing by DTE or idle.*** The DTE can abort the call at any time by signalling DTR OFF.
11. ***STATE = Clearing by DCE.*** The DCE indicates a clearing of the call by signalling DSR OFF.

17.3 Terminal adaptor Setup

Before connecting the Terminal adaptor to the DTE it is necessary to pre-configure it for the type of call control that is required. This is done by using one of the following commands:

SET CALL CONTROL V25 HDLC
SET CALL CONTROL V25 ASYNCHRONOUS (NOT YET AVAILABLE)
SET CALL CONTROL V25 SYNCHRONOUS (NOT YET AVAILABLE)
SET CALL CONTROL V25 DIRECT

On re-configuring a Terminal adaptor for a new type of call control all previous configuration is lost and the Terminal adaptor must be set up again for that particular call control. This allows the set up procedure to commence from a known condition.

For example, when configuring the Terminal adaptor for V.25 HDLC Call Control the following series of commands are used:

SET CALL CONTROL V25 HDLC
SET PORT SYNCHRONOUS
SET SPEED 19K2

The Terminal adaptor is configured in *addressed call* mode with the commands and indications packaged as HDLC frames and with the DTE - DCE interface operating synchronously at 19,200 bps. The configuration is maintained after power off.

NOTE: When a port is set to use a call control such as V.25bis, the unit does not respond to manual call commands. It is not able to initiate a call or answer a call using the front button or by using the COMMAND port and commands such as dial and answer.

18 PBX Operation Analogue Ports

18.1 Introduction

The CONNECT iQ 400 Series provides up to four voice ports; the 440 has two ports while the 460 supports four. Analogue or voice support is provided by the addition of one or two VOX modules. Each VOX module supports two analogue ports that may be used for a telephone, modem, fax, answering machine or door-phone.

18.2 Features Supported

The Connect iQ 400 Series supports the following features:

- Calls between four analogue telephones
- Hot call
- Call transfer on:
    - — Reply
    - — No reply
- Incoming call divert:
    - — No divert
    - — Divert immediate
    - — Divert on busy
    - — Divert on noreply
    - — Divert on noreply and busy
- Cyclic extension hunting
- Call redirection
- Call pickup
- Analogue telephony calls can be:
    - — Initiated from an attached phoneset and dialled using DTMF tones
    - — Answered by an attached phoneset
    - — Initiated from the command and configuration port for a voice port
- Supports call hold
- Call Shuttle (Brokers Call)
- Supports barring of:
    - — Specific dialled numbers
    - — Outgoing calls
    - — Incoming calls

  - — External call divert
  - — External call transfers
- Data calls can be initiated from the attached phoneset for either data port
- Call log for last 25 calls
- Supports MSN or DDI configuration for each port
- Supports B channel allocation for each port
- Emergency number override
- Short code dialling

18.3 Back Panel

See *Figure 10* for a description of the back panel.

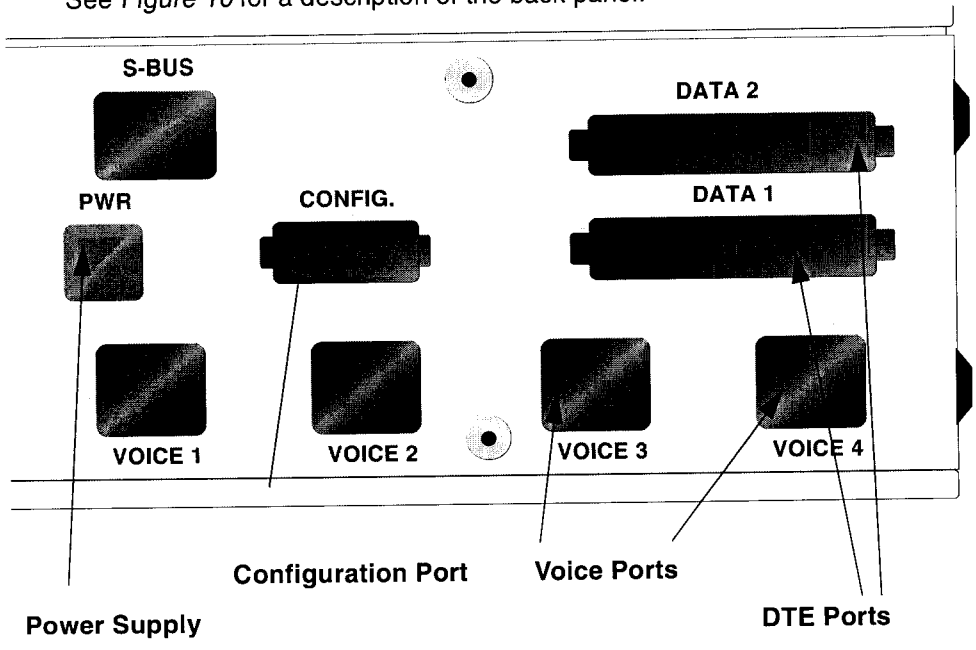

Figure 10 iQ 400 Series Back Panel

Connection	Number	Type of Connector
DTE Ports	2	25-pin D Female
Configuration Port	1	9-pin D Female
ISDN	1	RJ-45 ISDN
Power Supply	1	2.1mm DC Jack
Voice Ports	2 or 4	RJ-11

Table 38 Types of Connector

18.4 Attaching Analogue Equipment

Each port has a standard RJ-11 telephone socket that provides a Tip and Ring A/B pair. In the UK an RJ-11 to BS6312 stub is provided. In UK operation it also provides master socket capability and can support equipment with a REN (Ring Equivalence Number) of up to three. Each port can ring up to three devices (telephones, fax machines or modems) connected as main equipment or as extensions to the main equipment.

Analogue equipment can be attached directly to the socket or the port can be used to provide one or more extension sockets.

18.5 Making and Receiving Calls

18.5.1 Outgoing Calls

The analogue port is used to call out in two ways:

1. A telephone calls out by lifting the handset to go off hook or by pressing the hands free call initiate button. Modems and faxes call out in the normal manner
2. The Terminal adaptor can call for the attached equipment, primarily for a telephone. You initiate a call through the command port by changing to Port 4 and using the DIAL command. If the call is successful, the connected telephone rings

If the B channel is **not** available for use by the analogue port when call is made, a continuous tone is provided to the attached equipment.

The B channel can be unavailable because:

- Both B channels are being used by other analogue ports
- Another piece of ISDN terminal equipment is using the B channels
- The Terminal adaptor cannot communicate with the exchange line

18.5.2 Incoming Calls

The connected analogue equipment must be on-hook to receive incoming calls. Incoming calls alert the attached equipment by providing a ringing voltage at the port connector. The analogue port is capable of ringing electro-mechanical bells and the low current transducers found in modern telephones and also signals incoming calls to fax machines and modems.

18.6 Using MSN and Subaddresses

An ISDN line may be configured by an ISDN service provider to provide MSN (Multiple Subscriber Numbering) or subaddressing.

Some of these facilities are not used by analogue equipment attached to an ISDN line.

When a call originates from a non ISDN line, it cannot have an associated subaddress.

However, analogue ports receiving calls from analogue lines can use Multiple Subscriber Numbering (MSN). If more than one Terminal adaptor is attached to an ISDN line with more than one analogue port available to receive incoming calls, the incoming calls can be routed to particular analogue telephone equipment based on the number that was called. This is achieved by configuring the local address for Port 4 (the analogue port) with the appropriate telephone number.

MSN is an optional addition for an ISDN line. Please check with the ISDN service provider that this facility is available.

Optional subaddressing is **not** useful when using an analogue port unless all the incoming calls originate from ISDN lines. If a local subaddress is configured into ports 4, 5, 6 or 7 of the Terminal adaptor, it may prevent incoming calls being notified to the attached equipment.

NOTE: Do **not** set the local subaddress on the analogue port unless your lines have the optional subaddress facility.

18.7 Using the CONNECT iQ 400 Series

This section lists the functions that the Connect iQ 400 Series provides to end users, and describes how to use them.

18.7.1 Connecting Two Analogue Phones

Description

You can connect to an internal extension or to an outside number.

Procedure

To call an internal extension:

1. Lift the handset and wait for the dial tone
2. Dial the internal number prefix - the default value is 4. (*See PBX SET NUMBER on page 18 - 18* for information about setting up internal extension numbers)

3. Dial the extension number. When the extension rings, the calling extension will hear a ring tone

To call an outside number:

1. Lift the handset and wait for the dial tone
2. Dial the External Line prefix. (The default External Line prefix is nine, but this can vary according to the prefix specified for the system. *See PBX SET PREFIX on page 18 - 20* for details of setting the external line prefix)
3. The dial tone should change to the external service provider's dial tone
4. Dial the external telephone number

18.7.2 Connecting a Data Port Using the Analogue Port

Description

You can connect a data port to an ISDN line from an analogue telephone if you specify the data port number, destination number and data rate. Select a data rate of either 56K (US) or 64K (Europe). (*See PBX SET PREFIX on page 18 - 20* for information about setting the DATA prefix.)

Procedures

To set up a data port connection:

1. Lift the handset and wait for the dial tone
2. Dial #[1], followed by the port number[2], then the external prefix (usually 9), destination number and the data rate[3]

Example

#2 9 12345*

To hang an ISDN call:

1. Lift the handset and wait for the dial tone
2. Dial #[1], followed by the port number[2] then the data rate[3]

Example

#2*

18.7.3 Prefix Management

Prefixes are set up from the configuration port. (See *PBX SET PREFIX, page 18-20.*)

---

1. # is the default value for the Data Call Prefix. This may be reconfigured to another value on some systems.
2. The data ports are numbered one and two.
3. Select 56K for the US (use #) or 64K for Europe (use *).

18.7.4 Last Number Redial

Description

Last Number Redial enables you to automatically redial the last external number dialled by dialling the redial prefix on the telephone. (*See PBX SET PREFIX on page 18 - 20* for information about setting the Last Number Redial prefix.)

Procedure

1. Lift the handset and wait for the dial tone
2. Dial the last number redial prefix. The number will be redialled automatically.

18.7.5 Hot Call

Description

It is possible to set up the Connect iQ 400 Series to dial a number automatically when a telephone receiver is lifted. This is the hot call facility. (See *section 18.9.9* for a description of setting up hot call.)

Procedure

To use hot call:

1. Lift the receiver. The system dials the pre-programmed number. If the line is available, you will hear the ring tone

18.7.6 Call Hold

Description

Local hold allows you to mute a call and reconnect to it later.

Procedure

To use local hold:

1. Press the Recall button to put the connected call on hold. You should hear the dial tone
2. Press the Recall button again to retrieve the call
3. If you go on-hook with a call on local hold, your phone will ring so you can retrieve the call

18.7.7 Call Transfer

Description

You can set up two different types of call transfer. You can transfer the incoming call:

1. After the transfer phone replies
2. Without waiting for a reply from the transfer phone

Procedures

Transfer on Answer

To transfer a call to another extension:

1. Off-hook the receiver to answer the incoming call (step A)
2. Press the Recall button to put the incoming call on hold
3. Dial the number of the extension you want to transfer the call to (step B)
4. Wait for the extension to reply (step C)
5. When the extension replies (step D, put your receiver on-hook. The incoming call connects directly to the transfer extension (step E)

.

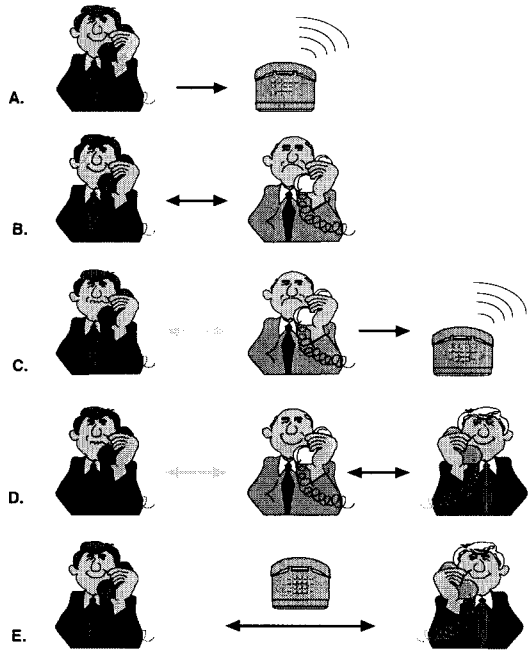

Figure 11 Call Transfer on Answer

Transfer on No Reply

To transfer a call without waiting for the other extension to reply:

1. Off-hook the receiver to answer the incoming call (step A)
2. Press the Recall button to put the incoming call on hold
3. Dial the number of the extension you want to transfer the call to (step B)
4. Wait for the transfer extension to ring (step C)
5. Put your receiver on-hook (step D)

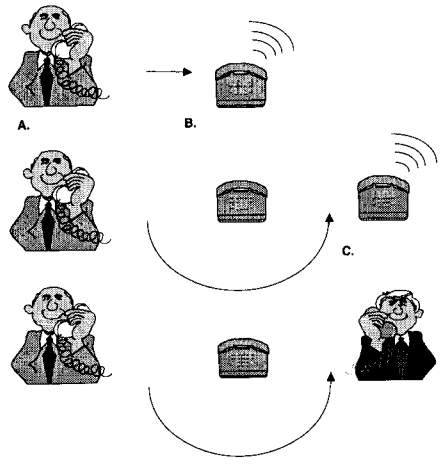

Figure 12 Call Transfer on No Reply

18.7.8 Shuttle or Brokers Call

Description

A shuttle or brokers call allows you to handle two simultaneous calls from the same telephone, switching between the two.

Procedure

To set up a brokers call:

1. Dial the first number and establish contact (steps A and B)
2. Press the Recall key to put the first call on hold. You should hear the dial tone again
3. Dial the second number and establish the other call (steps C and D)
4. Use the Recall key to switch between the two calls (step E)
5. If you put the telephone back on the hook with a call on hold, the telephone will ring and reconnect you to the holding call
6. Replace the telephone on the hook to disconnect the call

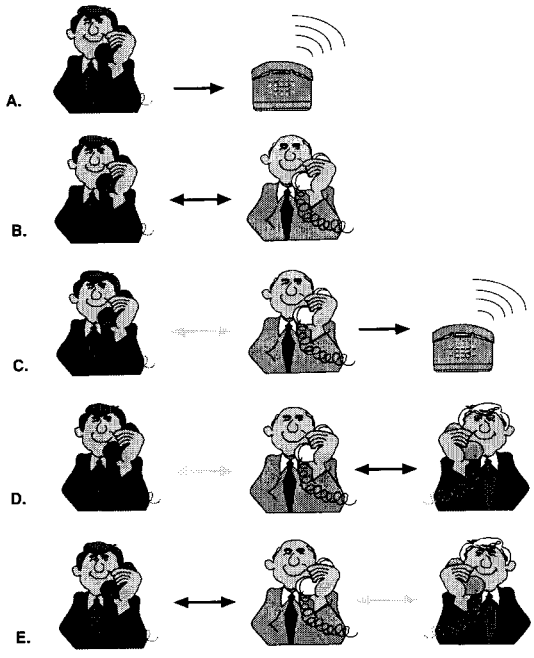

Figure 13 Shuttle or Brokers Call

Note: If you are shuttling between two calls, at least one of which is an internal call, and the handset is replaced while one party is active and the other is on hold, the two parties will be connected together (see *Call Transfer, page 18-6.*). To avoid this, ensure that one of the parties has cleared before replacing the handset

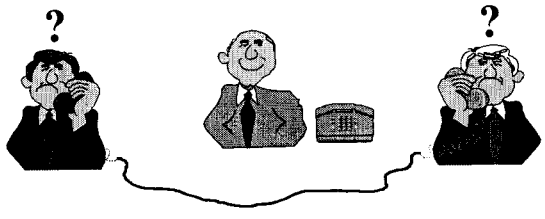

Figure 14 Brokers Call Transfer

18.7.9 Diverting Calls

Description

You can set up four different types of call diversion. (See *PBX SET DIVERT, page 18-27* for information about configuring Call Diversion on the iQ 400 Series.)

You can divert the incoming call:

- Immediately
- Only if the phone is busy

- After a set period of time when not answered
- When busy or after a set time period when not answered. This is divert *noanswer*

You can only use one type of call diversion at one time.

Note: It is **NOT** possible to set up Divert Immediate and Divert Noanswer to divert an external call to another external number during normal day service. (*See PBX SET PREFIX on page 18 - 20* for information about setting up the Night Service facility.)

Procedures

Divert Immediately

To divert the incoming call immediately:

1. Lift the handset and wait for the dial tone
2. Dial 53[4], the Divert Immediate prefix. The dial tone should disappear
3. Dial the number you want to divert calls to. Add a # after the number if you are diverting calls to an external number
4. If the divert is accepted, you will hear the feature accepted tone on the handset
5. Replace the handset on-hook

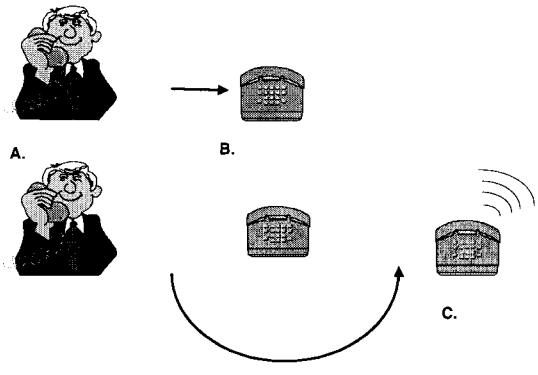

Figure 15 Divert Immediate

Figure 15 shows an example of Divert Immediate.

1. A caller phones extension B
2. B has an immediate divert to extension C set up
3. The call rings on extension C

4. This number may vary on some systems

Divert When Busy

To divert the incoming call when busy:

1. Lift the handset and wait for the dial tone
2. Dial [5]52, the Divert When Busy prefix. The dial tone should disappear
3. Dial the number you want to divert calls to. You will hear the feature set dial tone
4. Replace the handset on-hook. If your phone is busy, calls will be redirected

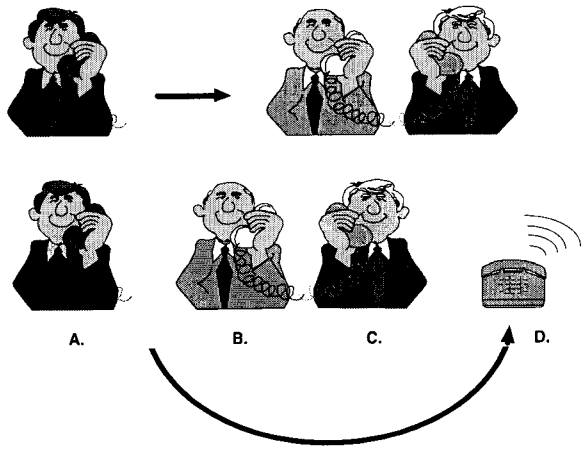

Figure 16 Divert When Busy

Figure 16 shows an example of Divert when Busy.

1. A caller rings extension B
2. B is busy talking to C. B has Divert when Busy set up to extension D
3. The call rings on extension D instead

Divert on No Reply

To divert the incoming call after a specified time when there is no reply:

1. Lift the handset and wait for the dial tone
2. Dial 51[5], the Divert No Reply prefix. The dial tone should disappear
3. Dial the number you want to divert calls to
4. If the divert is accepted, you will hear the feature accepted tone on the handset
5. Replace the handset on-hook

5. This number may vary on some systems

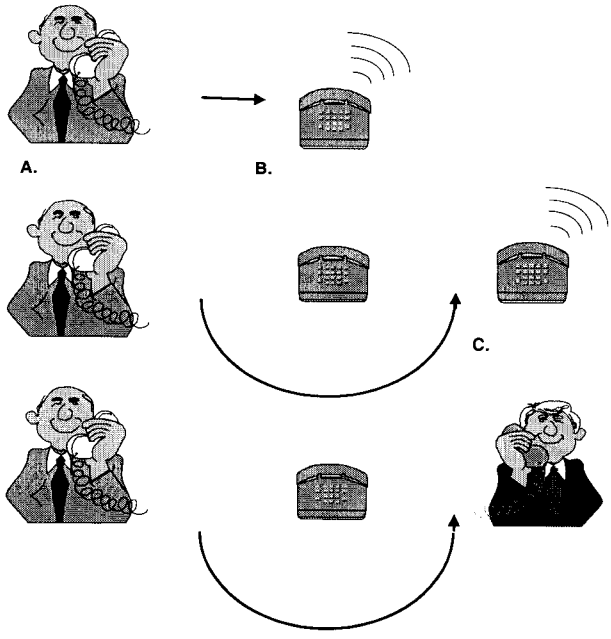

Figure 17 Divert Noreply

In Figure 17:

1. A calls extension B.
2. Extension B has Divert on Noreply set up. If there is no reply after ringing several times, the call diverts to extension C.

Divert Noanswer

To divert the incoming call after a specified time when there is no reply *or* if the phone is busy:

1. Lift the handset and wait for the dial tone
2. Dial 54[6], the Divert Noanswer prefix. The dial tone should disappear
3. Dial the number you want to divert calls to
4. If the divert is accepted, you will hear the feature accepted tone on the handset
5. Replace the handset on-hook

6. This number may vary on some systems

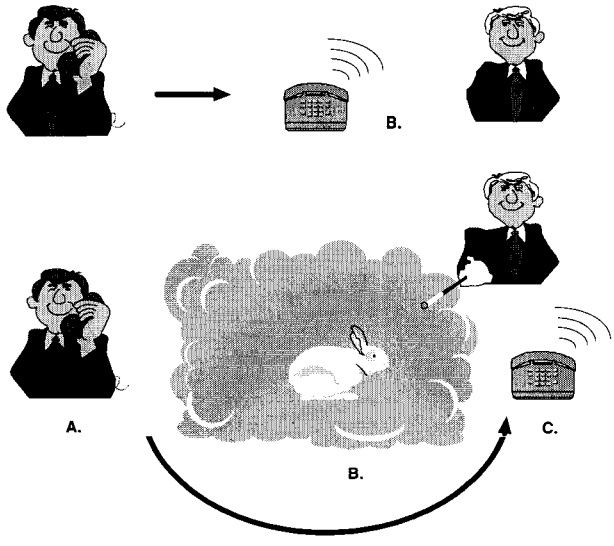

Figure 18 Divert Noanswer

Figure 18 shows an example of Divert Noanswer.

1. A calls extension B
2. Extension B has Divert Noanswer set up. If the call is not answered by B, the call automatically diverts to extension C

Clearing a Diversion

To clear a call diversion:

1. Off-hook the phone
2. You will hear the feature accepted tone on the handset
3. Dial 50[7], the Divert Clear prefix
4. You will hear the dial tone on the handset
5. Replace the handset

18.7.10 Call Pickup

Description

Call pickup allows you to answer a ringing telephone from another telephone. (*See PBX SET PREFIX on page 18 - 20* for information about setting the call pickup prefix.)

7. This number may vary on some systems

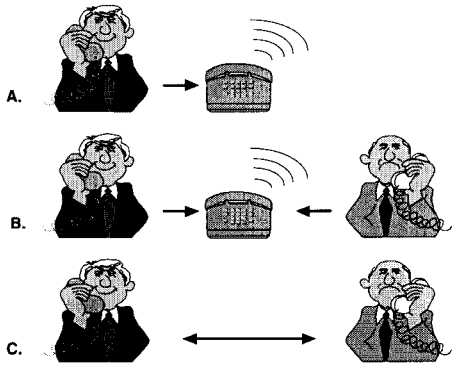

Figure 19 Call Pickup

Procedure

1. When you hear a ringing telephone, lift your own handset and wait for the dial tone.
2. Dial 6[8], the Call Pickup prefix. The dial tone should disappear.
3. The ringing will stop and the incoming call will transfer to your telephone extension (step C).

18.7.11 Emergency Call

Description

The iQ 400 can be set up to call an emergency number automatically. If you dial an emergency code, the unit will dial the emergency number. If all the channels are occupied, the unit will free a channel in order to make the emergency call.

Procedure

To use emergency call:

1. Lift the receive and wait for the dial tone
2. Dial the emergency code for the emergency number you require. The system frees a channel if necessary and dials the emergency number

18.7.12 Set Shortcodes

Description

This allows you to set your own private shortcodes for a particular extension. (*Section PBX SET PREFIX, page 18-20* gives details of setting public shortcodes.)

Procedure

1. Dial 84[9], the Port Specific Shortcode prefix. The dial tone will disappear
2. Dial two digits to identify the shortcode in the table of shortcodes. (Shortcodes range from 00 to 09)

---

8. This number may vary on some systems
9. This number may vary on some systems.

3. Dial the complete number you wish to shortcode, including the external call prefix if necessary
4. Terminate external numbers with #

Examples

Port Specific Code Prefix	Shortcode	Prefix	Destination Number	External Number Terminator	Explanation
84	01	9	12345	#	Sets the shortcode 01 to an external number
84	01	4	1		Sets the shortcode 01 to an internal number
84	01			#	Clear the entry for shortcode 01

Table 39 Shortcodes and Prefixes

18.7.13 Night Service

Description

Night service diverts incoming external calls to another external number. (PBX SET NIGHT, page 18-44 gives details of setting up night service.)

Procedure

1. Lift the handset and listen for the dial tone. If you hear the dial tone night service is not already set. If you hear the night service tone, step 2 will remove night service.
2. Dial the night service prefix to set night service.

18.7.14 Programmable Keys

There are three programmable keys that can be directly associated with a PBX Prefix. See PBX SET PREFIX, page 18-20 for information about setting up prefixes and programmable keys.

18.8 Virtual Private Networking (VPN)

Virtual Private Networking (VPN) allows a set of extensions distributed over up to four different sites to be numbered consistently. The external prefix and location code required to reach one of the other sites is set up as a global short code entry. Each different short code entry is then tied to a programmable key. Users can dial what appear to be two figure extension numbers using one programmable key and another non-programmable digit and make an external call to an extension on another site. Three keys ca be programmed supporting a maximum number of four VPN sites.

NOTE: If any of the prefix numbers have previously been used elsewhere, they must be released for use by the programmable keys

See PBX SET PREFIX, page 18-20 for information about setting up global shortcodes and Programmable Keys, page 18-15 for information about the programmable keys.

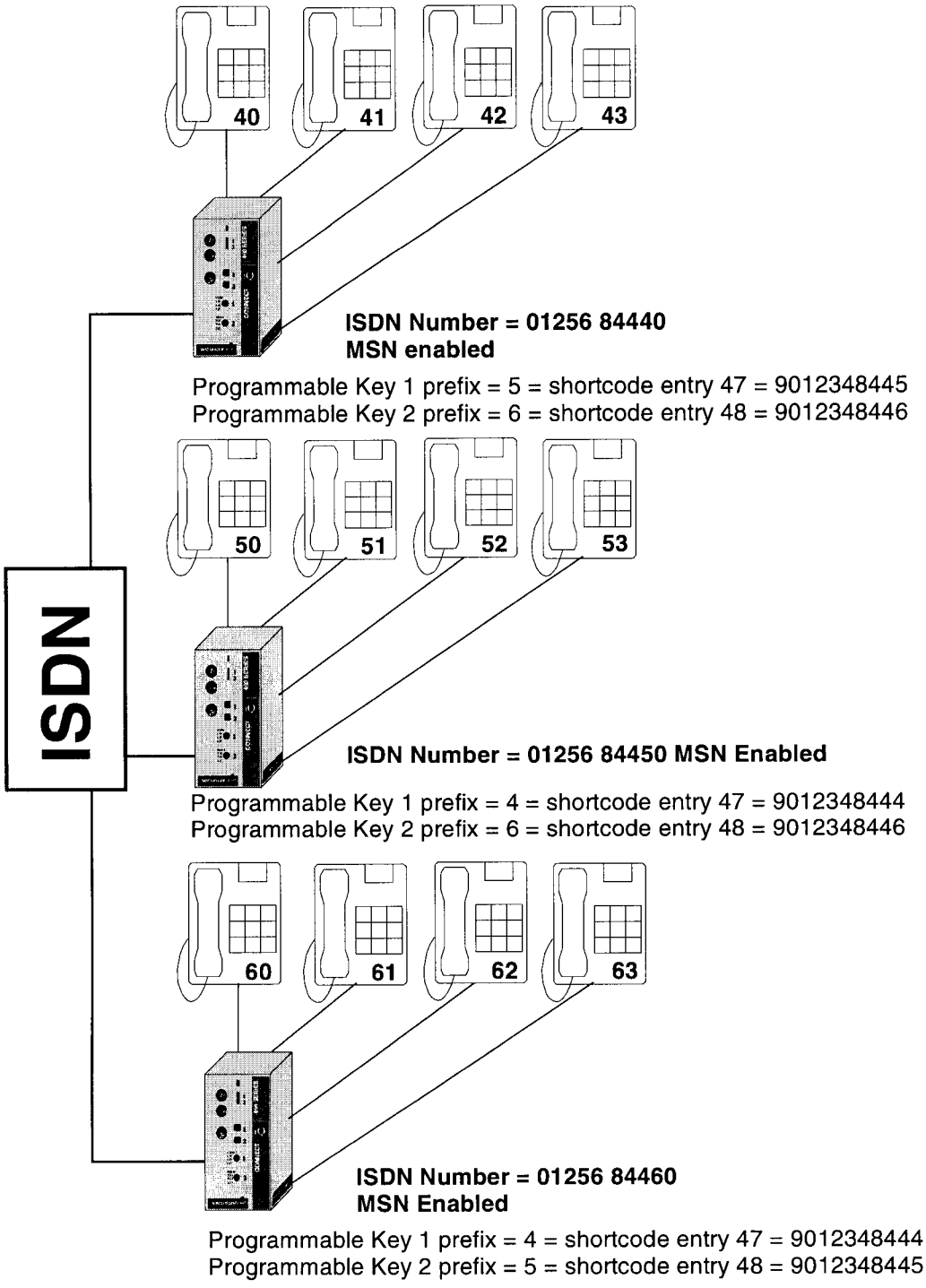

Figure 20 Example of Virtual Private Networking Using Programmable Keys

18.9 Configuring the Voice Options

This section discusses setting-up the Connect iQ 400 Series by using the on-line commands. These are used to change default values and define prefix commands for end users.

18.9.1 Using On-line Commands

Before you start make sure that the power is **DISCONNECTED** from the Connect iQ 400 Series.

1. Locate the port labelled CONFIG on the back panel of the unit. (*See Figure 10, iQ 400 Series Back Panel, page 18-2,* for the location of the CONFIG port.)
2. Attach a terminal or a PC running a suitable terminal emulator to the configuration port of the unit. Use a 9-pin cable that meets the specification described in *iQ 400 Series Configuration Port Interface, page 20-5*
3. Set the terminal or terminal emulator to the following settings:

Parameter	Value
Speed	9600 bits per second.
Character Size	8 bits
Parity	None
Stop Bits	1

Table 40 Terminal Emulator Settings

4. Connect the power supply to the Connect iQ 400 Series. The red power-on LED on the front panel lights when the power is connected
5. After a few moments, the screen displays a start-up message followed by the prompt >1<. This indicates that commands are being addressed to port 1
6. To select a different port, type the port number and press Return

18.9.2 PBX SET NUMBER

Description

The **PBX SET NUMBER** command sets the extension number for a specified voice port.

WARNING: You must enter the port number to change the focus of the command line to the correct port BEFORE issuing this command.

Each extension number must be unique. They must all have the same number of digits and a maximum length of four digits.

See Connecting Two Analogue Phones on page 18 - 4 for information about making internal and external calls.

Format

PBX SET NUMBER NNNN

NNNN = extension number

Port Number	Default Values
4	0
5	1
6	2
7	3

Table 41 Port Number Default Values

Example

These commands set the port number to 5 and then allocate extension number 1234.

5

PBX SET NUMBER 1234

18.9.3 PBX SHOW NUMBER

Description

The **PBX SHOW NUMBER** command displays all the extension numbers allocated to the voice ports. (*See PBX SHOW NUMBER on page 18 - 19* for information about setting up extension numbers.)

Format

PBX SHOW NUMBER

Example

PBX SHOW NUMBER

Response

LOCAL EXTENSION MAP LIST

PORT	PREFIX	NUMBER
04	4	0
05	4	1
06	4	2
07	4	3

18.9.4 PBX CLEAR NUMBER

Description

The **PBX CLEAR NUMBER** command clears an extension number allocated to a voice port.

Format

PBX CLEAR NUMBER

Example

4 >
PBX CLEAR NUMBER

18.9.5 PBX SHOW PORT

Description

PBX SHOW PORT displays the current port settings. First focus the command on the port by entering the port number and pressing Return. The prompt changes to the new port number. Then enter the PBX SHOW PORT command.

Format

SHOW PORT

Example

>4< SHO POR

Response

PBX PORT 4 EXTENSION 40
REMOTE DIAL ADDRESS = : SUBADDRESS = DISABLED
LOCAL ADDRESS = : SUBADDRESS
TONE SUPPRESSION TIMER 0

18.9.6 PBX SET PREFIX

Description

The **PBX SET PREFIX** command links a prefix to a specific function. Users require a prefix to be set up in order to access the functions available. The functions are discussed with the related commands. Default prefix values are listed in *Table 42 on page 18-21.*

Format

PBX SET PREFIX	**[EXTERNAL]**		**NN**
	[INTERNAL]		**NN**
	[OPERATOR]		**NN**
	[PRIVATE]		**NN**
	[PUBLIC]		**NN**
	[PICKUP]		**NN**
	[DIVERT]	**[IMMEDIATE]**	**NN**
		[BUSY]	**NN**
		[NOREPLY]	**NN**
		[NOANSWER]	**NN**
		[CLEAR]	**NN**
	[DATA]		**NN**
	[NIGHT]		**NN**
	[SHORT]		**NN**
	[REDIAL]		**NN**
	[KEY]	**[1]**	**NN**
		[2]	**NN**
		[3]	**NN**

NN = prefix number

Prefix	Function	Default Values
EXTERNAL	Sets the external line prefix	9
INTERNAL	Sets the internal extension prefix	4
OPERATOR	Sets the internal operator prefix	0
PRIVATE	Sets the prefix for using a port-specific shortcode	1
PUBLIC	Sets the prefix for using a global shortcode	2
PICKUP	Sets the call pick-up prefix	6
DIVERT NOREPLY	Sets the divert on no reply prefix	51
DIVERT BUSY	Sets the divert on busy prefix	52
DIVERT IMMEDIATE	Set the immediate divert prefix	53
DIVERT NOANSWER	Sets the divert on busy noanswer prefix	54
DIVERT CLEAR	Clears the diversion	50
DATA	Sets the prefix for a data call using a voice port	#

Table 42 Prefix Default Values

NIGHT	Sets the prefix for night service enabling divert external to external	83
SHORT	Sets a prefix for setting private shortcodes on the port	84
REDIAL	Sets the prefix for last number redial	7
KEY 1	Sets the prefix for programmable key 1	
KEY 2	Sets the prefix for programmable key 2	
KEY 3	Sets the prefix for programmable key 3	

Table 42 Prefix Default Values

Example

This example sets the internal call prefix to 3.

PBX SET PRE INT 3

Response

CAUTION SHORTCODES AND DIVERTS MAY NOW BE INVALID

PREFIXES

EXTERNAL	**9**
INTERNAL	**3**
OPERATOR	**0**
CALL PICKUP	**6**
DIVERT NO REPLY	**51**
DIVERT BUSY	**52**
DIVERT IMMEDIATE	**53**
DIVERT NOANSWER	**54**
DIVERT CLEAR	**50**
PUBLIC SHORTCODE	**2**
LOCAL SHORTCODE	**1**
DATA CALL/NUMBER TERMINATOR	**#**
NIGHT SERVICE	**83**
LAST NUMBER REDIAL	**7**
SET PORT SHORT CODE	**84**
PROGRAMMABLE KEY	**1**
PROGRAMMABLE KEY	**2**
PROGRAMMABLE KEY	**3**

Description

The **PBX SET PREFIX EXTERNAL** command sets the external call access prefix number. The prefix can have any value between zero and 99. The default value is nine. If you attempt to set a prefix number that is already in use, you will see the warning message Used Previously.

Format

PBX SET PREFIX EXTERNAL NN

NN	Possible Values	Default Value
External Call Prefix	0 - 99	9

Table 43 External Call Prefix Default Values

Description

The **PBX SET PREFIX PICKUP** command sets the call pickup prefix to a one or two digit value. Dialling the call pickup prefix will connect an extension to another ringing extension in the same group. The default value of the call pickup prefix is 6.

See *Section Call Pickup, page 18-13* for information about using call pickup.

Format

PBX SET PREFIX PICKUP XX

Example

This sets the call pickup prefix to 3.

PBX SET PREFIX PICKUP 3

Dialling 3 from one of the handsets now connects to any other ringing extension in the group.

18.9.7 PBX SHOW PREFIX

Description

The **PBX SHOW PREFIX** command displays all the prefixes set up on the system, and gives their default values.

Format

PBX SHOW PREFIX

Example

This example displays the prefix table and default prefix values.

PBX SHOW PREFIX

Response

PREFIXES

EXTERNAL	9
INTERNAL	4
OPERATOR	0
CALL PICKUP	6
DIVERT NO REPLY	51
DIVERT BUSY	52
DIVERT IMMEDIATE	53

DIVERT NOANSWER	54
DIVERT CLEAR	50
PUBLIC SHORTCODE	2
LOCAL SHORTCODE	1
DATA CALL/NUMBER TERMINATOR	#
NIGHT SERVICE	83
LAST NUMBER REDIAL	7
SET PORT SHORT CODE	84
PROGRAMMABLE KEY	1
PROGRAMMABLE KEY	2
PROGRAMMABLE KEY	3

18.9.8 PBX CLEAR PREFIX

Description

The **PBX CLEAR PREFIX** command removes a prefix set up on the system.

Format

PBX CLEAR PREFIX	[EXTERNAL]	
	[INTERNAL]	
	[OPERATOR]	
	[PRIVATE]	
	[PUBLIC]	
	[PICKUP]	
	[DIVERT]	[NOREPLY]
		[BUSY]
		[IMMEDIATE]
		[NOANSWER]
		[PICKUP]
		[CLEAR]
	[DATA]	
	[NIGHT]	
	[SHORT]	
	[REDIAL]	
	[KEY]	[1]
	[KEY]	[2]
	[KEY]	[3]

Example

This command clears the external prefix.

```
PBX CLE PRE EXT
```

Response

PREFIXES

EXTERNAL	9
INTERNAL	4
OPERATOR	0
CALL PICKUP	6
DIVERT NO REPLY	51
DIVERT BUSY	52
DIVERT IMMEDIATE	53
DIVERT NOANSWER	54
DIVERT CLEAR	50
PUBLIC SHORTCODE	2
LOCAL SHORTCODE	1
DATA CALL/NUMBER TERMINATOR	#
NIGHT SERVICE	83
LAST NUMBER REDIAL	7
SET PORT SHORT CODE	84
PROGRAMMABLE KEY	1
PROGRAMMABLE KEY	2
PROGRAMMABLE KEY	3

18.9.9 PBX SET AUTODIAL

Description

The **PBX SET AUTODIAL** command enables or disables the autodial function. Autodial automatically connects an off-hook telephone to the number recorded as the remote address by the PBX SET REMOTE ADDRESS command.

WARNING: PBX SET AUTODIAL must be used with **PBX SET REMOTE ADDRESS** to operate correctly. **PBX SET REMOTE ADDRESS** requires either the internal extension number (maximum of four digits) or the external prefix plus the external number (up to 21 digits).

This function is useful for entryphones. When the phone is off-hooked it connects directly to a specified number.

Format

PBX SET AUTODIAL	[ENABLED]	
	[DISABLED]	
PBX SET REMOTE ADDRESS	[PREFIX]	[NUMBER]
PBX SET REMOTE SUBADDRESS	[ALPHANUMBERIC]	

Parameter	Explanation
ENABLED	Enables the autodial function.
DISABLED	Disables the autodial function.

Example

The first command enables autodial and the second sets the remote address to be dialled as 0125 34567890 using the subaddress FREDA_SMITH.

SET AUTODIAL [ENABLED]
SET REMOTE ADDRESS 90125 34567890
SET REMOTE SUBADDRESS FREDA_SMITH

18.9.10 PBX SET HUNT

Description

The **PBX SET HUNT** command sets up automatic call redirection for extensions that are busy or unanswered within a certain time. The call will cycle through a list of extensions, ringing on each in turn until answered. The extensions are entered as a list of extension numbers separated by spaces.

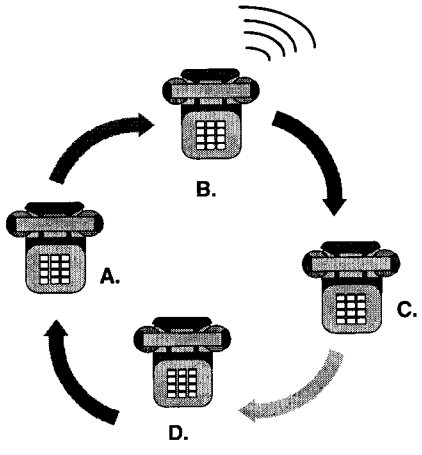

Figure 21 Cyclic Extension Hunting

Format

PBX SET HUNT	**[BUSY]**	**[NN_1], [NN_2] ... [NN_n]**
	[NOREPLY]	**[NN_1], [NN_2] ... [NN_n]**
	[NOANSWER	**[NN_1], [NN_2] ... [NN_n]**

]NN = extension number

Parameter	Explanation
BUSY	Calls are redirected automatically to another extension if the extension dialled is busy
NOREPLY	Calls are redirected automatically to another extension if there is no reply from the extension dialled
NOANSWER	Calls are redirected automatically to another extension if there is no reply from the extension dialled, or it is busy

Table 44 PBX Set Hunt Command Parameters

18.9.11 PBX SET DIVERT

Description

The **PBX SET DIVERT** command sets up call diversion. Select the port number, then use the command to set up the type of diversion required. There are four different types of call diversion to select from; immediate, on noreply, busy and noanswer (busy and noreply). Add the extension number you are diverting to at the end of the command line.

See *Section Diverting Calls, page 18-9* for information about using call diversion. A description of the dial tones used during call diversion is given in Appendix A, System Tones.

Format

PBX SET DIVERT	**IMMEDIATE**	**[NN]**
	NOREPLY	
	BUSY	
	NOANSWER	
	NONE	

Example

This sets up an immediate divert to extension 42.

```
4
PBX SET DIVERT IMMEDIATE 42
```

18.9.12 PBX SHOW DIVERT

Description

The **PBX SHOW DIVERT** command displays any call diversions set up. See *Section Diverting Calls, page 18-9* for information about using call diversion.

Format

PBX SHOW DIVERT

18.9.13 PBX SET BAR

Description

The **PBX SET BAR** command bars calls on a specified voice port. This stops certain types of calls or specified numbers being called from this extension.

WARNING: Before entering this command you must enter the port number to identify the target of this command. NNNN represents the number being barred.

There are three possible barred numbers per port plus the different types of call barring listed below.

Format

PBX SET BAR **[1] NNNN**
[2] NNNN
[3] NNNN
[INCOMING] **[ENABLE]**
[DISABLE]
[OUTGOING] **[ENABLE]**
[DISABLE]
[EXTERNAL] **[TRANSFER]** **[ENABLE]**
[DISABLE]

Commands and Values	Explanation
1	Barred number 1
2	Barred number 2
3	Barred number 3
NNNN...NN	NNNN... are the leading dialled digits that you wish to bar. It can be up to 25 digits long not including prefixes
INCOMING ENABLE	Bars incoming calls on the specified port
INCOMING DISABLE	Disables incoming call barring on the specified port

Table 45 Call Barring Parameters and Values

OUTGOING ENABLE	Bars outgoing calls on all ports
OUTGOING DISABLE	Allows outgoing calls on the specified port
EXTERNAL TRANSFER ENABLE	Enables external call transfers barring
EXTERNAL TRANSFER DISABLE	Disables barring of external call transfers
EXTERNAL DIVERT ENABLE	Enables outgoing call diversion
EXTERNAL DIVERT DISABLE	Disables outgoing call diversion

Table 45 Call Barring Parameters and Values

Example

This command bars calls to number 94567 from the current port.

PBX SET BAR 1 94567

Response

SET CALL BAR 1 TO 94567
BARRING OPTIONS
INCOMING DISABLED
OUTGOING DISABLED
TRANSFER DISABLED
DIVERT DISABLED
BARRED NUMBER LIST
BAR 1 NUMBER 94567
BAR 2 NUMBER
BAR 3 NUMBER

Example

This command bars incoming calls.

PBX SET BAR INC ENA

Response

INCOMING BAR = 1
BARRING OPTIONS
INCOMING ENABLED
OUTGOING DISABLED
TRANSFER DISABLED
DIVERT DISABLED
BARRED NUMBER LIST
BAR 1 NUMBER 94567
BAR 2 NUMBER
BAR 3 NUMBER

Example

This command bars external transfers.

PBX SET BAR EXT TRA ENA

Response

```
TRANSFER BAR = 1
BARRING OPTIONS
INCOMING ENABLED
OUTGOING DISABLED
TRANSFER ENABLED
DIVERT DISABLED
BARRED NUMBER LIST
BAR 1 NUMBER 94567
BAR 2 NUMBER
BAR 3 NUMBER
```

18.9.14 PBX SET EMERGENCY

Description

The **PBX SET EMERGENCY** command sets up to three emergency override numbers on the Connect iQ 400 Series unit. Emergency override numbers force the unit to connect to the emergency number even if there are no free channels or there are access restrictions.

Format

```
PBX SET EMERGENCY N X...X
```

Values of N	Values of X	Default Values
1	1 to 20 digit number	999[1]
2	1 to 20 digit number	911[1]
3	1 to 20 digit number	912[1]

Table 46 PBX Set Emergency Command Default Values

Note 1: Do **NOT** include the external call prefix e.g. 9, before the emergency number

---

Example

This example allocates the number 1 to the British emergency number 999.

```
PBX SET EMERGENCY 1 999
```

Example

This example sets the emergency override number 1 to the telephone number 900.

```
PBX SET EME 1 900
```

Response

```
EMERGENCY 01 SET TO 900
EMERGENCY DIAL LIST
01 - 900
02 - 911
03 - 912
```

18.9.15 PBX SHOW EMERGENCY

Description

The **PBX SHOW EMERGENCY** command displays the table of emergency override numbers set up on the Connect iQ 400 Series unit.

Format

```
PBX SHOW EMERGENCY
```

Example

This example shows the emergency override numbers set up on the system.

```
PBX SHO EME
```

Response

```
EMERGENCY DIAL LIST
01 - 999
02 - 911
03 - 912
```

18.9.16 PBX LOG

Description

The **PBX LOG** command enables logging of the last 25 calls.

Use **PBX LOG HISTORY** to display the entire log.

PBX LOG FILTER allows you to filter internal or external calls.

The log stores the following information:

- Call direction:
  - — Incoming
  - — Outgoing
  - — Redirected
- Call status:
  - — Completed
  - — Alerting
  - — Unanswered
- Call duration for completed calls in hours, minutes and seconds

- Called number identity for incoming calls on MSN and DDI lines
- Calling Line Identity for incoming calls when provided
- Port call would be directed to
- Port answering call (if different)

Format

PBX LOG	[ENABLE]			
	[DISABLE]			
	HISTORY			
	FILTER PORT	[INTERNAL]	[ENABLE]	
			[DISABLE]	
		[EXTERNAL]	[ENABLE]	
			[DISABLE]	
		STATUS	[CONNECT]	[ENABLE]
				[DISABLE]
			[BUSY]	[ENABLE]
				[DISABLE]
			[NOANSWER]	[ENABLE]
				[DISABLE]
			[BAR]	[ENABLE]
				[DISABLE]
			[DIVERT]	[ENABLE]
				[DISABLE]
			[PICKUP]	[ENABLE]
				[DISABLE]
			[TRANSFER]	[ENABLE]
				[DISABLE]
			[RING]	[ENABLE]
				[DISABLE]
			[CALL]	[ENABLE]
				[DISABLE]
	FILTER SHOW			

Command	Action
PBX [SHOW] LOG HISTORY	Displays the entire call log
PBX LOG [ENABLE I DISABLE]	Sets continuous log output
PBX LOG FILTER PORT [INTERNAL I EXTERNAL] [ENABLE I DISABLE]	Enables internal or external call filtering
PBX LOG FILTER STATUS [CONNECT I BUSY I NOANSWER I BAR I DIVERT]	Enables filtering by response status
PBX LOG FILTER SHOW	Displays all attributes set by the user

Table 47 Log Commands

18.10 Voice Call Logging

Voice call logging keeps a record of voice calls made and received.

This facility requires the optional voice hardware to be fitted to the CONNECT iQ 400 to work. The log is a rolling record of the last 25 calls made. It is stored in the RAM memory of the CONNECT iQ 400, and is cleared whenever the CONNECT iQ 400 is reset.

The log can be directed to the configuration port by enabling voice monitoring.

Voice call logging records the following information:

- Call originating port and destination port
- Call status, no answer, alerting. connected
- Call duration, in hours, minutes, seconds for connected calls
- Calling line identity for incoming calls (when supplied by the network)
- MSN number, when supplied by the network
- Called number for outgoing calls

18.10.1 Voice Logging Control Commands

These are the voice logging control commands.

To enable logging:

SET MONITOR VOICE

To list the last 25 calls in the voice log and present the voice log information on the configuration device when the call is completed.

SHOW VOICE HISTORY

To reset logging on the configuration device and clear the monitoring option:

SET MONITOR DISABLE

18.10.2 Voice Log Output

The voice log output has the following format:

II S >>> D CSCSCSCS HH:MM:SS UUUUUU NNNNNNNNNNNNNNNNNNNN

Where

II	= log entry number
S	= source
>>>	= to
D	= destination

CS = call status (connected / alerting / no ans)
HH = hours
MM = minutes
SS = seconds
UU = MSN number
NN = called number, or CLI number if presented

Example

Sample output:

```
07 5 >>> X  CONNECT 00:00:35          123
08 5 >>> X  NO ANS 00:00:00           00528
09 X >>> 4  CONNECT 00:00:05   3   01256376950
```

Explanation

Event 7 port 5 calls external no 123 and connects for 35 seconds.

Event 8 port 5 calls external no 00528 and gets no response.

Event 9 external call to port 4 using MSN 3 with CLI 01256376950, connects for 5 seconds.

18.10.3 PBX CLEAR EMERGENCY

Description

The **PBX CLEAR EMERGENCY** command clears the emergency override number set up on the Connect iQ 400 Series unit.

Format

PBX CLEAR EMERGENCY N

Example

The example clears emergency number 1.

PBX CLE EME 1

Response

EMERGENCY NUMBER 1 CLEARED
EMERGENCY DIAL LIST
01 -
02 - 911
03 - 912

18.10.4 PBX SET CHANNEL

Description

The **PBX SET CHANNEL** command allocates a specific B-channel to a voice port for both incoming and outgoing calls.

Format

```
                    >4<
PBX SET CHANNEL     [1]
                    [2]
                    [ANY
```

]Example

Default Port	Channel
4	Any
5	Any
6	Any
7	Any

Table 48 Default Ports and Channels

This command ensures that port 5 will use B channel 2.

```
5 PBX SET CHANNEL 2
```

Response

```
PORT        CHANNEL
4           ANY
5           2
6           ANY
7           ANY
```

18.10.5 PBX SHOW CHANNEL

Description

The **PBX SHOW CHANNEL** command displays the current voice port settings.

Format

```
PBX SHOW CHANNEL
```

Example

```
PBX SHO CHAN
```

Response

PORT	CHANNEL
4	ANY
5	1
6	ANY
7	ANY

18.10.6 PBX SET OPERATOR

Description

The **PBX SET OPERATOR** command allows you to change the physical PBX port number serving the operator. By default this value is set to 0, but can be reset to 1, 2 or 3.

Format

PBX SET OPERATOR N

N = the number of the port.

Possible values of N are 0, 1, 2 and 3.

18.10.7 PBX SHOW OPERATOR

Description

The **PBX SHOW OPERATOR** command displays the number of the operator port.

Format

PBX SHOW OPERATOR

Response

OPERATOR PORT = 0

18.10.8 PBX CLEAR OPERATOR

Description

The **PBX CLEAR OPERATOR** command clears the number set for the operator port.

Format

PBX SHOW OPERATOR

18.10.9 PBX SET SILENCE

Description

The **PBX SET SILENCE** command is used to set a period of silence before the tone reappears after a call. This is required by answering machines in order to detect the end of the call and switch off.

Format

PBX SET SILENCE NN

NN = the delay time in seconds. NN has a minimum value of 0 and a maximum of 60.

Response

TONE SUPPRESSION TIMER = 3

18.10.10 PBX SET PRIVATE

Description

The **PBX SET PRIVATE** command sets up a private shortcode. Private shortcodes can only be used on the port where they are set up.

Format

PBX SET PRIVATE XX	**[INTERNAL]**	**NNNN**
	[EXTERNAL]	**NNNNNNNNNN**

X = 1-digit private shortcode. Acceptable values of X are from 0 to 9.

NN..N = extension number or telephone number being shortcoded

Response

Displays the modified version of the private shortcode list.

18.10.11 PBX SHOW PRIVATE

Description

The **PBX SHOW PRIVATE** command displays the private shortcodes set for a port.

Format

PBX SHOW PRIVATE

Response

00	XX
01	
02	
03	
04	
05	
06	
07	
08	
09	

18.10.12 PBX CLEAR PRIVATE

Description

The **PBX CLEAR PRIVATE** command deletes specified private shortcodes set for a port.

Format

PBX CLEAR PRIVATE XX

XX = 2-digit private shortcode

18.10.13 PBX SET PUBLIC

Description

The **PBX SET PUBLIC** command sets up a public shortcode. Public shortcodes can be used on any port.

Format

PBX SET PUBLIC XX	**[INTERNAL]**	**NNNN**
	[EXTERNAL]	**NNNNNNNNNN**

XX = 2-digit public shortcode

NN.N = extension number or telephone number being shortcoded

18.10.14 PBX SHOW PUBLIC

Description

The **PBX SHOW PUBLIC** command displays a list of the public shortcodes set up on the iQ 460.

Format

PBX SHOW PUBLIC

NOTE: Shortcodes displayed to the screen are limited to a maximum of 20 digits. Longer codes are preceded by a ^ character and the line overflows losing tabulation.

18.10.15 PBX CLEAR PUBLIC

Description

The **PBX CLEAR PUBLIC** command deletes specified public shortcodes.

Format

PBX CLEAR PUBLIC XX

XX = 2-digit public shortcode

18.10.16 PBX SET REMOTE

Description

The **PBX SET REMOTE** command sets the remote or local subaddress.

Format

PBX SET	**[REMOTE]**	**[ADDRESS]**	**[NN]**
		[SUBADDRESS]	**[NN]**
	[LOCAL]	**[ADDRESS]**	**[NN]**
		[SUBADDRESS]	**[NN]**

NN = number

18.10.17 PBX CLEAR REMOTE

Description

The **PBX CLEAR REMOTE** command clears the remote or local subaddress.

Format

PBX CLEAR	[REMOTE]	[ADDRESS]
		[SUBADDRESS]
	[LOCAL]	[ADDRESS]
		[SUBADDRESS]

18.10.18 PBX SHOW STATUS

Description

The **PBX SHOW STATUS** command displays the status of the specified port. You need to specify the port before issuing the command.

Format

N
PBX SHOW STATUS

N = Port number

Response

Response	Explanation
SLEEPING	There is a fault
OFFHOOK	The phone is waiting to go back onhook and will not accept any dialled digits
ONHOOK	The phone is idle and onhook
RINGING	The phone is onhook and ringing
DIALLING	The phone is offhook and some digits have been dialled
ONHOOK CLEARING	The phone is onhook and a disconnect message has been sent. The port is waiting for a response
CALLING	The phone is offhook and dialling is complete. The destination phone is ringing
CALL HELD	The connected device has put the port on hold
CONNECTED	The phone is either connected to one other phone, or connected to one phone with another on hold
WAITING WITH HELD CALL	The port has a call on hold while it tries to connect to other services
CONNECTED WITH HELD CALL	The port has a call on hold while it is connected to other services
OFFHOOK CLEARING	The phone is offhook and a disconnect message has been ignored by the other device

Table 49 Port Status Responses

18.10.19 PBX SET TIMER

Description

The **PBX SET TIMER** command sets the time interval before an event occurs. The **TRANSFER** parameter sets the time period in seconds before the call is transferred. DIVERT sets the time period before the call diverts to another number. **INTERDIGIT** is used to control the timeout period between digits as they are being dialled.

Format

PBX SET TIMER [TRANSFER] NN
[DIVERT] NN
[INTERDIGIT] NN

18.10.20 PBX SHOW TIMER

Description

The **PBX SHOW TIMER** command displays a table showing the timer settings.

Format

PBX SHOW TIMER

Response

TIMERS

PORT	DIVERT	TRANSFER
4	10	10
5	10	10
6	10	10
7	10	10

18.10.21 PBX SET NIGHT

Description

The **PBX SET NIGHT** command sets night service enabled or disabled. Night service automatically diverts external calls to a specified external number. (See PBX SET PREFIX, page 18-20 for information about setting the night service prefix.)

Format

PBX SET NIGHT **[ENABLE]**
[DISABLE]

18.10.22 PBX SHOW NIGHT

Description

The **PBX SHOW NIGHT** command displays if night service is enabled or disabled.

Format

PBX SHOW NIGHT

Figure 22

19 Approval Requirements

19.1 English Language Version

19.1.1 Network Connection

This Terminal adaptor contains a Teltrend Midas Plus ISDN access module that is approved for connection to the PSTN using basic rate access interfaces compatible with I.420.

19.1.2 Ports for the Connection of Other Apparatus

The following interfaces operate at SELV[1] levels:

- Configuration Port
- User interfaces for connecting Data Terminal Equipment

The following interfaces operate at Telecommunication Network Voltage (TNV) levels:

- S-Bus for connection to ISDN Basic rate telecommunication networks
- User interfaces for connection to analogue terminal apparatus (telephone, modem)

19.1.3 Power Supply

In order to conform to the European safety standard, EN 60950 1992 (2nd edition), the CONNECT iQ 400 is provided with a limited power supply conforming to clause 2.11 of the standard. It also meets the earthing requirements of clause 2.5 as defined in the same standard.

WARNING: The use of any other supply may invalidate the declaration.

NOTE: Only connect the power supply to a socket that has a protective earth contact to ensure the integrity of the protective earthing.

---

1. SELV is a voltage that does not exceed 42.4V peak AC or 60V DC.

To conform to safety requirements it is essential that any alternative power supply used with the CONNECT iQ 400 meets the following specification:

- Output = 5 Volts DC, 2.4 Amps (5%)
- 2.1mm by 5.5mm DC lock-in jackplug with positive inner and negative outer polarity
- Must provide an earth path from the protective earth input to the signal ground return output
- Must provide limited power output only, conforming to clause 2.1.1 of EN60950 1992 2nd Edition

---

NOTE: Any alternative power supply used in Australia must be approved by the State Regulatory Office (for example, the Office of Energy).

19.1.4 Environmental Conditions

This apparatus is designed for operation under the following environmental conditions:

Operating Temperature:	0° C to 40° C
Storage Temperature:	20° C to 70° C
Humidity:	5% to 95% non condensing
Operating Atmospheric Pressure:	86kPa to 106kPa

19.2 Gesetztliche Meldungen (Anforderung der Zulassung)

19.2.1 Netzverbindung

Das Terminal Adaptor Gerät enthält eine Wisdm Midas Plus ISDN-basisanschlußkarte, die zum Anschluß am PSTN über I.420-kompatibele S0-Schnittstellen zugelassen ist.

19.2.2 Schnittstellen zum Anschluß anderer Geräte

Die folgenden Schnittstellen werden unter SELV Spannungen betrieben:

- Konfigurationbuchse (Configuation Port)
- Bentzerscnittstellen zum Anschluß von Endgeräte (Data Terminal Equipment)

SELV bedeutet eine Niederspannung, die 42,4 Volt (Spitzenwechselstrom) oder 60 Volt (Gleichstrom) nicht überstreitet.

Die folgende Schnittstelle ist eine Schaltung der Typ TNV (Telecommunications Network Voltage):

- S-Bus zur Verbindung an ISDN-basisanschluß (S0) Telekommunikationsnetze

19.2.3 Stromversorgungerklärung

Es wird hiermit erklärt, das Gerät namens CONNECT iQ 400 wird gemäß europäischen Sichertheitsnorm **EN 60950** mit folgenden *strombegrenzten* Versorgungseinheit zugeliefert:

EURO SA - 0522A4F

Der Gebrauch eines Transformators anderen Art könnte diese Erklärung ungültig machen.

19.2.4 Betriebsbedingungen

Die Geräte ist geeignet, unter die folgenden Bedingungen betrieben zu werden

:

Betriebstemperatur:	0° C to 40° C
Lagungstemperatur:	20° C to 70° C
Feuchtigkeit:	5 % bis zu 95 % (ohne Kondensat)
Luftdruck (bei Betrieb):	86 kPa bis zu 106 kPa.

19.3 INCOMING CALLS FROM THE U.S.A.

When calls originate from switched 56K services in the USA, it may be necessary to inhibit the call filtering capabilities of the unit. This allows the DTE speed to be set to 56K. It also allows the unit to accept an incoming data call that signals itself as a 64K data call, but is in fact a V.110 56K rate adapted call.

This scenario is often encountered on International calls, where no subaddress, CLI or other call type information is passed across the International link.

The call filter is disabled using the command:

SET FILTER DISABLED

The call filter can be reenabled using the command:

SET FILTER ENABLED

If the call filter is disabled it is shown on the 'Show All' screen adjacent to the port number.

19.4 EMI Requirements for Canadian Market

This digital equipment does not exceed the Class B limits for radio frequency noise from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communication.

19.5 Specification EMI pour le Marché Canadien

Ce dispositif digital, s'il est utilisé suivant les instructions et recommandation du constructeur, ne dépasse pas les limites de la Class B pour le bruit des fréquences radio, établies par les Régles sur l'interférence radio du Ministère Canadien des Communications.

20 Port Cables and Interfaces

The following pages contain diagrams and tables relating to the port cables and interfaces of the system.

WARNING: Customers providing their own cables are recommended to use double screened cables in order to conform with EN55022 Class B EMC emission limits

20.1 V.24 DTE Cable

V.24 DTE CABLE ASSEMBLY (ISO 2110)		
Port		DTE
1		
2	TxD	2
3	RxD	3
4	RTS	4
5	CTS	5
6	DSR	6
7	Signal Gnd	7
8	DCD	8
9		
10		
11		
12		
13		
14		
15	TxC	15
16		
17	RxC	17
18		
19		
20	DTR/C	20
21		
22	RI	22
23		
24		
25		
HOOD		
	ORDER NO. WL00143	

20.2 X.21 DTE Cable

X.21 DTE CABLE ASSEMBLY (ISO 4903)		
Port		**DTE**
1		
2	TxD -	2
3		
4		
5		
6		
7	Signal Gnd	8
8		
9	RxC +	13
10	DCD/I +	12
11		
12		
13		
14	TxD +	9
15		
16	RxD +	11
17		
18	RxD -	4
19		
20	DTR/C -	3
21	RxC -	6
22		
23		
24	DCD/I -	5
25		
HOOD		
	ORDER NO. WL00142	

20.3 V35 DTE Cable

V.35 DTE CABLE ASSEMBLY (ISO 2593)		
Port		**DTE**
1		
2	TxD -	P
3		
4	RTS	C
5	CTS	D
6	DSR	E
7	Signal Gnd	B
8	DCD	F
9	RxC +	X
10		
11		
12	TxC +	AA
13		
14	TxD +	S
15		
16	RxD +	T
17		
18	RxD -	R
19	TxC -	Y
20	DTR/C -	H
21	RxC -	V
22	RI	J
23		
24		
25		
HOOD		
	ORDER NO. WL00144	

20.4 RS-449 DTE Cable

RS-449 DTE CABLE ASSEMBLY (ISO 4902)		
Port		**DTE**
1		
2	TxD -	4
3		
4	RTS	7
5		
6		
7	Signal Gnd	19
8		
9	RxC +	26
10	DCD/I +	31
11	DSR +	29
12	TxC +	23
13	CTS +	27
14	TxD +	22
15		
16	RxD +	24
17		
18	RxD -	6
19	TxC -	5
20	DTR/C -	12
21	RxC -	8
22	RI	15
23	CTS -	9
24	DCD/I -	13
25	DSR -	11
HOOD		
	ORDER NO. WL00145	

20.5 CONNECT iQ 400 Series Voice Port Interface

CONNECT iQ 400 Series Voice Port Interface	
PIN	**Description**
1	
2	
3	Tip
4	Ring
5	Shunt
6	

20.6 iQ 400 Series Configuration Port Interface

iQ 400 Series Configuration Port Interface	
PIN	**Description**
1	
2	TXD output from iQ 400
3	RXD input to iQ 400
4	
5	Signal ground
6	
7	TX Stop input to iQ 400 (RTS)
8	RX Stop output from iQ 400 (CTS)
9	
HOOD	

21 Quick Reference

21.1 Explanation of Symbols

21.1.1 Access Level

Indicates the Access level required for the command when passwords are in use.

21.1.2 Port Specific

If the command is specific to the currently selected port, Yes appears in this column. If blank the command applies to the whole unit, regardless of the port currently selected.

21.1.3 Parameters

Symbol	Meaning
{ }	Mandatory parameters (do NOT type the brackets)
[ ]	Optional parameters
|	or, e.g. {1|2|any} means that you may type 1, 2 or any
name	Enter a name up to 10 characters long
address	Enter a telephone number up to 23 digits long
subaddress	Enter an ISDN subaddress: up to 6 alphanumeric characters
password	Enter a password

General Command Parameters	Notes	Port specific?	Access level
HELP	Display help information	Yes	0
SHOW ALL	Display most unit settings		0
SHOW PORT	Displays port specific options		0
RESET	Cause a software reset		0
SAVE	Save current configuration		3
SET NAME {name}	Assign a name to the unit		0
SHOW NAME	Display the unit name		3
CLEAR NAME	Delete the unit name		3

Making, Answering and Terminating Calls Command Parameters	Notes	Port specific?	Access level
DIAL [address][#subaddress]	Dial the address given	Yes	1
ANSWER	Connect an incoming call	Yes	0
HANGUP	Terminate the call	Yes	0

Changing Current Port Command Parameters	Notes	Port specific?	Access level
ONE or 1	Change to Port 1		0
TWO or 2	Change to Port 2		0
THREE or 3	Change to Port 3		0

Configuring Port Addresses Command Parameters	Notes	Port specific?	Access level
SET REMOTE ADDRESS {address}	Address to be dialled	Yes	2
SET REMOTE SUBADDRESS {subaddress}	Subaddress to be called	Yes	2
SET LOCAL ADDRESS {address}	Address of this port	Yes	2
SET LOCAL SUBADDRESS {subaddress}	Subaddress of this port	Yes	2

Clearing Port Addresses Command Parameters	Notes	Port specific?	Access level
CLEAR REMOTE ADDRESS	Clear address to be dialled	Yes	3
CLEAR REMOTE SUBADDRESS	Clear subaddress to be called	Yes	3
CLEAR REMOTE	Clear both	Yes	3
CLEAR LOCAL ADDRESS	Clear address of port	Yes	3
CLEAR LOCAL SUBADDRESS	Clear subaddress of port	Yes	3
CLEAR LOCAL	Clear both	Yes	3

Showing Port Addresses Command Parameters	Notes	Port specific?	Access level
SHOW LOCAL	Display addresses and subaddresses	Yes	0
SHOW REMOTE		Yes	0

Port Type and Speed Command Parameters	Notes	Port specific?	Access level
SET FILTER	Set the DTE speed to accept 56K	Yes	1
SET FLOW CONTROL {local | remote | none}	Set RTS/CTS flow control	Yes	2
SET PORT {sync | async | sync dial}	Set port interface	Yes	3
SET SPEED {9K6 | 19K2 | 48K | 56K | 64K}	Set synchronous port speed	Yes	2
SET ASYNC SPEED {2K4 | 4K8 | 9K6 | 19K2 | 38K4}	Set asynchronous port speed	Yes	1
SET ASYNC DATA {7 | 8}	Set number of data bits	Yes	1
SET ASYNC PARITY {mark | space | odd | even | none}	Set parity	Yes	1
SET ASYNC STOP {1 | 2}	No. of stop bits	Yes	1

Factory Default Port Settings Command Parameters	Notes	Port specific?	Access level
SET DEFAULTS	Restore factory defaults	Yes	3

Specifying Bearer Channel Command Parameters	Notes	Port specific?	Access level
SET CHANNEL {1 | 2 | any}	Port only use B channel(s) specified	Yes	2

Port Answer Mode and Call Control Command Parameters	Notes	Port specific?	Access level
SET ANSWER {manual | automatic}	For incoming calls	Yes	1
SET ANSWER DELAY {0-255}	Delay in no. of rings	Yes	1
SHOW ANSWER	Display answer mode	Yes	0
SET SILENCE {0-60}	Delays equipment engaged tone by N seconds if N>60 tone is never generated.	No	0
SET APPLICATION TYPE {data | voice | none | timelink | semiperm}	Define High Layer Compatibility	Yes	1
SET CALL CONTROL {AT | V25 HDLC | V25 sync | V25 async}	Specify call control mode	Yes	2
SHOW CALL CONTROL	Display call control mode	Yes	0

Setting Access levels and CLI Command Parameters: Security	Notes	Port specific?	Access level
SET PASSWORD {1 I 2 I 3} {password}	Set password for this level	Yes	3
PASSWORD {1 I 2 I 3} {password}	Allow access to level given	Yes	0
SHOW PASSWORD	Show current passwords		3
CLEAR PASSWORD {1 I 2 I 3}	Remove password		3
SET CLI {1-20} {address}	Address of line that may call		2
SET CLI {1-20} PORT {none I 1 -4 I any}	Port(s) CLI applies to		2
SET CLI {enabled I disabled}	Enable/disable CLI checking		2
SHOW CLI [use]	Display list of CLIs specified		0
CLEAR CLI {1-20}	Clear the CLI specified		3
SET OPTION { 1-16}	Sets port option specified		2
CLEAR OPTION {1-16}	Resets the port option		3
SET GLOBAL OPTIONS {1-16}	Sets the global option		2
CLEAR GLOBAL OPTIONS	Resets the specific global options		3
SHOW OPTIONS	Displays both port and global options		0
SECURE	Manually resets the access level		0

System Test and Monitoring Command Parameters	Notes	Port specific?	Access level
SHOW VERSION	Display firmware version	Yes	0
STATUS	Display port status		0
SET MONITOR {enabled I disabled I eng I x21 I line}	Enable/disable display of call progress messages		1
SET LOOP {2 I 3}	Establish data loopbacks	Yes	1
TEST	Teltrend use only		3

21.2 V.25bis Commands

Command	For-mat	Parameter Format	Example
Call request with:			
Number Provided	CRN	CRN xxxxxxxxx#yyyyyy xxxxxxx = remote address yyyyy = remote subaddress	CRN 0276681212#ABC
Memory Address Provided	CRS	CRS yy yy = memory location	CRS 1 See Note 1
Program:			
Remote Address & Subaddress	PRN	PRN xx;yyyyyy#zzzzz xx = memory location yyyyyy = remote address zzzzz = remote subaddress	PRN 1;0276681212#FGH
Calling Line Identity	PCI	PCI xx;yyyyyyyyyy xx = cli location yyyyyyy = calling address	PCI 20;0276681212 See Note 2
Port Speed	PSP	PSP zzzzz zzzzz = speed	PSP 19200 See Note 3
B-channel	PCH	PCH x x = B-channel	PCH 1 See Note 4
Local Address & Subaddress	PLA	PLA xxxxxxxxx#zzzzz xxxxxxx = local address zzzzzz = local subaddress	PLA 0276681212#XYZ
Application Type	PAT	PAT yy yy = application type	PAT 03 See Note 5
Service Profile Identifiers	PID	PID xx;zzzzzzzzz xx = SPID number zzzz = SPID value	PID 1 See Note 6
Save settings to Serial EEPROM	PMW	No Parameters	See Note 7
List request for stored:			
Remote Addresses & Subaddresses	RLN	No parameters	RLN
Calling Line Identities	RLC	No parameters	RLC
Speed	RLS	No parameters	RLS
B-channel	RLB	No parameters	RLB

Local Address & Subaddress	RLA	No parameters	RLA
Current Port Status	RLP	No parameters	RLP
ISDN Line Status	RLL	No parameters	RLL
Application Type	RLT	No parameters	RLT
Service Profile Identifiers	RLD	No parameters	RLD See Note 6
Clear:			
Remote Address & Subaddress	CLN	CLN xx xx = memory location	CLN 2
Calling Line Identifier	CLC	CLC xx xx = cli location	CLC 12
Local Address & Subaddress	CLA	No parameters	CLA
Service Profile Identifiers	CLD	CLD xx xx = SPID number	CLD See Note 6
Other Commands:			
Disregard Incoming Call	DIC	No parameters	DIC
Connect Incoming Call	CIC	No parameters	CIC

NOTE 1: Only two memory addresses are currently provided for the pre-configuration of remote addresses and subaddresses.

NOTE 2: Only 20 locations are currently allowed for the storage of pre-configured Calling Line Identifiers.

NOTE 3: The allowed speed values are:

0 9600
1 19200
2 48000
3 56000
4 64000 (default)

NOTE 4: The allowed values for channel are:

1	B-channel 1
2	B-channel 2
0	Any channel (default)

NOTE 5: The Application type values that are currently valid are:

1	Telephony (Recommendation G.711)
2	OSI Application (X.200)
3	Fax Group 2/3 (T.62)
4	Document Application Profile Group 4 (T.503)
5	Document Application Profile (T.501)
6	Document Application Profile (T.502)
7	Teletex (T.62 & T.70)
8	Document Application Profile For Videotex Interworking (T.504)
9	Telex
10	Message Handling Services (X.400)
15	No application type specified (default)
16	Timelink Application - (Australian Network Only)

NOTE 6: Only applicable for US National - 1 Networks.

NOTE 7: Units equipped with serial EEPROM's require this command prior to saving to the NV memory. Units equipped with parallel EEPROM do not require this command.

21.3 V.25bis Indications

Indication	Format	Parameter Format	Example
List stored:			
Remote Address & Subaddress	LSN	LSN xx;yyyyyy#zzzzz xx = memory location yyyyyy = remote address zzzzz = calling address	LSN 2;0276681212#FGH
Calling Line Identity	LSC	LSC xx;yyyyyyyyyy xx = cli location yyyyyyy = calling address	LSC 20;0276681212
Speed	LSS	LSS zzzzz zzzzz = speed	LSS 9600
B-channel	LSB	LSB x x = B-channel	LSB 0
Local Address & Subaddress	LSA	LSA xxxxxxxxxx#zzzzz xxxxxxx = local address zzzzzz = local subaddress	LSA 0276681212#XYZ
Port Status	LSP	LSP xxxxxxxxxx xxxxxxxx = port status	LSP ONLINE See Note 1
Application Type	LST	LST xx	LST 15 See Note 6
Line Status	LSL	LSL zzzzzzzzz zzzzzzzz = port status	LSL ACTIVE See Note 2
Service Profile Identifiers	LSD	LSD xx;yyyyyyyyy xx = SPID number yyyyyy = SPID value	LSD 1;679876543221

Other indications:			
Incoming Call	INC	INC xxxxxxxxx#zzzzzz xxxxxxx = called address zzzzz = called subaddress	INC 0276681212#ABC
Valid	VAL	No parameters	VAL
Invalid	INV	INV xx xx = error code (see following table)	INV CB
Call Connecting	CNX	No parameters	CNX

The following values are valid for the port status:

Port Status	Action
Dormant	The port is currently dealing with a remote management call and cannot be used for data transfer.
Normal	The port is idle and no call is present.
Connecting	The port is attempting to make an outgoing call but is not yet connected end-to-end.
Alerting	The port has received an incoming call but has not yet answered the call.
Synched	The port is attempting to connect a rate adapted call end-to-end.
Online	The port has an end-to-end connection currently active.
Disconnecting	The port is clearing away a previously connected call.

The following values are valid for the line status:

Status	Action
Disconnected	The ISDN line is disconnected
Connected	The ISDN line is connected, but the physical and link layers are inactive.
Active	The ISDN line is connected and the physical link is active.
Ready	The ISDN line is connected and the physical and data links are active.

NOTE: Only applicable for US National-1 variant.

21.4 Error Indications

Indication Error Code	Meaning
ET	Remote busy
NS	Number not stored
CB	Local DCE busy
AB	Abort call
CU	Command unknown
MS	Message syntax error
PS	Parameter syntax error
PV	Parameter value error

21.5 PBX Commands

Command	Notes	Port Number	Default Values
PBX SET NUMBER	**PBX SET NUMBER** sets the extension number for a specified voice port	4	0
		5	1
		6	2
		7	3
PBX SHOW NUMBER	**PBX SHOW NUMBER** displays all the extension numbers allocated to the voice ports.	4	40
		5	41
		6	42
		7	43

Command	Notes
PBX SHOW PORT	**PBX SHOW PORT** displays the current port settings.

Command	Notes	Prefixes	Explanations
PBX SET PREFIX	**PBX SET PREFIX** links a prefix to a specific function.	EXTERNAL	Sets the external line prefix.
		INTERNAL	Sets the internal extension prefix.
		OPERATOR	Sets the internal operator prefix.
		PRIVATE	Sets the prefix for using a port-specific shortcode.
		PUBLIC	Sets the prefix for using a global shortcode.
		PICKUP	Sets the call pick-up prefix.
		DIVERT NOREPLY	Sets the divert on no reply prefix.
		DIVERT BUSY	Sets the divert on busy prefix.
		DIVERT IMMEDIATE	Set the immediate divert prefix.
		DIVERT NOANSWER	Sets the divert on busy noanswer prefix.
		DIVERT CLEAR	Clears the diversion.
		DATA	Sets the prefix for a data call using a voice port.
		NIGHT	Sets the prefix for night service enabling divert external to external.
		SHORT	Sets a prefix for setting private shortcodes on the port.
		REDIAL	Sets the prefix for last number redial.
		HOLD or SHUTTLE	Sets the prefix for placing the last active call on hold and retrieving it, or retrieving a call on hold during a shuttle call.

Command	Notes
PBX SHOW PREFIX	**PBX SHOW PREFIX** displays all the prefixes set up on the system, and gives their default values.
PBX CLEAR PREFIX	**PBX CLEAR PREFIX** removes a prefix set up on the system.

Command	Notes	Parameter	Explanation
PBX SET AUTODIAL	**PBX SET AUTODIAL** enables or disables the autodial function.	ENABLED	Enables the autodial function.
		DISABLED	Disables the autodial function.

Command	Notes	Parameter	Explanation
PBX SET HUNT	**PBX SET HUNT** sets up automatic call redirection for extensions that are busy or unanswered within a certain time. The call will cycle through a list of extensions, ringing on each in turn until answered	BUSY	Calls are redirected automatically to another extension if the extension dialled is busy.
		NOREPLY	Calls are redirected automatically to another extension if there is no reply from the extension dialled.
		NOANSWER	Calls are redirected automatically to another extension if there is no reply from the extension dialled, or it is busy.

Command	Notes	Parameter	Explanation
PBX SET DIVERT	**PBX SET DIVERT** sets up call diversion. Select the port number, then use the command to set up the type of diversion required.	DIVERT	Sets the time period before the call diverts to another number.
		INTERDIGIT	Used to control the timeout period between digits as they are being dialled.
PBX SHOW DIVERT	**PBX SHOW DIVERT** displays any call diversions set up.		

Command	Notes	Commands and Values	Explanation
PBX SET BAR	**PBX SET BAR** bars calls on a specified voice port. This stops certain types of calls or specified numbers being called from this extension.	1	Barred number 1
		2	Barred number 2
		3	Barred number 3
		NNNN...NN	NNNN... are the leading dialled digits that you wish to bar. It can be up to 25 digits long not including prefixes.
		INCOMING ENABLE	Bars incoming calls on the specified port.
		INCOMING DISABLE	Disables incoming call barring on the specified port.
		OUTGOING ENABLE	Bars outgoing calls on all ports.
		OUTGOING DISABLE	Allows outgoing calls on the specified port.
		EXTERNAL TRANSFER ENABLE	Enables external call transfers barring.
		EXTERNAL TRANSFER DISABLE	Disables barring of external call transfers.
		EXTERNAL DIVERT ENABLE	Enables outgoing call diversion.
		EXTERNAL DIVERT DISABLE	Disables outgoing call diversion.

Command	Notes	Number	Value
PBX SET EMERGENCY	**PBX SET EMERGENCY** sets up to three emergency override numbers. Emergency override numbers force the unit to connect to the emergency number even if there are no free channels or there are access restrictions.	1	999
		2	911
		3	912
PBX SHOW EMERGENCY	**PBX SHOW EMERGENCY** displays the table of emergency override numbers set up.	1	999
		2	911
		3	

Command	Parameters	Notes
PBX LOG	PBX [SHOW] LOG HISTORYx	Displays the entire call log
	PBX LOG [ENABLE I DISABLE]	Sets continuous log output
	PBX LOG FILTER PORT [INTERNAL I EXTERNAL] [ENABLE I DISABLE]	Enables internal or external call filtering
	PBX LOG FILTER STATUS [CONNECT I BUSY I NOANSWER I BAR I DIVERT]	Enables filtering by response status
	PBX LOG FILTER SHOW	Displays all attributes set by the user

Command	Notes	Channel	Port
PBX SET CHANNEL	**PBX SET CHANNEL** allocates a specific B-channel to a voice port for both incoming and outgoing calls.	1	Port 1
		2	Port 2
		ANY	Any Port
Command	**Notes**		
PBX SHOW CHANNEL	**PBX SHOW CHANNEL** displays the current voice port settings.		

Command	Notes
PBX SET OPERATOR	**PBX SET OPERATOR** allows you to change the prefix dialled to contact the operator. By default this value is set to 0, but can be reset to 1, 2 or 3.

Command	Notes
PBX SET SILENCE	**PBX SET SILENCE** is used to set a period of silence before the tone reappears after a call. This is required by answering machines in order to detect the end of the call and switch off.

Command	Notes
PBX SET PRIVATE	**PBX SET PRIVATE** sets up a private shortcode. Private shortcodes can only be used on the port where they are set up.
PBX SHOW PRIVATE	**PBX SHOW PRIVATE** displays the private shortcodes set for a port.
PBX CLEAR PRIVATE	**PBX CLEAR PRIVATE** deletes specifed private shortcodes set for a port.

Command	Notes
PBX SHOW PUBLIC	**PBX SHOW PUBLIC** displays a list of the public shortcodes set up on the iQ 460.
PBX SET PUBLIC	**PBX SET PUBLIC** sets up a public shortcode. Public shortcodes can be used on any port.
PBX CLEAR PUBLIC	**PBX CLEAR PUBLIC** deletes specifed public shortcodes.

Command	Notes
PBX SET REMOTE	**PBX SET REMOTE** sets the remote or local subaddress.
PBX CLEAR REMOTE	**PBX CLEAR REMOTE** clears the remote or local subaddress.

Command	Notes	Response	Explanation
PBX SHOW STATUS	**PBX SHOW STATUS** displays the status of the specified port. You need to specify the port before issuing the command.	SLEEPING	There is a fault.
		OFFHOOK	phone is waiting to go back onhook and will not accept any dialled digits.
		ONHOOK	The phone is idle and onhook.
		RINGING	The phone is onhook and ringing.
		DIALLING	The phone is offhook and some digits have been dialled.
		ONHOOK CLEARING	The phone is onhook and a disconnect message has been sent The port is waiting for a response.
		CALLING	The phone is offhook and dialling is complete. The destination phone is ringing.
		CALL HELD	The connected device has put the port on hold.
		CONNECTED	The phone is either connected to one another phone, or connected to one phone with another on hold.
		WAITING WITH HELD CALL	The port has a call on hold while it tries to connect to other services.
		CONNECTED WITH HELD CALL	The port has a call on hold while it is connected to other services.
		OFFHOOK CLEARING	The phone is offhook and a disconnect message has been ignored by the other device.

Command	Notes	Parameters	Explanations
PBX SET TIMER	**PBX SET TIMER** sets the time interval before an event occurs.	TRANSFER	Sets the time period in seconds before the call is transfered.
		DIVERT	Sets the time period before the call diverts to another number.
		INTERDIGIT	Used to control the timeout period between digits as they are being dialled.
PBX SHOW TIMER	**PBX SHOW TIMER** displays a table showing the timer settings.		

Command	Notes	Parameters	Explanations
PBX SET NIGHT	**PBX SET NIGHT** toggles night service enabled or disabled	ENABLED	Enables night service.
		DISABLED	Disables night service.
PBX SHOW NIGHT	Displays if night service is enabled or disabled.		

Command	Notes	Number	Value
PBX SET EMERGENCY	**PBX SET EMERGENCY** sets up to three emergency override numbers. Emergency override numbers force the unit to connect to the emergency number even if there are no free channels or there are access restrictions.	1	999
		2	911
		3	912
PBX SHOW EMERGENCY	**PBX SHOW EMERGENCY** displays the table of emergency override numbers set up.	1	999
		2	911
		3	

22 ISDN Bulletin Board Service

There is now a bulletin board service available to users of the CONNECT iQ 400 (formerly Mini WIZARD VOX) Terminal Adaptors. This makes it simple for you to access new versions of the CONNECT iQ firmware and obtain new functionality and enhancements.

You can use the bulletin board to download software to a local PC. This software can then be installed in the terminal adaptor's FLASH memory using the LOADER function described in *Chapter 8 Flash Loader.*

22.1 Prerequisites for Using the Bulletin Board

22.1.1 Hardware

MIDAS PLUS (ISDN) Module Revision 3 or later.

NOTE: MIDAS PLUS (ISDN) Module Revision 3 does not support Async/Sync PPP conversion or X.25/TPAD facilities.

22.1.2 Configuration

Setting	Value
Operation	Asynchronous
Speed Setting	38 400 bps
Async. Operation	8 data bits, no parity, 1 stop bit (8N1)
Terminal Emulation	VT100
ISDN Bulletin Board Number	00 44 (0) 1256 812668

Table 50 Bulletin Board Configuration Settings

22.1.3 Passwords

There are three passwords that must be entered. The passwords are NOT case sensitive so you may use upper or lower case, or a mixture of both.

When you see the screen prompts, enter the following passwords in this order:

1. 3net
2. connectiq
3. public

22.1.4 Filename

The filename will be in this format:

CIQPAN.EXE

N will increment alphabetically with each release of the software.

22.1.5 File Transfer

Use a file transfer utility to transfer the latest version of the CONNECT iQ 400 operating firmware to a local PC.

22.1.6 File Format

The file is a compressed, self-extracting file. Execute the program to extract the core hex (data) file.

Appendix A: System Tones

A.1 Internally Available Tones

A single 400Hz frequency output for each port generates various tones within the system. The 400Hz output is cadenced in a number of different ways providing a number of different tones. Table 51 lists the tones available and describes their characteristics.

Tone	Used When	Cadence
Mute	Between keypresses	See Figure 23
Unavailable	When: An external call is made but all the B channels are busy An internal call is made but the number dialled is invalid An external call is made but barring is in operation	See Figure 24
Ring	The far end is ringing	See Figure 25
Busy	The far end is busy	See Figure 26
Dial	When telephone is off-hooked after idle but no feature is set	See Figure 27
Dial - Feature Set	When telephone is off-hooked after idle and a feature is activated	See Figure 28
Feature Barred	A user feature is not allowed	See Figure 29
Feature Set	When a user invokes a feature that the system accepts as valid	See Figure 30

Table 51 Internally Available Tones

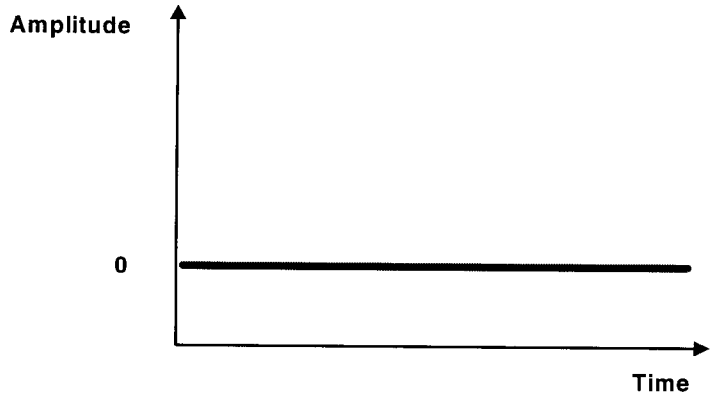

Figure 23 Mute Tone

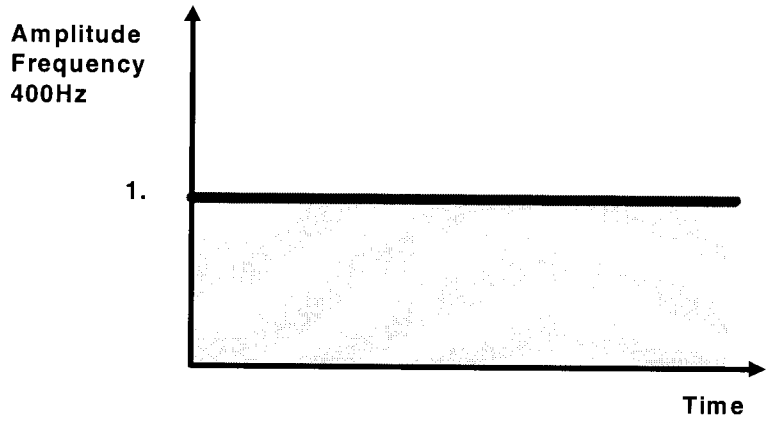

Figure 24 Unavailable Tone

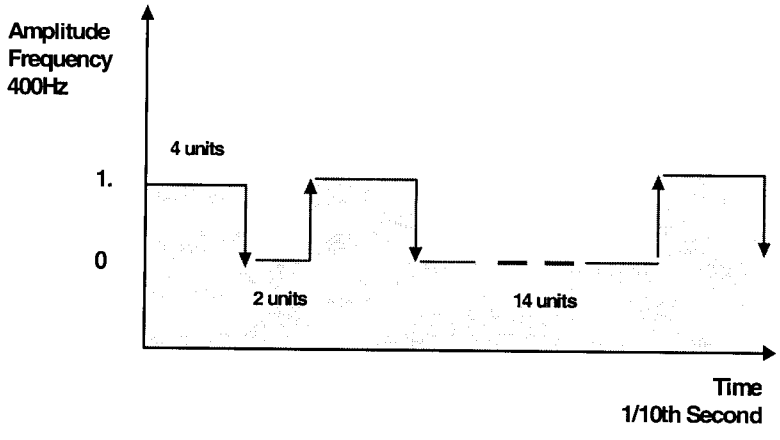

Figure 25 Ring Tone

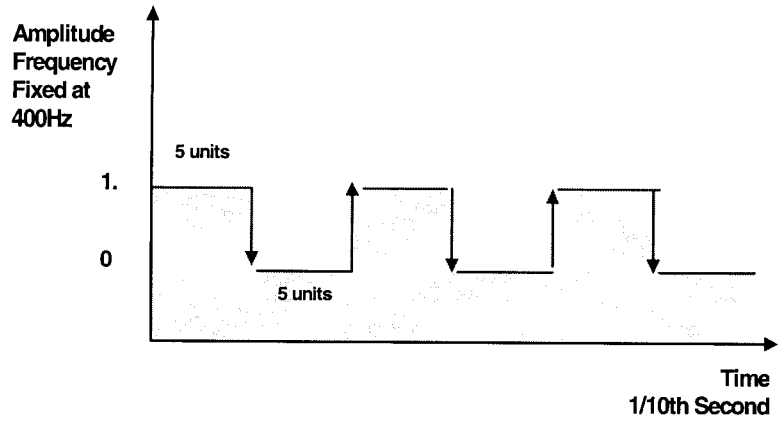

Figure 26 Busy Tone

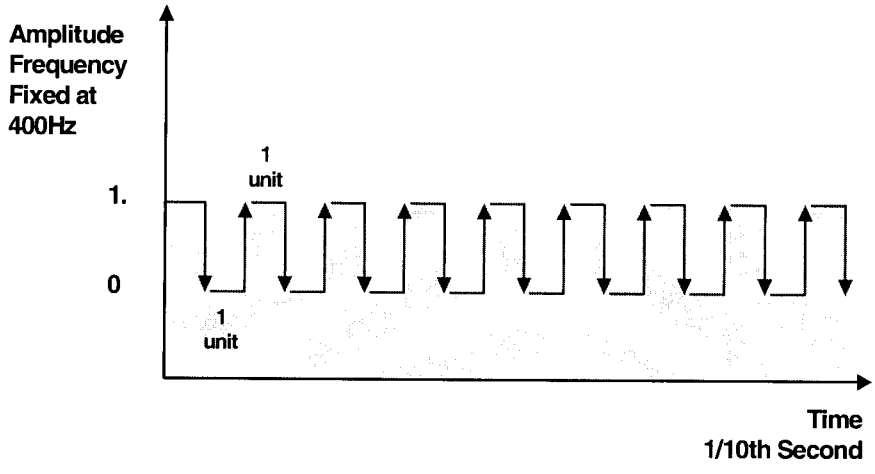

Figure 27 Dial tone

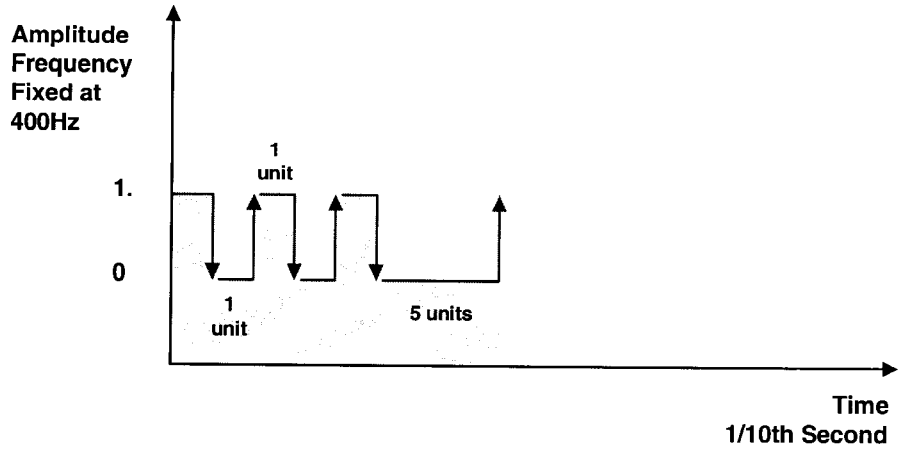

Figure 28 Dial Tone Feature Set

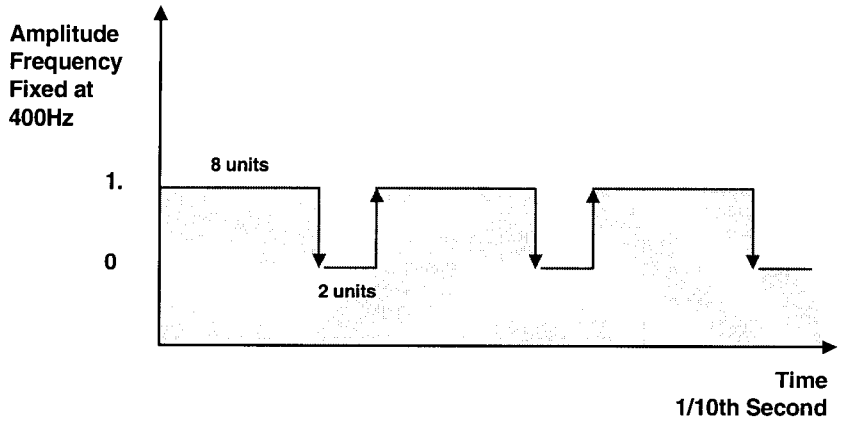

Figure 29 Feature Barred Tone

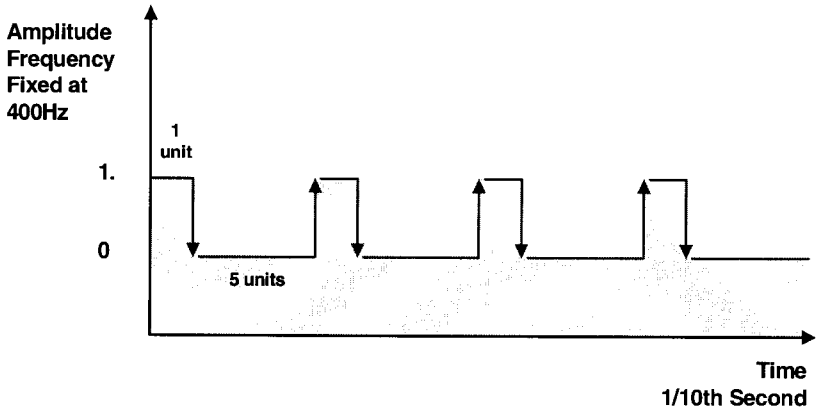

Figure 30 Feature Set Tone

Appendix B: Clearing Cause Codes

Value	Call Clearing Cause
0	S Bus not responding
1	Unallocated number
2	No Route to specified network
3	No route to destination
4	Channel unacceptable (BT only)
6	Channel unacceptable
7	Call awarded and being delivered in an established channel
16	Normal call clearing
17	User busy
18	No user responding
19	No answer from user (user alerting)
21	Call rejected
22	Number changed
26	Non-selected user clearing
27	Destination out of order
28	Invalid number format
29	Facility rejected
30	Response to Status Inquiry
31	Normal, unspecified
34	No channel, circuit available
38	Network out of order
41	Temporary failure
42	Switching equipment congestion
43	Access information discarded
44	Requested circuit / channel not available
47	Resources unavailable, unspecified
49	Quality of service unavailable
50	Requested facility not subscribed
57	Bearer capability not authorised
58	Bearer capability not presently available

Table 52 Call Clearing Causes possible for END messages from the Midas

63	Service or option not available, unspecified
65	Bearer capability not implemented
66	Channel type not implemented
69	Requested facility not implemented
70	Only restricted digital information bearer capability is available
79	Service or option not implemented, unspecified

Table 52 Call Clearing Causes possible for END messages from the Midas

Value	Call Clearing Cause
81	Invalid call reference value
82	Identified channel does not exist
83	A suspended call exists, but this call identity does not
84	Call identity in use
85	No call suspended
86	Call having the requested identity has been cleared
88	Incompatible destination
90	Destination address missing or incomplete
91	Invalid transit network selection
95	Invalid message, unspecified
96	Mandatory information element missing
97	Message type non-existent or not implemented
98	Message not compatible with call state or message type non-existent or not implemented
99	Information element non-existent or not implemented
100	Invalid information element contents
101	Message not compatible with call state
102	Recovery on timer expiry
111	Protocol error, unspecified
127	Inter networking, unspecified

Table 53 Call Clearing Causes possible for END messages from the Midas

B.1 Interpretation of Clearance Causes Returned by the ISDN

Clearance causes are seven bit values, i.e. in the range 0-127, not all values are assigned.

B.2.2 Classification of Clearance Causes

The most significant three bits of the value represent a "class", meaning that the causes can be grouped into broad categories.

Some causes will be seen routinely during normal operation on the ISDN. Specific actions may be programmed for some, or all, of these. Others are unlikely to be seen in normal operation, in these cases a default action should be programmed based on the class.

The following table shows the classes.

Class Number	Cause Range	Class
000 - 001	1 - 31	Normal event
010	32 - 47	Resource unavailable
011	48 - 63	Service or option not available
100	64 - 79	Service or option not implemented
101	80 - 95	Invalid message (e.g. parameter out of range)
110	96 - 111	Protocol error (e.g. unknown message)
111	112 - 127	Interworking

Figure 31 Call Clearing Cause Classes

Clearing cause zero is a special case in that it is returned by the MIDAS when it is unable to detect the network. This typically occurs when the S-Bus is not connected.

Please note that in the following notes the term "network" is used to mean the exchange to which the unit is connected. This may be a direct connection to the PTT exchange, or a connection to a local PABX.

Normal events are basically those that occur when things are working normally with no faults or procedural errors. It includes such events as wrong numbers, called party engaged and normal call clearing. For some causes in this class, it is possible that another, identical, call attempt would succeed.

Resource unavailable class covers those conditions when a call cannot be connected because something is currently not available that is required to complete the call (such as a free B channel). Most of these conditions are temporary, and attempting the call again could well result in success.

Service or option not available class is similar to the resource unavailable class except that the item is denied or unavailable. This means that the call will not succeed even if retried. In order for the call to succeed something external to the device must be changed (for example, a service must be subscribed to). These causes should always be regarded as fatal.

Service or option not implemented class is similar to the service or option not available except that the network itself does not support the service. This would normally be when requesting an unrestricted digital call. Connection to a different network would be necessary for the call to succeed. These causes should always be regarded as fatal.

Invalid message class can mean that there has been a procedural error in the communications between the device and the network. This would normally mean that the device is connected to a network other than the one the firmware is designated to work on. Depending upon circumstances, such connection could be illegal. The exceptions to this are cause 88 and, non-standard, BT cause 90.

Protocol error class always means that there has been a procedural error in the communications between the device and the network. This would normally mean that the device is connected to a network other than the one the firmware is designated to work on. Depending upon circumstances, such connection could be illegal.

Interworking class means that the call has been passed to another network that is unable to provide any cause information and the call has subsequently failed in, or beyond, that network. This may arise when calling via a private network, although, presumably, it could occur when placing an international ISDN call. In the absence of any other information, it may be worth retrying the call to see if the problem is of a temporary nature.

B.2.3 Notes on Specific Clearance Causes

Most clearance causes will be seen so infrequently that provision of special handling is not necessary, allowing the default action to occur will suffice. The rest are likely to be seen in the normal course of operation and therefore specific action for a given cause may be deemed appropriate.

It should also be remembered that these interpretations are the ETSI versions. Specific networks may not always correspond exactly, but normally they should be close enough that the recommended action will still be correct.

B.2.4 Cause Meaning and Suggested Course of Action

Clearing Cause	Meaning and Action
0	Non-ISDN Error: This usually means that the MIDAS was unable to activate the ISDN at the physical level. All connections between the MIDAS and the ISDN S-bus interface should be carefully checked. A retry of the call may also work.
1	Unallocated (Unassigned) Number: The number provided could not be reached. Check the telephone number used, if correct, contact your network provider to establish the reason.
16	Normal Call Clearing: Sometimes known as "user cleared", means that one of the users involved in the call decided to clear the call. No fault condition was present.
17	User Busy: Is the equivalent of the "Engaged" tone of a voice call. However it does convey some information, specifically, there was a device at the far end that was compatible with the call but it was unable to answer because it was processing another call at the time. Another call attempt may well succeed. Note that repeated call attempts without user intervention may be subject to restrictions by approvals authorities, check your national restrictions.
18	No User Responding: Implies that, although the called number existed, there was no equipment connected to it, or the connected equipment was not compatible with the call, or it was switched off.
19	No Answer From User (User Alerted): This indicates that there was a compatible equipment at the far end, the equipment indicated it was alerting the user to the presence of the incoming call, but did not subsequently answer the call. The most probable explanation for this is that the remote equipment was not configured for automatic answering and there was nobody there to accept the call.
21	Call Rejected: Means that the remote end decided to reject the call even though it was capable of accepting it at the time it was received. Probable reasons for this are that the remote end had Calling Line Identification Presentation (CLIP) enabled and yours was not an acceptable source number, or the remote user simply decided not to take the call. See the notes against causes 26 and 88.
26	Non-selected User Clearing: This should only occur with incoming calls that the local equipment was in the process of alerting or actually answering. It means that the equipment was not awarded the call. This implies that there was another piece of equipment on the S-bus that was also compatible with the call and it answered it. In the case of the MIDAS this also occurs when more than one listen matches an incoming call, causing multiple incoming call messages to be sent to the host. When one of these call indications is accepted, the others will be ended with cause number 26. (Also note that for a time BT are using non-standard cause number 21 instead of cause number 26.)

27	Destination Out of Order: indicates that there was difficulty in communications with the remote equipment. It could represent a line fault or an equipment fault at the far end. If possible, have the remote equipment checked out, including, if possible, an exchange loopback test.
28	Invalid Format (Address Incomplete): means that the network was unable to resolve the number supplied, it may have been in the wrong format, or simply incomplete. Check the number used.
34	No Circuit/Channel Available: Means that there was not a spare B-channel on the S-bus. This normally occurs where there are several devices on the single bus and one or more of these have call attempts in progress.
38	Network Out of Order: Means that the network is out of order in a big way and is unlikely to be back for some time. Contact your network provider for more information.
41	Temporary Failure: As 38, but the fault is known to be transient and the network should be back shortly. It is worth trying again (see note against cause 17).
42	Switching Equipment Congestion: This is the digital equivalent of the "Lines from Tunbridge Wells are engaged" message for voice calls. Try again (see note against cause 17).
88	Incompatible destination: Means that the remote equipment does not support the requested type of call. This could mean, for example, a voice call to a data only device (or vice versa), or a rate adapted digital call to a device that does not support the requested rate. If other speeds are supported, it may be worth retrying with a different speed. Alternatively, check out the configuration of the devices at each end. Note that dialling to the same destination with a different type of call may well not be regarded as a "retry" for approval purposes. As an empirical observation, it seems that sometimes the BT network will return cause 21 instead of cause 88, the reason for this is unknown.
90	BT network: Destination Address Missing or Incomplete: Treat this as cause 28. This is a non-standard cause and should eventually be phased out by BT.