

HARRIER

ISDN Basic Rate Access Tester



USER'S GUIDE

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CHESILVALE ELECTRONICS LIMITED
UNIT 3, MAESGLAS INDUSTRIAL ESTATE
NEWPORT
SOUTH WALES
NP20 2NN
UNITED KINGDOM

TELEPHONE: + 44 (0)1633 223552

FAX: + 44 (0)1633 223948

EMAIL contact@cve.co.uk

WEB www.cve.co.uk

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The Harrier contains no user serviceable parts – **Do not** dismantle it beyond removing the battery cover

The supplied power adapter contains no user serviceable parts – **Do not** dismantle this unit

CARE OF THE HARRIER ISDN BASIC RATE TESTER

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- expose to direct sunlight
- allow dust and humidity to penetrate inside the unit
- force it underwater - it's weatherproof not submersible
- use it as a hammer
- swing it by it's cord

EMC COMPLIANCE

The CE mark on this product indicates compliance with European EMC Directive 89/336/EEC. This compliance may be invalidated if non-standard cables or adapters are fitted.

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1 GENERAL INFORMATION

This section of the User Guide is designed to inform you of the capabilities of the Harrier ISDN tester.

1.1 General Description and Features

The Harrier ISDN Hand Held Tester is designed for direct connection to the customer side 4 Wire 'S/T' interface or the 2 Wire (2B1Q) (4B3T option) 'U' interface, POTS/Z interface (option) via the connecting cables provided with the Tester. It is a functional Tester tailored to fit the needs of Technicians installing, commissioning or maintaining an ISDN basic rate line or terminal equipment.

It is designed to cope with frequent changes in service definition and rollout as Network Operators evolve the ISDN to meet the challenges of emerging technology and new applications.

Harrier may be used as:

- an ISDN telephone
- a normal PSTN Analogue test telephone (option)
- to perform self call or end to end 'B' channel Bit Error Rate (BER) tests
- to perform Supplementary and Bearer Services operation checks
- to perform Teleservices operation and function checks
- to perform 'D' channel packet access and service (option) checks

1.1.1 Case Design

The Harrier Hand Held Tester is the ideal test telephone shape. Both keypad and display are positioned to face you. The control keys are sensibly placed in the handle section. The ergonomically designed test telephone is truly hand-held, shoulder placeable and highly water resistant.

1.1.2 Serial Data Port

A Serial Port, at the microphone end of the Tester, enables several extra functions to be performed

- Operating software can be 'field upgraded' (requires serial cable)
- Configuration information can be output to PC or printer (requires serial cable)
- Protocol analysis can be performed on a PC (option), with D-View software (option)
- Events information can be stored and later output to a PC (option)
- Tester can be remotely controlled from the PC (option)

1.1.3 Power Management

The Harrier Hand Held Tester's smart power management will automatically select to operate from mains derived, internal battery or line power sources and automatically recharge the internal battery. Under emergency conditions the Ni-MH battery can be replaced with a standard PP3 alkaline battery.

1.1.4 User Controls & Display

The back-lit LCD display shows user menus plus: call progress, layer 1, 2 and 3 error messages, ISDN call clear cause codes, and test information.

For call set-up the display is used in conjunction with the control keys SELECT, SCROLL and CLEAR located on the keypad.

1.2 Messages and Measurements

Diagnostic Self Test Error Messages:

Self Test OK, or....

SBUS FAIL, ARCOFI SBUS FAIL, UBUS FAIL, ARCOFI UBUS FAIL, ARCOFI Z FAIL, FPGA FAIL, ST6 FAIL, ST6 Z MODE FAIL CORRUPT CONFIG

Voltage Measurement:

Battery Voltage: Actual V (8.6V nominal)
So Interface Voltage: (Limit) Actual V
U Interface Voltage: (Limit) Actual V
Power Source 2: Actual V

Indicators:

LEDs indicate B1, B2; Channel Active (Green)
BER Test Sync. (Yellow)
S or U interface out of sync. (Red)

Layer 1, 2, 3 & Display I E Messages:

Displayed and saved to the message buffer

TEI: Menu selection (P-MP) AUTO / (P-P) xx / None

Supplementary Service Test:

User CLIP/CLIR, Network CLIP/CLIR, DDI, MSN, SUBADDRESS, TERMINAL PORTABILITY

Teleservice Test:

Auto and individual self call to test HLC for:
Telephony, Telefax G2/G3, Telefax G4, Teletex, Videotex, Mixed Mode, OSI, Telex and User

Bearer & Channel Selection:

64k Unrestricted Digital B1, B2, Bx (Any)
SPEECH B1, B2, Bx (Any)
3.1 kHz B1, B2, Bx (Any)
7 kHz B1, B2, Bx (Any)

Speech Call:

Dial digits (overlap or en bloc – menu selectable) and add; sub address (prefix with *) or keypad information / DTMF Tones (menu selectable).

Speech Call Mode:

Handset or Handsfree Mode

B Channel Transmission BER Test:

Self-call auto answer (Speech or data bearer)
B1 looped back to B2, or B2 looped back to B1 or Remote UTS-ISDN auto answer and loop Rx to Tx
Press '#' to insert single bit error
Press '*' to re-start BER Test counters and timers
1 minute, 15 minute, 1hr, user or continuous
G821 measurement: Errors, Time, UAT, BER, ES, SES, DM
Unavailable time, %ES, %SES, %DM, %UAT
Bit pattern 2^9-1 / $2^{11}-1$ / $2^{15}-1$

'D' Channel Packet Test:

Layer 2 link establishment and clear (standard)
Layer 2 & 3 Service Tests (option)

Message buffer:

99 line message buffer with filter option to save Layer 1, Layer 2, Layer 3 or Display Information Elements.

Volume Control:

Sounder volume control adjusted to suit operational environment. (Three levels)

Interface:

4 wire 'S' Interface or 2 wire 2B1Q (4B3T option) 'U' Interface

Number Store:

Speed dial store for up to 10 numbers

Call Numbers Store:

Read-back store for; Calling number, Called number and Connected number

Terminal Number Store:

Provides terminal identity

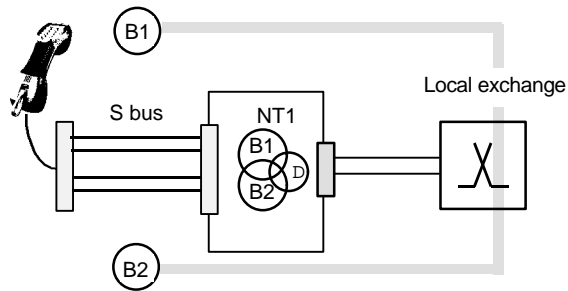
Loops:

Loopback Data, Speech, All or None

1.3 Tester Circuit Applications

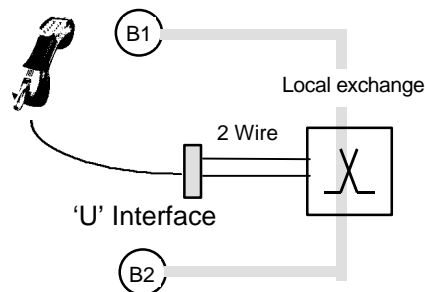
1.3.1 'S/T' Interface Testing

The RJ45 to RJ45 terminated cable allows direct connection to the customer side 4 wire S/T interface.



1.3.2 'U' Interface Testing

A range of optional RJ45 to 2 wire termination are provided to access to the 2 wire exchange side.

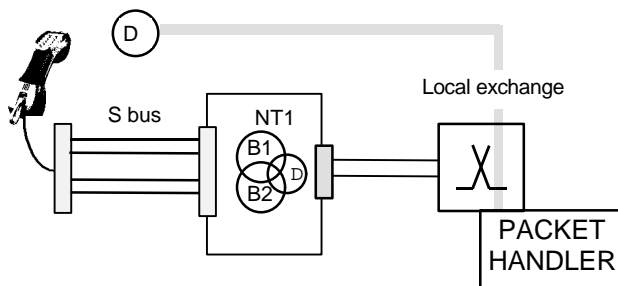


'U' interface Notes

- Although there is an International Standard for the 'U' reference point (e.g. 2B1Q ANSI T1.601), circuit characteristics will vary depending on the Network operator.
- To successfully test at the 'U' interface the user must be aware of the circuit characteristics before connecting to the 2 Wire circuit.
- The tester provides for the most commonly used line code 2B1Q (4B3T option). Some networks use AMI line codes and 3B2T. Check the provided line code if in doubt.
- Transmission over the 2 Wire circuit involves a 'start-up procedure' which introduces a 'start-up time' specified to last up to 30 seconds (depending on circuit conditions) before communication is established.

1.3.3 'D' Channel Packet Testing

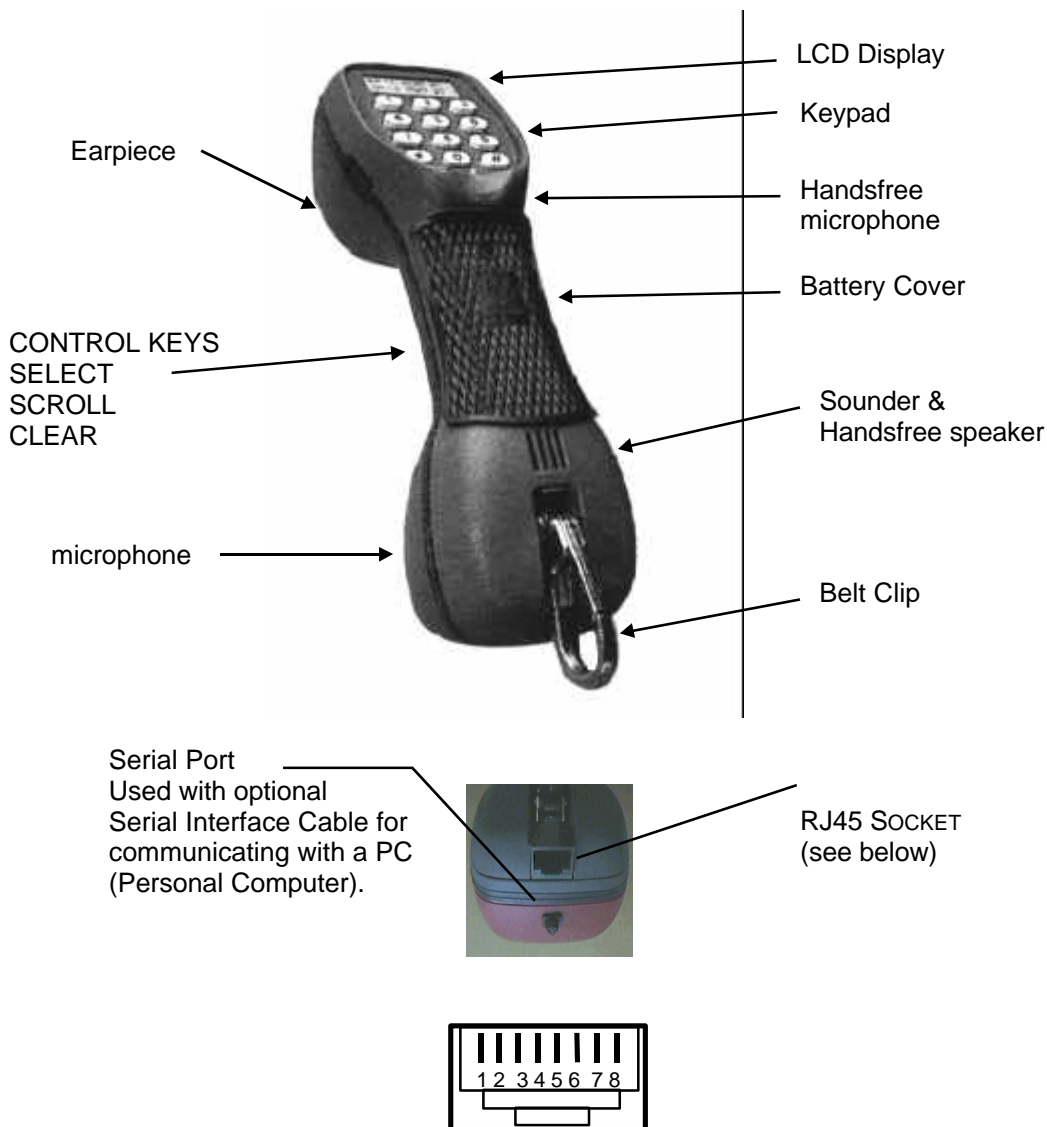
The Standard test option confirms access to the packet network over the D channel.



2 BASIC OPERATION OF THE TESTER

2.1 Controls and Connectors

The following view shows the Harrier ISDN tester operating controls:



RJ45 Socket

Pins 1&2 provide for connection to the 'U' Interface.

Pins 3,4,5&6 provide for connection to the 'S' Interface

Pins 7&8 provide for connection of the power adapter or Z/POTS interface (option).

The Tester is powered:

ON by holding down the SELECT key for 2 seconds.

OFF by first displaying any main menu option then holding the CLEAR key down for 2 seconds.

2.1.1 LCD Display

A 16 character, 2 line back-lit display presents information regarding:

- power up and self test status
- test configuration and parameter selection
- layer 1,2&3 error messages
- call progress messages
- called, calling and connected party numbers
- test progress and results

- 'clear cause' number and message decode

To preserve battery charge, the backlight turns OFF if no key is pressed for 1 minute. Any key press will turn the backlight back ON. In addition the tester will power down and the display will clear after 5 minutes of inactivity while operating in 'Battery Only' mode.

2.1.2 Control Keys

There are three control keys located at the top of the keypad.

The **SELECT** key is used to:

- turn ON the tester
- send the displayed number / answer a call
- select a menu item / accept data input
- scroll UP through the message buffer

The **SCROLL** key is used to:

- scroll DOWN to the next menu item
- switch from call-to-menu or call-to-call

The **CLEAR** key is used to perform a number of functions depending on the length of time the key is pressed. Each time the key is pressed a 'beep' is emitted from the sounder. A short press generates 1 'beep' while a long press (2 or 3 seconds) will generate 2 or 3 'beeps' respectively.

Use a Short Press to:

- clear a call that has completed to the CONNECTed phase
- delete the right-hand digit in a Number Entry sub-menu
- navigate UP one menu level towards the Top Level menu

Use a Long Press to:

- abort a call (during the ALERTING phase)
- cancel a menu operation e.g. a test sequence
- exit to the Top Level menu
- turn OFF the tester (when at the Top Level menu)

2.1.3 Status Indicator LED's

Two LED indicators are located between the control keys and the telephone keypad, and are labeled B1 and B2. The functions are as follows:

LED	COLOUR	MEANING
B1 & B2	Red flashing	S or U interface out of sync
B1 & B2	Yellow flashing	PRBS sync
B1 or B2	Green flashing	Channel Active

During the power on self test the B1 and B2 LED's flash alternately Red and Green.

2.1.4 Telephone Keypad

The keypad is used to enter telephone numbers and other numerical information. It is also used to make 'hot-key' menu selections as described later.

2.1.5 RJ45 Socket

The integral RJ45 socket provides connection to the following. **Only use the leads supplied with the Harrier ISDN Tester**

- Pins 1&2 provide for connection to the 'U' Interface.
- Pins 3,4,5&6 provide for connection to the 'S' Interface
- Pins 7&8 provide for connection of the power adapter or Z/POTS interface (option).

2.1.6 Serial Port Socket

The serial port is located at the microphone end of the tester and allows connection to a printer or PC. The serial interface cable is a charged option.

2.1.7 Sounder / Handsfree speaker

The sounder is located on the rear of the tester and emits a tone on receipt of incoming call that has to be manually answered from the interface being tested (for ISDN calls see the BERT Loops menu). It also emits a 'beep' each time a key is pressed, a series of 'beeps' if the CLEAR key is held depressed and 3 'beeps' indicating Low Battery.

2.1.8 The NiMH Battery

The Tester is supplied with a Nickel Metal Hydride (Ni-MH) multiple cell battery fitted and ready for use. Self-discharge is a characteristic of the battery design, the discharge rate varies with time and temperature therefore it's state of charge when you **first** use the Tester cannot be precisely defined.

In some cases, to achieve or restore the full performance of the battery, it may be necessary to charge the battery for up to 24 hours. Subsequently it is advisable to top up the battery on all occasions that a power source is available.

The Tester automatically takes power from the line or power source. The internal battery is necessary only when testing on a defective NT1, using the Tester with other designated line powered terminals on the 'S' bus, using the tester on a 'U' interface without power or using the Tester off line.

Detailed instructions on charging the battery are given in the Powering section of this guide.

2.1.9 AC Mains Power Adapter

The supplied power adapter derives 40V DC from a local AC mains supply to power the tester and charge the internal battery. It is not suitable for outdoor use.

Before using the adapter, ensure that the AC mains voltage marked on the adapter is the same as that of the local mains supply.

POWER ADAPTER TYPE	PART CODE
United Kingdom	M0180-04A
Europe	M0180-02A
USA	M0180-03A

An RJ45 Dual outlet adapter is supplied with the power module to facilitate connection to the test circuit and power source at the same time. Power is fed in on the RJ45 Connector Pins 7 & 8 and connections to the test circuit is via Pins 1 & 2 when testing at the 'U' Interface and Pins 3,4,5,6 when testing at the 'S' Interface.

2.1.10 DC Car Power Adapter

This power adapter (M0183-00) produces 40V from the 12V DC cigarette lighter socket found in most cars and vans. The lead is fitted with an LED to indicate when power is available at the cigarette lighter socket, as some sockets are only live when the car engine is operating. It is not suitable for outdoor use.



2.1.11 Tester Cables

Cables supplied with or that are optional for the Harrier are detailed below:

USE ONLY THE TEST CABLES PROVIDED or AVAILABLE AS AN OPTION

- RJ45 to RJ45 lead - for S Interface Testing - Chesilvale Part Code 1015-91-1200



- RJ45 to Crocodile Clips - for U Interface Testing - Chesilvale Part Code 1015-91-1260



- Dual RJ45 to Crocodile Clips - for U & Z/POTS Interface Testing - Chesilvale Part Code 1015-91-1490



- Tester Serial Port to 25 Way 'D' Type plug - used to interface to a PC for software download etc (Optional) Chesilvale Part Code M0181-00



2.2 Operation

2.2.1 Turning ON the Tester

- Hold the SELECT key pressed for 2-3 seconds
- If the key is not released the LCD display will show the message [RELEASE SELECT KEY]
- The Tester performs a series of initialisation tests lasting approx. 10 seconds and displaying the following messages:
 - Harrier Vx.x. SNyyyyy – (Internal software revision and Serial No.)
 - Harrier Vx.x Battery Low 7.6V – (Only if battery low)
 - Harrier Vx.x Testing – (B1 & B2 LED's flash red/green)
 - Harrier Vx.x SELF TEST OK
- The Top Level menu will appear as either display below dependant on if the POTS option has been fitted:

ISDN TE	1	OR	ISDN TE	1
Analog Phone	2		D Ch. Monitor	2

2.2.2 Initialisation Error Messages

If any of the following messages are displayed during initialisation, the Tester should be returned for repair:

Harrier Vx.x SBUS FAIL
Harrier Vx.x ARCOFI SBUS FAIL
Harrier Vx.x 2B1Q FAIL
Harrier Vx.x 4B3T FAIL
Harrier Vx.x ARCOFI 2B1Q FAIL
Harrier Vx.x ARCOFI 4B3T FAIL
Harrier Vx.x ARCOFI Z FAIL
Harrier Vx.x FPGA FAIL
Harrier Vx.x CORRUPT CONFIG

The following message, displayed during initialisation, indicates a stuck key. The Tester will power up and display:

Harrier Vx.x STUCK KEY ERROR

If the Tester fails to turn ON and the display is blank it may indicate a missing power supply or discharged battery. Try re-charging the battery or connecting to a powered ISDN interface.

2.2.3 Turning OFF the Tester

From the Top Level menu:

- Hold the CLEAR key pressed for 3 seconds – sounder should emit 3 'beeps'
- LCD display clears – Tester is OFF

From lower menu levels:

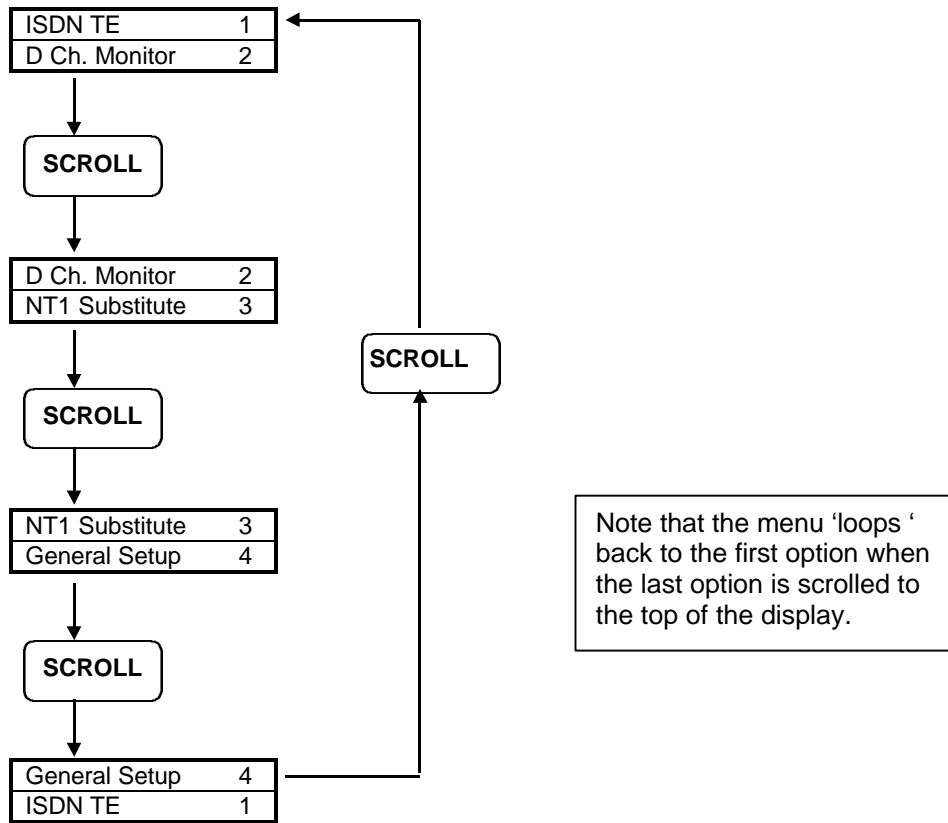
- Press the CLEAR key repeatedly to travel up the menu structure until the top level menu is displayed.
- Hold the CLEAR key pressed for 3 seconds – sounder should emit 2-3 'beeps'
- LCD display clears – Tester is OFF

2.3 Menu Navigation

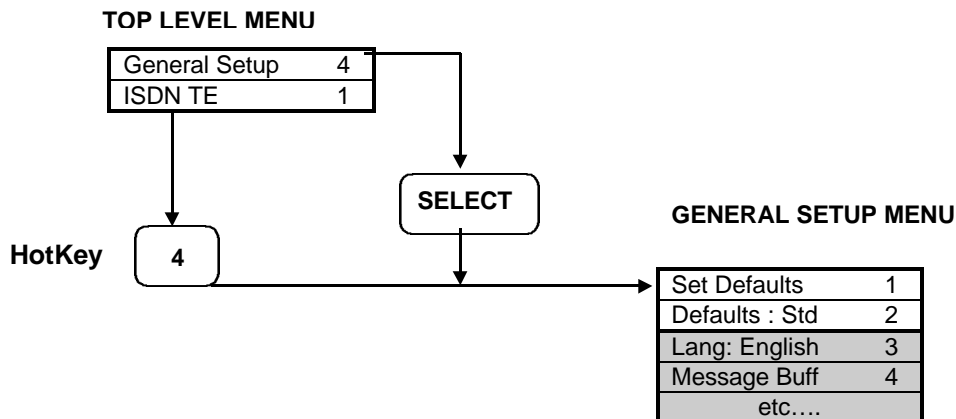
The Tester's functions are accessed and configured via a menu system which is up to 5 levels deep, and is structured to allow any selection to be made by operation of the SELECT, SCROLL and CLEAR keys. Fast access to a menu line item can be achieved by entering its associated number on the numerical keypad. (known as a 'hot-key').

Throughout this guide, menus are referred to by a number which is also the 'hot-key' number sequence for that menu from the Top Level menu e.g. Menu 1 is ISDN TE, Menu 11 is BER Test, Menu 12 is Voice etc.

Each menu is 'viewed' through a window only two lines deep with the SCROLL key used to bring additional 'hidden' items into view. The illustration below shows the Top Level menu that contains four sub-menus of which only two are visible at a time (the POTS option has not been fitted).



2.3.1 Selecting a Menu Item



2.3.2 Using the Control Keys

A menu item can be 'selected' by first scrolling it to the top line of the display and then pressing the SELECT key. The above illustration shows this technique used to access the General Setup menu from the Top Level menu.

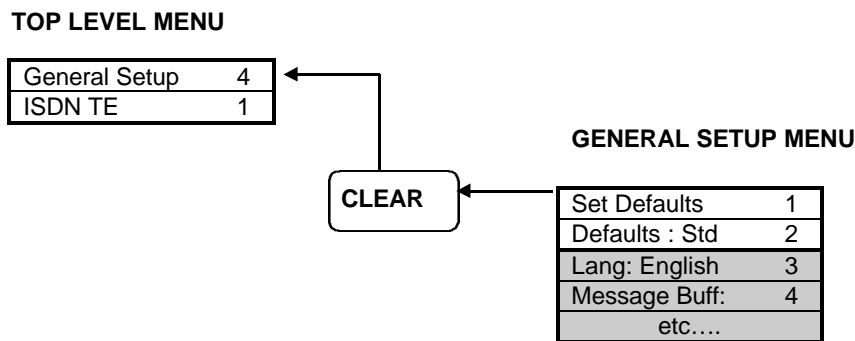
2.3.3 Using the 'Hot-Keys'

An alternative method of selecting a menu item is to press the 'hot-key' number at the right hand end of the menu line and is the equivalent to moving a required selection to the top of the display AND pressing the SELECT key.

For example, pressing [4] on the keypad while viewing any part of the Top Level menu will cause the Tester to jump to the [General Setup 4] sub-menu. The complete menu listing that follows later shows the 'hot-key' sequence required to access any sub-menu item from the Top Level menu.

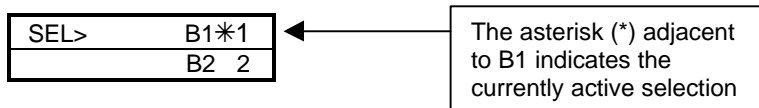
2.3.4 Navigating Back Up the Menu Tree

Pressing the CLEAR key is the only method of moving back up the menu structure towards the Top Level menu – the return route always reflects the original path. If the CLEAR key is kept pressed after reaching the Top Level menu the Tester will turn OFF.

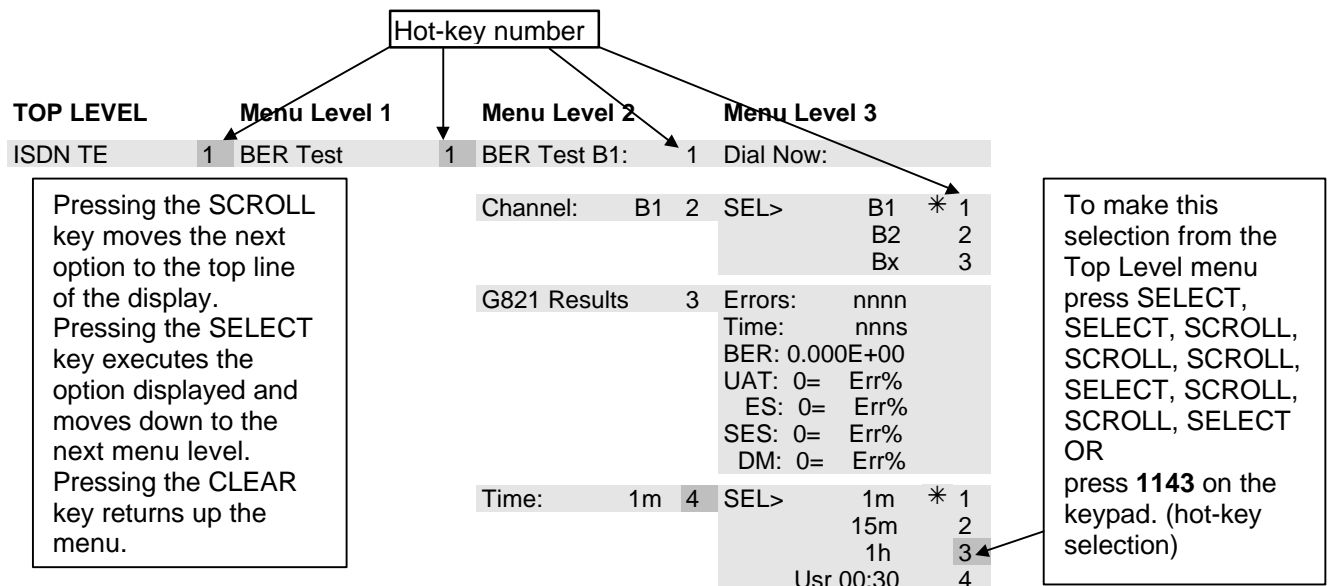


2.3.5 Selecting and Entering Data

When selecting a parameter from a range of pre-set options, for example when selecting a Channel for a BER Test, the menu will display [SEL>] on the left of the top line. To select a parameter from the available options use the SCROLL/SELECT keys or 'hot-key', as before.



Part of the BER Test 1 menu is shown to illustrate methods of navigating and selecting items from the menu. The complete Tester menu follows later for reference.



2.4 The Menu Structure

The complete Tester menu structure follows below:

TOP LEVEL	Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	
ISDN TE	1	BER Test	1	BER Test B1:	
			1	Dial Now:	
		Channel: B1	2	SEL> B1 * 1	
				B2 2	
				Bx 3	
		G821 Results	3	Errors: nnnn	
				Time: nnnn	
				BER: 0.000E+00	
				UAT: 0= Err%	
				ES: 0= Err%	
				SES: 0= Err%	
				DM: 0= Err%	
		Time: 1m	4	SEL> 1m * 1	
				15m 2	
				1h 3	
				Usr 00:30 4	
				Cont 5	
		Pattern: 2^11	5	SEL> 2^9 1	
				2^11 * 2	
				2^15 3	
		Bearer: 64kb/s	6	SEL> 64kb/s * 1	
				Speech 2	
		Loops: Data	7	SEL> Data * 1	
				Speech 2	
				All 3	
				None 4	
		G821 T'holds	8	Errs: 1 1	
				%ES: 2.4000% 2	
				%SES: 0.0010% 3	
				%DM: 3.0000% 4	
		Remote:None	9	SEL> None * 1	
				:LOOP UUS 2	
				Maint HLC 3	
	Voice	2	Voice: Bx	1	Dial Now:
			Bearer: Speech	2	SEL> Speech * 1
					3.1k 2
					7k 3
					Data 4
		Channel: Bx	3	SEL> B1 1	
				B2 2	
				Bx * 3	
		Dial: Overlap	4	SEL> Overlap * 1	
				En-bloc 2	
		Mode: Handset	5	SEL> Handset * 1	
				Handsfree 2	
		Coding Law: A	6	SEL> A * 1	
				u 2	
		Keypad: DTMF	7	SEL> DTMF * 1	
				Info E 2	
	Packet Data	3	TEI (0-63)	nn	

Note:
 * = Factory Default Setting
 n = Numeric Digit

TOP LEVEL	Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	
Teleservices	4	Auto Test	1 Dial B2 No:		
		Telephony	2 Dial B2 No:		
		Telefax G2/3	3 Dial B2 No:		
		Telefax G4	4 Dial B2 No:		
		Teletex	5 Dial B2 No:		
		Videotex	6 Dial B2 No:		
		Mixed Mode	7 Dial B2 No:		
		OSI	8 Dial B2 No:		
		Telex	9 Dial B2 No:		
		User=000	01 User HLC (0-126)		
Supplementary	5	Netw CLIP	1 Dial B1 No:		
		User CLIR	2 Dial B1 No:		
		DDI/MSN	3 Dial B2 No:		
		Subaddress	4 Dial B2 No:		
		Term Portab	5 Dial B2 No:		
Call Numbers	6	Calling Num:	1		
		Called Number:	2		
		Connected Num:	3		
Voltages	7	Battery: n.nV	1		
		S(32-42): nnV -	2		
		U(80-105): nnnV	3		
		PS2: nnV	4		
User Numbers	8	Stored Nos.	1 Store #x:	1	
		Terminal No.	2 Terminal No:	2	
View Messages	9	{99 lines}			
Setup	01	Set Defaults: *	1		
		Defaults: Std.	2 SEL>	Std. * 1 User 2 Save 3	
		TEI: Auto	3 P-P TEI=00 1 P-MP TEI=Auto * 2 No Protocol 3	TEI (0-63):	
		S-Term:Hi-Z	4 SEL>	Hi-Z * 1 100R 2	
		Interface: S	5 SEL>	S * 1 2B1Q 2 4B3T 3	
		(option)			
		Sub-Addr: NSAP	6 SEL>	User 1 NSAP * 2	
		LCD Messages	7	Call Prog: NO 1 User Msgs: YES 2 Disp. IE: NO 3	
		Serial:Events	8 SEL>	Decode 1	SEL> 9.6k 1 19.2k* 2
				Events * 2	SEL> 9.6k 1 19.2k* 2
				Term'l 3	SEL> 9.6k 1 19.2k* 2
		Event:OFF:300	9 SEL>	OFF:300 * 1 Mark 2 Clear 3 Flush 4	

NOTE: The darker shaded Menu items 8 and 9 are optional

With the POTS hardware option

TOP LEVEL	Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4
Analog Phone 2	Talk Mode 1	Dial Now: 1		
	Monitor Mode 2	Pol:Norm. nnV CLEAR:Exit		
	TBR: 100mS 3	SEL> 100mS * 1 300mS 2 600mS 3		
	Dial: DTMF 4	SEL> DTMF * 1 Pulse 2		
	Stored Nos. 5	Store #x:		
D Ch. Monitor (Option) 3	Passive mon.	U: SETUP N: SETUP ACK		
	Term: Hi-Z	SEL> Hi-Z* 1 100R 2		
	View Messages	{99 lines}		
NT1 Substitute (Option) 4	NT1 Emulation 1	U Sync : NO So Sync : NO		
	U I/ace: 2B1Q (Option) 2	SEL> 2B1Q* 1 4B3T 2		
	S I/Face: Bus 3	SEL> Bus* 1 PTP 2		
	S-Term: Hi-Z 4	SEL> Hi-Z* 1 100R 2		
	View Messages 5	{99 lines}		
General Setup 5	Set Defaults: * 1			
	Defaults: Std. 2	SEL> Std. 1 User 2 Save 3		
	Lang: English 3	SEL> English * 1 Francais 2 Deutsch 3 Espanol 4		
	Message Buff. 4	Layer 1: NO 1 Layer 2: YES 2 L2 - RR: NO 3 Layer 3: YES 4 Disp.IE: NO 5		
	Serial:Events 5	SEL> Decode 1	SEL> 9.6k 1 2	
		Events 2	SEL> 9.6k 1 2	
		Term'l 3	SEL> 9.6k 1 2	
	Event:OFF:300 6	SEL> OFF:300 * 1 Mark 2 Clear 3 Flush 4		
	Vol. >>> 7			
	Set Clock: 8	Date- dd *=Next01/01/96		

Note: The darker shaded Menu items 5, 6 & 8 are optional

Without the POTS hardware option

TOP LEVEL	Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4
D.Ch. Monitor (Option) 2	Passive mon.	U: SETUP N: SETUP ACK		
	Term: Hi-Z	SEL> Hi-Z* 1 100R 2		
	View Messages	{99 lines}		
NT1 Substitute (Option) 3	NT1 Emulation 1	U Sync : NO So Sync : NO		
	U I/ace: 2B1Q (Option) 2	SEL> 2B1Q* 1 4B3T 2		
	S I/Face: Bus 3	SEL> Bus* 1 PTP 2		
	S-Term: Hi-Z 4	SEL> Hi-Z* 1 100R 2		
	View Messages 5	{99 lines}		
General Setup 4	Set Defaults: * 1			
	Defaults: Std. 2	SEL> Std. 1 User 2 Save 3		
	Lang: English 3	SEL> English * 1 Francais 2 Deutsch 3 Espanol 4		
	Message Buff. 4	Layer 1: NO 1 Layer 2: YES 2 L2 - RR: NO 3 Layer 3: YES 4 Disp.IE: NO 5		
	Serial:Events 5	SEL> Decode 1	SEL> 9.6k 1 2	
		Events 2	SEL> 9.6k 1 2	
		Term'l 3	SEL> 9.6k 1 2	
	Event:OFF:300 6	SEL> OFF:300 * 1 Mark 2 Clear 3 Flush 4		
	Vol. >>> 7			
	Set Clock: 8	Date- dd *=Next01/01/96		

Note: The darker shaded Menu items 5, 6 & 8 are optional

2.5 Powering

The Tester automatically takes power from the connected interface or AC mains (via the power adapter). The internal battery is only used to power the Tester when:

- on a un-powered S interface
- with other designated line powered terminals on the 'S' bus
- on a un-powered 'U' interface
- off line (not connected to anything)
- on a 'Z' interface or POTS (Plain Ordinary Telephone System) line

The Tester may be powered from:

- internal Nickel Metal Hydride (Ni-MH) battery
- the supplied Power Adapter
- the 'S/T' interface using the supplied RJ45 – RJ45 cable
- the 'U' interface using the supplied RJ45-to-crocodile clips cable

The battery voltage is monitored continually by the Tester, and if it falls below prescribed limits the following occurs:

- below 7.6V – 3 'beeps' and LCD message [*Battery Low n.nV*] (where n.nV is measured battery voltage)
- below 7.2V – Tester switches OFF. This is to prevent damaging the battery.

2.5.1 To Charge the Battery

The Ni-MH rechargeable battery used has a nominal voltage of 8.6V. It is user replaceable.

Self-discharge is a characteristic of the battery design, the discharge rate varies with time and temperature therefore the state of charge when the Tester is **first** used cannot be precisely defined.

In some cases, to achieve or restore the full performance of the battery, it may be necessary to charge the battery for up to 24 hours. Subsequently it is advisable to top up the battery on all occasions that a power source is available. The Ni-MH battery does not suffer from 'memory effect' as do Nickel Cadmium types.

The battery can be re-charged in several ways.

- When the AC mains power adapter is connected (charge possible anytime)
- When connected to a Normal powered S interface (charge possible anytime)
- When connected to a Restricted powered S interface (charge only possible when the tester is powered off and also the only device connected to the NT1)
- When connected to a powered U interface (charge possible anytime)

When charging the battery using the Power Adapter, powered U interface or a Normal powered S interface, after an initial 'Fast Charge' the battery is kept 'Topped Up' with a trickle charge. Charging can take upto 14-16 hours to fully re-charge the battery.

2.5.2 Determining Battery Voltage

The actual battery voltage, as measured by the Tester, can be displayed on the LCD display by accessing the Voltages sub-menu as follows:

- From the Top Level menu select - [*ISDN TE 1*]
- From the Menu 1 select - [*Voltages 7*]
- The battery voltage is displayed on line 1 as [*Battery: n.nV*]

2.5.3 Charging Information

When the Tester is connected to the AC mains power adapter to charge the battery, the battery status can be determined from the Voltages sub-menu.

Connect the Tester to the AC mains power adapter and then select the Tester Voltages sub-menu as shown below.

Voltages	7	Battery:	n.nV	1	Battery terminal Voltage
		S(32-42):	nnV	2	'S' Interface voltage when connected
		U(80-105):	nnnV	3	'U' Interface voltage when connected
		PS2:	nnV	4	Power Source 2 voltage when connected

The Tester will display the battery voltage (Nominal 8.6Volts). The voltage will rise as the battery is being charged. The battery is charged with a switched constant current source.

3 TESTING ('S' OR 'U' INTERFACE)

The tester is designed for direct connection to either the 'S/T' or 'U' interface. To make an ISDN call the appropriate interface must be selected and the corresponding physical connection made using either the RJ45-RJ45 lead 'S' interface cable or the RJ45-to-crocodile clips 'U' interface cable.

3.1 Selecting the Interface

Selection of the Interface is made from the ISDN TE (1), Setup (101), Interface (1015) sub menu as shown below:

Menu 1015	
SEL>	S * 1
	2B1Q 2

* Indicates that the Tester is set to test at the 4 wire 'S' interface

The Factory default is the 'S' interface, and thus an asterisk '*' is displayed against option 1 of menu 1015. If the 'S' interface is to be accessed then no further action is required other than pressing SELECT (which will attempt an activation of the selected interface).

If the 'U' interface is to be tested then press SCROLL until the 2B1Q (or 4B3T) option is on the top line of the display and press SELECT.

The tester will briefly display [*Trying So sync*] or [*Trying 2B1Q (4B3T) sync*] as it goes through a training sequence with the Local Exchange circuit.

Depending on the circuit conditions this process may take some time. At the end of the sequence the Tester should display the following message and the red B1 & B2 LED's should stop flashing:

Sync OK

Interface selection ends with the Tester confirming the selected interface by displaying Menu 101:

Menu 101	
Interface: S	5
Sub-Addr: NSAP	6

OR

Menu 101	
Interface: 2B1Q	5
Sub-Addr: NSAP	6

OR

Menu 101	
Interface: 4B3T	5
Sub-Addr: NSAP	6

Press CLEAR, CLEAR to display the ISDN TE Test menu 1 ready to select BER tests.

3.1.1 Communication Failure

If the Tester was unable to establish communication, one or more of the following messages will be displayed:

Sync failure

Sync failure' will result in the B1 & B2 LEDs flashing red.

L1 Activation Failure

Bus Power Lost

First check connections to the interface then press the CLEAR key repeatedly to return to the ISDN TE (1) Top Level menu. Access the ISDN TE Setup menu (101) and either verify that settings are correct or select option 1 to set Factory Defaults.

Menu 101	
Set Defaults	*1
Defaults: Std.	2

The "*" indicates that default parameters are set

Press the SELECT key to choose option 1. An asterisk (if not already present) should appear to indicate Factory Defaults are set.

Repeat the above 'Selecting the Interface' procedure to establish communication on the chosen interface.

3.2 Making a Data Call

Follow the procedure in 'Selecting the Interface' above to select the 'S' or 'U' '2B1Q' (4B3T option) interface. This will ensure that communication over the chosen interface can be established.

Two types of Data Call can be made, 'Self Call' and 'End to End'.

3.2.1 Self Call

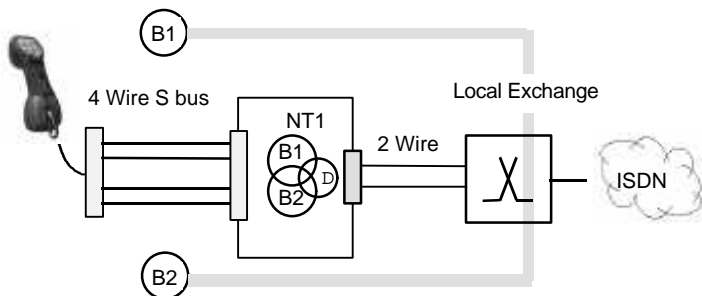
The Tester makes a call on channel B1 to the other channel, B2.

The Tester originates the test pattern on B1 to the Local Exchange. The Local Exchange loops the data incoming on B1 and sends the data out on B2. The Tester auto answers the call and loops back the test pattern on B2 back to the Local Exchange on B2. The Local Exchange loops the data incoming on B2 back out onto B1 back to the Tester that originated the call.

In this case the number of the B2 channel is entered in response to the **Dial Now:** prompt.

In the diagram below, connection to the 'S' interface is shown but the principal applies equally to the 'U' interface.

It is also possible to make a call on channel B2 to the other channel, B1. It is also possible to make a Bx call where the switch allocates the outgoing channel to the tester.



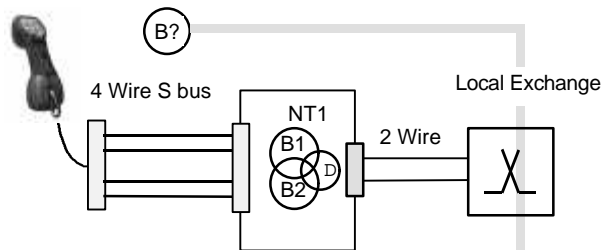
3.2.2 End to End Call

The Tester makes a call on **one** channel B1 or B2 to another Tester or a 'Loopback' Number which some administrations make available to loopback the originating signal.

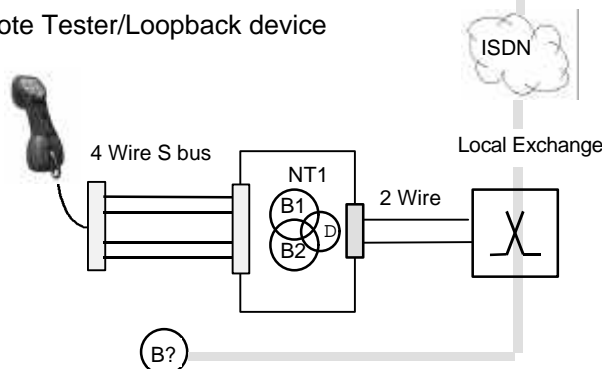
In this case the number of the device which provides the Loop is entered in response to the **Dial Now:** prompt.

In the diagram below, connection to the 'S' interface is shown but the principal applies equally to the 'U' interface.

Local Tester



Remote Tester/Loopback device



The call may be made from either channel on the local end to either channel on the remote end. User selected options vary depending on the Tester operating as the Local or Remote device.

3.2.3 BER Test Data Call

From the BER Test sub-menu (11) select option 1 to perform a BER (Bit Error Rate) Test on channel B1:

Menu 11	
BER Test B1:	1
Channel:	B1 2

Display changes to:

Dial Now:	01633223552
-----------	-------------

Use keypad to overwrite or enter B2 number (The number that you want to call)

Enter the B2 channel number (Self Call).

Or

Enter the number of another Tester or 'loopback' device (End to End Call).

Press SELECT to send the number.

The display will show call progress messages and/or user messages and the Tester will originate and receive data by performing a Bit Error Rate Test (BERT).

Self Call:

The B1 and B2 LED's will initially flash Green to indicate that channel B1 and B2 are active when the call is fully established and error free, the outgoing channel LED will flash amber to indicate synchronisation to the test pattern.

End to End Call:

The outgoing channel LED will initially flash green to indicate the channel is active and calling the remote device. It will then flash amber to indicate that the test pattern has been looped back by the remote device and synchronisation with the test pattern has been achieved. The display will show a series of messages ending with the following:

BERT B1: nnm	<p>Test time remaining depending on selection in Menu 114.</p> <p>Severely errored seconds</p> <p>Errored seconds</p> <p># (number) of bit errors</p>
nns	
#: n E: n S: n	

At the end of the **Test time** or if the call is cleared by the user, the display will indicate the result of the test as follows:

Test	Passed
#: 0 E: 0 S: 0	

Alternatively, the display may show #: number of bit errors, **E**: errored seconds, **S**: severely errored seconds and confirm that the BER Test has failed:

Test	Failed
#: 99 E: 9 S: 0	

During a test when errors are detected, the outgoing channel LED may flash green to indicate that the channel is active but for some reason synchronisation with the test pattern has been lost or not achieved.

Press the CLEAR key repeatedly to return to the Top Level menu. The results of the test may be reviewed by selecting option [G821 Results 3] from Menu 113.

Notes

The test can also be made in the direction B2 to B1 or with other user options selected.

Errors generated when first connecting to a circuit can be eliminated by pressing the '* key to reset the BER Test.

During the test the user can:

- Insert single bit errors by pressing the '#' key
- Reset the test by pressing the '* key (error counters and test time)
- Stop the test by pressing the CLEAR key

- Press the SCROLL key to gain access to the menus and make a call on the unused Channel or review the other 'call' if it is already established.

3.2.4 If the Data Call Fails

If communication could not be established the following displays may result:

L1 Activation
Failure

Temp. failure
01633223552

Check connections to the interface then press the CLEAR key repeatedly to return to the ISDN TE Top Level menu. Access the ISDN TE Setup menu (101) and either verify that settings are correct or select option 1 to set Factory Defaults.

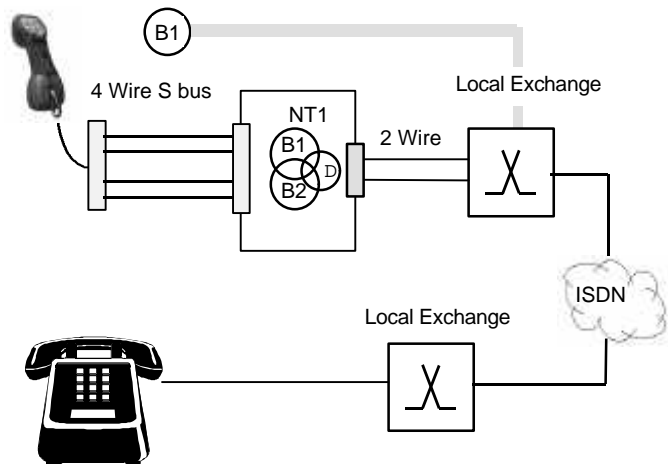
Menu 101	
Set Defaults	* 1
Defaults: Std.	2

The '*' indicates that default parameters are set

Press the SELECT key to choose option 1 and if an asterisk (if not already present) should now appear to indicate Factory Defaults are now set. Re-try the Data Call remembering to check that the correct interface is selected (menu 1015) and the correct cable is being used to connect to the interface.

3.2.5 Making a Speech Call

The Harrier can originate and receive voice calls on a variety of bearers. It is not possible for the Harrier to have two voice calls active at the same time



Follow the procedure in 'Selecting the Interface' above to select the 'S' or 'U' '2B1Q' (4B3T option) interface. This will ensure that communication over the chosen interface can be established.

From the Voice sub-menu (12) select option 1 to make a Voice call on channel Bx and with a Speech bearer.

Menu 12		
Voice:	Bx	1
Bearer:	Speech	2

If synchronisation isn't already established the display could show:

Trying So sync

If communications are successfully established the display changes to:

Dial Now:
01633223552

Use key pad to overwrite or enter B2 number

If the Dial Mode is set to En-Bloc then no dial tone will be heard at the "Dial Now" prompt. If the Dial Mode is set to Overlap then dial tone will be heard at the "Dial Now" prompt.

Enter the required number.

Either B1 or B2 LED will flash Green to indicate the channel is active. This is because that a Bx call requests any available channel from the network. The network will allocate either B1 or B2 channel to the Tester.

If the dial mode was set to Overlap, the display will show call progress messages and if a valid number was entered "ringing tone" will be heard. If the dial mode was set to En-Bloc, then the SELECT key must be pressed in order to initiate the call after the number has been entered into the tester. The display should then show:

ALERTING
01633223552

When the called party answers, the display will show:

CLEAR=Stop B1

The call may be completed using the Tester as a normal Handset.

To 'hang up' or end the call press the CLEAR key.

Note:

Pressing the SCROLL key will allow a second call (data only) to be set up on the other channel.

3.2.6 If the Speech Call Fails

If communication could not be established the following displays may result:

L1 Activation
Failure

Temp. failure
01633223552

Check connections to the interface then press the CLEAR key repeatedly to return to the ISDN TE Top Level menu. Access the ISDN TE Setup menu (101) and either verify that settings are correct or select option 1 to set Factory Defaults.

Menu 101	
Set Defaults	* 1
Defaults: Std.	2

The '*' indicates that default parameters are set

Press the SELECT key to choose option 1 and if an asterisk (if not already present) should now appear to indicate Factory Defaults are now set. Re-try the Speech Call remembering to check that the correct interface is selected (menu 1015) and the correct cable is being used to connect to the interface.

3.3 Harrier Operating as the Remote BRI Tester

When operating as a remote device, the Tester will respond to incoming calls depending on the Bearer Capability in the incoming SETUP message, and the setting of the BER Test sub-menu 'Loops:' option (menu 117).

SEL>	Data	* 1
	Speech	2
	All	3
	None	4

With this setting (Speech) an incoming voice call will not be answered as a voice call.

Note: This affects **all** incoming calls, the tester cannot distinguish between an incoming BERT call with a SPEECH Bearer, or a normal speech call.

	Bearer Capability	BERT Loops Setting	Treatment
1	Any	ALL	Call will be answered automatically and data looped back
2	Data	DATA	As in 1
3	Data	NONE	Call will be answered automatically. A PRBS pattern generator will be connected to the Tx. B-Channel and a detector will be connected to the Rx B-Channel.
4	Data	SPEECH	As in 3
5	Speech	DATA	Tester will ring and treat call as normal speech call.
6	Speech	NONE	As in 5
7	Speech	SPEECH	As in 1

Depending on the LCD Messages options selected in the Setup menu 1017, the Tester will display messages relating to the incoming call and finally display:

CLEAR=Stop Bn
SELECT=Loop OFF

The LED associated with the called channel will flash green to indicate 'In use'. Pressing the CLEAR key will clear down the data call.

Pressing the SELECT key will remove the loop and open circuit the data path. The originating Tester will see a flood of errors as soon as the loop is removed. This is useful for verifying that the calling Tester is connected to the correct Tester that is performing the loopback.

Pressing the SELECT key once more will re-connect the loop. The originating tester can the reset results screen by pressing the '*' key.

The user can press the SCROLL key to re-enter the menu structure, in order to make another call (either BERT or voice).

4 DETAILED OPERATION

4.1 The 'TOP LEVEL' Menu

The Top Level menu allows the selection of the operating mode. To select a mode either press SCROLL until the option required is at the top then press SELECT or, on the key-pad, press the number of the required option (hot-key). Hot-key numbers for each menu are shown after headings as [nn].

TOP LEVEL

ISDN TE	1
Analog Phone	2
D Ch. monitor	3
NT1 Substitute	4
General Setup	5

4.2 The 'ISDN TE' Menu [1]

This menu provides access to ISDN test functions.

TOP LEVEL Menu Level 1

ISDN TE	1	BER Test	1
		Voice	2
		Packet Data	3
		Teleservices	4
		Supplementary	5
		Call Numbers	6
		Voltages	7
		User Numbers	8
		View Messages	9
		Setup	01

4.2.1 The 'BER TEST' Menu [11]

This menu, and its sub-menus, provides access to the settings needed to perform Bit Error Rate (BER) tests on a chosen interface.

TOP LEVEL	Menu Level 1	Menu Level 2	Menu Level 3
ISDN TE	1	BER Test	1
		BER Test B1:	1
		Channel: B1	2
		SEL>	B1 * 1
			B2 2
			Bx 3
		G821 Results	3
		Errors:	nnnn
		Time:	nnns
		BER:	0.000E+00
		UAT:	0= Err%
		ES:	0= Err%
		SES:	0= Err%
		DM:	0= Err%
		Time: 1m	4
		SEL>	1m * 1
			15m 2
			1h 3
			Usr 00:30 4
			Cont 5
		Pattern: 2^11	5
		SEL>	2^9 1
			2^11 * 2
			2^15 3
		Bearer: 64kb/s	6
		SEL>	64kb/s * 1
			Speech 2
		Loops: Data	7
		SEL>	Data * 1
			Speech 2
			All 3
			None 4
		G821 T'holds	8
		Errs:	1 1
		%ES:	2.4000% 2
		%SES:	0.0010% 3
		%DM:	3.0000% 4
		Remote:None	9
		SEL>	None * 1
			LOOP UUS 2

Note:

* = Factory Default Setting
n = Numeric Digit

For all menus pressing the SCROLL key will display next option, pressing the SELECT key will select the option displayed on the option on the top line of the LCD and pressing the CLEAR key will take you up one level in the menu.

BER Test [11]

This menu provides access to a range of user selectable parameters to conduct Bit Error Rate Testing at the 'U' or 'S/T' interface.

Menu 11	
BER Test B1:	1
Channel:	B1 2

BER Test B1 [111]

Starts the BER test and subsequently displays the 'Dial Now' message.

Dial Now:	
	01633223552

Last number dialled may be displayed.

Channel: [112]

Allows selection of the channel used to originate the call.

Menu 112	
SEL >	B1* 1
	B2 2
	Bx 3

The '*' confirms this selection is set

Bx is selected in test situations where the network allocates a channel to the tester

G821 Results [113]

Allows review of the BER Test results:

Errors	xxxx
Time	xxxx
BER:	0.000E+00
UAT:	0= Err%
ES:	0= Err%
SES:	0= Err%
DM:	0= Err%

BER: Bit Error Rate
UAT: Un-Available Time
ES: Errored Seconds
SES: Severely Errored Seconds
DM: Degraded Minutes

Refer to the Appendix for additional information on G821 Results.

Test Time: [114]

Allows selection of the duration of the BER Test.

SEL>	1m* 1
	15m 2
	1h 3
	User 00:30 4
	Cont. 5

The first 2 digits entered are hh hours. Pressing the * or # key toggles between minutes and hours

Pattern: [115]

Allows selection of the test pattern for the BER Test.

SEL>	2^9 1
	2^11* 2
	2^15 3

Bearer: [116]

Allows selection of the bearer for the BER Test.

SEL>	64kb/s* 1
	Speech 2

Loops: [117]

Allows selection of the loop condition applicable to a call that is originated by ANOTHER TESTER OR TERMINAL.

SEL>	Data	* 1
	Speech	2
	All	3
	None	4

The Tester will automatically loop back a self call irrespective of the Loops setting.

G821 T'holds: [118]

Allows G821 Thresholds to be set. Default values apply to a local grade section G821 Hypothetical Reference Connection.

Errs:	1	1
%ES:	2.4000%	2
%SES:	0.0010%	3
%DM	3.0000%	4

The BER Test will result in the display of FAIL only when the Thresholds are exceeded.

Changing Err: value from 1 to 0 invokes the G821 limits resulting in a BER test failure only if the %ES or %SES or %DM values are exceeded otherwise, the limit is taken as the number of errors input by the user in the Errs: field.

In the above example 1 or more errors would cause the Tester to display 'Test Failure' at the end of a BER Test.

Remote: [119]

Allows the user to send user to user information (:LOOP) to the remote device, or the maintenance HLC.

The :LOOP message is often used if communicating with a "dumb" loopback unit. These units often will only loopback calls if they decode :LOOP in user to user information elements, and some require an additional specific sub-address in order to activate the loopback. Check the units operating instructions for further details.

The maintenance HLC is used by some network operators to activate automatic network loopbacks, so that every number dialled is looped back in the local switch. This avoids the cost of having to provide "dumb" loopback units.

SEL>	None	* 1
	:LOOP UUS	2
	Maint HLC	3

4.2.2 The 'Voice' Menu [12]

This menu selection provides access to a range of user selectable parameters to originate voice calls using a selectable bearer at the 'U' or 'S/T' interface.

Menu 12		
Voice:	Bx	1
Bearer:	Speech	2

TOP LEVEL	Menu Level 1	Menu Level 2	Menu Level 3
ISDN TE	1 Voice	2 Voice: Bx	1 Dial Now:
		Bearer: Speech	2 SEL> Speech * 1 3.1k 2 7k 3 Data 4
		Channel: Bx	3 SEL> B1 1 B2 2 Bx * 3
		Dial: Overlap	4 SEL> Overlap * 1 En-bloc 2
		Mode: Handset	5 SEL> Handset * 1 Handsfree 2
		Coding Law: A	6 SEL> A * 1 U 2
		Keypad: DTMF	7 SEL> DTMF * 1 Info E 2

For all menus pressing the SCROLL key will display next option, pressing the SELECT key will select the option displayed on the option on the top line of the LCD and pressing the CLEAR key will take you out one level in the menu.

Voice: [121]

The tester will originate a call on the user selected **Bearer**, on the user selected **Channel**, using user selected **Dial** mode. All of these parameters can be altered from within the Voice menu

Dial Now:
01633223552

Last number dialled may be displayed.

Bearer: [122]

Allows selection of the Bearer for the Voice call.

SEL>	Speech * 1
	3.1k 2
	7k 3
	Data 4

The '*' confirms this selection is set

Channel: [123]

Allows selection of the channel used to originate the call.

SEL>	B1 1
	B2 2
	Bx* 3

Bx is selected in test situations where the network allocates a channel to the tester

Dial: [124]

Allows selection of the dialling method. Overlap mode sends each digit to the network as they are keyed. En-Bloc mode sends the whole number once it has been keyed when the SELECT key has been pressed.

SEL>	Overlap *1
	En-bloc 2

Mode: [125]

Allows selection of speech mode. The handsfree mode maybe temporarily unavailable if the interface is unpowered, or if the S interface is restricted and the internal battery is low. Handsfree consumes significant amount of power, and the mode is restricted in order to preserve the integrity of the interface under test.

SEL>	Handset *1
	Handsfree 2

Coding Law: [126]

Enables selection of the companding method used for the voice call. For European networks this is usually A law. For USA markets this is usually u law.

SEL>	A *1
	u 2

Keypad: [127]

Allows selection of DTMF or Keypad Information Elements to be output when Keypad buttons are operated during the CONNECTed phase of the call. The DTMF tones, when selected, are sent over the active channel to operate services such as voice mail. The Keypad Information Elements, when selected, are sent over the D Channel to control network services.

For further information regarding Keypad Information Elements – refer to section 5

SEL>	DTMF *1
	Info E 2

4.2.3 The Packet Data Menu [13]

This menu selection provides access to a range of user selectable parameters to perform 'D' Channel Packet Service access test at the 'U' or 'S/T' interface.

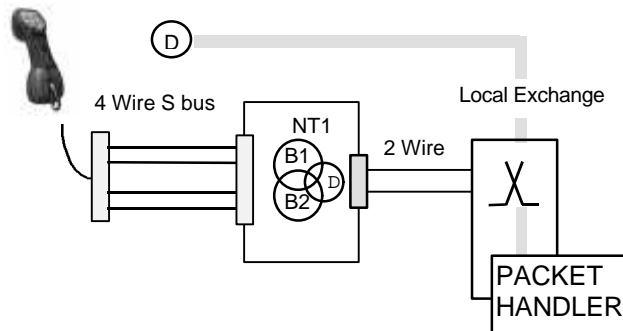
Menu 1	
Packet Data	3
Teleservices	4

Press SELECT to access the sub menu.

Menu 13	
TEI (0-63):	00

Default value

Press the SELECT key to send the default TEI value or enter a new value then press the SELECT key. Enter single digit numbers with a leading 0 (zero).



The display will show:

Sending SABME..	
SAPI=16	TEI=00

The Tester will make 3 attempts to establish a Layer 2 link with the local packet handler and finally displays either:

Packet Link	
Established	

Or

Packet Link	
Not Established	

It should be noted that there is an enhanced D-Channel packet test available for Harrier. This is a chargeable option that allows the user to test the X.25 call setup, tear down and data integrity of information packets. Contact Chesilvale for more information.

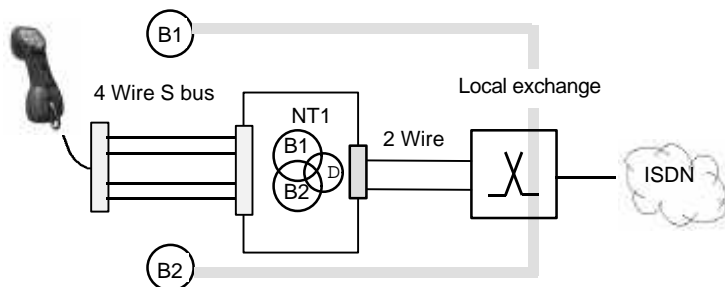
4.2.4 The Teleservices Menu [14]

This menu selection provides access to a sub menu which allows testing of Teleservices at the 'U' or 'S/T' interface.

Menu 1	
Teleservices	4
Supplementary	5

TOP LEVEL	Menu Level 1	Menu Level 2	Menu Level 3
ISDN TE	1 Teleservices	4 Auto Test	1 Dial B2 No:
		Telephony	2 Dial B2 No:
		Telefax G2/3	3 Dial B2 No:
		Telefax G4	4 Dial B2 No:
		Teletex	5 Dial B2 No:
		Videotex	6 Dial B2 No:
		Mixed Mode	7 Dial B2 No:
		OSI	8 Dial B2 No:
		Telex	9 Dial B2 No:
		User=000	01 User HLC (0-126)

For all menus pressing the SCROLL key will display next option, pressing the SELECT key will select the option displayed on the option on the top line of the LCD and pressing the CLEAR key will take you up one level in the menu.



Auto Test [141]

Allows an automatic test for Teleservices. This accomplished by making an outgoing call on the B1 channel to the B2 channel and observing the output from the network on the B2 channel.

Menu 14	
Auto Test	1
Telephony	2

Press the SELECT key to display a request to input the B2 channel number.

Dial B2 No:	223552
-------------	--------

Last number dialled may be displayed.

Key in the B2 channel number and press the SELECT key to start the test sequence:

Testing.....
1 Telephony

The B1 LED flashes green to indicate that the Tester is sending the Teleservice (Telephony in this case) Higher Level Compatibility (HLC) information element in the outgoing call Setup message. The B2 LED flashes green to indicate receipt of the incoming call Setup message. The Tester checks the incoming Setup message for the Teleservice HLC (Telephony in this case) information element and records the result. The Tester checks each Teleservice in the same way and finally displays the result.

Auto Test	1
Telephony	Y 2

'Y' indicates that the Teleservice is available

Press the SCROLL key to view the results of each test:

Telefax G2/3	Y	3
Telefax G4	Y	4
Teletex	N	5
Videotex	N	6
Mixed Mode	?	7
OSI	?	8
Telex	Y	9
User=000	Y	01

'N' indicates that the Teleservice is NOT available

'?' indicates that the Tester was unable to make a 'Y' or 'N' decision (call rejected by network or the number dialled was not the B2 channel number)

Telephony [142]

Allows for a Telephony Teleservice test.

Menu 14		
Telephony	Y	2
Telefax G2/3	Y	3

Result from earlier test may be displayed

Press the SELECT key to display a request to dial the B2 channel number. In this case ONLY the Telephony Teleservice check is made.

Dial B2 No:	
	223552

Last number dialled may be displayed.

Key in the B2 channel number and press the SELECT key to start the test sequence. The Tester will display call progress messages depending on the options selected under LCD Messages in the Setup menu 1017.

Testing.....
1 Telephony

The B1 LED flashes green to indicate that the Tester is sending the Telephony HLC information element in the outgoing call Setup message. The B2 LED flashes green to indicate receipt of the incoming call Setup message. The Tester checks the incoming Setup message for the Telephony HLC information element and displays the result:

Telephony	Y	2
Telefax G2/3		3

'Y' indicates that the Telephony HLC was returned by the network confirming that the Telephony Teleservice is available. 'N' indicates that the Teleservice is NOT available, '?' indicates that the Tester was unable to make a 'Y' or 'N' decision (call rejected by network or the number dialled was not the B2 channel number).

Other Services [143] to [149]

Each of the remaining Teleservices can be tested in the same way – either one by one (manually) or automatically.

Telefax G2/3		3
Telefax G4		4
Teletex		5
Videotex		6
Mixed Mode		7
OSI		8
Telex		9
User=000	Y	01

Press CLEAR key to return to the top of the menu.

User: [1401]

Allows the user to input a non-standard HLC (Higher Level Compatibility) information element for testing. The HLC has to be in the range 0-126 (decimal). The default is 000.

User HLC	(0-126)
	000

Enter the required HLC and press SELECT. A selection menu is displayed which allows the Bearer to be chosen as follows:

SEL>	Speech *	1
	3.1k	2
	7k	3
	Data	4

Once a suitable Bearer is selected the display changes to:

Dial B2 No:
223552

Last number dialled may be displayed.

Key in the B2 channel number and press the SELECT key to start the test sequence. The Tester will display call progress messages depending on the options selected under LCD Messages in the Setup menu 1017.

Testing
12 User= 000

The B1 LED flashes green to indicate that the Tester is sending the user specified HLC information element in the outgoing call Setup message. The B2 LED flashes green to indicate receipt of the incoming call Setup message. The Tester checks the incoming Setup message for the user specified HLC information element and displays the result:

User =000	? 01
Auto Test	1

'Y' indicates that the user specified HLC was returned by the network confirming that this Teleservice is available. 'N' indicates that the Teleservice is NOT available, '?' indicates that the Tester was unable to make a 'Y' or 'N' decision.

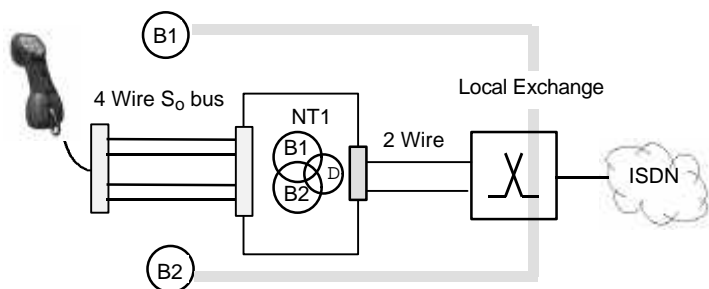
4.2.5 Supplementary [15]

This menu selection provides access to a sub menu which allows testing of Supplementary services at the 'U' or 'S/T' interface.

Menu 1	
Supplementary	5
Call Numbers	6

TOP LEVEL	Menu Level 1	Menu Level 2	Menu Level 3
ISDN TE	1 Supplementary	5	Netw CLIP 1 Dial B1 No:
			User CLIR 2 Dial B1 No:
			DDI/MSN 3 Dial B2 No:
			Subaddress 4 Dial B2 No:
			Term Portab 5

For all menus pressing the SCROLL key will display next option, pressing the SELECT key will select the option displayed on the option on the top line of the LCD and pressing the CLEAR key will take you up one level in the menu.



With the exception of Terminal Portability (which requires a speech call) Supplementary Services are tested by making a self call on the B1 channel and checking the incoming set up message on the B2 channel for the correct bearer capability and information element(s).

Netw CLIP [151]

Allows testing of Calling Line Identity Presentation Supplementary service.

Menu 15	
Netw CLIP	1
User CLIR	2

Press SELECT key to display the first prompt. Key in the B1 channel number and press the SELECT key.

Dial B1 No:	
223552	— Last number dialled may be displayed.

Key in the B2 channel number and press the SELECT key to start the test sequence.

Dial B2 No:	
223553	— Last number dialled may be displayed.

The Tester will display call progress messages depending on the options selected under LCD Messages in the Setup menu 1017. The B1 & B2 LED's flash green to indicate progress of the self call and finally the result of the test will be displayed.

Netw CLIP OK	1	— Presentation is allowed Service available
User CLIR	2	

Netw CLIP REST	1	— The service is available but the network is restricting the presentation of the users number
User CLIR	2	

Netw CLIP N/A ...	1	— The Network has not provided the number for checking at the B2 channel
User CLIR	2	

User CLIR [152]

Allows testing of Calling Line Identity Restriction Supplementary service.

Menu 15	
User CLIR	2
DDI/MSN	3

Press SELECT key to display the first prompt. Key in the B1 channel number and press the SELECT key.

Dial B1 No:	223552
-------------	--------

Last number dialled may be displayed.

Key in the B2 channel number and press the SELECT key to start the test sequence.

Dial B2 No:	223553
-------------	--------

Last number dialled may be displayed.

The Tester will display call progress messages depending on the options selected under LCD Messages in the Setup menu 1017. The B1& B2 LED's flash green to indicate progress of the self call and finally the result of the test will be displayed.

User CLIR	OK....2
DDI/MSN	3

User can restrict presentation Service is available

User CLIR	NETW 2
DDI/MSN	3

The user is able to restrict the number from being sent Service is not available

User CLIR	NO....2
DDI/MSN	3

The network does not support the transport and presentation of Calling Line Identity

DDI/MSN [153]

Allows testing of Direct Dialling Inward/Multiple Subscriber Number Supplementary service.

Menu 15	
DDI/MSN	3
Subaddress	4

Press SELECT key to display the "Dial Now" prompt. Key in the B2 channel number and press the SELECT key to start the test sequence.

Dial B2 No:	223553
-------------	--------

Last number dialled may be displayed.

The Tester will display call progress and/or user messages depending on the options selected under LCD Messages in the Setup menu 1017. The B1& B2 LED's will flash green to indicate progress of the self call and finally the result of the test is displayed.

DDI/MSN	Y 3
Subaddress	4

'Y' indicates that the line is provisioned for DDI/MSN, 'N' indicates that DDI/MSN is not available on this line.

Subaddress [154]

Allows testing of Subaddress Supplementary service.

Menu 15	
Subaddress	4
Term. Portab.	5

Press SELECT key to display the "Dial Now" prompt. Key in the B2 channel number followed by a '*' and the subaddress (if no subaddress is provided the Tester will insert '1234' as the subaddress).

Dial B2 No:	
	223553*9876

Last number dialled may be displayed.

Key in the B2 channel number followed by a '*' and the subaddress (if no subaddress is provided the Tester will insert '1234' as the subaddress). Press the SELECT key to start the test sequence.

The Tester will display call progress messages depending on the options selected under LCD Messages in the Setup menu 1017. The B1 & B2 LED's will flash green to indicate progress of the self call and finally the result of the test is displayed.

Subaddress	Y	4
Term Portab		5

'Y' indicates that the service is available 'N' indicates that the Supplementary service is NOT available.

NOTES

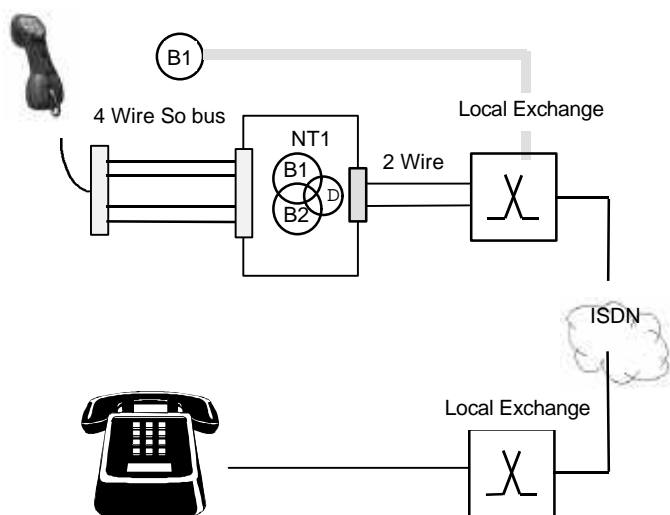
- It is possible to have a 'N' result even though the Supplementary Service is available. If the network only supports the transport of 4 subaddress characters (as a maximum) and if 5 characters were sent by the Tester, there would be a mis-match between sent and received lengths which would be interpreted as a failure. To observe what subaddressing information was received by the tester from the network look in menu 16 (Call Numbers).
- There are two types of subaddressing formats supported by the Tester – User and NSAP. The subaddressing format can be altered in menu 1016. It is possible that some networks will only support one format of subaddressing, but as a general rule, NSAP subaddressing is used on EURO ISDN compliant network equipment

Terminal Portability [155]

This service allows a call to be suspended and then resumed at another terminal or location on the S bus. Consequently a self call cannot be used for this test.

Menu 15	
Term. Portab.	5
Netw CLIP	1

For this test an end to end speech call is set up:



Press SELECT key to display the "Dial Now" prompt. Enter the remote terminal number and press SELECT key to send the number.

Dial Now:	

Stored number may be displayed

When the called party answers, the Tester display changes to:

SEL. to Suspend	
Call ID:	01

This is the default
Call IDentity number

The user can either use the default Call Identity number or overwrite it with another number. Press the SELECT Key to Suspend the call and the tester will confirm the action with the following display.

SEL. to Resume	
Call ID:	01

The call is now suspended until the user resumes the call or the network clears it down.

NOTE 1: The Call IDentity number provides security from an unauthorised terminal on the bus resuming the call. The call can only be resumed by a terminal using the same Call IDentity used to Suspend the call.

NOTE 2: Automatic implementation is used to simplify the Terminal Portability test, consequently, the Tester should not be disconnected from the line during this test sequence.

Pressing the SELECT Key Resumes the call and reconnects the user with the called party. It is possible to change the Resume Call Identity, by overwriting, from the value that was selected to suspend the call in order to test that the network will only resume the call if the correct Call IDentity is used.

SEL. to Resume	
Call ID:	01

The Tester display shows:

Test Passed	
CLEAR to finish	

Terminal Portability
is available

Test Failed	
CLEAR to finish	

Terminal Portability
is NOT available

Press the CLEAR Key to “hang up “ the call and the Tester will display the result of the test:

Term Portab	Y	5
Netw CLIP		1

‘Y’ indicates that the service is Available ‘N’ indicates that the Supplementary service is NOT available
It is the users responsibility to ensure that suspended calls are resumed and subsequently cleared.

4.2.6 Call Numbers [16]

This menu selection allows the user to review Call Numbers captured by the Tester in originating and answering test calls at the 'U' or 'S/T' interface.

Menu 1	
Call Numbers	6
Voltages	7

TOP LEVEL	Menu Level 1	Menu Level 2
ISDN TE	1 Call Numbers	6 Calling Num: 1 Called Number: 2 Connected Num: 3

For all menus pressing the SCROLL key will display next option, pressing the SELECT key will select the option displayed on the option on the top line of the LCD and pressing the CLEAR key will take you up one level in the menu.

Calling Number [161]

Allows display of the most recent Calling Number.

Calling Num.: 1
01633223552

Called Number [162]

Allows display the most recent Called Number.

Called Number: 2
01633223948

Connected Number [163]

Allows display the most recent Connected Number.

In situations where a call is connected to a line other than the one dialled (where a subscriber has a call diversion facility enabled) some networks provide a Connected Line Presentation (COLP) information element with the CONNECT message to the calling party.

Provision is made for the Tester to display this information if available as follows:

Connected Num.: 3
01633254009

4.2.7 Voltages [17]

This menu selection allows the user to review Battery, Line Interface and Power Source 2

Menu 1	
Voltages	7
User Numbers	8

TOP LEVEL	Menu Level 1	Menu Level 2
ISDN TE	1 Voltages	7 Battery: n.nV 1 S(32-42): nnV - 2 U(80-105): nnnV 3 PS2: nnV 4

For all menus pressing the SCROLL key will display next option, pressing the SELECT key will select the option displayed on the option on the top line of the LCD and pressing the CLEAR key will take you up one level in the menu.

Battery [171]

Allows display the battery status:

Battery	9.2V	1
S(32-42)	40V R	2

S-Bus [172]

Allows display of the S-Bus Voltage status (Power Source 1):

S(32-42)	40V R	2
U(80-105)	90V	3

'N' refers to Normal and
'R' to Restricted supply

U-Bus [173]

Allows display of the U- Bus Voltage status:

U(80-105)	90V	3
PS2	46V	4

Power Source 2 [174]

Allows display of the voltage presented at Pins 7 & 8 of the Tester RJ45 plug.

PS2	46V	4
Battery	9.2V	1

4.2.8 User Numbers [18]

Enables user to store up to 10 numbers which can be recalled in response to the **Dial Now:** prompt.

Menu 1	
User Numbers	8
View Messages	9

TOP LEVEL	Menu Level 1	Menu Level 2	Menu Level 3
ISDN TE	1 User Numbers	8 Stored Nos.	1 Store #: 1
		Terminal No.	2 Terminal No: 2

Stored Nos. [181]

Press the SELECT key to select option 8. The following display appears:

Menu 18	
Stored Nos.	1
Terminal No.	2

Press the SELECT key to select option 1. The following display appears:

Store #0:	

Number stored in #0 may be displayed if existing

Press the SCROLL Key to view next location if required. When required location is found, Press SELECT key and enter number. Press the SELECT key to store the entry.

Enter Number #0	
123456789	

Use Keypad to enter new number and CLEAR key to erase

Pause characters may be entered in the stored number. These are used in POTS mode only:

- Key # and hold for two beeps – Displayed as → and creates a pause in the dialled number.
- Key * and hold for two beeps – Displayed as → and produces a pause in the dialled number.

To use stored numbers

To retrieve the number 01633223552 stored in location 3 hold down the '3' key for more than 1 second in response to the Dial Now: prompt:

Dial Now :	

The display changes to show:

Dial Now:	
01633223552	

Terminal No. [182]

Provides the option to assign a Terminal Number to the Tester in order to identify it to a PBX or Network.

Menu 18	
Terminal No.	2
Stored Nos.	1

Press the SELECT key to select option 2. The following display appears:

Terminal No.	
123456	

Use Keypad to enter new number and CLEAR key to erase

Press SELECT key to store the number, menu 18 is re-displayed.

Each time a call is made the Terminal Number is sent in the CALLING PARTY information element of the SETUP message. On completion of the test requiring the Terminal Number it is good practice to erase the Terminal Number using the CLEAR key, otherwise it could cause problems on other networks or interfaces.

To ensure that the Tester always responds to an incoming call, 'Terminal No.' is erased whenever the Tester is powered down or the 'Set Defaults' option is activated.

4.2.9 View Messages [19]

This menu selection allows the user to review Layer 1, Layer 2, Layer 3 and Display Information Elements stored in a 99 line message buffer while testing at the 'U' or 'S/T' interface.

Menu 1	
View Messages	9
BER Test	1

Press the SELECT key to select option 9. The following display could appear. This indicates that no messages have been recorded.

~~~~~	
~~~~~	1

If messages have been recorded, the display will look similar to:

U017 CONNECT
U017 CONNECT_ACK

Press the SCROLL key to move down the buffer and the SELECT key to move up the buffer.

The messages stored are controlled by filter options selected in the General Setup menu 54 as shown below:

TOP LEVEL	Menu Level 1	Menu Level 2
General Setup	5	Message Buff. 4
		Layer 1: NO 1
		Layer 2: YES 2
		L2 - RR: NO 3
		Layer 3: YES 4
		Disp.IE: NO 5

Press SELECT key to enter the buffer at the last message, press the SELECT key again to move up the buffer and the SCROLL key to move down the buffer.

U017 CONNECT		Line 16 press SELECT, SELECT to see this line
U017 CONNECT_ACK		
N017 DISCONNECT		Lines displayed
U017 RELEASE 19		
N017 REL_COMP		Line 19 (of 99)
~~~~~		
~~~~~		End of data. Press SCROLL 3 times to see this line

Holding the SELECT key down moves the display 10 lines up (from line 65 to 54)

Holding the SCROLL key down moves the display 10 lines down (from line 71 to 82)

'N' = a message from the Network
'U' = a message from the User (Tester)

N017 DISCONNECT
U017 RELEASE 19

Call reference value (CR)

Messages relating to a different call will have a different Call reference value.

The message buffer is emptied when the Tester is powered down.

To exit the buffer at any point press the CLEAR key.

4.2.10 Setup [101]

This menu selection provides access to a Sub menu listing user selectable Tester configuration options.

Menu 101	
Setup	01
BER Test	1

TOP LEVEL	Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4
ISDN TE	1	Setup	01	Set Defaults: * 1
		Defaults: Std.	2	SEL> Std. * 1 User 2 Save 3
		TEI: Auto	3	P-P TEI=00 1 P-MP TEI=Auto * 2 No Protocol 3
		S-Term:Hi-Z	4	SEL> Hi-Z * 1 100R 2
		Interface: S	5	SEL> S * 1 2B1Q 2 (Option) 4B3T
		Sub-Addr: NSAP	6	SEL> User 1 NSAP * 2
		LCD Messages	7	Call Prog: NO 1 User Msgs: YES 2 Disp. IE: NO 3
		Serial:Events	8	SEL> Decode 1 SEL> 9.6k 1 19.2k* 2
				Events * 2 SEL> 9.6k 1 19.2k* 2
				Term'l 3 SEL> 9.6k 1 19.2k* 2
		Event:OFF:300	9	SEL> OFF:300 * 1 Mark 2 Clear 3 Flush 4

NOTE: The darker shaded Menu items 8 and 9 are optional

For all menus pressing the SCROLL key will display next option, pressing the SELECT key will select the option displayed on the option on the top line of the LCD and pressing the CLEAR key will take you up one level in the menu.

Set defaults [1011]

Allows the user to return the Tester to a known configuration at any time. To assist the user a hot key sequence of 011 has been assigned from within the ISDN TE menu.

Menu 101	
Set Defaults: *	1
Defaults: Std.	2

The '*' confirms that defaults are set

Press SELECT to activate Set Defaults. The '*' is removed when any of the default settings are changed.

Defaults: [1012]

Allows user defined defaults to be saved and allows selection of either Standard (factory set) defaults or User defined defaults to be implemented by the Set defaults menu option (Hot key sequence 1011).

Menu 1012		
SEL>	Std. *	1
	User	2
	Save	3

The '*' confirms that the factory set (Standard) defaults are active.

SEL>	User *	2
	Save	3

The '*' confirms that User selected defaults are active

SEL>	Save *	3
	Std	1

Current option selections are **Saved** and will be active when **User** (option 2) is selected

TEI: [1013]

Allows setting of the Terminal Endpoint Identifier to Automatic where the TEI value is allocated by the Network; Fixed where the user is prompted to enter a TEI value in the range 0 to 63 and None where the tester is being used to test out a fixed ("nailed up") link.

PP	TEI=00	1
P-MP	TEI=Auto *	2
No Protocol		3

The '*' confirms that the option is **set**

S-Term: [1014]

Provides the option to apply or remove a 100R termination to S interface RJ45 lead

SEL>	Hi-Z *	1
	100R	2

Interface: [1015]

Provides the option to test at the 'S/T' Interface or the 'U' 2B1Q (4B3T option) Interface.

SEL>	S *	1
	2B1Q	2
	4B3T	3

SubAdd: [1016]

Provides the option to select the SubAddress type.

SEL>	User	1
	NSAP *	2

LCD Messages [1017]

Allows selection of which call related messages are displayed when originating or receiving calls on the Tester.

Call Prog:	NO	1
User Msgs:	YES	2
Disp. IE:	NO	3

YES/NO indicates if message type is displayed on the LCD

Serial: [1018] - Option

Allows the Serial Port mode to be set.

SEL> Decode	1
Events	* 2
Term'l	3

Whichever of the three options are selected, a further selection level follows which enables the communications speed to be set to 9.6k or 19.2kbaud with 19.2kbaud being the Factory default.

Selecting the Decode option will enable the time and date stamped hexadecimal and message type data from the D channel. Selecting the Events option will output all the events information currently stored in the Events buffer. Selecting terminal mode enables the tester to be remotely controlled from a PC over its serial port

Event: [1019] - Option

SEL> OFF:300 *	1
Mark	2
Clear	3
Flush	4

May show ON or OFF and
Indicates 300 lines
available in the Events

The Events log is used to record any tests made (outgoing calls only) and the result(s) if applicable. The Events log will create a record a work carried out during the day which can then be dumped to a printer or PC for long term storage.

Mark prevents overwriting of events before the Mark.

Clear deletes events stored after the last Mark.

Flush deletes all events and sets the available lines back to 300.

If the Events log is full, the warning message 'Buffer Full' message will appear on the LCD for every message that could not be entered into the events log. To stop the message from appearing, either CLEAR (menu 10193) or FLUSH (menu 10194) the Events log, or turn the Events Log off (menu 10191)

4.3 The Analog Phone Menu [2] (Hardware Option)

This menu allows operation of the Tester as an Analog phone and allows various phone features to be set.

TOP LEVEL	Menu Level 1	Menu Level 2
Analog Phone 2	Talk Mode 1	Dial Now: 1
	Monitor Mode 2	Pol:Norm. nnV CLEAR:Exit
	TBR: 100mS 3	SEL> 100mS * 1 300mS 2 600mS 3
	Dial: DTMF 4	SEL> DTMF * 1 Pulse 2
	Stored Nos. 5	Store #x:

For all menus pressing the SCROLL key will display next option, pressing the SELECT key will select the option displayed on the option on the top line of the LCD and pressing the CLEAR key will take you up one level in the menu.

4.3.1 Talk Mode [21]

This option checks that there is sufficient line voltage on the Z interface (nominally 48V) and takes the instrument 'off-hook' and displays the prompt 'Dial Now:'

Enter the number to be dialled and Press SELECT.

Dial Now:

If the 'Z' interface is faulty or not connected, the following message may be displayed in place of the Dial Now screen:

Z INTERFACE
VOLTAGE < 5V

Once the dialling activity has been completed, within 5 seconds the LCD will change the following

SELECT = Mute
SCROLL = TBR

Pressing the SELECT Key will mute the microphone. Pressing the SELECT key once more will put the tester 2 back into talk mode. Pressing the SCROLL key will activate the Timed Break Recall (TBR or Flash). This will be 100ms, 300ms or 600ms as selected in menu 23. Press CLEAR to go "on-hook".

4.3.2 Monitor Mode [22]

This option enables the Tester to monitor (high impedance) on the analogue line without 'looping' it. This is a good working practice to monitor a line before attempting to go off hook on an unknown line. The top display line shows the line polarity and voltage. Press CLEAR to exit monitor mode.

Pol:Norm. nnV
CLEAR:Exit

4.3.3 TBR: [23]

This sub-menu allows selection of the Timed Break Recall (TBR or Flash) duration. TBR is usually used to indicate to the network that you wish to use special functions that are provided.

SEL> 100mS *1
300mS 2
600mS 3

The '*' confirms that the option is set

4.3.4 Dial: [24]

Allows selection of DTMF (Tone) or Pulse (didactic) dialling.

SEL> DTMF *1
Pulse 2

The '*' confirms that the option is set

4.3.5 Stored Nos. [25]

Provides for the user to store up to 10 numbers which can be recalled in response to the **Dial Now:** prompt. This is a common store with menu 181

Press the SCROLL Key to view next location if required. When required location is found, Press SELECT key and enter number. Press the SELECT key to store the entry.

Enter Number	#0
123→	456789

Use Keypad to enter new number
and CLEAR key to erase

Pause characters may be entered in the stored number. These are used in POTS mode only:

- Key # and hold for two beeps – Displayed as → and creates a pause in the dialled number.
- Key * and hold for two beeps – Displayed as → and produces a pause in the dialled number.

4.4 The D Channel Monitor Menu [3] (Software Option)

This menu allows operation of the Tester as a passive D channel monitor, in order to monitor and diagnose a problem on the **S interface**. The D channel traffic will be displayed on LCD during NT1 emulation mode and stored in the View Messages menu. It will also be output to the serial port in real time if the "serial" option has been purchased.

The menu numbers shown are for a POTS equipped tester. If your tester does not have POTS, the Passive D Channel Monitor menu will be item 2 in the top level menu.

TOP LEVEL	Menu Level 1	Menu Level 2
D Ch. Monitor (Option)	3 Passive mon.	1 U: SETUP N: SETUP ACK
	Term: Hi-Z	2 SEL> Hi-Z* 1 100R 2
	View Messages	3 {99 lines}

For all menus pressing the SCROLL key will display next option, pressing the SELECT key will select the option displayed on the option on the top line of the LCD and pressing the CLEAR key will take you up one level in the menu. To return to the top level menu use a long CLEAR (2 beeps)

4.4.1 Passive Monitor[31]

Selecting this menu item configure the tester to passively monitor layer 1 and D channel information. The B1 and B2 LED's will indicate the layer 1 sync condition of the S interface. The layer 1 sync condition is only affected by the NT1 or other TE connected to the S interface. The tester does not affect the layer 1 status.

Any D channel messages that are received will be displayed on the LCD as determined by the Message Buffer menu [54]. When a message is received it will overwrite the last message and will be displayed on the LCD for 3 seconds – this is to allow the user to observe and interpret the message. If no message is received for 3 seconds the LCD will be cleared. The 3 seconds persistence consequently causes the LCD to lag behind the real D channel traffic in periods of heavy D channel activity.

A sample message is shown below. The number associated with the message is known as the call reference as is unique for each call. The 'N' represents D channel traffic from the network to the user. The 'U' represents D channel traffic from the user to the network

N:017 DISCONNECT
U:017 RELEASE

4.4.2 Term [32]

Provides the option to apply or remove a 100R termination to the S interface

SEL>	Hi-Z * 1
	100R 2

4.4.3 View Messages[33]

This menu selection allows the user to review Layer 1, Layer 2, Layer 3 and Display Information Elements stored in a 99 line message buffer while testing at the 'U' or 'S/T' interface.

Menu 1	
View Messages	9
BER Test	1

Press the SELECT key to select option 9. The following display could appear. This indicates that no messages have been recorded.

~~~~~	
~~~~~	1

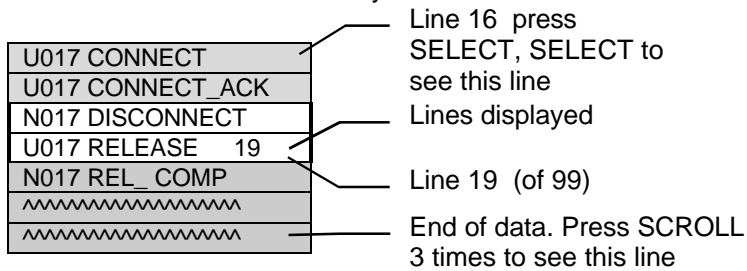
If messages have been recorded, the display will look similar to:

U017 CONNECT
U017 CONNECT_ACK

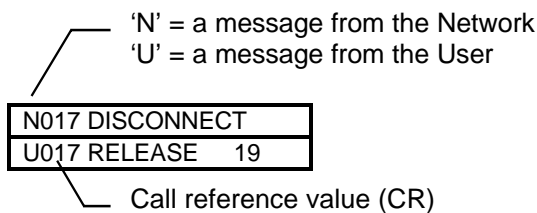
Press the SCROLL key to move down the buffer and the SELECT key to move up the buffer.
 The messages stored are controlled by filter options selected in the General Setup menu 54 as shown below:

TOP LEVEL	Menu Level 1	Menu Level 2
General Setup	5	Message Buff. 4
		Layer 1: NO 1
		Layer 2: YES 2
		L2 - RR: NO 3
		Layer 3: YES 4
		Disp.IE: NO 5

Press SELECT key to enter the buffer at the last message, press the SELECT key again to move up the buffer and the SCROLL key to move down the buffer.



Holding the SELECT key down moves the display 10 lines up (from line 65 to 54)
 Holding the SCROLL key down moves the display 10 lines down (from line 71 to 82)



Messages relating to a different call will have a different Call Reference value.
 The message buffer is emptied when the Tester is powered down.
 To exit the buffer at any point press the CLEAR key.

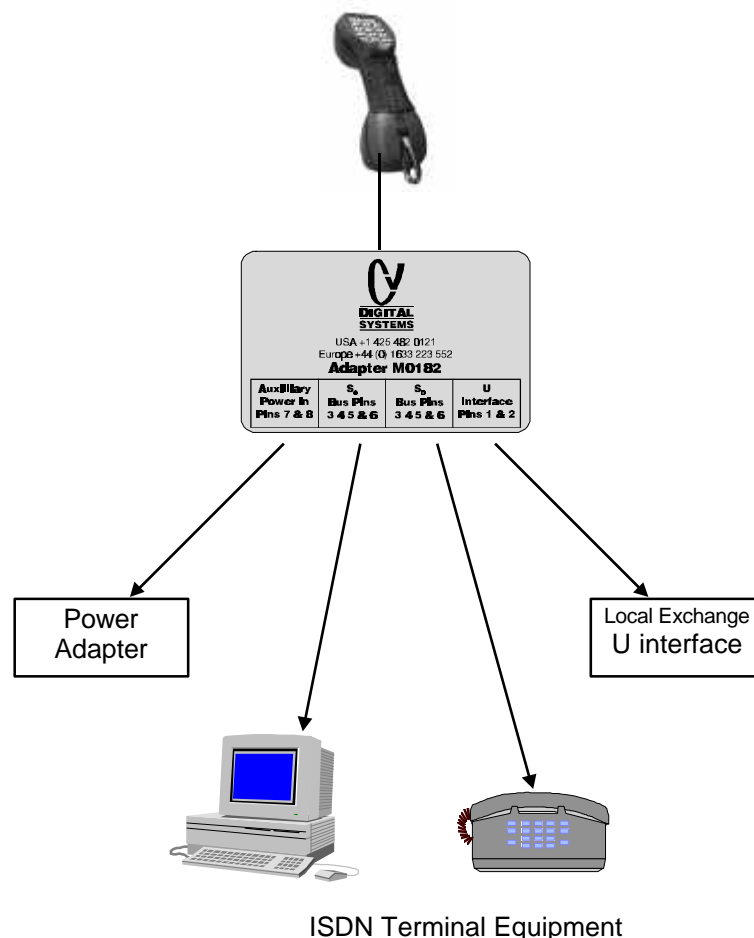
4.5 The NT1 Substitute Menu [4] (Software Option)

This menu allows operation of the Tester as NT1, in order to diagnose, identify and replace faulty NT1's; and passively monitor the D channel traffic at the S/U interface. The D channel traffic will be displayed on LCD during NT1 emulation mode and stored in the View Messages menu. It will also be output to the serial port in real time if the serial option has been purchased. The NT1 adapter (M0182) has to be used with the tester for this mode. Additionally it is advised to use the correct mains adapter (see section 2.1.9) also, in order that phantom power can be supplied to the connected S interface TE's.

The menu numbers shown are for a POTS equipped tester. If your tester does not have POTS, the NT1 substitute menu will be item 3 in the top level menu.

TOP LEVEL	Menu Level 1	Menu Level 2
NT1 Substitute (Option)	4	NT1 Emulation
	1	U Sync : NO So Sync : NO
	2	U I/ace: 2B1Q (Option) SEL> 2B1Q* 1 4B3T 2
	3	S I/Face: Bus SEL> Bus* 1 PTP 2
	4	S-Term: Hi-Z SEL> Hi-Z* 1 100R 2
	5	View Messages {99 lines}

For all menus pressing the SCROLL key will display next option, pressing the SELECT key will select the option displayed on the option on the top line of the LCD and pressing the CLEAR key will take you up one level in the menu. To return to the top level menu use a long CLEAR (2 beeps)



4.5.1 NT1 Emulation [41]

Selecting this menu item configures the tester into an NT1 whilst retaining the ability to passively monitor layer 1 and D channel information at the S/U interface. The B1 and B2 LED's will indicate the layer 1 sync condition of the U/S interface. Additionally the sync status of both interfaces is reported by the LCD, as shown below.

U Sync : YES
So Sync : NO

When both interfaces are synchronised, the LCD will change to show:

N:
U:

Any D channel messages that are now received will be displayed on the LCD as determined by the Message Buffer menu [54]. When a message is received it will overwrite the last message and will be displayed on the LCD for 3 seconds – this is to allow the user to observe and interpret the message. If no message is received for 3 seconds the LCD will be cleared. The 3 seconds persistence consequently causes the LCD to lag behind the real D channel traffic in periods of heavy D channel activity.

A sample message is shown below. The number associated with the message is known as the call reference as is unique for each call. The 'N' represents D channel traffic from the network to the user. The 'U' represents D channel traffic from the user to the network

N:017 DISCONNECT
U:017 RELEASE

4.5.2 U I/face[42]

Provides the option to test at the 'U' 2B1Q or 4B3T (option) Interface.

SEL>	2B1Q *	1
	4B3T	2

4.5.3 S I/face[43]

Provides the option to alter the timing recovery method between Bus mode and Point to Point mode. See I.430 for more information.

SEL>	Hi-Z *	1
	100R	2

4.5.4 S-Term [44]

Provides the option to apply or remove a 100R termination to the S interface

SEL>	Hi-Z *	1
	100R	2

4.5.5 View Messages [45]

This menu selection allows the user to review Layer 1, Layer 2, Layer 3 and Display Information Elements stored in a 99 line message buffer while testing at the 'U' or 'S/T' interface.

Menu 1	
View Messages	9
BER Test	1

Press the SELECT key to select option 9. The following display could appear. This indicates that no messages have been recorded.

~~~~~	
~~~~~	1

If messages have been recorded, the display will look similar to:

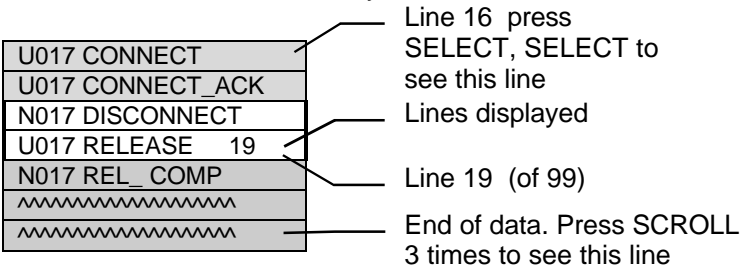
U017 CONNECT

U017 CONNECT_ACK

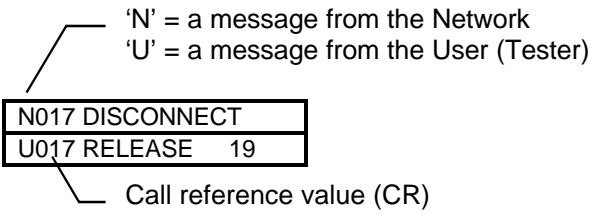
Press the SCROLL key to move down the buffer and the SELECT key to move up the buffer. The messages stored are controlled by filter options selected in the General Setup menu 54 as shown below:

TOP LEVEL	Menu Level 1	Menu Level 2
General Setup	5	Message Buff. 4
		Layer 1: NO 1
		Layer 2: YES 2
		L2 - RR: NO 3
		Layer 3: YES 4
		Disp.IE: NO 5

Press SELECT key to enter the buffer at the last message, press the SELECT key again to move up the buffer and the SCROLL key to move down the buffer.



Holding the SELECT key down moves the display 10 lines up (from line 65 to 54)
Holding the SCROLL key down moves the display 10 lines down (from line 71 to 82)



Messages relating to a different call will have a different Call reference value. The message buffer is emptied when the Tester is powered down. To exit the buffer at any point press the CLEAR key.

4.6 The General Setup Menu [5]

This menu allows setting of parameters which are common to more than one Tester mode e.g. Language. In general, these parameters need to be set once only when beginning a series of tests. The menu numbers shown are for a POTS equipped tester. If your tester does not have POTS, the General Setup menu will be item 4 in the top level menu.

TOP LEVEL	Menu Level 1	Menu Level 2	Menu Level 3
General Setup 5	Set Defaults: * 1		
	Defaults: Std. 2	SEL> Std. 1 User 2 Save 3	
	Lang: English 3	SEL> English * 1 Francais 2 Deutsch 3 Espanol 4	
	Message Buff. 4	Layer 1: NO 1 Layer 2: YES 2 L2 - RR: NO 3 Layer 3: YES 4 Disp.IE: NO 5	
	Serial:Events 5	SEL> Decode 1	SEL> 9.6k 1 2
		Events 2	SEL> 9.6k 1 2
		Term'l 3	SEL> 9.6k 1 2
	Event:OFF:300 6	SEL> OFF:300 * 1 Mark 2 Clear 3 Flush 4	
	Vol. >>> 7		
	Set Clock: 8	Date- dd *=Next01/01/96	

Note: The darker shaded Menu items 5, 6 & 8 are optional

For all menus pressing the SCROLL key will display next option, pressing the SELECT key will select the option displayed on the option on the top line of the LCD and pressing the CLEAR key will take you up one level in the menu.

4.6.1 Set defaults: [51]

Allows the user to return the Tester to a known configuration at any time.

Menu 5	
Set Defaults: *	1
Defaults: Std.	2

The '*' confirms that defaults are set

Press SELECT to activate Set Defaults.

The '*' is removed when any of the default settings are changed.

Press SCROLL key for the next option or CLEAR key to go up one level on the menu.

4.6.2 Defaults: [52]

Allows user defined defaults to be saved and allows selection of either Standard (factory set) defaults or User defined defaults to be implemented by the Set defaults menu option (Hot key sequence 51).

Menu 52	
SEL> Std. *	1
User	2
Save	3

The '*' confirms that the factory set (Standard) defaults are active

SEL> User *	2
Save	3

The '*' confirms that User selected defaults are active

SEL> Save	3
Std. *	1

Current option selections are **Saved** and will be active when **User** (option 2) is selected

4.6.3 Lang: [53]

Allows selection of the Language of the text displayed on the LCD and output through the serial port by the Tester.

Menu 53		
SEL>	English *	1
	Francais	2
	Deutsch	3
	Espanol	4

4.6.4 Message Buff. [54]

Allows selection of which call related messages are stored in the 99 line message buffer. The message buffer is accessed by selecting View Messages in the Main menu (menu 19).

Layer 1:	NO	1
Layer 2:	YES	2
L2 – RR:	NO	3
Layer 3:	YES	4
Disp. IE:	NO	5

YES/NO indicates if message type is saved to the buffer.

Press SCROLL key to display next option, SELECT key to toggle between YES and NO and CLEAR key to go up one level on the menu.

4.6.5 Serial: [55] - Option

Allows the Serial Port mode to be set.

SEL>	Decode	1
	Events *	2
	Term'l	3

Whichever of the three options are selected, a further selection level follows which enables the communications speed to be set to 9.6k or 19.2kbaud with 19.2kbaud being the Factory default.

Selecting the Decode option will enable the time and date stamped hexadecimal and message type data from the D channel (ISDN TE mode only). Selecting the Events option will output all the events information currently stored in the Events buffer. Selecting terminal mode enables the tester to be remotely controlled from a PC over its serial port

4.6.6 Event: [56] - Option

SEL>	OFF:300 *	1
	Mark	2
	Clear	3
	Flush	4

May show ON or OFF and Indicates 300 lines available in the Events

The Events log is used to record any tests made (outgoing calls only) and the result(s) if applicable. The Events log will create a record a work carried out during the day which can then be dumped to a printer or PC for long term storage.

Mark prevents overwriting of events before the Mark.

Clear deletes events stored after the last Mark.

Flush deletes all events and sets the available lines back to 300.

If the Events log is full, the warning message 'Buffer Full' message will appear on the LCD for every message that could not be entered into the events log. To stop the message from appearing, either CLEAR (menu 563) or FLUSH (menu 564) the Events log, or turn the Events Log off (menu 561)

4.6.7 Vol [57]

Allows the 'Ringer' audio level output to the speaker to be adjusted.

Vol >>>	7
Set Clock	8

Pressing the SELECT key will add '>' to the display and increase the volume until the desired level is reached or maximum level. On reaching maximum level a further key presses will return to the minimum setting.

4.6.8 Set Clock: [58] - Option

Allows setting of the real time clock. The real time clock is Y2K compliant. The first entry allows the 'day' element of the date field to be entered. Pressing the * key will move to the next entry

Date-	dd
*= Next	29/01/99

The second entry allows the 'month' element of the date field to be entered. Pressing the * key will move to the next entry

Date-	mm
*= Next	29/01/99

The third entry allows the 'year' element of the date field to be entered. Pressing the * key will move to the next entry

Date-	yy
*= Next	29/01/99

The fourth entry allows the 'hour' element of the time field to be entered. Pressing the * key will move to the next entry

Time	hh
*= Next	13:04:00

The fifth entry allows the 'minute' element of the time field to be entered. Pressing the * key will move back to the first (day) entry

Time	mm
*= Next	13:04:00

Each entry is checked to see that it is valid. When the input is completed press the SELECT key to store the settings. This can be done at any time. To abort any changes press the CLEAR key.

5 KEYPAD FACILITY

Provision is made for the user to send Keypad Facility information Elements BEFORE a call is set up or AFTER a call is set up (when making a VOICE call). The Keypad Facility Information elements are used to activate, de-activate and interrogate supplementary services using the generic keypad protocol.

5.1 Before a Call is Set Up

From the ISDN Test menu Set Defaults [011] and then select Voice call mode [12].

Voice:	Bn:	1
Bearer:	Speech	2

Bn may be B1, B2 or Bx
(Default)

If communication is established the Display changes to:

Dial Now:

Any key sequence which begins with a * or # is automatically sent as a Keypad information element.
e.g. *67* or *#67# or #67#
or *# 123*3456*789*# or any other combination.

Service activation

<service code>[<param1>* *<param n>]#

Service deactivation

#<service code>[*<param1>* *<param n>]#

Service interrogation

#<service code>[<param1>* *<param n>]#

5.2 After a Call is Set Up

From the Main Menu Set Defaults [011] and then select Voice call mode [12].

Voice:	Bn:	1
Bearer:	Speech	2

Bn may be B1, B2 or Bx
(Default)

If communication is established the Display changes to:

Dial Now:
01633223552

When the call is connected the display will show:

CLEAR =Stop Bn

Any keypad input is now sent as a Keypad information element provided that the Keypad menu (menu 126) is set to "Info E".

6 SUB-ADDRESS (USER DEFINED)

Provision is made for the user to enter a SUB ADDRESS on all calls where the complete number is input before it is transmitted. This can only be done for en-bloc voice calls, or data calls.

The beginning of the SUB ADDRESS is defined by pressing the * (star) Key.

Dial Now:
01633223552*4567

There are two types of subaddressing formats supported by the Tester – User and NSAP. The subaddressing format can be altered in menu 1016. It is possible that some networks will only support one format of subaddressing, but as a general rule, NSAP subaddressing is used on EURO ISDN compliant network equipment

Note: When conducting a SUPPLEMENTARY SUB ADDRESS service test from the main menu the SUB ADDRESS 1234 is automatically inserted if the user does not input a SUB ADDRESS. Alternatively the user may enter the SUB ADDRESS by first inputting a *.

7 CALL PROGRESS MESSAGES (LAYER 3)

The Tester decodes call progress messages and displays them for periods related to the information presented.

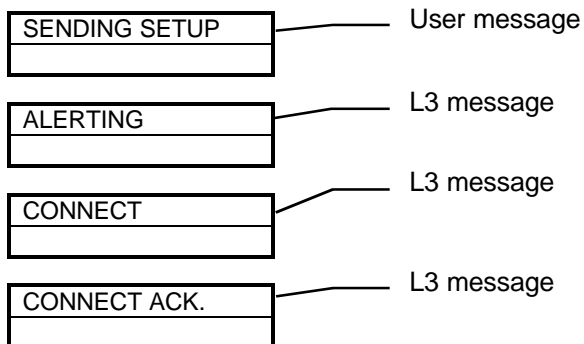
In order to provide a balance between displaying information, and keeping pace with the response of the network the unit displays the user messages for 3 seconds and L3 messages for 0.5 seconds to allow the user to follow the progress of the call.

After making a menu selection the display may show:



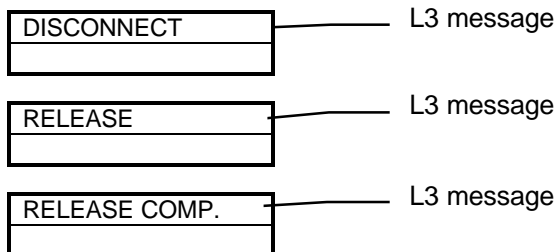
Pressing the SELECT key will SETUP the call and the display will show a combination of the following call progress (L3) messages:

7.1 Call Establishment Messages (Layer 3)



7.2 Call Release Messages (Layer 3)

When the call is answered or the network times out, Layer 3 call release messages are displayed.



7.3 Layer 3 messages displayed by the Tester

The following messages may be displayed by the Tester during call establishment or release:

ALERTING
CALL PROC
CONNECT
CONNECT ACK
PROGRESS
SETUP
SETUP ACK
MODIFY
MODIFY COMP
MODIFY REJ
RESUME
RESUME ACK
RESUME REJ
SERVICE
SERVICE ACK
SUSPEND
SUSPEND ACK

SUSPEND REJ
 USER INFO
 DISCONNECT
 RELEASE
 REL COMP
 RESTART
 RESTART ACK
 CONG CON
 FACILITY
 FAC CANCEL
 FAC ACK
 FAC REJ
 REG ACK
 REG REJ
 CANCEL REJ
 INFO
 NOTIFY
 REGISTER
 STATUS
 STATUS ENQ
 DETACH
 DETACH ACK
 UNKNOWN MSG

7.4 Clear Cause codes

The final stage of the call results in a DISCONNECT and the Tester displays the clear cause code and the message within the limits of the 16 character display

User busy		User message
DISCONNECT	17	

No user respond.		Full decode is "No user responding"
DISCONNECT	18	

User message

Refer to Appendix B for a detailed cross reference of Cause codes to Cause messages.

8 ERROR MESSAGES

8.1 Layer 1 Error Messages

No Phantom Power	Tester unable to derive power from the 4 wire 'S' bus
No U Bus Power	Tester unable to derive power from the 2 wire 'U' circuit
Trying So sync Sync failure	Tester unable to communicate over the 4 wire 'S' bus
Trying 2B1Q sync Sync failure	Tester unable to communicate over the 2 wire 'U' circuit.
L1 activation Failure	Tester unable to communicate with the network

8.2 Layer 2 Error Messages

Messages indicate a failure to establish an error free connection between the Tester and the network

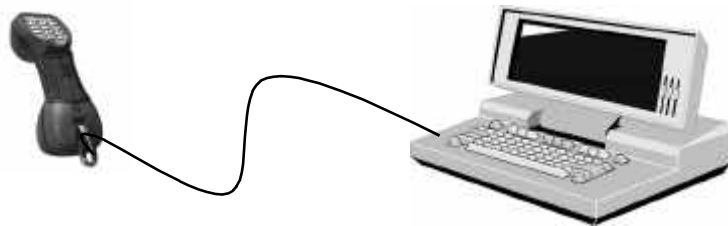
Layer 2 Error SABME Re-estab.	These messages provide additional information to assist the user in identifying the cause of failure.
Layer 2 Error SABME Retrans.	
Layer 2 Error DISC. Retrans.	Further analysis of the problem may require the use of a Basic Rate Protocol Analyser such as the Chesilvale DeMON, or equip your tester with the serial port option and D-View.
Layer 2 Error Stat. Enq. Retrans	
Layer 2 Error Q921 error ()	
LAYER 2 Unsolicited resp.	

9 THE COMMUNICATION PORT – (OPTION)

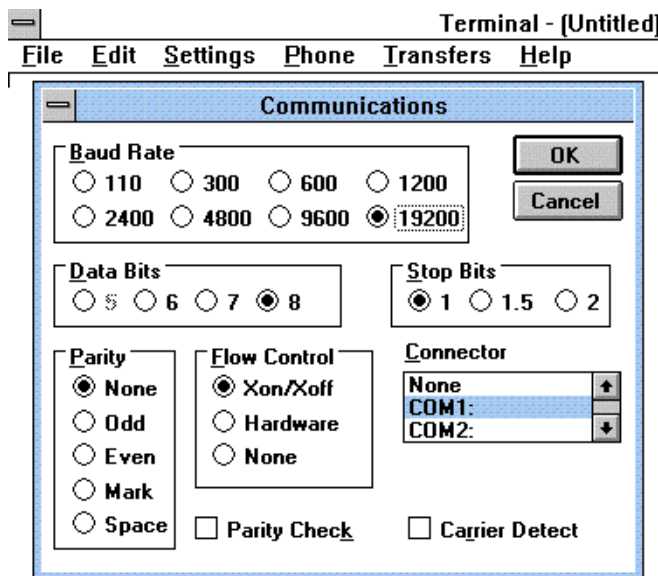
An optional Serial Cable is available to connect the Tester to the Serial port of a Printer or Personal Computer (PC).

Note

If the serial port of the PC malfunctions it may be because it is locked by another Window's application. In this case close all other applications and try again. If it still fails restart the computer and ensure that no other applications are in the start up list. This will ensure that no other applications are running or have taken control of the serial port.



The PC must be running a communication program such as Windows Terminal for the output of the Tester to be displayed on the PC screen.



The Terminal Communication options should be set as shown above. The COM1 or COM2 selection should match the PC port to which the serial cable is connected.

Terminal Preferences selections are set to suit the user.

Selection of the Tester operating mode is made via the General Setup Serial sub-menu (55) or from the ISDN TE Setup sub-menu (1018). Select the baud rate from the Serial sub-menu to match terminal settings either **9600 or 19200**.

General Setup	5	Serial:Events	5	SEL>	Decode *	1	SEL>	9.6k	1
									2
					Events	2	SEL>	9.6k	1
									2
					Term'l	3	SEL>	9.6k	1
									2

9.1 Serial: Decode [551]

The Tester will output for display, the 'D' channel protocol with text decode of Layer 3 message type and Hexadecimal decode of information elements as shown in the following example: 01/01/01

```
00:00:35.183 Net 03 02 FF 03 0031 SETUP
      08 01 72 05 A1 04 02 88 90 18 01 8A 28 10 2A 38 36 2A
      30 31 36 33 33 32 35 35 35 30 33 23 6C 0D 01 83 30 31
      36 33 33 32 35 35 35 30 33 7C 02 88 90
01/01/01 00:00:35.567 Usr 04 02 8B 01 02 0000 RR
01/01/01 00:00:36.240 Usr 04 00 8B 02 02 0007 CONNECT
      08 01 F2 07 18 01 82
01/01/01 00:00:36.396 Net 04 00 8B 01 04 0000 RR
01/01/01 00:00:36.556 Net 04 02 8B 02 04 0004 CONNECT_ACK
      08 01 72 0F
01/01/01 00:00:36.802 Usr 04 02 8B 01 04 0000 RR
```

9.2 Serial: Events [552]

The Tester will automatically store test Events equivalent to 300 lines of information for output to a printer or PC. Select Baud rate from the Events sub-menu to match terminal settings either **9600** or **19200**.

Selection of the **Events** option will output the contents of the Events Log to a serial port (Printer or PC) as shown by the following example.

```
00:00:01.791 BERT Test Started
      Channel= B1
      Called No:240010
00:00:05.014 BERT Test Stopped
      Test Time= 0:00:11
      Unavailable Time= 0
      %UAT= 00.000000
      Errors= 4
      BER= 5.682E-06
      Errored Seconds= 2
      %ES= 18.181818
      Severely ES= 0
      %SES= 00.000000
      Degraded Minutes= 0
      %DM= Err
00:05:36.750 Teleservice Auto Test Started
00:05:42.533 Telephony = NO
00:05:46.705 Telefax G2/3 = YES
00:05:51.026 Telefax G4 = YES
00:05:55.441 Teletex = YES
00:05:59.858 Videotex = YES
00:06:04.106 Mixed Mode = NO
00:06:08.322 OSI = NO
00:06:12.588 Telex = NO
```

9.3 Serial: Term'l [553]

Selection of Terminal mode provides for all functions of the Tester to be controlled by the PC operating as a data terminal equipment. Select Baud rate from the Term'l sub-menu to match PC settings either **9600 or 19200**.

In Terminal mode the Tester functions are controlled by operation of either the Tester Keys or via the PC keyboard. To obtain the following display on the PC screen first connect the tester to the PC serial port then select Terminal mode:

Harrier Terminal Mode

Serial: Events	01
Event: 265	02

z = SELECT key
x = SCROLL key
c = CLEAR key
C = ABORT key (Long CLEAR)
<SHIFT>n = Stored Number

In this mode information displayed on the Tester LCD is echoed on the PC screen.

9.4 Configuration Data

If connected to a suitable display e.g. PC, printer or terminal, the Tester will output the following information on power up at a fixed baud rate of 19200 baud:

```
Chesilvale Digital Systems - Configuration Data
Model Number      : 0300/10E
Protocol          : EURO
ST6 Version       : 55
Serial Number     : SN01097
Manufactured      : 98/09
Model             : HARRIER EURO (SERIAL & RTC)
Software          : Harrier b4.04E
Compiled         : Jan 25 1999 11:15:29
Programmed        : 01-25-1999 11:30:46
Top Menu Disp.   : Provisioned
Top Menus         : ISDN Analog D-Mon NT1
Interfaces        : S 2B1Q
Hardware          : Keypad 1 Main 1 Handle 1 RJ45 1 Z 1
Def. Language     : English
Def. Interface    : S
RTC               : Available
Handsfree         : Available
Dmon Type         : Monitor
Packet Test       : SABME-UA
Sub Address       : NSAP

Hardware Test Results
FPGA              : Passed
Battery           : 10.1v - Passed
LCD               : Passed
LEDs              : Passed
Keypad            : Passed
Real Time Clock   : Passed
Relays            : Passed
Sbus & Arcofi     : Sbus Passed Arcofi Passed
2B1Q & Arcofi     : 2B1Q Passed Arcofi Passed
Z & Arcofi        : Not tested - Auxilary Powering 01

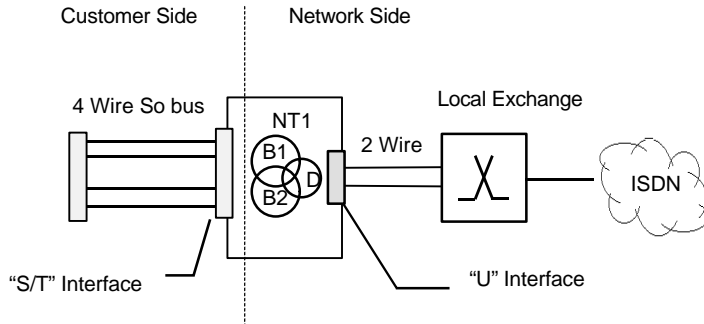
Self Test Passed
```

APPENDIX A

BASIC RATE ISDN

Basic Rate ISDN provides two 64Kbit/s 'B' and one 16Kbit/s 'D' channels over a 2 wire copper connection between the local exchange and the customer premises. The 2 wire line from the Local Exchange is terminated by an NT1 which is located on the customer premises. The NT1 is the CCITT defined Customer - to - Network Interface and the responsibility of the Network Operator.

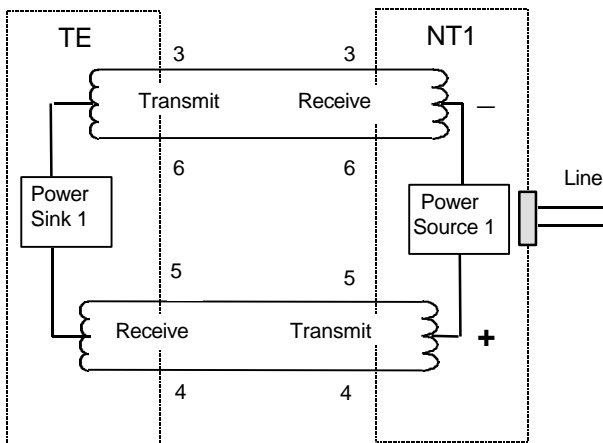
The 2 wire connection on the network side of the NT1 is defined as the "U" interface and the 4 wire connection on the customer side is defined as the "S" or "T" interface.



Customer equipment is connected at the S/T Interface by a 4 wire bus consisting of a transmit and receive pair. The bus can operate in point to point where one terminal can be connected at the end of a maximum of 1km of cable or point to multi-point where up to 8 terminals can be connected anywhere along the bus reduced to about 200m by timing constraints. The bus is terminated by 100Ω resistors at both the NT1 and distant ends on both the transmit and receive pairs. Over this bus passes 64Kbit/s B1 + 64Kbit/s B2 + 16Kbit/s D Channels + 48Kbit overhead making a total of 192Kbit/s.

Line Power Feeding

Sufficient power is available from the exchange to provide basic telephony service in the event of local power failure. A Power Source 1 is available within the NT which can supply via the centre tap of transformers (phantom feed) a nominal 40V up to 1 W of power. Under mains failure the power is "restricted" to 380mW and to indicate this to the TE the polarity is reversed.



Power feeding in RESTRICTED powering mode

Modes of Operation

Point to Point operation implies that only one source and one sink are active at any one time in each direction of transmission at the S/T interface. In this case the TEI option in the SET UP menu of the Tester would be set to FIXED and a value in the range 1 to 63 entered.

Point to Multipoint operation allows more than one TE (source and sink pair) to be simultaneously active at the S/T interface. Terminal Endpoint Identifier (TEI) would be set to AUTOMATIC allowing the Network to assign the appropriate value in the range 64 to 126.

APPENDIX B

CAUSE INFORMATION ELEMENT TO ETS 300-102-1

Cause No.	Cause
0	Cause unknown
1	Unallocated (Unassigned) number
2	No route to specified transit network
3	No route to destination
4	Channel. unacceptable
6	Channel unacceptable
7	Call awarded and being delivered in an established channel
8	Prefix 0 not allowed
9	Prefix 1 not allowed
10	Prefix 1 not required
16	Normal call clearing
17	User busy
18	No user responding
19	No answer from user (user alerted)
21	Call rejected
22	Number changed
23	Rev. charge reject
24	Call suspended
25	Call resumed
26	Non-selected user clearing
27	Destination out of order
28	Invalid number format
29	Facility rejected
30	Response to STATUS ENQUIRY
31	Normal, unspecified
32	Circuit out of order
34	No circuit/channel available
35	Destination unattainable
36	Out of order
37	Degraded service
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
51	Reverse charge not allowed
52	Outgoing call barred
56	Call waiting not subscribed
57	Bearer capability not authorised
58	Bearer capability not presently available
63	Service or option not available, unspecified
65	Bearer capability not implemented
66	Channel types not implemented
68	Message not implemented
69	Requested facility not implemented
70	Only restricted digital information bearer capability is available
79	Service or option not implemented, unspecified
81	Invalid call reference value
82	Identified channel does not exist

APPENDIX B

8 3	A suspended call exists, but this call identity does not
8 4	Call identity in use
8 5	No call suspended
8 6	Call having the requested call identity has been cleared
8 7	Destination not member
8 8	Incompatible. destination
8 9	Non existing address
9 0	Destination address missing
9 1	Invalid transit network selection
9 2	Invalid facility parameter
9 3	Mandatory. IE missing
9 5	Invalid message unspecified
9 6	Mandatory information element is missing
9 7	Message type non-existent or not implemented
9 8	Message not compatible with call state or message type non-existent or not implemented
9 9	Information element non-existent or not implemented
1 0 0	Invalid information elements contents
1 0 1	Message not compatible with call state
1 0 2	Recovery on timer expire
1 1 1	Protocol error, unspecified
1 2 7	Interworking, unspecified

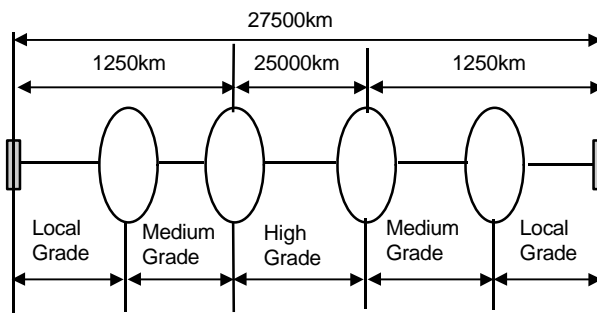
APPENDIX C

BIT ERROR RATE ANALYSIS TO G821

Error performance is usually evaluated in accordance with ITU Recommendation G821 which specifies the percentage of time certain threshold can be exceeded.

Performance classification	Objectives
Degraded Minutes (DM)	Fewer than 10% of one minute intervals to have a Bit Error Ratio (BER) worse than 10^{-6} .
Severely Errored Seconds (SES)	Fewer than 0.2% of one second intervals to have a Bit Error Ratio (BER) worse than 10^{-3} .
Errored Seconds (ES)	Fewer than 8% of one second intervals to have any errors - equivalent to 92% error free seconds.

G821 gives the error performance of an international digital connection forming part of an ISDN measured over a period T_L (e.g. one month) on a unidirectional 64kbit/s channel of the hypothetical reference connection of 27500km.



G821 Hypothetical Reference Connection

Circuit Classification	Allocation of Degraded Minutes and Errored Seconds objectives
Local grade (2 ends)	15% block allowance to each end
Medium grade (2 ends)	15% block allowance to each end
High grade	40% allowance

APPENDIX D

SOFTWARE DOWNLOAD

Provision is made to upgrade the Harrier software by download from a PC to the tester via the Serial Interface cable supplied.

The software is normally supplied on a diskette with a Windows Wizard designed to save the operating file to the Hard disk of a PC.

Download is accomplished by running the Harrier Upload Wizard (HUW) and following the on-screen instructions.

Full details on the procedure to be followed will accompany the software when issued.

Users should refer to their Maintenance Notes or consult the department responsible for controlling software issues for information on the latest available software.

APPENDIX E

ABBREVIATIONS

The following abbreviations are used within this User's Guide:

Abbreviation	Description
BER	Bit Error Rate
BERT	Bit Error Rate Test
BRI	Basic Rate Interface
DM	Degraded Minutes
EOC	Embedded Operations Channel
ES	Errored Seconds
FEBE	Far End Block Errors
FPGA	Field Programmable Gate Array
ISDN	Integrated Services Digital Network
RAM	Random Access Memory
NEBE	Near End Block Errors
NiMH	Nickel Metal Hydride (Battery)
NT1	Network Termination type 1
PC	Personal Computer
POTS	Plain Ordinary Telephone System
P-P	Point to Point
P-MP	Point to Multi Point
PSTN	Public Service Telephone Network
SES	Severely Errored Seconds
TE	Terminal Equipment
TEI	Terminal Endpoint Identifier
UAT	Unavailable Time

APPENDIX F

SPECIFICATIONS

So Interface:

ISDN Basic Rate Access CCITT I.430, Layer 1 ETS 300 012
RJ 45 socket Pins 3,4,5 & 6
High Impedance or 100Ω menu selectable

U Interface:

ANSI T1.601 – 1991, ETSI DTR/TM 3002
2B1Q block mode 4B3T (option) RJ 45 socket Pins 1 & 2

Companding:

A law or μ law menu selectable (option)

Access Protocols:

Layer 2 ETS 300 125
Layer 3 ETS 100 102
EURO

Language:

English, French, German & Spanish

Dialling Modes:

Overlap & en bloc 10 x 30 digit number store, redial

Function Keys:

SELECT select menu option; dial call; re-dial
SCROLL scroll through menu options
CLEAR return to top menu; clear call

Keypad:

3 x 4 elastomeric snap action 1-9, *, 0, #

Power:

Line powered from Network Termination Point
PP3 NiMH battery or standard Alkaline battery
Mains derived supply via an adapter (RJ45 Pins 7 & 8)

Serial Port:

Tx Rx & ground (all opto-isolated)

Message Buffer:

Messages depending on menu selection 99 line buffer stores L1, L2, L3 & Display

Size:

240mm x 71mm x 85mm

Weight:

550gm

Case:

High impact plastic

Hand/Shoulder Grip:

Silicone rubber

Display:

2 line 16 character dot matrix LCD

Operating temperature:

0°C to 50°C

Storage temperature:

8000-03-0020 Issue 1 08/04/99

APPENDIX C

-40°C to 70°C

APPENDIX G

WARRANTY

Chesilvale Electronics (The Company) warrants this product and each part thereof against all defects in material or workmanship for a period of one year from the date of delivery to the user. The Company agrees to remedy any such defect free of charge provided that:

- The product is returned carriage prepaid to the Company or the Agent/Distributor from whom the product was originally purchased.
- The product is returned in adequate packaging to prevent transit damage together with the return address, full details of the defect and an official repair order.
- A 'no charge' invoice will be raised by the Company for warranty repairs.
- All parts must be returned except where a prior agreement has been reached with the Company or its Agent/Distributor.
- Any missing parts will be charged for.
- The product has not been subject to neglect, accident or improper use (as defined by the Company).
- The product has not been altered or modified in any way other than by the Company or its authorised agents. Warranty seals (if fitted) are unbroken.

The Company's complete standard terms and conditions for warranty, which are published on the reverse of each sales invoice, shall apply.