# NG Harrier User's Guide





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# Introduction

The NG Harrier Test System is designed to facilitate testing of circuits associated with the delivery of ISDN and provides test capability appropriate to the test point accessed on a typical ISDN provision.



Testing on the distribution side is generally related to confirming that the signal launched from the Exchange Distribution frame reaches the customer side interface. Testing can be limited to confirming that the signal is present by simply making a Speech call using the **Hot Key** function of the hand held tester.

At the Customer Side of the Network the testing requirements can be more complex and may require that test results are recorded for customer reference or for historical records. In this situation it may be more appropriate to conduct the tests using a laptop computer.

The NG Harrier test system provides for both situations in allowing for **quick verification** of the ISDN circuit using the handheld unit and **comprehensive testing** of the circuit using the NG Harrier PC software.

Comprehensive POTS circuit test capability also allows Analogue Telephone circuits and services to be tested.

The standard NG Harrier test system comprises the following elements:

PC Software including User's Guide Hand Held Tester including shoulder strap Serial Cable (RJ45 to 9 Pin D type) to connect the hand held tester to the PC Test cables to facilitate testing at the S- Access and U-Access or POTS Access Power Adaptor and Battery charger Carry bag Quick Reference Guide

The following optional items are available and may be purchased in addition to the standard test system.

S-Bus Wiring test adaptor Network Simulation Passive Monitor D Channel Protocol Analysis Software

# **Safety Notices**

Tempo will not accept liability for damage or injury resulting from misuse, abuse or resulting from use of the NG Harrier test system without regard to normal safety practice.

Information on the correct use of the NG Harrier test system is provided by this document, the Quick Reference Guide and Targeted Help system forming an integral part of the PC software.

Do not dismantle the NG Harrier hand held unit beyond removing the battery cover.

The NG Harrier may only be used with the accessories supplied.

The use of other accessories may lead to erroneous measurements and may even cause damage to the NG Harrier and the connected installation.

The NG Harrier is only to be used in accordance with the instructions in this documentation. Any other usage may result in bodily injury and damage of the NG Harrier.

To prevent electrical shocks or damage to the NG Harrier do not connect it to lines with voltages in excess of 100 Volts

Never attempt a measurement with the case open

The NG Harrier is not watertight. Protect the NG Harrier from exposure to water

Before replacing the batteries switch the NG Harrier off, disconnect all the test leads and refer to the section "Internal Battery Supply".

Make certain that the polarity is correct when installing the batteries

Do not use low cost Zinc Carbon batteries as they may leak and let you down when it's cold.

# The NG Harrier Test System

The NG Harrier test system would normally be used as shown in the following diagram:



In this configuration all the information required to install commission and maintain ISDN services is provided by the PC software.

Information relating to the service or parameter under test is also provided to assist the user in understanding how it relates to the ISDN.

The "hover over" targeted help system assists the user in determining why a test has failed.

All the electronics required to conduct the tests are resident in the hand held unit. The inherent power of the PC is used to control the hand held

tester and present information to the user in a manner not economically possible in a hand held instrument.

It is assumed that the PC software has been loaded on the PC by following the instructions on the CD containing the NG Harrier software. The software is simply loaded by placing the CD in the drive and following the on screen instructions.

If the PC is not configured to "auto run" the CD it will be necessary to run the "setup" program on the CD. In both cases the resulting "Programs" will be as shown below;



After loading the software, run "NG-Launcher" to complete the installation and create the shortcut on the desktop for the NG-Harrier programme and NG-Harrier Test Results folder.



Double click on the NG-Harrier desktop icon to launch the software.

It is not necessary to connect the handheld tester in order to review the functionality of the PC software.

Clicking on the Help button in the top right hand of the screen will display "Getting Started" information to assist the user in exploring the way that the software operates.

# The Test Screens

The tests required to effectively characterise an ISDN installation are presented on three screens. All the information related to each page is available by moving the mouse pointer over the subject text.



# Screen 1 – Circuit Connection

The purpose of this screen is to present information required to confirm that the circuit is operational and the directory numbers are correct.

Network connection information is presented and a test call from one channel to the other in both directions is made to confirm that the channel numbers are valid.

Successful completion of this test

screen is confirmed by the voice announcement "Your ISDN connection test has passed". Failures on this screen are indicated in Red and the voice announcement is not played. Voltage indications that are outside normal limits are also shown in Red to indicate a potential problem. Reference to planning limits and use of calibrated voltage measurement instruments is advised in order to confirm a fault condition.

It is advisable to obtain a pass on this screen before proceeding otherwise subsequent testing may not be valid.



## Screen 2 – Services Testing

The purpose of this screen is to present information about the services available on the circuit being tested.

Available services are determined by a number of factors including switch type (System X or Y), type of interface, national deployment, ISDN version and customer subscription. The above factors are used to determine which services can be tested and a default set of tests are selected.

By using the "Clear" and "Set" buttons together with the "tick boxes" any combination of the available services can be tested.

Failures on this screen may be due to the fact that the service is "not available" or that the service is "not subscribed". Hovering the mouse over a Red box will display the reason for failure. As failures on this test screen may only indicate that the service is not available, a failure of this type may not affect any subsequent testing.

#### Screen 3 – Circuit Quality



The purpose of this screen is to present information about the transmission characteristics of the circuit under test.

The default test is conducted for one minute and the results are displayed.

A failure on this screen may require a repeat of the test or additional testing to determine the cause of failure.

The default test sends a stream of

"bits" down one channel (B1) via the exchange to the other channel (B2). The "bits" are returned by the tester along B2 via the exchange back along B1. The received "bit pattern" is compare with the transmitted "bit pattern" and the difference (if any) is reported as errors.

This screen provides for the results of all three test screens to be saved to the NG-Harrier Test Results folder with a file name "year, month, day, time, B1 channel number" and the extension NGH.

# **Button Functions**

The test screens include a common set of buttons along the top and bottom of the screen that become "active" or "change appearance" depending on the current tester activity or button selection. The function of buttons on the bottom of each screen is obvious while the function of buttons along the top of the screen require additional explanation.



## Auto Test Button

Selecting the **Auto Test** button opens the Auto Test screen that allows selection and management of "test scripts". Selecting the "Run Full Auto Test" button results in the three test screens being run automatically, one after the other, without user intervention. Only the services specified in the selected test script are tested.

This feature proves useful when customer specific or network specific test need to be defined and tested.

#### **New Button**

Selecting the **New** button begins a new test sequence. The software checks that the PC can communicate with the hand held tester via the serial cable. Then it runs a series of tests to determine if the tester is connected to a Line Access and displays information about the Line Access. Finally it checks if "Call Forwarding" is enabled.

Call Forwarding must be disabled before proceeding because test calls originated by the tester would be redirected and the results of the test call would be invalid.

Always press the "New" button after changing any connection to ensure that the Tester is aware of the changes.

#### **Review Test Button**

Selecting the **Review Test** button opens the Test Results folder and allows test result files to be loaded for review. Test results files saved independently by the hand held tester are also displayed and may be copied to the PC test results folder. These files can also be reviewed on the PC.

#### **Print Button**

Selecting the **Print** button opens a Print Option screen allowing test results to be printed in Text or Form formats.

#### **Trace On Button**

Selecting the **Trace On** button opens a Save As screen that allows a file containing the D Channel protocol to be saved. The saved file can be opened with the protocol decode software WinAnalyse to assist in determining why a test has failed.

Saving information to the file starts when the file is created and stops when **Trace Off** is selected. The button text changes from **Trace On** to **Trace Off** and flashes to indicate that the function is active.

#### WinAnalyse Button

Selecting the **WinAnalyse** button will launch the ISDN protocol decode software from within the NG Harrier application.

**WinAnalyse** is an option and must be separately purchased. If the **WinAnalyse** software is not loaded on the PC the **WinAnalyse** button is "greyed out" and remains inoperative.

#### **Help Button**

Selecting the **Help** button displays information intended to introduce the user to the PC software. Targeted Help about each test and how it relates to the ISDN is provided on each test screen. A printed Quick Reference Guide is provided with the tester and provides the minimum information required to begin using the NG Harrier Test System.

#### **Exit Button**

Selecting the Exit button closes the NG Harrier PC test programme.

# The Hand Held Tester



#### **Key Functions**



Select menu item, continue or enter.



Layer 1 measurement – displays signal and voltage levels



Navigate the menu – scroll in direction of arrow when the display shows a down arrow otherwise opens the Menu.



Initiates a "Telephone" call – first press allows input of called number and second press dials the number.



Switches the tester ON or OFF. A momentary press will switch ON the LCD backlight – to conserve battery power the backlight will switch OFF automatically after 5 seconds. Hold the key down to switch the tester OFF.

# About the Hand Held Tester

At all times it is possible to use the NG Harrier in Hand Held Tester mode for testing at ISDN Line Access points. Limitations of the hand held tester display compared to that of a PC requires additional effort from the user and a wider knowledge of how to test the ISDN.

Testing POTS Line Access points is more readily conducted in Hand Held mode because the telephone system is largely based on communication via the earpiece.

Making a "telephone call" at any of the Line Access test points using the hand held tester is a simple and effective way of checking that the circuit is operational.

To assist the user the telephone call function is simplified to four button presses in addition to entering the called number.

#### To Make a Voice Call – Using the Telephone key





Connect to the circuit under test using the appropriate connecting cable. Press the "power on" button to switch ON the NG Harrier and display the **Line Access** menu.



DEL

If sufficient power is available at the test point the tester will power up automatically and display the **Line Access** menu.

Press the soft-key below the "tick" to select **Automatic** Line Access. When connected to a working circuit the tester will automatically establish if it is connected to an S-Access. U-Access or POTS circuit and display the appropriate menu otherwise choose the **Line Access** type.



Press the Telephone key once to display the **Numbers** menu and enter the **Dest**ination **number**.



Press the Call key a second time to dial the number. Use the "soft-keys" to manage the call.

A single key press to initiate Tester functions is described in the **Hot Keys** section of this guide and listed on the back of the Tester for easy reference.

The function of the 3 keys located below the display is determined by what is displayed directly above the key consequently they are known as "Soft-keys".



Function Back one level Scroll the menu Select menu option on second line of LCD marked with ">" Function defined by the "TEXT"

#### Hot Keys

Once the Tester has recognised the type of Line Access and reached the Status Display condition the digit keys have a dual function. Unless the Tester expects a number entry, pressing a digit key has the following Hot Key function.

Hot Key	Function
Number 2 Key	Start Service Test
Number 3 Key	Start Supplementary Service Test
Number 4 Key	Starts Automatic Test
Number 6 Key	Dual Tests Menu
Number 7 Key	Numbers Menu – Speed dialling memory
Number 8 Key	Trace ON/OFF
Number 9 Key	Start Bit Error Rate Test (BERT)

#### **Connection Field**



9V –

External Power supply connection. The internal battery supply is disconnected when the external power supply is connected.

#### Line

Line Access test cable connection. S – Access on Pins 3, 4, 5 & 6. U-Access and POTS on pins 7&8.

#### Headset

Provision is made to connect an external headset

#### I/O Port

Serial port connection to a PC and connection to the S-Bus Wiring adaptor.

#### Power Management

In battery operation, if the NG Harrier is idle for 15 minutes, it will automatically switch to the power-down mode.

From power down mode, the system can only be reactivated by pressing the Power-Key. In the power-down mode, a battery will last about 3.8 years. Therefore, this mode serves as an effective protection against discharging the batteries.

Naturally, when the loop back function is active on the NG Harrier or it is in **Trace** mode, the NG Harrier will not switch to power-down mode.

As an alternative, it is possible to operate the NG Harrier using the included power supply. When the power supply is connected, the battery is automatically disconnected.

The NG Harrier can also be powered from the BRI line. In this case, it does not need batteries, accumulators, or the plug-in power supply.

Whenever the NG Harrier is powered from the plug-in power supply or the BRI line, the power-down mode is not active.

## **Internal Battery Supply**

The hand held tester is normally powered by three AA NiMH rechargeable cells (accumulators) located in a compartment at the back of the handset.

# Remove all connections to the tester and switch the tester off before attempting to remove the battery compartment cover.

Take care to insert batteries in accordance with the polarity markings.

If necessary, the rechargeable accumulators can be replaced by normal high quality batteries. Provision is made in the **Configuration – Device - Battery Type** menu to configure the Tester to operate permanently from either rechargeable Accumulators (accu) or non rechargeable battery types.

# Accu & Battery Icon

The battery icon will display the status of the battery (full - empty). This icon is only displayed while the Tester is in battery supply mode or during charge mode. Note: The voltage values for the three steps of the icon are different for rechargeable "accu" or non rechargeable battery mode.

# Accu Charging

In the event that the non-rechargeable batteries are subjected to a charging cycle the Tester will not be damaged. Care should be taken to avoid this happening by ensuring that the Tester is used in accordance with the instructions.



When the power adaptor is connected to the Tester it assumes that the power is required by the Tester, therefore charging does **not start** unless the Tester is switched OFF.

Accu charging can also be started from the **Configuration – Device – Accu servicing** menu.

Accu charging starts after switching the Tester OFF and is only available if

- Accu is selected in the Configuration Device Battery Type menu and
- the accu voltage is greater than 0,9 V (no accu) and
- the accu voltage is lower than 3,9 V and
- the 230 V AC/DC converter is connected.

Charg V: 3.8 abo	j <b>e acc</b> 5 rted	u 📋
CONT.		

Accu charging will be terminated by

- user (press ABORT Soft-key) or
- minus delta V or
- timer overflow (t > 7 hours) or
- maximum voltage (> 4,8 V) or
- maximum capacity (> 2500 mAh).

## **Backlight - LCD**

Momentary press of the ON/OFF key will turn **on** the LCD backlight.

To conserve battery power the backlight will switch OFF automatically after 5 seconds. The backlight will remain ON if the tester is powered by the external power supply. The LCD contrast adjustment is accessed via the **Menu, Configuration, Device, LCD contrast**.

# Menu Structure

The following diagram illustrates the top level of the menu structure. On power up the tester displays the **Line Access** options. If **Automatic** is selected the tester will automatically determine the Access mode and display the access Status and three soft key options. The available **Menu** options that are now displayed are related to the type of Access being tested. **Menu** options that are not appropriate to the Access being tested are not displayed.



Line Access can also be **User selected**. In this case the **Access Mode** must also be selected from the available menu options.

# Menu Navigation

Navigation of the menu is accomplished by using a combination of main keypad and soft-keys depending on the test situation. The following conventions are used to describe operation of the tester using representations of menu display.



# Line Access

All testing begins with the **Line Access** being determined by the user or by the Tester. It follows that the user can determine the **Line Access** prior to connection but the Tester must be connected to a working **Line Access** in order to determine correctly the type of **Line Access**.

There are five **Line Access** menu options. Pressing the "down arrow" Soft-key will display the available options and pressing the "tick" Soft-key will select the option.

When connected to a working ISDN access point, if sufficient power is available, the Tester will switch itself ON.

#### Line Access - Automatic

When connected to a working access point the Tester will automatically determine the **Line Access** and provide access to the main **Menu** via the **Status Display**.

If the Tester is unable to automatically determine the Line Access, because of some unusual circuit conditions, the user needs to select the Line Access and Access mode.

#### Line Access - S-Access

User selected by scrolling **S-Access** to the second line of the display and selecting the function to display the **Access Mode** menu. Selecting **TE automatic** in the **Access mode** menu returns the status display provides access to the main **Menu**.

#### Line Access - U-Access

User selected by scrolling **U-Access** to the second line of the display and selecting the function to display the **Access Mode** menu.

Selecting **TE automatic** in the **Access mode** menu returns the status display provides access to the main **Menu**.

## Line Access - POTS

User selected by scrolling **POTS** to the second line of the display and selecting the function to display the **Access mode** menu.

Selecting **POTS terminal** in the **Access mode** menu returns the status display provides access to the main **Menu**.

## Line Access - S-Bus Wiring

User selected by scrolling **S-Bus Wiring** to the second line of the display and selecting the function to access **S-Bus Wiring** main **Menu** directly because **Access mode** is not appropriate in this case. The Soft-key START begins the S-Bus Wiring test. This function requires an optional cable and adaptor.

Refer to the **Options** section of this guide for detailed information.

**Note: Line Access** selections are stored in EE-PROM therefore the last selected mode will be active until a new selection is made.





# Access mode [ISDN]

The NG Harrier Test System is primarily designed to test at the **S-Access**, 4 wire ISDN presentation because it is the endpoint of the system and the most common customer point of connection. To facilitate commissioning and maintenance of the ISDN service additional capability is built into the hand held tester.

Some of the additional test capability such as testing at the POTS Line Access is more readily carried out by the hand held component while the addition of a PC is required for D Channel protocol analysis. Test capability only required by some users to complete specific tasks is available as cost options. Appropriate messages are displayed when optional test capability is selected but not available with the configuration being used.

The Access mode menu available depends on the Line Access selection as shown:





**Note: Access mode** selections are stored in EE-PROM therefore the last selected mode will be active until a new selection is made.

# Access mode

## **TE automatic**

The Access mode (PP or P-MP) will be determined automatically to provide access to the main **Menu** via the **Status Display**.

## TE P-P

The Tester is set to operate in Terminal Equipment (TE) simulation mode at a Point to Point (P-P) connection to provide access to the main **Menu** via the **Status Display** 

## TE P-MP

The Tester is set to operate in Terminal Equipment (TE) simulation mode at a Point to Multi Point (P-MP) connection to provide access to the main **Menu** via the **Status Display** 

## **No Protocol (Permanent Circuits)**

The Tester is set to operate over an ISDN leased line that does not involve signalling over the D Channel hence **No Protocol**. Selecting the option provides access to the main **Menu** via the **Status Display**.

Besides dial-up connections to any subscriber, ISDN also supports the use of permanent circuits switched to a specific remote location.

These permanent circuits are available after setting up Layer 1, in other words after synchronizing both terminals.

As a quick test of a permanent circuit, you can simply call the opposite end using a selected B-channel. However, for a more revealing test of a permanent circuit, you should perform a bit error rate test. Both ends of the permanent circuit must use the same channel.

#### **Telephony on permanent circuits**



The telephony (voice) call can be started with the Telephone key or via selection of the ISDN call option in the Single test menu.

After the B-channel for the permanent circuit is selected, the telephone connection will be setup automatically. In addition to the Telephony function, the Tester also shows the B-channel used (second line in display) and the duration of the permanent circuit (third line).

#### **BERT** on permanent circuits

A number of variations are possible in testing permanent circuits with the bit error rate test. In the simplest case, a B-channel loop will be set up at the remote end. After selecting BERT start, selection of the B channel the Tester will send the test pattern, receive it back and evaluate it accordingly. The display and operation during and after the bit error rate test are similar to that of a BERT with dial-up connections. The only difference is that it is not necessary to select a call number or service.



It is also possible to run a BERT on the D Channel in end to end mode (refer to the Section single test-BERT) by making the appropriate selection in the Channel select menu. The Tester display changes to reflect that the D channel is being used for the test.

# **NE P-P (Option)**

If the option is available, the Tester can be set to operate in Network Emulation (NE) mode to facilitate the testing of Terminal Equipment (TE) operating in Pont to Point (P-P) mode. If the option is not fitted, the display will show "**Option not enabled!**" Refer to **Options** Section in this guide

## **NE P-MP (Option)**

If the option is available, the Tester can be set to operate in Network Emulation (NE) mode to facilitate the testing of Terminal Equipment (TE) operating in Pont to Multi Point (P-MP) mode. If the option is not fitted, the display will show "**Option not enabled!**". Refer to **Options** Section in this guide

## **Monitor (Option)**

If the option is available, the Tester can be set to operate in passive **Monitor** mode where it monitors the activity on the D channel that can be viewed on connected PC running WinAnalyse software. SETUP messages are displayed on the LCD and it is possible to monitor the signal on the incoming B channel. If the option is not fitted, the display will show "**Option not enabled**" Refer to **Options** section in this guide.

# **Status Display**

The Status Display is the state reached following automatic or user selection of Line Access and/or Access mode to provide access to the main Menu.

#### **Connection to an S-Access or U-Access**

While Layer 1 is being setup, the L1 LED above the display will blink. If an error occurs, the message **No Network** will be displayed.

When connected to a **U-Access** it can take up to 2.5 minutes to activate Layer 1.

As soon as Layer 1 is successfully setup, LED L1 will light continuously.

When Layer 2 is successfully setup, LED **L2** will also light continuously. If no error occurs, the Tester will display the access mode and a qualitative assessment of the signal **Level** 

The Tester (using the protocol set in the **Configuration** menu) will attempt to setup Layer 3 (LED **L3** lights). At the same time, the B-channel test is started and the results are shown on the **Status Display** to provide access to the main **Menu** as shown below.

In the example both B-channels are available.

- **B12** = both channels are available
- **B1-** = only B-channel 1 is available
- B-2 = only B-channel 2 is available
- **B--** = no  $\dot{B}$ -channel available

If only one B-channel is available, this can have an impact on the service check and the testing of the supplementary services.

The **Level** is in order (level can only be evaluated on a BRI access):

**OK** the level is in order

- **Hi** = the level is too low
- Lo = the level is too high
- No = no level

The Tester in **TE** mode, Point to Multi-Point employing the DSS1 protocol

Soft-key options allow back one menu level, access to the main Menu or a restart.

#### **Connection to a POTS interface**

In this case the POTS **Terminal** (**TE**) **Status Display** is reached via the intermediate step of **HF detection** unless **"POTS" Line Access** and **"Terminal" Access Mode** is user selected.

#### **Connection to S-Bus Wiring Adaptor**

The Status Display is simply reached by selecting S-Bus Wiring in the Line Access menu







Harrier U-2B1Q

TEs P-P DSS1

\_MENU RESTART

U: 90V

Harrier BRI

# Menu

The **Status Display** provides access to the main **Menu** that offers selections based on the **Access mode**.



#### **OPTIONAL Access mode** if available



# Menu - Single test

The **Single test** menu provides for the user to initiate calls that exercise the selected **Access mode**. Menu options that are not appropriate to the selected **Access mode** are not displayed.



# Menu – Automatic Tests

The **Automatic test** menu allows the user to initiate a test sequence automatically depending on the selected **Access mode**. The test results can be viewed in the display or saved by the PC component of NG Harrier and then be viewed and printed.

The Tester automatically performs the following sequence of tests:

#### On a BRI or U-interface access

- Level Measuring
- Service Tests
- BERT in an extended call to oneself
- Tests the supplementary services
- X.31 Test
- CF Interrogation

#### On an ISDN permanent circuit

- Level Measuring
- BERT in end-to-end mode (e.g. with a loop-box on the remote end)

The test results and the time will be saved in the Tester .Additionally, settings such as your own plus a remote call number will also be saved. The test results are stored in non-volatile memory and are not lost when the Tester is switched off. Each line in the **Auto test** menu refers to one of the test series saved as a record.

Therefore, the first step will open a dialog in which you must select one of the empty data records. The following display shows that record 6 was used to save results for a test interface with the own number 225600.



The final step is to select the desired service from the **Select service** menu. During the test the first three lines in the display will reflect the test currently being run. If the test is cancelled (using the ABORT soft-key) a menu will open with the option of aborting the entire series of tests or skipping individual test segments.

If the automatic test is interrupted, the test results gathered up to this point will **not** be saved. Any "old" data stored under this data record number from a prior test will be retained.

NG Harrier

# Menu – Line Voltage

## Line Voltage – S-Access

The Tester measures the level of the received useful signal and the phantom power feed. The measurement is updated continuously. A qualitative assessment of the voltage values is given. REV indicates inverted phantom feed and NONE indicates no phantom feed. **ABORT** returns to the Menu screen.

R>ON applies the S-Bus termination resistors and the display changes to R>OFF. NEW Layer 1 is set up again to update the Level measurement

4

Line voltage

>Voltage U

Power U

₽

# Line Voltage - U-Access

The Tester offers the option to measure the Voltage or power at the U- Access. Selecting the Voltage displays the measured line voltage that is updated continuously.

ABORT returns to the Menu screen. **NEW** refreshes the voltage measurement

# Line Voltage – U Access - Power

With this function you can use the tester to apply an incremental load to the U interface.

The Tester measures the voltage and calculates the current and power. When switching the load levels, the power limitations of the components within the Tester and the maximum permissible power (1300mW) of the U-

interface must be taken into consideration. Therefore, the Tester will only permit the load to be switched another increment when the specified power will not be exceeded.

Note:

Soft-keys "--"and"++" are used to vary the power. The values of "R" range between 2.72k Ohm and 64.4k Ohm.

23







Voltage U

89.9V

NEW

U:

ABORT

# Menu: Configuration

The **Configuration** menu provides for Tester or function variables to be set. The variable currently set is indicated by star "\*" symbol left of the text.

#### Menu–Configuration-Trace/remote

Open the menu allowing options related to the Tester passing D-Channel data to the connected PC.

The default setting is "Auto PC sync"

When Trace mode is active the "Trace" LED will be ON continuously. If the Tester is unable to send data to the PC without errors the "Trace" LED will flash at about 5 times per second.

#### Menu–Configuration-ISDN



Opens the "ISDN Config" sub-menu allowing the following ISDN options to be set.

#### Protocol

Normally the Tester will use the default DSS1 Layer 3 D-channel protocol. However, the Tester can be set to operate using CorNet-N, CorNet-T, QSIG or VN4 protocols. The selected protocol will be shown in the **Status** display. The selection is saved to EE-PROM and will remain in force until another selection is made.

#### **Alerting Mode**

You can specify whether, for an incoming call on a BRI point-to-point access, the Tester should only display the access number without extension or the complete number with extension.

If you select Manual, the extension can be displayed (An incoming call will be signalled. The Tester will send the Layer 3 message "Alert" when it accepts the call.

The digits of the extension that have been sent by this point will be displayed.). With the Manual setting, an incoming call must be answered within 20 seconds or it will be lost.

Furthermore, you should note that the remote subscriber will not hear a ringing tone. If you select Automatic, the Tester will only display the access number without extension or, depending on the configuration of the access in the exchange, it may not display the number called at all. The default setting is "Automatically"

#### **Clock Mode**

You can select the L1 clock mode according to the application. With the Tester operating in NE mode the Clock mode is set to "master" and for operating in TE mode it is set to "slave".

#### **BRI Termination**

You can set the "S-Bus termination" resistors to be "on" or "off". With the Tester operating in NE mode the BRI termination is "on" and for operating in TE mode the setting is "off".

## **Call parameter**

Allows the user to specify the Type of Number (TON) and the Numbering Plan (NP) for the CallinG party Number (CGN) and CalleD party (CDN) Number that is used in the outgoing (SETUP, INFO) message. CGN and CDN; Values are different for NE-Mode (NET) and TE mode (USER) as shown.

Text:	Mode:	Information element:	Parameter:
Net CGN TON:	NT simulation;	Calling party number;	Type of number
Net CGN NP:	NT simulation;	Calling party number;	Numbering plan
Net CDN TON:	NT simulation;	Called party number;	Type of number
Net CDN NP:	NT simulation;	Called party number;	Numbering plan
User CGN TON:	TE simulation;	Calling party number;	Type of number
User CGN NP:	TE simulation;	Calling party number;	Numbering plan
User CDN TON:	TE simulation;	Called party number;	Type of number
User CDN NP:	TE simulation;	Called party number;	Numbering plan

#### Services

Allows a user specified ISDN service to be defined by entering the BC, HLC and LLC. Once defined, the User Specified Service (1 -3) appears at the end of the Services list and is available for selection.



The value entry screen allows input of the BC, HLC and LLC in Hexadecimal format.

In each case press the enter values.



key to store the

# Call acceptance

In TE mode on a P-MP access, the Tester can either respond to all incoming calls or just those calls whose destination address matches the MSN of the access under test.

The function is only available, when your own call number has been saved in the speed-dialling memory under "own number" and the incoming call has a destination MSN. The default is to answer "all MSN/DDI"

# **Voice Coding**

Allows selection between A-law and  $\mu$ -law voice coding. The default is A-law.

## DTMF / keypad

Opens a menu that allows selection of signalling during an ISDN call between "keypad" information elements and "DTMF" tones. The default is "DTMF".

#### Menu–Configuration-BERT

Opens the "BERT Config" sub-menu allowing the following options to be set.

#### **BERT time**

The default setting for the duration of the Bit Error Test is1 minute. The measurement time may be set to a maximum of up to 99:59 (99 hours and 59 minutes) or an unlimited time (by entering 00:00).

If you select an unlimited measurement time, the test will **not** stop automatically, it must be stopped by the user.

#### **Error level**

The default threshold (error level) is  $10^{-06}$ . That means that, in the event that the bit error rate is less than  $10^{-06}$  (one in  $10^6 = 1,000,000$  sent bits), the bit error test will be evaluated as OK. If the bit error rate is greater than the error level value, the Tester will display NO.

This parameter can be set to any value from 01 ( $=10^{-01}$ ) to 99 ( $=10^{-99}$ ).

#### **HRX** value

Allows the Hypothetical Reference Connection (HRX) value to be set in %.

#### Bit pattern

There are two predefined bit patterns available. Additionally, it is also possible to enter a 16 bit pattern of your choice in binary.

The default pattern is 2<sup>15</sup>-1. If a "user defined" bit pattern is selected, an entry mask will be displayed.

A 16 bit long pattern can be entered here in binary. In the BERT, the Tester will then either send this bit pattern cyclically or compare it with the received bit pattern.

#### Menu–Configuration-Device

Opens the "Device Config" sub-menu allowing the following options to be set.

#### Menu language

Allows the menu language to be selected. The default language is "English"

#### LCD contrast

Allows the LCD contrast to be set using the up/down arrow keys. The default is a mid setting.

#### Printer

Allows printer options to be set. The default is Epson LQ.

If you wish to use a printer that is not compatible with either the HP-Printer or the EPSON LQ, select the *ESC sequence*. An entry mask will open in which you can enter an ESC sequence character-by-character, which will permit the optimum adaptation to your printer. Up to 9 different ESC sequences can be entered and saved in the EEPROM in the Tester so that these will still be available after the Tester has been switched off and then back on.

#### **Baud Rate**

There is a selection of baud rates available for use when connecting the Tester to a PC. The default setting is 57600 baud.

#### Handset

The Tester makes a distinction between the integrated handset and an external headset. **Note:** If "extern" is selected you can change to internal hand set using the Soft key "intern" during the connection. The default is "internal".

## Alarm bell

The Tester will sound an alarm in a variety of situations, for example, when a bit error occurs during a BERT. The Setting is not lost when the tester is switched off and back on again. The default setting is "off".

#### **Power supply**

The tester can be powered from the line "Normal" or "Restricted" supply. Modern NT1 units now include additional electronics that consume line power restricting the amount available at the test interface. The default setting is "no line power". **Note:** If "no line power" is selected and the tester is connected to a BRI line, it will try to take power from the line if no batteries are inserted.

#### **Battery type**

The tester can be operated using rechargeable accumulators or "normal" batteries. If Battery is selected the recharging circuit is disabled. The default setting is "Accu" which means rechargeable batteries.

#### Accu servicing

Allows the user to initiate a charge and discharge cycle. About 30 minutes after discharging the Tester automatically starts charging.

#### Software option

The user is able to enter the software key to enable additional Tester functionality purchased at a later date than the Tester. The software key is unique to the tester and is associated with the Tester serial number that can be revealed by keying the sequence "\*1".

#### Menu–Configuration-Numbers

Provides access to the "**Numbers**" sub-menu allowing up to ten numbers with a maximum of 24 places to be entered in the speed dial memory.

The first number **must** be the **own** call number of the access under test (this is especially important for the automatic Service test). In the *Remote No.1-8* memory locations, you can save which ever remote call numbers you wish.

In the memory location X.31 test number, the Tester expects the entry of the X.25 access number for the X.31 test.

When entering a call number with an extension (operation of the Tester on a PBX access) observe the following: The extension is separated from the access number by a #. For outgoing calls, the Tester uses the entire call number (without #) as the number called (CDPN) and, for the calling number (DSS1-CGPN) only the number after the #, in other words the extension.

A "#" at the beginning of a call number is treated as a valid character. If the "# "is at the end of a number, when the number is later dialled it will be done without calling party number (CGPN). This is important for some PBXs.

#### Menu–Configuration-Reset

The Tester resets all the settings or entries made in the **Configuration** menu back to their default values.

# The speed –dialling memory and the results of all the automatic tests will be deleted.

The default **Configuration** settings for all parameters are given in the Appendix.

# Menu – Dual Tests

The Tester can simultaneously start two tests or "connections" fully independent of each other. As an example, a BERT can be run at the same time that you make a phone call. The individual tests or "connections" use resources. All of the tests that have been started will be administered under "Dual Tests". Using Dual Tests you can start new tests, switch between tests running in parallel or terminate all of the tests that are currently running.

When a call attempt is in progress the soft-key label "**DT**" can be selected to enter the **Dual Tests** menu and administer a second call.

The Dual tests menu provides information about the tests currently active as shown in the following example where a self call BERT is set up. A self call BERT originates a call on B1 to B2. The call is looped back by B2 and returned to B1. It can be said that two calls are active – one on B1 the other on B2.

Second line of Display	First lir	ne of display	Meaning
Cancel all	Tests	-/02 B	There are 2 active tests
Start new one	Tests	-/02 B	There are 2 active tests
BERT outgoing	Tests	1/02 B01	Test 1 of 2 is using B1
Auto LOOP	Tests	2/02 B02	Test 2 of 2 is using B2

# Menu – L 1 Status [S-Access]

The Tester displays the current status of Layer 1. The signal received from the remote end (Rx) and the signal sent by the Tester (Tx).

# Menu – Single test – Supp.serv.test

The Tester allows the user to select test parameters that structure a test capable of checking a range of Supplementary Services.

The test begins with entering the Own Number, selecting a Service, the outgoing B channel and finally the Supplementary Service to be tested.



A brief explanation of the test and possible results is given below.

#### **TP test**

The Tester checks the TP (Terminal Portability) supplementary service by making a self call.

Result: + = TP is possible on this Access - = TP is not possible on this Access

#### **HOLD** test

The Tester checks the HOLD supplementary service by making a self call.

Result: + = HOLD is possible on this Access - = HOLD is not possible on this Access UUS test

-----

# Calling Line ID tests (CLIP / CLIR / COLP / CLOR)

For this test, the Tester will make up to three self calls one after the other. In this test, the Tester checks whether the 4 supplementary services CLIP, CLIR, COLP and COLR are supported on the access under test.

The test will be performed automatically for all four supplementary services.

## CLIP

Will the calling subscriber's number be displayed at the called subscriber? - = no += yes

#### CLIR

Will the display of calling subscriber's number at the called subscriber be suppressed or is it possible to temporarily suppress the display?

- = no += yes \* = no statement, since CLIP is not setup

## COLP

Will the call number of the subscriber who answered be displayed on the caller's phone?

- = no += yes

## COLR

Will the display of the call number of the subscriber who answered be suppressed on the caller's phone or is it possible to temporarily suppress the display?

- = no += yes \* = no statement, since COLP is not setup The supplementary services CLIP and CLIR as well as COLP and COLR will be tested in pairs. If CLIR or COLR is setup permanently, it is **not** possible to make a clear assessment.

## **DDI test**

Can a caller directly dial in to an extension on the PBX access under test? - = no += yes

#### **MSN** test

Can a caller dial the number assigned to a specific terminal on an S-Bus - = no += yes

# CF test (CFU / CFB / CFNR)

This test checks whether the 3 supplementary services CFU, CFB and CFNR are supported on the access under test. The test is automatically performed for all three supplementary services. The CF test attempts to setup a call diversion to the call number that is in the speed-dialling memory location for "destination no. 1". The CF test cannot be performed, if this location does not contain a valid call number to which it is possible to divert a call.

Use the down arrow soft-key to scroll through the test results

#### CW test

Can the access under test support call waiting.

- = no += yes

#### CCBS or CCBS-T test on a P-P Access

Will the access under test automatically recall a remote subscriber, if the number called was busy?

- = no += yes

#### CCNR or CCNR-T test on a P-P Access

Will the access under test automatically recall a remote subscriber if the call was not answered?

- = no += yes

#### MCID test

Does the access tested allow identification of malicious callers (call tracing)? - = no += yes

#### **3pty test**

Does the access under test support a three-party conference call? For this test, you need the assistance of a remote subscriber, whose call number must be entered.

- = no += yes

#### ECT test

Is an explicit call transfer supported by the access under test? For this test, you need the assistance of a remote subscriber, whose call number must be entered.

- = no += yes

#### CUG test

Is closed user group supported by the access under test? -= no += yes

#### CD test

Is call deflection supported by the access under test?

#### **AOC test**

The Tester checks whether the charges can be sent to the access under test. The test uses a call to oneself to check both AOC-D (AOC during a call) and AOC-E (AOC at the end of a call). Does the access support AOC?

- = no += yes

#### SUB test

A call is made to oneself and answered to check the transfer of the sub-address in both directions. Are sub-addresses supported on the access under test?

- = no += yes

#### **UUS test**

Does the access under test support the transfer of user data?

- = no += yes

# Menu – Single test – Service test

The Tester allows the user to test for the availability of the following ISDN Bearer services and Teleservices.

1. Speech	5. UDI TA	9. Mixed Mode	13. OSI
2. UDI 64 kBit	6. Tel. ISDN	10. Teletex	14. Tele. 7 kHz
3. 3.1 kHz audio	7. Fax G3	11. Videotext	15. Videotel 1
4. 7 kHz Audio	8 Fax G4	12. Telex	16. Videotel 2

The test runs automatically once the Own number and the outgoing B channel is selected.

The Service test is performed using a self call





The **B** channel select menu allows the selection of B1, B2 or **B** channel select Active B ch.: 1 Ch.available ! **B** channel select Active B ch.: 1 Ch.available ! **B** channel select **C** channel select **B** channel select **C** channel selec

For each service, the Tester will place a call to itself (to the access under test). However, the call will not be answered so no charges will be incurred. At the end of the test use the scroll keys to review the results.

#### Interpreting the test results:

The Tester reports on the result of making an outgoing call (the first +, - or \*) and the result of an incoming call (the second +, - or \*).

- + Service supported
- Service not supported
- \* Result not definite

The reason that it is not possible to make a definite statement is given in the adjacent error code.

#### **Test Result Description**

- ++ The self call functions OK or the remote end can take the call for this service
- + Call was sent successfully, however, it was rejected on the remote end due to missing authorization
- An outgoing call with this service is not possible
- + \* Call was sent successfully, the call back or call to the remote end failed (e.g., remote end busy or no B-channel available for the call back).
- \* Wrong number, no B-channel available or other error.

If the outgoing call is not successful, it is **not** possible to make a statement about an incoming call. Therefore, you will never see "- +" or "- \*" on the display.

# Menu – Single test – Bit Error Test

The bit error rate test (BERT = Bit Error Rate Test) serves to check the transmission quality of the access circuit.

As a rule, the network operator will guarantee an average error rate of  $1 \times 10^{-7}$ , in other words in long-term operation 1 bit error in 10 million transmitted bits.

A higher bit error rate will be especially noticeable in transmitting data. The application program detects the errors in the data blocks transmitted and requests that the remote partner send them again, which reduces the effective throughput of the ISDN connection.

In the bit error test, the tester establishes an ISDN connection to a remote tester or places a call to itself, sends a standardized (pseudo-) random number string and compares the received data with that which was sent. The individual bit errors are summed and evaluated in accordance with the ITU Guidelines G.821.

The duration of the BERT can be set in the **Configuration - BERT** menu (default setting is 1 minute). As a rule, the quality of the network operator's access circuits is quite good. Therefore, no bit errors should occur in a 1-minute test. However, if an error occurs, the test should be repeated with a measurement time of 15 minutes to achieve higher statistical precision. If more than 10 bit errors occur during this 15-minute test (call to oneself), the access circuit is too heavily distorted.

The BERT can be performed in three different ways:

#### 1. BERT in an extended call to oneself

A remote number is not needed, since the ISDN connection is setup to oneself. In this case, the tester requires two B-channels for the test.

#### 2. BERT with a loop-box

A loop-box (a device capable of looping back the bit pattern or another NG Harrier at the remote end) is required. The test uses one B-channel.

#### 3. BERT end-to-end

This test requires a waiting remote tester such as an NG Harrier in the **BERT wait** mode. A bit pattern is sent to the remote tester. Independent of the received bit pattern, the remote tester uses the same algorithm to generate the bit pattern that it sends back. Therefore, both directions are tested independently.

Note: For this test both devices must have the same bit pattern selected.

#### **BERT Start**

After selecting BERT Start, enter number of the channel that will loop-back the bit pattern. It may be your Own number (to perform a BERT in an extended call to oneself) the number of the loop-box or a remote NG Harrier (to perform an end to end BERT)



After the tester has set up the connection and synchronised the send and receive directions it will display the outgoing B channel, the remaining test time in hours:minutes:seconds,

the number of bit errors that have occurred (line 2) and the Synchronicity of the bit pattern (line 3 – synchronous or asynchronous).

Pressing the "ERROR" Soft-key injects an artificially generated bit error which can demonstrate that the test is effective when running end to ends tests. The Soft-key "DT" opens the **Dual Test** menu. If an end to end BERT is in progress where only one channel is being used, therefore the second call can be set up on the other channel via the **Dual Test** menu.

When a bit error is detected, it will be signalled by a brief alarm (if the **Configuration-Alarm bell** is set to **On**). In the event that the synchronisation is lost, a constant alarm will sound. The measurement time for the BERT is set in the **Configuration** menu.

After the test is done, the Tester will display the cause on the second line and the location that initiated the disconnect will be shown on the third line. If the test ran normally, the Tester will display "Active clearing". Press the "CONT." Soft-key to review the results.

First line: B-channel used

Second line: Transferred data in k Bits

Third line:Number of the bit errors that have occurredThe evaluation of the results depends on the error threshold that you set inConfiguration – BERT – Error level - Threshold

OK = bit error rate is less than the error threshold (set by the user) and NO = bit error rate is above the error threshold.

For a detailed explanation of the (G.821) results refer to the PC component of NG Harrier.

#### **BERT** wait

The **BERT wait** menu option is set for the remote Tester when conducting an end to end test. The local Tester uses the **BERT start** option.

The Tester first waits for a call and then sets up the connection. During the connection, the received bit pattern will be evaluated and an additional independent bit pattern will be sent.

#### **B-channel LOOP**

When the B-channel loop function is active, the Tester will automatically take an incoming call for any service and switch a loop back in the B-channel that is specified by the exchange. The Tester acts as a Loop-box.

The received bit pattern will be sent back to the caller/sender.

A second B-channel loop connection can be started via the **Dual test** menu

## Menu – Single test – X.31 Test

The x.31 test consists of two steps.

#### First Step

The tester checks whether it is possible to access the X.25 service via the Dchannel on the access under test. The Tester sequentially checks all the TEI from 0 to 63.

All the TEI, with which the X.31 service is possible on Layer 2, will be shown on the display.

#### Second Step

For each TEI with which X.31 is possible on Layer 2, a CALL\_REQ packet will be sent and then the Tester will wait for an answer. Beforehand, the Tester will request the entry of the X.25 access number, which will be saved in speed-dialling memory under **Configuration – Numbers – X.31 number**. With the entry of the X.25 access number, you can - if you wish - select a logical channel (LCN) other than the default. For this purpose, append a "#" plus the desired LCN to the access number (default: LCN = 1).

The test can take up to 4 minutes during which the Tester will display a rotating bar.

In the second line, beginning at the left, will be displayed the tested TEI and its result:

- + = X.31 is available for this TEI
- = X.31 is not available for this TEI

When the test sequence is completed the Tester displays whether the X.31 service is available for Layer 3 for the TEI found in Fist Step.

#### Test results:

TEI 02 = the first valid TEI value is 02.

+ + = both test steps were successful

+-= one test step successful, second step not. In this case, the Tester will display the relevant X.31 cause for the failure and an associated diagnostic code if there is one.

If the X.31 service is not available, the Tester will show the message "X.31 (D) n. impl."

Additional error information is given in Appendix F. X.31 – Error messages!

# Menu – Single test – CF Interrogation

The ARGUS will check whether a Call Forwarding (diversion) is setup in the exchange for the access under test. After the test, the Tester will show the type of diversion (CFU, CFNR or CFB) and the call diversion's service. The display is limited to a maximum of 10 call diversions for all of the MSN.

Any call diversion setup in the exchange can be cleared with the Tester.

The test can take a few seconds, during which a bar will rotate on the display.

# Menu – Single test – CF Activation

The Tester allows the user to set Call Forwarding at the test interface by selecting service, call forwarding type, originating number and destination number.



# Menu – Single test – ISDN Call

The Tester offers menu options for the user to set up a call selecting the dialling method, Service type, and outgoing channel.

In the case of a telephone connection, you can either use the integrated handset or attach an optional external handset.

When an ISDN connection is setup, pressing the number keys (0-9) or the \* or # will generate and send the corresponding DTMF tones or keypad information elements depending on the setting in **Configuration – ISDN – DTMF / keypad**.



The extension is separated from the access number by a #. For an outgoing call, the Tester uses the entire call number (without #) as the number called (CDPN or DAD) and, for the calling number, only the extension (DSS1-CGPN or 1TR6-OAD). A "#" at the beginning of a call number is treated as a valid character. A '#' at the end of the own call number instructs the Tester to not send the caller's number for outgoing calls (CGPN or OAD).

#### Simplified overlap signalling using the telephone key:



Regardless of the currently open menu, you can quickly and easily place a call:

Press the telephone key once to enter the Enblock Connect function (in the Single tests menu).enter the destination number and press the telephone key a second time to set up the connection.

# Menu – Single test – Time measuring

The Tester can measure three different times on a BRI or U interface access: connection setup time, the propagation delay of the data and the difference between the propagation delays for the data on two B-channels.



## **Connection setup time**

The Tester places an outgoing call and measures the time between sending the SETUP and receiving the ALERT or CONNECT message.

#### **B-channel delay**

The Tester places a call to itself (self call) or to a remote loop-box and measures the propagation delay for the data in the selected B-channel. The propagation delay is given in multiples of the time required for sending one byte at 64k Bit/s. (The time for sending 1 byte at 64k Bit/s = approx.  $125\mu$ s.)

#### **Interchannel delay**

The Tester establishes two separate connections to a remote loop-box. The loop-box sends the respective B channel data back on the same channel. The Tester measures the propagation delay for the data on each of the B-channels and determines the difference between the two propagation delays (inter-channel delay). The difference in the propagation delay (inter-channel delay) is given in multiples of the time required for sending one byte at 64k Bit/s.

(The time for sending 1 byte at 64kBit/s = approx. 125 µs.)

# When it is connected to a loop-box, if the Tester does not receive the data back within 13 seconds, it will display the message "No LOOP".

# Access mode [POTS]

# **HF Detection**

The Tester is set to operate in high impedance mode to measure the voltage on the POTS line and detect the presence of signal frequencies above 20kHz.



The presence of signals above 20kHz on a 2 wire circuit indicates that the line may be carrying digital services (ADSL) in place of, or in addition to, POTS. The user can exercise caution, confirm the correct circuit connection and avoid accidental disruption of the traffic on the line.



Select TE to for the Tester to behave as a Telephone terminal and press Talk to obtain dial tone.



## POTS Terminal (TE)

Selecting **POTS terminal** in the Access mode menu bypasses the HF detect function and the Tester is set to operate as an analogue telephone and provide access to the main **Menu** via the **Status Display** 

# POTS MONITOR

Selecting MONITOR in the HF detection menu allows the Tester to monitor the activity of another Telephone Terminal connected to the same line. DTMF digits dialled by the other telephone terminal are displayed on the Tester LCD.





Caller display information directed at the other connected terminal will also be shown on the display.

Pressing the DEL. Soft-key will clear information in the display.

# Menu – Line Voltage [POTS]

## Line Voltage POTS Access

The Tester displays Polarity based on

- Red plug = a
- Black plug = b.

The "On Hook" line open voltage and "Off Hook" line busy voltages are displayed.

**ABORT** returns to the Menu screen. **NEW** refreshes the voltage measurement

<b>Polarity:</b>	<b>a+ b-</b>
Line open:	45.3V
Line busy:	12.1V
ABORT	NEW

# Menu – Configuration [POTS]

Allows parameters related to POTS testing to be selected.

#### **POTS-Dial Mode**

Allows selection of DTMF or pulse mode dialling. The Default is DTMF

#### **POTS-DTMF** parameter

The Tester can set the parameters **Level**, **Duration** and **Interval** of the DTMF signals that are generated during POTS operation.



#### Setting the level of the DTMF signal

The default value is -3dB. The level can be set to a value between -21dB and +12 dB adjustable in steps of 3dB by pressing the up or down "arrow" keys.

## Setting the duration of the DTMF signal

The default setting is 80ms. The duration of the signal can be set to a value between 40ms and 1s. The duration can be raised or lowered using the arrow keys as follows:

In the range 40 200ms in 10ms increments

In the range 200...300ms in 20ms increments

In the range 300...1000ms in 100ms increments

When the upper limit is reached (1000ms), the soft-key up arrow will automatically change to a down arrow and vice versa when the lower limit (40ms) is reached.

#### Setting the interval between two DTMF characters

The default value is 80ms. The interval between two DTMF characters can take a value between 40ms and 1s. The interval can be raised or lowered by using the arrow keys as follows:

In the range 40 200ms in 10ms increments

In the range 200...300ms in 20ms increments

In the range 300...1000ms in 100ms increments

When the upper limit is reached (1000ms), the soft-key up arrow will automatically change to a down arrow and vice versa when the lower limit (40ms) is reached.



#### **Restore the Defaults**

Selecting the Defaults option restores the settings to the following values.

- Level=-3dB
- Time= 80ms
- Interval = 80ms

#### **POTS – FLASH time**

With this selection, you can set the duration of a flash in analogue operation. The FLASH time can be set to a value between 40ms and 1s. It can be raised or lowered using the arrow keys as follows:

In the range 40 200ms in 10ms increments In the range 200...300ms in 20ms increments In the range 300...1000ms in 100ms increments

# **OPTION - [S-Bus Wiring]**

## Access mode

This option is supplied complete with an additional test cable and Line Test adaptor. It is used to check the terminating resistors and wiring of a four-wire bus.

The tester also detects errors in the cabling e.g. any broken wires, short-circuits and crossed wires.



#### Menu

The **S-Bus wiring** menu provides for the user to initiate the wiring test and readily access the **Line Voltage** test and **Configuration** menu



#### **Test Sequence:**

To perform a thorough test of the lines, the test must be done in 2 steps.

# Unplug the NT and all terminal equipment from the bus, before performing wiring test!

#### WARNING

Should the Tester detect a user error (Line test on a fed bus), it will emit a continuous acoustic signal. In this case, to prevent the destruction of the Tester, the line test **must not** be started.

#### First step:

Use the test adapter to connect the Tester to the Bus to be tested. In this step, the Tester will determine whether or not there is a short circuit or a terminating resistor and whether there is a fault between the terminating resistor – if there is one – and the test adapter.



#### **Possible test results:**

- The Tester has detected a short circuit: Clear the fault and repeat the test
- The Tester reports that the resistance is wrong. Repeat the test from another socket, if necessary remove the terminating resistor(s)
- The Tester reports that the line is OK: Continue test with step 2



#### Second Step

Connect the test adapter to the jack, which was tested as OK in the first step. Connect the Tester via its I/O Port connector to the next jack on the bus.



#### **Possible test results:**

- The Tester reports broken connections or crossed wires: Clear the fault and repeat the test beginning with the first step.
- The Tester reports that the line is OK: Connect the Tester (L-Test jack) to each of the sockets on the bus one after the other.

#### Comments about the test results:

The bus can be considered to be free of defects, when all of the sockets have been reported by the Tester as OK.

- Short-circuits are reported as a resistance value less than 10ohms.
- Crossed wires and broken connections between the test adapter and the terminating resistor cannot be found.
- The displayed test results are either for just the bus lines between the Tester and the test adapter in the case of cross-wires and broken connections or for the entire bus in the event of short-circuits and terminations.

# **OPTION – [Passive Monitor]**

In Monitor mode, the Tester passively monitors the connected BRI access and sends the recorded D-channel signals via the serial interface to the connected PC on which WinAnalyse must be running. Neither the S-Bus nor Layer 1 is influenced.

After selecting the **Monitor** function, the Tester will initially be in the trace mode (the Tester will not yet be monitoring): the second line shows the evaluation (OK, hi, lo or no) of the level



Tester counts the number of incoming signals and presents this number in the

second line of the display. The amount of time that has passed since the monitor was started is displayed in third line.

The Trace LED is on. The captured D-channel signals will be

sent via the serial interface to the connected PC, which must be running WinAnalyse.

ABORT QUIET

#### Parallel call display in Monitor operating mode

When Monitor mode is active, the Tester will search all of the D-channels signals sent for a SETUP. As soon as a SETUP is found, the CALL Soft-key will appear in the display.



# **OPTION – [Network (NT) Simulation]**

In this mode the Tester simulates an exchange and is able to originate and terminate calls to and from ISDN terminals. Use the special cable supplied with this option to connect the Tester to the ISDN terminal and select NE P-MP in the Access mode menu or select NE P-P when connecting an ISDN switch (PBX).

## **Terminating calls**

Terminating call in NT mode requires no action other that to select the required (NE P-P or NE PMP) **Access** mode. The incoming call display screen shows the Service B channel and call numbers.



#### **Originating calls**

Originating calls in NT mode follows the same process as for operating the Tester in TE mode except that there are consequential restrictions on the range of tests that can be performed.

Selection of a Single test (ISDN Call) is followed by selecting the Dialling method, Service and outgoing B channel to place the outgoing call



With the addition of **Monitor** options and WinAnalyse, the D Channel protocol can be decoded and viewed to further assist the fault analysis of defective ISDN circuits.

# **OPTION – [WinAnalyse]**

This option is required to decode the D Channel protocol and is used in conjunction with the passive **Monitor** option. It is stand alone software product operating on a "Windows" PC Any NG Harrier Tester with the Monitor option can use the software.

Detailed operating instructions are supplied with the software.

# Appendix

# A. NG Harrier Configuration Defaults

PARAMETER	Default value	Restore default with RESET	Saved in EE-PROM
Trace/remote	Auto PC sync.	Yes	Yes
ISDN-Protocol	DSS1	Yes	Yes
ISDN-Alerting mode	Automatic.	Yes	Yes
ISDN-Clock mode	TE: slave	No	No
ISDN-BRI termination	NT: master NT: in TE: out	No	No
ISDN-Call parameter	all unknown	Yes	Yes
ISDN-Services			
ISDN-Call acceptance	all MSN	Yes	Yes
ISDN-Voice coding	A-Law	Yes	Yes
BERT-Time	1 min	Yes	Yes
BERT-Error level	10E-05	Yes	Yes
BERT-HRX value	15%	Yes	Yes
BERT-Bit pattern	(2^15)-1	Yes	Yes
BERT-Bit pattern user defined	000000000000000000000000000000000000000	Yes	Yes
POTS-Dial mode	DTMF	Yes	Yes
POTS - DTMF parameter Level	-3 dB	Yes	Yes
POTS - DTMF parameter Time	80msec	Yes	Yes
POTS - DTMF parameter Interval	80msec	Yes	Yes
POTS - Flash time	80msec	Yes	Yes
DEVICE- Menu language	English	Yes	Yes
DEVICE-LCD Contrast	Medium	Yes	Yes
DEVICE - Printer	Epson LQ	Yes	Yes
DEVICE - Printer Esc sequence	empty	Yes	Yes
DEVICE- Baud rate	57600	Yes	Yes
DEVICE- Headset	Internal	Yes	Yes
DEVICE Alarm bell	Off	Yes	Yes
DEVICE - Power supply	no line power	Yes	Yes
DEVICE- Battery type	Accu	Yes	Yes
DEVICE- Software option	no option	No	Yes
Numbers			
Own number	empty	Yes	Yes
dest. number 1	17070	Yes	Yes
dest. number 2	0800675230	Yes	Yes
Dest. Number 3 to 8	empty	Yes	Yes
Automatic test 110	empty empty	res Yes	Yes Yes

# B. Acronyms

3PTY Al	Three party service. Three party conference Action Indicator
AOC-D	Advice of Charge Charging information during the call and at the end of the
AOC-E	call Advice of Charge Charging information at the end of the call
AWS	Call Forwarding
BC	Bearer Capability
BER	Basic Encoding Rules / Bit Error Rate
BERI	Bit Error Rate Test
	CALL PROCeeding message
	Completion of Calls to Busy Subscriber
CONK	answer
CD	Call Deflection
CDPN	CalleD Party Number
CF	Call Forwarding
CFB	Call Forwarding Busy Forward calls when busy
CFNR	Call Forwarding No Reply Forward calls when no answer
CFU	Call Forwarding Unconditional Forward all calls
CGPN	CallinG Party Number
CLIP	Calling Line Identification Presentation Display caller's number
CLIR	Calling Line identification Restriction Suppress display of the caller's
COLP	Connected Line Identification Presentation Display the number of the party
	called
COLR	Connected Line Identification Restriction Suppress the display of the
	number of the party with whom one is connected
CONN	CONNect Message
CONN ACK	CONNect ACKnowledge Message
CR	Call Reference
	Call Transfer
CW	Call Waiting
	Direct Dialling In Direct dialling in to an extension on a PBX
DISC	DISConnect Message
DM	Supplementary services
DTMF	Dual Tone Multi Frequency
ECT	Explicit Call Transfer Call transfer or directed call forwarding
E-DSS1	European Digital Subscriber Signalling System Number 1
GBG	Closed user group (CUG)
	Aligh Layer Compatibility
ISDN	Integrated Services Digital Network
INFO	INFOrmation Message
LAPD	Link Access Procedure for D-channels
LCN	Logical channel number Channel number in X.25
LLC	Low Layer Compatibility
MCID	Malicious Call Identification
MSN	Multiple Subscriber Number
NSF NT	Network Specific Facilities
	Protocol Discriminator
REL	RELease Message
REL ACK	RELease ACKnowledge Message
REL COMPL	RELease COMPLete Message
SCI	Sending Complete Indication
SUB	Sub-addressing / Sub-addressing is possible

SUSP	SUSPend Message
TE	TErminal, Terminal Equipment
TEI	Terminal Endpoint Identifier
TP	Terminal Portability - Moving the terminal on the bus
UUS	User-to-User Signalling Transfer of user data

## C. Cause – Messages – DSS1 Protocol

#### Dec. Cause 01 Unallocated (unassigned) number 02 No route to specified transit network 03 No route to destination 06 Channel unacceptable 07 Call awarded and being delivered in an established channel 16 Normal call clearing 17 User busy 18 No user responding 19 No answer from user (user alerted) 21 Call rejected 22 Number changed 26 Non-selected user clearing 27 Destination out of order 28 Invalid number format (address incomplete) 29 Facility rejected 30 Response to STATUS ENQUIRY 31 Normal, unspecified 34 No circuit / channel available 38 Network out of order 41 Temporary failure 42 Switching equipment congestion 43 Access information discarded 44 Requested circuit / channel not available 47 Resources unavailable, unspecified 49 Quality of service unavailable 50 Requested facility not subscribed 57 Bearer capability not authorized 58 Bearer capability not presently available 63 Service or option not available 65 Bearer capability not implemented 66 Channel type not implemented 69 Requested facility not implemented 70 Only restricted digital information

- 70 Only restricted digital information bearer capability is available
  79 Service or option not implemented,
- service of option not implemented, service unspecified or option not implemented class" (Dummy)
- 81 Invalid call reference value
- 82 Identified Channel does not exist83 A suspended call exists, but this call identity does not
- 84 Call identity use
- 85 No call suspended

#### Description

No access under this call number Transit network not reachable Wrong route or routing error B-channel for the sending system not acceptable Call awarded and connected in an already existing channel (e.g., X.25 SVC) Normal disconnect The number called is busy No terminal equipment answered (Timer NT303 / NT310 time-out) Call time too long Call rejected (active) Call number has been changed Incoming call not awarded to this terminal Destination / access out of order Wrong call number format or call number incomplete The facility is not offered Response to status enquiry Unspecified for "normal class" (Dummy) No circuit / B-channel available Network not operational Network is temporarily not operational Switching equipment is overloaded Access information could not be transferred

Access information could not be transferred Requested circuit / B-channel is not available

Unspecified for "resource unavailable class" (Dummy)

The requested quality of service is not available Requested service attribute is not subscribed The requested bearer capability is not enabled The requested bearer capability is not currently available

"Service unspecified or option not available class" (Dummy)

Bearer capability is not supported Channel type is not supported

Requested facility is not supported Only limited bearer capability is available

#### Unspecified

Invalid call reference value

Requested channel is invalid

The call identity entered is the wrong one for the parked call The call identity is already in use

No call has been parked

- 86 Call having the requested call identity has been cleared
- 88 Incompatible destination
- 91 Invalid transit network selection
- 95 Invalid message, unspecified
- 96 Mandatory information element is missing
- 97 Message type non-existent or not implemented
- 98 Message not compatible with call state or message type non-existent or not implemented
- 99 Information element non-existent or not implemented
- **100** Invalid information element contents
- **101** Message not compatible with call state
- 102 Recovery on timer expired
- 111 Protocol error, unspecified
- 127 Inter-working, unspecified

The parked call has been cleared

Incompatible destination Invalid format for the transit network identifier Unspecified for "Invalid message class" (Dummy)

Mandatory information element is missing

This type of message is in this phase not permitted, not defined or not supported The content of the message is in this phase not permitted, not defined or not supported

The content of the information element is in this phase not permitted, not defined or not supported Invalid content in information element

Message not valid in this phase

Error handling routine started due to time-out Unspecified for "protocol error class" (Dummy) Unspecified for "inter-working class" (Dummy)

	-	· · · · · · · · · · · · · · · · · · ·
Error	Cause	Description
Number		
0	Network	The network is not in a state defined for DSS1 or 1TR6. It may
		be that this state is normal for a PBX.
1 to 127	Network	DSS1 or 1TR6 causes
150	NG Harrier	An error occurred during the supplementary service test.
		Frequent cause: no response from network
152	NG Harrier	The CF-Test was started with the wrong own number.
153	NG Harrier	no HOLD is available, but HOLD is required to test the
		supplementary service (ECT,3pty)
154	NG Harrier	CLIR or COLR could not be tested, since CLIP or COLP is not
		available
161	NG Harrier	The party called did not answer within the prescribed time
		(approx.10 sec)
162	NG Harrier	A call was setup to a remote subscriber, instead of being
		setup – as was expected – to your own number.
163	NG Harrier	The Auto-Test could not setup a connection and therefore the
		AOC/D supplementary service could not be tested.
199	NG Harrier	A call number was entered.
201	NG Harrier	Network did not confirm acceptance of the call (CONN sent, no
		CONN_ACK received from network)
204	NG Harrier	Layer 2 connection was cleared-down- No response to SETUP
		(call setup)- Layer 2 connection could not be setup
205	NG Harrier	Re establish the Layer 2Connection
210	NG Harrier	No response to the clear-down (REL sent, no
		REL_CMP/REL_ACK received from network)
220	NG Harrier	Remote end signalled that it is in State 0.
245	NG Harrier	Keypad sent via ESC, but no response was received from
		network
250	NG Harrier	FACility was sent, but no response was received from network

# E. NG Harrier Error Messages

# F. X.31 Test – Error messages

0 to 255	Network	See ISO 8208: 1987(E)Table 5- Coding of the clearing cause field in clear indication packets, page 35
257	NG Harrier	no response from network (for a CALL-REQUEST or CLEARREQUEST)
258	NG Harrier	Unexpected or wrong answer from network (no CALL- CONNECTED or CLEAR INDICATION as response to a CALLREQUEST)
259	NG Harrier	The network has indicated in a DIAGNOSTIC message that the logical channel is invalid. Cause: No (=1) or a wrong LCN was set.
512	NG Harrier	It was not possible to determine an internal or external cause. Cause: Layer 2 could not be setup or remote end does not support X.31
65535	NG Harrier	X.31 Layer 3 test was not performed. The error can only occur in a test log.

# X.31 Diagnostic (only for a cause less than 256)

0 to 255	Network	See ISO 8208: 1987(E)Figure 14A page 121Figure 14B page 123ff
		And/or CCITT Recommendation X.25, Annex E

End