ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Keysight / Agilent N1725A auroraDuet* at our website: *Click HERE*

auroraDuet

Basic & Primary Rate ISDN Tester



User Guide

Agilent Technologies
Innovating the HP Way

428856

Issue 2 - 05/00

Copyright Notice

The information contained in this document is the property of Trend Communications Ltd. and is supplied without liability for errors and omissions.

No part of this document may be reproduced or used except as authorized by contract or other written permission from Trend Communications Ltd. The copyright and all restrictions on reproduction and use apply to all media in which this information may be placed.

Trend Communications Ltd. pursue a policy of continual product improvement and reserve the right to alter without notice the specification, design, price or conditions of supply of any product or service.

The Trend aurora name is a registered trademark of Trend Communications Limited.

© Trend Communications Ltd. 2000

All rights reserved

Publication ref: 428856

Issue 2 - 05/00

Contents

Introduction 1-1

About this Guide 1-1

Structure 1-1

Conventions 1-2

Use of aurora^{Duet} 1-4

Care 1-5

Basic and Primary Rate Interface testers 1-5

Introduction to ISDN 1-6

Transmission services 1-6

Interface types 1-7

Equipment 1-8

Terminal Equipment 1-8

Network Terminators 1-8

Equipment interface reference points 1-9

aurora^{Duet} emulation modes 1-10

Power Sources 2-1

General information 2-1

Main battery pack 2-1

Real Time Clock battery 2-2

Automatic power-off 2-3

Replacing the main battery pack 2-3

Recharging the main battery pack 2-4

Discharging the battery pack 2-5

A Look at aurora^{Duet} 3-1

Power supply 3-2

Audiovisual interfaces 3-2

Controls 3-3

LED indicators 3-5

Communications ports and connectors 3-8
Connecting aurora[Duet] at the S/T interface 3-10
Connecting aurora[Duet] at the U interface 3-10
Telecommunications safety 3-10
Switching power on 3-11
Self test 3-11
Getting Started 4-1
The aurora[Duet] menu system 4-1
Moving around the menus 4-2
The MAIN menu display 4-2
Details of the MAIN menu display 4-3
The MAIN menu options 4-6
ISDN CALL SETUP 4-6
AUTO TEST 4-6
CAPTURE REVIEW 4-7
RESULTS 4-7
S BUS TEST(BRI) 4-7
U INTERFACE(BRI) 4-7
MONITOR 4-7
T1 TEST (PRI) 4-7
SETUP 4-7
UNATTENDED 4-8
LINE BERT (BRI) 4-8
How to get on-screen Help 4-8
Help STATUS screen 4-8
Function keys 4-9
The main function keys 4-10
F1—Help 4-10
F2—B Channel Selection (BRI) 4-10
F2—B Channel Selection (PRI) 4-11
F3—ISDN Call Information 4-12
F4—Hot Keys 4-14
F5—SPID Selection (BRI) 4-14
F5—T1 Status (PRI) 4-14
F6—Exit 4-14
Hot Keys (SIMULATE) 4-14
Switching between Basic and Primary Rate 4-15
Using the menu 4-15
Using the Hot Keys 4-16

Cross connections 4-17
Establishing a cross connection 4-17
Removing a cross connection 4-18
auroraDuet date and time setup 4-18
Checking the date and time setup 4-18
auroraDuet speech call function 4-19
Loading and upgrading auroraDuet software 4-20
Connecting auroraDuet to the PC 4-21
Software download 4-21
During the download procedure: 4-22
After the download procedure: 4-22
Setting Up auroraDuet 5-1
Chapter Summary 5-1
Using Hot Keys (SIMULATE) 5-3
Choosing a configuration 5-4
Switching between BRI and PRI mode 5-4
Settings assigned to the Hot Keys (BRI) 5-5
Settings assigned to the Hot Keys (PRI) 5-5
U INTERFACE screen (BRI) 5-6
Setting up manual U interface activation 5-6
EOC MODE screen (BRI) 5-7
Setting up Embedded Operations Channel functions 5-8
To specify the addressing type: 5-8
To select a command to transmit: 5-8
Function keys 5-9
U INTERFACE INFORMATION screen (BRI) 5-9
Information displayed 5-10
MAIN SETUP menu 5-10
Options in the MAIN SETUP menu 5-11
COMMS SETUP screen 5-12
Defining the communication settings 5-12
REAL TIME FILTER SETUP screen (MONITOR) 5-14
Setting up filters for data capture 5-14
TRACER SETUP screen 5-15
Choosing the type of Monitor trace output 5-16
Types of output available 5-16

T1 SETUP screen (PRI) (SIMULATE) 5-18
Setting up the T1 interface 5-18
T1 SETUP screen (PRI) (MONITOR) 5-19
Setting up the T1 interface 5-19
BERT SETUP screens (SIMULATE) 5-20
Setting up BERT 5-20
User defined BERT settings 5-22
Function keys 5-22
GENERAL SETUP menu 5-23
Moving on to further screens 5-24
Defining the general settings 5-24
RINGER VOLUME Screen (SIMULATE) 5-26
Adjusting the ringer volume 5-26
REAL TIME CLOCK screen 5-26
Changing the date and time 5-27
START TIME screen (MONITOR) 5-27
Setting the D Channel Monitor automatic start 5-28
aurora[Duet] default settings 5-29

Making Calls and Testing 6-1

Chapter summary 6-1
Notes on voice calls 6-1
Notes on data calls 6-2
Functions of the T1 interfaces (PRI) 6-3
Making a call 6-3
Voice calls 6-3
Data calls 6-4
Answering a voice call 6-5
Clearing a call 6-6
UNATTENDED mode 6-6
LINE BERT menu (BRI) 6-8
Choosing a channel 6-8
Choosing the test type 6-9
CONNECT LOOP screen 6-9
Running the Loop test 6-9
To stop the loop test 6-10
CONNECT BERT screen 6-10

Running the BER test 6-10
To stop the BER test 6-10
To store the test results 6-10
To restart the BER test 6-10
To print the results on-line 6-11
Function keys 6-11
T1 TEST Menu (PRI) 6-11
Options for the T1 test 6-12
Function keys 6-12
Setting up a T1 Test 6-13
Function keys 6-15
T1 TEST INFORMATION screens 6-15
BIT ERROR STATUS screen 6-15
ERROR COUNTS screen 6-16
T1 ERROR RATIO screen 6-17
Injecting errors into the test stream 6-17
To stop the test 6-17
To store the test results 6-18
To print the test results 6-18
Function keys in the T1 TEST INFORMATION screens 6-18
T1 STATUS screens (PRI) 6-19
LAYER 1 STATUS screen 6-19
Information displayed 6-20
PORT 1/PORT 2 LINE STATUS 6-20
Information displayed 6-21
PORT 1/PORT 2 PRM STATUS (SIMULATE) 6-21
Information displayed 6-22
Function keys in the T1 STATUS screens 6-22
RESULTS screen (BER test results)(SIMULATE) 6-22
Information displayed 6-23
Function keys 6-23
Monitor, Capture & Review Functions 7-1
Chapter summary 7-1
Functions of the T1 interfaces (PRI) 7-2
MONITOR menu 7-2
Understanding the Monitor display 7-3
Options in the MONITOR menu 7-4
Function keys 7-5

U INTERFACE INFORMATION screen 7-5
Information displayed 7-6
Function keys 7-6
D Channel monitoring 7-7
MONITOR SESSION screen 7-7
To assign a name to the session 7-8
To exit without starting a session 7-8
To start the monitor session 7-8
DATA MONITOR screen 7-9
Information on the DATA MONITOR screen 7-9
Settings for data monitoring 7-10
Function keys 7-11
VOICE MONITOR screen (BRI) 7-11
Connecting and disconnecting the headset 7-12
Adjusting the sound volume 7-12
Function keys 7-12
VOICE MONITOR screen (PRI) 7-13
Choosing a B channel for monitoring 7-13
Connecting and disconnecting the headset 7-13
Adjusting the sound volume 7-13
Reviewing stored D channel monitor sessions .. 7-14
SELECT SESSION screen 7-14
To select a session for review 7-15
To exit without selecting a session 7-15
Function keys 7-15
MONITOR REVIEW menu 7-16
Options in the MONITOR REVIEW menu 7-16
To choose how to review the session 7-17
Function keys 7-17
DISPLAY DECODE DATA screen 7-17
Information displayed about the session 7-18
Navigating through the data 7-19
Using markers 7-19
Function keys 7-20
Understanding Decode information 7-22
TRACE CAPTURE REVIEW menu (SIMULATE) 7-24
Options for reviewing the monitor sessions 7-25
Function keys 7-26
Clearing the memory 7-26

Protocol-Specific Setup Functions 8-1
Chapter summary 8-1
ISDN SETUP menu (SIMULATE) 8-2
Settings on the ISDN SETUP menu 8-2
Accessing more screens of settings 8-3
EMULATION screen 8-4
Setting up the emulation mode 8-4
LAYER 2 screen 8-7
Setting up Layer 2 (BRI) 8-8
Entering fixed B channel TEI values 8-9
SCREENING screen 8-10
Choosing the type of screening 8-10
NFAS SETUP screen (PRI) 8-12
NFS SETUP screen (PRI) 8-14
ISDN SETUP menu (MONITOR) 8-16
Settings in the ISDN SETUP menu 8-16
Dial Setup for aurora^{Duet} 9-1
Chapter summary 9-1
DIAL SETUP menu (SIMULATE) 9-2
Settings in the DIAL SETUP menu 9-2
Accessing further screens of dial settings 9-4
CPN DIRECTORY screen 9-5
Storing the CPNs 9-6
CALLING LINE ID screen 9-6
Setting up the Calling Line ID 9-6
SPID ENTRY screen (BRI) 9-7
Entering the SPID 9-8
Storing commonly used SPIDs 9-8
Sending the SPID to the network 9-8
Function keys 9-8
SPID DIRECTORY screen (BRI) 9-9
Adding or changing a stored SPID 9-9
Storing SPIDs from the SPID ENTRY screen 9-10
Pasting SPIDs into the SPID ENTRY screen 9-10
Function keys 9-10

Calls and Testing for the Protocols 10-1

Introduction 10-1
CALL SETUP screen 10-2
Choosing a channel for the call 10-3
Choosing a SPID for the call (BRI) 10-3
Choosing a bearer capability/service 10-3
Function keys 10-3
Setting up an outgoing call 10-4
BERT CHANNELS screen (multi-channel BERT) 10-5
How the channels are displayed 10-6
To set up the channels for BER testing: 10-6
Function keys 10-6
DIAL screen 10-7
Overlap dialing (BRI) 10-8
En Bloc dialing 10-8
When you have dialed the number 10-9
When the call is connected 10-9
Information displayed 10-9
Function keys 10-9
CONNECTED screen 10-10
Information displayed 10-10
Options on the CONNECTED screen 10-11
Function keys 10-12
BERT CONNECTED screen 10-12
Options on the BERT CONNECTED screen 10-13
Function keys 10-13
Information displayed 10-14
Incoming calls 10-15
Data calls 10-15
Information displayed 10-15
To connect a BER test 10-15
To clear the call 10-16
Voice calls 10-16
Information displayed 10-16
To answer the call 10-16
To clear the call 10-16
AUTO TEST menu (SIMULATE) 10-17
Starting a test 10-17

SERVICE TEST screen 10-18
To set up the service test 10-18
To start the test 10-19
Service results display 10-19
Notes on the service test 10-20
OUTGOING CHANNEL TEST screen 10-21
To set up the Outgoing Channel test 10-21
Starting the test 10-22
Function keys 10-23
FULL CHANNEL TEST screen 10-24
Setting up the Full Channel test 10-24
Starting the test 10-25
Function keys 10-25

Menutree Diagrams A1-1

Call Clear Cause Codes A2-1

AT&T Call Clear Cause Codes A2-1
National ISDN Call Clear Cause Codes A2-3
NorTel Call Clear Cause Codes A2-5

Technical Data A3-1

aurora^{Duet} specification A3-1
Measurements A3-1
Display A3-2
Keypad A3-2
Environmental A3-2
User safety A3-3
Memory buffer capacity A3-4
Connector configurations A3-4

Glossary

Index

Introduction 1

aurora^{Duet} lets you verify the integrity of public switched and private wire ISDN connections. It is designed for use by engineers and can operate either from an external power source or as a standalone unit with battery power.

About this Guide

This Guide is provided to help you use your aurora^{Duet}. It tells you how to make connections and use the keypad and controls both for simulation and monitoring.

If you are a new user, please take the time *now* to become sufficiently familiar with the contents of the Guide, so that you can find information when you need it.

When you are not using the Guide, keep it in the carrying case with aurora^{Duet}.

Note:
Since a number of different software options and upgrades can be loaded onto aurora^{Duet}, you may find small differences between your unit and this User Guide.

Structure

The Guide has the following structure:

Chapter 1—introduces aurora^{Duet} and the ISDN.

Chapter 2—describes the power sources and how to recharge the battery pack.

Chapter 3—describes the controls, connectors and audiovisual interfaces.

Chapter 4—gets you started by introducing the basic operation of aurora[Duet] and provides a summary of the menu structure.

Chapter 5—explains how to set up your aurora[Duet].

Chapter 6—describes how to make voice and data calls.

Chapter 7—covers the monitor, capture and review functions.

Chapter 8—describes setup functions that are specific to particular protocols.

Chapter 9—describes the dial setup functions for aurora[Duet]. These are all protocol-specific.

Chapter 10—describes protocol-specific call and testing functions.

Appendix A1—contains the menu trees for aurora[Duet].

Appendix A2—lists the call clear cause codes for each protocol.

Appendix A3—provides technical data relevant to your aurora[Duet].

Glossary—explains ISDN terms in the User Guide.

Conventions

Differences between Basic Rate—BRI and Primary Rate—PRI (if fitted) operation are indicated throughout the Guide by the following symbols:





Text that applies to both modes is not labeled.

Where there are differences between SIMULATE and MONITOR modes, this is indicated by the following symbols:





The aurora[Duet] hand held ISDN basic and primary rate tester currently meets the requirements for basic and primary rate implementation of the National ISDN, AT&T and Northern Telecom protocols. All screens and information in the Guide relate to the National ISDN protocol unless otherwise indicated.

Differences between the protocols are denoted, where appropriate, by the symbols:







Text that applies to all protocols is not labeled.

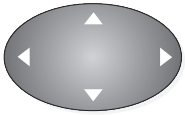
Text that does not apply to one particular protocol is indicated by a line through the protocol symbol. For example, if a feature is relevant to National ISDN and Northern Telecom but not to AT&T, this is shown as follows:



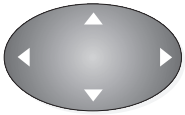
The following terms are used to describe particular ways of using the keypad in conjunction with menus or information displayed on the LCD.



"***Press***" means "Press the indicated key once only".



"***Toggle***" means "Press the ***LEFT*** or ***RIGHT*** direction arrow on the cursor pad as many times as necessary to cycle through the available options". Stop pressing when the option you want is displayed. To set the option displayed, press ***SELECT***, cursor ***DOWN***, or ***F6*—EXIT** as appropriate.



"***Move***" means "Use the cursor pad arrow key to move the display cursor".



"***Choose***" means "Move to an option on the menu, then press ***SELECT*** to choose it".

"***Exit***" means "Leave the current place in the menu system." The screen to which you are taken is determined by what you are doing.

Use of aurora[Duet]

You can use your aurora[Duet] as a hand-held unit in the same way as a telephone handset, or laid on its back. There is a hook on the back of the unit so that you can hang it up, and a shoulder strap for carrying purposes.

aurora^{Duet} is supplied complete in a carrying case also containing:

- a power adaptor/charger
- required cables
- optional equipment as ordered
- this User Guide

We recommend that you keep aurora^{Duet} in its carrying case when not in use.

Care

aurora^{Duet} has been designed and constructed to withstand the rigors of a typical telecommunications working environment. It can be used in wet conditions but is not waterproof and will not withstand excessive amounts of water.



Caution

Do not use solvents, strong detergents or abrasive materials to clean your aurora^{Duet}. Use only cleaning agents approved for use on plastics.

Basic and Primary Rate Interface testers



The BRI aurora^{Duet} is designed to test the ISDN Basic Rate Interface (BRI) at the 'S' and 'U' reference points, by emulating either a Terminal Equipment (TE), a Network Termination point (NT) or a Line Termination (LT). aurora^{Duet} can also test 'Fixed Links', or ISDN circuits which do not need a protocol transaction to establish a clear channel. For more information, see *Equipment Interface Reference Points* in this chapter.

PRI

The PRI aurora[Duet] is designed to test the ISDN Primary Rate Interface (PRI) at the 'T' reference point by emulating either a TE or an NT. For more information, see *Equipment Interface Reference Points* in this chapter.

Making and clearing a Basic Rate or Primary Rate connection between the terminal and the network uses communication protocols. aurora[Duet] tests the correct operation of these protocols and reports success or failure of the call on its Liquid Crystal Display (LCD).

When you have made or answered an ISDN call, (either voice or data type) aurora[Duet] lets you test the integrity of the connection.

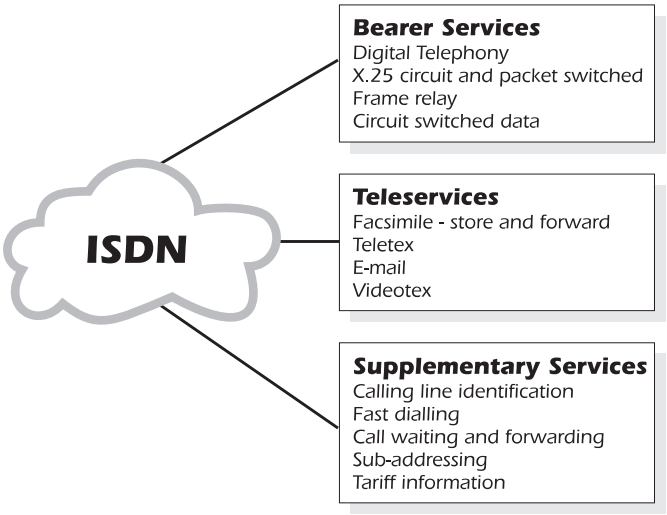
- For voice calls, this is done by means of a speech test with another party. A Bit Error Rate Test (BERT) can be done to test the quality of service.
- For data calls, a Bit Error Rate Test (BERT) can be carried out.

Introduction to ISDN

The Integrated Services Digital Network (ISDN) is an evolutionary circuit switched network based on digital telephony. It uses a common set of interface standards and allows all users to send and receive information over the network.

Transmission services

A number of transmission services may be offered. They are summarized in the following illustration.



ISDN offers end-to-end (caller to receiver) digital connectivity between terminal equipments (TEs) via network terminating equipments (NTs) and digital exchanges, both private and public.

Interface types

BRI

Your aurora^{Duet} is designed to test the Basic Rate Interface (BRI) which comprises three channels, collectively known as 2B+D. The two B channels are reserved for data at rates of up to 64kbps. The D channel is reserved for control and signaling data at 16kbps, and may also be used for X.25 packet-switched data.

PRI

Your aurora^{Duet} is designed to test the Primary Rate Interface (PRI), if fitted. This comprises 24 64kbps timeslots, which together form the 1.544Mbps signal. 23 of the timeslots are the B-channels, reserved for data at rates of up to 64kbps. Timeslot 24 is reserved for D channel signaling.

Equipment

There are two main types of ISDN equipment:

- Terminal equipment (TE)
- Network terminator (NT)

Terminal Equipment

This refers to end-user devices such as analog or digital telephones, X.25 data terminal equipment, ISDN workstations, or integrated voice/data terminals (IVDT). Terminal equipment can be classified by two types:

- TE1—this uses and supports ISDN protocols and services.
- TE2—this comprises non-ISDN compatible devices such as analog telephones, personal computers and printers. In these cases a terminal adaptor (TA) is used to allow a non-ISDN device access to the ISDN network.

Network Terminators

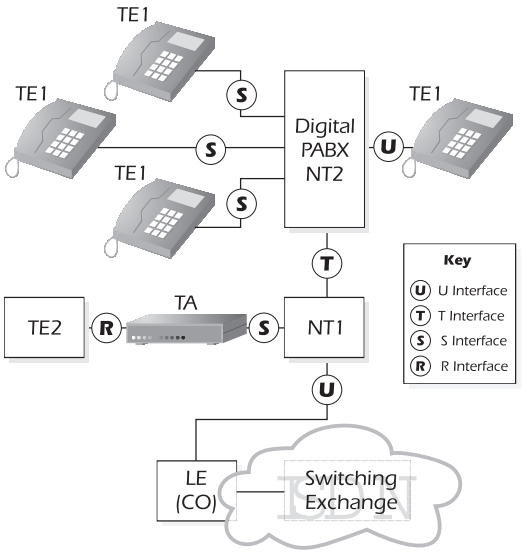
Network terminators (NTs) can be classified by two main types:

- NT1 equipment terminates the physical connection between a customer site and the Local Exchange (LE) or Central Office (CO). The NT1 equipment is actually on the customer site, at the 'U' interface point.
- NT2 equipment provides customer site switching, multiplexing and concentration. NT2 equipment may be Private Automatic Branch Exchanges (PABXs), Local Area Networks (LANs), mainframe computers, terminal controllers, and other digital voice/data switching equipment.

Equipment interface reference points

The various pieces of equipment connected to the BRI and PRI have their own interface classifications. The interfaces between a Terminal Equipment (TE) and a Local Exchange (LE), or Central Office (CO) are conceptually known as the 'R', 'S', 'T' and 'U' interface reference points.

The conceptual interface reference points are shown in the following illustration.



- The BRI aurora^{Duet} is used to test the 'S' and 'U' interface reference points.
- The PRI aurora^{Duet} is used to test the 'S' and 'T' interface reference points, provided the physical interface is compatible.

aurora[Duet] emulation modes

aurora[Duet] can test ISDN equipment and lines, and the route through the ISDN network via one or more exchanges. aurora[Duet] can either operate at Layer 1 as supplier of the clock or as receiver of the clock. It can also be set to be either the 'master' (network side) of the protocol at Layers 2 and 3, or the 'slave' (user side) of the protocol. You can also test fixed links—i.e. links without protocol support.

The options normally used are:

- Clock supplied / master protocol = "NT master" (abbreviated to NT within aurora[Duet])
- Clock received / slave protocol = "TE slave" (abbreviated to TE within aurora[Duet]).

When testing fixed links, i.e. without protocol, the opposite settings—i.e. "NT slave" and "TE master" may be used.

It is also possible to set aurora[Duet] to "NT fixed" or "TE fixed", for testing fixed links. In PRI mode you can do this using a Hot Key—see Chapter 5. In BRI mode it is done using the **L2 PROTOCOL** option in the **EMULATION** screen. See Chapter 8 for details.

In order to test terminal equipment, aurora[Duet] must be set to NT mode. In order to communicate with an exchange it is normally set to TE mode.

BRI

aurora[Duet] can also be configured for:

- Point-to-Point (PP) operation. This is operation between one NT and one TE on a single line sharing a common protocol.

- Point-to-Multipoint (PMP) operation. This is operation between one NT and up to eight TEs connected to an S-bus sharing a common protocol.

PRI

The PRI aurora^{Duet} always operates in Point-to-Point (PP) mode.

Power Sources 2



SAFETY WARNINGS

aurora^{Duet} contains a Lithium battery which maintains the real time clock and system settings. There is a danger of explosion if this battery is incorrectly replaced. It must only be replaced by a battery of the same or equivalent type recommended by Agilent Technologies. Should a defective battery be suspected, the whole aurora^{Duet} must be returned to an authorized Agilent Technologies service center.

The voltage applied to the RS232/parallel port, the DC power input connector, the headset connector and the S Bus Test connector must not exceed 20V D.C.

aurora^{Duet} is intended for use with the adaptor/charger shipped with the product. Using any other adaptor/ charger may invalidate approvals relating to safety or electromagnetic compatibility.

General information

aurora^{Duet} is powered by a removable, rechargeable Nickel-Cadmium battery pack with a capacity of 2300mAh. There is also a Lithium battery which maintains the real-time clock.

Note:
Ensure both batteries are fully charged before using **aurora^{Duet}** for the first time.

Main battery pack

The battery life under normal working conditions is up to 3 hours but depends on battery age, ambient temperature and the interface being used. Primary Rate emulation is the highest consumer.

When you are running aurora[Duet] from battery power, an indication of the charge condition of the battery pack is displayed in the **MAIN** menu as a column of up to 5 blocks.

When the battery pack is within 5 minutes of becoming dead, the LED labeled ***BATT*** on the front of **aurora**[Duet] flashes ***RED***. You must now charge the battery pack. If battery power falls to a level which is insufficient to power the tester reliably, aurora[Duet] clears any active calls and automatically switches itself off. **SETUP** values, however, are retained in non-volatile memory.

Charging of the battery pack must always be done with the pack fitted in **aurora**[Duet]. The LED labeled ***BATT*** on the front of **aurora**[Duet] is lit ***GREEN*** when the battery pack is fast charging. The battery display will reappear when **aurora**[Duet] is running from the battery supply.

Real Time Clock battery

aurora[Duet] contains a Lithium battery which powers the Real Time Clock. This battery is only charged when the unit is switched on.

If you have not used your unit for some time, this battery may be flat and you may experience problems with the Real Time Clock "losing time". We recommend that you connect the adaptor/charger for the external power supply, switch the unit on, and allow the battery to fully charge to avoid this happening.

The battery must only be replaced by the same or equivalent type recommended by Agilent Technologies.

Automatic power-off

When operated from batteries, **aurora**[Duet] can be set to switch off power automatically when it is not used. To select an automatic power off option, select **AUTO POWER OFF** from the **GENERAL SETUP** menu and use the ***LEFT*** and ***RIGHT*** arrow cursor keys to toggle between the following:

- Power-off after 1 minute of inactivity **(1 MIN)**
- Power-off after 5 minutes of inactivity **(5 MINS)**
- Power-off after 20 minutes of inactivity **(20 MINS)**
- Continuous operation (no automatic power-off) **(OFF)**

Note:
You will find instructions on how to access and use the **GENERAL SETUP** menu in Chapter 5 of this manual.

Replacing the main battery pack

To remove the battery pack from **aurora**[Duet], press the battery pack release button, remove the cover, and gently pull the pack out of the main unit.

Note:
You will find a diagram of **aurora**[Duet], showing the location of the battery pack release button, in Chapter 3 of this Guide.



CAUTION
Do not use any solvents, abrasives or detergents on the battery contacts—damage will be caused.

Dirty contacts will cause intermittent malfunctions of aurora[Duet]. Before you refit a battery pack, check that the contacts are clean and, if necessary, brush any deposits clear using a cloth or tissue. Keep spare battery packs in the carrying case when not in use. The battery packs are factory-sealed and must not be opened.

To refit the battery pack, gently slide it into the unit, contacts first. The correct end of the battery to insert first is rounded on one edge and flat on the other edge. The flat edge should line up with the flat side of aurora[Duet]. Firmly secure the cover, ensuring the battery pack release is firmly engaged.

Do not short circuit battery contacts.

Recharging the main battery pack

1. Check that the battery pack is completely discharged. All Nickel-Cadmium cells exhibit a 'memory'. This means that if a partially discharged battery is recharged, some of the capacity of the battery is lost. We recommend that battery packs are discharged completely before recharging.

   It is also possible to operate **aurora**[Duet] from an external power source. Simply remove the battery pack as described in *Replacing the Battery Pack* above, and secure the cover. Store the unused battery pack in the carrying case.

2. Plug the adaptor/charger into the DC input socket. **aurora**[Duet] can be switched on and used while the battery pack is being recharged, if required.

   Note:
   You will find a diagram of the **aurora**[Duet] communications ports and connectors, showing the location of the external DC supply, in Chapter 3.

3. Continue to charge until the battery pack is fully charged (all 5 blocks showing on the **MAIN** menu of **aurora**[Duet] when the adaptor is disconnected from the unit). The battery pack is fully recharged in 2 hours using the adaptor/charger supplied. When fully recharged it is safe to leave the charger connected for longer periods. However, avoid 'force charging' the **aurora**[Duet] by repeatedly removing and inserting the adaptor lead.

   A 3 amp fused cigar lighter adaptor is also available for charging batteries from the 12 Volt DC negative earth cigar lighter connection available in many vehicles.

4. When charging is complete switch off the external power source and disconnect the adaptor/charger.

Discharging the battery pack

A convenient way of doing this is to leave **aurora**[Duet] switched on in the **RINGER VOLUME** screen (see Chapter 5). In this screen, **aurora**[Duet] will only switch itself off automatically when the battery is discharged.

If aurora[Duet] is left in any other menu with no calls in progress, it will normally switch itself off after a set time to save the battery charge.

Note:

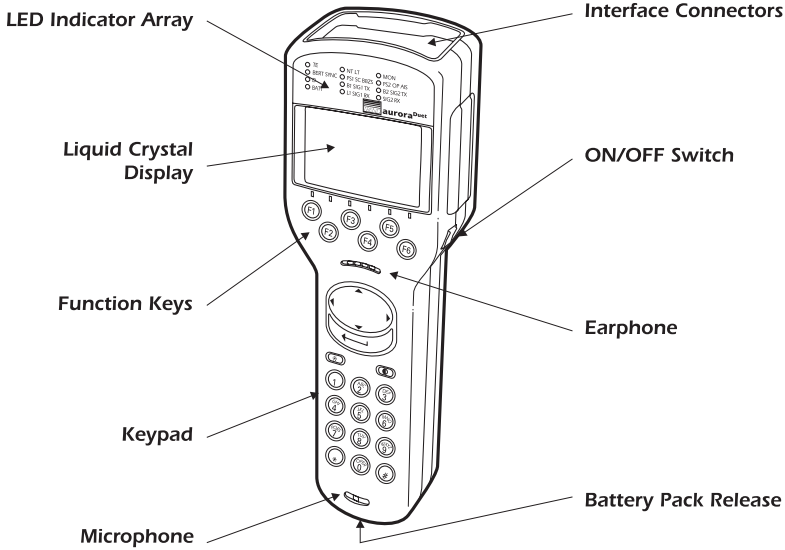
Please dispose of the battery pack in accordance with local environmental regulations and/or procedures.

A Look at aurora^{Duet} 3

This chapter introduces the following features of **aurora^{Duet}**:

- power supply
- audiovisual interfaces
- controls
- LED indicators
- communications ports and connectors

The most important features are identified in the illustration below.



Power supply

aurora[Duet] operates from a battery pack or from an external power source supplied through the DC connector from an adaptor/charger. Before using the unit you need to locate the following:

- ***ON/OFF Switch***—this is a rocker switch. To switch on your **aurora**[Duet], push this switch briefly in an upwards direction. To switch off, push it briefly in a downwards direction.
- ***Power Adaptor/Charger socket***—a standard DC input socket used for connection to the external power source through the adaptor/charger.
- ***Battery Pack Release***—releases the removable battery pack.

You will find detailed information on power sources and instructions on how to discharge and recharge the battery pack in Chapter 2 of this guide.

Audiovisual interfaces

aurora[Duet] has the following audiovisual interfaces:

- ***Earphone***—An earphone with a loudspeaker is provided as an integral part of the tester, allowing you to use it as a handset for voice communication and to listen to speech calls. You can adjust the volume using a function key.
- ***Microphone***—A microphone is provided as an integral part of the tester, to enable you to use it as a handset for voice communication. You speak into this when making voice calls.
- ***Headset***—You can connect an optional external headset through the connector marked with a handset symbol (see *Communication Ports and Connectors* later in this chapter). Amplification is provided within **aurora**[Duet].

A menu option lets you switch between the internal handset and the external headset while any voice call is in progress. In PRI Monitor mode, a function key is used to switch the headset.

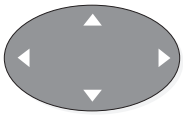
You can adjust the headset volume using the ***F3*** and ***F5*** keys in specific menus.

- ***Ringer—***This provides an audible ringing tone for incoming calls. You can adjust the volume of the ringer from the **GENERAL SETUP** menu.
- ***Liquid Crystal Display (LCD)—***This backlit screen, suitable for use in low light conditions, displays all menus, options, data and status messages. It is also used to display on-screen **HELP** information.

Controls



Function keys (F1—F6)—Press these keys to activate particular functions related to the operation you are currently performing.



Cursor pad UP, DOWN, LEFT and RIGHT—The cursor pad is marked with arrows in the four possible directions of cursor movement. To move the cursor a single step, press and release an arrow; for auto-repeat, hold the arrow down.

Use the ***UP*** and ***DOWN*** arrows to move the cursor between menu options. The option currently selected is displayed as white text on a black background. At the top of a menu, another press ***UP*** brings the cursor to the bottom; at the bottom of a menu, another press ***DOWN*** brings the cursor to the top. This does not apply to the **MAIN** menu in BRI mode, where a scroll bar is in use.

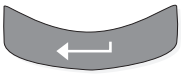
Use the arrows pointing ***LEFT*** and ***RIGHT*** either to switch between the available options for a setting or to move the cursor towards the beginning or end of a line where you can enter data. Use the arrow pointing ***LEFT*** to erase one character to the left of the cursor in text entry menus. You can also use the cursor keys to move around the Graphical User Interfaces (GUIs).



Contrast—Press and hold this key to allow the contrast of the LCD to sweep through its available range. The direction of change switches between increase and decrease each time you press the key. When the contrast is the way you want it, release the key.



Backlight ON/OFF—Press this key to illuminate the LCD backlight. To switch off, press the key again. The backlight switches off automatically after about 10 seconds without keypad activity when running from the battery. It remains on constantly when operating from the external power source.



SELECT—Press this key to choose a highlighted menu item or to start an operation, as indicated in this Guide.



Number Keys (0 to 9)—Use these keys to input telephone numbers and data.



*—This key is provided for compatibility with standard telephone handsets.



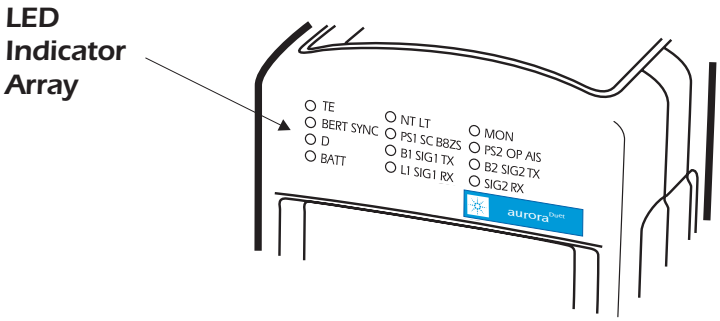
—This key is provided for compatibility with standard telephone handsets.





Press the # key when in the **MAIN** menu to display the **LAYER 1 STATUS** screen. This displays the status of T1 alarms, errors and ESF Performance Report Messages (PRM).

LED indicators



There are eleven Light Emitting Diode (LED) status indicators grouped on the front face of BRI **aurora**^{Duet} and twelve on the PRI **aurora**^{Duet}.

White text next to an LED relates to Basic Rate operation on the S interface, orange text relates to Basic Rate operation on the U interface and blue text relates to Primary Rate operation.

The LEDs have the following labels, colors and functions:

TE ***Green*** shows the unit is operating in TE mode on the S or U interface.

NT LT ***Green*** shows the unit is operating in NT mode on the S interface or LT mode on the U interface.

MON ***Green*** shows the unit is operating in monitor mode.

BERT SYNC ***Green*** shows a BER test is running and pattern synchronization has been achieved on the data call in progress.

BRI ***PS1 SC*** **Operating on the S interface:**

Green shows that Power Source 1, normal polarity, is detected on the line.
Green (flashing) shows that Power Source 1, reverse polarity, is detected on the line.

Operating on the U interface:

Green shows that Sealing Current, normal polarity, is detected on the line.
Green (flashing) shows that Sealing Current, reverse polarity, is detected on the line.

PRI ***B8ZS*** ***Green*** (single flash) shows that aurora[Duet] has detected a B8ZS code word on the line carrying the active D channel. This LED only shows green at the time when a code word is detected. At other times it remains off, even when aurora[Duet] is connected to a B8ZS line.

BRI ***PS2 OP*** **Operating on the S interface:**

Green shows that Power Source 2, normal polarity, is detected on the line.
Green (flashing) shows that Power Source 2, reverse polarity, is detected on the line.

Operating on the U interface:

Green shows that Optional Power, normal polarity, is detected on the line.
Green (flashing) shows that Optional Power, reverse polarity, is detected on the line.

PRI ***AIS*** ***Green*** shows that aurora[Duet] has detected an Alarm Indication Signal (AIS) on the line carrying the active D channel.

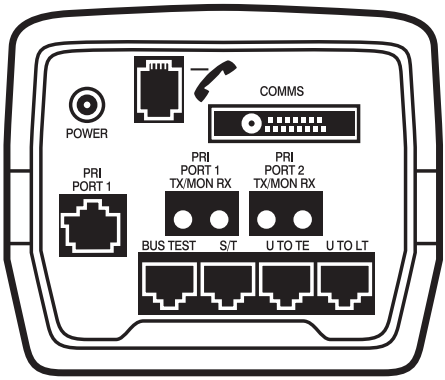
	D	***Green*** shows the presence of D channel signal with polarity logic 1 (mark) on line. ***Red*** shows the presence of D channel signal with polarity logic 0 (space) on line.
BRI	*B1*	***Green*** shows the presence of B1 channel signal with polarity logic 1 (mark) on line. ***Red*** shows the presence of B1 channel signal with polarity logic 0 (space) on line.
PRI	*SIG1TX*	***Green*** shows that a signal is being transmitted on line 1. ***Off*** means that the transmitter is currently off. You can switch off the transmitter from the **NFAS SETUP** screen—see Chapter 8.
BRI	*B2*	***Green*** shows the presence of B2 channel signal with polarity logic 1 (mark) on line. ***Red*** shows the presence of B2 channel signal with polarity logic 0 (space) on line.
PRI	*SIG2TX*	Shows the same information as ***SIG1 TX***, for line 2.
	BATT	***Green*** shows the battery is charging. ***Red*** (flashing) shows the battery is nearly discharged and will be unable to power the unit within a minimum of 5 minutes. You should immediately connect and switch on the adaptor/charger. For full details of the power sources for **aurora**^{Duet}, see Chapter 2.
BRI	*L1*	***Red*** shows the presence of the Layer 1 clock on the line. ***Green*** shows full Layer 1 activation.

PRI ***SIG1RX*** ***Green*** shows that a signal is being received on line 1 and valid framing is detected.
Red shows that a receive signal is present but no valid framing is detected (e.g. when aurora[Duet] is testing a line with different framing).

PRI ***SIG2RX*** Shows the same information as ***SIG1 RX***, for line 2.

Communications ports and connectors

aurora[Duet] has the following communications ports and connectors:



External DC Supply—Permits input from the adaptor/ charger supplied.

External Headset Connector—This RJ-11 socket is used to connect an external headset.

***Comms Port*—**This is a 15-pin connector that can be configured from the menu system to act as either a high speed parallel interface or an RS232 serial port. It is used for connection to a PC, terminal or printer for remote reporting and control. Separate cables are provided for connecting to serial or parallel devices.

PRI ***Primary Rate Tx/MON/Rx connector (PRI Port 1)*—**This RJ-45 connector, with a transmitter and receiver, is used for simulation/monitor functions on the T1 interface.

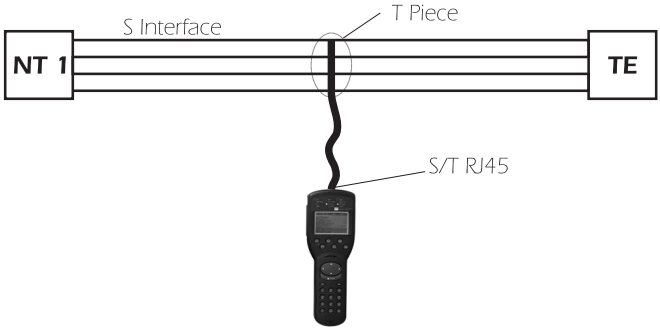
PRI ***Primary Rate Tx/MON/Rx connectors (x 2)*—**These Bantam connectors, each with a transmitter and receiver, are used for simulation/monitoring on the T1 interface. This means that, for example, you can monitor, capture and decode D and B channel traffic on two receive ports at the same time from a single T1 line, or use both T1 ports to test multiple T1 installations using NFAS.

BRI ***'S' Bus cable check connector*—**This RJ-45 socket is used for S Bus cable checking in 'S' tests.

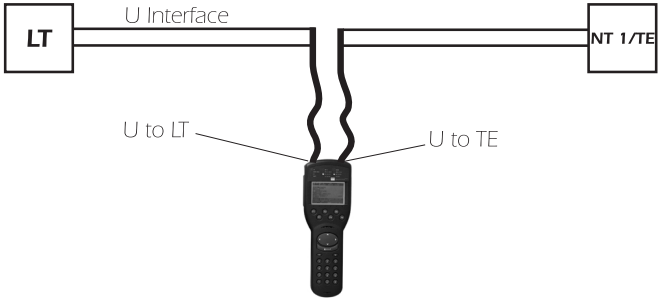
BRI ***'S/T' Interface connector*—**This RJ-45 socket is used for connection to the ISDN 'S' and 'T' reference points for simulation/monitor functions. An RJ-45 'T' piece may be used for monitoring on an S Bus. See the diagrams overleaf.

BRI ***'U' Interface connector*—**These RJ-45 sockets are used for connection to the ISDN 'U' reference point for simulation/monitor functions. Refer to the diagrams below.

Connecting aurora[Duet] at the S/T interface



Connecting aurora[Duet] at the U interface



When connected to the 'U' Interface in this way **aurora**[Duet] can be used to monitor and simulate on either LT or TE mode without having to alter the connections.

Telecommunications safety

The connectors on your **aurora**[Duet] conform to EN41003 safety status classification SELV (where **SELV** = Safety Extra Low Voltage).

Connections with other equipment should be made such that the equipment continues to comply with clause 2.3 of EN60950 for SELV circuits after a connection is made.

Switching power on

To switch on your **aurora**^{Duet}, push the **ON/OFF** switch briefly in an upwards direction.

Self test

When you switch the power on, **aurora**^{Duet} carries out a comprehensive self test of internal memory and I/O devices, displaying the results as they occur.

Do not attempt to adjust the screen contrast during the self test—the screen contrast key does not function until the logo screen is displayed. You can shorten the time taken by pressing ***F1*** to abort at the start of the Flash test. When the logo screen appears, press the ***SELECT*** key to skip further tests and display the **MAIN** menu.

Normally, the self test completes satisfactorily and **aurora**^{Duet} displays the **MAIN** menu. You will find a detailed description of the **MAIN** menu in the next chapter.

Getting Started 4

This chapter will help you become familiar with:

- the options on the **MAIN** menu
- how to get on-screen help from anywhere in the menu system
- the most important function keys
- the purpose of Hot Keys
- how to switch between Basic Rate (BRI) and Primary Rate (PRI)
- how to set up and remove cross connections
- how the date and time are set up—this section can also be used as a tutorial for new users
- speech call functions
- the procedure for loading and upgrading **aurora**^{Duet} software

The aurora^{Duet} menu system

You access the functions of your **aurora**^{Duet} through a menu system accessed by choosing options in the **MAIN** menu.

The menu system is mainly hierarchical—that is, it has a branching structure with different levels.

Each of the menu display pages for **aurora**^{Duet} can show up to 16 lines of information.

Note:
You will find a series of diagrams illustrating the complete aurora^{Duet} menu structure in Appendix 1.

Moving around the menus

Wherever you are in the menu system, you normally move to a *lower* level by choosing an option in the current screen. This means highlighting the option and pressing ***SELECT***.

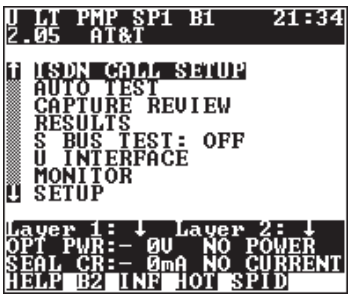
Your way of moving to a *higher* level in the menu system depends on what screen you are using. You may need to complete an action that returns you automatically to the previous screen or to some other screen. This could involve starting a process, entering data, choosing an option, or pressing a function key. In most circumstances, you can press ***F6*—EXIT**, which saves or aborts the current action and returns you to a useful starting point for other actions.

The MAIN menu display

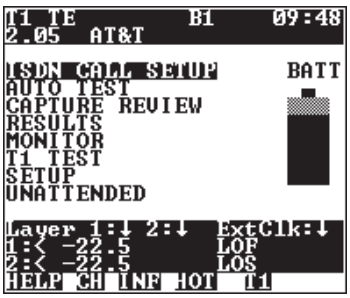
The **MAIN** menu is the menu from which you can access all the menu-driven functions of **aurora**[Duet]. It is displayed when you press the ***SELECT*** key from the logo screen (see *Switching Power On* in Chapter 3).

The **MAIN** menu in BRI mode has more than one page of display, as indicated by a scroll bar on the left hand side of the screen. Use the ***UP*** and ***DOWN*** arrow cursor keys to scroll through the available options.

BRI



PRI



Details of the MAIN menu display

The following is a line-by-line description of the information shown in the **MAIN** menu display.

Line 1 (Top)
shows the current emulation configuration. This information is also displayed on other selected menus and on the **STATUS** display page.

BRI Column 1 defines the interface type: 'S' or 'U'.

BRI Column 2 is blank.

BRI Columns 3, 4 and 5 define the emulation type:

TE	TE slave
NT	NT master
TEm	TE master
NTs	NT slave
LTs	LT slave
LT	LT master

BRI Columns 6, 7 and 8 define the type of interconnection:

PP	Point to Point
PMP	Point to Multipoint
-	Fixed link (i.e. a link without protocol)

BRI Columns 10, 11 and 12 show the SPID:

SP 1	SPID number 1
SP 2	SPID number 2

BRI Columns 15 and 16 show the currently selected B channel (B1, B2 or Bx).

BRI *Lines 14 and 15*
indicate the power source where the power is supplied or generated.

PWRSRC1 and **PWRSRC2**, or **OPT PWR** and **SEAL CR**, are displayed depending on the selected interface, as follows :

Interface	Display
S	PWR SRC 1 : +[,-] 0V and range information *
	PWR SRC 2 : +[,-] 0V and range information *
U	OPT PWR : +[,-] 0V and range information *
	SEALCR : +[,-] 0mA and range information *

* Range information may be **NO POWER**, **NO CURRENT**, **IN RANGE**, **OVER** or **UNDER**.

PWRSRC 1 Power Source 1. This is power supplied by the NT to the TE. Power is supplied on the two S Interface transmission pairs (Rx pins 4 & 5 and Tx pins 3 & 6).

PWRSRC 2 Power Source 2. This is power supplied by the NT to the TE. Power is supplied over pin 7 (negative voltage) and pin 8 (positive voltage).

OPT PW Optional Power. This is power supplied by the NT to the TE. Power is supplied over pin 7 (negative voltage) and pin 8 (positive voltage).

SEAL CR Sealing Current. This is current on the line. When present, Sealing Current is in the range of 1.0 to 50 mA.

PRI Columns 1 and 2 indicate T1.

PRI Column 3 is blank.

PRI Columns 5 and 6 define the emulation type:

TE	TE slave
NT	NT master
TEm	TE master
NTs	NT slave
LTs	LT slave
LT	LT master

PRI Columns 7 to 14 blank.

PRI Columns 15 and 16 show the B channel selected (B1 through B23, or B24 through B47 for NFAS).

Columns 17 to 19 blank.

Columns 20 to 24 show the real time clock setting.

Line 2
displays the software revision number and the currently selected protocol.

Lines 4 to 11
list the available option sub-menus which can be scrolled through using the ***UP*** and ***DOWN*** arrow cursor keys, then selected with the ***SELECT*** key. See the detailed descriptions of menus in later chapters of this User Guide.

Line 13
uses arrow symbols (up or down) to show the real-time status of Layers 1 and 2.

PRI ***Line 14*** displays Port 1 receive level and any alarms present.

PRI ***Line 15*** displays Port 2 receive level and any alarms present.

Line 16
shows the available function keys. These vary according to the screen currently displayed. See below for descriptions of the more common function keys.

When **aurora**^{Duet} is running from battery power, the right of the **MAIN** menu displays a simulated column gauge labeled **BATT**. This shows the charge condition of the battery pack in 5 steps.

The MAIN menu options

BRI

The **MAIN** menu has more than one page of options, as shown by a scroll bar on the left of the screen. Use the *UP* and *DOWN* arrow keys to scroll through the options.

BRI



PRI



The options are summarized below.

ISDN CALL SETUP

Accesses menus enabling you to set up calls as required for a particular protocol. For information on setting up calls, see Chapter 10.

AUTO TEST

Accesses a menu for initiating automatic test calls as required for a particular protocol. See Chapter 10 for further details.

CAPTURE REVIEW

Allows you to review or output captured trace data. See Chapter 7 for details.

RESULTS

Displays test results. For more information, see Chapter 6.

BRI

S BUS TEST

Allows you to switch between S Bus Test **ON** and **OFF**, by pressing the ***LEFT*** and ***RIGHT*** cursor keys.

If you choose **ON**, **aurora**[Duet] outputs a continuous repeating pattern of consecutive pulses to the S Bus cable check connector. This can be used to test an S Bus cable connected between the connector and the optional S Bus Tester. For more information, refer to the S Bus Cable Testing User Guide. The default setting is **OFF**: if you choose this, **aurora**[Duet] does not output any S Bus pulses.

BRI

U INTERFACE

When the U-interface is selected, you can choose this option to perform a manual activation of the U-interface. For more information, see Chapter 5.

MONITOR

Accesses monitor functions. These are described in Chapter 7.

PRI

T1 TEST

Accesses menus and screens that allow you to set up and perform testing of the physical layer (also known as Layer 1). For details, see Chapter 6.

SETUP

Accesses menus allowing you to set up both general parameters (see Chapter 5) and protocol-specific parameters (see Chapter 8).

UNATTENDED

Enables you to put **aurora**[Duet] into Unattended mode. See Chapter 6 for details.

BRI

LINE BERT

Enables you to select a loop or a BER test. For details, see Chapter 6.

How to get on-screen Help

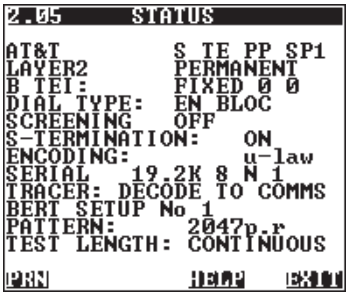
To get Help at any level in the **aurora**[Duet] menu structure:

- Go to the **aurora**[Duet] menu for which you need help.
- Press *F1*—**HELP** .

  The first screen displayed is always the **STATUS** screen, which displays information about the way **aurora**[Duet] is currently set up. See *Help STATUS Screen* below.
- Press *F4*—**HELP** from the **STATUS** screen to display Help text for the current menu.
- Press *F2*—**PREV** and *F4*—**NXT** as appropriate, to see all the available Help text.
- Press *F6*—**EXIT** to return to the **aurora**[Duet] menu for which you obtained **HELP**.

Help STATUS screen

This is the first screen displayed when you press *F1*—**HELP**.



Notes:

- Most menus have more than one screen of Help text. When in MONITOR mode, you will notice that there is a reduced amount of information displayed on the **STATUS** screen.
- The **STATUS** screen illustrated is the one displayed in BRI SIMULATE mode. The information shown for PRI and BRI modes is as follows:

BRI

- S-termination—either **ON** or **OFF**
- The type of voice encoding in use: either **A-LAW** or **µ-LAW**. In the US, µ-law encoding is normally used.
- The type of communications port selected, e.g. **SERIAL**; Baud Rate—e.g. **19k2**; Parity—e.g. **NONE** and Number of Stop Bits—e.g. **1**
- Tracer—the type of tracer output: e.g. **DECODE TO COMMS**
- BERT Setup Number—a digit between **1** and **4**
- BERT Pattern: e.g. **2047p.r.**
- BERT length: either **CONTINUOUS** or the test time

PRI

- PRI ID: for internal use only

Function keys

The function keys on **aurora**^{Duet} are used to activate particular operations, depending on the option currently selected.

Some function keys remain the same in all screens. For example, ***F1*** always accesses on-screen Help. However, some function keys change depending on the operation you are currently performing. For example, in the **MAIN** menu ***F2*** is used to select different B channels, but in the **BERT SETUP** menu it is used to display further screens.

The main function keys

A description of the most common function keys follows. Descriptions of the function keys for specific options are in the section related to each option.

F1—Help

The *F1*—**HELP** function key accesses the **HELP** information screens. For details, refer to *How to get on-screen Help* earlier in this chapter.

BRI

F2—B Channel Selection

In BRI mode, the *F2*—**B1/B2/BX** function key lets you switch between the channels that are available. In NT or LT mode you can toggle between channels B1 and B2. In TE mode you can toggle between channels B1, B2 and B*x*.

When you select B*x*, an outgoing call may be generated with a channel ID of **ANY**. When the first response to the call setup is received containing a valid B channel, the system automatically changes to the allocated B-channel and call processing continues as normal.

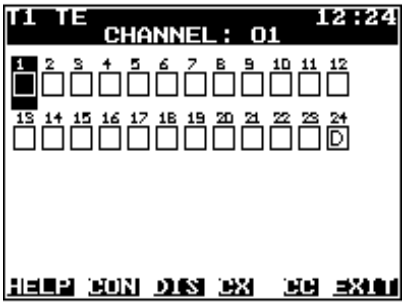
When an incoming call requests **ANY** B-channel, then **aurora**[Duet] allocates the channels from B1. If all channels are busy, **aurora**[Duet] releases the call with an appropriate call clear cause code.

Notes:

- **aurora**[Duet] must be set to **SLAVE** mode before making any outgoing B*x* (**ANY** B) channel calls.
- **aurora**[Duet] will not execute any **AUTO TEST**s if the B*x* channel is selected.
- You can select the B*x* channel even if the B1 and B2 channels are busy.

PRI **F2—B Channel Selection**

For PRI, the *F2*—**CH** function key displays a **B CHANNEL SELECTION** screen:



This screen lets you select a B channel using the arrow cursor pad keys. There are 24 boxes corresponding to 23 B channels and one D channel.

Note:
When NFAS is enabled, there are 48 boxes, corresponding to 47 B channels and one D channel.

The status of each channel is indicated by a symbol displayed within the box. The symbols have the following meanings:

- Channel has no active calls.
- Voice call in progress with the CODEC connected.
- A data call is in progress.
- A looped back data call is in progress.
- Speech call in progress with the CODEC not currently connected.

– Data call in progress but BER pattern generator not connected.

Incoming voice call requires answering.

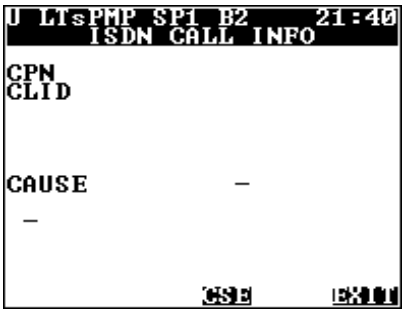
The channel represented by the box has a through connection to the channel whose number is displayed below the arrow.

The function keys on the **B CHANNEL SELECTION** screen are as follows:

F1	**HELP**	Displays the relevant help screen for the channel selected.
F2	**CON**	Establishes a cross connection. For more information, see *Cross Connections* later in this chapter.
F3	**DIS**	Disconnects a pair of cross connected B channels.
F4	**CX**	Removes all established cross connections.
F5	**CC**	Clears all established calls.
F6	**EXIT**	Returns to the previously displayed menu.

F3—ISDN Call Information

When in the **MAIN** menu or any **CALL CONNECTED** or **CALL CLEARING** screen you can press *F3*—**INF** to display the **ISDN CALL INFO** screen.



The following information is displayed:

- **CPN—**Called Party Number. This is the number dialed by the calling party.
- **CLID—**Calling Line Identity. This is the number that belongs to the calling party.
- **COL—**Calling Line Identity. This is the number of the line that is actually connected when the call is established. It may differ from the CPN, for example, when calls are forwarded.
- **Cause—**the last cause code generated is displayed. To view a full description of the cause, press the *F4*—**CSE** key.
- **Display IE contents**—the last received Display Element is shown on Lines 10 to 14. A maximum of 100 characters can be displayed.

If call activity other than charging information occurs while the **ISDN CALL INFO** screen is displayed, **aurora**[Duet] returns to the previous screen.

Press *F4*—**CSE** from this screen to display the most recent Call Clear Cause Code. To return to the **ISDN CALL INFO** screen press *F6*—**EXIT.**

F4—Hot Keys

When in the **MAIN** SIMULATE menu the *F4*—**HOT** function key takes you to the **HOT KEYS** menu, from which you can reconfigure **aurora**^{Duet} using a single keystroke. See below for an introduction to the Hot Keys, and Chapter 5 for a detailed description.

BRI

F5—SPID Selection

When in the **MAIN** menu, the *F5*—**SPID** function key accesses the **SPID STATUS** screen. You can use this screen to select a Service Profile Identifier (SPID) when making an outgoing call. For more information, see Chapter 9.

PRI

F5—T1 Status

When in the **MAIN** menu, the *F5*—**T1** function key accesses the **LAYER 1 STATUS** screens, which show the current status of the Layer 1 link for the T1 interface. For more information, see Chapter 6.

F6—Exit

The *F6*—**EXIT** function key usually returns you to the menu that was previously displayed. The information entered on the current screen is either saved or canceled depending on the option selected. For more information, see the description of the specific options.

Hot Keys SIMULATE

The **aurora**^{Duet} Hot Keys allow you to quickly change the operational configuration of **aurora**^{Duet} by pressing a single numeric key.

Note:

Hot Keys are available in SIMULATE mode only.

To use Hot Keys, follow these steps:

- Choose a protocol from the **EMULATION** menu (accessed via the **SETUP/ISDN SETUP** menus) .
- Press *F6*—**EXIT** until you return to the **MAIN** menu.
- From the **MAIN** menu, press the *F4*—**HOT** function key.
- **aurora**Duet displays a list of Hot Keys and the settings associated with them.
- Designate a configuration by pressing its number on the keypad or moving the cursor pad to highlight your selection and then pressing the *SELECT* key.
- **aurora**Duet aurora Duet reconfigures itself to the settings you have chosen - this may take a few moments, then displays the **MAIN** menu .

You will find a full description of the Hot Keys and how they work in Chapter 5.

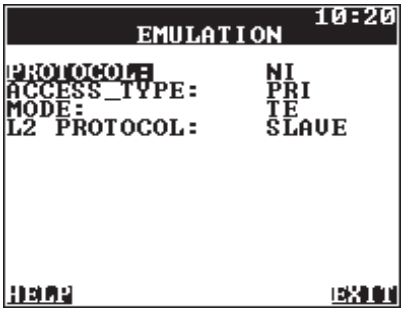
Switching between Basic and Primary Rate

If Primary Rate (PRI) mode is fitted on your **aurora**Duet, you can switch between the Basic Rate (BRI) and Primary Rate (PRI) modes of operation either by using menu selections or by using a Hot Key.

Using the menu

- First, choose the **ISDN SETUP** option from the main **SETUP** menu.
- Choose the **EMULATION** option. This displays the **EMULATION** menu.

The example screen below shows the **EMULATION** screen for PRI mode. For a full description of this screen, see Chapter 8.



- From this menu, choose the **ACCESS_TYPE** menu option and use the *LEFT* and *RIGHT* cursor keys to switch between **PRI** (Primary Rate) and **BRI** (Basic Rate).

Note:

You can only do this if the primary rate operating mode is fitted.

- To return to the **MAIN** menu, press *F6*—**EXIT** repeatedly. aurora[Duet] reconfigures itself to the settings you have chosen - this may take a few moments, then the **MAIN** menu appears.

Using the Hot Keys

- Display the **HOT KEYS** menu by pressing *F4*—**HOT** in the **MAIN** menu. For details of the Hot Keys, see Chapter 5.
- When the menu is displayed, move the cursor to highlight **BRI** or **PRI** on the screen and press *SELECT*.

  aurora[Duet] reconfigures itself to the settings you have chosen - this may take a few moments, then the **MAIN** menu appears.

Cross connections

While **aurora**^{Duet} is in NT mode, you can connect together any two B channels that have calls established on them. This allows equipment connected to the B channels to communicate.

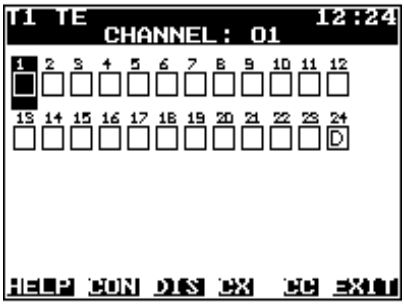
Note:

The B channels must have established calls ***before*** they can be cross connected.

Establishing a cross connection

- Press *F2*—**CH** to display the **B CHANNEL SELECTION** screen.

  On this screen, the currently selected B channel is highlighted. Its number is also displayed at the top of the screen in the format **CHANNEL:NN**.



- To select another B channel, move the cursor to highlight it. Alternatively, enter the channel number that you require. You must enter two digits—for example, for channel 3 you would enter 03.
- When the cursor highlights the required channel, press *F2*—**CON**. An arrow pointing down appears in the channel box.

- Highlight the second B channel and press ***F2***—**CON**. An arrow pointing down appears in the channel box. This completes the cross connection.

Each channel in the pair displays the number of the channel to which it is connected, directly below the box.

Note:
You cannot connect a channel that does not already have a call established, or which is already part of a connected pair.

Removing a cross connection

- Press ***F2***—**CH** to display the **B CHANNEL SELECTION** screen. Highlight either of the cross connected channels and press ***F3***—**DIS.**

The vertical arrow is replaced in both channel boxes by the symbol for an established call.

aurora^{Duet} date and time setup

If you are a new user, we advise you to use the **aurora**^{Duet} setup routines as a tutorial. This will help you become familiar with the keypad functions, the **MAIN** menu and some sub-menus. You will also get used to navigating through the menu structure.

You need not worry about changing settings or entering invented data. **aurora**^{Duet} lets you reset factory defaults and clear unwanted entries. Remember that context-sensitive help is available at any level by pressing ***F1***.

Checking the date and time setup

You can use this procedure to test the setup functions of your **aurora**^{Duet}.

- Switch power on by pushing the *ON/OFF* switch briefly in an upwards direction. **aurora**^{Duet} performs a self test which you can skip by pressing the ***F1*** key. The logo screen is then displayed. To skip further tests, press the *SELECT* key. The **MAIN** menu is displayed.

  If there is no response or **aurora**^{Duet} powers off automatically, there may be insufficient power. For detailed information about the power sources for **aurora**^{Duet}, see Chapter 2.
- In the **MAIN** menu, choose **SETUP** to display the **MAIN SETUP** menu.
- Choose **GENERAL SETUP** to display the **GENERAL SETUP** menu.
- Choose **REAL TIME CLOCK** to display the **REAL TIME CLOCK** screen.
- Verify the date and time displayed. You can change them if you wish.
- Press *F6*—**EXIT**. **aurora**^{Duet} saves the displayed date and time settings and returns to the **GENERAL SETUP** sub-menu.
- Press *F6*—**EXIT**. **aurora**^{Duet} returns to the **MAIN SETUP** menu.
- Press *F6*—**EXIT** again to return to the **MAIN** menu.

aurora^{Duet} speech call function

You can use this procedure to verify the speech call functions of your **aurora**^{Duet}.

- Connect the S Bus connector of **aurora**^{Duet} to the Network Termination of an ISDN circuit, using the cable supplied. There must be no other network cable connections to **aurora**^{Duet}.
- In the **MAIN** menu, choose **ISDN CALL SETUP**. **aurora**^{Duet} displays the **CALL SETUP** menu. The details of this screen will depend on the protocol in use.

- Choose **SPEECH CALL**, and key in the telephone number of a local recorded service. If you are using En Bloc Dialing, you can correct any mistakes by pressing the *LEFT* cursor key to delete one character to the left of the cursor.

  You can select a **CPN** (Called Party Number) previously stored in memory by choosing the **RECALL** option. A maximum of 10 **CPN**s can be stored. To choose one of the **CPN**s, use the *UP* and *DOWN* arrow cursor keys to move through the list and then press *SELECT*. **aurora**[Duet] returns to the **SPEECH CALL** menu.
- Choose the **DIAL** option.
- You should be able to hear the recorded service and the appropriate channel LEDs will be illuminated. You can also adjust the sound volume using the *F3* and *F5* function keys.
- Choose **CLEAR CALL**. **aurora**[Duet] displays the **CLEARED** screen indicating the clear cause code.
- Press *F6*—**EXIT** to return to the **MAIN** menu.

Loading and upgrading aurora[Duet] software

The software in aurora[Duet] can be upgraded by connecting the unit to a PC, selecting download mode on your aurora[Duet] and executing a download program on a PC running DOS (version 3.3 or later).



Important

It has been found that, under certain circumstances, errors may occur in the software download when it is performed using the Windows 95 operating system. If you wish to download onto a PC which runs Windows 95 you are advised to carry out the following steps:

1. ***Restart your computer with no applications running.***

2. ***Perform the download.***
3. ***Restart your computer in the normal way, i.e. so that any applications which run automatically at startup will do so.***

You can then continue working as normal.

Connecting aurora^{Duet} to the PC

Connect the aurora^{Duet} COMMS connector (RS232) to the PC COM port 1 or 2 using cable no. 422354.

Software download

In order to upgrade **aurora^{Duet}** software, the unit must be in download mode.

To put **aurora^{Duet}** into download mode:

- Switch on the unit and wait for the logo screen to be displayed.
- Now press the ***F1*** key. The screen changes to display the unique Electronic Serial Number (ESN) of the unit.
- Press the ***SELECT*** key to enter download mode. To return to the logo screen without upgrading the software, press ***F6***.

Note:

aurora^{Duet} automatically returns to the logo screen after 10 seconds unless the ***SELECT*** key is pressed.

In download mode aurora^{Duet} displays:

AURORADUET DOWNLOAD
Waiting For Remote Sync

On the PC:	Type	a:\setup
	Enter	1 or 2 to select the COM port
	Press	the ***ENTER*** key.

A list of instructions is now displayed on the screen. Ensure that the mouse driver is not installed on the selected COM port.

During the download procedure:

- aurora[Duet] and your PC display messages indicating that the unique electronic serial number has been checked correctly.
- Do not disturb any connections. The PC and aurora[Duet] ***must*** remain connected throughout the operation.
- Do not press any keys on aurora[Duet] or on the PC.

If the download procedure fails, switch off the aurora[Duet], switch on again and restart the download program on your PC.

After the download procedure:

- aurora[Duet] resets itself.
- The PC displays a 'Download Completed' message.
- When the title screen is displayed, press the ***F2*** key on **aurora**[Duet] to allow it to self test.



Important

You MUST press the F2 key when the title screen is displayed. This allows aurora[Duet] to run a memory check and test the U interface configuration. You must follow this procedure every time you install new software.

Setting Up aurora^{Duet} 5

aurora^{Duet} allows you to set up some parameters that are specific to particular protocols and others that are independent of protocol.

This chapter describes the *protocol-independent* setup functions that are available from the **MAIN** menu for SIMULATE and MONITOR modes. The *protocol-specific* setup functions are described in Chapters 8 and 9.

Chapter Summary

The chapter begins with a description of the Hot Keys and how to use them, then goes on to describe the following menus, screens and options:

BRI **U INTERFACE**	This screen is accessed from the **MAIN** menu. It allows you to perform a manual activation of the U interface, when the U interface is selected.
MAIN SETUP	This menu is accessed from the **MAIN** menu. From here you can access screens and sub-menus that allow you to set up a variety of general and BERT (Bit Error Rate Test) parameters.
MONITOR **REAL TIME FILTER SETUP**	This screen is accessed from the **MAIN SETUP** menu. It allows you to specify a set of filters to control the type of data that is captured during the monitor procedure.

COMMS SETUP

This screen is accessed from the **MAIN SETUP** menu. It allows you to set up a series of communication settings for **aurora**[Duet], such as parity and the baud rate.

TRACER SETUP

This screen is accessed from the **MAIN SETUP** menu. It allows you to determine the tracer output of the selected monitor.

PRI **T1 SETUP**

This screen is accessed from the **MAIN SETUP** menu. It allows you to specify the settings for the Physical Layer T1 interface. These settings are different depending on whether your aurora[Duet] is operating in SIMULATE or MONITOR mode.

SIMULATE **BERT SETUP**

These screens are accessed from the **MAIN SETUP** menu. There are four screens, all with the same options, allowing you to define up to four different combinations of settings for Bit Error Rate testing.

GENERAL SETUP

This menu is accessed from the **MAIN SETUP** menu. It accesses a number of screens used to define settings that you are unlikely to change very often, for example, the real time clock. The actual screens that you can access depend on whether **aurora**[Duet] is in MONITOR or SIMULATE mode.

(SIMULATE) **RINGER VOLUME**	This screen is accessed from the **GENERAL SETUP** menu. It lets you adjust the volume of the ringer which alerts you to an incoming call.
REAL TIME CLOCK	This screen is accessed from the **GENERAL SETUP** menu. It allows you to change the date and time on **aurora**^{Duet}'s internal clock.
(SIMULATE) **SET DEFAULTS**	This option is available from the **GENERAL SETUP** menu. It allows you to reset the parameters on **aurora**^{Duet} to their default values.
(MONITOR) **START TIME**	This screen is accessed from the **GENERAL SETUP** menu. It allows you to set an automatic start time for D Channel monitoring. For information about monitor functions, see Chapter 7.

Using Hot Keys (SIMULATE)

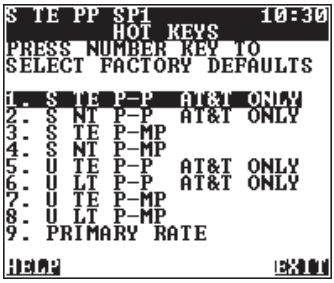
aurora^{Duet}'s Hot Keys allow you to change the operational configuration of the tester by pressing a single numeric key.

To display the HOT KEYS menu:
In the **MAIN** *menu, press the F4—***HOT** *function key.*

The Hot Keys available to you will depend on the protocol you are using.

The HOT KEYS menus for PRI and BRI modes are shown below.

BRI



PRI



To exit from the **HOT KEYS** menu without making changes, press *F6*—**EXIT**.

Choosing a configuration

To choose the configuration you require:

- On the keypad, press the Hot Key number for that configuration.
- Press the *SELECT* key.

aurora[Duet] resets itself to the chosen configuration, displaying the message **CONFIGURING SIMULATE PLEASE WAIT**. It then returns to the **MAIN** menu.

Switching between BRI and PRI mode

- Move the cursor to highlight **BRI** or **PRI** on the screen and press *SELECT*.

aurora[Duet] displays **CONFIGURATION RESET**, then the **MAIN** menu appears.

Settings assigned to the Hot Keys (BRI)

Hot Key Number	Interface	Mode	Line Type
1	S	TE	PP *
2	S	NT	PP *
3	S	TE	PMP
4	S	NT	PMP
5	U	TE	PP *
6	U	LT	PP *
7	U	TE	PMP
8	U	LT	PMP

* Applies to the AT&T protocol only

Settings assigned to the Hot Keys (PRI)



Hot key 1*:** ***TE Slave

Layer 2 protocol Slave. aurora^{Duet} acts as a TE recovering the clock from the line.



Hot key 2*:** ***NT Master

Layer 2 protocol Master. aurora^{Duet} acts as an NT and provides a clock to the line using its internal oscillator if no clock is present.



Hot key 3*:** ***TE Master

Layer 2 protocol Master. aurora^{Duet} acts as a TE and recovers the clock from the line.



Hot key 4*:** ***NT Slave

Layer 2 protocol Slave. aurora^{Duet} acts as an NT and provides the clock to the line using its internal oscillator if no clock is present.



Hot key 5*:** ***TE fixed

No Layer 2 protocol used. aurora^{Duet} acts as a TE recovering the clock from the line.



Hot key 6: ***NT fixed***

No Layer 2 protocol used. aurora[Duet] acts as an NT providing the clock on the line if no clock is present.

U INTERFACE screen BRI

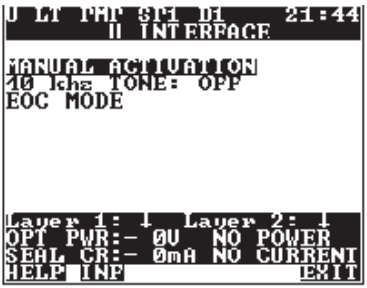
This screen allows you to perform a manual activation of the U interface.

Note:

This option is only available if the U interface is selected.

To display the U INTERFACE screen:

In the **MAIN** *menu, select* **U INTERFACE**.



Setting up manual U interface activation

To define each of the settings, move the cursor to highlight it on the screen and use the ***LEFT*** and ***RIGHT*** arrow keys to switch between the available options.

MANUAL (DE)ACTIVATION You can choose to perform either a remote activation or a remote deactivation of the U interface.

Note that in TE mode it is not possible to perform a remote deactivation.

40KHz TONE

Allows you to send a test tone across the interface. You can choose between **ON** and **OFF**.

Note that this option is used on an out of service line and is enabled when no calls are in progress.

EOC MODE

This is only available when **aurora**^{Duet} is in LT mode. It displays the **EOC MODE** screen, on which you can specify Embedded Operations Channel functions. See later sections for more information.

EOC MODE screen (BRI)

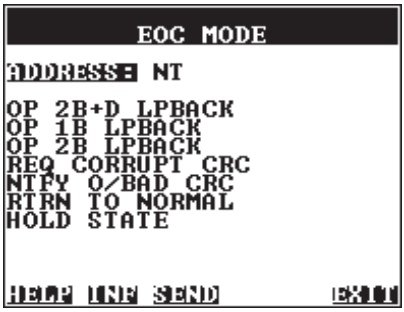
This screen allows you to specify Embedded Operations Channel functions.

Note:

You can only do this when **aurora**^{Duet} is in LT mode.

To display the EOC MODE screen:

When ***aurora***^{Duet} *is in LT mode, from the* **U INTERFACE** *screen, select* **EOC MODE**.



Setting up Embedded Operations Channel functions

You can specify the type of addressing to be used, then choose a command to transmit.

To specify the addressing type:

- Move the cursor to highlight **ADDRESS**.
- Use the ***LEFT*** and ***RIGHT*** arrow keys to switch between **NT**—Address 000, and **BROADCAST**—Address 111.

To select a command to transmit:

- Move the cursor to highlight the command you require.

The available commands are:

OP 2B+D	Operate 2B+D loopback. This directs the NT to loopback the user-data (2B+D) bit stream towards the network.
OP 1B LPBACK	Operate B1 channel loopback. This directs the NT to loopback the B1 channel towards the network.
OP 2B LPBACK	Operate B2 channel loopback. This directs the NT to loopback the B2 channel towards the network.
REQ CORRUPT CRC	Request corrupt CRC. This requests the sending of corrupt CRCs toward the network. Corrupt CRCs will continue to be sent until canceled with **RTRN TO NORMAL**.
NOTIFY O/BAD CRC	Notification of corrupt CRC. This notifies the NT that intentionally corrupt CRCs are to be sent from the network, until canceled with **RTRN TO NORMAL**.

RTRN TO NORMAL Return to normal. This message releases all outstanding EOC controlled operations and resets the EOC processor to its initial state.

HOLD STATE This message maintains EOC controlled operations in their present state.

Function keys

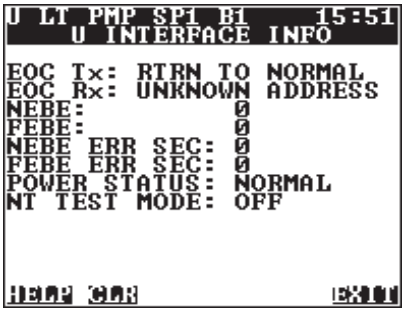
F2 **INF** Displays the **U INTERFACE INFORMATION** screen (see the next section for details).

F3 **SEND** Transmits the currently highlighted command.

U INTERFACE INFORMATION screen (BRI)

This screen displays the current status of the U interface.

To display the U INTERFACE INFORMATION screen:
When ***aurora***^{Duet} *is in LT mode, from the* **EOC MODE** *screen, press F2—***INF**.



Information displayed

- **EOC Tx**. The last EOC message sent.
- **EOC Rx**. The last EOC message received.
- **NEBE**. Total count of Near End Block Errors (NEBE).
- **FEBE**. Total count of Far End Block Errors (FEBE).
- **NEBE ERR SEC**. Near End Block Errored seconds.
- **FEBE ERR SEC**. Far End Block Errored seconds.
- **POWER STATUS**. The power status of the NT:

Display	Meaning
NORMAL	Primary and secondary power supplies are both normal.
SECONDARY OUT	Primary power is normal; secondary power is marginal, unavailable or not provided.
PRIMARY OUT	Primary power is marginal or unavailable; secondary power is normal.
DYING GASP	Both primary and secondary power are marginal or unavailable. The NT may cease normal operation.

- **NT TEST MODE**. When **ON** is displayed the NT is in test mode, initiated from the customer's side. Otherwise this setting is **OFF**.

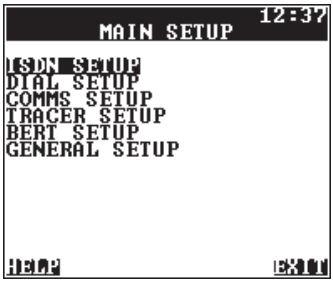
MAIN SETUP menu

This menu allows you to access screens and sub-menus through which you can set up a variety of general and BER test parameters.

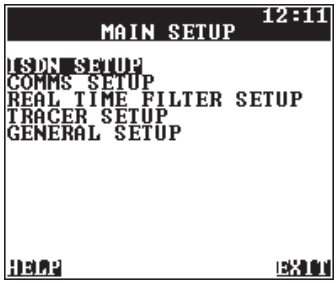
To display the MAIN SETUP menu:

- *In the* **MAIN** *menu (SIMULATE mode) or the* **MONITOR** *menu (MONITOR mode), select* **SETUP**.

SIMULATE



MONITOR



Note:

The example screens above show the setup options available in BRI mode. PRI mode has an additional option—**T1 SETUP**.

Options in the MAIN SETUP menu

ISDN SETUP Accesses the **ISDN SETUP** menu. This is protocol-specific and is described in Chapter 8.

SIMULATE **DIAL SETUP** Accesses the **DIAL SETUP** menu. This is protocol-specific and is described in Chapter 9.

COMMS SETUP Accesses the **COMMS SETUP** screen, on which you define general communication settings.

MONITOR **REAL TIME FILTER SETUP** Accesses the **REAL TIME FILTER SETUP** screen, on which you can set filters to apply to data captures.

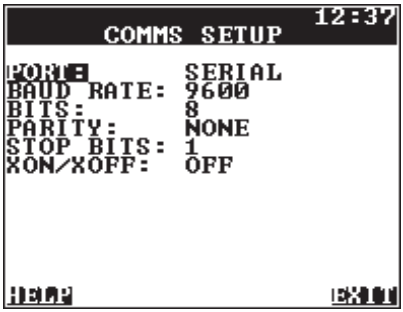
TRACER SETUP Accesses the **TRACER SETUP** screen, which determines the output format of trace information.

PRI **T1 SETUP**	Accesses the **T1 SETUP** screen, on which you set up the Physical Layer T1 interface. There are different settings for SIMULATE and MONITOR mode.
SIMULATE **BERT SETUP**	Accesses the **BERT SETUP** screens, where you can define up to four different BERT setups.
GENERAL SETUP	Accesses the **GENERAL SETUP** sub-menu, on which you define general settings such as the system date.

COMMS SETUP screen

This screen is used to define the communication port settings for aurora[Duet].

To display the COMMS SETUP screen:
In the **MAIN SETUP** *menu, select* **COMMS SETUP**.



Defining the communication settings

To define each of the communication settings, highlight it and use the *LEFT* and *RIGHT* arrow keys to toggle between the available options.

PORT	Allows you to choose either the **SERIAL** or **PARALLEL** communications port. The serial port is a standard asynchronous RS232 port. The high speed parallel port is Centronics compatible with 8 data lines, control and acknowledge handshake lines and use of the Centronic 'busy' signal. It operates at speeds in excess of 128kbps. If you choose the parallel port, all the other settings are removed from the screen.
BAUD RATE	The rate of data transmission. You can choose between **1200**, **2400**, **4800**, **9600** and **19.2k**. The data rate will depend on the terminal, VDU or printer that is currently connected to the port.
BITS	The character length of the port data. You can choose between **7** or **8** bits, to suit the connected device. The data is usually ASCII, unless you are using aurora^{Expert}.
PARITY	Allows you to add a parity bit to the transmitted data, if necessary, to suit the connected device. You can choose between **ODD**, **EVEN** and **NONE**.
STOP BITS	The number of transmitted stop bits. You can choose between **1** and **2** stop bits.

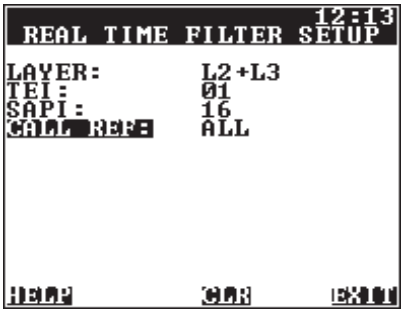
XON/XOFF Allows you to switch the **XON/XOFF** asynchronous flow control protocol **ON** and **OFF**.

Note:
When you are using **aurora**[Expert], you must choose **ON**.

REAL TIME FILTER SETUP screen (MONITOR)

This screen is used to set up filters to be applied at the time of data capture.

To display the REAL TIME FILTER SETUP screen:
In the **MAIN SETUP** *menu, select* **REAL TIME FILTER SETUP**.



Setting up filters for data capture

You can filter the data in the following ways:

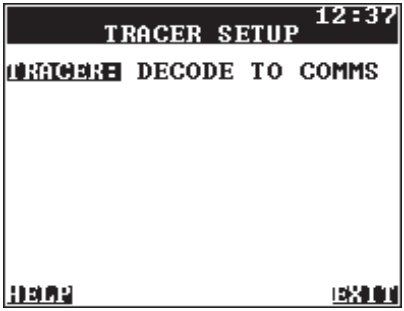
LAYER Allows you to choose a specific layer for which data is to be captured. Highlight **LAYER** and use the *LEFT* and *RIGHT* arrow keys to toggle through the available options.You can choose **L1, L2, L3, L2+L3** or **ALL** layers.

TEI	Allows you to capture data for a specific TEI (Terminal Endpoint Identifier). You can either type in a TEI number or press ***F4*** for all TEIs.
SAPI	Allows you to capture data for a specific SAPI (Service Access Point Identifier). You can either type in a SAPI number, or press ***F4*** for all SAPIs.
CALL REF	Allows you to capture for a specific Call Reference. You can either type in a number or press ***F4*** for all Call References.

TRACER SETUP screen

This screen is used to determine the trace output of the selected monitor.

To display the TRACER SETUP screen:
In the **MAIN SETUP** *menu, select* **TRACER SETUP**.



Choosing the type of Monitor trace output

To define the tracer setup, use the arrow keys to switch between the available options. The types of output that are available to you will depend on whether **aurora**[Duet] is in MONITOR or SIMULATE mode.

SIMULATE	**TRACER**	You can choose between **TO MEMORY, EXPERT TO COMMS, DECODE TO COMMS, SIMPLE TO COMMS, TEST TO COMMS, RESULTS TO COMMS** and **OFF**.
MONITOR	**TRACER**	You can choose **TO MEMORY** or **EXPERT TO COMMS**.

Types of output available

Depending on whether your **aurora**[Duet] is in MONITOR or SIMULATE mode, you can select from the following types of output:

	TO MEMORY	Layer 2 and 3 data is stored in the memory for use with the ***TRACE CAPTURE REVIEW*** menu. For more information, see Chapter 7.
MONITOR		If you choose **TO MEMORY**, a **MODE** setting appears, which you can set to **FILL** or ***WRAP***. In **FILL** mode data is stored until the memory is full. In ***WRAP*** mode data is stored continuously, and when the memory is full the oldest data is replaced by new data.
	EXPERT TO COMMS	This output is used for communication with other products, currently **aurora**[Expert].

SIMULATE **DECODE TO COMMS** Partial decode of layer 2 and layer 3 signaling with a full hexadecimal dump of D-channel messages, Tx/Rx indicator, timestamp and frame reference number.

SIMULATE **SIMPLE TO COMMS** Real-time output of data, containing a simple decode of message type, direction and timestamp.

SIMULATE **TEST TO COMMS** ***This option is for use by Agilent Technologies only. Its use cannot be guaranteed.***

An OSI protocol decode showing the messages sent between each layer in the protocol stack, and D-channel messages being transmitted and received by the Data Link layer. The layers are shown as follows:

MMI User Interface
CC Call Control
L3 Layer 3 (Network layer)
L2 Layer 2 (Data Link layer)
L2D HDLC controller
L1 Layer 1 (Physical layer)
ME Management Entity

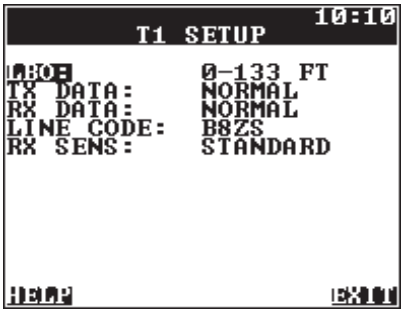
SIMULATE **RESULTS TO COMMS** This may be either the output generated from a BER test or an autoservice test. Choose BERT to turn on the BERT results output from the RS232 port.

T1 SETUP screen (SIMULATE) (PRI)

This screen allows you to specify the setup of the Physical Layer T1 interface.

To display the T1 SETUP screen:

In the **MAIN SETUP** *menu for SIMULATE mode, select* **T1 SETUP**.



Setting up the T1 interface

To define each setting, move the cursor to highlight it on the screen and use the *LEFT* and *RIGHT* arrow cursor keys to switch between the available options.

LBO — This allows you to set the Line Build-Out. You can choose between **0-133FT**, **133-266FT**, **266-399FT**, **399-533FT**, **533-655FT**, **-7.5DB**, **-15DB** and **-22.5DB**.

TX DATA — Sets the T1 data transmission. You can choose between **NORMAL** and **INVERT**. **INVERT** inverts the entire T1 payload prior to transmission.

RX DATA — Sets the T1 data reception. You can choose between **NORMAL** and **INVERT**. **INVERT** inverts the entire T1 payload when it is received.

LINE CODE Sets the line code type. You can choose between **B8ZS**, **AMI** and **AUTO**.

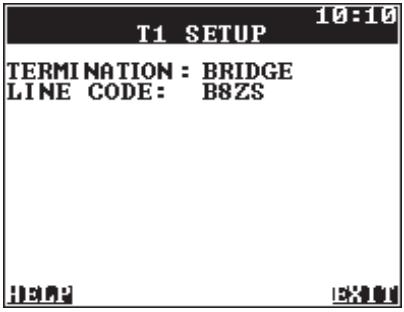
RX SENS Sets the T1 receiver sensitivity. You can choose between **STANDARD** and **INCREASED**.

T1 SETUP screen (MONITOR) (PRI)

This screen allows you to specify the setup of the Physical Layer T1 interface for monitoring.

To display the T1 SETUP screen:

In the **MAIN SETUP** *menu for MONITOR mode, select* **T1 SETUP**.



Setting up the T1 interface

To define each setting, move the cursor to highlight it on the screen and use the *LEFT* and *RIGHT* arrow keys to switch between the available options.

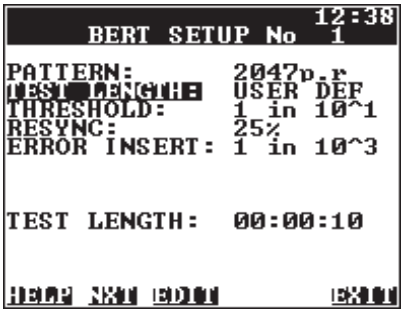
TERMINATION Sets the T1 termination type. You can choose between **BRIDGE** and **DSX MON**.

LINE CODE Sets the line code type. You can choose between **B8ZS**, **AMI** and **AUTO**.

BERT SETUP screens SIMULATE

These four screens allow you to define up to four different combinations of settings for Bit Error Rate testing. To switch between the screens, press *F2*—**NXT**. To select a combination of settings to be used for subsequent BER tests, press *F6*—**EXIT** while the appropriate screen is displayed.

To display the BERT SETUP screen:
In the **MAIN SETUP** *menu, select* **BERT SETUP**.



At the top of the screen, aurora[Duet] shows which of the four screens you are currently working on. In the above example this is screen 1.

Setting up BERT

To define each BERT setting, highlight it and use the *LEFT* and *RIGHT* arrow keys to switch between the available options.

PATTERN You can choose **2047 p.r.** (pseudo-random), **2^15-1p.r.**, **I2^15-1p.r.**, **2^20-1p.r.**, **2^20 QRSS**, **2^23-1p.r.**, **I2^23-1p.r.**, **USER DEF**, **BINARY 0**, **BINARY 1**, **1:1**, **1:3**, **1:7**, **3:1**, **3:24**, **63p.r.** or **511p.r.**. If you choose **USER DEF**,

aurora^{Duet} displays the current custom pattern and an *F3*—**EDIT** function key. See *User defined BERT settings* below.

TEST LENGTH — You can choose **CONTINUOUS**, **1 MIN**, **15 MINS**, **1 HOUR** or **USER DEF**. If you choose **USER DEF**, aurora^{Duet} displays the current custom length and an *F3*—**EDIT** function key. See *User defined BERT settings* below.

THRESHOLD — Allows you to set a pass/fail threshold for BERT. This can be a value of **1 in 10^1** to **1 in 10^9**, or **UNLIMITED**.

RESYNC — This selects the percentage of errors (**5%**, **10%**, **15%**, **20%** or **25%**) within a 100mS window at which BERT is automatically resynchronized. An indication that BERT is running in sync is provided by the ***BERT SYNC*** LED.

ERROR INSERT — This selects the rate of automatic error insertion during an on-line BER test. You can choose **2**, **3**, **4**, **5** or **6** as values of '*x*' in the error ratio of 1 in 10^*x* Bits.

Note:
The **2** value is always displayed, but you can only select it when the correct hardware is installed.

User defined BERT settings

When you set up the BERT **PATTERN** and **TEST LENGTH** as described above, you can choose **USER DEF—**User Defined. This allows you to enter custom values for these settings instead of choosing one of the predefined values.

- When you set **PATTERN** to **USER DEF**, Line 11 displays **USER PATTERN**, followed by the current user defined pattern.

  To enter a new pattern comprising two groups of two hexadecimal digits (i.e. hex numbers in the range *00 00* to *FF FF*), press *F3*—**EDIT**. A flashing cursor appears at the point where you enter the first digit. Use the keypad to enter digits, and the function keys to enter characters as follows:

  F1 = A, *F2 = B*, *F3= C*, *F4 = D*, *F5 = E*, *F6 = F*.

  The *LEFT* arrow key moves back to the first character. When you have entered four valid characters, the display returns to the **PATTERN** setting.

- When you set **TEST LENGTH** to **USER DEF**, Line 12 displays **TEST LENGTH**, followed by the current user defined test length.

  To enter a new length in the form *HH:MM:SS* (hours, minutes and seconds), press *F3*—**EDIT**. A flashing cursor appears at the point where you enter the first digit. Use the keypad to enter the digits.

  The *LEFT* arrow key moves back to the first digit. When you have entered six valid digits, the display returns to the **TEST LENGTH** setting.

Function keys

F2	**NXT**	Displays the next **BERT SETUP** screen in the sequence.
F3	**EDIT**	Allows you to edit a user defined value.

GENERAL SETUP menu

From this menu you access further screens to set up parameters that you are unlikely to change often—for example, the real time clock setting.

The screens that you can access from this menu will depend on whether your **aurora**^{Duet} is in SIMULATE or MONITOR mode.

SIMULATE

From the **GENERAL SETUP** menu you can access screens to:

- adjust the handset ringer volume
- change the real time clock settings

While in the **GENERAL SETUP** menu itself you can:

- reset all the parameters of **aurora**^{Duet} to the factory defaults
- define the auto power off delay

MONITOR

From the **GENERAL SETUP** menu you can access screens to:

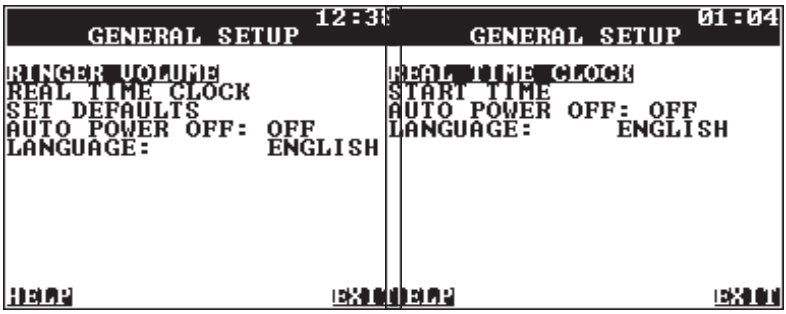
- change the real time clock settings
- set the start time for the D Channel Monitor

While in the **GENERAL SETUP** menu itself you can:

- define the auto power off delay

To display the GENERAL SETUP menu:
In the **MAIN SETUP** *menu, select* **GENERAL SETUP**.

SIMULATE MONITOR



Moving on to further screens

You can choose the following options to access further screens of settings:

- **REAL TIME CLOCK** accesses the **REAL TIME CLOCK** screen.

SIMULATE

- **RINGER VOLUME** accesses the **RINGER VOLUME** screen. Note that you can only select this if there is no call currently in progress.

These screens are described in later sections of this chapter.

Defining the general settings

On the **GENERAL SETUP** menu itself you can define the following settings:

SIMULATE

SET DEFAULTS This resets *all* parameters to the factory defaults stored in non-volatile memory. Note that this option erases all input data, including stored Called Party Numbers (**CPN**s) and communications port settings.

To choose **SET DEFAULTS**, move the cursor to highlight it on the screen and press ***SELECT***. A message appears instructing you to press ***F3*** to confirm your selection. If you confirm, **aurora**^{Duet} resets itself.

If you do not wish to confirm, press ***F6*** instead of ***F3***.

You will find a list of the default values that are set in ***aurora***^{Duet} *Default Settings*, later in this chapter.

AUTO POWER OFF This allows you to set the time delay before **aurora**^{Duet} automatically powers off if there has been no keypad or ISDN line activity when powered from the battery.

To do this, move the cursor to highlight **AUTO POWER OFF** on the screen and use the ***LEFT*** and ***RIGHT*** arrow keys to switch between the available options.

You can choose between **1 MIN**, **5 MINS**, **20 MINS** and **OFF**. If you choose **OFF**, **aurora**^{Duet} operates continuously with no automatic power off.

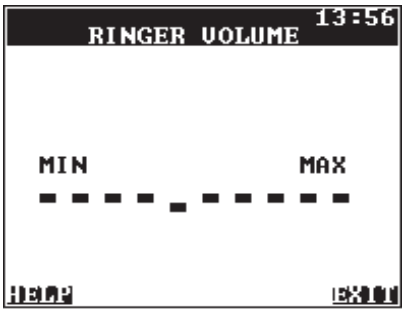
Note:

Although a **LANGUAGE** option is displayed, you cannot select any language other than English.

RINGER VOLUME Screen SIMULATE

This screen lets you adjust the sound volume of the ringer. You can only do this when there are no calls in progress.

To display the RINGER VOLUME screen:
In the **GENERAL SETUP** *menu, select* **RINGER VOLUME**.



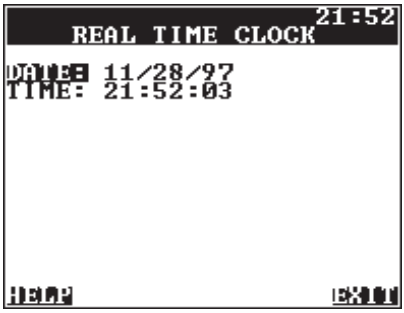
Adjusting the ringer volume

- Press the *RIGHT* or *LEFT* arrow keys to increase or decrease the volume. The display indicates the current volume level as one of ten steps.
- Press *F6* to set the ringer to the currently selected volume and return to the **GENERAL SETUP** menu.

REAL TIME CLOCK screen

This screen lets you change the date and time on **aurora**^{Duet}**'s** real time clock.

To display the REAL TIME CLOCK screen:
In the **GENERAL SETUP** *menu, select* **REAL TIME CLOCK**.



Changing the date and time

- Use the ***UP*** and ***DOWN*** arrow keys to move between the **DATE** (in *MM:DD:YY* format) and **TIME** (in *HH:MM:SS* format) settings. Highlight the line you want to change. A flashing cursor appears at the start of the editable value.
- Press a valid number key to overwrite the character highlighted by the cursor.

  To go back to the first character, press the ***LEFT*** arrow key.
- To set the date or time to the value you have entered, move the cursor onto the other setting.
- Press *F6*—**EXIT** to save the date and time currently displayed.

START TIME screen (MONITOR)

This screen lets you activate and deactivate an automatic start for the D Channel Monitor function, and set the time at which it will start.

When you have activated the automatic start and set a time, you go to the **D CHANNEL MONITOR** screen, enter a session name and press *F5*—**START**. When the real time clock reaches the time you have set, aurora^{Duet} begins monitoring.

For more information on the monitor functions, see Chapter 7.

To display the START TIME screen:

In the **GENERAL SETUP** *menu, select* **START TIME**.



Setting the D Channel Monitor automatic start

- You can activate or deactivate the automatic start. To do this, move the cursor to **AUTO START** and press the *LEFT* and *RIGHT* arrow keys to display **ON** to activate, or **OFF** to deactivate.
- When **AUTO START** is **ON**, highlight **START TIME** to make it available for editing. The cursor appears at the start of the editable value. Press a valid number key to overwrite the character highlighted by the cursor.

  If you press the *LEFT* arrow key, the cursor goes back to the beginning of the editable value.
- Press the *UP* and *DOWN* arrow keys to set the start time.
- Press *F6*—**EXIT** to save the **AUTO START** as **ON** or **OFF**, with the currently displayed start time, and return to the **GENERAL SETUP** menu.

aurora^{Duet} default settings

When you choose **SET DEFAULTS** in the **GENERAL SETUP** menu (described earlier in this chapter), and press *F3* to confirm, the following defaults are set:

ISDN SETUP		AT & T	Nortel	NI2
EMULATION	PROTOCOL	AT & T	Nortel	NI2
	ACCESS_TYPE	BRI	BRI	BRI
	INTERFACE	S	S	S
	MODE	TE	TE	TE
	LINE TYPE	PMP	—	—
LAYER 2	LAYER 2	AUTOMATIC	AUTOMATIC	AUTOMATIC
	BCH TEI	AUTOMATIC	AUTOMATIC	AUTOMATIC
	FIXED BTEI1	0	0	0
	FIXED BTEI2	0	0	0
SCREENING		Off	Off	Off
CHARGING		Off	Off	Off
S-TERMINATION		On	On	On
U-TERMINATION		—	—	—
ENCODING		u-LAW	u-LAW	u-LAW

DIAL SETUP	AT & T/Nortel/NI2
CPN Directory	All Numbers are Cleared
Calling Line ID	Cleared
Dial Type	En Bloc
Number Plan	ISDN
Number Type	Unknown
Send Complete	Omit
SPID	All Numbers are Cleared

COMMS SETUP	
PORT	SERIAL
BAUD	19200
BITS	8
PARITY	N
STOP BITS	1
XON/XOFF	OFF

TRACER SETUP		
TRACER		DECODE TO COMMS

T1 SETUP	
CLOCK SOURCE	LINE
BUILD OUT	0-133 FT
TX/RX DATA	NORMAL
LINE CODE	B8ZS

BERT SETUP	
PATTERN	2047P.R
TEST LENGTH	CONTINUOUS
THRESHHOLD	1 IN 10^1
RESYNC	25%
ERROR INSERT	1 IN 10^3
USER TEST LENGTH	10 SECONDS / 00:00:01

GENERAL SETUP

RINGER VOLUME	Not Changed
SPEAKER VOLUME	Not Changed
REAL TIME CLOCK	Not Changed
AUTO POWER OFF	CONT (Continuous)
LANGUAGE	English

BERT RESULTS

All saved BERT results are cleared

AUTO TEST RESULTS

All saved AUTO test results are cleared

Making Calls and Testing 6

You can use **aurora**Duet to test the operation of the call control protocol, check that data transmission is possible and that the quality is acceptable over an established connection.

Note:
The functions described in this chapter are only used in SIMULATE mode.

Chapter summary

This chapter describes:

- how to make and answer data and voice calls
- Unattended mode and how it can be used
- BER testing
- Physical Layer testing
- how to display the status of the T1 interface
- how to view stored BERT results.

Note:
The functions described in this chapter are independent of the protocol you are using. In addition to these functions, there are a number of call setup features that are protocol-specific. You will find information about these services in Chapter 10.

Notes on voice calls

Although the ISDN Basic Rate is capable of two simultaneous calls, which may both be voice calls, **aurora**Duet is only capable of testing one voice call at a time, because there is only one microphone/earphone set. The second call will be looped so that you can switch

between the two channels, connect the CODEC and listen to whichever call you want to.

It is possible, however, to make or receive a voice call at the same time as a data call is in progress. This is a valuable test which can be performed to detect any cross-channel interference which may be present.

Notes on data calls

Quality is tested by running a Bit Error Rate Test (BERT) in the data connection established by a call. This test transmits a selected known pattern of data at 56 or 64kbps and checks a similar received pattern for bit errors.

BER testing can be performed in the following ways:

- You can make an end-to-end test call between your **aurora**[Duet] and either another compatible ISDN basic or primary rate tester, or a non-compatible data tester connected to the ISDN through a terminal adaptor.
- You can make a loopback test call to another channel of the same **aurora**[Duet]. In this configuration, the other channel loops the received data back to line, so that it arrives back at the receiver of the originating channel. In this way you can perform a full duplex BER test of both channels simultaneously.

Functions of the T1 interfaces (PRI)

In PRI mode, the two T1 interfaces allow you to test as follows:

- You can use both T1 ports to test multiple T1 installations using NFAS (non facility associated signalling).
- You can perform out of service Physical Layer BER tests on a single T1 interface, in Framed (1.536Mbps) or Unframed (1.544 Mbps) mode.

Making a call

To make a voice or data test call, from the **MAIN** menu:

- Press the *F2* function key, if necessary, to select the B channel to be tested.
- Choose the **ISDN CALL SETUP** option to access the **CALL SETUP** menu.
- A screen is displayed listing the available bearer capabilities. Choose the type of call you wish to make, e.g. **SPEECH CALL** or **DATA 64k** call.

Voice calls

In the **DIAL** screen, choose **DIAL** or **RECALL** to dial the telephone number.

Note:
The **DIAL** screen and the dialling process are described in Chapter 10.

You can dial any ISDN voice or conventional telephone number, apart from the other channel of your **aurora**^{Duet}. You can use recorded services such as the time service to give a repeatable test for comparison of lines or calls. It may also be useful to set a conversation to check two-way audibility and interference.

The **DIAL** screen displays the **CPN**, and the **CLI** or **COL** depending on whether this is an incoming or an outgoing call. This display shows you exactly which digits have been transmitted. A maximum of 24 digits can be displayed: use the ***LEFT*** and ***RIGHT*** cursor keys to scroll through.

The progress of the call setup is reported on the status line of the **CONNECTED** screen (see Chapter 10), and for a successful call includes:

- **DIALING—**showing that the **aurora**^{Duet} is calling another party
- **RINGING—**showing that the called party is ringing
- **CONNECTED—**showing the called party has answered
- **ON HOOK—**showing that the call has not yet been answered. This status is only displayed when you are using En Bloc dialing.

Data calls

For single channel BER testing, in the **DIAL** screen, choose **DIAL** or **RECALL** to dial the required telephone number.

Note:
The **DIAL** screen and the dialing process are described in Chapter 10.

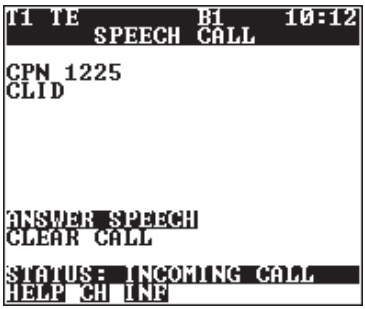
The number you choose can be a suitable ISDN data tester or the other B-channel of your **aurora**^{Duet}. Call screening and call progress information are displayed in the same way as for speech calls.

When the call is established, choose the **CONNECT BERT** option. The BER test starts automatically and the results are displayed.

Answering a voice call

Voice calls are always answered manually.

When an incoming voice call is received on the currently selected channel, **aurora**[Duet] sounds the ringer and displays the **INCOMING CALL** screen.



If the call is received on a different channel from the one that is currently selected, the *F2* (channel selection) function key flashes.

Note:
If any **SETUP** menu is displayed, all channels are considered busy and calls are not accepted.

To answer the call:

- Choose the **ANSWER SPEECH** option (by pressing *SELECT*) to answer the incoming call if it is on the currently selected B channel.
- If necessary, press *F2* to select the other B channel. The call will now be answered and the telephone number of the caller (**CLID**) displayed in the fifth line of the screen.

Clearing a call

To clear a voice call, choose the **CLEAR CALL** option.

To clear a BER test, press *F6*—**EXIT** in the BER test **RESULTS** screen.

The **CLEARED** screen displays a cause code to indicate why the call cleared. See the Call Clearing Cause Codes appendix for explanations of the codes. You can also display an explanation of the code on screen by pressing *F4*—**CSE**.

UNATTENDED mode

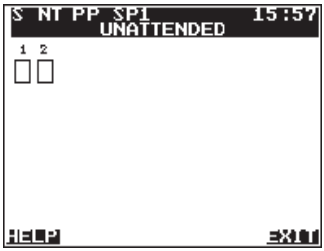
When aurora[Duet] is in Unattended mode, it will answer and loop data or speech calls automatically on one or all B channels while unattended. This allows you to perform a BER test from a device (e.g. another aurora[Duet]), in both Speech and Data modes, to a remote unattended aurora[Duet].

When a voice call has been successfully connected, you will hear 3 beeps and the loopback is connected.

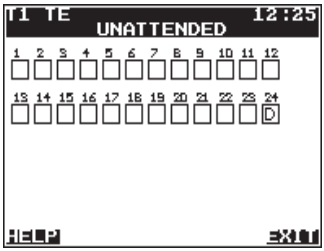
Note:
It is not possible to switch between the B-channels in this mode.

To display the UNATTENDED screen:
In the **MAIN** *menu, select* **UNATTENDED**.

BRI



PRI



Each box on the screen represents a B channel. An empty box indicates that there is no call in progress. A loopback arrow in a box indicates that a call has been established and the loop applied.

BRI

The LED indicators show which B-channels are in use. Any active calls are cleared down after exiting from Unattended mode. The B1 and B2 LED indicators will be illuminated if there are any active calls.

Choose ***F6*** to exit and clear all current calls. A remote clear on one B-channel will cause an unattended **aurora**^{Duet} to clear the other channel.

The automatic power-off facility that normally turns off aurora^{Duet} after a short period of no activity is disabled in Unattended mode. This allows operation until the battery is discharged (should no external power source be available).

LINE BERT menu (BRI)

From this menu you can access screens that allow you to perform either a Loop test or a BER test on the D or B channels.

To display the LINE BERT menu:

In the **MAIN** *menu, select* **LINE BERT**.



Notes:

- You cannot enter the **LINE BERT** menu while a call is in progress, because D channel signaling is active.
- Layer 2 functionality cannot be guaranteed if it is active when you select the **LINE BERT** option.
- Layer 1 *must* be active before a BER test can be performed.
- You cannot switch to or access any B channel while in this mode.

Choosing a channel

Highlight **CHANNEL** and use the *LEFT* and *RIGHT* arrows to switch between the available options. You can choose **D ONLY**, **B1 ONLY** or **B2 ONLY.**

Choosing the test type

To choose one of the available test types, highlight it and press *SELECT*.

CONNECT LOOP Starts a loop test on the selected channel and displays the **CONNECT LOOP** screen.

CONNECT BERT Performs BERT on the selected channel and displays the **CONNECT BERT** screen.

CONNECT LOOP screen

This screen is displayed when you choose to perform a loop test on the D channel.

To display the CONNECT LOOP screen:

In the **LINE BERT** *menu, select* **CONNECT LOOP**.



Running the Loop test

When you select the **CONNECT LOOP** option, the test begins automatically.

While the test is in progress, the status line displays **LOOP CONNECTED**. The loop test continues until you choose to stop it.

To stop the loop test

- Highlight **STOP TEST** and press *SELECT*.

The loop is removed from the line and the status line displays **ON HOOK**.

CONNECT BERT screen

This screen is displayed when you choose to run BERT on the B or D channel. It is the same as the screen displayed during B channel BERT—see *BERT CONNECTED Screen* in Chapter 10.

To display the CONNECT BERT screen:

In the **LINE BERT** *menu, select* **CONNECT BERT**.

Running the BER test

When you select the **CONNECT BERT** option, the test begins automatically.

To stop the BER test

- Move the cursor to the **STOP TEST** option and press *SELECT*.

The results of the test are now displayed on the screen.

To store the test results

- While the test is in progress, press *F6*—**EXIT**. aurora[Duet] stops the test and stores the results. Up to 30 BERT results can be stored at any one time.

  To view the stored results, choose **RESULTS** from the **MAIN** menu. You can view results even after aurora[Duet] has been switched off and on again.

To restart the BER test

- Return to the **D CHANNEL BERT** menu and select **CONNECT BERT**.

To print the results on-line

If you set Tracer Setup to **RESULTS TO COMMS** (see *TRACER SETUP Screen* in Chapter 5), the results are printed via the comms port, with timestamping of Errored Seconds, Severely Errored Seconds and Unavailable Seconds.

Function keys

F3 **CLR** Resets the BERT parameters and resumes the BER test.

F4 **ERR** Injects a single bit error into the pattern.

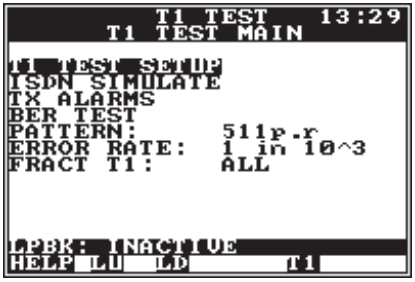
F5 **AUT/OFF** Choose **AUT** to insert errors automatically into the pattern, at the rate defined in the **BERT SETUP** option. To switch off the automatic error injection, choose **OFF**.

T1 TEST Menu (PRI)

This menu is displayed during testing of the Physical Layer and offers a number of options to be used in the tests and for displaying the results.

To display the T1 TEST menu:

When you select **T1 TEST** *from the* **MAIN** *menu, the* **T1 TEST** *menu is displayed automatically.*



Options for the T1 test

You can choose from the following test options:

T1 TEST SETUP Displays the **T1 TEST SETUP** menu, for more information see below.

ISDN SIMULATE Returns the aurora[Duet] to the **MAIN** menu.

TX ALARMS Sets the alarm to be sent in the test. You can choose between: **NONE**, **AIS** and **YELLOW**.

BER TEST Starts a BER test.

PATTERN Sets the test pattern for the BER test. You can choose between: **Binary 0**, **Binary 1**, **1:1**, **1:3**, **1:7**, **3:1**, **3:24**, **63p.r.**, **511p.r.**, **2047p.r.**, **2^15-1p.r.**, **2^15- INV**, **2^20-1p.r.**, **2^20 QRSS**, **2^23-1p.r.**, **2^23-1 INV**, **55 octet**, **T1 Daly**, **USER DEF** and **NONE**.

ERROR RATE Specifies the rate at which errors are inserted into the BER test stream when you select automatic error insertion during the test. You can choose between: **1 in 10^2**, **1 in 10^3**, **1 in 10^4**, **1 in 10^5** and **1 in 10^6**.

FRACT T1 Specifies which slots to use in the test. You can choose **56K**, **64K** or **ALL**. If you choose **56K** or **64K**, press *SELECT* to display a screen allowing you to choose a channel for the test.

Function keys

F2 **LU** Loop up - if you have selected a local loopback establishes a local loop. If you have selected an in-band or out-of-band sends a signal to the network requesting that a loop is established.

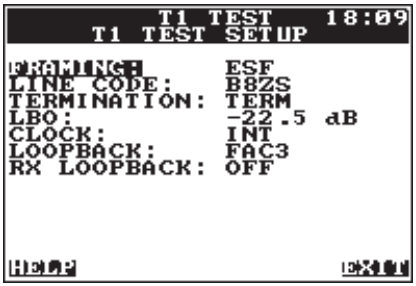
F2 **LD** Loop down - if you have selected a local loopback removes the local loop. If you have selected an in-band or out-of-band sends a signal to the network requesting that the loop is removed.

For information on types of loopback see *LOOPBACK* later in this section.

Setting up a T1 Test

To display the **T1 TEST SETUP MENU**:

- Move the cursor to the **T1 TEST SETUP** option and press *SELECT*.



FRAMING Sets the type of framing to use in the test. You can choose between **ESF** (also known as D5), **D4** (also known as superframe) and **UNFRAMED**.

LINE CODE Sets the type of line coding used. You can choose between **B8ZS**, **AMI** or **AUTO**.

TERMINATION Sets the type of termination applied. **DSX MON** applies no termination to the line; **BRIDGE** applies a 100 Ω resistor to the line in monitor mode; **TERM** applies a 100 Ω resistor to the line in simulate mode.

LBO	Sets the line build out used. Line build out compensates for the effect of the length of the cable on the signal. The longer the line the greater the amplitude of the signal sent. The shape of the signal sent is also changed to compensate for interference on the line - the longer the cable the more the cable is changed. You can choose between: **0-133 FT**, **133-266 FT**, **266-399 FT**, **399-533 FT**, **533-655 FT**. The other settings: **-7.7 dB**, **-15 dB**, **-22.5 dB** decrease the amplitude of the signal but leave the shape of the signal unchanged. These settings allow you to check the quality of a line.
CLOCK	Sets the source of the clock: **LINE** sets the clock to the network or **INT** (internal) sets the clock source to aurora^Duet.
LOOPBACK	Sets the loopback mode to use. You can choose between in-band loopback - **CSU**, **FAC1**, **FAC2**, **FAC3**, out-of-band loopback - **ESF LINE**, **ESF PAYLOAD**, **ESF NET**, and local loopback - **LOC LINE**, and **LOC PAYLOAD**.
RX LOOPBACK	Sets the way aurora^Duet responds if it is sent a loopback signal. If **AUTORESP** is selected the following signal is looped. If **OFF** is selected the loopback signal is ignored and the signal is not looped.

Function keys

F6 **EXIT** Cancels any test and/or test pattern that is in progress and returns to the **MAIN** menu.

T1 TEST INFORMATION screens

These screens display the error counters and performance settings associated with the current test. They also allow you to inject errors into the test stream.

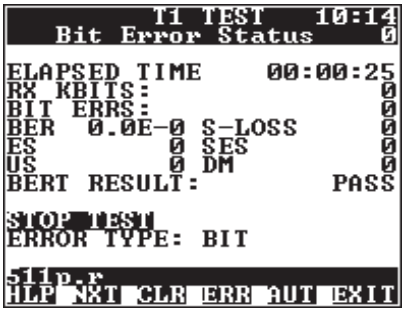
There are three information screens, displaying information on the Bit Error Status, Error Counts and T1 Error Ratios.

To display the T1 TEST INFORMATION screens

*The first screen (***BIT ERROR STATUS***) is displayed automatically when you start the test. To display each of the other screens in turn, press F2—***NXT***.*

BIT ERROR STATUS screen

This is the first screen displayed when you begin the test.



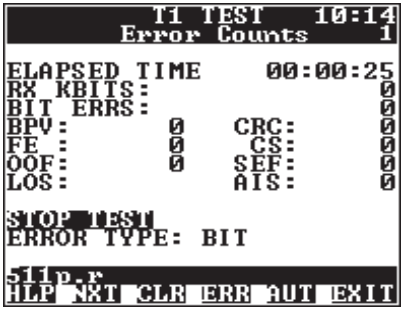
The **BIT ERROR STATUS** screen displays the elapsed time and counters for the Physical Layer errors listed below. To clear all error counters, press *F3*—**CLR**.

S-LOSS	Seconds out of sync Errored seconds	**ES**
SES	Severely errored seconds Unavailable seconds	**US**
DM	Degraded minutes	

Information about current activity is displayed at the foot of the screen, as follows:

- The **STATUS** line indicates any test or operation currently in progress. For example, if you select **AIS ALARM** the status is **SENDING AIS**.

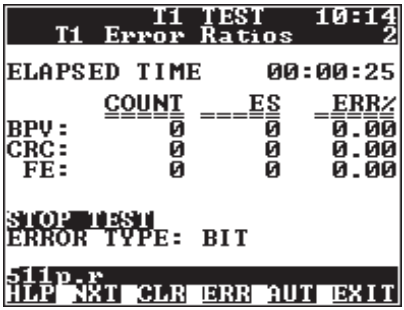
ERROR COUNTS screen



The **ERROR COUNTS** screen displays the elapsed time and counters for the errors listed below. To clear all error counters, press *F3*—**CLR**.

BPV	Bipolar violation
CRC	Cyclic redundancy check
FE	Frame bit error
CS	Controlled slips
OOF	Out of frame occurrences
SEF	Severely errored frames
LOS	Loss of signal occurrences
AIS	Alarm indication signal received occurrences

T1 ERROR RATIO screen



The **T1 ERROR RATIO** screen displays the elapsed time and counters, Errored Seconds and percentage error calculation for BPV, CRC and FE type errors. To clear all error counters, press *F3*—**CLR**.

Injecting errors into the test stream

- Move the cursor to highlight **ERROR TYPE** and use the *LEFT* and *RIGHT* arrows to switch between the different types of error you can insert. You can choose between **BIT**, **BPV**, **CRC-6**, **LOS**, **FRM 1 bit**, **FRM 2/6**, **FRM 2/5** and **FRM 2/4**.
- To inject a single occurrence of the selected error, press *F4*—**ERR**.
- To inject the selected error automatically, press *F5*—**AUT**. Errors are inserted at the rate selected using the **ERROR INSERT** setting in the main **T1 TEST** menu. To switch off automatic error injection, press *F5*—**OFF**.

To stop the test

- Highlight **STOP TEST** and press *SELECT*. To return to the **T1 TEST** menu, press *F6*—**EXIT**.

To store the test results

- Instead of selecting **STOP TEST**, press *F6*—**EXIT** while the test is still in progress. The test is stopped and the results are stored in non-volatile memory. A maximum of 30 results can be stored at any one time.

  To display the stored results, use the **RESULTS** option from the **MAIN** menu. The results are stored even while aurora[Duet] is switched off.

To print the test results

- For instructions on how to print the results of any of the last 30 stored tests, see **Results Screen (BER test results)** later in this chapter.

Function keys in the T1 TEST INFORMATION screens

F2	**NXT**	Displays the next test information screen.
F3	**CLR**	Clears all displayed error results, zeroing all counters.
F4	**ERR**	Injects a single occurrence of the selected error. See *Injecting errors into the test stream* above.
F5	**AUT/OFF**	Injects occurrences of the selected error. When you select **AUT** the function key changes to **OFF**, so that you can switch off error injection. See *Injecting errors into the test stream* above.
F6	**EXIT**	Returns to the previous menu.

T1 STATUS screens (PRI)

These screens show the status of the T1 interface.

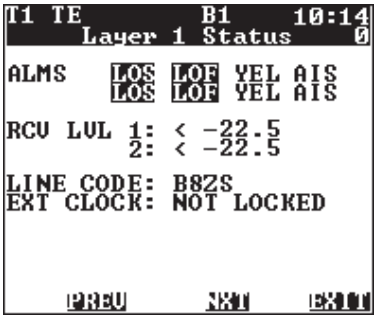
The first status screen in the sequence shows the status of Layer 1. Following this are screens showing the line status for ports 1 and 2. In SIMULATE mode you can also display screens showing the status of Performance Report Messages (PRM) for ports 1 and 2.

If no alarm is present, the alarm status is displayed in black text. If an alarm is present, the status is displayed in white text on a black background.

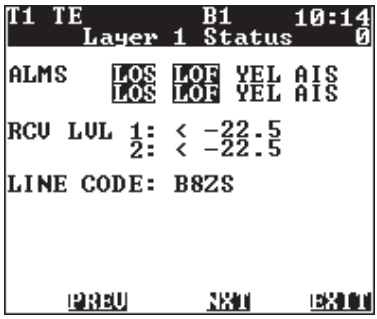
To display the T1 STATUS screens:
In the MONITOR or SIMULATE **MAIN** *menu, press F5—***T1** or **#**.

LAYER 1 STATUS screen

(SIMULATE)



(MONITOR)



Information displayed

The display shows the receive level of Ports 1 and 2, the T1 line coding being used and, in SIMULATE mode only, the status of the external clock. The following alarms are displayed:

LOS Loss Of Signal

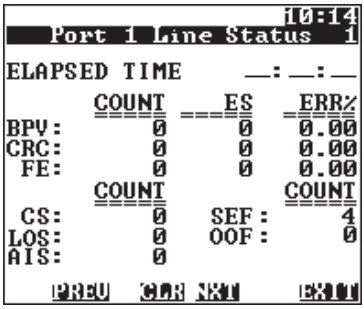
LOF Loss Of Framing

YEL 'Yellow' alarm - i.e. a Remote Alarm Indication (RAI)

AIS Alarm Indication Signal.

PORT 1/PORT 2 LINE STATUS

You can display the **LINE STATUS** screen for either Port 1 or Port 2 by pressing *F2*—**PREV** and *F4*—**NXT** to switch between the different T1 status screens. The example below shows the Line Status display for Port 1.



Information displayed

This Status screen displays a count, Errored Seconds and the percentage occurrence during the elapsed time for the following errors:

BPV Bipolar Violations

CRC Cyclic Redundancy Check (CRC-6) errors

FE Frame Bit Errors

The screen also shows a count for the following errors:

CS Controlled Slips

LOS Loss of Signal

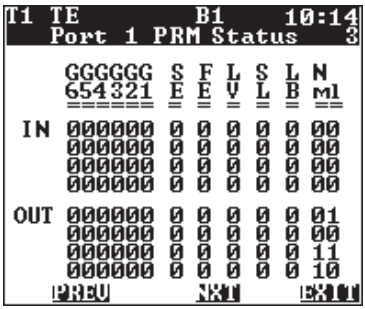
AIS Alarm Indication Signal.

SEF Severely Errored Frames

OOF Out Of Frame occurrences

PORT 1/PORT 2 PRM STATUS SIMULATE

You can display the **PRM STATUS** screen for either Port 1 or Port 2 by pressing *F2*—**PREV** and *F4*—**NXT** to switch between the different T1 status screens. The example below shows the PRM Status display for Port 1.



Information displayed

This Status screen displays incoming Performance Report messages.

Function keys in the T1 STATUS screens

F2	**PRV**	Displays the previous T1 Status screen.
F3	**CLR**	In the **LINE STATUS** screens, resets the time display and error counts to zero.
F4	**NXT**	Displays the next T1 Status screen.
F6	**EXIT**	Returns to the **MAIN** menu.

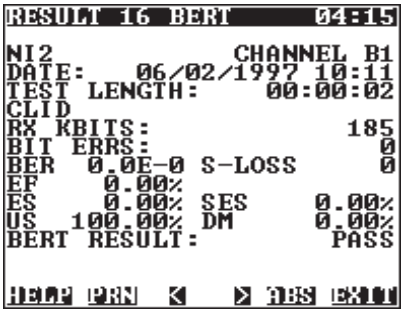
RESULTS screen (BER test results) SIMULATE

aurora[Duet] can store up to 30 BERT results. After 30 sets of results have been stored, any new results always overwrite the earliest ones.

This screen lets you view or print the stored results of recent BER tests.

To display the RESULTS screen:

Choose **RESULTS** *in the* **MAIN** SIMULATE *menu while there are no calls in progress.*



Information displayed

- Line 1 displays the title **RESULT NN**, where **NN** is the reference number of the stored results. It also displays the current real time clock setting.
- Line 3 displays the current protocol in use and the channel on which the BER test was performed: **B1**, **B2** or **D**.
- Line 4 displays the date and time the BER test was performed (in the format: *MM:DD:YYYY HH:MM*).
- Line 5 displays the length of time the BER test was running (in the format *HH:MM:SS*).
- Line 6 displays the Called Party Number (CPN) or Calling Line Identifier (CLID), depending on the call direction.
- Lines 7 to 13 display BER test results. Very large or very small values requiring more than 8 digits, including the decimal point, are displayed in exponential format (y.yyyEsxx), where 'y.yyy' is a floating point number, 'E' indicates exponent, 's' is the sign of the exponent (either 'minus' or 'plus'), and 'xx' is the 2-digit exponent.
- For a timed test, Line 14 displays whether the test has passed or failed.

Function keys

F2 **PRN** Prints out the results in a similar format to the screen display.

The following additional information, which is not visible on the screen, is incorporated in the printout:

***Channels*—**indication of whether it is an incoming or an outgoing channel and the channel number.

		Cause—indication of whether it was the local or remote that was responsible for the cleardown, and the cause number. ***Test time***—the amount of time taken to run the test, from the time of first synchronization. ***BER test SETUP information*** for the test—i.e. a number between 1 and 4 and the test length, pattern, threshold, resynchronization and error insertion.
F3	**<**	Displays the previous BER test result.
F4	**>**	Displays the next BER test result.
F5	**ABS/%**	Toggles between displaying **ABSOLUTE** and **PERCENTAGE** BER test results.
F6	**EXIT**	Returns to the **MAIN** menu.

Monitor, Capture & Review Functions

7

auroraDuet allows you to monitor, capture and review test sessions through the following menu options:

- The **MONITOR** menu allows you to access further menus and screens from which you can control all aspects of audio and data monitoring on the S or U interface (BRI) or the T1 interface (PRI).
- **The MONITOR REVIEW** menu, which is accessed from the **MONITOR** menu for the selected interface, lets you display or print the captured results of D Channel tracing during simulated calls. You can choose between simple and full decode.

For information on how to view stored BER test sessions, see *RESULTS Screen (BER Test Results)* in Chapter 6.

Note:
General settings related to the test conditions are set up as described in Chapter 5. There are also a number of protocol-specific functions, which are described in Chapter 8.

Chapter summary

This chapter is organized as follows:

- The main part of the chapter provides a detailed description of the data and voice monitoring functions of **aurora**Duet, and how to review stored monitor sessions. These functions are all accessed in MONITOR mode, from the **MONITOR** menu related to the selected interface.
- Following these sections, there is a description of the **TRACE CAPTURE REVIEW** menu, which allows you to review recently captured data in SIMULATE mode.

Functions of the T1 interfaces (PRI)

In PRI mode, the two T1 interfaces allow you to test as follows:

- You can monitor, capture and decode D and B channel traffic on two receive ports at the same time—that is, from a single T1 line.

MONITOR menu

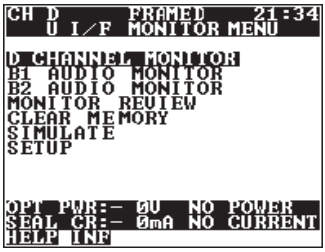
This menu allows you to access further menus and screens on which you can define how data or audio monitoring operates on the selected interface.

To display the MONITOR menu:
In the **MAIN** *menu, select* **MONITOR**.

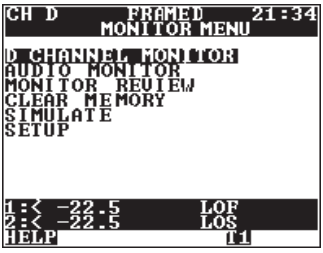
aurora[Duet] initializes MONITOR mode and displays the **MONITOR** menu for the selected interface. The menu for each interface is shown below.

(BRI)





(PRI)



Understanding the Monitor display

The top of the screen shows the channel currently selected for monitoring, the type of monitor selected and the real time clock setting.

BRI

The Status bar at the foot of the screen indicates the power source which supplies or generates the power. **PWRSRC1** and **PWRSRC2**, or **OPT PWR** and **SEAL CR**, are displayed depending on the selected interface, as follows :

Interface	Display
S	PWR SRC 1 : +[,-] 0V and range information *
	PWR SRC 2 : +[,-] 0V and range information *
U	OPT PWR : +[,-] 0V and range information *
	SEALCR : +[,-] 0mA and range information *

* Range information may be **NO POWER**, **NO CURRENT**, **IN RANGE**, **OVER** or **UNDER**.

PWRSRC 1 Power Source 1. This is power supplied by the NT to the TE. Power is supplied on the two S Interface transmission pairs (Rx pins 4 & 5 and Tx pins 3 & 6).

PWRSRC 2 Power Source 2. This is power supplied by the NT to the TE. Power is supplied over pin 7 (negative voltage) and pin 8 (positive voltage).

OPT PW Optional Power. This is power supplied by the NT to the TE. Power is supplied over pin 7 (negative voltage) and pin 8 (positive voltage).

SEAL CR Sealing Current. This is current on the line. When present, Sealing Current is in the range of 1.0 to 50 mA.

PRI The Status bar displays the receive level for Ports 1 and 2, and any alarms present.

Options in the MONITOR menu

To select one of the options, highlight and press *SELECT*. The available options are as follows:

D CHANNEL MONITOR Accesses the **MONITOR SESSION** screen, on which you can assign a name to and begin a data monitoring session.

BRI **B1/B2 AUDIO MONITOR** Access the BRI ***VOICE MONITOR*** screen for the chosen B channel. This lets you connect or disconnect the headset and adjust its sound volume.

PRI **AUDIO MONITOR** Access the PRI ***VOICE MONITOR*** screen, on which you can choose a B channel for monitoring, then connect or disconnect the headset and adjust its sound volume.

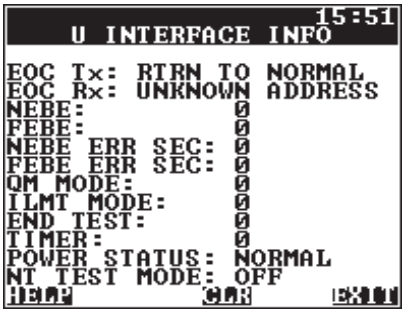
MONITOR REVIEW Accesses the **SELECT SESSION** menu. This lets you select one of up to 20 previously stored monitoring sessions for review, and print out the raw data. For the D channel, you can choose between simple or fully decoded

	mode. You can also choose to display the data rather than print it.
CLEAR MEMORY	Accesses the **CLEAR MEMORY** screen, which lets you clear the monitor memory.
SIMULATE	Returns **aurora**[Duet] to SIMULATE mode, allowing it to simulate a TE or NT as required. When you choose this option, **aurora**[Duet] initializes the SIMULATE setup and returns to the **MAIN** menu.
SETUP	Accesses the **MAIN SETUP** menu. See Chapter 5 for more information.

Function keys

BRI	*F2*	**INF**	When U interface monitoring is is selected, you can press *F2* to display the **U INTERFACE INFORMATION** screen.

U INTERFACE INFORMATION screen



Information displayed

- **EOC Tx/Rx**. The last EOC messages sent (**Tx**) and received (**Rx**).
- **NEBE**. Total count of Near End Block Errors.
- **FEBE**. Total count of Far End Block Errors.
- **NEBE ERR SEC**. Near End Block Errored seconds.
- **FEBE ERR SEC**. Far End Block Errored seconds.
- **QM MODE**. The number of times aurora[Duet] has received a Quiet Mode command.
- **ILMT MODE**. The number of times aurora[Duet] has received an Insertion Loss Measurement Test command.
- **END TEST**. The number of times aurora[Duet] has received an End Test command.
- **TIMER**. A 75 second timer that starts when aurora[Duet] is put into QM or ILMT mode. When an End Test command is received, it is reset to zero.
- **POWER STATUS**. The power status of the NT:

Display	Meaning
NORMAL	Primary and secondary power supplies are both normal.
SECONDARY OUT	Primary power is normal; secondary power is marginal, unavailable or not provided.
PRIMARY OUT	Primary power is marginal or unavailable; secondary power is normal.
DYING GASP	Both primary and secondary power are marginal or unavailable. The NT may cease normal operation.

- **NT TEST MODE**. **ON** indicates that the NT is in test mode, initiated from the customer's side Otherwise, the display shows **OFF**.

Function keys

F4 **CLR** Resets all error counters to zero.

D Channel monitoring

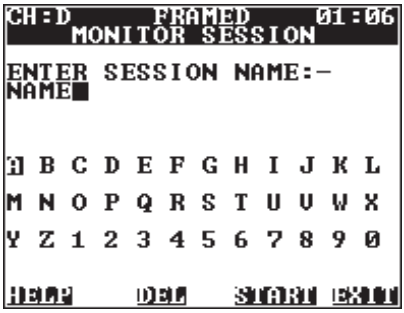
When you select **D CHANNEL MONITOR** from the **MONITOR** menu for the selected interface, **aurora**[Duet] takes you through the following steps:

- The **MONITOR SESSION** screen is displayed, on which you can assign a name to the session so that you can identify it for review at a later date.
- From this screen, when you have assigned the name, you can start the monitor session.
- While monitoring is in progress, **aurora**[Duet] displays the **DATA MONITOR** screen, which shows information about the current session.

MONITOR SESSION screen

This screen allows you to assign a name to the monitor session and begin the monitoring process. The name allows you to identify the session at a later date—for example, if you save it to monitor memory or as a file on the PC.

To display the MONITOR SESSION screen:
In the **MONITOR** *menu for the selected interface, choose* **D CHANNEL MONITOR**.



To assign a name to the session

The name you assign to the monitor session must have no more than 8 alphanumeric characters (for example, **TEST2001**). To enter the name:

- Select each character that you require by highlighting it and pressing ***SELECT*** to add it as the next character in the name. For numeric characters, you can press the number on the keypad.
- If you wish to change the last character entered, press ***F3*—DEL**. **aurora**[Duet] deletes that character and moves the cursor to the left.

If you do not enter a monitor session name, **aurora**[Duet] automatically assigns the name ***Snn*** (where ***nn*** is the existing number of stored sessions plus 1).

To exit without starting a session

- Press the ***F6*—EXIT** function key. **aurora**[Duet] returns to the **MONITOR** menu for the selected interface.

To start the monitor session

- Press the ***F5*—START** function key.

aurora[Duet] displays the **DATA MONITOR** screen, which shows information about the session. See below for details.

Note:

You can also start the D Channel monitor automatically. For more information, see *Setting the D Channel Monitor Auto Start* in Chapter 5.

DATA MONITOR screen

This is the information screen displayed while a data monitor session is in progress. It displays information about the session as it proceeds.

To display the DATA MONITOR screen:

In the **MONITOR** *menu for the selected interface, choose* **D CHANNEL MONITOR**. *Assign a session name and begin the session using the* **MONITOR SESSION** *screen described above. The* **DATA MONITOR** *screen is then displayed automatically.*



Information on the DATA MONITOR screen

Line 1 displays the channel currently selected for monitoring, i.e. D, and the real time clock setting.

The rest of the screen shows information about the session as follows:

- Line 4 shows the current status of the data monitor—whether it is **PAUSED** or **RUNNING**. See *Settings for data monitoring* for details on how to pause and restart the session.
- Line 5 shows the session name that you entered in the **MONITOR SESSION** screen.

- Line 6 shows the output of the selected monitor. **TO MEMORY** means that data is being stored in **aurora**[Duet]'s monitor memory. **EXPERT TO COMMS** means that data is being sent to an external device through the currently selected **aurora**[Duet] communication port. This depends on what has been set up as the tracer output—see *TRACER SETUP Screen* in Chapter 5.
- Line 8 shows the number of L1 activations and deactivations during the monitor session.
- Lines 9 and 10 show the frame activity. Two bar graphs, one for the NT and one for the TE, indicate that there is activity on the line. While a connection is successful, a continuous line is displayed on the screen. If a connection fails, the bar graph line stops. You can then press *F6*—**EXIT** to return to the **MONITOR** menu for the selected interface.
- Line 14 shows a graph indicating the amount of memory currently used.

aurora[Duet] can detect if you attempt to monitor a link with a protocol other than the one selected. For example, if you select the NI protocol but monitor a NORTEL session, **WRONG PROTOCOL** is displayed in the status line.

If a filter is applied during data capture, (see *Real Time Filter Setup Screen* in Chapter 5), **FILTERING** is displayed in the status line.

Settings for data monitoring

You can change certain settings for data monitoring using the function keys.

PRI

- When the **TRACER** setting is **TO MEMORY**, *F2* allows you to filter the output to display information only about certain layers.

See *Function Keys* below for more information.

Function keys

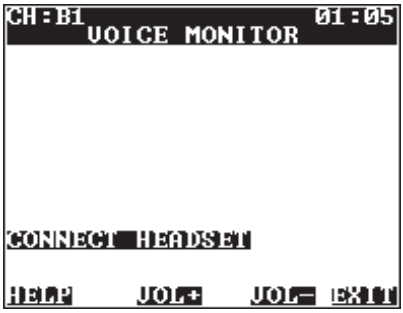
F2		When the **TRACER** setting is **TO MEMORY**, this key allows you to filter the output to display information only about certain layers. Press *F2* repeatedly to switch between **ALL, 2+3, L3, L2** and **L1**.
F3	**PAUS/RUN**	When the **TRACER** setting is **TO MEMORY**, this key allows you to switch the monitor status between **PAUS** (pause) and **RUN** (restart) the monitor session.
F4	**DISP**	Displays the monitor output in real time.
F6	**EXIT**	Stops the monitor session and returns to the **MONITOR** menu for the selected interface.

VOICE MONITOR screen (BRI)

This screen allows you to connect and disconnect an audio headset, and adjust its sound volume.

To display the VOICE MONITOR screen:

In the **MONITOR** *menu for the selected interface, select either* **B1** *or* **B2 AUDIO MONITOR**, *depending on the channel you wish to monitor.*



The top of the screen displays the channel currently selected for monitoring (**B1** or **B2**), and the real time clock setting.

When the headset is disconnected, you can choose **CONNECT HEADSET**. When it is connected, you can choose **DISCONNECT HEADSET**.

Connecting and disconnecting the headset

- Highlight **CONNECT HEADSET** or **DISCONNECT HEADSET** and press *SELECT*.

Adjusting the sound volume

- To increase the volume, press *F3*—**VOL+**.
- To decrease the volume, press *F5*—**VOL−**.

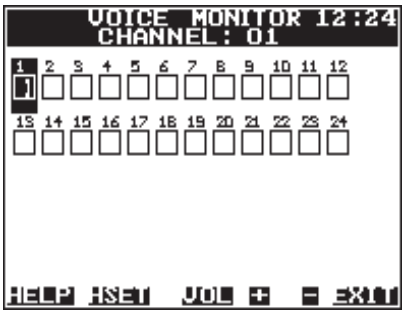
Function keys

F3	**VOL+**	Increases the sound volume of the headset.
F5	**VOL−**	Decreases the sound volume of the headset.
F6	**EXIT**	Stops the voice monitor session and returns to the **MONITOR** menu for the selected interface.

VOICE MONITOR screen (PRI)

This screen allows you to select a B channel for voice monitoring, connect and disconnect the audio headset and adjust its sound volume.

To display the VOICE MONITOR screen:
In the **MONITOR** *menu, select* **AUDIO MONITOR**.



At the top of the screen, aurora^{Duet} shows which B channel is currently selected.

Choosing a B channel for monitoring

- Use the arrow keys to highlight the channel you require.

Connecting and disconnecting the headset

- To connect the headset, press the *F2*—**HSET** function key.
- To disconnect the headset, press the *F2*—**SPKR** function key.

Adjusting the sound volume

- To increase the volume, press *F4*—**VOL+**.
- To decrease the volume, press *F5*—**VOL-**.

Reviewing stored D channel monitor sessions

aurora[Duet] allows you to review D channel monitor sessions that have previously been stored in the memory. To do this, select **MONITOR REVIEW** from the **MONITOR** menu for the selected interface. **aurora**[Duet] takes you through the following steps:

- The **SELECT SESSION** screen is displayed for you to select the stored session that you wish to review.
- The **MONITOR REVIEW** menu is displayed. This allows you to choose how you wish to review the selected session—e.g. on screen or using **aurora**[Expert]—and transmit the data in the appropriate form. For more information on **aurora**[Expert], contact Agilent Technologies.

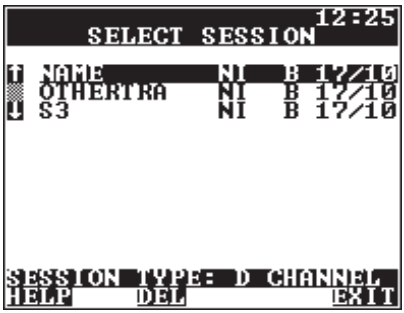
Note:
You can also review simulation D channel data, by selecting **CAPTURE REVIEW** in the SIMULATE **MAIN** menu. For instructions on how to do this, see *TRACE CAPTURE REVIEW Menu* later in this chapter.

SELECT SESSION screen

This screen displays a list of the monitor sessions that are currently stored and allows you to select one of them for review.

These sessions were named and stored using the **MONITOR SESSION** screen, which is described earlier in this chapter.

To display the SELECT SESSION screen:
In the **MONITOR** *menu for the selected interface, choose* **MONITOR REVIEW**.



Each stored session is identified by :

- Session name
- Protocol
- Basic or Primary Rate indicator, where B = Basic and P = Primary
- Date—month and day of data capture

To select a session for review

- Move the cursor to highlight the session and press *SELECT*.

aurora[Duet] then displays the **MONITOR REVIEW** menu, for you to select the form in which the data is to be reviewed. See below for details.

To exit without selecting a session

- Press *F6*—**EXIT**.

Function keys

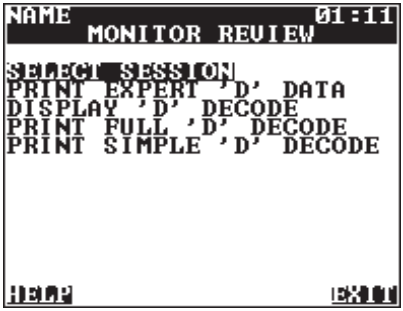
F3	**DEL**	Deletes the currently highlighted session from memory.

MONITOR REVIEW menu

This menu allows you to choose the form in which you wish to review the session, and transmit the data in the appropriate format.

To display the MONITOR REVIEW menu:

When you have chosen a session to review (using the **SELECT SESSION** *screen described above), the* **MONITOR REVIEW** *menu is displayed automatically.*



Options in the MONITOR REVIEW menu

You can choose one of the following:

SELECT SESSION	Returns you to the **SELECT SESSION** screen.
PRINT EXPERT 'D' DATA	Transmits the selected session in a form compatible with the **aurora**^{Expert} package to the currently selected communications port. A bar graph indicates the download progress in percentage format.
DISPLAY 'D' DECODE	Allows you to review the selected 'D' channel monitor session on screen. For details, see *DISPLAY DECODE DATA Screen* below.

PRINT FULL 'D' DECODE Transmits the selected D channel monitor session in a fully decoded mode to the currently selected communications port. A bar graph indicates the download progress in percentage format.

PRINT SIMPLE 'D' DECODE Transmits the selected D channel monitor session in a stick decoded mode to the currently selected communications port. A bar graph indicates the download time taken in a percentage format.

To choose how to review the session

- Highlight one of the above options and press *SELECT*.

Function keys

F6 **EXIT** Returns to the **MONITOR** menu for the selected interface.

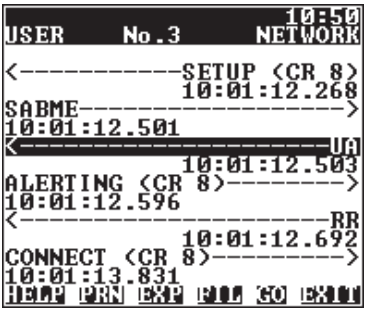
DISPLAY DECODE DATA screen

This screen displays the selected D Channel monitor session.

To display the DISPLAY DECODE DATA screen:

When you choose to view the session on screen by selecting **DISPLAY D DECODE** *from the* **MONITOR REVIEW** *menu described above, the* **DISPLAY DECODE DATA** *screen is displayed automatically.*

BRI



Note:
The above example shows the SIMPLE decode format. You can switch between SIMPLE and FULL format (which includes a full hex dump of the captured frame) by pressing *F3*.

Information displayed about the session

Line 1 displays the real time clock setting.

Line 2 displays the endpoints of the links, which are Network and User for Basic Rate and RXA and RXB for Primary Rate. As you scroll through the decode information, the number of the event that is currently displayed on the screen is indicated in the center of Line 2.

When you first display this screen, the data is displayed in SIMPLE decode format. This includes the following information:

- 1st line: The direction (**NETWORK**/**USER** or ***RXA***/***RXB***), the message type, the call reference in decimal format (if applicable) and direction.
- 2nd line: The timestamp of the message in hours, minutes, seconds and milliseconds.

Navigating through the data

Press the ***DOWN*** arrow to scroll down through the stored data one line at a time. To scroll back towards the beginning of the data, press the ***UP*** arrow.

In addition to using the cursor keys, you can scroll through the data using the following keys :

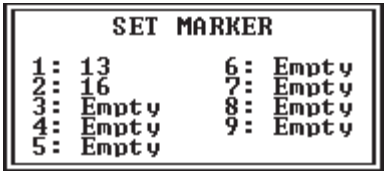
Navigation Keys

Key	Function
1	Displays the first event
2	Displays the previous event
3	'Pages up'
7	Displays the last event
8	Displays the next event
9	'Pages down'
*	Sets up display markers
#	Accesses marked events

Using markers

auroraDuet lets you 'mark' events to allow quick display at a later stage. Up to nine markers may be set. All markers are **deleted** when you exit from the **DISPLAY 'D' DECODE** screen.

To set a marker, display the event you wish to mark and press the asterisk key (*). The **SET MARKER** pop-up box is displayed.



Type the number of the marker which will be used to store the event number. For example, if event number 13 is displayed, you can type '1' to store event 13 in marker number 1. **Empty** is displayed next to unused markers. If the marker already contains a value, this is overwritten.

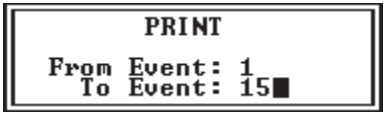
To go to a marked event, press the hash key (#). The **GOTO MARKER** pop-up box is displayed.



Type the marker number for the event you wish to display. In the above example, to display event number 13, type '1'.

Function keys

F2 **PRN** Prints an extract of events, using the **PRINT** pop-up box:



In **From Event**, key in the number of the first event from which you wish to print. In **To Event**, key in the number of the event where you wish to stop printing. Press *F6* to exit from the pop-up box and print the information.

F3 **EXPAND** Displays the data in expanded decode format, starting around the highlighted line 8 of the display. The expanded decode includes a full hex dump of the captured frame.

If you subsequently press ***F3*—SIMPLE**, the data is displayed in simple decode format, starting around the highlighted line 8 of the display. You can press ***F3*** to switch between **EXPAND** and **SIMPLE** as required.

F4 **FIL** Filters out specific information, using the **SET FILTERS** pop-up box:



Use the ***UP*** and ***DOWN*** arrow keys to move between **LAYER, TEI, SAPI** and **CALL REF**.

In **LAYER**, use the function keys to choose specific layers:

Function Keys

Key	Layer
F1	All Layers
F2	Layer 2 and Layer 3
F3	Layer 3
F4	Layer 2
F5	Layer 1

For **TEI**, either press ***F1*—ALL** or enter a new TEI value (you can use the ***LEFT*** arrow to delete any existing values).

For **SAPI**, either press ***F1*—ALL** or enter a new SAPI value (you can use the ***LEFT*** arrow to delete any existing values).

For **CALL REF**, either press ***F1—ALL*** or type a call reference (you can use the ***LEFT*** arrow to delete any existing numbers).

F5 **GO** Specifies an event number for display. The **GOTO EVENT** pop-up box is displayed.



Key in the event number, using the ***LEFT*** arrow key to delete any existing values.

F6 **EXIT** Returns to the previous menu.

Understanding Decode information

The Decode information is in the form of layer 2 and layer 3 partial decodes of the D Channel traffic. The layer 2 decode is displayed first followed by layer 3, if present, and a hexadecimal dump of the entire message. The following page shows a typical decode output for the beginning of the call setup process.

DECODE Output	Explanation
U<N Fr.52 05:34:42.759 L2:Sapi=0 Tei=127 UI pf=0 02 FF 03	Received Frame 52 at 05:34:42 with a SAPI of 0, a Tei of 127 and a Polling Bit of 0. This is a Layer 2 information frame, containing hex 02 FF 03.
L3:PD=08 CR(O)=6 M05 SETUP I04 bcap=Speech U Law I18 channel=B1 08 01 06 05 04 03 80 90 A2 18 01 89 70 04 80 31 32 33	The Layer 3 info is a SETUP message; bearer capability Speech, U Law on channel B1.
U>N Fr.46 05:34:43.053 L2:Sapi=0 Tei=64 INFO pf=0 Nr=0 Ns=0 00 81 00 00	Transmitted an ALERTING.
L3:PD=08 CR(D)=6 M01 ALERTING I18 channel=B1 08 01 86 01 18 01 89	Frames received 0. Frames sent 0.
U<N Fr.54 05:34:43.144 L2:Sapi=0 Tei=64 RR pf=0 Nr=1 00 81 01 02	Network replied with an RR. Frames received 1.
U>N Fr.47 05:34:45.433 L2:Sapi=0 Tei=64 INFO pf=0 Nr=0 Ns=1 00 81 02 00	Transmitted CONNECT.
L3:PD=08 CR(D)=6 M07 CONNECT 08 01 86 0	Frames received 0. Frames sent 1.
U<N Fr.55 05:34:45.447 L2:Sapi=0 Tei=64 INFO pf=0 Nr=2 Ns=0 02 81 00 04	Received CONNECT ACK.
L3:PD=08 CR(O)=6 M0F CONNECT ACK 08 01 06 0F	

TRACE CAPTURE REVIEW menu

SIMULATE

This menu allows you to review the most recent D Channel capture session. You can choose the form in which the data is to be reviewed, and there is also an option allowing you to clear the monitor memory.

Notes:

- You can print out the data via the comms port in **aurora**[Expert] compatible format. For information on **aurora**[Expert], contact Agilent Technologies.
- Each time new data is captured, any previous data is overwritten. When you switch off **aurora**[Duet] the most recently captured data is stored until new data is captured.
- To configure the communications port selected for printing, use the **COMMS SETUP** screen accessed through the **MAIN SETUP** menu.
- You can select the level of decoding and choose to display the data on-screen instead of printing it.

To display the TRACE CAPTURE REVIEW menu:
In the **MAIN** *SIMULATE menu, select* **CAPTURE REVIEW**.



The options you can select on this screen are identical to those on the **MONITOR REVIEW** menu described earlier in this chapter, with the following exceptions:

- there is a **CLEAR MEMORY** option
- the **SELECT SESSION** option is not available.

Options for reviewing the monitor sessions

To choose one of the available options, highlight it and press *SELECT*.

DISPLAY 'D' DECODE	Allows you to review the current D channel monitor session on screen.
PRINT EXPERT 'D' DATA	Transmits the current session, in a form compatible with the **aurora**[Expert] package, to the selected communications port. A bar graph indicates the download time taken in a percentage format.
PRINT FULL 'D' DECODE	Transmits the selected D channel monitor session, in a fully decoded mode, to the selected communications port. A bar graph indicates the download time taken in a percentage format.

PRINT SIMPLE 'D' DECODE	Transmits of the selected D channel monitor session, in a stick decoded mode, to the selected communications port. A bar graph indicates the download time taken in a percentage format.
CLEAR MEMORY	Removes all stored sessions from the memory.

Function keys

F6 **EXIT** Returns you to the **MAIN** menu.

Clearing the memory

To clear the memory of all stored sessions:

- Select **CLEAR MEMORY** from the **TRACE CAPTURE REVIEW** screen.
- When prompted, press ***F2*** to confirm.

To return to the **TRACE CAPTURE REVIEW** menu without clearing the memory press *F6*—**EXIT**.

Note:
In MONITOR mode, you clear the monitor memory by selecting **CLEAR MEMORY** from the **MONITOR** menu.

Protocol-Specific Setup Functions

8

aurora^{Duet} has some settings which are specific to particular protocols and others that are independent of protocol.

This chapter covers the *protocol-specific* general setup functions for **aurora**^{Duet}, which are all accessed from the **ISDN SETUP** menu. The *protocol-independent* setup functions are described in Chapter 5.

Chapter summary

This chapter describes general setup functions specific to the National ISDN, AT&T and Northern Telecom protocols in SIMULATE and MONITOR modes. It covers the screens used to define:

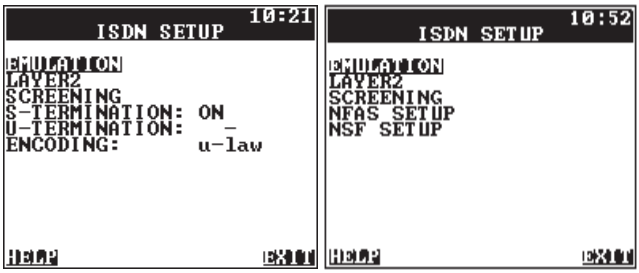
- the emulation mode
- Layer 2 settings
- screening options
- NFAS (Non Facility Associated Signalling) setup
- NSF (Network Specific Facility) setup
- setup functions in MONITOR mode

ISDN SETUP menu (SIMULATE)

In SIMULATE mode, the **ISDN SETUP** menu allows you to access further sub-menus to define a variety of ISDN parameters and operating modes.

To display the ISDN SETUP menu:
In the **MAIN SETUP** *menu, select* **ISDN SETUP**.

(BRI) (PRI)



Settings on the ISDN SETUP menu

To define each of the following settings, highlight it and use the *LEFT* and *RIGHT* arrow keys to toggle between the available choices.

(BRI)	**S-TERMINATION**	Switches the S termination relay **ON** and **OFF**.
(BRI)	**U-TERMINATION**	Switches the U termination relay **ON** and **OFF**.
(BRI)	**ENCODING**	Sets the voice encoding. You can choose between **A-LAW** and **µ-LAW** encoding. µ-law is the type most commonly used in the US.
(AT&T)	**SERVICE MSGS**	Switches the display of service messages from the network **ON** and **OFF**.

Accessing more screens of settings

To choose one of the available options, highlight it and press *SELECT*.

EMULATION — Accesses the **EMULATION** screen, from which you select an emulation mode.

BRI **LAYER 2** — Accesses the **LAYER 2** screen, on which you set up Layer 2 and B TEI information.

Note:
Although the **LAYER 2** option is displayed in both BRI and PRI mode, it is only used in BRI mode.

SCREENING — Accesses the **SCREENING** screen, on which you can allow incoming calls with a specific **CLID**, **CALL APPEARANCE** or **CPN/MSN**.

PRI **NFAS SETUP** — Accesses the **NFAS SETUP** screen, on which you can specify the use of NFAS (Non Facility Associated Signaling).

PRI **NFS SETUP** — Acceses the **NFS SETUP** screen, this allows you to choose to send a NSF feature or service message.

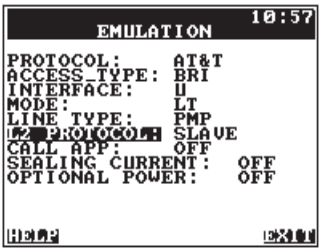
EMULATION screen

This screen is used to set the emulation mode of your **aurora**[Duet].

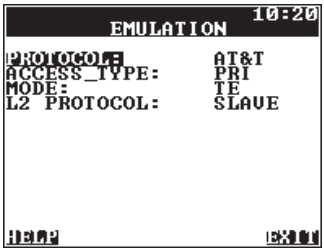
To display the EMULATION screen:

In the **ISDN SETUP** *menu, select* **EMULATION**.

BRI



PRI



Note:

When making your selections, if you work from the top downwards, **aurora**[Duet] automatically shows only the options which are valid with the previous selections.

Setting up the emulation mode

To define each of the following settings, highlight it and use the *LEFT* and *RIGHT* arrow keys to switch between the available choices.

PROTOCOL Sets the protocol to be used. You can choose between **AT&T**, **Nortel** and **NI**.

ACCESS_TYPE Switches between the Basic Rate (**BRI**) and Primary Rate (**PRI**) modes of operation, if PRI mode is fitted.

If you select PRI mode, the **INTERFACE**, **CALL APP** and **LINE TYPE** settings are not available.

BRI **INTERFACE**

Allows you to select the interface to be used. You can choose between **S** and **U**.

MODE

Determines whether **aurora**[Duet] operates as Terminal Equipment (**TE)**, a Network Terminator (**NT**) or a Line Terminator (**LT**). The options available depend on the interface you have selected. If you have selected Basic Rate and a U interface, **LT** and **TE** are available. If you have selected Basic Rate and a S interface, or Primary Rate, **NT** and **TE** are available. For more information, see ***aurora***[Duet] *Emulation Modes* in Chapter 1.

If you select **NT**, **aurora**[Duet] automatically selects the following:

L2 PROTOCOL	***MASTER***
power feed	**OFF**

If you select **TE**, **aurora**[Duet] automatically selects the following:

L2 PROTOCOL	***SLAVE***

If you select LT, **aurora**[Duet] automatically selects the following:

L2 PROTOCOL	***MASTER***
power feed	**OFF**

AT&T **BRI** **LINE TYPE**

This lets you choose between the **PMP** (Point-to-Multipoint) and **PP** (Point-to-Point) configurations.

L2 PROTOCOL

This lets you choose between the ***MASTER***, ***SLAVE*** and **NO D CHAN** protocol selection options.

MASTER and ***SLAVE*** are used to select Fixed Link operation. **NO D CHAN** is used to support Leased Line operation.

BRI **CALL APP**

Allows you to switch Call Appearance **ON** and **OFF**. A Call Appearance Identifier between 1 and 264 (AT&T) or 1 and 126 (NI or Nortel) is sent in the SETUP message when a call is made.

aurora[Duet] allows you to enter a Call Appearance Identifier whenever you make an outgoing call.

BRI **SEALING CURRENT**

When you have selected ***U INTERFACE*** and ***LT*** mode, this lets you switch the sealing current **ON** and **OFF**. The charger must be connected to supply NT power. For more information on sealing current, see Chapter 2.

BRI **OPTIONAL POWER**

When you have selected ***U INTERFACE*** and ***LT*** mode, this lets you switch optional power **ON** and **OFF**. The charger must be connected to supply NT power. For more information on optional power, see Chapter 2.

BRI **PS1 GENERATION**

When you have selected **S INTERFACE** and NT mode, this lets you switch **PS1** (power source 1) ON and **OFF**. The charger must be connected to supply NT power.

When **aurora**[Duet] is switched off, the power sources are automatically set back to **OFF**. For more information on power sources, see Chapter 2.

BRI **PS2 GENERATION**

When you have selected **S INTERFACE** and **NT** mode, this lets you switch **PS2** (power source 2) **ON** and **OFF**. The charger must be connected to supply NT power.

When **aurora**^{Duet} is switched off, the power sources are automatically set back to **OFF**. For more information on power sources, see Chapter 2.

The table below shows the possible power combinations for each selected interface type and mode.

Interface	S	S	U	U
Mode	TE	NT	TE	LT
PS1 Generation	—	OFF/ON	—	—
PS2 Generation	—	OFF/ON	—	—
Sealing Current	—	—	—	OFF/ ON
Optional Power	—	—	—	OFF/ ON

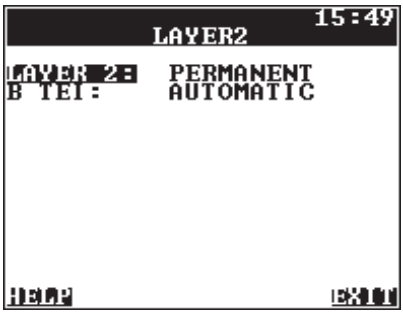
LAYER 2 screen

This screen is used to define various ISDN Layer 2 settings.

- In BRI mode, you can set up Layer 2 to be either Permanent or Automatic, and the Terminal Endpoint Identifiers (TEI) to be either automatic or fixed. See below for more information. If you set TEI to Fixed, you can enter up to two fixed B channel TEI values.
- In PRI mode, Layer 2 is always permanent and TEI is always fixed.

To display the LAYER 2 screen:

In the **ISDN SETUP** *menu, select* **LAYER 2**.



Setting up Layer 2 (BRI)

To define each setting, highlight it and use the ***LEFT*** and ***RIGHT*** arrow keys to switch between the available choices.

LAYER 2 Allows you to set Layer 2 to **AUTOMATIC** or **PERMANENT**.

If you choose **AUTOMATIC**, a Layer 2 logical link is established when a call is made, and released when the call is cleared.

If you choose **PERMANENT**, aurora[Duet] attempts to establish a Layer 2 link at power-on, with no call at Layer 3. If successful, the link is kept up and used in subsequent call setups. Layer 1 is inherent in this action. If the attempt is unsuccessful, aurora[Duet] tries again when the first call is made, and keeps up the link subsequently.

B TEI

Allows you to set the Terminal Endpoint Identifier (TEI) to either **FIXED** or **AUTOMATIC**.

If you choose **AUTOMATIC**, the B channel TEI values are assigned by the network.

If you select **FIXED**, additional menu items appear for you to enter two fixed **B TEI** values.

Entering fixed B channel TEI values

If you set **B TEI** to **FIXED** in BRI mode, or if you are in PRI mode, you can enter two fixed B TEI values. They must be in the range 00 to 63.

To enter a B TEI value:

- Press *F3*—**TEI1** to edit the **FIXED B TEI1** line, or *F4*—**TEI2** to edit the **FIXED B TEI2** line. A flashing cursor appears at the point where you enter the value.
- Enter a two digit number, using the keypad.

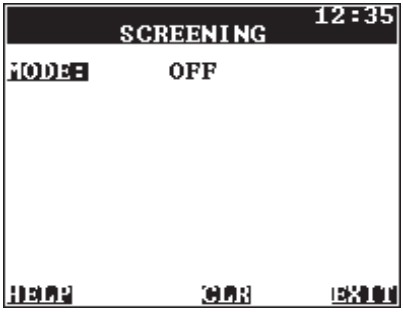
You must enter two digits before you can exit the line. To enter a single digit number, enter a leading zero followed by the single digit. For example, for '4' you would enter '04'.

SCREENING screen

When screening is enabled, you can set up **aurora**[Duet] to accept only those incoming calls which have a specific Calling Line Identifier (CLID), Calling Party Number/ Multiple Subscriber Number (CPN/MSN) or Call Appearance identifier (CA).

This screen is used to enable screening of incoming calls, set the type of screening that is to be used and the numbers that are to be screened.

To display the SCREENING screen:
In the **ISDN SETUP** *menu, select* **SCREENING**.



Choosing the type of screening

When you first enter the screen, screening is set to **OFF**. To change the screening type, check the current screening numbers or enter a new number, highlight **MODE** and use the *RIGHT* and *LEFT* arrow keys to switch between the available options: **OFF**, **CPN SCREEN, CLID SCREEN** and **CA SCREEN**.

As each type is displayed you can view and edit the numbers to be screened for that type. The numbers are stored even while **aurora**[Duet] is switched off. When editing a number, if you make a mistake use the ***LEFT*** cursor key to delete one digit at a time, or press the ***F4*—CLR** function key to delete the entire number.

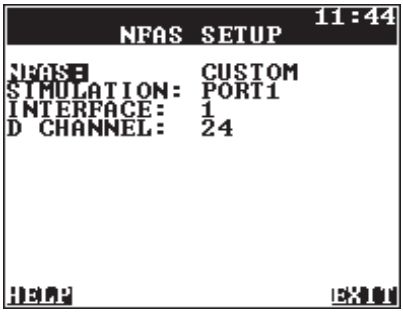
- If you choose **CPN**, you can enter up to 3 CPN (numbers consisting of up to 20 digits including a sub-address preceded with an asterisk (*).
- If you choose **CLID SCREEN**, you can enter one CLID number, consisting of up to 20 digits including a sub-address preceded with an asterisk (*).
- If you choose **CA**, you can enter one number consisting between 1 and 264 (AT&T) or 1 and 126 (NI and Nortel).
- If you choose **OFF**, this disables the screening facility.

NFAS SETUP screen (PRI)

When you enable **Non Facility Associated Signaling** (**NFAS**) on **aurora**[Duet], you can make and receive calls on a second T1 port, operating in 23B + D and 24B channel mode.

Both T1 ports can be configured to the ISDN network as TE or NT interfaces.

To display the NFAS SETUP screen:
In the **ISDN SETUP** *menu, select* **NFAS SETUP**.



To set the NFAS mode, move to **NFAS**, and use the *LEFT* and *RIGHT* arrow cursor keys to switch between the available choices.

You can choose between the following NFAS options: **OFF** (NFAS disabled), **STANDARD** (NFAS enabled) and **CUSTOM** (NFAS enabled, with the D channel location defined by you).

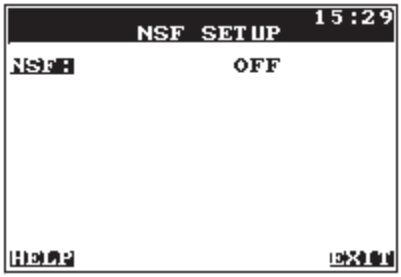
According to which mode you select, the following choices may be displayed:

SIMULATION	Sets the primary interface as **PORT 1** or **PORT 2**.
INTERFACE	Sets the second port's interface number (1-19) in **STANDARD** and **CUSTOM** NFAS mode. Use the keypad to enter the number. Press the ***LEFT*** arrow cursor key to erase the digit to the left of the cursor.
D CHANNEL	Sets the D channel slot number (1-24) in **CUSTOM NFAS** mode. Use the keypad to enter the number. Press the ***LEFT*** arrow key to erase the digit to the left of the cursor.

NFS SETUP screen (PRI)

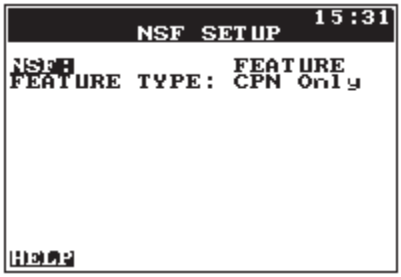
The **NSF** (Network Specific Facility) enables you to send a NSF information code in the SETUP message to a AT&T 4ESS switch.

To display the NSF SETUP screen:
In the **ISDN SETUP** *menu, select* **NSF SETUP**.



To set the NSF mode, move to **NSF**, and use the *LEFT* and *RIGHT* arrow cursor keys to choose between **FEATURE**, **SERVICE** and **OFF**.

To choose the code that is going to be sent, move to **FEATURE TYPE** or **SERVICE TYPE** and use the *LEFT* and *RIGHT* arrow cursor keys to switch between the available choices.



You can choose between the following codes:

Service Types:

SDN (Software Defined Network)
MEGACOM
ACCUNET
LONG DIST

Feature Types:

CPN Pref
BN Pref
CPN Only
BN Only
TSC Assoc
TSC
Operator
PCCO

The **Service Type** codes allow you to access the service types listed.

The feature type codes allow you to set up:

- how CPNs (Called Party Numbers) and BN (Billing numbers are sent when you make outgoing calls
- Call Associated and Non-call Associated TSCs (Temporary Signaling Connections)
- access to the operator or PCCO (Pre-Subscribed Common Carrier Operator)

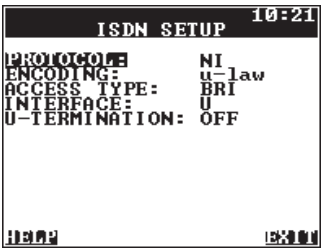
ISDN SETUP menu (MONITOR)

In MONITOR mode, when you choose **ISDN SETUP** in the **MAIN SETUP** menu, **aurora**[Duet] displays the **ISDN SETUP** menu.

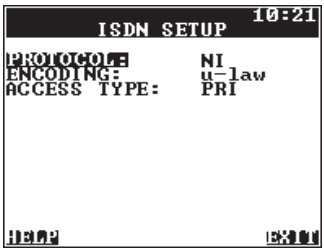
(BRI) This allows you to change the protocol and the encoding type. You can also switch between basic and primary rate, select an interface and switch U-termination on and off.

(PRI) This allows you to change the protocol and the encoding type. You can also switch between basic and primary rate.

(BRI)



(PRI)



Settings in the ISDN SETUP menu

To define each of the following settings, highlight it and use the *LEFT* and *RIGHT* arrow keys to toggle between the available choices.

PROTOCOL — Selects the protocol to be used. You can choose any of protocols available to you.

ENCODING — Sets the voice encoding. You can choose either ***A-LAW*** or ***μ-LAW***—μ-law is the type most commonly used in the US.

	ACCESS_TYPE	Allows you to switch between Basic Rate (**BRI**) and Primary Rate (**PRI**) operation, if PRI is fitted.
BRI	**INTERFACE**	Allows you to select either the **S** or **U** interface.
BRI	**U-TERMINATION**	When the U interface is selected, this setting allows you to switch U-termination **ON** and **OFF**.

Dial Setup for aurora^{Duet}

9

This chapter covers the dial setup functions for **aurora**^{Duet}. These are all protocol-specific, and are accessed from the ***DIAL SETUP*** menu.

Note:
You can only set up dialing in SIMULATE mode.

Chapter summary

This chapter covers the screens used to:

- create a directory of Called Party Numbers (CPNs)
- set the Calling Line ID (CLID) of your **aurora**^{Duet}
- set up the type of dialing to be used
- set up the number plan and number type to be used
- enter a Service Profile ID for your **aurora**^{Duet}

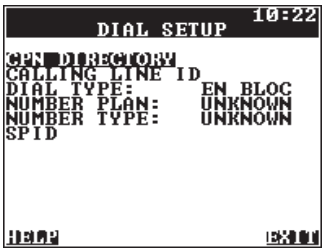
DIAL SETUP menu (SIMULATE)

This menu allows you to access further screens through which you can set up various different aspects of dialing. In addition, on the screen itself you can define the dial type, number plan and number type, and the way in which Send Complete is denoted in the call setup messages.

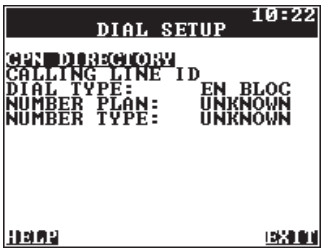
To display the DIAL SETUP menu:

In the **MAIN SETUP** *menu, select* **DIAL SETUP**.

BRI



PRI



Settings in the DIAL SETUP menu

To define each of the following settings, move the cursor to highlight it and use the *LEFT* and *RIGHT* arrow keys to toggle between the available choices.

DIAL TYPE

This setting determines the way in which dialed digits are transmitted. You can choose either **OVERLAP**—each digit is transmitted in its own call control packet, or **EN BLOC**—the digits are all assembled in one call control packet before transmission.

NUMBER PLAN

This setting determines the type of numbering plan format that you wish to use. The following formats are available:

UNKNOWN—The destination numbering plan format is not known. This is the default.

ISDN—See Recommendation E.164/E.163 for details.

DATA—See Recommendation X121 for details.

TELEX—See Recommendation F69 for details.

NATIONAL—National standard, i.e. it applies to public network exchanges.

PRIVATE—Private network numbering plan.

RESERVED—Reserved for future use.

NUMBER TYPE

This setting determines the number type format that will be used. The following formats are available:

UNKNOWN—The destination call format is not known. This is the default.

INTERNAT—Use this option when making an international call. Number formats vary according to the countries initiating and receiving the call.

NATIONAL—Use this option to make a call to another phone within the same country.

NETWORK—Use this option to make a call between two exchanges.

SUB. NUM.—A subscriber number, i.e. a local call without area codes.

ABB. NUM.—An abbreviated number, for example, a three digit extension number.

RESERVED—Reserved for future use.

Accessing further screens of dial settings

The other available dial setup screens are listed below. To move to ane of them, highlight it and press *SELECT*.

CPN DIRECTORY	Accesses the **CPN DIRECTORY**, in which you can store up to 10 Called Party Numbers to save time when setting up a call.
CALLING LINE ID	Accesses the **CALLING LINE ID** screen, in which you can choose whether to send the CLID in outgoing calls and Setup responses, and enter a CLID.

BRI **SPID**

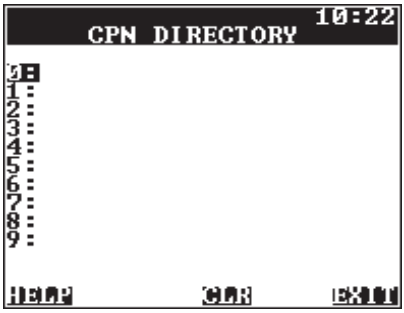
Accesses the **SERVICE PROFILE ID** screen, which lets you enter, view, edit and store a 16 digit Service Profile Identifier (SPID). This can be included as an information element in outgoing calls to identify your service profile to the network.

CPN DIRECTORY screen

You can use the CPN Directory to store up to 10 Called Party Numbers (CPNs) to save time when setting up a call using the **DIAL** menu.

Note:
If you choose **SET DEFAULTS** from the **GENERAL SETUP** menu, this clears all stored CPNs.

To display the CPN DIRECTORY screen:
In the **DIAL SETUP** *menu, select* **CPN DIRECTORY**.



Storing the CPNs

Highlight the CPN line you wish to edit. A flashing cursor shows the position at which you can enter a number.

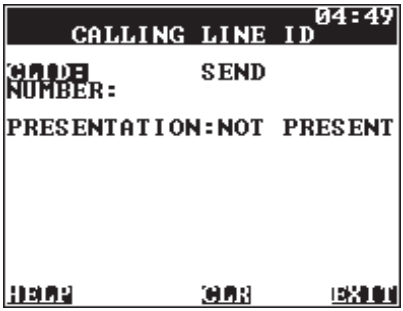
- Enter a CPN of up to 20 digits. To delete one character, press the ***LEFT*** arrow key. To delete the entire highlighted CPN, press ***F4*—CLR**.
- Press the ***UP*** or ***DOWN*** arrow to store the CPN being entered or edited.

NorTel The CPN may include a sub-address preceded by an asterisk (*).

CALLING LINE ID screen

This screen is used to enter, view, edit and store a 20-digit Calling Line ID (**CLID**). This can be included as an information element in outgoing calls.

To display the CALLING LINE ID screen:
In the **DIAL SETUP** *menu, select* **CALLING LINE ID**.



Setting up the Calling Line ID

- Highlight **CLID** and use the *LEFT* and *RIGHT* arrow keys to toggle between **SEND** and **DON'T SEND.** If you choose **SEND**, the **CLID** is sent in the Setup message for outgoing calls, and is in the Connect message for incoming calls.

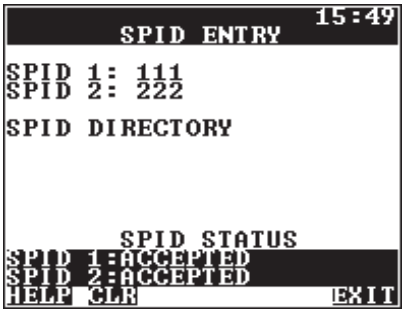
- Highlight **NUMBER** and type a CLID of up 20 digits. This may include a sub-address preceded by an asterisk (*). A flashing cursor appears at the point where you enter each digit. To erase the CLID, press *F4*—**CLR**.
- Highlight **PRESENTATION** and use the *LEFT* and *RIGHT* arrows to toggle between **ALLOWED**, **RESTRICTED**, **INTERWORK**, **RESERVED** and **NOT PRESENT**.
- Press *F6*—**EXIT** to save the CLID and return to the **DIAL SETUP** menu.

SPID ENTRY screen (BRI)

A Service Profile Identifier (SPID) is used by the terminal equipment to identify itself on the network on point-to-multipoint connections. It is included as an information element in outgoing calls.

This screen lets you enter, view, edit and store two 16 digit SPIDs.

To display the SPID ENTRY screen:
In the **DIAL SETUP** *menu, select* **SPID**. *You can also display the screen by pressing F5—***SPID** *in the* **MAIN** *menu.*



The screen displays the SPID values, if they are present.

At the foot of the screen, **aurora**[Duet] displays status messages from the network to indicate whether the SPID has been **ACCEPTED**, **REJECTED** or **NOT SENT**.

Entering the SPID

- Press the *DOWN* arrow key to highlight the required **SPID**.
- Use the keypad to enter a SPID of up to 16 digits. A flashing cursor appears at the point of entry for the next digit.

  You can use the *LEFT* arrow key to backspace and delete the previous digit. To clear the whole **SPID**, press *F2*—**CLR**.
- Press *F6*—**EXIT** to save the SPID as displayed and return to the **DIAL SETUP** menu.

Storing commonly used SPIDs

- Highlight **SPID DIRECTORY** and press *SELECT*. **aurora**[Duet] displays the **SPID DIRECTORY** screen, which is described later in this chapter.

Sending the SPID to the network

- To send SPID 1 to the network, press *F3*—**SND1**.
- To send SPID 2 to the network, press *F4*—**SND2**.

Function keys

F2	**CLR**	Erases the currently highlighted SPID.
F3	**SND1**	Sends SPID 1 to the network. This is only available when you have accessed the **SPID ENTRY** screen from the **MAIN** menu.

F4 **SND2** Sends SPID 2 to the network. This is only available when you have accessed the **SPID ENTRY** screen from the **MAIN** menu.

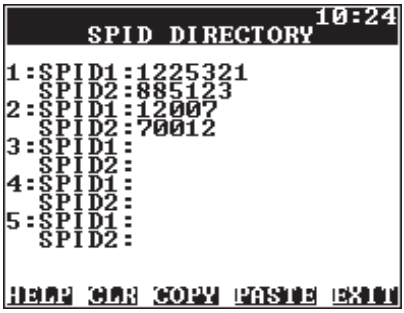
F6 **EXIT** Saves the changes and returns to either the **DIAL SETUP** menu or the **MAIN** menu.

SPID DIRECTORY screen (BRI)

This screen allows you to store up to 5 pairs of commonly used SPIDs.

To display the SPID DIRECTORY screen:

In the **SPID ENTRY** *screen, choose* **SPID DIRECTORY**.



Adding or changing a stored SPID

- Use the *UP* and *DOWN* arrow keys to highlight a line to add or change a **SPID**. A flashing cursor shows the point at which you can enter a number.
- Use the keypad to enter a **SPID** of up to 16 digits.

  If you make a mistake, use the *LEFT* arrow key to delete the character to the left of the cursor. To delete the entire **SPID**, press *F2*—**CLR**.
- Press the *UP* or *DOWN* arrow to store the SPID.

Storing SPIDs from the SPID ENTRY screen

- In the SPID directory, highlight the position in which you want the SPIDs from the **SPID ENTRY** screen to appear.
- Press *F3*—**COPY**. The SPID(s) are copied to that position.

Pasting SPIDs into the SPID ENTRY screen

- In the SPID directory, highlight the pair of SPIDs that you want to paste into the **SPID ENTRY** screen.
- Press *F4*—**PASTE**.

Function keys

F2	**CLR**	Erases the currently highlighted SPID.
F3	**COPY**	Copies SPID(s) from the **SPID ENTRY** screen to the current position in the SPID directory.
F4	**PASTE**	Pastes the highlighted SPID(s) into the **SPID ENTRY** screen.
F6	**EXIT**	Saves the changes and returns to the **SPID ENTRY** screen.

Calls and Testing for the Protocols

10

This chapter describes the call setup and testing functions for the National ISDN, AT&T and Northern Telecom protocols.

For information on non-protocol specific call and testing functions, see Chapter 6.

The chapter covers both Basic rate (BRI) and Primary rate (PRI) functionality. The main difference between BRI and PRI screens is that the ***F2*** (channel selection) function key, when available, shows **B1/B2** in BRI mode and **CH** in PRI mode. Also, in BRI mode, the ***F5*** (SPID selection) function key lets you swap between SPID 1 and SPID 2 (the one that is currently selected is displayed on the first line of the screen).

Introduction

All the functions described in this chapter are accessed by choosing **ISDN CALL SETUP** or **AUTO TEST** in the **MAIN** menu.

BRI

Calls can be in progress on both B1 and B2 channels simultaneously, but only one channel can be controlled (set up or cleared) at any one time.

PRI

Calls can be in progress on all 23 B channels (47 for NFAS) simultaneouslys, but only one channel can be controlled (set up or cleared) at any one time.

For voice calls, the called party would be another TE connected to the network.

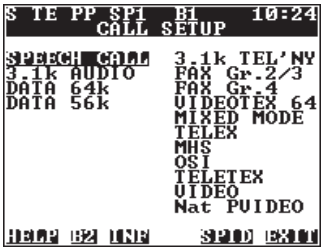
For data calls, the called party could either be another TE connected to the network or another channel of the same tester. This enables a full duplex looped BER test starting from B1TX, through the exchange, to B2RX, then looping back in the tester to output on B2TX, and back again through the exchange to B1RX (see the **BERT** and **LOOPBACK** screens).

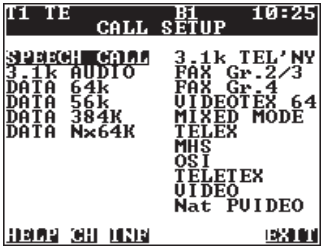
CALL SETUP screen

This lets you select the bearer capability and service for outgoing ISDN calls.

To display the CALL SETUP screen:
From the **MAIN** *menu, select* **ISDN CALL SETUP**.

BRI PRI





The screen shows a list of bearer capability and service options.

Choosing a channel for the call

Use the ***F2*** (channel selection) key as described in *The main function keys* in Chapter 4.

Choosing a SPID for the call (BRI)

- Use the ***F5*** key to switch between **SP1** (SPID 1) and **SP2** (SPID 2).

You will find information on how to set up SPIDs in Chapter 9.

Choosing a bearer capability/service

- Highlight your choice using the cursor and press *SELECT*.

aurora^{Duet} displays a **DIAL** screen from which you make outgoing calls using the bearer capability you have chosen.

(PRI) **Note:**

For **DATA Nx64K** calls, which are used for multi-channel BERT with protocol, before the **DIAL** screen **aurora**^{Duet} displays a **BERT CHANNELS** screen for you to select the channels for BER testing.

Function keys

F2	Allows you to select the channel on which the call will be made. For more information about channel selection, see the description of ***F2*** in *The main function keys* in Chapter 4.

BRI *F5* **SPID** Allows you to select a Service Profile ID (SPID) to use for the call. By pressing *F5* you can switch between SP1 and SP2. The current selection is displayed at the top of the screen.

For information on how to set up SPIDs, see Chapter 9.

F6 **EXIT** Returns you to the **MAIN** menu.

Setting up an outgoing call

The way in which you set up an outgoing call will depend upon:

- the bearer capability or service you are using
- the way in which dialing is set up—i.e. Overlap or En Bloc

When you select a bearer capability or service from the **CALL SETUP** menu:

- For all types of call except **DATA Nx64K**, **aurora**[Duet] displays the **DIAL** screen.
- For **DATA N*64K** calls, which are used for BERT on multiple channels, before the **DIAL** screen **aurora**[Duet] displays the **BERT CHANNELS** screen, for you to set up the channels on which BERT is to be performed. When you have set up the channels, **aurora**[Duet] proceeds to the **DIAL** screen.

PRI **Note:**
You can only make **DATA Nx64K** calls when using the Nortel or NI protocols, in PRI mode.

BERT CHANNELS screen (multi-channel BERT) PRI

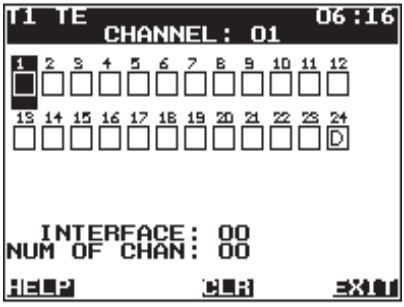
In the **CALL SETUP** menu, when you select the **DATA N*64K** option for BERT testing on multiple channels, this screen allows you to set up the channels on which BER testing is to be performed.

Notes:

- If you have chosen any bearer capability or service apart from **DATA N*64K**, the **BERT CHANNELS** screen is not displayed. You should proceed to the description of the **DIAL** screen later in this section.
- This section describes how to set up multi-channel BER testing when you are using a particular protocol. For information on multi-channel BERT without protocol see *BERT CHANNEL SELECT screen* in Chapter 6.

To display the BERT CHANNELS screen:

In the **CALL SETUP** *menu, when you select* **DATA N*64K**, *the* **BERT CHANNELS** *screen is displayed automatically.*



How the channels are displayed

When the NFAS feature is enabled (see Chapter 8), there are two channel selection screens, one for each T1 interface. Each screen displays 24 boxes, representing the 23 B channels plus the D channel. To switch between the two T1 interfaces, press ***F2—I/F***.

If there is already an active call on any channel, this is indicated by a horizontal line in the channel box. You cannot change the activity on this channel.

The **INTERFACE** line shows **00** for the first T1 interface (channel boxes 1 to 24) and **01** for the second T1 interface (channel boxes 25 to 48).

The line labeled **NUM OF CHAN** shows the total number of channels that you have selected for BER testing.

To set up the channels for BER testing:

- To select a channel for the BER test, highlight it and press *SELECT*.
- To deselect a selected channel, highlight it and press *SELECT* again.
- When you have selected all the channels you want for the test, press *EXIT*. The **DIAL** screen is displayed, as described on the following page.

Function keys

F2	**I/F**	Switches between the two T1 interfaces (only available if you have enabled NFAS).
F4	**CLR**	Deselects all channels.

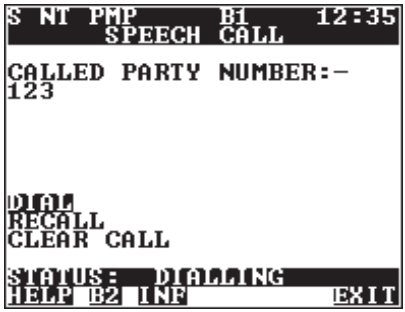
DIAL screen

This screen allows you to enter a called party number and initiate dialling. The format of the screen depends upon the selected bearer capability.

To display the DIAL Screen:

In the **CALL SETUP** *menu, when you select any bearer capability or service for an outgoing call except* **DATA N*64K**, *the* **DIAL** *screen is displayed automatically. If you choose* **DATA N*64K**, *the* **DIAL** *screen is displayed after you set up the channels for the BER test in the* **BERT CHANNELS** *screen*.

The example below shows the **DIAL** screen for a Speech call.



The selected bearer capability—for example, **SPEECH CALL**—is displayed.

Note:

The **DIAL** screen is similar for all bearer capabilities, with the following exception:

PRI

- If you have selected **DATA 384K**, which is used for higher data rate services, such as MPEG VIDEO data stream, you can select which block of 6 slots of the frame are to be assigned for the call. To do this, highlight **H0 TYPE** on the screen and use the *LEFT*

and ***RIGHT*** arrow keys to switch between the available options. You can choose between **PRIMARY 1-6**, **PRIMARY 7-12**, **PRIMARY 13-18**, **SECONDARY 1-6**, **SECONDARY 7-12**, **SECONDARY 13-18** and **SECONDARY 19-24**.

The last number dialed is automatically displayed.

The way you enter the CPN will depend on whether the dialing type is set to **OVERLAP** or **EN BLOC** in the **DIAL SETUP** screen. For details, see Chapter 9.

Overlap dialing (BRI)

- To dial the last CPN, while it is still displayed, select **DIAL.**
- To enter a new Called Party Number (CPN), use the keypad to enter up to 20 digits.

  With Overlap dialing, each digit you enter is sent immediately to the exchange until the call connects. This means that you cannot delete the digits you enter.
- To access the **CPN DIRECTORY** (see Chapter 9) and dial one of the stored CPNs, select **RECALL**.

En Bloc dialing

- To dial the last CPN, while it is still displayed, select **DIAL.**
- To delete the last CPN and start entering a new one, press any number on the keypad. You can use the *LEFT* arrow to delete from the end of the number.
- To dial a new CPN, use the keypad to enter up to 20 digits. To delete the last digit you entered, press the ***LEFT*** arrow key.
- Move the cursor to **DIAL** and press *SELECT*. With En Bloc dialing, all the digits you enter are sent as a group to the exchange.

When you have dialed the number

If a CLID has been entered using the **CALLING LINE ID** screen (see Chapter 9), the relevant information element is included in the outgoing Call Setup message.

The call status changes to **DIALING**, then progresses to **CODEC CONNECTED** (for voice calls) or **CONNECTED** (for data calls).

When the call is connected

For all call types the **CONNECTED** screen is displayed. For **DATA N*64K** calls, select the **CONNECT BERT** option. You will see the **N*64K BERT** screen, which displays the progress of the ongoing test.

To clear the call, move the cursor to **CLEAR CALL** and press *SELECT*. The clearing cause code is displayed. Press *F6*—**EXIT** to return to the **MAIN** menu.

Information displayed

Line 2 displays the bearer capability for the call.

Line 15 displays the call status: **DIALING**, **RINGING**, **CODEC CONNECTED** (for voice calls), **CONNECTED** (for data calls) or **CLEARED**. With En Bloc dialling the status can also be **ON HOOK**, before you initiate a call.

Function keys

F5	**SPID**	Allows you to select which Service Profile ID (SPID) to use when making a call. By pressing *F5* you can switch between SP1 and SP2. The current selection is displayed at the top of the screen.

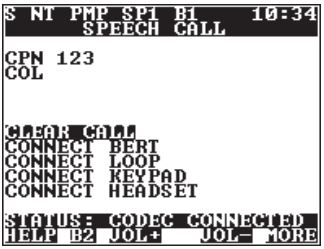
F6 **EXIT** If dialing has started, **aurora**[Duet] clears the call and displays the cause code. If dialing has not started, **aurora**[Duet] displays the **MAIN** menu.

CONNECTED screen

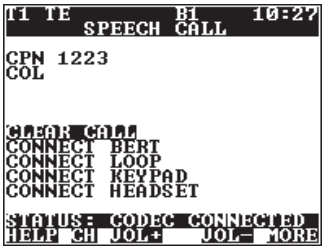
This screen is displayed during a connected call. It has options allowing you to perform various functions related to the call.

To display the CONNECTED Screen:
For all bearer capabilities and services on the **CALL SETUP** *menu, when a call is successfully connected, the* **CONNECTED** *screen is displayed automatically.*

BRI



PRI



Information displayed

The bearer capability or service for the connected call is displayed at the top of the screen.

The call status is either **CODEC CONNECTED** (for voice calls) or **CONNECTED** (for data calls).

For outgoing calls the Connected Party Number (COL), is displayed, if available. For incoming calls the Calling Line ID (CLID) is displayed, if available.

The function keys on the **CONNECTED** screen vary according to the type of call that is connected. See *Function keys* later in this section.

Options on the CONNECTED screen

To choose one of the available options, highlight it and press *SELECT*.

CLEAR CALL	Initiates clearing of the call. When the call is cleared, the clearing cause is displayed on the screen.
CONNECT BERT	Connects a BER test to the B channel. The **BERT CONNECTED** screen is displayed.
CONNECT LOOP	Loops back the channel. The **CONNECTED** screen is displayed, showing the status **LOOP CONNECTED**.
CONNECT KEYPAD	Lets you use the keypad to enter a string which you can send on the connection. The **KEYPAD** screen is displayed. Enter the string and press the *SELECT* key to send it.
CONNECT HEADSET	For voice calls (when the Codec is connected), this allows you to connect and disconnect an external headset.

Function keys

The function keys available on the **CONNECTED** screen will vary according to the type of call that is connected. For audio calls there are a number of specific function keys, as follows:

F2	**CH**	Displays the **Channel Selection** screen.
F3	**VOL+**	Increases the audio volume.
F5	**VOL-**	Decreases the audio volume.



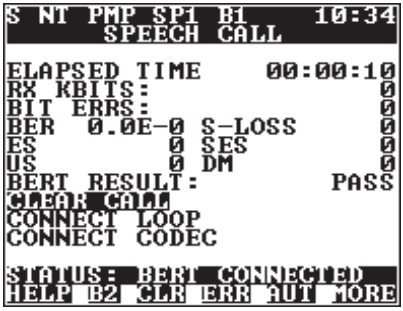
WARNING

Check the earphone volume is set to a safe level before lifting the tester to the ear as it is possible to increase the volume to a point where injury may result.

BERT CONNECTED screen

This screen displays BER test results on-line and lets you inject errors into the outgoing data stream.

To display the BERT CONNECTED screen:
From the **CONNECT** *menu, select* **CONNECT BERT**.



An indication that a BER test is running and in sync is provided by the *BERT SYNC* LED.

Options on the BERT CONNECTED screen

To choose one of the available options, highlight it and press the *SELECT* key.

CLEAR CALL Stops the BER test, stores the extended BER test results and initiates clearing of the call. When the call is cleared, the clearing cause is displayed in lines 12 and 13. Press *F6*—**EXIT** to return to the **MAIN** menu.

CONNECT LOOP Creates a loop back to the same B channel. The call status is displayed as **LOOP CONNECTED** to indicate that the loop is in progress.

CONNECT CODEC Allows you to speak after a BER test. The call status is displayed as **CODEC CONNECTED**, indicating that the BERT has been interrupted and you can now speak.

Function keys

F3 **CLR** Resets all counters and times accumulated.

F4 **ERR** Injects a single bit error into the transmitted data stream.

F5 **AUT/OFF** Allows you to toggle between starting and stopping the Auto Error Inject. The ratio of errors injected depends on the way you set up the **ERROR INSERT** option in the **BERT SETUP** menu.

F6 **MORE** Displays further function keys available to you, as follows:

F3 **INF** Displays information about the ISDN call. For details, see *The main function keys* in Chapter 4.

Information displayed

- Lines 4 to 9 display the BER test results, updated approximately each second. Results with very large or very small values are displayed in exponential format as described for the **BERT RESULTS** screen.

ELAPSED TIME (**HH:MM:SS**)	Elapsed time of BER test
RX KBITS	Number of received kilobits
BIT ERRS	Bit error count
BER	Bit Error Rate
ES	Errored Second
US	Unavailable Seconds
S-LOSS	SYNC loss
SES	Severely Errored Seconds
DM	Degraded Minutes

- If the BER test is a timed test, the results are stored and a **PASS/FAIL** indication is displayed on line 10. Times and pass / fail thresholds are defined using the **BERT SETUP** screens.
- Line 15 displays the following **STATUS** messages:

  CONNECTED (an end to end link is established), **BERT CONNECTED** (an end to end link is established and a test is in progress) and **CLEARED** (the link has been cleared down).

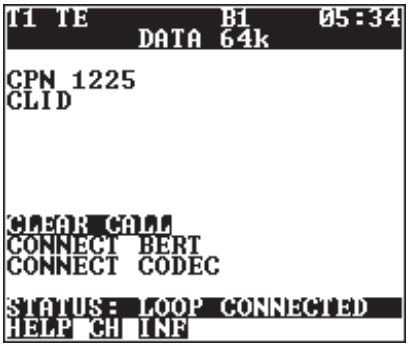
If there is an incoming **CLEAR CALL** request, **aurora**^{Duet} stops the BER test and stores the results.

Incoming calls

There are two ways in which an incoming call can be answered, depending on whether it is a Data or a Voice Type call.

Data calls

Incoming data calls are answered automatically. If the call is on the currently selected channel and no BER test is in progress, **aurora**[Duet] answers it automatically and displays a **LOOP CONNECTED** screen.



Information displayed

- Line 2 displays the bearer capability.
- Line 4 displays the Called Party Number **(CPN)**.
- Line 5 displays the Calling Line Identity **(CLID)**, if contained within the incoming call setup.

If the incoming call is on a channel other than the one currently selected, the ***F2*** (channel selection) function key flashes to alert you to the call.

To connect a BER test

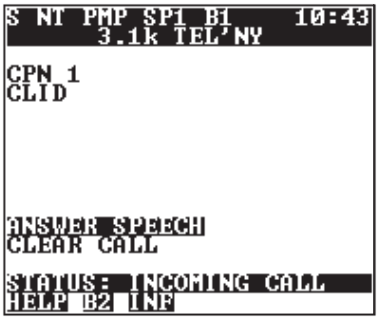
Highlight **CONNECT BERT** and press *SELECT*. **aurora**[Duet] displays the **BERT CONNECTED** screen for the relevant bearer capability.

To clear the call

Highlight **CLEAR CALL** and press *SELECT*.

Voice calls

When there is an incoming voice call, you can either answer it or clear the call.



Information displayed

- Line 2 displays the bearer capability.
- Line 4 displays the Called Party Number **(CPN)**.
- Line 5 displays the Calling Line Identity **(CLID)**, if contained within the incoming call setup.

To answer the call

Highlight **ANSWER SPEECH** and press *SELECT*. This answers the call and allows audio communication while **aurora**^{Duet} displays the **CONNECTED** screen for the relevant bearer capability.

To clear the call

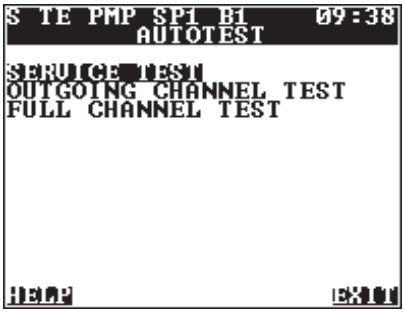
Highlight **CLEAR CALL** and press *SELECT*. When the call is cleared, press *F6*—**EXIT** to return to the **MAIN** menu.

AUTO TEST menu (SIMULATE)

This lets you select from a range of automatic tests.

To display the AUTO TEST menu:

From the **MAIN** *menu, select* **AUTO TEST**.



Starting a test

To select one of the tests, move the cursor to highlight it and press *SELECT*.

SERVICE TEST Displays the **SERVICE TEST** screen, on which you can enter a **CPN** and initiate an automatic test that uses all of the bearer capabilities for the current protocol, in turn, to check which services the link is configured to carry.

OUTGOING CHANNEL TEST Checks that outgoing calls can be established on each of the B channels in turn. You can also run a BER test on data calls.

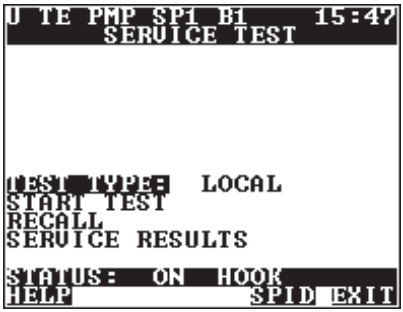
FULL CHANNEL TEST Establishes a call on each of the channels until all channels are active. The channels are then cleared down in the same order as they were established.

SERVICE TEST screen

This lets you enter a **CPN** and initiate an automatic test that uses all of the bearer capabilities for the current protocol, in turn, to determine which services the link is configured to carry. A call is made on the selected B channel for each of the bearer capabilities.

Service test results are stored even when **aurora**^{Duet} is switched off and on again.

To display the SERVICE TEST screen:
From the **AUTO TEST** *menu, select* **SERVICE TEST**.



To set up the service test

BRI

TEST TYPE Highlight **TEST TYPE** and use the arrow keys to toggle between **LOCAL** and **DISTANT**. A **DISTANT** test checks the acceptance of calls at all points over the ISDN network. A **LOCAL** test checks the acceptance of calls at the device to which you are connected—for example, your local exchange.

If you choose a **DISTANT** test, you need to enter a **CPN** of up to 20 digits. This is not required for a **LOCAL** test.

Note:

For Primary Rate testing, the service test is always **DISTANT**.

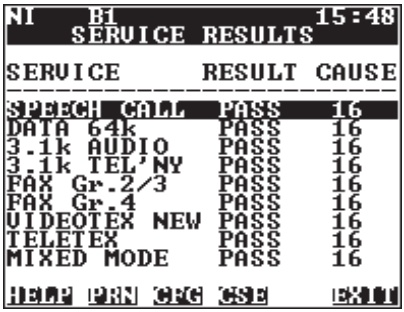
To start the test

- Select the test type (BRI only), then select **START TEST**. When each test is complete, the **SERVICE RESULTS** screen is displayed.

Note:

You can also access service results by selecting **SERVICE RESULTS** in the **SERVICE TEST** menu.

Service results display



The function keys available from the Service Results display are:

F2 **PRN** Prints the results via a serial port at the end of the test.

F3 **CFG** Displays information about the most recent Service test:

- **START TIME**—in the format **HH:MM**.
- **START DATE**—in the format **MM:DD:YY**.
- **PROTOCOL—**the protocol currently in use, e.g. NI.
- **ACCESS TYPE**—**BRI** or **PRI**.

BRI
- **INTERFACE—S** or **U**.
- **MODE—TE**, **NT**or **LT**.

BRI
- **LINE TYPE—PP** or **PMP**.
- ***L2 PROTOCOL—SLAVE*** or ***MASTER***.
- **CHANNEL—**one of **B1** through to **B23**.
- **TEST TYPE — LOCAL** or **DISTANT**.

F4 **CSE** Displays the call clear cause code and description.

F6 **EXIT** Aborts the test and returns to the **SERVICE TEST** screen.

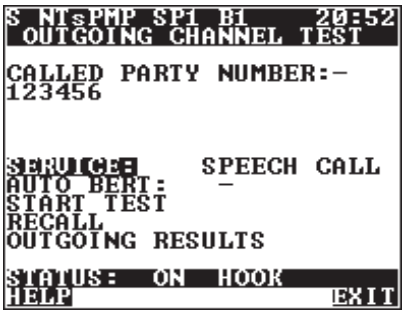
Notes on the service test

- If a test fails with an internal call cause code, all further tests are aborted and indicated as **FAIL** with a cause code of **0**.
- If you press *F6* during a test, all further tests are aborted after the current call has cleared. The remaining tests indicate that they have failed, with a cause code of **0**. The status line displays **SERVICE TEST STOPPING**.

OUTGOING CHANNEL TEST screen

This screen allows you to set up and perform an Outgoing Channel test. This establishes a data or speech call on each B channel in turn. You can also perform BERT on data calls.

To display the OUTGOING CHANNEL TEST screen:
From the **AUTO TEST** *menu, select* **OUTGOING CHANNEL TEST**.



To set up the Outgoing Channel test

To set up each of the test options, move the cursor to highlight it and use the *LEFT* and *RIGHT* cursor keys to switch between the available choices.

SERVICE Allows you to choose the type of service to be tested. You can choose between **DATA 64K** and **SPEECH CALL**.

AUTO BERT When the **DATA 64K** option is selected as the **SERVICE** type, this allows you to set **aurora**^{Duet} to perform a BER test after call connection. You can choose between **ON** and **OFF**.

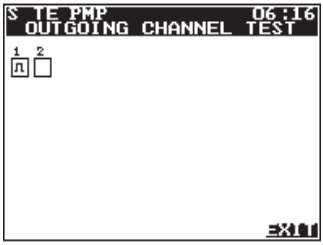
When a **SPEECH** service test is requested, the **AUTO BERT** option is automatically deselected. This is indicated by a hyphen (-).

Starting the test

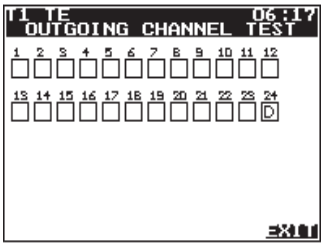
To begin the Outgoing Channel Test, choose the **START TEST** option.

The following screen is displayed:

BRI



PRI



The test starts at the current channel and continues until all channels have been tested. Each channel establishes a call.

On connection of a **DATA** service test, a BER test is executed if you have set the **AUTO BERT** option to **ON**. If **AUTO BERT** is set to **OFF**, the call disconnects immediately after connection.

The duration of the BER test depends on the setting of the **TEST LENGTH** option in the **BERT SETUP** menu. When this option is set to **CONTINUOUS** the test will run for 10 seconds.

When a **SPEECH** service test is selected, the call is disconnected as soon as an **ALERTING** message is received.

When the test is complete, a box is displayed for each channel containing one of the following symbols:

✓ Passed

✗ Failed

A shaded box indicates that the call has failed. The call clearing cause code is displayed below the channel box.

If a channel cannot be tested because a call is already active for that channel, then the result is **BUSY**. This is indicated by a blank box with a cause code displayed underneath.

When all channels have been tested, the results are displayed. The results can also be accessed from the **OUTGOING RESULTS** option as described below.

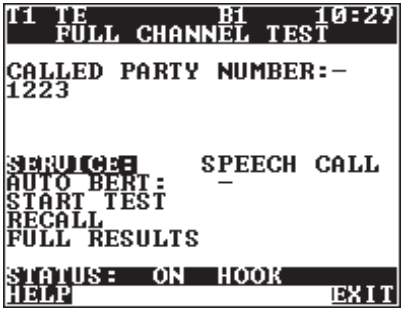
Note:
The results of each BER test are automatically printed to the comms port when the **TRACER SETUP** option is set to **RESULTS TO COMMS** and the **AUTO BERT** option is **ON**. The results are stored even while **aurora**^{Duet} is switched off.

Function keys
The function keys for the **OUTGOING CHANNEL TEST** screen are the same as for the **SERVICE TEST** described earlier in this chapter.

FULL CHANNEL TEST screen

This screen allows you to set up and perform a Full Channel Test. This establishes a call on each of the channels until all channels are active. The channels are then cleared down in the same order as they were established.

To display the FULL CHANNEL TEST screen:
From the **AUTO TEST** *menu, select* **FULL CHANNEL TEST**.



Setting up the Full Channel test

- Enter the number of the TE you wish to dial. The recommended number is your **aurora**$^{Duet'}$s own number or a device such as another **aurora**^{Duet} that is capable of handling multiple incoming calls. Note that if you choose your own **aurora**$^{Duet'}$s number then only half of the channels will be tested.

  To use a number from the CPN directory, highlight **RECALL** and press *SELECT*.

To set up each of the remaining test options, highlight it and use the *LEFT* and *RIGHT* arrow keys to toggle between the available choices.

SERVICE Allows you to choose the type of service to be tested. You can choose between **DATA 64K** and **SPEECH CALL**.

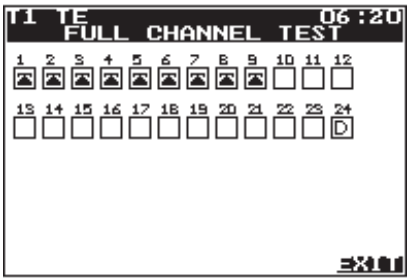
AUTO BERT When **SERVICE** is set to **DATA 64K**, you can set **aurora**^{Duet} to perform BERT after call connection. Choose **ON** or **OFF**.

When a **SPEECH** service test is requested, **AUTO BERT** is not available. This is indicated by a hyphen (-).

FULL RESULTS Displays the results of the last Full Channel test.

Starting the test

Choose **START TEST**. The screen below shows a typical channel display for Primary Rate.



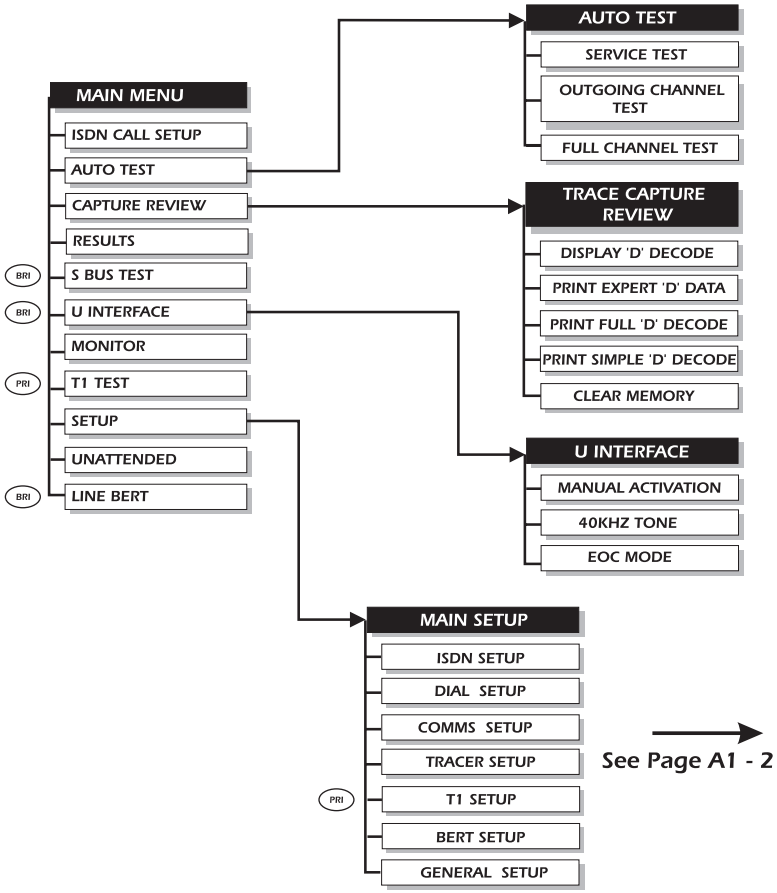
On completion of a **DATA** service test, **aurora**^{Duet} performs a BERT if **AUTO BERT** is set to **ON**. The test procedure and results are the same as for the **OUTGOING TEST**.

Function keys

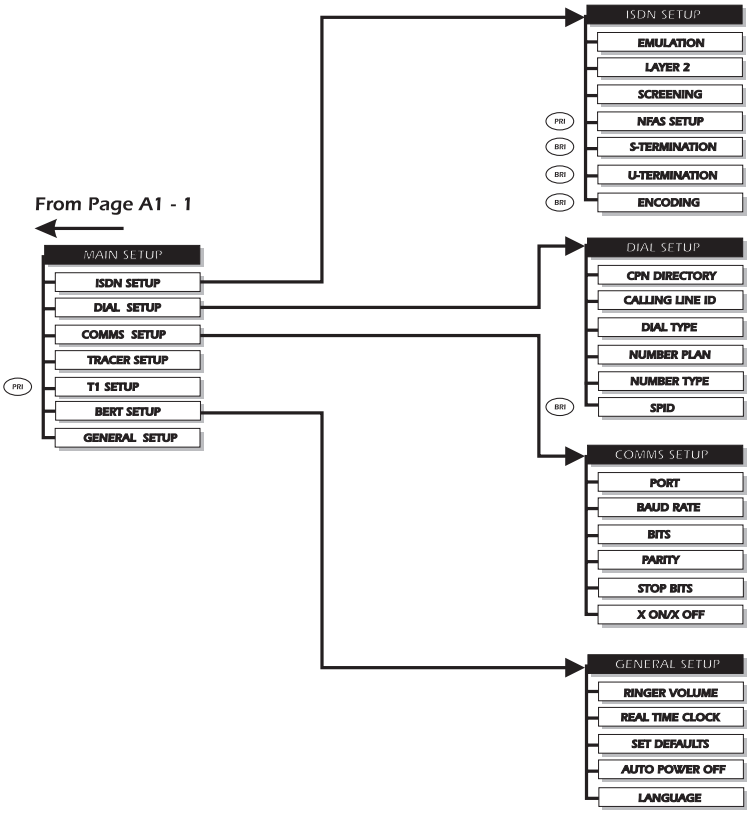
The function keys for the **FULL CHANNEL** test screen are the same as for the **SERVICE** test described earlier in this chapter.

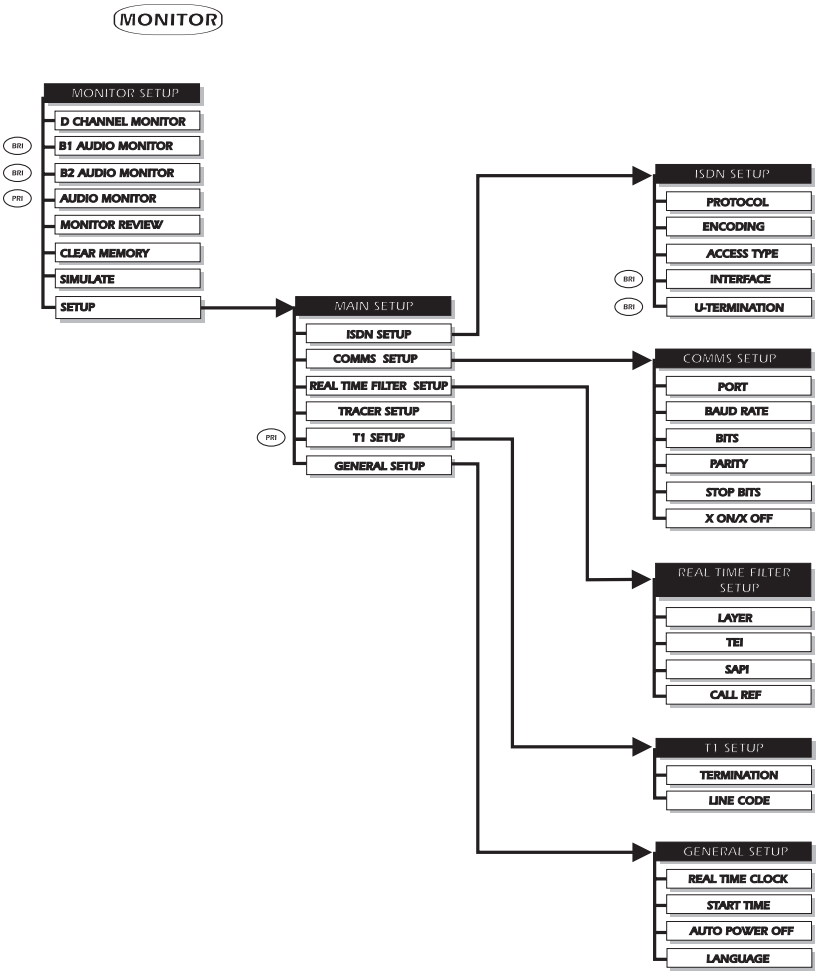
Menutree Diagrams A1

SIMULATE



See Page A1 - 2


From Page A1 - 1
MAIN SETUP
ISDN SETUP
DIAL SETUP
COMMS SETUP
TRACER SETUP
T1 SETUP
BERT SETUP
GENERAL SETUP
PRI
ISDN SETUP
EMULATION
LAYER 2
SCREENING
NFAS SETUP
S-TERMINATION
U-TERMINATION
ENCODING
PRI
BRI
BRI
BRI
DIAL SETUP
CPN DIRECTORY
CALLING LINE ID
DIAL TYPE
NUMBER PLAN
NUMBER TYPE
SPID
BRI
COMMS SETUP
PORT
BAUD RATE
BITS
PARITY
STOP BITS
X ON/X OFF
GENERAL SETUP
RINGER VOLUME
REAL TIME CLOCK
SET DEFAULTS
AUTO POWER OFF
LANGUAGE


MONITOR
MONITOR SETUP
D CHANNEL MONITOR
BRI
B1 AUDIO MONITOR
BRI
B2 AUDIO MONITOR
PRI
AUDIO MONITOR
MONITOR REVIEW
CLEAR MEMORY
SIMULATE
SETUP
MAIN SETUP
ISDN SETUP
COMMS SETUP
REAL TIME FILTER SETUP
TRACER SETUP
PRI
T1 SETUP
GENERAL SETUP
ISDN SETUP
PROTOCOL
ENCODING
ACCESS TYPE
BRI
INTERFACE
BRI
U-TERMINATION
COMMS SETUP
PORT
BAUD RATE
BITS
PARITY
STOP BITS
X ON/X OFF
REAL TIME FILTER SETUP
LAYER
TEI
SAPI
CALL REF
T1 SETUP
TERMINATION
LINE CODE
GENERAL SETUP
REAL TIME CLOCK
START TIME
AUTO POWER OFF
LANGUAGE

Call Clear Cause Codes A2

AT&T Call Clear Cause Codes

Cause Code	Description
1	*Unallocated (unassigned) number*
2	*No route to specified network*
3	*No route to specified transit network*
16	*Normal, Clearing*
17	*User busy*
18	*No user responding*
19	*User alerting, no answer*
21	*Call rejected*
22	*Number changed*
27	*Destination out of order*
28	*Invalid number format (incomplete number)*
29	*Requested facility rejected*
30	*Response to STATus ENQuiry*
31	*Normal, unspecified*
34	*No channel available*
35	*Call Queued*
41	*Temporary failure*
42	*Network congestion*
43	*Access information discarded*

Cause Code	Description
52	*Outgoing calls barred*
54	*Incoming calls barred*
58	*Bearer capability not presently available*
63	*Service or option not available, unspecified*
65	*Bearer capability not implemented*
66	*Channel type not implemented*
69	*Requested facility not implemented*
81	*Invalid call reference value*
82	*Identified channel does not exist*
88	*Incompatible destination*
91	*Transit network does not exist*
96	*Mandatory information element is missing*
97	*Message type nonexistent or not implemented*
98	*Message not compatible with Call state*
100	*Invalid information element contents*
102	*Recovery of timer expiry*
111	*Protocol error, unspecified*
127	*Interworking, unspecified*

National ISDN Call Clear Cause Codes

Cause Code	Description
1	*Unallocated (unassigned) number*
2	*No route to specified transit network*
3	*No route to destination*
4	*Vacant Code*
6	*Channel unacceptable*
7	*Call awarded and being delivered in an established channel*
8	*Prefix 0 dialled in error*
9	*Prefix 1 dialled in error*
10	*Prefix 1 not dialled*
11	*Excessive digits received, call is proceeding*
16	*Normal call clearing (peer)*
17	*User busy*
18	*No user responding*
19	*No answer from user (user alerted)*
21	*Call rejected*
27	*Destination out of order*
28	*Invalid number format*
30	*Response to STATUS ENQUIRY*
31	*Normal, unspecified*
34	*Circuit/channel congestion*
41	*Temporary failure*
42	*Switching equipment congestion*

Cause Code	Description
43	*Access information discarded*
44	*Requested circuit/channel not available*
57	*Bearer capability not authorized*
65	*Bearer capability not implemented*
81	*Invalid call reference value*
88	*Incompatible destination*
96	*Mandatory information element is missing*
99	*Mandatory information element is missing*
97	*Message type nonexistent or not implemented*
100	*Invalid information element contents*
101	*Message not compatible with call state*
102	*Recovery on time expiry*
111	*Protocol error, unspecified*
127	*Interworking, unspecified*

NorTel Call Clear Cause Codes

Cause Code	Description
1	*Unallocated (unassigned) number*
2	*No route to specified transit network*
3	*No route to destination*
6	*Channel unacceptable*
16	*Normal call clearing*
17	*User busy*
18	*No user responding*
19	*No answer from user (user alerted)*
21	*Call rejected*
22	*Number changed*
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*
41	*Temporary failure*
42	*Switch equipment congestion*
43	*Access information discarded*
44	*Requested circuit/channel unavailable*
47	*Resources unavailable/unspecified*

Cause Code	Description
50	*Requested facility not subscribed*
54	*Incoming calls barred*
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 type 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*
88	*Incompatible destination*
90	*Destination address missing, and direct call not subscribed*
95	*Invalid message, unspecified*
96	*Mandatory information element is missing*
97	*Message type non-existent or not implemented*
99	*Information element non-existent or not implemented*
100	*Invalid information element contents*
101	*Message not compatible with call state*

102 *Recovery on timer expiry*

111 *Protocol error, unspecified*

127 *Interworking, unspecified*

aurora^{Duet} specification

BRI

S interface

Conforms to CCITT (ITU-T) Rec. I430
Total Bit Rate 192kbps.
Net Data Rate 144kbps.
Connector RJ45.

2B1Q U interface (optional)

Designed to comply with ANSI T1.601
Net Data rate 144 kbps.
Connector RJ45.

Layer 3 protocols

5ESS/5ESS 200 specification 235-900-343
National ISDN specification SR-NWT-002661
Nortel specification NIS 5208-6 Iss.1.1.

Measurements

BRI

Physical

Measurement of Power Source 1 and 2 (on the S interface) and Sealing Current and Optional Power (on the U interface).

Voice

3.1kHz and ISDN voice calls on user selected B channel. Manual answer or automatic hands free listening.

BERT

Selectable test length - Custom, 1 min., 15 mins., 1 hr. or continuous patterns - Binary 0, Binary 1, 1:1, 1:3, 3:1, 63p.r., 511p.r., 2047p.r., 4095p.r., 2^15-1p.r., 2^20-1p.r. or user definable 16 bit pattern. Auto or manual bit error

inject. Automatic or manual answer and loop of receive to transmit data.

Results

Bits received. Bit Errors. Bit Error Ratio. Errored Seconds. Error Free Seconds. Severely Errored Seconds. Unavailable Seconds. Degraded Minutes. Elapsed Time. Sync Losses.

Protocol

Indication of call progress, showing status and clear/fail cause. Monitor and tracer facility giving time stamped full decode/layer primitives on screen or via selected printer port.

Display

Backlit, Supertwist Liquid Crystal Display (LCD). 24 characters by 16 lines.

Keypad

25 key keypad incorporating 6 function keys.

Environmental

Size:

320mm x 105mm x 75mm

Weight:

1.4 kg. (Basic Rate)
1.6 kg. (Basic & Primary Rate)

Temperature range:

0°C to 45°C (operating).
-25°C to +60°C (storage).

Power supply

Rechargeable Nickel Cadmium battery. Supplied with 110 Volt AC to DC adaptor.

User safety

The level of sound produced by the earpiece may exceed a safe level under some conditions, hence the earpiece should not be pressed hard against the ear. Care should also be exercised when using an external handset or headset, since the sound level generated by a user's handset or headset is beyond the control of Agilent Technologies.

When using your telephone equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock and injury to persons, including the following:

1. Avoid using the product during an electrical storm. There may be a remote risk of electric shock from lightning.

2. Use only the batteries indicated in this manual. Do not dispose of batteries in a fire. They may explode. Check with local codes for possible special disposal instructions.



Warning

aurora[Duet] contains a Lithium battery which maintains the real time clock and system settings. There is a danger of explosion if the battery is incorrectly replaced. The battery must only be replaced by the same or equivalent type recommended by Agilent Technologies. Should a defective battery be suspected, the whole **aurora**[Duet] must be returned to an authorized Agilent Technologies service center.

The voltage applied to the RS232/parallel port, the DC power input connector, the headset connector and the S Bus Test connector must not exceed 20V D.C.

Memory buffer capacity

Flash capacity

2MB standard; factory upgrade to 4MB is available.

Monitor memory

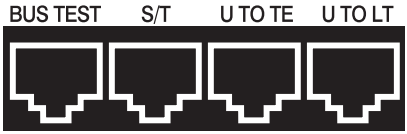
256KB standard; factory upgrade to 512KB available.

Tracer capacity

20 Kilobytes.

Connector configurations

Basic Rate connections:



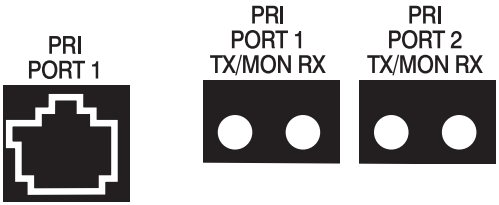
Four 8-position RJ-45 connectors:

BUS TEST	S-bus cable check connector
S/T	S-bus interface for simulation and monitoring
U TO TE	U interface LT line side for simulation and monitoring
U TO LT	U interface TE line side for simulation and monitoring

RJ-45 Pin assignment for the different modes of operation is as follows:

Basic Rate Connections				
Pin Number	**Monitor 'S' Function**	**NT 'S' Function**	**TE 'S' Function**	**'U' Function**
1	Not Used	Not Used	Not Used	Not Used
2	Not Used	Not Used	Not Used	Not Used
3	RXA+	RX+	TX+	Not Used
4	RXB+	TX+	RX+	Signal
5	RXB-	TX-	RX-	Signal
6	RXA-	RX-	TX-	Not Used
7	PS2 -	PS2 (source)	PS2 (sink) -	Power -
8	PS2 +	PS2 (source)	PS2 (sink) +	Power +

Primary Rate connections:



PRI PORT 1 8 position RJ-45 connector with transmitter and receiver, used for simulation/monitor functions on the T1 interface. Pin assignment as shown below.

Primary Rate Connections			
Pin	**TE Function**	**NT Function**	**Monitor Function**
1	Receive	Transmit	Receive A
2	Receive	Transmit	Receive A
3	No Connection	No Connection	No Connection
4	Transmit	Receive	Receive B
5	Transmit	Receive	Receive B
6	No Connection	No Connection	No Connection
7	No Connection	No Connection	No Connection
8	No Connection	No Connection	No Connection

TX/MON/RX Two Bantam connectors, each with transmitter and receiver, used for simulation/monitoring on the T1 interface.

Glossary

A-Law Companding technique for Pulse Code Modulation, used in Europe.

ASCII American Standard Code for Information Interchange.

AT&T A custom ISDN protocol used by AT&T.

auroraDuet A hand held BRI and/or PRI ISDN tester that enables you to verify the integrity of public switched and private wire ISDN connections.

B Channel Bearer Channel. ISDN utilizes multiplexed channels that are transmitted over the same physical medium. The channels that typically carry the user (subscriber's) voice/ data/video are referred to as Bearer Channels.

Basic Rate The type of ISDN circuit that is typically used for subscriber circuits. It consists of two B channels and one D channel = 144 Kbps of bidirectional user communications.

Baud Rate The number of line signal transitions per second. In a simple system where each bit is represented by a single level it is the same as the number of bits per second.

BER Bit Error Ratio. (Also called Bit Error Rate. It is a measure of transmission quality. It is the number of bits received in error during a transmission, divided by the total number of bits transmitted in a specific interval.)

BERT Bit Error Rate Test determines the probability of a single bit being misinterpreted over a defined period of time. It is determined by synchronizing and then comparing th received pattern with the binary test pattern as transmitted and counting any errors detected.

BRI Basic Rate Interface.

CCITT International Telegraph and Telephone Consultative Committee (acronym of the letters in French). A committee of the International Telecommunications Union (ITU), an agency of the United Nations, organised into 15 study groups that set standards or recommendations for telecommunications. An organisation with representatives from world governments.

Channel Refers to the path for transmission of information. It may be physical or logical.

Circuit In telecommunications it usually refers to a link connecting two or more nodes.

Clear Cause When a call is cleared a cause code is returned indicating the reason for the call being cleared.

CLID Calling Line Identity. This is the number that belongs to the calling party.

Clock An electronically generated periodic signal which is used to provide a timing reference to the transmitted data or other circuit functions.

CO Central Office. Refers to a central switching or control centre belonging to a Postal, Telegraph and Telephone.

CODEC Coder / Decoder.

COL Connected Line Number. This is the number of the called party, which may be different from the CPN dialled if the call has been redirected.

CPN Called Party Number. This is the number that is dialled by the calling party to make a call.

D Bit Delivery Confirmation bit or acknowledgement can be Local or End to End.

Data A term loosely used to describe any information which is presented in digital form whether it is text, voice or video.

D Channel	Demand Channel. This is one of the multiplexed channels in the ISDN information stream. The Demand channel carries signalling and call setup information ("the demands") and can also be used for packet data transmission to the subscriber.
EMC	Electromagnetic Compatibility.
EN_BLOC	The ISDN dialling digits are assembled and then sent in a single call control packet.
Encoding	Process for formatting information in a form suitable for transmission. Decoding involves converting it back to its original form at the received end.
End To End	Signalling method in which signals pass right through from end to end without processing within intermediate nodes.
ES	Errored Seconds. An Errored Second is a second in which one or more CRC violations are measured in a single direction of transmission.
ETSI	European Telecommunications Standards Institute.
FAS	Frame Alignment Signal.
HLC	Higher Layer Compatibility.
ISDN	Integrated Services Digital Network.
IVDT	Integrated Voice and Data Terminal.

kbps	Kilobits per second.
kHz	KiloHertz. Measure of frequency. Equal to 1000 cycles per second.
L2	Agilent Technologies aurora^{Duet}'s Layer 2 or Data Link Layer task.
L3	Agilent Technologies aurora^{Duet}'s Layer 3 or Network Layer task.
LAN	Local Area Network.
LED	Liquid Crystal Display.
LE	Local Exchange.
LED	Light Emitting Diode.
Loopback	Data received on the Rx channel of a circuit is re-transmitted on the Tx channel of the same circuit.
LT	Line Termination unit.
Master Clock	The clock which acts as the prime source within a network and from which all other clocks derive their synchronisation.
MMI	Man Machine Interface. (Human - computer interface).
Monitor	This is when an aurora^{Duet} receives information about current activity from ISDN equipment, i.e. an NT, TE or an aurora^{Duet}. In this mode, the aurora^{Duet} can only receive information; no transmission is possible.

MSN Multiple Subscriber Number.

μ - Law A companding technique used for PCN systems in North America. (Also written as mu-law).

National ISDN A standardised ISDN protocol used in North America. Also referred to as NI in this manual.

NFAS Non Frame Alignment Signal.

Northern Telecom A custom ISDN protocol used by Northern Telecom. Also called Nortel in this manual.

NT Network Termination.

OLI Originating Line Identity.

OSI Open Systems Interconnection.

Overlap The ISDN dialling digits are sent a digit at a time, each in their own separate call control packet.

PABX Private Automatic Branch Exchange.

Parity A simple mechanism for determining if a single bit error has occurred when individual characters are transmitted. Parity is transmitted as an additional bit in the character frame and may take the values: NONE, ODD and EVEN. NONE means that a parity bit is not included i.e. no error detection. ODD means that either a zero or a one is transmitted such that the total number

	of bits sent in a character including the parity bit is odd. EVEN, as per ODD, but the total number of bits sent is even.
PC	Personal Computer.
PMP	Point to Multipoint.
PP	Point to Point.
PRI	Primary Rate Interface.
Protocol	Rules, usually defined by a standards making body, for carrying out a specific function, such as exchange of information between two systems, synchronisation, error checking etc.
PSPDN	Packet Switched Public Data Network.
RJ45	An 8 pin IDC phone connector.
RTC	Real Time Clock - A calendar clock that is powered from its own battery and that continues to run even when the tester is switched off or the power is removed.
Rx	Receive.
SAPI	Service Access Point Identifier.
S Interface	A standard interface as defined in the CCITT recommendations that occurs on the terminal equipment side of the NT1 (e.g. between the TE1 and NT1 functional blocks or between TA and NT1). It is an interface to a 192Kbps, 2B+D, 4 wire circuit.

SELV Safety Extra Low Voltage circuit. (A circuit which is protected from hazardous voltages).

Simulate This is when an aurora^Duet emulates an NT or a TE, when in this mode an aurora^Duet can both transmit and receive information.

SPID Service Profile Identifier. A number, based on your equipment's directory number, that is used to identify the equipment on the bus.

Stop bits In asynchronous serial data transmission each character is encapsulated between a start bit and one or more stop bits.
In order to determine the end of one character and the start of the next the line is required to go to an idle state known as MARKING between characters and at the start of the next character it will become active again, SPACING. By convention we agree upon a minimum of: 1, 1.5, or 2 stop bits between characters, the line may be idle for any additional length of time until the next character is sent.

Sub Address The last two digits of an (NUA) not used by the network in routing. A suffix of 10 may be used to identify access to a Viewdata application, a suffix of 20 to access the host email post office application, and a suffix of 21 to access on line interactive login.

TA Terminal Adaptor. Used within ISDN to convert between non ISDN and ISDN references.

TE Terminal Equipment.

TEI Terminal Endpoint Identifier - an address on a multidrop ISDN that identifies a particular device. May be either permanently assigned or assigned on demand. E.g. TEI=127 is a broadcast, TEI=0-63 are permanently assigned, TEI=64-126 are dynamically assigned.

Teletex A data transmission standard, typically operating at 1200bits, which is an upgrade on the slower telex standard.

Terminator A resistor connected across the ends of a transmission line to satisfy the need for a constant impedance to reduce reflection and distortion of signals travelling down the transmission line. Transmission lines are normally terminated in a pure resistor whose Ohmic value is the same as the characteristic impedance of the transmission line.

TNV Telecommunication Network Voltage circuit. Test circuit for definition of safety in telecommunication systems.

Twisted pair	Refers to a cable consisting of a pair of wires which are twisted around each other, so as to minimise pick up of unwanted signals from other circuits.
Tx	Transmit.
U Interface	An ISDN reference point that occurs between the NT1 and the network. It is the first reference point at the customer premise.
Xon/Xoff	Flow control where the control signal passes in band in the normal data flow. The special characters XON (11H) and XOFF (13H) are used to halt and to restart the flow of data respectively.

Index

Symbols

3-4

A

AIS alarm 6-20
AOC D. *See* Charging
AOC E. *See* Charging
Auto Test 10-17
Automatic tests
  full channel test 10-24–10-25

B

B channel 4-3
Backlight 3-4
Basic Rate 1-7
  Switching to Primary Rate 4-15
Battery Pack 3-2
BCAP. *See* Bearer capability
Bearer capability 10-3
BER test 10-12. *See also* Bit Error Rate Test
  Connect 10-12
  Error insertion 5-21
BERT setup 5-20
BRI. *See* Basic Rate

C

Call Information 4-12
Capture
  Review 7-24
Capture Review 7-14
Cause codes 4-13, A2-1
Central Office 1-9
Channels 4-10, 4-11
Charger socket 3-2
CLI. *See* Calling Line ID; Calling Line Identity
CLID 4-13

Clock 4-5
CO. *See* Central Office
COL. *See* Connected Line Number
Comms Setup 5-12
Connect
  BERT 6-10
  Loop 6-9, 6-10, 6-15
Connected Line Number 4-13
Connecting auroraDuet 3-10
  at the S/T Interface 3-10
  at the U Interface 3-10
Contrast 3-4
CPN 4-13, 9-6. *See also* Called Party Number
  Directory 9-5
Cross Connections
  Establishing 4-17
  Removing 4-18
Cursor pad 3-3

D

D Channel BERT 6-8
Data calls 6-2, 6-4
Decode Data 7-17, 7-22
Dial Setup 9-2
Display Element 4-13

E

Earphone 3-2
Embedded Operations Channel 5-7
Emulation 8-4
  configuration 4-3
  type 4-3
Exit 4-14
External DC Supply 3-8
External Headset Connector 3-8

F

Full channel test 10-24–10-25
  setting up 10-24–10-25
FULL CHANNEL TEST screen 10-24–10-25

Function keys 3-3

G

General Setup 5-23

H

Headset 3-2
Help 4-8, 4-10
Hot Keys 4-14, 5-3

I

Incoming Call 10-15
Interconnection type 4-3
ISDN Setup 8-2

L

Layer 7-21
Layer 1 alarms
  alarm indication signal (AIS) 6-20
  FAS errors 6-21
  frame slips 6-21
  loss of frame synchronisation (LOS) 6-20
Layer 2 8-7
LCD. *See* Liquid Crystal Display
LE. *See* Local Exchange
LED 6-7. *See also* Light Emitting Diode
Light Emitting Diode 3-5
Liquid Crystal Display 3-3
Loading auroraDuet Software 4-20
Local Exchange 1-9
Loop test 6-9
LOS alarm 6-20

M

Main Menu 4-1
Main Setup 5-10
Markers 7-19
Microphone 3-2
Monitor 7-1
Monitor Review 7-14, 7-16

N

Network Terminator 1-8
Network terminator type 1 1-8
Network terminator type 2 1-8
NT. *See* Network Termination
NT1. *See* Network terminator type 1
NT2. *See* Network terminator type 2

O

ON/OFF Switch 3-2
Optional Power 4-4, 7-3

P

PMP. *See* Point-to-Multipoint
Point-to-Multipoint 1-11
Point-to-Point 1-10
Power 3-2, 3-11, 4-3, 7-3
  Optional Power 4-4, 7-3
  Power Source 1 4-4, 7-3
  Power Source 2 4-4, 7-3
  Sealing Current 4-4, 7-4
PP. *See* Point-to-Point
Presentation 9-7
PRI. *See* Primary Rate
Primary Rate 1-7
  Connections A3-5
  Switching to Basic Rate 4-15
Protocol 4-5, 8-1

R

Real Time Clock 5-26
Real Time Filter Setup 5-11
Ringer 3-3
  Volume 5-26

S

'S' Bus cable check connector 3-9
Safety 3-10, A3-3
Screening 8-10

Sealing Current 4-4, 7-4
SELECT key 3-4
Service Test
  Distant 10-19
  Local 10-18
SET DEFAULTS 9-5
Setup functions 4-18
Speech Call function 4-19
SPID 4-3. *See also* Service Profile ID
Start Time 5-27

T

TE. *See* Terminal Equipment
TEI 5-15, 7-21
Terminal Equipment 1-8, 1-9
Testing
  full channel test 10-24–10-25
Tracer Setup 5-15

U

U Interface 5-6
  connector 3-9
  Information 5-9
u-Law voice encoding
  Switching to A-Law 8-2, 8-16
Unattended 6-6
Upgrading auroraDuet Software 4-20

V

Voice calls 6-1, 6-3

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP