
HP OmniBER 718

About This Book

This book tells you how to select the features that you want to use for your test.

The selections available are presented in the following groups:

- Transmit and receive interfaces
- Test features, for example, the addition of errors and alarms to the test signal
- Measurements including test timing
- Storing, logging and printing results with general printer information
- Using instrument and disk storage
- Using the “Other” features.

The selections available will depend on the options fitted to your instrument. The examples given in this book cover all options and therefore may include selections which are not available on your instrument.

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Introduction

The HP OmniBER Communications Performance Analyzer provides all the test capability you need to fully verify the performance of today's high-capacity transmission systems and networks.



The main features of this instrument are:

- Multi-rate transmission testing from DS0 to OC-48, including jitter.
- Concatenated payloads testing to STM-16c/OC-48c.
- Full PDH/T-carrier testing.
- Direct measurement of protection switching time.
- Powerful thru-mode testing for SDH/SONET ring turn-up.
- Comprehensive SDH/SONET overhead testing.
- Fast access to key measurement tasks via HP Smart Test.

Conventions

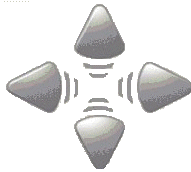
The conventions used in this manual to illustrate instrument keys and display information are as follows:

TRANSMIT

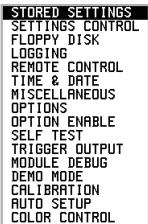
This is an example of a hardkey. Hardkeys (located to the right of the display) are used to give access to different sets of instrument settings, or select dedicated instrument functions. The key shown here displays the transmit settings.

PARALLEL

This is an example of a softkey. Softkeys (located below the display) are used to select instrument settings. The values associated with softkeys change as you move the display cursor from one instrument setting to another.



These are the cursor control keys. They are used to move the display cursor from one instrument setting to another.



This is an example of a pop-up menu. Pop-up menus are an alternative way of selecting instruments settings (instead of using softkeys). To access a pop-up menu, highlight an instrument setting, then use the **SET** key.



This symbol (when it appears next to settings on the display) indicates that there is a pop-up menu associated with the instrument setting. To access a pop-up application, highlight the instrument setting which has this symbol, then use the **SET** key.



This symbol appears at the bottom right of the display when an optical transmit module is fitted to the instrument. The symbol's background changes from black to yellow when the optical output is switched on.

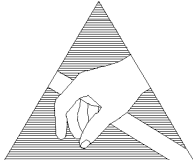
Connecting to the Network

Connecting to the Network

The network connectors are located on the modules at the side of the instrument. The connections available depend on the options fitted to your instrument.

Before connecting, note the Warning and Caution information given.

All Connectors

CAUTION

When connecting or disconnecting, ensure that you are grounded or, make contact with the metal surface of the Mainframe with your free hand to bring you, the module, and the mainframe to the same static potential.

Modules remain susceptible to ESD damage while the module is installed in the Mainframe

Additional ESD information is required when servicing, see your Installation/ Verification manual for further information.

Optical Interface Connectors

For your protection, review all laser information given in this manual and the Installation and Verification manual before installing or using the instrument.

WARNING

To prevent personal injury, avoid use that may be hazardous to others, and maintain the module in a safe condition. Ensure the information given below is reviewed before operating the module.

Laser Product Classification

All optical modules are classified as Class I (non-hazardous) laser product in the USA which complies with the United States Food and Drug Administration (FDA) Standard 21 CFR Ch.1 1040.10, and are classified as Class 1 (non-hazardous) laser products in Europe which complies with EN 60825-1 (1994).

To avoid hazardous exposure to laser radiation, it is recommended that the following practices are observed during system operation:

- **ALWAYS DEACTIVATE THE LASER BEFORE CONNECTING OR DISCONNECTING OPTICAL CABLES.**

- When connecting or disconnecting optical cables between the module and device-under-test, observe the connection sequences given below.

Connecting: Connect the optical cable to the input of the device-under-test **before** connecting to the module's *Optical Out* connector.

Disconnecting: Disconnect the optical cable from the module's *Optical Out* connector **before** disconnecting from the device-under-test. Always fit the fibre optic connector dust caps over the laser aperture.

- NEVER examine or stare into the open end of a broken, severed, or disconnected optical cable when it is connected to the module's *Optical Out* connector.
- Arrange for service-trained personnel, who are aware of the hazards involved, to repair optical cables.

Optical Interface Connectors

CAUTION

1. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
 2. Always fit the fibre optic connector dust caps on each connector when not in use. Before connection is made, *always* clean the connector ferrule tip with acetone or alcohol and a cotton swab. Dry the connector with compressed air. Failure to maintain cleanliness of connectors is liable to cause excessive insertion loss.
-

Laser Warning Symbols

The front panel of the optical module has the following label:

CLASS 1 LASER PRODUCT

NOTE

CLASS 1 LASER PRODUCT translates as follows:

Finnish - LUOKAN 1 LASERLAITE

Finnish/Swedish - KLASS 1 LASER APPARAT

This label indicates that the radiant energy present in this instrument is non-hazardous.

OPTICAL IN

Allows connection of an optical signal, wavelength 1200 to 1600 nm, at a maximum power level of -3 dBm (-8 dBm for OmniBER 718A instruments).

NEVER EXCEED +3 dBm.

Accepts SONET signals OC-1, OC-3 and OC-12.

OPTICAL OUT

Provides optical signals OC-1, OC-3 or OC-12 at wavelength 1280 to 1335nm (1280 to 1330nm for OmniBER 718A instruments), and/or 1480 to 1580 nm (1550 to 1565 for OmniBER 718A instruments) , at a nominal power level of +1 dBm.

Cleaning Optical Connectors

Cleaning Optical Connectors

It is recommended that the optical connectors be cleaned at regular intervals using the following materials:

Description	HP Part Number
Blow Brush	9300-1131
Isopropyl Alcohol	8500-5344
Lens Cleaning Paper	9300-0761
Adhesive Tape Kit	15475-68701

CAUTION

Do not insert any tool or object into the IN or OUT ports of the instrument as damage to or contamination of the optical fibre may result.

- 1 Recall Default settings (STORED SETTINGS 0) and remove the power from the HP OmniBER 718.
- 2 Remove the adapters from the IN and OUT ports. Use an 11 mm spanner to slacken the nut securing the adapter. On re-assembly tighten the nut using a torque spanner to 1.5 Nm.
- 3 Using the blow brush with the brush removed blow through the ferrule of the standard flexible connector and the adapter.

CAUTION

If the optical fibre of the fixed connector requires further cleaning this entails disassembly of the module which should only be carried out by suitably trained service personnel.

- 4 Apply some isopropyl alcohol to a piece of the cleaning paper and clean the barrel of the adapter. Using a new piece of cleaning paper, clean the face of the adapter. Repeat this operation, using a new piece of cleaning paper each time.
- 5 Lightly press the adhesive side of the tape provided against the front of the adapter, then remove it quickly - repeat twice. This removes any particles of cleaning paper which may be present.
- 6 Replace the adapters on the flexible connector.

Connecting Accessories

Connecting Accessories

LID Provides the output for the option 602 printer which is fitted in the cover (lid) of the instrument.

VGA Provides the output for a display monitor.

HANDSET Allows connection of a telephone handset for communication across the network.

Printer
HP-IB (GPIB),
RS232,
PARALLEL ONLY

External printer connection details are given in Chapter 4.
The port selected for external printer use is not available for remote control.

Remote Control
HP-IB (GPIB),
RS232,
10 BASE -T

Remote control connection is given in the Remote Control Manual.
The port selected for remote control use is not available for an external printer.

10 Base-T Lan Connection Radiated Emissions

To ensure compliance with EN 55011 (1991) a category 5, FTP patch lead, RJ45 cable should be used to connect the LAN port on the processor module marked "10 Base-T".

Front Panel Soft Recovery (Cold Start)

Front Panel Soft Recovery (Cold Start)

Use the following procedure if you need to perform a front panel soft recovery (i.e. cold start) of the instrument.

Soft Recovery Procedure

- 1 Switch off the instrument.
- 2 On the instrument front panel - press and hold softkeys 0 and 4 simultaneously (the softkeys immediately below the display; key 0 is on the extreme left).
- 3 Power up the HP OmniBER 718 while holding the softkeys pressed.
- 4 When the LOS LED has flashed OFF and then ON again, the keys can be released.
- 5 The LOS LED will flash OFF/ON again several times (7), followed by an audible 'beep' and the display indicating 'Initializing Instrument'.
- 6 Once the initiations is complete the display will indicate:
'Firmware Revision Update'
'Default settings assumed'
Hit any key to attempt restart'
- 7 Hit any key, then wait approximately 10 seconds. The instrument should return to its default settings and normal operation.

Instrument Options

Instrument Options

Option 001 - SDH

Option 002 - SDH/SONET

Option 012 - PDH

Option 014 - E1 in DS3 Mux/Demux

Option 104 - 1310nm Optics

Option 105 - 1550nm Optics

Option 106 - 1310/1550nm Optics

Option 200 - Jitter

Option 600 - OmniBook PC

Option 601 - Remote Control

Option 602 - In-lid printer

Option 610 - Replace FC/PC with SC connectors

Option 611 - Replace FC/PC with ST connectors

Option 620 - Replace BNC with WECO 560 connectors

Instrument Options

"Setting PDH/DSn Transmit Interface (option 012) " page 22

"Setting SDH Transmit Interface " page 25

"Setting Jitter Transmit Interface " page 29

"Setting Wander Transmit Interface " page 31

"Setting SDH THRU Mode " page 33

"Setting PDH/DSn Receive Interface (Option 012) " page 39

"Setting SDH Receive Interface " page 41

"Setting Jitter Receive Interface " page 42

"Setting Extended Jitter Receive Interface " page 43

"Setting Wander Receive Interface " page 44

Setting the Interfaces

This chapter tells you how to set the instrument interfaces to match the network being tested.

Setting the Interfaces

Setting PDH/DSn Transmit Interface (option 012)

Description

PDH transmit interface settings should match network equipment settings of Rate, Termination and Line Code and determine the Payload to be tested.

TIP:

To set the Transmitter and Receiver to the same interface settings choose **OTHER** **SETTINGS CONTROL** **COUPLED**.

TRANSMITTER OUTPUT		[PDH/DSn]
MAIN SETTINGS	STRUCT'D SETTINGS	JITTER TEST FUNCTION
SIGNAL		[2 Mb/s]
CLOCK	[INTERNAL]	
TERMINATION		[75Ω UNBAL]
LINE CODE		[HDB3]
FREQUENCY OFFSET		[OFF]
PAYLOAD TYPE	[UNFRAMED]	UNSTRUCTURED
PATTERN		[2 ¹⁵ -1 PRBS]
PRBS POLARITY		[INU] ITU
INTERNAL	EXTERNAL	STM-0 RECEIVE STM-0 OPT REC

HOW TO:

- 1 Choose the required SIGNAL rate from 2 Mb/s, 8 Mb/s, 34 Mb/s, 140 Mb/s PDH, plus DS1, DS3 T-carrier interfaces.
- 2 Choose the required CLOCK SYNC source, internally generated or recovered from the received PDH signal. If you select an external clock source, connect the external source to the appropriate port on the OmniBER clock module.
- 3 If a DS1 or DS3 SIGNAL is chosen, choose the required OUTPUT LEVEL.
- 4 If you have chosen 2 Mb/s as the SIGNAL rate, choose the required TERMINATION. (At all other signal rates the impedance is fixed).
- 5 If you have chosen 2 Mb/s, DS1 or 8 Mb/s as the SIGNAL rate, choose the

Setting the Interfaces

Setting PDH/DSn Transmit Interface (option 012)

required LINE CODE. (At 34 Mb/s, 140 Mb/s and DS3 coding is fixed.)

- 6 If required, choose the FREQUENCY OFFSET value.
See “Adding Frequency Offset to SDH Signal” page 56.
- 7 Choose the required PAYLOAD TYPE.
If **STRUCTURED** is required **FRAMED** must be chosen .
If **STRUCTURED** is chosen the PDH test signal must be set up. See “Setting Transmit Structured Payload/Test Signal” page 62.
If you have chosen 2 Mb/s, DS1 or DS3 as the PDH/DSn signal rate, the Framed choice is expanded to provide a menu of framing types.
At 2 Mb/s if you select PCM30 or PCM30CRC framing a field is displayed enabling 2M CAS ABCD bits to be set. See “Setting up Signaling Bits” page 59

Choose the PATTERN type and the PRBS POLARITY.

Additional Patterns at DS1

- 8 If you select a DS1 SIGNAL, two 8-bit patterns and a 55 Octet pattern are added to the list of available patterns. The 8-bit patterns are as follows:

Table 1 **8-Bit Patterns**

Type	Pattern
1-in-8	F01000000
2-in-8	F01100000

Note 1: F indicates the position of the framing bit with respect to the 8-bit pattern when the framed data is generated

Note 2: Both 8-bit patterns and the 55 Octet pattern can only be selected as a payload for the whole DS1, i.e. they can not be selected as a pattern for an individual 64 kb/s channel.

Note 3: Bit errors can be added to both 8-Bit and 55 Octet test patterns as with the other available test patterns.

The 55 Octet pattern uses the Daly pattern as per ANSI T1.403

Setting the Interfaces
Setting DS_n THRU Mode (option 012)

Setting DS_n THRU Mode (option 012)

Description

THRU mode is used to non-intrusively monitor DS_n lines where no protected monitor points are available.

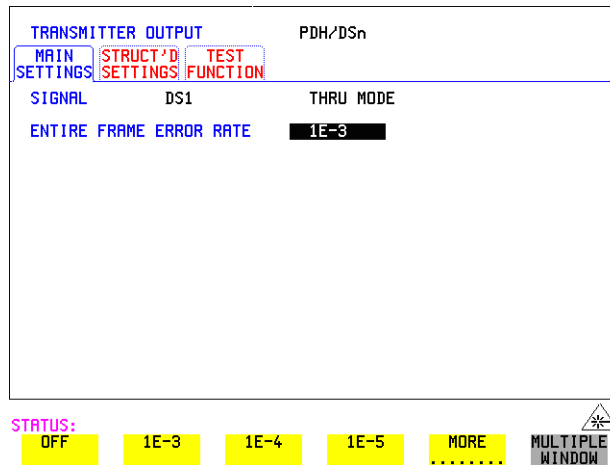
Note that since THRU mode locks some user settings, you must set SIGNAL RATE (DS1 or DS3), before selecting THRU mode.

Two modes of operation are possible:

Monitor Mode: This is when the Entire Frame Error Rate field is set to **OFF**. In this mode the received signal is passed through or transmitted unchanged, and the instrument monitors errors and alarms as normal DS1 operation.

Full Frame Overwrite Mode: The entire frame can be errored at a user defined rate. The error rates available are:

Data error rates: 1.0E-3, 1.0E-4, 1.0E-5, 1.0E-6, 1.0E-7 and user programmable in 0.1 steps from 1.1E-3 to 1.0E-9.



HOW TO:

- 1 Make the required SIGNAL RATE choice on the PDH/DS_n **TRANSMIT** and **RECEIVE** displays.
- 2 Select THRU MODE as shown in the figure above.
- 3 Select an entire frame error rate from the choices given or use the USER softkey to program an error rate.

Setting SDH Transmit Interface

Payload Selection

One of the key features of the HP OmniBER 718 is the ability to test concatenated payloads, read the following for a brief description of concatenated payloads, and the benefits of using them.

Concatenated Payloads

Bulk filled or contiguous payload structures eg. (STM-4c) are designed for carrying broadband services. The entire payload area is used to carry the service with no structured mapping or channelization.

In the case of a concatenated STM-4 (denoted STM-4c), the virtual container area is entirely filled by a single VC-4-4c. This VC-4-4c consists of one Path Overhead and a single container capable of carrying a tributary signal at rates up to approximately 600 Mb/s. Once assembled a VC-4-4c is multiplexed, switched and transported through the network as a single entity.

Benefits: Test the entire bandwidth in one go, and reduce test times. The following table illustrates the reduced test times using concatenated payloads.

Table 2 Test times using concatenated payloads

	Test Time (based on 100 errors)	
Performance test limit	STM-4c Container	STM-1 Bulk Payload
10^{-14}	12 days	48 days
10^{-13}	1.2 days	4.8 days
10^{-12}	2.90 hours	11.6 hours
10^{-11}	0.3 hour	1.2 hour
10^{-10}	1.75 minutes	7 minutes

Setting the Interfaces

Setting SDH Transmit Interface

Description

SDH transmit interface settings should match the network equipment settings of Rate, Wavelength and Mapping, determine the payload to be tested and set background conditions to prevent alarms while testing.

TIP:

If you wish to set the HP OmniBER 718 transmitter and receiver to the same interface settings choose **OTHER** **SETTINGS CONTROL** **COUPLED**.

TRANSMITTER OUTPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	JITTER	TEST FUNCTION OVERHEAD SETUP
SIGNAL	STM-16 OPT	1310nm	INTERNAL
CLOCK	STM-16 OPT	RX	
FREQUENCY OFFSET	OFF		
MAPPING	<input checked="" type="checkbox"/> AU-4	FOREGROUND TU-12 FL BYTE 2Mb/s 0101	
2M CAS ABCD BITS	STM-1	TUG3	TUG2 TU
CHANNEL	7	2	5 1
TU PAYLOAD	PCM30 UNSTRUCTURED		
PATTERN	2^15-1 PRBS INVERT ITU		

STATUS:

MULTIPLE WINDOW

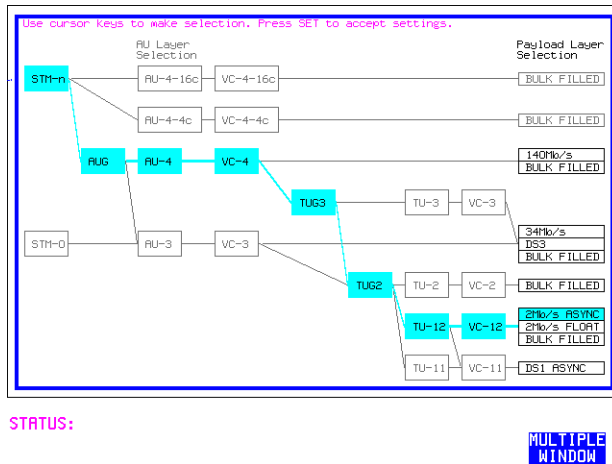
HOW TO:

- 1 Make your choice of SIGNAL rate.
If Option 106, Dual Wavelength optical module, is fitted and an optical rate is chosen, choose the required wavelength (1550) or (1310).
If STM-0 is chosen, choose the required interface level.
Choose **INTERNAL** unless **THRU MODE** is required. If **THRU MODE** is chosen, see "Setting SDH THRU Mode " page 33.
- 2 Make your choice of CLOCK synchronization source. The RECEIVE clock sync choice depends on the SDH Receive Interface choice.
EXTERNAL allows a choice of MTS, BITS or 10 MHz clocks.
- 3 If required choose the FREQUENCY OFFSET value. See "Adding Frequency Offset to SDH Signal" page 56.
- 4 Choose FOREGROUND **F/G MAPPING** , BACKGROUND **B/G MAPPING** MAPPING and type of payload.

Setting the Interfaces

Setting SDH Transmit Interface

Mapping may be selected from a pictorial display by moving the cursor to MAPPING and pressing **SET**.



Use **→** and **←** to move between AU Layer Selection, TU Layer Selection and Payload Layer Selection. Use **↑** and **↓** to set the mapping and **SET** to set your selection.

- 5 If TU-2 mapping is chosen, TU CONCATENATION selection is enabled. Choose **OFF** or the tributary at which the concatenation begins (TU2-2C through TU2-6C).
The BACKGROUND, PATTERN IN OTHER TU2s is fixed at NUMBERED, that is, each TU-2 contains a unique number to allow identification in case of routing problems.
- 6 If required, choose DS1/2M/34M/DS3/140M OFFSET value. See “Adding Frequency Offset to SDH Signal” page 56
- 7 If TU-3, TU-2, TU-12 or TU-11 mapping is chosen, choose the test tributary CHANNEL, including the STM-1 for an STM-4/STM-16 signal.
- 8 Choose the payload framing under PAYLOAD TYPE or TU PAYLOAD.
If **STRUCTURED** is required **FRAMED** must be chosen.
If **STRUCTURED** is chosen, the Payload test signal must be set up. See “Setting Transmit Structured Payload/Test Signal” page 62.
If **INSERT** is chosen, see “Inserting an External PDH/DSn Payload/Test Signal” page 68.
If you have chosen 2 Mb/s, DS1 or DS3 under Mapping, the Framed choice is expanded to provide a menu of framing types.

Setting the Interfaces

Setting SDH Transmit Interface

- 9 If 2 Mb/s framing **PCM30** or **PCM30CRC** is chosen, set the CAS ABCD bit values. See "Setting up Signaling Bits " page 59
- 10 Choose the PATTERN type and PRBS polarity.
- 11 Choose the mapping required in the background (non-test) TUG-3s. Refer to Appendix A for a table of background patterns for AU-3 and TUG-3.
- 12 If TU-12 mapping is chosen for the test TUG-3, choose the PATTERN IN OTHER TU-12s.

TRANSMITTER OUTPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	JITTER	TEST FUNCTION OVERHEAD SETUP
SIGNAL	STM-16 OPT	1310nm	INTERNAL
CLOCK	STM-16 OPT RX		
FREQUENCY OFFSET	OFF		
BACKGROUND			
BACKGROUND	AU-4's		UNEQUIPPED
TUG3 NO.1	TU12 MAP		
TUG3 NO.3	TU3 WORD		10101010
PATTERN IN OTHER TU-12s			2^9-1 PRBS

STATUS:

MULTIPLE WINDOW

Setting the Interfaces

Setting Jitter Transmit Interface

Setting Jitter Transmit Interface

Description:
Option 200 required for Jitter and option 012 for PDH.

You can add jitter to the transmitted PDH or SDH signal at 2 Mb/s, 8 Mb/s, 34 Mb/s, 140 Mb/s, DS1, DS3, STM-0, STM-1, STM-4 and STM-16. Jitter modulation can be sourced internally or from an external source.

TRANSMITTER OUTPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	JITTER	TEST FUNCTION OVERHEAD SETUP
JITTER / WANDER		JITTER	
JITTER		ON	
SIGNAL FREQUENCY		2.5Gb/s	
MODULATION SOURCE		INTERNAL	
JITTER MASK		OFF	
CLOCK SYNC		2.5Gb/s OPT RX	
RANGE		800 UI	
MODULATION FREQUENCY		10.000 Hz	
AMPLITUDE		45.0 UI	

STATUS:

MULTIPLE WINDOW

HOW TO:

- 1 If you are adding jitter to the PDH signal, set up the PDH transmit interface. See "Setting PDH/DSn Transmit Interface (option 012)" page 22.
- 2 If you are adding jitter to the SDH signal, set up the SDH transmit interface. See "Setting SDH Transmit Interface" page 25.
- 3 Choose JITTER/WANDER **JITTER**.
If you wish to add wander to the PDH or SDH signal, see "Setting Wander Transmit Interface" page 31.
- 4 Choose JITTER **ON**.
If you wish to perform a Jitter Tolerance measurement, choose **AUTO TOLERANCE**. See "Measuring Jitter Tolerance" page 123.
If you wish to perform a Jitter Transfer measurement choose **TRANSFER FUNCTION**. See "Measuring Jitter Transfer" page 126.

Setting the Interfaces

Setting Jitter Transmit Interface

- 5 Choose the modulation source.

If adding jitter to the PDH signal and **EXTERNAL** is chosen, connect the external source to the MOD IN port of the JITTER TX module. Up to 10 UI of external jitter modulation can be added at the MOD IN port.

If adding jitter to the SDH signal and **EXTERNAL** is chosen, connect the external source to the MOD IN port of the SDH Clock module. Up to 20 UI of external jitter modulation can be added at the MOD IN port.

- 6 Choose the JITTER MASK setting required.

You can choose the jitter range, jitter modulating frequency and jitter amplitude if **OFF** is chosen.

If you choose **SWEPT**, the HP OmniBER 718 will "sweep" through the ITU-T jitter mask (G.823 for PDH, G.958, G.825 or G.253 for SDH) adjusting the jitter amplitude according to the jitter frequency.

If you choose **SPOT**, you can choose the "spot" jitter frequency. The jitter amplitude is adjusted and controlled according to your jitter frequency choice.

TIP:

If, when using the SWEPT MASK capability, a problem occurs around a certain frequency, this may require closer examination. Stop the sweep at that point by choosing **SPOT**. You can then control the "spot" jitter frequency to make closer examination of the problem.

Setting the Interfaces

Setting Wander Transmit Interface

Setting Wander Transmit Interface

Description:
Option 200 required
for Jitter and option
012 for PDH.

You can add Wander to the 2 Mb/s PDH signal and the STM-1, STM-4 or STM-16 SDH signal.

TRANSMITTER OUTPUT		PDH/DSn	
MAIN SETTINGS	STRUCT'D SETTINGS	JITTER	TEST FUNCTION
JITTER / WANDER		WANDER	
WANDER		ON	
SIGNAL FREQUENCY		2 Mb/s	
MODULATION SOURCE		INTERNAL	
WANDER MASK		OFF	
CLOCK SYNC		155Mb/s RX	
MODULATION FREQUENCY		<input type="checkbox"/> 125000 μ Hz	
AMPLITUDE		<input type="checkbox"/> 80.0 UI	

STATUS:

MULTIPLE WINDOW

HOW TO:

PDH Wander (2 Mb/s)

- 1 Connect REF OUT on the SDH Clock module to REF IN on the PDH Jitter TX module (this provides the Wander Reference).
- 2 Set up the PDH transmit interface, choose CLOCK SYNC **2M REF** and select the SOURCE required from the menu. See "Setting PDH/DSn Transmit Interface (option 012)" page 22.
- 3 Choose JITTER/WANDER **WANDER**.
If you wish to add jitter to the PDH signal see "Setting Jitter Transmit Interface" page 29.
- 4 Choose WANDER **ON**.
- 5 Choose the modulation source.
If **EXTERNAL** is chosen, connect the external source to the MOD IN port of the PDH Jitter TX module. Up to 10 UI of Wander modulation can be added.
- 6 Choose the WANDER MASK setting required.

Setting the Interfaces

Setting Wander Transmit Interface

You can choose the wander modulating frequency and wander amplitude if

OFF is chosen.

If you choose **SPOT**, you can choose the "spot" wander frequency. The wander amplitude is adjusted and controlled according to your wander frequency choice.

SDH Wander (STM-1, STM-4, STM-16)

- 7 Set up the SDH transmit interface. See "Setting SDH Transmit Interface " page 25.
- 8 Choose JITTER/WANDER **WANDER**.
If you wish to add jitter to the SDH signal see "Setting Jitter Transmit Interface " page 29.
- 9 Choose WANDER **ON**.
- 10 Choose the WANDER MASK setting required.
You can choose the wander modulating frequency and wander amplitude if **OFF** is chosen.
If you choose **SPOT**, you can choose the "spot" wander frequency. The wander amplitude is adjusted and controlled according to your wander frequency choice.

Setting the Interfaces

Setting SDH THRU Mode

Setting SDH THRU Mode

Description

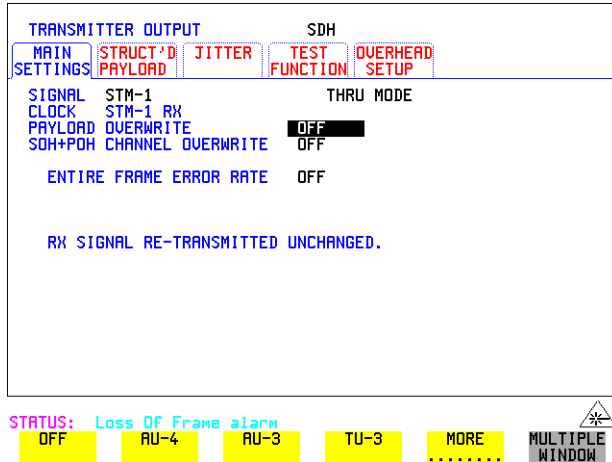
THRU mode is used to non-intrusively monitor SDH lines where no protected monitor points are available.

Select SIGNAL RATE before selecting THRU mode.

The entire frame can be errored at a user defined rate if PAYLOAD OVERWRITE and SOH+POH CHANNEL OVERWRITE are both set to **OFF**. If either overwrite is enabled the ENTIRE FRAME ERROR RATE function is disabled. Jitter can be added to the STM-0, STM-1, STM-4 and STM-16 signal.

There are nominally three modes of operation as follows:

1. Transparent mode: This is the case when the PAYLOAD OVERWRITE field is set to OFF. The received signal is passed through the transmitter completely unchanged. The figure below illustrates the settings for this mode.



2. Hitless THRU Mode

This mode enables you to change the channel under test and the payload mapping without causing errors in the line signal or any other payload channel, or having to switch out of THRU mode. When you select a Payload Overwrite choice (other than OFF) an additional field is displayed which allows you to enable/disable Payload Overwrite. If Payload Overwrite is disabled the instrument remains transmitting while you select another channel/tributary (see figure on next page). In this mode any Section or Line B1,B2 BIP errors are recalculated before transmission.

Setting the Interfaces

Setting SDH THRU Mode

3. Payload/Channel Overwrite: In this mode you can overwrite the payload as explained in the following text. Any Path B3 BIP errors are recalculated before transmission. Use the **HOW TO** procedure to setup your instrument for THRU Mode operation.

STM-0, STM-1

You can substitute a new payload, Section Overhead (SOH) and Path Overhead (POH) in the received STM-0/1 signal for testing.

STM-4, STM-16

The overhead and payload may be overwritten for AU-4 and AU3. PAYLOAD OVERWRITE is not available for AU-4-4c or AU-4-16c. SOH overwrite is available for AU-4-4C and AU-4-16c.

TRANSMITTER OUTPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	JITTER	TEST FUNCTION OVERHEAD SETUP
SIGNAL	STM-4 OPT	1310	ON THRU MODE
CLOCK	STM-4 OPT RX		
PAYLOAD OVERWRITE		AU-4	OFF
SOH+POH CHANNEL OVERWRITE		OFF	
MAPPING	<input checked="" type="checkbox"/> AU-4	UC-4	
140M OFFSET		140 Mb/s	
CHANNEL	STM-1	0 ppm	
PAYLOAD TYPE	1 UNFRAMED	UNSTRUCTURED	
PATTERN	2^23-1 PRBS	INVERT ITU	

STATUS: Loss Of Frame alarm

OFF ON

MULTIPLE WINDOW

HOW TO:

- 1 Make the required SIGNAL RATE choice on the SDH **TRANSMIT** display. See "Setting SDH Transmit Interface " page 25.
- 2 Make the PAYLOAD OVERWRITE choice required
Hitless Mode: The Payload Overwrite enable/disable field (next to the PAYLOAD OVERWRITE field) defaults to OFF.

If AU-4, AU-3, TU-3, TU-2 or TU-12 is chosen, the B1, B2 and B3 BIPs are recalculated before transmission and the Mapping, Selected TU, TU Payload, Pattern, Tributary Offset and Pattern in other TU's settings are displayed. To choose the settings in these, See "Setting SDH Transmit Interface " page 25, steps 4 through 10.

Setting the Interfaces

Setting SDH THRU Mode

- 3 Switch the PAYLOAD OVERWRITE enable/disable field to ON. Test functions are available whilst Payload Overwrite is enabled. Select the **TEST FUNCTION** folder and setup as required.
- 4 Make the SOH+POH OVERWRITE choice required.
The B1, B2 and B3 BIPs are recalculated before transmission.
- 5 If you wish to add jitter to the STM-0, STM-1, STM-4 or STM-16 signal, see "Setting Jitter Transmit Interface " page 29.

Using Smart Test

Smart Setup

The HP Smartsetup feature simplifies instrument operation by:

- Allowing the instrument to auto-configure on the incoming signal. It will attempt to identify signal structure, and detect mixed payload signal structures and alarms.

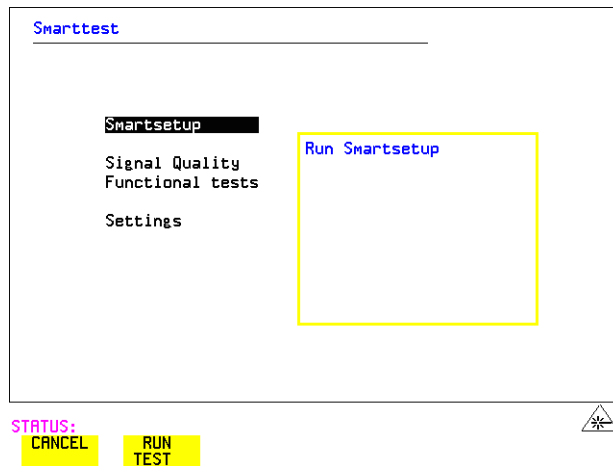
The HP OmniBER 718 automatically displays all of the J1 trace identifiers. Once the received signal has been identified you can select a channel of interest and explore further into the payload.

Smart Tests

- Allow you to quickly access the most commonly used instrument features such as:
 - Signal quality
 - Functional tests
 - Settings (stored, logging, Tx/Rx coupling and trigger output enable)

HOW TO USE SMARTSETUP:

- 1 Connect the HP OmniBER 718 to the network and choose if necessary the required SONET **RECEIVE** interface on the HP OmniBER 718 (Smartsetup will select PDH or SDH/SONET, but can not select between SDH and SONET).
- 2 Press **SMART TEST**.



- 3 With Smartsetup highlighted, press **RUN TEST** to auto-discover information about the receive signal. Or press **CANCEL** to exit Smart Test.

Setting the Interfaces Using Smart Test

An example of a typical display after choosing to RUN Smartsetup is shown below. **Note:** The Path Trace information displayed is the one obtained the last time a RESCAN was performed (see Figure 1). If you have changed the input signal since the last Smartsetup you must perform a RESCAN now. If you have selected a PDH/DSn interface and a PDH/DSn signal is received, a tributary mapping display indicating the framing and status of each tributary is given, (see Figure 2).

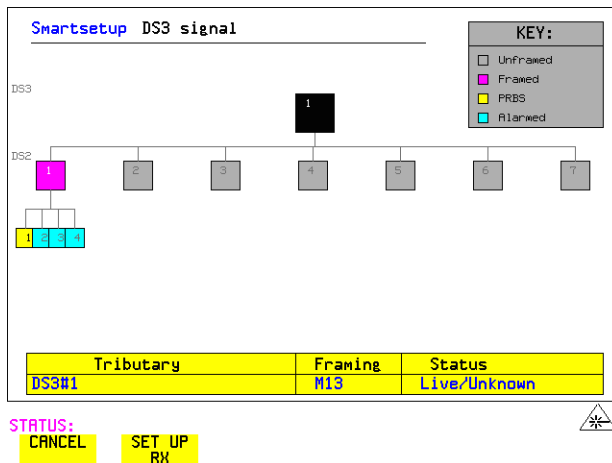
Figure 1

Smartsetup OC-12 (Optical)

STS1H	Payload	Path trace
1	STS-1 Uneq	
2	STS-1 Uneq	
3	STS-1 Uneq	
4	STS-1 Uneq	
5	STS-1 Uneq	
6	STS-1 DS3/34M HEWLETT-PACKARD, 37718 OMNIBER, 0000U0	
7	STS-1 Uneq	
8	STS-1 Uneq	
9	STS-1 Uneq	
10	STS-1 Uneq	
11	STS-1 Uneq	
12	STS-1 Uneq	

STATUS: CANCEL EXPLORE FURTHER RESCAN

Figure 2



Setting the Interfaces

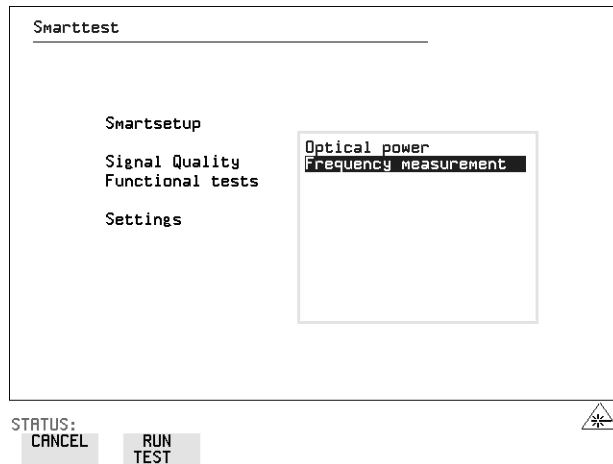
Using Smart Test

SET UP RX key

If you select an individual tributary using the cursor control keys, and then select **SET UP RX**, the instrument exits smartsetup and sets the receiver to the framing and status of the selected tributary.

To run a Smart Test (Signal Quality - Frequency Measurement):

- 1 Ensure a valid signal is connected to one of the instrument's Receive ports.
- 2 Press **SMART TEST**.
- 3 Use the down cursor control key to select Signal quality.
- 4 Use the right cursor control key to access the tests.
- 5 Use the down cursor control key to select Frequency Measurement.



- 6 Press **RUN TEST** to display the frequency measurement screen. Or press **CANCEL** to exit Smart Tests.

Setting PDH/DSn Receive Interface (Option 012)

Description

PDH Receive interface settings should match the network equipment settings of Rate, Termination and Line Code and determine the Payload to be tested.

TIP:

To set the transmitter and receiver to the same interface settings choose **OTHER SETTINGS CONTROL COUPLED**.

RECEIVER INPUT		PDH/DSn
MAIN SETTINGS	STRUCT'D SETTINGS	TEST FUNCTION
SIGNAL		34 Mb/s
TERMINATION		75Ω UNBAL
LINE CODE		HDB3
LEVEL		MONITOR
EQUALIZER	ON	GAIN 20 dB
PAYLOAD TYPE		UNFRAMED UNSTRUCTURED
PATTERN		2^23-1 PRBS
PRBS POLARITY		ITU ITU

STATUS:

MULTIPLE WINDOW

HOW TO:

- 1 Choose the required SIGNAL rate.
- 2 If you have chosen 2 Mb/s as the SIGNAL rate, choose the required TERMINATION. (At all other rates the impedance is fixed.)
- 3 If you have chosen 2 Mb/s, DS1 or 8 Mb/s as the SIGNAL rate, choose the required LINE CODE. (At 34Mb/s, 140 Mb/s and DS3 coding is fixed.)
- 4 If you are measuring at the network equipment monitor point, set the LEVEL field to **MONITOR**. In this case the received signal will be 20 to 30 dB below the normal level.
Choose the GAIN required to return the received signal to normal.
Choose EQUALIZATION **ON** to compensate for cable losses if required.

Setting the Interfaces

Setting PDH/DSn Receive Interface (Option 012)

Choose the PAYLOAD TYPE.

If **STRUCTURED** is required **FRAMED** must be chosen.

If **STRUCTURED** is chosen, the PDH test signal must be set up. See “Setting Transmit Structured Payload/Test Signal” page 62.

If you chose 2 Mb/s, DS1 or DS3 as the PDH/DSn SIGNAL rate, the FRAMED choice is expanded to provide a menu of framing types.

5 Choose the PATTERN type and the PRBS POLARITY required.

Additional Patterns at DS1

6 If you select a DS1 SIGNAL, two 8-bit patterns and a 55 Octet pattern are added to the list of available patterns. They are as follows:

Table 3 **8-Bit Patterns**

Type	Pattern
1-in-8	F01000000
2-in-8	F01100000

Note 1: F indicates the position of the framing bit with respect to the 8-bit pattern when the framed data is generated

Note 2: Both 8-bit patterns and the 55 Octet pattern can only be selected as a payload for the whole DS1, i.e. they can not be selected as a pattern for an individual 64 kb/s channel.

The 55 Octet pattern uses the Daly pattern as per ANSI T1.403.

Setting the Interfaces

Setting SDH Receive Interface

Setting SDH Receive Interface

Description

SDH Receive interface settings should match the network equipment settings of Rate and Mapping, and determine the payload to be tested.

TIP:

If you wish to set the HP OmniBER 718 transmitter and receiver to the same interface settings, choose **OTHER** **SETTINGS CONTROL** **COUPLED**.

RECEIVER INPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	TEST FUNCTION	OVERHEAD MONITOR
SIGNAL LEVEL		STM-1 TERMINATE	
MAPPING <input checked="" type="checkbox"/>	AU-4	TU-12 ASYNC 2Mb/s	
CHANNEL	TUG3 1	TUG2 6	TU 3
TU PAYLOAD PATTERN	PCM30CRC 2^11-1 PRBS	UNSTRUCTURED NORMAL	ITU

STATUS:

**MULTIPLE
WINDOW**

HOW TO:

- 1 Choose the required SIGNAL source.
If STM-0 or STM-1 electrical is chosen, choose the required LEVEL.
If the LEVEL chosen is **MONITOR** choose the required GAIN.
- 2 Choose mapping and type of payload.
- 3 If TU-2 mapping is chosen, and CONCATENATION is enabled, choose the tributary at which the concatenation begins.
If TU-2, TU-3, TU-12 or TU11 mapping is chosen, choose the test tributary under CHANNEL.
- 4 Choose the payload framing under PAYLOAD TYPE or TU PAYLOAD.
If **STRUCTURED** is required **FRAMED** must be chosen.
If **STRUCTURED** is chosen the Payload test signal must be set up. See “Setting Receive Structured Payload/Test Signal” page 64.
If DROP is chosen, see “Dropping an External Payload/Test Signal” page 71.
- 5 Choose the PATTERN type and PRBS polarity.

Setting the Interfaces

Setting Jitter Receive Interface

Setting Jitter Receive Interface

Description:
Option 200 required for Jitter..

Jitter and error measurements are made simultaneously when a jitter option is fitted. The measurements are made on the normal input to the PDH or SDH receiver and the interface selections are the normal Receiver selections. The jitter receive interface is selected with **RECEIVE PDH JITTER** or **RECEIVE SDH JITTER** MEASUREMENT TYPE **JITTER**.

The choices made on the jitter receive interface determine the jitter measurement range, the threshold level for determining a jitter hit and which filters are used in the jitter measurement.

RECEIVER INPUT	[PDH/DSn]		
MAIN SETTINGS	STRUCT'D SETTINGS	JITTER	TEST FUNCTION
MEASUREMENT TYPE	[JITTER]		
SIGNAL FREQUENCY	[34 Mb/s]		
RECEIVER RANGE	[1.6 UI]		
HIT THRESHOLD	[1.00 UI]		
FILTER	[LP+12kHz HP]		
12kHz HP FILTER VALUE	.....	
LP FILTER VALUE	.....	

HOW TO:

- 1 Choose the RECEIVER RANGE - the jitter measurement range.
- 2 Choose the HIT THRESHOLD level - if the received jitter exceeds the value chosen a jitter hit is recorded.
- 3 Choose the FILTER you wish to include in the peak to peak and RMS jitter measurement. The choices are:
LP, HP1, HP2, 12kHz HP, LP+HP, LP+HP2, LP+12kHz HP
- 4 Select FILTER VERSION, O.171 or O.172/GR-449.

Setting the Interfaces
Setting Extended Jitter Receive Interface

Setting Extended Jitter Receive Interface

Description:
*Option 200 required
for Jitter.*

Extended Jitter measurements are made in a jitter bandwidth of 0.1 Hz to 25 kHz. These measurements are made at the upper end of the standard wander frequency range and the lower end of the standard jitter frequency range. The extended jitter receive interface is selected with **RECEIVE PDH JITTER** or **RECEIVE SDH JITTER** MEASUREMENT TYPE **EXTENDED**.

The choices made on the jitter receive interface determine the threshold level for determining a jitter hit. The measurement Range and the Filters are not selectable.

RECEIVER INPUT		SDH		
MAIN SETTINGS	STRUCT'D PAYLOAD	JITTER	TEST FUNCTION	OVERHEAD MONITOR
MEASUREMENT TYPE	EXTENDED			
SIGNAL FREQUENCY	2.5Gb/s OPT			
RECEIVER RANGE	1024 UI			
JITTER BANDWIDTH	0.1 Hz - 25 kHz			
HIT THRESHOLD	10 UI			
FILTER	FIXED			

STATUS:

MULTIPLE WINDOW

HOW TO:

- 1 Choose MEASUREMENT TYPE **EXTENDED**.
- 2 Choose the HIT THRESHOLD level - if the received jitter exceeds the value chosen a jitter hit is recorded.

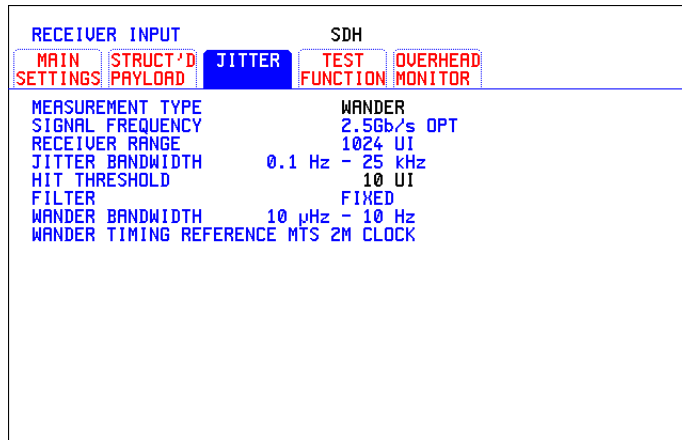
Setting the Interfaces

Setting Wander Receive Interface

Setting Wander Receive Interface

Description:

You can measure Wander at all PDH and SDH rates. A synchronization source for the 2 Mb/s reference should be selected on the **TRANSMIT** **PDH** or **SDH** **MAIN SETTINGS** display to ensure accurate Wander results.



STATUS:

MULTIPLE
WINDOW

HOW TO:

- 1 Choose a synchronization source for the 2 Mb/s reference on the **TRANSMIT** **SDH** **MAIN SETTINGS** display. See, “Setting SDH Transmit Interface” page 25.
- 2 If you intend to measure wander on a PDH signal, set up the PDH receive interface. See, “Setting PDH/DSn Receive Interface (Option 012)” page 39.
- 3 If you intend to measure wander on a SDH signal, set up the SDH receive interface. See, “Setting SDH Receive Interface” page 41.
- 4 Choose the wander HIT THRESHOLD - if the received wander exceeds the value chosen a wander hit is recorded.

- “Using Transmit Overhead Setup” page 46
- “Using Receive Overhead Monitor” page 48
- “Setting Overhead Trace Messages” page 50
- “Generating Overhead Sequences” page 52
- “Using Receive Overhead Capture” page 54
- “Adding Frequency Offset to SDH Signal” page 56
- “Adding Frequency Offset to the PDH/DSn Signal” page 58
- “Setting up Signaling Bits” page 59
- “Setting Transmit Structured Payload/Test Signal” page 62
- “Setting Receive Structured Payload/Test Signal” page 64
- “Setting Transmit N x 64 kb/s/N x 56 kb/s Structured Payload/Test Signal”
page 65
- “Setting Receive N x 64 kb/s/N x 56 kb/s Structured Payload/Test Signal”
page 67
- “Inserting an External PDH/DSn Payload/Test Signal” page 68
- “Dropping an External Payload/Test Signal” page 71
- “Adding Errors & Alarms at the SDH Interface” page 74
- “Adding Pointer Adjustments” page 79
- “Using Pointer Graph Test Function” page 87
- “Stressing Optical Clock Recovery Circuits” page 89
- “Generating Automatic Protection Switch Messages” page 90

Selecting Test Features

Selecting Test Features

Using Transmit Overhead Setup

Description

You can set an overhead byte to a known static state to aid troubleshooting, for example to quickly check for "stuck bits" in path overhead bytes. Section Overhead, Path Overhead, Trace Messages and Labels can be set using this feature.

```
TRANSMITTER OUTPUT          SDH
MAIN STRUCT'D TEST OVERHEAD
SETTINGS PAYLOAD FUNCTION SETUP
SETUP SOH STM-1# 1 COLUMN 1,4&7
H1/H2 DECIMAL POINTER VALUE : 0
S1 SYNC BYTE : G.812 TRANSIT
A1 11110110 A2 00101000 J0 FIXED
B1 xxxxxxxx E1 00000000 F1 00000000
D1 00000000 D2 00000000 D3 00000000
H1 xxxx10xx H2 xxxxxxxx H3 xxxxxxxx
B2 xxxxxxxx K1 00000000 K2 00000000
D4 00000000 D5 00000000 D6 00000000
D7 00000000 D8 00000000 D9 00000000
D10 00000000 D11 00000000 D12 00000000
S1 00000100 Z2 00000000 E2 00000000
```

STATUS:

MULTIPLE WINDOW

HOW TO:

- 1 Set up the SDH transmit interface and payload required. See "Setting SDH Transmit Interface " page 25.
- 2 Choose the type of overhead to SETUP.
If STM-4 OPT or STM-16 OPT is chosen as the SDH interface, choose the STM-1 you wish to set up.
DEFAULT - Use to set all overhead bytes to the standard values defined by Bellcore/ANSI.
If a test function is active then the overhead byte value is determined by the choices made in the Test Function. For example if APS Messages is chosen, the K1K2 value is determined by the APS Messages setup.
- 3 If SOH (Section Overhead) is chosen, choose the COLUMN to be displayed.
Many bytes in COLS 2,5,8 and 3,6,9 are unlabeled as the other overhead

Selecting Test Features

Using Transmit Overhead Setup

functions have not yet been defined.

If ALL COLUMNS is chosen, the hexadecimal value of all 81 bytes of the STM-1 section overhead selected are displayed (all 324 bytes of an STM-4 or 1,296 bytes of an STM-16 are displayed 81 bytes at a time by selecting each STM-1 in turn). The value of the bytes can be set using **DECREASE DIGIT**

INCREASE DIGIT  .

If BYTE NAMES is chosen, the labels for the ALL COLUMNS overhead bytes are displayed.

- 4 If POH (Path Overhead) is chosen, choose the TYPE of overhead within STM-1 under test to be setup.
J1 and J2 bytes can be set under Path Overhead or Trace Messages. H4 byte has a choice of sequences for TU-12, TU11 and TU-2 mapping:
Full Sequence - 48 byte binary sequence.
Reduced Sequence - Binary count sequence of 0 to 3 i.e. 11111(00 to 11).
COC1 Sequence - Binary count sequence of 0 to 3 i.e. 11000(00 to 11).
- 5 If TRACE MESSAGES is chosen, see "Setting Overhead Trace Messages " page 50.

NOTE

Any bit of an overhead byte which is displayed as x or s cannot be set at any time. All other bits can be set to 0 or 1.

TIP:

You can set all overhead bytes to the default state by selecting SETUP **DEFAULT**.

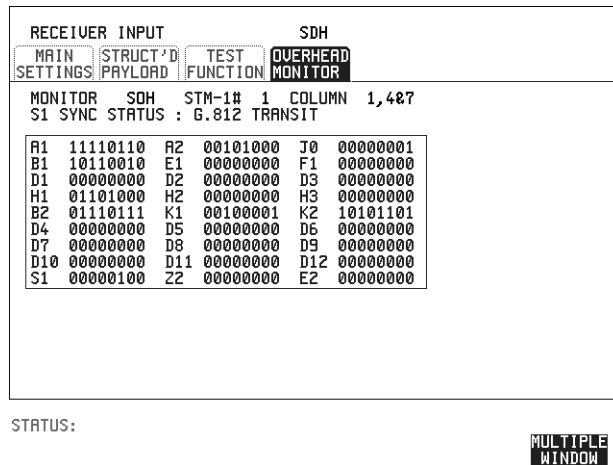
You can set all overhead bytes and test functions to the default state by recalling Stored Settings [0] on the **OTHER** display.

Using Receive Overhead Monitor

Description

When first connecting to a SDH network, a start up confidence check can be made by viewing the behavior of all the overhead bytes. If the SDH network shows alarm indications, some diagnosis of the problem may be gained from viewing all the overhead bytes. The OVERHEAD MONITOR display is updated once per second (once per 8000 frames) approximately.

A snapshot of the received overhead can be logged to the chosen logging device. See "Logging on Demand " page 156.



HOW TO:

- 1 Set up the receive SDH interface and payload as required. See “Setting SDH Receive Interface” page 41.
- 2 Choose the type of overhead to MONITOR.
- 3 If SOH (Section Overhead) is chosen, choose the STM-1 number and COLUMN to be displayed.
 Many bytes in COLS 2,5,8 and 3,6,9 are unlabeled because the other overhead functions have not yet been defined.
 If ALL COLUMNS is chosen, the hexadecimal value of all 81 bytes of section overhead is displayed (all 324 bytes of an STM-4 or 1,296 bytes of an STM-16 are displayed 81 bytes at a time by selecting each STM-1 in turn). The value of the bytes can be set using **DECREASE DIGIT** **INCREASE DIGIT** .

Selecting Test Features

Using Receive Overhead Monitor

If BYTE NAMES is chosen, the labels for the ALL COLUMNS overhead bytes are displayed.

- 4 If POH (Path Overhead) is chosen, choose the source of the overhead VC-4, VC-3, VC-2, VC-12 or VC-11.
J1 and J2 bytes can be monitored under Path Overhead or Trace Messages
- 5 If TRACE MESSAGES is chosen, you can monitor a data message to verify portions of the network.
If the 16 byte CRC7 message structure is detected, the 15 characters within the message are displayed.
If the CRC7 structure is not detected in J1, the 64 byte message format is assumed and displayed.
If the CRC7 structure is not detected for J0 or J2, all 16 bytes are displayed.
- 6 If LABELS is chosen, the S1 sync status, HP path label (C2) and the LP Path label (V5) are monitored.
- 7 If APS MESSAGES is chosen, choose the TOPOLOGY, **LINEAR** (G.783) or **RING** (G.841). The K1 and K2 bits are monitored.

TIP:

If any abnormal behavior is observed on a particular path or section overhead byte, or an associated group of bytes (3XA1,3XA2; D1 - D3), the **RECEIVE TEST FUNCTION** display of **OVERHEAD CAPTURE** can be used to "Zoom" in on the suspect byte or bytes on a frame by frame basis. See "Using Receive Overhead Capture " page 54.

Selecting Test Features

Setting Overhead Trace Messages

Setting Overhead Trace Messages

Description

You can insert a data message to verify portions of the network:

J0 verifies the regenerator section overhead.

J1 verifies the VC-3 or VC-4 path connection.

J2 verifies the VC-2, VC-12 or VC-11 path connection.

TRANSMITTER OUTPUT		[SDH]		
MAIN	STRUCT'D	JITTER	TEST	OVERHEAD
SETTINGS	PAYLOAD	FUNCTION	SETUP	
SETUP [TRACE]				
WITHIN STM-1# 1				
J0	[FIXED]	→	[00000001]	
J1	[TEST 64] (VC-4)	→	"HEWLETT-PACKARD, ??NAME?? OMNIBER GB00000000, D.00.00	
J2	[DEFAULT] (VC-12)	→	"XXXXXXXXXXXXXXXX"	
[SDH] [POH] [TRACE MESSAGES] [LABELS] [DEFAULT]				

Choose the message for insertion in the chosen trace channel.

Selecting Test Features

Setting Overhead Labels

Setting Overhead Labels

Description

Choosing LABELS allows the setting of the S1 SYNC STATUS, HP PATH LABEL (C2) and LP PATH LABEL (V5).

TRANSMITTER OUTPUT		SDH	
MAIN	STRUCT'D	TEST	OVERHEAD
SETTINGS	PAYLOAD	FUNCTION	SETUP

SETUP	LABELS
-------	---------------

S1 SYNC STATUS : 00000100
G.812 TRANSIT

HP PATH LABEL (C2) : 00000011
LOCKED TU

LP PATH LABEL (U5) : 011
BIT SYNCHRONOUS

STATUS:

SDH	POH	TRACE	LABELS	DEFAULT	MULTIPLE
		MESSAGES			WINDOW

Generating Overhead Sequences

Description



You may insert a pattern into a functional group of overhead bytes for testing or troubleshooting purposes.

TRANSMITTER OUTPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	TEST FUNCTION	OVERHEAD SETUP
TEST FUNCTION	SDH	SEQUENCES	
REPEAT RUN	STOPPED	-SEQUENCE STOPPED	
RSDH	3xA1, 3xA2	STM-1# 1	
A	F6F6F6282828		
B	B9C8F8C8CD2		
C	36FC16282828		
D	76F6F6A82828		
E	BA3827393939		
SEQUENCE	64000	FRAMES OF	A THEN
	01		B
	0		C
	0		D
	0		E

STATUS:

MULTIPLE WINDOW

HOW TO:

- 1 Set up the SDH transmit interface and payload required. See “Setting SDH Transmit Interface” page 25.
- 2 Select **TEST FUNCTION** , SDH, SEQUENCES as shown above.
- 3 Choose the type of sequence required.
 SINGLE RUN - runs the sequence once and then stops.
 REPEAT RUN - runs the sequence repeatedly until STOPPED is chosen.
- 4 Choose the overhead type as required.
 RSOH- Regenerator Section Overhead
 MSOH- Multiplexer Section Overhead
 POH - Path Overhead
- 5 Choose the byte or bytes of overhead required.
- 6 Set up the required number of data patterns and the number of frames in which each data pattern should appear.
 Your sequence is derived from up to 5 blocks of hexadecimal data. Each block can be transmitted in up to 64,000 frames.
 The data and the number of frames are set using **DECREASE DIGIT** **INCREASE DIGIT**  .

Selecting Test Features

Generating Overhead Sequences

7 Start the sequence by choosing **START**.

NOTE

When you start the sequence illustrated, one Out of Frame alarm and one Loss of Frame alarm should occur every eight seconds.

A1A2 Boundary Function

A1A2 provide a frame alignment pattern (A1=F6 H, A2=28 H). Use A1A2 to test the 6 framing bytes at the A1A2 boundary in the section overhead (see display on previous page). The 6 bytes across the boundary are:

STM-n

STM-1 channel:	#n-2	#n-1	#n	#1	#2	#3
Overhead byte:	A1 #3	A1 #3	A1 #3	A2 #1	A2 #1	A2 #1

A network element will use three of these bytes (which ones are not defined in the standards, so will vary between manufacturers) to gain and maintain frame synchronisation. The ability to stress test across the boundary is necessary to verify a correct synchronisation algorithm within a network element.

Using Receive Overhead Capture

Description

Regenerator section, Multiplexer section and Path overhead provide network support functions, responding dynamically to network conditions and needs. It is therefore useful to capture overhead activity on a frame by frame basis.

The Overhead Capture display can be logged to the chosen logging device. See "Logging on Demand " page 156.

RECEIVER INPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	TEST FUNCTION	OVERHEAD MONITOR
TEST FUNCTION	SDH	O/H CAPTURE	
RSOH	3xR1, 3xR2	STM-1#	1
TRIGGER	ON	F6F6F6282828	
CAPTURE	STOPPED		
DATA	FRAME COUNT		
F6F6F6282828	48048		
090909D7D7D7	3040		
F6F6F6282828	64000		
F6F6F6282828	64000		
F6F6F6282828	64000		
F6F6F6282828	64000		
F6F6F6282828	13636		
090909D7D7D7	1		

STATUS:

MULTIPLE WINDOW

HOW TO:

- 1 Set up the receive SDH interface and payload as required. See "Setting SDH Receive Interface" page 41.
- 2 Select **TEST FUNCTION**, SDH, O/H CAPTURE as shown above
- 3 Choose the overhead type as required.
RSOH- Regenerator Section Overhead
MSOH- Multiplexer Section Overhead
POH- Path Overhead
- 4 Choose the Byte or bytes of overhead to be captured.

Choose the TRIGGER to determine the start point of the capture.

OFF - starts immediately the capture is initiated. Can be used to provide a frame by frame monitor of the chosen byte or bytes.

ON -captures activity after your specified overhead state has occurred. Can be used for transient detection from a specified expected state.

Selecting Test Features

Using Receive Overhead Capture

ON NOT - captures activity after the first occurrence of a deviation from your specified overhead state. Can be used for transient detection from a specified expected state.

- 5 Up to 16 records of overhead state are provided. Each record will represent between 1 and 64,000 frames. A capture is started by pressing CAPTURE **START** and terminates when up to 16 records have been captured. The capture can be terminated earlier by pressing CAPTURE **STOP**.

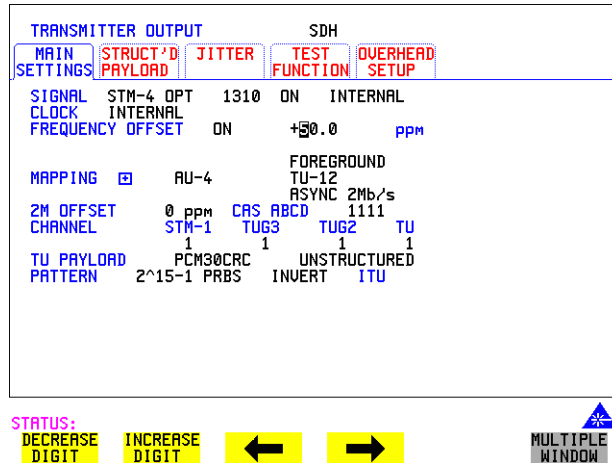
Selecting Test Features

Adding Frequency Offset to SDH Signal

Adding Frequency Offset to SDH Signal

Description

Frequency offset can be added to the SDH interface rate signal and to the payload signal.



HOW TO:

Line Rate Offset



- Choose the amount of frequency offset required.
 You can set the Frequency Offset in the range -999 ppm to +999 ppm in 1 ppm steps using **DECREASE DIGIT**, **INCREASE DIGIT**, and or press **SET** for a pop-up numerical keypad.
 The amount of applied Frequency Offset can be varied while measurements are taking place.
 If the value of the SDH line rate offset chosen is sufficient to cause the maximum stuff rate to be exceeded, the asynchronous payload is offset to prevent bit errors occurring and the maximum stuff rate is maintained. When Floating Byte 2 Mb/s is chosen, in conjunction with SDH line rate offset, the chosen tributary will be offset as the line rate is offset. (No pointer movements).

Selecting Test Features

Adding Frequency Offset to SDH Signal

Tributary Offset ± 100 ppm

- 1 Choose the amount of tributary offset required.

You can set the Offset in the range -100 ppm to +100 ppm in 1 ppm steps using **DECREASE DIGIT** **INCREASE DIGIT**  and  or press **SET** for a pop-up numerical keypad.

The amount of applied Frequency Offset can be varied while measurements are taking place.

Tributary offset affects the stuff rate but does not cause pointer movements and can be used to test mapping jitter. If the combined value of SDH line rate offset and tributary offset chosen is sufficient to cause the maximum stuff rate to be exceeded the payload is offset to prevent bit errors occurring and the maximum stuff rate is maintained.

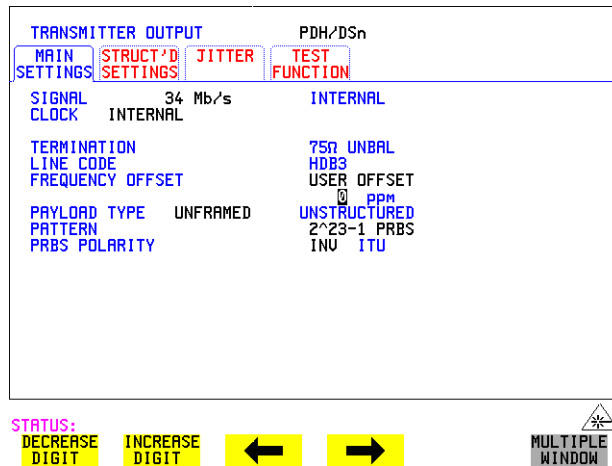
Adding Frequency Offset to the PDH/DSn Signal

Description



Option 012 required for PDH operation.

You can add frequency offset to the interface PDH/DSn SIGNAL at all rates. Frequency Offset can be added at preset ITU values or as User defined values in the range ± 100 ppm. The preset values change with the SIGNAL rate chosen as shown:

DS-1 (1.544 Mb/s)	+32 ppm	-32 ppm
2 Mb/s (E1)	+50 ppm	-50 ppm
8 Mb/s (E2)	+30 ppm	-30 ppm
34 Mb/s (E3)	+20 ppm	-20 ppm
DS-3 (44.736 Mb/s)	+20 ppm	-20 ppm
140 Mb/s (E4)	+15 ppm	-15 ppm



HOW TO:

- 1 Choose the FREQUENCY OFFSET required.
- 2 If you choose USER OFFSET, you can set the frequency offset to be between -100 ppm and +100 ppm in 1 ppm steps. Select the field immediately below USER OFFSET and use **DECREASE DIGIT**, **INCREASE DIGIT**,  and  to set the frequency offset. (The amount of frequency offset can be varied while measurements are taking place.)

Setting up Signaling Bits

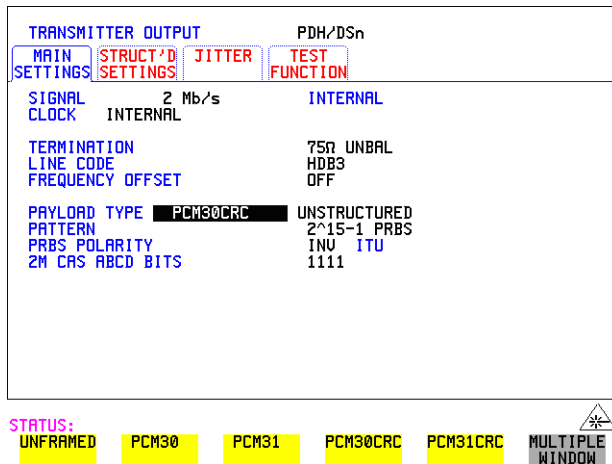
Description
Option 012 required
for PDH operation.

When transmitting 2.048 Mb/s signals with timeslot-16 CAS (PCM30 or PCM30CRC) multiframing the state of A,B,C,D signaling bits can be set. The signaling bits of all timeslots are set to the user-defined 4-bit value.

When transmitting a DS1 framed, structured signal the values of the A,B signaling bits for D4 and SLC-96 payloads, and A,B,C,D signaling bits for ESF payloads can be defined.

HOW TO

Transmit a 2 Mb/s signal with user-defined signaling bits PDH Operation



- 1 Choose **PDH/DSn** on the **TRANSMIT** display.
- 2 Choose SIGNAL **2 Mb/s** and PAYLOAD TYPE **PCM30** or **PCM30CRC** on the **MAIN SETTINGS** display.
- 3 If UNSTRUCTURED is chosen set the 2M CAS ABCD bits value on the **MAIN SETTINGS** display.
If STRUCTURED is chosen set the 2M CAS ABCD bits value on the **STRUCTURED SETTINGS** display.

Selecting Test Features

Setting up Signaling Bits

SDH Operation

TRANSMITTER OUTPUT		SDH			
MAIN SETTINGS	STRUCT'D PAYLOAD	JITTER	TEST FUNCTION	OVERHEAD SETUP	
SIGNAL	STM-4	OPT	1310	ON	INTERNAL
CLOCK	INTERNAL				
FREQUENCY OFFSET		OFF			
MAPPING	<input checked="" type="checkbox"/>	AU-4		BACKGROUND	TU-12
2M CAS ABCD BITS				FL BYTE 2Mb/s	1111
CHANNEL	STM-1	TUG3		TUG2	TU
TU PAYLOAD	1	1		1	1
PATTERN	2^15-1 PRBS			INVERT	ITU

STATUS:

PCM30	PCM31	PCM30CRC	PCM31CRC	INSERT 2Mb/s	MULTIPLE WINDOW
-------	-------	----------	----------	--------------	-----------------

- 1 Choose **SDH** on the **TRANSMIT** display.
- 2 Set MAPPING to TU-12.
- 3 Choose MAPPING **ASYNC 2Mb/s** or **FL BYTE 2Mb/s** and TU PAYLOAD to **PCM30** or **PCM30CRC** on the **MAIN SETTINGS** display.
- 4 If **UNSTRUCTURED** is chosen set the 2M CAS ABCD bits value on the **MAIN SETTINGS** display.
If **STRUCTURED** is chosen set the 2M CAS ABCD bits value on the **STRUCTURED SETTINGS** display.

Selecting Test Features

Setting up Signaling Bits

HOW TO

Transmit a DS1 payload signal with user-defined signaling bits

PDH Operation

TRANSMITTER OUTPUT		PDH/DSn
MAIN	STRUCT'D	TEST
SETTINGS	SETTINGS	FUNCTION
TEST SIGNAL		56 kb/s
DS1 PAYLOAD	DS2	DS1
	1	1
		56kb
		1
PATTERN		2 ¹¹ -1 PRBS
PRBS POLARITY		NORM
B/G PATTERN		RIS
B/G PATTERN 56 kb/s		NUMBERED
DS1 ESF ABCD BITS		1111

STATUS:
 D4 ESF SLC-96 MULTIPLE WINDOW

- 1 Choose **PDH/DSn** on the **TRANSMIT** display.
- 2 Choose SIGNAL **DS1** or **DS3**, and PAYLOAD TYPE **STRUCTURED** on the **MAIN SETTINGS** display
- 3 Choose TEST SIGNAL **56 kb/s** or **Nx56 kb/s** on the **STRUCTURED SETTINGS** display.
- 4 Set the A,B bits (for D4 and SLC-96) and A,B,C,D bits (for ESF) as required.

SDH Operation

- 1 Choose **SDH** on the **TRANSMIT** display.
- 2 Set MAPPING to TU-12.
- 3 Choose MAPPING **FL BYTE DS1**, **ASYNC DS1** or **DS3** and TU PAYLOAD **STRUCTURED** on the **MAIN SETTINGS** display. If you choose **FL BYTE DS1** proceed to step 5.
- 4 Choose TEST SIGNAL **56 kb/s** or **Nx56 kb/s** on the **STRUCTURED SETTINGS** display .
- 5 Set the A,B bits (for D4 and SLC-96) and A,B,C,D bits (for ESF) as required.
- 6 **Floating Byte DS1 selection:** Set the ABCD bits for **NO-F-BIT** or **ESF** framing and/or the AB bits for **D4** TU PAYLOAD framing as required.

Selecting Test Features

Setting Transmit Structured Payload/Test Signal

Setting Transmit Structured Payload/Test Signal

Description

Structured PDH Payload/Test Signal settings determine the SDH payload or the PDH test signal to be tested and set any background (non test) conditions to prevent alarms while testing.

TIP:

If you wish to set the HP OmniBER 718 transmitter and receiver to the same Payload settings, choose **OTHER** **SETTINGS CONTROL** **COUPLED**.

TRANSMITTER OUTPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	TEST FUNCTION	OVERHEAD SETUP
TEST SIGNAL			64 kb/s
2M PAYLOAD			PCMS0
	34Mb	8Mb	2Mb
	3	4	2
			64kb
			22
PATTERN			2^11-1 PRBS
PRBS POLARITY			NORM ITU
B/G PATTERN			RIS
B/G PATTERN	64 kb/s		NUMBERED
2M CAS ABCD BITS			1111

STATUS:

MULTIPLE WINDOW

HOW TO:

- 1 Choose the required TEST SIGNAL rate. If Nx64 kb/s is chosen, see "Setting Transmit N x 64 kb/s/N x 56 kb/s Structured Payload/Test Signal " page 65.
- 2 Choose the PAYLOAD framing pattern.
If the TEST SIGNAL chosen was 2Mb/s, the **INSERT 2 Mb/s** choice is added to PAYLOAD menu. See "Inserting an External PDH/DSn Payload/Test Signal " page 68.
- 3 Choose the test tributary in the structured payload, under 34Mb, 8Mb, 2Mb, 64 kb/s or DS2, DS1.
- 4 Choose the PATTERN type and PRBS POLARITY.

Selecting Test Features

Setting Transmit Structured Payload/Test Signal

- 5 Choose the B/G PATTERN (Background).
The B/G PATTERN in the non test 64 kb/s timeslots is fixed as NUMBERED, that is, each timeslot contains a unique number to allow identification in case of routing problems.

Signaling

- 6 If a 2 Mb/s PAYLOAD with PCM30 or PCM30CRC framing, or 56 kb/s or Nx56kb/s Test Signal is chosen. See, "Setting up Signaling Bits " page 59.

Selecting Test Features

Setting Receive Structured Payload/Test Signal

Setting Receive Structured Payload/Test Signal

Description

Structured PDH Payload/Test Signal settings determine the SDH payload or the PDH test signal to be tested.

TIP:

If you wish to set the HP OmniBER 718 transmitter and receiver to the same Payload settings, choose **OTHER** **SETTINGS CONTROL COUPLED**

RECEIVER INPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	TEST FUNCTION	OVERHEAD MONITOR
TEST SIGNAL			64 kb/s
2M PAYLOAD			PCMS0
	34Mb	8Mb	2Mb
	3	4	2
			64kb
			22
PATTERN			2 ¹¹ -1 PRBS
PRBS POLARITY			NORM ITU

STATUS:

MULTIPLE WINDOW

HOW TO:

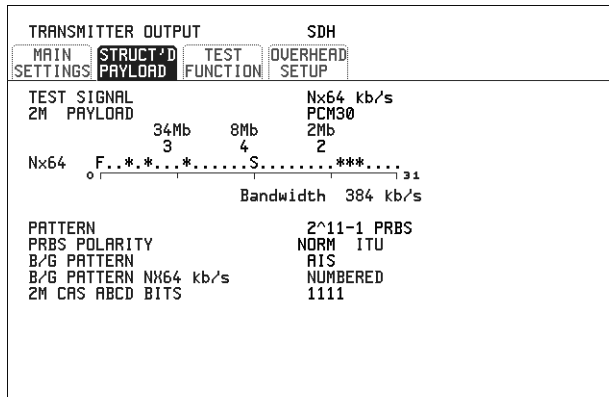
- 1 Choose the required Test Signal rate. If N x 64 kb/s or N x 56 kb/s is chosen, see "Setting Receive N x 64 kb/s/N x 56 kb/s Structured Payload/Test Signal " page 67.
- 2 Choose the Framing pattern of the PAYLOAD.
If 2 Mb/s TEST SIGNAL is chosen, **DROP 2 Mb/s** is added to the menu.
See "Dropping an External Payload/Test Signal " page 71.
- 3 Choose the test tributary within the structured payload, under 34Mb, 8Mb, 2Mb, 64 kb or DS2, DS1.
- 4 Choose the PATTERN type and PRBS polarity.

Setting Transmit N x 64 kb/s/N x 56 kb/s Structured Payload/Test Signal

Description

Wideband services such as high speed data links and LAN interconnection require a bandwidth greater than 56/64 kb/s but less than DS1/2 Mb/s for example 128 kb/s or 384 kb/s. These wideband signals are sent in a DS1/2 Mb/s frame by sharing the signal across multiple timeslots.

N x 64kb/s/N x 56 kb/s structured payload allows a test pattern to be inserted across a number of timeslots even if the chosen timeslots are non-contiguous.



STATUS:

MULTIPLE WINDOW

HOW TO:

- 1 Choose the required Test Signal rate.
- 2 Choose the Framing pattern of the 2M or DS1 PAYLOAD.
- 3 Choose the test timeslots within the structured payload using **DESELECT ALL**, **DESELECT**, **SELECT**, **←** and **→** softkeys. As each timeslot is selected, an * marks the chosen timeslot. In the example above Timeslots 3, 5, 9, 25, 26, 27 are selected for test.
- 4 Choose the PATTERN type and PRBS polarity.
- 5 Choose the B/G PATTERN.
- 6 The B/G PATTERN in the non-test 64 kb/s timeslots is fixed as NUMBERED, that is, each timeslot contains a unique identification number.

Selecting Test Features

Setting Transmit N x 64 kb/s/N x 56 kb/s Structured Payload/Test Signal

Signaling

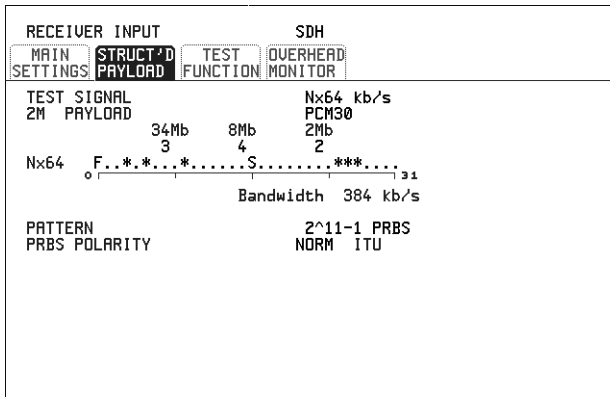
- 7** If a 2 Mb/s PAYLOAD with PCM30 or PCM30CRC framing, or 56 kb/s or Nx56kb/s Test Signal is chosen. See, "Setting up Signaling Bits " page 59.

Setting Receive N x 64 kb/s/N x 56 kb/s Structured Payload/Test Signal

Description

Wideband services such as high speed data links and LAN interconnection require a bandwidth greater than 56/64 kb/s but less than DS1/2 Mb/s e.g. 128 kb/s or 384 kb/s. These wideband signals are sent in a DS1/2 Mb/s frame by sharing the signal across multiple timeslots.

N x 64kb/s and N x 56 kb/s structured payload/test signal allows the test Timeslots to be chosen for error measurement even when the Timeslots are non contiguous.



STATUS:

MULTIPLE WINDOW

HOW TO:

- 1 Choose the required Test Signal rate.
- 2 Choose the Framing pattern of the 2M or DS1 PAYLOAD.
- 3 Choose the test timeslots within the structured payload using **DESELECT ALL**, **DESELECT**, **SELECT**, **←** and **→** softkeys. As each timeslot is chosen an * marks the chosen timeslot. In the example above Timeslots 3, 5, 9, 25, 26, 27 are chosen for test.
- 4 Choose the PATTERN type and PRBS polarity.

Inserting an External PDH/DSn Payload/Test Signal

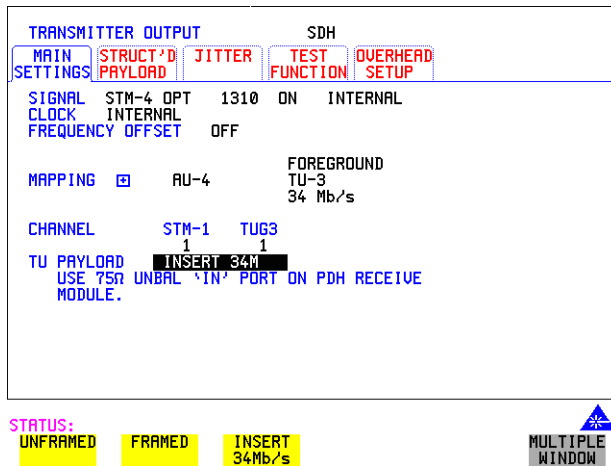
Description
Option 012 required for PDH operation.

You can insert a PDH/DSn signal from external equipment into the SDH/SONET signal, or you can insert 2 Mb/s or DS1 into the structured PDH signal. 140Mb/s, 34Mb/s, DS3 and 34 Mb/s can only be inserted if SDH is chosen as the receive interface. 2 Mb/s or DS1 can be inserted from a structured or non-structured SDH payload and from a structured PDH signal.

RATE	Availability	Option
140 Mb/s	SDH Only	012
DS3	SDH & SONET	001, 012
34Mb/s	SDH & SONET	001, 012
2Mb/s	PDH, SDH & SONET	001, 012
DS1	DSn, SDH & SONET	001, 012

HOW TO:

Insert 34 Mb/s, DS3 & 140 Mb/s



- 1 Connect the external payload to the 75Ω IN port of the PDH/DSn receive module.
- 2 Set up the required transmit SDH interface, set appropriate MAPPING then choose TU/VT PAYLOAD **INSERT 140 Mb/s** , **INSERT 34 Mb/s** or **INSERT DS3** as required.

Selecting Test Features

Inserting an External PDH/DSn Payload/Test Signal

Insert 2 Mb/s or DS1 (Unstructured SDH/SONET Payload)

TRANSMITTER OUTPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	TEST FUNCTION	OVERHEAD SETUP
SIGNAL	STM-16	OPT	INTERNAL
CLOCK	INTERNAL		
FREQUENCY	DIFFSET	OFF	
MAPPING	<input type="checkbox"/> AU-4		FOREGROUND TU-12 ASync 2Mb/s
CHANNEL	STM-1 8	TUG3 2	TUG2 ? TU 1
TU PAYLOAD	INSERT 2Mb/s		
LINE CODE	HDB3		
USE 'MUX' PORT ON PDH TX MODULE.			

STATUS:

PCM31CRC INSERT
 2Mb/s

MORE
.....

MULTIPLE
WINDOW

- 1 Connect the external payload to the MUX port of the PDH Transmit module. If 2 Mb/s connect to 75Ω MUX port. If DS1 connect to 100Ω MUX port.
- 2 Set up the required transmit SDH interface, and choose TU12 MAPPING or TU11 MAPPING and TU PAYLOAD **INSERT 2 Mb/s** or **INSERT DS1**.

Insert 2 Mb/s or DS1 (Structured SDH Payload or Structured PDH)

TRANSMITTER OUTPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	TEST FUNCTION	OVERHEAD SETUP
TEST SIGNAL			2 Mb/s
2M PAYLOAD			INSERT 2Mb/s
LINE CODE	HDB3		HDB3
	8Mb 4		2Mb 2
B/G PATTERN			AIS

STATUS:

PCM31CRC INSERT
 2Mb/s

MORE
.....

MULTIPLE
WINDOW

- 1 Connect the external payload to the MUX port of the PDH Transmit module. If 2 Mb/s connect to 75Ω MUX port. If DS1 connect to 100Ω MUX port.

Structured SDH Payload

- 2 Set up the required transmit SDH interface. See "Setting SDH Transmit Interface" page 25.

Selecting Test Features

Inserting an External PDH/DSn Payload/Test Signal

- 3 Set up the SDH structured payload. See "Setting Transmit Structured Payload/Test Signal " page 62.
- 4 Choose 2M PAYLOAD/DS1 PAYLOAD **INSERT 2 Mb/s** or **INSERT DS1**.
- 5 Choose the LINE CODE.

Structured PDH

- 6 Set up, the required transmit PDH interface, See "Setting PDH/DSn Transmit Interface (option 012) " page 22.
- 7 Set up the PDH Test Signal interface. See "Setting Transmit Structured Payload/Test Signal " page 62
- 8 Choose 2M PAYLOAD/DS1 PAYLOAD **INSERT 2 Mb/s** or **INSERT DS1**.
- 9 Choose the LINE CODE.

Dropping an External Payload/Test Signal

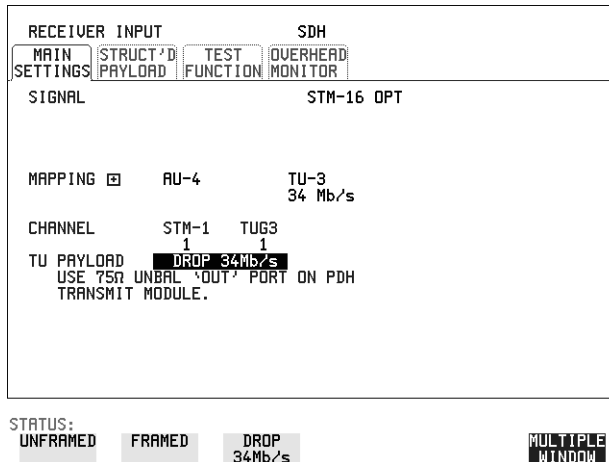
Description

You can drop a PDH/DSn signal from the received payload or drop 2 Mb/s or DS1 from the structured PDH/DSn signal to external equipment. 140Mb/s, 34Mb/s, DS3 and 34 Mb/s can only be dropped if SDH is chosen as the receive interface. 2 Mb/s or DS1 can be dropped from a structured or non-structured SDH payload and from a structured PDH signal.

RATE	Availability	Option
140 Mb/s	SDH Only	012 Only
DS3	SDH & SONET	001, 012
34Mb/s	SDH & SONET	001, 012
2Mb/s	PDH, SDH & SONET	001, 012
DS1	DSn, SDH & SONET	001, 012

HOW TO:

Drop 34 Mb/s, DS3 & 140 Mb/s



- 1 Connect the 75Ω OUT port of the PDH Tx module to the external equipment.

Selecting Test Features

Dropping an External Payload/Test Signal

- 2 Set up the receive SDH interface, and choose TU PAYLOAD **DROP 140 Mb/s**, **DROP 34 Mb/s** or **DROP DS3**.
If **DROP DS3** is chosen, choose the DS3 output level.

Drop 2 Mb/s /DS1 (Unstructured SDH Payload)

RECEIVER INPUT		SDH			
MAIN SETTINGS	STRUCT'D PAYLOAD	TEST FUNCTION	OVERHEAD MONITOR		
SIGNAL		STM-16 OPT			
MAPPING	<input checked="" type="checkbox"/> AU-4	TU-11 ASYNC DS1			
CHANNEL	STM-1 3	TUG3 2	TUG2 6	TU 3	
TU PAYLOAD	DROP DS1				
LINE CODE	AMI				
USE 'DEMUX' PORT ON PDH RX MODULE					

STATUS:
UNFRAMED D4 ESF SLC-96 DROP DS1 MULTIPLE WINDOW

- 1 Connect the DEMUX port of the PDH module to the external equipment.
- 2 Set up the required receive SDH interface, and choose TU12 MAPPING or TU11 MAPPING and TU PAYLOAD **DROP 2 Mb/s** or **DROP DS1**.
- 3 Choose the required LINE CODE.

Selecting Test Features

Dropping an External Payload/Test Signal

Drop 2 Mb/s/DS1 (Structured SDH Payload or Structured PDH)

RECEIVER INPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	TEST FUNCTION	OVERHEAD MONITOR
TEST SIGNAL	2M PAYLOAD	8Mb	2 Mb/s
LINE CODE		4	DROP 2Mb/s
			HDB3
			2Mb
			2

STATUS:
FCH31CRC **DROP 2Mb/s** MORE **MULTIPLE WINDOW**

- 1 Connect the DEMUX port of the PDH module to the external equipment.
If 2 Mb/s connect to 75Ω DEMUX port. If DS1 connect to 100Ω DEMUX port.

Structured SDH Payload

- 2 Set up the required receive SDH interface see "Setting SDH Receive Interface " page 41.
- 3 Set up the SDH structured payload, see "Setting Receive Structured Payload/ Test Signal " page 64.
- 4 Choose 2M PAYLOAD/DS1 PAYLOAD **DROP 2 Mb/s** or **DROP DS1** .
- 5 Choose the LINE CODE.

Structured PDH

- 6 Set up, the required receive PDH interface, see "Setting PDH/DSn Receive Interface (Option 012) " page 39.
- 7 Set up the PDH Test Signal interface, see "Setting Receive Structured Payload/ Test Signal " page 64
- 8 Choose 2M PAYLOAD/DS1 PAYLOAD **DROP 2 Mb/s** or **DROP DS1** .
- 9 Choose the LINE CODE.

Selecting Test Features

Adding Errors & Alarms at the SDH Interface

Adding Errors & Alarms at the SDH Interface

Description

Errors and alarms can be added on the SDH signal during testing.

TRANSMITTER OUTPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	TEST FUNCTION	OVERHEAD SETUP
TEST FUNCTION	SDH	ERR & ALARM	
ERROR ADD TYPE		B2 BIP	
RATE	100 ERRORS IN	MSP THRESHLD	10 MS
ALARM TYPE		AU-LDP	

STATUS:

MULTIPLE WINDOW

HOW TO:

- 1 Set up the SDH transmit interface and payload required. See "Setting SDH Transmit Interface " page 25.
- 2 Select **TEST FUNCTION** , SDH, ERR & ALARM as shown above.
- 3 Choose the ERROR ADD TYPE and RATE required.
Errors can be added at preset rates and at USER programmable rate. With the exception of ENTIRE FRAME and A1A2 FRAME, errors can be added at ERROR ALL rate.
If B2 BIP errors are chosen errors can be added to trigger an MSP THRESHOLD. This takes the form of N errors in T time period. N and T are both selectable.
- 4 Choose the ALARM TYPE
Errors and Alarms can be added at the same time.

Adding Errors & Alarms to a PDH signal

Description
Option 012 is required for PDH operation.

Errors and alarms can be added to a PDH signal during testing.

TRANSMITTER OUTPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	TEST FUNCTION	OVERHEAD SETUP
TEST FUNCTION	PDH PAYLD	ERR & ALARM	
ERROR ADD TYPE		FAS (LINE)	
RATE		1E-5	
ALARM TYPE		CAS MFM LOSS	

STATUS:

MULTIPLE WINDOW

HOW TO:

- 1 If SDH interface is chosen, set up the SDH transmit interface and payload required. See “Setting SDH Transmit Interface” page 25.
If PDH interface is chosen, set up the PDH interface and payload required. See “Setting PDH/DSn Transmit Interface (option 012)” page 22.
- 2 Choose the ERROR ADD TYPE and RATE on the Transmitter **TEST FUNCTION** display.
The RATE can be selected from a fixed value or is user programmable. If you select USER PROGRAM you can select the error rate before enabling the errors. This feature is useful for error threshold testing.
- 3 Choose the ALARM TYPE.
Errors and Alarms can be added at the same time.

Using FEAC Codes

Description
Option 012 required

The third C-Bit in subframe 1 is used as a FEAC channel, where alarm or status information from the far-end terminal can be sent back to the near-end terminal. The channel is also used to initiate DS3 and DS1 line loopbacks at the far-end terminal from the near-end terminal.

The codes are six digits long and are embedded in a 16 bit code word; the format is 0XXXXXX011111111.

There are two types of code, Loopback and Alarm Status.

Loopback provides a choice of two DS1 messages and two DS3 Messages. The DS1 Messages can be sent in ALL DS1 channels or in a SINGLE channel. The message can be repeated up to 15 times.

Alarm Status provides 13 preset codes and a USER programmable code function. These codes can be transmitted continuously or in bursts.

The new code is transmitted by choosing **BURST** or **ON**.

TRANSMITTER OUTPUT		PDH/DSn
MAIN SETTINGS	STRUCT'D SETTINGS	TEST FUNCTION
TEST FUNCTION	DSn	ERR & ALARM
ERROR ADD TYPE		BIT (TEST)
RATE		OFF
ALARM TYPE		DS3 FEAC
FEAC CODE TYPE		LOOPBACK
MESSAGE	ACTIVATE DS1	2
REPEAT (TIMES)	15 LOOP	15 MESS.
TRANSMIT NEW CODE		OFF

STATUS:

OFF	LOS	DS3 AIS	DS3 DOF	MORE	MULTIPLE WINDOW
-----	-----	---------	---------	------------	-----------------

HOW TO:

Transmit an FEAC code

- 1 Choose SIGNAL **DS3** and PAYLOAD TYPE **CBIT** on the **TRANSMIT MAIN SETTINGS** display.
- 2 Choose **TRANSMIT TEST FUNCTION**, DSn and ALARM TYPE **DS3 FEAC**. When a FEAC code is not being transmitted, an all ones pattern is transmitted.

Selecting Test Features

Using FEAC Codes

- 3 Choose the FEAC CODE TYPE.
- 4 Choose the MESSAGE from the choices displayed.
If you chose a DS1 message an additional field to the right of the DS1 MESSAGE is displayed. Position the cursor on this field and choose **ALL** or **SINGLE CHANNEL**.
If you choose **SINGLE CHANNEL** use the EDIT keys to select a channel from 1 to 28. Press **END EDIT** when finished.
- 5 If **LOOPBACK** is chosen, choose the REPEAT (TIMES) LOOP and MESS, in the range 1 to 15.
- 6 If **ALARM/ STATUS** is chosen, choose the BURST LENGTH (TIMES).
- 7 Choose TRANSMIT NEW CODE **BURST** or **ON** to transmit the selected FEAC message.

TIP:

To View FEAC Messages

The received FEAC message can be viewed on the **RESULTS** display.

```
RESULTS  DSn          FEAC MESSAGE

CURRENT FEAC MESSAGE
  IDLE (All Ones)
LAST NON-IDLE FEAC MESSAGE
  000000
  DS3 Out of Frame

ELAPSED TIME          00d 00h 00m 03s
```

STATUS:

ERROR SUMMARY **CUMUL- ATIVE** **SHORT TERM** **ERROR ANALYSIS** **MORE** **MULTIPLE WINDOW**

Setting PDH Spare Bits

Description

Certain Spare Bits will cause the occurrence of a minor alarm when received as a logical "0".:

- 140 Mb/s - FAS Bit 14
- 34 Mb/s - FAS Bit 12
- 8 Mb.s - FAS Bit 12
- 2 Mb/s - NFAS Timeslot (timeslot 0 of NFAS frame) Bit 0

TRANSMITTER OUTPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	TEST FUNCTION	OVERHEAD SETUP
TEST FUNCTION	PDH PAYLD	SPARE BITS	
140M: FAS BITS 14-16		111	
34M: FAS BIT 12		1	
8M: FAS BIT 12		1	
2M: Si BITS CRC4 FRAME E-BITS		11	
Sa BITS (NFAS T/S BITS 4-8)		11111	
Sa BIT SEQUENCE 11111111	IN BIT 4	OFF	
SEND SEQUENCE			

STATUS:

MULTIPLE WINDOW

HOW TO:

- 1 If SDH interface is chosen, set up the SDH transmit interface and payload required. See "Setting SDH Transmit Interface " page 25.
 If PDH interface is chosen, set up the PDH transmit interface and payload required. See "Setting PDH/DSn Transmit Interface (option 012) " page 22.
- 2 Set the value of the spare bits required for testing.
 If a BIT SEQUENCE is required, choose SEND SEQUENCE **ON** to transmit the sequence.

Adding Pointer Adjustments

Introduction

Pointers perform a critical role in the error free transmission of payload data (subscriber data) through an SDH network. They also enable individual payload channels to be inserted or extracted from a high speed STM-n line signal (for example the functionality provided by ADM's).

Pointer adjustments are often necessary to compensate for asynchronous operation between different nodes within an SDH network. These adjustments however can result in jitter being added to a PDH signal transmitted from an SDH network element.

Jitter caused by Pointer Adjustments

Pointer adjustments are the mechanisms within SDH to compensate for frequency and phase differences between VCs and outgoing SDH frames. These pointer adjustments are byte wide and since they can occur randomly, they may cause significant amounts of payload signal jitter. It is therefore necessary to control the jitter on payload signals that is due to pointer adjustments.

Pointer adjustment activity within a network can be randomly spaced individual pointer adjustments, pointer bursts or periodic pointer adjustments.

The ITU-T G.783 and ETSI TM-1015 recommendations define a set of pointer sequences to be used when evaluating an NE's pointer adjustment jitter performance.

The HP OmniBER 718 generates a set of test sequences which can be used to simulate network pointer adjustment activity. This allows the amount of tributary jitter due to different types of pointer adjustment to be measured in the HP OmniBER 718.

Selecting Test Features

Adding Pointer Adjustments

Description

The transmitted AU or TU pointer value can be adjusted for testing purposes.

TRANSMITTER OUTPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	TEST FUNCTION	OVERHEAD SETUP
TEST FUNCTION	SDH	ADJUST PTR	
POINTER TYPE	TU POINTER		
ADJUSTMENT TYPE	G.703 PHASE TRANSIENT		
POLARITY	POSITIVE		
REPEAT POINTER SEQUENCES	30 s STOPPED		

STATUS:

MULTIPLE WINDOW

HOW TO:

- 1 Set up the SDH transmit interface and payload required. See "Setting SDH Transmit Interface" page 25.
- 2 Choose the POINTER TYPE.
- 3 Choose the ADJUSTMENT TYPE required.

BURST - You determine the size of the burst by the number of PLACES chosen. If, for example, you choose 5 PLACES the pointer value will be stepped 5 times in unit steps e.g. 0 (start value), 1, 2, 3, 4, 5 (final value). The interval between steps is as follows:
 For AU and TU-3, the minimum spacing between adjustments is 500 us. For TU except TU-3, the minimum spacing between adjustments is 2 ms.
 Choose ADJUST POINTER [ON] to add the chosen burst.

NEW POINTER - You can choose a pointer value in the range 0 to 782 with or without a New Data Flag.
 The current pointer value is displayed for information purposes.
 Choose ADJUST POINTER [ON] to transmit the new pointer value.

OFFSET - You can frequency offset the line rate or the VC/TU rate, relative to each other, thus producing pointer movements. If you offset the AU pointer, an 87:3 sequence of pointer movements is generated. The available configurations are listed in the following table.
 If you are currently adding Frequency Offset to the SDH interface or payload, pointer OFFSET is not available.

Selecting Test Features
Adding Pointer Adjustments

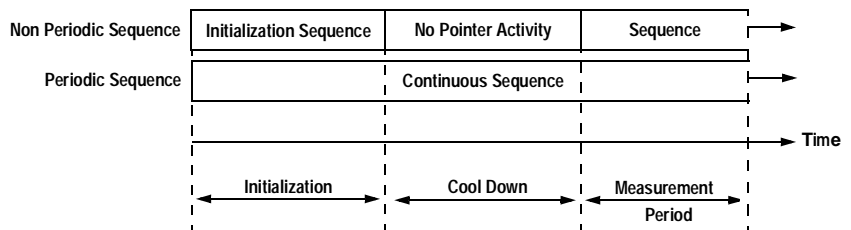
Pointer Type	Line Rate	AU Payload (VC) Rate	TU Payload (TU) Rate
AU	Constant	Offset	Tracks AU Payload
AU	Offset	Constant	Constant
TU	Constant	Constant	Offset
TU	Offset	Tracks Line Rate	Constant

G.783 - Provides pointer movements according to ITU-T G.783:
 Choose the G.783 ADJUSTMENT TYPE.
 Choose the POLARITY, INTERVAL and PATTERN (where applicable) for the selected sequence.
 Choose POINTER SEQUENCES **START INIT** to generate the selected G.783 sequence and **STOP INIT** to stop the pointer sequences.

G.783 Pointer Sequences Explained

In addition to the BURST, NEW POINTER and OFFSET pointer movements described, the HP OmniBER 718 can also generate pointer sequences (pointer movements) according to ITU-T G.783, T1.105.03 and GR-253. Note that T.105.03/GR-253 sequences are explained in the SONET version of this User’s Guide.

Before running a pointer sequence you can elect to run an initialization sequence, followed by a cool down period, and then run the chosen sequence. This is selected using the **START INIT** key shown in the display on the previous page. Initialized pointer sequences are made up of three periods: the *Initialization Period*, the *Cool Down Period*, and the *Sequence (Measurement) Period*, illustrated in the following figure:



Note: SINGLE (e), BURST (f) and PHASE TRANSIENT are Non Periodic Sequences.

Selecting Test Features

Adding Pointer Adjustments

Initialization Period

For SINGLE e), BURST f) and PHASE TRANSIENT sequences the initialization sequence consists of 60 seconds of pointer adjustments applied at a rate of 2 adjustments per second and in the same direction as the specified pointer sequence.

Cool Down Period

A period following the initialization period which for SINGLE e), BURST f) and PHASE TRANSIENT sequences is 30 seconds long when no pointer activity is present.

Sequence (Measurement) Period

The period following the Cool Down period where the specified pointer sequence runs continuously.

Periodic Test Sequences

For periodic test sequences (for example “PERIODIC ADD g/h”) both the 60 second initialization and 30 second cool down periods consist of the same sequence as used for the subsequent measurement sequence. If the product of the period T and the selected optional background pattern (87+3 or 26+1) exceeds 60 seconds then the longer period is used for the initialization. For example, if T is set for 10 seconds then the initialization period may be extended to 900 seconds.

The HP OmniBER 718 displays a message indicating which phase (initialization, cool down or measurement) the transmitter is currently generating.

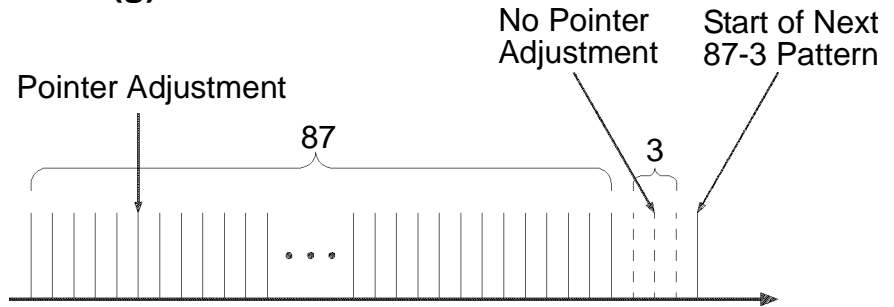
NOTE

The following conditions apply for pointer sequence generation:
The sequences can only be applied to the AU pointer when the AU does not contain a TU structure, otherwise it is applied to the TU pointer. Pointer sequence generation is not available when a frequency offset is being applied to the Line Rate.

The following figure gives an example of a G.783 (g) 87-3 Pointer Sequence.

Selecting Test Features
Adding Pointer Adjustments

G.783(g) 87-3 Pattern



An Example of a Pointer Sequence

Pointer Sequence	Description
G.783(a) PERIODIC SINGLE	Periodic Single adjustments, each with opposite polarity to the preceding adjustment. The interval between pointer adjustments is user selectable (see Note 1 page 85).
G.783 (b) PERIODIC ADD	Periodic Single adjustments, with selectable polarity and added adjustment (1 extra). The spacing between the added adjustment and the previous adjustment is set to the minimum, (see Note 2 page 85). The interval between pointer adjustments is user selectable (see Note 1). Added adjustments occur every 30 seconds.
G.783 (c) PERIODIC CANCEL	Periodic Single adjustments, with selectable polarity and cancelled adjustment (1 less). The interval between pointer adjustments is user selectable (see Note 1 page 85). Cancelled adjustments occur every 30 seconds.
G.783(d) PERIODIC DOUBLE	Periodic Double adjustments (pair of adjustments). The pair alternate in polarity. The spacing between pairs of adjustments, of like polarity is set to the minimum (see Note 2). The interval between pointer adjustments is user selectable (see Note 1).
G.783 (e) SINGLE	Periodic Single adjustments, all of the same polarity which is selectable. Separation between pointer adjustments is fixed at approximately 30 seconds.

Selecting Test Features
Adding Pointer Adjustments

Pointer Sequence	Description
G.783 (f) BURST	Periodic bursts of 3 adjustments, all of the same polarity which is selectable. The interval between bursts is fixed at approximately 30 seconds. The interval between adjustments within a burst is set to the minimum (see Note 2 page 85).
PHASE TRANSIENT	Phase transient pointer adjustment burst test sequence. All adjustments are of the same polarity, which is selectable. The interval between bursts is fixed at 30 seconds. Each burst consists of 7 pointer movement. The first 3 in each burst are 0.25 s apart, and the interval between the 3 and 4 movement, and each remaining movement 0.5 seconds.
G.783 (g) PERIODIC NORMAL (87-3 Pattern)	An 87-3 pattern is selected. The sequence pattern is 87 pointer movements followed by 3 missing pointer movements. Pointer polarity is selectable and the time interval between pointer adjustments settable (see Note 1 page 85).
G.783 (g) PERIODIC ADD (87-3 Pattern)	An 87-3 pattern is selected. The sequence pattern is 87 pointer movements followed by 3 missing pointer movements with an added pointer movement after the 43rd pointer. The spacing between the added adjustment and the previous adjustment is set to the minimum, (see Note 2 page 85). Pointer polarity is selectable. The time interval between pointer adjustments can be set (see Note 1). Added adjustments occur every 30 seconds or every repeat of the 87-3 pattern, whichever is longer.
G.783 (g) PERIODIC CANCEL (87-3 pattern)	An 87-3 pattern is selected. The sequence pattern is 87 pointer movements followed by 3 missing pointer movements with a cancelled pointer movement at the 87th pointer. Pointer polarity is selectable, and the time interval between pointer adjustments can be set (see Note 1). Cancelled adjustments occur every 30 seconds or every repeat of the 87-3 pattern, whichever is longer.
G.783 (h) PERIODIC NORMAL (Continuous Pattern)	Provides a continuous sequence of pointer adjustments. The polarity of the adjustments is selectable, and the time interval between adjustments can be set (see Note 1).
G.783 (h) PERIODIC ADD (Continuous Pattern)	Periodic Single adjustments, with selectable polarity and added adjustment (1 extra). The spacing between the added adjustment and the previous adjustment is set to the minimum, (see Note 2). The time interval between pointer adjustments can be set (see Note 1). Added adjustments occur every 30 seconds or every repeat of the 87-3 pattern, whichever is longer.

Selecting Test Features
Adding Pointer Adjustments

Pointer Sequence	Description
G.783 (h) PERIODIC CANCEL (Continuous Pattern)	Periodic Single adjustments, with selectable polarity and cancelled adjustment (1 less). The time interval between pointer adjustments can be set (see Note 1). Cancelled adjustments occur every 30 seconds or every repeat of the 87-3 pattern, whichever is longer.
PERIODIC NORMAL (26-1 Pattern)	This selection is only available if you have selected TU11 mapping, or TU12 with ASYNC DS1 selected. The sequence pattern is 26 pointer movements followed by 1 missing pointer movement. Pointer polarity is selectable and the time interval between pointer adjustments programmable to 200 ms, 500 ms, 1 s, 2 s, 5 s or 10 seconds.
PERIODIC ADD (26-1 Pattern)	This selection is only available if you have selected TU11 mapping, or TU12 with ASYNC DS1 selected. The sequence pattern is 26 pointer movements followed by 1 missing pointer movement. The added adjustment occurs 2 ms after the 13th pointer adjustment. Pointer polarity is selectable and the time interval between pointer adjustments programmable to 200 ms, 500 ms, 1 s, 2 s, 5 s or 10 s. Added adjustments occur every 30 seconds or every repeat of the 26-1 pattern, whichever is longer.
PERIODIC CANCEL (26-1 pattern)	This selection is only available if you have selected TU11 mapping, or TU12 with ASYNC DS1 selected. The sequence pattern is 26 pointer movements followed by 1 missing pointer movement. The cancelled adjustment is the 26th pointer adjustment, that is the one before the regular gap of 1. Pointer polarity is selectable and the time interval between pointer adjustments programmable to 200 ms, 500 ms, 1 s, 2 s, 5 s or 10s. Cancelled adjustments occur every 30 seconds or every repeat of the 26-1 pattern, whichever is longer.

Pointer Sequence Notes

Note 1: For AU and TU-3, the sequence interval is selectable from:
7.5 ms, 10, 20, 30, 34 ms, 40 to 100 ms in 10 ms steps, 100 to 1000 ms in 100 ms steps, 1, 2, 5, 10 seconds.
For TU except TU-3, the sequence interval is selectable from:
200 ms, 500 ms, 1, 2, 5 and 10 seconds.

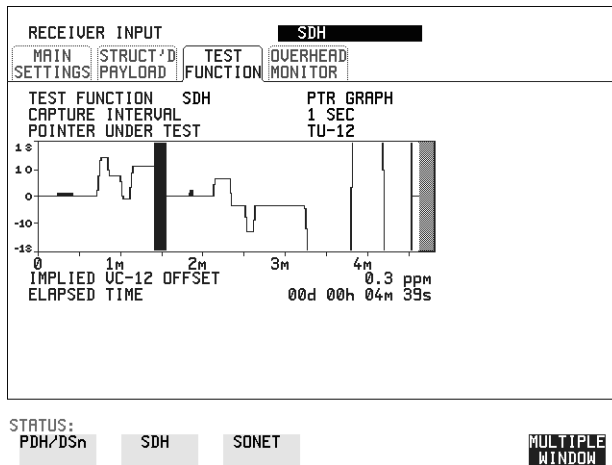
Selecting Test Features

Using Pointer Graph Test Function

Using Pointer Graph Test Function

Pointer Graph shows the relative offset during the measurement period. This allows the time relationship of AU or TU pointer movements to be observed. Up to 4 days of storage allows long term effects such as Wander to be observed. If an alarm occurs during the measurement period, a new graph starts at the centre of the display (offset zero) after recovery from the alarm.

The Pointer Graph display can be logged to the chosen logging device. See "Logging on Demand " page 156.



TIP:

The graph can also be viewed on the **RESULTS SDH RESULTS** display at the end of the measurement.

HOW TO:

- 1 Set up the receive SDH interface and payload as required. See "Setting SDH Receive Interface" page 41.
- 2 Choose the CAPTURE INTERVAL required.
The capture interval determines the time between captures. Low values of capture interval should be chosen when a high degree of pointer movements is expected. High values of capture interval should be chosen when a low degree of pointer movements is expected, for example Wander over 1 day, use 5 MINS and Wander over 4 days, use 20 MINS.
If, during a long term measurement (4 days), an event occurs at a particular time each day, a short term measurement can be made at the identified time to gain more detail of the event.

Selecting Test Features

Using Pointer Graph Test Function

- 3 Choose the POINTER UNDER TEST type.
- 4 Press **RUN/STOP** to start the measurement.

TIP:

If the event occurs outside normal working hours, a Timed Start measurement can be made.

The values of capture interval available and the approximate total capture window is as follows:

- 1 SEC - display window of approximately 5 minutes.
- 5 SECS - display window of approximately 25 minutes.
- 20 SECS - display window of approximately 1 hour 40 minutes.
- 1 MIN - display window of approximately 5 hours.
- 5 MIN - display window of approximately 1 day.
- 20 MIN - display window of approximately 4 days.

Stressing Optical Clock Recovery Circuits

Description

Ideally clock recovery circuits in the network equipment optical interfaces should recover the clock even in the presence of long strings of 0's. You can check the performance of your optical clock recovery circuits using the STRESS TEST test function.

The stress test is available at all optical rates.

TRANSMITTER OUTPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	TEST FUNCTION	OVERHEAD SETUP
TEST FUNCTION	SDH	STRESS TEST	
STRESSING PATTERN		ALL ONES	
BLOCK LENGTH		0002 BYTES	

STATUS:

MULTIPLE WINDOW

HOW TO:

- 1 Set up the SDH transmit interface and payload required. See "Setting SDH Transmit Interface " page 25.
Choose the required STRESSING PATTERN.
The G.958 test pattern consists of 7 consecutive blocks of data as follows:
the first row of section overhead bytes, ALL ONES, a PRBS, the first row of section overhead bytes, ALL ZEROS, a PRBS and the first row of section overhead bytes.
- 2 If you choose ALL ONES or ALL ZEROS as the stressing pattern, choose the number of bytes in the BLOCK LENGTH.

Selecting Test Features

Generating Automatic Protection Switch Messages

Generating Automatic Protection Switch Messages

Description

You can program the K1 and K2 bytes to exercise the APS functions for both LINEAR (ITU-T G.783) and RING (ITU-T G.841) topologies.

TRANSMITTER OUTPUT		SDH	
MAIN SETTINGS	STRUCT'D PAYLOAD	TEST FUNCTION	OVERHEAD SETUP
TEST FUNCTION	SDH	APS MESSAGES	
NEW TX	TOPOLOGY	RING	
K1 BITS 1->4	0011: EXERCISER	RING	
BITS 5->8	0101: DESTINATION NODE ID		
K2 BITS 1->4	1010: SOURCE NODE ID		
BIT 5	1: LONG PATH		
BITS 6->8	001: BRIDGE		
CURRENT TX		CURRENT RX	
K1 00110101		K1 00110101	
K2 10101001		K2 10101001	
TRANSMIT NEW K1/K2		SELECT	

STATUS:
SELECT **DOWN LOAD** **MULTIPLE WINDOW**

HOW TO:

- 1 Set up the SDH transmit interface and payload required. See "Setting SDH Transmit Interface " page 25.
- 2 Choose the ITU-T TOPOLOGY required.
- 3 Choose the message to be transmitted.
If LINEAR topology is chosen, choose the CHANNEL, the BRIDGED CHANNEL NO., the ARCHITECTURE and the RESERVED bits you require.
If RING topology is chosen, choose the DESTINATION NODE ID, the SOURCE NODE ID, the type of PATH and the status code (K2 Bits 6->8)
The current TX and RX, K1 and K2, values are displayed for reference only.
- 4 Choose **DOWNLOAD** to transmit the new K1/K2 values.

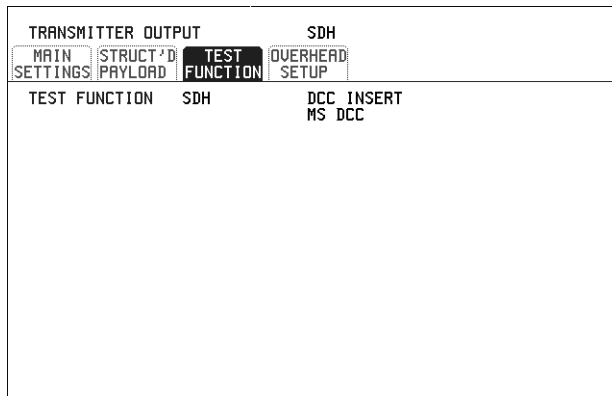
Inserting and Dropping the Data Communications Channel

Description

The Data Communications Channel (DCC) of the regenerator and multiplexer section overhead can be verified by protocol testing. The Insert and Drop capability provides access to the DCC via the RS-449 connector on the front panel of the SDH module.

DCC INSERT is available on the **TRANSMIT**, **SDH**, **TEST FUNCTION** display.

DCC DROP is available on the **RECEIVE** **SDH** **TEST FUNCTION** display.



STATUS:

**MULTIPLE
WINDOW**

HOW TO:

- 1 Connect the Protocol Analyzer to the DCC port on the Multirate Analyzer module.
- 2 Choose the required DCC.

Using DS1 LOOP Codes

Description

A loopback code causes the far end equipment to return a signal to the sender, so that the sender can verify signal integrity. Loop codes are used by carriers of the T1 signal and users of the transport medium as a maintenance tool to aid in fault location. Loopback commands are in-band (that is they use the payload space), and out-band (they use an ESF data link).

The HP OmniBER 719 provides both In-band and Out-band loop codes as follows:

Out-band Loop Codes

Out-band codes are transmitted in an ESF data link, in addition to transmitting the in-band signal in the payload. They are only available when ESF framing is selected on the Transmitter Output **MAIN SETTINGS** page.

Loop type	Activate	Deactivate
Line	11111111 01110000	1111111100011100
Payload	11111111 00101111	11111111 01001100
Network	11111111 01001000	n/a
Universal	n/a	11111111 00100100
User Code	111111110xxxxx0	

Note that when switching from an idle message to a loop-back message, the loop-back message will start following the idle message and not part way through it.

Note that the left most bit is transmitted first, and that when a loop code is not being sent, the idle data link sequence is sent. This is a continuous repetition of the pattern 01111110

In-band Loop Codes

With in-band codes, the transmitted signal comprises the entire payload of the signal, overwriting whatever signal was there before. The signal may be framed or unframed. When framed the framing bits overwrite the loopback code (see “In-Band DS1 Loopcode 156MTS Compatibility” on next page).

Note the user word can be set to any length, between 3 and 8 bits. The left most bit is transmitted first.

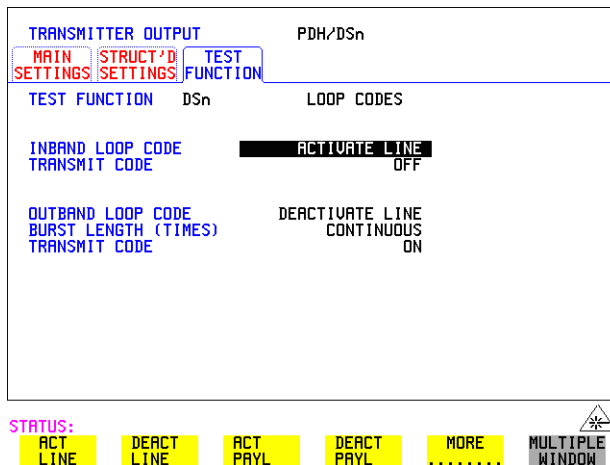
Selecting Test Features Using DS1 LOOP Codes

The following in-band codes can be selected .

Loop type	Activate	Deactivate
Line	00001	001
Payload	1100	1110
Network	11111111 01001000	n/a
User Code	xxxxxxxx	xxxxxxxx

In-Band DS1 Loopcode 156MTS Compatibility

Normal operation is such that DS1 framing bit overwrites the DS1 Loopcode pattern. A selection on the **OTHER MISCELLANEOUS** page enables you to change operation such that DS1 Loopcode is gapped in order to prevent the DS1 framing bit overwriting the DS1 Loopcode pattern. See page 168 In-Band DS1 Loopcode 156MTS Compatibility.



HOW TO:

Transmit an Out-band loop code

- 1 Choose SIGNAL **DS1** and set LINE CODE as required, and PAYLOAD TYPE to **ESF** on the **TRANSMIT MAIN SETTINGS** display.
- 2 Choose **TRANSMIT TEST FUNCTION** and set the TEST FUNCTION field to **DSn** and **LOOP CODES**.

Selecting Test Features Using DS1 LOOP Codes

- 3 Choose the OUTBAND LOOP CODE from the choices given.
- 4 Set the BURST LENGTH to **CONTINUOUS** or **BURST**. The BURST length can be set from 1 to 15 times .
- 5 To transmit the code set the TRANSMIT CODE field on the **TRANSMIT TEST FUNCTION** field to **ON** or **BURST** as required.

HOW TO:

Monitor/view received loop codes

- 6 Choose SIGNAL **DS1** and PAYLOAD TYPE **ESF** on the **RECEIVE MAIN SETTINGS** display. Also set the LINE CODE to match the setting on the Transmitter display.
- 7 Choose **DSn RESULTS** and **LOOP CODES** on the **RESULTS** display.
- 8 View the CURRENT CODE and LAST CODE results in the RESULTS window.

TRANSMITTER OUTPUT		PDH/DSn	
MAIN SETTINGS	STRUCT'D SETTINGS	JITTER	TEST FUNCTION
TEST FUNCTION	DSn	LOOP CODES	
INBAND LOOP CODE		ACTIVATE NETWORK	BURST
TRANSMIT CODE			
OUTBAND LOOP CODE		ACTIVATE LINE	CONTINUOUS ON
BURST LENGTH (TIMES)			
TRANSMIT CODE			

RECEIVER INPUT		PDH/DSn	
MAIN SETTINGS	STRUCT'D SETTINGS	JITTER	TEST FUNCTION
SIGNAL DS1			
TERMINATION		1000 BAL	
LINE CODE		RPT	TERMINATE
LEVEL			
PAYLOAD TYPE	ESF	UNSTRUCTURED	ORSS
PATTERN			

RESULTS		DSn		LOOP CODES	
INBAND		ACTIVATE NETWORK		DETECTED	
LOOPUP		DEACTIVATE LINE		....
LOOPDOWN					
LAST VALID CODE		11000		ACTIVATE NETWORK	
OUTBAND					
CURRENT CODE		111000		ACTIVATE LINE	
LAST VALID CODE		010100		ACTIVATE PAYLOAD	
ELAPSED TIME		00d 00h 00m 10s			

FUNCTION		MISCELLANEOUS	
KEYBOARD LOCK		ON	OFF
BEEP ON RECEIVED ERROR			
INBAND DS1 LOOPCODE		156MTS COMPATIBILITY	OFF
SUSPEND TEST ON SIGNAL LOSS		HS-RE1 RESULT ENABLE	OFF ON
GRAPH STORAGE RESOLUTION	COMPRESS		
NOTE: storing graph results with full resolution will reduce storage capacity by 50%			

STATUS: Transmitting inband burst

ACT LINE	ACT PYL	ACT N/WORK	USER CODE
----------	---------	------------	-----------

SINGLE WINDOW

HOW TO:

Transmit an Out-band loop code

- 1 Choose SIGNAL **DS1** and set LINE CODE as required, and PAYLOAD TYPE to **ESF** on the **TRANSMIT MAIN SETTINGS** display.
- 2 Choose **TRANSMIT TEST FUNCTION** and set the TEST FUNCTION field to **DSn** and **LOOP CODES**.

Selecting Test Features

Using DS1 LOOP Codes

- 3 Choose the OUTBAND LOOP CODE from the choices given.
- 4 Set the BURST LENGTH to **CONTINUOUS** or **BURST**. The BURST length can be set from 1 to 15 times .
- 5 To transmit the code set the TRANSMIT CODE field on the **TRANSMIT TEST FUNCTION** field to **ON** or **BURST** as required.

HOW TO:

Monitor/view received loop codes

- 6 Choose SIGNAL **DS1** and PAYLOAD TYPE **ESF** on the **RECEIVE MAIN SETTINGS** display. Also set the LINE CODE to match the setting on the Transmitter display.
- 7 Choose **DSn RESULTS** and **LOOP CODES** on the **RESULTS** display.
- 8 View the CURRENT CODE and LAST CODE results in the RESULTS window.

Selecting Test Features
Using DS1 LOOP Codes

“Using Overhead BER Test Function”	page 98
“Test Timing”	page 99
“Performing a Trouble Scan”	page 100
“Making SDH Analysis Measurements”	page 102
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“Measuring Optical Power”	page 105
“Measuring Round Trip Delay”	page 106
“Monitoring Signaling Bits”	page 108
“Measuring Service Disruption Time”	page 109
“Performing an SDH Tributary Scan”	page 112
“Performing an SDH Alarm Scan”	page 114
“Performing a PDH/DSn Alarm Scan”	page 115
“Measuring Jitter”	page 116
“Measuring Extended Jitter”	page 118
“Measuring Wander”	page 120
“Measuring Jitter Tolerance”	page 123
“Measuring Jitter Transfer”	page 126
“Measuring Pointer Adjustment (Tributary) Jitter”	page 132

Making Measurements

Making Measurements

Using Overhead BER Test Function

Using Overhead BER Test Function

Description

You can perform a Bit Error Rate test on chosen bytes of the regenerator section, multiplexer section and path overhead bytes.

You can access the transmit Overhead BER on the **TRANSMIT** **SDH** **TEST FUNCTION** display.

RECEIVER INPUT		SDH	
MAIN	STRUCT'D	TEST	OVERHEAD
SETTINGS	PAYLOAD	FUNCTION	MONITOR
TEST FUNCTION	SDH	OVERHEAD	BER
MEASURE PRBS FROM O/H BYTE	RSOH	E1	
ERROR COUNT			4
ERROR RATIO			1.953E-06
ERROR FREE SECONDS			28
%ERROR FREE SECONDS			87.500
PATTERN LOSS SECONDS			0
ELAPSED TIME			00d 00h 00m 32s

STATUS:

MULTIPLE
WINDOW

HOW TO:

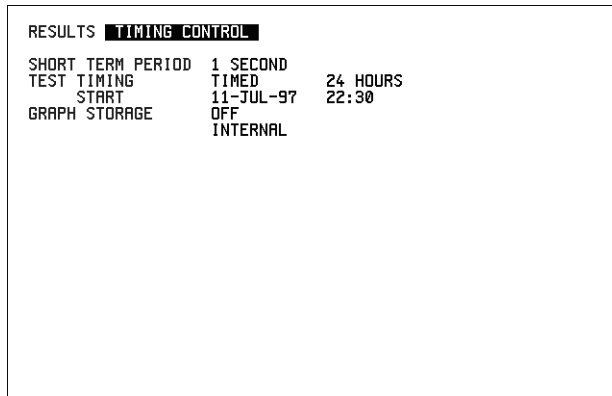
- 1 Set up the SDH transmit interface and payload required. See "Setting SDH Transmit Interface " page 25.
- 2 Set up the receive SDH interface and payload as required. See "Setting SDH Receive Interface " page 41.
- 3 Choose the overhead byte to be tested on the **RECEIVE** **SDH** **TEST FUNCTION** display.
- 4 Choose the overhead byte to be tested on the **TRANSMIT** **SDH** **TEST FUNCTION** display.
- 5 Press **RUN/STOP** to start the test.
- 6 The PRBS pattern can be errored by pressing **SINGLE**.

Test Timing

Description

There are two aspects to test timing:

- Error results may be displayed as short term or cumulative over the measurement period. If short term error measurements are required, the short term period may be selected.
- The period of the test may be defined or controlled manually.



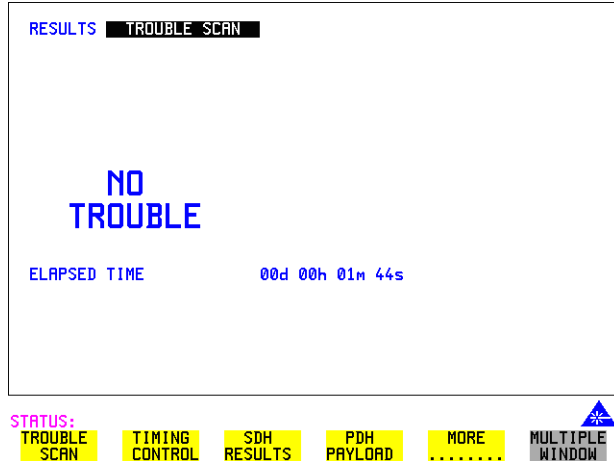
HOW TO:

- 1 Choose **TIMING CONTROL** on the **RESULTS** display.
- 2 Choose the SHORT TERM PERIOD required for short term results.
- 3 Choose the type of TEST TIMING required:
For manual control with **RUN/STOP** choose **MANUAL**.
For a single timed measurement period started with **RUN/STOP**, choose **SINGLE** and choose the Test duration.
For a timed period starting at a specified time, choose **TIMED**, choose the Test duration and the test START date and time.

Performing a Trouble Scan

When first connecting to the network it can be useful to have an indication of any problems that exist before starting testing. In OmniBER this feature is provided by Trouble Scan.

All possible error sources and alarms are scanned simultaneously. If any error counts are not zero then these are displayed. Up to 4 non-zero error counts are displayed in priority order.



If all error counts are zero and any alarms are detected "ALARMS DETECTED" is displayed.

SHOW and the alarm led's can be used to determine which alarms were detected.

If no alarms are detected and all error counts are zero then "NO TROUBLE" is displayed.

Error Count Priority - see the Table on the following page for a list of error count priorities. The Table lists the error types in order of importance, most important at the top of table.

Making Measurements
Performing a Trouble Scan

Error Count Priority

PDH	DSn	SDH	SONET
CRC CODE FAS 140M FAS 34M FAS 8M FAS 2M REBE BIT	CRC CODE DS3FR (DS1FR) P-BIT C-BIT FEBE BIT	B1 BIP B2 BIP B3 BIP TU BIP FRAME CRC FAS2 (DS3FR, DS1FR) MS REI HP REI HP IEC LP REI P-BIT C-BIT REBE (FEBE) BIT	CV-S CV-L CV-P CV-V FRAME CRC DS3FR (DS1FR, FAS2) REI-L REI-P CV-IEC REI-V P-BIT C-BIT REBE (FEBE) BIT

Making Measurements

Making SDH Analysis Measurements

Making SDH Analysis Measurements

Description

G.826, M.2101, M.2110 and M.2120 analysis results are provided for all relevant SDH error sources.

In addition the following results are provided:

- Cumulative error count and error ratio
- Short Term error count and error ratio
- Alarm Seconds
- Frequency
- Pointer Values
- Pointer Graph. See, "Using Pointer Graph Test Function " page 87.

RESULTS		SDH		ERROR ANALYSIS	
G.826	M.2101	M.2110	M.2120		
ERROR TYPE B2 BIP					
B2 BIP ANALYSIS (G.826)					
EB	5679	ES	2		
SES	1	URS	0		
FURS	0	BBE	624		
ESR	3.571E-02	SESR	1.786E-02		
BBER	1.418E-03				
ELAPSED TIME		00d 00h 00m 56s			

STATUS:

ERROR SUMMARY	CUMULATIVE	SHORT TERM	ERROR ANALYSIS	MORE	MULTIPLE WINDOW
---------------	------------	------------	----------------	------------	-----------------

HOW TO:

- 1 Set up the receive SDH interface and payload required. See "Setting SDH Receive Interface " page 41.
- 2 If required set up the SDH transmit interface and payload. See "Setting SDH Transmit Interface " page 25.
- 3 Press **RUN/STOP** to start the measurement.
- 4 You can view the analysis results on the **RESULTS SDH ANALYSIS** display.

TIP:

The measurement will not be affected if you switch between the different results provided.

Making PDH Analysis Measurements

Description
Option 012 is required for PDH operation.

G.821, G.826, M.2100, M.2110 and M.2120 analysis results are provided for all relevant PDH and PDH Payload error sources. In addition the following results are provided:

- Cumulative error count and error ratio. Short Term error count and error ratio.
- Alarm Seconds
- SIG/BIT Monitor. See "Monitoring Signaling Bits " page 108.

RESULTS	PDH		ERROR ANALYSIS	
G.821	G.826	M.2100	M.2110	M.2120
FAS 140 Mb/s				
EC	0			
ES	9		4.68750%	
EFS	183		95.31250%	
SES	9		4.68750%	
UNAU	0		0.00000%	
DEG_MIN	0		0.00000%	
CODE ES	N/A			
ELAPSED TIME	00d 00h 03m 12s			

STATUS:

MULTIPLE WINDOW

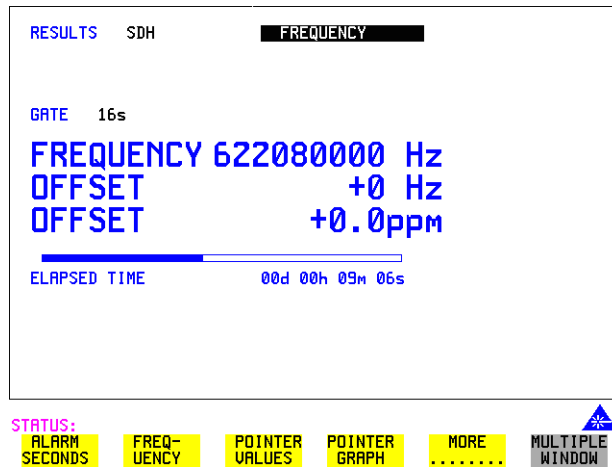
HOW TO:

- 1 If SDH is chosen as the interface, set up the Receive Interface and Payload required. See "Setting SDH Receive Interface " page 41. If required set up the Transmit Interface and Payload. See "Setting SDH Transmit Interface " page 25.
- 2 If PDH is chosen as the interface, set up the PDH receive interface. See "Setting PDH/DSn Receive Interface (Option 012) " page 39. If required set up the PDH transmit interface. See "Setting PDH/DSn Transmit Interface (option 012) " page 22.
- 3 Press **RUN/STOP** to start the measurement.
- 4 If SDH is chosen as the interface, you can view the analysis results on the **RESULTS PDH PAYLOAD ERROR ANALYSIS** display
 If PDH is chosen as the interface, you can view the analysis results on the **RESULTS PDH ERROR ANALYSIS** display.

Measuring Frequency

Description

The signal frequency and the amount of offset from ITU-T standard rate can be measured to give an indication of the probability of errors.



HOW TO:

- 1 Connect the signal to be measured to the IN port of the PDH/DSN RECEIVE module or the IN port of the Multirate Analyzer module (SDH electrical) or the IN port of the Optical Interface module (SDH optical).
- 2 Choose the required SIGNAL rate and LEVEL on the **PDH** **RECEIVE** **MAIN SETTINGS** or **SDH** **RECEIVE** **MAIN SETTINGS** display.

NOTE

1. Frequency measurement is always available even if test timing is off.
2. The result is only valid if a complete sweep of the highlighted bar has occurred since the input was applied. Also if you select an External or Received clock source the measurement result will depend on the accuracy of the applied clock source.

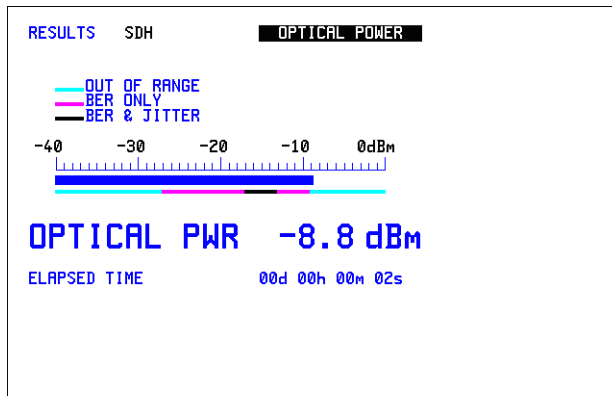
Test Period

Two counter gate periods, selected in the **GATE** field are provided simultaneously, 1s and 16s. For the 16s gate period a “Fuel Gauge” indicates progress towards the next update.

Measuring Optical Power

Description

Optical power measurement can be performed on the SDH signal connected to the IN port of the Optical Interface module.



STATUS:
ERROR SUMMARY CUMULATIVE SHORT TERM ERROR ANALYSIS MORE MULTIPLE WINDOW

HOW TO:

- 1 Connect the SDH optical signal to the IN port of the Optical Interface module.
- 2 Choose the received input signal rate on the **RECEIVE** **SDH** display.

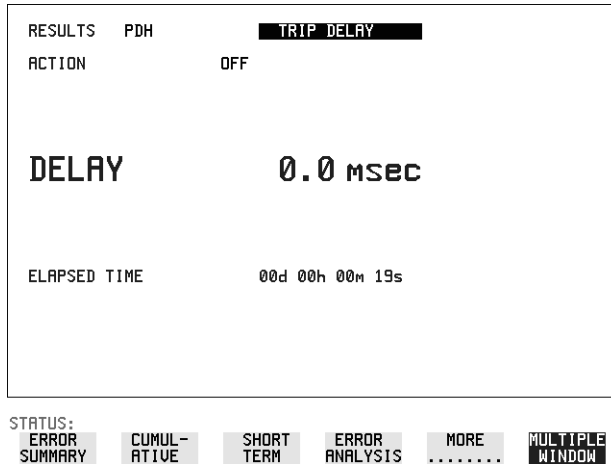
NOTE

1. Optical power measurement is always available even if test timing is off.
 2. The white portion of the coloured bar shows the power range for accurate jitter measurement. The green portion of the coloured bar shows the power range for accurate BER measurement.
-

Measuring Round Trip Delay

Description:

The time taken for voice traffic to pass through the network is very important. Excessive delay can make speech difficult to understand. The Round Trip Delay feature of the HP OmniBER 718 measures the delay in a 64 kb/s timeslot. A test pattern is transmitted in the 64 kb/s timeslot and a timer is set running. A loopback is applied to the network equipment to return the test signal. The received pattern stops the timer and the Round Trip Delay is calculated.



NOTE

You can only measure Round Trip Delay on a 64 kb/s test signal obtained from a 140 Mb/s, 34 Mb/s, 8 Mb/s or 2 Mb/s PDH/DSn interface or PDH/DSn payload signal.

HOW TO:

- 1 If measuring on an SDH interface, set up the SDH transmit and receive interfaces and payloads required. See "Setting SDH Transmit Interface " page 25 and "Setting SDH Receive Interface" page 41.
- 2 If measuring on a PDH interface, set up the PDH transmit and receive interfaces and payloads required. See "Setting PDH/DSn Transmit Interface (option 012)" page 22 and "Setting PDH/DSn Receive Interface (Option 012)" page 39.
- 3 Connect a loopback to the network equipment.
- 4 Choose ACTION **ON** to start the measurement.

Making Measurements

Measuring Round Trip Delay

If measuring on an SDH interface, the results are available on the **RESULTS** **PDH PAYLOAD** display.

If measuring on a PDH interface, the results are available on the **RESULTS** **PDH** display.

The Round Trip delay measurement range is up to 2 seconds. The resolution varies with the received interface signal rate:

2 Mb/s	1 microsecond
8, 34, 140 Mb/s	10 microseconds
STM-0, STM-1	0.5 milliseconds
STM-4, STM-16	0.5 milliseconds

Monitoring Signaling Bits

Description

The HP OmniBER 718 receiver can be used to monitor the state of signaling bits in received 2 Mb/s signals with timeslot-16 CAS multiframing (PCM30 or PCM30CRC) and DS1 structured signals.

2.048 Mb/s Results

For 2 Mb/s signals with timeslot-16 CAS multiframing a table showing the values of A,B,C,D signaling bits in all 30 channels is given.

DS1 Results

D4 and SLC-96 payloads

A table simultaneously showing the state of the A and B signaling bits in the 6th and 12th frames of a superframe is given. Each frame contains 24 timeslots. In SLC-96 mode A and B choices are 0, 1 or alternating. If you set bit A or B to alternate, the displayed bit changes to an A, to indicate that the bit is alternating from 1 to 0. The same signaling is transmitted in all channels.

ESF Payloads

A table simultaneously showing the state of the A, B, C and D signaling bits in the 6th, 12th, 18th and 24th frames of a superframe is given. Each frame contains 24 timeslots.

RESULTS DS _n PAYLOAD SIG/BIT MONITOR							
DS1 ESF ABCD BITS							
TS	ABCD	TS	ABCD	TS	ABCD	TS	ABCD
1	1100	7	1111	13	1111	19	1111
2	1111	8	1111	14	1111	20	1111
3	1111	9	1111	15	1111	21	1111
4	1111	10	1111	16	1111	22	1111
5	1111	11	1111	17	1111	23	1111
6	1111	12	1111	18	1111	24	1111

STATUS:
 ERROR SUMMARY CUMULATIVE SHORT TERM ERROR ANALYSIS MORE MULTIPLE WINDOW

Measuring Service Disruption Time

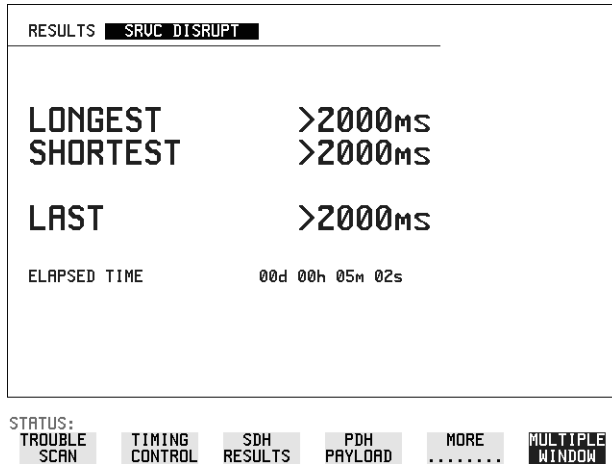
Description:

Protection switching ensures that data integrity is maintained and revenue protected when equipment failure occurs. The speed of operation of the protection switch can be measured.

The sequence of events involved in measuring the switching time is:

- Pattern Synchronization (no errors) is achieved.
- The protection switch is invoked - Pattern Synchronization is lost.
- The standby line is in place - Pattern Synchronization is regained.

The time interval between pattern sync loss and pattern sync gain is a measure of the disruption of service due to protection switching.

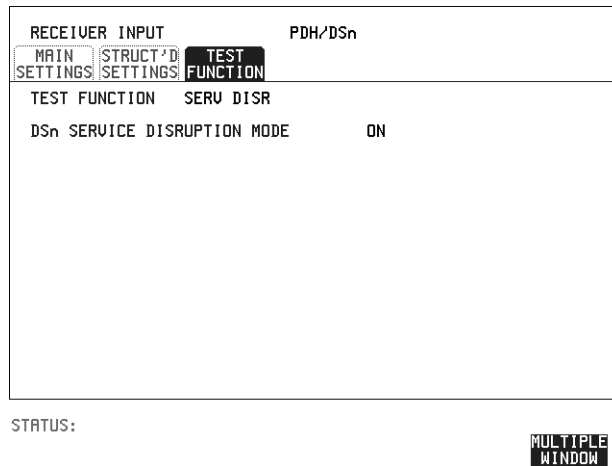


Service Disruption is chosen on the **RESULTS** display except for the following configuration:

- If you choose a PDH or SDH/SONET interface and an ANSI (DS1, DS3) framed, unstructured payload you must select Service Disruption on the **TRANSMIT** and **RECEIVE TEST FUNCTION** displays.

Making Measurements

Measuring Service Disruption Time



NOTE

At DS1 and DS3, Service Disruption results are only available for Unstructured payloads.

Error Burst Definition

Error bursts start and finish with an error. Bursts of less than 10 us are ignored. Bursts are assumed to have completed when >200 ms elapses without any errors being received.

The longest burst detected is 2 seconds.

Accuracy

50 us when a pattern slip occurs.

1 us when no pattern slip occurs.

HOW TO:

- 1 If interfacing at SDH set up the SDH transmit and receive interfaces and payloads required. See "Setting SDH Transmit Interface " page 25 and "Setting SDH Receive Interface " page 41.
- 2 If interfacing at PDH/DSn set up the PDH/DSn transmit and receive interfaces and payloads as required. See "Setting PDH/DSn Transmit Interface (option 012) " page 22 and "Setting PDH/DSn Receive Interface (Option 012) " page 39.
- 3 If you choose a DS1 or DS3 framed unstructured payload, choose **SERVICE DISRUPT** on the **TRANSMIT** and **RECEIVE TEST FUNCTION** displays.

Making Measurements

Measuring Service Disruption Time

- 4 Press **RUN/STOP** to start the measurement.
- 5 Invoke the protection switch.
- 6 View the results on the **RESULTS** **SRVC DISRUPT** display.

Results Displayed

LONGEST - Longest burst of errors during measurement.

SHORTEST - Shortest burst of errors during measurement.

LAST - Length of last burst of errors detected during measurement.

Performing an SDH Tributary Scan

Description

Tributary Scan tests each tributary for error free operation and no occurrence of Pattern Loss. A failure is indicated by highlighting the tributary in which the failure occurred. The **TRANSMIT** **SDH** **MAIN SETTINGS**, mapping setup determines the tributary structure. The HP OmniBER 718 will configure the Transmitter to the Receiver and the PATTERN is forced to the payload it will fill.

The SDH Tributary Scan display can be logged to the chosen logging device. See "Logging on Demand " page 156.

TRANSMITTER OUTPUT		SDH		
MAIN SETTINGS	STRUCT'D PAYLOAD	JITTER	TEST FUNCTION	OVERHEAD SETUP
TEST FUNCTION	TRIB SCAN	STOP		
BIT ERROR THRESHOLD	>= 1E-3			
TEST TIMING	SINGLE	10 SECS		
SEE RESULTS PAGE FOR TRIBUTARY SCAN RESULTS				

STATUS:

MULTIPLE WINDOW

HOW TO:

- 1 Set up the transmit and receive SDH interfaces and payload as required. See "Setting SDH Transmit Interface " page 25 and "Setting SDH Receive Interface " page 41.
- 2 Choose the required BIT ERROR THRESHOLD.
This determines the error rate above which a failure is declared.
- 3 Choose the required TEST TIMING.
The value you choose is the test time for each individual tributary and not the total test time.
For example, 63 TU-12 tributaries in an AU-4 - the time taken to complete the Tributary Scan will be 63 X TEST TIMING choice.
- 4 The Tributary Scan results can be viewed on the **RESULTS** **SDH TRIBSCAN** display.

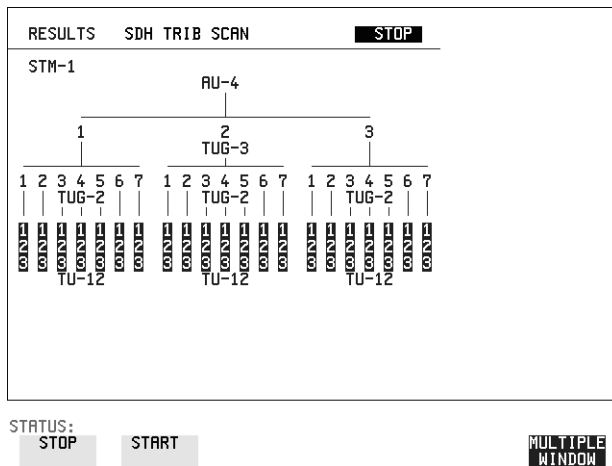
Making Measurements

Performing an SDH Tributary Scan

The Scan can be started on the **TRANSMIT** **SDH** **TEST FUNCTION** display or the **RESULTS** display by choosing **START**.
 If the Scan is started on the **TRANSMIT** **SDH** **TEST FUNCTION** display, the HP OmniBER 718 changes to the **RESULTS** display.
 If a single path, for example, SIGNAL [STM-1] MAPPING AU-4 [VC-4] is chosen, then Tributary Scan is disabled.

NOTE

The keyboard is locked during tributary scan.



Making Measurements
Performing a PDH/DSn Alarm Scan

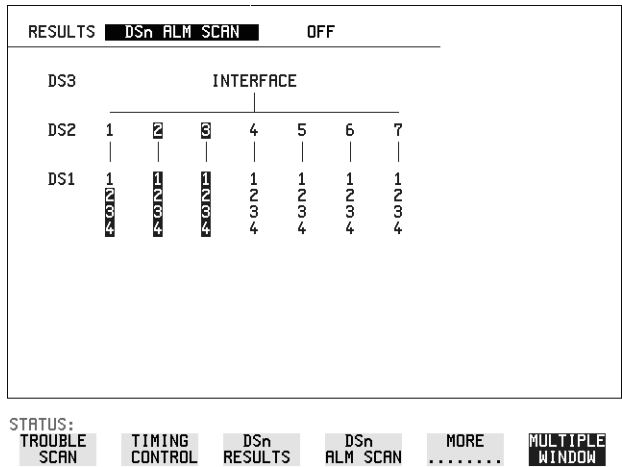
Performing a PDH/DSn Alarm Scan

Description

PDH Alarm Scan tests each channel for the following alarms:

- Frame Loss
- RAI
- AIS

The channel in which an alarm occurs is highlighted.



HOW TO:

- 1 Set up the receive PDH interface as required. See “Setting PDH/DSn Receive Interface (Option 012)” page 39.
- 2 Choose **ON** to start the Alarm Scan.

Measuring Jitter

Description:
Option 200 is required for Jitter measurements.

Jitter and error measurements are made simultaneously when a jitter option is fitted. The measurements are made on the normal input to the PDH or SDH receiver and the interface selections are the normal PDH or SDH Receiver selections.

Cumulative and Short Term results of Jitter Amplitude and Jitter Hits are provided on the **RESULTS JITTER** display.

Graph and Text results for Jitter Transfer and Jitter Tolerance are also provided.

Jitter Measurement Filters

LP, HP1 and HP2 filters to ITU-T Q.171 (PDH) Q.172 (SDH); 12 kHz HP filter

	HP1 (Hz)	HP2 (kHz)	LP (kHz)	HP rms (kHz)
2 Mb/s	20	18	100	12
8 Mb/s	20	80	400	12
34 Mb/s	100	10	800	12
140 Mb/s	200	10	3500	12
155 Mb/s	500	65	1300	12
622 Mb/s	1000	250	5000	12
2.5 Gb/s	5000	1000	20000	12

NOTE

To obtain optimum performance while measuring jitter on optical signals ensure the signal optical power level is within the measurement window. See Measuring Optical Power page 105.

Making Measurements

Measuring Jitter

RESULTS	JITTER	CUMULATIVE
HITS	AMPLITUDE	
+VE PEAK		0.074UI
-VE PEAK		0.044UI
PEAK-PEAK		0.118UI
RMS		0.009UI
FILTERS		HP2
ELAPSED TIME		00d 00h 01m 14s

STATUS:

MULTIPLE
WINDOW

HOW TO:

- 1 If measuring Jitter on a PDH signal, set up the receive PDH interface and the receive Jitter interface. See “Setting PDH/DSn Receive Interface (Option 012)” page 39 and “Setting Jitter Receive Interface” page 42.
- 2 If measuring jitter on an SDH Optical signal, check on the **RESULTS** **SDH RESULTS** **OPTICAL POWER** display that the measured optical power level falls within the white portion of the coloured bar. This ensures the accuracy of the Jitter results.
- 3 If measuring Jitter on an SDH signal, set up the receive SDH interface and the receive Jitter interface. See “Setting SDH Receive Interface” page 41 and “Setting Jitter Receive Interface” page 42.
- 4 If performing a Jitter Tolerance measurement, see “Measuring Jitter Tolerance ” page 123.
If performing a Jitter Transfer measurement, see “Measuring Jitter Transfer ” page 126.
- 5 Press **RUN/STOP** to start the measurement.
- 6 You can view the Jitter hits and Amplitude results on the **RESULTS** **JITTER** display.

Measuring Extended Jitter

Description:
Option 200 is required for Jitter measurements.

Extended jitter measurements are made in a jitter bandwidth of 0.1 Hz to 25 kHz. These measurements are made at the upper end of the standard wander frequency range and the lower end of the standard jitter frequency range.

When **EXTENDED** is chosen Jitter results are provided. Cumulative and Short Term results of Jitter Amplitude and Jitter Hits are provided on the **RESULTS JITTER** display.

RESULTS	JITTER	CUMULATIVE
HITS	AMPLITUDE	
+VE PEAK		0.074UI
-VE PEAK		0.044UI
PEAK-PEAK		0.118UI
RMS		0.009UI
FILTERS		HP2
ELAPSED TIME		00d 00h 01m 14s

STATUS:

MULTIPLE WINDOW

HOW TO:

- 1 If measuring Extended jitter on a PDH signal, set up the receive PDH interface and the receive Jitter interface. See “Setting PDH/DSn Receive Interface (Option 012)” page 39 and Chapter “Setting Extended Jitter Receive Interface” page 43.
- 2 If measuring Extended jitter on an SDH Optical signal, check on the **RESULTS SDH RESULTS OPTICAL POWER** display that the measured optical power level falls within the white portion of the coloured bar. This ensures the accuracy of the Jitter results.
- 3 If measuring Extended jitter on an SDH signal, set up the receive SDH interface and the receive Jitter interface. See “Setting SDH Receive Interface” page 41 and Chapter “Setting Extended Jitter Receive Interface”.

Making Measurements
Measuring Extended Jitter

- 4 Press **RUN/STOP** to start the measurement.

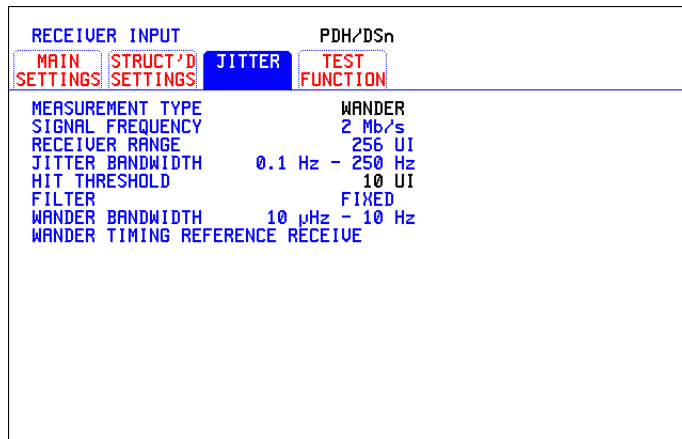
Measuring Wander

Description:
Option 200 is required for Jitter measurement.

Wander is defined as the long-term variations of the significant instants of a digital signal from their ideal positions in time, where long-term implies phase oscillations of frequency less than or equal to a demarcation point that is specified for each interface rate. Refer to ANSI T1.102 for the demarcation frequencies for each digital signal.

Accurate Wander measurements require a Wander reference derived from the SDH Clock module. Wander results are displayed in UI and nanoseconds and Jitter Amplitude and Jitter Hits results are available.

When wander is measured at 2 Mb/s, Estimated Bit and Frame slips are calculated and a Bar Graph shows the cumulative Wander over the measurement period.



STATUS:

MULTIPLE WINDOW

HOW TO:

Make the Measurement

- 1 To obtain the Wander reference from the PDH transmitter connect REF OUT on the SDH Clock module to REF IN on the PDH Jitter TX module. Choose SIGNAL **2 Mb/s** on the **TRANSMIT** **PDH** **MAIN** **SETTINGS** display, choose CLOCK SYNC **2M REF** and choose the SOURCE required from the menu. See "Setting PDH/DSn Transmit Interface (option 012)" page 22.
- 2 To obtain the Wander reference from the SDH transmitter choose the required reference from the CLOCK menu on the **TRANSMIT** **SDH**

Making Measurements

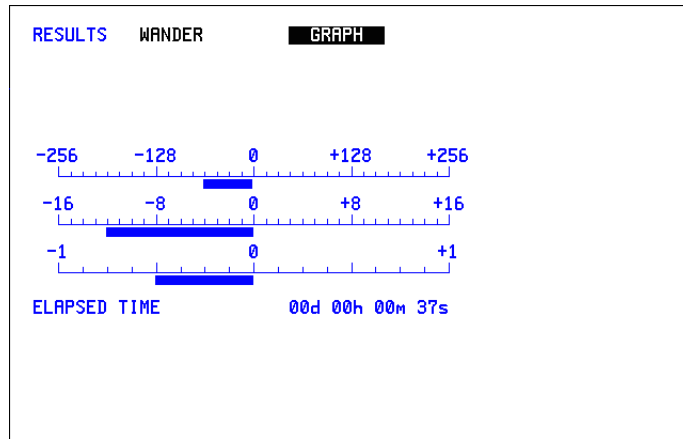
Measuring Wander

MAIN SETTINGS display. See, “Setting SDH Transmit Interface” page 25.

- 3 If measuring wander at a PDH rate set up the PDH receive interface. See, “Setting PDH/DSn Receive Interface (Option 012)” page 39.
- 4 If measuring wander on an SDH Optical signal, check on the **RESULTS** **SDH RESULTS** **OPTICAL POWER** display that the measured optical power level falls within the white portion of the coloured bar. This ensures the accuracy of the Wander results.
- 5 If measuring wander at a SDH rate set up the SDH receive interface. See, “Setting SDH Receive Interface” page 41.
- 6 Choose MEASUREMENT TYPE **WANDER**.
- 7 Choose the WANDER HIT THRESHOLD level - if the received wander exceeds the value chosen a wander hit is recorded.
- 8 Press **RUN/STOP** to start the measurement.

HOW TO:

View the Results



STATUS:

TIME

UI

GRAPH

MULTIPLE WINDOW

- 1 Choose **WANDER** on the **RESULTS** display and choose the display units required:
TIME displays the wander results in nanoseconds.
UI displays the wander results in Unit Intervals.
If you are measuring wander at 2 Mb/s Estimated Bit slips and Estimated Frame slip results are provided and a **GRAPH** choice is added to the menu.

Making Measurements

Measuring Wander

If **GRAPH** is chosen the cumulative wander results are displayed in graphical form. The Graphs are additive and in the example shown the Wander is -76.5 BITS.

NOTE

Estimated Bit Slips signify the slippage from the start of the measurement.
One Estimated Frame Slip corresponds to 256 Bit Slips.
Implied Frequency Offset is calculated from the Wander results.

Measuring Jitter Tolerance

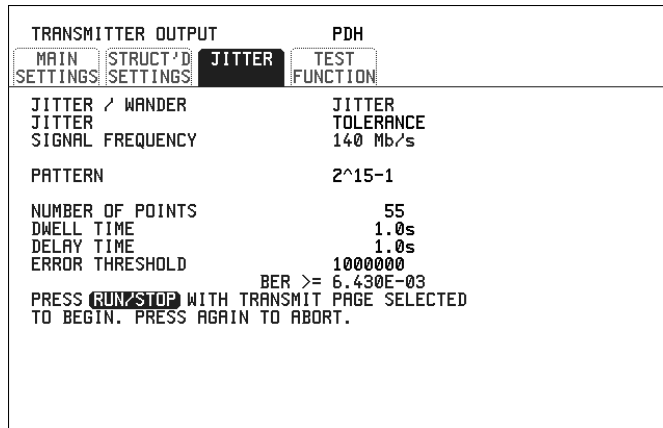
Description:
Option 200 is required for Jitter measurement and 012 for PDH operation.

The jitter auto tolerance feature provides jitter tolerance measurements within the relevant ITU-T mask, G.823 for PDH, G.958, G.825 and Bellcore GR-253 for SDH.

Jitter is generated at a range of frequencies within the mask and an error measurement is made. If no errors occur (PASS), the jitter amplitude at that frequency point is increased until errors occur (FAIL) or the maximum jitter amplitude is reached. The highest jitter amplitude at which PASS occurs is plotted on the graph as the Jitter Tolerance for that jitter frequency.

TIP:

The transmitter and receiver can be set to different rates to allow testing across multiplexers, for example transmitter set to STM-1 with embedded 34 Mb/s and receiver set to 34 Mb/s.



STATUS:



HOW TO:

Make the Measurement

- 1 If you are performing jitter tolerance on the PDH signal, set up the PDH transmit and receive interfaces. See “Setting PDH/DSn Transmit Interface (option 012)” page 22 and “Setting PDH/DSn Receive Interface (Option 012)” page 39.
- 2 If you are performing jitter tolerance on an SDH Optical signal, check on the **RESULTS** **SDH RESULTS** **OPTICAL POWER** display that the measured

Making Measurements

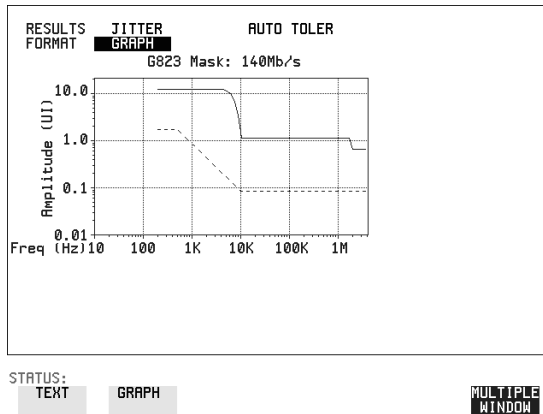
Measuring Jitter Tolerance

optical power level falls within the white portion of the coloured bar. This ensures the accuracy of the Jitter results.

- 3 If you are performing jitter tolerance on the SDH signal, set up the SDH transmit and receive interfaces. See “Setting SDH Transmit Interface” page 25 and “Setting SDH Receive Interface” page 41.
- 4 If SDH is chosen as the interface, choose the SDH MASK.
TYPE A masks as per ITU-T G.958 have good jitter tolerance and the mask corner points are modified to compensate.
TYPE B masks as per ITU-T G.958 have poorer jitter tolerance but a narrower jitter transfer function and the mask corner points are modified to compensate.
- 5 Choose the required test PATTERN.
- 6 Choose the NUMBER OF POINTS at which jitter is transmitted (3 to 55)
- 7 Choose the DWELL TIME - the time jitter is generated at each jitter frequency point (1 to 99.9 seconds).
- 8 Choose the DELAY TIME - the time delay between the jitter frequency/amplitude being applied and the error measurement being made. This allows the network equipment to settle as jitter frequency is changed. (0 to 99.9 seconds).
- 9 Choose the ERROR THRESHOLD.
If ANY ERRORS is chosen, any BIP or BIT error will result in a FAIL.
If BIT ERRORS is chosen, choose a value between 1 and 1,000,000 to determine the bit error threshold for the jitter tolerance PASS/FAIL decision.
BER \geq shows the bit error ratio calculated from the bit error threshold choice and the dwell time choice.
- 10 Press **RUN/STOP** to start the jitter auto tolerance measurement.
The measurements progress can be monitored on the **TRANSMIT** display. At the end of the test the results can be viewed on the **TRANSMIT** or **RESULTS** displays. The **TRANSMIT** display is cleared when **TRANSMIT** is pressed but the results remain on the **RESULTS** display until the next jitter tolerance measurement is made.

Making Measurements

Measuring Jitter Tolerance



HOW TO:

View the Results

- 1 Choose the results FORMAT.

If **GRAPH** is chosen, a plot of the jitter tolerance results against the ITU-T mask is displayed.

If **TEXT** is chosen, the results from which the graph is constructed are displayed, Point number, Frequency, Mask amplitude, Tolerance, Result.

If applicable, results 13 through 55 can be viewed on pages 2 through 5.

RESULTS	JITTER	AUTO TOLER		
FORMAT	TEXT	PAGE	1	
G823 Mask: 34Mb/s				
Point	Frequency	Mask(UI)	To1(UI)	Result
1	100.0	1.50	>10.00	PASS
2	118	1.50	>10.00	PASS
3	139	1.50	>10.00	PASS
4	165	1.50	>10.00	PASS
5	195	1.50	>10.00	PASS
6	230	1.50	>10.00	PASS
7	271	1.50	>10.00	PASS
8	321	1.50	>10.00	PASS
9	379	1.50	>10.00	PASS
10	447	1.50	>10.00	PASS
11	528	1.50	>10.00	PASS
12	624	1.50	>10.00	PASS

STATUS: 1 2 3 4 5 MULTIPLE WINDOW

If you wish to log the jitter tolerance results to a printer, see “Logging Jitter Tolerance Results” page 162.

Measuring Jitter Transfer

Description:

Option 200 is required for Jitter measurement.

You can perform Jitter transfer measurements at each of the four PDH rates 2, 8, 34, 140 Mb/s, plus DS1, DS3 and also STM-0, STM-1, STM-4 and STM-16.

The jitter generator provides the stimulus for the jitter transfer measurement. Narrow band filtering is used in the jitter receiver thus allowing selection and measurement of the relevant jitter components to provide accurate and repeatable results.

The jitter transfer results are presented in graphical and tabular form.

Graphical results are plotted as Gain V Frequency.

The relevant Pass Mask (ITU-T G.823 for PDH, ITU-T G.958 and Bellcore GR-253 for SDH) is also displayed on the graph.

NOTE

1. The Transmitter and Receiver must be set to the same interface rate.
2. There is no ITU-T Pass Mask for 140 Mb/s.

HOW TO:

Achieve the required accuracy:

- 1 The HP OmniBER 718 must be connected back to back in order to perform a calibration cycle before making a Jitter Transfer measurement.
- 2 The HP OmniBER 718 must have been switched on for 1 hour before starting a calibration cycle.
- 3 The climatic conditions must remain stable from switch-on to end of measurement.
- 4 The Jitter Transfer measurement must be started within 10 minutes of completion of the Calibration.
- 5 If maximum Delay time, maximum Dwell time and maximum number of Points is selected, the accuracy specification cannot be guaranteed as the time from start of calibration to end of measurement (test period) will be approximately two hours. It is recommended that the maximum test period does not exceed 90 minutes.
Test Period = Delay Time + Dwell Time + 5 Seconds X Number of Points X 2 (Calibration + Measurement).

NOTE

For best results a Dwell Time of 20 seconds and Delay Time of 10 seconds are recommended.

Making Measurements

Measuring Jitter Transfer

TRANSMITTER OUTPUT		PDH	
MAIN SETTINGS	STRUCT'D SETTINGS	JITTER	TEST FUNCTION
JITTER / WANDER		JITTER	
JITTER		TRANSFER FN	
SIGNAL FREQUENCY		140 Mb/s	
MODE		CALIB	
NUMBER OF POINTS		55	
DELAY TIME	5.0s	DWELL TIME	5s
INPUT MASK		G.823	
F1	200	F2	500
F3	10000	F4	3500000
PASS MASK		A1	1.50 UI
		A2	0.08 UI
		NONE	
PRESS RUN/STOP WITH TRANSMIT PAGE SELECTED TO BEGIN. PRESS AGAIN TO ABORT.			

STATUS:

MULTIPLE WINDOW

HOW TO:

Perform Jitter Transfer Calibration

NOTE

The CALIBRATION should always be carried out with LEVEL **TERMINATE** selected on the **RECEIVE MAIN SETTINGS** display.

- 1 If PDH Jitter Transfer is required, set up the PDH transmit and receive interfaces, the receive jitter interface and connect PDH IN to PDH OUT. See “Setting PDH/DSn Transmit Interface (option 012)” page 22, “Setting PDH/DSn Receive Interface (Option 012)” page 39 and “Setting Jitter Receive Interface” page 42.
- 2 If you are performing jitter transfer on an SDH Optical signal, check on the **RESULTS SDH RESULTS OPTICAL POWER** display that the measured optical power level falls within the white portion of the coloured bar. This ensures the accuracy of the Jitter results.
- 3 If STM-0, STM-1, STM-4 or STM-16 Optical Jitter Transfer is required, set up the SDH transmit and receive interfaces, the receive jitter interface and connect the OUT port of the Optical module to the IN port of the Optical module. See “Setting SDH Transmit Interface” page 25, “Setting SDH Receive Interface” page 41 and “Setting Jitter Receive Interface” page 42.

CAUTION

If STM-0/1/4/16 SDH Jitter Transfer is required, a 15 dB attenuator must be connected between the IN and OUT ports of the Optical module.

Making Measurements

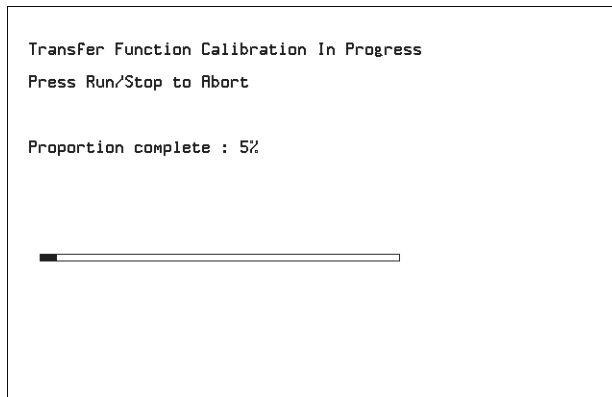
Measuring Jitter Transfer

- 4 If you wish to measure STM-0 or STM-1 electrical jitter transfer, set up the SDH transmit and receive interfaces, the receive jitter interface and connect IN port to OUT port on the SDH module. See “Setting SDH Transmit Interface” page 25, “Setting SDH Receive Interface” page 41 and “Setting Jitter Receive Interface” page 42.
- 5 Choose JITTER **TRANSFER FUNCTION** on the **TRANSMIT** **JITTER** display.
- 6 Choose the NUMBER OF POINTS at which jitter is transmitted (1 to 55)
- 7 Choose the DWELL TIME - the time jitter is generated at each jitter frequency point (5 to 30 seconds).
- 8 Choose the DELAY TIME - the time delay between the jitter frequency/amplitude being applied and the error measurement being made. This allows the network equipment to settle as jitter frequency is changed (5 to 30 seconds).
- 9 Choose the INPUT MASK.
If measuring SDH jitter transfer, the ITU-T G.958 mask can be Type A or Type B and the Bellcore GR-253 mask can be High or Low.
TYPE A masks have good jitter tolerance and the mask corner points are modified to compensate.
TYPE B masks have poorer jitter tolerance but a narrower jitter transfer function and the mask corner points are modified to compensate.
GR-253 Low masks cover the lower frequency band.
GR-253 High masks cover the upper frequency band.
If measuring 2 Mb/s or 8 Mb/s jitter transfer, a Q Factor choice is provided. Your Q Factor choice should match the network equipment regenerator Q Factor.
Low Q systems have good jitter tolerance and the mask corner points are modified to compensate.
High Q systems have poorer jitter tolerance but a narrower jitter transfer function and the mask corner points are modified to compensate.
If **G.823** (PDH) or **G.958** or **GR-253** (SDH) is chosen the mask frequencies and amplitudes are displayed for information purposes.

If **USER** is chosen, choose the mask jitter frequencies, F1, F2, F3 and F4, and mask jitter amplitudes A1 and A2.
- 10 Choose MODE **CALIB** and press **RUN/STOP** to start the calibration.
The Jitter Transfer display is replaced by an information display for the duration of the Calibration.
A bar graph showing the progress of the calibration will appear on the display.
When the Calibration is complete, the display will revert to the **TRANSMIT** **JITTER** display.

Making Measurements

Measuring Jitter Transfer



STATUS: Jitter transfer function in progress

MULTIPLE
WINDOW

HOW TO: Start the Jitter Transfer Measurement

NOTE

The Jitter Transfer measurement must be started within 10 minutes of the completion of calibration.

- 1 After the CALIBRATION is completed, remove the back to back connection from the PDH or SDH or optical interfaces.
If the measurement is to be made at a network equipment monitor point, choose **MONITOR** on the PDH or SDH **RECEIVE** display before making the jitter transfer measurement.
- 2 Choose MODE **MEASURE** on the **TRANSMIT** **JITTER** display and press **RUN/STOP**.
The measurement's progress can be monitored on the **TRANSMIT** display.

HOW TO: View the Results

- 1 Choose the results FORMAT.
If **GRAPH** is chosen, a plot of the jitter transfer results against the ITU-T mask is displayed.
If **TEXT** is chosen, the results from which the graph is constructed are displayed: Point number, Frequency, Mask amplitude (dB), Jitter Gain (dB), Result.
If applicable, results 13 through 55 can be viewed on pages 2 through 5.

Making Measurements

Measuring Jitter Transfer

RESULTS	JITTER	TRANSFER FN		
FORMAT	TEXT	PAGE		
GR-253	Mask: 155Mb/s	3		
Point	Frequency	Mask(dB)	Gain(dB)	Result
23	12309	0.10	-0.03	PASS
24	14239	0.10	-0.05	PASS
25	16471	0.10	-0.02	PASS
26	19053	0.10	-0.03	PASS
27	22040	0.10	-0.01	PASS
28	25495	0.10	0.01	PASS
29	29491	0.10	0.00	PASS
30	34114	0.10	0.01	PASS
31	39461	0.10	-0.03	PASS
32	45647	0.10	0.02	PASS
33	52802	0.10	0.01	PASS
34	61079	0.10	-0.01	PASS

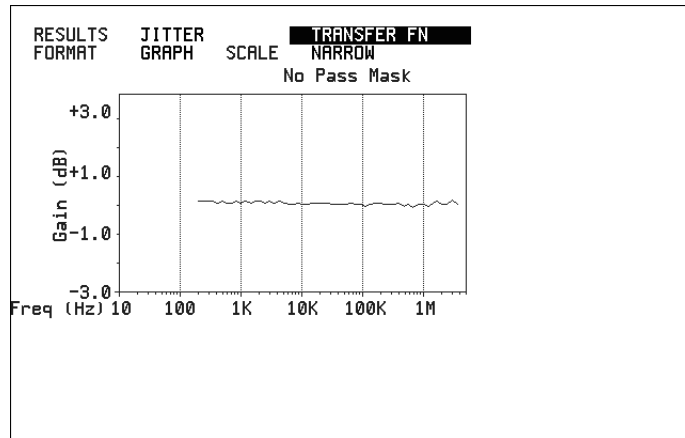
STATUS:



- If **GRAPH** is chosen, choose the SCALE required.
 - WIDE** provides a vertical axis range of +5 to -60 dB and is recommended for viewing the high frequency portion of the graph. This allows a clearer view of the difference between the actual result and the ITU-T pass mask.
 - NARROW** provides a vertical axis range of +3 to -3 dB and is recommended for viewing the low frequency portion of the graph. This allows a clearer view of the difference between the actual result and the ITU-T pass mask.

Making Measurements

Measuring Jitter Transfer



STATUS:

CUMUL
ATIVE

SHORT
TERM

AUTO
TOLER

TRANSFER
FUNCTION

MULTIPLE
WINDOW

- 3 If you wish to log the jitter tolerance results to a printer, see “Logging Jitter Transfer Results” page 164.

Measuring Pointer Adjustment (Tributary) Jitter

Introduction

During the transition from a PDH network to mixed PDH/SDH networks, tight control of jitter levels is essential, especially as new sources of jitter emerge, caused by the mapping process and network synchronisation problems resulting in pointer adjustments. The pointer adjustments cause tributary jitter at the PDH output ports of the network element.

Pointer Adjustment Jitter

Jitter resulting from pointer adjustments is transient in nature, relatively high in amplitude, and most of the energy is contained in low frequency components.

ITU-T G.783 and ETSI TM-1015 recommendations define a set of pointer sequences when evaluating NE's pointer adjustment jitter performance. These sequences are designed to emulate the pointer activity that results from incorrect synchronisation within a network element.

The HP OmniBER Transmitter can generate the test sequences recommended by ITU-T G.783/ETSI TM-1015. Use these sequences to stress the system under test for correct levels of tributary jitter.

Refer to "Adding Pointer Adjustments" on page 54 for instructions on how to add pointer adjustments and detailed explanations of the pointer sequences provided by the HP OmniBER.

Making Measurements

Measuring Pointer Adjustment (Tributary) Jitter

Table 1 ITU-T G.783 Jitter Specification

Table 1. ITU-T G.783 combined jitter specification

Payload	Pointer	Sequence	Measurement bandwidth	Max. jitter (UI p-p)
2 Mb/s	TU-12	A, B, C	0.02 to 100 kHz *	0.4
		A, B, C	18 to 100 kHz **	0.075
34 Mb/s	TU-3	A, B, C	0.1 to 800 kHz *	0.4
		D	0.1 to 800 kHz *	0.75
		A, B, C, D	10 to 800 kHz **	0.075
140 Mb/s	AU-4	A, B, C	0.02 to 3500 kHz *	0.4
		D	0.02 to 3500 kHz *	0.75
		A, B, C, D	10 to 3500 kHz **	0.075

* Denotes LP + HP1 filters

** Denotes LP + HP2 filters

Table 2 Pointer Jitter Measurement Settings

Payload	SDH Tx settings		PDH Rx settings		Max. jitter (UI p-p)
	Pointer sequence	PDH service offset	Measurement filters	Measurement period	
2 Mb/s	A	± 50 ppm	LP + HP1	20 s	0.4
	B C		LP + HP1	30 s	0.4
	A	Any value in range	LP + HP2	20 s	0.075
	B C		LP + HP2	30 s	0.075
34 Mb/s	A D	± 20 ppm	LP + HP1	20 s	0.4(A)0.75(D)
	B C		LP + HP1	30 s	0.4
	A D	Any value in range	LP + HP2	20 s	0.075
	B C		LP + HP2	30 s	0.075
140 Mb/s	A D	± 15 ppm	LP + HP1	20 s	0.4(A)0.75(D)
	B C		LP + HP1	30 s	0.4
	A D	Any value in range	LP + HP2	20 s	0.075
	B C		LP + HP2	30 s	0.075

Making Measurements

Measuring Pointer Adjustment (Tributary) Jitter

Performing a Tributary Jitter Measurement

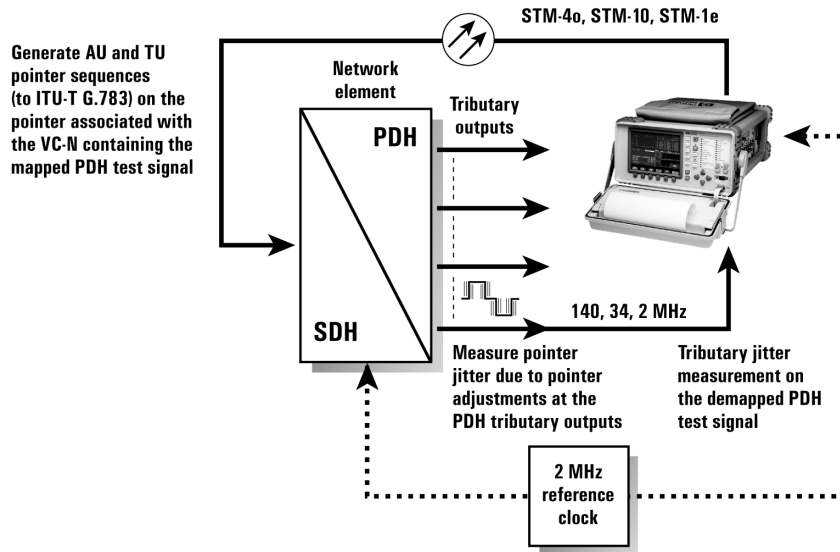


Figure 1 Typical tributary jitter test setup

HOW TO:

- 1 Connect the HP OmniBER to the Network Element as shown in Figure 1. Ensure the HP OmniBER and the NE are synchronised.
- 2 Configure the HP OmniBER as follows:
- 3 Set the Transmitter PDH offset to any in-range value (see Table 2 previous page).
- 4 Set Receiver PDH interface line rate as required.
- 5 Set the required test pattern.
- 6 Set up and run pointer sequence A (see page 54 Adding Pointer Adjustments and Table 1 page ** for pointer sequences for appropriate AU/TU).
- 7 Set the RESULTS display to JITTER, CUMULATIVE and AMPLITUDE.
- 8 Set the test timing controls to SINGLE and period to 20 seconds.
- 9 Set jitter measurement range to 1.6 UI and measurement filter to LP+HP1.
- 10 Verify that no alarms or errors are detected by the OmniBER receiver.
- 11 Measure and record peak-to-peak jitter from ten consecutive measurement

Making Measurements

Measuring Pointer Adjustment (Tributary) Jitter

periods. Evaluate results against limit shown in Table 2.

12 Change the filter setting to LP+HP2, and repeat step 11.

13 Repeat the above procedure for pointer sequences B, C, D, E, F and G as required. Refer to O.172 recommendation or the Table 1 on page ** for a list of sequence tests.

Making Measurements

Measuring Pointer Adjustment (Tributary) Jitter

- “Saving Graphics Results to Instrument Store” page 138
- “Recalling Stored Graph Results” page 139
- “Viewing the Bar Graph Display” page 141
- “Viewing the Graphics Error and Alarm Summaries” page 143
- “Logging Graph Displays” page 145
- “Logging Results” page 147
- “Logging on Demand” page 156
- “Logging Jitter Tolerance Results” page 162
- “Logging Jitter Transfer Results” page 164
- “Logging Results to Parallel (Centronics) Printer” page 166
- “Logging Results to HP-IB Printer” page 167
- “Logging Results to Internal Printer” page 168
- “Logging Results to RS-232-C Printer” page 169
- “Printing Results from Disk” page 170
- “Connecting an HP 850C DeskJet Printer to a Parallel Port” page 171
- “Changing Internal Printer Paper” page 172
- “Cleaning Internal Printer Print Head” page 175

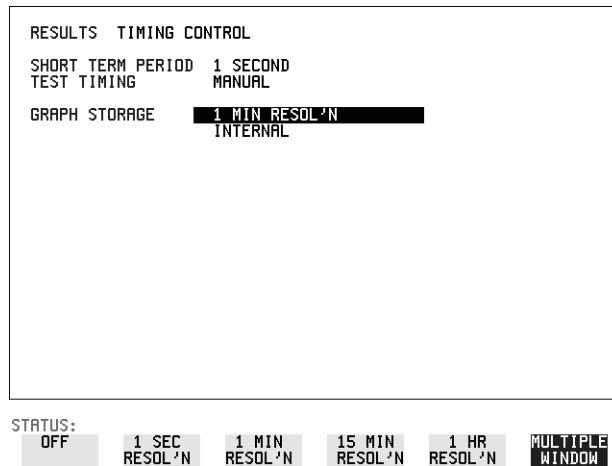
Storing, Logging and Printing

Saving Graphics Results to Instrument Store

Description

Graphical representation of measurement results is very useful particularly during a long measurement period. It provides an overview of the results and can be printed for record keeping.

Graphics results can be stored in instrument graph storage or on floppy disk.



HOW TO:

- 1 Before starting your measurement, choose the GRAPH STORAGE resolution and location.
The resolution chosen affects the ZOOM capability when viewing the bar graphs. If 1 MIN is selected, 1 MIN/BAR, 15 MINS/BAR and 60 MINS/BAR are available. If 15 MINS is selected, 15 MINS/BAR and 60 MINS/BAR are available. If 1 HOUR is selected, 60 MINS/BAR is available.
The graphics results can be stored in the instrument - INTERNAL or stored on DISK. Storage to disk will use a default file name unless a file name is specified on the **OTHER FLOPPY DISK** display. See "Saving Graphical Results to Disk" page 190.
- 2 Press **RUN/STOP** to start the measurement. Graphical results will be stored in the chosen location.

Recalling Stored Graph Results

Description

Results stored from a previous measurement can be recalled to the graphics displays for viewing and printing.

STORE	START DATE	START TIME	TEST DURATION	STORE USE
DISK				
-9				
-8				
-7				
-6				
-5				
-4				
-3				
-2	10-JUL-1997	15:20	16h 28m 34s	2%
-1	11-JUL-1997	07:50	00h 01m 04s	<1%
LAST	12-JUL-1997	07:51	00h 01m 19s	Nil
STORAGE 1 SEC			TOTAL	USED
RESOL'N COMPRESSED			RAM	FREE
FREE STORE 19626 EVENTS				98%

STATUS: **GRAPH RESULTS** **TEXT RESULTS** **DELETE STORE** **DELETE ALL** **MULTIPLE WINDOW**

HOW TO:



- 1 If currently viewing the bar graph display, select **TEXT RESULTS** then **STORE STATUS**. If currently viewing the error or alarm summary, select **STORE STATUS**.
- 2 Using **↑** and **↓**, move the highlighted cursor to the store location which contains the required results.
 If the required results are stored on Disk, move the highlighted cursor to DISK and choose RECALL GRAPHICS on the FLOPPY DISK display. See “Recalling Graphics Results from Disk” page 197.
- 3 Choose **GRAPH RESULTS** if you wish to view the bar graphs.
 The display will change to the bar graph display of the highlighted results.
- 4 Choose **TEXT RESULTS** if you wish to view the error and alarm Summaries.
 The display will change to the text results display of the highlighted results.
DELETE STORE deletes the results in the highlighted store.
 If **DELETE ALL** is chosen, a **CONFIRM DELETE** ; **ABORT DELETE** choice prevents accidental deletion of all the stored results.

The top row of the display comprises five fields:

Store Memory location in which the displayed bar graph data is

Storing, Logging and Printing

Recalling Stored Graph Results

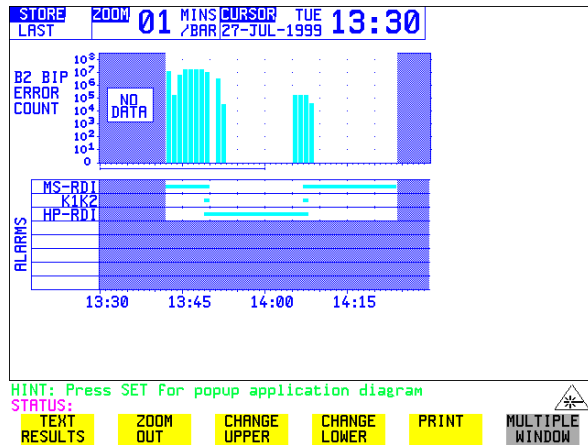
stored. Move the highlighted cursor, to the STORE location desired, using  and .

Start Date	The start date of the test, which produced the stored results.
Start Time	The start time of the test, which produced the stored results.
Test Duration	The duration of the test, which produced the stored results.
Store Use	The percentage (%) of the overall storage capacity occupied by each set of stored results. The TOTAL percentage used and the percentage still FREE is provided at the bottom of the STORE USE column.

Viewing the Bar Graph Display

Description

All the graphic results obtained during the measurement are available for viewing. Identify a period of interest and zoom in for more detailed examination.





HOW TO:

- 1 To view the current bar graphs, press **GRAPH** and use **CHANGE UPPER** and **CHANGE LOWER** to obtain the bar graphs required.
- 2 To view previously stored graphs, see "Recalling Stored Graph Results " page 139.
- 3 For more detailed inspection of the bar graph, position the cursor centrally within the area of interest using **→**, **←** and select **ZOOM IN** to reduce the time axis to 15 MINS/BAR. This is only possible if the graphics results were stored with a STORAGE resolution of 1 SEC,1 MINS or 15 MINS.
For further reduction of the time axis to 01 MINS/BAR or 01 SECS/BAR, position the cursor centrally within the area of interest and select **ZOOM IN** until the required time axis is obtained.

The top row of the display comprises three fields:

- Store** Memory location in which the displayed bar graph data is stored. Store can only be changed when the status of stored results is displayed. See "Recalling Stored Graph Results " page 139.
- Zoom** The width, in minutes, of each "bar" in the bar graph, controlled by **ZOOM IN** / **ZOOM OUT**.

Storing, Logging and Printing
Viewing the Bar Graph Display

Cursor The cursor position in terms of time and date, controlled by  and . The cursor position changes in steps of 1 second, 1 minute, 15 minutes or 60 minutes dependent upon the ZOOM setting. The cursor is physically located between the two graphs.

Viewing the Graphics Error and Alarm Summaries

Description

The error and alarm summaries of the measurement chosen are displayed on the **TEXT RESULTS** display. The error summary or alarm summary can be viewed at any time.

STORE	START	14:28	STOP	14:48
-1	TUE 8-SEP-1998		TUE 8-SEP-1998	
DSn ERROR SUMMARY				
	COUNT		RATIO	
BIT	261865		1.423E-04	
BPU	202187		3.715E-06	
DS3 FRAME	838		2.369E-06	
DS1 FRAME	12		1.877E-06	
P-BIT	224151		4.197E-06	
C-BIT	50271		3.424E-07	
FEBE	16981		3.202E-07	
CRC	N/A		N/A	

STATUS:
STORE STATUS **GRAPH RESULTS** **PRINT** **NEXT SUMMARY** **ALARM SUMMARY** **MULTIPLE WINDOW**

HOW TO:

- 1 To view the error or alarm summary associated with the current bar graphs, press **GRAPH** then **TEXT RESULTS**.
- 2 To view the error or alarm summary associated with previously stored bar graphs, see "Recalling Stored Graph Results " page 139.
- 3 To view the Alarms which have occurred during the measurement, select **ALARM SUMMARY**. Use **NEXT SUMMARY** to view the PDH/DSn; and SDH Alarm Summaries in turn if applicable.
- 4 To view the Errors which have occurred during the measurement select **ERROR SUMMARY**. Use **NEXT SUMMARY** to view the PDH/DSn; and SDH Error Summaries in turn if applicable.

The top row of the display comprises three fields:

Store Memory location in which the bar graphs, error summary and alarm summary are stored.
Store can only be changed when the status of stored results is displayed. See "Recalling Stored Graph Results " page 139.

Viewing the Graphics Error and Alarm Summaries

Start The start time and date of the test, that produced the displayed results.

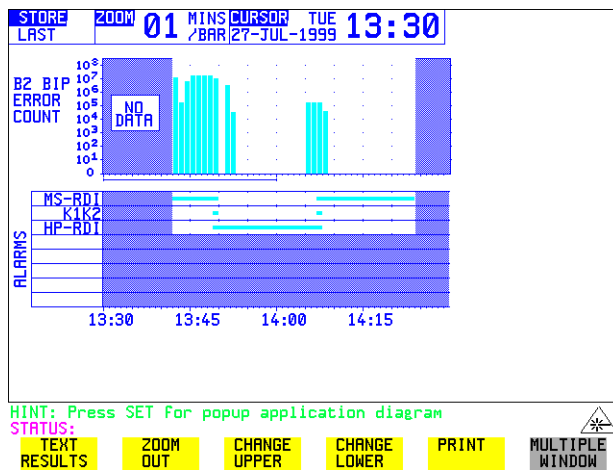
Stop The stop time and date of the test, that produced the displayed results.

Logging Graph Displays

Description

The bar graphs and error and alarm summaries can be logged to the disk for printing at a later date.

If Option 601, Remote Control, is fitted, the bar graphs and error and alarm summary can be logged to an external HP DeskJet printer at the end of the test period. If a printer is not immediately available, the graphics results remain in memory and can be logged at a later time when a printer becomes available.



HOW TO:

Log to an External Printer

- 1 Connect an external RS-232-C HP DeskJet printer to the HP 37718A RS232 port. See "Logging Results to RS-232-C Printer " page 169 or connect an external HP-IB HP DeskJet printer to the HP 37718A HP-IB port. See "Logging Results to HP-IB Printer " page 167 or connect a Parallel DeskJet printer to the HP 37718A Parallel port. See "Logging Results to Parallel (Centronics) Printer " page 166.
- 2 Make the required selections on the **OTHER LOGGING** display: LOGGING PORT [HPIB] or [RS232] or [PARALLEL] and LOGGING [ON].
- 3 To log the Error and Alarm summaries, the displayed Bar graphs and the Alarm graph to the printer, choose **PRINT** on the bar graph display.
- 4 Choose to confirm or abort the print.
To confirm the print and only print the portion of the graph displayed

Storing, Logging and Printing

Logging Graph Displays

and the summaries choose **THIS SCREEN**.

To confirm the print and print the graph for the whole measurement period and the summaries choose **CURSOR TO END**.

To abort the print choose **ABORT**.

- 5 To log the selected Error and Alarm summaries to the printer, choose **PRINT** on the Text Results display.

HOW TO:

Log to the Disk Drive

- 1 Insert a floppy disk in the disk drive.
- 2 Choose LOGGING PORT **DISK** on the **OTHER LOGGING** display.
Enter a filename on the **OTHER FLOPPY DISK** display. See "Saving Data Logging to Disk " page 194.
- 3 To log the Error and Alarm summaries, the displayed Bar graphs and the Alarm graph to the disk, choose **PRINT** on the bar graph display.
- 4 Choose to confirm or abort the print.
To confirm the print and only print the portion of the graph displayed and the summaries choose **THIS SCREEN**.
To confirm the print and print the graph for the whole measurement period and the summaries choose **CURSOR TO END**.
To abort the print choose **ABORT**.
- 5 To log the selected Error and Alarm summaries to the disk, choose **PRINT** on the Text Results display.

Logging Results

Description

Test Period Logging

If degradations in system performance can be observed at an early stage, then the appropriate remedial action can be taken to maximize circuit availability and avoid system crashes. Test period logging allows you to monitor the error performance of your circuit. At the end of the test period the selected results are logged. Results can be logged at regular intervals during the test period by selecting a LOGGING PERIOD of shorter duration than the test period. An instant summary of the results can be demanded by pressing **PRINT NOW** without affecting the test in progress.

Error Event Logging

Manual tracing of intermittent faults is time consuming. Error event logging allows you to carry out unattended long term monitoring of the circuit. Each occurrence of the selected error event is logged.

The results obtained during the test are retained in memory until they are overwritten by the next set of results. The results can be logged at any time during the test period and at the end of the test period. The results required are selected using **OTHER LOGGING LOGGING SETUP CONTROL**.

Any Alarm occurrence results in a timed and dated message being logged.

BER and Analysis results can be selected by the user.

Cumulative and Period versions of the results are calculated and can be selected by the user.

Period The results obtained over a set period of time during the test.
The Period is defined by the LOGGING PERIOD selection.

Cumulative The results obtained over the time elapsed since the start of the test.

The results can be logged to the following devices, selectable using **OTHER LOGGING LOGGING SETUP DEVICE**:

- Optional Internal printer fitted into the instrument front cover (Option 602)
- External HP-IB printer (option 601)

Storing, Logging and Printing

Logging Results

- External RS-232-C printer (option 601)
- External Parallel Port printer (option 601)
- Disk Drive

FUNCTION	LOGGING
LOGGING SETUP	CONTROL
LOGGING	ON
LOGGING PERIOD	USER PROGRAM
RESULTS LOGGED	10 MINS
WHEN	SELECTED
CONTENT	PERIOD EC>0
LOG ERROR SECONDS	ER & ANAL
LOG AT END OF TEST	PER & CUMUL
LOG ON DEMAND	ON
	ALL RESULTS
	RESULTS

STATUS:

STORED SETTINGS	SETTINGS CONTROL	FLOPPY DISK	LOGGING	MORE	MULTIPLE WINDOW
-----------------	------------------	-------------	---------	------------	-----------------

HOW TO:

- 1 Choose LOGGING [ON] - enables the logging of results and alarms.
- 2 Choose LOGGING PERIOD - determines how regularly the results and alarms are logged.
USER PROGRAM provides a choice of 10 minutes to 99 hours.
- 3 Choose RESULT LOGGED - allows you to log all results to or choose only those results you require.
- 4 Choose WHEN - allows you to choose to only log when the error count for the logging period is greater than 0. If the error count is 0 then the message NO BIT ERRORS is displayed.
- 5 Choose CONTENT - allows you a choice of error results to be logged.
Error Results, Analysis or Error and Analysis (ER & ANAL)
and
Period, Cumulative or Period and Cumulative (PER & CUMUL).
- 6 If LOG ERROR SECONDS [ON] is chosen a timed and dated message is logged each time an error second occurs (excessive occurrences of error seconds during the logging period will result in heavy use of printer paper).
- 7 Choose the logging DEVICE.
If RS232 is chosen, see "Logging Results to RS-232-C Printer " page 169.
If HPIB is chosen, see "Logging Results to HP-IB Printer " page 167.

Storing, Logging and Printing

Logging Results

If PARALLEL is chosen, see "Logging Results to Parallel (Centronics) Printer " page 166.

If DISK is chosen, see "Saving Data Logging to Disk" page 194.

If Option 602, Internal Printer, is fitted and INTERNAL is chosen, see "Logging Results to Internal Printer " page 168.

Logging Results Examples

There are four phases of results logging:

- Start of measurement - Header is logged
- During the measurement - Alarm events and if enabled error events
- End of logging period - Complete set of period and cumulative results
- End of measurement - Complete set of cumulative results.

Logging Header

When the measurement is started the logging header provides a record of the instrument configuration that produced the results.

```
|=====|
|                Hewlett Packard HP37718A                |
|                Instrument Configuration                  |
|-----|
| RECEIVER                                               |
|  Receive Signal   : STM-16 OPTICAL      STM-1 under test   : 8 |
|  Mapping          : AU-4      TU-12     FL BYTE 2Mb/s  TS0   |
|  Selected TU      : TUG3[3] TUG2[7] TU[2]                |
|  Payload (Struct) : PCM30CRC                                                    |
|  Test Signal      : 64kb/s                                                    |
|  Tributaries      :                                                    64kb [ 1] |
|  Pattern          : 2^11-1                Polarity          : NORMAL |
|-----|
| MEASUREMENT STARTED  20 Jan 99  13:58:02          Print Period  15 Minutes |
|-----|
```

Logging During Measurement

During the measurement a timed and dated message is logged each time an alarm occurs, and if LOG ERROR SECONDS [ON] is chosen a timed and dated message is logged each time an error second occurs (excessive occurrences of error seconds during the logging period will result in heavy use of printer paper).

```
| 14:19:43 LOF                SET |
| 14:19:43 OOF                SET |
```

Storing, Logging and Printing

Logging Results

|	14:19:43	AU-LOP	SET	|
|	14:19:43	H4 LOM	SET	|
|	14:19:43	TU-LOP	SET	|
|	14:19:43	PSL	SET	|
|	14:19:43	Loss of Frame 2M	SET	|
|	14:19:43	MultiFrame Loss	SET	|
|	14:19:43	Pattern Loss	SET	|
|	14:19:43	LOS	SET	|
|	14:19:44	LOS	CLEAR	|
|	14:19:44	LOS	SET	|
|	14:19:45	LOS	CLEAR	|
|	14:19:45	LOF	CLEAR	|
|	14:19:45	AU-LOP	CLEAR	|
|	14:19:45	H4 LOM	CLEAR	|
|	14:19:45	PSL	CLEAR	|
|	14:19:45	TU-LOP	CLEAR	|
|	14:19:45	Loss of Frame 2M	CLEAR	|
|	14:19:45	Pattern Loss	CLEAR	|
|	14:19:45	MultiFrame Loss	CLEAR	|
|	14:19:45	OOF	CLEAR	|
|	14:19:45		ALL ALARMS CLEAR	|
|	14:19:46	Pattern Loss	SET	|
|	14:19:46	Pattern Loss	CLEAR	|
|	14:19:46		ALL ALARMS CLEAR	|
|	14:19:46	B1 BIP	102	|
|	14:19:46	B2 BIP	3888	|
|	14:19:46	B3 BIP	87	|
|	14:19:46	HP-REI	2	|
|	14:19:46	TU BIP	4	|
|	14:19:46	A1A2 FRAME	20	|
|	14:19:46	MS-REI	96	|
|	14:19:46	HP-IEC	8	|
|	14:19:46	BIT	22420	|
|	14:19:46	CRC	3	|
|	14:19:47	BIT	3187	|
|	14:21:32	Loss of Frame 2M	SET	|
|	14:21:32	MultiFrame Loss	SET	|
|	14:21:32	Pattern Loss	SET	|
|	14:21:32	Loss of Frame 2M	CLEAR	|
|	14:21:32	Pattern Loss	CLEAR	|
|	14:21:32	MultiFrame Loss	CLEAR	|
|	14:21:33	Pattern Loss	SET	|

Storing, Logging and Printing

Logging Results

| 14:21:33	Pattern Loss	CLEAR	|
| 14:21:33		ALL ALARMS CLEAR	|
| 14:21:40	Rmt MultiFrame Loss	SET	|
| 14:21:44	Rmt MultiFrame Loss	CLEAR	|
| 14:21:45		ALL ALARMS CLEAR	|
| 14:21:58	CRC	1	|
| 14:22:23	Loss of Frame 2M	SET	|
| 14:22:23	MultiFrame Loss	SET	|
| 14:22:23	Pattern Loss	SET	|
| 14:22:23	Loss of Frame 2M	CLEAR	|
| 14:22:23	Pattern Loss	CLEAR	|
| 14:22:23	MultiFrame Loss	CLEAR	|
| 14:22:24	Pattern Loss	SET	|
| 14:22:24	BIT	12814	|
| 14:22:24	Pattern Loss	CLEAR	|
| 14:22:25		ALL ALARMS CLEAR	|
| 14:22:25	BIT	12798	|
| 14:23:03	K1/K2 Change	SET	|
| 14:23:03	K1/K2 Change	CLEAR	|
| 14:23:04		ALL ALARMS CLEAR	|
| 14:23:11	K1/K2 Change	SET	|
| 14:23:11	K1/K2 Change	CLEAR	|
| 14:23:12		ALL ALARMS CLEAR	|
| 14:23:15	B3 BIP	30546	|
| 14:23:16	B3 BIP	17536	|
| 14:24:05	TU BIP	1	|

Logging at the End of Measurement

At the end of the measurement a complete set of cumulative results are logged. At the end of each LOGGING PERIOD a complete set of Period results and a full set of cumulative results are logged.

```
|=====|
| MEASUREMENT COMPLETE 20 Jan 99 14:34:00 Elapsed Time 00d 00h 03m 58s|
|=====|
```

Storing, Logging and Printing Logging Results

Cumulative Results					
Error Results :					
	A1A2 FRAME	B1 BIP	B2 BIP	MS-REI	B3 BIP
Error Count	0	0	1253	667253	10
Error Ratio	0	0	2.166E-09	1.153E-06	2.829E-10
	HP-REI	HP-IEC	TU BIP	LP-REI	
Error Count	1182	46	5140	40	
Error Ratio	3.344E-08	1.301E-09	9.760E-06	7.596E-08	
	FAS 140M	FAS 34M	FAS 8M	FAS 2M	
Error Count	N/A	N/A	N/A	2	
Error Ratio	N/A	N/A	N/A	3.038E-07	
	BIT	CODE	CRC	REBE	
Error Count	4	N/A	1	0	
Error Ratio	2.658E-07	N/A	4.254E-06	0	
Analysis Results :					
G.826 ANALYSIS					
	B1 BIP	B2 BIP	MS-REI	B3 BIP	
Errored Blocks	0	1253	37618	2	
Errored Seconds	5	11	6	6	
Severely Errored Seconds	5	5	6	5	
Unavailable Seconds	0	0	0	0	
Path Unavailable Seconds	N/A	0	0	0	
Background Block Errors	0	1253	0	2	
Errored Second Ratio	2.101E-02	4.622E-02	2.575E-02	2.521E-02	
Severely Errored Sec Ratio	2.101E-02	2.101E-02	2.575E-02	2.101E-02	
Background Block Err Ratio	0	6.722E-04	0	1.073E-06	
	HP-REI	HP-IEC	TU BIP	LP-REI	
Errored Blocks	1182	46	4590	40	
Errored Seconds	2	4	9	3	
Severely Errored Seconds	0	0	8	0	
Unavailable Seconds	0	0	0	0	
Path Unavailable Seconds	0	N/A	0	0	
Background Block Errors	1182	46	1	40	
Errored Second Ratio	8.584E-03	1.717E-02	3.782E-02	1.288E-02	
Severely Errored Sec Ratio	0	0	3.361E-02	0	
Background Block Err Ratio	6.341E-04	2.468E-05	2.174E-06	8.584E-05	

Storing, Logging and Printing Logging Results

M.2101 ANALYSIS					
	Section		High Order Path		
	Rx	Tx	Rx	Tx	
Errored Seconds	11	6	6	2	
Severely Errored Seconds	5	0	5	0	
Unavailable Seconds	0	0	0	0	
Low Order Path					
	Rx	Tx			
Errored Seconds	9	3			
Severely Errored Seconds	8	0			
Unavailable Seconds	0	0			
G.821 ANALYSIS					
	BIT	FAS 140M	FAS 34M	FAS 8M	FAS 2M
Errored Sec	6	N/A	N/A	N/A	6
%Errored Sec	2.52101	N/A	N/A	N/A	2.52101
%ES (Annex D)	0.42017	N/A	N/A	N/A	N/A
Error Free Sec	232	N/A	N/A	N/A	232
%Error Free Sec	97.47899	N/A	N/A	N/A	97.47899
Severely Err Sec	5	N/A	N/A	N/A	5
%Severely Err Sec	2.10084	N/A	N/A	N/A	2.10084
Degraded Minutes	0	N/A	N/A	N/A	1
%Degraded Minutes	0.00000	N/A	N/A	N/A	25.00000
Unavailable Sec	0	N/A	N/A	N/A	0
%Unavailable Sec	0.00000	N/A	N/A	N/A	0.00000
			CODE	CRC4	REBE
Errored Sec			N/A	6	0
%Errored Sec			N/A	2.52101	0.00000
Error Free Sec			N/A	232	233
%Error Free Sec			N/A	97.47899	100
Severely Err Sec			N/A	5	0
%Severely Err Sec			N/A	2.10084	0.00000
Degraded Minutes			N/A	0	0
%Degraded Minutes			N/A	0.00000	0.00000
Unavailable Sec			N/A	0	0
%Unavailable Sec			N/A	0.00000	0.00000
G.826 ANALYSIS					

Storing, Logging and Printing

Logging Results

		Near	8Mb/s	Far		Near	2Mb/s	Far
Errored Blocks		N/A		N/A		1		0
Errored Seconds		N/A		N/A		6		0
Severely Errored Seconds		N/A		N/A		5		0
Unavailable Seconds		N/A		N/A		0		0
Path Unavailable Seconds		N/A		N/A		0		0
Background Block Errors		N/A		N/A		1		0
Errored Second Ratio		N/A		N/A		2.521E-02		0
Severely Errored Sec Ratio		N/A		N/A		2.101E-02		0
Background Block Err Ratio		N/A		N/A		4.292E-06		0
BIT Errors								
Errored Blocks						4		
Errored Seconds						1		
Severely Errored Seconds						0		
Unavailable Seconds						0		
Background Block Errors						4		
Errored Second Ratio						4.202E-03		
Severely Errored Sec Ratio						0		
Background Block Err Ratio						2.101E-06		
M.2100 ANALYSIS								
		Rx	8Mb/s	Tx		Rx	2Mb/s	Tx
Errored Seconds		N/A		N/A		6		0
Severely Errored Seconds		N/A		N/A		5		0
Unavailable Seconds		N/A		N/A		0		0
64k Rx								
Errored Seconds						6		
Severely Errored Seconds						5		
Unavailable Seconds						0		
M.2110 ANALYSIS								
	15-min	1-hr	2-hr	24-hr	7-day			
BIS Results	WAIT	WAIT	WAIT	WAIT	WAIT			
Frequency : 2488320.0 kHz Offset : +0.0 kHz Offset : +0.0ppm								
Pointer Results :								
	AU POINTER				TU POINTER			
	Count	Seconds		Count	Seconds			
NDF			1					2

Storing, Logging and Printing

Logging Results

| Missing NDF		0		0	|
| +ve Pointer Adjustments	0	0	0	0	|
| -ve Pointer Adjustments	0	0	0	0	|
| Implied VC Offset	0.0		0.0		|
| Pointer Value	782		0		|
=====					

Logging on Demand

Description

When **PRINT NOW** is pressed the chosen results are logged to the chosen logging device. The choice of results for logging is:

- RESULTS SNAPSHOT - last recorded measurement results
- OVERHEAD SNAPSHOT - last recorded overhead values of the chosen STM-1
- OVERHEAD CAPTURE - Overhead Capture display
- POINTER GRAPH - Pointer Graph display
- SDH TRIBUTARY SCAN - SDH Tributary Scan display
- SDH ALARM SCAN - SDH Alarm Scan display
- SCREEN DUMP - allows logging of the chosen display

FUNCTION	LOGGING
LOGGING SETUP	CONTROL
LOGGING	OFF
LOG ON DEMAND	SCREEN DUMP
SCREEN DUMP DESTINATION	DISK
BITMAP COMPRESSION (RLE)	OFF

STATUS:
POINTER GRAPH SDH TRIBSCAN SDH ALM SCAN SELFTTEST FAILS MORE MULTIPLE WINDOW

HOW TO:

- 1 Choose LOG ON DEMAND to determine results to be logged when **PRINT NOW** is pressed.
 SCREEN DUMP allows you to log the selected display when **PRINT NOW** is pressed. (Logging or Disk displays cannot be logged using this feature).
- 2 Choose the logging DEVICE.
 If RS232 is chosen, see "Logging Results to RS-232-C Printer " page 169.

 If GPIB is chosen, see "Logging Results to HP-IB Printer " page 167.
 If PARALLEL is chosen, see "Logging Results to Parallel (Centronics) Printer " page 166.

Storing, Logging and Printing

Logging on Demand

If DISK is chosen, see "Saving Data Logging to Disk" page 194.

If DISK and SCREEN DUMP are chosen, see "Saving a Screen Dump to Disk" page 192.

If Option 602, Internal Printer, is fitted and INTERNAL is chosen, see "Logging Results to Internal Printer" page 168.

Log on Demand Examples

Overhead Capture, Pointer Graph, SDH Tributary Scan and SDH Alarm Scan logging are copies of the relevant display. Screen Dump logs a copy of the selected display (not Logging or Disk displays).

Overhead Snapshot

Overhead Snapshot provides the value of each byte of overhead in the STM-1 chosen for test.

```
=====
| 11:20:21 PRINT DEMANDED- O/H SNAPSHOT           Elapsed Time  00d 00h 06m 37s|
=====
|           | Setup : STM-16 OPTICAL                |
-----
|           | SOH (STM-1 #1 )                                |
-----+-----+-----+-----+-----+-----+-----+-----+-----+
| A1 | F6  F6  F6  | A2 | 28  28  28  | J0 | 01  AA  AA  | J0 Path Trace: |
| B1 | 90  00  00  | E1 | 00  00  00  | F1 | 00  00  00  | "              |
| D1 | 00  00  00  | D2 | 00  00  00  | D3 | 00  00  00  | E.164 CRC NOT FOUND |
| H1 | 68  93  93  | H2 | 00  FF  FF  | H3 | 00  00  00  | S1 Sync Status: |
| B2 | C9  93  7E  | K1 | 00  00  00  | K2 | 00  00  00  | QUALITY UNKNOWN |
| D4 | 00  00  00  | D5 | 00  00  00  | D6 | 00  00  00  |
| D7 | 00  00  00  | D8 | 00  00  00  | D9 | 00  00  00  |
| D10| 00  00  00  | D11| 00  00  00  | D12| 00  00  00  |
| S1 | 00  00  00  | Z2 | 00  00  00  | E2 | 00  00  00  |
-----+-----+-----+-----+-----+-----+-----+-----+-----+
| High Order POH      TYPE VC-4 | Low Order POH      TYPE VC-12 |
| WITHIN STM-1 #8      |                               |
-----+-----+-----+-----+-----+-----+-----+-----+-----+
|           | HP Path Label (C2): |           | LP Path Label (V5): |
| J1 | 00  "TUG STRUCTURE  " | V5 | C4  "010 ASYNCHRONOUS  " |
| B3 | 9C                               | J2 | 00                               |
| C2 | 02  J1 Path Trace: | N2 | 00  J2 Path Trace: |
| G1 | 00  "~~~~~" | K4 | 00  "~~~~~" |
| F2 | 00  "              " |           |
| H4 | 1B  "              " |           |
-----+-----+-----+-----+-----+-----+-----+-----+-----+
```

Storing, Logging and Printing

Logging on Demand

```
| F3 | 00      "          " | | |
| K3 | 00      | | |
| N1 | 00      | | |
|=====|
```

Results Snapshot

Results Snapshot provides a Header listing the instrument settings that produced the results and the last recorded, complete set of cumulative measurement results.

```
|=====|
|                                     |
|                               Hewlett Packard HP37718A |
|                               Instrument Configuration |
|-----|
| RECEIVER |
| Receive Signal : STM-16 OPTICAL      STM-1 under test : 8 |
| Mapping       : AU-4      TU-12      ASYNC 2Mb/s |
| Selected TU   : TUG3[1] TUG2[1] TU[1] |
| Payload (Struct) : PCM30CRC |
| Test Signal   : 64kb/s |
| Tributaries   : |
| Pattern       : 2^11-1          Polarity       : NORMAL |
|
| MEASUREMENT STARTED  21 Jan 99  11:10:39          Print Period  OFF |
|-----|
| MEASUREMENT COMPLETE  21 Jan 99  11:17:17          Elapsed Time  00d 00h 06m 37s |
|=====|
| 11:18:44 PRINT DEMANDED- RESULTS SNAPSHOT          Elapsed Time  00d 00h 06m 37s |
|=====|
|                                     |
|                               Cumulative Results |
|
| Error Results : |
|
|           A1A2 FRAME      B1 BIP      B2 BIP      MS-REI      B3 BIP |
| Error Count           7464              3              3              3              2 |
| Error Ratio           2.345E-03  3.031E-12  3.065E-12  3.094E-12  3.344E-11 |
|
|           HP-REI      HP-IEC      TU BIP      LP-REI |
| Error Count           3              3              4              4 |
| Error Ratio           5.046E-11  5.016E-11  4.489E-09  4.489E-09 |
|
|           FAS 140M      FAS 34M      FAS 8M      FAS 2M |
| Error Count           N/A              N/A              N/A              0 |
| Error Ratio           N/A              N/A              N/A              0 |
|
|=====|
```

Storing, Logging and Printing

Logging on Demand

	BIT	CODE	CRC	REBE
Error Count	25626	N/A	0	0
Error Ratio	1.007E-03	N/A	0	0
Analysis Results :				
G.826 ANALYSIS				
	B1 BIP	B2 BIP	MS-REI	B3 BIP
Errored Blocks	3	3	3	2
Errored Seconds	1	1	6	2
Severely Errored Seconds	0	0	5	0
Unavailable Seconds	0	0	0	0
Path Unavailable Seconds	N/A	0	0	0
Background Block Errors	3	3	3	2
Errored Second Ratio	2.519E-03	2.519E-03	1.511E-02	5.038E-03
Severely Errored Sec Ratio	0	0	1.259E-02	0
Background Block Err Ratio	9.446E-07	9.446E-07	9.566E-07	6.297E-07
	HP-REI	HP-IEC	TU BIP	LP-REI
Errored Blocks	3	3	4	4
Errored Seconds	6	1	2	2
Severely Errored Seconds	4	0	0	0
Unavailable Seconds	0	0	0	0
Path Unavailable Seconds	0	N/A	0	0
Background Block Errors	3	3	4	4
Errored Second Ratio	1.511E-02	2.519E-03	5.038E-03	5.038E-03
Severely Errored Sec Ratio	1.008E-02	0	0	0
Background Block Err Ratio	9.542E-07	9.446E-07	5.038E-06	5.038E-06
M.2101 ANALYSIS				
	Section		High Order Path	
	Rx	Tx	Rx	Tx
Errored Seconds	1	6	2	6
Severely Errored Seconds	0	5	0	4
Unavailable Seconds	0	0	0	0
	Low Order Path		Rx	Tx
Errored Seconds	2	2		
Severely Errored Seconds	0	0		
Unavailable Seconds	0	0		

Storing, Logging and Printing Logging on Demand

G.821 ANALYSIS						
	BIT	FAS 140M	FAS 34M	FAS 8M	FAS 2M	
Errored Sec	17	N/A	N/A	N/A	1	
%Errored Sec	4.28212	N/A	N/A	N/A	0.25189	
%ES (Annex D)	4.28212	N/A	N/A	N/A	N/A	
Error Free Sec	380	N/A	N/A	N/A	396	
%Error Free Sec	95.71788	N/A	N/A	N/A	99.74811	
Severely Err Sec	2	N/A	N/A	N/A	1	
%Severely Err Sec	0.50378	N/A	N/A	N/A	0.25189	
Degraded Minutes	1	N/A	N/A	N/A	0	
%Degraded Minutes	14.28571	N/A	N/A	N/A	0.00000	
Unavailable Sec	0	N/A	N/A	N/A	0	
%Unavailable Sec	0.00000	N/A	N/A	N/A	0.00000	
			CODE	CRC4	REBE	
Errored Sec			N/A	1	0	
%Errored Sec			N/A	0.25189	0.00000	
Error Free Sec			N/A	396	396	
%Error Free Sec			N/A	99.74811	100	
Severely Err Sec			N/A	1	0	
%Severely Err Sec			N/A	0.25189	0.00000	
Degraded Minutes			N/A	0	0	
%Degraded Minutes			N/A	0.00000	0.00000	
Unavailable Sec			N/A	0	0	
%Unavailable Sec			N/A	0.00000	0.00000	
G.826 ANALYSIS						
	Near	8Mb/s	Far	Near	2Mb/s	Far
Errored Blocks	N/A		N/A	0		0
Errored Seconds	N/A		N/A	1		0
Severely Errored Seconds	N/A		N/A	1		0
Unavailable Seconds	N/A		N/A	0		0
Path Unavailable Seconds	N/A		N/A	0		0
Background Block Errors	N/A		N/A	0		0
Errored Second Ratio	N/A		N/A	2.519E-03		0
Severely Errored Sec Ratio	N/A		N/A	2.519E-03		0
Background Block Err Ratio	N/A		N/A	0		0
BIT Errors						
Errored Blocks		6415				
Errored Seconds		17				
Severely Errored Seconds		1				

Storing, Logging and Printing

Logging on Demand

```

| Unavailable Seconds                0
| Background Block Errors            815
| Errored Second Ratio              4.282E-02
| Severely Errored Sec Ratio        2.519E-03
| Background Block Err Ratio        2.573E-04
|
|                                     M.2100 ANALYSIS
|                                     Rx      8Mb/s  Tx           Rx      2Mb/s  Tx
| Errored Seconds                   N/A      N/A           2           0
| Severely Errored Seconds          N/A      N/A           2           0
| Unavailable Seconds               N/A      N/A           0           0
|
|                                     64k Rx
| Errored Seconds                   17
| Severely Errored Seconds          2
| Unavailable Seconds               0
|
|                                     M.2110 ANALYSIS
|                                     15-min   1-hr      2-hr      24-hr     7-day
| BIS Results                       WAIT      WAIT      WAIT      WAIT      WAIT
|
| Frequency : 2488320.0 kHz          Offset :  +0.0 kHz          Offset :  +0.0ppm
|
| Pointer Results :
|                                     AU POINTER
|                                     Count      Seconds
| NDF                                0           1
| Missing NDF                        0           0
| +ve Pointer Adjustments            0           0
| -ve Pointer Adjustments            0           49
| Implied VC Offset                  0.0         0.4
| Pointer Value                       782         90
|=====

```

Logging Jitter Tolerance Results

Description

The jitter auto tolerance feature provides jitter tolerance measurements within the relevant ITU-T mask, G.823 for PDH, G.958, G.825 and G.253 for SDH.

You can log the jitter auto tolerance results to a printer for record keeping purposes. The **GRAPH** version or the **TEXT** version of the jitter tolerance results can be logged to an external printer.

FUNCTION	LOGGING
LOGGING SETUP	DEVICE
LOGGING PORT	RS232
REMOTE CONTROL PORT	LAN
PRINTER TYPE	ALT. PRINTER
MODE	NORMAL
SPEED	9600 BAUD
PROTOCOL	XON/XOFF

STATUS:
DEVICE CONTROL

**MULTIPLE
WINDOW**

HOW TO:

- 1 If logging to a Parallel Port (Centronics) printer, connect the printer to the PARALLEL port. See "Connecting an HP 850C DeskJet Printer to a Parallel Port " page 171.
- 2 If a non-HP printer is connected choose **ALT. PRINTER**.
- 3 Choose 80 character column width (**NORMAL**) or 40 character column width (**COMPRESS**) according to the capabilities of your printer.
- 4 If logging to an HP-IB printer, connect an HP-IB printer to the HPIB port. See "Logging Results to HP-IB Printer " page 167.
- 5 If logging to an RS-232-C printer, connect an RS-232-C printer to the RS-232-C port. See "Logging Results to RS-232-C Printer " page 169.
- 6 If a non HP printer is connected, choose **ALT. PRINTER**.
- 7 Choose 80 character column width (**NORMAL**) or 40 character column width

Storing, Logging and Printing

Logging Jitter Tolerance Results

- (**COMPRESS**) according to the capabilities of your printer.
- 8 Choose the same baud **SPEED** as chosen on your printer.
 - 9 Choose the **PROTOCOL** required for the transfer of logging data.
 - 10 Choose **LOGGING ON** on the **LOGGING SETUP CONTROL** display.
 - 11 Choose **GRAPH** on the **RESULTS AUTO TOLER** display if you wish to log the graph to the printer.
Choose **TEXT** and the **PAGE** number on the **RESULTS AUTO TOLER** display if you wish to log the text results to the printer.
 - 12 Press **PRINT NOW** to log the chosen results to the printer.

Logging Jitter Transfer Results

Description

The jitter transfer feature provides jitter transfer measurements within the relevant ITU-T mask, G.823 for SDH and G.958 for SDH.

You can log the jitter transfer results to a printer for record keeping purposes. The **GRAPH** version or the **TEXT** version of the jitter transfer results can be logged to an external printer.

FUNCTION	LOGGING
LOGGING SETUP	DEVICE
LOGGING PORT	RS232
REMOTE CONTROL PORT	LAN
PRINTER TYPE	ALT. PRINTER
MODE	NORMAL
SPEED	9600 BAUD
PROTOCOL	XON/XOFF

STATUS:
DEVICE CONTROL

**MULTIPLE
WINDOW**

HOW TO:

- 1 If logging to a Parallel Port (Centronics) printer, connect the printer to the PARALLEL port. See "Connecting an HP 850C DeskJet Printer to a Parallel Port " page 171.
- 2 If a non-HP printer is connected, choose **ALT. PRINTER** .
- 3 Choose 80 character column width (**NORMAL**) or 40 character column width (**COMPRESS**) according to the capabilities of your printer.
- 4 If logging to an HP-IB printer, connect an HP-IB printer to the HPIB port. See "Logging Results to HP-IB Printer " page 167.
- 5 If logging to an RS-232-C printer, connect an RS-232-C printer to the RS-232-C port. See "Logging Results to RS-232-C Printer " page 169.
- 6 If a non HP printer is connected, choose **ALT. PRINTER** .
- 7 Choose 80 character column width (**NORMAL**) or 40 character column width

Storing, Logging and Printing

Logging Jitter Transfer Results

- (**COMPRESS**) according to the capabilities of your printer.
- 8 Choose the same baud **SPEED** as chosen on your printer.
 - 9 Choose the **PROTOCOL** required for the transfer of logging data.
 - 10 Choose **LOGGING ON** on the **LOGGING SETUP CONTROL** display.
 - 11 Choose **GRAPH** and **SCALE NARROW** or **WIDE** on the **RESULTS JITTER TN FUNCTION** display if you wish to log the graph to the printer.
Choose **TEXT** and the **PAGE** number on the **RESULTS JITTER TN FUNCTION** display if you wish to log the text results to the printer.
 - 12 Press **PRINT NOW** to log the chosen results to the printer.

Logging Results to Parallel (Centronics) Printer

Description

If Option 601, Remote Control Interface, is fitted, you can log the results and alarms to an external Parallel printer connected to the PARALLEL port. The Parallel port provides a standard IEEE 1284-A compatible interface.

FUNCTION	LOGGING
LOGGING SETUP	DEVICE
LOGGING PORT	PARALLEL
REMOTE CONTROL PORT	HP IB
PRINTER TYPE	HP PRINTER

STATUS:
RS232 **HP IB** **DISK** **PARALLEL** **MULTIPLE WINDOW**

CAUTION

Damage to the instrument may result if a serial connection is made to this port.

HOW TO:

- 1 Connect the Parallel printer to the PARALLEL port. See "Connecting an HP 850C DeskJet Printer to a Parallel Port " page 171.
- 2 If a non HP printer is connected choose ALT PRINTER.
Choose **NORMAL** 80 character column width or **COMPRESS** 40 character column width according to the capabilities of your printer.
- 3 Choose LOGGING SETUP **CONTROL** and set up the display as required. See "Logging Results " page 147 or "Logging on Demand " page 156.

Logging Results to HP-IB Printer

Description

If Option 601, Remote Control Interface, is fitted, you can log the results and alarms to an external HP-IB printer connected to the HP-IB port.

FUNCTION	LOGGING
LOGGING SETUP	DEVICE
LOGGING PORT	HP-IB
REMOTE CONTROL PORT	RS232

STATUS:
RS232 HP-IB DISK PARALLEL MULTIPLE WINDOW

HOW TO:

- 1 Connect an HP-IB printer to the HP-IB port.

NOTE

Choosing HP-IB external printer for logging prevents the use of HP-IB remote control.

- 2 Choose the LOGGING SETUP **CONTROL** and set up the display as required. See "Logging Results " page 147 or "Logging on Demand " page 156.

Storing, Logging and Printing
Logging Results to Internal Printer

Logging Results to Internal Printer

Description

If Option 602, Internal Printer is fitted, you can log the results and alarms to the in-lid printer.

FUNCTION	LOGGING
LOGGING SETUP	DEVICE
LOGGING PORT	INTERNAL
REMOTE CONTROL PORT	HP1B

STATUS:	INTERNAL	RS232	HP1B	DISK	PARALLEL	MULTIPLE WINDOW
---------	-----------------	-------	------	------	----------	-----------------

HOW TO:

- 1 Choose the LOGGING SETUP **CONTROL** and set up the display as required. See "Logging Results " page 147.

Logging Results to RS-232-C Printer

Description

If Option 601, Remote Control Interface, is fitted, you can log the results and alarms to an external RS-232-C printer connected to the RS-232-C port.

FUNCTION	LOGGING
LOGGING SETUP	DEVICE
LOGGING PORT	RS232
REMOTE CONTROL PORT	LAN
PRINTER TYPE	ALT. PRINTER
MODE	NORMAL
SPEED	9600 BAUD
PROTOCOL	XON/XOFF

STATUS:
RS232 **HPIB** **DISK** **PARALLEL** **MULTIPLE WINDOW**

HOW TO:

- 1 Connect an RS-232-C printer to the RS-232-C port.

NOTE

Choosing RS232 external printer for logging prevents the use of RS-232-C remote control.

- 2 If a non HP printer is connected choose ALT PRINTER.
Choose **NORMAL** 80 character column width or **COMPRESS** 40 character column width according to the capabilities of your printer.
- 3 Choose the LOGGING SETUP **CONTROL** and set up the display as required.
See "Logging Results " page 147 or "Logging on Demand " page 156.

Printing Results from Disk

Description

The results and alarms you logged to Disk can be printed by removing the Disk from the HP 37718A and inserting it into a personal computer (PC).

HOW TO:

Print from DOS Prompt

copy/b a:\<filename> <printer name>

HOW TO:

Print from Windows

- 1** Choose the required file from Filemanager.
- 2** Choose FILE - COPY FILE TO
<printer name>

Connecting an HP 850C DeskJet Printer to a Parallel Port

Description

If Remote Control Option, 601, is fitted, the HP 37718A has the capability of interfacing with an HP 850C DeskJet printer or, an alternative suppliers printer, via the PARALLEL port.

CAUTION

Do not connect a serial printer e.g. RS-232-C or HPIB to the HP 37718A Parallel port as this will damage the interface.

HOW TO:

- 1 Connect the HP 37718A Parallel port to the HP 850C DeskJet Parallel port using printer cable HP 24542D.

Changing Internal Printer Paper

Description

The printer accepts rolls of thermal paper with the following dimensions:

Width:	216 mm (8.5 in) or 210 mm (8.27 in) (A4) tolerance +2.0 mm - 1.0 mm
Maximum Outside Diameter:	40 mm
Inside Core Diameter:	Between 12.5 mm and 13.2 mm

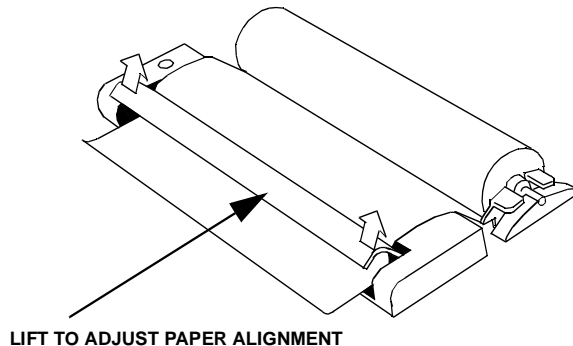
Suitable rolls of paper are available from Hewlett Packard, Part Number 9270-1360.

WARNING

The paper tear-off edge is SHARP. This edge is exposed when the printer cover is raised. Note the  CAUTION SHARP EDGE label on the cover.

HOW TO:

- 1 Raise the two locking tabs on the sides of the printer cover and then raise the cover.
- 2 Raise the printer mechanism front cover. This releases the paper drive. Remove any remaining paper from the front (in the normal direction of operation).



- 3 Lift out the spindle. Adjust the paper width adaptor to the width of the paper being used.
- 4 Put the paper roll on the spindle such that the sensitive side will be on the underside of the print mechanism. Ensure that the relocation of the spindle locks

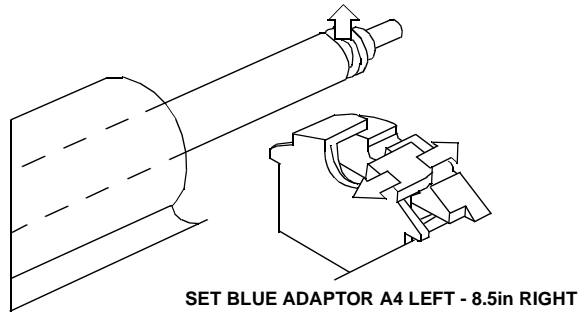
Storing, Logging and Printing

Changing Internal Printer Paper

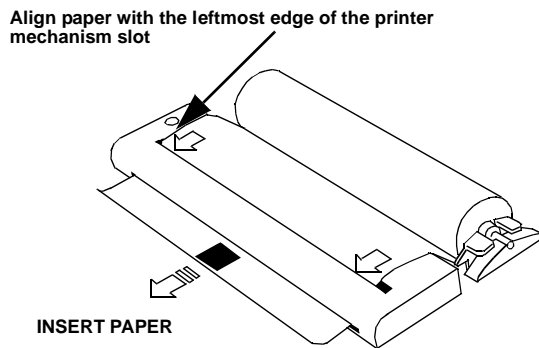
the blue width adaptor in position.

NOTE

The paper must be installed such that when it is in the print mechanism, the sensitive side (slightly shiny) is the underside. The illustrations here show the correct fitting for HP 9270-1360 paper which has the sensitive side on the outside of the roll.



- 5 Feed the paper into the upper entry of the print mechanism. When the front cover of the print mechanism is closed, the printer should automatically feed the paper through until there is approximately 2.5 cm (1 in) clear at the front of the print mechanism.

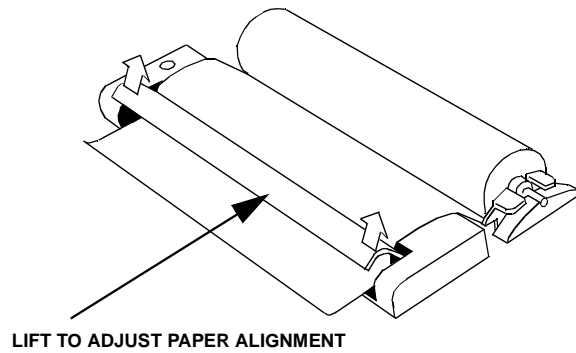


CAUTION

Do not close the outer cover until the automatic paper feed is complete.

Storing, Logging and Printing
Changing Internal Printer Paper

- 6 If the printer paper is incorrectly aligned, raise the printer mechanism front cover to releases the paper drive and realign the paper.




Cleaning Internal Printer Print Head

Description

The print head should be cleaned when broken or light characters occur in a vertical line on the page. To maintain a high quality print, clean the print head after 200 to 300 prints.

The print head is cleaned with a special cleaning paper which is supplied with the instrument.

WARNING

The paper tear-off edge is SHARP. This edge is exposed when the printer cover is raised. Note the  CAUTION SHARP EDGE label on the cover.

HOW TO:

- 1** Open the printer as for changing the paper. See "Changing Internal Printer Paper " page 172.
If printer paper is fitted, remove it from the printer.
- 2** Feed the cleaning paper into the top entry of the print mechanism with the rough black side, which contains the cleaning material, towards the rear of the printer.
- 3** When the automatic feed is complete and the paper stops moving use the instrument front panel key **PAPER FEED** to move the cleaning paper through the print mechanism.
- 4** Remove the cleaning paper and replace the normal printer paper. See "Changing Internal Printer Paper " page 172.

NOTE

Retain the cleaning paper. It is designed to last for the life of the printer.

Storing, Logging and Printing

Cleaning Internal Printer Print Head

6

- “Titling Configuration in Instrument Store” page 179
- “Managing Files and Directories on Disk” page 183
- “Accessing Directories and Files” page 184
- “Deleting a File on Disk” page 187
- “Saving Graphical Results to Disk” page 190
- “Saving a Screen Dump to Disk” page 192
- “Saving Data Logging to Disk” page 194
- “Recalling Graphics Results from Disk” page 197
- “Copying Graphics Results from Instrument Store to Disk” page 202

Using Instrument and Disk Storage

Storing Configurations in Instrument Store

Description

You can store measurement settings which are used regularly and recall them with a single operation.

One preset store is provided which cannot be overwritten, STORED SETTING NUMBER [0]. This store is used to set the instrument to a known state, the FACTORY DEFAULT SETTINGS.

FUNCTION		STORED SETTINGS	
STORED SETTING	NUMBER	1	
	LOCK	OFF	
	ACTION	OFF	
SETTING			
0	FACTORY DEFAULT SETTINGS		
1	.....	
2	.....	
3	.....	
4	.....	

STATUS: OFF RECALL SAVE MULTIPLE WINDOW

HOW TO:

- 1 Set the HP 37718A to the configuration you wish to store.
- 2 Choose the STORED SETTING NUMBER to receive the configuration.
- 3 Choose LOCK **OFF**.
- 4 Choose ACTION **SAVE** to store the configuration in the chosen store.
- 5 To add a descriptive title see "Titling Configuration in Instrument Store " page 179.

Titling Configuration in Instrument Store

Description

When storing configurations, you can give them an easily remembered title for identification at a later date.

FUNCTION		STORED SETTINGS	
STORED SETTING NUMBER		1	
LOCK		OFF	
ACTION		OFF	
SETTING			
0	FACTORY DEFAULT SETTINGS		
1	PAYLOAD MAPPING.....		
2	SDH ANALYSIS.....		
3	.....	
4	.....	

STATUS:
JUMP **PREVIOUS CHAR** **NEXT CHAR** **←** **→** **MULTIPLE WINDOW**

HOW TO:

- 1 Choose the STORED SETTING NUMBER which contains the stored configuration.
- 2 Choose LOCK **OFF**.
- 3 Use **JUMP**; **NEXT CHAR**; **PREVIOUS CHAR**; **→** and **←** to title the settings.

Recalling Configurations from Instrument Store

Description

Having stored a configuration for future use, you must be able to recall that configuration in the future.

FUNCTION		STORED SETTINGS	
STORED SETTING NUMBER		2	
LOCK		OFF	
ACTION		OFF	
SETTING			
0	FACTORY DEFAULT SETTINGS		
1	PAYLOAD.MAPPTG.....		
2	SDH.ANALYSIS.....		
3	.....	
4	.....	

STATUS:
OFF **RECALL** **SAVE** **MULTIPLE WINDOW**

HOW TO:

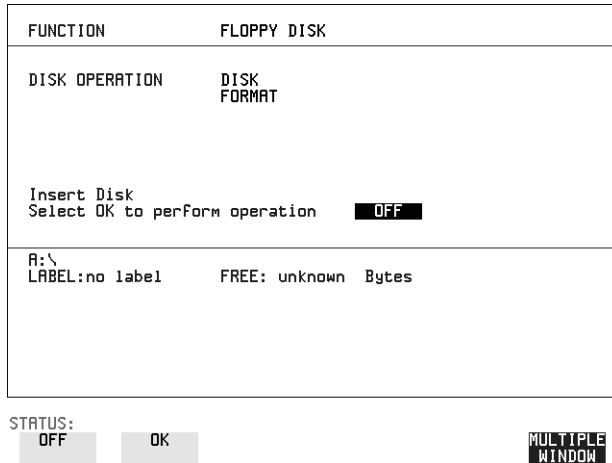
- 1 Choose the STORED SETTING NUMBER which contains the stored configuration.
- 2 Choose ACTION **RECALL** to recall the stored configuration.
The recall operation can be verified by checking the relevant display settings.

Formatting a Disk

Formatting a Disk

Description

Only 1.44M, MS-DOS compatible disks can be used in the HP 37718A. Any other format or capacity will result in a disk access error being displayed.



NOTE

Disks can be formatted in an IBM compatible PC (1.44M, MS-DOS only) but it is recommended that the disk is formatted in the HP 37718A as this will ensure full compatibility with the Floppy Disk power fail recovery included in the HP 37718A.

HOW TO:

- 1 Choose DISK OPERATION .
- 2 Insert the Disk into the Disk drive.
- 3 Choose to Format the disk.
A warning that this operation will erase all data is displayed and asks “do you wish to continue”.
If YES is selected, all the data on the Disk will be erased and the disk will be formatted.
If NO is selected, the operation is aborted. This allows you to view the data on the Disk and verify that it is no longer needed.

Labeling a Disk

Labeling a Disk

Description

You can label your disks for ease of identification.

FUNCTION	FLOPPY DISK
DISK OPERATION LABEL	DISK LABEL MY DISK
Select OK to perform operation	<input type="checkbox"/> OFF
A:\ LABEL: MY DISK	FREE: Bytes

STATUS:

OFF

OK

MULTIPLE WINDOW

HOW TO:

- 1 Choose DISK OPERATION **DISK LABEL**.
- 2 Label the Disk using **PREVIOUS CHAR** **NEXT CHAR** **→** **←** or press **SET** and use the pop-up keypad.
- 3 Choose **OK** to confirm the label is correct.
The label is displayed at the bottom of the display to confirm the operation has taken place.

Managing Files and Directories on Disk

Description

File and Directory structures can be important in speeding up the transfer of data between the instrument and the disk drive.

It is recommended that you create a directory structure as an aid to efficient file management particularly when the disk is moved to a PC.

Creating a Directory on Disk

FUNCTION	FLOPPY DISK	
DISK OPERATION	FILE CREATE DIRECTORY	
NAME	SDH	
Select OK to perform operation	OFF	
A:\ LABEL:	FREE:	Bytes

STATUS:
OFF OK MULTIPLE WINDOW

HOW TO:

- 1 Choose DISK OPERATION **FILE CREATE DIRECTORY** on the **OTHER FLOPPY DISK** display.
- 2 Enter the directory name using **PREVIOUS CHAR** **NEXT CHAR** **→** **←** or press **SET** and use the pop-up keypad.
The directory name can contain up to 8 alphanumeric characters.
- 3 To create the directory choose **OK**.
This will create a sub directory of the directory displayed at the bottom of the display. In this example A:\SDH will be created.

Using Instrument and Disk Storage

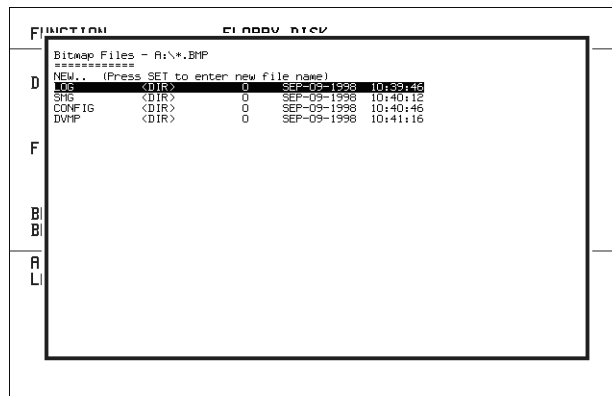
Managing Files and Directories on Disk

Accessing Directories and Files

- 1 Choose DISK OPERATION **SAVE**.
- 2 Choose FILE TYPE you wish to view.
This acts as a filter on the filename extension:
CONFIGURATION - .CNF filter, **GRAPHICS** - .SMG filter,
DATA LOGGING - .PRN filter, **SCREEN DUMP** - .BMP filter.
- 3 Move the highlighted cursor to the NAME field and press **SET**.

NOTE

- . <DIR> - Current Directory.
 - .. <DIR> - Parent directory. Move highlighted cursor to this line and press **SET** to move to parent directory.
- 4 Move the highlighted cursor to
.. <DIR> and press **SET** to move to parent directory.
 - 5 Move the highlighted cursor to the directory required and press **SET** to move to that directory. (The directory name will appear on the display).
Only the files with the file extension chosen in FILE TYPE will be displayed.



STATUS:

**MULTIPLE
WINDOW**

- 6 Move the highlighted cursor up and down the display using **↑** and **↓**.

Using Instrument and Disk Storage

Managing Files and Directories on Disk

NOTE

Title Bar - File types displayed and current directory. (cannot be highlighted).

. <DIR> - Current Directory.

.. <DIR> - Parent directory. Move highlighted cursor to this line and press **SET** to move to parent directory.

SDH1.PRN - File (with named extension) in current directory. Move highlighted cursor to this line and press **SET** to select the file. The display will return to the **SAVE** display and the selected file name will appear in the FILE NAME field.

NEXT - Move highlighted cursor to this line and press **SET** to access the next page of file names.

PREV - Move highlighted cursor to this line and press **SET** to access the previous page of file names.

FUNCTION	CL	DBV	DISK
Data Logging Files - A:\LOG*.PRN			

NEW.. (Press SET to enter new file name)			
D	.	<DIR>	0 SEP-09-1998 10:39:46
	.	<DIR>	0 SEP-09-1998 10:39:46
	SDH1.PRN	8452	SEP-09-1998 11:05:16
	DS3.PRN	8616	SEP-09-1998 10:45:22
	SDH4.PRN	11158	SEP-09-1998 11:11:20
	SHG1.PRN	16888	SEP-09-1998 13:12:10
F	34MB.PRN	10584	SEP-09-1998 12:34:54
	LINK1.PRN	6156	SEP-09-1998 12:52:14
	LINK3.PRN	7878	SEP-09-1998 12:53:36
	SDH2.PRN	8862	SEP-09-1998 12:59:18
	SDH3.PRN	11076	SEP-09-1998 13:01:50
	DS1.PRN	5254	SEP-09-1998 13:04:18
L	PDH1.PRN	5254	SEP-09-1998 13:09:12
L	PDH2.PRN	7632	SEP-09-1998 13:10:28
L	LINK2.PRN	2135	SEP-09-1998 13:18:34
	LINK4.PRN	8090	SEP-09-1998 13:19:54
	LONG1.PRN	2135	SEP-09-1998 13:20:36
	LOCAL.PRN	8101	SEP-09-1998 13:21:48
R	LONG1.PRN	2135	SEP-09-1998 13:22:22
L	SDHT.PRN	8101	SEP-09-1998 13:24:26
	SDH8.PRN	2135	SEP-09-1998 13:24:48
	SDH9.PRN	6871	SEP-09-1998 13:25:32
	PDH3.PRN	2135	SEP-09-1998 13:26:10
	PDH4.PRN	6871	SEP-09-1998 13:26:32
	NEXT PAGE ->		

STATUS:

MULTIPLE WINDOW

7 **NEW.** - Allows entry of new file name using pop-up keypad. Press **SET** to obtain the pop-up keypad display. Enter the new filename, Choose **END** and press **SET** to return to the file manager display.

8 Press **CANCEL** to return to the **SAVE** display.

The filename entered via the keypad appears on the **SAVE** display.

The file extension is added automatically.

The Directory name and the disk Label appear at the bottom of the display.

Using Instrument and Disk Storage

Managing Files and Directories on Disk

Renaming a File on Disk

Description

Files can be renamed as an aid to efficient file management.

FUNCTION	FLOPPY DISK
DISK OPERATION	FILE RENAME
FROM:NAME	FILENAME.CNF
TO: DIRECTORY NAME	A:\ FILENAME.CNF
Select OK to perform operation	<input type="checkbox"/> OFF
A:\ LABEL:	FREE: Bytes

STATUS:

OFF

OK

MULTIPLE
WINDOW

HOW TO:

- 1 Choose DISK OPERATION **FILE RENAME**.
- 2 Enter the FROM filename using **PREVIOUS CHAR** **NEXT CHAR** **→** **←** or
Choose the directory which contains the file to be renamed. See "Accessing
Directories and Files " page 184. Move the highlighted cursor to the file to be
renamed and press **SET** to return to the **FILE RENAME** display.
The filename, with extension, can contain up to 12 alphanumeric characters.
- 3 Choose the directory in which to locate the renamed file (it will appear on the
display). See "Accessing Directories and Files " page 184.
- 4 Enter the TO filename using **PREVIOUS CHAR** **NEXT CHAR** **→** **←** or
press **SET** twice and use the pop-up keypad.
The filename can contain up to 8 alphanumeric characters.
The file extension is fixed to the FROM filename extension.
- 5 To rename the file choose **OK**.
If you have entered a filename which already exists, a warning "File exists - are
you sure" you wish to continue is displayed.
If YES is selected, the data in the file will be overwritten. If NO is selected, the
operation is aborted.
This allows you the opportunity to verify before renaming.

Using Instrument and Disk Storage

Managing Files and Directories on Disk

Deleting a File on Disk

Description

Obsolete files can be deleted as an aid to efficient file management.

FUNCTION	FLOPPY DISK	
DISK OPERATION	FILE DELETE DELETE FILE	
NAME	FILENAME.EXT	
Select OK to perform operation	<input type="checkbox"/> OFF	
A:\ LABEL:	FREE:	Bytes

STATUS:

OFF

OK

MULTIPLE
WINDOW

HOW TO:

- 1 Choose DISK OPERATION **FILE** **DELETE** **DELETE FILE**.
- 2 Choose the directory containing the file to be deleted. See "Accessing Directories and Files " page 184.
- 3 Enter the filename to be deleted using **PREVIOUS CHAR** **NEXT CHAR** **←** or press **SET**, highlight the file to be deleted on the file manager display, and press **SET**.
The file name can contain up to 12 alphanumeric characters, including the filename extension.
- 4 To delete the file choose **OK**.
A warning "Are you sure you wish to continue" is displayed.
If YES is selected, the file is deleted.
If NO is selected, the operation is aborted.
This prevents accidental deletion of a wanted file.

Using Instrument and Disk Storage

Managing Files and Directories on Disk

Deleting a Directory on Disk

Description

Obsolete Directories should be deleted as an aid to efficient file management.

FUNCTION	FLOPPY DISK
DISK OPERATION	FILE DELETE DELETE DIRECTORY
Select OK to perform operation	<input type="checkbox"/> OFF
A:\ LABEL:	FREE: Bytes

STATUS:
 OFF OK

MULTIPLE
WINDOW

NOTE

A directory cannot be deleted until all the files within the directory have been deleted. See "Deleting a File on Disk " page 187.

HOW TO:

- 1 Choose the directory you wish to delete (it will appear on the display). See "Accessing Directories and Files " page 184.
- 2 Choose DISK OPERATION **FILE DELETE DELETE DIRECTORY**.
- 3 To delete the directory choose **OK**.
A warning "Are you sure you wish to continue" is displayed.
If YES is selected, the directory is deleted.
If NO is selected, the operation is aborted.
This prevents accidental deletion of a wanted directory.
If the directory is not empty the messages "delete directory failed" "directory is not empty" are displayed.
- 4 If files need to be deleted to prepare the directory for deletion. See "Deleting a File on Disk " page 187.

Using Instrument and Disk Storage

Managing Files and Directories on Disk

Adding Descriptors to Disk Files

Description

When storing configurations or graphics on disk, you can give them an easily remembered descriptor for identification at a later date.

Descriptors can be added to .CNF and .SMG files.

FUNCTION	FLOPPY DISK
DISK OPERATION	FILE PROPERTIES
DISPLAY OPTION	FILE DESCRIPTOR
FILE NAME DESCRIPTOR	FILENAME.CNF Press SET to select filename popup
Select OK to perform operation	OFF
A:\ LABEL:	FREE: Bytes

STATUS:

TIME & DATE

FILE DESC

MULTIPLE WINDOW

HOW TO:

- 1 Choose the directory containing the file you wish to add the descriptor to. See "Accessing Directories and Files " page 184.
- 1 Choose DISK OPERATION **FILE PROPERTIES** and DISPLAY OPTION **FILE DESCRIPTOR**.
- 2 Move the highlighted cursor to the FILE NAME DESCRIPTOR field. Enter the file descriptor using **PREVIOUS CHAR** **NEXT CHAR** **→** **←** or press **SET**, highlight the file required on the file manager display, and press **SET**.
- 3 Move the highlighted cursor to Select OK to perform operation and choose OK. The File List will show the descriptor instead of the TIME and DATE information as long as FILE DESCRIPTOR is selected.

NOTE

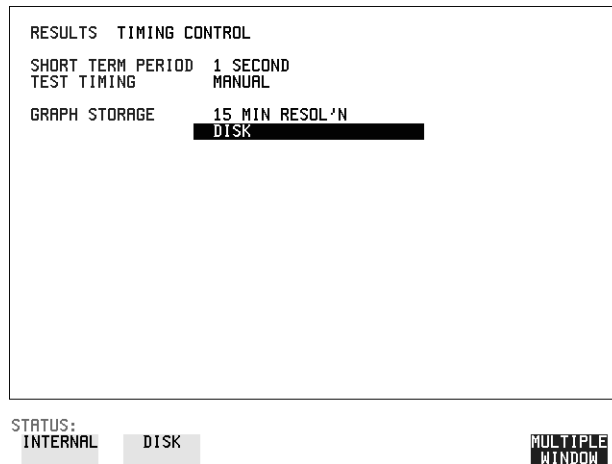
This slows down the updating of the display.

Saving Graphical Results to Disk

Description

Graphical results can be saved to a file on disk. Two methods of naming the file, which is created when the measurement is started, are available:

- Automatic** A filename in the form meas001 is created automatically without any action from you.
- Your Choice** You can input a filename of your choice which will override the automatically generated filename. This must be entered before the measurement is started. If the filename you enter already exists, graphics results will be saved to the automatically generated filename. This prevents existing files from being overwritten each time the measurement is started.



HOW TO:

- 1 Choose GRAPH STORAGE **DISK** and the Graph Storage resolution required on the **RESULTS** display. See “Saving Graphics Results to Instrument Store” page 138.
If you wish to use the automatically generated filename no further action is required and the graphics results will be saved on Disk when the measurement is completed.

Using Instrument and Disk Storage

Saving Graphical Results to Disk

FUNCTION	FLOPPY DISK	
DISK OPERATION	SAVE	
FILE TYPE	GRAPHICS	
NAME	FILENAME.SMG	
A:\ LABEL:	FREE:	Bytes

STATUS:

CONFIG-
URATION

GRAPHICS

DATA
LOGGING

MULTIPLE
WINDOW

- 2 Choose the directory in which to save the graphics results. See "Accessing Directories and Files " page 184.
- 3 If you wish to enter your own choice of filename, choose DISK OPERATION **SAVE** FILE TYPE **GRAPHICS**.
- 4 Move the highlighted cursor to NAME and enter the filename using **PREVIOUS CHAR** **NEXT CHAR** **→** **←** or press **SET** twice and use the pop-up keypad.
 The filename can contain up to 8 alphanumeric characters.
 The filename extension is fixed as .SMG.
 The graphics results will be saved on Disk at the end of the measurement.

Saving a Screen Dump to Disk

Description

The chosen display may be stored on disk in bitmap format using the Screen Dump feature of the HP37718A. Logging and Floppy Disk displays must be set up for screen dump. See, "Logging on Demand " page 156. The current display is stored on disk when **PRINT NOW**, is pressed.

FUNCTION	LOGGING
LOGGING SETUP	CONTROL
LOGGING	OFF
LOG ON DEMAND	SCREEN DUMP
SCREEN DUMP DESTINATION	DISK
BITMAP COMPRESSION (RLE)	OFF

STATUS: STORED SETTINGS FLOPPY LOGGING MORE MULTIPLE
 SETTINGS CONTROL DISK WINDOW

HOW TO:

- 1 Choose LOGGING SETUP **DEVICE** and LOGGING PORT **DISK** on the **OTHER**, **LOGGING** display.
- 2 Choose LOGGING SETUP **CONTROL** LOG ON DEMAND **SCREEN DUMP** on the **OTHER**, **LOGGING** display.
- 3 If compression is required to save disk space, select BITMAP COMPRESSION (RLE) **ON** .

Using Instrument and Disk Storage

Saving a Screen Dump to Disk

FUNCTION	FLOPPY DISK
DISK OPERATION	SAVE
FILE TYPE NAME	SCREEN DUMP FILENAME.BMP
BMP DIR : A:\ BMP FILE: SDUMP029.BMP	
A:\ LABEL:no label	FREE: unknown Bytes

STATUS:
STORED SETTINGS FLOPPY LOGGING MORE MULTIPLE
SETTINGS CONTROL DISK WINDOW

- 4 Choose the directory in which to save the Screen Dump. See "Accessing Directories and Files " page 184.
- 5 If you wish to enter your own choice of filename, choose DISK OPERATION **SAVE** FILE TYPE **SCREEN DUMP**.

NOTE

You have the option of an auto generated filename or entering your chosen filename. The file name can have a maximum of 8 characters. The file extension is fixed as .BMP. The file name must satisfy DOS requirements, that is, there must be no spaces or other illegal characters.

- 6 Move the highlighted cursor to NAME and enter the filename using **PREVIOUS CHAR** **NEXT CHAR** **→** **←** or press **SET** twice and use the pop-up keypad.
- 7 Choose the display you want to store on disk and press **PRINT NOW**. After a few second the message "SAVING SCREEN DUMP . . . (XX% COMPLETE)" is displayed.

Saving Data Logging to Disk

Description

Data Logging can be saved to a file on disk. The disk can be transferred to a personal computer (PC) and the logging investigated at a later date.

FUNCTION	FLOPPY DISK
DISK OPERATION	SAVE
FILE TYPE NAME	DATA LOGGING FILENAME.PRN APPEND TO FILE
A:\ LABEL:	FREE: Bytes

STATUS:

OVER-
WRITE

APPEND
TO FILE

MULTIPLE
WINDOW

HOW TO:

- 1 Choose the directory in which to save the logging results. See "Accessing Directories and Files" page 184.
- 2 Choose DISK OPERATION **SAVE** FILE TYPE **DATA LOGGING** and enter your choice of filename using **PREVIOUS CHAR** **NEXT CHAR** **→** **←** or press **SET** twice and use the pop-up keypad.
The filename can contain up to 8 alphanumeric characters.
The filename extension is fixed as .PRN.
- 3 If you wish to add the data logging to a file which already exists, choose **APPEND TO FILE**. The data logging is added to the named file on Disk in the available free space.
If you wish to overwrite the contents of the named file with the data logging, choose **OVERWRITE**.
- 4 Set up the **OTHER LOGGING** display. See "Logging Results" page 147.
When the named file is opened, data logging is saved on the disk:
 - As each logging output occurs during the measurement or
 - **PRINT NOW** is pressed.

Saving Configurations to Disk

Description

You can store a large number of measurement settings which are used regularly and recall them when required.

Configurations can be stored to a file on the floppy disk. The floppy disk can be used in other instruments which have the same option structure.

FUNCTION	FLOPPY DISK
DISK OPERATION	SAVE
FILE TYPE NAME	CONFIGURATION SDHMANAL .CNF
Select OK to perform operation	OFF
A:\ LABEL:no label	FREE: 1148928 Bytes

STATUS:
 CONFIG-
URATION GRAPHICS DATA
LOGGING SCREEN
DUMP MULTIPLE
WINDOW

HOW TO:

- 1 Set the HP 37718A to the configuration you wish to store.
- 1 Choose the directory in which you wish to save the HP 37718A configuration. See "Accessing Directories and Files " page 184.
- 2 Choose DISK OPERATION **SAVE**, FILE TYPE **CONFIGURATION** and enter the filename using **PREVIOUS CHAR** **NEXT CHAR** **→** **←** or press **SET** twice and use the pop-up keypad.
The filename extension is fixed as .CNF.
The filename can contain up to 8 alphanumeric characters.
- 3 Choose **OK** to save the current configuration to disk.
If you have entered a filename which already exists, a warning "File exists - are you sure you wish to continue" is displayed.
If YES is selected, the configuration will be saved.
To cancel, change OK to OFF and enter new filename. See "Accessing Directories and Files " page 184.

Recalling Configuration from Disk

Description

If a configuration has been stored on disk, you will need to recall it at some time in the future to configure the instrument.

FUNCTION	FLOPPY DISK	
DISK OPERATION	RECALL	
FILE TYPE NAME	CONFIGURATION FILENAME.CNF	
Select OK to perform operation	OFF	
A:\ LABEL:	FREE:	Bytes

STATUS:

CONFIG-
URATION

GRAPHICS

MULTIPLE
WINDOW

HOW TO:

- 1 Choose the directory that contains the configuration file to be recalled. See "Accessing Directories and Files " page 184.
- 2 Choose DISK OPERATION **RECALL** FILE TYPE **CONFIGURATION** and enter your choice of filename using **PREVIOUS CHAR** **NEXT CHAR** **←** **→**.
The filename can contain up to 8 alphanumeric characters.
The filename extension is fixed as .CNF.
- 3 To recall the configuration from disk to instrument, choose **OK**.
The recall operation can be verified by checking the relevant display settings.

Recalling Graphics Results from Disk

Description

If graphic results have been stored on disk, you will need to recall them in able to view the results on the **GRAPH** display.

FUNCTION	FLOPPY DISK	
DISK OPERATION	RECALL	
FILE TYPE NAME	GRAPHICS FILENAME.SMG	
Select OK to perform operation	<input type="checkbox"/> OFF	
A:\ LABEL:	FREE:	Bytes

STATUS:

OFF

OK

MULTIPLE
WINDOW

HOW TO:

- 1 Choose the directory that contains the graphics file to be recalled. See "Accessing Directories and Files " page 184.
- 2 Choose DISK OPERATION **RECALL** FILE TYPE **GRAPHICS** and enter your choice of filename using **PREVIOUS CHAR** **NEXT CHAR** **→** **←**. The filename can contain up to 8 alphanumeric characters. The filename extension is fixed as .SMG.
- 3 To recall the graphics results from disk to instrument, choose **OK**.
- 4 To view the graphics results, see "Recalling Stored Graph Results" page 139.

Copying Configuration from Instrument Store to Disk

Description

If you have a configuration stored in the instrument store that you wish to use on another instrument, you can copy it to disk. The configuration can then be downloaded from the disk in to another HP 37718A with the same options as the original instrument.

FUNCTION	FLOPPY DISK
DISK OPERATION	FILE COPY CONFIGURATION
FROM: 1 ATM27.....	
TO: NAME	FILENAME.CNF
Select OK to perform operation	<input type="checkbox"/> OFF
A:\ LABEL:	FREE: Bytes

STATUS:

OFF

OK

MULTIPLE WINDOW

HOW TO:

- 1 Choose the directory to receive the configuration file. See "Accessing Directories and Files " page 184.
- 2 Choose DISK OPERATION **FILE COPY CONFIGURATION** and enter the Instrument Store number using **DECREASE DIGIT** and **INCREASE DIGIT** or press **SET** and use the pop-up keypad.
The Stored Settings description appears alongside the store number.
If required the description can be modified using **JUMP NEXT CHAR PREVIOUS CHAR** **← →** or press **SET** and use the pop-up keypad.
The description can contain up to 24 alphanumeric characters.
- 3 Enter the chosen filename using **PREVIOUS CHAR NEXT CHAR** **→ ←** or press **SET** twice and use the pop-up keypad.
The file name can contain up to 8 alphanumeric characters.
The filename extension is fixed as .CNF.

Using Instrument and Disk Storage

Copying Configuration from Instrument Store to Disk

- 4 To copy the configuration from instrument to Disk choose **OK**.
If you have entered a filename which already exists, a warning "File exists - are you sure you wish to continue" is displayed.
If YES is selected, the data on the Disk will be overwritten.
If NO is selected, the operation is aborted.

Copying Configuration from Disk to Instrument Store

Description

If you have a configuration stored in the instrument store that you wish to use on another instrument, you can copy it to Disk. The configuration can then be downloaded from the disk in another HP 37718A with the same options as the original instrument.

FUNCTION	FLOPPY DISK
DISK OPERATION	FILE COPY CONFIGURATION
TO:	4 ATMTST.....
FROM:	NAME FILENAME.CNF
Select OK to perform operation <input type="checkbox"/> OFF	
A:\ LABEL:	FREE: Bytes

STATUS:
 OFF OK

MULTIPLE WINDOW

HOW TO:

- 1 Choose the directory containing the configuration file. See "Accessing Directories and Files " page 184.
- 2 Choose DISK OPERATION **FILE COPY CONFIGURATION** and enter the Instrument Store number using **DECREASE DIGIT** and **INCREASE DIGIT** or press **SET** and use the pop-up keypad.
Enter a description of the configuration using **PREVIOUS CHAR** **NEXT CHAR** **→** **←** or press **SET** and use the pop-up keypad.
The description can contain up to 24 alphanumeric characters.
- 3 Enter the filename the configuration is to be copied from using **PREVIOUS CHAR** **NEXT CHAR** **→** **←** or press **SET**, highlight the file to be copied on the file manager display and press **SET**.
The file name can contain up to 8 alphanumeric characters.
The filename extension is fixed as .CNF.

Using Instrument and Disk Storage

Copying Configuration from Disk to Instrument Store

- 4 To copy the configuration from Disk to instrument, choose **OK**.
If you have entered a instrument store number which already contains a configuration, a warning "Are you sure you wish to continue" is displayed.
If YES is selected, the data in the instrument store will be overwritten.
If NO is selected, the operation is aborted.

Copying Graphics Results from Instrument Store to Disk

Description

You can copy Graphics Results from the instrument store to the Disk. This is useful under the following conditions:

- If you have graphics results stored in the instrument that you wish to prevent from being overwritten by a future measurement (only 10 store locations in the instrument)
- If you wish to retrieve the graphics results for viewing via a spreadsheet.

FUNCTION	FLOPPY DISK
DISK OPERATION	FILE COPY GRAPHICS
FROM: STORE	-9
TO: NAME FORMAT	FILENAME.SMG NORMAL
Select OK to perform operation	<input type="checkbox"/> OFF
A:\ LABEL:	FREE: Bytes

STATUS:
OFF

OK

MULTIPLE
WINDOW

HOW TO:

- 1 Choose the directory to receive the graphics file. See "Accessing Directories and Files" page 184.
- 2 Choose DISK OPERATION **FILE COPY GRAPHICS** and enter the Instrument Store number using **DECREASE DIGIT** and **INCREASE DIGIT** or press **SET** and use the pop-up keypad.
- 3 Enter the filename the graphic results are to be copied to using **PREVIOUS CHAR** **NEXT CHAR** **→** **←** or press **SET** twice and use the pop-up keypad.
The file name can contain up to 8 alphanumeric characters.
The filename extension is fixed as .SMG.

Using Instrument and Disk Storage

Copying Graphics Results from Instrument Store to Disk

- 4 If you wish to view the graphic results at a later date via a spreadsheet, choose FORMAT **CSV**. CSV is Comma Separated Variable.
If you wish to view the graphic results at a later date on an HP 37718A, choose FORMAT **NORMAL**.
- 5 To copy the configuration from instrument to Disk, choose **OK**.
If you have entered a filename which already exists, a warning "File exists - are you sure you wish to continue" is displayed.
If YES is selected, the data on the Disk will be overwritten.
If NO is selected, the operation is aborted.
This allows you the opportunity to view the data on the Disk and verify that it is no longer needed.

Using Instrument and Disk Storage

Copying Graphics Results from Instrument Store to Disk

- “Coupling Transmit and Receive Settings” page 206
- “Setting Time & Date” page 207
- “Enabling Keyboard Lock” page 208
- “Enabling Beep on Received Error” page 209
- “In-Band DS1 Loopcode 156MTS Compatibility” page 210
- “Suspending Test on Signal Loss” page 211
- “MS-REI Result/Enable” page 212
- “Graph Storage Resolution” page 213
- “Setting Error Threshold Indication” page 214
- “Setting Screen Brightness and Color” page 215
- “To change the parameters of a User-defined jitter mask” page 216
- “To Generate a New Jitter Mask” page 217
- “Running Self Test” page 219

Selecting and Using "Other" Features

Coupling Transmit and Receive Settings

Description

When generating and measuring at the same interface level, you can have the transmit and receive settings coupled together. Any settings change made on the transmit display will automatically occur on the receive display. Any settings change made on the receive display will automatically occur on the transmit display.

This function is available on the **OTHER SETTINGS CONTROL** display.

FUNCTION	SETTINGS CONTROL
TRANSMITTER AND RECEIVER	COUPLED
RECEIVER COUPLED TO TRANSMITTER	

STATUS:
INDEP-
ENDENT

COUPLED

MULTIPLE
WINDOW

HOW TO:

- 1 Choose TRANSMITTER AND RECEIVER **COUPLED**.

Setting Time & Date

Setting Time & Date

Description

When making Bit error measurements and recording results you can have certain events timed chronologically, for example, Alarms; Error Seconds.

The capability to set the Time and Date is provided on the **OTHER** **TIME & DATE** display.

FUNCTION	TIME & DATE
CLOCK MODE	SETUP
TIME	15:22:59
DATE	29-JUL-89

STATUS:
DECREASE DIGIT INCREASE DIGIT ← → MULTIPLE WINDOW

HOW TO:

- 1 Choose CLOCK MODE **SETUP** and set the Time and Date using **↑**; **↓**; **←**; **→**; **INCREASE DIGIT** and **DECREASE DIGIT**.
- 2 Choose CLOCK MODE **RUN** to complete the setting of Time and Date.

Selecting and Using "Other" Features

Enabling Keyboard Lock


Enabling Keyboard Lock

Description

You can protect the measurement settings from interference during a test.

This function is provided in the HP 37718A on the **OTHER** **MISCELLANEOUS** display.

The following keys are not affected by Keyboard Lock:

- Display keys **TRANSMIT**; **RECEIVE**; **RESULTS**; **GRAPH**; **OTHER**
- cursor keys    and 
- **SHOW** **PAPER FEED** **LOCAL** **SMART TEST**

The following display functions are not affected by Keyboard Lock:

- RESULTS type on the **RESULTS** display
- KEYBOARD LOCK on the **OTHER** display

FUNCTION	MISCELLANEOUS
KEYBOARD LOCK	ON
BEEP ON RECEIVED ERROR	OFF
INBAND DS1 LOOPCODE	
156Mhz COMPATIBILITY	OFF
SUSPEND TEST ON SIGNAL LOSS	OFF
MS-REI RESULT ENABLE	ON
GRAPH STORAGE RESOLUTION	COMPRESS
NOTE: storing graph results with Full resolution will reduce storage capacity by 50%	

STATUS:

OFF

ON



HOW TO:

- 1 Choose KEYBOARD LOCK **ON**.

Selecting and Using "Other" Features

Enabling Beep on Received Error

Enabling Beep on Received Error

Description

You can have an audible indication of an error which is particularly useful when the display on the test set is hidden from view.

This function is provided in the HP 37718A on the **OTHER** **MISCELLANEOUS** display.

FUNCTION	MISCELLANEOUS
KEYBOARD LOCK	ON
BEEP ON RECEIVED ERROR	ON
INBAND DS1 LOOPCODE	
156MTS COMPATIBILITY	OFF
SUSPEND TEST ON SIGNAL LOSS	OFF
MS-REI RESULT ENABLE	ON
GRAPH STORAGE RESOLUTION	COMPRESS
NOTE: storing graph results with full resolution will reduce storage capacity by 50%	

STATUS:

OFF

ON



HOW TO:

- 1 Choose BEEP ON RECEIVED ERROR **ON**.

Selecting and Using "Other" Features
In-Band DS1 Loopcode 156MTS Compatibility

In-Band DS1 Loopcode 156MTS Compatibility

Description

The instrument default state is with the INBAND DS1 LOOPCODE 156MTS COMPATIBILITY field set to **OFF**. In this mode the instrument operates as per the T1.403.CORE standard which states that the DS1 framing bit should overwrite the DS1 Loopcode pattern. When **ON** is selected the instrument operation changes such that DS1 Loopcode is gapped in order to prevent the DS1 framing bit overwriting the DS1 Loopcode pattern. This is compatible with HP's 156MTS T-carrier and SONET tester.

FUNCTION	MISCELLANEOUS
KEYBOARD LOCK	ON
BEEP ON RECEIVED ERROR	OFF
INBAND DS1 LOOPCODE 156MTS COMPATIBILITY	ON
SUSPEND TEST ON SIGNAL LOSS	OFF
MS-REI RESULT ENABLE	ON
GRAPH STORAGE RESOLUTION	COMPRESS
NOTE: storing graph results with full resolution will reduce storage capacity by 50%	

STATUS:

OFF

ON



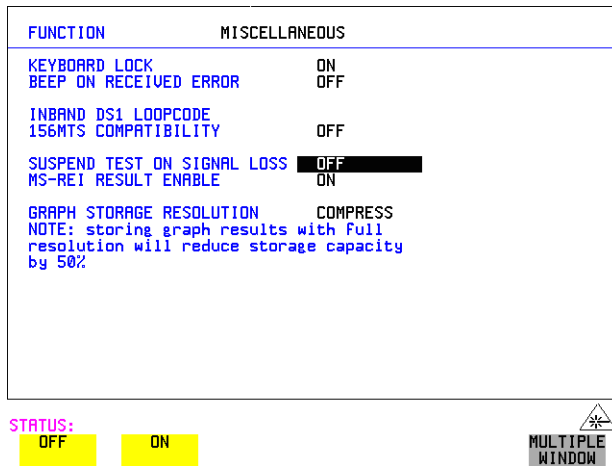
Selecting and Using "Other" Features

Suspending Test on Signal Loss

Suspending Test on Signal Loss

When running a test, you can choose to suspend the test during periods of signal loss.

This function is available on the **OTHER MISCELLANEOUS** display.



HOW TO:

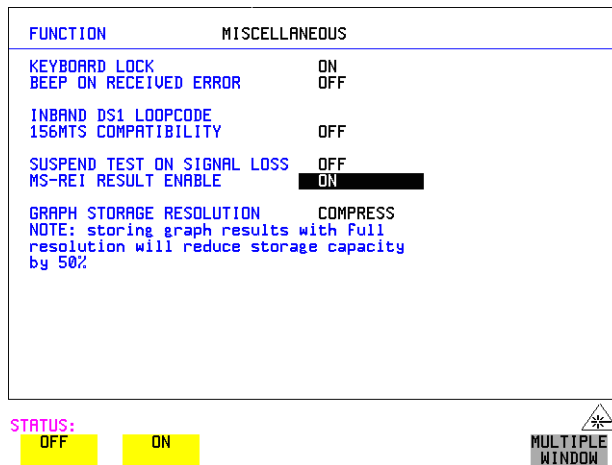
- 1 Choose SUSPEND TEST ON SIGNAL LOSS **ON**.

MS-REI Result/Enable

MS-REI Result/Enable

Before running a test, you can choose to enable or disable the SDH measurement of MS-REI or the equivalent SONET measurement of REI-L.

This function is available on the **OTHER** **MISCELLANEOUS** display.



HOW TO:

- 1 Choose MS-REI ENABLE **ON** or **OFF** as required.

When set to **OFF**, the MS-REI and REI-L measurements are suppressed. Cumulative, Short Term and Analysis measurements are affected alike.

The MS-REI measurement is twinned with B2-BIP with regard to the G.826 PUAS measurement. This results in the B2-BIP PUAS measurement showing **N/A** when MS-REI is set to **OFF**.

Selecting and Using "Other" Features

Graph Storage Resolution

Graph Storage Resolution

Description

The total graphics store capacity is normally 20,000 events. If GRAPH STORAGE RESOLUTION **FULL** is selected the capacity reduces to 10,000 events.

FUNCTION	MISCELLANEOUS
KEYBOARD LOCK	ON
BEEP ON RECEIVED ERROR	OFF
INBAND DS1 LOOPCODE 156MTS COMPATIBILITY	OFF
SUSPEND TEST ON SIGNAL LOSS MS-REI RESULT ENABLE	OFF ON
GRAPH STORAGE RESOLUTION	COMPRESS
NOTE: storing graph results with Full resolution will reduce storage capacity by 50%	

STATUS:

COMPRESS

FULL


**MULTIPLE
WINDOW**

Selecting and Using "Other" Features

Setting Error Threshold Indication

Setting Error Threshold Indication

Description

When making error measurements, you can have an indication of when an error count or error ratio threshold has been exceeded. You can set the HP 37718A to indicate this by a color change, from yellow to red, of the bar on the **GRAPH** display and the result on the **RESULTS** display. You can choose the thresholds at which the color change occurs.

The Count and Ratio selections are independent.

This function is available on the **OTHER** **COLOR CONTROL** display.

FUNCTION	COLOR CONTROL
COLOR ENHANCE RESULTS	ON
COUNT THRESHOLD	10000
RATIO THRESHOLD	10 ⁻⁸
COLOR PALETTE	TWO
DISPLAY BRIGHTNESS	FULL

STATUS:
10⁻³ 10⁻⁶ 10⁻⁷ 10⁻⁸ 10⁻⁹ MULTIPLE WINDOW

HOW TO:

- 1 Choose COLOR ENHANCE RESULTS **ON**.
- 2 Choose the COUNT THRESHOLD and RATIO THRESHOLD.

Selecting and Using "Other" Features Setting Screen Brightness and Color

Setting Screen Brightness and Color

Description

The HP 37718A screen can be set to single or two color using the COLOR PALETTE selection on the **OTHER**, **COLOR CONTROL** display.

The screen brightness can be set to full or half brightness.

The half brightness setting is used when the room brightness is such that half brightness is desirable and will also prolong the life of the screen.

If the brightness is set to FULL and there have been no key presses in the last hour, then the screen automatically dims to the half brightness level and the status message "Display set to half brightness" is shown. Any key press will return the screen to full brightness.

This function is available on the **OTHER**, **COLOR CONTROL** display.

The function of the COUNT THRESHOLD and RATIO THRESHOLD fields is explained on the previous page.

FUNCTION	COLOR CONTROL
COLOR ENHANCE RESULTS	ON
COUNT THRESHOLD	10000
RATIO THRESHOLD	10^-3
COLOR PALETTE	TWO
DISPLAY BRIGHTNESS	FULL

STATUS:

HALF

FULL

**MULTIPLE
WINDOW**

HOW TO:

- 1 Choose the DISPLAY BRIGHTNESS to suit the operating environment.

To change the parameters of a User-defined jitter mask

To change the parameters of a User-defined jitter mask

1. Select **OTHER**, and set FUNCTION to **JITTER MASKS**, you will have to select **MORE** to access the JITTER MASKS key.
2. Check the mask LOCK is set to **OFF**, then select USER MASK NUMBER, and select the appropriate user mask (1 to 5).
3. Position the cursor on DISPLAY, then select

MASK TITLE and enter a title for the mask number selected. When the title is finished position the cursor on DISPLAY and select **MASK POINTS**.

FUNCTION		[JITTER MASKS]]	
USER MASK NUMBER	[2]	LOCK	[OFF]	DISPLAY	[MASK TITLE]
MASK					
1	[.....]	2	[TEST.NO.#.....]	3	[.....]
4	[.....]	5	[.....]		
STATUS: TUMP PREVIOUS CHAR NEXT CHAR ← → MULTIPLE WINDOW					

4. Select NUMBER OF POINTS and using the **↑**, **↓** keys, and edit keys (INCREASE/DECREASE DIGIT) select the number of points in the mask (maximum 55) and the frequency and amplitude at each point. Use the PAGE field to switch between pages to access all 55 points in the mask.

FUNCTION		[JITTER MASKS]]	
USER MASK NUMBER	[2]	LOCK	[OFF]	DISPLAY	[MASK POINTS]
NUMBER OF POINTS	[55]	PAGE	[1]		
FREQ(Hz)	AMP(U)	FREQ(Hz)	AMP(U)		
01 [1000] [0.01]	07 [1000] [0.01]	02 [1000] [0.01]	08 [1000] [0.01]		
03 [1000] [0.01]	09 [1000] [0.01]	04 [1000] [0.01]	10 [1000] [0.01]		
05 [1000] [0.01]	11 [1000] [0.01]	06 [1000] [0.01]	12 [1000] [0.01]		
STATUS: MASK TITLE MASK POINTS GENERATE MASK MULTIPLE WINDOW					

5. Note that it is not possible to edit a user mask when any user mask is currently selected on the Transmitter JITTER page. When this occurs the message *LOCKED BY TX* is displayed.
6. Set the UPDATE SELECTED USER MASK field to **GENERATE**.

Locking the Mask

To prevent accidental changes to the masks when finished set the LOCK to **ON**.

Selecting and Using "Other" Features To Generate a New Jitter Mask

To Generate a New Jitter Mask

This feature enables the user to quickly generate a new mask, without having to set each point in the mask. The procedure is as follows:

1. Select **OTHER** , **JITTER MASKS** , you will have to select **MORE** to access the JITTER MASKS key.

2. Select a USER MASK NUMBER (from 1 to 5). Note that it is not possible to edit a User Mask when there is a User Mask currently selected on the Transmitter JITTER page. When this occurs the message *LOCKED BY TX* is displayed. If this is true select **TRANSMIT** ,

JITTER , position the cursor on INPUT MASK and select a fixed Jitter Transfer INPUT MASK (i.e. G.958 A/B or GR-253 Low/High), and then return to the JITTER MASKS FUNCTION on the **OTHER** page.

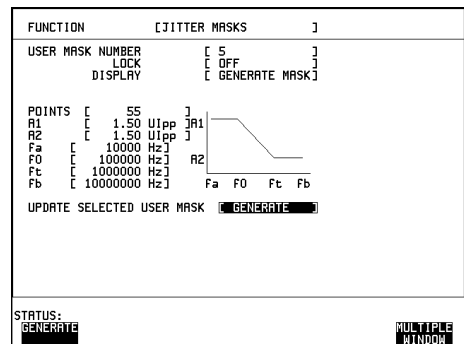
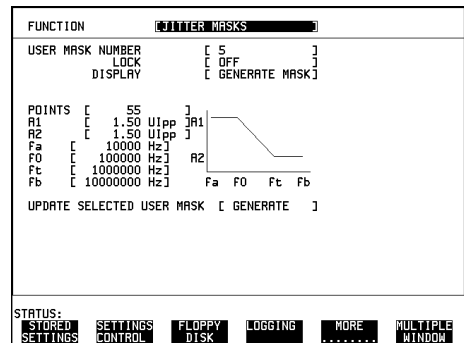
3. Position the cursor on DISPLAY and select **GENERATE MASK** .

4. Position the cursor on POINTS and set the required number of points in the mask.

5. Using the **↑** , **↓** and edit keys setup the amplitude and frequency of the user-selectable points given on the display.

6. Position the cursor on the UPDATE SELECTED USER MASK field and select

GENERATE .



Selecting and Using "Other" Features

To Generate a New Jitter Mask

NOTE

A status message “Illegal mask parameters” will occur if the specified frequency and amplitude points are invalid. Check that the frequency points are in ascending order and that the A1 and A2 amplitudes are valid for the specified frequencies.

7. Select DISPLAY **MASK POINTS** . Note that the GENERATE action has resulted in a new mask being calculated and placed into the frequency and amplitude fields. Further editing can now take place as required, using the edit keys.

Selecting and Using "Other" Features

Running Self Test

Running Self Test

Description

Before using the HP 37718A to make measurements, you can run Self Test ALL TESTS to ascertain the integrity of the HP 37718A. These tests take at least 1 hour to complete depending on the options fitted.

Alternatively you can run Confidence Tests which only takes 2 to 3 minutes to complete. This is not a full verification but performs BER measurements with internal and external loopbacks fitted.

FUNCTION	SELF TEST
TEST TYPE	ALL TESTS
TEST NUMBER	0
SUBTEST NUMBER	---
TEST STATUS	READY
PRESS THE (RUN/STOP) KEY TO START TESTING.	
CABLING INFO	<input checked="" type="checkbox"/> ALL

STATUS:
 ALL TESTS CPU TESTS CONF. TESTS PDH TESTS MORE MULTIPLE WINDOW

HOW TO:

Run ALL TESTS

- 1 Choose TEST TYPE **ALL TESTS** on the **(OTHER) SELF TEST** display.
- 2 Insert a formatted disk into the instrument disk drive.
- 3 Make the loopback connections listed below:
Connect Transmit module 75Ω OUT to Receive module 75Ω IN
Connect Transmit module 100/120Ω OUT to Receive module 100/120Ω IN
Connect Transmit module 75Ω MUX to Receive module 75Ω DEMUX
Connect Transmit module 100/120Ω MUX to Receive module 100/120Ω DEMUX
Connect Multirate Analyser IN to OUT
Connect Optical OUT to Optical IN via a 15 dB attenuator.

NOTE

If any or all of these connections are not made the HP 37718A will FAIL Self Test.

Selecting and Using "Other" Features

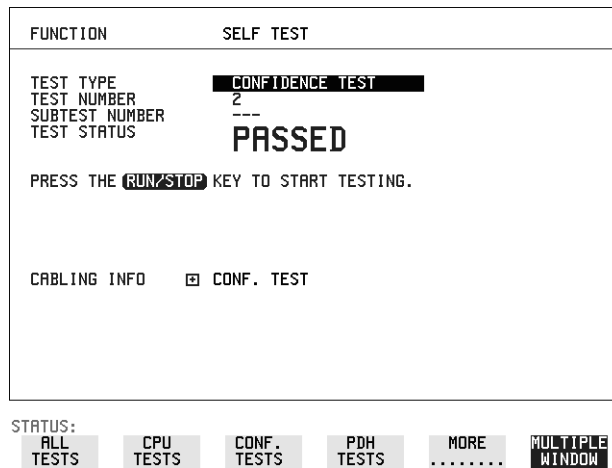
Running Self Test

- 4 Press **RUN/STOP** to activate the Self Test. TEST STATUS RUNNING will be displayed.

The information pertaining to TEST TYPE, TEST NUMBER and SUBTEST NUMBER will change as the Self Test progresses.

If the HP 37718A is functioning correctly, after a time of at least 1 hour, TEST STATUS PASSED is displayed.

If TEST STATUS [FAIL nnn] is displayed, the HP 37718A should be returned to a service office for repair.



HOW TO:

Run Confidence TESTS

- 1 Choose TEST TYPE **CONF. TESTS** on the **OTHER SELF TEST** display.
- 2 Insert a formatted disk into the instrument disk drive.
- 3 Make the loopback connections listed below:
Connect Transmit module 75Ω OUT to Receive module 75Ω IN
Connect Transmit module 100/120Ω OUT to Receive module 100/120Ω IN
Connect Transmit module 75Ω MUX to Receive module 75Ω DEMUX
Connect Transmit module 100/120Ω MUX to Receive module 100/120Ω DEMUX
Connect Multirate Analyser IN to OUT
Connect Optical OUT to Optical IN via a 15 dB attenuator.
- 4 Press **RUN/STOP** to activate the Self Test. TEST STATUS RUNNING will be displayed.
The information pertaining to TEST TYPE, TEST NUMBER and SUBTEST NUMBER will change as the Self Test progresses.
If the HP 37718A is functioning correctly, after a time of 2 to 3minutes, TEST

Selecting and Using "Other" Features

Running Self Test

STATUS PASSED is displayed.

If TEST STATUS [FAIL nnn] is displayed, the HP 37718A should be returned to a service office for repair.

NOTE

Each individual self test requires unique loopback connections. To obtain a list of the connections required move the highlighted cursor to CABLING INFO and press **SET**. The Loopbacks list will appear on the display.

FUNCTION	SELF TEST
TEST TYPE	PDH TESTS
TEST NUMBER	3
SUBTEST NUMBER	---
TEST STATUS	RFAY
PDH SELFTEST - CABLING INFORMATION	
PAYLOAD MODULE CONNECTIONS :	
CONNECT PDH OUT TO PDH IN (UNBALANCED DS3, 21kb/s, 341kb/s)	
CONNECT PDH OUT TO PDH IN (BALANCED 21kb/s)	
CONNECT HUX TO DEFLUX (BALANCED DS1)	
CONNECT HUX TO DEFLUX (UNBALANCED 21kb/s)	

STATUS:

**MULTIPLE
WINDOW**

Selecting and Using "Other" Features
Running Self Test

Appendix A

AU-3/TUG-3 Background Patterns

The following tables list the background patterns available when selecting specific foregrounds.

Table 5 AU-3 Background Patterns

Foreground	Background choice in Foreground AU-3	Background choice in other AU-3s
AU-3	-----	TU-11, TU-12 Mapping or AU-3 Word (8 bit user programmable word).
TU-2	Pattern in other TU-2s is numbered. They contain the word 11NNNNNx, where NNNNN is the binary number of the TU.	TU-11, TU-12 Mapping or AU-3 Word (8 bit user programmable word).
TU-12 (2 Mb/s) Unframed	TU-12 structure, unframed with 2E15-1, 2E9-1 PRBS or 1100 word pattern in all information bits.	TU-12, TU-11 Mapping or AU-3 Word (8 bit user programmable word).
TU-12 (2 Mb/s) Framed	TU-12 structure, framed with 2E15-1, 2E9-1 PRBS, NUMBERED or 1100 word pattern. In Numbered mode, each timeslot contains the pattern 0NNNNNNX where NNNNNN is the binary number of the TU. The least significant digit (X) is alternated between 0 and 1 in successive frames.	TU-12, TU-11 Mapping or AU-3 Word (8 bit user programmable word).
TU-11 (DS1) Unframed	TU-11 structure, D4 framed with 2E15-1, 2E9-1 PRBS or 1100 Word pattern in other TU-11s.	TU-12, TU-11 Mapping or AU-3 Word (8 bit user programmable word).

Table 5 AU-3 Background Patterns, continued

Foreground	Background choice in Foreground AU-3	Background choice in other AU-3s
TU-11 (DS1) Framed	TU-11 structure, DS1, D4 framed with 2E15-1, 2E9-1 PRBS, NUMBERED or 1100 word pattern in other TU-11s. In Numbered mode, each timeslot contains the pattern 1NNNNNN1 where NNNNNN is the binary number of the TU. Framing type will be the same as the foreground except when SLC96 is selected. In this case, D4 framing is inserted in the background	TU-12, TU-11 Mapping or AU-3 Word (8 bit user programmable word).

Table 6 TUG-3 Background Patterns

Foreground	Background choice in Foreground TUG-3	Background choice in other TUG-3s
TUG-3	-----	TU-11, TU-12 Mapping or TU-3 Word (8 bit user programmable word).
TU-2	Pattern in other TU-2s is numbered. They contain the word 11NNNNNx, where NNNNN is the binary number of the TU.	
TU-12 (2 Mb/s) Unframed	TU-12 structure, unframed with 2E15-1, 2E9-1 PRBS or 1100 word pattern in all information bits.	TU-12, TU-11 Mapping or TU-3 Word (8 bit user programmable word).

Table 6 TUG-3 Background Patterns

Foreground	Background choice in Foreground TUG-3	Background choice in other TUG-3s
TU-12 (2 Mb/s) Framed	TU-12 structure, framed with 2E15-1, 2E9-1 PRBS, NUMBERED or 1100 word pattern. In Numbered mode, each timeslot contains the pattern 0NNNNNX where NNNNN is the binary number of the TU. The least significant digit (X) is alternated between 0 and 1 in successive frames.	TU-12, TU-11 Mapping or TU-3 Word (8 bit user programmable word).
TU-11 (DS1) Unframed	TU-11 structure, D4 framed DS1 with 2E15-1, 2E9-1 PRBS or 1100 Word pattern in other TU-11s.	TU-12, TU-11 Mapping or TU-3 Word (8 bit user programmable word).
TU-11 (DS1) Framed	TU-11 structure, framed with 2E15-1, 2E9-1 PRBS, NUMBERED or 1100 word pattern in other TU-11s. In Numbered mode, each timeslot contains the pattern 1NNNNN1 where NNNNN is the binary number of the TU. Framing type will be the same as the foreground except when SLC96 is selected. In this case, D4 framing is inserted in the background	TU-12, TU-11 Mapping or TU-3 Word (8 bit user programmable word).

Appendix B

ETSI/ANSI Terminology

A table of ETSI terms with their ANSI equivalents.

ETSI/ANSI Conversion and Equivalent Terms

Introduction

The terminology used on the instrument display can be ETSI (SDH) or ANSI (SONET) terminology. Refer to the table given in this appendix for an explanation of equivalent SDH/SONET terms.

ETSI: European Telecommunications Standards Institute.

ANSI: American National Standards Institute.

Table 7 **ETSI / ANSI Terminology**

ETSI Term	ANSI Term
AU-3	STS-1 SPE + H1, H2, H3
AU-4	STS-3c SPE + H1, H2, H3
BIP (Bit Interleaved parity)	CV (Code Violation)
High Order Path (HP / HO)	STS Path
I-n Intra Office, (n=STM-n level)	Intermediate Reach (IR)
L-n.1 or L-n.2 long haul	LR long reach
Low Order Path (LP / LO)	VT Path
LP-REI	REI-V
M.S.P	A.P.S
Multiplexer Section (MS)	Line
Multiplexer Section Protection	Automatic Protection Switching
MS-AIS	Line AIS / AIS-L
MS-BIP	Line CV / CV-L
MS-DCC	Line DCC / DCC-L
MS-REI	Line FEBE / REI-L

ETSI/ANSI Terminology
ETSI/ANSI Conversion and Equivalent Terms

Table 7 **ETSI / ANSI Terminology , continued**

ETSI Term	ANSI Term
MS-RDI	Line FERF / RDI-L
Multiplexer Section Overhead	Line Overhead
Network Node Interface	Line Interface
OOF	SEF (severely errored frame defect)
Path AIS / AU-AIS	AIS-P
Path REI / HP REI	REI-P
Path FERF / HP RDI	RDI-P
Path IEC / AU-IEC	IEC-P
Path Overhead	Path Overhead
Regenerator	Repeater
Regenerator Section (RS)	Section
Regenerator Section Overhead	Section Overhead
Remote Alarm Indicator	RAI
RS-DCC	Section DCC (DCC-S)
Section Overhead (SOH)	Transport Overhead (TOH)
S-n.1 or S-n.2 short haul	Short Reach (SR)
SOH	TOH
STM-m	OC-n / STS-n (where $m = n \div 3$ for $m \geq 1$)
STM-0	STS-1
STM-1	OC3c / STS-3c
STM-4	OC-12 / STS-12
STM-16	OC-48 / STS-48
Tributary Unit (TU)	Virtual Tributary (VT)

Table 7 **ETSI / ANSI Terminology , continued**

ETSI Term	ANSI Term
TU	VT
TU-11	VT 1.5
TU-12	VT 2
TU-2	VT 6
TU-3	NONE
TU BIP	VT BIP (CV-V)
TU RDI / LP-RDI	RDI-V
TUG	VT Group
TUG2	VT Group (12 columns)
TUG3	VT Group (86 columns)
TU multiframe	VT superframe
TU PATH AIS	VT AIS (AIS-V)
VC	SPE
VC4	STS3C SPE
Virtual Container (VC)	Synchronous Payload Envelope (SPE)

NOTE: VC is an ETSI abbreviation for Virtual Container and an ETSI / ANSI abbreviation for (ATM) Virtual Channel. The context of VC must therefore be taken into account when converting between standards.

Appendix C

Glossary of Terms

A brief explanation of abbreviations used in the HP OmniBER 718.

Glossary of Terms

Glossary

A		BPV	Bipolar Violation
AAL	ATM Adaptation Layer	C	
ABR	Available Bit Rate	CAS	Channel Associated Signaling
ADDF	Automatic Digital Distribution Frame	CBR	Constant Bit Rate
ADM	Add Drop Multiplexer	CCITT	Consultative Committee on International Telegraphy and Telephony
ADPCM	Adaptive Differential Pulse Coded Modulation	CCS	Common Channel Signaling
AIM	ATM Inverse Multiplexer	CDT	Cell Delay Tolerance
AIS	Alarm Indication Signal	CDV	Cell Delay Variation
AMI	Alternate Mark Inversion	CEPT	Committee of European PTTs
ANSI	American National Standards Institute	CMI	Coded Mark Inversion
APS	Automatic Protection Switching	CO	Central Office
ASCII	American Standard Code for Information Interchange	CPE	Customer Premises Equipment
ATM	Asynchronous Transfer Mode	CRC	Cyclic Redundancy Check
AU	Administrative Unit	CSES	Consecutive Severely Errored Seconds
AU-AIS	AU Pointer Justification Event	D	
AU-LOP	Loss of AU Pointer	D/I	Drop and Insert
AU-NDP	AU Pointer New Data Flag	DACS	Digital Access and Cross-connect Switches
B		dB	Decibel
BBER	Background Block Error Ratio	DCC	Data Communications Channel
BC	Background Channel	DCS	Digital Cross-connect Switches
BCD	Binary Coded Decimal	DDF	Digital Distribution Frame
BER	Bit Error Rate	DDN	Digital Data Network
BERT	Bit Error Rate Testing	DTMF	Dual Tone Multifrequency Signaling
BIP	Bit Interleaved Parity		
BPS	Bits Per Second		

Glossary of Terms

DWDM	Dense Wave Division Multiplexing	HP-IB	Hewlett-Packard Interface Bus (IEEE 488)
DXC	Digital Cross Connect	HP-PLM	High Path Payload Label Mismatch
E			
EB	Error Block	HP-RDI	High Path Remote Defect Indication
EOW	Engineering Orderwire	HP-REI	High Path Remote Error Indication
ES	Error Seconds	HP-TIM	High Path Trace Identifier Mismatch
ESF	Extended Superframe Format	HP-UNEQ	High Path Unequipped
ESR	Errored Second Ratio	Hz	Hertz (cycles per second)
ETSI	European Telecommunications Standards Institute	I	
F			
FAS	Frame Alignment Signal	ISDN	Integrated Services Digital Network
FC	Foreground Channel	ISO	International Standards Organization
FDDI	Fiber Distributed Data Interface	ITU	International Telecommunications Union
FEAC	Far End Alarm Channel	L	
FEBE	Far End Block Error	LAN	Local Area Network
FEC	Forward Error Connection	LO	Low Order
FERF	Far End Receive Failure	LOF	Loss of Frame
G			
GUI	Graphical User Interface	LOP	Loss of Path
H			
HDB3	High Density Bipolar 3	LOS	Loss of Signal
HEC	Header Error Control	LP-PLM	Low Path Payload Label Mismatch
HO Path RAI	High Order Path Remote Alarm Indication	LP-RDI	Low Path Remote Defect Indication
HO PTE	High Order Path Terminating Equipment	LP-REI	Low Path Remote Error Indication
HO	High Order	LP-RFI	Low Path Remote Failure Indication
		LP-TIM	Low Path Trace Identifier Mismatch
		LP-UNEQ	Low Path Unequipped
		LSB	Least Significant Bit

Glossary of Terms

LTE	Line Terminal Equipment	PBX	Private Branch Exchange	
LTM	Line Terminal Multiplexer	PC	Personal Computer	
M		PCM	Pulse Code Modulation	
		PCN	Personal Communications Network	
	MS	Multiplex Section	PCR	Peak Cell Rate
	MS-AIS	Multiplex Section AIS	PDH	Plesiochronous Digital Hierarchy
	MSOH	Multiplex Section Overhead	PES	Percentage Error Second
	MS-RDI	Multiplex Section Remote Defect Indication	POH	Path Overhead
	MS-REI	Multiplex Section Remote Error Indication	POTS	Plain Old Telephone Service
			PRBS	Pseudo Random Binary Sequence
	MTBF	Mean Time Between Failures	PSN	Packet Switched Network
	MTIJ	Maximum Tolerance Input Jitter	PSTN	Public Switched Telephone Network
MUX	Multiplexer	PT	Payload Type	
N		PTT	Public Telephone and Telegraph	
	NDF	New Data Flag	PTE	Path Terminating Equipment
	NE	Network Element	PU	Physical Unit
	NFAS	Non Frame Alignment Signal		
			Q	
O		QoS	Quality of Service	
	OAM	Operations, Administration and Maintenance	R	
	OC	Optical Carrier	RAI	Remote Alarm Indication
	OH	Overhead	RDI	Remote Defect Indication
	OLTU	Optical Line Terminal Unit	REBE	Remote End Block Error
OOF	Out of Frame	REI	Remote Error Indication	
OS	Operations System	RF	Radio Frequency	
P		RS	Regenerator Section	
	P/AR	Peak-to-Average Ratio		

Glossary of Terms

RSOH	Regenerator Section Overhead	TE	Terminal Equipment
RSTE	Regenerator Section Terminating Equipment	TMN	Telecommunications Management Network
RS-TIM	Regenerator Section Trace Identifier Mismatch	TOH	Transport Overhead
RX	Receiver	TU	Tributary Unit
		TU-AIS	TU Alarm Indication Signal
		TUG	Tributary Unit Group
		TU-LOM	TU Loss of Multiframe
		TU-LOP	Loss of TU Pointer
		TU-NDF	TU Pointer New Data Flag
		TX	Transmitter
S		U	
S/N	Signal to Noise Ratio	UI	Unit Interval
SCPI	Standard Commands for Programmable Instrumentation	V	
SDH	Synchronous Digital Hierarchy	VBR	Variable Bit Rate
SDXC	Synchronous Digital Cross Connect	VC	Virtual Channel
SEF	Severely Errored Frame	VC-n	Virtual Container
SES	Severely Errored Second	VP	Virtual Path
SESR	Severely Errored Seconds Ratio	VT	Virtual Tributary
SF	Super Frame	VXI	VMEbus Extensions for Instrumentation
SOH	Section Overhead	W	
SONET	Synchronous Optical Network	WAN	Wide Area Network
SPE	Synchronous Payload Envelope	WDM	Wave Division Multiplexing
STE	Section Terminating Equipment		
STM	Synchronous Transport Module		
STS	Synchronous Transport Signal		
SUT	System Under Test		
T			
TDM	Time Division Multiplexing		
TDMA	Time Division Multiple Access		

Glossary of Terms

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