HP OmniBER 719 User Guide

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.

1 Introduction

2 Setting the Interfaces

3 Selecting Test Features

4 Making Measurements

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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.
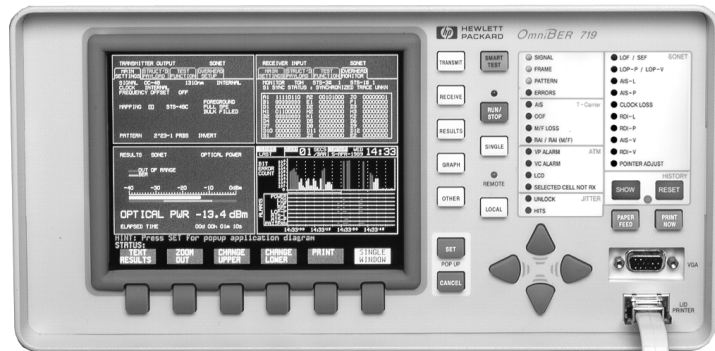
The main features of this instrument are:

- Multi-rate transmission testing to DS0 to OC-48.

- Supports concatenated payloads to OC-48c.

- T-carrier testing.

- Direct measurement of protection switching time.

- Powerful thru-mode testing for SONET ring turn-up.

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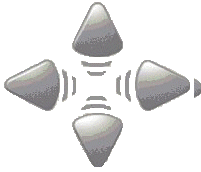
These are the cursor control keys. They are used to move the display cursor from one instrument setting to another.

```
STORED SETTINGS
SETTINGS CONTROL
FLOPPY DISK
LOGGING
REMOTE CONTROL
TIME & DATE
MISCELLANEOUS
OPTIONS
OPTION ENABLE
SELF TEST
TRIGGER OUTPUT
MODULE DEBUG
DEMO MODE
CALIBRATION
AUTO SETUP
COLOR CONTROL
```

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 application 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 goes active.

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.

Removing/Inserting Modules

Modules should only be removed or inserted by trained personnel.

All Connectors
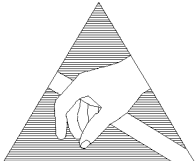
CAUTION   When connecting or disconnecting, ensure that you are grounded or, make contact with the metal surface of the Mainframe with your free hand to bring you, the module, and the mainframe to the same static potential.
Modules remain susceptible to ESD damage while the module is installed in the 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 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 719A 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 719A instruments), and/or 1480 to 1580 nm (1550 to 1565 for OmniBER 719A instruments) , at a nominal power level of +1 dBm.

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 719.

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

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)

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 719 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

Option 013 - T Carrier

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

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

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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 013)

Description   DSn 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   STRUCT'D   TEST
SETTINGS SETTINGS FUNCTION

SIGNAL       2 Mb/s          INTERNAL
CLOCK    INTERNAL

TERMINATION                  120Ω BAL
LINE CODE                    AMI
FREQUENCY OFFSET             OFF

PAYLOAD TYPE   UNFRAMED      UNSTRUCTURED
PATTERN                      2^15-1 PRBS
PRBS POLARITY                INV  ITU




STATUS:                                    ⚠
                                    MULTIPLE
                                     WINDOW
```

HOW TO:

1   Choose the required SIGNAL rate.
Rates of DS1, DS3, 2 Mb/s, 8 Mb/s and 34 Mb/s are available.

2   Choose the required CLOCK (clock synchronization source). If you select an external clock source, connect the external source to the appropriate port on the OmniBER clock module.

3   If DS1 or DS3 is chosen, choose the required OUTPUT LEVEL (DSX-1 or DS1-LO).

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 8 Mb/s, 2 Mb/s or DS1 as the SIGNAL rate, choose the
required LINE CODE. (At 140 Mb/s, 34 Mb/s and DS3 coding is fixed.)

6   If required, choose the FREQUENCY OFFSET value.
See "Adding Frequency Offset to SONET Signal" page 50.

7   Choose the required PAYLOAD TYPE.
If STRUCTURED is required FRAMED must be chosen.
If Structured is chosen the DSn test signal must be set up. See "Setting Transmit
Structured Payload/Test Signal" page 56.
If you have chosen 2 Mb/s, DS1 or DS3 as the DSn SIGNAL rate, the Framed
choice is expanded to provide a menu of framing types.

8   Choose the PATTERN type and the PRBS POLARITY.

Additional Patterns at DS1

9   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 DSn THRU Mode (Option 013)

Description   THRU mode is used to non-intrusively monitor DSn lines where no protected
monitor points are available.
Select 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/DS3 operation.

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

Data error rates: 1E-3, 1E-4, 1E-5, 1E-6, 1E-7 and user programmable in 0.1 steps
from 1.1E-3 to 1.0E-9.
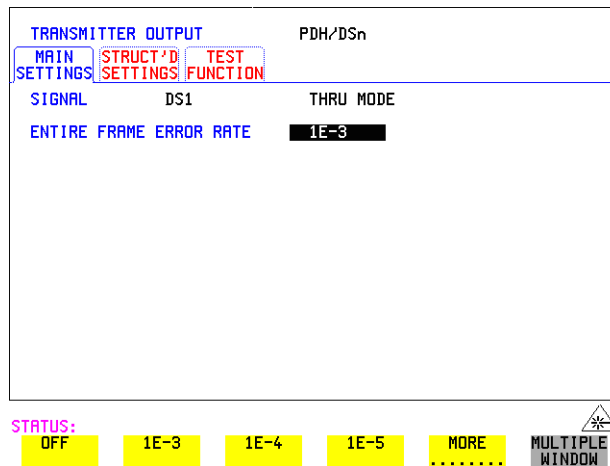
HOW TO: **1**   Make the required SIGNAL RATE choice on the PDH/DSn [TRANSMIT]
display.

2   Select an entire frame error rate from the choices given or use the USER softkey
to program an error rate.

Setting SONET Transmit Interface

Payload Selection

One of the key features of the OmniBER 719 is the ability to test concatenated payloads. The following gives a brief description of concatenated payloads, and the benefits of using them.

Concatenated Payloads

Bulk filled or contiguous payload structures eg. (STS-12c) 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 STS-12 (denoted STS-12c), the virtual container area is entirely filled by a single STS-12c SPE. This STS-12c SPE consists one Path Overhead and a single container capable of carrying a tributary signal operating at rates up to approximately 600 Mb/s. Once assembled a STS-12c SPE 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.

	Test Time (based on 100 errors)	
Performance test limit	**STS-12c SPE Container**	**STS-3 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

Description   SONET 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 719 transmitter and receiver to the same interface settings choose **OTHER** **SETTINGS CONTROL** **COUPLED** .

Laser On/Off Control

If you wish to switch off the laser when connecting/disconnecting cables, set the field between the wavelength and INTERNAL selections to OFF. When the laser is on the laser symbol at the bottom right of the display is illuminated (yellow).

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

SIGNAL   OC-12        1310  ON   INTERNAL
CLOCK    INTERNAL
FREQUENCY OFFSET      OFF

                           FOREGROUND
MAPPING  ⊞     STS-1       VT-1.5
                           ASYNC DS1
DS1 OFFSET                      0 ppm
CHANNEL        STS-3    STS-1   UTGRP   UT
                 1        1       1      1
UT PAYLOAD     ESF          UNSTRUCTURED
PATTERN      1-IN-8
```

STATUS:
LASER   LASER   MULTIPLE
 OFF   ON   WINDOW
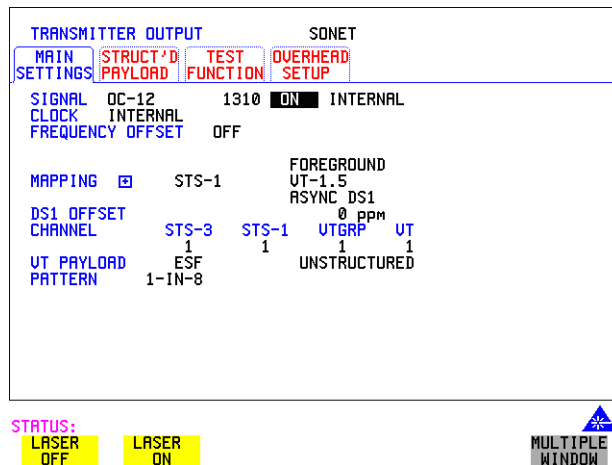
HOW TO: **1** Make your choice of SIGNAL rate.
                     If Option 106, Dual Wavelength optical module, is fitted and an optical rate is chosen, choose the required wavelength (1550 or 1310).
                     If STS-1 is chosen, choose the required interface level.
                     Choose INTERNAL unless THRU MODE is required. If THRU MODE is chosen, see "Setting SONET THRU Mode " page 29.

        2 Make your choice of CLOCK synchronization source. The RECEIVE clock sync choice depends on the SONET 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 SONET Signal" page 50.

        4 Choose FOREGROUND **F/G MAPPING** .

5 Select FOREGROUND, chose B/G MAPPING to set Background signals either
as FOREGROUNG settings or leave Unequipped.

Mapping may be selected from a pictorial display by moving the cursor to
MAPPING and pressing SET .
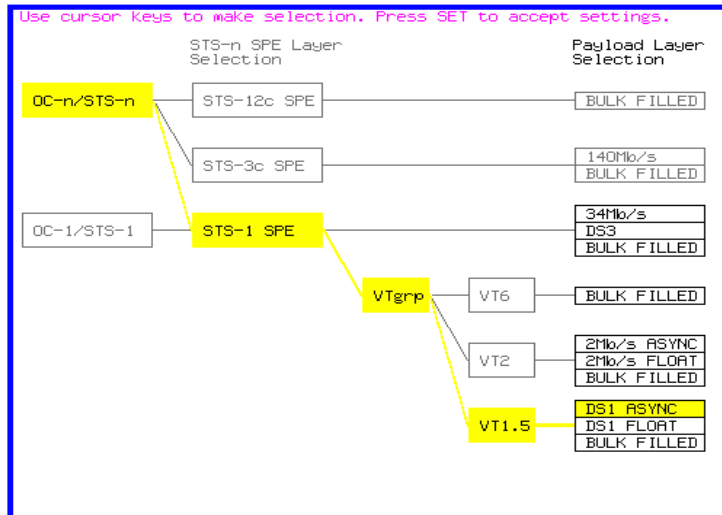
Use ➡ and ⬅ to move between STS Layer choice, VT Layer choice and
Payload Layer choice. Use ⬆ and ⬇ to choose the mapping.
Use SET to confirm your choice and return to the SONET   MAIN SETTINGS
display.

6 If VT-6 mapping is chosen, VT CONCATENATION selection is enabled,
choose OFF or the tributary at which the concatenation begins, VT6-2C through
VT6-6C.
The BACKGROUND, PATTERN IN OTHER VT-6s is fixed at NUMBERED,
that is, each VT-6 contains a unique number to allow identification in case of
routing problems.

7 If required, choose DS1/2M/34M/DS3 OFFSET value. See "Adding Frequency
Offset to SONET Signal" page 50

8 If FULL SPE, VT-6, VT-2 or VT-1.5 mapping is chosen, choose the test tributary
CHANNEL, including the STS-3 for an OC-12/OC-48 signal.

9 Choose the payload framing under PAYLOAD TYPE or VT 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 56.

If INSERT is chosen, see "Inserting an External DSn Payload/Test Signal" page 63.
If you have chosen 2 Mb/s, DS1 or DS3 under Mapping, the Framed choice is expanded to provide a menu of framing types.

10 Choose the PATTERN type and PRBS polarity.

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

 SIGNAL  OC-48                  INTERNAL
 CLOCK   INTERNAL
 FREQUENCY OFFSET    OFF

                         BACKGROUND

 BACKGROUND STS-1's        UNEQUIPPED



 PATTERN IN OTHER VT-1.5s   2^15-1 PRBS



STATUS:
                                    MULTIPLE
                                     WINDOW
```

11 Choose the mapping required in the background (non-test) STS's.

12 If VT mapping is chosen for the test STS, choose the PATTERN IN OTHER VT's.

Setting SONET THRU Mode

Description   THRU mode is used to non-intrusively monitor SONET 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 TOH+POH CHANNEL OVERWRITE are both set to OFF. If either overwrite
is enabled the ENTIRE FRAME ERROR RATE function is disabled.

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.
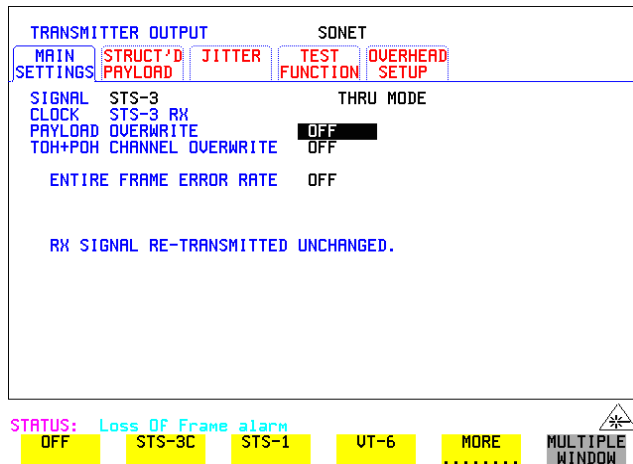
- **2. Hitless THRU Mode**
  This mode enables you to change the channel under test and the payload mapping
  without causing errors in the line signal or any other payload channel, or having
  to switch out of THRU mode. When you select a Payload Overwrite choice (other
  than OFF) an additional field 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 CV errors are recalculated before transmission.

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

OC-1/STS-1, OC-3/STS-3
You can substitute a new payload, Section and Line Overhead (TOH) and Path overhead (POH) in the received OC-1/STS-1 or OC-3/STS-3 signal for testing.

OC-12, OC-48
The overhead and payload may be overwritten for STS-3c SPE and STS-1. PAYLOAD OVERWRITE is not available for STS-12C or STS-48C. TOH+POH CHANNEL overwrite is available for STS-12C and STS-48C

.
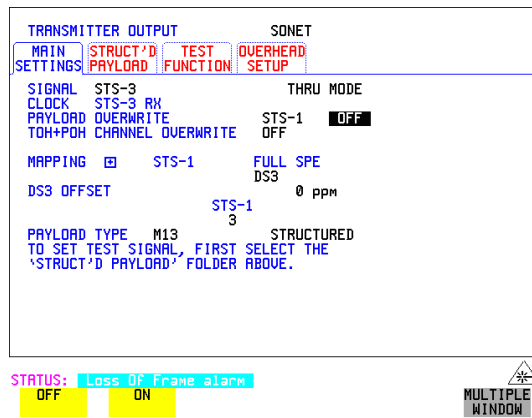
HOW TO:

1 Make the required SIGNAL RATE choice, and select THRU MODE on the SONET **TRANSMIT** display, See "Setting SONET 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 STS-3c SPE, STS-1 SPE, VT-6, VT-2 or VT-1.5 is chosen, the Section, Line and Path CVs are recalculated before transmission and the Mapping, Selected VT, VT Payload, Pattern, Tributary Offset and Pattern in other VT's settings are displayed. To choose the settings in these, See "Setting SONET Transmit Interface " page 25, steps 4 through 10.

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 TOH+POH CHANNEL OVERWRITE choice required.
The Section, Line and Path CVs are recalculated before transmission.

Using Smart Test

Smart Setup   The HP Smart Setup 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 719 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: **1** Connect the HP OmniBER 719 to the network and choose if necessary the required SONET **RECEIVE** interface on the HP OmniBER 719 (Smartsetup will select PDH or SONET).

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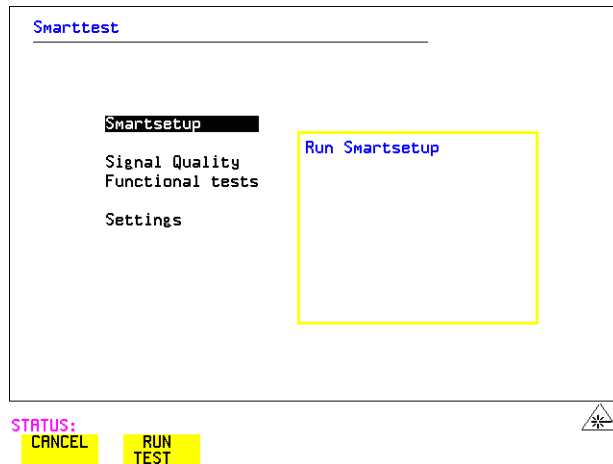
3 With Smartsetup highlighted, press **RUN TEST**   to auto-discover information about the receive signal. Or press **CANCEL** to exit Smart Tests.

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. 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 below.

`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 up and down cursor control keys to select Signal quality.

4 Use the left and right cursor control keys to access the tests.

5 Use the up and down cursor control keys to select Frequency Measurement.

```
Smarttest
_____

      Smartsetup
                            ┌──────────────────────────────┐
      Signal Quality        │ Optical power                │
      Functional tests      │ Frequency measurement        │
                            │                              │
      Settings              │                              │
                            │                              │
                            │                              │
                            │                              │
                            └──────────────────────────────┘

                                                      ⬦
STATUS:
  CANCEL        RUN
                TEST
```
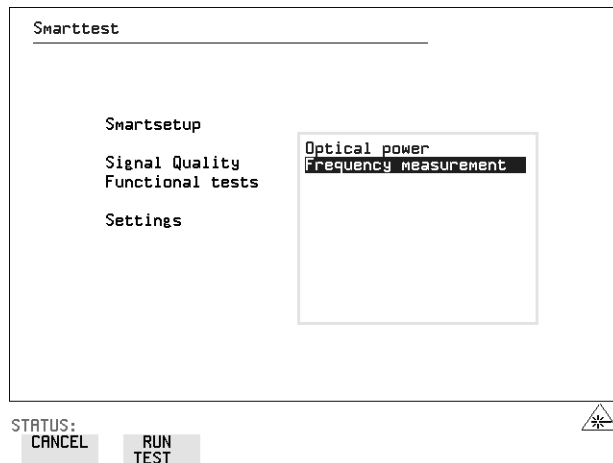
6 Press `RUN TEST` to display the frequency screen. Or press `CANCEL` to exit Smart Tests.

Setting PDH/DSn Receive Interface

Description   DSn 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   STRUCT'D   TEST
SETTINGS SETTINGS 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             INV  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, 8Mb/s or DS1 as the SIGNAL rate, choose the required LINE CODE. (At 34Mb/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 to compensate for cable losses if required.

5 Choose the PAYLOAD TYPE.

If STRUCTURED is required FRAMED must be chosen.
If STRUCTURED is chosen, the PDH/DSn test signal must be set up. See
"Setting Transmit Structured Payload/Test Signal" page 56.
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.

6 Choose the PATTERN type and the PRBS POLARITY required.

Additional Patterns at DS1

7 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 2	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 SONET Receive Interface

Description   SONET 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 719 transmitter and receiver to the same interface settings, choose `OTHER` `SETTINGS CONTROL` `COUPLED`.

```
RECEIVER INPUT              SONET
 MAIN   STRUCT'D   TEST    OVERHEAD
SETTINGS PAYLOAD  FUNCTION MONITOR
SIGNAL                      STS-3
LEVEL                       TERMINATE


MAPPING ⊞      STS-1      VT-1.5
                          ASYNC DS1

CHANNEL                STS-1   VTGRP   VT
                         1       5      2
VT PAYLOAD     ESF            UNSTRUCTURED
PATTERN   QRSS



STATUS:
                                    MULTIPLE
                                    WINDOW
```

HOW TO:

1 Choose the required SIGNAL source.
       If STS-1 or STS-3 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 VT-6 mapping is chosen, and CONCATENATION is enabled, choose the tributary at which the concatenation begins.
       If VT-6, VT-2 or VT-1.5 mapping is chosen, choose the test tributary under CHANNEL.

4 Choose the payload framing under PAYLOAD TYPE or VT 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 58.
       If DROP is chosen, see "Dropping an External Payload/Test Signal (Option 013)" page 66.

5 Choose the PATTERN type and PRBS polarity.

3

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. Transport Overhead, Path Overhead, Trace Messages and Labels can be set using this feature.

```
TRANSMITTER OUTPUT          SONET
  MAIN   STRUCT'D   TEST   OVERHEAD
SETTINGS PAYLOAD FUNCTION   SETUP
 SETUP    TOH      STS-3# 1    STS-1# 1
 H1/H2 DECIMAL POINTER VALUE :      0
 S1 SYNC BYTE   : STRATUM3 TRACEABLE
 A1  11110110  A2  00101000  J0    FIXED
 B1  xxxxxxxx  E1  00000000  F1  00000000
 D1  00000000  D2  00000000  D3  00000000
 H1  xxxx00xx  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  00001010  Z2  00000000  E2  00000000




STATUS:
                                   MULTIPLE
                                    WINDOW
```

HOW TO: **1** Set up the SONET transmit interface and payload required. See "Setting SONET Transmit Interface " page 25.

2 Choose the type of overhead to SETUP.
If OC-12 or OC-48 is chosen as the SONET interface, choose the STS-3# and STS-1# you wish to set up.
If STS-3 is chosen as the SONET interface, choose the STS-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. If APS Messages is chosen, for example, K1K2 value is set by the APS Messages setup.
If **TOH** (Transport Overhead) is chosen, choose the STS-1 to be displayed.
Many bytes in **STS-1# 2** and **STS-1#3** are unlabeled as the other overhead

functions have not yet been defined.

If **STS-1# 1,2,3** is chosen, the hexadecimal value of all 81 bytes of the STS-3 section & line overhead selected are displayed (all 324 bytes of an OC-12 or 1,296 bytes of an OC-48 are displayed 81 bytes at a time by selecting each STS-3 in turn). The value of the bytes can be set using **DECREASE DIGIT** **INCREASE DIGIT** **←** **→**.

If BYTE NAMES is chosen, the labels for the **STS-1# 1,2,3** overhead bytes are displayed.

3 If POH (Path Overhead) is chosen, choose the TYPE of overhead within STS-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 VT-2, VT-1.5 and VT-6 mapping:

Full Sequence - 48 byte binary sequence.

Reduced Sequence - Binary count sequence of 0 to 3 i.e. 111111(00 to 11).

COC1 Sequence - Binary count sequence of 0 to 3 i.e. 110000(00 to 11).

H4 byte is transmitted as all zero's for 34 Mb/s and DS3.

4 If TRACE MESSAGES is chosen, see "Setting Overhead Trace Messages " page 44.

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 SONET network, a start up confidence check can be made by viewing the behavior of all the overhead bytes. If the SONET 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.

TIP: A snapshot of the received overhead can be logged to the chosen logging device. See "Logging on Demand " page 124.

```
RECEIVER INPUT              SONET
 MAIN   STRUCT'D   TEST   OVERHEAD
SETTINGS PAYLOAD  FUNCTION MONITOR

MONITOR   TOH    STS-3#  1    STS-1# 1
S1 SYNC STATUS : STRATUM3 TRACEABLE

A1  11110110  A2   00101000  J0   00000001
B1  10111001  E1   00000000  F1   00000000
D1  00000000  D2   00000000  D3   00000000
H1  01100000  H2   00000000  H3   00000000
B2  10100101  K1   00000000  K2   00000000
D4  00000000  D5   00000000  D6   00000000
D7  00000000  D8   00000000  D9   00000000
D10 00000000  D11  00000000  D12  00000000
S1  00001010  Z2   00000000  E2   00000000



STATUS:
  TOH       POH      TRACE    LABELS    APS     MULTIPLE
                    MESSAGES          MESSAGES   WINDOW
```

HOW TO: **1** Set up the receive SONET interface and payload as required. See "Setting SONET Receive Interface" page 37.

2 Choose the type of overhead to MONITOR.

3 If **TOH** (Transport Overhead) is chosen, choose the STS-3 # and STS-1# to be displayed.
Many bytes in **STS-1# 2** and **STS-1#3** are unlabeled because the other overhead functions have not yet been defined.
If **STS-1# 1,2,3** is chosen, the hexadecimal value of all 81 bytes of section overhead is displayed (all 324 bytes of an OC-12 or 1,296 bytes of an OC-48 are displayed 81 bytes at a time by selecting each STS-3 in turn).
If BYTE NAMES is chosen, the labels for the **STS-1# 1,2,3** overhead bytes are displayed.

4 If POH (Path Overhead) is chosen, choose the source of the overhead, SPE or VTSPE.

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, STS path label (C2) and the VT Path label (V5) are monitored.

7 If APS MESSAGES is chosen, choose the TOPOLOGY, **LINEAR** (GR-253) or **RING** (GR-1230). The K1 and K2 bits are monitored.

TIP:

8 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 48.

Setting Overhead Trace Messages

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

J0 verifies the section overhead.
J1 verifies the STS-1 SPE or STS-3c SPE path connection.
J2 verifies the VT SPE path connection.

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

  SETUP    TRACE
    WITHIN ALL STS-3's ALL STS-1's

    J0   FIXED      ⟶  00000001

    J1   TEST 64    ⟶ "HP37718A COMMUNI
    (SPE)                CATIONS PERFORMA
                         NCE ANALYZER,
                         GB00000109   ⌐⌐"

    J2    TEST      ⟶ "HP:- GB00000109"
    (VT-SPE)




STATUS:
                                      MULTIPLE
                                      WINDOW
```

HOW TO: **1**   Choose the message for insertion in the chosen trace channel.

Setting Overhead Labels

Description   Choosing LABELS in TRACE MESSAGES allows the setting of the S1 SYNC STATUS, STS PATH LABEL (C2) and VT PATH LABEL (V5)

.
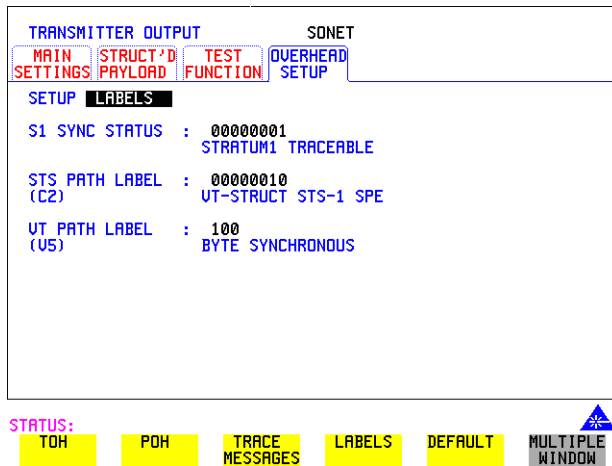
Generating Overhead Sequences

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

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

TEST FUNCTION    SONET        SEQUENCES
 SINGLE RUN    STOPPED   -SEQUENCE STOPPED
 SOH    3×A1,3×A2      STS-3# 2
        A  F6F6F6282828
        B  D9B124292252D
        C  162626F42458
        D  B7C8C4FB0B56
        E  1929B2F55556
 SEQUENCE  64000  FRAMES OF  A  THEN
                    91           B
                     0           C
                     0           D
                     0           E




STATUS:
                                    MULTIPLE
                                    WINDOW
```

HOW TO: **1** Set up the SONET transmit interface and payload required. See "Setting SONET Transmit Interface" page 25.

2 Select **TEST FUNCTION** , SONET 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.
SOH- Section Overhead
LOH- Line 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 ← →.

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:

STS-n

STS-3 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 algorithim within a network element.

Using Receive Overhead Capture

Description   Section, Line 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.

TIP: The Overhead Capture display can be logged to the chosen logging device. See
"Logging on Demand " page 124.

```
RECEIVER INPUT              SONET
MAIN     STRUCT'D   TEST   OVERHEAD
SETTINGS PAYLOAD  FUNCTION MONITOR

TEST FUNCTION    SONET        O/H CAPTURE
 SOH    3×A1,3×A2     STS-3# 2
TRIGGER      ON NOT  F6F6F6282828
CAPTURE      STOPPED
DATA                        FRAME COUNT
D9B12429252D                        91
F6F6F6282828                     64000
D9B12429252D                        91
F6F6F6282828                     64000
D9B12429252D                        91
F6F6F6282828                     64000
D9B12429252D                        91
F6F6F6282828                     64000



STATUS:
                                        MULTIPLE
                                        WINDOW
```

HOW TO: **1**   Set up the receive SONET interface and payload as required. See "Setting
SONET Receive Interface" page 37.

2   Select   **TEST FUNCTION**   , SONET, O/H CAPTURE as shown above.

3   Choose the overhead type as required.
SOH- Section Overhead
LOH- Line Overhead
POH- Path Overhead

4   Choose the Byte or bytes of overhead to be captured.

5   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.

6 `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.

7 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`.

Adding Frequency Offset to SONET Signal

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

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

SIGNAL   OC-12      1310  ON   INTERNAL
CLOCK    INTERNAL
FREQUENCY OFFSET    ON        +34.0      ppm

                         FOREGROUND
MAPPING    ⊞     STS-1   FULL SPE
                         DS3
DS3 OFFSET                    0 ppm
CHANNEL          STS-3    STS-1
                   1        1
PAYLOAD TYPE    UNFRAMED      UNSTRUCTURED
PATTERN    2^23-1 PRBS   INVERT
```

```
STATUS:
DECREASE  INCREASE      ←      →        MULTIPLE
 DIGIT     DIGIT                        WINDOW
```
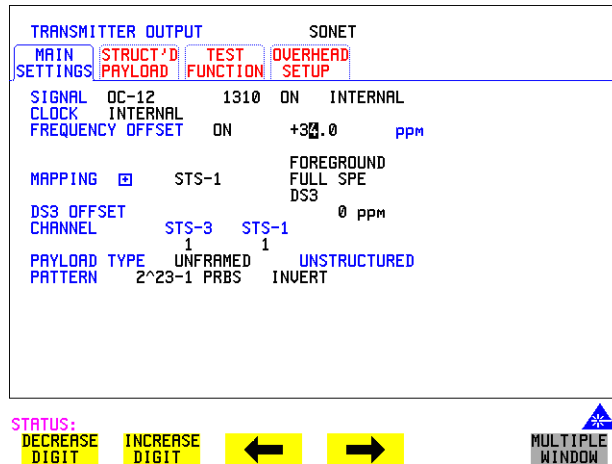
HOW TO: **SONET Line Rate Offset**

1 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 SONET 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 SONET line rate offset, the chosen tributary will be offset as the line rate is offset. (No pointer movements).

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 SONET 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 DSn Signal

Description   You can add frequency offset to the interface DSn SIGNAL at all rates. Frequency Offset can be added at preset 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

```
TRANSMITTER OUTPUT          PDH/DSn
 MAIN   STRUCT'D   TEST
SETTINGS SETTINGS FUNCTION

SIGNAL                   34 Mb/s

CLOCK SYNC    INTERNAL
TERMINATION              75Ω UNBAL
LINE CODE                HDB3
FREQUENCY OFFSET         USER OFFSET
                         +100  ppm
PAYLOAD TYPE   UNFRAMED  UNSTRUCTURED
PATTERN                  2^23-1 PRBS
PRBS POLARITY            INV  ITU
```

```
STATUS:
DECREASE   INCREASE      ←        →              MULTIPLE
 DIGIT      DIGIT                                 WINDOW
```
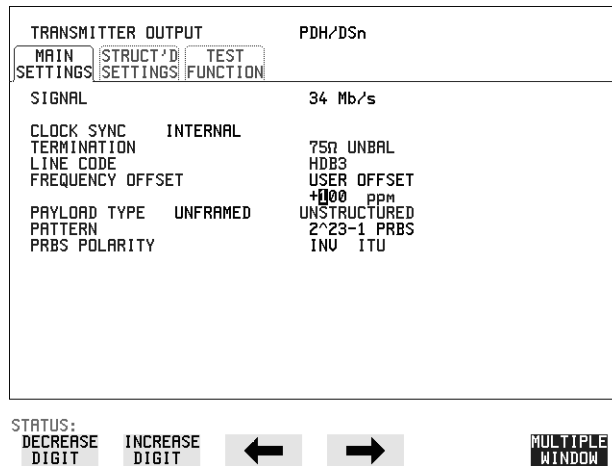
HOW TO:

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   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 DS1 payload signal with user-defined signaling bits**

DSn Operation

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.

SONET Operation

1   Choose **SONET** on the **TRANSMIT** display.

2   Choose MAPPING **FL BYTE DS1** , **ASYNC DS1** or **DS3** and VT PAYLOAD **STRUCTURED** on the **MAIN SETTINGS** display. If you choose **FL BYTE DS1** proceed to step 5.

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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.

5 **Floating Byte DS1 selection:** Set the ABCD bits for **NO-F-BIT** or **ESF** framing and/or the AB bits for **D4** VT PAYLOAD framing as required.

HOW TO: **Transmit a 2 Mb/s signal with user-defined signaling bits**

DSn Operation

```
TRANSMITTER OUTPUT          PDH/DSn
 ┌──────┬───────┬───────┐
 │ MAIN │STRUCT'D│ TEST │
 │SETTINGS│SETTINGS│FUNCTION│
 └──────┴───────┴───────┘
 SIGNAL                      2 Mb/s

 CLOCK SYNC      INTERNAL
 TERMINATION                 75Ω UNBAL
 LINE CODE                   HDB3
 FREQUENCY OFFSET            OFF

 PAYLOAD TYPE   ▐PCM30CRC▐   UNSTRUCTURED
 PATTERN                     2^15-1 PRBS
 PRBS POLARITY               INV  ITU
 2M CAS ABCD BITS            1111




STATUS:
 UNFRAMED    PCM30     PCM31    PCM30CRC   PCM31CRC  MULTIPLE
                                                     WINDOW
```

1 Choose ▐PDH/DSn▐ on the ▐TRANSMIT▐ display.

2 Set MAPPING to VT-1.5.

3 Choose SIGNAL ▐2 Mb/s▐ and PAYLOAD TYPE ▐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.

SONET Operation

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

SIGNAL  OC-12                 INTERNAL
CLOCK   INTERNAL
FREQUENCY OFFSET    OFF

                        FOREGROUND
MAPPING  ⊞    STS-1     VT-2
                        FL BYTE 2Mb/s
2M CAS ABCD BITS            1111
CHANNEL        STS-3   STS-1  VTGRP   VT
                 2       3      5     1
VT PAYLOAD       PCM30        UNSTRUCTURED
PATTERN    2^15-1 PRBS   INVERT
```

```
STATUS:
 PCM30      PCM31     PCM30CRC   PCM31CRC   INSERT    MULTIPLE
                                           2Mb/s     WINDOW
```

1   Choose **SONET** on the **TRANSMIT** display.

2   Set MAPPING to VT-2.

3   Choose MAPPING **ASYNC 2Mb/s** or **FL BYTE 2Mb/s** and VT PAYLOAD
      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 (applies to FL BYTE 2 Mb/s only).
      If STRUCTURED is chosen set the 2M CAS ABCD bits value on the
      STRUCTURED SETTINGS display.

Setting Transmit Structured Payload/Test Signal

Description   Structured PDH/DSn Payload/Test Signal settings determine the payload or the DSn
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 719 transmitter and receiver to the same
Payload settings, choose **OTHER** **SETTINGS CONTROL** , **COUPLED** .

Interested in International Gateway Testing?
If your instrument has option 014 fitted you can map an E1 or 2Mb/s signal into DS3
as shown below:
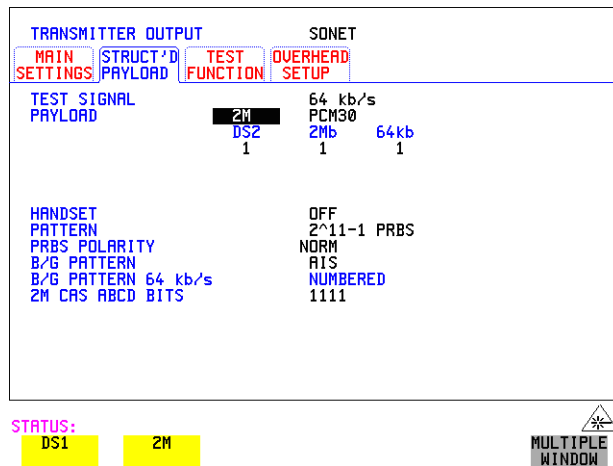
HOW TO: **1** Choose the required TEST SIGNAL rate. If Nx64 kb/s or N X 56 kb/s is chosen,
see "Setting Transmit N x 64 kb/s/N x 56 kb/s Structured Payload/Test Signal "
page 60.

2 Choose the PAYLOAD framing pattern.
If TEST SIGNAL 2Mb/s is chosen **INSERT 2 Mb/s** is added to the PAYLOAD
menu. See "Inserting an External DSn Payload/Test Signal " page 63.
If TEST SIGNAL DS1 is chosen **INSERT DS1** is added to the menu.
See "Inserting an External DSn Payload/Test Signal " page 63.

3 Choose the test tributary in the structured payload, under 34Mb/s, 8Mb/s,
 2Mb/s, 64 kb/s, DS2, DS1 or 56 kb/s.

4 Choose the PATTERN type and PRBS POLARITY.

5 Choose the B/G PATTERN (background).
The B/G PATTERN in the non test 56/64 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, refer to "Setting up Signaling Bits " page 53.

Setting Receive Structured Payload/Test Signal

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

TIP: If you wish to set the HP OmniBER 719 transmitter and receiver to the same Payload settings, choose **OTHER** **SETTINGS CONTROL** , **COUPLED** .

Interested in International Gateway Testing?
If your instrument has option 014 fitted you can map an E1 or 2Mb/s signal from DS3.

```
RECEIVER INPUT              SONET
 MAIN  |STRUCT'D   TEST  |OVERHEAD
SETTINGS PAYLOAD FUNCTION MONITOR

TEST SIGNAL                  2 Mb/s
2M PAYLOAD                  PCM30
                    DS2      2Mb
                     1        1



PATTERN                 2^15-1 PRBS
PRBS POLARITY           INV
```

```
STATUS:
   DS1      2 Mb/s    64 kb/s    Nx64     MORE    MULTIPLE
                                 kb/s    ........  WINDOW
```
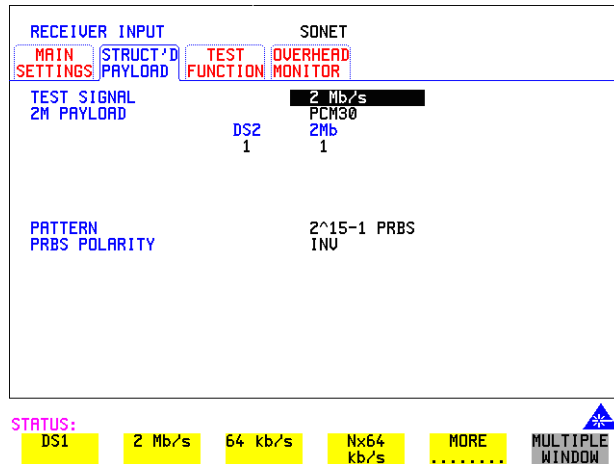
HOW TO: **1** Choose the required Test Signal rate. If N x 64 kb/s or N x 56 kb/s is chosen, see "Setting Receive N x 64 kb/s/N x 56 kb/s Structured Payload/Test Signal " page 62.

2 Choose the Framing pattern of the PAYLOAD.
If TEST SIGNAL 2 Mb/s is chosen, **DROP 2 Mb/s** is added to the menu. See "Dropping an External Payload/Test Signal (Option 013) " page 66.
If TEST SIGNAL DS1 is chosen, **DROP DS1** is added to the menu.
See "Dropping an External Payload/Test Signal (Option 013) " page 66.

3 Choose the test tributary within the structured payload, under 34Mb, 8Mb, 2Mb, 64 kb or DS2, DS1, 56 kb/s.

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 112 kb/s or 336 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.
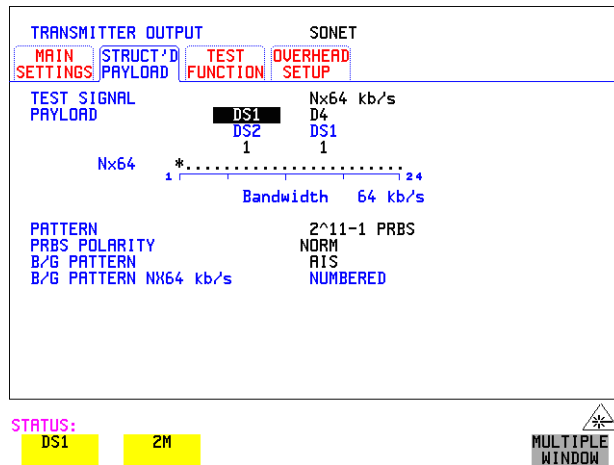
HOW TO: **1** Choose the required Test Signal rate.

2 If your instrument has option 014 fitted you can map an E1 or 2Mb/s signal into DS3. Select DS1 or 2M as shown in the figure above.

3 Choose the Framing pattern of the 2M or DS1 PAYLOAD.

4 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.

5   Choose the PATTERN type and PRBS polarity.

6 Choose the B/G PATTERN.

7 The B/G PATTERN in the non-test 56/64 kb/s timeslots is fixed as NUMBERED, that is, each timeslot contains a unique identification number.

Signaling

8 If a 2 Mb/s PAYLOAD with PCM30 or PCM30CRC framing, or 56 kb/s or Nx56kb/s Test Signal is chosen, refer to "Setting up Signaling Bits " page 53.

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. 112 kb/s or 336 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.
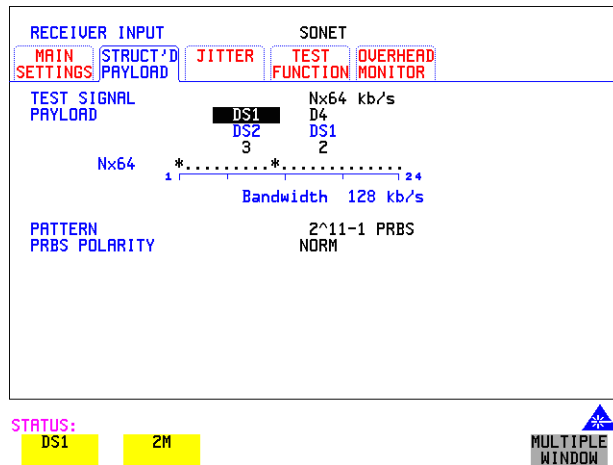
HOW TO: **1**   Choose the required Test Signal rate.

2   If your instrument has option 014 fitted you can map an E1 or 2Mb/s signal into DS3. Select DS1 or 2M as shown in the figure above.

3   Choose the Framing pattern of the 2M or DS1 PAYLOAD.

4   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, 21, 22, 23 are chosen for test.

5   Choose the PATTERN type and PRBS polarity.

Inserting an External DSn Payload/Test Signal

Description
Option 013 required.
You can insert a DSn signal from external equipment into the SONET signal, or you can insert 2 Mb/s or DS1 into the structured DSn signal. DS3 and 34 Mb/s can only be inserted if SONET is chosen as the receive interface. 2 Mb/s or DS1 can be inserted into a structured or non-structured SONET payload and from a structured DSn signal.

HOW TO: **Insert 34 Mb/s & DS3**

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

SIGNAL  OC-12                  INTERNAL
CLOCK   INTERNAL
FREQUENCY OFFSET    OFF

                         FOREGROUND
MAPPING  ⊞    STS-1      FULL SPE
                         DS3

CHANNEL       STS-3    STS-1
               4        2
PAYLOAD TYPE    INSERT DS3
    USE 75Ω UNBAL 'IN' PORT ON PDH RECEIVE
    MODULE.
```

```
STATUS:
 UNFRAMED    M13     C-BIT    INSERT          MULTIPLE
                              DS3             WINDOW
```

1 Connect the external payload to the 75Ω IN port of the PDH/DSn receive module.

2 Set up the required transmit SONET interface, and MAPPING then choose PAYLOAD **INSERT 34 Mb/s** or **INSERT DS3** as required.

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

```
TRANSMITTER OUTPUT          SONET
┌──────┐┌────────┐┌──────┐┌────────┐
│ MAIN ││STRUCT'D││ TEST ││OVERHEAD│
│SETTINGS││PAYLOAD││FUNCTION││ SETUP │
└──────┘└────────┘└──────┘└────────┘
SIGNAL  OC-12                    INTERNAL
CLOCK   INTERNAL
FREQUENCY OFFSET    OFF

                        FOREGROUND
MAPPING  ⊞    STS-1     VT-1.5
                        ASYNC DS1

CHANNEL        STS-3  STS-1   VTGRP   VT
               2      3       7       1
VT PAYLOAD     ███INSERT DS1███
LINE CODE      AMI
   USE 'MUX' PORT ON PDH TX MODULE.




STATUS:
┌────────┐ ┌────┐ ┌────┐ ┌──────┐ ┌──────┐ ┌────────┐
│UNFRAMED│ │ D4 │ │ESF │ │SLC-96│ │INSERT│ │MULTIPLE│
└────────┘ └────┘ └────┘ └──────┘ │ DS1  │ │ WINDOW │
                                  └──────┘ └────────┘
```

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

2 Set up the required transmit SONET interface, and choose VT-2 or
VT-1.5 MAPPING and VT PAYLOAD **INSERT 2 Mb/s** or **INSERT DS1** .

Insert 2 Mb/s or DS1 (Structured SONET Payload or Structured DSn)

```
TRANSMITTER OUTPUT          SONET
┌──────┐┌────────┐┌──────┐┌────────┐
│ MAIN ││STRUCT'D││ TEST ││OVERHEAD│
│SETTINGS││PAYLOAD││FUNCTION││ SETUP │
└──────┘└────────┘└──────┘└────────┘
TEST SIGNAL              DS1
DS1 PAYLOAD             ███INSERT DS1███
LINE CODE               AMI
                 DS2    DS1
                 5      1




B/G PATTERN             AS F/G




STATUS:
┌────────┐ ┌────┐ ┌────┐ ┌──────┐ ┌──────┐ ┌────────┐
│UNFRAMED│ │ D4 │ │ESF │ │SLC-96│ │INSERT│ │MULTIPLE│
└────────┘ └────┘ └────┘ └──────┘ │ DS1  │ │ WINDOW │
                                  └──────┘ └────────┘
```

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

Structured SONET Payload

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

3 Set up the SONET structured payload. See "Setting Transmit Structured Payload/Test Signal " page 56.

4 Choose 2M PAYLOAD/DS1 PAYLOAD **INSERT 2 Mb/s** or **INSERT DS1** .

5 Choose the LINE CODE.

Structured DSn

6 Set up, the required transmit DSn interface, See "Setting PDH/DSn Transmit Interface (Option 013) " page 22.

7 Set up the DSn Test Signal interface. See "Setting Transmit Structured Payload/Test Signal " page 56

8 Choose 2M PAYLOAD/DS1 PAYLOAD **INSERT 2 Mb/s** or **INSERT DS1** .

9 Choose the LINE CODE.

Dropping an External Payload/Test Signal (Option 013)

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

HOW TO: **Drop 34 Mb/s & DS3**

```
RECEIVER INPUT              SONET
 MAIN  STRUCT'D   TEST   OVERHEAD
SETTINGS PAYLOAD FUNCTION MONITOR

SIGNAL                     OC-12


MAPPING ⊞     STS-1      FULL SPE
                         DS3

CHANNEL        STS-3   STS-1
                 2       3
PAYLOAD TYPE    DROP DS3        DSX-3
   USE 75Ω UNBAL 'OUT' PORT ON PDH
   TRANSMIT MODULE.




STATUS:
 UNFRAMED      M13     C-BIT      DROP                MULTIPLE
                                  DS3                  WINDOW
```
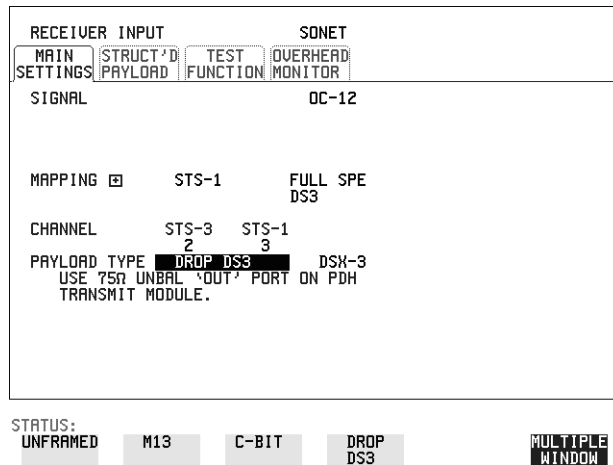
1   Connect the 75Ω OUT port of the DSn Transmit module to the external
equipment.

2   Set up the receive SONET interface, and choose PAYLOAD , **DROP 34 Mb/s**
or **DROP DS3** .

If **DROP DS3** is chosen, choose the DS3 output level.

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

```
RECEIVER INPUT              SONET
 MAIN   STRUCT'D   TEST   OVERHEAD
SETTINGS PAYLOAD FUNCTION MONITOR

 SIGNAL                   OC-12


 MAPPING ⊞     STS-1      VT-1.5
                          ASYNC DS1

 CHANNEL      STS-3  STS-1  VTGRP   VT
               2      3       1      1
 VT PAYLOAD    DROP DS1
 LINE CODE     AMI
    USE 'DEMUX' PORT ON PDH RX MODULE
```

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

1   Connect the DEMUX port of the DSn module to the external equipment.

2   Set up the required receive SONET interface, and choose VT-2 or
VT-1.5 MAPPING and VT PAYLOAD **DROP 2 Mb/s** or **DROP DS1** .

3   Choose the required LINE CODE.

Drop 2 Mb/s/DS1 (Structured SONET Payload or Structured DSn)

```
RECEIVER INPUT              SONET
 MAIN   STRUCT'D   TEST   OVERHEAD
SETTINGS PAYLOAD FUNCTION MONITOR
 TEST SIGNAL              DS1
 DS1 PAYLOAD              DROP DS1
 LINE CODE                B8ZS
                    DS2    DS1
                     7      3
```

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

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

Structured SONET Payload

2 Set up the required receive SONET interface. See "Setting SONET Receive Interface " page 37.

3 Set up the SONET structured payload. See "Setting Receive Structured Payload/ Test Signal " page 58.

4 Choose 2M PAYLOAD **DROP 2 Mb/s** or DS1 PAYLOAD **DROP DS1** .

5 Choose the LINE CODE.

Structured DSn

6 Set up the required receive DSn interface, See "Setting PDH/DSn Receive Interface " page 35.

7 Set up the DSn Test Signal interface. See "Setting Receive Structured Payload/ Test Signal " page 58

8 Choose 2M PAYLOAD **DROP 2 Mb/s** or DS1 PAYLOAD **DROP DS1** .

9 Choose the LINE CODE.

Adding Errors & Alarms at the SONET Interface

Description   Errors and alarms can be added to an SONET signal during testing.

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

TEST FUNCTION    SONET          ERR & ALARM

ERROR ADD TYPE                  CV-L (B2)
         RATE                   MSP THRESHLD
            7680   ERRORS IN   1 s


ALARM TYPE                      RDI-L
```

STATUS:

MULTIPLE
WINDOW

HOW TO:

1 Set up the SONET transmit interface and payload required. See "Setting SONET
Transmit Interface " page 25.

2 Select **TEST FUNCTION** , SONET, 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 CV-L errors are chosen errors can be added to trigger an APS 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 and Alarms to a DSn Signal

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

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

TEST FUNCTION    DSn PAYLD      ERR & ALARM

ERROR ADD TYPE                 FRM + MFRM
            RATE               USER
                               1.0E-3
                               ON
ALARM TYPE                     DS3 RAI/XBIT
```

```
STATUS:  Remote / X-bit alarm at DS3
DS3 RAI/      DS3                            MORE      MULTIPLE
 X-BIT        FERC                           ......    WINDOW
```

HOW TO: **1** If SONET interface is chosen, set up the SONET transmit interface and payload
required. See "Setting SONET Transmit Interface" page 25.
If DSn interface is chosen, set up the DSn interface and payload required. See
"Setting PDH/DSn Transmit Interface (Option 013)" page 22.

2 Select **TEST FUNCTION** , DSn PAYLD, ERR & ALARM as shown above.

3 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.

4 Choose the ALARM TYPE.
Errors and Alarms can be added at the same time.

Using FEAC Codes

Description

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   STRUCT'D    TEST
SETTINGS SETTINGS 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      DS3     MORE    MULTIPLE
                       AIS      OOF    ........  WINDOW
```
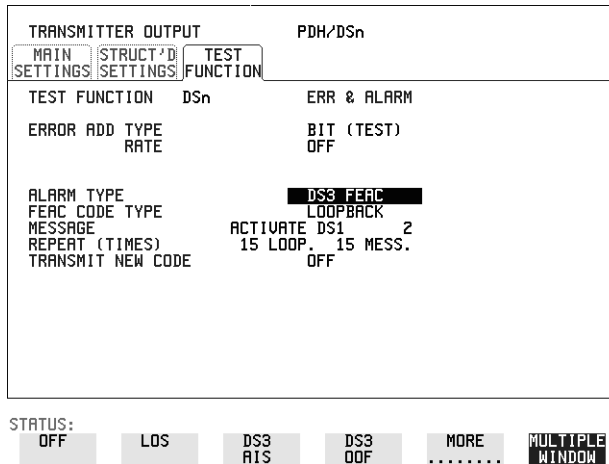
HOW TO:

Transmit an FEAC code

1 Choose SIGNAL **DS3** and PAYLOAD TYPE **CBIT** on the (TRANSMIT) **MAIN SETTINGS** display.

2 Choose (TRANSMIT) **TEST FUNCTION** , DSn PAYLD and ALARM TYPE **DS3 FEAC**. When a FEAC code is not being transmitted, an all ones pattern is transmitted.

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     CUMUL-     SHORT     ERROR      MORE    MULTIPLE
 SUMMARY    ATIVE      TERM    ANALYSIS   ........   WINDOW
```

Setting DSn Spare Bits

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

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

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

 TEST FUNCTION   DSn PAYLD   SPARE BITS




 2M: Si BIT (T/S-0 BIT 1)          1
     Sa BITS (NFAS T/S BITS 4-8)   11111


     CAS MFM T/S-16 BITS 5,7,8     111




STATUS:                              
                              MULTIPLE
                               WINDOW
```

HOW TO: **1** If SONET interface is chosen, set up the SONET transmit interface and payload required. See "Setting SONET Transmit Interface " page 25.
If DSn interface is chosen, set up the DSn transmit interface and payload required. See "Setting PDH/DSn Transmit Interface (Option 013) " 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 SONET network. They also enable individual payload channels to be inserted or extracted from a high speed OC-n line signal (for example the functionality provided by ADMs).

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

Jitter caused by Pointer Adjustments

Pointer adjustments are the mechanisms within SONET to compensate for frequency and phase differences between SPEs and outgoing SONET 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 719 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 719.

Description   The transmitted SPE or VT pointer value can be adjusted for testing purposes.

```
TRANSMITTER OUTPUT          SONET
 MAIN  ‖STRUCT'D‖  TEST  ‖OVERHEAD
SETTINGS‖PAYLOAD ‖FUNCTION‖ SETUP

TEST FUNCTION    SONET        ADJUST PTR

POINTER TYPE              VT POINTER
                         T1.105 / GR-253
ADJUSTMENT TYPE      A4 PERIODIC NORMAL
          PATTERN        26-1
          POLARITY       NEGATIVE
          INTERVAL       200 ms

POINTER SEQUENCES        STOPPED




STATUS:
                                    MULTIPLE
                                    WINDOW
```

HOW TO: **1** Set up the SONET transmit interface and payload required. See "Setting SONET 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 STS-SPE the minimum spacing between adjustments is
500 μs. For VT the minimum spacing between adjustments is 2ms.
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 SPE/VT rate, relative to each other, thus producing pointer movements. If you offset the SPE 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 SONET interface or payload, pointer OFFSET is not available.

Pointer Type	Line Rate	SPE Rate	VT Rate
SPE	Constant	Offset	Tracks STS Payload
SPE	Offset	Constant	Constant
VT	Constant	Constant	Offset
VT	Offset	Tracks Line Rate	Constant

T1.105/GR-253 - Provides pointer movements according to T1.105 and GR-253:

4   Choose the T1.105/GR-253 ADJUSTMENT TYPE.

5   Choose the POLARITY, INTERVAL and PATTERN (where applicable) for the selected sequence.

6   Choose POINTER SEQUENCES **START INIT** to generate the selected G.783 sequence and **STOP INIT** to stop the pointer sequences.

T1.105/GR-253 Pointer Sequences Explained

In addition to the BURST, NEW POINTER and OFFSET pointer movements described, the HP OmniBER 719 can also generate pointer sequences (pointer movements) according to T1.105.03 and GR-253.

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 softkey 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*, an example is given in the following figure:
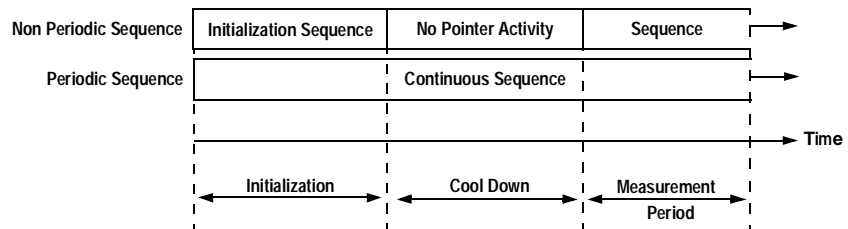
Note: SINGLE (A1), BURST (A2) and PHASE TRANSIENT(A3) are Non Periodic Sequences.

Initialization Period

For SINGLE A1, BURST A2 and PHASE TRANSIENT A3 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) 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 719 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 SPE pointer when the SPE does not contain a VT structure, otherwise it is applied to the VT 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 T1.105/GR-253, 87-3 Pointer Sequence.

T1.105 A4 and A5, 87-3 Pattern
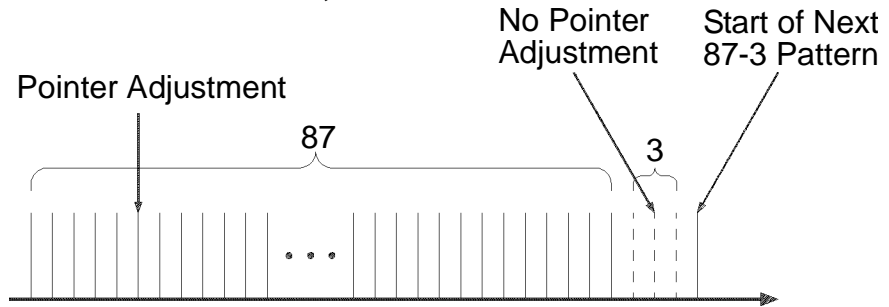
An Example of a Pointer Sequence

Pointer Sequence	Description
T1.105 A1 SINGLE GR-253 5-29	Periodic Single adjustments, all of the same polarity which is selectable. Separation between pointer adjustments is fixed at approximately 30 seconds.
T1.105 A2 BURST OF 3 GR-253 5-30	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.
T1.105 A3 PHASE TRANSIENT GR-253 5031	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.
T1.105 A4 PERIODIC NORMAL (87-3 Pattern) GR-253 5-33(b)	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.
T1.105 A4 PERIODIC NORMAL (Continuous Pattern) GR-253 5-34(b)	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).

Pointer Sequence	Description
GR-253 5-32(b) PERIODIC NORMAL (26-1 Pattern)	This selection is only available if you have selected VT1.5 mapping. 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.
T1.105 A5 PERIODIC ADD (87-3 Pattern) GR-253 5-33(c)	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. 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.
T1.105 A5 PERIODIC ADD (Continuous Pattern) GR-253 5-34(c)	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.
GR-253 5-32(c) PERIODIC ADD (26-1 Pattern)	This selection is only available if you have selected VT1.5 mapping. 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.
T1.105 A5 PERIODIC CANCEL (87-3 pattern) GR-253 5-33(d)	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.

Pointer Sequence	Description
T1.105 A5 PERIODIC CANCEL (Continuous Pattern) GR-253 5-34(d)	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.
GR-253 5-32(d) PERIODIC CANCEL (26-1 pattern)	This selection is only available if you have selected VT1.5 mapping. 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.

NOTE For SPE pointers 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 VT pointers the sequence interval is selectable from: 200 ms, 500 ms, 1, 2, 5 and 10 seconds. For SPE pointers the minimum spacing between adjustments is 500 us. For VT pointers the minimum spacing between adjustments is 2 ms.

Table 3   **Pointer Sequences Available with Selected Mapping**

	MAPPING		
POINTER SEQUENCE	**SPE**	**VT6, VT2**	**VT1.5**
A1 SINGLE	✓	✓	✓
A2 BURST OF 3	✓	✓	✓
A3 PHASE TRANSIENT	✓	✓	✓
A4 PERIODIC NORMAL(87-3)	✓		
A4 PERIODIC NORMAL (Continuous)	✓	✓	✓
PERIODIC NORMAL (26-1)			✓
A5 PERIODIC ADD (87-3)	✓		
A5 PERIODIC ADD (Continuous)	✓	✓	✓
PERIODIC ADD (26-1)			✓
A5 PERIODIC CANCEL (g) 87-3	✓		
A5 PERIODIC CANCEL (Continuous)	✓	✓	✓
PERIODIC CANCEL 26-1			✓

Using Pointer Graph Test Function

Pointer Graph shows the relative offset during the measurement period. This allows the time relationship of SPE or VT 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.

TIP: The Pointer Graph display can be logged to the chosen logging device. See "Logging on Demand " page 124.

```
RECEIVER INPUT              SONET
  MAIN    STRUCT'D   TEST   OVERHEAD
SETTINGS  PAYLOAD  FUNCTION MONITOR

TEST FUNCTION    SONET        PTR GRAPH
CAPTURE INTERVAL              1 SEC
POINTER UNDER TEST            VT-1.5
18
10
0
-10
-18
      0     1M      2M       3M      4M
      IMPLIED VT SPE OFFSET      -0.5 ppm
      ELAPSED TIME           00d 00h 04M 40s
```
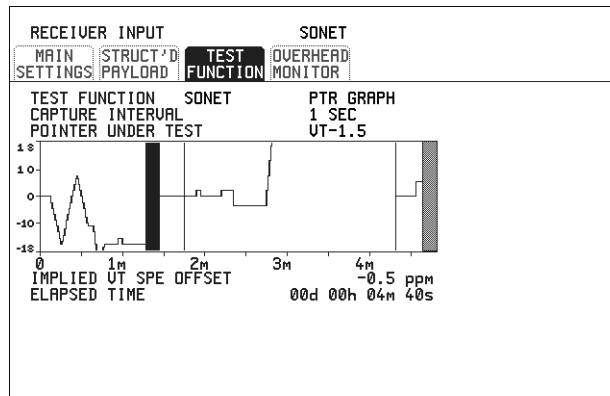
STATUS:

```
MULTIPLE
 WINDOW
```

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

HOW TO:

1 Set up the receive SONET interface and payload as required. See "Setting SONET Receive Interface" page 37.

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.

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.
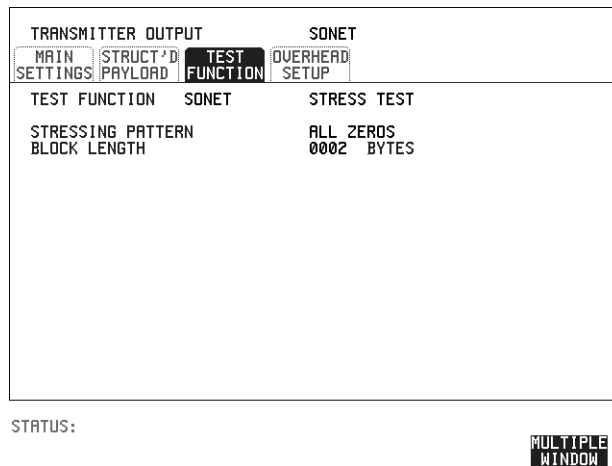
```
TRANSMITTER OUTPUT          SONET
  MAIN   STRUCT'D  TEST  OVERHEAD
SETTINGS PAYLOAD FUNCTION  SETUP

TEST FUNCTION    SONET       STRESS TEST

STRESSING PATTERN            ALL ZEROS
BLOCK LENGTH                 0002  BYTES




STATUS:
                                        MULTIPLE
                                         WINDOW
```

HOW TO: **1**   Set up the SONET transmit interface and payload required. See "Setting SONET 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.

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            SONET
 MAIN     STRUCT'D   TEST   OVERHEAD
SETTINGS  PAYLOAD  FUNCTION  SETUP

TEST FUNCTION    SONET        APS MESSAGES
NEW TX              TOPOLOGY  RING
K1 BITS 1->4  0010:REVERSE REQUEST(SPAN)
   BITS 5->8  1010  DESTINATION NODE ID
K2 BITS 1->4  1000  SOURCE NODE ID
   BIT  5        1: LONG PATH
   BITS 6->8   010: BRIDGED & SWITCHED

CURRENT TX                    CURRENT RX
K1 00101010                   K1 00101010
K2 10001010                   K2 10001010

TRANSMIT NEW K1/K2    SELECT
```

```
STATUS:
 SELECT       DOWN                          MULTIPLE
              LOAD                           WINDOW
```

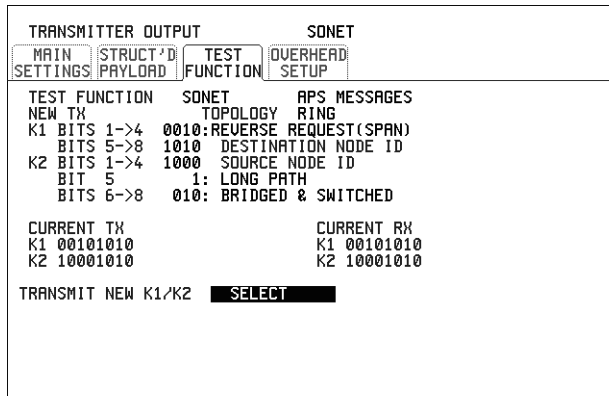*HOW TO:*   **1** Set up the SONET transmit interface and payload required. See "Setting SONET Transmit Interface " page 25.

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 & 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 Multirate Analyser module.

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

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

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

TEST FUNCTION    SONET       DCC INSERT
                             LINE DCC
```
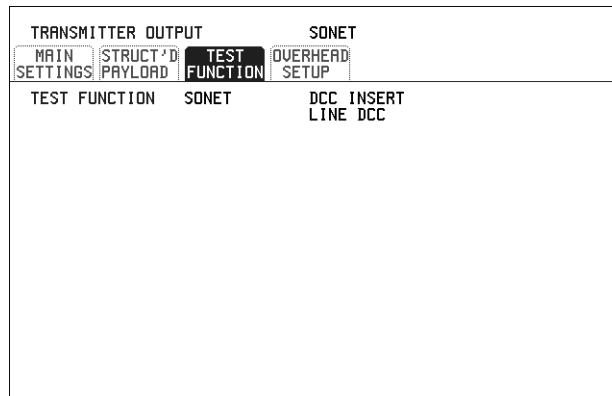
STATUS:

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	111111110xxxxxx0	

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.

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.
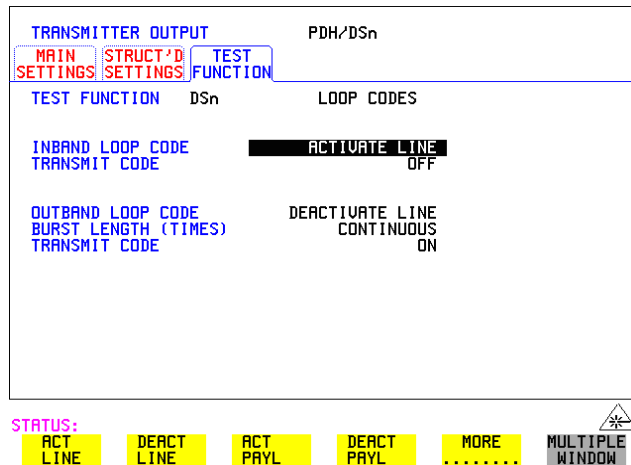
HOW TO: **Transmit an In-band loop code**

1   Choose SIGNAL **DS1** and set LINE CODE and PAYLOAD TYPE as required on the **TRANSMIT** **MAIN SETTINGS** display.

2   Choose **TRANSMIT** **TEST FUNCTION** and set the TEST FUNCTION field to **DSn** and **LOOP CODES** .

3 Choose the INBAND LOOP CODE from the choices given.

4 To transmit a code select the TRANSMIT CODE field on the `TRANSMIT` `TEST FUNCTION` , `DSn`, `LOOP CODES` display and select `BURST`. The code is sent for nominally eight seconds.

HOW TO: **Monitor/view received loop codes**

5 Choose SIGNAL `DS1` on the `RECEIVE` `MAIN SETTINGS` display. Also set the LINE CODE to match the setting on the Transmitter display.

6 Choose `DSn RESULTS` and `LOOP CODES` on the `RESULTS` display.

7 Set the INBAND LOOPUP and LOOPDOWN fields to the required codes. Note the instrument receiver only detects the codes you have chosen. It does not detect other codes in the background. If you wish to view other codes, then you must select them in the appropriate fields.

8 View the results in the RESULTS 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`.

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.

4

Making Measurements

Using Overhead BER Test Function

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

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

```
RECEIVER INPUT              SONET
  MAIN   STRUCT'D   TEST   OVERHEAD
SETTINGS PAYLOAD FUNCTION MONITOR

TEST FUNCTION    SONET       OVERHEAD BER
MEASURE PRBS FROM BYTE  SOH      Z0
                 WITHIN STS-3# 3   STS-1# 3


ERROR COUNT                       19
ERROR RATIO               6.071E-06
ERROR FREE SECONDS               42
%ERROR FREE SECONDS          87.500

PATTERN LOSS SECONDS              0

ELAPSED TIME        00d 00h 00m 48s




STATUS:

                                 MULTIPLE
                                 WINDOW
```

HOW TO: **1** Set up the SONET transmit interface and payload required. See "Setting SONET Transmit Interface " page 25.

2 Set up the receive SONET interface and payload as required. See "Setting SONET Receive Interface " page 37.

3 Choose the overhead byte to be tested on the **RECEIVE** **SONET** **TEST FUNCTION** display**.**

4 Choose the overhead byte to be tested on the **TRANSMIT** **SONET** **TEST FUNCTION** display.

5 Press **RUN/STOP** to start the test.

6 The PRBS pattern can be errored by pressing **SINGLE**.

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 the HP OmniBER 719 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.
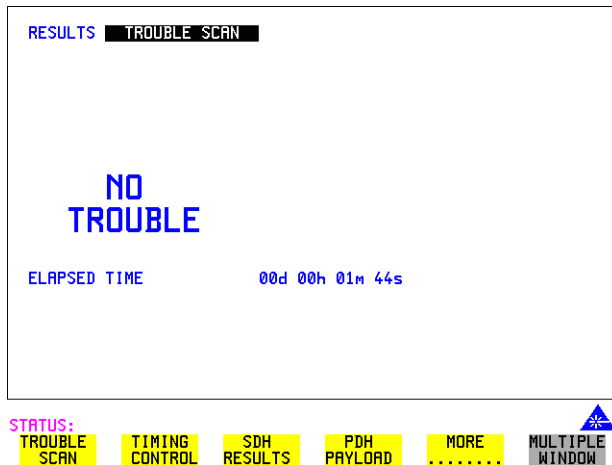
If all error counts are zero and any alarms are detected "ALARMS DETECTED" is displayed.

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 prioritys.

Error Count Priority

DSn	SONET
CRC	CV-S
CODE	CV-L
DS3FR	CV-P
(DS1FR)	CV-V
P-BIT	FRAME
C-BIT	CRC
FEBE	DS3FR (DS1FR,
BIT	FAS2)
	REI-L
	REI-P
	CV-IEC
	REI-V
	P-BIT
	C-BIT
	REBE (FEBE)
	BIT

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.

```
RESULTS  TIMING CONTROL

SHORT TERM PERIOD  1 SECOND
TEST TIMING        SINGLE      1 HOUR

GRAPH STORAGE      OFF
                   INTERNAL
```

STATUS:
TROUBLE   TIMING   SONET   DSn   MORE   MULTIPLE
SCAN   CONTROL   RESULTS PAYLOAD .... WINDOW
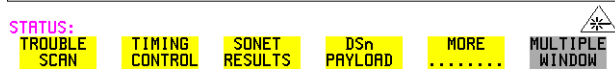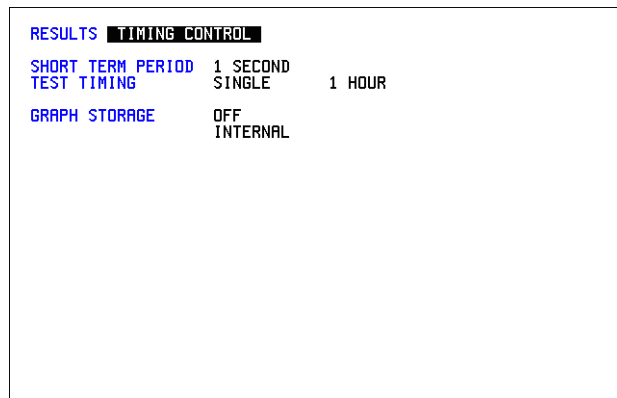
HOW TO: **1** Choose **TIMING CONTROL** on the **RESULTS** display.

2 Choose the SHORT TERM PERIOD to the timing 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.

Making SONET Analysis Measurements

Description   G.826 analysis results are provided for all relevant SONET 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

```
RESULTS   SONET          ERROR ANALYSIS
G.826   M.2101   M.2110   M.2120


ERROR TYPE  CV-L(B2)

CV-L(B2) ANALYSIS (G.826)

EB          56000  ES              7
SES              7  UAS             0
PUAS             0  BBE             0
ESR     1.000E+00  SESR    1.000E+00
BBER             0

ELAPSED TIME          00d 00h 00m 07s




STATUS:

MULTIPLE
WINDOW
```

HOW TO:

1 Set up the receive SONET interface and payload required. See "Setting SONET Receive Interface " page 37.

2 If required set up the SONET transmit interface and payload. See "Setting SONET Transmit Interface " page 25.

3 Press $\boxed{\text{RUN/STOP}}$ to start the measurement.

4 You can view the analysis results on the $\boxed{\text{RESULTS}}$ **SONET** **ANALYSIS** display.

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

Making DSn Analysis Measurements

Description　　　　G.821, G.826, M.2100, M.2110 and M.2120 analysis results are provided for all relevant DSn and DSn 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 102.

```
RESULTS   DSn              ERROR ANALYSIS
┌─────────┬────────┬────────┬────────┬────────┐
│ G.821   │ G.826  │ M.2100 │ M.2110 │ M.2120 │
└─────────┴────────┴────────┴────────┴────────┘
                        BIT

EC        2.900E+06  AnD ES 82.93743%
ES              72         87.80488%
EFS             10         12.19512%
SES              5          6.09756%
UNAV            21         20.38835%
DEG MIN          2              100%
BPV ES           5

ELAPSED TIME           00d 00h 01m 43s




STATUS:                                MULTIPLE
                                        WINDOW
```

HOW TO:　　　**1** If SONET is chosen as the interface, set up the Receive Interface and Payload required. See "Setting SONET Receive Interface " page 37. If required set up the Transmit Interface and Payload. See "Setting SONET Transmit Interface " page 25.

2 If DSn is chosen as the interface, set up the DSn receive interface. See "Setting PDH/DSn Receive Interface " page 35. If required set up the DSn transmit interface. See "Setting PDH/DSn Transmit Interface (Option 013) " page 22.

3 Press `RUN/STOP` to start the measurement.

4 If SONET is chosen as the interface, you can view the analysis results on the `RESULTS` `DSn PAYLOAD` `ERROR ANALYSIS` display
If DSn is chosen as the interface, you can view the analysis results on the `RESULTS` `DSn` `ERROR ANALYSIS` display.

Measuring Frequency

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

```
RESULTS  SONET        FREQUENCY


GATE   16s
FREQUENCY 622080000 Hz
OFFSET              +0 Hz
OFFSET          +0.0ppm
_____
ELAPSED TIME        00d 00h 00m 33s




STATUS:
TROUBLE    TIMING    SONET     DSn      MORE    MULTIPLE
 SCAN     CONTROL   RESULTS  PAYLOAD   ........  WINDOW
```
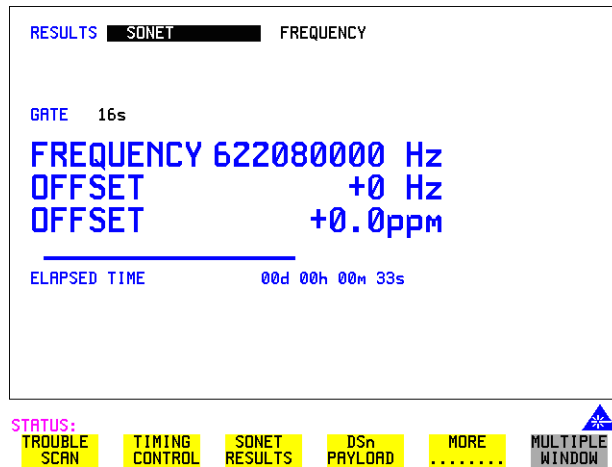
HOW TO: **1**   Connect the signal to be measured to the IN port of the DSN Receive module or the IN port of the Multirate Analyzer module (SONET electrical) or the IN port of the Optical Interface module (SONET optical).

2   Choose the required SIGNAL rate and LEVEL on the **PDH** **RECEIVE** **MAIN SETTINGS** or **SONET** **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 SONET signal connected to the Optical module IN port.

```
RESULTS    SONET              ████OPTICAL POWER████

       ──OUT OF RANGE
       ──BER

  -40      -30      -20      -10      0dBm
       ┗┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┛
       ████████████████████████████▒▒▒▒▒▒▒▒▒

  OPTICAL PWR -12.2 dBm

  ELAPSED TIME              00d 00h 00m 48s

```
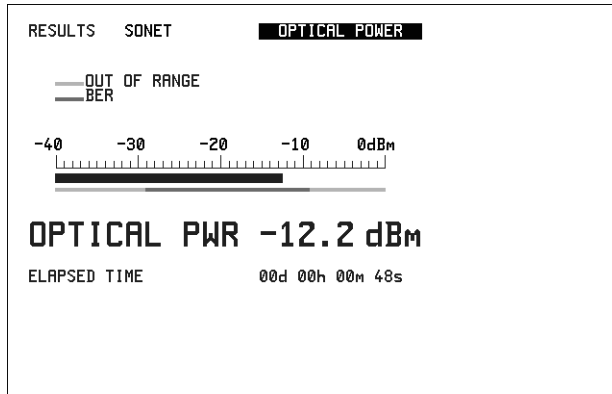
STATUS:
| ERROR SUMMARY | CUMUL ATIVE | SHORT TERM | ERROR ANALYSIS | MORE .... | MULTIPLE WINDOW |

HOW TO: **1**   Connect the SONET optical signal to the IN port of the Optical Interface module.

2   Choose the received input signal rate on the [RECEIVE] **SONET** display.

3   Select [RESULTS], SONET, OPTICAL POWER as shown above.

NOTE   Optical power measurement is always available even if test timing is off.
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 719 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
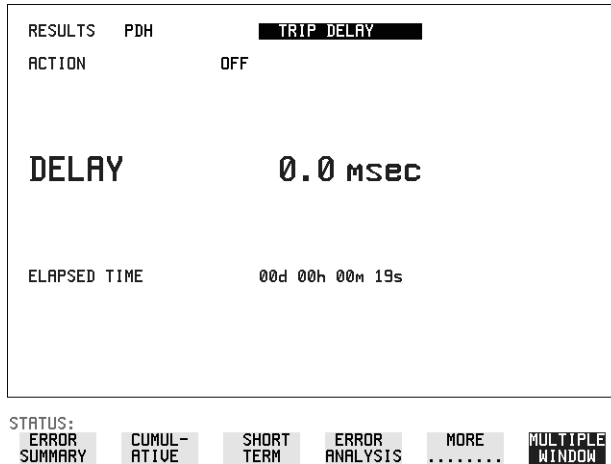loopback is applied to the network equipment to return the test signal. The received
pattern stops the timer and the Round Trip Delay is calculated.

```
RESULTS    PDH            TRIP DELAY
ACTION               OFF



DELAY                  0.0 msec



ELAPSED TIME           00d 00h 00m 19s




STATUS:
 ERROR    CUMUL-      SHORT    ERROR     MORE    MULTIPLE
SUMMARY   ATIVE       TERM    ANALYSIS  ........  WINDOW
```

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

HOW TO: **1**   If measuring on an SONET interface, set up the SONET transmit and receive
interfaces and payloads required. See "Setting SONET Transmit Interface "
page 25 and "Setting SONET Receive Interface" page 37.

2   If measuring on a DSn interface, set up the DSn transmit and receive interfaces
and payloads required. See "Setting PDH/DSn Transmit Interface (Option 013)"
page 22 and "Setting PDH/DSn Receive Interface" page 35.

3   Connect a loopback to the network equipment.

4 Choose ACTION **ON** to start the measurement.
If measuring on an SONET interface, the results are available on the ⟨**RESULTS**⟩ **DSn PAYLOAD** display.
If measuring on a DSn interface, the results are available on the ⟨**RESULTS**⟩ **DSn** 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
34 Mb/s	10 microseconds
STS-1, STS-3	0.5 milliseconds
OC-12, OC-48	0.5 milliseconds

Monitoring Signaling Bits

Description

The HP OmniBER 719 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.

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.

```
RESULTS  SRVC DISRUPT


 LONGEST          0.000ms
 SHORTEST         0.000ms

 LAST             0.000ms

 ELAPSED TIME       00d 00h 00m 20s




STATUS:
   PDH      SERVICE    SONET    SONET     MORE    MULTIPLE
 ALM SCAN   DISRUPT  ALM SCAN TRIBSCAN  ........   WINDOW
```
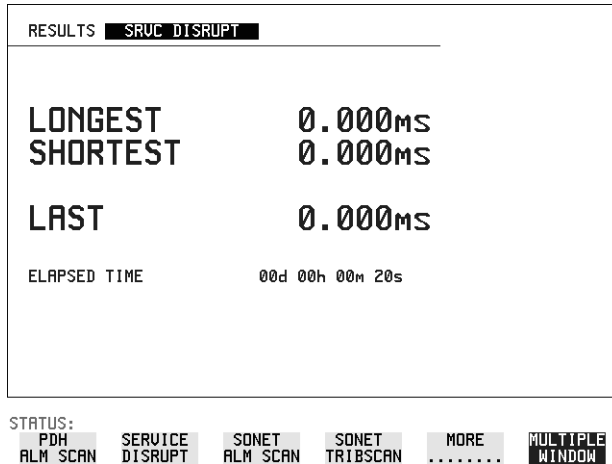
Service Disruption is chosen on the $\boxed{\text{RESULTS}}$ page except for the following configuration:

• If you choose a DSn or SONET interface and an ANSI (DS1, DS3) framed, unstructured payload you must select Service Disruption on the Transmitter and Receiver $\boxed{\text{TEST FUNCTION}}$ display.

```
RECEIVER INPUT              PDH/DSn
 MAIN    STRUCT'D  TEST
SETTINGS SETTINGS FUNCTION

TEST FUNCTION    SERV DISR

DSn SERVICE DISRUPTION MODE      ON




STATUS:
                                    MULTIPLE
                                    WINDOW
```

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 >2000ms elapses without any errors being received.
The longest burst detected is 2 seconds.

Accuracy

300 μs for DS1, 2Mb/s and 34Mb/s signals.
60 μs for DS3 signals.

HOW TO: **1** If interfacing at SONET set up the SONET transmit and receive interfaces and payloads required. See "Setting SONET Transmit Interface " page 25 and "Setting SONET Receive Interface " page 37.

2 If interfacing at DSn set up the DSn transmit and receive interfaces and payloads as required. See "Setting PDH/DSn Transmit Interface (Option 013) " page 22 and "Setting PDH/DSn Receive Interface " page 35.

3 If you choose a DS1 or DS3 framed unstructured payload, choose **SERVICE DISRUPT** on the **TRANSMIT** and **RECEIVE** **TEST FUNCTION** displays.

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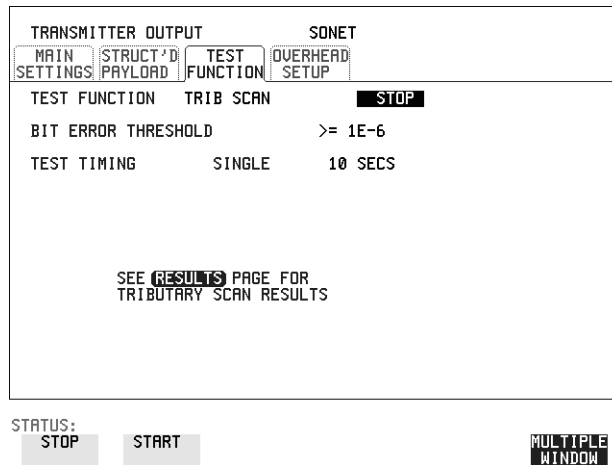**LAST** - Length of last burst of errors detected during measurement.

Performing a SONET 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` `SONET` `MAIN SETTINGS`, mapping setup determines the tributary structure. The HP OmniBER 719 will configure the Transmitter to the Receiver and the PATTERN is forced to the payload it will fill.

TIP: The SONET Tributary Scan display can be logged to the chosen logging device. See "Logging on Demand " page 124.

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

TEST FUNCTION    TRIB SCAN        STOP

BIT ERROR THRESHOLD          >= 1E-6

TEST TIMING        SINGLE     10 SECS




            SEE RESULTS PAGE FOR
            TRIBUTARY SCAN RESULTS

```

STATUS:
   STOP   START   MULTIPLE
                                                     WINDOW

HOW TO: **1** Set up the transmit and receive SONET interfaces and payload as required. See "Setting SONET Transmit Interface " page 25 and "Setting SONET Receive Interface " page 37.

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, 28 VT-1.5 tributaries in an STS-1 SPE - the time taken to complete the Tributary Scan will be 28 X TEST TIMING choice.

4 The Tributary Scan results can be viewed on the RESULTS
SONET TRIBSCAN display.
The Scan can be started on the TRANSMIT SONET TEST FUNCTION
display or the RESULTS display by choosing START.
If the Scan is started on the TRANSMIT SONET TEST FUNCTION display,
the HP OmniBER 719 changes to the RESULTS display.
If a single path, for example, MAPPING STS-3c SPE is chosen, then Tributary
Scan is disabled.

NOTE The keyboard is locked during tributary scan.

```
RESULTS  SONET TRIBSCAN              STOP

 STS-3  1              STS-3

         1              2              3
                    STS-1 SPE
 1 2 3 4 5 6 7  1 2 3 4 5 6 7  1 2 3 4 5 6 7
 | | UTGRP | |  | | UTGRP | |  | | UTGRP | |
 | | |   | | |  | | |   | | |  | | |   | | |
 1 1 1 1 1 1 1  1 1 1 1 1 1 1  1 1 1 1 1 1 1
 2 2 2 2 2 2 2  2 2 2 2 2 2 2  2 2 2 2 2 2 2
 3 3 3 3 3 3 3  3 3 3 3 3 3 3  3 3 3 3 3 3 3
 4 4 4 4 4 4 4  4 4 4 4 4 4 4  4 4 4 4 4 4 4
    UT-1.5         UT-1.5         UT-1.5




STATUS:
     STOP       START                              MULTIPLE
                                                   WINDOW
```
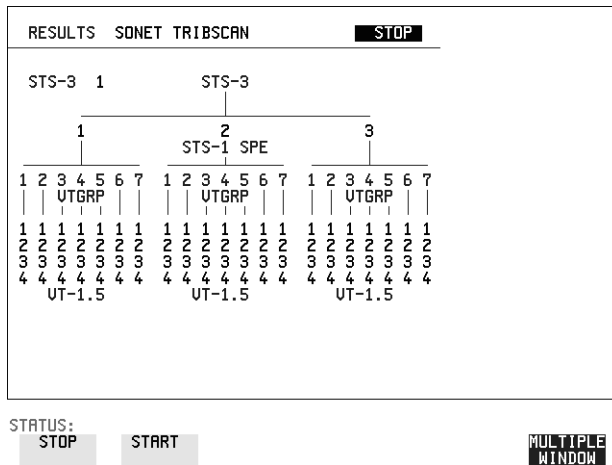
Performing an SONET Alarm Scan

Description   SONET Alarm Scan tests each channel for alarm free operation and identifies and indicates any Unequipped channels.
You can configure the Scan to check for the occurrence of any Path layer CV errors above a chosen threshold.
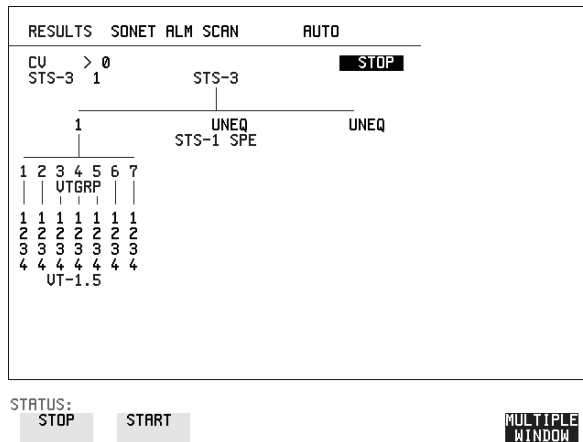The channel in which an alarm occurred is highlighted if any of the following alarms occur:
STS SPE: LOP-P, RDI-P, AIS-P,
VT-1.5: LOP-P, AIS-P, RDI-P, H4 LOM, LOP-V, AIS-V, RDI-V

TIP: The SONET Alarm Scan display can be logged to the chosen logging device. See
 "Logging on Demand " page 124.

```
RESULTS  SONET ALM SCAN     AUTO

CV    > 0                      ┌────────┐
STS-3  1            STS-3      │  STOP  │
                               └────────┘
     ────────────────────────────────────────
          1              UNEQ           UNEQ
                       STS-1 SPE
     ─────────────────────
     1 2 3 4 5 6 7
     | | VTGRP | |
     1 1 1 1 1 1 1
     2 2 2 2 2 2 2
     3 3 3 3 3 3 3
     4 4 4 4 4 4 4
       VT-1.5
```

```
STATUS:
       ┌────────┐   ┌────────┐                    ┌──────────┐
       │  STOP  │   │ START  │                    │ MULTIPLE │
       └────────┘   └────────┘                    │  WINDOW  │
                                                  └──────────┘
```

HOW TO: **1** Set up the receive SONET interface and payload as required. See "Setting SONET Receive Interface" page 37.

2 Choose **SONET ALM SCAN** on the **RESULTS** display.

3 Choose AUTO or RX SETTINGS.
RX SETTINGS: The scan checks the structure set on the **RECEIVE** **SONET** display.
AUTO: The scan checks the structure being received. This can be particularly useful when receiving mixed payloads.

4 Choose the CV error threshold.
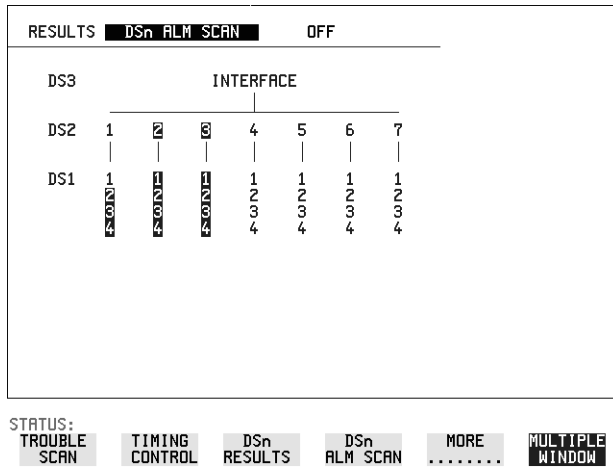
5 Choose **START** to start the Alarm Scan.

Performing a DSn Alarm Scan

Description   DSn 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 DSn interface as required. See "Setting PDH/DSn Receive Interface" page 35.

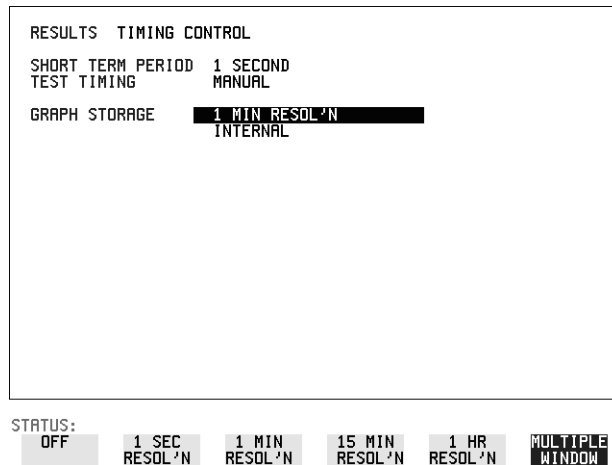**2** Choose **ON** to start the Alarm Scan.

5

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

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

```
RESULTS  TIMING CONTROL

SHORT TERM PERIOD  1 SECOND
TEST TIMING        MANUAL

GRAPH STORAGE      1 MIN RESOL'N
                   INTERNAL
```

STATUS:

| OFF | 1 SEC RESOL'N | 1 MIN RESOL'N | 15 MIN RESOL'N | 1 HR RESOL'N | MULTIPLE WINDOW |

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 150.

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   START TEST          STORE
      DATE    TIME  DURATION      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   2%
RESOL'N COMPRESSED           RAM    FREE  98%
FREE STORE 19626  EVENTS
```

```
STATUS:
GRAPH      TEXT     DELETE    DELETE              MULTIPLE
RESULTS    RESULTS  STORE     ALL                 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 155.

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
                          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.
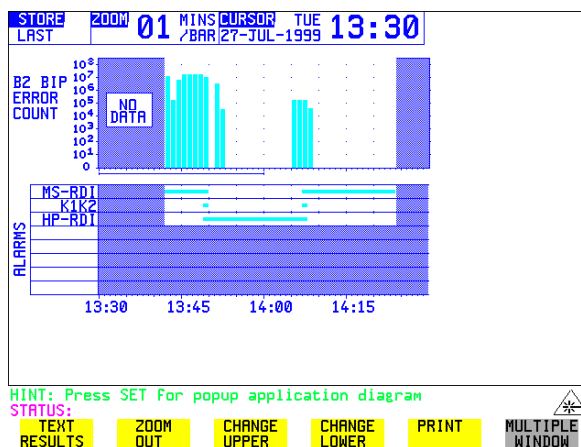
HOW TO: **1** To view the current bar graphs, press **GRAPH** and use **CHANGE UPPER** and **CHANGE LOWER** to obtain the bar graphs required. Press **SET** to obtain a choice of options.

2 To view previously stored graphs, see "Recalling Stored Graph Results" page 113.

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 113.

Zoom The width, in minutes, of each "bar" in the bar graph, controlled by **ZOOM IN** / **ZOOM OUT**.

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 Graphic 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        │
│  BPV            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       9.424E-07        │
│  FEBE            16981       3.202E-07        │
│  CRC               N/A           N/A          │
│                                              │
│                                              │
│                                              │
│                                              │
└─────────────────────────────────────────────┘
 STATUS:
 ┌──────┐ ┌──────┐ ┌──────┐ ┌──────┐ ┌──────┐ ┌────────┐
 │STORE │ │GRAPH │ │PRINT │ │NEXT  │ │ALARM │ │MULTIPLE│
 │STATUS│ │RESULTS│ │      │ │SUMMARY│ │SUMMARY│ │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 113.

3 To view the Alarms which have occurred during the measurement, select
ALARM SUMMARY. Use **NEXT SUMMARY** to view the DSn/DSn; and
SONET 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 DSn/DSn; and
SONET 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 113.

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.
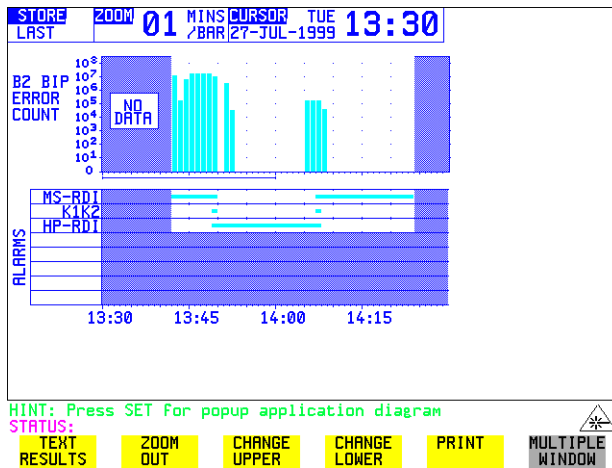
HOW TO: **Log to an External Printer**

1   Connect an external RS-232-C HP DeskJet printer to the HP OmniBER 719 RS232 port. See "Logging Results to RS-232-C Printer " page 129 or connect an external HP-IB HP DeskJet printer to the HP 37719 HP-IB port. See "Logging Results to HP-IB Printer " page 127 or connect a Parallel DeskJet printer to the 37719 Parallel port. See "Logging Results to Parallel (Centronics) Printer " page 126.

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

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 152.

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)

• 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
                           10     MINS
RESULTS LOGGED             SELECTED
         WHEN              PERIOD EC>0
         CONTENT           ER & ANAL
                           PER & CUMUL
LOG ERROR SECONDS          ON
LOG AT END OF TEST         ALL RESULTS
LOG ON DEMAND              RESULTS




STATUS:
 STORED   SETTINGS  FLOPPY  LOGGING   MORE   MULTIPLE
SETTINGS  CONTROL    DISK            ........  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 129.
If HPIB is chosen, see "Logging Results to HP-IB Printer " page 127.
If PARALLEL is chosen, see "Logging Results to Parallel (Centronics) Printer " page 126.

If DISK is chosen, see "Saving Data Logging to Disk" page 152.
If Option 602, Internal Printer, is fitted and INTERNAL is chosen, see "Logging Results to Internal Printer " page 128.

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 STS-3
    OVERHEAD CAPTURE - Overhead Capture display
    SCREEN DUMP - allows logging of the chosen display
    POINTER GRAPH - Pointer Graph display
    SONET TRIBUTARY SCAN - SONET Tributary Scan display
    SONET ALARM SCAN - SONET Alarm Scan display
    SELFTEST FAILS - Last recorded selftest failures

```
FUNCTION           LOGGING

LOGGING SETUP              CONTROL

LOGGING                    OFF




LOG ON DEMAND             SCREEN DUMP
SCREEN DUMP DESTINATION    DISK
BITMAP COMPRESSION (RLE)   OFF




STATUS:
POINTER    SDH       SDH      SELFTEST    MORE    MULTIPLE
 GRAPH   TRIBSCAN  ALM SCAN    FAILS     ........  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 129.
                       If HPIB is chosen, see "Logging Results to HP-IB Printer " page 127.

                       If PARALLEL is chosen, see "Logging Results to Parallel (Centronics) Printer
                       " page 126.

If DISK is chosen, see "Saving Data Logging to Disk" page 152.
If Option 602, Internal Printer, is fitted and INTERNAL is chosen, see "Logging Results to Internal Printer " page 128.

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      HPIB

PRINTER TYPE             HP PRINTER
```

```
STATUS:
  RS232      HPIB      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 DeskJet Printer to a Parallel Port " page 131.

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 121 or "Logging on Demand " page 124.

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                 HPIB
REMOTE CONTROL PORT          RS232
```

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

HOW TO: **1** Connect an HP-IB printer to the HPIB 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 121 or "Logging on Demand " page 124.

_____

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         HPIB




















STATUS:
INTERNAL   RS232     HPIB      DISK    PARALLEL  MULTIPLE
                                                  WINDOW
```

HOW TO: **1** Choose the LOGGING SETUP **CONTROL** and set up the display as required.
See "Logging Results " page 121.

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 121 or "Logging on Demand " page 124.

Printing Results from Disk

Description   The results and alarms you logged to Disk can be printed by removing the Disk from the HP OmniBER 719 and inserting it into a personal computer (PC).

HOW TO: **Print from DOS Prompt**

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

Print from Windows

1   Choose the required file from Filemanager.

2   Choose FILE - COPY FILE TO
       <printer name>

Connecting an HP DeskJet Printer to a Parallel Port

Description   If Remote Control Option, 601, is fitted, the HP OmniBER 719 has the capability of interfacing with an HP DeskJet printer or, an alternative suppliers printer, via the PARALLEL port.

CAUTION   Do not connect a serial printer e.g. RS-232-C or HP-IB to the HP OmniBER 719 Parallel port as this will damage the interface.

HOW TO: **1** Connect the HP OmniBER 719 Parallel port to the HP 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).


LIFT TO CLEAR PAPER PATH
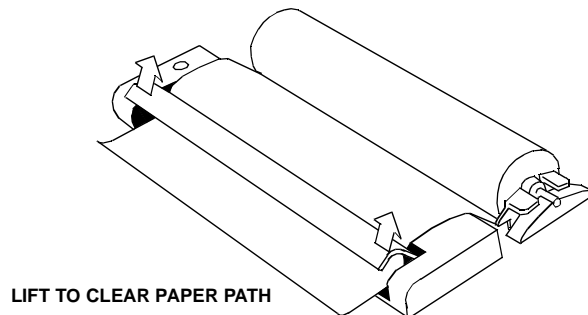
3   Lift out the spindle. Adjust the paper width adaptor to the width of the paper being used.

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 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.

SET BLUE ADAPTOR A4 LEFT - 8.5in RIGHT
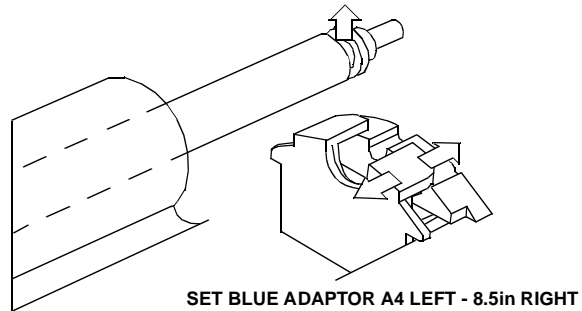
5   Feed the paper into the upper entry of the print mechanism. When the front cover of the print mechanism is closed, the printer should automatically feed the paper through until there is approximately 2.5 cm (1 in) clear at the front of the print mechanism.

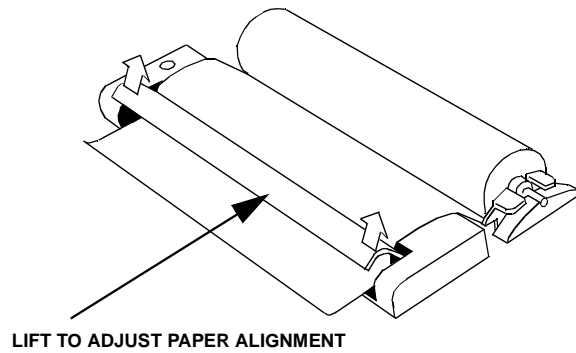**Align paper with the leftmost edge of the printer mechanism slot**

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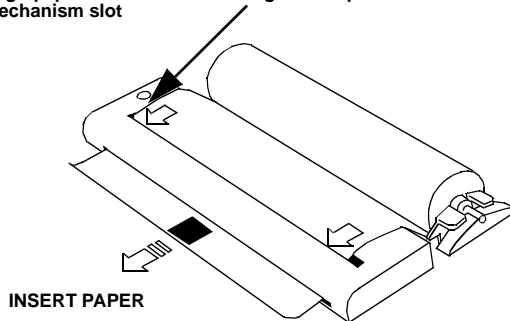
CAUTION   Do not close the outer cover until the automatic paper feed is complete.

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

LIFT TO ADJUST PAPER ALIGNMENT

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 132.
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 132.

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

6

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 OmniBER 719 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 139.

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        2
              LOCK           OFF
              ACTION         OFF
SETTING
   0   FACTORY DEFAULT SETTINGS
   1    SONET ROUTING..................
   2    DS3 CARRIER.█..................
   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.
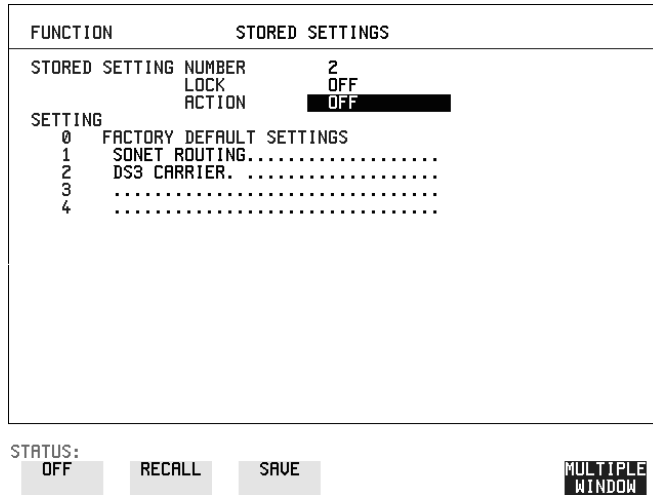
```
FUNCTION            STORED SETTINGS

STORED SETTING NUMBER      2
             LOCK         OFF
             ACTION       OFF
SETTING
   0   FACTORY DEFAULT SETTINGS
   1    SONET ROUTING..................
   2    DS3 CARRIER. ..................
   3         ..............................
   4         ..............................




STATUS:
     OFF      RECALL      SAVE                          MULTIPLE
                                                        WINDOW
```
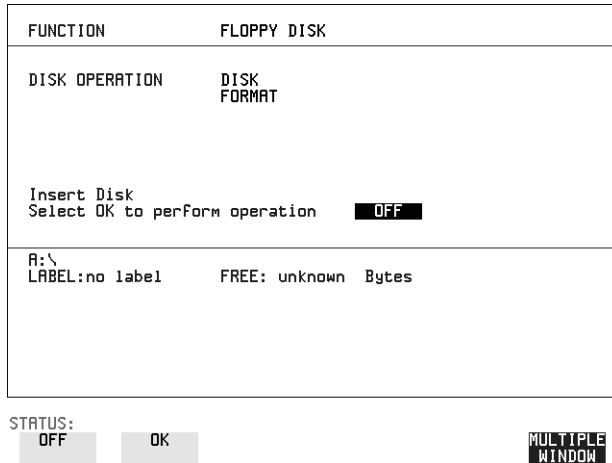
HOW TO: **1** Choose the STORED SETTING NUMBER which contains the stored
configuration.

2 Choose ACTION **RECALL** to recall the stored configuration.
The recall operation can be verified by checking the relevant display settings.

Formatting a Disk

Description   Only 1.44M, MS-DOS compatible disks can be used in the HP OmniBER 719. Any
other format or capacity will result in a disk access error being displayed.

```
FUNCTION            FLOPPY DISK

DISK OPERATION      DISK
                    FORMAT




Insert Disk
Select OK to perform operation       █ OFF █

A:\
LABEL:no label      FREE: unknown  Bytes



STATUS:
    OFF          OK                        MULTIPLE
                                           WINDOW
```

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 OmniBER 719 as this will ensure
full compatibility with the Floppy Disk power fail recovery included in the HP
OmniBER 719.

HOW TO: **1** Choose DISK OPERATION **DISK** **FORMAT** .

2 Insert the Disk into the Disk drive.

3 Choose **OK** 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

Description   You can label your disks for ease of identification.

```
FUNCTION              FLOPPY DISK


DISK OPERATION        DISK
                      LABEL
        LABEL         MY DISK




Select OK to perform operation        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           SONET

 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:\SONET will be created.

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.
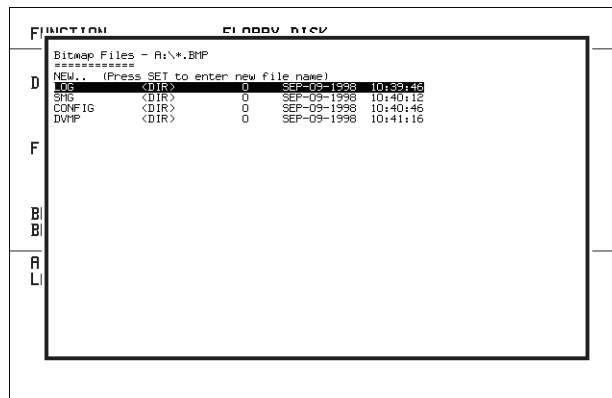
6 Move the highlighted cursor up and down the display using ⬆ and ⬇.

NOTE   **Title Bar** - File types displayed and current directory. (cannot be highlighted).
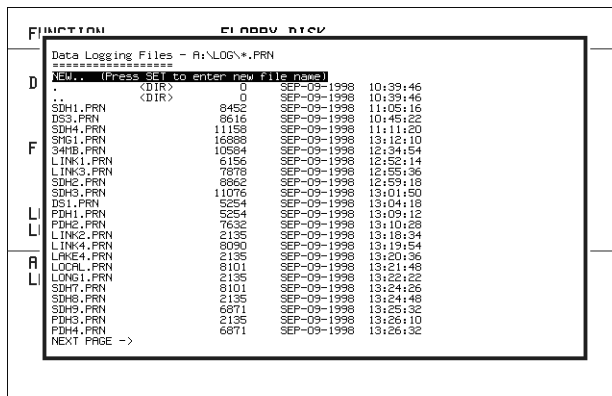
.   <DIR> - Current Directory.

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

SONET1.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              FLOPPY DISK
┌─────────────────────────────────────────────────┐
│ Data Logging Files - A:\LOG\*.PRN                │
│ ================                                 │
│ NEW..  (Press SET to enter new file name)        │
│ .          <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 │
│ SMG1.PRN             16888    SEP-09-1998 13:12:10 │
│ 34MB.PRN             10584    SEP-09-1998 12:34:54 │
│ LINK1.PRN             6156    SEP-09-1998 12:52:14 │
│ LINK3.PRN             7878    SEP-09-1998 12:55:36 │
│ 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 │
│ PDH1.PRN              5254    SEP-09-1998 13:09:12 │
│ PDH2.PRN              7632    SEP-09-1998 13:10:28 │
│ LINK2.PRN             2135    SEP-09-1998 13:18:34 │
│ LINK4.PRN             8090    SEP-09-1998 13:19:54 │
│ LAKE4.PRN             2135    SEP-09-1998 13:20:36 │
│ LOCAL.PRN             8101    SEP-09-1998 13:21:48 │
│ LONG1.PRN             2135    SEP-09-1998 13:22:22 │
│ SDH7.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.

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        A:\
     NAME             FILENAME.CNF

Select OK to perform operation        ▉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 144. 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 144.

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.

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      ▐ OFF ▌          │
│                                                       │
├─────────────────────────────────────────────────────┤
│  A:\                                                  │
│  LABEL:             FREE:          Bytes              │
│                                                       │
│                                                       │
│                                                       │
└─────────────────────────────────────────────────────┘
```

```
STATUS:
 ▐ OFF ▌      ▐  OK  ▌                      ▐ MULTIPLE ▌
                                           ▐ WINDOW   ▌
```

HOW TO: **1**   Choose DISK OPERATION ▐FILE▌ ▐DELETE▌ ▐DELETE▌ .

2   Choose the directory containing the file to be deleted. See "Accessing Directories and Files " page 144.

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.

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        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 147.

HOW TO:

1 Choose the directory you wish to delete (it will appear on the display). See "Accessing Directories and Files " page 144.

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 147.

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             FILENAME.CNF
     DESCRIPTOR       .................
Press SET to select Filename popup

Select OK to perform operation      OFF


A:\
LABEL:              FREE:      Bytes




STATUS:
TIME        FILE                                        MULTIPLE
& DATE      DESC                                        WINDOW
```

HOW TO:

1 Choose the directory containing the file you wish to add the descriptor to. See "Accessing Directories and Files " page 144.

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.

```
RESULTS  TIMING CONTROL

SHORT TERM PERIOD  1 SECOND
TEST TIMING        MANUAL

GRAPH STORAGE      15 MIN RESOL'N
                   DISK
```

```
STATUS:
  INTERNAL      DISK                                        MULTIPLE
                                                            WINDOW
```
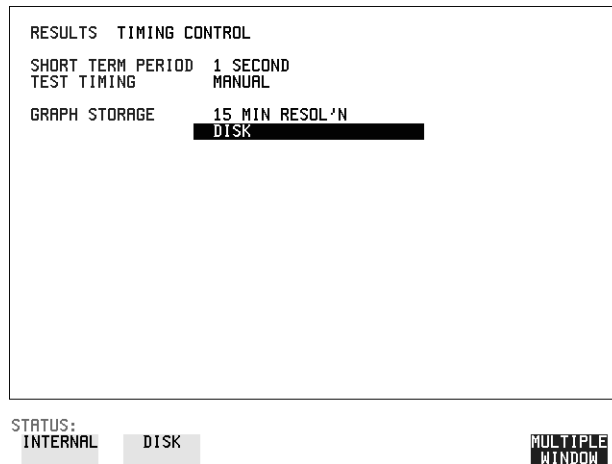
HOW TO: **1** Choose GRAPH STORAGE **DISK** and the Graph Storage resolution required on the **RESULTS** display. See "Saving Graphics Results to Instrument Store" page 112.
If you wish to use the automatically generated filename no further action is required and the graphics results will be saved on Disk when the measurement is completed.

```
 ┌─────────────────────────────────────────────────────────────┐
 │  FUNCTION            FLOPPY DISK                              │
 │                                                              │
 │                                                              │
 │  DISK OPERATION      SAVE                                    │
 │                                                              │
 │                                                              │
 │  FILE TYPE           ▓GRAPHICS▓▓▓▓▓▓▓                        │
 │       NAME           FILENAME.SMG                            │
 │                                                              │
 │                                                              │
 ├──────────────────────────────────────────────────────────── │
 │  A:\                                                         │
 │  LABEL:              FREE:        Bytes                      │
 │                                                              │
 │                                                              │
 │                                                              │
 └─────────────────────────────────────────────────────────────┘
 STATUS:
 ┌────────┐ ┌────────┐ ┌────────┐                        ┌────────┐
 │CONFIG- │ │GRAPHICS│ │DATA    │                        │MULTIPLE│
 │URATION │ │        │ │LOGGING │                        │WINDOW  │
 └────────┘ └────────┘ └────────┘                        └────────┘
```

2 Choose the directory in which to save the graphics results. See "Accessing Directories and Files " page 144.

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 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         DATA LOGGING
      NAME        FILENAME.PRN
                  APPEND TO FILE




A:\
LABEL:            FREE:        Bytes




STATUS:
  OVER-      APPEND                              MULTIPLE
  WRITE      TO FILE                             WINDOW
```

HOW TO: **1**   Choose the directory in which to save the logging results. See "Accessing
Directories and Files " page 144.

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 121.
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             CONFIGURATION
      NAME            SDHANAL .CNF


Select OK to perform operation     OFF


A:\
LABEL:no label        FREE:  1148928 Bytes




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

HOW TO: **1** Set the HP OmniBER 719 to the configuration you wish to store.

1 Choose the directory in which you wish to save the HP OmniBER 719 configuration. See "Accessing Directories and Files " page 144.

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 144.

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             CONFIGURATION
       NAME           █ILENAME.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 144.

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           GRAPHICS
     NAME           FILENAME.SMG

Select OK to perform operation      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 144.

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 113.

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 OmniBER 719 with the same options as the original instrument.

```
FUNCTION            FLOPPY DISK


DISK OPERATION      FILE
                    COPY
FROM:               CONFIGURATION
     1  ATM27........................
TO:
    NAME            FILENAME.CNF

Select OK to perform operation      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 144.

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.

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 OmniBER 719 with the same options as the original instrument.

```
FUNCTION           FLOPPY DISK


DISK OPERATION     FILE
                   COPY
TO:                CONFIGURATION
     4   ATMTEST......................
FROM:
     NAME          FILENAME.CNF

Select OK to perform operation      ██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 144.

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.

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
 FROM:               GRAPHICS
      STORE          -9
 TO:
      NAME           FILENAME.SMG
      FORMAT         NORMAL
 Select OK to perform operation      ▮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 144.

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.

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 OmniBER 719,
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.

7

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-     COUPLED                                    MULTIPLE
     ENDENT                                                 WINDOW
```
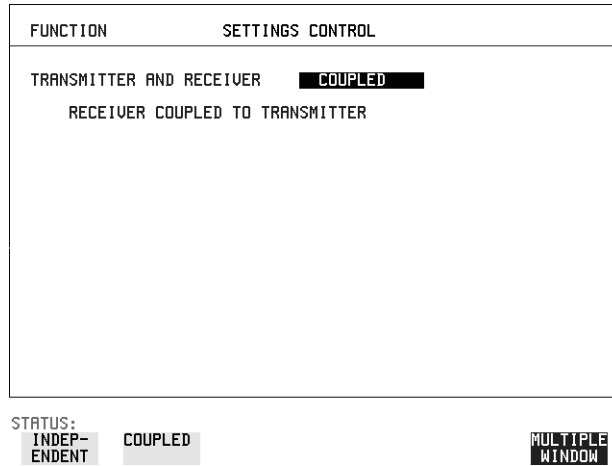
HOW TO: **1** Choose TRANSMITTER AND RECEIVER **COUPLED**.

Setting Time and 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   INCREASE
 DIGIT   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.

Enabling Keyboard Lock

Description

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

This function is provided in the HP OmniBER 719 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
156MTS COMPATIBILITY       OFF

SUSPEND TEST ON SIGNAL LOSS   OFF
REI-L RESULT ENABLE           OFF

GRAPH STORAGE RESOLUTION   COMPRESS
NOTE: storing graph results with Full
resolution will reduce storage capacity
by 50%




STATUS:
    OFF         ON                        MULTIPLE
                                          WINDOW
```

HOW TO:

1 Choose KEYBOARD LOCK **ON** .

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 OmniBER 719 on the OTHER MISCELLANEOUS display.

```
FUNCTION              MISCELLANEOUS
KEYBOARD LOCK                    ON
BEEP ON RECEIVED ERROR          OFF

INBAND DS1 LOOPCODE
156MTS COMPATIBILITY            OFF

SUSPEND TEST ON SIGNAL LOSS     OFF
REI-L RESULT ENABLE             OFF

GRAPH STORAGE RESOLUTION        COMPRESS
NOTE: storing graph results with full
resolution will reduce storage capacity
by 50%
```

```
STATUS:
  OFF        ON                          MULTIPLE
                                         WINDOW
```

HOW TO: **1**   Choose BEEP ON RECEIVED ERROR **ON**.

━━━━━━━━━━ ─────────────────────────

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 compatibile with
HP's 156MTS T-Carrier & SONET tester.

```
FUNCTION            MISCELLANEOUS

KEYBOARD LOCK                  ON
BEEP ON RECEIVED ERROR        OFF

INBAND DS1 LOOPCODE
156MTS COMPATIBILITY          OFF

SUSPEND TEST ON SIGNAL LOSS   OFF
REI-L RESULT ENABLE           ON

GRAPH STORAGE RESOLUTION      COMPRESS
NOTE: storing graph results with full
resolution will reduce storage capacity
by 50%
```

STATUS:
OFF   ON   MULTIPLE
                                        WINDOW

Suspending Test on Signal Loss

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

This function is available on the $\boxed{\text{OTHER}}$ $\boxed{\text{MISCELLANEOUS}}$ display.

```
FUNCTION           MISCELLANEOUS

KEYBOARD LOCK                 ON
BEEP ON RECEIVED ERROR        OFF

INBAND DS1 LOOPCODE
156MTS COMPATIBILITY          OFF

SUSPEND TEST ON SIGNAL LOSS   OFF
REI-L RESULT ENABLE           ON

GRAPH STORAGE RESOLUTION      COMPRESS
NOTE: storing graph results with full
resolution will reduce storage capacity
by 50%
```

STATUS:
OFF   ON   MULTIPLE
                                           WINDOW
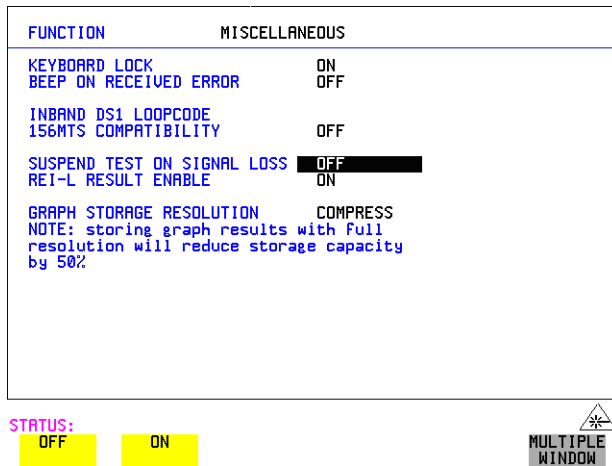
HOW TO: **1**   Choose SUSPEND TEST ON SIGNAL LOSS $\boxed{\text{ON}}$.

REI-L Result/Enable

Description   Before running a test, you can choose to enable or disble the SONET measurement
of REI-L.

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

```
FUNCTION            MISCELLANEOUS

KEYBOARD LOCK                    ON
BEEP ON RECEIVED ERROR          OFF

INBAND DS1 LOOPCODE
156MTS COMPATIBILITY            OFF

SUSPEND TEST ON SIGNAL LOSS     OFF
REI-L RESULT ENABLE             OFF

GRAPH STORAGE RESOLUTION        COMPRESS
NOTE: storing graph results with full
resolution will reduce storage capacity
by 50%




STATUS:
    OFF         ON                              MULTIPLE
                                                 WINDOW
```

HOW TO: **1**   Choose REI-L ENABLE **ON** or **OFF**   as required.

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

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     OFF
REI-L RESULT ENABLE             OFF

GRAPH STORAGE RESOLUTION        COMPRESS
NOTE: storing graph results with full
resolution will reduce storage capacity
by 50%
```

STATUS:
COMPRESS   FULL   MULTIPLE
                                                      WINDOW

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 OmniBER 719 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^-3

 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.

Setting Screen Brightness and Color

Description   The HP OmniBER 719 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.

```
  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.

Dumping Display to Disk

Description   The chosen display may be stored on disk in bitmap format using the Screen Dump feature of the HP OmniBER 719. Logging and Floppy Disk must be set up for screen dump. The current display is stored on disk when $\boxed{\text{PRINT NOW}}$. 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 | SETTINGS CONTROL | FLOPPY DISK | LOGGING | MORE .... | MULTIPLE WINDOW |

HOW TO: **1** Choose LOGGING SETUP $\boxed{\text{DEVICE}}$ and LOGGING PORT $\boxed{\text{DISK}}$ on the $\boxed{\text{OTHER}}$, $\boxed{\text{LOGGING}}$ display.

2 Choose LOGGING SETUP $\boxed{\text{CONTROL}}$ LOG ON DEMAND $\boxed{\text{SCREEN DUMP}}$ on the $\boxed{\text{OTHER}}$, $\boxed{\text{LOGGING}}$ display.

3 If compression is required to save disk space, select BITMAP COMPRESSION (RLE) $\boxed{\text{ON}}$.

```
FUNCTION              FLOPPY DISK

DISK OPERATION        SAVE


FILE TYPE             SCREEN DUMP
       NAME           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 144.

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 filname. 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.

Running Self Test

Description Before using the HP OmniBER 719 to make measurements, you can run Self Test ALL TESTS to ascertain the integrity of the HP OmniBER 719. These tests take between 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    ⊞ ALL




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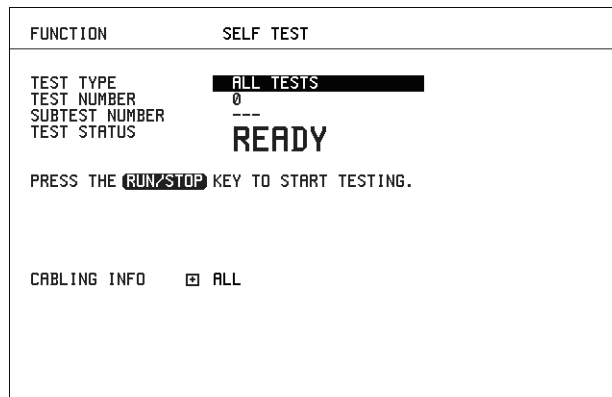
```
 STATUS:
  ALL      CPU      CONF.    PDH      MORE     MULTIPLE
  TESTS    TESTS    TESTS    TESTS    ........  WINDOW
```

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 OmniBER 719 will FAIL Self Test.

4 Press $\boxed{\text{RUN/STOP}}$ 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 OmniBER 719 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 OmniBER 719 should be returned to a service office for repair.

```
FUNCTION            SELF TEST

TEST TYPE           █CONFIDENCE TEST█
TEST NUMBER         2
SUBTEST NUMBER      ---
TEST STATUS         PASSED

PRESS THE █RUN/STOP█ KEY TO START TESTING.



CABLING INFO    ⊞ CONF. TEST
```

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

HOW TO: **Run Confidence TESTS**

1 Choose TEST TYPE **CONF. TESTS** on the $\boxed{\text{OTHER}}$ **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 $\boxed{\text{RUN/STOP}}$ 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 OmniBER 719 is functioning correctly, after a time of 2 to 3minutes,
TEST STATUS PASSED is displayed.
If TEST STATUS [FAIL nnn] is displayed, the HP OmniBER 719 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
$\boxed{\text{SET}}$. The Loopbacks list will appear on the display.

```
FUNCTION          SELF TEST

TEST TYPE         PDH TESTS
TEST NUMBER       3
SUBTEST NUMBER    ---
TEST STATUS       READY

    PDH SELFTEST - CABLING INFORMATION


    PAYLOAD MODULE CONNECTIONS :
        CONNECT PDH OUT TO PDH IN (UNBALANCED DS3, 2Mb/s, 34Mb/s)
        CONNECT PDH OUT TO PDH IN (BALANCED 2Mb/s)
        CONNECT MUX TO DEMUX (BALANCED DS1)
        CONNECT MUX TO DEMUX (UNBALANCED 2Mb/s)
```

STATUS:

MULTIPLE
WINDOW

Appendix A

STS-1 SPE Background Patterns

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

Table 4   **STS-1 SPE Background Patterns**

Foreground	Background choice in Foreground TUG-3	Background choice in other AU-3
STS-1 SPE	---------	VT-1.5, VT-2 Mapping or SPE Word (8 bit user programmable word).
VT-6	Pattern in other VT-6s is numbered. They contain the word 11NNNNNx, where NNNNN is the binary number of the TU.	VT-1.5, VT-2 Mapping or SPE Word (8 bit user programmable word).
VT-2 (2 Mb/s) Unframed	VT-2 structure, unframed with 2E15-1, 2E9-1 PRBS or 1100 word pattern in all information bits.	VT-2, VT-1.5 Mapping or SPE Word (8 bit user programmable word).
VT-2 (2 Mb/s) Framed	VT-2 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.	VT-2, VT-1.5 Mapping or SPE Word (8 bit user programmable word).
VT-1.5 (DS1) Unframed	VT-1.5 structure, D4 framed with 2E15-1, 2E9-1 PRBS or 1100 Word pattern in other TU-11s.	VT-2, VT-1.5 Mapping or SPE Word (8 bit user programmable word).

Table 4   **STS-1 SPE Background Patterns, continued**

Foreground	Background choice in Foreground TUG-3	Background choice in other AU-3
VT-1.5 (DS1) Framed	VT-1.5 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	VT-2, VT-1.5 Mapping or SPE Word (8 bit user programmable word).

STS-1 SPE Background Patterns

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 5   **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

Table 5   **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÷ 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 5   **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 terms and abbreviations used in the HP OmniBER 719.

Glossary

A

AAL	ATM Adaptation Layer
ABR	Available Bit Rate
ADDF	Automatic Digital Distribution Frame
ADM	Add Drop Multiplexer
ADPCM	Adaptive Differential Pulse Coded Modulation
AIM	ATM Inverse Multiplexer
AIS	Alarm Indication Signal
AMI	Alternate Mark Inversion
ANSI	American National Standards Institute
APS	Automatic Protection Switching
ASCII	American Standard Code for Information Interchange
ATM	Asynchronous Transfer Mode
AU	Administrative Unit
AU-AIS	AU Pointer Justification Event
AU-LOP	Loss of AU Pointer
AU-NDF	AU Pointer New Data Flag

B

BBER	Background Block Error Ratio
BC	Background Channel
BCD	Binary Coded Decimal
BER	Bit Error Rate
BERT	Bit Error Rate Testing
BIP	Bit Interleaved Parity
BPS	Bits Per Second
BPV	Bipolar Violation

C

CAS	Channel Associated Signaling
CBR	Constant Bit Rate
CCITT	Consultative Committee on International Telegraphy and Telephony
CCS	Common Channel Signaling
CDT	Cell Delay Tolerance
CDV	Cell Delay Variation
CEPT	Committee of European PTTs
CMI	Coded Mark Inversion
CO	Central Office
CPE	Customer Premises Equipment
CRC	Cyclic Redundancy Check
CSES	Consecutive Severely Errored Seconds

D

D/I	Drop and Insert
DACS	Digital Access and Cross-connect Switches
dB	Decibel
DCC	Data Communications Channel
DCS	Digital Cross-connect Switches
DDF	Digital Distribution Frame
DDN	Digital Data Network

DTMF	Dual Tone Multifrequency Signaling
DWDM	Dense Wave Division Multiplexing
DXC	Digital Cross Connect

E

EB	Error Block
EOW	Engineering Orderwire
ES	Error Seconds
ESF	Extended Superframe Format
ESR	Errored Second Ratio
ETSI	European Telecommunications Standards Institute

F

FAS	Frame Alignment Signal
FC	Foreground Channel
FDDI	Fiber Distributed Data Interface
FEAC	Far End Alarm Channel
FEBE	Far End Block Error
FEC	Forward Error Connection
FERF	Far End Receive Failure

G

GUI	Graphical User Interface

H

HDB3	High Density Bipolar 3
HEC	Header Error Control
HO Path RAI	High Order Path Remote Alarm Indication
HO PTE	High Order Path Terminating Equipment

HO	High Order
HP-IB	Hewlett-Packard Interface Bus (IEEE 488)
HP-PLM	High Path Payload Label Mismatch
HP-RDI	High Path Remote Defect Indication
HP-REI	High Path Remote Error Indication
HP-TIM	High Path Trace Identifier Mismatch
HP-UNEQ	High Path Unequipped
Hz	Hertz (cycles per second)

I

ISDN	Integrated Services Digital Network
ISO	International Standards Organization
ITU	International Telecommunications Union

L

LAN	Local Area Network
LO	Low Order
LOF	Loss of Frame
LOP	Loss of Path
LOS	Loss of Signal
LP-PLM	Low Path Payload Label Mismatch
LP-RDI	Low Path Remote Defect Indication
LP-REI	Low Path Remote Error Indication
LP-RFI	Low Path Remote Failure Indication
LP-TIM	Low Path Trace Identifier Mismatch
LP-UNEQ	Low Path Unequipped
LSB	Least Significant Bit

LTE	Line Terminal Equipment		PBX	Private Branch Exchange
LTM	Line Terminal Multiplexer		PC	Personal Computer
			PCM	Pulse Code Modulation
M			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
			POTS	Plain Old Telephone Service
MS-REI	Multiplex Section Remote Error Indication		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			
NFAS	Non Frame Alignment Signal		PU	Physical Unit
O			**Q**	
OAM	Operations, Administration and Maintenance		QoS	Quality of Service
OC	Optical Carrier		**R**	
OH	Overhead		RAI	Remote Alarm Indication
OLTU	Optical Line Terminal Unit		RDI	Remote Defect Indication
OOF	Out of Frame		REBE	Remote End Block Error
OS	Operations System			
P			REI	Remote Error Indication
P/AR	Peak-to-Average Ratio		RF	Radio Frequency
			RS	Regenerator Section

RSOH	Regenerator Section Overhead
RSTE	Regenerator Section Terminating Equipment
RS-TIM	Regenerator Section Trace Identifier Mismatch
RX	Receiver

S

S/N	Signal to Noise Ratio
SCPI	Standard Commands for Programmable Instrumentation
SDH	Synchronous Digital Hierarchy
SDXC	Synchronous Digital Cross Connect
SEF	Severely Errored Frame
SES	Severely Errored Second
SESR	Severely Errored Seconds Ratio
SF	Super Frame
SOH	Section Overhead
SONET	Synchronous Optical Network
SPE	Synchronous Payload Envelope
STE	Section Terminating Equipment
STM	Synchronous Transport Module
STS	Synchronous Transport Signal
SUT	System Under Test

T

TDM	Time Division Multi-plexing
TDMA	Time Division Multiple Access

TE	Terminal Equipment
TMN	Telecommunications Management Network
TOH	Transport Overhead
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

U

UI	Unit Interval

V

VBR	Variable Bit Rate
VC	Virtual Channel
VC-n	Virtual Container
VP	Virtual Path
VT	Virtual Tributary
VXI	VMEbus Extensions for Instrumentation

W

WAN	Wide Area Network
WDM	Wave Division Multi-plexing

Glossary of Terms

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