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Verification Manual

OmniBER 720

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1 General Information

Warranty

HP PRODUCT	DURATION OF WARRANTY
Omniber 720	3 years

1 Agilent Technologies warrants Agilent hardware, accessories and supplies against defects in materials and workmanship for the period specified above. If Agilent receives notice of such defects during the warranty period, Agilent will, at its option, either repair or replace products which prove to be defective. Replacement products may be either new or like-new.

2 Agilent warrants that Agilent software will not fail to execute its programming instructions, for the period specified above, due to defects in material and workmanship when properly installed and used. If Agilent receives notice of such defects during the warranty period, Agilent will replace software media which does not execute its programming instructions due to such defects.

3 Agilent does not warrant that the operation of Agilent products will be uninterrupted or error free. If Agilent is unable, within a reasonable time, to repair or replace any product to a condition as warranted, customer will be entitled to a refund of the purchase price upon prompt return of the product.

4 Agilent products may contain remanufactured parts equivalent to new in performance or may have been subject to incidental use.

5 The warranty period begins on the date of delivery or on the date of installation if installed by Agilent. If customer schedules or delays Agilent installation more than 30 days after delivery, warranty begins on the 31st day from delivery.

6 Warranty does not apply to defects resulting from (a) improper or inadequate maintenance or calibration, (b) software, interfacing, parts or supplies not supplied by Agilent, (c) unauthorized modification or misuse, (d) operation outside of the published environmental specifications for the product, or (e) improper site preparation or maintenance.

7 TO THE EXTENT ALLOWED BY LOCAL LAW, THE ABOVE WARRANTIES ARE EXCLUSIVE AND NO OTHER WARRANTY OR CONDITION, WHETHER WRITTEN OR ORAL, IS EXPRESSED OR

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IMPLIED AND AGILENT SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY, SATISFACTORY QUALITY, AND FITNESS FOR A PARTICULAR PURPOSE.

8 Agilent will be liable for damage to tangible property per incident up to the greater of $300,000 or the actual amount paid for the product that is the subject of the claim, and for damages for bodily injury or death, to the extent that all such damages are determined by a court of competent jurisdiction to have been directly caused by a defective Agilent product.

9 TO THE EXTENT ALLOWED BY LOCAL LAW, THE REMEDIES IN THIS WARRANTY STATEMENT ARE CUSTOMER'S SOLE AND EXCLUSIVE REMEDIES. EXCEPT AS INDICATED ABOVE, IN NO EVENT WILL AGILENT OR ITS SUPPLIERS BE LIABLE FOR LOSS OF DATA OR FOR DIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFIT OR DATA), OR OTHER DAMAGE, WHETHER BASED IN CONTRACT, TORT, OR OTHERWISE.

FOR CONSUMER TRANSACTIONS IN AUSTRALIA AND NEW ZEALAND: THE WARRANTY TERMS CONTAINED IN THIS STATEMENT, EXCEPT TO THE EXTENT LAWFULLY PERMITTED, DO NOT EXCLUDE, RESTRICT OR MODIFY AND ARE IN ADDITION TO THE MANDATORY STATUTORY RIGHTS APPLICABLE TO THE SALE OF THIS PRODUCT TO YOU.

Responsibilities of the Customer

The customer shall provide:

1 Access to the products during the specified periods of coverage to perform maintenance.

2 Adequate working space around the products for servicing by Agilent personnel.

3 Access to and use of all information and facilities determined necessary by Agilent to service and/or maintain the products. (Insofar as these items may contain proprietary or classified information, the customer shall assume full responsibility for safeguarding and protection from wrongful use.)

4 Routine operator maintenance and cleaning as specified in the Agilent Operating and Service Manuals.

5 Consumables such as paper, disks, magnetic tapes, ribbons, inks, pens, gases, solvents, columns, syringes, lamps, septa, needles, filters, frits, fuses, seals, detector flow cell windows, etc.

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Certification

Agilent certifies that this product met its published specifications at the time of shipment from the factory. Agilent further certifies that its calibration measurements are traceable to the United States National Bureau of Standards, to the extent allowed by the Bureau's calibration facility and to the calibration facilities of other International Standards Organization members!

Assistance

Product maintenance agreements and other customer assistance agreements are available for Agilent products.

Notice

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Agilent shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of this material.

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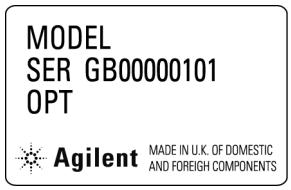
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Instruments Covered By Manual

Attached to the rear panel of the instrument is a serial number plate. The serial number plate has a two letter reference denoting country of origin (GB = Great Britain) and an eight digit serial number. The serial number is unique to each instrument and should be quoted in all correspondence with Agilent, especially when ordering replacement parts. Refer to Chapter 6 for instrument options covered.



Serial Number Plate

Storage and Shipment

The instrument may be stored or shipped in environments within the following limits:

Temperature -20^{o} C to +70^{o} C

-15^{o} C to +50^{o} C with lid printer

Altitude Up to 4,600 meters (15,000 feet)

The instrument should also be protected from temperature extremes which could cause condensation within the instrument.

Repackaging for Shipment

Tagging for Service. If the instrument is being returned to Agilent for service, please complete a repair tag and attach it to the instrument.

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Original Packaging. Containers and materials identical to those used in factory packaging are available from Agilent offices. If the instrument is being returned to Agilent for servicing, attach a tag indicating the type of service required, return address, model number, and full serial number. Mark the container FRAGILE to ensure careful handling. In any correspondence, refer to the instrument by model number and full serial number.

Other Packaging. The following general instructions should be followed when repackaging with commercially available materials:

- Wrap instrument in heavy paper or plastic. If the instrument is being shipped to Agilent, attach a tag indicating the type of service required, return address, model number and full serial number.
- Use a strong shipping container. A double wall carton made of 350 pound test material is adequate.
- Use a layer of shock absorbing material 70 to 100 mm (3 to 4 inch) thick, around all sides of the instrument to provide firm cushioning and prevent movement inside the container. Protect the Front Panel controls and Rear Panel connectors with cardboard.
- Seal shipping container securely.
- Mark shipping container FRAGILE to ensure careful handling.
- In any correspondence, refer to instrument by model number and full serial number.

Weight and Dimensions

Weight:	12 kg (26 lb)
Dimensions:	190mm (7.5in) high, 340mm (14in) wide, 420mm (17in) deep (including cover).

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Safety Precautions for the Operator

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent assumes no liability for the customer's failure to comply with these requirements.

In particular, the operator should note the following safety information:

- "Safety Symbols" on page 1-7
- "Connecting to the Power Supply" on page 2-4
- "Operating Environment" on page 2-2
- "Fuse Replacement" on page 2-3
- "Operators Maintenance" on page 1-8
- "Lifting/Carrying the OmniBer 720" on page 1-6

DO NOT operate damaged equipment: Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to a Agilent Sales and Service Office for service and repair to ensure the safety features are maintained.

Lifting/Carrying the OmniBer 720

Before attempting to lift or carry the instrument consider the following basic lifting techniques to help avoid personal injury.

Using both arms to lift instrument.

- Reach for the instrument - bend your knees and waist, and keep your back straight.
- GRASP the instrument firmly.
- LIFT with your legs.
- KEEP your shoulders level.

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Safety Symbols

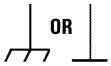
The following symbols on the instrument and in the manual indicate precautions which must be taken to maintain safe operation of the instrument



The Instruction Documentation Symbol. The product is marked with this symbol when it is necessary for the user to refer to the instructions in the supplied documentation.



Indicates the field wiring terminal that must be connected to earth ground before operating the equipment - protects against electrical shock in case of fault.



Frame or chassis ground terminal - typically connects to the equipment's metal frame.



Alternating current (AC)



Direct current (DC)



Indicates hazardous voltages

WARNING

Warning denotes a hazard. It calls attention to a procedure, which if not correctly performed or adhered to could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.

CAUTION



Caution denotes a hazard. It calls attention to a procedure, which if not correctly performed or adhered to could result in damage to or destruction of the instrument. Do not proceed beyond a caution note until the indicated conditions are fully understood and met.



Indicates that a laser is fitted. The user must refer to the manual for specific Warning or Caution information to avoid personal injury or damage to the product.

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Operators Maintenance

WARNING **NO OPERATOR SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL. TO PREVENT ELECTRICAL SHOCK DO NOT REMOVE COVERS.**

Maintenance appropriate for the operator is:

- Cabinet cleaning
- Optical Connector Cleaning
- Power supply fuse replacement
- Ensure ventilating fan cover is clean.

Cleaning

Instrument Cleaning

Clean the cabinet using a dry cloth only.

Optical Connector Cleaning

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

Description	Agilent 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.

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1 Recall Default settings (STORED SETTINGS 0) and remove the power from the Omniber 720.

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.

Power Supply Fuse Replacement

See “Fuse Replacement” on page 2-3

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Statement of Compliance

This instrument has been designed and tested in accordance with IEC Publication 1010-1 + A1:1992 Safety requirements for Electrical Equipment for Measurement, Control and Laboratory Use, and has been supplied in a safe condition. The instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the instrument in a safe condition.



The CE mark shows that the product complies with all relevant European legal Directives.

ISM 1-A

This is a symbol of an Industrial Scientific and Medical Group 1 Class A product.



The CSA mark is a registered trademark of the Canadian Standards Association.

Australian EMC Regulations



The C-Tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australian EMC Framework Regulations under the terms of the Radiocommunications Act of 1992.

Noise Declaration (German)

LpA<70dB

am Arbeitsplatz (operator position)
normaler Betrieb (normal position)
nach DIN 45635 pt.19 (per ISO 7779)

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Electromagnetic Compatibility

This product conforms with the protection requirements of European Council Directive 89/336/EEC for Electromagnetic Compatibility (EMC).

The conformity assessment requirements have been met using the technical Construction file route to compliance, using EMC test specifications EN 55011:1991 (Group 1, Class A) and EN 50082-1:1992.

In order to preserve the EMC performance of the product, any cable which becomes worn or damaged must be replaced with the same type and specification.

See the Declaration of Conformity on page 1-12.

See also “10 Base-T Lan Connection Radiated Emissions” on page 2-11.

Electrostatic Discharge:

"When any electrostatic air discharge is applied to the OmniBER according to IEC 61000-4-3:1995, degradation of performance may be observed in the form of occasional bit errors being counted."

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DECLARATION OF CONFORMITY

According to ISO/IEC Guide 22 and CEN/CENELEC EN45014

Manufacturer's Name:	**Agilent Technologies UK Ltd.**
Manufacturer's Address:	Telecomms Networks Test Division South Queensferry West Lothian, EH30 9TG Scotland, United Kingdom

Declares that the product

Product Name:	OmniBER 720 Communications Performance Analyzer
Model Number:	J1407A
Product Options:	This declaration covers all options of the above product as detailed in TCF A-5951-9852-01.

EMC:

Conforms with the protection requirements of European Council Directive 89/336/EEC on the approximation of the laws of the member states relating to electromagnetic compatibility, against EMC test specifications EN 55011:1991 (Group 1, Class A) and EN 50082-1:1992.

As Detailed in:	Electromagnetic Compatibility (EMC) Technical Construction File (TCF) No. A-5951-9852-01
Assessed by:	DTI Appointed Competent Body EMC Test Centre, GEC-Marconi Avionics Ltd., Maxwell Building, Donibristle Industrial Park, Hillend, Dunfermline KY11 9LB Scotland, United Kingdom

Technical Report Number:6893/2200/CBR, dated 21 August 1997

Safety:

The product conforms to the following safety standards:

IEC 61010-1(1990) +A1(1992) +A2(1995) / EN 61010-1:1993
IEC 60825-1(1993) / EN 60825-1:1994
Canada / CSA-C22.2 No. 1010.1-93
USA / CFR Ch.1 1040.10

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC, and carries the CE mark accordingly.

South Queensferry, Scotland. ***24 March 2000*** WR Pea

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DECLARATION OF CONFORMITY

According to ISO/IEC Guide 22 and CEN/CENELEC EN45014

W.R. Pearson / Quality Manager

For further information, please contact your local Agilent Technologies sales office, agent, or distributor.

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2 Installation

Initial Inspection

WARNING **TO AVOID HAZARDOUS ELECTRICAL SHOCK, DO NOT PERFORM ELECTRICAL TESTS WHEN THERE ARE SIGNS OF SHIPPING DAMAGE TO ANY PORTION OF THE OUTER ENCLOSURE (COVERS, PANELS, METERS).**

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the instrument has been checked both mechanically and electrically. Procedures for checking electrical operation are given in Chapter 3. If the contents of the shipment are incomplete, if there is mechanical damage or defect, notify the nearest Agilent Technologies Office. If the instrument does not pass the electrical performance tests given in Chapter 3, notify the nearest Agilent office. If the shipping container is also damaged, or the cushioning material shows signs of stress, notify the carrier as well as the nearest Agilent office. Keep the shipping materials for the carrier's inspection. The Agilent office will arrange for repair or replacement without waiting for claim settlement.

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Operating Environment

This instrument is designed for Indoor use only.

DO NOT operate the product in an explosive atmosphere or in the presence of flammable gasses or fumes.

This instrument may be operated in environments within the following limits:

Temperature:	0^{o}C to $+45^{o}$C
	$+5^{o}$C to $+35^{o}$C with lid printer
Altitude	up to 3050m (10,000ft)
Humidity	up to 95% relative humidity to 40^{o}C, but it should be protected from temperature extremes which may cause condensation.

To ensure adequate cooling do not obstruct air vents in the instrument cabinet. Do not for example operate the instrument if it is standing on its rear feet, as air vents may be obstructed by floor covering.

CAUTION This instrument is designed for use in Installation Category II and Pollution Degree 2 per IEC 61010 and 60664 respectively.

CAUTION VENTILATION REQUIREMENTS: When installing the instrument in a cabinet, the convection into and out of the instrument must not be restricted. If the total power dissipated in the cabinet is greater than 800 watts, then forced convection must be used.

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Preparation for Use

WARNING **FOR CONTINUED PROTECTION AGAINST FIRE HAZARD REPLACE FUSE ONLY WITH SAME TYPE AND RATINGS (see "Fuses" on page 2-3).**

WARNING **If this instrument is not used as specified, the protection provided by the equipment could be impaired. This instrument must be used in a normal condition only (in which all means for protection are intact).**

Power Requirements



The OmniBER 720 Communications Performance Analyzer requires a power source of 100 V to 240 V ac at a frequency between 47 Hz and 63 Hz (nominal).

Total power consumption is 450 VA (maximum).

The fuse rating for the power source is given in the following table.

Fuses

Line Voltage	Fuse Rating	Agilent Part Number
100 V to 240 V	5 A Timed, 250 V	2110-1120

Fuse Replacement

Only the ac line fuse located at the rear of the instrument may be replaced by the operator.

WARNING **ALL OTHER FUSE REPLACEMENT SHOULD ONLY BE CARRIED OUT BY SUITABLY TRAINED SERVICE PERSONNEL AWARE OF THE HAZARDS INVOLVED.**

WARNING **BEFORE REMOVING THE FUSE, THE AC LINE POWER CORD SHOULD BE DISCONNECTED FROM THE POWER SOURCE AND THE OTHER END DISCONNECTED FROM THE INSTRUMENT.**

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WARNING **ONLY USE A FUSE OF THE CORRECT RATING AS LISTED IN "Fuses" on page 2-3. DO NOT** use repaired fuses or short-circuited fuseholders: For continued protection against fire, replace the line fuse(s) only with fuse(s) of the same voltage and current rating and type.

The fuse is removed by inserting a suitable flat bladed tool into the slot in the fuse cap and turning counter-clockwise. The cap and the fuse can then be removed and the fuse changed for another of the correct rating. The fuse rating and Agilent part number are listed in "Fuses" on page 2-3.

Connecting to the Power Supply

WARNING **This is a Safety Class I instrument (provided with a protective earthing ground, incorporated in the powercord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the instrument is likely to make the instrument dangerous. Intentional interruption is prohibited.**

WARNING **Appliance coupler (mains input power cord) is the power disconnect device. Do not position the instrument such that access to the coupler is impaired.**

CAUTION Before switching on this instrument, make sure that the line supply voltage is in the specified ranges. Range selection is automatic.

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Power Cord

WARNING **TO AVOID THE POSSIBILITY OF INJURY OR DEATH, THE FOLLOWING PRECAUTIONS MUST BE FOLLOWED BEFORE THE INSTRUMENT IS SWITCHED ON:-**

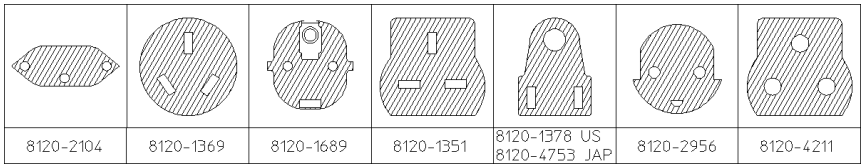
WARNING **(a) Note that the protection provided by grounding the instrument cabinet may be lost if any power cable other than the three-pronged type is used to couple the ac line voltage to the instrument. Under these circumstances, the external protective earth terminal will be connected to ground.**

WARNING **(b) If this instrument is to be energized via an auto-transformer to reduce or increase the line voltage, make sure that the common terminal is connected to the neutral pole of the power source.**

WARNING **(c) The power cable plug shall only be inserted into a socket outlet provided with a protective ground contact. The protective action must not be negated by the use of an extension cord without a protective conductor (grounding).**

The power cord supplied with each instrument varies with the country of destination. The following figure illustrates the standard power plug and cord configurations that are commonly used. The part number shown beneath each plug is the part number of the appropriate power cord and plug. If the appropriate power cord is not included with the instrument notify the nearest Agilent office and a replacement will be provided.

Power Cord Configurations and Part Numbers



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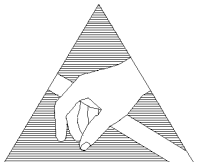
Connecting to the Network

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

Before Connecting, note the Warning and Caution information given.

All Connectors

CAUTION



When connecting or disconnecting, ensure that you are grounded or, make contact with the metal surface of the Mainframe with your free hand to bring you, the module, and the mainframe to the same static potential.
Modules remain susceptible to ESD damage while the module is installed in the Mainframe
Additional ESD information is required when servicing see “Additional Precautions for Service Engineers” on page 2-13

Electrical Interface Connectors

RECEIVER 2,8,34,DS3 IN

64k REF IN
10M REF IN
2M REF IN

DS1 REF IN These ports allow connection of timing reference signals.

64k REF IN
1.5M REF IN
2M REF IN These ports allow connection of timing reference signals. Note, unused ports must not have a signal present.

REF OUT Provides a 2 MHz reference Clock Output.

MUX

CLOCK TRIGGER Reference SONET clock trigger output 51 MHz; nominal +/- 400 mV into 50 ohms.

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DCC

Allows the Drop and Insert of Regenerator Section (192 kb/s) and Multiplexer Section (576 kb/s) Data Communication Channels (DCC).

The following connections are available:

Pin Number	Connection
1	Shield Ground
2	Data input for Tx(-)
3	Tx Clock
4	Data Output from Rx(-)
5	NC
6	Rx Clock(-)
7	NC
8	Signal Ground
9	Data Input for Tx(+)
10	Tx Clock(+)
11	Data output from Rx(+)
12	NC
13	Rx Clock(+)
14	NC
15	NC

PROTECTED MONITOR POINT INPUT

52/155/622 Mb/s (NRZ); Line Code NRZ; Level nominal 1 V p-p into 50 ohms; SMA connector.

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Optical Interface Connectors

For your protection, review all laser information given in this 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.

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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 -8 dBm. **NEVER EXCEED +3 dBm**.
Accepts SONET optical signals OC-1, OC-3, OC-12, and OC-48 depending on the model and options fitted.

OPTICAL OUT

Provides SONET optical signals OC-1, OC-3, OC-12 or OC-48 at wavelength 1290 to 1330 nm at a nominal power level of +1 dBm depending on the model and options fitted.

Cleaning Optical Connectors

See “Optical Connector Cleaning” on page 1-8

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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.

Printer GPIB, RS232, PARALLEL ONLY

External printer connection details are given in the SONET User's Guide.
The port selected for external printer use is not available for remote control.

Remote Control 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".

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General Purpose Interface Bus

The OmniBER 720 Communications Performance Analyzer (Option 601) is connected to the GPIB by means of an appropriate GPIB cable.The GPIB interconnecting cables available are listed in the following table.

GPIB Interconnecting Cables

Length	Agilent Accessory Number
1 meter	10833A
2 meters	10833B
4 meters	10833C
0.5 meter	10833D

To achieve interface design performance standards, restrictions are placed on the GPIB system cable lengths. These restrictions allow the bus interface electronics to maintain correct line voltage levels and timing relationships.

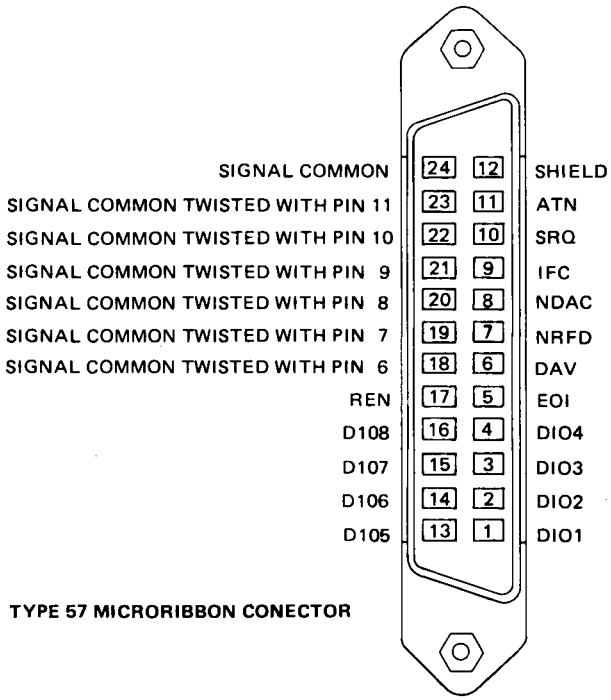
When connecting an GPIB system the following rules should be observed:

The total GPIB cable length used must be less than or equal to 20 meters (65.6 feet).

The total GPIB cable length used must be less than or equal to 2 meters (6 feet) × the total number of devices connected to the bus.

A standard GPIB connector is provided on the instrument. The connections are shown in the following figure. The mating connector Agilent part number is 1251-0293 or Amphenol 57-30240.

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TYPE 57 MICRORIBBON CONECTOR

GPIB Address Selection

The OmniBER 720 (Option 601) GPIB address is accessed on the OTHER display under the REMOTE CONTROL function.

The address can be set to any value between 0 and 30 inclusive.

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Additional Precautions for Service Engineers

Safety Precautions

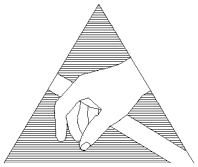
DO NOT substitute parts or modify equipment: Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to a Agilent Sales and Service Office for service and repair to ensure the safety features are maintained.

DO NOT service or adjust alone: Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, service personnel must not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

Review “Safety Precautions for the Operator” on page 1-6

ESD Precautions

CAUTION



When making connections to the modules, review “Connecting to the Network” on page 2-6.

The module contains components sensitive to electrostatic discharge.
To prevent component damage, carefully follow the handling precautions presented below.

The smallest static voltage most people can feel is about 3500 volts. It takes less than one tenth of that (about 300 volts) to destroy or severely damage static sensitive circuits. Often, static damage does not immediately cause a malfunction but significantly reduces the component’s life. Adhering to the following precautions will reduce the risk of static discharge damage.

- Keep the module in its conductive storage box when not installed in the Mainframe. Save the box for future storage of the module.
- Before handling the module, select a work area where potential static sources are minimized. Avoid working in carpeted areas and non-conductive chairs. Keep body movement to a minimum. Agilent recommends that you use a controlled static workstation.

- Handle the module by its front-panel. Avoid touching any components or edge

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connectors. When you install the module, keep one hand in contact with the protective bag as you pick up the module with your other hand. Then, before installing the module, 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. **This also applies whenever you connect/disconnect cables on the front-panel.**

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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 OmniBER 720 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.

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3 Performance Tests

Introduction

The procedures given in this Section, test the OmniBER 720 performance using the specifications provided, as performance standards. Tests are intended to be performed in the recommended order for a full instrument calibration check. Tests can be run individually, however it will be assumed that any preceding test would meet specifications.

Equipment Required

Equipment required for the Performance Tests is given in this chapter. Any equipment which meets or exceeds the critical specification of the equipment listed, may be substituted. Recommended Agilent models are those typically used in Agilent Service Centers. Alternative models are also listed.

Performance Test Record

The results of the Performance Tests may be recorded on the Test Records at the end of this chapter. The Performance Test Record lists all the tested specifications and the acceptable limits. The results recorded at incoming inspection may be used for comparison during periodic maintenance, troubleshooting or after repair or adjustment.

Calibration Cycle

This instrument requires periodic verification of performance. Depending on use and environmental conditions, the instrument should be checked approximately once every 2 years, using these Performance Tests.

Instrument Model and Option Configuration

Please refer to chapter 6 and the instrument specifications for information on option configuration.

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Figure 3-1 **Recommended Test Equipment**

Instrument	Critical Specification	Recommended Agilent Model
Oscilloscope	400 MHz Bandwidth, 1 MΩ Input Termination Telecom mask measurement capability.	54520A opt 001 or 54810A opt 001
Frequency Synthesizer	75Ω Output, Sinewave to 80 MHz, Amplitude to 3 V pk-pk at 10 kHz, 1 Hz resolution	3335A opt 001 or 3325B & 8657A with 50/75Ω matching pad
Signal Generator	Sinewave 700 kHz to 170 MHz, Amplitude 500 mV	8657A
Frequency Counter	Range 0 to 200 MHz, 2 channels with accuracy <0.1ppm. (Ratio Mode)	5325A opt 010 or 53181A opt 001
Spectrum Analyzer**	Frequency >2.5 Gb/s. Resolution bandwidth 10 Hz.	8560E
Optical Coupler**	1310 and 1510 nm. 10/90% output.	15477C
Optical Power Meter and Sensor Module	Range -8 dBm to -15 dBm, Wavelength1270-1560 nm	8153A and 81536A
Lightwave Converter	Wavelength 1300 to 1560 nm, Conversion Gain >300 volts/watt, Frequency Response < 3 dB down at 1 GHz.	11982A opt 012
Optical Attenuator	Wavelength 1200 - 1600 nm, Range 0 - 30 dB	8157A or 8156A opt 100
FC/PC Optical Interface Connector	Unique	81000FI (Qty 4)
Optical Cables	Unique	11871A (Qty 2)
64 kb/s Clock Generator	64 kb/s ternary clock.	37732A
Adaptor	SMA to BNC	1250-1787 (Qty 2)
Balanced/Unbalanced Converter	110Ω balanced: 75Ω Unbalanced (nominal)	15508B (Qty 2)

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Self Test Loopback Cables and Accessories

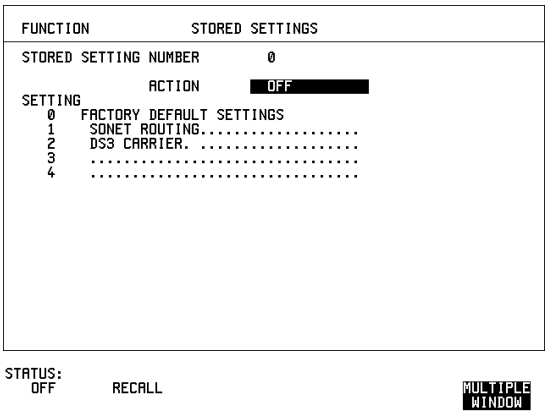
E4545A 3 m fibre optic cable FC/CP connectors. (supplied accessory)
E4546A FC/CP 15 dB attenuator. (supplied accessory)
15525A 75 ohm BNC, 3 off.
15512A Siemens 3 pin
15670A Bantam 110 ohm, 2 off.
DCC 15 pin loopback plug - see figure in DCC Test.
Formatted floppy disk.

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Recall Default Settings

The Performance Tests require the OmniBER 720 to be set to a pre-defined (default) state at the beginning of each test.

1 Using OTHER, display softkeys, ↓ ↑ → and ← set up the OTHER STORED SETTINGS display as shown opposite



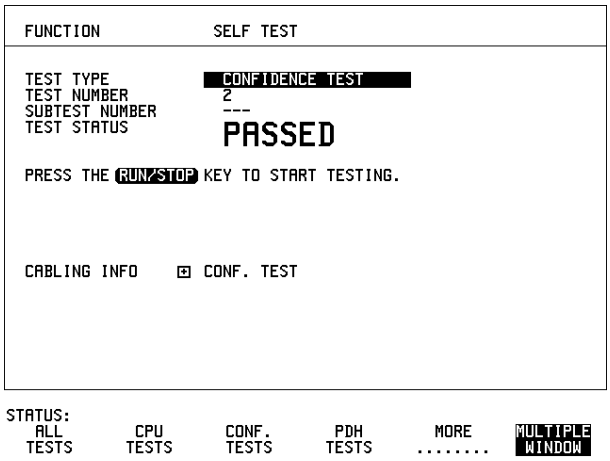
2 Press RECALL to recall the instrument default settings.The instrument display will blank for a few seconds while the settings are recalled and the status display will indicate stored settings number 0 recalled.

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Self Test

Description

Before carrying out the performance tests run Self Test to ascertain the integrity of the OmniBER 720. These tests take at least 1 hour to complete depending on the options fitted. Alternatively you can run Confidence Tests which only takes 2 to 3 minutes to complete. This is not a full verification but performs BER measurements with internal and external loopbacks fitted.



Run Confidence TESTS

1 Choose TEST TYPE **CONF. TESTS** on the **OTHER** **SELF TEST** display.

CAUTION

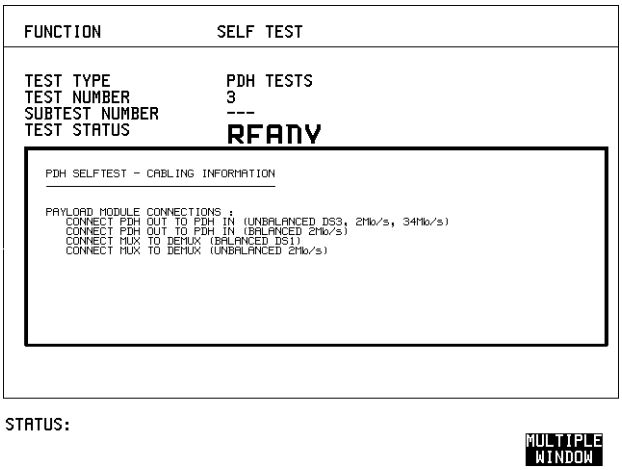
Safety precaution, care and connection cleanliness are essential to avoid optical signal degradation or damage, see Operators Maintenance in chapter 1, and see Optical Interface Connectors in chapter 2 if in doubt.
The use of air-gap attenuators is not recommended.
Failure to attenuate the optical signal could result in damage to the optical receiver.

2 Make the loopback connections listed below:
Connect the 15 dB optical attenuator provided at the Optical OUT and then connect the attenuator output to Optical IN using the optical cable supplied with your instrument.

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3 Press RUN/STOP to activate the Self Test. TEST STATUS RUNNING will be displayed.
The information pertaining to TEST TYPE, TEST NUMBER and SUBTEST NUMBER will change as the Self Test progresses.
If the OmniBER 720 is functioning correctly, after a time of 2 to 3 minutes, TEST STATUS PASSED is displayed.
If TEST STATUS [FAIL nnn] is displayed, check the displayed error information and check loopback connections are correct. Repeat the test and if the problem persists contact your local Agilent representative. See chapter 5 for information.

NOTE Each individual self test requires unique loopback connections. To obtain a list of the connections required move the highlighted cursor to CABLING INFO and press SET. The Loopbacks list will appear on the display. Also refer to chapter 5 for Self Test connection information.



Run ALL TESTS

1 Choose TEST TYPE ALL TESTS on the OTHER SELF TEST display.

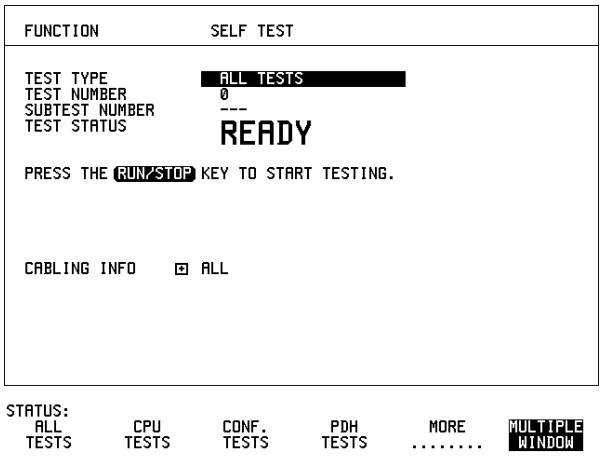
2 Insert a formatted disk into the instrument disk drive.

3 Make the loopback connections listed below:
Connect the 15 dB optical attenuator provided, to Optical OUT and connect the attenuator output to Optical IN.

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

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The information pertaining to TEST TYPE, TEST NUMBER and SUBTEST NUMBER will change as the Self Test progresses.
If the OmniBER 720 is functioning correctly, after a time of at least 1 hour, TEST STATUS PASSED is displayed.
If TEST STATUS [FAIL nnn] is displayed, check the displayed error information and check loopback connections are correct. Repeat the test and if the problem persists contact your local Agilent representative. See Chapter 5 for information.

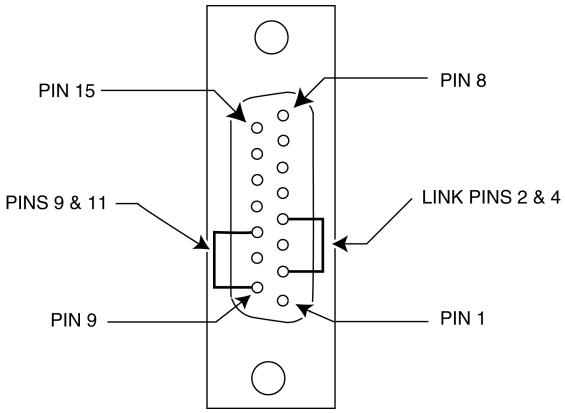


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DCC Port Tests:

1 Select BER TESTS

2 Make the following connections at the Multirate Analyzer DCC port.



3 Run the BER TESTS.

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SDH/SONET Transmitter Clock Accuracy

Specification

Bit Rate	Accuracy
51.84 Mb/s	±4.5 ppm

Description

The test uses a Frequency Counter connected to the Multirate Analyzer module Clock Trigger output port. This output is derived from the Clock module internal 10MHz clock oscillator providing a 51.84 MHz that is directly related to all SDH/SONET output rates.

Equipment Required

Frequency Counter : HP 5335A Option 010

Procedure

1. Recall the OmniBER 720 DEFAULT SETTINGS as shown on page 3-4.
2. Set the Transmitter Output to SDH/SONET.
3. Connect the OmniBER 720 Multirate Analyzer module CLOCK TRIGGER port to the Frequency Counter Input A, set the input termination to 50Ω.
4. Adjust the Frequency Counter Trigger Level to obtain a stable reading and ensure that the Frequency Counter reads between 51.839670 MHz and 51.840230 MHz.
5. Disconnect all the test equipment.

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External Clock/Data Reference Inputs & Clock Reference Output

Specifications

Clock Rate	Description
2.048 Mb/s MTS	Accepts timing reference as per ITU-T G.811
10 MHz Reference	Accepts 10 MHz timing reference
1.544 Mb/s BITS	Accepts DS-1 timing reference as per TA-TSY-000378
64 kb/s	Accepts 64 kb/s timing reference as per ITU-T G.703 Section 1.2.2
STM-1/STS-3 Receive	Recovers clock from received STM/STS input signal.

NOTE The Rates available are dependent on the OmniBER 720 option

Description

This test verifies that signal integrity is maintained when an EXTERNAL clock is used as a reference.

Equipment Required

Synthesizer	: HP 3335A option 001 (75Ω)
PDH/DSn Test Set	: OmniBER 720
110Ω/75Ω Balanced to Unbalanced Converter	: HP 15508B
Frequency Counter	: HP 5335A Opt 010
64kb/s Test Set	: HP 37732A

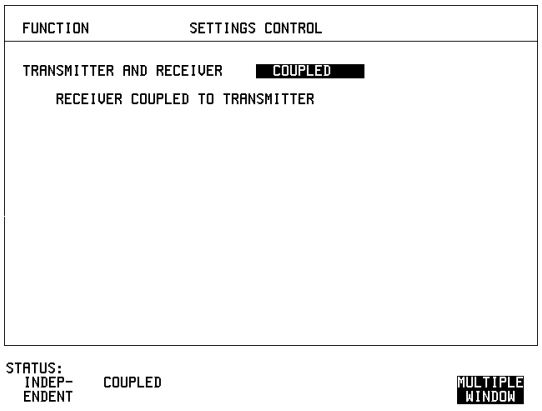
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Procedure

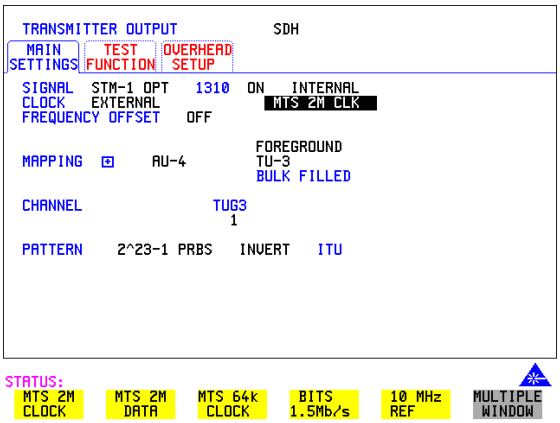
MTS Clock - Clock Format

1 Connect the 52/155 Mb/s DATA OUT port to the 52/155 Mb/s DATA IN port.

2 Recall the OmniBER 720 Default Settings as shown on page 3-4 and set the OTHER SETTINGS CONTROL display as shown below.



3 Press TRANSMIT and set up the display as shown below.



4 Set the HP 3335A to 2.048 MHz at +10 dBm.

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5 Connect the HP 3335A to the OmniBER 720 75Ω 2M REF IN port on the Clock module.

6 Press RESULTS; TROUBLE SCAN .

7 Press RUN/STOP, check that the display reads NO TROUBLE and all the Alarm leds are off.

8 Press RUN/STOP to halt the measurement.

Clock REF OUT

9 Connect the Clock REF Out port to the Frequency Counter and check that a 2.048MHz signal is present.

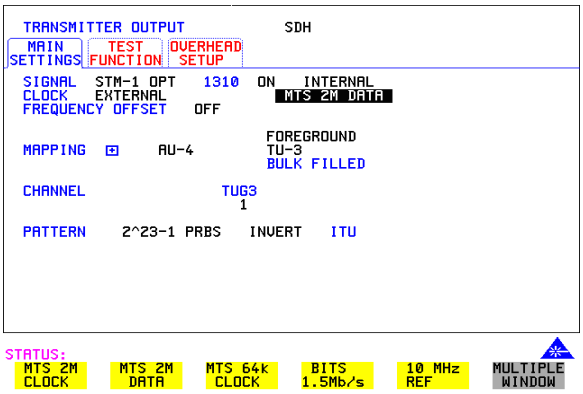
MTS Clock - Data

10 Disconnect the HP 3335A Synthesizer from the OmniBER 720 75Ω 2M REF IN port.

11 Set the PDH/DSn Test Set to transmit a 2 Mb/s unframed signal.

12 Connect the PDH/DSn Test Set, 75Ω Output to the OmniBER 720 75Ω 2M REF IN Port and Recall the DEFAULT SETTINGS as shown on page 3-4.

13 Set the TRANSMIT display as shown below.



14 Select CLOCK SYNC FORMAT [2 Mb/s DATA] on the SDH TRANSMIT Display.

15 Press RESULTS TROUBLE SCAN then RUN/STOP.

16 Check that the RESULTS Display reads NO TROUBLE and all the Alarm LEDS are off. Press RUN/STOP to halt the measurement.

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17 Disconnect the PDH/DSn Test Set, 75Ω 2 Mb/s PDH Output from the 75Ω 2M REF IN Port.

18 Connect the PDH/DSn Test Set, 120Ω 2 Mb/s PDH Output to the 120Ω 2M REF IN Port.

19 Change the PDH O/P termination to 120Ω on the PDH/DSn Test Set and the OmniBER 720.

20 Press [RESULTS] [TROUBLE SCAN] then [RUN/STOP] on the OmniBER 720.

21 Check that the [RESULTS] Display reads NO TROUBLE and all the Alarm LEDS are off. Press [RUN/STOP] to halt the measurement.

STM-1/STS-3 Receive Data

22 Disconnect the PDH/DSn Test Set Data Output from the OmniBER 720, 120Ω 2M REF IN port.

23 Disconnect the 52/155 Mb/s DATA OUT port from the 52/155 Mb/s DATA IN port

24 Select CLOCK SYNC [STM-1/STS-3 RECEIVE] ON THE OmniBER 720 [TRANSMIT] display.

25 The SDH Clock Loss Alarm led should be lit on the OmniBER 720.

26 Set the Synthesizer frequency to 77.760MHz and amplitude to +10dBm.

27 Connect the Synthesizer to the 75Ω 52/155 Mb/s DATA IN port.

28 Ensure that the SDH/SONET Clock Loss Alarm Led is not lit.

NOTE As the signal is unframed the LOF/OOF etc. alarms will be on.

10 MHz Reference

29 Select CLOCK SYNC [10MHz REF] ON THE OmniBER 720 [TRANSMIT] display.

30 The SDH/SONET Clock Loss Alarm led should be lit on the OmniBER 720.

31 Set the Synthesizer frequency to 10.000MHz and amplitude to +10dBm.

32 Connect the Synthesizer to the OmniBER 720, 75Ω 2M REF IN Port.

33 Ensure that the SDH/SONET Clock Loss Alarm Led is not lit.

BITS Clock

34 Select CLOCK SYNC [BITS] ON THE OmniBER 720 [TRANSMIT] display.

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35 The SDH/SONET Clock Loss Alarm led should be lit on the OmniBER 720.

36 Set the Synthesizer frequency to 772kHz and amplitude to +10dBm.

37 Connect the Synthesizer, via the Balanced to Unbalanced converter, to the OmniBER 720, 100Ω BITS Clock Port.

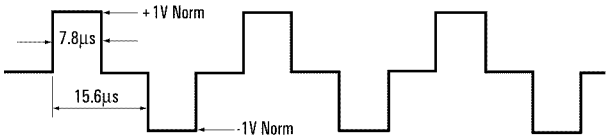
38 Ensure that the SDH/SONET Clock Loss Alarm Led is not lit.

64 kb/s Clock

39 Select CLOCK SYNC [64 kb/s] ON THE OmniBER 720 **TRANSMIT** display.

40 The SDH/SONET Clock Loss Alarm led should be lit on the OmniBER 720.

41 Set the 64kb/s Test Set to provide a 64kb/s Clock Signal.



Suitable 64kb/s AMI signal (into 100/120 ohms balanced)
if 64kb/s Test set is not available.
Signal must be derived from a stable synthesized source.

42 Connect the Clock Signal to the OmniBER 720 balanced 64K Clock input.

43 Ensure that the SDH/SONET Clock Loss Alarm Led is not lit.

44 Disconnect all the test equipment.

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SDH/SONET Frequency Offsets

Specifications

Range	±999 ppm
Resolution	0.1 ppm
Accuracy	0.02 ppm

Description

The test uses a Frequency Counter connected to the Multirate Analyzer module Clock Trigger output port. This output is derived from the Clock module and is directly related to the SDH/SONET output rate. An external 10 MHz reference from a Signal Generator is used to clock the OmniBER 720 and also provides a timebase reference for the Frequency counter. The counter measures the Clock Trigger frequency to check the offset accuracy and range.

Equipment Required

Signal Generator : HP 8657A

Frequency Counter : HP 5335A Opt 010

T Connector : HP 1250-0781

Procedure

1. Recall the OmniBER 720 DEFAULT SETTINGS as shown on page 3-4. Set the Transmitter Output to SDH/SONET.
2. Select CLOCK SYNC [10MHz REF] ON THE OmniBER 720 **TRANSMIT** display.
3. Connect the HP8657A to the OmniBER 720 Unbalanced 75Ω 2M REF IN port on the Clock Module.
4. Set the Signal Generator frequency to 10.000MHz and amplitude to +10dBm.
5. Check the Clock Loss Alarm Led is not lit.
6. Connect the Signal Generator, Timebase OUT port (rear panel), to the counter

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Timebase IN port (rear panel).

7 Check the Counter EXT TIME BASE flag is illuminated on the front panel.

8 Connect the OmniBER 720 Multirate Analyzer module CLOCK TRIGGER port to the Frequency Counter, set input termination to 50Ω.

9 Adjust the Frequency Counter Trigger Level to obtain a stable reading.

10 The reading should be between 51.839999 - 51.840001MHz. If not check setup and ensure the Counter is locked to the Signal Generator.

11 Set the OmniBER 720 frequency offset to the settings given in Table 3-2 and verify the frequency at each step is within the Min/Max limits.

Table 3-2 SDH/SONET Offset

Offset (ppm)	Min Expected Frequency	Max Expected Frequency
-999ppm	51788210.8 Hz	51788212.9 Hz
-100ppm	51834814.9 Hz	51834817.1 Hz
-66.6ppm	51836546.4 Hz	51836548.5 Hz
+33.3ppm	51841725.2 Hz	51841727.3 Hz
+100ppm	51845182.9 Hz	51845185.1 Hz
+999ppm	51891787.1 Hz	51891789.2 Hz

12 Disconnect all the test equipment.

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Multirate Optical Interfaces

Specification (1310 nm Transmitter up to 622 Mb/s)

Wavelength	1290 nm to 1330 nm (Typical 1310 nm)
Power Output	-3.0 dBm to +2.0 dBm (Typical 0.0 dBm)
Line Coding	NRZ
Safety Class	Class 1, FDA 21 CFR Ch.1 1040.10 and EN 60825
Data Rates	51.84, 155.52, or 622.08 Mb/s (Nominal)

Specification (1310 nm Transmitter up to 2488.32 Mb/s)

Wavelength	1290 nm to 1330 nm (Typical 1310 nm)
Power Output	0.0 dBm to +3.0 dBm (Typical +1 dBm)
Line Coding	NRZ
Safety Class	Class 1, FDA 21 CFR Ch.1 1040.10 and EN 60825
Data Rates	51.84, 155.52, 622.08 or 2488.32 Mb/s (Nominal)

Specification (Receiver) up to 2488.32 Mb/s

Wavelength	1200 nm to 1600 nm
Maximum Input Power	-8 dBm (for BER of $1.0E^{-10}$)
Line Coding	NRZ
Sensitivity	-34 dBm (OC-1/3/12 -28 dBm Minimum (OC-48) (wavelength=1310/1550 nm, Modulation = 100%, Data=2^{23}-1, BER=$1.0E^{-10}$)
PMP Electrical Input	150 mV pk-pk (Nominal) 51.84, 155.52 and 622.08 Mb/s only
PMP Impedance	Nominal 50Ω

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Specification (Receiver) up to 622.08 Mb/s

Wavelength	1200 nm to 1600 nm
Maximum Input Power	-3 dBm (for BER of $1.0E^{-10}$)
Line Coding	NRZ
Sensitivity	-34 dBm (OC-1/3 -28 dBm Minimum (OC-12) (wavelength=1310/1550 nm, Modulation = 100%, Data=2^{23}-1, BER=$1.0E^{-10}$)
PMP Electrical Input	150 mV pk-pk (Nominal) 51.84, 155.52 and 622.08 Mb/s only
PMP Impedance	Nominal 50Ω

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Description

The optical power output is measured on a power meter. The receiver sensitivity is verified by attenuating the transmitter output and checking for no errors in back-to-back mode.

The Protected Monitor Point (PMP) functionality is verified by looping the OmniBER 720 Optical Output to the PMP input via an Optical Attenuator and Lightwave Converter, then checking for error-free operation.

Equipment Required

Power Meter	: 8153A
Power Meter Sensor Module	: 81536A
Oscilloscope	: 54520A
Lightwave Converter	: 11982A
Optical Attenuator	: 8157A
FC/PC Connector Interface	: 81000FI (Qty. 4)
Optical Cables (qty 2)	: 11871A
Adaptor (SMA to BNC)	: 1250-1787

WARNING

Safety precautions must be observed when handling the OmniBER 720 optical modules as these generate laser signals which can cause serious injury. The guidelines below must be followed:
Check the connector configuration of the 2.5 Gb/s fiber optic interfaces. If non FC/PC connectors are fitted then remove them, then fit the FC/PC connector interface.
Check for any damage to the OmniBER 720 fiber optic interface spring loaded aperture covers and connectors. Do not power up the instrument if in any doubt about the integrity of these connectors.
Make all connections to the OmniBER 720 fiber optic interfaces before powering up the instrument.

Procedure

1 Switch on the OmniBER 720 and recall the DEFAULT SETTINGS as shown on page 3-4.

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Procedure 1310nm - Optical Power Output

1 Switch on the OmniBER 720 and recall the DEFAULT SETTINGS as shown on page 3-4.

2 Connect the OmniBER 720 Optical Out Port to the HP8153A (ensure that all connections are tight and that the cable has no twists).

3 Setup the HP 8153A as follows:
a. Press **PARAM** key to display wavelength [λ]
b. Using ←,→ ↑ and ↓ keys, set the wavelength to 1310nm.
c. Press **PARAM** key to display Time [t]
d. Using ←,→ ↑ and ↓ keys, set the time to 200mS.
e. Press **PARAM** key to display REF.
f. Using ←,→ ↑ and ↓ keys, set the REF to 0.000dBm.
g. Press **PARAM** key to display CAL.
h. Using ←,→ ↑ and ↓ keys, set the CAL to 0.000dBm.
i. Press the **ZERO** key on the Power Meter to calibrate - the Power Meter is now ready.

4 Press **MODE** to select the Power Level measurement on the HP8153A.

5 Press **TRANSMIT** **SDH** or **SONET** and select SIGNAL [STM-0 OPT] or [OC-1].

6 Check the HP8153A Power Meter reading is between 0 dBm and +3 dBm (Typically +1 dBm).

7 Press **TRANSMIT** **SDH** or **SONET** and select SIGNAL [STM-1 OPT] or [OC-3].

8 Check the HP8153A Power Meter reading is between 0 dBm and +3 dBm (Typically +1 dBm).

9 Press **TRANSMIT** **SDH** or **SONET** and select SIGNAL [STM-4 OPT] or [OC-12].

10 Check the HP8153A Power Meter reading is between 0 dBm and +3 dBm (Typically +1 dBm).

11 Press **TRANSMIT** **SDH** or **SONET** and select SIGNAL [STM-16 OPT] or [OC-48].

12 Check the HP8153A Power Meter reading is between 0 dBm and +3 dBm (Typically +1 dBm).

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Optical Receiver Sensitivity

13 Recall the OmniBER 720 DEFAULT SETTINGS as shown on page 3-4.

14 Set the Optical Attenuator to ATTEN 15 dB, WAVELENGTH 1310 nm ; CAL=0 ; ENB ON. Connect the Optical Attenuator between the Power Meter and the OmniBER 720 Optical Out port (ensure that all connections are tight and that the cable has no twists).

15 Press TRANSMIT SDH or SONET and select SIGNAL [STM-0 OPT] or [OC-1].

16 Adjust the Optical Attenuator to obtain a reading of -34 dBm on the Power Meter.

17 Recall the OmniBER 720 DEFAULT SETTINGS as shown on page 3-4.

18 Disconnect the Optical Attenuator Output from the HP 8153A and connect to the OmniBER 720 Optical IN Port.

19 Press OTHER then SETTINGS CONTROL and select TRANSMITTER AND RECEIVER [COUPLED].

20 Press TRANSMIT SDH or SONET and select SIGNAL [STM-0 OPT] or [OC-1].

21 Press RESULTS TROUBLE SCAN then RUN/STOP to start a measurement.

22 After 5 minutes check that NO TROUBLE is displayed on the RESULTS display.

23 Repeat steps 13 through 22, substituting SIGNAL [STM-1 OPT] or [OC-3] in steps 15 & 20.

24 Repeat steps 13 through 22, substituting SIGNAL [STM-4 OPT] or [OC-12] in steps 15 & 20.

25 Repeat steps 13 through 22, substituting SIGNAL [STM-16 OPT] or [OC-48] in steps 15 & 20 and -28 dBm in step 16.

PMP Electrical Input

26 Recall the OmniBER 720 DEFAULT SETTINGS as shown on page 3-4.

27 Disconnect the optical cable from the OmniBER 720 Optical IN port and connect to the HP 11982A Lightwave Converter input.

28 Connect the output from the Lightwave Converter to the Oscilloscope using the SMA/BNC adaptor and 50Ω BNC cable.

29 Press TRANSMIT SDH or SONET and select SIGNAL [STM-0 OPT] or [OC-1].

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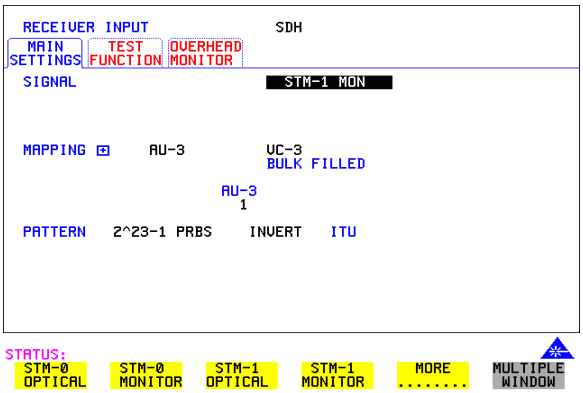
30 Press AUTOSCALE on the Oscilloscope and adjust the Timebase and Range to obtain an STM-0/OC-1 waveform.

31 Measure the amplitude of the waveform using the Oscilloscope and adjust the Optical Attenuator until the amplitude is 150mV pk-pk.

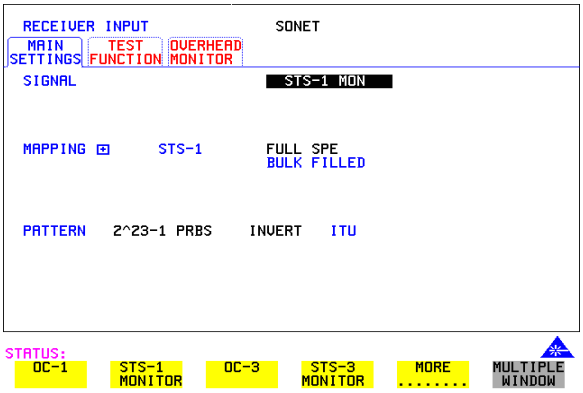
32 Disconnect the output of the Lightwave Converter from the Oscilloscope and connect instead to the OmniBER 720 Optical Module Monitor input.

33 Press RECEIVE and set up the display as shown below for SDH or SONET as required.

SDH display



SONET display



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34 Press [RESULTS] **TROUBLE SCAN** then [RUN/STOP] to start the measurement.

35 After 5 minutes, check that NO TROUBLE is displayed on the [RESULTS] display. Press [RUN/STOP] to stop the measurement.

36 Recall the OmniBER 720 DEFAULT SETTINGS as shown on page 3-4.

37 Repeat steps 28 to 36 but with [STM-1 OPT] or [OC-3] selected on the OmniBER 720 [TRANSMIT] and [RECEIVE] displays.

38 Recall the OmniBER 720 DEFAULT SETTINGS as shown on page 3-4.

39 Repeat steps 28 to 36 but with [STM-4 OPT] or [OC-12] selected on the OmniBER 720 [TRANSMIT] and [RECEIVE] displays.

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Performance Test Record

OmniBER 720
Communications Performance Analyzer

Location:	***Serial No.:***
Tested by:	***Options:***
Temperature:	***Certified by:***
Humidity:	***Date:***

Note the test steps applicable are dependent on the instrument options and bit rates available.

Performance Test Record

Page No.	Test Description		Result Min	Actual	Max
3-5	**Self Test**				
3-6	Step 3	Confidence Tests		Pass/Fail	
3-6	Step 4	All Tests		Pass/Fail	
3-8	Step 3	DCC Tests		Pass/Fail	
3-9	**SDH/SONET Transmitter Clock Accuracy**				
	Step 4:	Frequency	51.839670 MHz		51.840230 MHz
3-10	**External MTS Clock**				
	Step 7:	2Mb/s Clock		Pass/Fail	
	Step 9:	Ref Clock Out		Pass/Fail	
	Step 16:	2Mb/s Data		Pass/Fail	
	Step 21:	2Mb/s Data Balanced		Pass/Fail	
	Step 25:	Rx Data Clock Loss		Pass/Fail	
	Step 28:	Rx Data Clock Gain		Pass/Fail	
	Step 30:	10 MHz Clock Loss		Pass/Fail	

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Performance Test Record

Page No.	Test Description		Result Min	Actual	Max
	Step 33:	10MHz Clock Gain		Pass/Fail	
	Step 35:	BITS Clock Loss		Pass/Fail	
	Step 38:	BITS Clock Gain		Pass/Fail	
	Step 41:	64kb/s Clock Loss		Pass/Fail	
	Step 42:	64kb/s Clock Gain		Pass/Fail	
3-15	**SDH/SONET Freq Offsets**				
	Step 5:	Clock Loss		Pass/Fail	
	Step 10:	0ppm		51.84MHz	
	Step 11:	-999ppm	51.7882108MHz		51.7882129MHz
	Step 11:	-100ppm	51.8348149MHz		51.8348171MHz
	Step 11:	-66ppm	51.8365464MHz		51.8365485MHz
	Step 11:	+33ppm	51.8417252MHz		51.8417273MHz
	Step 11:	+100ppm	51.8451829MHz		51.8451851MHz
	Step 11:	+999ppm	51.8917871MHz		51.8917892MHz
3-17	**Multirate Optical Interface**				
		Power 1310 nm			
3-20	Step 6:	OC-1	0 dBm		+3 dBm
	Step 8:	OC-3	0 dBm		+3 dBm
	Step 10:	OC-12	0 dBm		+3 dBm
	Step 12:	OC-48	0 dBm		+3 dBm
		Sensitivity 1310 nm			
3-21	Step 23:	OC-1		Pass/Fail	
	Step 24:	OC-3		Pass/Fail	
	Step 25:	OC-12		Pass/Fail	
	Step 26:	OC-48		Pass/Fail	

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Performance Test Record

Page No.	Test Description		Result Min	Actual	Max
		PMP input			
3-21	Step 36:	OC-1		Pass/Fail	
	Step 38:	OC-3		Pass/Fail	
	Step 40:	OC-12		Pass/Fail	

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Performance Test Record

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4 Terms

This section contains Tables of ETSI Terms with their ANSI equivalents and current terms with their equivalent earlier terms.

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 chapter for an explanation of equivalent SDH/SONET terms.

ETSI: European Telecommunications Standards Institute.

ANSI: American National Standards Institute.

Table 3 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

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Table 3 ETSI / ANSI Terminology , continued

ETSI Term	ANSI Term
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
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

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Table 3 ETSI / ANSI Terminology , continued

ETSI Term	ANSI Term
STM-m	OC-n / STS-n (where m= n÷ 3 for m ≥ 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)
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.

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5 Self Tests

This section gives an overview of the Self Tests and their function.

There are several Self Test selections. Some test provide overall functional tests and others provide specific measurement hardware/functions tests.

Overall Function Self Tests

Confidence Test (test time - < 5 minutes depending on options)

Provides a quick verification of the main instrument functions using external Back to Back loopback of the instrument Transmit/Receive sections. See Table below for a list of the subtests and Figure 5-1 for the external loopback cabling required for this test. Use this test to provide a quick operational verification.

Subtest	Test Function
5	**SDH, STM-0e Test/SONET, STS-1e Test**
6	**SDH, STM-0e Test/SONET, OC-1 Test**
7	**SDH, STM-1e Test/SONET, STS-3e Test**
8	**SDH, STM-1o Test/SONET, OC-3 Test**
9	**SDH, STM-4o Test/SONET, OC-12 Test**
10	**SDH, STM-16o Test/SONET, OC-48 Test**

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All Tests (test time - up to 1 hour depending on options)

This provides an extensive Back to Back verification test of the instrument operation. The test uses much of the specific function tests, performing the appropriate subtest depending on options fitted. Test are run as follows.

CPU test

CONFIDENCE test

BER test (Note does not perform DCC port test)

See Tables for each of these tests for a list of the subtests and Figure 5-1 for the loopback cabling required for this test. Note a Formatted floppy disk is required as the CPU test is run as part of All Tests selection.

Use this test to provide a comprehensive operational verification.

Specific Measurement Hardware/Function Tests

CPU Tests (test time - approximately 2 minutes)

Provides a quick test of the Main and Front Panel processors. No external cabling is required, but formatted floppy disk must be installed.

Subtest	Test Function
1	Flash ROM CRC checks
2	Ram Test
3-7	Not used
8	In-Lid Printer present check, (if option 602 fitted)
9	Not used
10	Floppy disk write/read
11	Not used
12-16	Front Panel processor checks

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BER Test (test time- approximately 20 minutes)

These tests perform extensive test of the SDH/SONET Transmit/Receive sections. Note this test is run as part of ALL TESTS with the exception of Subtest 83, DCC port test.

Subtest	Test Function
1	STM-16/OC-48 MUX/DEMUX Internal Loopback
2-4	STM-0e/STS-1e Pulse Shape
5-8	Basic STM-0o/OC-1 Tx/Rx Test
7-8	Basic STM-1e /STS-3e Tx/Rx Test
9-10	Basic STM-1o/OC-3 Tx/Rx Test
11-12	Basic STM-4o/OC-12 Tx/Rx Test
13-14	Basic STM-16o/OC-48 Tx/Rx Test
15-17	STM-4o/OC-12 Frequency Measurement
18	STM-16o/OC-48 Frequency Measurement
19-20	Clock Reference Source
21-22	Optical Power Measurement
23	Overhead Byte Defaults [part 1]
24	Overhead Byte Defaults [part 2]
25	STM16o/OC-48 J0 Path Trace Message
26	J1 Path Trace Message
27	J2 Path Trace Message
28-35	SDHSONET Error Add[RATE]/Detection
36-44	SDH SONET Single Error Add/Detection
45	STM-16o/OC-48 Entire Frame Error Add/Detect
46	A1A2 Frame Error Add
47-49	PDH Payload Error Add[RATE]/Detection
50-52	PDH Payload Single Error Add/Detection
53-67	Alarm Generation/Detection
68-69	OOF Alarm Generation/Detection
70	TU-3/TU12 Mixed Payload Test

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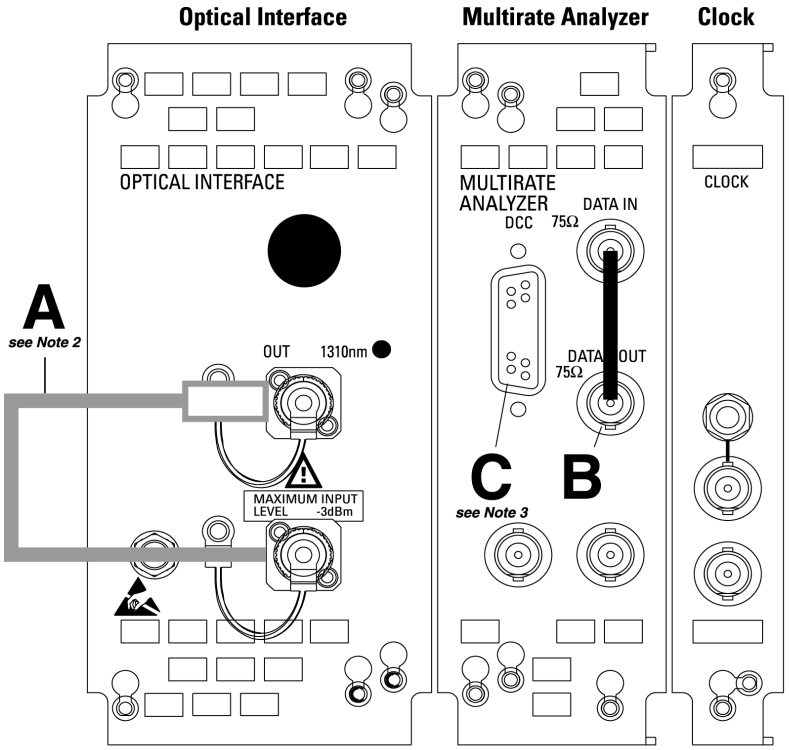
71	**TU-12/TU-3 Mixed Payload Test**
72	**TU-3/TU-11 Mixed Payload Tests**
73	**TU-11/TU-3 Mixed Payload Tests**
74-75	**AU/SPE New Pointer Test**
76-77	**AU/SPE Frequency Offset Pointer Moves**
78-79	**TU Frequency Pointer Moves**
80-81	**STM-16o /OC-48 140Mb/s Payload VC Offset Test**
82	**TU-3 Background Pattern Test**
83	**DCC Port Test**
84-87	**Stress Test**
88-99	**Service Disruption Test**

Long GATING test (test time- approximately 6 Hours)

This test performs an extended gating check of each SONET Optical rate to confirm error free operation. Test time at each rate is sufficient to ensure that the error ratio is less than 1 in 10^12. The test does NOT form part of ALL TESTS.

Subtest	**Test Function**
1	**Tx/Rx OC-1 with Bulk 2^23 Payload**
2	**Tx/Rx OC-3 with Bulk 2^23 Payload**
3	**Tx/Rx OC-12 with Bulk 2^23 Payload**
4	**Tx/Rx OC-48 with Bulk 2^23 Payload**

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OmniBER 720 communications performance analyzer

Minimum loopbacks required by each test

TEST	A	B	C	D
Conf	X	X		
All	X	X		X
CPU				X
BER	X	X	X	
Long gating	X			

15552A BNC 75Ω loopback

15670A Bantam 110Ω loopback

4545A 3m fiber optic cable FC/PC

Note 1:
A formatted floppy disk *must* be fitted into the disk drive before running 'All' or 'CPU' self tests. — **D**

Note 2:
A 15 dB optical attenuator (4546A) *must* be fitted at the optical *output* port.

Note 3:
If running BER self tests, a loopback *must* be connected to the DCC port (see P3-8).

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Self Test Errors

The Tests will halt if a Self Test Error is detected. A message indicating the test point being run and error detected is displayed. Check all loopback connections and re-run the test. If the problem persists and contact your local Agilent Service Office or representative. Tests should only performed in a stable ambient environment where the instrument will not be disturbed during test.

The Self Test Error code numbering uses the following numeric format.

First Number indicates the Test being run.

CPU	1xxx
CONFIDENCE	2xxx
BER	4xxx
LONG GATING	6xxx

Note ALL TESTS uses the number from the tests it calls.

The next digits indicate the Subtest, e.g. 415x, is Subtest 15 of Test 4 (BER).

(where subtests are >99 the numbering restarts)

The last digit indicates the error type. In general these are -

1 = Loss of Signal

2 = specific for subtest

3 = test result too low

4 = test result too high

5 = loss of frame sync

6 = loss of pointer sync

7 = loss of pattern sync

The error codes are accompanied by appropriate error messages.

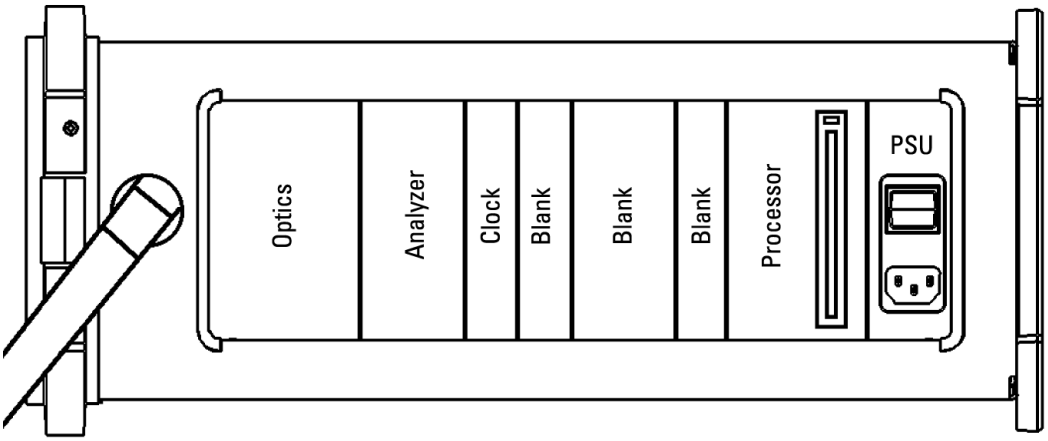
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6 Option Structure/Module Configuration

The OmniBER 720 option structure and module configuration is shown in this section.

Description	Product/Option
OmniBER 720 communications performance analyzer mainframe	J1407A
SDH only	001
SDH/SONET dual standard	002
SONET only	003
OC-48/12/3/1 transmit and receive 1310 nm optical interfaces	104
LAN and RS-232 remote control	601
In-lid printer	602
SC connectors	610
ST connectors	611

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