

Service,
Installation &
Verification
Manual

HP E7580A
ProBER2

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HP Part No. E7580-90001

First edition, **12/98**

Printed in U.K.

Warranty

The information contained in
this document is subject to
change without notice.

*Hewlett-Packard makes no
warranty of any kind with
regard to this material,
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material.

WARNING

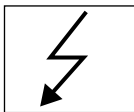
For details of safety, see Safety
information at the front of this
manual.

Warning Symbols Used on the Product



The

product is marked with this
symbol when the user should
refer to the instruction manual
in order to protect the apparatus
against damage.



The

product is marked with this
symbol to indicate that
hazardous voltages are present

Hewlett-Packard Limited
Telecommunications Networks Test Division
South Queensferry
West Lothian, Scotland EH30 9TG

Service, Installation & Verification Manual

Serial Numbers

This manual applies directly to instruments with serial numbers GB00000101 and above.

HP Part Number E7580A-90001

Printed in U.K. December1998

**HP E7580A
ProBER2**

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Contents

1 General Information

Warranty

HP Product	Duration of Warranty
HP E7580A	3 years

- 1 HP warrants HP hardware, accessories and supplies against defects in materials and workmanship for the period specified above. If HP receives notice of such defects during the warranty period, HP will, at its option, either repair or replace products which prove to be defective. Replacement products may be either new or like-new.
- 2 HP warrants that HP 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 HP receives notice of such defects during the warranty period, HP will replace software media which does not execute its programming instructions due to such defects.
- 3 HP does not warrant that the operation of HP products will be uninterrupted or error free. If HP 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.

General Information

- 4** HP 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 HP. If customer schedules or delays HP 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 HP, (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 IMPLIED AND HP SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY, SATISFACTORY QUALITY, AND FITNESS FOR A PARTICULAR PURPOSE.
- 8** HP 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 HP product.

General Information

- 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 HP OR ITS SUPPLIERS BE LIABLE FOR LOSS OF DATA OR FOR DIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL (INCLUDING LOST PROFIT OR DATA), OR OTHER DAMAGE, WHETHER BASED IN CONTRACT, TORT, OR OTHERWISE.**

FOR CONSUMER TRANSACTIONS IN NEW ZEALAND AND AUSTRALIA: 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 Hewlett-Packard personnel.**
- 3 Access to and use of all information and facilities determined necessary by Hewlett-Packard 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.)**

General Information

- 4** Routine operator maintenance and cleaning as specified in the Hewlett-Packard 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.

Certification

Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard 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 Hewlett-Packard products.

Notice

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Use, duplication, or disclosure by the government is subject to restrictions as set forth in subdivision (b)(3)(ii) of the Rights in Technical Data and Computer Software clause at 52.227-7013. Hewlett-Packard Company; 3000 Hanover Street; Palo Alto, California 94304.

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 Hewlett-Packard, especially when ordering replacement parts.



Serial Number Plate

General Information

Storage and Shipment

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

Temperature

-20° C to +70° C

Altitude

Up to 15,200 meters (50,000 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 Hewlett-Packard for service, please complete a repair tag and attach it to the instrument.

Original Packaging. Containers and materials identical to those used in factory packaging are available from Hewlett-Packard offices. If the instrument is being returned to Hewlett-Packard 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.

General Information

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 Hewlett-Packard, 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: 1 kg (2.2 lb) fully loaded

Dimensions: 275mm (10.8in) high, 127mm (5.0in) wide, 55mm (2.2in) deep (including cover).

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. Hewlett-Packard Company 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 1-9
- “Connecting to the Power Supply” on page 2-5
- “Operating Environment” on page 2-2
- “Battery Replacement” on page 2-5
- “Operators Maintenance” on page 1-11

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 Hewlett-Packard Sales and Service Office for service and repair to ensure the safety features are maintained.

General Information

Safety Symbols

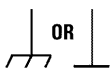
The following symbols on the instrument and in the manual indicate precautions which must be taken to maintain safe operation of the instrument



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



Equipment protected throughout by Double Insulation or Reinforced Insulation, equivalent to Class II of IEC 536.

General Information

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 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 until the indicated conditions are fully understood and met.

General Information

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
- Battery replacement

Cabinet Cleaning

Clean the cover using a damp cloth only.

Battery Replacement

See “Battery Replacement” on page 2-5

General Information

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.

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.

General Information

Noise Declaration (German)

L_pA<70dB

am Arbeitsplatz (operator position)

normaler Betrieb (normal position)

nach DIN 45635 pt.19 (per ISO 7779)

Electromagnetic Compatibility

This product has been designed to meet the protection requirements of the European Communities Electromagnetic Compatibility (EMC) directive 89/336/EEC. 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.

General Information

Declaration of Conformity

Declaration of Conformity

according to ISO/IEC Guide 22 and EN45014

Manufacturer's Name: Hewlett-Packard Ltd.

Manufacturer's Address: Telecomms Networks Test Division
South Queensferry
West Lothian, EH30 9TG
Scotland, United Kingdom

Declares that the product

Product Name: 2Mbits-1Bit Error Rate Test Set

Model Numbers: HP E7580A

Product Options: This declaration covers all options of the above products as detailed in TCF A-5951-9852-01

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,
KY11 5LB
Scotland, United Kingdom

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

Supplementary Information:

The product conforms to the following safety standards:

IEC 61010-1:1992
EN 61010-1:1993
EN 60825-1(1994) / IEC 825-1 (1993)

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

South Queensferry, Scotland

10 December 1998



Location

Date

W.R. Pearson / Quality Manager

Europe Contact::

Your Local Hewlett-Packard Sales and Service Office or Hewlett Packard GmbH, Department 2Q / Standards Europe
Herrenberger Strasse 130, D7030 Boblingen (Fax: +49-7031-143143)

General Information

Specifications

Except where otherwise stated, the following parameters are warranted performance specifications. Parameters described as "typical" or "nominal" are supplemental characteristics which provide a useful indication of typical but non-warranted performance characteristics.

Transmitter

Bit rate: 2.048 Mb/s

Line code: HDB3 or AMI

Connectors:

BNC nominal 75Ω unbalanced

3 pin Siemens nominal 120Ω balanced

Mark level:

75Ω unbalanced - $2.37V \pm 10\%$

120Ω balanced - $3.0V \pm 10\%$

Clock source: Internal, recovered, external

Internal clock accuracy: ± 4.6 ppm

Recovered clock range: 2.048 Mb/s ± 100 ppm

External clock: As ITU-T G.703 Section 10 (Reference 1)

Will not operate if derived from coded (HDB3/AMI) source.

Clock frequency offset: Preset, User

Preset offset: ± 50 ppm

User offset: ± 100 ppm in 1 ppm steps

Test patterns

PRBS: 2^9 , 2^{11} , $2^{15}-1$, 2^{20} , $2^{23}-1$ as per ITU-T O.151, O.152, O.153.

Word: User-defined 8 bit word, user defined 16 bit word, all ones, all zeros, 1010, 1000.

General Information

Voice channel insert: Single tone, DTMF dialling

Tone frequency: 300 Hz to 3400 Hz in 1 Hz steps

Tone level: -60dB to +3dB in 1dB steps

Error add: Bit, FAS, CRC4, Code, E-Bit

Bit, CRC4, Code, E-Bit Rate: Single, 1 in 10^3 , 1 in 10^4 , 1 in 10^5 , 1 in 10^6 , 1 in 10^7

FAS Rate: 1 frame error in 4 framing words, 2 in 4, 3 in 4, 4 in 4.

Alarm generation: LOS, AIS, LOF, TS AIS, RDI, RDI MF

Background fill signal: Each background timeslot comprises a fixed byte which contains a number relating to its position in the 2 Mb/s structure.

Framing: Standard framing (PCM31),
CRC4 multiframe (PCM31CRC),
standard framing with timeslot 16 CAS multiframe (PCM30),
CRC4 multiframe with timeslot 16 CAS multiframe (PCM30CRC).

User defined framing bits

PCM31, PCM31CRC: Remote alarm, spare bits (As per ITU-T G.704 reference 2).

PCM30, PCM30CRC: Remote alarm, remote CAS alarm, ABCD signalling bits, spare bits (As per ITU-T G.704 reference 2).

Receiver

Bit rate: 2.048 Mb/s

Connectors:

BNC 75Ω unbalanced

3 pin Siemens 120Ω balanced

Bridged Input:

Unbalanced $1.2\text{ k}\Omega$

Balanced $1\text{ k}\Omega$

General Information

Line code: HDB3 or AMI

Mark level:

75 Ω unbalanced - 2.37V peak

120 Ω balanced - 3.0V peak

Return loss: As ITU-T G.703 (Reference 1)

Clock capture range: 2.048 Mb/s \pm 100 ppm

Test patterns

PRBS: 2^9 , 2^{11} , $2^{15}-1$, 2^{20} , $2^{23}-1$

Word: User-defined 8 bit word, user defined 16 bit word, all ones, all zeros, 1010, 1000.

Live traffic: No test pattern expected during In-service measurements.

N X 64 kb/s: Contiguous or non-contiguous timeslots.

Framing: Standard framing (PCM31),

CRC4 multiframe (PCM31CRC),

standard with timeslot 16 CAS multiframe (PCM30),

CRC4 multiframe with timeslot 16 CAS multiframe (PCM30CRC).

Reported framing bits

PCM31: Remote alarm, spare bits (As per ITU-T G.704 Reference 2).

PCM31CRC: Remote alarm, remote end block alarm, spare bits, Si bits (As per ITU-T G.704 Reference 2).

PCM30: Remote alarm, remote CAS alarm, ABCD signalling bits, spare bits (As per ITU-T G.704 Reference 2).

PCM30CRC: Remote alarm, remote CAS alarm, remote end block alarm, ABCD signalling bits, spare bits, Si bits (As per ITU-T G.704 Reference 2).

Frame Alignment 2 Mb/s: As ITU-T Rec. G.706 (Reference3)

Frame Gain 2 Mb/s: 1 correct sequence of FAS-NFAS-FAS.

General Information

Frame Loss 2 Mb/s: 3 consecutive incorrect FAS or NFAS words.

Frame Alignment 2 Mb/s CRC4: As ITU-T Rec. G.706 (Reference 3).

Frame Alignment 2 Mb/s CAS: As ITU-T Rec. G.732 (Reference 4).

Frame Gain 2 Mb/s CAS: 1 correct CAS multiframe and the previous CAS word is not 0000.

Frame Loss 2 Mb/s CAS: 2 consecutive errored CAS multiframe patterns or 16 frames with CAS word 0000.

Input mode & signal conditioning

Terminated: 2.37V unbalanced, 3.0V balanced

Equalization at f/2: 6dB

Monitor gain: 20dB, 26dB, 30dB

Monitor equalization at f/2: 12dB

Pattern gain: 32 consecutive error free bits received.

Pattern loss:

PRBS: BER \geq 20% for 10 consecutive 100 ms periods

Word: BER \geq 4%

Jitter tolerance: To ITU-T Rec G.823 (Reference 8).

Voice channel monitor

Frequency measurement range: 300Hz to 3400 Hz

Frequency measurement accuracy: \pm 1Hz

Level measurement accuracy

-60dB to -20dB: \pm 5dB

-20dB to +3dB: \pm 1dB

Autosetup: Detects and matches, if possible, the line rate framing and test pattern of an incoming signal.

Test period: Manual, single, delayed

Manual: Start by pressing **START/STOP**, will continue until **START/STOP** is pressed.

General Information

Single: Fixed duration. Started by pressing **START/STOP** and stops when fixed duration has passed. Can be stopped sooner by pressing **START/STOP**.

Delayed: Fixed duration. Starts when user selected date & time is reached and stops when fixed duration has passed. Can be stopped sooner by pressing **START/STOP**.

Fixed periods (Single & Delayed): 10 seconds, 1 minute, 15 minutes, 1 hour, User

User periods (Single & Delayed): 1 to 59 seconds, 1 to 59 minutes, 1 to 23 hours (Line voltage operation only), 1 to 99 days (Line voltage operation only).

Alarms detected: LOS, LOF, AIS, TS AIS, RDI, RDI MF, pattern loss, CAS multiframe loss.

Alarm indicators: Battery low, error, alarm, signal loss.

Errors detected: Bit, FAS, CRC, E-Bit, Code

Round trip delay

Accuracy: $\pm 1\mu\text{s}$

Resolution: $1\mu\text{s}$

Range: $1\mu\text{s}$ to 1999.999 ms

Frequency Measurement: Input frequency displayed in Hz with 1 Hz resolution, frequency offset displayed in Hz and ppm.

Accuracy: ± 4.6 ppm

Advanced signal quality measurement Option 001

Allows Jitter measurement, level measurement and pulse mask verification on received 2.048 Mb/s signals.

Jitter measurement Jitter is measured on the received signal using the recovered clock of 2.048 Mb/s with up to ± 50 ppm of frequency offset.

General Information

Measurement ranges: Range 1.6 - 0 to 1.6UI pk-pk,
range 16 - 0 to 16 UI pk-pk

Measurement bandwidth: Range 1.6 - 2Hz to >100kHz,
range 16 - 2Hz to 50kHz

Jitter peak results resolution: 0.001UI range 1.6,
0.01UI range 16

Hit threshold resolution: 0.01UI range 1.6,
0.1UI range 16.

Jitter Measurement accuracy:

Jitter Range	Jitter Level	Peak Accuracy	Peak-Peak Accuracy
1.6UI	0 - 0.2UI	$\pm 10\% \pm X \pm Y \pm Z$	$\pm 10\% \pm 2X \pm Y \pm 2Z$
1.6UI	0.21 - 1.6UI	$\pm 5\% \pm X \pm Y \pm Z$	$\pm 5\% \pm 2X \pm Y \pm 2Z$
16UI	0 - 0.2UI	$\pm 10\% \pm X \pm Y \pm Z$	$\pm 10\% \pm 2X \pm Y \pm 2Z$
16UI	0.21 - 16UI	$\pm 5\% \pm X \pm Y \pm Z$	$\pm 5\% \pm 2X \pm Y \pm 2Z$

Range 1.6: X = 0.01UI, Y=0.02UI,

Range 16: X= 0.03UI, Y=0.07 UI (Clock All 1;s), 0.10UI (PRBS)

Z = (f - 30 kHz)/70 X 10% (f= jitter modulation frequency in kHz)

NOTE

1. Typically there will be an additional 0.02 UI when using monitor gain.
 2. Typically there will be an additional 0.01UI when using up to 6dB equalization.
 3. Values are peak to peak jitter measured with HP1 filter present.
-

General Information

Internal jitter filters: Off, LP, HP1, HP2, LP + HP1, LP + HP2

Nominal 3dB corner frequencies

LP: 100kHz

HP1: 20Hz

HP2: 18kHz

OFF: Lower 3dB point at 2 Hz, response flat to 100kHz and upper 3dB point between 100kHz and 200kHz.

Pulse mask measurement - 2.048Mb/s signal must be in the level range -28dB to +4dB relative to the nominal level defined in ITU-T G.703 (Reference 1).

Pulse width accuracy: ± 20 ns

Pulse width ratio: 0.95 to 1.05

Pulse level ratio: 0.95 to 1.05

Pass/Fail test: Signal must be within 3dB of the nominal level and every part of the pulse must fit inside the mask.

Level measurement - 2.048Mb/s signal must be in the level range -28dB to +4dB relative to the nominal level defined in ITU-T G.703 (Reference 1).

Resolution: 1dB

Level accuracy

-10dB to +4db: ± 1 dB

-20dB to -10db: ± 2 dB

-36dB to -20db: ± 3 dB

Co-directional interface Option 002

Provides 64kb/s transmit and receive interfaces as per ITU-T G.703.

Transmitter

Rate: 64 kb/s

Connector: 3 pin Siemens, 120 Ω balanced

Line Code: As per ITU-T G.703 section 1.2.1.1.5 (Reference 1).

General Information

Mark level: The pulse mask at the output will comply with ITU-T G.703 section 1.2.1.2 (Reference 3).

Clock source: Internal, recovered, external

Internal clock accuracy: ± 4.6 ppm

Recovered clock range: 64 kb/s ± 100 ppm

External clock: Divided down version of a clock complying with ITU-T G.703 Section 10 (Reference 1).

Error add: Bit

Rate: Single, 1 in 10^3 , 1 in 10^4 , 1 in 10^5 , 1 in 10^6 , 1 in 10^7

Alarm Generation: Loss of signal, octet loss, pattern loss

Receiver

Rate: 64 kb/s

Connector: 3 pin Siemens, 120 Ω balanced

Line Code: As per ITU-T G.703 section 1.2.1.1.5 (Reference 1).

Operating level: The pulse mask at the input will comply with ITU-T G.703 section 1.2.1.2 (Reference 3).

Alarms detected: Signal loss, octet loss, pattern loss

Measurement results: Frequency, bit error count

General Information

Recommended Test Equipment

Instrument	Critical Specification	Recommended Model
Oscilloscope	400 MHz Bandwidth, 1 M Ω Input Termination	HP 54520A Opt 001
Synthesizer	Sinewave 1 KHz to 5 KHz Amplitude +10 dBm	HP 3335A Opt 010 (75 Ω)
Frequency Counter	Range 0 to 5 MHz, 2 channels with accuracy <0.1ppm. (Ratio Mode)	HP 8560E
Spectrum Analyser	Range 0 to 10 MHz	HP 5335A Opt 010
BER/Jitter Generator	2.048 Mb/s Line Rate with PCM30 Framing, Jitter Frequency range 2 Hz to 100 kHz, Jitter Amplitude Range 0.5 UI to 16 UI	HP 37717C Opt A3K
Converter	75 Ω Unbalanced to 120 Ω Balanced	HP 15508C
75 Ω Termination	0 to 200 MHz	HP 15522-80010
T Connector	BNC to Dual BNC	HP 1250-0781

General Information

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 the Calibration manual. If the contents of the shipment are incomplete, if there is mechanical damage or defect, notify the nearest Hewlett-Packard Office. If the instrument does not pass the electrical performance tests given in the Calibration manual, notify the nearest Hewlett-Packard office. If the shipping container is also damaged, or the cushioning material shows signs of stress, notify the carrier as well as the nearest Hewlett-Packard office.

Installation

Keep the shipping materials for the carrier's inspection. The Hewlett-Packard office will arrange for repair or replacement without waiting for claim settlement.

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° C to +45° C

Altitude up to 3050m (10,000ft)

Humidity up to 95% relative humidity to 40° C, but it should be protected from temperature extremes which may cause condensation.

CAUTION

This instrument is designed for use in Installation Category II and Pollution Degree 2 per IEC 1010 and 644 respectively.

Installation

CAUTION

This instrument has an external power supply which has an autoranging line voltage input. Ensure the line supply is within the specified range.

Preparation for Use

WARNING

FOR CONTINUED PROTECTION AGAINST FIRE HAZARD REPLACE FUSE ONLY WITH SAME TYPE AND RATINGS, See "Power Requirements" on page 2-4).

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).

Installation

Power Requirements

The external power supply requires a power source of 90 V to 264 V ac at a frequency between 47 Hz and 63 Hz (nominal).

WARNING

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

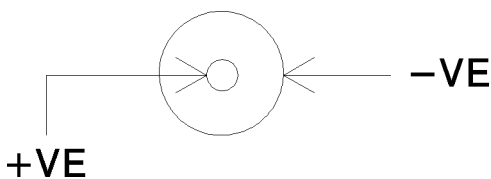
Total power consumption is 22.5 VA (maximum).

Battery Power

The HP ProBER2 requires a nominal DC supply of 7.2 Volts.

The rechargeable battery (Part No. E7580-60010) will typically power ProBER2 for >8 hours with backlight OFF and Bit error measurement mode selected.

DC Connector Polarity



Installation

Battery Replacement

WARNING



CONTAINS NICKEL-METAL HYDRIDE. BATTERY MUST BE RECYCLED OR DISPOSED OF PROPERLY.

Connecting to the Power Supply

Power Cord

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 Hewlett-Packard office and a replacement will be provided.

Power Cord Configurations and Part Numbers

8120-2104	8120-1369	8120-1689	8120-1351	8120-1378 US 8120-4753 JAP	8120-2956	8120-4211

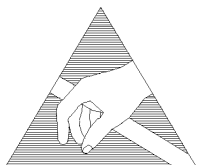
Installation

Connecting to the Network

The network connectors are located at the top of the instrument. Before Connecting, note the Warning and Caution information given.

All Connectors

CAUTION



When connecting or disconnecting, ensure that you are grounded to bring you and the instrument to the same static potential.

Electrical Interface Connectors

75 Ω Receive

Receiver input interface. Allows the connection of 75 Ω unbalanced data signals.

75 Ω Transmit

Transmitter output interface. Provides 75 Ω unbalanced data output.

Installation

120Ω Receive

Receiver input interface. Allows the connection of 120Ω balanced data signals.

120Ω Transmit

Transmitter output interface. Provides 120 Ω balanced data output.

EXT CLOCK

Allows connection of a 75 Ω timing reference as per CCITT G.811. The reference format may be either clock or data.

RS232 Printer

External printer connection details are given in the Users Guide.

Installation

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 Hewlett-Packard Sales and Service Office for service and repair to ensure the safety features are maintained.

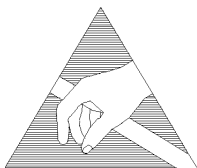
DO NOT service or adjust alone: Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, service personnel must not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation,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

Review "Safety Precautions for the Operator" on page 1-8

Installation

ESD Precautions

CAUTION



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

The instrument 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.

- Before handling the instrument, 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. Hewlett-Packard recommends that you use a controlled static workstation.
- Handle the instrument by its cover. Avoid touching any components or edge connectors.

Installation

3 Performance Tests

Introduction

The procedures given in this Section, test the HP E7580A ProBER2 electrical performance using the Specifications listed in Section 1, General Information, as performance standards. Each test is self contained and, therefore, may be performed as a stand-alone test or as part of full instrument calibration.

Equipment Required

Equipment required for the Performance Tests is listed in, "Recommended Test Equipment" on page 1-23. Any equipment which meets or exceeds the critical specification of the equipment listed, may be substituted.

Performance Test Record

The results of the Performance Tests may be recorded on the performance test record. The results recorded at incoming inspection may be used for comparison during periodic maintenance, troubleshooting or after repair or adjustment.

Performance Tests

Calibration Cycle

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

Recall Default Settings

The Performance Tests require the HP E7580A ProBER2 to be set to a pre-defined (default) state at the beginning of each test. The pre-defined default settings are listed in Appendix?

- 1 Using display softkeys, ▼ ▲ ◀ and ▶ set up the **OTHER INST.SETTINGS** display as shown below.

Menu	Other
Type:	Inst. Settings
Overwrite Protection: <input type="checkbox"/> On	
0 :Factory Default Settings	
1	
2	
3	
4	
? Select the required action on the selected store	
Recall	




- 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.

Performance Tests

Instrument Reset (Cold Start)

If you cannot control the HP ProBER 2 using the front panel keys perform an Instrument Reset (Cold Start).

Procedure

- 1 Press and hold down  for longer than 7 seconds.
- 2 When the display blanks (switched off)  can be released.
- 3 To restore power press .
The HP ProBER 2 will return to the Default settings, but any data previously stored in memory will be lost.

Performance Tests

Self Test

Description

The instrument **Auto Tests** **ALL TESTS** self test is run to verify the functionality of the instrument prior to carrying out the performance tests.

Procedure

- 1 Choose **MENU** **Other** **Selftest** to obtain the Selftest display.
- 2 Choose **Auto Tests** **All Tests**
- 3 Connect the TRANSMIT 75Ω port to the RECEIVE 75Ω port.
- 4 Press **START/STOP** to run the selftest. While the tests are running the Test Name, Subtest Number and Test Status are updated on the display to show the progress of the test.
- 5 If the HP ProBER 2 is functioning correctly, after 3 minutes, Overall Status PASSED is displayed. If Overall Status FAIL is displayed the HP E7580A ProBER2 should be returned to a service office for repair.

FailNumber	Description	Fail Number	Description
1xxxx	CPU	5xxxx	BER
2xxxx	Real Time Clock	6xxxx	Pulse Mask
3xxxx	Line Level	7xxxx	Jitter
4xxxx	Clock	8xxxx	Delay

Performance Tests

Internal Transmitter Clocks

Specifications

Bit Rate	Specification
2.048 MHz	2.048 MHz \pm 9.421 Hz
64 kHz (Opt 002)	64 kHz \pm 0.3Hz

Description

This test verifies that the PDH transmit data rates are within limits. These limits assume the instrument is within the annual calibration cycle. The Frequency Offset capability (deviation from Standard Bit Rate) is also tested here.

The test uses a Frequency Counter connected to the TRANSMIT port to measure the data rate on an **ALL 1's** pattern. This gives an indirect measure of the internal transmitter clock frequency as the data is clocked by the internal clock oscillator. Because the Frequency Counter triggers from the positive pulses only, the frequency count will be half the selected data rate.

Equipment Required

Frequency Counter	: HP 5335A Option 010
75 Ω Termination	: HP 15522-80010
T Connector	: HP 1250-0781
120 Ω /75 Ω Balanced to Unbalanced Converter	: HP 15508C

Performance Tests

Procedure

2.048 Mb/s Interface

- 1 Recall the HP E7580A ProBER2 DEFAULT SETTINGS as shown on Page 3-2 and select Test Pattern **ALL 1's**.
- 2 Connect the Unbalanced TRANSMIT port to the Frequency Counter. Terminate the Frequency Counter input in 75Ω (use the T connector).
- 3 Set the frequency counter to:
FUNCTION - FREQ A
ATTEN - X10
- 4 Adjust the Frequency Counter ATTEN and trigger level to obtain a stable reading and ensure that the Frequency Counter reads between 1023995.39 Hz and 1024004.61 Hz.

64 kHz Interface (Option 002 Only)

- 5 Select Transmit Line Rate **64 kb/s** on the **TX/RX SETUP** display.
- 6 Connect the Balanced TRANSMIT port to the Frequency Counter via the $120\Omega/75\Omega$ Balanced to Unbalanced Converter. Terminate the Frequency Counter input in 75Ω (use the T connector).
- 7 Adjust the Frequency Counter trigger level to obtain a stable reading and ensure that the Frequency Counter reads between 63999.7 Hz and 64000.3 Hz.

Performance Tests

2 Mb/s Frequency Offsets

- 8 Select **Transmit Line Rate** **2 Mb/s** on the **TX/RX SETUP** display and connect the unbalanced TRANSMIT port to the Frequency Counter. Terminate the Frequency Counter input in 75Ω (use the T connector).
- 9 Select **OFFSET** **+50ppm** on the **TEST SETUP** **FREQ OFFSET** display, adjust the Frequency Counter trigger level to obtain a stable reading and ensure that the Frequency Counter reads between 1024046.59 Hz and 1024055.8 Hz.
- 10 Select **OFFSET** **-50ppm**, adjust the Frequency Counter trigger level to obtain a stable reading and ensure that the Frequency Counter reads between 1023944.2 Hz and 1023953.41 Hz.
- 11 Select **EDIT**, set **OFFSET** +100ppm, adjust the Frequency Counter trigger level to obtain a stable reading and ensure that the Frequency Counter reads between 1024097.79 Hz and 1024107.0 Hz.
- 12 Select **EDIT**, set **OFFSET** -100ppm, adjust the Frequency Counter trigger level to obtain a stable reading and ensure that the Frequency Counter reads between 1023893.0 Hz and 1023902.2 Hz.

Performance Tests

PDH Transmitter Output

Specifications

Pulse Shape: As per ITU Rec. G.703

Pulse Amplitude:

120 Ω Balanced 3.00V \pm 10%

75 Ω Unbalanced 2.37V \pm 10%

Description

This test verifies that the PDH transmitter output level and pulse shape meets the required ITU specification. The Unbalanced TRANSMIT port is connected to an Oscilloscope and the waveform is checked for amplitude and duty cycle at the nominal mid-points. The waveform shape is also checked by comparison with the special ITU masks.

NOTE

This performance test is written using the HP 54520A Oscilloscope with Option 001 - Telecom Masks Application. If any other Oscilloscope is used the keystrokes given in this procedure will not apply. The Positive pulse masks are contained in the ROOT directory of the Telecom Mask Application Disk and the Negative pulse masks are in the INV_MASK directory.

Performance Tests

Equipment Required

Oscilloscope	: HP 54520A Option 001
T Connector	: HP 1250-0781
75Ω Termination	: HP 15522-80010
120Ω/75Ω Balanced to Unbalanced Converter	: HP 15508C

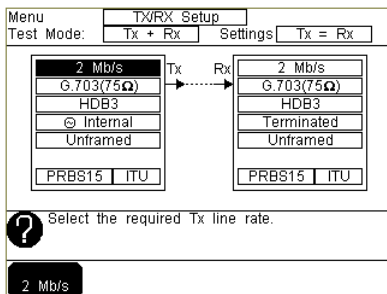
Installing the Telecom Masks Option

- 1 Insert the Disk containing the Telecom Mask into the Oscilloscope Disk Drive.
- 2 Press SHIFT (Blue Key) DISK
- 3 Press **DIRECTORY** then **ROOT DIRECTORY** softkeys.

Procedure - 2.048 Mb/s

Positive Pulse

- 1 Recall the HP E7580A ProBER2 DEFAULT SETTINGS as shown on Page 3-2.
- 2 Press **TX/RX SETUP** and set up the display as shown below.



Performance Tests

- 3 Connect the TRANSMIT unbalanced 75Ω port to the Oscilloscope CHAN 1, terminate in 75Ω
- 4 Select CHAN 1 on the oscilloscope and set to $1M\Omega$ input impedance.

Load the Telecom Mask

- 5 On the oscilloscope, use the following key sequence:
 - a/ SHIFT (Blue Key) APPLICATION.
 - b/ **TELECOM MASK/MASK** softkey.
 - c/ Use ENTRY/MEASURE control to select DS_1E in the highlighted MSK FILES window.
 - d/ **LOAD SETUP 8 M1M2** softkey.

Compare Pulse with Mask

- 6 On the oscilloscope, use the following key sequence:
 - a/ RECALL 8
 - b/ DEFINE MEAS
 - c/ **COMPARE** softkey
 - d/ **TEST ON** softkey
 - e/ **M1M2** softkey
 - f/ **AFTER FAIL CONTINUE** softkey
 - g/ RUN
- 7 The oscilloscope will automatically display and compare an isolated positive pulse with the mask limits. A PASS message should appear on the Oscilloscope.

NOTE

It may be necessary to visibly fit the waveform to the mask by adjusting the vertical position and horizontal delay to obtain a PASS on the Mask.

Performance Tests

- 8 Measure the peak pulse amplitude at the mid pulse-width using the oscilloscope and verify that this is between 2.133V and 2.607 Volts.
- 9 Connect ProBER2 TRANSMIT balanced 120 Ω port to the Oscilloscope CHAN 1 via the balanced to unbalanced converter and select 120 Ω balanced on the **TX/RX SETUP** display.
- 10 Terminate in 75 Ω , select CHAN 1 on the oscilloscope and set to 1M Ω input impedance.
- 11 Repeat Steps 6 through 8.

Negative Pulse

- 12 On the Oscilloscope, use the following key sequence:
 - a/ SHIFT (Blue Key) DISK
 - b/ **DIRECTORY** softkey
 - c/ Use ENTRY/MEASURE control to highlight INV_MASK
 - d/ **CHANGE DIRECTORY** softkey

Load the Telecom Mask

- 13 On the oscilloscope, use the following key sequence:
 - a/ SHIFT (Blue Key) APPLICATION.
 - b/ **TELECOM MASK/MASK** softkey.
 - c/ Use ENTRY/MEASURE control to select DS_1E in the highlighted MSK FILES window.
 - d/ **LOAD SETUP 8 M1M2** softkey.

Performance Tests

Compare Pulse with Mask

- 14 On the oscilloscope, use the following key sequence:
 - a/ RECALL 8
 - b/ DEFINE MEAS
 - c/ **COMPARE** / softkey
 - d/ **TEST ON** softkey
 - e/ **M1M2** softkey
 - f/ **AFTER FAIL CONTINUE** softkey
 - g/ RUN
- 15 The oscilloscope will automatically display and compare an isolated positive pulse with the mask limits. A PASS message should appear on the Oscilloscope.

NOTE

It may be necessary to visibly fit the waveform to the mask by adjusting the oscilloscope vertical position and horizontal delay to obtain a PASS on the Mask.

- 16 Measure the peak pulse amplitude at the mid pulse-width using the oscilloscope and verify that this is between 2.133V and 2.607 Volts.
- 17 Connect ProBER2 TRANSMIT unbalanced 75 Ω port to the Oscilloscope CHAN 1 and select 75 Ω unbalanced on the **TX/RX SETUP** display.
- 18 Terminate in 75 Ω , select CHAN 1 on the oscilloscope and set to 1M Ω input impedance.
- 19 Repeat Steps 14 through 16.

Performance Tests

Frequency Measurement and Looped Clock

Specifications

Accuracy	± 7 ppm
Measured Offset	± 100 ppm

Description

This test verifies that the HP E7580A ProBER2 Receiver Frequency Measurement is within specified limits. These limits assume the instrument is within the annual calibration cycle.

A Synthesizer is used to generate a sinewave at half the data rate. This is applied to the HP E7580A ProBER2 Receiver Signal In port. As this signal corresponds to an *All Ones Ternary Signal*, the HP E7580A ProBER2 receiver should sync up with no errors if set to an **ALL 1's** pattern. The Frequency Measurement accuracy of the HP E7580A ProBER2 can be determined by comparison with the frequency displayed on the Synthesizer. Frequency Offset Measurement is also verified during this test as the HP E7580A ProBER2 will display deviation from the expected Signal In frequency in ppm. The transmitter recovered clock function is also verified using the frequency counter in RATIO mode.

Performance Tests

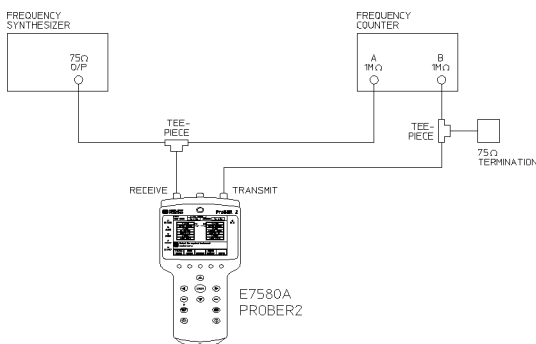
Equipment Required

Synthesizer : HP 3335A Option 010 (75Ω)

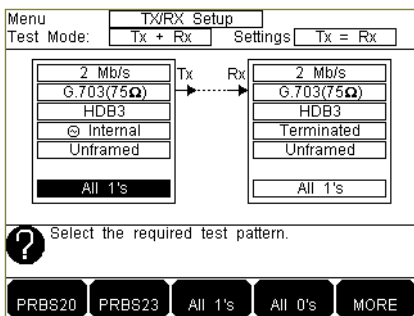
Frequency Counter : HP 5335A Option 010

Procedure

- 1 Recall the HP E7580A ProBER2 DEFAULT SETTINGS as shown on Page 3-2.
- 2 Connect up the equipment as shown below.

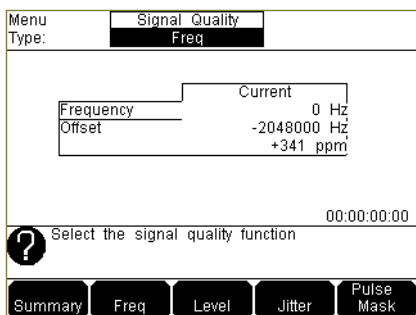


- 3 Press **TX/RX SETUP** and set up the display as shown below.



Performance Tests

- 4 Set the Synthesizer to: FREQUENCY - 1024.000 KHz sinewave AMPLITUDE - +10dBm.
- 5 Set the frequency counter to RATIO A/B.
- 6 Press **RESULTS** and set up the display as shown below.



- 7 Verify that the FREQUENCY displayed is between 2047986 Hz and 2048014 Hz.
- 8 Verify that the Offset displayed is between +7 ppm and -7 ppm.
- 9 Set the synthesizer frequency to 1024.102 kHz and verify that the frequency displayed on the **RESULTS** display is between 2048190 Hz and 2048219 Hz.
- 10 Verify that the Offset displayed is between 93 ppm and 107 ppm. The frequency counter should read 1.00.
- 11 Set the synthesizer frequency to 1023.898 kHz and verify that the frequency displayed on the **RESULTS** display is between 2047781 Hz and 2047810 Hz.

Performance Tests

- 12 Verify that the Offset displayed is between -93 ppm and -107 ppm. The frequency counter should read 1.00.

Performance Tests

Jitter Measurement

Specifications

Jitter Range	Jitter Level	Peak Accuracy	Peak-Peak Accuracy
1.6UI	0 - 0.2UI	$\pm 10\% \pm X \pm Y \pm Z$	$\pm 10\% \pm 2X \pm Y \pm 2Z$
1.6UI	0.21 - 1.6UI	$\pm 5\% \pm X \pm Y \pm Z$	$\pm 5\% \pm 2X \pm Y \pm 2Z$
16UI	0 - 0.2UI	$\pm 10\% \pm X \pm Y \pm Z$	$\pm 10\% \pm 2X \pm Y \pm 2Z$
16UI	0.21 - 16UI	$\pm 5\% \pm X \pm Y \pm Z$	$\pm 5\% \pm 2X \pm Y \pm 2Z$

Range 1.6: $X = 0.01\text{UI}$, $Y = 0.02\text{UI}$,

Range 16: $X = 0.03\text{UI}$, $Y = 0.07\text{UI}$ (Clock All 1's),
0.10UI (PRBS)

$Z = (f - 30\text{ kHz})/70 \times 10\%$ (f = jitter modulation frequency in kHz)

NOTE

1. Typically there will be an additional 0.02 UI when using monitor gain.

2. Typically there will be an additional 0.01UI when using up to 6dB equalization.

3. Values are peak to peak jitter measured with HP1 filter present.

Performance Tests

Description

This test verifies that the jitter receiver measures jitter to the required accuracy.

The test uses a BER/Jitter generator to provide a 2 Mb/s line rate, accurate jitter source. The accuracy is achieved using the Bessel null method measured on a Spectrum Analyser.

Equipment Required

BER/Jitter Generator	: HP 37717C Option A3K
Spectrum Analyser	: HP 8560E
75Ω/50Ω Matching Pad	: HP 11825B

Procedure

- 1 Recall the HP E7580A ProBER 2 DEFAULT SETTINGS as shown on Page 3-2.
- 2 Set the BER Jitter generator as follows:

Line Rate	2.048 Mb/s
Framing	PCM30
Pattern	All Ones
Line Code	HDB3
Line Termination	75Ω
Jitter Amplitude	0.77 UI
Jitter Frequency	2400 Hz
- 3 Connect the BER/jitter generator signal to the spectrum analyser via the matching pad.

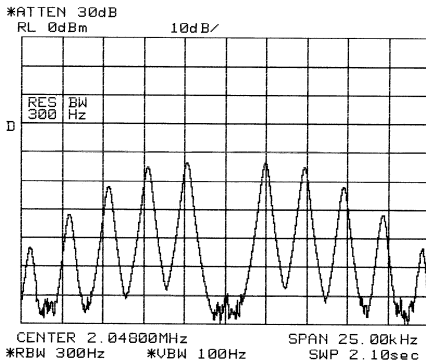
Performance Tests

4 Set the spectrum analyser as follows:

Centre Frequency	2048 kHz
Frequency Span	25 kHz
Reference Level	0 dBm
Sweep Time	1.0 seconds
Video Bandwidth	100 Hz
Resolution Bandwidth	300 Hz

5 Adjust the BER/jitter generator amplitude to obtain the first carrier null on the spectrum analyser.

The first carrier null occurs when the jitter is 0.77 UI.



Bessel Null Display

6 Connect the BER/jitter generator signal to the HP ProBER 2, E7580A RECEIVE IN port.

7 Choose **MENU** **Signal Quality** and set up the HP ProBER 2 display as shown below.

Performance Tests

Menu	Signal Quality	
Type:	Jitter	On
Range:	1.6UI	Hit Threshold 1.00 UI
Filter:	Off	
	Total	Current
Peak-Peak	0.000 UI	0.000 UI
+ve Peak	0.000 UI	0.000 UI
-ve Peak	0.000 UI	0.000 UI
Hit Count	0	0
Hit Secs	0	-
Hit Free Secs	0	-
00:00:00:00		
? Select the signal quality function.		
Summary	Freq	Level
Jitter	Pulse Mask	

- 8 Check that the peak to peak jitter result is between 0.692 UI and 0.849 UI and the peak jitter result is between 0.336 UI and 0.434 UI.
- 9 Set the BER/jitter generator to generate 4.8 UI of jitter.
- 10 Connect the jitter generator signal to the spectrum analyser and adjust the jitter amplitude to obtain the first carrier null. The first carrier null should occur when the jitter is 4.8 UI.
- 11 Connect the Jitter generator signal to the HP ProBER 2, E7580A RECEIVE IN port.
- 12 Choose Range **16UI** and check that the peak to peak jitter is between 4.43UI and 5.17UI and the peak jitter is between 2.18UI and 2.62UI.
- 13 Disconnect all the test equipment.

Performance Tests

Performance Test Record

Hewlett-Packard Model E7580A ProBER2	
<i>Location:</i>	<i>Serial No.:</i>
	<i>Tested by:</i>
<i>Temperature:</i>	<i>Certified by:</i>
<i>Humidity:</i>	<i>Date:</i>

Page No.	Test Description		Result Actual		
			Min		Max
	<i>Self Test</i>				
3-3	Step 5	All Tests		Pass/ Fail	
	<i>PDH Internal Transmitter Clocks</i>				
3-6	Step 4:	2 Mb/s	1023995.39 Hz		1.024004.61Hz
	Step 7:	64 kb/s	63999.7 Hz		64000.3 Hz
		Offset			
3-7	Step: 9	+ 50 ppm	1024046.59 Hz		1024055.8 Hz
	Step:10	- 50 ppm	1023944.02 Hz		1023953.41 Hz
	Step:11	+ 100 ppm	1024097.79 Hz		1024107.0 Hz

Performance Tests

Page No.	Test Description		Result		
			Actual	Min	Max
	Step:12	- 100 ppm	1023893.0 Hz		1023902.2 Hz
	<i>PDH Transmitter Output</i>				
3-10	Step 7:	Unbal +ve Pulse Mask		Pass/ Fail	
3-11	Step: 8	Unbal +ve Pulse Amp	2.133 V pk		2.607 V pk
	Step10:	Bal +ve Pulse Mask		Pass/ Fail	
	Step:10	Bal +ve Pulse Amp	2.133 V pk		2.607 V pk
3-12	Step:15 :	Bal -ve Pulse Mask		Pass/ Fail	
	Step:16	Bal -ve Pulse Amp	2.133 V pk		2.607 V pk
	Step:19	Unbal -ve Pulse Mask		Pass/ Fail	
	Step:19	Unbal -ve Pulse Amp	2.133 V pk		2.607 V pk
	<i>Frequency Measurement & Looped Clock</i>				
3-15	Step: 7	Frequency	2047986 Hz		2048014 Hz
	Step: 8	Offset	-7 ppm		+7 ppm
	Step: 9	Frequency (+100 ppm)	2048190 Hz		2048219 Hz

Performance Tests

Page No.	Test Description		Result Actual		
			Min		Max
	Step:10	Offset (+100 ppm)	+93 ppm		+107 ppm
3-15	Step:11	Frequency (-100 ppm)	2047781 Hz		2047810 Hz
3-16	Step:12	Offset (-100 ppm)	-93 ppm		-107 ppm
	<i>Jitter Measurement</i>				
3-20	Step: 8	1.6UI Pk-Pk	0.692 Ui		0.849 UI
	Step: 8	1.6UI Peak	0.336 UI		0.434 UI
	Step:12	16UIPk-Pk	4.43 UI		5.17 UI
	Step:12	16UI Peak	2.18 UI		2.62 UI

Performance Tests

Repair

4 Repair

The repair policy for HP ProBER 2, E7580A is:

- Replacement of a faulty battery.
- Replacement of exterior clam shell and connector boards.
- Replacement of faulty instrument with an exchange instrument.

Exchange Program

Hewlett-Packard operate an exchange program, whereby a faulty product can be quickly repaired by replacing a faulty assembly with a restored exchange assembly. In the case of HP ProBER 2, E7580A the complete product is exchanged for a restored exchange unit.

The exchange program operates as follows:

- 1 Contact your local Service Office and notify them of your problem. Give them the Serial Number of your instrument, its Option mix and the part number of the Exchange unit you require.

Standard -	E7580-69100
Option 001	E7580-69101
Option 002	E7580-69102
Option 001 & 002	E7580-69103

Repair

- 2 When you receive the Exchange unit, it will have a Serial Plate with the serial number of your replacement unit and the serial number of your faulty unit. This ensures continuity of Warranty. The Calibration certificate refers to the serial number of the Exchange unit.
- 3 Complete an Exchange Failure Report and return it to Hewlett-Packard along with the faulty unit in the same packaging in which the exchange unit was received.

ESD Precautions

CAUTION

When making connections to the HP ProBER 2, 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.

Repair

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 HP ProBER 2 in its conductive storage box when not in use. Save the box for future storage of the module.
- Before handling the HP ProBER 2, 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. Hewlett-Packard recommends that you use a controlled static workstation.
- Handle the HP ProBER 2 by its front-panel. Avoid touching any components or edge connectors.

Anti-Static Products

The following anti-static products are available from Hewlett-Packard:

- Anti-static workstation - Part Number 9300-0792
- Wrist-Strap and cord - Part Number 9300-0970

Repair

Replacement of Battery

HP ProBER 2, E7580A contains a rechargeable Nickel-Metal Hydride battery pack which can be replaced in the event of failure.

Procedure

- 1 Remove 6 TORX screws from the lower clam shell, using a size 10 TORX screwdriver, and remove the lower clam shell.
- 2 Disconnect the battery and remove the 3 screws from the battery retaining plate.
- 3 Remove the retaining plate and keep the foam packaging for re-use.
- 4 Insert the new battery and replace the retaining plate along with the foam packaging.
- 5 Replace the 3 retaining screws using the size 10 TORX screwdriver to tighten.
- 6 Reconnect the battery.
- 7 Carefully re-locate the lower clam shell, and ensure that all RF gaskets are properly located.
- 8 Replace the 6 retaining screws and tighten using the size 10 TORX screwdriver.
- 9 Insert charger into socket and commence charging the new battery.
- 10 Dispose of the faulty battery in the approved manner.

Repair

WARNING



CONTAINS NICKEL-METAL HYDRIDE. BATTERY MUST BE RECYCLED OR DISPOSED OF PROPERLY.

Replaceable Parts

Description	HP Part number
Battery Charger	0950-3412
Bottom Clam	E7580-40006
Top Clam + Keys (No Display)	E7580-60016
Top Clam + Keys + Display	E7580-60005
Battery	E7580-60010
Interface Board	E7580-60007
Printer/RS232 board	E7580-60015

Repair

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