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J1420B 10G SpectralBER

Receiver Module User's Manual (Part No. J1420-90014)

Where to Find it - Online and Printed Information:

System installation (hardware/software)	VXIbus Configuration Guide* This Manual SpectralBER Installation & System Reference Manual
Module configuration/control	SpectralBER Installation & System Reference Manual This Manual
SCPI information	Agilent SpectralBER Remote Control Manual
VXI programming	Agilent SpectralBER UID Online Help
VXI example programs	Agilent SpectralBER UID Online Help Agilent SpectralBER Remote Control Manual VXI function reference Agilent SpectralBER UID Online Help
Soft Front Panel information	SpectralBER Installation & System Reference Manual Agilent SpectralBER UID Online Help
VISA language information	Agilent VISA User's Guide

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Legal and Safety Information

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Agilent Product: J1420B **Duration Of Warranty:** 1 year

1. Agilent 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.

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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.

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10. 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.

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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 Technologies personnel.
3. Access to and use of all information and facilities determined necessary by Agilent Technologies 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 Technologies 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

Agilent Technologies Company certifies that this product met its published specifications at the time of shipment from the factory. Agilent Technologies 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 Technologies products.

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Laser Safety Warning

To prevent personal injury, ensure the following information is reviewed before operating transmitter modules.

The Agilent J1422B, Agilent J4230A, Agilent J4231A and Agilent J4232A are classified as Class I (non-hazardous) laser products, which in the USA complies with the United States Food and Drug Administration (FDA) Standard 21 CFR Ch.1 1040.10, and Class 1 Europe complies with EN 60825-1 (1994).

For your protection, review all laser information given in this manual and in the Agilent J1422B/J4230A/31A/32A Transmitter Modules User's Manual before installing or using these modules.

To avoid hazardous exposure to laser radiation, it is recommended that you do the following:

ALWAYS DEACTIVATE THE LASER BEFORE CONNECTING OR DISCONNECTING OPTICAL CABLES.

When connecting or disconnecting cables between the module(s) and the device-under-test, observe the connection sequence given below:

Connecting: Connect the optical cable to the device-under-test **before** connecting to the module's optical output connector.

Disconnecting: Disconnect the optical cable from the module's optical output connector **before** disconnecting from the device-under-test. Always ensure the screw cap is fitted properly on to 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 output connector.

Arrange for service-trained personnel, who are aware of the hazards involved, to repair optical cables.

Use of controls or adjustments or performance procedures other than those specified herein may result in hazardous radiation exposure.

The following labels appears on the front panel of the module and indicate that a laser is fitted and that the radiation is non-hazardous.





CLASS 1 LASER PRODUCT translates as follows:

Finnish - LUOKAN 1 LASERLAITE

Finnish/Swedish - KLASS 1 LASER APPARAT

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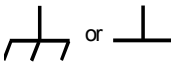
Safety Symbols



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



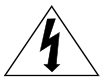
Frame or chassis ground terminal—typically connects to the equipment's metal frame.



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.

General Safety Information

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 Technologies Company assumes no liability for the customer's failure to comply with these requirements.

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

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.

DO NOT perform procedures involving cover or shield removal unless you are qualified to do so: Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers and shields are for use by service-trained personnel only.

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.

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 Technologies Sales and Service Office for service and repair to ensure the safety features are maintained.

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 Technologies Sales and Service Office for service and repair to ensure the safety features are maintained.

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Statement of Compliance

Safety Information

These modules have been designed and tested in accordance with publication EN61010-1(1993) / IEC 61010-1(1990) +A1(1992) +A2(1995) / CSA C22.2 No. 1010.1(1993) Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use, and have 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 modules 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, and indicates compliance to the standards layed out by them.

The C-Tick mark is a registered trademark of the Australian Communications Authority. 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)

Electromagnetic Compatibility (EMC) Information

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 6.

Electrostatic Discharge:
When any electrostatic air discharge is applied to the SpectralBER System according to IEC 61000-4-2:1995, degradation of performance may be observed in the form of occasional errors being counted.

Fuse Information

Fuses on the Receiver and Transmitter Modules are **not** user replaceable.

In both Receiver and Transmitter Modules the fuses are:

Agilent Ref.	Agilent Part No.	Amp	Volt	Type
F1, F2	2110-0945	3 A	125 V	M*
F3, F4, F500, F501	2110-0946	10 A	125 V	M*
F5	2110-1138	15 A	125 V	M*
F6	2110-0936	4 A	125 V	M*

* M = Medium Time Lag

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DECLARATION OF CONFORMITY

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

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

Declares that the product

Product Name:	Receiver Module 9.953Gb/s
Model Number:	J1420B
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 825-1(1993) / EN 60825-1(1994)

The product herewith complies with the requirements of the General Product Safety Directive 92/59/EEC and the EMC Directive 89/336/EEC and carries the CE-marking accordingly.
This product was tested in a typical configuration.

South Queensferry, Scotland. October 20 2000

Robert Tait / Product Regulations Manager

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

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Chapter 1
Module Overview

Introduction

This manual provides you with information about the Agilent J1420B Receiver Module.

Description

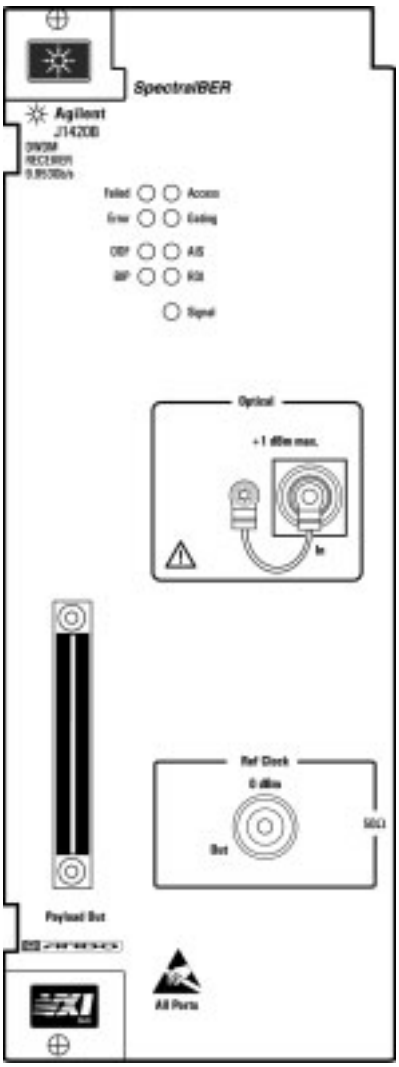
The Agilent J1420B, a register-based C-size three slot VXI module, is the receiver module of the SDH/SONET analyzer. It is used in combination with the Agilent J1421A Clock Source Module and the Agilent J1422B Transmitter Module. It receives framed SDH/SONET signals at 10 Gb/s using an optical interface while monitoring various alarms and errors.

The Receiver Module has the following characteristics:

- Receives SDH/SONET framed STM-64/STS-192 signals.
- Tests a range of SOH alarms and errors.
- Monitors J0 an J1 section trace messages.
- Tests for bit errors using PRBS patterns.
- Control of K1/K2 byte sequences.
- Capture of APS messages.
- Service disruption test.
- Structured payloads to STS-1/VC-3.
- G.826 and G.828 analysis.

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Front Panel Features



J1420B

Optical In

(Universal Optical Connector)

This is the optical input connector for the OC-192 signal. The maximum input power without causing damage is +1 dBm.The maximum input power for BER = 1×10^{-12} is −3 dBm. Sensitivity for BER = 1×10^{-12} is −12 dBm.

Ref Clock Out

(SMA Connector)

This port provides a reference clock synchronized with the received data. When synchronizing the transmitter with received data, connect this output to Ref Clock Slave In of the Agilent J1421A Clock Source module. The output has a nominal amplitude of 0.7 Vp-p.

Payload Out

This is for future use.

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LEDs

Failed (Red)	Turned on when Fail is detected during a module self-test. When the self-test is successful the LED is turned off.
Access (Green)	Turned on when the module is accessed via the VXIbus.
Errors (Red)	Turned on when a module error message exists, a SCPI command error for example. The LED is turned off after the error message is read.
Gating (Yellow)	Turned on during measurement.
OOF (Red)	Turned on when an OOF/LOF alarm is detected.
AIS (Red)	Turned on when an AIS alarm is detected.
BIP (Red)	Turned on when a B1, B2 or B3 error is detected.
RDI (Red)	Turned on when an RDI alarm is detected.
Signal (Green)	Turned on when there is input from an optical signal.

Module Identification

An identification label is attached to the module clamshell enclosure. The serial number on the label has a two letter reference denoting country of origin (JP = Japan) and an eight digit serial number. The serial number is unique to each module and should be quoted in all correspondence with Agilent Technologies, especially when ordering replacement parts.

Accessories

The following additional accessory is supplied with the J1420B Receiver Module.

- System Software (CD-ROM).

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Manuals

A set of manuals can be obtained by ordering the J1423A Manual Set. The manual set is comprised of the following:

- J1420B User's Manual
- J1421A/J1422B/J1426A/J1427A User's Manual
- Remote Control Manual
- Installation & System Reference Manual

Safety Precautions for the Operator

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

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

- "Laser Safety Warning" on page 3
- "Safety Symbols" on page 4
- "ESD Precautions" on page 15
- "Operator Maintenance" on page 15

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

Additional Safety Precautions for Service Engineers

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

DO NOT attempt to service or make adjustments alone: Under certain conditions, dangerous voltages may exist even when the equipment is switched off. To avoid dangerous electrical shock, trained service personnel must not attempt to service or make adjustments unless in the presence of someone capable of rendering first aid and resuscitation.

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ESD Precautions

Caution **This module contains components that are sensitive to electrostatic discharge. To prevent damage to components, carefully follow the precautions described below.**

The smallest static charge the average person 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. Static damage will not often immediately cause a malfunction but will significantly reduce a component's life. By closely following the precautions below you will reduce the risk of static discharge damage.

- Keep the module in its conductive storage box when not installed in the VXI Mainframe. Save the box for future storage.
- Before handling the module, select a work area where potential static sources have been minimized. Avoid working in carpeted areas and using nonconductive chairs. Keep body movement to a minimum. Agilent Technologies recommends that you use a controlled static workstation.
- Handle the module by its front panel. Avoid touching any components or edge connectors. When you install the module, keep one hand in contact with the protective bag and pick up the module with the other. Before installing the module, touch the metal surface of the VXI Mainframe with your free hand to ensure that you, the module and the VXI Mainframe have the same static potential. This also applies whenever you connect/disconnect cables on the front panel.

Operator Maintenance

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

Maintenance that can be done by operators:

- Cabinet cleaning
- Optical connector cleaning

Cleaning

Cabinet Cleaning

Clean the cabinet with a damp cloth only.

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Optical Connector Cleaning

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

Description	Part Number
Air 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 module as damage to or contamination of the optical fiber may result.**

1. Switch off the VXI Mainframe, then remove the power cord from the AC main power socket.
2. Remove the adapters from the Out ports.
3. Using the air brush, clean the ferrules in both the standard flexible connector and the adapter.

Caution **If the optical fiber in the fixed connector requires further cleaning, the module will have to be disassembled – something that should only be carried out by trained service personnel.**

4. Dampen a piece of cleaning paper with isopropyl alcohol and clean the barrel of the adapter. Using a new piece of paper, clean the face of the adapter. Repeat, using a new piece of paper each time.
5. Lightly press the adhesive side of the tape (provided) against the front of the adapter, then remove quickly—repeat twice. This removes any particles of cleaning paper that may be remain.
6. Replace the adapters on the flexible connector.

Storage and Shipment

The module may be stored in or shipped to environments that meet the following conditions:

Temperature: −20 °C to +60 °C
Altitude: Up to 15,200 meters (50,000 feet)
Humidity: Up to 95% relative humidity to 40 °C.

The module should also be protected from extreme temperatures that could cause interior condensation.

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Repackaging for Shipment

Original Packaging

Containers and materials identical to those used in factory packaging are available from Agilent Technologies offices. If the module is being returned to Agilent Technologies 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 module by its model number and full serial number.

Other Packaging

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

- Wrap module in heavy paper or plastic. If the module is being shipped to Agilent Technologies, attach a tag indicating the type of service required, return address, model number and full serial number.
- Use a strong shipping container. A double-walled carton made of 350-pound test material is adequate.
- Use a layer of shock absorbing material 70 to 100 mm (3 to 4 inches) thick, around all sides of the module 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 the module using its model number and full serial number.

Weight

5.2 kg

Dimensions

261 mm (10.3 in) height, 90 mm (3.54 in) width, 360 mm (14 in) depth

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Chapter 2
Installation

Initial Inspection

WARNING **TO AVOID HAZARDOUS ELECTRICAL SHOCK, DO NOT PERFORM ELECTRICAL TESTS IF YOU SEE ANY INDICATIONS OF SHIPPING DAMAGE TO ANY PORTION OF THE OUTER ENCLOSURE (COVERS, PANELS, METERS).**

Inspect the shipping container for damage. If the container or packing material has been damaged, it should be kept until the contents of the shipment have been inspected for completeness and all module functionality has been verified. Procedures for checking electrical operation are given in Chapter 4. If the shipment is incomplete or if there is damage or defects have been found, notify your nearest Agilent Technologies office. If the module does not pass the electrical performance tests described in Chapter 4, notify your nearest Agilent Technologies office. If the shipping container is damaged, or the packing material shows signs of wear, notify the carrier and your nearest Agilent Technologies office. Keep the shipping materials for the carrier's inspection. The Agilent Technologies office will arrange for repair or replacement without waiting for a claim settlement.

Operating Environment

This module is designed for indoor use only. **DO NOT** operate the product in the presence of flammable gases.

This module may be operated in environments that satisfy the following conditions:

Temperature: 5 °C to 35 °C
Altitude: up to 3,050m (10,000ft).
Humidity: 30% to 85% relative humidity
The module should be protected from temperature extremes that could cause condensation.

Caution **The modules is designed for use in Installation Category II and Pollution Degree 2 (IEC 61010 and 644).**

Caution **VENTILATION: When installing the module in a cabinet, make sure there is sufficient ventilation.**

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Preparation for Use

Caution **Damage can occur to the Agilent J1420B optical input port if it is connected directly to the Agilent J1422B optical output port.**

If the module is not going to be used for a long period, fit the optical connector cover.

Power Requirements

Modules are powered by DC voltage provided from the backplane of the VXI Mainframe that houses the modules during normal operation.

The power consumption of the J1420B module is 112 W.

Connecting Modules

WARNING **If this equipment 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).**

Caution **Turn off all power to instruments and field wiring before installing or removing any module.**

Regard all connectors as being at the same potential as the highest voltage applied to any connector.

Use Static Safe handling techniques. Only install with metal covers attached. Do not touch module connector contacts.

Before connecting or disconnecting, make sure you are properly grounded. Touch the metal surface of the VXI Mainframe with your free hand to ensure that you, the module and the mainframe have the same static potential. Modules remain susceptible to ESD damage while being installed in the VXI Mainframe. Additional ESD information is required when servicing. See “ESD Precautions.”

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Optical Interface Adapters

FC/PC optical interface adapters are supplied with the module. Alternative optical interface adapters that can be used with this module are listed below:

Interface Type	Part Number
DIN	81000SI
SC	81000KI
ST	81000VI

SMA Adapters

These adapters (1250-1462) are available and can be screwed into the **Ref Clock Out** port to protect the connector threads.

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Installing and Removing the Module

Caution **Review the "ESD Precautions" on page 15 before installing or removing the module and switch the Mainframe OFF to prevent irreparable damage to the module or to the VXI Mainframe.**

Note Set the module address switches before installing the module. Refer to the following paragraphs.

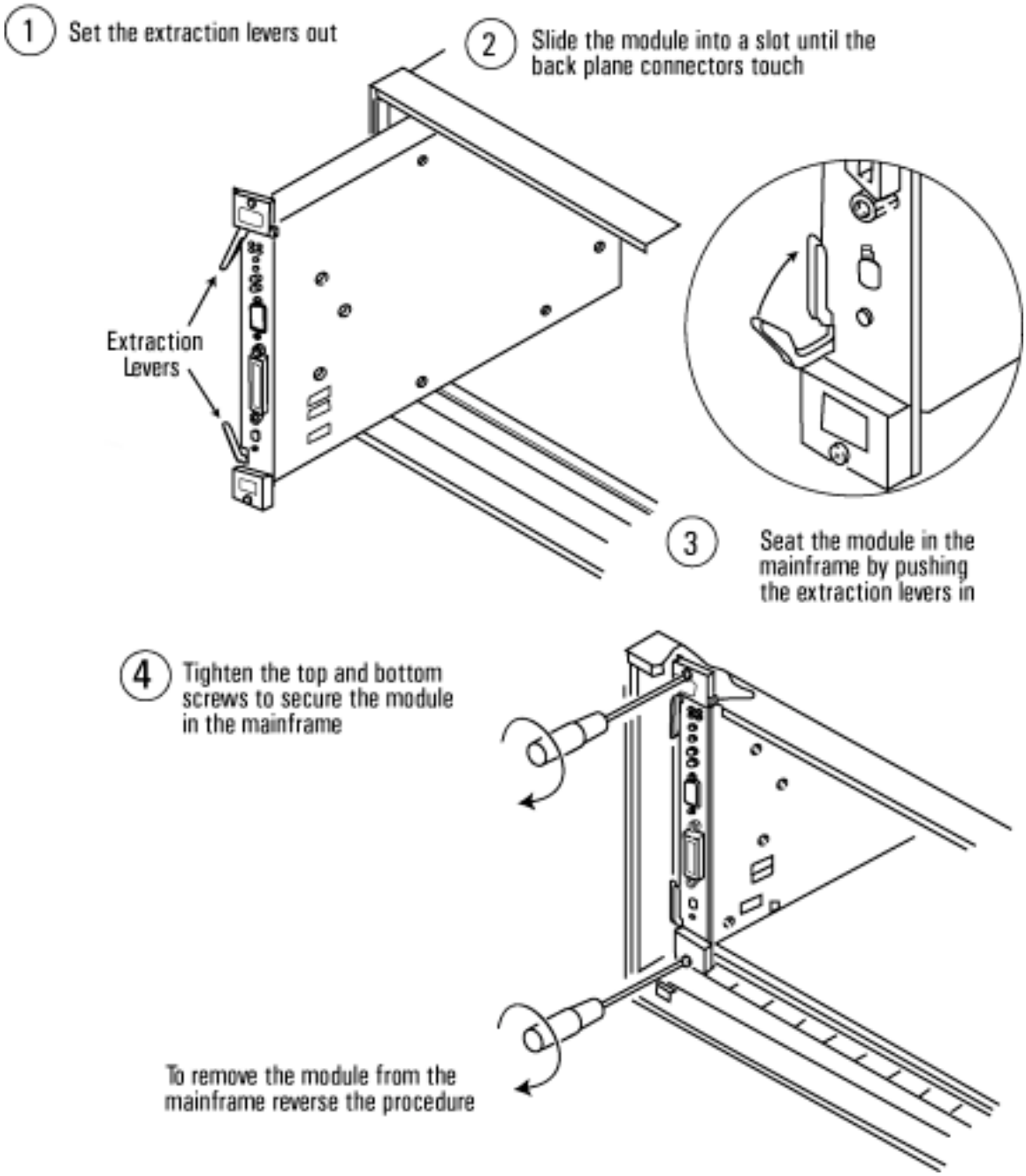


Figure 2-1. Installing and Removing a Module

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Addressing

An Agilent 10 Gb/s System is a “virtual instrument” in VXI terms, consisting of a number of message based servants. The servants can be any mix of Clock Source, Transmitters and/or Receivers.

To create the VXI instrument, the normal VXI rules as regards logical address settings must be observed. Each servant Clock Source, Transmitter and/or Receiver must have its logical address set such that it is unique within the VXI Mainframe and within the servant area setting of the Slot 0 Command Module. The logical addresses of the servant modules are set by switches on the modules. A typical configuration is shown in the “Installation” chapter of the *Installation & System Refernce Manual.*

Assign a logical address to the Receiver module by setting the DIP switches that are accessed on the rear panel of the module (see diagram below). Switches 0 (LSB) to 7 (MSB) are marked on the clamshell enclosure.

Note The J1420B factory default logical address is 32 (GPIB secondary address 04). The setting selected must not conflict with the logical address of any other module in the system.

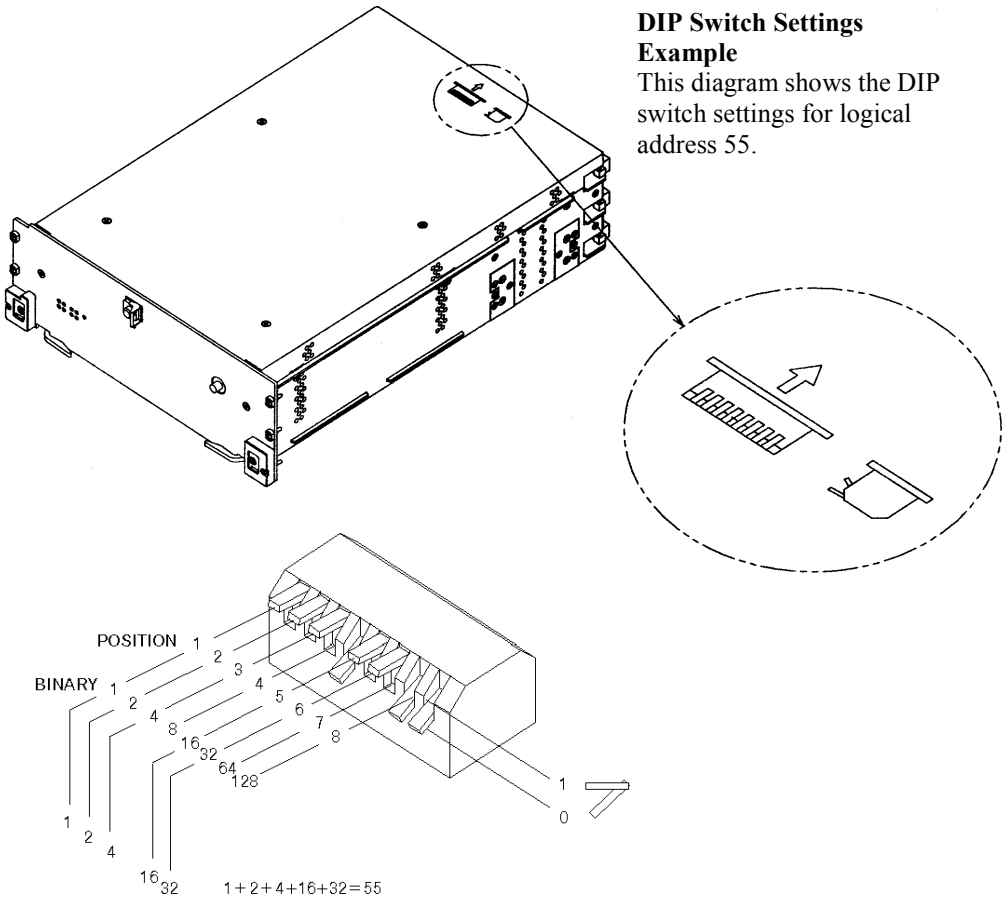
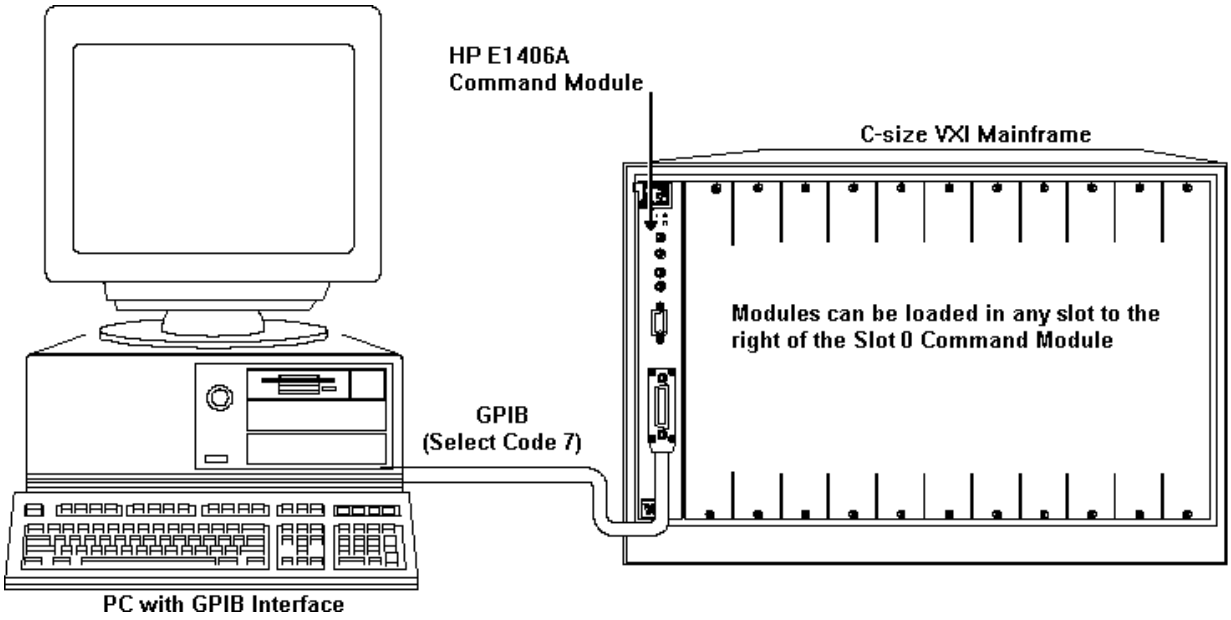


Figure 2-2. Setting the Logical Address Switches

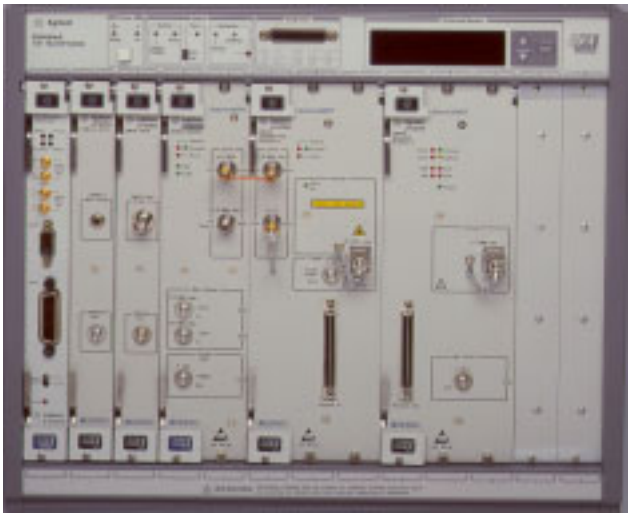
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Module Slot Location

It is recommended that modules be loaded as shown below. Refer to the *Installation & System Reference Manual* for more system installation information.



The following example shows the two timing source modules, a Clock Source module, a Transmitter module and a Receiver module mounted in a VXI Mainframe.



Verifying Module Installation

Refer to the *Installation & System Reference Manual* Chapter 2 for a procedure to verify module installation.

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Connecting Modules

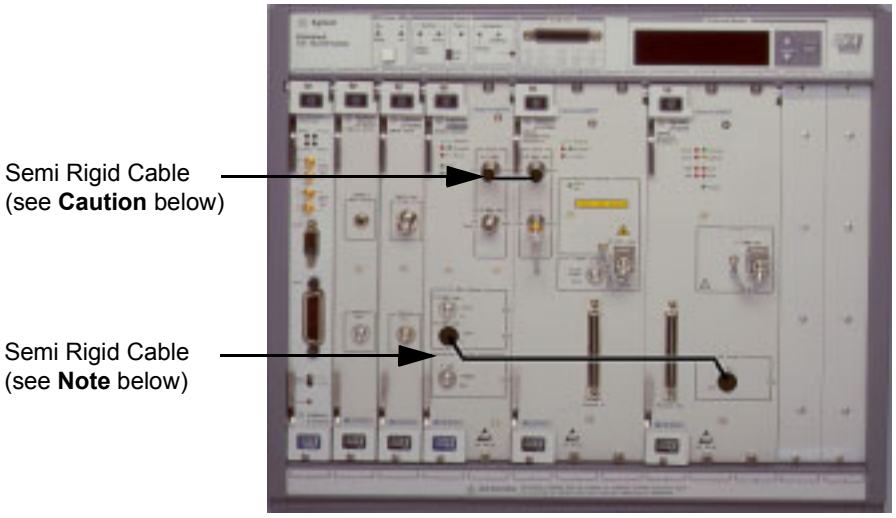
Loop Timing (Synchronizing with Received Data)

Electrical Connection

Connect the modules as follows to synchronize the J1422B Transmitter Module to the data received by the J1420B Receiver Module:

1. Connect the J1421A Clock Source Module (Clock Out) to the J1422B Transmitter Module (Clock In). Use the semi rigid cable provided as shown below.

2. Connect the Ref Clock Out of the J1420B Receiver Module to the Ref Clock In Slave of the J1421A Clock Source Module as shown below.



Caution **Use only the cable provided to connect the J1421A Clock Source and J1422B Transmitter modules. The line clock signal provided by the Clock Source is at 10 GHz.**

Note Use of the supplied semi rigid cable between the J1420B Receiver and the J1421A Clock Source is only possible when the Clock Source, Transmitter and Receiver are next to each other in the same VXI Mainframe. If this is not the case, use a suitable flexible cable instead.

Note Optimum performance of Precision 3.5 mm connectors is achieved when they are tightened to a torque of 90 Ncm (5 lb-inch).

Optical Connection

Connect one end of the optical cable to the Transmitter **Optical Out** connector, connect the other end of the cable to the Receiver **Optical In** connector or to the device to be tested.

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Chapter 3
Module Control

Introduction

SpectralBER modules can be controlled from a PC or workstation using SCPI commands, Universal Instrument Drivers (UIDs) or manually using the Soft Front Panel.

If you want to control modules using the Soft Front Panel, you will need to install the appropriate Soft Front Panel software. For more information about installing Agilent SpectralBER software, controlling modules manually or using UIDs, see the Agilent SpectralBER *Installation & System Reference Manual*.

For more information on using SCPI commands, see the *10G SpectralBER Remote Control Manual*.

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Chapter 4
Verification Tests

Introduction

This chapter contains verification information to test the Agilent J1420B Receiver module when no Soft Front Panel control is available, or to verify that a module has limited functional operation. If the Verification Tests indicate that a module is out of specification, or if full warranted specification testing is required, refer to Chapter 5 "Performance Tests".

Note The warranted specifications are supplied as part of the documentation package provided with the system.

Recommended Test Equipment

Table 4-1 lists the equipment required for Verification testing of the system. Alternative equipment that meets or exceeds the critical specification of the listed equipment may be substituted. Recommended models are those typically used in Agilent Service Centers.

Table 4-1. Recommend Test Equipment

Instrument	Critical Specification		Recommended Model
Lightwave Multimeter	800 to 1700 nm		Agilent 8153A
Power Meter Sensor Module	800 to 1700 nm	+3 dbm to –40 dbm	Agilent 81536A
Muli Wavelength Meter	1200 nm to1700 nm		Agilent86120B
Clock Source	10 G		Agilent J1421A
10G Transmitter Module			Agilent J1422B
Optical Attenuator	Wavelength: Range: Insertion Loss:	1200 to 1600 nm 0 to 30 db 4 db	Agilent 8156A
FC/PC Optical Interface Connector	Unique		Agilent 81000FI (x 4)
Optical Cable	Unique		Agilent 11871A (x 2)

Calibration Cycle

The Verification Tests can be checked at any time.

Verification Test Record

The results of the Verification Tests can be recorded on the “Verification Test Record” on page 32. These results can be used to verify that a module is operational or if further performance testing is required.

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J1420B Receiver Module

Specifications

Table 4-2. J1420B Receiver Module Specifications

Data Rate:	9.953280000 Gb/s
Wavelength:	1500 nm to 1600 nm (nomimal)
Maximum Input Power:	–3 dBm (for BER =1E–12)
Sensitivity:	–12 dBm (for BER =1E–12)

Description

This test verifies the Input Sensitivity range of the optical **In** port by attenuating the Transmitter output and checking for errors in back-to-back mode.

Equipment Required

Lightwave Multimeter:	8153A
Power Meter Sensor Module	81536A
Optical Attenuator:	8156A
Optical Cables:	11871A (x 2)
Multi Wavelength Meter	86120B
FC/PC Optical Connectors:	81000FI (x 4)
Clock Source	J1421A
Transmitter Module:	J1422B

Procedure

Input Sensitivity

1. Switch on the VXI mainframe.
2. Connect the **Clock Out** port on the J1421A Clock Source to the **Clock In** port on the J1422B Transmitter.
3. Connect the Transmitter optical **Out** port to the Agilent 86120B (ensure that all connections are tight and that the cable has no twists).
4. Press **PRESET** on the Agilent 86120B. Note the wavelength.
5. Disconnect the Transmitter optical Out port from the Agilent 86120B.
6. Connect the Transmitter optical **Out** port to the Agilent 8153A through the Optical Attenuator. (Ensure that all connectors are tight and that the cables have no twists.)

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7. Set up the Agilent 8153A as follows:
   a. Press **PARAM** key to display wavelength [λ]
   b. Using ←,→ ↑ and ↓ keys, set the wavelength to to the wavelength measured on the Agilent 86120B (typically 1557 nm).
   c. Press **PARAM** key to display Time [t]
   d. Using ←,→ ↑ and ↓ keys, set the time to 200 ms.
   e. Press **PARAM** key to display REF.
   f. Using ←,→ ↑ and ↓ keys, set the REF to 0.00 dBm.
   g. Press **PARAM** key to display CAL.
   h. Using ←,→ ↑ and ↓ keys, set the CAL to 0.000 dBm.
   i. Press the **ZERO** key on the Power Meter to calibrate - the Power Meter is now ready.

8. Press **MODE** to select the Power Level measurement on the Agilent 8153A.

9. Set the Optical Attenuator wavelength to the wavelength measured on the Agilent 86120B (typically 1557 nm) and set the attenuation level to 0.00 dB. This should result in an optical power reading of between –3 dBm and –5dBM on the Agilent 8153A. (Equivalent to optical power in the range –1dbm to +1dbm, through the insertion loss of 4db in the Agilent 8156A Optical Attenuator.)

Note For an Option 001 Transmitter, the attenuation level must be set to –2.0 dB for this test.

10. Disconnect the Optical Attenuator from the Agilent 8153A and connect to Receiver module optical **In** port.

11. Check that **Signal** present LED on the Receiver module is ON and that no **BIP errors** are detected (Red BIP LED is OFF.)

12. Increase the Optical attenuation until the **BIP errors** LED is ON. Decrease the attenuation until the **BIP errors** LED goes OFF.

13. Reconnect the Optical Attenuator to the Agilent 8153A and check that the optical power reading is > –12 dBm.

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Verification Test Record

J1420B Receiver Module	
Location:	*Serial No.:*
	Tested by:
Temperature:	*Certified by:*
Humidity:	*Date:*

Page	Test Description		Result		
			Min.	**Actual**	**Max.**
	Input Sensitivity Test				
	Step 11	Signal LED ON BIP LED OFF		Pass/Fail	
	Step 13	> –12 dBm	–12 dBm	Pass/Fail	

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Chapter 5
Performance Tests

Introduction

This chapter contains Performance Tests to test the warranted specifications of the Agilent J1420B Receiver module using PC or workstation softpanel control. If no softpanel control is available, or if only a basic operational check is required, refer to Chapter 4 "Verification Tests".

Note The warranted specifications are supplied as part of the documentation package provided with the system.

Recommended Test Equipment

Table 5-1 lists the equipment required for Performance testing of the system. Alternative equipment that meets or exceeds the critical specification of the listed equipment may be substituted. Recommended models are those typically used in Agilent Service Centers.

Table 5-1. Recommend Test Equipment

Instrument	Critical Specification		Recommended Model
Lightwave Multimeter	800 to 1700 nm		Agilent 8153A
Power Meter Sensor Module	800 to 1700 nm	+3 dBm to –40 dBm	Agilent 81536A
Muli Wavelength Meter	1200 to 1700 nm		Agilent 86120B
Clock Source	10G		Agilent J1421A
Transmitter Module			Agilent J1422B
Optical Attenuator	Wavelength: Range: Insertion Loss:	1200 to 1600 nm 0 to 30 db 4 dB	Agilent 8156A
Frequency Counter	Range: Input Level:	10 Hz to 20 GHz +6 dBm	Agilent 5343A
FC/PC Optical Interface Connector	Unique		Agilent 81000FI (x 4)
Optical Cable	Unique		Agilent 11871A (x 2)
Cable	SMA to SMA	0.5 meter	Agilent E1675-64210
Adapter	SMA (female) to BNC (male)		Agilent 1250-2015

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Calibration Cycle

Depending upon the use and environmental conditions, the performance of the modules should be checked once a year, by using the following Performance Tests.

Verification Test Record

The results of the Performance Tests can be recorded on the "Performance Test Record" on page 47. The Performance Tests Record lists all tested specifications and the acceptable limits. The results recorded at incoming inspection can be used for comparison during the periodic maintenance, troubleshooting or after a repair.

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J1420B Receiver Module

Specifications

Table 5-2. J1420B Receiver Module Specifications

Data Rate:	9.953280000 GHz +/- 20ppm
Wavelength:	1500 nm to 1600 nm (nomimal)
Maximum Input Power:	–3 dBm (for BER =1E–12) at 10 GHz
Sensitivity:	–12 dBm (for BER =1E–12) at 10 GHz
Ref Clock Out	155.52MHz

Description

This test verifies the Input Sensitivity range of the optical **In** port by attenuating the Transmitter output and checking for errors in back-to-back mode. The test also checks the **Ref Clock Out** port.

Equipment Required

Lightwave Multimeter:	8153A
Power Meter Sensor Module	81536A
Optical Attenuator:	8156A
Optical Cables:	11871A (x 2)
Multi Wavelength Meter	86120B
FC/PC Optical Connectors:	81000FI (x 4)
Clock Source	J1421A
Transmitter Module:	J1422B
Frequency Counter	5343A
Cable SMA to SMA	E1675-64210
Adapter	1250-2015

Procedure

Input Sensitivity

1. Switch on the VXI mainframe and check that the J1422B Transmitter Module **Laser On** LED is ON (indicating that the laser is enabled)
2. Check that the J1421A Clock Source module **10G** LED is ON.
3. Connect the **Clock Out** port on the J1421A Clock Source to the **Clock In** port on the J1422B Transmitter

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4. Select the following softpanel parameters :

Clock Setup

Mode	**: Internal**
Bit Rate	**: 9.953GHz**
Offset	**: 0 ppm**
Receiver Setup	**: Coupled**

Transmitter Setup

Format	**: SDH**
Rate	**: STM64**
Mapping	**: Internal**
	: VC4-64C
Payload	**: Foreground : PRBS 31 (NORM)**
	: Backgound : PRBS 23 (NORM)
Signal	**: Norm**

5. Connect the Transmitter optical Out port to the Agilent 86120B (ensure that all connections are tight and that the cable has no twists).

6. Press **PRESET** on the Agilent 86120B. Note the wavelength.

7. Disconnect the Transmitter optical Out port from the Agilent 86120B.

8. Connect the Transmitter optical **Out** port to the Agilent 8153A through the Optical Attenuator. (Ensure that all connectors are tight and that the cables have no twists.)

9. Set up the Agilent 8153A as follows:
   a. Press PARAM key to display wavelength [λ]
   b. Using ←,→ ↑ and ↓ keys, set the wavelength to to the wavelength measured on the Agilent 86120B (typically 1557 nm).
   c. Press PARAM key to display Time [t]
   d. Using ←,→ ↑ and ↓ keys, set the time to 200 ms.
   e. Press PARAM key to display REF.
   f. Using ←,→ ↑ and ↓ keys, set the REF to 0.00 dBm.
   g. Press PARAM key to display CAL.
   h. Using ←,→ ↑ and ↓ keys, set the CAL to 0.000 dBm.
   i. Press the ZERO key on the Power Meter to calibrate - the Power Meter is now ready.

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10. Press MODE to select the Power Level measurement on the Agilent 8153A.

11. Set the Optical Attenuator wavelength to the wavelength measured on the Agilent 86120B (typically 1557 nm) and set the attenuation level to 0.00 dB. This should result in an optical power reading of between –3 dBm and –5dBm on the Agilent 8153A. (Equivalent to optical power in the range –1 dBm to +1 dBm, through the insertion loss of 4 dB in the Agilent 8156A Optical Attenuator.)

Note For an Option 001 Transmitter, the attenuation level must be set to –2.0 dB for this test.

12. Disconnect the Optical Attenuator from the Agilent 8153A and connect to Receiver module optical **In** port.

13. Check that **Signal** present LED on the Receiver module is ON and that no **BIP errors** are detected (Red BIP LED is OFF.) All other LEDS should be OFF except the **Access** LED.

14. Increase the Optical attenuation until the **BIP errors** LED is ON. Decrease the attenuation until the **BIP errors** LED goes OFF.

15. Reconnect the Optical Attenuator to the Agilent 8153A and check that the optical power reading is > –12 dBm.

16. Reset the Optical Attenuator to 0.00 dBm attenuation. (For Option 001, set the attenuation level to –2.0 dB.)

Ref Clock Out

17. Connect the **Ref Clock Out** port to the 10 Hz - 500 MHz input on the Frequency Counter.

18. Select 10 Hz - 500 MHz setting on the Frequency Counter.

19. Check that the measured clock frequency is nominally 155.52 MHz.

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System Tests

Specifications

Table 5-3. J1420B/J1421A/J1422B System Specifications

Data Rate:	9.95328 GHz
Frame Formats	SDH or SONET
Mapping Modes	J1422A, AP9940, J1422B
J1422A	STM-64c or OC-192c
AP9940	STM-64c or OC-192c
J1422B	VC-4-64c, VC-4-16c, VC-4-4c, VC-4, VC-3 STS-192c, STS-48c, STS-12c, STS-3c, STS-1 SPE
Payload Patterns	
J1422A	PRBS 31, 23,15, 20, 11, 10, 9 All 0's All 1's User programmable
AP9940	PRBS 31, 23, 15, All 0's All 1's User programmable
J1422B	PRBS 31, 23, 20, 15, 11, 10, 9 All 0's All 1's User programmable
Error Add	Bit, B1, B2,B3, REI-L/MS-REI, REI-P/HPREI Single Error Rate m x 10(n): where m = 1 to 9 and n = 6 to 12
Alarms	LOS, OOF, LOF, A1S-L/MS-AIS, RDI-L/MS-RDI, AIS-P/AU-AIS, LOP-P/AU-LOP, RDI-P/HP-RDI

Description

This test contains information to enable you to perform back to back system tests. Tests such as frame format, pattern, error measurement and alarm detection are made using the Agilent J1420B Receiver, the Agilent J1421A Clock Source module and the Agilent J1422B Transmitter module.

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Note There is no 2.48832 GHz capability on the Agilent J1420B Receiver module

Equipment Required

Optical Cables:	11871A (x1)
FC/PC Optical Connectors:	81000FI (x 2)
Clock Source	J1421A
Transmitter Module	J1422B

Procedure

Intial Set-up

1. Switch on the VXI mainframe and check that the J1422B Transmitter Module **Laser On** LED is ON (indicating that the laser is enabled)
2. Check that the J1421A Clock Source module **10G** LED is ON.
3. Connect the **Clock Out** port on the J1421A Clock Source to the **Clock In** port on the J1422B Transmitter.
4. Connect the optical **Out** port on the Transmitter module to the optical **In** port on the Receiver module.

Note For an Option 001 Transmitter, it is necessary to add approximately 3 dB of attenuation between the **Out** port and the **In** port.

5. Select the following soft panel parameters :

Clock Setup

Mode : Internal
Bit Rate : 9.953GHz
Offset : 0 ppm

Receiver Setup : Coupled

Transmitter Setup

Format : SDH
Rate : STM64
Mapping : J1422B
: VC4-64C

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Payload : Foreground : PRBS 31 (NORM)

: Backgound : PRBS 23 (NORM)

Signal : Norm

6. Select **Timing : Manual** on the **Receiver Set-up** and the select **START** to begin a gating period.

7. Check that **Signal** present LED on the Receiver module is ON and that no **BIP errors** are detected (Red BIP LED is OFF.) All other LEDS should be OFF except the **Access** LED.

8. Select **STO**P to end the gating period

Mapping Modes

9. Select **Format : SDH** and **Rate : STM-64** on the **Transmitter Set-up.**

10. Select **Timing : Manual** on the **Receiver Set-up** and the select **START** to begin a gating period.

11. Check that the Gating LED is flashing and all **Error** and **Alarm** LEDS on the display are Green.

12. Select **STOP** to end the gating period.

13. Select **Format : SONET** and **Rate : OC-192** on the **Transmitter Setup.**

14. Select **START** to begin a new gating period.

15. Check that the Gating LED is flashing and all **Error** and **Alarm** LEDS are Green.

16. Select **STOP** to end the gating period.

17. Select **Mapping Mode : AP9940** and **Mapping : STM-64c, Frame Format : SDH** and **Rate : STM-64** on the **Transmitter Setup.**

18. Repeat steps 9 to 12.

19. Select **Mapping Mode : AP9940** and **Mapping : OC-192c, Frame Format : SONET** and **Rate : OC-192** on the **Transmitter Setup.**

20. Repeat steps 13 to 16.

21. Select **Mapping Mode : Payload** and **Mapping : STM-64c, Frame Format : SDH** and **Rate : STM-64** on the **Transmitter Setup.**

22. Repeat steps 9 to 12 for **Mapping : VC-4-64c, VC-4-16c, VC-4-4c, VC-4 and VC-3.**

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23. Select **Mapping Mode : Payload** and **Mapping : OC-192c, Frame Format : SONET** and **Rate : OC-192** on the **Transmitter Setup.**

24. Repeat steps 13 to 16 for **Mapping : STS-192c, STS-48c, STS-12c, STS-3c and STS1-SPE.**

Patterns

25. Select the following softpanel parameters :

Receiver Setup : Coupled

Transmitter Setup

Format : SDH

Rate : STM64

Mapping : J1422B

: VC4-64C

Payload : Foreground : PRBS 31 (NORM)

: Backgound : PRBS 23 (NORM)

Signal : Norm

26. Select **START** to begin a new gating period.

27. Check that all **Error** and **Alarm** LEDs are Green.

28. Select **STOP** to end the gating period.

29. Repeat steps 25 to 28 for **PRBS 23, 20, 15, 11, 10** and **9**, and **Pattern All'0's** and **All '1's**.

Error Add

30. Select the following softpanel parameters :

Receiver Setup : Coupled

Transmitter Setup

Format : SDH

Rate : STM64

Mapping : J1422B

: VC4-64C

Payload : Foreground : PRBS 31 (NORM)

: Backgound : PRBS 23 (NORM)

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Signal : Norm

Scramble : On

Error Type : Bit

Error Mode : Off

31. Select **START** to begin a new gating period.

32. Check that all **Error** and **Alarm** LEDs are Green.

33. Select **Single Error** 3 times.

34. Select **Error Count** of the **Results** panel and Check that the error count is **3** and that the **Error** LED is AMBER.

Note The Error LED may indicate RED before showing AMBER.

35. Select **STOP** to end the gating period.

36. Select **START** to begin a new gating period.

37. Check that all **Error** and **Alarm** LEDs are Green.

38. Select **Error Mode : Rate** and **Error Rate : 1 x 10(-6)** on the **Transmitter Setup** and **Error Ratio** on the **Results** panel.

39. Check that the **Error Ratio** is approximately **1.00E-6** and the **Error** LED on the display is RED.

40. Select **STOP** to end the gating period.

41. Repeat steps 30 to 40 for **B1, B2,B3**, **MS-REI** and **REI-P/HPREI** error add.

42. For **B1**, **B2** and **B3**, check that the **BIP Error** LED on the Receiver Module is ON when errors are detected.

Alarms

LOS Alarm

43. Select the following softpanel parameters :

Receiver Setup : Coupled

Transmitter Setup

Format : SDH

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Rate : **STM64**

Mapping : **J1422B**

: **VC4-64C**

Payload : **Foreground : PRBS 31 (NORM)**

: **Backgound : PRBS 23 (NORM)**

Signal : **Norm**

Scramble : **On**

Alarm Type : **LOS**

Alarm Mode : **Off**

44. Select **START** to begin a new gating period.

45. Check that all **Error** and **Alarm** LEDs are Green.

46. Select **Single Alarm** 3 times**.**

47. Check that the **Alarm Seconds** count for both **LOS** and **OOF** is **3** and that the **LOS** and **OOF Alarm** LEDs are AMBER.

Note The Alarm LEDs may indicate RED before showing AMBER.

48. Select the **STOP** key to end the gating period.

49. Select **START** to begin a new gating period.

50. Check that all **Error** and **Alarm** LEDs are Green.

51. Select **Alarm Mode : ON**.

52. Check that the **LOS, LOF, OOF** and **SYNC Alarm** LEDs on the display are RED**.**

53. Check that the Transmitter module **Laser** LED is now OFF; the Receiver module **Signal** LED is OFF and the **OOF** LED is ON.

54. Select the **STOP** to end the gating period.

OOF Alarm

55. Select **START** to begin a new gating period.

56. Select **Alarm Type : OOF** and **Alarm Mode : Off.**

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57. Check that all **Error** and **Alarm** LEDs are Green.

58. Select **Single Alarm** 3 times**.**

59. Check that the **Alarm Seconds** count is **OOF = 3** and the **OOF Alarm** LED is AMBER.

Note The Alarm LEDs may indicate RED before showing AMBER.

60. Select the **STOP** key to end the gating period.

61. Select **START** to begin a new gating period.

62. Check that all **Error** and **Alarm** LEDs are Green.

63. Select **Alarm Mode : ON**.

64. Check that the **LOF, OOF** and **SYNC Alarm** LEDs on the display are RED**.**

65. Check that the Receiver module **OOF** LED is ON.

66. Select the **STOP** once to end the gating period.

LOF Alarm

67. Select **Alarm Type : LOF** and **Alarm Mode : Off.**

68. Select **START** to begin a new gating period.

69. Check that all **Error** and **Alarm** LEDs are Green.

70. Select **Single Alarm** 3 times**.**

71. Check for **Alarm Seconds** count **LOF = 3** and **OOF = 3.**

72. Check that the **LOS**, **OOF** and **LOF Alarm** LEDs are AMBER.

Note The Alarm LEDs may indicate RED before showing AMBER.

73. Select the **STOP** key to end the gating period.

74. Select **START** to begin a new gating period.

75. Check that all **Error** and **Alarm** LEDs are Green.

76. Select **Alarm Mode : ON**.

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77. Select **START** to begin a new gating period.

78. Check that the **LOF, OOF** and **SYNC Alarm** LEDs on the display are RED**.**

79. Check that the Receiver module **OOF** LED is ON.

80. Select the **STOP** once to end the gating period.

MS-AIS Alarm

81. Select **Alarm Type : MS-AIS** and **Alarm Mode : Off.**

82. Select **START** to begin a new gating period.

83. Check that all **Error** and **Alarm** LEDs are Green.

84. Select **Single Alarm** 3 times**.**

85. Check for Alarm Seconds count **MS-AIS = 3.**

Note B2, MS-REI and Bit Errors may also be indicated.

86. Check **MS-AIS Alarm** LED is AMBER.

Note The Alarm LEDs may indicate RED before showing AMBER.

87. Select the **STOP** key to end the gating period.

88. Select **START** to begin a new gating period.

89. Check that all **Error** and **Alarm** LEDs are Green.

90. Select **Alarm Mode : ON**.

91. Check that the **MS-AIS** and **PSL Alarm** LEDs on the display are RED**.**

92. Check that the Receiver module **AIS** LED is ON.

93. Select the **STOP** once to end the gating period.

MS-RDI Alarm

94. Select **Alarm Type : MS-RDI** and **Alarm Mode : Off.**

95. Select **START** to begin a new gating period.

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96. Check that all **Error** and **Alarm** LEDs are Green.

97. Select **Single Alarm** 3 times**.**

98. Check that the **Alarm Seconds** count for **MS-RDI** is **3** and that the **MS-RDI Alarm** LED is AMBER.

Note The Alarm LEDs may indicate RED before showing AMBER.

99. Select the **STOP** key to end the gating period.

100. Select **START** to begin a new gating period.

101. Check that all **Error** and **Alarm** LEDs are Green.

102. Select **Alarm Mode : ON**.

103. Check that the **MS-RDI Alarm** LED on the display is RED**.**

104. Check that the Receiver module **RDI** LED is ON.

105. Select the **STOP** once to end the gating period.

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Performance Test Record

J1420B Receiver Module	
Location:	*Serial No.:*
	Tested by:
Temperature:	*Certified by:*
Humidity:	*Date:*

Page	Test Description		Result		
			Min.	Actual	Max.
	Input Sensitivity Test				
	Step 1	Laser LED ON		Pass/Fail	
	Step 2	10G LED ON		Pass/Fail	
	Step 13	Signal LED ON BIP LED OFF		Pass/Fail Pass/Fail	
	Step 15	>-12 dBm		Pass/Fail	
		Ref Clock Out			
	Step 19	155.52MHz		Pass/Fail	
		System Tests			
	Step 1	Laser ON		Pass/Fail	
	Step 2	10G LED ON		Pass/Fail	
	Step 7	Signal LED ON BIP LED ON		Pass/Fail	
		Mapping Modes			
	Step 11	STM-64		Pass/Fail	
	Step 15	OC-192		Pass/Fail	
	Step 18	STM-64		Pass/Fail	
	Step 20	OC-192		Pass/Fail	
	Step 21	STM-64		Pass/Fail	
	Step 21	OC-192		Pass/Fail	
	Step 22	VC-4-64c		Pass/Fail	
	Step 22	VC-4-16c		Pass/Fail	
	Step 22	VC-4-4c		Pass/Fail	

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Page	Test Description		Result		
			Min.	Actual	Max.
	Step 22	VC-4		Pass/Fail	
	Step 22	VC-3		Pass/Fail	
	Step 23	STS-48c		Pass/Fail	
	Step 23	STS-12c		Pass/Fail	
	Step 23	STS-3c		Pass/Fail	
	Step 23	STS1-SPE		Pass/Fail	
		Pattern			
	Step 27	PRBS 31		Pass/Fail	
	Step 29	PRBS 23		Pass/Fail	
	Step 29	PRBS 20		Pass/Fail	
	Step 29	PRBS 15		Pass/Fail	
	Step 29	PRBS 11		Pass/Fail	
	Step 29	PRBS 10		Pass/Fail	
	Step 29	PRBS 9		Pass/Fail	
	Step 29	All ‘0’s		Pass/Fail	
	Step 29	All ‘1’s		Pass/Fail	
		Error Add			
	Step 34	Bit Error Single		Pass/Fail	
	Step 39	Bit Error Rate		Pass/Fail	
	Step 41	B1 Error Single		Pass/Fail	
	Step 41	B1 Error Rate		Pass/Fail	
	Step 41	B2 Error Single		Pass/Fail	
	Step 41	B2 Error Rate		Pass/Fail	
	Step 41	B3 Error Single		Pass/Fail	
	Step 41	B3 Error Rate		Pass/Fail	
	Step 41	MS-REI Error Single		Pass/Fail	
	Step 41	MS-REI Error Rate		Pass/Fail	

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Page	Test Description		Result		
			Min.	Actual	Max.
	Step 42	B1, B2, B3 Error LED		Pass/Fail	
		Alarms			
	Step 47	LOS Single		Pass/Fail	
	Steps 52,53	LOS ON		Pass/Fail	
	Step 59	OOF Single		Pass/Fail	
	Steps 64,65	OOF ON		Pass/Fail	
	Steps 71,72	LOF Single		Pass/Fail	
	Steps 78,79	LOF ON		Pass/Fail	
	Steps 85,86	MS-AIS Single		Pass/Fail	
	Steps 91,92	MS-AIS ON		Pass/Fail	
	Step 98	MS-RDI Single		Pass/Fail	
	Steps 103,104	MS-RDI ON		Pass/Fail	

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