OPERATING AND PROGRAMMING MANUAL

HP 8155A LASER SOURCES

SERIAL NUMBERS

This manual applies directly to instruments with serial number 2724G00101 and higher. Any change made in instruments having serial numbers higher than the above numbers will be found in a "Manual Changes" supplement supplied with this manual. Be sure to examine the supplement for changes which apply to your instrument and record these changes in the manual.

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FEDERAL REPUBLIC OF GERMANY

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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.

WARRANTY

This Hewlett-Packard instrument product is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period, HP will, at its option, either repair or replace products which prove to be defective.

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HP warrants that its software and firmware designated by HP for use with an instrument will execute its programming instructions when properly installed on that instrument. HP does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

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ELEKTRISCHE SICHERHEIT

WARNING

Im Falle von erkennbaren Transportschaeden (beschaedigte Abdeckungen, Frontplatte, Stecker, usw.) darf das Geraet im Interesse der elektrischen und laseroptischen Sicherheit nicht in Betrieb genommen werden.

Das Geraet muss an einer Wechselspannung von 100-120Vrms oder 220-240Vrms (±10%), 48-400 Hz betrieben werden.

CAUTION

VOR DEM EINSCHALTEN IST SICHERZUSTELLEN, dass das Geraet auf die vorhandene Netzspannung eingestellt ist.

WARNING

Im Interesse der Sicherheit sind vor dem Einschalten des Geraetes die folgenden Sicherheitshinweise zu beachten.

a) *Falls das Geraet an einem Spartransformator betrieben wird, muss der Masseanschluss des Transformators mit dem Nulleiter des Stromnetzes verbunden werden.*

b) *Das Netzkabel darf nur in Schutzkontakt-Steckdosen gesteckt werden. Der Schutzleiter darf nicht durch Verwendung ungeeigneter Verlaengerungskabel unterbrochen werden.*

c) *Vor dem Einschalten muss sichergestellt sein, dass die Chassismasse des Geraetes mit dem Schutzleiter verbunden ist. Mit der Verwendung des mitgelieferten Netzkabels wird dies sichergestellt.*

OPTISCHE SICHERHEITSVORKEHRUNGEN

Das HP 8155A ist ein Geraet der Laserklasse 1. Das Geraet wurde mit Bezug auf Sicherheitsnormen VDE 0836 and VDE 0837 hergestellt.

Vor Inbetriebnahme sollten die Sicherheitshinweise in diesem Handbuch, insbesondere auf der roten Seite, sorgfaeltig durchgelesen werden. Dies ist im Interesse einer einwandfreien Geraetefunktion und der Sicherheit des Benutzers unbedingt erforderlich.

Bei eingeschaltetem Geraet darf man auf keinen Fall in einem am Geraete-Ausgang angeschlossenen Lichtwellenleiter hineinschauen.

Geraete mit defektem Laser duerfen AUSSCHLIESSLICH durch ein HP-Service Buero repariert oder kalibriert werden.

WARNING

Reparturarbeiten duerfen nur von speziall dafuer ausgebildetem und bevollmaechtigtem Personal durchgefuehrt werden.

SPEZIFIKATIONEN

	Opt.002	Opt.003
Wellenlaenge	1310±30nm	1550±40nm
Spektrale Bandbreite	<2.5nm	<4nm
Optische Ausgangsleistung	>-4dBm	>-4dBm
Langzeitstabilitaet ueber 12Std und ΔT=±2°C	±0.03dB	±0.03dB
Kurzzeitstabilitaet ueber 15 Minuten bei konst. Temperatur	±0.003dB	±0.003dB

REINIGUNGSANWEISUNG

WICHTIG!

Um die beschriebenen Geraetespezifikationen zu gewaehrleisten ist auf die Sauberkeit des Steckers besonders zu achten. Ein verschmutzter Stecker kann Daempfungen von 1dB und mehr verursachen, die somit die Geraetleistungen erheblich beeinflussen koennen.

Es wird empfohlen, fuer die folgende Reinigungsanweisung den HP Cleaning Kit mit der Modelnummer 15475A zu benutzen.

1) Entfernen Sie die Schutzkappe des optischen Adapters.

2) Schrauben Sie den optischen Adapter vom Instrument ab.

3) Benutzen Sie den Reinigungspinsel mit Blasebalg und blasen Sie damit den Adapter aus.

4) Geben Sie etwas Reinigungsfluessigkeit auf ein beigefuegtes Reinigungspapier und reinigen Sie den inneren Teil der Fuehrungshuelse. Reinigen Sie bitte das Steckerende mit einem neuen Blatt Reinigungspapier. Wiederholen Sie die Reinigung ein zweites Mal und benutzen Sie in jedem Fall ein neues Blatt Reinigungspapier.

5) Druecken Sie leicht mit der adhaesiven Seite des beigefuegten Bandes gegen die Oberflaeche des Steckers, dann wieder entfernen. Wiederholen Sie den Vorgang ein zweites Mal. Mit dem Band entfernen Sie alle Rueckstaende oder Fussel des Reinigungspapiers.

6) Schrauben Sie den Adapter wieder auf den Geraeteausgang.

Wichtig: **Benutzen Sie nie Reinigungsfluessigkeiten die Schleifmittel enthalten zur Saeuberung optischer Stecker. Der Gebrauch dieser Materialien kann optische Bauteile beschaedigen und die Leistung des optischen Systems stark beeinflussen. Benutzen Sie nur die dem Kit beigefuegten Materialien oder gleichwertige Produkte.**

KURZFORM BEDIENUNGSANLEITUNG

INBETRIEBNAHME DER LASER-QUELLE

Die Laser-Quelle kann mit den Bedienungselementen (Wipptasten) auf der Frontplatte bedient oder ueber HP-IB programmiert werden. Die jeweilige Betriebsart des Laserausganges wird durch LED's angezeigt, die mit dem "DISABLE" und dem Laserausgang verbunden sind.

- "DISABLE" LED an = optischer Signalweg unterbrochen
- "LASER ACTIVE" an = optischer Signalweg eingeschaltet

Bei wiederholtem Betaetigen der "DISABLE"-Taste schaltet das Geraet den optischen Signalweg an und aus.

Nach dem Einschalten unterbricht das HP 8155A automatisch den optischen Signalweg und schaltet alle Modulations-Betriebsarten auf aus. Zusaetzlich blinkt das "DISABLE"-Tasten LED 20 Sekunden. Waehrend dieser Zeit ist das Geraet nicht manuell oder ueber HP-IB bedienbar.

WICHTIG!

Das HP 8155A hat einen eingebauten Sicherheitskreis, welcher den optischen Signalweg im Falle eines Geraetefehlers unterbricht. Bei Erreichen der nach IEC 825 Norm festgelegten Hoechstgrenze der optischen Ausgangsleistung von 600uW fuer die Geraete Option 002 (1300nm) und 800uW fuer die Geraete Option 003 (1550nm) wird der optische Signalweg durch den eingebauten Sicherheitskreis automatisch unterbrochen. Im Falle einer Unterbrechung durch den Sicherheitskreis leuchten alle Kontrolleuchten auf der Frontplatte mit Ausnahme des LED fuer den HP-IB Status. Durch wiederholtes Druecken der "DISABLE"-Taste wird das Geraet wieder in den normalen Betriebszustand versetzt. Leuchten alle Kontrolleuchten der Frontplatte erneut auf sollte das Geraet im Sinne der Sicherheit ausser Betrieb gesetzt werden und zur naechsten HP-Niederlassung eingeschickt werden.

. . . im CW (Dauerstrich) Betrieb

Fuer den CW (Dauerstrich) Betrieb sind alle Modulations Tasten am HP 8155A auszuschalten. Fuer den Fall, dass ein Modulationstasten-LED leuchtet, ist dieses durch Betaetigen der entsprechenden Taste auszuschalten. Durch die Betaetigung der "DISABLE" Taste schaltet der Laser auf Dauerstrichbetrieb.

. . . im internen Modulations Betrieb

Der interne 270Hz Quarzoszillator wird mit der INT. (interne Modulation) Taste eingeschaltet. Das optische Signal steht nach Betaetigen der "DISABLE" Taste als moduliertes Rechtecksignal am Ausgang zur Verfuegung. Zur Synchronisation externer Geraete steht ein elektrisches 270Hz Rechtecksignal am BNC-Ausgang zur Verfuegung.

. . . im externen Niederfrequenz (LF) Betrieb

Das HP 8155A bietet die Moeglichkeit das Ausgangssignal extern von 0Hz bis 1MHz zu modulieren. Durch Betaetigen der Tasten EXT. LF und "DISABLE" und dem Anlegen eines externen Signals am BNC-Eingang steht ein frequenzmoduliertes Signal am Ausgang zur Verfuegung. Die Betriebsrat ist eine reine EIN/AUS Modulation.

. . . im externen Hochfrequenz (RF) Betrieb

Durch Betaetigen der Tasten "EXT. RF" und "DISABLE" und dem Anlegen eines externen Signals am BNC-Eingang kann das Instrument von 1KHz bis 850MHz moduliert werden. Das Verhaeltnis von oberem zu unterem Pegel (Extinktionsverhaeltnis) liegt im RF-Betrieb bei 10:1.

CAUTION

Bei externer Modulation < 1KHz kann der Sicherheitskreis ansprechen.

PARTIE ELECTRIQUE

WARNING

Pour éviter l'utilisation de la partie électrique et/ou de la partie optique de facon dangereuse, ne procéder à aucun test dynamique si une partie quelconque du coffret de l'appareil (carters, panneaux, connecteurs, etc.) semble avoir été endommagée pendant le transport.

L'instrument doit être raccordée à une source d'alimentation en 100-120Veff, 220-240Veff (±10%), 48-400Hz.

CAUTION

AVANT DE METTRE CET INSTRUMENT SOUS TENSION s'assurer que le sélecteur de tension secteur a été correctement positionné.

WARNING

Afin d'éviter les risques de blessure ou d'électrocution mortelle, les précautions suivantes doivent être observées avant de mettre l'instrument sous tension.

a) Si l'instrument est alimenté par l'intermédiaire d'un auto-transformateur abaisseur de tension, s'assurer que la borne du commun est reliée au pôle de la terre de la source d'alimentation.

b) La fiche du cordon d'alimentation ne doit être insérée que dans une prise munie d'un contact de mise à la terre. La protection ne doit être rendue inopérante par l'utilisation d'un prolongateur sans conducteur de mise à la terre.

c) Avant de mettre l'instrument sous tension, sa borne de masse doit être reliée au conducteur de terre du cordon d'alimentation. On peut vérifier que cette connexion existe avec le cordon d'alimentation qui est envoyé avec l'instrument.

PARTIE OPTIQUE

Le HP 8155A est classé dans la catégorie 1 des produits à laser. Il a été construit et testé conformément aux normes de sécurité IEC 825.

Avant utilisation, l'instrument et le manuel, ainsi que le sommaire de sécurité en rouge, doivent être examinés pour bien connâitre, tous les repères de sécurité et les étiquettes d'avertissement. Toutes les recommandations doivent être suivies à la lettre afin de maintenir l'instrument en bon état de fonctionnement et éviter une utilisatin pouvant être dangereuse pour l'utilisateur.

En aucun cas, il ne faut regarder dans l'extrémité spiralé, ni dans aucun autre câble relié à la sortie optique lorsque la source de laser 8155A est en fonctionnement.

Les instruments dont le bloc laser fonctionne mal DOIVENT être renvoyés à un centre de dépannage HP pour réparation et étalonnage.

WARNING

Ne confier l'entretien et le dépannage qu'a du personnel autorise!

SPECIFICATIONS

	Opt.002	Opt.003
Longueur d'ondes	1310±30nm	1550±40nm
Bande passante spectrale	<2.5nm	<4nm
Puissance de sortie optique	>-4dBm	>-4dBm
Stabilité à long terme sur 12 h avec une variation de température de 2°C	±0.03dB	±0.03dB
Stabilité à court terme sur 15 min. à température constante	±0.003dB	±0.003dB

PROCEDURE DE NETTOYAGE

IMPORTANT!

Il est impératif de conserver le connecteur optique dans un état parfaitement popre afin que les performances de l'instrument restent dans les spécifications indiquées. Un connectuer sale peut produire des atténuations supérieures à 1 dB et affecter par conséquent les performances de l'instrument.

Il est recommandé d'utiliser le kit de nettoyage HP 15475A pour suivre la procédure suivante.

1) Dévissez le capuchon de protection situé sur le connecteur optique.

2) Dévissez la traversée de la fibre, et retirez la.

3) A l'aide du pinceau soufflant fourni, chassez les poussières de la traversée de la fibre.

4) Appliquez quelques gouttes du liquide nettoyant sur une feuille de papier spécial de nettoyance fournie, et nettoyez le barillet du connecteur. Nettoyez la face du connecteur à l'aide d'une nouvelle feuille de papier. Recommancez cette opération plusieurs fois en utilisant une nouvelle feuille à chaque fois.

5) Appuyez légèrement le coté adhésif du ruban fourni sur la face du connecteur, et retirez ce ruban rapidement. Recommancez cette opération une deuxième fois. Elle a pour pourraient rester sur le connecteur.

6) Revissez la traversée de la fibre sur le connecteur.

ATTENTION

N'utilisez jamais de matériaux abrasifs pour nettoyer le connecteur optique. L'emploi de tels matériaux peut endommager les composants optiques et affecter considérablement les performances du système. Utilisez seulement le produit de nettoyage fourni dans le kit, ou on produit similaire.

REGLAGE DE LA SOURCE LASER

La source laser est réglable à partir des touches de la face avant (mode local) ou par programmation à l'aide de l'interface HP-IB. L'état effectif de la sortie optique est toujours indiqué par les DEL associées à la touche DISABLE et au raccordement du connecteur:

- DEL de la touche DISABLE allumée = Sortie optique invalidée
- DEL du connecteur allumée = Sortie optique validée

La touche DISABLE valide et invalide alternativement la sortie optique.

A la mise sous tension, la sortie optique du HP 8155A est invalidée automatiquement, et tous les modes de modulation sont inhibés. La DEL de la touche DISABLE clignote pendant 20 secondes après la mise sous tension. Pendant ce temps, rien ne peut être fait avec l'instrument, y compris un adressage HP-IB.

IMPORTANT!

Le HP 8155A possède un circuit de sécurité intégré qui invalide la sortie optique en cas d'anomalie interne si la puissance de sortie atteint 600µW pour l'option 002 (1300nm) et 800µW pour l'option 003 (1550nm). Si le laser est invalidé par ce circuit, toutes les DEL de l'instrument seront allumées à l'exception de celles de l'état HP-IB. Pour voir si le problème peut se résoudre de lui-même, appuyez sur la touche DISABLE. Si les DEL s'allument à nouveau, l'instrument doit être retourné directement au service après-vente HP le lpus proche. Sinon l'instrument est en ordre de marche.

. . . pour un signal optique en ondes continues

Pour que le HP 8155A délivre une sortie optique en ondes continues, assurez vous que tous les modes de modulation sont inhibés. Si une DEL d'une touche de MODULATION est allumée, appuyez sur cette touche pour invalider le mode de modulation correspondant. Ensuite, validez la sortie optique en appuyant sur la touche DISABLE.

. . . pour un signal optique module de maniere interne

Pour moduler le signal de sortie optique du HP 8155A avec le générateur de 270Hz incorporé (rapport cyclique de 50%), appuyez sur la touche INTernal MODULATION (la DEL de la touche s'allumera) et validez la sortie optique. Le signal de modulation est également délivré par le connecteur de sortie BNC pour synchroniser des dispositifs externes.

. . . pour un signal optique module par un signal BF externe

Pour moduler le signal de sortie optique du HP 8155A par un signal basse fréquence appliqué sur le connecteur d'entrée, appuyez sur la touche EXTernal LF MODULATION (la DEL de la touche s'allumera) et validez la sortie optique.

La fréquence du signal modulant doit être comprise entre 0 et 1 MHz.

Pour le mode LF (basse fréquence) le signal de modulation doit avoir la forme d'une impulsion. Le signal optique modulé sera de type tout ou rien (ON/OFF).

. . . pour un signal optique module par un signal RF externe

Pour moduler le signal optique de sortie du HP 8155A par un signal RF appliqué sur le connecteur d'entrée, appuyez sur la touche EXTernal RF MODULATION (la DEL de la touche s'allumera) et validez la sortie optique.

La fréquence du signal modulant doit être comprise entre 1KHz et 850MHz.

ATTENTION

NE PAS appliquer de signal modulant de fréquence inférieure à 1KHz en mode de modulation RF externe, car cela pourrait conduire à des problèmes de sécurité, et amener le circuit de sécurité de l'instrument à invalider la sortie optique.

Un signal de modulation externe rapide appliqué sur l'entrée RF produit un signal de sortie optique en forme d'impulsion, où la diode laser est modulée au dessus de son seuil avec un rapport d'extinction de 1/10.

LIST OF EFFECTIVE PAGES

The List of Effective Pages gives the date of the most recent version of each page in the manual. To verify that your manual contains the most current information, check the dates printed at the bottom of each page with those listed below. The date on the bottom of each page reflects the edition or subsequent update in which that page was printed.

First Edition	December 1987

Effective Pages	**Date**
ALL	December 1987

PRINTING HISTORY

New editions are complete revisions of the manual. Update packages, which are issued between editions, contain additional and replacement pages to be merged into the manual by the customer. The date on the title page and back cover of the manual only changes when a new edition is published. When an edition is reprinted, all the prior updates to the edition are incorporated. No information is incorporated into a new edition unless it appears in a prior update.

First Edition Printed December 1987

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SECTION I

GENERAL INFORMATION

1.1 INTRODUCTION

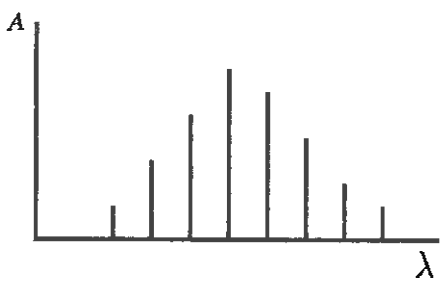
This manual contains the information required to install, test, and operate the Hewlett-Packard HP 8155A Laser Source. The HP 8155A series of Laser Sources consists of two instruments that have different wavelength outputs:

Opt 002	-	1300nm
Opt 003	-	1550nm

1.2 SPECIFICATIONS

Specifications of the HP 8155A are given in Table 1-1. These specifications are the performance standards or limits against which the instrument is tested. The specifications apply to the Diamond® HMS-10/HP connector and connector interface (Opt.011).

The spectral bandwidth specified has been calculated using the RMS method. The formula used is shown below:



Spectral Bandwidth $\Delta\lambda(RMS) = \sqrt{\frac{\sum(A_i(\lambda_i - \bar{\lambda})^2)}{\sum A_i}}$

where $\bar{\lambda} = \frac{\sum(A_i\lambda_i)}{\sum A_i}$

1.3 SAFETY CONSIDERATIONS

The HP 8155A is a Safety Class 1 Laser Product (provided with a terminal for protective earthing) which has been designed with reference to IEC 825 and 21 CFR 1040.10.

Before operation, the instrument and manual, including the red safety page, should be reviewed for safety markings and instructions. These must then be followed to ensure safe operation and to maintain the instrument in safe condition.

Instruments with malfunctioning lasers MUST be returned to an HP Service Center for repair.

WARNING

Refer servicing only to qualified and authorized personnel!

Do not enable the laser when no fiber is attached to the optical output connector.

Under no circumstances look into the end of any fiber attached to the optical output when the HP 8155A Laser Source is operational.

1.4 INSTRUMENTS COVERED BY THE MANUAL

Each HP 8155A has a two-part serial number. The first 4 digits and the letter comprise the serial number prefix; the last 5 digits a sequential suffix which is unique to each HP 8155A. The contents of this manual apply directly to laser sources having the serial prefix 2724G.

1.5 DESCRIPTION

The HP 8155A series are high performance Laser Sources for measurements requiring high stability and narrow spectral bandwidth. Within a 12 hour time-frame and an enviromental temperature change of ±2°C, the power level variation is less than 0.03dB for both options, including the optical connector. The HP 8155A Laser Sources output very stable CW light. However, if required, the HP 8155A output level may be modulated with external LF signals upto 1MHz, RF signals from 1KHz to 850MHz or with the built-in 270Hz generator.

The instrument has a InGaAsP laser type and a divergent 9μm beam diameter with a numerical aperture (NA) of 0.1.

The HP 8155A has an in-built safety circuit that will disable, in the case of any internal failure, the optical output at an output power of 600μW (Opt.002) and 800μW (Opt.003).

1.6 ACCESSORIES SUPPLIED

The HP 8155A is supplied complete with the following accessories:

Item	HP Part No.
T 400mA, 250Vac Fuse (100/120V)*	2110-0340
T 200mA, 250Vac Fuse (220/240V)*	2110-0235
Power Cord	see Figure 2-2

* one fitted and one supplied

1.7 ACCESSORIES AVAILABLE

A number of interface cables are available for simplifying connection of the HP 8155A to various optical signal sources and receivers. For a list of these adapter cables, see the latest Ordering Guide.

The following lists the company options available for the HP 8155A:

Option 907	Front Handle Kit
Option 908	Rack Flange Kit
Option 916	Additional Operating and Programming Manual
P/N 5061-9071	Bail Handle Kit

An additional accessory for the HP 8155A is the HP 15475A Cleaning Kit. This kit includes cleaning material (brush, tissue, tape, etc.) to clean optical surfaces such as connectors and is supplied in a plastic carrying case.

Table 1-1. Specifications

Specifications describe the instrument's warranted performance.
They apply to the end of a 2m single-mode (9/125μm) pigtail with a Diamond® HMS-10/HP connector and HMS-10/HP connector interface attached. The connectors must have a manufacturing date code of 31-87 or higher.

Optical Characteristics

	opt 002	opt 003
Wavelength:	1310±30nm	1550±40nm
Spectral Bandwidth:*	<2.5nm	<4nm
Optical output power:**	>-4dBm	>-4dBm
Long-term stability over 12h and ΔT= ±2°C:	<±0.03dB	<±0.03dB
Short-term stability over 15 minutes at constant temp.:	<±0.003dB	<±0.003dB

* The spectral bandwidth is measured using the RMS method.
** **Attention:** With regard to Class 1 Laser Products, the HP 8155A complies with the international standards IEC 825 and 21 CFR 1040.10.
The maximum safe output power is ≤600μW for Opt.002 and ≤800μW for Opt.003. The output power given is the power at the instrument output connector and not in the attached fiber.

Supplementary Performance Characteristics

(Description of non-warranted typical performance parameters)

Digital Modulation Modes:
All output signals are pulse-shaped

	Digital Input LF	Digital Input RF
Max. input volage:	±10V	±2.5V
Input impedance:	10kohm	50ohm
Input frequency:	0-1MHz	DC, 1KHz-850MHz
Input level:	TTL	≥±200mV ***

*** Symmetrical about GND

270Hz Output TTL Squarewave
Output levels: TTL
Max. external voltage: ±10V
Output impedance: 600 ohm
Output frequency: 270 Hz (derived from internal quartz oscillator)

Operating Modes
Operating modes OFF (INT. and EXT./RF/LF): CW signal
Output disable: Laser switched off
LF/RF input enable: Activates the selected input
Internal modulation enable: Activates internal 270Hz generator

General

Recalibration period: 1 year
Warm-up time for specified stabilities: 45 minutes

HP-IB Capability*
All modes and parameters can be programmed

Listen (time for HP 8155A to receive, verify and execute a message)
Output/modulation enable/disable: <100ms
Receive time: <1ms/character

Talk (time for HP 8155A to transmit a message)
Query commands: <0.5ms/character

HP-IB Interface Function Code: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0

Environmental
Storage temperature: -40°C to +75°C
Operating temperature: 0°C to 55°C
Humidity: <95% R.H. from 0°C to 40°C

Power: AC 100-120/220-240Vrms, ±10%, 45VA max., 48-400Hz

Dimensions: 89mm H, 212.3mm W, 345mm D (3.5"x8.36"x13.6")

Weight: net 4.5kg (9.9lbs), shipping 8.6kg (18.9lbs)

* Hewlett-Packard's implementation of the IEEE Standard 488 in 1978.

For adapter cables and other accessories see latest Ordering Guide.

Data subject to change.

SECTION II

INSTALLATION

2.1 INTRODUCTION

This section provides installation instructions for the HP 8155A and its accessories. It also includes information about initial inspection and damage claims, preparation for use, packaging, storage and shipment.

2.2 INITIAL INSPECTION

Inspect the shipping container for damage. If the container or cushioning is damaged, it should be kept until the contents of the shipment have been checked for completeness and the instrument has been verified both mechanically and electrically.

Procedures for checking the optical operation are given in Section 4. If the contents are incomplete, mechanical damage or defect is apparent, or if an instrument does not pass the operator's checks, notify the nearest Hewlett-Packard office. Keep the shipping materials for carrier's inspection. The HP office will arrange for repair or replacement without waiting settlement.

2.3 PREPARATION FOR USE

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,etc.).

2.4 Power Requirements

The instrument requires an AC power source of 100-120/220-240 Vrms (±10%) at a frequency of 48-400 Hz single phase. The maximum power consumption is 45 VA.

2.5 Line Voltage Selection

CAUTION

BEFORE SWITCHING ON THE INSTRUMENT, make sure that the instrument is set to the local line voltage.

The switch is combined with the power line voltage receptacle on the rear panel. If it is necessary to change the setting, **THE POWER CORD MUST FIRST BE DISCONNECTED**. Then insert a screwdriver into the recess at the left-hand side of the assembly and prise open the cover. Figure 2-1 shows the main details of the assembly. To change the voltage setting, the selector must be removed and then replaced with the new setting value displayed. If necessary, change the fuse in accordance with the new voltage setting.

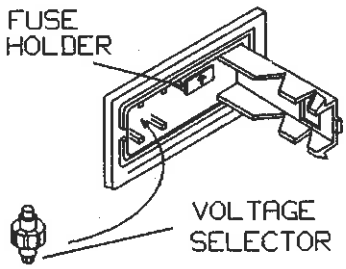


Figure 2-1. Line Voltage Switch Assembly.

VOLTAGE	100-120V	220-240V
FUSE	T 400mA, 250Vac	T 200mA, 250Vac

2.6 Power Cable

In accordance with international safety standards, this instrument is equipped with a three-wire power cable. When connected to an appropriate ac power receptacle, this cable grounds the instrument cabinet. The type of power cable shipped with each instrument depends on the country of destination. Refer to Figure 2-2 for the part numbers of the power cables available.

WARNING

To avoid the possibility of injury or death, the following precautions must be followed before the instrument is switched on.

a) *If this instrument is to be energised via an autotransformer for voltage reduction, ensure that the Common terminal is connected to the grounded pole of the power source.*

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

c) *Before switching on the instrument, the protective ground terminal of the instrument must be connected to a protective conductor. This is verified by using the power cord which is supplied with the instrument.*

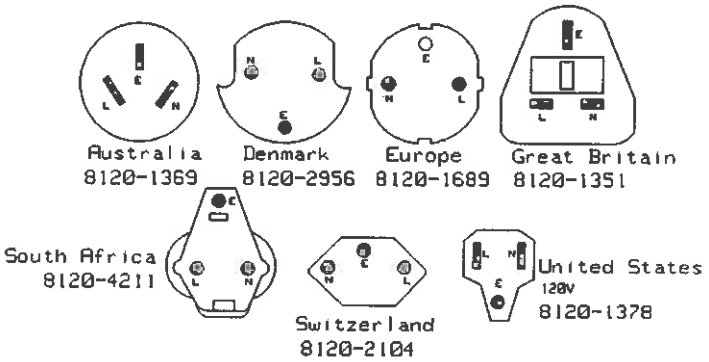


Figure 2-2. Power Cables - Plug Identification

The following work should be carried out by a qualified electrician - all local electrical codes being strictly observed. If the plug on the cable does not fit the power outlet, or the cable is to be attached to a terminal block, cut the cable at the plug end and re-wire it.

The color coding used in the cable will depend on the cable supplied. If a new plug is to be connected, it should meet local safety requirements and include the following features:

Adequate load-carrying capacity (see table of specifications in Section 1).
Ground connection.
Cable clamp.

2.7 HP-IB Connector

The rear panel HP-IB connector (Fig 2-3), is compatible with the connector on Cable Assemblies 10833A, B, C and D. If a cable is to be locally manufactured, use male connector, HP part number 1251-0293.

2.8 HP-IB Logic Levels

The HP 8155A HP-IB lines use standard TTL logic, the levels being as follows:

True = Low = digital ground or 0V dc to 0.4V dc,

False = High = open or 2.5V dc to 5V dc.

All HP-IB lines have LOW assertion states. High states are held at 3.0V d.c. by pull-ups within the instrument. When a line functions as an input, approximately 3.2mA of current is required to pull it low through a closure to digital ground. When a line functions as an output, it will sink up to 48mA in the low state and approximately 0.6mA in the high state.

NOTE: Isolation, the HP-IB line screens are not isolated from ground.

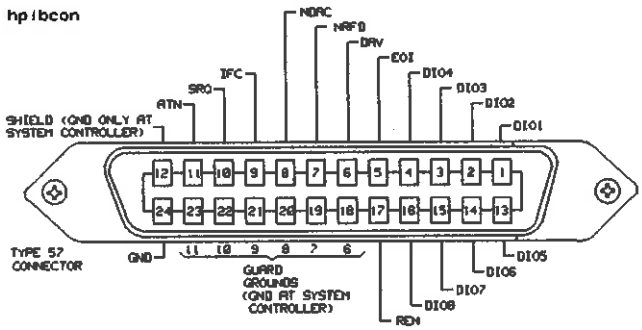


Figure 2-3. HB-IB Connector

2.9 OPERATING ENVIRONMENT

The operating temperature limits are 0 deg C to 55 deg C. The specifcations also apply over this range.

2.10 CLAIMS AND REPACKAGING

If physical damage is evident or if the instrument does not meet specification when received, notify the carrier and the nearest Hewlett-Packard Service Office. The Sales/Service Office will arrange for repair or replacement of the unit without waiting for settlement of the claim against the carrier.

2.11 STORAGE AND SHIPMENT

The instrument can be stored or shipped at temperatures between minus 40 deg C and plus 75 deg C. The instrument should be protected from temperature extremes which may cause condensation within it.

If the instrument is to be shipped to a Hewlett-Packard Sales/Service Office, attach a tag showing owner, return address, model number and full serial number and the type of service required.

The original shipping carton and packing material may be re-usable, but the Hewlett-Packard Sales/Service Office will also provide information and recommendations on materials to be used if the original packing is no longer available or reusable. General instructions for repacking are as follows:

1. Wrap instrument in heavy paper or plastic.

2. Use strong shipping container. A double wall carton made of 350-pound test material is adequate.

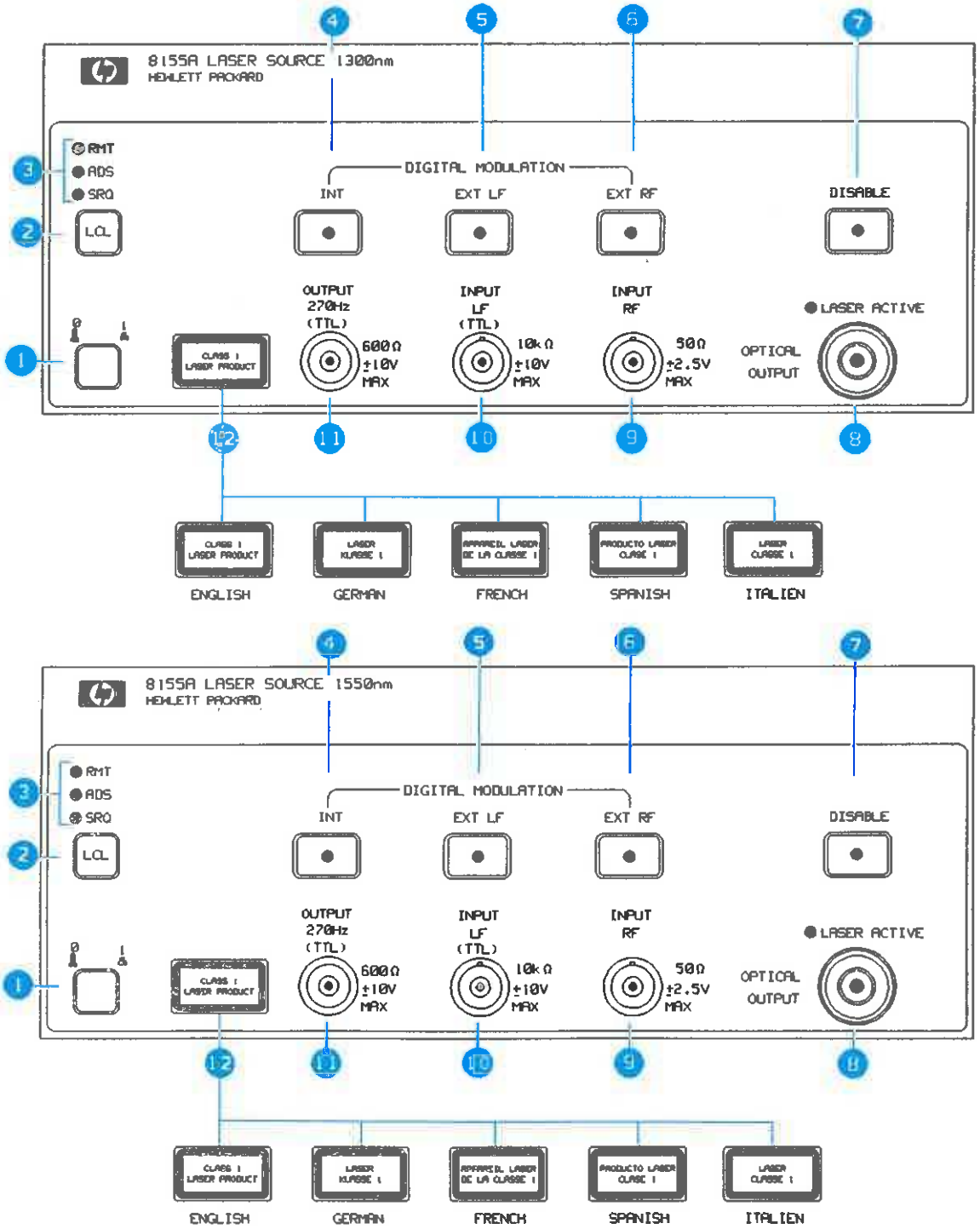
3. Use enough shock-absorbing material (3 to 4 inch layer) around all sides of the instrument to provide a firm cushion and prevent movement inside container. Protect control panel with cardboard.

4. Seal shipping container securely.

5. Mark shipping container FRAGILE to encourage careful handling.

6. In any correspondence, refer to instrument by model number and serial number.

Figure 3-1. Front and Rear Panel Controls, Indicators and Connectors



SECTION III

OPERATING AND PROGRAMMING

3.1 INTRODUCTION

This section explains the functions of controls, indicators and connectors, as well as providing operating and programming information. Figure 3-1 provides a numbered illustration of the front and rear panel controls, and should be folded out when reading the description "Getting to Know Your Instrument". Programming information is located at the end of this section.

3.2 SPECIAL OPERATING CONSIDERATIONS

The following points should be noted before applying power to the instrument:

- Read the safety summary at the beginning of this manual.
- Ensure that the VOLTAGE SELECTOR switch on the rear panel is set for operation at the local line voltage.

If any change is made to the setting of the VOLTAGE SELECTOR switch, the fuse must also be changed. Before making either of these changes, switch the instrument off and disconnect the power cord.

3.3 GETTING TO KNOW YOUR INSTRUMENT

The following should be read in conjunction with Figure 3-1 which can be folded out to aid understanding.

1. LINE switch. Power on/off switch.

2. LCL pushbutton. This pushbutton returns the HP 8155A to local manual operation when the instrument is under remote control. Note that this key is disabled when the LOCAL LOCKOUT command has been sent by the system controller to the instrument.

3. Program status LEDs. When illuminated, the following is indicated.

   RMT: Indicates remote control. All frontpanel pushbuttons (except the LCL pushbutton) are disabled.

   ADS: Indicates that the instrument is being addressed under program control, although the frontpanel pushbuttons may still be enabled depending on the status of the RMT LED.

   SRQ: Indicate that a Service Request has been sent by the instrument to the controller.

4. INTernal MODULATION key. Used to select internal modulation of the optical output. Selection is indicated by illuminated key LED. The modulating signal is available as an electrical output at connector (11).

5. EXTernal LF MODULATION key. Used to select LF external modulation of the optical output. Selection is indicated by illuminated key LED. The modulating signal must be applied to connector (10).

6. EXTernal RF MODULATION key. Used to select RF external modulation of the optical output. Selection is indicated by illuminated key LED. The modulating signal must be applied to connector (9).

7. DISABLE key. Used to enable/disable the optical output (8). When the key LED is illuminated, the optical output is disabled.

8. Connector interface option and associated LED for optical output. When the LED is illuminated, the optical output is enabled.

9. BNC input connector for RF external modulating signal.

10. BNC input connector for LF external modulating signal.

11. BNC output connector for internal modulating signal.

12. Warning Label that states that the instrument is a Laser Class I Product.

Rear Panel Connectors

13. HP-IB address switch.

14. HP-IB connector.

15. LINE connector assembly (including VOLTAGE SELECTOR switch). A three-pronged receptacle to provide chassis ground through the power cable for operator protection.

3.4 SETTING THE LASER SOURCE . . .

The laser source can be operated via frontpanel pushbuttons (local operation) or programmed using the HP-IB. The current optical output state is always indicated by the LEDs associated with DISABLE key (7) and connector interface (8):

- DISABLE key LED on = optical output disabled
- Connector LED on = optical output enabled

Repetitive operation of the DISABLE key toggles the optical output state between enabled and disabled.

At power-on, the HP 8155A's optical output is automatically disabled and all modulation modes are switched off. The disable key (7) will flash for 20 seconds after power-on. During this time nothing can be done to the instrument, including accessing the instrument with HP-IB.

NOTE

The HP 8155A has an in-built safety circuit that disables the optical output in the case of an internal failure if the output power reaches 600μW for option 002 (1300nm) and 800μW for option 003 (1550nm). If the laser is disabled by this circuit, then all of the instrument's LEDs, except the HP-IB Status LEDs, will come on. In order to see if the problem is cleared, press the disable key. If the LEDs come on again, then the instrument should be sent directly to the nearest HP Service Center. If not, then the instrument is in a working order.

3.5 . . for CW Optical Output

To set the HP 8155A for CW optical output, ensure that all MODULATION modes are switched off. If any of the MODULATION key LED's is illuminated, press the illuminated key to disable the MODULATION mode. Now enable the optical output via key (7). The HP 8155A then delivers 0.5mW (Opt.002) or 0.7mW (Opt.003) CW optical output power.

3.6 . . for Internally Modulated Optical Output

To modulate the HP 8155A's optical output level with the built-in 270 Hz generator (50% duty cycle), press the INTernal MODULATION key (4) (key LED illuminated) and enable the optical output via key (7). The modulating signal is also routed to the BNC output connector (11) for synchronization of external devices. The optical output power levels are:

- 0.5mW (Opt.002) or 0.7mW (Opt.003) when the modulating signal is high
- 0 mW when the modulating signal is low

3.7 . . for Externally Modulated LF Optical Output

To modulate the HP 8155A's optical output with an external LF signal applied to input connector (10), press the EXTernal LF MODULATION key (5) (key LED illuminated) and enable the optical output via key (7). The optical output power levels are:

- 0.5mW (Opt.002) or 0.7mW (Opt.003) when the modulating signal is TTL high
- 0 mW when the modulating signal is TTL low

The frequency of the modulating signal can be from 0 to 1 MHz.

For the LF mode the input signal must be pulse-shaped. The output is an ON/OFF modulated signal.

3.8 . . for Externally Modulated RF Optical Output

To modulate the HP 8155A's optical output with an external RF signal applied to input connector (9), press the EXTernal RF MODULATION key (6) (key LED illuminated) and enable the optical output via key (7). The optical output power levels are:

- 0.5mW (Opt.002) or 0.7mW (Opt.003) when the modulating signal is high
- 50μW when the modulating signal is low

The frequency of the modulating signal can be from 1 KHz to 850 MHz.

CAUTION

DO NOT use a frequency of less than 1KHz when using the externally modulated RF optical output, as this could lead to safety problems, in which case the instruments safety circuit would disable the optical output.

Modulating the RF input with a fast external signal produces a pulse-shaped optical output signal, where the laser diode is modulated above the threshold with an extinction ratio of 10:1.

3.9 ROUTINE MAINTENANCE

IMPORTANT!

It is imperative that the optical connector be kept in a clean condition in order that instrument performance be maintained within the published specifications. A dirty connector can cause attenuations of 1 dB or more, thereby affecting the performance of the instrument.

3.10 Cleaning Procedure

It is recommended that for the following procedure, the HP Model 15475A Cleaning Kit be used.

1. Unscrew the protective cap on the optical connector casing.

2. Unscrew the fiber feedthrough and remove.

3. Using the blow brush, blow through the fiber feedthrough.

4. Apply some of the Head Cleaner to a piece of the cleaning paper provided and clean the barrel of the protruding connector. Using a new piece of cleaning paper, clean the face of the connector. Repeat this operation twice more, using a new piece of cleaning paper each time.

5. Lightly press the adhesive side of the tape provided against the face of the connector, then remove it quickly. Repeat twice. This operation removes any particles of cleaning paper which may be present.

6. Rescrew the fiber feedthrough onto the connector.

NOTE: **Never use abrasive materials to clean the optical connector. The use of such materials can damage optical components and drastically affect the performance of an optical system. Use only the cleaning agent supplied with the kit, or a similar product.**

PROGRAMMING INSTRUCTIONS

3.11 WHAT YOU NEED TO KNOW . . . .

Programming information in this section is restricted to HP 8155A specifics, and assumes that you have a working knowledge of HP-IB intrinsics. If you are not familiar with HP-IB, then refer to the following publications:

- HP Publication 5952-0156, "Tutorial Description of HP-IB"
- ANSI/IEEE-488-1978, "Digital Interface for Programmable Instrumentation" published by the Institute of Electrical and Electronic Engineers

For a complete list of the HP 8155A programming commands, refer to the blue pages at the end of this section.

3.12 . . . About The HP 8155A's HP-IB Capabilities

The HP 8155A interfaces to the HP-IB as defined by the IEEE Standard 488-1978. The interface functional subset which the HP 8155A implements is specified in Table 3-1.

Table 3-1. HP-IB Capabilities

MNEMONIC	INTERFACE FUNCTION NAME
SH1	SOURCE HANDSHAKE CAPABILITY
AH1	ACCEPTOR HANDSHAKE CAPABILITY
T6	BASIC TALKER, SERIAL POLL, UNADDRESSED IF MY LISTEN ADDRESS
L4	BASIC LISTENER, UNADDRESSED IF MY TALK ADDRESS
SR1	SERVICE REQUEST CAPABILITY
RL1	REMOTE/LOCAL CAPABILITY
PP0	NO PARALLEL POLL CAPABILITY
DC1	DEVICE CLEAR CAPABILITY
DT0	NO DEVICE TRIGGER CAPABILITY
C0	NO CONTROLLER CAPABILITY

3.13 . . . About Programming Examples in This Section

Programming examples are given in this section to aid explanation. These examples assume the following:

- an HP9000, Series 200 or 300 Computer is controller
- that BASIC is the programming language
- the HP 8155A is set to HP-IB address 25 (factory setting)

3.14 GETTING STARTED

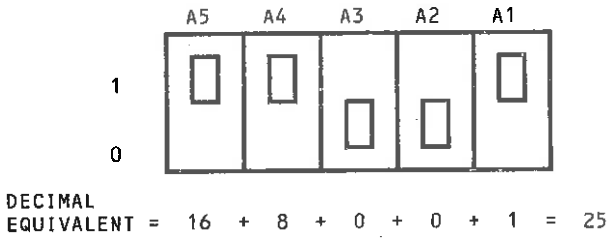
If this is the first time you are programming the HP 8155A, the following gives you a few simple tasks to carry out prior to detailed program development. The benefits are twofold in that it gets you started on programming the HP 8155A, at the same time checking remote operation of your instrument.

3.15 Setting the Address

Each instrument that you connect to the interface bus has a unique "address", and the HP 8155A is no different. The address used in a typical BASIC statement takes the form "7xx" where:

7 = the interface select code
xx = the instrument address, which can be any integer from 00 to 30 (21 is usually reserved for the controller)

The HP 8155A is preset at the factory to address 25 as shown in the following illustration of the rear panel address switch.



If you are satisfied with this address, then continue with the next task "Checking Remote Operation" (Note that all examples in this section assume the address is set to 25).

If you want to change the address, first ensure that the HP 8155A is **in local mode** and **not addressed** (i.e. the ADS and RMT LEDs **(3)** are not illuminated, i.e. switch off the instrument), then change the bit settings on the rear panel address switch **(13)**. The new address is automatically activated.

3.16 Checking Remote Operation

You can now check remote operation using a few simple commands as follows:

BASIC Statement	Comment	Visual Indicator
10 CLEAR 725	Clears 8155A's input/output buffers.	RMT and ADS LEDs on.
20 OUTPUT 725;"MOD1"	Internal modulation selected.	RMT and ADS LEDs on. INTernal MODULATION key LED on.
30 OUTPUT 725;"MOD?"	Interrogate modulation setting.	
40 ENTER 725;A	Transfer data to controller.	
50 PRINT A	Print modulation setting data.	Printout "1"
60 END		

3.17 SENDING DATA TO THE HP 8155A (LISTENER FUNCTION)

All the settings you can make via front panel keys can also be programmed via HP-IB. To aid explanation, consider the following programming example:

```
10   OUTPUT 725;"MOD 0;D0"
20   END
```

This sets the HP 8155A modulation off, optical output enabled. The points to note on the setting string are as follows:

- Each setting in the string must be terminated by a ";"
- Either upper or lower case may be used (d0 is same as D0)

A complete list of the setting commands is given on the blue pages at the end of this section.

3.18 RECEIVING DATA FROM THE HP 8155A (TALKER FUNCTION)

Just as you can program each setting via HP-IB, you can also interrogate each setting. The HP 8155A can also send data regarding installed firmware, error and status reports. A complete list of the interrogating commands is given on the blue pages at the end of this section.

A short BASIC program to illustrate an interrogate command is as follows:

```
10   OUTPUT 725;"d?"
20   ENTER 725;A
30   PRINT A
40   END
```

The HP 8155A returns 0 or 1 to indicate optical output enabled or disabled.

3.19 STATUS/ERROR REPORTING (TALKER FUNCTION)

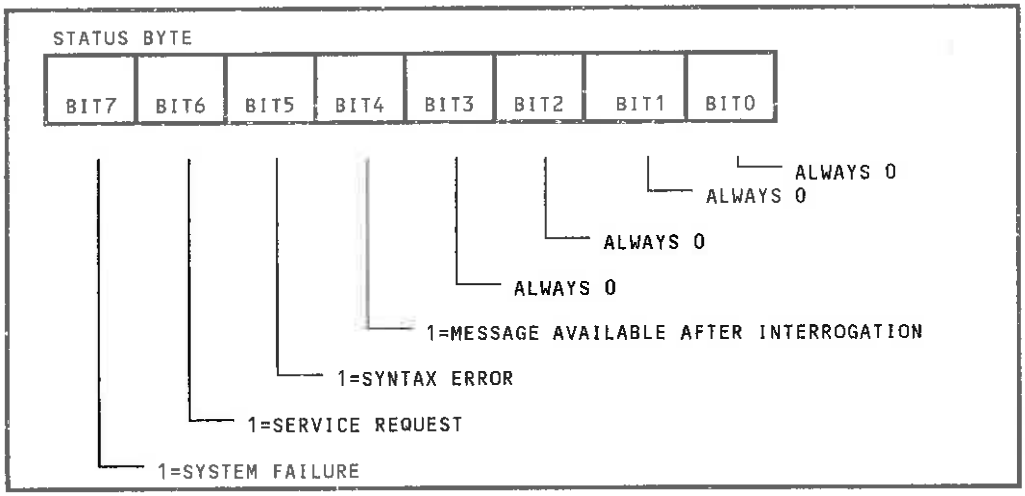
Another important feature of the HP 8155A is that you can program it to interrupt the controller when certain status/error conditions are met. The Require Service (SRQ) message is used to implement this feature and is independent of all other HP-IB activity. However, the HP 8155A **must be programmed** for the interrupt, via the SRQ mask, before the interrupt will take place. The possible interrupt conditions that can be programmed via the SRQ mask are listed as follows:

System Failure	Caused by a safety failure. The output level is greater than 600μW for option 002 and 800μW for option 003.
Message Available	When the HP 8155A is ready to respond to an interrogation command.
Syntax Error	An invalid instruction has been sent.

These 3 interrupt conditions are monitored by an 8-bit Status Register, the content of this register being referred to as the Status Byte.

3.20 Status Register and Status Byte

The following shows which bit in the Status Register is allocated to which interrupt condition:



When an interrupt condition is true, the corresponding bit in the status Register is set to 1 - **independent of the SRQ mask setting.** However, an interrupt (SRQ) will only occur when the SRQ mask has been set for that condition. It is therefore possible for one or more bits of the Status Register to be true without the HP 8155A causing an interrupt - **because the SRQ mask has not been set for these bits.**

This is typically the case at power-on or after "Device Clear" - **as the SRQ mask is then set to decimal 000 and all interrupts are disabled.** If the HP 8155A is now serial polled or receives the "STB?" command, the decimal equivalent of the Status Byte is returned to the controller - **but the Status Byte remains unchanged.** To clear the Status Byte, the "CSB" (Clear Status Byte) command must be used. For example:

```
10  CLEAR 725                  - Clears HP 8155A's I/O buffers; SRQ mask = 000
20  OUTPUT 725;"CSB"           - Clear Status Byte
30  OUTPUT 725;"di?"           - Interrogate optical output state.
40  S=SPOLL(725)               - Serial poll of HP 8155A
50  IF BIT(S,4) = 0 THEN GOTO 40 - Check Status Byte; if Bit 4=0,repeat Serial poll; if Bit
                                   4=1, message available
60  ENTER 725;A                - Transfer output state data to controller
70  PRINT A                    - Print result
80  OUTPUT 725;"CSB"           - Clear Status Byte
90  END
```

If the SRQ mask is set for certain conditions, and one of these conditions occur, bit 6 of the Status Register will go true ("1" state), the SRQ LED on the front panel will illuminate, and the HP-IB SRQ message will be sent. At this point, it will be necessary to address the HP 8155A as talker by using the Serial Poll command or "STB?" command as follows:

```
10 A=SPOLL(725)          ← Transfers Status Byte to variable "A"
20 PRINT A
30 END
```

or

```
10 OUTPUT 725;"STB?"     ← Interrogates the Status Byte
20 ENTER 725;A           ← Transfers the Status Byte to variable "A"
30 PRINT A
40 END
```

The Status Byte is returned to the controller as a decimal number which can be broken down into its 8 binary components to determine which bit has gone true. At the same time, the Status Register is cleared and SRQ set false.

NOTES

- Once SRQ is set true, the Status Byte remains unchanged until serial polled or interrogated via the "STB?" command. For any interrupt condition going true during this period, the corresponding bit in the Status Register **will not be set.** Instead, the "1" state will be held in HP 8155A memory and loaded into the Status Register after it is cleared e.g. by serial poll.

- For this reason, if both conditions are enabled by the SRQ mask and they both go true, only the condition that occurred first will have its bit set in the Status Register. The bit setting for the other condition will be held in HP 8155A memory, and loaded into the Status Register after it is cleared. If you have set more than one condition by the SRQ mask, therefore, your program should serial poll the HP 8155A **twice** to ensure that the Status Register is cleared and SRQ set false.

3.21 Setting the SRQ Mask

The SRQ mask can be set to mask bits 4,5 and 7 on the Status Register. Default mask value is 0 i.e. all interrupt conditions are disabled and no SRQ can be generated. To set the mask first determine which condition(s) you want to interrupt the controller, e.g., syntax error and/or message available. Determine the decimal number (1-191) corresponding to those condition(s). A "1" in the mask byte enables the corresponding interrupt condition. Then output the "SRE" instruction mnemonic followed by the decimal number. The following shows the Status Register and the SRQ mask set for bits 4 and 5, message available and syntax error. (OUTPUT 725;"SRE176").

STATUS REGISTER	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0	
	SYSTEM FAILURE	SRQ	SYNTAX ERROR	MESSAGE AVAIL	ALWAYS 0	ALWAYS 0	ALWAYS 0	ALWAYS 0	
DECIMAL EQUIVALENT	128		32	16	8	4	2	1	
SRQ MASK =	1		1	1	0	0	0	0	= 176

HP 8155A COMMAND SUMMARY

SETTINGS (LISTENER FUNCTION)

Parameter/Operation	Mnemonics	Data	Comment
Modulation settings	MOD	0	Modulation off
	MOD	1	Internal modulation
	MOD	2	External LF modulation
	MOD	3	External RF modulation
Optical output state	D	0	Optical output enabled
	D	1	Optical output disabled
Set SRQ Mask	SRE	value	value = decimal number (0-191). A "1" in the binary equivalent sets SRQ on this condition.
Clear Status Byte	CSB		Always clears Status Byte independent of SRQ state.
Instrument Reset	RST		Resets instrument to optical output disabled and modulation off.

INTERROGATING SETTINGS (TALKER FUNCTION)

Parameter/Operation	Mnemonics	Comment
Interrogate modulation setting	MOD?	Returns integer (0, 1, 2 or 3) to indicate off, internal, external LF or RF.
Interrogate optical output state	D?	Returns integer (0 or 1) to indicate enabled or disabled.

STATUS/ERROR REPORTING (TALKER FUNCTION)

Interrogation	Mnemonics	Comment
Status Byte	STB?	Returns 3-digit integer (000-191). With SRQ false, does not clear Status Byte.
Status Byte Mask	SRE?	Returns 3-digit integer (000-191)
Identifier	IDN?	Returns 40-character string identifying currently installed firmware and manufacturer model no.
Self-test	TST?	Returns 0 if passed, 1 if failed.

UNIVERSAL COMMANDS

Command	ASCII Character	Equivalent Forms Binary	Octal	Decimal
Device Clear	DC4	00010100	024	20
Selected Device Clear	EOT	00000100	004	4

Both "CLEAR" commands clear all input/output buffers, reset SRQ mask to all disabled and SRQ to false, but have no effect on HP 8155A settings.

SECTION IV

PERFORMANCE TESTS

4.1 INTRODUCTION

The procedures in this section test the optical performance of the instrument. The complete specifications to which the HP8155A is tested are given in Table 1-1. All tests can be performed without access to the interior of the instrument. The performance tests refer specifically to tests using the Diamond® HMS-10/HP connector (Opt.011). If you wish to verify the performance of instruments containing the FC/DIN/ST connectors (Opts. 012/013/014) then you must replace the connector with a Diamond® HMS-10/HP connector.

4.2 EQUIPMENT REQUIRED

Equipment required for the performance test is listed in Table 4-1. Recommended Test Equipment. Any equipment which satisfies the critical specifications given in the table may be substituted for recommended models.

Table 4-1. Recommended Test Equipment

Instrument/Accesory	Rec. Model
Power Meter Standard	HP8152A Power Meter with HP81521B Optical Head
Lens Adapter for single-mode fiber	HP81010BL
Connector Adapter (head)	HP81000AA
Connector Adapter (Opt.11 source)	HP08154-61701
Single-mode Fiber	HP81101AC
Pulse / Function Generator	HP8116A
Pulse Generator	HP8080A with 8091A and 8093A
O/E Transducer	Bandwidth > 1GHz
Oscilloscope with Accessories	HP54100A (Bandwidth >=1GHz)
Cleaning Kit	HP15475A

4.3 TEST RECORD

Results of the performance test may be noted in the Performance Test Test Procedure. The Test Record can also be used as a permanent record and may be reproduced without written permission from Hewlett-Packard.

4.4 TEST FAILURE

If the HP8155A fails any performance test, return the instrument to the nearest Hewlett-Packard Sales/Service Office for repair.

4.5 INSTRUMENTS SPECIFICATION

Specifications are the performance characteristics of the instrument which are certified. These specifications, listed in Table 1-1 are the performance standards or limits against which the HP8155A can be tested. Table 1-1 also lists some supplemental characteristics of the HP8155A and should be considered as additional information.

Any changes in the specifications due to manufacturing changes, design, or traceability to the National Bureau of Standards will be covered in a manual change supplement or revised manual. The specifications listed here supersede any previously published.

4.6 PERFORMANCE TESTS

The performance tests given in this section are separated into Output Power Test, Stability Test and Modulation Tests. Perform each step in the tests in the order they are given using the corresponding test equipment.

NOTE

Make sure that all optical connections of the test setups given in the procedure are dry and clean. For cleaning use accessory kit Model HP15475A.

The ambient temperature must be constant (±2 degree C) during the test
The Power Meter must be zeroed before the measurement.

4.7 OUTPUT POWER AND STABILITY TESTS.

Equipment required: for HP8155A Opt. 002 and Opt. 003

Power Meter Standard 8152A with
81521B Optical Head
Lens Adapter for single-mode Fiber 81010BL
Connector Adapter 81000AA
Single-mode Fiber 81101AC

Specifications:

	Opt. 002	Opt. 003
Wavelength [nm]:	1310±30	1550±40
Optical output power out of 9/125µm fiber:	>-4dBm	>-4dBm
Stability over 12h and ±2°C env. temp. window:	<±0.03dB	<±0.03dB
Stability over 15 minutes at constant temperature	±0.003dB	±0.003dB

Procedure:

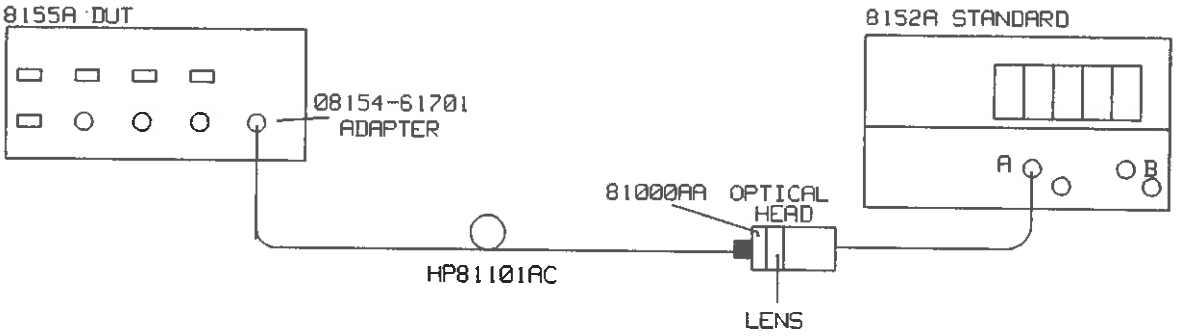


Figure 4-1. Output Power and Stability Test Set-up

1. Make sure that cable connectors, lenses and detector windows are clean.

2. Connect equipment as shown in Figure 4-1, turn instruments on and allow instruments to warm up for at least 45 minutes.

3. Set λ of the Power Meter Standard to the HP8155A center-wavelength which is marked on the HP8155A and make sure that CAL is set to the calibration factor marked on the lens.

4. With the HP8155A output disabled zero the Power Meter, then enable the HP8155A, check the output power and note the result for the specific HP8155A option in the Test Record provided.

5. Make sure that the optical cable is fixed on the table and the cable is not moved during the measurement.

6. Set DISPLay to REFerence and monitor the output power during the next 15 minutes and note the maximum drift in the Test Record.

7. Set DISPlay to REFerence again and after 12 hours zero the Power Meter as described in step 4, enable the HP8155A and note the result in the Test Record.

4.8 MODULATOR FUNCTION TESTS

Equipment required:

Power Meter HP8152A with
HP81521B Optical Head
Oscilloscope
BNC to BNC Cable
Pulse Function Generator
Pulse Generator 1 GHz
O/E Transducer bandwidth > 1GHz
Oscilloscope bandwidth > 1GHz

Typical Characteristics:

Digital LF Input 0-1Mhz
Digital RF Input DC, 1KHz - 850MHz

LF Modulation Function Test:

1. Connect equipment as shown in Figure 4-2

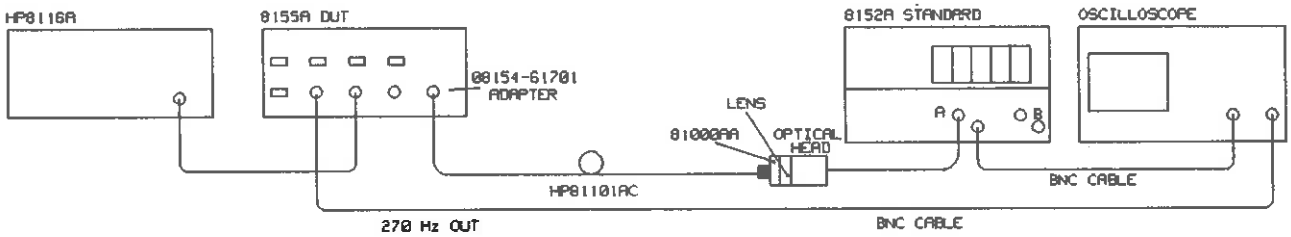


Figure 4-2. LF Modulation Test Set-up

2. Select internal modulation on the HP8155A and check the 270Hz signal at the HP8152A transducer output.

3. Set the Pulse / Function Generator to approx. 600Hz square-wave, TTL level and connect the output to the LF INput on the HP8155A.

4. Select EXT LF and check the modulated signal at the HP8152A transducer output.

HF Modulation Function Test:

1. Set the Pule Generator frequency to 850MHz and the output amplitude to 400mV symetrical to 0 Volt (+-200mV).

2. Connect equipment as shown in Figure 4-3.

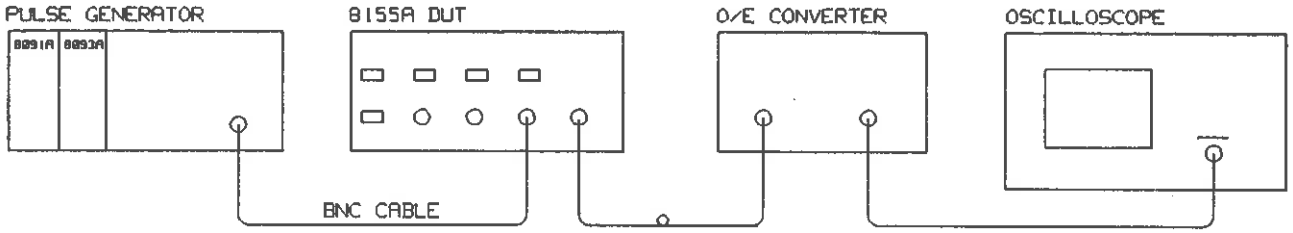


Figure 4-3. HF Modulation Test Set-up

3. Select EXT HF on the HP8155A and check modulation.

PERFORMANCE TEST RECORD

Hewlett-Packard Model 8155A Opt._____ Test Performed By_____

Laser Source Date_____

Serial Number _____ Comments_____

OUTPUT POWER, STABILITY AND MODULATOR TESTS

Test Condition: 1300nm or 1550nm wavelength
with Diamond HMS-10/HP connectors

8155A Opt. 002 (1300nm)

Output Power > -4dBm	Result	_____dBm
Stability over 15min. +/-0.003dB	Result	_____dB
Stability over 12h. +/-0.03dB	Result	_____dB

8155A Opt. 003 (1550nm)

Output Power > -4dBm	Result	_____dBm
Stability over 15min. +/-0.003dB	Result	_____dB
Stability over 12h. +/-0.03dB	Result	_____dB

	Passed	Failed
Internal Modulator Test	_____	_____
LF Modulator Test	_____	_____
HF Modulator Test	_____	_____

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