Model 708 8-Channel Butterfly Telecom Laser Diode Mount

User's Manual

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Certificate No.: FM 27207

Newport Corporation, Irvine, California, has been certified compliant with ISO 9002 by the British Standards Institution.

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Limited Warranty

Newport warrants that this product will be free from defects in materials and workmanship for a period of two years from the date of shipment. If any such product proves defective during the applicable warranty period, Newport, at its option, either will repair the defective product with charge for parts and labor or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, the customer must notify Newport of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. In all cases the customer will be responsible for packaging and shipping the defective product back to the service center specified by Newport, with shipping charges prepaid. Newport shall pay for the return of the product to the customer if the shipment is within the continental United States, otherwise the customer shall be responsible for all shipping charges, insurance, duties and taxes, if the product is returned to any other location.

This warranty shall not apply to any defect, failure or damage caused by improper use or failure to observe proper operating procedures per the product specification or operators manual or improper or inadequate maintenance and care. Newport shall not be obligated to furnish service under this warranty 1) to repair damage resulting from attempts by personnel other than Newport's representatives to repair or service the product; 2) to repair damage resulting from improper use or connection to incompatible equipment; 3) to repair damage resulting from operation outside of the operating or environmental specifications of the product.

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1. General Information

1.1 Introduction

This manual describes the features and specifications of the Model 708 8-Channel Butterfly Telecom Laser Diode Mount.

Figure 1 – Model 708 8-Channel Butterfly Telecom Laser Diode Mount

1.2 Model 708 Laser Diode Mount

The Model 708 8-Channel Telecom Laser Diode Mount is designed to hold up to eight (8) butterfly type telecommunications laser diodes. The mount includes rack-mount ears and can be easily installed into a standard instrumentation rack. Eight fiber optic bulkhead connectors are mounted onto the front panel with choices including FC/PC, FC/APC, SC/PC, SC/APC, or ST fiber connectors. The Model 708 mount offers an easy-to-use platform that is compatible with all of Newport's benchtop laser diode instrumentation and with Newport's test and measurement and burn-in rack type systems.

Features of the Model 708 mounts include:

- Cost and space effective method for holding up to 8 laser diode packages
- Efficient heat transfer – resulting in stable temperature control
- Rack mountable in a single rack space (1.75-in.)
- Reconfigurable design supports numerous butterfly package styles – having various dimensions and pin-out configurations

1.3 Safety Terms

The following safety terms are used in this manual:

The **WARNING** heading in this manual explains dangers that could result in personal injury or death.

The **CAUTION** heading in this manual explains hazards that could damage the instrument.

The **NOTES** heading provides information to the user that may be beneficial when using this instrument.

1.4 General Warnings and Cautions

The following general warnings and cautions are applicable to this instrument:

CAUTION
Although ESD protection is designed into the Model 708, operation in a static-free work area is required.

CAUTION
Do **NOT** plug-in or unplug a laser diode fixture with the laser driver or TE driver connected to the mount.

CAUTION
There are no serviceable parts inside the Model 708. Work performed by persons not authorized by Newport Corporation may void the warranty. For instructions on obtaining warranty repair or service please refer to Chapter 4 of this manual.

WARNING
Any use of the Model 708 not specified by Newport Corporation, or failure to comply with precautions or specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of this equipment. Violation of safety standards and misuse of equipment may cause damage or injury.

WARNING
Disconnect AC power from the controller before cleaning.

1.5 Model 708 Laser Diode Mount Specifications

Model 708 Specifications

Laser Diode Package Style Supported	14-pin Butterfly Package
Laser Housing Mounting Plate	8 Butterfly flatpack sockets
Laser Housing Connectors Electrical Fiber Optic	 15-pin male D-sub, LDD and TEC control (Qty. 8) FC/PC, FC/APC, SC/PC, SC/APC, or ST bulkhead
General Size (H x W x D) Weight	1.75 x 19 x 12.5 inches (43 x 483 x 318 millimeters) 9 pounds (4.1 kilograms)

NOTE: In accordance with ongoing efforts to continuously improve our products, Newport Corporation reserves the right to modify product specifications without notice and without liability for such changes.

C H A P T E R 2

2. Butterfly Telecom Laser Diode Mount Use

2.1 Introduction

The Model 708 8-Channel Butterfly Telecom Laser Diode Mount is designed for use with Newport Corporation controller and rack systems. The following chapter provides information for safely and effectively setting up and using the Model 708 Butterfly Package mount.

NOTE: Refer to the controller or other component's User's Manual for additional information.

2.2 Installation

The Model 708 should be handled with care. Read the CAUTION statements below before installing the module in the rack and connecting the module to the controller.

2.2.1 Rack Mounting

The Model 708 was designed to be rack mounted. Using the supplied hardware, mount the Model 708 Laser Diode Mount in a single slot in the rack with four (4) Phillips head screws.

CAUTION
Although ESD protection is designed into the Model 708, operation in a static-free work area is required.

CAUTION
Do **NOT** plug-in or unplug a laser diode fixture with the laser driver or TE driver connected to the mount.

Ensure that the area in the back of the unit is unobstructed to allow access to the rear of the unit.

2.2.2 Power Up Sequence

Please refer to the Laser Diode Driver Controller User's Manual for additional set up and power up information.

2.3 Front Panel Familiarization

Described below is the Model 708 Laser Diode Mount front panel as shown in **Figure 2 – Model 708 8-Channel Butterfly Telecom Laser Diode Mount Front Panel** below.

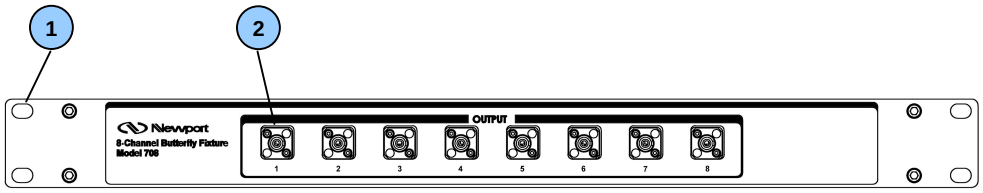

Figure 2 – Model 708 8-Channel Butterfly Telecom Laser Diode Mount Front Panel

1. **Rack Mounting Screw Holes** – The outermost corner holes in the front panel allow the Model 708 Mount to be installed in a rack system. Use the supplied screws to mount the unit in the rack.

2. **Fiber Optic Bulkhead Connectors (numbered 1 through 8)** – The fiber optic bulkhead connectors (FC/PC, FC/APC, SC/PC, SC/APC, or ST) enable the laser source to be connected to the mounted laser diode device inside the unit, eight in total. See **Section 3.2.2 Fiber Optic Connector Cleaning and End Preparation** for descriptions of the available connector choices.

2.4 Rear Panel Familiarization

Described below is the rear panel as shown in **Figure 3 – Model 708 Laser Diode Mount Rear Panel**.

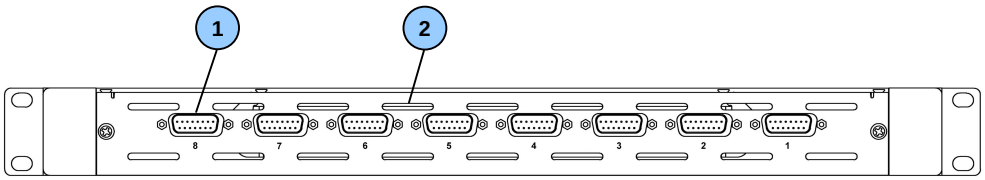

Figure 3 – Model 708 Laser Diode Mount Rear Panel

1. **Laser Diode Communications Cable Connector (8 through 1)** – The 15-pin laser diode communications connector provides an accessible interface for the laser diode communications cable. See **Section 2.8.1 Rear Panel Laser Diode Connector** for connector pin assignments.

2. **Ventilation Holes** – The rounded slots in the rear panel allow air to flow in and out of the unit for proper cooling of the devices inside. Ensure that there is a two to four inch minimum free space behind the rear panel to effectively move air through the unit.

2.5 Laser Diode Protection Requirements

Laser diodes are extremely sensitive to electrostatic discharge and current spikes (transients). Damage can result in reduced output power, shift in threshold current, changes in beam divergence, and ultimately failure to lase (LED-like output only).

Newport precision current sources and controllers offer the most advanced laser protection features available, including power line filters, clamping current limits, and slow-start-up circuits.

However, no instrument can protect against all conditions, especially ESD at the laser. In order to optimize immunity from radiated or conducted electromagnetic energy, e.g. static discharge, the following guidelines for the laser diode must be adhered to:

- ESD is the primary cause of premature laser failure. As a minimum, use anti-static wrist straps (grounded with 1 MΩ resistor), anti-static floor coverings, grounded soldering irons, and grounded work areas. Ionized air blowers are also recommended.
- Laser diode leads should be shorted whenever the laser is transported or stored.
- Select a driver module with the lowest possible current rating that still exceeds the laser's maximum operating current.
- If industrial loads are switched in or near your laboratory, use isolation transformers and/or surge suppresser power strip with your laser current source.
- Isolate your laser current driver with a surge suppresser when using a common line with laboratory power supplies, soldering irons, or other electronic instruments. Avoid using such devices on the same surge suppresser as your laser source.
- Make sure the all cables to the laser diode are securely fastened. Avoid "bundling" current source cables with other cables in your laboratory,
- Set current and voltage limits to appropriate levels, following the laser manufacturer's recommendations (or to just above the expected operating current). Suggestions include setting the compliance voltage no more than 10% above V_f, and setting the current limit at or below the maximum operating current of the laser diode.
- Avoid ground loops. Do not ground the LDD cable shield to the laser diode body.

2.6 "Butterfly" Style Laser Diode Device Mounting

The Model 708 provides a 14-pin swing-latch flatpack rest socket and mounting base plate for 0.100-in. centers "butterfly" style laser diode packages. The housing is milled from solid aluminum bar stock, tumble burnished, and finished black anodized. Each laser diode package is mounted to the base plate using four screws and the laser diode leads (pins) are clamped to ensure secure and continuous contact during testing. Each of the eight testing positions is labeled with the corresponding number for that device (from 1 through 8). Once the laser diodes are mounted according to the procedure below, testing on the laser diodes can begin.

Mount the laser diode devices according to the following procedure:

1. Using a cross-slotted screwdriver, remove the six (6) screws from the Model 708 top case cover.

2. Starting with position 1, open the laser diode pin clamps for the mount.

3. Using a 5/64-in. hex wrench, remove the four laser diode package mounting screws from the base plate.

4. Ensure that the height of the base plate is appropriate for the butterfly package pins to make contact with the mount leads by placing the laser diode on the base plate.

   If necessary, change the mounting height for the laser diode base plates. Refer to **Section 2.7 "Butterfly" Style Laser Diode Device Mounting Base plate Height Adjustment** for additional information.

5. Place the butterfly style laser diode on the base plate so that the fiber ends are routed toward the inside of the Model 708.

6. Using a 5/64-in. hex wrench, insert and tighten the four (4) 2-56 x 1/4-in. socket head cap screws.

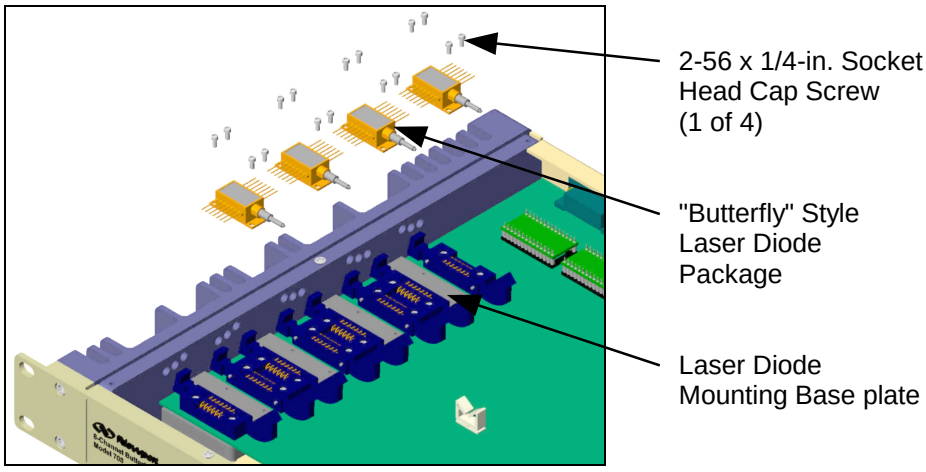

Figure 4 – Butterfly Laser Diode Mounting

7. Close the laser diode pin clamps on the laser diode device until the clamps lock. The clamps should lock firmly over the diode pins.

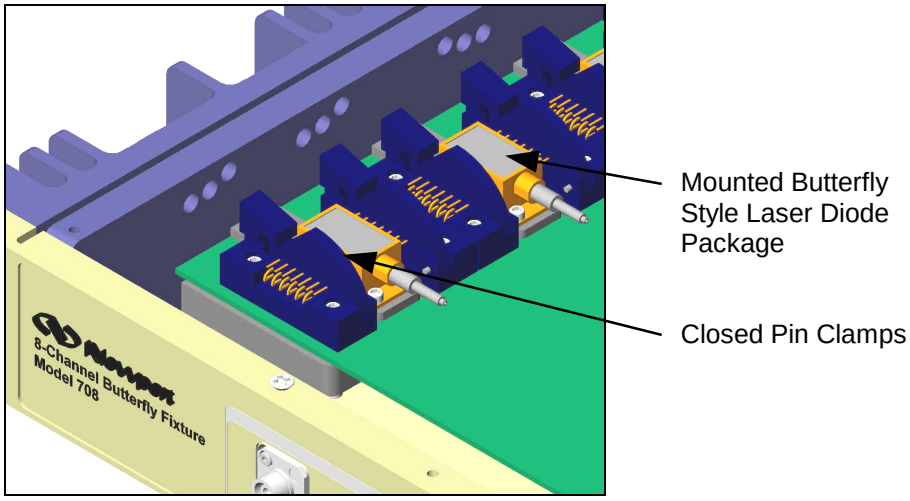

Figure 5 – Laser Diode Package Pin Clamps Closed

8. Repeat Steps 2 through 7 for each of the eight (8) devices.

9. Neatly gather and wind all optical fibers in a coil in the center of the unit as shown in Figure 7 below.

Figure 6 – Mounted Butterfly Packages and Fiber Optics

10. Check the connection for all eight (8) laser diode devices.

11. Replace the unit cover plate.

12. Using a cross-slotted screwdriver, tighten the six (6) cover screws.

13. Insert the Model 708 in the rack and ensure that all communications cables are connected for each device.

2.7 "Butterfly" Style Laser Diode Device Mounting Base Plate Height Adjustment

The Model 708 allows the user to adjust the height of the laser diode device mounting plate in the fixture to accommodate different height and style butterfly laser diode packages.

Adjust the height of the laser diode mounting base plate according to the following procedure:

1. Using a 9/64-in. hex wrench, loosen and remove the five (5) base plate mounting 8-32 socket head cap screws from the side of the Model 708.

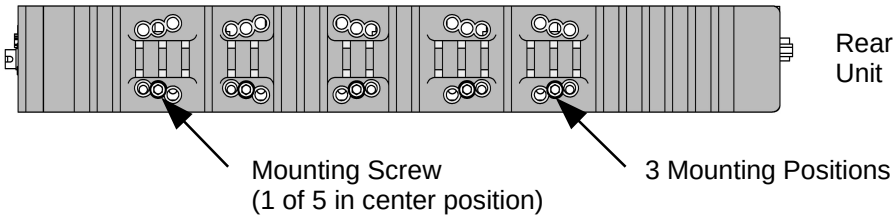

Figure 7 – Model 708 Side Panel - Base Plate Mounting Screws

2. Move the base plate to the desired mounting height so that the mounting holes of the base plate align with the holes in the side of the Model 708.

   NOTE: The top set of mounting holes are not used.

3. Using a 9/64-in. hex wrench, insert and tighten each of the five (5) socket head cap mounting screws.

4. Ensure that the height of the base plate is appropriate for the butterfly package pins to make contact with the mount leads by placing the laser diode on the base plate.

5. Return to **Section 2.6 "Butterfly" Style Laser Diode Device Mounting** to mount the laser diode devices in the Model 708.

2.8 8-Channel Butterfly Telecom Laser Diode Mount Connections

The Model 708 uses standard style connectors for the communication and interlock connections. The pin assignments for the connectors are provided below where appropriate. The front panel fiber optic bulkhead connectors are available in five different styles. Each style is described in **Section 3.2.2 Fiber Optic Connector Cleaning and End Preparation** below.

2.8.1 Rear Panel Laser Diode Connector

The 15-pin D-sub connectors are for the laser diode communications cables. The pin assignments for each of the eight rear connectors shown in **Figure 3 – Model 708 Laser Diode Mount Rear Panel** are identical and are listed in **Table 1 – Rear Panel Laser Diode Connection Pin Assignments**. If necessary, contact your Newport Corporation representative for additional information and assistance.

Pin	Description
1	TE+
2	TE-
3	THERM+
4	THERM-
5	PDA
6	PDC
7	LDA
8	LDC
9	TE+
10	TE-
11	No Connect
12	No Connect
13	No Connect
14	LDA
15	LDC

Table 1 – Rear Panel Laser Diode Connection Pin Assignments

2.8.2 Configuration Board

The "scramble" configuration boards available for the Model 708 laser diodes allow the user to change the configuration for the communications connector. Two different configuration boards are available through Newport Corporation. The pin assignments for each configuration board are listed in **Table 3 – Configuration Board Pin Assignments**. If necessary, contact your Newport Corporation representative for additional information and assistance.

2.8.2.1 Configuration Board Identification

Table 2 – Configuration Board Identification provides information that can be used to order or identify a configuration board for the Model 708 Laser Diode Mount. The Dash Number is used for ordering purposes. The Model Number is used to identify the board layout.

Dash Number	Model Number
-01	708-CONF-1
-02	708-CONF-2

Table 2 – Configuration Board Identification

2.8.2.2 Configuration Board Layout

Pin	708-CONF-1 Description	708-CONF-2 Description
1	TEC	Thermistor
2	Thermistor	Thermistor
3	Monitor Anode	Laser Cathode
4	Monitor Cathode	Monitor Anode
5	Thermistor	Monitor Cathode
6	No Connect	TEC+
7	No Connect	TEC-
8	No Connect	No Connect
9	No Connect	No Connect
10	No Connect	No Connect
11	Laser Cathode	Laser Anode
12	No Connect	No Connect
13	No Connect	No Connect
14	TEC-	No Connect

Table 3 – Configuration Board Pin Assignments

2.9 Fiber Optic Connector Types

The Model 708 accepts a variety of different fiber optic connector types. When the Model 708 is ordered, part of the model number that is specified contains the code for the connector type. It is important that the proper connector type is specified to ensure that all components are compatible. Usual connector types available for the Model 708 include FC/PC, FC/APC, SC/PC, SC/APC, and ST/PC. See **Section 3.2.2 Fiber Optic Connector Cleaning and End Preparation** for additional connector information.

NOTE: Clean connectors in good condition are essential for optimum fiber optic performance and accurate measurements. Before making any fiber optic connections, refer to **Section 3.2.2.2 Cleaning Fiber Optic Connectors** for details.

C H A P T E R 3

3. Maintenance

3.1 Introduction

Module specific calibration can be found in the module's manual. No calibration is required on the mainframe. Do not attempt to remove the cover of the instrument!

3.2 General Cleaning

The Model 708 is designed for easy and reliable usage. Regular cleaning of the instrument and connectors will help to maintain the appearance and trouble-free operation of the Model 708.

3.2.1 Cleaning Instrument Surfaces

Use a mild soap solution on a damp but not wet lint-free cloth to wipe off dirty surfaces on the outside of the instrument.

WARNING
Disconnect AC power before cleaning.

3.2.2 Fiber Optic Connector Cleaning and End Preparation

A variety of different connectors can be used with the Model 708 and some of its components. Four connector types are shown and described below. The FC/APC connectors are differentiated from the FC/PC connectors with a green cap. But also, there is a small milled out dimple above the key slot of the FC/PC connector. This way the FC/APC connectors can be identified when the green caps are not in place. Note that not all of the connector types described below are used with the Model 708.

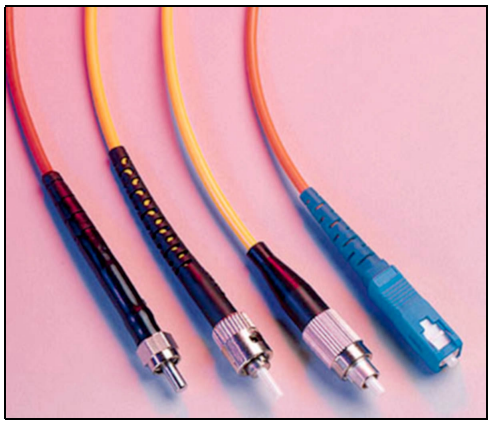

Figure 8 – Fiber Optic Connectors

SMA – Due to its stainless steel structure and low-precision, threaded fiber locking mechanism, this connector is used mainly in applications requiring the coupling of high-power laser beams into large-core, multimode fibers. The typical insertion loss of an SMA connector is greater than 1 dB. These connectors are not typically used with the Model 708.

ST – The ST connector is used extensively both in the field and indoor fiber optic LAN applications. Its high-precision, ceramic ferrule allows its use with both multimode and single-mode fibers. The bayonet style, keyed coupling mechanism, featuring push and turn locking of the connector, prevents over tightening and damaging of the fiber end. The insertion loss of the ST connector is less than 0.5 dB, with typical values of 0.3 dB being routinely achieved.

FC – The FC connector is rapidly becoming the connector of choice for single-mode fibers, and is mainly used in fiber optic instruments and SM fiber optic components and in high-speed fiber optic communication links. This high-precision, ceramic ferrule connector is equipped with an anti-rotation key, reducing fiber end face damage and rotational alignment sensitivity of the fiber. The key is also used for repeatable alignment of fibers in the optimal, minimal-loss position. Multimode versions of this connector are also available. The typical insertion loss of the FC connector is around 0.3 dB. Drilled-out, metallic FC connectors, having insertion losses of > 1 dB, are being used with Newport's large-core (> 140 µm) fibers.

SC – The more recently introduced SC connector is becoming increasingly popular in single-mode fiber optic telecom and analog CATV, field deployed links. The high-precision, ceramic ferrule construction is optimal for aligning single-mode optical fibers. The connectors' outer, square profile combined with its push-pull coupling mechanism, allow for greater connector packaging density in instruments and patch panels. The keyed outer body prevents rotational sensitivity and fiber end face damage. Multimode versions of this connector are also available. The typical insertion loss of the SC connector is around 0.3 dB.

3.2.2.1 Connector End Face Preparation

Once the optical fiber is terminated with a particular connector, the connector end face preparation will determine what the connector return loss, also known as back reflection, will be. The back reflection is the ratio between the light propagating through the connector in the forward direction and the light reflected back into the light source by the connector surface. Minimizing back reflection is of great importance in high-speed and analog fiber optic links, utilizing narrow line width sources such as DFB lasers, which are prone to mode hopping and fluctuations in their output if light is reflected back into them.

Flat Polish – A flat polish of the connector surface will result in a back reflection of about -16 dB (4%).

PC Polish – The Physical Contact (PC) polish results in a slightly curved connector surface, forcing the fiber ends of mating connector pairs into physical contact with each other. This eliminates the fiber-to-air interface, thereby resulting in back reflections of -30 to -40 dB. The PC polish is the most popular connector end face preparation, used in most applications.

SPC Polish – In the Super PC (SPC) polish, an extended polishing cycle enhances the surface quality of the connector, resulting in back reflections of -40 to -55 dB. This polish is used in high-speed, digital fiber optic transmission systems.

APC Polish – The Angled PC (APC) polish, adds an 8-degree angle to the connector end face. While the fiber cores are still in contact with each other, light will be reflected at an angle, missing the other fiber's core area. Back reflections of <-60 dB can routinely be accomplished with this polish.

Fiber Cleaving – Cleaving is the fastest way to achieve a mirror-flat fiber end and takes only seconds. The basic principle involves placing the fiber under tension, scribing with a diamond or carbide blade perpendicular to the axis, then pulling the fiber apart to produce a clean break.

3.2.2.2 Cleaning Fiber Optic Connectors

WARNING
Disconnect AC power before cleaning.

Proper care of fiber optic connectors is important to maintain the performance and accuracy that are expected from the optical fiber itself. Fiber optic connectors should be inspected and cleaned regularly according to the procedure below, especially before making any connections. If the connector is still not clean after the initial cleaning, clean the connector again, until the connector is sufficiently clean and performance is suitable.

Use the following procedure to inspect and clean the fiber optic connectors on the cable ends:

1. Disconnect the laser and/or TEC driver(s) from the Model 708 Laser Diode Mount.

2. Disconnect the fiber optic connector from the front panel of the instrument.

3. Apply pure isopropyl alcohol to a clean lint-free cotton swab or lens paper.

   NOTE: If cotton swabs are used, ensure that no cotton fibers are left on any surfaces after cleaning.

4. Wipe around the ferrule and the outside of the connector, avoiding the fiber tip.

5. Apply pure isopropyl alcohol to a new clean lint-free cotton swab or lens paper.

6. Carefully swipe across the fiber optic tip.

   NOTE: Do not scrub the fiber optic tip with the first cleaning. Particles on the tip may gouge the surface if the tip is scrubbed.

7. Using a new clean cotton swab or lens paper with pure isopropyl alcohol, clean the fiber optic tip.

8. Using a clean dry cotton swab or lens paper, immediately dry the wet fiber optic tip.

9. Using clean, dry compressed air, blow across the end face of the fiber optic tip at a distance of approximately 6 to 8 inches away.

   NOTE: Nitrogen gas or compressed air may also be used, however, care must be taken to not shake, tilt, or invert the container since this may release particulates from the container.

10. As soon as the fiber tip is dry, attach the connector to the front panel of the instrument or cover the end of the connector for future use.

    If the insertion loss performance is poorer than expected, repeat the steps above to clean the connector again.

CHAPTER 4

4. Factory Service

4.1 Introduction

This section contains information regarding calibration and obtaining factory service for the Model 708 8-Channel Butterfly Telecom Laser Diode Mount.

4.2 Obtaining Service

To obtain information concerning factory service, contact Newport Corporation or your nearest Newport representative. Please have the following information available:

- Instrument model number (on front panel)
- Instrument serial number (on rear panel)
- Description of the problem

If the instrument is to be returned to Newport Corporation, you will be given a Return Materials Authorization (RMA) number, which you should reference in your shipping documents as well as clearly marked on the outside of the shipping container.

Please fill out the service form, located on the following page, and have the information ready when contacting Newport Corporation. Return the completed service form with the instrument.

Service Form

Newport Corporation
USA Office: 949/863-3144
FAX: 949/253-1800

Name _____ RETURN AUTHORIZATION # _____

Company _____ (Please obtain prior to return of item)

Address _____

Country _____ Date _____

P.O. Number _____ Phone Number _____

Item(s) being returned:
Model # _____ Serial # _____

Description _____

Reason for return of goods (please list any specific problems) _____

_____

List all control settings and describe problem _____

_____

_____

_____ (Attach additional sheets as necessary)

Show a block diagram of your measurement system including all instruments connected (whether power is turned on or not). Describe signal source. If source is laser, describe output mode, peak power, pulse width, and repetition rate.

Where is measurement being performed?
(factory, controlled laboratory, out-of-doors, etc.) _____

What power line voltage is used? _____ Variation? _____

Frequency? _____ Ambient Temperature? _____

Any additional information. If the user has made special modifications, please describe below.

_____

_____

_____