





# AC-9603 BIAS-T MODULATION HEAD

## Connecting a Laser Diode or Pigtailed Laser Diode to a 4-Pin Bias-T

The 4-Pin AC-9603 Bias-T is designed to accommodate both 3-Pin and 4-Pin Laser Diode Packages, and Pigtailed Laser Diodes. The AC-9603 can be used in conjunction with the AC-9300 Passive Heat Sink, or the AC-9550A Temperature Head.

Use the following procedure to connect Laser Diodes or Pigtails to the AC-9603 Bias-T:

- Determine the Laser/Pin configuration of your Laser Diode from the Manufacturers Data Sheet. Pay extra attention to the Data Sheet Mechanical Diagrams, as it is not always clear if they are indicating a top, or bottom view, and also the pin numbering is not always consistent. Once the configuration is determined use the chart below to select the appropriate colour coded cable to connect between the AC-9603 Bias-T and Laser Diode Driver. Please contact Seastar Optics for ordering information of these cables.

Type 1		Toshiba Hitachi 9mm Sony	SDL5311G1 Mitsubishi: ML40116R All round 9mm Mitsubishi except ML4404
Type 2		Sharp "M" Type Mitsubishi: ML4404 5.6mm Sony	Toshiba
Type 3		Mitsubishi: ML7011R (5.6mm)	
Type 5		Mitsubishi: ML5704F, ML6708E, ML7701A, ML7761, ML7781, ML8701, ML9701AA, ML9702	

**NOTE:** These configuration diagrams are as viewed when looking at the end of the Bias-T Laser Diode input connector. The Laser Diode input connector is the brass tube with four sockets that protrudes from the AC-9603 Bias-T body. This view is the same as the Laser Diode's window side, not it's pin or bottom side.

A few of the more popular Laser Diodes have been listed in the above chart to aid in determining the proper colour coded cable necessary to use with your Laser Diode.

**NOTE ON BLACK CABLE:** The BLACK colour coded cable has a 9 volt battery clip attached to it when supplied with a LD-2310 Laser Diode Driver System. The Type 3 and Type 5 configurations require a reverse bias voltage on their PIN diodes. The LD-2000 has an internal bias battery, however the LD-2310 does not have this internal battery and therefore requires it to be connected to the BLACK cable for Type 3 and Type 5 configurations.

- Plug 4-Pin Laser Diodes into the socket of the AC-9603 oriented as shown in figure 1. For 3-Pin Laser Diodes orient the Laser Diode as shown in figure 2. For 3-Pin Pigtailed Laser Diodes orient the Pigtail the same as the Laser Diode shown in figure 2 and attach it to the AC-9550 Temperature Head with the mounting cap as shown in Figure 5

The Laser Diode should normally be connected to the AC-9603 Bias-T via a AC-9300 Passive Heat Sink, or a AC-9550 A Temperature Head. Figures 1 & 2 does not show these components in order to clearly indicate the Laser Diode orientation with respect to the AC-9603 Bias-T socket.

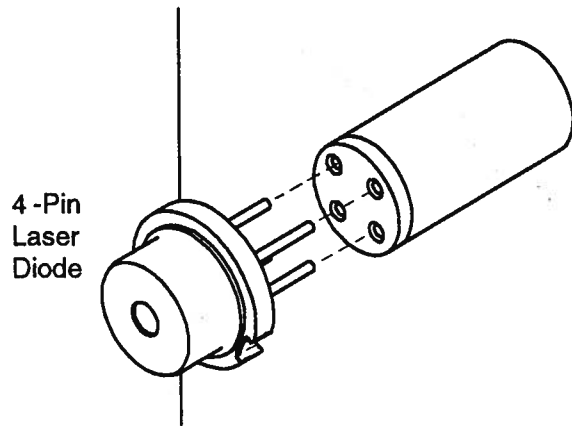


Figure 1

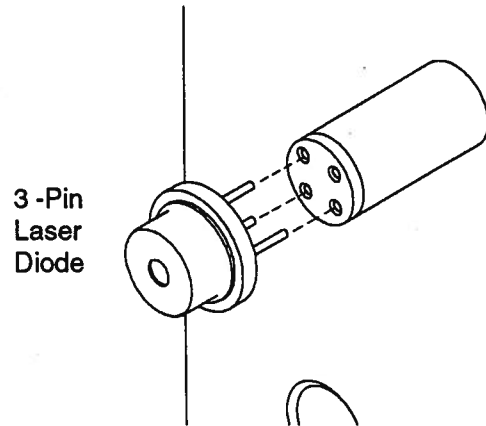


Figure 2

Figure 3 shows how the components of a Bias-T/Temperature Head System are assembled together with a Laser Diode.

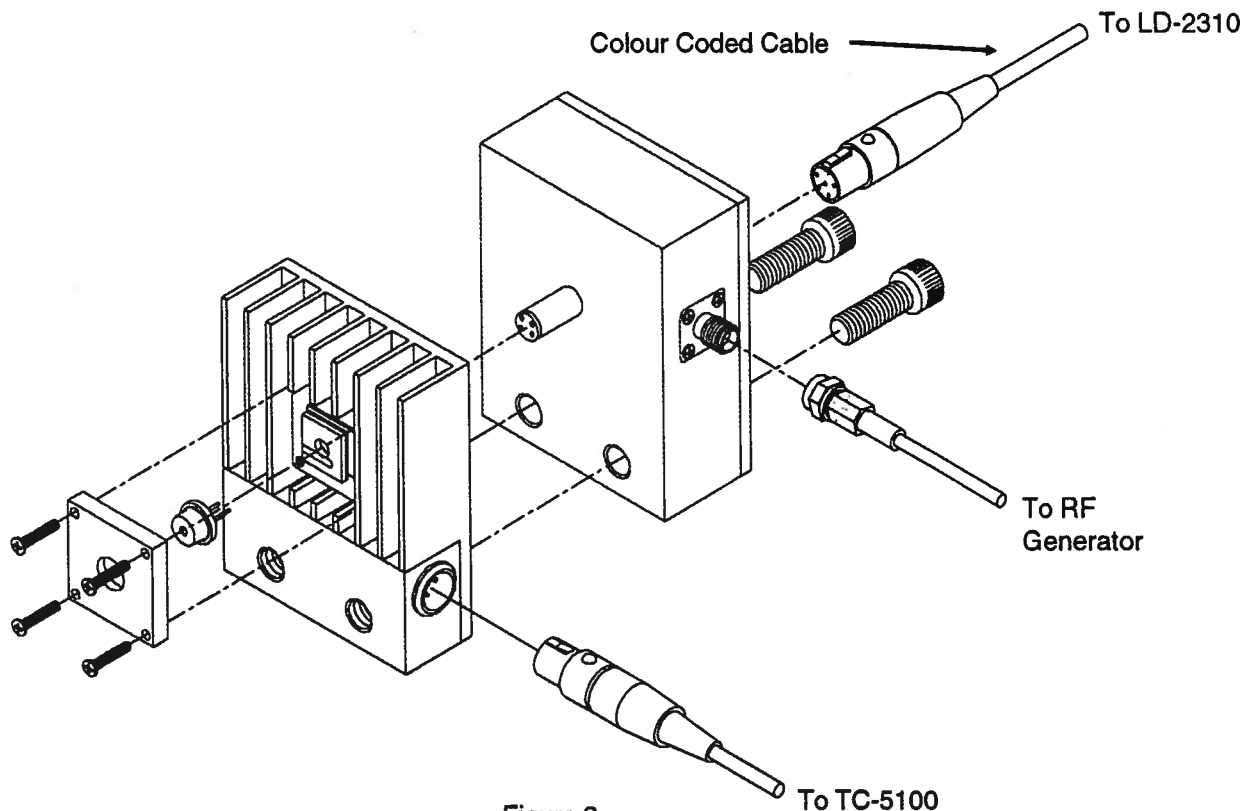


Figure 3

Figure 4 indicates the orientation of the 4-Pin Pigtailed Laser Diode when being plugged into a 4-Pin AC-9603 Bias-T/AC-9550 Temperature Head Assembly. Note that the notch on the pigtail is facing towards the bottom right corner of the AC-9550 Temperature Head.

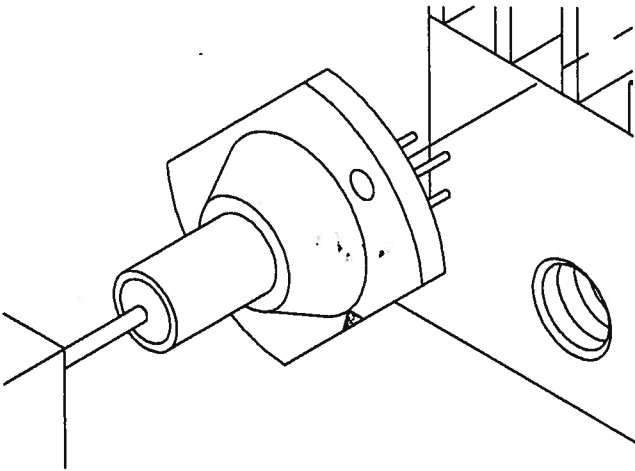


Figure 5 shows the installation of the Pigtailed Laser Diode Cap which is screwed in place with the four supplied mounting screws. Please refer to Figure 3 which indicates how the AC-9603 Bias-T is connected to the AC-9550 Temperature Head.

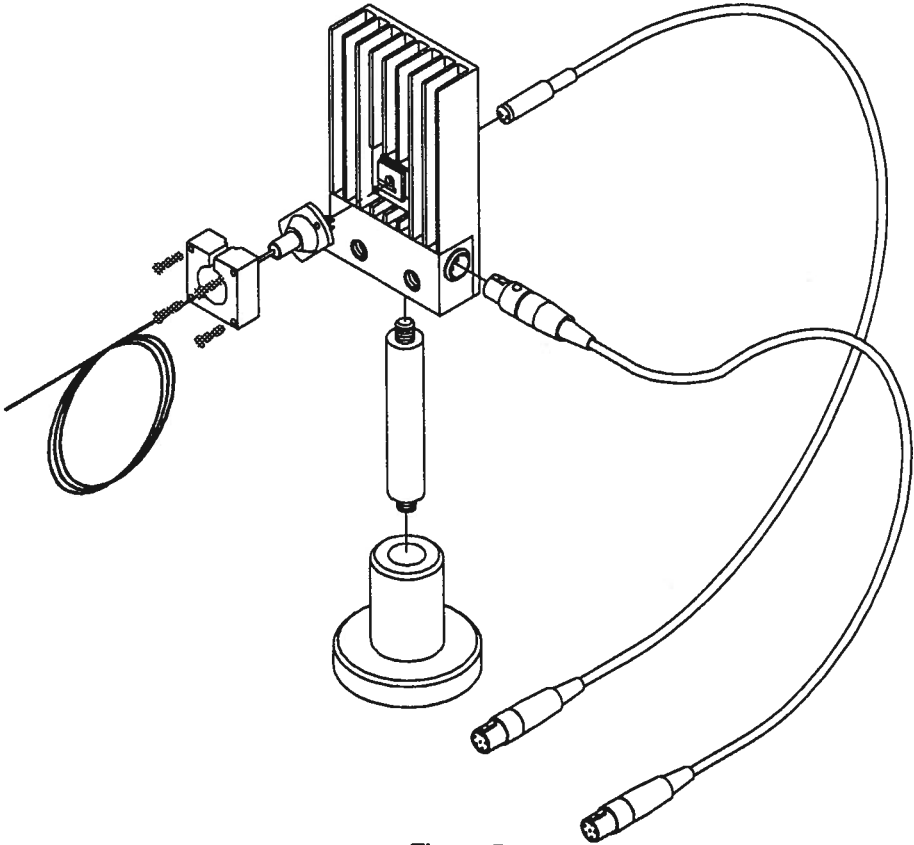


Figure 5

# AC-9603 Bias-T CAUTION

When using the AC-9603 Bias-T with a laser diode driver such as the LD-2310 or LD-2000 the possibility exists of connecting external test equipment in such a way as to bypass the current control circuitry in the driver. This results in the laser diode being connected directly between the driver's V+ and ground and therefore destroying the laser diode.

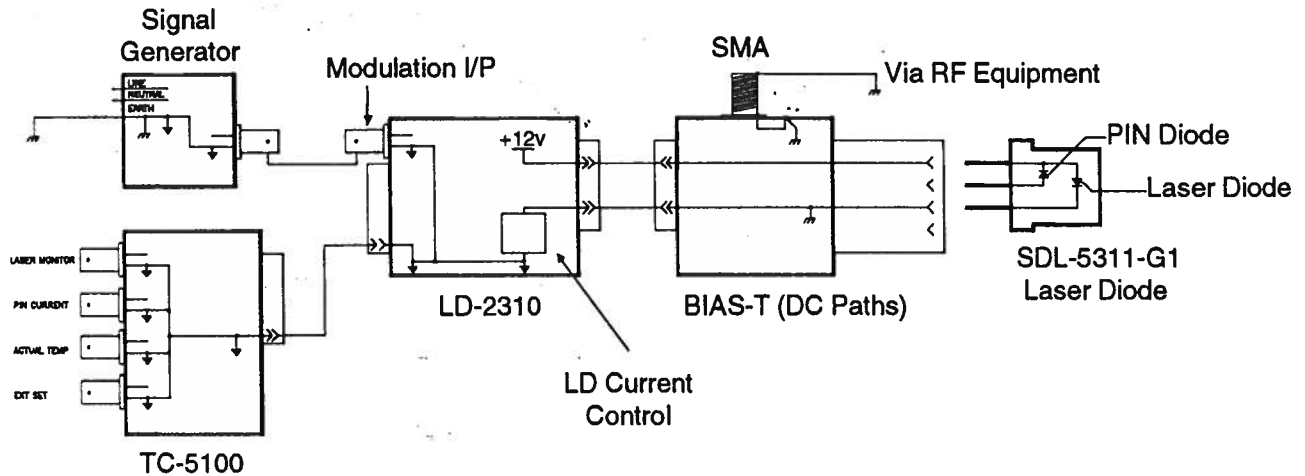


Figure 1

Figure 1 shows the block diagram of a typical system with external test equipment in a configuration which would cause the problem. To avoid the problem do not connect any external test equipment while a RF SMA cable is connected to the Bias-T or while the Bias-T is touching earth ground. (e.g. Optical bench ) In addition take care that none of the BNC connectors on the Seastar equipment are touching earth ground. (e.g. the case of a scope or loose cables )

## AC-9603 BIAS-T MODULATION HEAD

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### AC-9603 SPECIFICATIONS

- Frequency Range: 10 MHz to 1.5 GHz
- RF Input Impedance: 50 ohm
- Maximum DC bias current: 500 mA
- Maximum RF input power: 20 dBm

### NOTE:

The maximum RF input power of 20 dBm corresponds to 6.2 V p/p in 50 ohms and results in 124 mA p/p current swing in the laser diode about the bias current.

The transfer ratio of the 50 ohms input impedance corresponds to 20 mA/V .

**EXAMPLE:** - Calculate the peak to peak current swing for a 10 dBm RF input signal.

$$10 \text{ dBm} = 10 \text{ mW} \quad I = \sqrt{\frac{P}{R}} \quad I = \sqrt{\frac{0.01}{50}} \quad I = 14 \text{ mA}_{\text{RMS}}$$

$$I_{\text{P/P}} = I_{\text{RMS}} \times 2 \sqrt{2} \quad I_{\text{P/P}} = 14 \text{ mA} \times 2 \sqrt{2} \quad I_{\text{P/P}} = 40 \text{ mA}$$

- For a bias of 100mA through the laser diode, and a RF input signal of 10 dBm, the current would swing from 80 mA to 120 mA.

