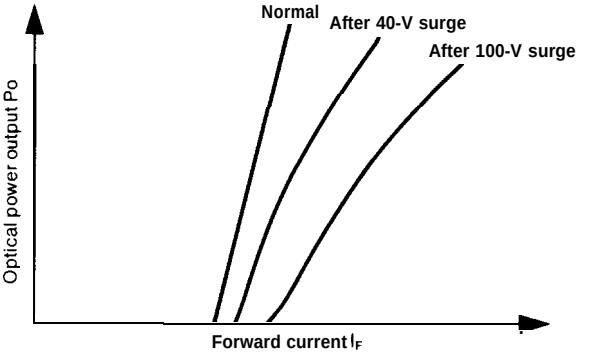
Handling Precautions

Because of their quick response (greater than 1 GHz) and low operating voltage (typically about 2 V), laser diodes are extremely susceptible to damage caused by surge currents.

If excessive current is allowed to flow through the laser diode, the optical power output would become too large and rapid deterioration of the device will result. Application of an electrostatic charge will cause a change in the optical power output vs. forward current characteristic, as shown in Fig. 36-1 Even an instantaneous application of a 40volt charge will increase the drive current and limit the usability of the laser diode. Whenever handling laser diodes, please pay strict attention to the following precautions.

Fig 36-1 Changea in Optical Power Output va. Forward Current Characteristic after Surge Currant

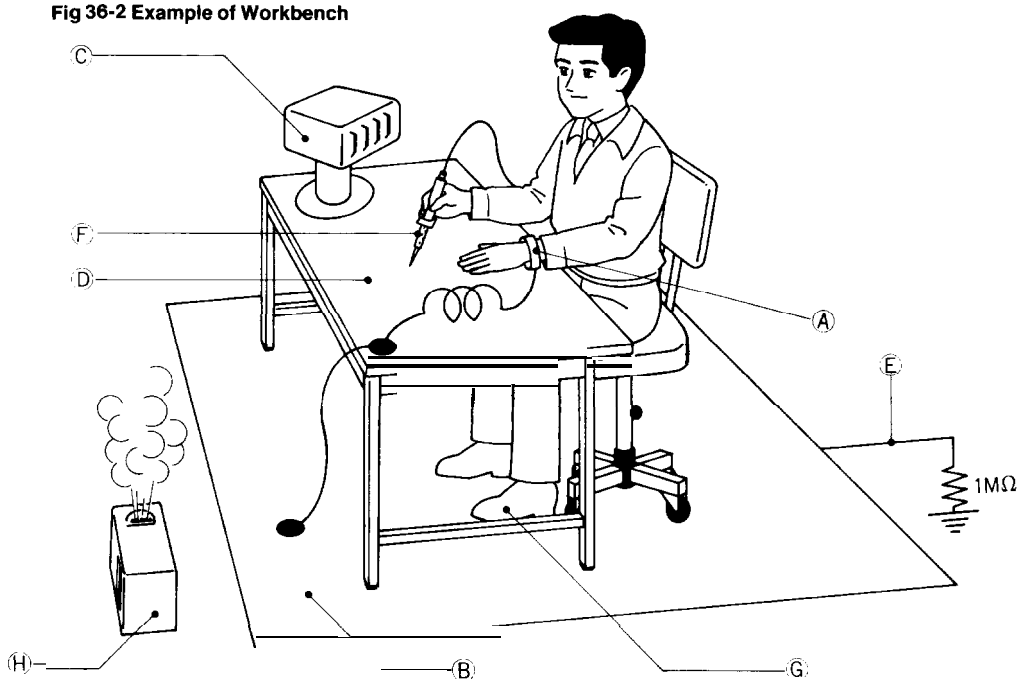


Electrostatic Surge Prevention

Laser diodes are even more sensitive to electrostatic discharge than CMOS LSI's, and require even more preventive measures.

Example of Laser Diode Workbench

Fig 36-2 Example of Workbench



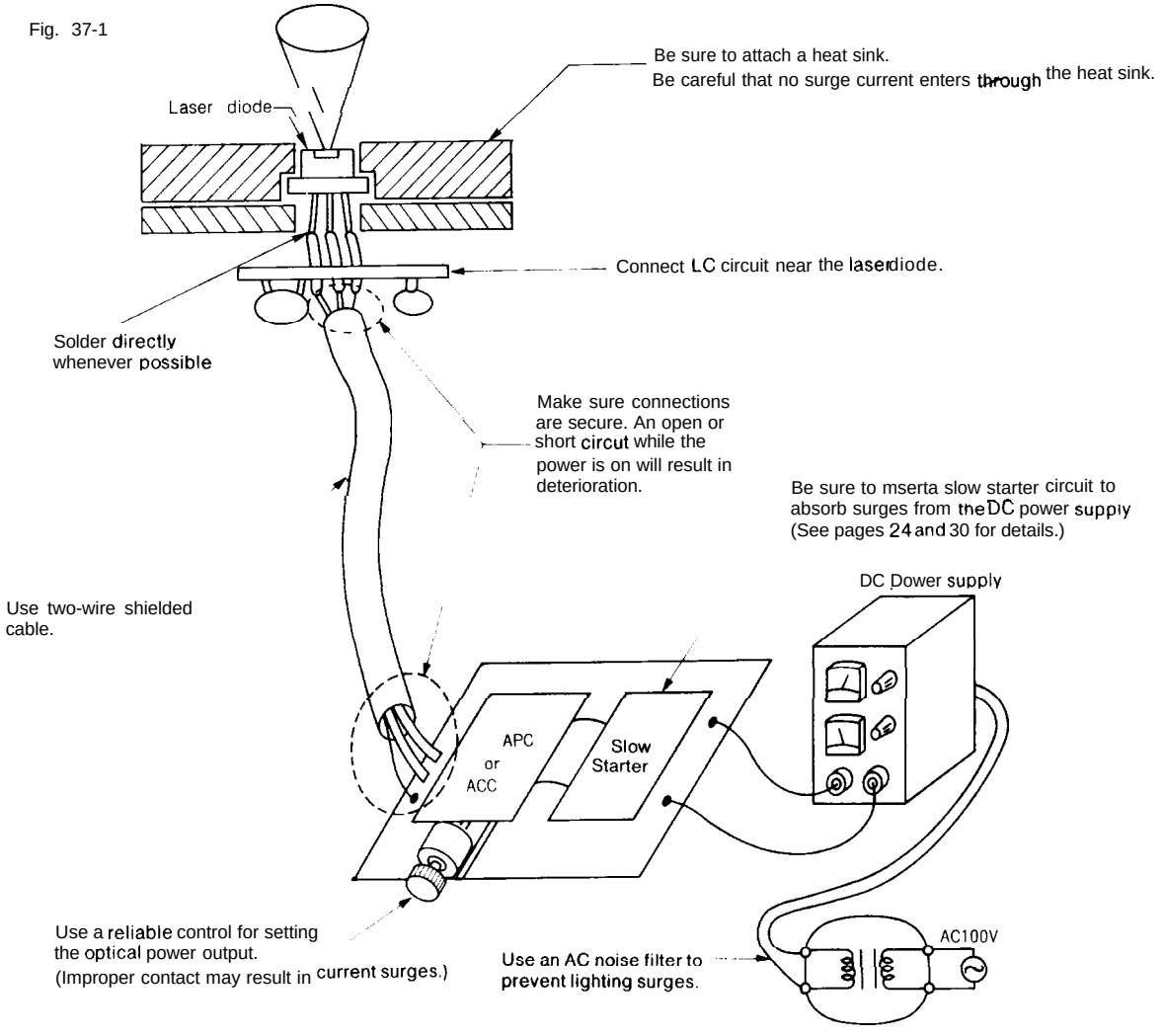
(A) Wrist **strap**
(B) Conductive **floor mat**
(C) Ionized **air blower**
(D) Conductive **table mat**
Must have the same potential as the floor mat.
(E) Ground
Ground through a 1 -M Ω resistance.
(F) Grounded **soldering iron**
(G) Antistatic **shoes**
(H) Humidifier

When shipping laser diodes, they should be inserted in antistatic bags to prevent electrostatic charging due to vibration.

Circuit and Circuit Board Precautions

While operating, a laser diode can be easily damaged by surge currents which may occur during power on and off of the drive circuit or while adjusting the power output. Care must also be taken to prevent surge currents from entering the circuit from external sources.

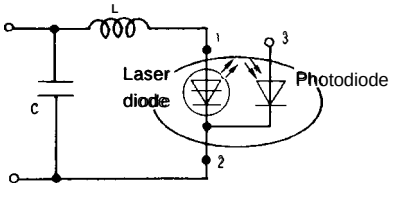
Fig. 37-1



- While the laser diode is powered up, do not touch probes from a synchroscope or voltmeter against the circuitry or laser diode terminals
- If even an Instantaneous excessive optical power output should be emitted while the laser diode is operating, the mirror surfaces of the laser diode chip will be damaged. Even if the drive current supply has an APC, ACC, or both, be sure to monitor the optical power output while setting it. It is not safe to estimate the optical power output only from the drive current.

Note Added protection from electrostatic surges or surges from the circuitry can be obtained by inserting a coil and capacitor near the laser diode as shown in Fig 37-2

Fig. 37-2



L: Inductor IO-1 OOHH
C: Monolithic ceramic capacitor
0.3-1 5μF
When applying high speed modulation to the laser diode, make the LC time constant small relative to the required response time

. Simple Optical Power Output Measurement Method

When the absolute maximum optical power output is exceeded in a laser diode, the reflecting mirrors become physically damaged, Therefore, when using a laser diode for the first time, the optical power output should be measured and confirmed.

To accurately measure (error within ± 5%) optical power output, an optical power meter specifically for laser diodes should be obtained from an Instrument manufacturer.

To simply measure (± 15% error) laser diode optical power output, Sharp's SPD photodiode series is ideal. The photodetector surface area in the SPD series is large, and the peak of their spectral sensitivity matches the wavelength of laser diodes (0.5 mA/mW) and has a flat response characteristic.

A measurement method using SPD102 is described in Fig. 38-1. When the load resistance R_L is set at 10Ω, a 5mV output is obtained for every 1 mW of optical power output. The load resistance can be changed depending on the optical power output of the laser diode, but be sure the output voltage does not exceed 200 mV. When output voltage exceeds 200 mV, linearity is lost. Measure with the laser diode set against the window of the SPD1 02. The optical power output can be measured from the voltage across the load resistance

When operating an LT024 series, LTO15 series, LTOI 7 series, LTO16 series or LT090 series laser diode, the monitor current is small, so measure the optical power output with the SPD slightly tilted as shown in Fig. 38-2 to prevent the reflected light from recentering the package and striking the built-in photodiode while the APC is operating

Fig. 38-1 Optical Power output Measurement Method I

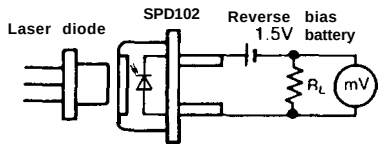
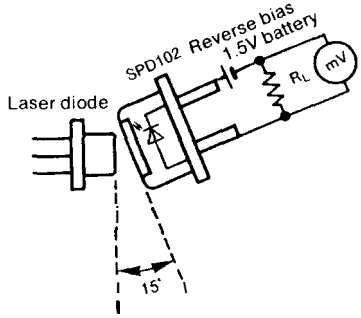


Fig. 36-2 Optical Power Output Measurement Method II



● Others

- Due to the high coherence of laser beams, dust or finger prints on the window glass will cause diffraction or interference of the light, resulting in ripples in the far-field pattern and a drop in optical power output, When handling laser diodes, be sure to use a finger sock and assemble the optical system in a clean room to prevent dust from entering the system. If the laser diode window glass should become soiled, gently clean it with a cotton swab dipped in ethanol,
- The window glass may break or crack if excessive force is applied to the package cap
- When attaching a heat sink to the package, do not place the cap between the plates as this may cause the window glass to crack, Never solder the heat sink to the package

Fig. 38-3