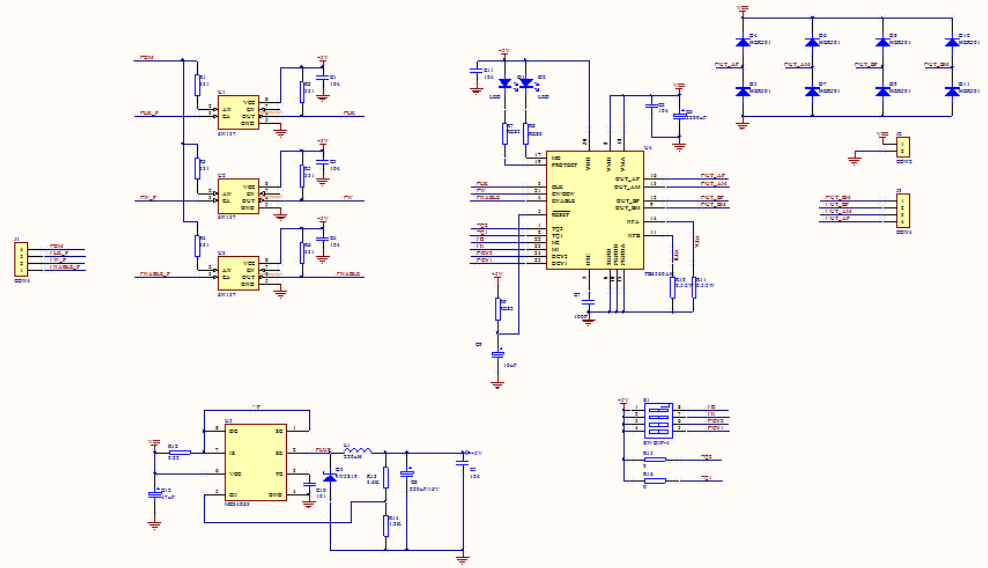
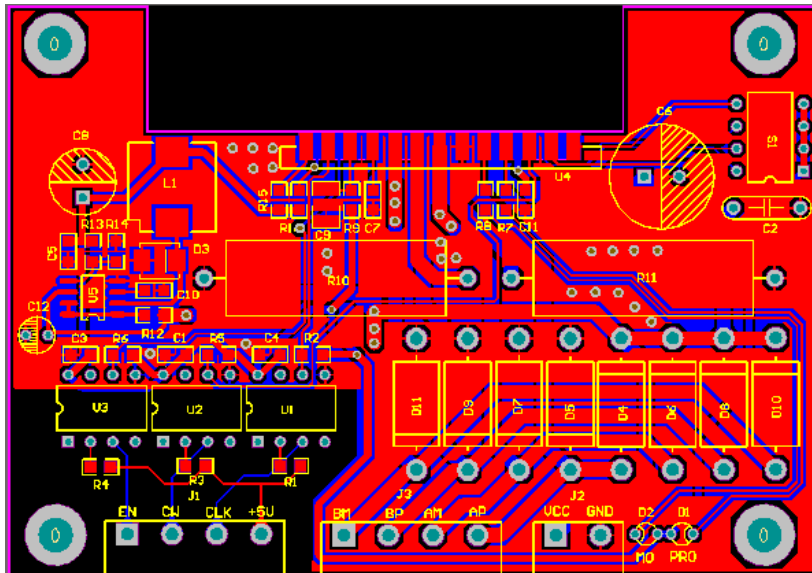


Power Electronics

- Microstepping stepper motor driver
 - 2A, 40V
 - <\$10
 - 1/16 microstep
 - Communication with Microcode
- Variable speed DC motor driver
 - 10A, 40V
 - <\$10
 - Communication with Microcode
- High power H-bridge (10A if time allows)

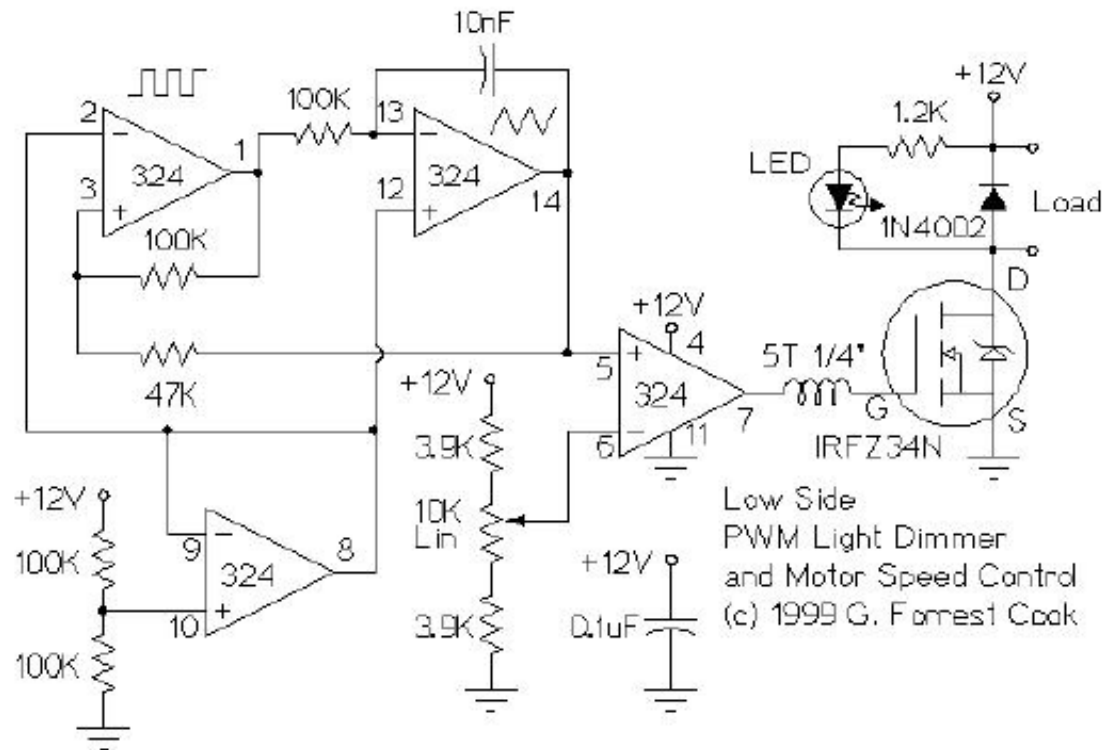
Power Electronics

Microstepping Driver



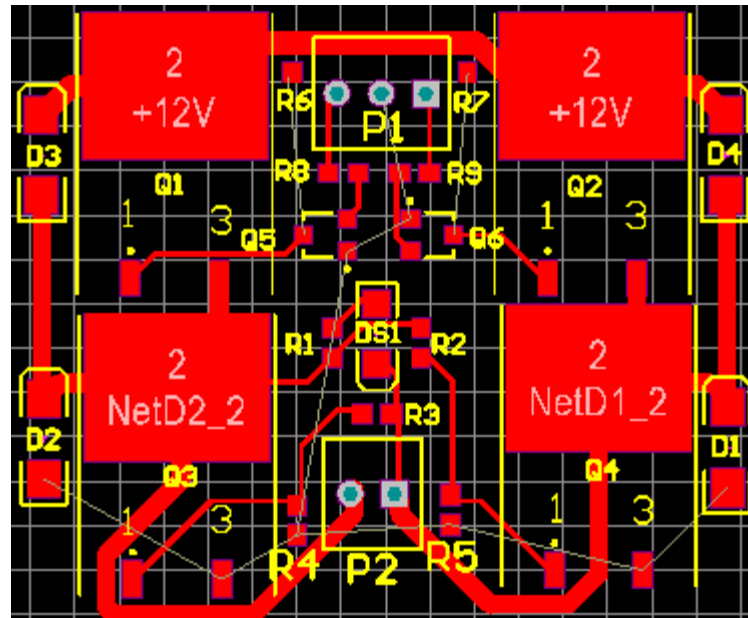
Power Electronics

Variable Speed DC Motor Driver



Power Electronics

High Power H-Bridge



Laser Cutter vs EDM vs Machining

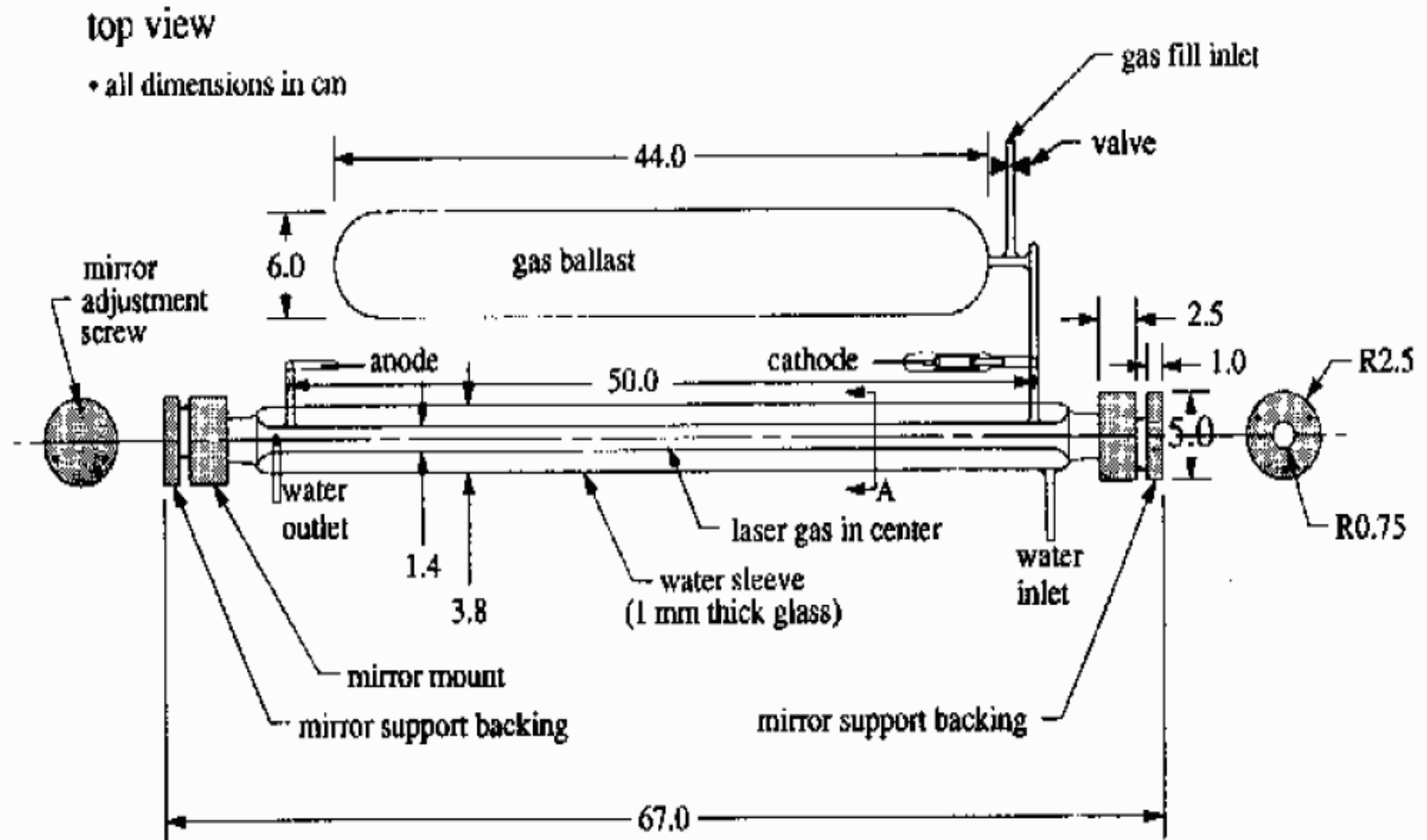
- Cutting Energy
 - Laser – 29J/mm^3 (Plastics)
 - EDM – 37J/mm^3 (Aluminum)
 - Machining – $0.4\text{-}1.1\text{ J/mm}^3$ (Aluminum)
- Suitability for rapid prototyping
 - Laser cutter

Motivation for Laser Cutter

- Stencils for SMT paste application
- Aluminum Stencils
 - 1.5 kW Laser
 - \$99 per piece
 - Lead time 3 days
- Mylar Stencils (3 mils)
 - Rapid home prototyping
 - Cost of Mylar sheets (3 mils)
 - Lead time 5 minutes

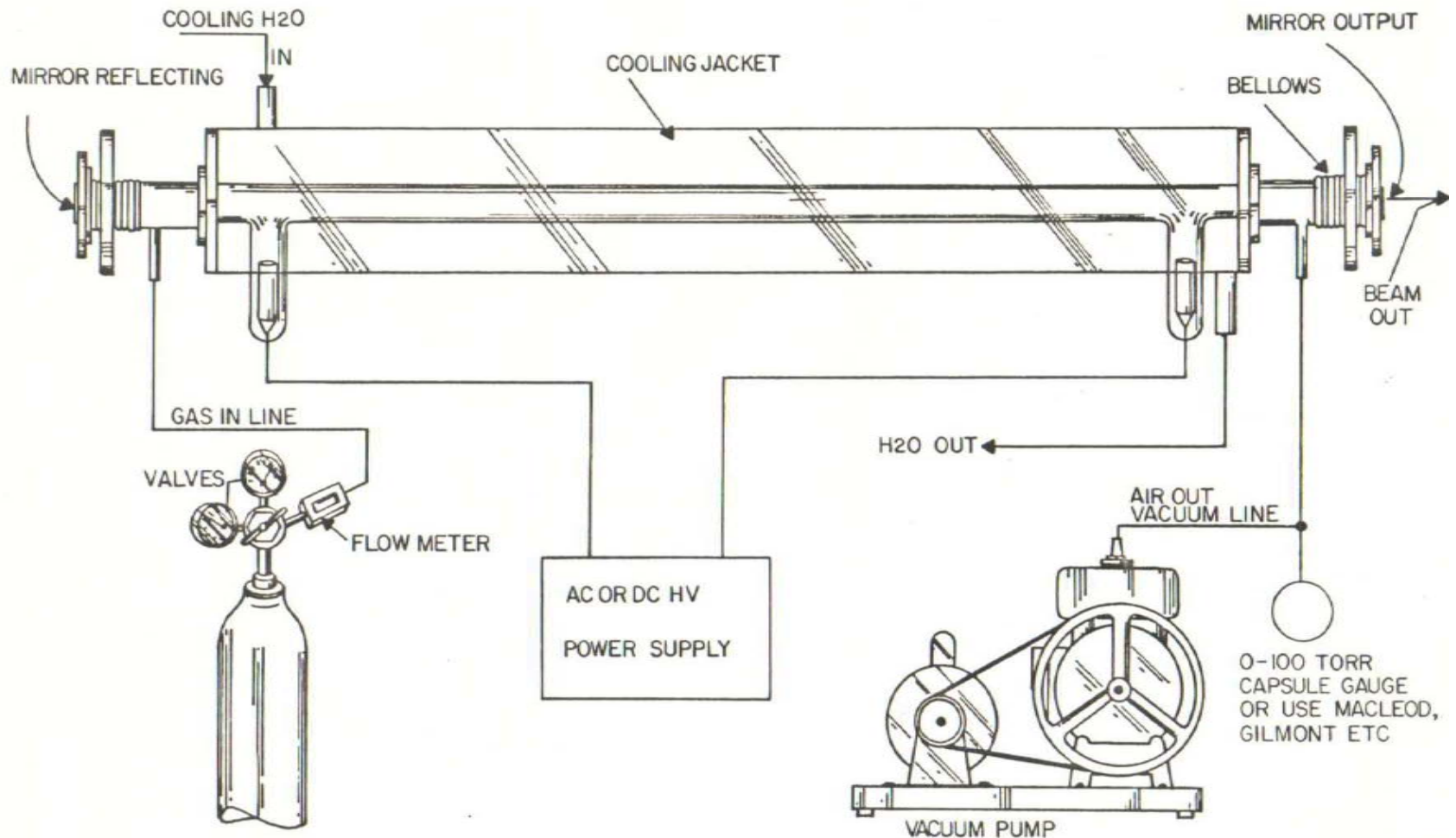
Laser Cutter – CO2

CO2 Laser Tube - \$220



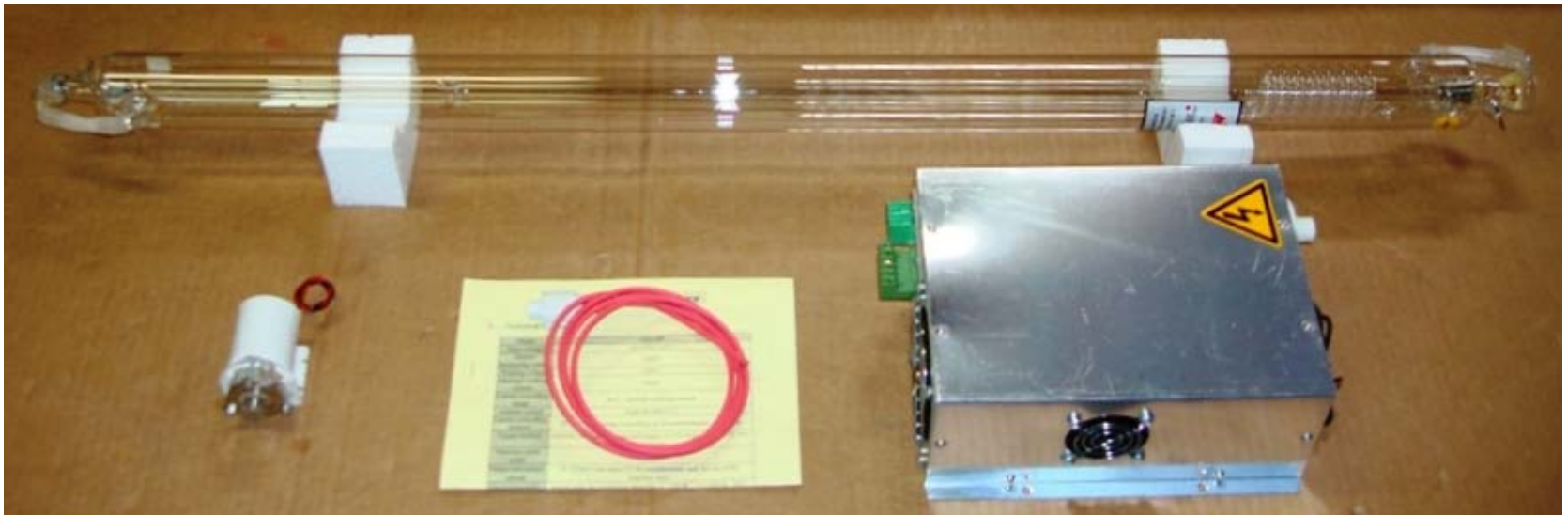
Laser Cutter – CO2

CO2 Laser Cutter Schematic



Laser Cutter – CO2

- 40W CO2 Laser Power Supply
- 40W CO2 Laser Tube
- Water Pump
- \$1200 (Ebay)



Laser Cutter – Solid State

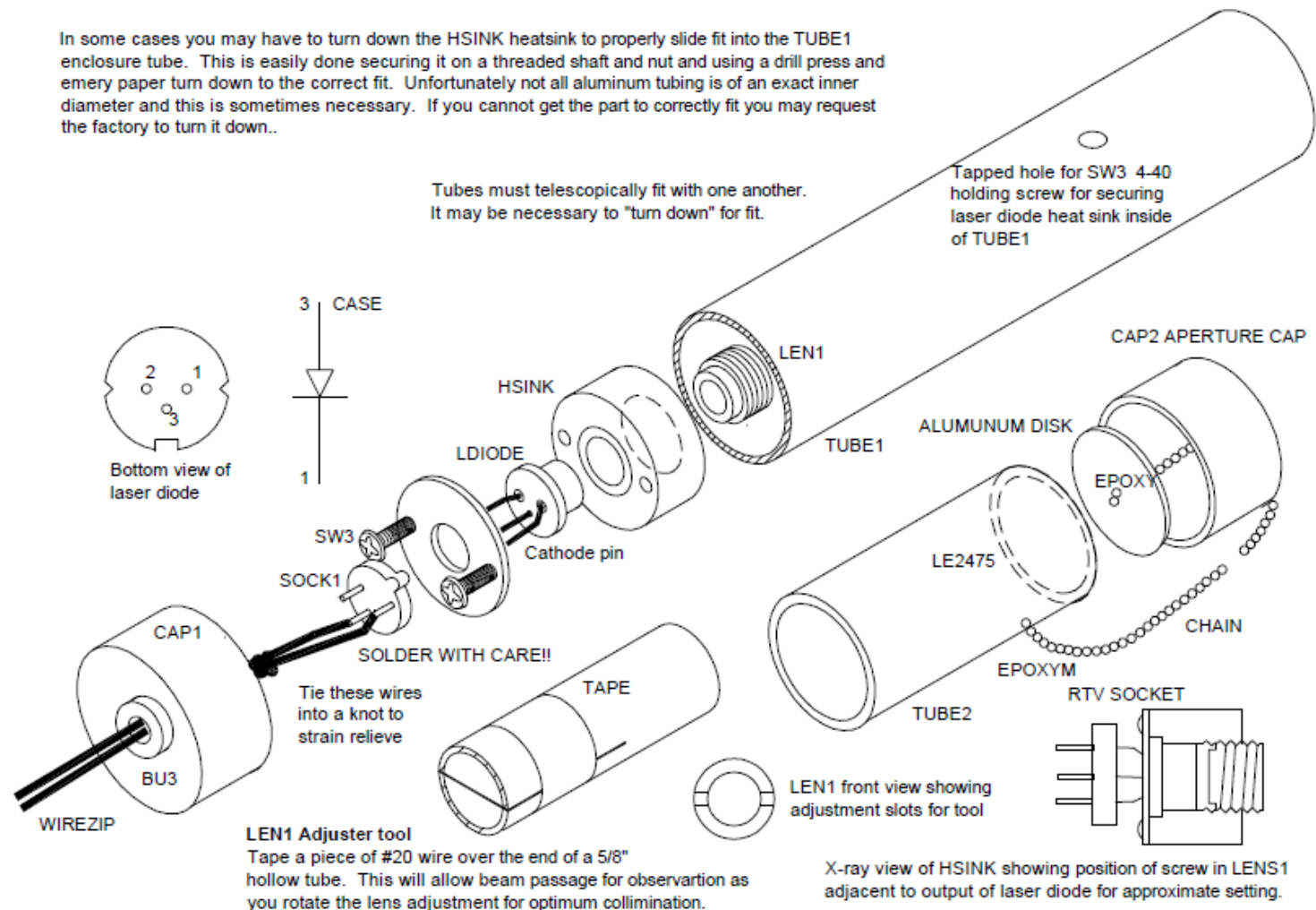
- 1W Laser Diode
- Module without Diode \$250
(www.amazing1.com)
- 11w 808nm laser diode TO-5 Package
\$80 (Ebay)



Laser Cutter – Solid State

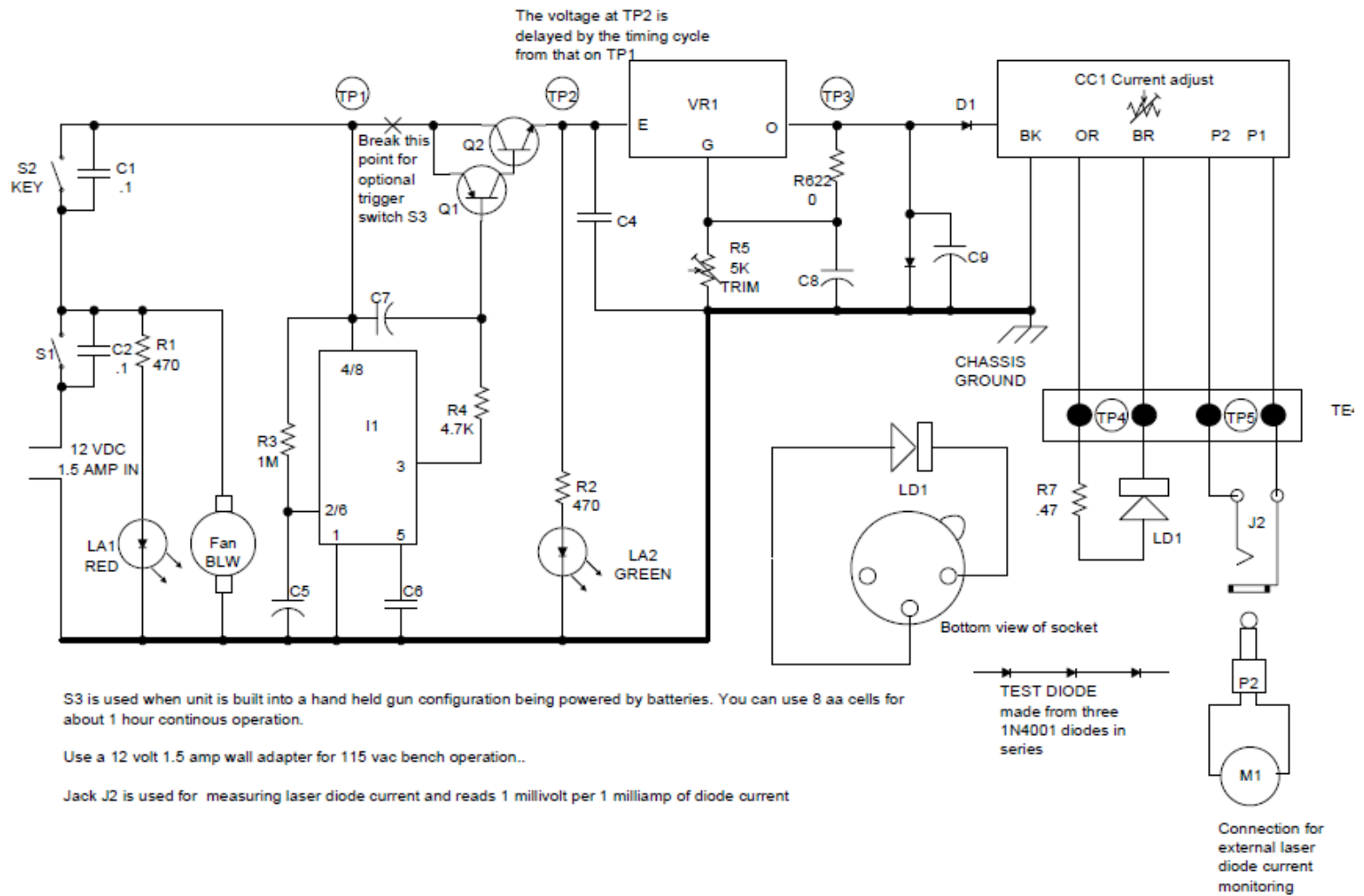
Laser Diode Assembly

In some cases you may have to turn down the HSINK heatsink to properly slide fit into the TUBE1 enclosure tube. This is easily done securing it on a threaded shaft and nut and using a drill press and emery paper turn down to the correct fit. Unfortunately not all aluminum tubing is of an exact inner diameter and this is sometimes necessary. If you cannot get the part to correctly fit you may request the factory to turn it down..



Laser Cutter – Solid State

Laser Diode Driver



Relevant Skills

- Precision Machine Design (FEA static and frequency analysis)
- Motor driver electronics (Stepper motors DC motors)
- Geometrical Optics (AFM optics)
- Analog Electronics (High speed avalanche photodiode, quadrant diode amplifiers)