New Folder Name Information on Pizzo Mirror Tilter and Laser Diode Drivers

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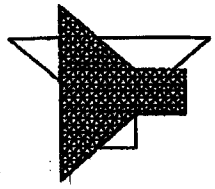
LIGO-T950077-00-D

CSR

Massachusetts Institute of Technology
Center for Space Research
Cambridge, Massachusetts 02139



MIT/CSRFAX: 617-253-8084 **Confirmation: 617-253-0228**

To: Jay Heefner Rolf Bork

FAX #: (818) 304-9834

ADDRESS:

Date Sent: 20 SEP 95

FROM: John H. Tappan

TEL #: (617) 253-3319

ADDRESS: MIT
NE80-6095
Cambridge, MA 02139

Pages (with cover): 6 **Hard Copy to Follow:** YES (NO)

MESSAGE:

As you requested in our telecon on Monday, here is some information on piezo mirror tilters and laser diode drivers. We have not made selections yet, but these are some that I have looked at. I think that the tilting mirror mount may be a custom design but I hope that the laser diode driver is a catalog item.

Your comments, caveats, or instructions would be welcomed. E-mail can be sent to: jht@space.mit.edu

Tilting Mirror Systems

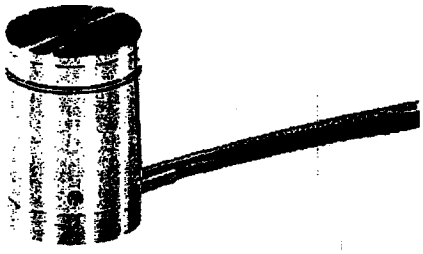
S-330 Tilting Mirror Mount

- Two Tilting Axes
- Integrated Position Sensors
- Excellent Temperature Stability

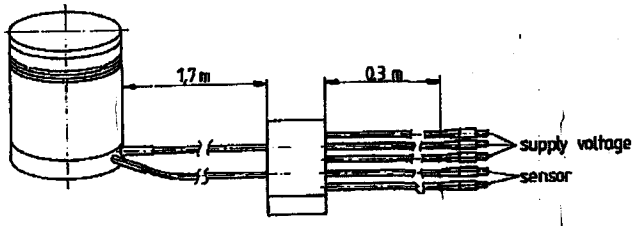
S-330 Tilting Mirror Mounts are designed for precise angular movements around two axes. The moving platform is mounted on four piezoelectric translators, each capable to expand by 15 microns. The movements of the translators are sensor controlled and allow independent tiltings of the platform of more than 2 mrad with a resolution of better than 5 µrad.

The mechanical design is optimized for wide range temperature applications and offers best stability within the range from −40 °C to +80 °C. The casing is made from stainless steel and provides the mechanical preload. High stiffness in horizontal and vertical direction make the S-330 a very robust positioning unit dedicated for a wide field of applications where mirrors or other components have to be tilted with high precision.

The S-330 is available with or without internal strain gauge sensors, depending on the application. Standard PI amplifiers and position control modules can be used for manual or computer controlled operation.



S-330.10 Tilting Mirror Mount 8.10/1



S-330 Cable configuration 8.10/2

Technical Data S-330

Design characteristic:	quadrature PZT support, two axis
Controlled axes:	ϑ, φ
Operating voltage:	-20 to +120 V
Max. tilting range:	2 mrad at 100 V amplitude
Sensors:	strain gages
Angular resolution:	5 µrad
Linearity deviations:	< 0.5%
Crosstalk:	< 1%
Resonance frequency:	3.5 kHz
Capacitance:	2 x 3.6 µF
Bandwidth using P-864:	120 Hz
Casing material:	stainless steel
Weight:	0.2 kg

Cable connections:

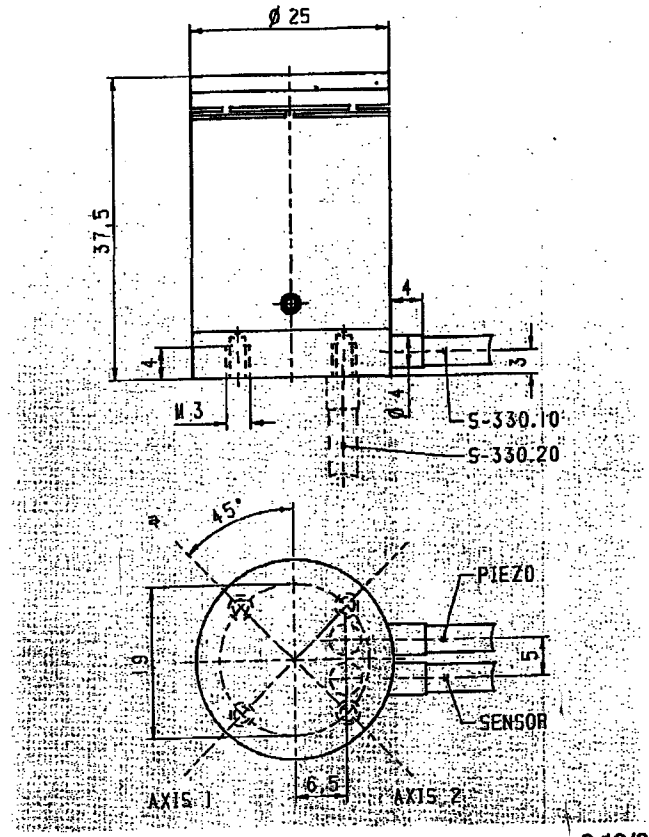
Control voltage:	3 teflon coaxial cables, 2 m; connector: LEMO type FFA.00.250
Sensors:	one teflon cables, 2 m; connector: LEMO type FFA.0S.304

Driving electronics: P-864 or P-865 PZT Drivers with E-809 Control Module

Model Survey:

S-330.10 Tilting Mirror Mount, two axes, with position sensor, radial cable outlet

S-330.20 Tilting Mirror Mount, two axes, with position sensor, axial cable outlet



Dimensions 8.10/3

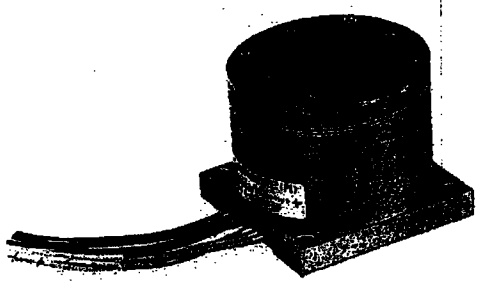
S-340 Tilting Mirror

- Two Tilting Axes
- For Dynamic Applications
- ±1 mrad Tilting Angle
- 1 µrad Resolution

The S-340 Two-axis Tilting Mirror was developed for use in dynamic applications such as image stabilization, beam adjustment, beam steering and fault correction in optical systems.

The S-340 works by using four piezoelectric translators in a bridge circuit. Integrated LVDT sensors guarantee a resolution of 1 µrad in closed loop operation. Compared to the S-330 this unit is designed for larger mirror sizes.

The tilting platform of the S-340 is made of titanium to giving it a similar temperature coefficient to a glass mirror. The mirror is normally glued to the platform. Other platform materials (INVAR, aluminium) are available on request. The S-340 is delivered without mirror.



S-340 Tilting Mirror 8.11/1

Technical Data

Tilting angle:	±1 mrad per axis at 0 to 100 V
Resolution:	1 µrad
Resonant frequency:	1.4 kHz (without mirror)
Axis coupling (cross talk):	< 0.1%
Capacitance per axis:	7.2 µF
Casing material:	
platform:	titanium
casing:	aluminium
Moment of inertia:	18000 gmm²
Distance of pivot point to platform surface:	7.5 mm

Electrical Connections:

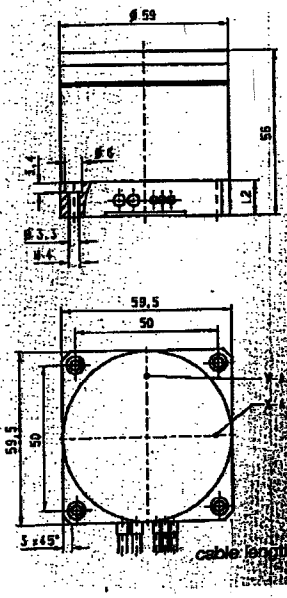
Operating voltages:	3 teflon coaxial cables, 1 meter with LEMO plug FFA.00.250.CTA
Sensor (S-340.10):	2 PVC cables, 1 meter with LEMO plug FFA.05.304.CLAC32

Electronics:

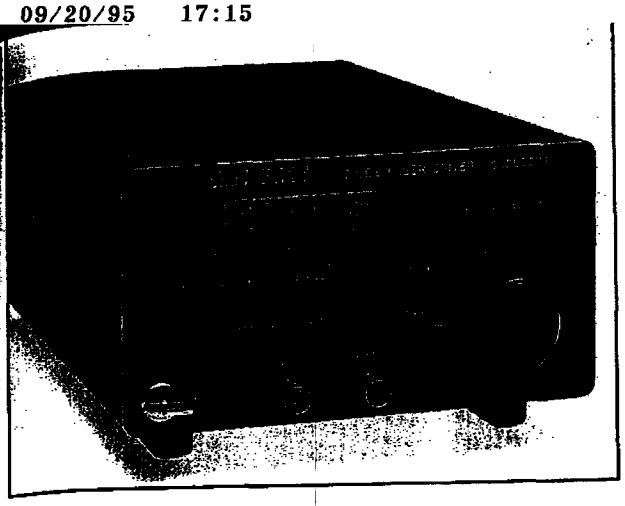
S-340.00:	P-864.00 or P-865.30
S-340.10:	P-864.00 + E-809.00 or P-865.30 + E-809.00 Options: E-255.10 or E-255.60

Model Survey:

S-340.00 Tilting Mirror, two axes, without sensors
S-340.10 Tilting Mirror, two axes, with LVDT sensors,

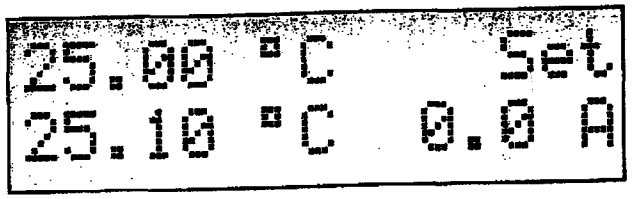


Dimensions of S-340 8.11/2



Precision Diode Laser Driver

- **Up to 300 mA of Low-Noise Drive Current**
- **Integral 16 W TE Cooler Controller**
- **Analog Modulation to 1 MHz**
- **Optional IEEE 488.2 Interface**



TEMPERATURE DISPLAY.

The 06 DLD 203 diode laser driver is a microprocessor-driven low-noise current source and temperature controller. It offers both current- and power-stabilized modes of operation, modulation capability, and the ability to preset all laser and temperature values prior to turning on the diode laser. The front-panel, backlit LCD simultaneously displays the laser drive current, photocurrent, and voltage or the temperature set point and actual value. The unit is compatible with all Melles Griot collimated diode laser head assemblies as well as any unmounted diode laser requiring up to 300 mA of drive current. An external input for remote modulation (tuning) of diode laser temperature is also provided.

LOW-NOISE CURRENT SOURCE

The 06 DLD 203 has been carefully designed to provide the utmost in low-noise current output. Its highly stable output (<5 ppm/°C) is fully floating, allowing case grounding of any diode laser type. Two user-selectable bandwidth ranges allow the driver to be optimized for maximum bandwidth with minimal output current noise.

An external modulation signal can be applied to the unit's front-panel input for remote linear control of the operating current or optical output power. The low-bandwidth range is best suited for use in cw or near-cw applications. The current noise is limited to <1.5 μA rms, over a dc to 500 Hz (700 μsec rise/fall time) −3 dB bandwidth. The high-bandwidth range allows dc to 1.0 MHz (350 nsec rise/fall time) external modulation, while current noise is limited to <4.9 μA rms.

Two user-adjustable photodiode gain settings allow precise control of the diode laser's light output. The photo-low setting allows adjustment of photocurrent from 0 to 2 mA, with 1 μA resolution. In the photo-high gain setting it is possible to control photocurrent levels as high as 10 mA with 10 μA resolution.

PRECISION TEMPERATURE CONTROLLER

The low-noise thermoelectric cooler controller in the 06 DLD 203 permits closing of a precision temperature-control loop utilizing thermistors, IC temperature sensors, and diode laser voltage feedback. Thermoelectric cooler modules requiring up to 8 V at 2 A can be accurately controlled, and an adjustable cooler current limit prevents devices from being accidentally overdriven. The intuitive front-panel controls make temperature sensor selection easy.

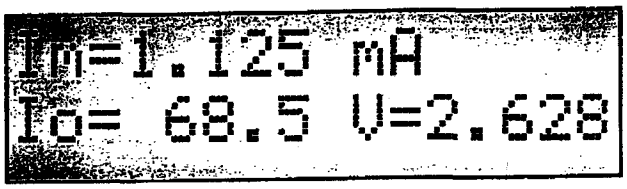
Thermistors are attractive for many applications because they are low-cost, readily available and compact in size. The driver is compatible with thermistors with resistance ranging from 10 Ω to 125 kΩ. Temperature values are entered and displayed in ohms.

The 06 DLD 203 is compatible with IC temperature sensors such as the AD 590 and AD 592CN. Temperature can be controlled from −20°C to +60°C with 0.01°C resolution.

The instrument also provides a unique temperature control feature which uses the diode laser's forward voltage as the error signal in the temperature-stabilization loop. Superior stability can be achieved because the diode laser's junction temperature, via voltage feedback, rather than the temperature of a heat sink, is being monitored and controlled.

2× 16 CHARACTER ALPHANUMERIC DISPLAY

In addition to improved levels of performance and functionality, the 06 DLD 203 contains a 2-row, 16-character-per-row backlit LCD. This highly visible display, along with the intuitive front-panel controls, simplifies all setup and operating details associated with diode lasers. The laser current, photocurrent, and laser voltage are simultaneously displayed for maximum convenience. Similarly, the set point and actual temperature are displayed when thermoelectric cooling is used.



CURRENT DISPLAY.

SETUP AUTOSAVE

The 06 DLD 203 saves its entire configuration menu to non-volatile memory upon power down. This eliminates the need to reconfigure the unit for each session. Saved parameters include laser and photocurrent level and gain setting, current limit, active mode (current- or power-stabilized), bandwidth, external output configuration, temperature sensor type, thermoelectric cooler current limit, and temperature set point.

MONITOR CAPABILITIES

Any laser or temperature parameter displayed on the front-panel LCD may also be externally monitored via a front-panel BNC connector. This isolated high-speed port is useful for monitoring dynamic properties of displayed values. A 9-pin D connector on the unit's rear panel allows remote selection of the parameter that will be available at the monitor output. This TTL-compatible connection overrides any front-panel display selection.

DIODE LASER PROTECTION

The 06 DLD 203 is equipped with an adjustable current limit setting. Once set, this limit can never be exceeded. In addition, soft-start circuitry slowly applies current to the laser upon power-up and likewise removes it during power-down. The unit is compatible with all diode laser pin configurations, and the floating output permits case grounding of any type of laser.

SPECIFICATIONS: PRECISION DIODE LASER DRIVER

CURRENT SOURCE

Current-Stabilized Mode

Current Range: 1–300 mA, floating

Resolution: 100 μA

Temperature Coefficient: <5 ppm/°C

Drift: 10 ppm over 1 hour @ 25°C

Analog Modulation:
dc–500 Hz, low bandwidth; dc–1.0 MHz, high bandwidth

Noise: <1.5 μA rms, low bandwidth; <4.9 μA, high bandwidth

Voltage Compliance: >7 VDC

Display Accuracy:
±0.1 mA operating current, ±2.0 μA photocurrent

Power-Stabilized Mode

Ranges: 0–2 mA, photo low; 0–10 mA, photo high

Resolution: 1 μA, photo low; 10 μA, photo high

Temperature Coefficient: <5 ppm/°C

Drift: 10 ppm over 1 hour @ 25°C

Analog Power Modulation:
dc–500 Hz, low bandwidth; dc–500 kHz, high bandwidth

Voltage Compliance: >7 VDC

Display Accuracy:
±0.1 mA operating current, ±2.0 mA photocurrent

Modulation bandwidth, noise, and temperature coefficient are dependent upon the diode laser type used in power-stabilized mode. Values stated are for Sharp Model LT026.

Current Limit

Range: 1–300 mA

Accuracy: ±1% of full scale

Resolution: 0.1 mA

Overshoot: <5%

TEMPERATURE CONTROLLER

Output

Maximum Current: 2 A

Maximum Voltage: 8 V

Read Resolution: 10 mA

Read Accuracy: ±50 mA

Current Limit Range: 0–2 A

Current Limit Accuracy: ±50 mA

Current Limit Resolution: 10 mA

TEMPERATURE SENSING

Diode Laser Voltage

Diode Voltage Range: 0–5.0 VDC

Long-Term Drift of Diode Laser @ 25°C ± 1°C ambient:
± 10 μV typical, over 1 hour

Set-Point Resolution: 2 μV

Read Resolution: 2 mV

IC Temperature Sensors

IC Sensor Types: AD 590 and AD 592CN

Temperature Range: −20°C to +60°C

Long-Term Drift of Heat Sink @ 25°C ± 1°C ambient:
0.01°C typical, over 1 hour

Resolution: 0.01°C

Accuracy: Sensor dependent (±0.5°C for AD592CN)

Thermistors

Range: 10 Ω to 125 kΩ

Long-Term Drift of Heat Sink @ 25°C ± 1°C ambient:
0.01°C typical, over 1 hour

Resolution: 10 Ω

Accuracy: The larger of ± 1% or 10 Ω

GPIB

Type: IEEE 488.2 Interface

General: Implements Talker/Listener functions

Environmental and General

Dimensions (W × H × L):
180 mm (7 in.) × 105 mm (4 in.) × 300 mm (12 in.)

Weight: 4.4 kg (9.7 lbs)

Power Requirements:
100–120 VAC, 220–240 VAC, 50–60 Hz

Temperature:
−40°C to +70°C storage,
10°C to +40°C operating

Safety: Complies with CDRH US21 CFR 1040.10

See page 50–26 for a listing of diode laser mounts and heatsinks.

	PRODUCT NUMBER
Precision Diode Laser Driver	06 DLD 203
With IEEE 488.2	06 DLD 203/IEEE