Notes from Pixel Mechanics Meeting
June 18, 2001

Present: Anderssen, Johnson, Wirth, Goozen, Gilchriese, Stillwater, Weber, Ryan, Jones, Wise

1. Sector drawing status. Dave is working on drawings and will meet with Eric/Jon on Thursday. Dave to check in, Eric to add drawing numbers supplied by EDMS. Eric to create pdfs to upload to EDMS. Schedule for completion of tooling drawings(for fab) needs to be clarified. Tooling is hoped to be ready(for tube bending) in July, assuming tubes arrive on schedule.

2. Sector materials- No news on carbon-carbon plates or tubes. Foam has been delivered and preliminary inspection looks OK and agreement with Allcomp. Foam density is over the spec but has been accepted.

3. Coolant connections - measurements of variseals appear to show systematic increase in leakage as temperature is lowered. This will be better quantified. Is there hysterisis? Does the leak rate stabilize at low temperature? Status of RFQ/contract with second laser welding vendor(Isis, formerly Laserfab) to be checked. Fred has lure-lok fittings in aluminum, PEEK, glass-filled PEEK and expects samples to be ready for test by end of week.

4. Sector 11 tests. Doug reported and is doing this. This is the first 8-sector designed prototype. Thermal performance tests(pre-rad) are complete and look good. Maximum delta T before any tests is 6.7C. After 50 thermal cycles to -35, thermal shock with LN2 to -35, pressurization to 8 bar, and then another 50 cycles to -35, the maximum deltaT is 7.7C. Tests of the sector 12(with rigid epoxy instead of CGL attaching the tube) will be done this week. Irradiation may be done at high rate facility in Sacramento to speed up irradiation but this wont happen until early July.

5. Sector thermal QC fixture - design is progressing by Cliff. Drawing of Pt on kapton should assume current thickness of Pt as on silicon heaters. Should proceed as soon as possible with making Pt-on-kapton heaters since long lead time.

6. TVH. See attached notes from Allison. Drawings done in ProE. Has order translator, micrometer head. Allison, Doug, Tom J., Eric, Neal...have to take laser safety course(next scheduled class is June 29). Re-setup of TVH is at least 2 weeks away according to Eric.

7. Friction tests. Tai showed concept for rotary static and dynamic test set up to test materials for sliders against rail material. Drawings to be finished by next week and parts ordered. Plan to use existing rack mounted computer for data acquisition when automated, first version is "by hand".

8. Ring inside frame. First tests are complete and results posted on Fred's web site http://www-atlas.lbl.gov/~goozen/supportframe.html. The results look good so far. Next steps are to remove ring and replace and understand how repeatable this is.

9. Fred has developed a concept for survey based on a commercial instrument. I append this.

10. B-layer support tube. Eric has complete first model of B-layer support tube and has sent it to Bill Miller.

11. Endplate region and pixel support. Eric will work on pixel support concept and needs endplate model from Bill.

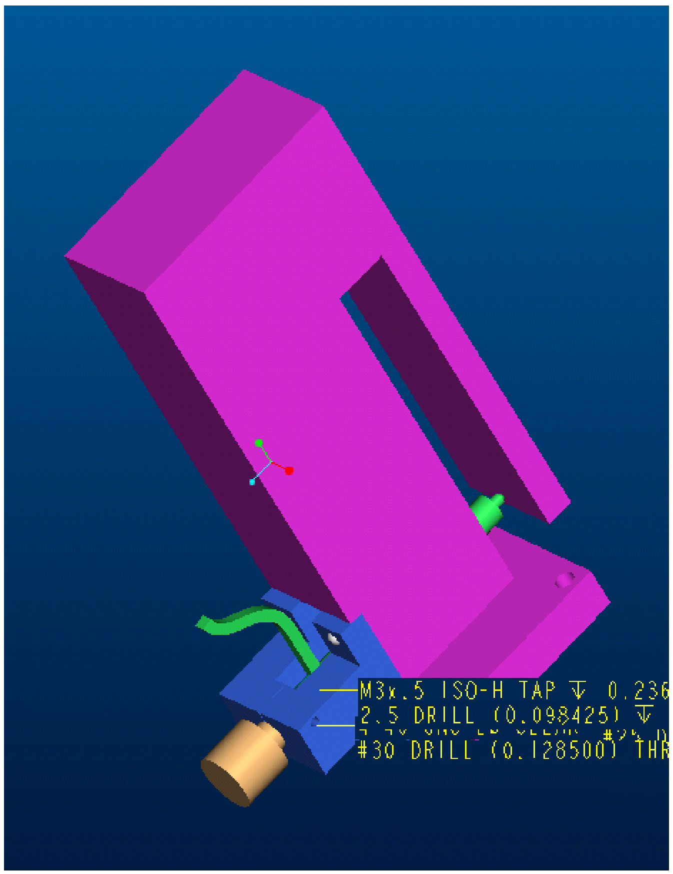
TVH test fixture update

Allison Ryan

Atlas Pixel Mechanics Meeting

6-18-01

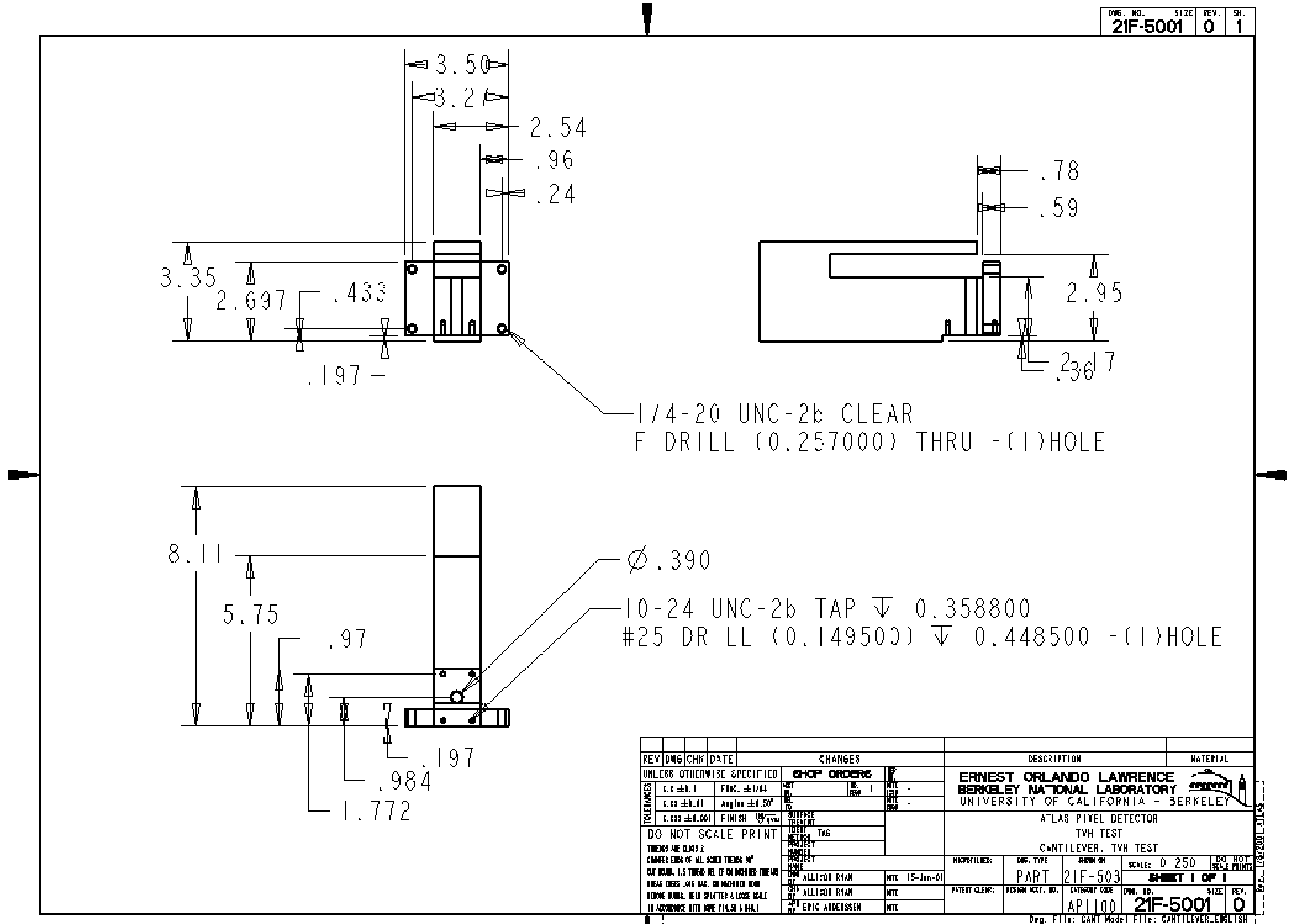
Test Assembly



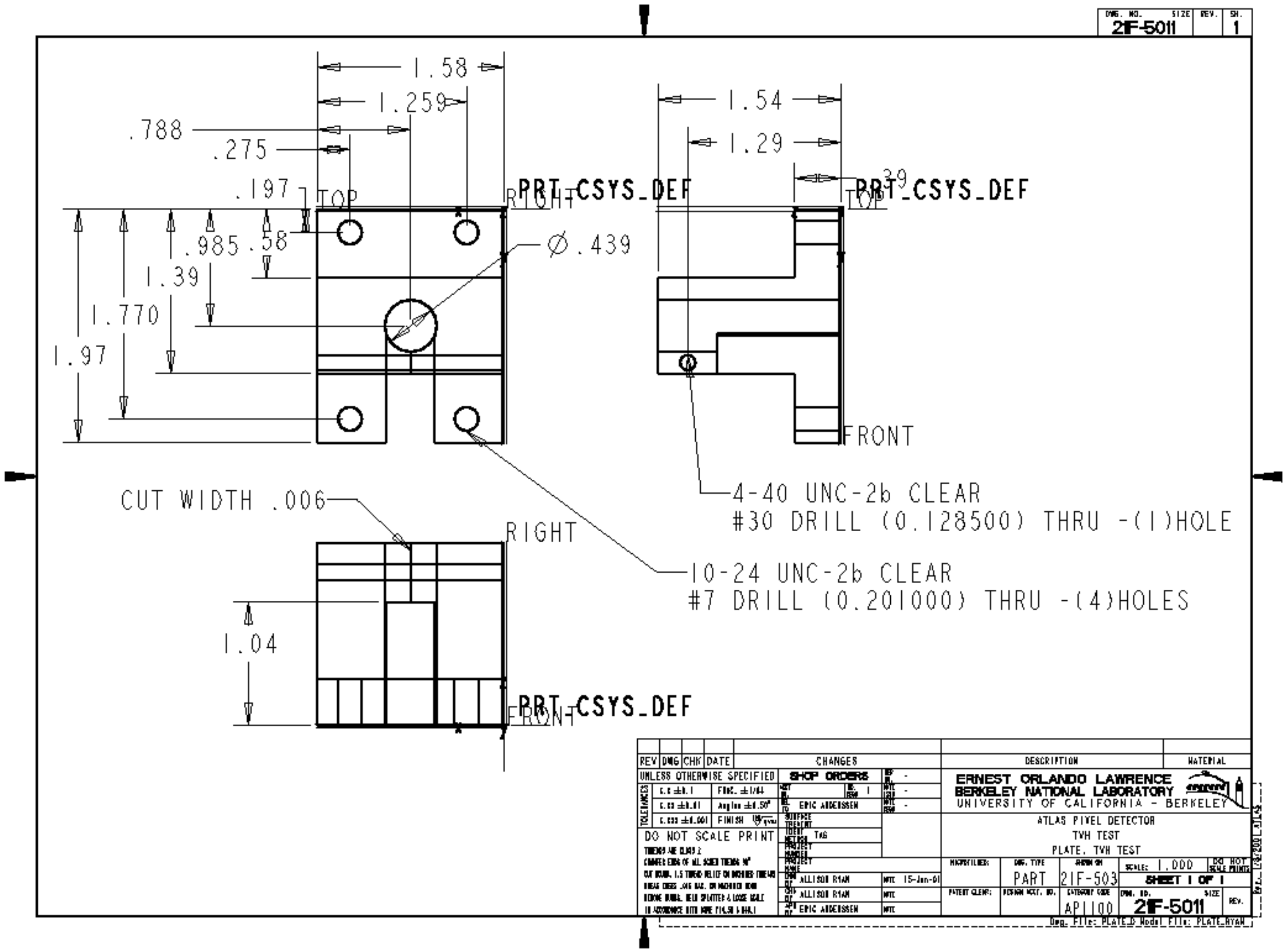
Includes

- Cantilever
- Back plate
- Piezo translator
- Translator end plug
- Micrometer head

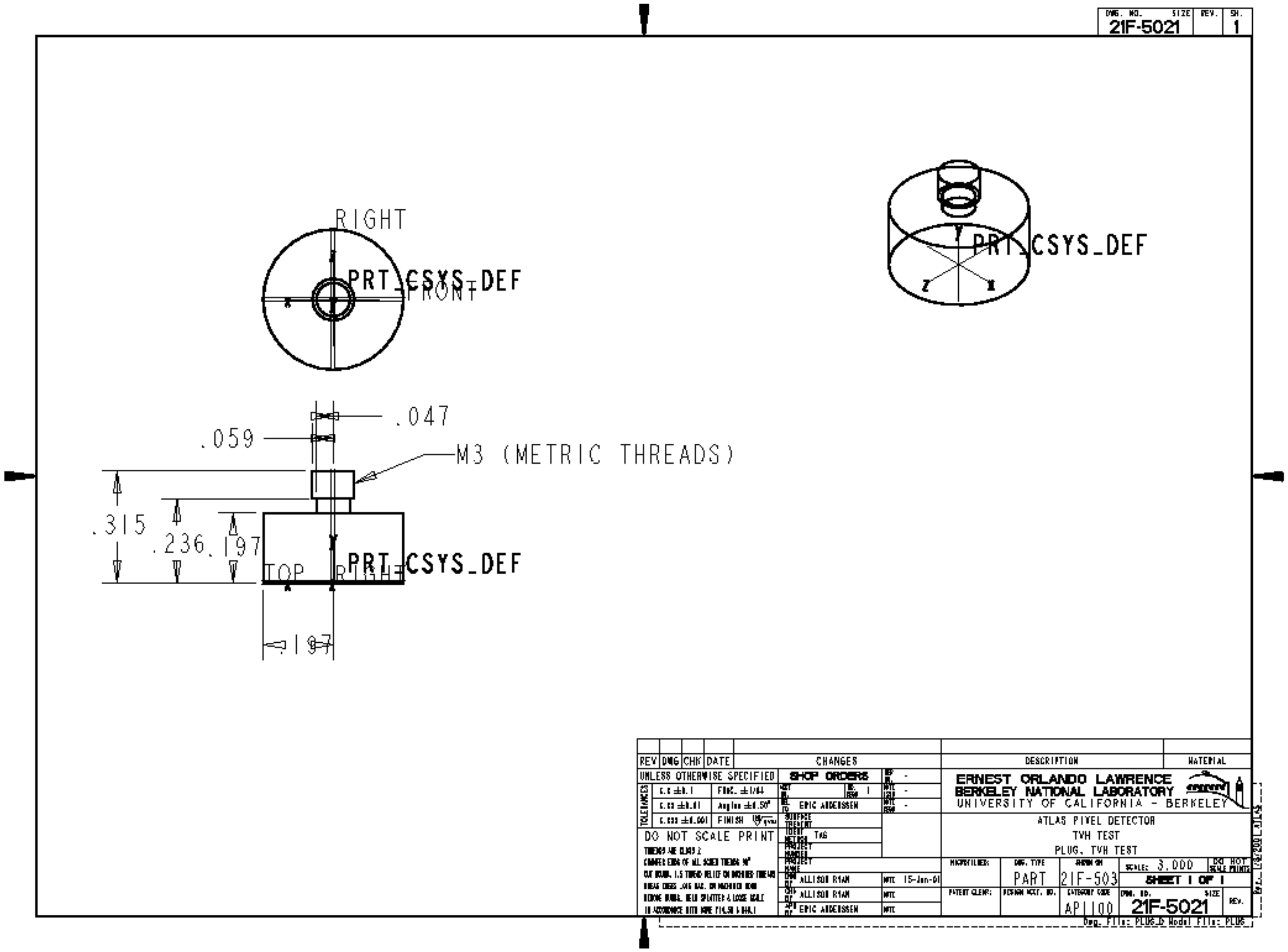
Cantilever drawing



Back plate drawing



End plug drawing



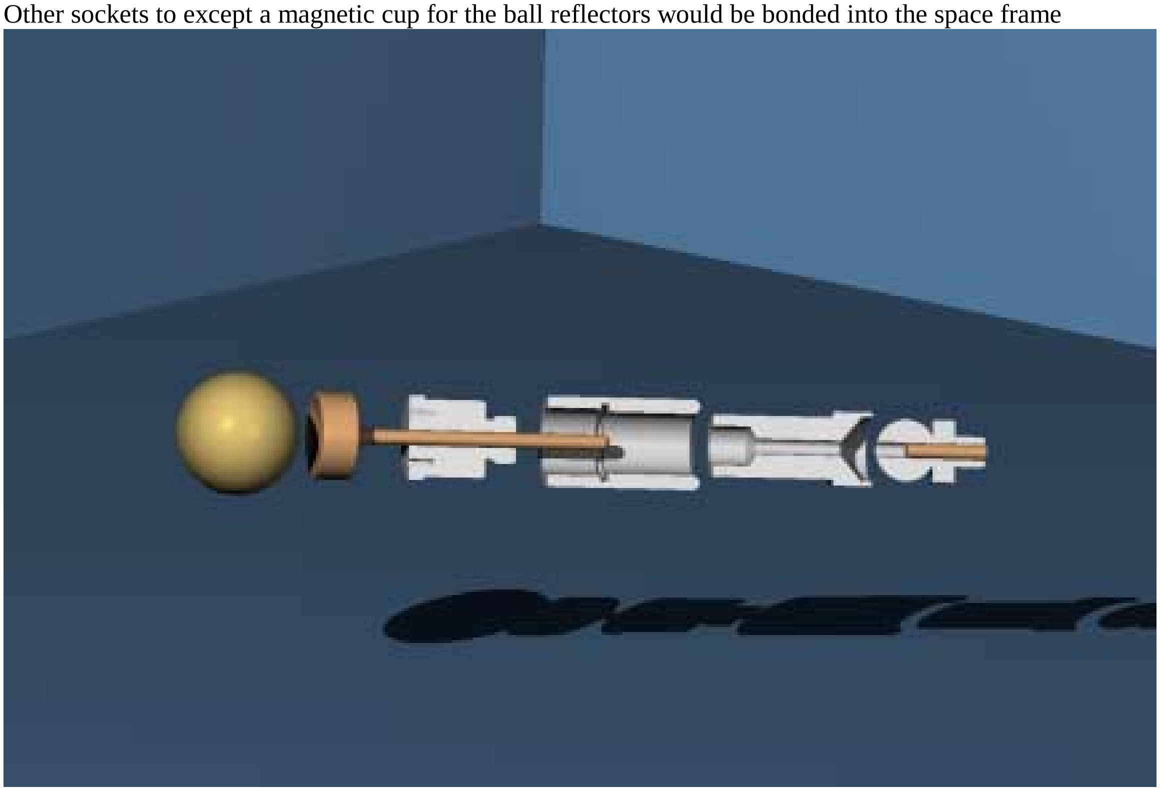
This part forms the interface between the piezo translator and the micrometer head, preventing concentrated loading on the piezo

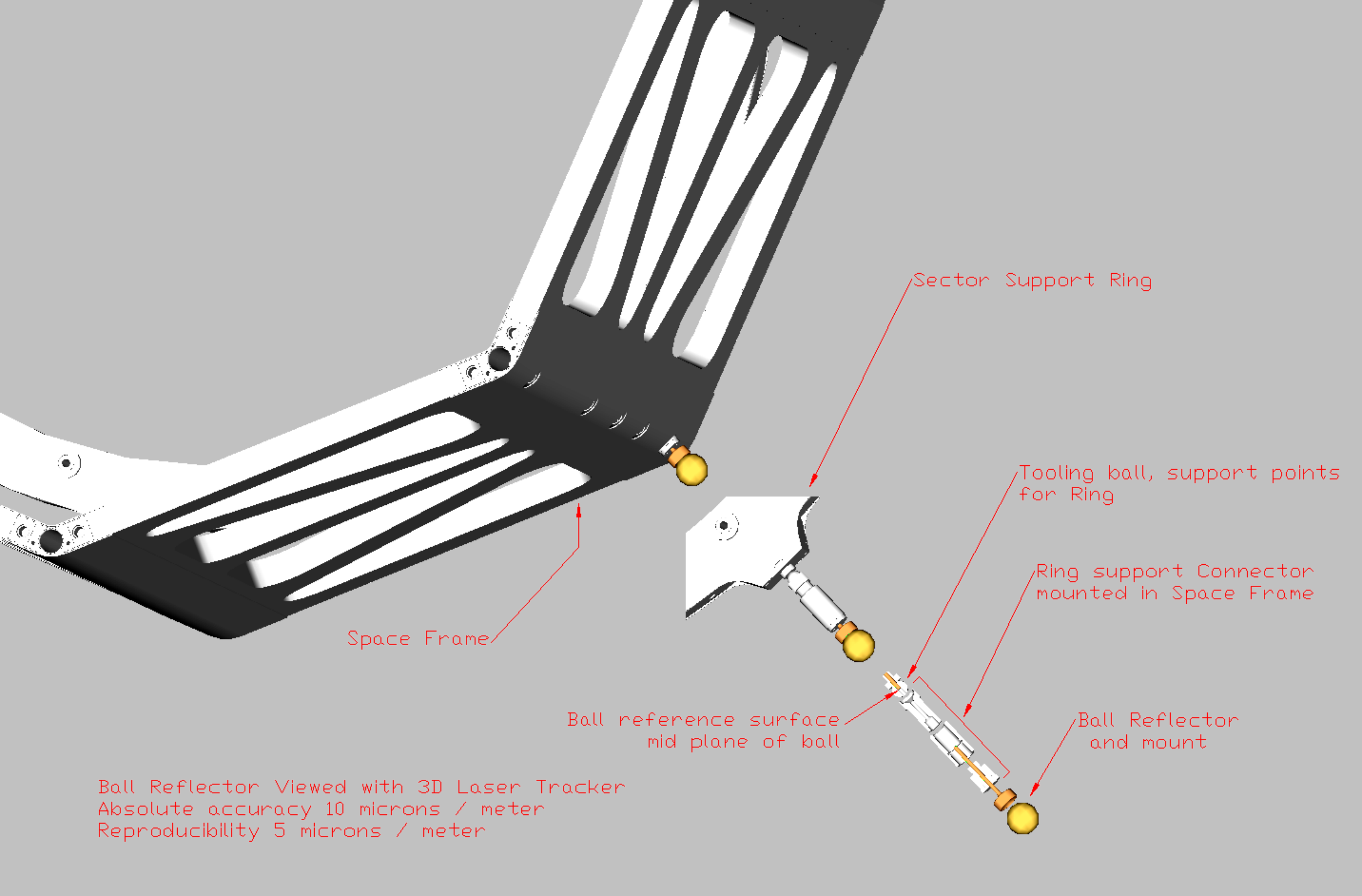
Atlas Pixal Survey

With detectors mounted on sectors and using mounting holes to construct datum measure all detector targets relative to datum on both sides.

With sectors mounted on sector support ring and using support balls for datum re-measure subset of targets relative support ball datum.

After sector support ring is mounted in space frame the position of ring support balls is transferred through the space frame by a probe with a magnetic cup at one end that supports a ball reflector. The probe runs down the axis of the support ball connector that is bonded into the space frame. By making two measurements one with the probe full in and another practically in the location of the ball is knowen. Other sockets to except a magnetic cup for the ball reflectors would be bonded into the space frame




Sector Support Ring
Tooling ball, support points for Ring
Ring support Connector mounted in Space Frame
Space Frame
Ball reference surface mid plane of ball
Ball Reflector and mount
Ball Reflector Viewed with 3D Laser Tracker
Absolute accuracy 10 microns / meter
Reproducibility 5 microns / meter

Measuring principle of the 3D Laser Tracker LTD500

Basic Principle

The combination of horizontal and vertical angle measurements with distance measurements allows determining the 3D coordinates of a reflector within any tool or part coordinate system. Motors support fully automated measurements and a position detector guarantees high speed tracking capabilities.

Leica's Key Technology

While the angles are measured with high precision encoders, distances can be derived from Leica's patented absolute or interferometric distance measuring devices.

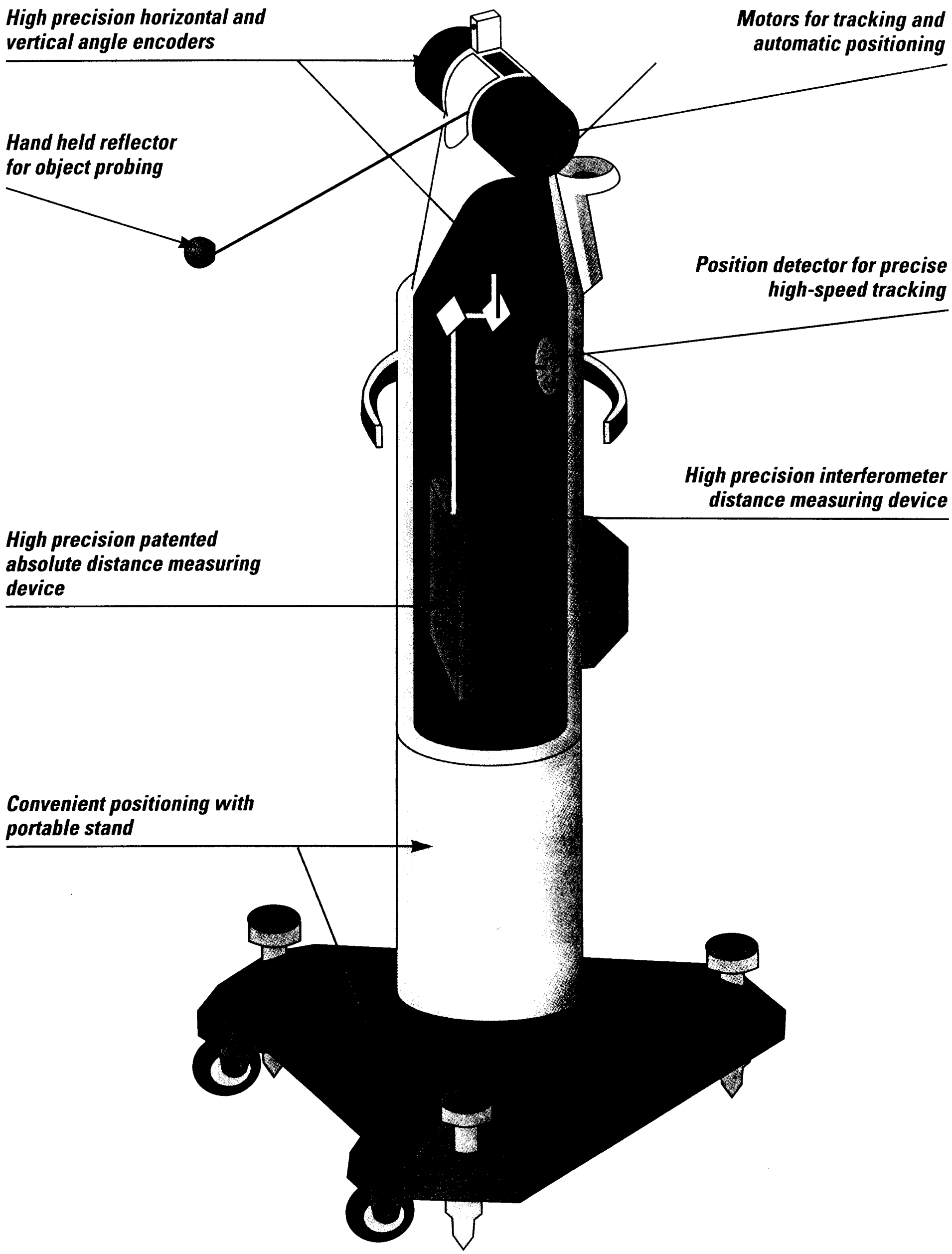
Laser Tracker LT(D) 500

The LT500 incorporates the interferometer technology for precise and fast tracking and scanning jobs.

The LTD500 with the additional absolute distance measuring device increases productivity, flexibility and automation.

Flexible positioning

The Laser Tracker can be mounted on Leica's portable stand or any other state of the art height adjustable device. In addition vertical positioning of the measurement head is possible.



Specifications

Tracking

Max. target speed	
at right angles to the laser beam	> 4.0 m/s
in the direction of the laser beam	> 6.0 m/s
Max. acceleration	
in all directions	> 2 g
Range of measurement	
horizontal	± 235°
vertical	± 45°
distance	0–35 m (0–115')
Retroreflector	air path corner cube, cateye, solid glass corner cube

Accuracy

Angle resolution	0.14"
Distance resolution	1.26 µm
Reproducibility of a coordinate*	± 5 ppm (µm/m)
Absolute accuracy of a coordinate*	
for non-moving target (static)	± 10 ppm (µm/m)
for moving target (dynamic)	± 20–40 ppm (µm/m)

Laser Interferometer

Principle of operation	
Single-beam interferometer	heterodyne
Class 2 Laser Product	< 0.3 mW/CW
Wave length	633 nm (visible)
Beam diameter (1/e2)	ca. 4.5 mm

Absolut Distance Meter (only LTD500)

Principle of operation	light polarization modulation
Resolution	1 µm
Accuracy*	± 0,05 mm (0.002")
Measurement range	2–35 m (7–115')
Class 1 Laser Product	< 0.5 mW/2 sec.
Wave length	780 nm (infrared)
Beam diameter	ca. 10 mm

Ambient Conditions

Working temperature (three ranges)	+5°–+40° C	+41°–+104° F
Storage temperature	−10°–+60° C	+14°–+140° F
Relative humidity	10–90% (non-condensing)	
Air pressure/elevation		
operation	0–3000 m	0–10000 ft
storage	0–7000 m	0–23000 ft

Dimensions and Weight

Sensor unit		
dimensions LT500/LTD500	220 x 280 x 855 mm 8.7" x 11" x 33.7"	
transit axis height	805 mm	31.7"
weight LT500	30.0 kg	66.1 lb
weight LTD500	31.5 kg	69.0 lb
Controller		
dimension	455 x 350 x 200 mm 17.9" x 13.8" x 7.9"	
weight	10.5 kg	23.1 lb

Recommended System Computer

Personal Computer	Compaq PentiumTM
Operating system	Windows® 95, 97, 98 or NT4.0
Rate of measurement	up to 1000 points/sec.
Real time output	via parallel interface

LT500

LTD500

Note:
The accuracy shown above (*) is stated as a 2 σ (sigma) value.
In North America, it is customary to state accuracy as a 1 σ (sigma) value.
In an approximation 1 σ values can be derived by deviding 2 σ values by two.

LTD500 is manufactured under the following US patents: Nr. 4714339 and Nr. 5530549.
Other US and international patents pending.