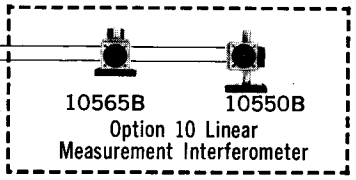
LASER INTERFEROMETER
Linear & Angular Measurement
Models 5526A, 5510A

Choice of options for
Length, Angle, Flatness,
Straightness Non-contact and 2 Axes



Model 5526A Laser/Display
System Base

Configuration

The Laser Measurement System is a major advance in economical dimensional metrology. With a multi-purpose two channel laser head, interferometer options are available to measure length, angle, flatness, straightness and squareness and two measurements simultaneously. The 5526A, which forms the base of the system, includes the 5500C Laser Head and the 5505A Laser Display.

General capabilities

The system is a highly accurate displacement measuring tool with a resolution of one millionth of an inch (linear) and 0.1 arc-second (angular). Fully automatic tuning, instant warm-up, and remote interferometry assure drift-free accuracy from the instant of switch-on. A laser tube lifetime in excess of 10,000 hours can confidently be expected. The unique optical heterodyning principle makes for practical, convenient measurements in adverse environments.

There is no interferometer in the laser head so all users benefit from the advantages of remote interferometry at no extra cost. Price: 5526A Laser/Display: $9,100.

Interferometer options

Option 010—Linear Interferometer

This consists of the 10565B Remote Interferometer (Magic Cube) and a 10550B Retroreflector. Since the Remote Interferometer is completely passive it makes for an almost perfect linear measuring instrument. Although it may be placed in the laser head, it offers significant advantages when used remotely. Complete thermal stability is assured since the laser head can be some distance away on a tripod, while its small size makes for easy fixturing and minimal distortion. Deadpath can be virtually eliminated and, due to its small size, permanent installation in machines is very attractive. Price: $3,300.

Option 020—Linear + Angular/Flatness Interferometer

The addition of two simple optical modules to the Magic Cube converts it into an angular measuring interferometer for fast, accurate measurements of pitch, yaw, or flatness. The option also includes two turning mirrors designed especially for rapid calibration of surface plates. Price: 5,120.

Option 030—Straightness Interferometer

This option converts the 5526A into an interferometric straightedge. Lateral deviations from a perfectly straight line are displayed to a resolution of one millionth of an inch to an axial range of 10 feet or more. Unlike alignment lasers the Hewlett-Packard system does not depend on the pointing stability of the laser beam for its reference, but instead uses two rigidly mounted plane mirrors and a special prism interferometer. Accuracy is ± 5 microinches/ft ± 1 count.

Squareness: By passing the straightness interferometer beam through a 90° beam bender, Option 030 can be used to check squareness. Thus, the same instrument which calibrates a machine tool or measuring machine for coordinate positioning accuracy can also check geometry. Price: To be announced.

Option 040—Single Beam Interferometer

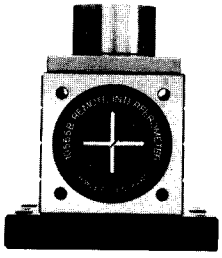
This is a special type of remote interferometer for use where a cube-corner would present serious disadvantages. With the K08-10565A Non-contact Converter it measures displacement of reflective surfaces. Price: $2,500.

Option 011—Second Axis Add-on

The laser head is equipped with two sets of photodetectors. By the addition of Option 011, two measurements may be made simultaneously. Price: $7,650.

Option 012—Plane Mirror Conversion Kit

This includes the 10581A Plane Mirror Converter which, when assembled onto the Remote Interferometer of Option 010, converts it into a plane mirror interferometer. This is a very useful method of measuring XY displacements. Since it is insensitive to tilt of the mirror, alignment is not critical. Price: $460.



Option 021—Angular/Flatness Add-on

Angular or flatness measurement may be added to Option 010 at any time with this option which includes a Beam Bender, Reflector Mount, two Turning Mirrors and a Storage Case. Price, $1,820.

Option 013—Second Axis Add-on (Plane Mirror)

For two-axis plane reflector measurements, this option should be ordered with Option 010, 011 and 012. It is very useful for XY table applications. Price: $8,110.

5510A—Automatic Compensator

The Automatic Compensator provides accurate, continuous correction for variations in the refractive index of air and for temperature of the material being measured. Air temperature, pressure and humidity and material temperature are measured by rugged sensors designed especially for use in machine shops. Sensor readings can be observed at the Laser Display without disturbing the measurement. Price: $3,750.

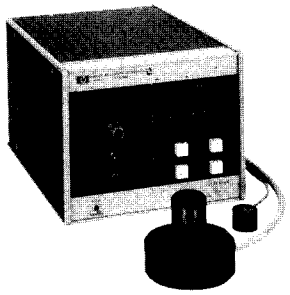
Other options

Additional options include real time error-plotting, fringe based pulse or quadrature signals for closed-loop control, and a real-time resolution extender for applications where 0.1 millionths of an inch (0.001 micrometers) is needed, or where the high update rate of the normal mode is needed with the resolution of the X10 mode. A printer is also available.

Brief specifications

5526A Laser/Display

Laser: Helium-Neon type. Fully automatic tuning. Instant warmup.
Accuracy: (for all linear displacement measurements):
Inch units: ±0.5 parts per million ±1 count in last digit.
Metric units: ±0.5 parts per million ±2 ounts in last digit.



5510A

Resolution: Normal and Smooth modes:
Normal 0.000,01 in. Metric: 0.1μ. Angular: 1 arc-sec.
X10 0.000,001 in. Metric: 0,01μ. Angular: 0.1 arc-sec.
Maximum allowable signal loss: 95% (−13 dB).
Maximum measuring velocity: 720 in/min (182 m/min).
Maximum lateral return beam offset: ±0.2 inch (±5 mm).
Atmospheric and material compensation: manual input from tables. 5510A Automatic Compensator optional.
Dimensions:
Display: 5.53″ high x 16.75″ wide x 13.25″ deep (141 mm x 436 mm x 337 mm).
Head: 5.00″ high x 7.00″ wide x 20.70″ long (127 mm x 178 mm x 526 mm).
Weight: Laser Display: 24 lb (19,9 kg); Laser Head: 17 lb (7,8 kg).

Option 10—Linear Interferometer

Accuracy: as for 5526A Laser/Display.
Maximum measuring range: up to 700 feet (210 m) depending on conditions.
Maximum lateral offset: The remote interferometer or the cube-corner retroreflector may be offset by up to ±0.1 in. (±2.5 mm) since a cube-corner displacement is doubled for the reflected beam.
Dimensions: Too numerous to list. Ask for 5526A data sheet.
Weight: 10565B Remote Interferometer: 2.7 lb (1,1 kg); 10550B Reflector and Mount: 2.0 lb (0,8 kg).

Option 20 — Linear + Angular/Flatness Interferometer
Linear specifications are as for Option 10

Accuracy:
±0.1 arc-second (±1 count in last digit) up to ±100 arc-seconds.
±1 arc-seconds (±1 count in last digit) up to ±1000 arc-seconds.
±4 arc-seconds per degree (±1 count in last digit) up to 10 degrees using correction table.

Option 30—Straightness Interferometer

Accuracy:
Straightness Reference:
Inch: ±5 microinches/foot ±1 count in last digit.
Metric: ±0.4 micrometer/meter ±2 counts in last digit.
Calibration: ±3% of reading. Can be calibrated out with the gain adjustment of an analog recorder, if used.
Resolution: As for 5526A Laser/Display.
Lateral range: ±0.1 inch (±2.5 mm).
Axial range: 10 feet (3 m).

Option 012—Plane Mirror Interferometer (with Opt. 010)

Performance: As for the Model 5526A Laser/Display and Option 10 Linear Interferometer.
Reflector requirements:
Flatness: Must not deviate by more than λ/8 (3 microinches) over any 0.8 inch (20 mm) dimension.
Surface Finish: Metal 0.1-0.3 microinch arithmetic average Optical 80-40.
Maximum Angular Misalignment: Depends on distance between interferometer and mirror plane. Typical values are:
±25 arc-minutes for 10 in. (254 mm)
±15 arc-minutes for 20 in. (508 mm)
±5 arc-minutes for 50 in. (1270 mm)
Weight: Model 10581A 0.5 lb (225 gm).

5510A Automatic Compensator

Dimensions: 6.25 in. x 7.75 in. x 11 in. (159 mm x 197 mm x 280 mm) w/o sensors. With sensors depth increases by 3 in. (76 mm).
Weight: 10.8 lb (4,9 kg).

5501A Laser Transducer

This new product is a laser-based linear and angular transducer designed primarily for original equipment manufacturers of numerically-controlled machine tools, measuring machines, and other precision positioning equipment. Using a **single** remote laser source and miniaturized optical and electronic components, the modular system is able to monitor up to eight axes simultaneously. Since pitch and yaw can be measured, as well as position, the same transducer yields both positioning and corrective control feedback. The transducer requires no periodic recalibration. The 5501A Laser Transducer contains options to interface with most hard-wired and mini computer controllers. Price: To be announced.

Specifications

Resolution: 6 microinches (0.15 micrometers).
Accuracy: ½ parts per million.
Range: 200 feet (65 meters), sum of axes.
Maximum Allowable Velocity: 720 inches/minute (0.3 meters/sec).
Number of Axes: 1 to 8.