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PHYSICAL AND OPTICAL MEASUREMENTS

Laser system for dimensional measurements

Model 5526A

NEW





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

10565B 10550B
Option 10 Linear
Measurement Interferometer

Model 5526A Laser/Display
System Base

Configuration

The 5526A Laser Measurement System is a major advance in economical dimensional metrology. A choice of options allows the measurement of length, angle, flatness, straightness, squareness, parallelism and the capability of two measurements simultaneously. In addition, output options are available to reduce the data to printed or plotted format. The 5526A, which forms the base of the system, includes the 5500C Laser Head and the 5505A Laser Display. Measuring and output options are added to this base system to allow modular build-up of measurement capability.

General capabilities

The system is a highly accurate displacement measuring tool with a resolution of one millionth of an inch (0.01 μm) for linear measurements and 0.1 arc-second for angular measurements. Fully automatic tuning, instant warm-up and remote interferometric measurement techniques assure drift-free accuracy from the moment of switch-on. A laser tube lifetime in excess of 10,000 hours can be confidently expected and the unique optical heterodyning principle makes for practical, convenient measurements in adverse environments.

Measurement options

Option 010 linear interferometer

This option consists of the 10565B Remote Interferometer and a 10550B Retroreflector. Since the Remote Interferometer is completely passive, it makes for an almost perfect linear measuring instrument. Complete thermal stability is assured since the laser head can be some distance away on a tripod. The small size of the Remote Interferometer allows easy fixturing and minimal distortion.

The Option 010 Linear Interferometer is ideal for any high accuracy and resolution linear measurement requirement such as machine tool calibration and metrology laboratory use.

Option 020 linear + angular flatness interferometer

While including all the capabilities of the Option 010 Linear Interferometer, this option also provides angular measurement ability. The addition of passive optical modules allows fast, accurate measurements of pitch, yaw, or flatness. The option also includes two turning mirrors designed especially for rapid calibration of surface plates.

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 (0.01 μm) over an axial range of 10 feet (3 m). 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. A long range version (Option 31) is also available with a resolution of ten millionths of an inch (0.1 μm) over an axial range of 100 feet (30 m).

Ideal for determining geometric characteristics of machine tools, the Straightness Option can also measure such parameters as parallelism and with an optional pentaprism, squareness.

Option 200 laser measurement/calculator system

The combination of the 5526A Laser Measurement System with the Model 9820 Calculator provides a complete problem solving system for a wide variety of measurements. In addition to the Calculator, the Option 200 consists of all measurement options for linear, angular, flatness, straightness, squareness and parallelism determination.

Data is transferred directly from the Laser Display to the Calculator during the measurement of machine tools or surface plates, eliminating tedious manual data recording and possible operator errors. A package of metrology applications programs developed especially for the Option 200 enables fast data reduction and plotting of measurements such as surface plate calibration, lead error analysis and geometry characteristics of machine tools and measuring machines, including straightness, parallelism and squareness. One important program included implements the NMTBA (National Machine Tool Builders Association) recommendations for accuracy and repeatability of numerically controlled machine tools.

No knowledge of calculator programming is required to operate the system. The Metrology Program Package has been prepared for the QC technician and can be run simply by following the step-by-step instructions displayed by the Calculator in an interactive manner.

5510A Automatic compensator

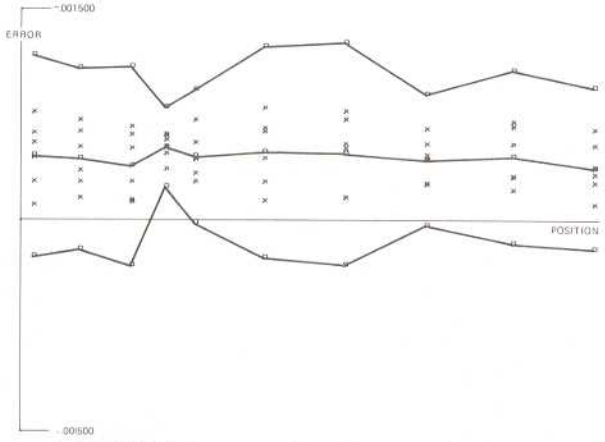
The 5510A Automatic Compensator provides accurate, continuous correction for variations in the refractive index of air and for temperature of the material being measured. Air temperature, pressure, humidity and material temperature are measured by rugged sensors designed especially for use in machine shops. Sensor readings can be observed at the Laser Display without disturbing the measurement.

Additional options

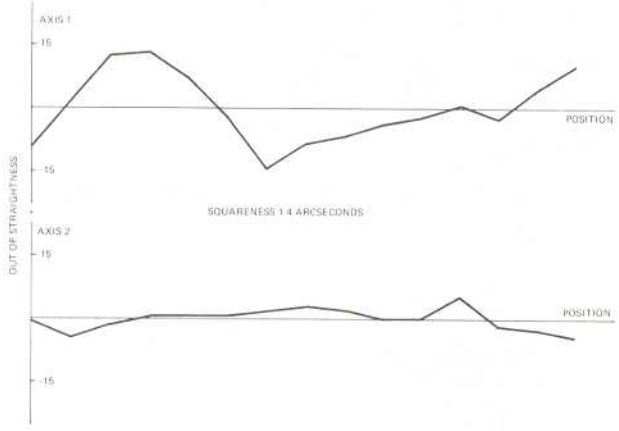
Other options to the 5526A Laser Measurement System are available including a Single Beam Interferometer which in conjunction with the non-Contact Converter measures displacement of reflective surfaces. The Plane Mirror Converter when added to the Remote Interferometer of Option 010 allows measurements from a plane mirror surface with relative insensitivity to mirror tilt. A Second Axis Add-on is available to allow the Laser System to make two simultaneous independent measurements.

Additional options include real time error plotting and a real time resolution extender for applications where 0.1 millionths of an inch (0.001 μm) is needed or where high resolution at a high update is required. A printer is also available.

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Option 200 NMTBA Accuracy Plot: Mean positioning error with ±3 σ confidence bands.



Option 200 straightness and squareness plot

Brief specification

5526A Laser/display

Laser: Helium-Neon type. Fully automatic tuning. Instant warmup.
Accuracy (for all linear displacement measurements): ±0.5 parts per million ±1 count (Metric ±0.5 parts per million ±2 counts).
Resolution: Normal and Smooth Modes:
Normal 0.000,01 in. Metric: 0.1 μm. Angular: 1 arc-sec. **X10** 0.000,001 in. Metric: 0.01 μm. 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.

Option 10 linear interferometer

Accuracy: as for 5526A Laser Display.
Maximum measuring range: up to 200 feet (60 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.

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 short range straightness interferometer

Accuracy:
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 31 long range straightness interferometer

Accuracy: As for Option 030.
Calibration: ±10% of reading. Can be calibrated with the gain adjustment of an analog recorder, if used.
Resolution:
Normal: 0.0001 inch (1 μm).
X10: 0.00001 inch (0.1 μm).

5510A Automatic compensator

5526A/5510A System accuracy (worst case):
1. For air temperature within range 68-85°F (20-30°C) 1.3 ppm ±1 count (metric 1.3 ppm ±2 counts).
2. For air temperature within range 55-105°F (13-40°C) 1.5 ppm ±1 count (metric 1.3 ppm ±2 counts).

Model number and name	Price
5526A Laser/Display	$10,750
Option 010 Linear Interferometer	$3895
Option 020 Linear + Angular/Flatness Interferometer	$5985
Option 030 Straightness Interferometer	$3895
Option 200 Laser Measurement/Calculator System	$32,215
5510A Automatic Compensator	$3995

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