Index

NUMERICS

10700A 33% Beam Splitter, 6-7 10701A 50% Beam Splitter, 6-7 10702A Linear Interferometer linear interferometer Agilent 10766A, 7A-3 10702A-001 linear interferometer, 7A-2, 7A-4 10703A Retroreflector, 7A-3, 7A-4 10704A Retroreflector, 7B-2 10705A Single Beam Interferometer, 7B-2 10706A Plane Mirror Interfereometer, 7C-4 10706A Plane Mirror Interferometer, 7C-2 10706B High Stability Plane Mirror Interferometer, 7D-4 10707A Beam Bender, 6-10 10709A/B/C Receiver Cable, 9-11 10710B Adjustable Mount, 9-2 10710B/10711A Adjustable Mount Specifications, 9-5 10711A adjustable mount, 9-2 10713B 1-Inch Cube Corner, 7A-16 10713C 1/2-Inch Cube Corner, 7B-9 10713D 1/4-Inch Cube Corner, 7B-10 10715A, orientation horizontal or vertical, 7G-2, 7G-7 10716A High Resolution Interferometer, 7A-2 10717A Wavelength Tracker troubleshooting, 11-12 10717A Wavelength Tracker, 7I-2 10719A Differential Interferometer, 7J-2 10721A Two-Axis Differential Interferometer, 7K-2 10722A Plane Mirror Converter, 7C-4 10723A High Stability Adapter, 7C-2, 7C-20 10724A Plane Mirror Reflector, 7C-2, 9-21, 9-22 10724A Plane Mirror specifications, 9-24 10725A 50% Beam Splitter, 6-12 10726A Beam Bender, 6-12 10728A Plane Mirror. 9-25 10728A Plane Mirror specifications, 9-25 10735A Three-Axis Interferometer, 7N-2 10736A Three-Axis Interferometer, 7N-2 10736A-001 Three-Axis Interferometer, 3-39, 7N-2 10715A Differential Interferometer, 7G-2 10751C,D Air sensor, 3-10

10753B laser tripod, 9-20 10759A Footspacing Kit, 9-20 10766A linear interferometer. 7A-4 10766A Linear Interferometer. 7A-3 10767A Linear Retroreflector, 7A-4 10767A Retroreflector. 7A-3 10770A Angular Interferometer, 7V-2 10771A Angular Reflector, 7V-2 10772A Turning Mirror, 9-26 10772A Turning Mirror Specifications, 9-27 10773A Flatness Mirror, 9-27 10773A Flatness Mirror Specifications, 9-28 10774A Short Range Straightness Optics, 7Y-2 10775A Long Range Straightness Optics, 7Y-2 10776-67001 Straightness Retrorelector specifications, 9-30 10777A Optical Square, 9-31 **1077A Optical Square** Specifications, 9-32 10780C Receiver, 8-5 10780C Receiver Specifications, 8-17 10784A Base, 9-4 10785A Height Adjuster and Post, 9-4 10785A Height Adjuster/Post and the Agilent 10784A Base Specifications, 9-7 10790A/B/C Receiver Cable, 4-4 10880A/B/C Receiver Cable, 4-5, 9-12 10881A/B/C Laser Head Cable, 4-3, 9-13 10881D/E/F Laser Head Cable, 4-4, 9-14 10884A Power Supply specifications and characteristics, 9-36 10885A PC Axis Board, 3-9 10886A PC Compensation board. 3-10 10887B PC Calibrator Board, 3-10 10888A Remote Control units. 3-10 10895A VMEbus Laser Axis Board, 3-10 10897B High Resolution VMEbus Laser Axis Board. 3-9 10898A High Resolution VMEbus Dual Laser Axis Board, 3-9 5517A Laser Head dimensions. illustrated, 5-13 5517A Laser Head, mounting and clearance, 5-11 5517B Laser Head description. 5-14 5517B Laser Head dimensions. illustrated. 5-17

5517B Laser Head mounting and clearance, 5-14 5517B Laser Head specifications, 5-17 5517C Laser Head, 5-18 5517C Laser Head (Standard) dimensions, 5-21 5517C Laser Head description description 5517C Laser Head, 5-18 5517C Laser Head indicators, 5-18 5517C Laser Head specifications (Standard), 5-21 5517C laser heads, mounting and clearance, 5-19 5517C-003 Laser Head, 5-18 5517C-003 Laser Head dimensions, 5-21 5517C-003 Laser Head specifications, 5-21 5517C-009, 3-39 5517C-009 9-mm Laser Head, 3-17 5517C-009 Laser Head, 5-18 5517D laser Head, 5-23 5517D Laser Head description, 5-23 5517D Laser Head indicators, 5-23 5517D laser heads, mounting and clearance, 5-24 5519A Laser Head dimensions, 5-33 5519A/B Laser Head, 3-10 5519A/B Laser Head dimensions, 5-33 5519A/B Laser Head specifications, 5-33 5571A Laser Head specifications, 5-13 9-mm beam 5517C-009, 3-39

A

Abbé error, 6-2 definition, 15-22 minimizing, 15-56 Abbé offset error, 7-2 absolute pressure, 16-2 ac interferometer, 18-2 ac light power defined, 8-30 **AC Optical Signal Intensity** Agilent E1708A vs Agilent E1709A. 8-34 AC/DC ratio defined, 8-30 light power relationship illustrated, 8-29 accessories, 8-1, 9-1 10776A Straightness Accessory Kit, 9-29 Agilent N1203C, N1204C, N1207C Beam Manipulators, 9-33 beam manipulator, 9-33

cables. 9-8 accuracy, 18-2 definition, 15-2 accuracy and repeatability, 15-1 accuracy considerations, 3-4, 5-5 adjustable mounting hardware, 9-2 adjustable mounts, 3-11, 3-19, 4-6, 6-4, 9-2 Agilent 10710B, 9-2 Agilent 10711A, 9-2 adjuster, height, 9-4 adjustment considerations, 3-11 adjustments, positioning, 3-19 Agilent 10567A Dual Beam Beam-Splitter, 6-5 Agilent 10700A 33% Beam Splitter, 6-7 Agilent 10702A-001 Linear Interferometer with Windows, 7A-3, 7A-4 Agilent 10703A Retroreflector, 7A-3, 7A-4 Agilent 10706A Plane Mirror Interferometer, 7C-4 Agilent 10706B High Stability Plane Mirror Interferometer, 7D-4 Agilent 10707A Beam Bender, 6-10 Agilent 10701A 50% Beam Splitter, 6-7 Agilent 10722A Plane Mirror Converter, 7C-4 Agilent 10725A 50% Beam Splitter, 6-12 Agilent 10726A Beam Bender, 6-12 Agilent 10751C/D Air Sensor, 15-48 Agilent 10757D, E, F Material Temperature sensor(s), 3-9 Agilent 10757D/E/F Material **Temperature Sensor**, 15-49 Agilent 10766A Linear Interferometer, 7A-4 Agilent 10767A Linear Retroreflector, 7A-4 Agilent 10780C/F vs Agilent E1709A application replacement, 8-34 power consumption, 8-35 use of metal screws, 8-35 Agilent 10780F Remote Receiver Specifications, 8-18 Agilent 5517A indicators, 5-10 Agilent 5517B Laser Head indicators, 5-14 Agilent 55292A USB Expansion Module, 3-10 Agilent 5529A/55292A system dynamic calibrator 5529A, 3-9 Agilent E1705A Fiber-Optic Cable, 8-19, 8-23, 8-33

Agilent E1706A Remote Sensor, 8-19, 8-33 Agilent E1708A Remote Dynamic **Receiver Specifications**, 8-27 Agilent E1708A vs Agilent E1709A alignment requirements, 8-34 DC light power, 8-29 dynamic range, 8-34 power requirements, 8-35 retrofit issues, 8-34 sensitivity, 8-34 size, 8-34 slew rate, 8-34 technical enhancements, 8-34 temperature sensitivities, 8-34 use of scope probe, 8-35 Agilent N1203C Precision Beam Translator, 6-14 Agilent N1204C Horizontal Precision Beam Bender, 6-14 Agilent N1207C Precision Vertical Beam Bender, 6-14 Agilent N1231A PCI Three-Axis Board, 3-9 Agilent 10715A Differential Interferometer, 7G-2 Agilent 10721A Two-Axis Differential Interferometer, 7K-2 aids, alignment, 4-19 air sensor 10751C,D, 3-9 air turbulence, 15-50 air turbulence, reducing, 15-51 aligning optic, 4-10 aligning optics, 2-6, 4-10 alignment Agilent E1708A vs Agilent E1709A, 8-34 Gunsight method, 7Y-13 alignment aids, 4-19 alignment method autoreflection, 4-14 overlapping dots, 4-16 alignment principles, 4-12 alignment targets and alignment aids, 9-18 alignment techniques autoreflection and overlapping dots, 4-14 ambient pressure, 16-2 angular interferometer Agilent 10770A Angular Interferometer, 7V-2 angular measurements, 7V-3 angular motion, 3-3

pitch or yaw, 3-3 angular reflector Agilent 10771A Angular Reflector, 7V-2 application, 6-14 applications general-purpose, 7-3 vacuum, 3-20 atmospheric compensation error, 15-8 automatic compensation, 15-47 automatic compensation for the wavelength of light, 14-2 automatic tuning and warmup period, 5-6 autoreflection alignment method, 4-20 autoreflection method alignment procedure, 4-14 autoreflection method of alignmen, 4-14 Autoreflection method of alignment alignment Autoreflection method, 7-12 axis electronics, 18-2

B

ball and spring suspension, 6-18, 6-19 barometric pressure, 16-2 basic Agilent Laser Measurement System components, 14-6 beam bender, 6-12 beam bender(s) orientation, 3-5 See also Agilent 10707A, 3-5 See also Agilent 10726A, 3-5 beam bender, 10707A, 6-10 beam bender, horizontal description, 6-14 beam bender, specific purpose, 6-14 beam bender, vertical description, 6-14 beam legs, 4-13 beam manipulator accessories, 9-33 beam manipulator dimensions, 6-24 beam manipulator feet, 6-15 beam manipulators, 6-1 beam path, 7A-8 beam path loss, power budget, 3-23 beam power loss, optical power loss, 3-23 beam shutters, 5-6 beam splitter, 6-7, 6-12, 18-2 beam splitter(s) See also Agilent 10700A, 3-5 See also Agilent 10701A, 3-5 See also Agilent 10725A, 3-5 beam through window, 7-10 beam translator description, 6-14

beam translator, specific purpose, 6-14 beam-bending optics, 6-2 beam-directing optics, 6-2 beam-splitting optics, 6-2

С

cables 10790A/B/C Receiver Cable, 4-5, 9-11 10880A/B/C Receiver Cable, 4-5, 9-12 10881A/B/C Laser Head Cable, 4-3, 9 - 1310881D/E/F Laser Head Cable 10881D/E/F Laser Head Cable, 4-4, 9-14 10882A/B/C Laser Head Cable 10882A/B/C Laser Head Cable, 9-15 laser head, 4-3 N1250A/B Receiver Cable, 4-5, 9-16 N1251A/B Laser Head Cable, 4-4, 9-17 fiber-optic, 8-19, 8-23, 8-33 cables, list, 3-7, 3-8, 9-8 cabling external, 4-3 calculation of exact Wavelength-of-Light (WOL) compensation factor, 16-3 calculation of signal loss, 3-25 calibration system electronics, 3-10 calibrator board 10887B PC, 3-9 care of product, 10-1 characteristics, required, window, 3-20 checklist, pre-installation, 4-2 cleaning fiber-optic cable, 10-3 cleaning optics, 10-2 clearance laser heads, 3-15 CMM, 18-2 color-coded labels, 4-3 compact three-axis interferometer Agilent 10737L/R Compact Three-Axis Interferometer 10737L/R Compact Three-Axis Interferometer, 70-2 comparison of Agilent Laser Receiver Families, 8-2 comparison of laser heads, 5-9 compensation automatic, 15-47 manual, 15-47 compensation board 10886A PC, 3-9 compensation, Wavelength-of-Light, 18-2 components basic laser measurement system, 14-6

computing the optical power loss, 3-23 configuration effects, 3-18 configuration example four-axis measurement configuration, 3-32 multiaxis system for a precision X-Y stage, 3-31 multiaxis systems using Agilent 10719A and Agilent 10721A, 3-39 single-axis to control servo-track writing, 3-29 three-axis measurement system using discrete plane mirror interferometers, 3-35 two-axis plane mirror, 3-33 two-axis plane mirror in a vacuum, 3-33 configurations multiaxis, 3-30 controller, 2-4, 2-9 converting an Agilent 10706A Plane Mirror Interferometer to the Agilent 10706B configuration, 7-20 coordinate measuring machine, 18-2 coordinate measuring machines, 15-51 cosine error, 18-2 definition, 15-24 cover, protective, telescoping, 3-11 cube corner, 18-2

D

dc interferometer, 18-2 dc light power defined, 8-29 deadpath counts, 15-55 deadpath error definition, 15-16 deadpath errors compensation for, 15-54 minimizing, 15-52 degrees of freedom, 18-3 description 5517A Laser Head, 5-10 5517B Laser Head, 5-14 5517C Laser Head, 5-23 description of beam manipulators description of beam bender, 6-14 beam translator, 6-14 description of 5517A Laser Head, 5-10 descriptions of laser heads, 5-9 determining, 3-28 determining the overall laser system measurement accuracy, 15-49 differences between

Agilent E1708 and Agilent E1709A, 8-34 differential configurations customized, 3-21 differential interferometer, 18-2 differential interferometer, 10715A, 7G-2 differential measurement. 18-2 differential measurement in a lithography application, 7-11 differential measurements with interferometers, 3-21 differential measurements, with interferometers. 7-10 dimensions 5517A Laser Head, 5-13 5517B Laser Head, 5-17 5517C Laser Head (Standard), 5-21 5517C-003 Laser Head, 5-21 5519A Laser Head. 5-33 5519B Laser Head, 5-33 beam manipulators, 6-24 direction sense, 7-6 displacement, how it is measured, 14-3 doppler frequency shifting, 14-5 dual beam beam-splitter, 6-5 dynamic calibrator USB Expansion Module, 3-10 **Dynamic Range** Agilent E1708A vs Agilent E1709A, 8-34

Ε

E1705A Fiber-Optic Cable, 8-19, 8-23, 8-33 E1706A Remote Sensor, 8-19, 8-33 E1708A and E1709A differences, 8-34 E1708A Remote Dynamic Receiver, 8-19 E1709A Remote High-Performance Receiver, 8-28 effect on measurement direction sense, 3-17 effects of configuration, 3-18 effects of temperature changes, 14-3 efficiency values, 3-25 electronic resolution, 15-4 electronics 5529A/55292A calibrator system, 3-10 N1231A PCI Three-Axis Board, 3-9 electronics cables connecting, 2-5 electronics error, 15-4 electrostatic discharge, ESD, 18-3 environment temperature-controlled, 15-50 environment sensors, 14-8 environmental conditions, 14-8

environmental effects, 15-50 environments vacuum, 3-20 environments, non-uniform, 15-50 equipment required, 11-4 error abbé, 15-22 atmospheric compensation, 15-8 cosine, 15-24, 18-2 deadpath, definition, 15-16 proportional, 18-6 error, electronics, 15-4 ESD, Electrostatic Discharge, 18-3 etalon, 18-3 example, determining accuracy and repeatability IC Wafer Stepper, 15-35 **Precision Coordinate Measuring** Machine (CMM) example, 15-27 examples calculation of measurement accuracy and repeatability of Agilent laser systems, 15-26 expansion coeffients, 17-2 expansion module USB, 55292A, 3-10

F

f1, frequency 1, 5-2, 5-3 f2, 18-3 f2, frequency 2, 5-2, 5-3 fA, 18-3 fasteners, 7-9 fasteners for optics, 3-20 fB, 18-3 feet of beam manipulator, 6-15 fibe-optic cable, E1705A, 8-19, 8-23, 8-33 fiber-optic cable cleaning, 10-3 fiber-optic cable considerations, 8-23 fixed mounting platform, 7-15 fl, 18-3 footspacing kit 10759A Footspacing Kit, 9-20 four-axis measurement configuration example configurations, 3-32 frequency measurement, 18-5 frequency, f1, 5-3 frequency, f2, 5-3 frequency, reference, 5-2, 5-4 frequency, split, 5-4 fundamental optical resolution, 7-6 G

gauge block, 4-15 general-purpose applications, 7-3 glossary, 18-1

grounding laser head, 3-14 PC electronics, 3-14 PCI electronics, 3-14 receiver, 3-14 system, 4-3 VME electronics, 3-14 grounding, system 10895A, 3-14 10897B, 3-14 10898A Dual Laser Axis, 3-14 Gunsight method of alignment, 7-13

H

half-wave plate, 18-4 height adjuster and post, 9-4 HEX, 18-4 Hexadecimal, 18-4 high resolution interferomenter Agilent 10716A, 7A-2 high stability adapter Agilent 10723A, 7C-2 Agilent 10723A High Stability Adapter, 7C-20

I

IC Wafer Stepper example, 15-35 incoming inspection and unpacking, 12-1 indicators 5517A Laser Head. 5-10 5517B Laser Head. 5-14 5517C Laser Head. 5-18 5517D Laser Head, 5-23 input and output ports optical, 6-17 inspection, incoming, 12-1 installing laser electronics in PC, 2-5 inteferometry, Laser, 18-4 interferometer, 18-4 ac, 18-2 dc. 18-2 differential. 18-2 linear, 18-5 plane mirror, 18-6 interferometer (reference) site preparation, 3-41 interferometer resolutions, 7-6 interferometers. 14-2 referenced, a list, 3-41 interferometers, differential measurements, 7-10 isolation thermal. 3-16 vibration. 3-16

K

kinematic mounting, 18-4

kit 10776A Straightness Accessory, 9-29 L labels, color-coded, 4-3 Laser, 18-4 laser beam introducing offset, 3-22 laser beam path, 7A-8 laser beam protection, 3-11 laser beam through window, 7-10 Laser Head, 18-4 laser head, 5-2, 14-7 5517C, 5-18 5517C-003, 5-18 5517C-009, 5-18 5517C-009 9-mm, 3-17 5517D, 5-23 descriptions, 5-9 orientation, 3-15 site preparation, 3-40 warm-up, 5-8 wavelength of light, 5-5 laser head cables, 4-3, 9-8 laser head differences, 5-9 laser head, mounting feet, 3-15 laser head, orientation, 5-7 laser heads comparison, 5-9 thermally-stabilized cavity lengths, 5-6 Laser Interferometry, 18-4 laser measurement systems basic parts, 3-2 laser positioning system one-axis example, 2-2 laser tripod 10753B Laser Tripod, 9-20 laser tube assembly, packing for storage or shipment, 13-2 laser wavelength, 15-4 linear interferometer, 18-5 Agilent 10702A, 7A-3 linear thermalexpansion coefficients of metals and alloys, 17-2 list of cables, 3-7, 3-8, 9-8 lithography equipment, 15-51 lithography, differential measurement, 7-11

Μ

magnetic shielding, 3-17 maintenance, 10-1 making a measurement, 2-7 manipulators, beam, 6-1 manual compensation, 15-47 manual organization, 1-2

manuals available. 1-6 manuals, how to order, 1-7 Material Expansion Coefficients, 17-1 material temperature sensor 10757D, E, F, 3-9 measurement differential. 18-2 differential with interferometers, 3-21 making, 2-7 parallelism, 7-3, 18-6 squareness, 7-3 straigntness, 7-2 measurement axis. 7-2 measurement direction sense, 7-6 optics affect, 3-17 measurement frequency, 18-5 definition, 8-30 measurement optic, 7-1 measurement optics summary, table, 7-3 measurement signal error, 5-6 measurements angular, 7V-3 mechanical stability, 6-16 metals and alloys linear thermal expansion coeffients, 17-2 metrology, primary standard, 5-5 motion, angluar, 3-3 motions, possible component, 3-3 mount, adjustable, 7-16 mounting and clearance 5517A Laser Head, 5-11 5517B Laser Head, 5-14 5517C laser heads, 5-19 5517D laser heads, 5-24 mounting feet on the laser head, 3-15 mounting plane tolerance, 3-15 mounting platform, fixed, 7-15 mounting screws for optics, 3-20 mounting surface, 5-11 mounting, fasteners, 7-9 mounting, kinematic, 18-4 mounts, adjustable, 9-2 MTC, 18-5 multiaxis configurations, 3-30 multiaxis measurement configurations, 7J-4 multiaxis measuring system considerations when designing, 3-23 multiaxis system for a precision X-Y stage example configuration, 3-31 multiaxis systems using Agilent 10719A and Agilent 10721A example configuraton, 3-39 multiaxis systems using Agilent 10735A and Agilent 10736A

example configuration configuration example multiaxis system using Agilent 10735A and Agilent 10736A, 3-39

Ν

N1203C Precision Beam Translator, description, 6-14 N1204C Horizontal Precision Beam Bender, description, 6-14 N1207C Precision Vertical Beam Bender, description, 6-14 N1231A PCI Three-Axis Board, 3-9 N1250A/B Receiver Cable, 4-5, 9-16 N1251A/B High Performance Laser Head Cable, 4-4 N1251A/B Laser Head Cable, 9-17 nominal optical measurement range, 7-6 Nonlinearity 10706B, 15-36 10716A. 15-28 Nonlinearity, 10716A, 15-28 nonlinearity, optics definition, 15-7 number systems, 18-5 base 10, 18-5 base 16, 18-5 base 2, 18-5 base 8, 18-5

0

offset into the laser beam introducing, 3-22 one-axis differential interferometer Agilent 10719A One-Axis Differential Interferometer, 7J-2 operation principles, 14-1 optic aligning, 4-10 optical device troubleshooting, 3-39, 11-12 optical devices site preparation, 3-40 optical efficiency, 3-23, 3-25 optical input and output ports, 6-17 optical power change, see also Dynamic Range, 8-34 optical power loss computing, 3-23 optical schematic 10716A beam path 10716A. 7A-4 optics, 3-17, 9-20 10724A Plane Mirror Reflector, 9-21, 9-22

10728A Plane Mirror. 9-25 10772A Turning Mirror, 9-26 10773A Flatness Mirror, 9-27 10777A Optical Square, 9-31 aligning, 4-10 beam-bending, 6-2 beam-splitting, 6-2 cleaning, 10-2 straightness measurement, 7Y-2 system, 14-7 optics alignment, 2-6 optics nonlinearity definition, 15-7 optics protection, 3-11 optics thermal drift definition, 15-12 option 5517C-009, 3-39 options 10736A-001, 3-39 orientation, horizontal or vertical, 10715A, 7G-7 orientation, laser head, 5-7 overlapping dot alignment procedure alignment method overlapping dot, 4-24 overlapping dots alignment procedure, 4-14 overlapping dots alignment method, 4-16

Р

packaging for storage or shipment, 13-1 packaging, original materials, 13-2 parallelism measurement, 7Y-3, 18-6 pc axis board, 10885A, 3-9 pentaprism, 4-13 pitch, 3-3 plane and direction, 4-13 plane mirror interferometer, 18-6 Agilent 10706A, 7C-2 plane mirror reflector Agilent 10724A, 7C-2 10724A Plane Mirror Reflector, 7C-19 pointing stability, 3-16, 5-8 ports inputs and outputs, optical, 6-16 possible component motions, 3-3 post and height adjuster, 9-4 power requirements Agilent E1708A vs Agilent E1709A, 8-35 power safety factor, 3-26 power supply 10884A Power Supply 10884A Power Supply, 9-34

powering up system, 2-6 Precision Coordinate Measuring Machine (CMM) example, 15-27 pressure absolute, 16-2 primary standard for metrology, 5-5 principles of operation, 14-1 problems, solving, 2-8 proportional error, 18-6 protecting laser beam, 3-11 protecting optics, 3-11

R

range, nominal optical measurement, 7-6 receiver. 14-8 10780F Remote Receiver, 8-5 5519A/B internal receiver, 8-7 Agilent 10780C Receiver, 8-5 Agilent 10780F Remote Receiver, 8-5 Agilent E1708A Remote Dynamic Receiver, 8-19 only restriction, 3-3 receiver cables, 4-4, 9-8 receiver mounting locations and positions, 3-28 receiver troubleshooting, 11-8 Receivers, 8-1 receivers Agilent E1709A Remote High-Performance Receiver, 8-28 comparison, 8-2 recommendation scope probe, 8-35 reference frequecny, 5-2 reference frequency, 5-4 referenced interferometers a list, 3-41 referenced mirrors (true squares), 4-20 reflector, plane mirror 10724A, 7C-2 remote sensor, E1706A, 8-19, 8-33 removable tooling, 6-14 repeatability definition, 15-2 repeatability and accuracy, 15-1 requirements alignment, 8-34 DC power, 8-35 measurement axis, 8-28 resolution, electronics, 15-4 resolution, fundamental optical, 7-6 resolution, interferometers, 7-6 resolution system for interferometers, 15-6

retrofit issues Agilent E1708A vs Agilent E1709A, 8-34 retroreflector Agilent 10703A, 7A-2, 7A-3, 7A-4 Agilent 10704A, 7A-2, 7A-3, 7A-4 Agilent 10767A, 7A-3 retroreflectors, 14-2 returning product to Agilent Technologies, 13-2 roll, 3-3, 5-7

S

safety checks, 10-7, 11-15 scope probe Agilent E1708A vs Agilent E1709A, 8-35 sense, measurement direction, 7-6 sensitivity Agilent E1708A vs Agilent E1709A, 8-34 sensor placement, 15-48 sensors, environment, 14-8 shielding, magnetic, 3-17 shipment laser tube assembly, 13-2 shutter controls, 5-6 single beam interferometer Agilent 10705A, 7B-2 single-axis system to control servo-track writing example configuration, 3-29 site preparation for laser head, 3-40 site preparation for optical devices, 3-40 site preparation for referenced interferometers, 3-41 six degrees of freedom, 18-3 six-degrees-of-freedom, 7J-15 size Agilent 10780F vs Agilent E1709A, 8-34 Agilent E1708A vs Agilent E1709A, 8-34 slew rate Agilent E1708A vs Agilent E1709A. 8-34 related to cables, 8-35 specifiations 10780C Receiver, 8-17 specifications 10710B/10711A Adjustable Mount, 9-5 10724A Plane Mirror. 9-24 10728A Plane Mirror, 9-25 10772A Turning Mirror, 9-27 10773A Flatness Mirror, 9-28

10776-67001 Straightness **Retroreflector**, 9-30 10777A Optical Square, 9-32 10780F Remote Receiver, 8-18 10784A Base, 9-7 10785A Height Adjuster/Post, 9-7 **10884A Power Supply Specifications** and Characteristics, 9-36 5517A Laser Head, 5-13 5517B Laser Head, 5-17 5517C Laser Head (Standard), 5-21 5517C-003 Laser Head, 5-21 E1708A Remote Dynamic Receiver, 8-27 split frequenc, 5-4 split frequency definition, 8-30 squareness measurement, 7-3 stability mechanical, 6-16 thermal, 6-16 stability, pointing, 3-16, 5-8 starting system, 2-6 storage laser tube assembly, 13-2 straightness measurement optics, 7Y-2 Agilent 10774A Short Range Straightness Optics, 7Y-2 Agilent 10775A Long Range Straightness Optics, 7Y-2 summary of measurement optics, table, 7-3 system grounding, 3-14, 4-3 10895A, 3-14 10898A, 3-14 laser head, 3-14 PC electronics, 3-14 PCI electronics, 3-14 receiver, 3-14 VME electronics, 3-14 system measurement resolution for each interferometer, 15-6 system optics, 14-7 system power-up, 2-6

Т

tagging returned products, 13-2 temperature changes, effects, 14-3 temperature sensitivities Agilent E1708A vs Agilent E1709A, 8-34 temperature-controlled environment, 15-50 term definitions, 18-1 test equipment required, 11-4 Test Polarizer, 5-14, 5-18 thermal drift, optics definition, 15-12 thermal equilibrium, 5-8 thermal expansion coefficients, 17-2 thermal gradients, avoiding, 15-51 thermal isolation, 3-16 thermal stability, 6-15 thermal stabilization, 5-6 three-axis interferometer Agilent 10735A Three-Axis Interferometer, 7-2 Agilent 10736A Three-Axis Interferometer, 7N-2 three-axis measurement system using discrete plane mirror interferometers example configuration, 3-35 tolerance, mounting plane, 3-15 troubleshooting, 11-1 10717A Wavelength Tracker, 11-12 10780C/F Receiver, 11-8 5519A/B Laser Head, 11-8 laser head, 11-6 optical device, 3-39, 11-12 test equipment required, 11-4 troubleshooting, receiver, 11-8 true square, 4-13, 4-15 true squares (referenced mirrors), 4-20 two-axis differential interferometer, 7K-2 two-axis measurement system using two Agilent 10715A interferometers example configuration configuration example two-axis measurement system using two Agilent 10715A in terferometers, 3-35 two-axis plane mirror example configuration, 3-33 two-axis plane mirror in a vacuum example configuration, 3-33 two-frequency laser beam, how

U

created, 14-4

unpacking and incoming inspection, 12-1 USB Expansion Module, 3-10

V

vacuum applications, 3-20, 7-10 vacuum applications, beam-directing optics, 6-4 vacuum chamber, 3-20 vacuum environments, 3-20 values efficiency, 3-25 vibration isolation, 3-16, 5-6, 7-9 VME board 10898A Dual Laser Axis, 3-9 VME electronic 10898A Dual Laser Axis, 3-9

W

warm up period, 5-6 warm-up, laser head, 5-8 wavelength conversion factor, 15-55 wavelength of laser light, 14-2 wavelength of light from the laser head, 5-5 wavelength tracker Agilent 10717A, 7I-2 wavelength, laser, 15-4 Wavelength-of-Light (WOL), 16-2 Wavelength-of-Light Compensation, 16-1 wavelength-of-light value, 14-2 window, laser beam going through, 7-10 WOL compensation, 16-1 WOL compensation factor, calculation, 16-3 WOL compensation method comparison, 15-49

Y

yaw, 3-3



Service and Support

Contacting Agilent Technologies:

For more information about Agilent test and measurement products, applications, and services, visit our web site at http://www.agilent.com.

Technical Support:

If you need technical assistance with an Agilent test and measurement product or application, you can find a list of local service representatives on the web site at http://www.agilent.com. If you do not have access to the Internet, one of the following centers can direct you to your nearest representative:

Asia Pacific:	Europe:
Hong Kong	France
Tel: 800 930 871	Tel: +33 0825 010 700
Indonesia	Germany
Tel: (62-21) 380-0902	Tel: 49 (01805) 24 6333
Japan	Ireland
Tel: 0120-421-345	Tel: +353 1890 924 204
Korea	Netherlands
Tel: 82-2-2004-5004	Tel: 31 (0) 20 547 2111
Malaysia	Scotland
Tel: 1-800-828-848	Tel: 07004-666666
Philippines	UK
Tel: 1-800-828-848	Tel: 07004-666666
Singapore Tel: 1800-375-8100 Canada:	United States: Test & Measurement Call Center Englewood, CO, U.S.A. Tel: (800) 452 4844 (Tell free in US)
Tel: 877-894-4414	Fax: (303) 662-3726

Printed in U.S.A Data subject to change Rev 05/02

Continued from front matter. . .

Warranty (contd)

Agilent does not warrant that the operation of Agilent products will be uninterrupted or error free. If Agilent is unable, within a reasonable time, to repair or replace any product to a condition as warranted, customer will be entitled to a refund of the purchase price upon prompt return of the product.

Agilent products may contain remanufactured parts equivalent to new in performance or may have been subjected to incidental use.

The warranty period begins on the date of delivery or on the date of installation if installed by Agilent. If customer schedules or delays Agilent installation more than 30 days after delivery, warranty begins on the 31st day from delivery.

Warranty does not apply to defects resulting from (a) improper or inadequate maintenance or calibration, (b) software, interfacing, parts or supplies not supplied by Agilent, (c) unauthorized modification or misuse, (d) operation outside of the published environmental specifications for the product, or (e) improper site preparation or maintenance.

TO THE EXTENT ALLOWED BY LOCAL LAW. THE ABOVE WARRANTIES ARE EXCLUSIVE AND NO OTHER WARRANTY OR CONDITION, WHETHER WRITTEN OR ORAL, IS EXPRESSED OR IMPLIED AND AGILENT SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY, SATISFACTORY QUALITY, AND FITNESS FOR A PARTICULAR PURPOSE.

Agilent will be liable for damage to tangible property per incident up to the greater of \$300,000 or the actual amount paid for the product that is the subject of the claim, and for damages for bodily injury or death, to the extent that all such damages are determined by a court of competent jurisdiction to have been directly caused by a defective Agilent product.

TO THE EXTENT ALLOWED BY LOCAL LAW, THE REMEDIES IN THIS WARRANTY STATEMENT ARE CUSTOMER'S SOLE AND EXCLUSIVE REMEDIES. EXCEPT AS INDICATED ABOVE. IN NO EVENT WILL AGILENT OR ITS SUPPLIERS BE LIABLE FOR LOSS OF DATA OR FOR DIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFIT OR DATA), OR OTHER DAMAGE, WHETHER BASED IN CONTRACT, TORT, OR OTHERWISE.

For consumer transactions in Australia and New Zealand: the warranty terms contained in this statement, except to the extent lawfully permitted, do not exclude, restrict or modify and are in addition to the mandatory statutory rights applicable to the sale of this product to you.

Assistance

Product maintenance agreements and other customer assistance agreements are available for Agilent products.

For any assistance, contact your nearest Agilent Sales and Service Office.



Product specifications and descriptions in this document subject to change without notice. Copyright (C) 2002 Agilent Technologies Printed in U.S.A. 07/02 This is a chapter from the manual titled: Laser and Optics User's Manual For complete manual, order: Paper version: p/n 05517-90045 CD version: p/n 05517-90063 This chapter is p/n 05517-90145



Printed in U.S.A, JULY 2002