

Davidson Optronics
A TRIOPTICS COMPANY

Autocollimating Alignment Telescope | D-271



This small precision Alignment Telescope is rugged, versatile and easy to use. It will align points along its optical axis to better than ± 0.010 inch (0.25 mm) up to 35 feet (10 m) away. Mechanical fixturing is made easy because the barrel is parallel to the optical axis. With the added feature of an autocollimator, reflective surfaces can be aligned perpendicular to the D-271.

The Model D-271V incorporates a video option with the alignment telescope, allowing the user to view the image of objects and alignment patterns on a monitor. The D-271V includes a video camera, monitor, relay lens, mounting brackets and all connecting cables.

- Low cost
- Compact
- Easy to use
- Autocollimating
- Labor saving

Optional Accessories

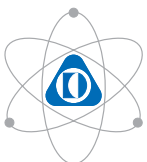
- D-165 High Intensity Light Source (may be required when autocollimating off of low reflectivity surfaces or small mirrors)
- D-212 Adjustable Instrument Stand
- D-416B 220V 50Hz Power Supply
- 105-2761-271 Video Subsystem (included with D-271V)

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West Covina, California 91790

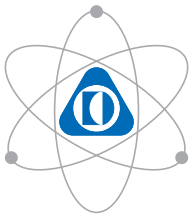
Phone: (626) 962-5181
Fax: (626) 962-5188

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sales@davidsonoptronics.com

Specifications	
Right Angle Eyepiece:	24X
Focusing Range:	7 inch (178 mm) to infinity
Field of View:	0.75 inch at 1 ft (19 mm at 0.3 m) 3.5 inch at 5 ft (88.9 mm at 1.5 m) 12 inch at 15 ft (304.8 mm at 4.6 m)
Aperture:	0.9 inch (23 mm)
Length:	8.2 inch (208 mm)
Barrel:	1.5 inch (38 mm) diameter Stainless Steel
Reticles:	Projects center dot with 1 arc min graduations ± 30 min Eyepiece – 0.000 5 inch (12.7 μ m) wide cross hair
Light Source:	Incandescent lamp with D-416, 6 VDC variable power supply 110V/ 60Hz or 220V/ 50Hz
Measuring Range:	1 degree at 1 ft (0.3 m) ± 10 arc min at 5 ft (1.5 m)
Carrying Case:	Hardwood
Weight:	2 lbs (0.9 kg)
Shipping Weight:	10 lbs (4.6 kg)

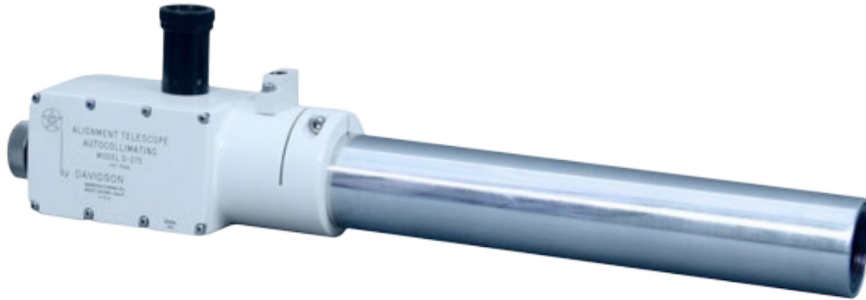


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Autocollimating Alignment Telescope | D-275



The Model D-275 Autocollimating Alignment Telescope can be focused from 16 inch (406.4 mm) to infinity, to align any number of points along its optical axis. Due to the fact that the mechanical axis of the tube and the optical axis of the instrument are parallel within 3 arc seconds, the instrument is easily adaptable to jigs and setups using a dial indicator.

A reflective surface may be established normal to the optical axis by utilizing the autocollimating feature. The Model D-275 provides the most-pertinent features at a low price.

The Model D-275V incorporates a video option with the alignment telescope, allowing the user to view the image of objects and alignment patterns on a video monitor. The D-275V includes a video camera, monitor, relay lens, mounting brackets and all connecting cables.

- Telescope for simplest, most accurate alignment
- Establish 2-axis perpendicularity to line of sight through autocollimation
- Annular rings and crossed-line reticles allow uncluttered view of reference and easy reading
- Telescope tube is made of hardened stainless steel
- Outer diameter of telescope tube is concentric to optical axis to within 0.0003 inch at 16 inch (7.6 μ m at 406 mm)
- Low cost permits semi-permanent installation in fixtures

Optional Accessories

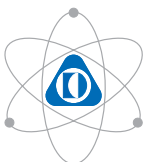
- D-165 High Intensity Light Source (may be required when autocollimating off of low reflectivity surfaces or small mirrors)
- D-247 Table Instrument Stand
- D-276/D-277/D-295/Nikon Type C Adjustable Instrument Stands
- D-416B 220V 50Hz Power Supply
- 105-2761-275 Video Subsystem (included with D-275V)

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Specifications		
Magnification:		24X
Focusing Range:		16 inch (406 mm) to infinity
Resolution:		5 arc sec
Field of View:		26 inch at 100 ft (660 mm at 30 m)
Light Source:		Incandescent lamp with D-416, 6 VDC variable power supply 110V/ 60Hz or 220V/ 50Hz
Reticles:	Autocollimating:	Fifteen concentric circles 1 arc min apart (30 arc min field)
	Eyepiece:	Cross hair width 0.000 25 inch (6.5 μ m) wide lines
Telescope Tube:		2.249 66 inch (57 mm) diameter (Designed to fit NAS-900 Spherical Mount) Concentric to optical axis within 0.000 3 inch at 16 inch (7.6 μ m at 406 mm)
Carrying Case:		Hardwood
Housing Finish:		Ivory Enamel
Weight:		13 lbs (5.9 kg)
Shipping Weight:		24 lbs (10.9 kg)

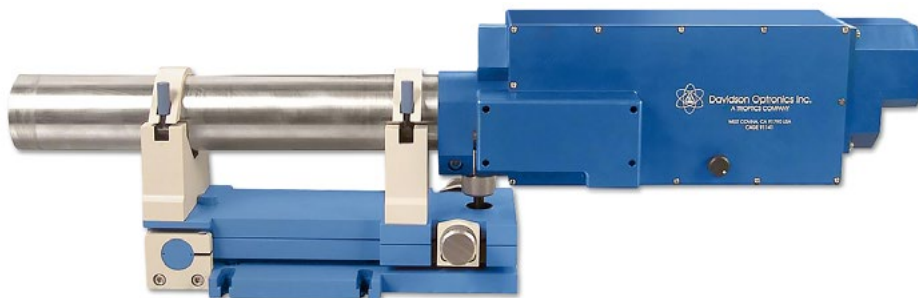


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Automatic Alignment Telescope | D-275-AAT



The Model D-275-AAT Automatic Autocollimating Alignment Telescope focuses from 16 inches (40cm) to infinity, to align and measure the location and angular orientation of any number of targets along its optical axis. Since the mechanical axis of the tube and the optical axis of the instrument are parallel within 3 arc seconds, the instrument is easily adaptable to mounts, jigs, stages, and various setups and setups using a dial indicator.

A reflective surface may be established normal to the optical axis by utilizing the autocollimating feature. The Model D-275-AAT provides the flexibility to align most complex optical assemblies and beam paths.

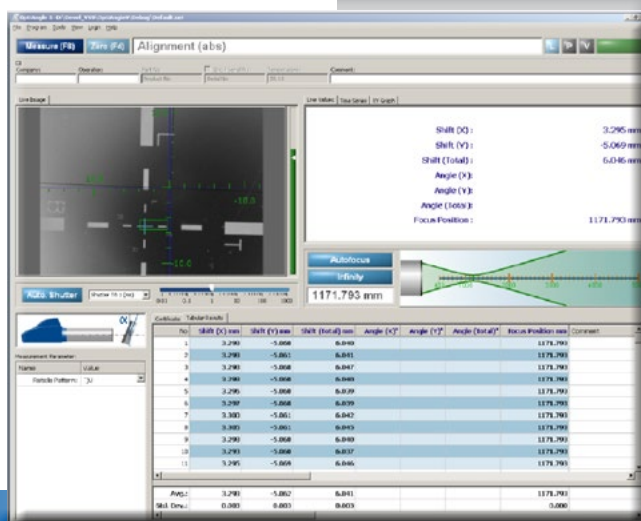
- Only fully Automated Telescope for Alignment and/or Measurement of 5 axes of components in optical beam paths and subassemblies
- Remotely controllable using TCP/IP
- Easy to use software
- Calibration certified & traceable to NIST standards

APPLICATIONS

- Telescope Alignment
- Laser Cavity Alignment
- Complex Optical System Alignment
- Alignment of Beam Delivery Systems

Optional Accessories

- Options for Adjustable Instrument Stands
- Multiple Target Options Available
- Mounted Cubes & Prisms
- Laboratory Tip/Tilt Stages



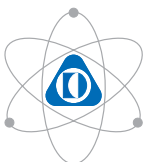
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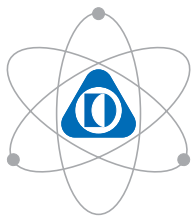
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Specifications	
Focusing Range:	16" (400mm) to infinity
Eyepiece Focal Length:	1.1" (28mm)
Collimator Focal length:	7.3" (185.4 mm) to 10.4" (264.3mm)
Resolution:	0.05 arc seconds
Field of View:	26" at 100 feet (660mm at 30m)
Light Source:	Variable intensity superbright green LED (Other wavelengths available)
Computer Platform:	Mini Desktop w/Microsoft Windows 7
Line Power:	110V, 60 Hz or 220V, 50 Hz
Telescope Tube:	2.25" \pm 0.00025" (57.15mm) diameter (Designed to fit NAS-900 Spherical Mount). Tube is concentric to the optical axis with a 0.0003" runout at 16" (7.6 μ m at 400mm) and a 0.003" runout at Infinity. (76 μ m at Infinity)
Housing Finish:	Light Blue Anodized
Carrying Case:	Ruggedized and padded for protection and transit
Instrument Weight:	17.6 lbs. (7.98)
Accessories Weight:	19 lbs. (8.62 kg)
Shipping Weight:	80 lbs. (36.3kg)

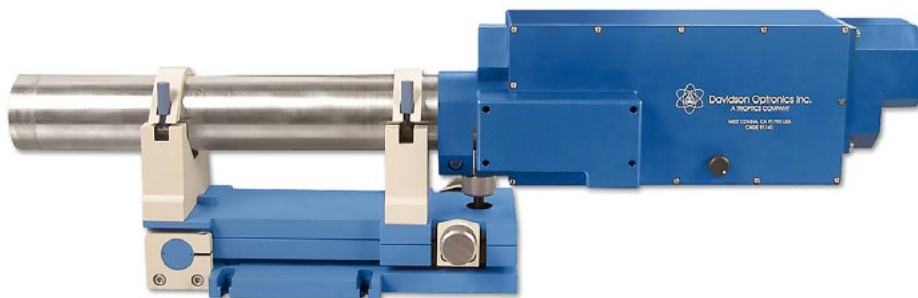


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Automatic Alignment Telescope | D-275-AAT



The Model D-275-AAT Automatic Autocollimating Alignment Telescope focuses from 16 inches (40cm) to infinity, to align and measure the location and angular orientation of any number of targets along its optical axis. Since the mechanical axis of the tube and the optical axis of the instrument are parallel within 3 arc seconds, the instrument is easily adaptable to mounts, jigs, stages, and various setups and setups using a dial indicator.

A reflective surface may be established normal to the optical axis by utilizing the autocollimating feature. The Model D-275-AAT provides the flexibility to align most complex optical assemblies and beam paths.

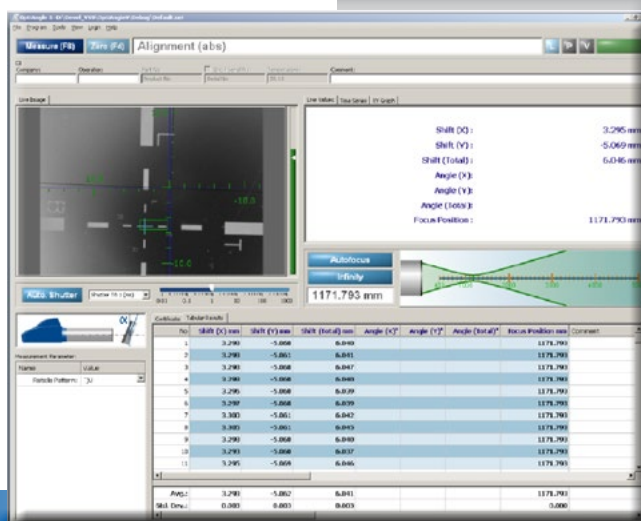
- Only fully Automated Telescope for Alignment and/or Measurement of 5 axes of components in optical beam paths and subassemblies
- Remotely controllable using TCP/IP
- Easy to use software
- Calibration certified & traceable to NIST standards

APPLICATIONS

- Telescope Alignment
- Laser Cavity Alignment
- Complex Optical System Alignment
- Alignment of Beam Delivery Systems

Optional Accessories

- Options for Adjustable Instrument Stands
- Multiple Target Options Available
- Mounted Cubes & Prisms
- Laboratory Tip/Tilt Stages



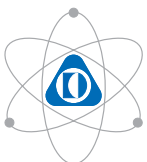
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Specifications	
Focusing Range:	16" (400mm) to infinity
Eyepiece Focal Length:	1.1" (28mm)
Collimator Focal length:	7.3" (185.4 mm) to 10.4" (264.3mm)
Resolution:	0.05 arc seconds
Field of View:	26" at 100 feet (660mm at 30m)
Light Source:	Variable intensity superbright green LED (Other wavelengths available)
Computer Platform:	Mini Desktop w/Microsoft Windows 7
Line Power:	110V, 60 Hz or 220V, 50 Hz
Telescope Tube:	2.25" \pm 0.00025" (57.15mm) diameter (Designed to fit NAS-900 Spherical Mount). Tube is concentric to the optical axis with a 0.0003" runout at 16" (7.6 μ m at 400mm) and a 0.003" runout at Infinity. (76 μ m at Infinity)
Housing Finish:	Light Blue Anodized
Carrying Case:	Ruggedized and padded for protection and transit
Instrument Weight:	17.6 lbs. (7.98)
Accessories Weight:	19 lbs. (8.62 kg)
Shipping Weight:	80 lbs. (36.3kg)



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D-279 Alignment Collimator



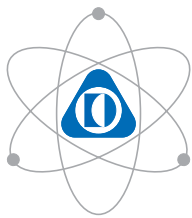
- Optical line of sight testing
- Straightness of focusable optical instruments
- Infinity target
- Bench mark

The D-279 Alignment Collimator is an optical line of sight testing fixture and target, utilized primarily as a means of testing the straightness of the line of sight of focusable optical instruments. In addition, the D-279 may be utilized as an infinity target or benchmark for calibrating focused instruments.

Six filar-bifilar type reticles provide alignment targets at different distances from the collimator objective. The virtual image distance of each reticle at 0, 8, 16, 32 and 64 feet (2.4, 4.9, 9.6 and 19.5 m) is inscribed in the first quadrant of that reticle. The infinity reticle has the additional feature of a stadia scale with graduations equal to 1 arc minute ± 2 arc seconds.

Specifications:

Reticle Alignment:	All reticles and the objective lens are aligned to within 5 minutes
Reticle Concentricity:	All reticle centers are made concentric with the outside diameter of the mounting tube to within 0.001 inch (2.5 μ m)
Light Source Adapter:	An adapter is supplied for mounting a lamp assembly with standard 2"-24 N.S. threads
Dust Prevention:	The zero reticle on the front and a filter on the rear seal the collimator against dust
Length:	13.36 inch (339 mm)
Diameter:	2.249 inch (57 mm)
Material:	Hardened stainless steel
Finish:	Ivory enamel and chrome
Weight:	12 lbs (5.9 kg)
Shipping Weight:	24 lbs (10.9 kg)



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Comparison Autocollimator | D-600



Model D-600 Comparison Autocollimators apply a unique principle of autocollimation to compare and measure small angles with extremely high precision. Specifically, the instrument measures the difference in angle between two reflecting surfaces. A beam of collimated light from the instrument is divided to illuminate a reference mirror and a second mirror whose relative angle is to be determined. The patented design employs a unique arrangement of optical tipping plates coupled to a calibrated micrometer dial, where the relative angle is read when the images are aligned.

Differences in angle of the returning beams can be measured with average repeatability of 1/10 arc seconds, either vertically or horizontally. The micrometer dial is graduated in 1/10 arc seconds, with each second numbered. One complete revolution of the dial is equal to 10 arc seconds with a total range of 120 arc seconds.

Of utmost importance to precision is the fact that instrument movement during reading will only move the images in the field of view; it will have absolutely no effect on the reading. This fact eliminates the rigid mounting and extreme handling care demanded by other instruments, where any motion is translated directly into the micrometer reading.

Optional Accessories

- **D-165 High Intensity Light Source** (may be required when autocollimating off of low reflectivity surfaces or small mirrors)
- **D-247 Table Instrument Stand**
- **D-416B 220V 50Hz Power Supply**

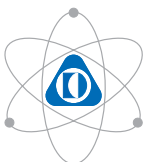
- **Measure angular differences between two reflecting surfaces to ± 0.1 arc seconds**
- **Readings are not affected by instrument movement**
- **Extremely simple to check surface plates or machine tool alignment**
- **Measure either vertical or horizontal axis**
- **Certification of accuracy traceable to NIST**

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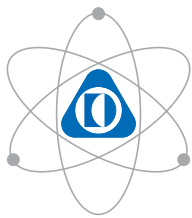
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Specifications	
Sensitivity:	1/10 arc sec
Accuracy:	$\pm 1/2$ arc sec
Focal Length:	20 inch (508 mm)
Aperture Diameter:	2.375 inch (60 mm)
Measuring Range:	120 arc sec
Micrometer Scale:	Graduation 1/10 sec One revolution equals 10 sec
Overall Dimensions: (L x W x H)	23 x 5.375 x 5.125 inch (584 x 137 x 130 mm)
Finish:	Ivory enamel
Light Source:	Transformer and rheostat for 115 VAC
Carrying Case:	Hardwood
Instrument Weight:	10 lbs (4.5 kg)
Shipping Weight:	35 lbs (15.9 kg)



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Manual Autocollimator | D-602



With no moving parts, the Model D-602 is one of the easiest autocollimators to use for aligning a mirror normal to the line of sight within one arc second. The circular rings of the projected reticle (see above) indicate alignment errors within the 20 arc minute range (in the example shown, it is estimated to be 3 min 10 sec Azimuth, 2 min 15 sec Elevation). The standard reticle has four 15 arc second center rings and ten outer one arc minute displacement rings numbered 1', 5', and 10' to simplify simultaneous readings in two orthogonal planes. The entire 20 inch (508 mm) focal length folded optical path system is built into a compact 9.5 inch (241 mm), instrument weighing only 9 lbs (4 kg).

- **Null to 1.0 arc seconds**
- **Easiest to use for rapid mirror alignment in two orthogonal planes**
- **Rugged construction with no moving parts**
- **Low cost**
- **Certification of accuracy traceable to NIST**

The Model D-602-101-004 has a USAF 1951 Resolution Pattern projected reticle.

The Digital Autocollimator Upgrade Kit allows existing D-602 models to have all the digital functionality of the New Model D-720, Digital Two-Axis Autocollimator.

The upgrade kit replaces the autocollimator eyepiece assembly with a video imager. The included OptiAngle software allows results to be viewed in real-time, statistically analyzed and stored for later reference. The program includes routines for the measurements of angles about orthogonal axes, optical wedges, 90° prism errors, telescope angles and more. Certificates documenting test results are automatically generated.

Optional Accessories

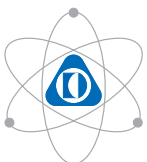
- **D-165 High Intensity Light Source may be required when autocollimating off of low reflectivity surfaces or small mirrors**
- **D-247 Table Instrument Stand**
- **105-2761-602 Video Subsystem**

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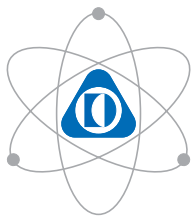
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Specifications	
Focal Length:	20 inch (508 mm), folded
Aperture Diameter:	2.375 inch (60 mm)
Field Range:	20 arc min
Reticle:	Dark field, bright rings
Overall Dimensions: (L x W x H)	9.5 x 10 x 4 inch (241 x 254 x 102 mm)
Finish:	Ivory enamel
Light Source:	Incandescent lamp with D-416, 6 VDC variable power supply 110V/ 60Hz or 220V/ 50Hz
Carrying Case:	Hardwood
Weight:	9 lbs (4 kg)
Shipping Weight:	20 lbs (9.1 kg)



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Coordinate Autocollimators | D-638



Operating ease and convenience are built into the D-638 Coordinate Autocollimator. The midsection turret with tilting eyepiece and adjoining, easily read micrometer drum enables technicians to take more readings with less effort. Hand adjustments of the mirrors in the line of sight is brought approximately 10 inches closer to the viewer so that one may stand normally and comfortably.

The D-638 measures angles around an X-Y axis or intermediate points between obliquely tilted surfaces. By rotating the turret assembly 90° the filar bisection of the target gives a corresponding read-out in arc minutes and seconds on the micrometer drum, either for azimuth or elevation. Azimuth and elevation adjustments are quickly made with fine thread adjustment screws mounted in base.

The Digital Autocollimator Upgrade Kit allows existing D-638 models to have all the digital functionality of the New Model D-720, Digital Two-Axis Autocollimator.

The upgrade kit replaces the autocollimator eyepiece assembly with a video imager. The included OptiAngle software allows results to be viewed in real-time, statistically analyzed and stored for later reference. The program includes routines for the measurements of angles about orthogonal axes, optical wedges, 90° prism errors, telescope angles and more. Certificates documenting test results are automatically generated.

Optional Accessories

- **D-165 High Intensity Light Source** may be required when autocollimating off of low reflectivity surfaces or small mirrors
- **D-247 Table Instrument Stand**
- **D-416B 220V 50Hz Power Supply**
- **104-0160 Autocollimator Alignment Aide**
- **105-2761-638 Analog Video Subsystem**
- **104-0170 Digital Autocollimator Upgrade Kit**

- **Two axis capability**
- **Center tilted eyepiece for**
- **Easy viewing**
- **Compact design for easy alignment**
- **Built in adjustable mounting base**
- **Certification of accuracy traceable to NIST**

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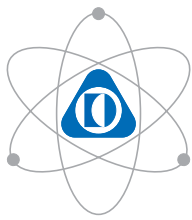
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Specifications	
Accuracy:	½ arc sec over one arc minute, 3 arc sec over 20 arc min (Calibration curve over full range at nominal cost)
Sensitivity:	0.1 arc sec (standard deviation 0.2 arc sec)
Measuring Range:	20 arc min graduations 0.2 arc sec
Seconds Scale:	One revolution equals one minute
Minute Scale:	Counts the revolutions of Seconds Scale; graduated from 0 to 20 arc min
Reticle Pattern:	Dot with illuminated rings
Aperture Diameter:	2.375 inch (60 mm)
Focal Length:	20 inch (508 mm)
Measuring Range:	30 ft ± 10 min; 125 ft ± 2 min (9.1 m; 38.1 m)
Base Elevation Adjustment:	± 2°
Base Azimuth Adjustment:	± 2°
Light Source:	Incandescent lamp with D-416, 6 VDC variable power supply 110V/ 60Hz or 220V/ 50Hz
Finish	Ivory enamel
Carrying Case:	Hardwood, fitted for instruction and light source
Weight:	21 lbs (9.5 kg)
Shipping Weight:	40 lbs (18.1 kg)



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5 Inch-Aperture Autocollimator | D-652

The D-652 Coordinate Autocollimator combines a 5 inch (127 mm) aperture with a 26 inch (660 mm) focal length optical system into an 18 inch (457 mm) long instrument. The short-coupled design and the midsection eyepiece make it possible for one operator, while viewing through the eyepiece, to adjust one or more mirrors without assistance.

Model D-652 Autocollimators measure angles around an X-Y axis or intermediate points between obliquely tilted surfaces. The filar bisection of the target gives a corresponding read-out in arc minutes and seconds on the adjoining micrometer drum, either for azimuth or elevation. Azimuth and elevation adjustment are quickly made with fine thread adjustment screws mounted in base.

There are no screws to loosen or tighten and no distracting numbers or scales in the field of view. This simplicity makes the D-652 very useful for aligning polygons, precision rotary tables, optical systems and laser optics. Several reflectors can be accommodated simultaneously with the 5 inch (127 mm) aperture. This feature saves the cost of a second autocollimator.

The D-652-103 has a filar eyepiece that rotates 90° and a readout dial toward the rear of the instrument, otherwise it is identical to the D-652-101.

The Model D-652 Autocollimator is also available in a configuration optimized for operation at near-infrared wavelengths.

The Digital Autocollimator Upgrade Kit allows existing D-652 models to have all the digital functionality of the New Model D-720, Digital Two-Axis Autocollimator.

The upgrade kit replaces the autocollimator eyepiece assembly with a video imager. The included OptiAngle software allows results to be viewed in real-time, statistically analyzed and stored for later reference. The program includes routines for the measurement of angles about orthogonal axes, optical wedges, 90° prism errors, telescope angles and more. Certificates documenting test results are automatically generated.

- **Large aperture accommodates several reflectors**
- **Compact folded optical design makes alignment easy**
- **20 arc minute measuring range**
- **Built-in adjustable mounting base**
- **Center tilted eyepiece for easy viewing**
- **Dark field projected reticle and external readout reduce eye fatigue**
- **Certification of accuracy traceable to NIST**



Optional Accessories

- **D-165 High Intensity Light Source** may be required when autocollimating off of low reflectivity surfaces or small mirrors.
- **D-247 Table Instrument Stand**
- **D-416B 220V 50Hz Power Supply**
- **104-0160-652 Autocollimator Alignment Aide**
- **105-2761-652 Analog Video Subsystem**
- **104-0170 Digital Autocollimator Upgrade Kit**

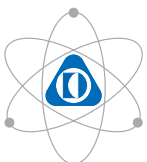
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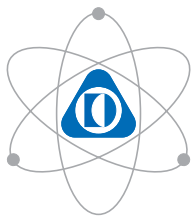
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Specifications

Readout:	The second dial is graduated in divisions of 0.2 arc sec, with each arc sec indicated by an extended graduation line and every fifth second numbered. The minutes dial is graduated and numbered 1 through 20 with every number equal to one revolution of the seconds dial (60 sec)	
Filar Reticle:	Crosshair with elevation line defined "EL" and azimuth line defined "AZ"	
Target Reticle:	Illuminated concentric circles, approx. 2 arc min apart, around an illuminated centered dot, approx. 10 arc sec in diameter, all on a dark field	
Measuring Range:	20 arc min	
Accuracy:	0.5 arc sec over one arc minute, 3 arc sec over 20 arc min. (Calibration curve over full range at nominal cost.)	
Sensitivity:	0.1 arc sec	
Repeatability:	0.2 arc sec (standard deviation)	
Operating Distance:	At 50 ft the measuring range is ± 10 arc min (15.2 m)	
Power Source:	110V/ 60Hz or 220V/ 50Hz	
Eyepiece Magnification:	12X	
Aperture Diameter:	5 inch (127 mm)	
Focal Length:	28.625 inch (727 mm)	
Base:	Elevation:	$\pm 1.5^\circ$
	Azimuth:	$\pm 1.5^\circ$
Overall Dimensions: (H x W x L)	12 x 9 x 18 inch (305 x 229 x 457 mm)	
Base Plate Dimensions:	13 x 9 inch (330 x 229 mm) Mounting holes provided	
Center Line of Sight to Mounting Surface:	4.5 inch (114 mm)	
Finish:	Ivory enamel	
Carrying Case:	Fiber glass	
Weight:	50 lbs (22.7 kg)	
Shipping Weight:	90 lbs (40.8 kg)	



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Two-Axis Autocollimator | D-656

Model D-656 Two Axis Autocollimators excel in measuring two orthogonal planes because both azimuth and elevation readings are obtained with the same dial. This eliminates the error often introduced by autocollimator barrel rotation when alternating between azimuth and elevation positions. The midsection eyepiece has sufficient eye relief for those who wear glasses; also, eye strain is reduced by the dark field reticle with illuminated target (see above) and the distinct black crosshair filar marked to show azimuth and elevation. Turning the micrometer dial causes the filar to travel across the field until the proper line bisects the center of the target. No numbers or scales confuse the field of view, but are carried entirely on the micrometer drum. The D-656 functions efficiently off optically flat surfaces and aluminized surfaces as small as 0.5 inch (13 mm) in diameter.

With the Model D-656V with CCD camera and monitor, readings become very easy even for unskilled personnel. Repeat readings are more accurate and faster. The camera eliminates any errors from parallax and greatly reduces eye fatigue.

The Digital Autocollimator Upgrade Kit allows existing D-656 models to have all the digital functionality of the New Model D-720, Digital Two-Axis Autocollimator.

The upgrade kit replaces the autocollimator eyepiece assembly with a video imager. The included OptiAngle software allows results to be viewed in real-time, statistically analyzed and stored for later reference. The program includes routines for the measurement of angles about orthogonal axes, optical wedges, 90° prism errors, telescope angles and more. Certificates documenting test results are automatically generated.

- **Measure displacement of both axes without adjustment**
- **Compact folded design makes alignment easy**
- **Dark field reticle and external readout reduce eye fatigue**
- **Certification of accuracy traceable to NIST**



Optional Accessories

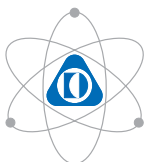
- **D-165 High Intensity Light Source** (may be required when autocollimating off of low reflectivity surfaces or small mirrors)
- **D-247 Table Instrument Stand**
- **D-416B 220V 50Hz Power Supply**
- **104-0160 Autocollimator Alignment Aide**
- **105-2761-656 Video Subsystem** (included with D-656V)
- **104-0170 Digital Autocollimator Upgrade Kit**

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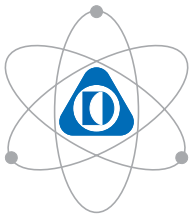
Phone: (626) 962-5181
Fax: (626) 962-5188

www.davidsonoptronics.com
sales@davidsonoptronics.com

Specifications		
Accuracy:		0.5 arc sec over one arc min, 3 arc sec over 20 arc min
Sensitivity:		0.1 arc sec
Repeatability:		±0.2 arc sec or better
Measuring Range:		20 arc min
Seconds Scale:		Graduations 0.2 arc sec
Minute Scale:		One revolution equals one arc min. Counts the revolutions of Seconds Scale; graduated from 0 through 20 arc min
Reticle Pattern:		Dot with illuminated rings
Aperture Diameter:		2.375 inch (60 mm)
Focal Length:		20 inch (508 mm)
Measuring Range:		35 ft ± 10 arc min (11 m)
@ Long Distances:		125 ft ± 2 arc min (38 m)
Base:	Azimuth:	±2°
	Elevation:	±2°
Light Source:		Incandescent lamp with D-416, 6 VDC variable power supply 110V/ 60Hz or 220V/ 50Hz
Finish:		Ivory enamel
Carrying Case:		Hardwood, fitted for instrument and light source
Weight:		21 lbs (9.5 kg)
Shipping Weight:		40 lbs (18.1 kg)



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Tooling Autocollimators | D-657



Model D-657 Tooling Autocollimator provides industry with an autocollimator economical enough to permanently install as part of a tooling fixture, thereby offering low cost in-process inspection. The instrument's operational simplicity makes it extremely fast for revealing the degree of perpendicularity of a reflector to the optical axis.

The instrument incorporates features such as an interchangeable between perpendicular and line of sight eyepiece, wide angle field (one degree), 3 arc second average nulling sensitivity, autocollimation from small reflectors and comes complete with a power pack and variable intensity light source.

The Model D-657-500 Tooling Autocollimator is identical to the standard D-657 except the two piece barrel is approximately 11 inch (279 mm) long. With graduations in 30 arc second increments, deviations of 15 arc seconds or better are easily estimated. With twice the resolution, nulling to ± 1 arc second is possible.

- **Economical cost permits permanent installation in tooling fixtures**
- **Measures angular deviation of one degree about either vertical or horizontal axis (-500 has 30 arc minute range)**
- **Eyepiece and light source assemblies interchangeable for straight through or right angle viewing**
- **Certification of accuracy traceable to NIST**

Optional Accessories

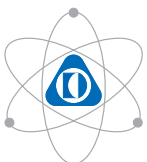
- **D-165 High Intensity Light Source** may be required when autocollimating off of low reflectivity surfaces or small mirrors
- **D-212 Adjustable Instrument Stand**
- **D-266 Angle Checker**
- **D-416B 220V 50Hz Power Supply**
- **104-0160-657 Autocollimator Alignment Aide**
- **105-2761-657 Analog Video Subsystem**

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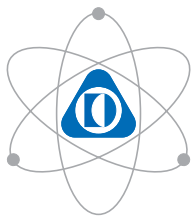
Phone: (626) 962-5181
Fax: (626) 962-5188

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sales@davidsonoptronics.com

Specifications		
	D-657	D-657-500
Aperture Diameter:	0.9 inch (23 mm)	
Focal Length:	5.0 inch (127 mm)	12.0 inch (305 mm)
Dimensions: (L x H x W)	7.75 x 3.25 x 1.5 inch (197 x 83 x 38 mm)	14.5 x 3.25 x 1.5 inch (368 x 83 x 38 mm)
Barrel Dimensions:	1.5 inch (38 mm)	
Finish:	Ivory enamel	
Reticles:	See below	See below
Light Source:	Incandescent lamp with D-416, 6 VDC variable power supply 110V/ 60Hz or 220V/ 50Hz	
Reticle Accuracy:	10 sec at 30 min, graduated in 1 min increments	5 sec at 15 min, graduated in 30 sec increments
Nulling Sensitivity:	3 sec	1 sec
Measuring Range:	1° @ 3 ft	15 min @ 3 ft
Carrying Case:	Fitted for instrument & Power Pack	
Weight:	2 lbs (0.9 kg)	3 lbs (1.4 kg)
Shipping Weight:	10 lbs (4.5 kg)	15 lbs (6.8 kg)



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Two Axis Autocollimator | D-660



The Model D-660 straight through Two Axis Autocollimator is capable of repeating angular measurements to ± 0.1 arc second. The two micrometer readout dials are independent of each other and have separate eyepieces for reading their scales. The standard 2.249 inch (57 mm) diameter barrel makes interchanging this instrument with other mounts or using V-blocks easy. With the Model D-165 High Intensity Light Source, Fiber Light Guide and Adaptor the Model D-660 can also measure uncoated parts.

- **Standard 2.249 inch (57 mm) diameter barrel**
- **Dark line bright field reticles**
- **Separate readout dials for each axis**
- **Certification of accuracy to NIST**

Optional Accessories

- **D-165 High Intensity Light Source (may be required when autocollimating off of low reflectivity surfaces or small mirrors)**
- **D-247 Table Instrument Stand**
- **D-254/ D-276/ D-277/ D-295 Adjustable Instrument Stands**
- **D-416B 220V 50Hz Power Supply**
- **104-0160 Autocollimator Alignment Aide**
- **105-2830 220V 50Hz Power Supply**

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Specifications	
Accuracy:	0.5 arc sec over any 1 minute increment. ± 2.0 arc sec over the total 10 min measuring range
Axis:	Two
Sensitivity:	0.1 arc sec
Measuring Range:	10 arc min ± 5 ft (± 1.5 m)
Dial Scale:	One revolution equals 60 arc sec graduated to 0.1 arc sec
Reticle:	30 arc sec increments numbered 0-10 arc min. Projected reticle is filer/bifilar (dark line, bright field)
Objective Lens:	1.8 inch (46 mm)
Light Source:	115V/ 60Hz or 220V/ 50Hz – variable 6 to 9 volts DC
Barrel Diameter:	2.249 inch (57 mm) made from steel with hard chrome plate (designed to fit NAS-900)
Housing:	Ivory enamel
Overall Length:	18.75 inch (476 mm)
Carrying Case:	Finished hardwood, fitted for instrument and power pack
Weight:	13 lbs (5.9 kg)
Shipping Weight:	24 lbs (10.9 kg)



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D-691 Laser Alignment Autocollimator

- Monitors alignment of laser system
- Wide angle (one degree) field
- 5 arc second nulling sensitivity
- Economical cost permits permanent installation in laser fixtures



The Model D-691 Laser Alignment Autocollimator is economical enough to be permanently installed in deliverable laser systems or use in house as a Laser Alignment Autocollimator. The instrument incorporates such features as a wide angle field (one degree), average nulling sensitivity of 5 arc seconds, and autocollimating from small reflectors. It comes complete with a power pack.

The Model D-691 is designed to provide an accurate and convenient means of determining angular deviation of an external reflector simultaneously in azimuth and elevation. The D-691 is readily adaptable to any situation requiring an accurate and extremely compact instrument to monitor angular offset. Deviations from initial settings are determined at a glance by sighting through the eyepiece and noting the related positions of the straight through and right angle reticles.

The Model D-691V incorporates a video option with the alignment telescope, allowing the user to view the image of objects and alignment patterns on a video monitor. The D-691V includes a video camera, monitor, relay lens, mounting brackets and all connecting cables.

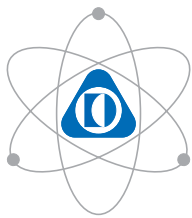


Specifications:

Sensitivity:		Nulls to 5 arc sec
Measuring range:		1° at 3 ft (1 m) ±4 arc min at 20 ft (6 m)
Aperture Diameter:		0.9 inch (23 mm)
Eyeiece Magnification:		12X (24X available)
Focal Length:		5 inch (127 mm)
Eyeiece Reticle:		3 arc sec wide crosshair
Projected Reticle:		Dark field with 50 arc second diameter bright dot
Light Source:		Incandescent lamp with D-416, 6 VDC variable power supply 110V/ 60Hz or 220V/ 50Hz
Barrel Material:		Hardened and polished Stainless Steel
Overall Dimensions:	Barrel Diameter:	1.5 inch (38 mm) concentric to optical axis
	Height:	2.12 inch (54 mm)
	Length:	7.5 inch (190 mm)
Instrument Weight:		2 lbs (0.9 kg)
Shipping Weight:		4 lbs (1.8 kg)

Optional Accessories:

- D-165 High Intensity Light Source (may be required when autocollimating off of low reflectivity surfaces or small mirrors)
- D-212 Adjustable Instrument Stand
- D-266 Angle Checker
- D-416B 220V 50Hz Power Supply
- 104-0160-691 Autocollimator Alignment Aide
- 105-2761-691 Video Subsystem (included with D-691V)



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Digital Two Axis Autocollimator | D-720

The Model D-720 Digital Two Axis Autocollimator measures angles around an X-Y axis or intermediate points between obliquely tilted surfaces. The instrument provides direct angular measurements of the reflective surface deviation through acquisition and measurement of the deviated return beam angle.

This autocollimator's large 2.375 inch (60 mm) aperture provides NIST. traceable measurements with 0.1 arc second sensitivity and 0.2 arc second accuracy over a ± 5 arc minute measuring range. Both azimuth and elevation readings are taken simultaneously, minimizing measurement errors. The adjustable, built in mounting base has fine thread screws for fast and easy azimuth and elevation adjustments.

This modern test platform features an IEEE 1394 "FireWire" CCD camera, high power green (530nm) LED light source and computer. The installed OptiAngle metrology software includes advanced algorithms that processes angular data with sub-pixel accuracy, makes all necessary calculations, displays and saves measured values in real-time and generates user-selected certificates summarizing test results. The program also offers routines for measurement of angles about orthogonal axes, optical wedges, 90° prism errors, telescope angles and much more.

The Digital Autocollimator Upgrade Kit (Part Number 104-0170) affords all the advanced capabilities described about for the Model D-720 to several of Davidson Optronics' legacy products, such as the Models D-602, D-638, D-652 and D-656.

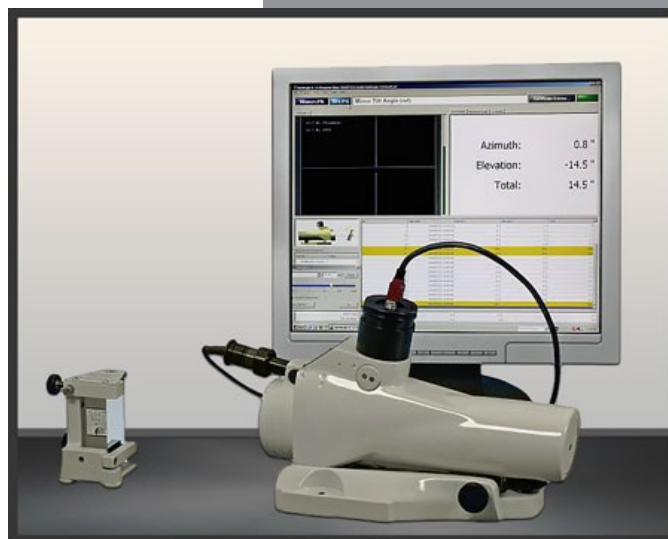
Ordering Information

D-720: Digital Two Axis Autocollimator

104-0170: Digital Autocollimator Upgrade Kit for Davidson Optronics Legacy Autocollimators

Optional Accessories

- **D-247: Table Instrument Stand**
- **D-616 : Adjustable Reference Mirror (as shown)**



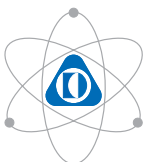
- **Measure both orthogonal planes without adjustment**
- **10 arc minute measuring range**
- **Compact folded design makes alignment easy**
- **Dark field reticle enhances return pattern recognition**
- **Built-in adjustable mounting base**
- **Certification of accuracy traceable to NIST**

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Specifications		
Sensitivity:		0.1 arc sec
Accuracy:		0.2 arc sec over one arc min, 1 arc sec over 10 arc min
Repeatability:		±0.2 arc sec or better (standard deviation)
Measuring range:		±5 arc min
Measuring range at long distances:		±2 arc min at 35 ft (11 m) ±1 arc min at 125 ft (38 m)
Aperture Diameter:		2.375 inch (60 mm)
Focal Length:		20 inch (508 mm), folded
Image Sensor:		IEEE 1394a "FireWire" 700 x 500 pixel CCD
Projected Reticle:		Brightline (approximately 6 arc sec wide) Crosshair on Dark Field
Light Source:		Superbright Green 530 nm LED
Housing Material:		Aluminum
Base adjustment:	Azimuth:	±2°
	Elevation:	±2°
Overall Dimensions:	Height:	9 inch (229 mm)
	Width:	6 inch (152 mm)
	Length:	12.5 inch (318 mm)
	Base Length:	10.5 inch (267 mm)
	Height to Aperture Center:	3 inch (76 mm)
Finish:		Ivory enamel
Carrying Case:		Finished Hardwood
Weight:		21 lbs (10 kg)
Shipping Weight:		40 lbs (18 kg)



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