

# Model 940D Computerized Photometric Range System

## PRODUCT SUMMARY

The RoadVista Model 940D Computerized Photometric Range System is the ultimate in photometric testing of retroreflective materials, devices, automotive lighting and light sources. It allows the material engineer and the light source designer to characterize their products, whether purchased and developed in-house.

When used in conjunction with Gamma Scientific's flexOptometer, the system allows photometric measurements that determine the effective intensity of red and white strobe type anti-collision lights for aircraft and integrated illuminance energy in units of Lux-seconds (lumen/m<sup>2</sup> per second) and luminous intensity energy (candela second) for barricade and other flashing lamp sources.

The system can also be configured with the Gamma Scientific RadOMA spectroradiometer system to perform night-time color measurements of retroreflectors and spatial color measurements of automotive lighting and light sources.

The Windows 7 compatible system software enables a single operator to perform highly accurate measurements in a matter of minutes. Simplifying retroreflectance measurements via default measurement sequences conforming to ASTM E809 procedures A and B for retroreflective materials. Or utilize SAE configurations for measuring light sources such as headlights, taillights and message and warning lights including LED's. Single, vector and matrix measurements are possible with easily programmed data collection macro sequence files.

Absolute measurements such as those recommended by ASTM, the Federal Highway Administration (FHWA), National Institute of Standards and Technology (NIST), the Society of Automotive Engineers (SAE) and the Federal Aviation Administration (FAA) can be performed with ease using the 940D computerized photometric range system.

For retroreflectance, the Model 940D software allows default measurement sequences conforming to ASTM E809 procedures A and B for retroreflective materials. The intuitive software simplifies measurements of devices such as warning signs, raised pavement markers (RPMs), pavement markings and post delineators.

An optional 5<sup>th</sup>-axis and rail mount system allow automated alignment of the system at different test distances between 5 and 30 meters (16 and 100 feet).

The system also allows SAE configurations for measuring light sources such as headlights, taillights and message and warning lights, including LED's. Single, vector and matrix measurements are possible with easily programmed data collection macro sequence files.



## FEATURES

- Provides complete and accurate retroreflection measurements
- Three-axis goniometer with 6.5" resolution -  $\beta_1$ ,  $\beta_2$  AND  $\epsilon$  conforms to international standards.
- Observation Angle Positioner (OAP) with 3 ARC-SECONDS conforms to ASTM and international Recommendations
- Photoreceptor with a photopic-corrected silicon detector,  $f_1 < 3\%$
- Stable and uniform illuminant A projection light source
- Variable separation from 5 to 30 meters with 5<sup>th</sup>-axis option
- Measurement capability for all types of Retroreflective materials and light sources
- Night time retroreflected color, lamp and LED color with optional Gamma Scientific RadOMA spectroradiometer system

# ROADVISTA

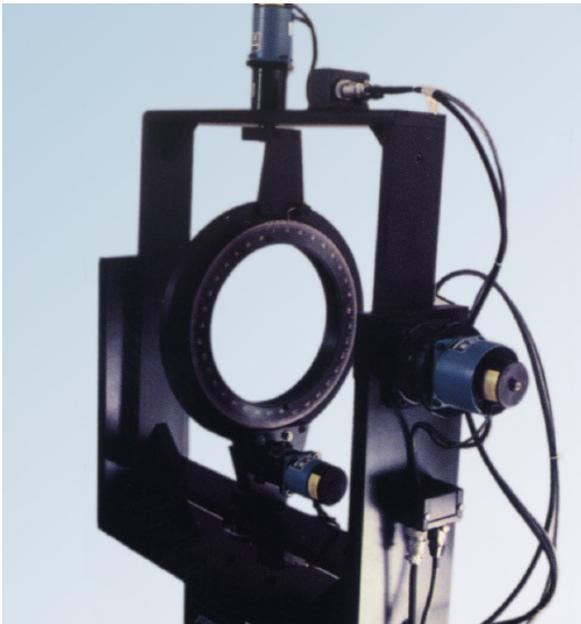
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The Model 940D system consists of a Model 940 OAP observation angle positioner (OAP) with a Model 940 PR photoreceptor and a projection light source, an indexer control unit shown at right, a measurement sample 3-Axis goniometer shown below and a PC running Windows 2000 or Windows XP. Microstepped stepping motors with a zero backlash harmonic drive system drive the Model 940 DG 3-Axis goniometer's beta one (horizontal) and beta two (vertical) axes to achieve angular resolutions measured in seconds of arc shown below. The rotation axis is a ring, so various support fixtures can be used to test different device samples. A stepping motor drives the rotation axis. A closed-loop indexing control unit controls each stepping motor, thus assuring that no steps will be lost.



Model 940 DG 3-axis Goniometer showing the clear opening for mounting various devices.



Model 940OAP with Model 940PR photoreceptor, Model RS-50/RS-3 projection lamp system

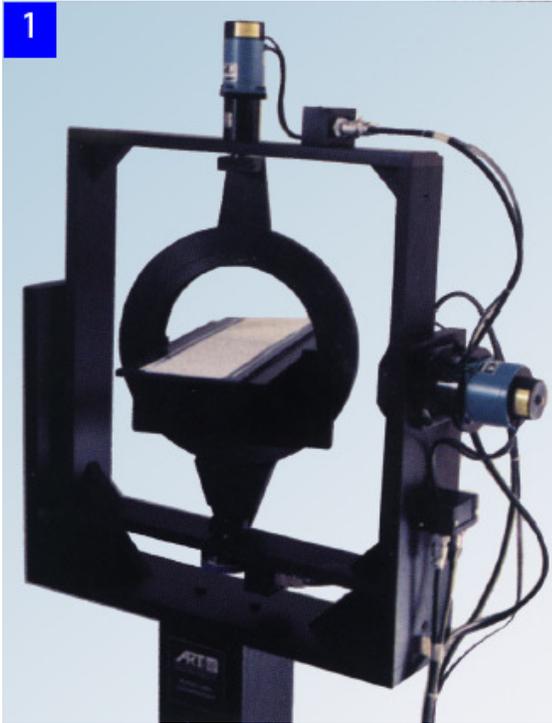


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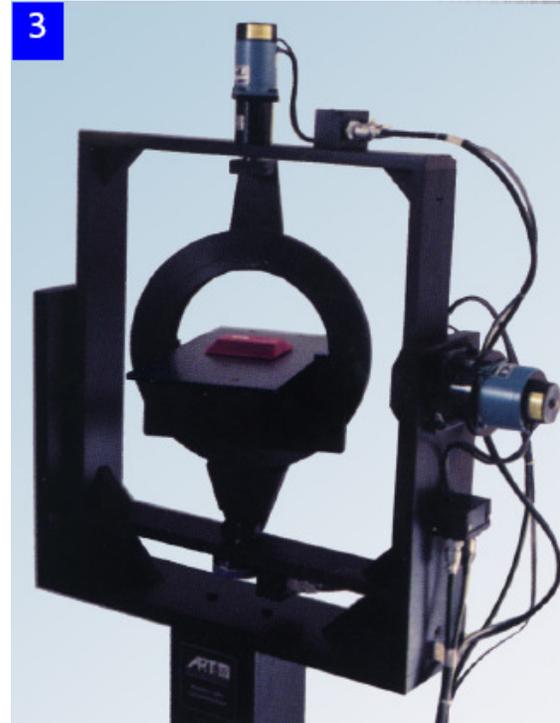
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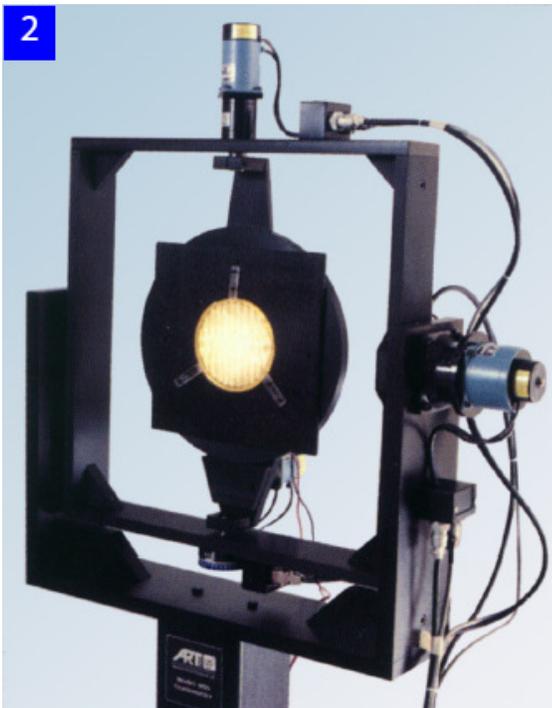
## PRODUCT SUMMARY



1. Measuring a pavement marking



3. Measuring a Raised Pavement Marker



2. Measuring a barricade lamp



Left: Model 940DG with 30 inch STOP sign  
Right: 940OAP with 940D5, 940LUPR and RadOMA RRC upgrades

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## SPECIFICATIONS

<b>General Description:</b>	RoadVista's precision laboratory photometric range system meets international standards for measuring retroreflection properties of materials and lamps. Now offered with a modern and easy to use Graphical User Interface (GUI), the system has proven durable in even continuously daily operation. The complete system provides all the measurement components required in the ASTM E809, E810 and E811 with optional color measurement systems.
<b>Model 940 OAP Observation Angle Positioner</b>	Observation angle range 0.1 to 2.0 degrees at a 15-meter separation with the goniometer. It has an angular resolution of 3 arc-seconds (0.0008 degrees).
<b>Model 940 DG 3-Axis Goniometer</b>	Angular range for CIE Geometry Beta1 and Beta2 axes +/- 90 degrees with an angular resolution of 6.5 arc-seconds (0.0018 degrees). The angular range of the rotation (Epsilon) axis is -180 to +180 degrees with an angular resolution of 36 arc-seconds (0.01 degrees). Accommodates sample sizes up to 36 by 36 inches (91 by 91 cm).
<b>Model 940PR Photoreceptor</b>	Entrance pupil diameter = 25mm (0.1 degree at a 15m measurement distance) Auto-ranging with seven decades of dynamic response Power: 110/220 VAC Photopic-corrected silicon detector, $V(\lambda) f_1' < 2\%$ Viewing system with six different field stops to reduce stray light
<b>Model RS-50VF with RS-3 Projection Light Source</b>	Exit pupil diameter = 25 mm Illumination diameter – continuously variable from 15 cm (6 in.) to 100 cm (39 in.) at 15 meter distance. Illuminance uniformity +/-3% over 100 cm (39 in.) diameter Correlated Color Temperature = 2856 +/- 20 K Power: 110/220 VAC constant flux output by constant current control
<b>Model 940 IC Indexer Control Unit</b>	Contains the closed-loop indexing controllers for the stepping motors, RS-485 computer interface and Windows XP / Vista control software. Power: 110 VAC Requires 940IC-VC Voltage Converter for 220/240 VAC operation
<b>Options: RadOMA RRC Retroreflected Color Spectral Measurement System</b>	When coupled to the 940D system, the RadOMA RRC is used worldwide for measuring the colorimetric characteristics of retroreflectors under nighttime conditions as recommended by ASTM E811. The RadOMA RRC consists of a high-resolution CCD array spectroradiometer. The system offers high-speed measurements for all types of retroreflectors. It also exceeds color measurement requirements of traffic signals, headlamps, tail lights and other light sources in accordance with SAE and other agency specifications
<b>Options: Model 940LUPR Low-Uncertainty Photoreceptor</b>	The 940LUPR takes advantage of Gamma Scientific's world-class candela standard that is supplied to national standards labs around the world. It includes temperature stabilized photopic filter and silicon detector with a high-precision amplifier to measure light levels down to 10 nanolux. The 940LUPR replaces the 940PR above. Entrance pupil diameter = 25 mm Auto-ranging with eight decades of dynamic response Power: 110/220 VAC Photopic-corrected silicon detector, $V(\lambda) f_1' < 1.5\%$ Viewing system with six different field stops to reduce stray light
<b>Options: Model 940DGS 3-Axis Goniometer</b>	Same as 940DG above, but smaller in size. Accommodates sample sizes up to 10 by 10 inches (25 by 25 cm)
<b>Options: Model 940D5 5th-Axis</b>	Adds a tilt axis to the 940OAP to automatically adjust the arc of travel of the photoreceptor to different test distances. Also adds a variable focus RS-50VF Projection Light Source



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