

## Large Spectrosun® Solar Simulator

Depicted here is Spectrolab's Large Solar Simulator, the Spectrosun® A4500 built for the Indian Space Research Organization (ISRO) in Bangalore, India. This Large Space Simulation Chamber (LSSC) was built from the ground up by a team including Spectrolab and High Vacuum Engineering Co. in the U.S., and PSI Data Systems and Bharat Heavy Plate and Vessels in India. Spectrolab has built a number of large area solar simulators, using water cooled 20-30 kW Xenon lamps to cover areas from 2 square meters (the standard model X-200) up to 18 square meters.

An array of Spectrolab XM-300 Source Modules focuses the energy from 13 lamps onto the Transfer Optics. The XM-300 is a prefocused assembly including a lamp, a high efficiency concave reflector and support equipment (high voltage ignitor circuit, water flow controls, focusing mount). A source module can be replaced by a spare during system operation without interrupting the test cycle or degrading performance.

The Transfer Optics is an array of lenses which splits the light into 31 smaller beams, all aimed and focused onto the central plane of the test volume, providing the desired uniformity of irradiance in the central plane. The large (31.5 inch) output lens also serves as the entrance window into the vacuum chamber and must be designed for physical strength as well as optical performance.

The Collimating Mirror, located in the vacuum chamber, simulates the collimated light from the sun and determines the uniformity of irradiance in the test volume outside the central plane. This large mirror (over 5 meter diameter), is built up from 55 hexagonal segments, each mounted to the aluminum backing structure by a kinematic adjustment mechanism. Mirror temperature is controlled by gaseous nitrogen cooling tubes on the back of each segment.

The control system uses a digital process controller with remote I/O modules for fast response and stable performance characteristics. In the event of lamp failure, the control system will automatically maintain the light level in the target volume by adjusting the power to the remaining lamps. The control system may be programmed by the operator for a wide variety of test cycles.



### Performance

- **Target Volume:** 4 m diameter x 4 m long  
(10 lamps @ 16 kW)  
Expandable to: 4.5 m diameter  
(12 lamps @ 16 kW)
- **Uniformity:** +/- 4% in central plane  
+/- 6% throughout test volume
- **Irradiance Range** 0 - 1.7 kW/m<sup>2</sup>
- **Stability and Control Accuracy:** +/- 5%

ISO9001:2000  
REGISTERED

SPECTROLAB

A BOEING COMPANY

The information contained on this sheet is for reference only.  
Specifications subject to change without notice.