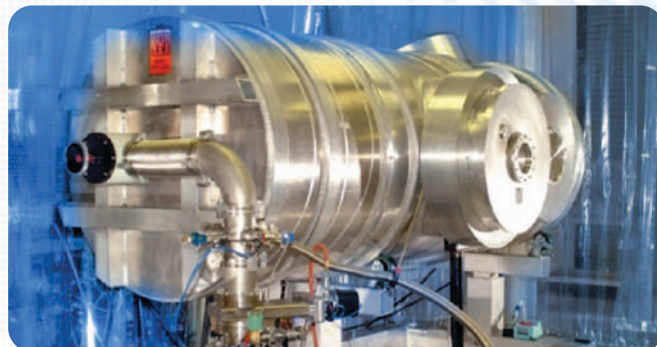
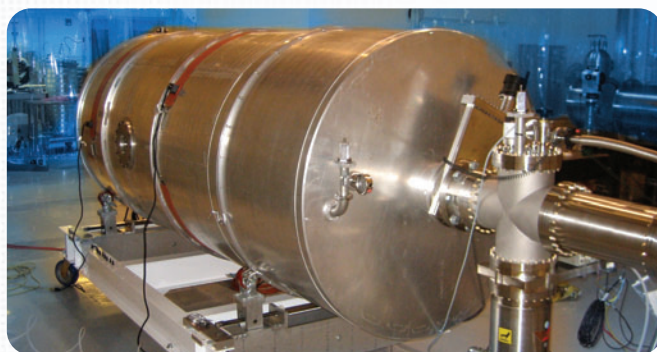


# ELECTRO-OPTICAL CALIBRATION FACILITIES

With over thirty years in the electro-optical calibration field, the Space Dynamics Laboratory (SDL) has built a nationally- and internationally-recognized reputation as state-of-the-art calibration facility. Among many other payloads, SDL has calibrated instruments for the WISE, SPIRIT III, MKV, NFIRE, GIFTS, FIRST, and SBIRS programs. Most of SDL's specialized calibration hardware is traceable to national standards.



MIC 2



MIC 3



MIC 5

## MULTIFUNCTION CALIBRATION CHAMBERS

SDL's Multifunction Calibration Chambers are used to characterize a variety of optical sensors in the infrared and visible ranges. They can operate in multiple configurations (e.g., collimator, extended source, Jones source), and can interface to a variety of external sources (e.g., spectral, radiance sources).

These chambers can also interface directly to standalone sensors or sensors located in any of SDL's antechambers. Furthermore, coordinated control and monitoring of these calibration chambers and sensors under test enables automated test sequences. These chambers are based in Logan, Utah, but are transportable to customer locations. In addition to the chambers highlighted below, SDL also owns and operates other specialty test chambers.

PARAMETER		MIC2	MIC3	MIC5
<b>External dimensions</b> (length x diameter)	•	109" x 40"	118" x 53"	144" x 84"
<b>Focal length</b>	•	198.5"	279.9"	147"
<b>Exit beam diameter</b>	•	11" x 21"(ellipse)	19"	15.5"
<b>Pointing mirror range</b>	•	~5° x 5°	~5° x 5°	20° x 17°
<b>Background</b>	•	10 K, 77 K	Ambient	77 K

*Calibration equipment and facilities not highlighted herein include: various clean rooms, a step-scan Fourier transform spectrometer, a vibration table, and contamination measurement equipment.*



**Space Dynamics**  
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**TVAC CHAMBERS** • SDL maintains a variety of thermal-vacuum (TVAC) chambers for use in testing customer equipment. Many of the TVAC chambers can be attached mechanically and optically to SDL's other calibration chambers and sources for ease of testing. SDL's largest TVAC chamber, THOR, has a thermally controlled cold bench for mounting sensors and other equipment

under test, as well as a shroud that can be cooled to LN<sub>2</sub> temperatures.

\*THOR is not transportable to customer sites



THOR

PARAMETER	THOR
<b>External dimensions</b> (length x diameter)	• 144" x 84"
<b>Vacuum capability</b>	• 10 <sup>-7</sup> Torr
<b>Operating temperature range</b>	• 77 K to 373 K
<b>Time to pump down</b>	• ~48 hrs
<b>Time to cool and stabilize</b>	• ~24 hrs

**RADIANCE SOURCES** • SDL has two large radiance sources used to characterize electro-optical sensors. Our Long-Wave Infrared Calibration Source (LWIRCS) has been characterized at the NIST facility in Gaithersburg, MD using their LBIR chamber and is SDL's secondary national radiance transfer standard. HAES-15 is SDL's high accuracy extended radiance source and provides a large aperture source for sensor testing.

PARAMETER	LWIRCS	HAES-15
<b>External dimensions</b> (length x diameter)	• 40" x 16"	• Cold tube: 51" x 25"; BB tube: 63" x 25"
<b>Operating Temperature Range</b>	• 100 K to 353 K	• 100 K to 353 K
<b>Control Stabilization Time</b>	• Near 150 K: ~2 h; Near 300 K: ~3 h	• Near 100 K: <1.5 h; Near 300 K: <2 h
<b>Normal Emissivity</b>	• 10-80 μm: 0.9994; 80-100 μm: 0.9963	• 3-20 μm: 0.999
<b>Sensor Types</b>	• 10 to 100 μm	• 1 to 25 μm
<b>Radiometric aperture</b>	• 6" exit aperture	• 20" radiometer
<b>Notes</b>	• Light rays entering at near normal incidence must encounter at least six surfaces before exiting	• An LN <sub>2</sub> -cooled shutter sits between the two tubes so view to the extended source can be closed.

**SDL TRANSFER RADIOMETER** • SDL has developed a transfer-radiometer similar to NIST's BXR to assist in transferring NIST calibrations from SDL instruments to customer equipment and to provide a relative measurement during test of undesired buildup on cryogenic optics.

PARAMETER	SDLXR
<b>Entrance beam diameter</b>	• 70 mm
<b>Field of view</b>	• 1 milli-radian
<b>Optical bench operating temp</b>	• 15 K to 50 K
<b>Spectral range</b>	• 2 to 30 micron
<b>Si:As bib detector operating temp</b>	• ~ 11K, with 10K shroud
<b>F/#</b>	• ~ 4.84.



SDL-XR (Transfer-Radiometer) •

