NPS Form 10-900
(7-81)

United States Department of the Interior
National Park Service

National Register of Historic Places Inventory—Nomination Form

For NPS use only
received
date entered

See instructions in *How to Complete National Register Forms*
Type all entries—complete applicable sections

1. Name

historic Twenty-Five Foot Space Simulator

and/or common Twenty-Five Foot Space Simulator

2. Location

street & number Jet Propulsion Labortory ___ not for publication

city, town Pasadena ___ vicinity of **congressional district**

state California **code** 06 **county** Los Angeles **code** 037

3. Classification

Category	Ownership	Status	Present Use	
___ district	_X_ public	___ occupied	___ agriculture	___ museum
___ building(s)	___ private	___ unoccupied	___ commercial	___ park
_X_ structure	___ both	___ work in progress	___ educational	___ private residence
___ site	**Public Acquisition**	**Accessible**	___ entertainment	___ religious
___ object	___ in process	_X_ yes: restricted	_X_ government	_X_ scientific
	___ being considered	___ yes: unrestricted	___ industrial	___ transportation
		___ no	___ military	_X_ other: Space Exploration

4. Owner of Property

name National Aeronautics and Space Administration (NASA)

street & number

city, town Washington ___ vicinity of **state** D.C. 20546

5. Location of Legal Description

courthouse, registry of deeds, etc. National Aeronautics and Space Administration (NASA)

street & number Real Property Management Office Code NXG

city, town Washington **state** D.C. 20546

6. Representation in Existing Surveys

title None **has this property been determined eligible?** ___ yes ___ no

date ___ federal ___ state ___ county ___ local

depository for survey records

city, town **state**

7. Description

Condition		Check one	Check one
_X_ excellent	___ deteriorated	___ unaltered	_X_ original site
___ good	___ ruins	___ altered	___ moved date _____
___ fair	___ unexposed		

Describe the present and original (if known) physical appearance

The 25-foot Space Simulator is at the Jet Propulsion Laboratory (JPL) in Pasadena, California. It was built in 1961 to provide high-quality space simulation for testing spacecraft under conditions of extreme cold, high vacuum, and intense, highly uniform collimated solar radiation.[1]

The 25-foot Space Simulator chamber is a stainless-steel cylindrical vessel 27 feet in diameter and 85 feet high; a 15-by 25-foot side-opening access door is provided for test-item loading. A personnel door provides entry through the access door. The minimum operating pressure of the chamber is 5×10^{-7} torr. The walls and floor are lined with thermally opaque aluminum cryogenic shrouds controlled over a temperature range of -320° to +200°F by liquid or gaseous nitrogen. The off-axis solar simulation system consists of an array of 37 xenon 20- to 30-kilowatt compact arc lamps, an integrating lens unit, a penetration window, and a one-piece collimator. This provides a simulated solar beam that is reflected down into the test volume by the collimating mirror, which is temperature controlled with gaseous nitrogen through a range of -100° to +200°F.

The test volume of the Simulator, 20 feet in diameter and 25 feet high, can be irradiated by a beam of simulated solar energy selected from a variety of beam sizes and intensities. The maximum beam diameter is 18.5 feet, which can provide intensities up to 2.7 solar constants. With a smaller collimating mirror and different integrating lens unit, a 9-foot diameter beam with intensites up to 12 solar constants can be provided. The spectrum is that of xenon arc lamps, as modified by the simulator optics. A water-cooled douser is provided to simulate eclipse of the sun.

The simulated space environment can be established in about 75 minutes. Test conditions can be terminated and access provided to the test item in about 2 1/2 hours.

A 1000-square-foot clean room facility is available for test article assembly and system test prior to environmental testing. An airlock separates the clean room from the Simulator.

Test article (spacecraft) suspension within the Space Simulator can be provided by a variety of support systems. The chamber has wall-mounted attachment points at three levels, each capable of a 10,000-pound vertical load. These points can be used to attach suspension cables or fixed hardware.

The cooled chamber floor has openings that allow support columns for hardmounted support structure. These columns rest on an isolated seismic mass below the Simulator.

8. Significance

Period	Areas of Significance—Check and justify below				
___ prehistoric	___ archeology-prehistoric	___ community planning	___ landscape architecture	___ religion	
___ 1400–1499	___ archeology-historic	___ conservation	___ law	___ science	
___ 1500–1599	___ agriculture	___ economics	___ literature	___ sculpture	
___ 1600–1699	___ architecture	___ education	___ military	___ social/ humanitarian	
___ 1700–1799	___ art	X engineering	___ music	___ theater	
___ 1800–1899	___ commerce	___ exploration/settlement	___ philosophy	___ transportation	
X 1900–	___ communications	___ industry	___ politics/government	X other (specify) Space Exploration	
		___ invention			

Specific dates 1961-Present **Builder/Architect** NASA

Statement of Significance (in one paragraph)

The 25-Foot Space Simulator has technological capabilities in simulating the environment of space and has strong associations with the unmanned space exploration program of the United States.

The 25-Foot Space Simulator is the only NASA facility capable of producing true interplanetary conditions of extreme cold, high vacuum, and intense solar radiation coupled with a 25 foot-test chamber that can accommodate most modern spacecraft. Its use of a collimating mirror to produce the intense solar radiation of space was the first system of its type when installed in 1966.

This ability to create a true space environment has led engineers and scientists from Europe and Japan to study its many support systems in an attempt to build similar facilities in those countries.

Over the years spacecraft tested in this facility include Ranger, Surveyor, Mariner, Voyager and other spacecraft. The success of the American space program in exploring these planets has not been replicated by any other nation. One of the reasons for this success is the 25-Foot Space Simulator that enables JPL engineers to test their spacecraft in a true space environment and to locate and eliminate any problems before launch.

9. Major Bibliographical References

See continuation sheets

10. Geographical Data

Acreage of nominated property Less than 1 acre

Quadrangle name Pasadena **Quadrangle scale** 1:24,000

UMT References

	Zone	Easting	Northing
A	11	391940	3785060
B			
C			
D			
E			
F			
G			
H			

Verbal boundary description and justification

The boundary of the Twenty-Five-Foot Space Simulator is defined by the outside perimeter of Building 150 at the Jet Propulsion Laboratory.

List all states and counties for properties overlapping state or county boundaries

state	code	county	code
state	code	county	code

11. Form Prepared By

name/title Harry A. Butowsky

organization National Park Service **date** May 15, 1984

street & number Division of History **telephone** (202) 343-8168

city or town Washington, D.C. 20240 **state**

12. State Historic Preservation Officer Certification

The evaluated significance of this property within the state is:

___ national ___ state ___ local

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

State Historic Preservation Officer signature

title **date**

For NPS use only

I hereby certify that this property is included in the National Register

date

Keeper of the National Register

Attest: **date**

Chief of Registration

A geosynchronous orbit simulation support system is available, providing one revolution per day with a fast advance and return capability and declination angle change, all possible in a vacuum.

Special test article loading provisions can be accommodated, using either a movable monorail hoist or ramp system within the chamber.

The 25-Foot Space Simulator is still in use by NASA and is likely to remain in use for many years to come.

Footnotes

1. The descriptive material from this section has been taken from the following source. Our Captive Space--JPL Space Simulator Facilities (Pasadena, California: Jet Propulsion Laboratory, 1980). pp. 2-5.

Bibliography

Blaine, J.C.D. The End of an Era in Space Exploration. San Diego, California: American Astronautical Society, 1976.

Koopes, Clayton, R. JPL and the American Space Program. New Haven: Yale University Press, 1982.

Our Captive Space-JPL Space Simulator Facilities. Pasadena, California: Jet Propulsion Laboratory, 1980.

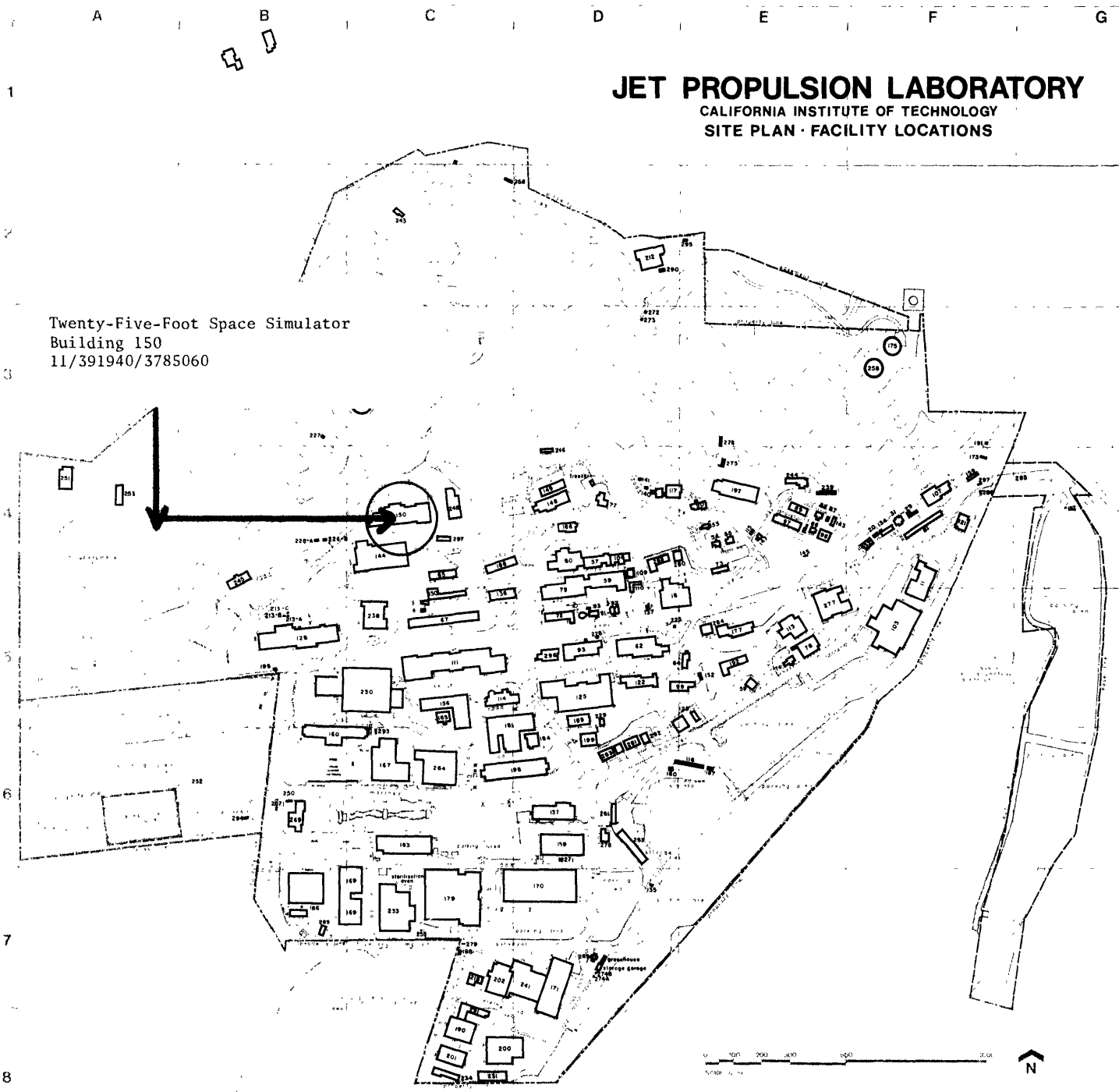
Technical Facilities Catalog Vol. 1. Washington, D.C.: National Aeronautics and Space Administration, 1974.

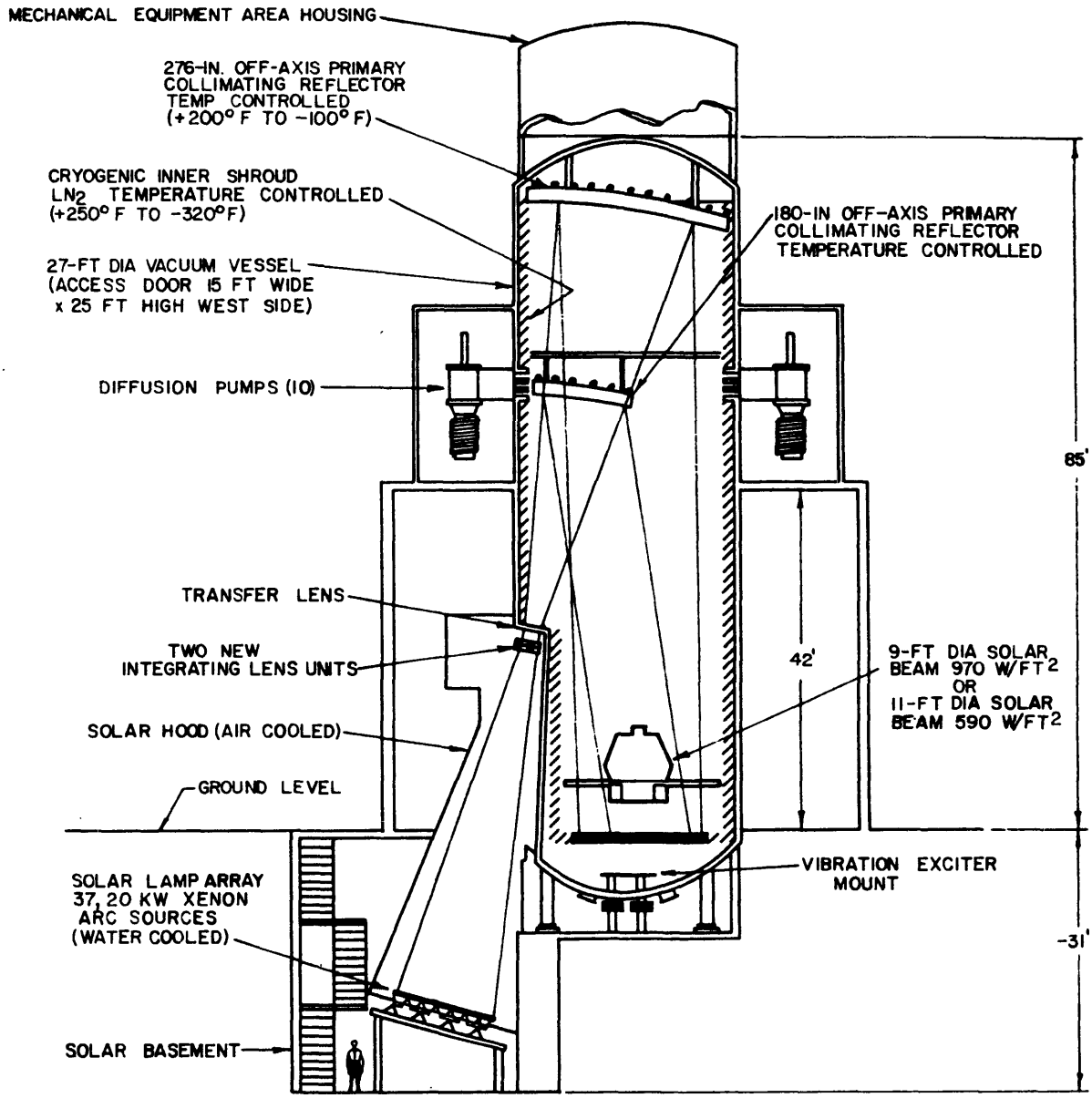
JET PROPULSION LABORATORY

CALIFORNIA INSTITUTE OF TECHNOLOGY

SITE PLAN · FACILITY LOCATIONS

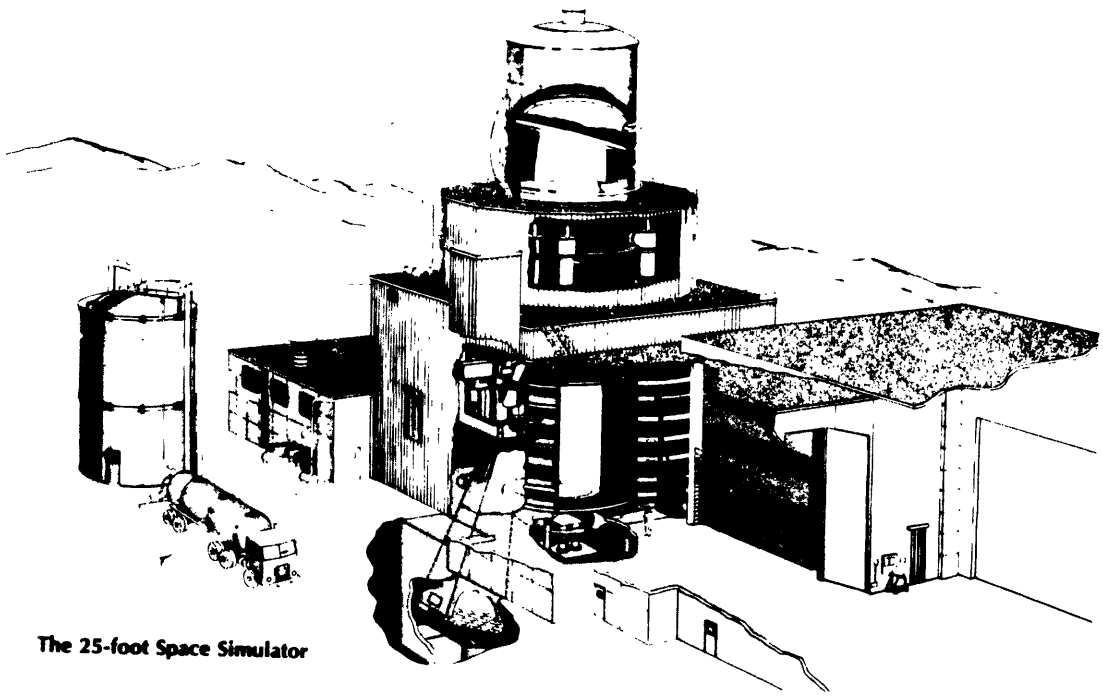
Twenty-Five-Foot Space Simulator
Building 150
11/391940/3785060





25-FT SPACE SIMULATOR
CROSS SECTION

Source: Technical Facilities Catalog Vol. 1, 1974, p. 6-79.



The 25-foot Space Simulator

Source: Our Captive Space-JPL Space Simulator Facilities, p. 2.