United States Department of the Interior  
National Park Service  

National Register of Historic Places  
Inventory—Nomination Form  

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

1. Name

historic  Rendezvous Docking Simulator  
and/or common  Real-Time Dynamic Simulator

2. Location

street & number  Langley Research Center  

city, town  Hampton  
state  Virginia  
code  51  

vicinity of  congressional district

3. Classification

<table>
<thead>
<tr>
<th>Category</th>
<th>Ownership</th>
<th>Status</th>
<th>Present Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>district</td>
<td>public</td>
<td>occupied</td>
<td>museum</td>
</tr>
<tr>
<td>building(s)</td>
<td>private</td>
<td>unoccupied</td>
<td>commercial</td>
</tr>
<tr>
<td>site</td>
<td>both</td>
<td>work in progress</td>
<td>educational</td>
</tr>
<tr>
<td>object</td>
<td>Public Acquisition</td>
<td>in process</td>
<td>entertainment</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>yes: restricted</td>
<td>government</td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>yes: unrestricted</td>
<td>industrial</td>
</tr>
<tr>
<td></td>
<td></td>
<td>no</td>
<td>military</td>
</tr>
</tbody>
</table>

Accessibility:  yes: restricted  yes: unrestricted  no

4. Owner of Property

name  National Aeronautics and Space Administration (NASA)

street & number

city, town  Washington  
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

<table>
<thead>
<tr>
<th>title</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>has this property been determined eligible?</td>
<td>yes  no</td>
</tr>
<tr>
<td>date</td>
<td>federal  state  county  local</td>
</tr>
</tbody>
</table>

depository for survey records

city, town

state
The Rendezvous Docking Simulator (RDS) is in Building 1244 in the East Area of the Langley Research Center. The RDS is a full-scale dynamic facility which was used to study pilot-controlled docking of various types of space vehicles. It was built in 1963 and simulated controlled docking procedures for both the Gemini spacecraft with the Agena booster and the Apollo Lunar Excursion Module with the Command Module.

The simulator consists of an overhead carriage and cable-suspended gimbal system. The carriage is electrically driven and provides three degrees of freedom in translation. The gimbal is hydraulically driven and provides three degrees of freedom in rotation. Thus, the pilot flies the vehicle in six-degree-of-freedom motion which is controlled in a closed-loop fashion through a ground-based analog computer. The operating volume of the simulator is 210 feet horizontally by 15 feet laterally and 40 feet vertically. This enabled the test pilots to dock with target Gemini and Apollo spacecraft in a three dimensional mode. Depending upon the test, either a full scale module of the Gemini or Apollo spacecraft, could be hung from the simulator.

After the completion of the Apollo program the Rendezvous Docking Simulator was modified to solve open-and-closed loop pilot control problems, aircraft landing approaches, simulator validation studies, and passenger ride quality studies. The name of the facility was changed and it is now called the Real-Time Dynamic Simulator. Modifications to the facility consisted of removing the Apollo Command Module cockpit and installing an aircraft cockpit. The system was also linked to the Langley real-time digital computer system and Langley landing terrain scene generator. At the present time this facility is no longer in use.
8. Significance

<table>
<thead>
<tr>
<th>Period</th>
<th>Areas of Significance—Check and justify below</th>
<th>Specific dates</th>
<th>Builder/Architect</th>
</tr>
</thead>
<tbody>
<tr>
<td>800-1400</td>
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<td>1963-1972</td>
<td>NASA</td>
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<tr>
<td>1500-1800</td>
<td>historic, archeology-historic, education</td>
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</tr>
<tr>
<td>1600-1800</td>
<td>agriculture, art, commerce</td>
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</tr>
<tr>
<td>1700-1800</td>
<td>architecture, exploration/settlement, industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1900-1999</td>
<td>communications, invention</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Statement of Significance (In one paragraph)

The Rendezvous Docking Simulator is significant because it permitted NASA to train Gemini and Apollo astronauts in docking procedures they had to master before attempting to land on the moon. The simulator gave the astronauts the experience of a docking spacecraft in a safe three dimensional mode that closely approximated a space environment. Training received here and in the Lunar Landing Research Facility was indispensable to accomplishing the goal of landing men on the moon by 1969.

The decision by President Kennedy to land a man on the moon by 1969 meant that NASA had to quickly decide the method of accomplishing the journey. NASA engineers decided that the best method of accomplishing the goal of the moon landing was through the concept of the lunar orbit rendezvous (LOR) which called for a single Saturn V launch of two spacecraft into lunar orbit where one would remain in orbit and the other would descend to the moon. Successful completion of this method of traveling to the moon meant that the vehicle on the moon would have to boost itself back into lunar orbit, rendezvous, and dock with the mother ship and then return to the Earth.

The LOR technique was a bold decision to speed up the schedule for landing a man on the moon. To accomplish this mission it was essential that Apollo astronauts be trained in all aspects and problems likely to arise in the attempt to dock the Apollo Command and Lunar Excursion Modules in lunar orbit. Failure to accomplish this docking would result in the failure of the entire mission and the likely loss of the lives of the astronauts. This justified the need for the Rendezvous Docking Simulator. Only when the Apollo astronauts had successfully mastered rendezvous and docking skills, learned on this facility, would NASA give permission for the attempt to land on the moon.
9. Major Bibliographical References

See continuation sheets

10. Geographical Data

Acreage of nominated property: Less than 1 acre

Quadrangle name: Newport News North

Quadrangle scale: 1:24,000

UMT References

A

Zone

Eastings

11 17

Northing

4 1 9 5 0 6 0

B

Zone

Eastings

Northing

C

D

E

F

G

H

Verbal boundary description and justification

The boundary of the Rendezvous and Docking Simulator is contained within the perimeter of Building 1244 in the East Area of the Langley Research Center.

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

<table>
<thead>
<tr>
<th>state</th>
<th>code</th>
<th>county</th>
<th>code</th>
</tr>
</thead>
<tbody>
<tr>
<td>state</td>
<td>code</td>
<td>county</td>
<td>code</td>
</tr>
</tbody>
</table>

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

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

date

Attest:

date

Chief of Registration
Footnotes


Langley Research Center Staff. A Compilation of Recent Research Related to the Apollo Mission. TM X-890. Hampton, Va.: Langley Research Center, No Date Given.


FIGURE 1-1
Regional Map
Rendezvous Docking Simulator
UTM References:
18/377520/4105060
Rendezvous Docking Simulator