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

county  Hampton

state  Virginia

code  51

county code  650

3. Classification

Category

___ district

___ building(s)

___ structure

___ site

___ object

Ownership

X  public

___ private

___ both

Public Acquisition

___ in process

___ being considered

Status

___ occupied

___ unoccupied

___ work in progress

Accessible

X  yes: restricted

___ yes: unrestricted

___ no

Present Use

___ agriculture

___ commercial

___ educational

___ entertainment

___ government

___ industrial

___ military

X  other: Inactive

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

title  None

has this property been determined eligible?  ___ yes  ___ no

date

___ federal  ___ state  ___ county  ___ local

depository for survey records

city, town

state
7. Description

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<tr>
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Describe the present and original (if known) physical appearance

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

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<td>Specific dates</td>
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<td>Builder/Architect</td>
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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

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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>
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</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

Keeper of the National Register

date

Attest:

title

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.


Rendezvous Docking Simulator
UTM References:
18/377520/4105060
Rendezvous Docking Simulator
Building 1244
18/377520/4105060

FIGURE 1-4
West Area
Rendezvous Docking Simulator