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 __ vicinity of congressional district

state Virginia code 51 county Hampton code 650

3. Classification

<table>
<thead>
<tr>
<th>Category</th>
<th>Ownership</th>
<th>Status</th>
<th>Present Use</th>
<th>Present Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>district</td>
<td>X public</td>
<td>occupied</td>
<td>agriculture</td>
<td>museum</td>
</tr>
<tr>
<td>building(s)</td>
<td>private</td>
<td>unoccupied</td>
<td>commercial</td>
<td>park</td>
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<tr>
<td>structure</td>
<td>both</td>
<td>work in progress</td>
<td>educational</td>
<td>private residence</td>
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<tr>
<td>site</td>
<td>Public Acquisition</td>
<td>Accessible</td>
<td>entertainment</td>
<td>religious</td>
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<tr>
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<td>in process</td>
<td>yes: restricted</td>
<td>government</td>
<td>scientific</td>
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<td>being considered</td>
<td>yes: unrestricted</td>
<td>industrial</td>
<td>transportation</td>
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<td>no</td>
<td>military</td>
<td>X other: Inactive</td>
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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
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.
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.
Footnotes

1. Howard G. Hatch, Jr., Jack E. Pennington, and Jere B. Cobb, Dynamic Simulation of Lunar Module Docking with Apollo Module in Lunar Orbit NASA TN D-3972 (Hampton, Va: Langley Research Center, No Date), p. 3.

Bibliography


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.


9. Major Bibliographical References

See continuation sheets

10. Geographical Data

Acreage of nominated property  Less than 1 acre

Quadrange name Newport News North

UMT References

<table>
<thead>
<tr>
<th>A</th>
<th>Zone</th>
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<th>Northing</th>
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</table>

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

code | county code

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) 343-9168

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--865), 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  

Rendezvous Docking Simulator
UTM References:
18/377520/4105060