

NASA
George C. Marshall Space Flight Center
RECORD OF ENVIRONMENTAL CONSIDERATION

Project: Modifications and Operations at Building 4572 in Support of Ares Project

Description and Location of Proposed Action: The MSFC-Aft Dome/ Thrust Cone Structural Test Facility Modifications Project consists of constructing a cast-in-place concrete foundation (reaction block) to accommodate testing of the ARES I Aft Skirt Tank concept. The concrete pad would be poured over existing concrete and anchored with bolts in the new concrete. The pad would be 30' x 50' and 9 ft deep. The project is located at TS 4572 in the existing flame deflector trench on the east side of the test stand. TS 4572 located at Marshall Space Flight Center in Huntsville, AL is a 60-year old hot fire test stand that was originally utilized for Saturn testing.

A. Anticipated Date and/or Duration of the Proposed Action: 2010 - 2012

B. It has been determined that the above action:

- a. _____ Is adequately covered in and existing _____ EA, _____ EIS, entitled _____ and dated _____.
- b. Qualifies for Categorical Exclusion as described by NPG 8580.1, page 45, Section 4.2.1 (d) and NASA NEPA regulations 14 CFR 1216.305, and has no special circumstances which would suggest a need for an Environmental Assessment.
- c. _____ Is exempt from NEPA requirements under the provisions of (cite superseding law): _____.
- d. _____ Has no environmental impact as indicated by the results of an Environmental Analysis Check Sheet and/or a detailed Environmental Analysis (attach check sheet and/or Environmental Analysis as applicable).
- e. _____ Will require an Environmental Assessment or Environmental Impact Statement.
- f. _____ Will include mitigation as described below:

Other Environmental Considerations (i.e., permits, hazardous material handling):

A section 106 package was submitted to AL SHPO. Concurrence of no adverse effects was received.

All cleaning materials would be disposed of in accordance with Hazardous Waste Management MWI 8500.1 and Hazardous Materials Management MWI 8500.5

No work would be performed on the exterior of the test stand other than the flame trench.

A CERCLA Site Access form must be obtained before implementing any action that would impact soils at the site.

Signed: Allen Elliott Date: 1/26/10
Manager, Environmental Engineering and Occupational Health (EEOH) Office

NEPA Preliminary Evaluation

Project Name:	Modifications and Operations at Building 4572		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">New Construction</td> <td style="width: 50%; text-align: center;">Modification</td> </tr> </table>	New Construction	Modification
New Construction	Modification		
Project Contact(s):	Jeff Bland/Jimmy Guarin		
Originator Signature:	 1/26/10		
Project Description:	The MSFC-Aft Dome/ Thrust Cone Structural Test Facility Modifications Project consists of constructing a cast-in-place concrete foundation (reaction block) to accommodate testing of the ARES I Aft Skirt Tank concept. The project is located at TS 4572 in the existing flame deflector trench on the east side of the test stand. TS 4572 located at Marshall Space Flight Center in Huntsville, AL is a 60-year old hot fire test stand that was originally utilized for Saturn testing. Modifications would include adding a Nitrogen tank, pumps, piping, and electrical equipment. No work would be performed on the test stand.		

Operational Phase:	No	Yes	Maybe	Comments
a) Potential to disproportionately impact low income or minority populations.	X			
b) Affects wetlands, floodplains, protected species or critical habitat.	X			
c) Have impacts to cultural or historical resources.	X			
d) Impacts a CERCLA restricted site.	X			
e) Potential to cause soil contamination.	X			
f) Requires use or storage of toxic or hazardous materials (including propellants and explosives).	X			
g) Will generate hazardous, toxic or radiological wastes.			X	All cleaning materials would be disposed of in accordance with Hazardous Waste Management MWI 8500.1 and Hazardous Materials Management MWI 8500.5.
h) Causes air pollution or have discharges to air.	X			
i) Requires new air permit or Title V modification.	X			
j) Causes water pollution or have water discharges.	X			
k) Requires new Clean Air Act permit or modification.	X			
l) Significant increases in use of potable water.	X			
m) Potential to impact quality of groundwater.	X			
n) Requires use of groundwater.	X			
o) Potential to violate safety, health or noise standards.	X			
p) Requires use of radiation (ionizing or non-ionizing).	X			
q) Requires use of pesticides, herbicides, fungicides, etc.	X			
r) Uses Class I ozone-depleting substances.	X			
s) Potential exposure to asbestos or lead containing materials.	X			
t) Significant increases in energy consumption.	X			
u) Have transportation impacts (new roads, traffic, parking).	X			
v) Significant increases in labor force.	X			
w) Impacts community socio-economics.	X			

Project Name: Modifications and Operations at Building 4572

Phase: New Construction Modification

Project Contact(s): Jeff Bland/Jimmy Guarin *J.B. / 1/5/30 1/26/10*

Project Originator Signature: _____

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Phase Starts in FY: 2010

Construction Phase:	No	Yes	Maybe	Comments
a) Affects wetlands, floodplains, protected species or critical habitat.	X			
b) Have impacts to cultural or historical resources.		X		Section 106 consultation attached.
c) Impacts a CERCLA restricted site.			X	A CERCLA Site Access form must be obtained before implementing any action that would impact soils at this site.
d) Potential to cause soil contamination.	X			
e) Requires use or storage of toxic or hazardous	X			
f) Will generate hazardous, toxic or radiological wastes.	X			
g) Causes air pollution or have discharges to air.	X			
h) Requires new Clean Water Act permit or modification.	X			
i) Causes water pollution or have water discharges.	X			
j) Potential to impact quality of groundwater.	X			
k) Requires use of groundwater.	X			
l) Potential to violate safety, health or noise standards.	X			
m) Requires use of radiation (ionizing or non-ionizing).	X			
n) Requires use of pesticides, herbicides, fungicides,	X			
o) Uses Class I ozone-depleting substances.	X			
p) Potential exposure to asbestos or lead containing materials.	X			No work will be performed on the exterior of the test stand other than in the flame bucket.
q) Have transportation impacts (new roads, traffic, parking).	X			
r) Significant increases in labor force.	X			

Operational Phase:	No	Yes	Maybe	Comments
a) Potential to disproportionately impact low income or minority populations.	X			
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d) Impacts a CERCLA restricted site.	X			
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f) Requires use or storage of toxic or hazardous	X			
g) Will generate hazardous, toxic or radiological wastes.			X	All cleaning materials would be disposed of in accordance with Hazardous Waste Management MWF 8500.1 and Hazardous Materials Management MWF 8500.5.
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v) Significant increases in labor force	X			
w) Impacts community socio-economics.	X			

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, AL 35812



July 29, 2008

Reply to Attn of:

AS21

Ms Elizabeth Ann Brown
Deputy State Historic Preservation Officer
Alabama Historical Commission
468 South Perry St
Montgomery, AL 36130-0090

Elizabeth:

NASA has undertaken the development of two new rocket systems to take man back to the Moon and on to Mars as directed by the President. Marshall Space Flight Center will play a major role in the development and testing of these new rocket systems. Several of our test stands that have played a significant part in the testing of the Saturn and Space Shuttle programs will again be called upon to test these new rockets. These tests will require modifications to the stands to accommodate the new rocket configurations and will allow us to also do much needed repairs and maintenance.

The testing is a tremendous step in improving the condition of the stands and can only be seen as having a positive effect by adding to the already historic significance of the stands.

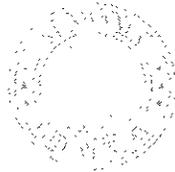
The attached Section 106 submittal describes the proposed changes to the Static Test Stand (Propulsion and Structural Test Facility), building 4572, one of Marshall Space Flight Center's four National Historic Landmarks.

Please review the attached package. Contact me if you need additional information.

Respectfully,

A handwritten signature in black ink, appearing to read "R. Allen", written in a cursive style.

Ralph H. Allen
Marshall Space Flight Center
Historic Preservation Officer
256-544-4959



STATE OF ALABAMA
ALABAMA HISTORICAL COMMISSION
468 SOUTH PERRY STREET
MONTGOMERY, ALABAMA 36130-0900

FRANK W. WHITE
EXECUTIVE DIRECTOR

August 20, 2008

TEL: 334-242-3184
FAX: 334-240-3477

Ralph H. Allen
Historic Preservation Officer
Marshall Space Flight Center, Alabama 35812

Re: AHC 08-1040
Modify Static Test Stand, Building 4572
Marshall Space Flight Center
Madison County, Alabama

Dear ~~Mr. Allen:~~ *Ralph*

Upon review of the information forwarded by your office, we have determined that the proposed action will have no adverse effect on the National Historic Landmark and mitigation recording is complete. We would like to remind you that the Secretary of the Interior should be contacted regarding this project.

We appreciate your efforts on this project. Should you have any questions, please contact Greg Rhinehart at (334) 230-2662. Please have the AHC tracking number referenced above available and include it with any correspondence.

Truly yours,

A handwritten signature in cursive script, reading "Elizabeth Ann Brown".

Elizabeth Ann Brown
Deputy State Historic Preservation Officer

EAB/gcr

National Aeronautics and
Space Administration
George C. Marshall Space Flight Center
Marshall Space Flight Center, AL 35812



July 29, 2008

Reply to Attn of: AS21

Tom McCulloch
Advisory Council on Historic Preservation
Federal Property Management Section
Office of Federal Agency Programs
1100 Pennsylvania Ave NW, Suite 803
Washington, DC 20004

Tom:

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Respectfully,

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Ralph H. Allen
Marshall Space Flight Center
Historic Preservation Officer
256-544-4959

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, AL 35812



July 28, 2008

Reply to Attn of:

AS21

Ms Jody Cook
National Historic Landmark Program
Cultural Resources Division
Southeast Region
100 Alabama St. SW – 1924 Building
Atlanta, GA 30303

Jody:

NASA has undertaken the development of two new rocket systems to take man back to the Moon and on to Mars as directed by the President. Marshall Space Flight Center will play a major role in the development and testing of these new rocket systems. Several of our test stands that have played a significant part in the testing of the Saturn and Space Shuttle programs will again be called upon to test these new rockets. These tests will require modifications to the stands to accommodate the new rocket configurations and will allow us to also do much needed repairs and maintenance.

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Respectfully,

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Ralph H. Allen
Marshall Space Flight Center
Historic Preservation Officer
256-544-4959

Modifications To Building 4572 East Flame Trench at Marshall Space Flight Center, Huntsville, AL For Structural Testing of Ares LOX Components

(4572 is Listed on the National Register as a National Landmark Structure)



NASA's Marshall Space Flight Center (MSFC) proposes to modify the east flame trench of building 4572 to test the new Ares rocket Liquid Oxygen (LOX) components.

Index

- General Description of Planned Work and Perspective In Context of Previous Testing
- Summary
- Test Stand Location Map
- Site Aerial
- Photo Showing Test Stand and Work Area
- Structure Description
- General Building Data
- Historical Data
- Significance
- Recordation and Mitigation
- Public Access
- 1961 Photo of Test Stand and Area
- HAER Documents

General Description of Planned Work And Perspective In Context of Previous Testing

The Static Test Stand (4572) was built in 1953 as a static testing complex. Over the years the test stand and complex has been modified many times to accommodate new testing requirements for a variety of rocket engines.

NASA is now developing the next generation of manned (and unmanned) space vehicles, Ares I and Ares V, and plans to again use the 4572 testing complex for liquid oxygen (LOX) component structural tests.

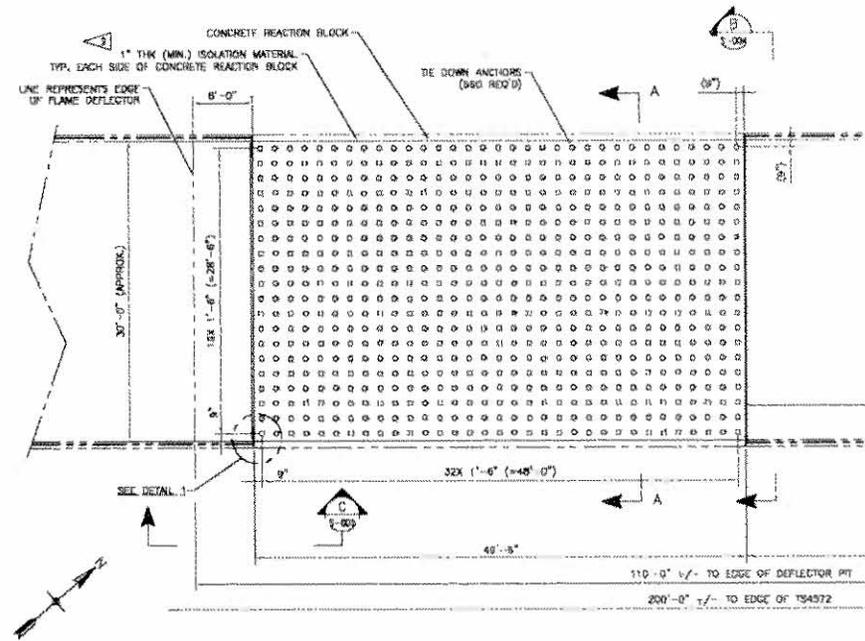
The stand was listed as a National Historic Landmark as a part of the “Man in Space” theme study for the part it played in the testing of the many of NASA’s rockets. The planned testing of the Ares vehicles will continue that history of testing and can only be seen as having a positive effect on the significance of this facility.

General Description of Planned Work And Perspective In Context of Previous Testing - Continued

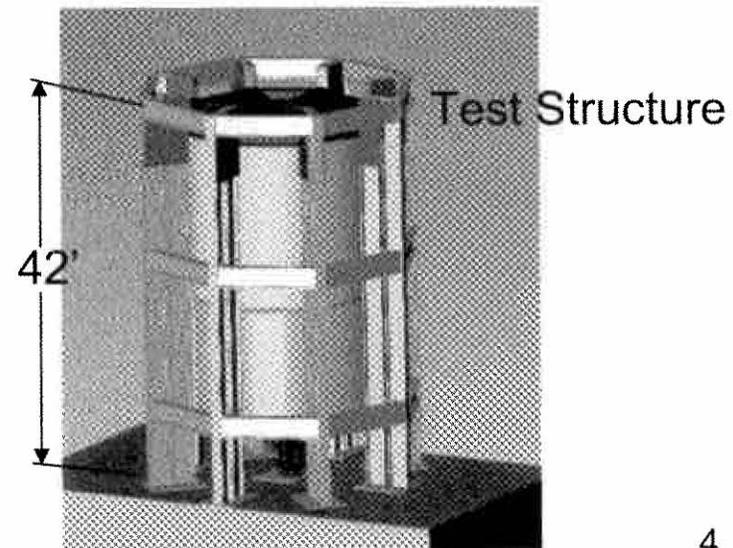
This project will modify the east flame trench of the stand support NASA's new Project Constellation with the construction of a test structure which will be used for structural component testing of the Ares Ix tank.

A concrete reaction block 50' x the depth of the trench will be poured in the trench and the test structure will be anchored to the reaction block. The only demolition will be the removal of the railing at this section and the removal of the top +/- 1' of the trench wall.

The existing test stand and gantry crane will not be modified for this work.



Flame Trench Reaction Block



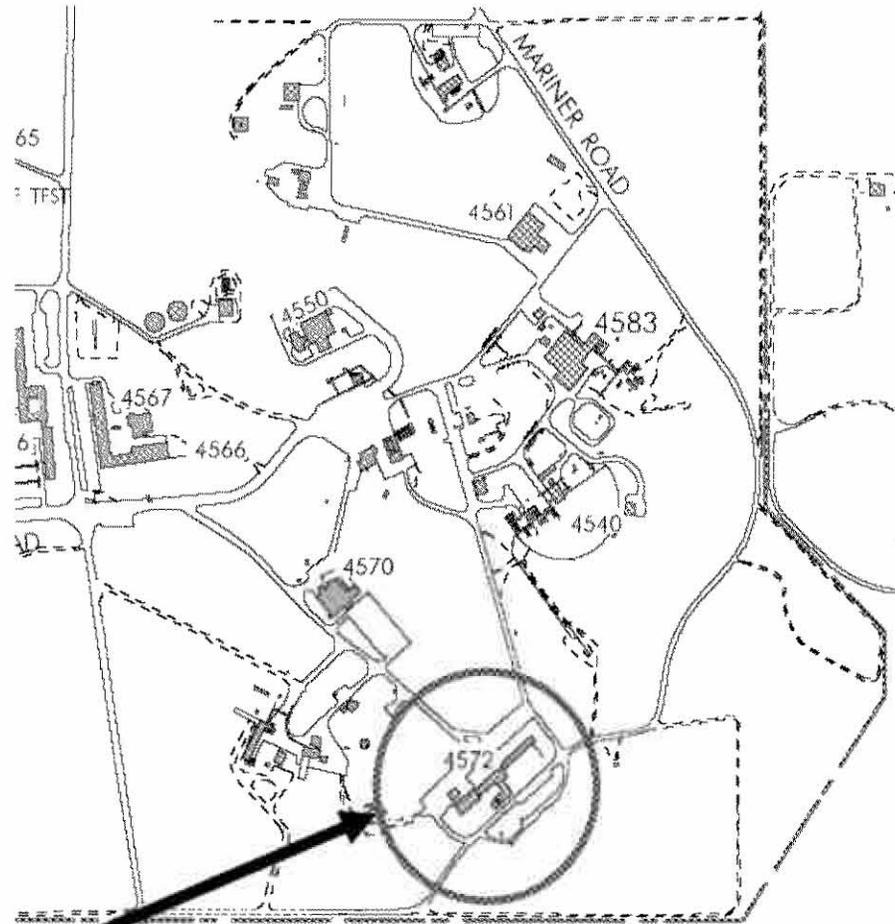
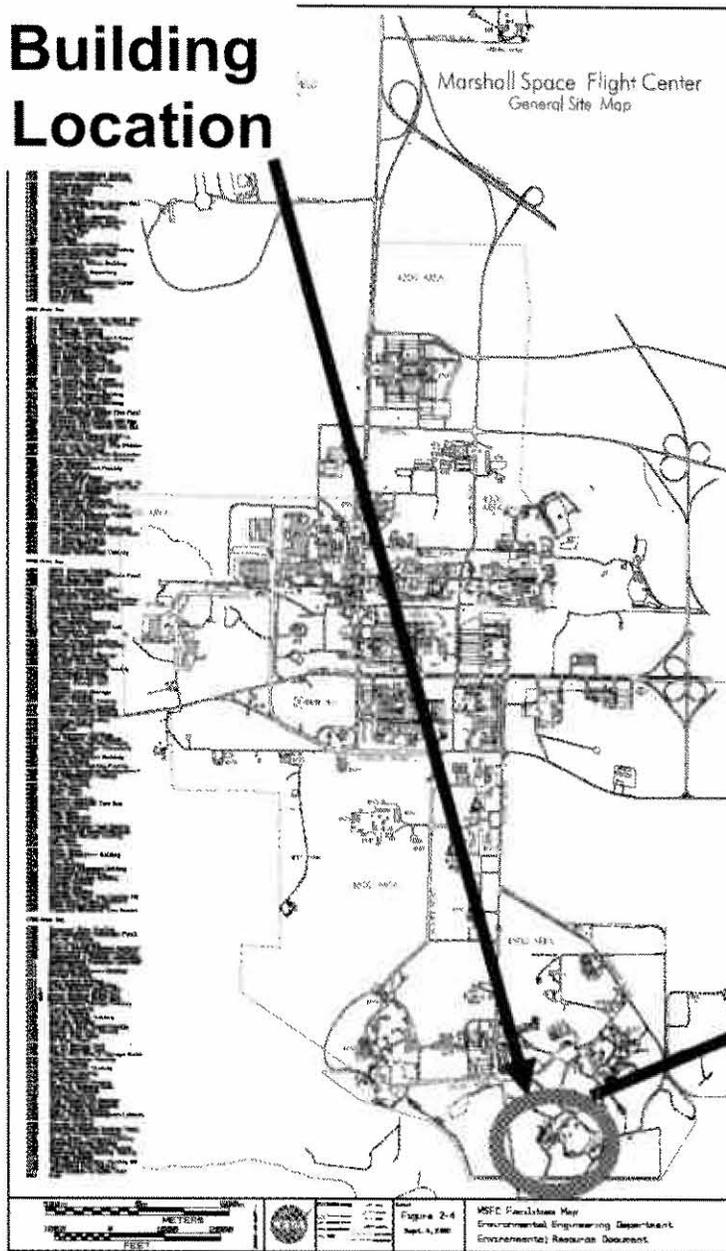
Summary:

Adjacent to Test Stand 4572, a National Landmark Structure, Marshall Space Flight Center (MSFC) proposes adding a 42' vertical test structure in the east flame trench for structural testing. Test Stand 4572 is inactive and this testing will be conducted in a new structure in the east flame trench. This testing is important to NASA's new Ares program and it is significant that this testing will be done at Marshall Space Flight Center.

The only way a test structure of this type can remain viable is for it to be used, and in order to be used, it must be modified to accommodate testing requirements. The proposed testing at this location is a positive development and could lead to additional testing at the stand.

Although the proposed modifications do make minor alterations to the east flame trench, our assessment is that the new test structure and activities will not have an adverse effect on Test Stand 4572.

Building Location



Site Plan of 4572 Vicinity

EAST TEST AREA



8/25/2008

Site Map of Marshall Space Flight Center
Huntsville, Alabama

Site Plan

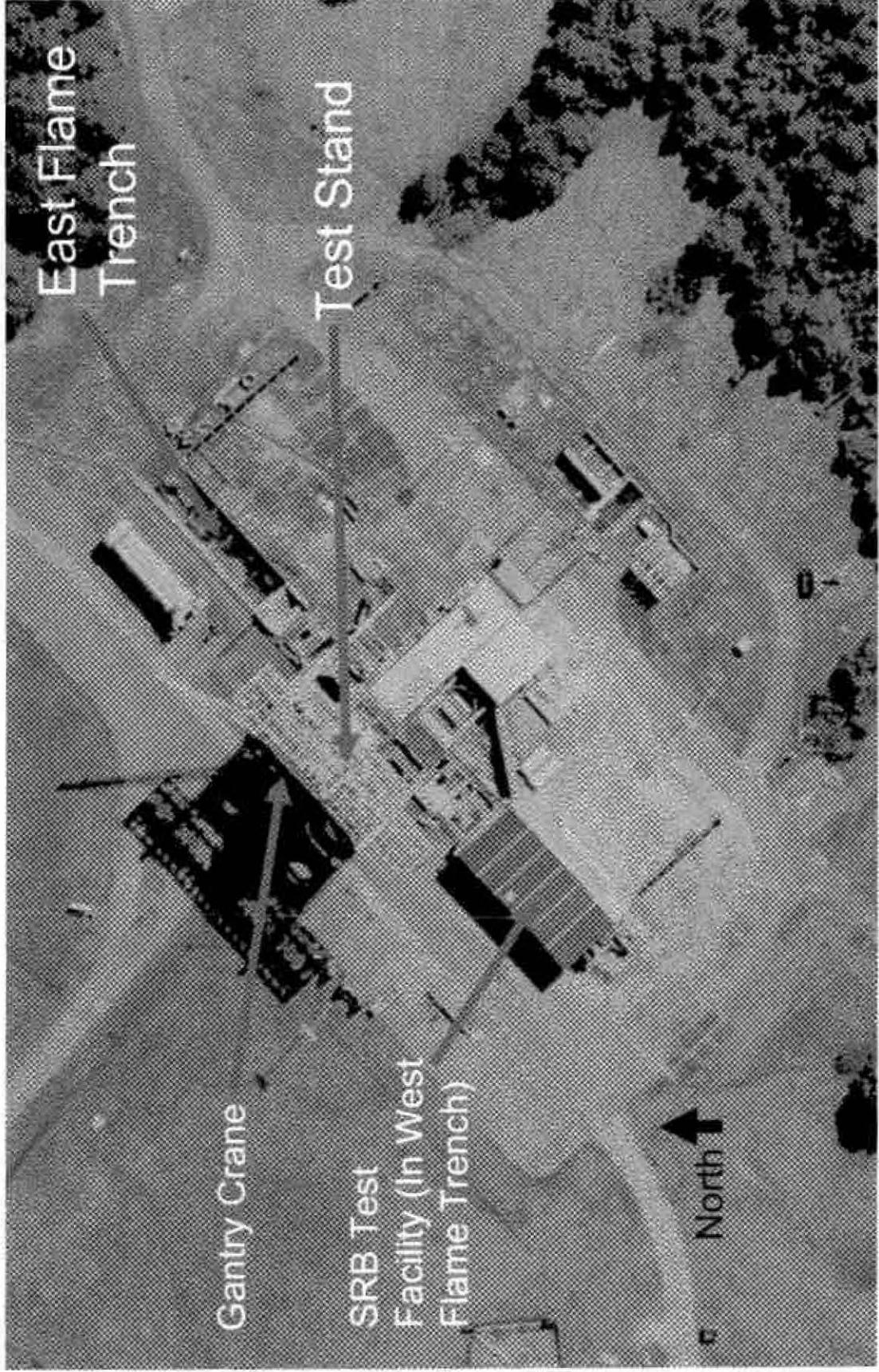


Photo of 4572 (Looking NNE)



Test Stand

Gantry Crane

Location of New
Test Structure

SRB Test Facility
(In West Flame
Trench)

8/25/2008

Structure Description

(From MSFC's 2003 Historical Assessment of Marshall Space Flight Center)

Buildings 4572 and 4573 (The Gantry Crane) are functionally a single static test complex comprised of a test stand and its gantry crane. Building 4572 stands 175' high, with an irregular footprint. The test stand incorporates a terminal room, shop and equipment rooms, offices, and storage in an L-shaped structure extending from the rear. The attached multi-purpose structure includes a small basement (connected via an underground cable tunnel to Building 4570), a full first floor, and a stepped configuration of second and third floors. The overall footprint of the tower base and its attached structure is 65'7" by 67'6". Building 4572 is a "T" shaped stand, allowing two test positions (east and west) with an upper steel truss structure that extends approximately 460' east-west.

Building 4573 is a 45-ton revolving gantry crane originally built in 1942, adapted for inclusion at the test stand in 1953. Moving on tracks from east to west 431' 4" along the north face of the test stand.

4572 General Building Data

NAME OF STRUCTURE:

Static Test Stand
Static Test Tower (STT)

LOCATION: Marshall Space Flight Center
Huntsville, Alabama

DATE(S) OF DESIGN: 1953
Modified in 1958-59 and 1962

ARCHITECT/ENGINEER:

Parsons-Aerojet Company – Los Angeles
Maurice H. Connell & Associates - Miami
(enhancement and additions)

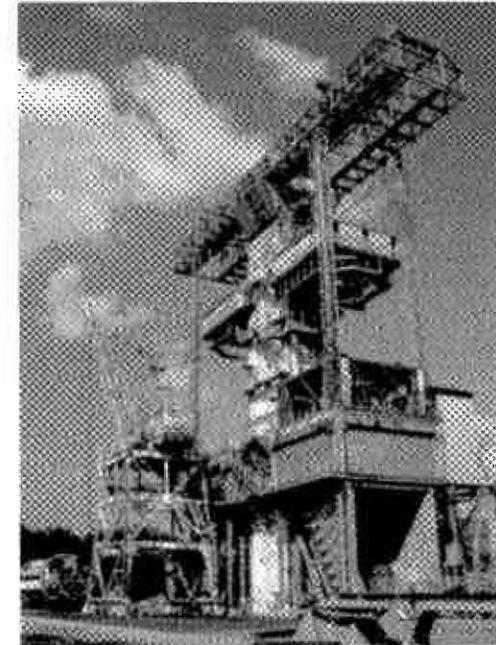
USE (ORIGINAL/PAST MODIFICATIONS/FUTURE):

Originally designated as building 271 prior to 1957. A major enhancement was made to the east side of the tower in 1958-1959. Transferred from the Army to NASA in 1960. West side modified in 1962 to accommodate testing of two Saturn C-1 boosters simultaneously. Flame deflector and water cooling system added in 1962. 2010 – Ares Lox Tank Structural Testing

NRHP ASSESSMENT: National Landmark Listing

2003 MSFC Historical Assessment – Eligible under Criteria A, B, and C.

INTEGRITY: Good



Northwest Corner Looking ESE

Historical Data

The Los Angeles engineering firm of Parsons-Aerojet designed Building 4572. The revolving gantry crane, Building 4573, appears to be a feature added by the Redstone Arsenal.

Original drawings for the test stand date to August 1953, with the test stand mapped as completed by August 1954. (The Corps of Engineers signed off on the drawings in 1955, with a final as-built acceptance date of 1957—these dates have led to confusion about the design date of the test stand.)

The Washington Iron Works of Seattle manufactured the revolving crane. Drawings for the crane date to June 1942, with adaptation for the Redstone Arsenal in October 1953. Use of a World War II stock piece of equipment to augment Building 4572 is in keeping with the frugality and creativity manifested at the Redstone Arsenal by the German scientists and engineers developing the guided missiles program during the early 1950s. A full set of drawings for the crane, before its adaptation as Building 4573, exist in the NASA History Office flat files in a hard-cover portfolio annotated with the name “Weidner.”

Historical Data Continued

In 1956, Mr. H.K. Weidner was the Deputy Director of the Structures and Mechanics Laboratory, working under Directors Dr. Wilhelm Raithel (1955 and earlier) and Mr. William A. Mrazek (as of 1956). These men were all Project Paperclip recruits who had accompanied Wernher von Braun to the Redstone Arsenal from Peenemünde, via Fort Bliss. Building 4573 is illustrative of the hands-on involvement of the Paperclippers in the early design of testing facilities, paralleling their *ad hoc* construction of Building 4665.

First-use date for Building 4572 is unverified and confused in documentary sources. *Aviation Week* illustrates Buildings 4572 and 4573 as of February 1956, inclusive of a Redstone missile emplaced in the west test position.

An Army history of 1961 notes a construction completion date of August 1956. Most probable are shake-down tests using Buildings 4572 and 4573 as of late 1954.

Historical Data Continued

Maurice H. Connell & Associates of Miami augmented the east position of the test stand in 1958-1959, inclusive of the 100-ton attached crane, loading and moveable platforms, a flame bucket, added fuel storage and value pits, and a tall, earthen-bermed observation bunker (the former Building 4571) to the south.

By late 1958, the Army was testing the Jupiter in the west test position, and the Juno V in the east position. The Juno V, renamed, became the Saturn booster vehicle.

As of mid-1961, NASA had made plans to augment the west position to 1.5 million pounds of thrust, to create a double-position static test stand for the Saturn I vehicle. Maurice H. Connell handled this modification in 1962. After completion of the Saturn program at Marshall, engineers again modified the west position of Building 4572 for testing of a solid rocket booster for the Space Shuttle program.

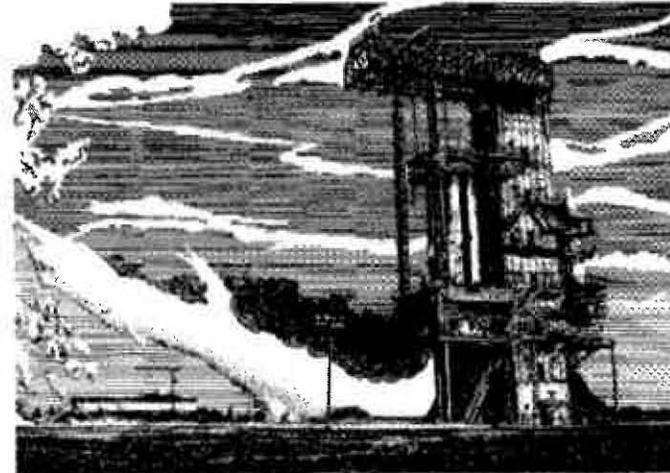
Significance

Buildings 4572 and 4573 are a highly significant test complex in the east test area. Building 4572 is the first permanent test stand designed for the Redstone Arsenal, following upon the interim facilities of Building 4665. The tentative circumstances of the early missile and space program as well as the limited funding for such efforts during the Korean War are also evoked in the use of a World War II revolving crane to create the gantry on site, Building 4573.

The Army and NASA tested the Redstone, Mercury-Redstone, Jupiter, Juno, Saturn, and solid rocket booster for the Space Shuttle in the two positions of the stand. Building 4572 is a National Historic Landmark. As appropriate, the National Park Service is recommended to amend the landmark nomination to include Building 4573 as an integrated ancillary structure servicing the test stand.

INVENTORIED BY: Karen J. Weitze, Lori Lilburn, and Carrie Gregory, EDAW Inc., San Diego, California, 92101. (619) 233-1454 January 2002. See bibliography for sources.

Recordation & Mitigation



Saturn I booster test firing June 1960, as captured by an archival photograph from MSFC's Collection

This important test stand was documented by HAER in 1996. Their documentation is the highest level of recordation and interpretation available and provides us with a historic record of the stand and the role that it has played. Along with their records (which are archived in the Library of Congress and available on their website) MSFC has an extensive record of drawings and photographs in our archives covering the stand and its evolution over the years.

The HAER level I drawings, photographs and history along with our extensive construction document files, historic files, photographic files, testing documents and our 2003 Historical Assessment of Marshall Space Flight Center provide a very detailed record of the stand and its usage since construction. We do not propose any additional recordation or mitigation.

Public Access

Marshall Space Flight Center is located on a secure Army Base with restricted access. Test Stand 4572 is further secured within an additional layer of security control that requires security and safety clearances for access.

The nature of testing NASA's rocket components is not a process that is safe for the public to participate in and there are portions of the testing and components that must be kept classified and protected from foreign intelligence and terrorist activities. As a result, public access is not allowed.

Marshall Space Flight Center is working to arrange guided bus tours of certain areas of the Center that could include viewing of this stand when conditions allow safe access.

Photo of 4572

(March 1961 - Looking North)

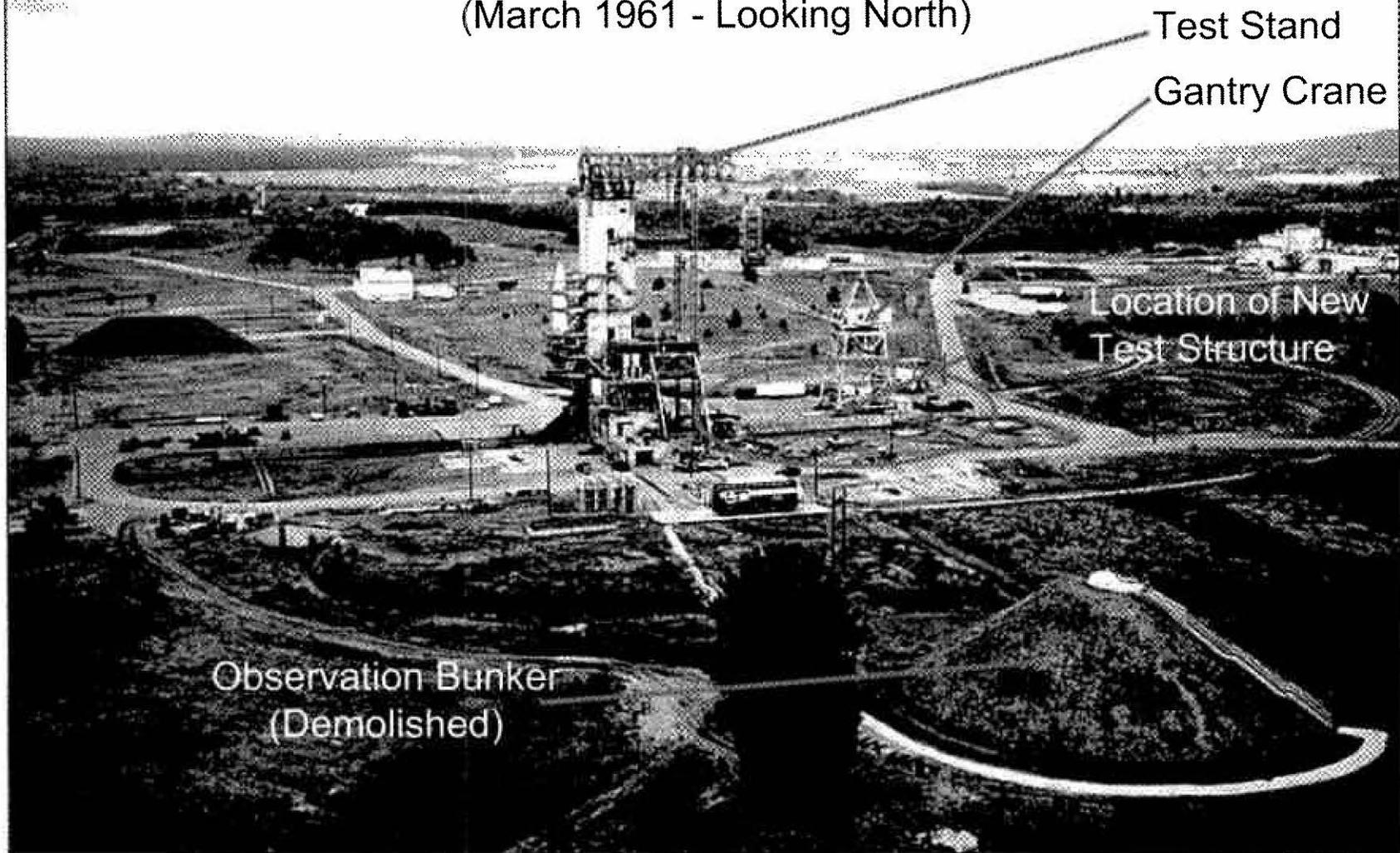


Plate 36. Building 4571 (foreground right) and Buildings 4572-4573 (middleground center). In Army Ordnance Missile Command, *Facilities Briefing*, 7 March 1961. Redstone Arsenal History Office.

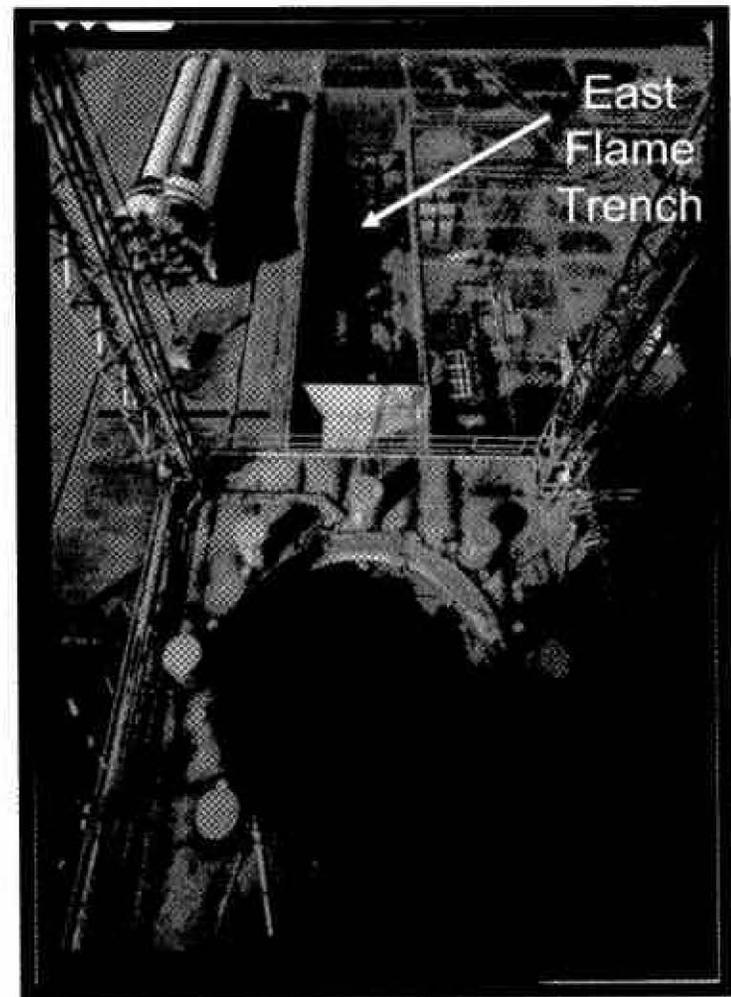
HAER Level I Documents

Following are six HAER drawings of the Static Test Stand. Also, there are 51 photographs of the stand and surrounding test area available on the HAER website (also in the Library of Congress)

HAER Website:

http://memory.loc.gov/ammem/collections/habs_haer/

This is one of the HAER photos showing the east flame trench

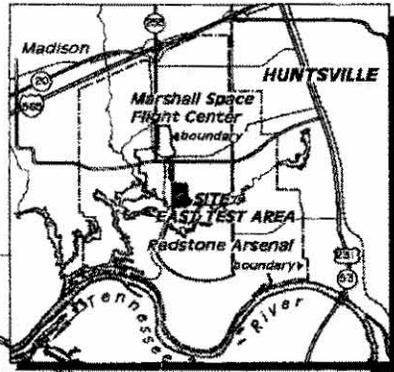




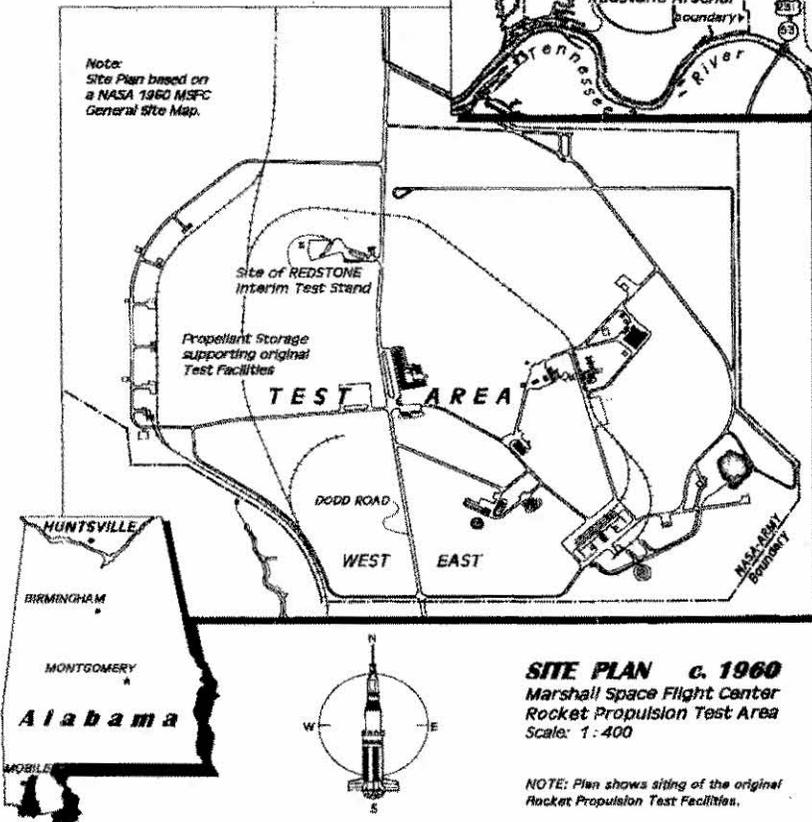
ROCKET PROPULSION TEST FACILITIES

**MARSHALL SPACE FLIGHT CENTER
U. S. ARMY REDSTONE ARSENAL**

VICINITY MAP 1996
Huntsville Region
Scale 1" = 1.5 miles
Madison Quadrangle
UTM 16, 531260, 3831780

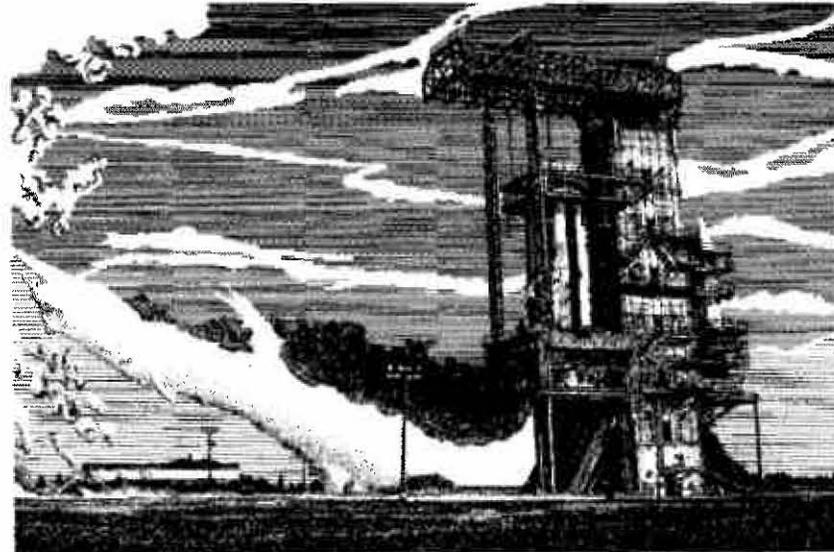


Note:
Site Plan based on
a NASA 1960 MSFC
General Site Map.



SITE PLAN c. 1960
Marshall Space Flight Center
Rocket Propulsion Test Area
Scale: 1:400

NOTE: Plan shows siting of the original
Rocket Propulsion Test Facilities.



Saturn I booster test firing June 1960, as captured by an archival photograph from MSFC's Collection.

In the 1960s mankind flew for the first time into outer space. This vast new frontier was opened by a new technology, liquid propellant rocketry. Liquid rocketry had been heralded as a means to space flight since the 1920s, but at mid-century the liquid rocket was refined by the military as a weapon called the guided missile. The U.S. Army's guided missile experts worked at Redstone Arsenal near Huntsville, Alabama. Led by Wernher von Braun, the team designed and developed guided missiles and test facilities that could be adapted for their long-range goal of manned space exploration.

In response to the Soviet launch of Sputnik, the world's first artificial satellite, the U.S. Congress established the National Aeronautic and Space Administration (NASA) in 1958. Two years later, NASA assumed control of the Army's top liquid rocket experts and all of the production and testing facilities at the heart of the Redstone Arsenal. What once had been the Army's guided missile center was renamed NASA's George C. Marshall Space Flight Center (MSFC), and the Redstone Arsenal's guided missile test facilities became MSFC's East Test Area facilities. At the same test site where the Army's Jupiter missile was born, massive Saturn rocket boosters were developed for the historic Apollo Moon mission.

These drawings explore the liquid-rocket testing facilities built and operated by the von Braun team at Redstone Arsenal, with a focus on questions of

function and adaptability. How were these facilities used to refine liquid-rocket launch vehicles, and how were they modified to hasten the development of the Apollo-Saturn boosters that sent the first man to the Moon?

This recording project is part of the Historic American Engineering Record (HAER), a division of the National Park Service devoted to the documentation of the engineering and industrial heritage of the United States. The project was cosponsored by the Facilities Office of the Marshall Space Flight Center, with the assistance of Mr. Pete Allen. Special gratitude is given to the engineers and operators of the East Test Area who assisted the recording team in accurately representing the site and its operations.

Field work, measured drawings, photographs and a historical report were prepared under the general direction of Eric N. DeLony, Chief of HAER. The project was managed by Richard J. O'Connor, HAER Historian and Thomas M. Behrens, HAER Architect. The field team consisted of supervisory architect Marianne M. Graham, AIA (Annapolis, Maryland); historian Dan Bonenberger (West Virginia University); architectural technicians Wendy M. Hillis (University of Virginia), Lori A. Koch (Texas Tech University), Randy M. Plesance (Tulane University) and Anthony P. Tiberia (Tulane University); and HAER Photographer Jet Lowe.

Marjianne M. Graham, Summer 1996, Marcela Lopez de Santa Maria
MARSHALL SPACE FLIGHT CENTER, EAST TEST AREA
RECORDING PROJECT
HUNTSVILLE, ALABAMA
A.L. 1312-E

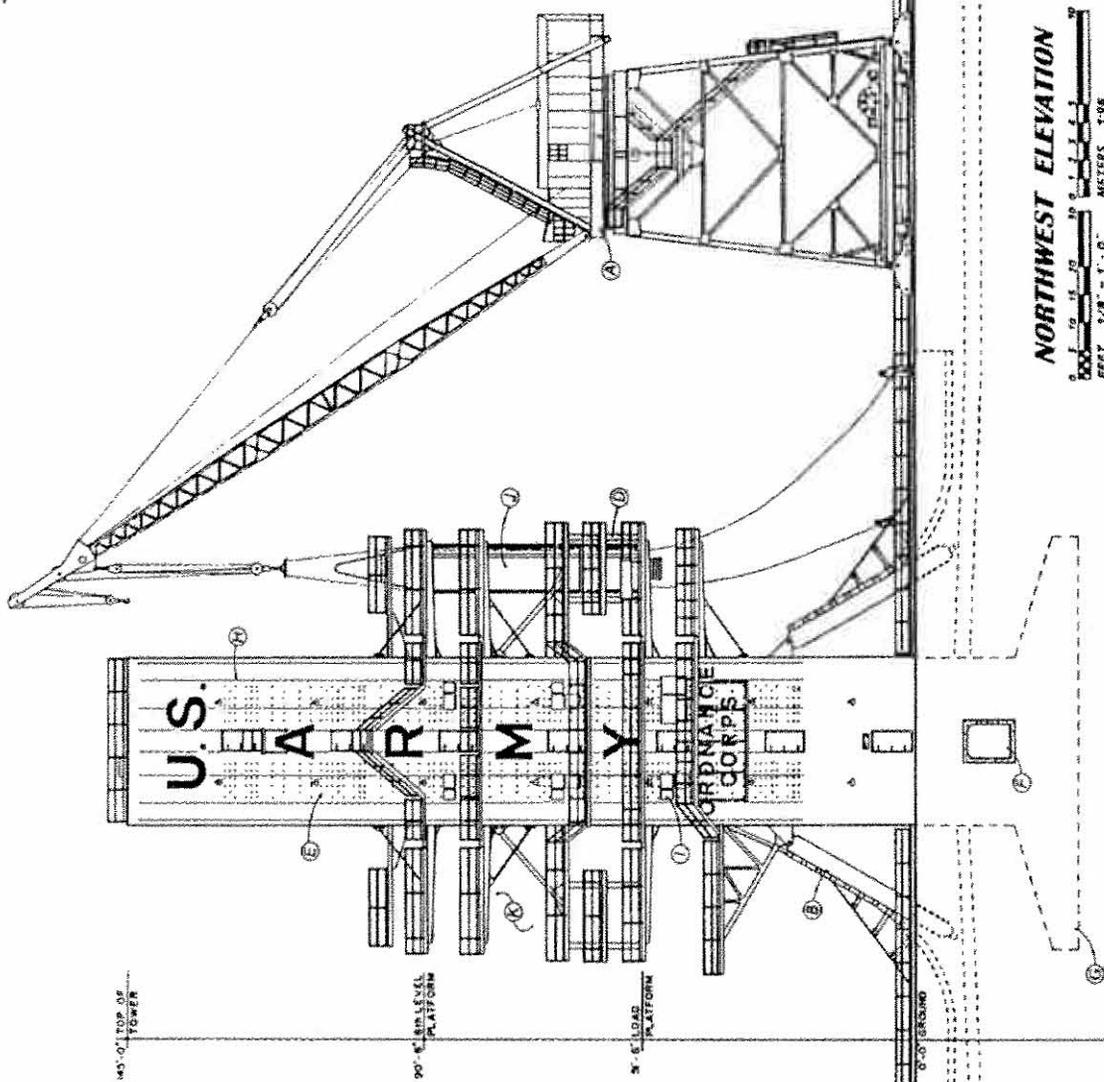
STATIC TEST TOWER PHASE I - C. 1957



**U. S. ARMY
JUPITER ROCKET**

During a test launch in May 1957, a Jupiter flew over 1000 nautical miles, becoming America's first IRBM (intermediate range ballistic missile). Two years later, its atomic warhead was replaced by upper stage rockets and aeriatric payloads. In this configuration, known as Juno II, the booster was used for space exploration.

Height	60 feet
Diameter	105 inches
Weight, fueled	110,000 lbs.
Propellants	Lox and RP-1
Engine	S-3D
Thrust	150,000 lbs.
Range	1600 miles
Velocity	10,000 mph
Prime Contractor	Chrysler
S-3D Engine by	Rocketdyne



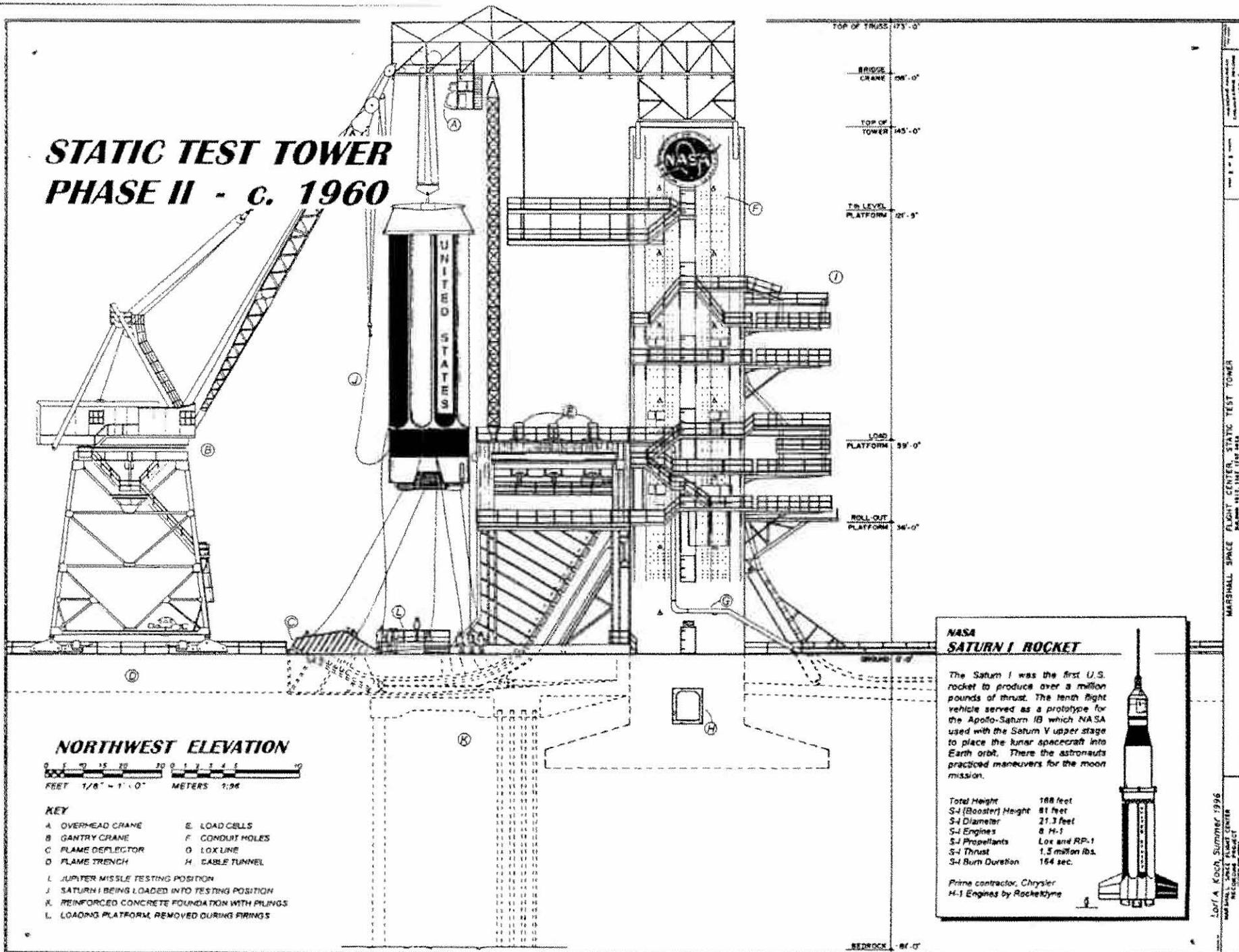
NORTHWEST ELEVATION



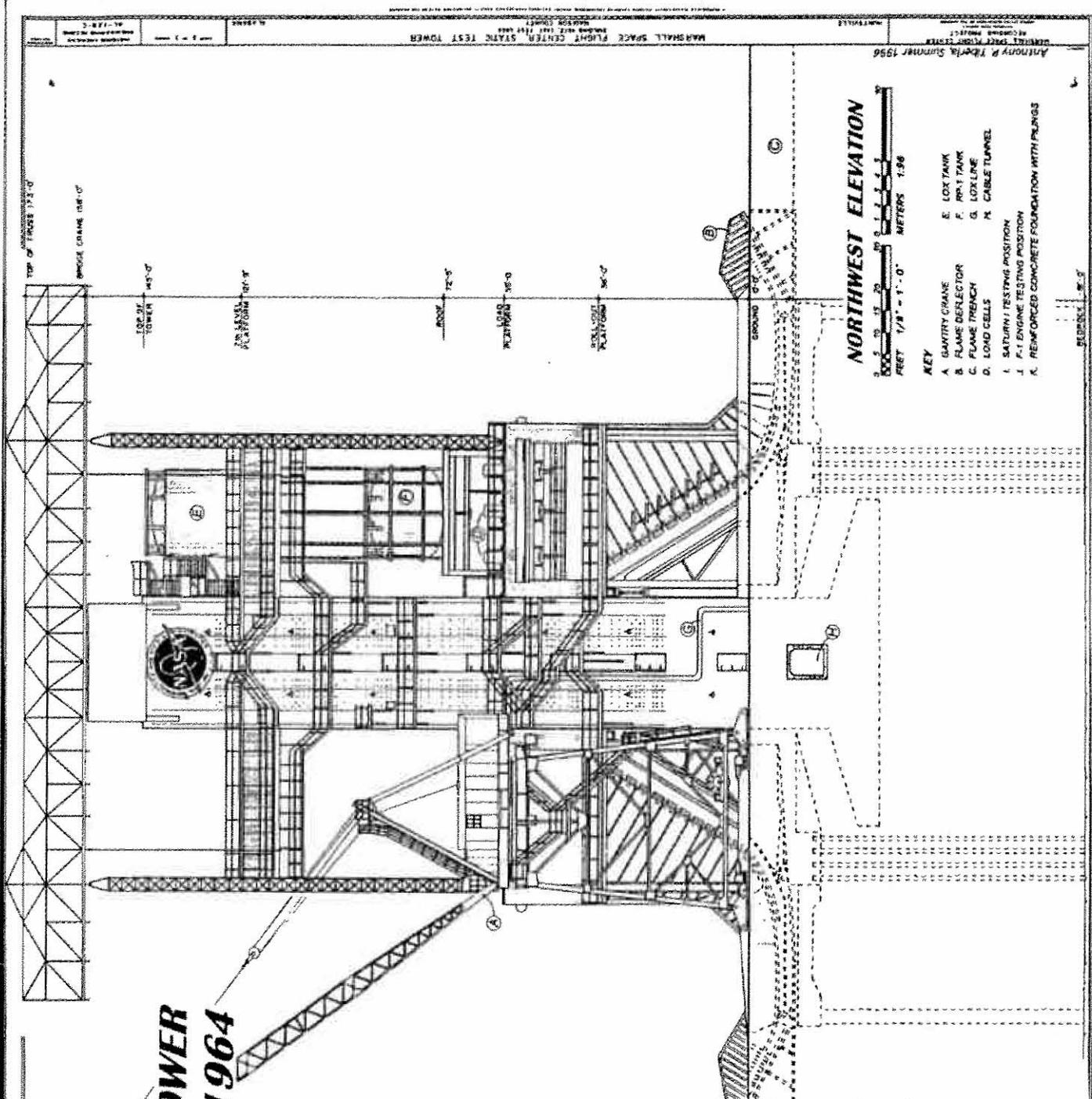
- KEY**
- A GANTRY CRANE
 - B FLAME DEFLECTOR
 - C FLAME TRENCH
 - D LOAD CELLS
 - E EXTERNAL TERMINAL PANEL COVERS
 - F JUPITER BEING LOADED INTO TESTING POSITION
 - G ADDITIONAL JUPITER MISSILE TESTING POSITION
 - K COMBUST HOLES
 - L CABLE TUNNEL
 - M CONIC FOUNDATION
 - N UNISTROT SYSTEM

MARSHALL SPACE FLIGHT CENTER, STATIC TEST TOWER
 RANDY M. PERSINGER, SUMMER 1986
 1/8" = 1'-0" METERS 1:98

STATIC TEST TOWER PHASE II - c. 1960



STATIC TEST TOWER PHASE III - C. 1964



NASA SATURN V ROCKET

In 1969 the Saturn V rocket sent the first humans to the moon. The booster stage (S-IC) was powered by five F-1 engines that were developed at the Static Test Tower.

Total height	363 feet
S-IC height	138 feet
S-IC diameter	65 feet
S-IC weight, fueled	4.9 million lbs.
S-IC thrust	7.6 million lbs.
Propellants	Lox and RP-1

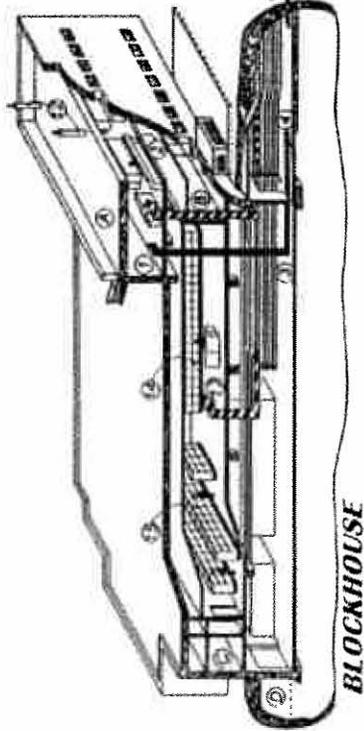
Rocketdyne F-1 Engine

PROPULSION SYSTEM TESTING

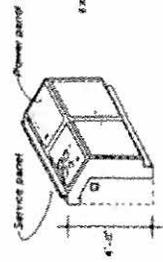
Static testing of the Saturn I booster, shown here, began in the test area in 1960. Engineers and technicians performed static tests of the Saturn so they could study and improve the entire propulsion system. A static test was much like an actual launch, except that the booster was restrained and wired to many instruments. Engineers analyzed the data from these instruments to locate and correct faulty components, a desperately important step for success in manned space exploration.

The static test began when an engineer in the control room (1) pressed the launch button on the control panel (2). Signals traveled down a set of cables into the basement (3) of the Blockhouse. The cables ran through a tunnel (4) for 955 feet into the basement of the **STATIC TEST TOWER** where they entered the terminal room (5), a working space where all wires ended. From the terminal room, some control signals were routed to the ground support equipment (the various electrical, pressurized, and propellant units that supported a booster prior to launch) so that the propulsion system would get the proper support as the launch sequence began. Other control commands entered the tower (6) and continued traveling up cables into the booster (7) and continued traveling into the main stage firing.

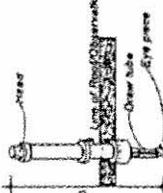
The thrust of the booster was absorbed and registered via eight load cells (8). Similarly, changes in pressure, temperature, and vibrations within the propulsion system were sensed by hundreds of transducers that had been strategically placed prior to the test. This information was transmitted along wires that ran back into the tower (9), and down to the terminal room (10). The data left this room and headed back up the tunnel (11). A small amount of information branched off and went up to the control room, where the test was being observed through three periscopes (12). The rest of the information went into the recorder room (13) where it was observed on strip chart recorders (14) and oscillographs (15). After each test the engineers analyzed all of the test records, looking for abnormalities. Faulty components prompted further investigations at the test facilities. Flawless boosters were readied for flight tests to further prepare the Saturn I launch vehicle for its historic role in the Apollo Program.



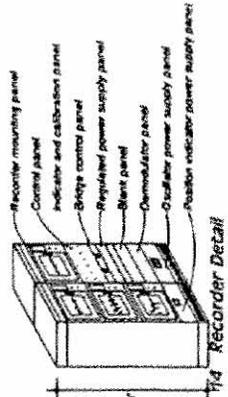
BLOCKHOUSE



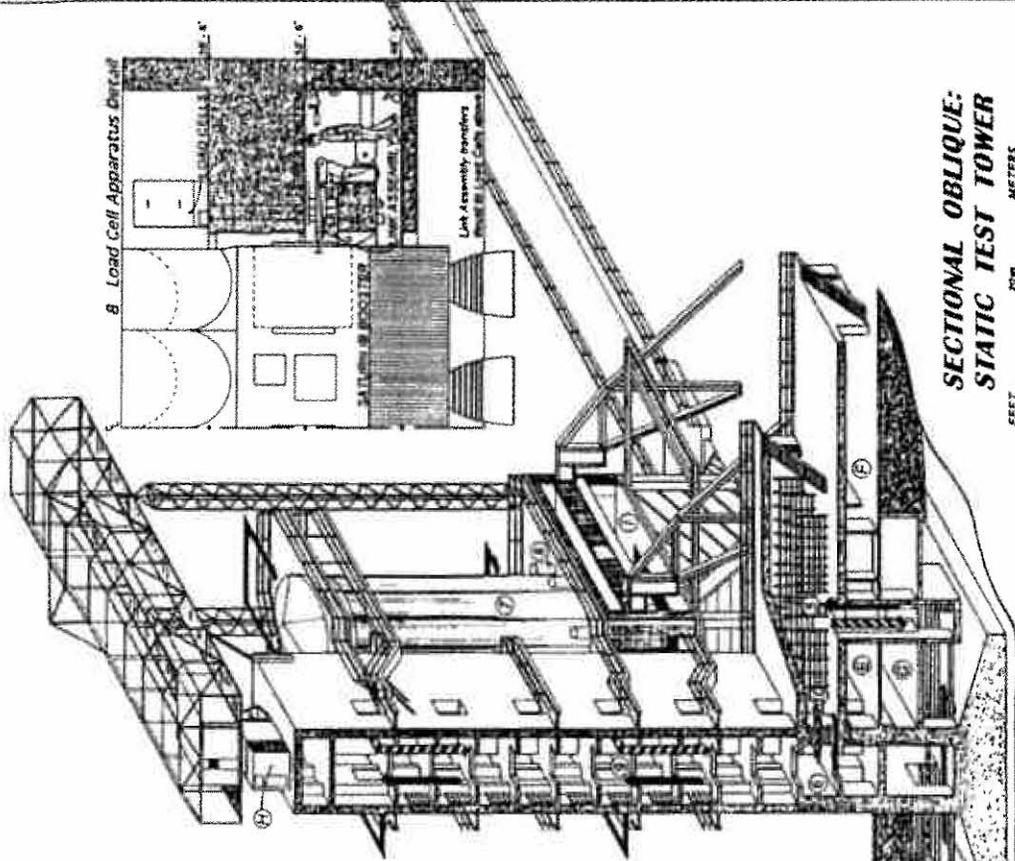
2 Control Panel Detail



12 Periscope Detail



14 Recorder Detail



SECTIONAL OBLIQUE: STATIC TEST TOWER



- KEY**
- A. OBSERVATION DECK
 - B. OBSERVATION ROOM
 - C. DARK ROOM
 - D. FUTURE TUNNEL
 - E. GENERATOR ROOM
 - F. WORKSHOP
 - G. EXCAVATED SPACE
 - H. OVERHEAD CRANE
 - I. RETRACTING FLOOR

↑ PATH OF CONTROL

↙ PATH OF INSTRUMENTATION