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GEORGE C. MARSHALL SPACE FLIGHT CENTER

HUNTSVILLE, ALABAMA

VISUAL AIDS LIBRARY

SLIDE GUIDE

GRAPHIC ENGINEERING AND MODELS BRANCH
MANAGEMENT SERVICES OFFICE

MAY 1967

National Aeronautics and Space Administration

NASA

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

TO Slide Guide Recipients DATE October 27, 1967

FROM Chief, Graphic Engineering and Models Branch, MS-G

SUBJECT Revisions to the Visual Aids Library Slide Guide

In order to provide you with current updated presentation material, the attached revisions should be made in your Visual Aids Library Slide Guide. Changes will be accomplished in the following manner:

1. Obsolete charts should be crossed out of the book.

2. Chart number changes should be made in ink.

3. New charts will be added by changing pages or inserting additional pages.

If your office has no further need for the Slide Guide or does not have time to make the required changes, please return it to this office for re-distribution to other users. Please notify this office of any changes to be made in the mailing addresses.

F. Duke

MSFC - Form 488 (August 1960)

THE FOLLOWING PAGES SHOULD BE REVISED AS INDICATED:

PAGE NUMBER	ACTION	CHART NUMBER EFFECTED
13	Obsolete	Cross Out Chart ED 825 Upper Left Corner
31	Obsolete	Cross Out Chart PA 126 Lower Left Corner
32	Change Number	Lower Left Chart to PA 117
35	Obsolete	Cross Out Charts, IND 2013 Upper Left Corner IND 2014 Upper Right Corner IND 2015 Lower Left Corner
41	Change Pages	Add ED 724 and IND 2045
109	Change Numbers	Lower Left Chart to Read MSFC-67-PA 116 and Lower Right Chart to Read MSFC 67-PA 118
198	Change Page	Add IND 7865
201	Change Pages	Obsolete IND 7200-1,2,3, Revise IND 7200-4
202	Change Pages	Revise IND 7200-5,6,7,8
203	Change Pages	Revise IND 7200-9,10,11,12
204	Change Pages	Revise IND 7200-13, Limit Use of IND 7200-14, 15, 17
208 A&B	Add New Page	Add MS-G 93-5-66, IND 7200-17, 18, MS-G 109 Add IND 7200-19, 20, 21, and 22
208 C&D	Add New Page	Add IND 7200-23, 24, and 25
216	Changing Pages	Add PA 3225-1, -2, and -3
216A	Add New Page	Add PA 3225-4 and -5
228 A&B	Add New Page	Add MS-G 5077, 5078, and MS-G 5079
232	Change Numbers	Upper Right Will Read MS-G 1316 Lower Left Will Read MS-G 1317
245	Change Number Obsolete	Lower Left ED-1302 To Read IND 2039 Lower Right MS-G 84-65
250	Obsolete	Upper Left Chart ED-1333
252	Add New Page	Add Charts MSFC-67-IND 1200-109

THE FOLLOWING PAGES SHOULD BE REVISED AS INDICATED:

PAGE NUMBER	ACTION	CHART NUMBER EFFECTED
256	Obsolete	Lower Right Chart RDO 2105
266	Change Numbers	Lower Left Chart Will Read R&DO 7453
		Lower Right Chart Will Read R&DO 7454
268	Change Numbers	Upper Right Chart Will Read R&DO 7455
286	Change Page	Replace Numbers On Upper Right to R&DO 7447
395	Change Page	Add Chart MS-G 98-66
399	Change Numbers	Lower Right Chart Will Read IND 437
402	Obsolete	Lower Right Chart IND 401
407	Change Page	Add Chart PA 3223
418	Add New Page	Add NASA Charts S66-54560,63034,37910,54893
		NASA S65-45737, 45746, NASA S67-16592
442A	Add New Page	Add Charts MS-G 113, 114, 115, and MS-108
451	Change Page	Add Chart PA 3243
452	Change Page	Add Charts PA 3239, 3240, 3241, 3242
47	Change Page	Add Chart ED 3508

PREFACE

This reference document catalogues all MSFC oriented visual aids filed in the Visual Aids Library of Marshall Space Flight Center. These visual aids are updated by the Graphic Engineering & Models Branch, Industrial Operations Program Management Information Office, and the Research and Development Operations Management Office.

The purpose of the Visual Aids Library is to provide management data visuals in the form of slides (3 X 4 and 2 X 2), or black and white prints, to MSFC offices and laboratories, and other centers, who have a valid requirement. The visual aids are issued on a loan basis in order to obtain as wide a use for each visual and to assure that the latest revisions are incorporated in the issued item. Visuals may be ordered from the Visual Aids Library, located on the 10th floor of building 4200 (Phone 876-7237, 876-6960, 876-0983). In addition to the visuals published in this book, photographs from prime contractors are available from Industrial Operations, Program Management Information Office, Room 621, building 4201.

Visuals with erroneous or obsolete information should be brought to the attention of the Visual Aids Library, preferably in writing, so that corrections can be made immediately.

This publication will be kept current through distribution of pages of new visuals and notification will be made on obsolete visuals so they may be crossed out in the catalogue. Comments and suggestions concerning this publication will be greatly appreciated. Changes in the distribution lists should be directed to Mr. Gordon O. Willhite, or Mrs. Opal Tabor, Visual Aids Library, MS-G.

V. C. Sorensen

V. C. Sorensen
Chief, Management Services Office
George C. Marshall Space Flight Center

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MSFC MANPOWER, FINANCAL, AND CONTRACTORS CHARTS

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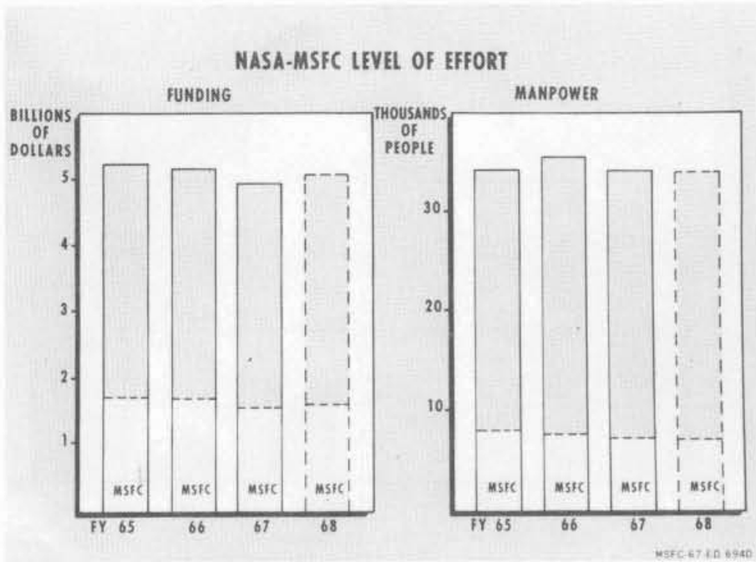
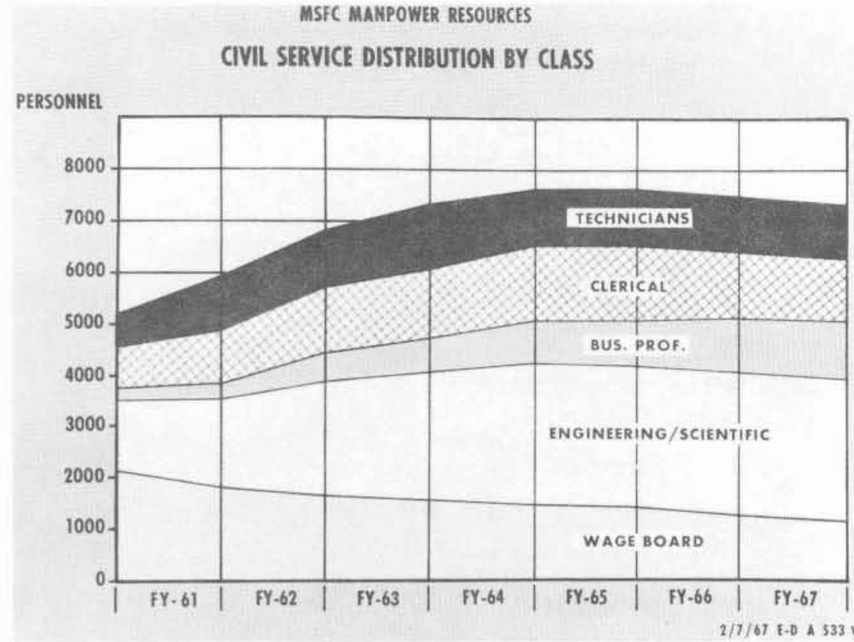
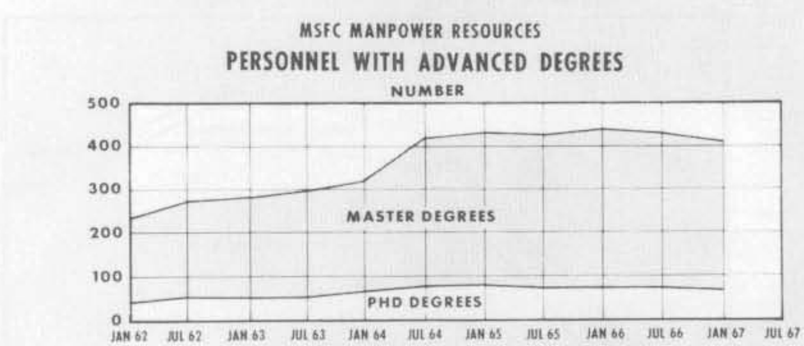


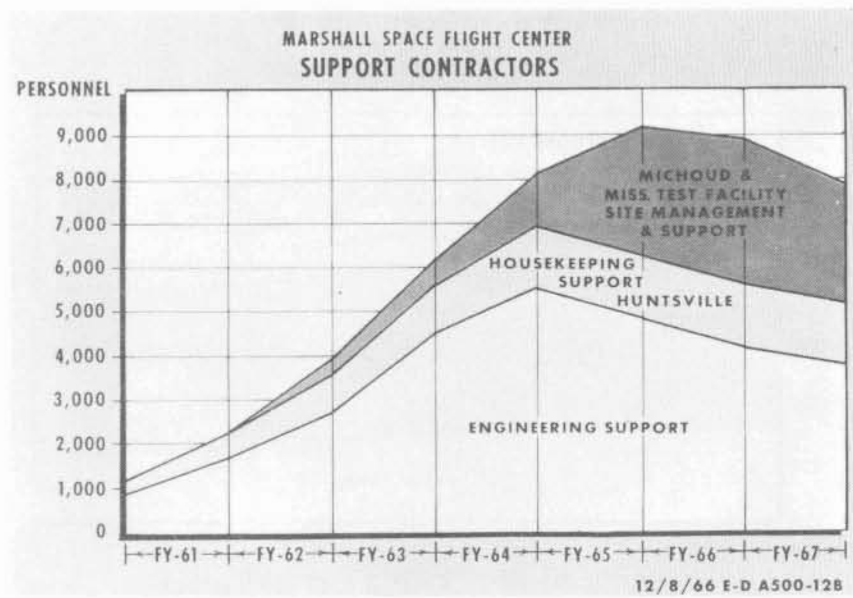


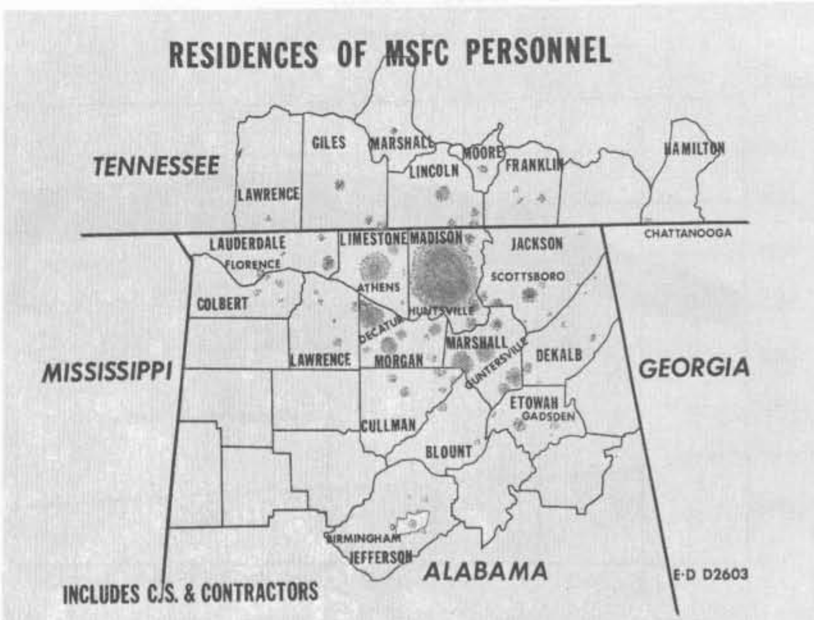


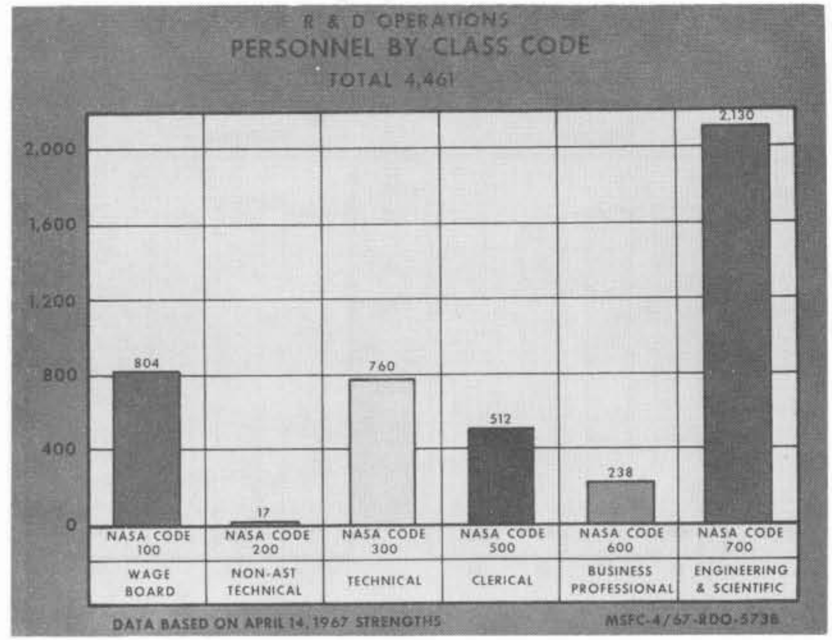
PERCENTAGE OF TOTAL EMPLOYEES WITH ADVANCED DEGREES

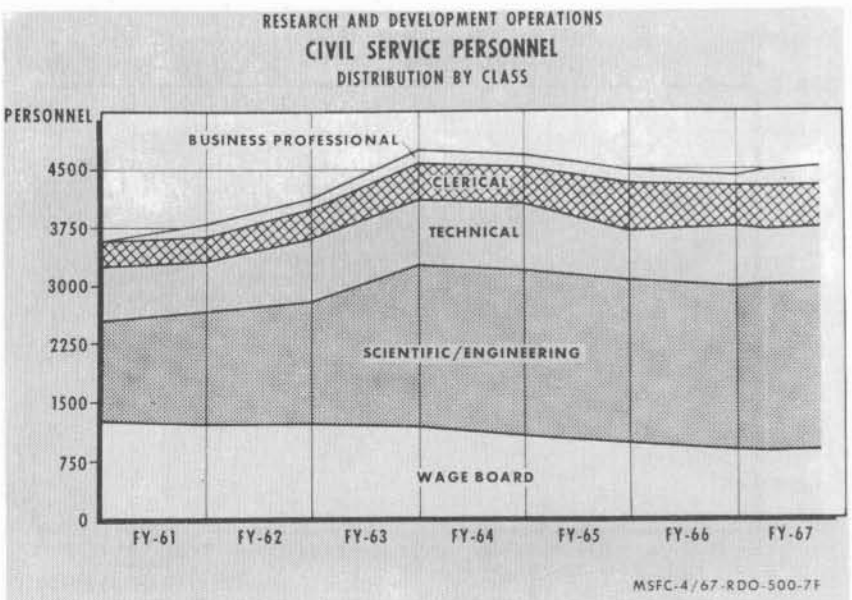
DEGREES	JAN 62	JUL 62	JAN 63	JUL 63	JAN 64	JUL 64	JAN 65	JUL 65	JAN 66	JUL 66	JAN 67	JUL 67
PHD	0.7%	0.8%	0.8%	0.7%	0.9%	1.0%	1.0%	1.0%	1.0%	1.0%	0.9%	
MASTER	3.1%	3.2%	3.2%	3.4%	3.5%	4.5%	4.6%	4.5%	4.8%	4.7%	4.5%	
TOTAL	3.8%	4.0%	4.0%	4.1%	4.4%	5.5%	5.6%	5.5%	5.8%	5.7%	5.4%	

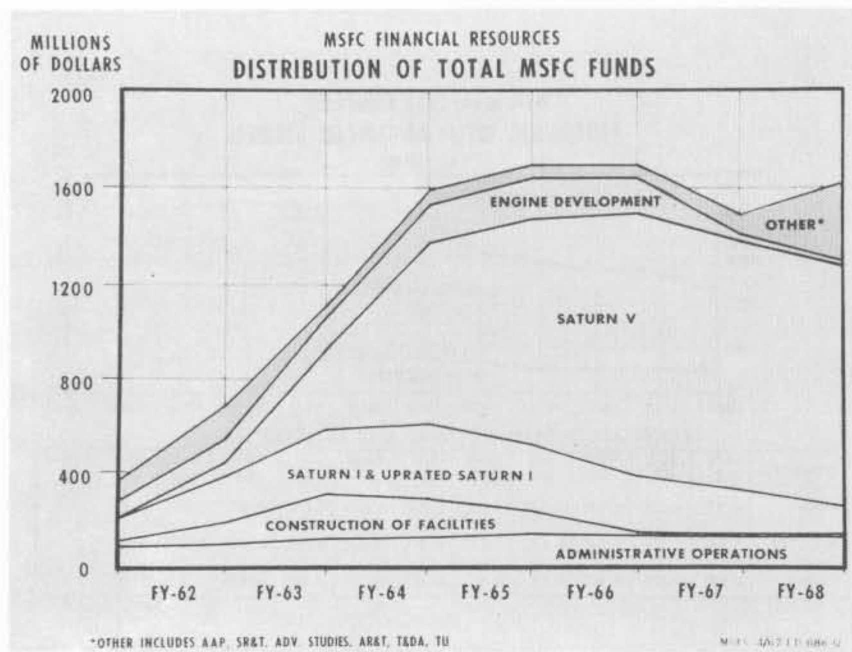
MSFC-67-ED 523F

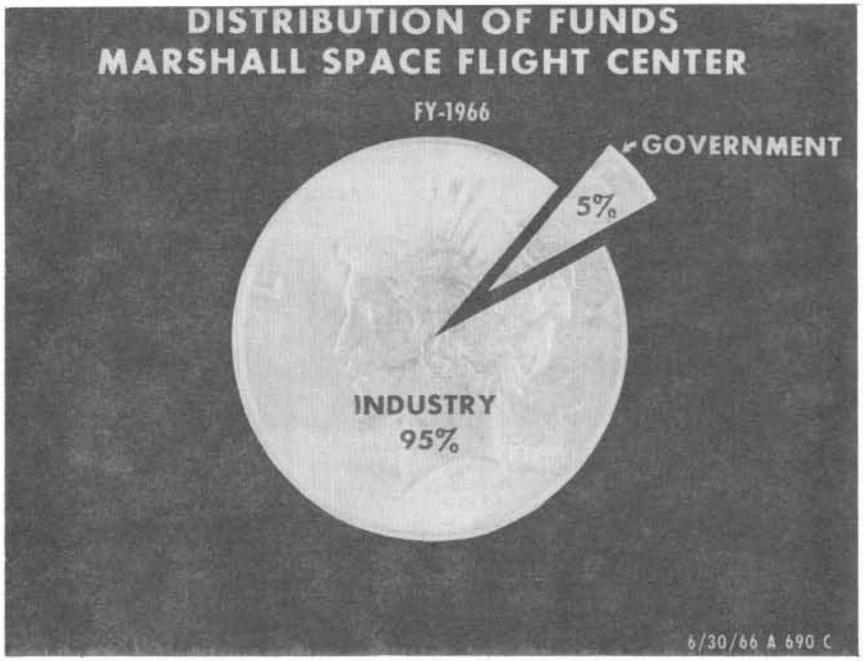


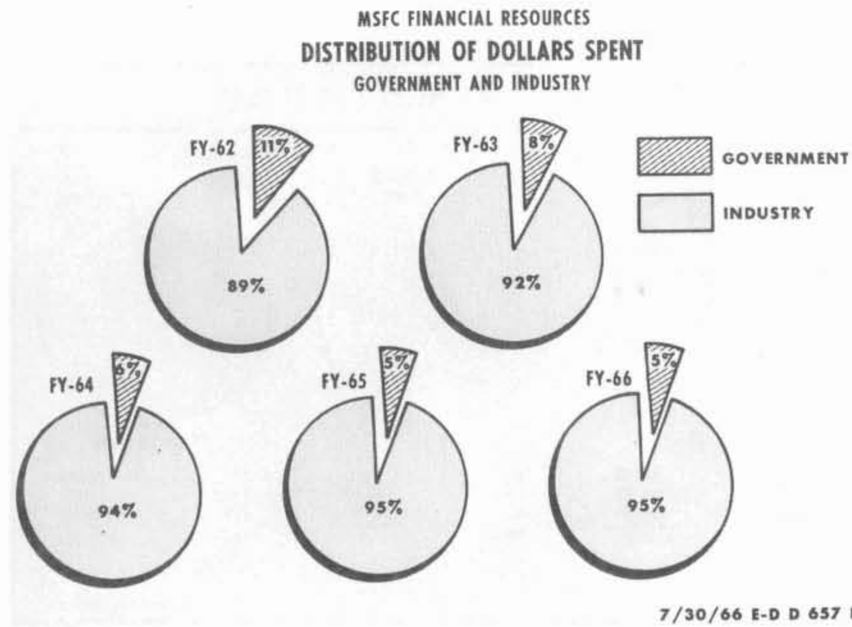

RESIDENCES OF MSFC PERSONNEL
TENNESSEE
GILES
MARSHALL
MOORE
LINCOLN
FRANKLIN
HAMILTON
LAWRENCE
CHATTANOOGA
LAUDERDALE
FLORENCE
LIMESTONE
MADISON
JACKSON
ATHENS
SCOTTSBORO
COLBERT
HUNTSVILLE
DECATUR
MARSHALL
GUNTERSVILLE
DEKALB
LAWRENCE
MORGAN
MISSISSIPPI
GEORGIA
ETOWAH
GADSDEN
CULLMAN
BLOUNT
BIRMINGHAM
JEFFERSON
ALABAMA
INCLUDES C/S. & CONTRACTORS
E-D D2603

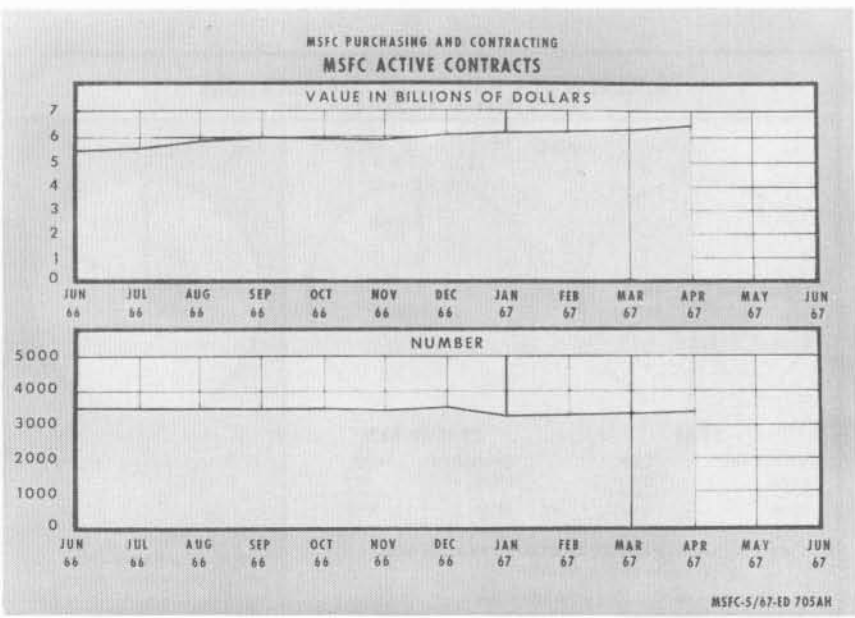

R & D OPERATIONS
PERSONNEL BY CLASS CODE
TOTAL 4,461
2,000
1,600
1,200
800
400
0
804
17
760
512
238
2,130
NASA CODE 100
NASA CODE 200
NASA CODE 300
NASA CODE 500
NASA CODE 600
NASA CODE 700
WAGE BOARD
NON-AST TECHNICAL
TECHNICAL
CLERICAL
BUSINESS PROFESSIONAL
ENGINEERING & SCIENTIFIC
DATA BASED ON APRIL 14, 1967 STRENGTHS
MSFC-4/67-RDO-573B

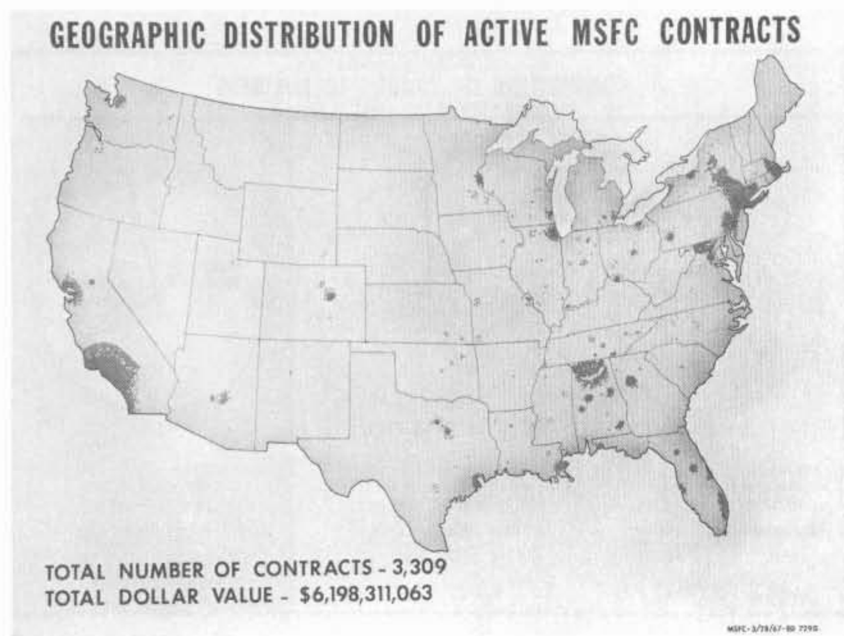

RESEARCH AND DEVELOPMENT OPERATIONS
CIVIL SERVICE PERSONNEL
DISTRIBUTION BY CLASS
PERSONNEL
4500
3750
3000
2250
1500
750
0
BUSINESS PROFESSIONAL
CLERICAL
TECHNICAL
SCIENTIFIC/ENGINEERING
WAGE BOARD
FY-61
FY-62
FY-63
FY-64
FY-65
FY-66
FY-67
MSFC-4/67-RDO-500-7F


MILLIONS OF DOLLARS
MSFC FINANCIAL RESOURCES
DISTRIBUTION OF TOTAL MSFC FUNDS
2000
1600
1200
800
400
0
ENGINE DEVELOPMENT
OTHER*
SATURN V
SATURN I & UPRATED SATURN I
CONSTRUCTION OF FACILITIES
ADMINISTRATIVE OPERATIONS
FY-62
FY-63
FY-64
FY-65
FY-66
FY-67
FY-68
*OTHER INCLUDES AAP, SR&T, ADV. STUDIES, AR&T, T&DA, TU


DISTRIBUTION OF FUNDS
MARSHALL SPACE FLIGHT CENTER
FY-1966
GOVERNMENT
5%
INDUSTRY
95%
6/30/66 A 690 C


MSFC FINANCIAL RESOURCES
DISTRIBUTION OF DOLLARS SPENT
GOVERNMENT AND INDUSTRY
FY-62
11%
89%
FY-63
8%
92%
GOVERNMENT
INDUSTRY
FY-64
6%
94%
FY-65
5%
95%
FY-66
5%
95%
7/30/66 E-D D 657 L

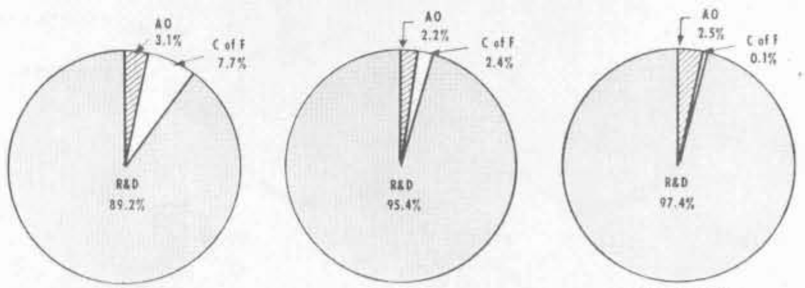

MSFC PURCHASING AND CONTRACTING
MSFC ACTIVE CONTRACTS
VALUE IN BILLIONS OF DOLLARS
7
6
5
4
3
2
1
0
JUN 66
JUL 66
AUG 66
SEP 66
OCT 66
NOV 66
DEC 66
JAN 67
FEB 67
MAR 67
APR 67
MAY 67
JUN 67
NUMBER
5000
4000
3000
2000
1000
0
JUN 66
JUL 66
AUG 66
SEP 66
OCT 66
NOV 66
DEC 66
JAN 67
FEB 67
MAR 67
APR 67
MAY 67
JUN 67
MSFC-5/67-ED 705AH


GEOGRAPHIC DISTRIBUTION OF ACTIVE MSFC CONTRACTS
TOTAL NUMBER OF CONTRACTS - 3,309
TOTAL DOLLAR VALUE - $6,198,311,063

MSFC PURCHASING AND CONTRACTING

PROCUREMENT ACTIONS BY TYPE OF FUNDS

THOUSANDS OF DOLLARS



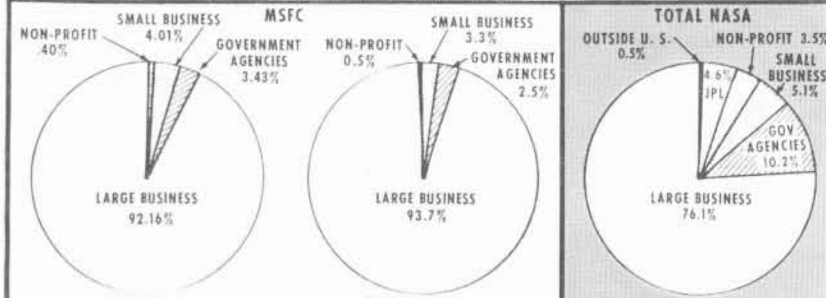
	FY'65	FY'66	FY'67 TO DATE
AO	50,088	35,225	27,528
C of F	124,792	38,049	1,515
R&D	1,439,809	1,513,942	1,090,681
TOTAL	1,614,689	1,587,216	1,119,724

MSFC 3/31/67 ED 706AB (QUARTERLY)

MSFC PURCHASING AND CONTRACTING

PROCUREMENT BY TYPE OF CONTRACTOR

VALUE OF AWARDS IN THOUSANDS OF DOLLARS



MSFC

	FY'66	FY'67 TO DATE
LARGE BUSINESS	1,462,701	1,049,375
GOVERNMENT AGENCIES	54,414	28,138
SMALL BUSINESS	63,730	37,017
NON-PROFIT	6,371	5,194
TOTAL	1,587,216	1,119,724

NOTE: SMALL BUSINESS=LESS THAN 500 EMPLOYEES

MSFC 3/31/67 ED 707 AB (QUARTERLY)

TOTAL NASA — FY'66

LARGE BUSINESS	3,831,800
GOVERNMENT AGENCIES	512,500
SMALL BUSINESS	255,900
NON-PROFIT	177,700
JPL	230,300
OUTSIDE U.S. & POSSESSIONS	23,400
TOTAL	5,031,600

(SOURCE: NASA HEADQUARTERS ANNUAL PROCUREMENT REPORT)

MSFC PURCHASING AND CONTRACTING

COMPETITION IN AWARDS TO BUSINESS

VALUE OF AWARDS IN THOUSANDS OF DOLLARS

	MSFC FY'66	MSFC FY'67 TO DATE	TOTAL NASA FY'66
COMPETITIVE ADVERTISED	7,874	3,286	111,000
COMPETITIVE NEGOTIATED	827,866	845,948	2,581,500
NON-COMPETITIVE	696,997	242,353	1,395,200
TOTAL	1,532,737	1,091,587	4,087,700

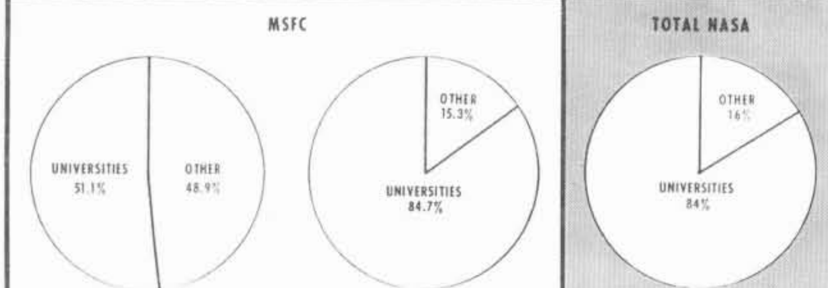
MSFC 3/31/67 ED 708 AC (QUARTERLY)

(SOURCE: NASA HEADQUARTERS ANNUAL PROCUREMENT REPORT)

MSFC PURCHASING AND CONTRACTING

PROCUREMENT - NON-PROFIT ORGANIZATIONS

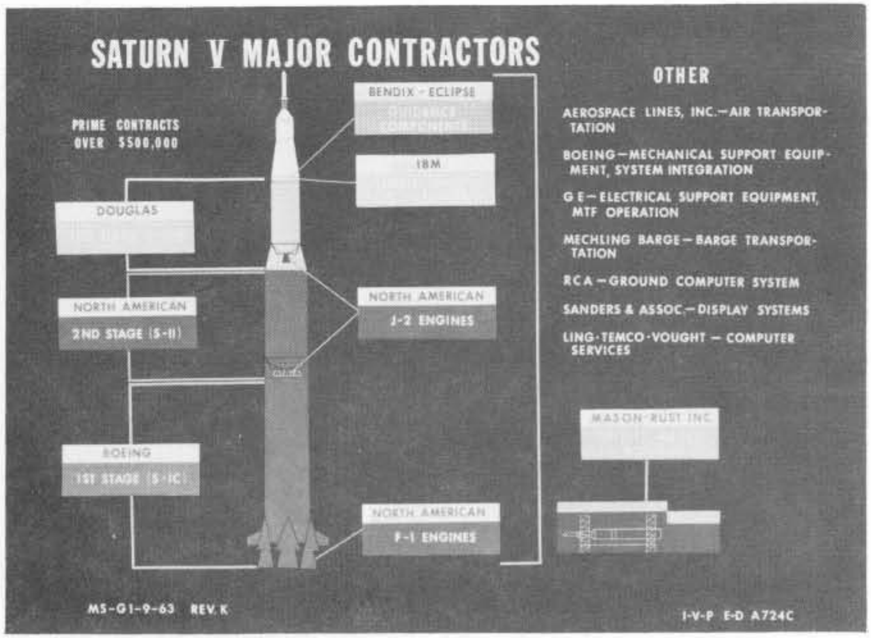
VALUE OF AWARDS IN THOUSANDS OF DOLLARS

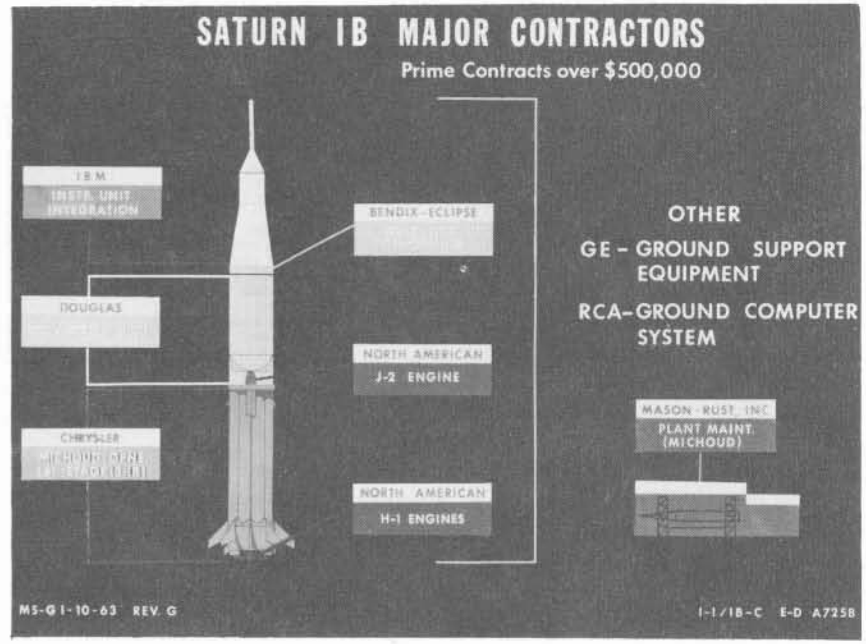


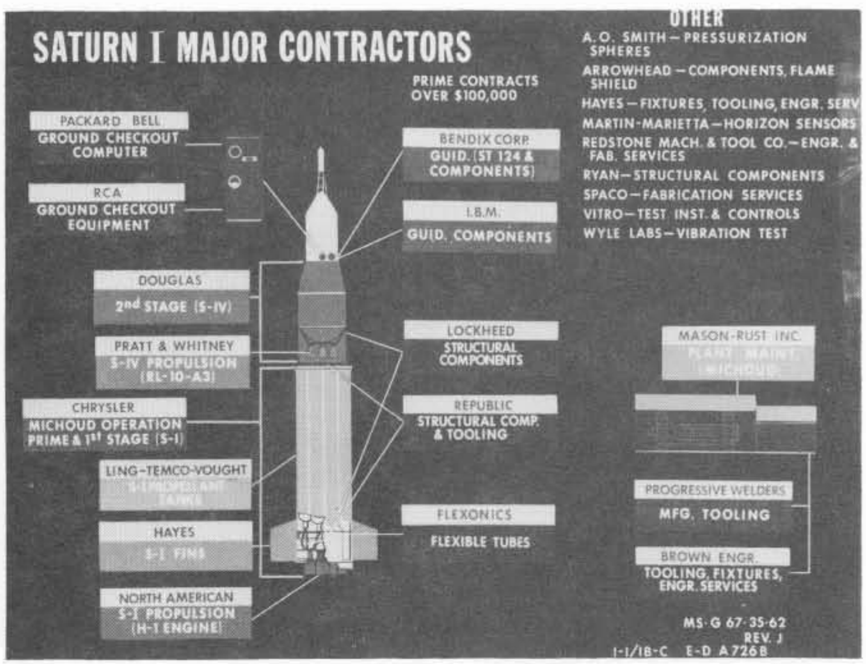
	MSFC FY'66	MSFC FY'67 TO DATE	TOTAL NASA FY'66
UNIVERSITIES	3,254	4,402	150,000
OTHER	3,117	792	27,700
TOTAL	6,371	5,194	177,700

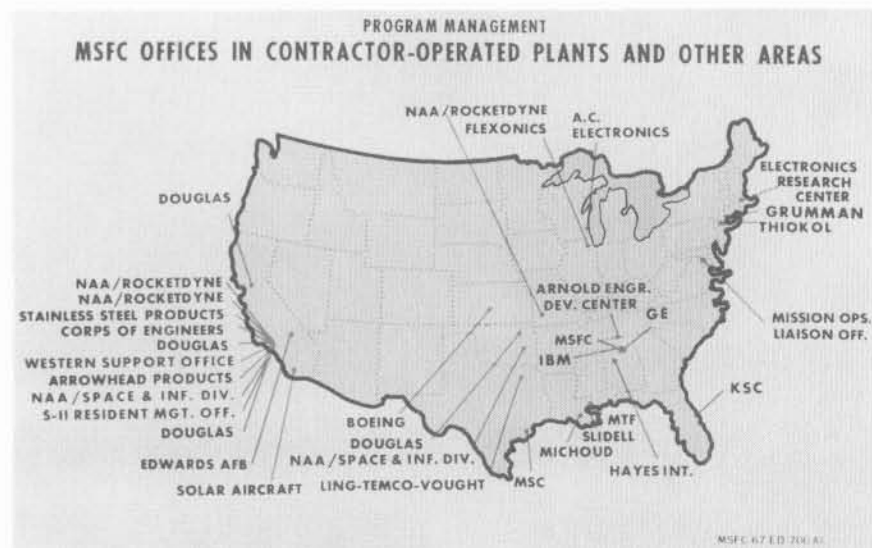
NOTE: OTHER=ORGANIZATIONS CONTRACTING ON NO-FEE BASIS OR ORGANIZED ON NON-PROFIT BASIS

(SOURCE: NASA HEADQUARTERS ANNUAL PROCUREMENT REPORT)


SATURN V MAJOR CONTRACTORS
PRIME CONTRACTS OVER $500,000
BENDIX - ECLIPSE
IBM
DOUGLAS
NORTH AMERICAN
2ND STAGE (S-II)
NORTH AMERICAN
J-2 ENGINES
BOEING
1ST STAGE (S-IC)
NORTH AMERICAN
F-1 ENGINES
OTHER
AEROSPACE LINES, INC.—AIR TRANSPORTATION
BOEING—MECHANICAL SUPPORT EQUIPMENT, SYSTEM INTEGRATION
G E—ELECTRICAL SUPPORT EQUIPMENT, MTF OPERATION
MECHLING BARGE—BARGE TRANSPORTATION
RCA—GROUND COMPUTER SYSTEM
SANDERS & ASSOC.—DISPLAY SYSTEMS
LING-TEMCO-VOUGHT — COMPUTER SERVICES
MASON-RUST INC.
MS-G1-9-63 REV. K
I-V-P E-D A724C


SATURN IB MAJOR CONTRACTORS
Prime Contracts over $500,000
IBM
INSTR. UNIT INTEGRATION
BENDIX-ECLIPSE
DOUGLAS
NORTH AMERICAN
J-2 ENGINE
CHRYSLER
NORTH AMERICAN
H-1 ENGINES
OTHER
GE - GROUND SUPPORT EQUIPMENT
RCA-GROUND COMPUTER SYSTEM
MASON-RUST INC.
PLANT MAINT. (MICHOUD)
MS-G1-10-63 REV. G
I-1/IB-C E-D A725B


SATURN I MAJOR CONTRACTORS
PRIME CONTRACTS OVER $100,000
OTHER
A. O. SMITH—PRESSURIZATION SPHERES
ARROWHEAD—COMPONENTS, FLAME SHIELD
HAYES—FIXTURES, TOOLING, ENGR. SERV
MARTIN-MARIETTA—HORIZON SENSORS
REDSTONE MACH. & TOOL CO.—ENGR. & FAB. SERVICES
RYAN—STRUCTURAL COMPONENTS
SPACO—FABRICATION SERVICES
VITRO—TEST INST. & CONTROLS
WYLE LABS—VIBRATION TEST
PACKARD BELL
GROUND CHECKOUT COMPUTER
RCA
GROUND CHECKOUT EQUIPMENT
BENDIX CORP.
GUID. (ST 124 & COMPONENTS)
I.B.M.
GUID. COMPONENTS
DOUGLAS
2nd STAGE (S-IV)
PRATT & WHITNEY
S-IV PROPULSION (RL-10-A3)
CHRYSLER
MICHOUD OPERATION PRIME & 1st STAGE (S-I)
LING-TEMCO-VOUGHT
HAYES
S-I FINS
NORTH AMERICAN
S-I PROPULSION (H-1 ENGINE)
LOCKHEED
STRUCTURAL COMPONENTS
REPUBLIC
STRUCTURAL COMP. & TOOLING
FLEXONICS
FLEXIBLE TUBES
MASON-RUST INC.
PROGRESSIVE WELDERS
MFG. TOOLING
BROWN ENGR.
TOOLING, FIXTURES, ENGR. SERVICES
MS-G 67-35-62 REV. J
I-I/IB-C E-D A726B


PROGRAM MANAGEMENT
MSFC OFFICES IN CONTRACTOR-OPERATED PLANTS AND OTHER AREAS
NAA/ROCKETDYNE FLEXONICS
A.C. ELECTRONICS
ELECTRONICS RESEARCH CENTER
GRUMMAN
THIOKOL
DOUGLAS
NAA/ROCKETDYNE
NAA/ROCKETDYNE
STAINLESS STEEL PRODUCTS
CORPS OF ENGINEERS
DOUGLAS
WESTERN SUPPORT OFFICE
ARROWHEAD PRODUCTS
NAA/SPACE & INF. DIV.
S-II RESIDENT MGT. OFF.
DOUGLAS
EDWARDS AFB
SOLAR AIRCRAFT
ARNOLD ENGR. DEV. CENTER
GE
MSFC
IBM
MISSION OPS. LIAISON OFF.
KSC
BOEING
DOUGLAS
NAA/SPACE & INF. DIV.
LING-TEMCO-VOUGHT
MSC
MTF
SLIDELL
MICHOUD
HAYES INT.

MSFC PERSONNEL ASSIGNED TO CONTRACTOR PLANTS AND OTHER AREAS

LOCATION	NAME OF CONTRACTOR/OFFICE	PROGRAM	NO. MSFC EMPLOYEES
ALABAMA			
BIRMINGHAM	HAYES INTERNATIONAL	SATURN	1(R-QUAL)
HUNTSVILLE	GENERAL ELECTRIC	SATURN	2(I-I/IB, R-ASTR)
HUNTSVILLE	I.B.M. CORP.	SATURN	15(I-I/IB, R-QUAL, R-ASTR)
CALIFORNIA			
BURBANK	STAINLESS STEEL PRODUCTS	SATURN	1(R-QUAL)
CANOGA PARK	NAA, ROCKETDYNE DIV.	H-1,F-1,J-2 ENGINES	36(I-E, R-QUAL, I-CO, R-ME)
EDWARDS	EDWARDS AFB	F-1 ENGINE	3(I-E, R-QUAL)
HUNTINGTON BEACH	DOUGLAS AIRCRAFT	SATURN,J-2 ENGINE	49(R-QUAL, R-P&VE, I-E, I-CO, R-ASTR, I-I/IB, R-ME, MS-T)
LOS ALAMITOS	ARROWHEAD PRODUCTS	SATURN	1(R-QUAL)
LOS ANGELES	CORPS OF ENGINEERS	SATURN	2(F&D)
SACRAMENTO	DOUGLAS AIRCRAFT	SATURN,J-2 ENGINE	15(I-I/IB, R-QUAL, I-E, R-P&VE)
SAN DIEGO	SOLAR AIRCRAFT	SATURN	2(R-QUAL)
SANTA MONICA	DOUGLAS AIRCRAFT	SATURN	4(R-QUAL, I-I/IB)
SANTA MONICA	WESTERN SUPPORT OFFICE	SATURN, APOLLO	8(R-QUAL, R-ME, I-PL)
SANTA SUSANA	NAA, SPACE & INFO DIV.	J-2 ENGINE	2(I-E)
SEAL BEACH	NAA, SPACE & INFO DIV.	SATURN	12(R-QUAL, R-ME)
SEAL BEACH	S-II RESIDENT MGMT. OFFICE (NAA)	SAT., APOLLO	114(I-V, R-OM, R-QUAL, I-E, R-P&VE, R-ME)
DISTRICT OF COLUMBIA			
WASHINGTON	MISSION OPERS LIAISON OFFICE	ALL PROGRAMS-OSRO	1(I-MO)
FLORIDA			
CAPE KENNEDY	KENNEDY SPACE CENTER	SAT., ENGINE PROJECTS	26(I-DIR, I-CO, I-I/IB, I-V, R-QUAL, R-P&VE, I-E, I-PL, I-MICH)
ILLINOIS			
ELGIN	FLEXONICS CORP	SATURN	1(R-QUAL)

MSFC-5/10/67-ED 718AU CHART 1

MSFC PERSONNEL ASSIGNED TO CONTRACTOR PLANTS AND OTHER AREAS

LOCATION	NAME OF CONTRACTOR/OFFICE	PROGRAM	NO. MSFC EMPLOYEES
KANSAS			
WICHITA	THE BOEING COMPANY	SATURN	2(R-QUAL, I-MICH)
LOUISIANA			
NEW ORLEANS	MICHOUD ASSEMBLY FACILITY	SATURN	244 (I-PL, I-MICH)
SLIDELL	COMPUTER FACILITIES-MICHOUD,MTF	SATURN	7(I-MICH)
MASSACHUSETTS			
CAMBRIDGE	ELECTRONICS RESEARCH CENTER	GEN. CONTRACTS	2(R-QUAL)
MISSISSIPPI			
BAY ST. LOUIS	MISSISSIPPI TEST FACILITY	SATURN	119 (LABOR RELATIONS,MTF,R-QUAL)
MISSOURI			
NEOSHO	NAA, ROCKETDYNE DIV.	H-1 ENGINE	5(R-QUAL, I-E)
NEW JERSEY			
DENVILLE	THIOKOL	C-1 ENGINE	2(I-E, R-QUAL)
NEW YORK			
BETHPAGE	GRUMMAN AIRCRAFT	LUNAR MODULE	1(R-ME)
OKLAHOMA			
McALESTER	NAA, SPACE & INFO DIV.	SATURN	1(R-QUAL)
TULSA	DOUGLAS AIRCRAFT	SAT., APOLLO	3(R-QUAL, R-ME)
TENNESSEE			
TULLAHOMA	ARNOLD ENGINEERING DEVELOPMENT CENTER	J-2 ENGINE	1(I-E)
TEXAS			
DALLAS	LING-TEMCO-VOUGHT	SATURN	1(R-QUAL)
HOUSTON	MANNED SPACECRAFT CENTER	SAT., APOLLO	11(R-DIR, I-S/AA, I-MO, R-ASTR)
WISCONSIN			
MILWAUKEE	A. C. ELECTRONICS	APOLLO	1(R-ME)
			TOTAL 695

MSFC-5/10/67-ED 719AU CHART 2

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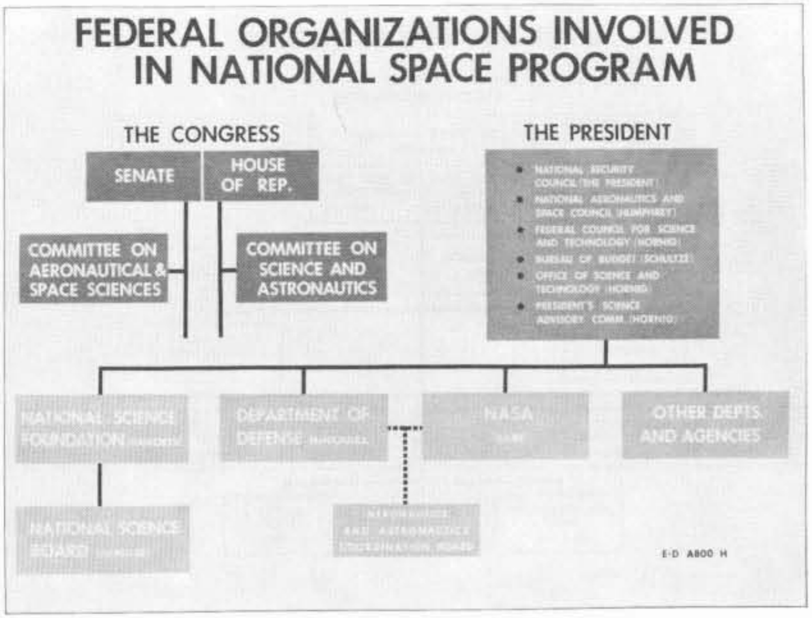
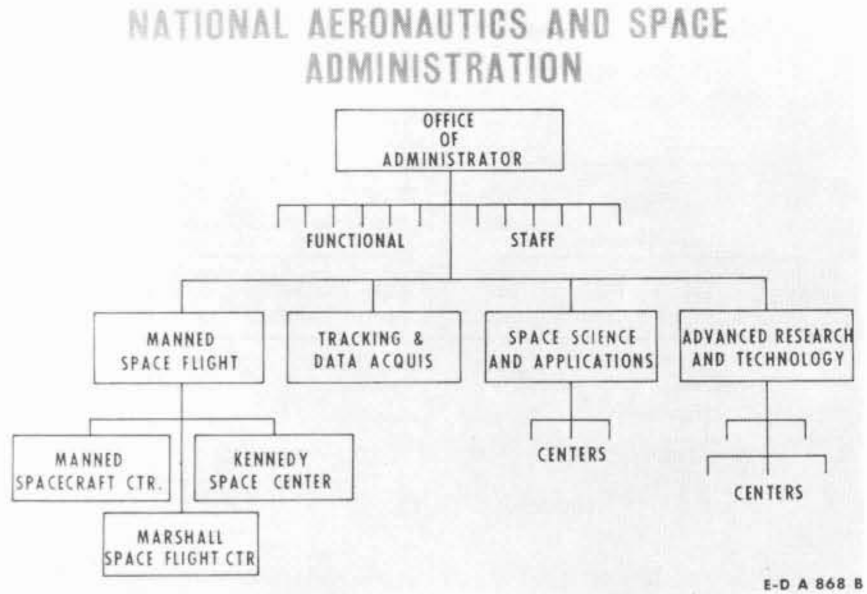
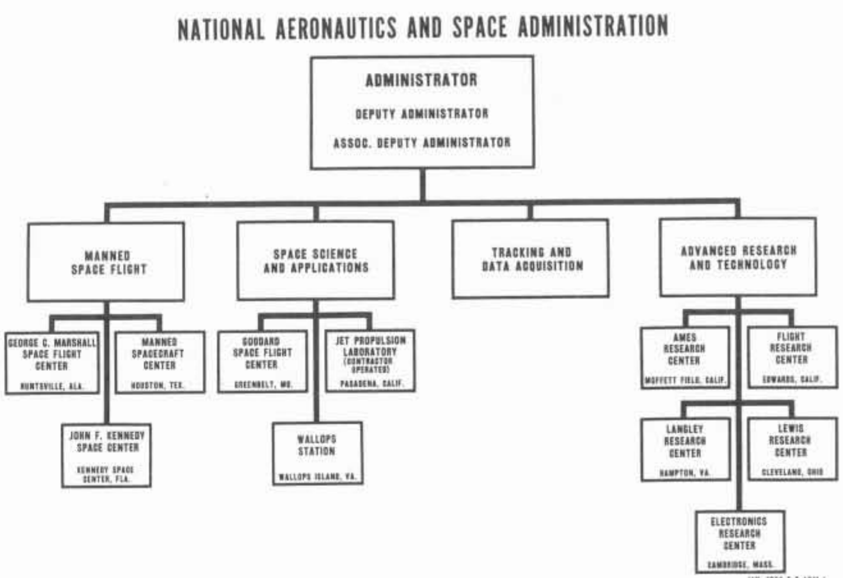
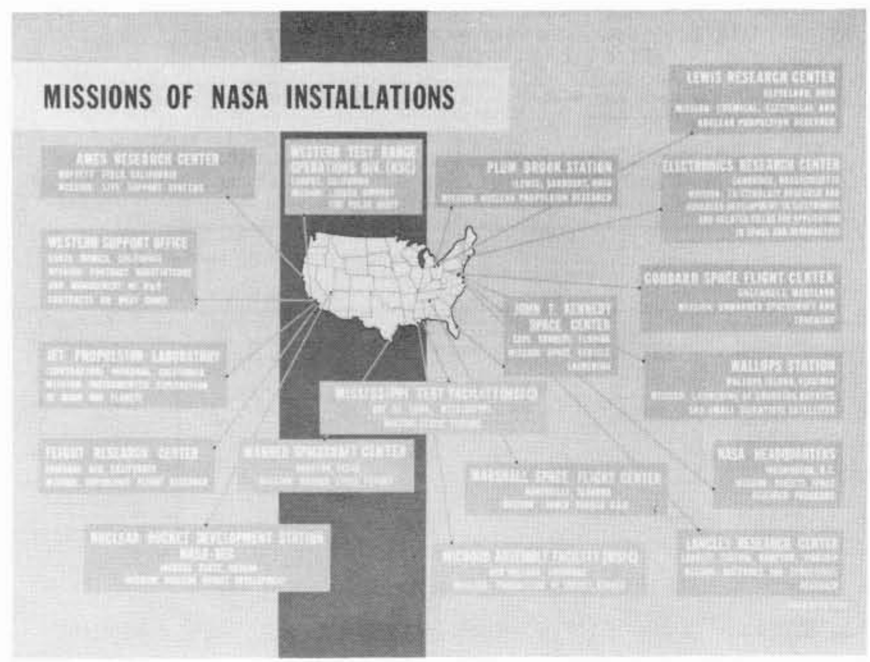
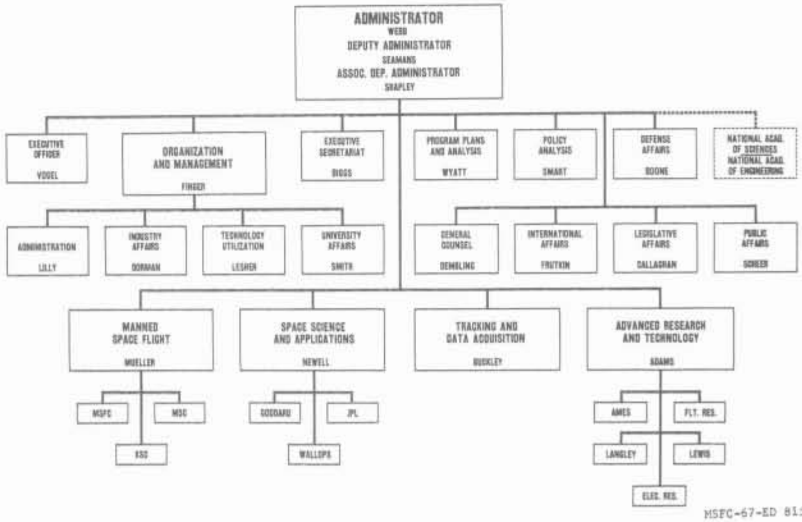

FEDERAL ORGANIZATIONS INVOLVED IN NATIONAL SPACE PROGRAM
THE CONGRESS
SENATE
HOUSE OF REP.
COMMITTEE ON AERONAUTICAL & SPACE SCIENCES
COMMITTEE ON SCIENCE AND ASTRONAUTICS
THE PRESIDENT
NATIONAL SECURITY COUNCIL (THE PRESIDENT)
NATIONAL AERONAUTICS AND SPACE COUNCIL (HUMPHREY)
FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY (HORNIG)
BUREAU OF BUDGET (SCHULTZE)
OFFICE OF SCIENCE AND TECHNOLOGY (HORNIG)
PRESIDENT'S SCIENCE ADVISORY COMM. (HORNIG)
NATIONAL SCIENCE FOUNDATION
DEPARTMENT OF DEFENSE
NASA
OTHER DEPTS. AND AGENCIES
NATIONAL SCIENCE BOARD
E-D A800 H


NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
OFFICE OF ADMINISTRATOR
FUNCTIONAL
STAFF
MANNED SPACE FLIGHT
TRACKING & DATA ACQUIS
SPACE SCIENCE AND APPLICATIONS
ADVANCED RESEARCH AND TECHNOLOGY
MANNED SPACECRAFT CTR.
KENNEDY SPACE CENTER
MARSHALL SPACE FLIGHT CTR
CENTERS
CENTERS
E-D A 868 B

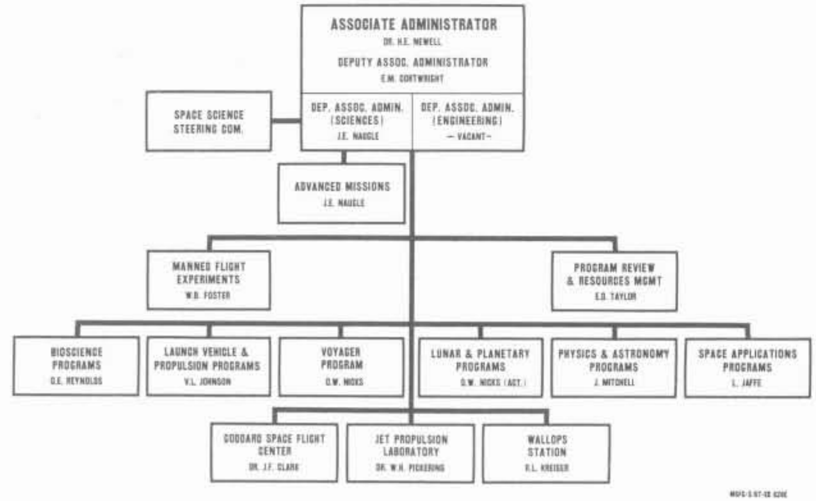

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ADMINISTRATOR
DEPUTY ADMINISTRATOR
ASSOC. DEPUTY ADMINISTRATOR
MANNED SPACE FLIGHT
SPACE SCIENCE AND APPLICATIONS
TRACKING AND DATA ACQUISITION
ADVANCED RESEARCH AND TECHNOLOGY
GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALA.
MANNED SPACECRAFT CENTER
HOUSTON, TEX.
JOHN F. KENNEDY SPACE CENTER
KENNEDY SPACE CENTER, FLA.
GODDARD SPACE FLIGHT CENTER
GREENBELT, MD.
JET PROPULSION LABORATORY (CONTRACTOR OPERATED)
PASADENA, CALIF.
WALLOPS STATION
WALLOPS ISLAND, VA.
AMES RESEARCH CENTER
MOFFETT FIELD, CALIF.
FLIGHT RESEARCH CENTER
EDWARDS, CALIF.
LANGLEY RESEARCH CENTER
HAMPTON, VA.
LEWIS RESEARCH CENTER
CLEVELAND, OHIO
ELECTRONICS RESEARCH CENTER
CAMBRIDGE, MASS.
JAN. 1968 E-D A811 L


MISSIONS OF NASA INSTALLATIONS
LEWIS RESEARCH CENTER
AMES RESEARCH CENTER
PLUM BROOK STATION
ELECTRONICS RESEARCH CENTER
WESTERN SUPPORT OFFICE
GODDARD SPACE FLIGHT CENTER
JOHN F. KENNEDY SPACE CENTER
JET PROPULSION LABORATORY
WALLOPS STATION
NASA HEADQUARTERS

NASA HEADQUARTERS



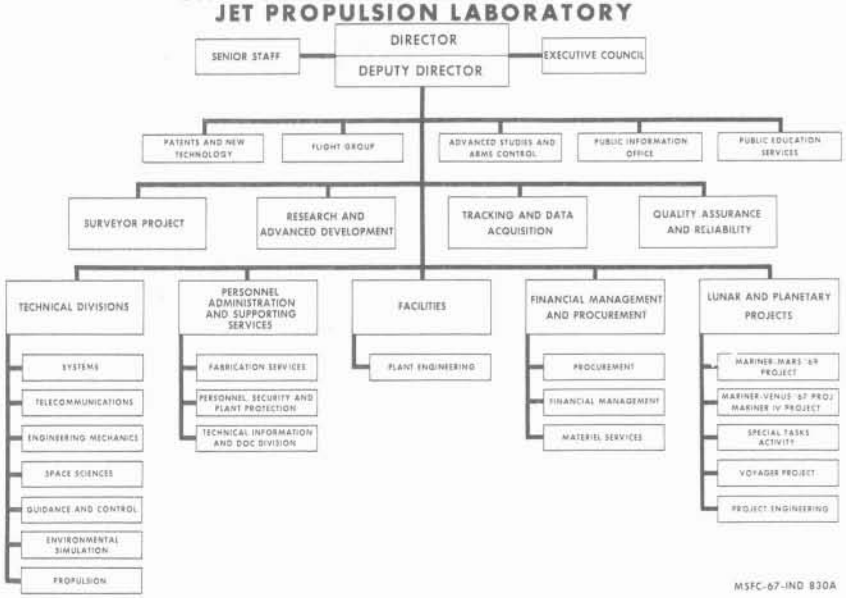
OFFICE OF SPACE SCIENCE AND APPLICATIONS



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

OFFICE OF SPACE SCIENCE AND APPLICATIONS

JET PROPULSION LABORATORY



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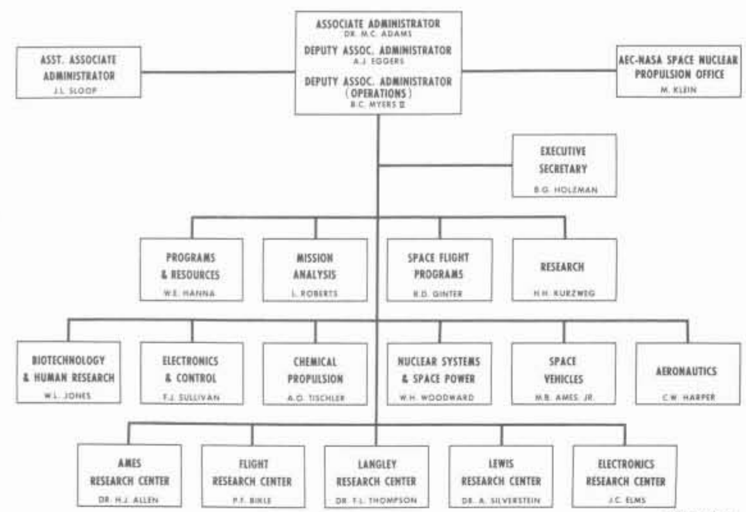
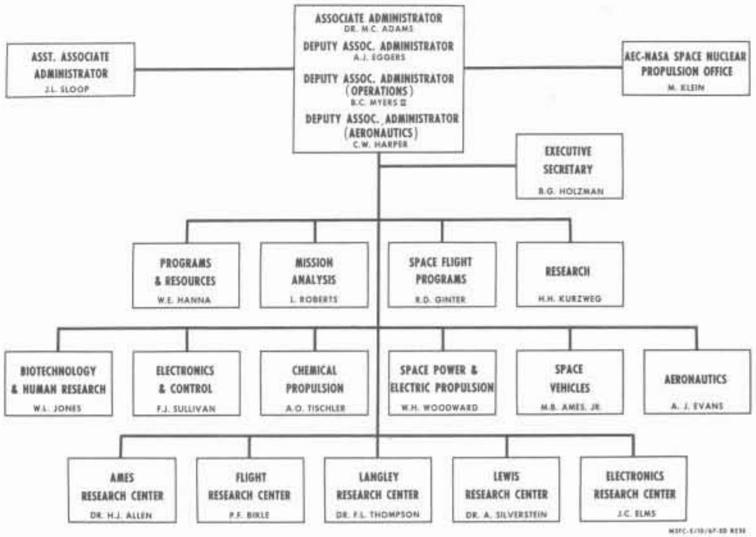
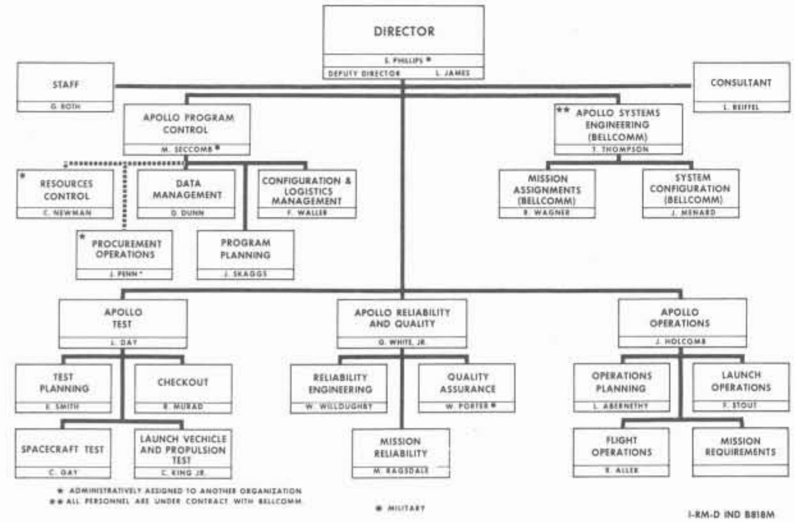
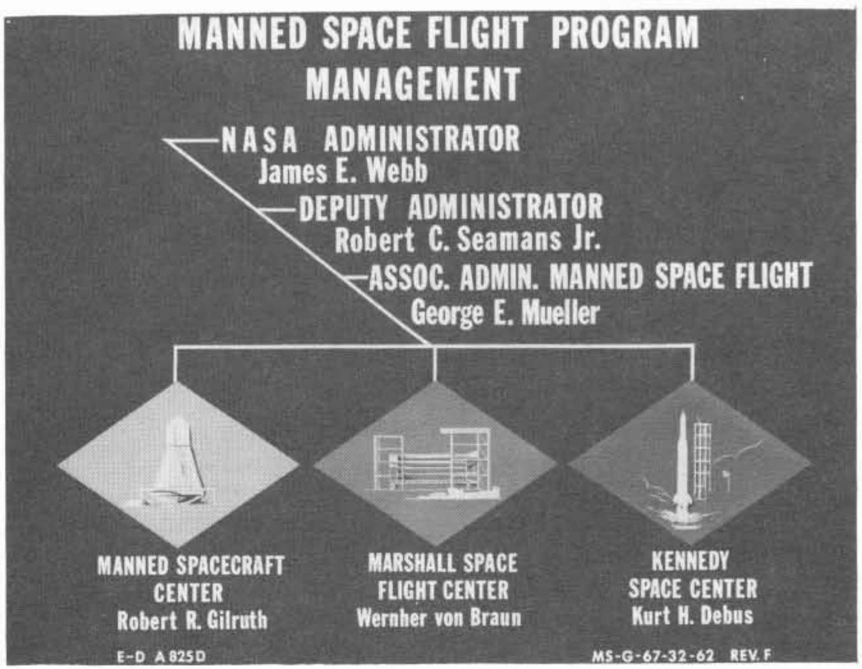


OFFICE OF ADVANCED RESEARCH AND TECHNOLOGY



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
OFFICE OF MANNEL SPACE FLIGHT
APOLLO PROGRAM





MANNED SPACE FLIGHT
MANAGEMENT COUNCIL

FUNCTION:

MONTHLY REVIEW OF PROGRAM GOALS, PROGRESS AND POLICIES.

MEMBERSHIP:

DR. MUELLER-MSF (CHAIRMAN)
DR. GILRUTH-DIR., MSC
BRIG. GEN. BOWMAN-MSF (SECRETARY)
DR. VON BRAUN-DIR., MSFC
DR. DEBUS-DIR., KSC

PROGRAM REVIEW

STATUS REPORTS BY PROGRAM DIRECTORS AND MANAGERS.

EXECUTIVE SESSION

MAJOR MSF POLICY DECISIONS.

E-D P874

MANNED SPACE FLIGHT

EXPERIMENTS BOARD

FUNCTION:

RECOMMEND TO THE ASSOCIATE ADMINISTRATOR, MSF, SCIENTIFIC, TECHNOLOGICAL AND MEDICAL EXPERIMENTS TO BE CARRIED ON NASA MANNED SPACE FLIGHT SPACE VEHICLES.

MEMBERSHIP:

DR. MUELLER (CHAIRMAN) -MSF
DR. ADAMS-ART
DR. NEWELL-SSA
MR. FINK-DEP. DIR., RESEARCH & ENGR. (STRATEGIC & SPACE SYSTEMS), DOD
GEN. FERGUSON-CDR., AFSC

FREQUENCY:

EVERY TWO MONTHS.

MSFC-67-ED 875F

MANNED SPACE FLIGHT

DESIGN CERTIFICATION BOARD

FUNCTION:

- BEFORE THE FIRST FLIGHT OF A NEW CONFIGURATION OF A MANNED SPACE FLIGHT VEHICLE, REVIEWS TOTAL MISSION COMPLEX FOR PROOF OF DESIGN AND DEVELOPMENT MATURITY.
- ASSESSES AND CERTIFIES:
  - SPACE VEHICLE DESIGN FOR FLIGHT WORTHINESS.
  - DESIGN FOR MANNED APOLLO MISSIONS OF LAUNCH COMPLEX, MISSION CONTROL CENTER, MANNED SPACE FLIGHT NETWORK, LAUNCH INSTRUMENTATION.

MEMBERSHIP:

- MSF MANAGEMENT COUNCIL.

DR. MUELLER (CHAIRMAN)-MSF
DR.GILRUTH-DIR., MSC
DR. von BRAUN-DIR., MSFC
DR. DEBUS-DIR., KSC

MSFC-67-ED 876B

MANNED SPACE FLIGHT

POLICY COMMITTEE

FUNCTION:

- TO PROVIDE AN EXPEDITIOUS MEANS TO COORDINATE, AT THE POLICY LEVEL, THE MANNED SPACE FLIGHT PROGRAMS OF DOD AND NASA.

MEMBERSHIP:

- CO-CHAIRMEN

  DR. SEAMANS, DEP. ADMINISTRATOR, NASA
  MR. FOSTER, DIR., DEFENSE RESEARCH & ENGR., DOD

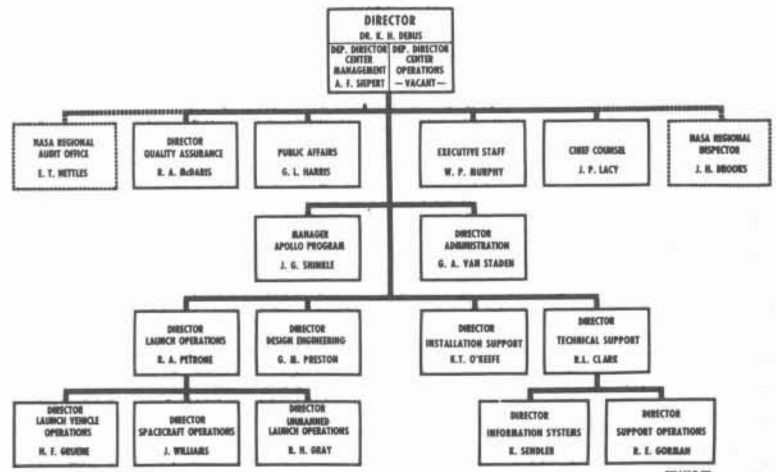
- MEMBERS

  DR. MUELLER-MSF
  DR. NEWELL-SSA
  MR. FINK-DEP.DIR., RESEARCH & ENGR. (STRATEGIC & SPACE SYSTEMS), DOD
  DR. FLAX-ASST. SEC. FOR R&D, AIR FORCE

E-D A880

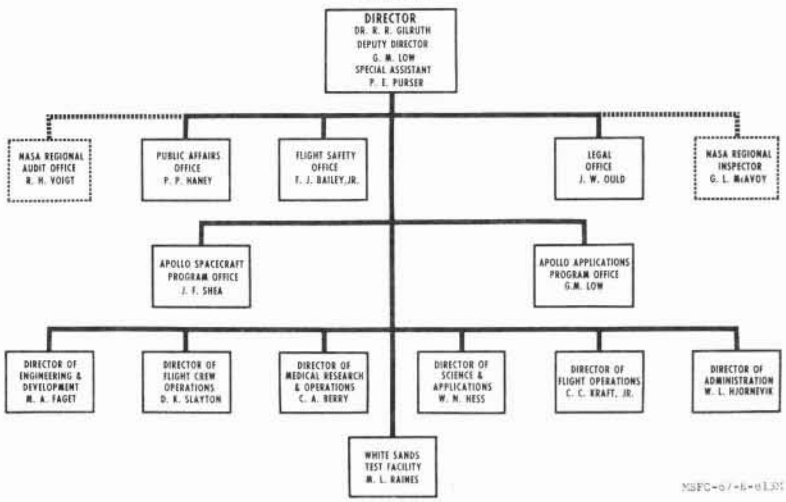
JOHN F KENNEDY SPACE CENTER

CAPE KENNEDY, FLORIDA

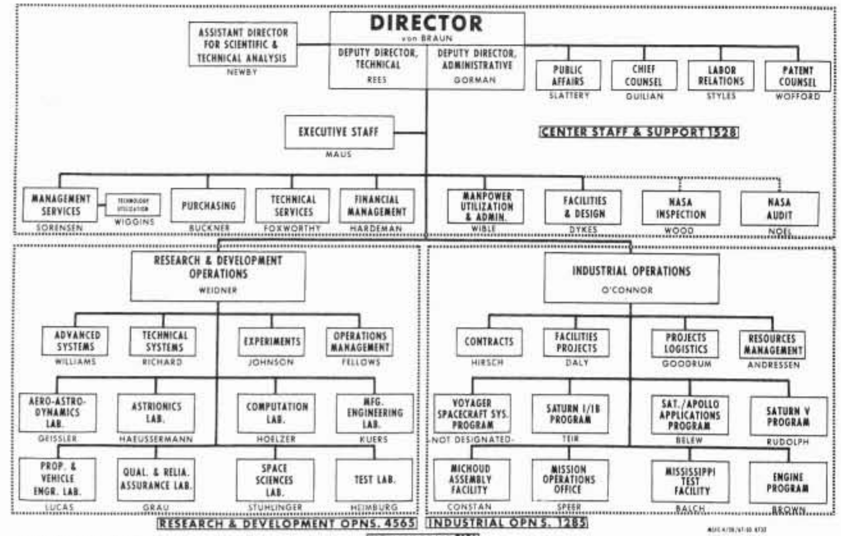


MANNED SPACECRAFT CENTER

HOUSTON, TEXAS

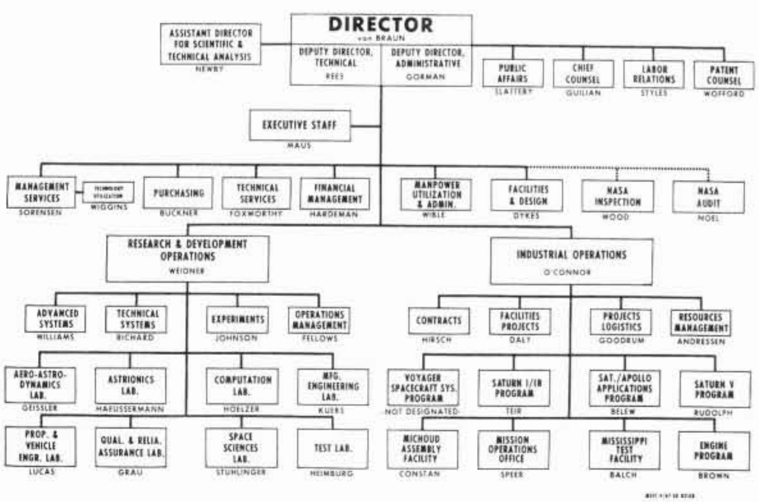


GEORGE C. MARSHALL SPACE FLIGHT CENTER

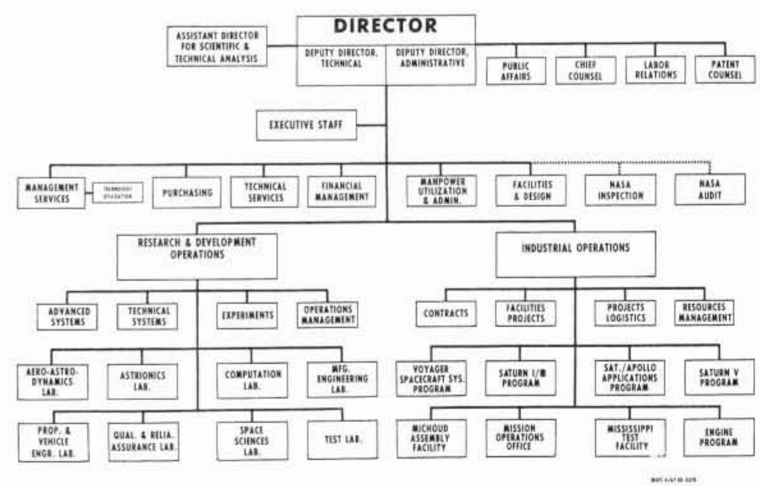


NOTE: EXCLUDES YOC'S & "PART-TIME" STUDENTS

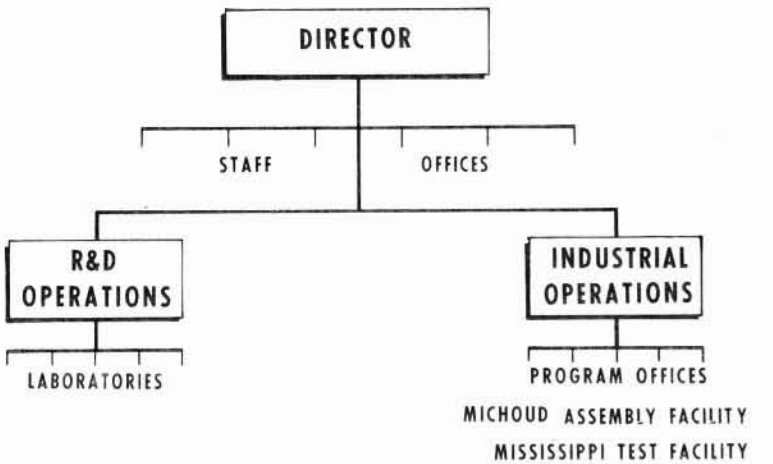
GEORGE C. MARSHALL SPACE FLIGHT CENTER



GEORGE C. MARSHALL SPACE FLIGHT CENTER

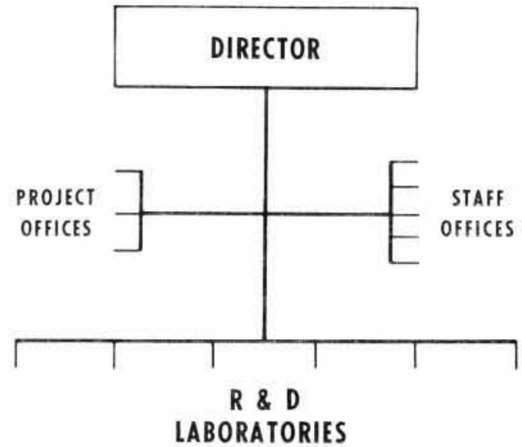


MSFC ORGANIZATION



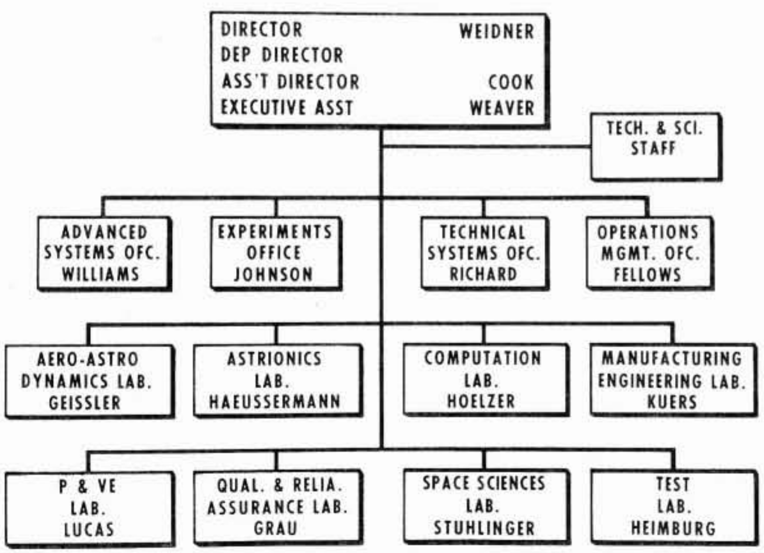
6/65 E-D A867 B

FORMER MSFC ORGANIZATION



E-D A 878

RESEARCH & DEVELOPMENT OPERATIONS



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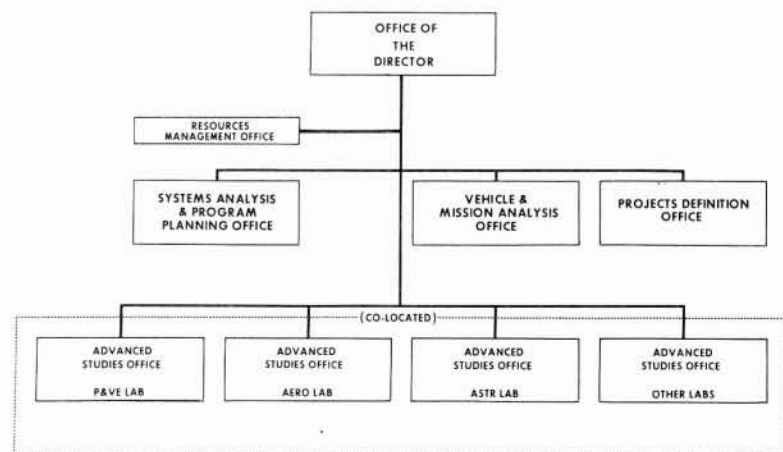
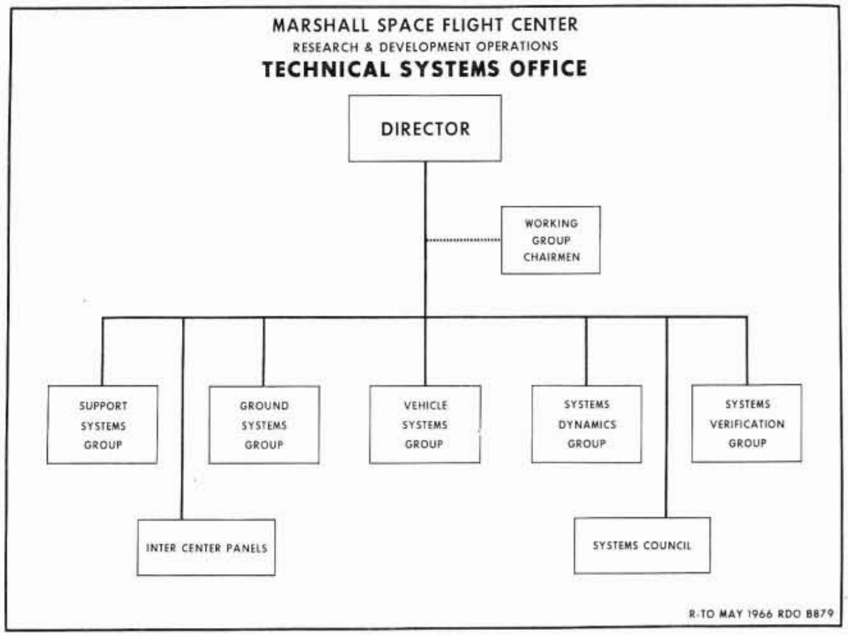
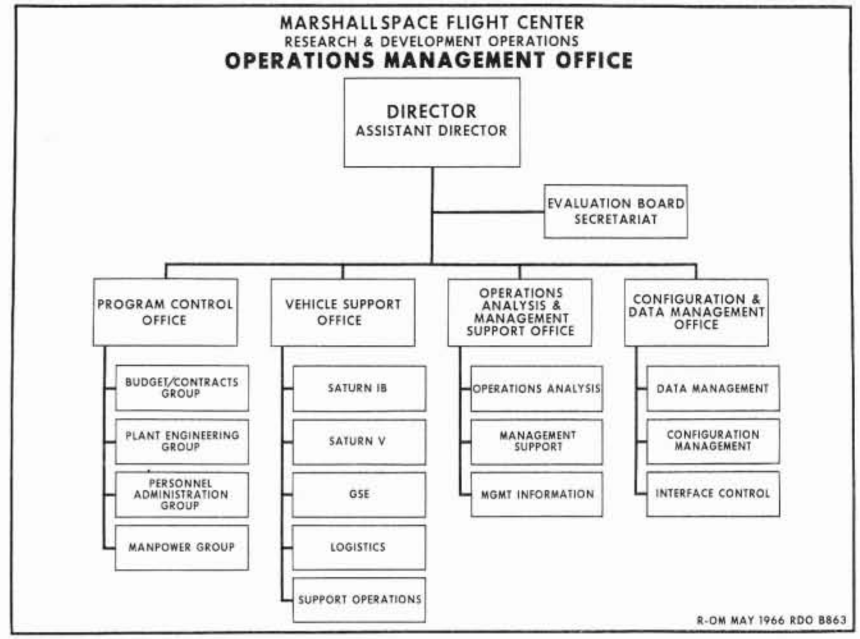
GEORGE C. MARSHALL SPACE FLIGHT CENTER
RESEARCH & DEVELOPMENT OPERATIONS
***ADVANCED SYSTEMS OFFICE**



* PENDING APPROVAL

MSFC-2/67-RDO-881A


MARSHALL SPACE FLIGHT CENTER
RESEARCH & DEVELOPMENT OPERATIONS
TECHNICAL SYSTEMS OFFICE
DIRECTOR
WORKING GROUP CHAIRMEN
SUPPORT SYSTEMS GROUP
GROUND SYSTEMS GROUP
VEHICLE SYSTEMS GROUP
SYSTEMS DYNAMICS GROUP
SYSTEMS VERIFICATION GROUP
INTER CENTER PANELS
SYSTEMS COUNCIL
R-TO MAY 1966 RDO 8879


MARSHALL SPACE FLIGHT CENTER
RESEARCH & DEVELOPMENT OPERATIONS
OPERATIONS MANAGEMENT OFFICE
DIRECTOR
ASSISTANT DIRECTOR
EVALUATION BOARD SECRETARIAT
PROGRAM CONTROL OFFICE
VEHICLE SUPPORT OFFICE
OPERATIONS ANALYSIS & MANAGEMENT SUPPORT OFFICE
CONFIGURATION & DATA MANAGEMENT OFFICE
BUDGET/CONTRACTS GROUP
PLANT ENGINEERING GROUP
PERSONNEL ADMINISTRATION GROUP
MANPOWER GROUP
SATURN IB
SATURN V
GSE
LOGISTICS
SUPPORT OPERATIONS
OPERATIONS ANALYSIS
MANAGEMENT SUPPORT
MGMT INFORMATION
DATA MANAGEMENT
CONFIGURATION MANAGEMENT
INTERFACE CONTROL
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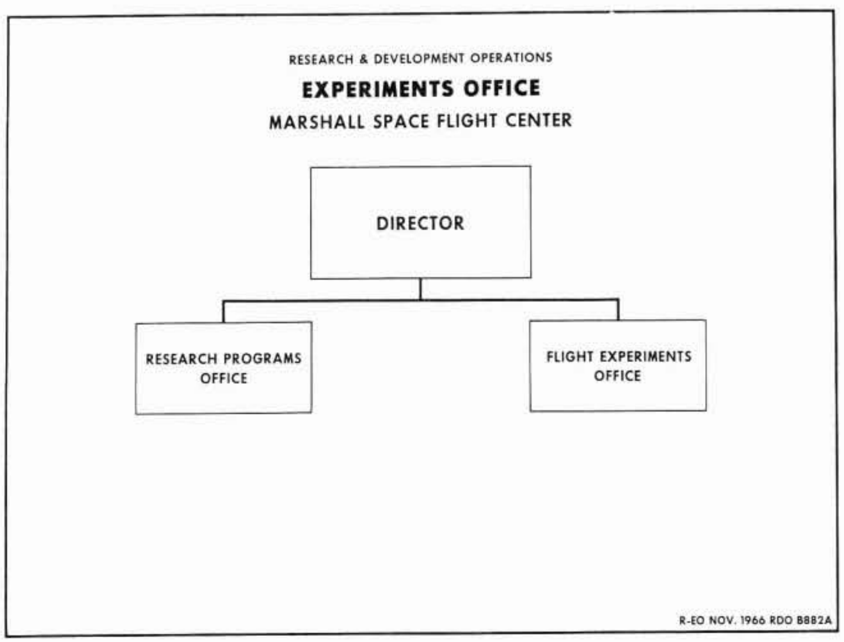
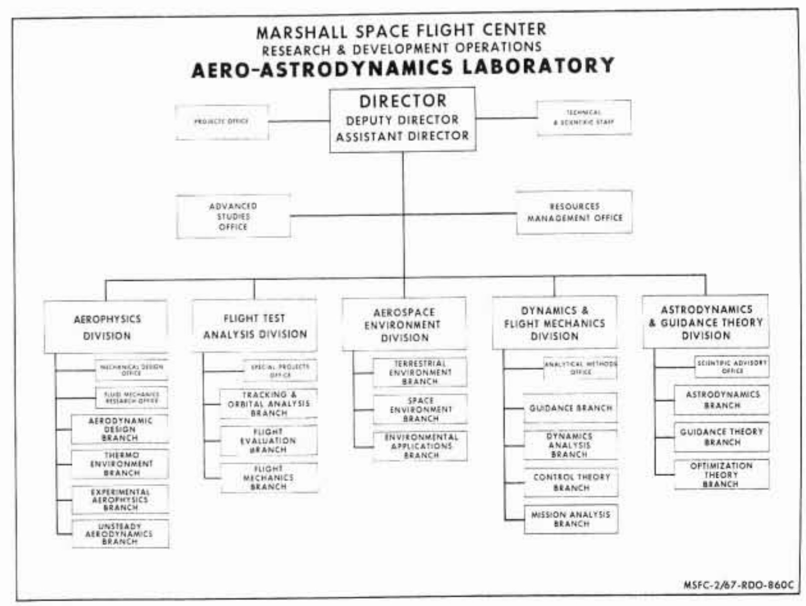

RESEARCH & DEVELOPMENT OPERATIONS
EXPERIMENTS OFFICE
MARSHALL SPACE FLIGHT CENTER
DIRECTOR
RESEARCH PROGRAMS OFFICE
FLIGHT EXPERIMENTS OFFICE
R-EO NOV. 1966 RDO 8882A


MARSHALL SPACE FLIGHT CENTER
RESEARCH & DEVELOPMENT OPERATIONS
AERO-ASTRODYNAMICS LABORATORY
DIRECTOR
DEPUTY DIRECTOR
ASSISTANT DIRECTOR
PROJECTS OFFICE
TECHNICAL & SCIENTIFIC STAFF
ADVANCED STUDIES OFFICE
RESOURCES MANAGEMENT OFFICE
AEROPHYSICS DIVISION
MECHANICAL DESIGN OFFICE
FLUID MECHANICS RESEARCH OFFICE
AERODYNAMIC DESIGN BRANCH
THERMO ENVIRONMENT BRANCH
EXPERIMENTAL AEROPHYSICS BRANCH
UNSTEADY AERODYNAMICS BRANCH
FLIGHT TEST ANALYSIS DIVISION
SPECIAL PROJECTS OFFICE
TRACKING & ORBITAL ANALYSIS BRANCH
FLIGHT EVALUATION BRANCH
FLIGHT MECHANICS BRANCH
AEROSPACE ENVIRONMENT DIVISION
TERRESTRIAL ENVIRONMENT BRANCH
SPACE ENVIRONMENT BRANCH
ENVIRONMENTAL APPLICATIONS BRANCH
DYNAMICS & FLIGHT MECHANICS DIVISION
ANALYTICAL METHODS OFFICE
GUIDANCE BRANCH
DYNAMICS ANALYSIS BRANCH
CONTROL THEORY BRANCH
MISSION ANALYSIS BRANCH
ASTRODYNAMICS & GUIDANCE THEORY DIVISION
SCIENTIFIC ADVISORY OFFICE
ASTRODYNAMICS BRANCH
GUIDANCE THEORY BRANCH
OPTIMIZATION THEORY BRANCH
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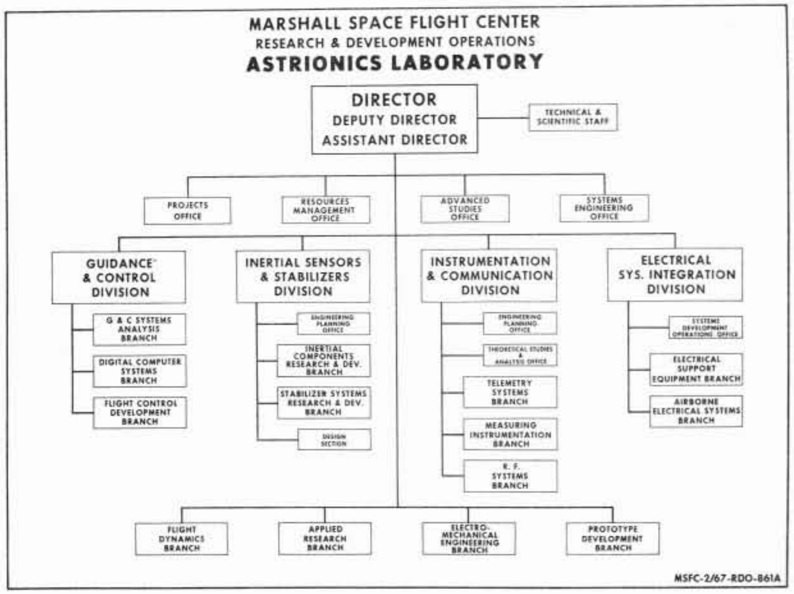
MARSHALL SPACE FLIGHT CENTER
RESEARCH & DEVELOPMENT OPERATIONS
ASTRIONICS LABORATORY
DIRECTOR
DEPUTY DIRECTOR
ASSISTANT DIRECTOR
TECHNICAL & SCIENTIFIC STAFF
PROJECTS OFFICE
RESOURCES MANAGEMENT OFFICE
ADVANCED STUDIES OFFICE
SYSTEMS ENGINEERING OFFICE
GUIDANCE & CONTROL DIVISION
G & C SYSTEMS ANALYSIS BRANCH
DIGITAL COMPUTER SYSTEMS BRANCH
FLIGHT CONTROL DEVELOPMENT BRANCH
INERTIAL SENSORS & STABILIZERS DIVISION
ENGINEERING PLANNING OFFICE
INERTIAL COMPONENTS RESEARCH & DEV. BRANCH
STABILIZER SYSTEMS RESEARCH & DEV. BRANCH
DESIGN SECTION
INSTRUMENTATION & COMMUNICATION DIVISION
ENGINEERING PLANNING OFFICE
THEORETICAL STUDIES & ANALYSIS OFFICE
TELEMETRY SYSTEMS BRANCH
MEASURING INSTRUMENTATION BRANCH
R. F. SYSTEMS BRANCH
ELECTRICAL SYS. INTEGRATION DIVISION
SYSTEMS DEVELOPMENT OPERATIONS OFFICE
ELECTRICAL SUPPORT EQUIPMENT BRANCH
AIRBORNE ELECTRICAL SYSTEMS BRANCH
FLIGHT DYNAMICS BRANCH
APPLIED RESEARCH BRANCH
ELECTRO-MECHANICAL ENGINEERING BRANCH
PROTOTYPE DEVELOPMENT BRANCH
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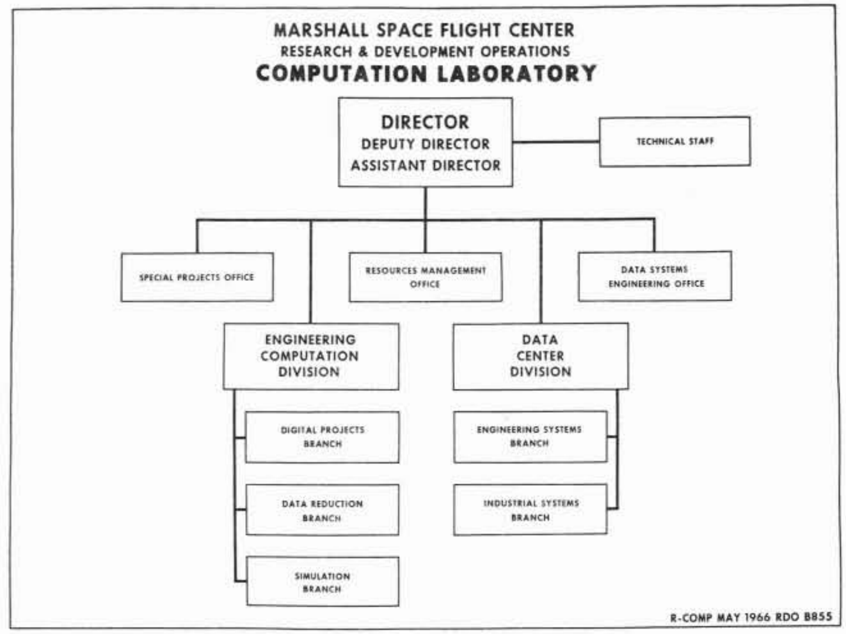
MARSHALL SPACE FLIGHT CENTER
RESEARCH & DEVELOPMENT OPERATIONS
COMPUTATION LABORATORY
DIRECTOR
DEPUTY DIRECTOR
ASSISTANT DIRECTOR
TECHNICAL STAFF
SPECIAL PROJECTS OFFICE
RESOURCES MANAGEMENT OFFICE
DATA SYSTEMS ENGINEERING OFFICE
ENGINEERING COMPUTATION DIVISION
DIGITAL PROJECTS BRANCH
DATA REDUCTION BRANCH
SIMULATION BRANCH
DATA CENTER DIVISION
ENGINEERING SYSTEMS BRANCH
INDUSTRIAL SYSTEMS BRANCH
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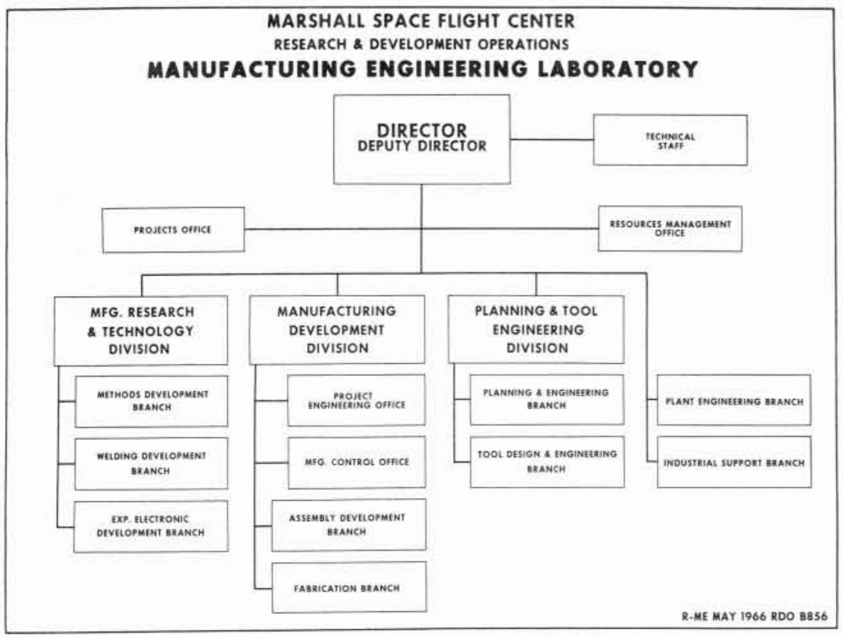
MARSHALL SPACE FLIGHT CENTER
RESEARCH & DEVELOPMENT OPERATIONS
MANUFACTURING ENGINEERING LABORATORY
DIRECTOR
DEPUTY DIRECTOR
TECHNICAL STAFF
PROJECTS OFFICE
RESOURCES MANAGEMENT OFFICE
MFG. RESEARCH & TECHNOLOGY DIVISION
METHODS DEVELOPMENT BRANCH
WELDING DEVELOPMENT BRANCH
EXP. ELECTRONIC DEVELOPMENT BRANCH
MANUFACTURING DEVELOPMENT DIVISION
PROJECT ENGINEERING OFFICE
MFG. CONTROL OFFICE
ASSEMBLY DEVELOPMENT BRANCH
FABRICATION BRANCH
PLANNING & TOOL ENGINEERING DIVISION
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TOOL DESIGN & ENGINEERING BRANCH
PLANT ENGINEERING BRANCH
INDUSTRIAL SUPPORT BRANCH
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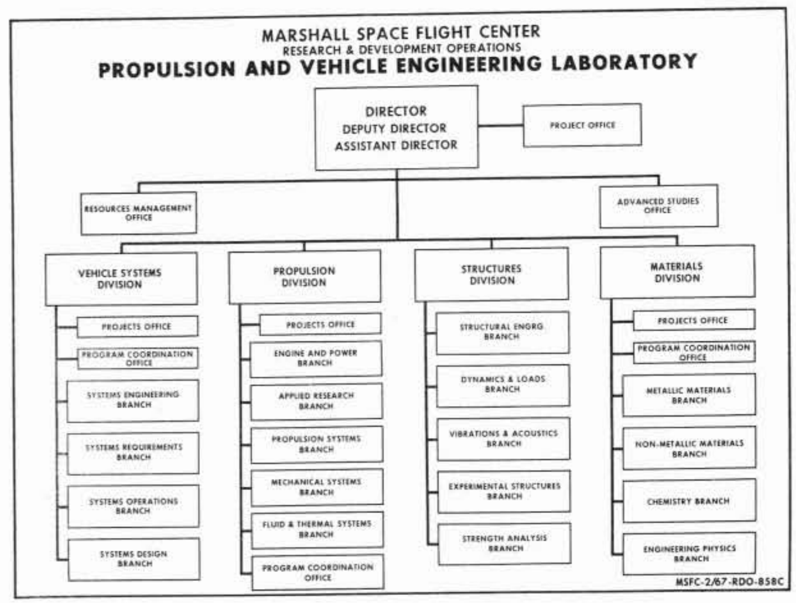
MARSHALL SPACE FLIGHT CENTER
RESEARCH & DEVELOPMENT OPERATIONS
PROPULSION AND VEHICLE ENGINEERING LABORATORY
DIRECTOR
DEPUTY DIRECTOR
ASSISTANT DIRECTOR
PROJECT OFFICE
RESOURCES MANAGEMENT OFFICE
ADVANCED STUDIES OFFICE
VEHICLE SYSTEMS DIVISION
PROJECTS OFFICE
PROGRAM COORDINATION OFFICE
SYSTEMS ENGINEERING BRANCH
SYSTEMS REQUIREMENTS BRANCH
SYSTEMS OPERATIONS BRANCH
SYSTEMS DESIGN BRANCH
PROPULSION DIVISION
PROJECTS OFFICE
ENGINE AND POWER BRANCH
APPLIED RESEARCH BRANCH
PROPULSION SYSTEMS BRANCH
MECHANICAL SYSTEMS BRANCH
FLUID & THERMAL SYSTEMS BRANCH
PROGRAM COORDINATION OFFICE
STRUCTURES DIVISION
STRUCTURAL ENGRG BRANCH
DYNAMICS & LOADS BRANCH
VIBRATIONS & ACOUSTICS BRANCH
EXPERIMENTAL STRUCTURES BRANCH
STRENGTH ANALYSIS BRANCH
MATERIALS DIVISION
PROJECTS OFFICE
PROGRAM COORDINATION OFFICE
METALLIC MATERIALS BRANCH
NON-METALLIC MATERIALS BRANCH
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ENGINEERING PHYSICS BRANCH
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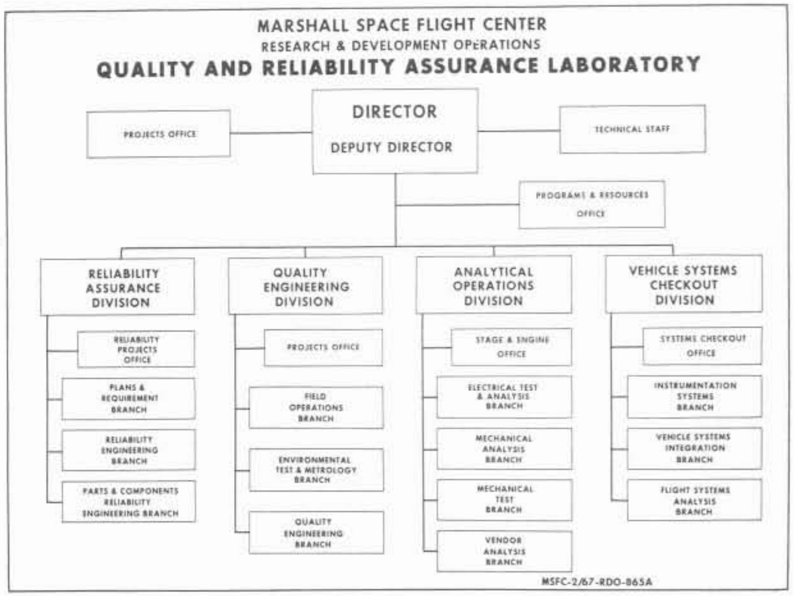
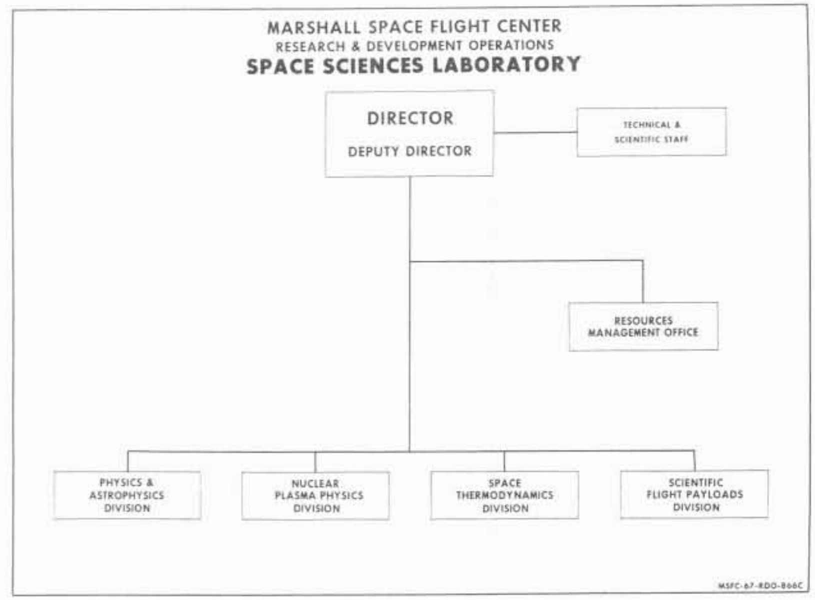
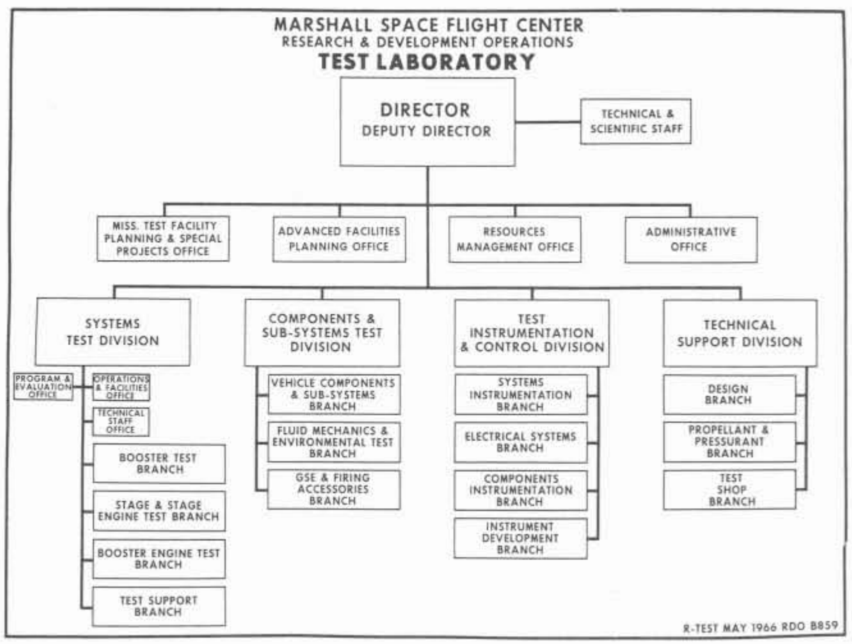
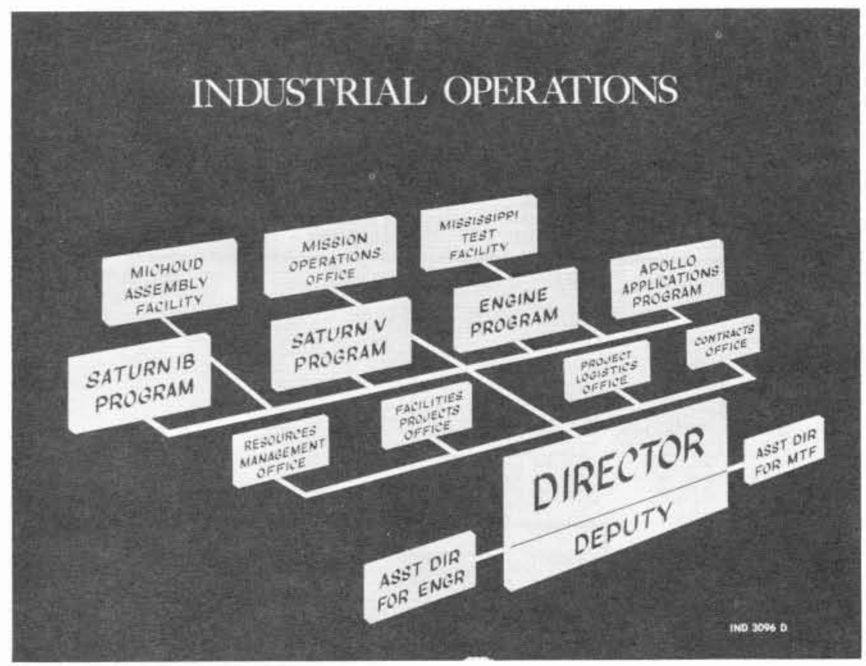
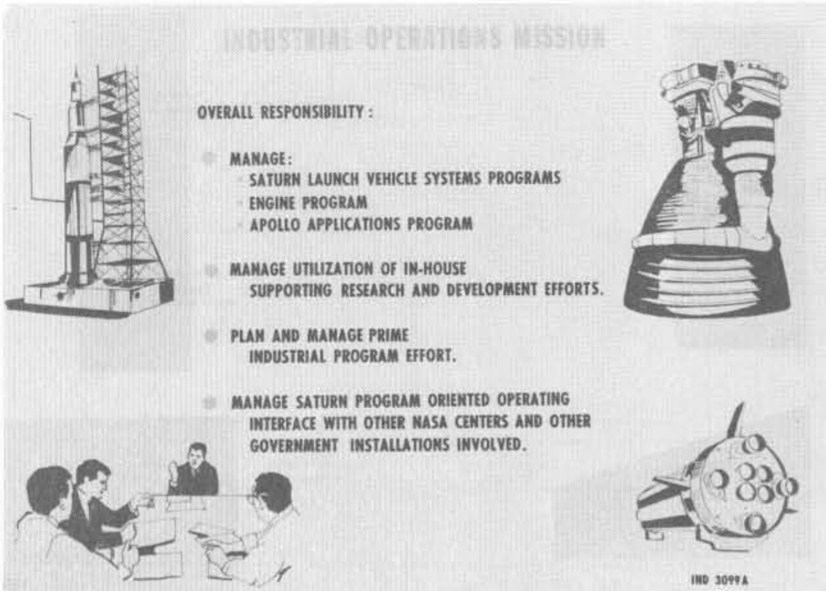

MARSHALL SPACE FLIGHT CENTER
RESEARCH & DEVELOPMENT OPERATIONS
QUALITY AND RELIABILITY ASSURANCE LABORATORY
PROJECTS OFFICE
DIRECTOR
DEPUTY DIRECTOR
TECHNICAL STAFF
PROGRAMS & RESOURCES OFFICE
RELIABILITY ASSURANCE DIVISION
RELIABILITY PROJECTS OFFICE
PLANS & REQUIREMENT BRANCH
RELIABILITY ENGINEERING BRANCH
PARTS & COMPONENTS RELIABILITY ENGINEERING BRANCH
QUALITY ENGINEERING DIVISION
PROJECTS OFFICE
FIELD OPERATIONS BRANCH
ENVIRONMENTAL TEST & METROLOGY BRANCH
QUALITY ENGINEERING BRANCH
ANALYTICAL OPERATIONS DIVISION
STAGE & ENGINE OFFICE
ELECTRICAL TEST & ANALYSIS BRANCH
MECHANICAL ANALYSIS BRANCH
MECHANICAL TEST BRANCH
VENDOR ANALYSIS BRANCH
VEHICLE SYSTEMS CHECKOUT DIVISION
SYSTEMS CHECKOUT OFFICE
INSTRUMENTATION SYSTEMS BRANCH
VEHICLE SYSTEMS INTEGRATION BRANCH
FLIGHT SYSTEMS ANALYSIS BRANCH
MSFC-2/67-RDO-865A

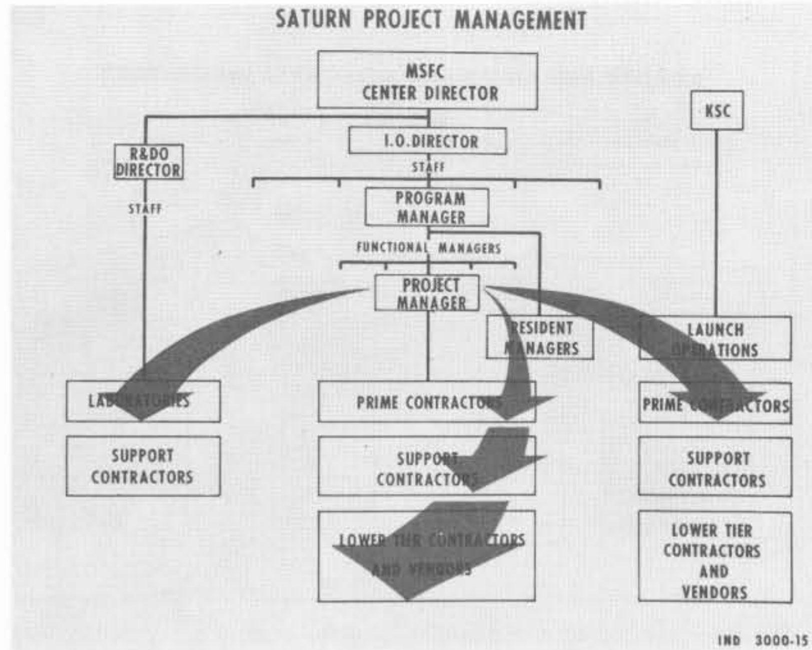

MARSHALL SPACE FLIGHT CENTER
RESEARCH & DEVELOPMENT OPERATIONS
SPACE SCIENCES LABORATORY
DIRECTOR
DEPUTY DIRECTOR
TECHNICAL & SCIENTIFIC STAFF
RESOURCES MANAGEMENT OFFICE
PHYSICS & ASTROPHYSICS DIVISION
NUCLEAR PLASMA PHYSICS DIVISION
SPACE THERMODYNAMICS DIVISION
SCIENTIFIC FLIGHT PAYLOADS DIVISION
MSFC-67-RDO-866C


MARSHALL SPACE FLIGHT CENTER
RESEARCH & DEVELOPMENT OPERATIONS
TEST LABORATORY
DIRECTOR
DEPUTY DIRECTOR
TECHNICAL & SCIENTIFIC STAFF
MISS. TEST FACILITY PLANNING & SPECIAL PROJECTS OFFICE
ADVANCED FACILITIES PLANNING OFFICE
RESOURCES MANAGEMENT OFFICE
ADMINISTRATIVE OFFICE
SYSTEMS TEST DIVISION
PROGRAM & EVALUATION OFFICE
OPERATIONS & FACILITIES OFFICE
TECHNICAL STAFF OFFICE
BOOSTER TEST BRANCH
STAGE & STAGE ENGINE TEST BRANCH
BOOSTER ENGINE TEST BRANCH
TEST SUPPORT BRANCH
COMPONENTS & SUB-SYSTEMS TEST DIVISION
VEHICLE COMPONENTS & SUB-SYSTEMS BRANCH
FLUID MECHANICS & ENVIRONMENTAL TEST BRANCH
GSE & FIRING ACCESSORIES BRANCH
TEST INSTRUMENTATION & CONTROL DIVISION
SYSTEMS INSTRUMENTATION BRANCH
ELECTRICAL SYSTEMS BRANCH
COMPONENTS INSTRUMENTATION BRANCH
INSTRUMENT DEVELOPMENT BRANCH
TECHNICAL SUPPORT DIVISION
DESIGN BRANCH
PROPELLANT & PRESSURANT BRANCH
TEST SHOP BRANCH
R-TEST MAY 1966 RDO B859

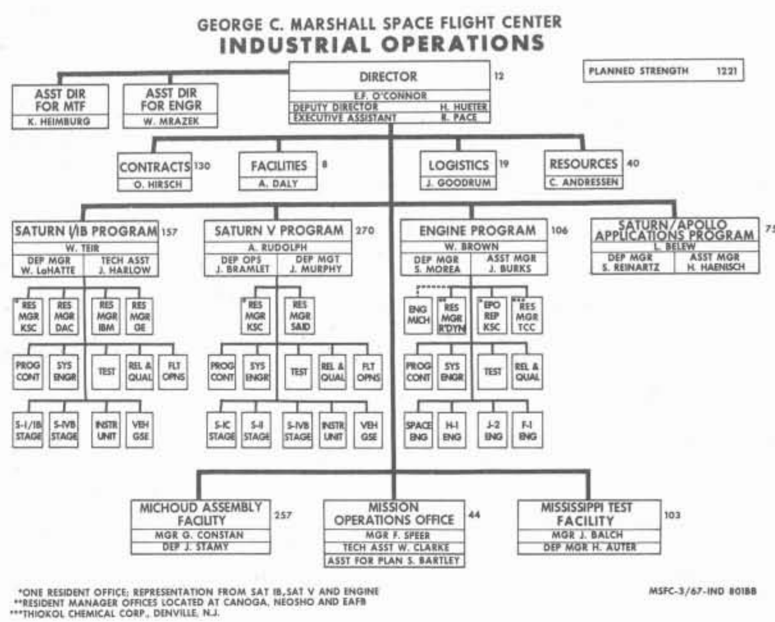

INDUSTRIAL OPERATIONS
MICHOUD ASSEMBLY FACILITY
MISSION OPERATIONS OFFICE
MISSISSIPPI TEST FACILITY
APOLLO APPLICATIONS PROGRAM
ENGINE PROGRAM
SATURN V PROGRAM
SATURN IB PROGRAM
CONTRACTS OFFICE
PROJECT LOGISTICS OFFICE
FACILITIES PROJECTS OFFICE
RESOURCES MANAGEMENT OFFICE
DIRECTOR
DEPUTY
ASST DIR FOR MTF
ASST DIR FOR ENGR
IND 3096 D



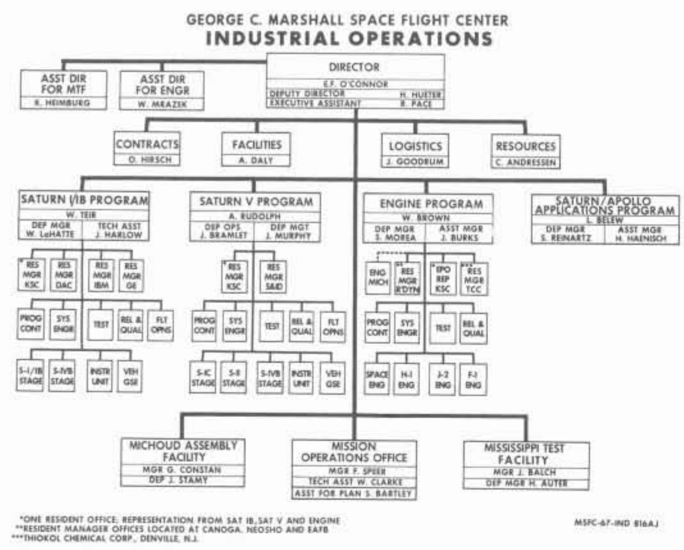
INDUSTRIAL OPERATIONS MISSION
OVERALL RESPONSIBILITY :
MANAGE:
SATURN LAUNCH VEHICLE SYSTEMS PROGRAMS
ENGINE PROGRAM
APOLLO APPLICATIONS PROGRAM
MANAGE UTILIZATION OF IN-HOUSE SUPPORTING RESEARCH AND DEVELOPMENT EFFORTS.
PLAN AND MANAGE PRIME INDUSTRIAL PROGRAM EFFORT.
MANAGE SATURN PROGRAM ORIENTED OPERATING INTERFACE WITH OTHER NASA CENTERS AND OTHER GOVERNMENT INSTALLATIONS INVOLVED.
IND 3099A



SATURN PROJECT MANAGEMENT
MSFC CENTER DIRECTOR
KSC
R&DO DIRECTOR
STAFF
I.O. DIRECTOR
STAFF
PROGRAM MANAGER
FUNCTIONAL MANAGERS
PROJECT MANAGER
RESIDENT MANAGERS
LAUNCH OPERATIONS
LABORATORIES
PRIME CONTRACTORS
PRIME CONTRACTORS
SUPPORT CONTRACTORS
SUPPORT CONTRACTORS
SUPPORT CONTRACTORS
LOWER TIER CONTRACTORS AND VENDORS
LOWER TIER CONTRACTORS AND VENDORS
IND 3000-15

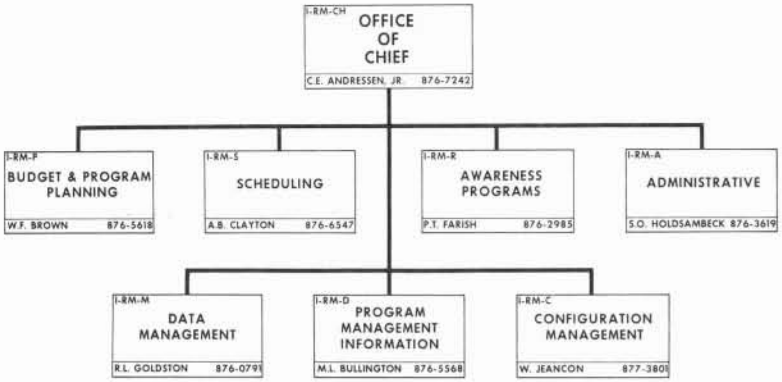


GEORGE C. MARSHALL SPACE FLIGHT CENTER
INDUSTRIAL OPERATIONS
PLANNED STRENGTH 1221
DIRECTOR 12
E.F. O'CONNOR
DEPUTY DIRECTOR H. HUETER
EXECUTIVE ASSISTANT R. PACE
ASST DIR FOR MTF
K. HEIMBURG
ASST DIR FOR ENGR
W. MRAZEK
CONTRACTS 130
O. HIRSCH
FACILITIES 8
A. DALY
LOGISTICS 19
J. GOODRUM
RESOURCES 40
C. ANDRESSEN
SATURN I/IB PROGRAM 157
W. TEIR
DEP MGR W. LaHATTE
TECH ASST J. HARLOW
SATURN V PROGRAM 270
A. RUDOLPH
DEP OPS J. BRAMLET
DEP MGT J. MURPHY
ENGINE PROGRAM 106
W. BROWN
DEP MGR S. MOREA
ASST MGR J. BURKS
SATURN/APOLLO APPLICATIONS PROGRAM 75
L. BELEW
DEP MGR S. REINARTZ
ASST MGR H. HAENISCH
*RES MGR KSC
RES MGR DAC
RES MGR IBM
RES MGR GE
*RES MGR KSC
RES MGR SAID
ENG MICH
**RES MGR R'DYN
*EPO REP KSC
***RES MGR TCC
PROG CONT
SYS ENGR
TEST
REL & QUAL
FLT OPNS
S-I/IB STAGE
S-IVB STAGE
INSTR UNIT
VEH GSE
S-IC STAGE
S-II STAGE
S-IVB STAGE
INSTR UNIT
VEH GSE
SPACE ENG
H-I ENG
J-2 ENG
F-I ENG
MICHOUD ASSEMBLY FACILITY 257
MGR G. CONSTAN
DEP J. STAMY
MISSION OPERATIONS OFFICE 44
MGR F. SPEER
TECH ASST W. CLARKE
ASST FOR PLAN S. BARTLEY
MISSISSIPPI TEST FACILITY 103
MGR J. BALCH
DEP MGR H. AUTER
*ONE RESIDENT OFFICE; REPRESENTATION FROM SAT IB, SAT V AND ENGINE
**RESIDENT MANAGER OFFICES LOCATED AT CANOGA, NEOSHO AND EAFB
***THIOKOL CHEMICAL CORP., DENVILLE, N.J.
MSFC-3/67-IND 801BB



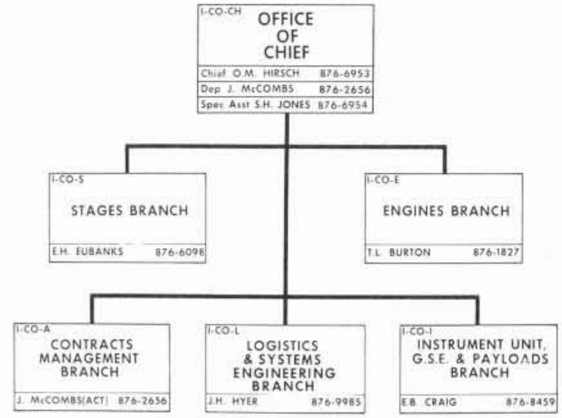
GEORGE C. MARSHALL SPACE FLIGHT CENTER
INDUSTRIAL OPERATIONS
DIRECTOR
E.F. O'CONNOR
DEPUTY DIRECTOR H. HUETER
EXECUTIVE ASSISTANT R. PACE
ASST DIR FOR MTF
K. HEIMBURG
ASST DIR FOR ENGR
W. MRAZEK
CONTRACTS
O. HIRSCH
FACILITIES
A. DALY
LOGISTICS
J. GOODRUM
RESOURCES
C. ANDRESSEN
SATURN I/IB PROGRAM
W. TEIR
DEP MGR W. LaHATTE
TECH ASST J. HARLOW
SATURN V PROGRAM
A. RUDOLPH
DEP OPS J. BRAMLET
DEP MGT J. MURPHY
ENGINE PROGRAM
W. BROWN
DEP MGR S. MOREA
ASST MGR J. BURKS
SATURN/APOLLO APPLICATIONS PROGRAM
L. BELEW
DEP MGR S. REINARTZ
ASST MGR H. HAENISCH
MICHOUD ASSEMBLY FACILITY
MGR G. CONSTAN
DEP J. STAMY
MISSION OPERATIONS OFFICE
MGR F. SPEER
TECH ASST W. CLARKE
ASST FOR PLAN S. BARTLEY
MISSISSIPPI TEST FACILITY
MGR J. BALCH
DEP MGR H. AUTER
*ONE RESIDENT OFFICE; REPRESENTATION FROM SAT IB, SAT V AND ENGINE
**RESIDENT MANAGER OFFICES LOCATED AT CANOGA, NEOSHO AND EAFB
***THIOKOL CHEMICAL CORP., DENVILLE, N.J.

GEORGE C. MARSHALL SPACE FLIGHT CENTER
INDUSTRIAL OPERATIONS
RESOURCES MANAGEMENT OFFICE



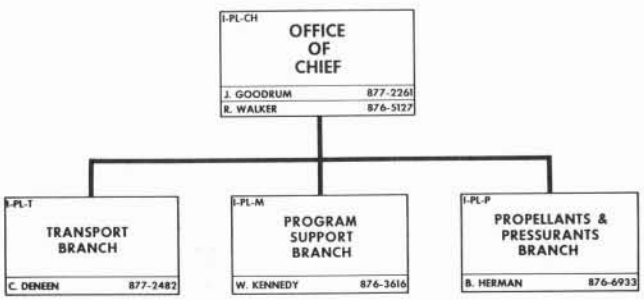
I-RM-D NOV.7, 1966 IND B810W

GEORGE C. MARSHALL SPACE FLIGHT CENTER
INDUSTRIAL OPERATIONS
CONTRACTS OFFICE



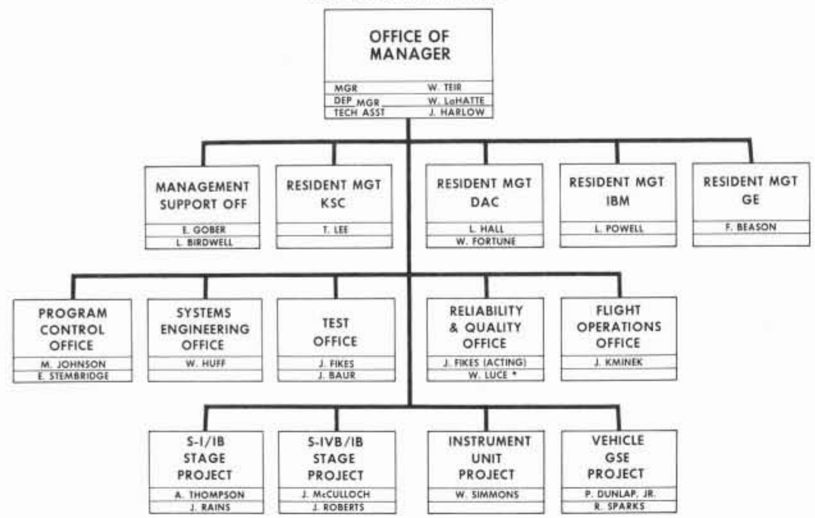
MSFC-67-IND 807X

GEORGE C. MARSHALL SPACE FLIGHT CENTER
INDUSTRIAL OPERATIONS
PROJECT LOGISTICS OFFICE



I-PL-CH NOV.7, 1966 IND B809V

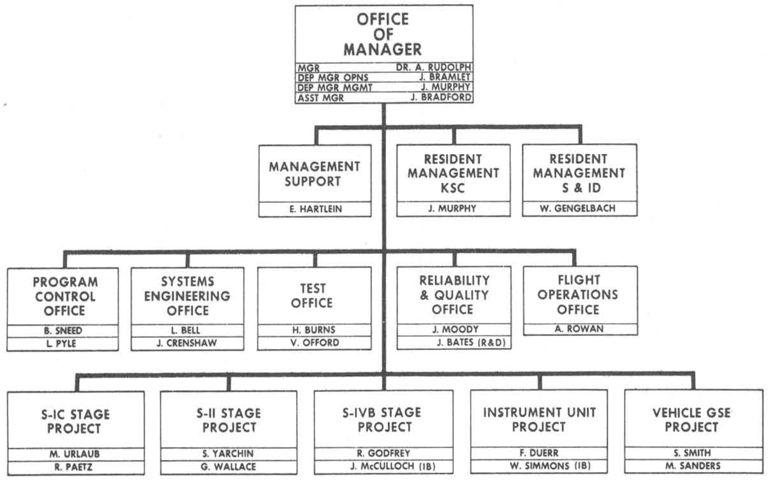
GEORGE C. MARSHALL SPACE FLIGHT CENTER
INDUSTRIAL OPERATIONS
SATURN I/IB PROGRAM



* ASSIGNED BY QUALITY & RELIABILITY ASSURANCE LABORATORY

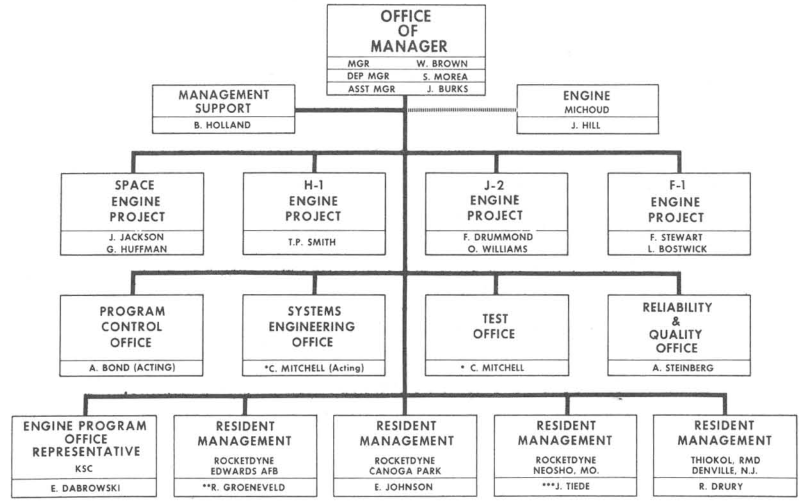
MSFC-67-IND 802AG

GEORGE C. MARSHALL SPACE FLIGHT CENTER
INDUSTRIAL OPERATIONS
SATURN V PROGRAM



MSFC-67-IND 803AG

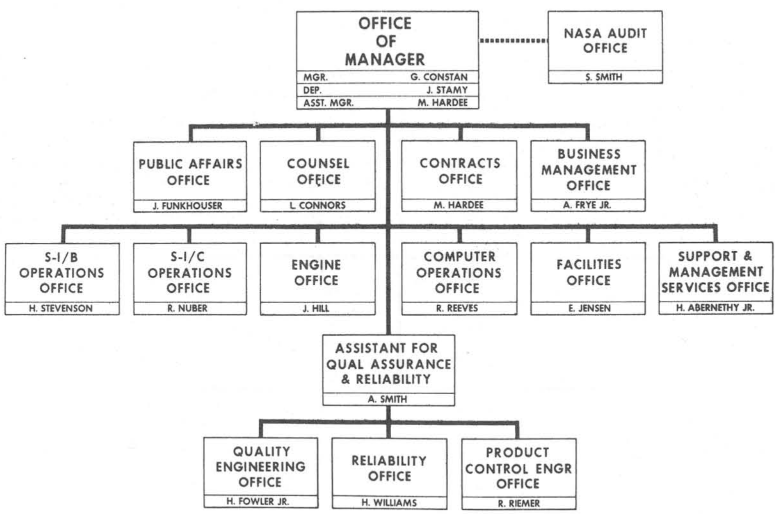
GEORGE C. MARSHALL SPACE FLIGHT CENTER
INDUSTRIAL OPERATIONS
ENGINE PROGRAM OFFICE



* DUAL FUNCTION
** DUAL FUNCTION-Also serves as F-1 ENGINE Resident Project Manager
*** DUAL FUNCTION-Also serves as H-1 ENGINE Resident Project Manager

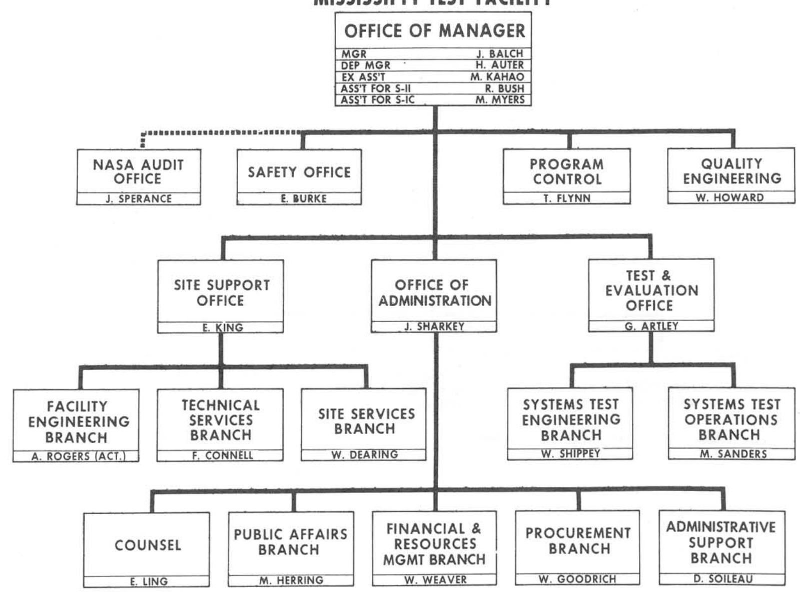
MSFC-67-IND 804AA

GEORGE C. MARSHALL SPACE FLIGHT CENTER
INDUSTRIAL OPERATIONS
MICHOUD ASSEMBLY FACILITY



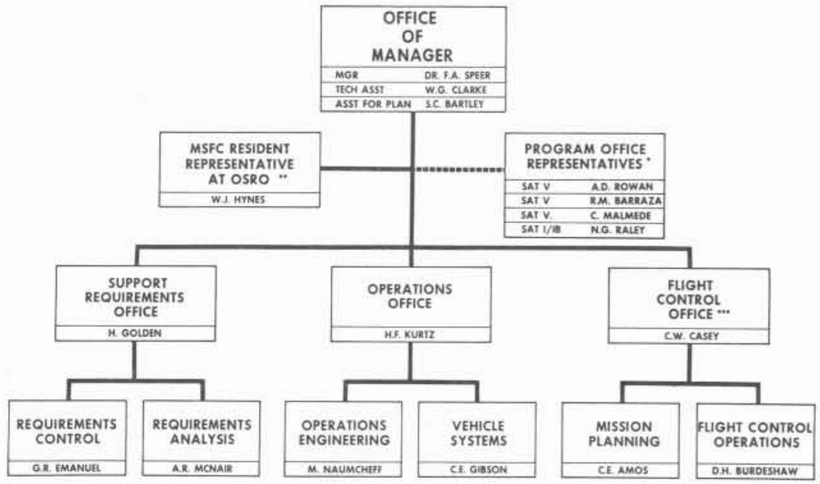
MSFC-67-IND 805V

GEORGE C. MARSHALL SPACE FLIGHT CENTER
INDUSTRIAL OPERATIONS
MISSISSIPPI TEST FACILITY



I-RM-D IND B806T

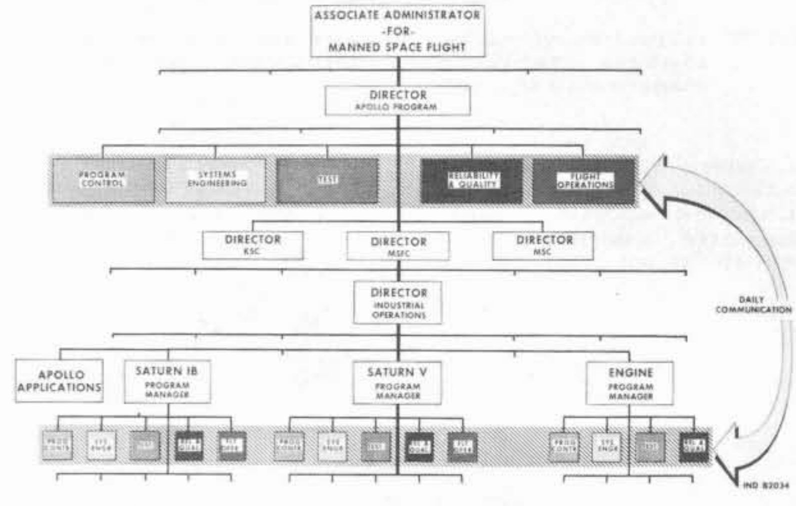
GEORGE C. MARSHALL SPACE FLIGHT CENTER
INDUSTRIAL OPERATIONS
MISSION OPERATIONS OFFICE



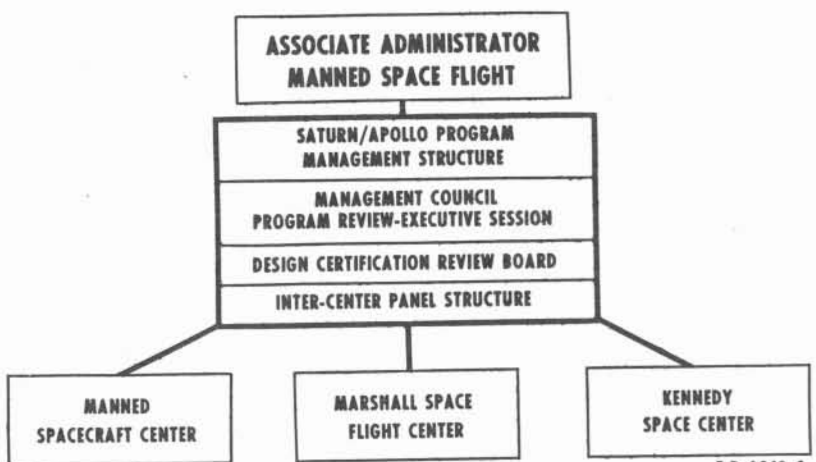
* ASSIGNED BY PROGRAM OFFICES
** HEADQUARTERS, WASHINGTON
*** MSC, HUSTON

MSFC-67-IND 820K

SATURN PROGRAM MANAGEMENT RELATIONSHIPS WITH MSF



MANNED SPACE FLIGHT PROGRAM MANAGEMENT TOOLS FOR PROGRAM DIRECTION



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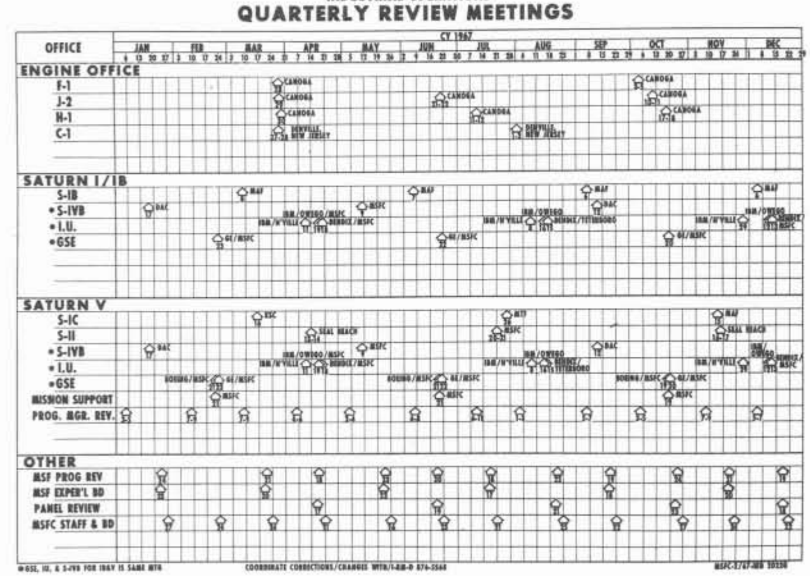
INDUSTRIAL OPERATIONS
QUARTERLY REVIEW MEETINGS



INSTRUMENTATION AND COMMUNICATIONS PANEL

FUNCTION: TO DEFINE, RESOLVE PROBLEMS, AND INSURE COMPATIBILITY OF ON-BOARD AND RESPECTIVE GROUND SYSTEMS, INSTRUMENTATION AND COMMUNICATION INTERFACES.

MEMBERSHIP

CO-CHAIRMAN:	R. W. WILLIAMS	MSC
CO-CHAIRMAN:	O. A. HOBERG	MSFC-ASTRO.
CO-SECRETARY:	B. J. MILLS	MSFC-ASTRO
CO-SECRETARY:	J. McKENZIE	MSC
OTHER MEMBERS	MSF	2
	KSC	3
	MSC	4
	OTDA	1
	JPL	1
	GODDARD	1
	MSFC	
	IO	3
	ASTRO	2
	AERO	1
	QUAL	1
		23

MEETINGS:

FREQUENCY: EVERY 3 MONTHS
SPECIAL MEETINGS CALLED

PLACE: ROTATED BETWEEN MSC & MSFC,KSC

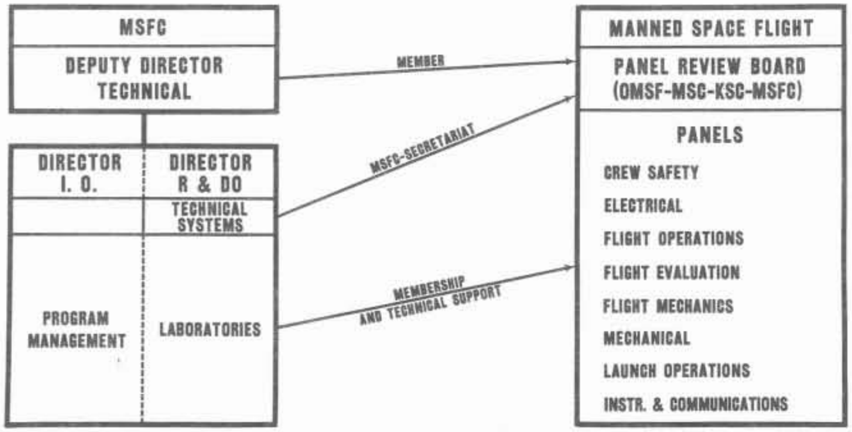
LENGTH: 2-3 DAYS

E-D A 845 E

MSFC PARTICIPATION IN MSF PANEL STRUCTURE

PANEL REVIEW BOARD: SUPERVISES THE ACTIVITIES OF THE INTER-CENTER PANELS.

INTER-CENTER PANELS: RECOMMEND TO PROGRAM MANAGEMENT SOLUTION OF TECHNICAL INTERFACE PROBLEMS INVOLVING THE LAUNCH VEHICLE, SPACECRAFT, FACILITIES AND ASSOCIATED EQUIPMENT.



MSFC PROVIDES CO-CHAIRMEN FOR ALL PANELS EXCEPT LAUNCH OPERATIONS.

E-D A847 E

MSFC CENTER LEVEL MANAGEMENT MEETINGS

MEETINGS	OFFICE OF DIRECTOR: DIRECTOR	OFFICE OF DIRECTOR: DEP. DIR. TECH.	OFFICE OF DIRECTOR: DEP. DIR. ADMIN.	CENTER STAFF: EXECUTIVE STAFF	CENTER STAFF: STAFF OFFICES	R & DO OPERATIONS: DIRECTOR	R & DO OPERATIONS: STAFF OFFICES	R & DO OPERATIONS: LABORATORY DIR.	INDUSTRIAL OPERATIONS: DIRECTOR	INDUSTRIAL OPERATIONS: STAFF OFFICES	INDUSTRIAL OPERATIONS: PROGRAM OFFICES
1. DIRECTOR'S LUNCHEON - DAILY	(X)	X	X	X		X			X		
2. DEP. DIR, TECH, STAFF MEETING - DAILY		(X)	X	X		X			X		
3. DEP. DIR, ADMIN, STAFF MEETING - WEEKLY			(X)		X						
4. CENTER PROGRAM REVIEW - MONTHLY	X	X	X	X		X			(X)	X	X
5. CENTER STAFF MEETING - MONTHLY	X	X	(X)	X	X	X	X	X	X	X	X
6. CENTER BOARD MEETING - MONTHLY	X	(X)	X	X		X	X	X	X	X	X
7. EXECUTIVE SESSION - MONTHLY	(X)	X	X	X		X	X	X	X		X
8. PRIME CONTRACTOR REVIEWS - QUARTERLY	X	X		X		X		X	X	X	(X)
9. PROGRAM OPERATING PLAN REVIEW - QUARTERLY	X	X	X	(X)	X	X	X	X	X	X	X

(X) - DENOTES CHAIRMAN

E-D D848 A

GUIDE TO CONGRESSIONAL COMMITTEES OF PRIMARY INTEREST TO MSFC

SENATE COMMITTEES

SENATE COMMITTEE ON APPROPRIATIONS

CARL HAYDEN, ARIZ. (D) CHMN
RICHARD B. RUSSELL, GA. (D)
ALLEN J. ELLENDER, LA. (D)
LISTER HILL, ALA. (D)
JOHN L. McCLELLAN, ARK. (D)
WARREN G. MAGNUSON, WASH. (D)
SPESSARD L. HOLLAND, FLA. (D)
JOHN STENNIS, MISS. (D)
JOHN O. PASTORE, R.I. (D)
A. S. MIKE MONRONEY, OKLA. (D)
ALAN BIBLE, NEV. (D)
ROBERT C. BYRD, W. VA. (D)
GALE W. McGEE, WYO. (D)
MIKE MANSFIELD, MONT. (D)
E.L. BARTLETT, ALASKA (D)
WILLIAM PROXMIRE, WIS. (D)
RALPH W. YARBOROUGH, TEX. (D)
MILTON R. YOUNG, N.D. (R)
KARL E. MUNDT, S.D. (R)
MARGARET CHASE SMITH, MAINE (R)
THOMAS H. KUCHEL, CALIF. (R)
ROMAN L. HRUSKA, NEB. (R)
GORDON ALLOTT, COLO. (R)
NORRIS COTTON, N.H. (R)
CLIFFORD P. CASE, N.J. (R)
JACOB K. JAVITS, N.Y. (R)

SENATE SUBCOMMITTEE ON INDEPENDENT OFFICES

WARREN G. MAGNUSON, WASH. (D) CHMN
LISTER HILL, ALA. (D)
ALLEN J. ELLENDER, LA. (D)
RICHARD B. RUSSELL, GA. (D)
SPESSARD L. HOLLAND, FLA. (D)
JOHN O. PASTORE, R.I. (D)
A.S. MIKE MONRONEY, OKLA. (D)
JOHN STENNIS, MISS. (D)
MIKE MANSFIELD, MONT. (D)
GORDON ALLOTT, COLO. (R)
MARGARET CHASE SMITH, MAINE (R)
ROMAN L. HRUSKA, NEB. (R)
NORRIS COTTON, N.H. (R)
CLIFFORD P. CASE, N.J. (R)
JACOB K. JAVITS, N.Y. (R)
MILTON R. YOUNG, N.D. (R)

SENATE COMMITTEE ON GOVERNMENT OPERATIONS
SUBCOMMITTEE ON GOVERNMENT RESEARCH

FRED R. HARRIS, OKLA. (D), CHMN
JOHN L. McCLELLAN, ARK. (D)
ABRAHAM A. RIBICOFF, CONN. (D)
JOSEPH M. MONTOYA, N.M. (D)
KARL E. MUNDT, S.D. (R)
CLIFFORD P. HANSEN, WYO. (R)

SENATE COMMITTEE ON GOVERNMENT OPERATIONS
PERMANENT SUBCOMMITTEE ON INVESTIGATIONS

JOHN L. McCLELLAN, ARK. (D), CHMN
HENRY M. JACKSON, WASH. (D)
SAM J. ERVIN, JR., N.C. (D)
EDMUND S. MUSKIE, MAINE (D)
ABRAHAM A. RIBICOFF, CONN. (D)
FRED R. HARRIS, OKLA. (D)
KARL E. MUNDT, S.D. (R)
CARL T. CURTIS, NEBR. (R)
JACOB K. JAVITS, N.Y. (R)

SENATE COMMITTEE ON AERONAUTICS AND SPACE SCIENCES

CLINTON P. ANDERSON, N.M. (D), CHMN
RICHARD B. RUSSELL, GA. (D)
WARREN G. MAGNUSON, WASH. (D)
STUART B. SYMINGTON, MO. (D)
JOHN STENNIS, MISS. (D)
STEPHEN M. YOUNG, OHIO (D)
THOMAS J. DODD, CONN. (D)
HOWARD W. CANNON, NEV. (D)
SPESSARD L. HOLLAND, FLA. (D)
WALTER F. MONDALE, MINN. (D)
MARGARET CHASE SMITH, MAINE (R)
BOURKE B. HICKENLOOPER, IOWA (R)
CARL T. CURTIS, NEB. (R)
LEN B. JORDAN, IDAHO (R)
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CHARLES H. PERCY, ILL. (R)

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MICHAEL J. KIRWAN, OHIO (D)
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JEFFERY COHELAN, CALIF. (D)
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FRANK T. BOW, OHIO (R)
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MELVIN R. LAIRD, WIS. (R)
ELFORD A. CEDERBERG, MICH. (R)
GLENARD P. LIPSCOMB, CALIF. (R)
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ROBERT H. MICHEL, ILL. (R)
SILVIO O. CONTE, MASS. (R)
ODIN LANGEN, MINN. (R)
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GLENN R. DAVIS, WIS. (R)
HOWARD W. ROBINSON, N.Y. (R)
GARNER E. SHRIVER, KAN. (R)
JOSEPH M. McDADE, PA. (R)
MARK ANDREWS, N.D. (R)
WILLIAM HENRY HARRISON, WYO. (R)
LOUIS C. WYMAN, N.H. (R)
BURT L. TALCOTT, CALIF. (R)
CHARLOTTE T. REID, ILL. (R)
DONALD W. RIEGLE JR., MICH. (R)

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ROBERT N. GIAIMO, CONN. (D)
JOHN O. MARSH, VA. (D)
DAVID PRYOR, ARK. (D)
CHARLES R. JONAS, N.C. (R)
WILLIAM E. MINSHALL, OHIO (R)
LOUIS C. WYMAN, N.H. (R)
BURT L. TALCOTT, CALIF. (R)

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SUBCOMMITTEE ON RESEARCH AND TECHNICAL PROGRAMS

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TORBERT H. MACDONALD, MASS. (D)
WILLIAM S. MOORHEAD, PA. (D)
JIM WRIGHT, TEX (D)
JOHN W. WYDLER, N.Y. (R)
JOHN T. MYERS, IND. (R)
FLETCHER THOMPSON, GA. (R)

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SUBCOMMITTEE ON MILITARY OPERATIONS

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EDWARD A. GARMATZ, MD. (D)
WILLIAM S. MOORHEAD, PA. (D)
WILLIAM J. RANDALL, MO. (D)
FRANK J. HORTON, N.Y. (R)
DONALD RUMSFELD, ILL. (R)
JOHN N. ERLENBORN, ILL. (R)

HOUSE COMMITTEE ON SCIENCE AND ASTRONAUTICS

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OLIN E. TEAGUE, TEXAS (D)
JOSEPH E. KARTH, MINN. (D)
KEN HECHLER, W. VA. (D)
EMILIO Q. DADDARIO, CONN. (D)
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WILLIAM F. RYAN, N.Y. (D)
THOMAS N. DOWNING, VA. (D)
JOE D. WAGGONNER JR., LA. (D)
DON FUQUA, FLA. (D)
GEORGE E. BROWN, CALIF. (D)
LESTER L. WOLFF, N.Y. (D)
WILLIAM J. GREEN III, PA. (D)
EARLE CABELL, TEXAS (D)
JACK BRINKLEY, GA. (D)
BOB ECKHARDT, TEXAS (D)
VACANCY
JAMES G. FULTON, PA. (R)
CHARLES A. MOSHER, OHIO (R)
RICHARD L. ROUDEBUSH, IND. (R)
ALPHONZO BELL, CALIF. (R)
THOMAS M. PELLY, WASH. (R)
DONALD RUMSFELD, ILL. (R)
EDWARD J. GURNEY, FLA. (R)
JOHN W. WYDLER, N.Y. (R)
GUY VANDER JAGT, MICH. (R)
LARRY WINN JR., KAN. (R)
JERRY L. PETTIS, CALIF. (R)
DONALD E. LUKENS, OHIO. (R)
JOHN E. HUNT, N.J. (R)

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SUBCOMMITTEE ON MANPOWER AND CIVIL SERVICE

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H. R. GROSS, IOWA (R)
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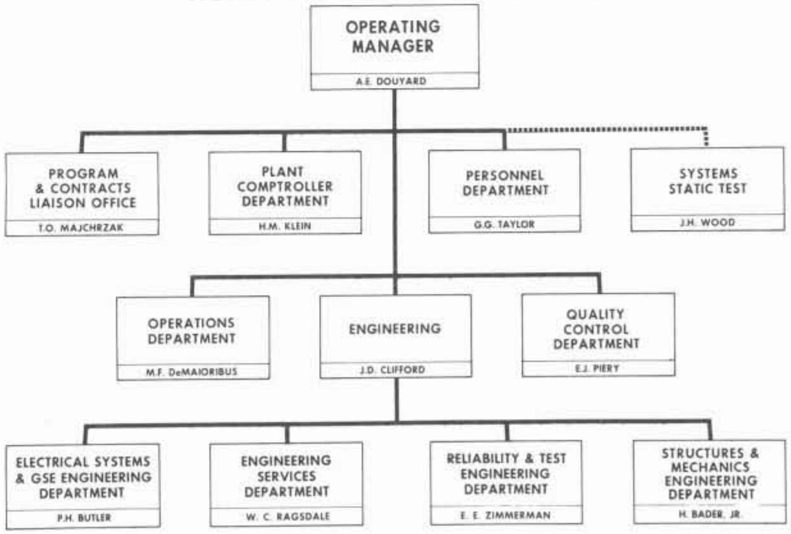
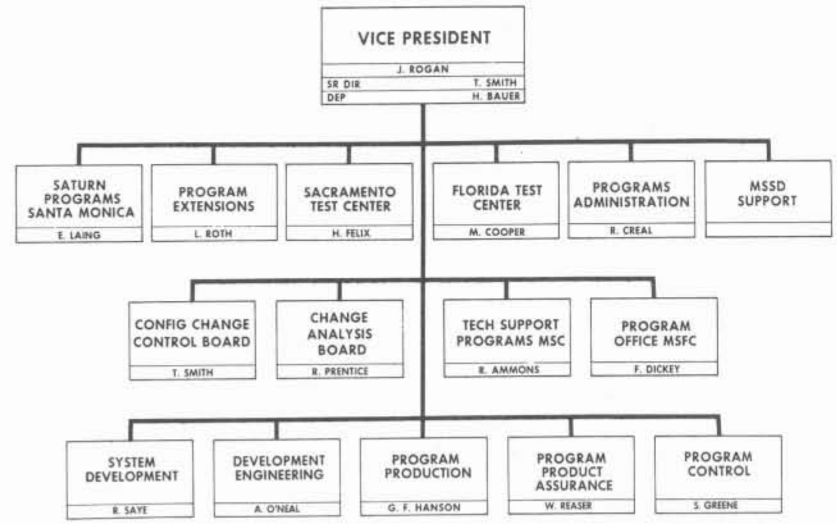
JAMES T. BROYHILL, N.C. (R)

CHRYSLER CORPORATION
SPACE DIVISION
HUNTSVILLE SPACE OPERATIONS



MSFC-67-IND 811-1G

DOUGLAS AIRCRAFT COMPANY
MISSILES AND SPACE SYSTEMS DIVISION
SATURN/APOLLO PROGRAMS



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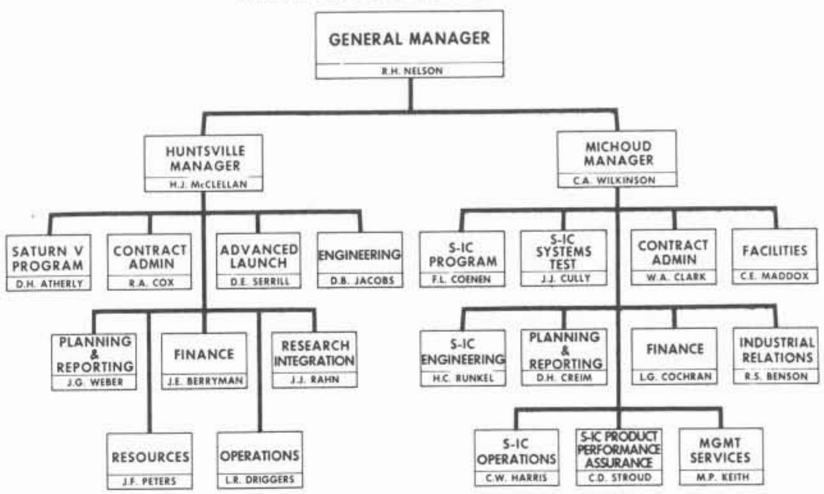
THE BOEING COMPANY
AEROSPACE GROUP
LAUNCH SYSTEMS BRANCH



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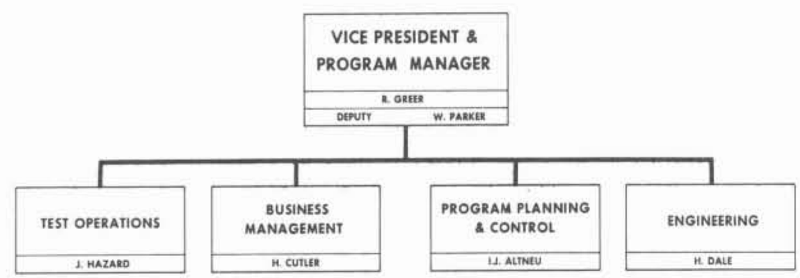
NORTH AMERICAN AVIATION INC.
SPACE AND INFORMATION DIVISION
S-II PROGRAM



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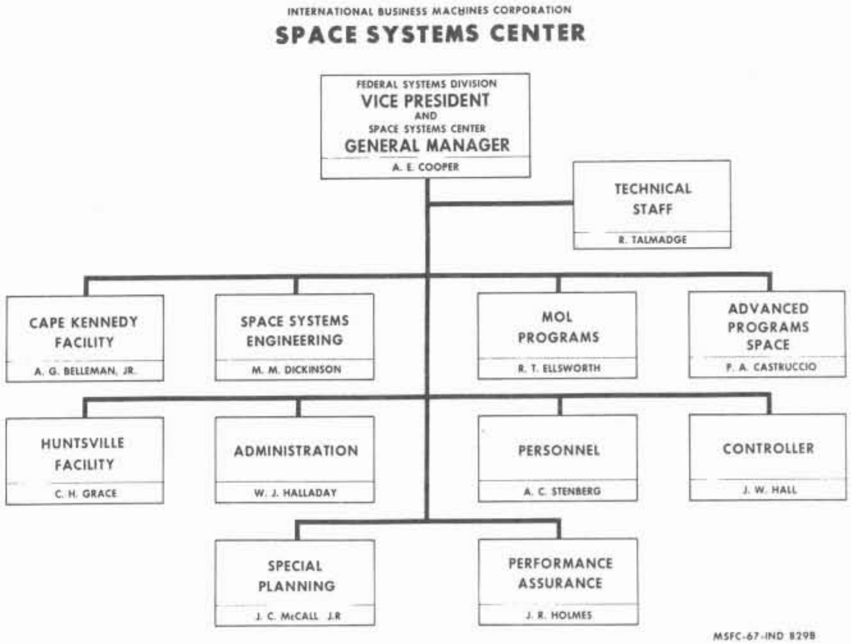
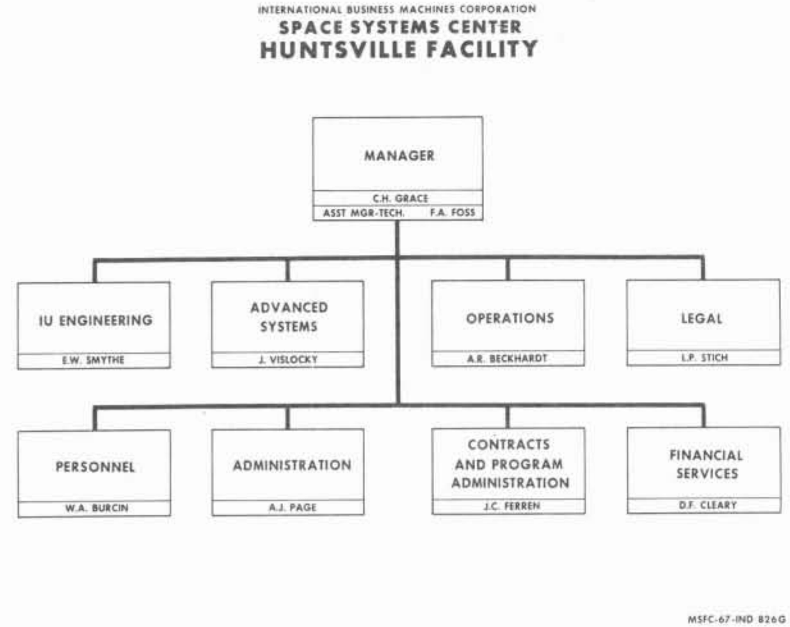
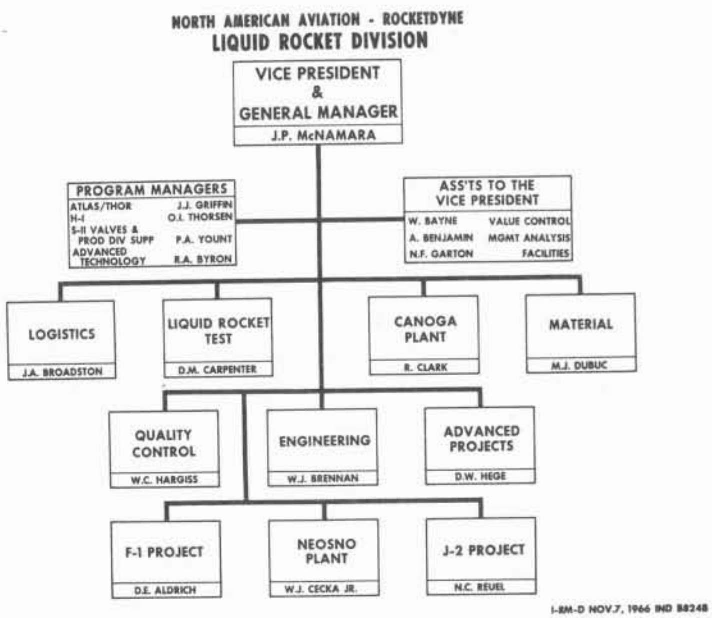

INTERNATIONAL BUSINESS MACHINES CORPORATION
SPACE SYSTEMS CENTER
FEDERAL SYSTEMS DIVISION VICE PRESIDENT AND SPACE SYSTEMS CENTER GENERAL MANAGER
A. E. COOPER
TECHNICAL STAFF
R. TALMADGE
CAPE KENNEDY FACILITY
A. G. BELLEMAN, JR.
SPACE SYSTEMS ENGINEERING
M. M. DICKINSON
MOL PROGRAMS
R. T. ELLSWORTH
ADVANCED PROGRAMS SPACE
P. A. CASTRUCCIO
HUNTSVILLE FACILITY
C. H. GRACE
ADMINISTRATION
W. J. HALLADAY
PERSONNEL
A. C. STENBERG
CONTROLLER
J. W. HALL
SPECIAL PLANNING
J. C. McCALL JR
PERFORMANCE ASSURANCE
J. R. HOLMES
MSFC-67-IND 829B


INTERNATIONAL BUSINESS MACHINES CORPORATION
SPACE SYSTEMS CENTER
HUNTSVILLE FACILITY
MANAGER
C.H. GRACE
ASST MGR-TECH. F.A. FOSS
IU ENGINEERING
E.W. SMYTHE
ADVANCED SYSTEMS
J. VISLOCKY
OPERATIONS
A.R. BECKHARDT
LEGAL
L.P. STICH
PERSONNEL
W.A. BURCIN
ADMINISTRATION
A.J. PAGE
CONTRACTS AND PROGRAM ADMINISTRATION
J.C. FERREN
FINANCIAL SERVICES
D.F. CLEARY
MSFC-67-IND 826G


NORTH AMERICAN AVIATION - ROCKETDYNE
LIQUID ROCKET DIVISION
VICE PRESIDENT & GENERAL MANAGER
J.P. McNAMARA
PROGRAM MANAGERS
ATLAS/THOR J.J. GRIFFIN
H-I O.I. THORSEN
S-II VALVES & PROD DIV SUPP P.A. YOUNT
ADVANCED TECHNOLOGY R.A. BYRON
ASS'TS TO THE VICE PRESIDENT
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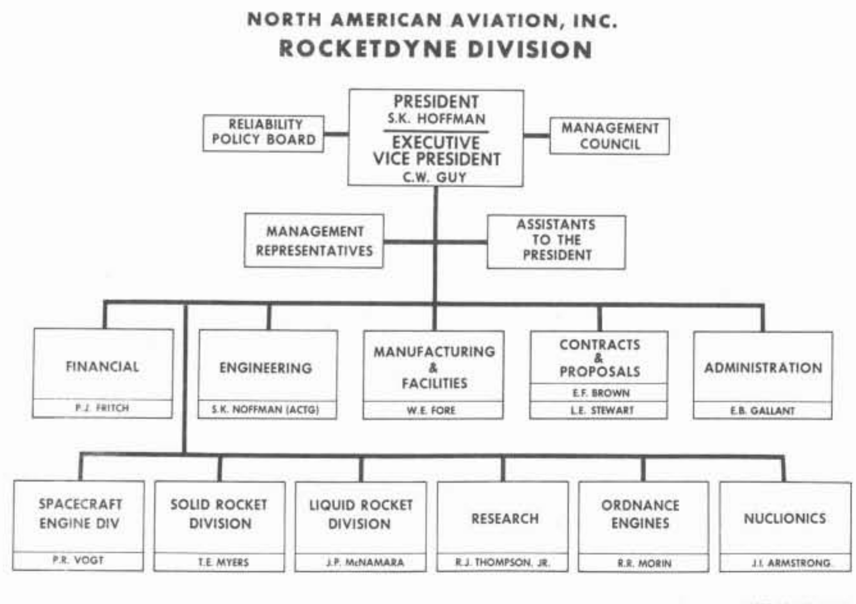
N.F. GARTON FACILITIES
LOGISTICS
J.A. BROADSTON
LIQUID ROCKET TEST
D.M. CARPENTER
CANOGA PLANT
R. CLARK
MATERIAL
M.J. DUBUC
QUALITY CONTROL
W.C. HARGISS
ENGINEERING
W.J. BRENNAN
ADVANCED PROJECTS
D.W. HEGE
F-1 PROJECT
D.E. ALDRICH
NEOSNO PLANT
W.J. CECKA JR.
J-2 PROJECT
N.C. REUEL
I-RM-D NOV.7, 1966 IND 8824B


NORTH AMERICAN AVIATION, INC.
ROCKETDYNE DIVISION
PRESIDENT
S.K. HOFFMAN
EXECUTIVE VICE PRESIDENT
C.W. GUY
RELIABILITY POLICY BOARD
MANAGEMENT COUNCIL
MANAGEMENT REPRESENTATIVES
ASSISTANTS TO THE PRESIDENT
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MANUFACTURING & FACILITIES
W.E. FORE
CONTRACTS & PROPOSALS
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L.E. STEWART
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E.B. GALLANT
SPACECRAFT ENGINE DIV
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SOLID ROCKET DIVISION
T.E. MYERS
LIQUID ROCKET DIVISION
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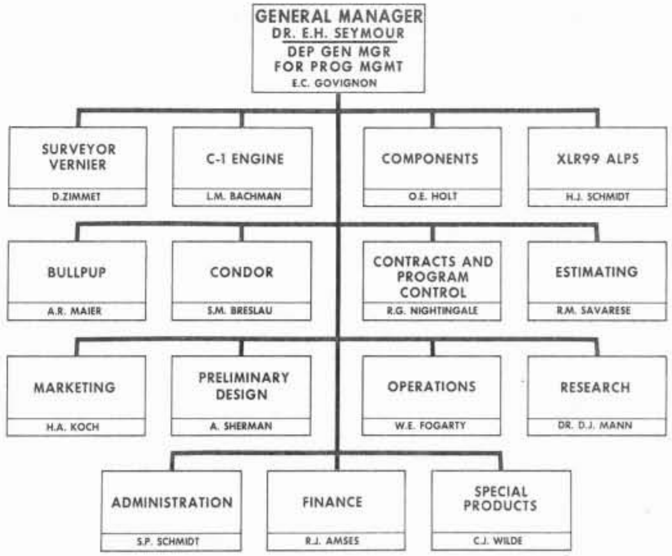
RESEARCH
R.J. THOMPSON, JR.
ORDNANCE ENGINES
R.R. MORIN
NUCLIONICS
J.I. ARMSTRONG
MSFC-67-IND 827C

THIOKOL CHEMICAL
REACTION MOTORS DIVISION



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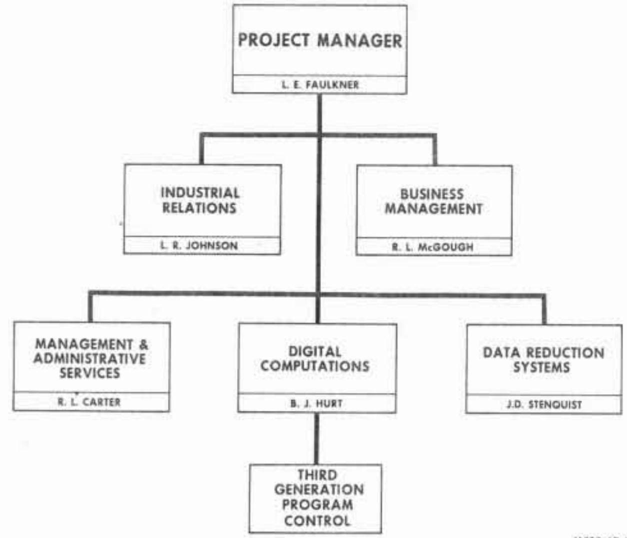
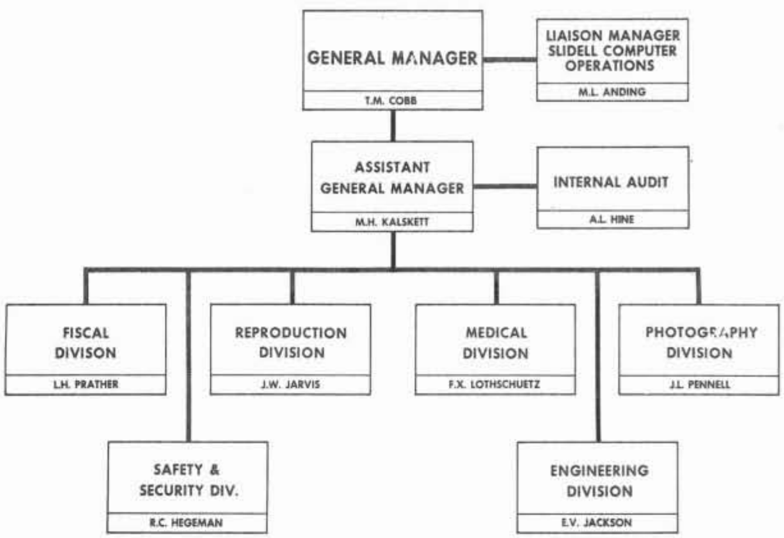
LING-TEMCO-VOUGHT, INC
LTV RANGE SYSTEMS DIVISION



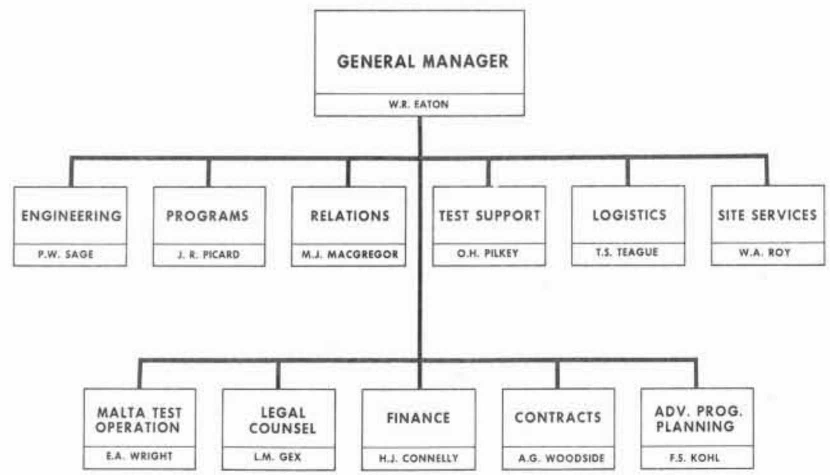
MSFC-67-IND 828G

MASON RUST
MICHOUD DIVISION



MSFC-67-IND 815L

GENERAL ELECTRIC
MISSISSIPPI TEST SUPPORT OPERATION



MSFC-67-IND 821F

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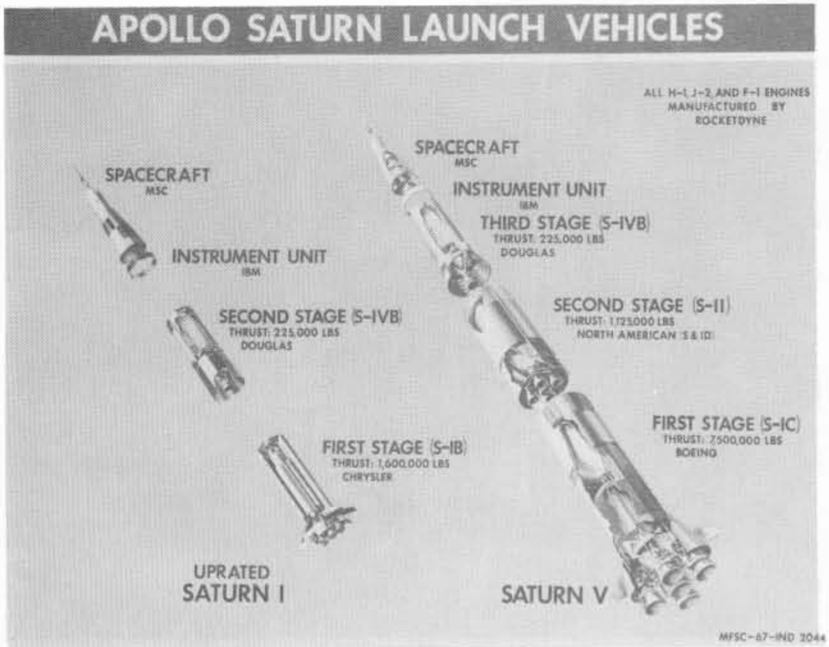
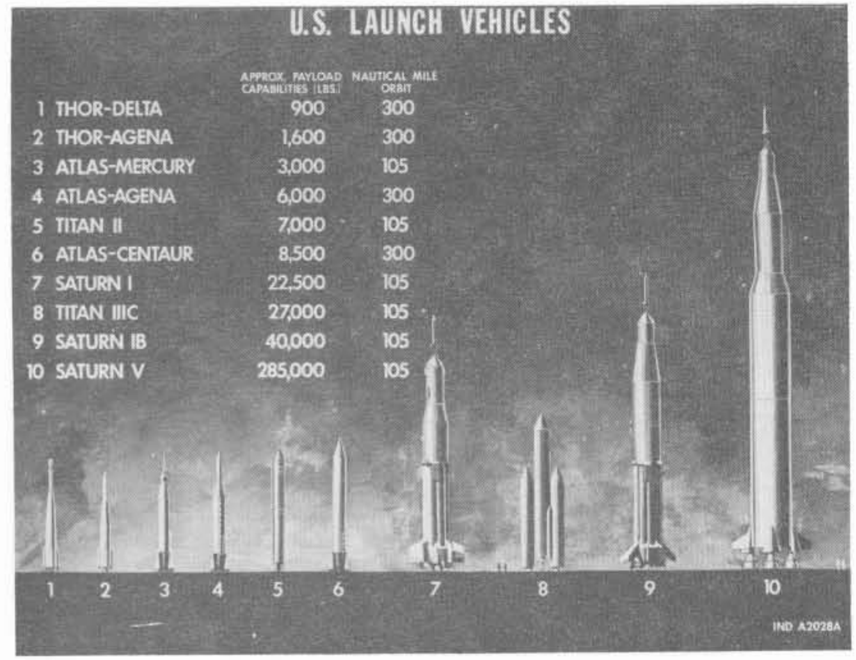
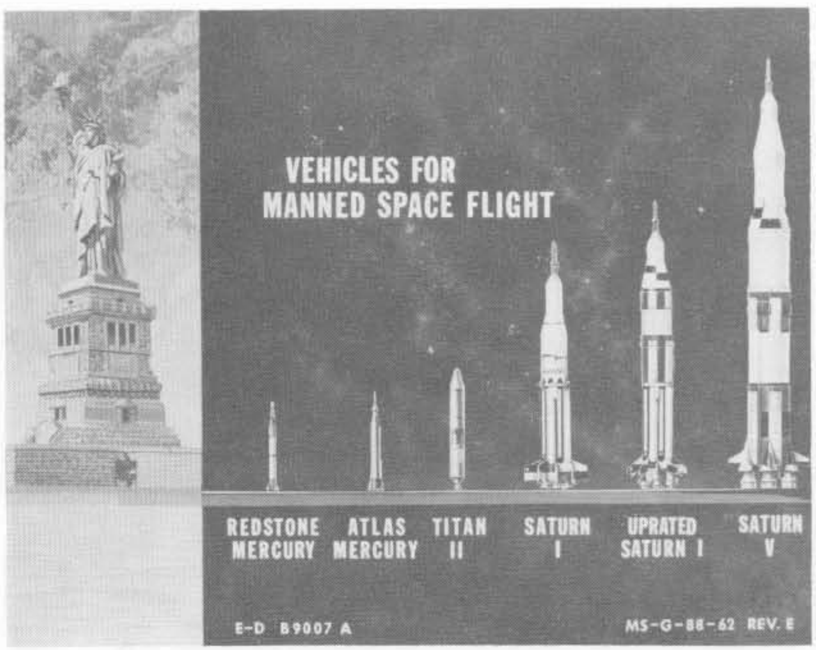
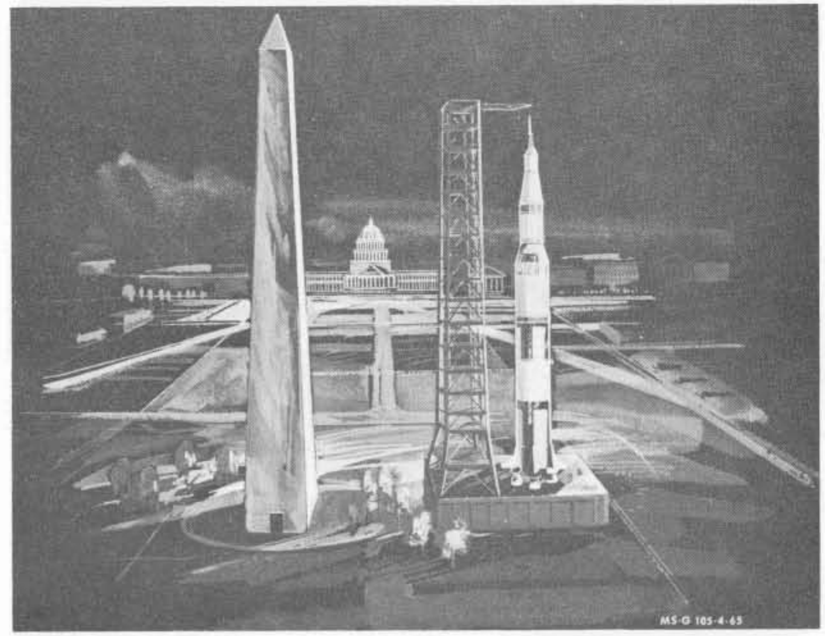

APOLLO SATURN LAUNCH VEHICLES
ALL H-1, J-2, AND F-1 ENGINES MANUFACTURED BY ROCKETDYNE
SPACECRAFT
MSC
INSTRUMENT UNIT
IBM
SECOND STAGE (S-IVB)
THRUST: 225,000 LBS
DOUGLAS
FIRST STAGE (S-IB)
THRUST: 1,600,000 LBS
CHRYSLER
UPRATED
SATURN I
SPACECRAFT
MSC
INSTRUMENT UNIT
IBM
THIRD STAGE (S-IVB)
THRUST: 225,000 LBS
DOUGLAS
SECOND STAGE (S-II)
THRUST: 1,125,000 LBS
NORTH AMERICAN (S & ID)
FIRST STAGE (S-IC)
THRUST: 7,500,000 LBS
BOEING
SATURN V
MFSC-67-IND 2044

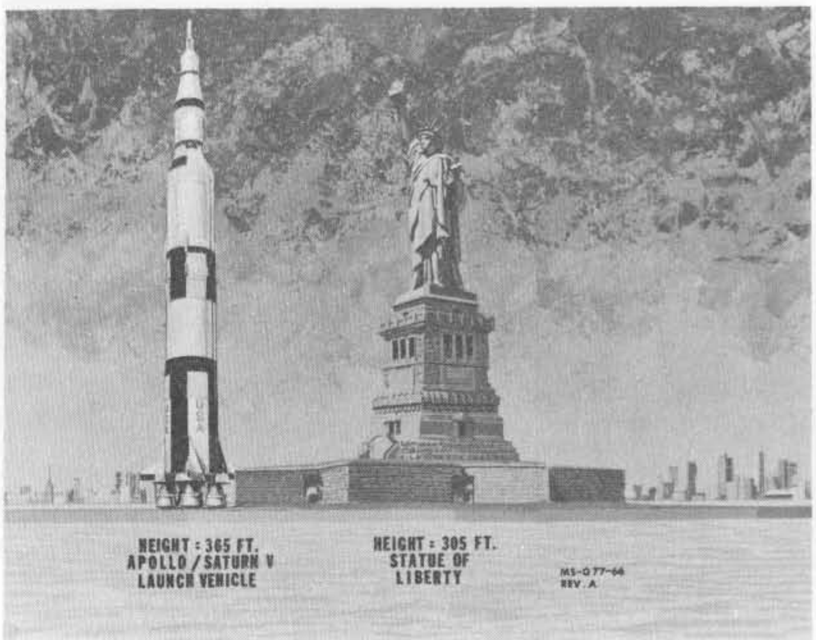

U.S. LAUNCH VEHICLES
APPROX. PAYLOAD CAPABILITIES (LBS.)
NAUTICAL MILE ORBIT
1 THOR-DELTA 900 300
2 THOR-AGENA 1,600 300
3 ATLAS-MERCURY 3,000 105
4 ATLAS-AGENA 6,000 300
5 TITAN II 7,000 105
6 ATLAS-CENTAUR 8,500 300
7 SATURN I 22,500 105
8 TITAN IIIC 27,000 105
9 SATURN IB 40,000 105
10 SATURN V 285,000 105
1 2 3 4 5 6 7 8 9 10
IND A2028A

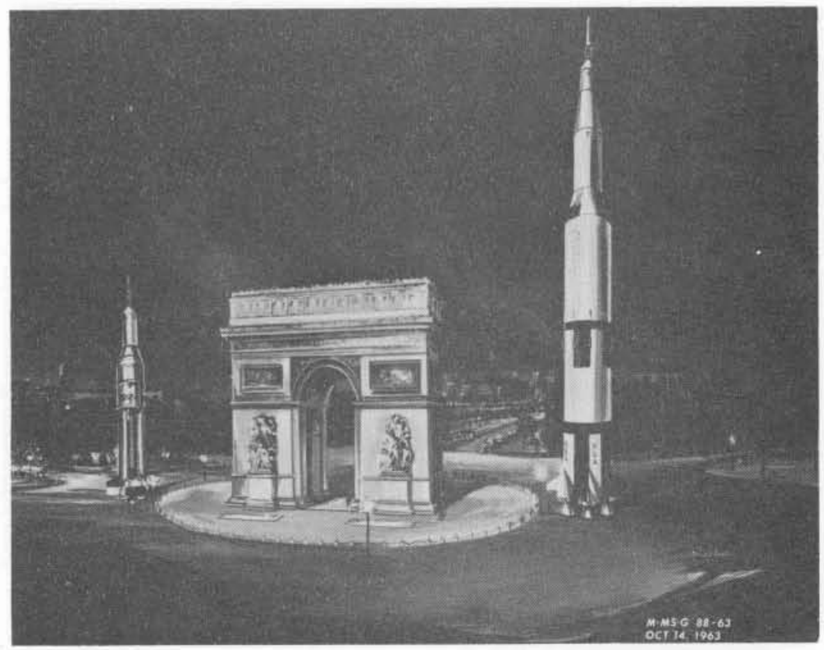

VEHICLES FOR
MANNED SPACE FLIGHT
REDSTONE MERCURY
ATLAS MERCURY
TITAN II
SATURN I
UPRATED SATURN I
SATURN V
E-D B9007 A
MS-G-88-62 REV. E


SATURN
COMPARISON


MS-G-105-63 NOV 29, 63

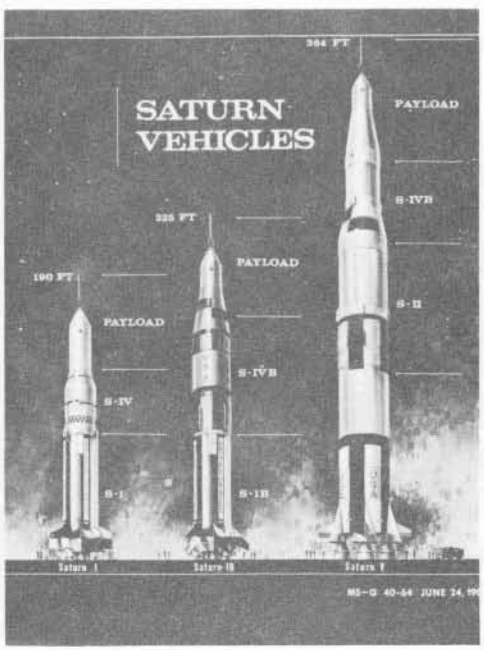

MS-G 105-4-65

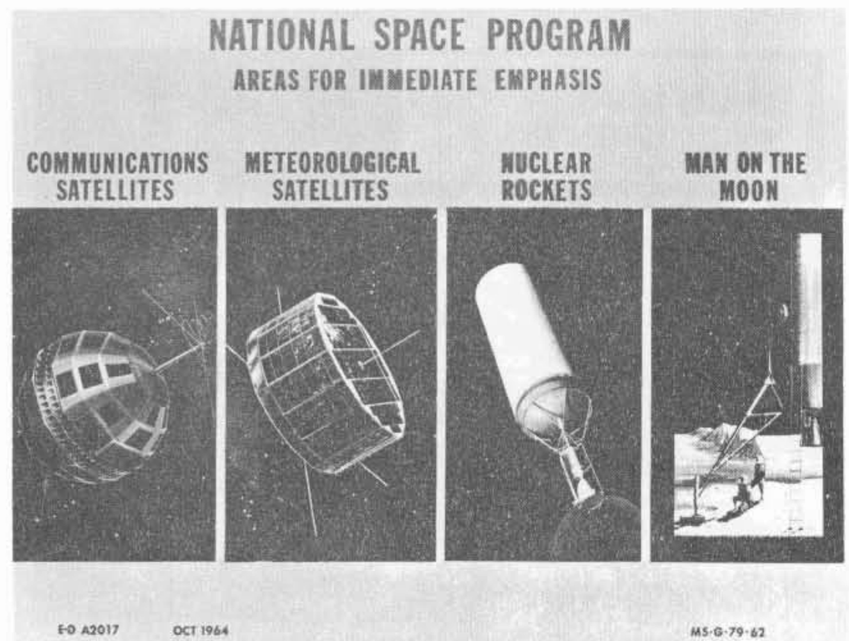

HEIGHT = 365 FT.
APOLLO / SATURN V
LAUNCH VEHICLE
HEIGHT = 305 FT.
STATUE OF
LIBERTY
MS-G77-64
REV. A

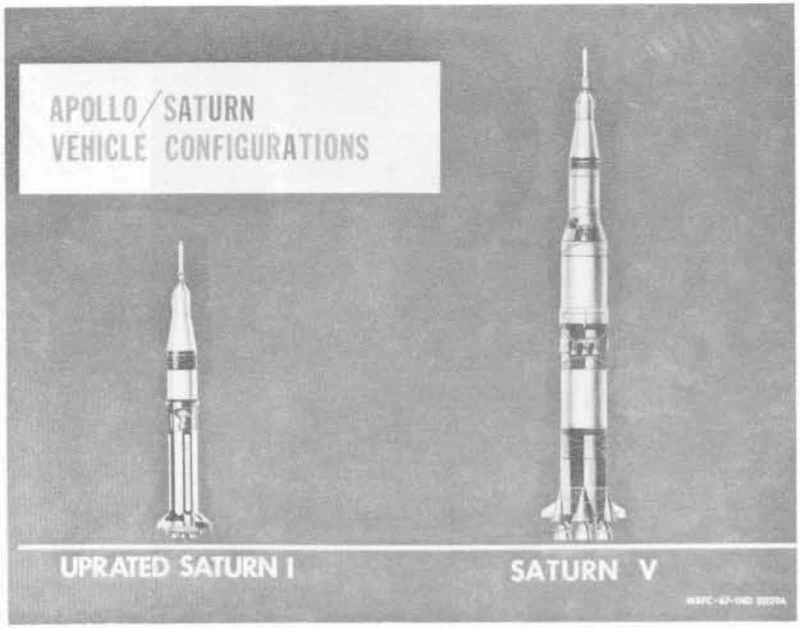

M-MS-G 88-63
OCT 14, 1963

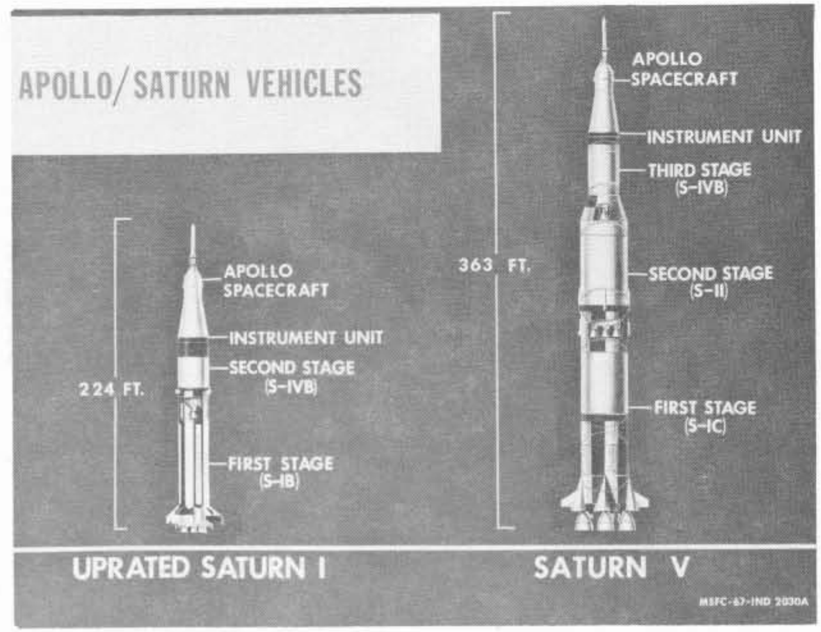

MS-G 8-64 FEB

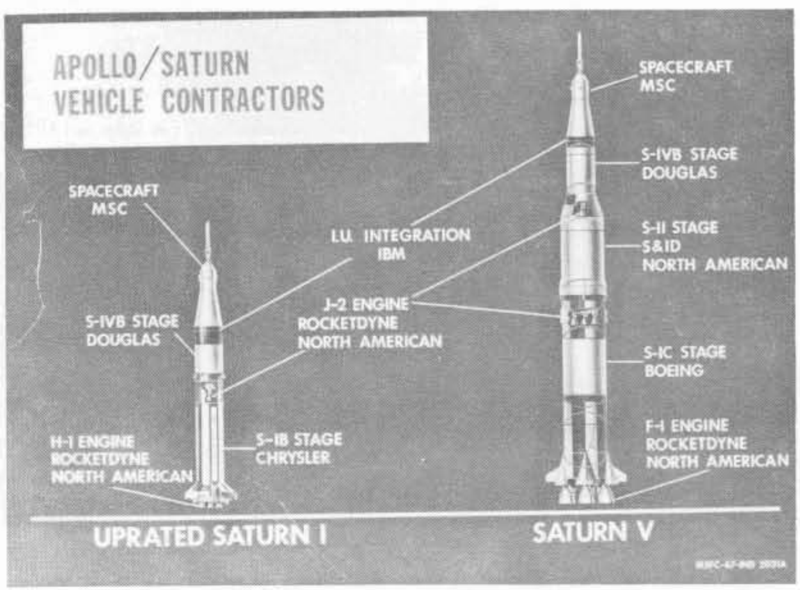

MAR. 24,1964

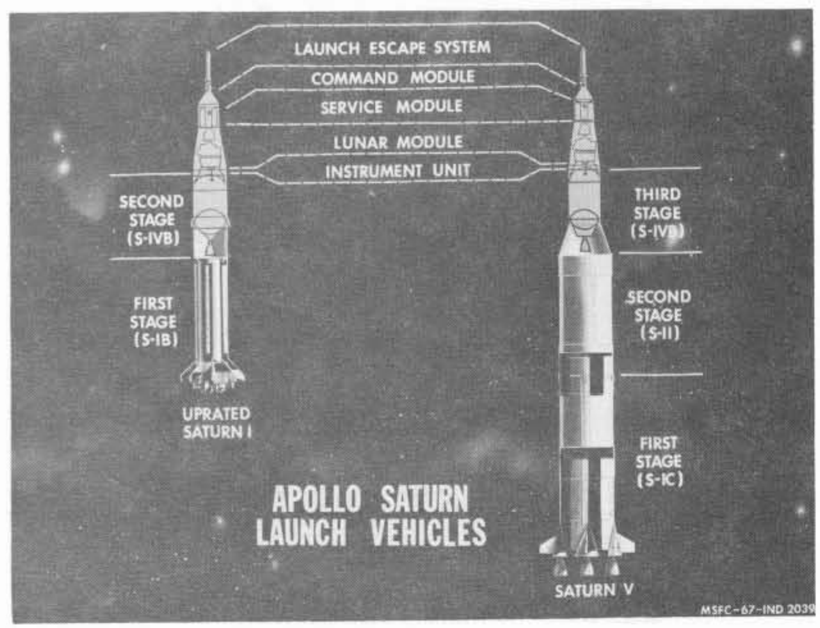

SATURN VEHICLES
190 FT
PAYLOAD
PAYLOAD
PAYLOAD
S-IV
S-IVB
S-IVB
S-II
S-IB
Saturn IB
Saturn V
MS-G 40-64 JUNE 24,

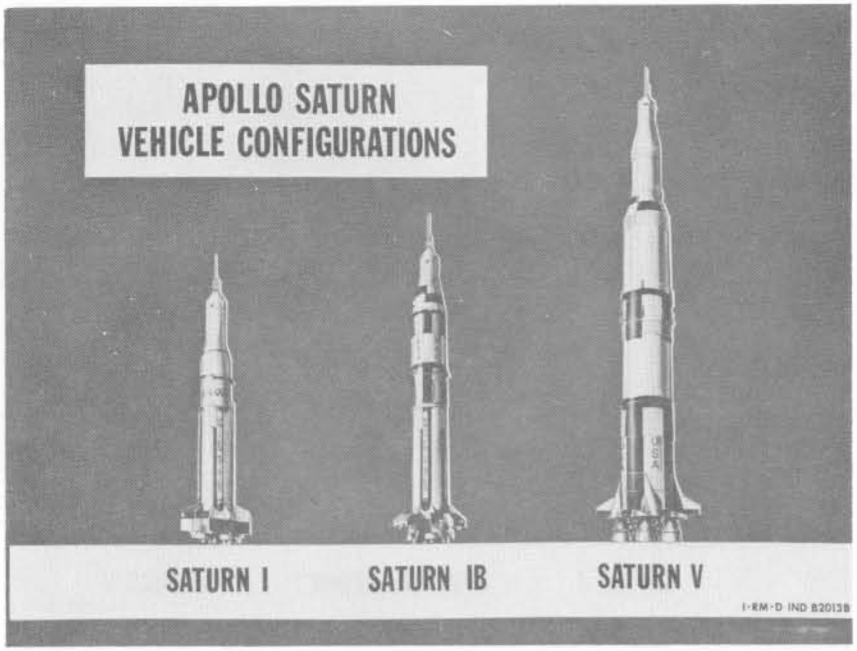

NATIONAL SPACE PROGRAM
AREAS FOR IMMEDIATE EMPHASIS
COMMUNICATIONS SATELLITES
METEOROLOGICAL SATELLITES
NUCLEAR ROCKETS
MAN ON THE MOON
E-O A2017
OCT 1964
MS-G-79-62

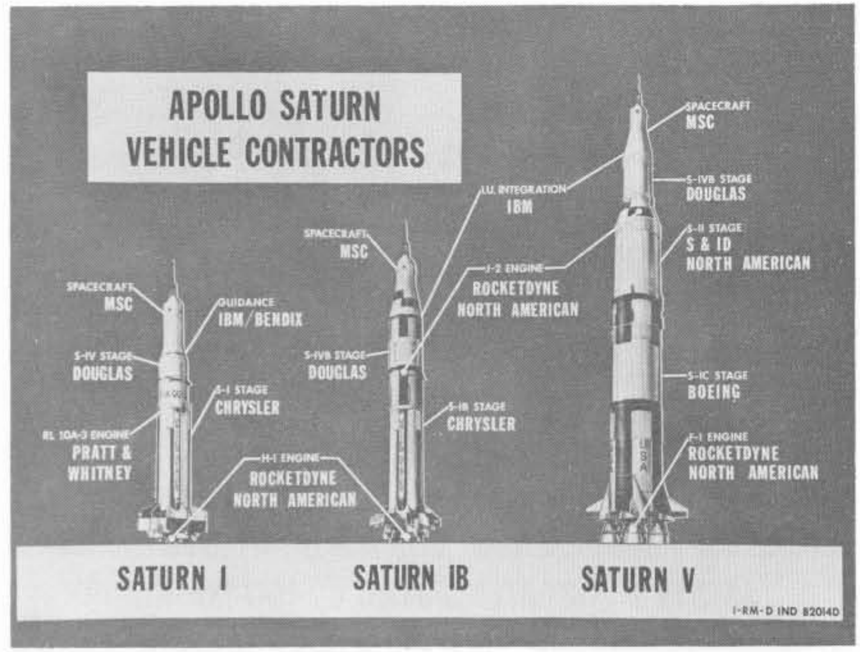

APOLLO/SATURN
VEHICLE CONFIGURATIONS
UPRATED SATURN I
SATURN V

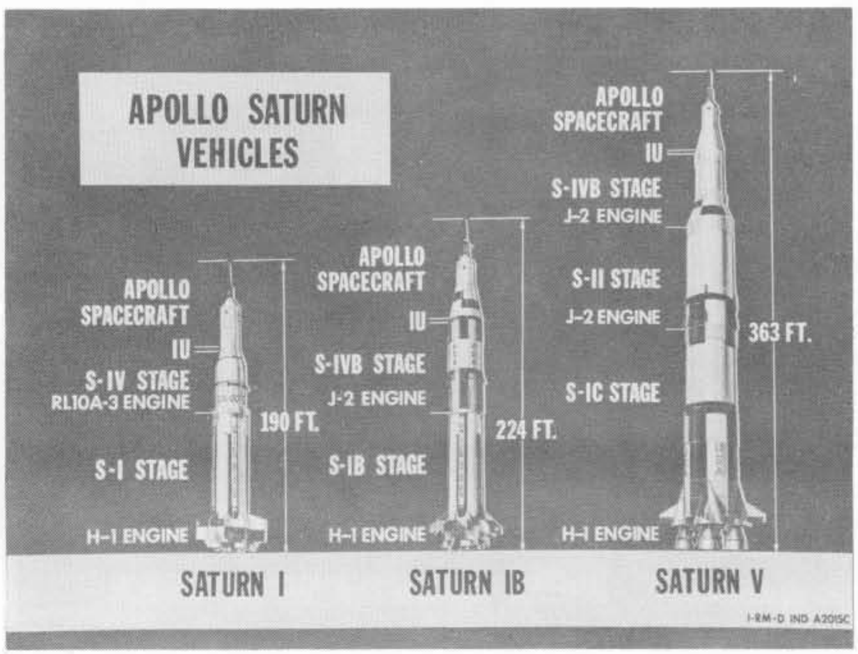

APOLLO/SATURN VEHICLES
APOLLO SPACECRAFT
INSTRUMENT UNIT
SECOND STAGE (S-IVB)
FIRST STAGE (S-IB)
224 FT.
APOLLO SPACECRAFT
INSTRUMENT UNIT
THIRD STAGE (S-IVB)
SECOND STAGE (S-II)
FIRST STAGE (S-IC)
363 FT.
UPRATED SATURN I
SATURN V
MSFC-67-IND 2030A

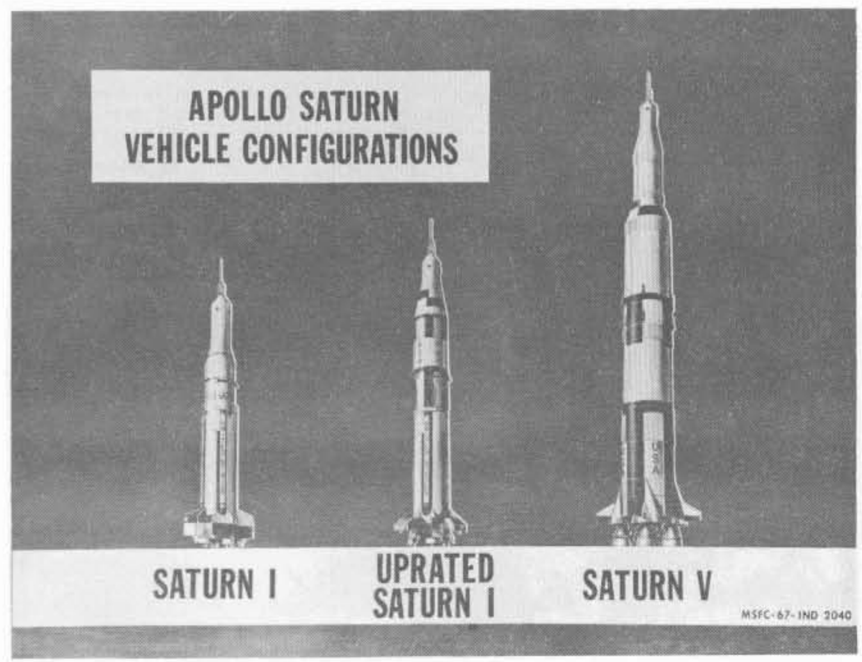

APOLLO/SATURN
VEHICLE CONTRACTORS
SPACECRAFT MSC
S-IVB STAGE DOUGLAS
H-1 ENGINE ROCKETDYNE NORTH AMERICAN
S-IB STAGE CHRYSLER
I.U. INTEGRATION IBM
J-2 ENGINE ROCKETDYNE NORTH AMERICAN
SPACECRAFT MSC
S-IVB STAGE DOUGLAS
S-II STAGE S&ID NORTH AMERICAN
S-IC STAGE BOEING
F-1 ENGINE ROCKETDYNE NORTH AMERICAN
UPRATED SATURN I
SATURN V

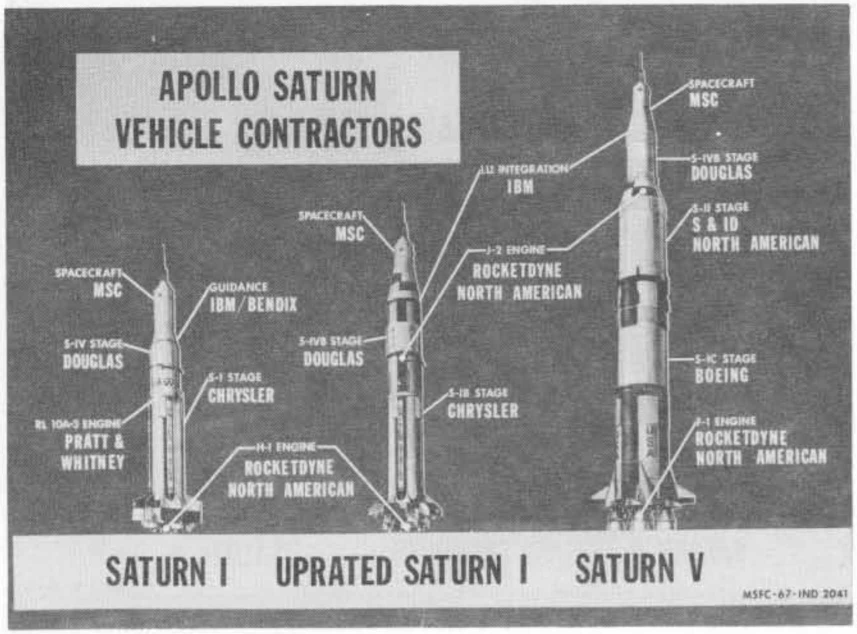

LAUNCH ESCAPE SYSTEM
COMMAND MODULE
SERVICE MODULE
LUNAR MODULE
INSTRUMENT UNIT
SECOND STAGE (S-IVB)
FIRST STAGE (S-IB)
UPRATED SATURN I
THIRD STAGE (S-IVB)
SECOND STAGE (S-II)
FIRST STAGE (S-IC)
APOLLO SATURN
LAUNCH VEHICLES
SATURN V
MSFC-67-IND 2039

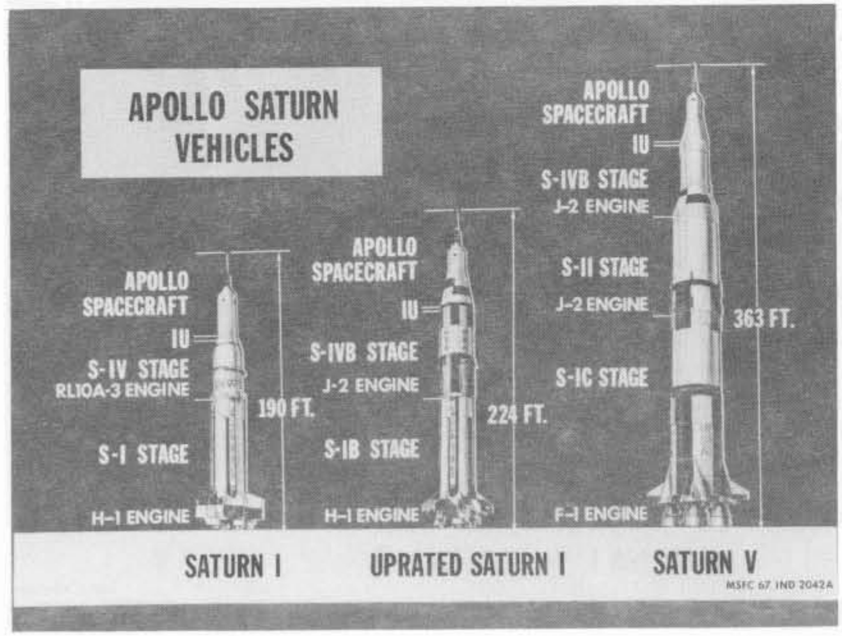

APOLLO SATURN
VEHICLE CONFIGURATIONS
SATURN I
SATURN IB
SATURN V
I-RM-D IND 82013B

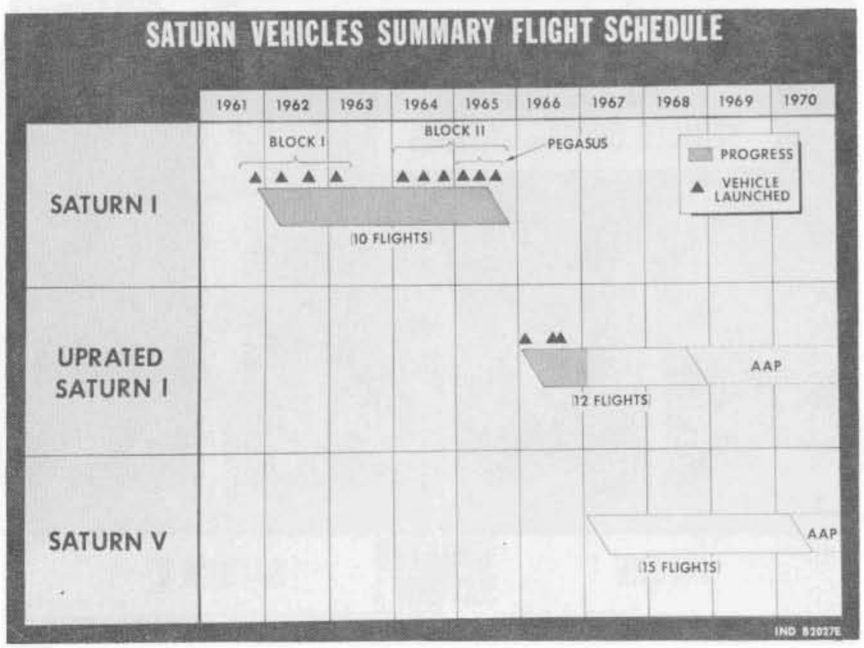

APOLLO SATURN
VEHICLE CONTRACTORS
SPACECRAFT
MSC
GUIDANCE
IBM/BENDIX
S-IV STAGE
DOUGLAS
S-I STAGE
CHRYSLER
RL 10A-3 ENGINE
PRATT & WHITNEY
H-I ENGINE
ROCKETDYNE
NORTH AMERICAN
SPACECRAFT
MSC
I.U. INTEGRATION
IBM
J-2 ENGINE
ROCKETDYNE
NORTH AMERICAN
S-IVB STAGE
DOUGLAS
S-IB STAGE
CHRYSLER
SPACECRAFT
MSC
S-IVB STAGE
DOUGLAS
S-II STAGE
S & ID
NORTH AMERICAN
S-IC STAGE
BOEING
F-I ENGINE
ROCKETDYNE
NORTH AMERICAN
SATURN I
SATURN IB
SATURN V
I-RM-D IND 82014D

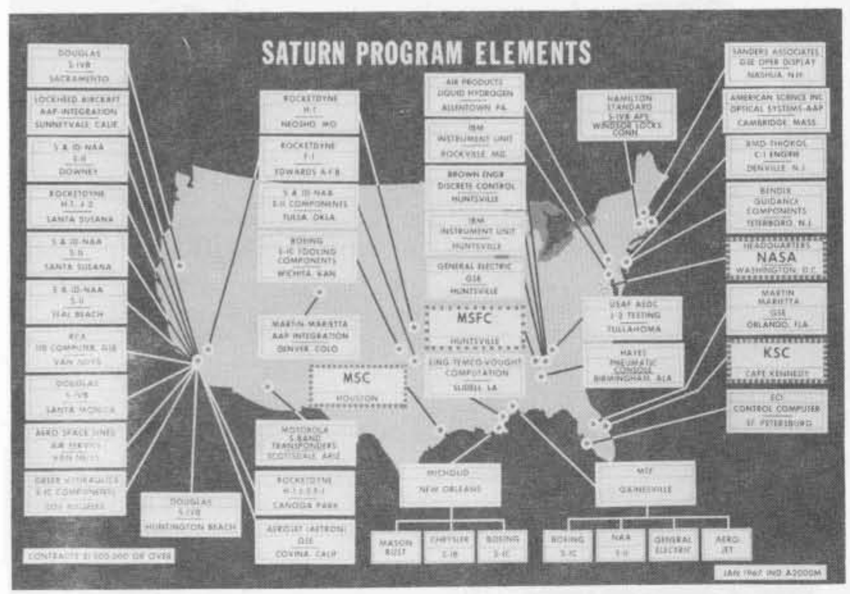

APOLLO SATURN
VEHICLES
APOLLO SPACECRAFT
IU
S-IV STAGE
RL10A-3 ENGINE
190 FT.
S-I STAGE
H-1 ENGINE
APOLLO SPACECRAFT
IU
S-IVB STAGE
J-2 ENGINE
224 FT.
S-IB STAGE
H-1 ENGINE
APOLLO SPACECRAFT
IU
S-IVB STAGE
J-2 ENGINE
S-II STAGE
J-2 ENGINE
363 FT.
S-IC STAGE
H-1 ENGINE
SATURN I
SATURN IB
SATURN V
I-RM-D IND A2015C

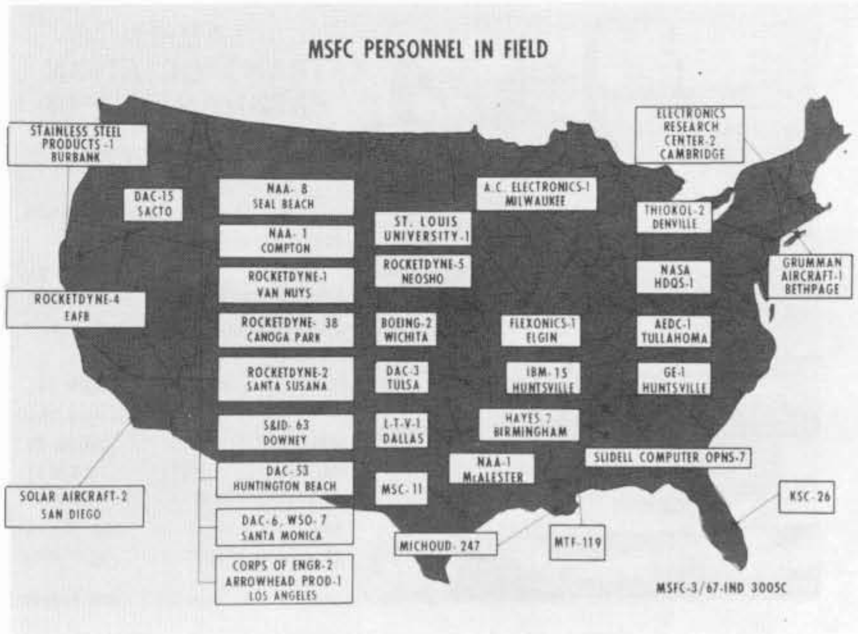

APOLLO SATURN
VEHICLE CONFIGURATIONS
SATURN I
UPRATED SATURN I
SATURN V
MSFC-67-IND 2040

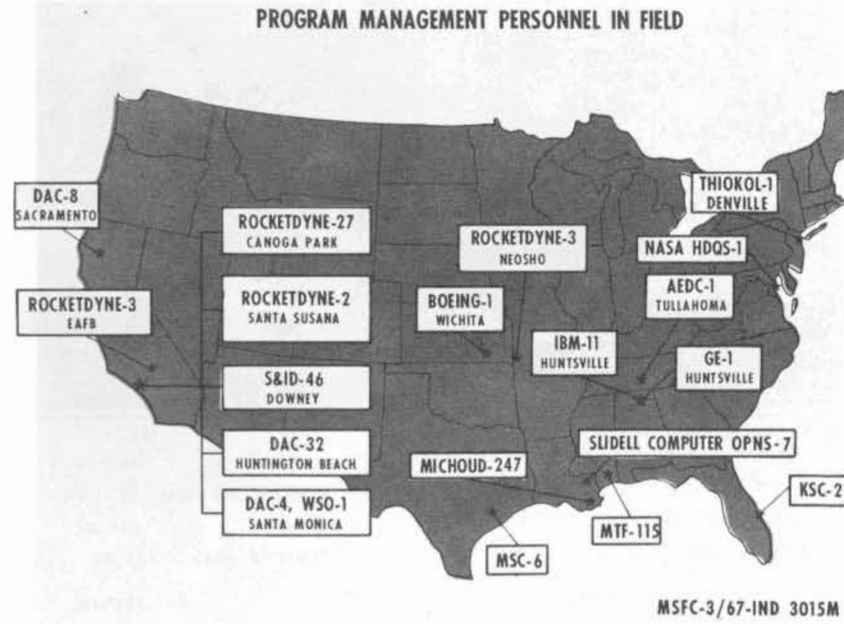

APOLLO SATURN VEHICLE CONTRACTORS
SPACECRAFT MSC
GUIDANCE IBM/BENDIX
S-IV STAGE DOUGLAS
S-I STAGE CHRYSLER
RL 10A-3 ENGINE PRATT & WHITNEY
H-1 ENGINE ROCKETDYNE NORTH AMERICAN
SPACECRAFT MSC
S-IVB STAGE DOUGLAS
S-IB STAGE CHRYSLER
IU INTEGRATION IBM
J-2 ENGINE ROCKETDYNE NORTH AMERICAN
SPACECRAFT MSC
S-IVB STAGE DOUGLAS
S-II STAGE S & ID NORTH AMERICAN
S-IC STAGE BOEING
F-1 ENGINE ROCKETDYNE NORTH AMERICAN
SATURN I
UPRATED SATURN I
SATURN V
MSFC-67-IND 2041


APOLLO SATURN VEHICLES
APOLLO SPACECRAFT
IU
S-IV STAGE
RL10A-3 ENGINE
S-I STAGE
H-1 ENGINE
190 FT.
APOLLO SPACECRAFT
IU
S-IVB STAGE
J-2 ENGINE
S-IB STAGE
H-1 ENGINE
224 FT.
APOLLO SPACECRAFT
IU
S-IVB STAGE
J-2 ENGINE
S-II STAGE
J-2 ENGINE
S-IC STAGE
F-1 ENGINE
363 FT.
SATURN I
UPRATED SATURN I
SATURN V
MSFC 67 IND 2042A


SATURN VEHICLES SUMMARY FLIGHT SCHEDULE
1961
1962
1963
1964
1965
1966
1967
1968
1969
1970
SATURN I
BLOCK I
BLOCK II
PEGASUS
(10 FLIGHTS)
PROGRESS
VEHICLE LAUNCHED
UPRATED SATURN I
AAP
(12 FLIGHTS)
SATURN V
AAP
(15 FLIGHTS)
IND B2027E


SATURN PROGRAM ELEMENTS
DOUGLAS S-IVB SACRAMENTO
LOCKHEED AIRCRAFT AAP-INTEGRATION SUNNYVALE CALIF
S & ID-NAA S-II DOWNEY
ROCKETDYNE H-1, J-2 SANTA SUSANA
S & ID-NAA S-II SANTA SUSANA
S & ID-NAA S-II SEAL BEACH
DOUGLAS S-IVB SANTA MONICA
DOUGLAS S-IVB HUNTINGTON BEACH
CONTRACTS $1,000,000 OR OVER
ROCKETDYNE H-1 NEOSHO MO
ROCKETDYNE F-1 EDWARDS A F B
S & ID-NAA S-II COMPONENTS TULSA OKLA
BOEING S-IC TOOLING COMPONENTS WICHITA KAN
MARTIN MARIETTA AAP INTEGRATION DENVER COLO
MSC HOUSTON
MOTOROLA S-BAND TRANSPONDERS SCOTTSDALE ARIZ
CANOGA PARK
AEROJET (AETRON) GSE COVINA CALIF
AIR PRODUCTS LIQUID HYDROGEN ALLENTOWN PA
IBM INSTRUMENT UNIT ROCKVILLE MD
BROWN ENGR DISCRETE CONTROL HUNTSVILLE
IBM INSTRUMENT UNIT HUNTSVILLE
GENERAL ELECTRIC GSE HUNTSVILLE
MSFC HUNTSVILLE
LING-TEMCO-VOUGHT COMPUTATION SLIDELL LA
MICHOUD NEW ORLEANS
MASON RUST
CHRYSLER S-IB
BOEING S-IC
HAMILTON STANDARD S-IVB APS WINDSOR LOCKS CONN
USAF AEDC J-2 TESTING TULLAHOMA
HAYES PNEUMATIC CONSOLE BIRMINGHAM ALA
MTF
BOEING S-IC
NAA S-II
GENERAL ELECTRIC
AERO-JET
SANDERS ASSOCIATES GSE OPER DISPLAY NASHUA N.H.
AMERICAN SCIENCE INC OPTICAL SYSTEMS-AAP CAMBRIDGE MASS
RMD-THIOKOL C-1 ENGINE DENVILLE N.J.
BENDIX GUIDANCE COMPONENTS TETERBORO N.J.
HEADQUARTERS NASA WASHINGTON D.C.
MARTIN MARIETTA GSE ORLANDO FLA
KSC CAPE KENNEDY
ECI CONTROL COMPUTER ST PETERSBURG
JAN 1967 IND A2000M

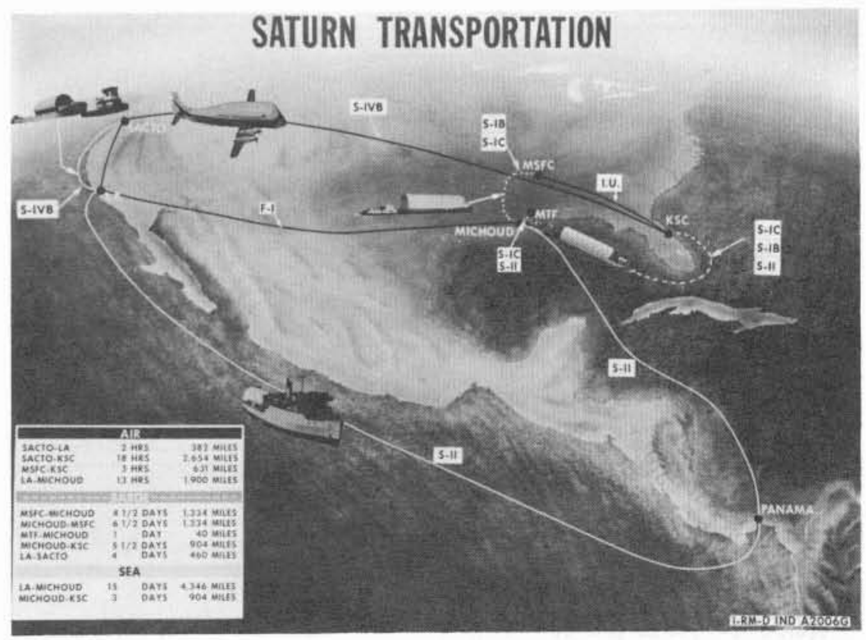




SATURN MAJOR TRANSPORATION EQUIPMENT

ITEM	DESCRIPTION	USE	OWNER / OPER.	OPER. COST	REMARKS
USNS POINT BARROW	MODIFIED NAVY AKD COVERED	TRANSPORTS S-II STAGES TO MICHOUD AND S-IB, S-IC & SIVB TO KSC	US NAVY / MSTS	$4500 DAY	NEXT REQUIREMENT S-II-3 4/25/67
BARGE ORION	MODIFIED NAVY YFNB;	TO BE MODIFIED FOR S-IC/S-II CONFIGURATION	NASA / MSFC		SAVANNAN, GA. ETC MODIFICATION 7/67
BARGE PROMISE	MODIFIED NAVY YFNB; COVERED	TRANSPORT OF S-IB STAGES BETWEEN MICHOUD, MSFC, AND KSC	NASA / MSTS	$2500 DAY	MICHOUD
BARGE PALAEMON	COVERED BARGE	TRANSPORT OF S-IB STAGES BETWEEN MICHOUD, MSFC AND KSC	NASA / MSFC	$2500 DAY	MICHOUD
POSEIDON	MODIFIED NAVY YFNB COVERED	RIVER & OCEAN TRANSPORT OF S-IC & S-II STAGES; PRIMARILY BETWEEN MICHOUD, MSFC AND KSC	NASA / MSFC	$2800 DAY	MICHOUD
BARGE PEARL RIVER	MODIFIED NAVY YFNB UNCOVERED	TRANSPORTS S-IC & S-II STAGES BETWEEN MICHOUD AND MTF	NASA / MSFC	$700 DAY	MICHOUD/MTF
BARGE LITTLE LAKE	MODIFIED NAVY YFNB; UNCOVERED	TRANSPORTS S-IC & S-II STAGES BETWEEN MICHOUD AND MTF	NASA / MSFC	$700 DAY	MICHOUD/MTF
SUPER GUPPY AIRCRAFT	MODIFIED BOEING YC97J AIRCRAFT	TRANSPORTS S-IVB STAGES, INSTRUMENT UNITS, LEM ADAPTERS AND F-1 ENGINES	AERO SPACE / AERO SPACE	$12.00 MILE	TRANSPORT CARGO FOR DOD, MSC, & MSFC
PREGNANT GUPPY AIRCRAFT	MODIFIED BOEING 377 AIRCRAFT	TRANSPORTS APOLLO S/C, & S/C COMPONENTS	AERO SPACE / AERO SPACE	$12.00 MILE	TRANSPORT CARGO FOR DOD, MSC, & MSFC

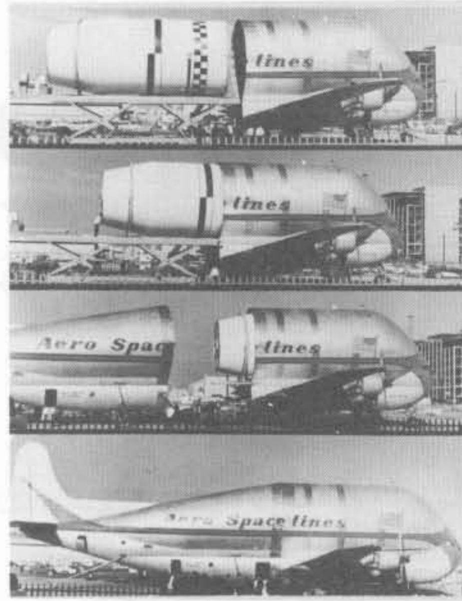
MSFC-2/67-IND 2016AC



PREGNANT GUPPY

CARGO. CARRIED F-1 ENG, APOLLO, AND OTHER LARGE COMPONENTS		LENGTH	125.58 FT
RUNWAY REQUIRED	APPROX 6900 FT	HEIGHT	38.3 FT
CONTRACTOR	AERO SPACELINES	INTERNAL DIAMETER	19.7 FT
AIRPLANE TYPE	MODIF B-377	RANGE	800 MI
WEIGHT:	GROSS 141,000 LBS CARGO 32,500 LBS	CRUISING SPEED	225 MPH

IND B2008B



SATURN TRANSPORTATION PREGNANT GUPPY

CARGO CARRIED - S-IV STG, F-1 ENG, APOLLO, AND OTHER LARGE COMPONENTS

RUNWAY REQUIRED - APPROX. 6,900 FT

CONTRACTOR - AERO SPACELINES

AIRPLANE TYPE - MODIF. B-377

WEIGHT:

GROSS - 141,000 LBS

CARGO - 32,500 LBS

LENGTH - 125.58 FT

HEIGHT - 38.3 FT

INTERNAL DIAM. - 19.7 FT

RANGE - 800 MILES

CRUISING SPEED - 225 MPH

IND B2011A

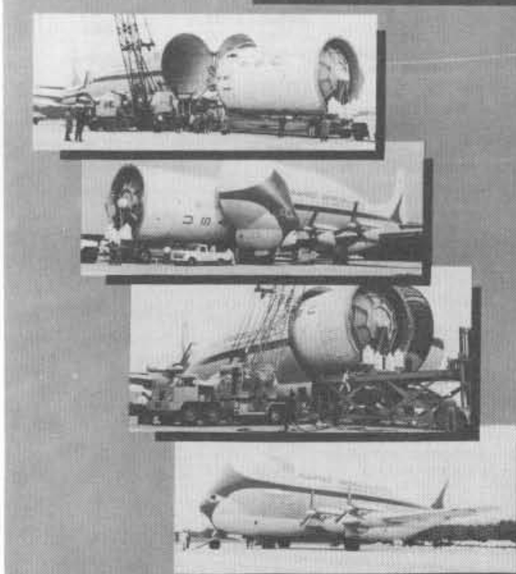
SUPER GUPPY

DIMENSIONS	
WING SPAN	156 ft 3 in
FUSELAGE LENGTH	141 ft 2 in
TAIL HEIGHT	46 ft 5 in
FUSELAGE HEIGHT	36 ft 6 in
CARGO COMP. (DIAMETER)	300 in
CARGO COMP. LENGTH	94 ft 6 in
LENGTH CARGO COMP. 25 ft DIA.	30 ft 8 in

SPECIFICATIONS (APPROXIMATE)	
EMPTY WEIGHT	110,000 LBS
PAYLOAD (APPROXIMATELY)	45,000 LBS
TAKEOFF WEIGHT (MAXIMUM)	175,000 LBS
CRUISE SPEED	250 MPH

IND B2025B

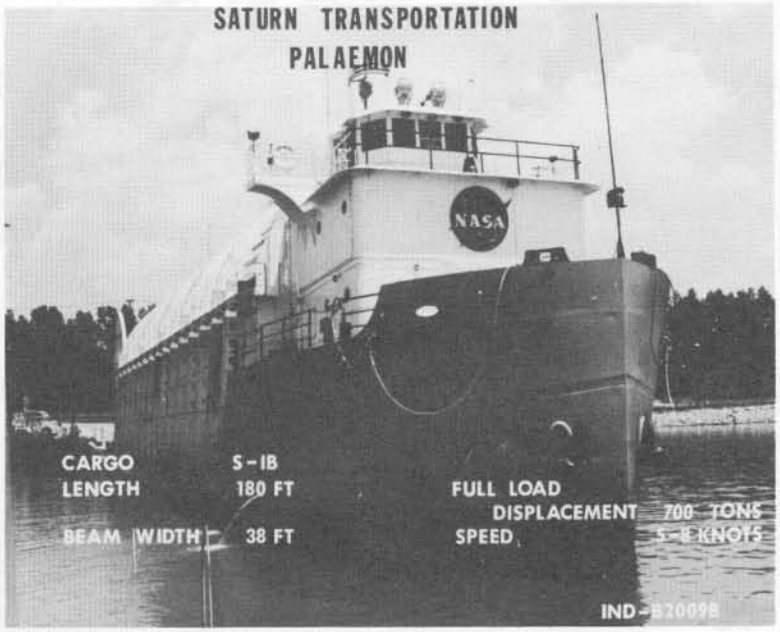
SUPER GUPPY



CARGO CARRIED - S-IVB STAGE, F-1 ENGINE, INSTRUMENT UNIT, OTHER LARGE COMPONENTS

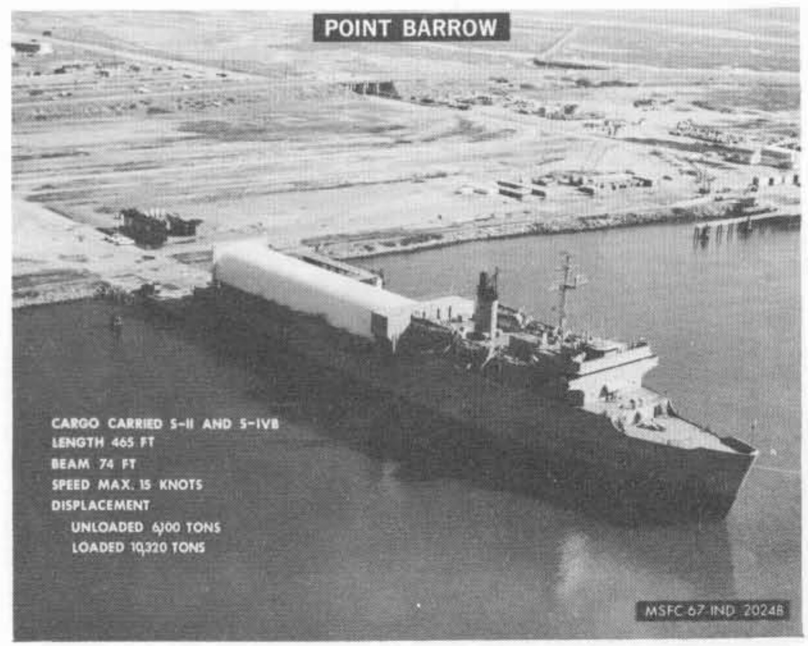
RUNWAY REQUIRED	APPROX. 6,900 FT
CONTRACTOR	AERO SPACELINES
WEIGHT:	
EMPTY	110,000 LBS
GROSS	175,000 LBS
CARGO	45,000 LBS
FUSELAGE LENGTH	141 FT
TAIL HEIGHT	46.5 FT
INTERNAL DIAMETER	25 FT
WING SPAN	156.25 FT
CRUISING SPEED	250 MPH

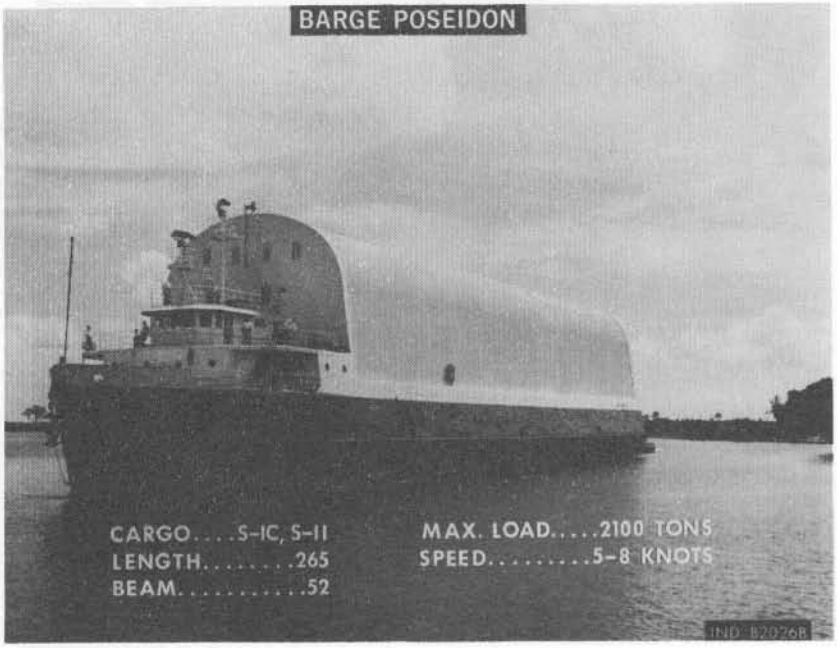
IND B 2033A

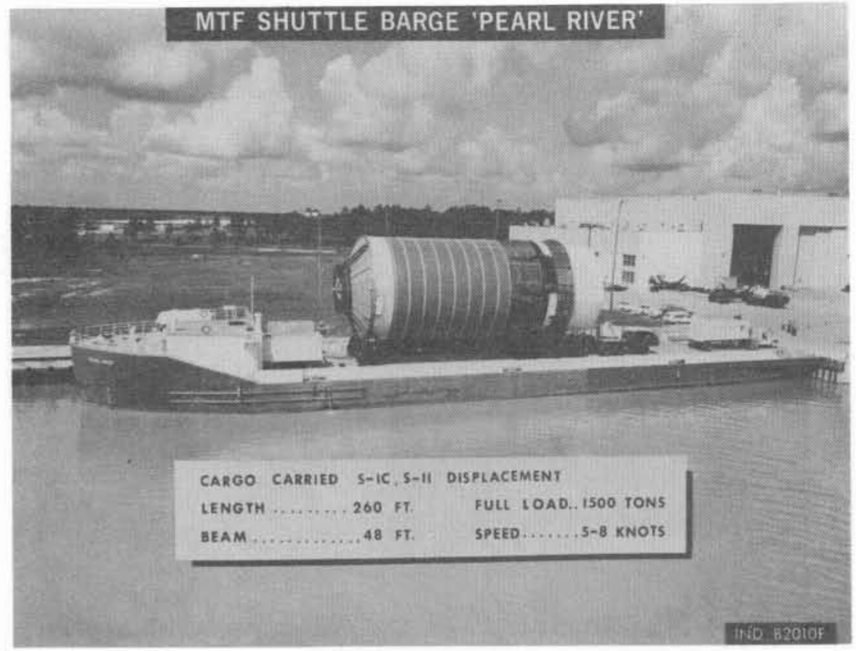

SATURN TRANSPORTATION
PALAEMON
CARGO S-IB
LENGTH 180 FT
BEAM WIDTH 38 FT
FULL LOAD
DISPLACEMENT 700 TONS
SPEED 5-8 KNOTS
IND-82009B


BARGE PROMISE
PROMISE
CARGO CARRIED S-IB
LENGTH 260 FT.
BEAM 48 FT.
WEIGHT DISPLACEMENT
UNLOADED 840 LONG TONS
LOADED 2145 LONG TONS
DRAFT
UNLOADED 3.25 FT.
LOADED 7.5 FT.
SPEED 6-8 KNOTS
LOADING METHOD -
ROLLING ON & OFF
IND 82012C


BARGE ORION
CARGO CARRIED S-IVB
LENGTH 260 FT.
BEAM 48 FT.
DISPLACEMENT:
FULL LOAD 2358 TONS
SPEED 7-10 KNOTS
IND 82023B


POINT BARROW
CARGO CARRIED S-II AND S-IVB
LENGTH 465 FT
BEAM 74 FT
SPEED MAX. 15 KNOTS
DISPLACEMENT
UNLOADED 6,100 TONS
LOADED 10,320 TONS
MSFC 67 IND 2024B





LOGISTICS ACTIVITY SUMMARY

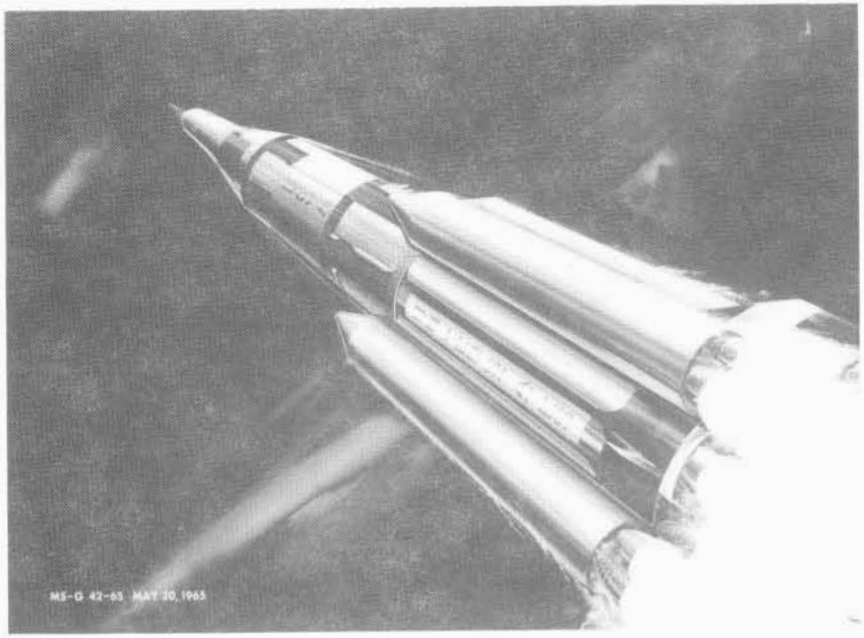
TRANSPORTATION	FY 65	FY 66	FY 67
WATER			
NUMBER OF BARGES & SHIPS	4	8	8
NUMBER OF SHIPMENTS	21	97	188
CRYOGENICS BARGES		9	9
AIR–GUPPY			
FORECAST MILES	106,660	373,250	473,741
ACTUAL MILES	212,395	349,319	350,249 *
COST			
WATER AND AIR	3.6M	4.2M	4.7M

* THROUGH FEBRUARY 67

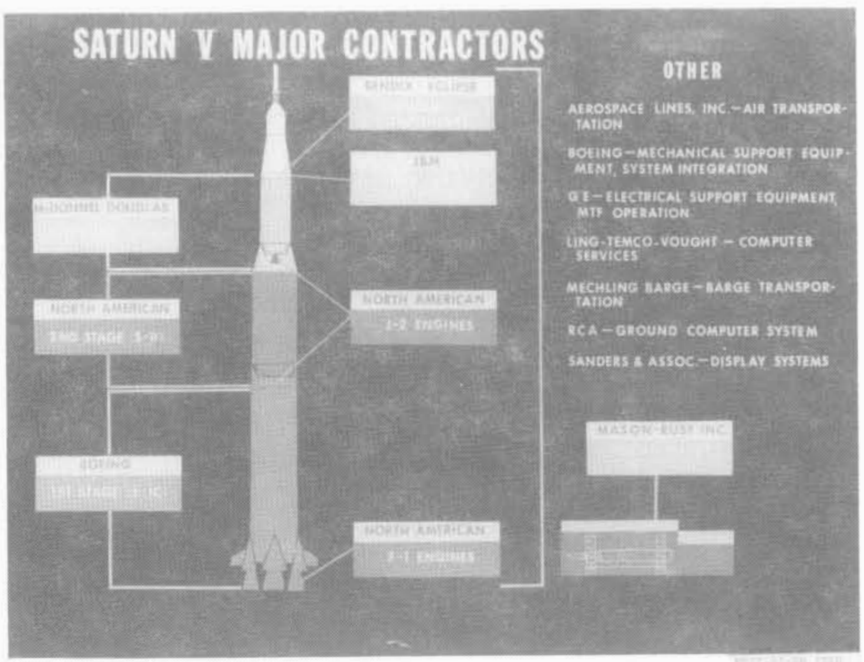
PROPELLANTS AND PRESSURANTS

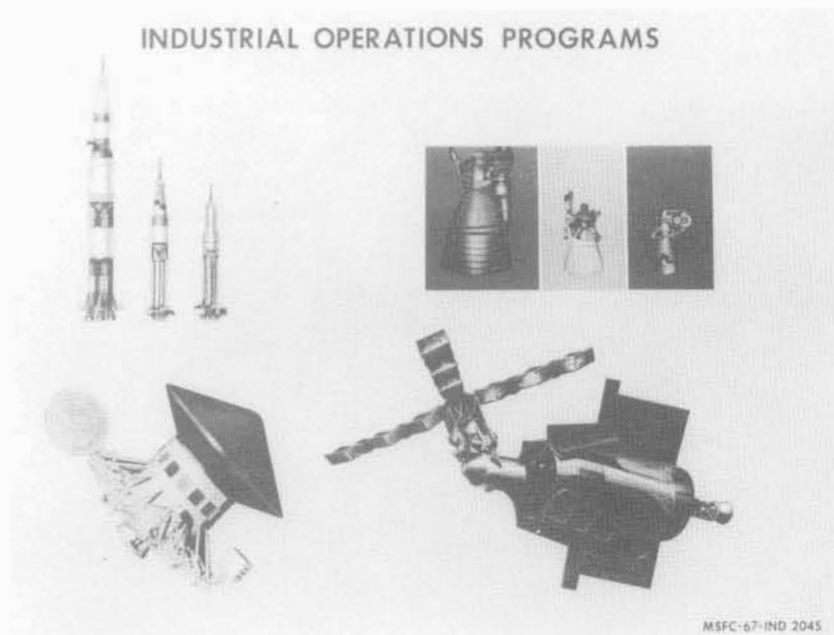
NUMBER OF USER SITES	67
NUMBER OF PLANTS	38
LH_2 PRODUCTION CAPACITY AVAIL.	126 TONS/DAY
LO_2/LN_2 PRODUCTION CAP. AVAIL.	6400 TONS/DAY
GH_E PRODUCED	1,031,400,000 STD. CU FT/YR

MSFC-4/67-IND 2043A


MS-G 42-65 MAY 20, 1965


SATURN V IMPROVEMENT
(STRAP-ON LIQUIDS)
MS-G 43-65 MAY 20, 1965


SATURN V MAJOR CONTRACTORS
NORTH AMERICAN
J-2 ENGINES
NORTH AMERICAN
F-1 ENGINES
NORTH AMERICAN
BOEING
OTHER
AEROSPACE LINES, INC.—AIR TRANSPORTATION
BOEING—MECHANICAL SUPPORT EQUIPMENT, SYSTEM INTEGRATION
G E—ELECTRICAL SUPPORT EQUIPMENT, MTF OPERATION
LING-TEMCO-VOUGHT — COMPUTER SERVICES
MECHLING BARGE—BARGE TRANSPORTATION
RCA—GROUND COMPUTER SYSTEM
SANDERS & ASSOC.—DISPLAY SYSTEMS


INDUSTRIAL OPERATIONS PROGRAMS
MSFC-67-IND 2045

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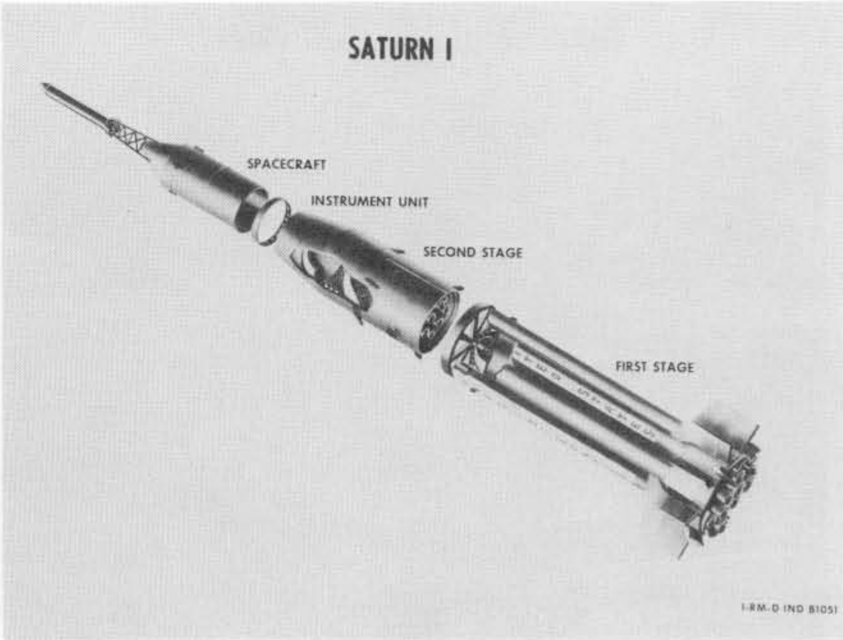
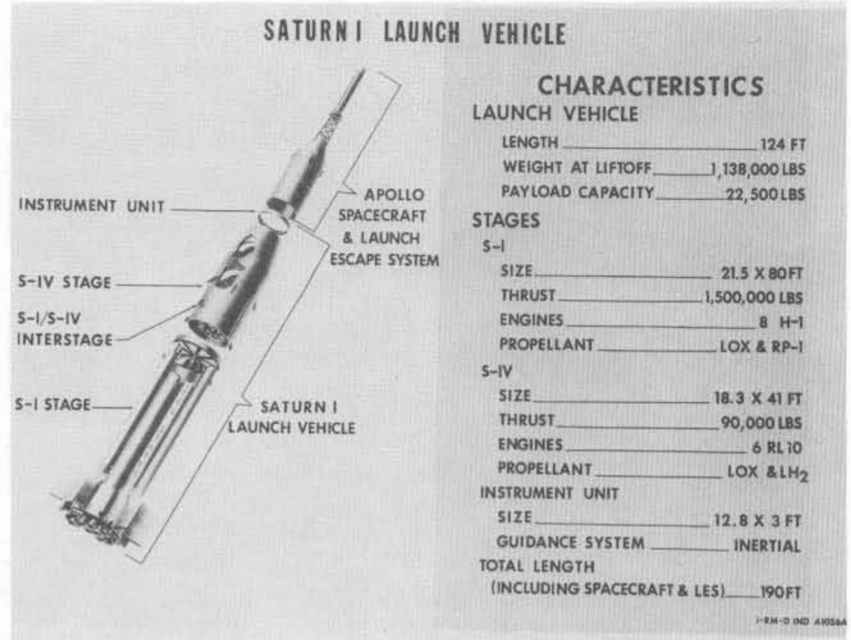
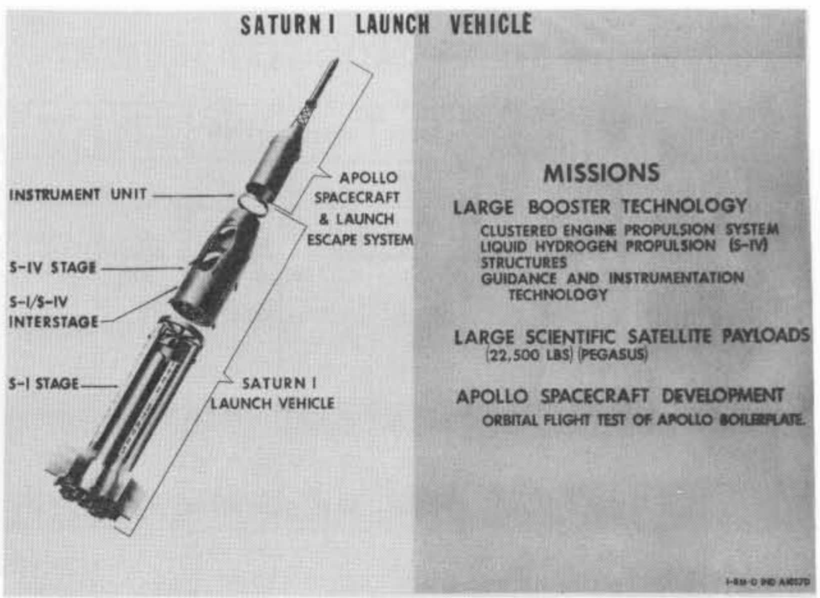
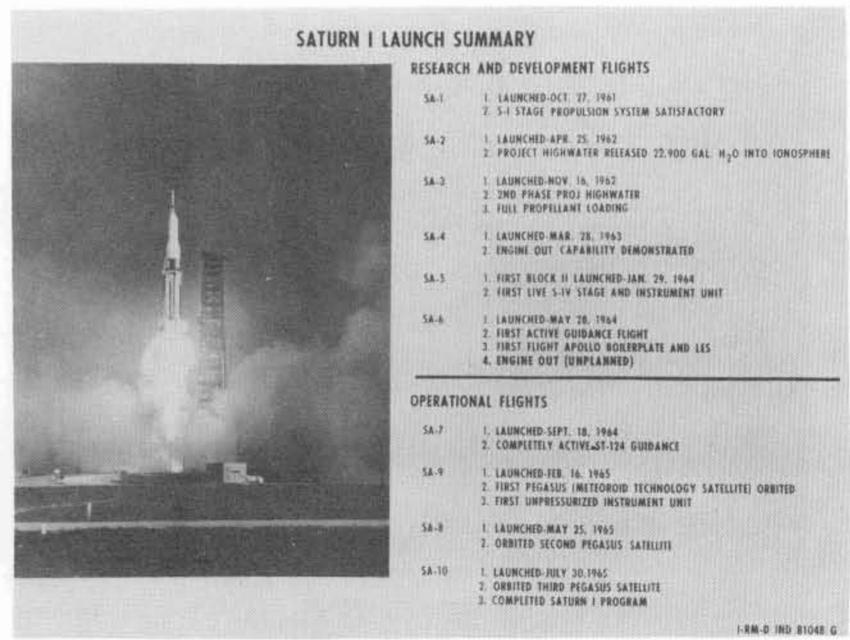
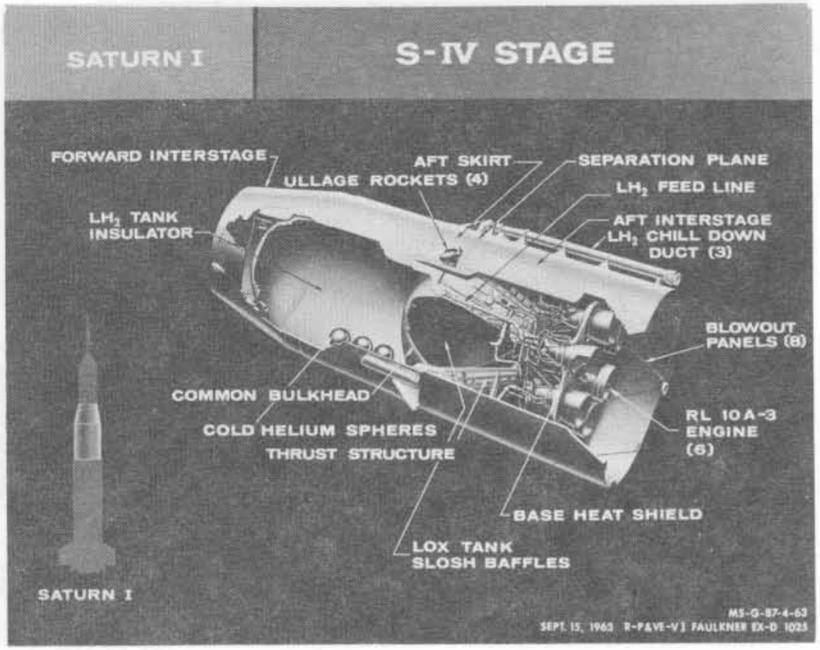

SATURN I
SPACECRAFT
INSTRUMENT UNIT
SECOND STAGE
FIRST STAGE
I-RM-D IND B1051

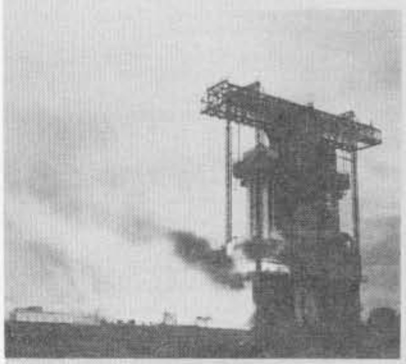

SATURN I LAUNCH VEHICLE
INSTRUMENT UNIT
S-IV STAGE
S-I/S-IV
INTERSTAGE
S-I STAGE
APOLLO
SPACECRAFT
& LAUNCH
ESCAPE SYSTEM
SATURN I
LAUNCH VEHICLE
CHARACTERISTICS
LAUNCH VEHICLE
LENGTH 124 FT
WEIGHT AT LIFTOFF 1,138,000 LBS
PAYLOAD CAPACITY 22,500 LBS
STAGES
S-I
SIZE 21.5 X 80 FT
THRUST 1,500,000 LBS
ENGINES 8 H-1
PROPELLANT LOX & RP-1
S-IV
SIZE 18.3 X 41 FT
THRUST 90,000 LBS
ENGINES 6 RL10
PROPELLANT LOX & LH_2
INSTRUMENT UNIT
SIZE 12.8 X 3 FT
GUIDANCE SYSTEM INERTIAL
TOTAL LENGTH
(INCLUDING SPACECRAFT & LES) 190 FT


SATURN I LAUNCH VEHICLE
INSTRUMENT UNIT
S-IV STAGE
S-I/S-IV
INTERSTAGE
S-I STAGE
APOLLO
SPACECRAFT
& LAUNCH
ESCAPE SYSTEM
SATURN I
LAUNCH VEHICLE
MISSIONS
LARGE BOOSTER TECHNOLOGY
CLUSTERED ENGINE PROPULSION SYSTEM
LIQUID HYDROGEN PROPULSION (S-IV)
STRUCTURES
GUIDANCE AND INSTRUMENTATION
TECHNOLOGY
LARGE SCIENTIFIC SATELLITE PAYLOADS
(22,500 LBS) (PEGASUS)
APOLLO SPACECRAFT DEVELOPMENT
ORBITAL FLIGHT TEST OF APOLLO BOILERPLATE


SATURN I LAUNCH SUMMARY
RESEARCH AND DEVELOPMENT FLIGHTS
SA-1
1. LAUNCHED-OCT. 27, 1961
2. S-I STAGE PROPULSION SYSTEM SATISFACTORY
SA-2
1. LAUNCHED-APR. 25, 1962
2. PROJECT HIGHWATER RELEASED 22,900 GAL. H_2O INTO IONOSPHERE
SA-3
1. LAUNCHED-NOV. 16, 1962
2. 2ND PHASE PROJ HIGHWATER
3. FULL PROPELLANT LOADING
SA-4
1. LAUNCHED-MAR. 28, 1963
2. ENGINE OUT CAPABILITY DEMONSTRATED
SA-5
1. FIRST BLOCK II LAUNCHED-JAN. 29, 1964
2. FIRST LIVE S-IV STAGE AND INSTRUMENT UNIT
SA-6
1. LAUNCHED-MAY 28, 1964
2. FIRST ACTIVE GUIDANCE FLIGHT
3. FIRST FLIGHT APOLLO BOILERPLATE AND LES
4. ENGINE OUT (UNPLANNED)
OPERATIONAL FLIGHTS
SA-7
1. LAUNCHED-SEPT. 18, 1964
2. COMPLETELY ACTIVE ST-124 GUIDANCE
SA-9
1. LAUNCHED-FEB. 16, 1965
2. FIRST PEGASUS (METEOROID TECHNOLOGY SATELLITE) ORBITED
3. FIRST UNPRESSURIZED INSTRUMENT UNIT
SA-8
1. LAUNCHED-MAY 25, 1965
2. ORBITED SECOND PEGASUS SATELLITE
SA-10
1. LAUNCHED-JULY 30,1965
2. ORBITED THIRD PEGASUS SATELLITE
3. COMPLETED SATURN I PROGRAM
I-RM-D IND B1048 G



SATURN I/S-I STAGE STATIC TEST PROGRAM

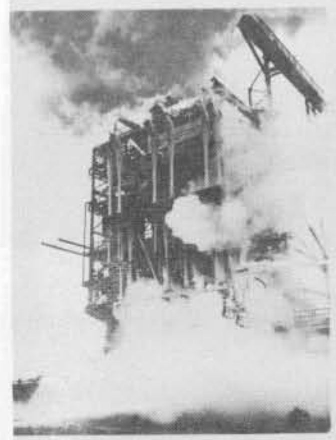


STAGE	START	COMPLETE	NUMBER FIRINGS	TOTAL SECONDS
SA-T	APR 29,'60	FEB 20,'62	20	1430
SA-T 4.5	OCT 26,'62	NOV 9,'62	3	211
S-I-1	APR 29,'61	MAY 11,'61	3	185
S-I-2	OCT 10,'61	OCT 24,'61	2	151
S-I-3	APR 10,'62	MAY 24,'62	3	179
S-I-4	SEP 11,'62	SEP 26,'62	2	153
S-I-5	FEB 27,'63	MAR 27,'63	3	316
S-I-6	MAY 5,'63	JUN 6,'63	2	170
S-I-7	OCT 2,'63	OCT 22,'63	2	173
S-I-9	MAR 13,'64	MAR 24,'64	2	177
S-I-8	MAY 26 '64	JUN 11 '64	2	189
S-I-10	SEP 22,'64	OCT 6,'64	3	192

TOTAL FLIGHT STAGE FIRING ACCUMULATION: 1885 SECONDS

I-RM-D IND B1055

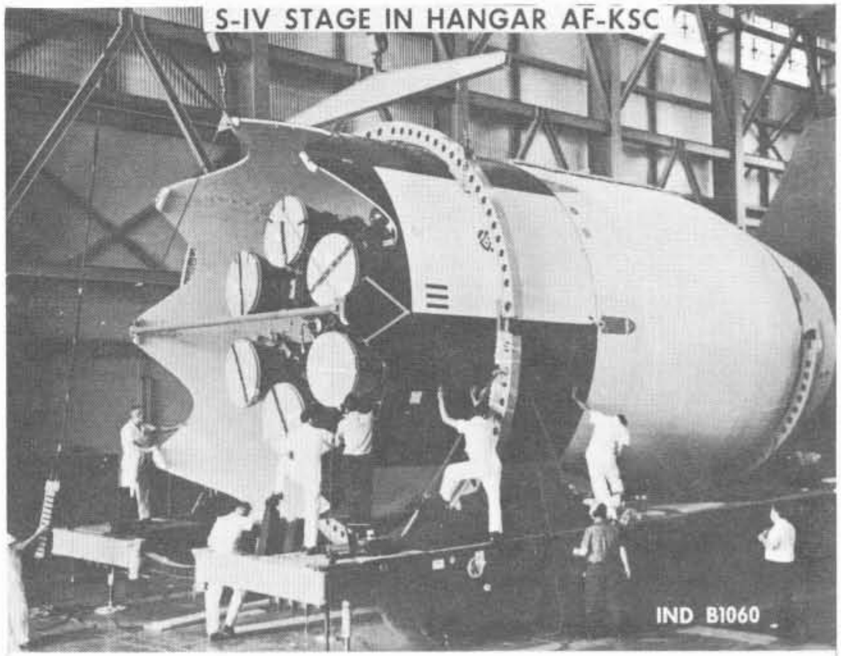
SATURN I/S-IV STAGE STATIC TEST SUMMARY



STAGE	START	COMPLETE	NUMBER FIRINGS	TOTAL SECONDS
BATTLESHIP (RL 10A-1)	AUG 17, '62	NOV 8, '62	11	1137.6
BATTLESHIP (RL 10A-3)	JAN 26, '63	MAY 4, '63	16	4302.6
S-IV-5	AUG 5, '63	AUG 12, '63	2	540
S-IV-6	NOV 22, '63	NOV 22, '63	1	460
S-IV-7	APR 29, '64	APR 29, '64	1	485
S-IV-9	AUG 6, '64	AUG 6, '64	1	400
S-IV-8	NOV 20, '64	NOV 20, '64	1	476
S-IV-10	JAN 21, '65	JAN 21, '65	1	479

TOTAL FLIGHT STAGE FIRING ACCUMULATION: 2840 SECONDS

I-RM-D IND B1059


S-IV STAGE IN HANGAR AF-KSC
IND B1060


SA-9 LAUNCH - KSC
IND B 1046A

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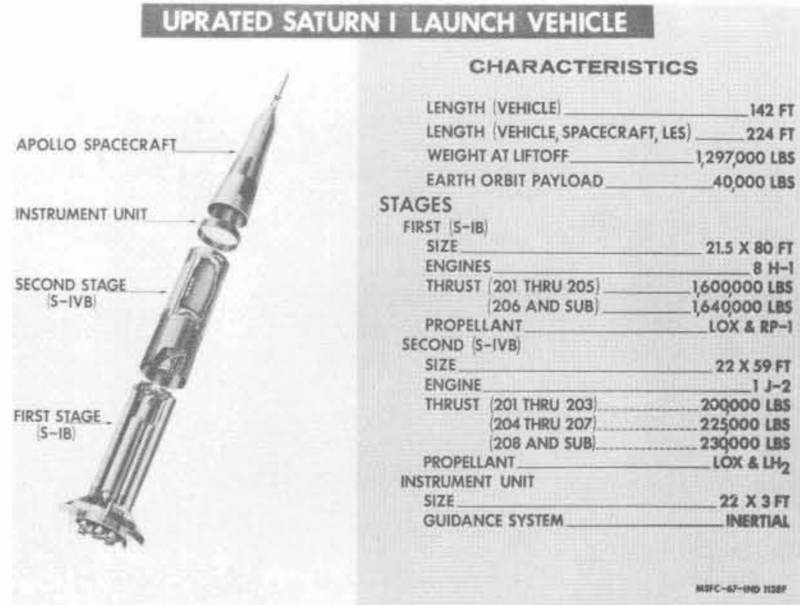
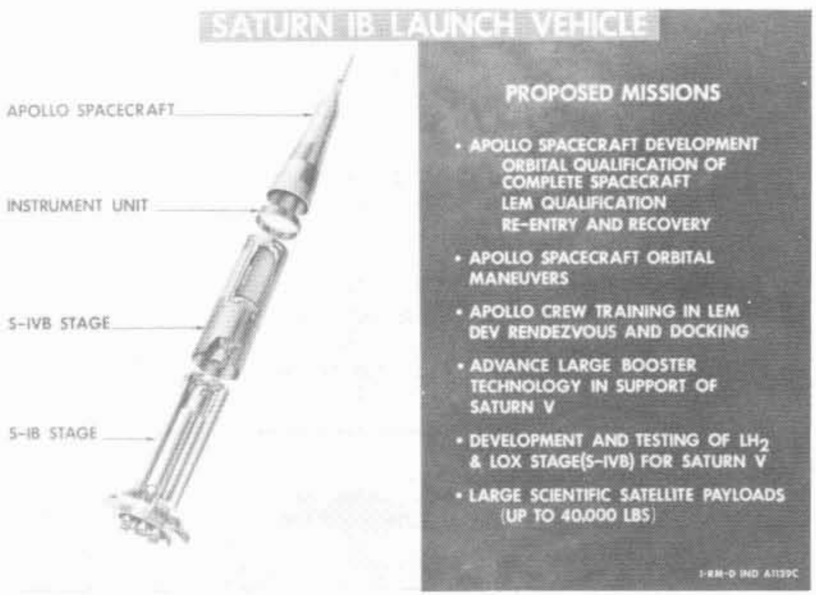
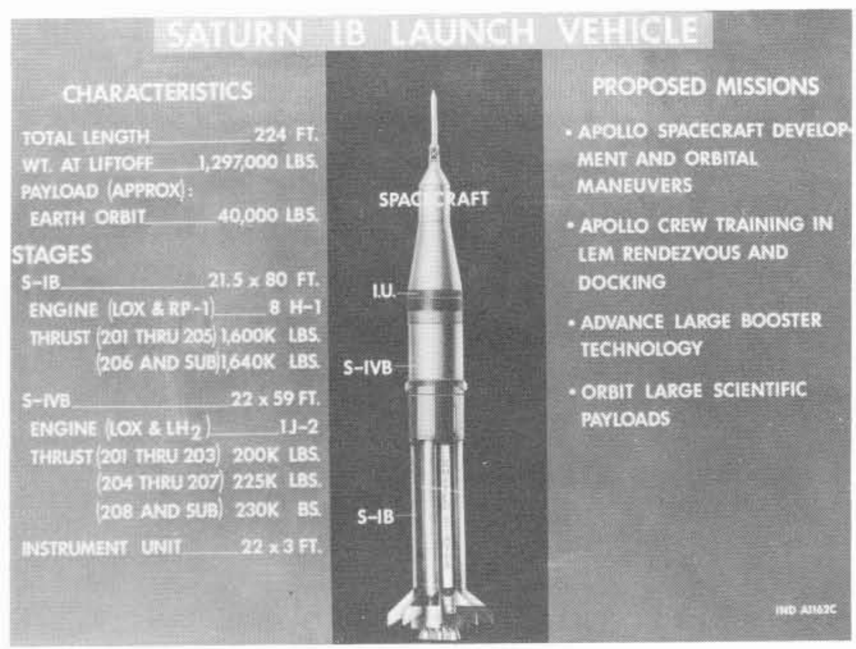
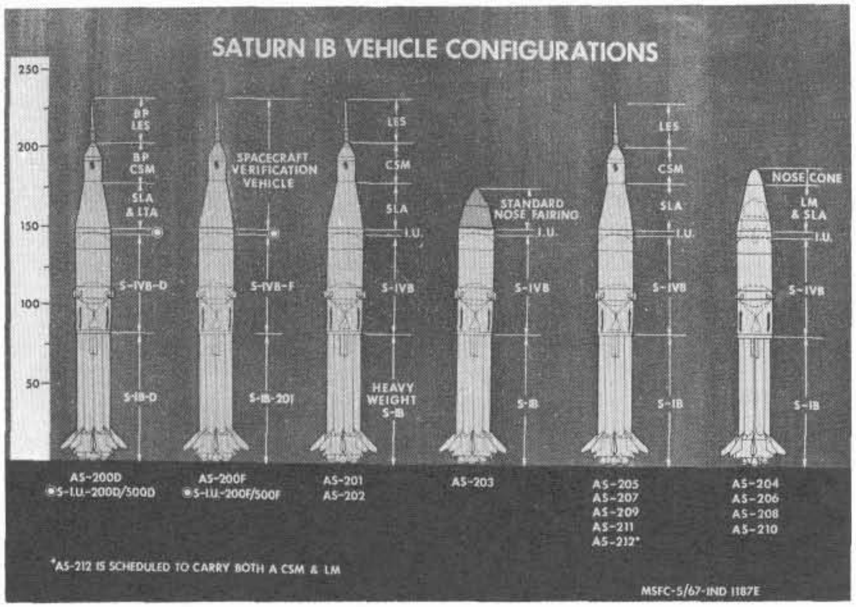
UPRATED SATURN I LAUNCH VEHICLE
SPACECRAFT
INSTRUMENT UNIT
SECOND STAGE (S-IVB)
FIRST STAGE (S-IB)
I-RM-D IND B1125C


UPRATED SATURN I LAUNCH VEHICLE
APOLLO SPACECRAFT
INSTRUMENT UNIT
SECOND STAGE (S-IVB)
FIRST STAGE (S-IB)
CHARACTERISTICS
LENGTH (VEHICLE) 142 FT
LENGTH (VEHICLE, SPACECRAFT, LES) 224 FT
WEIGHT AT LIFTOFF 1,297,000 LBS
EARTH ORBIT PAYLOAD 40,000 LBS
STAGES
FIRST (S-IB)
SIZE 21.5 X 80 FT
ENGINES 8 H-1
THRUST (201 THRU 205) 1,600,000 LBS
(206 AND SUB) 1,640,000 LBS
PROPELLANT LOX & RP-1
SECOND (S-IVB)
SIZE 22 X 59 FT
ENGINE 1 J-2
THRUST (201 THRU 203) 200,000 LBS
(204 THRU 207) 225,000 LBS
(208 AND SUB) 230,000 LBS
PROPELLANT LOX & LH_2
INSTRUMENT UNIT
SIZE 22 X 3 FT
GUIDANCE SYSTEM INERTIAL


SATURN IB LAUNCH VEHICLE
APOLLO SPACECRAFT
INSTRUMENT UNIT
S-IVB STAGE
S-IB STAGE
PROPOSED MISSIONS
• APOLLO SPACECRAFT DEVELOPMENT
ORBITAL QUALIFICATION OF COMPLETE SPACECRAFT
LEM QUALIFICATION
RE-ENTRY AND RECOVERY
• APOLLO SPACECRAFT ORBITAL MANEUVERS
• APOLLO CREW TRAINING IN LEM DEV RENDEZVOUS AND DOCKING
• ADVANCE LARGE BOOSTER TECHNOLOGY IN SUPPORT OF SATURN V
• DEVELOPMENT AND TESTING OF LH_2 & LOX STAGE(S-IVB) FOR SATURN V
• LARGE SCIENTIFIC SATELLITE PAYLOADS (UP TO 40,000 LBS)


SATURN IB LAUNCH VEHICLE
CHARACTERISTICS
TOTAL LENGTH 224 FT.
WT. AT LIFTOFF 1,297,000 LBS.
PAYLOAD (APPROX):
EARTH ORBIT 40,000 LBS.
STAGES
S-IB 21.5 x 80 FT.
ENGINE (LOX & RP-1) 8 H-1
THRUST (201 THRU 205) 1,600K LBS.
(206 AND SUB) 1,640K LBS.
S-IVB 22 x 59 FT.
ENGINE (LOX & LH_2) 1J-2
THRUST (201 THRU 203) 200K LBS.
(204 THRU 207) 225K LBS.
(208 AND SUB) 230K BS.
INSTRUMENT UNIT 22 x 3 FT.
SPACECRAFT
I.U.
S-IVB
S-IB
PROPOSED MISSIONS
• APOLLO SPACECRAFT DEVELOPMENT AND ORBITAL MANEUVERS
• APOLLO CREW TRAINING IN LEM RENDEZVOUS AND DOCKING
• ADVANCE LARGE BOOSTER TECHNOLOGY
• ORBIT LARGE SCIENTIFIC PAYLOADS

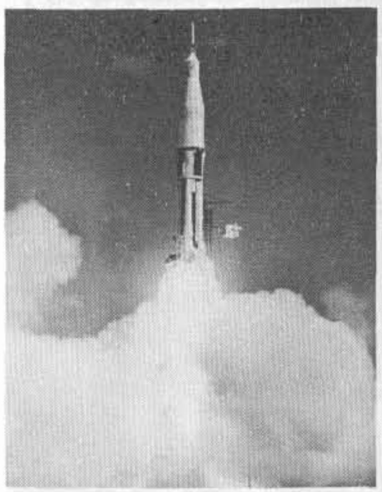


UPRATED SATURN I LAUNCH VEHICLE STATUS

STAGE	AS-205	AS-206	AS-207	AS-208	AS-209
FIRST (S-IB)	IN STORAGE AT MICHOUD	IN STORAGE AT MICHOUD	IN SYSTEMS RETEST AT MICHOUD	IN STORAGE AT MICHOUD	AWAITING AVAILABILITY OF CHECKOUT STATION
SECOND (S-IVB)	IN STORAGE AT SACRAMENTO	IN STORAGE AT SACRAMENTO	IN STORAGE AT SACRAMENTO	IN STORAGE AT SACRAMENTO	IN STATIC TEST OPERATIONS AT SACTO.
INSTRUMENT UNIT	IN STORAGE AT IBM HUNTSVILLE	IN STORAGE AT IBM HUNTSVILLE	IN STORAGE AT IBM HUNTSVILLE	IN CHECKOUT AT IBM HUNTSVILLE	IN COMPONENT ASSEMBLY AT IBM

MSFC 5/11/67-IND 1100-24B
SHEET 1 OF 2

SATURN IB LAUNCH SUMMARY



AS-201
1. LAUNCHED FEB 26, 1966
2. SHORT LOB-LAUNCH VEHICLE AND CSM DEVELOPMENT

AS-203
1. LAUNCHED JULY 5, 1966
2. ORBITAL LIQUID HYDROGEN EXPERIMENT

AS-202
1. LAUNCHED AUG 25, 1966
2. LONG LOB-LAUNCH VEHICLE AND CSM DEVELOPMENT

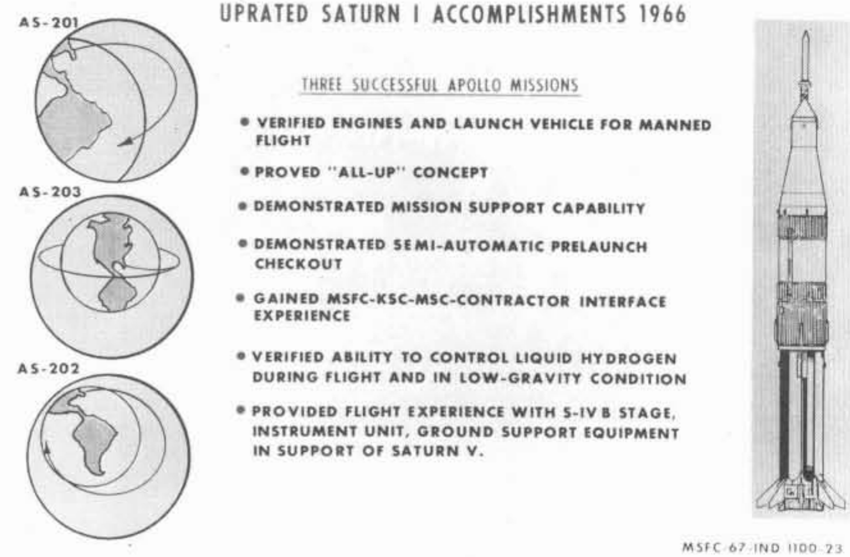
I-RM-D IND 81100-5

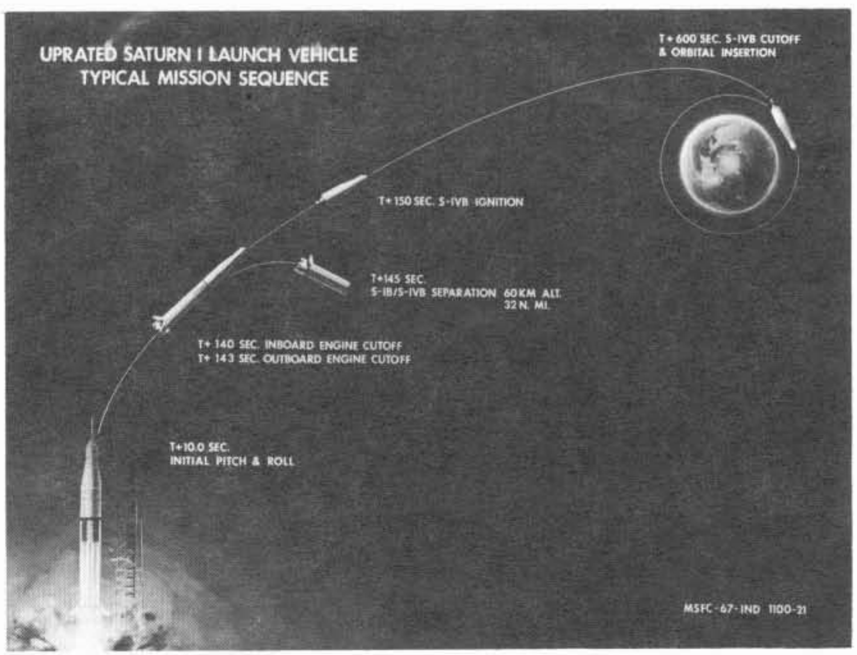
UPRATED SATURN I LAUNCH VEHICLE STATUS (CONT.)

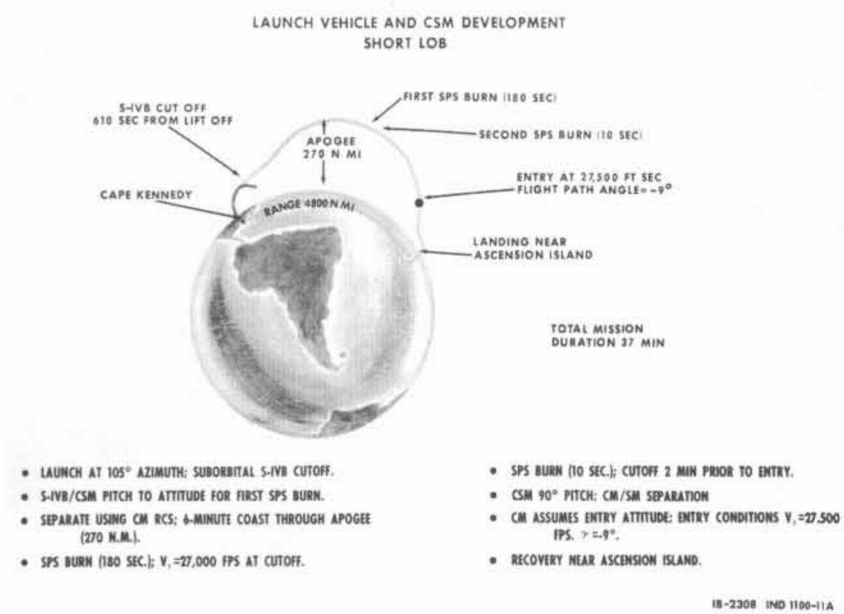
STAGE	AS-210	AS-211	AS-212
FIRST (S-IB)	AT MSFC FOR STATIC TEST	IN PRE-STATIC CHECKOUT AT MICHOUD	IN ASSEMBLY AT MICHOUD
SECOND (S-IVB)	IN STORAGE HUNTINGTON BEACH PENDING AVAILABILITY OF BETA III	IN FACTORY CHECKOUT AT HUNTINGTON BEACH	INSULLATION IS BEING COMPLETED HUNTINGTON BEACH
INSTRUMENT UNIT	IN STRUCTURAL ASSEMBLY AT IBM HUNTSVILLE	SYSTEMS IN MANUFACTURING	SYSTEMS IN MANUFACTURING

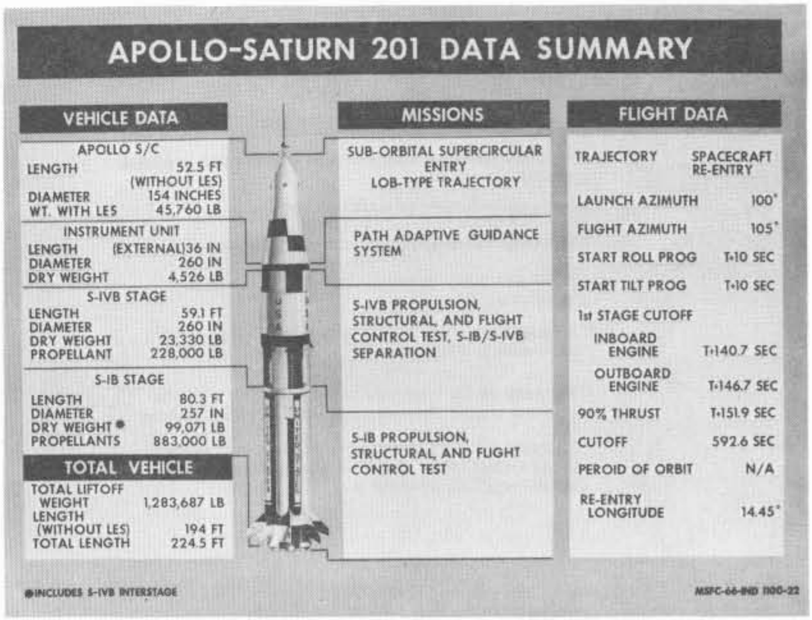
MSFC 5/11/67-IND 1100-24B
SHEET 2 OF 2

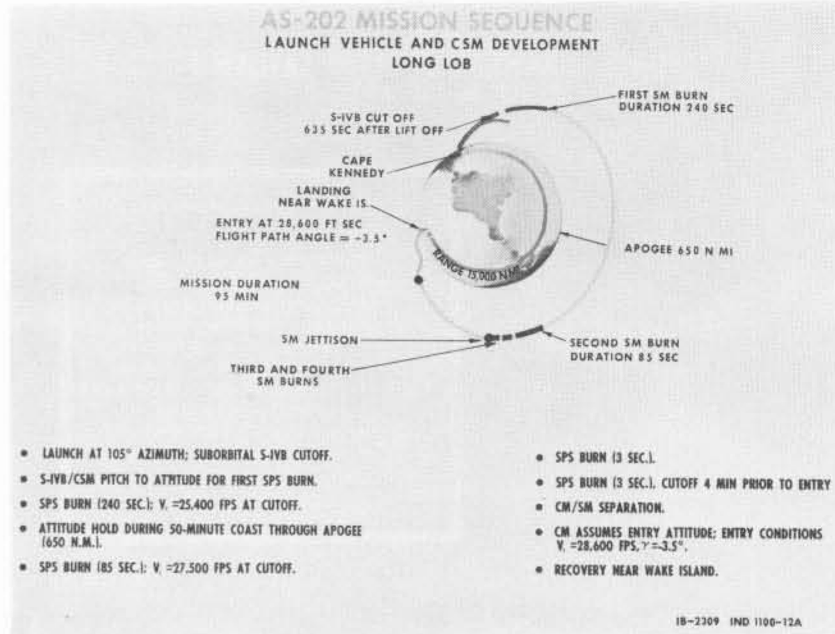

LAUNCH SUMMARY-UPRATED SATURN I
AS-201, AS-203, AS-202
• THREE SUCCESSFUL LAUNCHES.
• DEMONSTRATED:
• J-2 ENGINE AND S-IVB STAGE FLIGHT WORTHINESS.
• MISSION SUPPORT CAPABILITY.
• MATURITY OF PROPULSION, GUIDANCE AND CONTROL, AND ELECTRICAL SYSTEMS.
• STRUCTURAL ADEQUACY OF S-IVB COMMON BULKHEAD.
• VEHICLE STRUCTURAL INTEGRITY
• FEASIBILITY OF ALL-UP CONCEPT
• CONTROL OF LIQUID HYDROGEN BEHAVIOR IN ORBIT.
IND 1100-19A

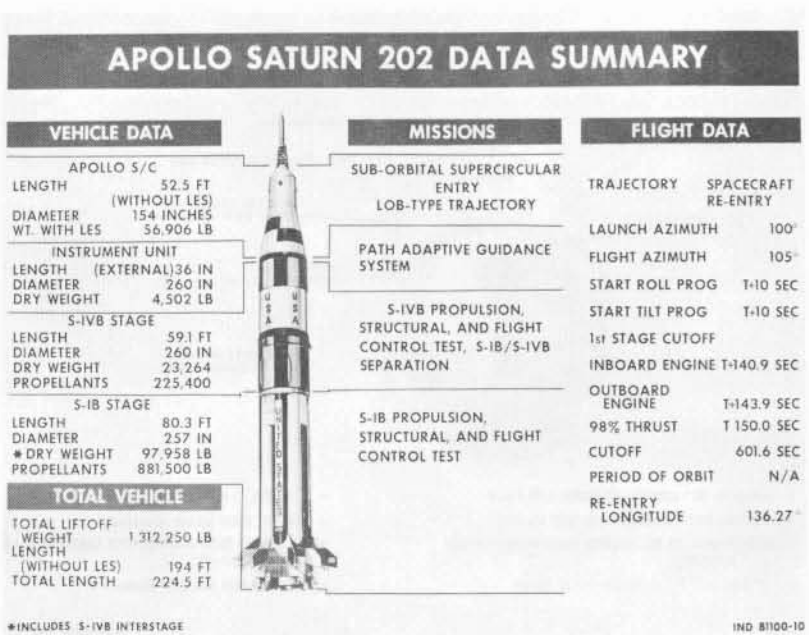

UPRATED SATURN I ACCOMPLISHMENTS 1966
AS-201
AS-203
AS-202
THREE SUCCESSFUL APOLLO MISSIONS
• VERIFIED ENGINES AND LAUNCH VEHICLE FOR MANNED FLIGHT
• PROVED "ALL-UP" CONCEPT
• DEMONSTRATED MISSION SUPPORT CAPABILITY
• DEMONSTRATED SEMI-AUTOMATIC PRELAUNCH CHECKOUT
• GAINED MSFC-KSC-MSC-CONTRACTOR INTERFACE EXPERIENCE
• VERIFIED ABILITY TO CONTROL LIQUID HYDROGEN DURING FLIGHT AND IN LOW-GRAVITY CONDITION
• PROVIDED FLIGHT EXPERIENCE WITH S-IVB STAGE, INSTRUMENT UNIT, GROUND SUPPORT EQUIPMENT IN SUPPORT OF SATURN V.
MSFC-67-IND 1100-23

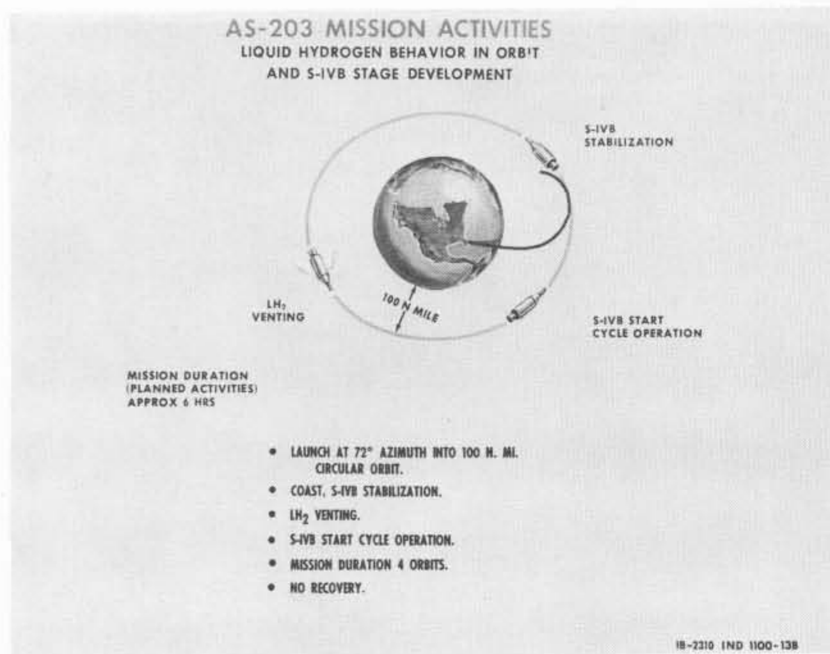

UPRATED SATURN I LAUNCH VEHICLE
TYPICAL MISSION SEQUENCE
T+600 SEC. S-IVB CUTOFF & ORBITAL INSERTION
T+150 SEC. S-IVB IGNITION
T+145 SEC. S-IB/S-IVB SEPARATION 60KM ALT. 32 N. MI.
T+140 SEC. INBOARD ENGINE CUTOFF
T+143 SEC. OUTBOARD ENGINE CUTOFF
T+10.0 SEC. INITIAL PITCH & ROLL
MSFC-67-IND 1100-21

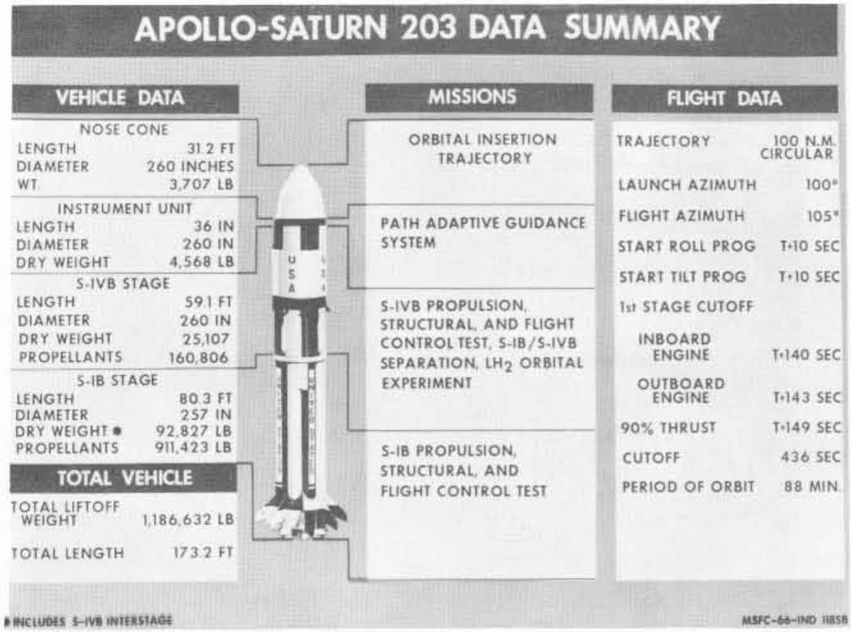

LAUNCH VEHICLE AND CSM DEVELOPMENT
SHORT LOB
S-IVB CUT OFF 610 SEC FROM LIFT OFF
FIRST SPS BURN (180 SEC)
APOGEE 270 N MI
SECOND SPS BURN (10 SEC)
ENTRY AT 27,500 FT SEC FLIGHT PATH ANGLE= -9°
CAPE KENNEDY
RANGE 4800 N MI
LANDING NEAR ASCENSION ISLAND
TOTAL MISSION DURATION 37 MIN
• LAUNCH AT 105° AZIMUTH; SUBORBITAL S-IVB CUTOFF.
• S-IVB/CSM PITCH TO ATTITUDE FOR FIRST SPS BURN.
• SEPARATE USING CM RCS; 6-MINUTE COAST THROUGH APOGEE (270 N.M.).
• SPS BURN (180 SEC.); V =27,000 FPS AT CUTOFF.
• SPS BURN (10 SEC.); CUTOFF 2 MIN PRIOR TO ENTRY.
• CSM 90° PITCH; CM/SM SEPARATION
• CM ASSUMES ENTRY ATTITUDE; ENTRY CONDITIONS V =27,500 FPS. γ =-9°.
• RECOVERY NEAR ASCENSION ISLAND.
IB-2308 IND 1100-11A

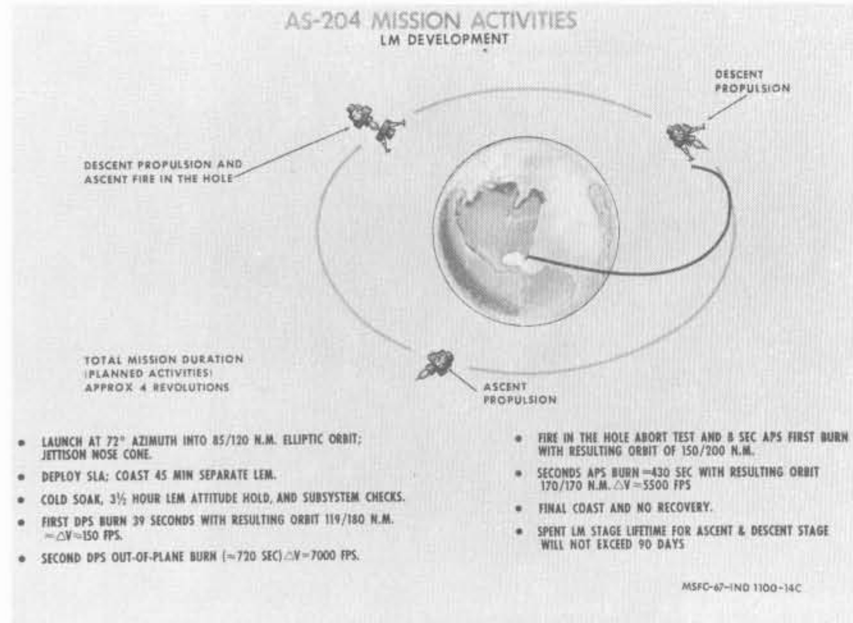

APOLLO-SATURN 201 DATA SUMMARY
VEHICLE DATA
APOLLO S/C
LENGTH 52.5 FT (WITHOUT LES)
DIAMETER 154 INCHES
WT. WITH LES 45,760 LB
INSTRUMENT UNIT
LENGTH (EXTERNAL)36 IN
DIAMETER 260 IN
DRY WEIGHT 4,526 LB
S-IVB STAGE
LENGTH 59.1 FT
DIAMETER 260 IN
DRY WEIGHT 23,330 LB
PROPELLANT 228,000 LB
S-IB STAGE
LENGTH 80.3 FT
DIAMETER 257 IN
DRY WEIGHT * 99,071 LB
PROPELLANTS 883,000 LB
TOTAL VEHICLE
TOTAL LIFTOFF WEIGHT 1,283,687 LB
LENGTH (WITHOUT LES) 194 FT
TOTAL LENGTH 224.5 FT
MISSIONS
SUB-ORBITAL SUPERCIRCULAR ENTRY LOB-TYPE TRAJECTORY
PATH ADAPTIVE GUIDANCE SYSTEM
S-IVB PROPULSION, STRUCTURAL, AND FLIGHT CONTROL TEST, S-IB/S-IVB SEPARATION
S-IB PROPULSION, STRUCTURAL, AND FLIGHT CONTROL TEST
FLIGHT DATA
TRAJECTORY SPACECRAFT RE-ENTRY
LAUNCH AZIMUTH 100°
FLIGHT AZIMUTH 105°
START ROLL PROG T+10 SEC
START TILT PROG T+10 SEC
1st STAGE CUTOFF
INBOARD ENGINE T+140.7 SEC
OUTBOARD ENGINE T+146.7 SEC
90% THRUST T+151.9 SEC
CUTOFF 592.6 SEC
PEROID OF ORBIT N/A
RE-ENTRY LONGITUDE 14.45°
*INCLUDES S-IVB INTERSTAGE
MSFC-66-IND 1100-22

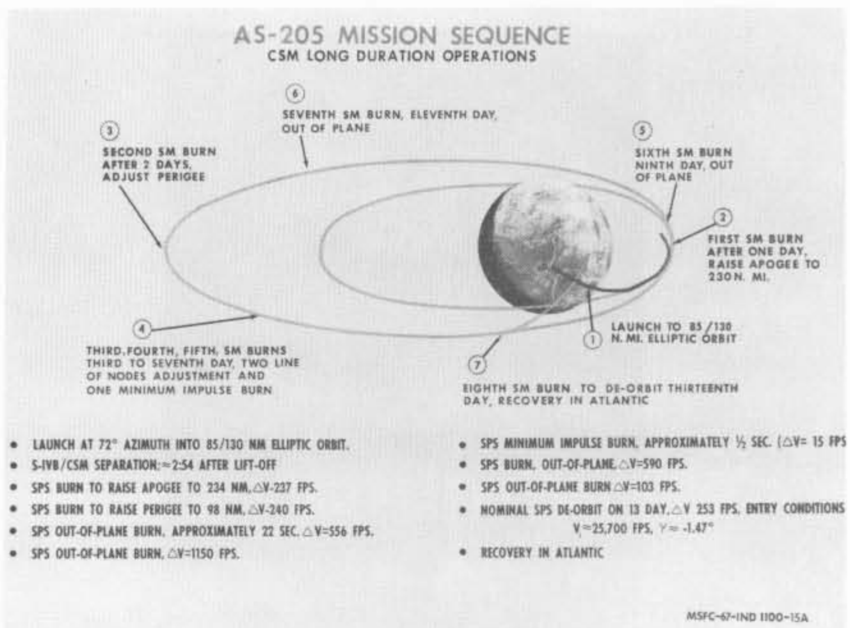

AS-202 MISSION SEQUENCE
LAUNCH VEHICLE AND CSM DEVELOPMENT
LONG LOB
FIRST SM BURN DURATION 240 SEC
S-IVB CUT OFF 635 SEC AFTER LIFT OFF
CAPE KENNEDY
LANDING NEAR WAKE IS.
ENTRY AT 28,600 FT SEC FLIGHT PATH ANGLE = -3.5°
APOGEE 650 N MI
RANGE 15,000 N MI
MISSION DURATION 95 MIN
SM JETTISON
SECOND SM BURN DURATION 85 SEC
THIRD AND FOURTH SM BURNS
• LAUNCH AT 105° AZIMUTH; SUBORBITAL S-IVB CUTOFF.
• S-IVB/CSM PITCH TO ATTITUDE FOR FIRST SPS BURN.
• SPS BURN (240 SEC.): V, =25,400 FPS AT CUTOFF.
• ATTITUDE HOLD DURING 50-MINUTE COAST THROUGH APOGEE (650 N.M.).
• SPS BURN (85 SEC.): V, =27,500 FPS AT CUTOFF.
• SPS BURN (3 SEC.).
• SPS BURN (3 SEC.), CUTOFF 4 MIN PRIOR TO ENTRY
• CM/SM SEPARATION.
• CM ASSUMES ENTRY ATTITUDE; ENTRY CONDITIONS V, =28,600 FPS, γ=-3.5°.
• RECOVERY NEAR WAKE ISLAND.
1B-2309 IND 1100-12A

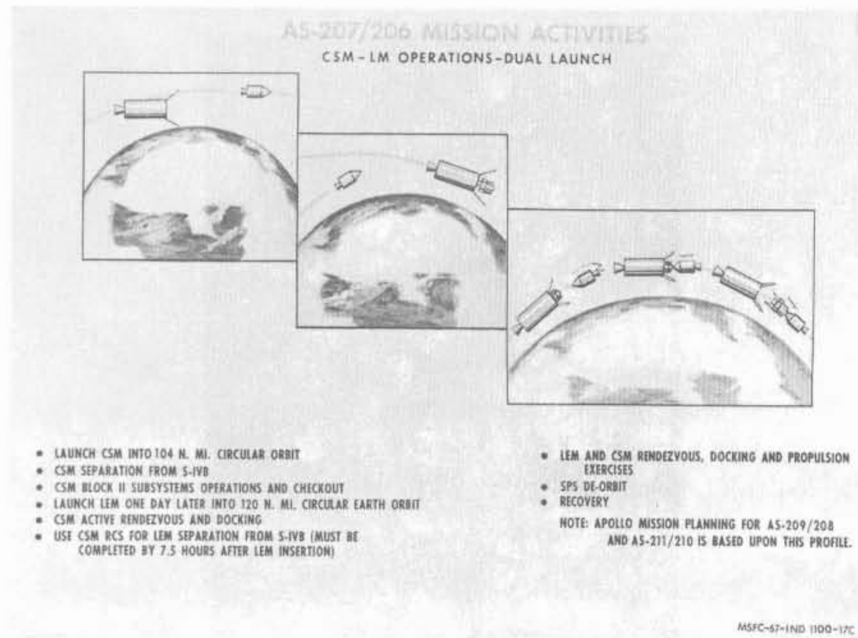

APOLLO SATURN 202 DATA SUMMARY
VEHICLE DATA
APOLLO S/C
LENGTH 52.5 FT (WITHOUT LES)
DIAMETER 154 INCHES
WT. WITH LES 56,906 LB
INSTRUMENT UNIT
LENGTH (EXTERNAL)36 IN
DIAMETER 260 IN
DRY WEIGHT 4,502 LB
S-IVB STAGE
LENGTH 59.1 FT
DIAMETER 260 IN
DRY WEIGHT 23,264
PROPELLANTS 225,400
S-IB STAGE
LENGTH 80.3 FT
DIAMETER 257 IN
* DRY WEIGHT 97,958 LB
PROPELLANTS 881,500 LB
TOTAL VEHICLE
TOTAL LIFTOFF WEIGHT 1,312,250 LB
LENGTH (WITHOUT LES) 194 FT
TOTAL LENGTH 224.5 FT
MISSIONS
SUB-ORBITAL SUPERCIRCULAR ENTRY LOB-TYPE TRAJECTORY
PATH ADAPTIVE GUIDANCE SYSTEM
S-IVB PROPULSION, STRUCTURAL, AND FLIGHT CONTROL TEST, S-IB/S-IVB SEPARATION
S-IB PROPULSION, STRUCTURAL, AND FLIGHT CONTROL TEST
FLIGHT DATA
TRAJECTORY SPACECRAFT RE-ENTRY
LAUNCH AZIMUTH 100°
FLIGHT AZIMUTH 105°
START ROLL PROG T+10 SEC
START TILT PROG T+10 SEC
1st STAGE CUTOFF
INBOARD ENGINE T+140.9 SEC
OUTBOARD ENGINE T+143.9 SEC
98% THRUST T 150.0 SEC
CUTOFF 601.6 SEC
PERIOD OF ORBIT N/A
RE-ENTRY LONGITUDE 136.27°
*INCLUDES S-IVB INTERSTAGE
IND 81100-10

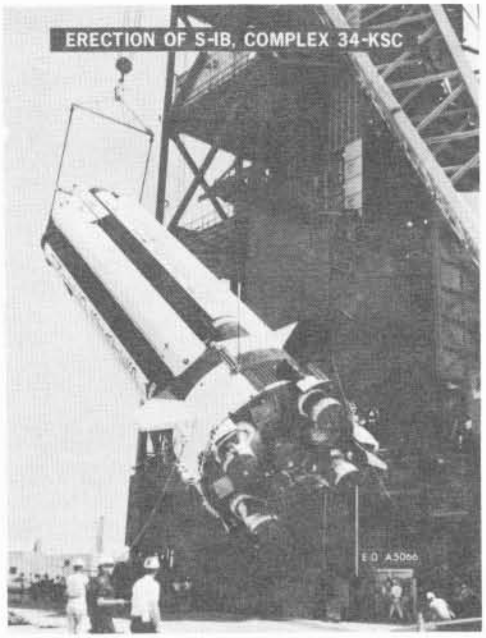

AS-203 MISSION ACTIVITIES
LIQUID HYDROGEN BEHAVIOR IN ORBIT
AND S-IVB STAGE DEVELOPMENT
S-IVB STABILIZATION
LH₂ VENTING
100 N MILE
S-IVB START CYCLE OPERATION
MISSION DURATION (PLANNED ACTIVITIES) APPROX 6 HRS
• LAUNCH AT 72° AZIMUTH INTO 100 N. MI. CIRCULAR ORBIT.
• COAST, S-IVB STABILIZATION.
• LH_2 VENTING.
• S-IVB START CYCLE OPERATION.
• MISSION DURATION 4 ORBITS.
• NO RECOVERY.
1B-2310 IND 1100-13B


APOLLO-SATURN 203 DATA SUMMARY
VEHICLE DATA
NOSE CONE
LENGTH 31.2 FT
DIAMETER 260 INCHES
WT. 3,707 LB
INSTRUMENT UNIT
LENGTH 36 IN
DIAMETER 260 IN
DRY WEIGHT 4,568 LB
S-IVB STAGE
LENGTH 59.1 FT
DIAMETER 260 IN
DRY WEIGHT 25,107
PROPELLANTS 160,806
S-IB STAGE
LENGTH 80.3 FT
DIAMETER 257 IN
DRY WEIGHT * 92,827 LB
PROPELLANTS 911,423 LB
TOTAL VEHICLE
TOTAL LIFTOFF WEIGHT 1,186,632 LB
TOTAL LENGTH 173.2 FT
MISSIONS
ORBITAL INSERTION TRAJECTORY
PATH ADAPTIVE GUIDANCE SYSTEM
S-IVB PROPULSION, STRUCTURAL, AND FLIGHT CONTROL TEST, S-IB/S-IVB SEPARATION, LH2 ORBITAL EXPERIMENT
S-IB PROPULSION, STRUCTURAL, AND FLIGHT CONTROL TEST
FLIGHT DATA
TRAJECTORY 100 N.M. CIRCULAR
LAUNCH AZIMUTH 100°
FLIGHT AZIMUTH 105°
START ROLL PROG T+10 SEC
START TILT PROG T+10 SEC
1st STAGE CUTOFF
INBOARD ENGINE T+140 SEC
OUTBOARD ENGINE T+143 SEC
90% THRUST T+149 SEC
CUTOFF 436 SEC
PERIOD OF ORBIT 88 MIN.
U S A
* INCLUDES S-IVB INTERSTAGE
MSFC-66-IND 1185B

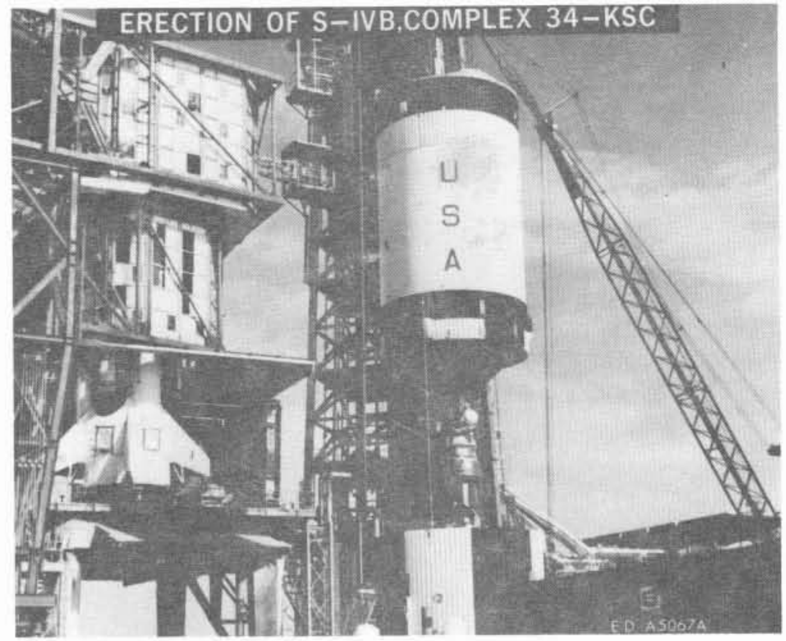

AS-204 MISSION ACTIVITIES
LM DEVELOPMENT
DESCENT PROPULSION
DESCENT PROPULSION AND ASCENT FIRE IN THE HOLE
TOTAL MISSION DURATION (PLANNED ACTIVITIES) APPROX 4 REVOLUTIONS
ASCENT PROPULSION
• LAUNCH AT 72° AZIMUTH INTO 85/120 N.M. ELLIPTIC ORBIT; JETTISON NOSE CONE.
• DEPLOY SLA; COAST 45 MIN SEPARATE LEM.
• COLD SOAK, 3½ HOUR LEM ATTITUDE HOLD, AND SUBSYSTEM CHECKS.
• FIRST DPS BURN 39 SECONDS WITH RESULTING ORBIT 119/180 N.M. ≈△V≈150 FPS.
• SECOND DPS OUT-OF-PLANE BURN (≈720 SEC)△V=7000 FPS.
• FIRE IN THE HOLE ABORT TEST AND 8 SEC APS FIRST BURN WITH RESULTING ORBIT OF 150/200 N.M.
• SECONDS APS BURN ≈430 SEC WITH RESULTING ORBIT 170/170 N.M. △V≈5500 FPS
• FINAL COAST AND NO RECOVERY.
• SPENT LM STAGE LIFETIME FOR ASCENT & DESCENT STAGE WILL NOT EXCEED 90 DAYS
MSFC-67-IND 1100-14C


AS-205 MISSION SEQUENCE
CSM LONG DURATION OPERATIONS
6 SEVENTH SM BURN, ELEVENTH DAY, OUT OF PLANE
3 SECOND SM BURN AFTER 2 DAYS, ADJUST PERIGEE
5 SIXTH SM BURN NINTH DAY, OUT OF PLANE
2 FIRST SM BURN AFTER ONE DAY, RAISE APOGEE TO 230 N. MI.
4 THIRD, FOURTH, FIFTH, SM BURNS THIRD TO SEVENTH DAY, TWO LINE OF NODES ADJUSTMENT AND ONE MINIMUM IMPULSE BURN
1 LAUNCH TO 85/130 N. MI. ELLIPTIC ORBIT
7 EIGHTH SM BURN TO DE-ORBIT THIRTEENTH DAY, RECOVERY IN ATLANTIC
• LAUNCH AT 72° AZIMUTH INTO 85/130 NM ELLIPTIC ORBIT.
• S-IVB/CSM SEPARATION: ≈2:54 AFTER LIFT-OFF
• SPS BURN TO RAISE APOGEE TO 234 NM, △V-237 FPS.
• SPS BURN TO RAISE PERIGEE TO 98 NM, △V-240 FPS.
• SPS OUT-OF-PLANE BURN, APPROXIMATELY 22 SEC. △V=556 FPS.
• SPS OUT-OF-PLANE BURN, △V=1150 FPS.
• SPS MINIMUM IMPULSE BURN, APPROXIMATELY ½ SEC. (△V= 15 FPS
• SPS BURN, OUT-OF-PLANE △V=590 FPS.
• SPS OUT-OF-PLANE BURN △V=103 FPS.
• NOMINAL SPS DE-ORBIT ON 13 DAY, △V 253 FPS, ENTRY CONDITIONS V≈25,700 FPS, γ≈ -1.47°
• RECOVERY IN ATLANTIC
MSFC-67-IND 1100-15A

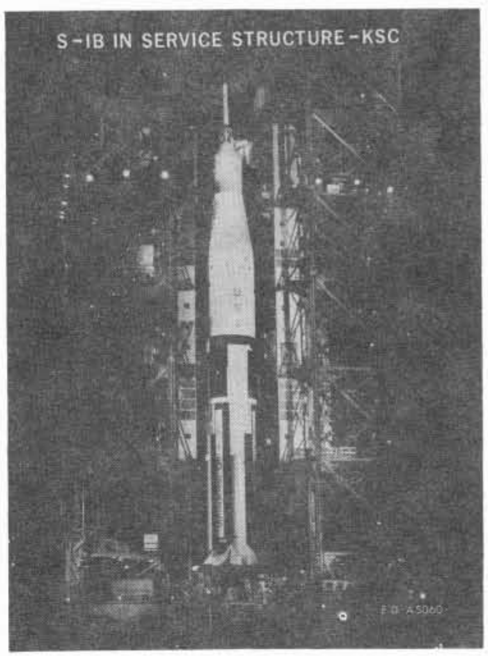

AS-207/206 MISSION ACTIVITIES
CSM-LM OPERATIONS-DUAL LAUNCH
• LAUNCH CSM INTO 104 N. MI. CIRCULAR ORBIT
• CSM SEPARATION FROM S-IVB
• CSM BLOCK II SUBSYSTEMS OPERATIONS AND CHECKOUT
• LAUNCH LEM ONE DAY LATER INTO 120 N. MI. CIRCULAR EARTH ORBIT
• CSM ACTIVE RENDEZVOUS AND DOCKING
• USE CSM RCS FOR LEM SEPARATION FROM S-IVB (MUST BE COMPLETED BY 7.5 HOURS AFTER LEM INSERTION)
• LEM AND CSM RENDEZVOUS, DOCKING AND PROPULSION EXERCISES
• SPS DE-ORBIT
• RECOVERY
NOTE: APOLLO MISSION PLANNING FOR AS-209/208 AND AS-211/210 IS BASED UPON THIS PROFILE.
MSFC-67-IND 1100-17C



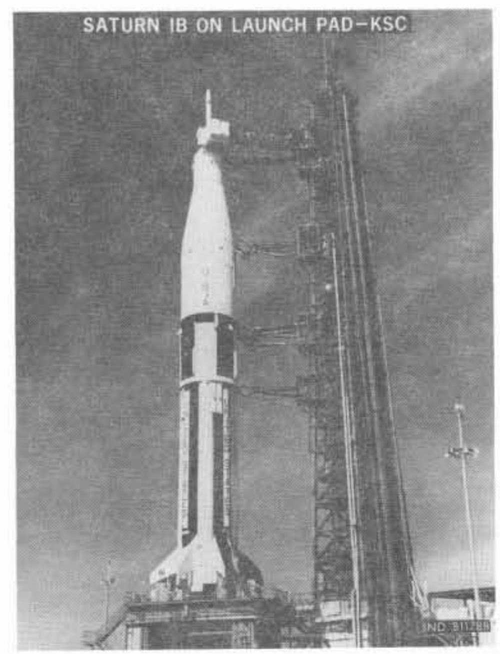
ERECTION OF S-IB, COMPLEX 34-KSC



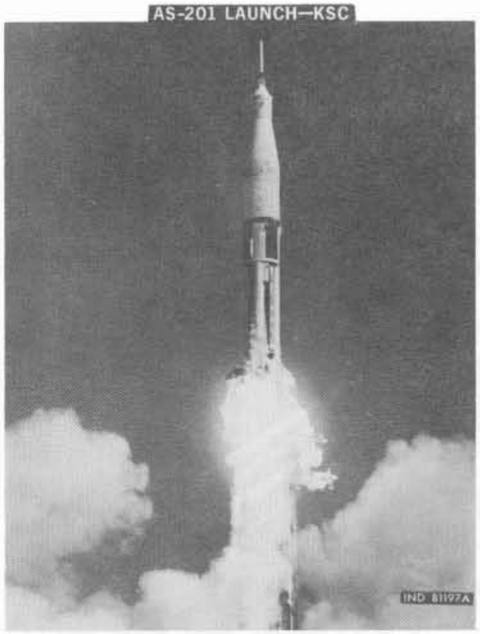
ERECTION OF S-IVB,COMPLEX 34-KSC

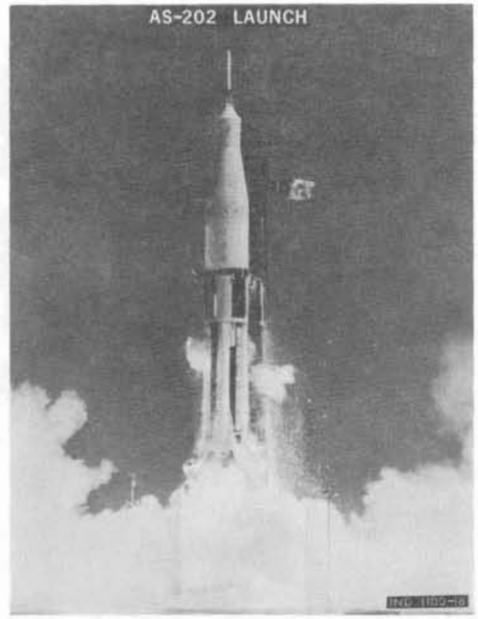


S-IB IN SERVICE STRUCTURE-KSC



SATURN IB ON LAUNCH PAD-KSC

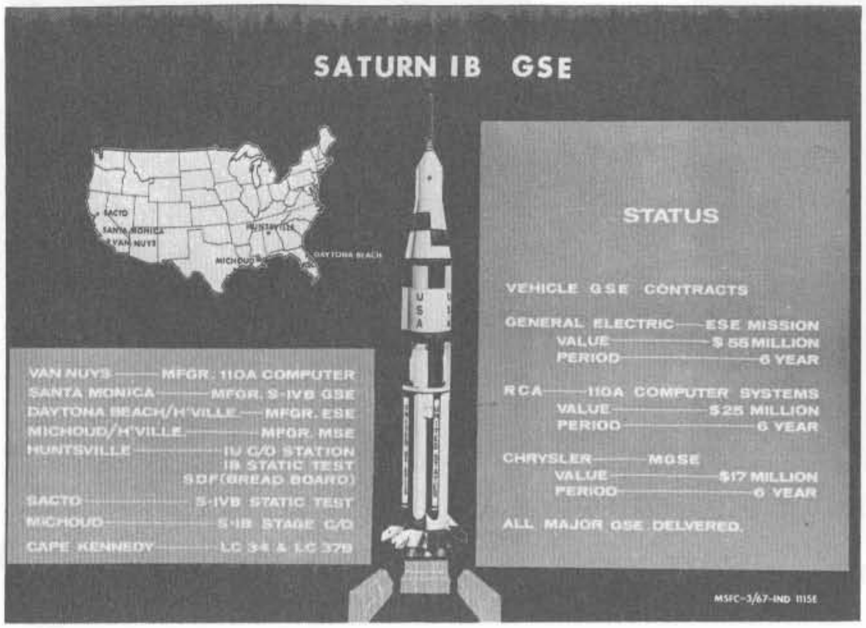

AS-201 LAUNCH—KSC
IND 81197A

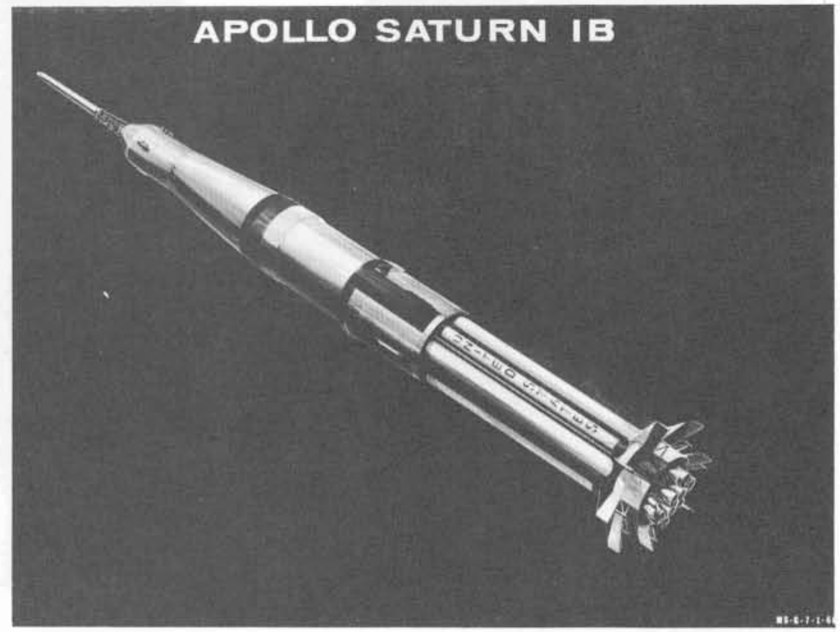

AS-202 LAUNCH

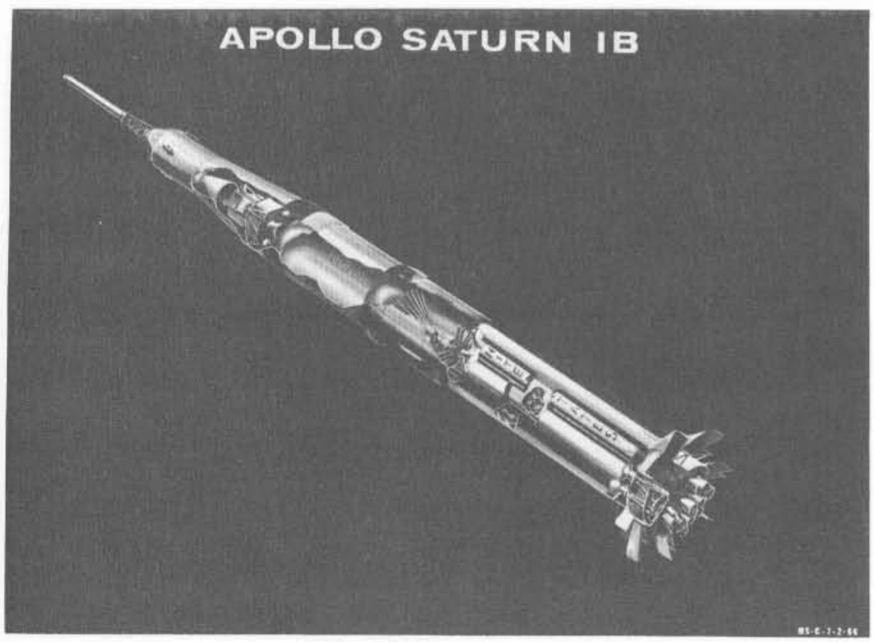

AS-203 LAUNCH
IND A1100 3

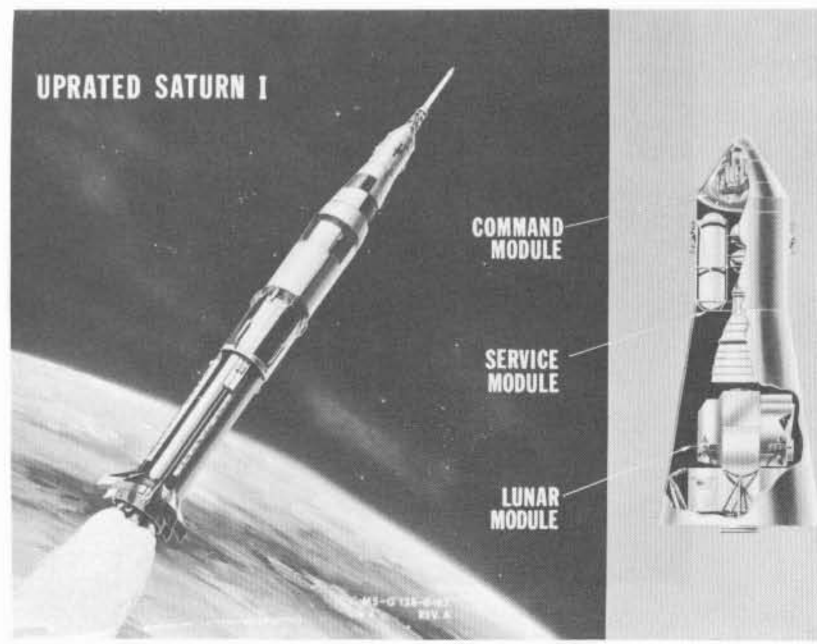

ERECTION OF
APOLLO SPACECRAFT
COMPLEX 34—KSC

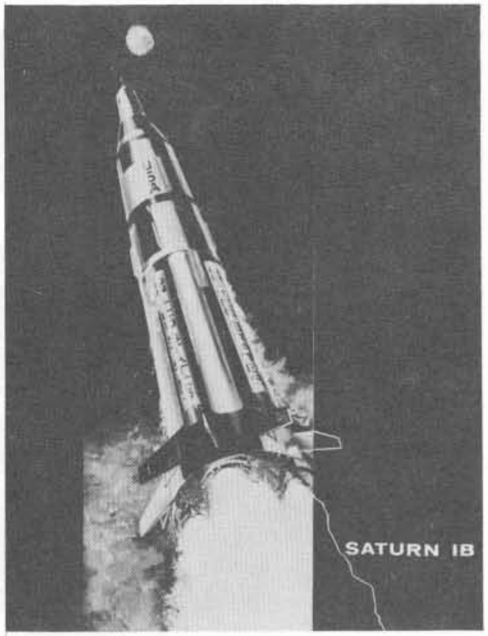

APOLLO SPACECRAFT ERECTION—KSC
MSFC 67 IND 1170A


SATURN IB GSE
SACTO
SANTA MONICA
VAN NUYS
HUNTSVILLE
MICHOUD
DAYTONA BEACH
VAN NUYS——MFGR. 110A COMPUTER
SANTA MONICA——MFGR. S-IVB GSE
DAYTONA BEACH/H'VILLE——MFGR. ESE
MICHOUD/H'VILLE——MFGR. MSE
HUNTSVILLE——IU C/O STATION
IB STATIC TEST
SDF(BREAD BOARD)
SACTO——S-IVB STATIC TEST
MICHOUD——S-IB STAGE C/O
CAPE KENNEDY——LC 34 & LC 37B
STATUS
VEHICLE GSE CONTRACTS
GENERAL ELECTRIC——ESE MISSION
VALUE——$ 55 MILLION
PERIOD——6 YEAR
RCA——110A COMPUTER SYSTEMS
VALUE——$25 MILLION
PERIOD——6 YEAR
CHRYSLER——MGSE
VALUE——$17 MILLION
PERIOD——6 YEAR
ALL MAJOR GSE DELVERED.
MSFC-3/67-IND 1115E

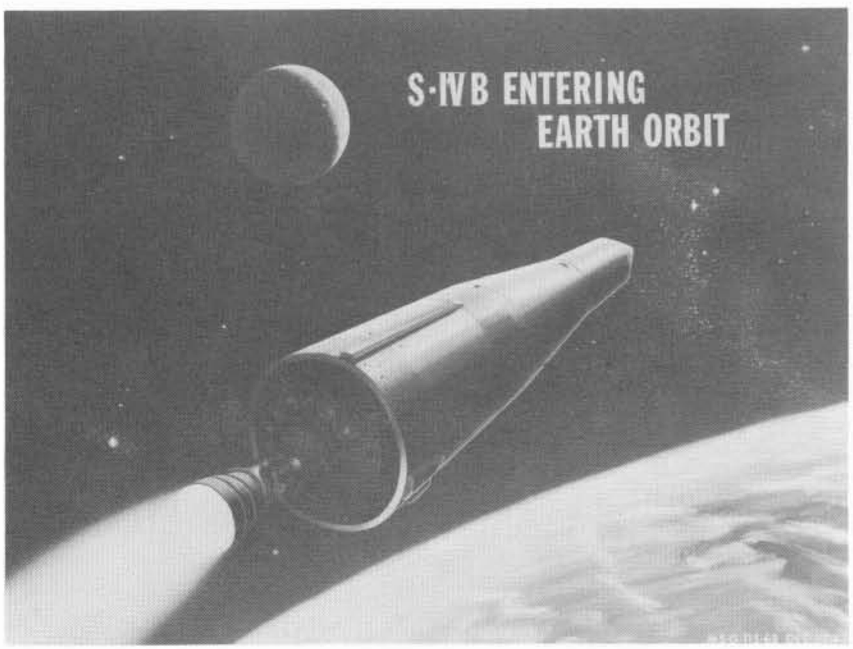

APOLLO SATURN IB

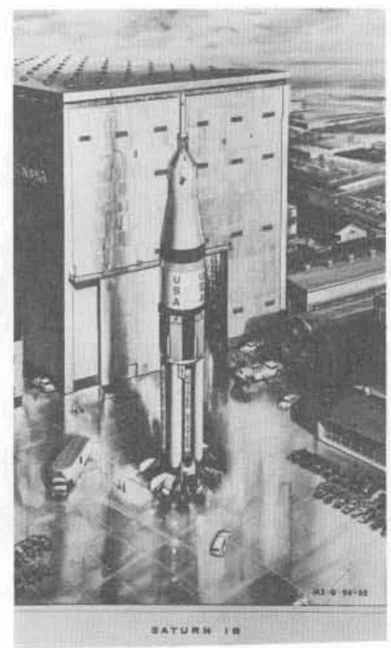

APOLLO SATURN IB

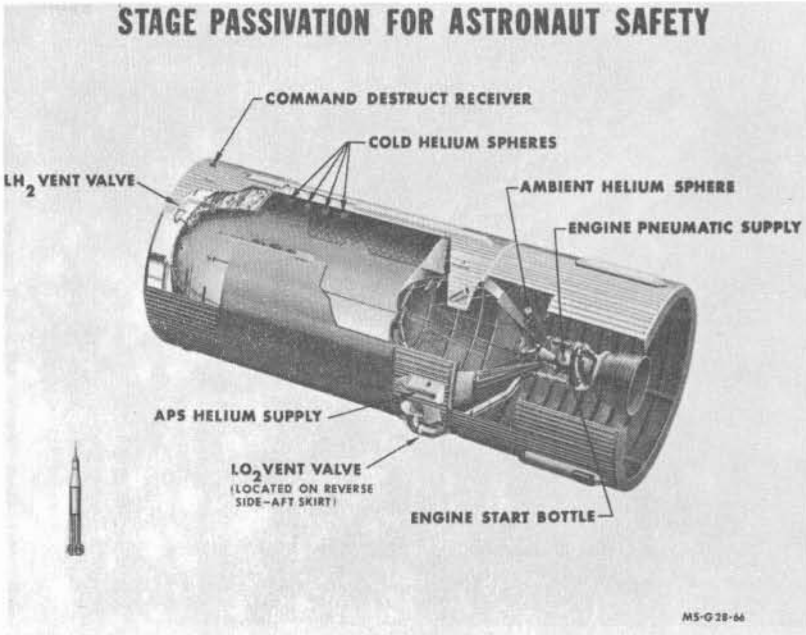

UPRATED SATURN I
COMMAND MODULE
SERVICE MODULE
LUNAR MODULE


SATURN IB

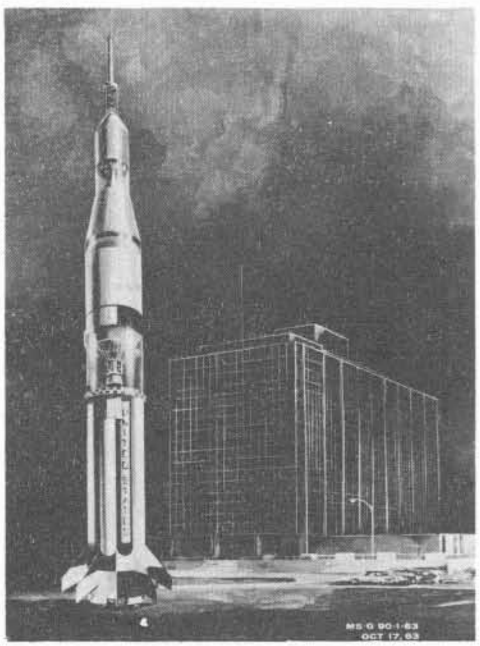

SATURN I-B/MINUTEMAN STRAP-ON
MS-G 60-64
NOV 16, 1964

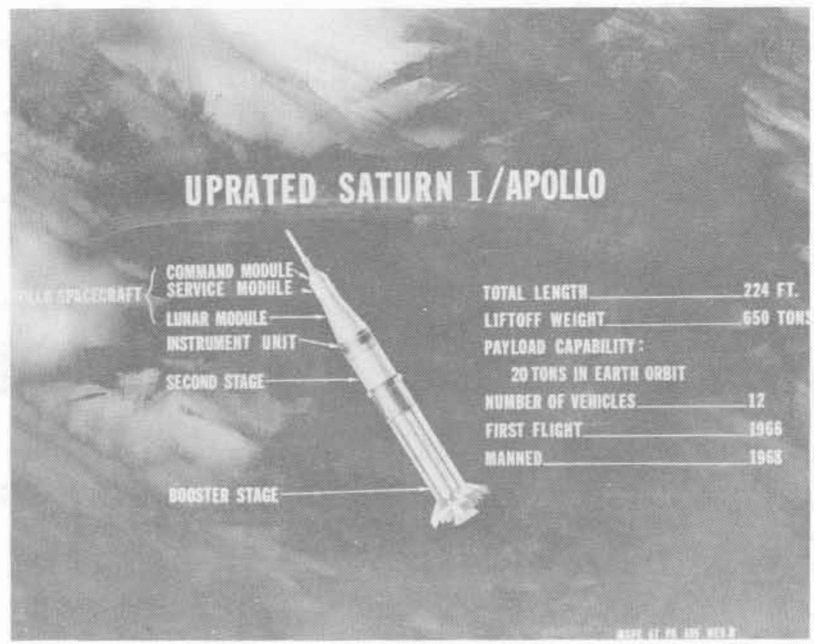

S-IVB ENTERING
EARTH ORBIT


USA
SATURN IB


STAGE PASSIVATION FOR ASTRONAUT SAFETY
COMMAND DESTRUCT RECEIVER
COLD HELIUM SPHERES
LH_2 VENT VALVE
AMBIENT HELIUM SPHERE
ENGINE PNEUMATIC SUPPLY
APS HELIUM SUPPLY
LO_2 VENT VALVE
(LOCATED ON REVERSE SIDE-AFT SKIRT)
ENGINE START BOTTLE
MS-G 28-66


UPRATED SATURN I
MS-G 69-66


MS G 90-1-63
OCT 17, 63


UPRATED SATURN I/APOLLO
COMMAND MODULE
SERVICE MODULE
LUNAR MODULE
INSTRUMENT UNIT
SECOND STAGE
BOOSTER STAGE
TOTAL LENGTH 224 FT.
LIFTOFF WEIGHT 650 TON
PAYLOAD CAPABILITY:
20 TONS IN EARTH ORBIT
NUMBER OF VEHICLES 12
FIRST FLIGHT 1966
MANNED 1968

S-IB STAGE

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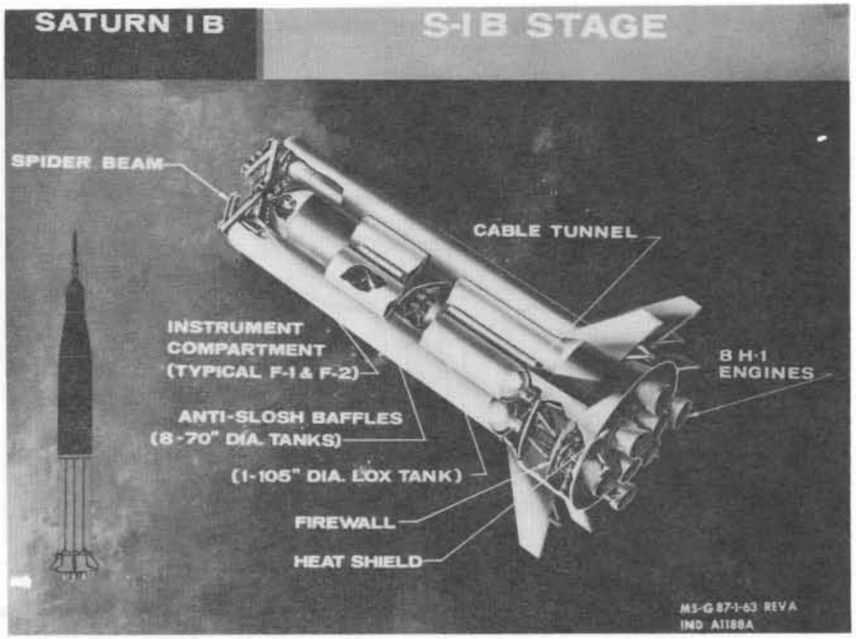
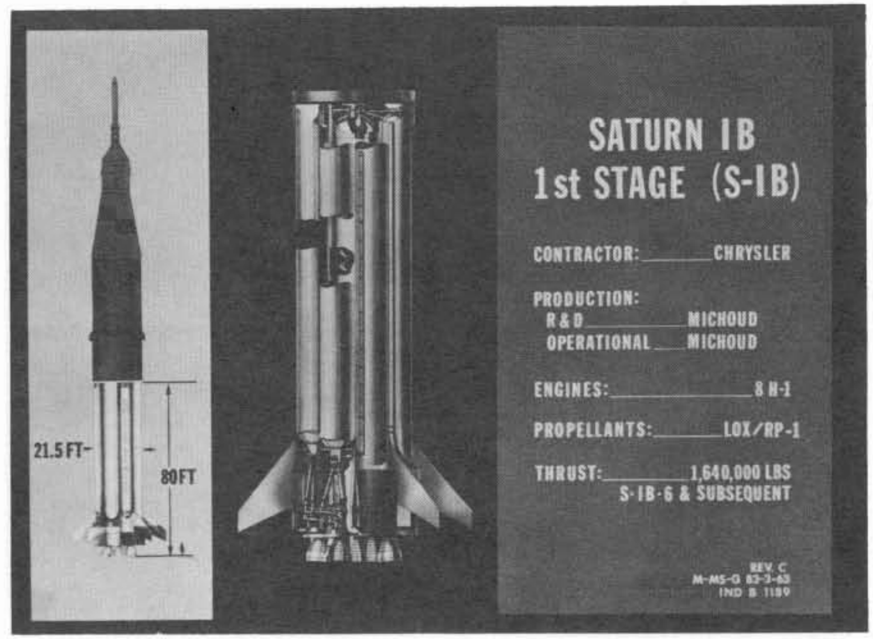
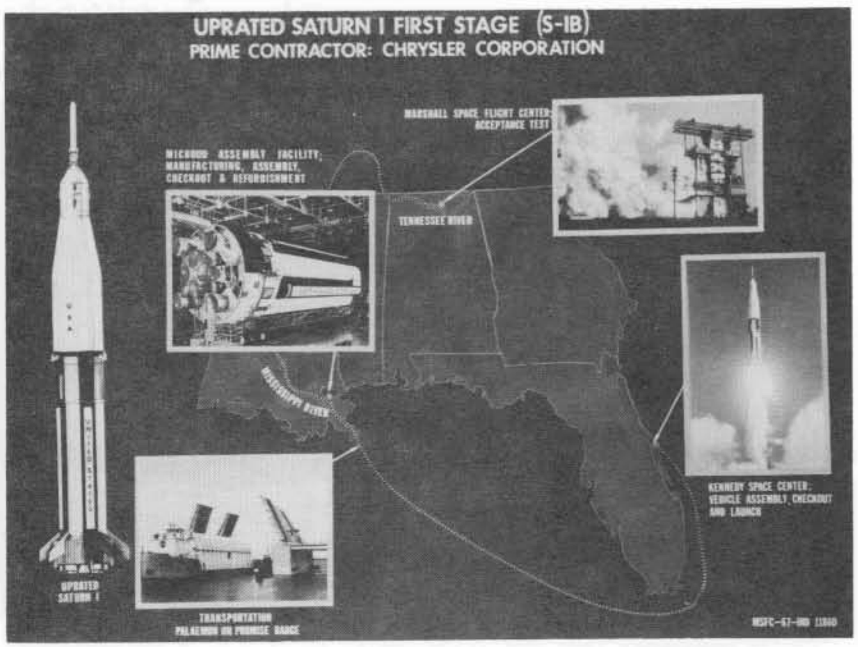
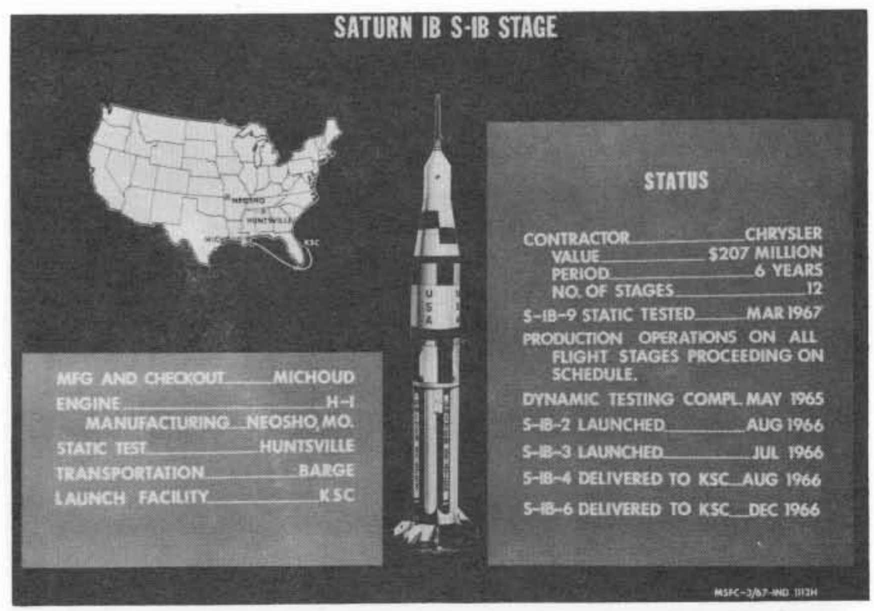
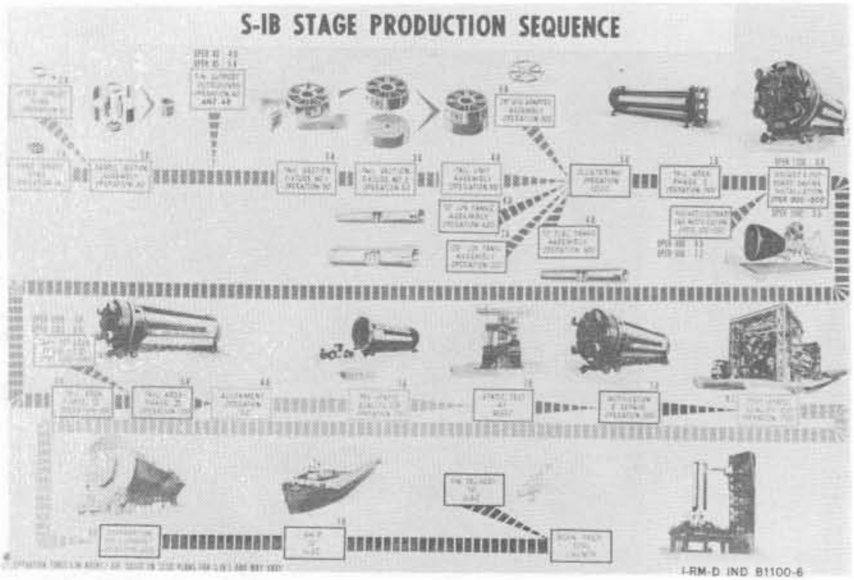

SATURN IB
S-IB STAGE
SPIDER BEAM
CABLE TUNNEL
INSTRUMENT COMPARTMENT (TYPICAL F-1 & F-2)
8 H-1 ENGINES
ANTI-SLOSH BAFFLES (8-70" DIA. TANKS)
(1-105" DIA. LOX TANK)
FIREWALL
HEAT SHIELD
MS-G 87-1-63 REV A
IND A1188A

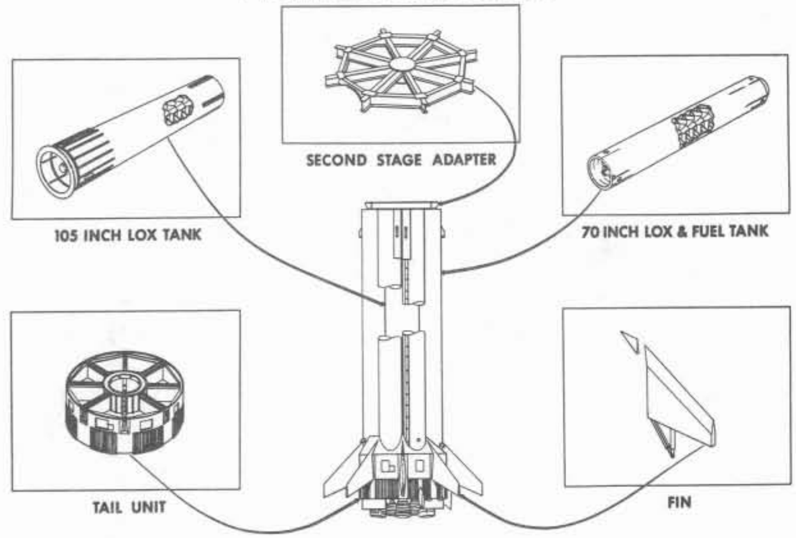

21.5 FT
80 FT
SATURN IB
1st STAGE (S-IB)
CONTRACTOR: CHRYSLER
PRODUCTION:
R & D MICHOUD
OPERATIONAL MICHOUD
ENGINES: 8 H-1
PROPELLANTS: LOX/RP-1
THRUST: 1,640,000 LBS
S-IB-6 & SUBSEQUENT


UPRATED SATURN I FIRST STAGE (S-IB)
PRIME CONTRACTOR: CHRYSLER CORPORATION
MICHOUD ASSEMBLY FACILITY; MANUFACTURING, ASSEMBLY, CHECKOUT & REFURBISHMENT
MARSHALL SPACE FLIGHT CENTER; ACCEPTANCE TEST
TENNESSEE RIVER
KENNEDY SPACE CENTER: VEHICLE ASSEMBLY, CHECKOUT AND LAUNCH
UPRATED SATURN I
TRANSPORTATION PALAEMON OR PROMISE BARGE

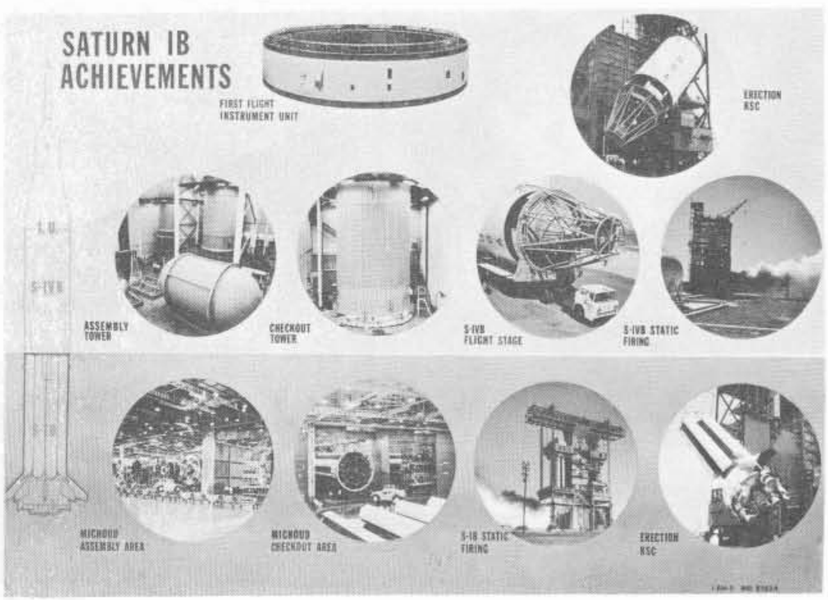

SATURN IB S-IB STAGE
MFG AND CHECKOUT MICHOUD
ENGINE H-1
MANUFACTURING NEOSHO, MO.
STATIC TEST HUNTSVILLE
TRANSPORTATION BARGE
LAUNCH FACILITY KSC
STATUS
CONTRACTOR CHRYSLER
VALUE $207 MILLION
PERIOD 6 YEARS
NO. OF STAGES 12
S-IB-9 STATIC TESTED MAR 1967
PRODUCTION OPERATIONS ON ALL FLIGHT STAGES PROCEEDING ON SCHEDULE.
DYNAMIC TESTING COMPL. MAY 1965
S-IB-2 LAUNCHED AUG 1966
S-IB-3 LAUNCHED JUL 1966
S-IB-4 DELIVERED TO KSC AUG 1966
S-IB-6 DELIVERED TO KSC DEC 1966

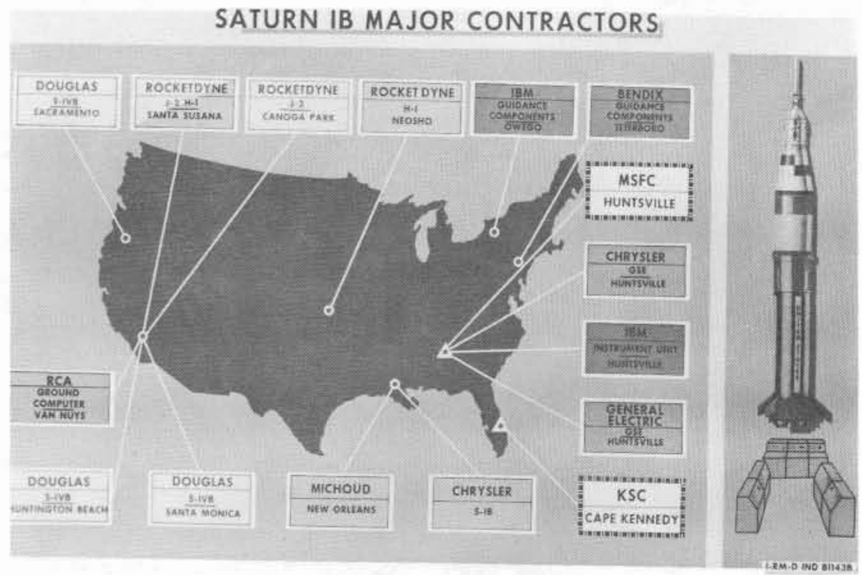


S-IB STRUCTURAL ARRANGEMENT

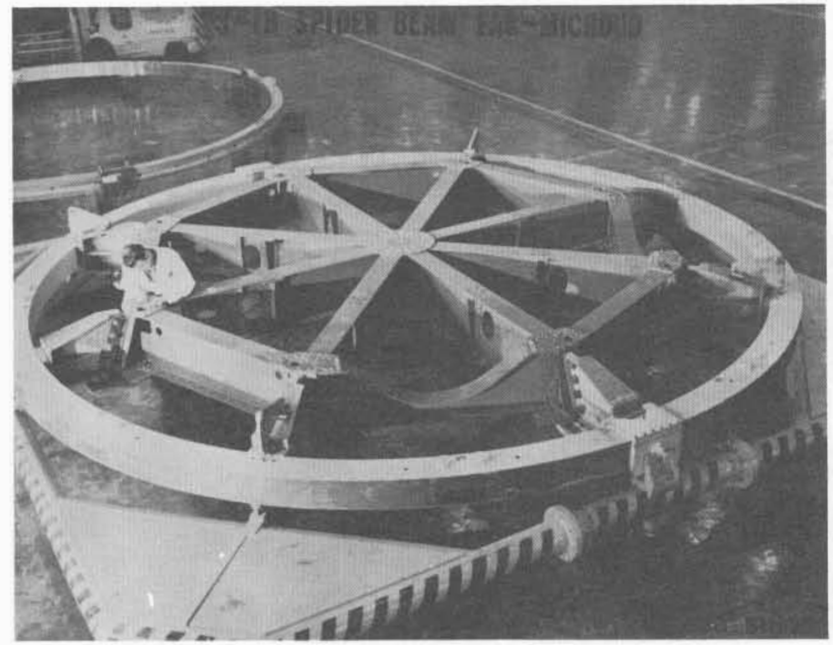


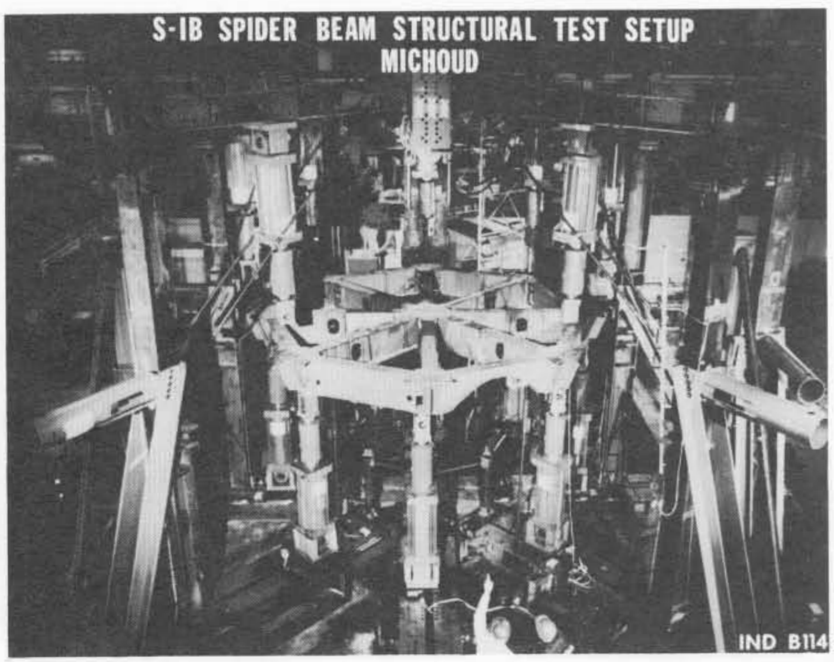
IND 1166



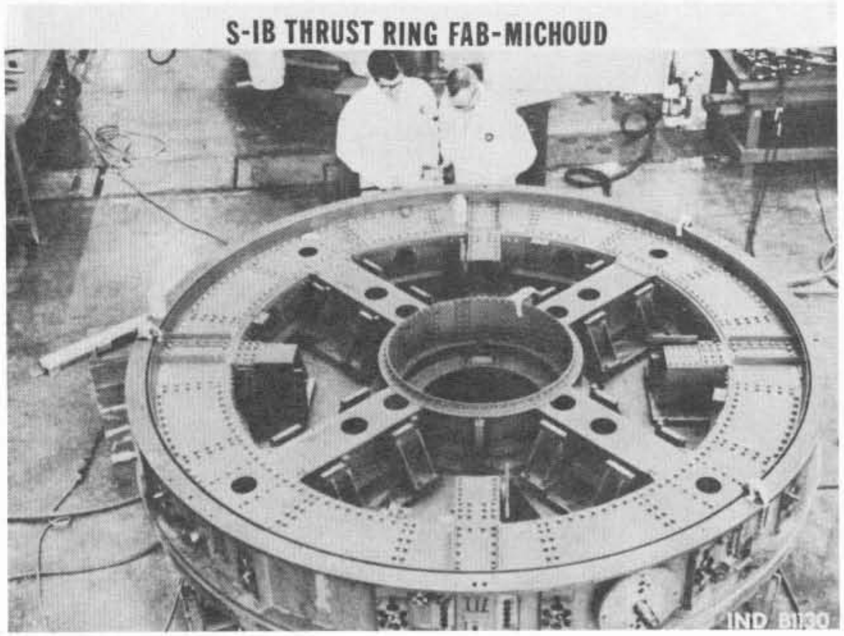



S-IB FAB & ASSY AREA - MICHOUD
IND B1142A

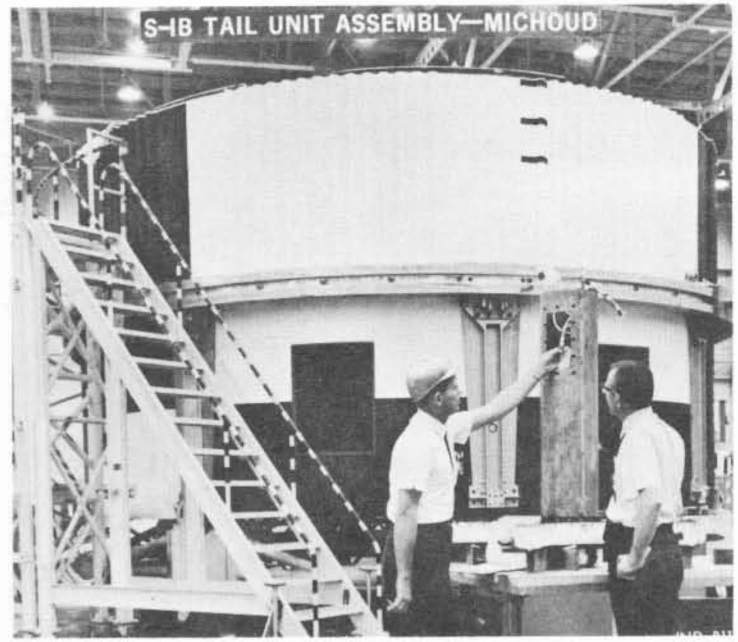

SPIDER BEAM


S-IB SPIDER BEAM STRUCTURAL TEST SETUP
MICHOUD
IND B114


S-IB-2 THRUST STRUCTURE -MICHOUD

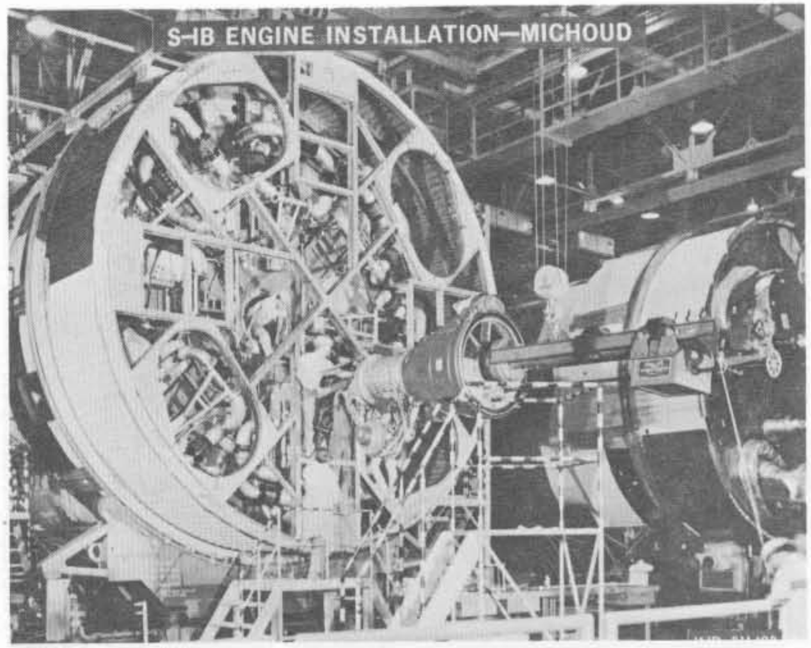


S-IB THRUST RING FAB-MICHOUD

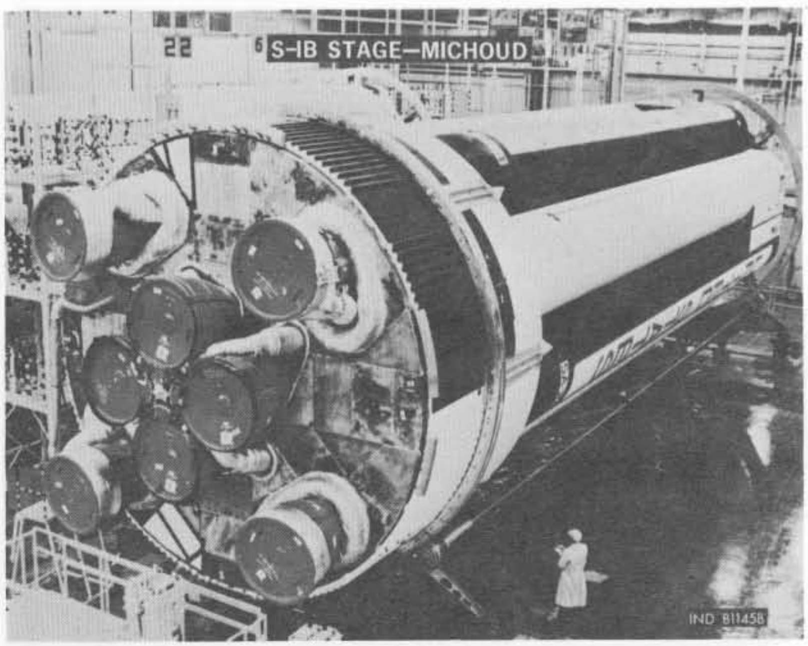

S-IB TAIL UNIT ASSEMBLY—MICHOUD

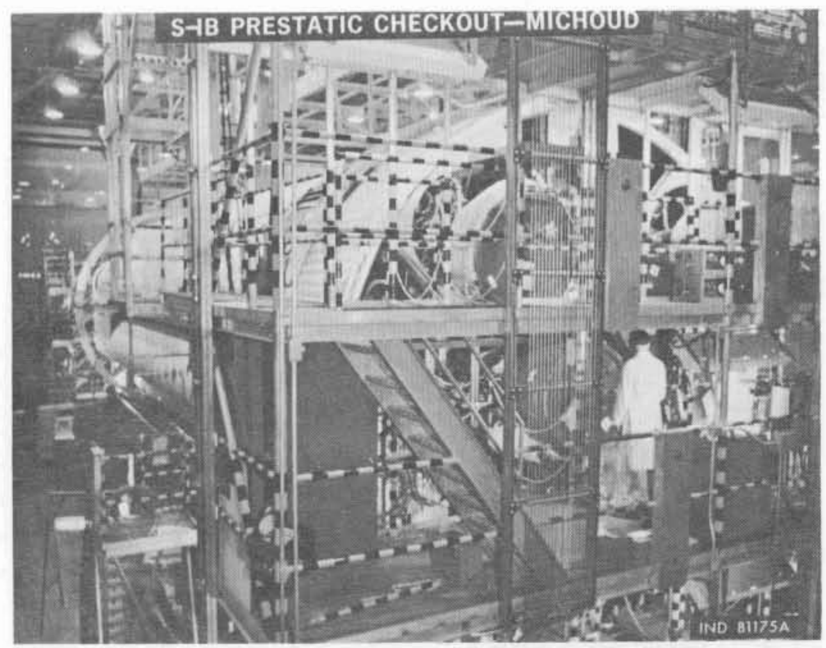
S-IB 105 INCH LOX TANK-MICHOUD

S-IB CLUSTERING—MICHOUD

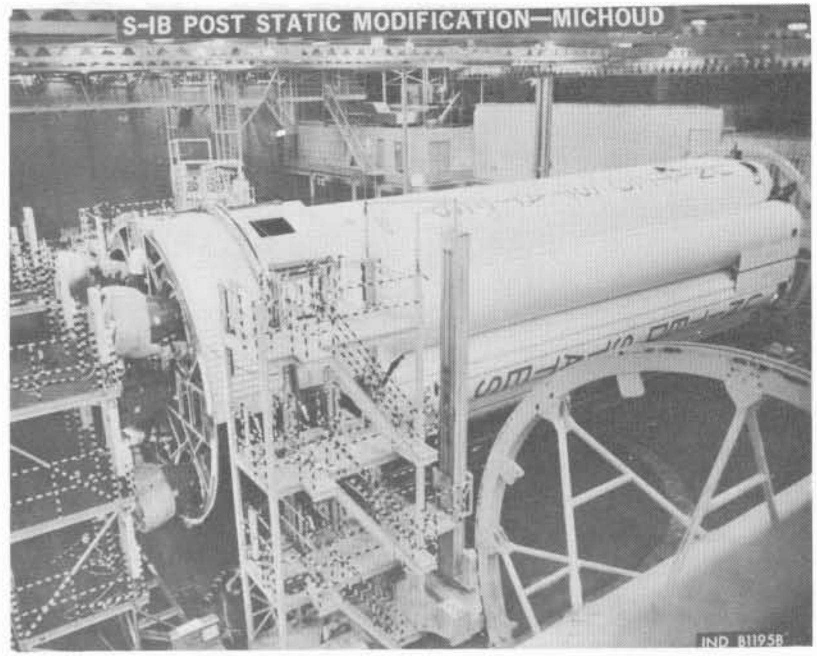

S-IB ENGINE INSTALLATION—MICHOUD


S-IB ASSEMBLY AND CHECKOUT AREA—MICHOUD
IND A1144B

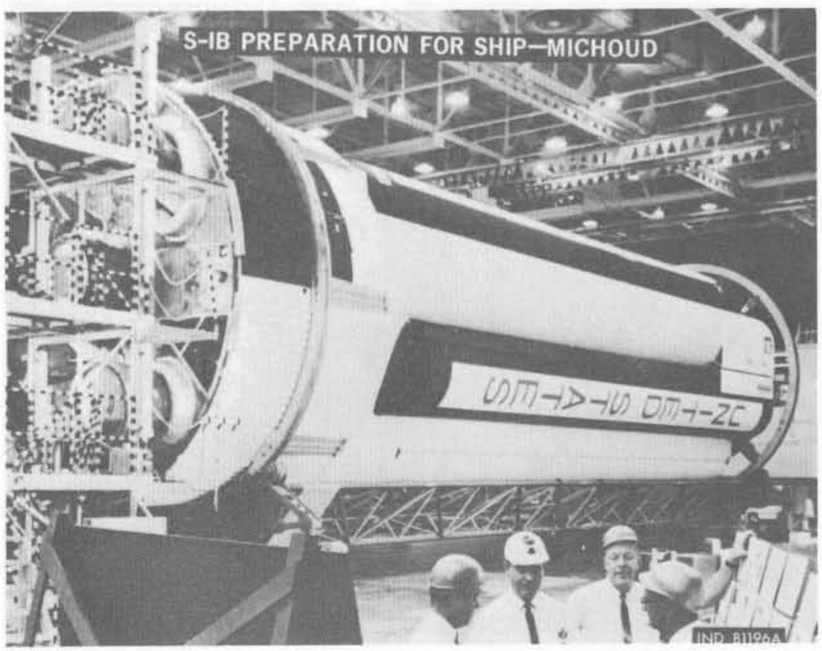

22
S-IB STAGE—MICHOUD
IND B1145B


S-IB PRESTATIC CHECKOUT—MICHOUD
IND B1175A

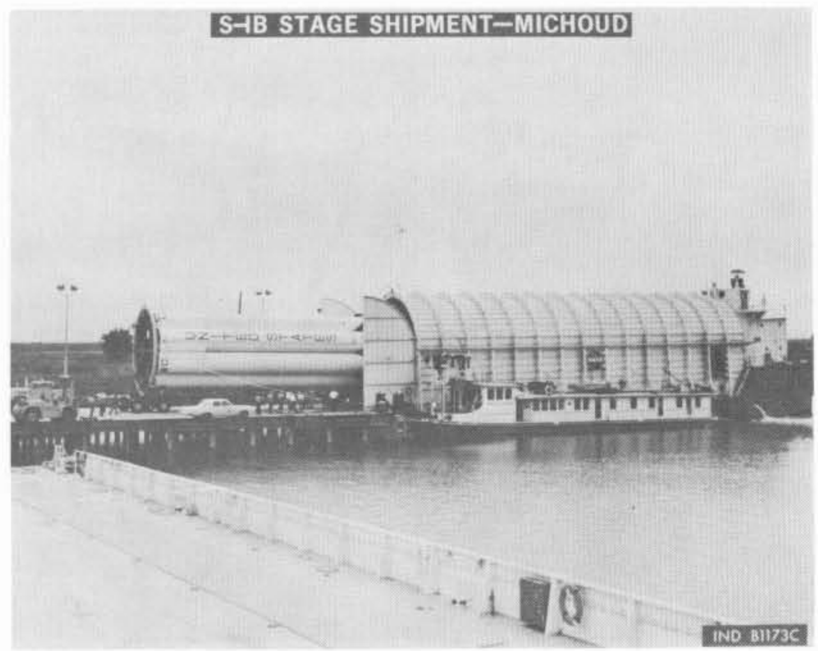
S-IB CHECKOUT STATION 1- MICHOUD



S-IB POST STATIC MODIFICATION—MICHOUD

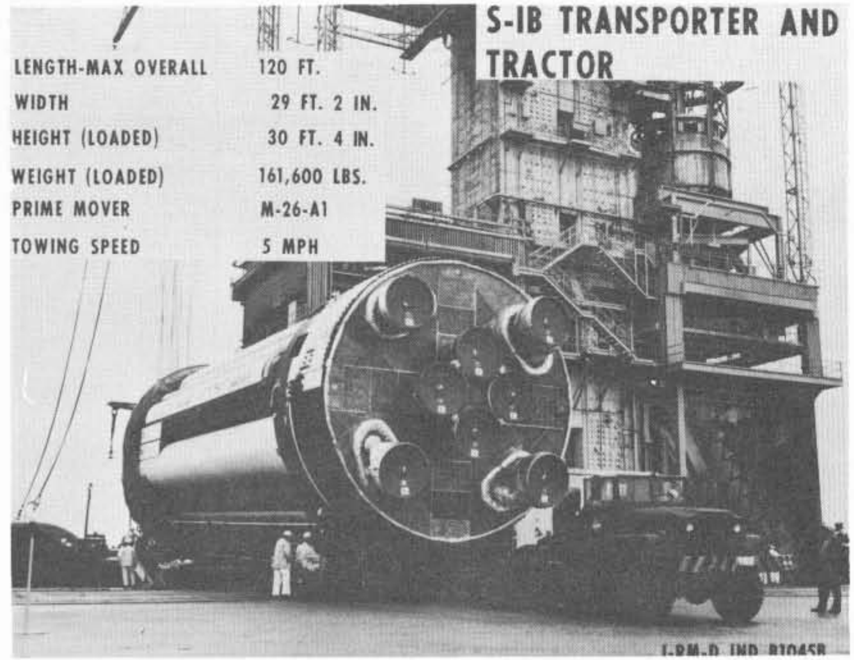


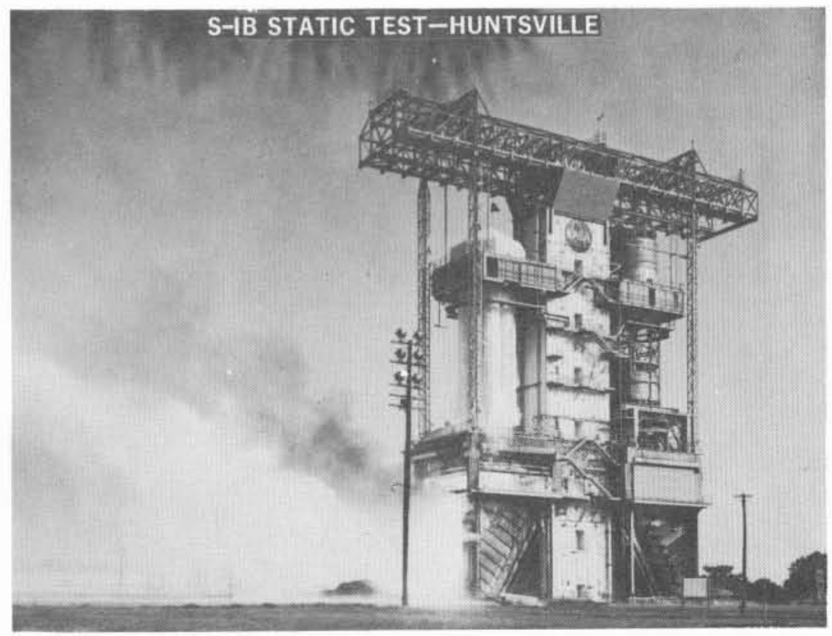
S-IB PREPARATION FOR SHIP—MICHOUD



S-IB STAGE SHIPMENT—MICHOUD

S-IB STAGE ARRIVAL—HUNTSVILLE

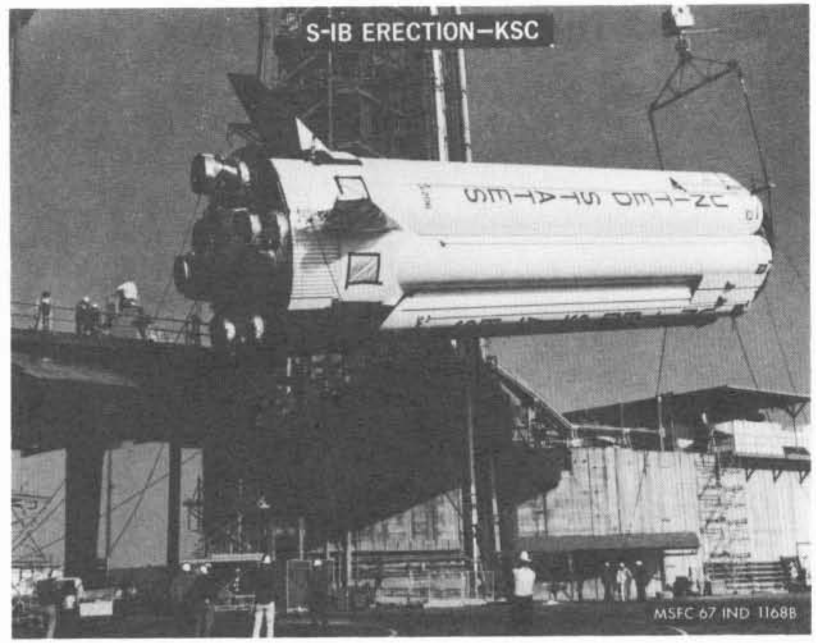




S-IB STAGE ACCEPTANCE TEST PROGRAM

STAGE	DATE	DURATION (SECONDS) PLANNED	ACTUAL INB'D	ACTUAL OUTB'D	RESULTS
S-IB-1	APR 1, 65	35	35.174	35.294	SUCCESSFUL
S-IB-1	APR 13, 65	145	138.210	142.010	SUCCESSFUL
S-IB-2	JUL 8, 65	35	3.002	3.100	TERMINATED AUTOMATICALLY DUE TO RANDOM FAILURE OF ENGINE #4 THRUST OK PRESSURE SWITCH #2
S-IB-7	JUL 9, 65	35	35.192	35.302	SUCCESSFUL
S-IB-2	JUL 20, 65	140	143.285	144.283	SUCCESSFUL
S-IB-3	OCT 12, 65	35	35.176	35.295	SUCCESSFUL
S-IB-3	OCT 26, 65	140	145.522	146.226	SUCCESSFUL
S-IB-4	JAN 17, 66	35	35.227	35.339	SUCCESSFUL
S-IB-4	JAN 21, 66	140	143.934	147.110	SUCCESSFUL
S-IB-5	MAR 23, 66	35	34.912	35.028	SUCCESSFUL
S-IB-5	MAR 31, 66	140	141.848	144.676	SUCCESSFUL
S-IB-6	JUN 23, 66	35	35.463	35.580	SUCCESSFUL
S-IB-6	JUN 29, 66	140	138.580	141.236	SUCCESSFUL
S-IB-7	SEP 1, 66	35	35.460	35.576	SUCCESSFUL
S-IB-7	SEP 13, 66	140	137.100	139.720	SUCCESSFUL
S-IB-8	NOV 16, 66	35	35.444	35.560	SUCCESSFUL
S-IB-8	NOV 29, 66	140	142.656	145.352	SUCCESSFUL
S-IB-9	FEB 24, 67	35	13.252	13.528	PREMATURELY TERMINATED DUE TO DROPOUT OF GROUND COMPUTER CIRCUIT BREAKER
S-IB-9	FEB 27, 67	35	35.324	35.440	SUCCESSFUL
S-IB-9	MAR 7, 67	140	3.080	3.356	PERMATURELY TERMINATED DUE TO LOOSE CONNECTION IN THE DIGITAL DATA SYSTEM
S-IB-9	MAR 7, 67	140	142.400	145.448	SUCCESSFUL
TOTAL			1610.241	1634.461	

MSFC-4/67-IND 1183E



S-IB ERECTION—KSC

MSFC 67 IND 1168B

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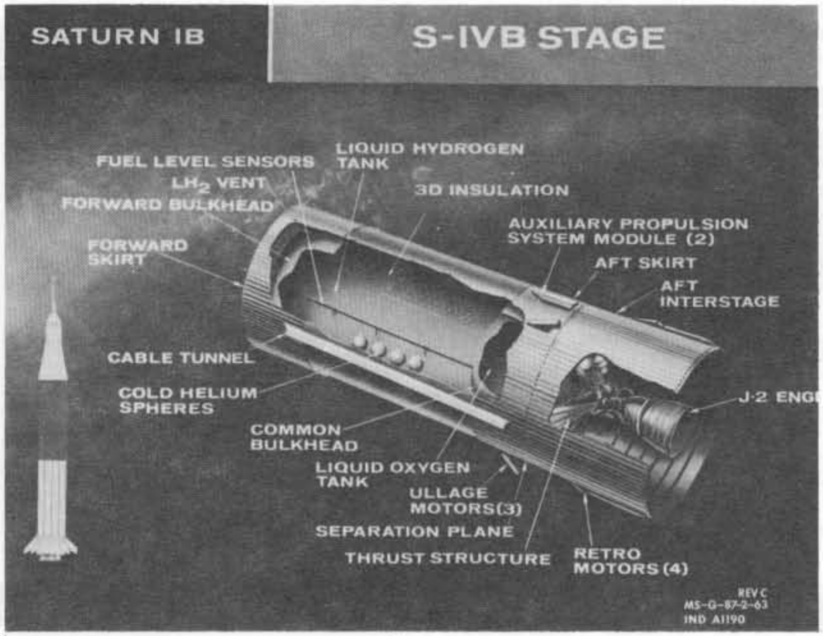
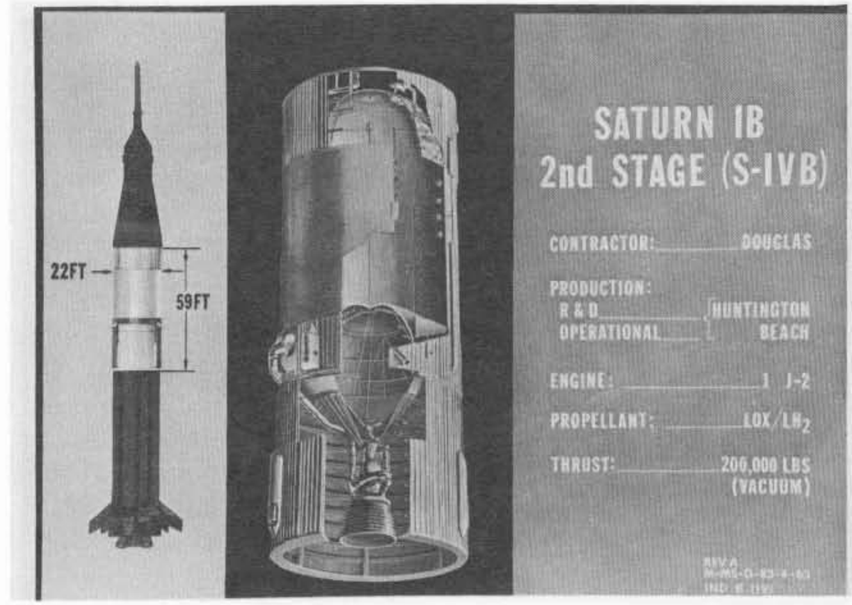
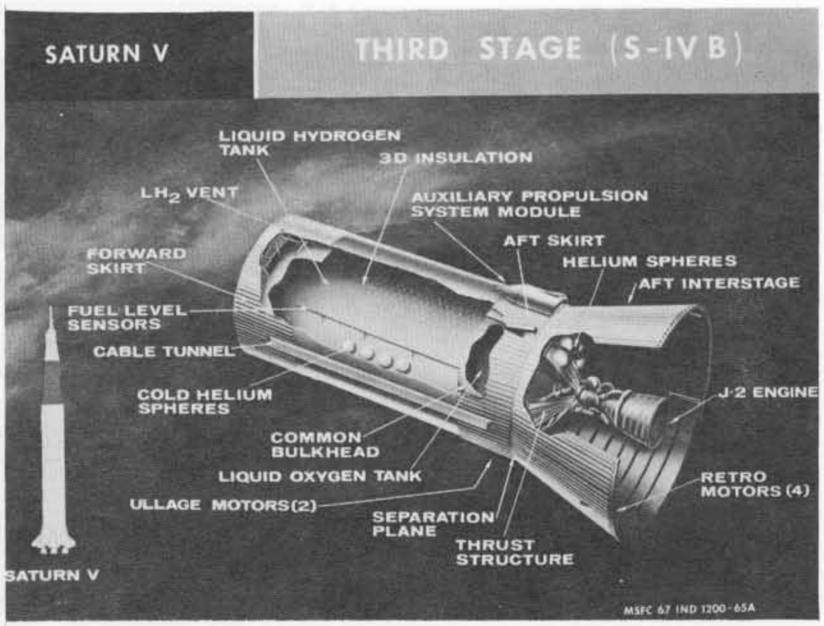

SATURN IB
S-IVB STAGE
FUEL LEVEL SENSORS
LIQUID HYDROGEN TANK
LH2 VENT
FORWARD BULKHEAD
3D INSULATION
AUXILIARY PROPULSION SYSTEM MODULE (2)
FORWARD SKIRT
AFT SKIRT
AFT INTERSTAGE
CABLE TUNNEL
COLD HELIUM SPHERES
J-2 ENG
COMMON BULKHEAD
LIQUID OXYGEN TANK
ULLAGE MOTORS(3)
SEPARATION PLANE
THRUST STRUCTURE
RETRO MOTORS (4)
REV C
MS-G-87-2-63
IND A1190

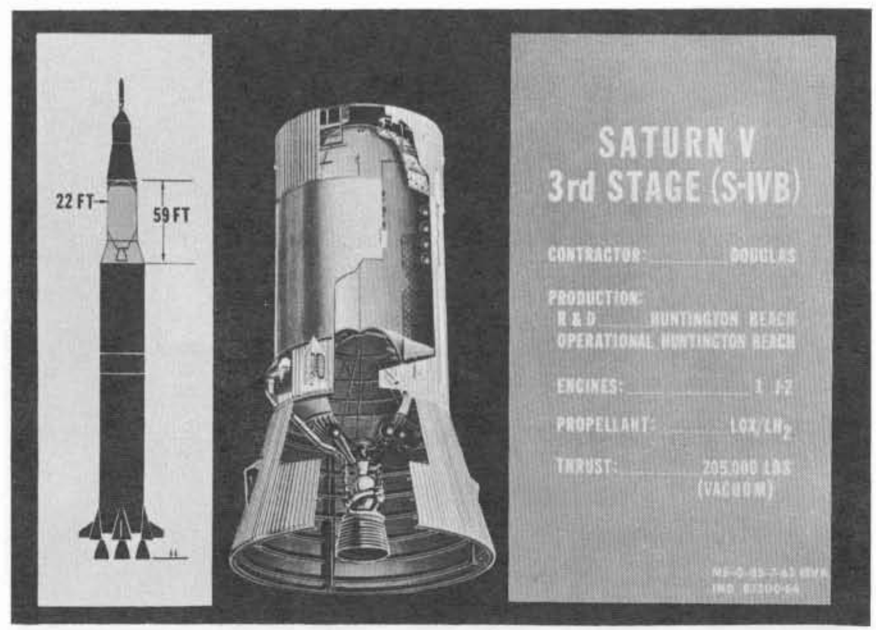
a


22FT
59FT
SATURN IB
2nd STAGE (S-IVB)
CONTRACTOR: DOUGLAS
PRODUCTION:
R & D
OPERATIONAL
HUNTINGTON BEACH
ENGINE: 1 J-2
PROPELLANT: LOX/LH2
THRUST: 200,000 LBS (VACUUM)

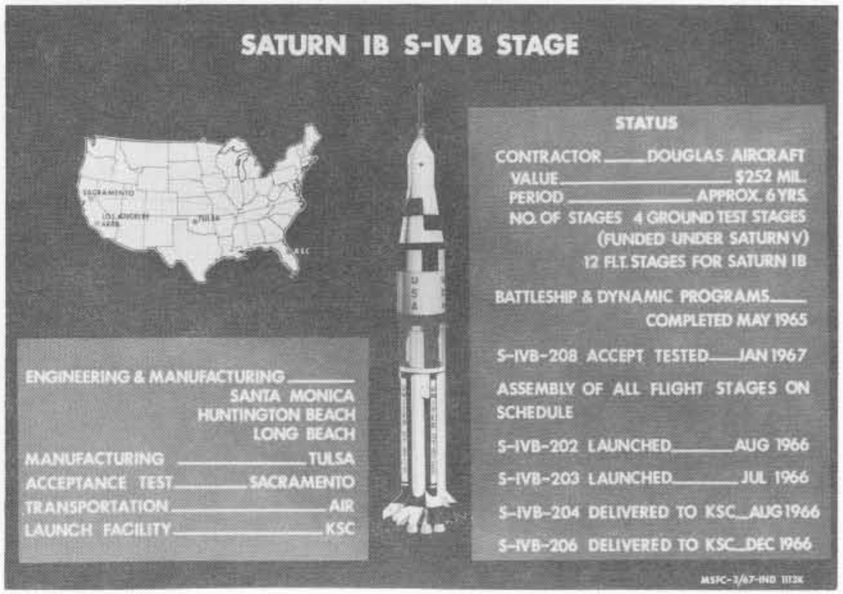
b

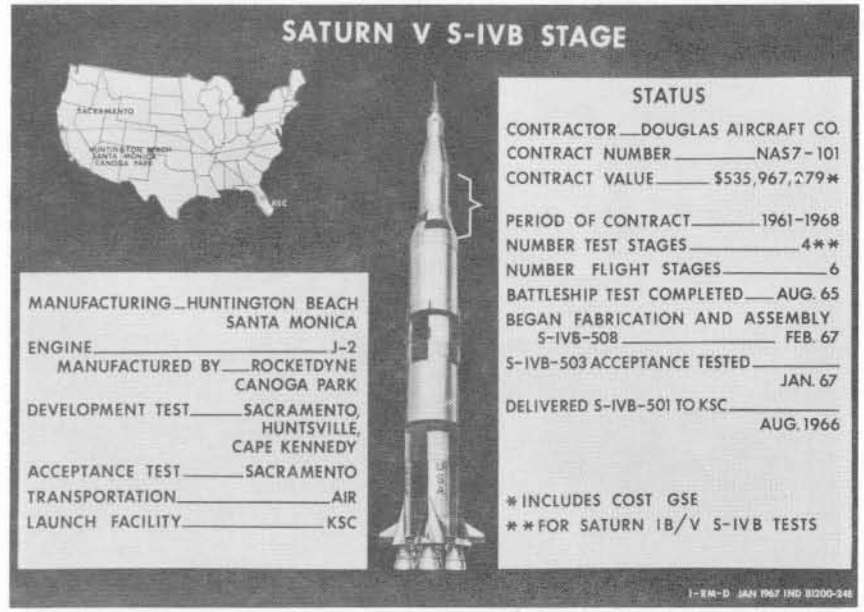

SATURN V
THIRD STAGE (S-IV B)
LIQUID HYDROGEN TANK
3D INSULATION
LH2 VENT
AUXILIARY PROPULSION SYSTEM MODULE
AFT SKIRT
FORWARD SKIRT
HELIUM SPHERES
AFT INTERSTAGE
FUEL LEVEL SENSORS
CABLE TUNNEL
J-2 ENGINE
COLD HELIUM SPHERES
COMMON BULKHEAD
LIQUID OXYGEN TANK
RETRO MOTORS (4)
ULLAGE MOTORS(2)
SEPARATION PLANE
THRUST STRUCTURE
SATURN V
MSFC 67 IND 1200-65A

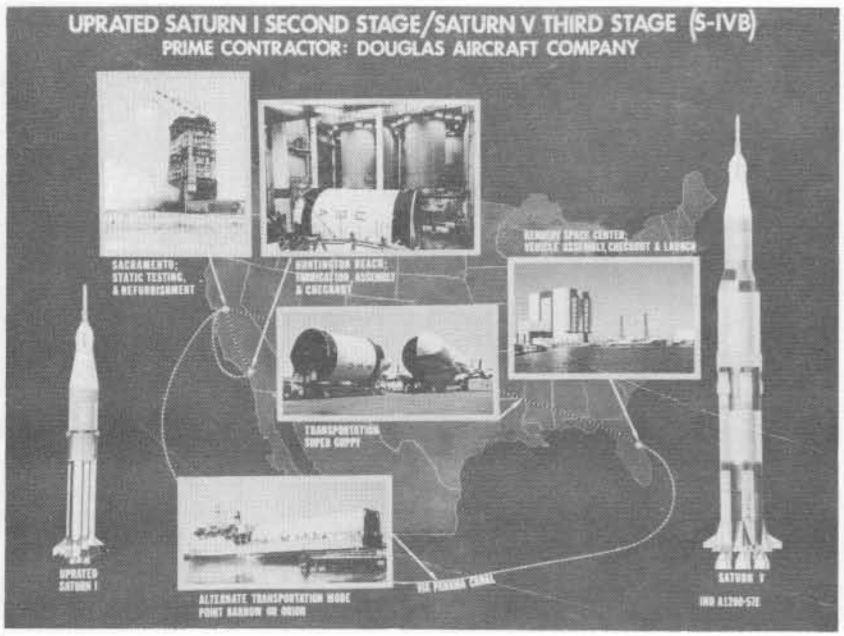
c


22 FT
59 FT
SATURN V
3rd STAGE (S-IVB)
CONTRACTOR: DOUGLAS
PRODUCTION:
R & D HUNTINGTON BEACH
OPERATIONAL HUNTINGTON BEACH
ENGINES: 1 J-2
PROPELLANT: LOX/LH2
THRUST: 205,000 LBS (VACUUM)

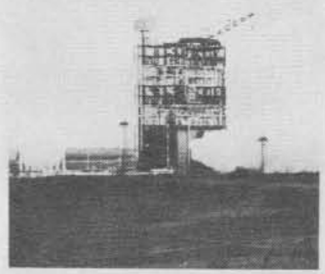
d







S-IVB BATTLESHIP TEST PROGRAM

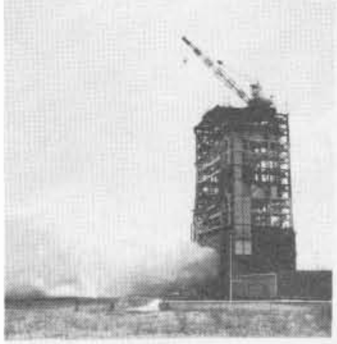


ENGINE	DATE	DURATION PLANNED	DURATION ACTUAL	RESULTS
#2003	NOV 7, 1964	10 SEC	2.5 SEC	CUTOFF DUE TO GAS GENERATOR OVER-TEMPERATURE INDICATION
	DEC 1, 1964	10 SEC	10.67 SEC	SUCCESSFUL
	DEC 9, 1964	50 SEC	30.7 SEC	SUCCESSFUL
	DEC 15, 1964	150 SEC	150.4 SEC	SUCCESSFUL
	DEC 23, 1964	FULL DURA	414.6 SEC	CUTOFF PRIOR TO DEPLETION OF LOX. SUCCESSFUL
#2013	MAR 13, 1965	10 SEC	11.8 SEC	SUCCESSFUL
	MAR 19, 1965	FULL DURA	29.2 SEC	MANUALLY CUTOFF DUE TO INSTRUMENTATION FAILURE
	MAR 25, 1965	FULL DURATION	0	THREE ABORTED ATTEMPTS DUE TO VARIOUS FAILURES
	MAR 31, 1965	FULL DURA	470 SEC	SUCCESSFUL
	APR 7, 1965	FULL DURA	42 SEC	ERRONEOUS INDICATION OF MALFUNCTION
	APR 15, 1965	FULL DURA	506.75 SEC	SUCCESSFUL
	APR 27, 1965	FULL DURA	374 SEC	CUTOFF DUE TO HIGH HYDRAULIC RESERVOIR OIL TEMPERATURE
	MAY 4, 1965	FULL DURATION	493.5 SEC	SUCCESSFUL
#2020	JUN 19, 1965	RESTART	8.92 SEC	AUTOMATICALLY TERMINATED DUE TO SIGNAL DROPOUT
	JUN 26, 1965	RESTART	170.84 SEC	167 SEC FIRST BURN, SECOND BURN TERMINATED AFTER 3.84 BY AUTOMATIC MONITORING SYSTEM
	JUL 1, 1965	RESTART	5.45 SEC	TERMINATED AUTOMATICALLY BY FIRING CONTROL LOGIC
	JUL 1, 1965	RESTART	6.37 SEC	TERMINATED MANUALLY DUE TO FIRE IN THRUST CONE AREA
	JUL 1, 1965	RESTART	1.72 SEC	MANUALLY TERMINATED DUE TO VISUAL INDICATION OF FIRE IN THRUST STRUCTURE
	AUG 13, 1965	RESTART	16 SEC	MANUALLY TERMINATED DUE TO VISUAL INDICATION OF FIRE.
	AUG 17, 1965	RESTART	489 SEC	SUCCESSFUL, 120 SEC FIRST BURN, 319 SEC SECOND BURN
	AUG 20, 1965	RESTART	531 SEC	SUCCESSFUL, 171 SEC FIRST BURN, 360 SEC SECOND BURN

TOTAL ACCUMULATED FIRING TIME 3935.42 SECONDS

IND 81181

UPRATED SATURN I S-IVB ACCEPTANCE TEST PROGRAM

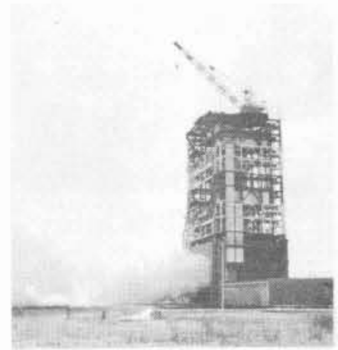


STAGE	DATE	DURATION PLANNED	DURATION ACTUAL	RESULTS
S-IVB-201	AUG 4,1965	FULL DURATION	6.7 SEC	CUTOFF DUE TO INSTRUMENTATION MALFUNCTION
S-IVB-201	AUG 4,1965	FULL DURATION	15.3 SEC	CUTOFF DUE TO AUTOMATIC LOGIC ERROR
S-IVB-201	AUG 8,1965	FULL DURATION	452 SEC	SUCCESSFUL
S-IVB-202	NOV 2,1965	FULL DURATION	2.9 SEC	CUTOFF DUE TO INSTRUMENTATION ERROR
S-IVB-202	NOV 9,1965	FULL DURATION	307SEC	CUTOFF DUE TO FAILURE OF PROPELLANT ULITIZATION SYSTEM
S-IVB-202	DEC 1,1965	FULL DURATION	10 SEC	CUTOFF ACCIDENTIALLY BY OBSERVER
S-IVB-202	DEC 1, 1965	FULL DURATION	463 SEC	SUCCESSFUL
S-IVB-203	FEB 22, 1966	FULL DURATION	142 SEC	CUTOFF DUE TO MINOR FIRE IN ENGINE AREA
S-IVB-203	FEB 26,1966	FULL DURATION	285 SEC	SUCCESSFUL-LOX WAS OFF LOADED FOR LH_2 EXPERIMENT
S-IVB-204	MAR 18, 1966	FULL DURATION	455 SEC	SUCCESSFUL
S-IVB-205	JUNE 2, 1966	FULL DURATION	440 SEC	SUCCESSFUL
S-IVB-206	AUG 19, 1966	FULL DURATION	433.7 SEC	SUCCESSFUL-DEFECTIVE LOX TURBINE FOUND AFTER FIRING
S-IVB-207	OCT 19, 1966	FULL DURATION	447 SEC	SUCCESSFUL
S-IVB-208	JAN 12, 1967	FULL DURATION	428 SEC	SUCCESSFUL

TOTAL ACCUMULATED FIRING TIME 3887.6 SEC

MSFC-67-IND 1182E

SATURN V S-IVB FLIGHT STAGE ACCEPTANCE TEST PROGRAM

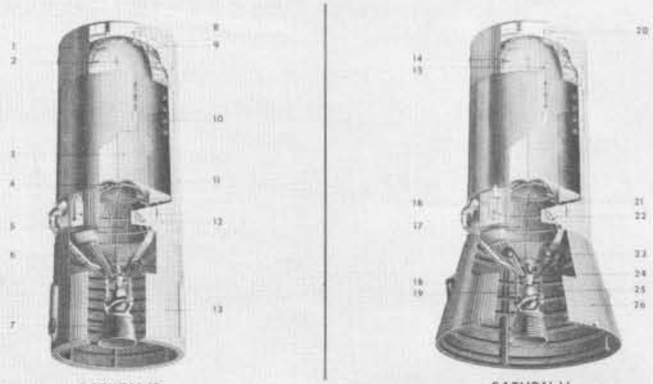


STAGE	DATE	DURATION PLANNED	DURATION ACTUAL	RESULTS
S-IVB-501	MAY 20,1966	FULL DURATION W/RESTART	47 SEC	AUTOMATIC CUTOFF WHEN ONE OF REDLINE VALUES WAS EXCEEDED
S-IVB-501	MAY 26, 1966	FULL DURATION W/RESTART	452 SEC	SUCCESSFUL
S-IVB-502	JULY 29,1966	FULL DURATION W/RESTART	450 SEC	SUCCESSFUL
S-IVB-503	MAY 5, 1967	FULL DURATION NO RESTART	442 SEC	SUCCESSFUL

TOTAL ACCUMULATED FIRING TIME 1391 SEC

MSFC-5/67-IND 1200-89A

S-IVB STAGE



SATURN IB

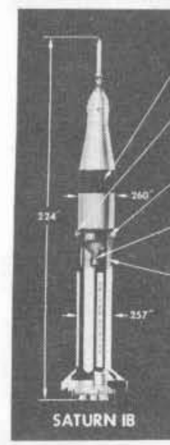
SATURN V

1. FORWARD SKIRT STRUCTURE
2. P.U. PROBE (HYDROGEN)
3. HYDROGEN TANK
4. ANTI-SLOSH BAFFLE
5. LOX TANK
6. THRUST STRUCTURE
7. J-2 ENGINE
8. ELECTRICAL MODULE PANEL
9. ANTENNA-RANGE SAFETY
10. COLD HELIUM SPHERES
11. TUNNEL
12. LOWER UMBILICAL PANEL
13. AFT INTERSTAGE
14. INSTRUMENTATION PROBE (HYDROGEN)
15. PRESSURIZATION LINE
16. APS MODULE
17. INSTRUMENTATION PROBE (LOX)
18. RETRO ROCKET
19. HYDROGEN FEED LINE
20. HYDROGEN VENT
21. P.U. PROBE (LOX)
22. ULLAGE ROCKET
23. AMBIENT HELIUM SPHERES
24. LOX FEED LINE
25. ENGINE RESTART SPHERE
26. AFT INTERSTAGE STRUCTURE

I-RM-D IND 81135

S-IVB DIFFERENCES

SATURN IB vs SATURN V



FORWARD SKIRT
SATURN IB 150 LBS LIGHTER - LIGHTER PAYLOAD

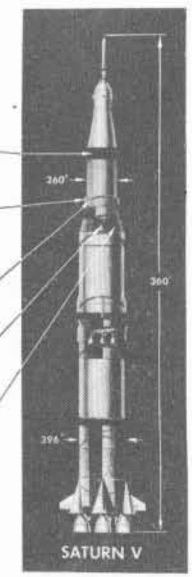
AUXILIARY PROPULSION AND ULLAGE SYSTEM
SATURN IB 40 LBS LIGHTER - ATTITUDE CONTROL AND VENTING REQUIREMENT LESS ON SATURN IB THAN ON SATURN V.

AFT SKIRT
SATURN IB 500 LBS LIGHTER - LIGHTER PAYLOAD

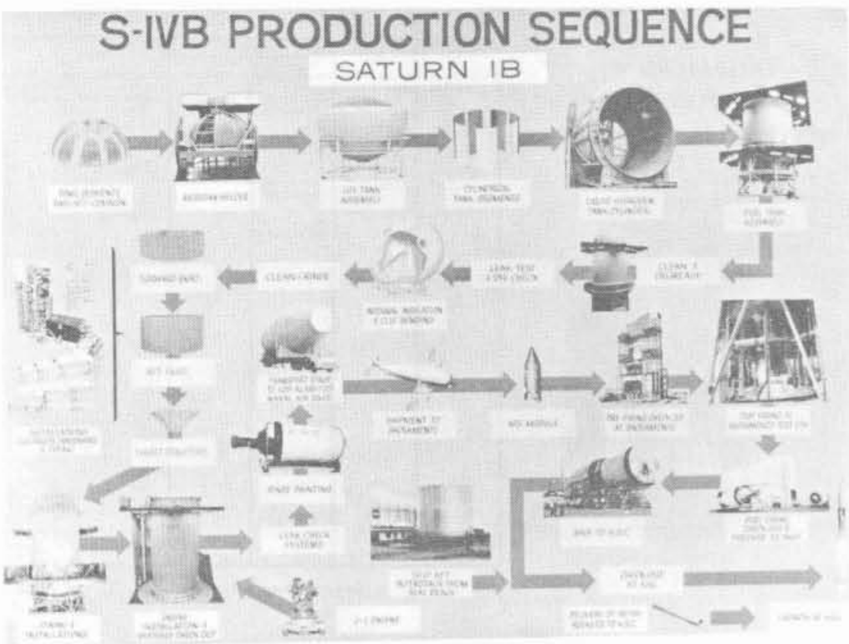
PROPULSION SYSTEM
SATURN IB 1500 LBS LIGHTER - LESS HELIUM STORAGE REQUIRED. ENGINE WILL NOT BE RESTARTED IN ORBIT.

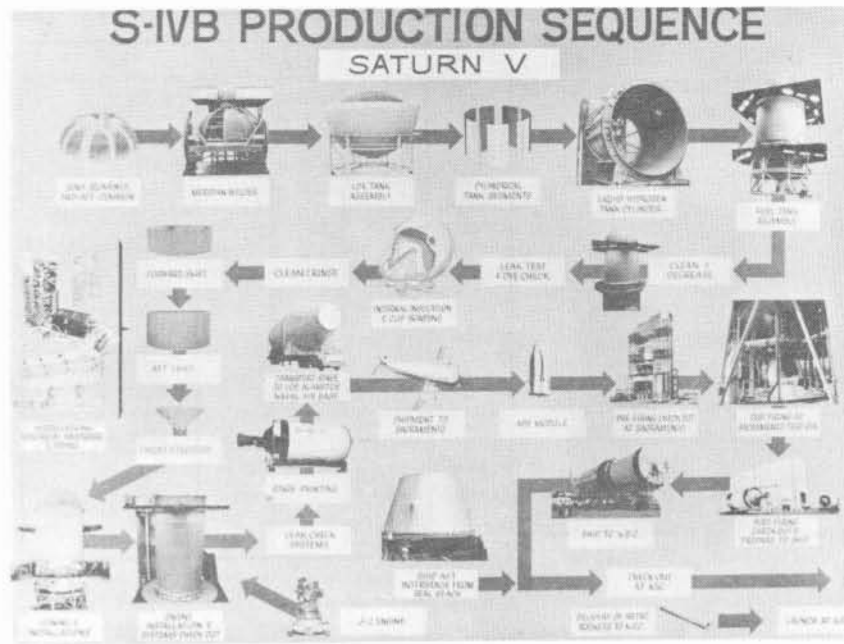
INTERSTAGE
SATURN IB 1300 LBS LIGHTER - 260 INCH DIAMETER. SATURN V FLARED FROM 260" DIA. TO 396" DIA.

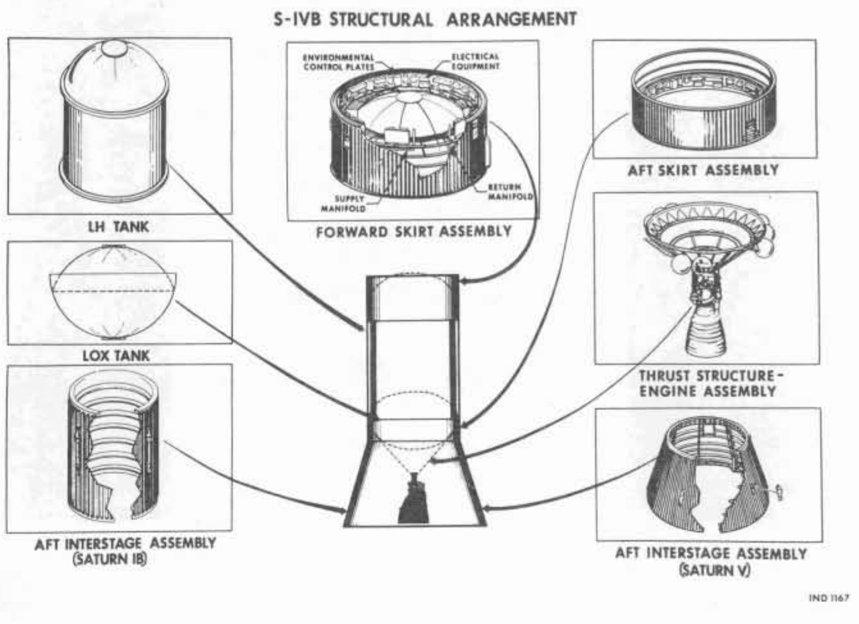
NOTE: WEIGHT DIFFERENCES BASED ON CURRENT ESTIMATES OF OPERATIONAL STAGES.

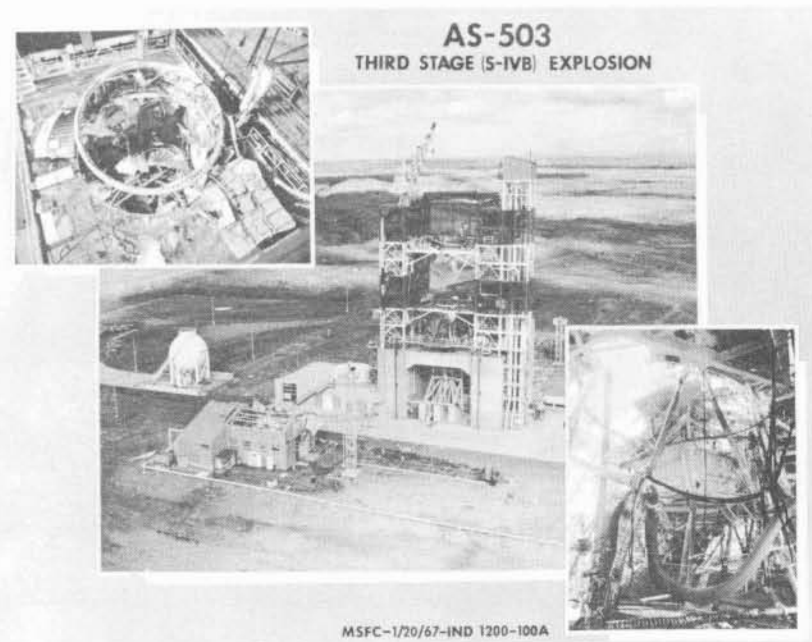


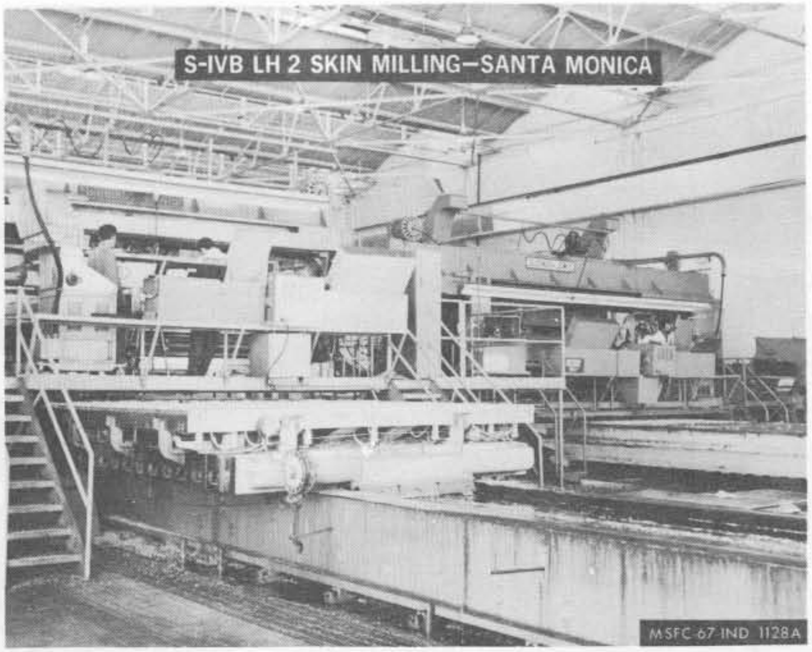
IND B1279H

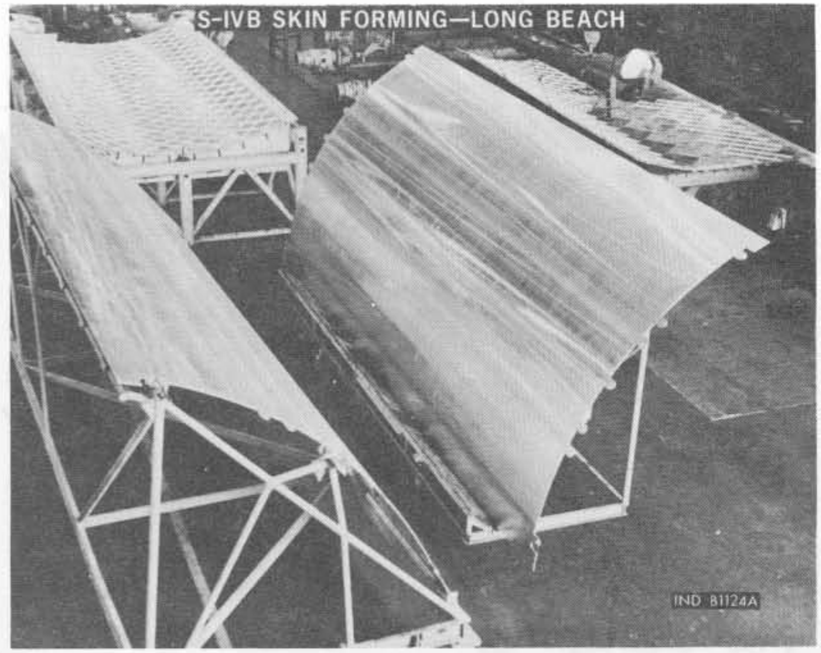

S-IVB PRODUCTION SEQUENCE
SATURN IB


S-IVB PRODUCTION SEQUENCE
SATURN V

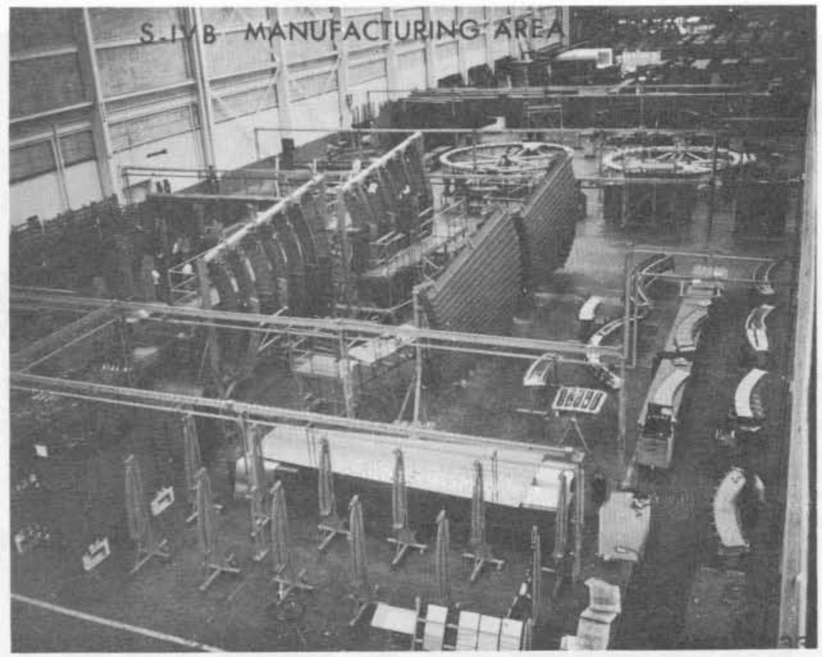

S-IVB STRUCTURAL ARRANGEMENT
ENVIRONMENTAL CONTROL PLATES
ELECTRICAL EQUIPMENT
SUPPLY MANIFOLD
RETURN MANIFOLD
FORWARD SKIRT ASSEMBLY
LH TANK
LOX TANK
AFT INTERSTAGE ASSEMBLY (SATURN IB)
AFT SKIRT ASSEMBLY
THRUST STRUCTURE-ENGINE ASSEMBLY
AFT INTERSTAGE ASSEMBLY (SATURN V)
IND 1167


AS-503
THIRD STAGE (S-IVB) EXPLOSION
MSFC-1/20/67-IND 1200-100A


S-IVB LH 2 SKIN MILLING—SANTA MONICA
MSFC-67-IND 1128A

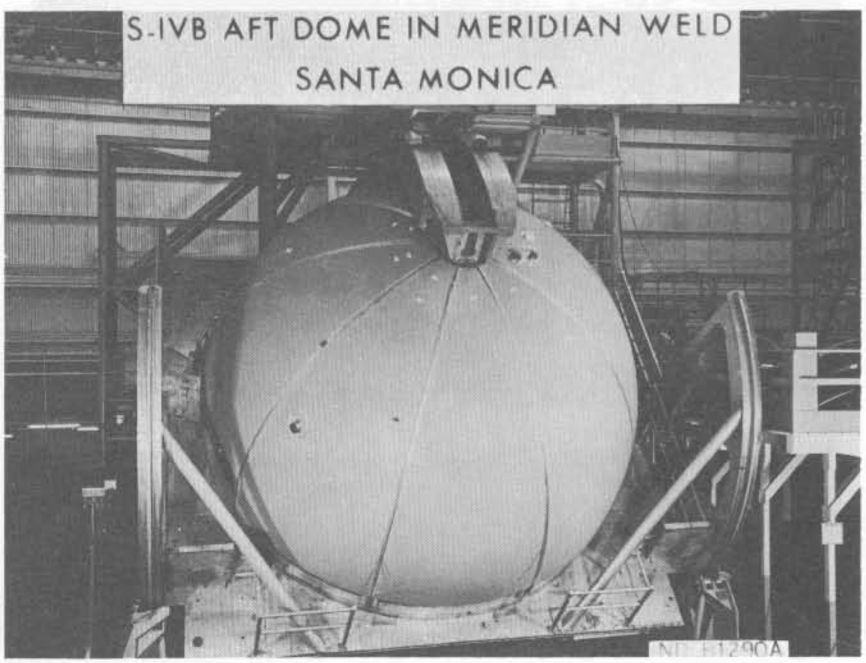

S-IVB SKIN FORMING—LONG BEACH
IND 81124A

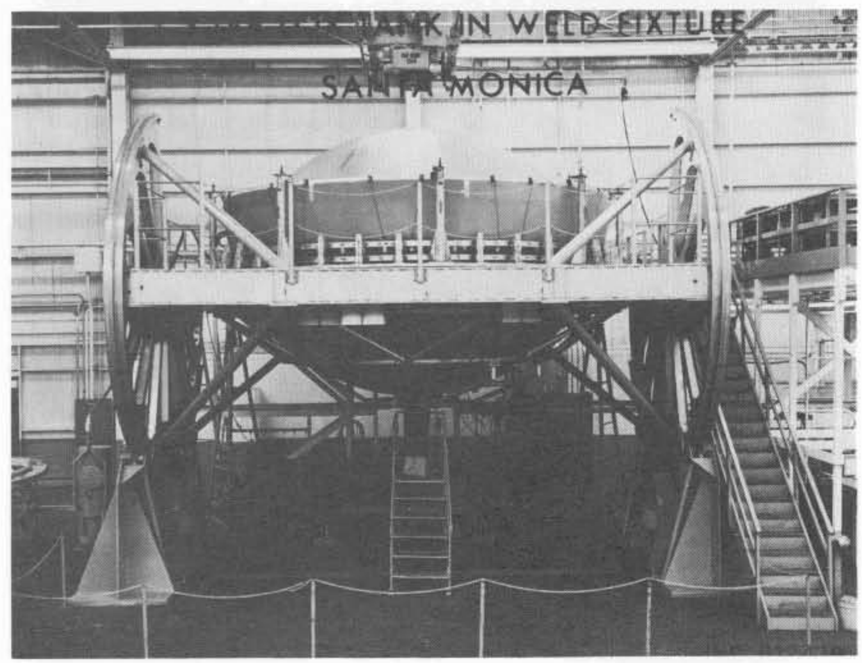

S-IVB BULKHEAD SKIN FORMING—SANTA MONICA
MSFC-67-IND 1267B


S-IVB MANUFACTURING AREA


S-IVB DOME SEGMENT FAB - SANTA MONICA

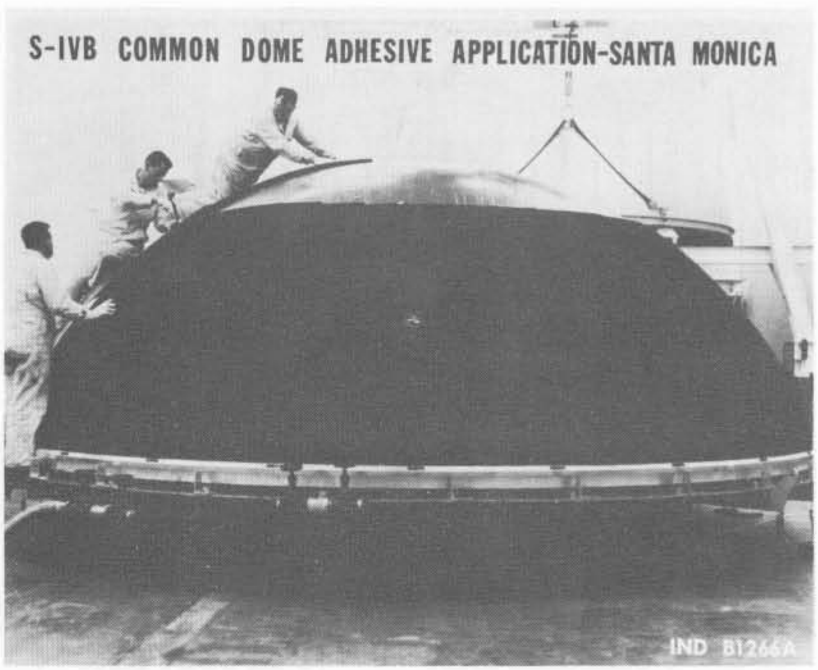

S-IVB AFT DOME SEGMENT AREA - SANTA MONICA
IND B1159A


S-IVB AFT DOME IN MERIDIAN WELD
SANTA MONICA

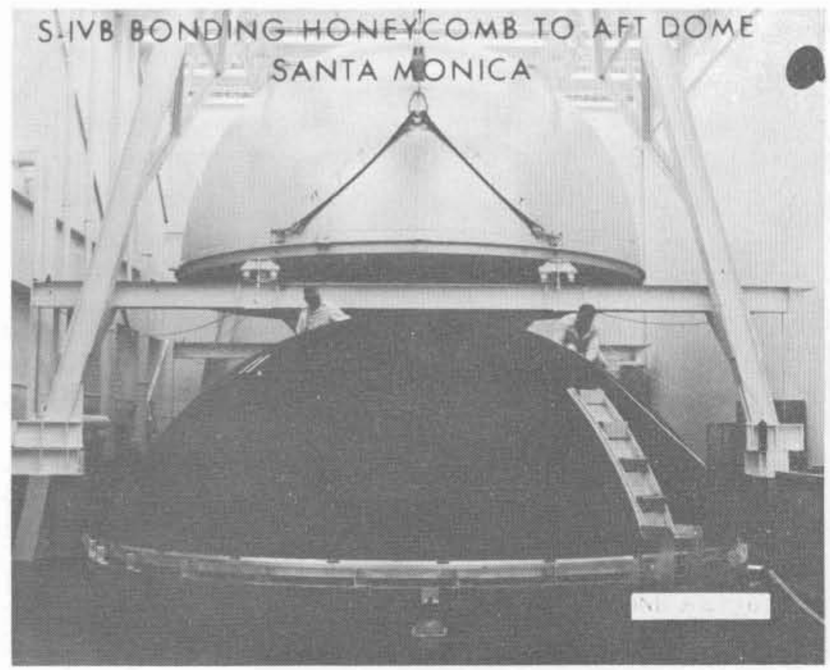

IN WELD FIXTURE
MONICA

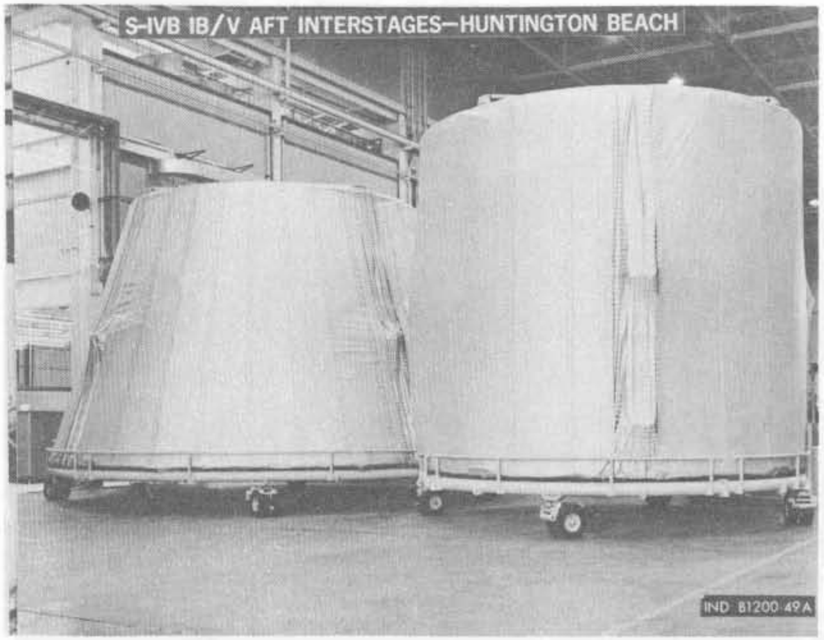
S-IVB LOX TANK—SANTA MONICA

S-IVB COMMON BULKHEAD AREA—SANTA MONICA



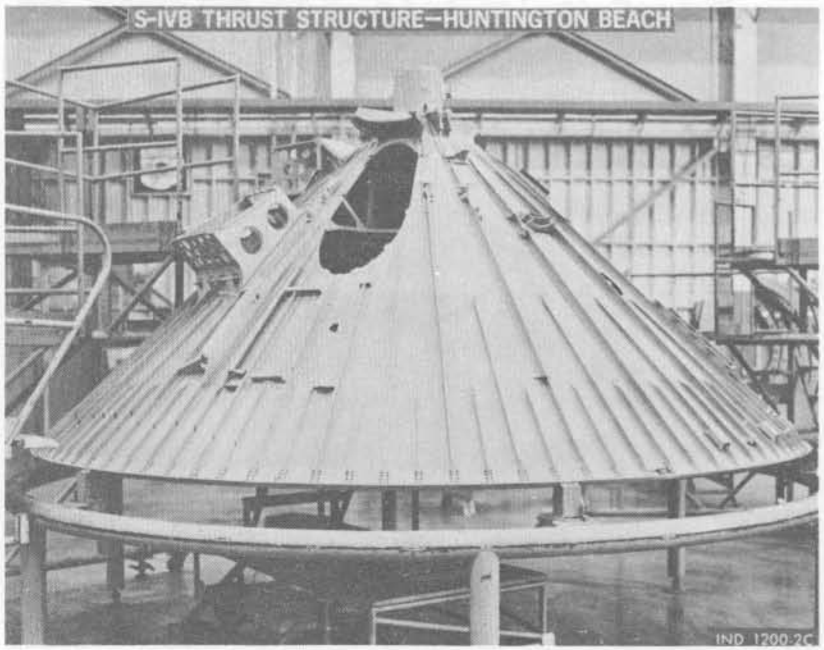
S-IVB COMMON DOME ADHESIVE APPLICATION-SANTA MONICA


S-IVB BONDING HONEYCOMB TO AFT DOME
SANTA MONICA

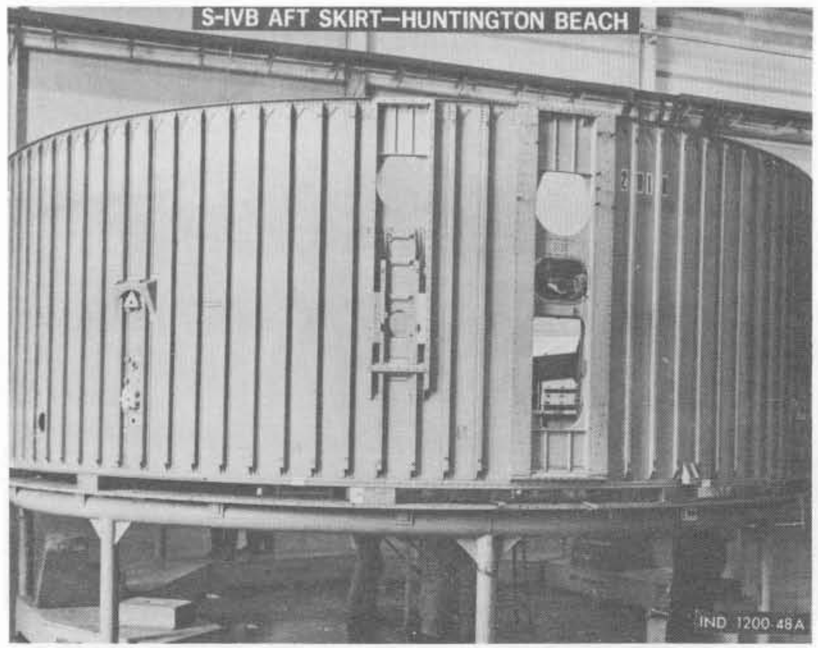


S-IVB IB/V AFT INTERSTAGES—HUNTINGTON BEACH

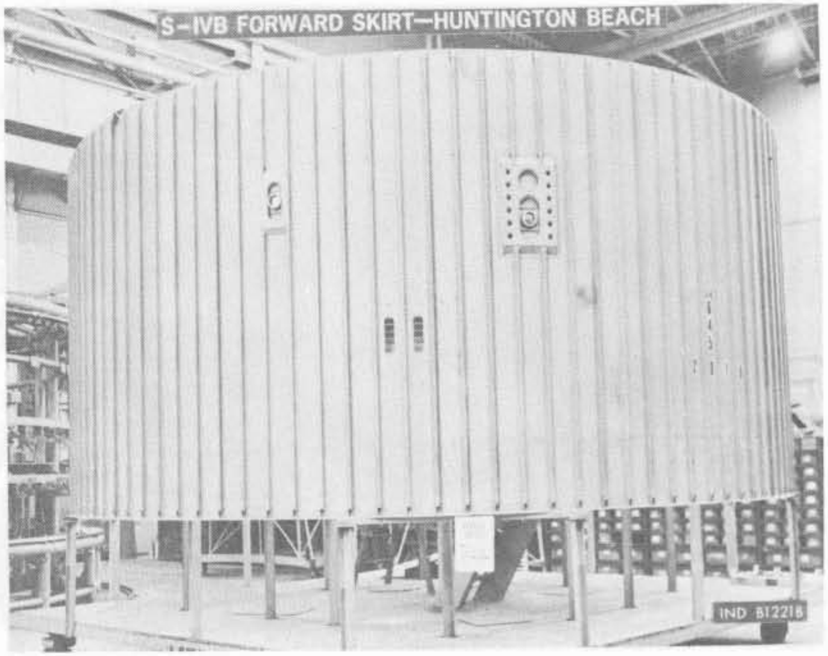
S-IVB SATURN V AFT INTERSTAGE—HUNTINGTON BEACH



S-IVB THRUST STRUCTURE—HUNTINGTON BEACH



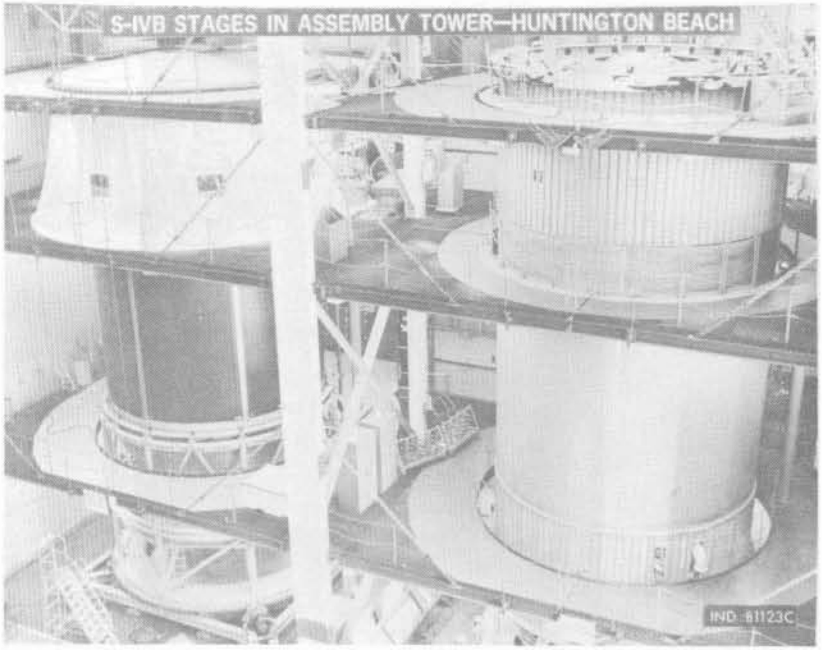
S-IVB AFT SKIRT—HUNTINGTON BEACH


S-IVB FORWARD SKIRT—HUNTINGTON BEACH
IND 81221B

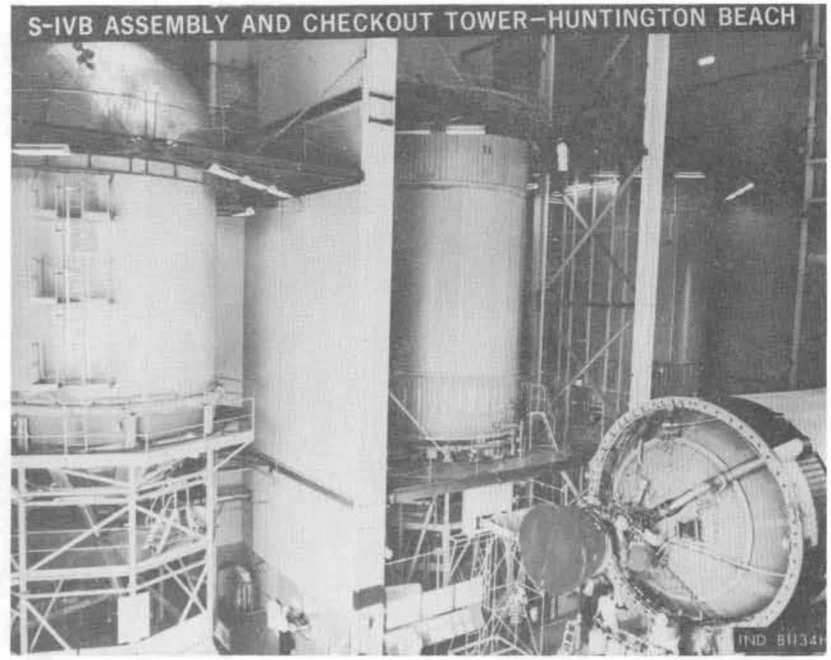

IND 81165


S-IVB FORWARD & AFT SKIRTS—HUNTINGTON BEACH
IND 81164D

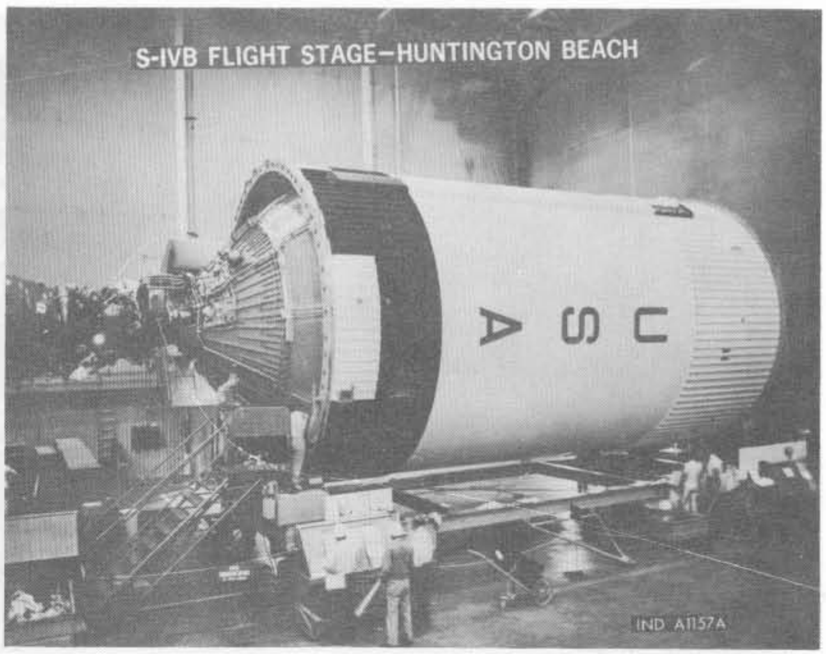

S-IVB PRODUCTION AREA—HUNTINGTON BEACH
IND 81226C



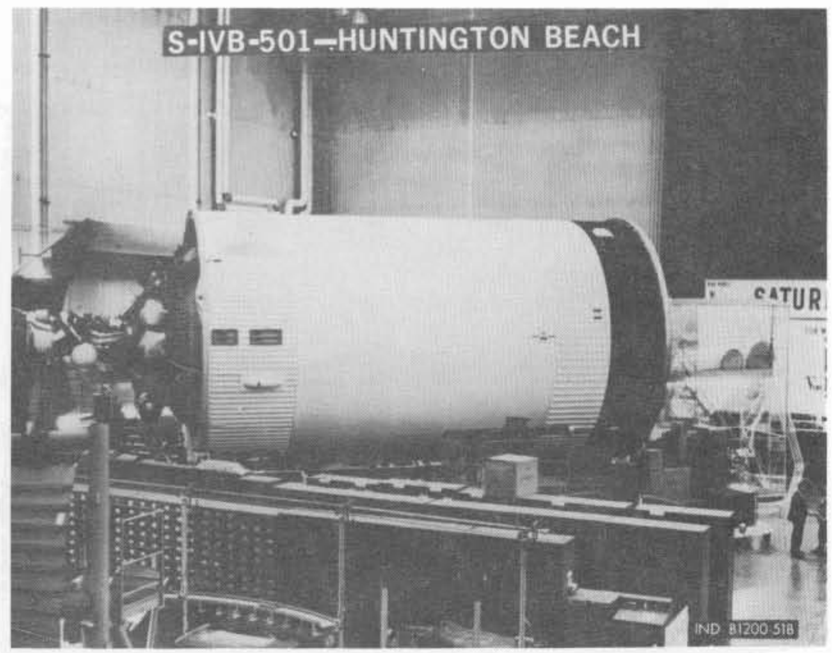
S-IVB STAGES IN ASSEMBLY TOWER—HUNTINGTON BEACH



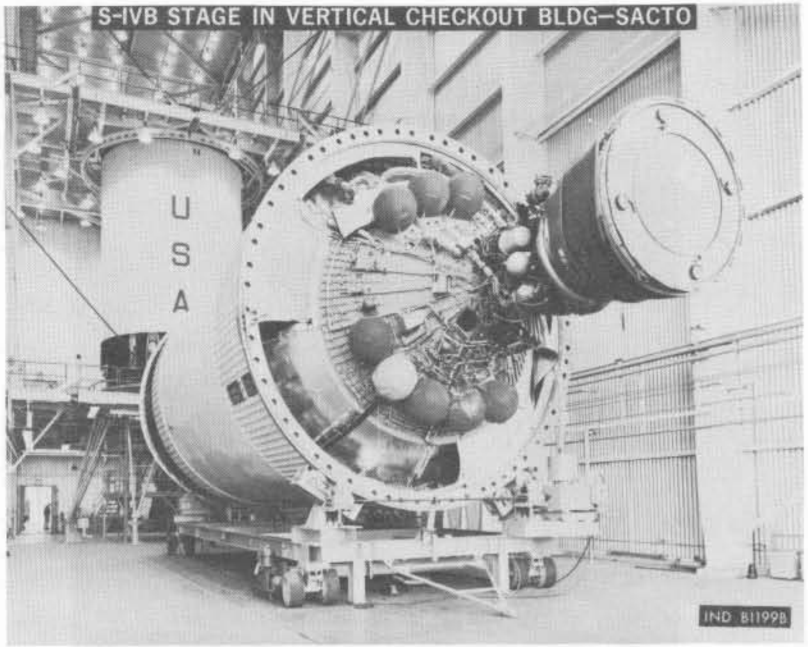
S-IVB ASSEMBLY AND CHECKOUT TOWER—HUNTINGTON BEACH



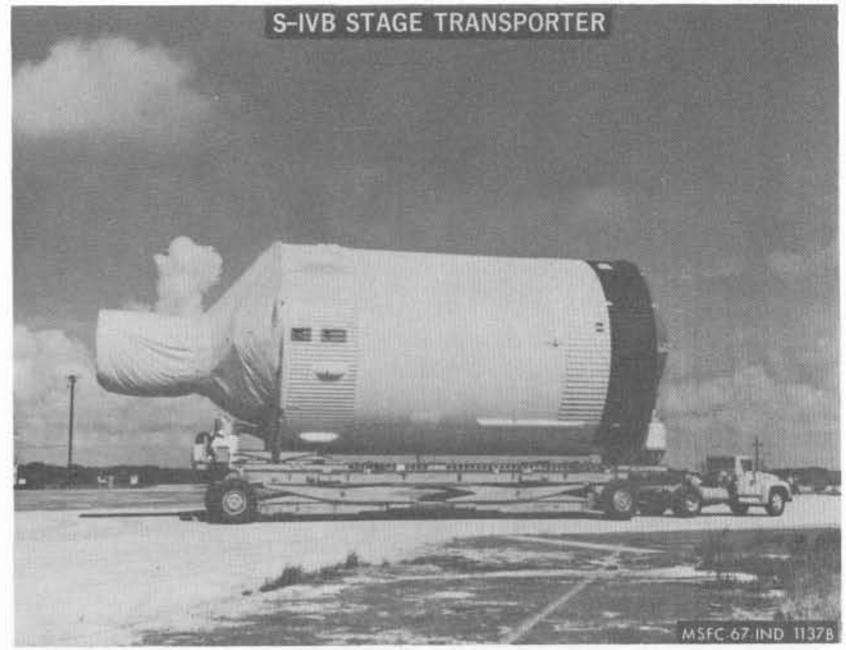
S-IVB FLIGHT STAGE—HUNTINGTON BEACH



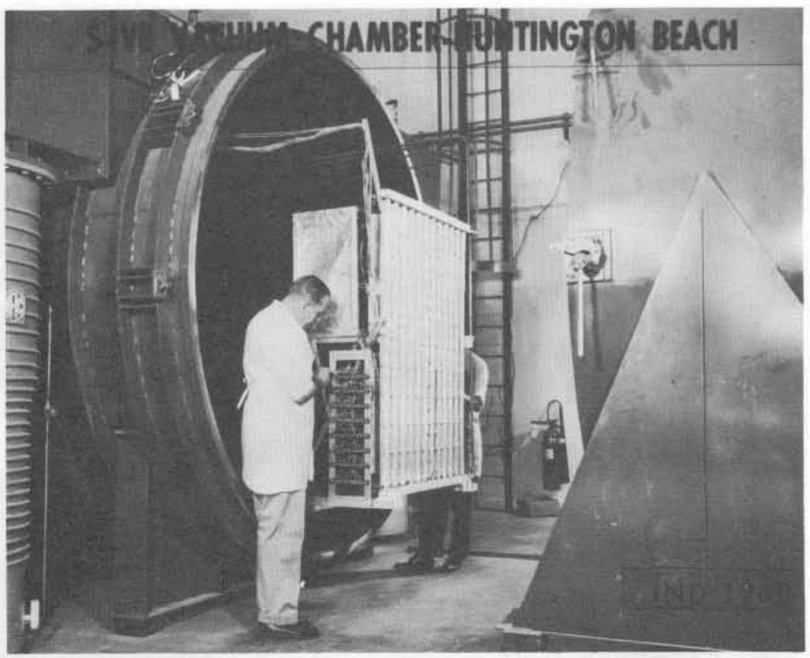
S-IVB-501—HUNTINGTON BEACH



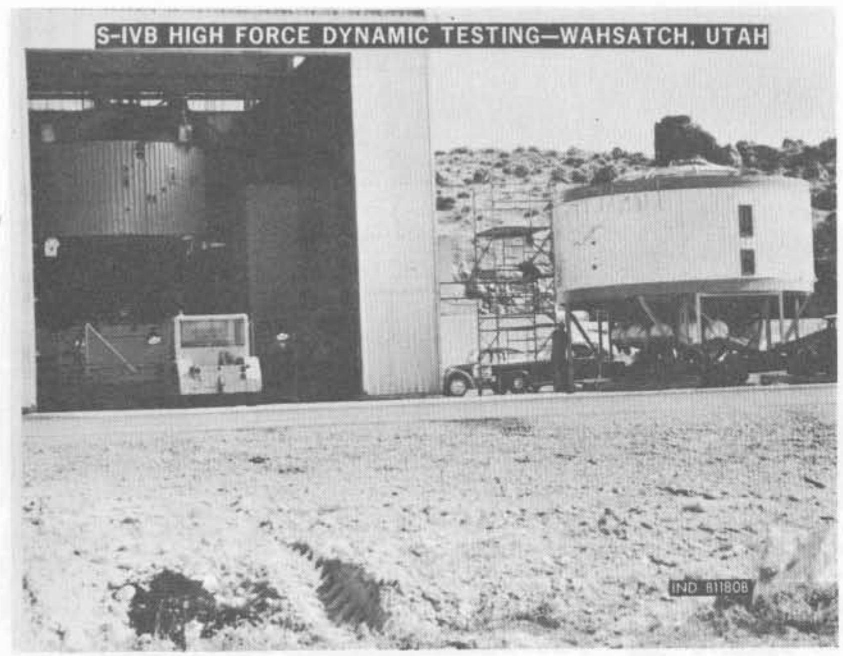
S-IVB STAGE IN VERTICAL CHECKOUT BLDG—SACTO



S-IVB STAGE TRANSPORTER



S-IVB VACUUM CHAMBER—HUNTINGTON BEACH

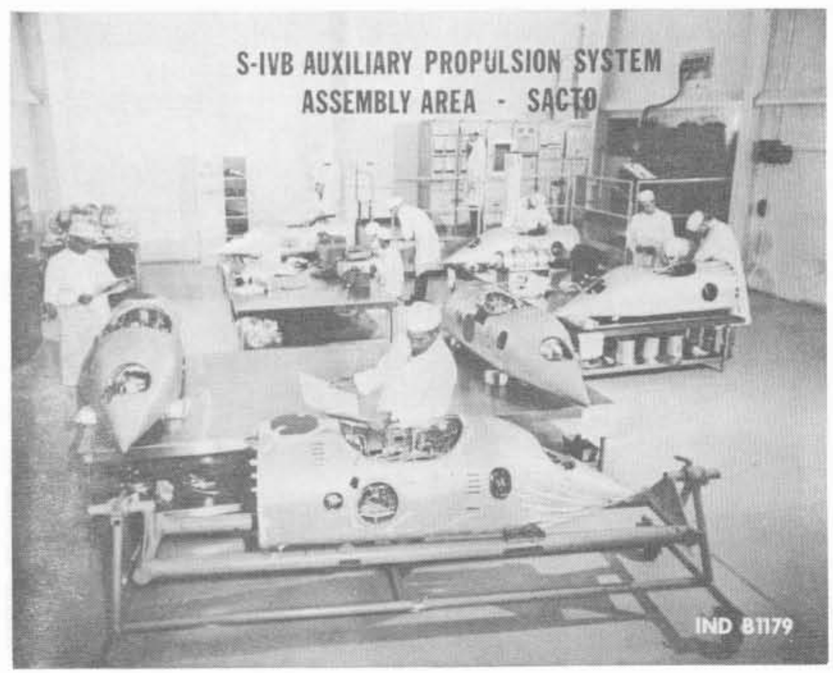


S-IVB HIGH FORCE DYNAMIC TESTING—WAHSATCH, UTAH

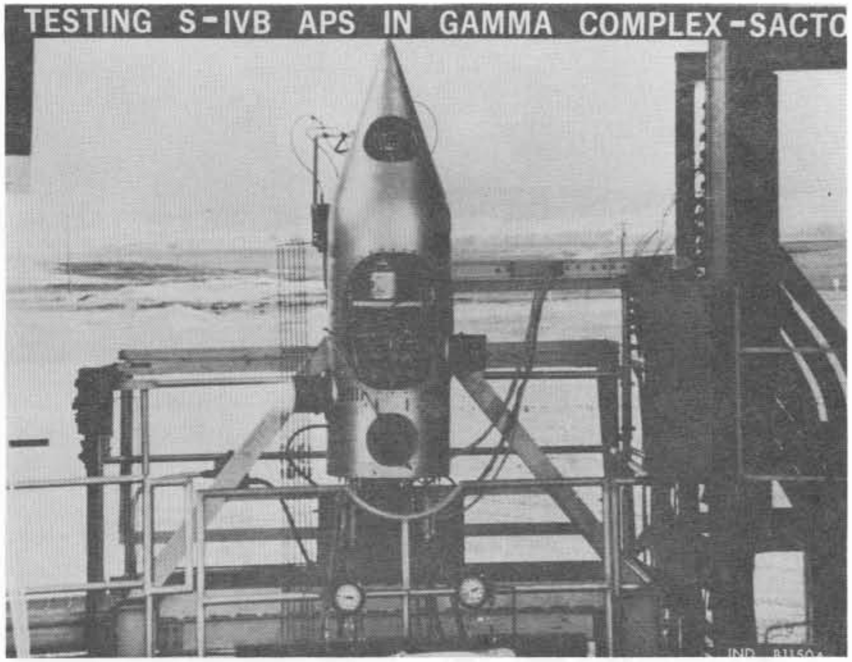
S-IVB DYNAMICS STAGE ERECTION - HUNTSVILLE

DELIVERY SPACECRAFT ADAPTER FOR DYNAMIC TESTING HUNTSVILLE

S-IVB VEHICLE CHECKOUT BUILDING—SACTO

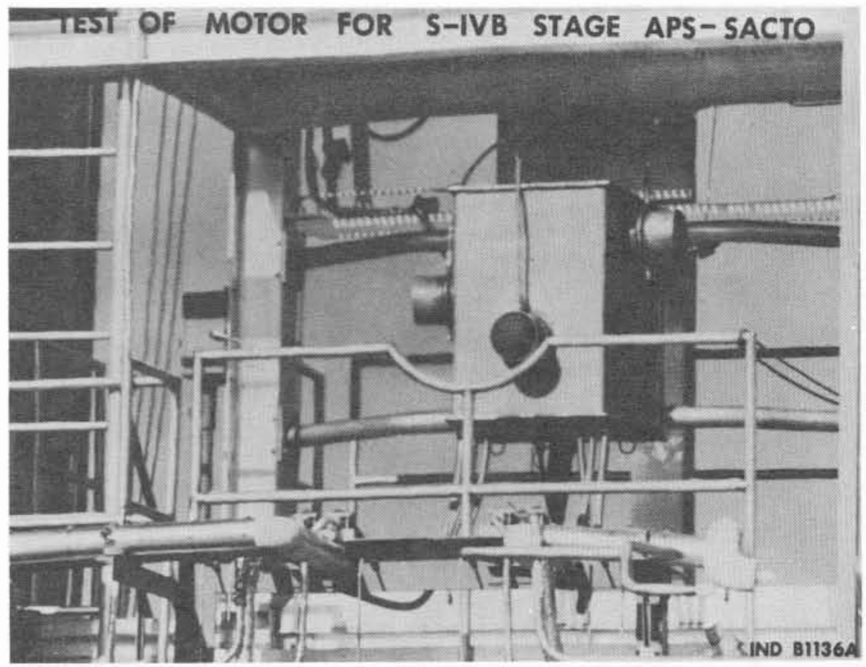


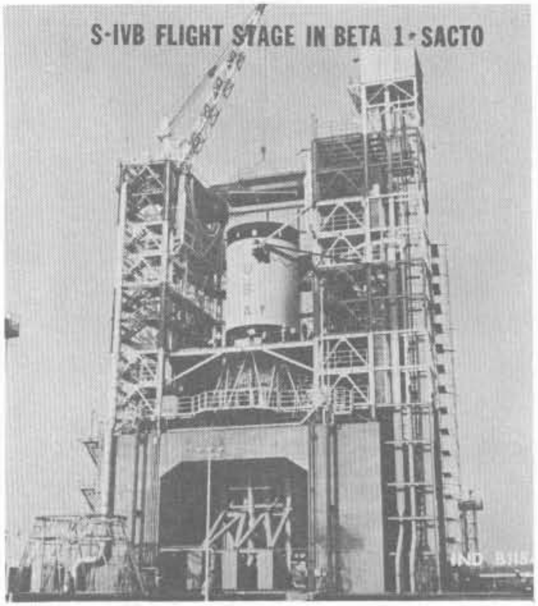
S-IVB AUXILIARY PROPULSION SYSTEM ASSEMBLY AREA - SACTO


TESTING S-IVB APS IN GAMMA COMPLEX-SACTO

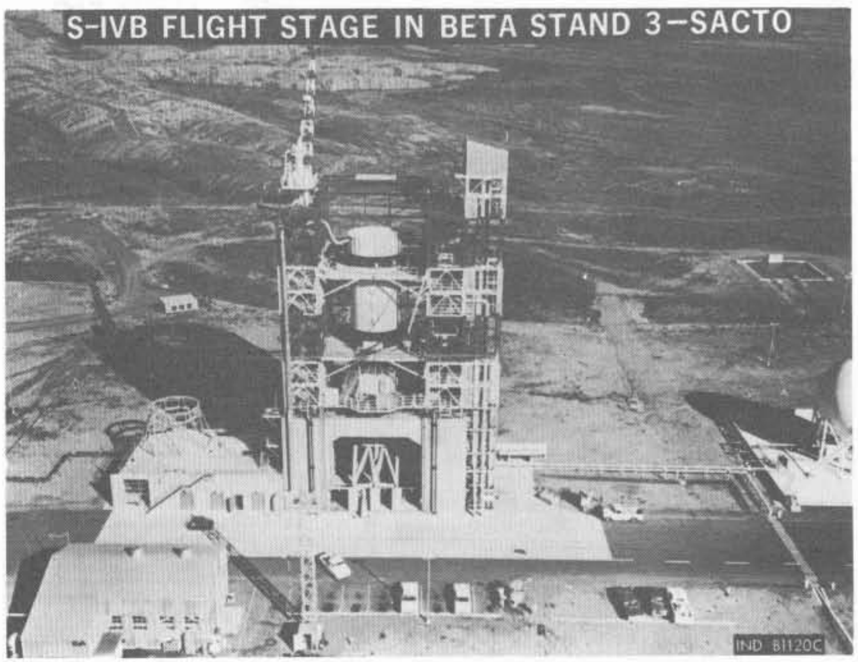

S-IVB RETROROCKET TESTING
TULSA
IND B1193


TEST CELLS GAMMA COMPLEX-SACTO
IND B1132A

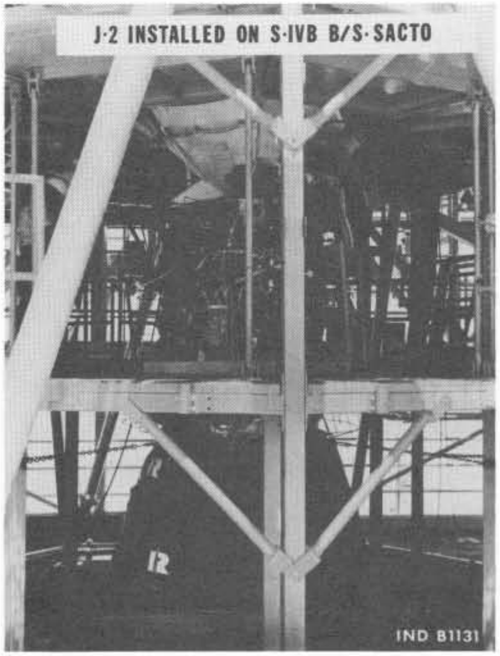

TEST OF MOTOR FOR S-IVB STAGE APS-SACTO
IND B1136A


S-IVB FLIGHT STAGE IN BETA 1-SACTO

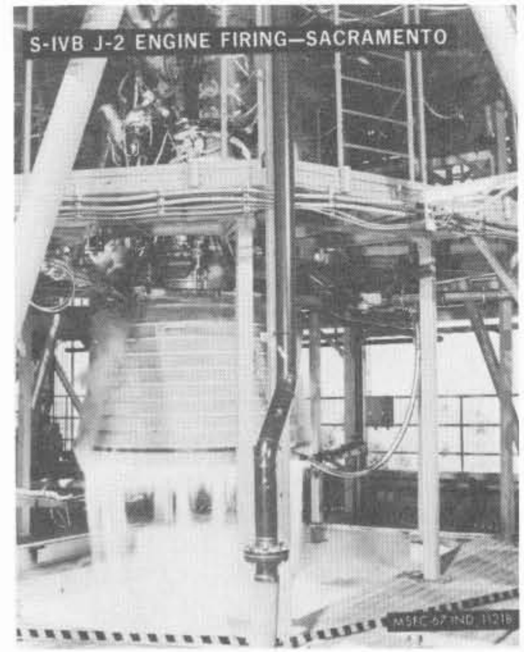

S-IVB STAGE IN BETA 1-SACRAMENTO
MSFC-67-IND 1119C


S-IVB FLIGHT STAGE IN BETA STAND 3-SACTO
IND B1120C

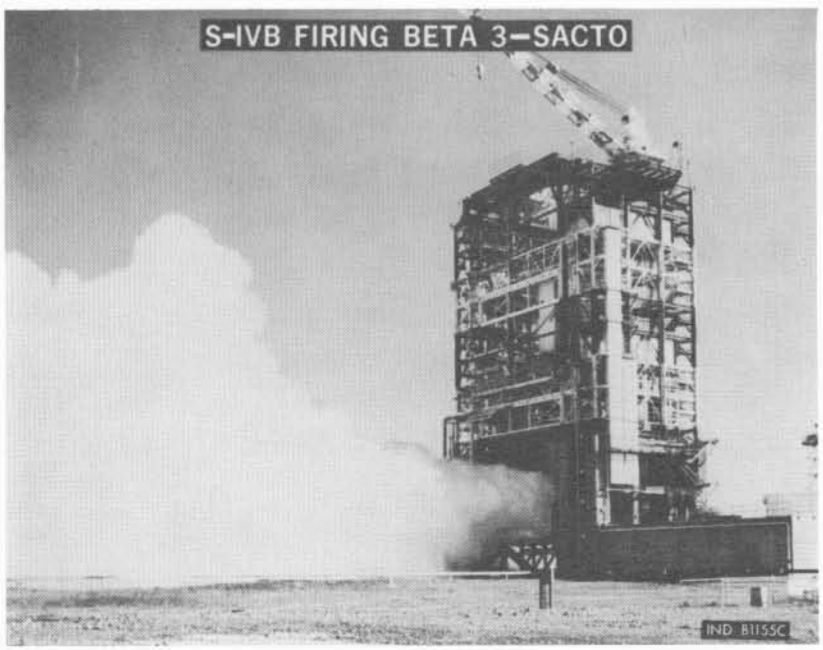

S-IVB STAGE ACCEPTANCE TEST-SACRAMENTO
MSFC-67-IND 1169A



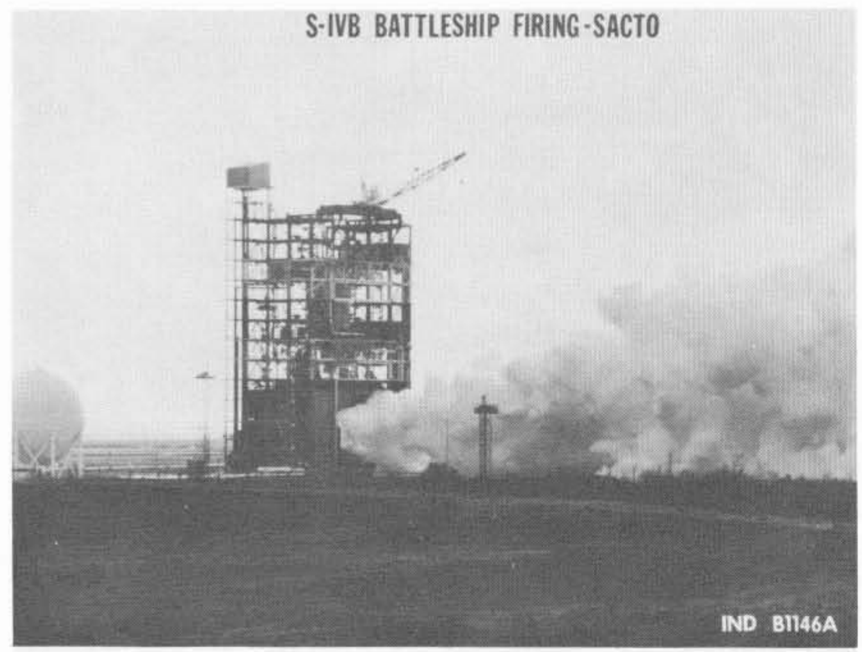
J-2 INSTALLED ON S-IVB B/S-SACTO



S-IVB J-2 ENGINE FIRING—SACRAMENTO



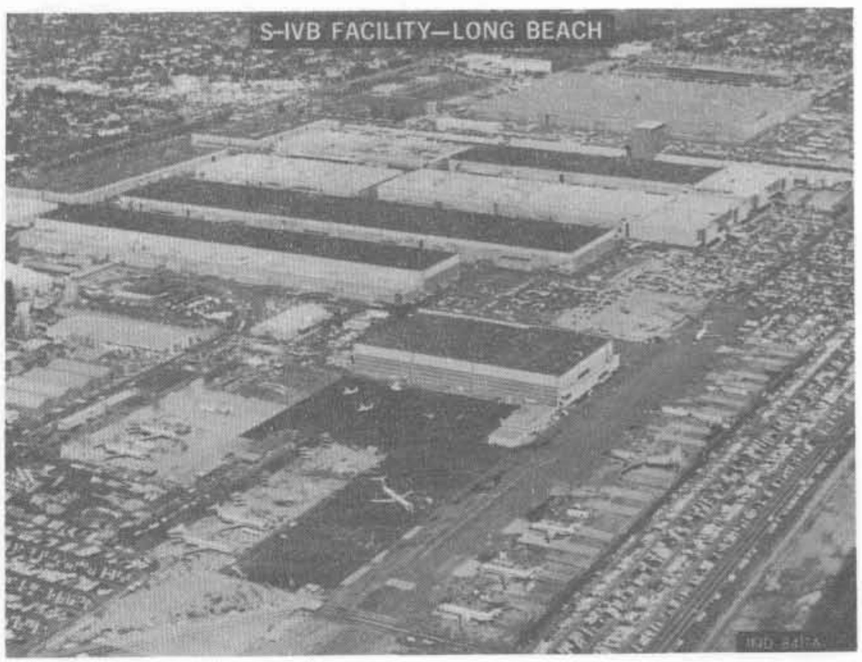
S-IVB FIRING BETA 3—SACTO

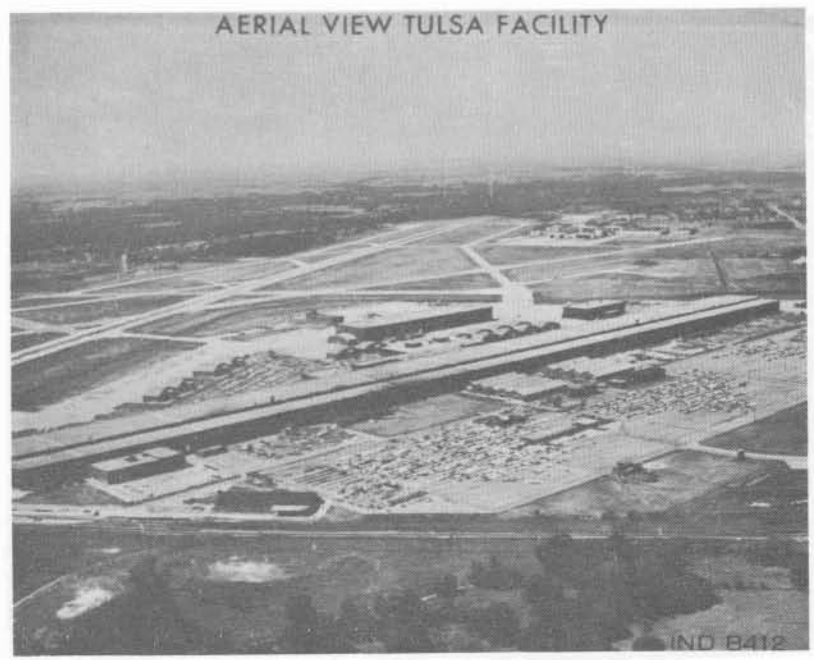


S-IVB BATTLESHIP FIRING-SACTO


S-IVB FACILITIES—HUNTINGTON BEACH
MSFC-67 IND 4318


S-IVB FACILITIES—SANTA MONICA
MSFC-67 IND 4108


S-IVB FACILITY—LONG BEACH

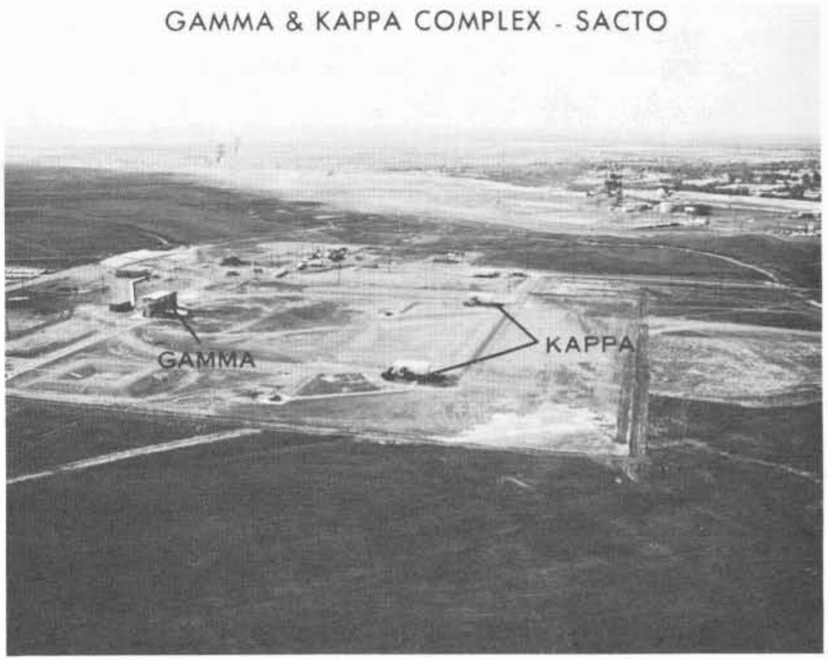

AERIAL VIEW TULSA FACILITY
IND B412


AEROPHYSICS LAB — EL SEGUNDO


S-IVB STAGE TESTING
SACRAMENTO
ALPHA COMPLEX
KAPPA COMPLEX
BETA COMPLEX
GAMMA COMPLEX
ADMINISTRATION AREA
IND 8432


S-IVB FACILITIES—SACTO
ALPHA COMPLEX
BETA COMPLEX
GAMMA COMPLEX
ADMINISTRATION & CHECKOUT AREA
IND A1298C


BETA COMPLEX AERIAL VIEW - SACTO
BETA 3
BLOCK HOUSE



GAMMA & KAPPA COMPLEX - SACTO

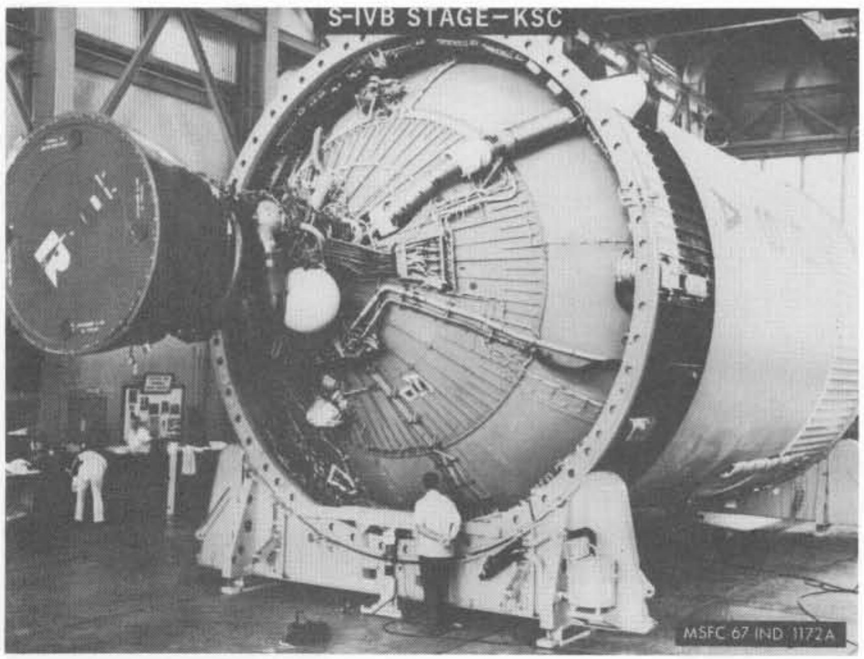

ALPHA STAND 2-SACTO

ADMINISTRATION BLDG - SACTO

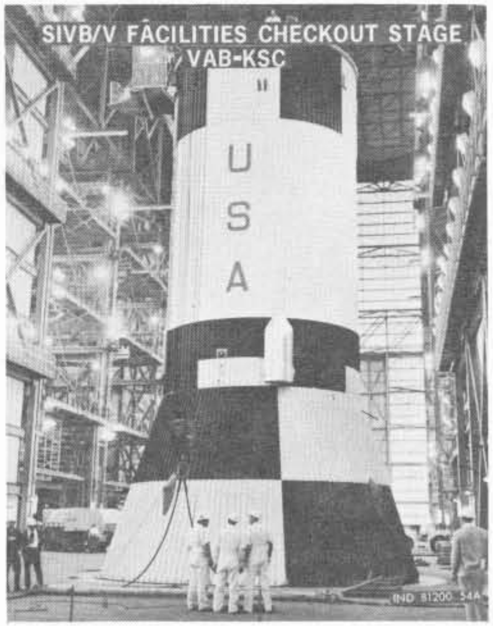
S-IVB VERTICAL CHECKOUT TOWER
HUNTINGTON BEACH


S-IVB ARRIVAL KSC BY SUPER GUPPY
U
S
A
IND 81176A


S-IVB FLIGHT STAGE ARRIVAL–KSC


S-IVB STAGE–KSC
MSFC 67 IND 1172A


S-IVB ERECTION–KSC
U
S
A


SIVB/V FACILITIES CHECKOUT STAGE
VAB-KSC
USA

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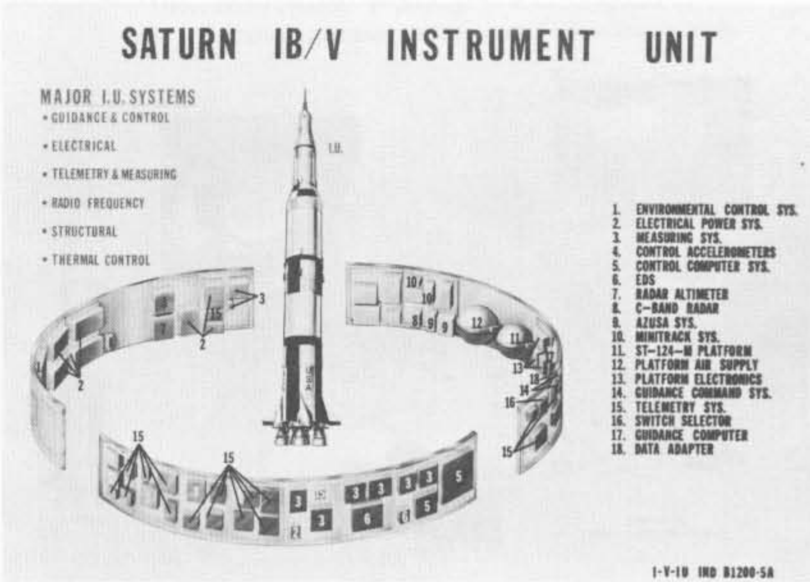
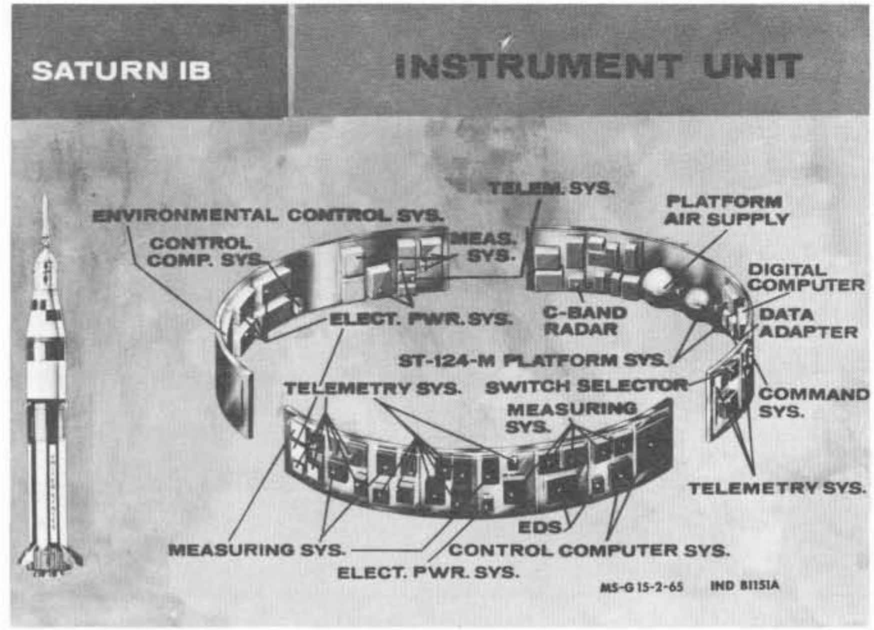
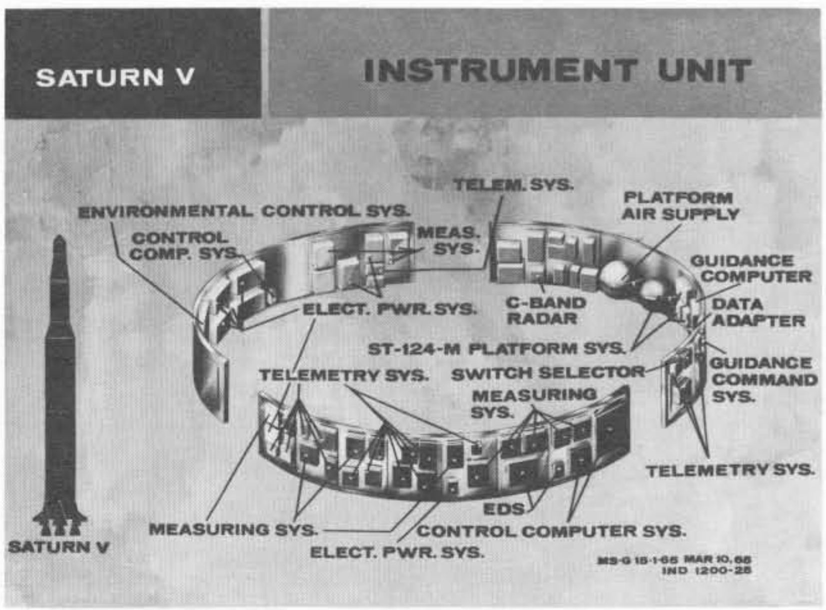


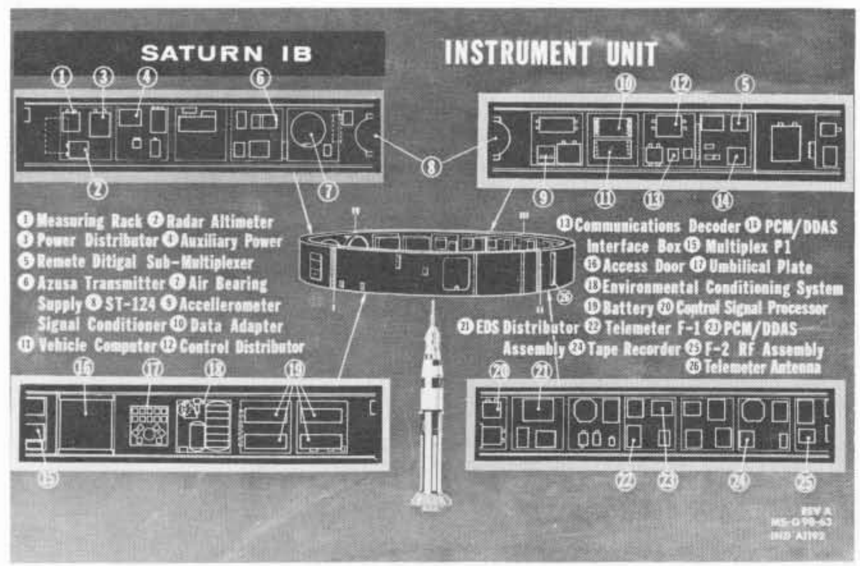
SATURN IB/V INSTRUMENT UNIT
MAJOR I.U. SYSTEMS
• GUIDANCE & CONTROL
• ELECTRICAL
• TELEMETRY & MEASURING
• RADIO FREQUENCY
• STRUCTURAL
• THERMAL CONTROL
I.U.
1. ENVIRONMENTAL CONTROL SYS.
2. ELECTRICAL POWER SYS.
3. MEASURING SYS.
4. CONTROL ACCELEROMETERS
5. CONTROL COMPUTER SYS.
6. EDS
7. RADAR ALTIMETER
8. C-BAND RADAR
9. AZUSA SYS.
10. MINITRACK SYS.
11. ST-124-M PLATFORM
12. PLATFORM AIR SUPPLY
13. PLATFORM ELECTRONICS
14. GUIDANCE COMMAND SYS.
15. TELEMETRY SYS.
16. SWITCH SELECTOR
17. GUIDANCE COMPUTER
18. DATA ADAPTER
I-V-IU IND B1200-5A



SATURN IB
INSTRUMENT UNIT
TELEM. SYS.
ENVIRONMENTAL CONTROL SYS.
PLATFORM AIR SUPPLY
CONTROL COMP. SYS.
MEAS. SYS.
DIGITAL COMPUTER
ELECT. PWR. SYS.
C-BAND RADAR
DATA ADAPTER
ST-124-M PLATFORM SYS.
TELEMETRY SYS.
SWITCH SELECTOR
MEASURING SYS.
COMMAND SYS.
TELEMETRY SYS.
EDS
MEASURING SYS.
CONTROL COMPUTER SYS.
ELECT. PWR. SYS.
MS-G 15-2-65 IND B1151A

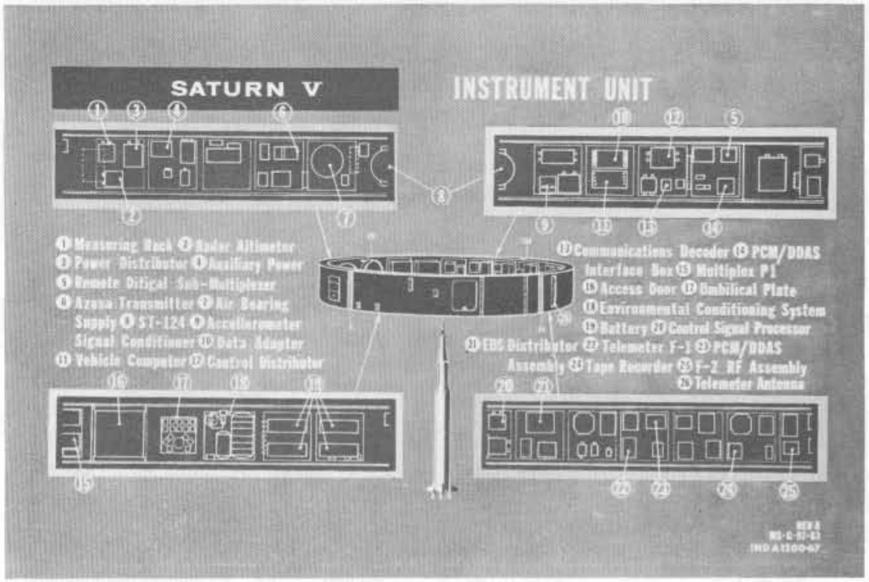


SATURN V
INSTRUMENT UNIT
TELEM. SYS.
ENVIRONMENTAL CONTROL SYS.
PLATFORM AIR SUPPLY
CONTROL COMP. SYS.
MEAS. SYS.
GUIDANCE COMPUTER
ELECT. PWR. SYS.
C-BAND RADAR
DATA ADAPTER
ST-124-M PLATFORM SYS.
GUIDANCE COMMAND SYS.
TELEMETRY SYS.
SWITCH SELECTOR
MEASURING SYS.
TELEMETRY SYS.
EDS
MEASURING SYS.
CONTROL COMPUTER SYS.
ELECT. PWR. SYS.
SATURN V
MS-G 15-1-65 MAR 10, 65 IND 1200-25

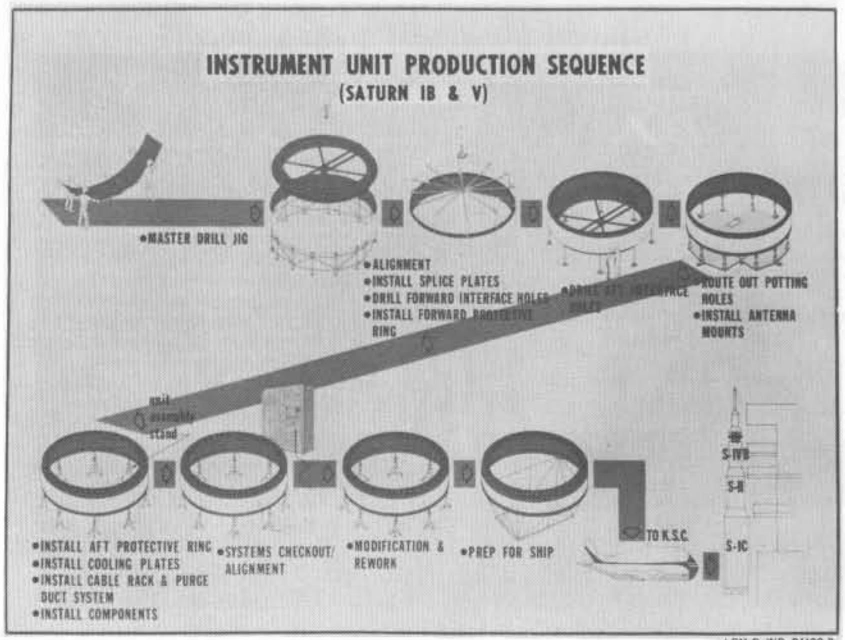


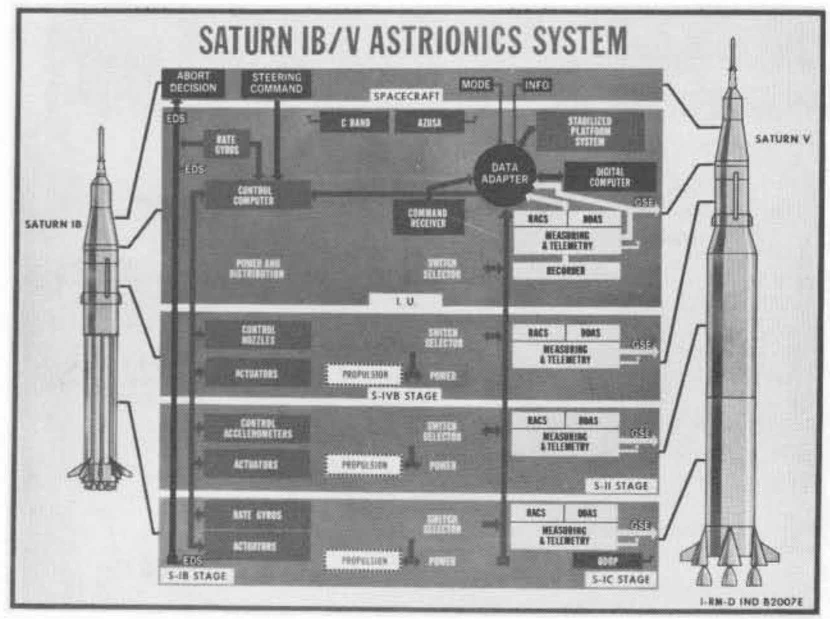
SATURN IB
INSTRUMENT UNIT
1 Measuring Rack 2 Radar Altimeter
3 Power Distributor 4 Auxiliary Power
5 Remote Ditigal Sub-Multiplexer
6 Azusa Transmitter 7 Air Bearing Supply 8 ST-124 9 Accellerometer Signal Conditioner 10 Data Adapter
11 Vehicle Computer 12 Control Distributor
13 Communications Decoder 14 PCM/DDAS Interface Box 15 Multiplex P1
16 Access Door 17 Umbilical Plate
18 Environmental Conditioning System
19 Battery 20 Control Signal Processor
21 EDS Distributor 22 Telemeter F-1 23 PCM/DDAS Assembly 24 Tape Recorder 25 F-2 RF Assembly
26 Telemeter Antenna

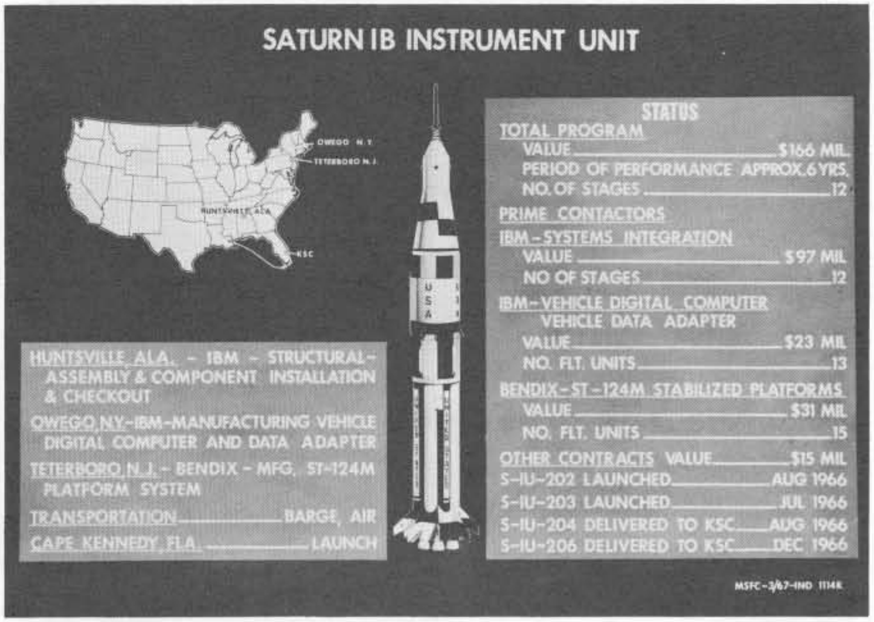
C


SATURN V
INSTRUMENT UNIT
1 Measuring Rack 2 Radar Altimeter
3 Power Distributor 4 Auxiliary Power
5 Remote Digital Sub-Multiplexer
6 Azusa Transmitter 7 Air Bearing Supply 8 ST-124 9 Accelerometer Signal Conditioner 10 Data Adapter
11 Vehicle Computer 12 Control Distributor
13 Communications Decoder 14 PCM/DDAS Interface Box 15 Multiplex P1
16 Access Door 17 Umbilical Plate
18 Environmental Conditioning System
19 Battery 20 Control Signal Processor
21 EDS Distributor 22 Telemeter F-1 23 PCM/DDAS Assembly 24 Tape Recorder 25 F-2 RF Assembly
26 Telemeter Antenna

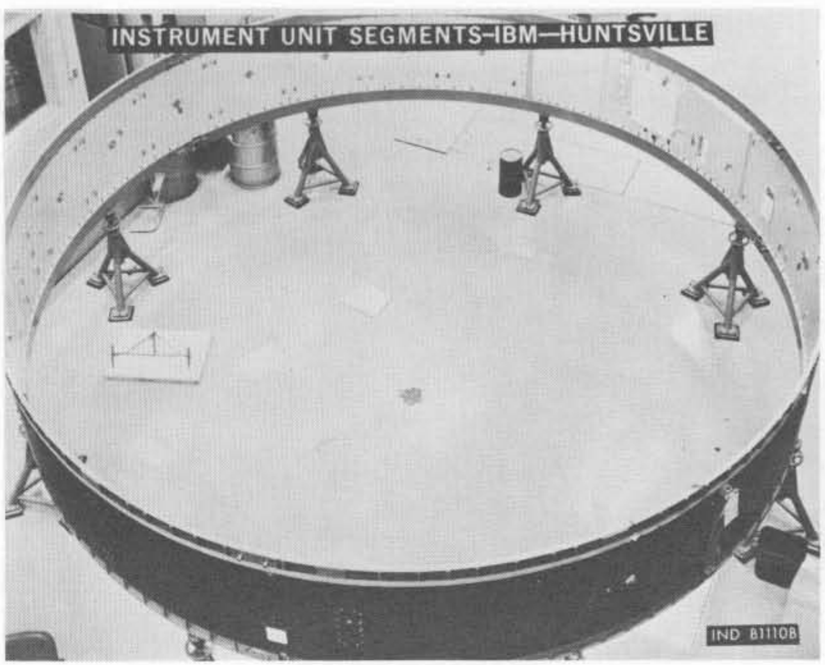

UPRATED SATURN I/SATURN V INSTRUMENT UNIT
PRIME CONTRACTOR: INTERNATIONAL BUSINESS MACHINES (IBM)
IBM - HUNTSVILLE MANUFACTURE, ASSEMBLY, CHECKOUT AND TEST
KENNEDY SPACE CENTER VEHICLE ASSEMBLY, CHECKOUT AND LAUNCH
UPRATED SATURN I
ALTERNATE TRANSPORTATION MODE
SUPER GUPPY
SATURN V

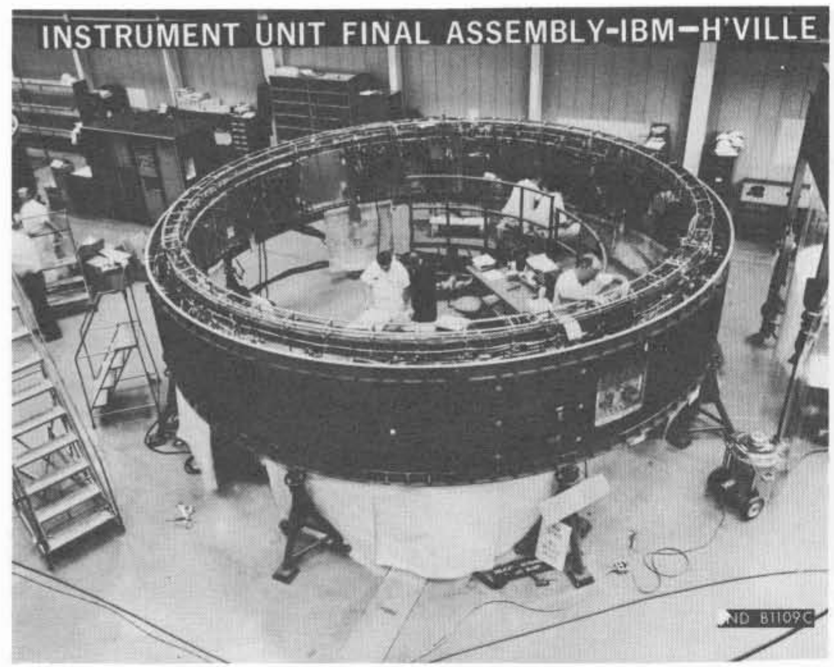

INSTRUMENT UNIT PRODUCTION SEQUENCE
(SATURN IB & V)
•MASTER DRILL JIG
•ALIGNMENT
•INSTALL SPLICE PLATES
•DRILL FORWARD INTERFACE HOLES
•INSTALL FORWARD PROTECTIVE RING
•ROUTE OUT POTTING HOLES
•INSTALL ANTENNA MOUNTS
•INSTALL AFT PROTECTIVE RING
•INSTALL COOLING PLATES
•INSTALL CABLE RACK & PURGE DUCT SYSTEM
•INSTALL COMPONENTS
•SYSTEMS CHECKOUT/ ALIGNMENT
•MODIFICATION & REWORK
•PREP FOR SHIP
TO K.S.C.
S-IVB
S-II
S-IC
I-RM-D IND 81100-B

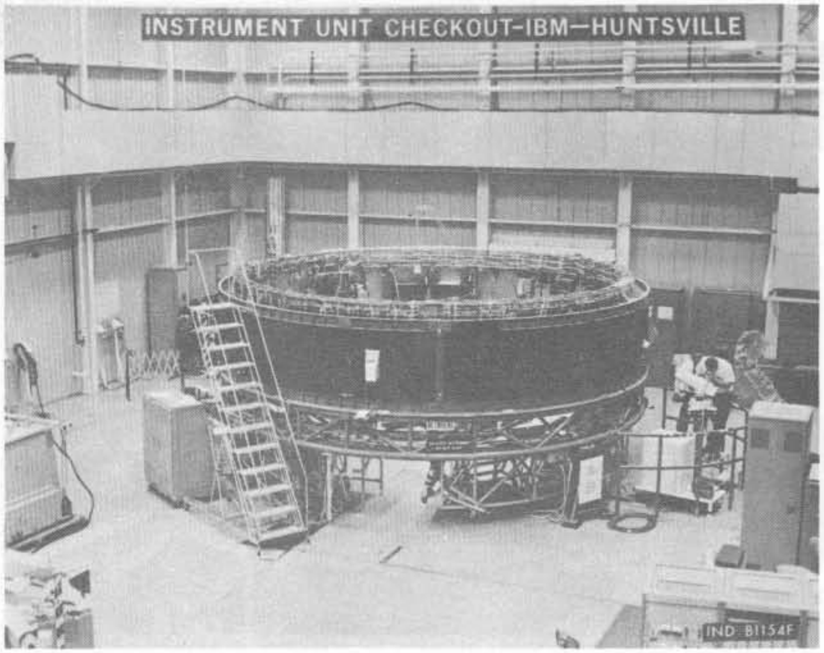

SATURN IB/V ASTRIONICS SYSTEM
ABORT DECISION
STEERING COMMAND
SPACECRAFT
MODE
INFO
EDS
C BAND
AZUSA
STABILIZED PLATFORM SYSTEM
DATA ADAPTER
DIGITAL COMPUTER
CONTROL COMPUTER
COMMAND RECEIVER
POWER AND DISTRIBUTION
SWITCH SELECTOR
MEASURING & TELEMETRY
RECORDER
GSE
I. U.
S-IVB STAGE
S-II STAGE
S-IB STAGE
S-IC STAGE
SATURN IB
SATURN V
I-RM-D IND 82007E


SATURN IB INSTRUMENT UNIT
OWEGO N.Y.
TETERBORO N.J.
KSC
HUNTSVILLE, ALA. - IBM - STRUCTURAL-ASSEMBLY & COMPONENT INSTALLATION & CHECKOUT
OWEGO, N.Y.-IBM-MANUFACTURING VEHICLE DIGITAL COMPUTER AND DATA ADAPTER
TETERBORO, N.J. - BENDIX - MFG. ST-124M PLATFORM SYSTEM
TRANSPORTATION ____ BARGE, AIR
CAPE KENNEDY, FLA. ____ LAUNCH
U S A
STATUS
TOTAL PROGRAM
VALUE ____ $166 MIL.
PERIOD OF PERFORMANCE APPROX. 6 YRS.
NO. OF STAGES ____ 12
PRIME CONTACTORS
IBM - SYSTEMS INTEGRATION
VALUE ____ $97 MIL
NO OF STAGES ____ 12
IBM - VEHICLE DIGITAL COMPUTER VEHICLE DATA ADAPTER
VALUE ____ $23 MIL
NO. FLT. UNITS ____ 13
BENDIX - ST-124M STABILIZED PLATFORMS
VALUE ____ $31 MIL
NO. FLT. UNITS ____ 15
OTHER CONTRACTS VALUE ____ $15 MIL
S-IU-202 LAUNCHED ____ AUG 1966
S-IU-203 LAUNCHED ____ JUL 1966
S-IU-204 DELIVERED TO KSC ____ AUG 1966
S-IU-206 DELIVERED TO KSC ____ DEC 1966
MSFC-3/67-IND 1114K

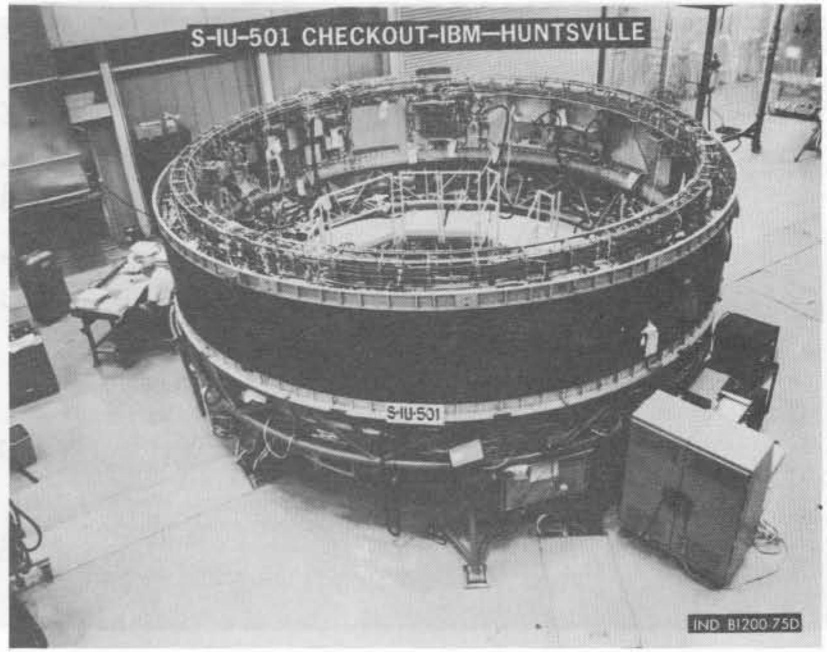

FABRICATION AND ASSEMBLY AREA-IBM—HUNTSVILLE
IND B1161D


INSTRUMENT UNIT SEGMENTS-IBM—HUNTSVILLE
IND B1110B


INSTRUMENT UNIT FINAL ASSEMBLY-IBM—H'VILLE

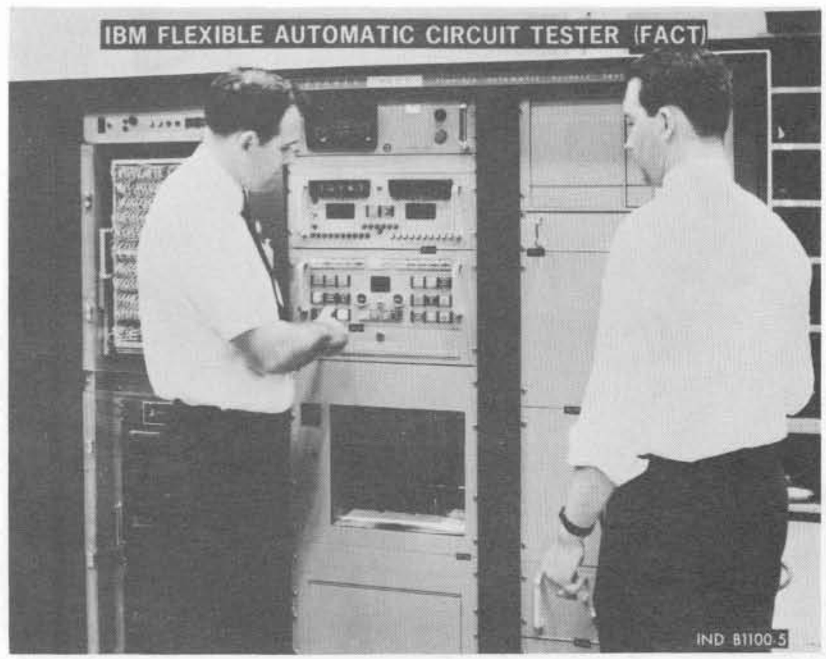


INSTRUMENT UNIT CHECKOUT-IBM—HUNTSVILLE



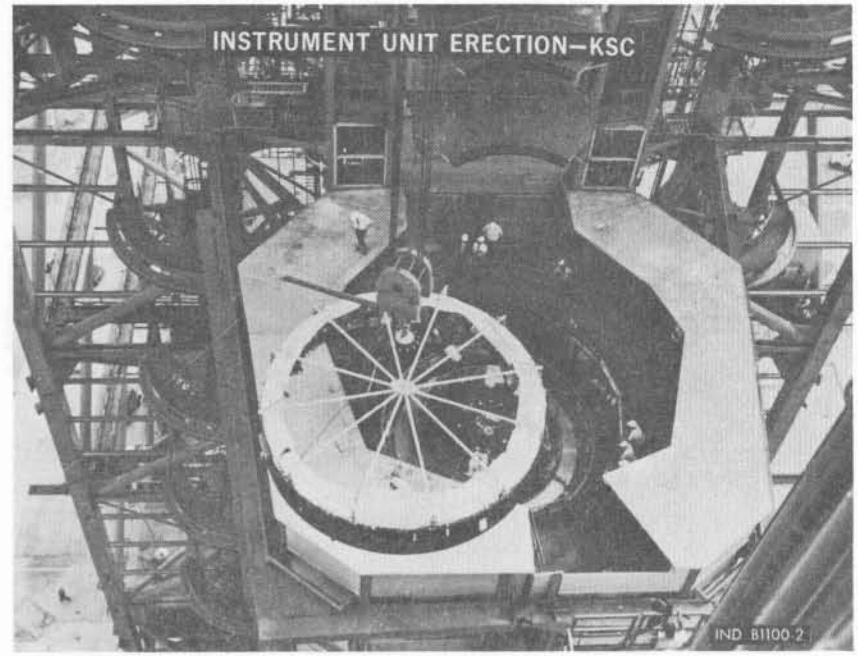
S-IU-501 CHECKOUT-IBM—HUNTSVILLE

INSTRUMENT UNIT IN MOBILE CLEAN ROOM-IBM—HUNTSVILLE

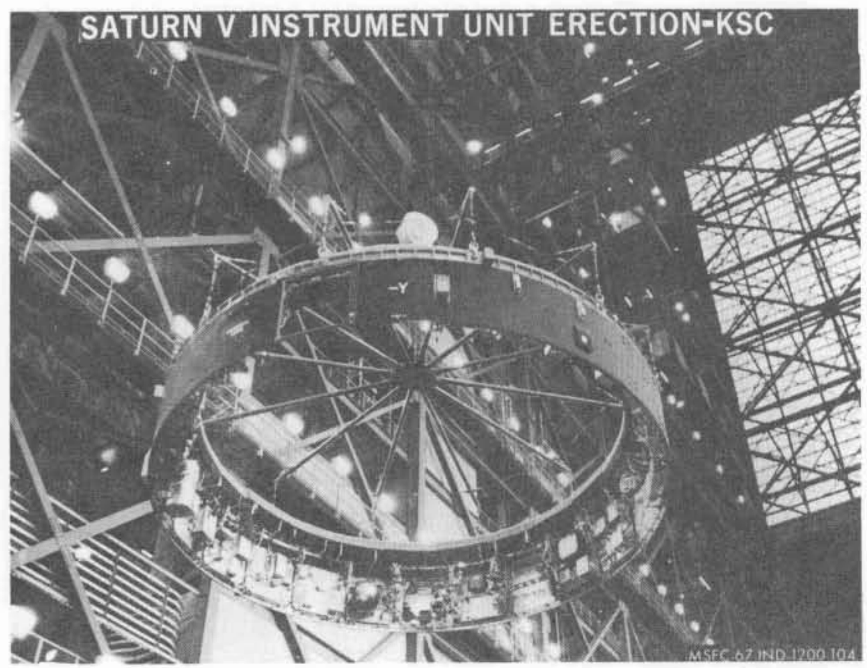


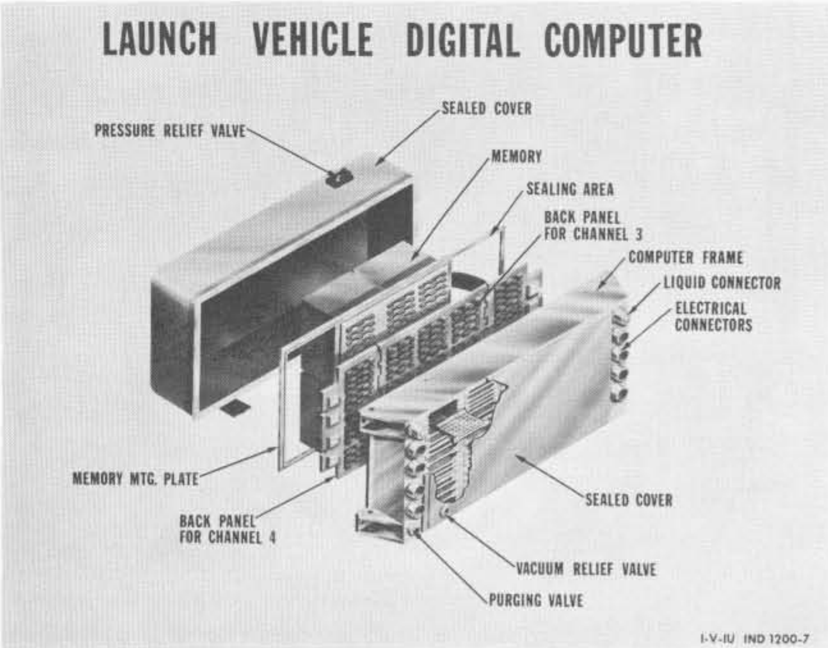
IBM FLEXIBLE AUTOMATIC CIRCUIT TESTER (FACT)

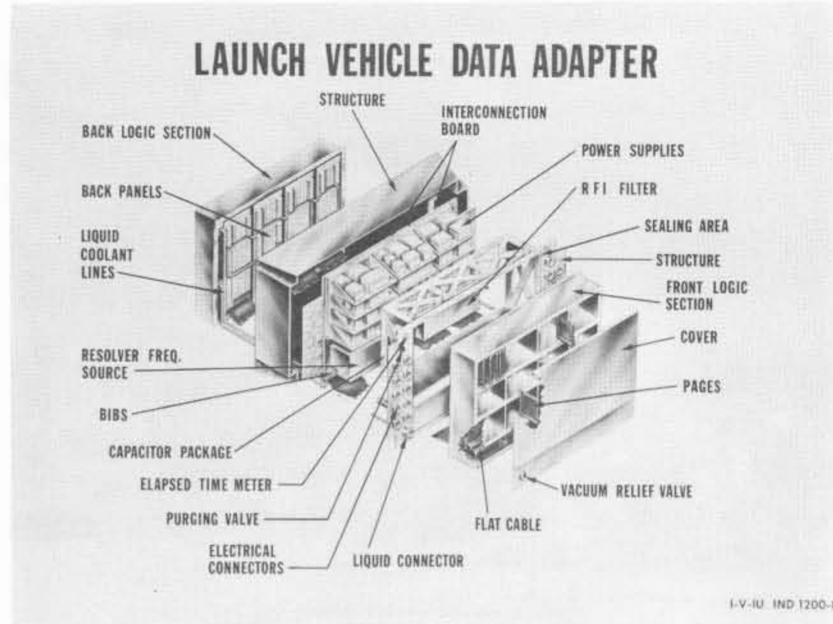

INSTRUMENT UNIT SHIPMENT BY SUPER GUPPY
IND B1100.1A

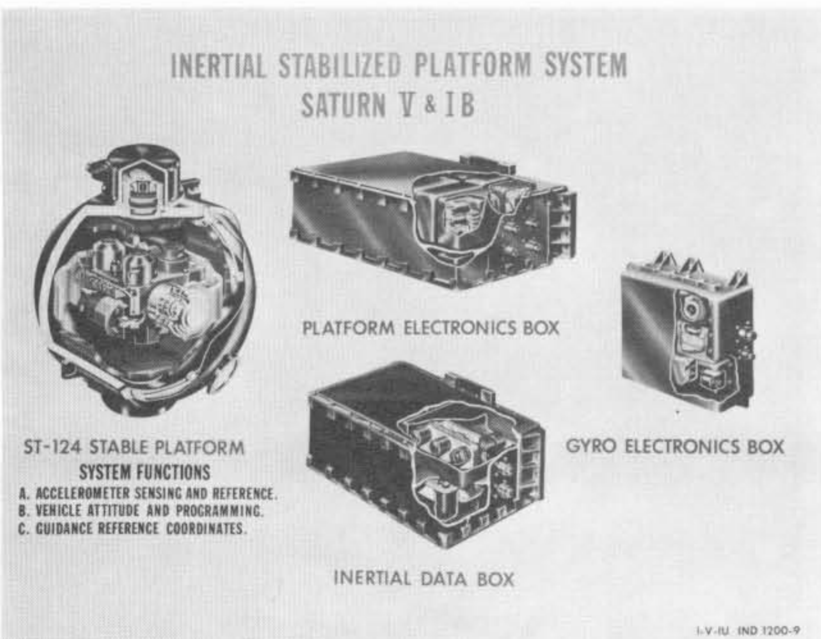

INSTRUMENT UNIT ERECTION–KSC
IND B1100.2

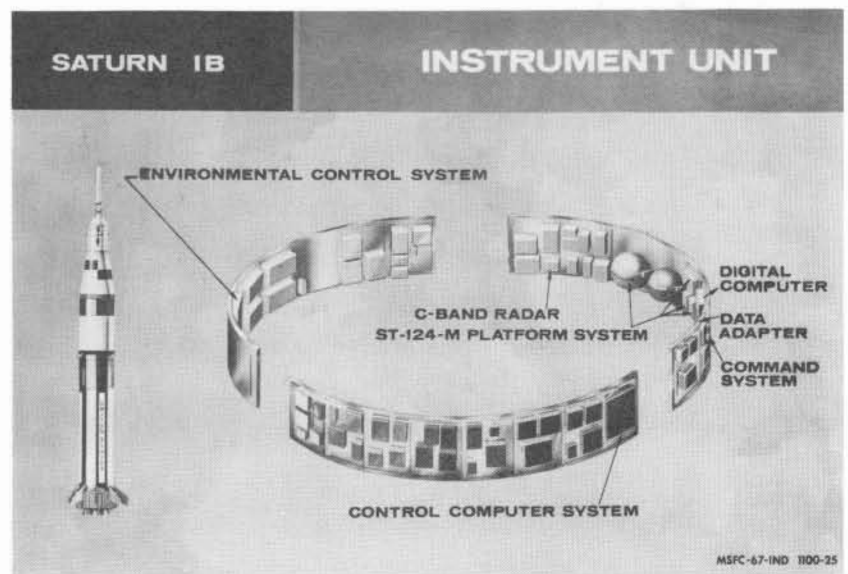

S-IU-200/500 FACILITY CHECKOUT UNIT–KSC
IND B1153C


SATURN V INSTRUMENT UNIT ERECTION-KSC
MSFC 67 IND 1200.104


LAUNCH VEHICLE DIGITAL COMPUTER
PRESSURE RELIEF VALVE
SEALED COVER
MEMORY
SEALING AREA
BACK PANEL FOR CHANNEL 3
COMPUTER FRAME
LIQUID CONNECTOR
ELECTRICAL CONNECTORS
MEMORY MTG. PLATE
BACK PANEL FOR CHANNEL 4
SEALED COVER
VACUUM RELIEF VALVE
PURGING VALVE
I-V-IU IND 1200-7


LAUNCH VEHICLE DATA ADAPTER
STRUCTURE
INTERCONNECTION BOARD
BACK LOGIC SECTION
POWER SUPPLIES
BACK PANELS
R F I FILTER
SEALING AREA
LIQUID COOLANT LINES
STRUCTURE
FRONT LOGIC SECTION
COVER
RESOLVER FREQ. SOURCE
PAGES
BIBS
CAPACITOR PACKAGE
ELAPSED TIME METER
VACUUM RELIEF VALVE
PURGING VALVE
FLAT CABLE
ELECTRICAL CONNECTORS
LIQUID CONNECTOR
I-V-IU IND 1200-8


INERTIAL STABILIZED PLATFORM SYSTEM
SATURN V & IB
PLATFORM ELECTRONICS BOX
GYRO ELECTRONICS BOX
ST-124 STABLE PLATFORM
SYSTEM FUNCTIONS
A. ACCELEROMETER SENSING AND REFERENCE.
B. VEHICLE ATTITUDE AND PROGRAMMING.
C. GUIDANCE REFERENCE COORDINATES.
INERTIAL DATA BOX
I-V-IU IND 1200-9


SATURN IB
INSTRUMENT UNIT
ENVIRONMENTAL CONTROL SYSTEM
DIGITAL COMPUTER
C-BAND RADAR
ST-124-M PLATFORM SYSTEM
DATA ADAPTER
COMMAND SYSTEM
CONTROL COMPUTER SYSTEM
MSFC-67-IND 1100-25

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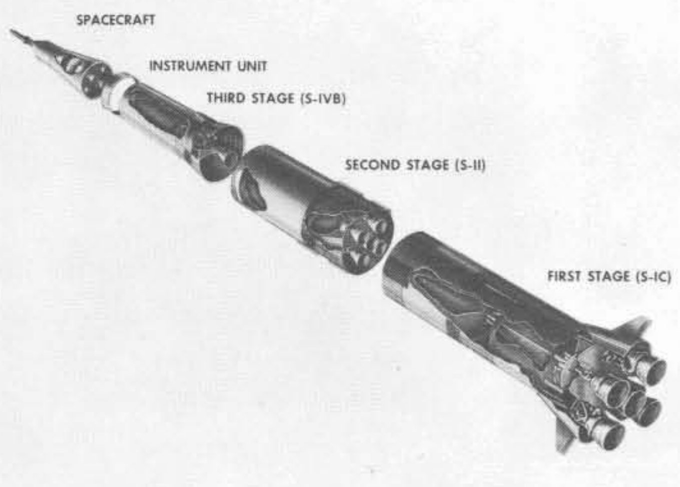
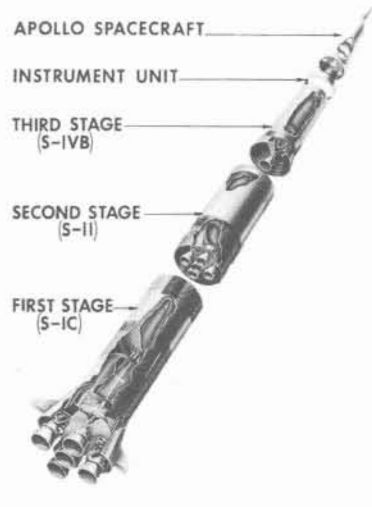
APOLLO SATURN V LAUNCH VEHICLE



I-RM-D IND 81200-15D

SATURN V LAUNCH VEHICLE



CHARACTERISTICS

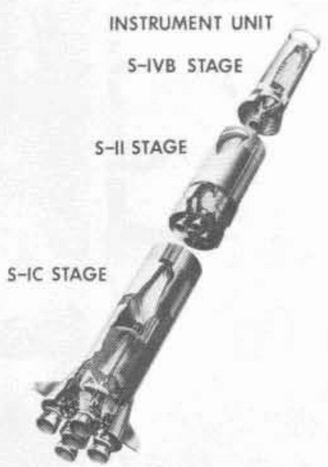
LENGTH (VEHICLE)	281 FT
LENGTH (VEHICLE, SPACECRAFT, LES)	365 FT
WEIGHT AT LIFTOFF	6,400,000 LBS
PAYLOAD CAPABILITY APPROXIMATE	
TRANSLUNAR TRAJECTORY	95,000 LBS
EARTH ORBIT	285,000 LBS

STAGES

FIRST (S-IC)	
SIZE	33 X 138 FT
ENGINES	5 F-1
THRUST (501 THRU 503)	7,500,000 LBS
(504 AND SUB)	7,610,000 LBS
PROPELLANTS	LOX & RP-1
SECOND (S-II)	
SIZE	33 X 81 FT
ENGINES	5 J-2
THRUST (501 THRU 503)	1,125,000 LBS
(504 AND SUB)	1,150,000 LBS
PROPELLANTS	LOX & LH_2
THIRD (S-IVB)	
SIZE	22 X 59 FT
ENGINE	1 J-2
THRUST (501 THRU 503)	225,000 LBS
(504 AND SUB)	230,000 LBS
PROPELLANTS	LOX & LH_2
INSTRUMENT UNIT	
SIZE	22 X 3 FT
GUIDANCE SYSTEM	INERTIAL

MSFC-67-IND 1223G

SATURN V LAUNCH VEHICLE



MISSION CAPABILITIES

EARTH ESCAPE

- APOLLO MANNED LUNAR LANDING
- CIRCUMLUNAR FLIGHTS
- EXTENDED LUNAR EXPLORATION
- LUNAR LOGISTICS
- PLANETARY PROBES (MANNED & UNMANNED)

EARTH ORBITAL

EQUATORIAL ORBITS
SYNCHRONOUS ORBITS
POLAR ORBITS

- MANNED SPACE STATIONS
- MULTI-MISSION, UNMANNED SCIENTIFIC SATELLITES

MSFC-67 IND 1224E

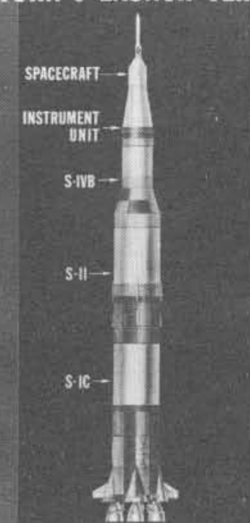
SATURN V LAUNCH VEHICLE

CHARACTERISTICS

TOTAL LENGTH	365 FT.
WT. AT LIFTOFF	6,400,000 LBS
PAYLOAD (APPROX):	
ESCAPE	95,000 LBS.
EARTH ORBIT	285,000 LBS.

STAGES

S-IC	
SIZE	33 x 138 FT.
THRUST	7,610,000 LBS.
ENGINES (LOX & RP-1)	5 F-1
S-II	
SIZE	33 x 81 FT.
THRUST	1,025,000 LBS.
ENGINE (LOX & LH_2)	5 J-2
S-IVB	
SIZE	22x59 FT.
THRUST	205,000 LBS.
ENGINE (LOX & LH_2)	1 J-2
INSTRUMENT UNIT	
SIZE	22 x 3 FT.



PROPOSED MISSION

EARTH ESCAPE:

- APOLLO MANNED LUNAR LANDING
- CIRCUMLUNAR FLIGHT
- LUNAR LOGISTICS
- PLANETARY PROBES

EARTH ORBITAL:

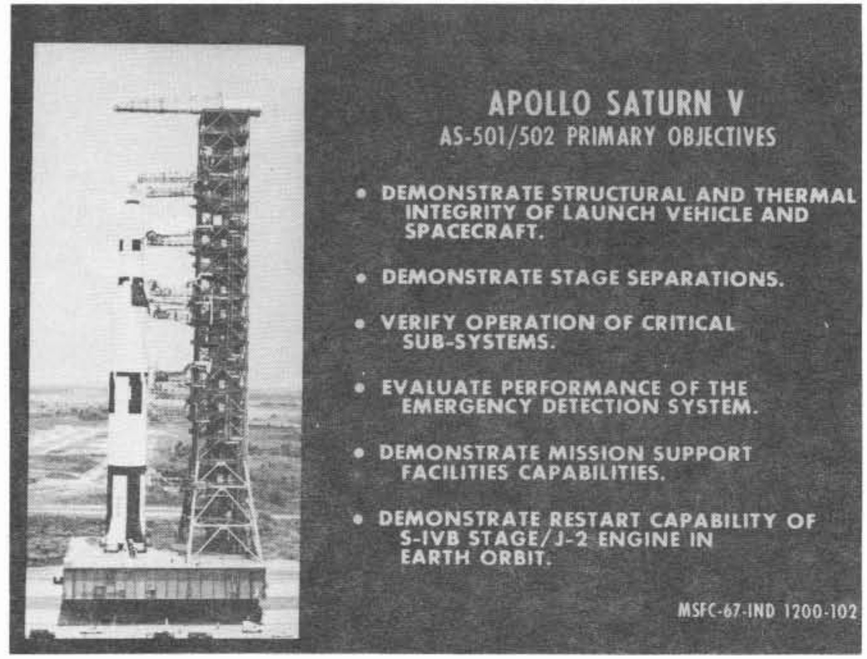
- MANNED SPACE STATIONS
- MULTI-MISSION, UNMANNED SCIENTIFIC SATELLITES
- EQUATORIAL ORBITS
- SYNCHRONOUS ORBITS
- POLAR ORBITS

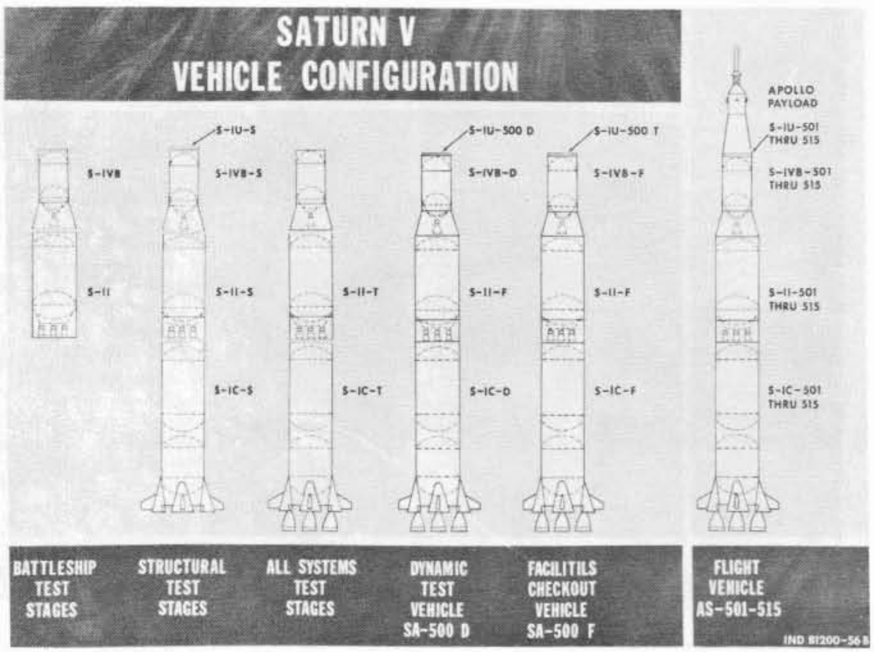
REV A
MS-G69-1-65
IND A1200-29D

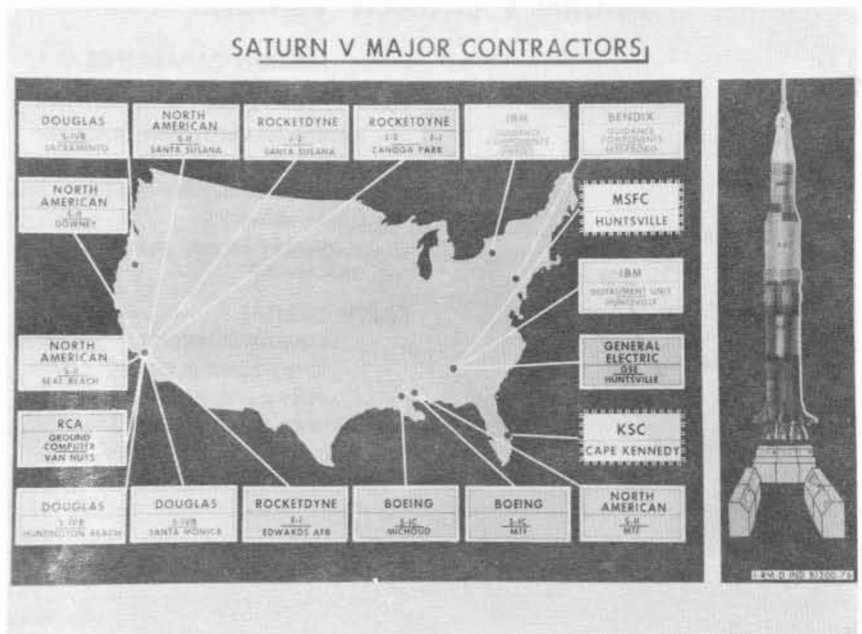
SATURN V LAUNCH VEHICLE STATUS

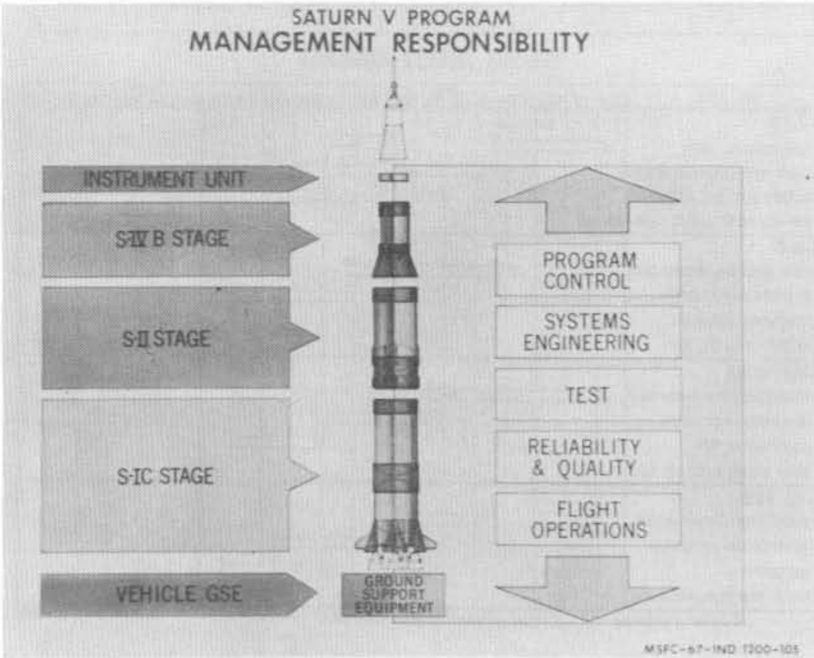
STAGE	AS-501	AS-502	AS-503	AS-504
FIRST (S-IC)	IN STACK/KSC	IN STACK/KSC	IN MODIFICATION & UPDATING AT MAF AVAILABLE FOR SHIP SCHEDULED ON DOCK KSC AUG 30	INSTALLED IN TEST STAND AT MTF APRIL 5. SCHEDULED FOR ACCEPTANCE FIRING MAY 11
SECOND (S-II)	IN STACK/KSC	IN POST STATIC CHECKOUT. SCHEDULED ON DOCK KSC MAY 19	IN SYSTEMS CHECKOUT. SCHEDULED ON DOCK MTF MAY 13	IN SYSTEMS INSTALLATION AT SEAL BEACH. SCHEDULED ON DOCK MTF AUG 22
THIRD (S-IVB)	IN STACK/KSC	IN STACK/KSC	S-IVB-503 (NEW) PREPARED FOR CAPTIVE FIRING AT SACTO SCHEDULED FOR APRIL 26	IN SYSTEMS CHECKOUT AT HUNTINGTON BEACH
INSTRUMENT UNIT	IN STACK/KSC	IN STACK/KSC	CONTINUES IN CHECKOUT. SCHEDULED ON DOCK KSC AUG 30	IN COMPONENT ASSEMBLY AT IBM HUNTSVILLE

MSFC-4/25/67-IND 1200-103A

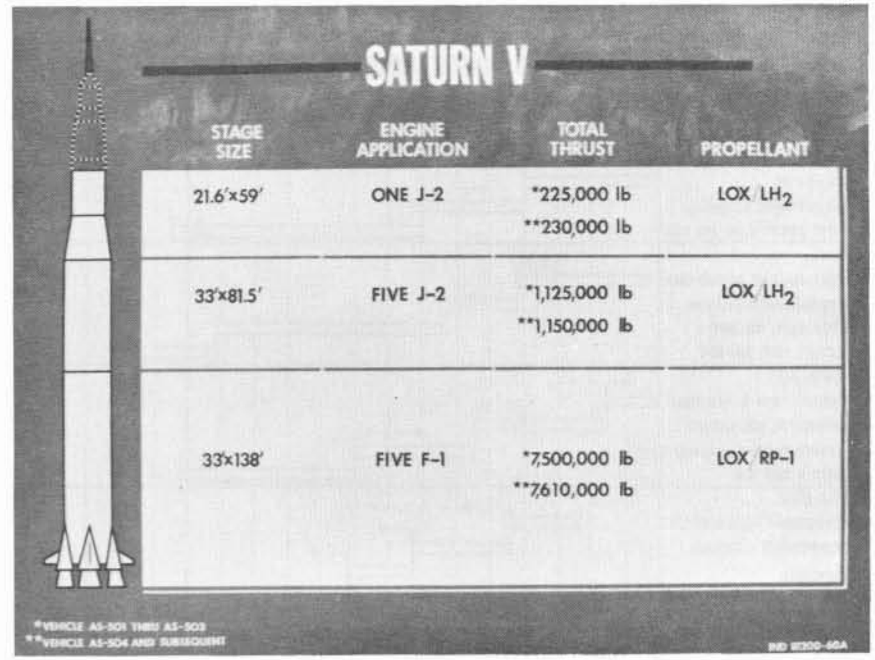




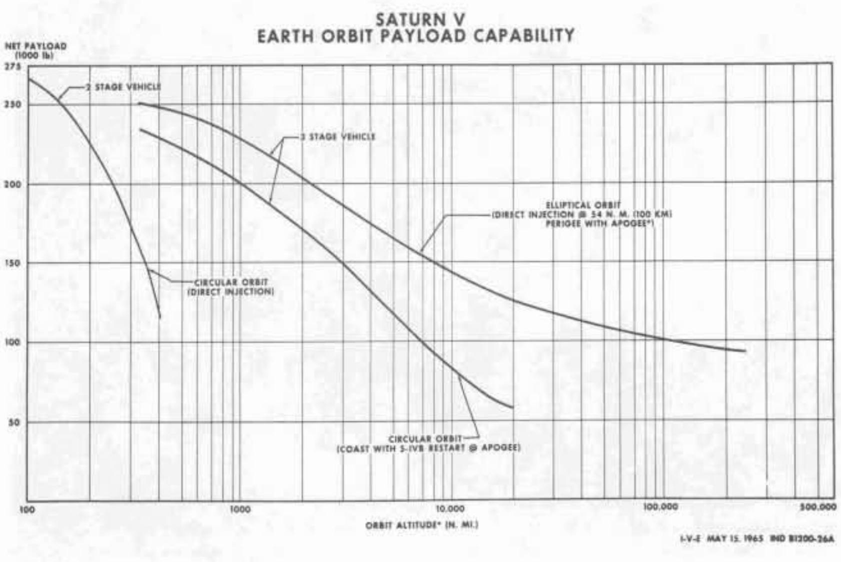




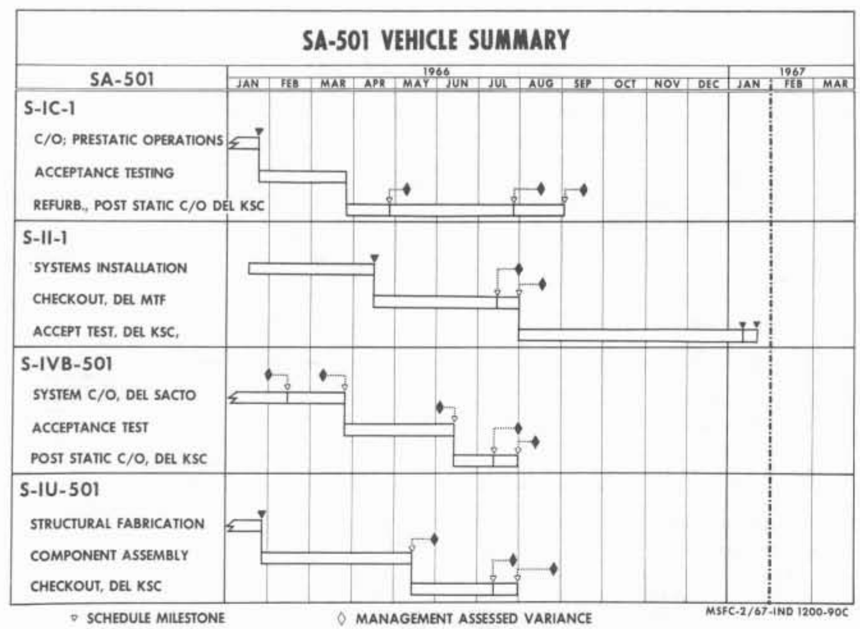
SATURN V PROGRAM
MANAGEMENT RESPONSIBILITY
INSTRUMENT UNIT
S-IVB STAGE
S-II STAGE
S-IC STAGE
VEHICLE GSE
GROUND SUPPORT EQUIPMENT
PROGRAM CONTROL
SYSTEMS ENGINEERING
TEST
RELIABILITY & QUALITY
FLIGHT OPERATIONS
MSFC-67-IND 1200-105



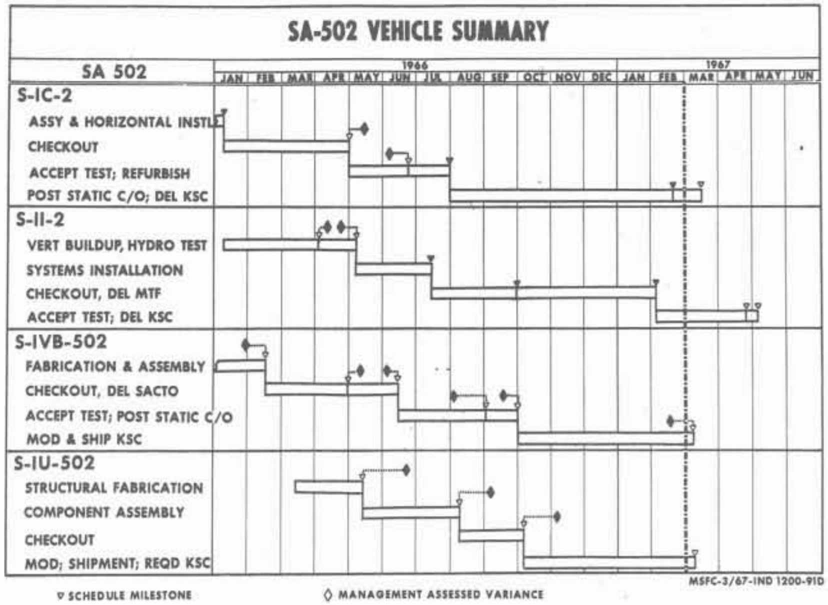
SATURN V
STAGE SIZE
ENGINE APPLICATION
TOTAL THRUST
PROPELLANT
21.6'x59'
ONE J-2
*225,000 lb
**230,000 lb
LOX/LH2
33'x81.5'
FIVE J-2
*1,125,000 lb
**1,150,000 lb
LOX/LH2
33'x138'
FIVE F-1
*7,500,000 lb
**7,610,000 lb
LOX/RP-1
*VEHICLE AS-501 THRU AS-503
**VEHICLE AS-504 AND SUBSEQUENT

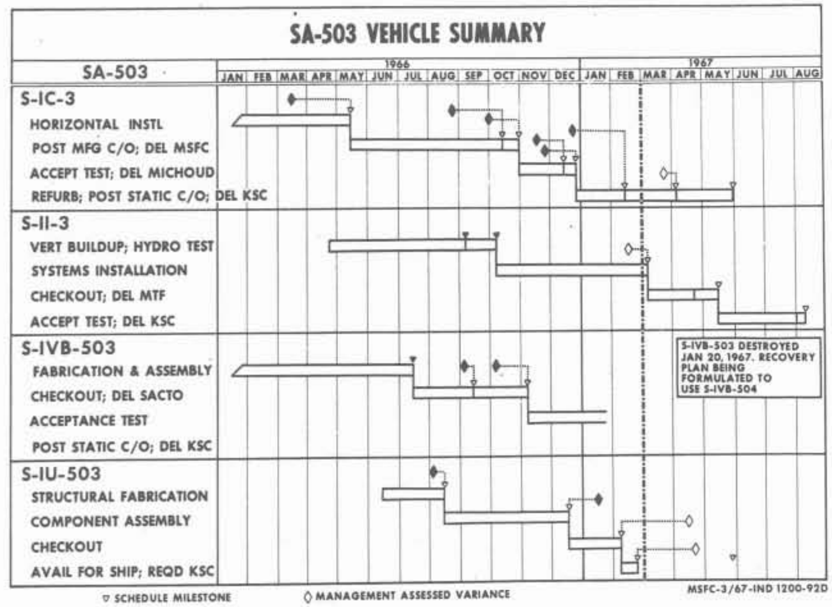


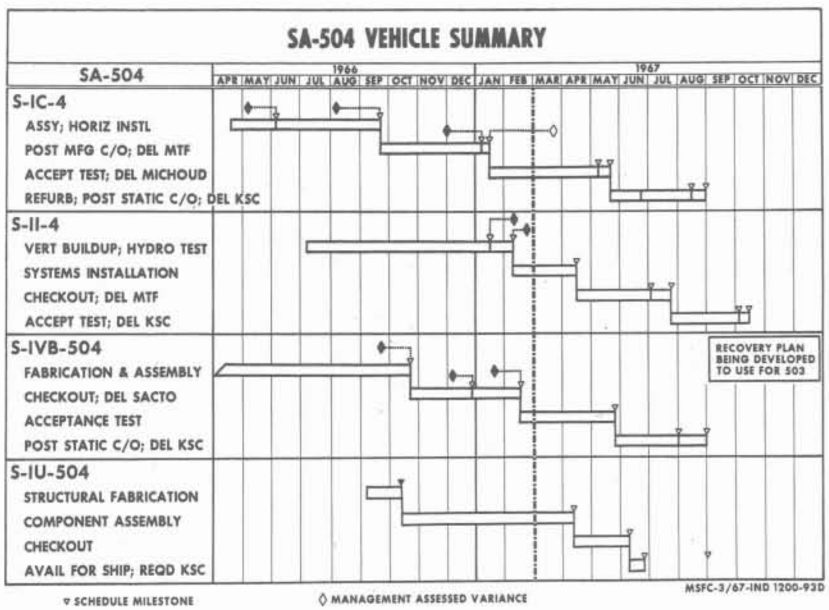
SATURN V
EARTH ORBIT PAYLOAD CAPABILITY
NET PAYLOAD (1000 lb)
275
250
200
150
100
50
2 STAGE VEHICLE
3 STAGE VEHICLE
ELLIPTICAL ORBIT (DIRECT INJECTION @ 54 N. M. (100 KM) PERIGEE WITH APOGEE*)
CIRCULAR ORBIT (DIRECT INJECTION)
CIRCULAR ORBIT (COAST WITH S-IVB RESTART @ APOGEE)
100
1000
10,000
100,000
500,000
ORBIT ALTITUDE* (N. MI.)
I-V-E MAY 15, 1965 IND 81200-26A

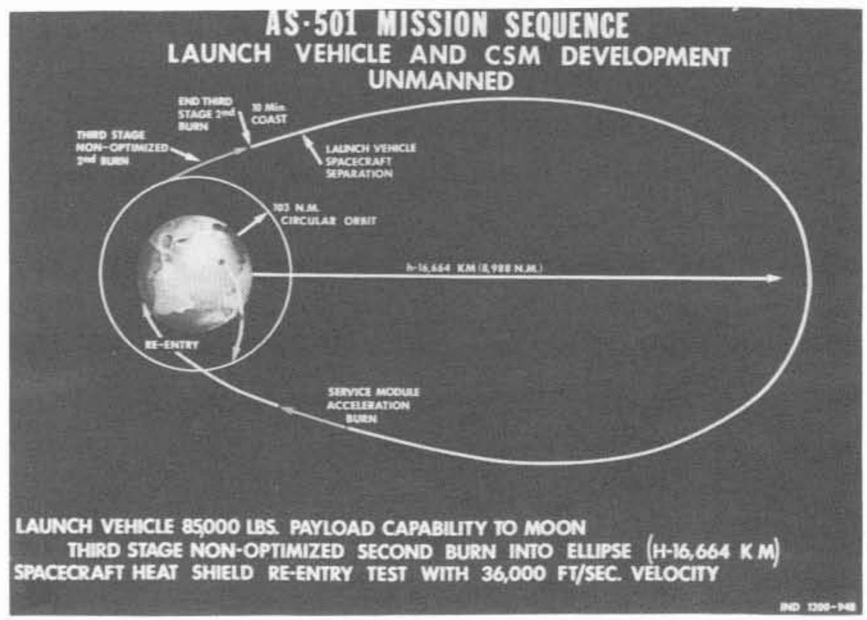


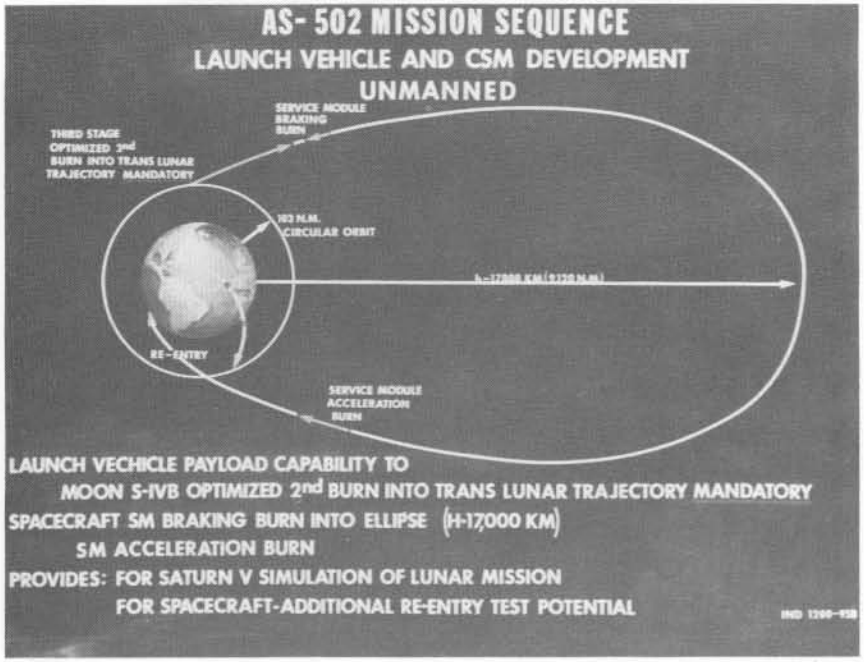
SA-501 VEHICLE SUMMARY
SA-501
1966
1967
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR
S-IC-1
C/O; PRESTATIC OPERATIONS
ACCEPTANCE TESTING
REFURB., POST STATIC C/O DEL KSC
S-II-1
SYSTEMS INSTALLATION
CHECKOUT, DEL MTF
ACCEPT TEST, DEL KSC,
S-IVB-501
SYSTEM C/O, DEL SACTO
ACCEPTANCE TEST
POST STATIC C/O, DEL KSC
S-IU-501
STRUCTURAL FABRICATION
COMPONENT ASSEMBLY
CHECKOUT, DEL KSC
▽ SCHEDULE MILESTONE
◇ MANAGEMENT ASSESSED VARIANCE
MSFC-2/67-IND 1200-90C

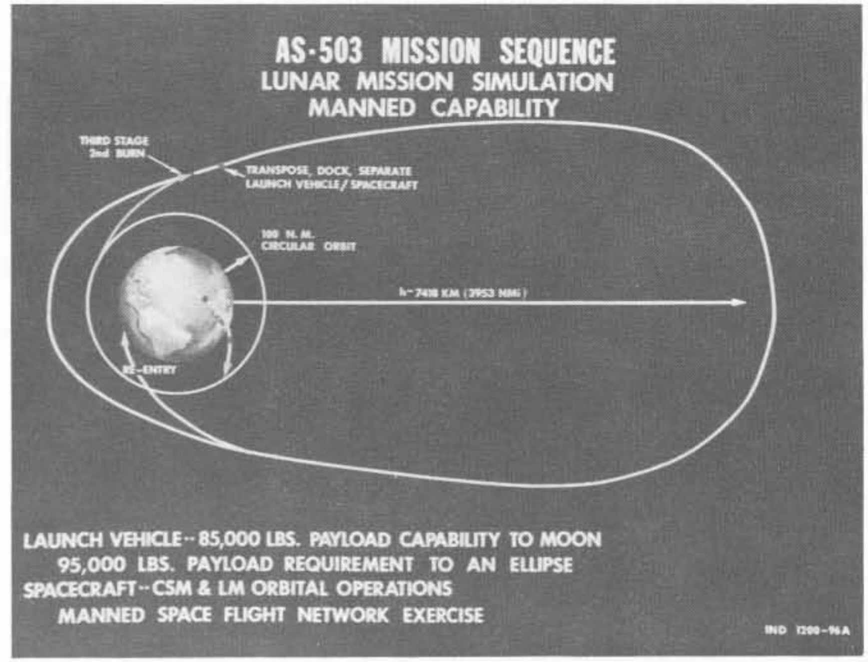

SA-502 VEHICLE SUMMARY
SA 502
1966
1967
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN
S-IC-2
ASSY & HORIZONTAL INSTL
CHECKOUT
ACCEPT TEST; REFURBISH
POST STATIC C/O; DEL KSC
S-II-2
VERT BUILDUP, HYDRO TEST
SYSTEMS INSTALLATION
CHECKOUT, DEL MTF
ACCEPT TEST; DEL KSC
S-IVB-502
FABRICATION & ASSEMBLY
CHECKOUT, DEL SACTO
ACCEPT TEST; POST STATIC C/O
MOD & SHIP KSC
S-IU-502
STRUCTURAL FABRICATION
COMPONENT ASSEMBLY
CHECKOUT
MOD; SHIPMENT; REQD KSC
▽ SCHEDULE MILESTONE
◇ MANAGEMENT ASSESSED VARIANCE
MSFC-3/67-IND 1200-91D

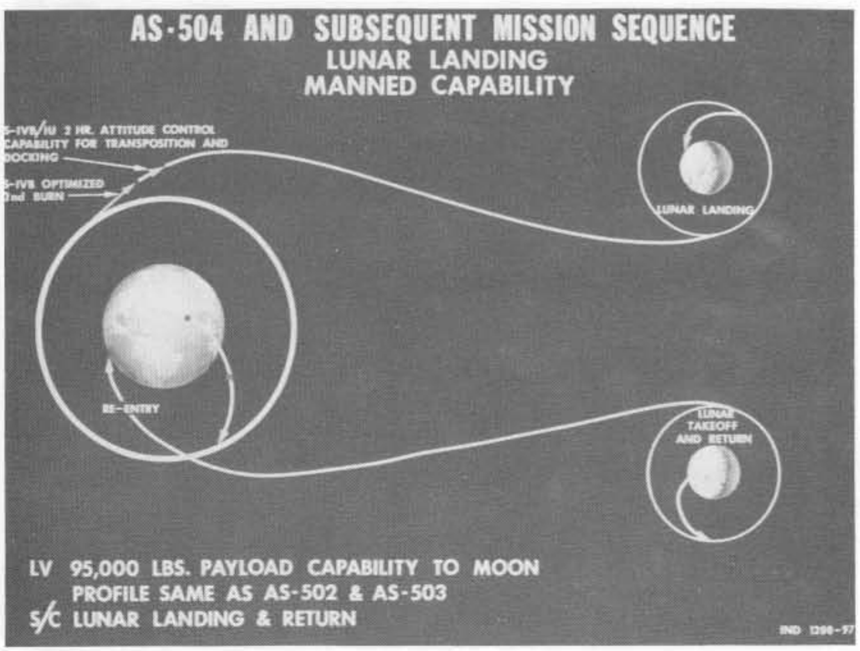

SA-503 VEHICLE SUMMARY
SA-503
1966
1967
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG
S-IC-3
HORIZONTAL INSTL
POST MFG C/O; DEL MSFC
ACCEPT TEST; DEL MICHOUD
REFURB; POST STATIC C/O; DEL KSC
S-II-3
VERT BUILDUP; HYDRO TEST
SYSTEMS INSTALLATION
CHECKOUT; DEL MTF
ACCEPT TEST; DEL KSC
S-IVB-503
FABRICATION & ASSEMBLY
CHECKOUT; DEL SACTO
ACCEPTANCE TEST
POST STATIC C/O; DEL KSC
S-IVB-503 DESTROYED JAN 20, 1967. RECOVERY PLAN BEING FORMULATED TO USE S-IVB-504
S-IU-503
STRUCTURAL FABRICATION
COMPONENT ASSEMBLY
CHECKOUT
AVAIL FOR SHIP; REQD KSC
▽ SCHEDULE MILESTONE
◇ MANAGEMENT ASSESSED VARIANCE
MSFC-3/67-IND 1200-92D

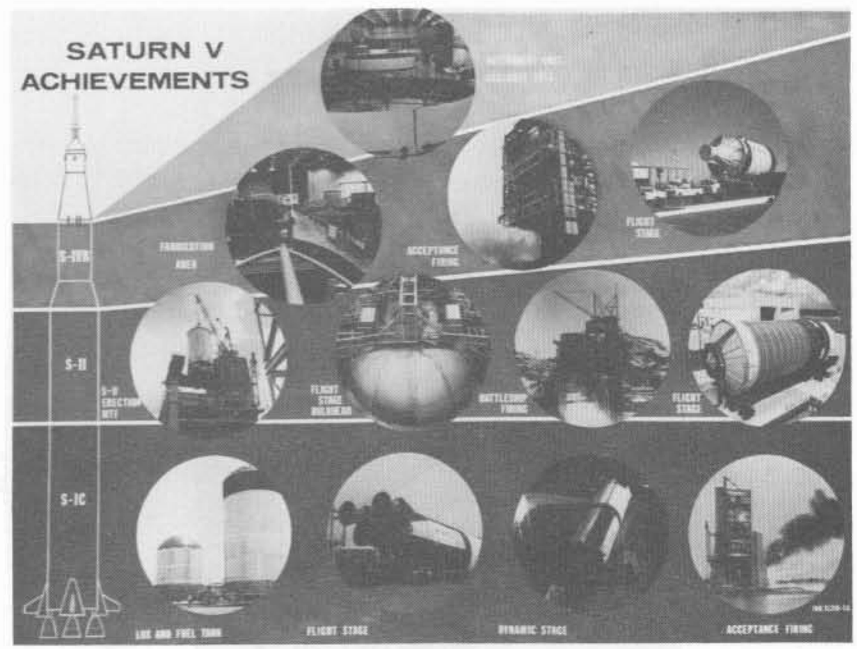

SA-504 VEHICLE SUMMARY
SA-504
1966
1967
APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
S-IC-4
ASSY; HORIZ INSTL
POST MFG C/O; DEL MTF
ACCEPT TEST; DEL MICHOUD
REFURB; POST STATIC C/O; DEL KSC
S-II-4
VERT BUILDUP; HYDRO TEST
SYSTEMS INSTALLATION
CHECKOUT; DEL MTF
ACCEPT TEST; DEL KSC
S-IVB-504
FABRICATION & ASSEMBLY
CHECKOUT; DEL SACTO
ACCEPTANCE TEST
POST STATIC C/O; DEL KSC
RECOVERY PLAN BEING DEVELOPED TO USE FOR 503
S-IU-504
STRUCTURAL FABRICATION
COMPONENT ASSEMBLY
CHECKOUT
AVAIL FOR SHIP; REQD KSC
▽ SCHEDULE MILESTONE
◇ MANAGEMENT ASSESSED VARIANCE
MSFC-3/67-IND 1200-93D

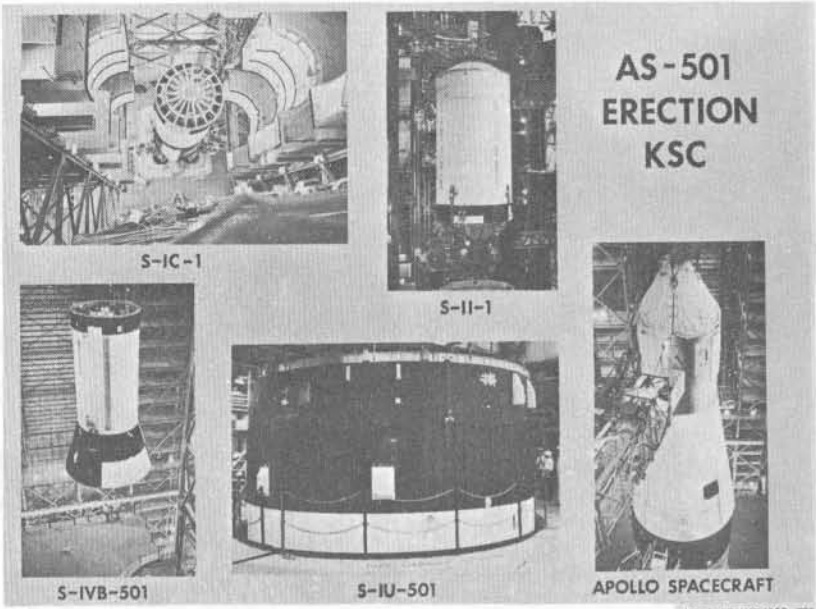

AS-501 MISSION SEQUENCE
LAUNCH VEHICLE AND CSM DEVELOPMENT
UNMANNED
LAUNCH VEHICLE 85,000 LBS. PAYLOAD CAPABILITY TO MOON
THIRD STAGE NON-OPTIMIZED SECOND BURN INTO ELLIPSE (H-16,664 K M)
SPACECRAFT HEAT SHIELD RE-ENTRY TEST WITH 36,000 FT/SEC. VELOCITY

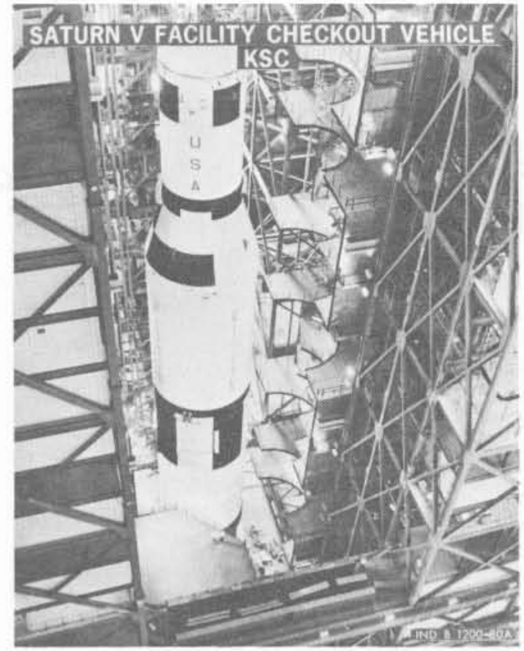

AS- 502 MISSION SEQUENCE
LAUNCH VEHICLE AND CSM DEVELOPMENT
UNMANNED
SERVICE MODULE BRAKING BURN
THIRD STAGE OPTIMIZED 2nd BURN INTO TRANS LUNAR TRAJECTORY MANDATORY
CIRCULAR ORBIT
RE-ENTRY
SERVICE MODULE ACCELERATION BURN
LAUNCH VECHICLE PAYLOAD CAPABILITY TO
MOON S-IVB OPTIMIZED 2nd BURN INTO TRANS LUNAR TRAJECTORY MANDATORY
SPACECRAFT SM BRAKING BURN INTO ELLIPSE (H-17,000 KM)
SM ACCELERATION BURN
PROVIDES: FOR SATURN V SIMULATION OF LUNAR MISSION
FOR SPACECRAFT-ADDITIONAL RE-ENTRY TEST POTENTIAL

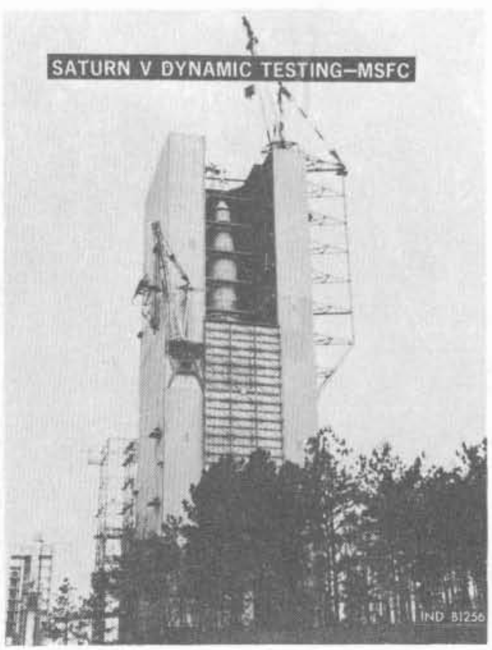

AS-503 MISSION SEQUENCE
LUNAR MISSION SIMULATION
MANNED CAPABILITY
THIRD STAGE 2nd BURN
TRANSPOSE, DOCK, SEPARATE LAUNCH VEHICLE/ SPACECRAFT
100 N. M. CIRCULAR ORBIT
RE-ENTRY
LAUNCH VEHICLE -- 85,000 LBS. PAYLOAD CAPABILITY TO MOON
95,000 LBS. PAYLOAD REQUIREMENT TO AN ELLIPSE
SPACECRAFT -- CSM & LM ORBITAL OPERATIONS
MANNED SPACE FLIGHT NETWORK EXERCISE

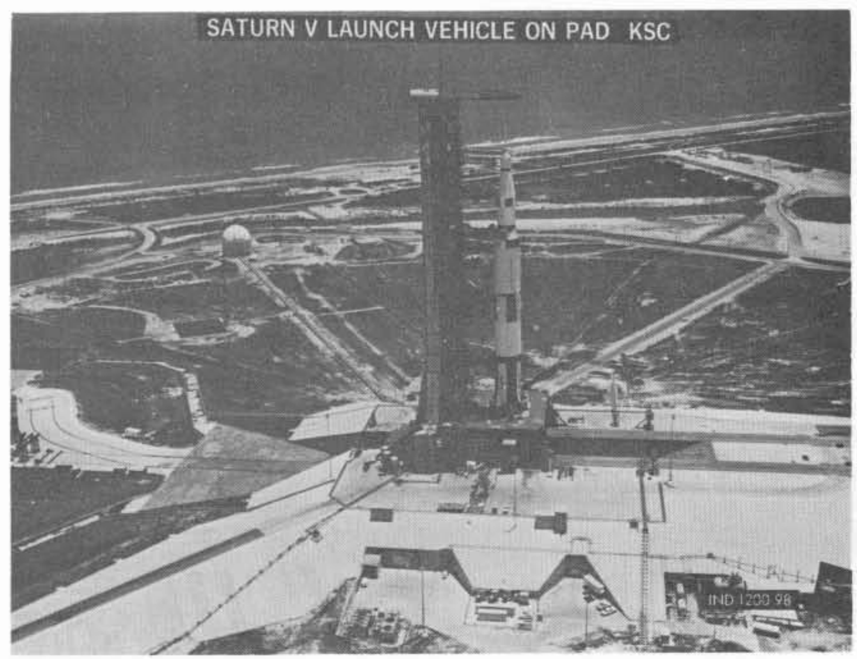

AS-504 AND SUBSEQUENT MISSION SEQUENCE
LUNAR LANDING
MANNED CAPABILITY
S-IVB/IU 2 HR. ATTITUDE CONTROL CAPABILITY FOR TRANSPOSITION AND DOCKING
S-IVB OPTIMIZED 2nd BURN
LUNAR LANDING
RE-ENTRY
LUNAR TAKEOFF AND RETURN
LV 95,000 LBS. PAYLOAD CAPABILITY TO MOON
PROFILE SAME AS AS-502 & AS-503
S/C LUNAR LANDING & RETURN

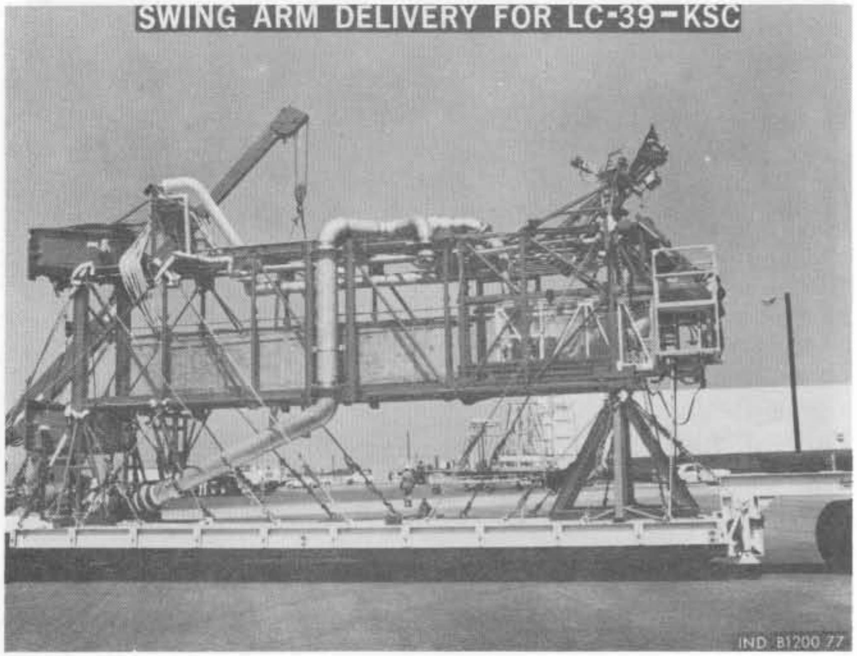

SATURN V
ACHIEVEMENTS
S-IVB
S-II
S-IC
FLIGHT STAGE
LOX AND FUEL TANK
DYNAMIC STAGE
ACCEPTANCE FIRING


AS-501
ERECTION
KSC
S-IC-1
S-II-1
S-IVB-501
S-IU-501
APOLLO SPACECRAFT
MSFC-67-IND 1200-798

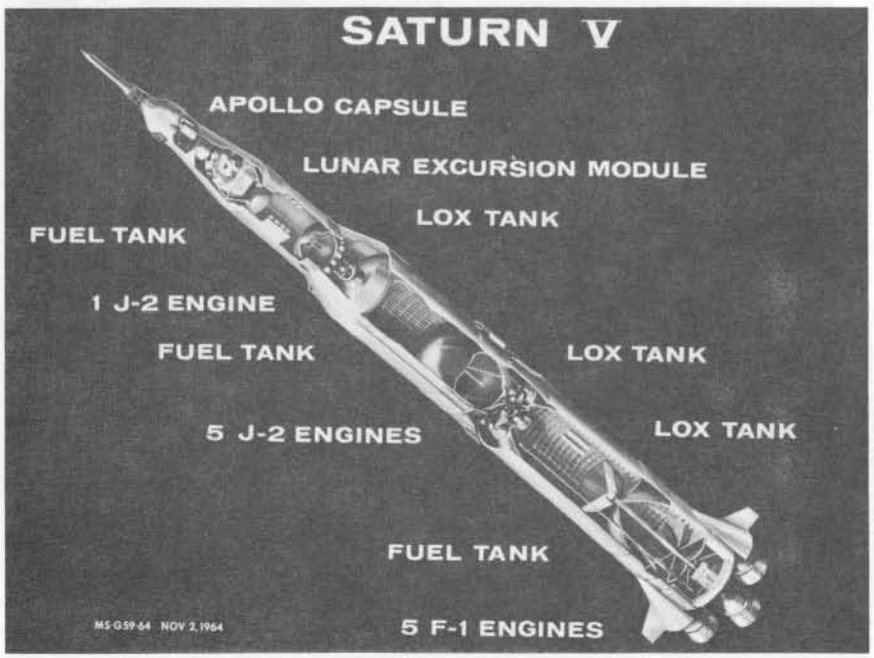

SATURN V FACILITY CHECKOUT VEHICLE
KSC
USA

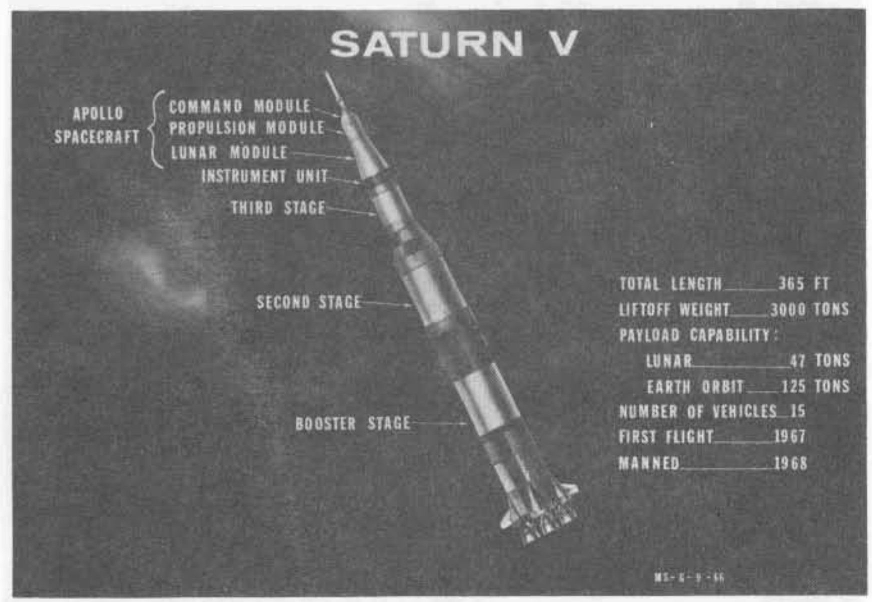

SATURN V DYNAMIC TESTING–MSFC
IND 81256

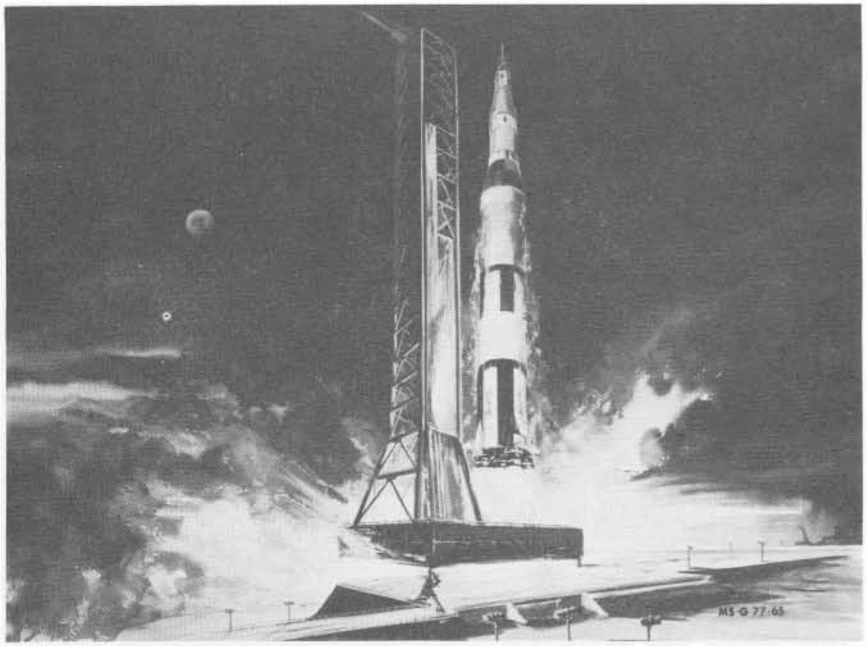

SATURN V LAUNCH VEHICLE ON PAD KSC
IND 1200 98

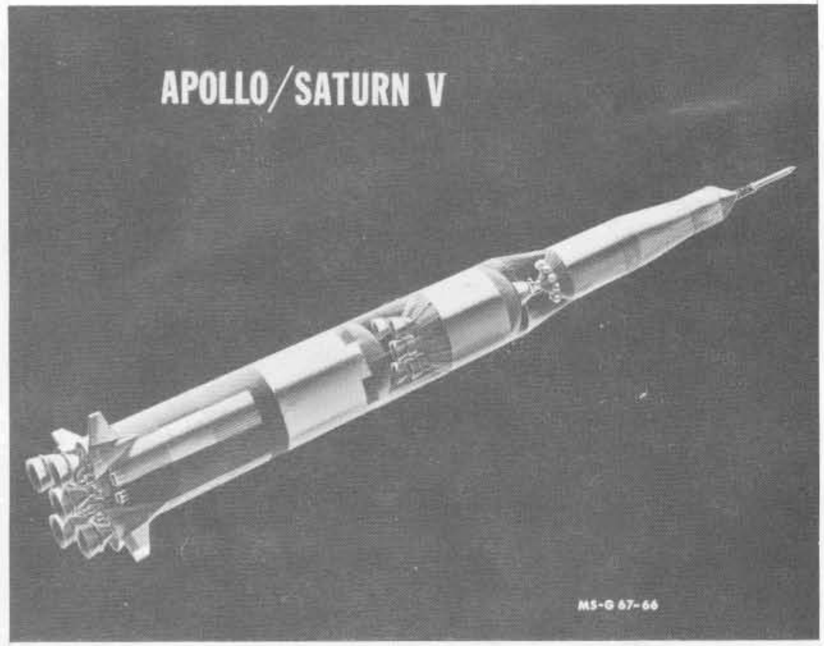

SWING ARM DELIVERY FOR LC-39-KSC
IND 81200 77

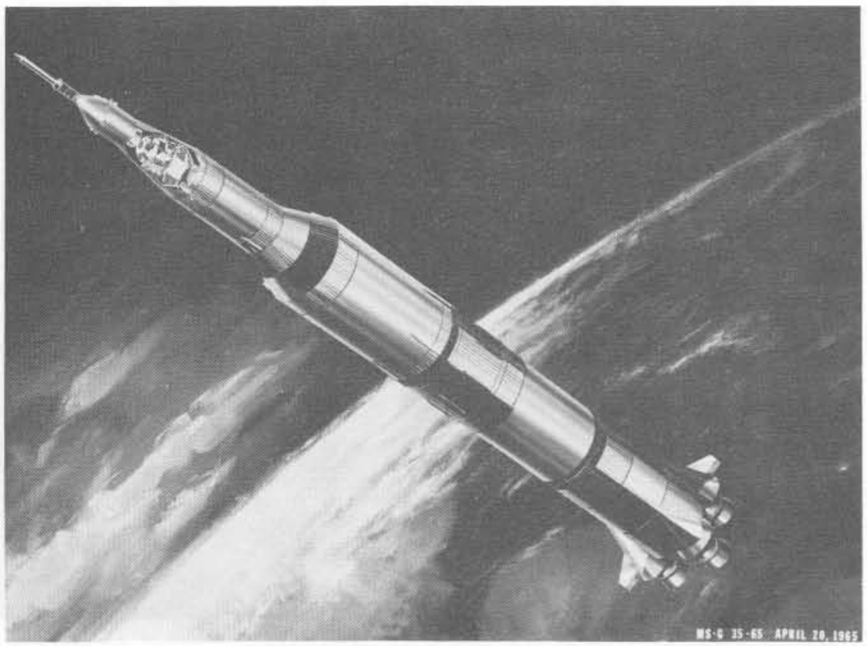

SATURN V BREADBOARD—HUNTSVILLE
IND 81200-83


SATURN V
APOLLO CAPSULE
LUNAR EXCURSION MODULE
LOX TANK
FUEL TANK
1 J-2 ENGINE
FUEL TANK
LOX TANK
5 J-2 ENGINES
LOX TANK
FUEL TANK
5 F-1 ENGINES
MS-G59-64 NOV 2, 1964

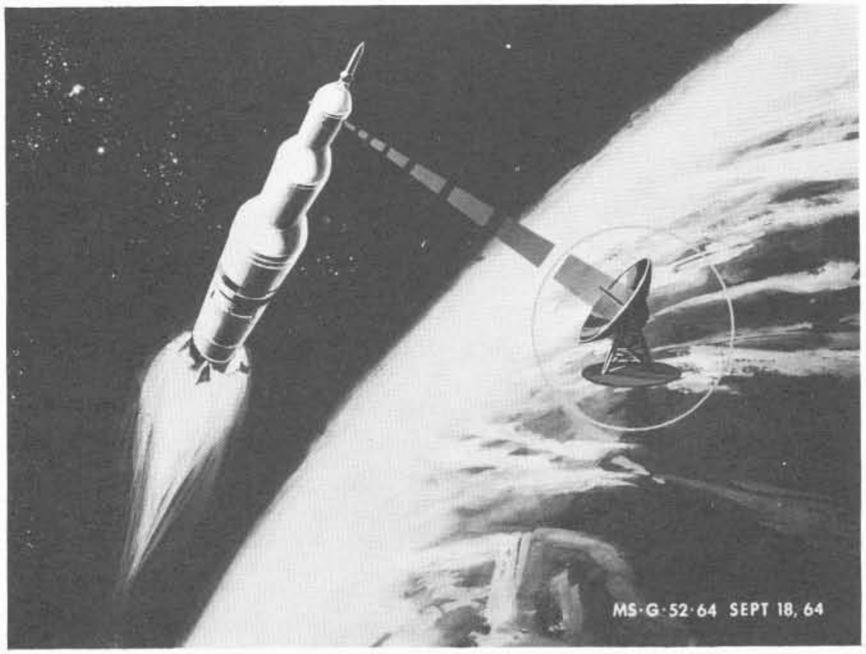

SATURN V
APOLLO SPACECRAFT
COMMAND MODULE
PROPULSION MODULE
LUNAR MODULE
INSTRUMENT UNIT
THIRD STAGE
SECOND STAGE
BOOSTER STAGE
TOTAL LENGTH 365 FT
LIFTOFF WEIGHT 3000 TONS
PAYLOAD CAPABILITY:
LUNAR 47 TONS
EARTH ORBIT 125 TONS
NUMBER OF VEHICLES 15
FIRST FLIGHT 1967
MANNED 1968

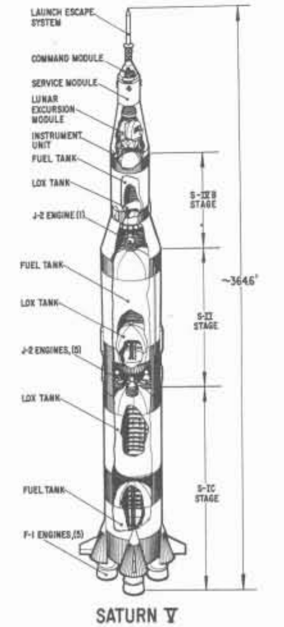

MS-G 77-65

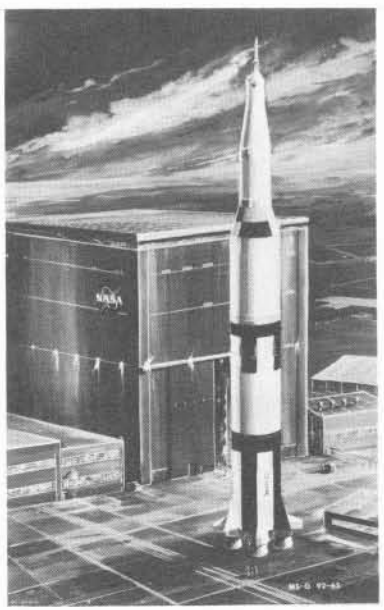

APOLLO/SATURN V
MS-G 67-66

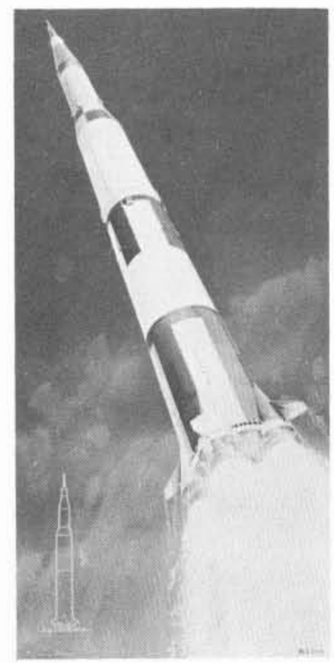

MS-G 35-65 APRIL 20, 1965


SATURN V
USA
DEC 17, 63


MS-G-52-64 SEPT 18, 64


LAUNCH ESCAPE SYSTEM
COMMAND MODULE
SERVICE MODULE
LUNAR EXCURSION MODULE
INSTRUMENT UNIT
FUEL TANK
LOX TANK
J-2 ENGINE (1)
FUEL TANK
LOX TANK
J-2 ENGINES, (5)
LOX TANK
FUEL TANK
F-1 ENGINES, (5)
S-IVB STAGE
S-II STAGE
S-IC STAGE
~364.6'
SATURN V






AERIAL VIEW OF LC-39—KSC
VERTICAL ASSEMBLY BUILDING
LAUNCH PAD A
MSFC-5/67-IND 1200-107

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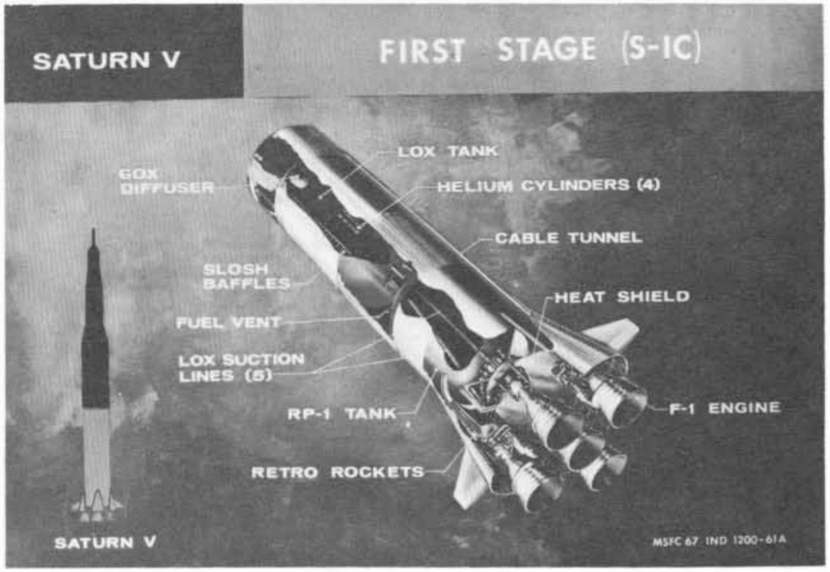
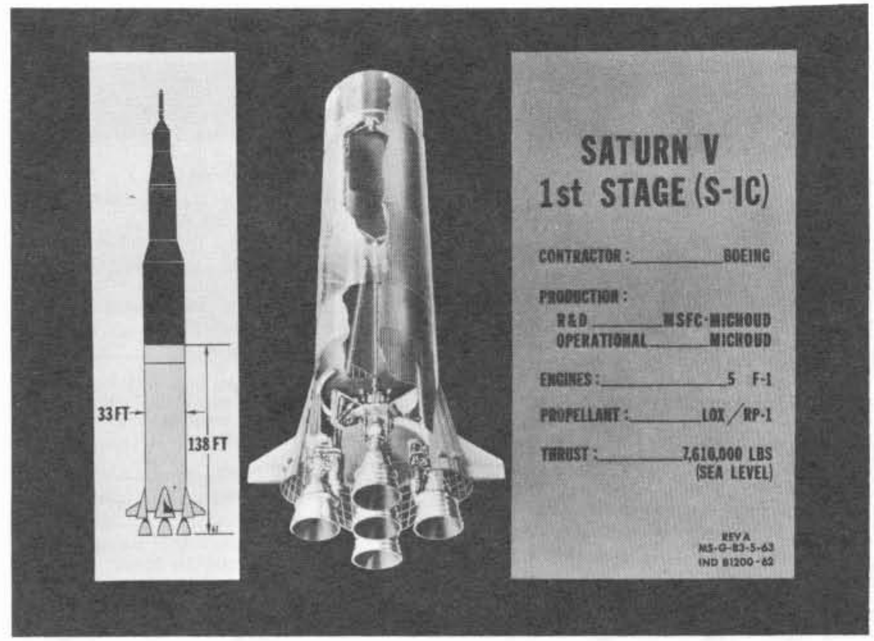
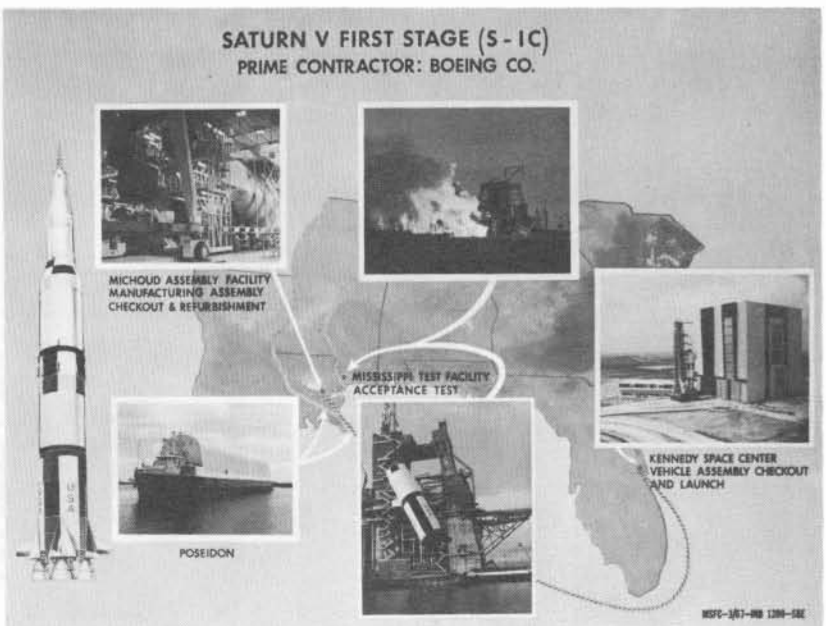
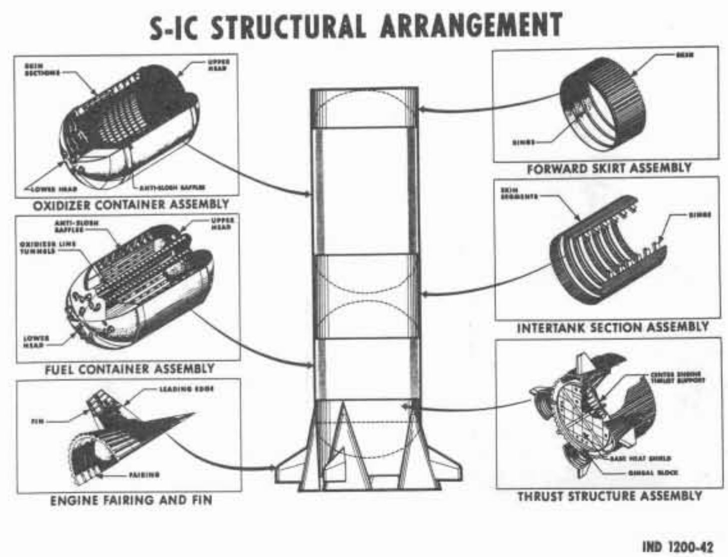

SATURN V
FIRST STAGE (S-IC)
GOX DIFFUSER
LOX TANK
HELIUM CYLINDERS (4)
CABLE TUNNEL
SLOSH BAFFLES
HEAT SHIELD
FUEL VENT
LOX SUCTION LINES (5)
RP-1 TANK
F-1 ENGINE
RETRO ROCKETS
SATURN V
MSFC 67 IND 1200-61A


33 FT
138 FT
SATURN V
1st STAGE (S-IC)
CONTRACTOR: BOEING
PRODUCTION:
R&D MSFC-MICHOUD
OPERATIONAL MICHOUD
ENGINES: 5 F-1
PROPELLANT: LOX/RP-1
THRUST: 7,610,000 LBS (SEA LEVEL)
REV A
MS-G-83-5-63
IND 81200-62


SATURN V FIRST STAGE (S-IC)
PRIME CONTRACTOR: BOEING CO.
MICHOUD ASSEMBLY FACILITY
MANUFACTURING ASSEMBLY
CHECKOUT & REFURBISHMENT
MISSISSIPPI TEST FACILITY
ACCEPTANCE TEST
KENNEDY SPACE CENTER
VEHICLE ASSEMBLY CHECKOUT
AND LAUNCH
POSEIDON


S-IC STRUCTURAL ARRANGEMENT
OXIDIZER CONTAINER ASSEMBLY
FUEL CONTAINER ASSEMBLY
ENGINE FAIRING AND FIN
FORWARD SKIRT ASSEMBLY
INTERTANK SECTION ASSEMBLY
THRUST STRUCTURE ASSEMBLY
IND 1200-42

SATURN V S-IC STAGE

MANUFACTURING
S-IC-1, -2 .... HUNTSVILLE
S-IC-3 AND SUBSEQUENT - MICHOUD
ENGINE F-1
MANUFACTURED BY ROCKETDYNE CANOGA PARK
DEVELOPMENT TEST .... HUNTSVILLE, CAPE KENNEDY
ACCEPTANCE TEST
S-IC-1-2-3 .... HUNTSVILLE
S-IC-4 AND SUBSEQUENT .... MTF
TRANSPORTATION .... BARGE
LAUNCH FACILITY .... KSC

STATUS

CONTRACTOR .... BOEING
CURRENT CONTRACT VALUE *$851,824,000
CONTRACT NUMBER NAS8-5608
PERIOD OF CONTRACT ... JAN 1963-DEC 1968
NUMBER GROUND TEST STAGES 2
NUMBER FLIGHT STAGES 8

(NOT INCLUDED ARE ONE TEST STAGE, TEST COMPONENTS AND FLIGHT STAGES 1 AND 2 WHICH ARE BEING MANUFACTURED AT MSFC, HUNTSVILLE)

S-IC-T STATIC FIRED .... APR 65
S-IC-1 STATIC TESTED .... FEB 66
S-IC-2 STATIC TESTED .... JUN 66

*INCLUDES C OF F AND SYSTEM ENGINEERING AND INTEGRATION FUNDS

SATURN V/S-IC-T STAGE TEST PROGRAM

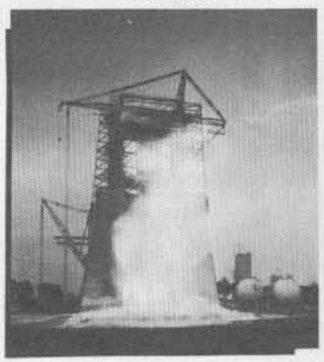
DATE	DURATION		RESULTS
	PLANNED	ACTUAL	
* APR 9,'65	7 SEC		40% THRUST REACHED. CUTOFF BY OBSERVER
* APR 9,'65	7 SEC	2.55 SEC	BROKEN WIRE IN CANNON CONNECT
* APR 10,'65	15 SEC	16.73 SEC	MAINSTAGE TEST SUCCESSFUL
APR 16,'65	7 SEC	6.5 SEC	SUCCESSFUL
MAY 6,'65	15 SEC	15.55 SEC	ENGINE 1 GIMBALED SUCCESSFULLY
MAY 20,'65	40 SEC	40.8 SEC	4 OUTBOARD ENGINES GIMBALED SUCCESSFULLY
JUN 8,'65	90 SEC	41.1 SEC	OBSERVER CUTOFF. ASPIRATOR BLOW BACK DURING 4% GIMBAL OF ENG. POS. 3 & EXCESSIVE DEFLECTOR EXTERIOR WATER LEAKAGE.
JUN 11,'65	90 SEC	90.9 SEC	ENGINES 1 & 4 GIMBALED FOR 4 CYCLES BEGINNING AT 70 SEC.
JUL 29,'65	40 SEC	17.6 SEC	OBSERVER CUTOFF. LOX TANK. TANK AUXILARY PRESSURIZATION SYSTEMS MALFUNCTION.
AUG 5,'65	145 SEC	143 SEC	ENGINE 5 CUTOFF 143 SEC. OUTBOARD ENGINES CUTOFF 147 SEC.
OCT 8,'65	40 SEC	42 SEC	SUCCESSFUL. INBOARD CUTOFF 42 SEC. OUTBOARD 47 SEC
NOV 3,'65	145 SEC	90.5 SEC	OBSERVER CUTOFF, NO GIMBALLING
NOV 24,'65	145 SEC	148.4 SEC	SUCCESSFUL. ENGINE 5 CUTOFF 148.4 SEC.
DEC 9,'65	145 SEC	146 SEC	OUTBOARD CUTOFF 150 SEC. TWO MAJOR OBJECTIVES NOT MET. ADDITIONAL TEST SCHEDULED.
DEC 16,'65	40 SEC	40.98 SEC	SUCCESSFUL. INBOARD CUTOFF 40.98 SEC. OUTBOARD CUTOFF 45.98 SEC.
MAR 3,'67	15 SEC	15 SEC	SUCCESSFUL. FIRST FIRING AT MTF
MAR 17,'67	60 SEC	60.18 SEC	SUCCESSFUL. SECOND FIRING AT MTF

* SINGLE ENGINE TEST

TOTAL ACTUAL FIRING TO DATE 917.79 SEC (15.29 MIN)
TOTAL ACTUAL FIRING TIME S-IC-T ENGINES 4492.55 SEC (74.87 MIN)

MSFC-4/67-IND 1200-44F

S-IC FLIGHT STAGE ACCEPTANCE TEST PROGRAM SUMMARY

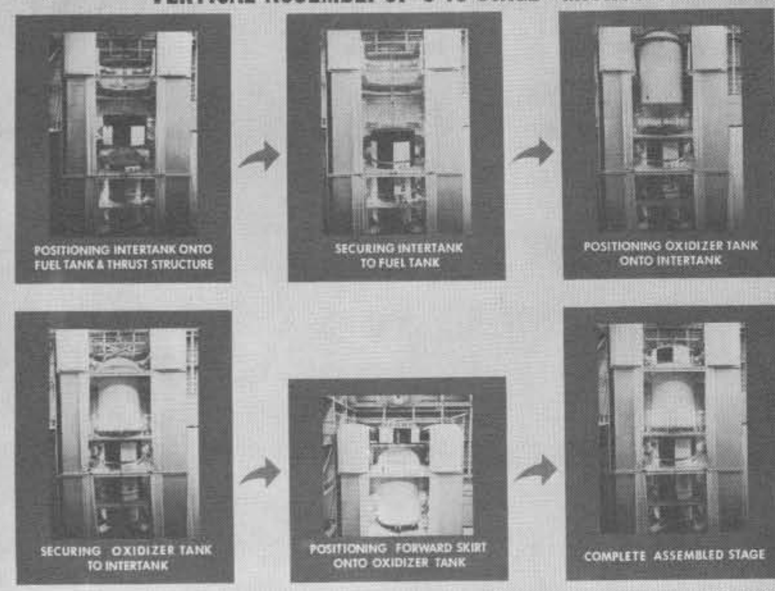


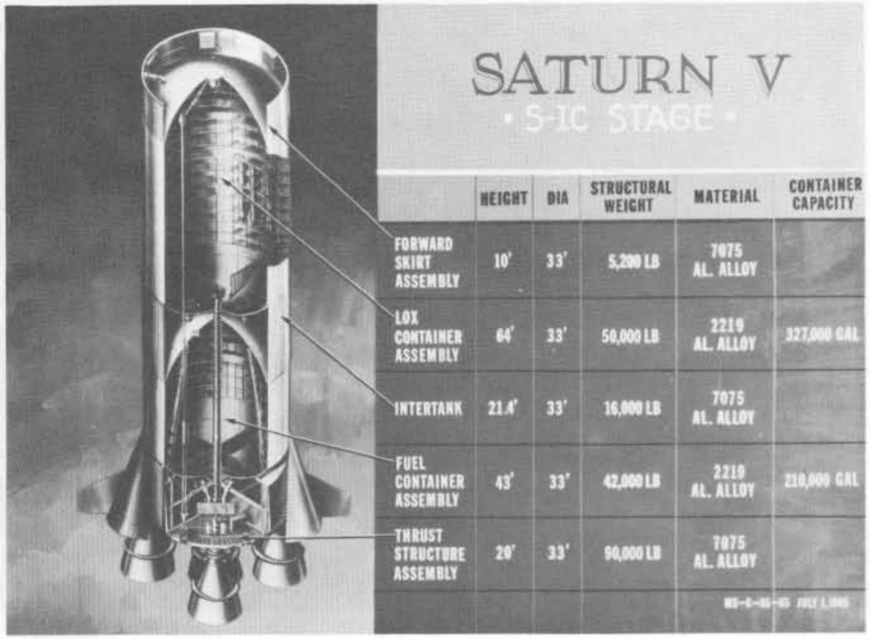
STAGE	DATE	DURATION		RESULTS
		PLANNED	ACTUAL	
S-IC-1	2-17-66	40	40.79	SUCCESSFUL
S-IC-1	2-25-66	125	83.2	SUCCESSFUL. OBSERVER CUTOFF, CHAMBER PRESSURE REDLINE.
S-IC-2	6-7-66	125	126.3	SUCCESSFUL
S-IC-3	11-15-66	120	121.7	SUCCESSFUL

TOTAL STAGE FIRING TO DATE 371.99 SEC

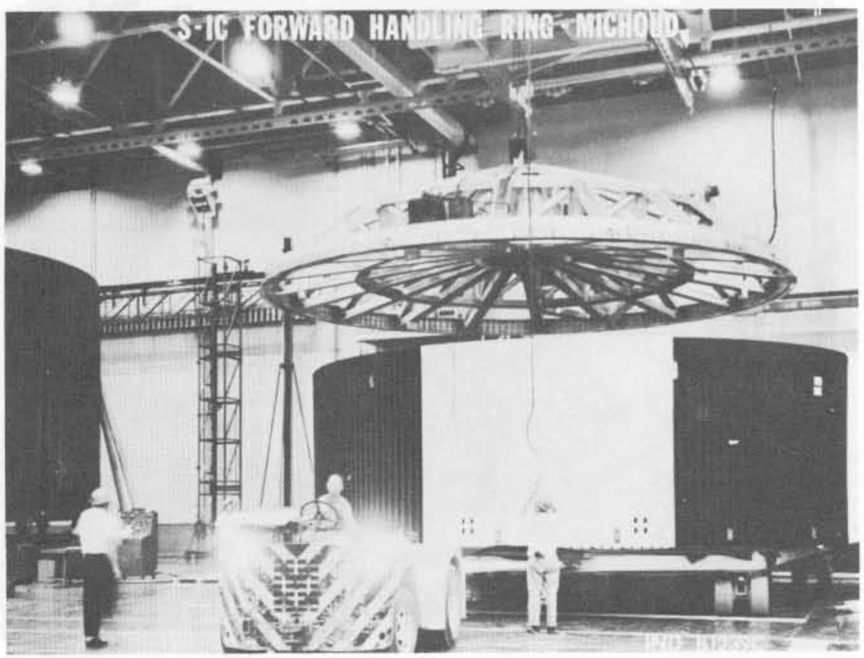
IND B 1200-88A

VERTICAL ASSEMBLY OF S-IC STAGE—MICHOUD

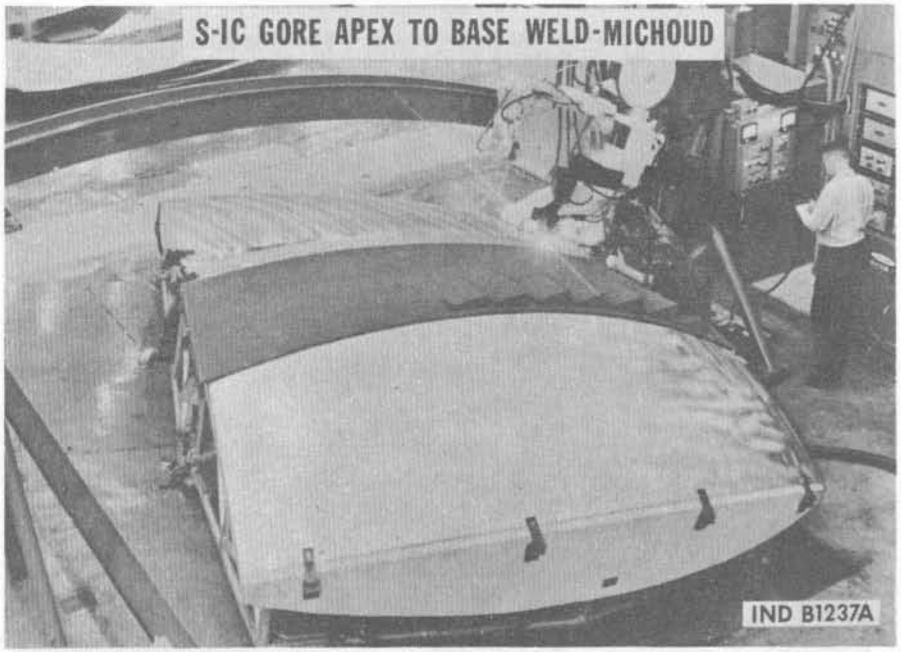



SATURN V
S-IC STAGE
HEIGHT
DIA
STRUCTURAL WEIGHT
MATERIAL
CONTAINER CAPACITY
FORWARD SKIRT ASSEMBLY 10' 33' 5,200 LB 7075 AL. ALLOY
LOX CONTAINER ASSEMBLY 64' 33' 50,000 LB 2219 AL. ALLOY 327,000 GAL
INTERTANK 21.4' 33' 16,000 LB 7075 AL. ALLOY
FUEL CONTAINER ASSEMBLY 43' 33' 42,000 LB 2219 AL. ALLOY 210,000 GAL
THRUST STRUCTURE ASSEMBLY 20' 33' 90,000 LB 7075 AL. ALLOY


S-IC FABRICATION & ASSEMBLY AREA-MICHOUD
IND B8930


S-IC FORWARD HANDLING RING-MICHOUD


S-IC GORE BASE TRIM FIXTURE-MICHOUD
IND B1238A

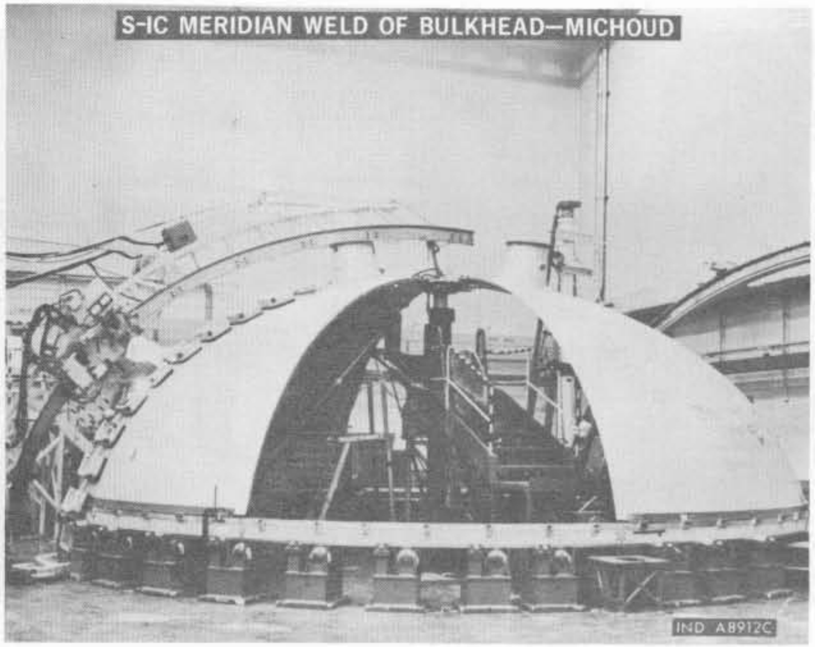


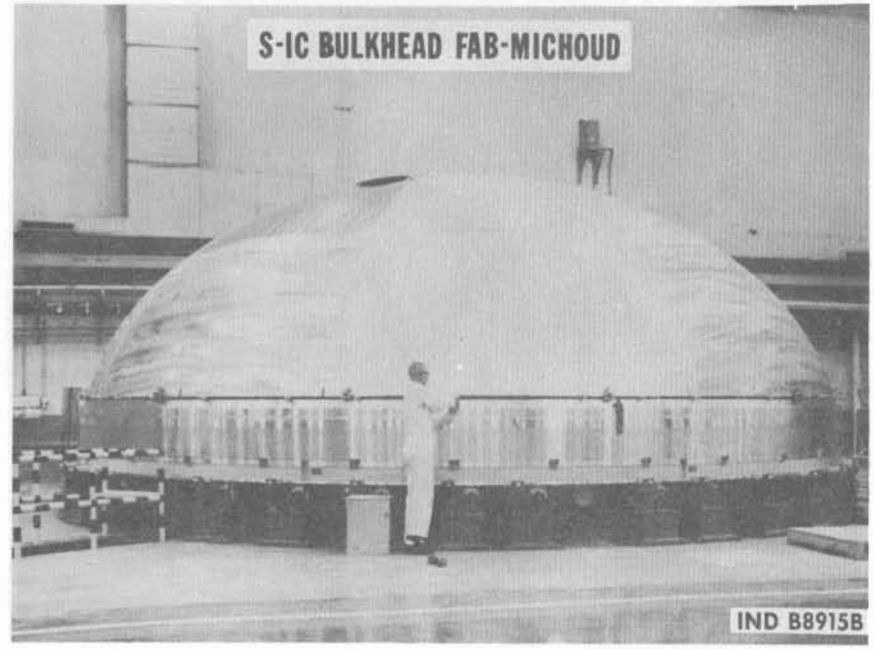
S-IC GORE APEX TO BASE WELD-MICHOUD

S-IC GORE APEX TRIM-MICHOUD

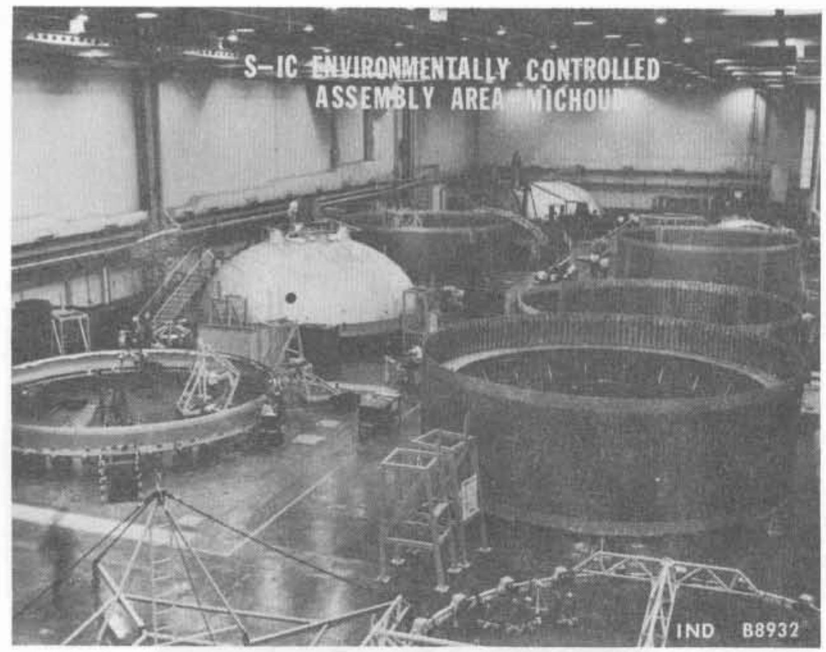
S-IC GORE SECTION ASSEMBLY—MICHOUD

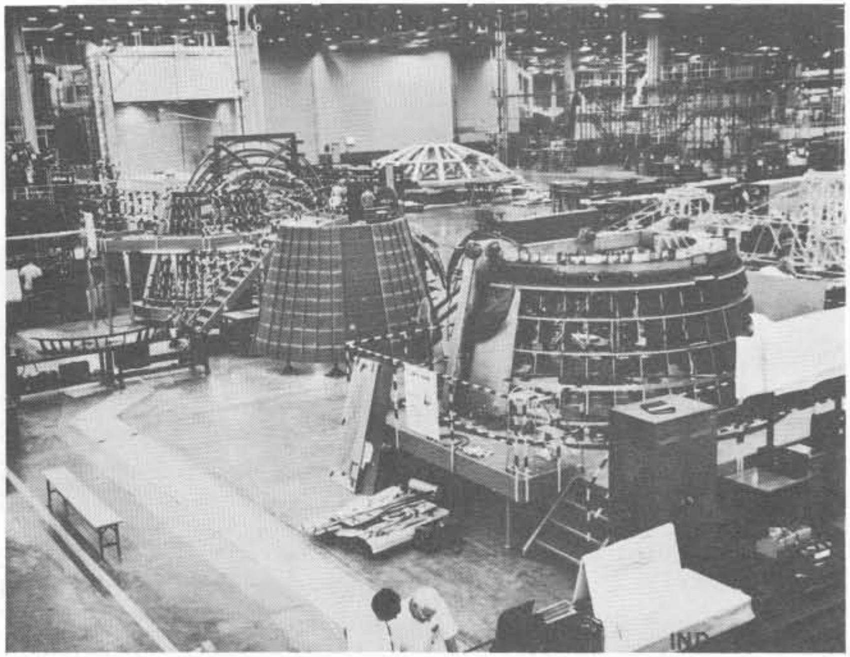
S-IC MERIDIAN WELD OF GORES—MICHOUD


S-IC MERIDIAN WELD OF BULKHEAD—MICHOUD
IND A8912C

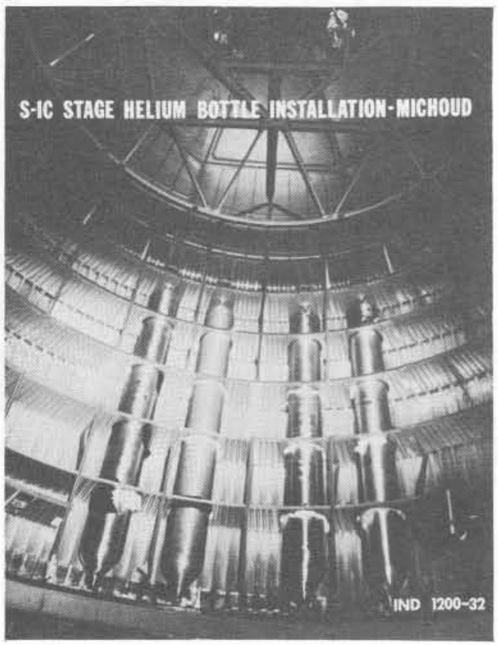

S-IC BULKHEAD FAB-MICHOUD
IND B8915B

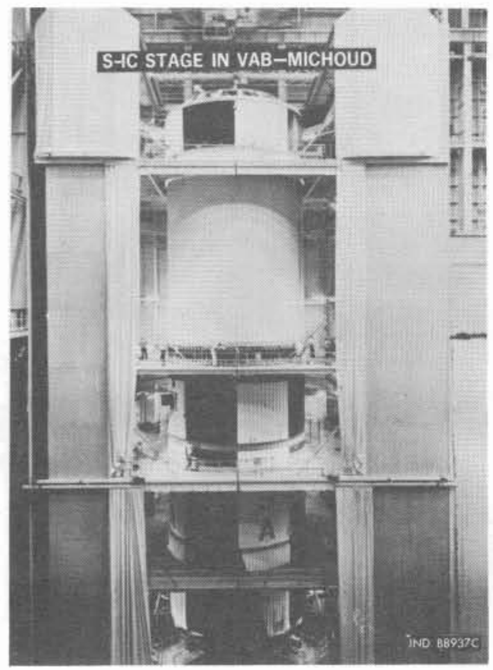

S—IC HORIZONTAL ASSEMBLY AREA—MICHOUD
IND B8931

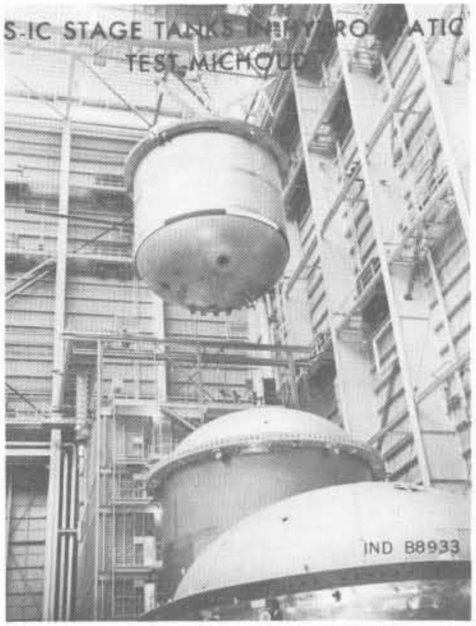

S—IC ENVIRONMENTALLY CONTROLLED
ASSEMBLY AREA—MICHOUD
IND B8932



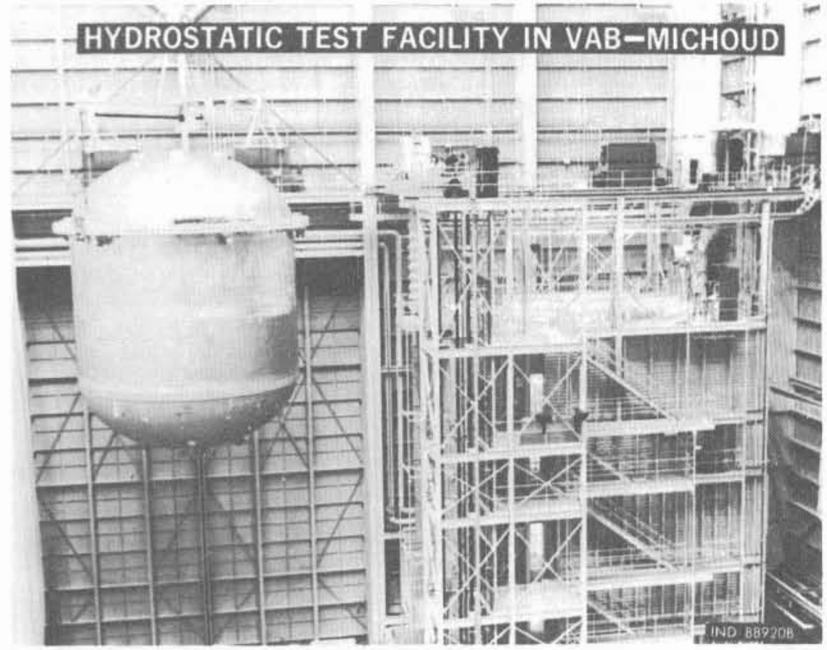

S-IC SKIN PANEL SUB-ASS'Y. AREA
MICHOUD
IND-8914


S-IC STAGE HELIUM BOTTLE INSTALLATION-MICHOUD
IND 1200-32

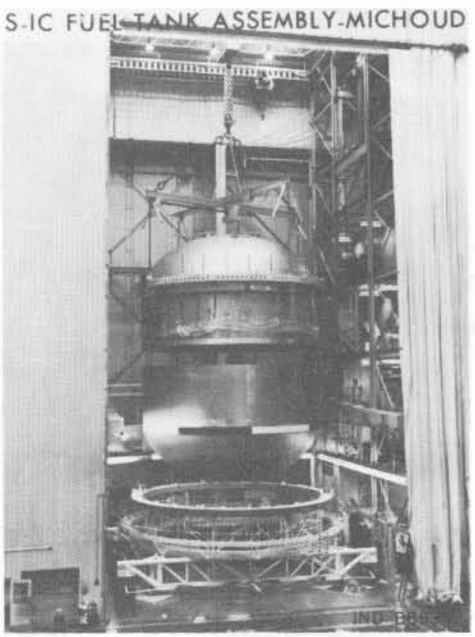

S-IC STAGE IN VAB—MICHOUD



S-IC STAGE TANKS IN HYDROSTATIC TEST-MICHOUD

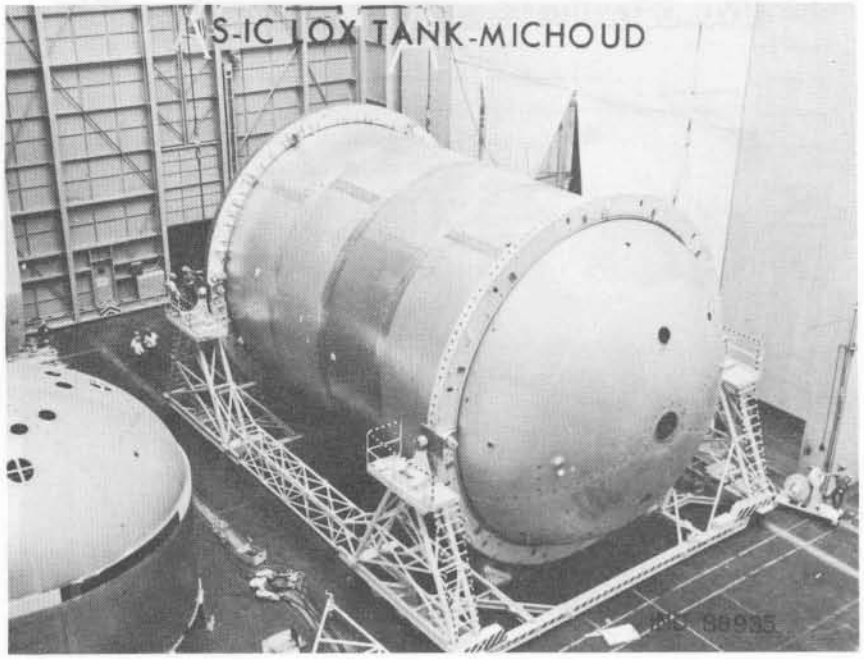


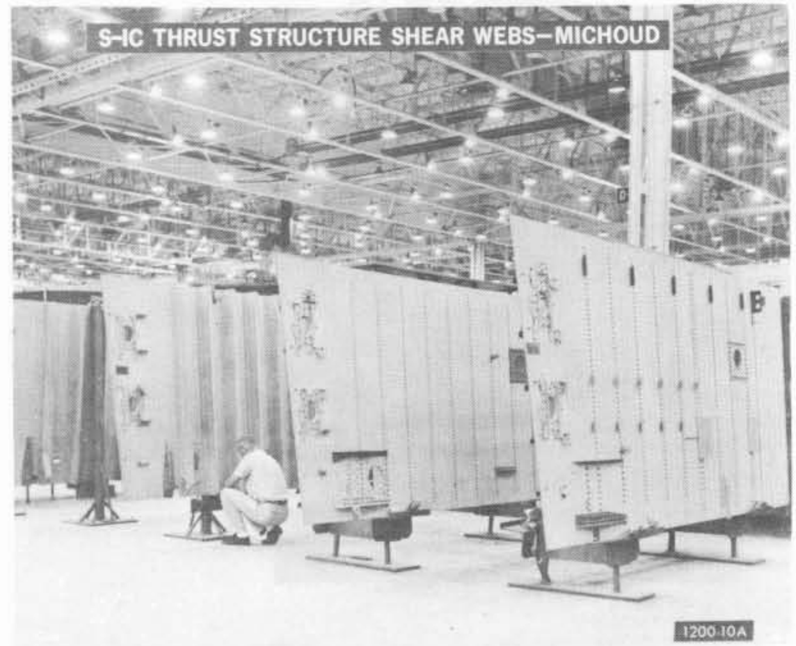
HYDROSTATIC TEST FACILITY IN VAB—MICHOUD

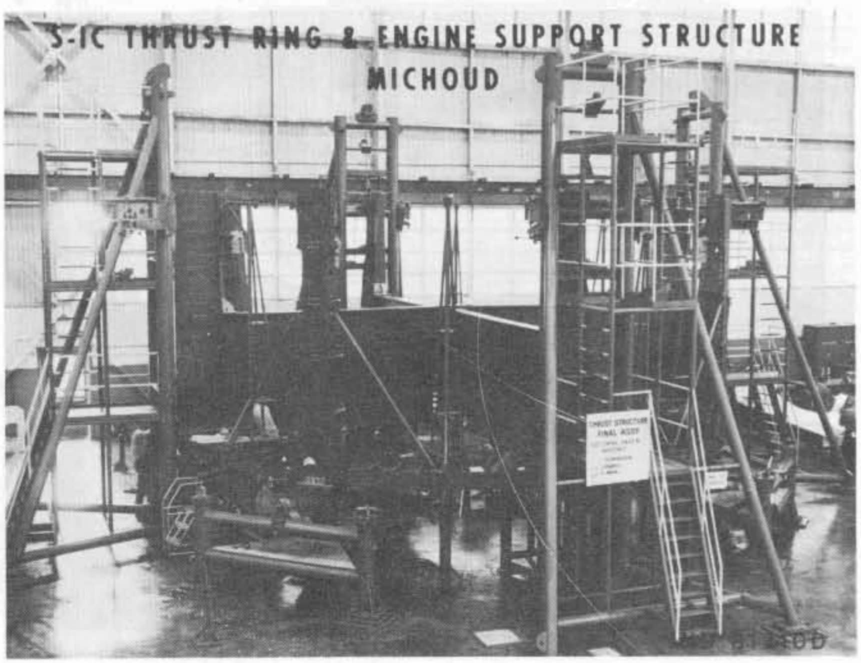


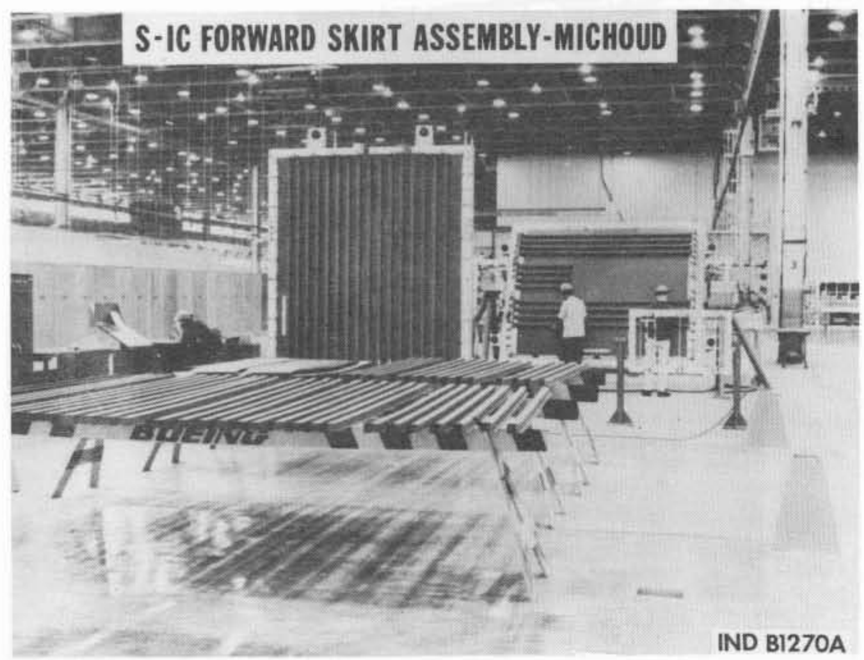
S-IC FUEL TANK ASSEMBLY-MICHOUD

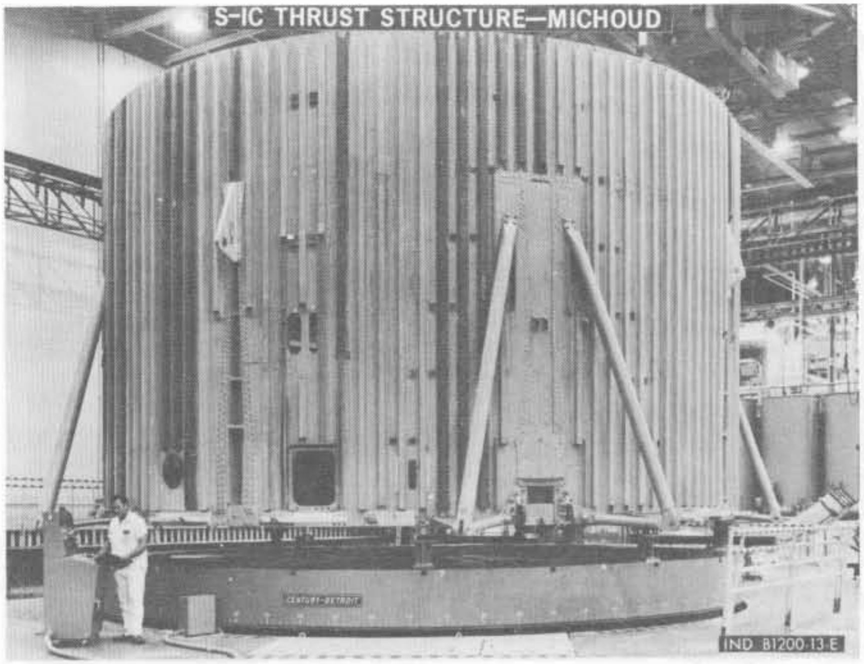
S-IC FUEL TANK—MICHOUD

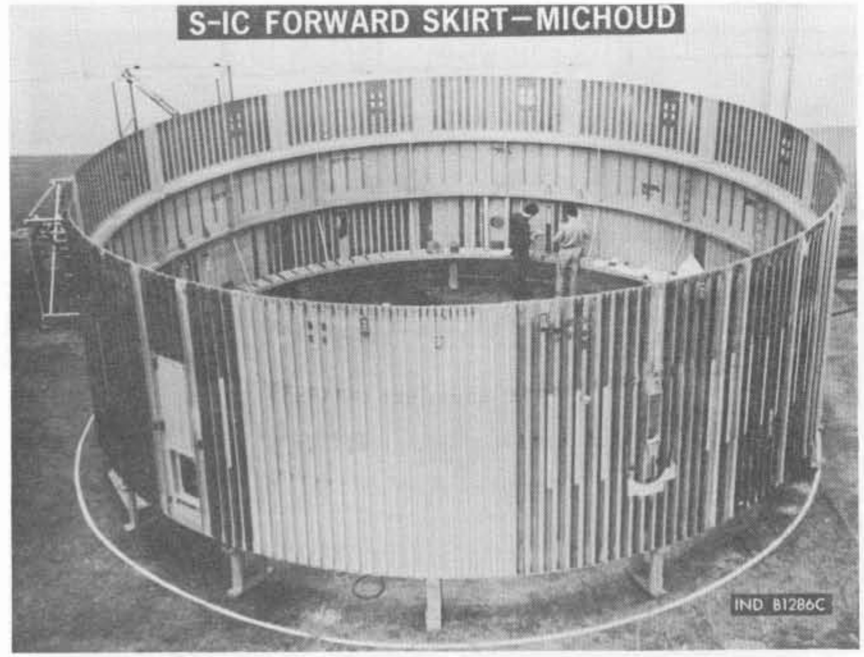

S-IC LOX TANK-MICHOUD
IND 98935

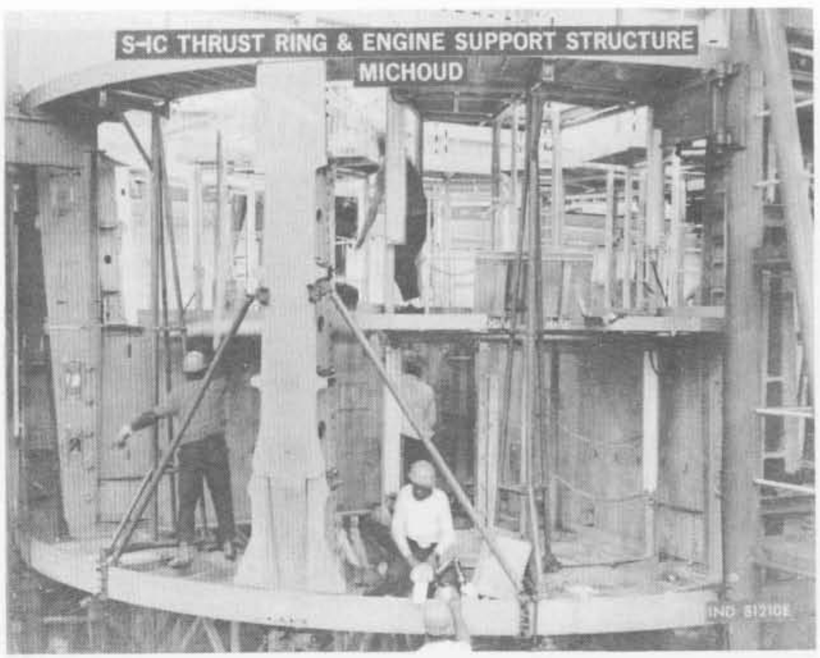

S-IC THRUST STRUCTURE SHEAR WEBS—MICHOUD
1200-10A

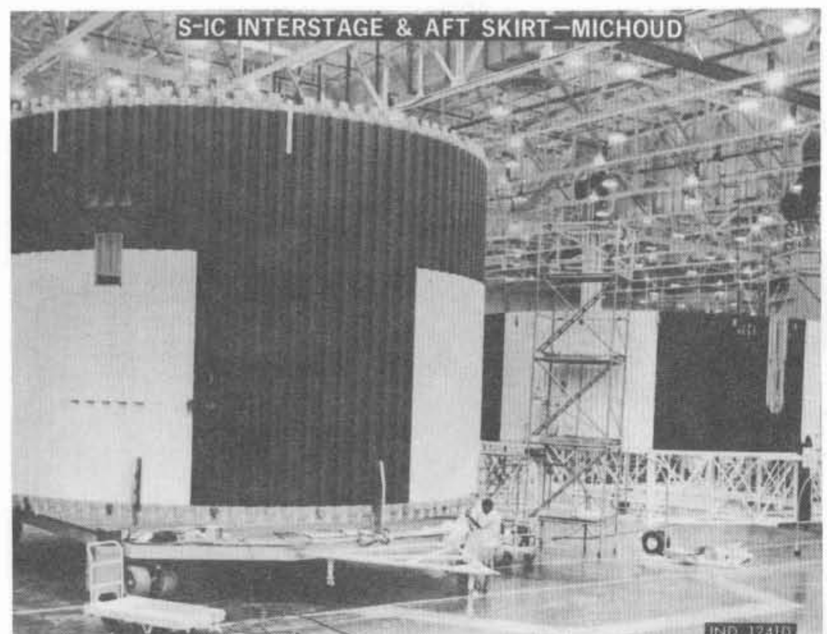

S-IC THRUST RING & ENGINE SUPPORT STRUCTURE
MICHOUD


S-IC FORWARD SKIRT ASSEMBLY-MICHOUD
IND B1270A

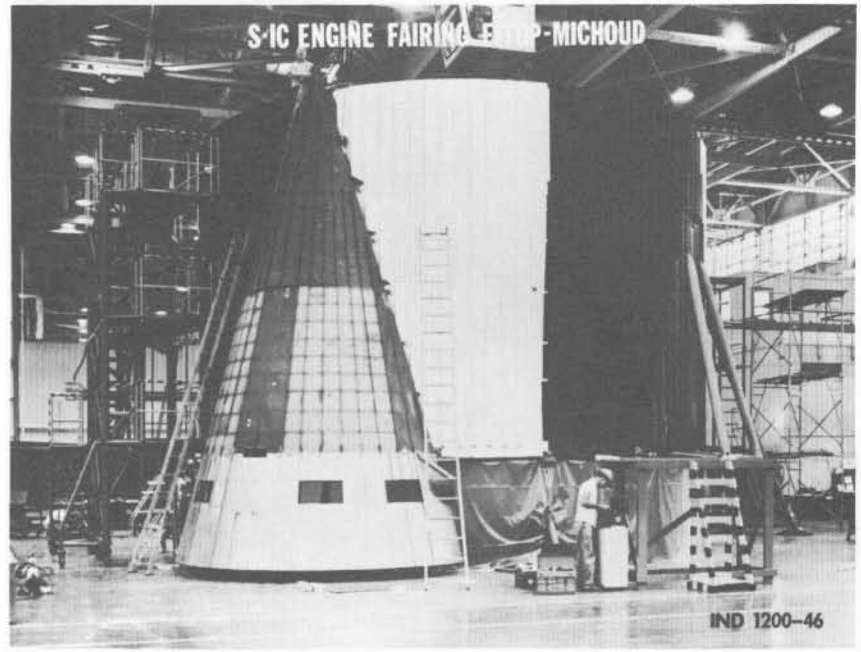

S-IC THRUST STRUCTURE—MICHOUD
IND B1200-13-E

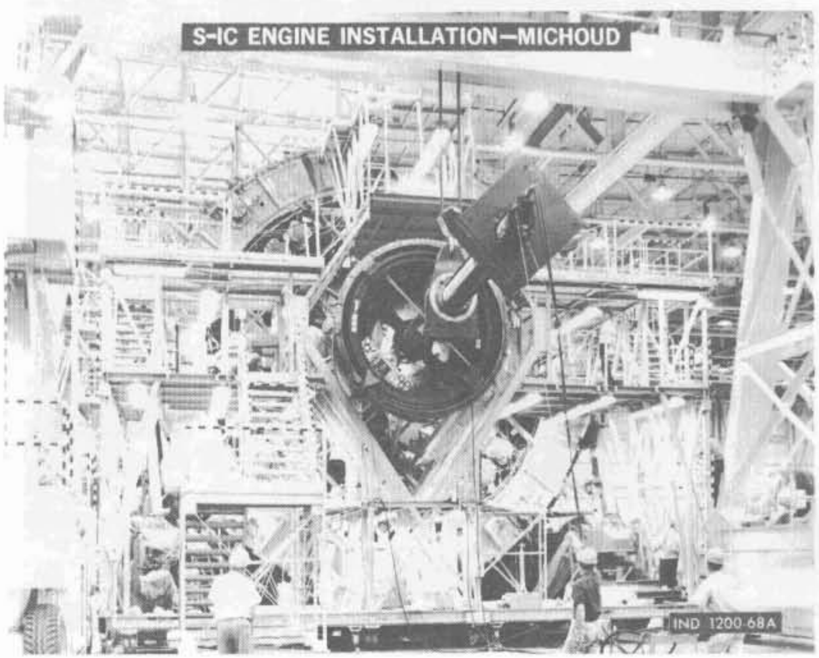

S-IC FORWARD SKIRT—MICHOUD
IND B1286C

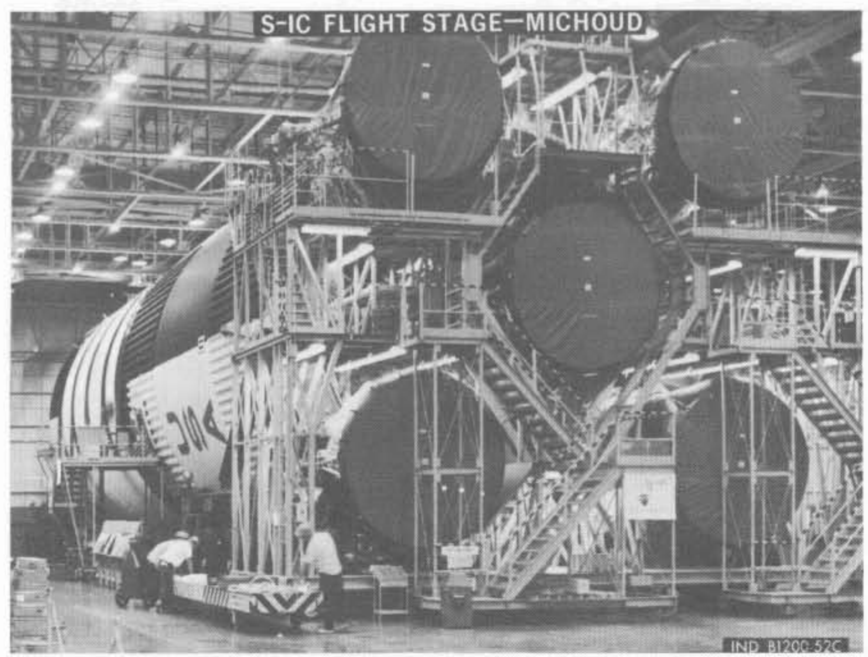

S-IC THRUST RING & ENGINE SUPPORT STRUCTURE
MICHOUD
IND B1210E


S-IC INTERSTAGE & AFT SKIRT—MICHOUD
IND 1241D

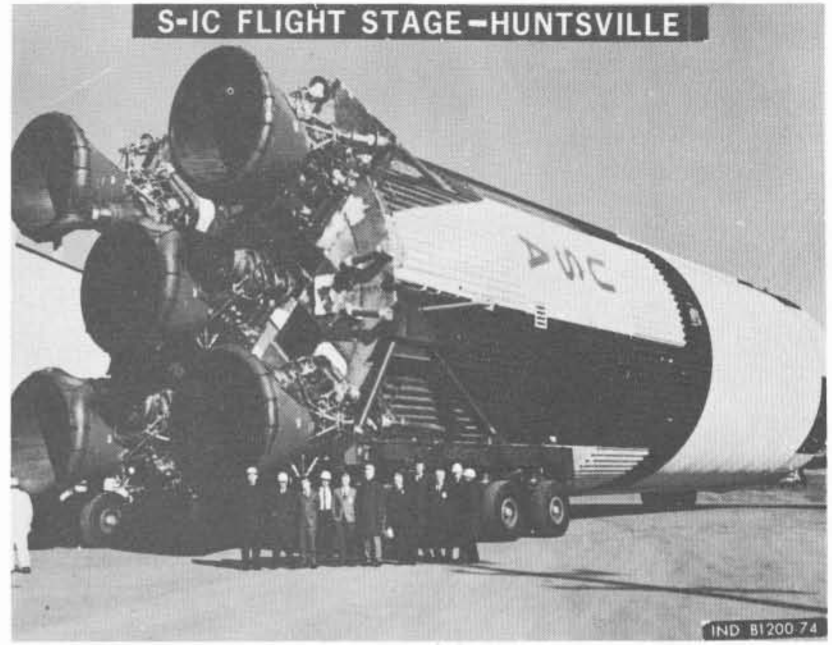

S-IC FIN AND FAIRING ASSEMBLY—MICHOUD
IND 81200 40A

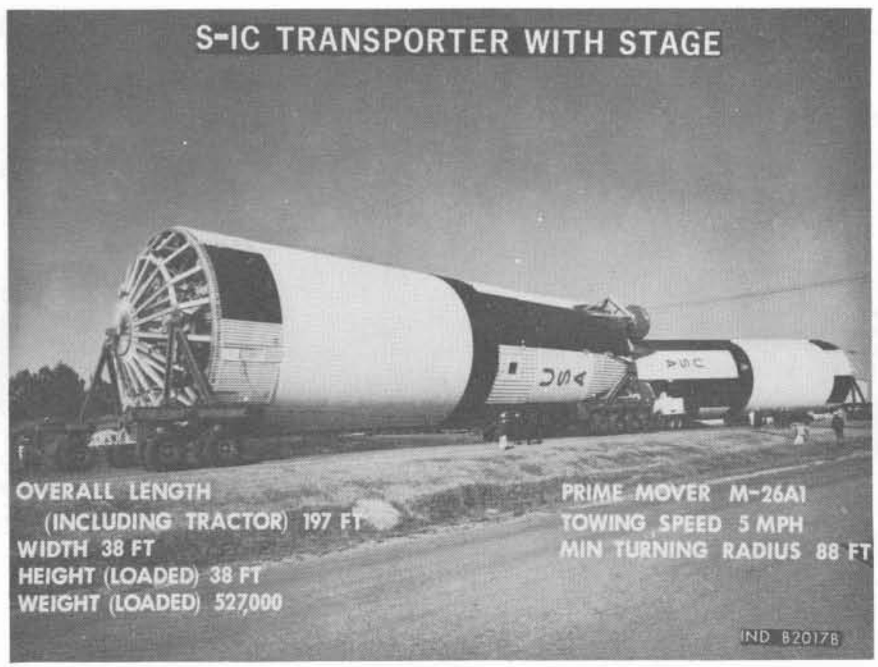

S-IC ENGINE FAIRING
P-MICHOUD
IND 1200-46


S-IC ENGINE INSTALLATION—MICHOUD
IND 1200 68A

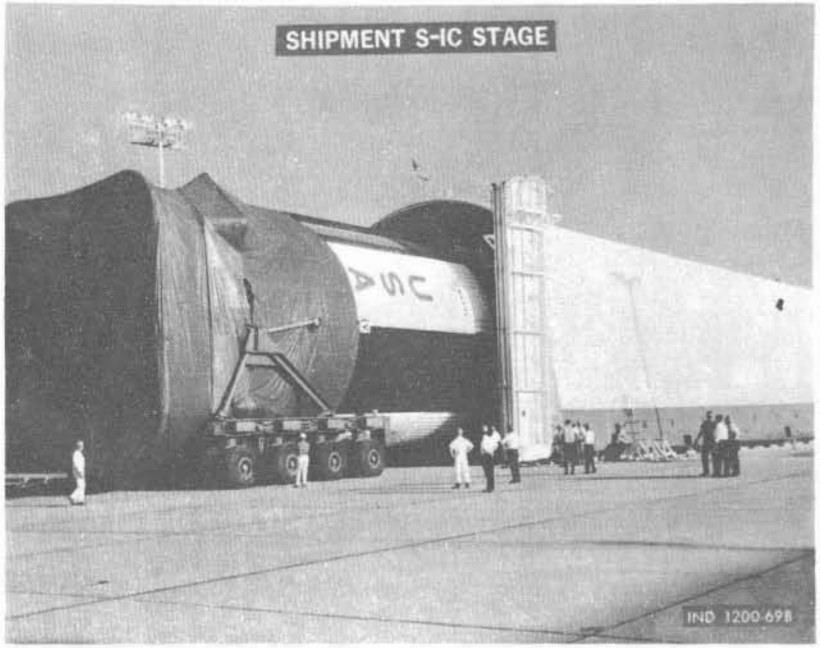

S-IC FLIGHT STAGE—MICHOUD
IND 81200 52C


S-IC STAGES IN HORIZONTAL AREA—MICHOUD


S-IC FLIGHT STAGE—HUNTSVILLE

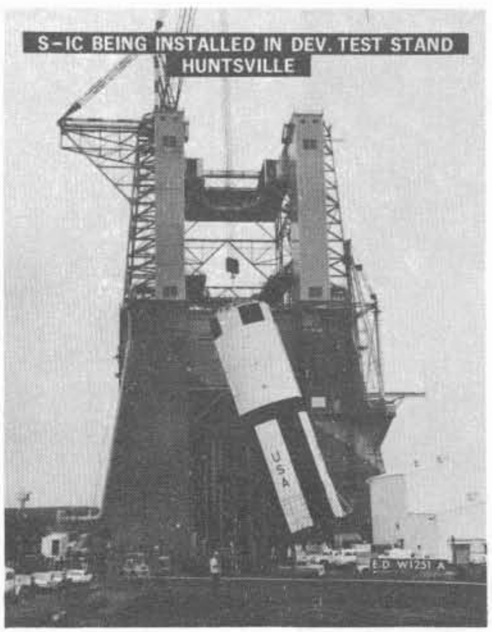


S-IC TRANSPORTER WITH STAGE

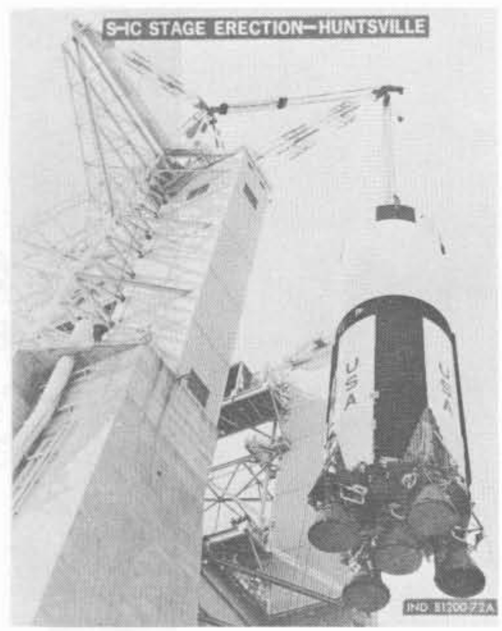


SHIPMENT S-IC STAGE

S-IC-D ERECTION–HUNTSVILLE



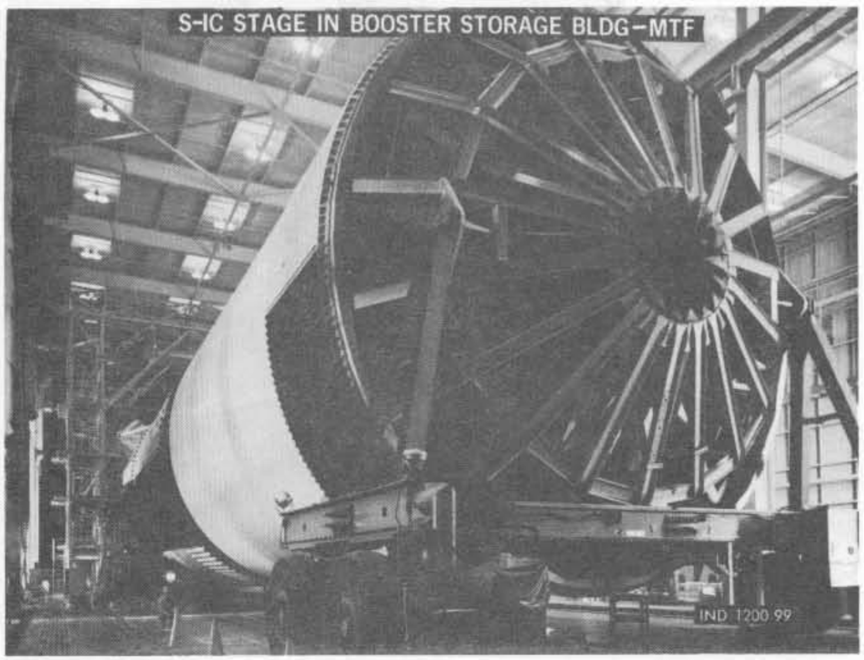
S-IC BEING INSTALLED IN DEV. TEST STAND HUNTSVILLE



S-IC STAGE ERECTION–HUNTSVILLE

S-IC FIRING—HUNTSVILLE

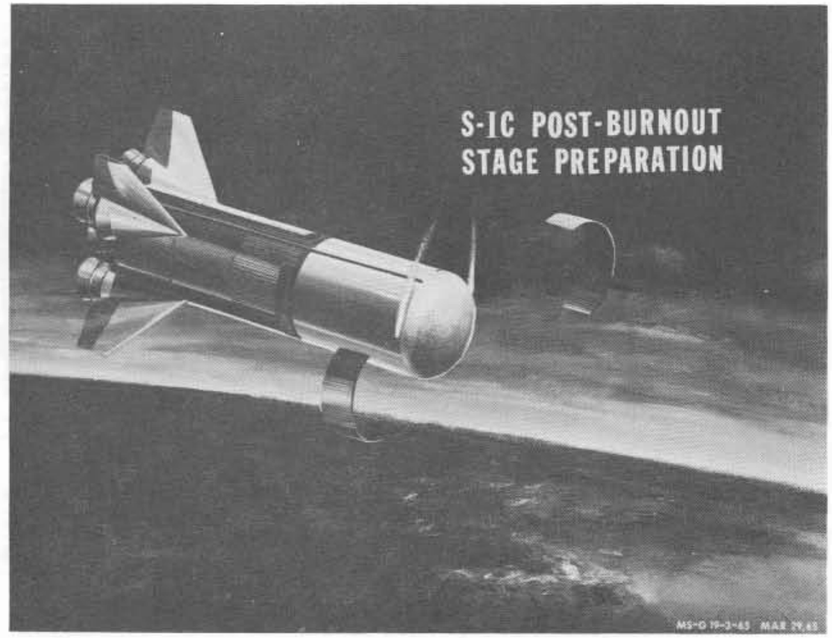
S-IC ARRIVAL—MTF

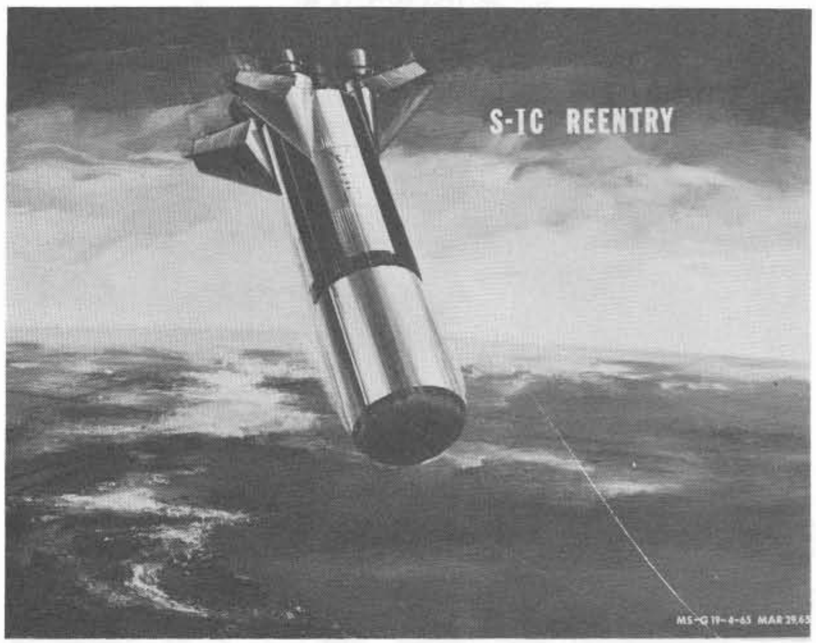


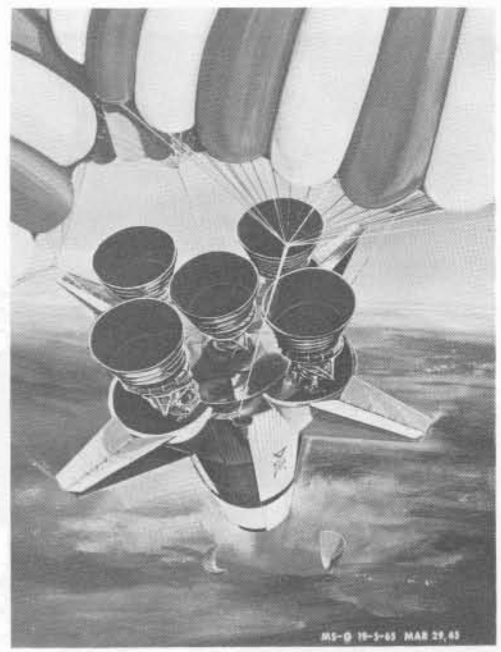
S-IC STAGE IN BOOSTER STORAGE BLDG—MTF

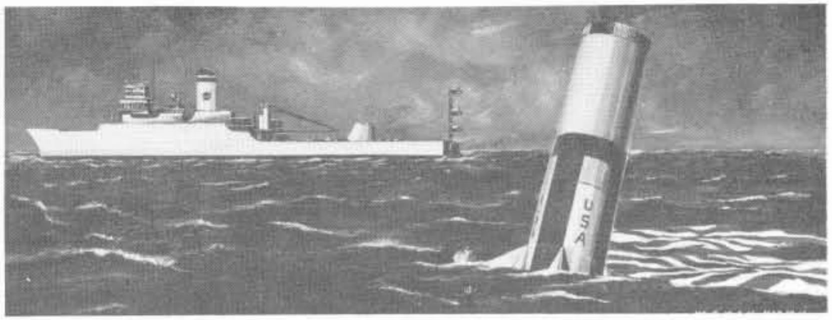
S-IC FIRING—MTF


S-IC STAGE ARRIVAL—KSC
IND 81200.73

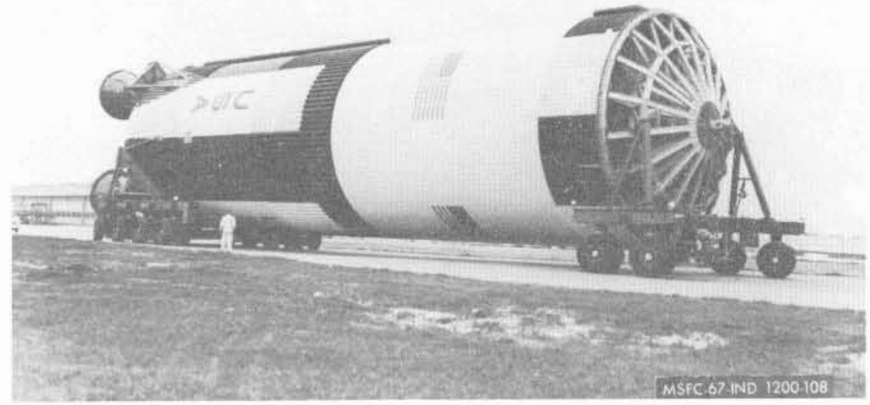

S-IC POST-BURNOUT
STAGE PREPARATION


S-IC REENTRY


MS-G 19-5-65 MAR 29, 65



S-IC STAGE ON TRANSPORTER



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S-II STAGE

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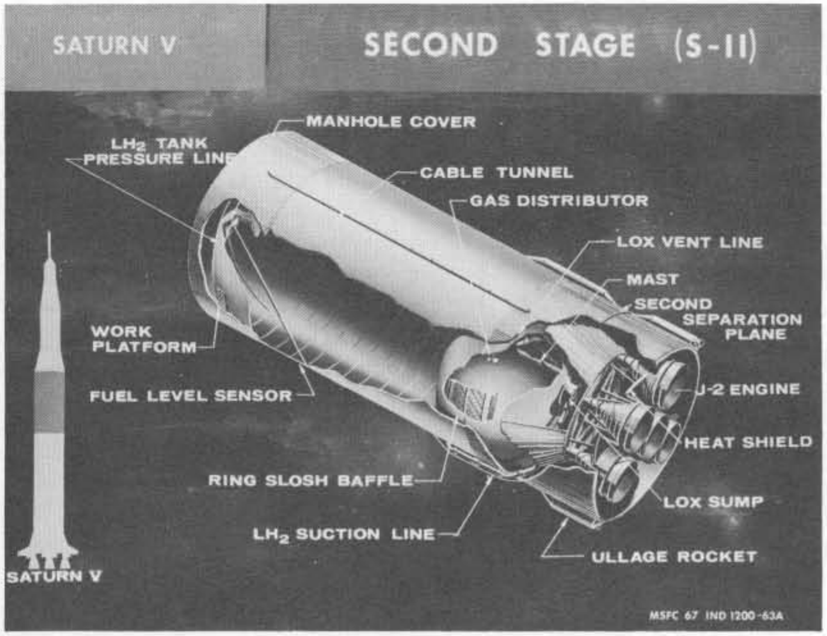
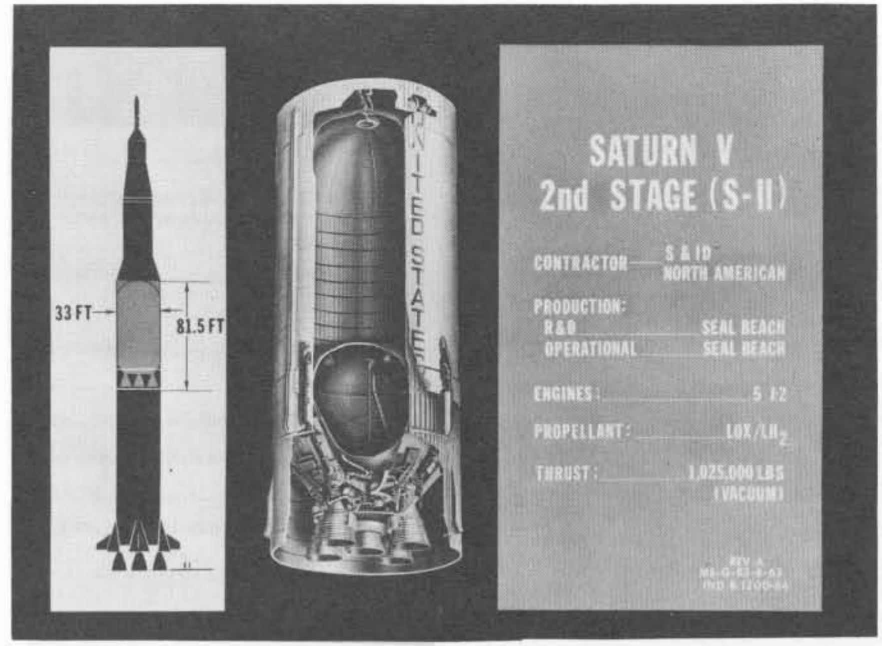
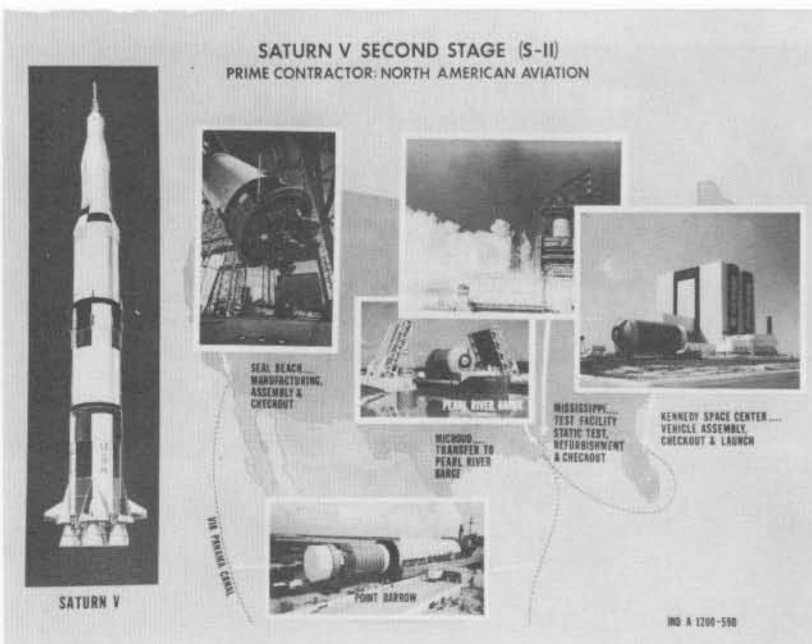
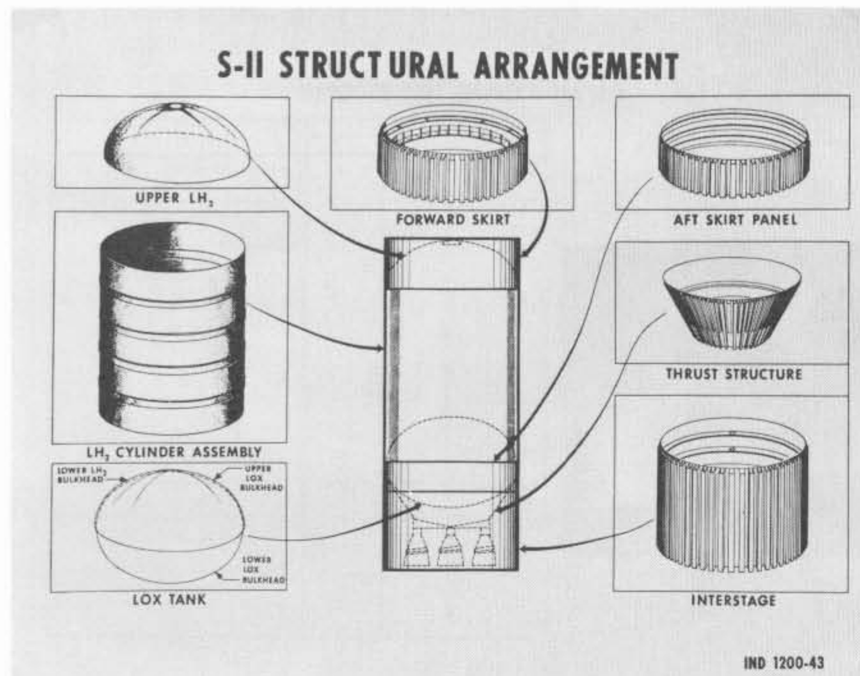

SATURN V
SECOND STAGE (S-II)
MANHOLE COVER
LH2 TANK PRESSURE LINE
CABLE TUNNEL
GAS DISTRIBUTOR
LOX VENT LINE
MAST
SECOND SEPARATION PLANE
WORK PLATFORM
FUEL LEVEL SENSOR
J-2 ENGINE
HEAT SHIELD
RING SLOSH BAFFLE
LOX SUMP
LH2 SUCTION LINE
ULLAGE ROCKET
SATURN V
MSFC 67 IND 1200-63A


33 FT
81.5 FT
SATURN V
2nd STAGE (S-II)
CONTRACTOR — S & ID NORTH AMERICAN
PRODUCTION:
R&D — SEAL BEACH
OPERATIONAL — SEAL BEACH
ENGINES: — 5 J-2
PROPELLANT: — LOX/LH2
THRUST: — 1,025,000 LBS (VACUUM)


SATURN V SECOND STAGE (S-II)
PRIME CONTRACTOR: NORTH AMERICAN AVIATION
SATURN V
SEAL BEACH... MANUFACTURING, ASSEMBLY & CHECKOUT
MICHOUD... TRANSFER TO PEARL RIVER BARGE
MISSISSIPPI... TEST FACILITY STATIC TEST, REFURBISHMENT & CHECKOUT
KENNEDY SPACE CENTER... VEHICLE ASSEMBLY, CHECKOUT & LAUNCH
VIA PANAMA CANAL
POINT BARROW
IND A 1200-59B


S-II STRUCTURAL ARRANGEMENT
UPPER LH2
FORWARD SKIRT
AFT SKIRT PANEL
LH2 CYLINDER ASSEMBLY
THRUST STRUCTURE
LOX TANK
INTERSTAGE
IND 1200-43

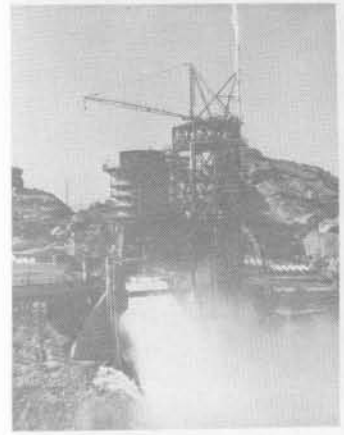
SATURN V S-II STAGE

MANUFACTURING	SEAL BEACH
ENGINE	J-2
MANUFACTURED BY	ROCKETDYNE CANOGA PARK
DEVELOPMENT TEST	SEAL BEACH SANTA SUSANA, HUNTSVILLE, & CAPE KENNEDY
ACCEPTANCE TEST	MISSISSIPPI TEST FACILITY
TRANSPORTATON	SHIP & BARGE
LAUNCH FACILTY	KSC

STATUS

CONTRACTOR	SPACE AND INFORMATION SYSTEMS DIVISION–NORTH AMERICAN AVIATION
CONTRACT VALUE	$877,700,000
CONTRACT NUMBER	NAS 7-200
PERIOD OF CONTRACT	1962–1969
NUMBER TEST STAGES	2
NUMBER FLIGHT STAGES	10
BATTLESHIP STATIC TEST BEGUN	NOV '64
S-II-1 STATIC TESTED	DEC '66
S-II-2 STATIC TEST SCHEDULED	APR '67

SATURN V/S-II BATTLESHIP STAGE TEST PROGRAM



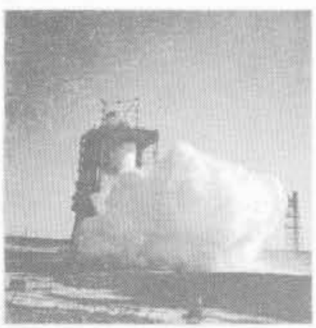
DATE	DURATION		RESULTS
	PLANNED	ACTUAL	
*NOV. 9,'64	IGNITION	IGNITION	SUCCESSFUL
*NOV. 21, '64	TRANSITION	TRANSITION	SUCCESSFUL
*NOV. 26,'64	10 SEC.	1.2 SEC.	PREMATURE CUTOFF. TEMP OVER LIMIT
*DEC. 11,'64	10 SEC.	10 SEC.	SUCCESSFUL
APR. 24,'65	IGNITION	IGNITION	SUCCESSFUL
MAY 1,'65	10 SEC.	IGNITION	PREMATURE CUTOFF. FALSE SIGNAL.
MAY 5,'65	10 SEC.	1.2 SEC.	PREMATURE CUTOFF. FALSE SIGNAL
MAY 7,'65	10 SEC.	10 SEC.	SUCCESSFUL
JUN. 9,'65	25 SEC.	8 SEC.	LOST PREP-COMPLETE SIGNAL
JUN. 15,'65	25 SEC.	5 SEC.	LOST PREP - COMPLETE SIGNAL
JUN. 17,'65	25 SEC.	TRANSITION	PREMATURE CUTOFF. SLAM PRESS. SWITCH
JUN. 26,'65	25 SEC.	3 SEC.	PREMATURE CUTOFF GAS GEN. OVERHEAT
JUL. 13,'65	25 SEC.	2.86 SEC.	MANUAL CUTOFF. FAULTY CONNECTION
JUL. 13,'65	25 SEC.	27 SEC.	SUCCESSFUL
JUL. 16,'65	150 SEC.	34 SEC.	MANUAL CUTOFF. FALSE INDICATION.
JUL. 20,'65	150 SEC.	150 SEC.	SUCCESSFUL
JUL. 27,'65	FULL	IGNITION	IGNITION CUTOFF. FAULTY PROBE
JUL. 27,'65	FULL	60 SEC.	MANUAL CUTOFF. FALSE SIGNAL.
JUL. 30,'65	FULL	65 SEC.	AUTOMATIC CUTOFF. LOST H_2 CONTROL SOLENOID SIGNAL.
AUG. 3,'65	FULL	5 SEC.	PREMATURE CUTOFF. OVERTEMP #2 ENG.
AUG. 9,'65	FULL	FULL	SUCCESSFUL 392 SEC.
AUG. 12,'65	150 SEC.	104 SEC.	MANUAL CUTOFF. ENGINE FIRES
DEC.22'65	15 SEC.	1.02 SEC.	AUTOMATIC CUTOFF. FAULTY INDICATION.
DEC.28'65	15 SEC.	1.08 SEC.	AUTOMATIC CUTOFF. FAULTY WIRING
DEC.29'65	15 SEC.	5.3 SEC.	MANUAL CUTOFF. OBSERVER ERROR
DEC.29'65	15 SEC.	18 SEC.	SUCCESSFUL
JAN.12'66	350 SEC.	354 SEC.	SUCCESSFUL
FEB.7'66	200-350 SEC.	335 SEC.	SUCCESSFUL

*SINGLE ENGINE TEST

TOTAL ACTUAL FIRING TO DATE 1592.67 SEC.

IND B1200-458

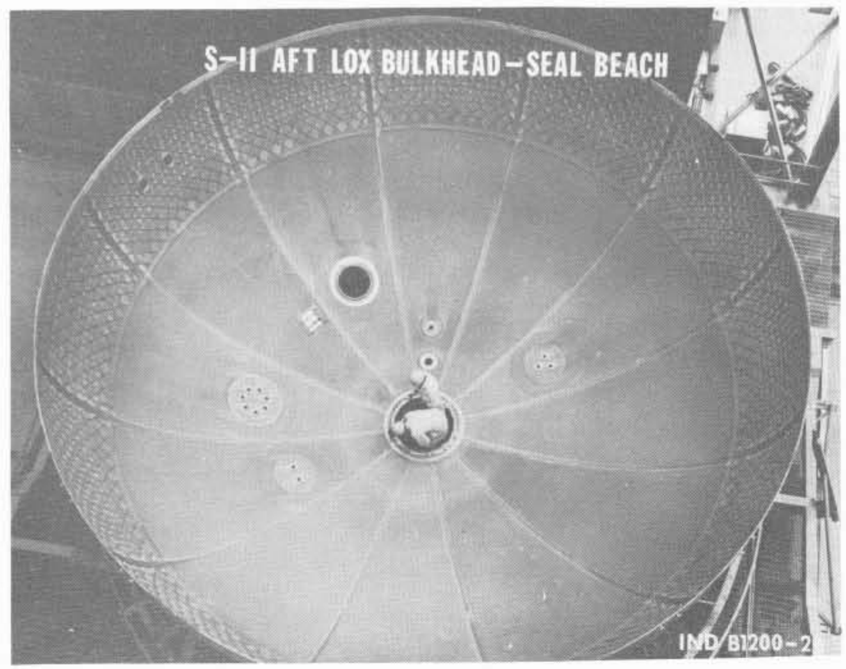
S-II ALL SYSTEMS TEST PROGRAM



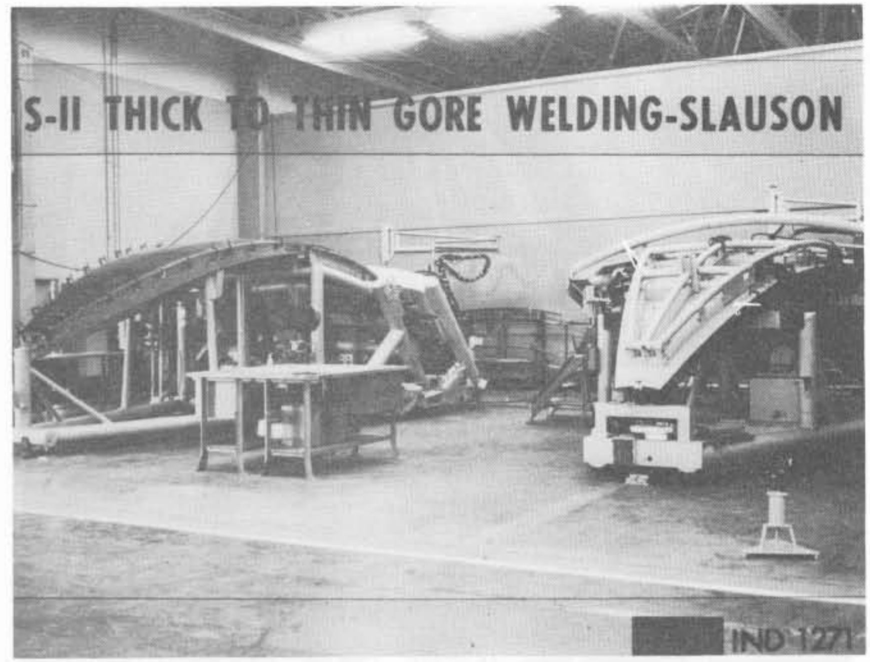
DATE	DURATION (SEC)		RESULTS
	PLANNED	ACTUAL	
APRIL 23, 1966	15	15	OBSERVER TIMED CUTOFF
MAY 5, 1966	150	[illegible]	TERMINATED DUE TO P.U. VALVE NOT SLEWING PRIOR TO OFFLOADING LH2
MAY 10, 1966	150	[illegible]	OBSERVER CUTOFF DUE TO ERRONEOUS INDICATION ON THE ENGINE HELIUM CONTROL BOTTLE PRESSURE.
MAY 11, 1966	150	43	AUTOMATIC CUTOFF DUE TO AN ERRONEOUS ENGINE #3 GAS GENERATOR OVERTEMPERATURE DEVICE
MAY 14, 1966	150	[illegible]	AUTOMATIC CUTOFF DUE TO AN ERRONEOUS VIBRATION SAFETY CUTOFF
MAY 17, 1966	150	150	OBSERVER TIMED CUTOFF
MAY [illegible], 1966	FULL	354	LOX TANK LOW LEVEL SENSOR CUTOFF
MAY [illegible], 1966	FULL	[illegible]	AUTOMATIC CUTOFF DUE TO AN ERRONEOUS VIBRATION SAFETY CUTOFF
MAY [illegible], 1966	FULL	[illegible]	AUTOMATIC CUTOFF FROM MAINSTAGE PRESSURE SWITCH AFTER LOX ASI LINE FAILED AND BURNED CABLES CAUSING A SHORT

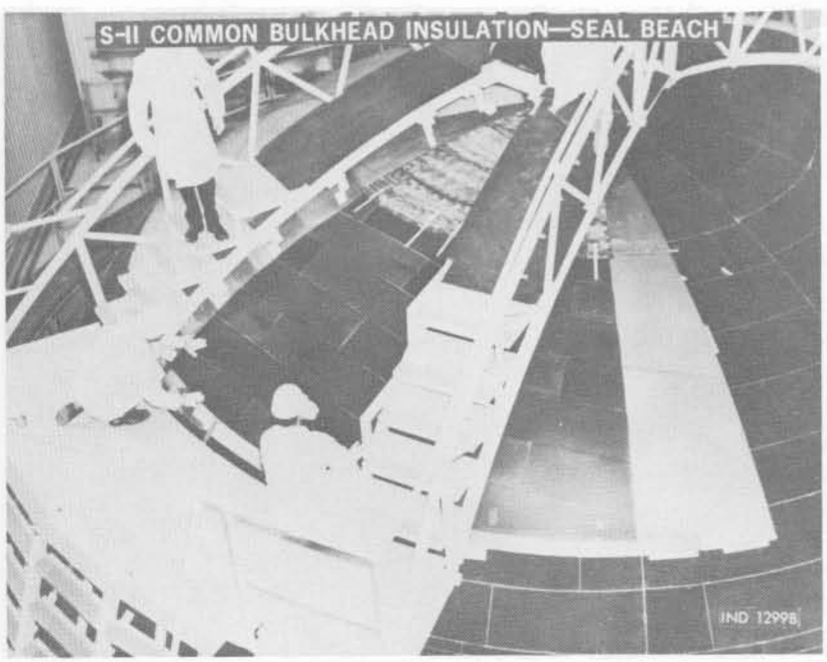
TOTAL ACTUAL FIRING [illegible] SECONDS

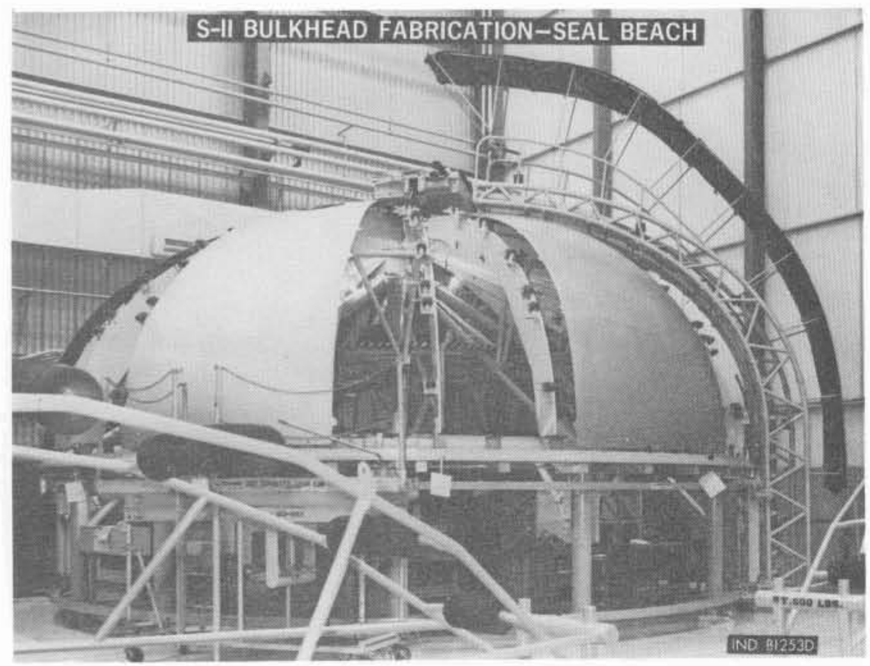
IND B1200-[illegible]




S-II SKATE BULKHEAD WELDER—SEAL BEACH
IND 81213B

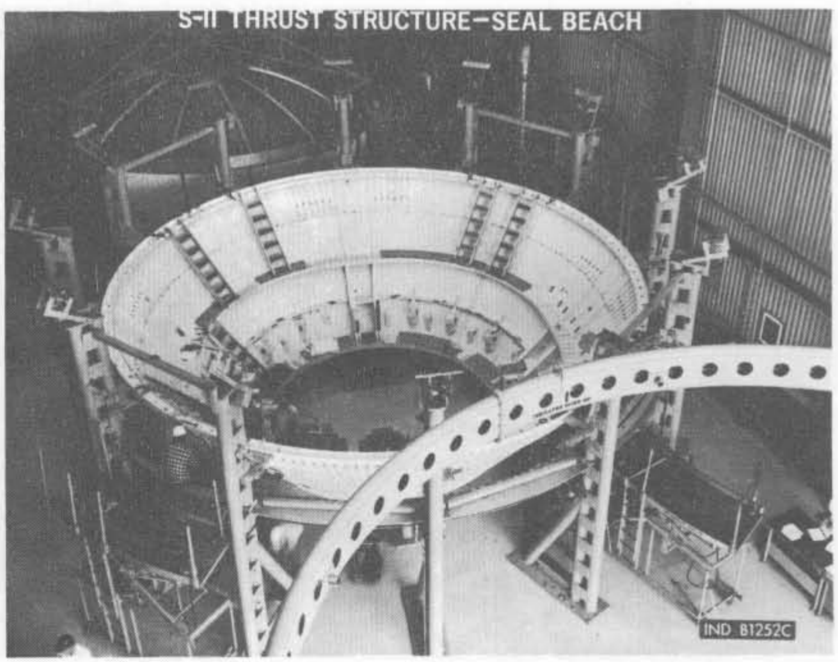

S-II THICK TO THIN GORE WELDING-SLAUSON
IND 1271

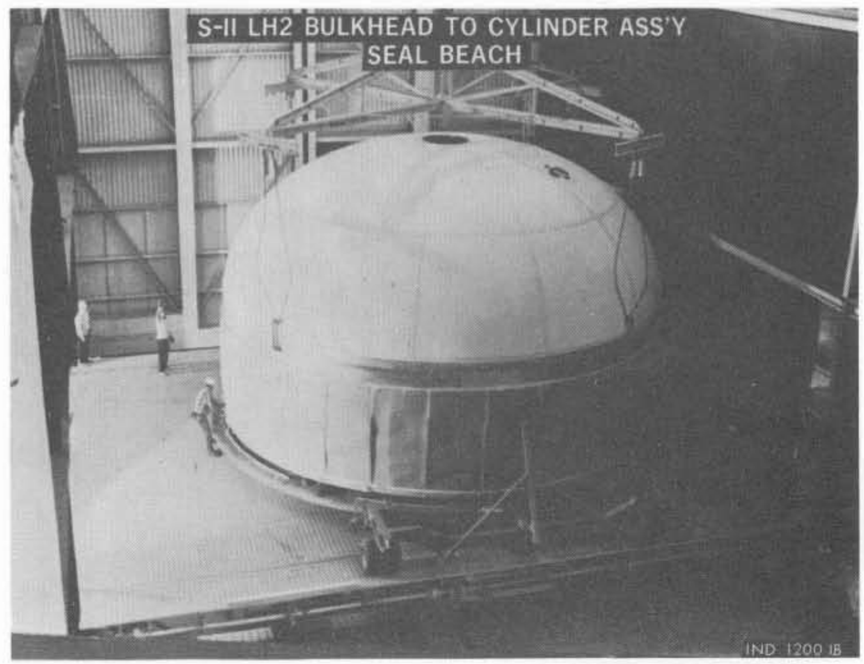

S-II COMMON BULKHEAD INSULATION—SEAL BEACH
IND 12998


S-II BULKHEAD FABRICATION—SEAL BEACH
IND 81253D

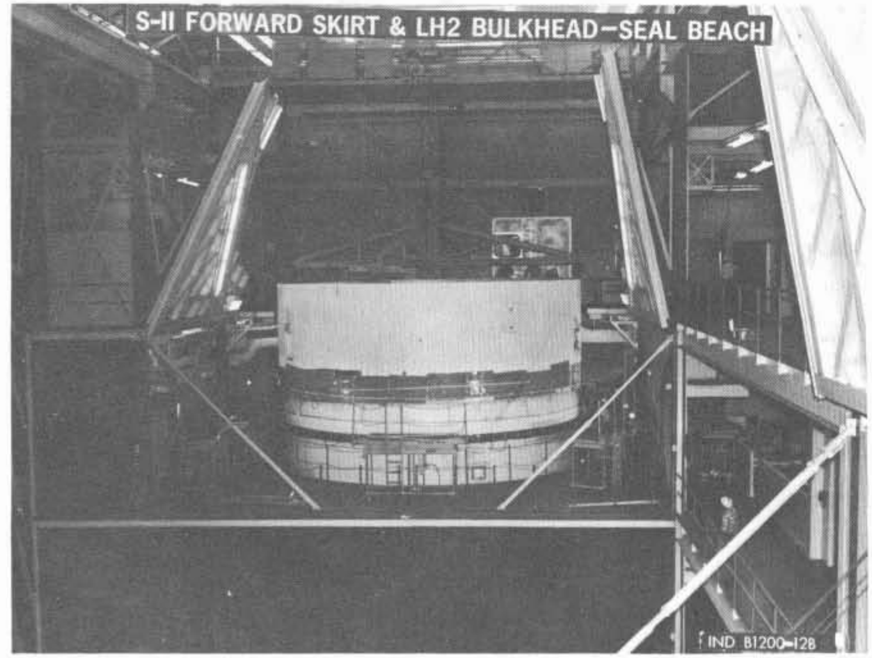

S-II COMMON BULKHEAD FABRICATION – SEAL BEACH
IND B1254B

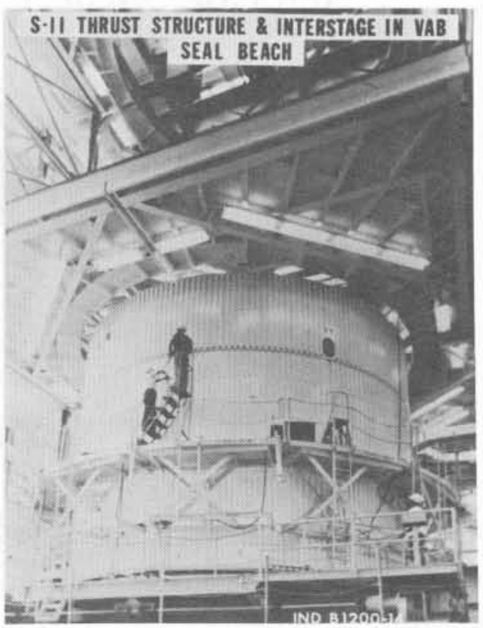

S-II HYDROTEST FIXTURE-SEAL BEACH
IND 1289


S-II THRUST STRUCTURE–SEAL BEACH
IND B1252C

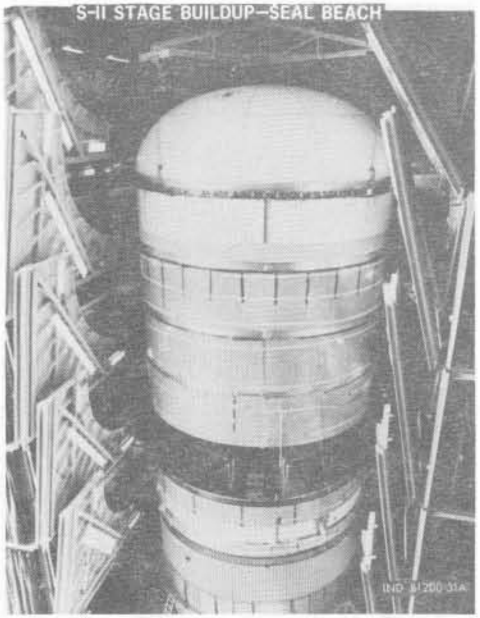

S-II LH2 BULKHEAD TO CYLINDER ASS'Y
SEAL BEACH
IND 1200 IB

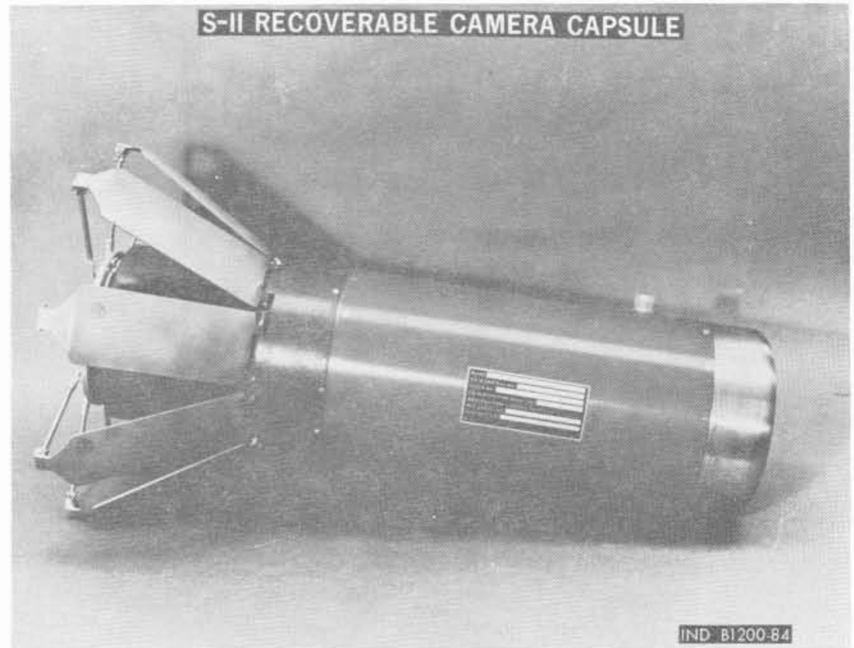

S-II VERTICAL ASSY & HYDROTEST BLDG
SEAL BEACH


S-II FORWARD SKIRT & LH2 BULKHEAD—SEAL BEACH
IND B1200-128

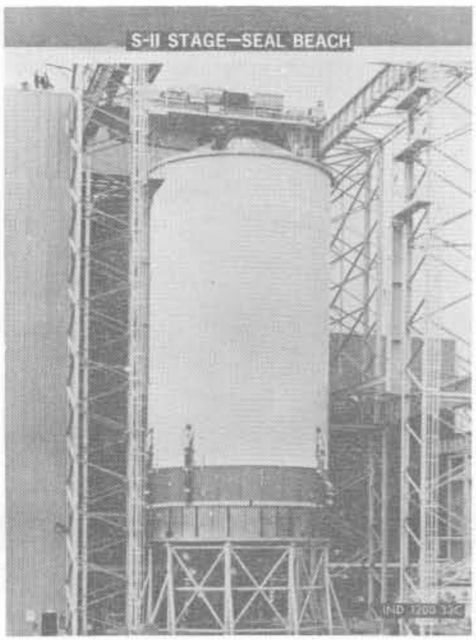

S-II THRUST STRUCTURE & INTERSTAGE IN VAB
SEAL BEACH

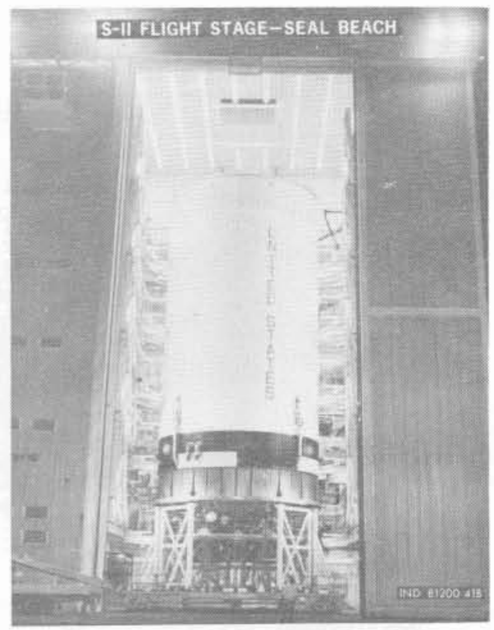

S II INTERSTAGE—SEAL BEACH
IND B1200-6C

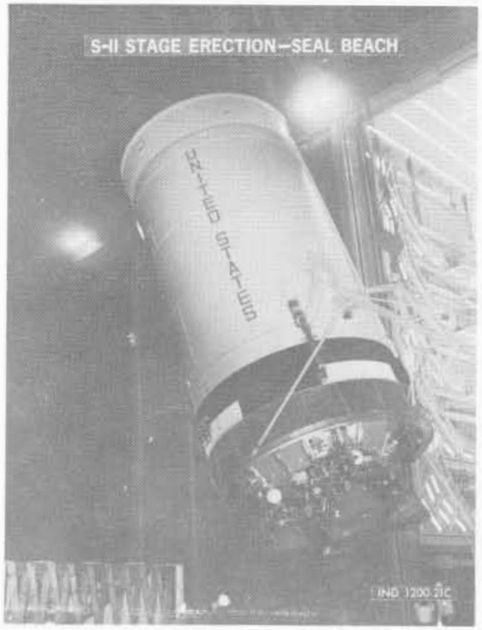

S-II STAGE BUILDUP—SEAL BEACH

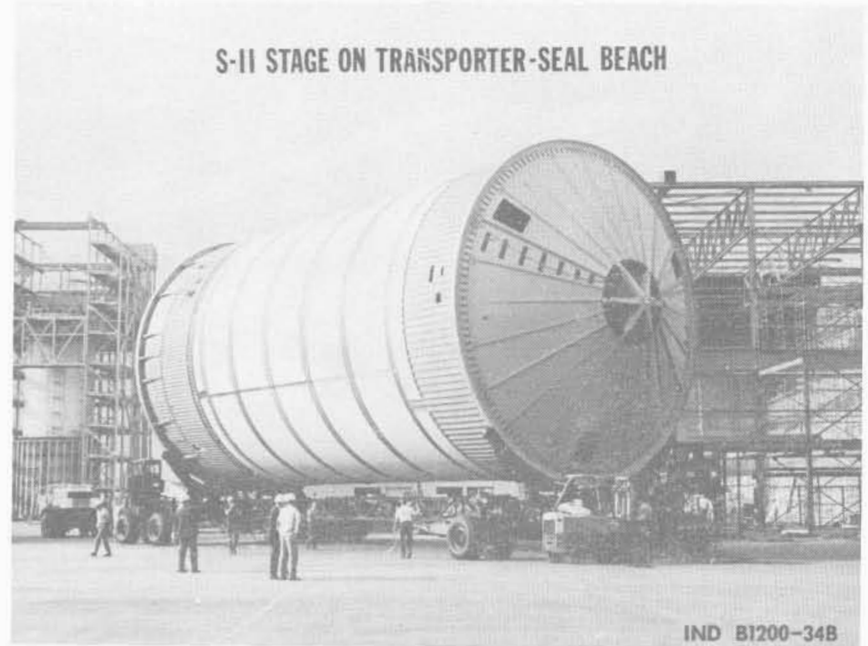


S-II RECOVERABLE CAMERA CAPSULE

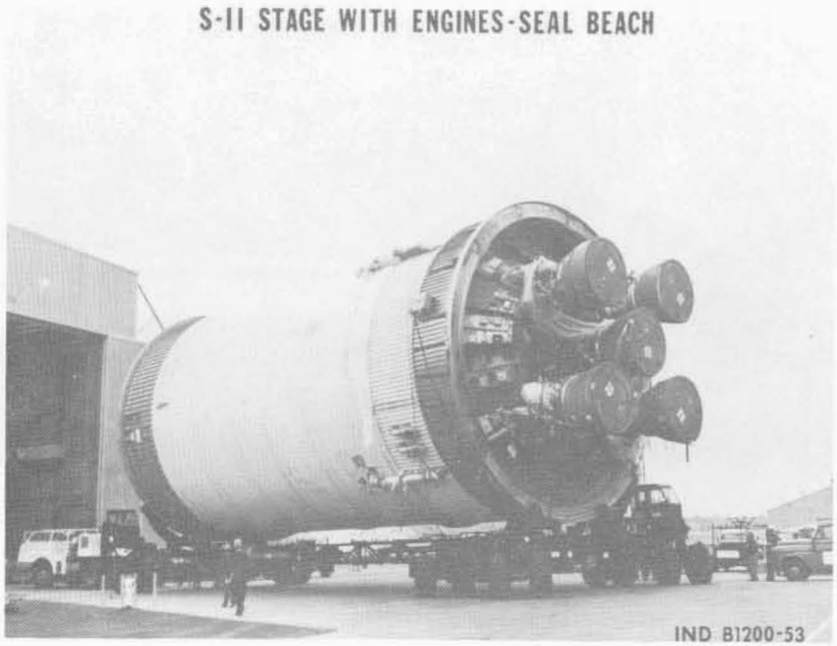

S-II STAGE—SEAL BEACH

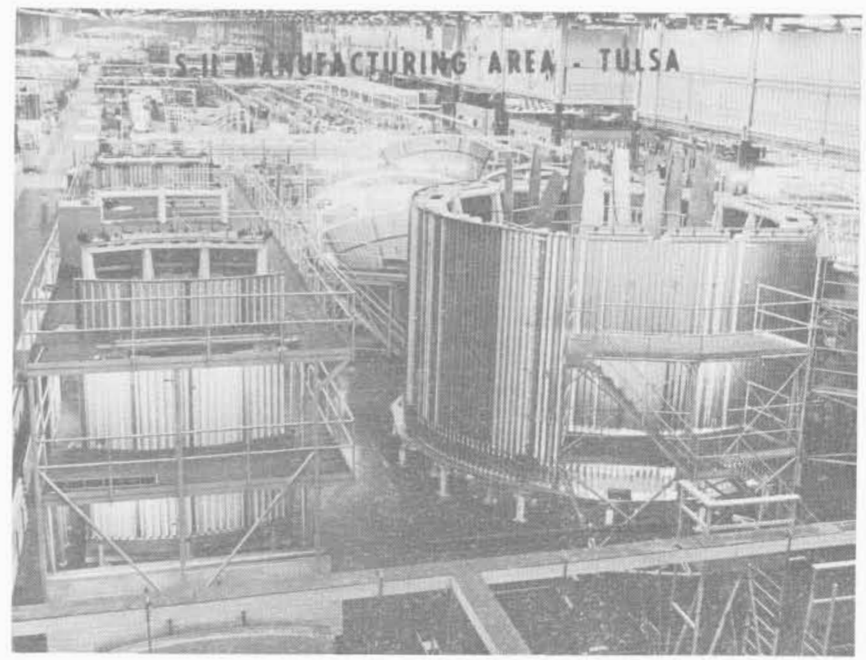

S-II FLIGHT STAGE—SEAL BEACH

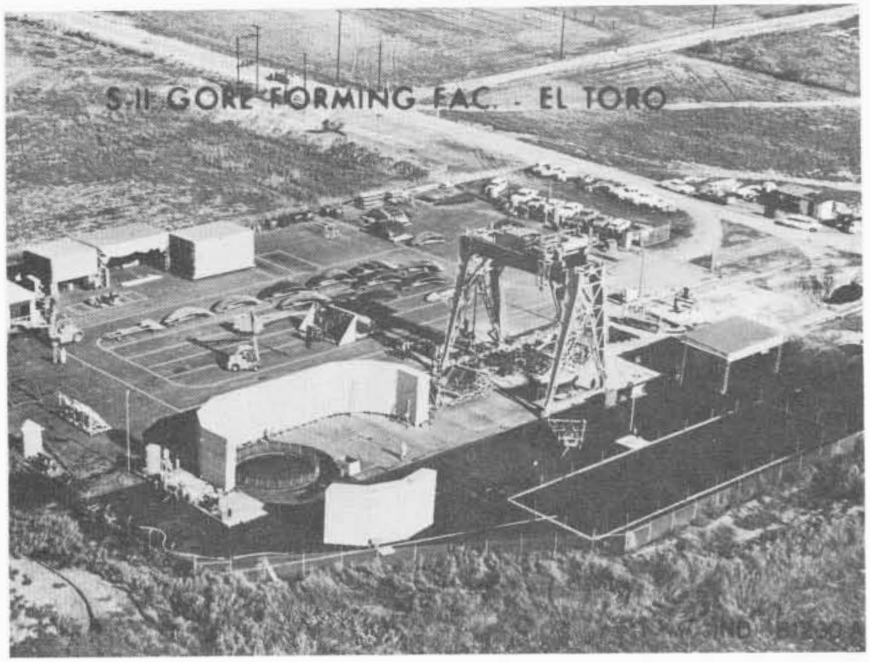

S-II STAGE ERECTION—SEAL BEACH

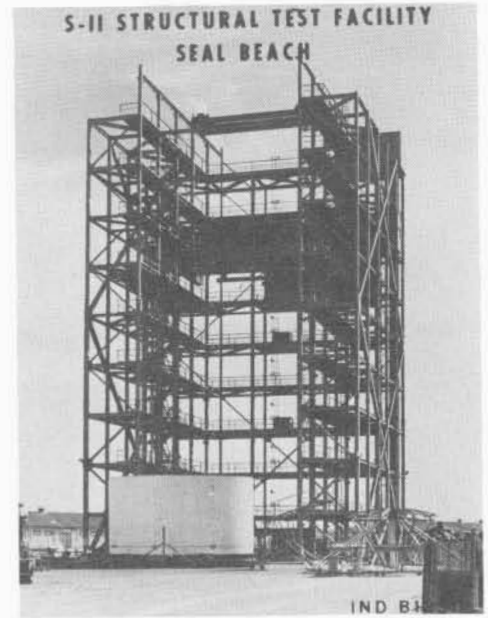


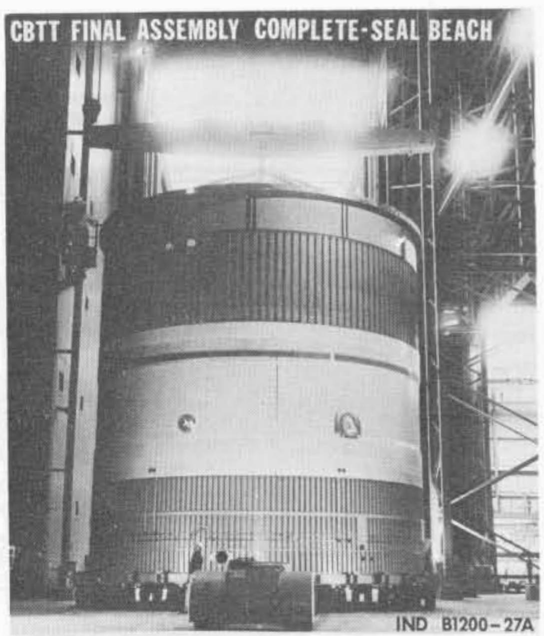
S-II STAGE ON TRANSPORTER-SEAL BEACH
IND B1200-34B

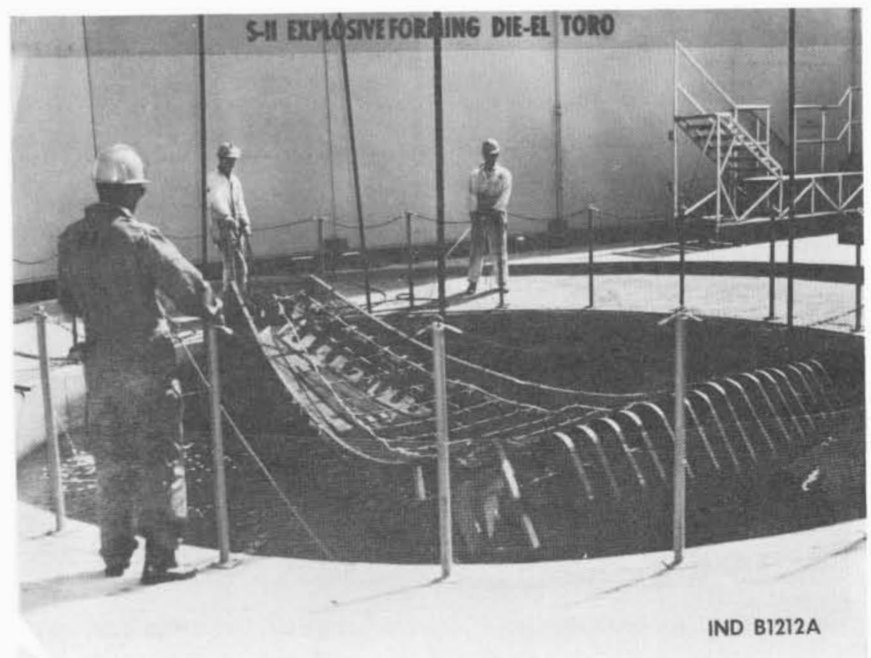

S-II STAGE WITH ENGINES-SEAL BEACH
IND B1200-53


S-II MANUFACTURING AREA - TULSA

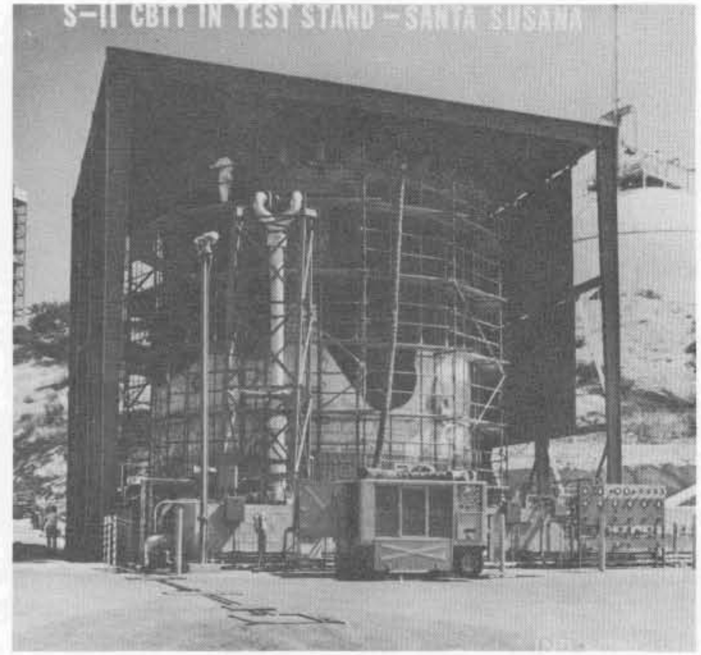

S-II GORE FORMING FAC. - EL TORO


S-II STRUCTURAL TEST FACILITY
SEAL BEACH


CBTT FINAL ASSEMBLY COMPLETE-SEAL BEACH
IND B1200-27A


S-II EXPLOSIVE FORMING DIE-EL TORO
IND B1212A

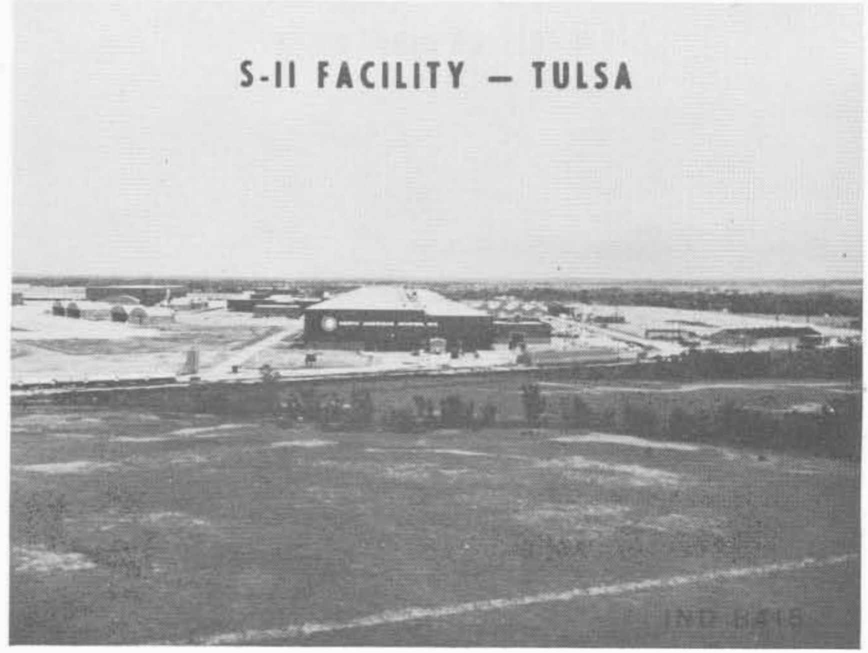

S-II CBTT ON BARGE ORION

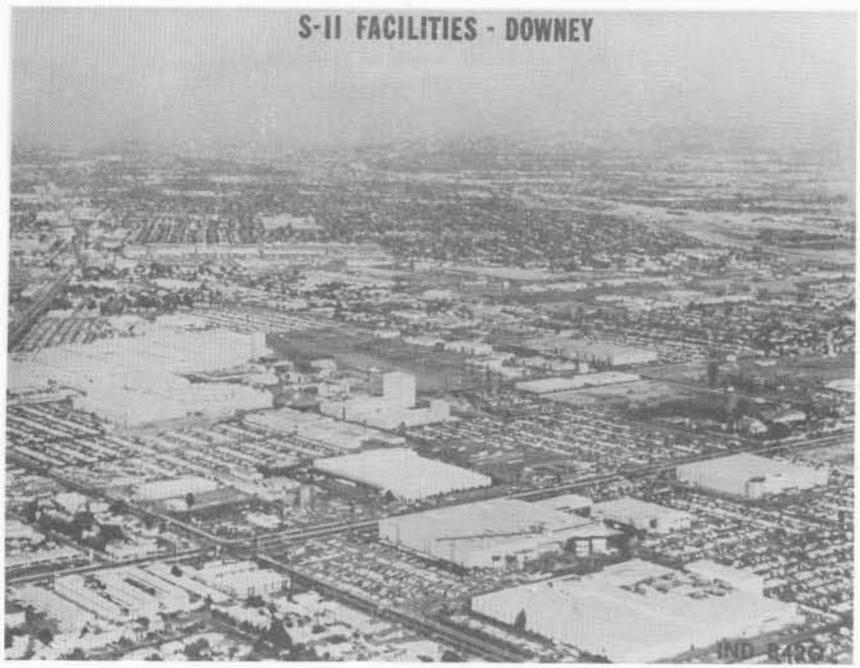

S-II CBTT IN TEST STAND — SANTA SUSANA

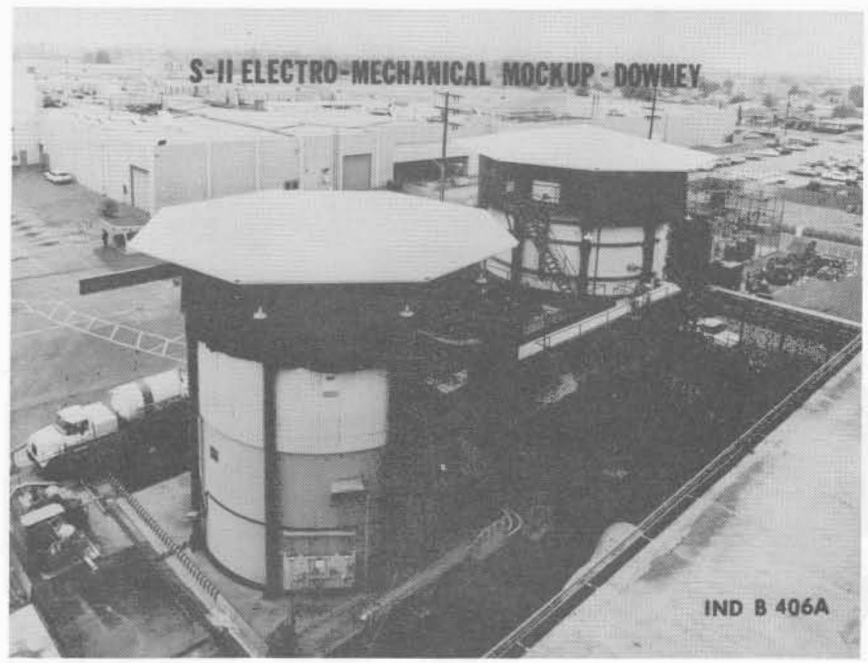

COMMON BULKHEAD TEST STAND
SANTA SUSANA
IND B 427


S-II FACILITIES—SEAL BEACH
VERTICAL ASSEMBLY & HYDRO TEST
VERTICAL CHECKOUT
PNEUMATIC PAINT & PACKAGING
BULKHEAD FABRICATION
WATER CONDITIONING
SERVICE
SUB ASSEMBLY FACILITY
WAREHOUSE
MSFC 67 IND 407H


S-II BULKHEAD FABRICATION BLDG., SEAL BEACH
IND B1281B


S-II FACILITY — TULSA


S-II FACILITIES - DOWNEY

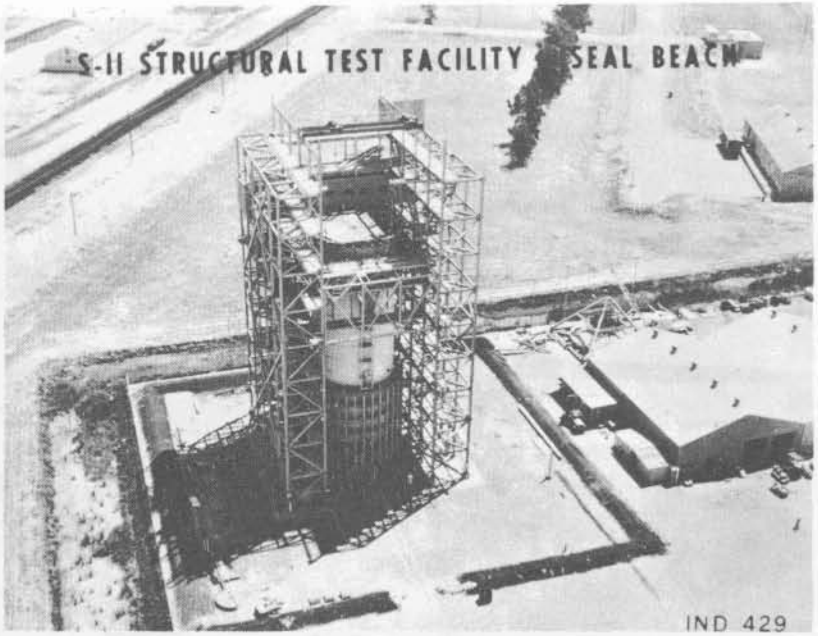

S-II ELECTRO-MECHANICAL MOCKUP - DOWNEY
IND B 406A

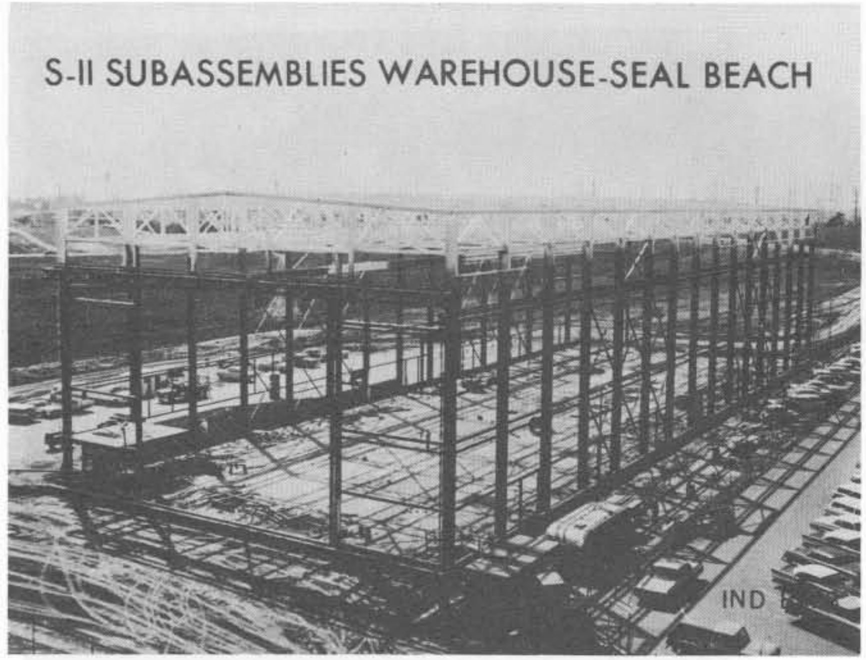

S-II CRYOGENIC LAB (A) & PRESSURIZATION
SYSTEM DEVELOPMENT FAC-(B) DOWNEY
(A)
(B)
IND B419A

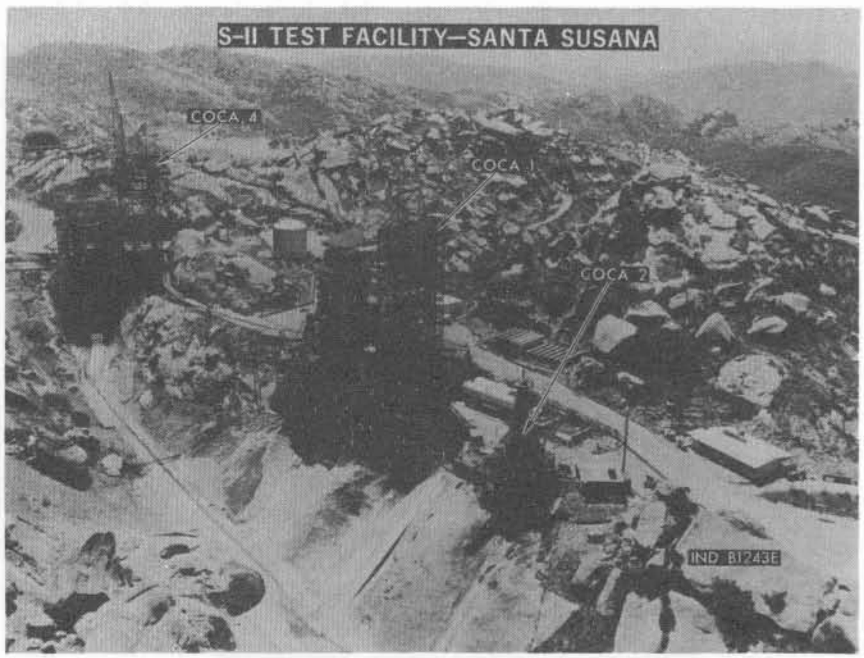

S-II SERVICE BUILDING — SEAL BEACH


S-II VERT ASSY & HYDROTEST BLDG — SEAL BEACH
IND B418


S-II VERTICAL CHECKOUT BLDG—SEAL BEACH

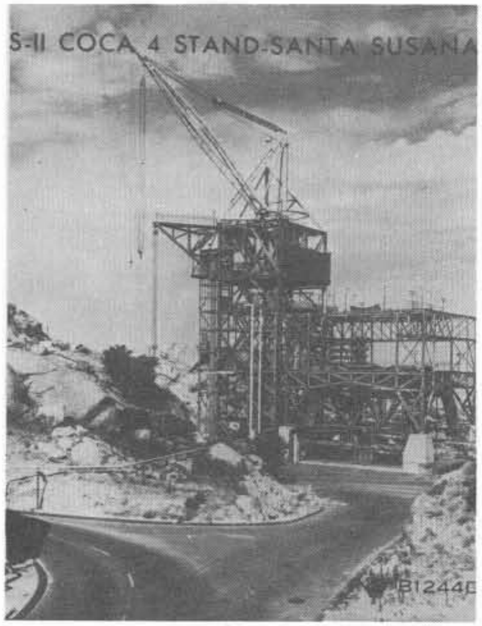

S-II STRUCTURAL TEST FACILITY SEAL BEACH
IND 429


S-II SUBASSEMBLIES WAREHOUSE-SEAL BEACH
IND

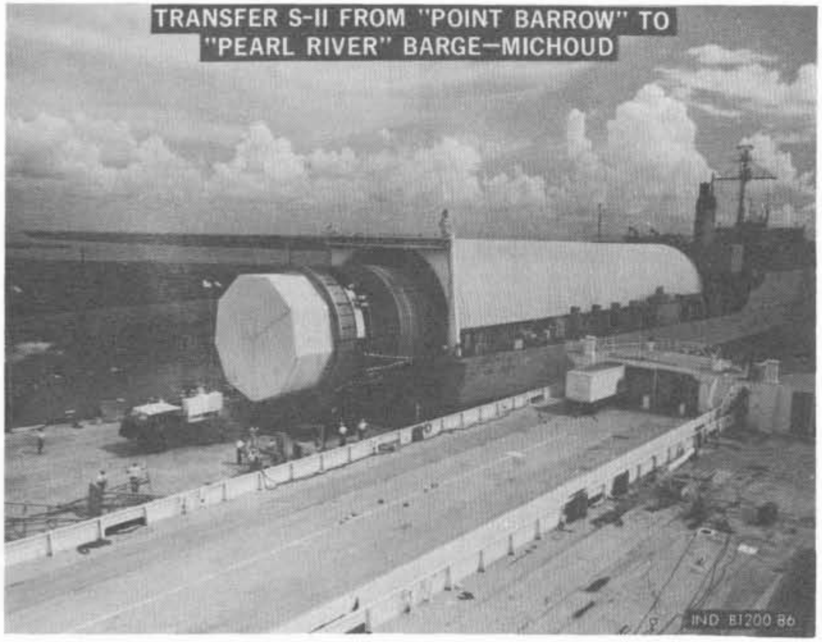

S-II TEST FACILITY—SANTA SUSANA
COCA 4
COCA 1
COCA 2
IND 81243E

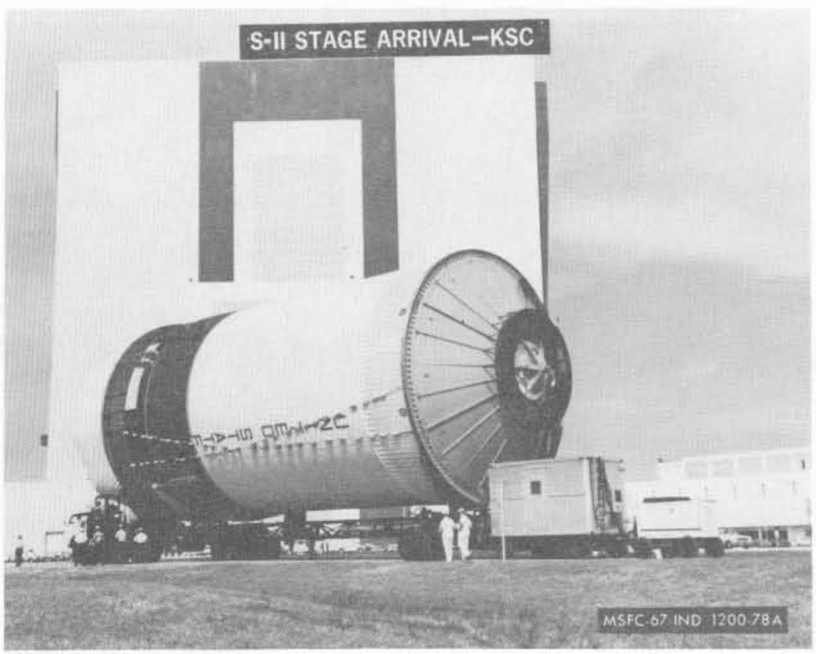

S-II BATTLESHIP FIRING—SANTA SUSANA
IND 81200-20D


S-II BATTLESHIP IN COCA 1 - SANTA SUSANA

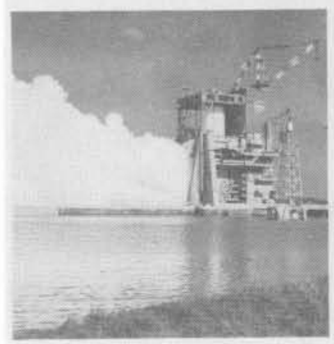

S-II COCA 4 STAND-SANTA SUSANA
B1244D


S-II F ARRIVAL—MSFC
IND B1200-16C


TRANSFER S-II FROM "POINT BARROW" TO
"PEARL RIVER" BARGE—MICHOUD
IND B1200 86



S-II FLIGHT STAGE ACCEPTANCE TEST PROGRAM



STAGE	DATE	DURATION		RESULTS
		PLANNED	ACTUAL	
S-II-1	DEC 1, 1966	LH_2 MANUAL	384 SEC	SUCCESSFUL
S-II-1	DEC 30, 1966	LOX DEPL.	364 SEC	SUCCESSFUL
S-II-2	APR 6, 1967	LH_2 MANUAL	364 SEC	SUCCESSFUL
S-II-2	APR 15, 1967	LOX DEPL.	367 SEC	SUCCESSFUL

TOTAL ACTUAL FIRING 1479 SECONDS

MSFC-5/67-IND 1200-106

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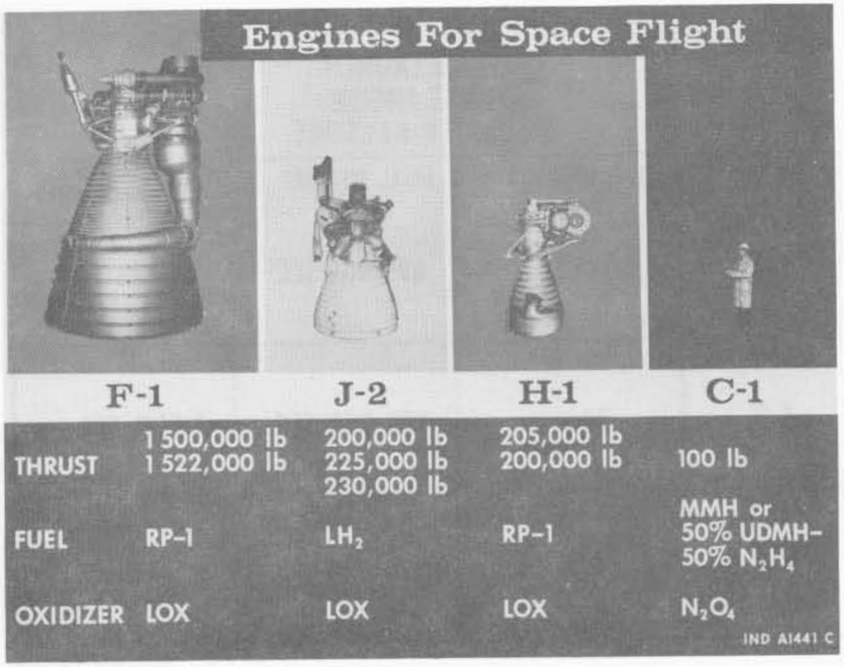
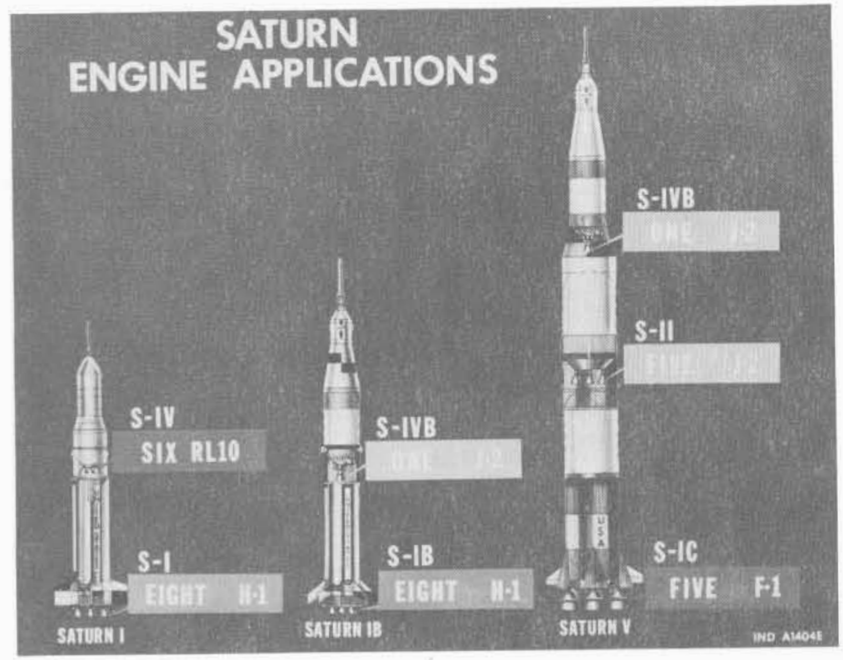
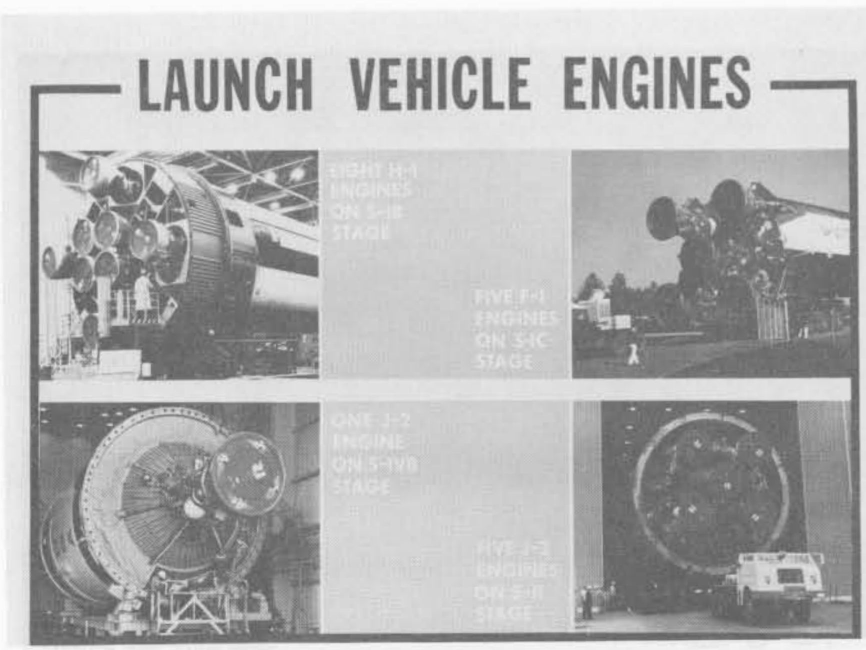
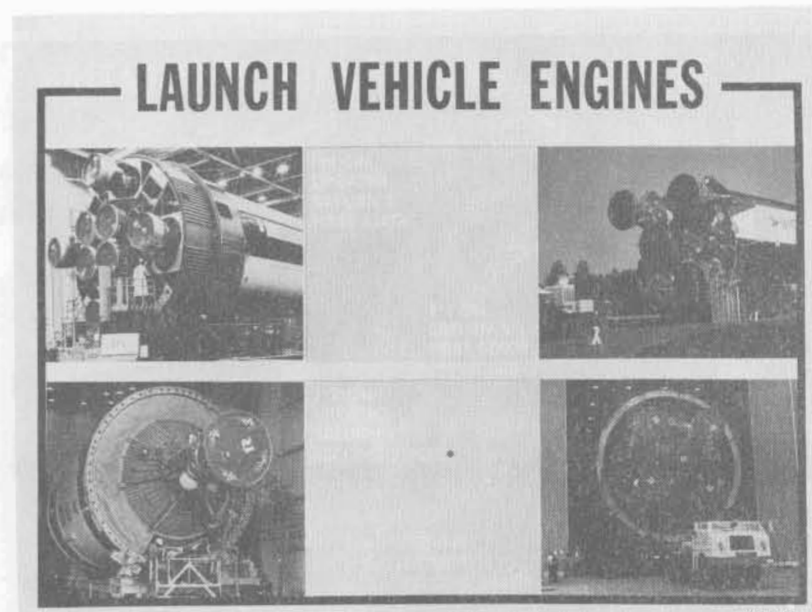


a



b





* ALSO SATURN V THIRD STAGE

IND 1490

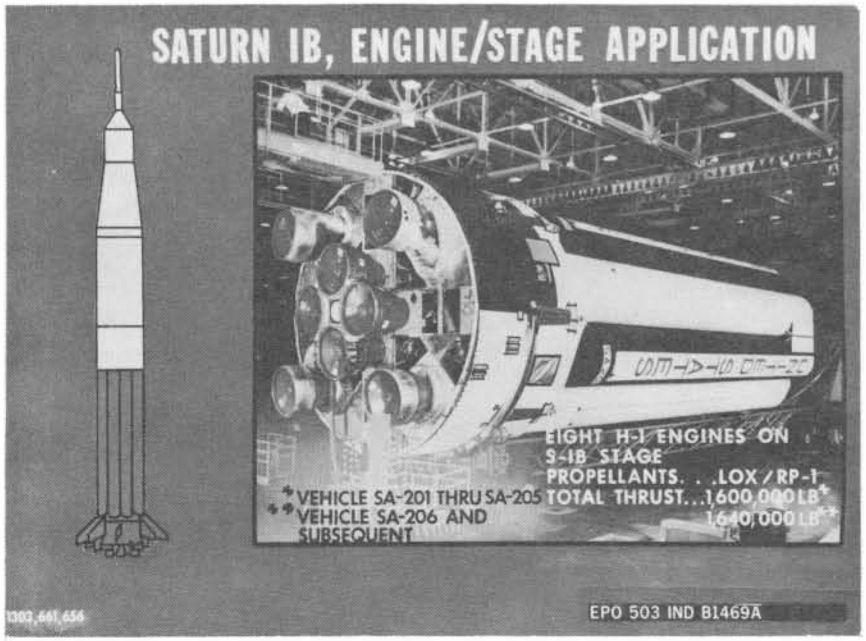
SATURN VEHICLE ENGINE CHARACTERISTICS

ITEM	H-1	F-1	J-2	C-1
RP-1 FUEL, LOX OXIDIZER	●	●		
LH_2 FUEL, OXIDIZER			●	
MMH OR 50% UDMH-50% N_2H_4 FUEL, N_2O_4 OXIDIZER				●
PUMP FED SYSTEM	●	●	●	
PRESSURE FED SYSTEM				●
ALTITUDE RESTART CAPABILITY			●	●
REGENERATIVE COOLED THRUST CHAMBER	●	●	●	
RADIATION REGENERATIVE COOLED THRUST CHAMBER				●
SPARK PLUG IGNITION			●	
HYPERGOLIC IGNITION	●	●		●

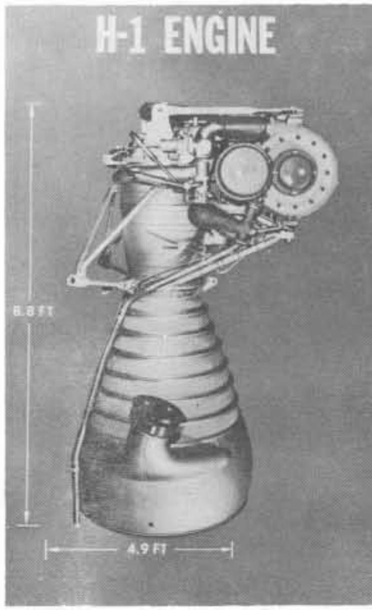
SATURN LAUNCH VEHICLE ENGINE MATURITY FACTORS

ENGINE	TOTAL DELIVERED	TOTAL TEST TIME	TOTAL FLIGHT TIME
H-1	262	499,960 SEC	13,323 SEC
J-2	106	288,060 SEC	1,200 SEC
F-1	57	174,540 SEC	0

MSFC-4/67-IND 1488D



H-1 ENGINE

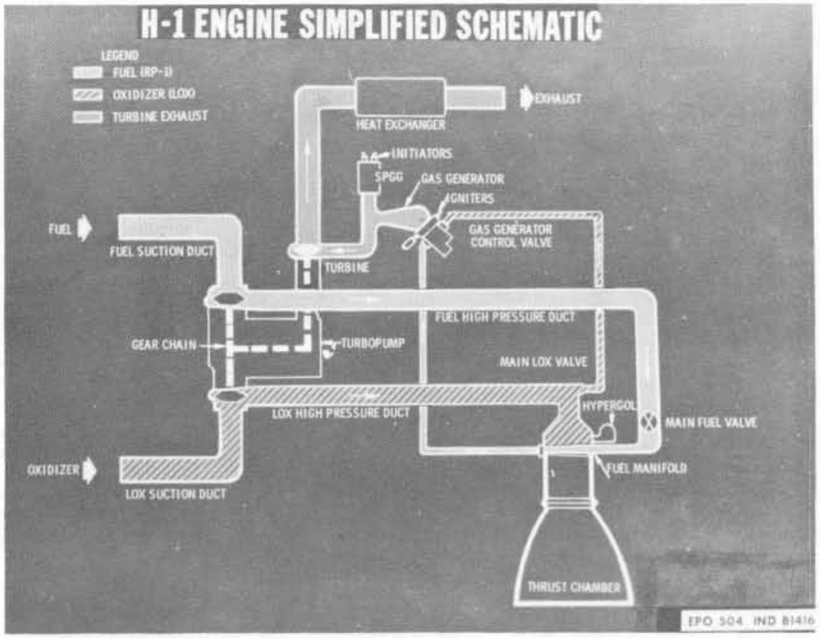


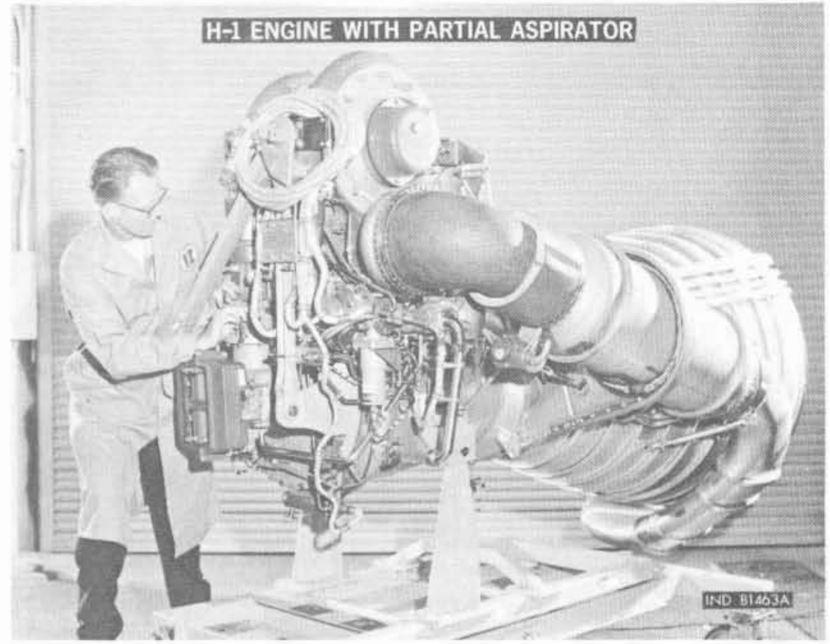
	VEHICLE EFFECTIVITY SA-201 THRU SA-205	SA-206 & SUBSEQUENT
THRUST (SEA LEVEL)	200,000 LB	205,000 LB
THRUST DURATION	155 SEC	155 SEC
SPECIFIC IMPULSE (LB-SEC/LB)	260.5 MIN	261.0 MIN
ENGINE WT DRY (INBD)	1,830 LB	2,100 LB
(OUTBD)	2,100 LB	2,100 LB
ENGINE WT BURNOUT (INBD)	2,200 LB	2,200 LB
(OUTBD)	2,200 LB	2,200 LB
EXIT-TO-THROAT AREA RATIO	8 TO 1	8 TO 1
PROPELLANTS	LOX & RP-1	LOX & RP-1
MIXTURE RATIO	2.23±2%	2.23±%

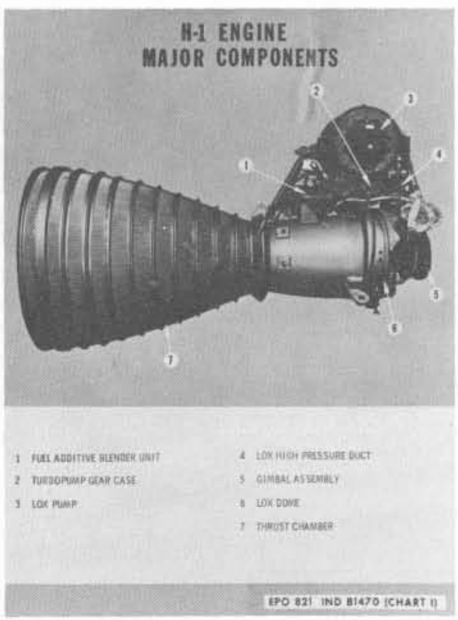
CONTRACTOR: NAA/ROCKETDYNE

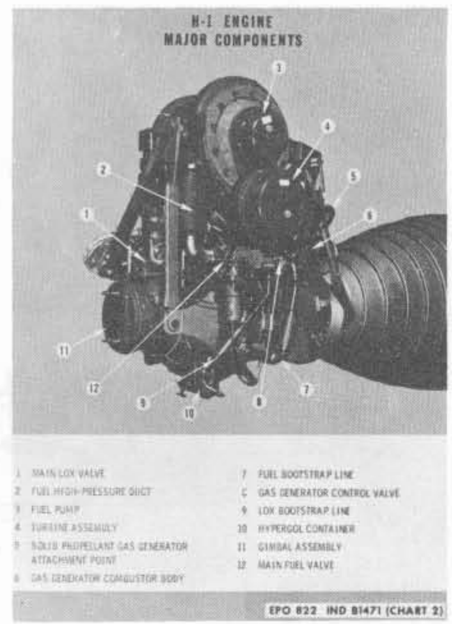
VEHICLE APPLICATION
SATURN IB/S-IB STAGE (EIGHT ENGINES)

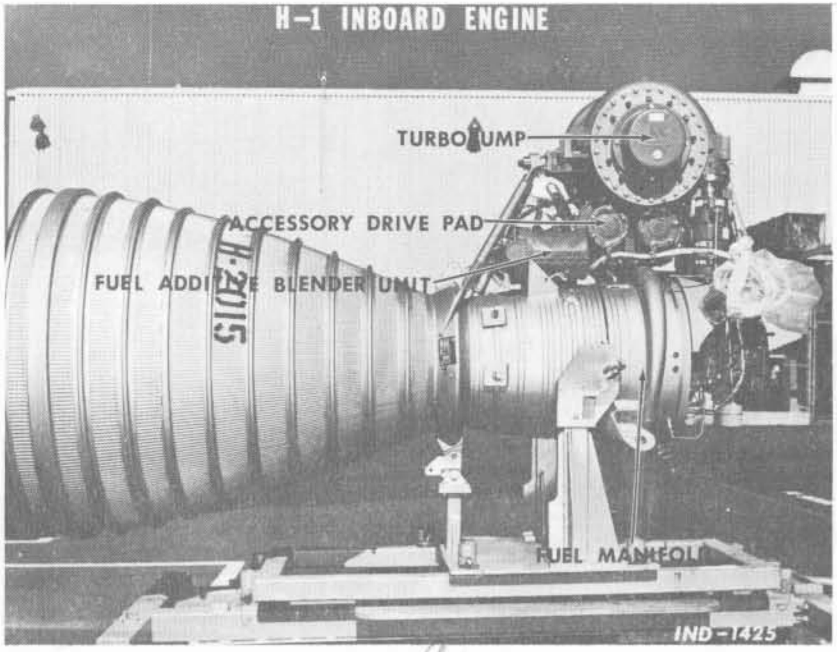
IND B1408F


H-1 ENGINE SIMPLIFIED SCHEMATIC
LEGEND
FUEL (RP-1)
OXIDIZER (LOX)
TURBINE EXHAUST
HEAT EXCHANGER
EXHAUST
INITIATORS
SPGG
GAS GENERATOR
IGNITERS
GAS GENERATOR CONTROL VALVE
FUEL
FUEL SUCTION DUCT
TURBINE
FUEL HIGH PRESSURE DUCT
GEAR CHAIN
TURBOPUMP
MAIN LOX VALVE
HYPERGOL
MAIN FUEL VALVE
LOX HIGH PRESSURE DUCT
OXIDIZER
LOX SUCTION DUCT
FUEL MANIFOLD
THRUST CHAMBER
EPO 504 IND B1416

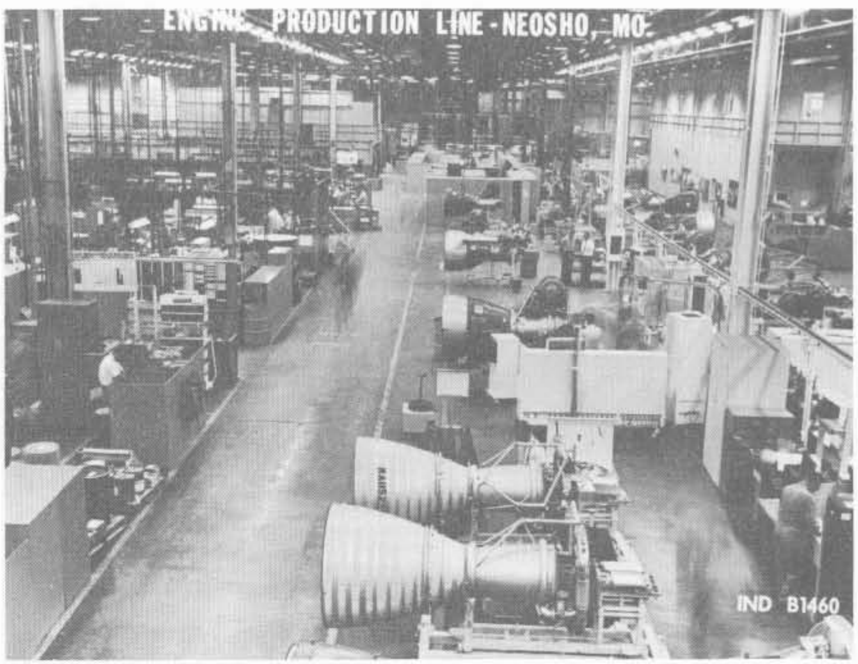

H-1 ENGINE WITH PARTIAL ASPIRATOR
IND B1463A


H-1 ENGINE
MAJOR COMPONENTS
1 FUEL ADDITIVE BLENDER UNIT
2 TURBOPUMP GEAR CASE
3 LOX PUMP
4 LOX HIGH PRESSURE DUCT
5 GIMBAL ASSEMBLY
6 LOX DOME
7 THRUST CHAMBER
EPO 821 IND B1470 (CHART 1)


H-1 ENGINE
MAJOR COMPONENTS
1 MAIN LOX VALVE
2 FUEL HIGH-PRESSURE DUCT
3 FUEL PUMP
4 TURBINE ASSEMBLY
5 SOLID PROPELLANT GAS GENERATOR ATTACHMENT POINT
6 GAS GENERATOR COMBUSTOR BODY
7 FUEL BOOTSTRAP LINE
8 GAS GENERATOR CONTROL VALVE
9 LOX BOOTSTRAP LINE
10 HYPERGOL CONTAINER
11 GIMBAL ASSEMBLY
12 MAIN FUEL VALVE
EPO 822 IND B1471 (CHART 2)


H-1 INBOARD ENGINE
TURBOPUMP
ACCESSORY DRIVE PAD
FUEL ADDITIVE BLENDER UNIT
FUEL MANIFOLD
IND-1425


H-1 ENGINE WITH STAINLESS STEEL THRUST CHAMBER
IND 1023


ENGINE PRODUCTION LINE-NEOSHO, MO.
IND B1460

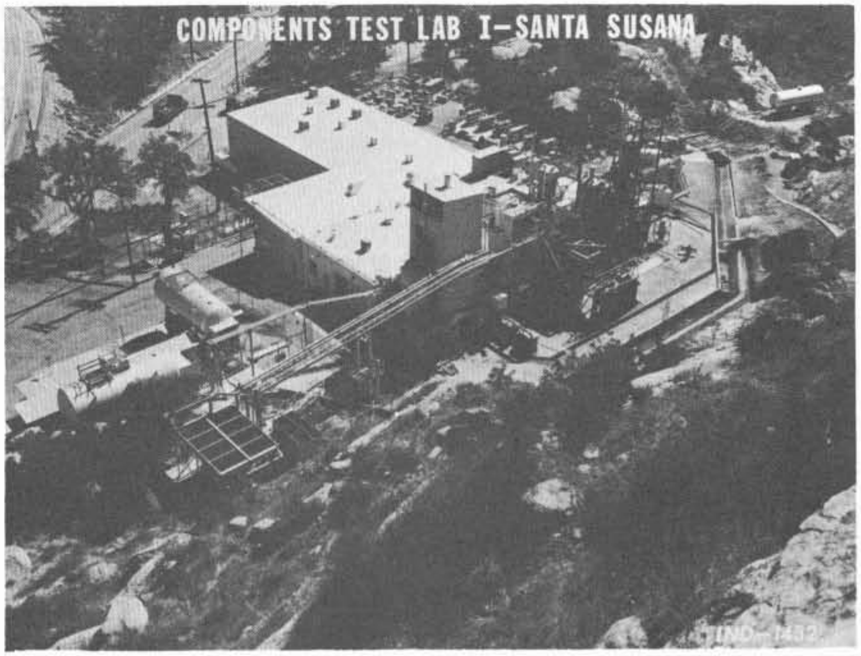

MANUFACTURING AREA-NEOSHO, MO.
IND-1430


AERIAL VIEW TEST AREA—NEOSHO, MO.
STAND 1
STAND 2
IND-1431


H-1 ENGINE ACCEPTANCE TESTING—NEOSHO, MO.
IND 1031B

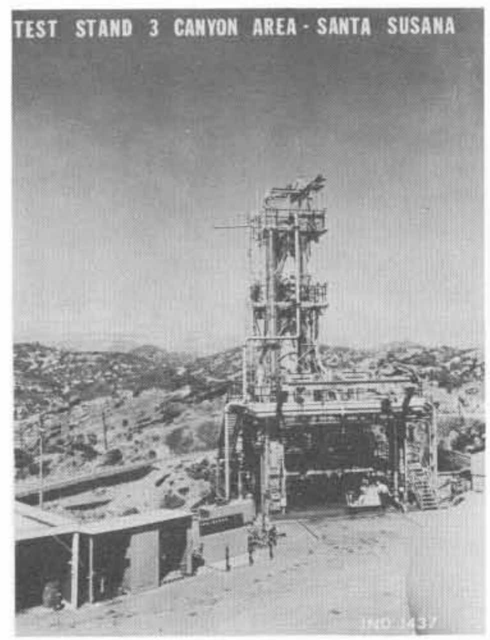

COMPONENTS TEST LAB-NEOSHO
IND-1027

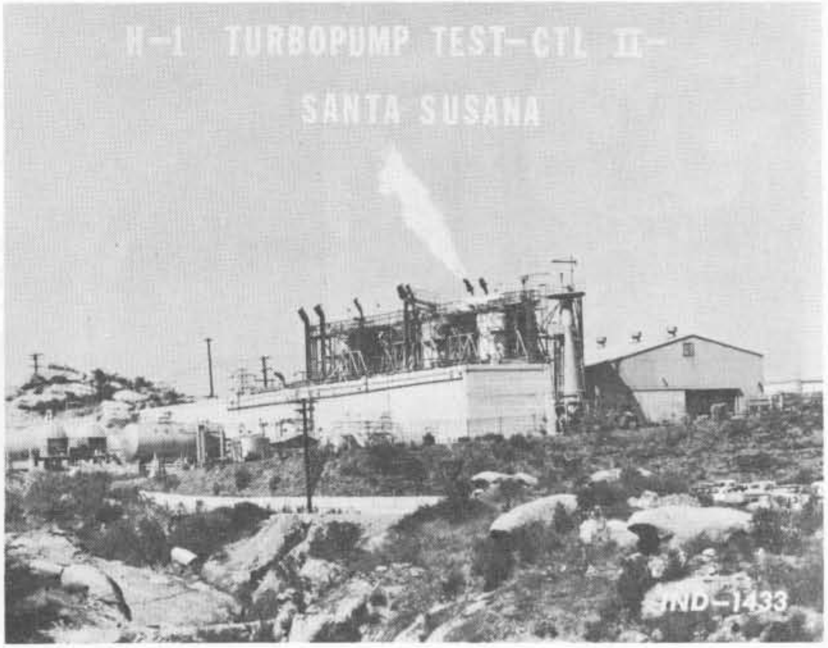

CANYON TEST AREA - SANTA SUSANA
STAND 2
STAND 1
STAND 3
IND B1434A

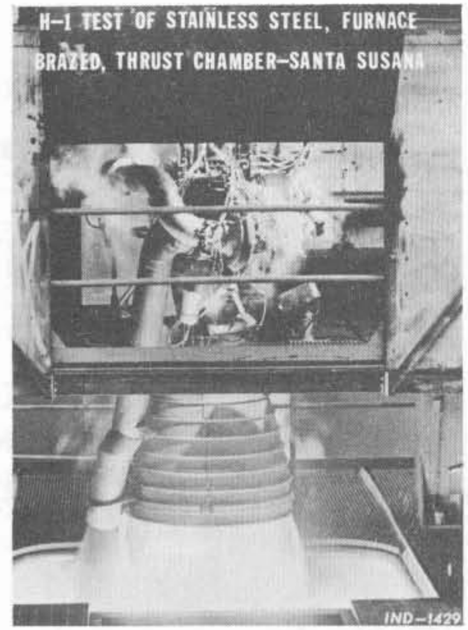

COMPONENTS TEST LAB I—SANTA SUSANA

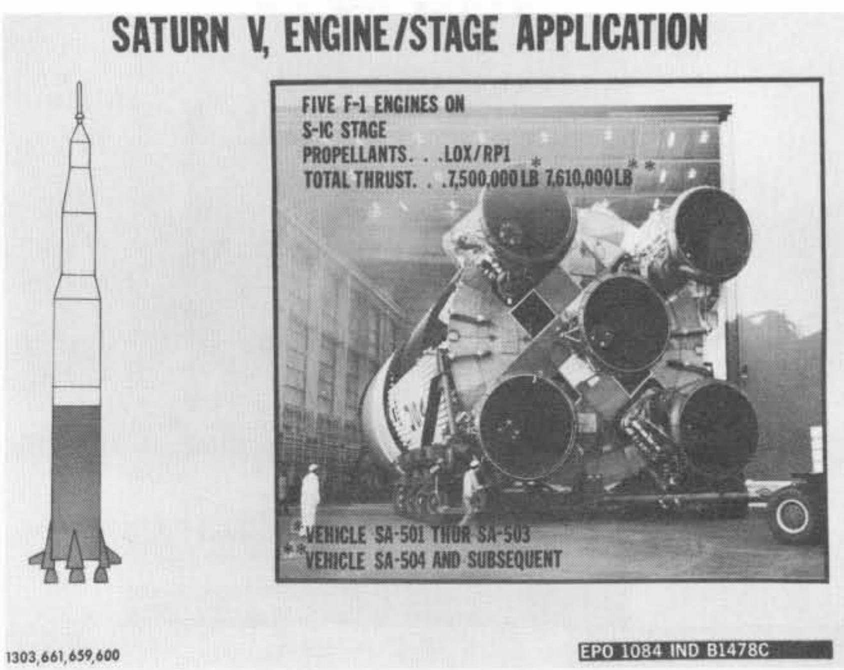

TEST STAND 1 CANYON AREA - SANTA SUSANA


TEST STAND 2 CANYON AREA - SANTA SUSANA

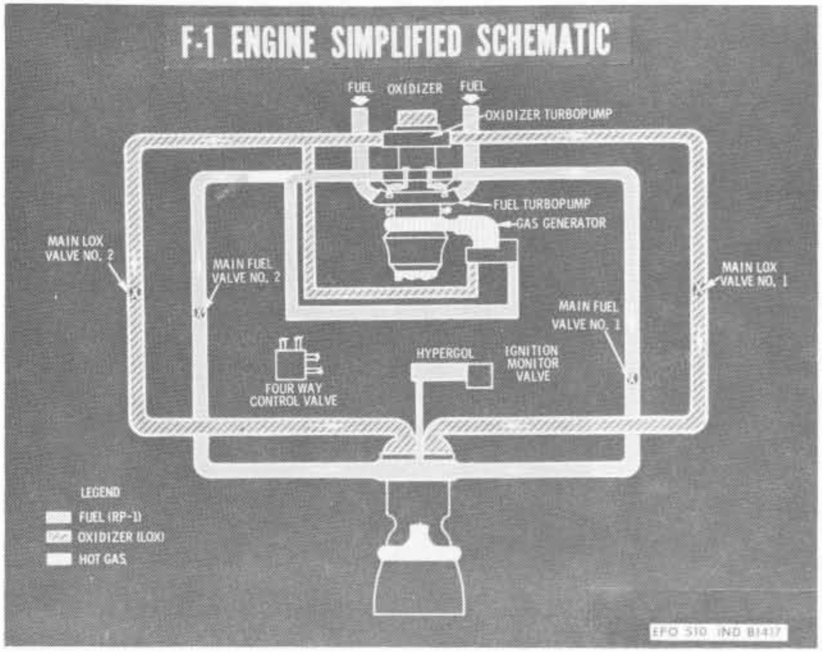

TEST STAND 3 CANYON AREA - SANTA SUSANA

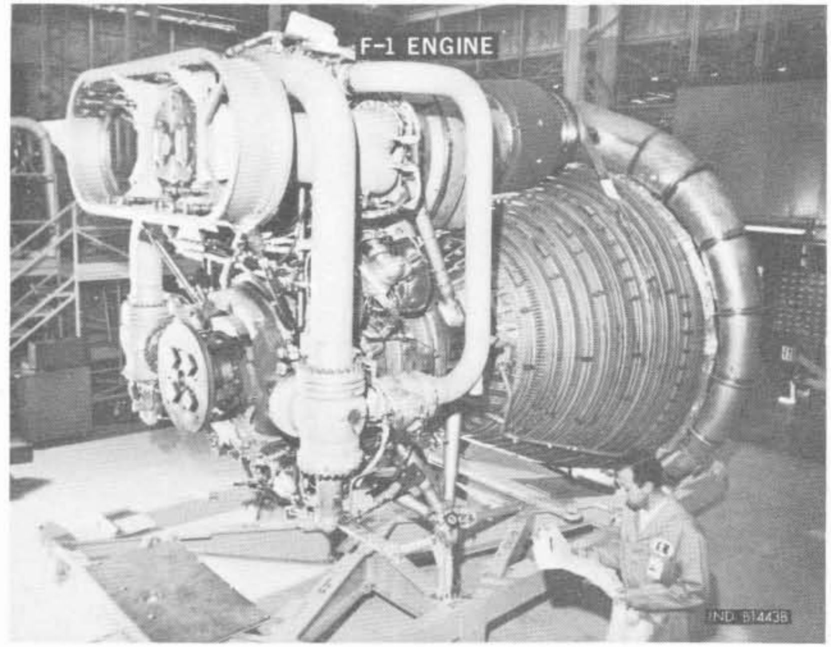

H-1 TURBOPUMP TEST-CTL II-
SANTA SUSANA
IND-1433

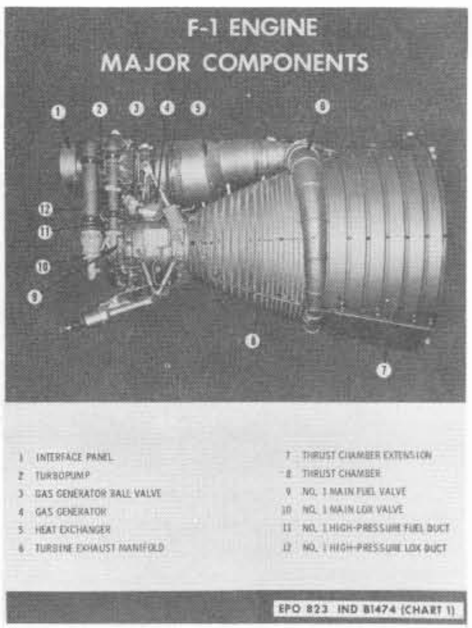

H-1 TEST OF STAINLESS STEEL, FURNACE BRAZED, THRUST CHAMBER-SANTA SUSANA
IND-1429

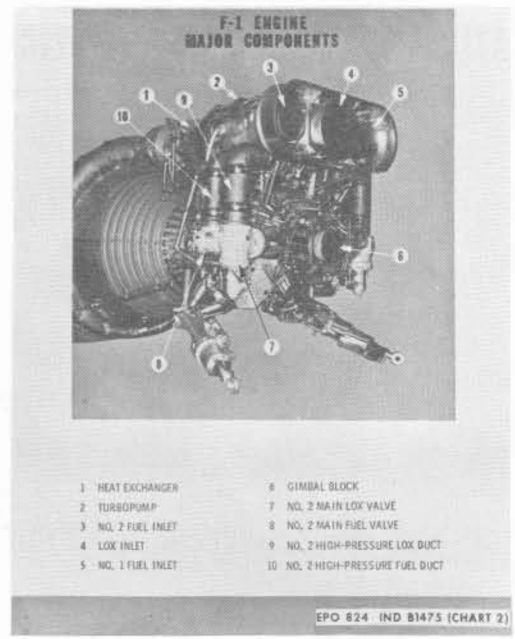

SATURN V, ENGINE/STAGE APPLICATION
FIVE F-1 ENGINES ON
S-IC STAGE
PROPELLANTS. . .LOX/RP1
TOTAL THRUST. . .7,500,000 LB* 7,610,000 LB**
*VEHICLE SA-501 THUR SA-503
**VEHICLE SA-504 AND SUBSEQUENT
1303,661,659,600
EPO 1084 IND B1478C

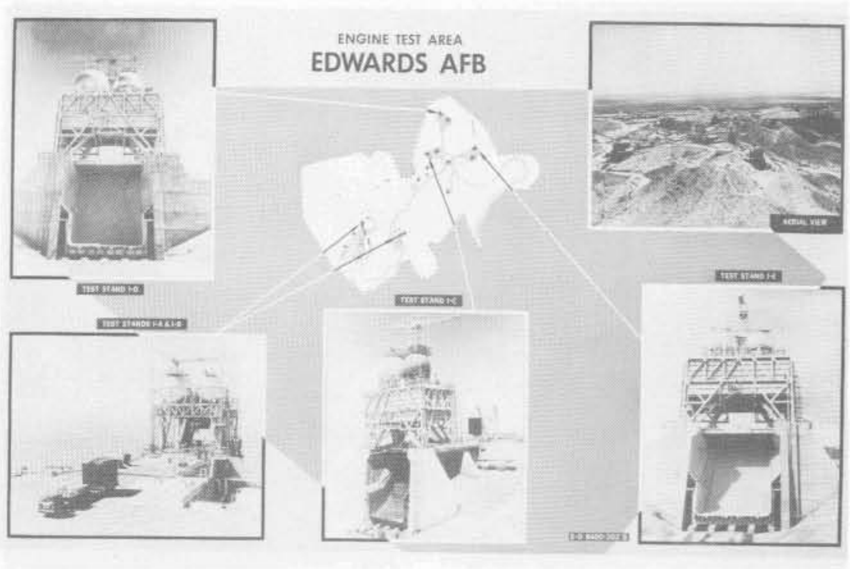

F-1 ENGINE
VEHICLE EFFECTIVITY
SA-501 THRU SA-503
SA-504 & SUBSEQUENT
THRUST (SEA LEVEL) 1,500,000 LB 1,522,000 LB
THRUST DURATION 150 SEC 165 SEC
SPECIFIC IMPULSE (LB-SEC/LB) 260 SEC MIN 263 MIN
ENGINE WEIGHT DRY 18,416 LB 18,500 LB
ENGINE WEIGHT BURNOUT 20,096 LB 20,180 LB
EXIT-TO-THROAT AREA RATIO 16 TO 1 16 TO 1
PROPELLANTS LOX & RP 1 LOX & RP 1
MIXTURE RATIO 2.27±2% 2.27±2%
CONTRACTOR: NAA/ROCKETDYNE
VEHICLE APPLICATION:
SATURN V/S-IC STAGE (FIVE ENGINES)
IND B1413D

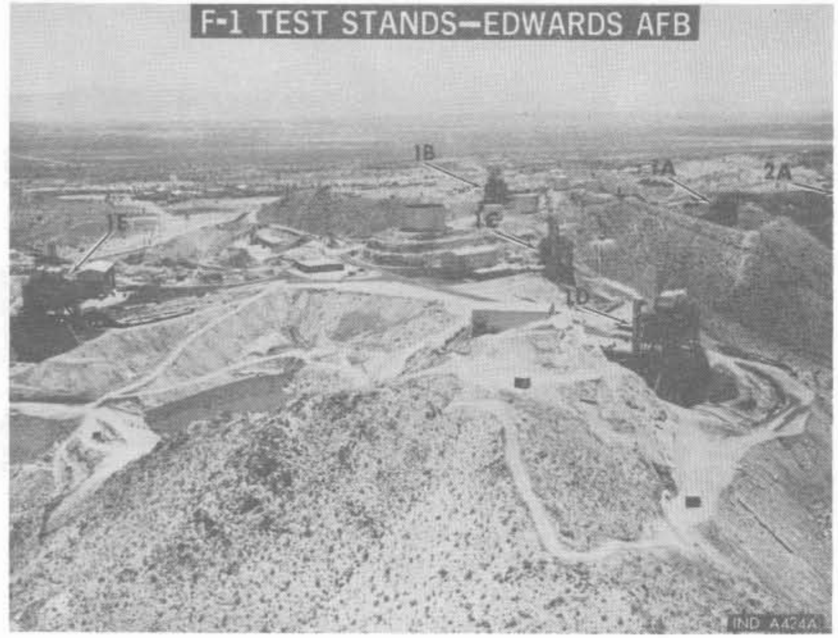

F-1 ENGINE SIMPLIFIED SCHEMATIC
FUEL
OXIDIZER
FUEL
OXIDIZER TURBOPUMP
FUEL TURBOPUMP
GAS GENERATOR
MAIN LOX VALVE NO. 2
MAIN FUEL VALVE NO. 2
MAIN LOX VALVE NO. 1
MAIN FUEL VALVE NO. 1
HYPERGOL
IGNITION MONITOR VALVE
FOUR WAY CONTROL VALVE
LEGEND
FUEL (RP-1)
OXIDIZER (LOX)
HOT GAS
EPO 510 IND 81417


F-1 ENGINE
IND 81443B

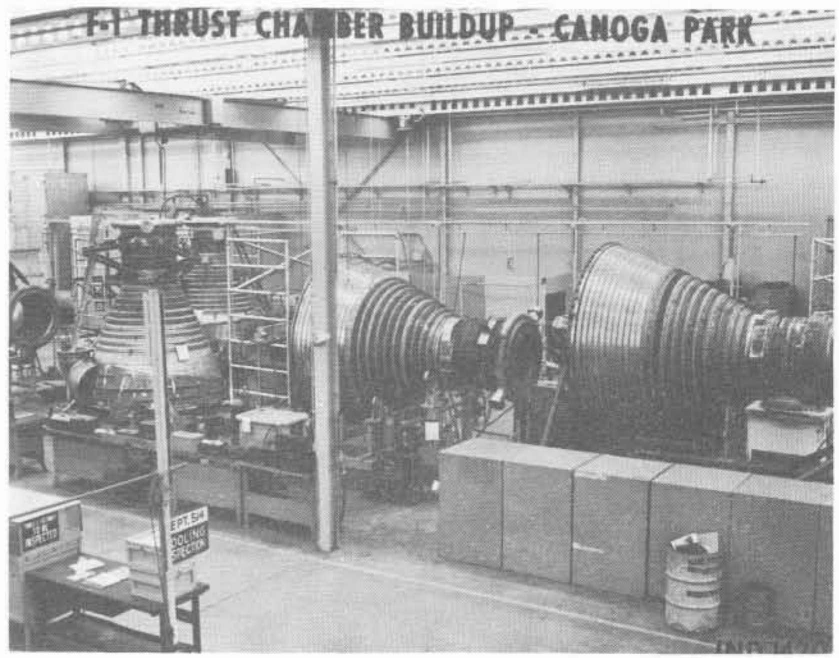

F-1 ENGINE
MAJOR COMPONENTS
1 INTERFACE PANEL
2 TURBOPUMP
3 GAS GENERATOR BALL VALVE
4 GAS GENERATOR
5 HEAT EXCHANGER
6 TURBINE EXHAUST MANIFOLD
7 THRUST CHAMBER EXTENSION
8 THRUST CHAMBER
9 NO. 1 MAIN FUEL VALVE
10 NO. 1 MAIN LOX VALVE
11 NO. 1 HIGH-PRESSURE FUEL DUCT
12 NO. 1 HIGH-PRESSURE LOX DUCT
EPO 823 IND 81474 (CHART 1)

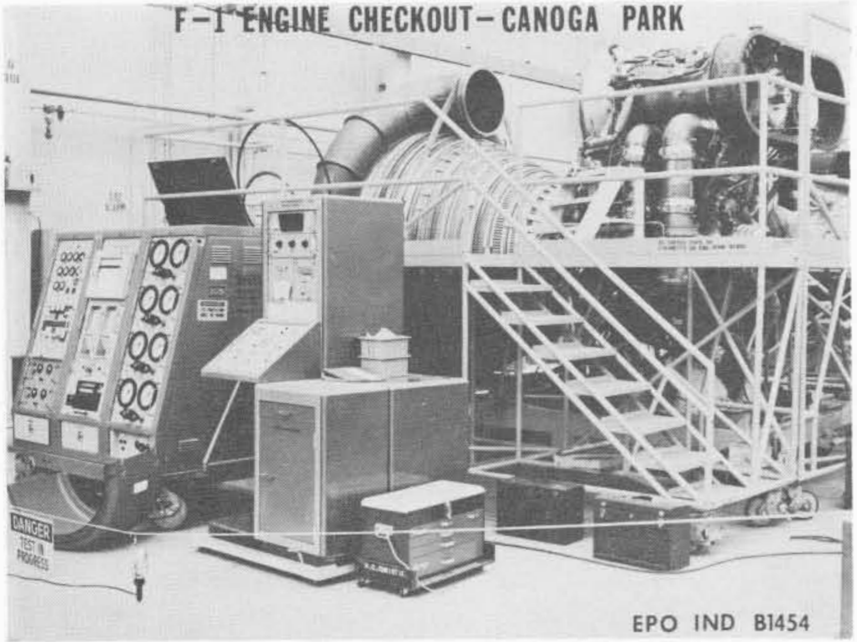

F-1 ENGINE
MAJOR COMPONENTS
1 HEAT EXCHANGER
2 TURBOPUMP
3 NO. 2 FUEL INLET
4 LOX INLET
5 NO. 1 FUEL INLET
6 GIMBAL BLOCK
7 NO. 2 MAIN LOX VALVE
8 NO. 2 MAIN FUEL VALVE
9 NO. 2 HIGH-PRESSURE LOX DUCT
10 NO. 2 HIGH-PRESSURE FUEL DUCT
EPO 824 IND 81475 (CHART 2)

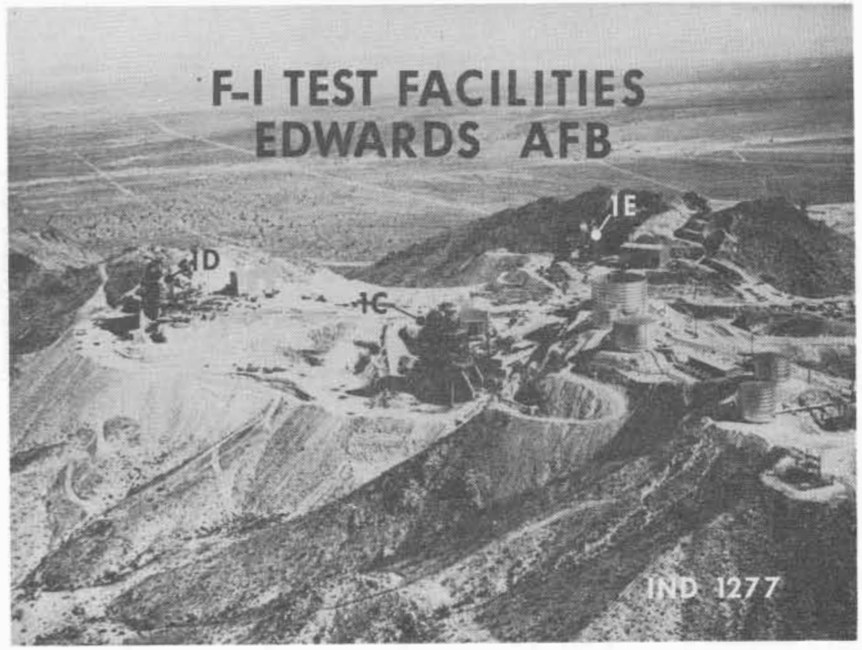

ENGINE TEST AREA
EDWARDS AFB

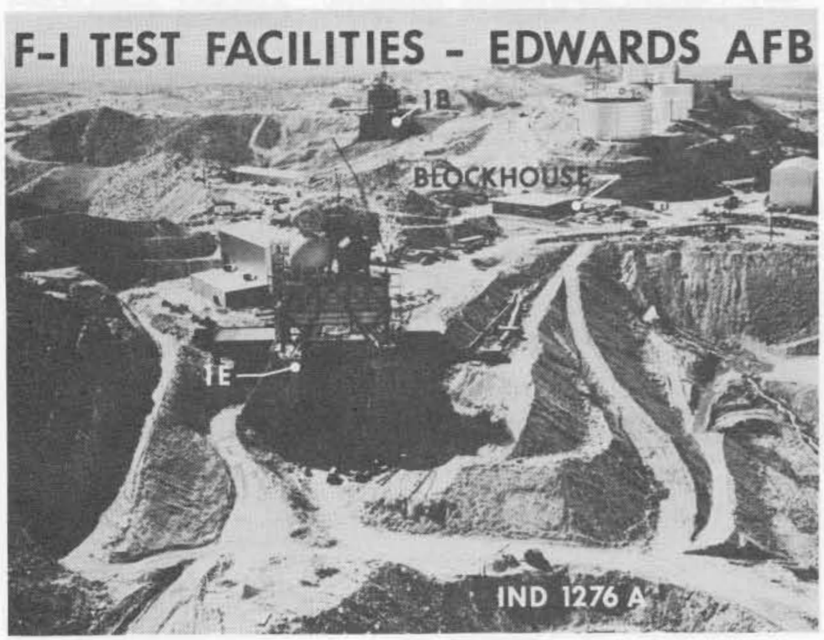

F-1 TEST STANDS—EDWARDS AFB
1B
1A
2A
1E
1C
1D
IND A424A

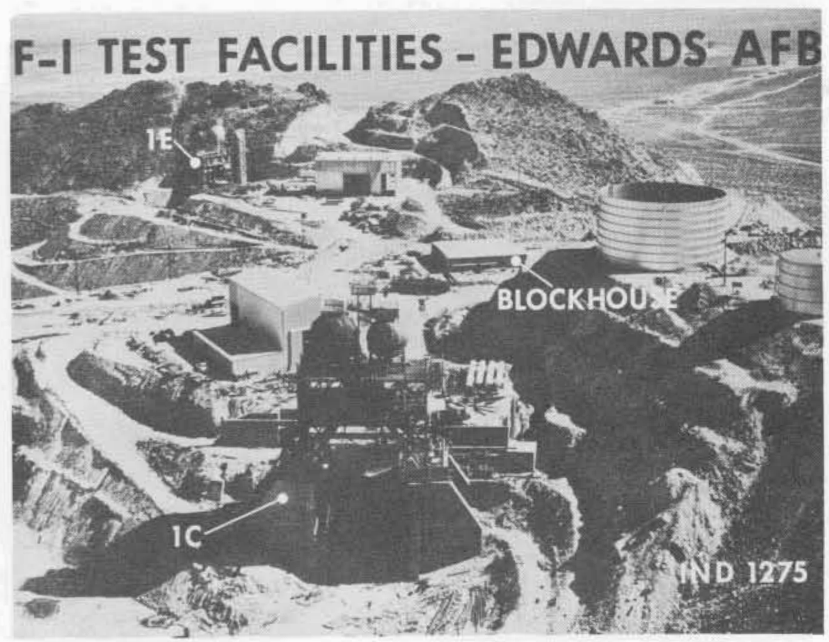

F-I ENGINE FINAL ASSEMBLY AREA—CANOGA PARK
IND 814398

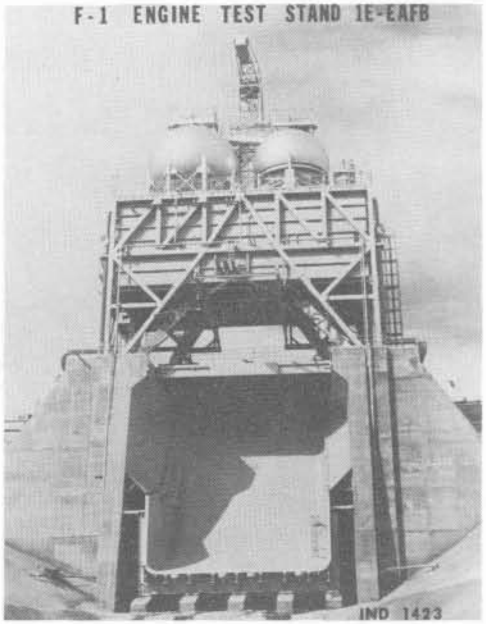

F-1 THRUST CHAMBER BUILDUP - CANOGA PARK


F-1 ENGINE CHECKOUT – CANOGA PARK
DANGER
TEST IN PROGRESS
EPO IND B1454


F-1 TEST FACILITIES
EDWARDS AFB
1E
1D
1C
IND 1277

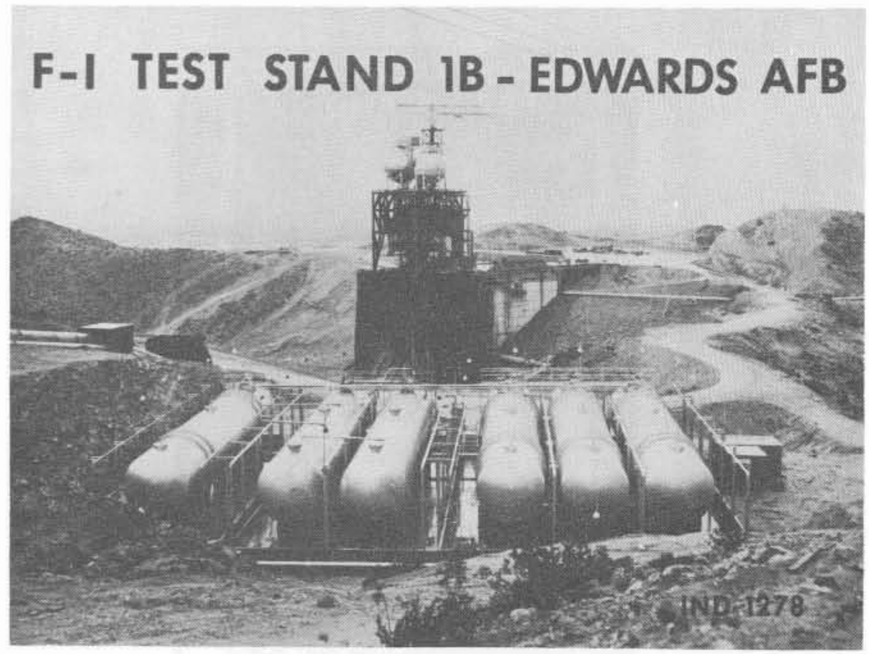

F-1 TEST FACILITIES - EDWARDS AFB
1B
BLOCKHOUSE
1E
IND 1276 A

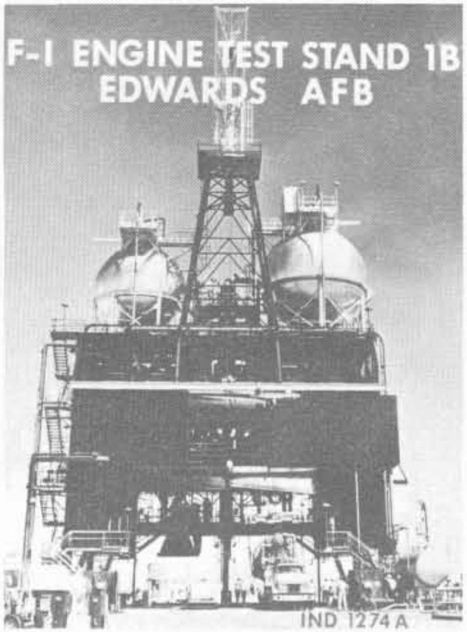

F-1 TEST FACILITIES - EDWARDS AFB
1E
BLOCKHOUSE
1C
IND 1275


F-1 ENGINE TEST STAND 1E-EAFB
IND 1423

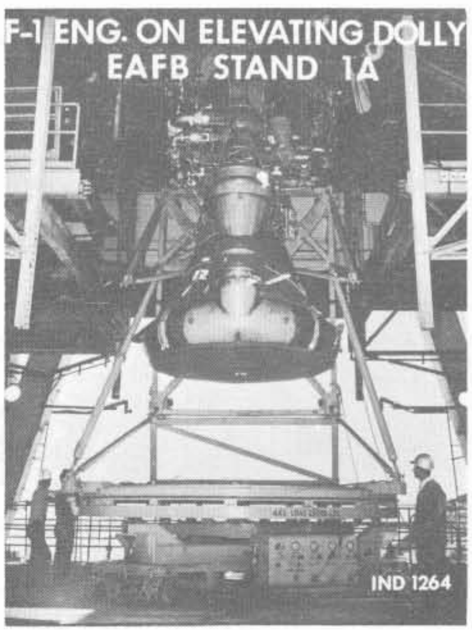

F-1 ENGINE TEST STAND 1C-EAFB
IND 1421

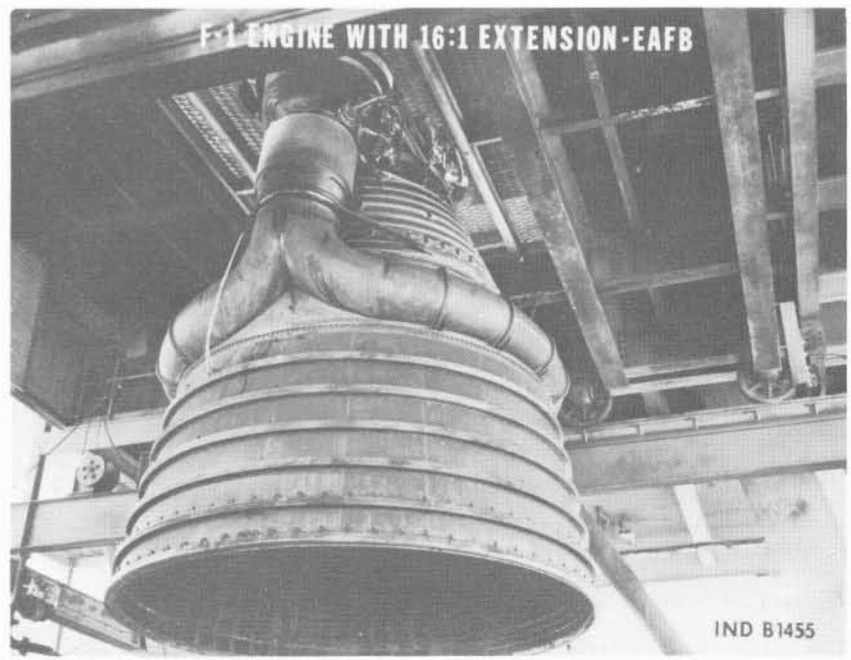

F-1 TEST STAND 1A-EAFB
IND 1424

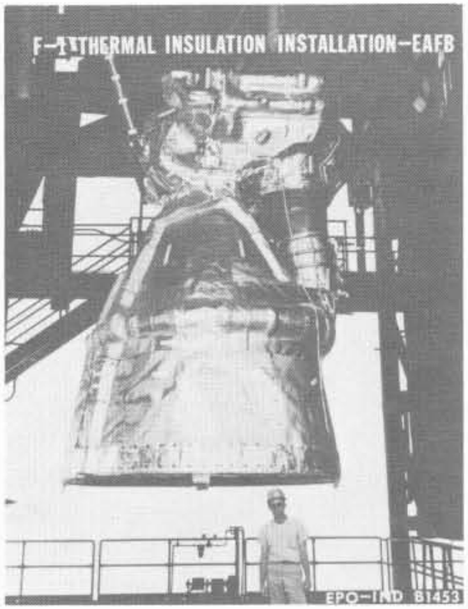

F-I TEST STAND 1B - EDWARDS AFB
IND-1278

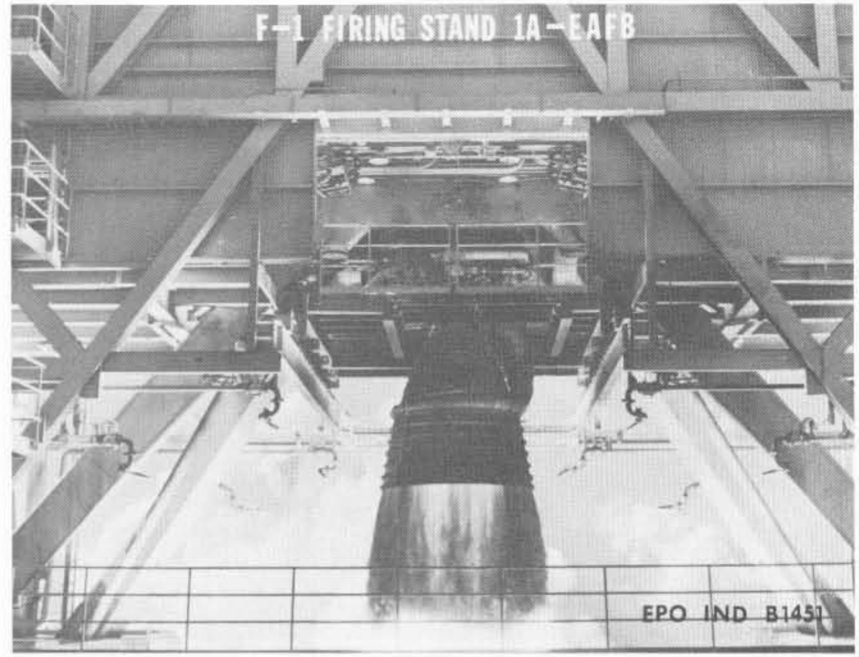

F-I ENGINE TEST STAND 1B
EDWARDS AFB
IND 1274 A


F-I COMPONENT TEST STAND BRAVO I - SANTA SUSANA
IND B1446

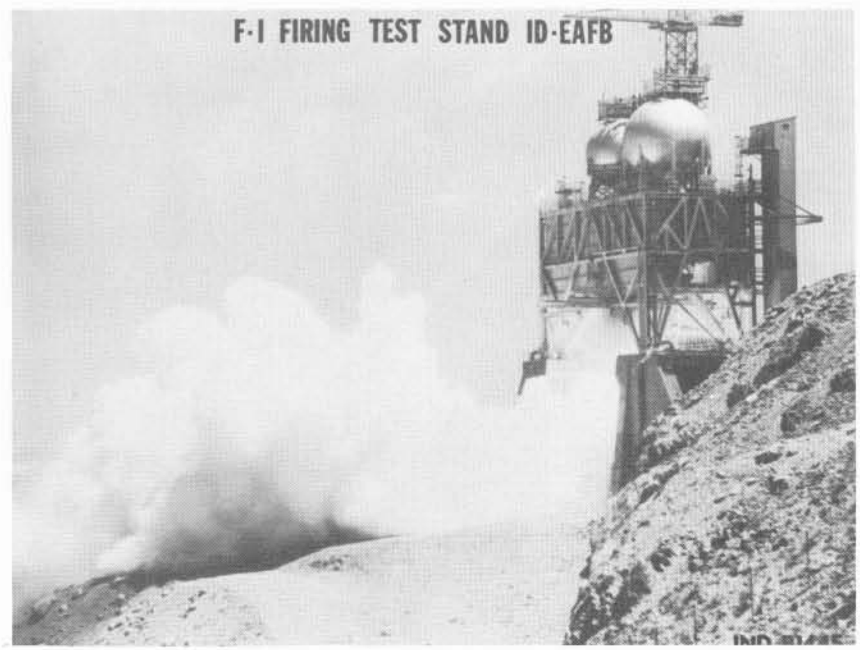

F-1 ENG. ON ELEVATING DOLLY
EAFB STAND 1A
IND 1264


F-1 ENGINE WITH 16:1 EXTENSION-EAFB
IND B1455

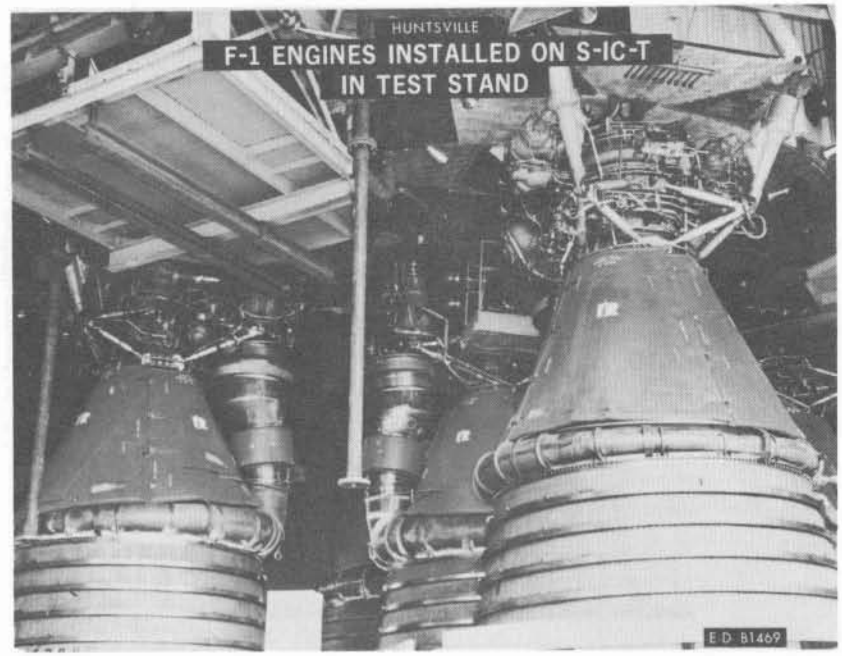

F-1 THERMAL INSULATION INSTALLATION—EAFB
EPO—IND B1453


F-1 FIRING STAND 1A—EAFB
EPO IND B1451

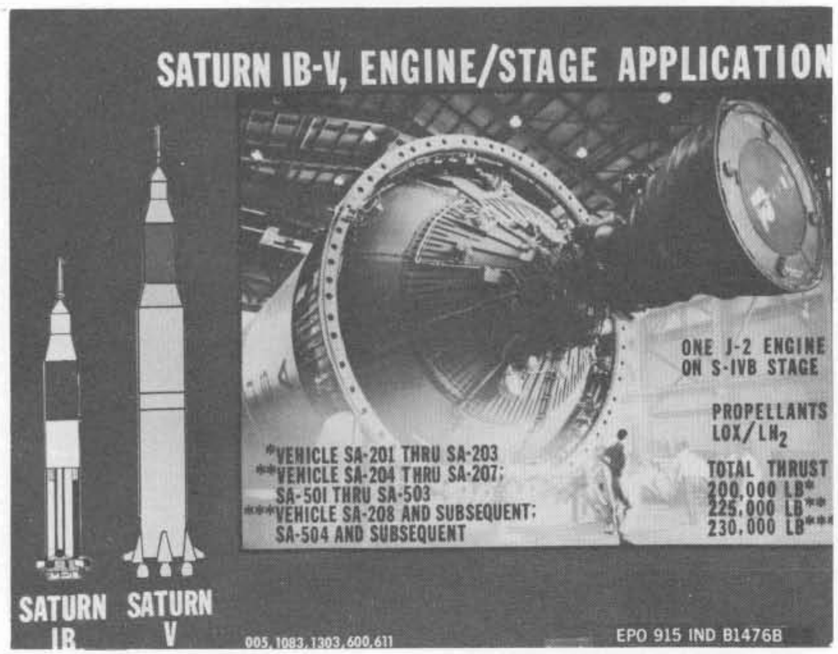

F-1 FIRING TEST STAND 1A-EAFB
IND 1419

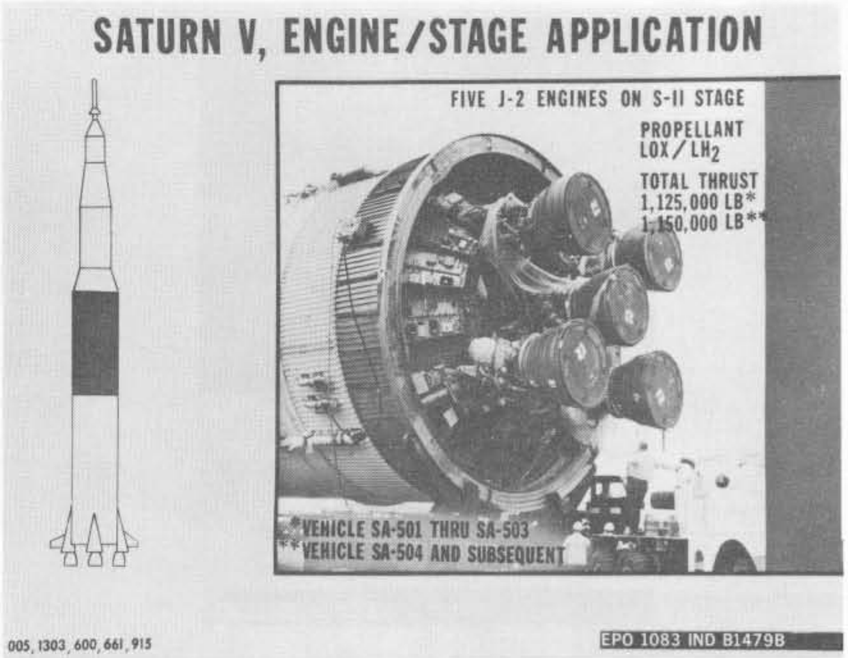

F-1 FIRING TEST STAND 1D-EAFB

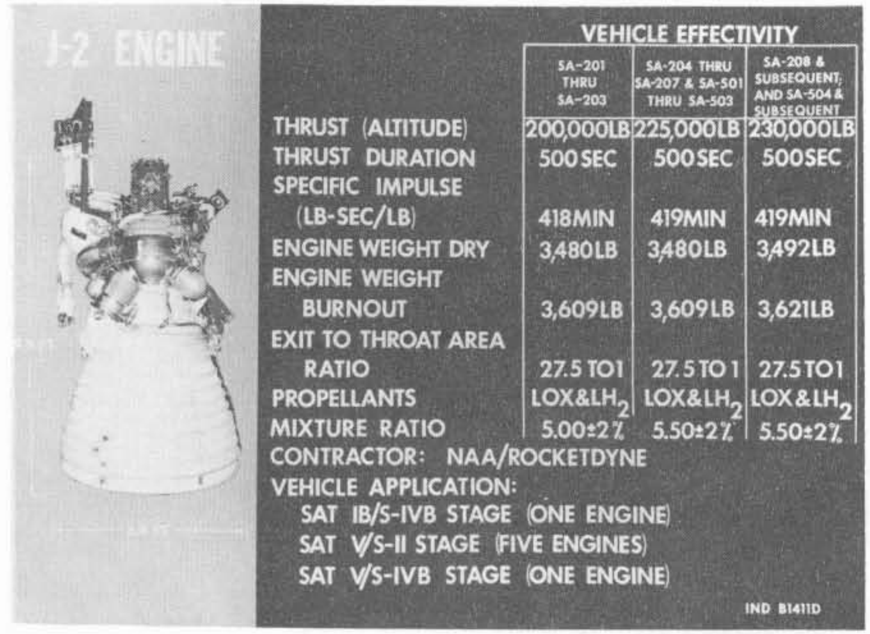

F-1 ENGINE FIRING-HUNTSVILLE
IND 81485A

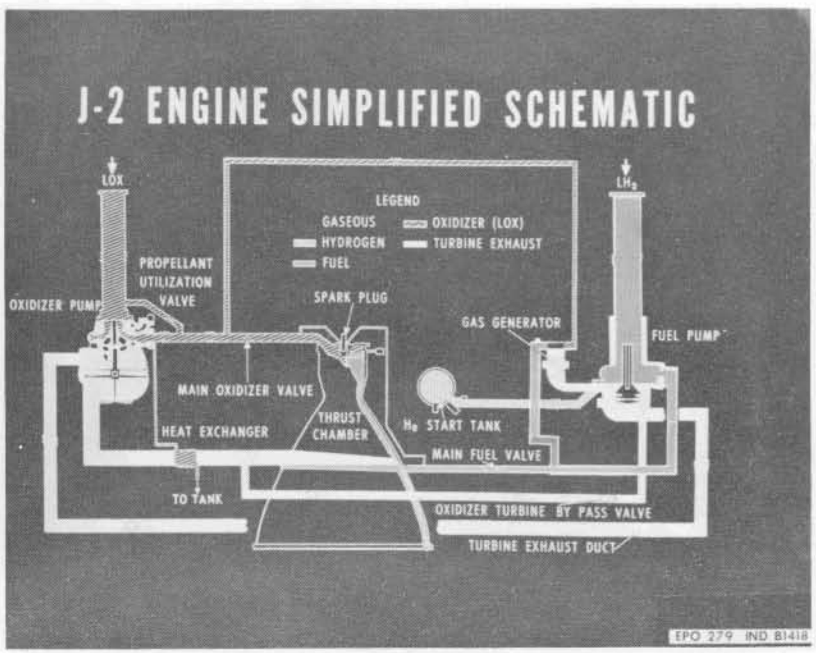

HUNTSVILLE
F-1 ENGINES INSTALLED ON S-IC-T
IN TEST STAND
E D 81469

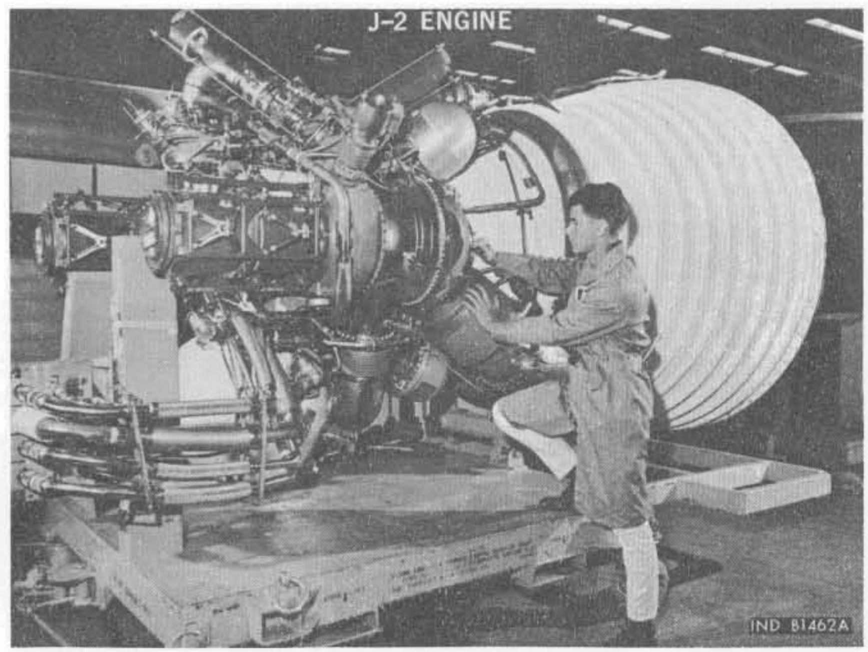

F-1 ENGINE LOADING ON GUPPY
IND B 1466

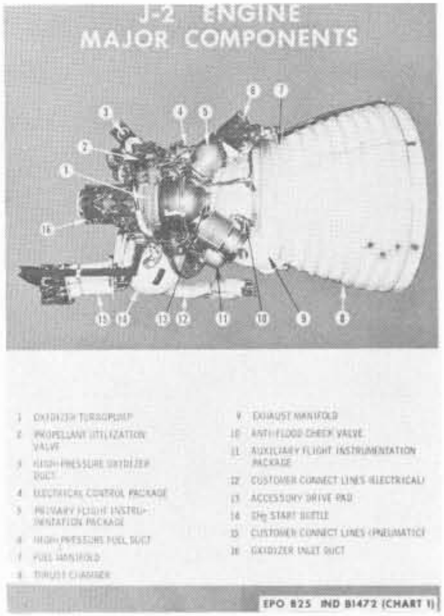

SATURN IB-V, ENGINE/STAGE APPLICATION
ONE J-2 ENGINE
ON S-IVB STAGE
PROPELLANTS
LOX/LH2
TOTAL THRUST
200,000 LB*
225,000 LB**
230,000 LB***
*VEHICLE SA-201 THRU SA-203
**VEHICLE SA-204 THRU SA-207;
SA-501 THRU SA-503
***VEHICLE SA-208 AND SUBSEQUENT;
SA-504 AND SUBSEQUENT
SATURN IB
SATURN V
005,1083,1303,600,611
EPO 915 IND B1476B

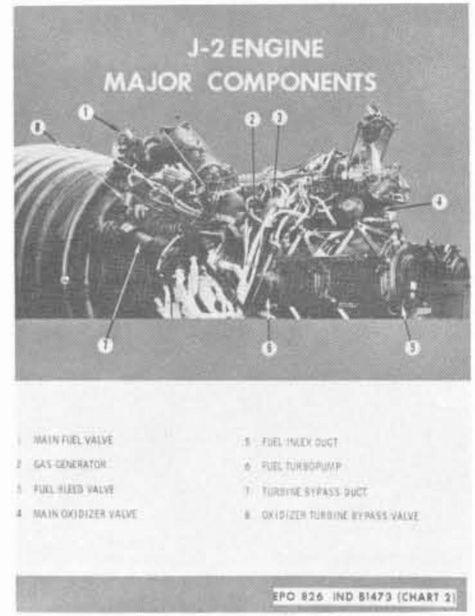

SATURN V, ENGINE/STAGE APPLICATION
FIVE J-2 ENGINES ON S-II STAGE
PROPELLANT
LOX / LH2
TOTAL THRUST
1,125,000 LB*
1,150,000 LB**
*VEHICLE SA-501 THRU SA-503
**VEHICLE SA-504 AND SUBSEQUENT
005, 1303, 600, 661, 915
EPO 1083 IND B1479B


J-2 ENGINE
VEHICLE EFFECTIVITY
SA-201 THRU SA-203
SA-204 THRU SA-207 & SA-501 THRU SA-503
SA-208 & SUBSEQUENT; AND SA-504 & SUBSEQUENT
THRUST (ALTITUDE) 200,000LB 225,000LB 230,000LB
THRUST DURATION 500SEC 500SEC 500SEC
SPECIFIC IMPULSE (LB-SEC/LB) 418MIN 419MIN 419MIN
ENGINE WEIGHT DRY 3,480LB 3,480LB 3,492LB
ENGINE WEIGHT BURNOUT 3,609LB 3,609LB 3,621LB
EXIT TO THROAT AREA RATIO 27.5 TO1 27.5 TO1 27.5 TO1
PROPELLANTS LOX&LH2 LOX&LH2 LOX&LH2
MIXTURE RATIO 5.00±2% 5.50±2% 5.50±2%
CONTRACTOR: NAA/ROCKETDYNE
VEHICLE APPLICATION:
SAT IB/S-IVB STAGE (ONE ENGINE)
SAT V/S-II STAGE (FIVE ENGINES)
SAT V/S-IVB STAGE (ONE ENGINE)
IND B1411D


J-2 ENGINE SIMPLIFIED SCHEMATIC
LOX
LH2
LEGEND
GASEOUS HYDROGEN
OXIDIZER (LOX)
TURBINE EXHAUST
FUEL
PROPELLANT UTILIZATION VALVE
OXIDIZER PUMP
SPARK PLUG
GAS GENERATOR
FUEL PUMP
MAIN OXIDIZER VALVE
HEAT EXCHANGER
THRUST CHAMBER
He START TANK
MAIN FUEL VALVE
TO TANK
OXIDIZER TURBINE BY PASS VALVE
TURBINE EXHAUST DUCT
EPO 279 IND B1418


J-2 ENGINE
IND B1462A


J-2 ENGINE
MAJOR COMPONENTS
1 OXIDIZER TURBOPUMP
2 PROPELLANT UTILIZATION VALVE
3 HIGH-PRESSURE OXIDIZER DUCT
4 ELECTRICAL CONTROL PACKAGE
5 PRIMARY FLIGHT INSTRUMENTATION PACKAGE
6 HIGH-PRESSURE FUEL DUCT
7 FUEL MANIFOLD
8 THRUST CHAMBER
9 EXHAUST MANIFOLD
10 ANTI-FLOOD CHECK VALVE
11 AUXILIARY FLIGHT INSTRUMENTATION PACKAGE
12 CUSTOMER CONNECT LINES (ELECTRICAL)
13 ACCESSORY DRIVE PAD
15 CUSTOMER CONNECT LINES (PNEUMATIC)
16 OXIDIZER INLET DUCT
EPO 825 IND 81472 (CHART 1)

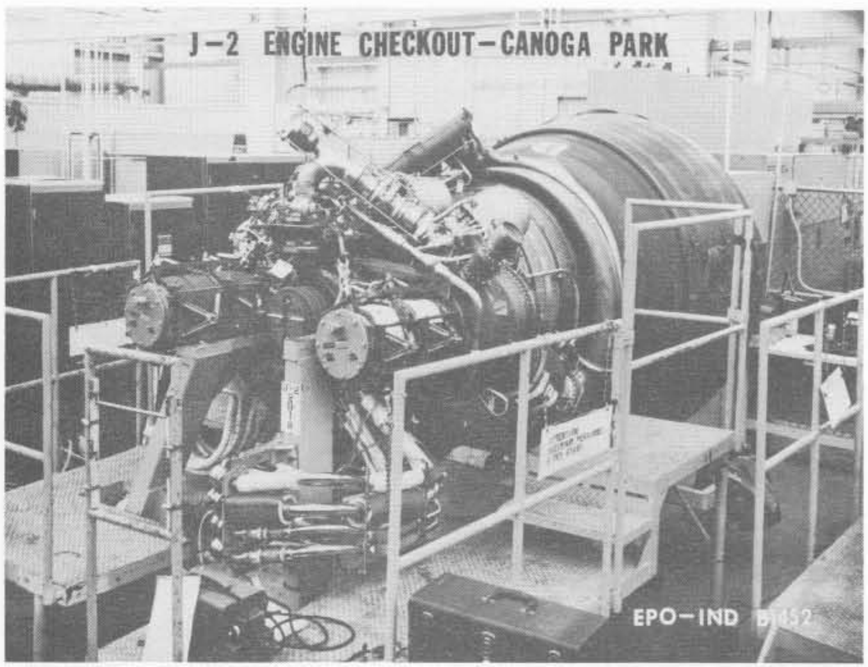

J-2 ENGINE
MAJOR COMPONENTS
1 MAIN FUEL VALVE
2 GAS GENERATOR
3 FUEL BLEED VALVE
4 MAIN OXIDIZER VALVE
5 FUEL INLET DUCT
6 FUEL TURBOPUMP
7 TURBINE BYPASS DUCT
8 OXIDIZER TURBINE BYPASS VALVE
EPO 826 IND 81473 (CHART 2)

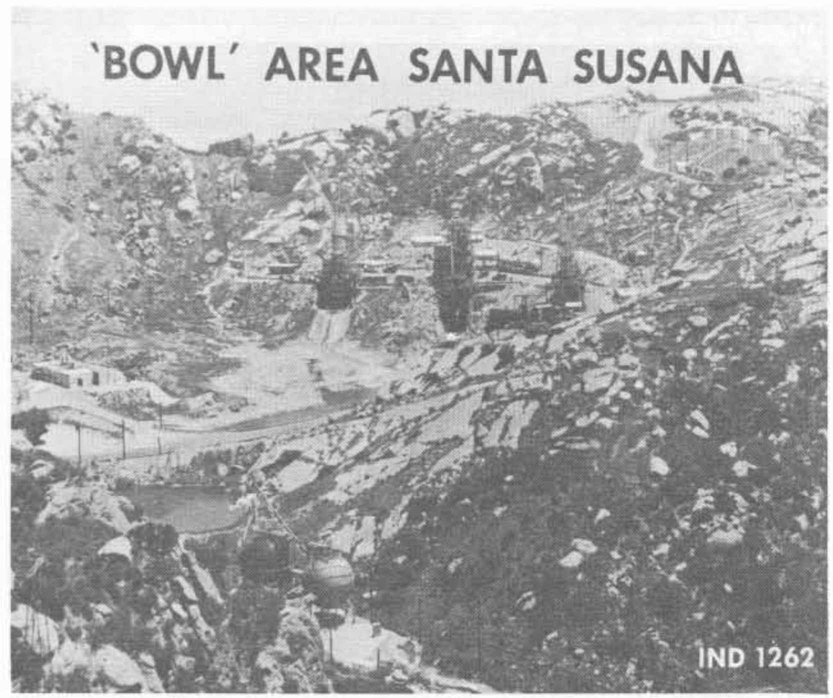

J-2 AND F-1 ENGINE MANUFACTURING FACILITY
CANOGA PARK
MSFC 67 IND 4168


J-2 ASSEMBLY AREA - CANOGA PARK
EPO IND 81456A

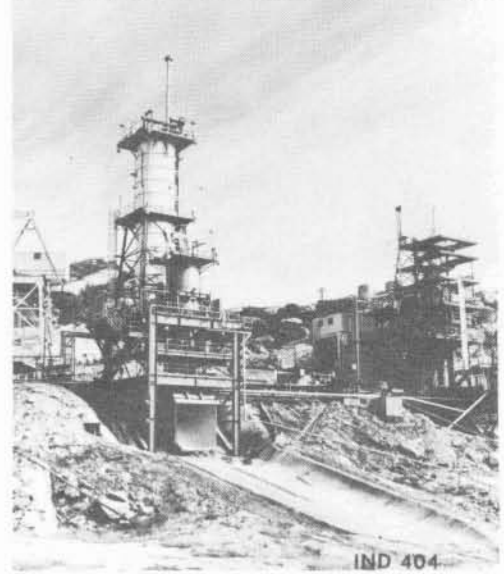

J-2 TURBOPUMP PRODUCTION - CANOGA PARK
IND 1422


J-2 THRUST CHAMBER AREA-CANOGA PARK
EPO IND B1458

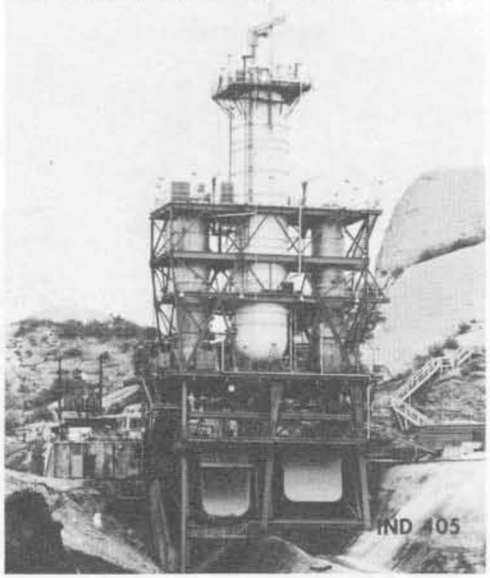

J-2 ENGINE CHECKOUT-CANOGA PARK


'BOWL' AREA SANTA SUSANA
IND 1262

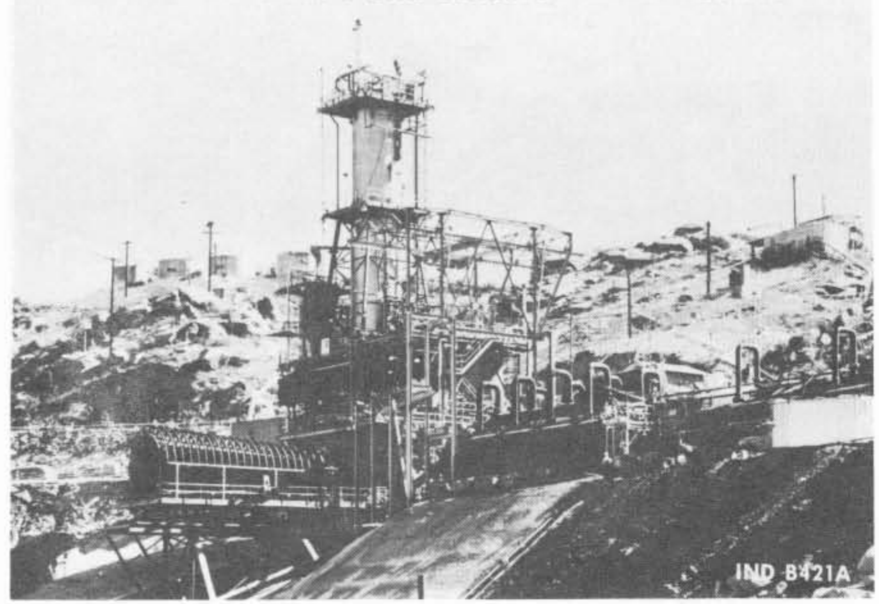
J-2 VERTICAL TEST STAND 2 - SANTA SUSANA

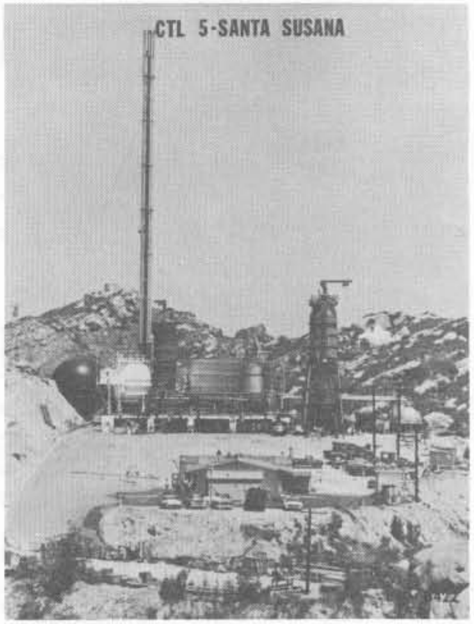


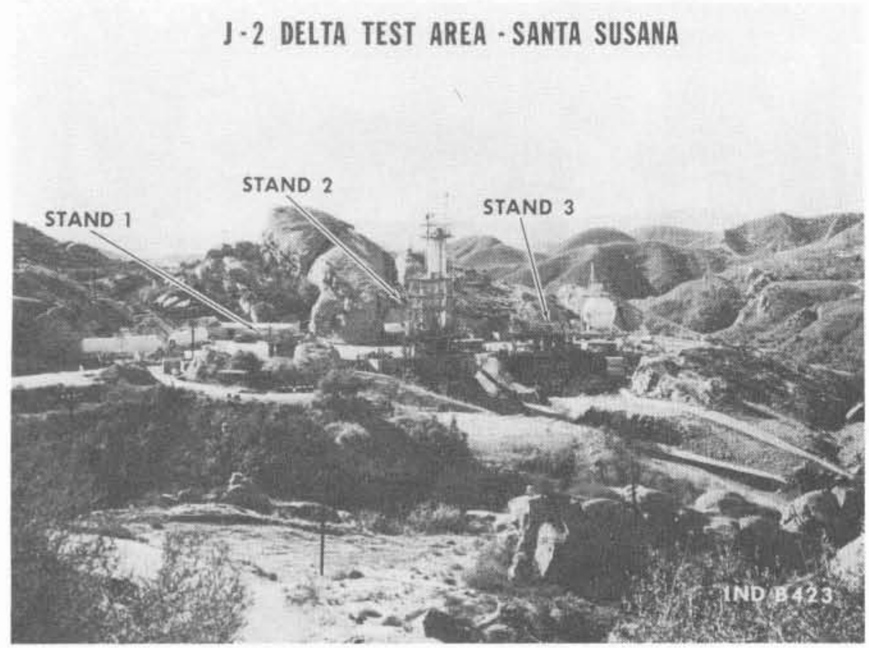
J-2 DELTA 2 TEST STAND - SANTA SUSANA

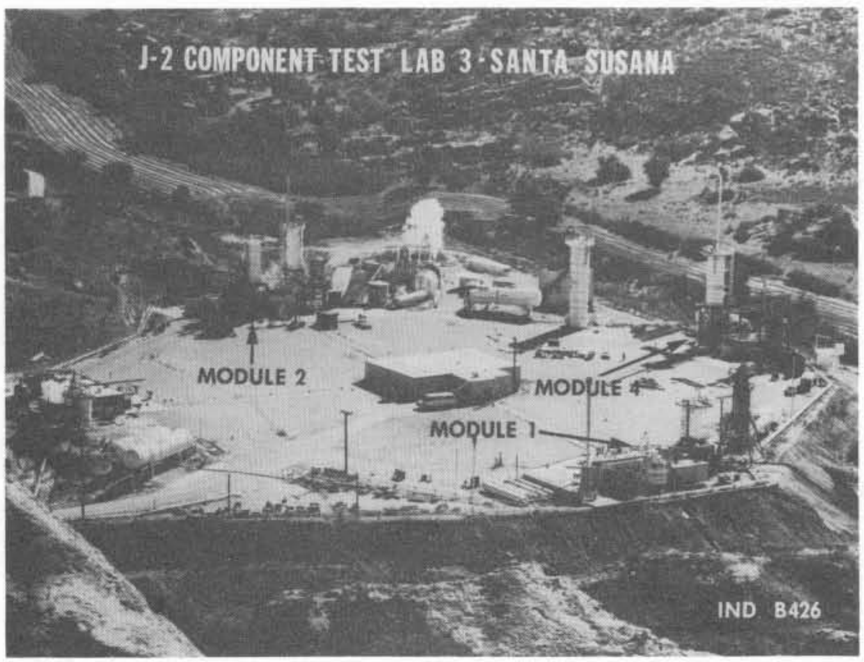


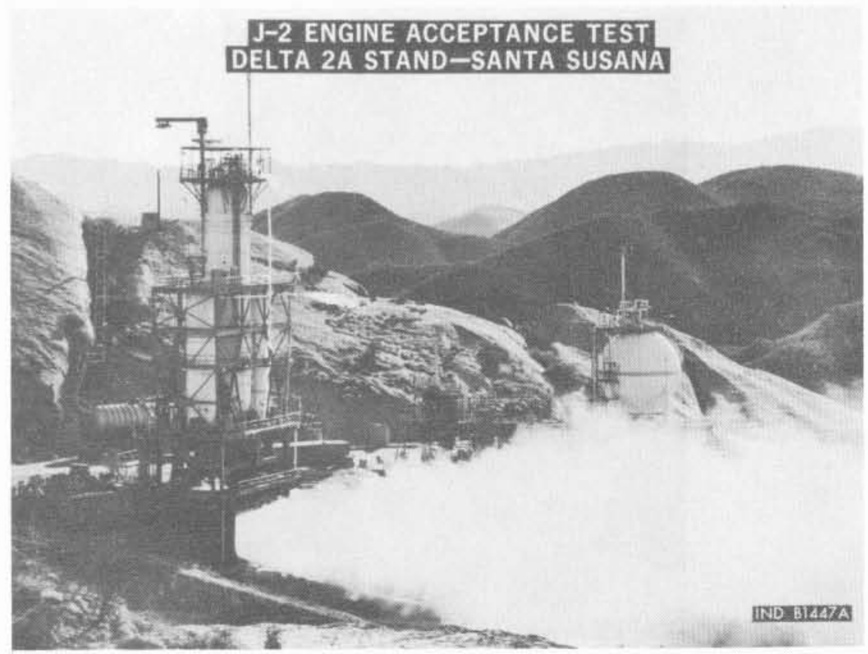
VERTICAL TEST STAND 3 WITH DIFFUSER - SANTA SUSANA

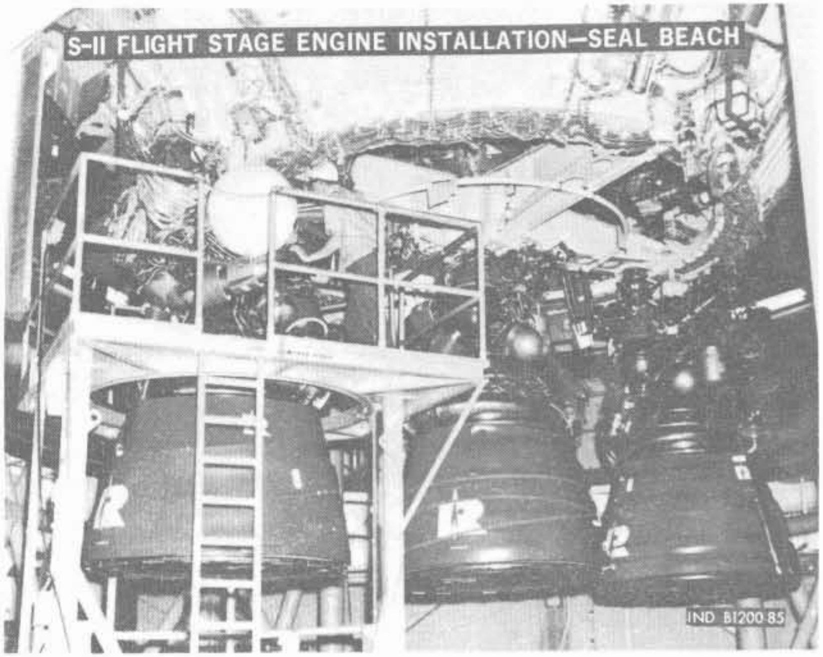



CTL 5-SANTA SUSANA

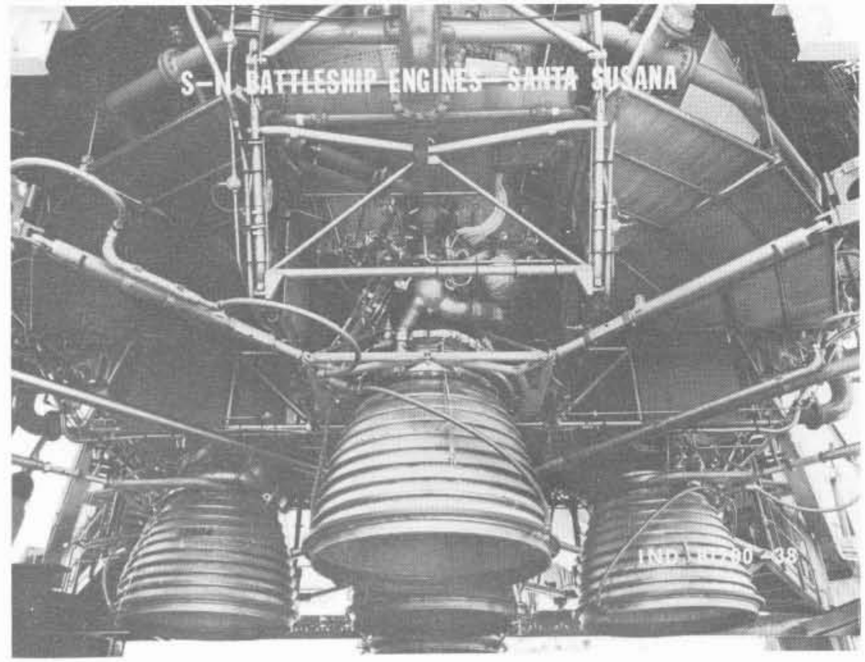

J-2 DELTA TEST AREA - SANTA SUSANA
STAND 1
STAND 2
STAND 3
IND B423


J-2 COMPONENT TEST LAB 3 - SANTA SUSANA
MODULE 2
MODULE 4
MODULE 1
IND B426

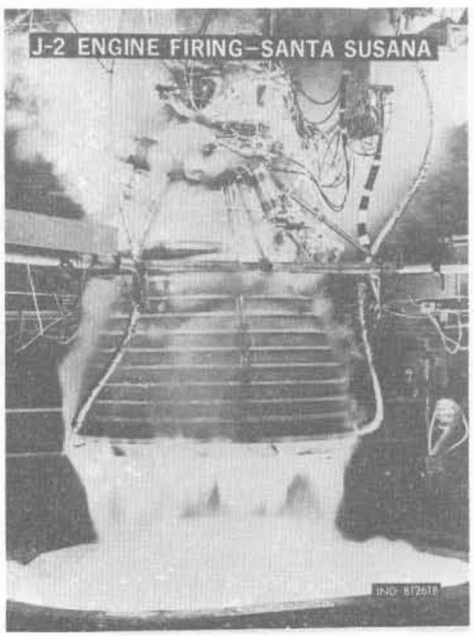

J-2 ENGINE ACCEPTANCE TEST
DELTA 2A STAND—SANTA SUSANA
IND B1447A



S-II FLIGHT STAGE ENGINE INSTALLATION—SEAL BEACH



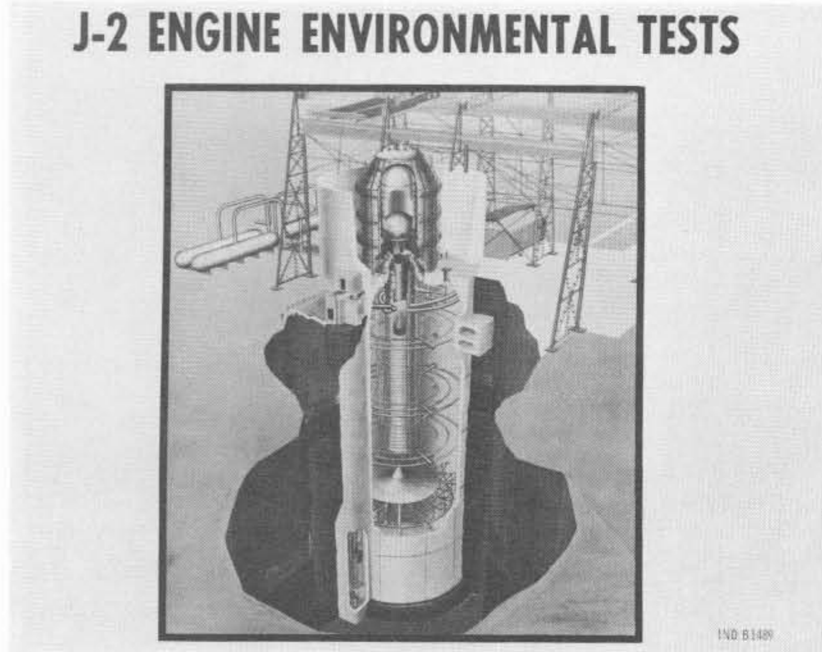
S-II BATTLESHIP ENGINES—SANTA SUSANA

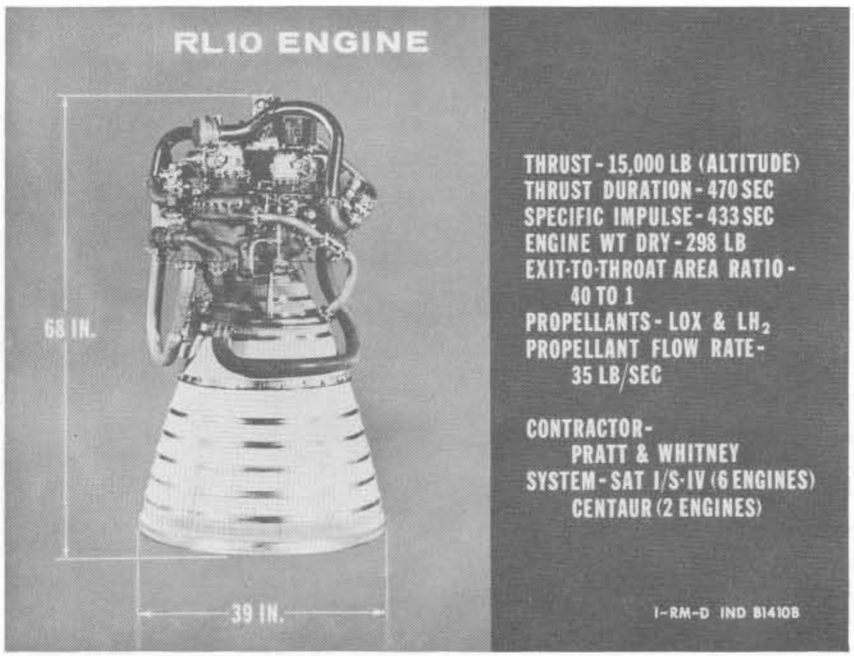


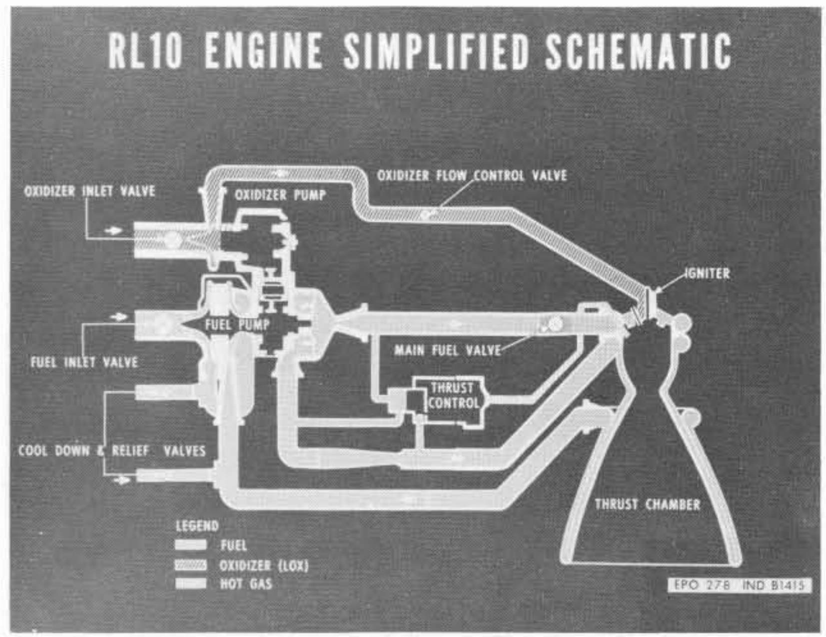
J-2 ENGINE FIRING—SANTA SUSANA

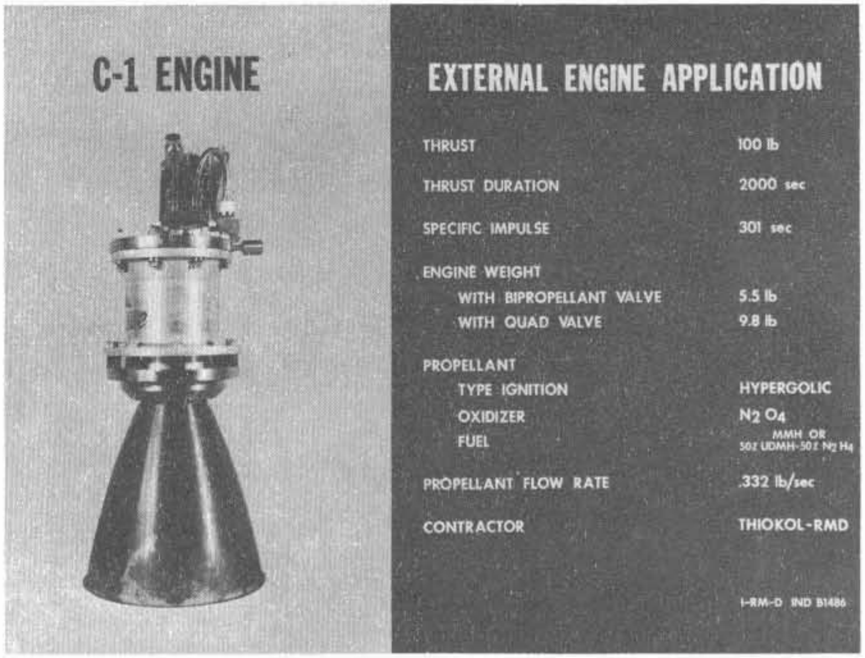
S-II BATTLESHIP STAGE FIRING—SANTA SUSANA

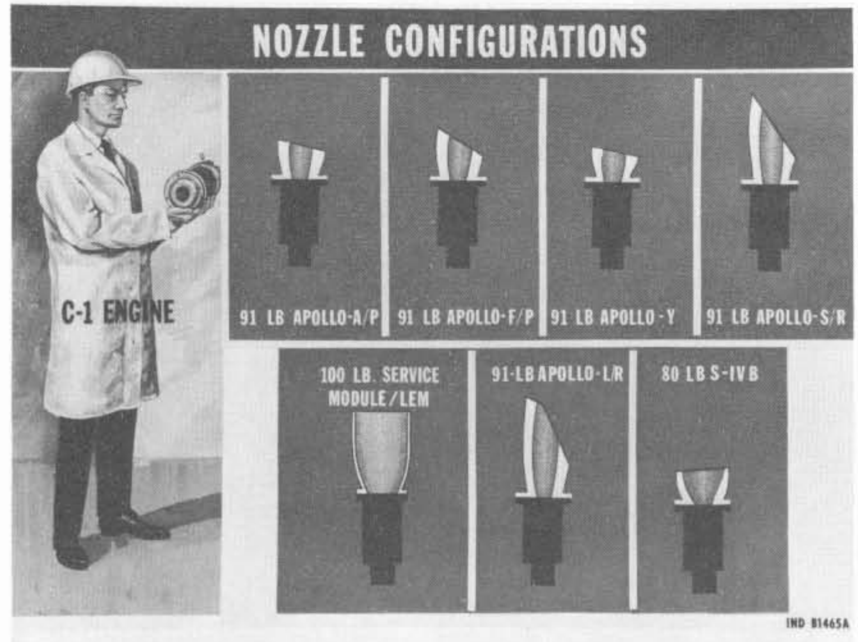

J-2 ENGINE ALTITUDE TEST FACILITY—AEDC
IND 434


J-2 ENGINE ENVIRONMENTAL TESTS
IND B1489


RL10 ENGINE
68 IN.
39 IN.
THRUST - 15,000 LB (ALTITUDE)
THRUST DURATION - 470 SEC
SPECIFIC IMPULSE - 433 SEC
ENGINE WT DRY - 298 LB
EXIT-TO-THROAT AREA RATIO - 40 TO 1
PROPELLANTS - LOX & LH2
PROPELLANT FLOW RATE - 35 LB/SEC
CONTRACTOR - PRATT & WHITNEY
SYSTEM - SAT I/S-IV (6 ENGINES)
CENTAUR (2 ENGINES)
I-RM-D IND B1410B


RL10 ENGINE SIMPLIFIED SCHEMATIC
OXIDIZER INLET VALVE
OXIDIZER PUMP
OXIDIZER FLOW CONTROL VALVE
IGNITER
FUEL PUMP
MAIN FUEL VALVE
FUEL INLET VALVE
THRUST CONTROL
COOL DOWN & RELIEF VALVES
THRUST CHAMBER
LEGEND
FUEL
OXIDIZER (LOX)
HOT GAS
EPO 278 IND B1415


C-1 ENGINE
EXTERNAL ENGINE APPLICATION
THRUST 100 lb
THRUST DURATION 2000 sec
SPECIFIC IMPULSE 301 sec
ENGINE WEIGHT
WITH BIPROPELLANT VALVE 5.5 lb
WITH QUAD VALVE 9.8 lb
PROPELLANT
TYPE IGNITION HYPERGOLIC
OXIDIZER N_2O_4
FUEL MMH OR 50% UDMH-50% N_2H_4
PROPELLANT FLOW RATE .332 lb/sec
CONTRACTOR THIOKOL-RMD
I-RM-D IND B1486


NOZZLE CONFIGURATIONS
C-1 ENGINE
91 LB APOLLO-A/P
91 LB APOLLO-F/P
91 LB APOLLO-Y
91 LB APOLLO-S/R
100 LB. SERVICE MODULE/LEM
91-LB APOLLO-L/R
80 LB S-IVB
IND B1465A

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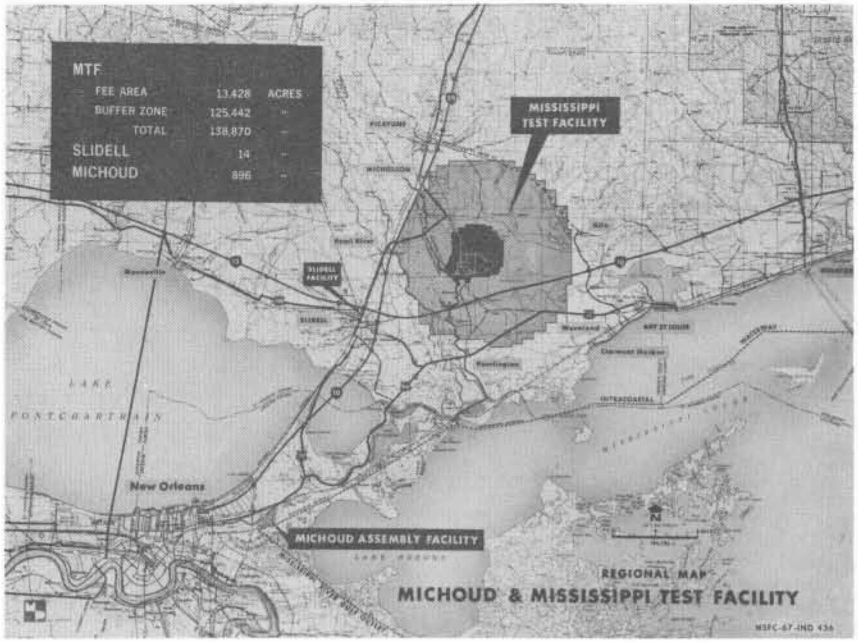
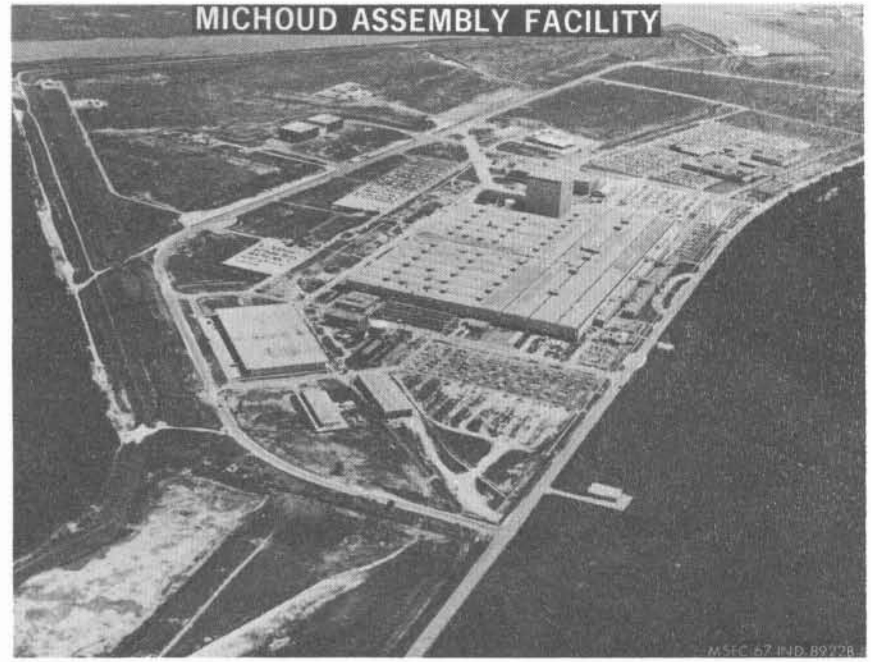




1. MAINTENANCE SUPPLY
2. HAZARDOUS MATLS
3. VEHICLE COMPONENT SUPPLY
4. BOILER PLANT & FUEL TANKS
5. BATTERY CHARGING
6. COOLING TOWER
7. LABORATORY
8. CHEMICAL WASTE RESERVOIR
9. CHRYSLER FAB AREA (S-IB)
10. BOEING FAB AREA (S-IC)
11. ENGINEERING BUILDINGS
12. VERT ASSY & HYDROSTATIC TEST
13. SYSTEMS ENGINEERING BLDG
14. BOOSTER HANGAR
15. MAINTENANCE
16. ENGINEERING & OFFICE BLDG
17. CAFETERIA
18. CONTRACTOR SERVICES BLDG
19. STAGE TEST & CHECK OUT
20. SALVAGE YARD
21. HIGH PRESSURE TEST FACILITY
22. MAIN PUMPING STATION
23. BARGE DOCK
24. LOX & LH_2 PLANT

IND 8904F

MSFC - MICHOUD ASSEMBLY FACILITY
GENERAL DATA

FACILITIES

BUILDING OR AREAS	SQUARE FEET
ADMINISTRATION BUILDING	90,010
ENGINEERING BUILDING	119,807
ENGINEERING & OFFICE BUILDING	541,833
MANUFACTURING BUILDINGS	2,022,352
TRANSPORTATION BUILDING	2,486
MAINTENANCE SUPPLY BUILDING	34,661
MISCELLANEOUS	672,713
TOTAL	3,483,862

CAPITAL VALUE-FACILITIES & EQUIPMENT

S-IC (BOEING FUNDED)	
FACILITIES	$14,958,000
EQUIPMENT	$27,094,000
S-IB (CHRYSLER FUNDED)	
EQUIPMENT	$7,273,000
FACILITIES	$11,350,000
MSFC FUNDED	
FACILITIES	$26,255,000
MASON-RUST	
EQUIPMENT	$7,635,000
FACILITIES	$2,703,000

PERSONNEL

CIVIL SERVICE	251
BOEING	4,508
CHRYSLER	2,594
MASON-RUST	761

CONTRACT VALUE *

BOEING (DESIGN, MANUFACTURE, ASSEMBLE & TEST 15 S-IC STAGES)	$1,006,998,765
CHRYSLER (MANUFACTURE, ASSEMBLE & TEST 2 S-IA 12 S-IB STAGES.)	$334,260,822
MASON-RUST (PROVIDE COMMON SERVICES TO GOVT. & CONTRACTORS ASSIGNED TO MICHOUD.)	$60,902,252

*EXCLUDES C OF F AND EQUIPMENT.

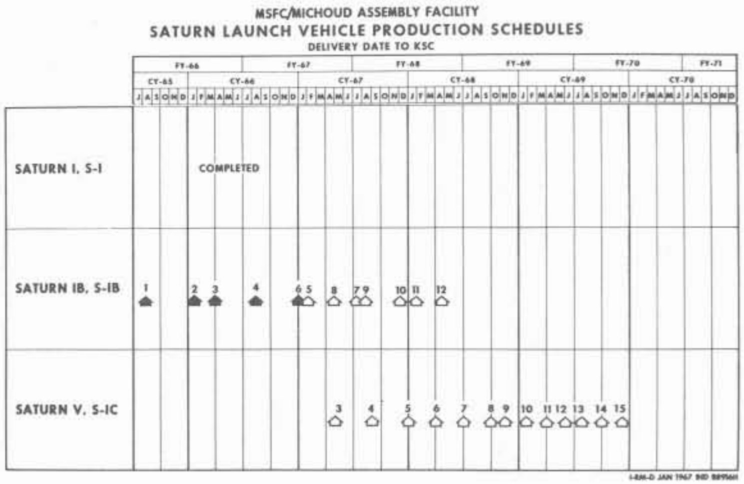
STAGE ASSEMBLY STATUS

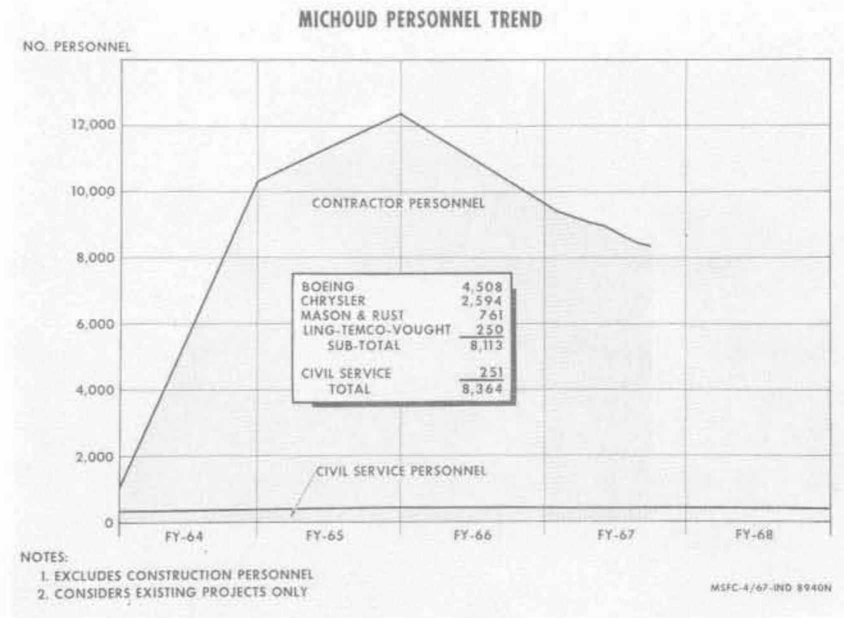
STAGE	STATUS
S-IB-1	LAUNCHED FEB 26, 1966
S-IB-2	LAUNCHED AUG 25, 1966
S-IB-3	LAUNCHED JULY 5, 1966
S-IB-4	PRE-LAUNCH CHECKOUT AT KSC
S-IB-5	MICHOUD STORAGE
S-IB-6	MICHOUD STORAGE
S-IB-7	RE-VERIFICATION CHECKOUT
S-IB-8	PREP FOR SHIP TO KSC
S-IB-9	POST STATIC MOD
S-IB-10	STATIC TEST-MSFC
S-IB-11	PRE STATIC CHECKOUT-MICHOUD
S-IB-12	FINAL ASSEMBLY
S-IC-D	MTF STORAGE
S-IC-F	MICHOUD STORAGE
S-IC-3	MICHOUD STORAGE
S-IC-4	ACCEPTANCE TEST-MTF
S-IC-5	CHECKOUT
S-IC-6	HORIZONTAL INSTALLATION
S-IC-7	VERTICAL ASSEMBLY
S-IC-8	ASSEMBLY
S-IC-9	SUB-ASSEMBLY OPERATIONS
S-IC-10	SUB-ASSEMBLY OPERATIONS
S-IC-11	SUB-ASSEMBLY OPERATIONS

COMPUTER OPERATIONS-SLIDELL

FACILITIES	
OFFICE & COMPUTER BLDG	95,518
TAPE STORAGE	4,442
MAINTENANCE AREA	2,921
LAND	14 ACRES
PERSONNEL	
CIVIL SERVICE	7
LING-TEMCO-VOUGHT	250
CONTRACT VALUE	
LING-TEMCO-VOUGHT (OPERATE CENTRAL COMPUTER FACILITY SUPPORTING MICHOUD AND MTF)	9,195,000

MSFC-4/1/67-IND 8902W





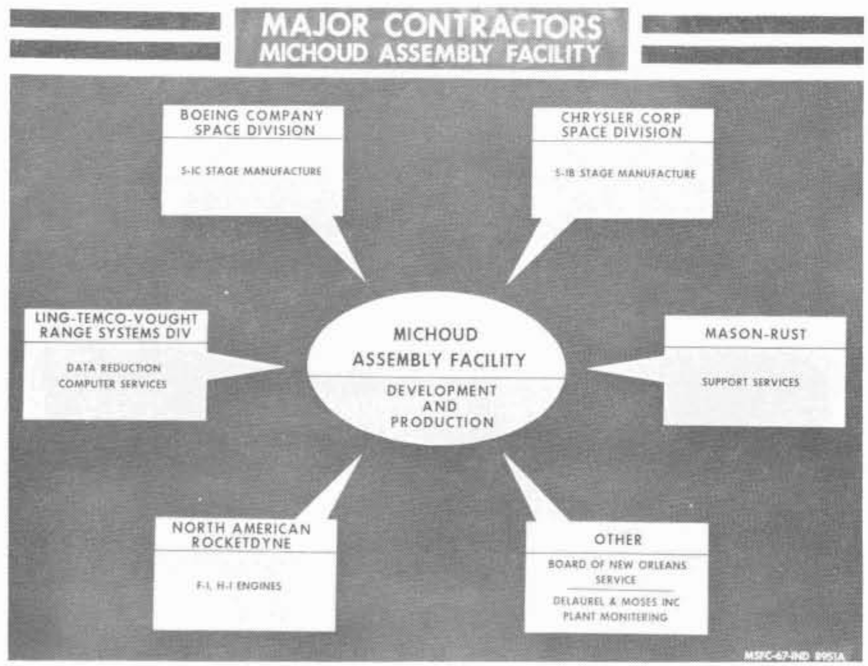
MICHOUD ASSEMBLY FACILITY

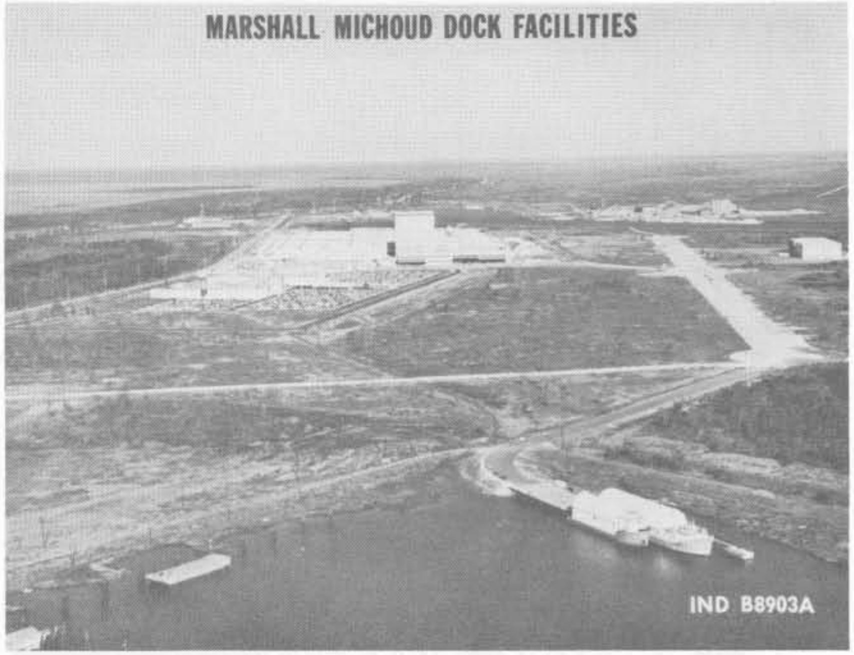
ECONOMIC IMPACT

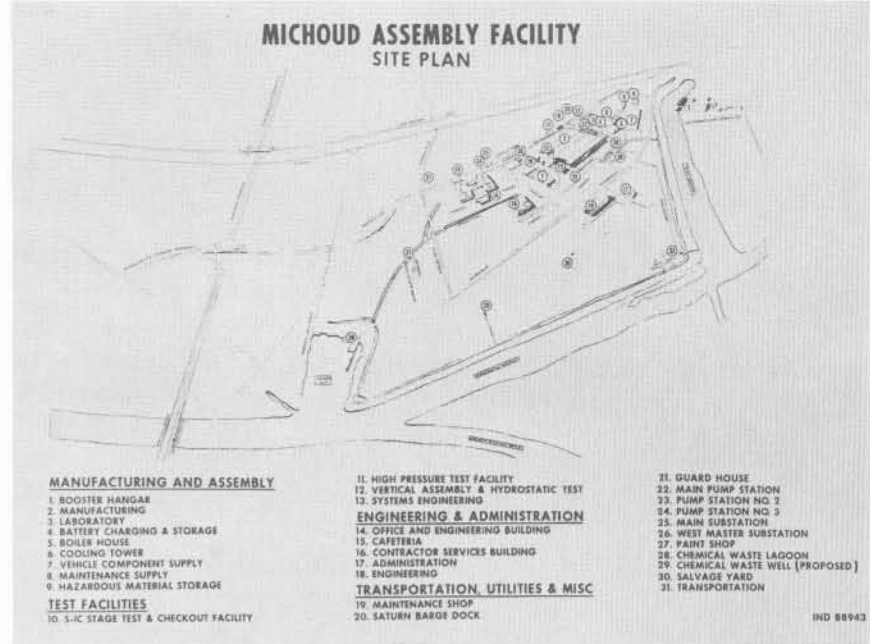
NEW JOBS		
MICHOUD EMPLOYEES		11,000
CONSTRUCTION WORKERS		1,000
COLLATERAL INDUSTRIES		5,000
SERVICE INDUSTRIES		10,000
	TOTAL	27,000

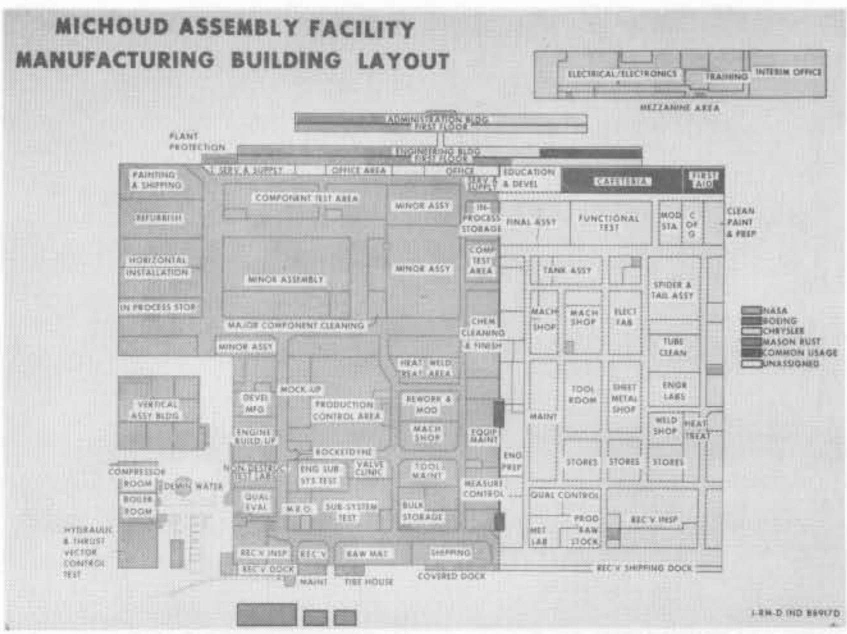
SALARIES AND WAGES		
MICHOUD EMPLOYEES		$94,000,000
CONSTRUCTION WORKERS		6,000,000
COLLATERAL INDUSTRIES		35,000,000
SERVICE INDUSTRIES		50,000,000
	TOTAL	$185,000,000
ESTIMATED RETAIL SALES		$123,000,000
ANNUAL VISITORS (1966)		30,000

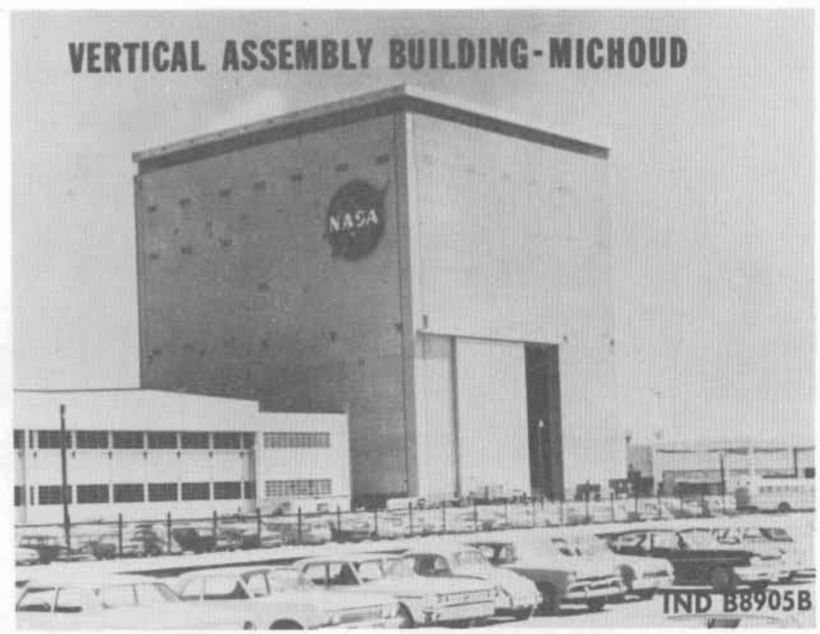
JAN 1967 IND B8944A

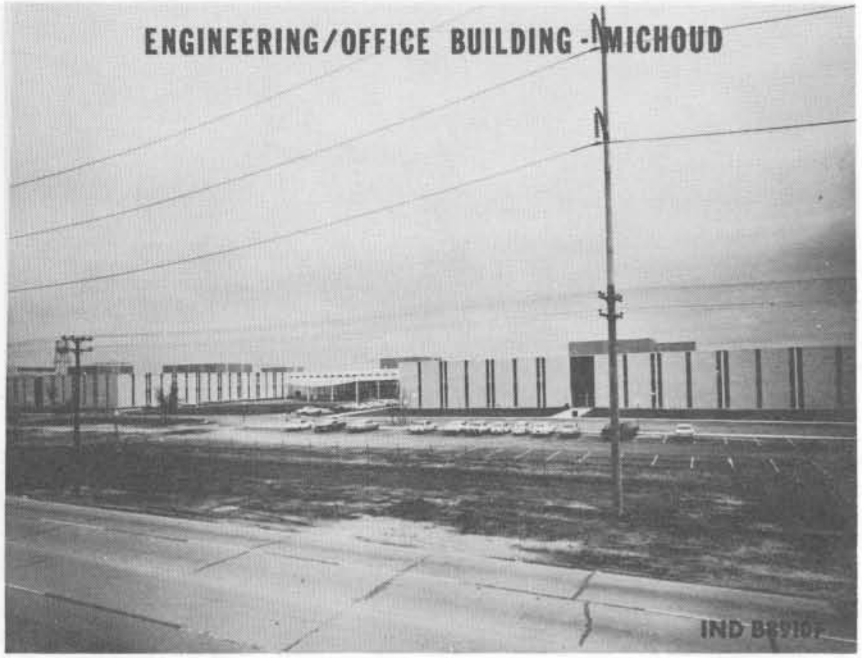



MARSHALL MICHOUD DOCK FACILITIES
IND B8903A


MICHOUD ASSEMBLY FACILITY
SITE PLAN
MANUFACTURING AND ASSEMBLY
1. BOOSTER HANGAR
2. MANUFACTURING
3. LABORATORY
4. BATTERY CHARGING & STORAGE
5. BOILER HOUSE
6. COOLING TOWER
7. VEHICLE COMPONENT SUPPLY
8. MAINTENANCE SUPPLY
9. HAZARDOUS MATERIAL STORAGE
TEST FACILITIES
10. S-IC STAGE TEST & CHECKOUT FACILITY
11. HIGH PRESSURE TEST FACILITY
12. VERTICAL ASSEMBLY & HYDROSTATIC TEST
13. SYSTEMS ENGINEERING
ENGINEERING & ADMINISTRATION
14. OFFICE AND ENGINEERING BUILDING
15. CAFETERIA
16. CONTRACTOR SERVICES BUILDING
17. ADMINISTRATION
18. ENGINEERING
TRANSPORTATION, UTILITIES & MISC
19. MAINTENANCE SHOP
20. SATURN BARGE DOCK
21. GUARD HOUSE
22. MAIN PUMP STATION
23. PUMP STATION NO. 2
24. PUMP STATION NO. 3
25. MAIN SUBSTATION
26. WEST MASTER SUBSTATION
27. PAINT SHOP
28. CHEMICAL WASTE LAGOON
29. CHEMICAL WASTE WELL (PROPOSED)
30. SALVAGE YARD
31. TRANSPORTATION
IND B8943

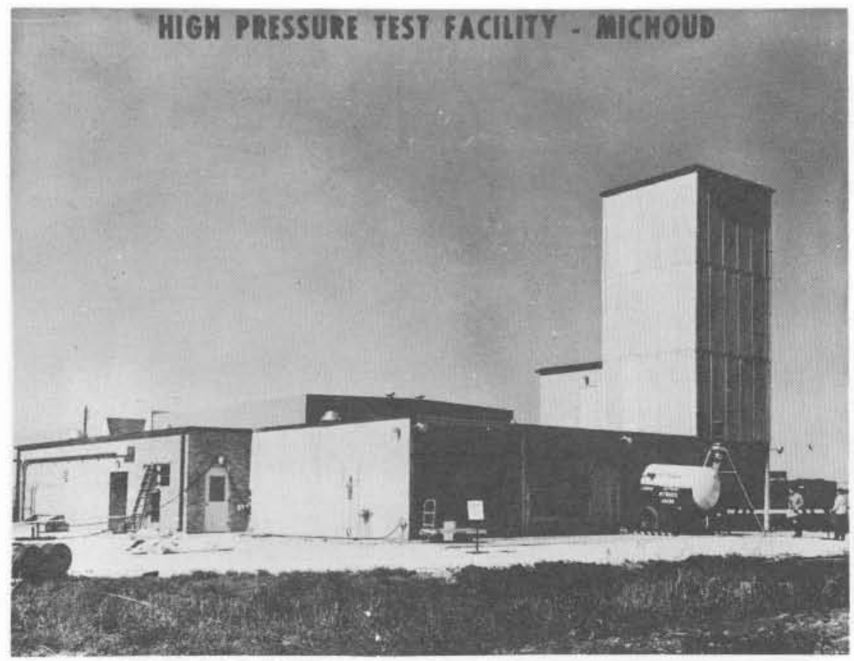

MICHOUD ASSEMBLY FACILITY
MANUFACTURING BUILDING LAYOUT
MEZZANINE AREA
ADMINISTRATION BLDG FIRST FLOOR
ENGINEERING BLDG FIRST FLOOR
CAFETERIA
FIRST AID
COMPONENT TEST AREA
MINOR ASSY
MINOR ASSEMBLY
FUNCTIONAL TEST
TANK ASSY
MAJOR COMPONENT CLEANING
PRODUCTION CONTROL AREA
CLEAN PAINT & PREP
NASA
BOEING
CHRYSLER
MASON RUST
COMMON USAGE
UNASSIGNED


VERTICAL ASSEMBLY BUILDING-MICHOUD
NASA
IND B8905B

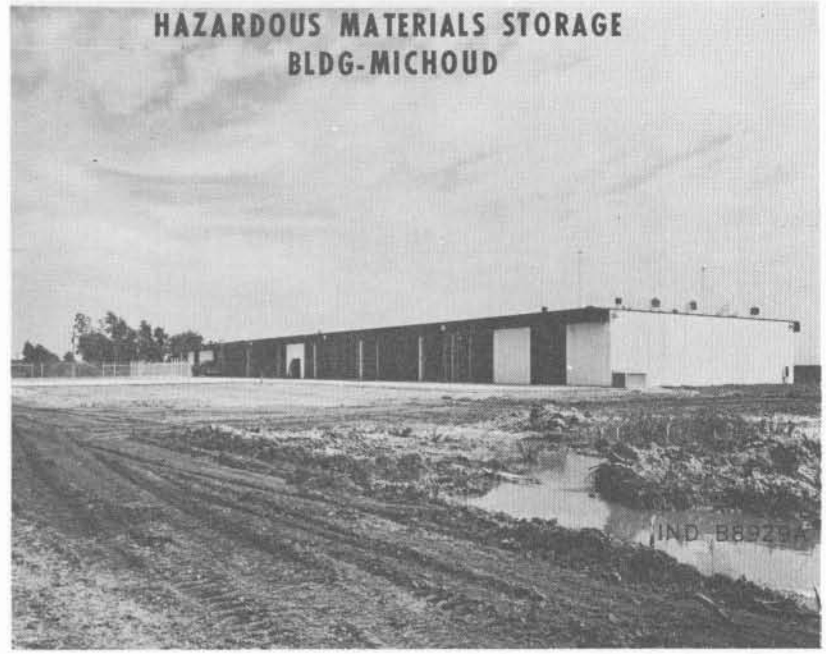

ENGINEERING/OFFICE BUILDING - MICHOUD

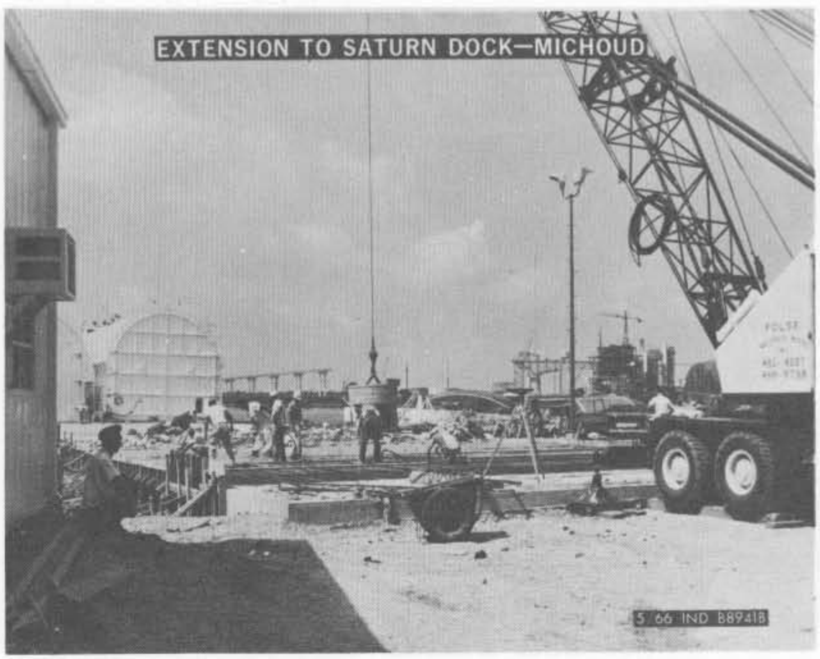

S-IC STAGE TEST & CHECKOUT FACILITY—MICHOUD
IND B8918G

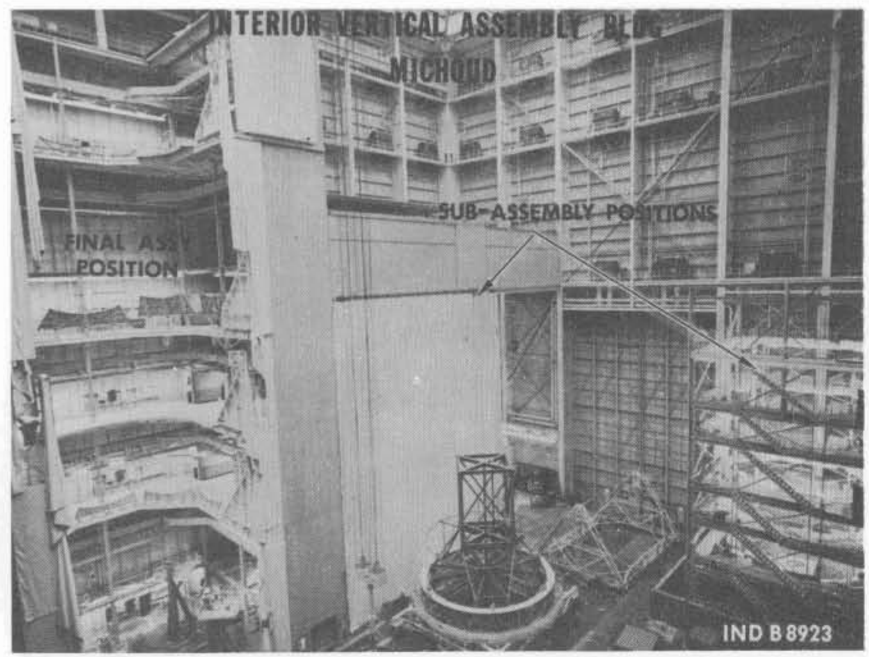

CONTRACTOR SERVICES BUILDING—MICHOUD
8/66 IND B8942E

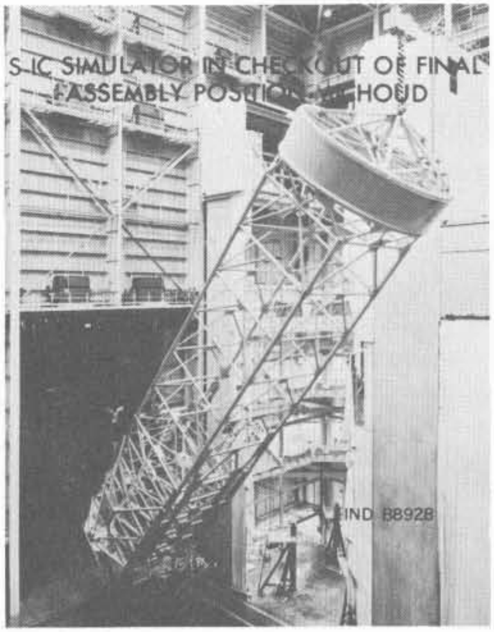

HIGH PRESSURE TEST FACILITY - MICHOUD


VEHICLE COMPONENT SUPPLY BLDG-MICHOUD
IND B8921D

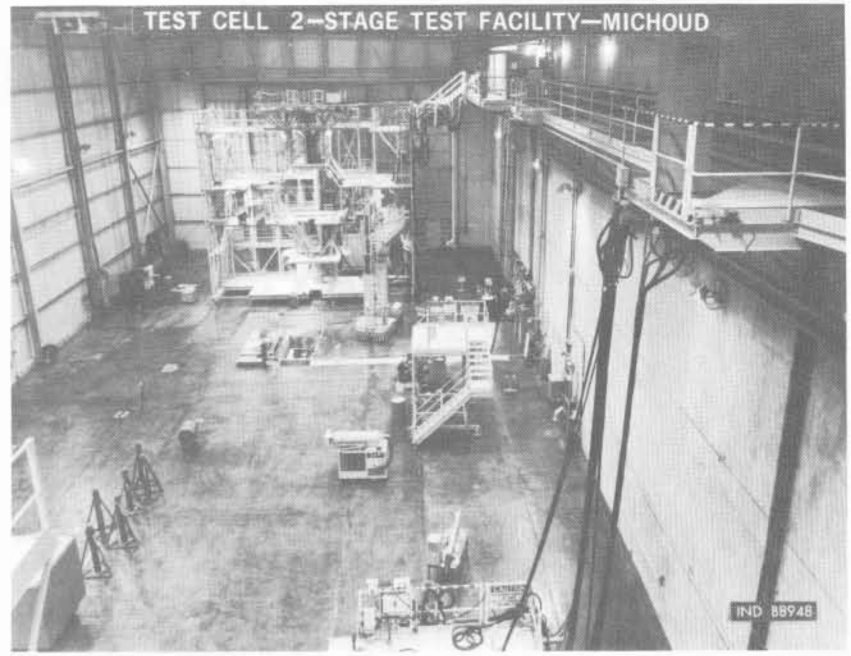

HAZARDOUS MATERIALS STORAGE
BLDG-MICHOUD
IND B8929A


EXTENSION TO SATURN DOCK—MICHOUD
5/66 IND B8941B

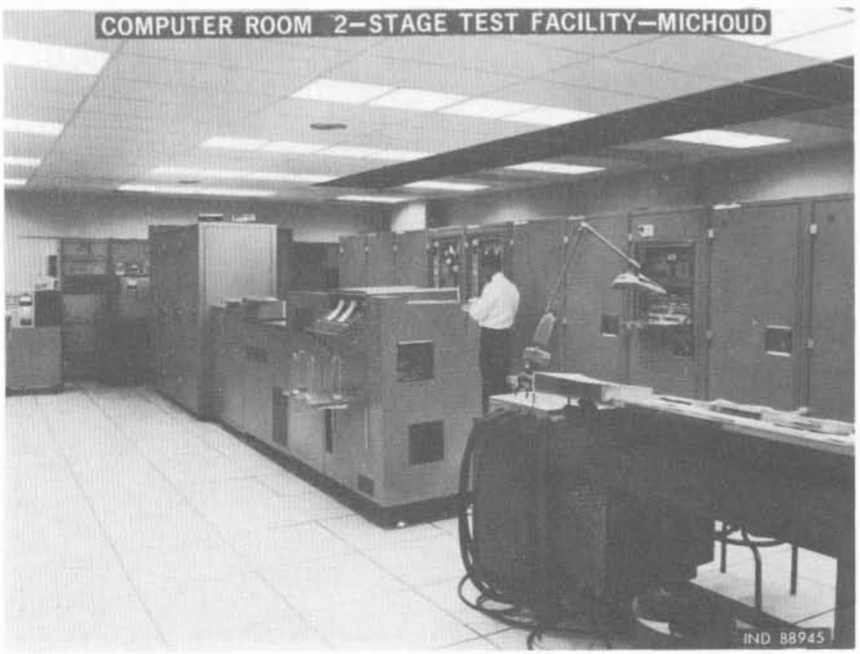

INTERIOR VERTICAL ASSEMBLY BLDG
MICHOUD
SUB-ASSEMBLY POSITIONS
FINAL ASSY
POSITION
IND B 8923



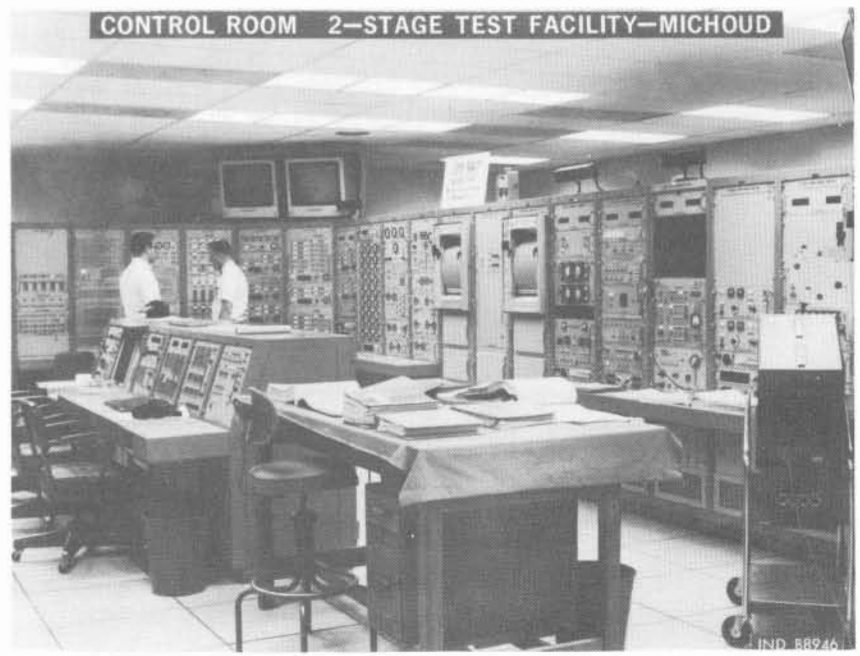
S-IC SIMULATOR IN CHECKOUT OF FINAL ASSEMBLY POSITION—MICHOUD



TEST CELL 2—STAGE TEST FACILITY—MICHOUD

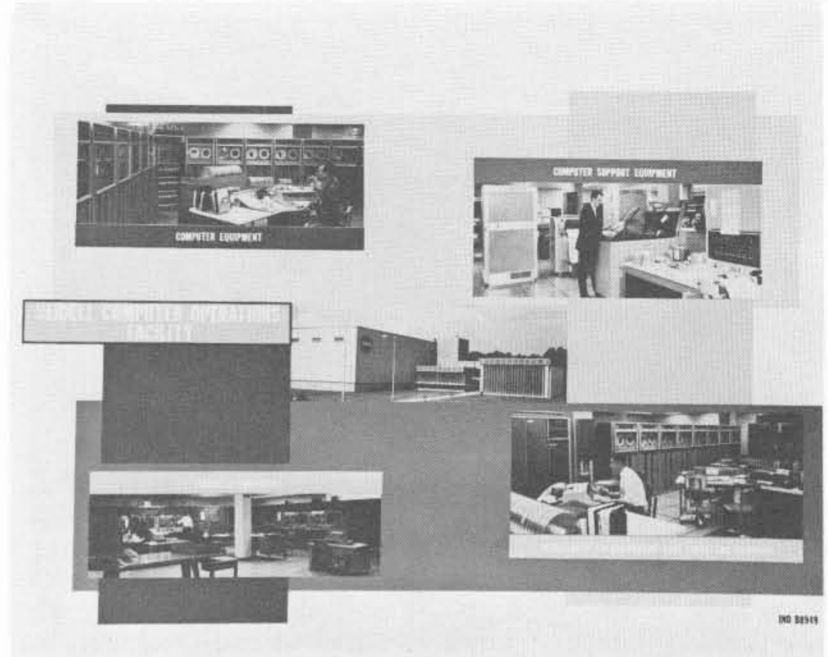


COMPUTER ROOM 2—STAGE TEST FACILITY—MICHOUD

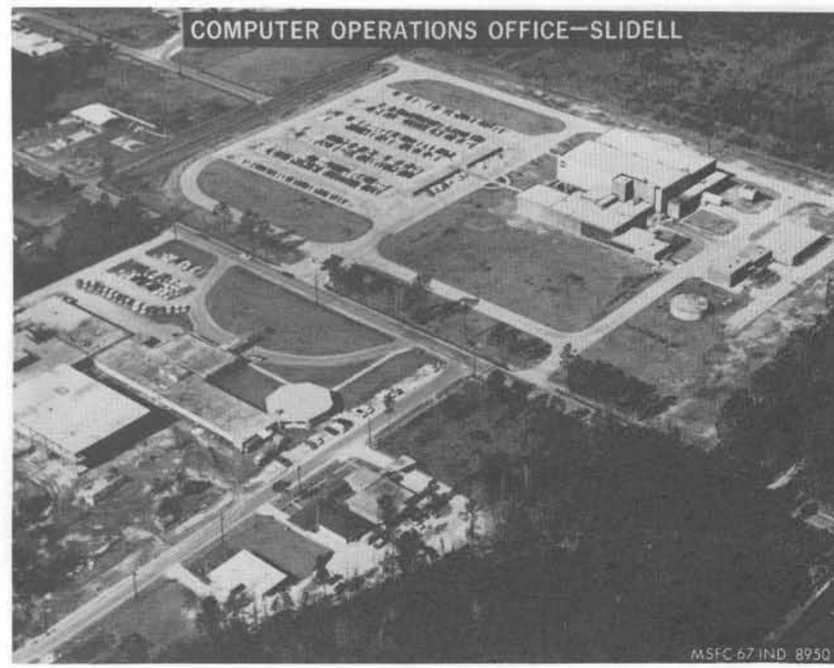


CONTROL ROOM 2—STAGE TEST FACILITY—MICHOUD

TELEMETRY ROOM 2—STAGE TEST FACILITY—MICHOUD



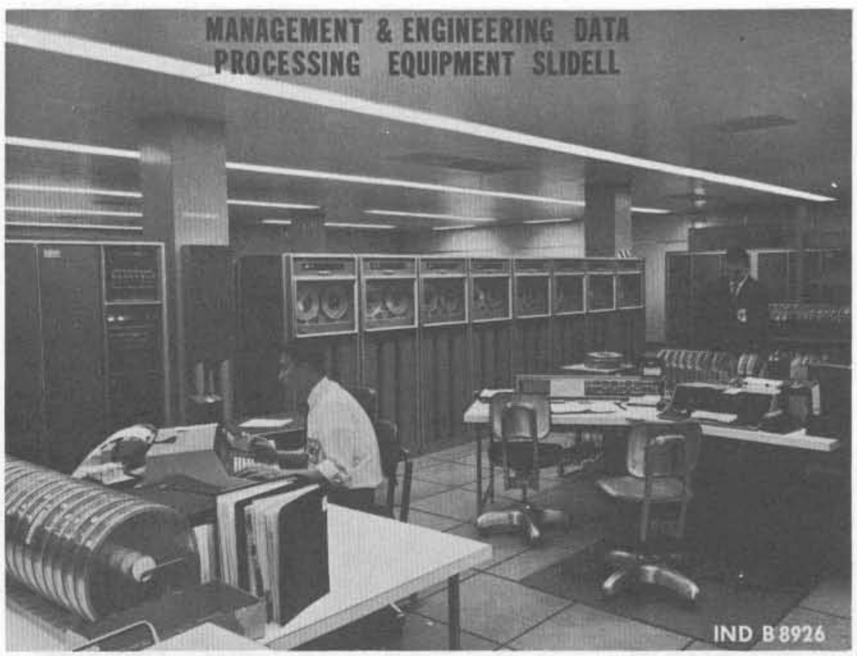
COMPUTER OPERATIONS OFFICE—SLIDELL



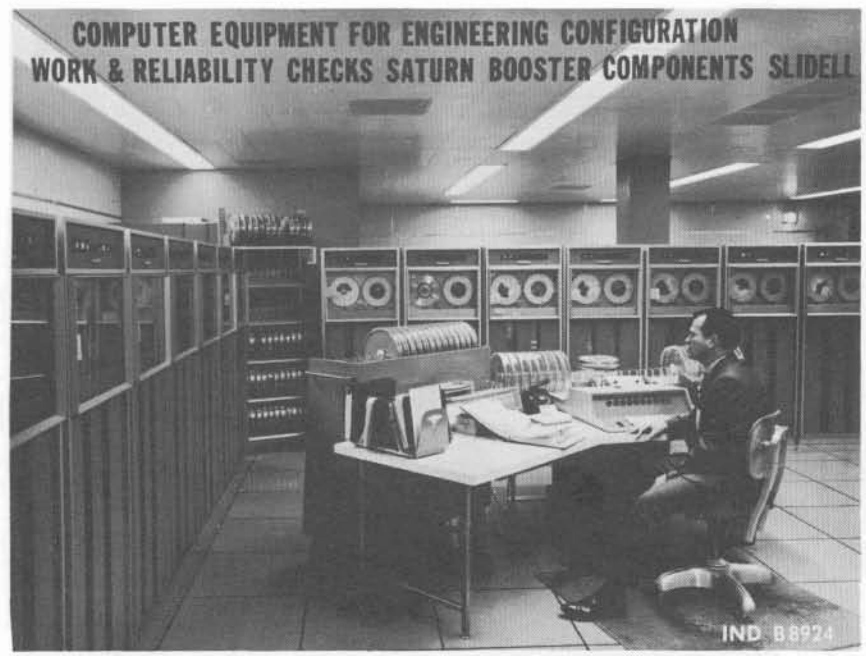
COMPUTER OPERATIONS OFFICE—SLIDELL

COMPUTER SUPPORT EQUIPMENT – SLIDELL

COMPUTER EQUIPMENT TO SIMULATE CONDITIONS & DESIGN PROBLEMS OF SATURN BOOSTERS – SLIDELL



MANAGEMENT & ENGINEERING DATA PROCESSING EQUIPMENT SLIDELL



COMPUTER EQUIPMENT FOR ENGINEERING CONFIGURATION WORK & RELIABILITY CHECKS SATURN BOOSTER COMPONENTS SLIDELL

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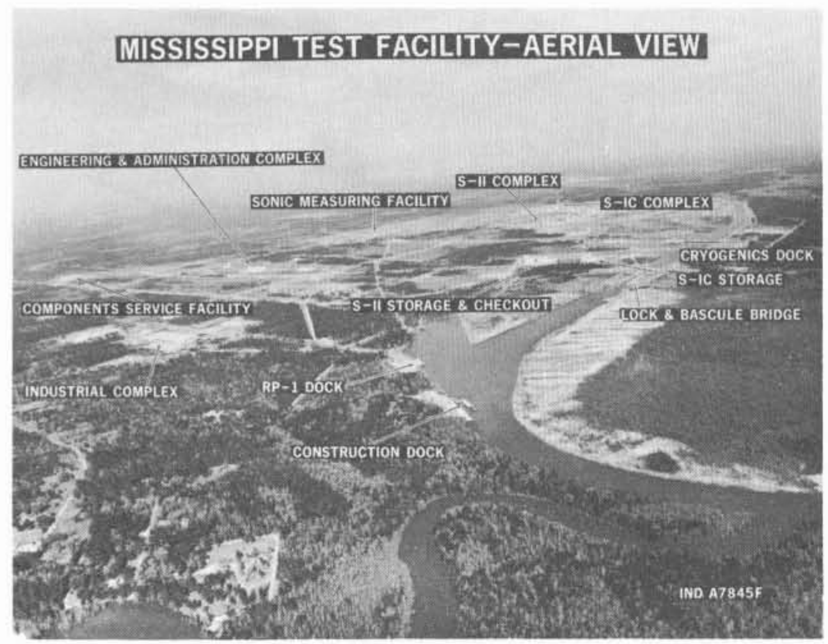
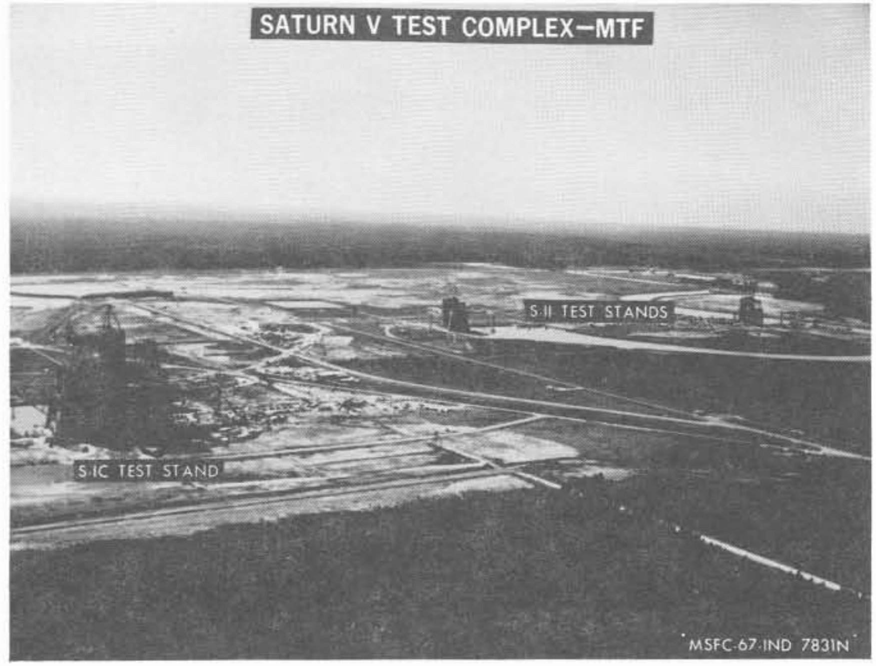
MISSISSIPPI
TEST
FACILITY

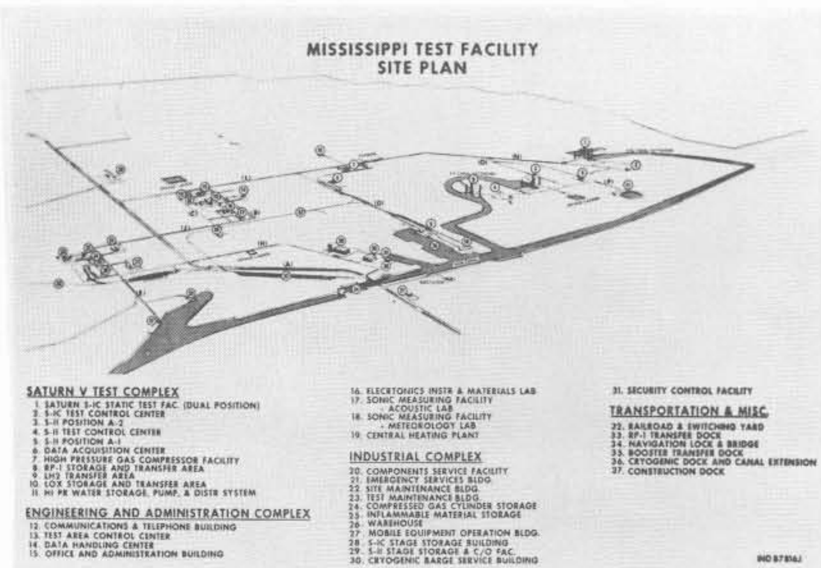

MISSISSIPPI TEST FACILITY
PRIMARY MISSION
TO BUILD, ACTIVATE, AND MANAGE A MAJOR FACILITY FOR TESTING LARGE LAUNCH VEHICLE STAGES
MSFC-67-IND 7862

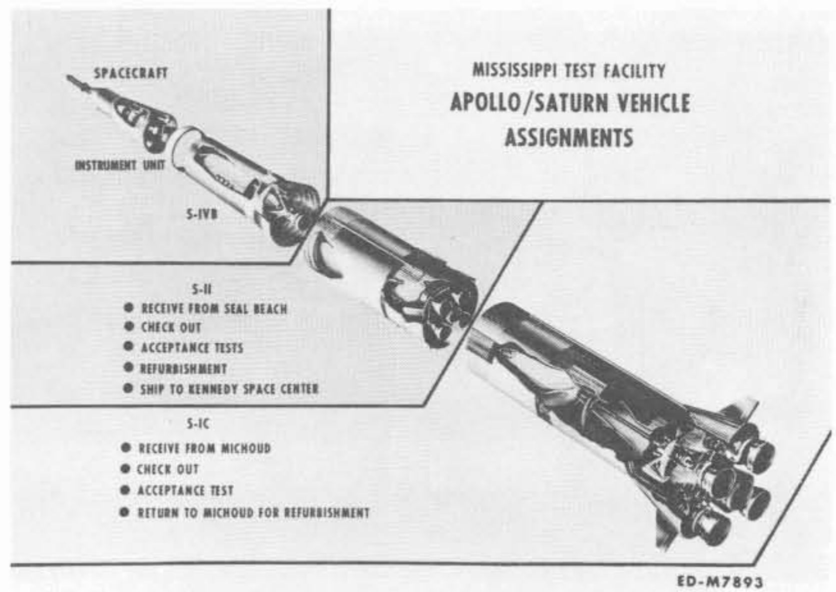

MISSISSIPPI TEST FACILITY
PRIMARY MISSION
-TO BUILD, ACTIVATE, AND MANAGE A MAJOR FACILITY FOR TESTING OF LARGE LAUNCH VEHICLE STAGES.
-INTEGRATE AND COORDINATE THE TESTING PROGRAMS FOR STAGE MANAGERS, PRIME CONTRACTORS & SUPPORT CONTRACTOR.
-CONDUCT CHECKOUT & ACCEPTANCE TEST OF THE FIRST (S-IC) & SECOND (S-II) STAGES OF THE SATURN V LAUNCH VEHICLE.
-REFURBISH THE S-II & PREPARE IT FOR SHIPMENT TO KENNEDY SPACE CENTER.
-CONTINUE DEVELOPMENT WORK ON THE F-I & J-2 ENGINE THROUGH MULTI-ENGINE, FULL DURATION FIRINGS.

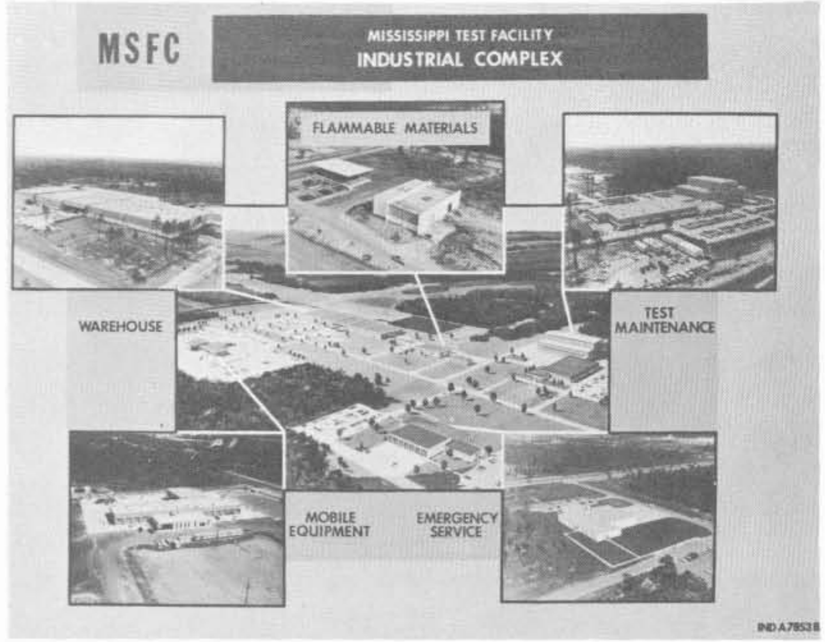

MISSISSIPPI TEST FACILITY—AERIAL VIEW
ENGINEERING & ADMINISTRATION COMPLEX
S-II COMPLEX
SONIC MEASURING FACILITY
S-IC COMPLEX
CRYOGENICS DOCK
S-IC STORAGE
COMPONENTS SERVICE FACILITY
S-II STORAGE & CHECKOUT
LOCK & BASCULE BRIDGE
INDUSTRIAL COMPLEX
RP-1 DOCK
CONSTRUCTION DOCK
IND A7845F


AERIAL VIEW—MTF
MSFC-67-IND 7864


SATURN V TEST COMPLEX—MTF
S-II TEST STANDS
S-IC TEST STAND
MSFC-67-IND 7831N


MISSISSIPPI TEST FACILITY
SITE PLAN
SATURN V TEST COMPLEX
1. SATURN S-IC STATIC TEST FAC. (DUAL POSITION)
2. S-IC TEST CONTROL CENTER
3. S-II POSITION A-2
4. S-II TEST CONTROL CENTER
5. S-II POSITION A-1
6. DATA ACQUISITION CENTER
7. HIGH PRESSURE GAS COMPRESSOR FACILITY
8. RP-1 STORAGE AND TRANSFER AREA
9. LH2 TRANSFER AREA
10. LOX STORAGE AND TRANSFER AREA
11. HI PR WATER STORAGE, PUMP, & DISTR SYSTEM
ENGINEERING AND ADMINISTRATION COMPLEX
12. COMMUNICATIONS & TELEPHONE BUILDING
13. TEST AREA CONTROL CENTER
14. DATA HANDLING CENTER
15. OFFICE AND ADMINISTRATION BUILDING
16. ELECRTONICS INSTR & MATERIALS LAB
17. SONIC MEASURING FACILITY - ACOUSTIC LAB
18. SONIC MEASURING FACILITY - METEOROLOGY LAB
19. CENTRAL HEATING PLANT
INDUSTRIAL COMPLEX
20. COMPONENTS SERVICE FACILITY
21. EMERGENCY SERVICES BLDG
22. SITE MAINTENANCE BLDG
23. TEST MAINTENANCE BLDG
24. COMPRESSED GAS CYLINDER STORAGE
25. INFLAMMABLE MATERIAL STORAGE
26. WAREHOUSE
27. MOBILE EQUIPMENT OPERATION BLDG.
28. S-IC STAGE STORAGE BUILDING
29. S-II STAGE STORAGE & C/O FAC.
30. CRYOGENIC BARGE SERVICE BUILDING
31. SECURITY CONTROL FACILITY
TRANSPORTATION & MISC.
32. RAILROAD & SWITCHING YARD
33. RP-1 TRANSFER DOCK
34. NAVIGATION LOCK & BRIDGE
35. BOOSTER TRANSFER DOCK
36. CRYOGENIC DOCK AND CANAL EXTENSION
37. CONSTRUCTION DOCK
IND 87816J


MISSISSIPPI TEST FACILITY
APOLLO/SATURN VEHICLE
ASSIGNMENTS
SPACECRAFT
INSTRUMENT UNIT
S-IVB
S-II
● RECEIVE FROM SEAL BEACH
● CHECK OUT
● ACCEPTANCE TESTS
● REFURBISHMENT
● SHIP TO KENNEDY SPACE CENTER
S-IC
● RECEIVE FROM MICHOUD
● CHECK OUT
● ACCEPTANCE TEST
● RETURN TO MICHOUD FOR REFURBISHMENT
ED-M7893



MSFC-MISSISSIPPI TEST FACILITY GENERAL DATA

LAND ACQUISITION

AREA	ACREAGE	COST
FEE	13428	$18,608,928
BUFFER	125,442	

CONSTRUCTION STATUS

PROJECT	PERCENT COMP	BOD	OPER
S-II A-1 STAND	100	FEB 67	MAY 67
S-IC B-2 STAND	100	DEC 66	MAR 67
S-IC B-1 STAND	80	JUN 67	INDEF
COMP SERVICE	100	FEB 67	INDEF

FACILITIES FUNDING

YEAR	FUNDED
THRU FY 63	103,331,800
FY 64	105,112,500
FY 65	59,033,000
TOTAL	267,477,300

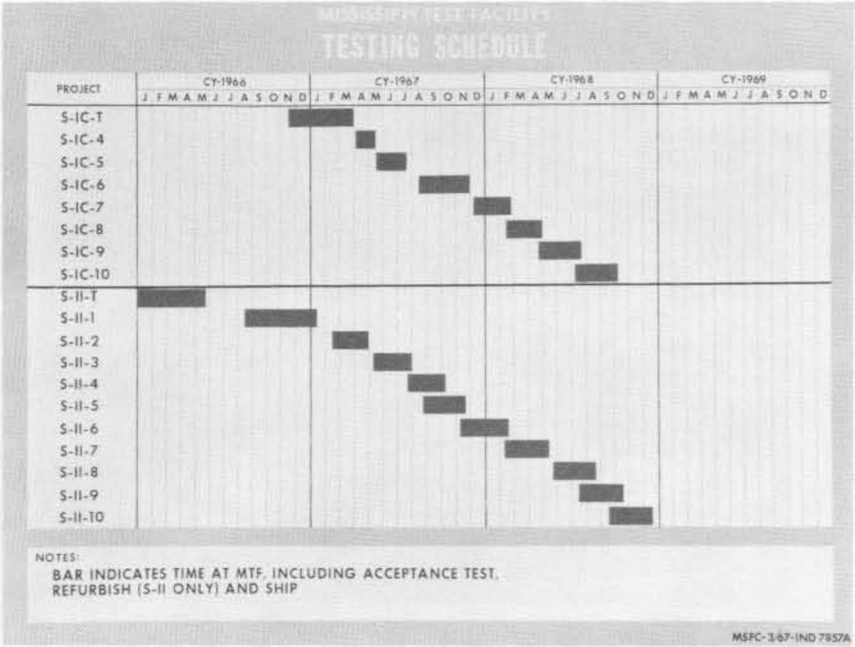
FIRINGS

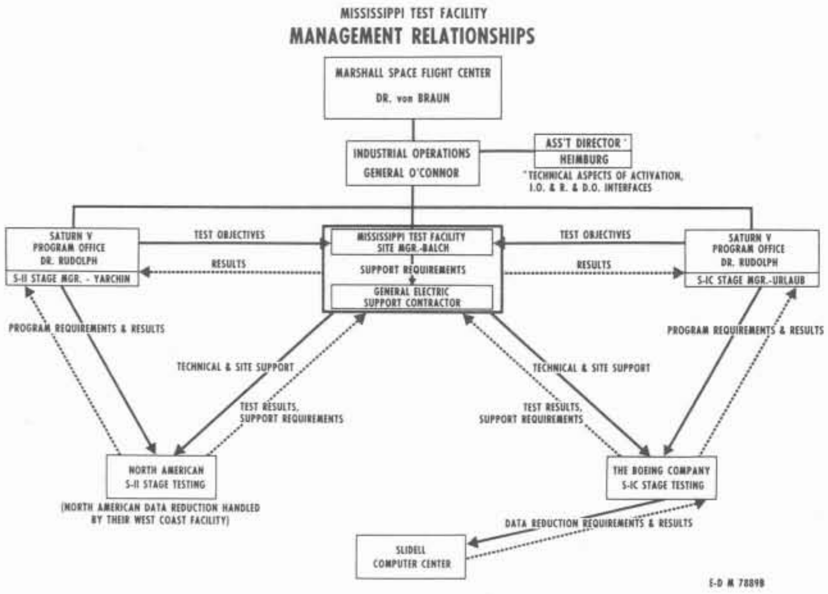
STAGE	TEST STAND	NO. OF FIRINGS	TOTAL DURATION	REMARKS
S-II-T	S-II-A-2	9	798 sec	SIX PARTIAL FIRINGS & THREE COMPLETE FIRINGS. FOUR FIRINGS PLANNED. STAGE DESTROYED 5/28/66 DURING LEAK CHECKS.
S-II-1	S-II-A-2	2	747 sec	TWO FULL DURATION FIRINGS ON 12/1/66 AND 12/30/66
S-IC-T	S-IC-B-2	2	75 sec	15-SEC FIRING ON 3/3/67 AND 60-SEC FIRING ON 3/17/67

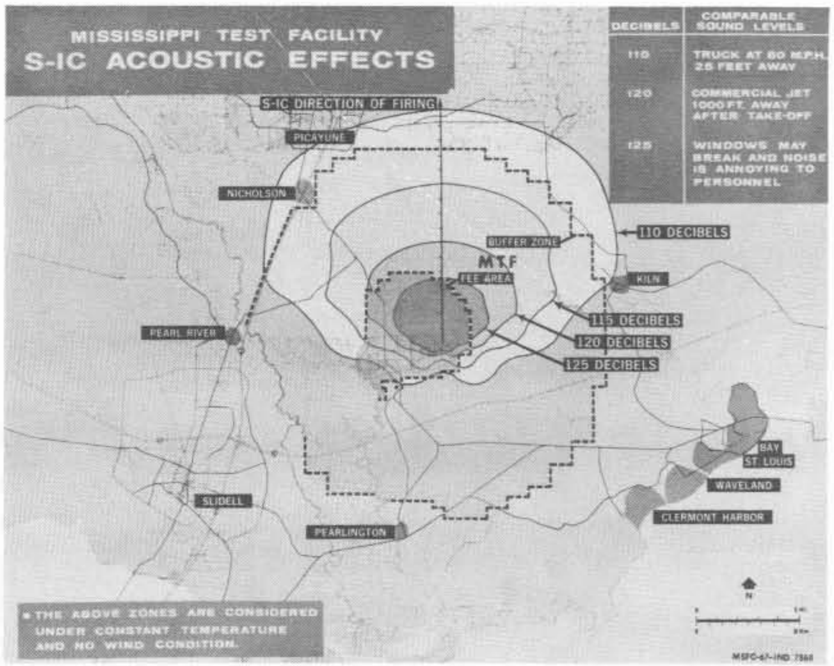
PERSONNEL

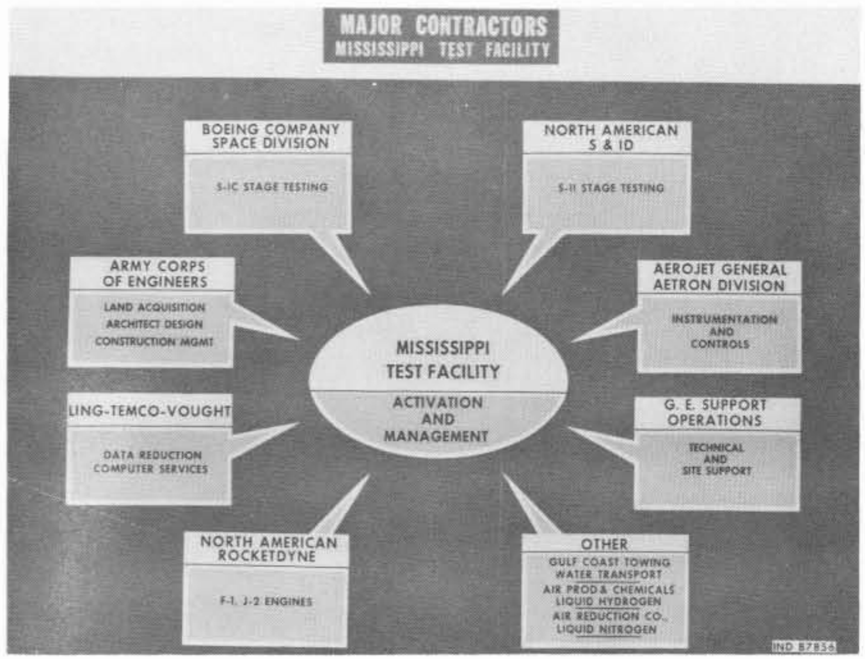
GOVERNMENT	PERSONNEL			TOTALS
NASA	101		MGMT	
NASA-DOD	58		QLTY ASSUR.	
U.S. WEATHER BUREAU	7		METEOROLOGY	
CORP OF ENG	42		CONSTR MGMT	
TOTAL	208			
CONTRACTOR	(PRIME)	(SUB)	MISSION	208
GENERAL ELECTRIC	1476	661	SUPPORT	
GENERAL ELECTRIC	76	63	TECH SYSTEMS	
BOEING	417	0	S-IC	
S & ID	748	13	S-II	
C of E CONSTR. CONTR	395	-	CONSTR	
ROCKETDYNE	24	-	F-1, J-2	
OTHERS	12			
TOTAL-PRIME	3148			3148
TOTAL-SUB		727		727
GRAND TOTAL →				4083

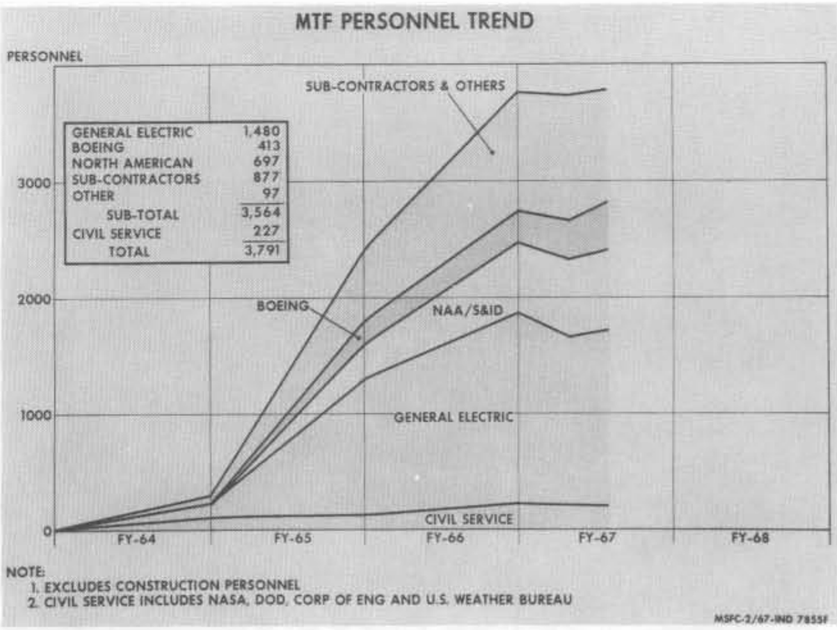
MSFC-3/67-IND 78265

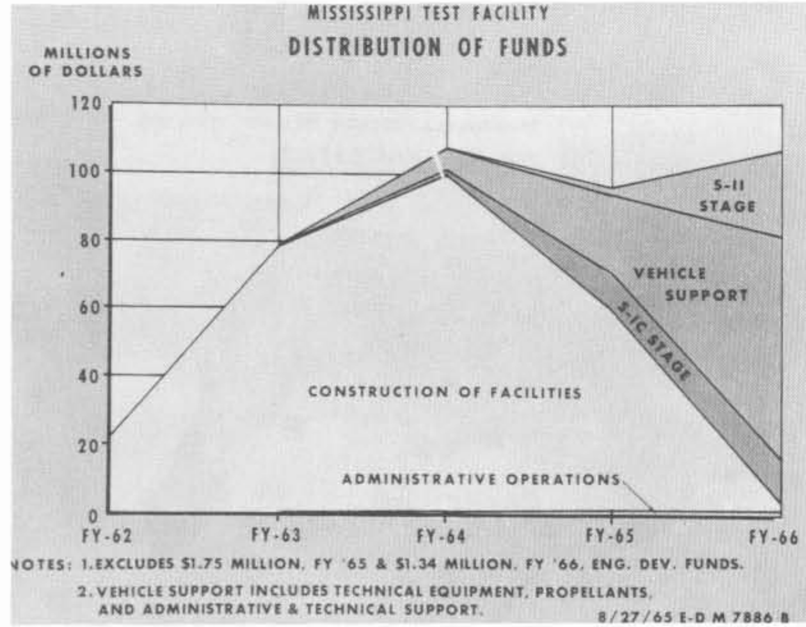

MISSISSIPPI TEST FACILITY
TESTING SCHEDULE
PROJECT
CY-1966
CY-1967
CY-1968
CY-1969
J F M A M J J A S O N D
S-IC-T
S-IC-4
S-IC-5
S-IC-6
S-IC-7
S-IC-8
S-IC-9
S-IC-10
S-II-T
S-II-1
S-II-2
S-II-3
S-II-4
S-II-5
S-II-6
S-II-7
S-II-8
S-II-9
S-II-10
NOTES:
BAR INDICATES TIME AT MTF, INCLUDING ACCEPTANCE TEST, REFURBISH (S-II ONLY) AND SHIP
MSFC-3/67-IND 7857A

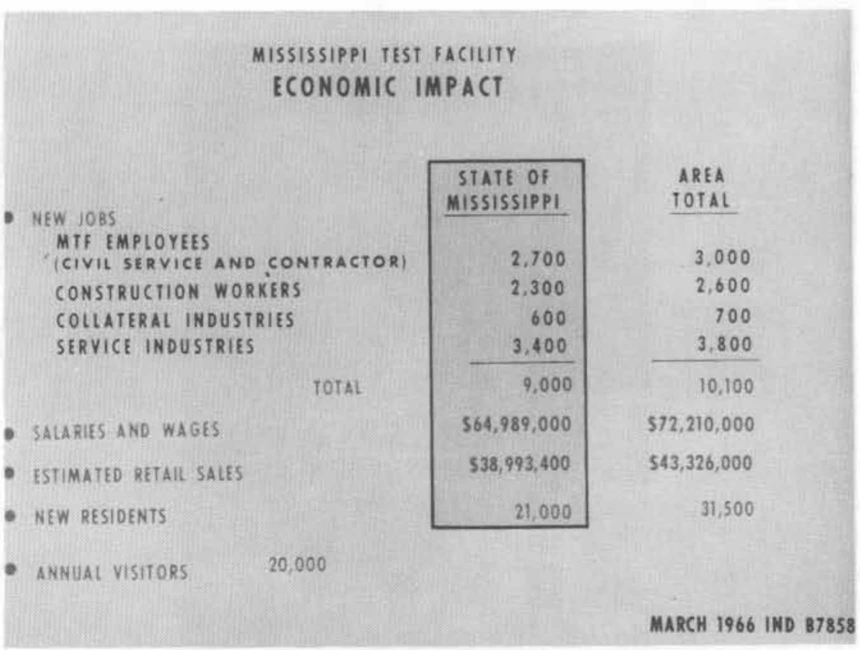

MISSISSIPPI TEST FACILITY
MANAGEMENT RELATIONSHIPS
MARSHALL SPACE FLIGHT CENTER
DR. von BRAUN
INDUSTRIAL OPERATIONS
GENERAL O'CONNOR
ASS'T DIRECTOR*
HEIMBURG
*TECHNICAL ASPECTS OF ACTIVATION, I.O. & R. & D.O. INTERFACES
SATURN V
PROGRAM OFFICE
DR. RUDOLPH
S-II STAGE MGR. - YARCHIN
TEST OBJECTIVES
RESULTS
MISSISSIPPI TEST FACILITY
SITE MGR.-BALCH
SUPPORT REQUIREMENTS
GENERAL ELECTRIC
SUPPORT CONTRACTOR
TEST OBJECTIVES
RESULTS
SATURN V
PROGRAM OFFICE
DR. RUDOLPH
S-IC STAGE MGR.-URLAUB
PROGRAM REQUIREMENTS & RESULTS
TECHNICAL & SITE SUPPORT
TEST RESULTS,
SUPPORT REQUIREMENTS
TECHNICAL & SITE SUPPORT
TEST RESULTS,
SUPPORT REQUIREMENTS
PROGRAM REQUIREMENTS & RESULTS
NORTH AMERICAN
S-II STAGE TESTING
(NORTH AMERICAN DATA REDUCTION HANDLED BY THEIR WEST COAST FACILITY)
THE BOEING COMPANY
S-IC STAGE TESTING
DATA REDUCTION REQUIREMENTS & RESULTS
SLIDELL
COMPUTER CENTER
E-D M 78898


MISSISSIPPI TEST FACILITY
S-IC ACOUSTIC EFFECTS
DECIBELS
COMPARABLE SOUND LEVELS
110
TRUCK AT 60 M.P.H. 25 FEET AWAY
120
COMMERCIAL JET 1000 FT. AWAY AFTER TAKE-OFF
125
WINDOWS MAY BREAK AND NOISE IS ANNOYING TO PERSONNEL
S-IC DIRECTION OF FIRING
PICAYUNE
NICHOLSON
BUFFER ZONE
110 DECIBELS
MTF
FEE AREA
KILN
PEARL RIVER
115 DECIBELS
120 DECIBELS
125 DECIBELS
BAY
ST. LOUIS
WAVELAND
SLIDELL
PEARLINGTON
CLERMONT HARBOR
N
* THE ABOVE ZONES ARE CONSIDERED UNDER CONSTANT TEMPERATURE AND NO WIND CONDITION.


MAJOR CONTRACTORS
MISSISSIPPI TEST FACILITY
BOEING COMPANY
SPACE DIVISION
S-IC STAGE TESTING
NORTH AMERICAN
S & ID
S-II STAGE TESTING
ARMY CORPS
OF ENGINEERS
LAND ACQUISITION
ARCHITECT DESIGN
CONSTRUCTION MGMT
AEROJET GENERAL
AETRON DIVISION
INSTRUMENTATION
AND
CONTROLS
MISSISSIPPI
TEST FACILITY
ACTIVATION
AND
MANAGEMENT
LING-TEMCO-VOUGHT
DATA REDUCTION
COMPUTER SERVICES
G. E. SUPPORT
OPERATIONS
TECHNICAL
AND
SITE SUPPORT
NORTH AMERICAN
ROCKETDYNE
F-1, J-2 ENGINES
OTHER
GULF COAST TOWING
WATER TRANSPORT
AIR PROD.& CHEMICALS
LIQUID HYDROGEN
AIR REDUCTION CO.
LIQUID NITROGEN
IND 87856



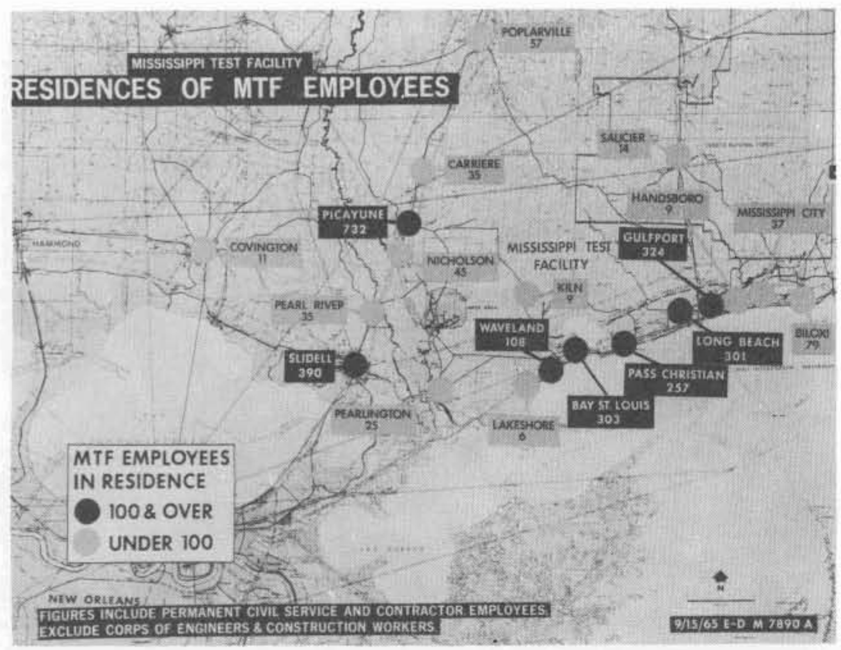


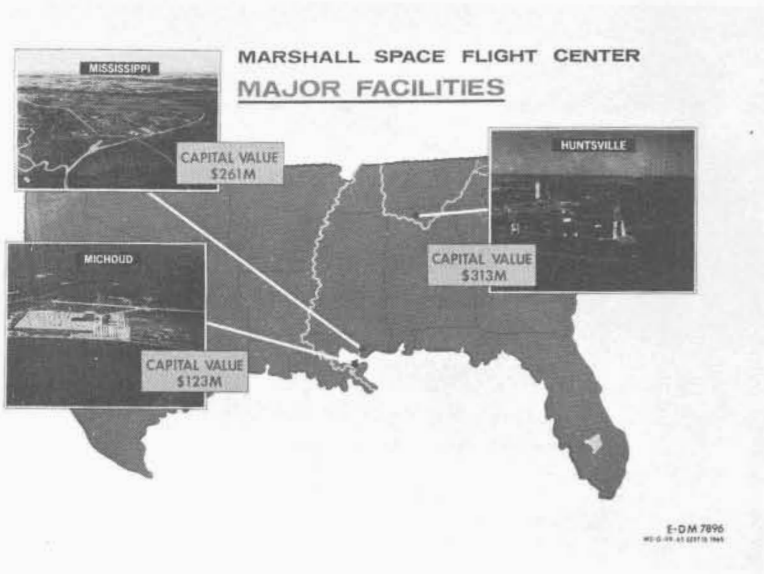


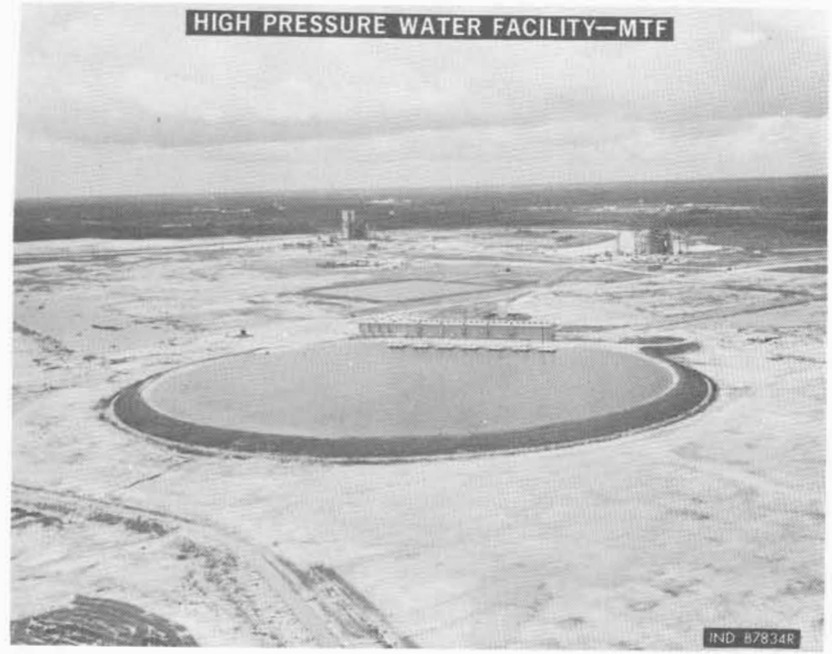
MISSISSIPPI TEST FACILITY
ECONOMIC IMPACT

	STATE OF MISSISSIPPI	AREA TOTAL
• NEW JOBS		
MTF EMPLOYEES (CIVIL SERVICE AND CONTRACTOR)	2,700	3,000
CONSTRUCTION WORKERS	2,300	2,600
COLLATERAL INDUSTRIES	600	700
SERVICE INDUSTRIES	3,400	3,800
TOTAL	9,000	10,100
• SALARIES AND WAGES	$64,989,000	$72,210,000
• ESTIMATED RETAIL SALES	$38,993,400	$43,326,000
• NEW RESIDENTS	21,000	31,500
• ANNUAL VISITORS 20,000		

MARCH 1966 IND B7858

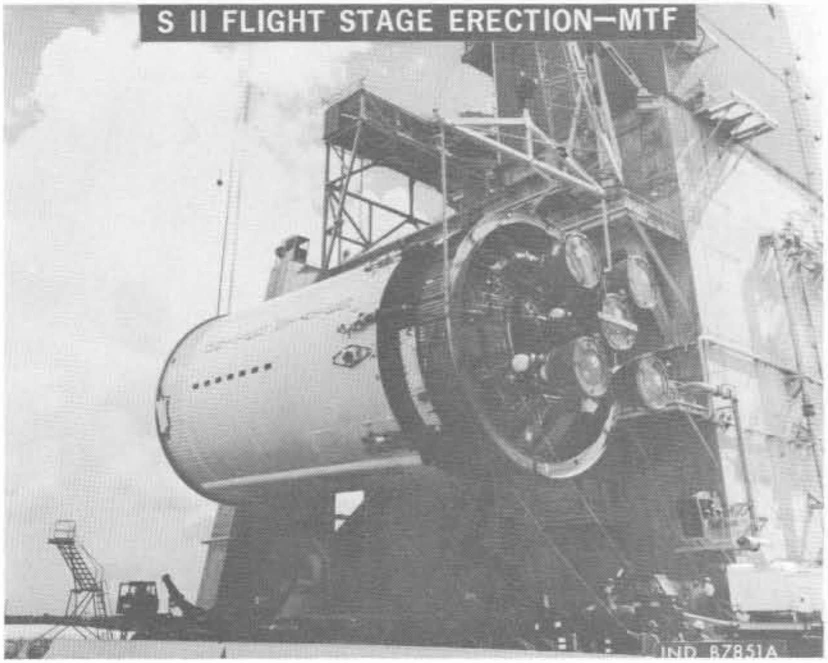



MARSHALL SPACE FLIGHT CENTER
MAJOR FACILITIES
MISSISSIPPI
CAPITAL VALUE $261M
HUNTSVILLE
CAPITAL VALUE $313M
MICHOUD
CAPITAL VALUE $123M
E-DM 7896

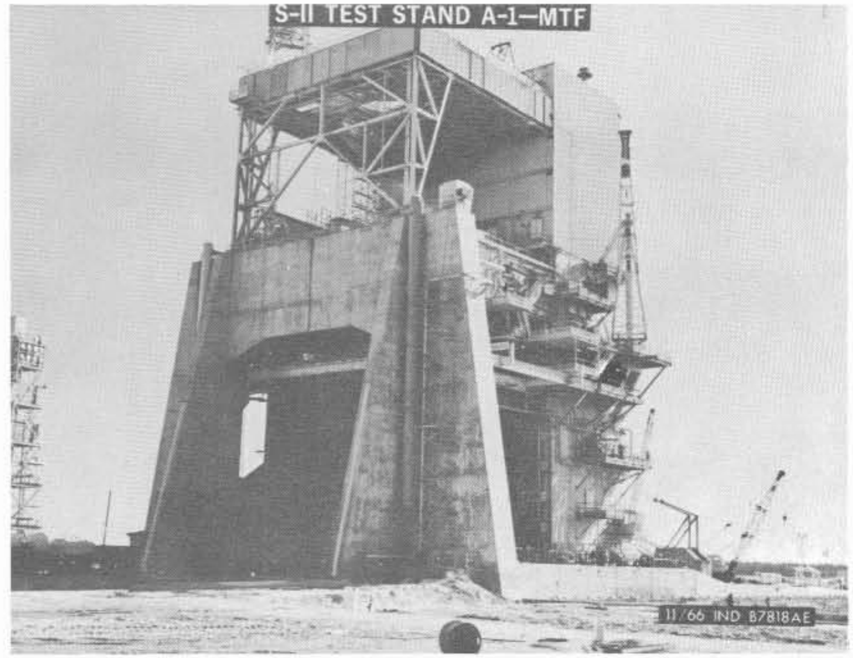

HIGH PRESSURE WATER FACILITY—MTF
IND 87834R


DATA ACQUISITION BUILDING—MTF
IND 87819T


S-II TEST STAND A-2—MTF
IND A7801AD

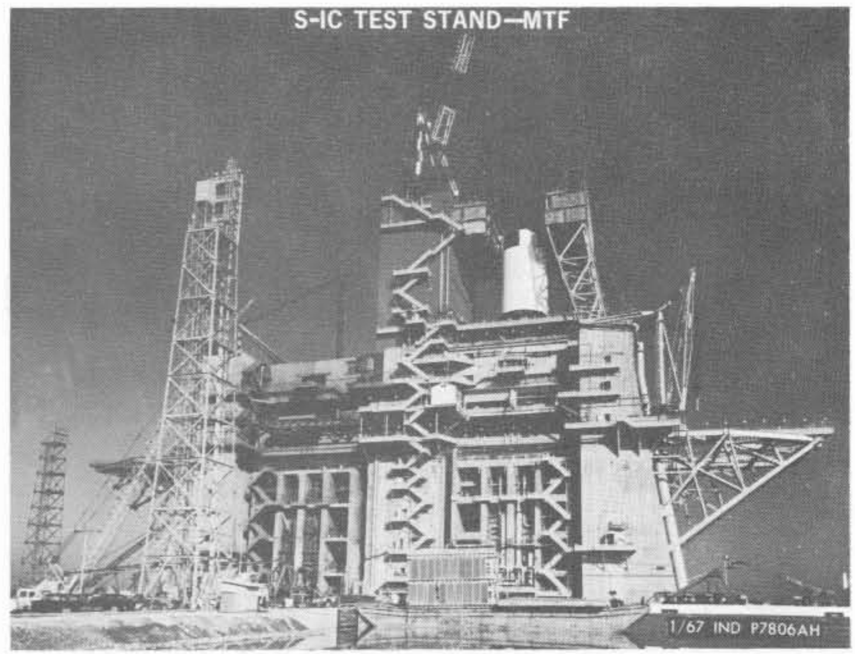


S II FLIGHT STAGE ERECTION—MTF

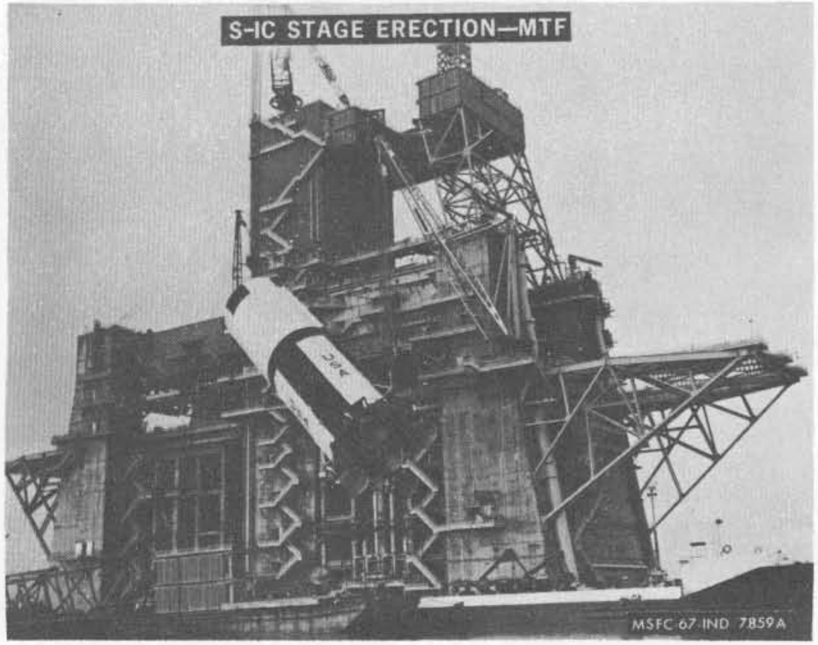


S-II TEST STAND A-1—MTF

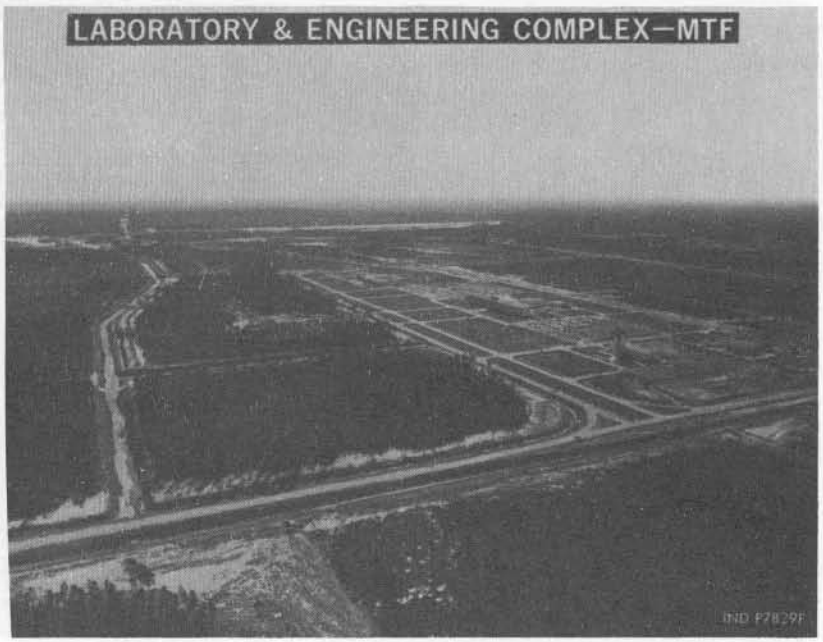
S-II TEST CONTROL CENTER—MTF



S-IC TEST STAND—MTF

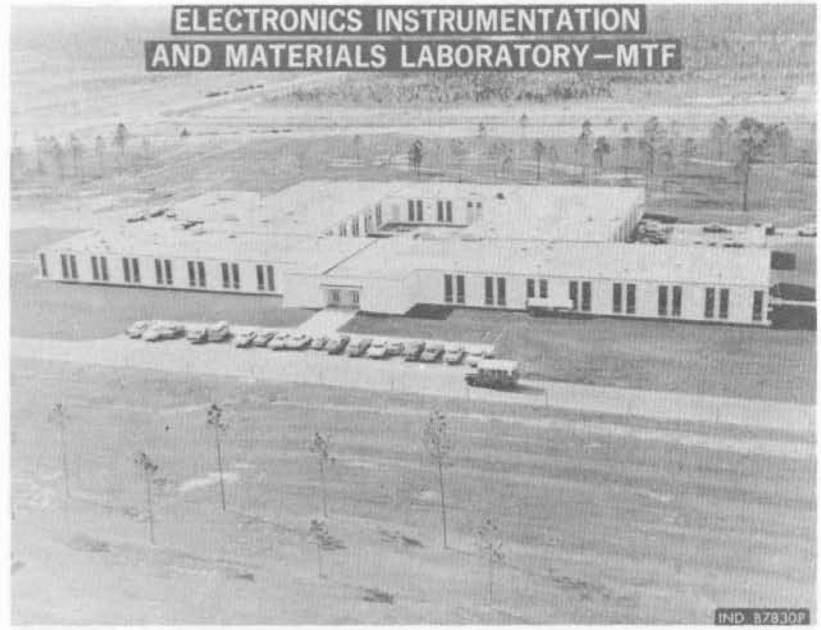

S-IC STAGE ERECTION—MTF
MSFC 67 IND 7859A


S-IC TEST CONTROL CENTER—MTF


LABORATORY & ENGINEERING COMPLEX—MTF


CENTRAL CONTROL BUILDING—MTF
IND 87825Q

LABORATORY & ENGINEERING BUILDING—MTF

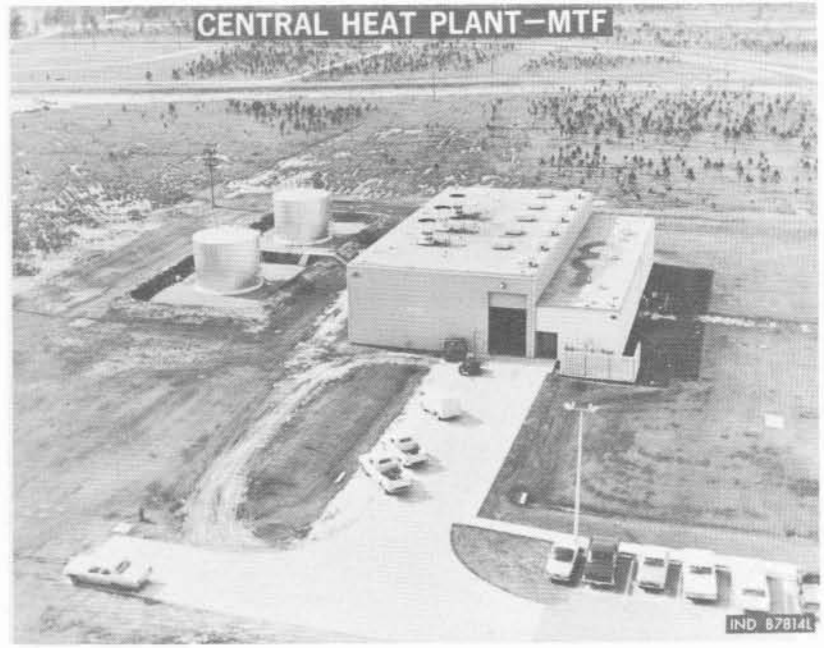


ELECTRONICS INSTRUMENTATION AND MATERIALS LABORATORY—MTF

DATA HANDLING BUILDING—MTF

ACOUSTIC LABORATORY—MTF

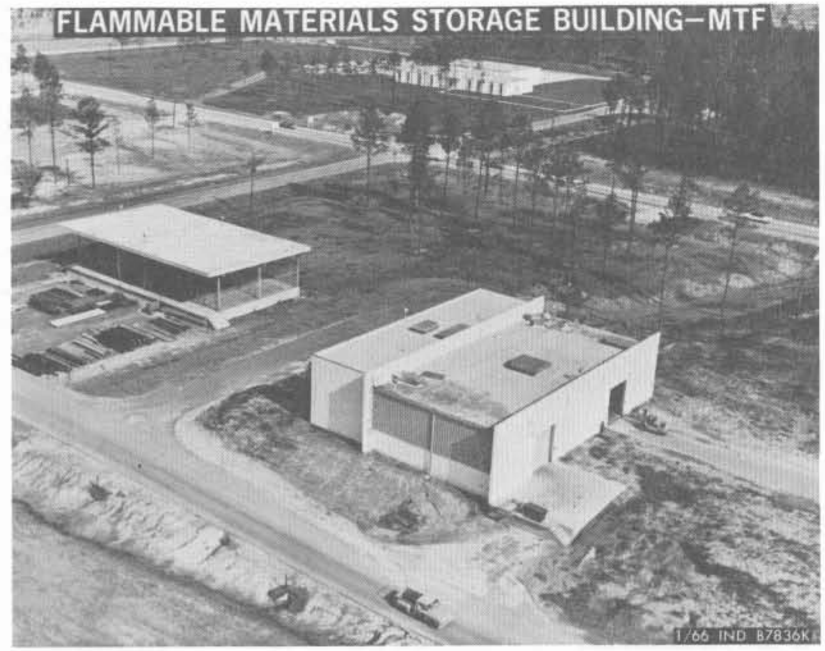

TELEPHONE BUILDING—MTF
IND 87807N


CENTRAL HEAT PLANT—MTF
IND 87814L


INDUSTRIAL COMPLEX-MTF
IND P7828Q


TEST MAINTENANCE SHOP—MTF
IND 87832

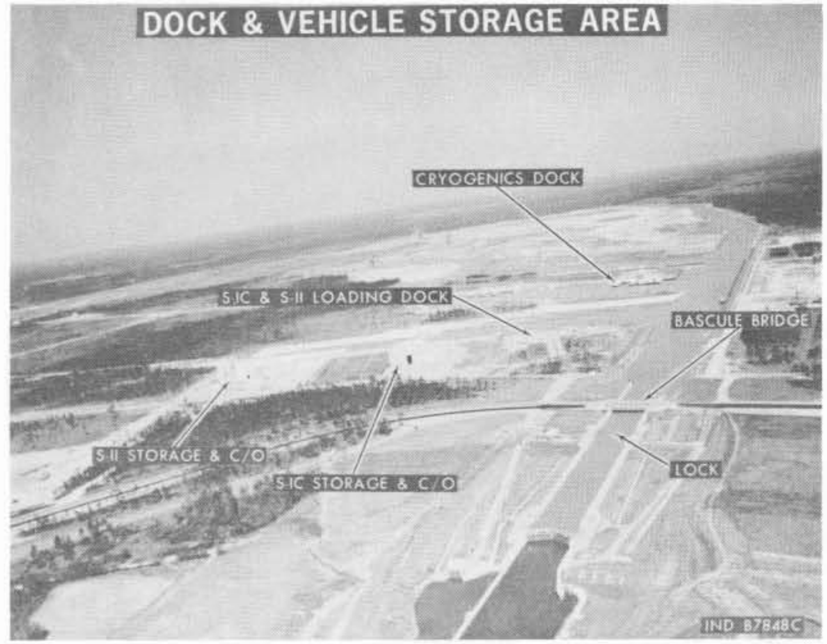

WAREHOUSE BUILDING–MTF
IND 87803X

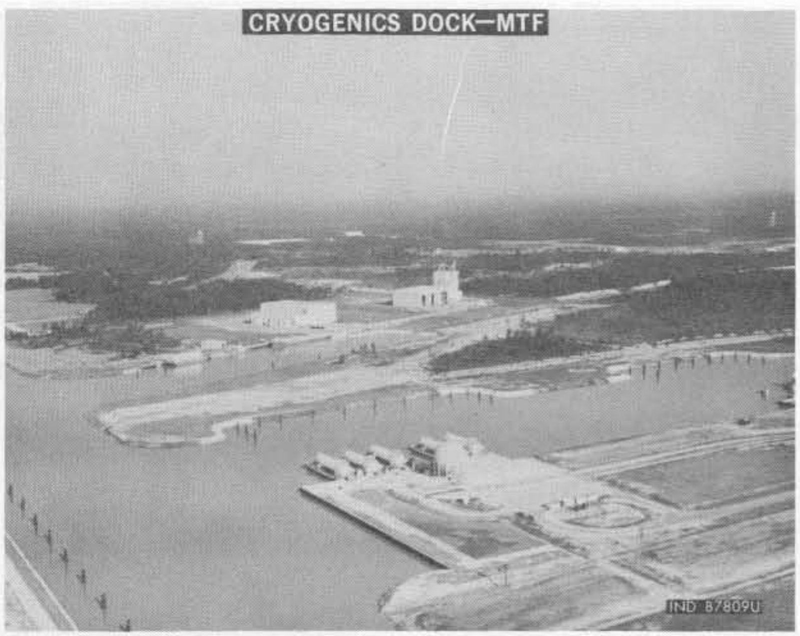

FLAMMABLE MATERIALS STORAGE BUILDING–MTF
1/66 IND 87836K


MOBILE EQUIPMENT OPERATION BUILDING–MTF
IND 87837Q

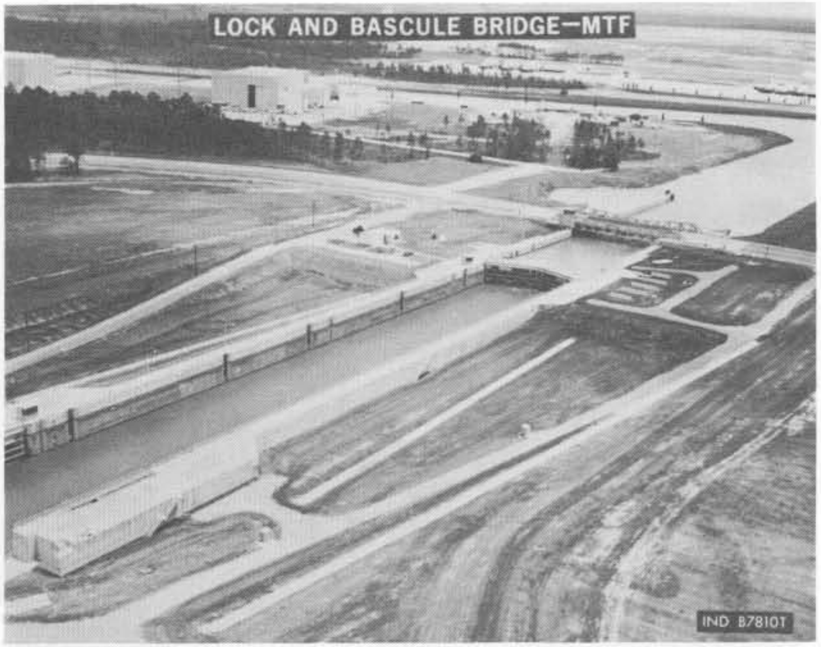

EMERGENCY SERVICES BUILDING–MTF
IND A7811R


COMPONENT SERVICE FACILITY—MTF
7/66 IND 87841S

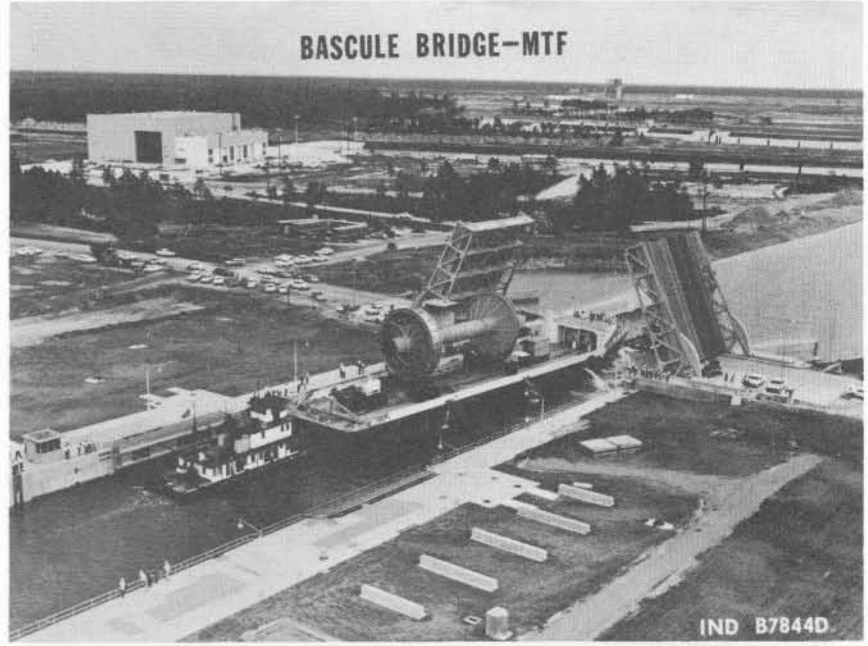

DOCK & VEHICLE STORAGE AREA
CRYOGENICS DOCK
S-IC & S-II LOADING DOCK
BASCULE BRIDGE
S-II STORAGE & C/O
S-IC STORAGE & C/O
LOCK
IND 87848C


CRYOGENICS DOCK—MTF
IND 87809U


CRYOGENICS BARGE—MTF
IND 87843D



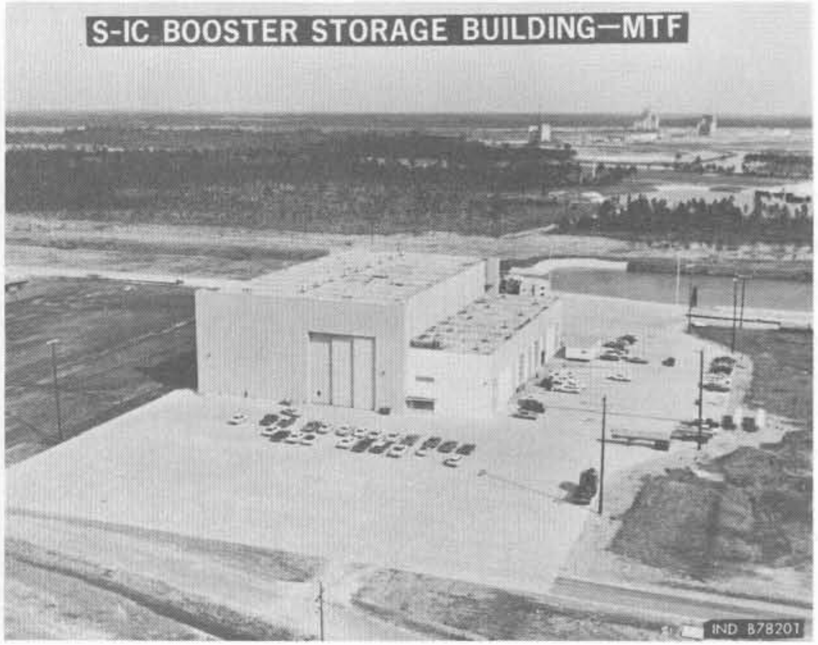
LOCK AND BASCULE BRIDGE—MTF



BASCULE BRIDGE—MTF

S-IC IN TRANSIT—MTF

S-II STAGE STORAGE AND VERTICAL CHECKOUT FACILITY—MTF



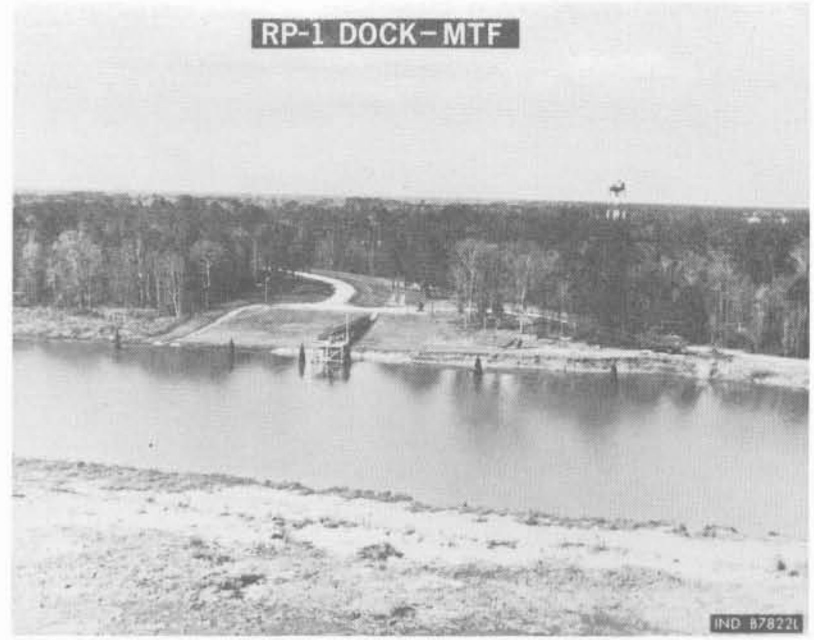
S-IC BOOSTER STORAGE BUILDING—MTF

SECURITY CONTROL CENTER, NORTH—MTF

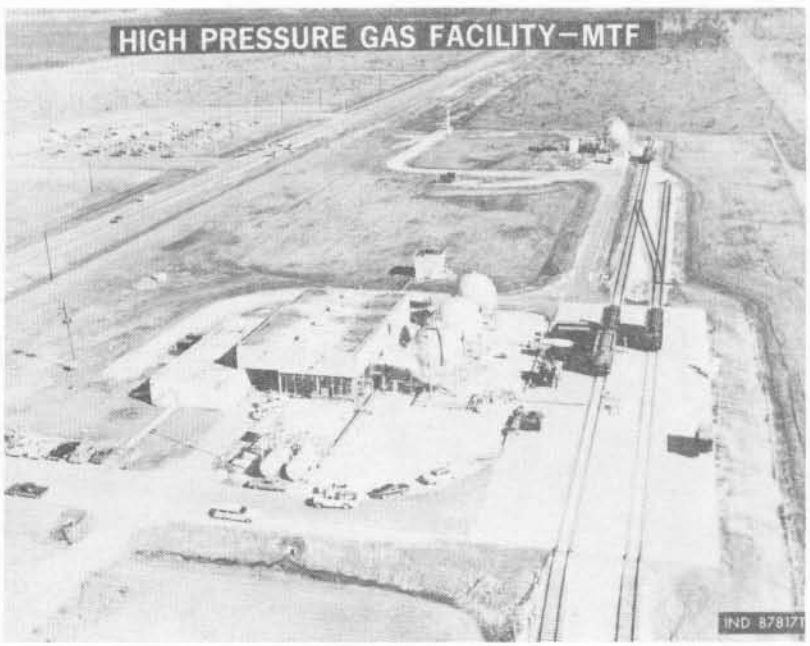
SECURITY CONTROL CENTER, SOUTH—MTF

METEOROLOGY LABORATORY—MTF

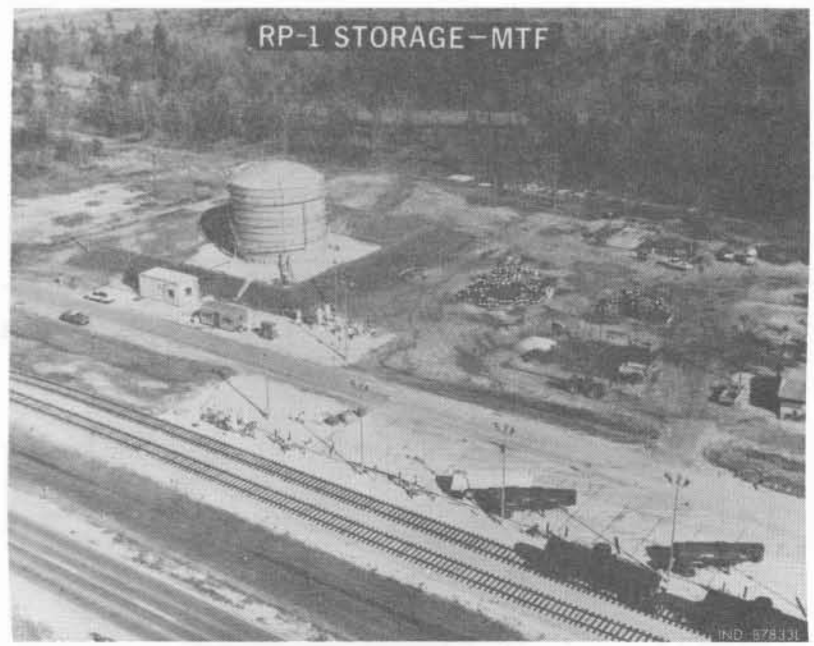
CONSTRUCTION DOCK–MTF



RP-1 DOCK–MTF

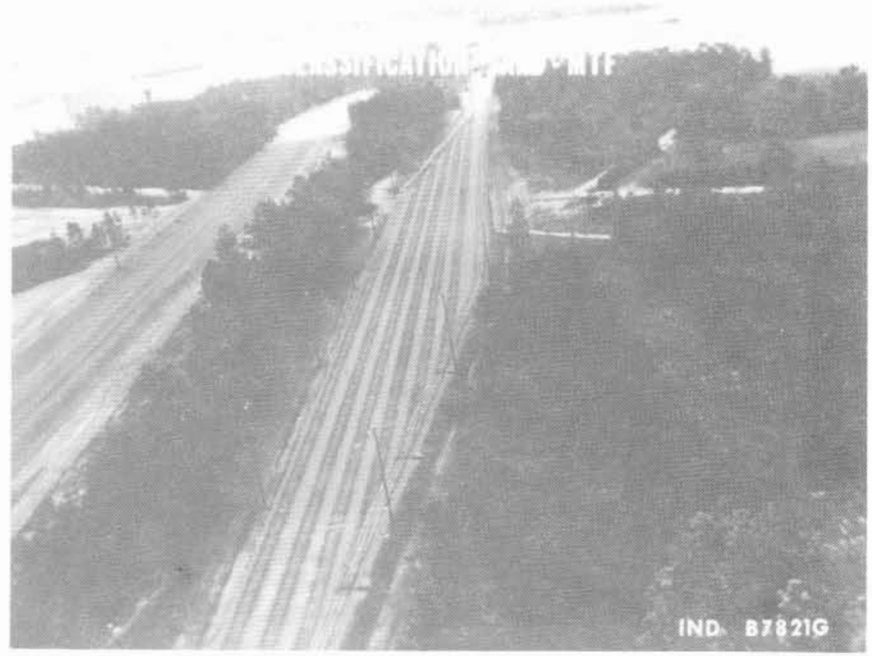


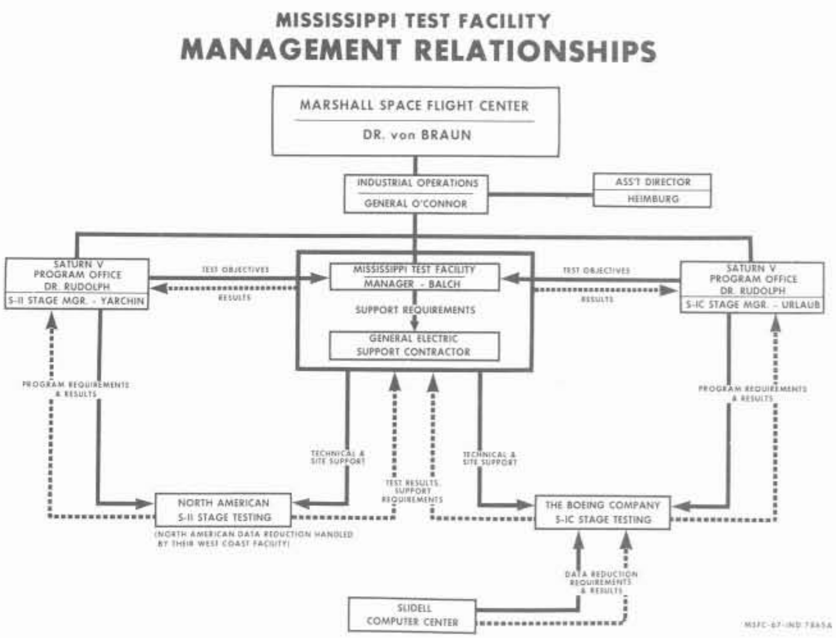
HIGH PRESSURE GAS FACILITY–MTF



RP-1 STORAGE–MTF


110 KV SUB-STATION—MTF
IND 7804F


IND B7821G


MISSISSIPPI TEST FACILITY
MANAGEMENT RELATIONSHIPS
MARSHALL SPACE FLIGHT CENTER
DR. von BRAUN
INDUSTRIAL OPERATIONS
GENERAL O'CONNOR
ASS'T DIRECTOR
HEIMBURG
SATURN V PROGRAM OFFICE DR. RUDOLPH
S-II STAGE MGR. - YARCHIN
TEST OBJECTIVES
RESULTS
MISSISSIPPI TEST FACILITY
MANAGER - BALCH
SUPPORT REQUIREMENTS
GENERAL ELECTRIC SUPPORT CONTRACTOR
TEST OBJECTIVES
RESULTS
SATURN V PROGRAM OFFICE DR. RUDOLPH
S-IC STAGE MGR. - URLAUB
PROGRAM REQUIREMENTS & RESULTS
TECHNICAL & SITE SUPPORT
TEST RESULTS, SUPPORT REQUIREMENTS
TECHNICAL & SITE SUPPORT
PROGRAM REQUIREMENTS & RESULTS
NORTH AMERICAN S-II STAGE TESTING
(NORTH AMERICAN DATA REDUCTION HANDLED BY THEIR WEST COAST FACILITY)
THE BOEING COMPANY S-IC STAGE TESTING
DATA REDUCTION REQUIREMENTS & RESULTS
SLIDELL COMPUTER CENTER
MSFC-67-IND 7845A

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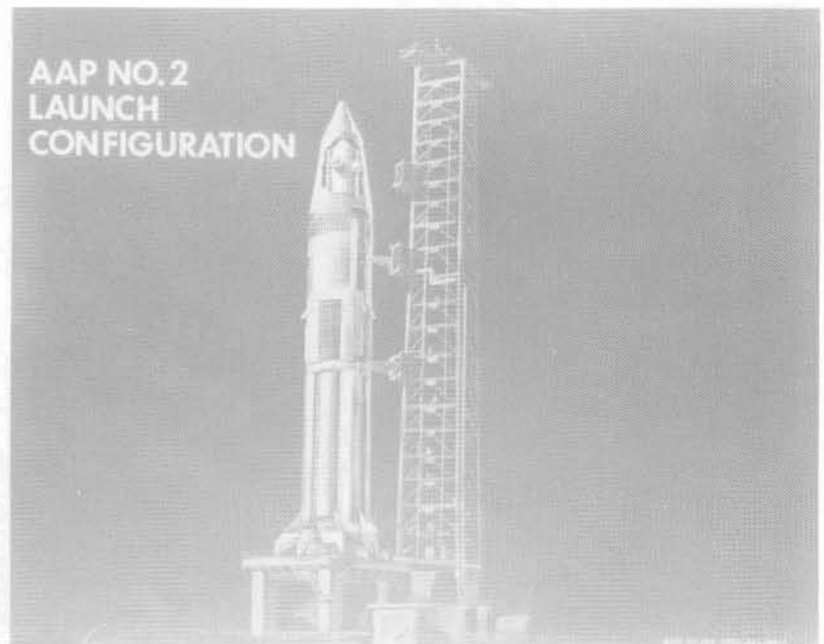
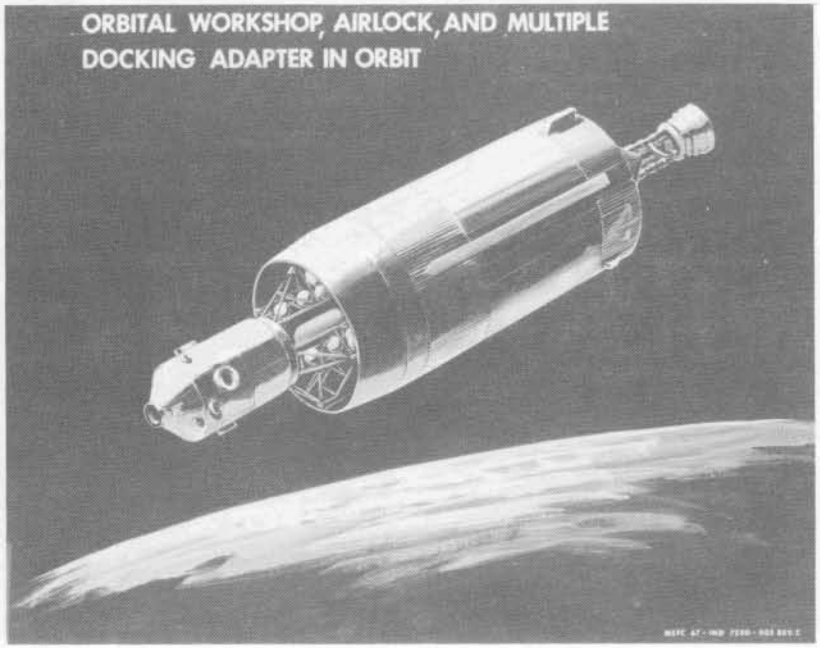
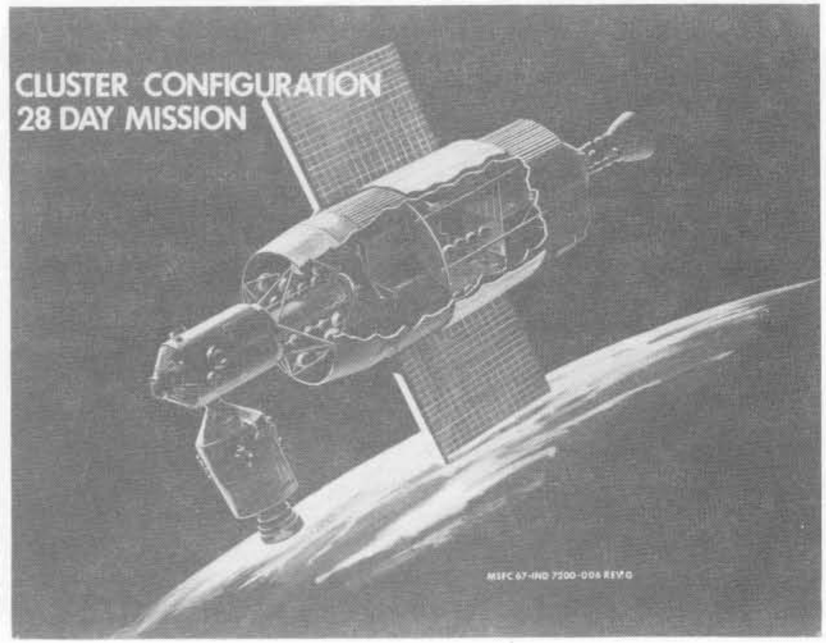
OBSOLETE

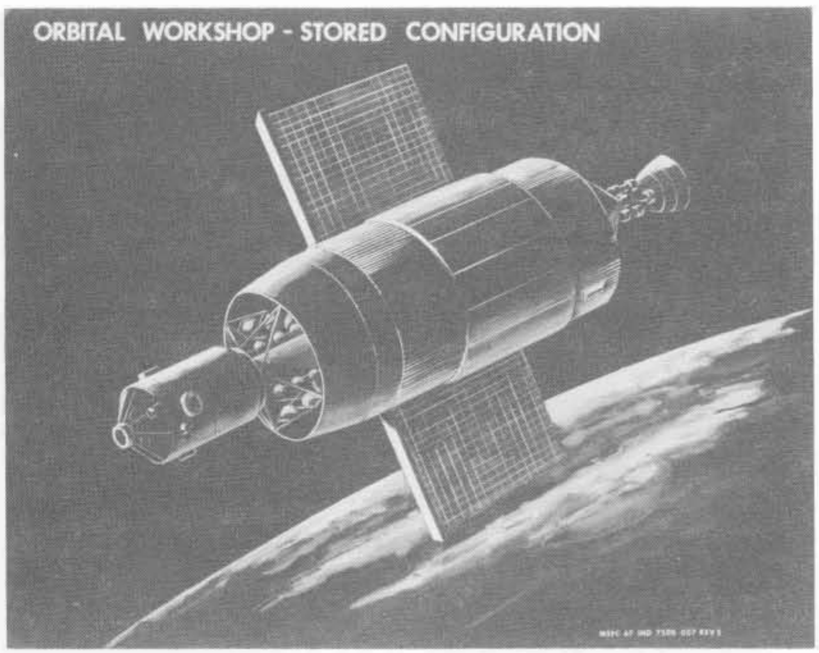

OBSOLETE

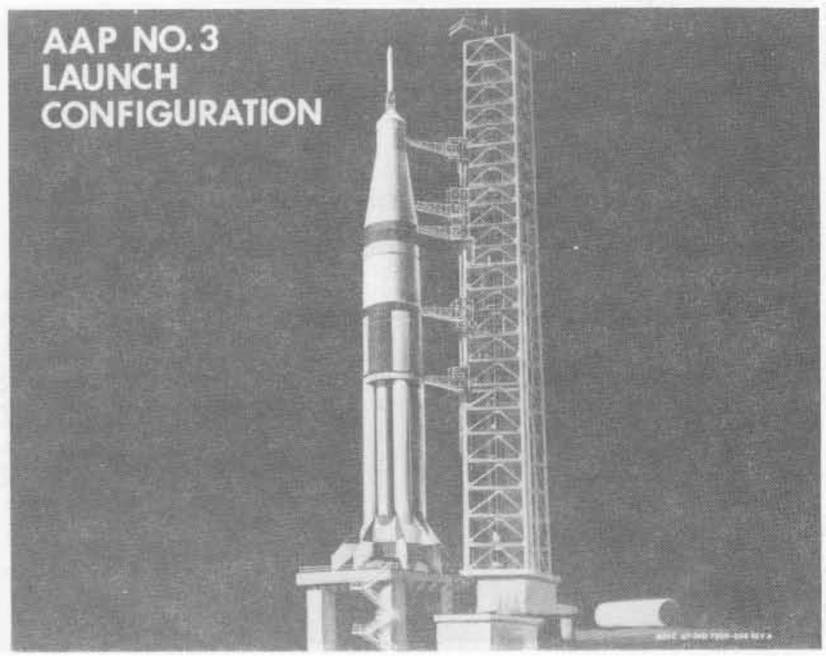

OBSOLETE

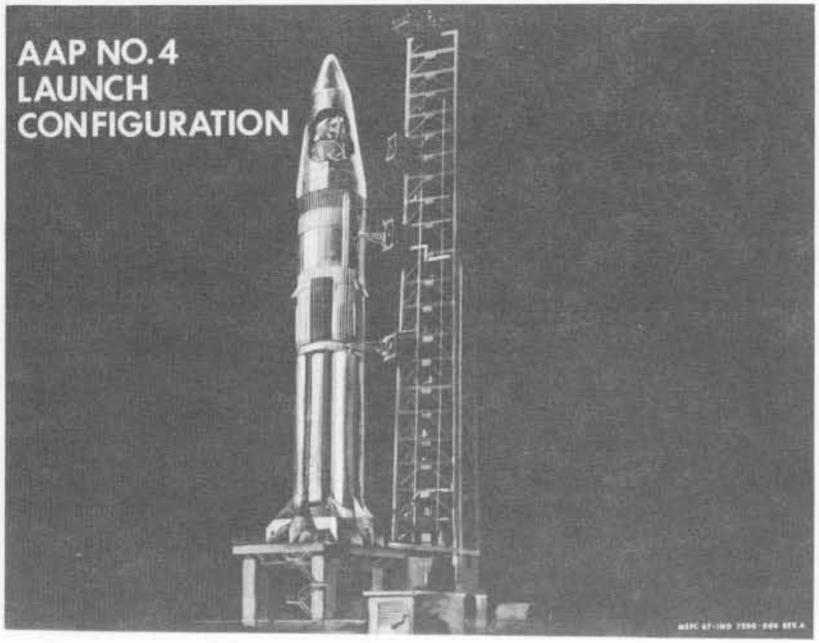

AAP NO. 2
LAUNCH
CONFIGURATION

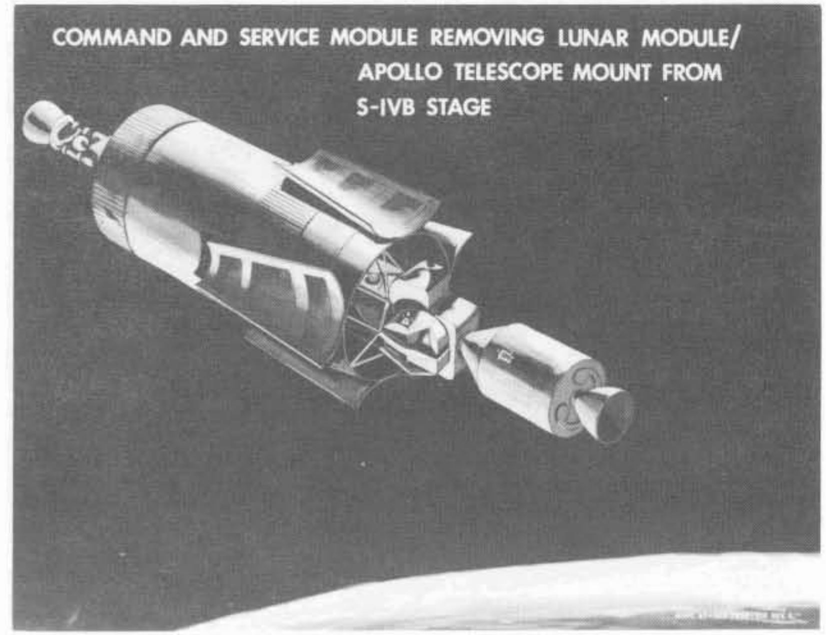

ORBITAL WORKSHOP, AIRLOCK, AND MULTIPLE
DOCKING ADAPTER IN ORBIT

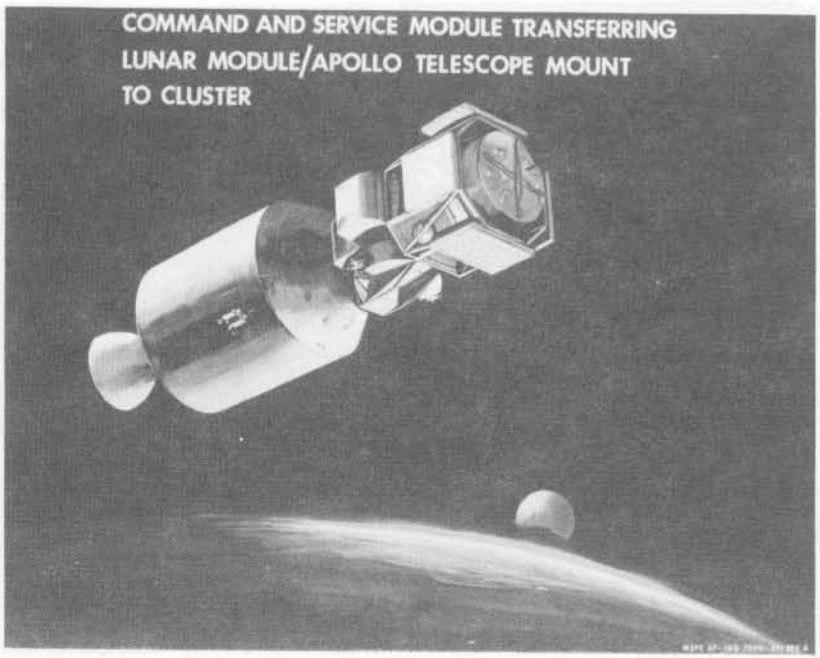

CLUSTER CONFIGURATION
28 DAY MISSION

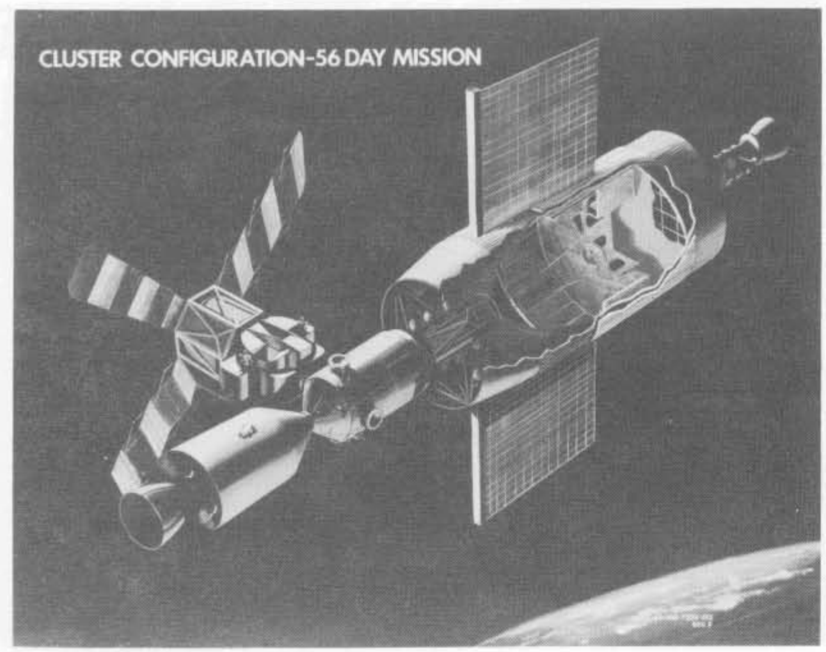

ORBITAL WORKSHOP - STORED CONFIGURATION

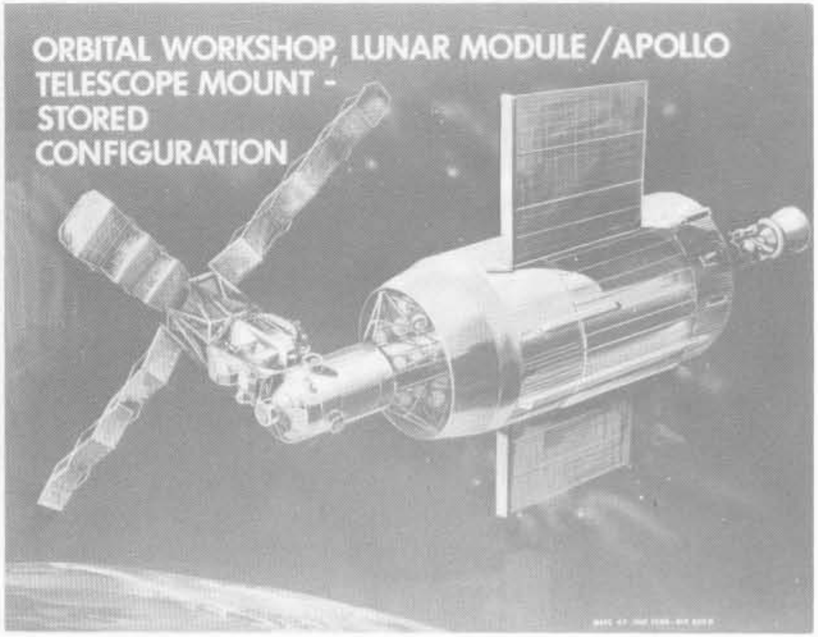

AAP NO. 3
LAUNCH
CONFIGURATION


AAP NO. 4
LAUNCH
CONFIGURATION


COMMAND AND SERVICE MODULE REMOVING LUNAR MODULE/
APOLLO TELESCOPE MOUNT FROM
S-IVB STAGE


COMMAND AND SERVICE MODULE TRANSFERRING
LUNAR MODULE/APOLLO TELESCOPE MOUNT
TO CLUSTER

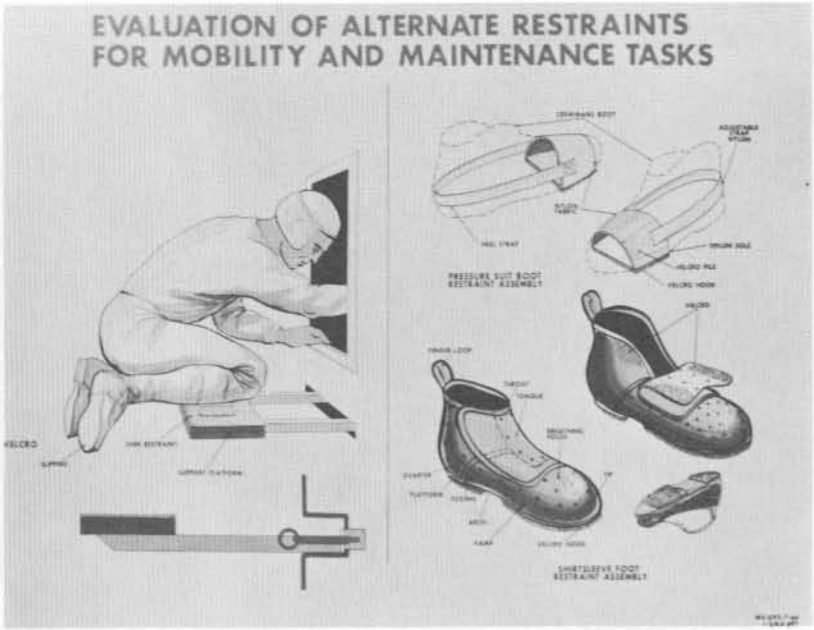

CLUSTER CONFIGURATION-56 DAY MISSION

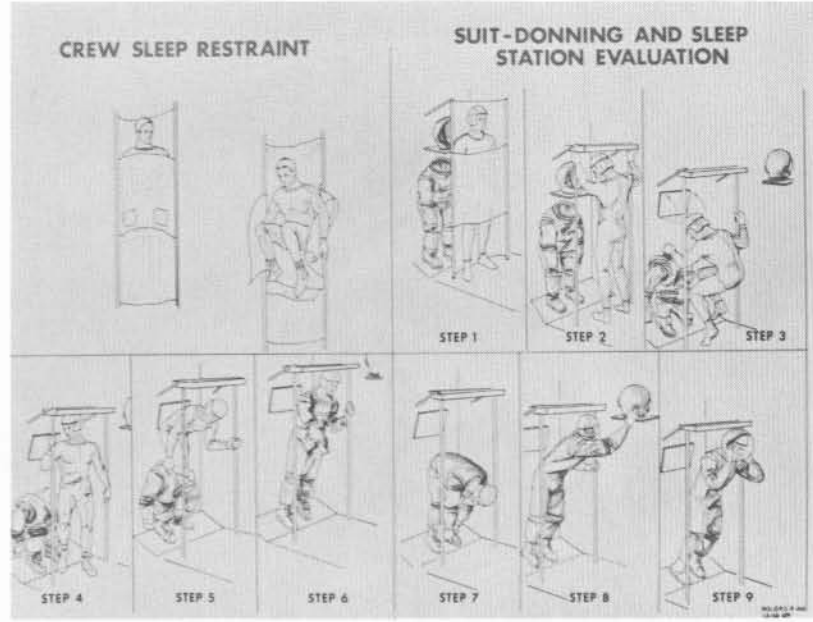


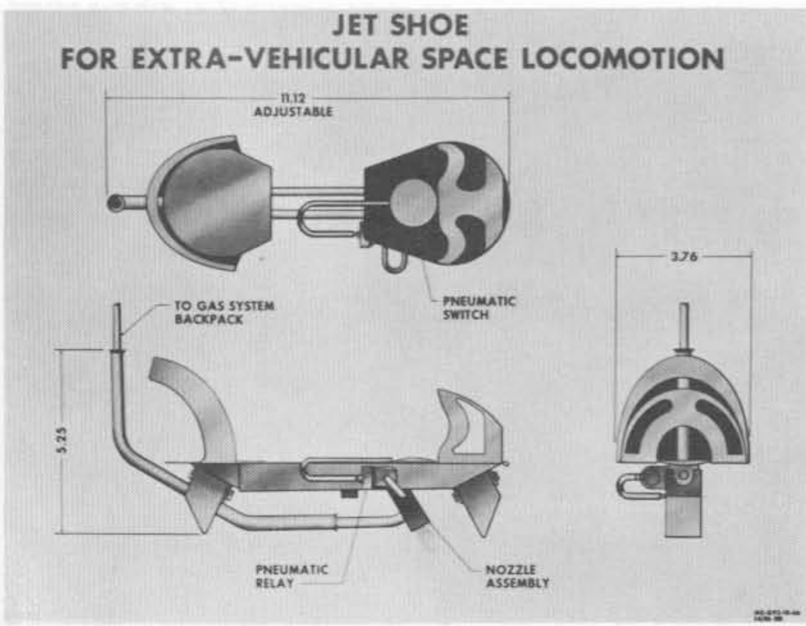
NOT TO BE RELEASED AT THIS TIME

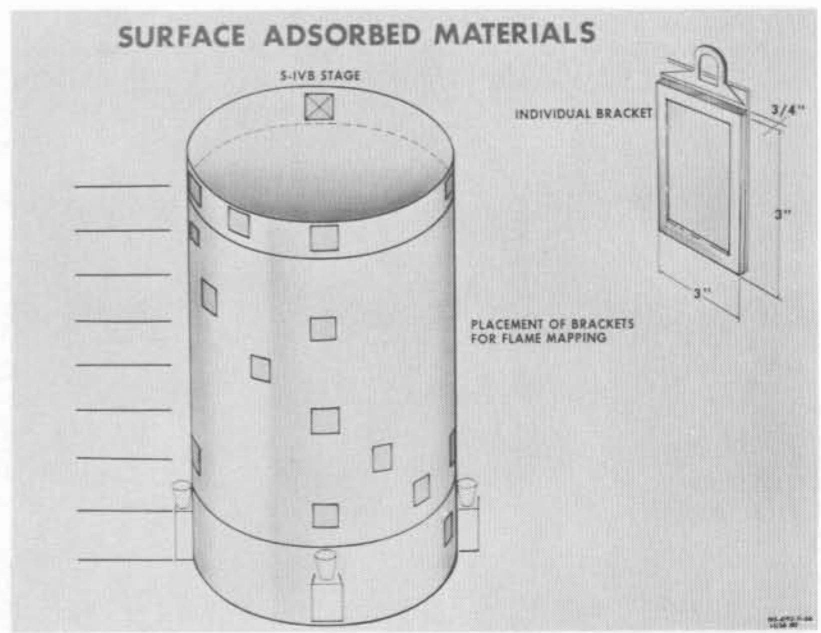
NOT TO BE RELEASED AT THIS TIME

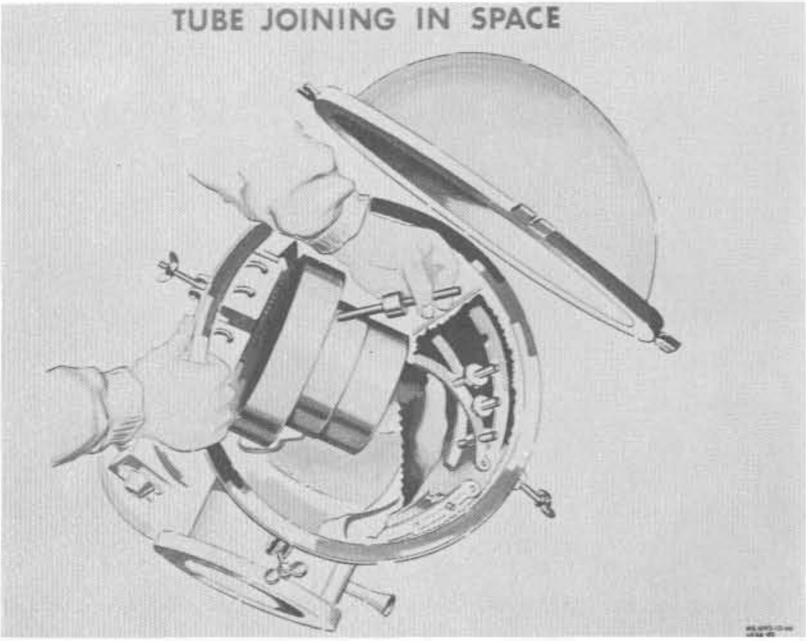
NOT TO BE RELEASED AT THIS TIME

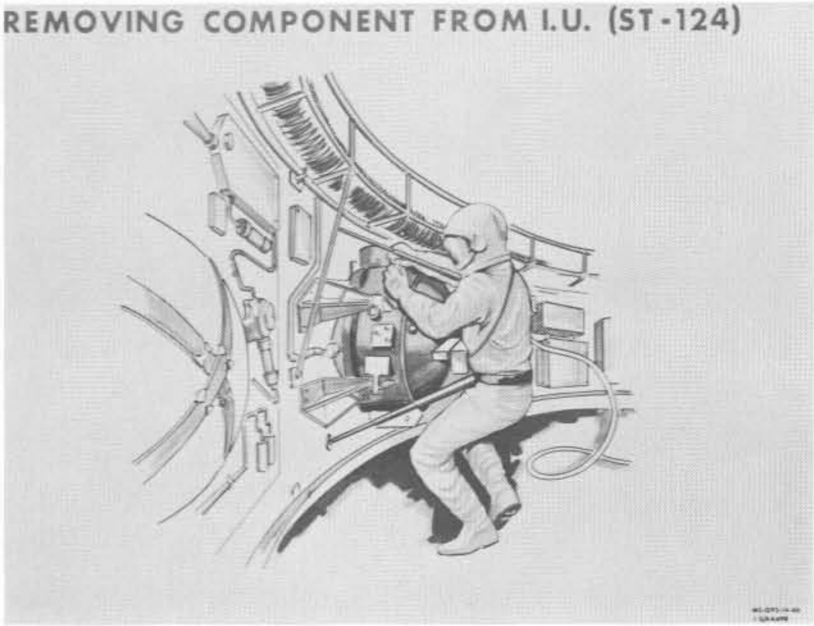

EVALUATION OF ALTERNATE RESTRAINTS
FOR MOBILITY AND MAINTENANCE TASKS

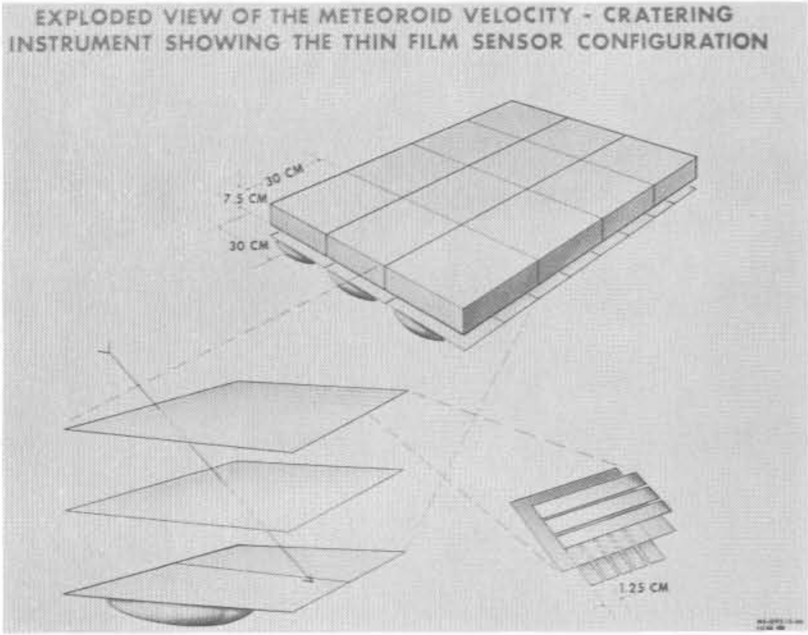

CREW SLEEP RESTRAINT
SUIT-DONNING AND SLEEP STATION EVALUATION
STEP 1
STEP 2
STEP 3
STEP 4
STEP 5
STEP 6
STEP 7
STEP 8
STEP 9

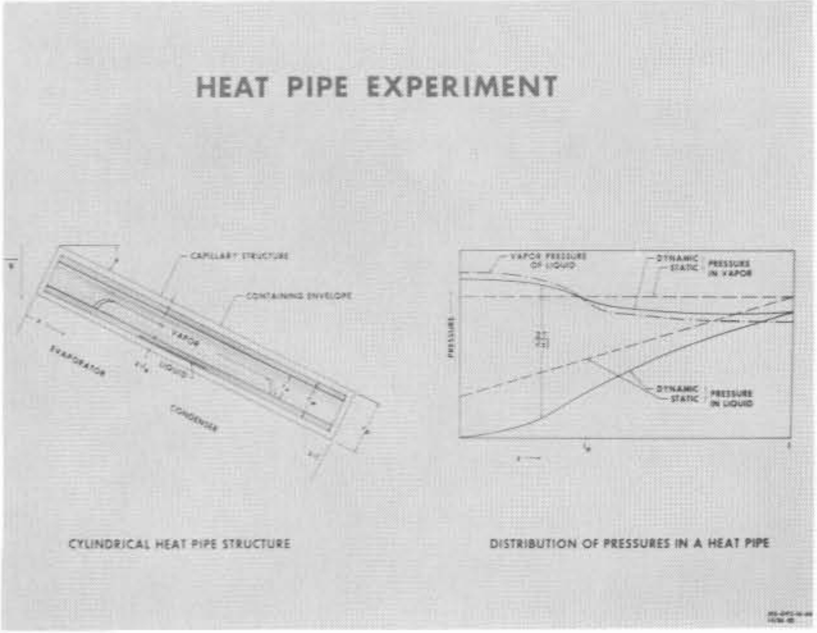

JET SHOE
FOR EXTRA-VEHICULAR SPACE LOCOMOTION
11.12
ADJUSTABLE
3.76
TO GAS SYSTEM BACKPACK
PNEUMATIC SWITCH
5.25
PNEUMATIC RELAY
NOZZLE ASSEMBLY

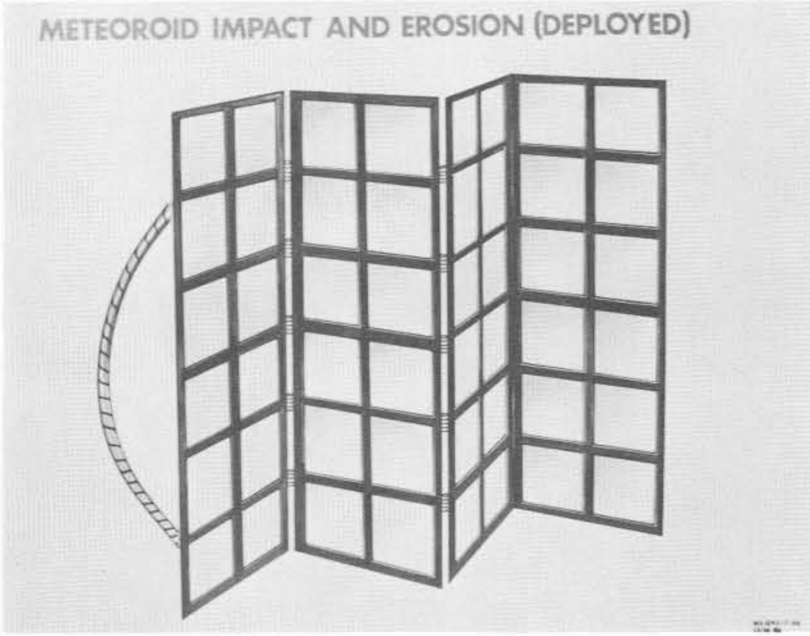

SURFACE ADSORBED MATERIALS
S-IVB STAGE
INDIVIDUAL BRACKET
3/4"
3"
3"
PLACEMENT OF BRACKETS FOR FLAME MAPPING

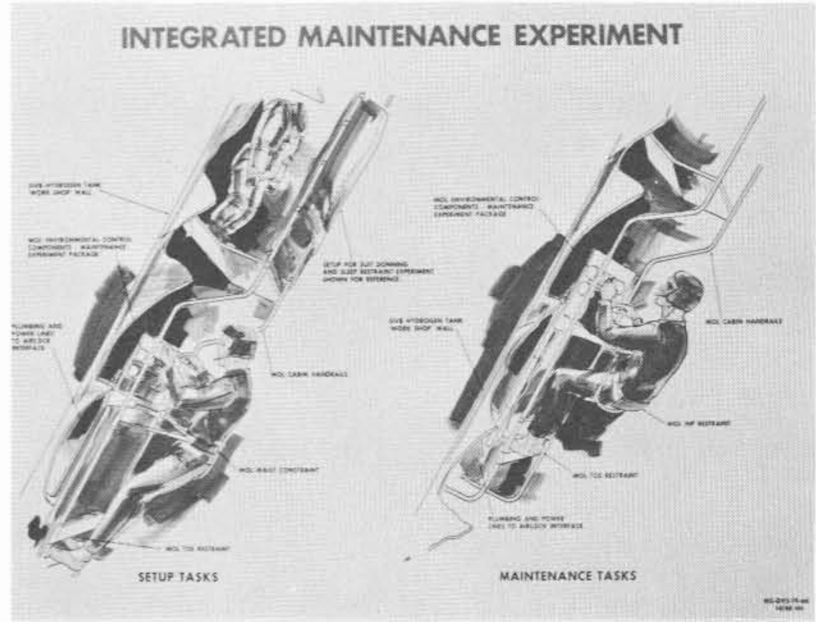

TUBE JOINING IN SPACE

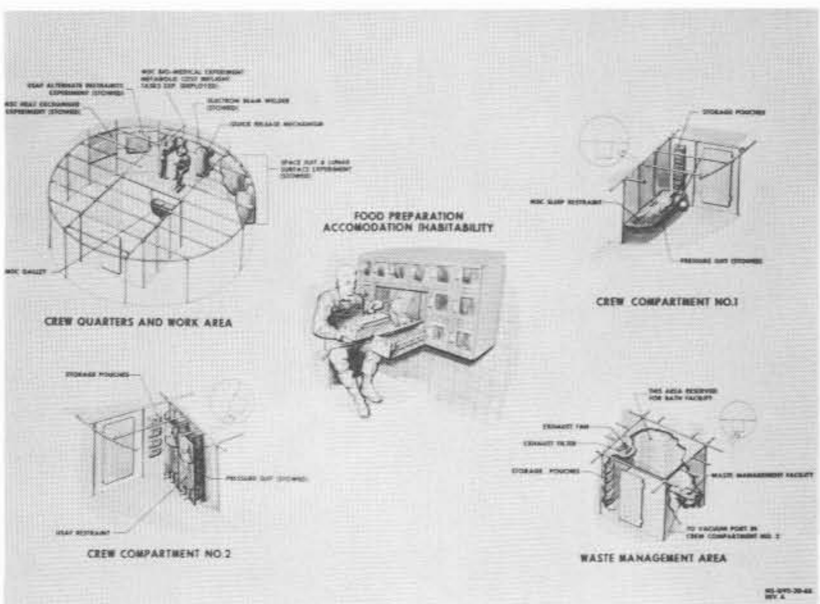

REMOVING COMPONENT FROM I.U. (ST-124)

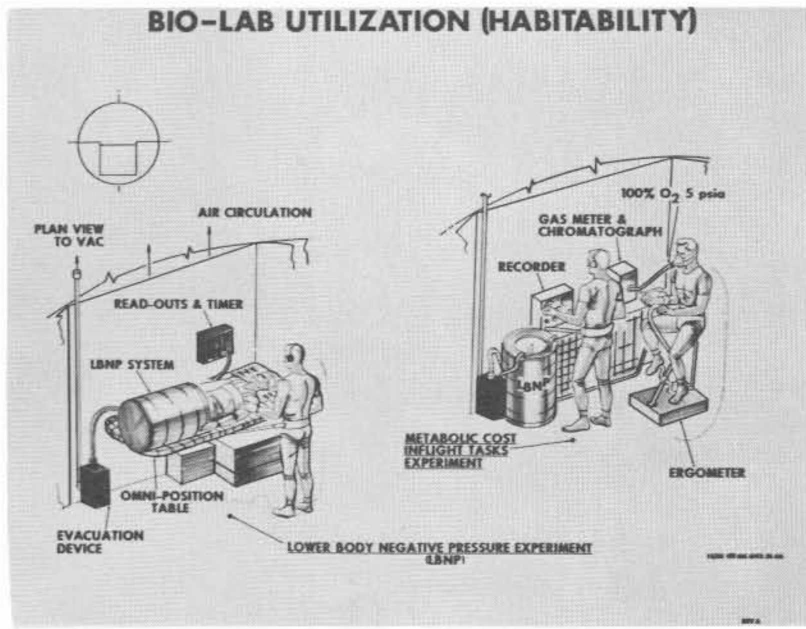

EXPLODED VIEW OF THE METEOROID VELOCITY - CRATERING
INSTRUMENT SHOWING THE THIN FILM SENSOR CONFIGURATION
30 CM
7.5 CM
30 CM
1.25 CM

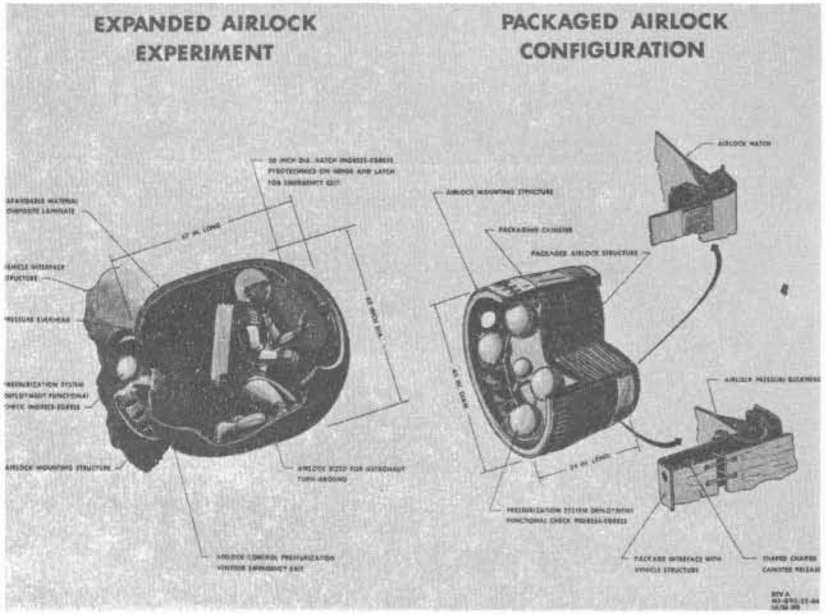

HEAT PIPE EXPERIMENT
CAPILLARY STRUCTURE
CONTAINING ENVELOPE
VAPOR
LIQUID
EVAPORATOR
CONDENSER
VAPOR PRESSURE OF LIQUID
DYNAMIC
STATIC
PRESSURE IN VAPOR
DYNAMIC
STATIC
PRESSURE IN LIQUID
PRESSURE
CYLINDRICAL HEAT PIPE STRUCTURE
DISTRIBUTION OF PRESSURES IN A HEAT PIPE

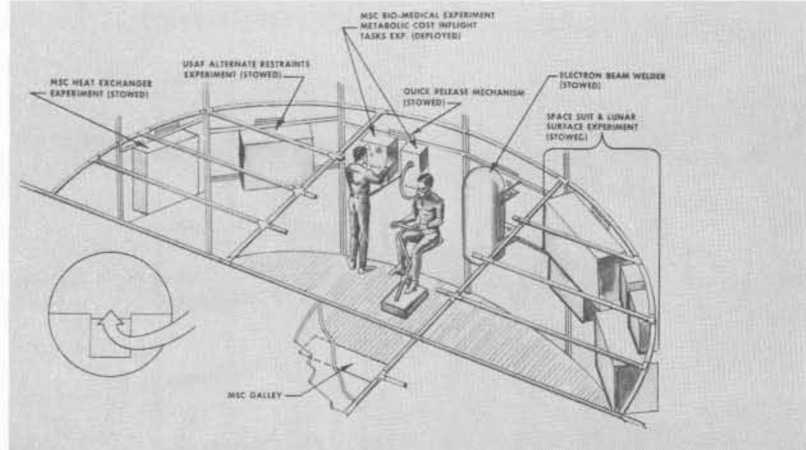

METEOROID IMPACT AND EROSION (DEPLOYED)


INTEGRATED MAINTENANCE EXPERIMENT
SETUP TASKS
MAINTENANCE TASKS

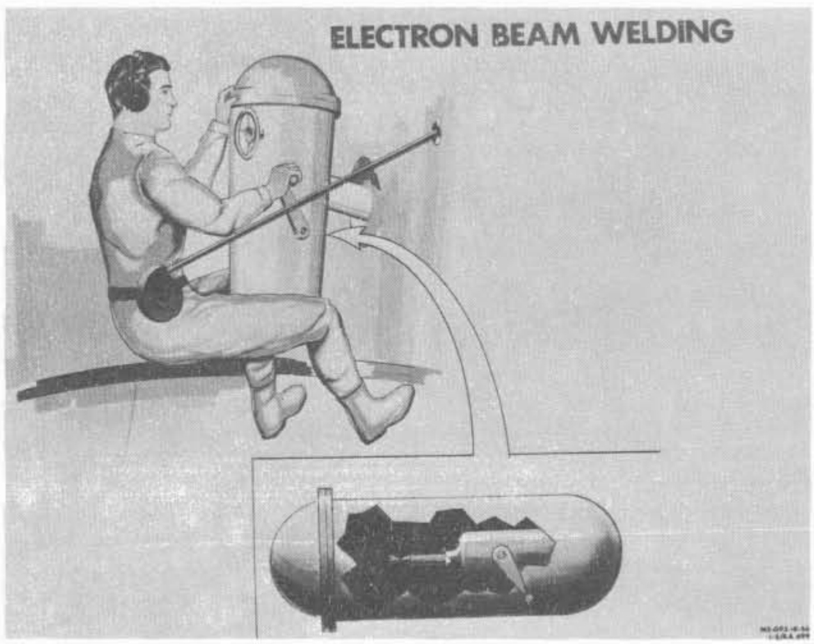

FOOD PREPARATION
ACCOMODATION HABITABILITY
CREW QUARTERS AND WORK AREA
CREW COMPARTMENT NO.1
CREW COMPARTMENT NO.2
WASTE MANAGEMENT AREA

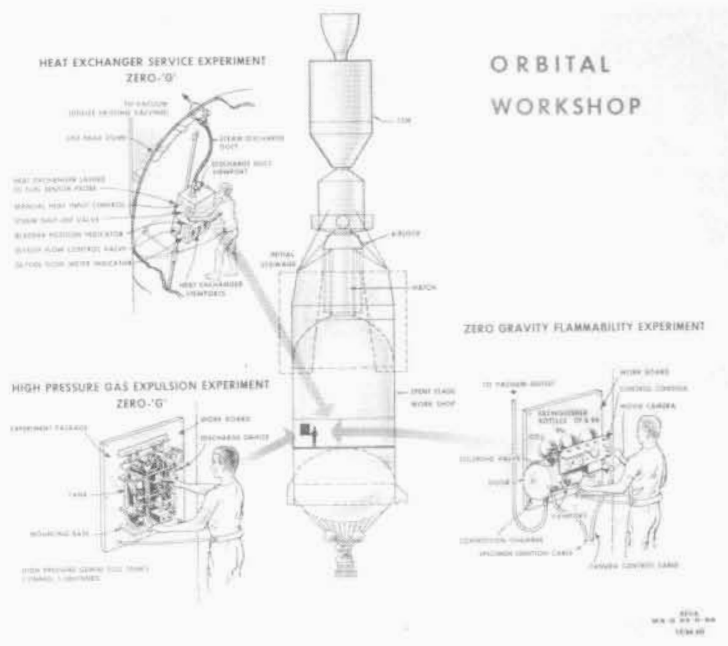

BIO-LAB UTILIZATION (HABITABILITY)
PLAN VIEW
TO VAC
AIR CIRCULATION
READ-OUTS & TIMER
LBNP SYSTEM
OMNI-POSITION TABLE
EVACUATION DEVICE
LOWER BODY NEGATIVE PRESSURE EXPERIMENT (LBNP)
100% O2 5 psia
GAS METER & CHROMATOGRAPH
RECORDER
METABOLIC COST INFLIGHT TASKS EXPERIMENT
ERGOMETER

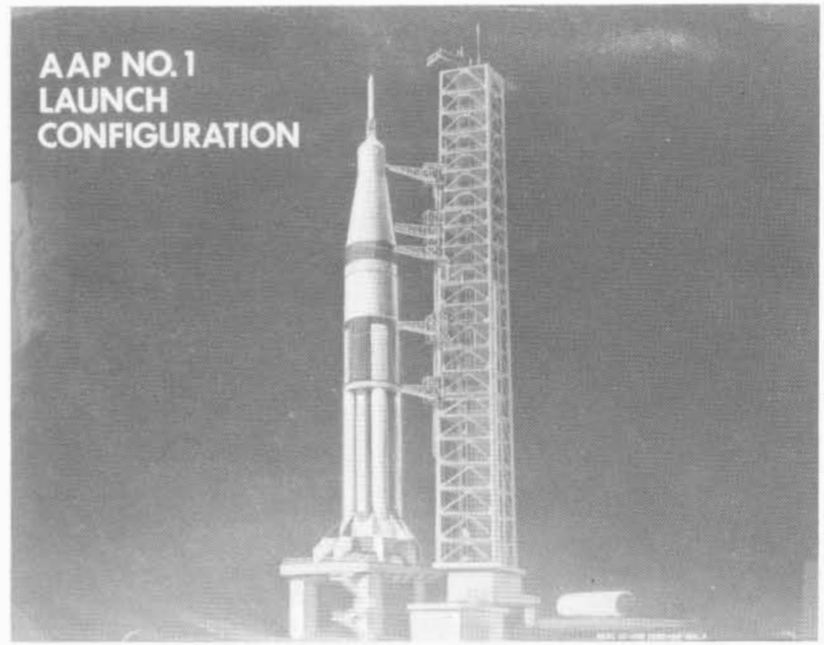




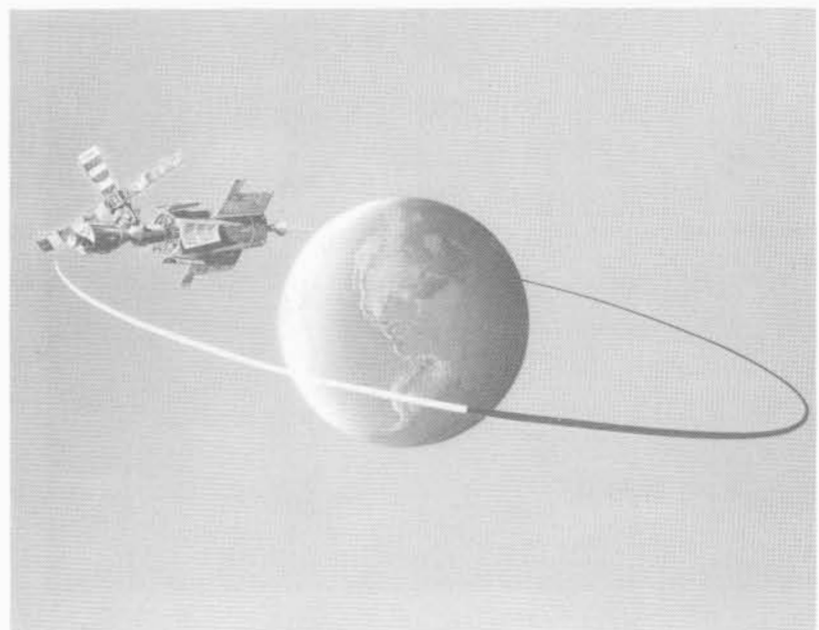
CREW WORK AREA

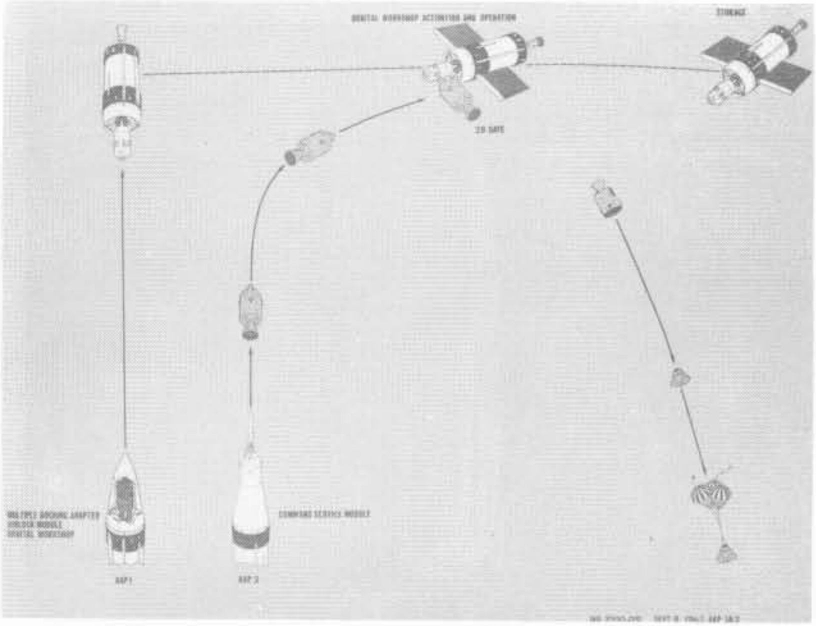


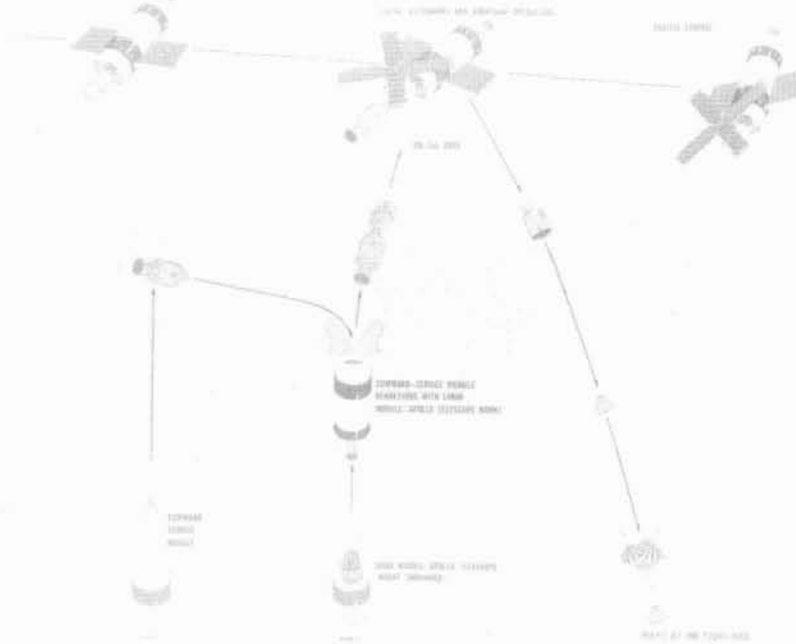

ORBITAL
WORKSHOP
HEAT EXCHANGER SERVICE EXPERIMENT
ZERO-'G'
HIGH PRESSURE GAS EXPULSION EXPERIMENT
ZERO-'G'
ZERO GRAVITY FLAMMABILITY EXPERIMENT

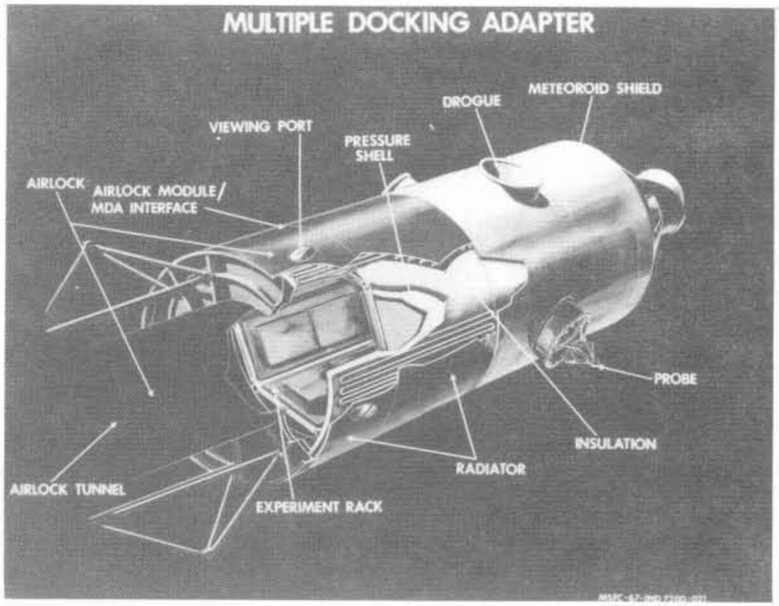

AAP NO. 1
LAUNCH
CONFIGURATION

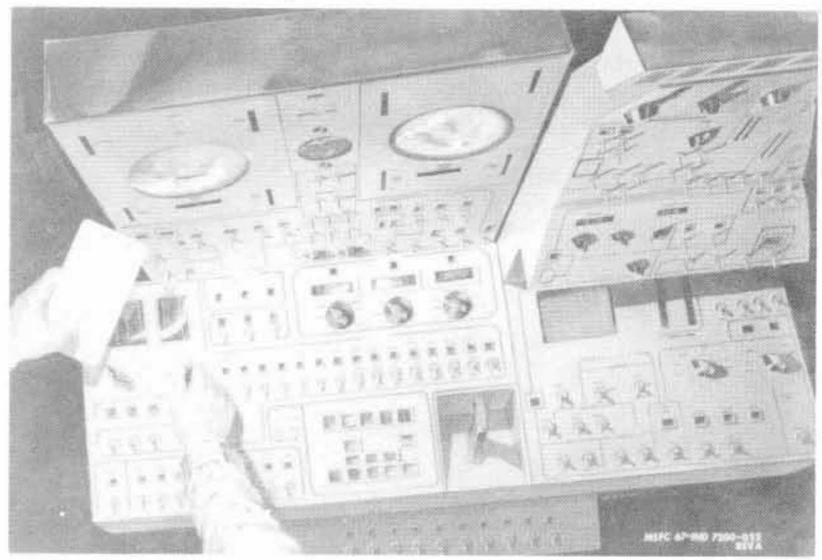

S-IVB ORBITAL WORKSHOP
SLEEPING
QUARTERS
USA
SLEEP
EVALUATION
AREA
WASTE
MANAGEMENT
AREA
ASTRONAUTS
AT WORK
MAIN ROOM WITH EXERCISE TABLE

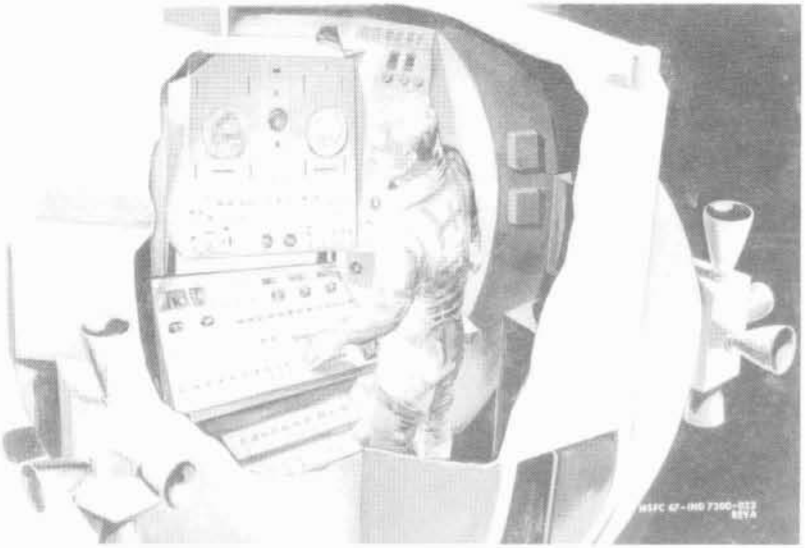


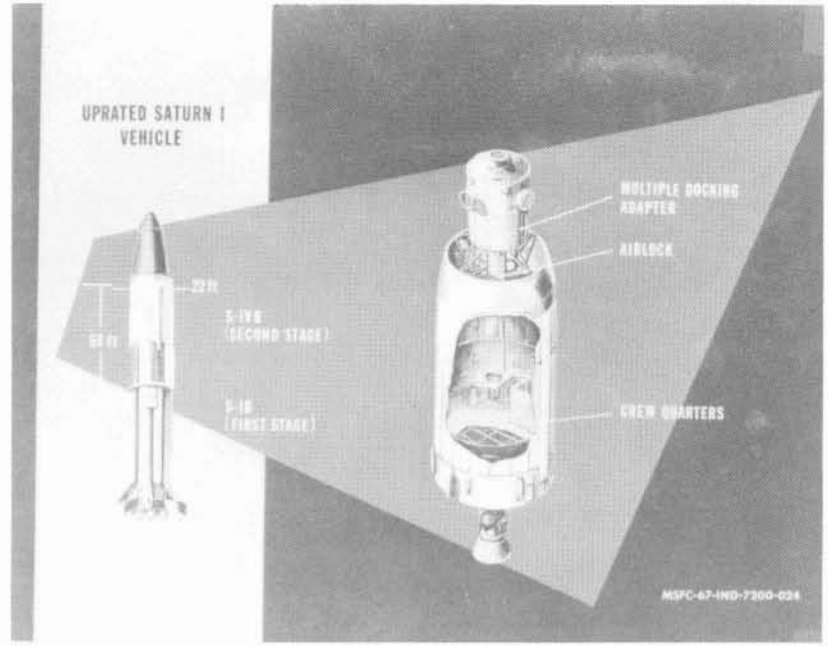


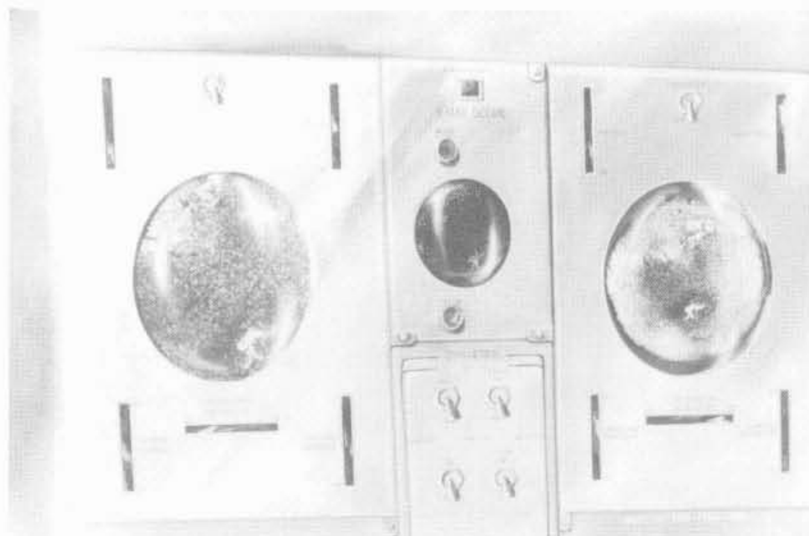



MULTIPLE DOCKING ADAPTER
METEOROID SHIELD
DROGUE
VIEWING PORT
PRESSURE SHELL
AIRLOCK
AIRLOCK MODULE/ MDA INTERFACE
PROBE
INSULATION
RADIATOR
AIRLOCK TUNNEL
EXPERIMENT RACK






UPRATED SATURN I
VEHICLE
S-IVB
(SECOND STAGE)
S-IB
(FIRST STAGE)
MULTIPLE DOCKING
ADAPTER
AIRLOCK
CREW QUARTERS
MSFC-67-IND-7200-024



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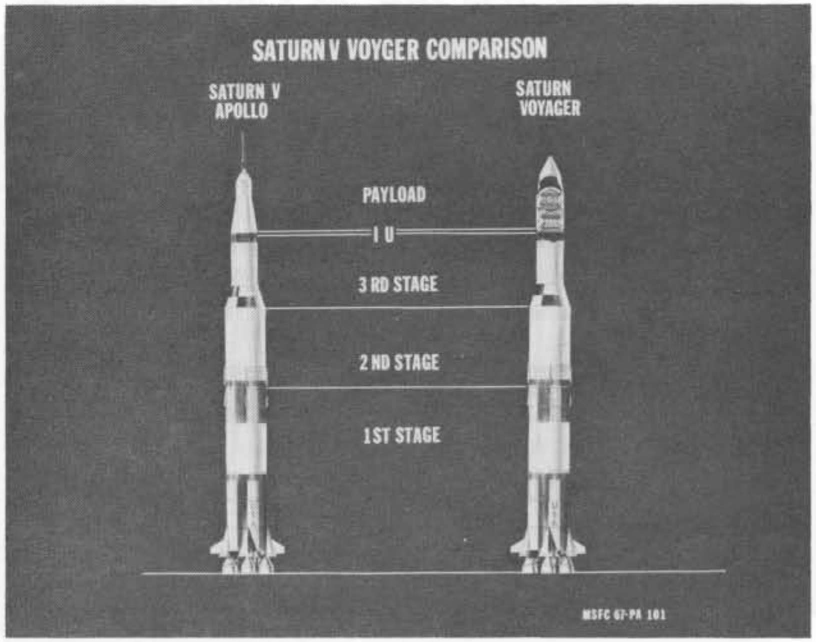
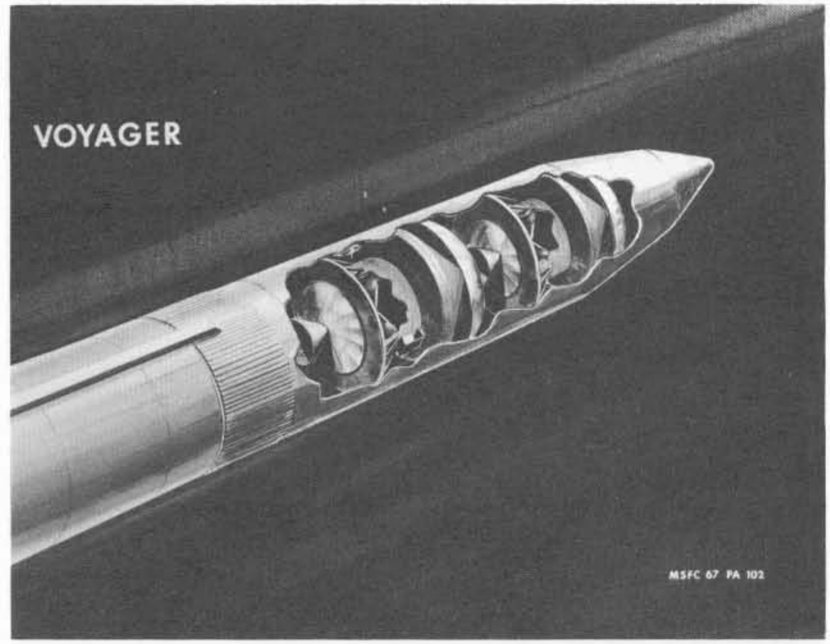
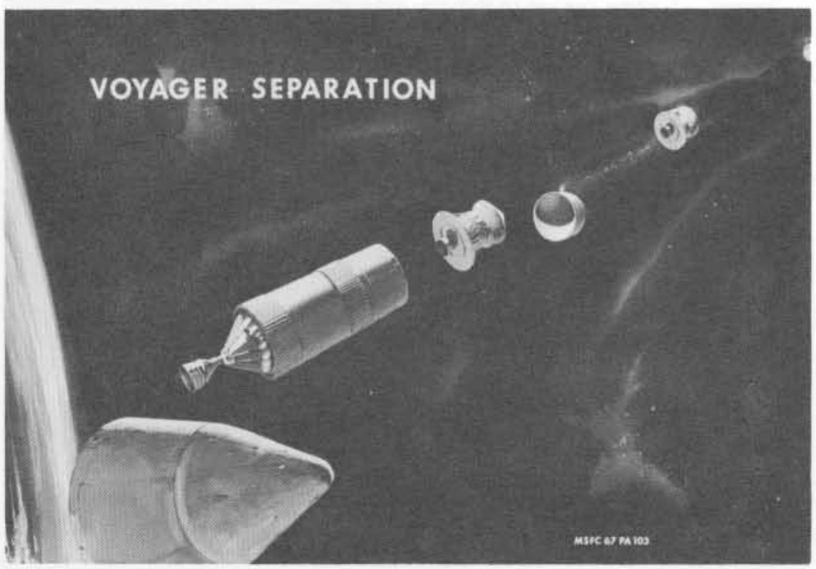
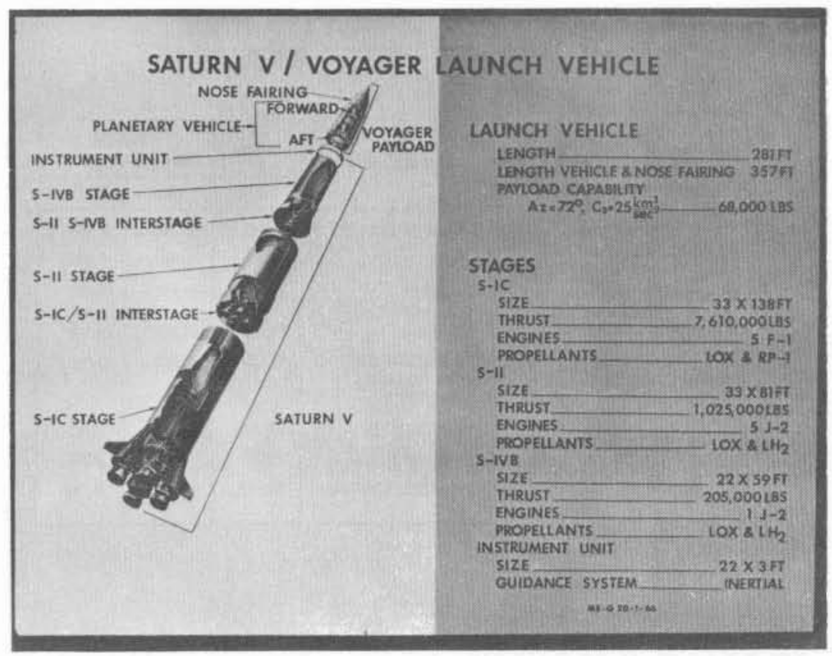
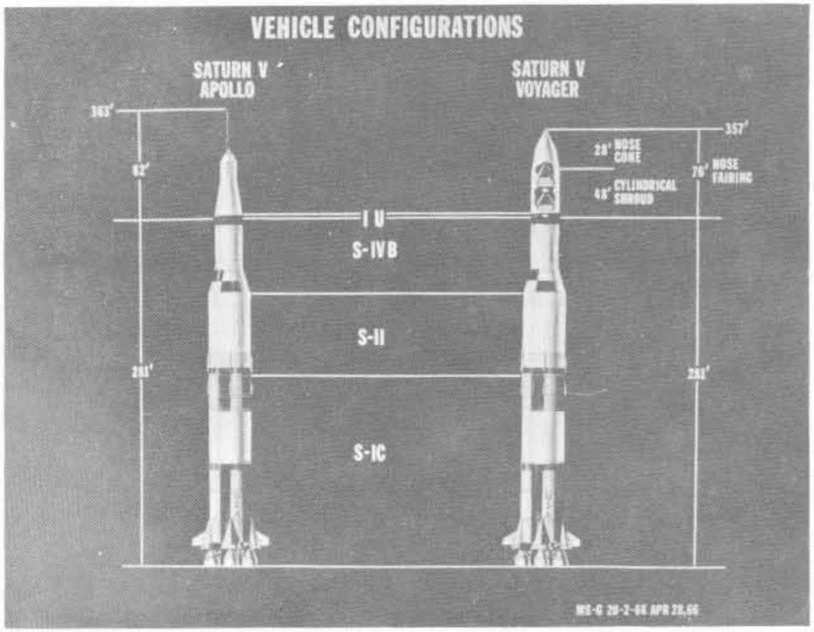

SATURN V VOYGER COMPARISON
SATURN V
APOLLO
SATURN
VOYAGER
PAYLOAD
I U
3 RD STAGE
2 ND STAGE
1ST STAGE
MSFC 67-PA 101

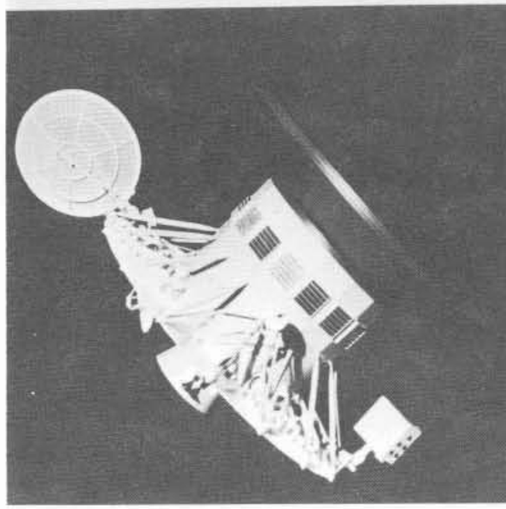

VOYAGER
MSFC 67 PA 102


VOYAGER SEPARATION
MSFC 67 PA 103


SATURN V / VOYAGER LAUNCH VEHICLE
NOSE FAIRING
FORWARD
PLANETARY VEHICLE
AFT
VOYAGER PAYLOAD
INSTRUMENT UNIT
S-IVB STAGE
S-II S-IVB INTERSTAGE
S-II STAGE
S-IC/S-II INTERSTAGE
S-IC STAGE
SATURN V
LAUNCH VEHICLE
LENGTH 281 FT
LENGTH VEHICLE & NOSE FAIRING 357 FT
PAYLOAD CAPABILITY
STAGES
S-IC
SIZE 33 X 138 FT
THRUST 7,610,000 LBS
ENGINES 5 F-1
PROPELLANTS LOX & RP-1
S-II
SIZE 33 X 81 FT
THRUST 1,025,000 LBS
ENGINES 5 J-2
PROPELLANTS LOX & LH_2
S-IVB
SIZE 22 X 59 FT
THRUST 205,000 LBS
ENGINES 1 J-2
PROPELLANTS LOX & LH_2
INSTRUMENT UNIT
SIZE 22 X 3 FT
GUIDANCE SYSTEM INERTIAL

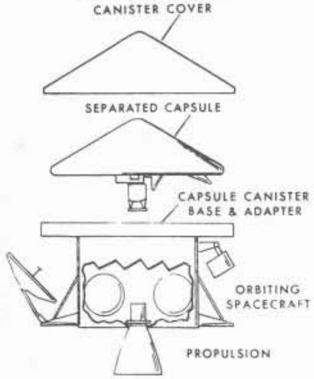


VOYAGER PLANETARY VEHICLE CONCEPT



PLANETARY VEHICLE	WEIGHT IN LBS.
ORBITING SPACECRAFT	2,500
LANDING CAPSULE	5,000 to 7,000
PROPULSION	13,000 to 15,000
TOTAL	20,500 to 24,500
SCIENCE SUBSYSTEM	
ORBITING SPACECRAFT	400
LANDING CAPSULE	300 to 500+

OVERALL VOYAGER WEIGHT BREAKDOWN



MAJOR PARTS OF ONE PLANETARY VEHICLE

CHARACTERISTIC	BASELINE	TYPICAL GROWTH POTENTIAL	
	1973	1975	1977/1979
ORBITING SPACECRAFT	2,500 LB	2,500 LB	2,500 LB
CAPSULE	5,000	6,000	7,000
PROPULSION	13,000	14,000	15,000
TOTAL (ONE PLANETARY VEHICLE)	20,500	22,500	24,500
NET INJECTION WEIGHT (TWO PLANETARY VEHICLES)	41,000	45,000	49,000
SHROUD ADAPTER	9,300	9,300	9,300
CONTINGENCY	5,000	3,700	2,700
GROSS INJECTED WEIGHT	55,300	58,000	61,000

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VOYAGER LAUNCH PROFILE

1. LAUNCH
2. S-I-C STAGE JETTISON
3. S-II STAGE JETTISON
4. S-IV-B IGNITION
5. PARKING ORBIT INSERTION
6. NOSE FAIRING JETTISON
7. S-IV-B REIGNITION
8. INTERPLANETARY INJECTION
9. FORWARD PLANETARY VEHICLE SEPARATION
10. SHROUD JETTISON
11. AFT PLANETARY VEHICLE SEPARATION
12. MIDCOURSE MANEUVERS

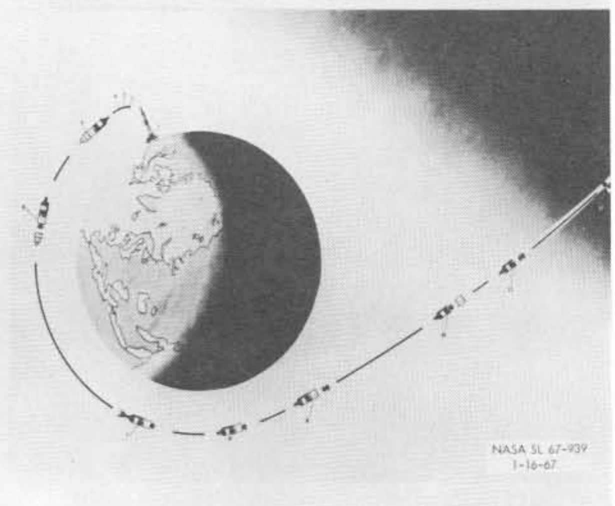

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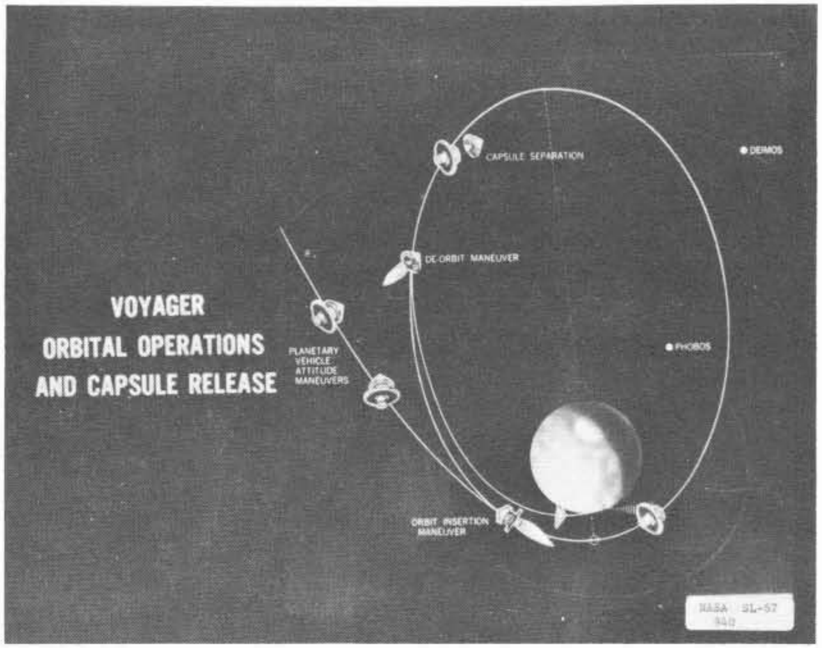
Figure 8



VOYAGER ORBITER MISSION

OPERATION

- ALTITUDES AS LOW AS 700 MILES
- ORBITAL PERIODS FROM 6 TO 12 HOURS
- FULL COVERAGE OF PLANET
- EARLY MISSIONS - 6 MONTHS OPERATION
- LATER MISSIONS - ONE TO TWO YEARS OPERATION

SCIENTIFIC DATA

- VISUAL MAPPING AND TOPOGRAPHY
- PLANETARY TEMPERATURE DISTRIBUTION
- DAILY AND SEASONAL CHANGES
- MAJOR GEOLOGICAL FEATURES
- PLANETARY GRAVITY AND GEODESY
- BIOLOGICAL ENVIRONMENT
- LARGE SCALE ATMOSPHERIC FEATURES

INSTRUMENTATION

- VIDEO ● SPECTROMETERS ● RADIOMETERS
- IONOSPHERIC SOUNDERS ● POLARIMETERS

VOYAGER ORBITING SPACECRAFT

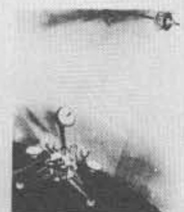
- THREE AXIS ATTITUDE STABILIZATION
- 250 SQ. FT. OF SOLAR CELLS - ABOUT 1000 WATTS
- RECHARGEABLE BATTERIES - ABOUT 3,000 TO 4,000 WATT-HR. CAPACITY
- DATA STORAGE - 10^9 TO 10^{10} BITS
- DATA RATE - 8,000 TO 15,000 BITS/SEC.
- PROPULSION ΔV - ABOUT 6,500 FT/SEC.

	WEIGHT, LB
ENGINEERING MECHANICS	775
TELECOMMUNICATIONS	340
GUIDANCE AND CONTROL	250
POWER	535
SCIENCE	400
CONTINGENCY	200
TOTAL ORBITER	2,500
PROPULSION	13,000-15,000

Figure 11

VOYAGER MISSIONS TO MARS

VOYAGER 1973: ORBITER AND LANDER



VOYAGER 1975: ORBITER AND LANDER

VOYAGER 1977/1979: ORBITER AND LANDER

	VOYAGER 1973: ORBITER AND LANDER	VOYAGER 1975: ORBITER AND LANDER	VOYAGER 1977/1979: ORBITER AND LANDER
SCIENTIFIC OBJECTIVES	Make selected spectroscopic and visual surveys Make exploratory measurements on surface Investigate biological environment Investigate diurnal variations on surface Observe seasonal changes from orbit	Make additional spectroscopic and visual surveys Make physical and chemical surface measurements Perform biological experiments Investigate seasonal changes on surface	Make spectroscopic and visual studies of specific areas Perform detailed surface studies in areas of high interest Perform specific biological experiments Investigate meteorology of Mars
TECHNICAL ADVANCES	Development of orbital operations Development of landing technology Communications rate of 15,000 bits/sec from orbit Communications rate of 600 bits/sec from Martian surface	Use of radioisotope power Introduction of automatic programming and control	Use of automated laboratory Introduction of mubility on surface

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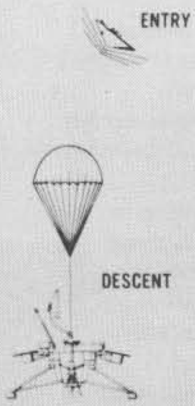
1-16-67

VOYAGER MISSION DURING ENTRY AND DESCENT



OPERATION

- DATA DERIVED DURING ENTRY AND DESCENT
- ATMOSPHERE SAMPLED FROM ENTRY TO LANDING
- TIME IN ATMOSPHERE FROM 4½ TO 9 MINUTES

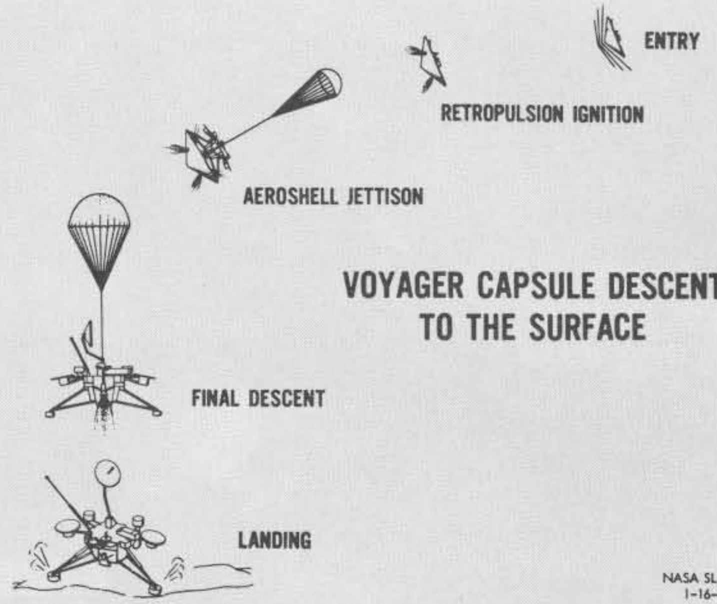
SCIENTIFIC DATA

- VISUAL TOPOGRAPHICAL
- PRESSURE ALTITUDE PROFILE
- TEMPERATURE ALTITUDE PROFILE
- ATMOSPHERIC COMPOSITION

INSTRUMENTATION

- VIDEO
- ACCELEROMETERS
- PRESSURE TRANSDUCERS
- TEMPERATURE PROBES
- MASS SPECTROMETERS

VOYAGER CAPSULE DESCENT TO THE SURFACE



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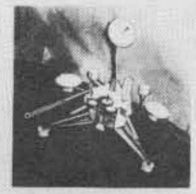
VOYAGER LANDING CAPSULE

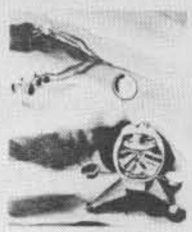
			WEIGHT, LB
CAPSULE BUS			3,140
PRE-ENTRY EQUIPMENT		1,275	
ENGINEERING MECHANICS	860		
DE-ORBIT PROPULSION	415		
ENTRY AND LANDING EQUIPMENT		1,865	
ENGINEERING MECHANICS	1,015		
TELECOMMUNICATIONS	15		
GUIDANCE AND CONTROL	180		
POWER	90		
PROPULSION	565		
SURFACE LABORATORY			860
ENGINEERING MECHANICS	250		
TELECOMMUNICATIONS	70		
GUIDANCE AND CONTROL	25		
POWER	215		
SCIENCE	300		
CONTINGENCY			1,000
TOTAL			5,000

- DECELERATION TECHNIQUES - AERODYNAMIC, PARACHUTE, RETRO PROPULSION
- BALLISTIC COEFFICIENT - .3 SLUG/SQ.FT.
- CAPSULE DIAMETER - 20 FEET MAXIMUM
- BATTERY POWER - 5000 WATT - HR. CAPACITY
- DATA RATE
  RELAY - 50,000 TO 200,000 BPS
  DIRECT - 600 BPS
- MAXIMUM ENTRY VELOCITY - 15,000 FT/SEC
- ENTRY ANGLE - 15° TO 19°

VOYAGER MISSIONS ON MARTIAN SURFACE



EARLY MISSIONS



LATER MISSIONS

OPERATION

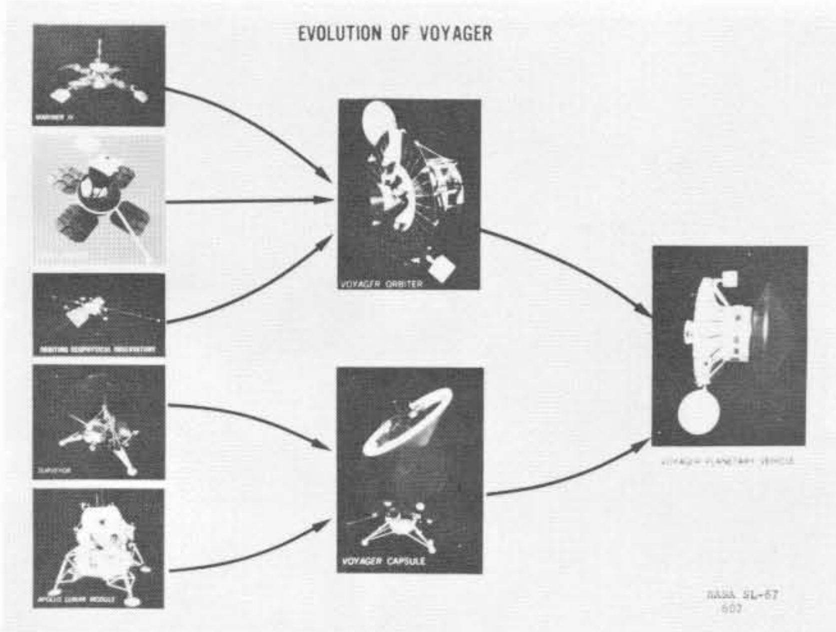
- EARLY MISSIONS • TWO DAY OPERATION
  • STATIONARY LABORATORY
- LATER MISSIONS • SIX MONTHS TO TWO YEARS OPERATION
  • MOBILITY

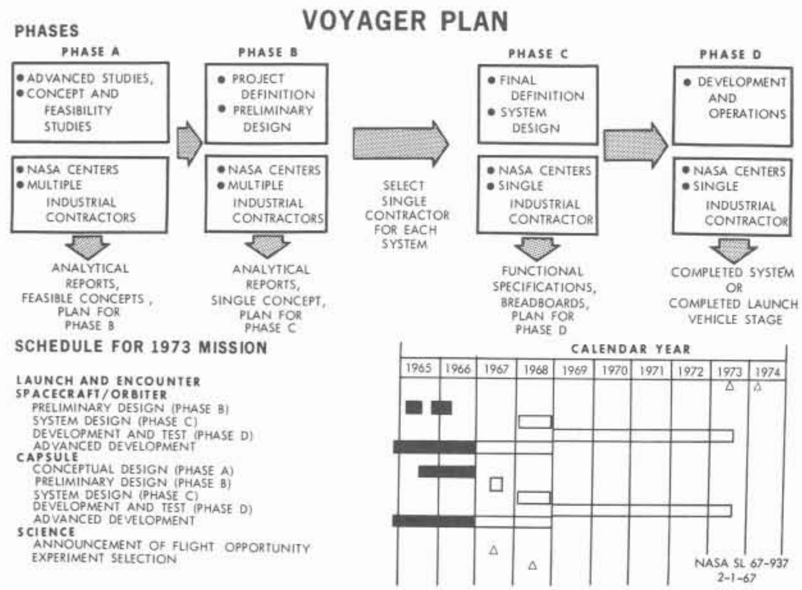
SCIENTIFIC DATA

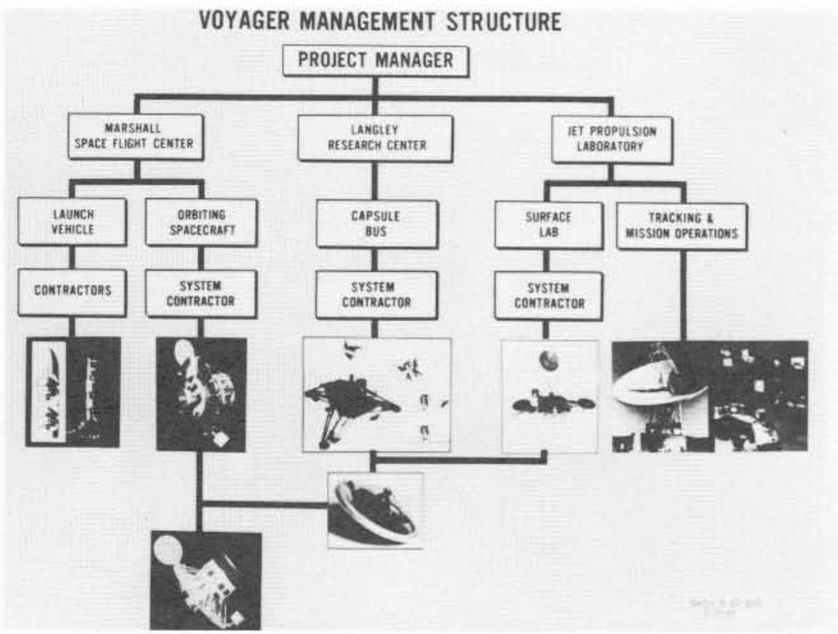
- VISUAL TOPOGRAPHICAL
- ATMOSPHERIC AND METEOROLOGICAL
- INCIDENT RADIATION
- SURFACE CHEMICAL COMPOSITION
- BIOLOGICAL ENVIRONMENT
- BIOCHEMISTRY
- DIRECT LIFE TESTS
- SUBSURFACE PROBING

INSTRUMENTATION

- VIDEO • GAS CHROMATOGRAPH
- MASS SPECTROMETER
- RADIOMETER • PRESSURE AND TEMPERATURE TRANSDUCERS
- LIFE DETECTION EXPERIMENTS
- UV AND ALPHA SCATTER SPECTROMETERS







SPACE APPLICATIONS PROGRAM
OBJECTIVES

- To develop a capability to expand human knowledge of the phenomena in the atmosphere and space, and support the exploration of space, by conducting a broad-based program of applications-oriented research and technology (National Aeronautics and Space Act of 1958).
- To develop and test procedures, instruments, subsystems, spacecraft, and interpretive techniques in the various applications areas.
- To accomplish long-range studies of the potential benefits to be gained from, and the problems involved in, utilization of space activities for peaceful and scientific purposes for the benefits of mankind.

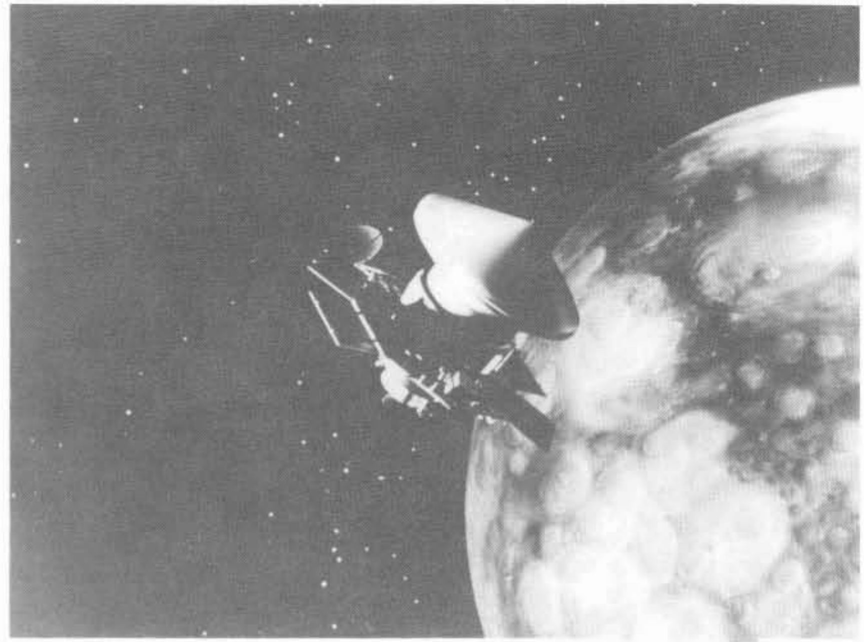
NASA SA 67-935
1-16-67

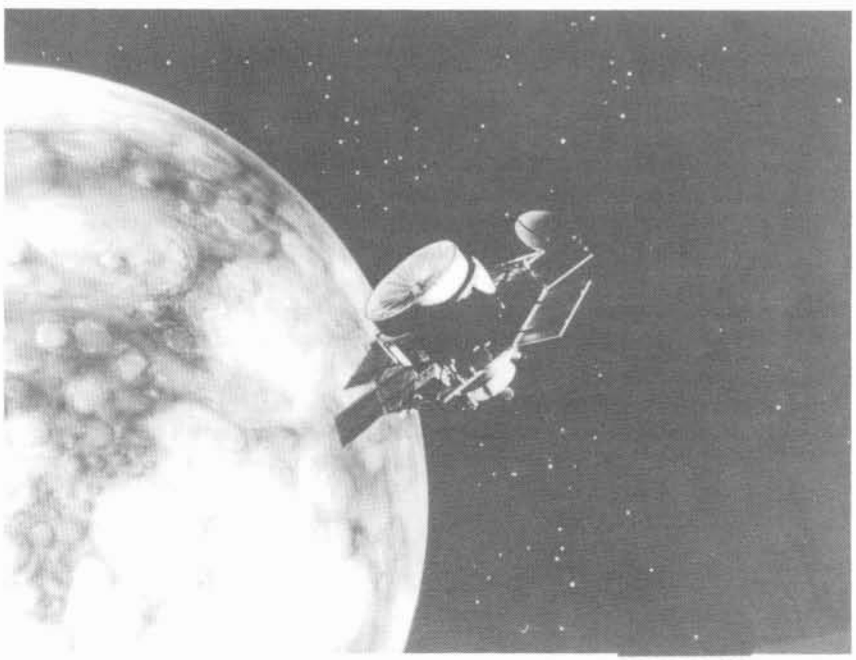
APP-A OBSERVATIONS

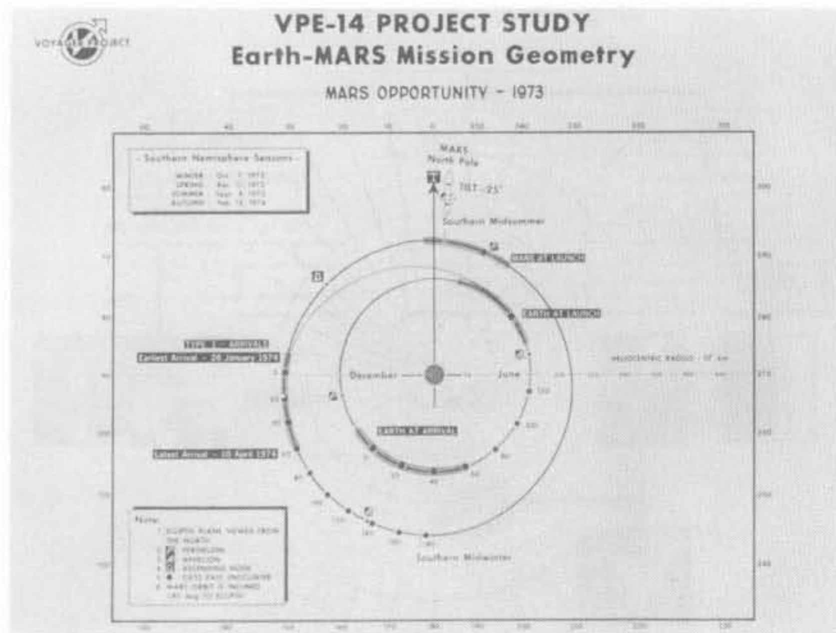
SPECTRAL DISTRIBUTION

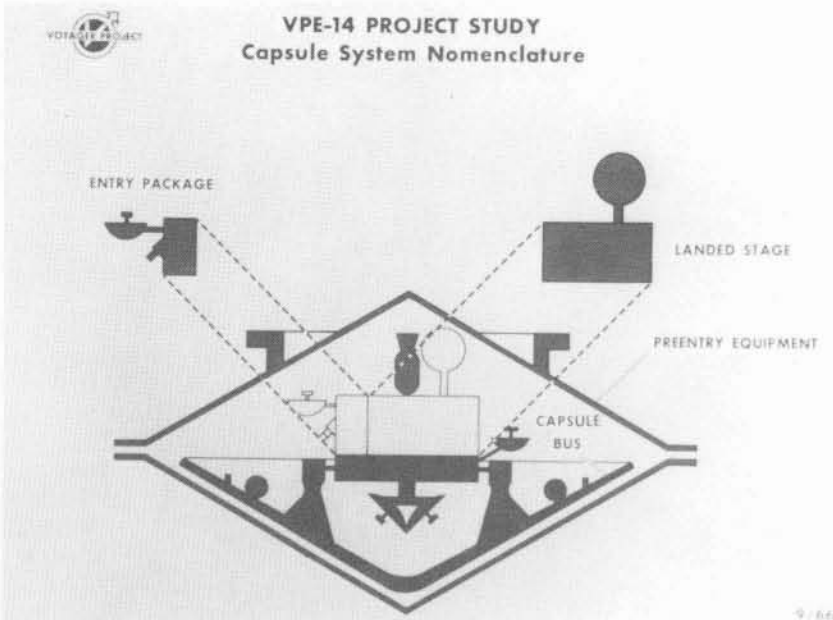
PARAMETERS	VISIBLE	INFRARED	MICROWAVE	UHF
CLOUD COVER	X			
CLOUD HEIGHT		X		
ATMOSPHERIC TEMPERATURE		X	X	
ATMOSPHERIC CONSTITUENTS	X	X	X	
ATMOSPHERIC MOTION	X			
AIR POLLUTION	X	X		
DENSITY	X	X		
EARTH RESOURCES	X	X	X	
ELECTRICAL ACTIVITY				X
COMMUNICATION				X

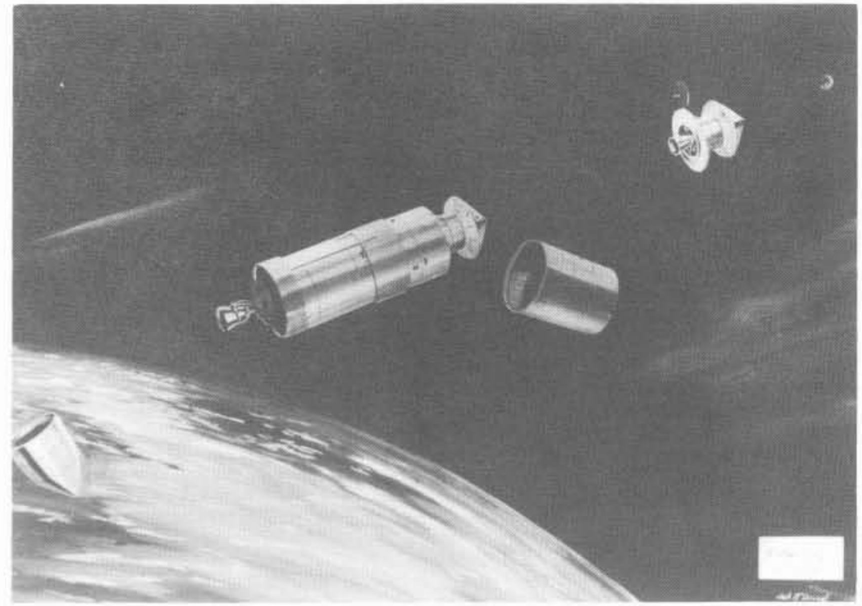
NASA SA 67-933
1-16-67








VOYAGER PROJECT
VPE-14 PROJECT STUDY
Capsule System Nomenclature
ENTRY PACKAGE
LANDED STAGE
PREENTRY EQUIPMENT
CAPSULE
BUS
9/66



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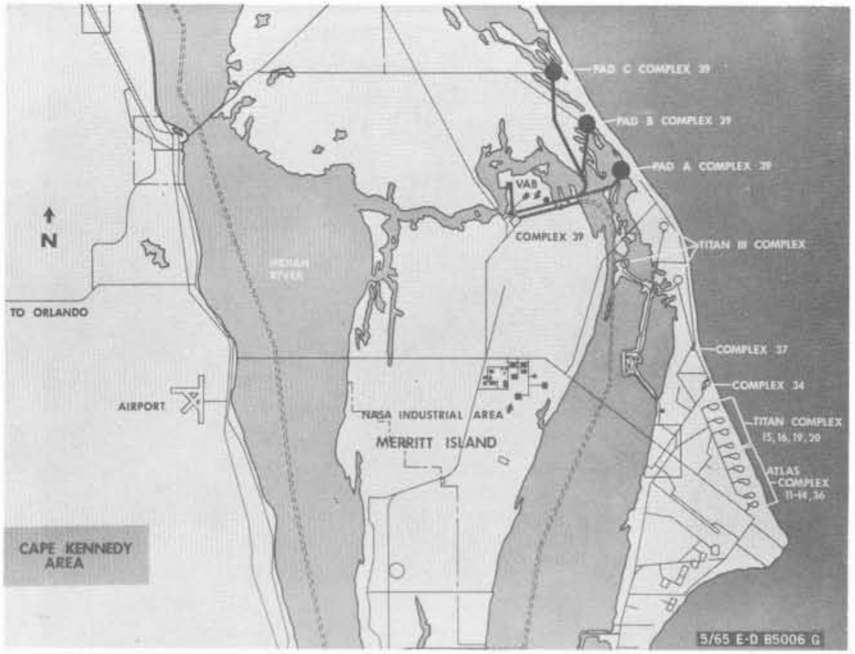
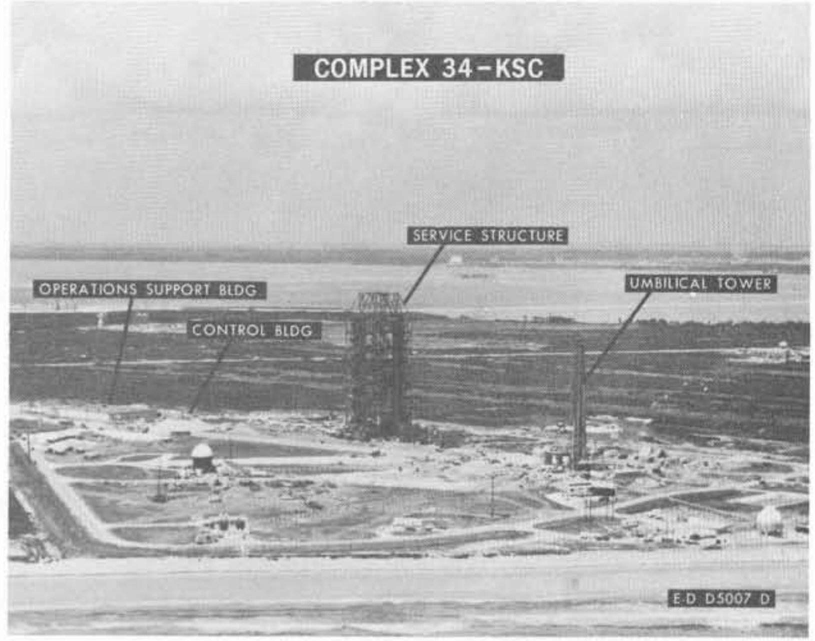
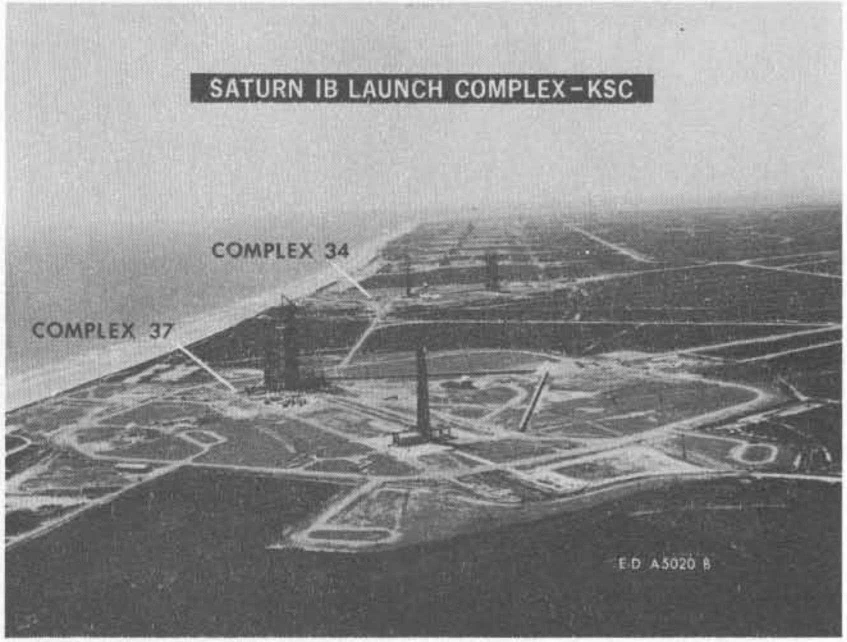
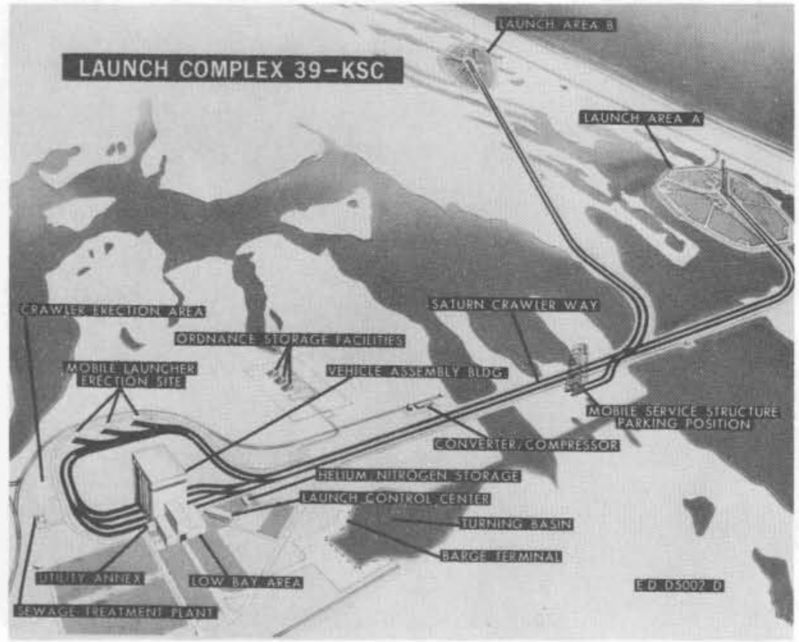

PAD C COMPLEX 39
PAD B COMPLEX 39
PAD A COMPLEX 39
VAB
COMPLEX 39
N
TITAN III COMPLEX
TO ORLANDO
COMPLEX 37
COMPLEX 34
AIRPORT
NASA INDUSTRIAL AREA
MERRITT ISLAND
TITAN COMPLEX
15, 16, 19, 20
ATLAS
COMPLEX
11-14, 36
CAPE KENNEDY
AREA
5/65 E-D B5006 G


COMPLEX 34-KSC
SERVICE STRUCTURE
OPERATIONS SUPPORT BLDG
UMBILICAL TOWER
CONTROL BLDG
E-D D5007 D


COMPLEX 37-KSC
E-D D5045

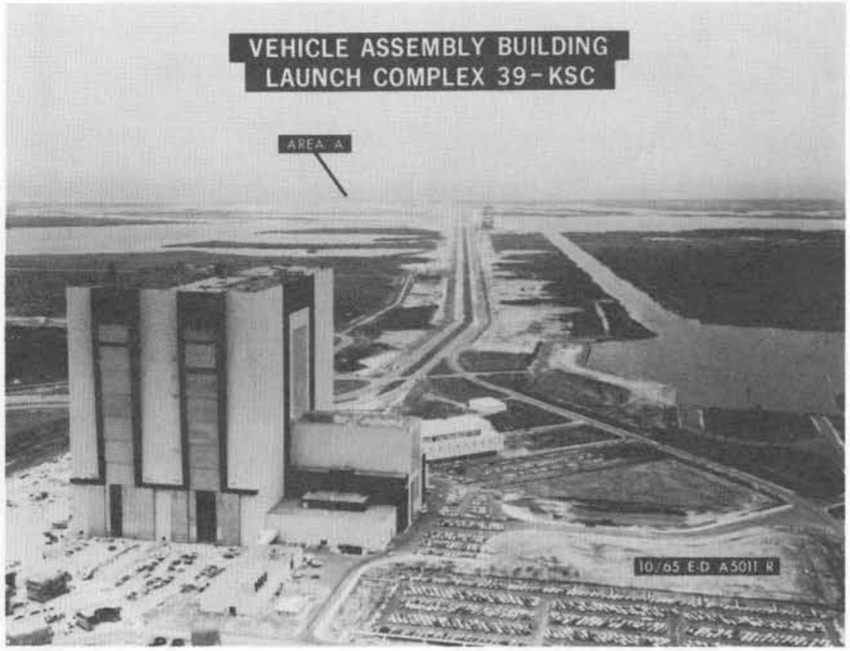

COMPLEX 37-KSC

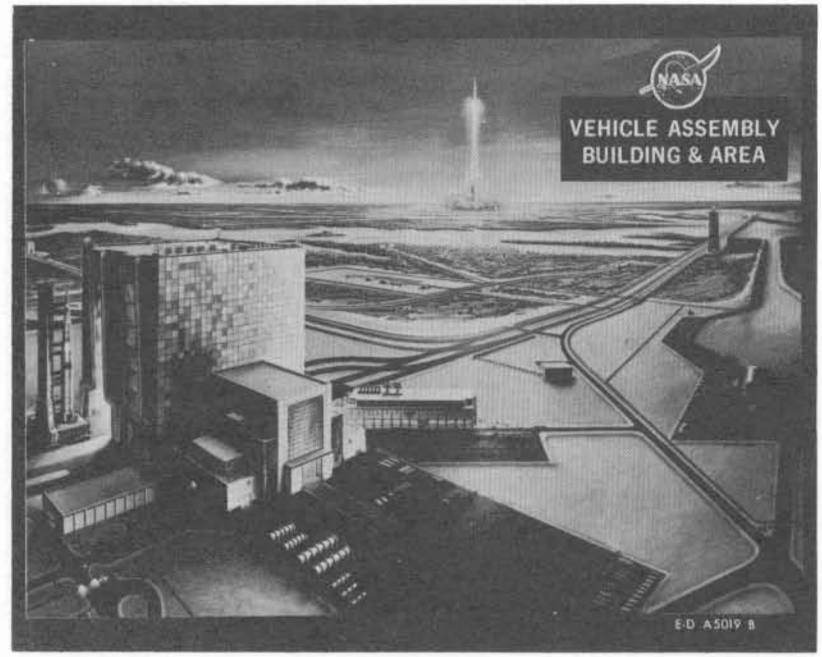

SATURN IB LAUNCH COMPLEX-KSC
COMPLEX 34
COMPLEX 37
E-D A5020 B

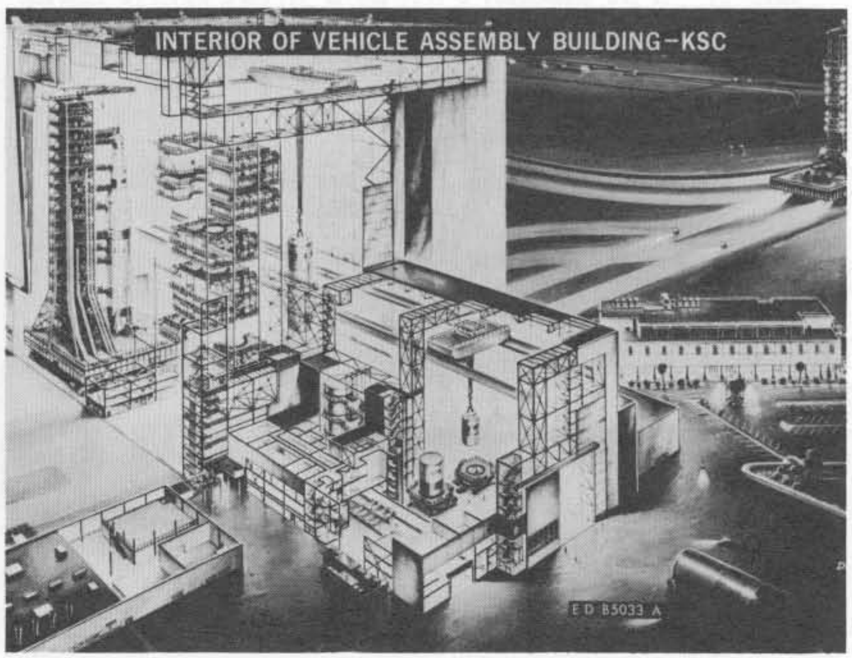

LAUNCH COMPLEX 39-KSC
LAUNCH AREA B
LAUNCH AREA A
CRAWLER ERECTION AREA
ORDNANCE STORAGE FACILITIES
SATURN CRAWLER WAY
MOBILE LAUNCHER ERECTION SITE
VEHICLE ASSEMBLY BLDG.
MOBILE SERVICE STRUCTURE PARKING POSITION
CONVERTER/COMPRESSOR
HELIUM NITROGEN STORAGE
LAUNCH CONTROL CENTER
TURNING BASIN
BARGE TERMINAL
UTILITY ANNEX
LOW BAY AREA
SEWAGE TREATMENT PLANT
E-D D5002 D

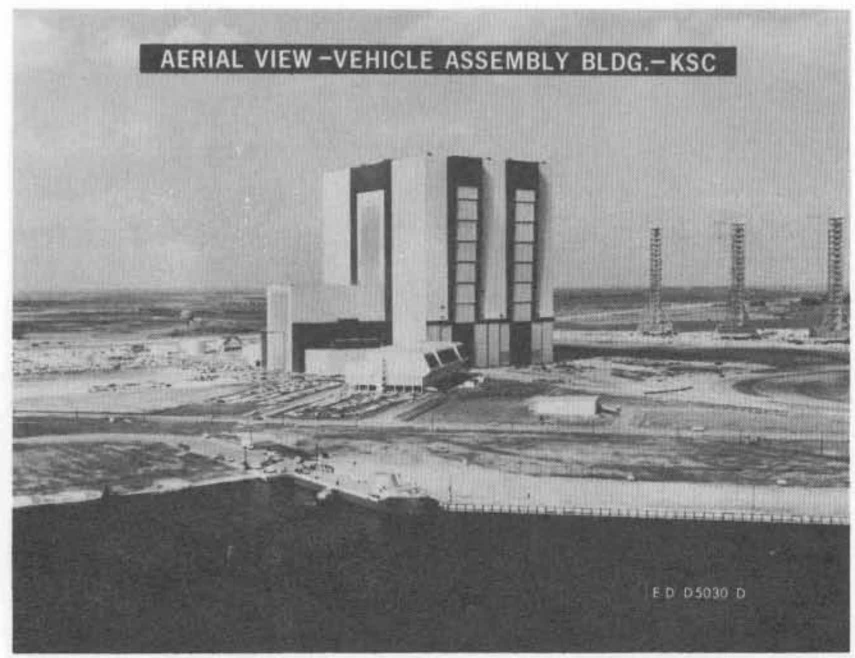

SATURN V LAUNCH COMPLEX 39-KSC
E-D A5068


LAUNCH AREA A, COMPLEX 39-KSC
H_2 BURN POND
H_2 FACILITIES
FLAME DEFLECTOR PARKING
RP-1 FACILITIES
LOX FACILITIES
HOLDING POND
AZIMUTH ALIGNMENT BLDG
TYPICAL CAMERA PAD
REMOTE AIR INTAKE BLDG.
PTCR
E-D D5003 B


VEHICLE ASSEMBLY BUILDING
LAUNCH COMPLEX 39-KSC
AREA A
10/65 E-D A5011 R


NASA
VEHICLE ASSEMBLY
BUILDING & AREA
E-D A5019 B

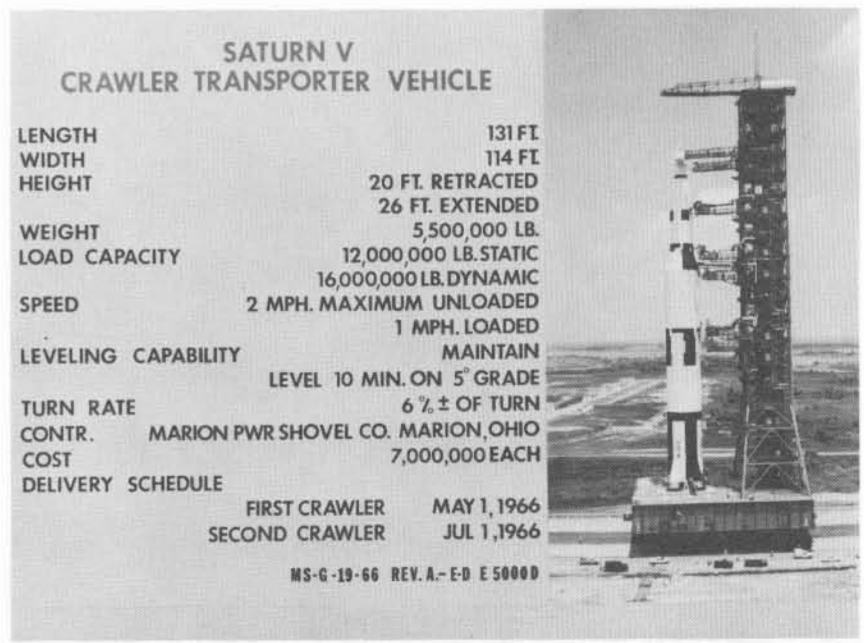

INTERIOR OF VEHICLE ASSEMBLY BUILDING-KSC
E D B5033 A

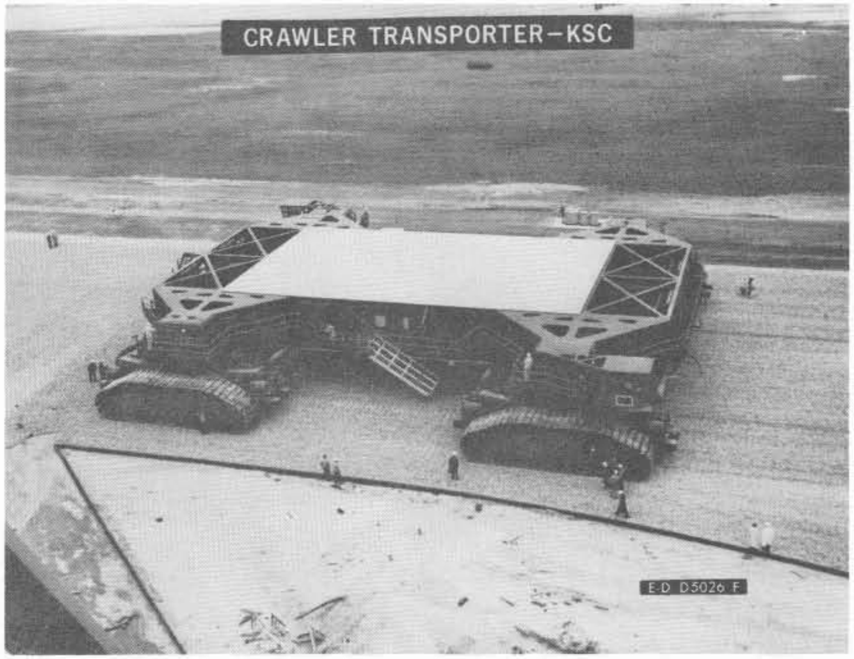

AERIAL VIEW-VEHICLE ASSEMBLY BLDG.-KSC
E D D5030 D

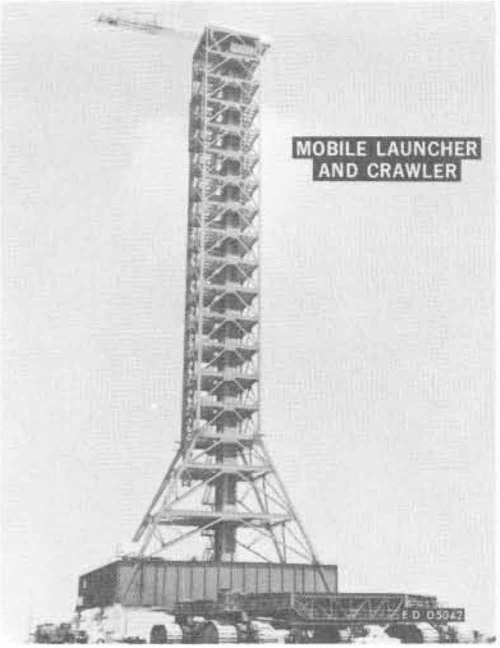

MOBILE LAUNCHERS–KSC
9/65 E-D D5028 F

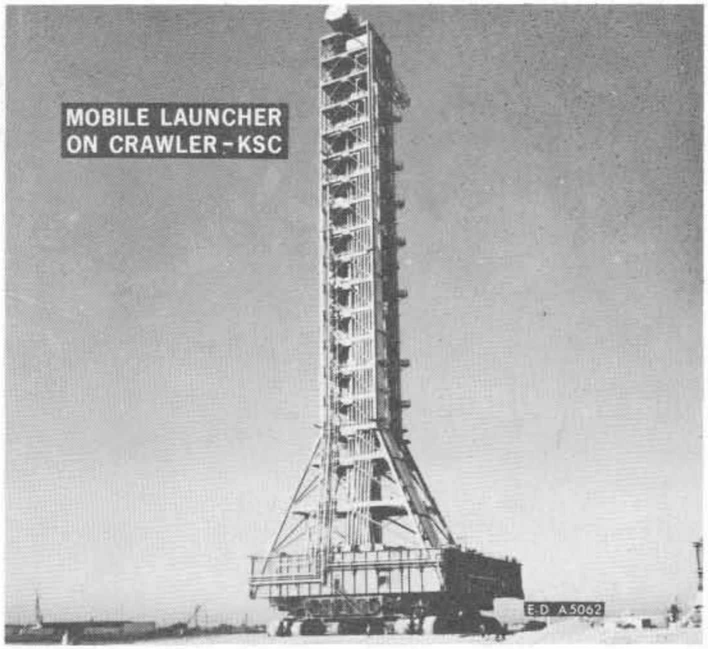

KENNEDY SPACE CENTER
LAUNCH CONTROL CENTER–COMPLEX 39
E-D D5022 G


INTERIOR OF LAUNCH CONTROL CENTER–COMPLEX 39–KSC
E-D A5075


SATURN V
CRAWLER TRANSPORTER VEHICLE
LENGTH 131 FT.
WIDTH 114 FT.
HEIGHT 20 FT. RETRACTED
26 FT. EXTENDED
WEIGHT 5,500,000 LB.
LOAD CAPACITY 12,000,000 LB. STATIC
16,000,000 LB. DYNAMIC
SPEED 2 MPH. MAXIMUM UNLOADED
1 MPH. LOADED
LEVELING CAPABILITY MAINTAIN
LEVEL 10 MIN. ON 5° GRADE
TURN RATE 6 % ± OF TURN
CONTR. MARION PWR SHOVEL CO. MARION, OHIO
COST 7,000,000 EACH
DELIVERY SCHEDULE
FIRST CRAWLER MAY 1, 1966
SECOND CRAWLER JUL 1, 1966
MS-G-19-66 REV. A.-E-D E 5000D


CRAWLER TRANSPORTER-KSC
E-D D5026 F

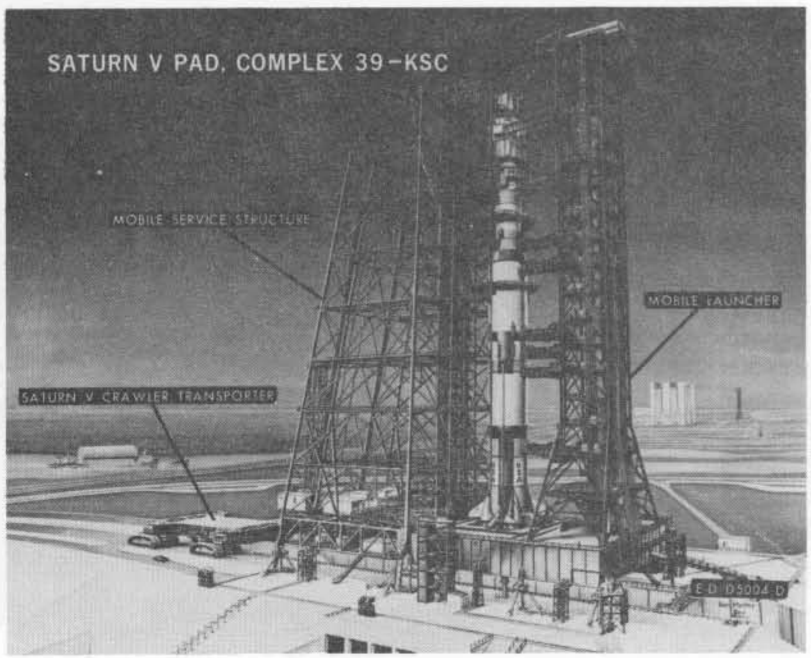

MOBILE LAUNCHER
AND CRAWLER
E-D D5062

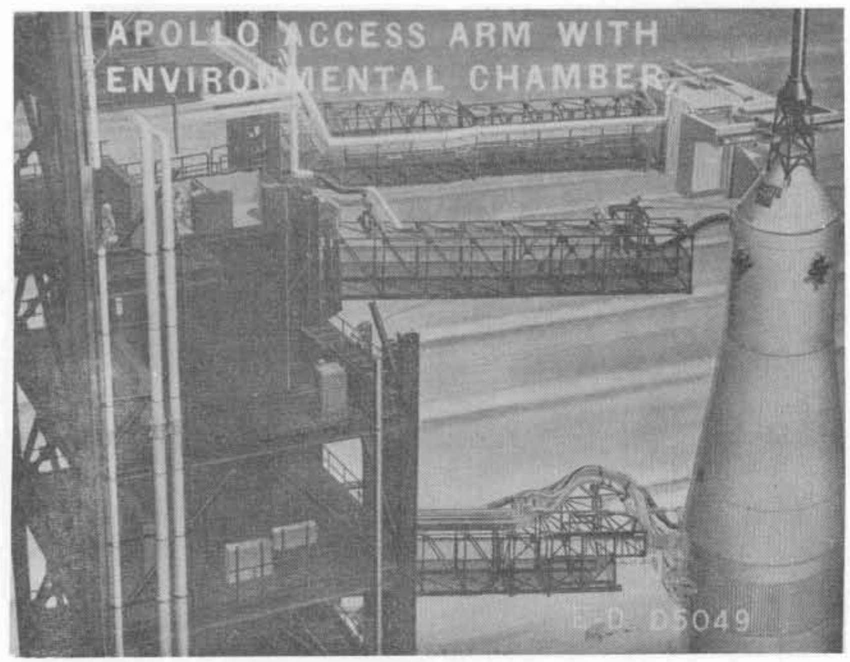

MOBILE LAUNCHER
ON CRAWLER-KSC
E-D A5062


AERIAL VIEW OF LAUNCH AREA A-KSC
VAB
LAUNCH AREA A
10/65 E-D D5031 E

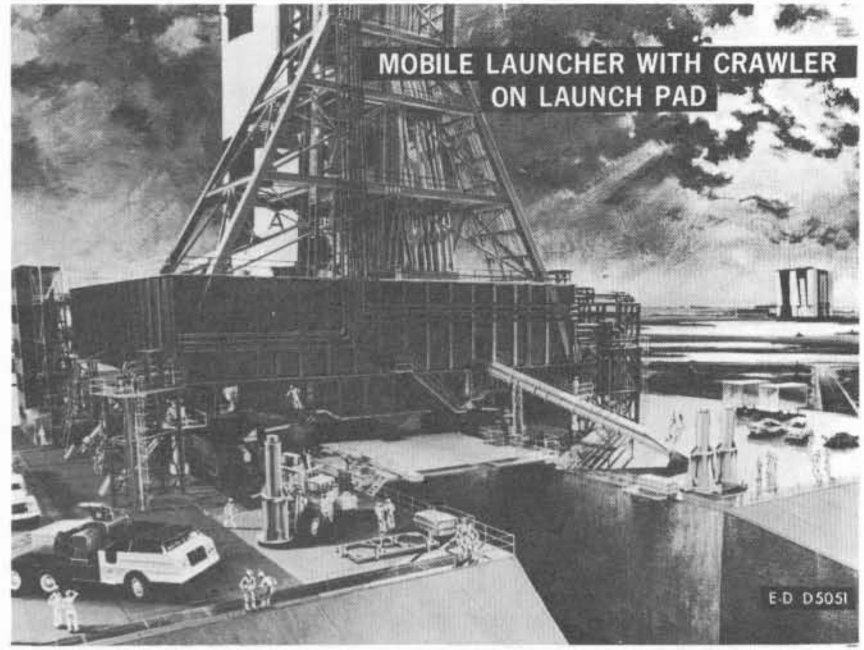

AERIAL VIEW OF LAUNCH AREA B—KSC
LAUNCH AREA B


OPERATIONS AND CHECKOUT BUILDING-KSC
E-D D5017 B


SATURN V PAD, COMPLEX 39-KSC
MOBILE SERVICE STRUCTURE
MOBILE LAUNCHER
SATURN V CRAWLER TRANSPORTER
E-D D5004 D


APOLLO ACCESS ARM WITH
ENVIRONMENTAL CHAMBER
E-D. D5049

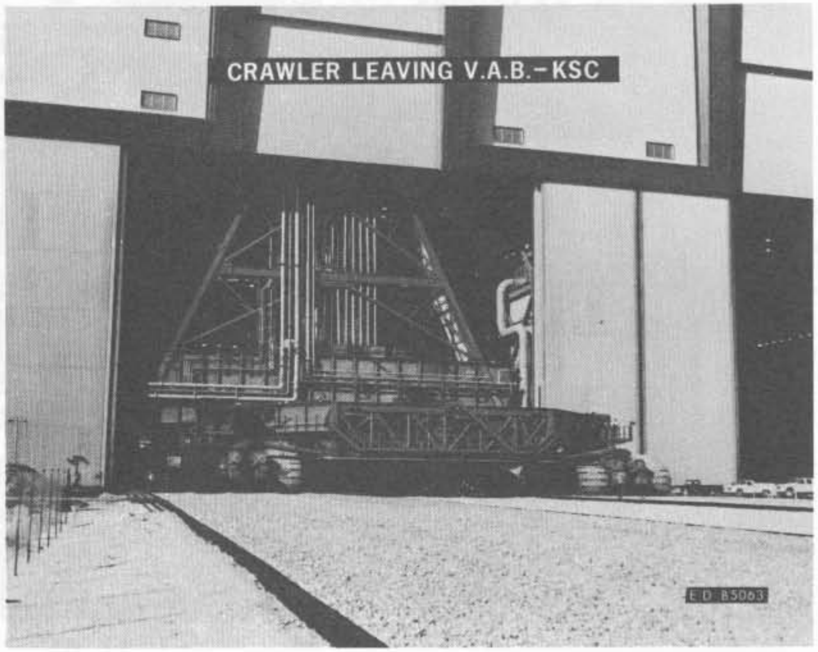
MOBILE LAUNCHER SERVICE ARMS FOR S-II AND S-IVB STAGES



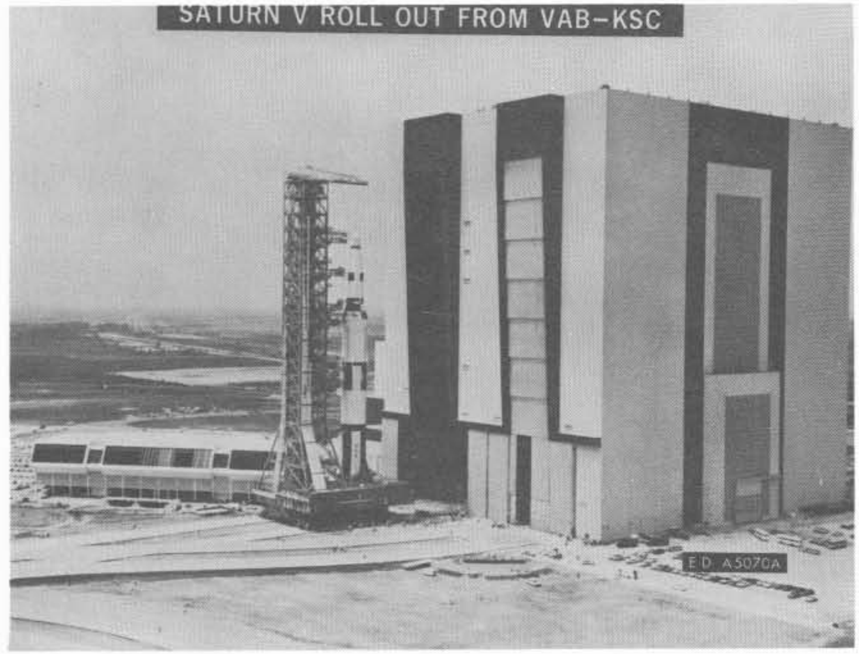
MOBILE LAUNCHER WITH CRAWLER ON LAUNCH PAD

MOBILE SERVICE STRUCTURE–KSC

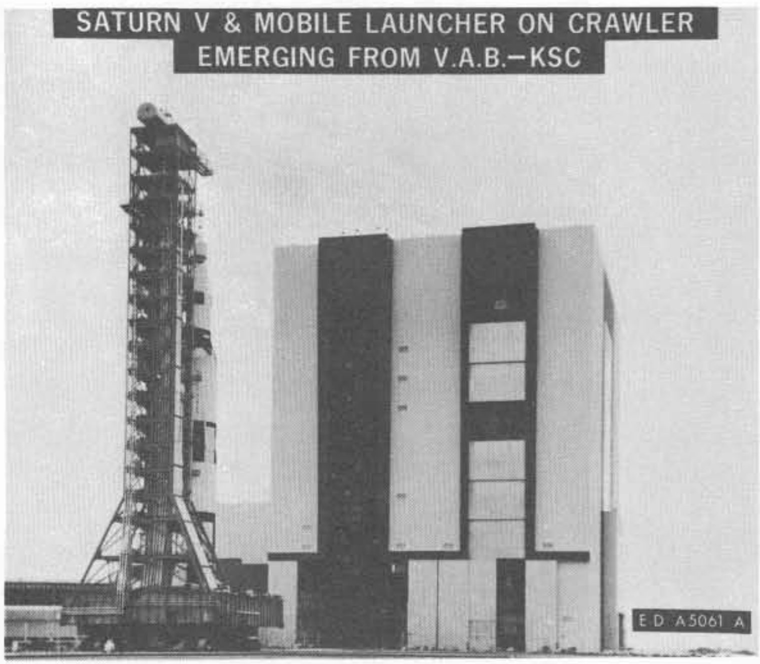

MOBILE SERVICE STRUCTURE ON CRAWLER–KSC



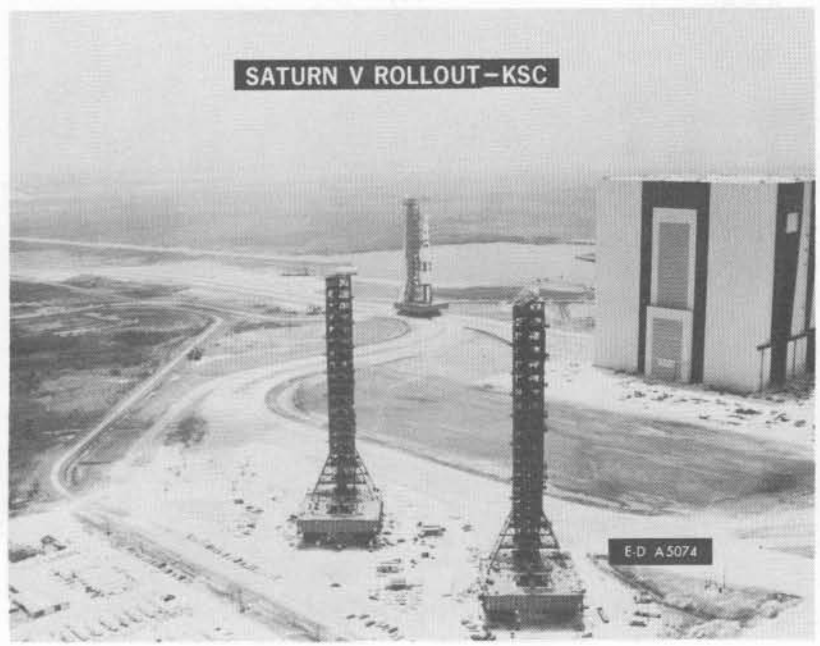
CRAWLER LEAVING V.A.B.-KSC



SATURN V ROLL OUT FROM VAB-KSC



SATURN V & MOBILE LAUNCHER ON CRAWLER EMERGING FROM V.A.B.-KSC

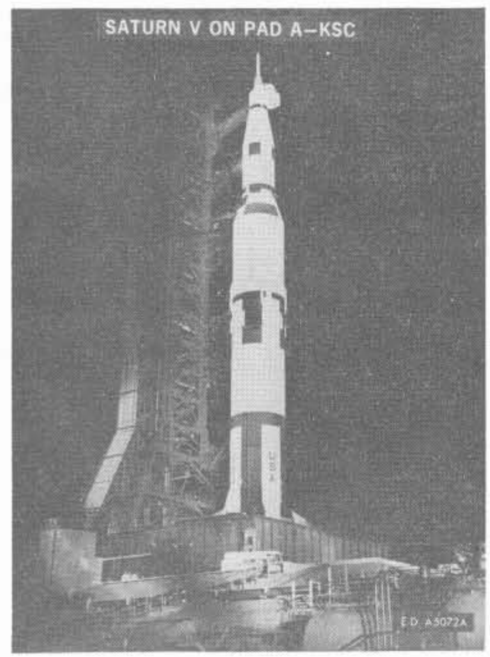


SATURN V ROLLOUT-KSC

SATURN V ON MOBILE LAUNCHER AND CRAWLER—KSC

HARD STAND AT AREA A COMPLEX 39—KSC

SATURN V ON PAD A RAMP—KSC

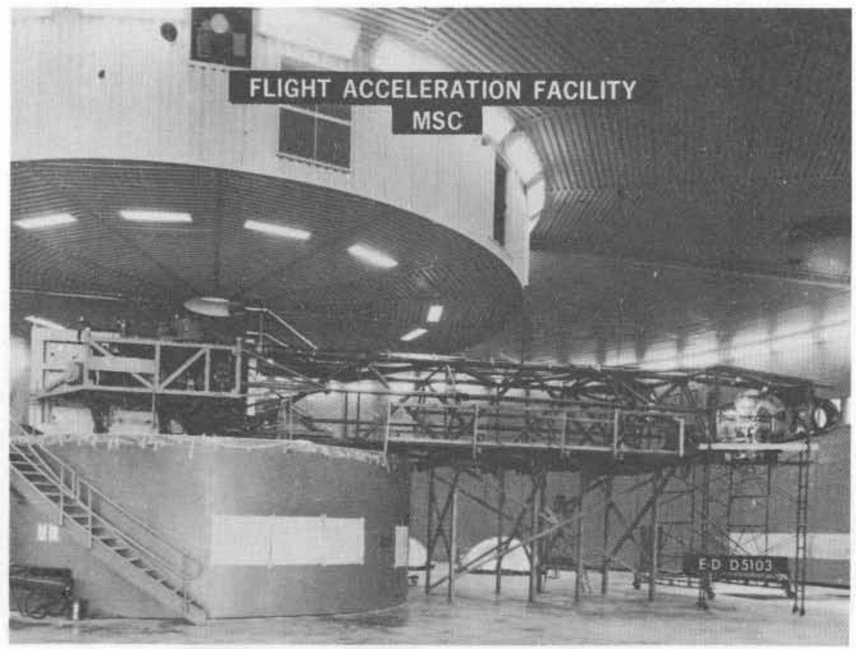


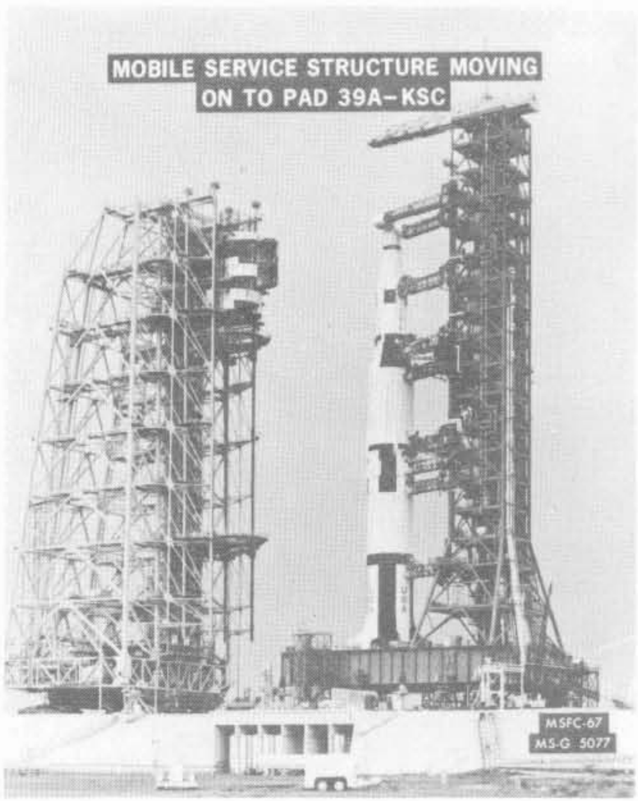
SATURN V ON PAD A—KSC

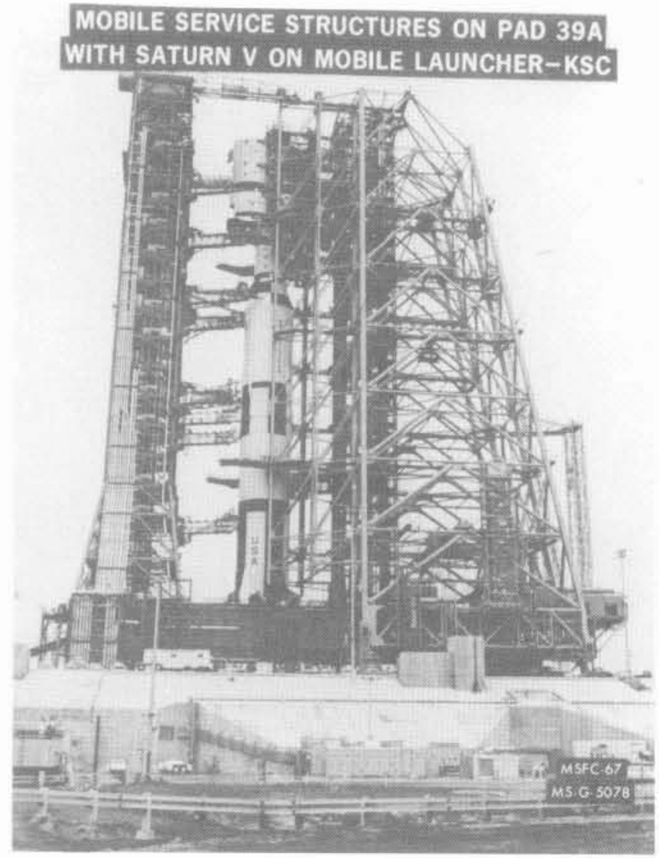

MSC AERIAL VIEW-HOUSTON
E-D B5100 B

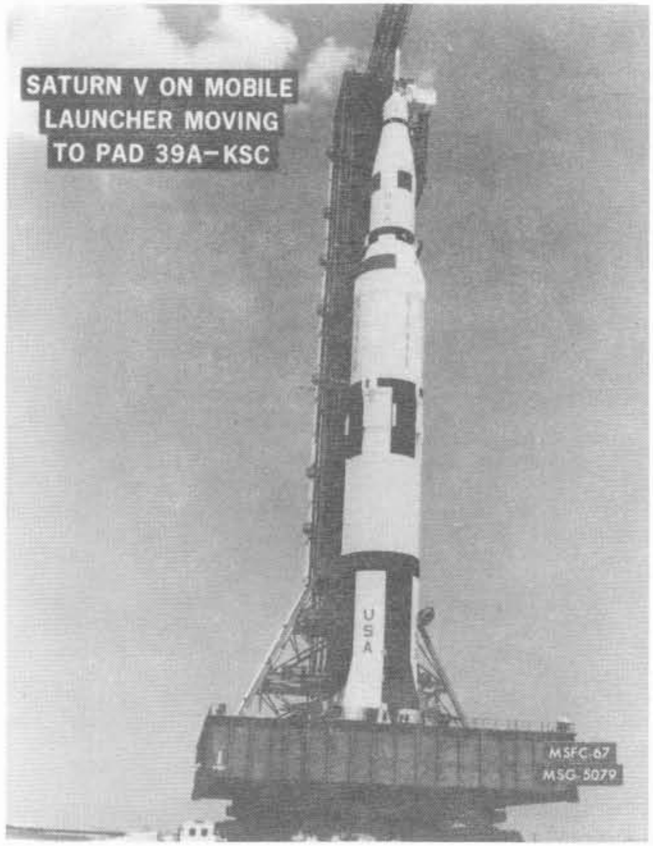

MISSION CONTROL CENTER
E-D D5101


MISSION CONTROL CENTER
MSC
E-D D5102


FLIGHT ACCELERATION FACILITY
MSC
E-D D5103


MOBILE SERVICE STRUCTURE MOVING
ON TO PAD 39A-KSC
MSFC-67
MS-G 5077


MOBILE SERVICE STRUCTURES ON PAD 39A
WITH SATURN V ON MOBILE LAUNCHER-KSC
MSFC-67
MS-G 5078


SATURN V ON MOBILE LAUNCHER MOVING TO PAD 39A-KSC
USA
MSFC-67
MSG-5079

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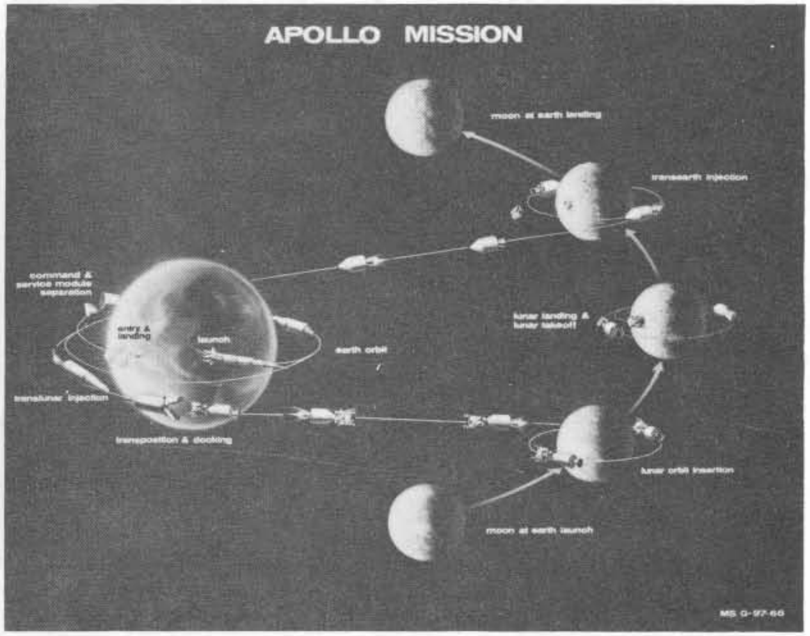
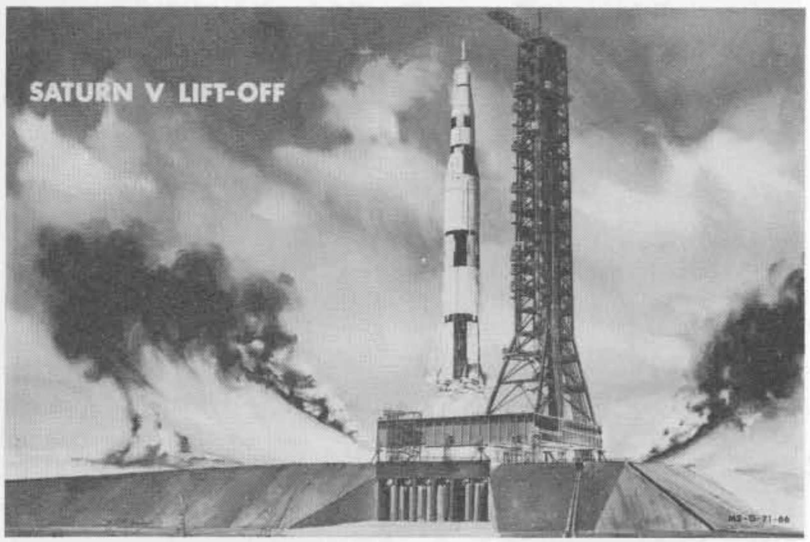
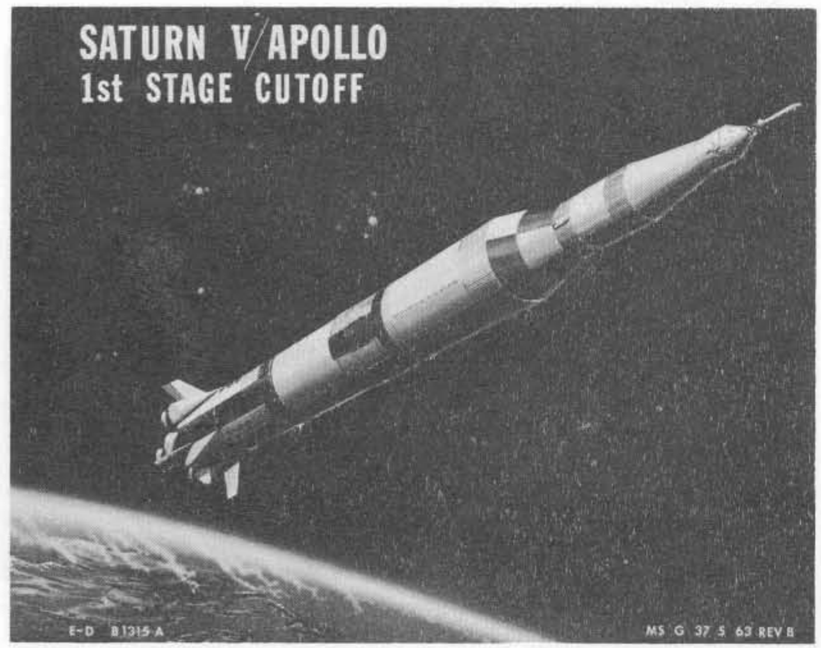
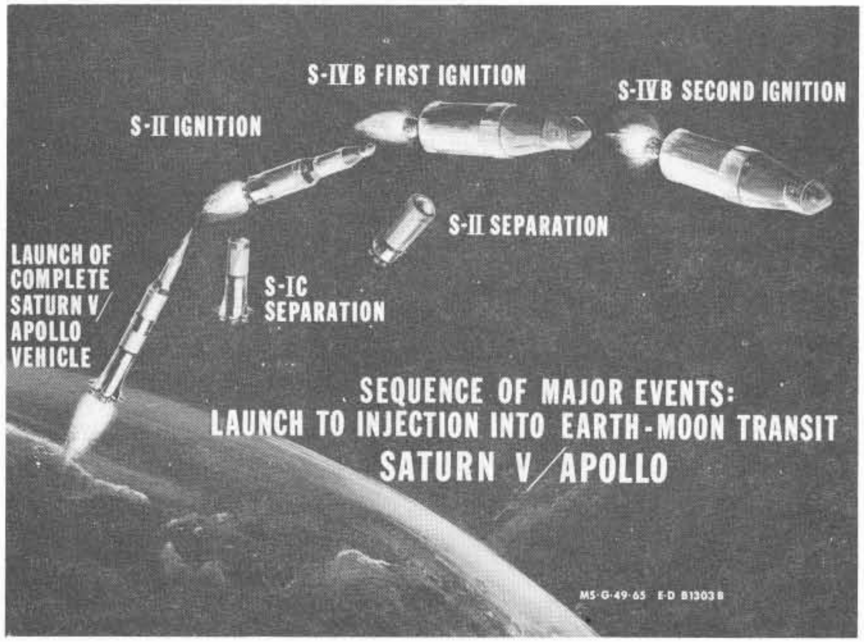
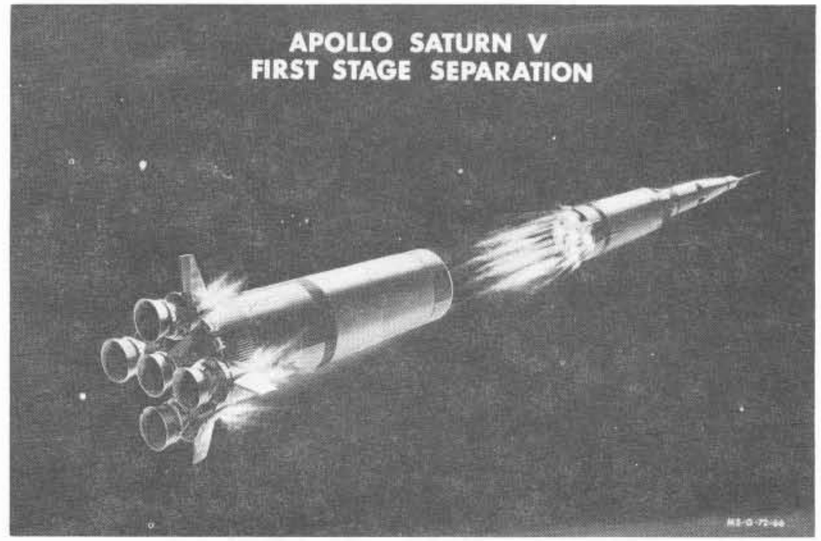

APOLLO MISSION
moon at earth landing
transearth injection
command &
service module
separation
entry &
landing
launch
earth orbit
lunar landing &
lunar takeoff
translunar injection
transposition & docking
lunar orbit insertion
moon at earth launch
MS G-97-66

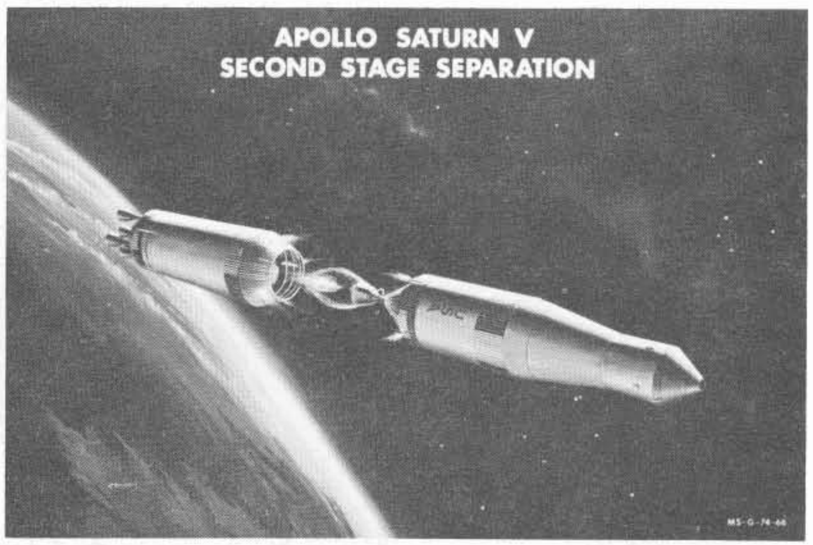

ASTRONAUTS ENTER COMMAND MODULE

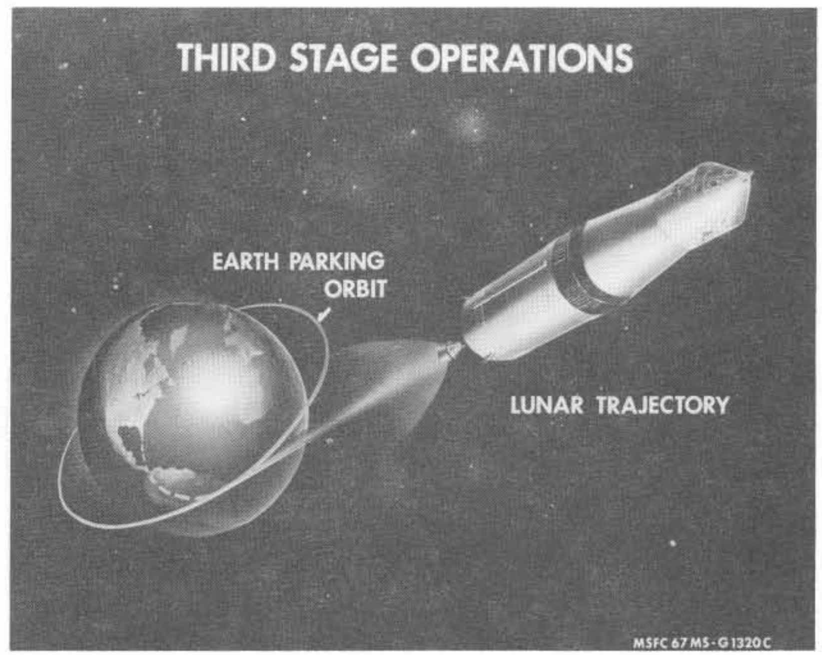

SATURN V LIFT-OFF


SATURN V/APOLLO
1st STAGE CUTOFF
E-D B1315-A
MS G 37 5 63 REV B

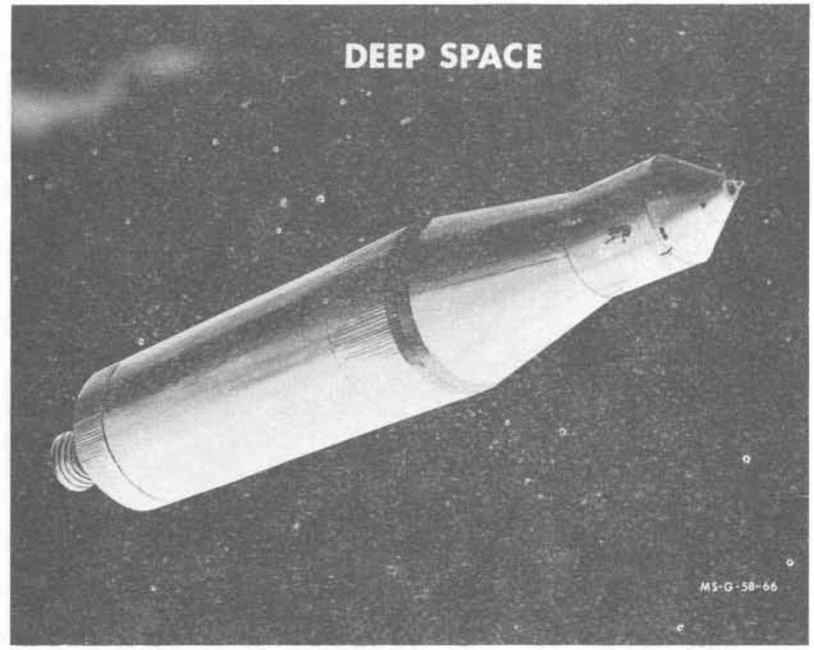

S-IVB FIRST IGNITION
S-IVB SECOND IGNITION
S-II IGNITION
S-II SEPARATION
LAUNCH OF COMPLETE SATURN V/ APOLLO VEHICLE
S-IC SEPARATION
SEQUENCE OF MAJOR EVENTS:
LAUNCH TO INJECTION INTO EARTH-MOON TRANSIT
SATURN V/APOLLO
MS-G-49-65 E-D B1303B

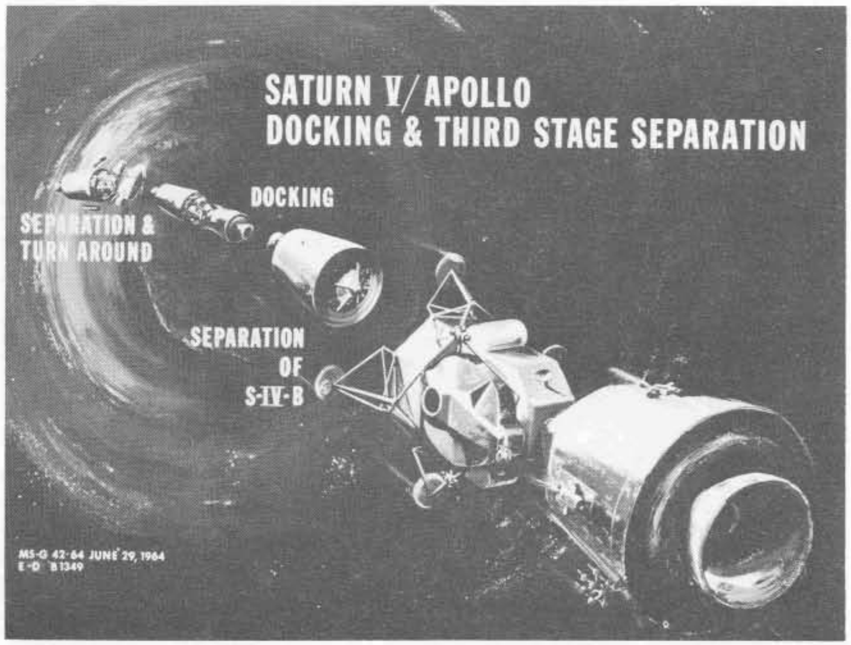

APOLLO SATURN V
FIRST STAGE SEPARATION


APOLLO SATURN V
SECOND STAGE SEPARATION

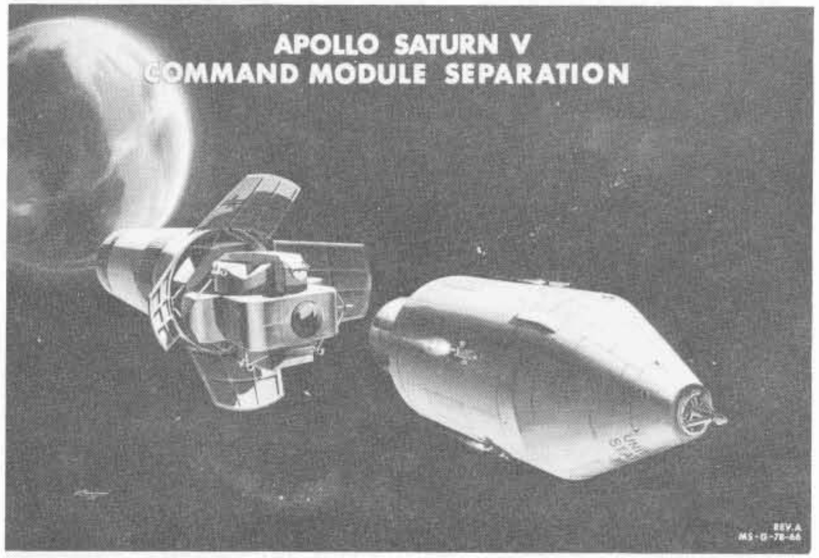

THIRD STAGE OPERATIONS
EARTH PARKING ORBIT
LUNAR TRAJECTORY
MSFC 67 MS-G1320C

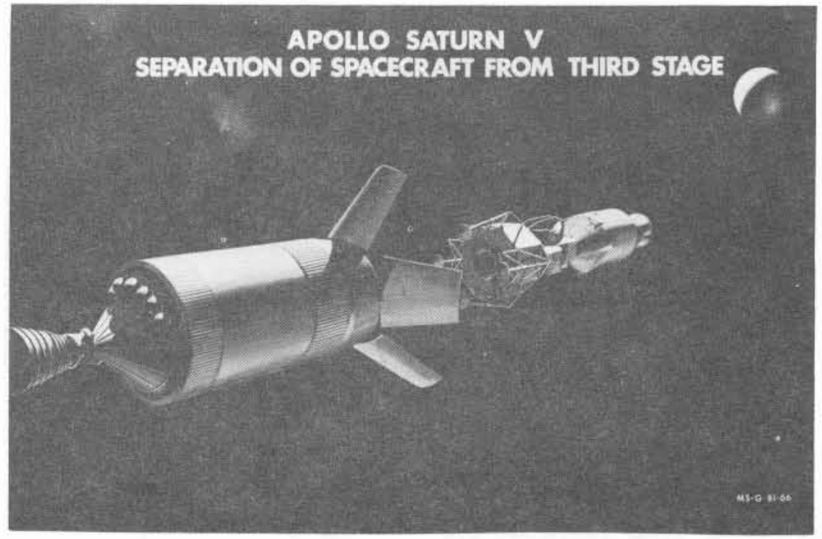

EARTH PARKING ORBIT
USA
MS-G 44-66

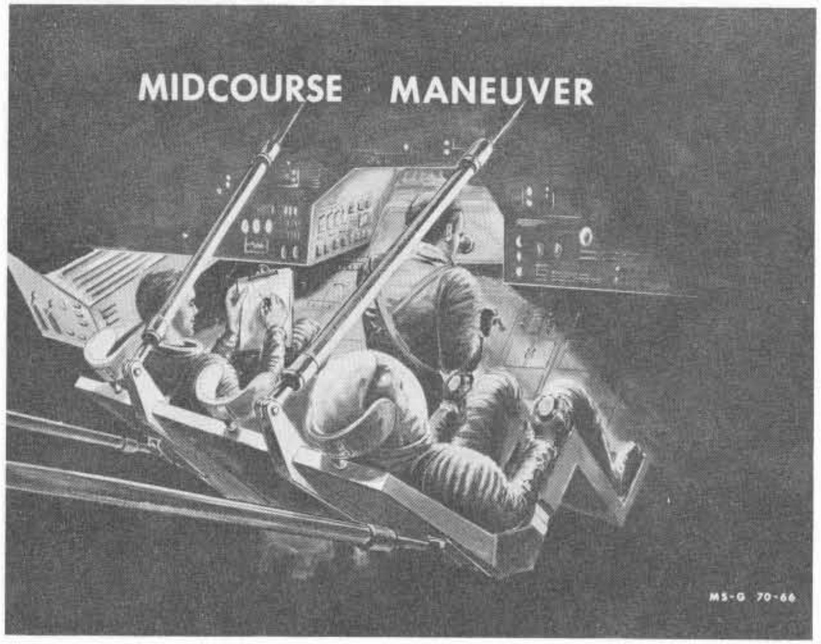

DEEP SPACE
MS-G-58-66

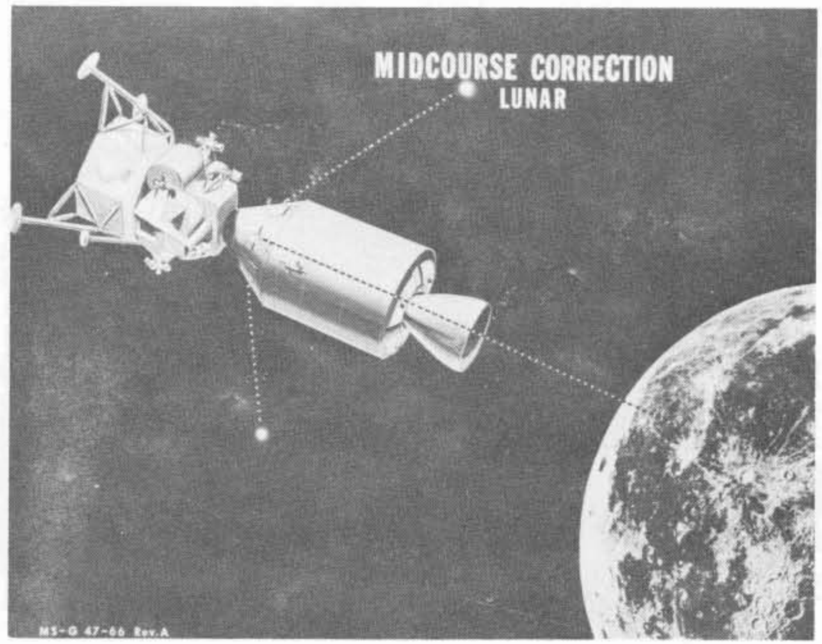

SATURN V/APOLLO
DOCKING & THIRD STAGE SEPARATION
DOCKING
SEPARATION & TURN AROUND
SEPARATION OF S-IV-B
MS-G 42-64 JUNE 29, 1964
E-D B1349

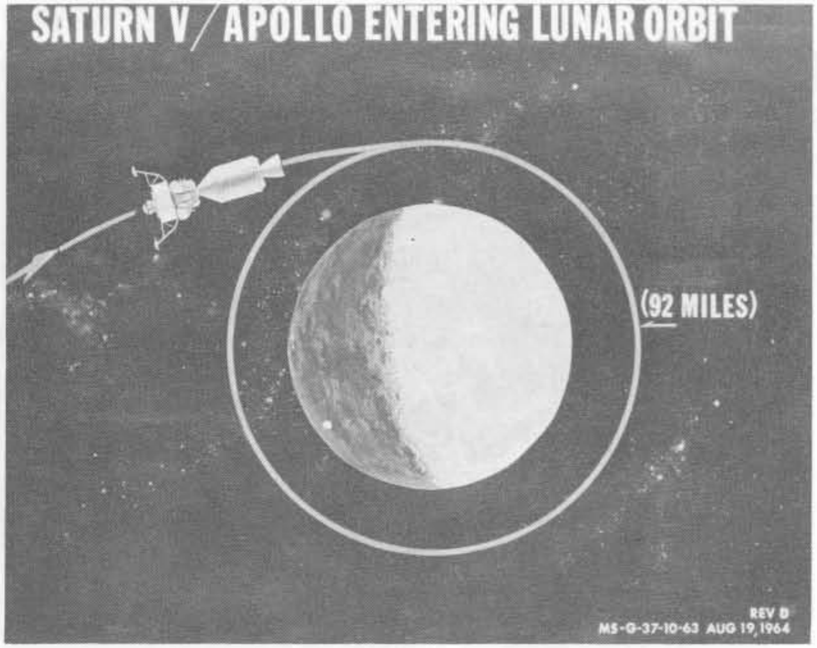

SATURN-V/APOLLO
DOCKING IN TRANSIT
REV D
E-D A1304C
MS-G-37-9-63

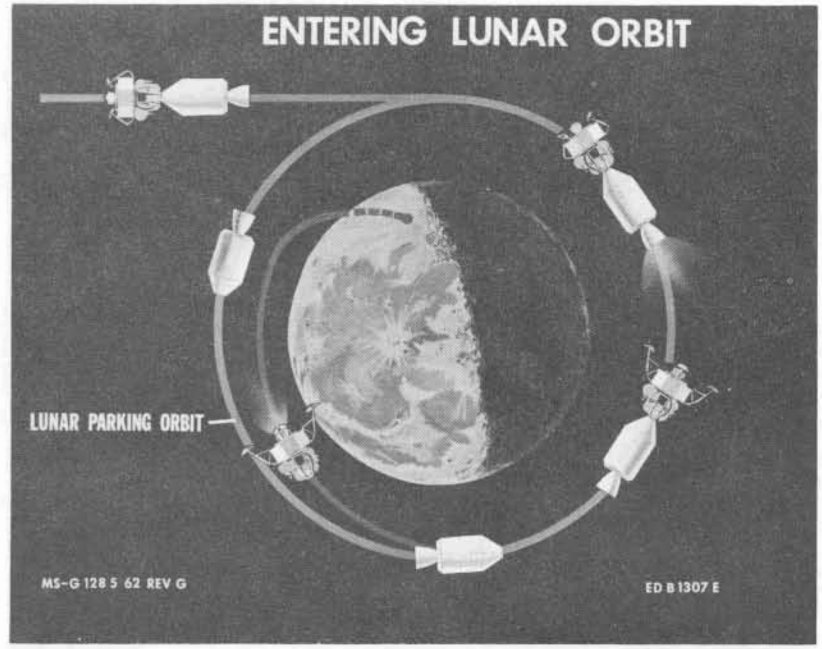

APOLLO SATURN V
COMMAND MODULE SEPARATION
REV. A

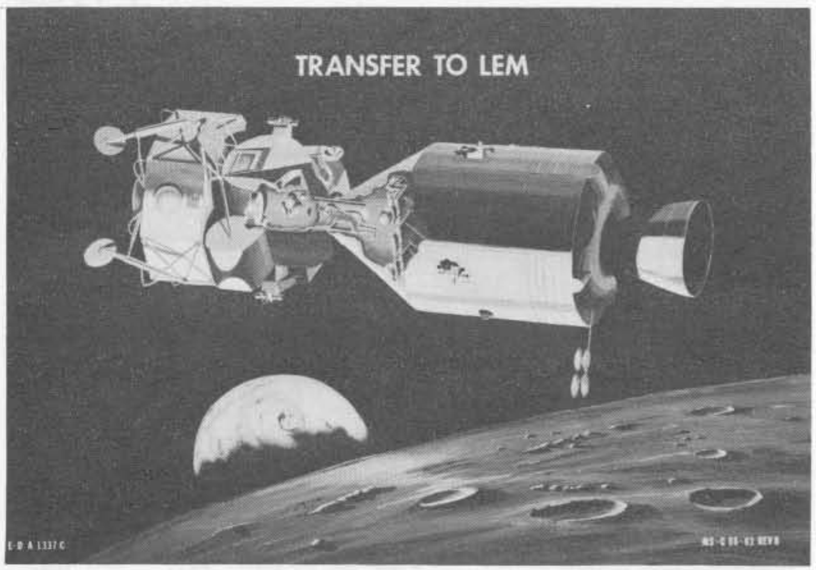

APOLLO SATURN V
SEPARATION OF SPACECRAFT FROM THIRD STAGE


MIDCOURSE MANEUVER
MS-G 70-66

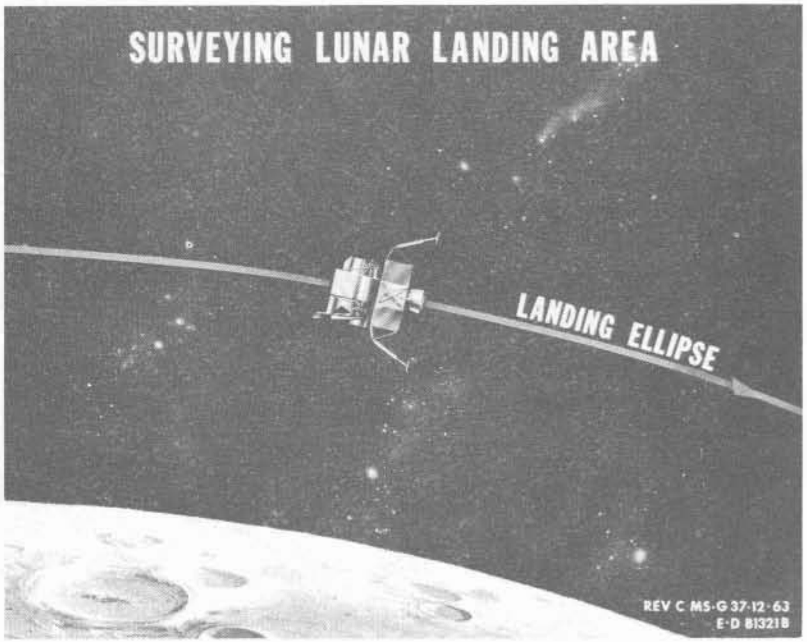

MIDCOURSE CORRECTION
LUNAR
MS-G 47-66 Rev.A

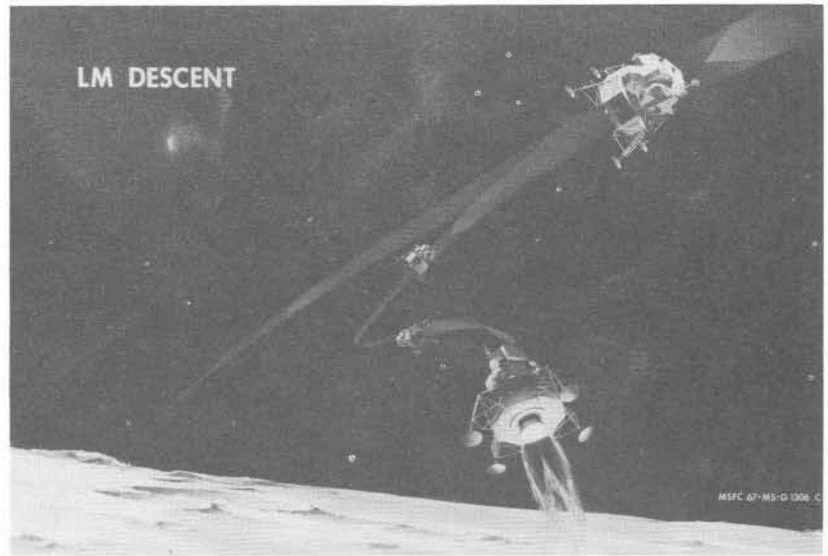

SATURN V/APOLLO ENTERING LUNAR ORBIT
(92 MILES)
REV D
MS-G-37-10-63 AUG 19, 1964


ENTERING LUNAR ORBIT
LUNAR PARKING ORBIT
MS-G 128 5 62 REV G
ED B 1307 E

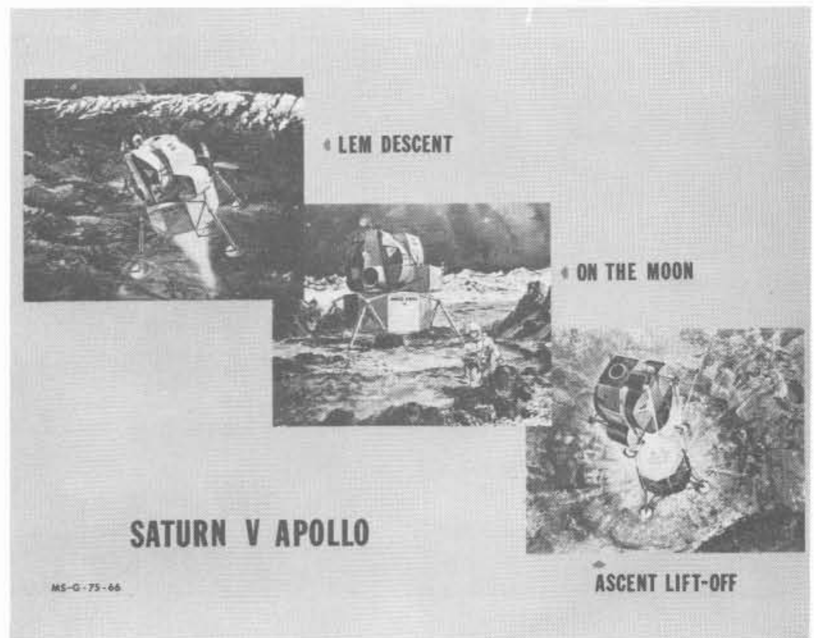

TRANSFER TO LEM

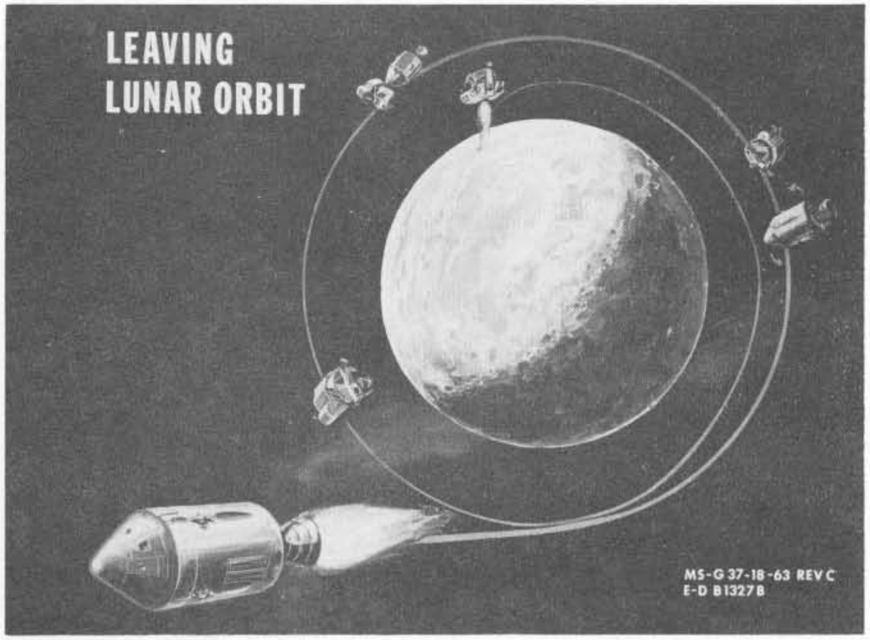

SATURN V/APOLLO
LEM INTERIOR
AY 12, 1965 E-D B1324B

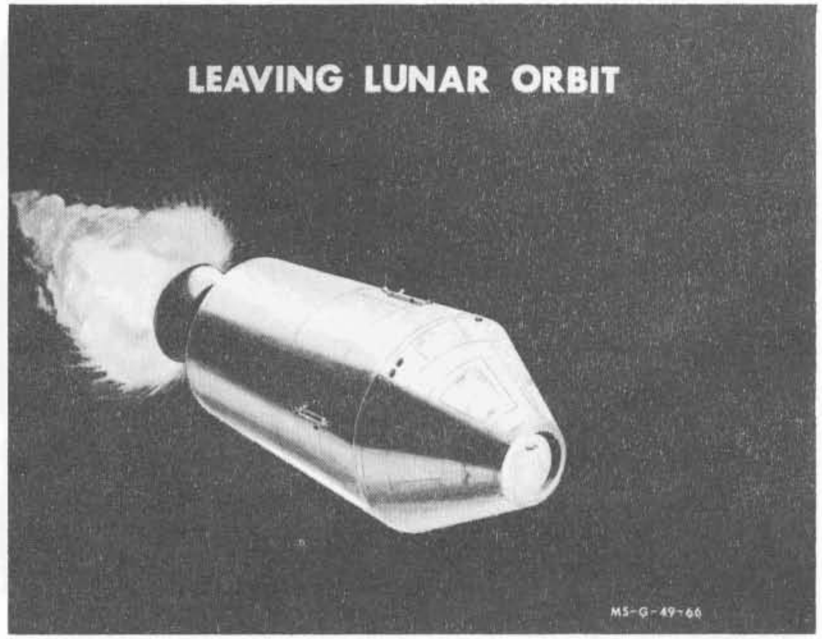

SURVEYING LUNAR LANDING AREA
LANDING ELLIPSE
REV C MS-G 37-12-63
E-D 81321B

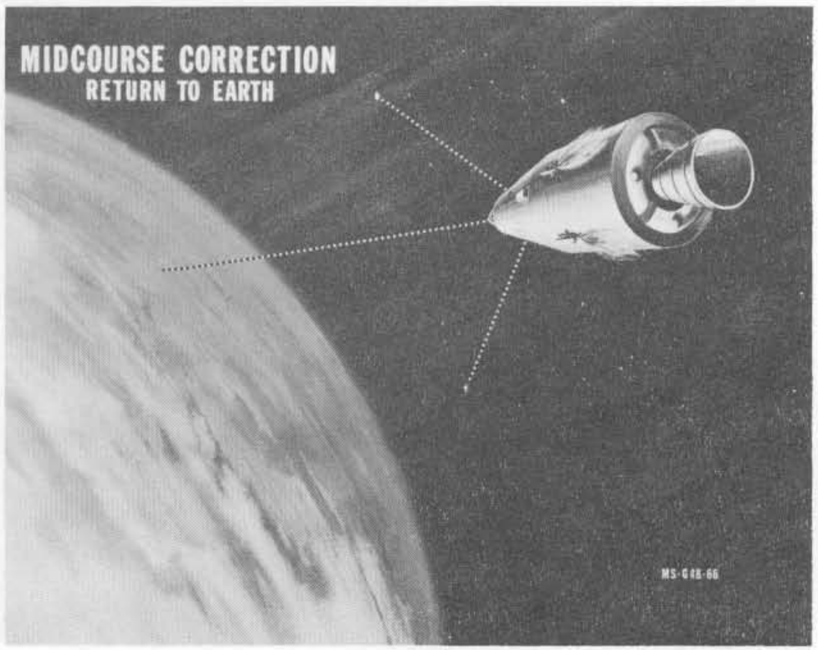

LM DESCENT

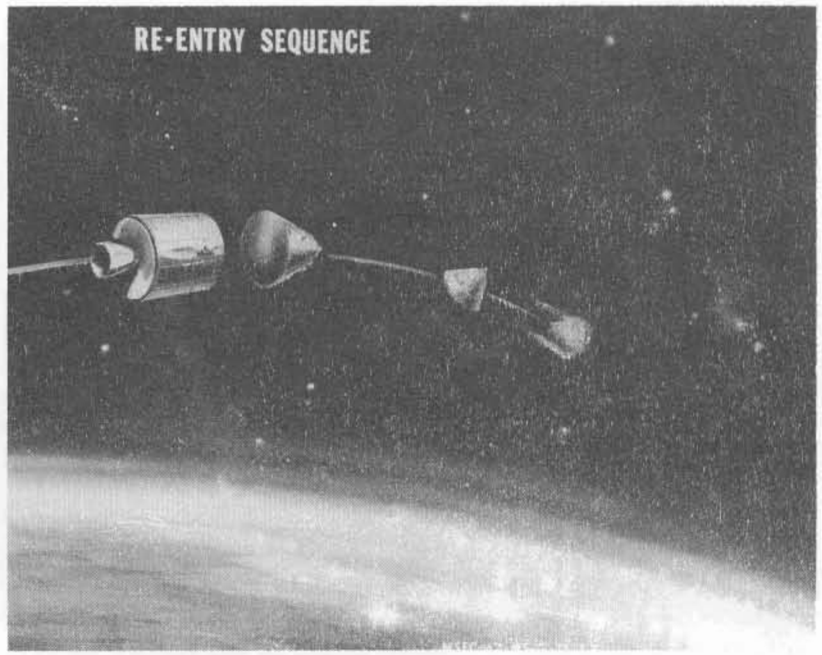

LUNAR LANDING MANEUVER
MS-G-37-14-63 REV D

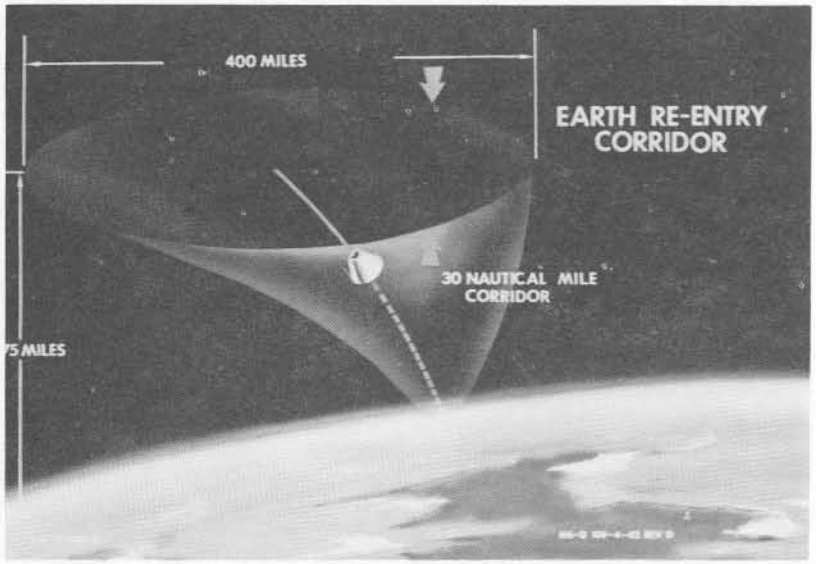

LEM DESCENT
ON THE MOON
ASCENT LIFT-OFF
SATURN V APOLLO
MS-G-75-66

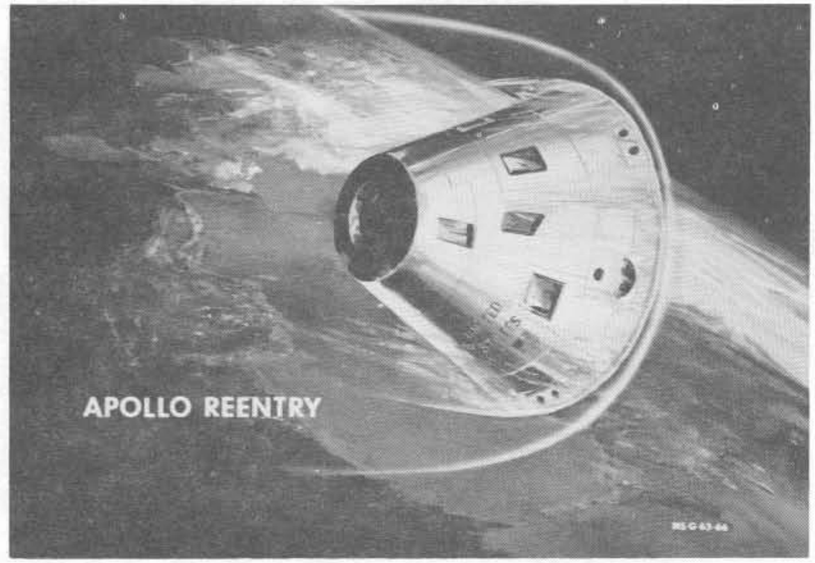

LEAVING
LUNAR ORBIT
MS-G 37-18-63 REV C
E-D B1327B

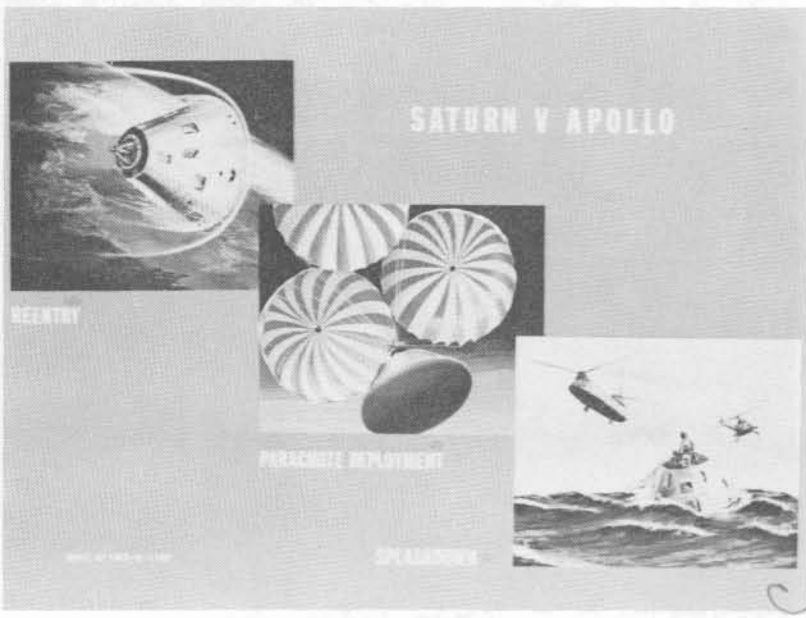

LEAVING LUNAR ORBIT
MS-G-49-66

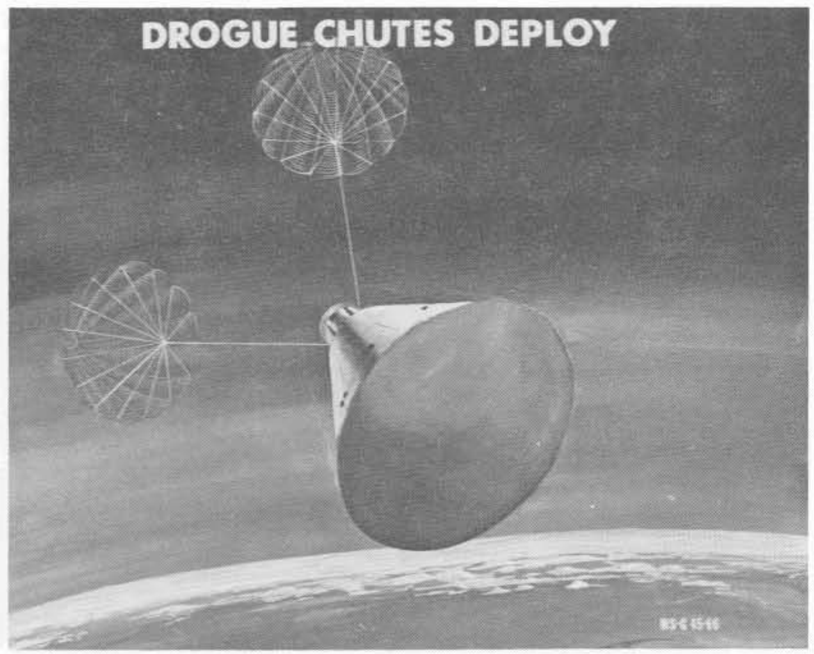

MIDCOURSE CORRECTION
RETURN TO EARTH


RE-ENTRY SEQUENCE


400 MILES
EARTH RE-ENTRY CORRIDOR
30 NAUTICAL MILE CORRIDOR
75 MILES

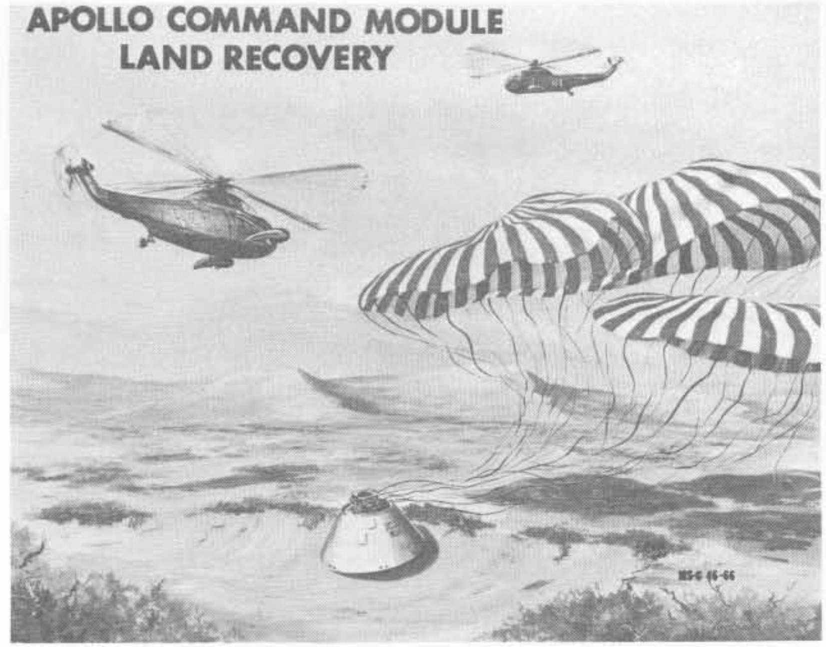

APOLLO REENTRY


SATURN V APOLLO
REENTRY
PARACHUTE DEPLOYMENT
SPLASHDOWN

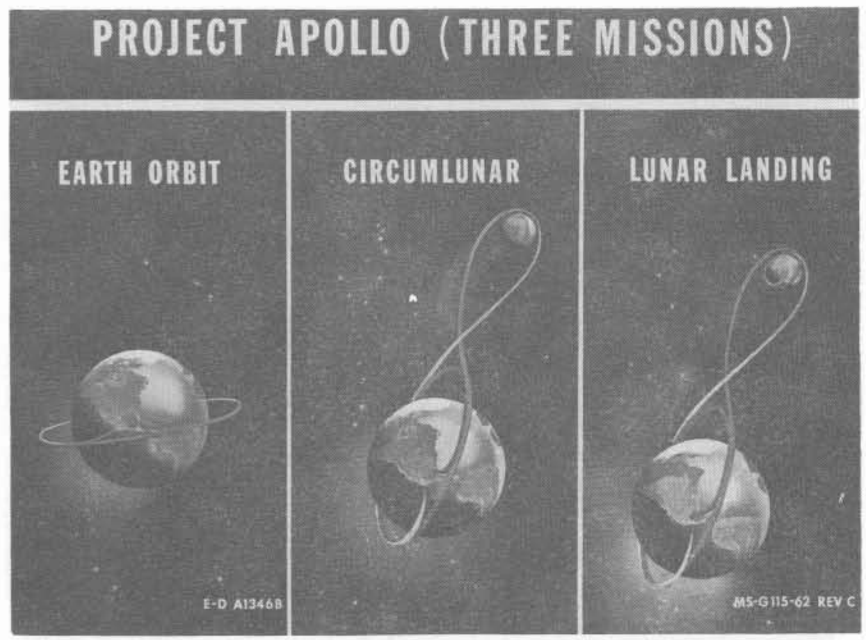

DROGUE CHUTES DEPLOY

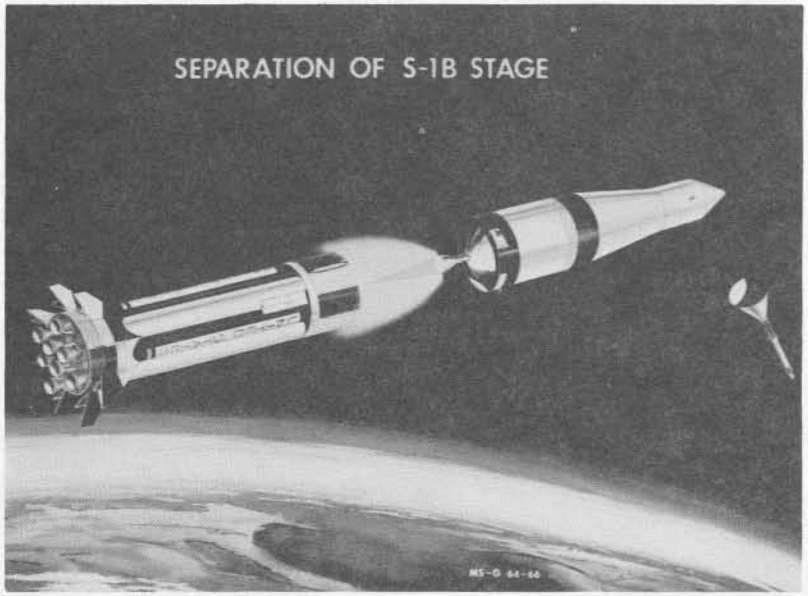

APOLLO SEA RECOVERY

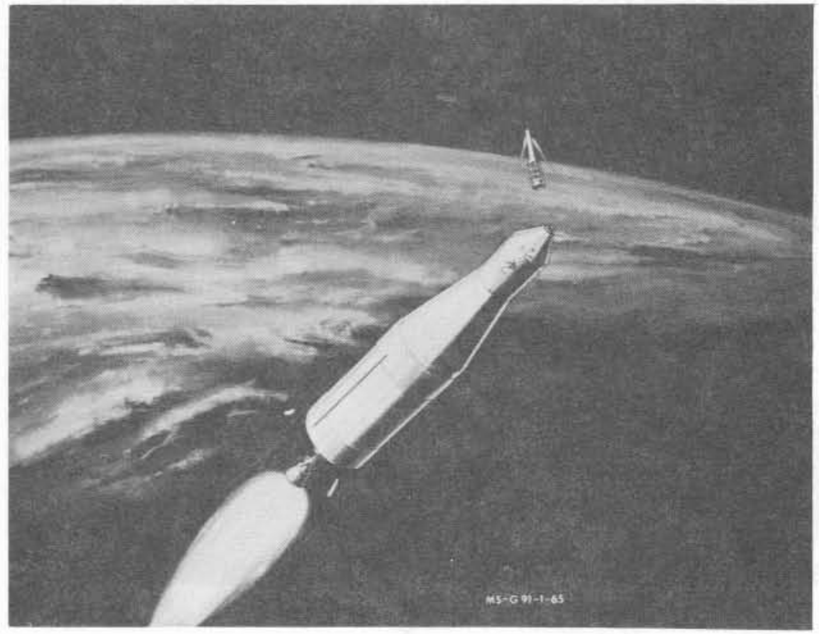
a

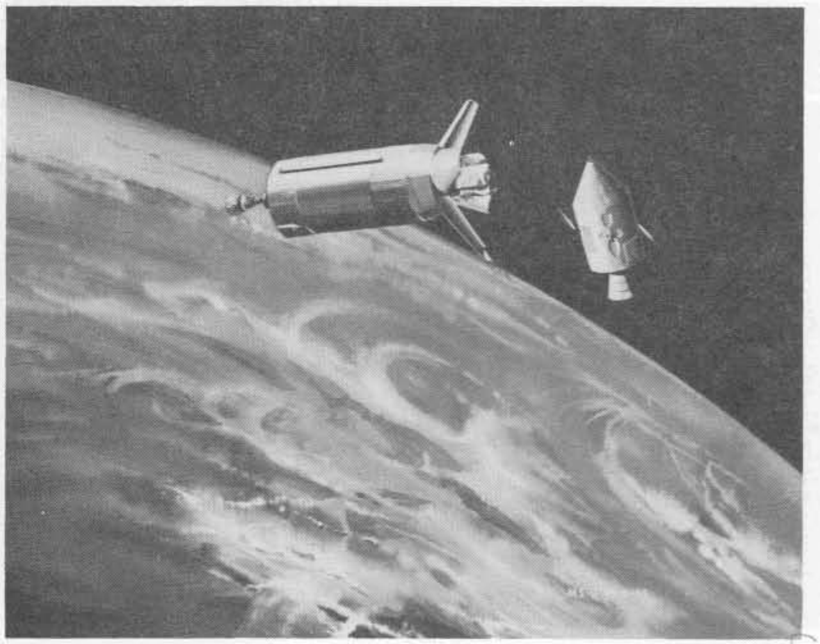

APOLLO COMMAND MODULE
LAND RECOVERY

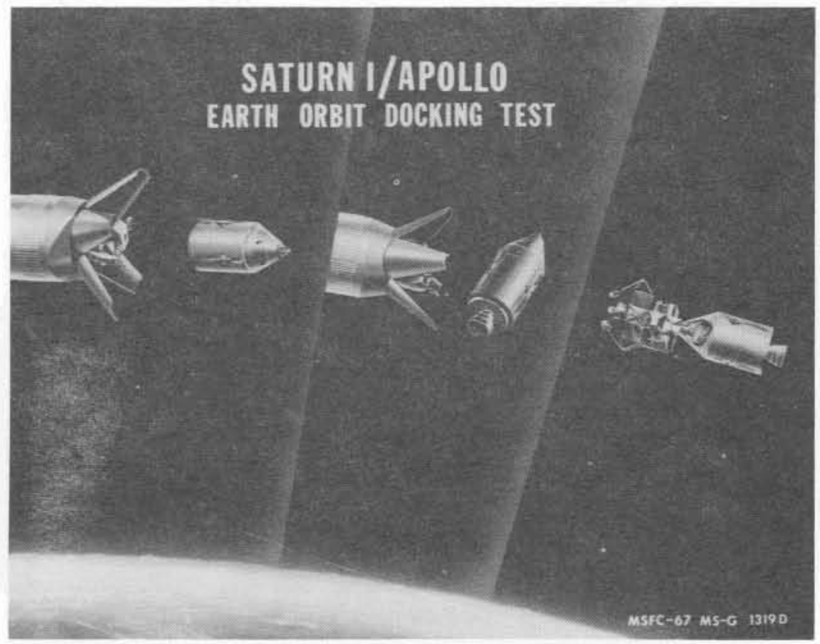

APOLLO-EARTH LANDING

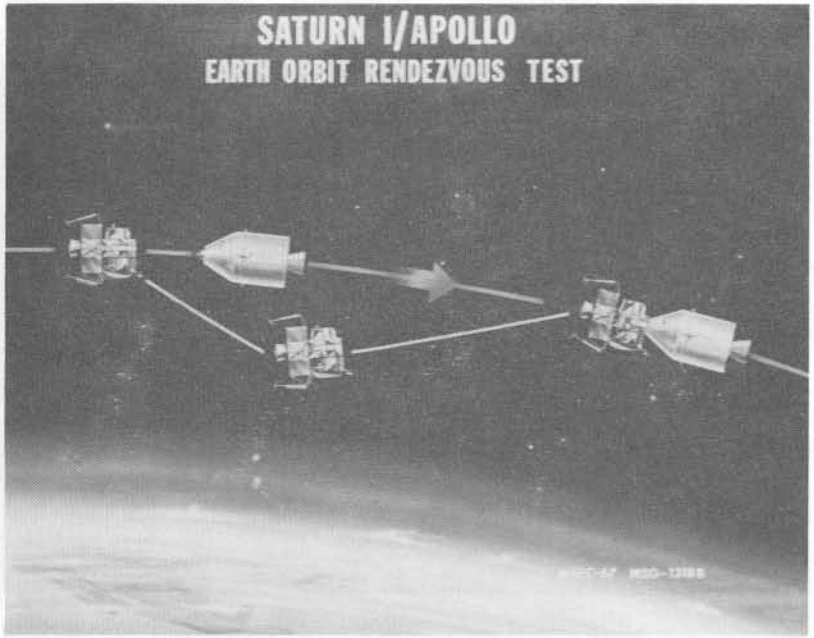

PROJECT APOLLO (THREE MISSIONS)
EARTH ORBIT
CIRCUMLUNAR
LUNAR LANDING
E-D A1346B
MS-G115-62 REV C

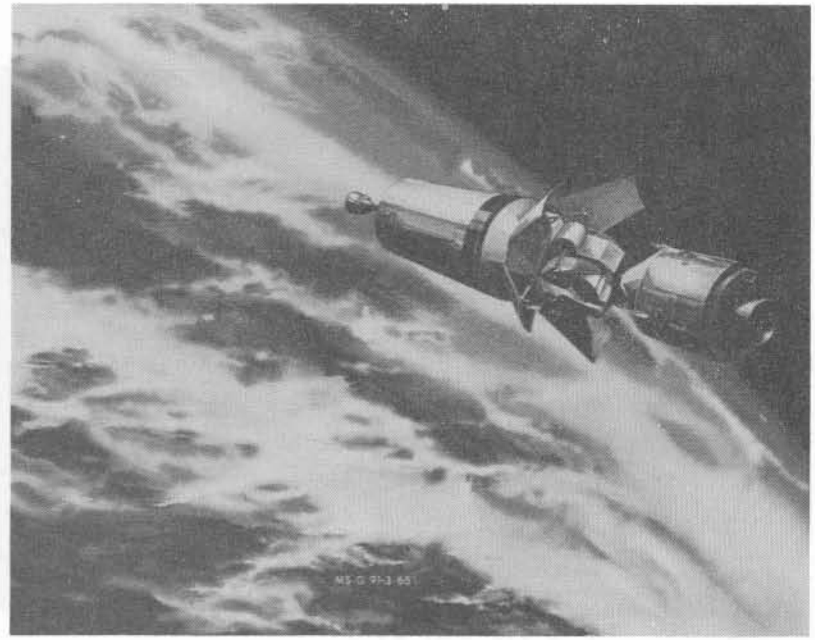

SEPARATION OF S-1B STAGE
MS-G 64-66

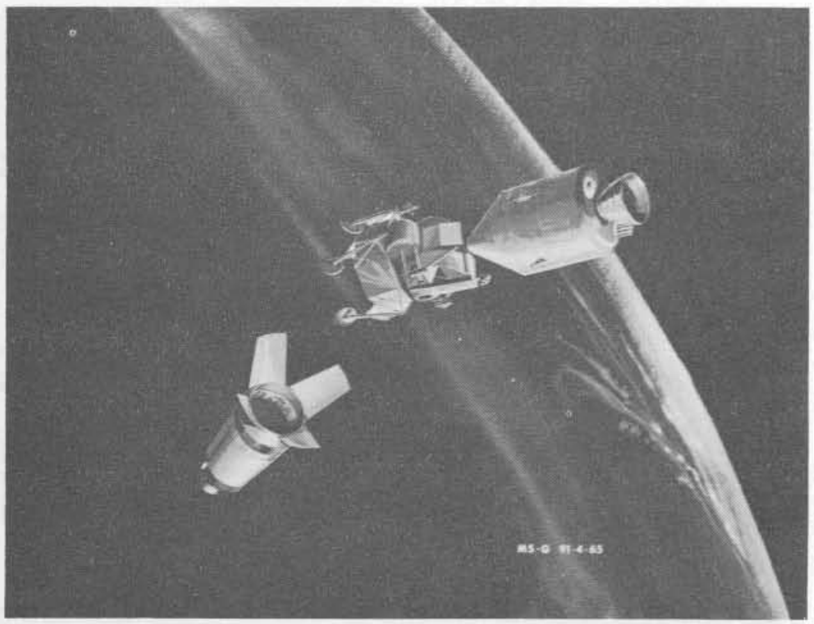

MS-G 91-1-65

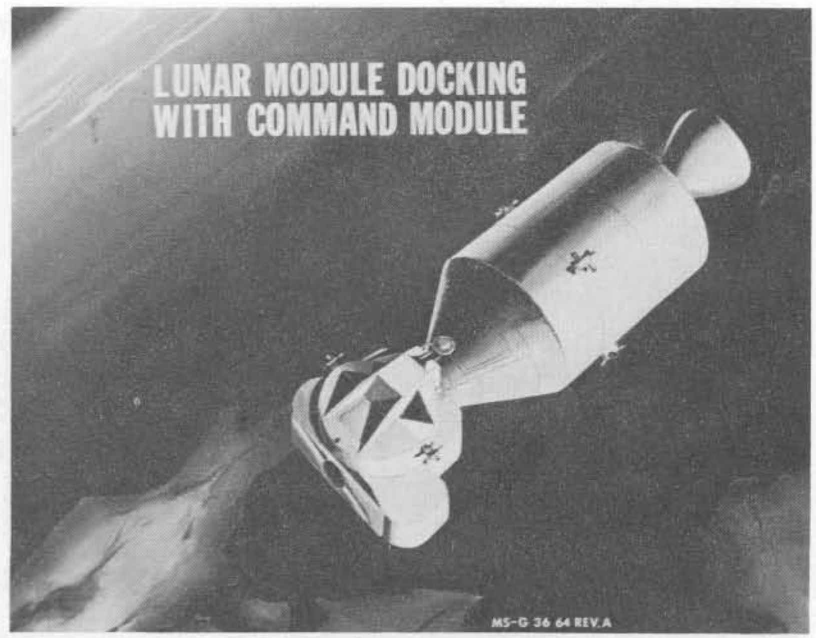


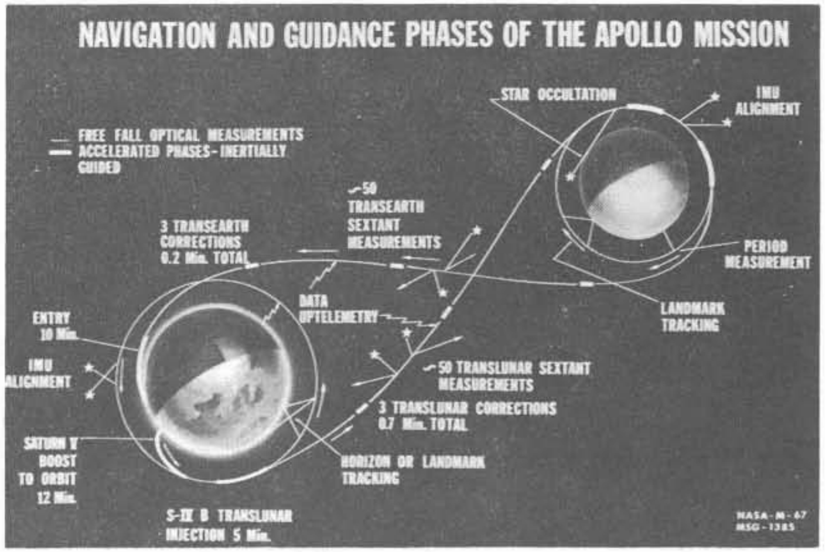

SATURN I/APOLLO
EARTH ORBIT DOCKING TEST
MSFC-67 MS-G 1319D

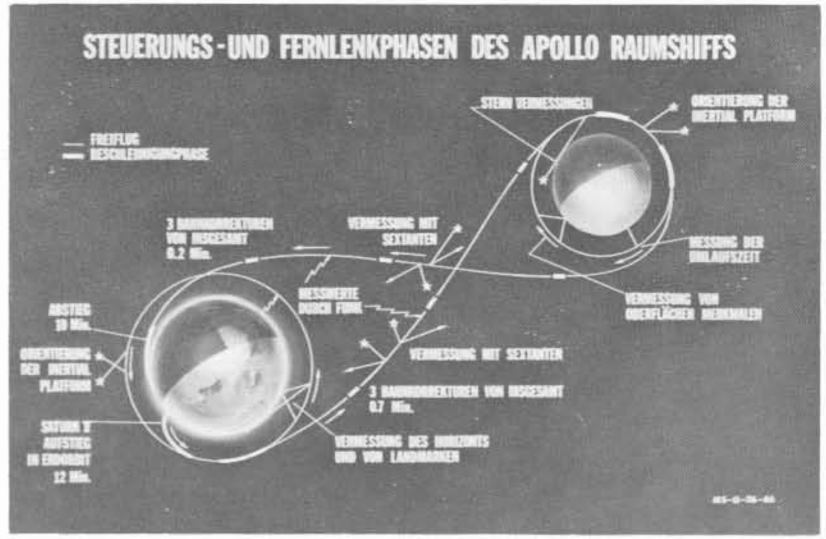

SATURN I/APOLLO
EARTH ORBIT RENDEZVOUS TEST



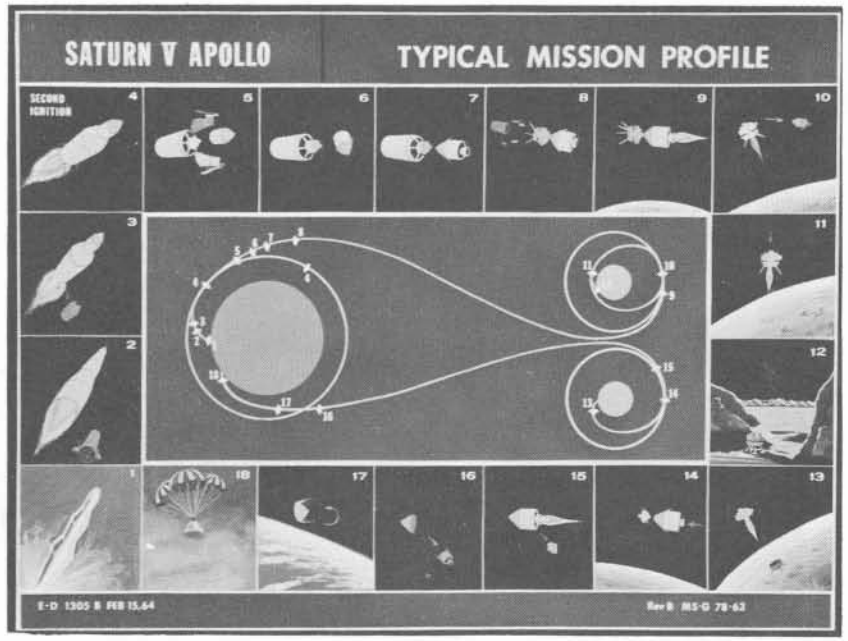

MS-G 91-4-65

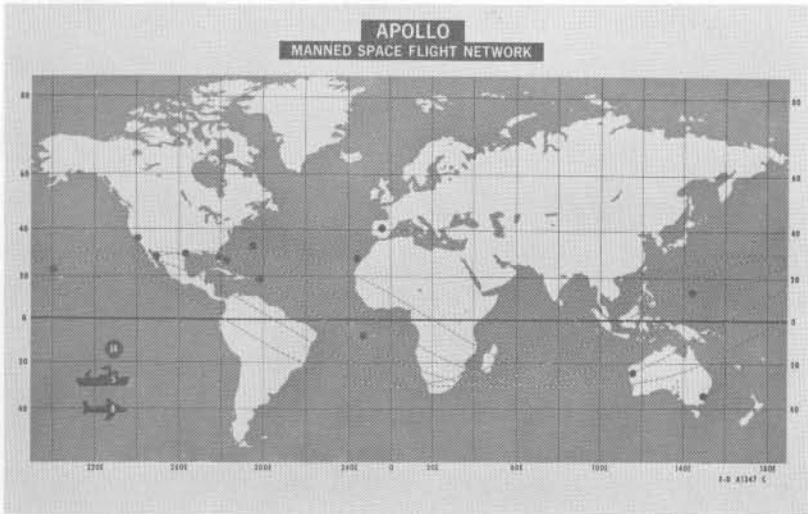

LUNAR MODULE DOCKING
WITH COMMAND MODULE
MS-G 36 64 REV.A

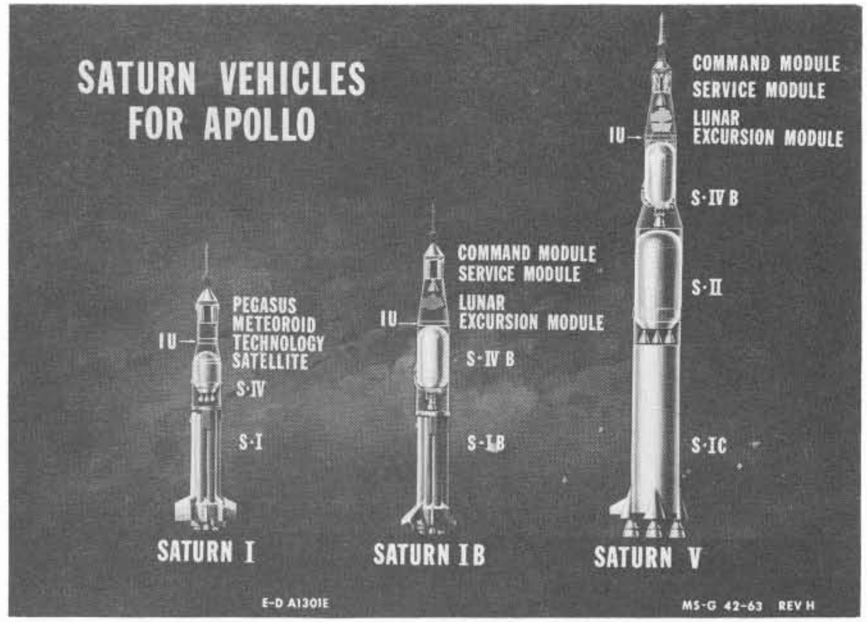

NAVIGATION AND GUIDANCE PHASES OF THE APOLLO MISSION
FREE FALL OPTICAL MEASUREMENTS
ACCELERATED PHASES-INERTIALLY GUIDED
STAR OCCULTATION
IMU ALIGNMENT
~50 TRANSEARTH SEXTANT MEASUREMENTS
3 TRANSEARTH CORRECTIONS 0.2 Min. TOTAL
PERIOD MEASUREMENT
DATA UPTELEMETRY
LANDMARK TRACKING
ENTRY 10 Min.
IMU ALIGNMENT
~50 TRANSLUNAR SEXTANT MEASUREMENTS
3 TRANSLUNAR CORRECTIONS 0.7 Min. TOTAL
SATURN V BOOST TO ORBIT 12 Min.
HORIZON OR LANDMARK TRACKING
S-IV B TRANSLUNAR INJECTION 5 Min.
NASA-M-67
MSG-1385

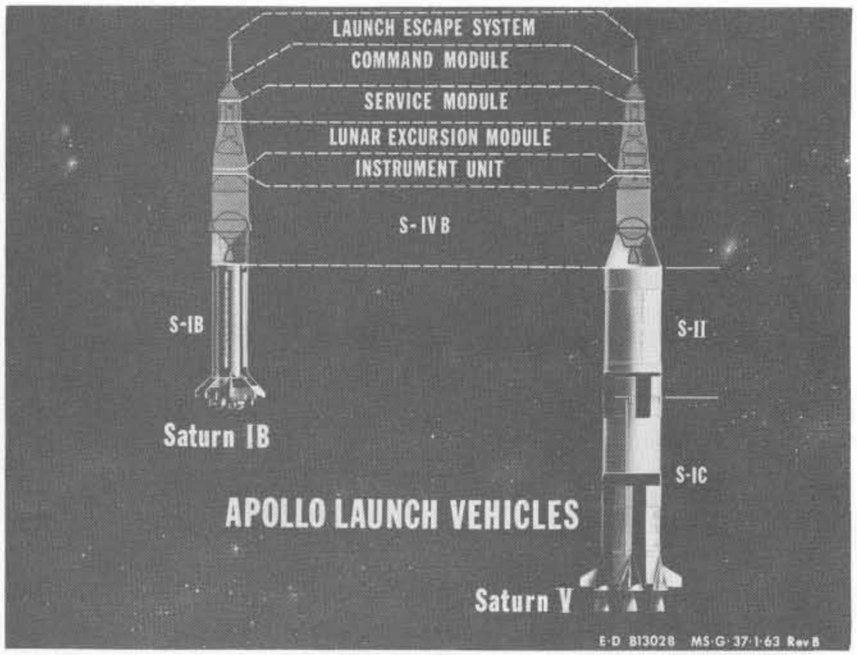

STEUERUNGS-UND FERNLENKPHASEN DES APOLLO RAUMSHIFFS
FREIFLUG
VERMESSUNG MIT SEXTANTEN
ABSTIEG 10 Min.
VERMESSUNG MIT SEXTANTEN
SATURN V AUFSTIEG IN ERDORBIT 12 Min.

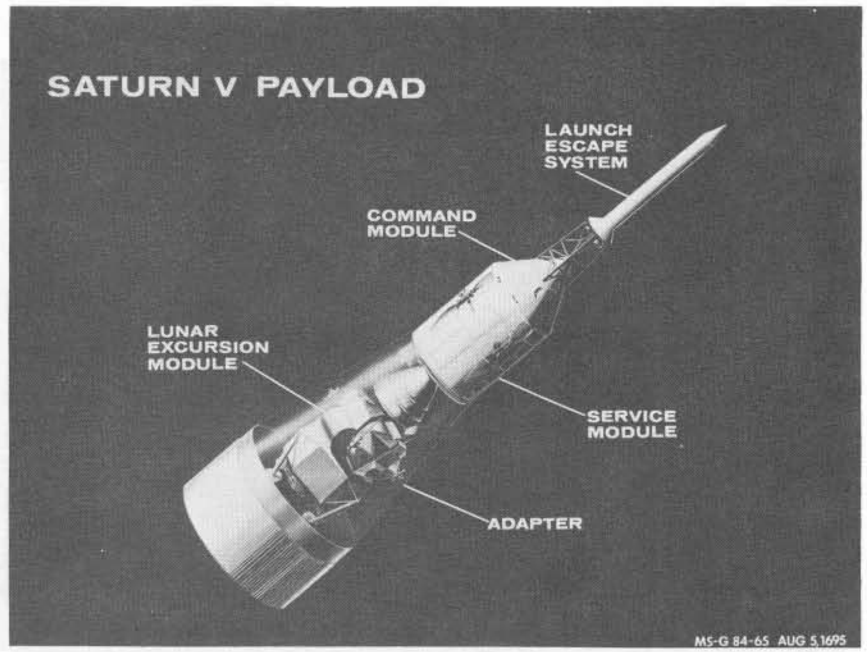

LUNAR ORBIT RENDEZVOUS MISSION
1. EARTH LAUNCH
2. 2nd STAGE IGNITION
3. 3rd STAGE FIRST IGNITION
4. 3rd STAGE FIRST CUTOFF
5. 3rd STAGE SECOND IGNITION
6. 3rd STAGE CUTOFF END OF LAUNCH VEHICLE FLIGHT
MS-G 7-7-64 REV. A
MAY 15,1964 E-D A1345A

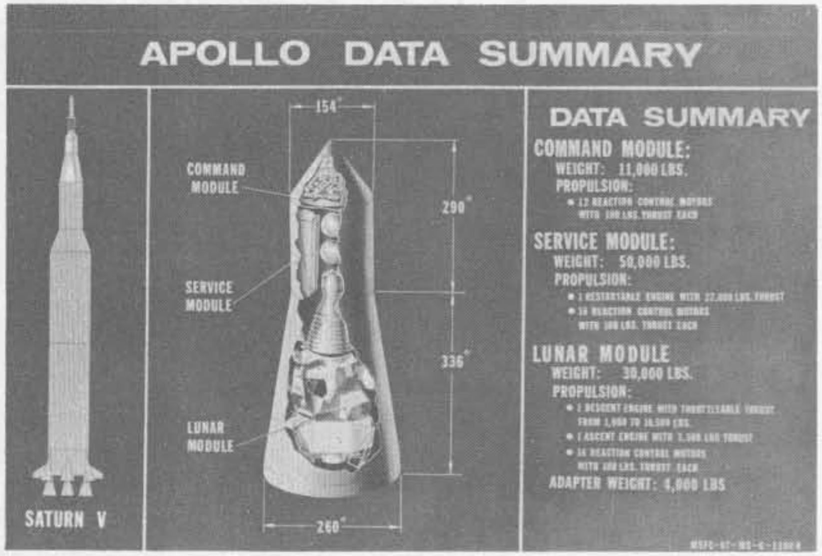

SATURN V APOLLO
TYPICAL MISSION PROFILE
SECOND IGNITION

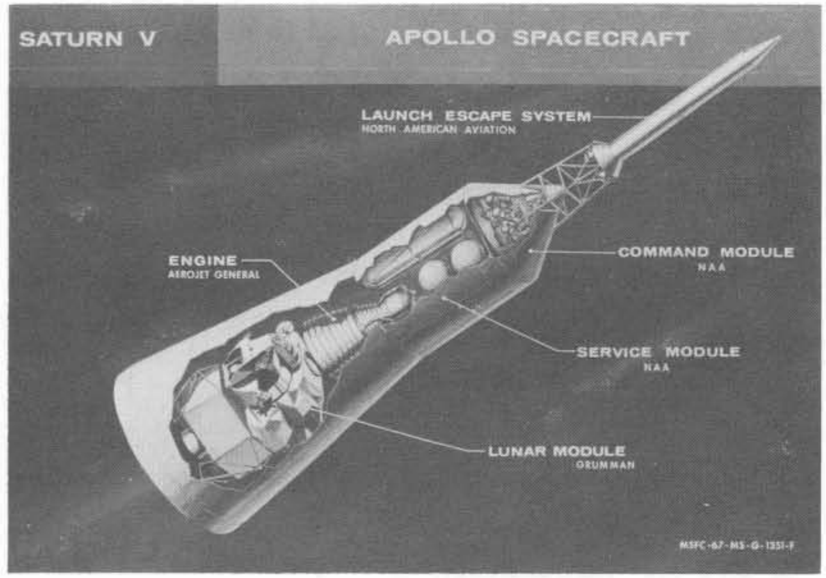

APOLLO
MANNED SPACE FLIGHT NETWORK


SATURN VEHICLES FOR APOLLO
PEGASUS METEOROID TECHNOLOGY SATELLITE
IU
S-IV
S-I
SATURN I
COMMAND MODULE
SERVICE MODULE
LUNAR EXCURSION MODULE
IU
S-IV B
S-IB
SATURN IB
COMMAND MODULE
SERVICE MODULE
LUNAR EXCURSION MODULE
IU
S-IV B
S-II
S-IC
SATURN V
E-D A1301E
MS-G 42-63 REV H

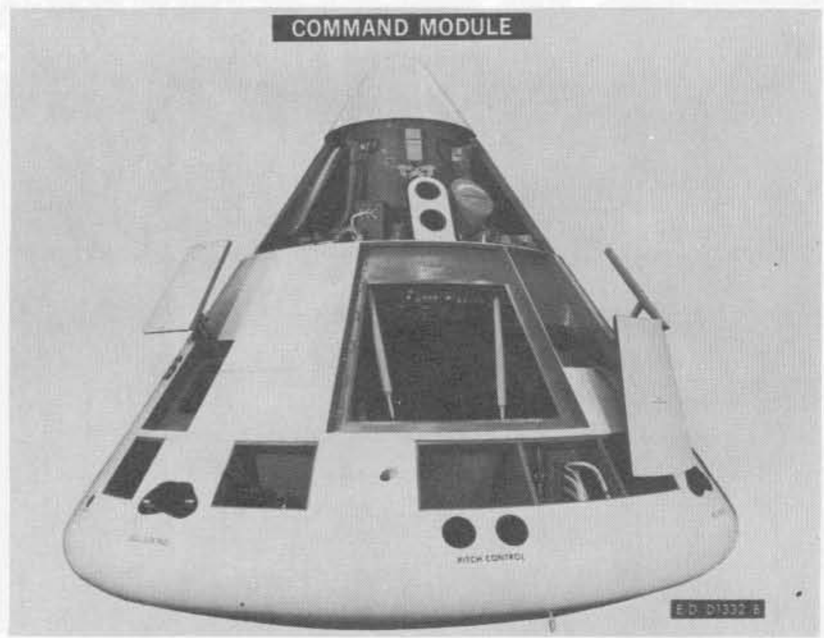

LAUNCH ESCAPE SYSTEM
COMMAND MODULE
SERVICE MODULE
LUNAR EXCURSION MODULE
INSTRUMENT UNIT
S-IVB
S-IB
S-II
S-IC
Saturn IB
APOLLO LAUNCH VEHICLES
Saturn V
E-D B13028 MS-G-37-1-63 Rev B

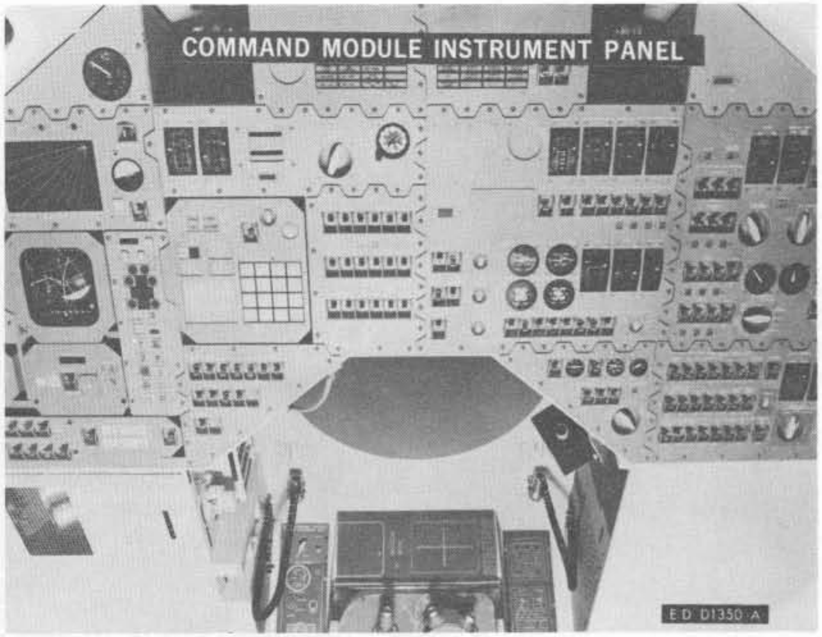

SATURN V PAYLOAD
LAUNCH ESCAPE SYSTEM
COMMAND MODULE
LUNAR EXCURSION MODULE
SERVICE MODULE
ADAPTER
MS-G 84-65 AUG 5,1695

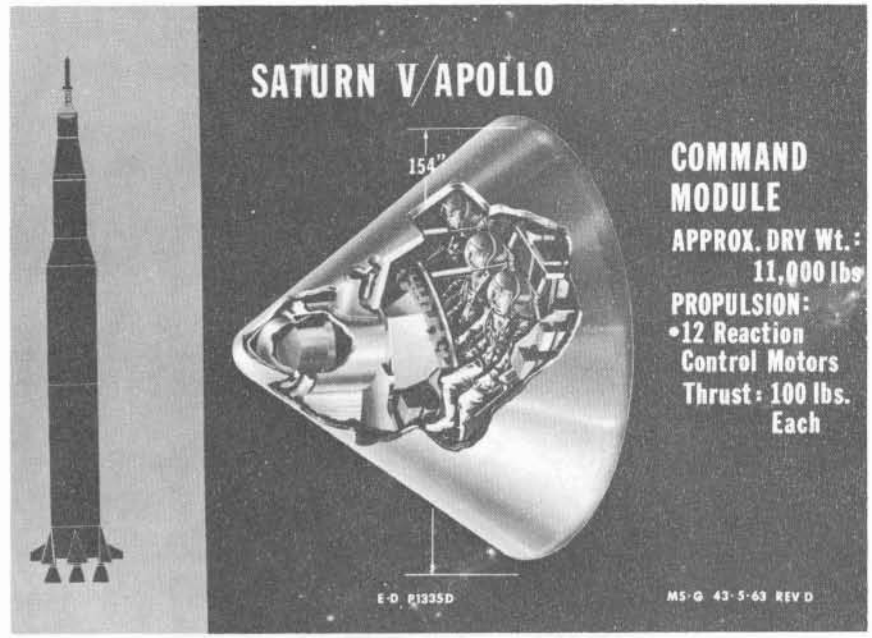

APOLLO DATA SUMMARY
SATURN V
COMMAND MODULE
SERVICE MODULE
LUNAR MODULE
154"
290"
336"
260"
DATA SUMMARY
COMMAND MODULE:
WEIGHT: 11,000 LBS.
PROPULSION:
SERVICE MODULE:
WEIGHT: 50,000 LBS.
PROPULSION:
LUNAR MODULE
WEIGHT: 30,000 LBS.
PROPULSION:
ADAPTER WEIGHT: 4,000 LBS

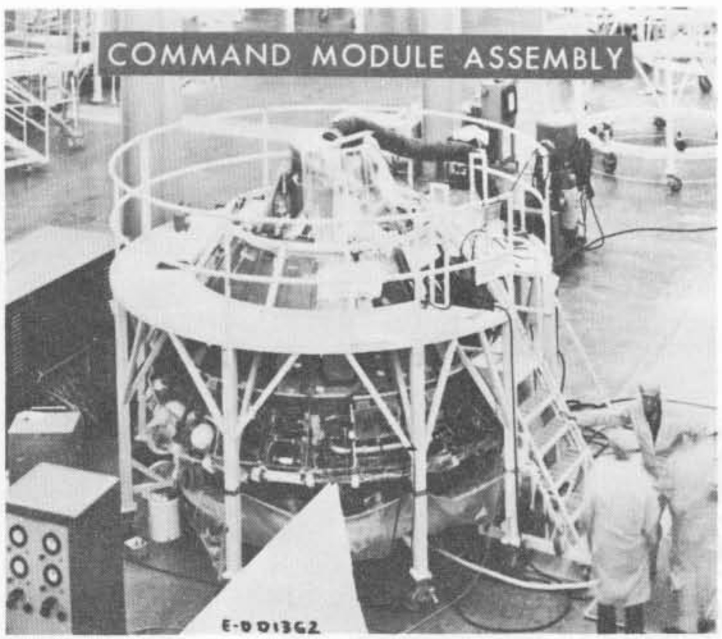

SATURN V
APOLLO SPACECRAFT
LAUNCH ESCAPE SYSTEM
NORTH AMERICAN AVIATION
ENGINE
AEROJET GENERAL
COMMAND MODULE
NAA
SERVICE MODULE
NAA
LUNAR MODULE
GRUMMAN
MSFC-67-MS-G-1351-F

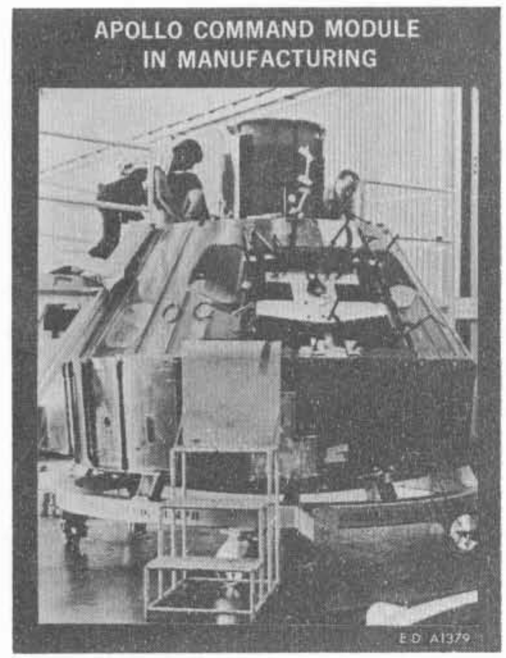

CAPSULE COMPARISON
MERCURY
DIA.-74.5"
L.-115"
GEMINI
DIA.-90"
L.-228"
APOLLO
DIA.-154"
L.-132"
E-D 81339A MAR 18, 64
MS-G-77-63 REV B


COMMAND MODULE
PITCH CONTROL
E D D1332 B

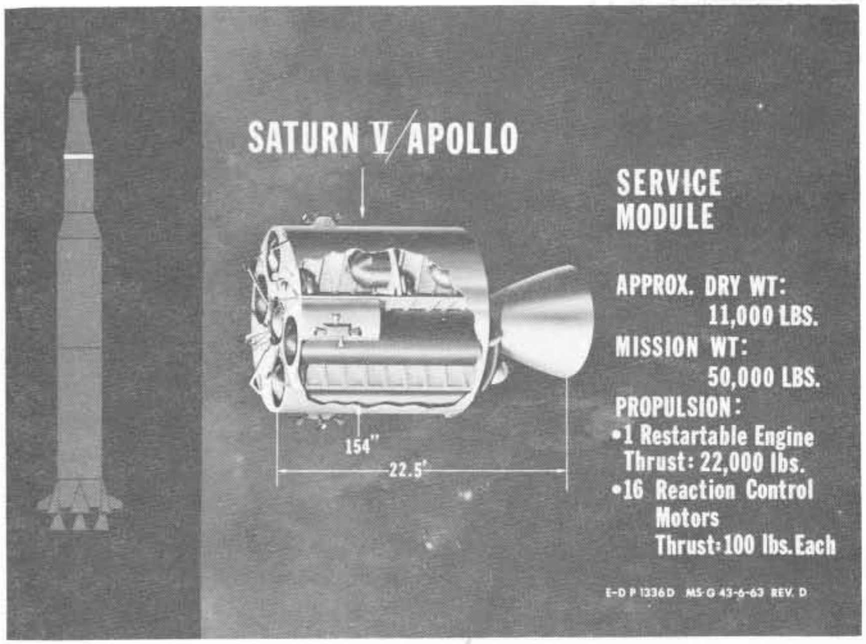

COMMAND MODULE INSTRUMENT PANEL
E D D1350 A

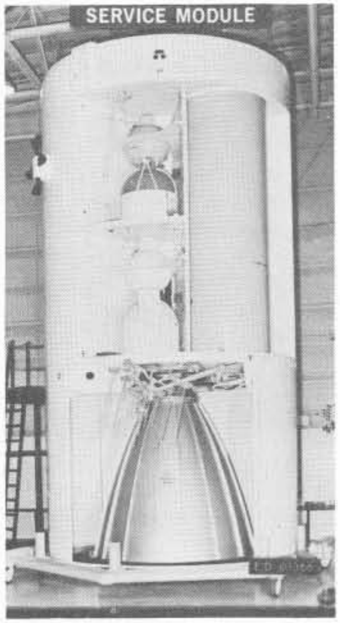

SATURN V/APOLLO
154"
COMMAND MODULE
APPROX. DRY Wt.: 11,000 lbs
PROPULSION:
•12 Reaction Control Motors
Thrust: 100 lbs. Each
E-D P1335D
MS-G 43-5-63 REV D


COMMAND MODULE ASSEMBLY
E-D D1362


APOLLO COMMAND MODULE
IN MANUFACTURING
E D A1379


COMMAND MODULE RECOVERY

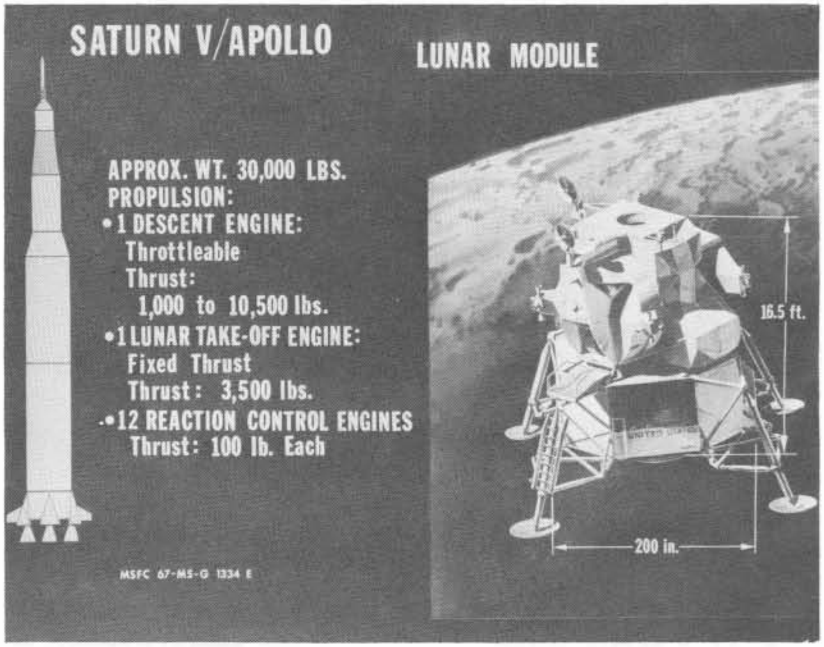

SATURN V/APOLLO
SERVICE MODULE
APPROX. DRY WT: 11,000 LBS.
MISSION WT: 50,000 LBS.
PROPULSION:
•1 Restartable Engine Thrust: 22,000 lbs.
•16 Reaction Control Motors Thrust: 100 lbs. Each
154"
22.5'
E-D P 1336D MS-G 43-6-63 REV. D

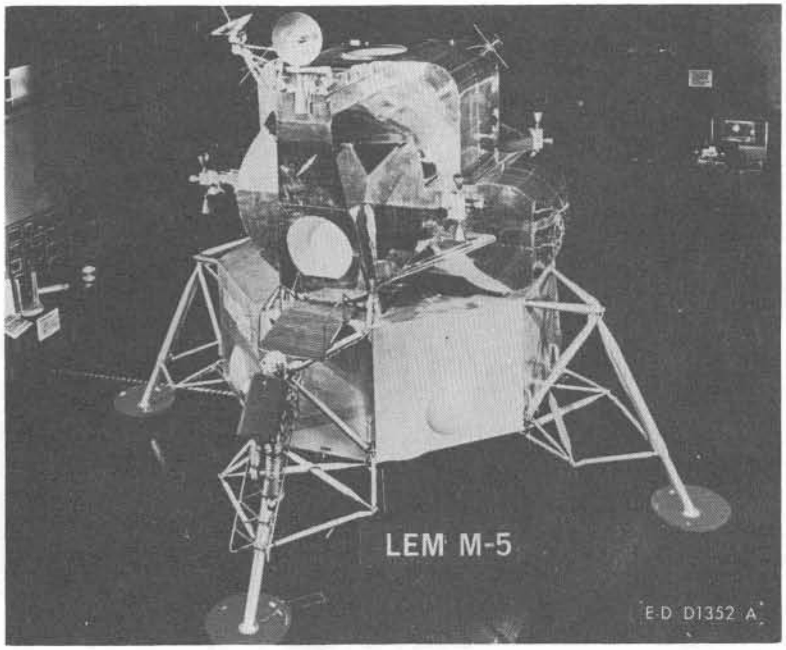

SERVICE MODULE

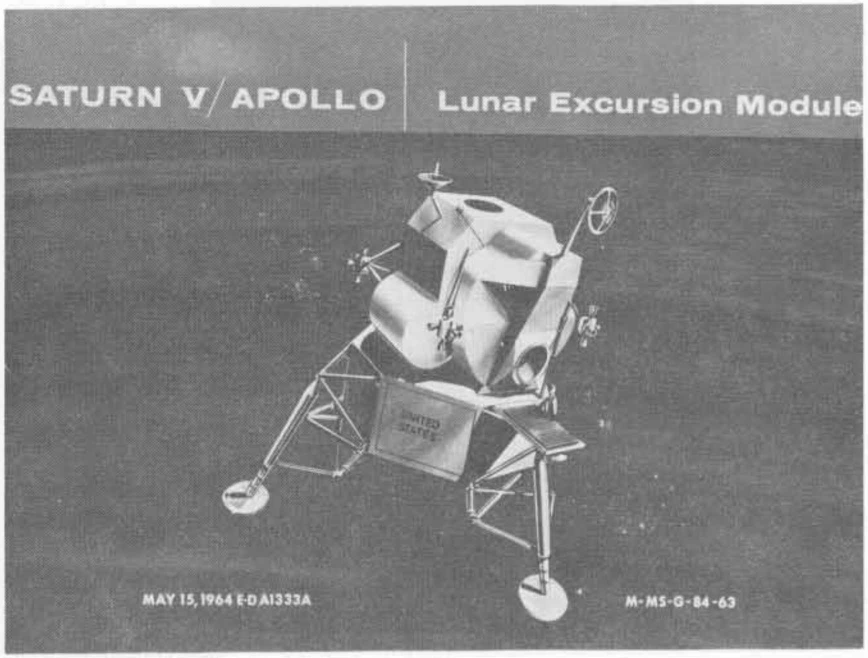

COMMAND AND SERVICE MODULE
SYSTEMS INTEGRATION AND CHECKOUT
E-D D1369

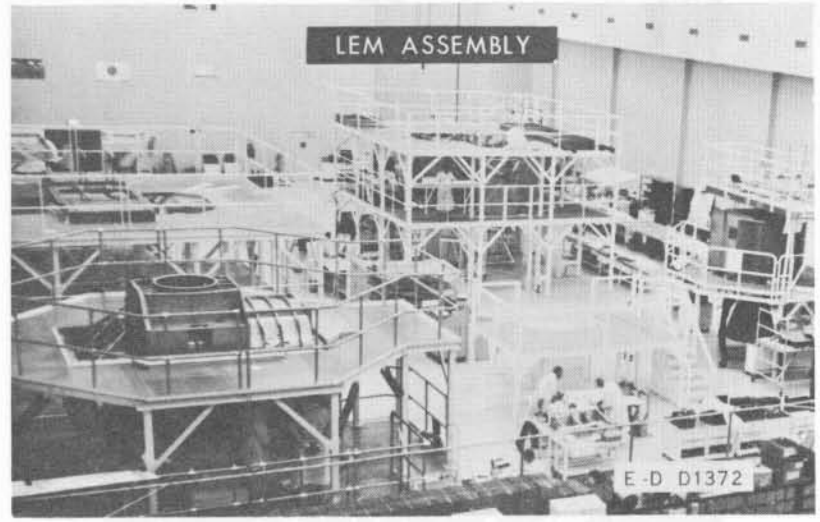

COMMAND AND SERVICE MODULE
E-D D1370

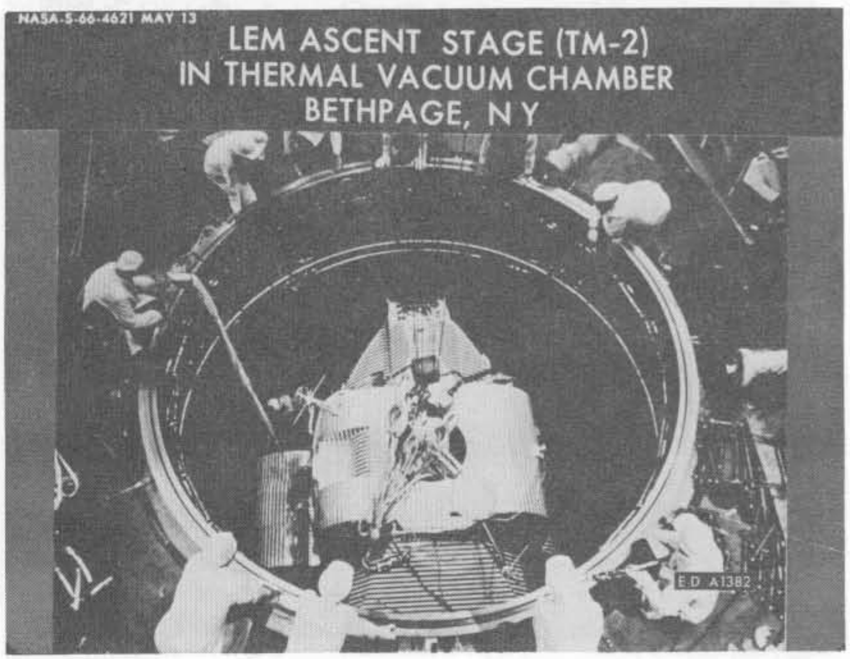

APOLLO SERVICE MODULE
E-D A1380

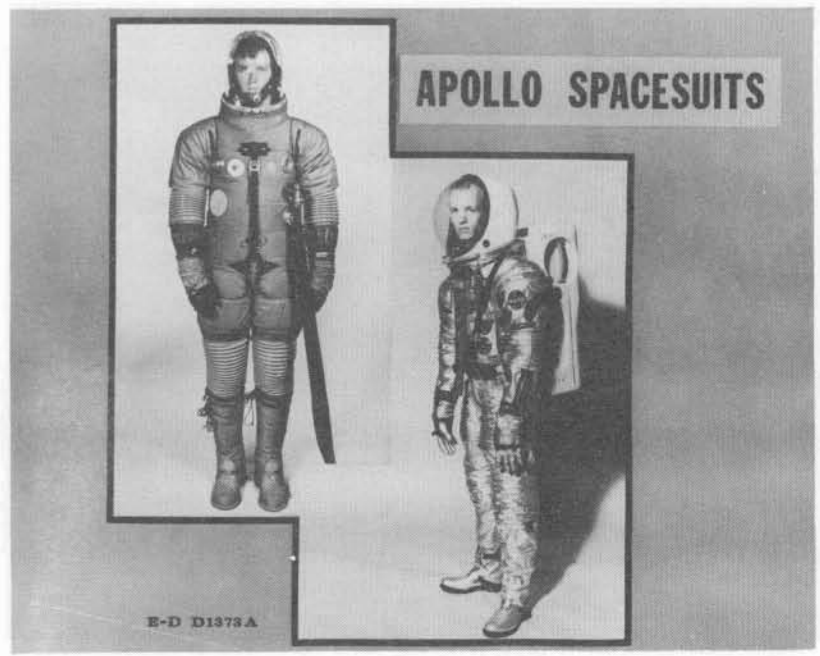

SATURN V/APOLLO
LUNAR MODULE
APPROX. WT. 30,000 LBS.
PROPULSION:
• 1 DESCENT ENGINE:
Throttleable
Thrust:
1,000 to 10,500 lbs.
• 1 LUNAR TAKE-OFF ENGINE:
Fixed Thrust
Thrust: 3,500 lbs.
• 12 REACTION CONTROL ENGINES
Thrust: 100 lb. Each
16.5 ft.
200 in.
MSFC 67-MS-G 1334 E

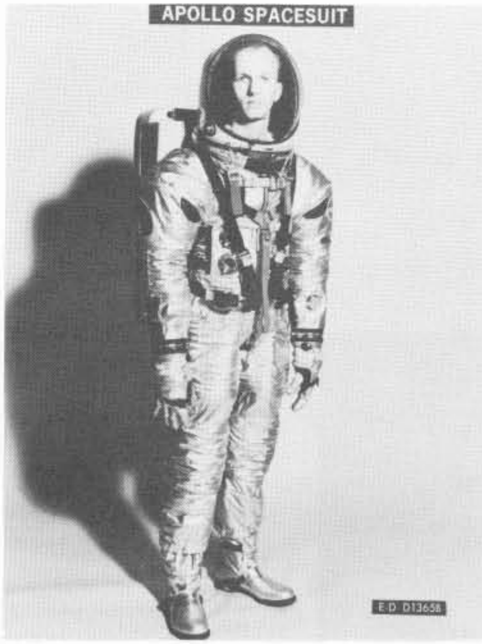

LEM M-5
E-D D1352 A


SATURN V/APOLLO
Lunar Excursion Module
MAY 15, 1964 E-D A1333A
M-MS-G-84-63


LEM ASSEMBLY
E-D D1372


NASA-S-66-4621 MAY 13
LEM ASCENT STAGE (TM-2)
IN THERMAL VACUUM CHAMBER
BETHPAGE, N Y
E D A1382

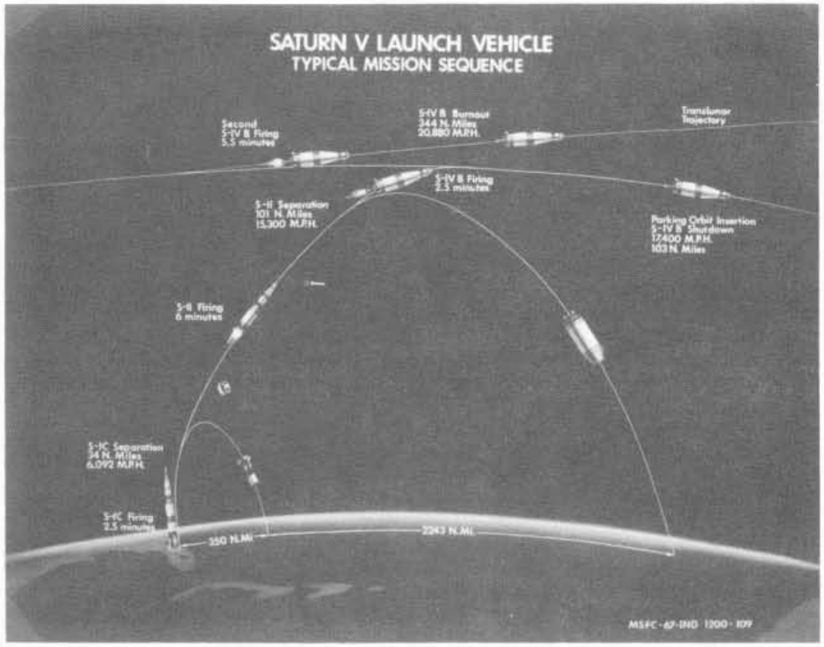

APOLLO SPACESUITS
E-D D1373A


APOLLO SPACESUIT
E-D D1365B


APOLLO SPACESUIT
E-D D1374 A


TEST OF LAUNCH ESCAPE SYSTEM
E-D D1360


LAUNCH ESCAPE SYSTEM
E-D D1361


SATURN V LAUNCH VEHICLE
TYPICAL MISSION SEQUENCE
Second S-IV B Firing 5.5 minutes
S-IV B Burnout 344 N. Miles 20,880 M.P.H.
Translunar Trajectory
S-IV B Firing 2.5 minutes
S-II Separation 101 N. Miles 15,300 M.P.H.
Parking Orbit Insertion S-IV B Shutdown 17,400 M.P.H. 103 N. Miles
S-II Firing 6 minutes
S-IC Separation 34 N. Miles 6,092 M.P.H.
S-IC Firing 2.5 minutes
350 N.Mi
2243 N.Mi.
MSFC-67-IND 1200-109

R & DO GENERAL

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MARSHALL SPACE FLIGHT CENTER
RESEARCH AND DEVELOPMENT OPERATIONS
RDO W7906 A

RESEARCH & DEVELOPMENT OPERATIONS

PRIMARY MISSION:

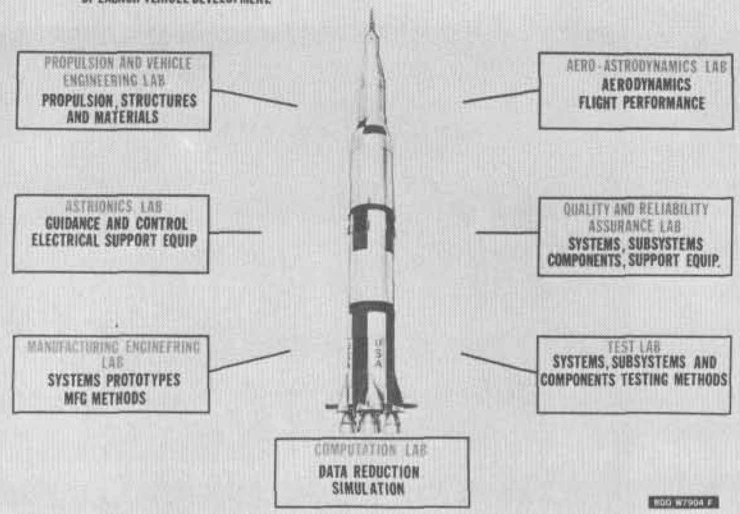
- MAJOR LAUNCH VEHICLE DEVELOPMENT PROGRAMS.
- ADVANCED LAUNCH VEHICLES AND SPACE FLIGHT SYSTEMS PROGRAMS.
- SUPPORTING RESEARCH AND TECHNOLOGY PROGRAMS.
- DEVELOPMENT OF PAYLOADS AND EXPERIMENTS FOR THE APOLLO APPLICATIONS PROGRAM.
- TECHNICAL SUPPORT TO INDUSTRIAL OPERATIONS.

RDO W7903C

RESEARCH & DEVELOPMENT OPERATIONS

LAUNCH VEHICLE DEVELOPMENT

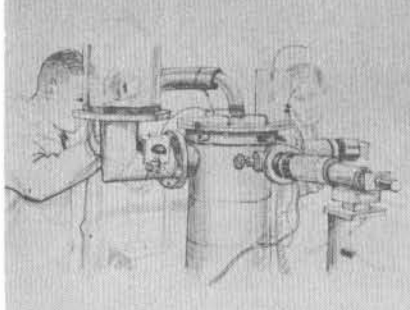
- PERFORM THE LEAD TECHNICAL ROLE IN MSFC FOR THE DESIGN, DEVELOPMENT, FABRICATION (PROTOTYPES), AND TESTING OF LAUNCH VEHICLE AND SPACE TRANSPORTATION SYSTEMS.
- PROVIDE ENGINEERING MANAGEMENT WITH IN-HOUSE TECHNICAL CAPABILITY, IN DEPTH, IN DISCIPLINES OF LAUNCH VEHICLE DEVELOPMENT.



RDO W7904 F

MSFC RESEARCH

AREAS OF ACTIVITY



- RADIATION PHYSICS
- THERMAL PHYSICS
- CHEMICAL PROPULSION RESEARCH
- CRYOGENIC TECHNOLOGY
- ELECTRONICS RESEARCH
- CONTROL SYSTEMS
- MANUFACTURING TECHNOLOGY
- MATERIALS AND STRUCTURES
- GROUND TESTING
- QUALITY ASSURANCE AND CHECKOUT
- SPACE ENVIRONMENT
- AERODYNAMICS
- INSTRUMENTATION
- MATHEMATICS AND COMPUTATION
- GUIDANCE CONCEPT
- ASTRODYNAMICS
- ADVANCED TRACKING SYSTEMS
- COMMUNICATION SYSTEMS
- LUNAR PHYSICS
- METEOROID PHYSICS
- ADVANCED PROPULSION
- POWER SYSTEMS

RDO D 6001 B

MSFC RESEARCH AND TECHNOLOGY

TYPICAL EXAMPLES

DIRECT SUPPORT OF PROJECTS

- DEVELOPMENT OF STRUCTURAL ADHESIVES
- COMMON BULKHEAD DEVELOPMENT AND EVALUATION
- MICRO MINIATURIZATION OF ELECTRONIC COMPONENTS
- DEVELOPMENT OF VALVES FOR CRYOGENIC LIQUIDS
- TITANIUM MANUFACTURING PROCESSES
- DEVELOPMENT OF NON-DESTRUCTIVE TESTING TECHNIQUES

SUPPORT OF FUTURE GENERATION SPACE SYSTEMS

- ELECTRIC PROPULSION
- NUCLEAR, SOLAR AND CHEMICAL POWER GENERATION
- VEHICLE ENVIRONMENTAL FACTORS
- VEHICLE STRUCTURES AND ADVANCED MATERIALS
- GUIDANCE AND CONTROL
- DATA HANDLING AND PROCESSING
- ADVANCED INSTRUMENTATION
- MAN-SYSTEM INTEGRATION
- SOLID AND LIQUID PROPULSION TECHNOLOGY
- METEOROLOGICAL ATMOSPHERIC INVESTIGATIONS

RDO D2105F

MSFC RESEARCH PROGRAM MANAGEMENT

MANAGEMENT CENTRALIZED IN ONE RESEARCH PROGRAM OFFICE WITH RESPONSIBILITY TO:

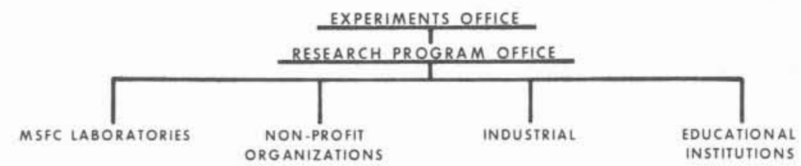
- PLAN, DEVELOP, COORDINATE AND IMPLEMENT MSFC RESEARCH PROGRAMS
- PREPARE PROGRAM DOCUMENTS AND PRESENT AND JUSTIFY PROGRAMS TO NASA HEADQUARTERS
- PROVIDE PROGRAM GUIDANCE TO MSFC LABS. ON TECHNICAL REQUIREMENTS, FUNDING, SCHEDULING, AND CONTRACTING
- ESTABLISH EFFECTIVE VISIBILITY AND PRESENTATION OF RESEARCH ACHIEVEMENTS
- MAINTAIN LIAISON WITH OTHER GOVERNMENT AGENCIES AND THE SCIENTIFIC COMMUNITY FOR EXCHANGE OF TECHNICAL AND SCIENTIFIC KNOWLEDGE

RDO W6000B

RESEARCH AND DEVELOPMENT OPERATIONS

RESEARCH AND TECHNOLOGY PROGRAMS

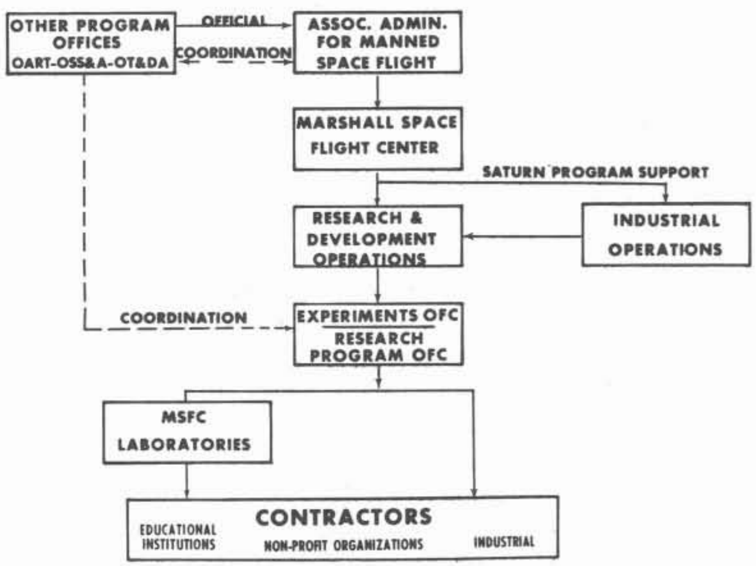
- TO IDENTIFY AND SOLVE CRITICAL TECHNICAL PROBLEMS BEARING ON THE PRESENT GENERATION OF SPACE VEHICLES.
- TO ADVANCE THE STATE OF THE ART TO ENABLE THE DEVELOPMENT OF MORE ADVANCED SPACE VEHICLES.
- TO BUILD A BROAD TECHNOLOGICAL BASE FOR THE NATION'S FUTURE SPACE ACTIVITIES.



RDO W2111B

RESEARCH AND DEVELOPMENT OPERATIONS

RESEARCH AND TECHNOLOGY



RDO W2112A

RESEARCH & DEVELOPMENT OPERATIONS

REALIGNMENT OF R & DO EFFORT TO SUPPORT PROGRAM MANAGEMENT:

—ROUTINE ENGINEERING AND TECHNICAL FUNCTIONS ARE BEING TRANSFERRED TO PRIME AND ENGINEERING SUPPORT CONTRACTORS.

—GOVERNMENT PERSONNEL ARE CONCENTRATING IN AREAS SUCH AS:

- INVESTIGATING IN DEPTH UNIQUE AND FIRST-OF-A-KIND ENGINEERING PROBLEMS ENCOUNTERED IN CONTRACTORS' EFFORTS.
- ADVANCING THE STATE-OF-THE-ART IN NEW DESIGN AND ANALYTICAL TECHNIQUES.
- DEVELOPING MANUFACTURING TECHNIQUES AND PROCESSES.
- VALIDATING QUALITY AND RELIABILITY STANDARDS FOR SPACE SYSTEMS.
- INVESTIGATING THE PROBLEMS ASSOCIATED WITH OPERATING IN THE NEW ENVIRONMENT OF SPACE AND THE LUNAR SURFACE.

RDO W7912A

RESEARCH & DEVELOPMENT OPERATIONS

LEAD LABORATORY PROJECT ASSIGNMENTS

TITLE & DATE OF ASSIGNMENT	LAB	ENGINEERING MANAGER	PROJECT ENGINEER	R&DO STAFF		I. O. PROGRAM		NASA HQ PROGRAM OFFICE	REMARKS
				OFFICE	COORDINATOR	OFFICE	MANAGER		
SAT IB/206, 208 & 210 NOSE CONE MAY 27, 1966	P&VE	G. A. KELLER	N. FOSTER	R-OM	W. F. FETZER	I-I/IB	D. M. GERMANY	MSF	
RACK(PAYLOAD MODULE) JUNE 16, 1966	P&VE	G. A. KELLER	W. L. FOWLER	R-OM	R. B. GIBSON	I-S/AAP	R. D. STEWART	MSF	
SAT V DAMPER SYS. JUNE 17, 1966 SEP. 19, 1966	P&VE	H. S. McCULLOUGH	W. THOMPSON	R-OM	C. M. SPENCER	I-V	B. CHEREEK	MSF	
APOLLO TELE-SCOPE MOUNT JUNE 23, 1966	ASTR	W. P. HORTON	G. CAGLE	R-OM	J. A. CORBETT	I-S/AAP	R. ISE	MSF/OSSA	
NUCLEAR GRD. TEST MODULE JUNE 5, 1966	P&VE	W. A. BROOKSBANK (PROG MGR)	H. A. CONNELL	R-OM	R. R. MORTON	N/A	N/A	OART	
ORBITAL WORKSHOP JULY 29, 1966	P&VE	W. A. BROOKSBANK	W. FAULKNER	R-OM	M. CASH	I-S/AAP	W. A. FERGUSON	MSF	
MULTIPLE DOCKING ADAPTER 2/7/67	P&VE	R. G. EUDY	R. G. EUDY	R-OM	M. CASH	I-S/AAP	G. B. HARDY	MSF	
MODERATE DEPTH LUNAR DRILL DEC. 15, 1966	TEST	J. T. LUNDY	R. E. TEPOOL	R-OM	M. DORMAN	I-S/AAP	R. D. STEWART	MSF	

MSFC-4/67-RDO-7916H

TYPICAL AREAS OF R&DO SUPPORT TO I.O. FOR SATURN/APOLLO APPLICATIONS PROGRAM

ORIGINATE AND PROPOSE SCIENTIFIC EXPERIMENTS AND PAYLOADS FOR SATURN/APOLLO APPLICATIONS PROGRAM

PROVIDE PRINCIPAL INVESTIGATORS FOR APPROVED R&DO FLIGHT EXPERIMENTS AND PAYLOADS

PROVIDE TECHNICAL COORDINATION WITH INDUSTRY, UNIVERSITIES AND OTHER GOVERNMENT AGENCIES FOR PROPOSED AND APPROVED EXPERIMENT PAYLOADS

PROVIDE SYSTEMS ENGINEERING AND INTEGRATION FOR APPROVED EXPERIMENT PAYLOADS

FABRICATE EXPERIMENTS AND SUBSYSTEMS FOR PAYLOADS

PROVIDE GROUND SUPPORT EQUIPMENT DESIGN AND/OR FABRICATION

PROVIDE AND OPERATE COMPONENT, SUBSYSTEM AND SYSTEM TEST AND CHECKOUT FACILITIES WHERE REQUIRED

INTEGRATE SPACECRAFT TO VEHICLE

PROVIDE TECHNICAL MANAGEMENT AND/OR SURVEILLANCE OF EXPERIMENT OR SYSTEMS CONTRACTORS

PROVIDE FLIGHT TRAJECTORY AND DYNAMICS ANALYSIS

REDUCE AND ANALYZE FLIGHT TELEMETRY DATA

RDO W7918

EXPERIMENTS OFFICE ACTIVITIES

- COORDINATES PREPARATION OF MSFC PROPOSED FLIGHT EXPERIMENTS. (EXPERIMENTS THAT MAY BE ADDED TO PRESENT AND FUTURE VEHICLES AND PAYLOADS).
- REPRESENTS MSFC ON THE MANNED SPACE FLIGHT EXPERIMENTS BOARD (MSFEB).
- PRESENTS MSFC EXPERIMENT PROPOSALS TO MSFEB FOR APPROVAL.
- COORDINATES MANAGEMENT AND EXECUTION OF APPROVED MSFC EXPERIMENTS.
- COORDINATES MSFC EXPERIMENT ACTIVITIES WITH INDUSTRY, OTHER NASA ELEMENTS, OTHER GOVERNMENT AGENCIES, AND UNIVERSITIES.
- PROVIDES R-DIR WITH MANAGEMENT VISIBILITY OF OVER-ALL MSFC EXPERIMENTS ACTIVITIES.
- COORDINATES PREPARATION OF MSFC PROGRAM OF SUPPORTING RESEARCH AND TECHNOLOGY (SRT) AND SUPPORTING DEVELOPMENT (SD).
- PROVIDES OVER-ALL MANAGEMENT IN EXECUTION OF MSFC'S APPROVED SRT AND SD ACTIVITIES.

R&DO 7919 DEC. 1, 1966

TYPICAL AREAS OF R&DO SUPPORT TO I.O. FOR SATURN PROGRAM

- SYSTEMS ENGINEERING IN DEPTH
- FABRICATION OF PROTOTYPE STAGES
- COMPONENT, STAGE AND VEHICLE TESTING
- QUALITY ASSURANCE AND RELIABILITY PROGRAM
- GROUND SUPPORT EQUIPMENT-ELECTRIC SUPPORT EQUIPMENT INTEGRATION
- DESIGN AND DEVELOPMENT OF INSTRUMENT UNITS
- MISSISSIPPI TEST FACILITY TECHNICAL SUPPORT
- TECHNICAL SURVEILLANCE OF SYSTEMS PRIME CONTRACTORS
- CONFIGURATION CONTROL PARTICIPATION
- WORKING GROUP PARTICIPATION
- FLIGHT EVALUATION
- SCIENTIFIC COMPUTATION SUPPORT

RDO W7911C

MSFC PROPOSED EXPERIMENTS

MSFC NO.	HDQ NO.	EJ NO.	TITLE	MSFC INVESTIGATOR	LAB	CENTER MONITOR	FEASIBILITY INITIATE	FEASIBILITY COMPL.	DEFINITION INITIATE	DEFINITION COMPL.	SUBM. 1138	ECP DATE	ECP SPO	SUBM. EIP	MSFEB DATE	MSFEB ACTION	DEV. INITIATE
2	M415	0205	THERMAL CONTROL COATINGS	E. McKANNAN	R-P&VE MEE	H.R. PALAORO R-P&VE-DIR	7/65	1/66	1/66	5/66	EDP IN LIEU OF	●	OMSF	5/66	9/65	OK FLIGHT	3/66
3	M416	0207	PROPELLANT MASS DETERMINATION	J.C. CODY	R-P&VE PT	H.R. PALAORO R-P&VE-DIR	2/65	3/66	8/66	3/67	5/67	●	OMSF				
4	M417	0206	LIQUID INTERFACE STABILITY	A.L. WORLUND	R-P&VE PT	H.R. PALAORO R-P&VE-DIR	2/65	3/66	8/66	3/67	5/67	●	OMSF				
5	M418	0127	BOILING HEAT TRANSFER	A.L. WORLUND	R-P&VE PT	H.R. PALAORO R-P&VE-DIR	7/65	3/66	8/66	3/67	5/67	●	OMSF				
6	M419	0196	CRYOGENIC PROPELLANT TRANSFER	J.L. VANIMAN	R-P&VE PT	H.R. PALAORO R-P&VE-DIR	7/65	3/66	8/66	3/67	5/67	●	OMSF				
7	M420	0214	PROPELLANT STORAGE SYSTEM	W.O. RANDOLPH	R-P&VE PT	H.R. PALAORO R-P&VE-DIR	7/65	3/66	8/66	3/67	5/67	●	OMSF				
8	M421	0211	MECHANICAL PROPERTIES	E. McKANNAN	R-P&VE MEE	H.R. PALAORO R-P&VE-DIR	7/65						COMBINE WITH MSC PROPOSAL				
9	M422	0212	D.C. MOTOR AND GEAR LUBRICATION	K. DEMOREST	R-P&VE MEE	H.R. PALAORO R-P&VE-DIR	7/65	8/66	11/66	5/67	5/67						
11	M423	0231	HYDROSTATIC GAS BEARING	O.C. GREEN	R-ASTR GCC	J. ROBINSON R-ASTR-BU	8/65	CONCURRENT STUDY		7/66	8/66	●	OMSF APPROVE	10/66	2/67	APPROVE	
14	M425	0197	TRACKING AND NAVIGATION (AROD)	G. SAUNDERS	R-ASTR I	W. THORNTON R-ASTR-S	8/65										
15	T018	0315	PRECISION OPTICAL TRACKING	C.L. WYMAN	R-ASTR RP	G. BARR R-ASTR-BE	8/65	1/66	1/66	5/66	1/66	●	OART	[illegible]/66	11/65	OK FLIGHT	PEND FLT ASSMT

● INITIATED PRIOR TO ESTABLISHMENT OF ECP

ECP- EXPERIMENT COORDINATION PANEL
SPO- SPONSORING PROGRAM OFFICE (OSSA,OART,OMSF,ODTA)
EIP- EXPERIMENT IMPLEMENTATION PLAN

MSFC PROPOSED EXPERIMENTS

MSFC NO.	HDQ NO.	EJ NO.	TITLE	MSFC INVESTIGATOR	LAB	CENTER MONITOR	FEASIBILITY INITIATE	FEASIBILITY COMPL.	DEFINITION INITIATE	DEFINITION COMPL.	SUBM. 1138	ECP DATE	ECP SPO	SUBM. EIP	MSFEB DATE	MSFEB ACTION	DEV. INITIATE
16		0267	OPTICAL GUIDANCE SYSTEM	C.L. WYMAN	R-ASTR RP	W. THORNTON R-ASTR-S	8/65	1/66	1/67	9/67	1/67						
18			SPACE PLASMA PROBE	L. WOOD	R-RP	L. WOOD R-RP-N	10/65										
19			PLASMA ELECTRO-STATIC POTENTIAL	E.L. SHRIVER	R-RP	E.L. SHRIVER R-RP	8/66			8/67	9/67						
20	M426		CONDENSING HEAT TRANSFER	G.D. HOPSON	R-P&VE PTD	H.R. PALAORO R-P&VE-DIR	11/65	3/66	8/66	3/67	5/67						
21	M454	0437	SOLAR SHIELDS	G.E. COMER	R-P&VE PTP	H.R. PALAORO R-P&VE-DIR	11/65										
22	M427		STRAPDOWN PLATFORM	G.B. DOANE	R-ASTR G	W. THORNTON R-ASTR-S	11/65			12/66	12/66						
23			CROSS BEAM CORRELATION	F.R. KRAUSE	R-AERO A	O.C. JEAN R-AERO-DIR	2/66	1/67	1/67								
24			SPECTROREFLECTO-METER	E.R. MILLER	R-RP	W.G. JOHNSON R-EO-DIR	1/66	5/66	5/66	11/66	11/66						
26	M496		LIQUID DROP DYNAMICS (DR. J.M. TEEM E.O.S.)	C. FRITZ	R-P&VE PE	H.R. PALAORO R-P&VE-DIR	8/65										
27		0594	FLUID FLOWMETER DEMONSTRATION	F.E. WELLS	R-QUAL ATR	P. DAVIS R-QUAL-P	10/65	4/66									
28		0587	LEAK DETECTOR DEMONSTRATION	F.E. WELLS	R-QUAL ATR	P. DAVIS R-QUAL-P	10/65	4/66	8/66								

● INITIATED PRIOR TO ESTABLISHMENT OF ECP

MSFC PROPOSED EXPERIMENTS

MSF NO.	HDQ NO.	EJ NO.	TITLE	MSFC INVESTIGATOR	LAB	CENTER MONITOR	FEASIBILITY INITIATE	FEASIBILITY COMPL.	DEFINITION INITIATE	DEFINITION COMPL.	SUBM. 1138	ECP DATE	ECP SPO	SUBM. EIP	MSFEB DATE	MSFEB ACTION	DEV. INITIATE
31	M469		ST-124 REMOVAL	V.H. YOST	R-ME MMA	R.J. SCHWINGHAMER R-ME-M	2/66	4/66	4/66	9/66	6/66	6/28/66	OMSF APPROVE	9/12/66	9/19/66	APPROVE AS-209	
33	M505	0585	EXPLOSIVE METAL CUTTING	P.H. SCHUERER	R-ME MMP	R.J. SCHWINGHAMER R-ME-M	2/66	4/66	4/66	10/66	REWRITE	6/28/66	OART/ OMSF PEND				
34	M506	0589	SPACE BONDING	H.M. WALKER	R-ME MM	R.J. SCHWINGHAMER R-ME-M	2/66	4/66	4/66	9/66	REWRITE	7/15/66	OART/ OMSF PEND				
35	M492	0590	JOINING TUBULAR ASSEMBLIES	H.G. LIENAU	R-ME	R.J. SCHWINGHAMER R-ME-M	2/66	4/66	4/66	9/66	6/66	7/15/66	OMSF APPROVE	9/12/66	9/19/66	APPROVE AS-209	
36	M493	0591	ELECTRON BEAM WELDING	H.G. LIENAU	R-ME	R.J. SCHWINGHAMER R-ME-M	2/66	4/66	4/66	9/66	6/66	7/15/66	OMSF APPROVE	9/12/66	9/19/66	APPROVE AS-209	
37	T022	0583	HEAT PIPE DEMONSTRATION (DR. G. GROVER LASL)	A. BYRD	R-RP N	A. BYRD R-RP-N	8/65	3/66	3/66	6/66	6/66	6/28/66	OART APPROVE	11/1/66	11/66	APPROVE	
40		0643	ATTITUDE CONTROL BY ANGULAR MOM.	V.H. YOST	R-ME MMA	R.J. SCHWINGHAMER R-ME-M	2/66	6/66			7/66	8/18/66	OMSF REJECT				
42	T023	0593	SURFACE ADSORBED MAT'L COLLECTION	E. McKANNAN	R-P&VE M	H.R. PALAORO R-P&VE-DIR	4/61	4/65	5/65	6/66	6/66	7/15/66	OART/ APPROVE	9/12/66	9/19/66	APPROVE AS-209	
43	M497		FLUID DENSITY GRADIENT (DR. R.W. GRAHAM E.O.S.)	C. FRITZ	R-P&VE PT	H.R. PALAORO R-P&VE-DIR	8/65					●	OMSF				
44			ORBITAL DENSITY MEASUREMENTS	R.E. SMITH	R-AERO YS	R.E. SMITH R-AERO-YS	2/66	5/66									
45			PHYSICS OF GAS SURFACE INTERACTIONS	J.O. BALLANCE	R-AERO AM	R.E. SMITH R-AERO-YS	2/66	6/66									

● INITIATED PRIOR TO ESTABLISHMENT OF ECP

MSFC PROPOSED EXPERIMENTS

MSFC NO.	HDQ NO.	EJ NO.	TITLE	MSFC INVESTIGATOR	LAB	CENTER MONITOR	FEASIBILITY INITIATE	FEASIBILITY COMPL.	DEFINITION INITIATE	DEFINITION COMPL.	SUBM. 1138	ECP DATE	ECP SPO	SUBM. EIP	MSFEB DATE	MSFEB ACTION	DEV. INITIATE
46			ORBITAL DRAG EXPERIMENT	J.O. BALLANCE	R-AERO AM	R.E. SMITH R-AERO-YS	2/66	8/66									
47			MULTI-SPHERE SATELLITE ODESSEY I	J.O. BALLANCE	R-AERO AM	R.E. SMITH R-AERO-YS	2/66	8/66	8/66	12/66	11/66			7/67			
48			LASER COMMUNICATIONS SATELLITE	E.J. REINBOLT	R-ASTR R	W. THORNTON R-ASTR-S	RESULTS FROM ART STUDIES			6/66	11/66						
49	S027	0455	GALACTIC X-RAY MAPPING (DR. KRAUSHAAR U. OF WISC.)	T. PONDER	R-ASTR I	J. ROBINSON R-ASTR-BU		6/65	1/66	6/66	6/65	●	OSSA	6/66	7/66	OK FLIGHT	9/66
53			DIELECTRIC MATERIALS EXPERIMENT	E.C. McKANNAN	R-P&VE	H.R. PALAORO R-P&VE-DIR	10/66										
54			BEHAVIOR OF PARTICULATE MATERIALS	DR. P.E. GLASER A.D. LITTLE, INC.	R-RP	DR. SCHOCKEN R-RP-T	10/65			8/66	9/66						
55	M498		BUBBLE GROWTH AND DYNAMICS	J.C. CODY	R-P&VE	H.R. PALAORO R-P&VE-DIR	7/65	3/66	8/66	3/67	5/67		OMSF				
56	M499		PROPELLANT SETTLING AND ULLAGE CONTROL	J.C. CODY	R-P&VE	H.R. PALAORO R-P&VE-DIR	7/65	3/66	8/66	3/67	5/67		OMSF				
57	M507		GRAVITY SUBSTITUTE WORKBENCH	O.C. HOLDERER R-AERO	R-AERO	W.G. JOHNSON R-EO-DIR	10/66			12/66	12/66						
58	M500		ORBITAL SLOSHING	J.C. CODY	R-P&VE	H.R. PALAORO R-P&VE-DIR	7/65	3/66	8/66	3/67	5/67		OMSF				
59	M501		LIQUID SUCTION DIP PREVENTION	J.L. VANIMAN	R-P&VE	H.R. PALAORO R-P&VE-DIR	7/65	3/66	8/66	3/67	5/67		OMSF				
60	M502		STRATIFICATION & STRATIFICATION DESTRUCTION	J.L. VANIMAN	R-P&VE	H.R. PALAORO R-P&VE-DIR	7/65	3/66	8/66	3/67	5/67		OMSF				

● INITIATED PRIOR TO ESTABLISHMENT OF ECP

MSFC PROPOSED EXPERIMENTS

MSFC NO.	HDQ NO.	EJ NO.	TITLE	MSFC INVESTIGATOR	LAB	CENTER MONITOR	FEASIBILITY INITIATE	FEASIBILITY COMPL.	DEFINITION INITIATE	DEFINITION COMPL.	SUBM. 1138	ECP DATE	ECP SPO	SUBM. EIP	MSFEB DATE	MSFEB ACTION	DEV. INITIATE
61	M503		VENTING CRYOGENIC FLUIDS UNDER ZERO G	W.O. RANDOLPH	R-P&VE	H.R. PALAORO R-P&VE-DIR	7/65	3/66	8/66	3/67	5/67						
62	M504		FLOW STABILITY	G.D. HOPSON	R-P&VE	H.R. PALAORO R-P&VE-DIR	7/65	3/66	8/66	3/67	5/67						
63			EXTENDIBLE ROD	DR. G.S. NURRE	R-ASTR	W. THORNTON R-ASTR-S	1/66			1/67	1/67						
64			GRAVITY GRADIENT STABILIZATION OF S-IVB	DR. G.S. NURRE	R-ASTR	W. THORNTON R-ASTR-S	1/66			1/67	1/67						
65	T005		PHASE CHANGE THERMAL RADIATOR	T.C. BANNISTER	R-RP-T	G. HELLER R-RP-T		10/66	9/66	6/67	10/66						
66																	
67																	
68																	
69																	
70																	
71																	
72																	
73																	
74																	
75																	

● INITIATED PRIOR TO ESTABLISHMENT OF ECP

PART 5 OF 5 ITEMS MSFC # 1, 10, 13, 17, 25, 29, 30, 33, 38, 39, 41, 50, 51, 52, 12, WITHDRAWN AND CANCELLED.

R-EO-F R&D 7917-H APR. 4, 1967

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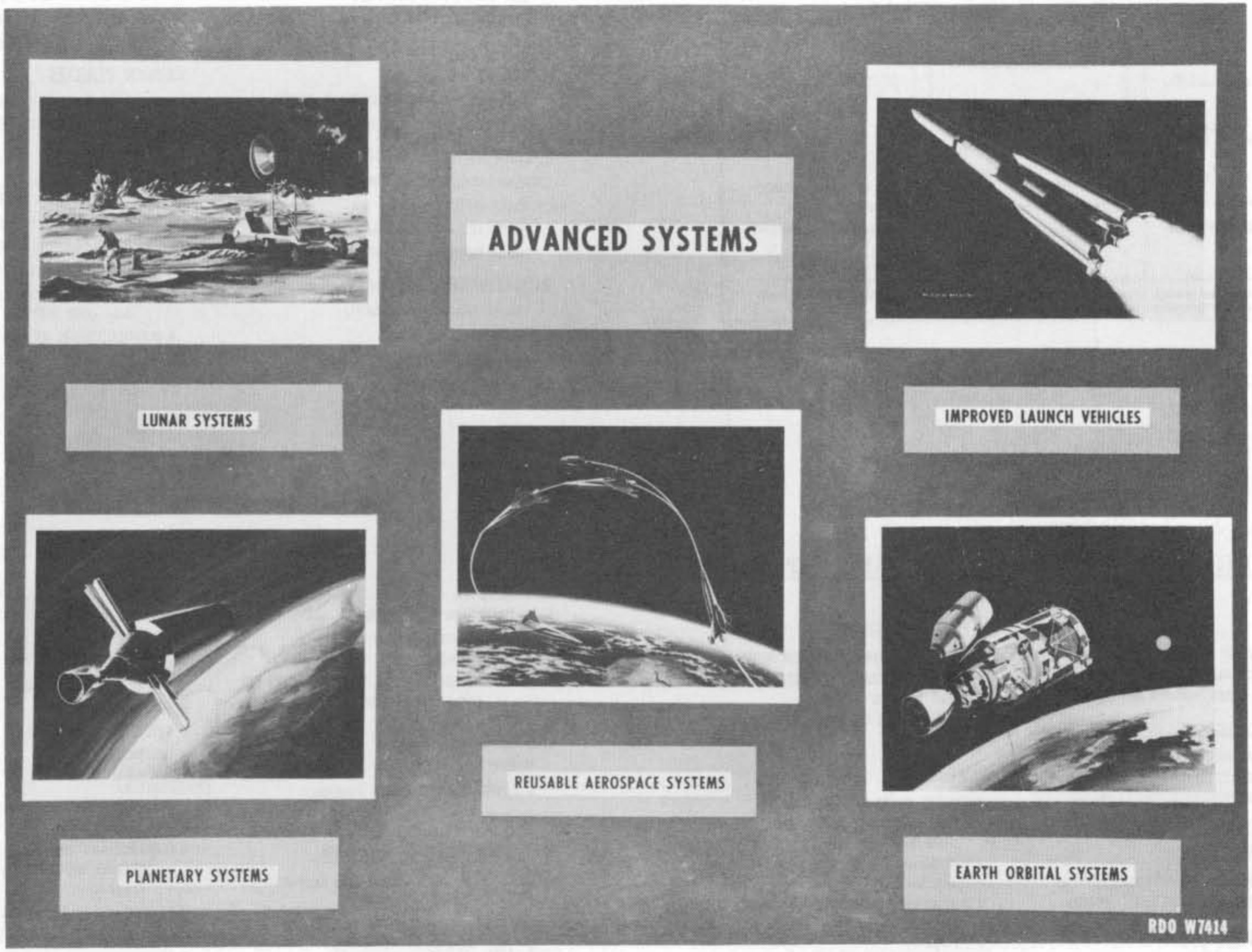

ADVANCED SYSTEMS
LUNAR SYSTEMS
IMPROVED LAUNCH VEHICLES
REUSABLE AEROSPACE SYSTEMS
PLANETARY SYSTEMS
EARTH ORBITAL SYSTEMS
RDO W7414

ADVANCED PROGRAMS

RELATIONSHIP OF FUTURE MISSIONS TO PRESENT PROGRAM

THE APPROVED PROGRAM PROVIDES:	EXTENSION OF PRESENT PROGRAM CAPABILITIES CAN PROVIDE:	ADVANCED PROGRAMS WILL REQUIRE MAJOR NEW DEVELOPMENTS TO PROVIDE:
GEMINI, APOLLO, AND SATURN, MANUFACTURE, TEST AND LAUNCH CAPABILITY	1-2 MONTH EARTH ORBITAL FLIGHTS IN POLAR, SYNCHRONOUS, AND ELLIPTICAL ORBITS FOR SCIENTIFIC AND TECHNICAL EXPERIMENTS	SPACE STATIONS
1-2 WEEK EARTH ORBITAL FLIGHTS	RENDEZVOUS, REPAIR, RESCUE, INSPECTION	LUNAR ROVING VEHICLE AND LUNAR BASE
MANEUVERS AND RENDEZVOUS	EXTENDED LUNAR STAY TIME	POST SATURN LAUNCH VEHICLES
LUNAR ORBIT AND LUNAR LANDING	EXTENSIVE LUNAR MAPPING	LIFTING REENTRY VEHICLES
	UNMANNED PLANETARY EXPLORATION	MANNED PLANETARY EXPLORATIONS

OPERATING EXPERIENCE AND TECHNICAL RESOURCES AVAILABLE FROM ONGOING PROGRAM, AND UNDERLYING BASIC AND APPLIED RESEARCH AND ADVANCED TECHNOLOGY EFFORT SUPPORTS ALL PROGRAM PHASES

RDO D 7105

ADVANCED PROGRAMS

MAJOR CAPABILITIES EXISTING OR UNDER DEVELOPMENT

AERONAUTICS

- R&D HYPERSONIC AIRPLANES
- OPERATIONAL SUPERSONIC MILITARY AIRPLANES
- COMMERCIAL SUPERSONIC AIRPLANES

SPACE APPLICATIONS

- SATELLITE PICTURES OF EARTH WEATHER
- INTERCONTINENTAL COMMUNICATIONS (INCL TV)

UNMANNED EXPLORATION

- NEAR EARTH EXPLORATION
- SOLAR EFFECTS
- PLANETARY AND INTERPLANETARY PROBES
- LUNAR PROBES AND LANDERS

BIOSATELLITE SPACECRAFT

- ORBITAL FLIGHTS (1-30 DAYS)
- RECOVERABLE CAPSULES
- BIOLOGICAL EXPERIMENTS

MANNED OPERATIONS

- MAN IN EARTH ORBIT (1-2 WEEKS)
- MANEUVER AND RENDEZVOUS
- LUNAR ORBITING, LANDING AND RETURN

LAUNCH VEHICLES

- UP TO 125 TONS IN EARTH ORBIT
- OVER 47 TONS TO ESCAPE

TECHNOLOGY

- NUCLEAR AND SOLAR CELL POWER SUPPLIES OF INCREASED POWER
- MORE ACCURATE GUIDANCE AND CONTROL
- INCREASED COMMUNICATIONS CAPABILITY
- LIFE SUPPORT FOR LONG PERIODS
- INCREASED RELIABILITY OF FLIGHT HARDWARE AND CREW SURVIVAL
- MANUFACTURING AND QUALITY CONTROL
- MATERIALS AND STRUCTURES

RDO D7108

ADVANCED PROGRAMS

INTERMEDIATE MISSIONS-EXTENSIONS OF PRESENT CAPABILITIES

AERONAUTICS

- SUPER TRANSPORT
- HYPERSONIC ENGINE DEVELOPMENT
- VERTICAL OR SHORT TAKE-OFF AND LANDING

SPACE APPLICATIONS

- ADVANCED TECHNOLOGY SATELLITES
- DIRECT BROADCAST FM
- COMMUNICATIONS/NAVIGATIONS SATELLITES
- METEOROLOGICAL OBSERVATION TECHNOLOGY

UNMANNED EXPLORATION

- OBSERVATORIES, PIONEERS, EXPLORERS CONT'D
- PLANETARY FLY BY, ORBITERS AND LANDERS

LAUNCH VEHICLES

- SMALL SPACE PROPULSION UNIT

MANNED OPERATIONS

- EARTH ORBIT APPLICATION (1-2 MONTHS)
- RENDEZVOUS, INSPECTION, REPAIR, RESCUE
- LUNAR MAPPING
- EXTENDED STAY ON LUNAR SURFACE (3-14 DAYS)

TECHNOLOGY

- ISOTOPE POWER SUPPLIES (1-2 KW)
- GUIDANCE CONTROL (WITHIN MILES OF POINT ON MARS)
- COMMUNICATIONS (3000 BITS/SEC FROM MARS)
- STABILIZATION
- LIFE SUPPORT (3 MEN, 1-2 MONTHS)
- STERILIZATION
- RELIABILITY
- MANUFACTURING AND MATERIALS
- PROPELLANT STORAGE

RDO D 7106 A

ADVANCED PROGRAMS

LONG-TERM DEVELOPMENT

AERONAUTICS

- HYPERSONIC TRANSPORTS
- REUSABLE MULTI-MISSION AEROSPACE TRANSPORT
- COMMERCIAL VERTICAL OR SHORT TAKE-OFF AND LANDING AIRCRAFT

SPACE APPLICATIONS

- DIRECT TV BROADCAST
- NAVIGATION AND TRAFFIC CONTROL
- CONTINUOUS GLOBAL WEATHER OBSERVATION

MANNED SPACE EXPLORATION

- CONVENTIONAL TAKE-OFF AND LANDING OF SPACE VEHICLES
- FLEXIBLE EARTH ORBITAL OPERATIONS
- LARGE PERMANENT SPACE LAB
- ROVING LUNAR VEHICLES AND LUNAR BASES
- PLANETARY EXPLORATION

UNMANNED SPACE EXPLORATION

- PROBES AND LANDERS TO DISTANT PLANETS
- GALACTIC PROBES

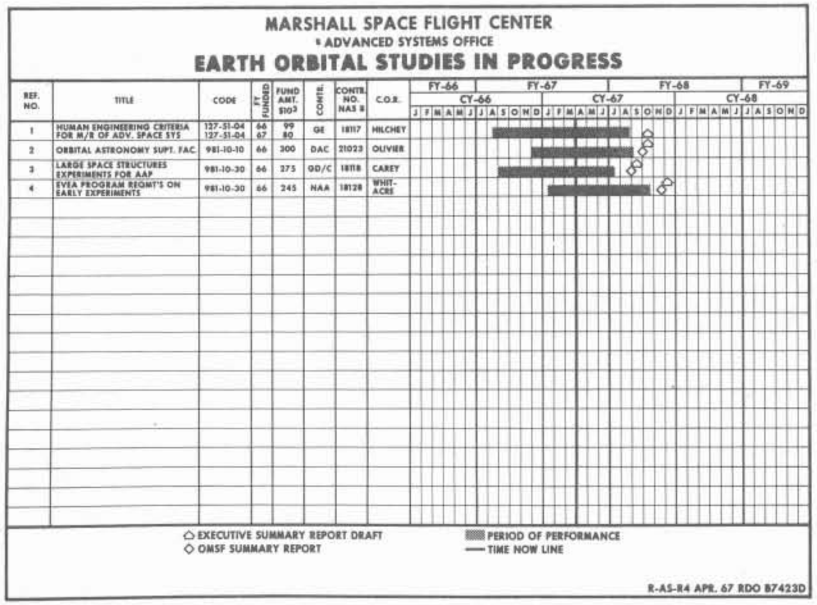
LAUNCH VEHICLES

- 1 MILLION POUNDS IN EARTH ORBIT
- NUCLEAR ENGINES
- RECOVERABLE BOOSTERS
- ELECTRIC PROPULSION

TECHNOLOGY

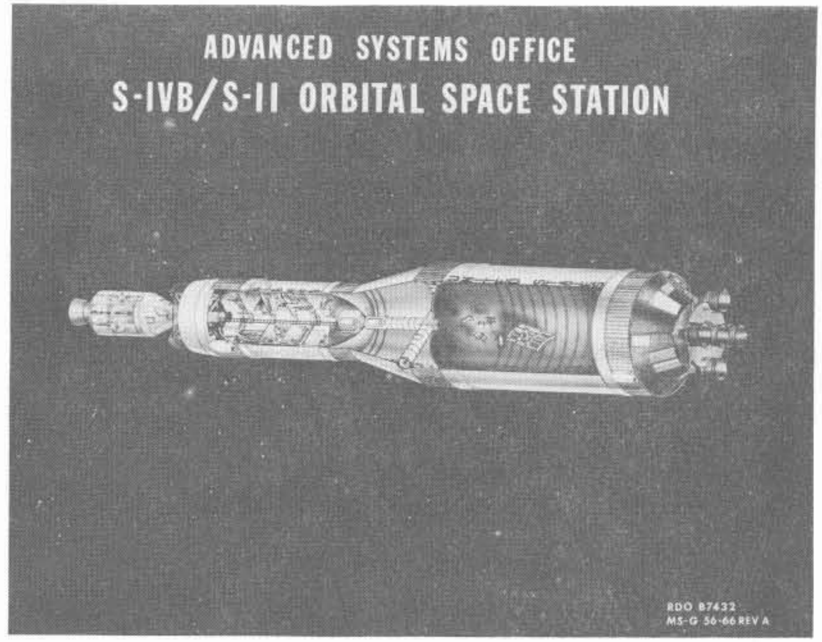
- NUCLEAR AND ISOTOPE POWER SUPPLIES (MEGAWATT)
- GUIDANCE AND CONTROL (CONTROLLED LANDINGS AT DESIRED LOCATIONS ON OTHER PLANETS)
- COMMUNICATIONS (WIDE BAND COMMUNICATIONS WITH PLANETARY VEHICLES)
- STABILIZATION
- PERMANENT LIFE SUPPORT SYSTEMS
- RELIABILITY

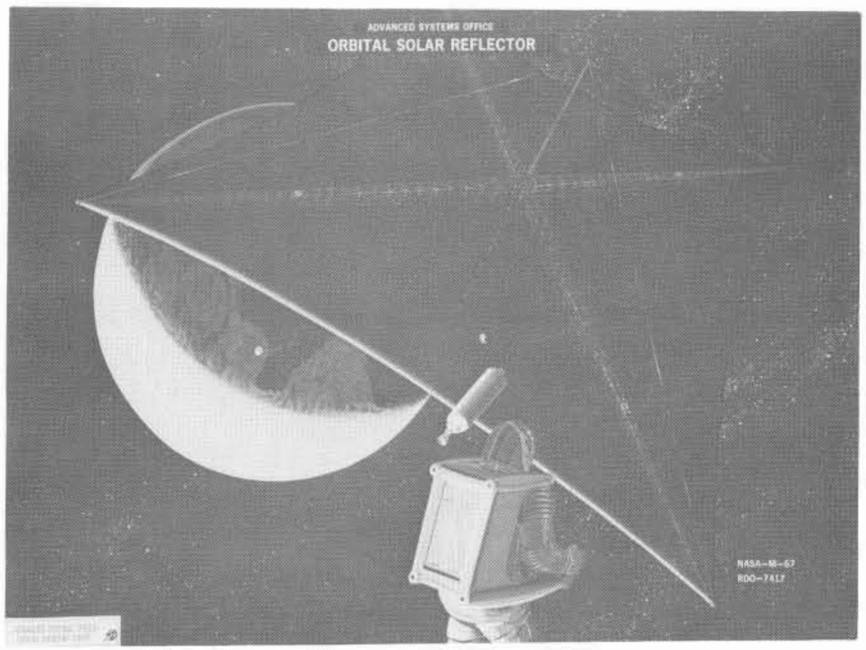
RDO D7109

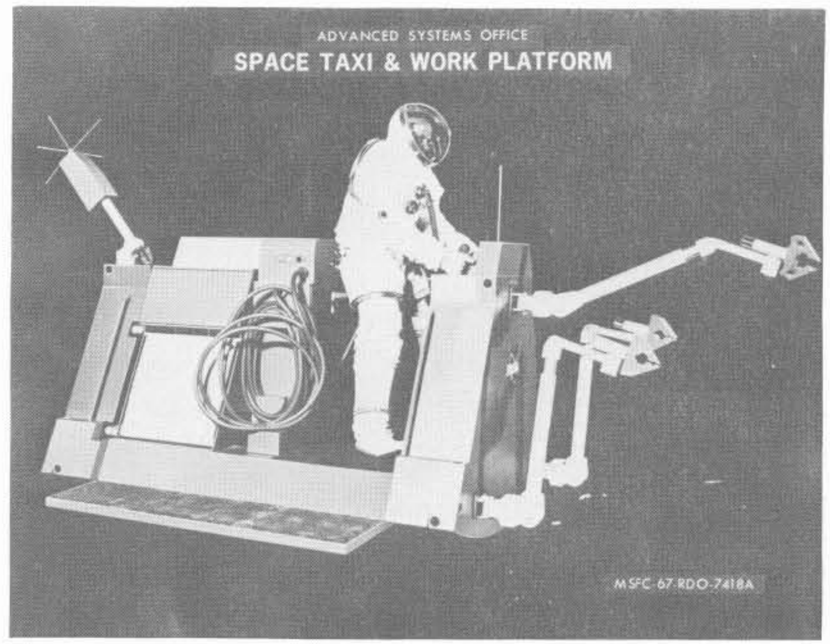


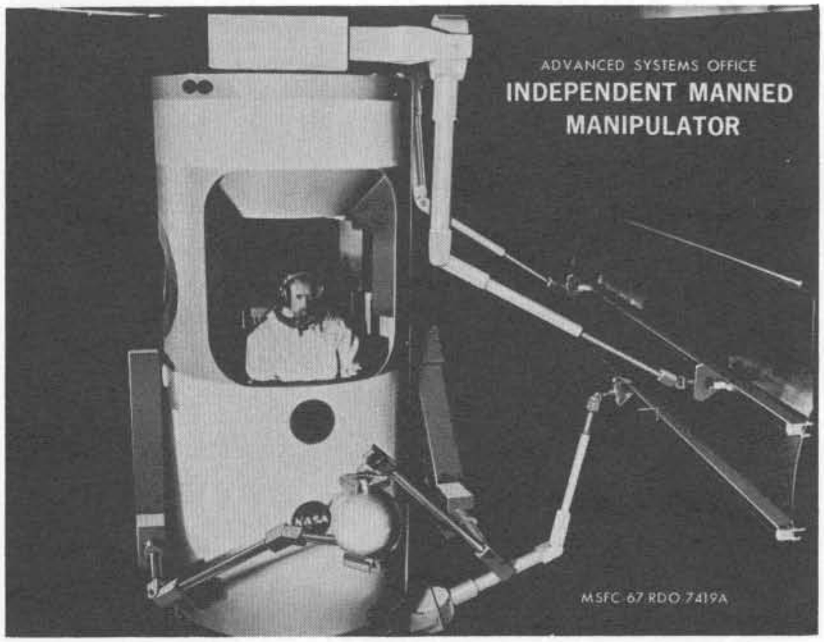
MARSHALL SPACE FLIGHT CENTER
ADVANCED SYSTEMS OFFICE
EARTH ORBITAL STUDIES IN PROGRESS

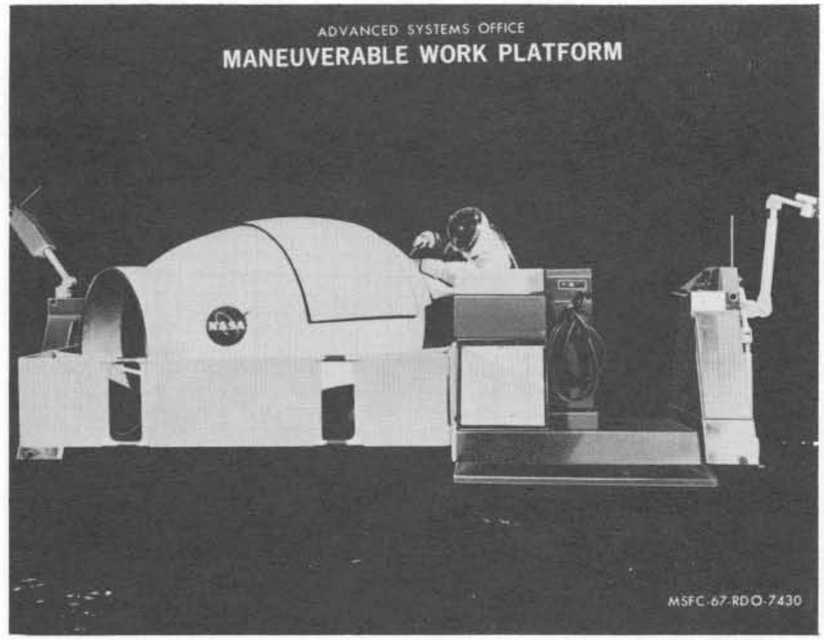
REF. NO.	TITLE	CODE	FY FUNDED	FUND AMT. $10³	CONTR.	CONTR. NO. NAS 8	C.O.R.
1	HUMAN ENGINEERING CRITERIA FOR M/R OF ADV. SPACE SYS	127-51-04 127-51-04	66 67	99 80	GE	18117	HILCHEY
2	ORBITAL ASTRONOMY SUPT. FAC.	981-10-10	66	300	DAC	21023	OLIVIER
3	LARGE SPACE STRUCTURES EXPERIMENTS FOR AAP	981-10-30	66	275	GD/C	18118	CAREY
4	EVEA PROGRAM REQMT'S ON EARLY EXPERIMENTS	981-10-30	66	245	NAA	18128	WHIT-ACRE

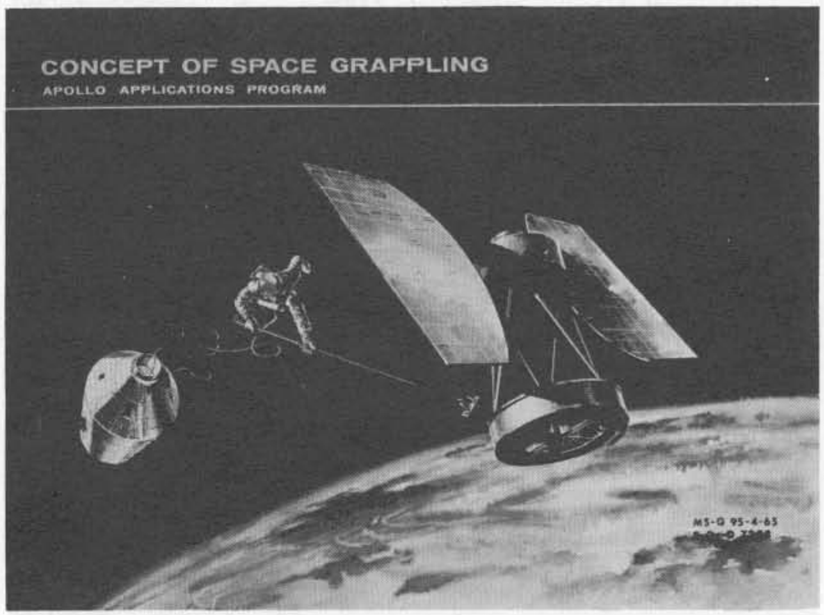


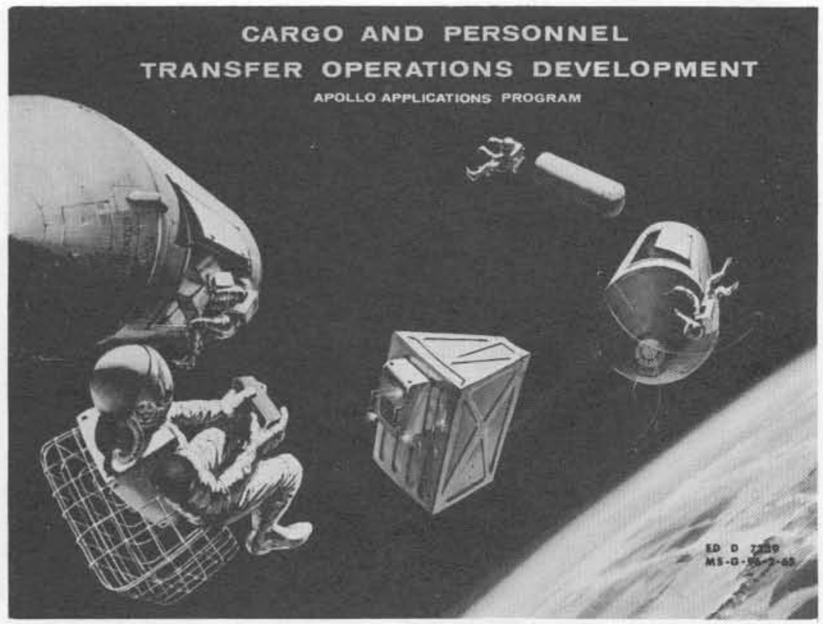


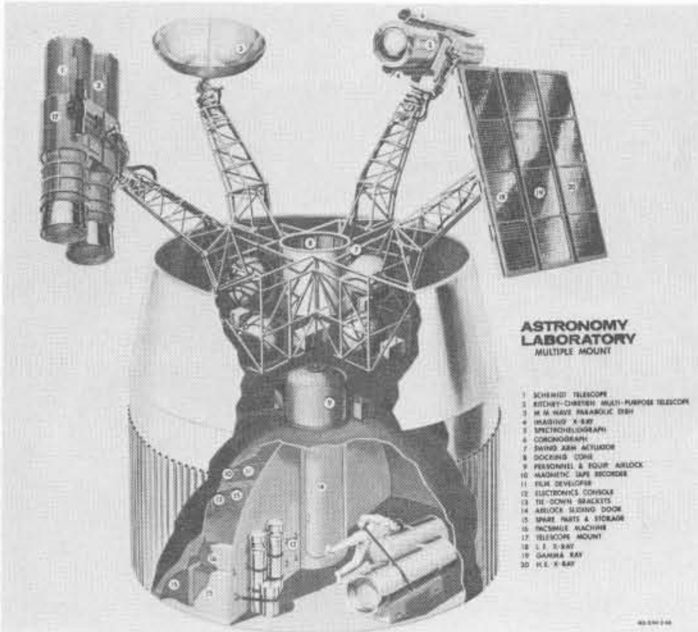


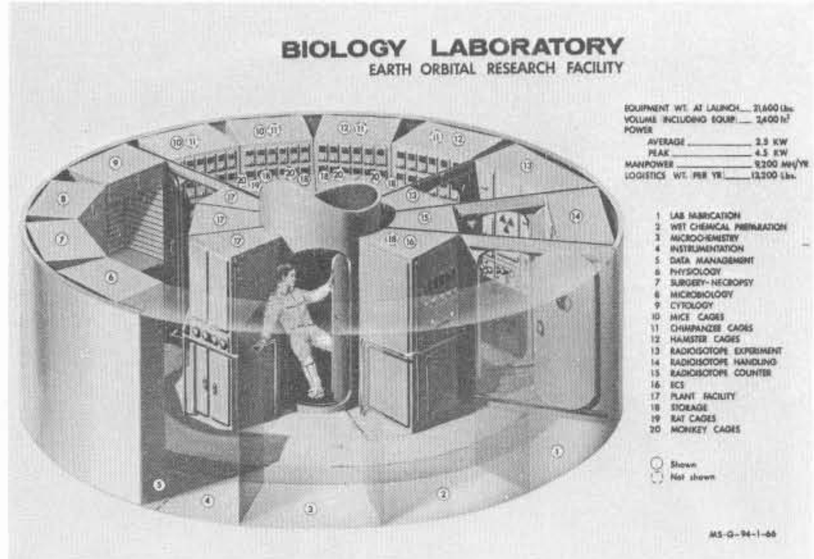

ADVANCED SYSTEMS OFFICE
INDEPENDENT MANNED MANIPULATOR
MSFC-67-RDO-7419A

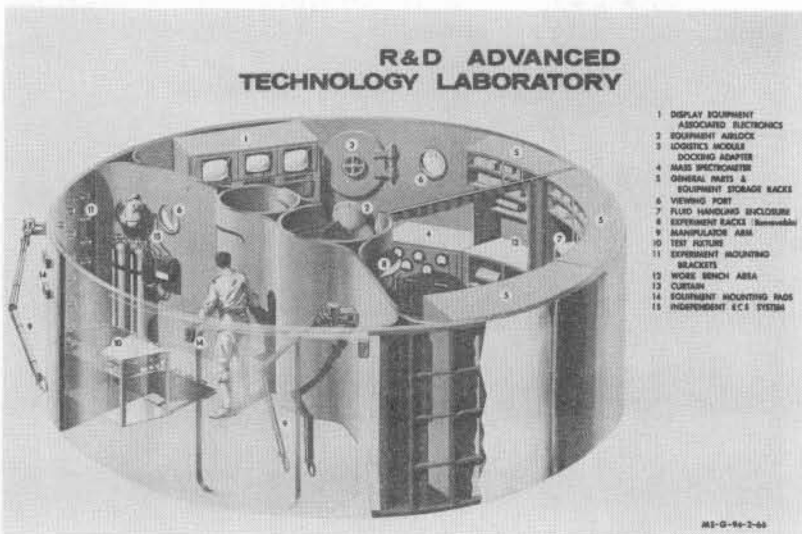

ADVANCED SYSTEMS OFFICE
MANEUVERABLE WORK PLATFORM
MSFC-67-RDO-7430

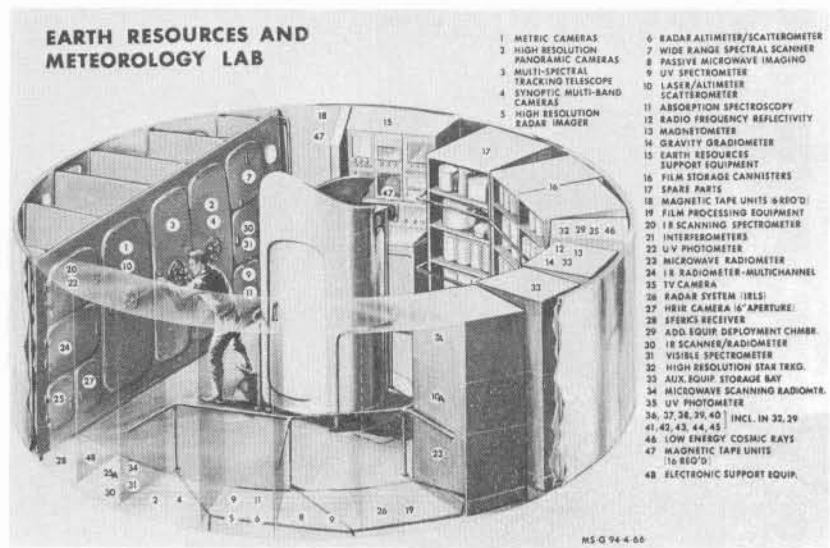

CONCEPT OF SPACE GRAPPLING
APOLLO APPLICATIONS PROGRAM
MS-G 95-4-65

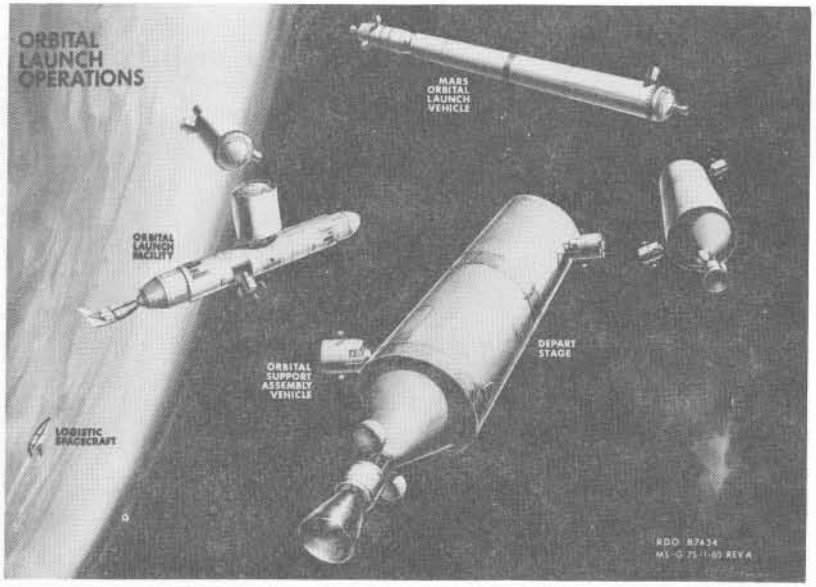

CARGO AND PERSONNEL
TRANSFER OPERATIONS DEVELOPMENT
APOLLO APPLICATIONS PROGRAM

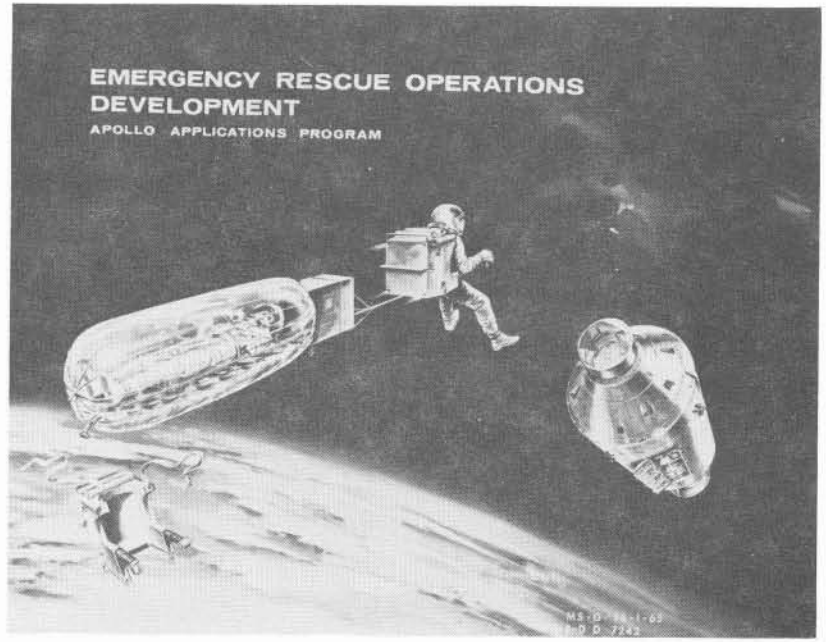

ASTRONOMY LABORATORY
MULTIPLE MOUNT
1 SCHMIDT TELESCOPE
2 RITCHEY-CHRETIEN MULTI-PURPOSE TELESCOPE
3 M M WAVE PARABOLIC DISH
4 IMAGING X-RAY
5 SPECTROHELIOGRAPH
6 CORONOGRAPH
7 SWING ARM ACTUATOR
8 DOCKING CONE
9 PERSONNEL & EQUIP. AIRLOCK
10 MAGNETIC TAPE RECORDER
11 FILM DEVELOPER
12 ELECTRONICS CONSOLE
13 TIE-DOWN BRACKETS
14 AIRLOCK SLIDING DOOR
15 SPARE PARTS & STORAGE
16 FACSIMILE MACHINE
17 TELESCOPE MOUNT
18 L.E. X-RAY
19 GAMMA RAY
20 H.E. X-RAY

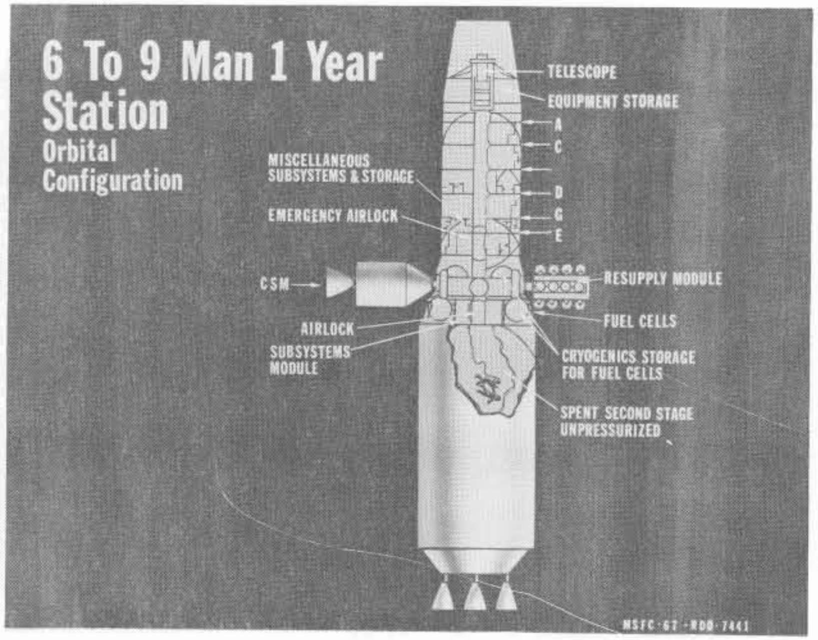

BIOLOGY LABORATORY
EARTH ORBITAL RESEARCH FACILITY
EQUIPMENT WT. AT LAUNCH ___ 21,600 Lbs.
VOLUME INCLUDING EQUIP. ___ 2,400 ft³
POWER
AVERAGE ___ 2.5 KW
PEAK ___ 4.5 KW
MANPOWER ___ 9,200 MH/YR
LOGISTICS WT. PER YR ___ 13,200 Lbs.
1 LAB FABRICATION
2 WET CHEMICAL PREPARATION
3 MICROCHEMISTRY
4 INSTRUMENTATION
5 DATA MANAGEMENT
6 PHYSIOLOGY
7 SURGERY-NECROPSY
8 MICROBIOLOGY
9 CYTOLOGY
10 MICE CAGES
11 CHIMPANZEE CAGES
12 HAMSTER CAGES
13 RADIOISOTOPE EXPERIMENT
14 RADIOISOTOPE HANDLING
15 RADIOISOTOPE COUNTER
16 ECS
17 PLANT FACILITY
18 STORAGE
19 RAT CAGES
20 MONKEY CAGES
Shown
Not shown
MS-G-94-1-66

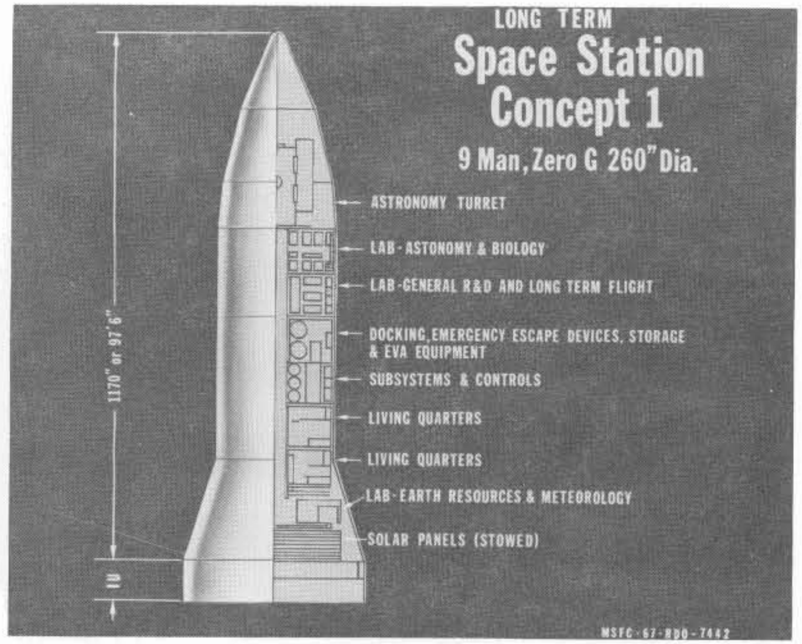

R&D ADVANCED TECHNOLOGY LABORATORY
1 DISPLAY EQUIPMENT ASSOCIATED ELECTRONICS
2 EQUIPMENT AIRLOCK
3 LOGISTICS MODULE DOCKING ADAPTER
4 MASS SPECTROMETER
5 GENERAL PARTS & EQUIPMENT STORAGE RACKS
6 VIEWING PORT
7 FLUID HANDLING ENCLOSURE
8 EXPERIMENT RACKS (Removable)
9 MANIPULATOR ARM
10 TEST FIXTURE
11 EXPERIMENT MOUNTING BRACKETS
12 WORK BENCH AREA
13 CURTAIN
14 EQUIPMENT MOUNTING PADS
15 INDEPENDENT E C S SYSTEM


EARTH RESOURCES AND METEOROLOGY LAB
1 METRIC CAMERAS
2 HIGH RESOLUTION PANORAMIC CAMERAS
3 MULTI-SPECTRAL TRACKING TELESCOPE
4 SYNOPTIC MULTI-BAND CAMERAS
5 HIGH RESOLUTION RADAR IMAGER
6 RADAR ALTIMETER/SCATTEROMETER
7 WIDE RANGE SPECTRAL SCANNER
8 PASSIVE MICROWAVE IMAGING
9 UV SPECTROMETER
10 LASER/ALTIMETER SCATTEROMETER
11 ABSORPTION SPECTROSCOPY
12 RADIO FREQUENCY REFLECTIVITY
13 MAGNETOMETER
14 GRAVITY GRADIOMETER
15 EARTH RESOURCES SUPPORT EQUIPMENT
16 FILM STORAGE CANNISTERS
17 SPARE PARTS
18 MAGNETIC TAPE UNITS (6 REQ'D)
19 FILM PROCESSING EQUIPMENT
20 I R SCANNING SPECTROMETER
21 INTERFEROMETERS
22 U V PHOTOMETER
23 MICROWAVE RADIOMETER
24 I R RADIOMETER-MULTICHANNEL
25 TV CAMERA
26 RADAR SYSTEM (IRLS)
27 HRIR CAMERA (6" APERTURE)
28 SFERICS RECEIVER
29 ADD. EQUIP. DEPLOYMENT CHMBR.
30 IR SCANNER/RADIOMETER
31 VISIBLE SPECTROMETER
32 HIGH RESOLUTION STAR TRKG.
33 AUX. EQUIP. STORAGE BAY
34 MICROWAVE SCANNING RADIOMTR.
35 UV PHOTOMETER
36, 37, 38, 39, 40 41, 42, 43, 44, 45 INCL. IN 32, 29
46 LOW ENERGY COSMIC RAYS
47 MAGNETIC TAPE UNITS (16 REQ'D)
48 ELECTRONIC SUPPORT EQUIP.
MS-G 94-4-66

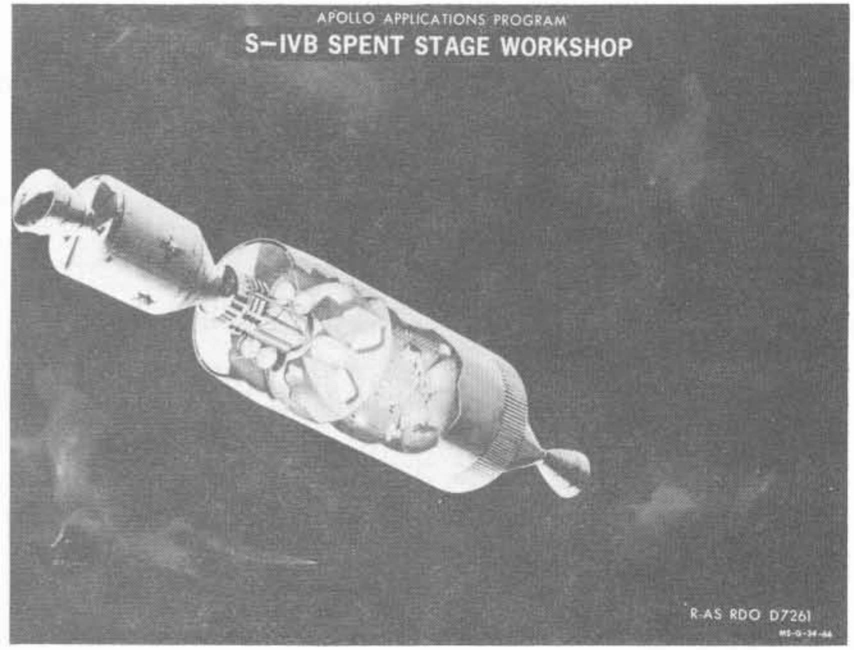

ORBITAL
LAUNCH
OPERATIONS
MARS
ORBITAL
LAUNCH
VEHICLE
ORBITAL
LAUNCH
FACILITY
DEPART
STAGE
ORBITAL
SUPPORT
ASSEMBLY
VEHICLE
LOGISTIC
SPACECRAFT
RDO 87434

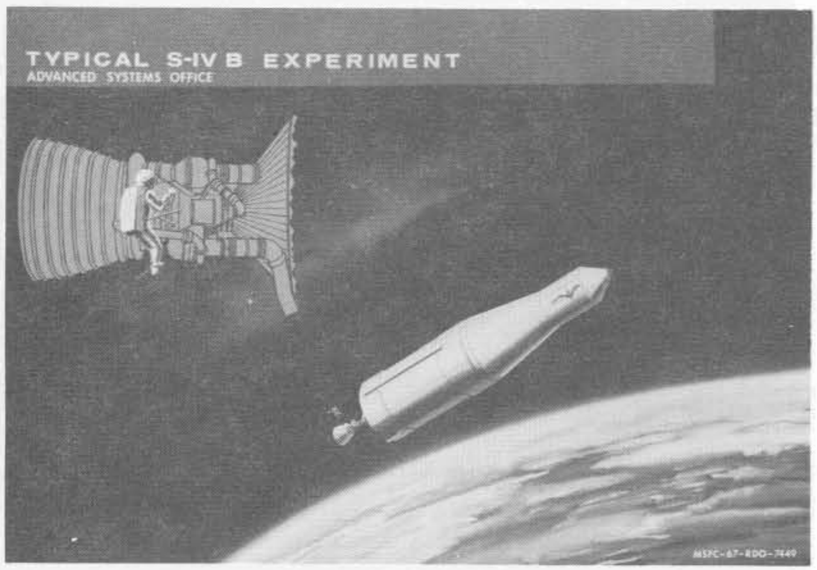

EMERGENCY RESCUE OPERATIONS
DEVELOPMENT
APOLLO APPLICATIONS PROGRAM

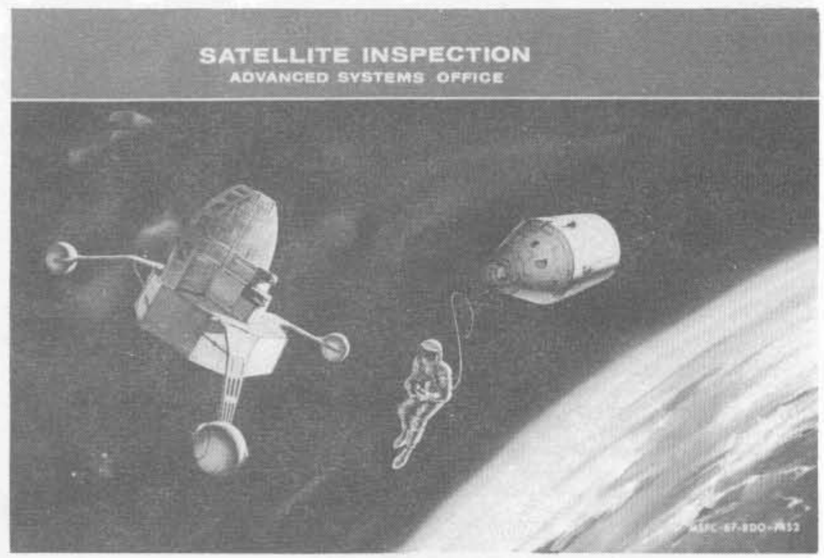

6 To 9 Man 1 Year
Station
Orbital
Configuration
TELESCOPE
EQUIPMENT STORAGE
A
C
MISCELLANEOUS
SUBSYSTEMS & STORAGE
D
G
E
EMERGENCY AIRLOCK
CSM
RESUPPLY MODULE
FUEL CELLS
AIRLOCK
SUBSYSTEMS
MODULE
CRYOGENICS STORAGE
FOR FUEL CELLS
SPENT SECOND STAGE
UNPRESSURIZED
MSFC-67-RDO-7441

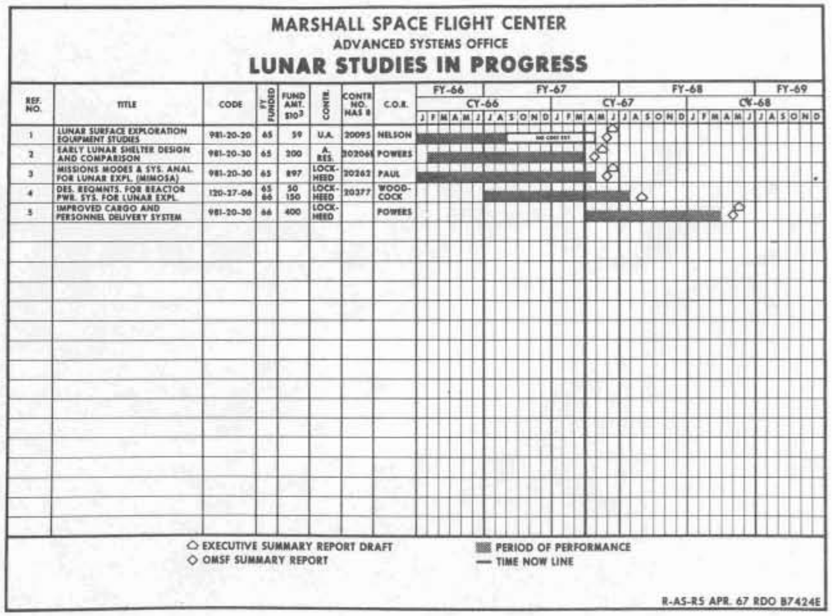

LONG TERM
Space Station
Concept 1
9 Man, Zero G 260" Dia.
ASTRONOMY TURRET
LAB-ASTONOMY & BIOLOGY
LAB-GENERAL R&D AND LONG TERM FLIGHT
DOCKING, EMERGENCY ESCAPE DEVICES, STORAGE
& EVA EQUIPMENT
SUBSYSTEMS & CONTROLS
LIVING QUARTERS
LIVING QUARTERS
LAB-EARTH RESOURCES & METEOROLOGY
SOLAR PANELS (STOWED)
1170" or 97' 6"
IU
MSFC-67-RDO-7442

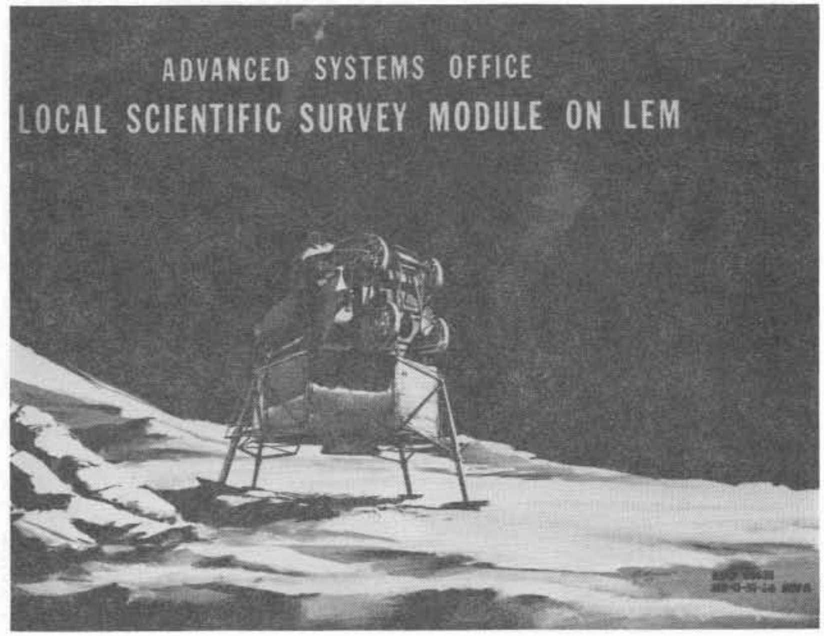

EARTH/LUNAR ORBITAL SPACECRAFT
ADVANCED SYSTEMS OFFICE
MSFC-67-RDO-7446

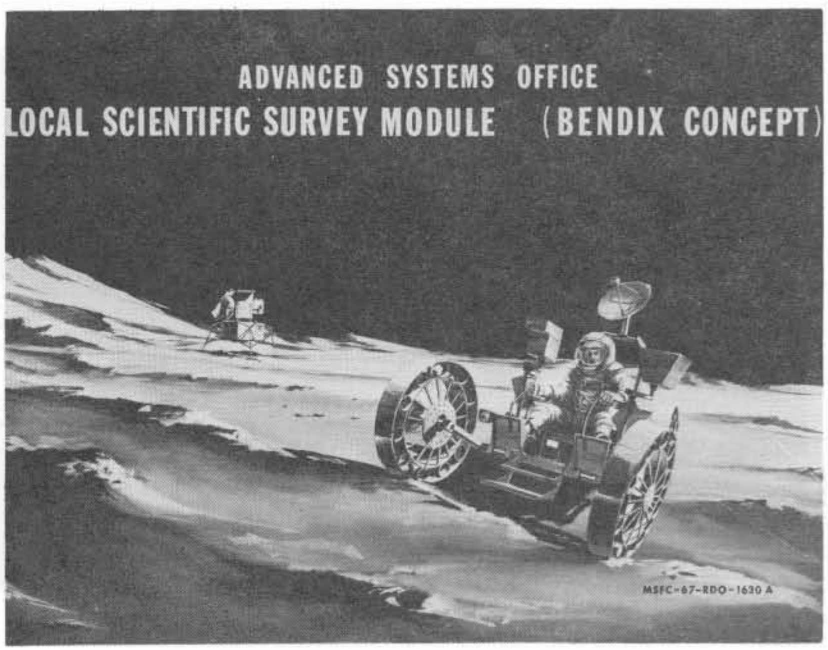

APOLLO APPLICATIONS PROGRAM
S-IVB SPENT STAGE WORKSHOP
R-AS RDO D7261

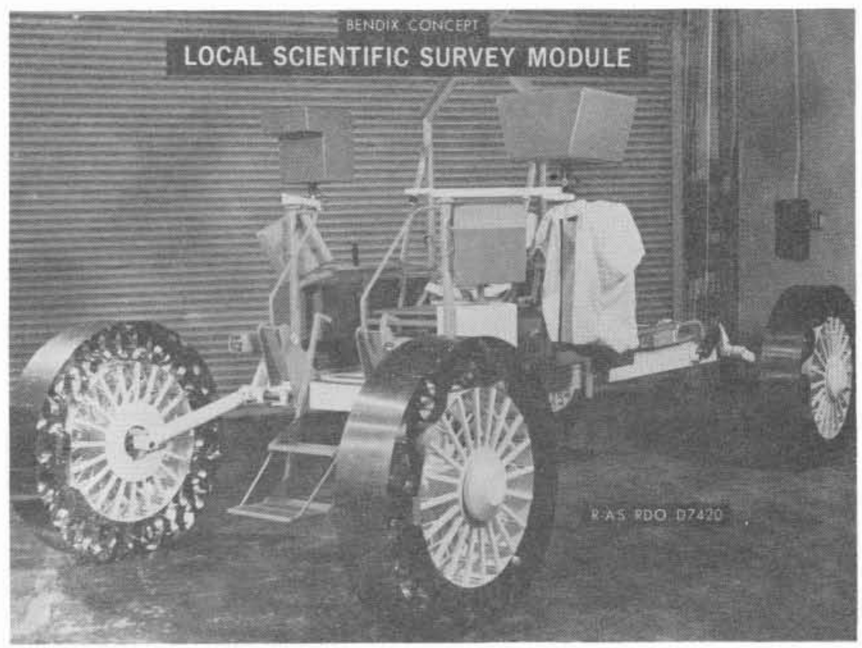

TYPICAL S-IV B EXPERIMENT
ADVANCED SYSTEMS OFFICE
MSFC-67-RDO-7449

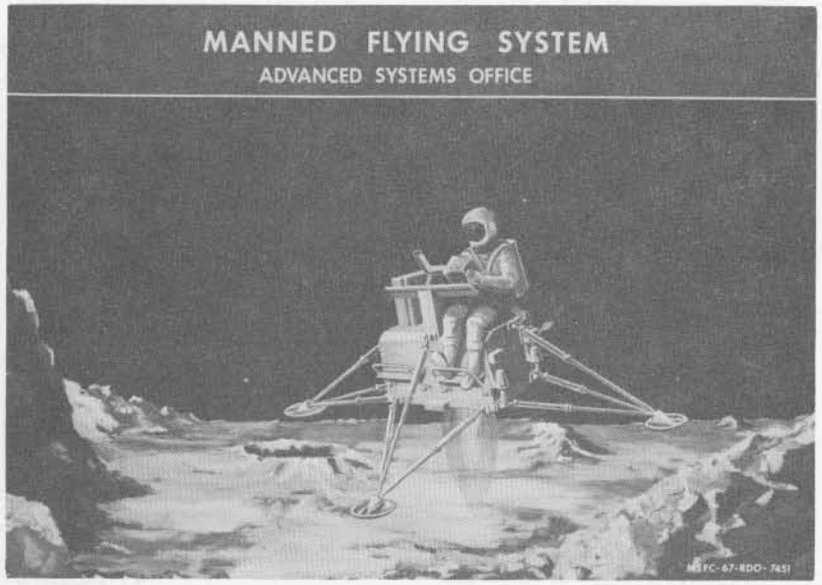

SATELLITE INSPECTION
ADVANCED SYSTEMS OFFICE

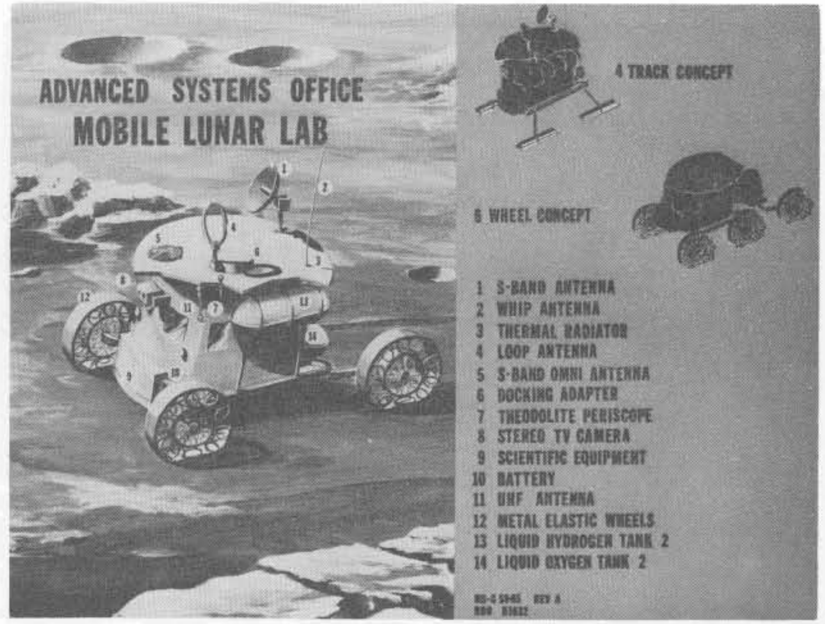

MARSHALL SPACE FLIGHT CENTER
ADVANCED SYSTEMS OFFICE
LUNAR STUDIES IN PROGRESS
REF. NO.
TITLE
CODE
FY FUNDED
FUND AMT. $10³
CONTR.
CONTR NO. NAS 8
C.O.R.
FY-66
FY-67
FY-68
FY-69
CY-66
CY-67
CY-68
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1 LUNAR SURFACE EXPLORATION EQUIPMENT STUDIES 981-20-20 65 59 U.A. 20095 NELSON
2 EARLY LUNAR SHELTER DESIGN AND COMPARISON 981-20-30 65 200 A. RES. 20206 POWERS
3 MISSIONS MODES & SYS. ANAL. FOR LUNAR EXPL. (MIMOSA) 981-20-30 65 897 LOCK-HEED 20262 PAUL
4 DES. REQMNTS. FOR REACTOR PWR. SYS. FOR LUNAR EXPL. 120-27-06 65 66 50 150 LOCK-HEED 20377 WOOD-COCK
5 IMPROVED CARGO AND PERSONNEL DELIVERY SYSTEM 981-20-30 66 400 LOCK-HEED POWERS
EXECUTIVE SUMMARY REPORT DRAFT
OMSF SUMMARY REPORT
PERIOD OF PERFORMANCE
TIME NOW LINE
R-AS-RS APR. 67 RDO B7424E

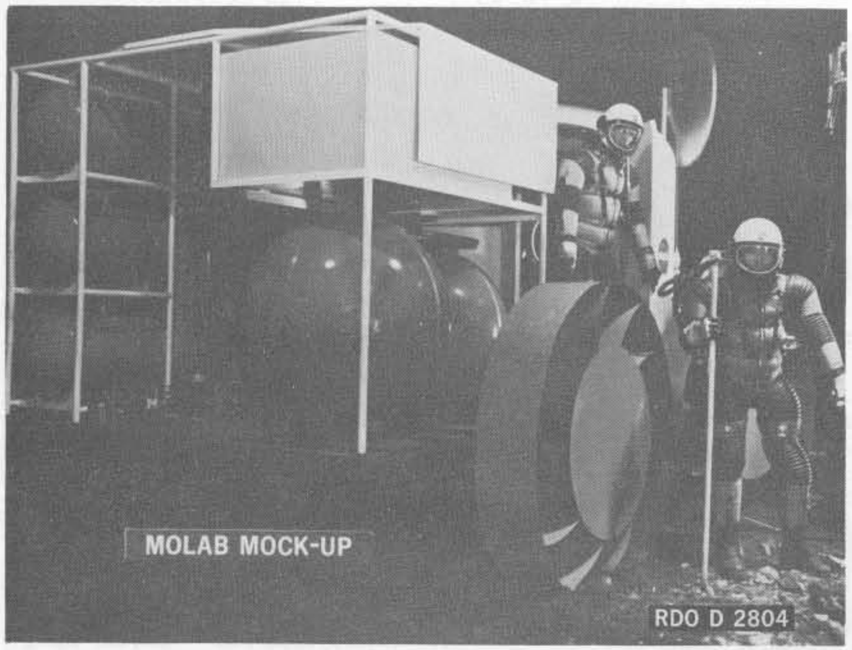

ADVANCED SYSTEMS OFFICE
LOCAL SCIENTIFIC SURVEY MODULE ON LEM

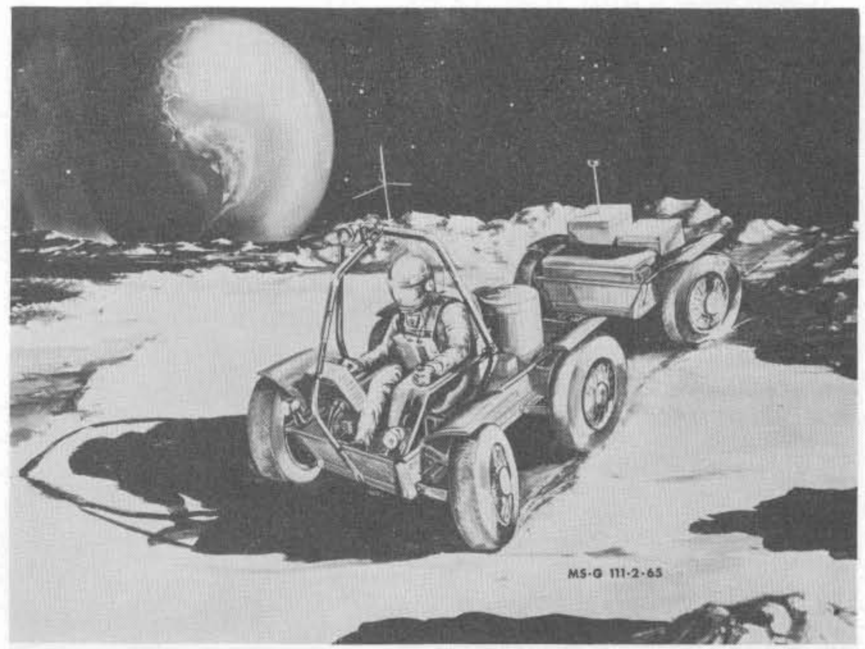

ADVANCED SYSTEMS OFFICE
LOCAL SCIENTIFIC SURVEY MODULE (BENDIX CONCEPT)
MSFC-67-RDO-1630 A


BENDIX CONCEPT
LOCAL SCIENTIFIC SURVEY MODULE
R-AS RDO D7420

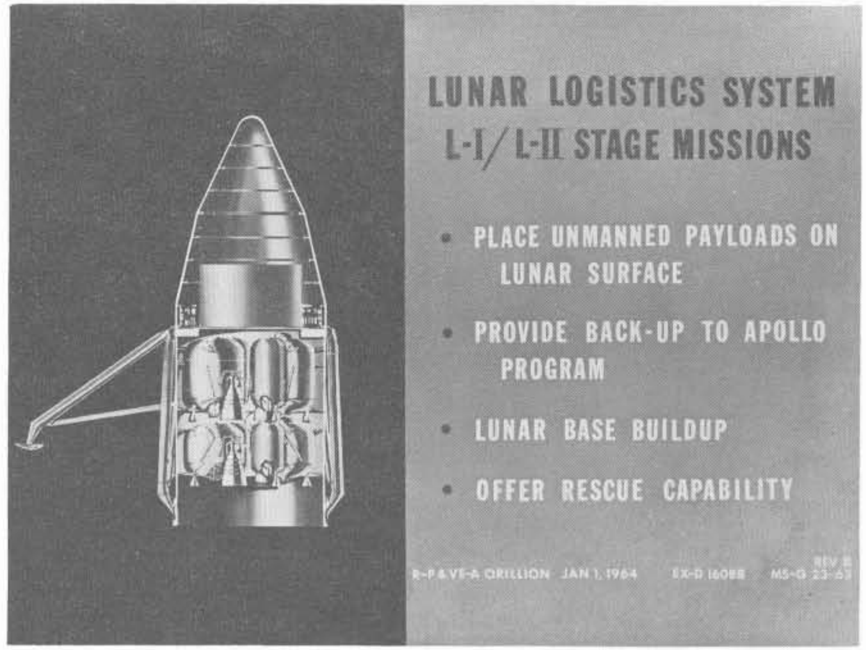

MANNED FLYING SYSTEM
ADVANCED SYSTEMS OFFICE
MSFC-67-RDO-7451

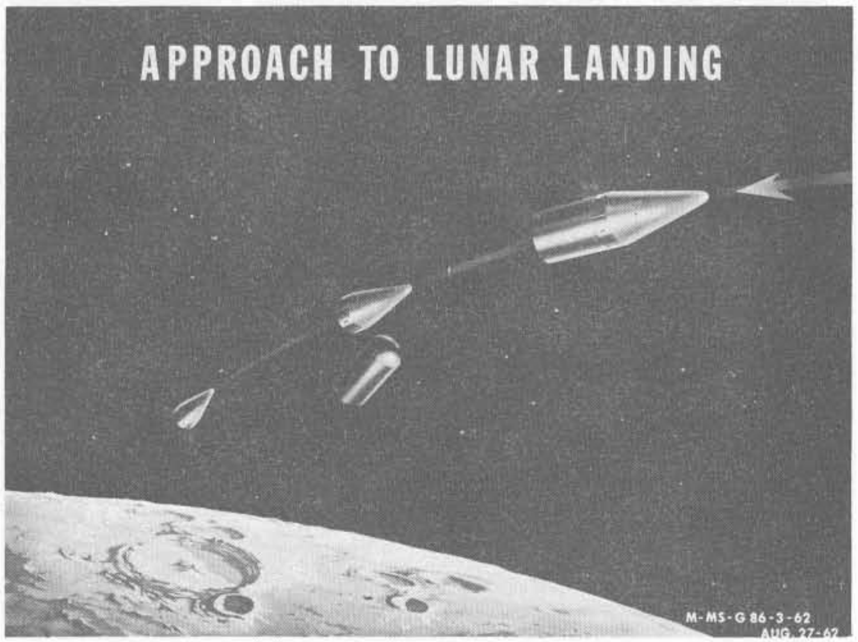

ADVANCED SYSTEMS OFFICE
MOBILE LUNAR LAB
4 TRACK CONCEPT
6 WHEEL CONCEPT
1 S-BAND ANTENNA
2 WHIP ANTENNA
3 THERMAL RADIATOR
4 LOOP ANTENNA
5 S-BAND OMNI ANTENNA
6 DOCKING ADAPTER
7 THEODOLITE PERISCOPE
8 STEREO TV CAMERA
9 SCIENTIFIC EQUIPMENT
10 BATTERY
11 UHF ANTENNA
12 METAL ELASTIC WHEELS
13 LIQUID HYDROGEN TANK 2
14 LIQUID OXYGEN TANK 2


MOLAB MOCK-UP
RDO D 2804


MS-G 111-2-65

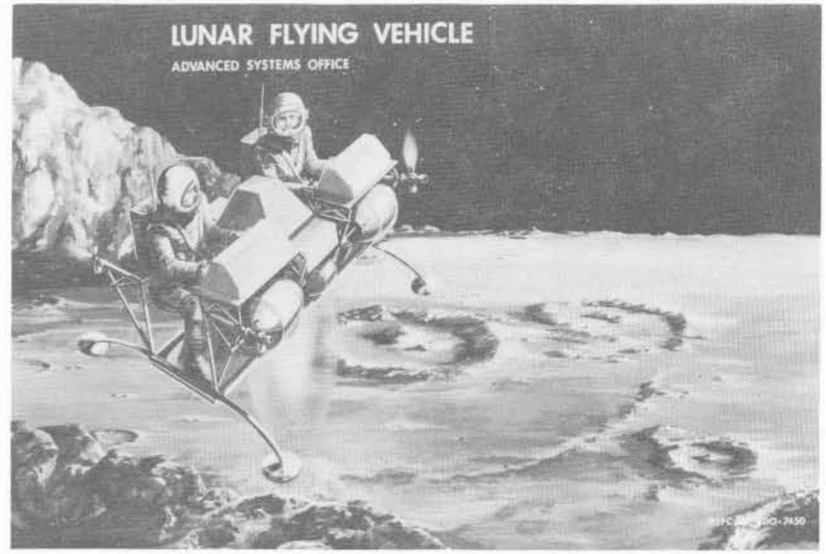

LUNAR LOGISTICS SYSTEM
MISSIONS
PLACE UNMANNED PAYLOADS ON THE LUNAR SURFACE PRIOR TO OR AFTER MANNED LANDING
PROVIDE BACK UP TO THE APOLLO PROGRAM
OFFER RESCUE CAPABILITY
LUNAR BASE BUILDUP
REV. C
R-P&VE.ORILLION DEC 10.63 EX-D 1600 B

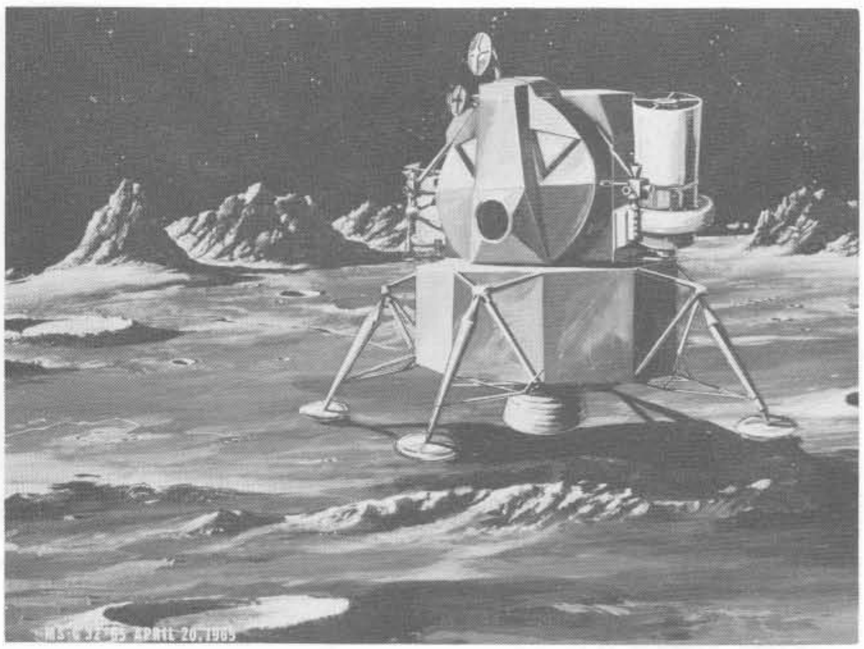

LUNAR LOGISTICS SYSTEM
L-I/L-II STAGE MISSIONS
• PLACE UNMANNED PAYLOADS ON LUNAR SURFACE
• PROVIDE BACK-UP TO APOLLO PROGRAM
• LUNAR BASE BUILDUP
• OFFER RESCUE CAPABILITY
R-P&VE-A ORILLION JAN 1, 1964

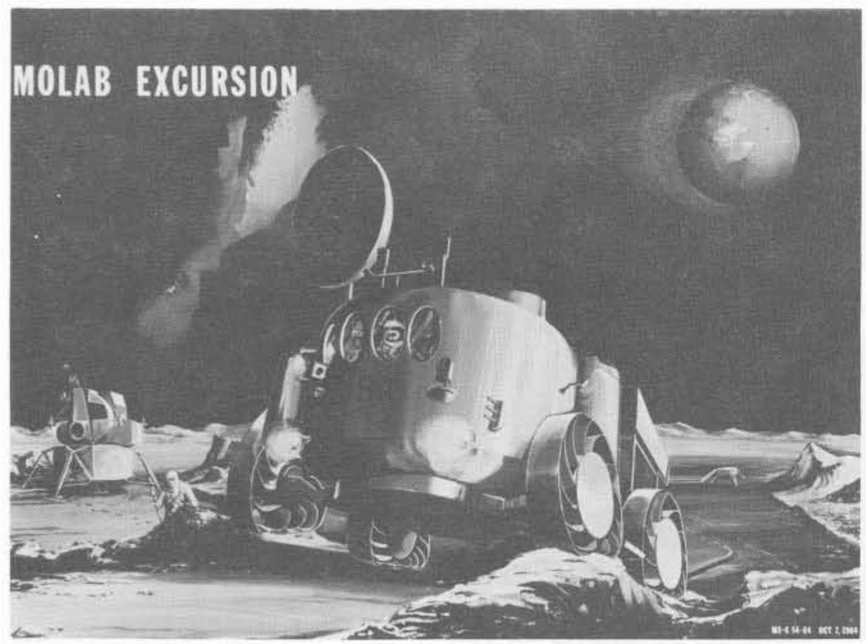

APPROACH TO LUNAR LANDING
M-MS-G 86-3-62
AUG. 27-62


CARGO LANDING

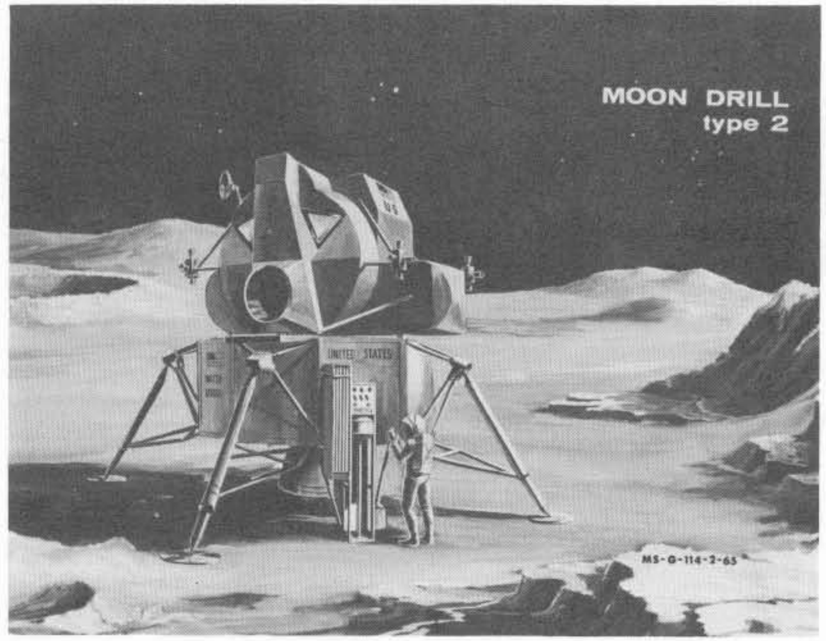

MS-G 55-66

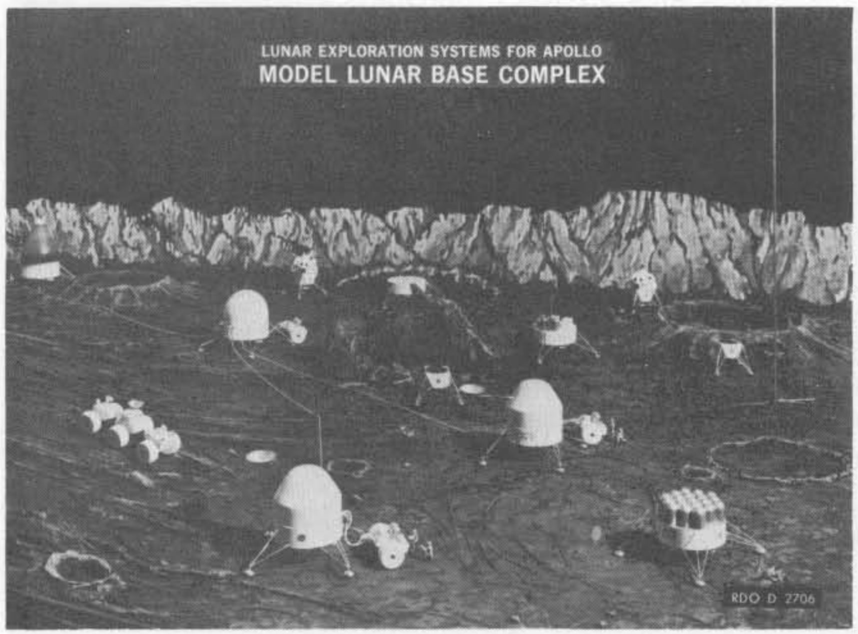

LUNAR FLYING VEHICLE
ADVANCED SYSTEMS OFFICE

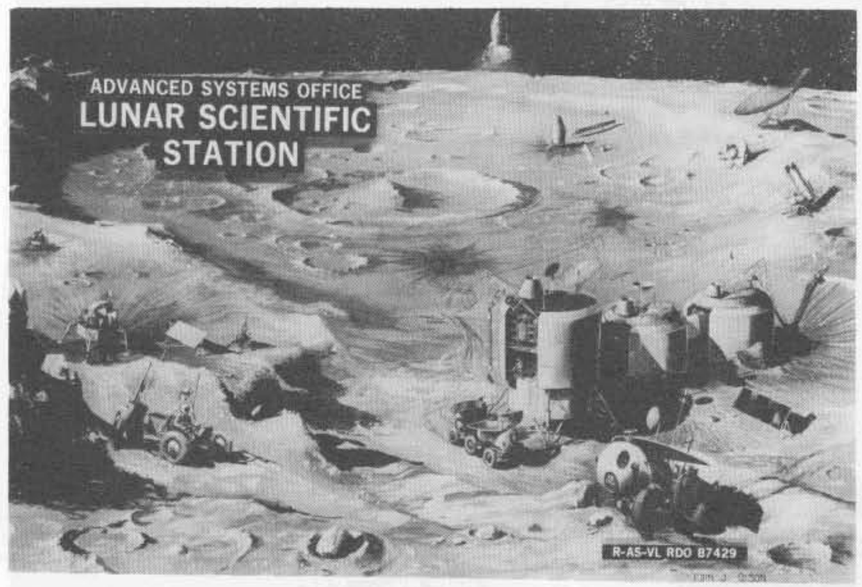

APRIL 20, 1965

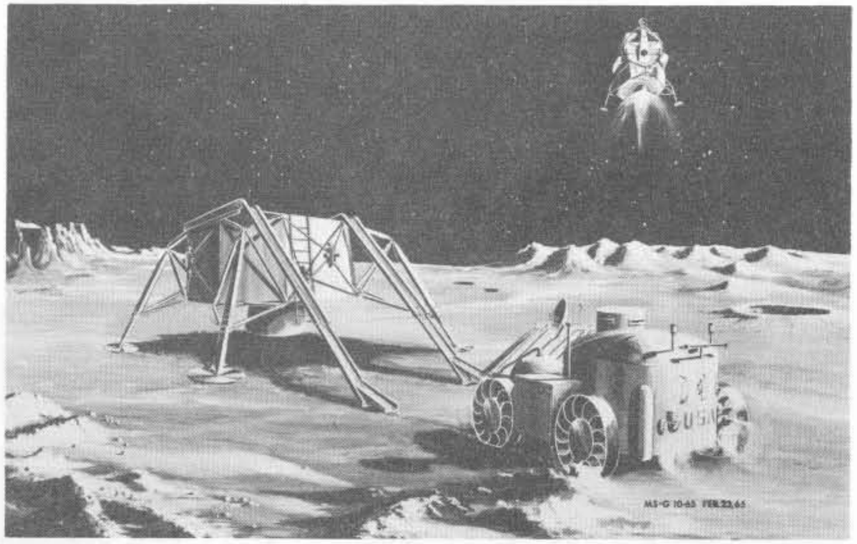

MOLAB EXCURSION

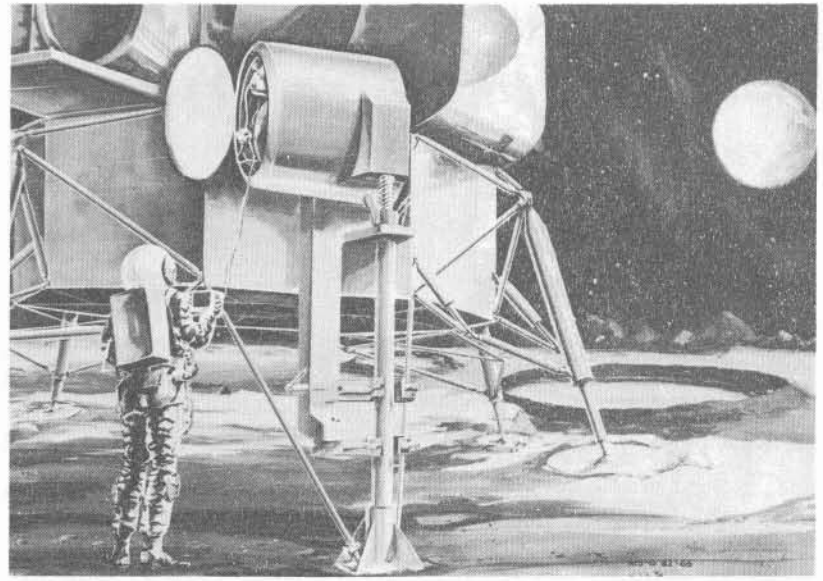

MOON DRILL
type 1
MS-G-114-1-65

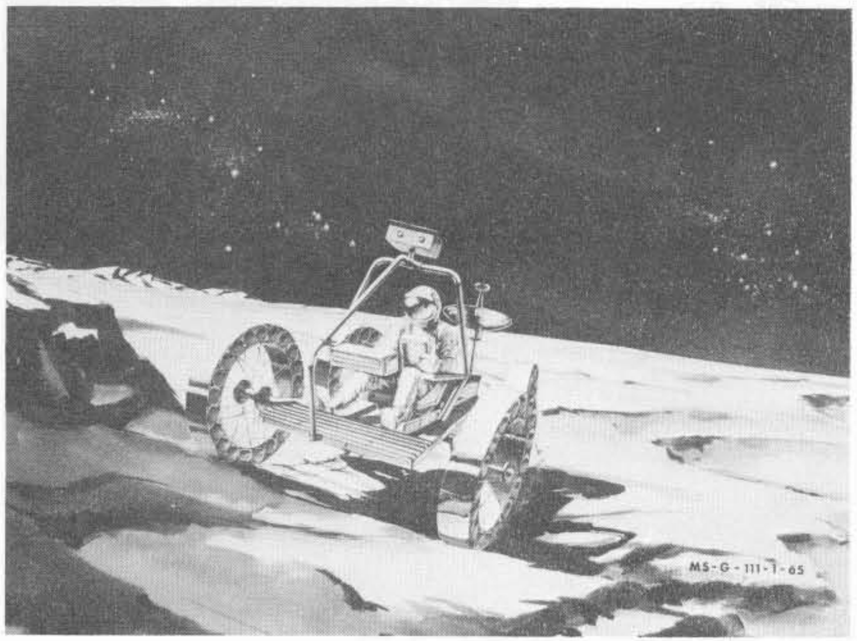

MOON DRILL
type 2
UNITED STATES
MS-G-114-2-65

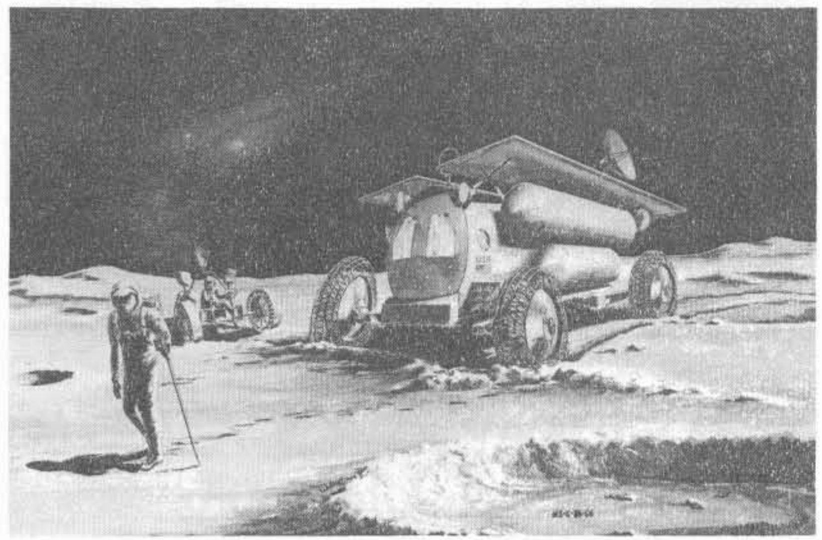

LUNAR EXPLORATION SYSTEMS FOR APOLLO
MODEL LUNAR BASE COMPLEX
RDO D 2706

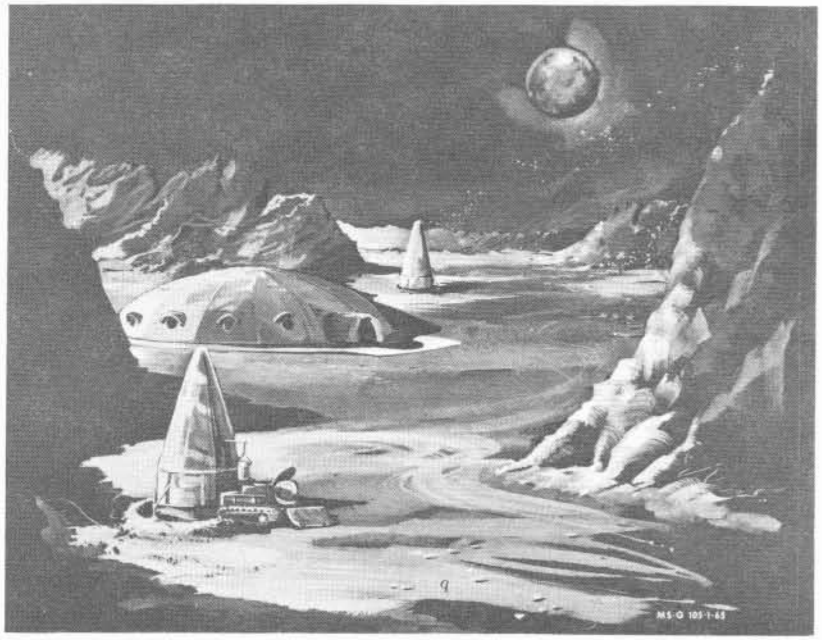

ADVANCED SYSTEMS OFFICE
LUNAR SCIENTIFIC
STATION
R-AS-VL RDO 87429

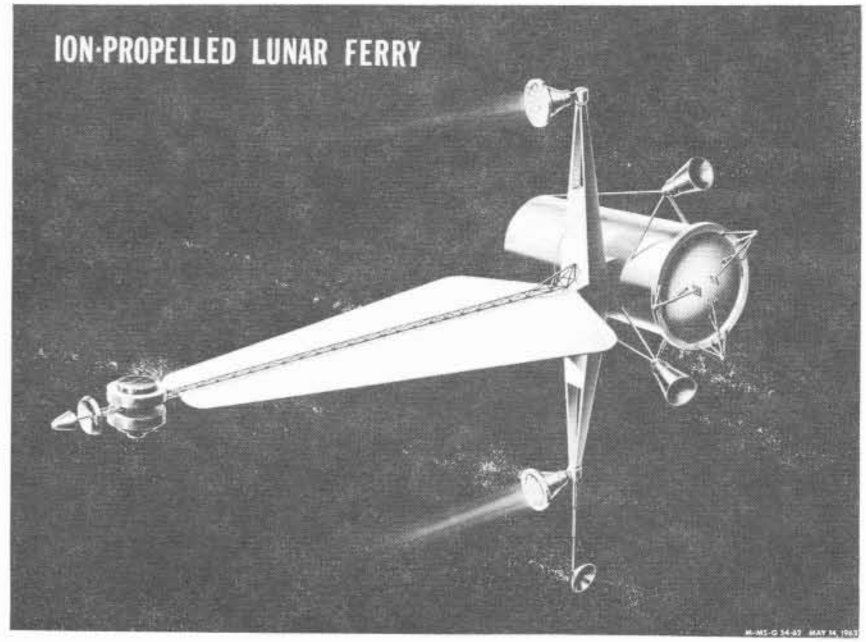

MS-G 10-65 FEB.23,65




MS-G-111-1-65




MS-G 105-1-65


ION-PROPELLED LUNAR FERRY

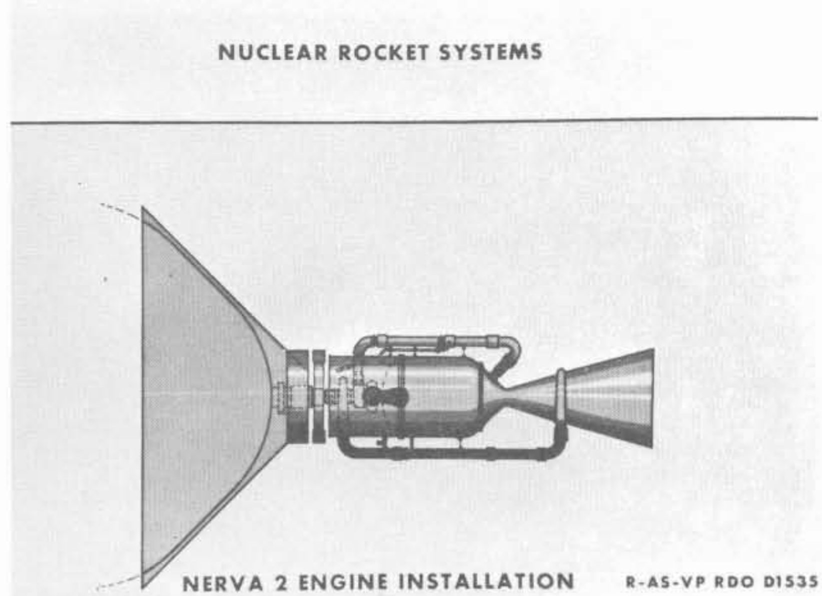
MARSHALL SPACE FLIGHT CENTER
ADVANCED SYSTEMS OFFICE
PLANETARY NUCLEAR STUDIES IN PROGRESS

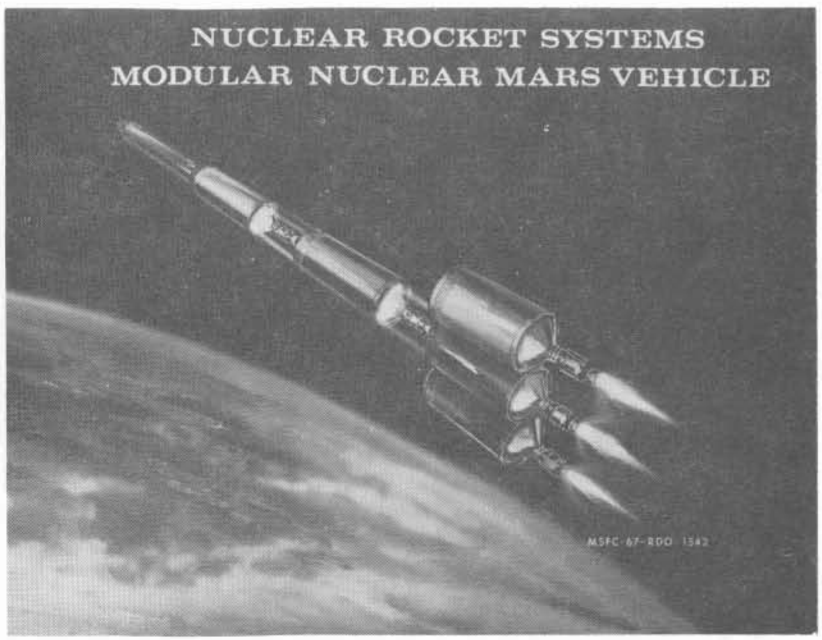
REF. NO.	TITLE	CODE	FY FUNDED	FUND AMT. $10³	CONTR.	CONTR. NO. NAS 8	C.O.R.
1	MISSION-ORIENTED STUDY OF NUCLEAR SYSTEM PARAMETERS	122-29-04	65	104	TRW	5371 MOD 6	HARRIS
2	MISSION-ORIENTED STUDY OF NUCLEAR SYSTEM PARAMETERS	789-30-01	66	64	TRW	5371 MOD 8	HARRIS
3	STUDY OF MOD. NUCLEAR TECH. PROBLEMS & SAFETY SYS. & MOD I	121-30-04	65	357	LOCK-HEED	20007	JORDAN SAXTON
	STUDY OF MOD. NUCLEAR TECH. PROBLEMS & SAFETY SYS. & MOD I	122-05-00	65	40	LOCK-HEED	20007 MOD 2	JORDAN SAXTON
	STUDY OF MOD. NUCLEAR TECH. PROBLEMS & SAFETY SYS. & MOD I	122-05-00	66	44	LOCK-HEED	20007 MOD 3	JORDAN SAXTON
	STUDY OF MOD. NUCLEAR TECH. PROBLEMS & SAFETY SYS. & MOD I	121-30-04	66	317	LOCK-HEED	20007 MOD 4	SAXTON
	STUDY OF MOD. NUCLEAR TECH. PROBLEMS & SAFETY SYS. & MOD I	122-05-00	66	104	LOCK-HEED	20007 MOD 6	SAXTON
4	MANNED PLANETARY FLYBY MISS. BASED ON SAT/APOLLO	981-30-20	66	400	NAA	18025	NOB-UTT
5	FEASIBILITY OF MOD. THE S-II FOR MANNED FLYBY MISSIONS	981-30-20	66	100	NAA	18021	ALLEN
6	FEASIBILITY OF MOD THE S-IVB FOR MANNED FLYBY MISSIONS	981-30-20	66	100	DAC	18032	ALLEN
7	ALTERNATIVE MISSION MODES	981-30-10	66	200	TRW	18056	AUSTIN
8	LOW ACCEL. SPACE TRANSP. SYS. (TRAJECTORY MODEL)	120-26-07	65	47	UNITED AIR	11309	RUSSELL
	LOW ACCEL. SPACE TRANSP. SYS. (TRAJECTORY MODEL)	120-26-07	66	73	UNITED AIR	11309 MOD 4	RUSSELL
9	LOW ACCEL. SPACE TRANSP. SYS. (HYBRID-STAGE)	789-30-01	66	148	G.E.	21030	RUSSELL
10	MISSION ENGR. STUDY OF ELEC. PROPELLED MANNED VEHICLES	981-30-10	66	183	G.E.	20372	RUSSELL

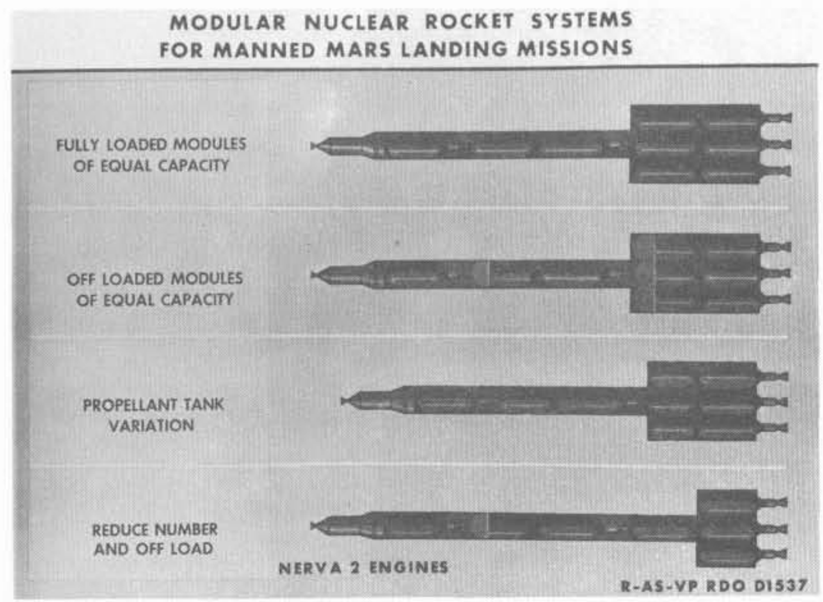
FY-66 FY-67 FY-68 FY-69
CY-66 CY-67 CY-68

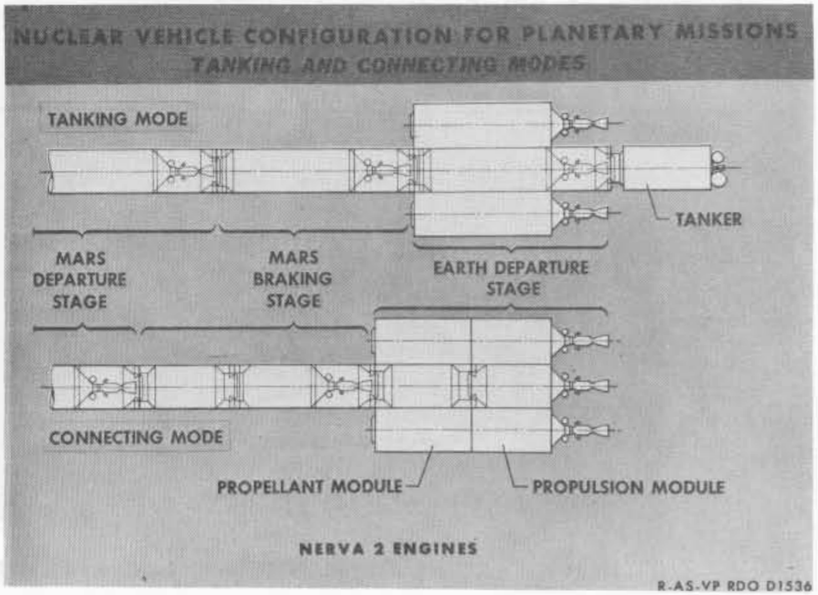
△ EXECUTIVE SUMMARY REPORT DRAFT
◇ OMSF SUMMARY REPORT
▬ PERIOD OF PERFORMANCE
— TIME NOW LINE

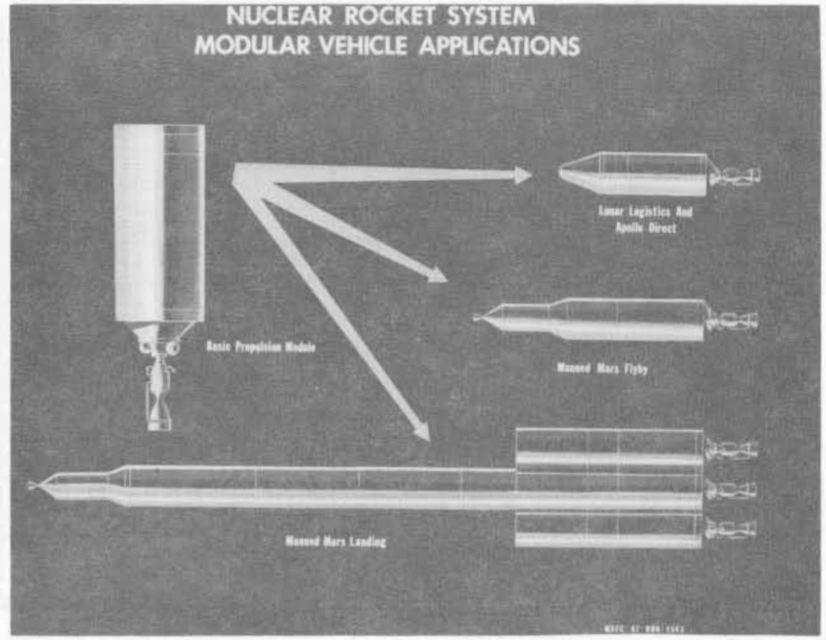
R-AS-R6 APR. 67 RDO B7425D

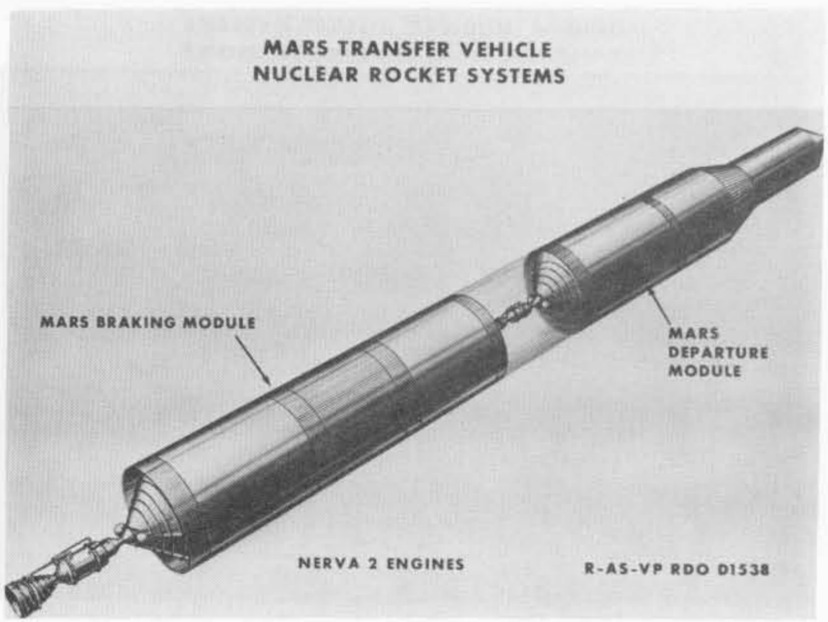


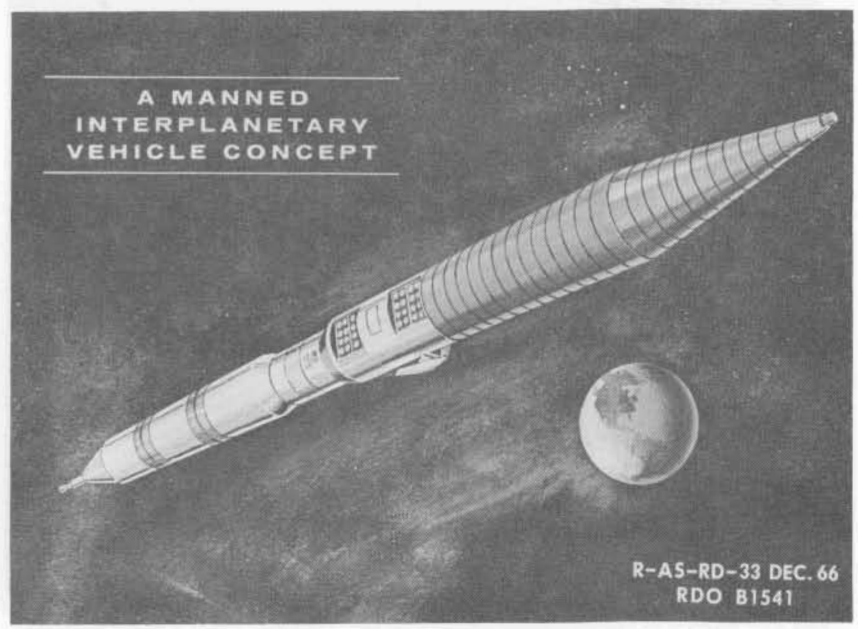


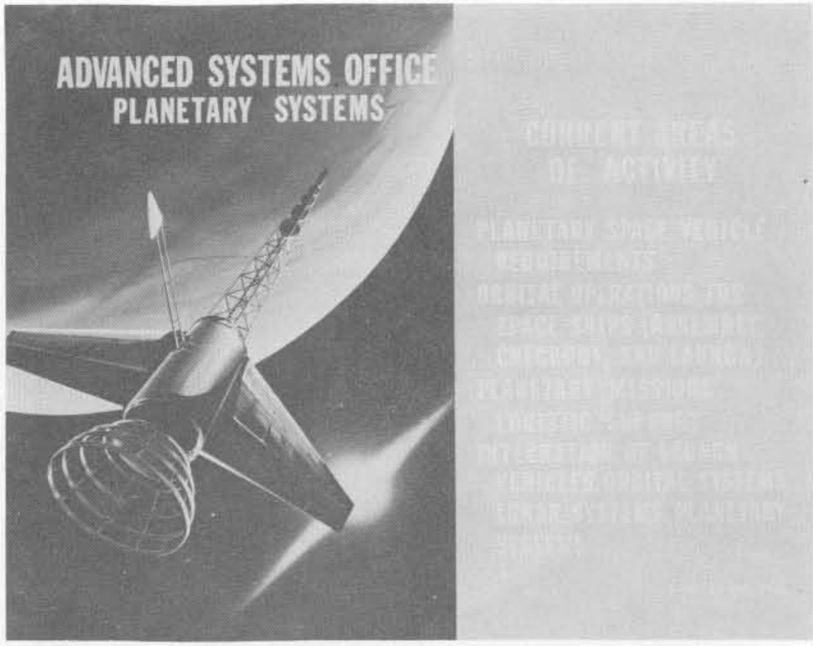


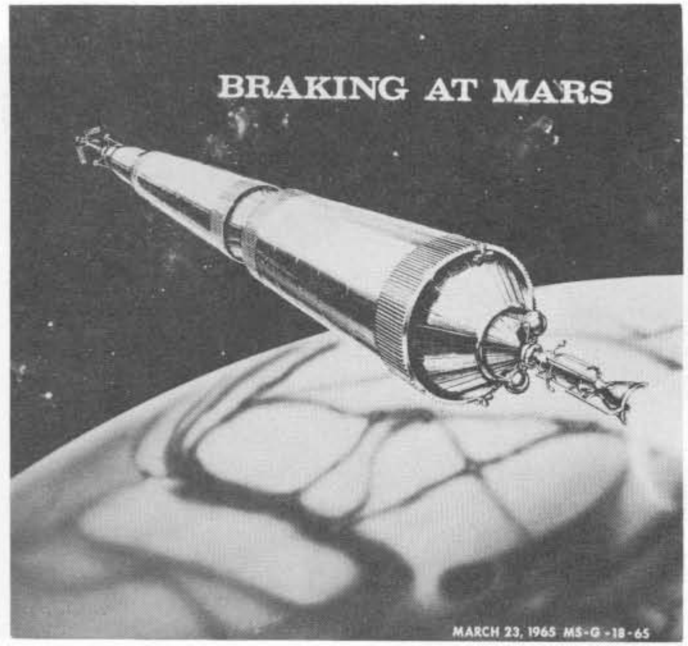

NUCLEAR VEHICLE CONFIGURATION FOR PLANETARY MISSIONS
TANKING AND CONNECTING MODES
TANKING MODE
TANKER
MARS DEPARTURE STAGE
MARS BRAKING STAGE
EARTH DEPARTURE STAGE
CONNECTING MODE
PROPELLANT MODULE
PROPULSION MODULE
NERVA 2 ENGINES
R-AS-VP RDO D1536

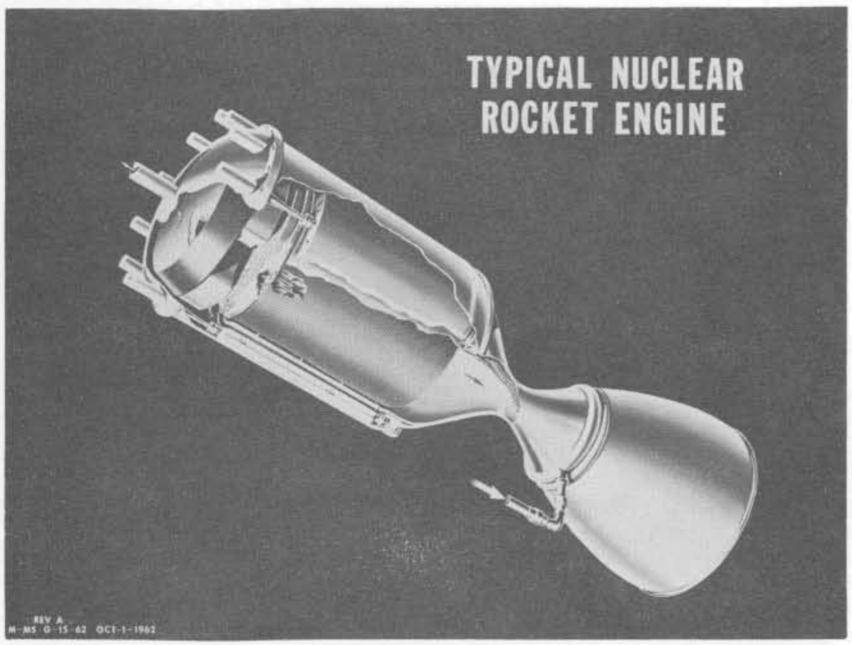

NUCLEAR ROCKET SYSTEM
MODULAR VEHICLE APPLICATIONS
Basic Propulsion Module
Lunar Logistics And Apollo Direct
Manned Mars Flyby
Manned Mars Landing

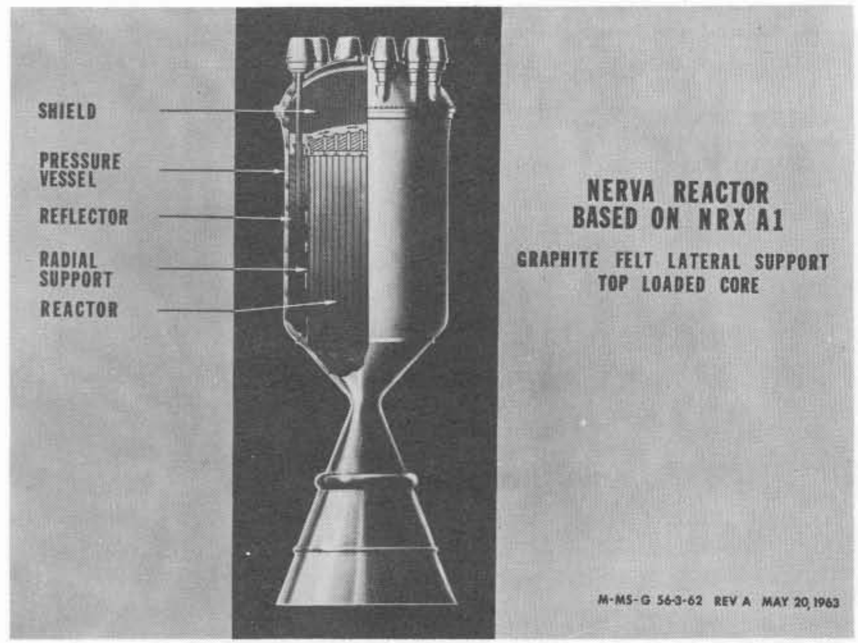

MARS TRANSFER VEHICLE
NUCLEAR ROCKET SYSTEMS
MARS BRAKING MODULE
MARS DEPARTURE MODULE
NERVA 2 ENGINES
R-AS-VP RDO D1538

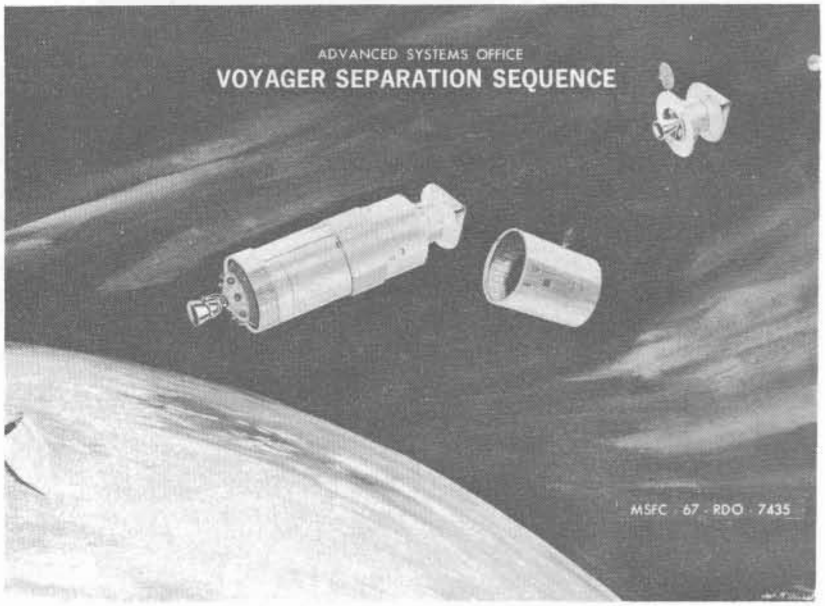

A MANNED INTERPLANETARY VEHICLE CONCEPT
R-AS-RD-33 DEC. 66
RDO B1541

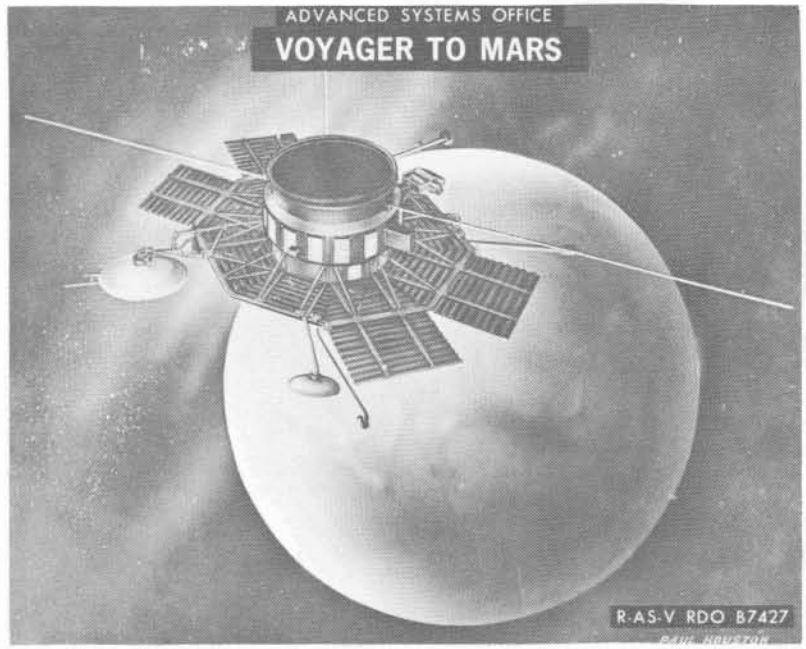

ADVANCED SYSTEMS OFFICE
PLANETARY SYSTEMS

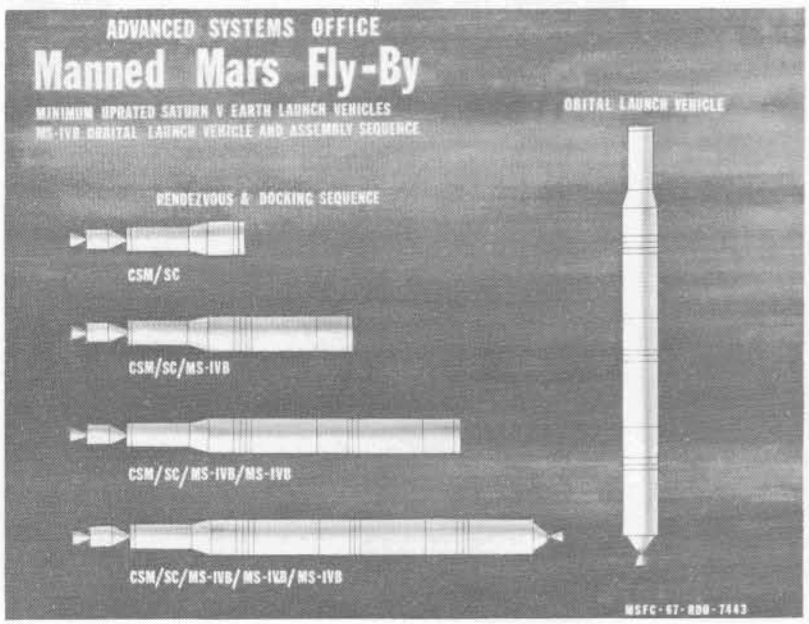

BRAKING AT MARS
MARCH 23, 1965 MS-G -18-65

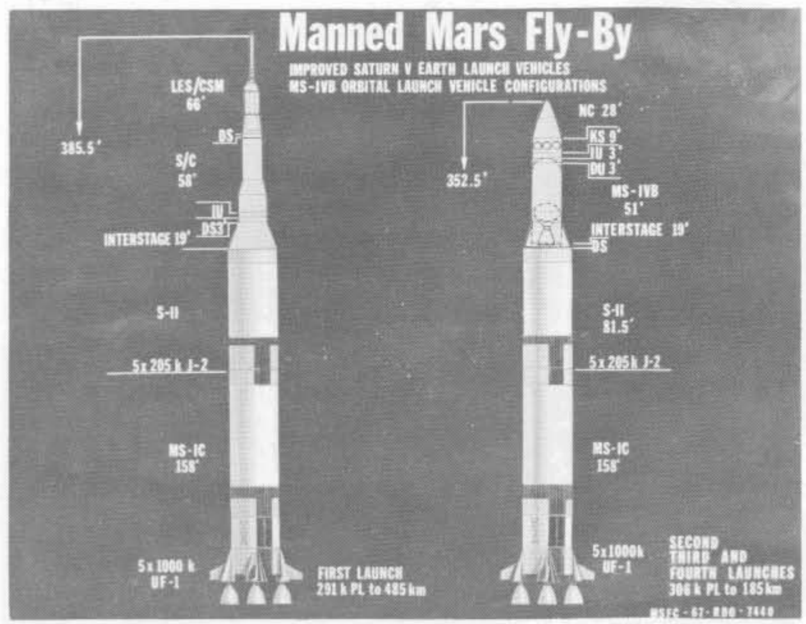

TYPICAL NUCLEAR
ROCKET ENGINE
REV A
M-MS G-15-62 OCT-1-1962

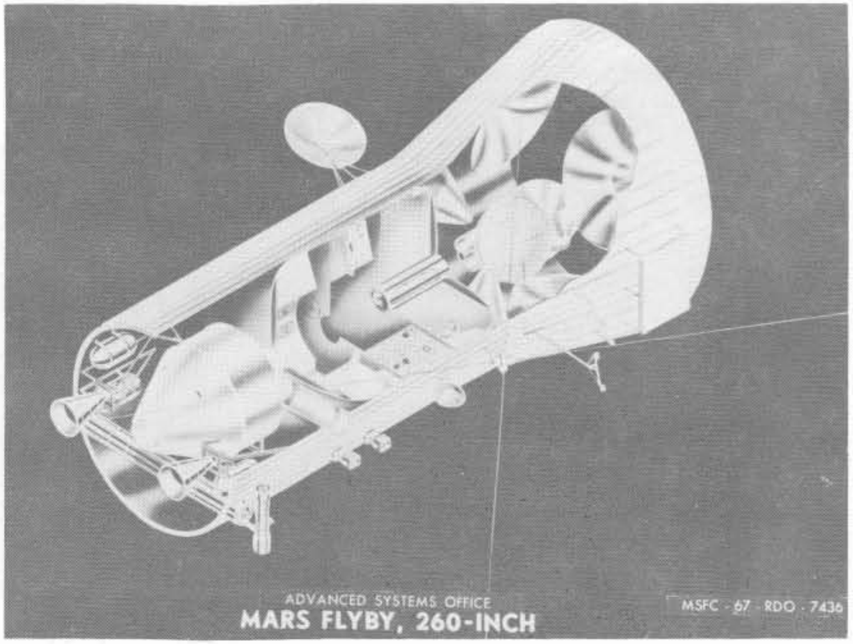

SHIELD
PRESSURE VESSEL
REFLECTOR
RADIAL SUPPORT
REACTOR
NERVA REACTOR
BASED ON NRX A1
GRAPHITE FELT LATERAL SUPPORT
TOP LOADED CORE
M-MS-G 56-3-62 REV A MAY 20, 1963

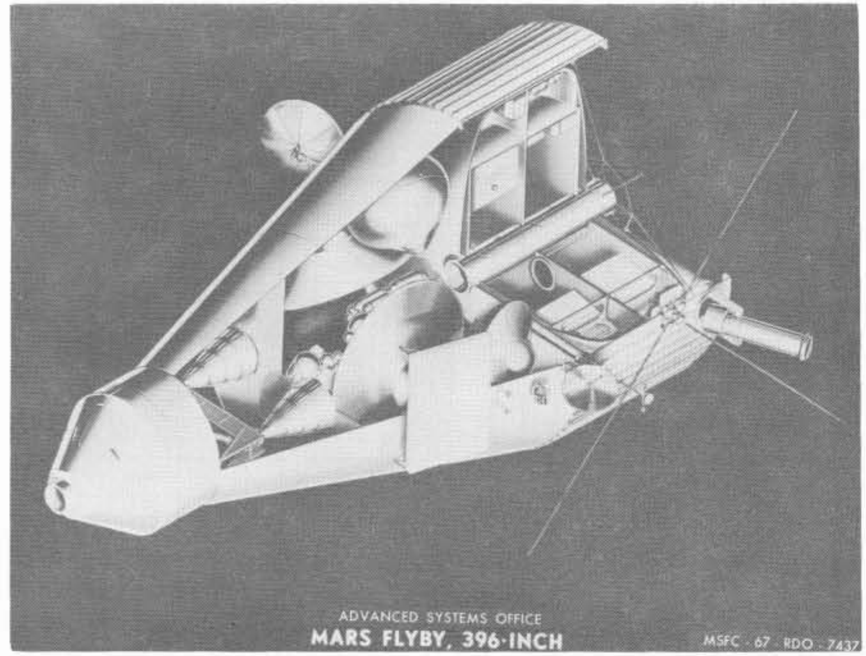

ADVANCED SYSTEMS OFFICE
VOYAGER SEPARATION SEQUENCE
MSFC · 67 · RDO · 7435

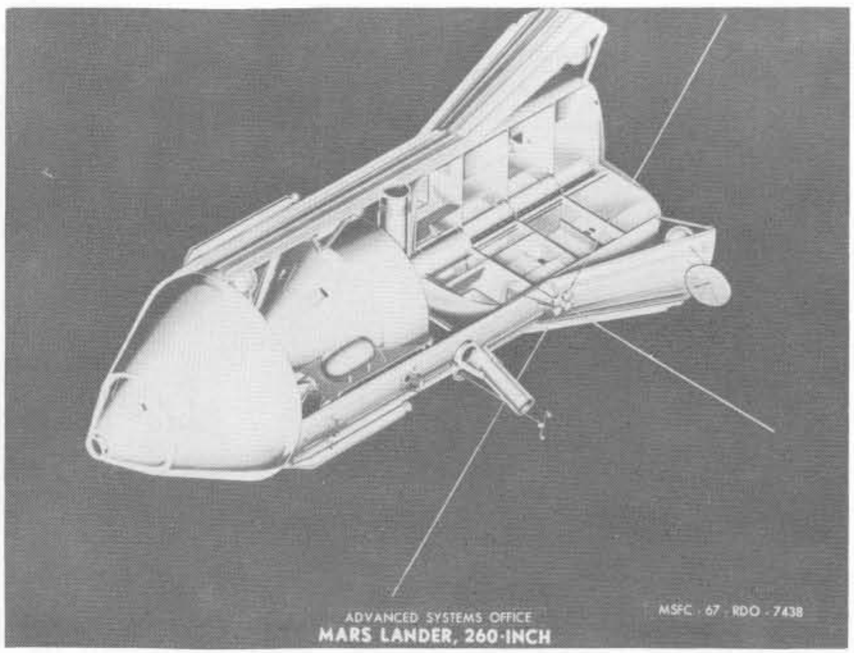

ADVANCED SYSTEMS OFFICE
VOYAGER TO MARS
R-AS-V RDO B7427

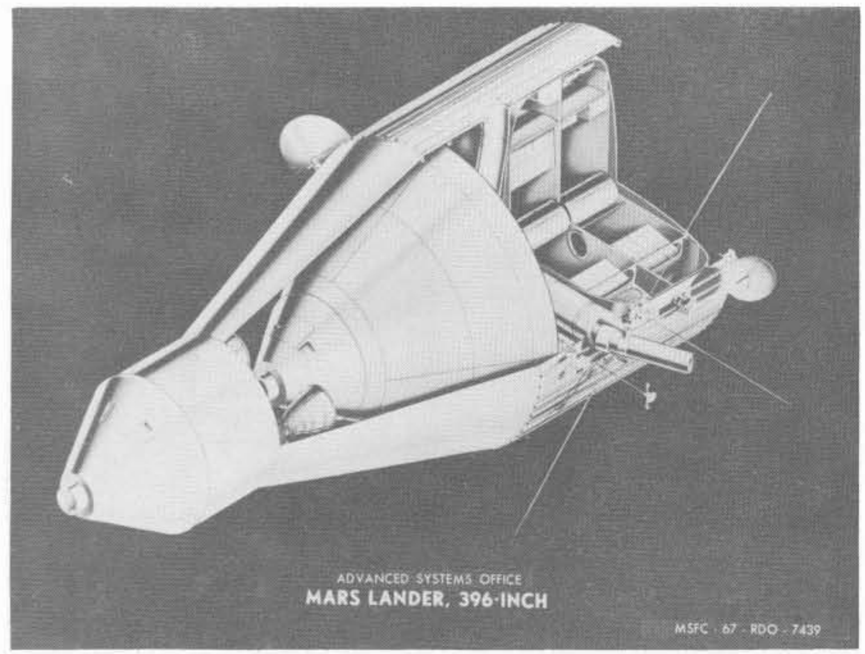

ADVANCED SYSTEMS OFFICE
Manned Mars Fly-By
MINIMUM UPRATED SATURN V EARTH LAUNCH VEHICLES
MS-IVB ORBITAL LAUNCH VEHICLE AND ASSEMBLY SEQUENCE
ORBITAL LAUNCH VEHICLE
RENDEZVOUS & DOCKING SEQUENCE
CSM/SC
CSM/SC/MS-IVB
CSM/SC/MS-IVB/MS-IVB
CSM/SC/MS-IVB/MS-IVB/MS-IVB
MSFC-67-RDO-7443

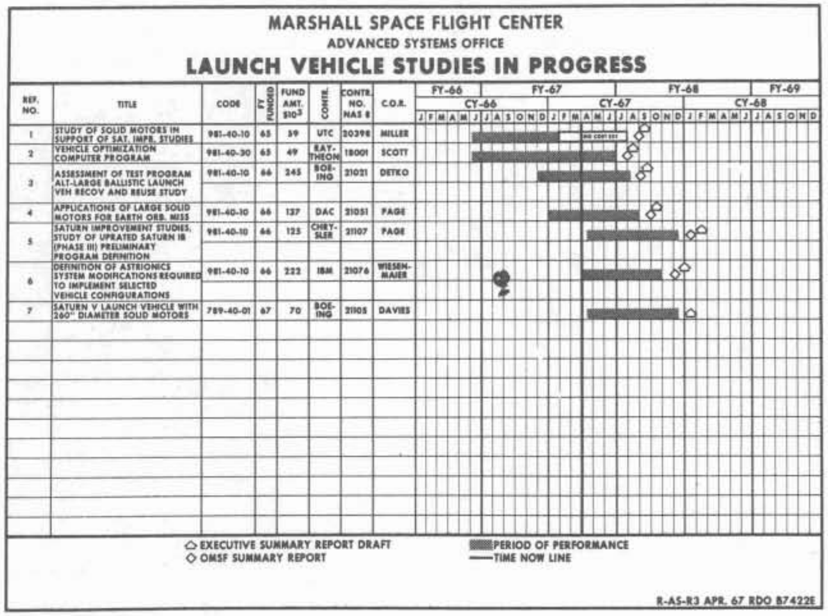

Manned Mars Fly-By
IMPROVED SATURN V EARTH LAUNCH VEHICLES
MS-IVB ORBITAL LAUNCH VEHICLE CONFIGURATIONS
LES/CSM 66'
385.5'
DS
S/C 58'
IU
DS3
INTERSTAGE 19'
S-II
5x205 k J-2
MS-IC 158'
5x1000 k UF-1
FIRST LAUNCH
291 k PL to 485 km
NC 28'
KS 9'
IU 3'
DU 3'
352.5'
MS-IVB 51'
INTERSTAGE 19'
DS
S-II 81.5'
5x205k J-2
MS-IC 158'
5x1000k UF-1
SECOND
THIRD AND
FOURTH LAUNCHES
306 k PL to 185 km


ADVANCED SYSTEMS OFFICE
MARS FLYBY, 260-INCH
MSFC - 67 - RDO - 7436


ADVANCED SYSTEMS OFFICE
MARS FLYBY, 396-INCH
MSFC - 67 - RDO - 7437


ADVANCED SYSTEMS OFFICE
MARS LANDER, 260-INCH
MSFC - 67 - RDO - 7438


ADVANCED SYSTEMS OFFICE
MARS LANDER, 396-INCH
MSFC - 67 - RDO - 7439

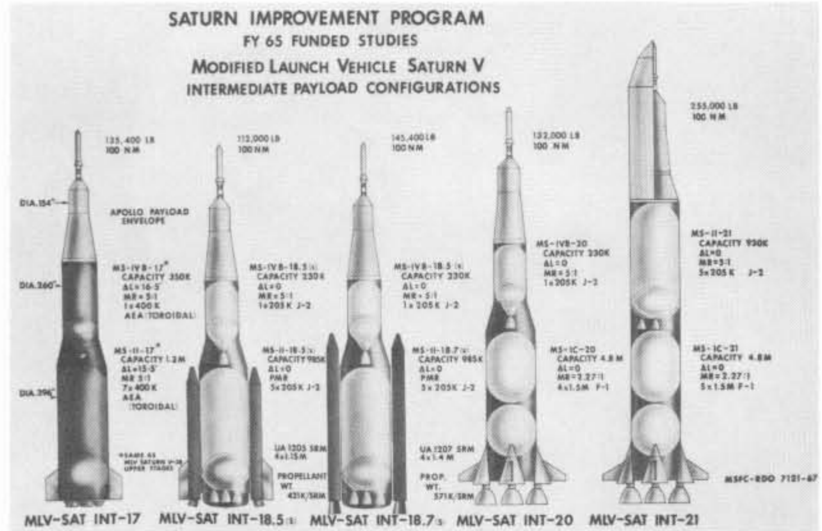


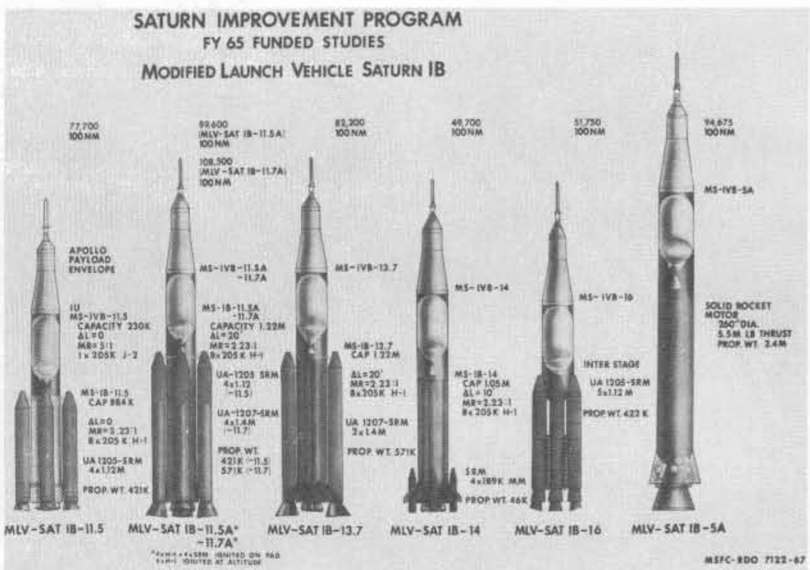
MARSHALL SPACE FLIGHT CENTER
ADVANCED SYSTEMS OFFICE
LAUNCH VEHICLE STUDIES IN PROGRESS

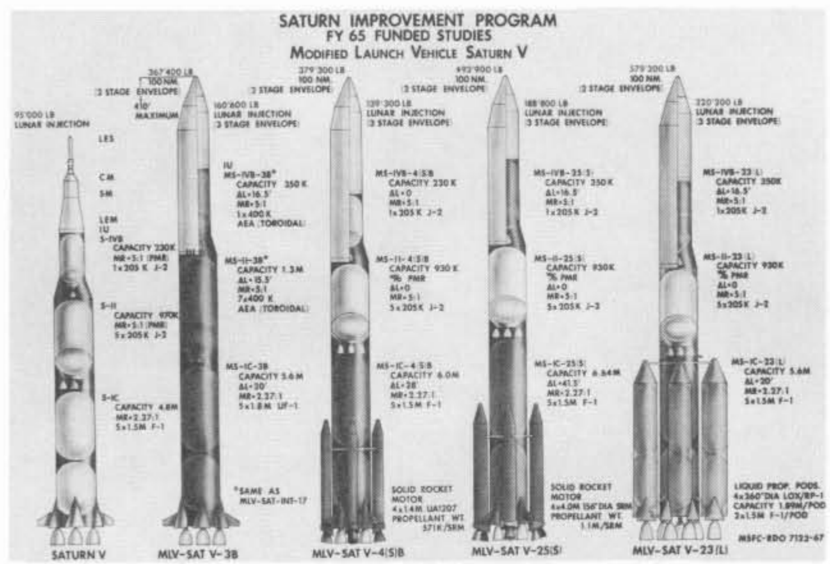
REF. NO.	TITLE	CODE	FY FUNDED	FUND AMT. $10^3	CONTR.	CONTR. NO. NAS 8	C.O.R.
1	STUDY OF SOLID MOTORS IN SUPPORT OF SAT. IMPR. STUDIES	981-40-10	65	59	UTC	20398	MILLER
2	VEHICLE OPTIMIZATION COMPUTER PROGRAM	981-40-30	65	49	RAYTHEON	18001	SCOTT
3	ASSESSMENT OF TEST PROGRAM ALT-LARGE BALLISTIC LAUNCH VEH RECOV AND REUSE STUDY	981-40-10	66	245	BOEING	21021	DETKO
4	APPLICATIONS OF LARGE SOLID MOTORS FOR EARTH ORB. MISS	981-40-10	66	137	DAC	21051	PAGE
5	SATURN IMPROVEMENT STUDIES, STUDY OF UPRATED SATURN IB (PHASE III) PRELIMINARY PROGRAM DEFINITION	981-40-10	66	125	CHRYSLER	21107	PAGE
6	DEFINITION OF ASTRIONICS SYSTEM MODIFICATIONS REQUIRED TO IMPLEMENT SELECTED VEHICLE CONFIGURATIONS	981-40-10	66	222	IBM	21076	WIESENMAIER
7	SATURN V LAUNCH VEHICLE WITH 260" DIAMETER SOLID MOTORS	789-40-01	67	70	BOEING	21105	DAVIES

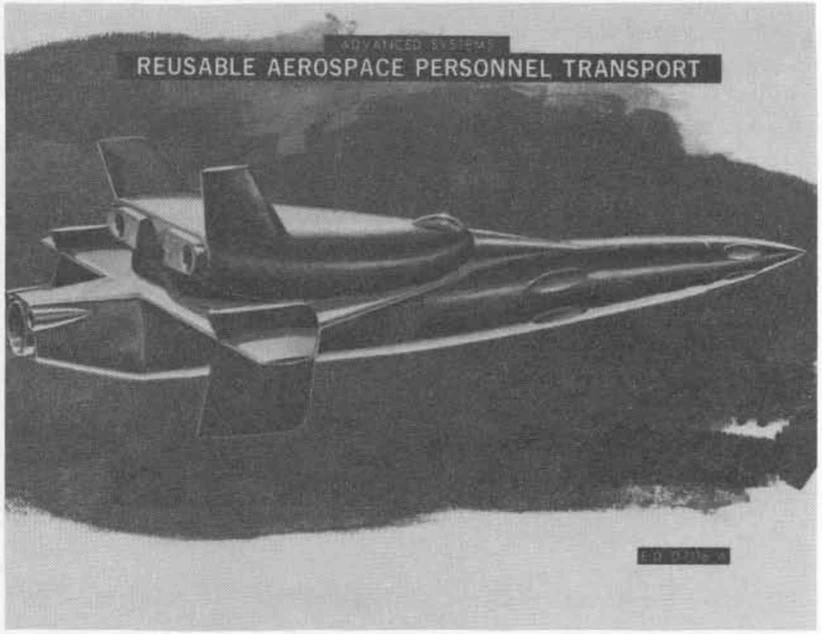
◇ EXECUTIVE SUMMARY REPORT DRAFT
◇ OMSF SUMMARY REPORT
▬ PERIOD OF PERFORMANCE
— TIME NOW LINE

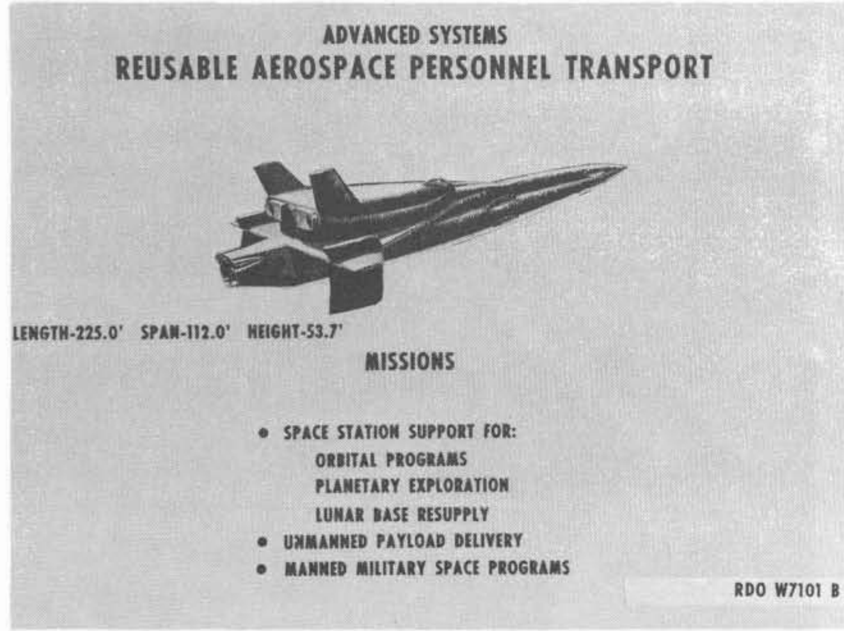
R-AS-R3 APR. 67 RDO B7422E

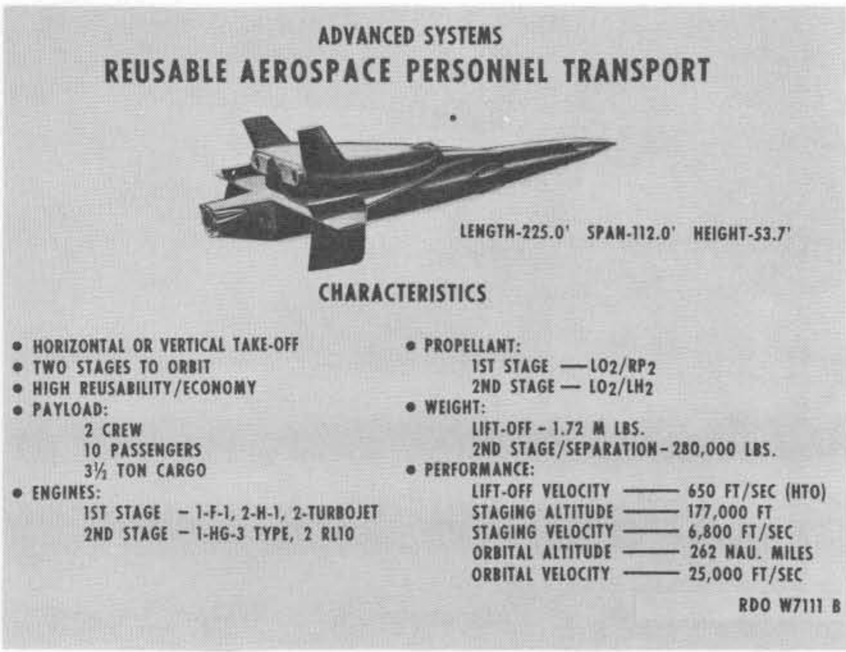


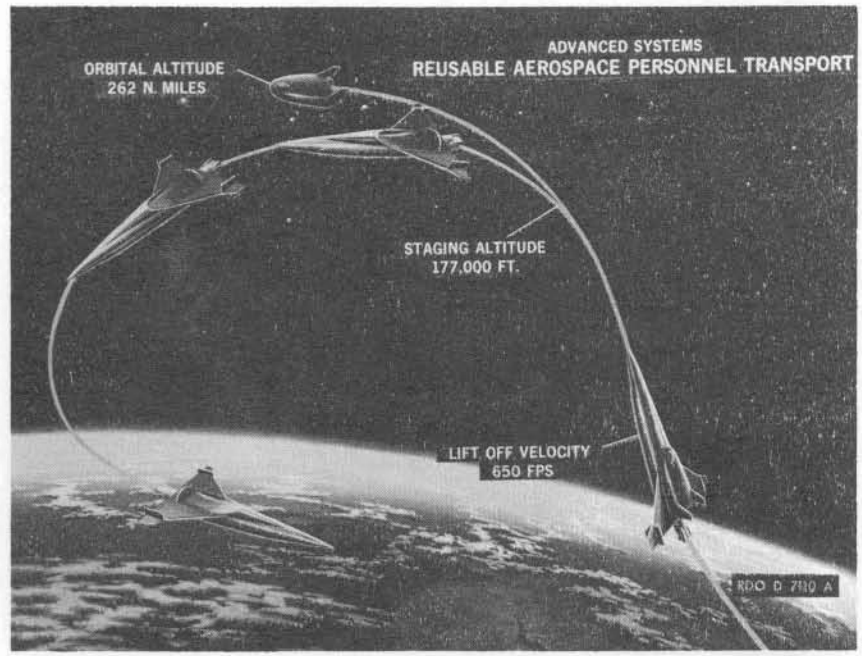


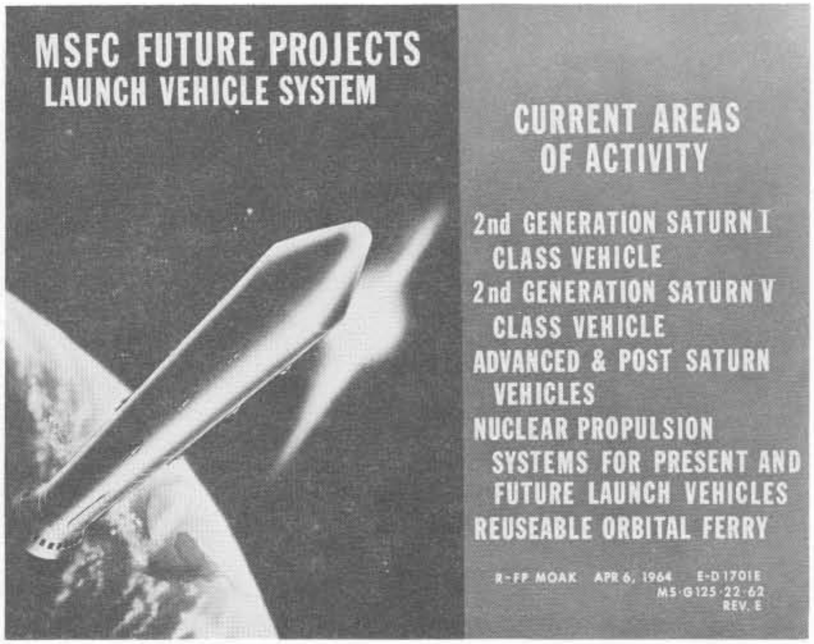


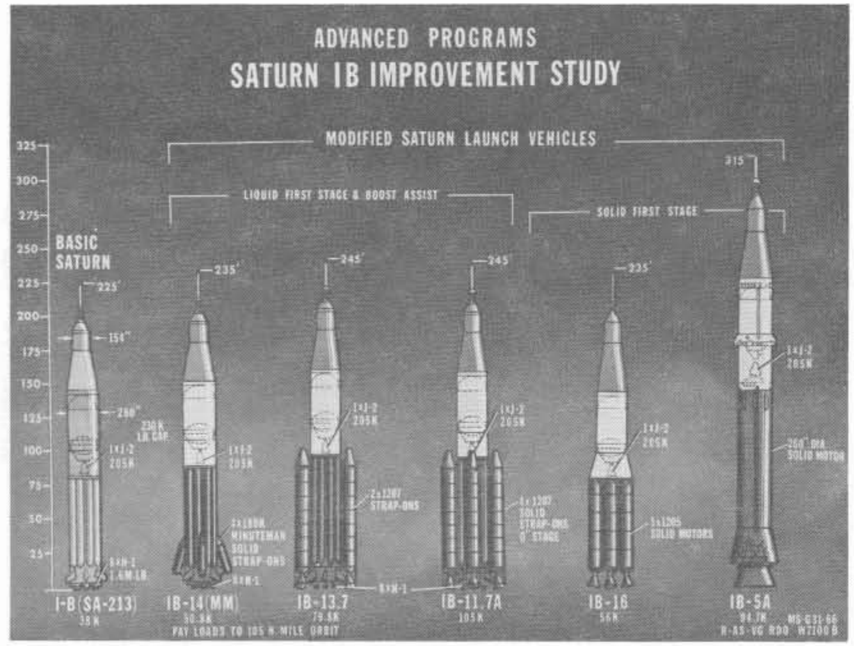

ADVANCED SYSTEMS
REUSABLE AEROSPACE PERSONNEL TRANSPORT

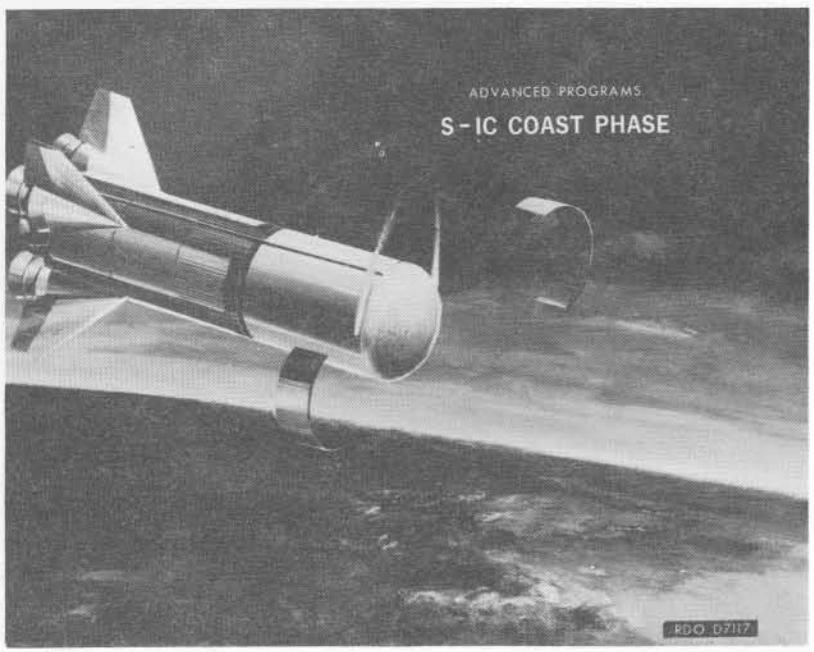

ADVANCED SYSTEMS
REUSABLE AEROSPACE PERSONNEL TRANSPORT
LENGTH-225.0' SPAN-112.0' HEIGHT-53.7'
MISSIONS
• SPACE STATION SUPPORT FOR:
ORBITAL PROGRAMS
PLANETARY EXPLORATION
LUNAR BASE RESUPPLY
• UNMANNED PAYLOAD DELIVERY
• MANNED MILITARY SPACE PROGRAMS
RDO W7101 B


ADVANCED SYSTEMS
REUSABLE AEROSPACE PERSONNEL TRANSPORT
LENGTH-225.0' SPAN-112.0' HEIGHT-53.7'
CHARACTERISTICS
• HORIZONTAL OR VERTICAL TAKE-OFF
• TWO STAGES TO ORBIT
• HIGH REUSABILITY/ECONOMY
• PAYLOAD:
2 CREW
10 PASSENGERS
3½ TON CARGO
• ENGINES:
1ST STAGE – 1-F-1, 2-H-1, 2-TURBOJET
2ND STAGE – 1-HG-3 TYPE, 2 RL10
• PROPELLANT:
1ST STAGE — LO_2/RP_2
2ND STAGE — LO_2/LH_2
• WEIGHT:
LIFT-OFF - 1.72 M LBS.
2ND STAGE/SEPARATION - 280,000 LBS.
• PERFORMANCE:
LIFT-OFF VELOCITY —— 650 FT/SEC (HTO)
STAGING ALTITUDE —— 177,000 FT
STAGING VELOCITY —— 6,800 FT/SEC
ORBITAL ALTITUDE —— 262 NAU. MILES
ORBITAL VELOCITY —— 25,000 FT/SEC
RDO W7111 B


ADVANCED SYSTEMS
REUSABLE AEROSPACE PERSONNEL TRANSPORT
ORBITAL ALTITUDE
262 N. MILES
STAGING ALTITUDE
177,000 FT.
LIFT OFF VELOCITY
650 FPS
RDO D 7110 A

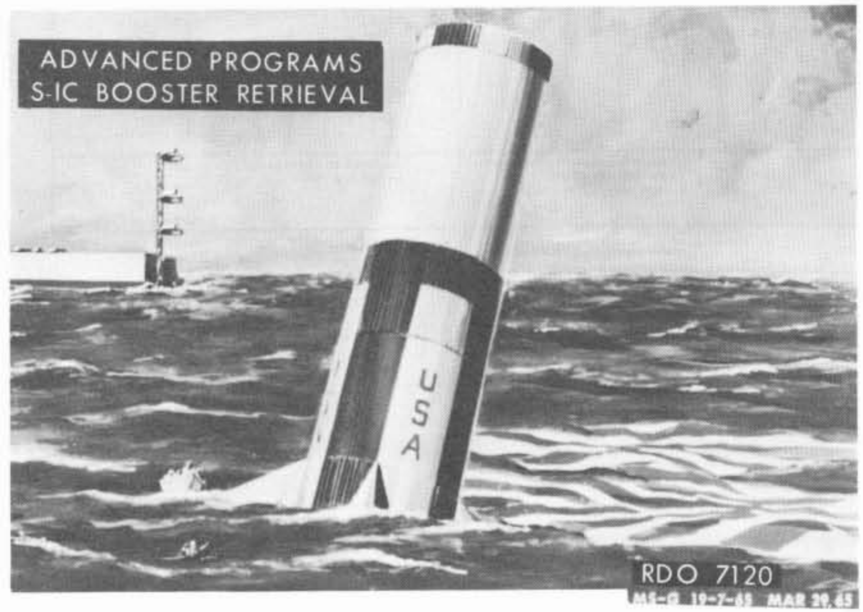

MSFC FUTURE PROJECTS
LAUNCH VEHICLE SYSTEM
CURRENT AREAS
OF ACTIVITY
2nd GENERATION SATURN I
CLASS VEHICLE
2nd GENERATION SATURN V
CLASS VEHICLE
ADVANCED & POST SATURN
VEHICLES
NUCLEAR PROPULSION
SYSTEMS FOR PRESENT AND
FUTURE LAUNCH VEHICLES
REUSEABLE ORBITAL FERRY
R-FP MOAK APR 6, 1964 E-D 1701E
MS-G125-22-62
REV. E


ADVANCED PROGRAMS
SATURN IB IMPROVEMENT STUDY
MODIFIED SATURN LAUNCH VEHICLES
LIQUID FIRST STAGE & BOOST ASSIST
SOLID FIRST STAGE
BASIC
SATURN
I-B (SA-213)
IB-14 (MM)
IB-13.7
IB-11.7A
IB-16
IB-5A
PAY LOADS TO 105 N MILE ORBIT


ADVANCED PROGRAMS
S-IC COAST PHASE
RDO D7117


ADVANCED PROGRAMS
S-IC REENTRY
RDO D7118


ADVANCED PROGRAMS
TERMINAL DESCENT
RDO D7119
MS-G 19-5-65 MAR 29, 65


ADVANCED PROGRAMS
S-IC BOOSTER RETRIEVAL
USA
RDO 7120
MS-G 19-7-65 MAR 29, 65

MARSHALL SPACE FLIGHT CENTER
ADVANCED SYSTEMS OFFICE
PROJECTS DEFINITION STUDIES IN PROGRESS

REF. NO.	TITLE	CODE	FY FUNDED	FUND AMT. $10³	CONTR.	CONTR. NO. NAS 8	C.O.R.
1	LUNAR DUST REMOVAL	908-40-22	65	90	NORTHROP	20116	RANDOLPH
2	HUMAN FACTORS VISUAL SIMULATION	908-40-22	65	61	NAA	20283	LARSON
3	LOCAL SCIENTIFIC SURVEY MODULE (LSSM)	981-20-10	66	350	BENDIX	20378	BRADFORD
4	(LSSM)	981-20-10	66	350	BOEING	20340	BRADFORD
5	MOBILITY TEST ARTICLE(MTA) ENGR. SERVICES	981-20-10	66	25	BENDIX	20441	SHAEFER
6	MTA-ENGR. SERVICES	981-20-10	66	25	G.M.	20443	SHAEFER
7	MOBILITY TEST ARTICLE	981-20-10	66	250	TECOM	H-13240	SHAEFER
8	MTA-ENGR. SERVICES	981-20-10	66	25	TECOM	H-13240	SHAEFER
9	SIMULATED LUNAR FLIGHT OF A ONE-MAN FLYING VEHICLE (POGO)	905-21-01	67	100	BELL	21042	TREXLER
10	UTILIZATION OF SPENT S-IVB STAGE IN EARTH ORBIT	981-10-10	66	400	DAC	21064	MADEWELL
11	•STUDY FOR OPTICAL TECH APOLLO EXTENSION SYSTEM	749-21-02	67	250	PERKIN ELMER	20255	REINBOLT
12	•STUDY FOR OPTICAL TECH APOLLO EXTENSION SYSTEM	749-21-02	67	250	CHRYSLER	20256	REINBOLT
13	•LEM RELAY EXPERIMENT OPNS COMM TRACKING RELAY	949-10-07	66	29	HUGHES	21071	BARR

FY-66 FY-67 FY-68 FY-69
CY-66 CY-67 CY-68

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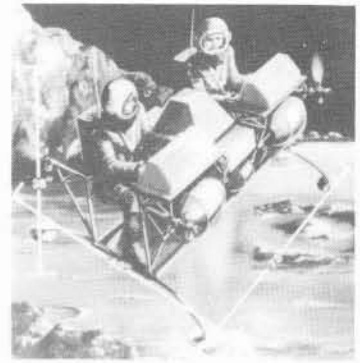
◇ OMSF SUMMARY REPORT
• FUNDS SUB-PARED TO R-ASTR

▬ PERIOD OF PERFORMANCE
— TIME NOW LINE

R-AS-R7 APR. 67 RDO B7426E

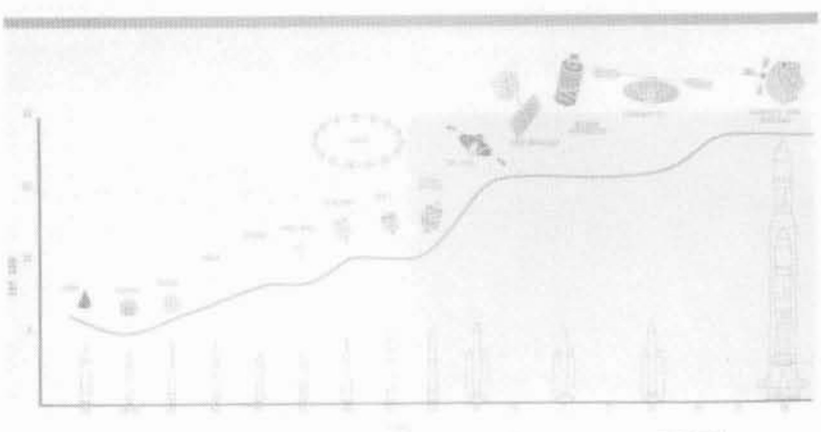
ADVANCED SYSTEMS OFFICE
LUNAR FLYING VEHICLE



CHARACTERISTICS
- WEIGHT-DRY (350-450 LB) (160-200 kg)
  WET (1000-1100 LB) (450-500 kg)
- RANGE- 50 S. MILES (ONE WAY)
  18 S. MILES (ROUND)
- ENGINES- 5×100 LB
- PACKAGE
  SIZE-38"×60"×78" (1.0×1.5×2.0 m)
- CAPACITY-2 ASTRONAUTS
  OR
  1 ASTRONAUT+250 LB (120 kg)
  SCIENTIFIC EQUIPMENT
- TRAJECTORY-BALLISTIC OR HORIZONTAL HOVER

MSFC-67-RDO-7447

ILLUSTRATED CHRONOLOGY OF COMMUNICATION SATELLITES



AERO-ASTRODYNAMICS LABORATORY

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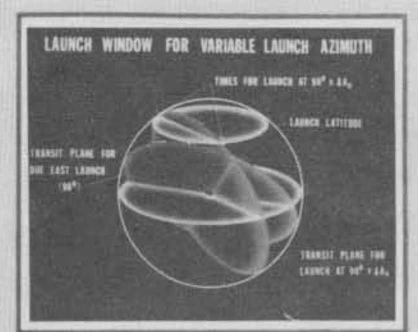
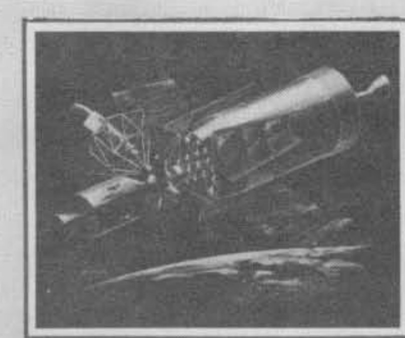
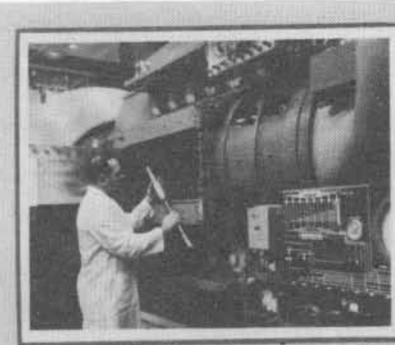


TRAJECTORY ANALYSIS

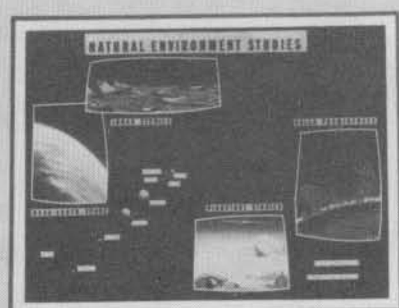


INTEGRATED MISSION ANALYSIS

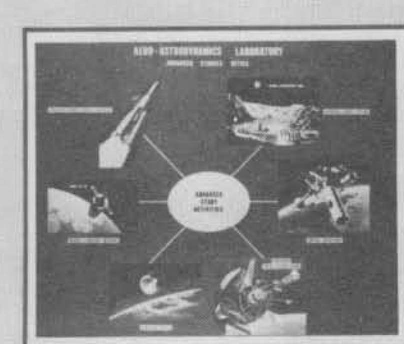


EXPERIMENTAL THEORETICAL AERODYNAMICS

AERO-ASTRODYNAMICS LABORATORY



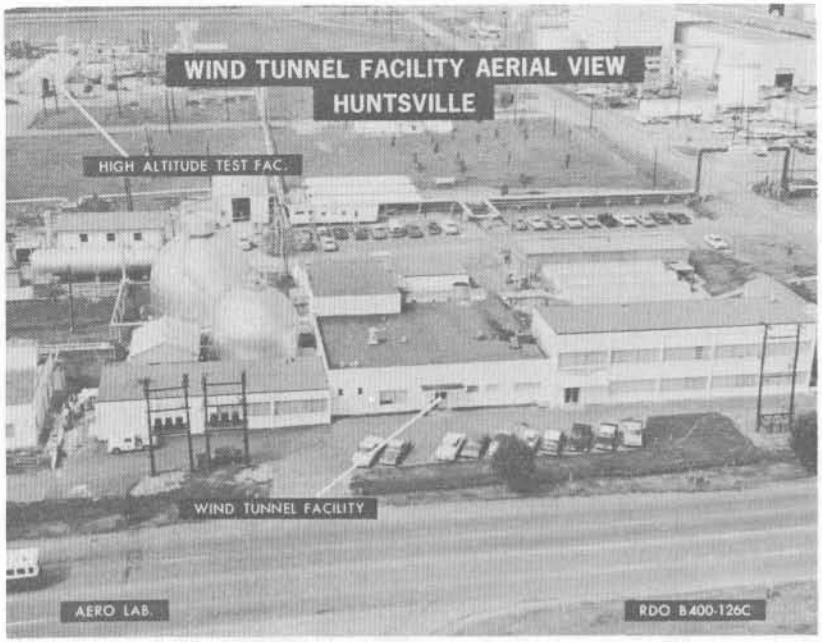
AERO-SPACE ENVIRONMENTAL ANALYSIS

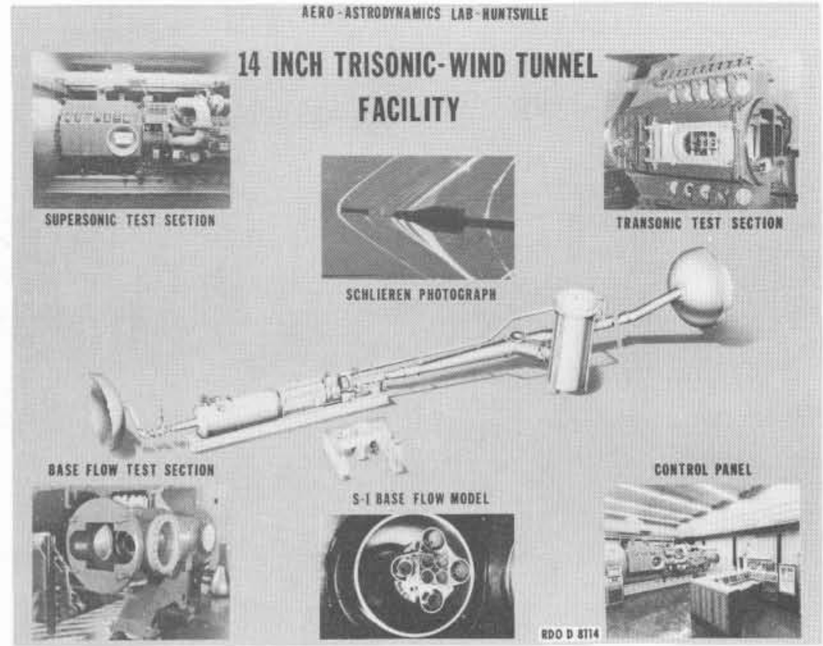


ADVANCED SYSTEMS STUDIES

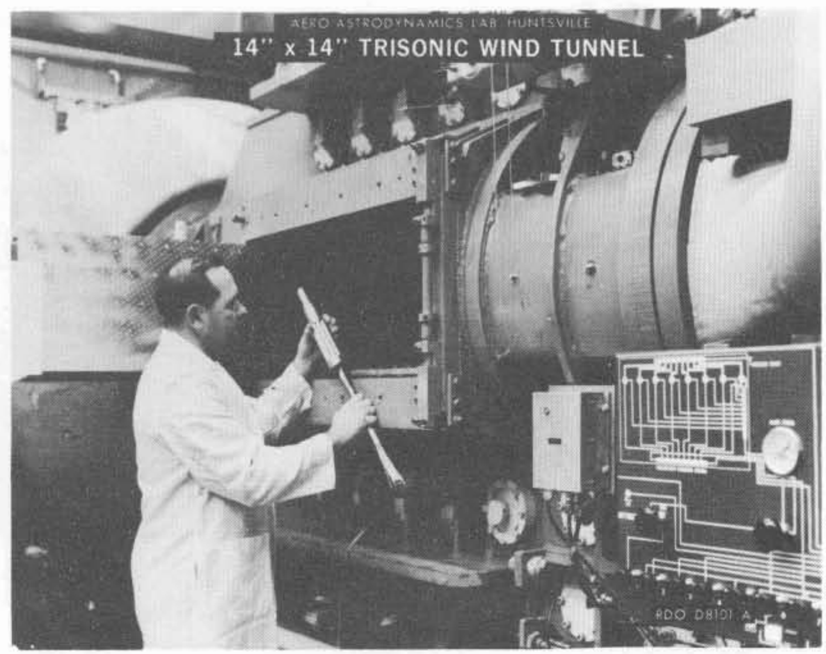
TECHNICAL EVALUATION OF FLIGHTS

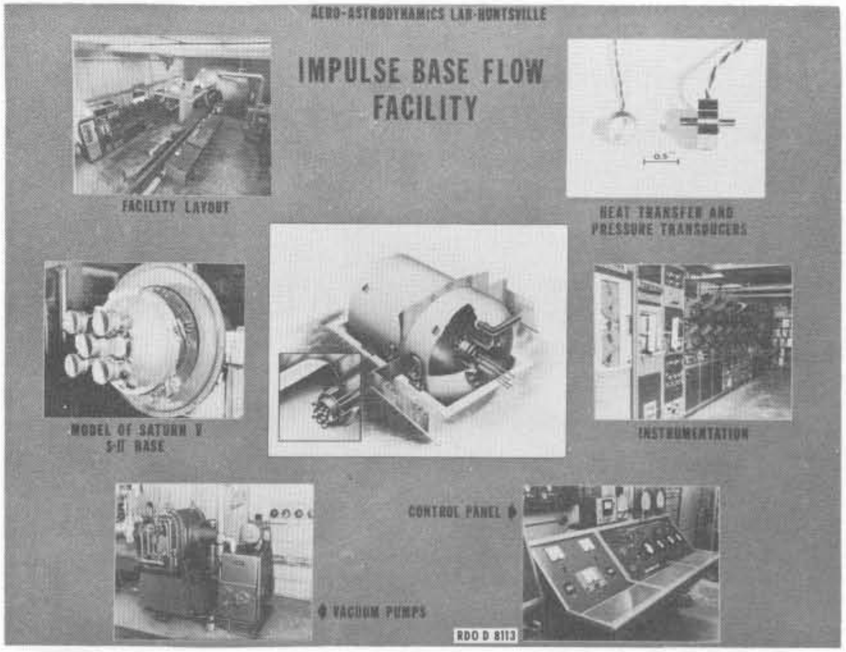
MSFC-67-RDO-8110E

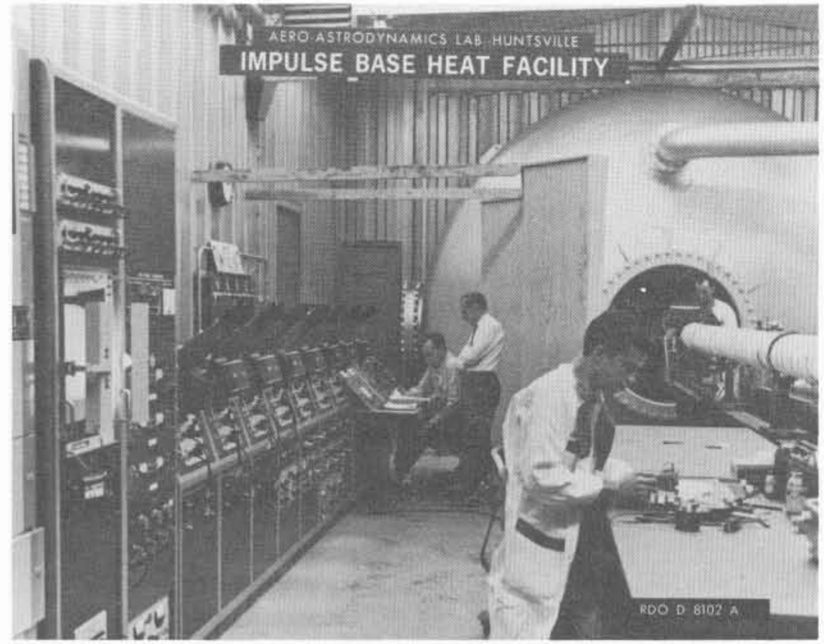

WIND TUNNEL FACILITY AERIAL VIEW
HUNTSVILLE
HIGH ALTITUDE TEST FAC.
WIND TUNNEL FACILITY
AERO LAB.
RDO B400-126C

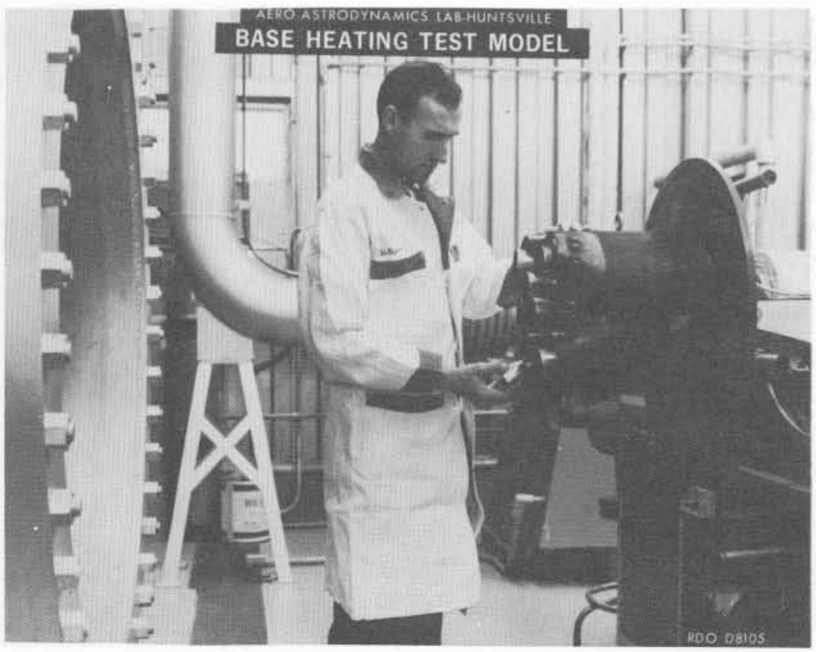

AERO-ASTRODYNAMICS LAB-HUNTSVILLE
14 INCH TRISONIC-WIND TUNNEL FACILITY
SUPERSONIC TEST SECTION
SCHLIEREN PHOTOGRAPH
TRANSONIC TEST SECTION
BASE FLOW TEST SECTION
S-I BASE FLOW MODEL
CONTROL PANEL
RDO D 8114

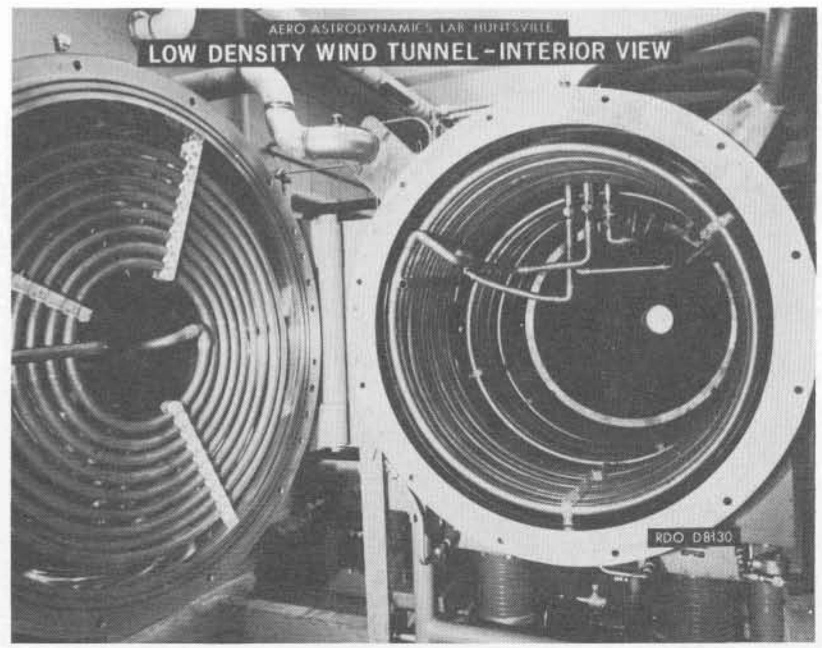

AERO ASTRODYNAMICS LAB HUNTSVILLE
OVERALL VIEW 14" x 14" TRISONIC WIND TUNNEL


AERO ASTRODYNAMICS LAB HUNTSVILLE
14" x 14" TRISONIC WIND TUNNEL
RDO D8101 A

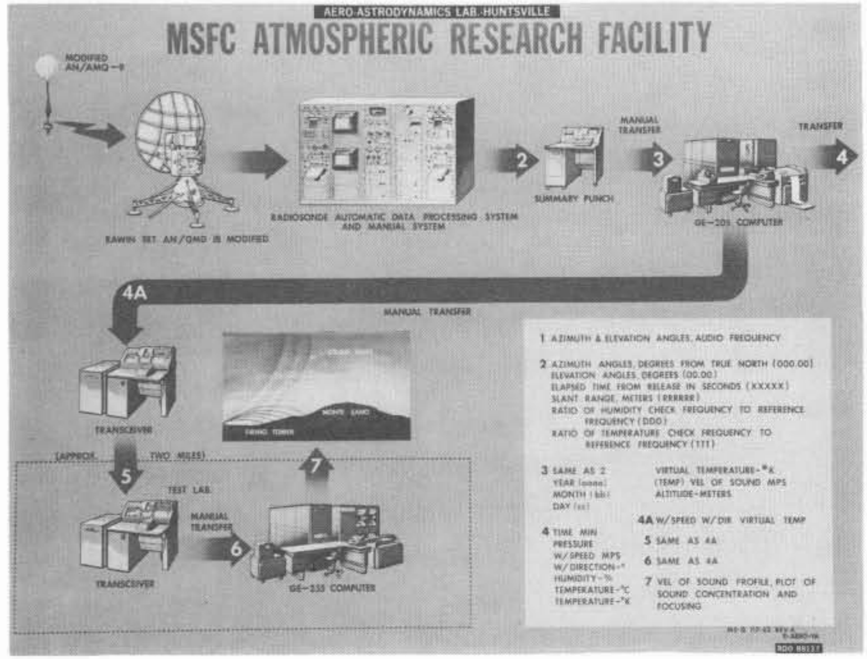

AERO-ASTRODYNAMICS LAB-HUNTSVILLE
IMPULSE BASE FLOW FACILITY
FACILITY LAYOUT
HEAT TRANSFER AND PRESSURE TRANSDUCERS
MODEL OF SATURN V S-II BASE
INSTRUMENTATION
CONTROL PANEL
VACUUM PUMPS
RDO D 8113

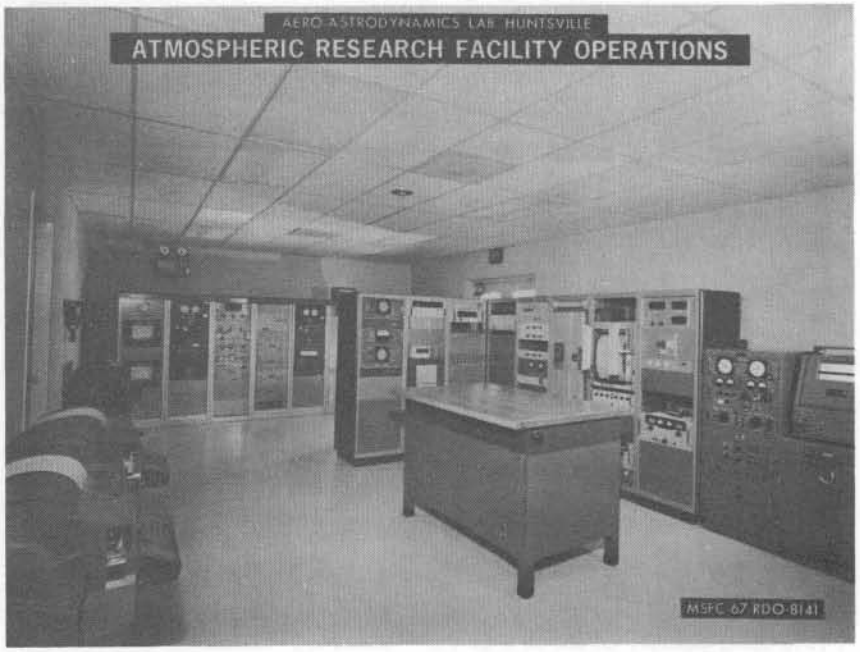

AERO-ASTRODYNAMICS LAB-HUNTSVILLE
IMPULSE BASE HEAT FACILITY
RDO D 8102 A

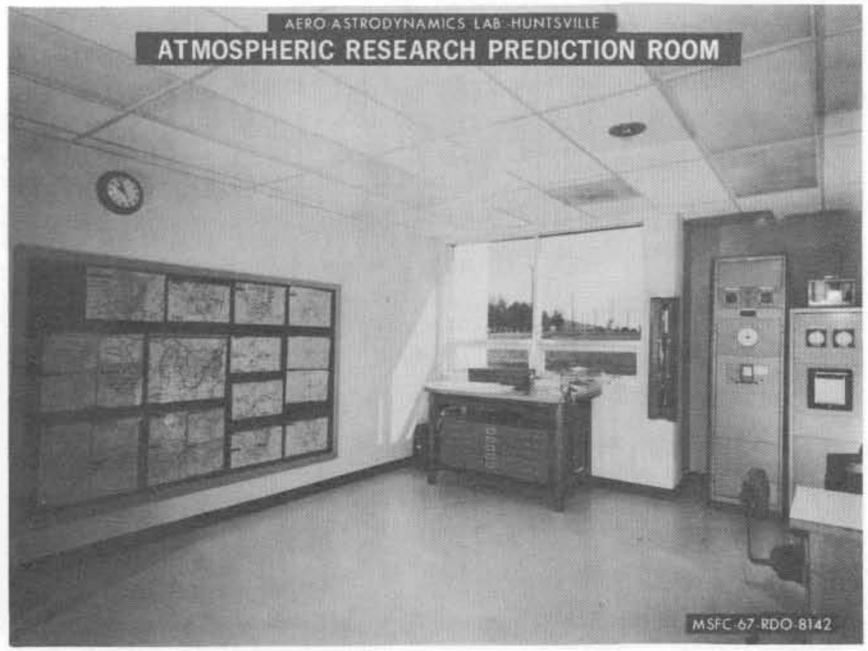

AERO-ASTRODYNAMICS LAB-HUNTSVILLE
BASE HEATING TEST MODEL
RDO D8105


AERO-ASTRODYNAMICS LAB-HUNTSVILLE
LOW DENSITY WIND TUNNEL-INTERIOR VIEW
RDO D8130

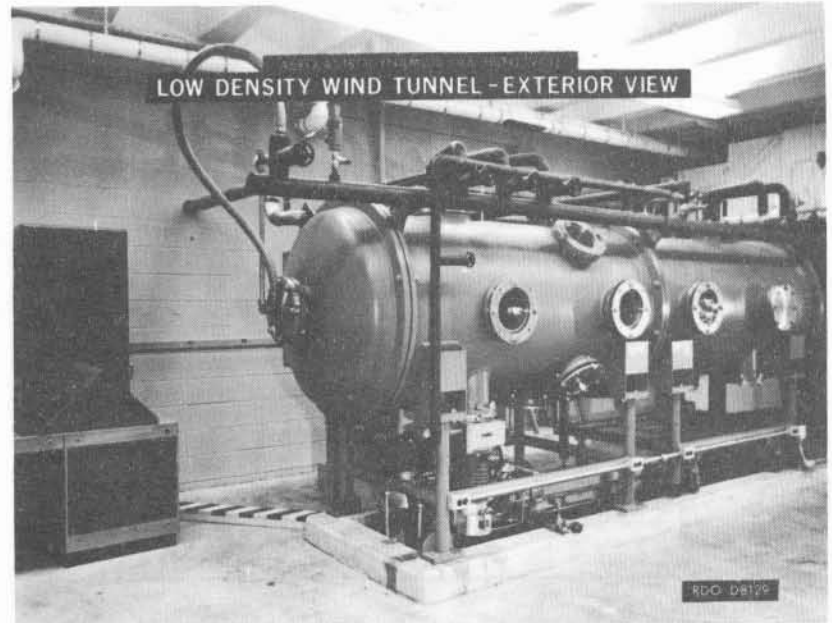

AERO-ASTRODYNAMICS LABORATORY
ENVIRONMENTAL APPLICATION STUDIES
ATMOSPHERIC CRITERIA FOR STUDY OF:
• LOW LEVEL WIND PROFILES
• DIFFUSION
• SENSORS RESPONSE
FOR VEHICLE DESIGN,LAUNCH & FLIGHT EVALUATION
RDO 8133
MS-G 66-64


AERO-ASTRODYNAMICS LAB.-HUNTSVILLE
MSFC ATMOSPHERIC RESEARCH FACILITY
MODIFIED AN/AMQ-9
RAWIN SET AN/GMD IS MODIFIED
RADIOSONDE AUTOMATIC DATA PROCESSING SYSTEM AND MANUAL SYSTEM
SUMMARY PUNCH
MANUAL TRANSFER
GE-205 COMPUTER
TRANSFER
4A
MANUAL TRANSFER
TRANSCEIVER
(APPROX. TWO MILES)
TEST LAB.
MANUAL TRANSFER
TRANSCEIVER
GE-235 COMPUTER
1 AZIMUTH & ELEVATION ANGLES, AUDIO FREQUENCY
2 AZIMUTH ANGLES, DEGREES FROM TRUE NORTH (000.00)
ELEVATION ANGLES, DEGREES (00.00)
ELAPSED TIME FROM RELEASE IN SECONDS (XXXXX)
SLANT RANGE, METERS (RRRRRR)
RATIO OF HUMIDITY CHECK FREQUENCY TO REFERENCE FREQUENCY (DDD)
RATIO OF TEMPERATURE CHECK FREQUENCY TO REFERENCE FREQUENCY (TTT)
3 SAME AS 2
VIRTUAL TEMPERATURE-°K
(TEMP) VEL OF SOUND MPS
ALTITUDE-METERS
4A W/SPEED W/DIR VIRTUAL TEMP
4 TIME MIN
PRESSURE
W/SPEED MPS
W/DIRECTION-°
HUMIDITY-%
TEMPERATURE-°C
TEMPERATURE-°K
5 SAME AS 4A
6 SAME AS 4A
7 VEL OF SOUND PROFILE, PLOT OF SOUND CONCENTRATION AND FOCUSING

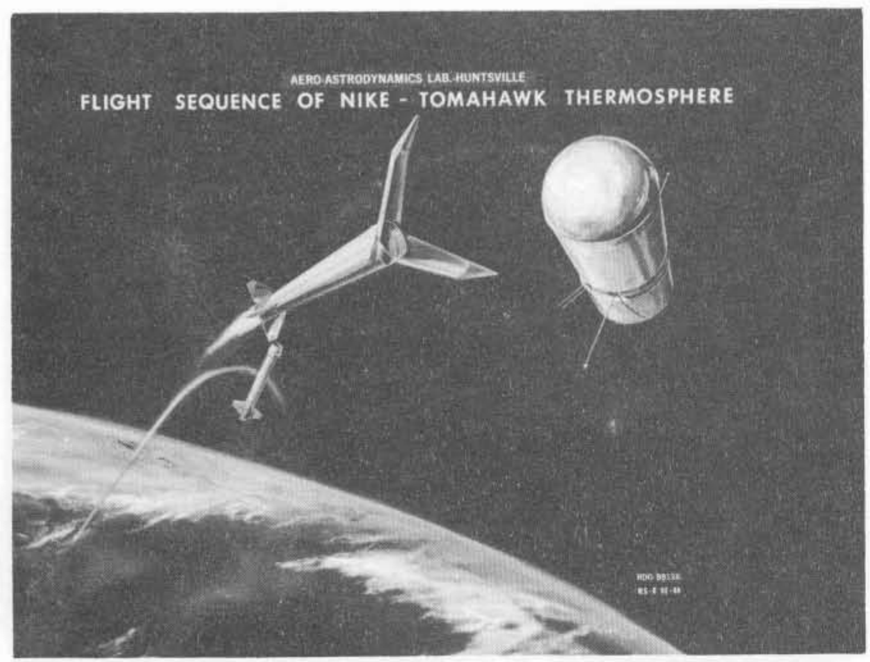

AERO-ASTRODYNAMICS LAB. HUNTSVILLE
ATMOSPHERIC RESEARCH FACILITY OPERATIONS
MSFC 67 RDO-8141

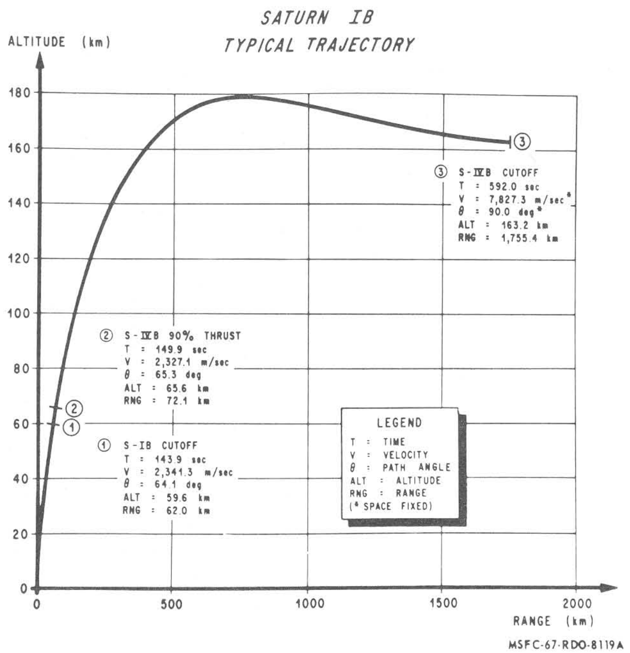

AERO-ASTRODYNAMICS LAB.-HUNTSVILLE
ATMOSPHERIC RESEARCH PREDICTION ROOM
MSFC 67-RDO-8142

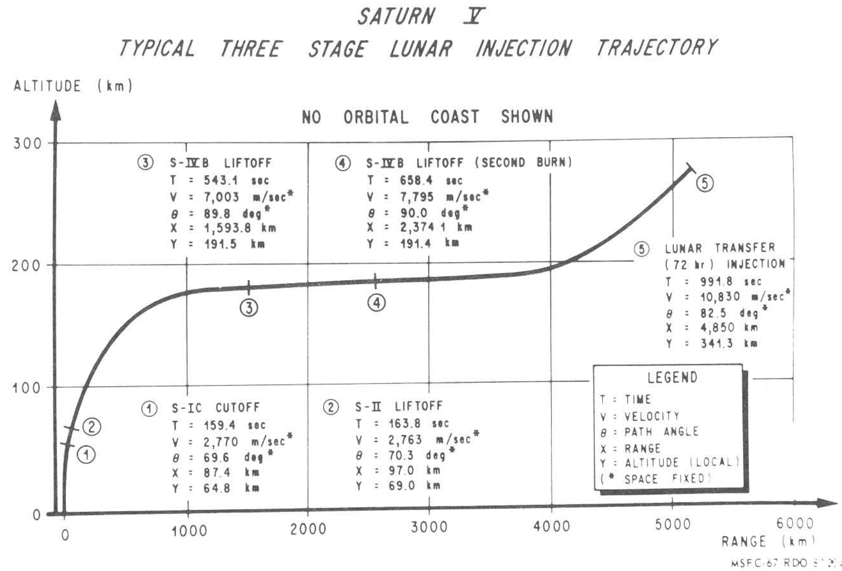

7" x 7" BISONIC WIND TUNNEL
RDO D8100 A


LOW DENSITY WIND TUNNEL - EXTERIOR VIEW
RDO D8129


AERO ASTRODYNAMICS LAB. HUNTSVILLE
THERMAL ACOUSTIC FACILITY
MSFC 67 RDO 8140


AERO-ASTRODYNAMICS LAB. HUNTSVILLE
FLIGHT SEQUENCE OF NIKE - TOMAHAWK THERMOSPHERE





APOLLO-SATURN PREDICTED FLIGHT INFORMATION (204)

AZIMUTH: AIMING 100°–FLIGHT 72 PAD 37B

FLIGHT CONFIGURATION

S-IB 1ST STAGE
S-IV B 2ND STAGE
INSTRUMENT UNIT
LUNAR MODULE (LM)
SPECIAL LM ADAPTER
NOSE CONE

VEH PROPELLANT***		MASS CHARACTERISTICS (kg) L.O.	OECO	S-IVB*	S-IVB C.O
S-IB	LOX	276,960	DEPLETE		
	RP-1	123,660	420		
S-IVB	LOX			87,340	1,210
	LH_2			16,720	630

TIMES OF EVENTS (sec.)

EVENT	TIME (sec.)
FIRST MOTION	0.0
INITIATE PITCH & ROLL	10.2
EXTENDED ROLL OFF	18.2
FREEZE TILT	133.2
IECO	140.9
OECO	143.9
ULLAGE ROCKETS IGNITE	145.0
S-IB/S-IVB SEPARATION	145.3
RETRO ROCKETS IGNITE	145.3
S-IVB *	149.9
JETTISON ULLAGE ROCKETS	157.2
INITIATE ACTIVE GUIDANCE	160.9
S-IVB CUTOFF	592.3

PROPULSION

		S-IB ****	S-IVB**
THRUST (N)	VAC. FOR S-IVB	7,187,800	961,700

INSERTION ELEMENTS	PRED.
TIME (SEC)	602.3
ALTITUDE (km)	163.2
LONGITUDE	61.8
LATITUDE (GEODETIC)	31.5
VELOCITY (m/sec)	7,828.8
FLT. PATH ANGLE (deg.)	0.0
RANGE (km)	1,834.6

MAJOR EVENTS

EVENT	RANGE (km)	CR. RANGE (km)	ALT. (km)	EARTH FIXED VEL. (m/s)
OECO	61.08	.046	61.64	2015.8
SEP.	63.42	.045	63.10	2012.9
S-IVB *	71.25	.039	67.91	1996.5
S-IVB C.O.	1762.20	88.410	163.20	7415.71

REMARKS

1. *S-IVB ENGINE OPERATING AT 90% THRUST
2. **S-IVB VALUES AVERAGED OVER BOTH M.R. STEPS. ie HIGH M.R. & LOW M.R.
3. *** PROPELLANT IN TANKS
4. **** AVERAGE LONGITUDINAL COMPONENT

MSFC-67-RDO-8128H

APOLLO-SATURN PREDICTED FLIGHT INFORMATION (501)

AZIMUTH: AIMING: 90° FLIGHT: 72° LAUNCH COMPLEX: MERRITT ISLAND PAD 39A

CONFIGURATION	MEASUREMENT M	WTS + PROPELLANT KGS
S-IC STAGE	42	2,100,000
S-II STAGE	25	470,000
S-IVB STAGE	18	118,000
COMBINED INTERSTAGES		9,000
INSTRUMENT UNIT	1	2,300
SPACECRAFT INCLUDING LEM, SM, CM & LES	25	39,000
	111M	2,738,300 KG

PROPULSION FOR POWERED FLIGHT

STAGE	ENGINES & NO.	APPROX. THRUST
S-IC	F-1 (5)	1,500,000 LB/ENG (S.L.)
S-II	J-2 (5)	200,000 LB/ENG
S-IVB	J-2 (1)	200,000 LBS

IMPORTANT PARAMETERS AT KEY EVENTS

EVENT	ALTITUDE KM	INERTIAL VELOCITY M/S	VELOCITY GAIN M/S
LIFTOFF	0.0	410	
S-IC CUT OFF	55.9	2710	2300
S-II CUT OFF	190.5	6760	4050
PARKING ORBIT INSERTION	191.5	7790	1030
WAITING ORBIT INSERTION	583.8	9350	1560

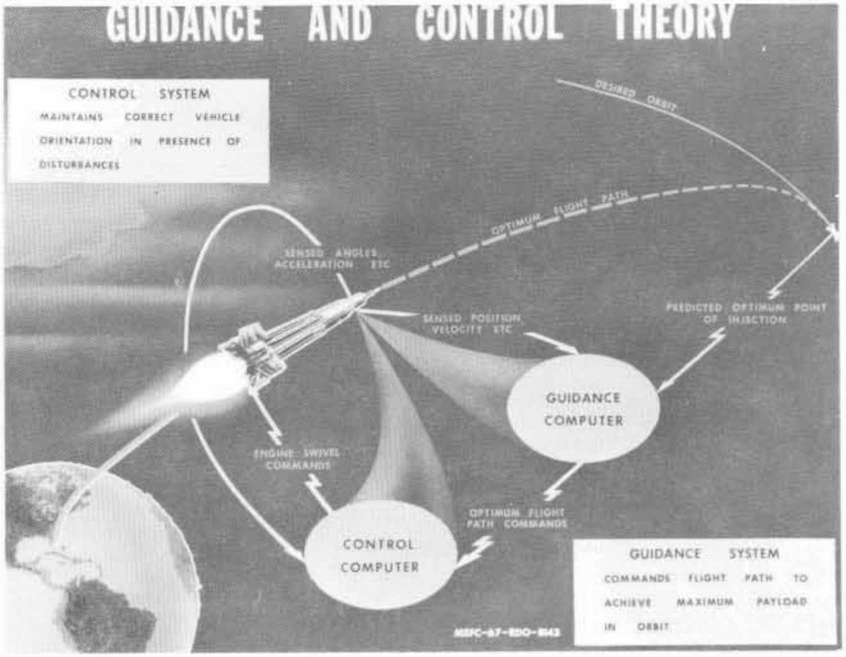
SEQUENCE OF EVENTS

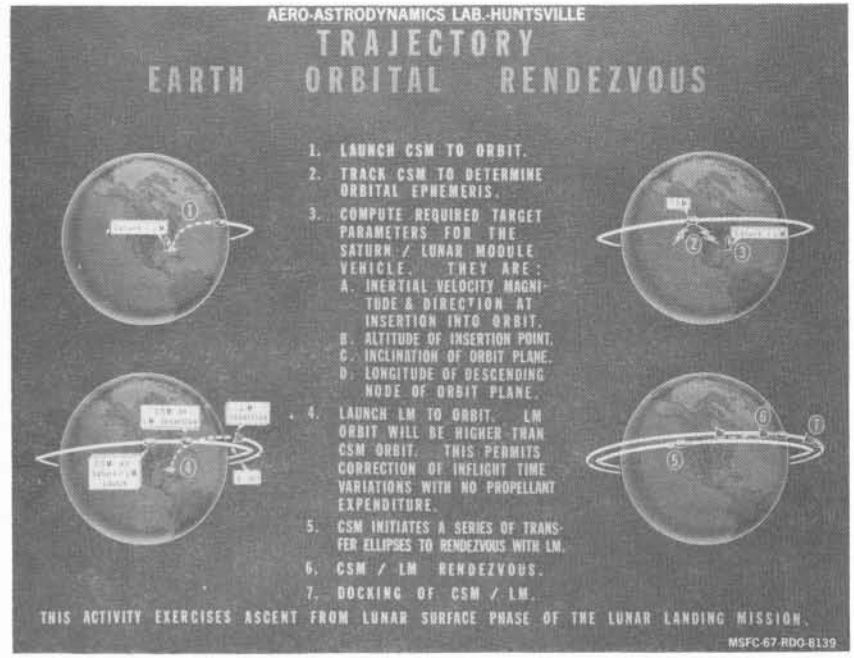
EVENT	TIME (SEC)
LIFT OFF	0
BEGIN PITCH & ROLL	11
MAX. Q	81
CECO	145
OECO	150
SEPARATION S-IC/S-II	151
S-II IGNITION	153
JETTISON INTERSTAGE	182
JETTISON LES	187
S-II/S-IVB SEPARATION	518
S-IVB 1ST IGNITION	519
PARKING ORBIT INSERTION	671
S-IVB RE-IGNITION	11503
WAITING ORBIT INJECTION	11815
RE ENTRY (APPROX)	28800

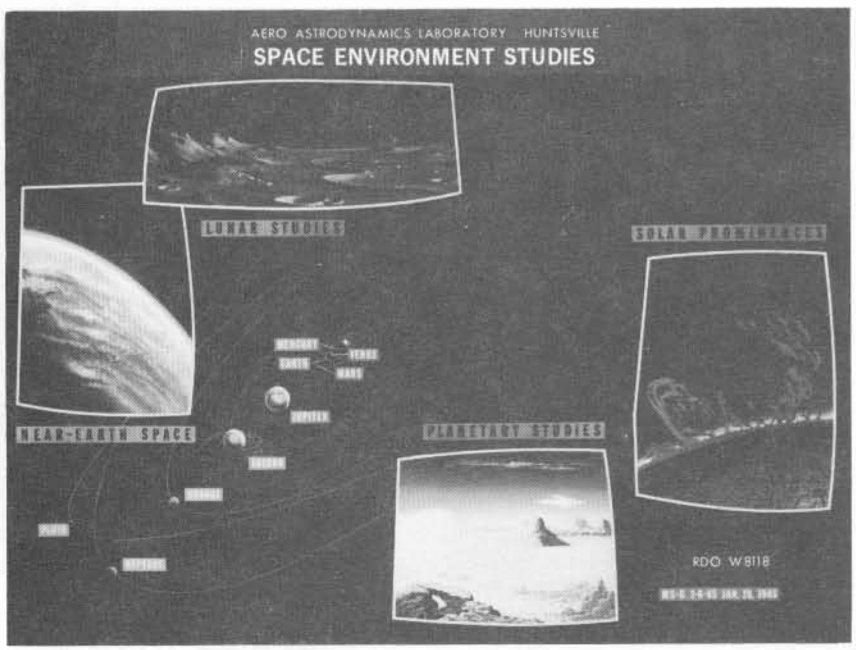
REMARKS

BOOST TO PARKING ORBIT CONSISTS OF COMPLETE BURNS OF S-IC & S-II STAGES & PARTIAL BURN OF S-IVB STAGE. THE VEHICLE REMAINS IN EARTH PARKING ORBIT FOR 3 HOURS. THE S-IVB SECOND BURN INJECTS THE SPACECRAFT INTO AN ECCENTRIC WAITING ORBIT. COAST TIME IN WAITING ORBIT IS APPROXIMATELY 4.7 HOURS. THE TOTAL MISSION IS CONSTRAINED NOT TO EXCEED 12 HOURS.

R-OM-01 OCT. 1966 RDO D8135


GUIDANCE AND CONTROL THEORY
CONTROL SYSTEM
MAINTAINS CORRECT VEHICLE ORIENTATION IN PRESENCE OF DISTURBANCES
DESIRED ORBIT
OPTIMUM FLIGHT PATH
SENSED ANGLES, ACCELERATION ETC
SENSED POSITION VELOCITY ETC
PREDICTED OPTIMUM POINT OF INJECTION
GUIDANCE COMPUTER
ENGINE SWIVEL COMMANDS
OPTIMUM FLIGHT PATH COMMANDS
CONTROL COMPUTER
GUIDANCE SYSTEM
COMMANDS FLIGHT PATH TO ACHIEVE MAXIMUM PAYLOAD IN ORBIT
MSFC-67-RDO-8142


AERO-ASTRODYNAMICS LAB.-HUNTSVILLE
TRAJECTORY
EARTH ORBITAL RENDEZVOUS
1. LAUNCH CSM TO ORBIT.
2. TRACK CSM TO DETERMINE ORBITAL EPHEMERIS.
3. COMPUTE REQUIRED TARGET PARAMETERS FOR THE SATURN / LUNAR MODULE VEHICLE. THEY ARE:
A. INERTIAL VELOCITY MAGNITUDE & DIRECTION AT INSERTION INTO ORBIT.
B. ALTITUDE OF INSERTION POINT.
C. INCLINATION OF ORBIT PLANE.
D. LONGITUDE OF DESCENDING NODE OF ORBIT PLANE.
4. LAUNCH LM TO ORBIT. LM ORBIT WILL BE HIGHER THAN CSM ORBIT. THIS PERMITS CORRECTION OF INFLIGHT TIME VARIATIONS WITH NO PROPELLANT EXPENDITURE.
5. CSM INITIATES A SERIES OF TRANSFER ELLIPSES TO RENDEZVOUS WITH LM.
6. CSM / LM RENDEZVOUS.
7. DOCKING OF CSM / LM.
THIS ACTIVITY EXERCISES ASCENT FROM LUNAR SURFACE PHASE OF THE LUNAR LANDING MISSION.
MSFC-67-RDO-8139


AERO ASTRODYNAMICS LABORATORY HUNTSVILLE
SPACE ENVIRONMENT STUDIES
LUNAR STUDIES
NEAR-EARTH SPACE
PLANETARY STUDIES
RDO W8118


AERO-ASTRODYNAMICS LABORATORY
TERRESTRIAL ENVIRONMENTAL STUDIES
• FAR-FIELD ACOUSTICS PREDICTION
• WIND STATISTICS FOR DESIGN, OPERATION, PERFORMANCE & ADV. STUDIES

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ASTRIONICS LABORATORY

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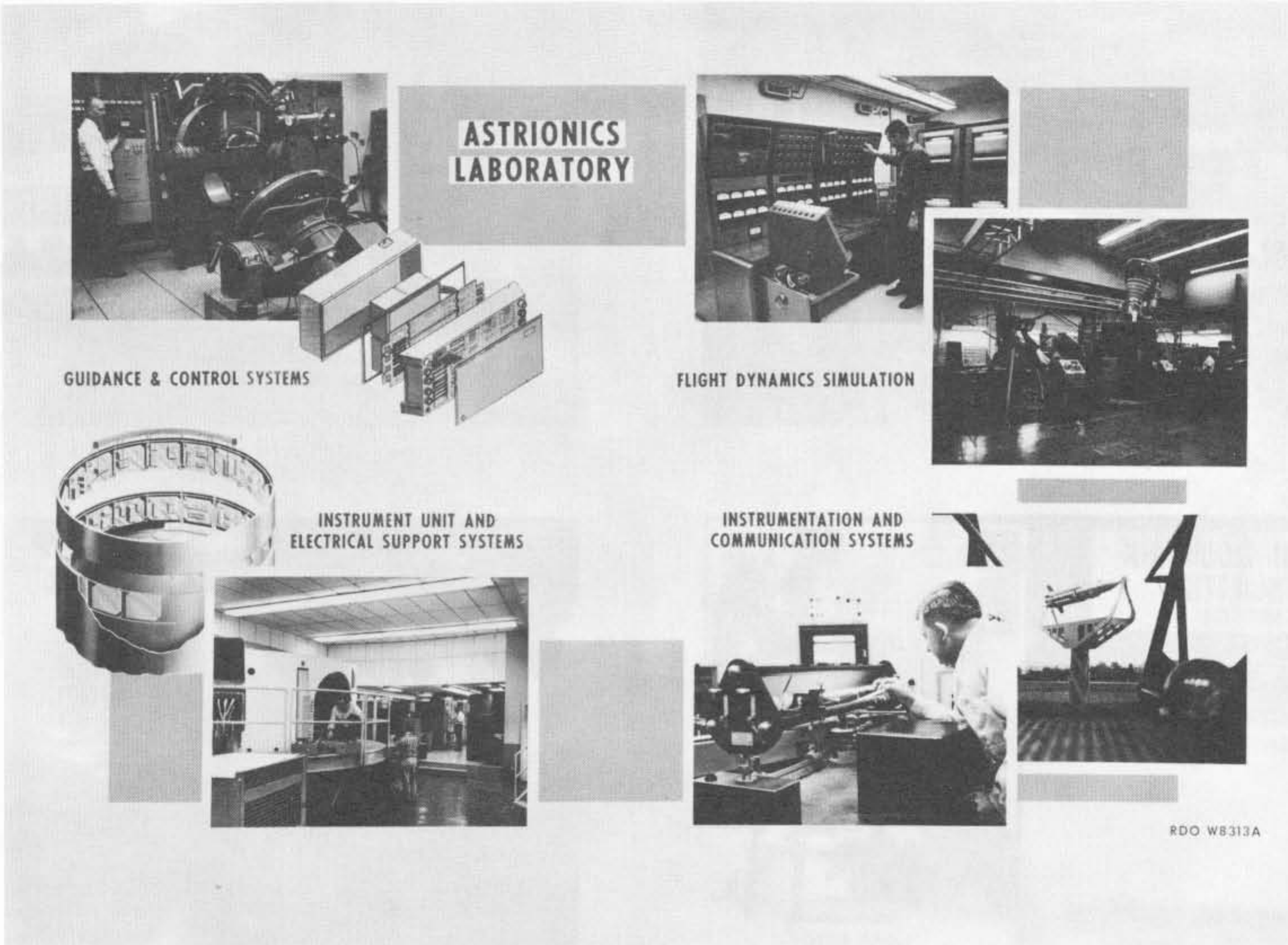
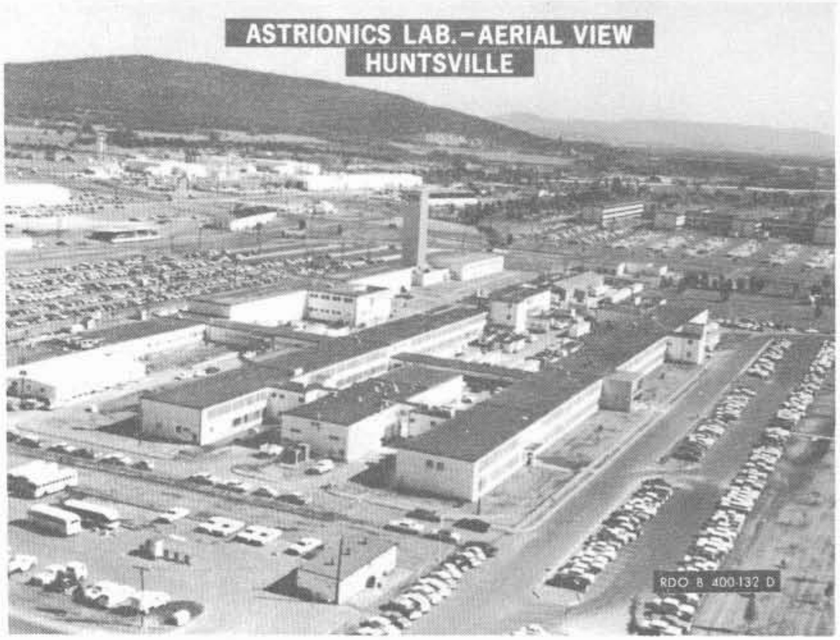
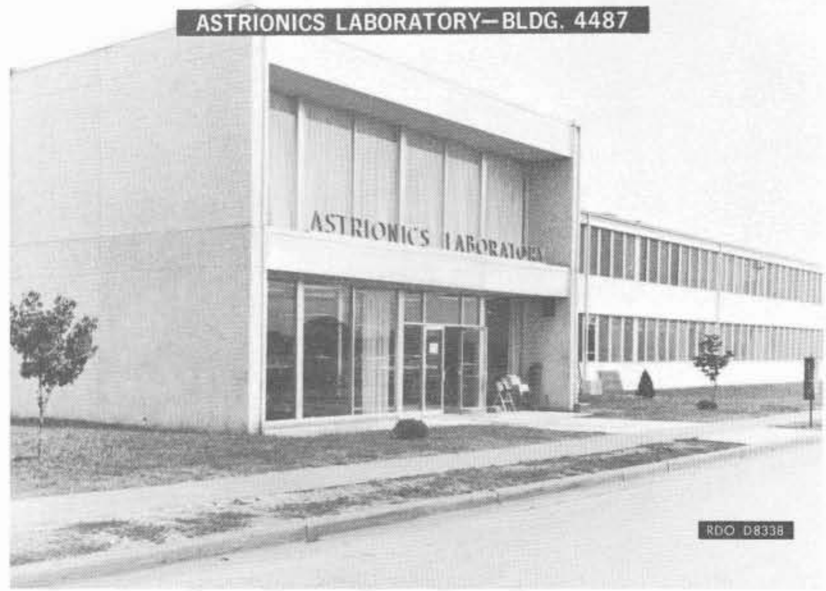
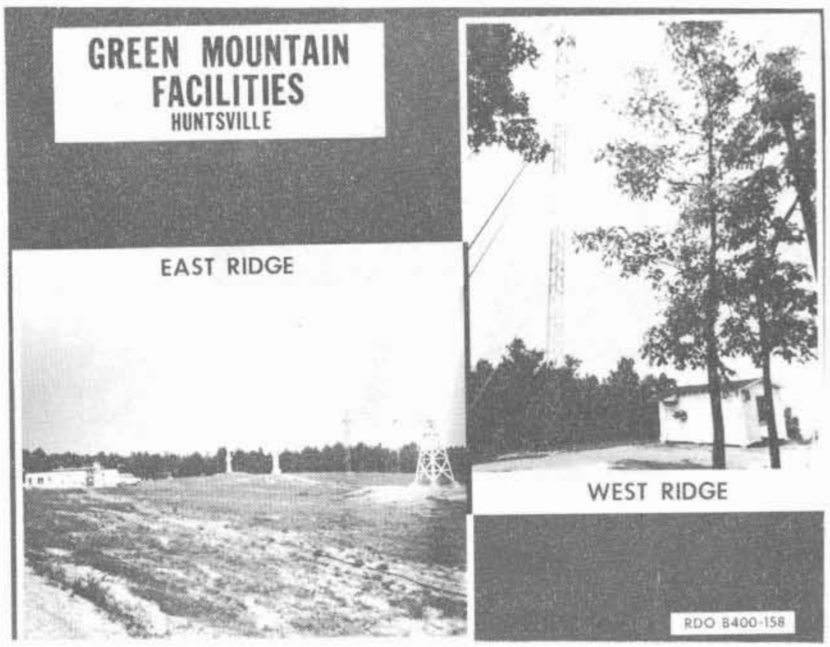
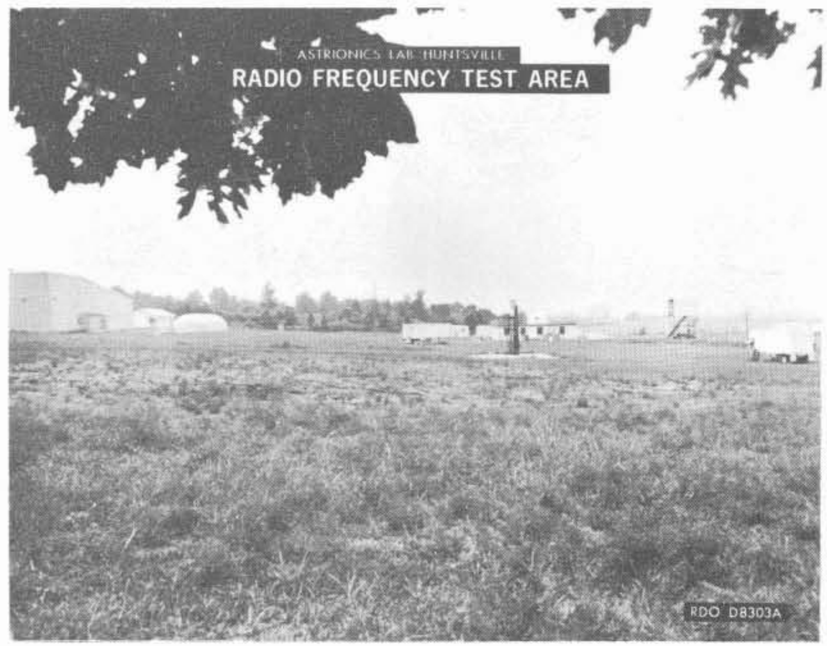
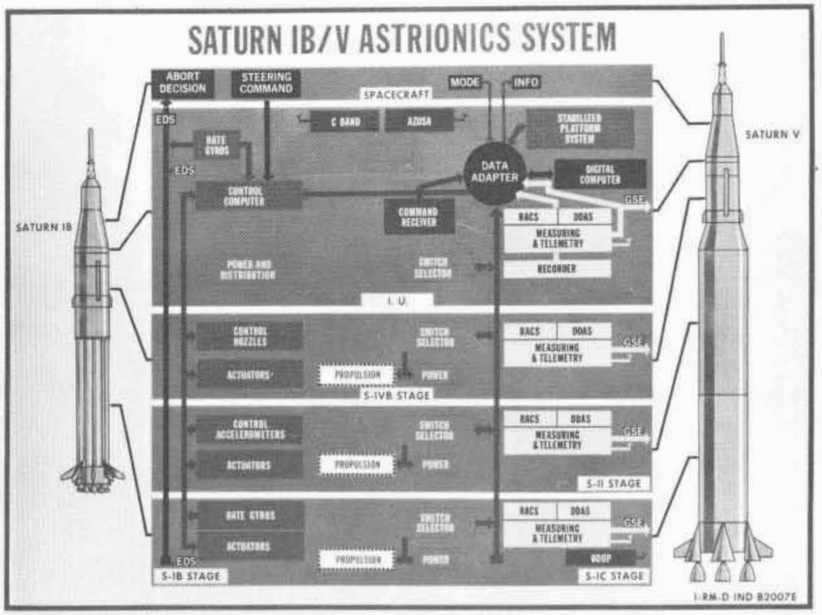

ASTRIONICS LABORATORY
GUIDANCE & CONTROL SYSTEMS
FLIGHT DYNAMICS SIMULATION
INSTRUMENT UNIT AND ELECTRICAL SUPPORT SYSTEMS
INSTRUMENTATION AND COMMUNICATION SYSTEMS
RDO W8313A

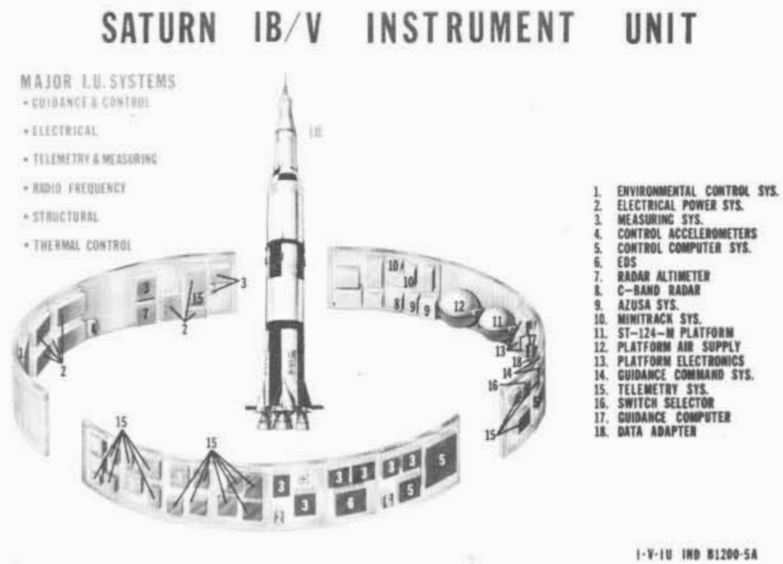

ASTRIONICS LAB.–AERIAL VIEW
HUNTSVILLE
RDO 8 400-132 D


ASTRIONICS LABORATORY–BLDG. 4487
ASTRIONICS LABORATORY
RDO D8338


GREEN MOUNTAIN
FACILITIES
HUNTSVILLE
EAST RIDGE
WEST RIDGE
RDO B400-158

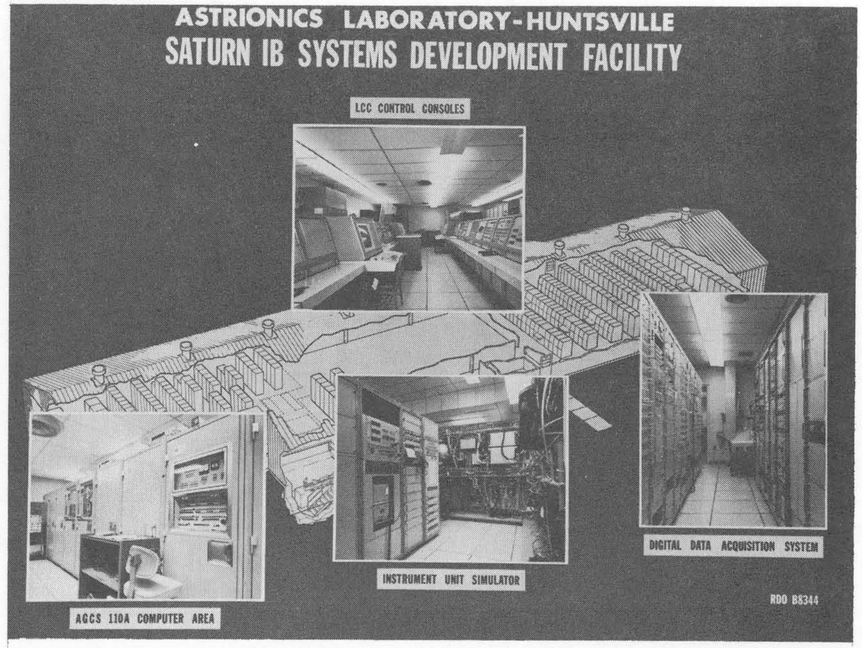

ASTRIONICS LAB HUNTSVILLE
RADIO FREQUENCY TEST AREA
RDO D8303A

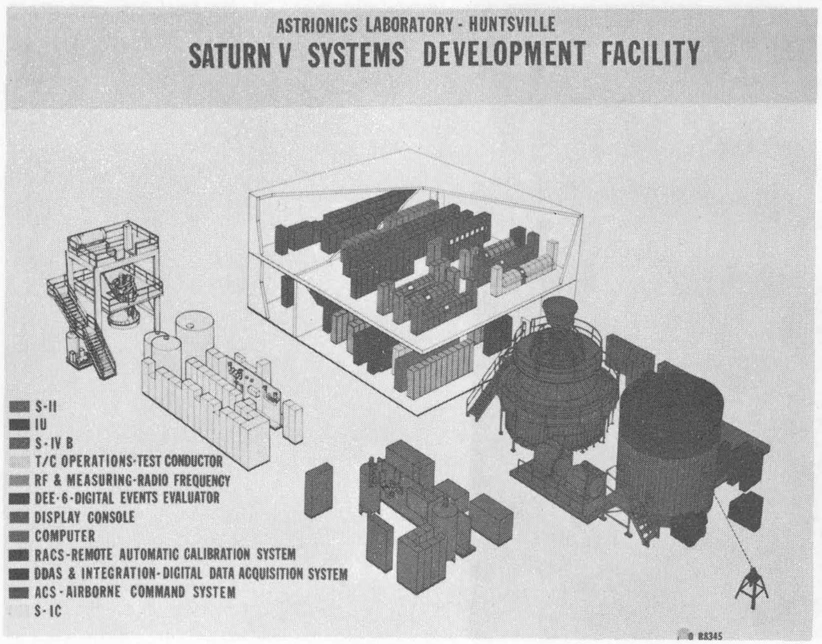

SATURN IB/V ASTRIONICS SYSTEM
SATURN IB
SATURN V
ABORT DECISION
STEERING COMMAND
MODE
INFO
SPACECRAFT
EDS
C BAND
AZUSA
STABILIZED PLATFORM SYSTEM
RATE GYROS
DATA ADAPTER
DIGITAL COMPUTER
CONTROL COMPUTER
COMMAND RECEIVER
GSE
RACS
DDAS
MEASURING & TELEMETRY
POWER AND DISTRIBUTION
SWITCH SELECTOR
RECORDER
I. U.
CONTROL NOZZLES
ACTUATORS
PROPULSION
POWER
S-IVB STAGE
CONTROL ACCELEROMETERS
S-II STAGE
RATE GYROS
ODOP
S-IB STAGE
S-IC STAGE
I-RM-D IND B2007E

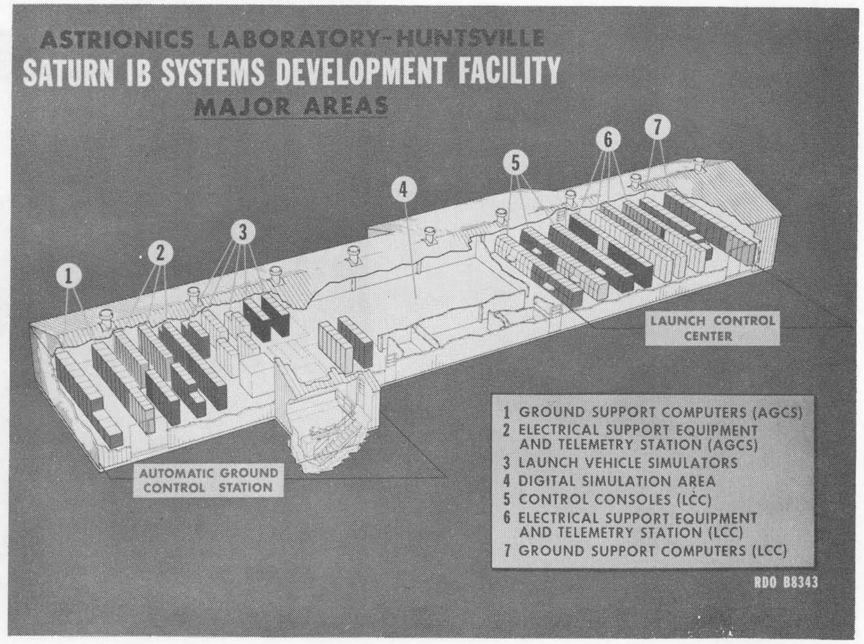

SATURN IB/V INSTRUMENT UNIT
MAJOR I.U. SYSTEMS
• GUIDANCE & CONTROL
• ELECTRICAL
• TELEMETRY & MEASURING
• RADIO FREQUENCY
• STRUCTURAL
• THERMAL CONTROL
1. ENVIRONMENTAL CONTROL SYS.
2. ELECTRICAL POWER SYS.
3. MEASURING SYS.
4. CONTROL ACCELEROMETERS
5. CONTROL COMPUTER SYS.
6. EDS
7. RADAR ALTIMETER
8. C-BAND RADAR
9. AZUSA SYS.
10. MINITRACK SYS.
11. ST-124-M PLATFORM
12. PLATFORM AIR SUPPLY
13. PLATFORM ELECTRONICS
14. GUIDANCE COMMAND SYS.
15. TELEMETRY SYS.
16. SWITCH SELECTOR
17. GUIDANCE COMPUTER
18. DATA ADAPTER
I-V-IU IND B1200-5A

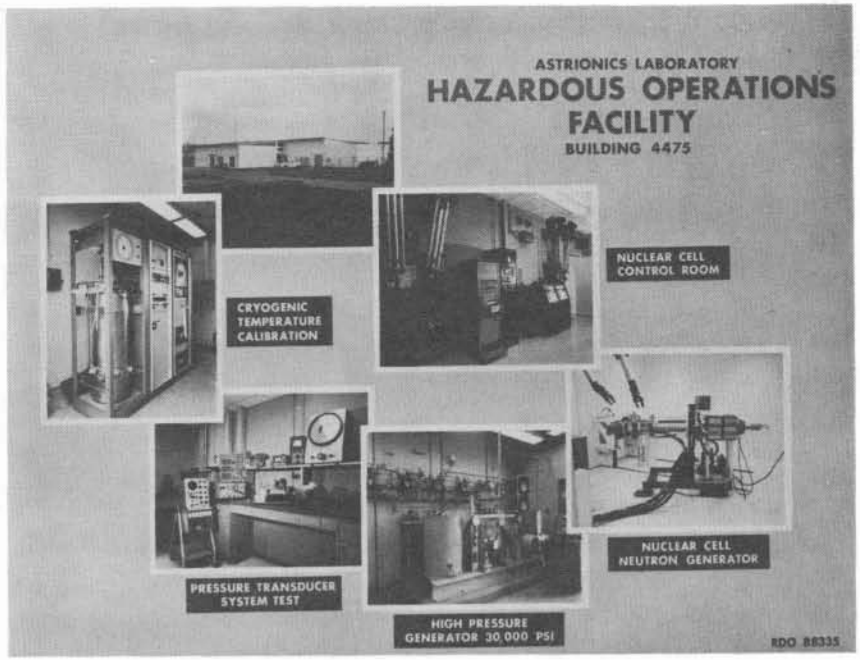

ASTRIONICS LAB HUNTSVILLE
TELEMETRY GROUND STATION
RDO D8334

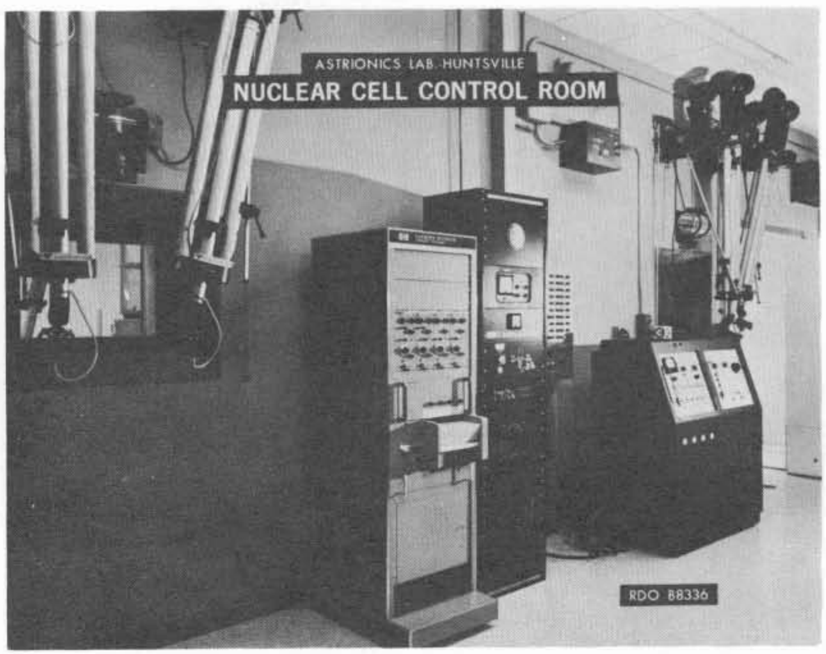

ASTRIONICS LABORATORY - HUNTSVILLE
LAUNCH CONTROL CENTER
SATURN V SYSTEMS DEVELOPMENT FACILITY
S-II STAGE SIMULATOR
S-IVB INSTRUMENT UNIT

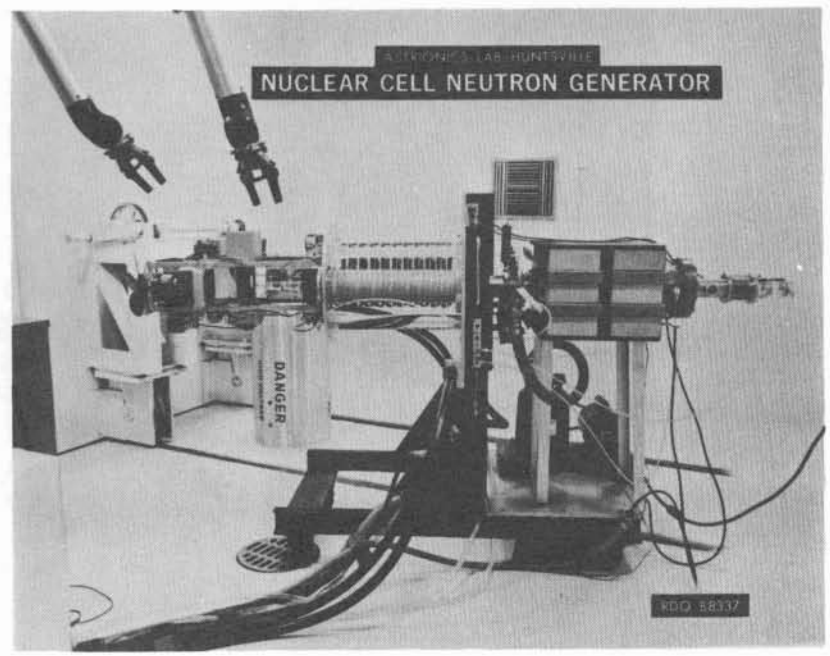

ASTRIONICS LABORATORY-HUNTSVILLE
SATURN IB SYSTEMS DEVELOPMENT FACILITY
LCC CONTROL CONSOLES
DIGITAL DATA ACQUISITION SYSTEM
INSTRUMENT UNIT SIMULATOR
AGCS 110A COMPUTER AREA
RDO B8344

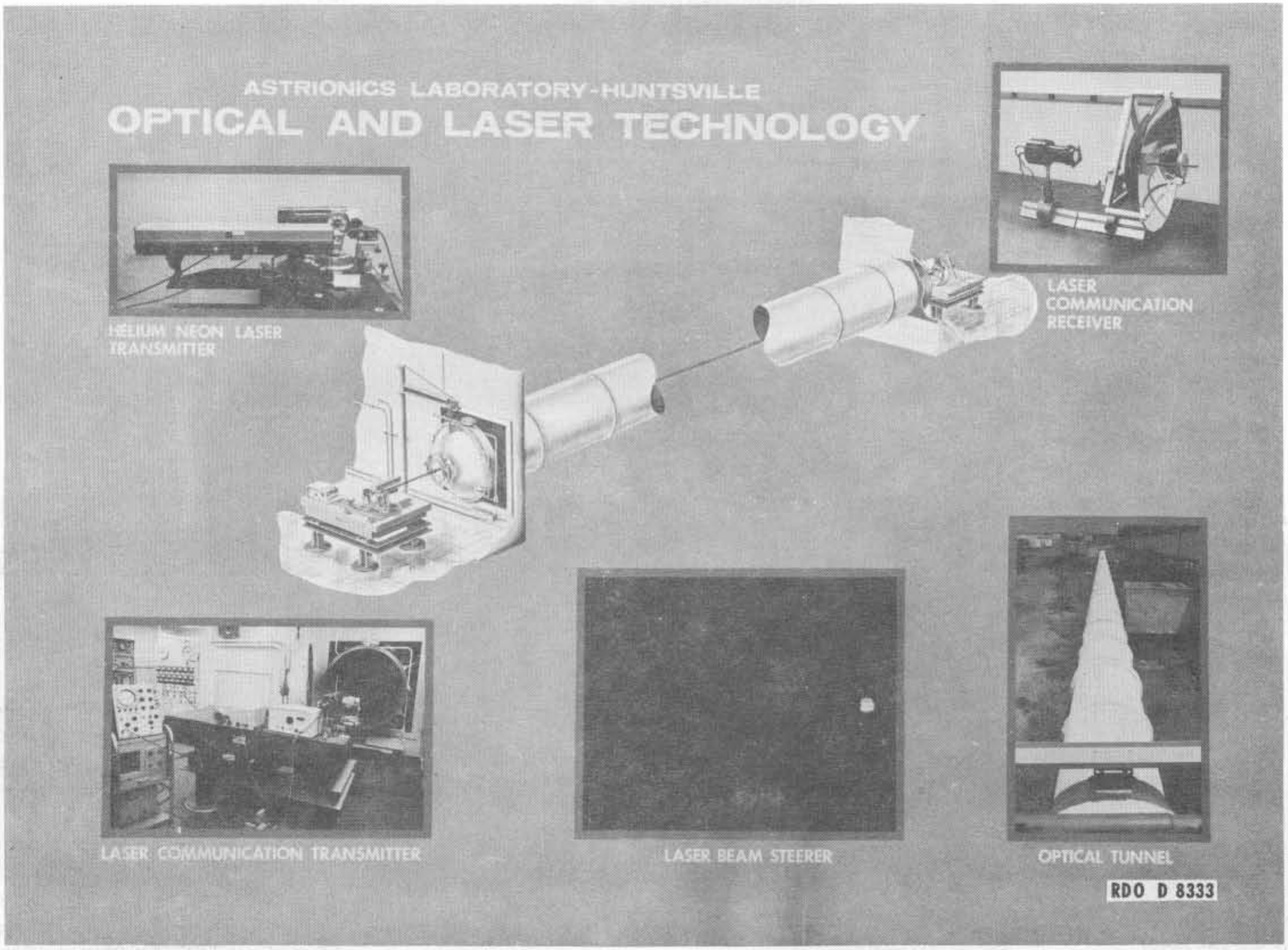

ASTRIONICS LABORATORY - HUNTSVILLE
SATURN V SYSTEMS DEVELOPMENT FACILITY
S-II
IU
S-IV B
T/C OPERATIONS-TEST CONDUCTOR
RF & MEASURING-RADIO FREQUENCY
DEE-6-DIGITAL EVENTS EVALUATOR
DISPLAY CONSOLE
COMPUTER
RACS-REMOTE AUTOMATIC CALIBRATION SYSTEM
DDAS & INTEGRATION-DIGITAL DATA ACQUISITION SYSTEM
ACS-AIRBORNE COMMAND SYSTEM
S-IC

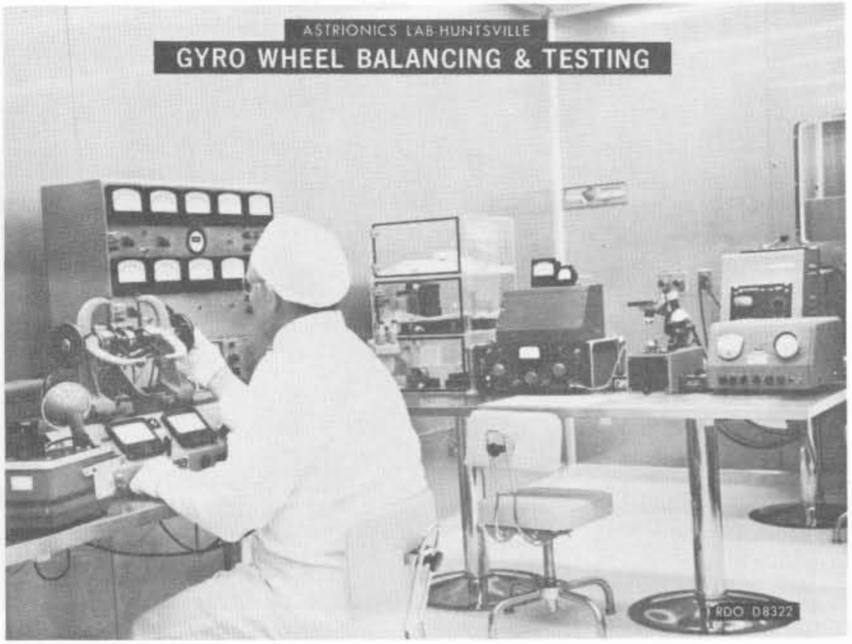

ASTRIONICS LABORATORY-HUNTSVILLE
SATURN IB SYSTEMS DEVELOPMENT FACILITY
MAJOR AREAS
1
2
3
4
5
6
7
LAUNCH CONTROL CENTER
AUTOMATIC GROUND CONTROL STATION
1 GROUND SUPPORT COMPUTERS (AGCS)
2 ELECTRICAL SUPPORT EQUIPMENT AND TELEMETRY STATION (AGCS)
3 LAUNCH VEHICLE SIMULATORS
4 DIGITAL SIMULATION AREA
5 CONTROL CONSOLES (LCC)
6 ELECTRICAL SUPPORT EQUIPMENT AND TELEMETRY STATION (LCC)
7 GROUND SUPPORT COMPUTERS (LCC)
RDO B8343

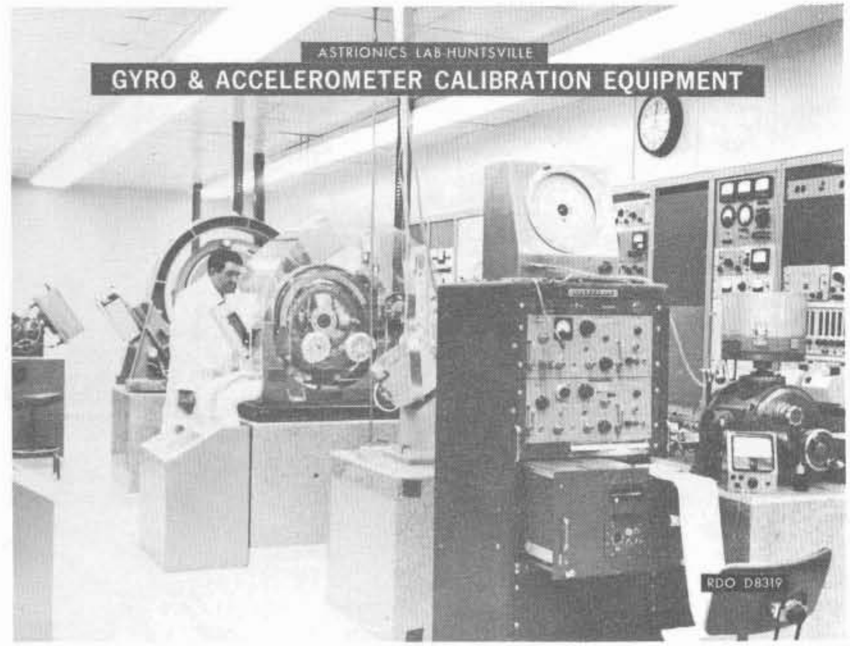

ASTRIONICS LABORATORY
HAZARDOUS OPERATIONS FACILITY
BUILDING 4475
CRYOGENIC TEMPERATURE CALIBRATION
NUCLEAR CELL CONTROL ROOM
PRESSURE TRANSDUCER SYSTEM TEST
HIGH PRESSURE GENERATOR 30,000 PSI
NUCLEAR CELL NEUTRON GENERATOR
RDO 88335

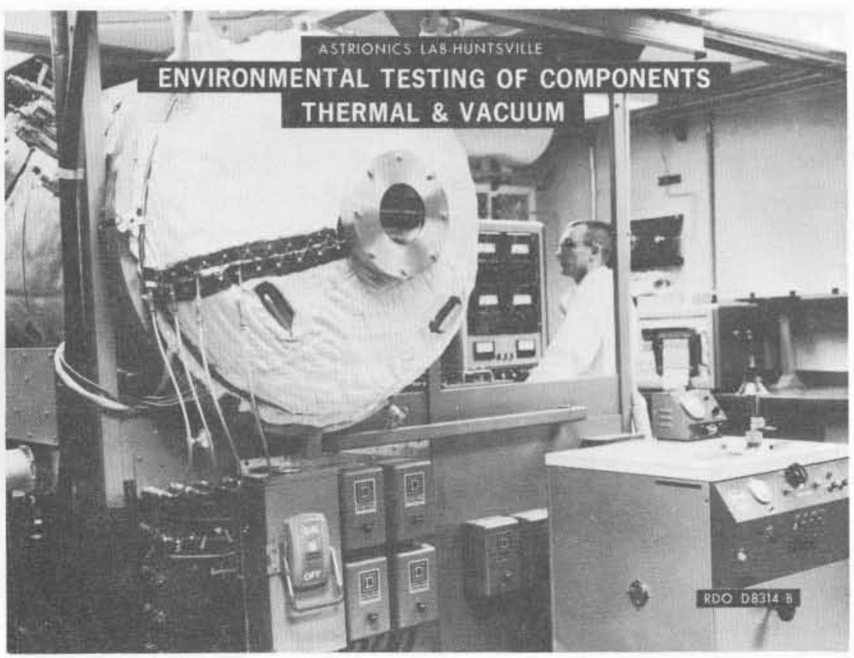

ASTRIONICS LAB. HUNTSVILLE
NUCLEAR CELL CONTROL ROOM
RDO 88336


ASTRIONICS LAB HUNTSVILLE
NUCLEAR CELL NEUTRON GENERATOR
DANGER
RDO 88337


ASTRIONICS LABORATORY-HUNTSVILLE
OPTICAL AND LASER TECHNOLOGY
HELIUM NEON LASER TRANSMITTER
LASER COMMUNICATION RECEIVER
LASER COMMUNICATION TRANSMITTER
LASER BEAM STEERER
OPTICAL TUNNEL
RDO D 8333

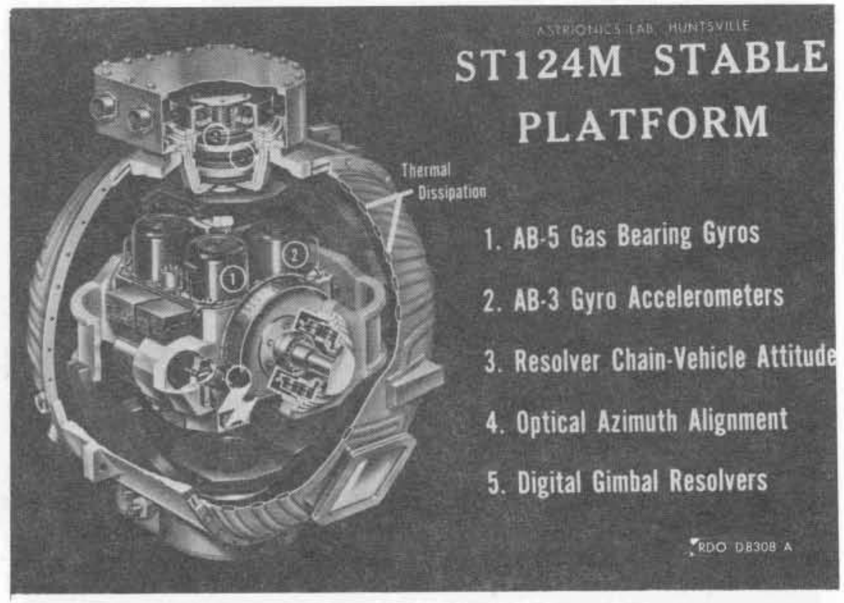

ASTRIONICS LAB-HUNTSVILLE
GYRO WHEEL BALANCING & TESTING
RDO D8322

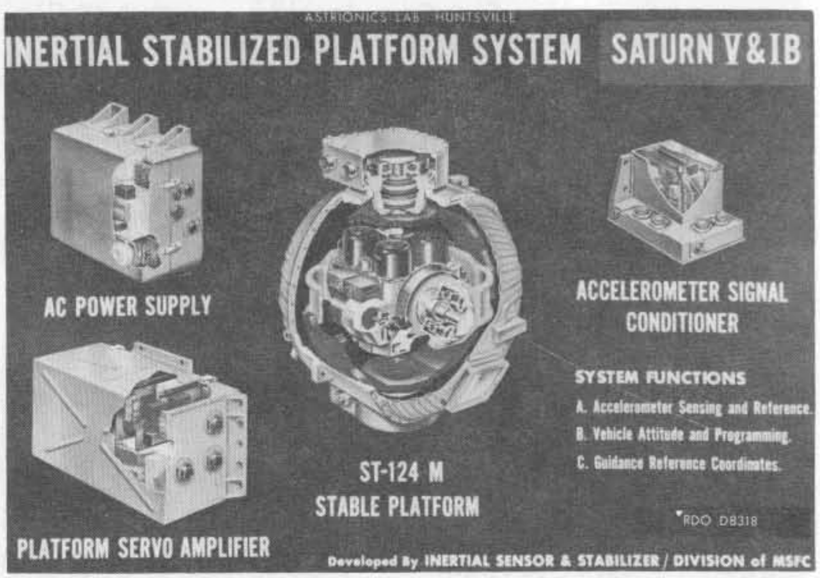

ASTRIONICS LAB-HUNTSVILLE
GYRO & ACCELEROMETER CALIBRATION EQUIPMENT
RDO D8319

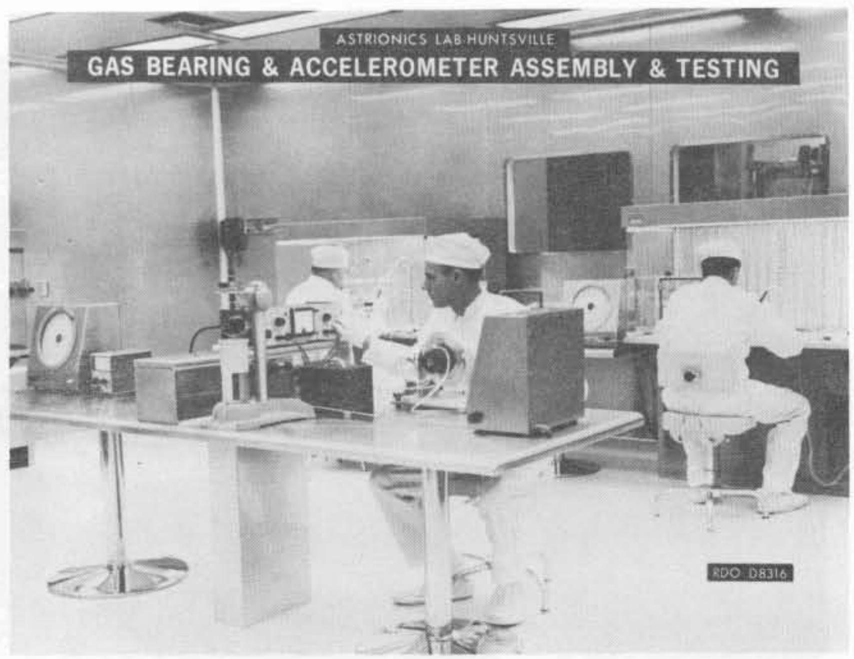

ASTRIONICS LAB-HUNTSVILLE
ENVIRONMENTAL TESTING OF COMPONENTS
THERMAL & VACUUM
RDO D8314 B


ASTRIONICS LAB-HUNTSVILLE
ENVIRONMENTAL TESTING OF COMPONENTS-
ULTRA HIGH VACUUM
RDO D 8317 A


ASTRIONICS LAB
CHECKOUT & CALIBRATION OF ST-124
STABILIZED PLATFORM
RDO D8304


ASTRIONICS LAB HUNTSVILLE
ST124M STABLE
PLATFORM
Thermal
Dissipation
1. AB-5 Gas Bearing Gyros
2. AB-3 Gyro Accelerometers
3. Resolver Chain-Vehicle Attitude
4. Optical Azimuth Alignment
5. Digital Gimbal Resolvers
RDO D8308 A

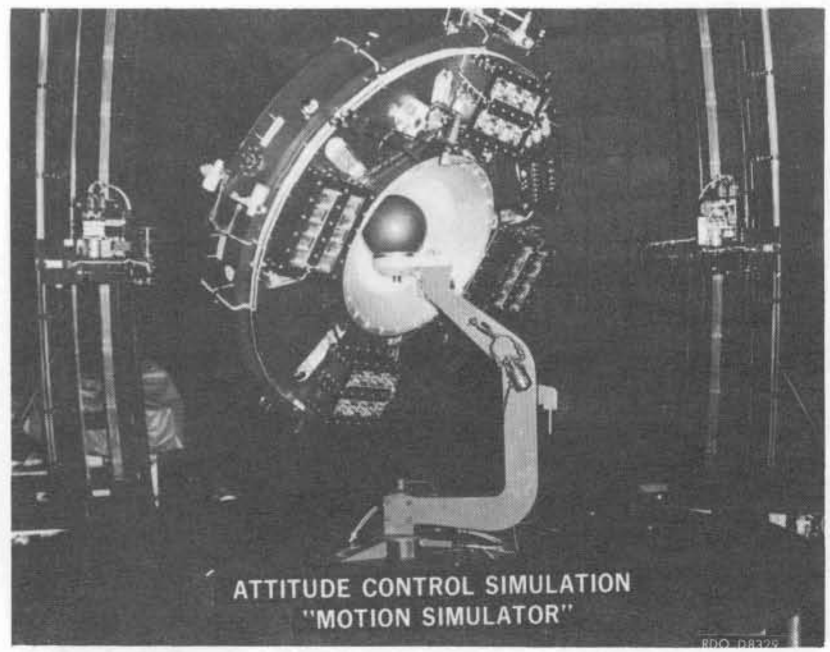

ASTRIONICS LAB HUNTSVILLE
INERTIAL STABILIZED PLATFORM SYSTEM SATURN V&IB
AC POWER SUPPLY
ACCELEROMETER SIGNAL
CONDITIONER
SYSTEM FUNCTIONS
A. Accelerometer Sensing and Reference.
B. Vehicle Attitude and Programming.
C. Guidance Reference Coordinates.
ST-124 M
STABLE PLATFORM
RDO D8318
PLATFORM SERVO AMPLIFIER
Developed By INERTIAL SENSOR & STABILIZER / DIVISION of MSFC

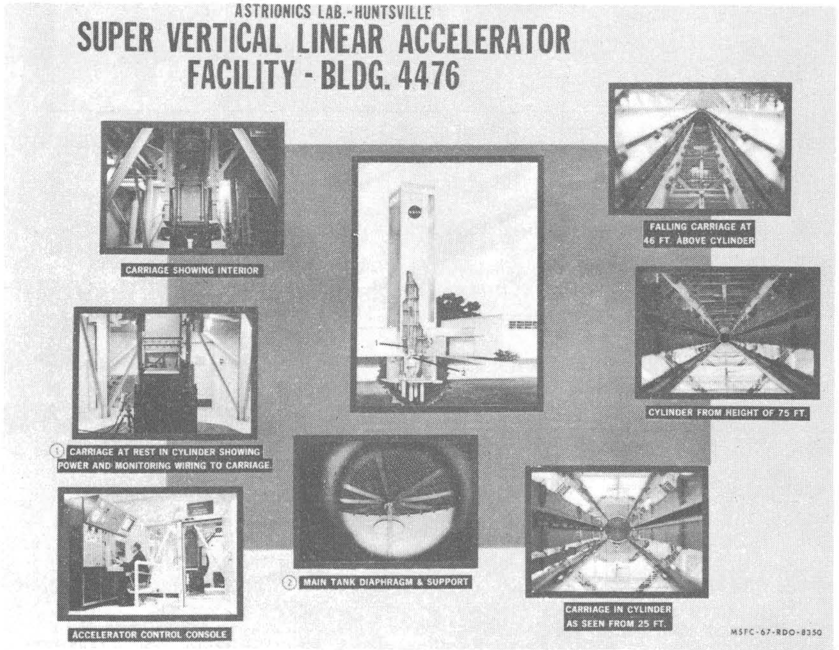

ASTRIONICS LAB HUNTSVILLE
GAS BEARING & ACCELEROMETER ASSEMBLY & TESTING
RDO D8316

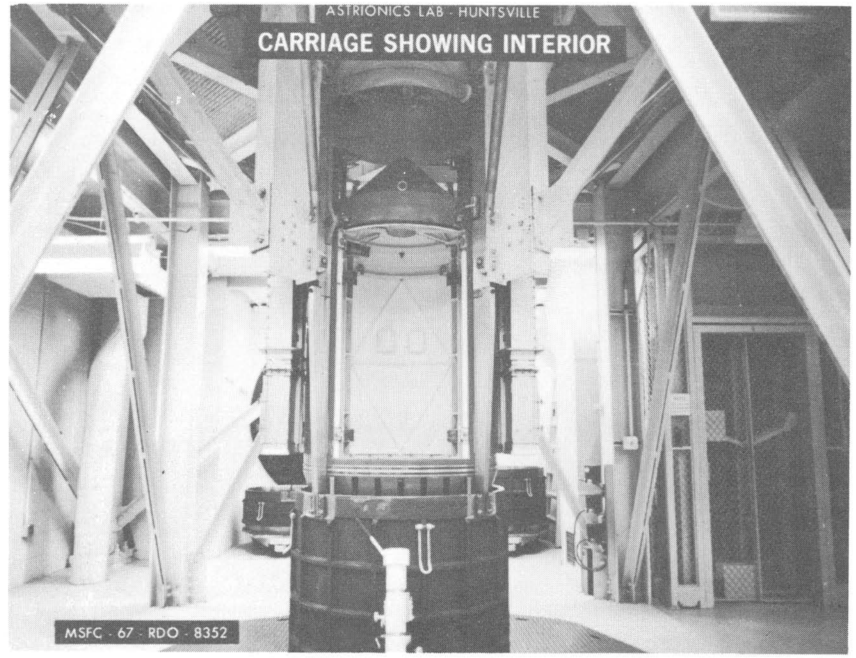

ASTRIONICS LAB-HUNTSVILLE
CONTROL ROOM FOR SIMULATED GUIDANCE & CONTROL SYSTEMS TESTS
RDO D8321 A

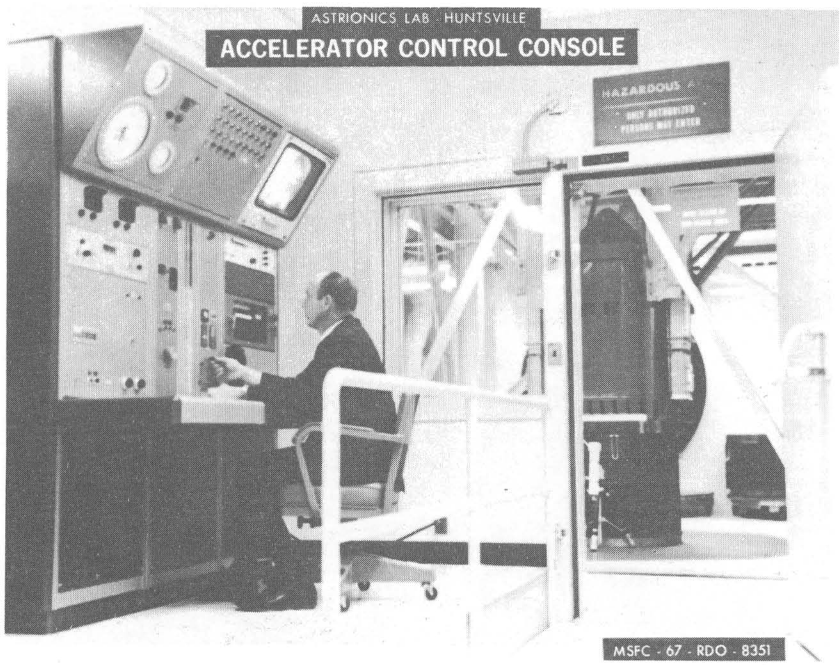

ASTRIONICS LAB HUNTSVILLE
CHECKOUT OF F-1 ACTUATORS LOAD TEST SIMULATOR
RDO D8325 A

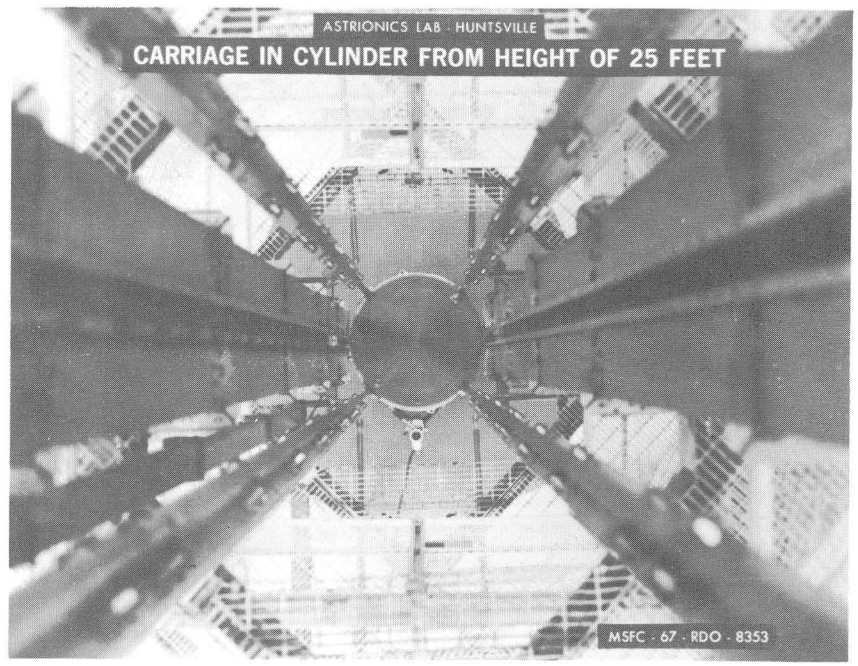

ASTRIONICS LABORATORY HUNTSVILLE
CHECKOUT & EVALUATION OF LAUNCH VEHICLE DIGITAL COMPUTER
RDO D8326

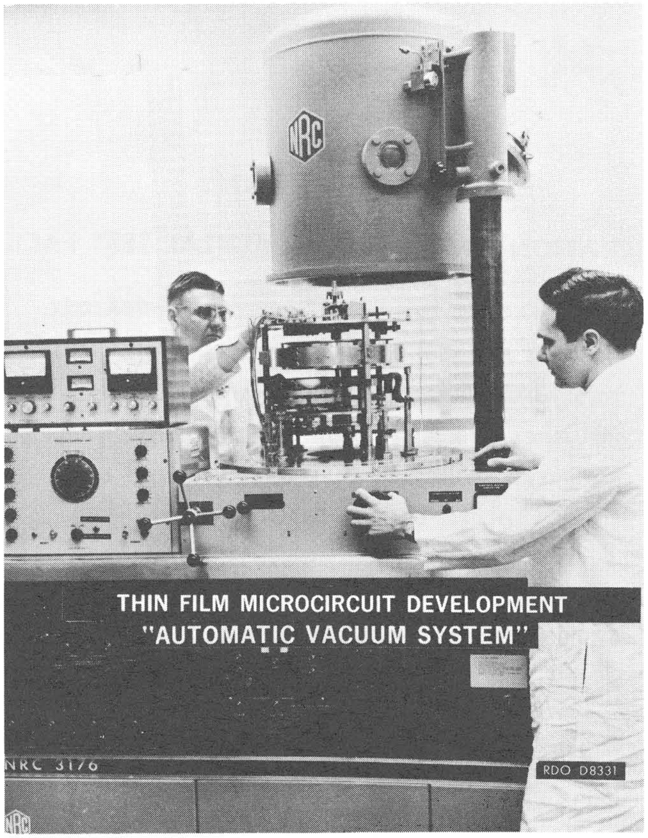

ATTITUDE CONTROL SIMULATION "MOTION SIMULATOR"

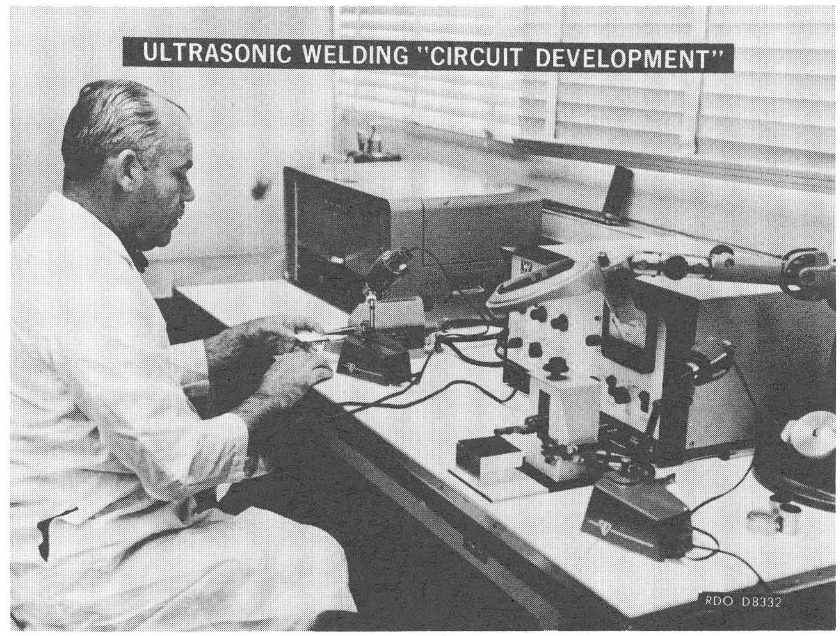

ASTRIONICS LAB.-HUNTSVILLE
SUPER VERTICAL LINEAR ACCELERATOR
FACILITY - BLDG. 4476
CARRIAGE SHOWING INTERIOR
FALLING CARRIAGE AT
46 FT. ABOVE CYLINDER
CYLINDER FROM HEIGHT OF 75 FT.
① CARRIAGE AT REST IN CYLINDER SHOWING
POWER AND MONITORING WIRING TO CARRIAGE.
② MAIN TANK DIAPHRAGM & SUPPORT
CARRIAGE IN CYLINDER
AS SEEN FROM 25 FT.
ACCELERATOR CONTROL CONSOLE
MSFC-67-RDO-8350

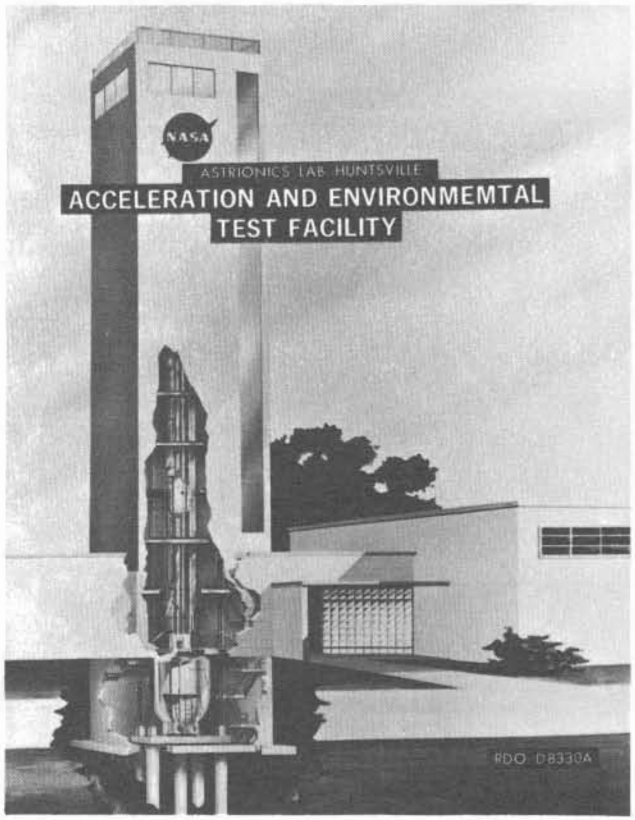

ASTRIONICS LAB - HUNTSVILLE
CARRIAGE SHOWING INTERIOR
MSFC - 67 - RDO - 8352


ASTRIONICS LAB - HUNTSVILLE
ACCELERATOR CONTROL CONSOLE
HAZARDOUS
MSFC - 67 - RDO - 8351


ASTRIONICS LAB - HUNTSVILLE
CARRIAGE IN CYLINDER FROM HEIGHT OF 25 FEET
MSFC - 67 - RDO - 8353


NRC
THIN FILM MICROCIRCUIT DEVELOPMENT
"AUTOMATIC VACUUM SYSTEM"
NRC 3176
RDO D8331


ULTRASONIC WELDING "CIRCUIT DEVELOPMENT"
RDO D8332



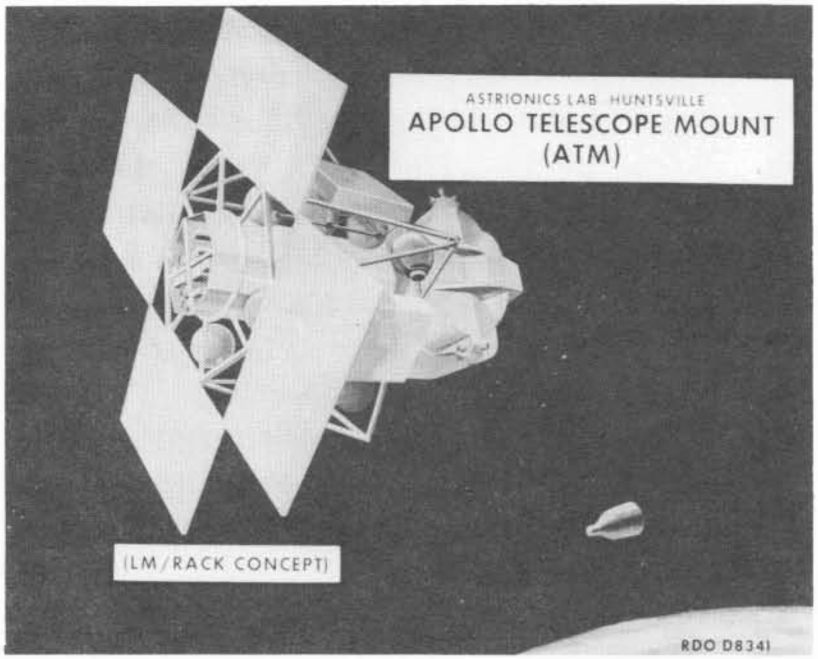
DESCRIPTION

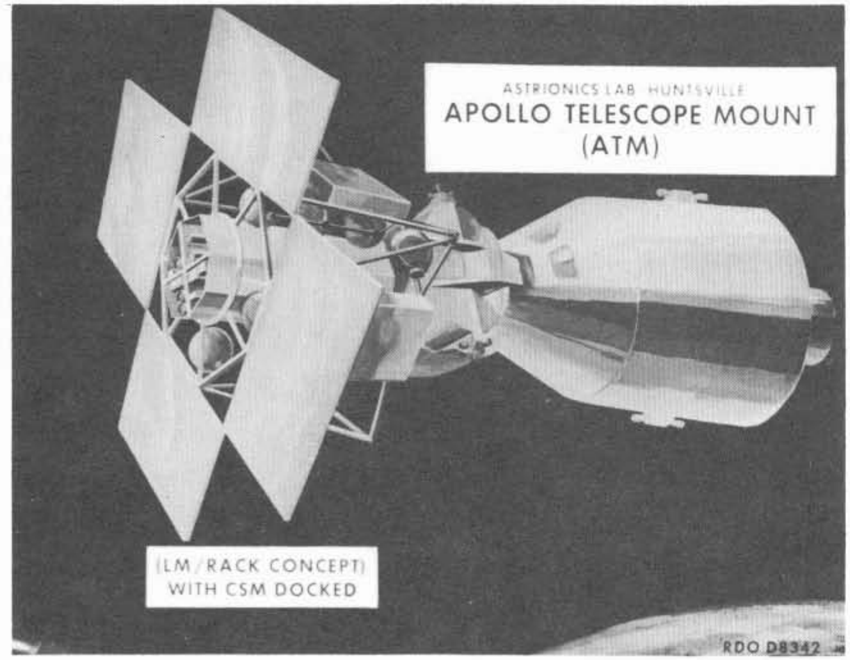
ACCELERATION AND ENVIRONMENTAL TEST FACILITY

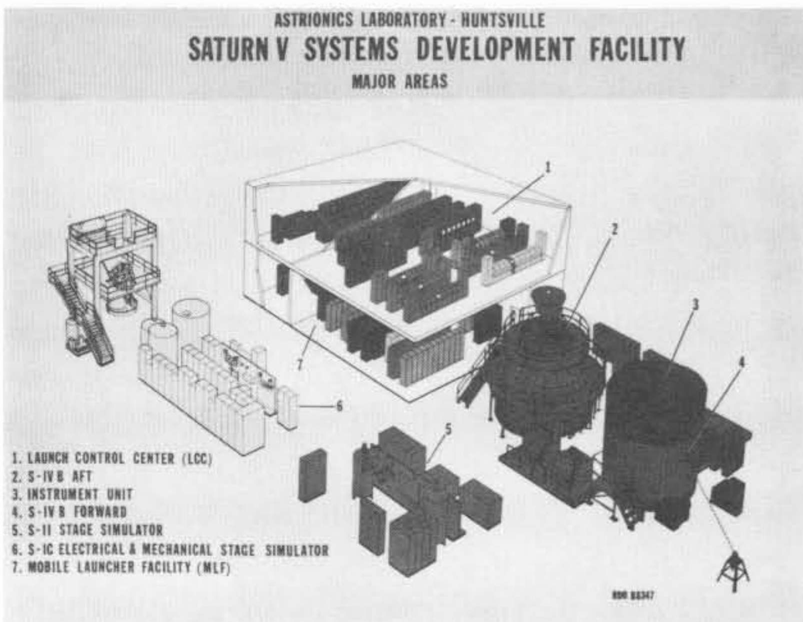
THIS FACILITY CONSISTS OF UTILITIES, LABORATORY FACILITIES AND TEST EQUIPMENT NECESSARY TO SUBJECT OPERATING VEHICLE HARDWARE TO INFLUENCE OF ACCELERATION, ZERO GRAVITY, HIGH LEVEL SOUND PRESSURE VIBRATION AND EXTREMES IN TEMPERATURE CONDITION.

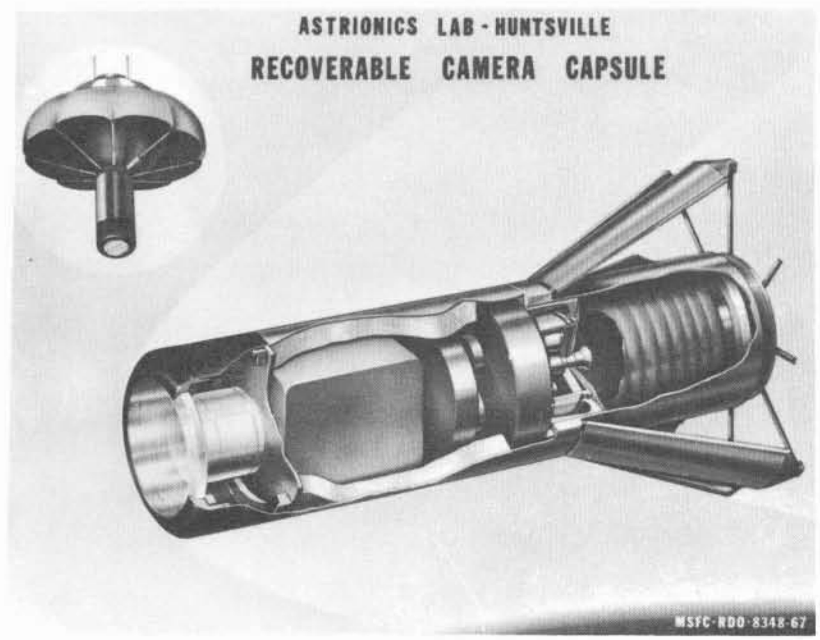
THE BUILDING, APPROXIMATELY 1400 SQUARE FEET, INCLUDES A TOWER 27 FEET SQUARE BY 115 FEET HIGH.

RDO D8340


ASTRIONICS LAB HUNTSVILLE
APOLLO TELESCOPE MOUNT
(ATM)
(LM/RACK CONCEPT)
RDO D8341


ASTRIONICS LAB HUNTSVILLE
APOLLO TELESCOPE MOUNT
(ATM)
(LM/RACK CONCEPT)
WITH CSM DOCKED
RDO D8342


ASTRIONICS LABORATORY - HUNTSVILLE
SATURN V SYSTEMS DEVELOPMENT FACILITY
MAJOR AREAS
1. LAUNCH CONTROL CENTER (LCC)
2. S-IV B AFT
3. INSTRUMENT UNIT
4. S-IV B FORWARD
5. S-II STAGE SIMULATOR
6. S-IC ELECTRICAL & MECHANICAL STAGE SIMULATOR
7. MOBILE LAUNCHER FACILITY (MLF)


ASTRIONICS LAB - HUNTSVILLE
RECOVERABLE CAMERA CAPSULE
MSFC-RDO-8348-67

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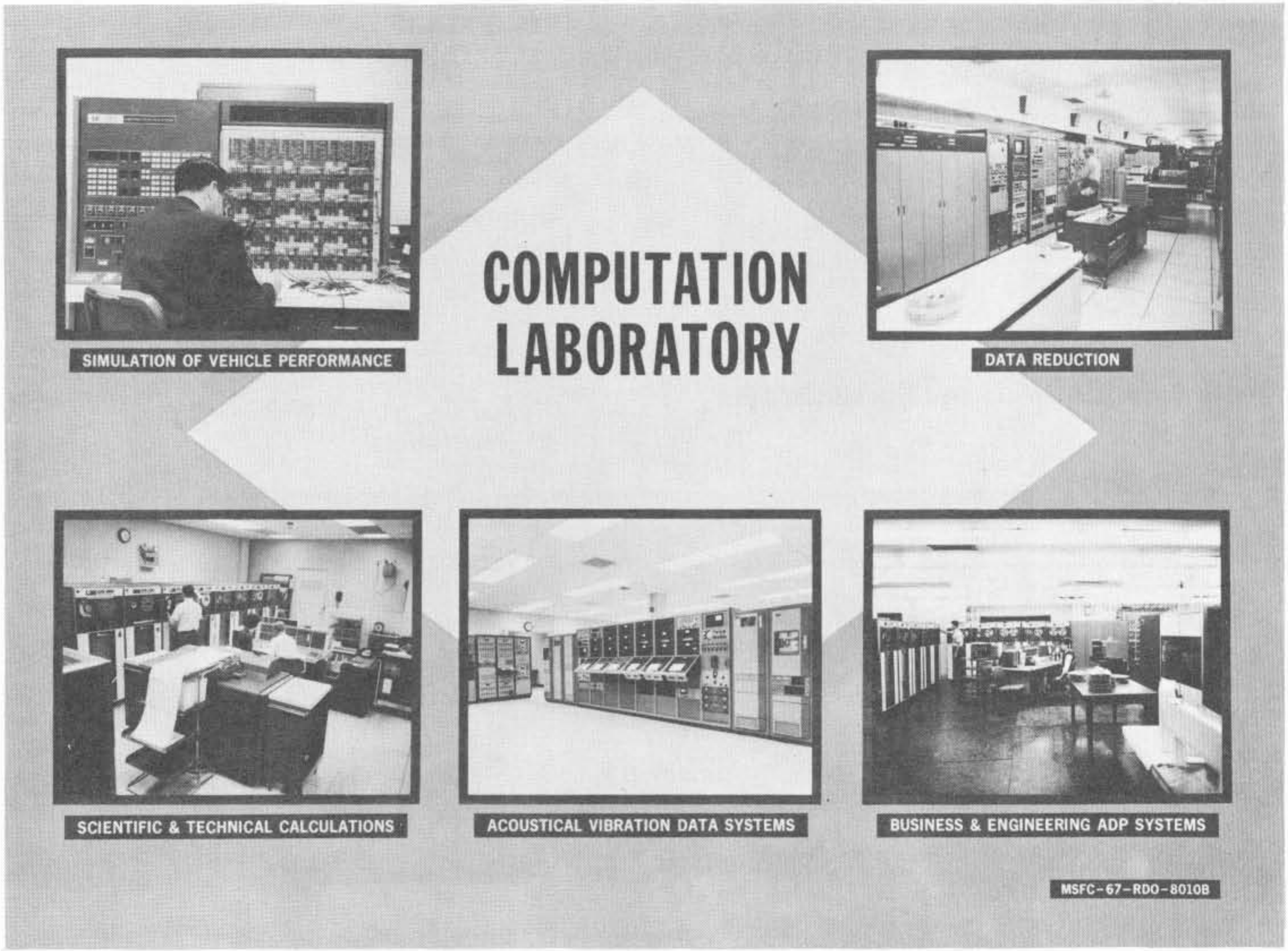
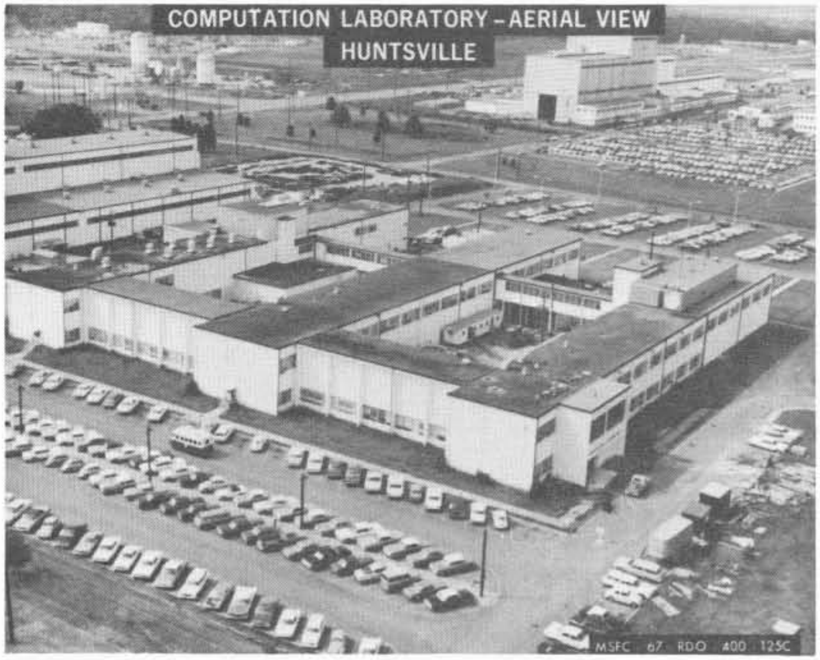
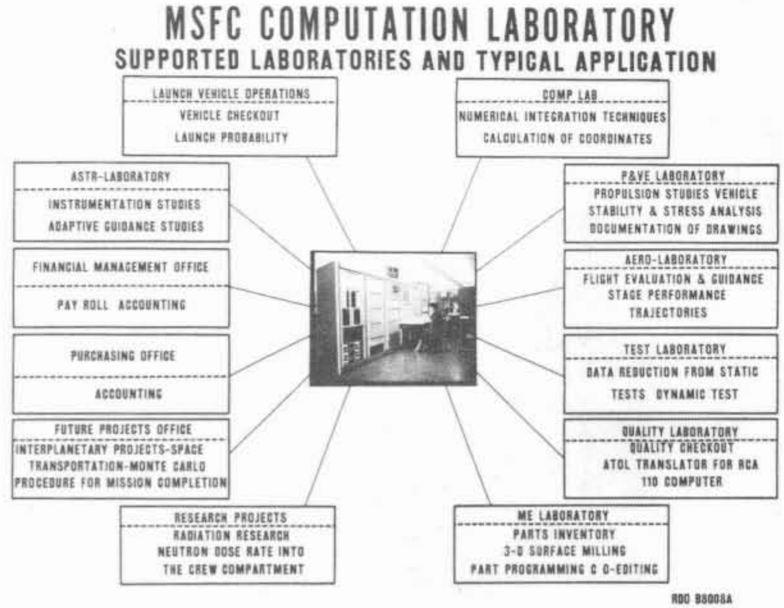
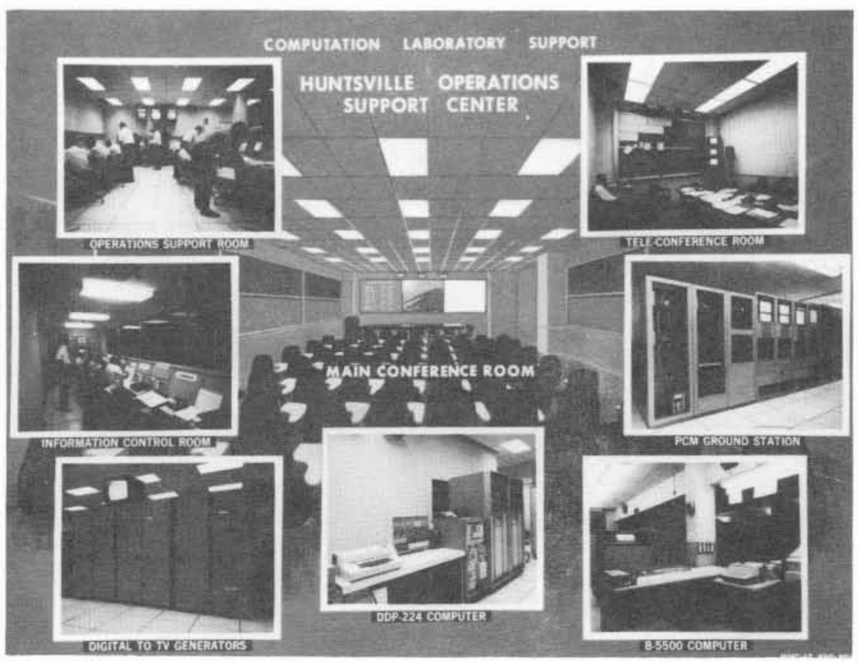
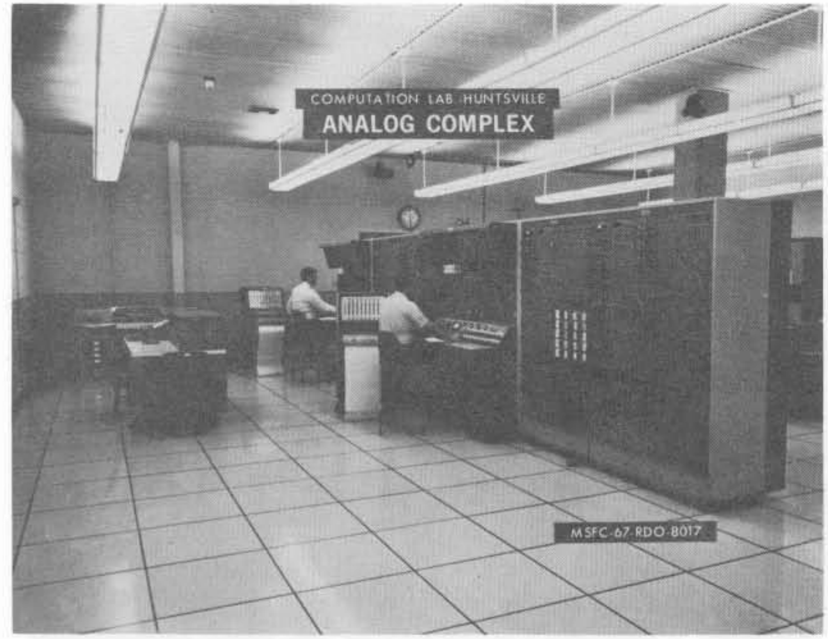

COMPUTATION LABORATORY
SIMULATION OF VEHICLE PERFORMANCE
DATA REDUCTION
SCIENTIFIC & TECHNICAL CALCULATIONS
ACOUSTICAL VIBRATION DATA SYSTEMS
BUSINESS & ENGINEERING ADP SYSTEMS
MSFC-67-RDO-8010B

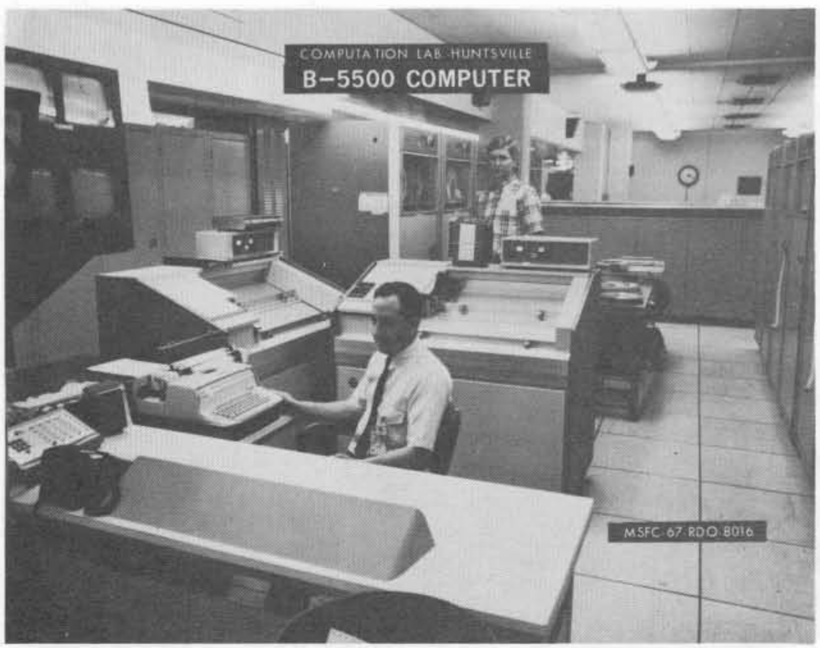

COMPUTATION LABORATORY - AERIAL VIEW
HUNTSVILLE
MSFC 67 RDO 400 125C


MSFC COMPUTATION LABORATORY
SUPPORTED LABORATORIES AND TYPICAL APPLICATION
LAUNCH VEHICLE OPERATIONS
VEHICLE CHECKOUT
LAUNCH PROBABILITY
COMP LAB
NUMERICAL INTEGRATION TECHNIQUES
CALCULATION OF COORDINATES
ASTR-LABORATORY
INSTRUMENTATION STUDIES
ADAPTIVE GUIDANCE STUDIES
P&VE LABORATORY
PROPULSION STUDIES VEHICLE
STABILITY & STRESS ANALYSIS
DOCUMENTATION OF DRAWINGS
FINANCIAL MANAGEMENT OFFICE
PAY ROLL ACCOUNTING
AERO-LABORATORY
FLIGHT EVALUATION & GUIDANCE
STAGE PERFORMANCE
TRAJECTORIES
PURCHASING OFFICE
ACCOUNTING
TEST LABORATORY
DATA REDUCTION FROM STATIC
TESTS DYNAMIC TEST
FUTURE PROJECTS OFFICE
INTERPLANETARY PROJECTS-SPACE
TRANSPORTATION-MONTE CARLO
PROCEDURE FOR MISSION COMPLETION
QUALITY LABORATORY
QUALITY CHECKOUT
ATOL TRANSLATOR FOR RCA
110 COMPUTER
RESEARCH PROJECTS
RADIATION RESEARCH
NEUTRON DOSE RATE INTO
THE CREW COMPARTMENT
ME LABORATORY
PARTS INVENTORY
3-D SURFACE MILLING
PART PROGRAMMING & D-EDITING
RDO B8008A


COMPUTATION LABORATORY SUPPORT
HUNTSVILLE OPERATIONS
SUPPORT CENTER
OPERATIONS SUPPORT ROOM
TELE-CONFERENCE ROOM
MAIN CONFERENCE ROOM
INFORMATION CONTROL ROOM
PCM GROUND STATION
DDP-224 COMPUTER
DIGITAL TO TV GENERATORS
B-5500 COMPUTER

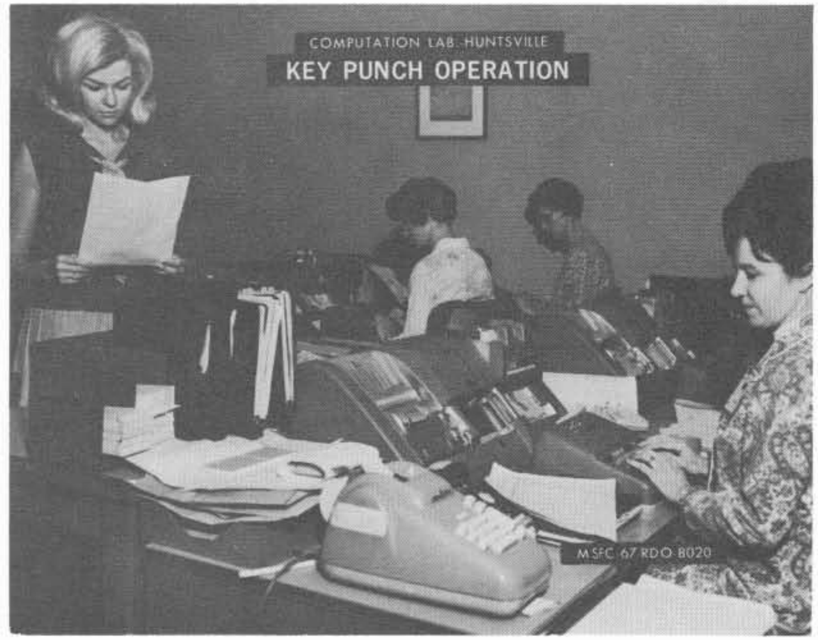

COMPUTATION LAB HUNTSVILLE
CYCLE COUNTER
MSFC-67-RDO-8015

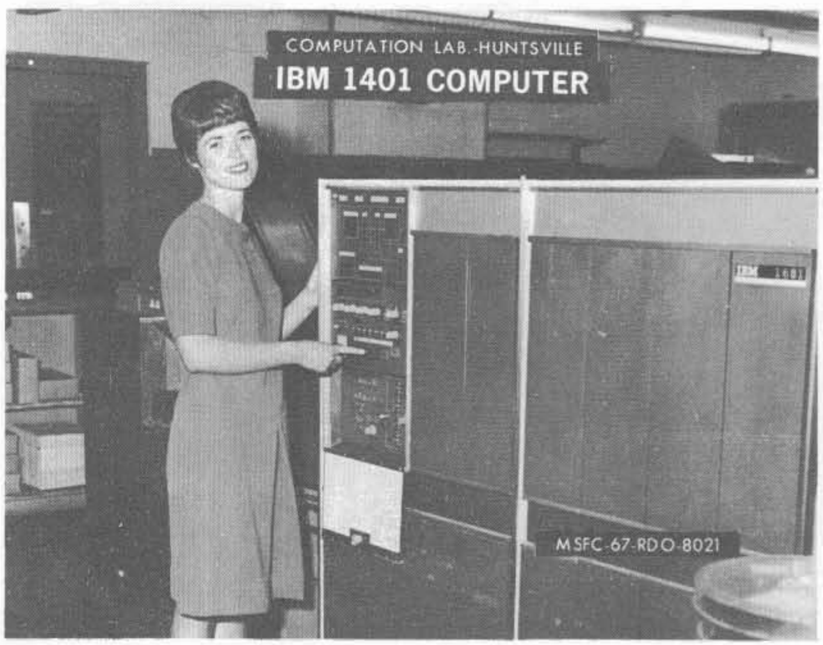

COMPUTATION LAB HUNTSVILLE
ANALOG COMPLEX
MSFC-67-RDO-8017

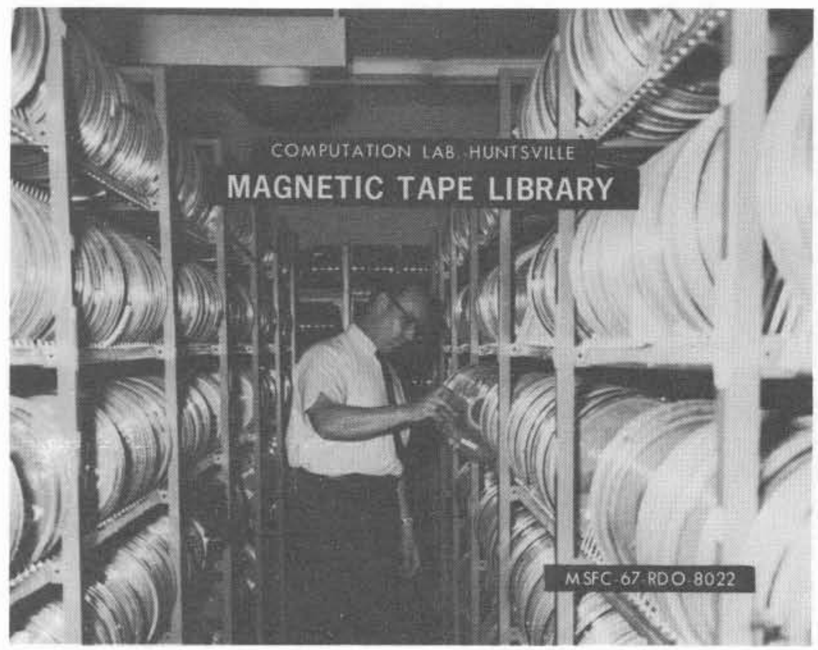

COMPUTATION LAB HUNTSVILLE
B-5500 COMPUTER
MSFC-67-RDO-8016


COMPUTATION LAB HUNTSVILLE
ANALOG DIGITAL COMPLEX
MSFC-67-RDO-8018


COMPUTATION LAB.-HUNTSVILLE
INQUIRY STATION FOR IBM 7010
TELEPROCESSING SYSTEM
MSFC-67-RDO-8019


COMPUTATION LAB.-HUNTSVILLE
KEY PUNCH OPERATION
MSFC-67-RDO-8020


COMPUTATION LAB.-HUNTSVILLE
IBM 1401 COMPUTER
MSFC-67-RDO-8021


COMPUTATION LAB.-HUNTSVILLE
MAGNETIC TAPE LIBRARY
MSFC-67-RDO-8022


COMPUTATION LAB HUNTSVILLE
IBM 7010 TELEPROCESSING SYSTEM
MSFC 67-RDO-8023


COMPUTATION LAB HUNTSVILLE
UNIVAC 1004 PRINTERS
MSFC 67-RDO-8024


COMPUTATION LAB HUNTSVILLE
MANAGEMENT VISUAL DISPLAY DEVICE
MSFC 67-RDO-8025

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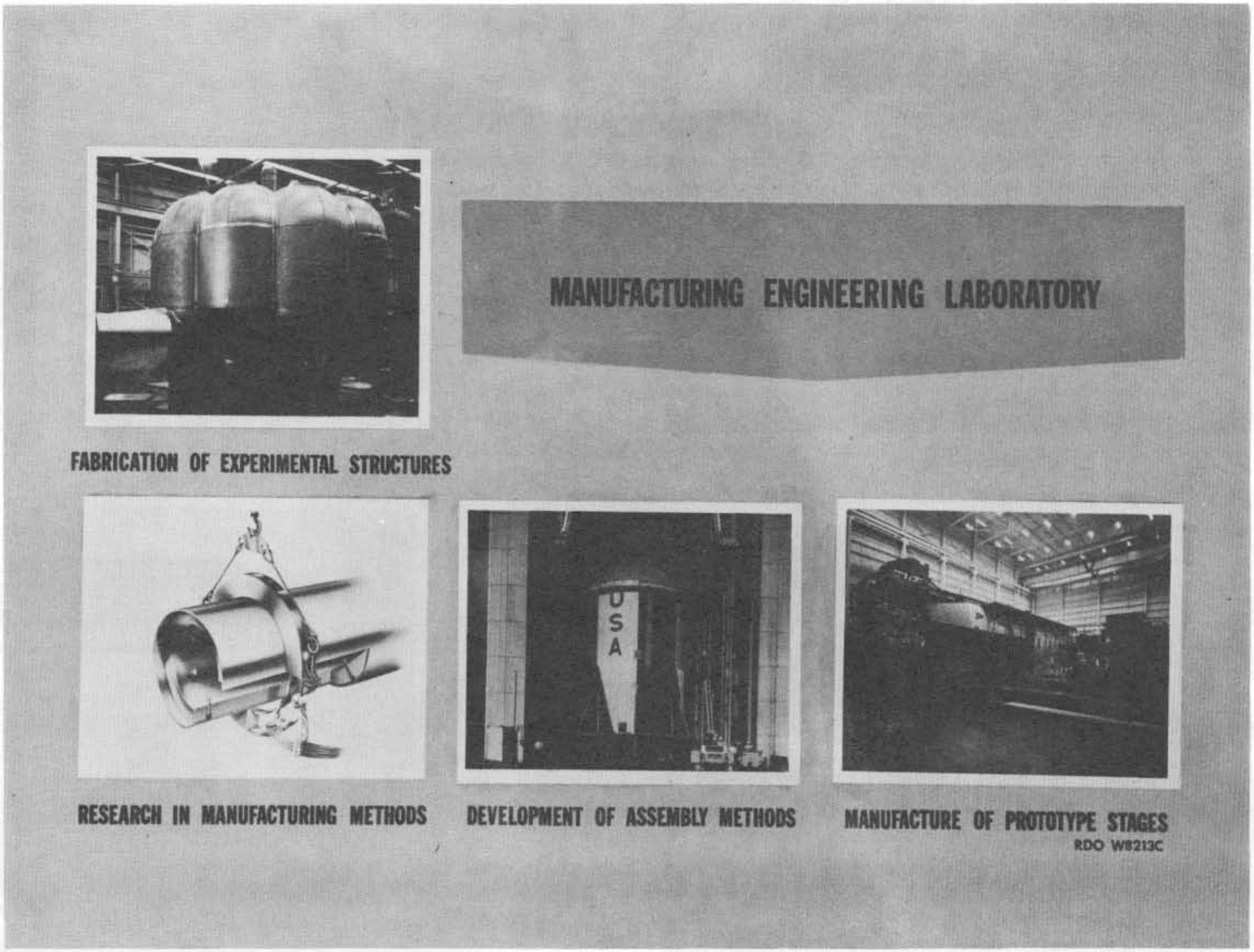
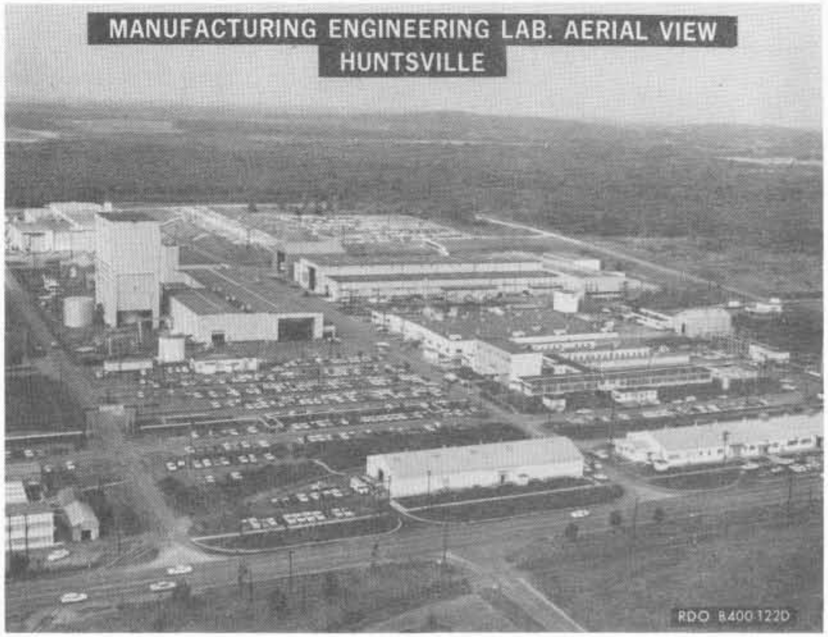
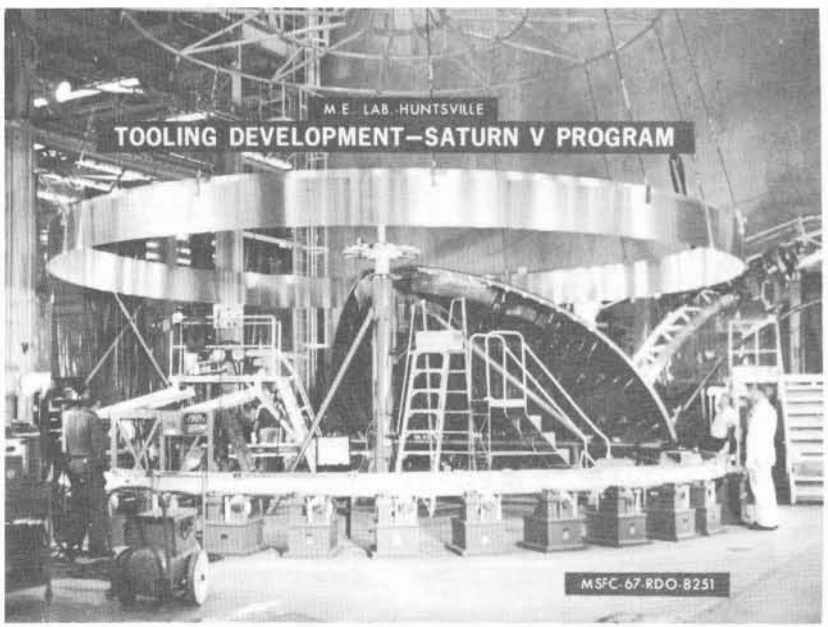
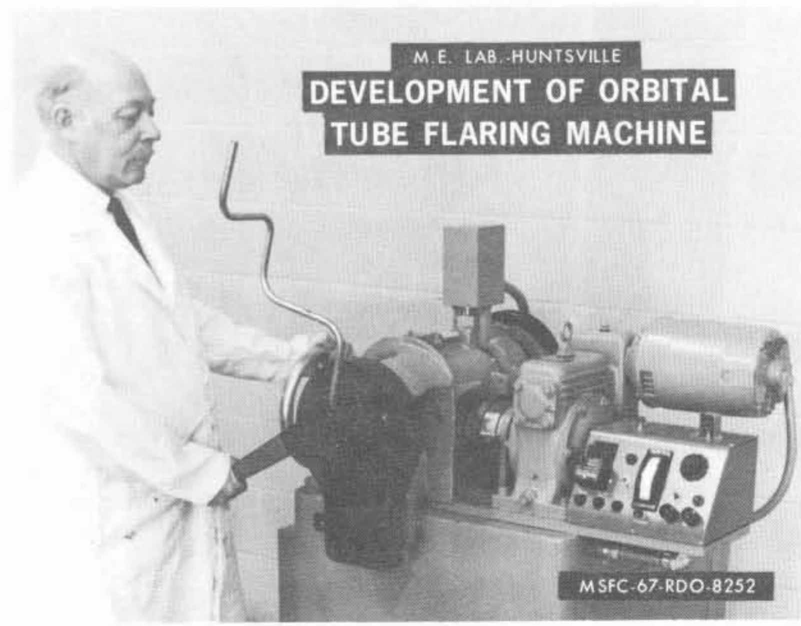
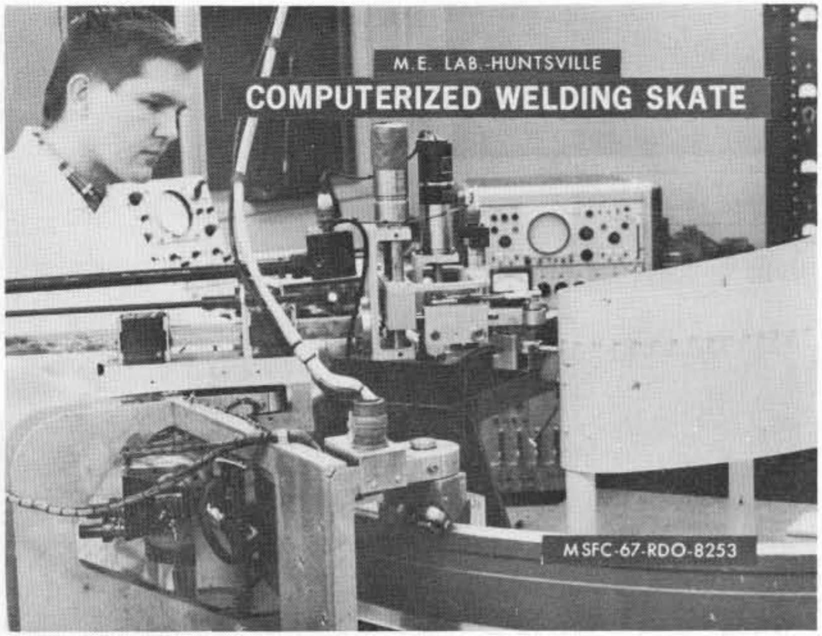

MANUFACTURING ENGINEERING LABORATORY
FABRICATION OF EXPERIMENTAL STRUCTURES
USA
RESEARCH IN MANUFACTURING METHODS
DEVELOPMENT OF ASSEMBLY METHODS
MANUFACTURE OF PROTOTYPE STAGES
RDO W8213C

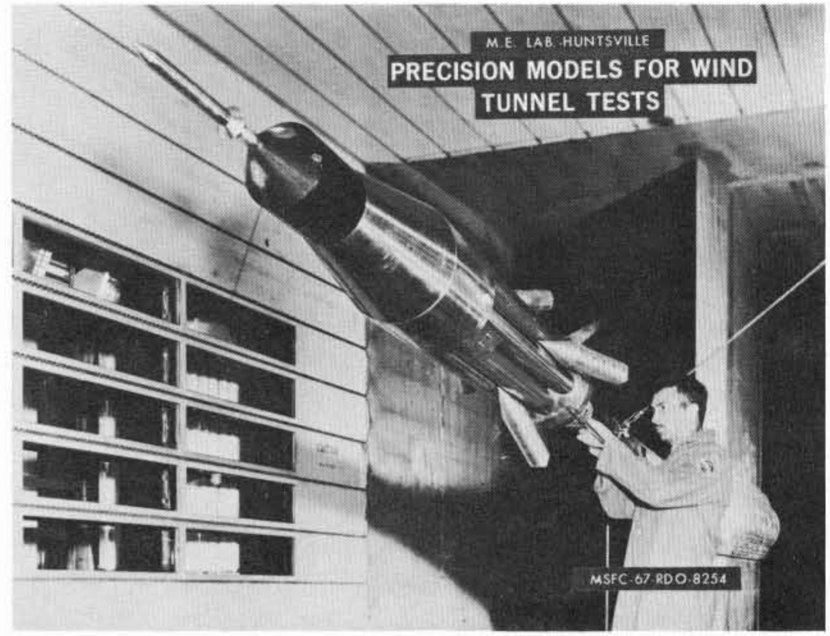

MANUFACTURING ENGINEERING LAB. AERIAL VIEW
HUNTSVILLE
RDO 8400-122D

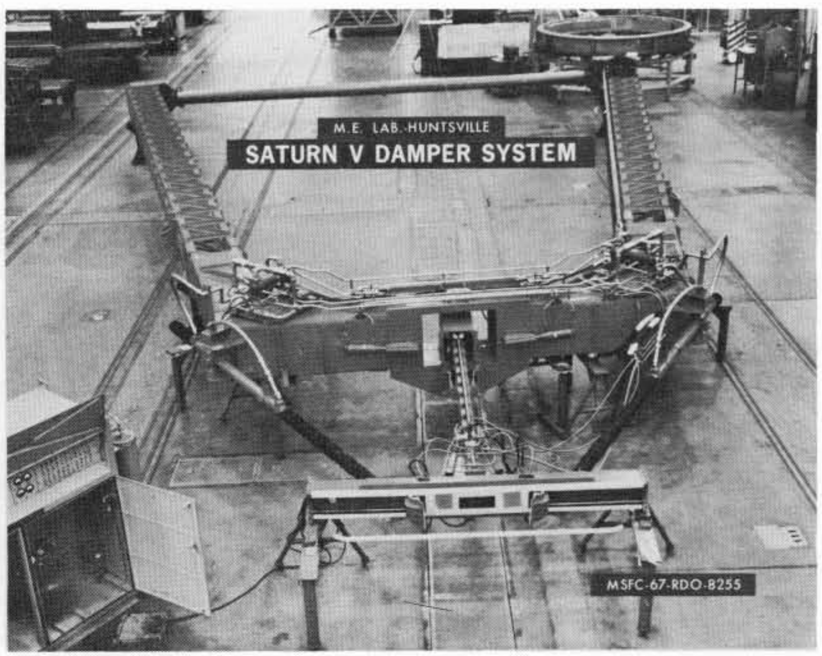

M. E. LAB.-HUNTSVILLE
MACHINE SHOP (RELOCATED 4705 NORTH WING)
RDO 88242

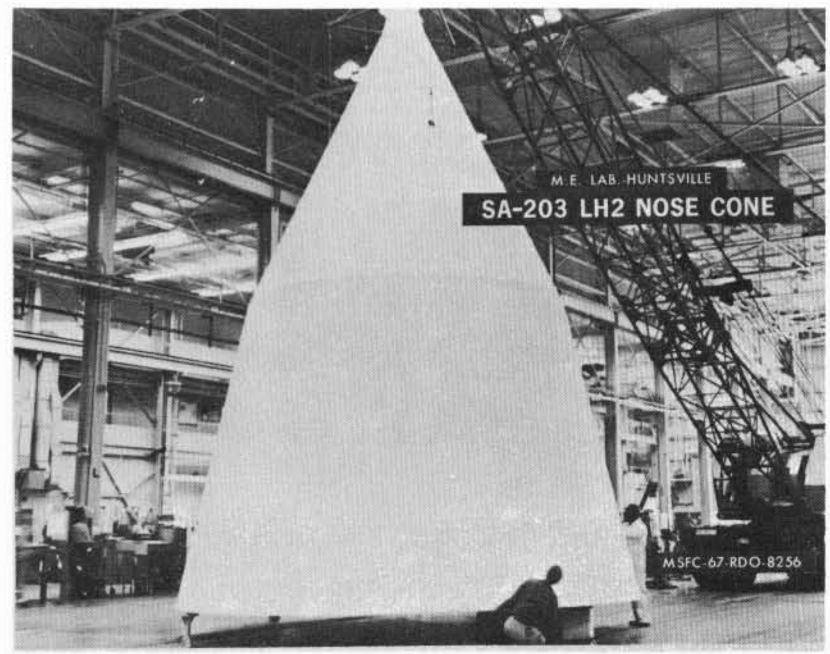

M.E. LAB.-HUNTSVILLE
TOOLING DEVELOPMENT–SATURN V PROGRAM
MSFC-67-RDO-8251

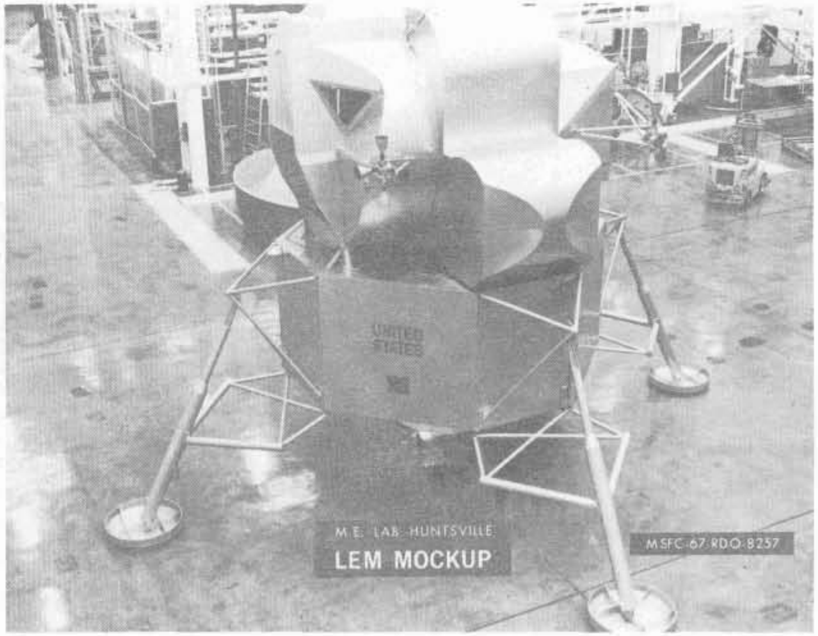

M.E. LAB.-HUNTSVILLE
DEVELOPMENT OF ORBITAL
TUBE FLARING MACHINE
MSFC-67-RDO-8252

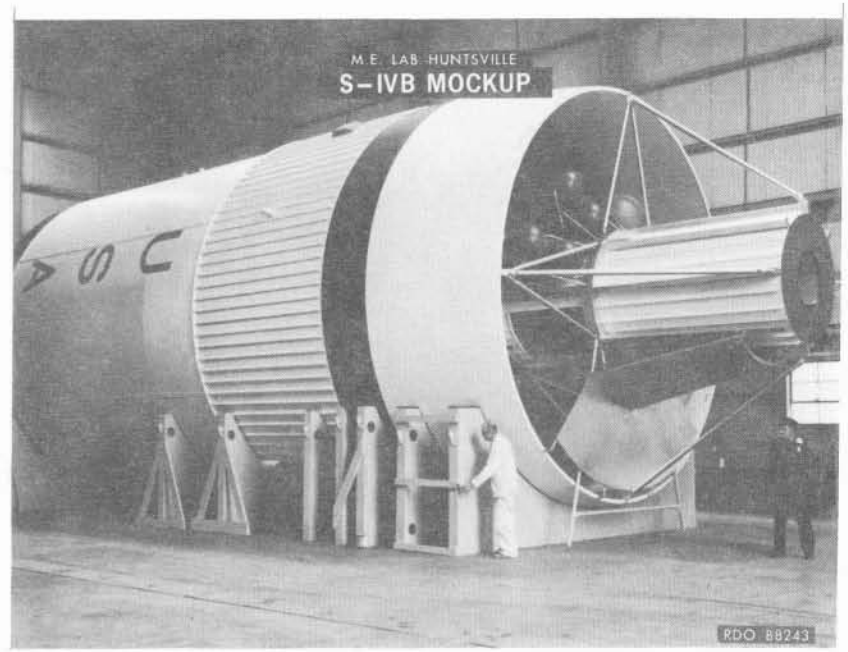

M.E. LAB.-HUNTSVILLE
COMPUTERIZED WELDING SKATE
MSFC-67-RDO-8253

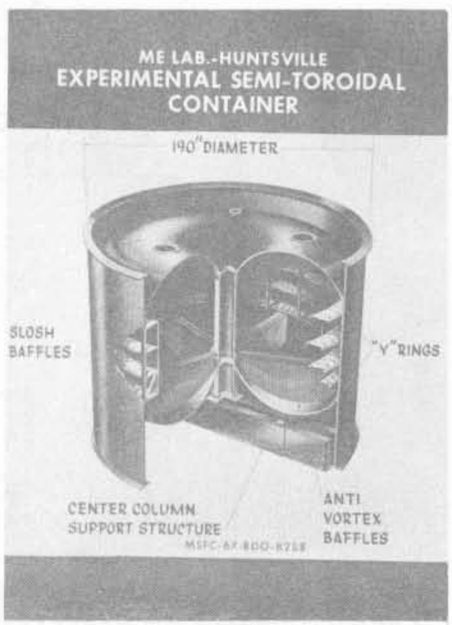

M.E. LAB.-HUNTSVILLE
PRECISION MODELS FOR WIND TUNNEL TESTS
MSFC-67-RDO-8254

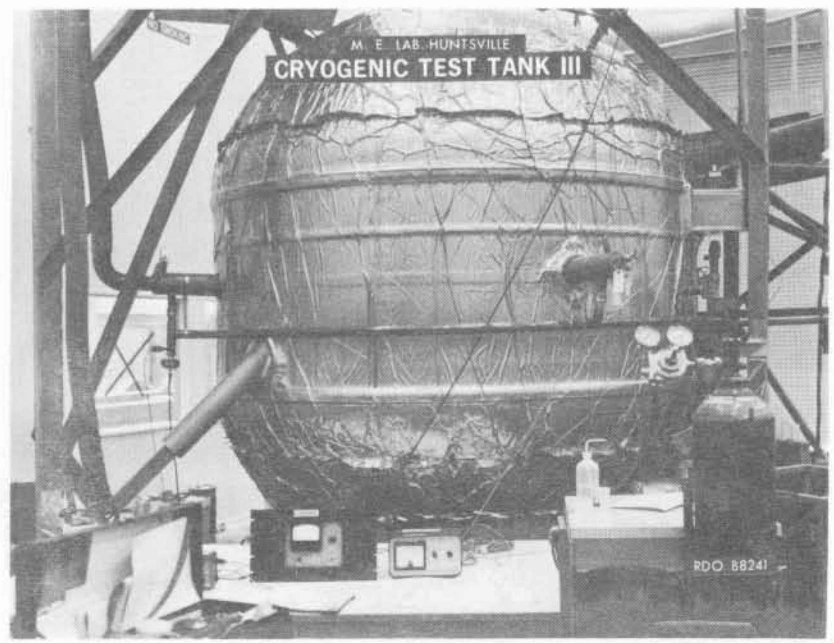

M.E. LAB.-HUNTSVILLE
SATURN V DAMPER SYSTEM
MSFC-67-RDO-8255

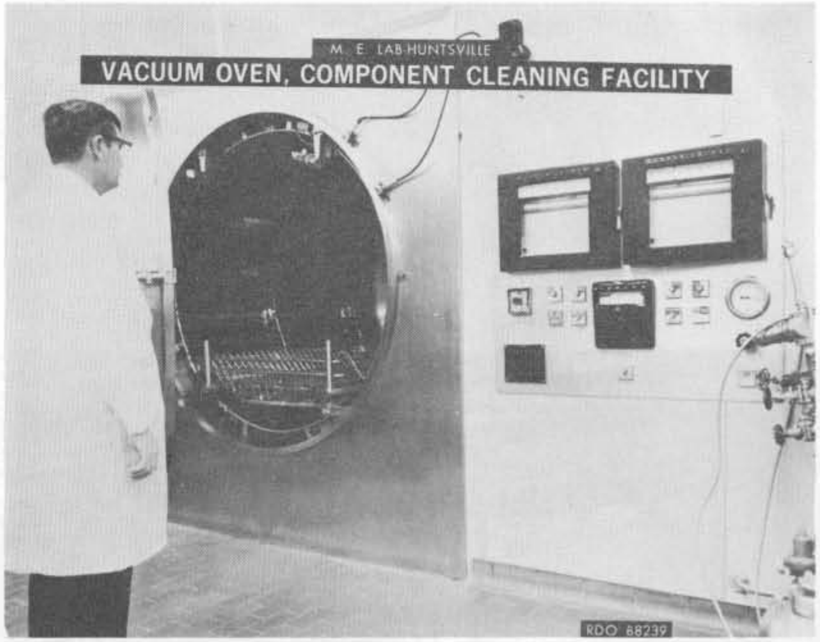

M.E. LAB.-HUNTSVILLE
SA-203 LH2 NOSE CONE
MSFC-67-RDO-8256

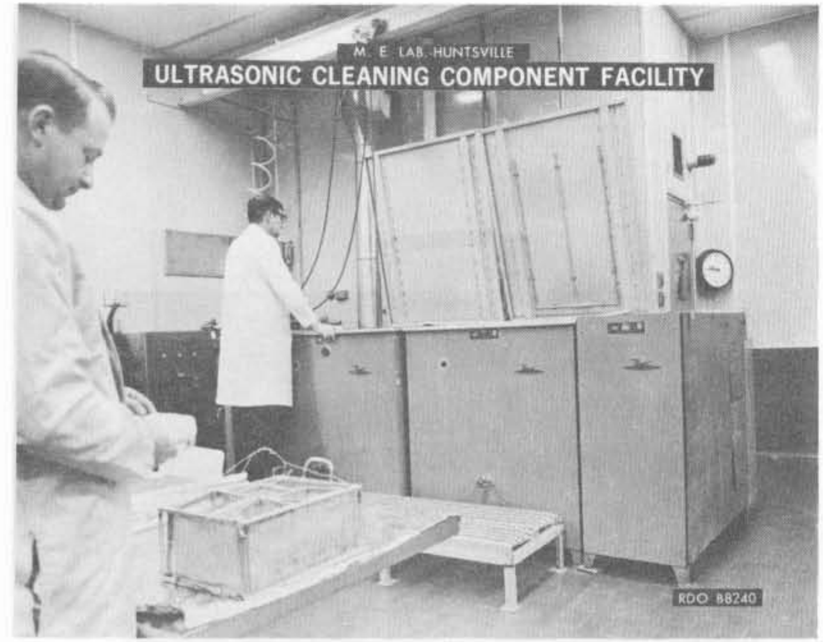

M.E. LAB HUNTSVILLE
LEM MOCKUP
MSFC-67-RDO-8257

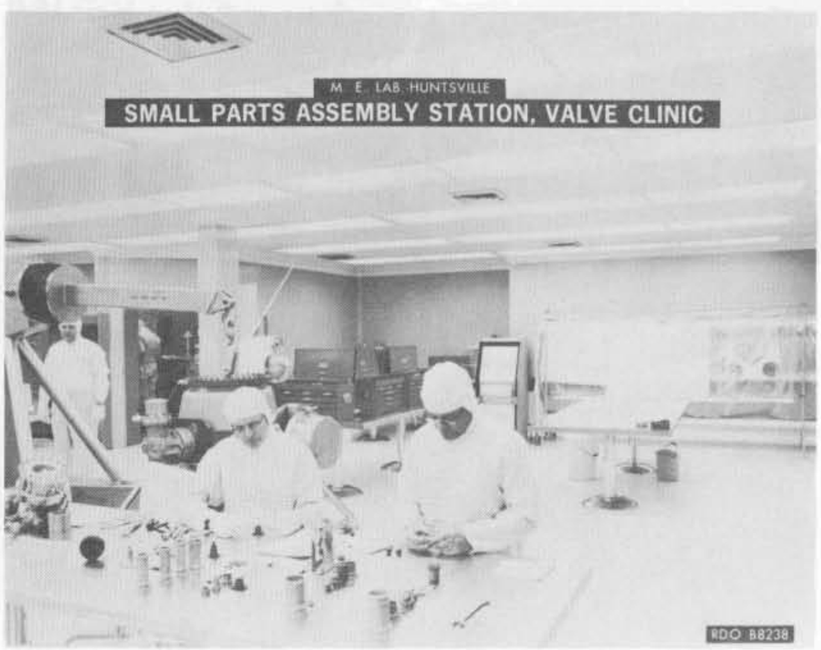

M.E. LAB HUNTSVILLE
S-IVB MOCKUP
RDO 88243

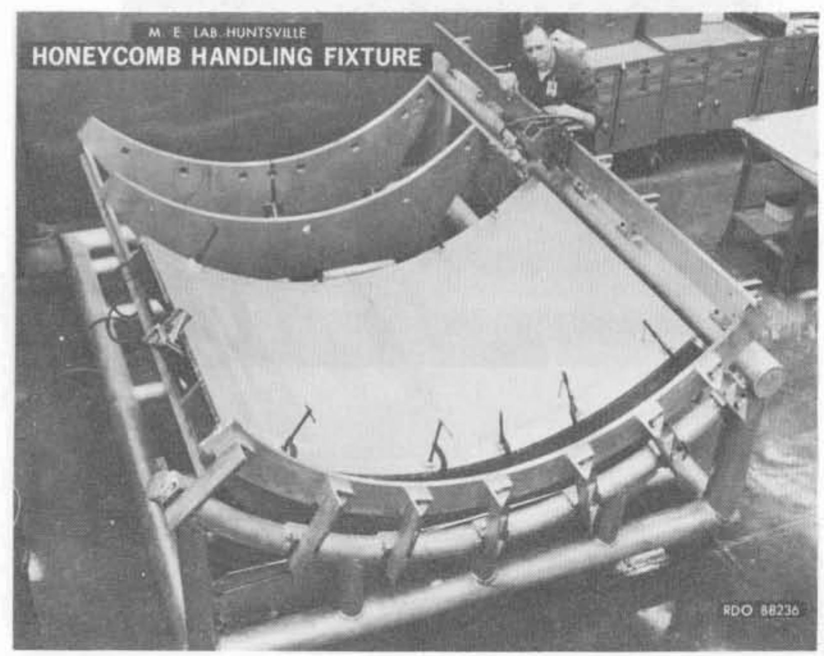

ME LAB.-HUNTSVILLE
EXPERIMENTAL SEMI-TOROIDAL
CONTAINER
190" DIAMETER
SLOSH
BAFFLES
"Y" RINGS
CENTER COLUMN
SUPPORT STRUCTURE
ANTI
VORTEX
BAFFLES

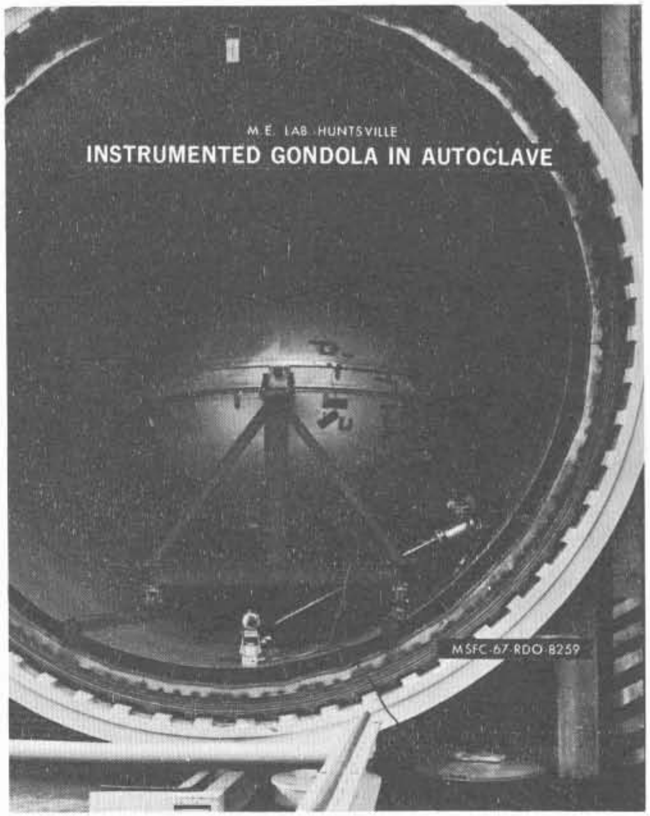

M. E. LAB. HUNTSVILLE
CRYOGENIC TEST TANK III
RDO 88241

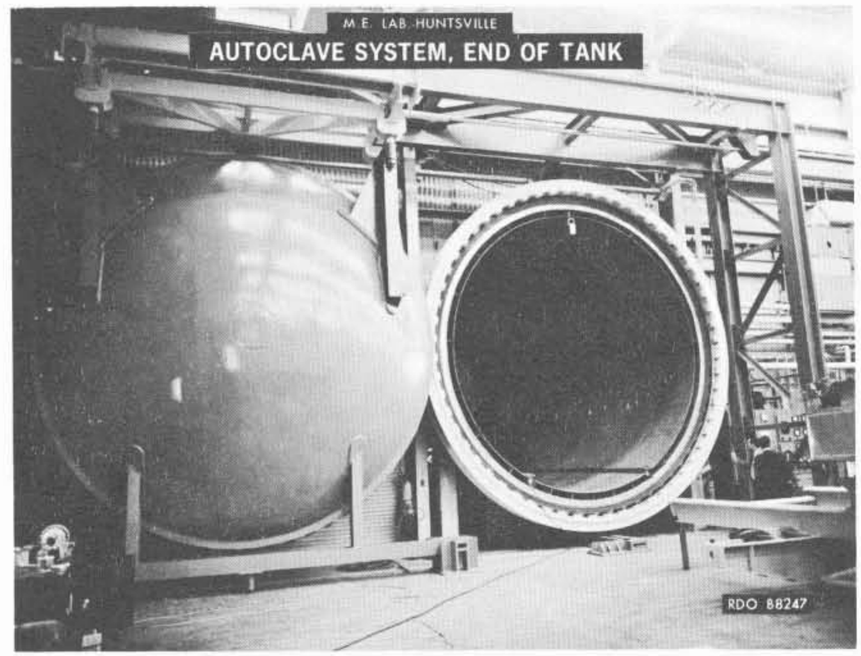

M. E. LAB HUNTSVILLE
VACUUM OVEN, COMPONENT CLEANING FACILITY
RDO 88239

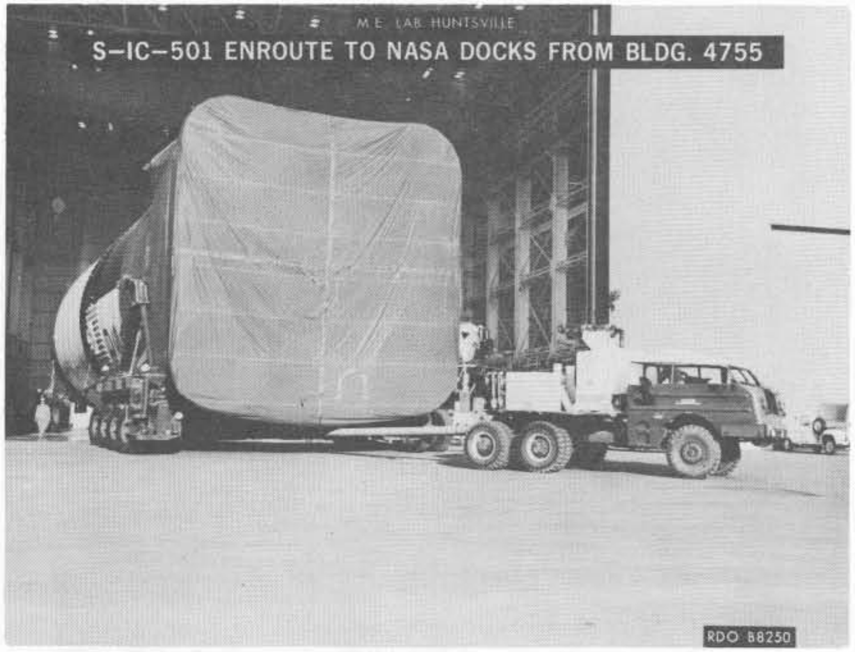

M. E. LAB. HUNTSVILLE
ULTRASONIC CLEANING COMPONENT FACILITY
RDO 88240

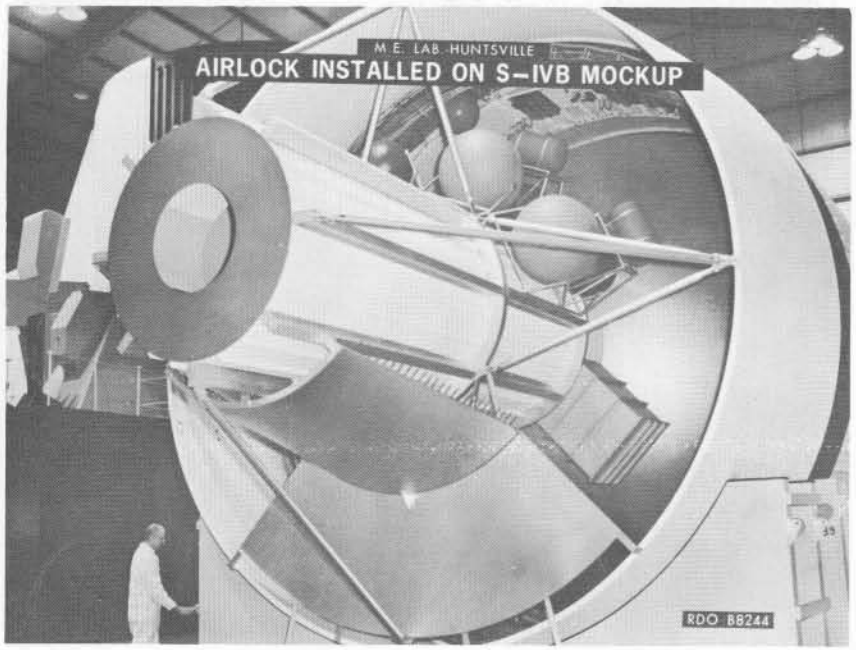

M. E. LAB. HUNTSVILLE
SMALL PARTS ASSEMBLY STATION, VALVE CLINIC
RDO 88238

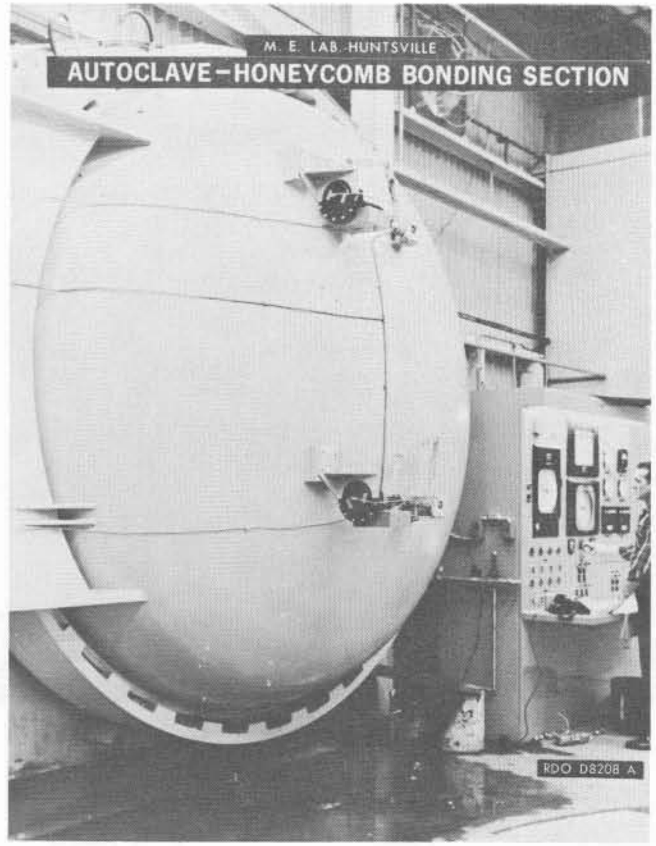

M. E. LAB. HUNTSVILLE
HONEYCOMB HANDLING FIXTURE
RDO 88236


M.E. LAB HUNTSVILLE
INSTRUMENTED GONDOLA IN AUTOCLAVE
MSFC-67-RDO-8259


M.E. LAB HUNTSVILLE
AUTOCLAVE SYSTEM, END OF TANK
RDO 88247


M.E. LAB HUNTSVILLE
S-IC-501 ENROUTE TO NASA DOCKS FROM BLDG. 4755
RDO 88250


M.E. LAB HUNTSVILLE
AIRLOCK INSTALLED ON S-IVB MOCKUP
RDO 88244


M. E. LAB HUNTSVILLE
AUTOCLAVE-HONEYCOMB BONDING SECTION
RDO D8208 A


MANUFACTURING ENGINEERING LABORATORY
VEHICLE ASSEMBLY BUILDINGS
HANGAR FOR VEHICLE COMPONENTS
COMPONENT & SUB-ASS'Y BLDG
RDO D 400-214


HANGAR FOR VEHICLE COMPONENTS - HUNTSVILLE
RDO D 400 156 M

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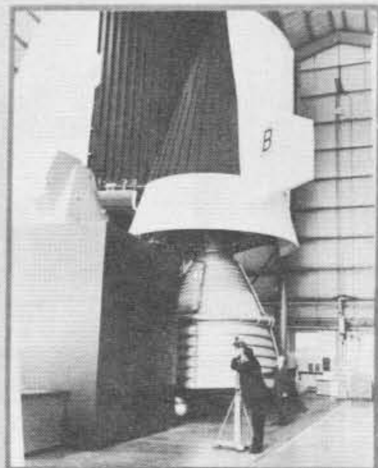
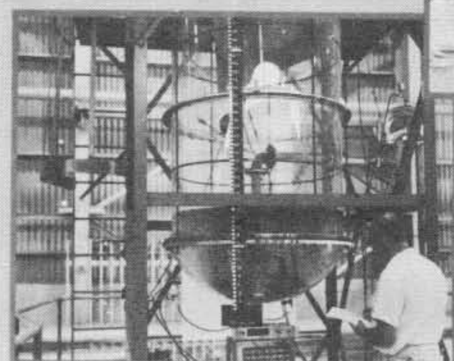
PROPULSION AND VEHICLE ENGINEERING LABORATORY

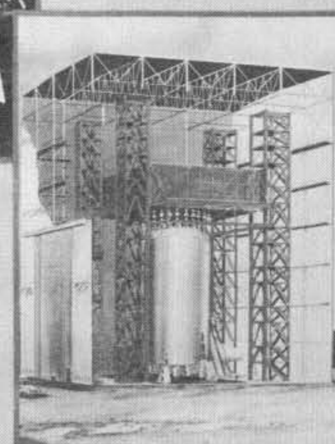


VEHICLE SYSTEMS DESIGN

MATERIALS RESEARCH

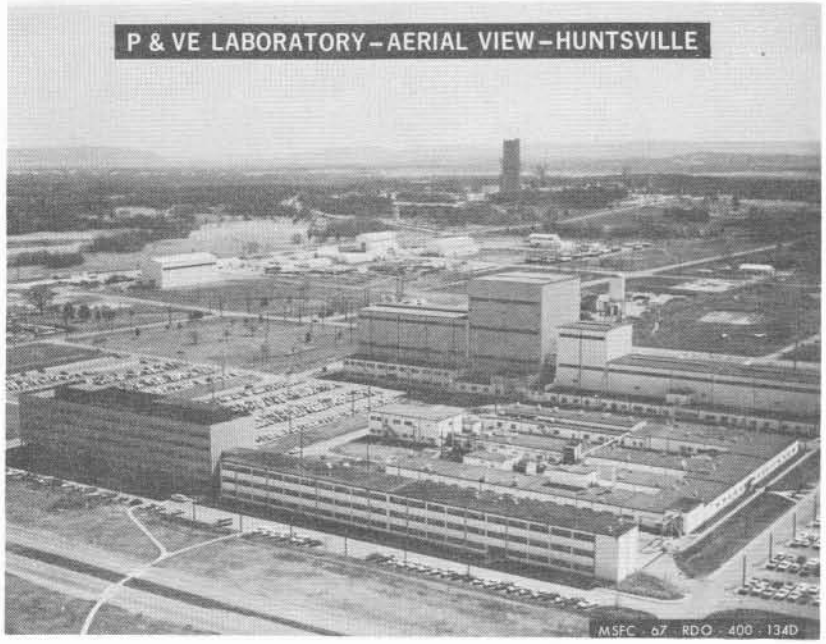


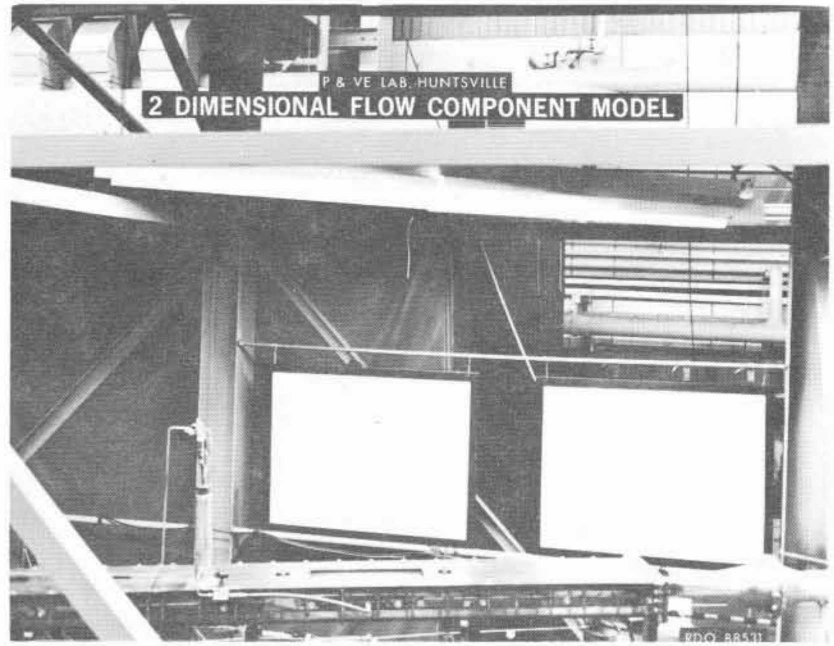
PROPULSION DEVELOPMENT

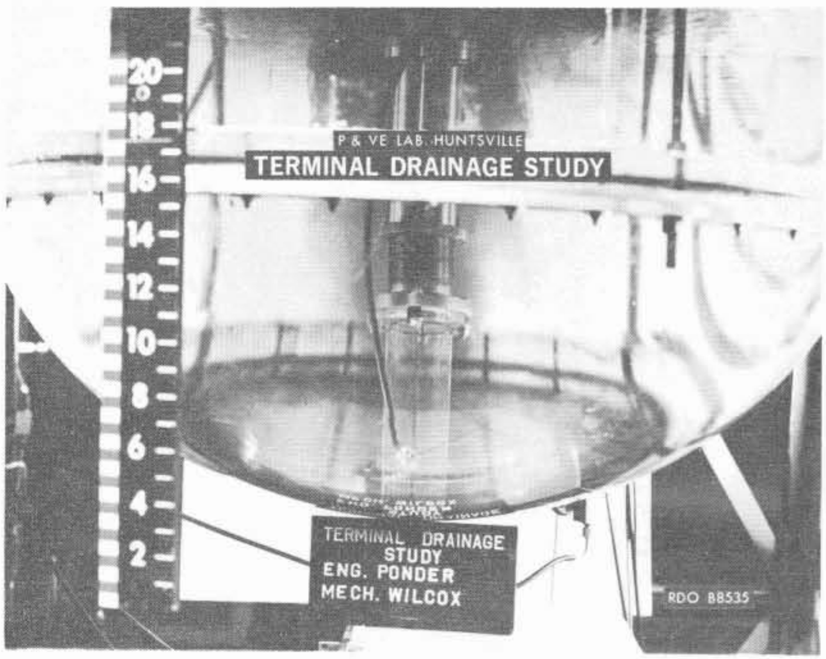


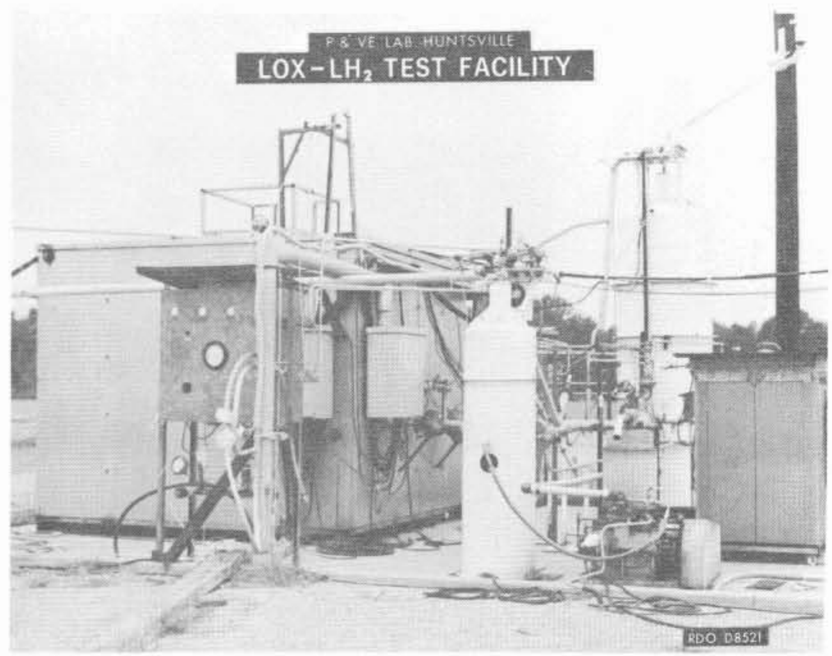
STRUCTURES DEVELOPMENT

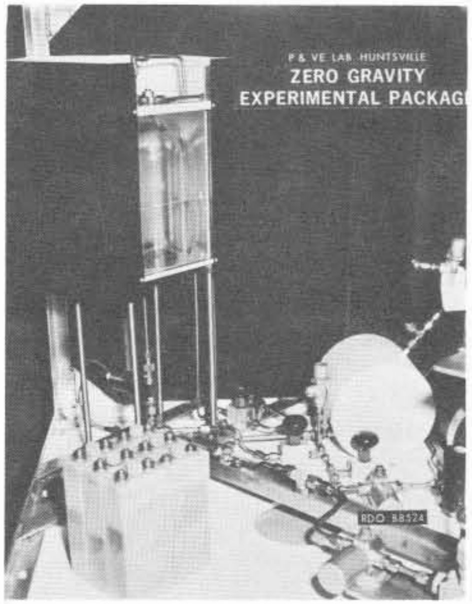
E-D W8515 A

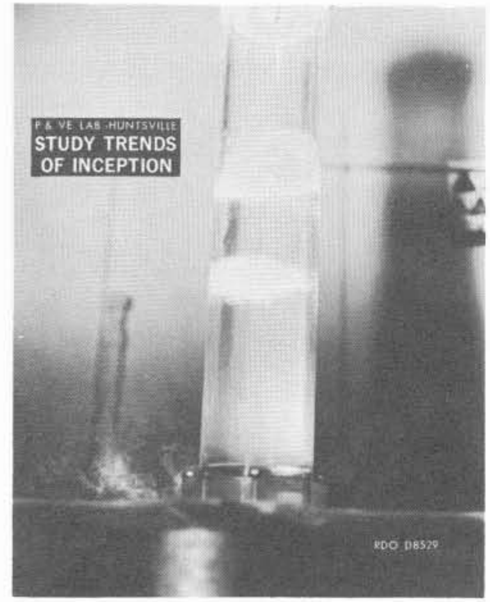

P & VE LABORATORY - AERIAL VIEW - HUNTSVILLE
MSFC - 67 RDO - 400 - 134D

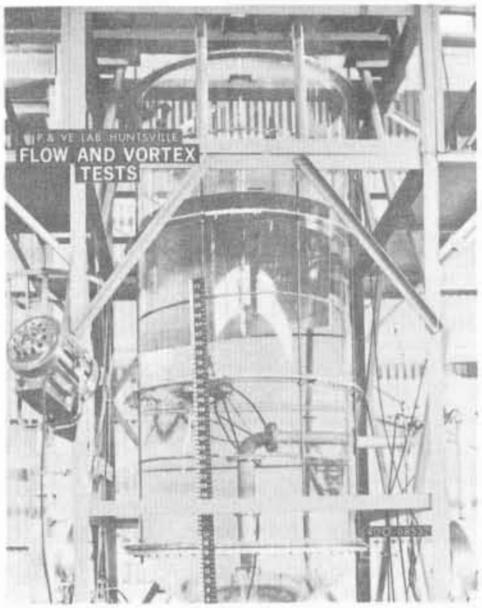

P & VE LAB. HUNTSVILLE
2 DIMENSIONAL FLOW COMPONENT MODEL


P & VE LAB. HUNTSVILLE
TERMINAL DRAINAGE STUDY
TERMINAL DRAINAGE STUDY
ENG. PONDER
MECH. WILCOX
RDO 88535

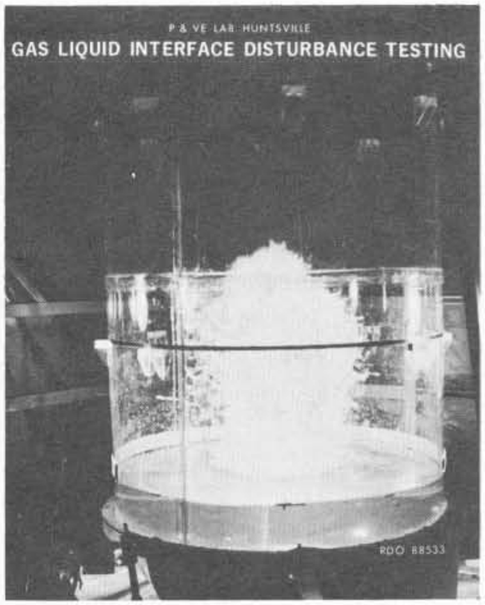

P & VE LAB. HUNTSVILLE
LOX-LH2 TEST FACILITY
RDO D8521


P & VE LAB HUNTSVILLE
ZERO GRAVITY
EXPERIMENTAL PACKAG
RDO 88524

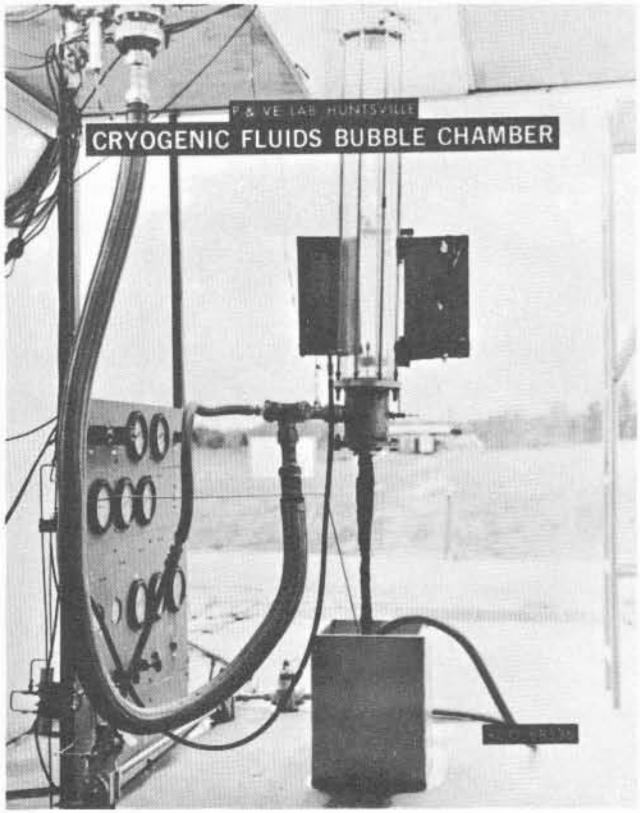

P & VE LAB HUNTSVILLE
STUDY TRENDS
OF INCEPTION
RDO D8529

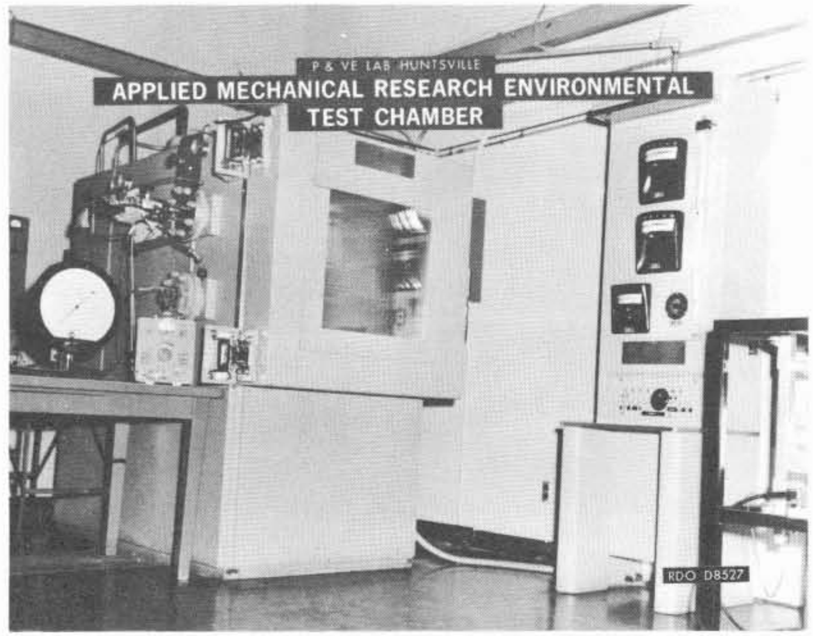

P & VE LAB HUNTSVILLE
FLOW AND VORTEX TESTS

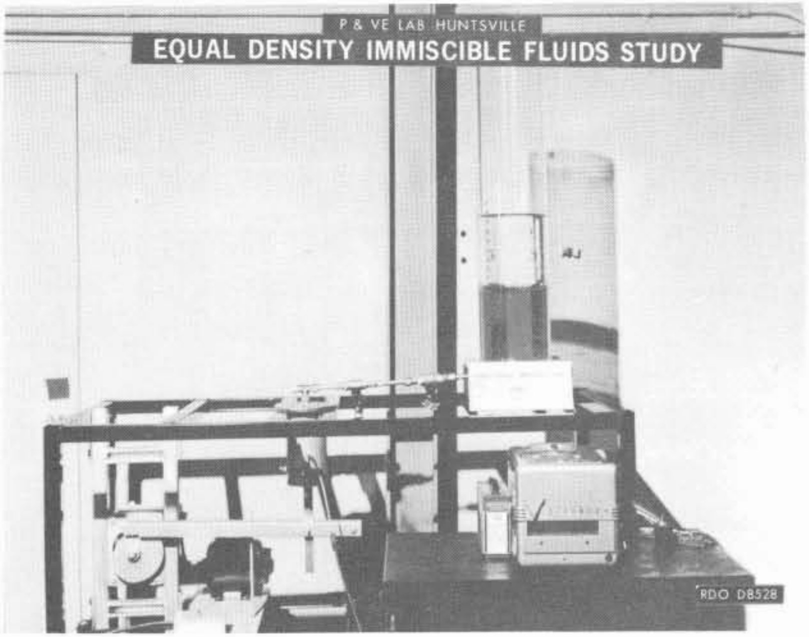

P & VE LAB HUNTSVILLE
CRYOGENIC FLOW FACILITY
RDO 88530


P & VE LAB HUNTSVILLE
GAS LIQUID INTERFACE DISTURBANCE TESTING
RDO 88533

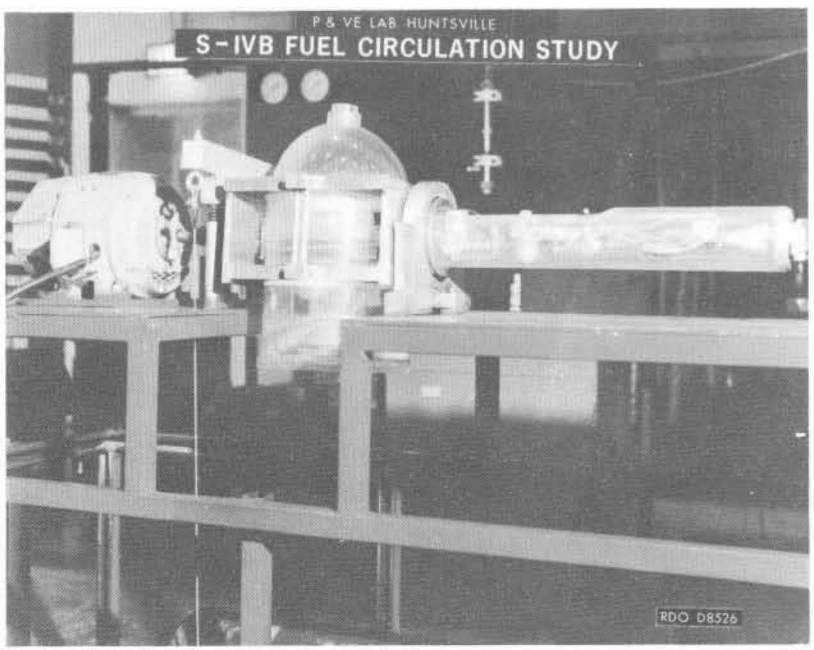

P & VE LAB HUNTSVILLE
CRYOGENIC DRAINING
SIMULATOR


P & VE LAB HUNTSVILLE
CRYOGENIC FLUIDS BUBBLE CHAMBER

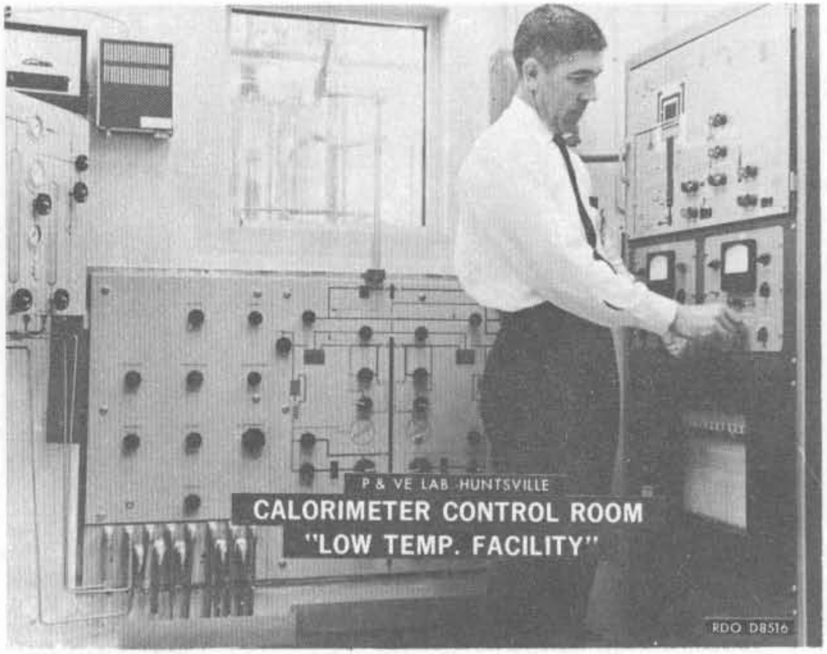

P & VE LAB HUNTSVILLE
APPLIED MECHANICAL RESEARCH ENVIRONMENTAL TEST CHAMBER
RDO D8527

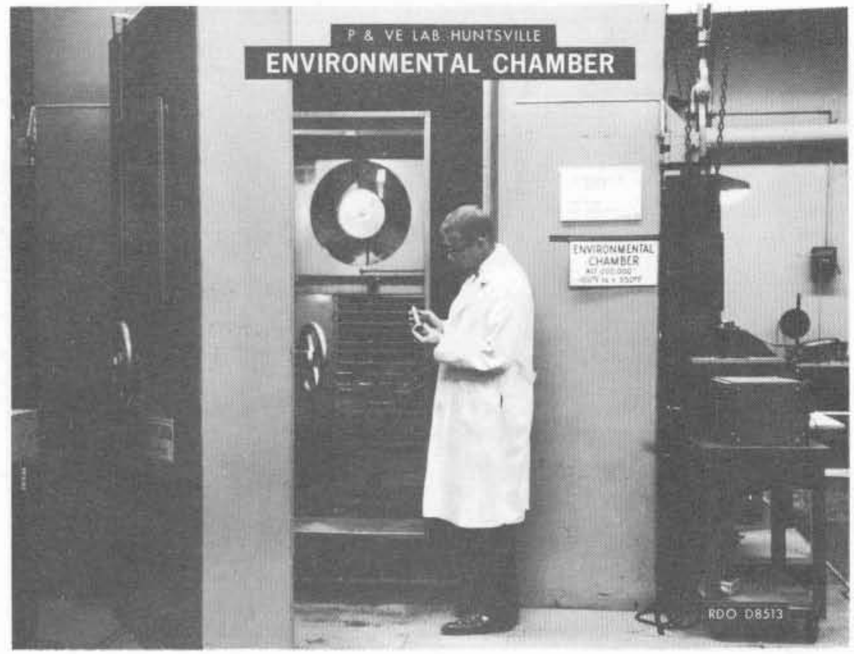

P & VE LAB HUNTSVILLE
EQUAL DENSITY IMMISCIBLE FLUIDS STUDY
RDO D8528


P & VE LAB HUNTSVILLE
ENVIRONMENTAL CHAMBER FOR VIBRATION TABLE

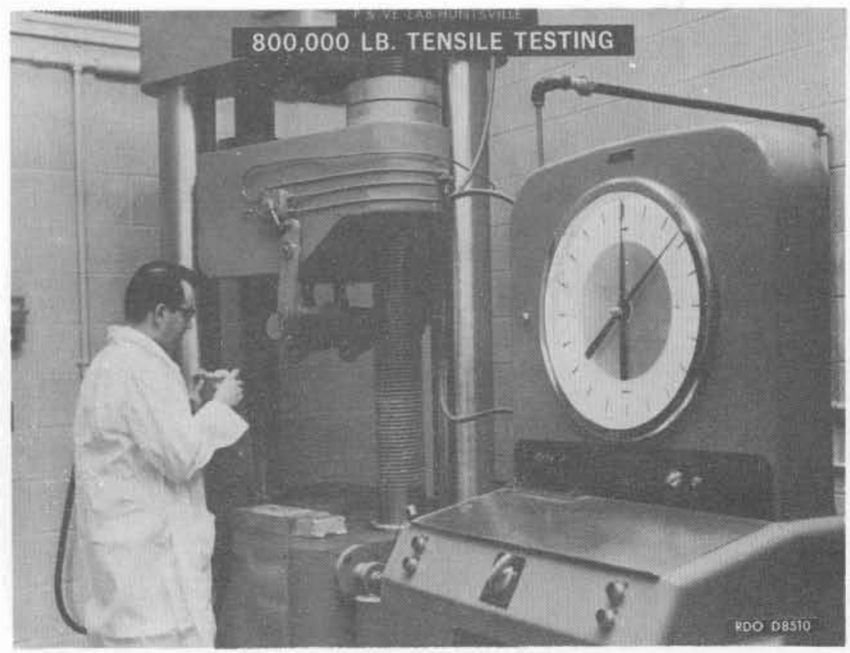

P & VE LAB HUNTSVILLE
S-IVB FUEL CIRCULATION STUDY
RDO D8526

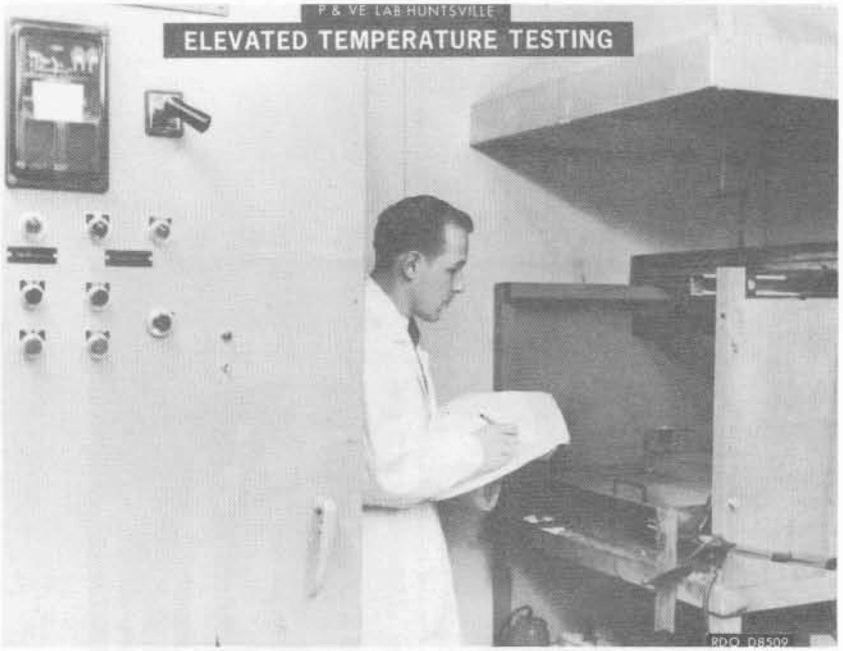

P & VE LAB HUNTSVILLE
LIQUEFYING HELIUM
"LOW TEMP. FACILITY"
RDO D8517

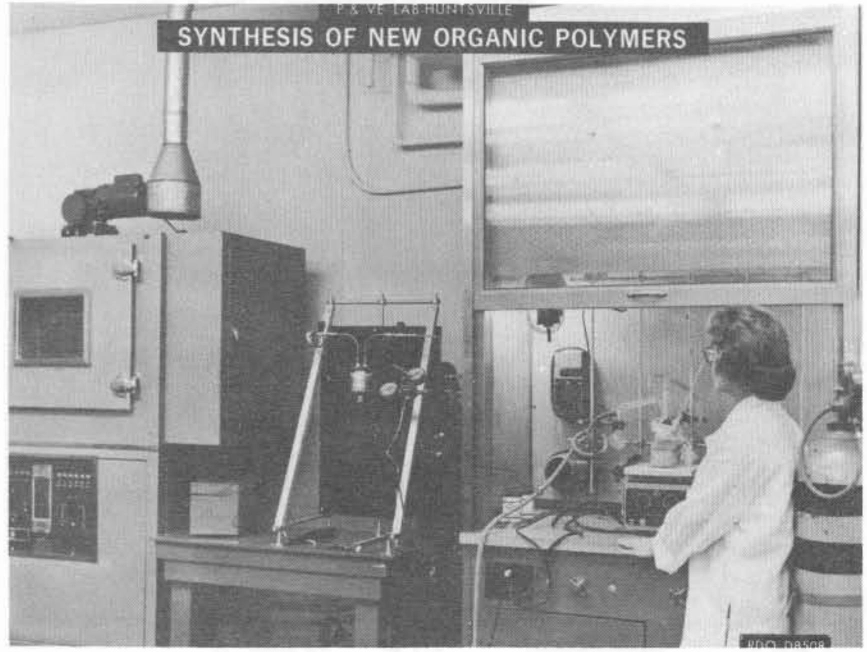

P & VE LAB HUNTSVILLE
CALORIMETER CONTROL ROOM
"LOW TEMP. FACILITY"
RDO D8516

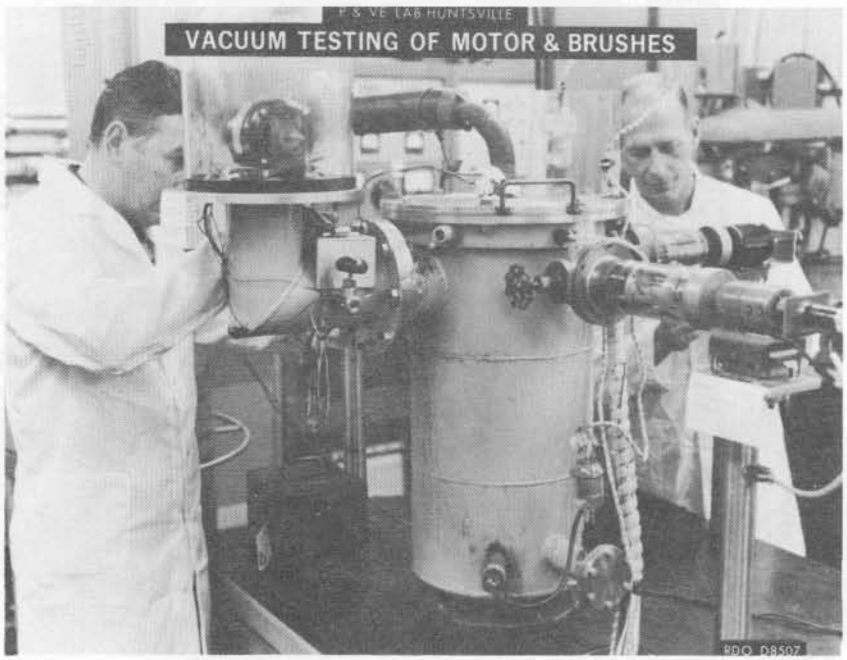

P & VE LAB HUNTSVILLE
ENVIRONMENTAL CHAMBER
ENVIRONMENTAL CHAMBER
RDO D8513


P & VE LAB HUNTSVILLE
CONTROL CONSOLE FOR LIQUID HYDROGEN FACILITY
RDO D8511

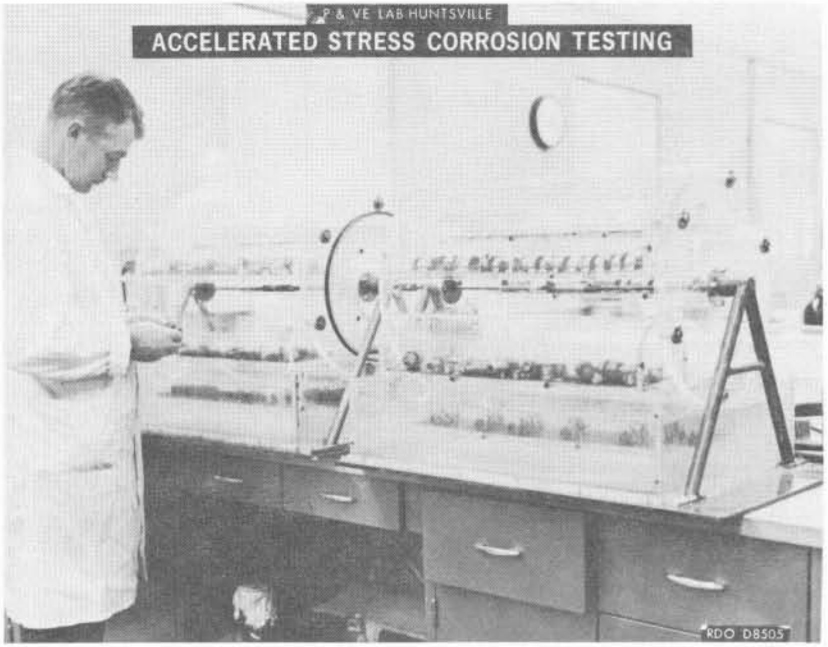

800,000 LB. TENSILE TESTING
RDO D8510


P & VE LAB HUNTSVILLE
ELEVATED TEMPERATURE TESTING
RDO D8509

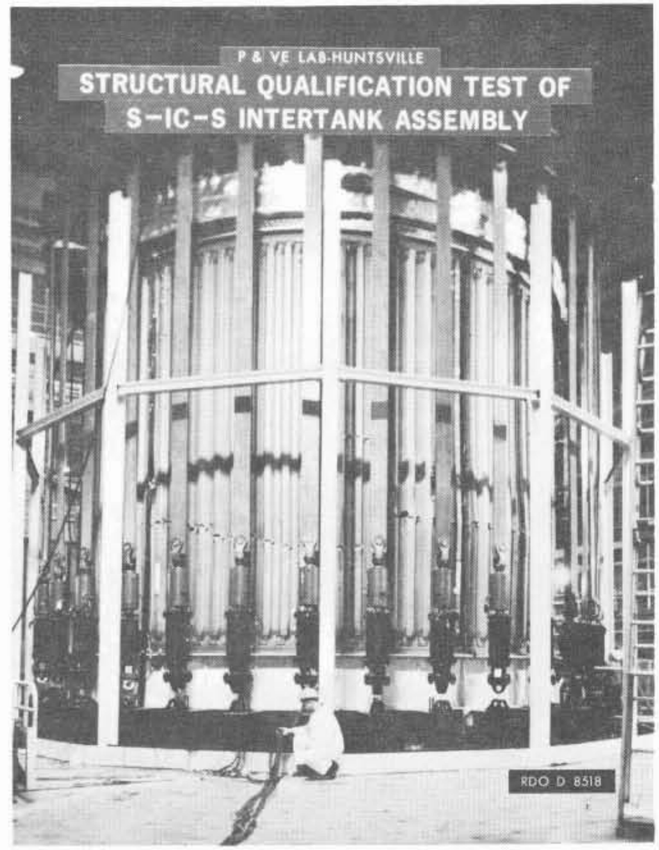

P & VE LAB HUNTSVILLE
SYNTHESIS OF NEW ORGANIC POLYMERS

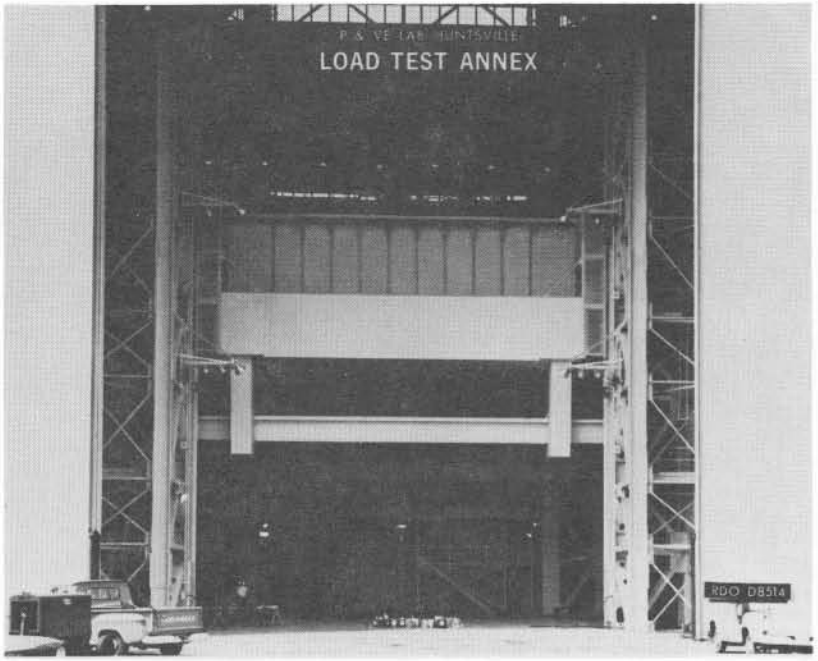

P & VE LAB HUNTSVILLE
VACUUM TESTING OF MOTOR & BRUSHES
RDO D8507

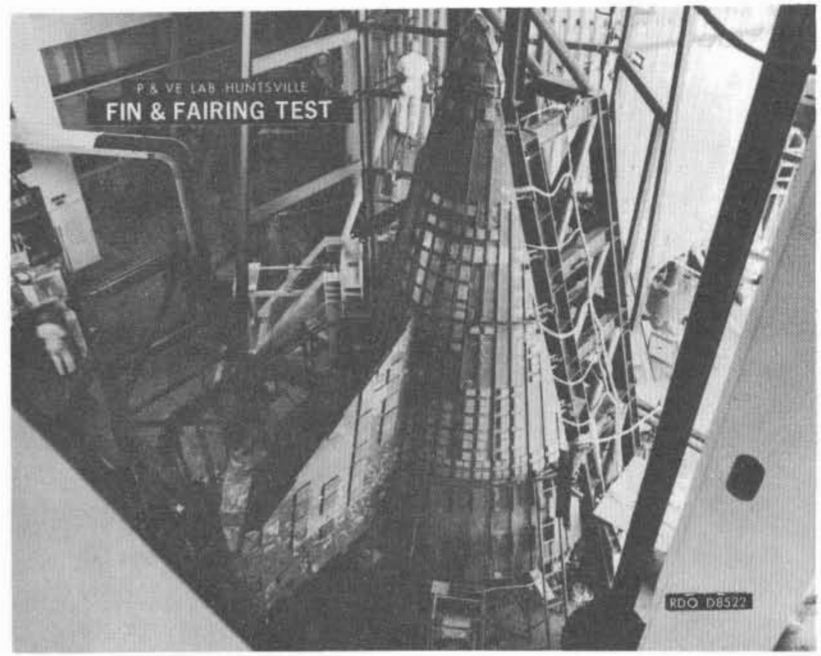

P & VE LAB HUNTSVILLE
ULTRASONIC ACOUSTIC INSPECTION
HONEYCOMB MATERIALS
RDO D8506

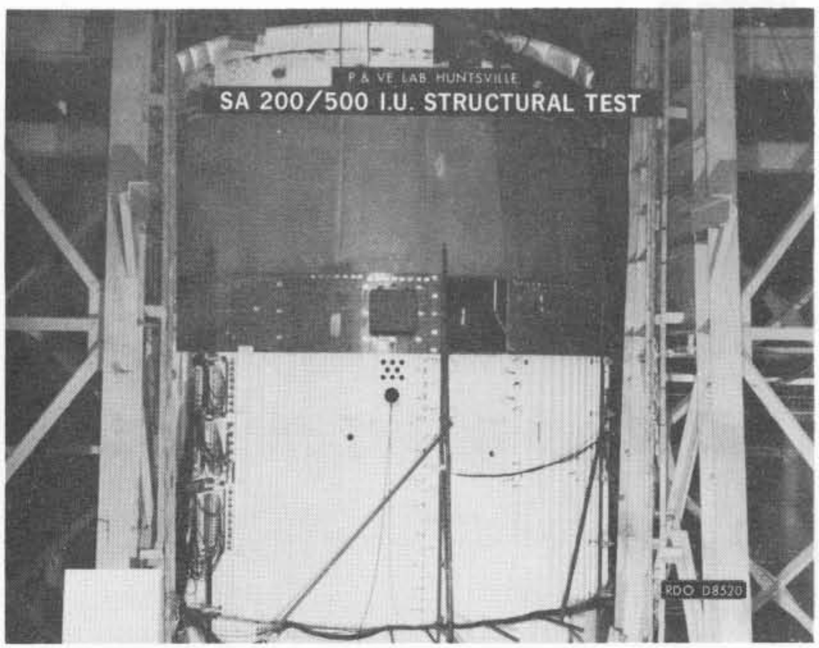

P & VE LAB-HUNTSVILLE
ACCELERATED STRESS CORROSION TESTING
RDO D8505

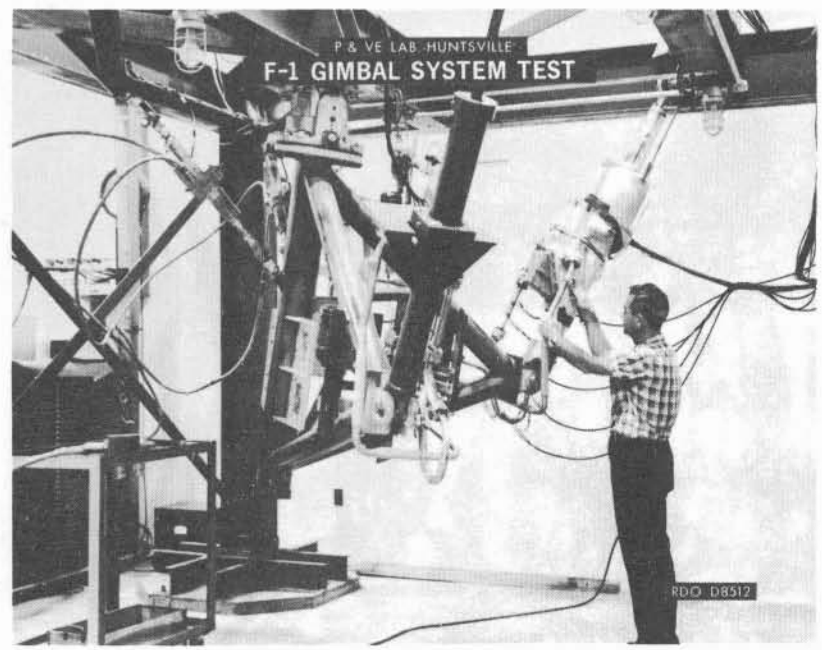

P & VE LAB-HUNTSVILLE
RUBBER & PLASTIC TECHNOLOGY
RDO D8501


P & VE LAB-HUNTSVILLE
STRUCTURAL QUALIFICATION TEST OF
S-IC-S INTERTANK ASSEMBLY
RDO D 8518


P & VE LAB HUNTSVILLE
LOAD TEST ANNEX
RDO D8514

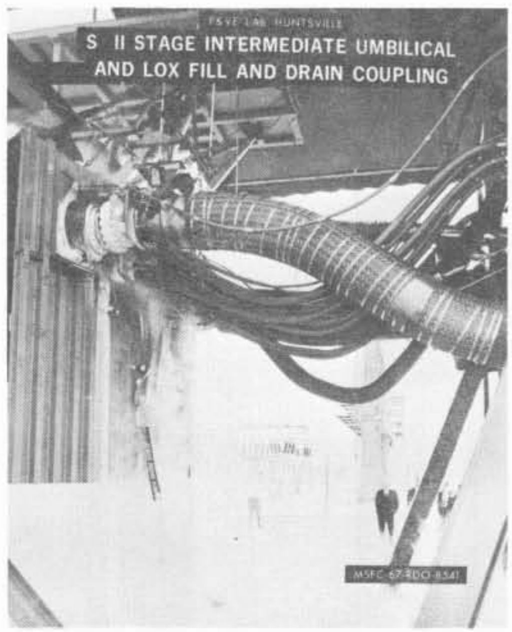

P & VE LAB HUNTSVILLE
FIN & FAIRING TEST
RDO D8522


P & VE LAB HUNTSVILLE
SA 200/500 I.U. STRUCTURAL TEST
RDO D8520

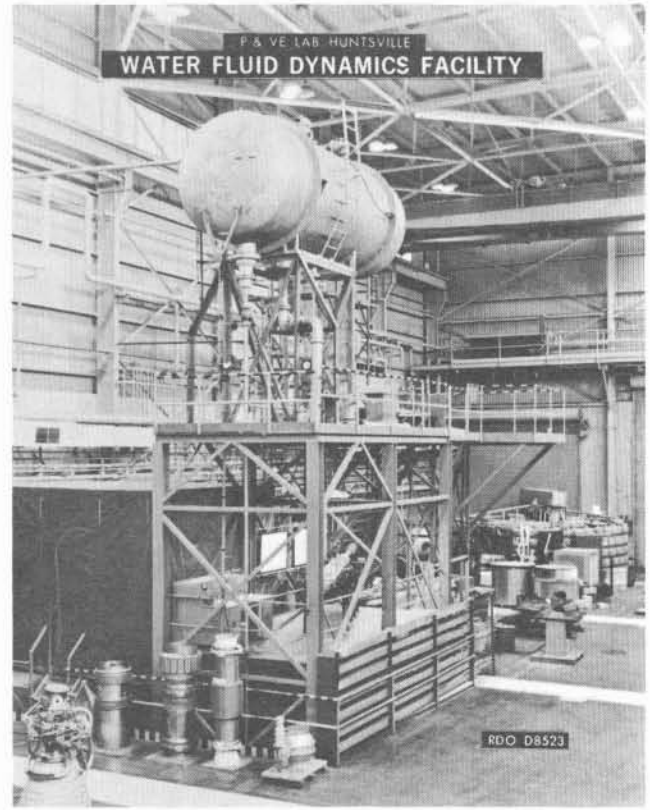

P & VE LAB HUNTSVILLE
F-1 GIMBAL SYSTEM TEST
RDO D8512

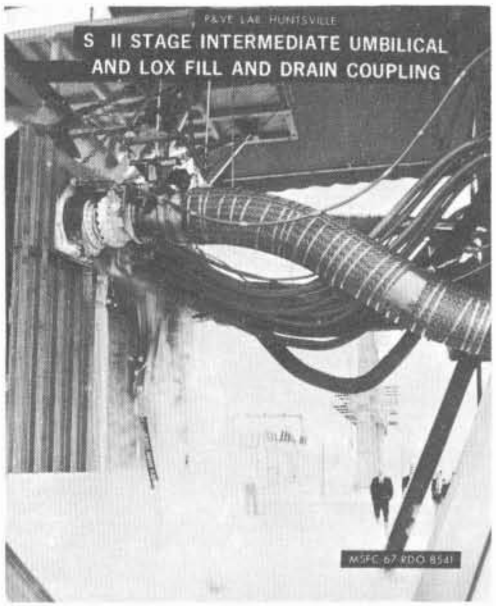

P&VE LAB. HUNTSVILLE
MASTER CONTROL ROOM FOR
VIBRATION AND ACOUSTIC TESTING
MSFC-67-RDO-8539

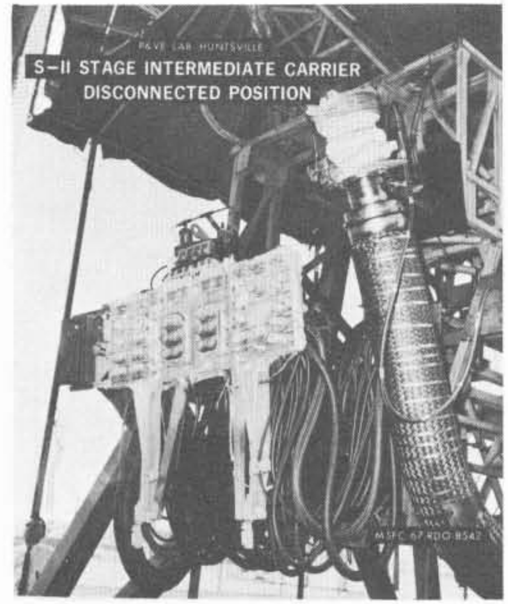

P&VE LAB. HUNTSVILLE
VIBRATION ROOM NUMBER 1—BLDG. 4619
MSFC-67-RDO-8540

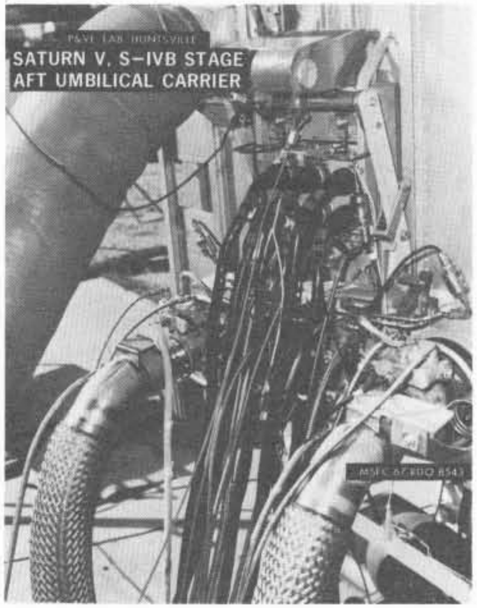

P&VE LAB. HUNTSVILLE
S II STAGE INTERMEDIATE UMBILICAL
AND LOX FILL AND DRAIN COUPLING
MSFC-67-RDO-8541

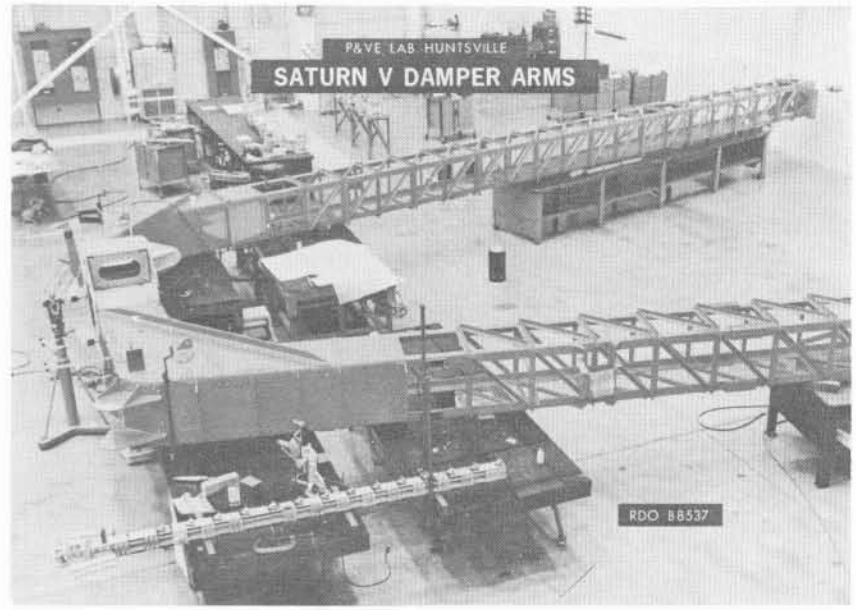

P & VE LAB HUNTSVILLE
S–IC FUEL TANK IN LOAD TEST ANNEX
RDO D8519


P & VE LAB HUNTSVILLE
WATER FLUID DYNAMICS FACILITY
RDO D8523

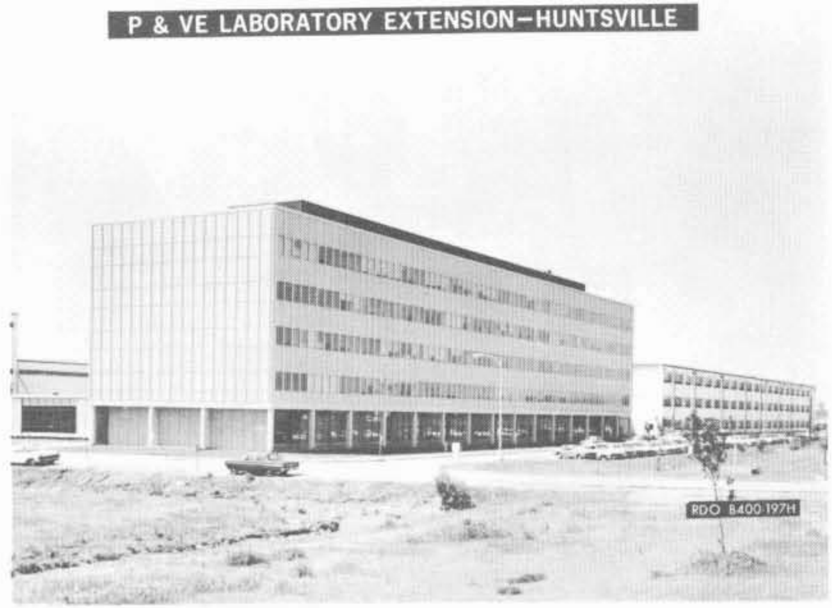

P&VE LAB HUNTSVILLE
S II STAGE INTERMEDIATE UMBILICAL
AND LOX FILL AND DRAIN COUPLING
MSFC 67 RDO 8541


P&VE LAB HUNTSVILLE
S-II STAGE INTERMEDIATE CARRIER
DISCONNECTED POSITION
MSFC 67 RDO 8542

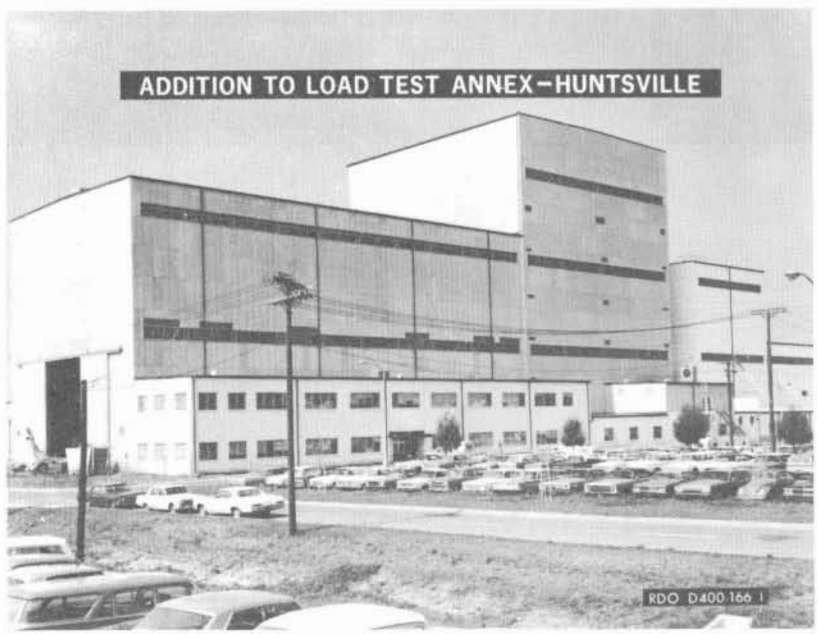

P&VE LAB HUNTSVILLE
SATURN V, S–IVB STAGE
AFT UMBILICAL CARRIER


P&VE LAB HUNTSVILLE
SATURN V DAMPER ARMS
RDO 88537

AERIAL VIEW OF LOAD TEST ANNEX
HUNTSVILLE



P & VE LABORATORY EXTENSION—HUNTSVILLE



ADDITION TO LOAD TEST ANNEX—HUNTSVILLE

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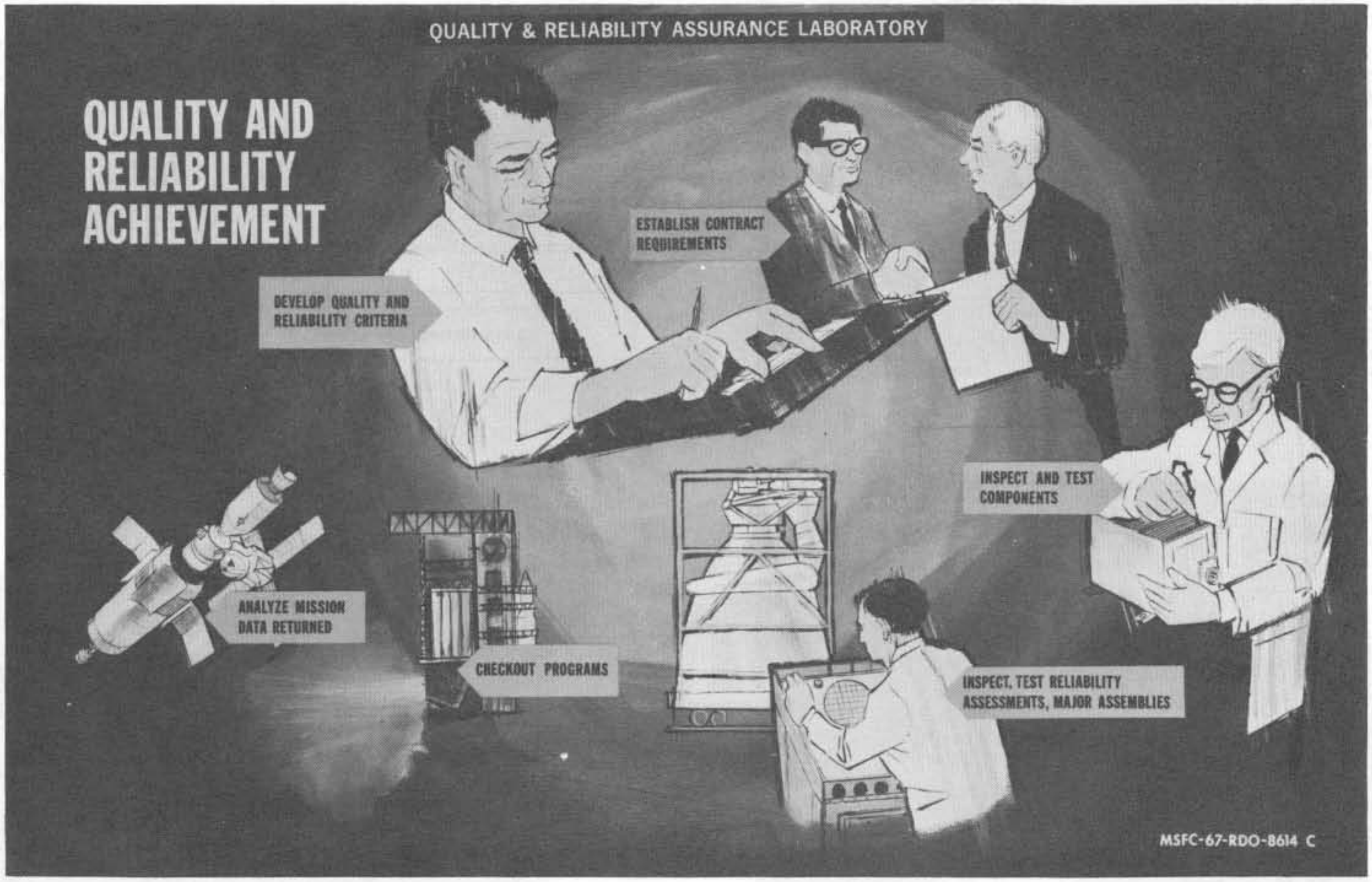

QUALITY & RELIABILITY ASSURANCE LABORATORY
QUALITY AND RELIABILITY ACHIEVEMENT
ESTABLISH CONTRACT REQUIREMENTS
DEVELOP QUALITY AND RELIABILITY CRITERIA
INSPECT AND TEST COMPONENTS
ANALYZE MISSION DATA RETURNED
CHECKOUT PROGRAMS
INSPECT, TEST RELIABILITY ASSESSMENTS, MAJOR ASSEMBLIES
MSFC-67-RDO-8614 C

QUALITY AND RELIABILITY ASSURANCE LABORATORY HUNTSVILLE

MSFC QUALITY AND RELIABILITY ASSURANCE PROGRAM IMPLEMENTATION

NASA HEADQUARTERS
POLICY GUIDANCE
NASA CONTROLLING DOCUMENTS

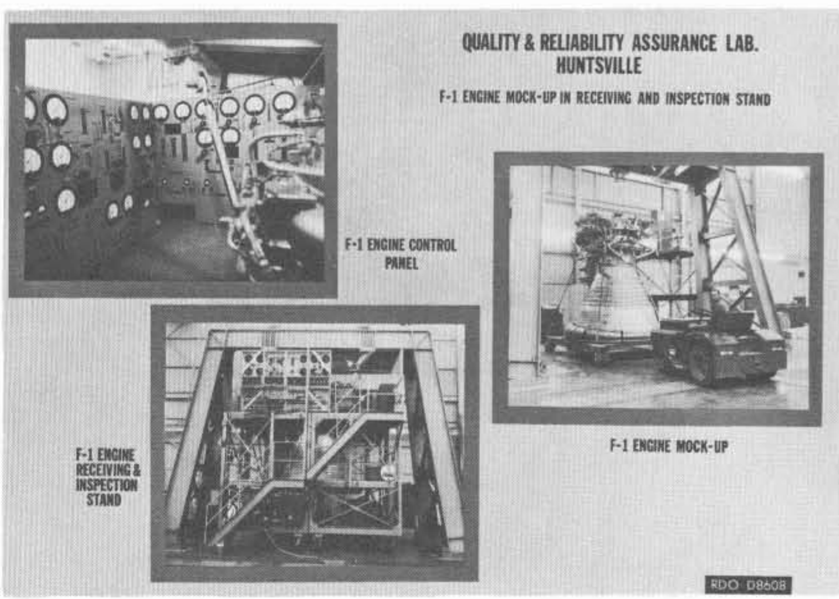
GEORGE C. MARSHALL SPACE FLIGHT CENTER

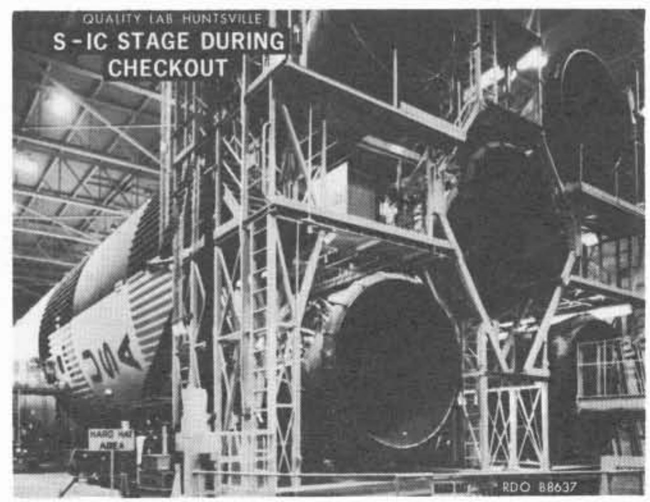
PROGRAM IMPLEMENTATION

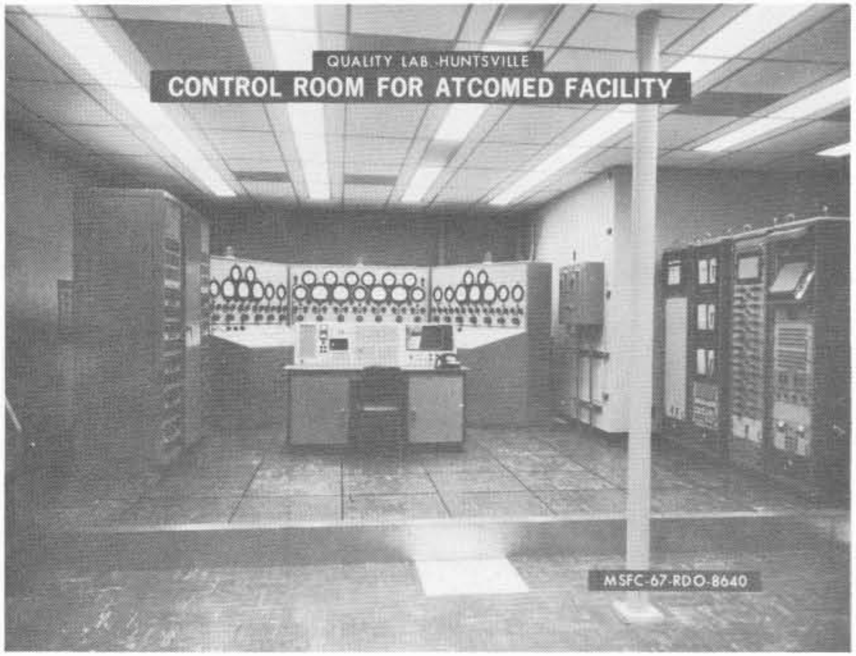
- DESIGN & DESIGN DOCUMENT REVIEW
- ESTABLISH CONTRACTUAL QUALITY & RELIABILITY PROVISIONS
- SPECIAL SURVEYS OF CONTRACTOR FACILITIES & TECHNICAL CAPABILITY
- DETERMINE GOVERNMENT AGENCY USAGE & ARRANGE DELEGATION OF FUNCTIONS
- SUPPLEMENT CONTROLLING DOCUMENTS
- MONITOR OR PERFORM FME & CA & PREDICTIONS
- TECHNICAL QUALITY & RELIABILITY SUPPORT TO GOVERNMENT AGENCY & CONTRACTOR (RESIDENT, AREA OR TDY)
- GOVERNMENT AGENCY & CONTRACTOR QUALITY & RELIABILITY SYSTEM EVALUATION (RESIDENT, AREA, TDY, OR AT MSFC)
- INSPECTION TEST & CHECKOUT VERIFICATION AT CONTRACTOR PLANTS
- PRODUCT INSPECTION, ANALYSIS, TEST & CHECKOUT AT MSFC & LAUNCH SITE
- RELIABILITY ASSESSMENT
- QUALIFICATION, RELIABILITY & OTHER SPECIAL TESTING
- DEFECT & FAILURE REPORTING AND ANALYSIS
- DEVELOP NEW QUALITY & RELIABILITY METHODS & TECHNIQUES

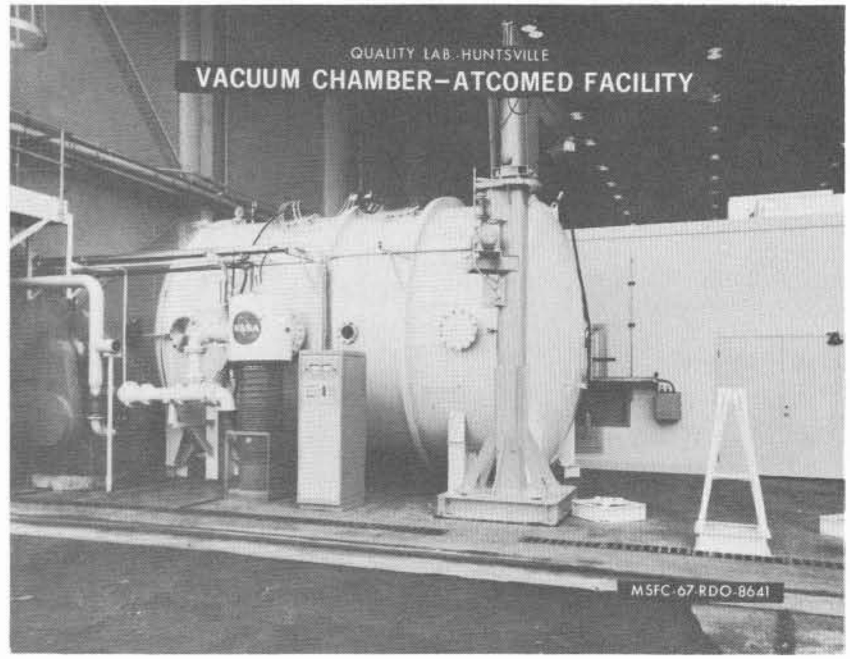
CONTRACTORS ↔ GOVERNMENT AGENCIES ↔ NASA INSTALLATIONS

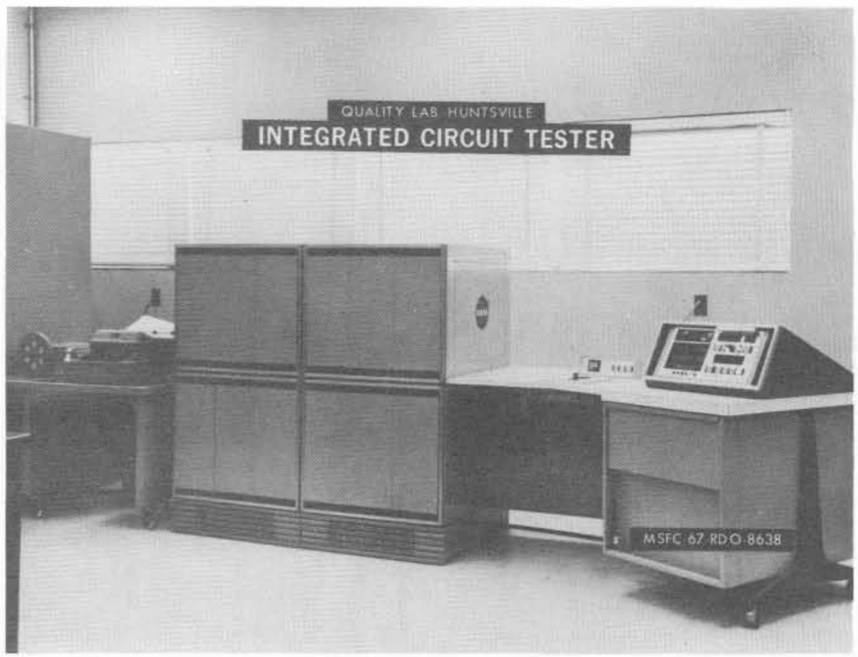
RDO D8600 C

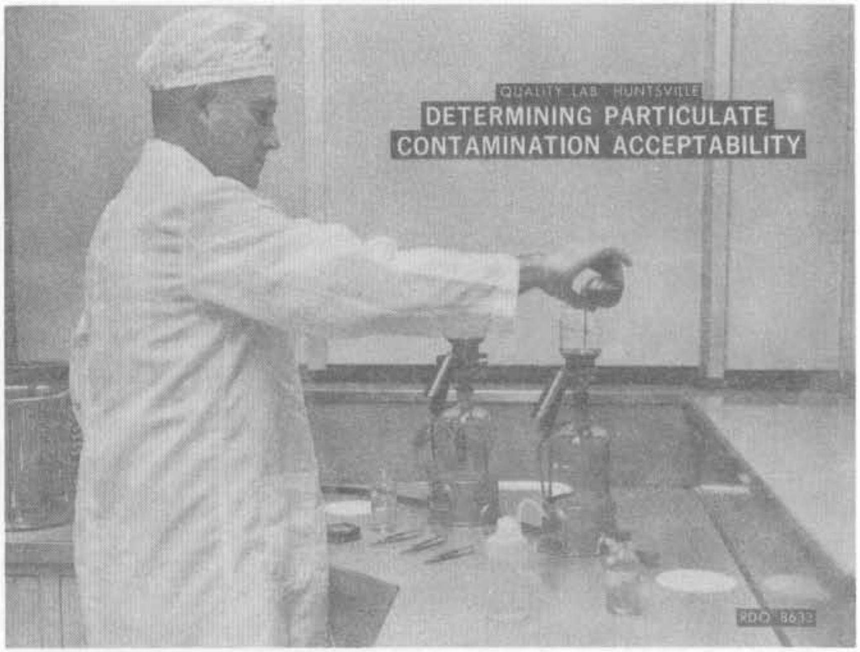


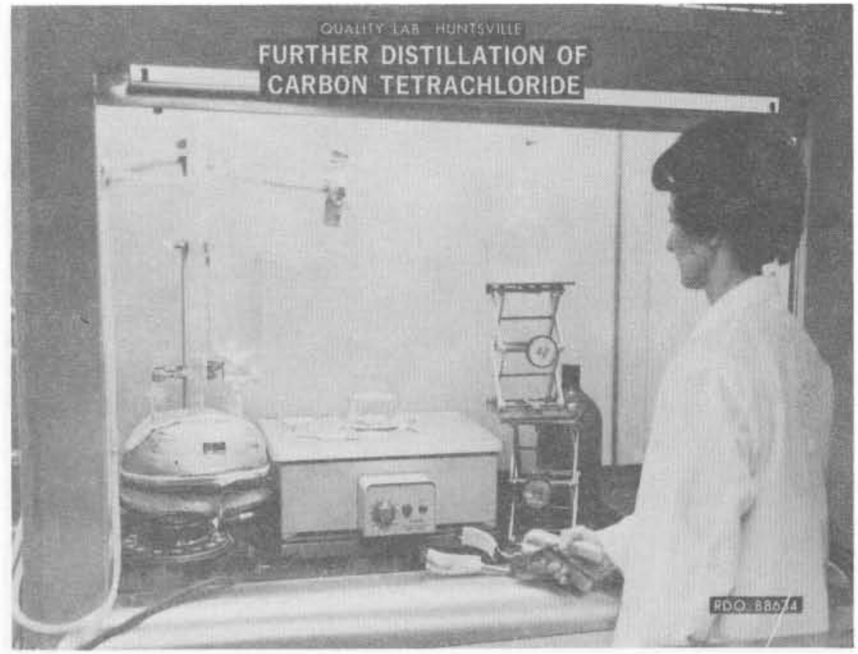



QUALITY LAB.-HUNTSVILLE
CONTROL ROOM FOR ATCOMED FACILITY
MSFC-67-RDO-8640

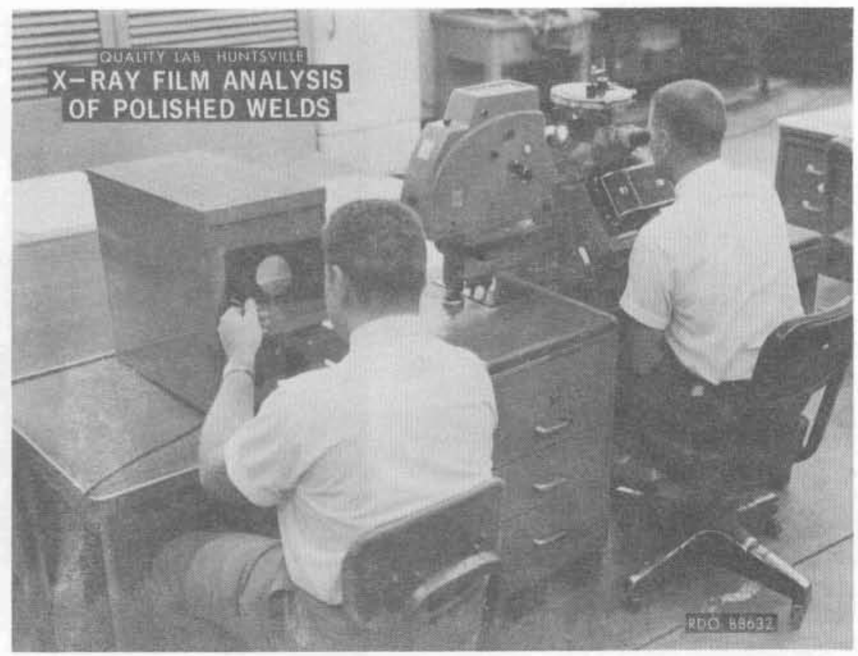

QUALITY LAB.-HUNTSVILLE
VACUUM CHAMBER–ATCOMED FACILITY
MSFC-67-RDO-8641

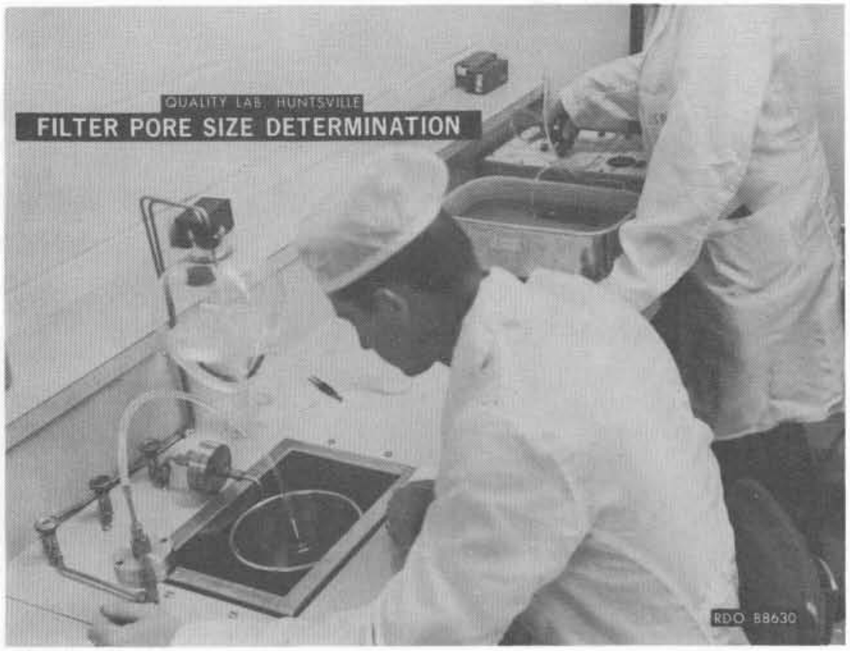

QUALITY LAB. HUNTSVILLE
INTEGRATED CIRCUIT TESTER
MSFC-67-RDO-8638

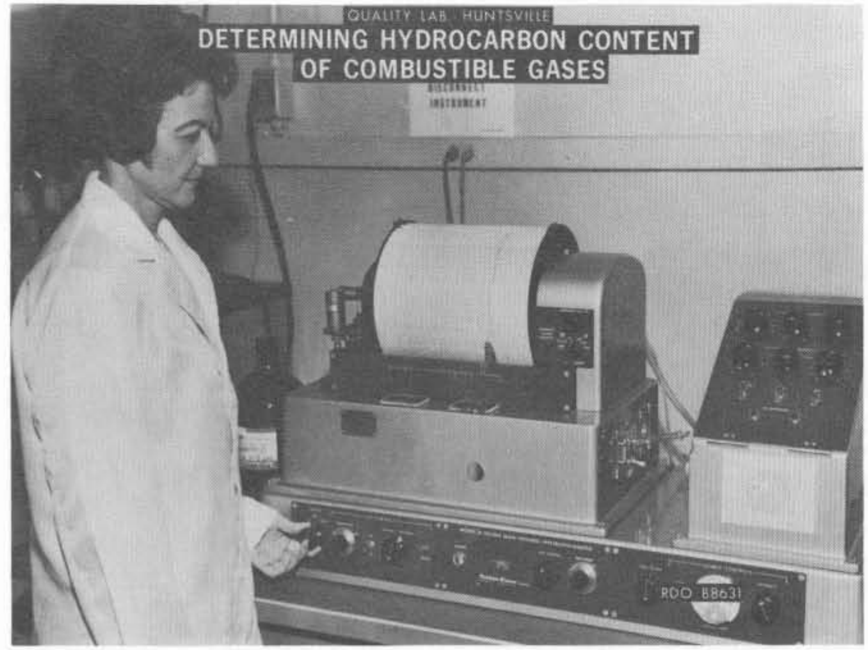

QUALITY LAB HUNTSVILLE
DETERMINING PARTICULATE
CONTAMINATION ACCEPTABILITY

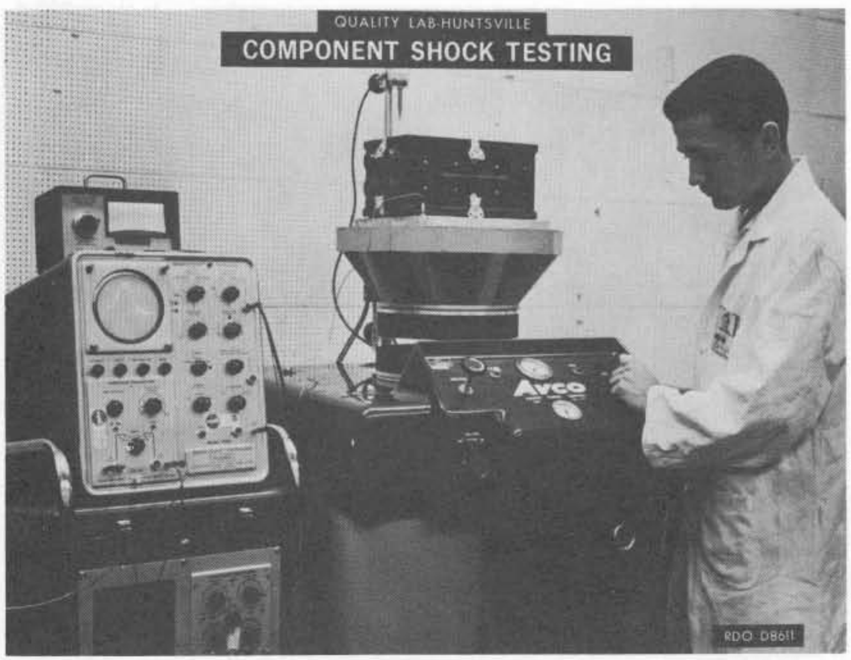

QUALITY LAB HUNTSVILLE
FURTHER DISTILLATION OF
CARBON TETRACHLORIDE


VIDICACE
QUALITY LAB HUNTSVILLE
DETERMINING WALL THICKNESS
RDO 88635


QUALITY LAB HUNTSVILLE
X-RAY FILM ANALYSIS
OF POLISHED WELDS
RDO 88632


QUALITY LAB. HUNTSVILLE
FILTER PORE SIZE DETERMINATION
RDO B8630

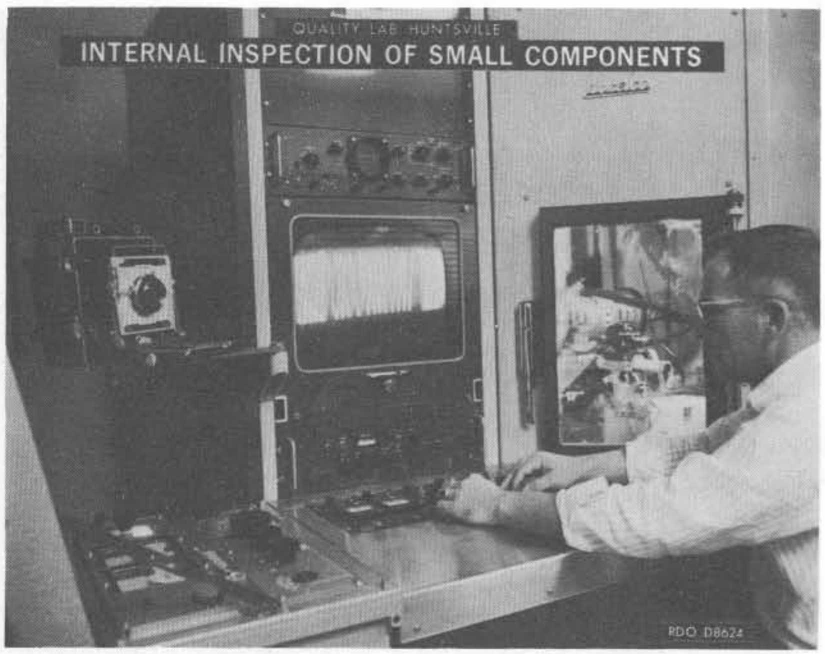

QUALITY LAB. HUNTSVILLE
DETERMINING HYDROCARBON CONTENT
OF COMBUSTIBLE GASES
RDO B8631

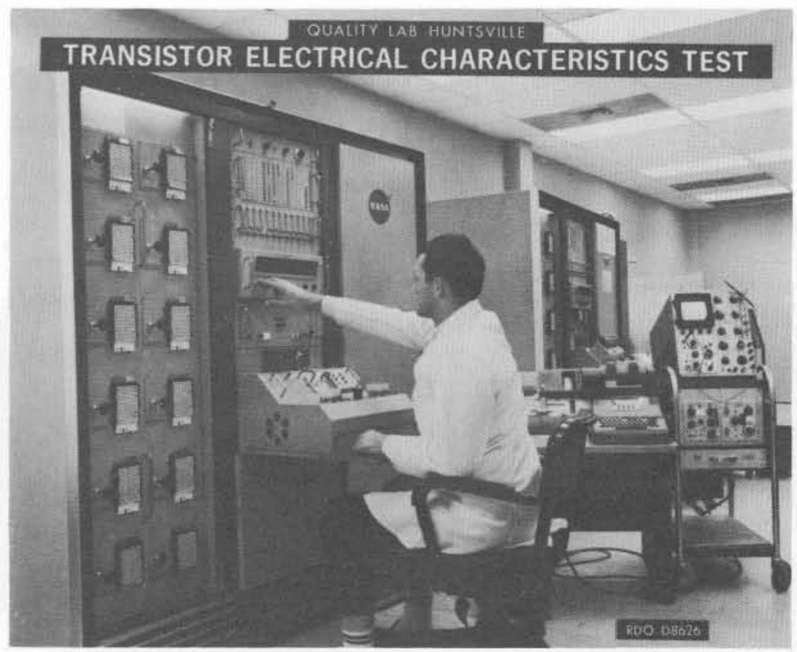

QUALITY LAB-HUNTSVILLE
COMPONENT SHOCK TESTING
AVCO
RDO D8611

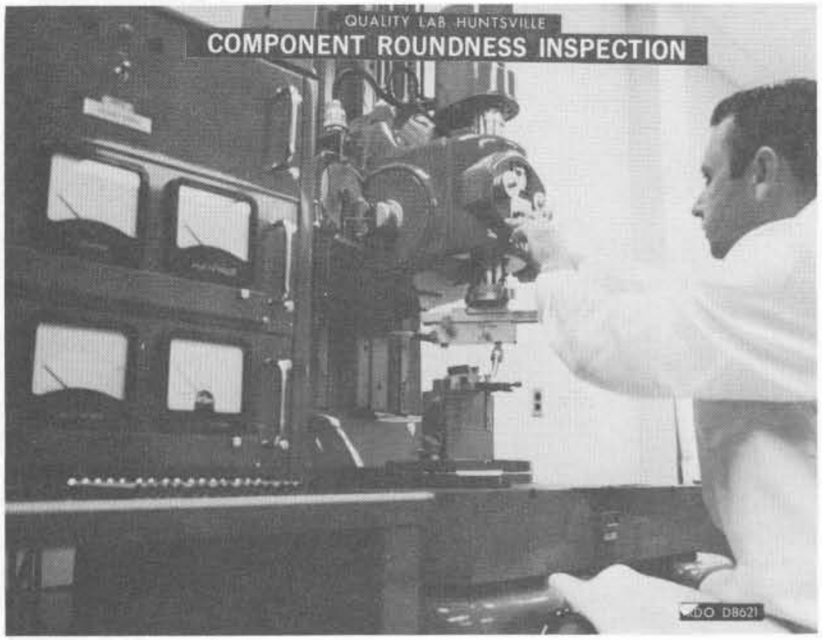

QUALITY LAB. HUNTSVILLE
ULTRASONIC BUTT-WELD INSPECTION
RDO D8616

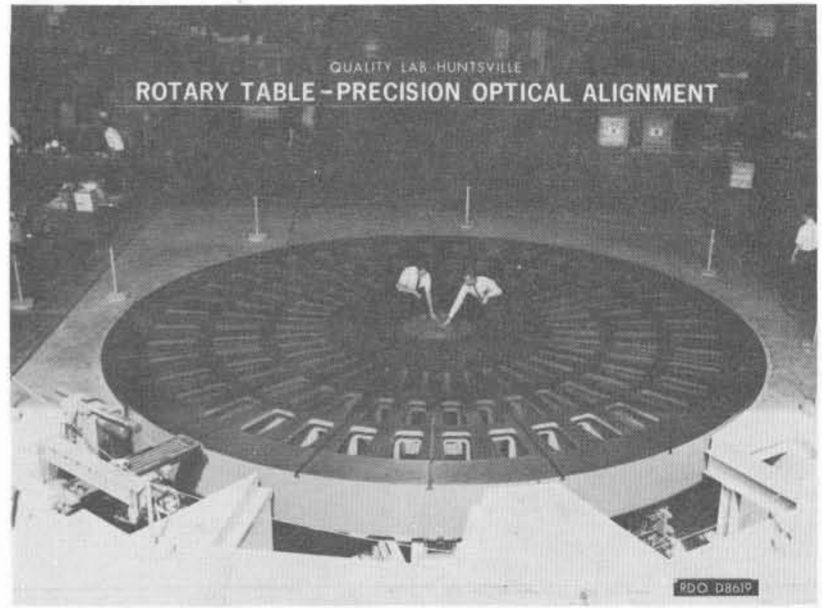

QUALITY LAB HUNTSVILLE
SEALED COMPONENT LEAK DETECTION
HELIUM TRACER GAS
RDO D8622

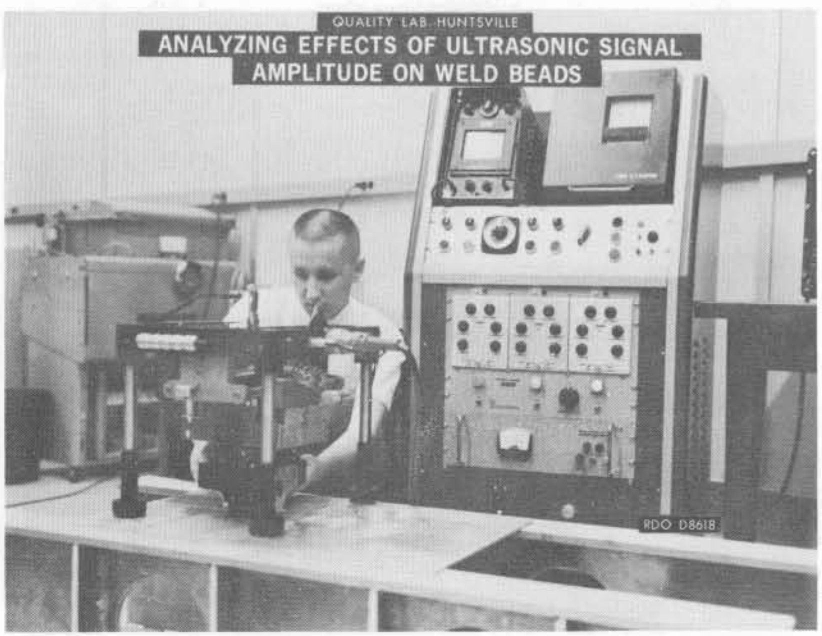

QUALITY LAB HUNTSVILLE
SEALED COMPONENT LEAK DETECTION
KRYPTON-85 TRACER GAS
RDO D8623

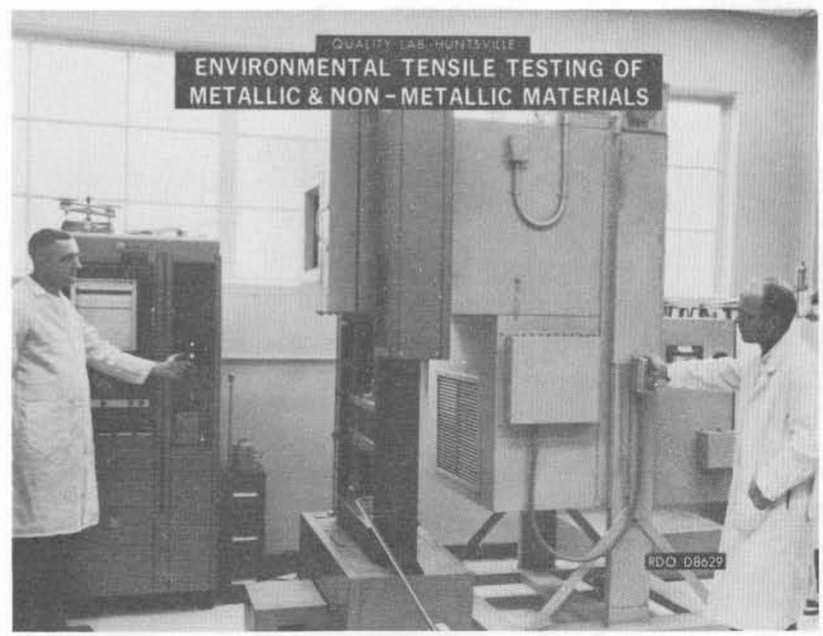

QUALITY LAB HUNTSVILLE
INTERNAL INSPECTION OF SMALL COMPONENTS
RDO D8624

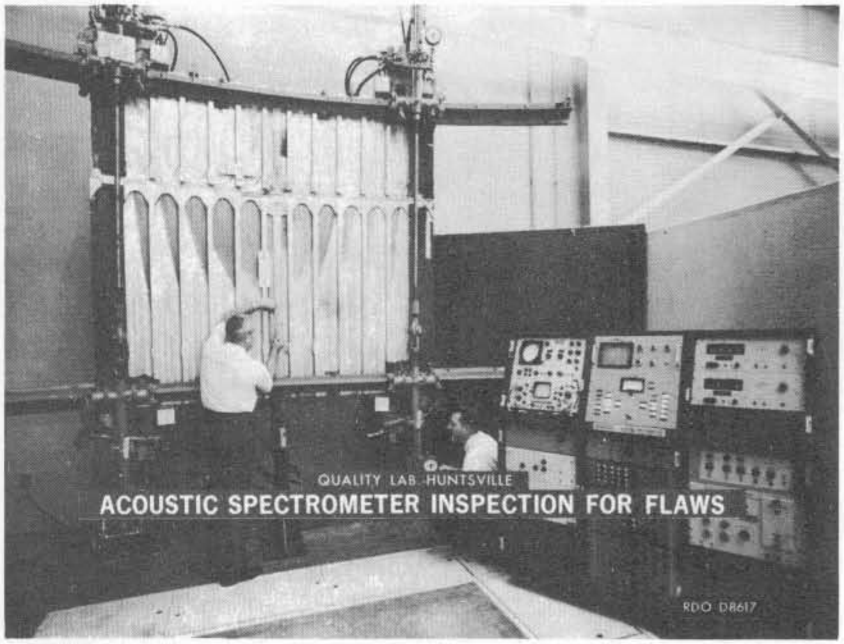

QUALITY LAB HUNTSVILLE
TRANSISTOR ELECTRICAL CHARACTERISTICS TEST
RDO D8626


QUALITY LAB HUNTSVILLE
COMPONENT ROUNDNESS INSPECTION
RDO D8621

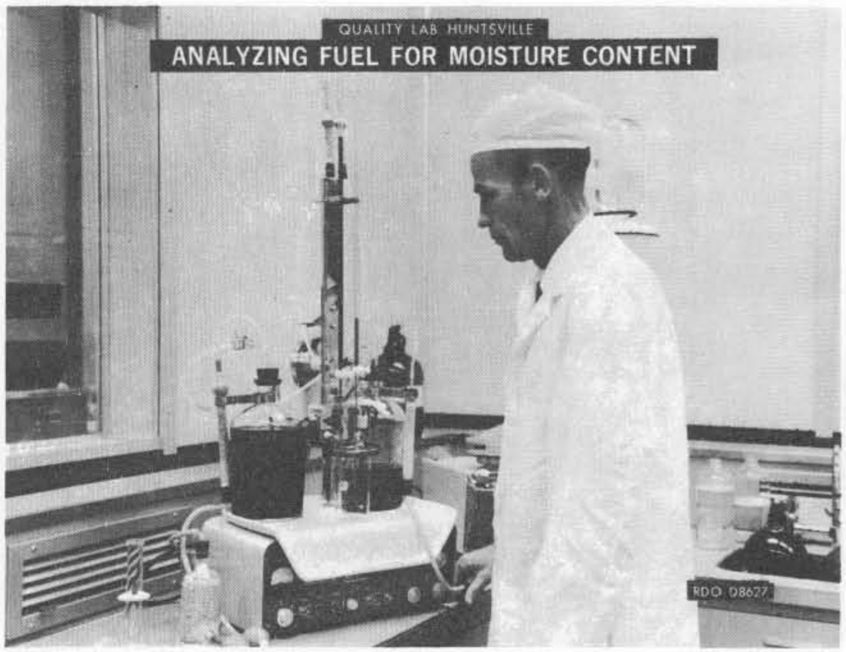

QUALITY LAB HUNTSVILLE
ROTARY TABLE-PRECISION OPTICAL ALIGNMENT
RDO D8619

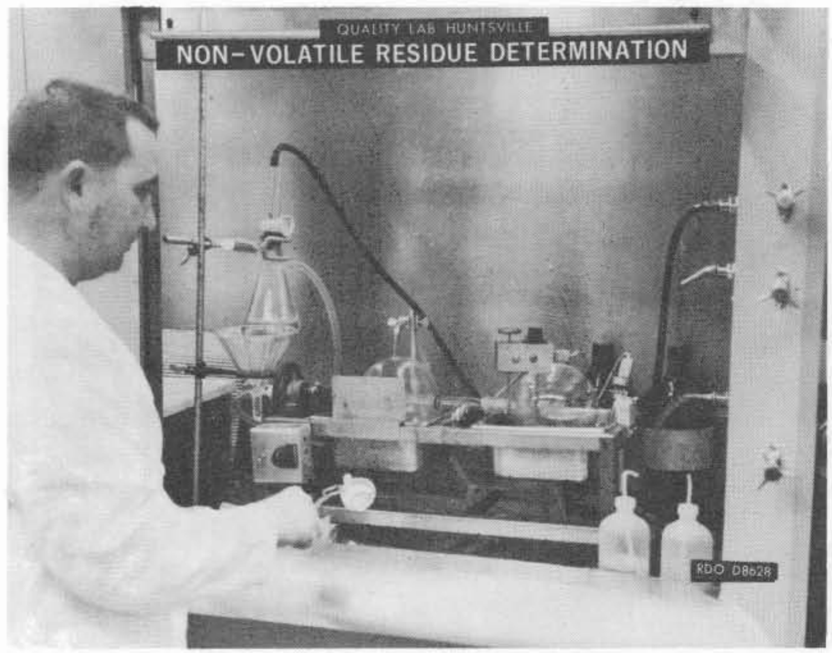

QUALITY LAB HUNTSVILLE
ANALYZING EFFECTS OF ULTRASONIC SIGNAL AMPLITUDE ON WELD BEADS
RDO D8618

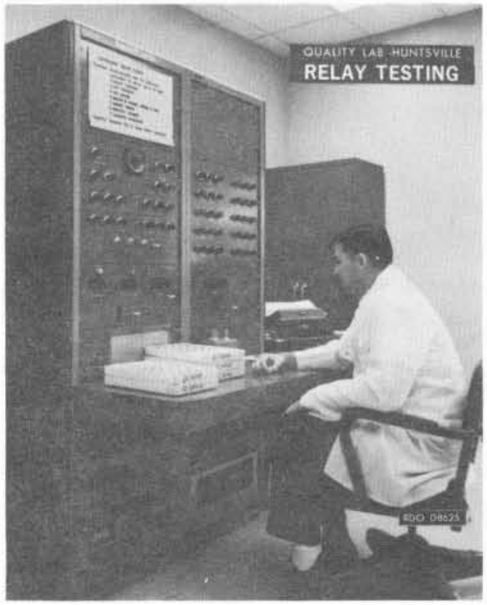

QUALITY LAB HUNTSVILLE
ENVIRONMENTAL TENSILE TESTING OF METALLIC & NON-METALLIC MATERIALS
RDO D8629

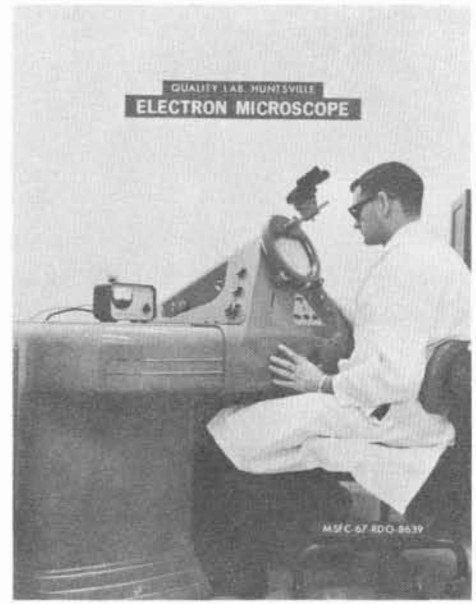

QUALITY LAB HUNTSVILLE
ACOUSTIC SPECTROMETER INSPECTION FOR FLAWS
RDO D8617

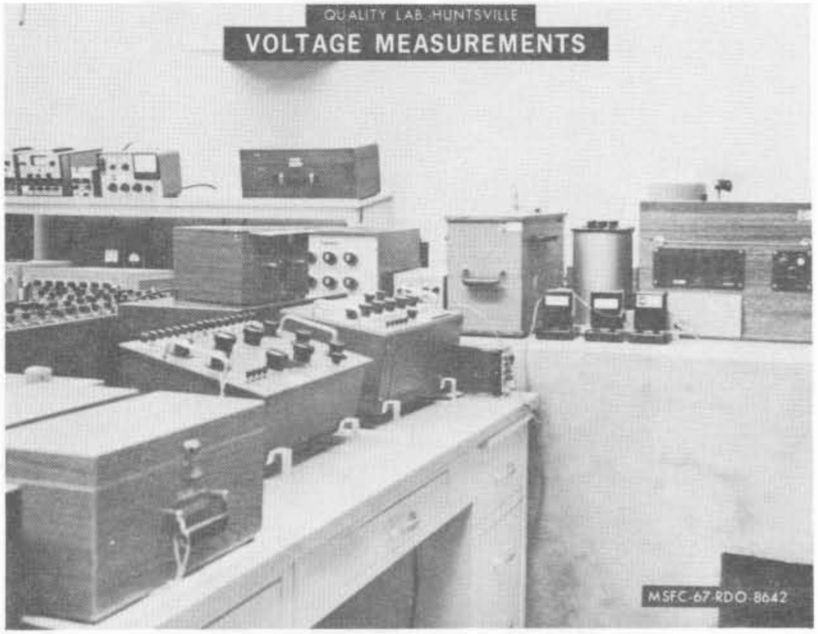

QUALITY LAB HUNTSVILLE
COORDINATE MEASURING OF XY & Z AXES
RDO D8620


QUALITY LAB HUNTSVILLE
ANALYZING FUEL FOR MOISTURE CONTENT
RDO D8627

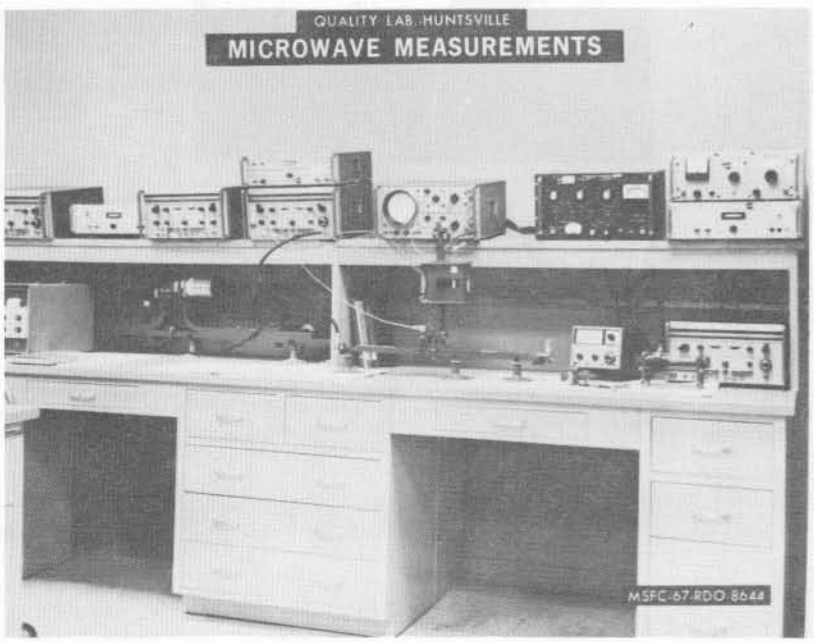

QUALITY LAB HUNTSVILLE
NON-VOLATILE RESIDUE DETERMINATION
RDO D8628

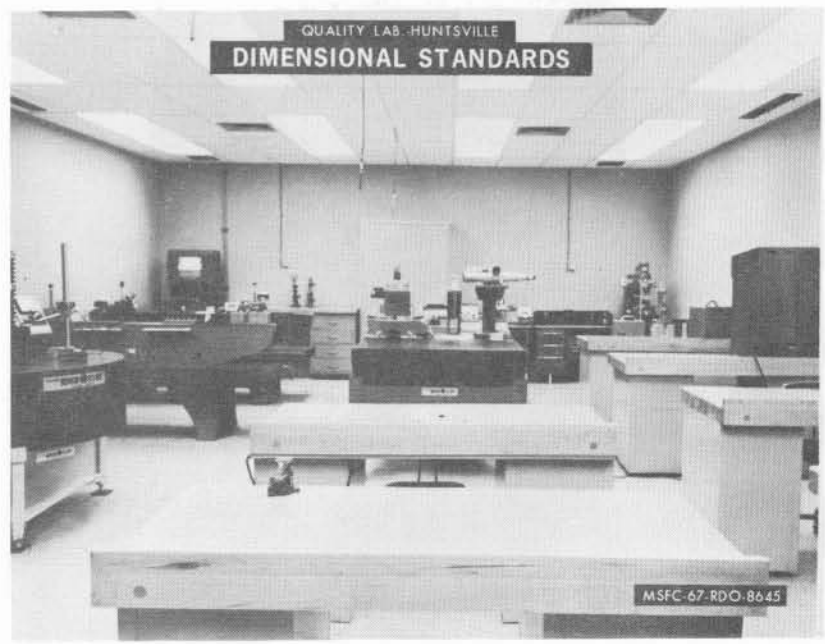

QUALITY LAB HUNTSVILLE
RELAY TESTING
RDO 08625

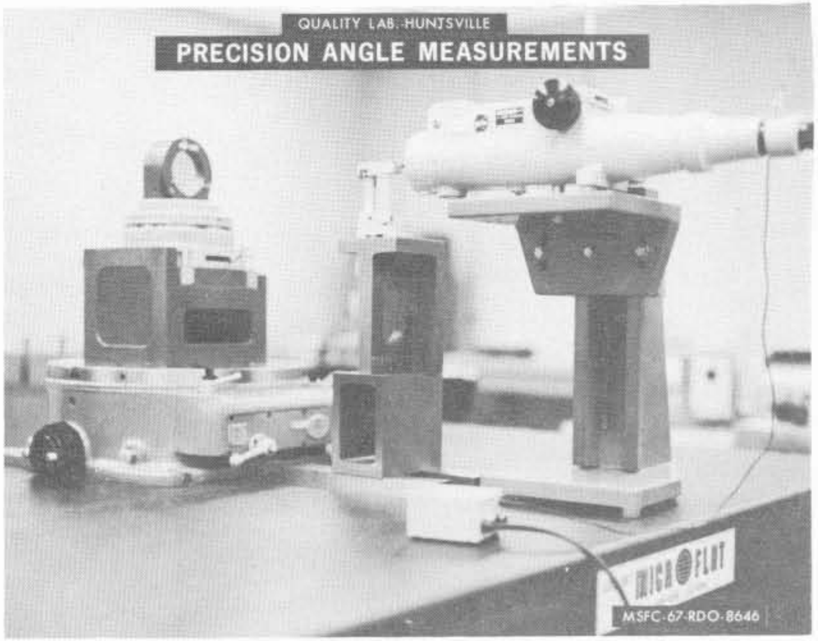

QUALITY LAB HUNTSVILLE
ELECTRON MICROSCOPE
MSFC-67-RDO-8639

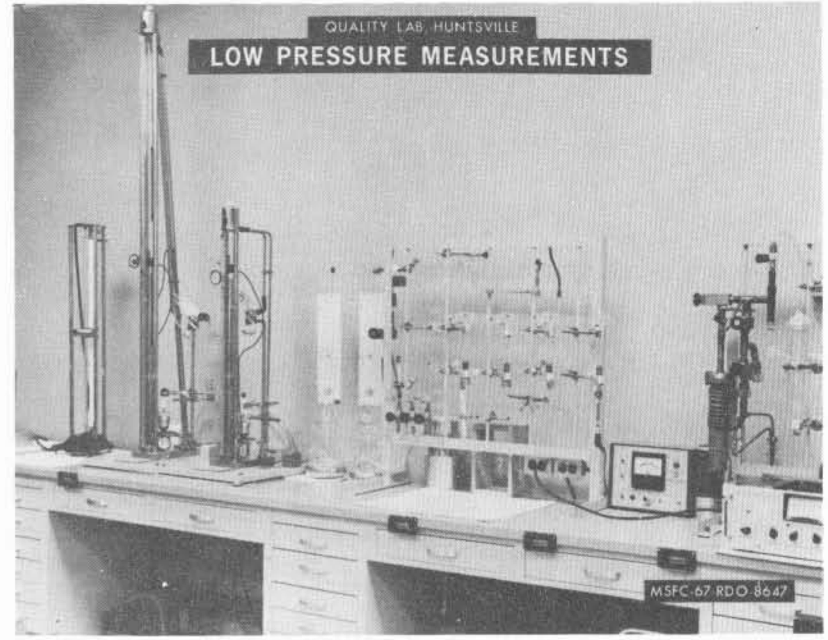

QUALITY LAB HUNTSVILLE
VOLTAGE MEASUREMENTS
MSFC-67-RDO-8642

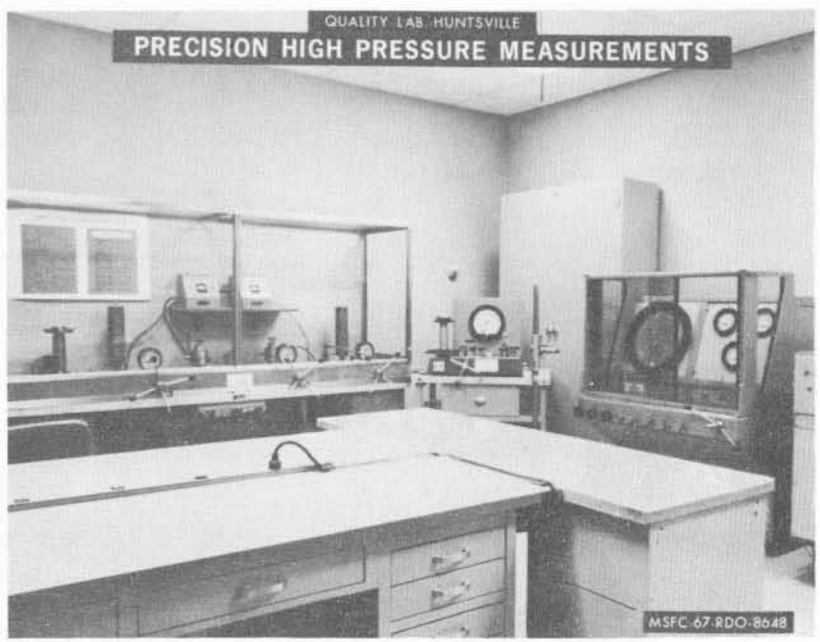

RESISTANCE MEASUREME
MSFC-67-RDO-8643

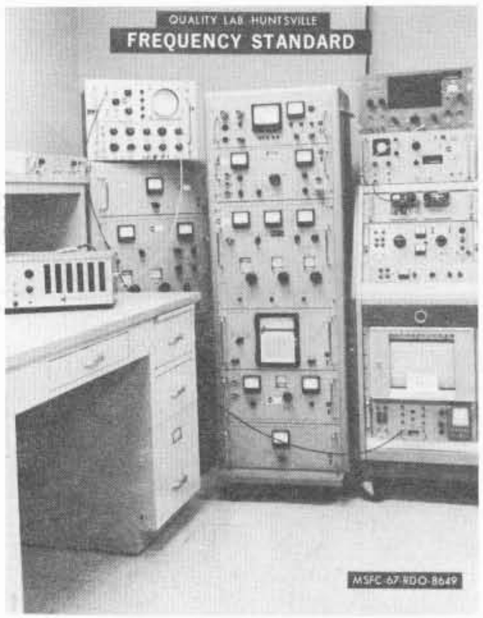

QUALITY LAB HUNTSVILLE
MICROWAVE MEASUREMENTS
MSFC-67-RDO-8644


QUALITY LAB HUNTSVILLE
DIMENSIONAL STANDARDS
MSFC-67-RDO-8645


QUALITY LAB. HUNTSVILLE
PRECISION ANGLE MEASUREMENTS
MSFC-67-RDO-8646


QUALITY LAB. HUNTSVILLE
LOW PRESSURE MEASUREMENTS
MSFC-67-RDO-8647


QUALITY LAB. HUNTSVILLE
PRECISION HIGH PRESSURE MEASUREMENTS
MSFC-67-RDO-8648


QUALITY LAB HUNTSVILLE
FREQUENCY STANDARD
MSFC-67-RDO-8649


QUALITY LAB HUNTSVILLE
PRECISION ACCELERATION MEASUREMENTS

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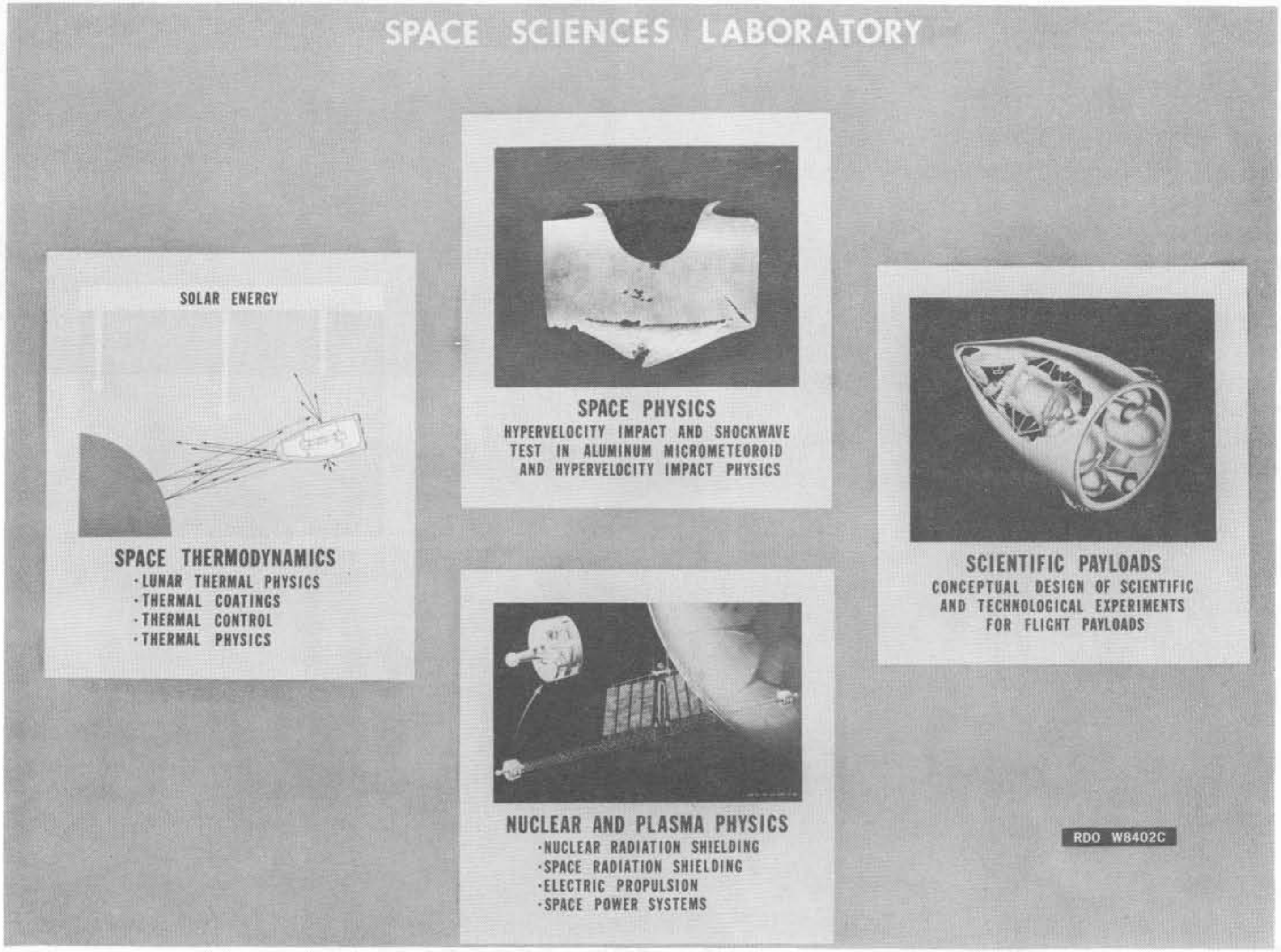
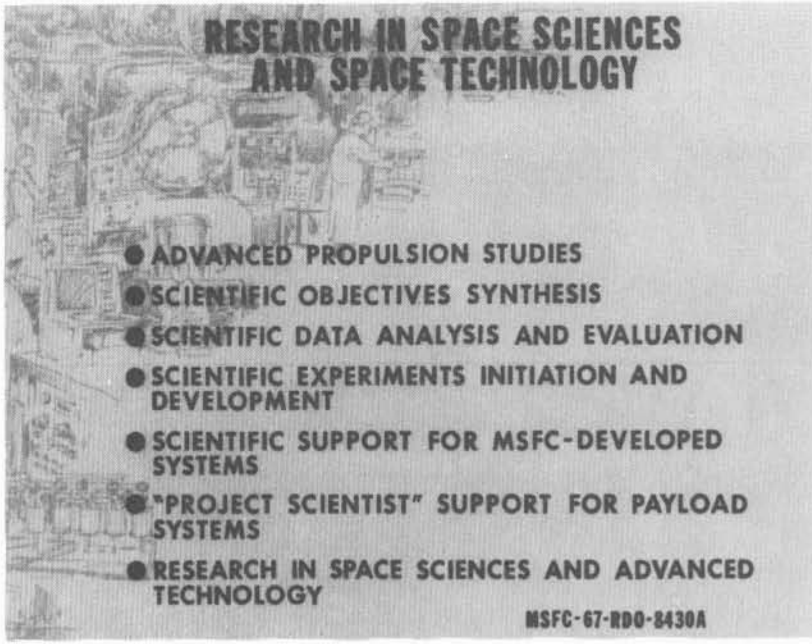
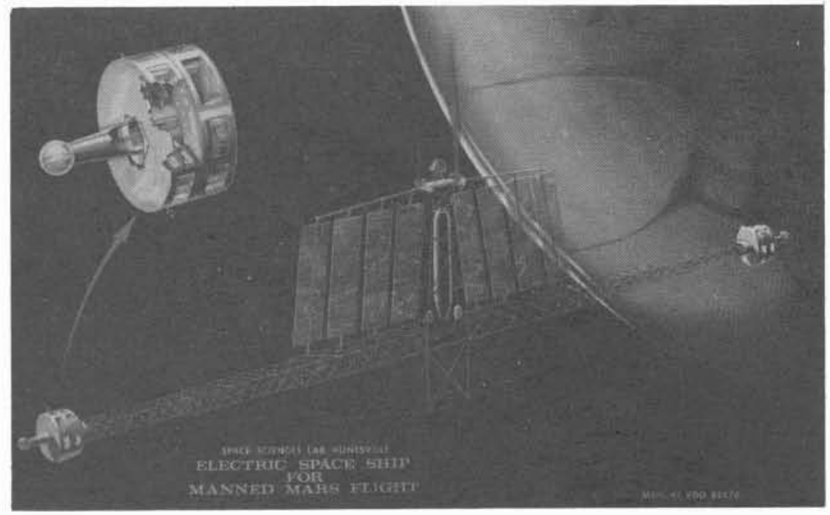
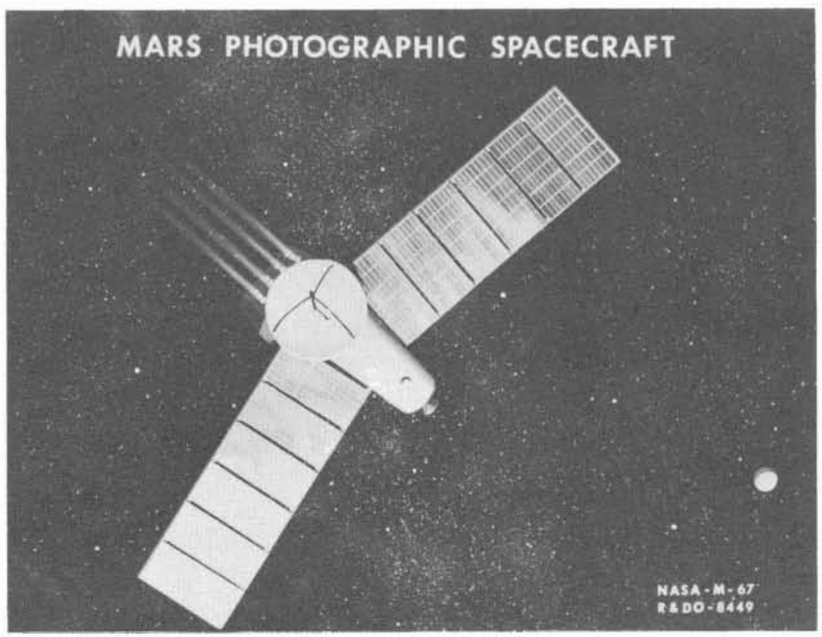

SPACE SCIENCES LABORATORY
SOLAR ENERGY
SPACE THERMODYNAMICS
·LUNAR THERMAL PHYSICS
·THERMAL COATINGS
·THERMAL CONTROL
·THERMAL PHYSICS
SPACE PHYSICS
HYPERVELOCITY IMPACT AND SHOCKWAVE TEST IN ALUMINUM MICROMETEOROID AND HYPERVELOCITY IMPACT PHYSICS
SCIENTIFIC PAYLOADS
CONCEPTUAL DESIGN OF SCIENTIFIC AND TECHNOLOGICAL EXPERIMENTS FOR FLIGHT PAYLOADS
NUCLEAR AND PLASMA PHYSICS
·NUCLEAR RADIATION SHIELDING
·SPACE RADIATION SHIELDING
·ELECTRIC PROPULSION
·SPACE POWER SYSTEMS
RDO W8402C


RESEARCH IN SPACE SCIENCES
AND SPACE TECHNOLOGY
● ADVANCED PROPULSION STUDIES
● SCIENTIFIC OBJECTIVES SYNTHESIS
● SCIENTIFIC DATA ANALYSIS AND EVALUATION
● SCIENTIFIC EXPERIMENTS INITIATION AND DEVELOPMENT
● SCIENTIFIC SUPPORT FOR MSFC-DEVELOPED SYSTEMS
● "PROJECT SCIENTIST" SUPPORT FOR PAYLOAD SYSTEMS
● RESEARCH IN SPACE SCIENCES AND ADVANCED TECHNOLOGY
MSFC-67-RDO-8430A

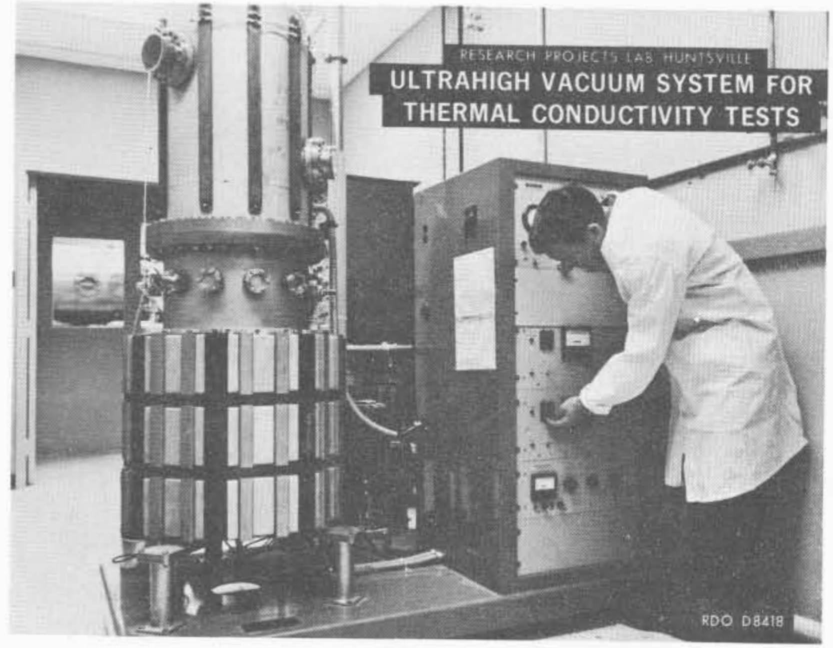

ELECTRIC SPACE SHIP
FOR
MANNED MARS FLIGHT

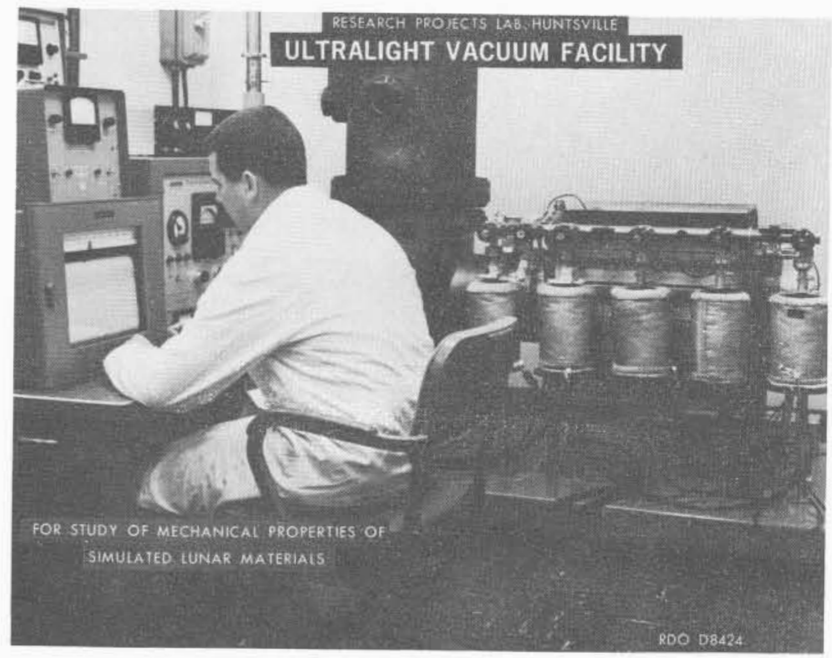

MARS PHOTOGRAPHIC SPACECRAFT
NASA-M-67
R&DO-8449

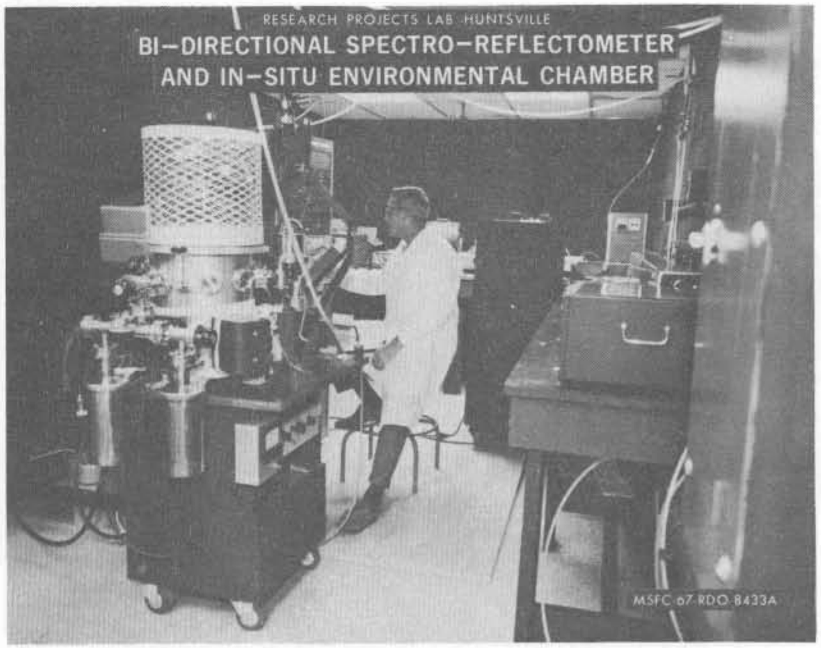
THEORETICAL RESEARCH IN THERMAL PHYSICS

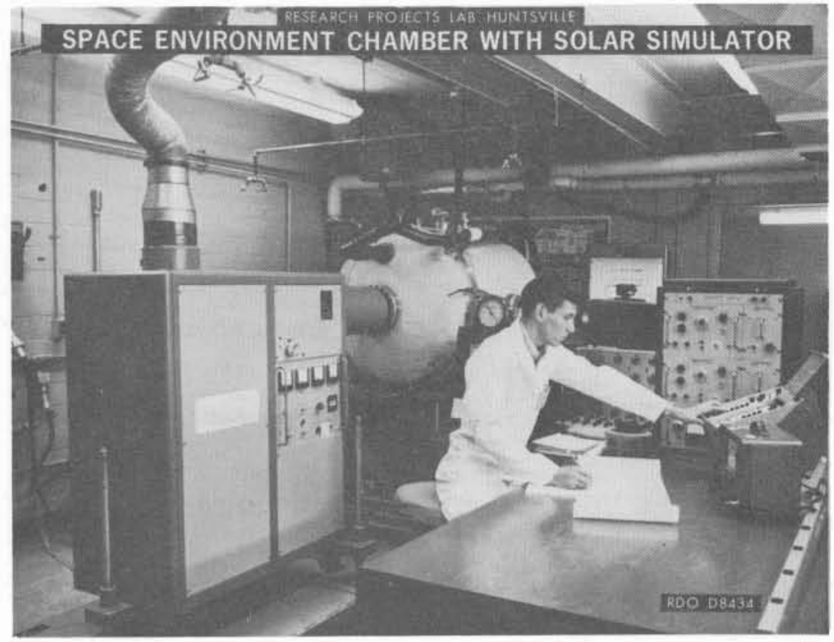
- THERMAL SIMILITUDE AND DIMENSIONAL ANALYSIS
- THEORETICAL CALCULATION OF SPACECRAFT TEMPERATURES
- THEORETICAL MODEL OF MOON'S ENVIRONMENT
- THEORETICAL MODEL OF MOON'S THERMAL PROPERTIES
- THEORETICAL MODEL OF EARTH ALBEDO
- THEORETICAL MODEL OF HEAT TRANSFER IN POWDERS

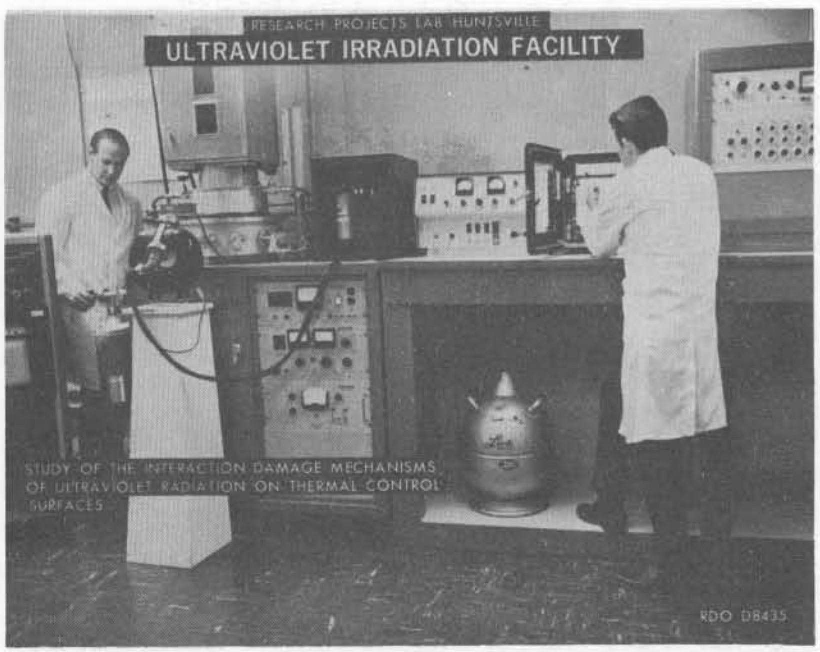
RDO D8431

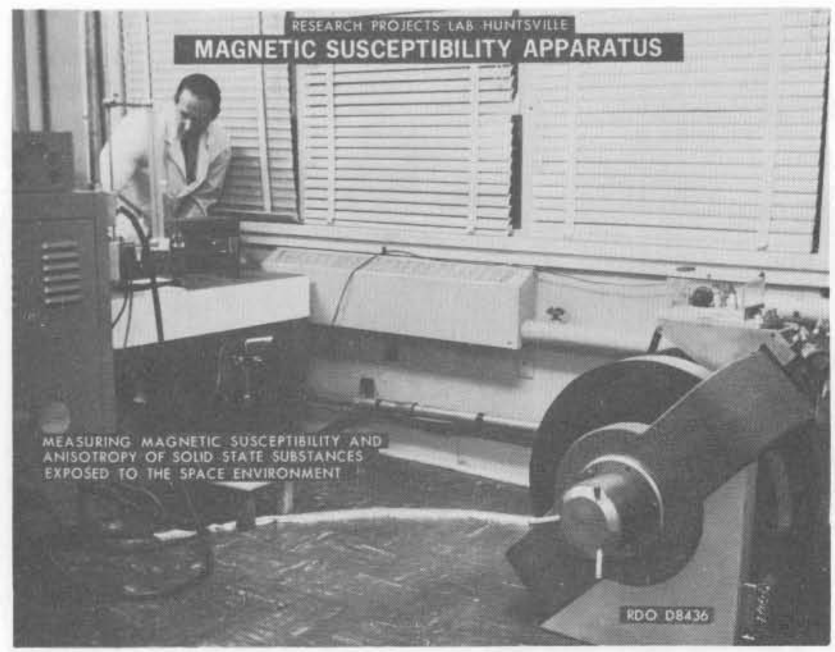


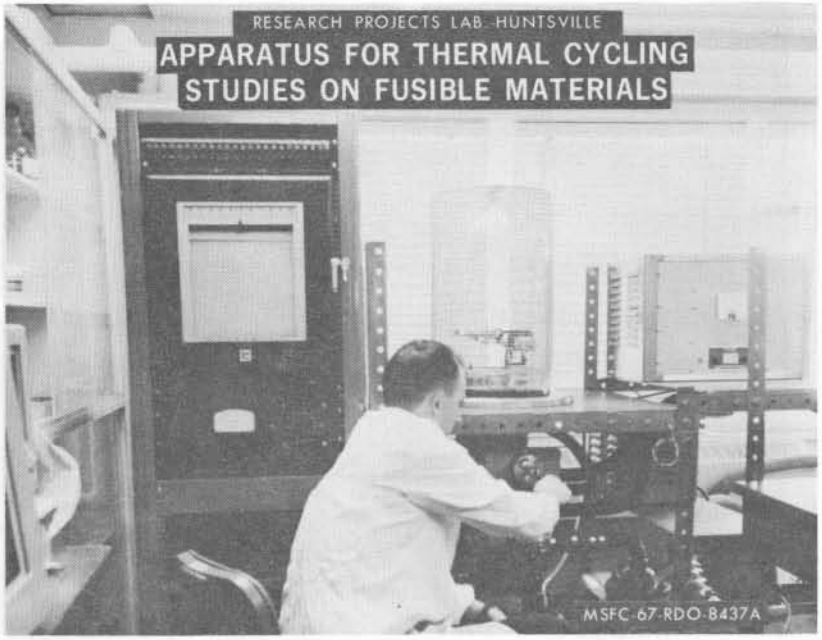


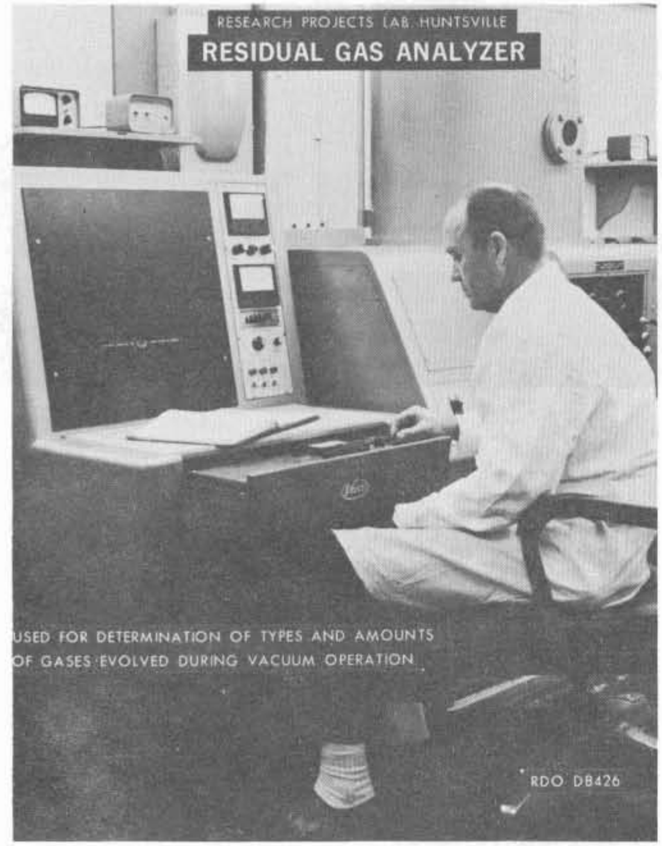

RESEARCH PROJECTS LAB HUNTSVILLE
BI-DIRECTIONAL SPECTRO-REFLECTOMETER
AND IN-SITU ENVIRONMENTAL CHAMBER
MSFC 67-RDO-8433A

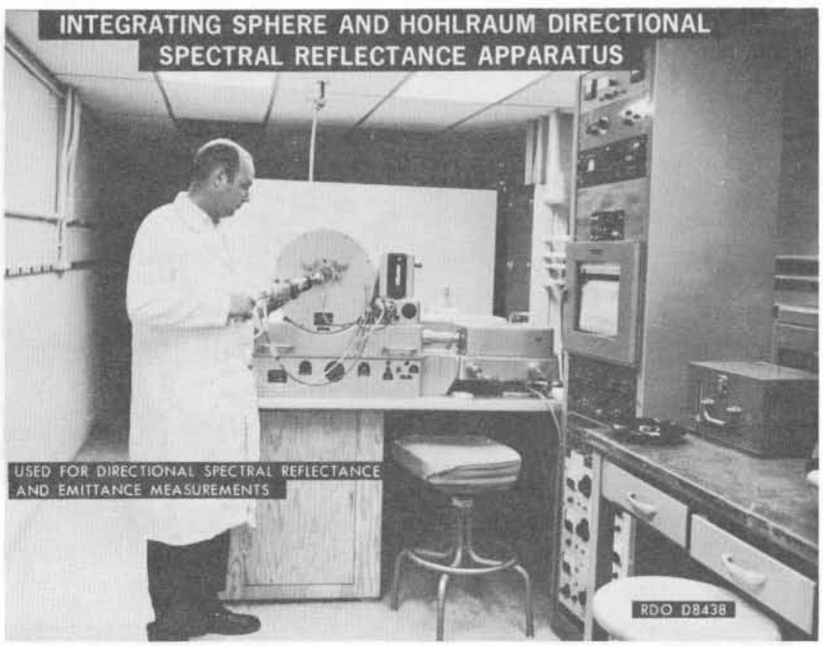

RESEARCH PROJECTS LAB HUNTSVILLE
SPACE ENVIRONMENT CHAMBER WITH SOLAR SIMULATOR
RDO D8434

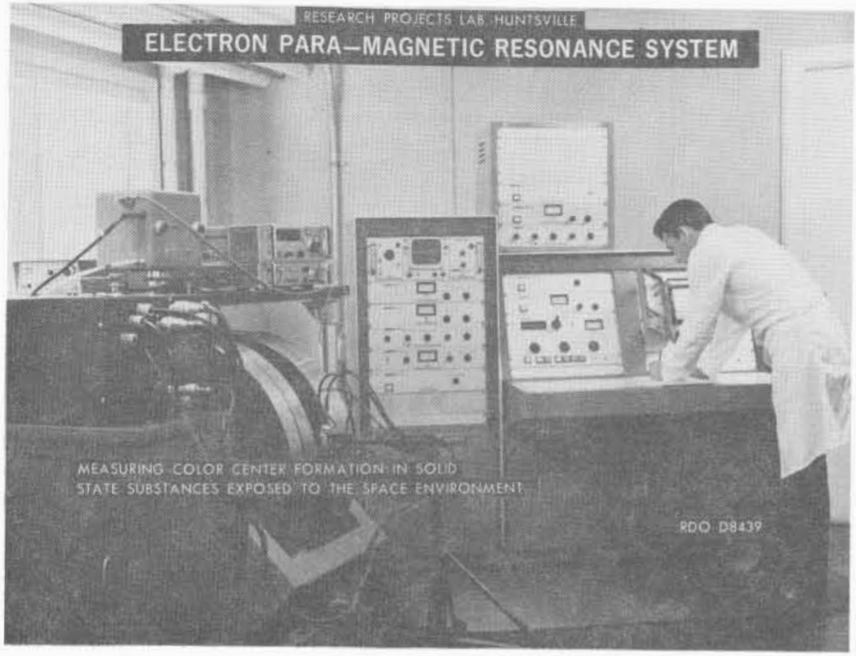

RESEARCH PROJECTS LAB HUNTSVILLE
ULTRAVIOLET IRRADIATION FACILITY
STUDY OF THE INTERACTION DAMAGE MECHANISMS OF ULTRAVIOLET RADIATION ON THERMAL CONTROL SURFACES
RDO D8435

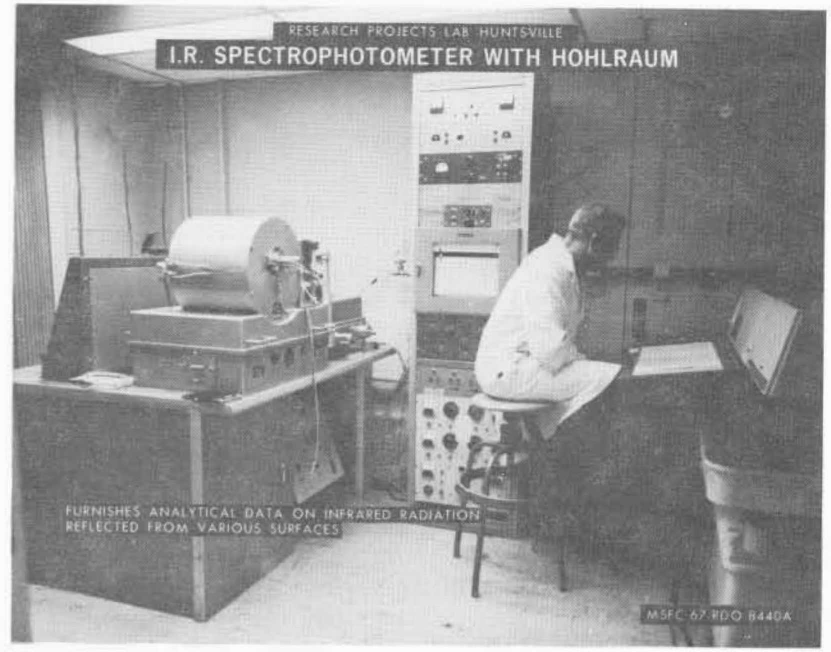

RESEARCH PROJECTS LAB HUNTSVILLE
MAGNETIC SUSCEPTIBILITY APPARATUS
MEASURING MAGNETIC SUSCEPTIBILITY AND ANISOTROPY OF SOLID STATE SUBSTANCES EXPOSED TO THE SPACE ENVIRONMENT
RDO D8436


RESEARCH PROJECTS LAB HUNTSVILLE
APPARATUS FOR THERMAL CYCLING
STUDIES ON FUSIBLE MATERIALS
MSFC-67-RDO-8437A


RESEARCH PROJECTS LAB HUNTSVILLE
RESIDUAL GAS ANALYZER
USED FOR DETERMINATION OF TYPES AND AMOUNTS
OF GASES EVOLVED DURING VACUUM OPERATION
RDO D8426


INTEGRATING SPHERE AND HOHLRAUM DIRECTIONAL
SPECTRAL REFLECTANCE APPARATUS
USED FOR DIRECTIONAL SPECTRAL REFLECTANCE
AND EMITTANCE MEASUREMENTS
RDO D8438

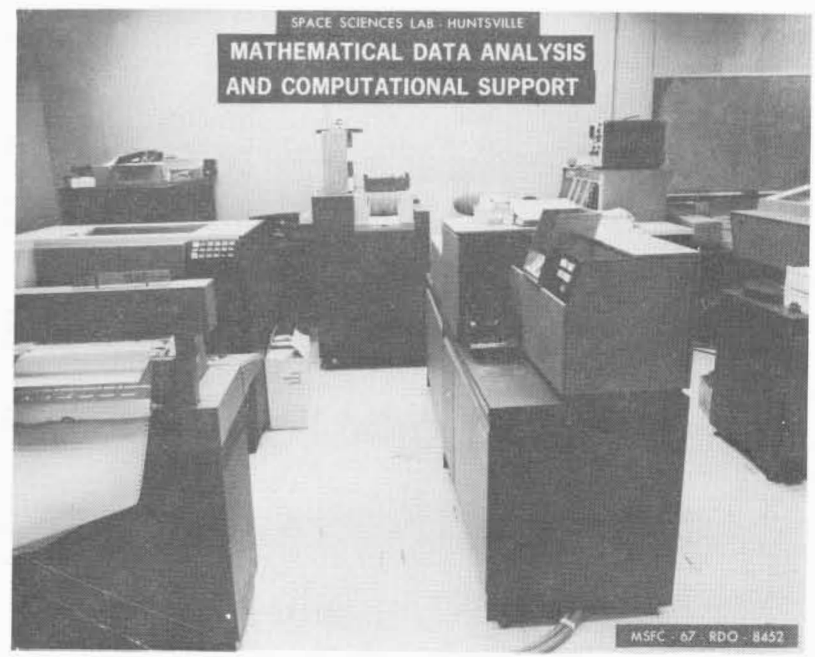




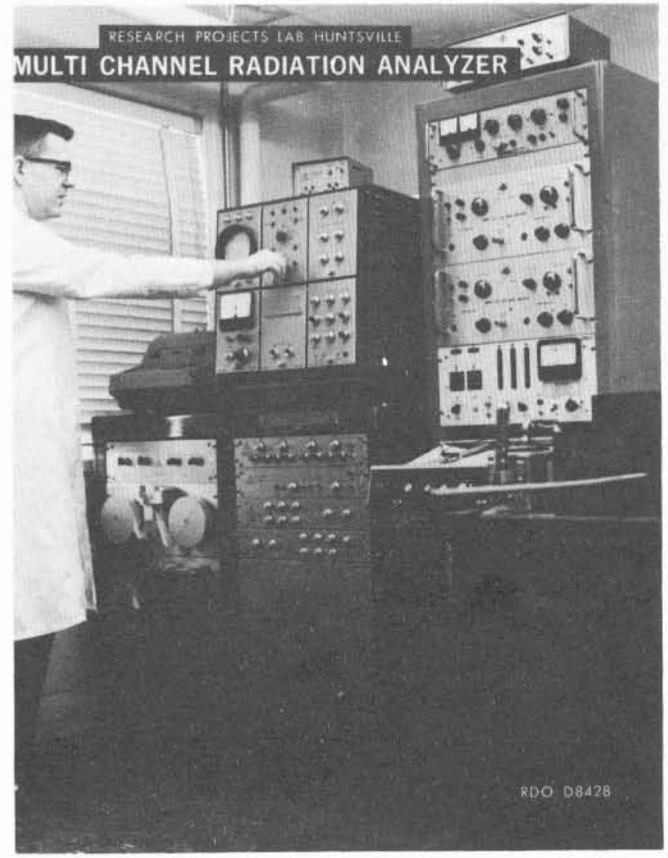
THEORETICAL RESEARCH IN NUCLEAR, PLASMA AND SOLID STATE PHYSICS

- APPLIED NUCLEAR PHYSICS AND ENGINEERING
- RADIATION PHYSICS
- SUPERCONDUCTIVITY STUDIES
- SURFACE PHYSICS
- MATHEMATICAL AND THEORETICAL PHYSICS
- PLASMA ANALYSIS
- ATMOSPHERIC REACTION KINETICS
- PARTICLES AND FIELDS ANALYSIS

RDO D8441




RESEARCH PROJECTS LAB.-HUNTSVILLE
ULTRAVIOLET SCANNING SPECTROMETER
PHOTO-DISSOCIATION OF WATER VAPOR
MSFC-67-RDO-8423A

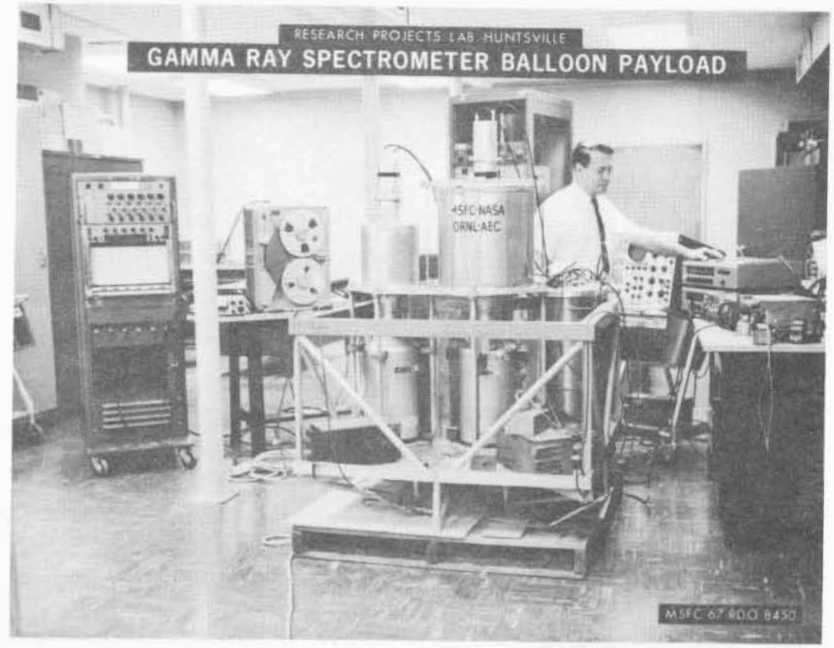

RESEARCH PROJECTS LAB HUNTSVILLE
MULTI CHANNEL RADIATION ANALYZER
RDO D8428

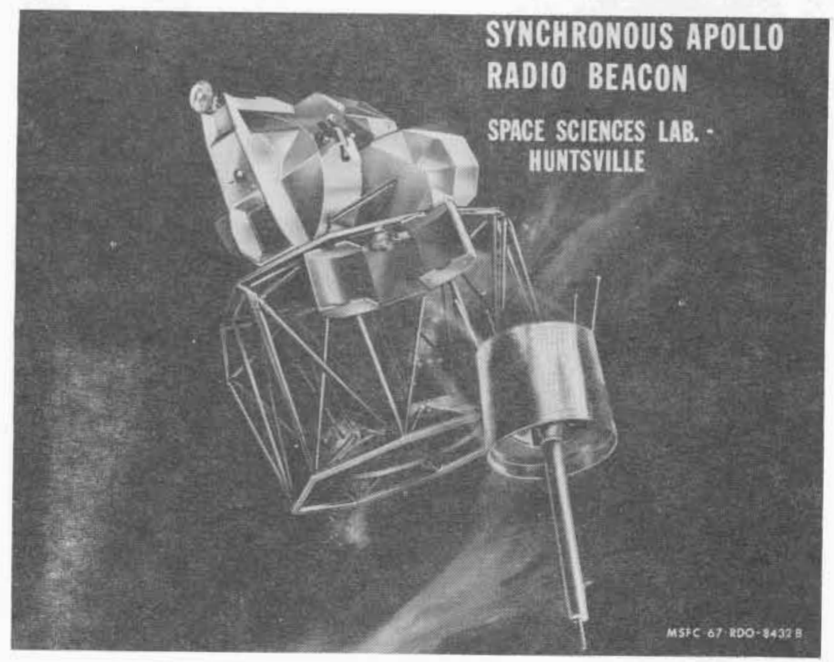
SPACE SCIENCE EXPERIMENTS

AREAS OF WORK

- ASTRONOMY
- RADIO PHYSICS
- GEOLOGY
- MECHANICS OF LUNAR AND PLANETARY MATERIALS
- GEOPHYSICS
- SCIENTIFIC INSTRUMENTS
- SCIENTIFIC MISSION ANALYSIS

RDO D8446

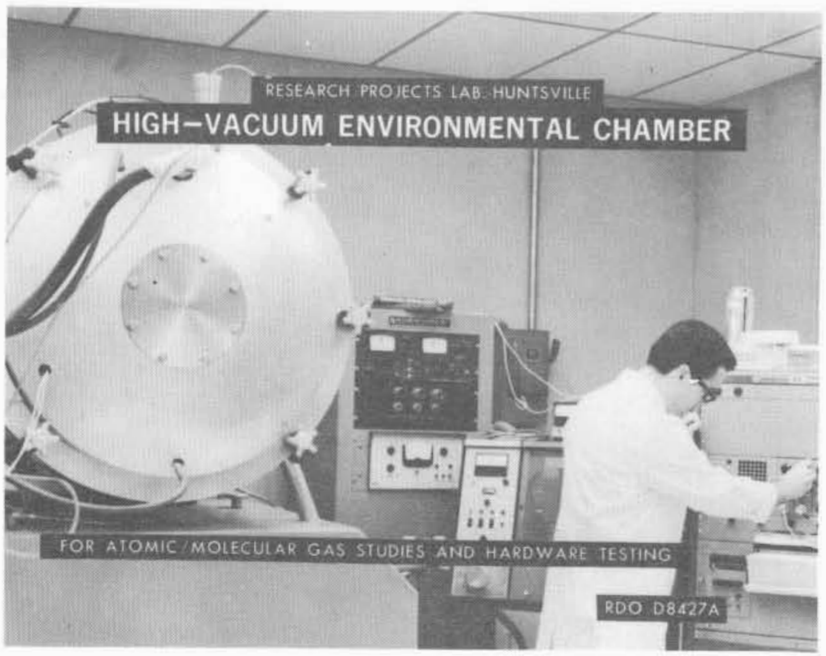


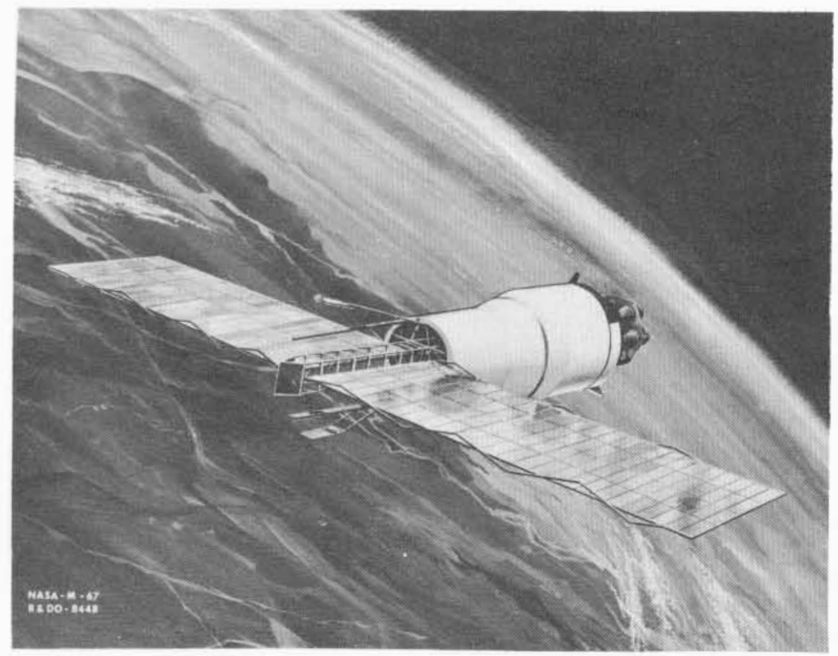


THEORETICAL RESEARCH IN PHYSICS AND ASTROPHYSICS

- HYPERVELOCITY IMPACT PHYSICS
- PHYSICS OF SOLIDS AT HIGH PRESSURE
- METEOROID PHYSICS
- ADVANCED ACCELERATOR CONCEPTS
- NON-LINEAR MECHANICS
- GENERAL RIGID BODY PHYSICS
- GRAVITATIONAL POTENTIAL THEORY
- PERTURBATION THEORY FOR ROTATING BODIES
- QUANTUM ELECTRODYNAMICS
- ATOMIC ELECTROMAGNETIC INTERACTIONS

RDO D8444





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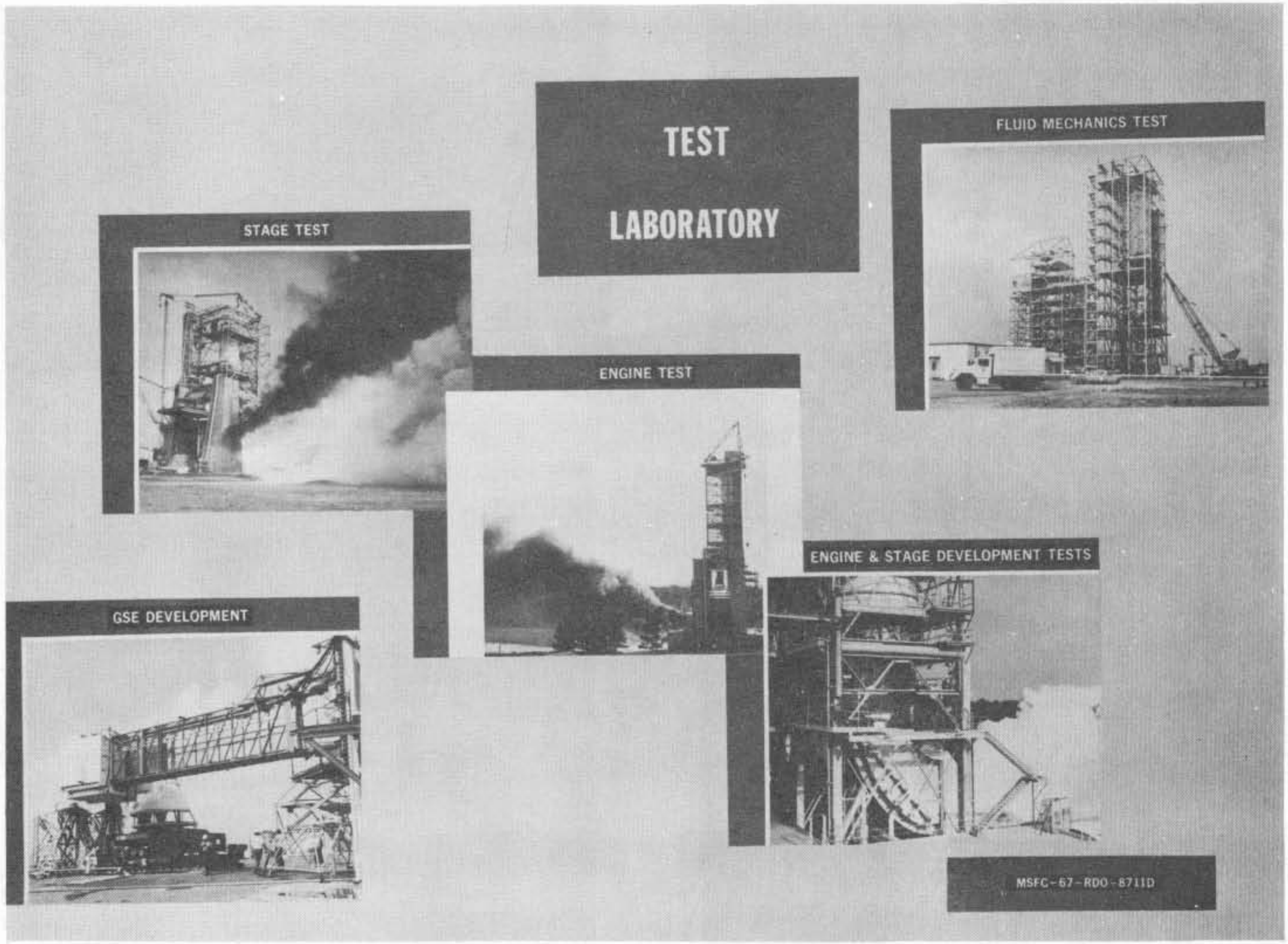
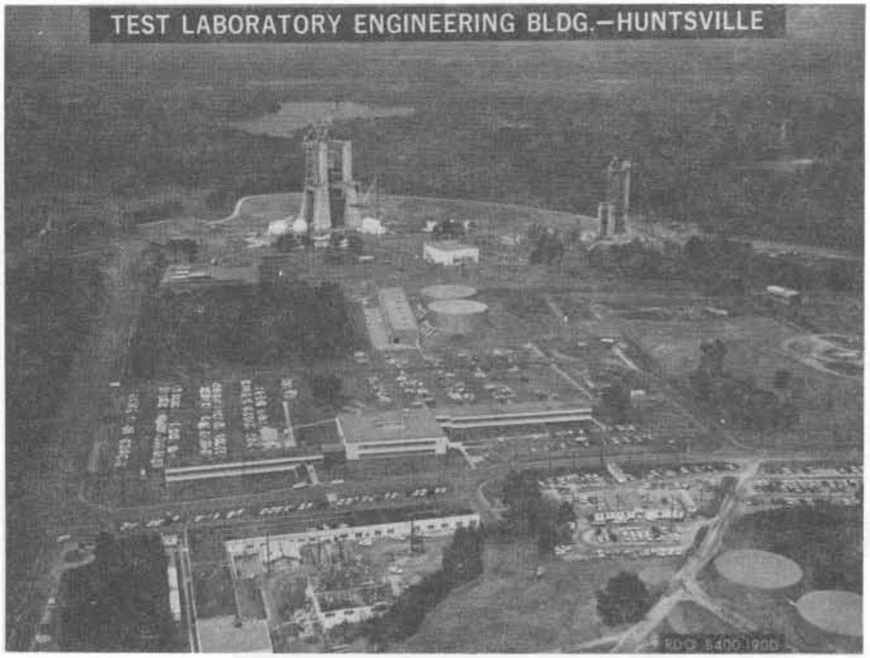
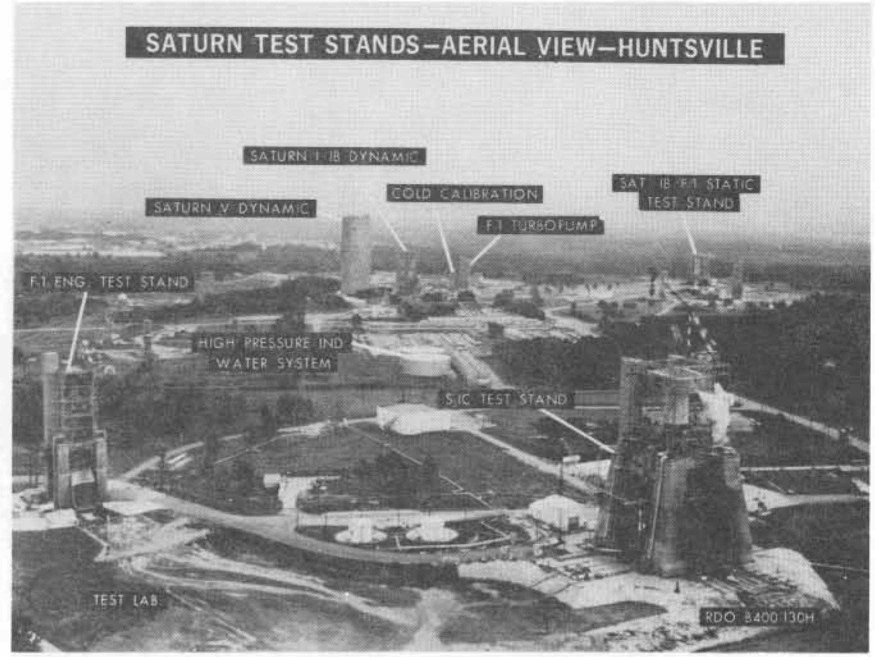
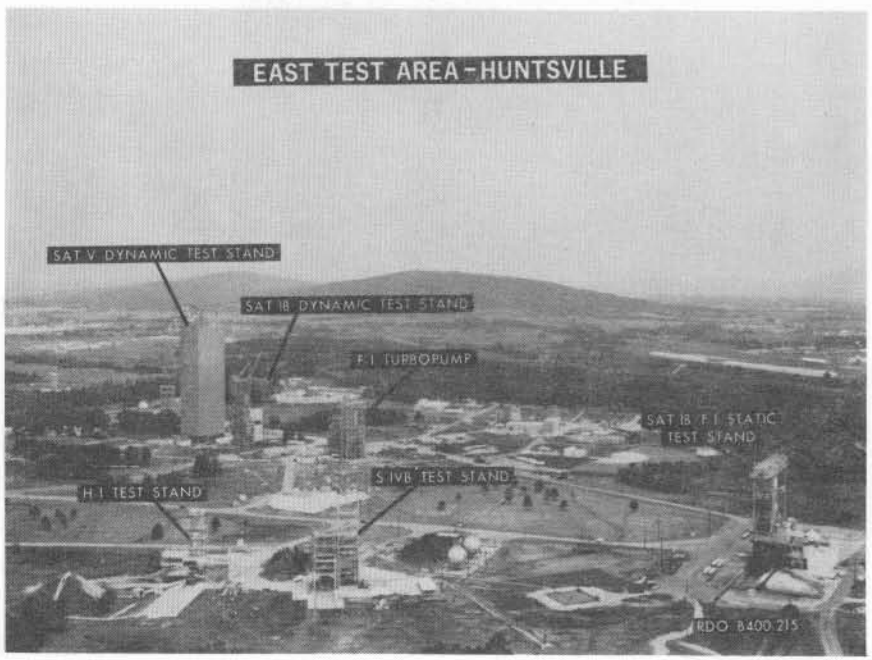

TEST
LABORATORY
STAGE TEST
FLUID MECHANICS TEST
ENGINE TEST
ENGINE & STAGE DEVELOPMENT TESTS
GSE DEVELOPMENT
MSFC-67-RDO-8711D

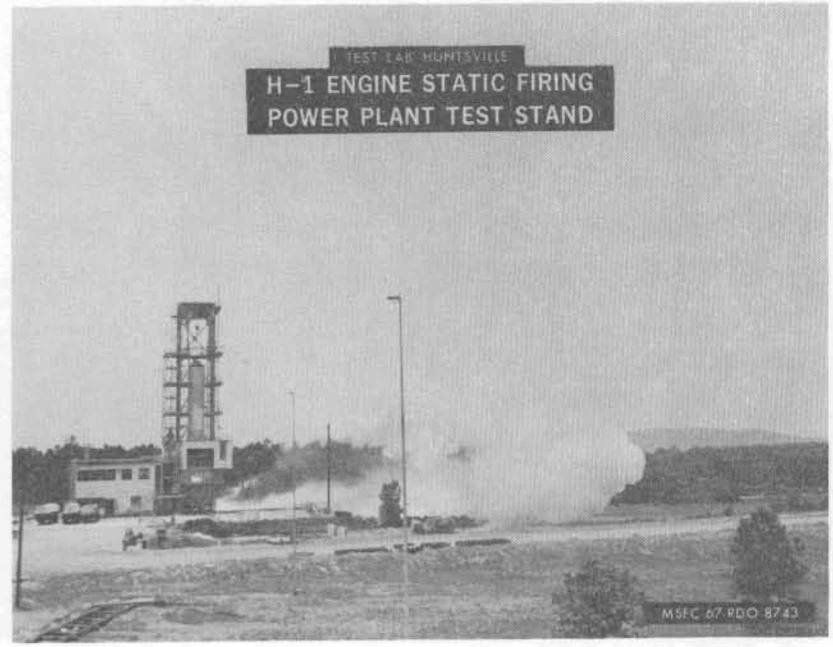

TEST LABORATORY ENGINEERING BLDG.—HUNTSVILLE
RDO 8400-190D

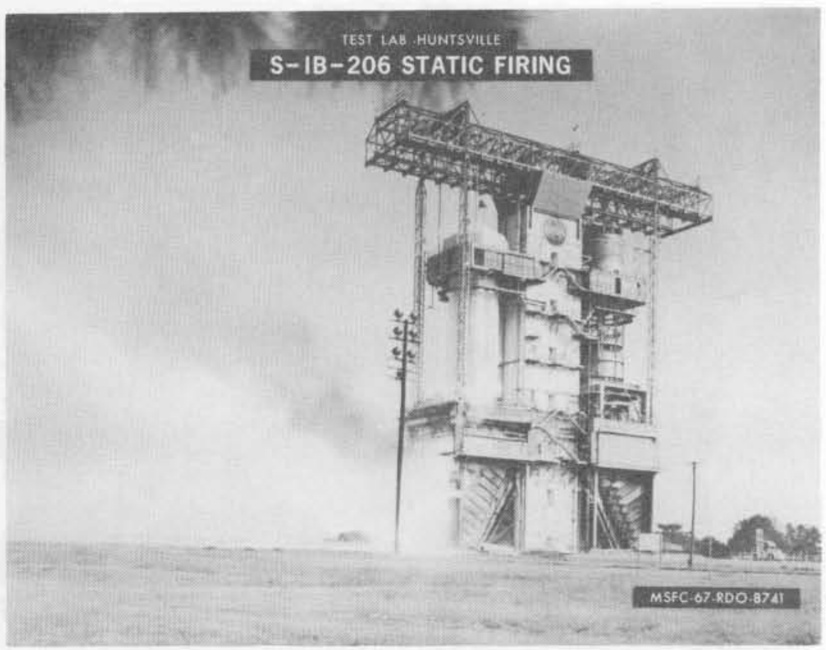

SATURN TEST STANDS—AERIAL VIEW—HUNTSVILLE
SATURN I-IB DYNAMIC
SATURN V DYNAMIC
COLD CALIBRATION
SAT IB F-1 STATIC TEST STAND
F-1 TURBOPUMP
F-1 ENG. TEST STAND
HIGH PRESSURE IND WATER SYSTEM
S-IC TEST STAND
TEST LAB
RDO 8400-130H

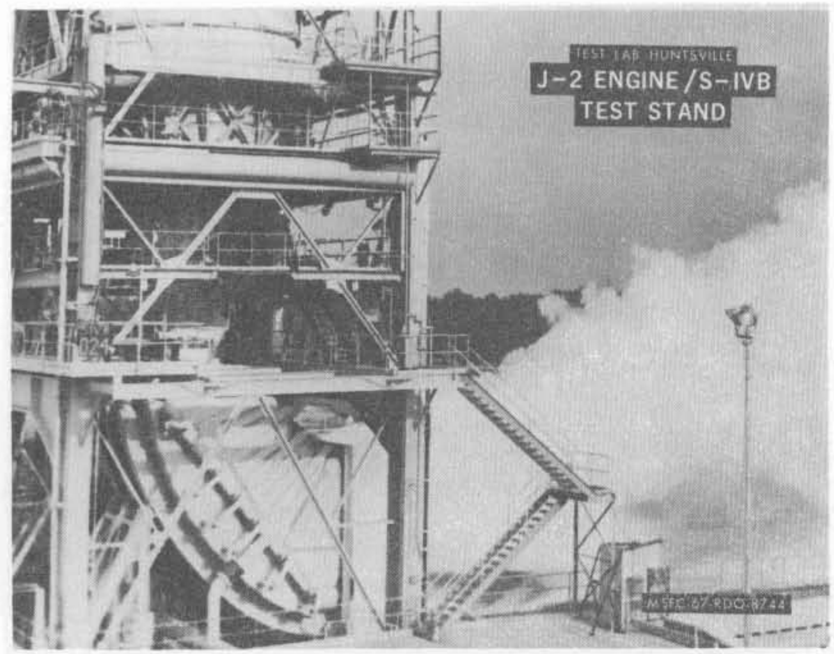

EAST TEST AREA-HUNTSVILLE
SAT V DYNAMIC TEST STAND
SAT IB DYNAMIC TEST STAND
F-1 TURBOPUMP
SAT IB F-1 STATIC TEST STAND
S-IVB TEST STAND
H-1 TEST STAND
RDO 8400-215

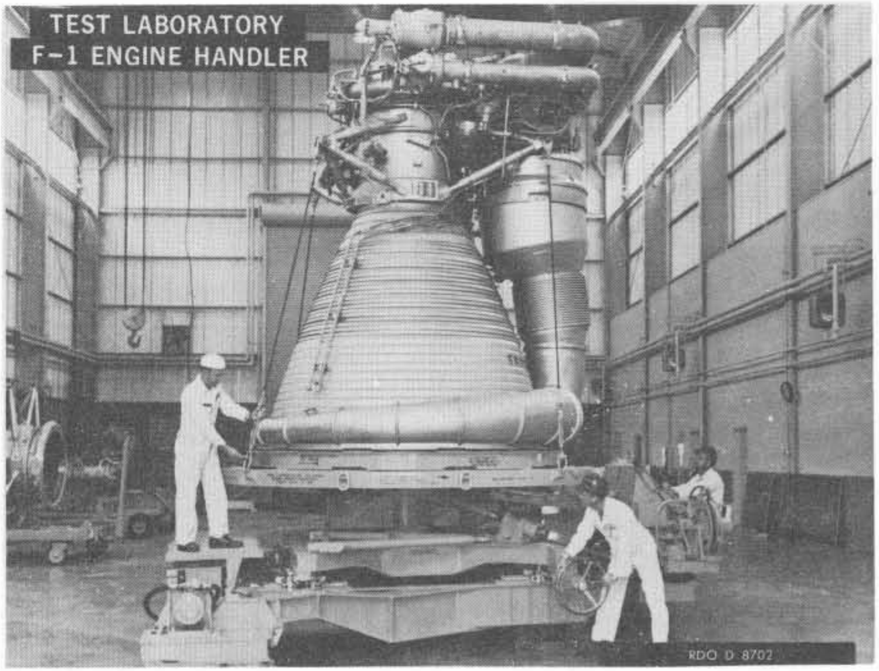

WEST TEST AREA—HUNTSVILLE
S-IC TEST STAND
F-1 ENGINE TEST STAND
WEST BLOCKHOUSE
RDO 8400-216

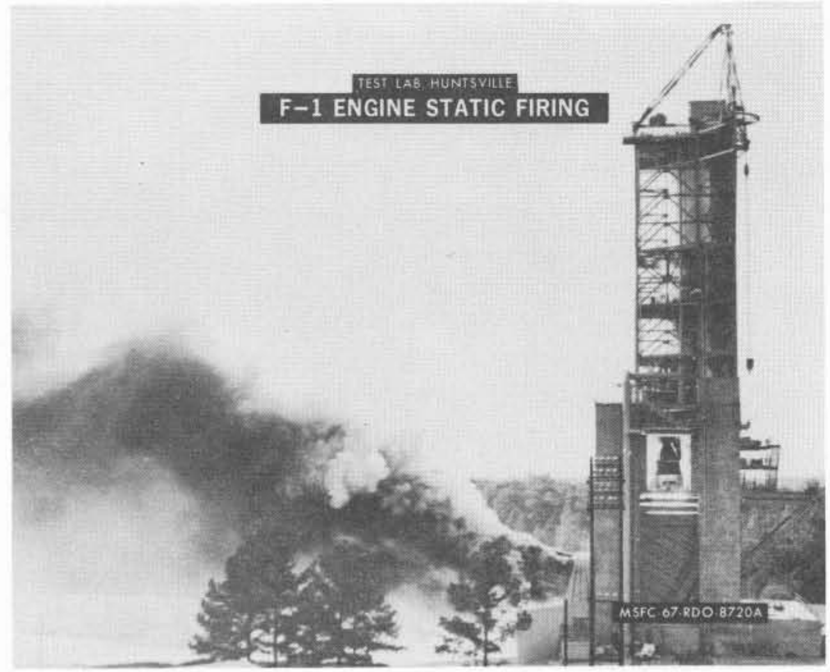

TEST LAB HUNTSVILLE
S-IC-T STATIC FIRING
MSFC-67-RDO-8742

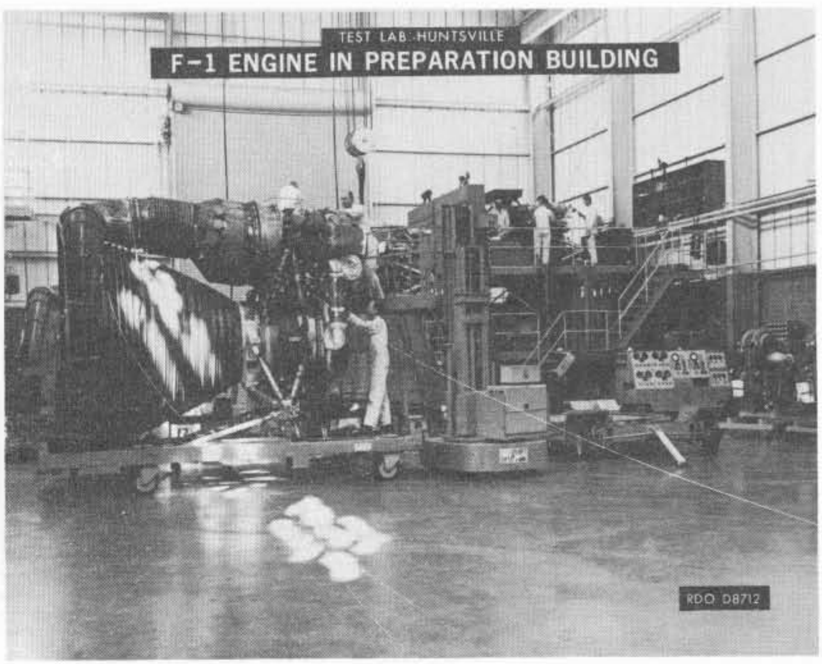

TEST LAB HUNTSVILLE
H-1 ENGINE STATIC FIRING
POWER PLANT TEST STAND
MSFC-67-RDO-8743

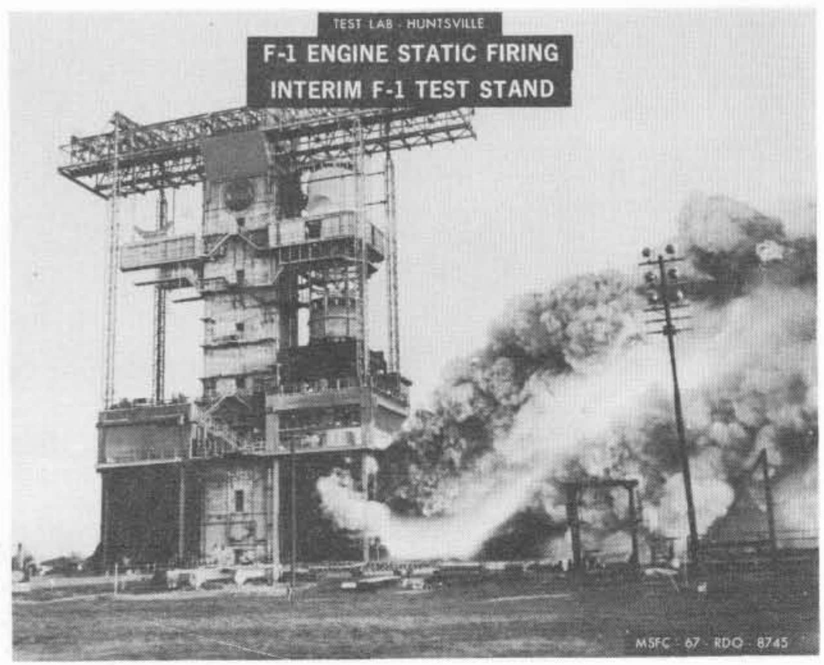

TEST LAB HUNTSVILLE
S-IB-206 STATIC FIRING
MSFC-67-RDO-8741


TEST LAB HUNTSVILLE
J-2 ENGINE/S-IVB
TEST STAND
MSFC-67-RDO-8744

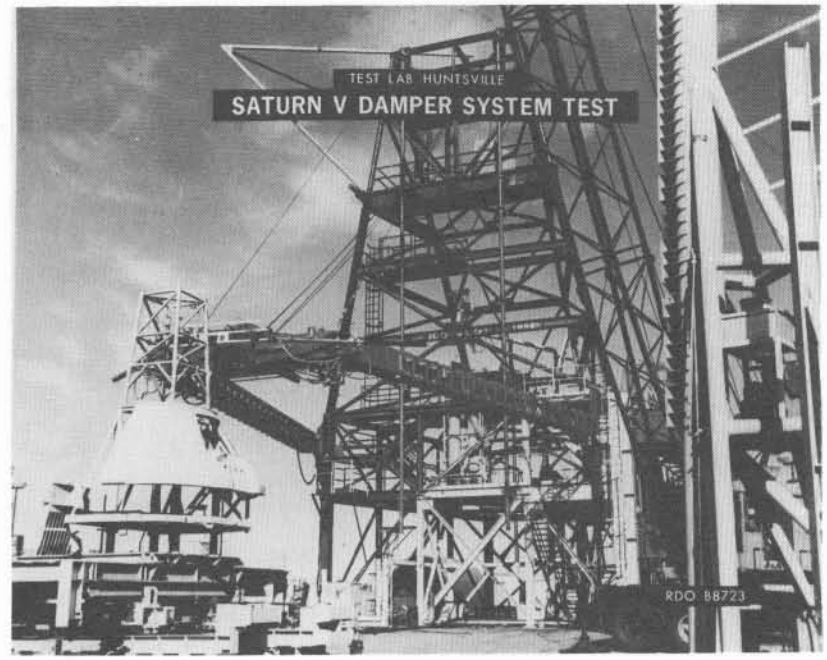

TEST LABORATORY
F-1 ENGINE HANDLER
RDO D 8702

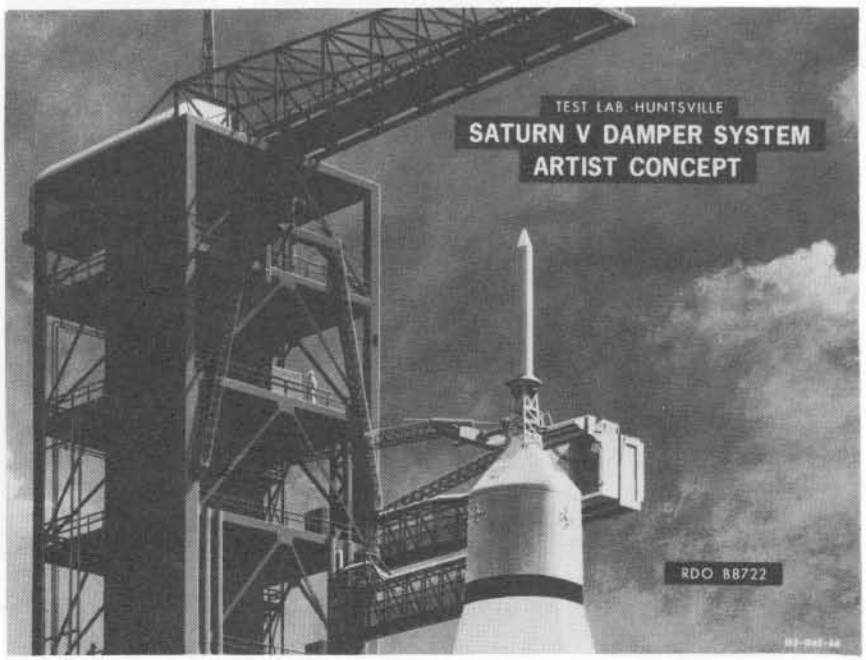

TEST LAB. HUNTSVILLE
F-1 ENGINE STATIC FIRING
MSFC 67-RDO-8720A

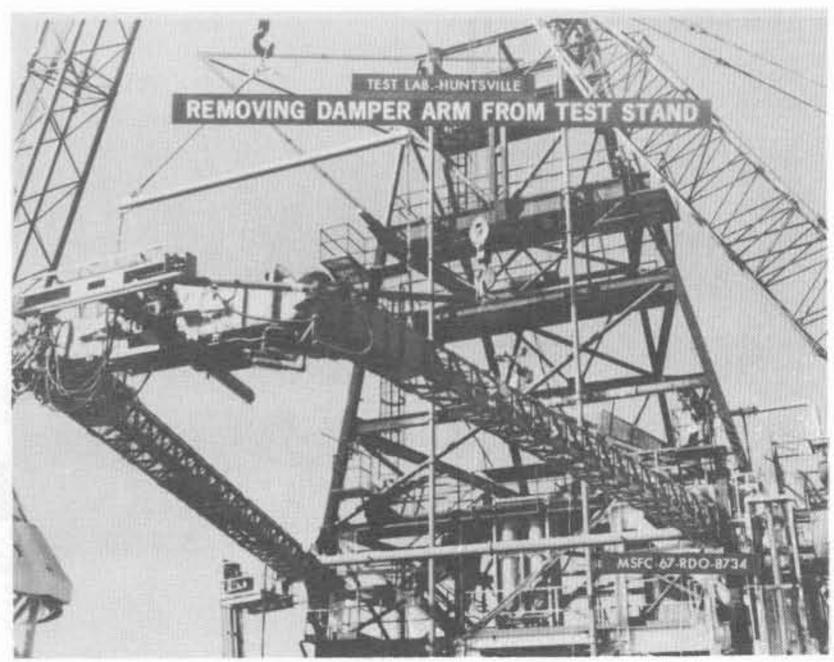

TEST LAB. HUNTSVILLE
F-1 ENGINE IN PREPARATION BUILDING
RDO D8712


TEST LAB - HUNTSVILLE
F-1 ENGINE STATIC FIRING
INTERIM F-1 TEST STAND
MSFC - 67 - RDO - 8745

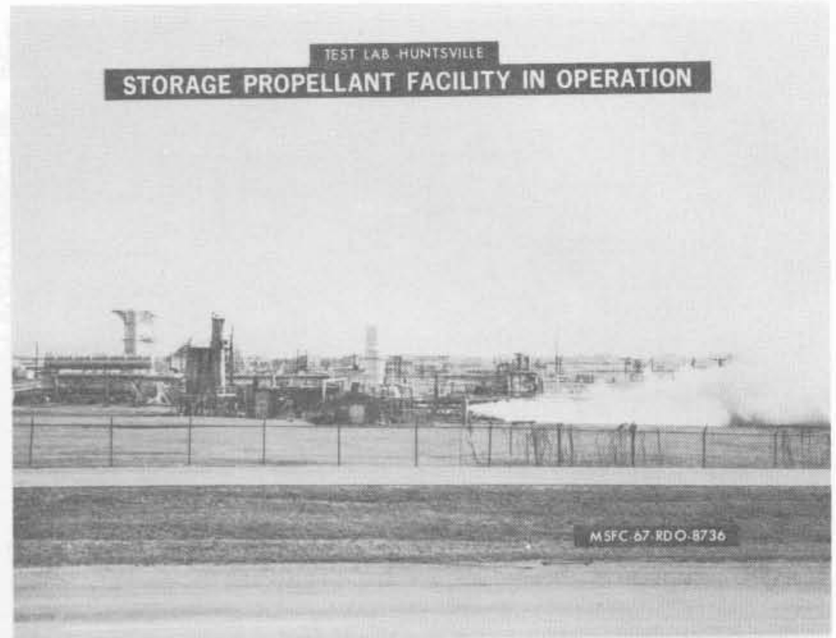

SATURN V GSE TEST FACILITY
HUNTSVILLE
11/65 RDO 8400-107N

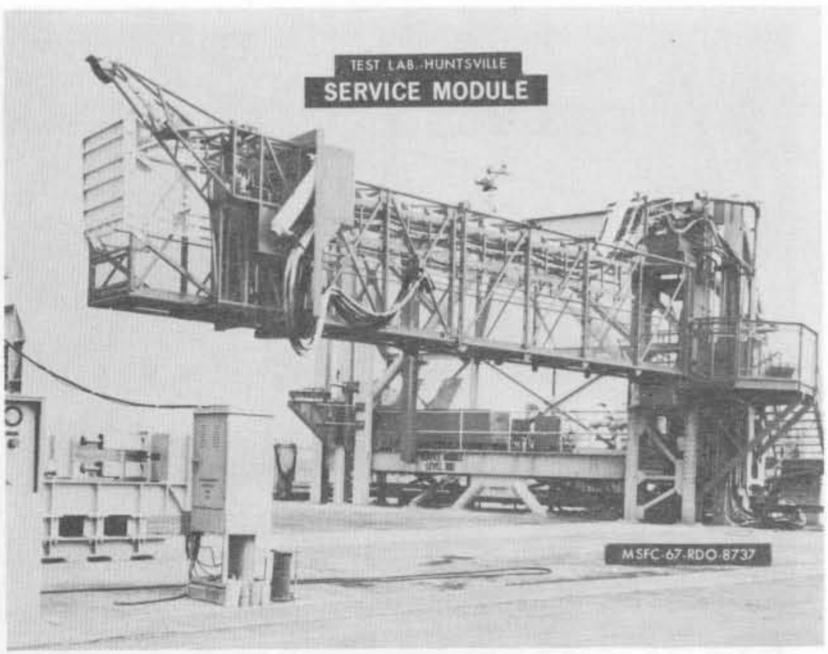

TEST LAB HUNTSVILLE
SATURN V DAMPER SYSTEM TEST
RDO 88723

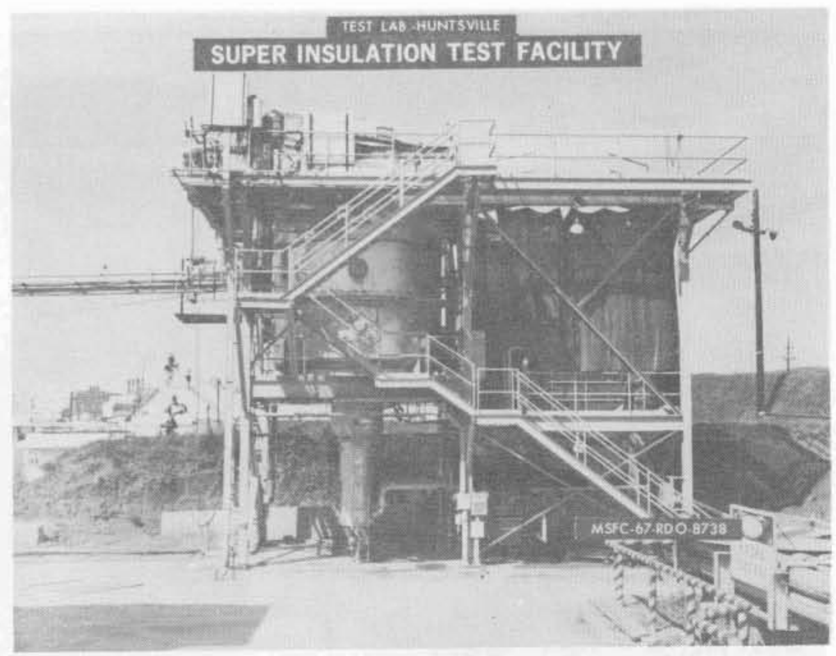

TEST LAB. HUNTSVILLE
SATURN V DAMPER SYSTEM
ARTIST CONCEPT
RDO 88722

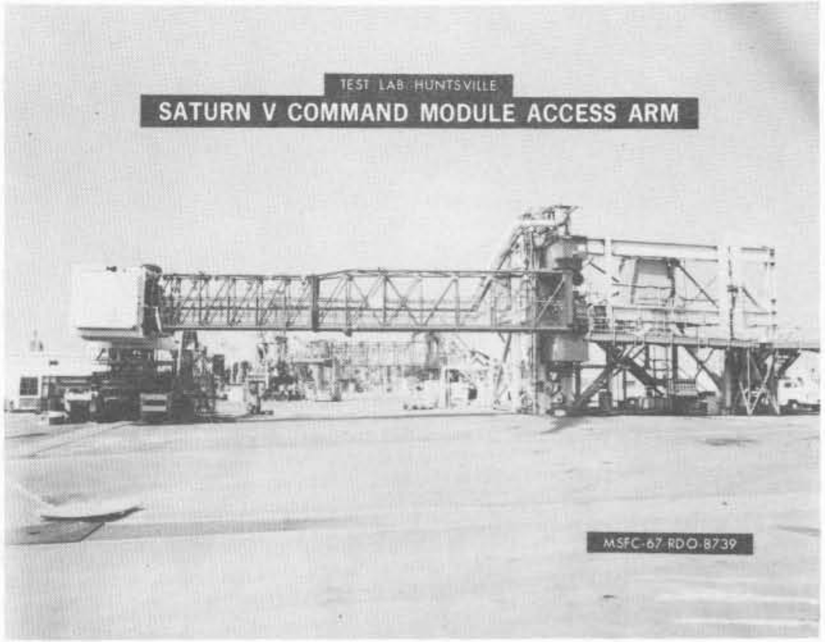

TEST LAB. HUNTSVILLE
REMOVING DAMPER ARM FROM TEST STAND
MSFC 67-RDO-8734

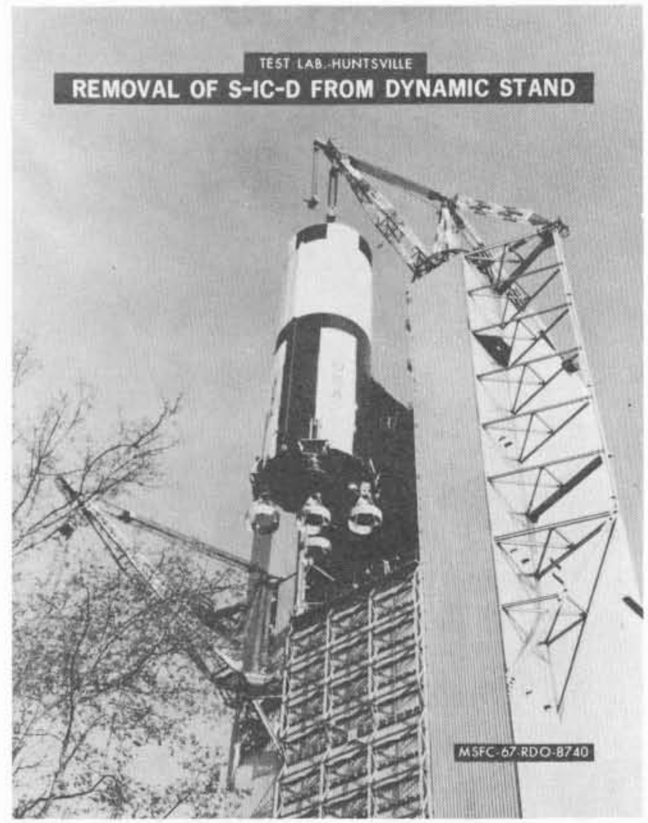

TEST LAB HUNTSVILLE
TURBO PUMP FIRING
MSFC-67-RDO-8735

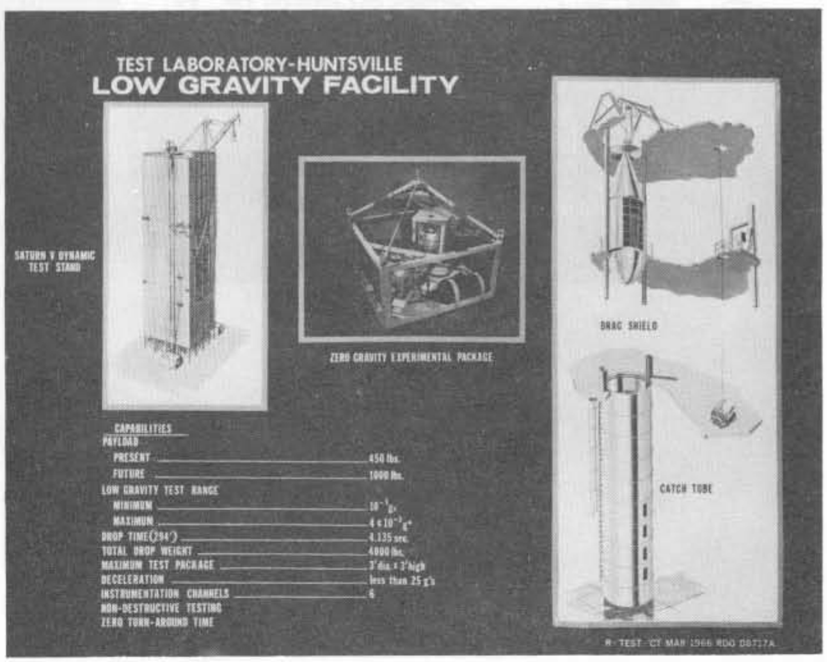

TEST LAB HUNTSVILLE
STORAGE PROPELLANT FACILITY IN OPERATION
MSFC-67-RDO-8736

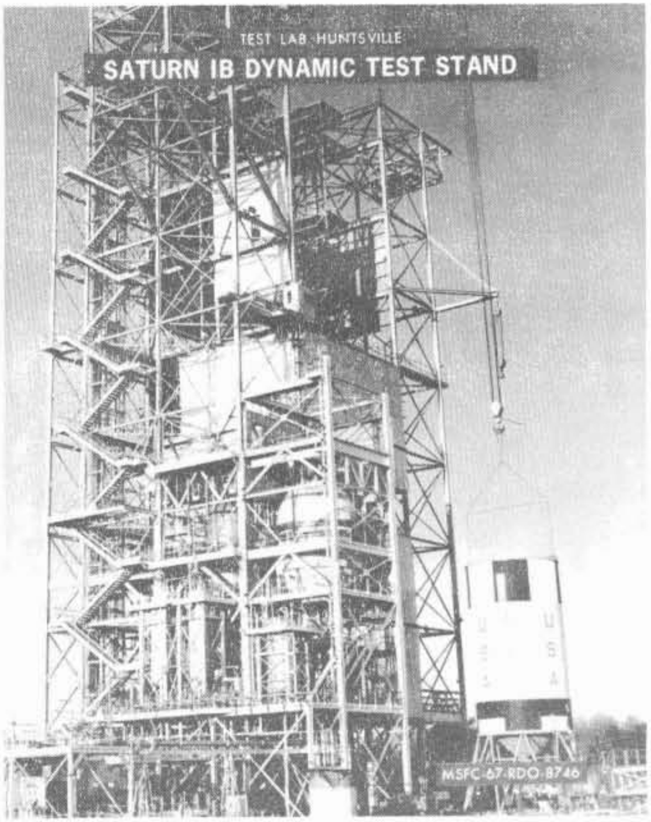

TEST LAB.-HUNTSVILLE
SERVICE MODULE
MSFC-67-RDO-8737

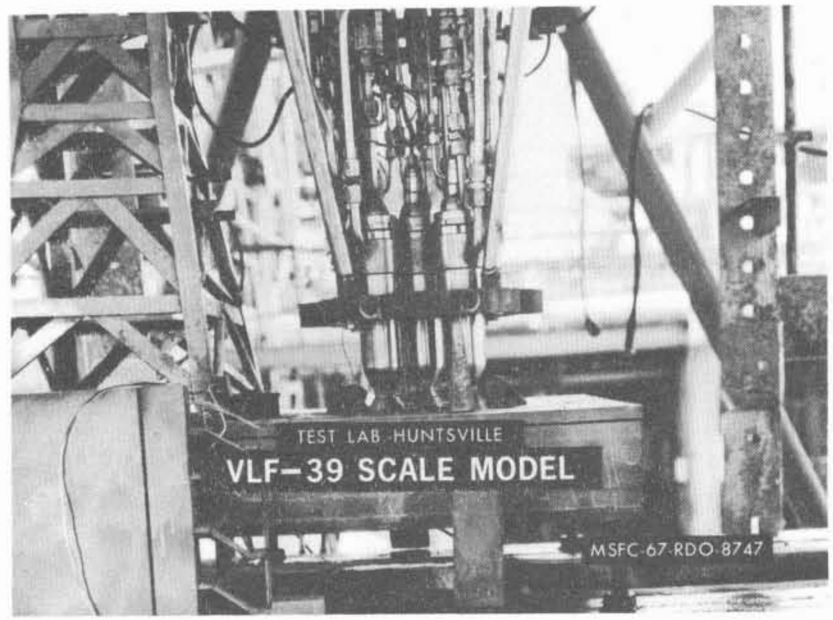

TEST LAB.-HUNTSVILLE
SUPER INSULATION TEST FACILITY
MSFC-67-RDO-8738


TEST LAB HUNTSVILLE
SATURN V COMMAND MODULE ACCESS ARM
MSFC-67-RDO-8739

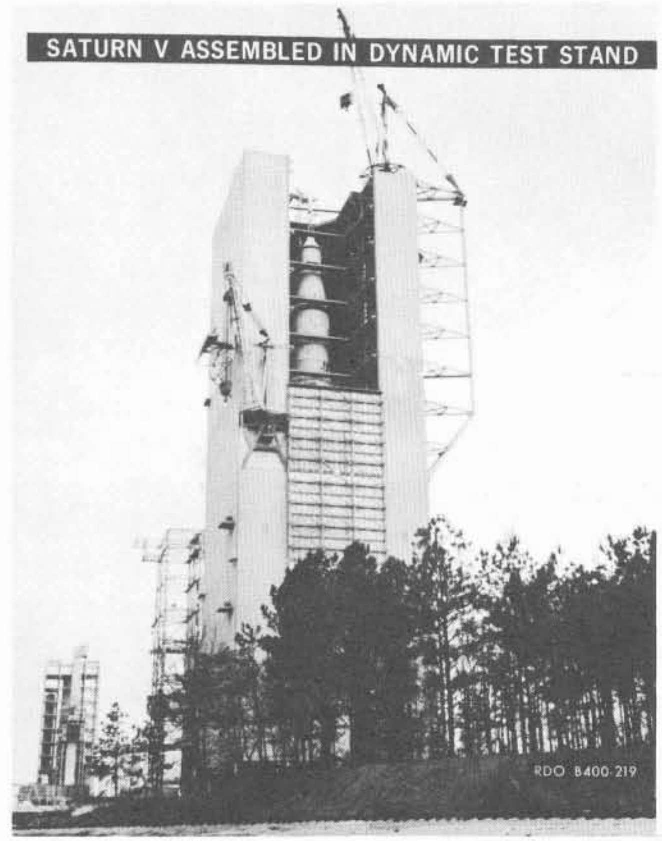

TEST LAB.-HUNTSVILLE
REMOVAL OF S-IC-D FROM DYNAMIC STAND
MSFC-67-RDO-8740


TEST LABORATORY-HUNTSVILLE
LOW GRAVITY FACILITY
SATURN V DYNAMIC TEST STAND
ZERO GRAVITY EXPERIMENTAL PACKAGE
DRAG SHIELD
CATCH TUBE
CAPABILITIES
PAYLOAD
PRESENT 450 lbs.
FUTURE 1000 lbs.
LOW GRAVITY TEST RANGE
MINIMUM
MAXIMUM
DROP TIME (294') 4.135 sec.
TOTAL DROP WEIGHT 4000 lbs.
MAXIMUM TEST PACKAGE 3' dia. x 3' high
DECELERATION less than 25 g's
INSTRUMENTATION CHANNELS 6
NON-DESTRUCTIVE TESTING
ZERO TURN-AROUND TIME


TEST LAB HUNTSVILLE
SATURN IB DYNAMIC TEST STAND
MSFC-67-RDO-8746


TEST LAB HUNTSVILLE
VLF-39 SCALE MODEL
MSFC-67-RDO-8747

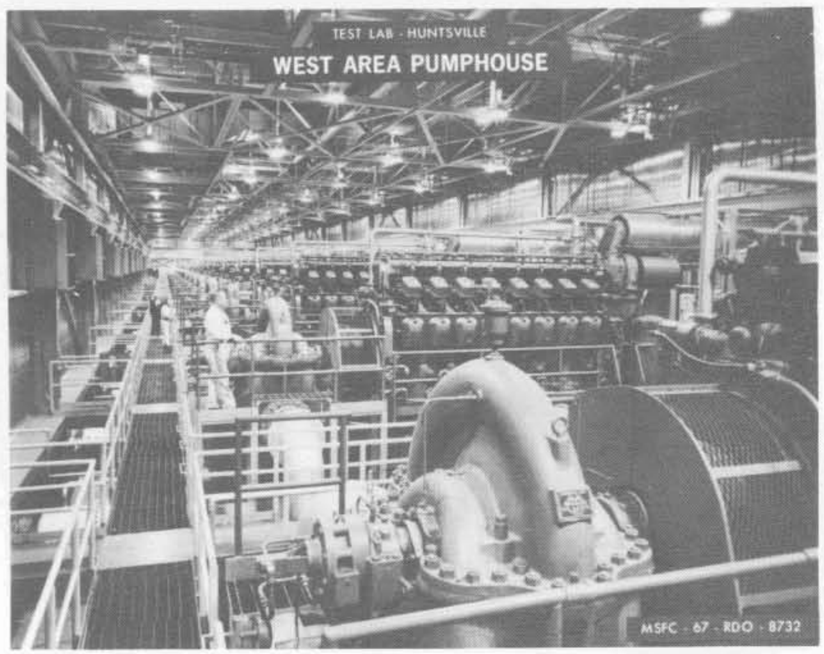

TEST LABORATORY
OVERWATER LAUNCH TEST — HUNTSVILLE
RDO D8706


SATURN V ASSEMBLED IN DYNAMIC TEST STAND
RDO B400-219

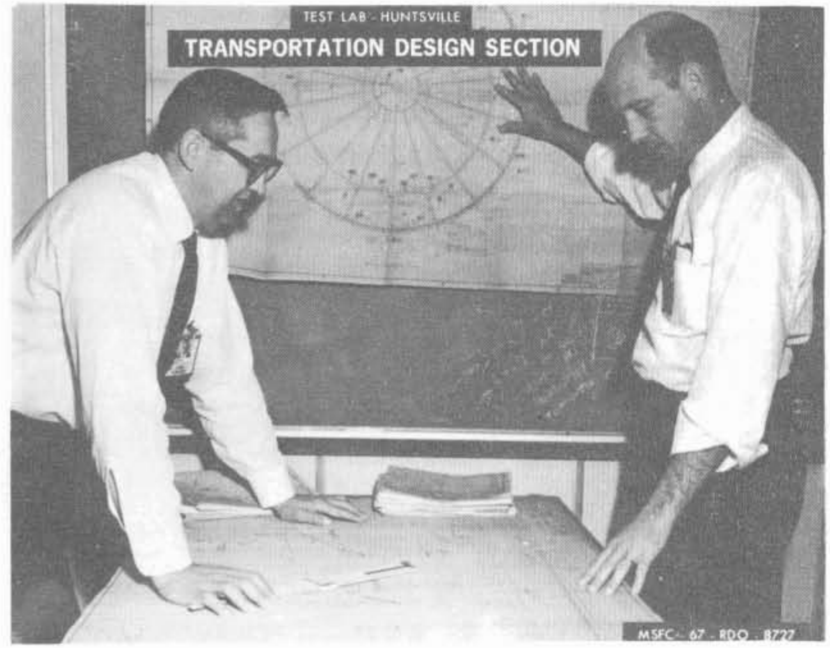

TEST LAB - HUNTSVILLE
MACHINE SHOP, BLDG. 4650
MSFC - 67 - RDO - 8728


TEST LAB - HUNTSVILLE
AIR COMPRESSOR FACILITY, BLDG. 4647
MSFC - 67 - RDO - 8733

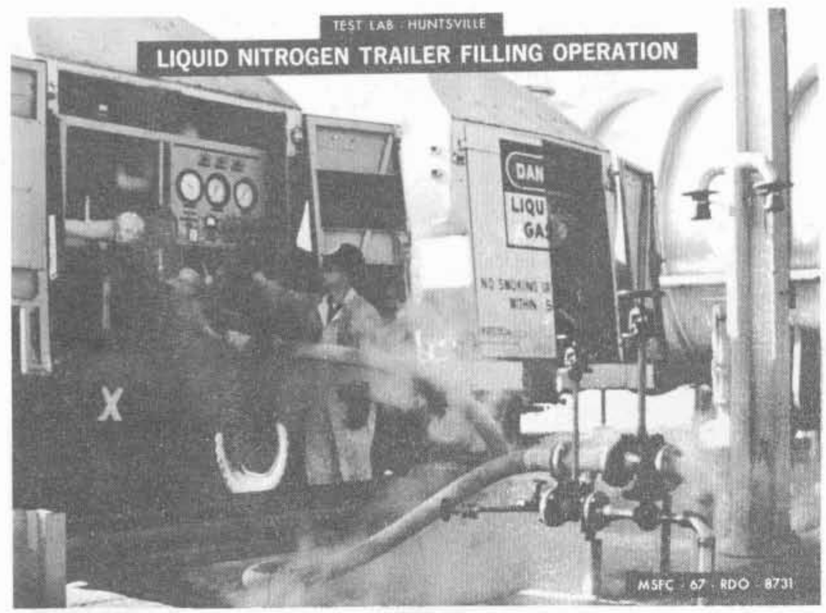

TEST LAB - HUNTSVILLE
AIR COMPRESSOR STATION, BLDG. 4747
MSFC - 67 - RDO - 8730

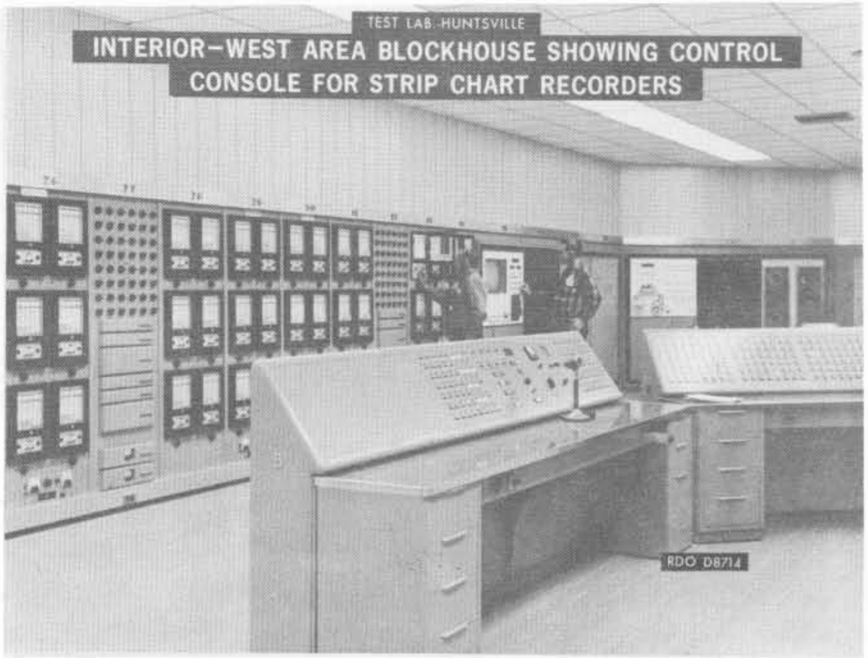

TEST LAB - HUNTSVILLE
WEST AREA PUMPHOUSE
MSFC - 67 - RDO - 8732

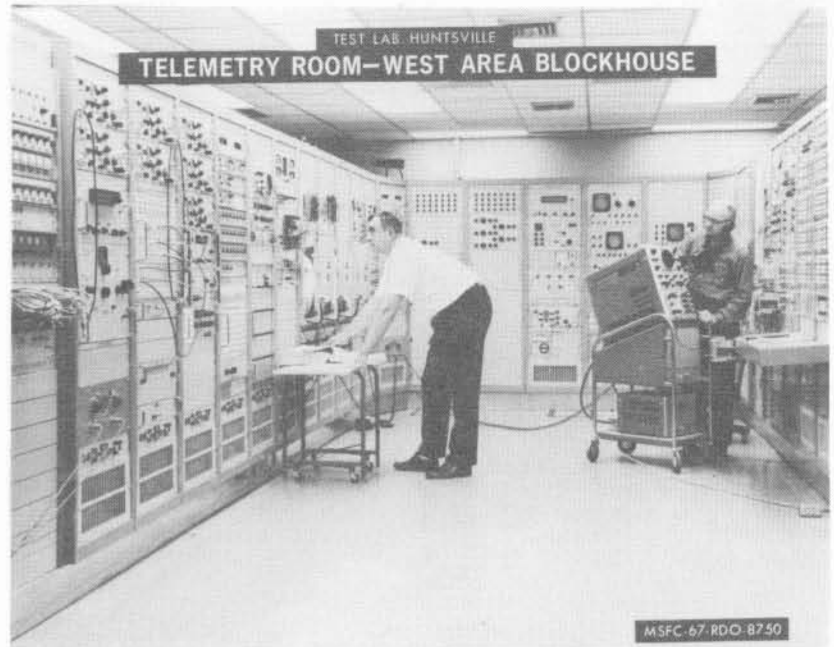

TEST LAB · HUNTSVILLE
PIPING DESIGN SECTION
MSFC · 67 · RDO · 8729

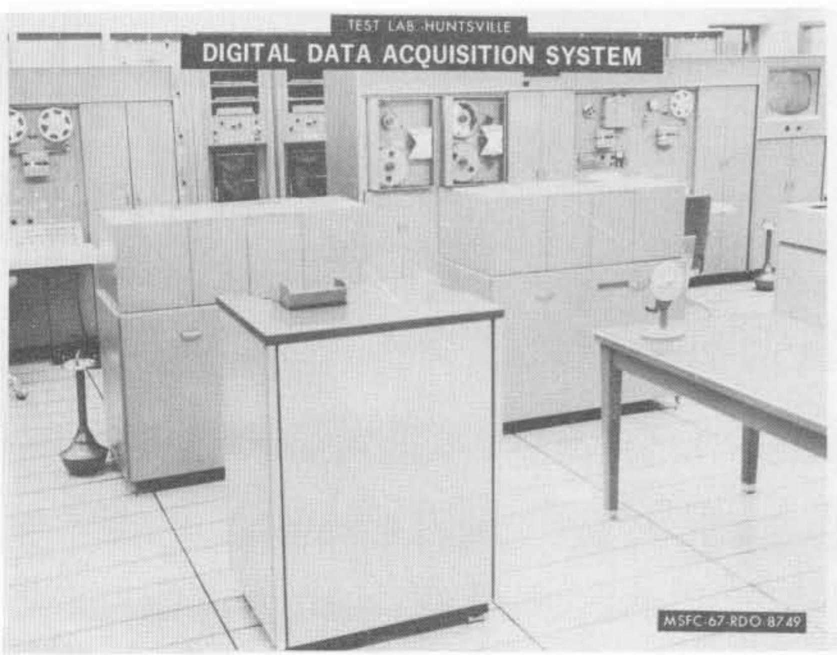

TEST LAB · HUNTSVILLE
TRANSPORTATION DESIGN SECTION
MSFC · 67 · RDO · 8727

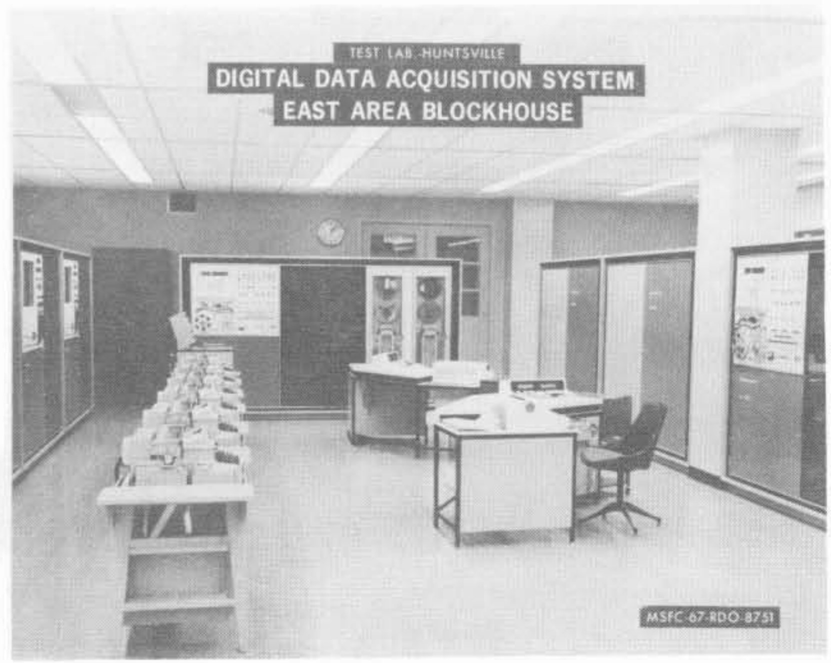

TEST LAB · HUNTSVILLE
FUEL TRANSFER, S-IVB TEST STAND
MSFC · 67 · RDO · 8725


TEST LAB · HUNTSVILLE
LIQUID NITROGEN TRAILER FILLING OPERATION
MSFC · 67 · RDO · 8731


TEST LAB-HUNTSVILLE
INTERIOR—WEST AREA BLOCKHOUSE SHOWING CONTROL CONSOLE FOR STRIP CHART RECORDERS
RDO D8714

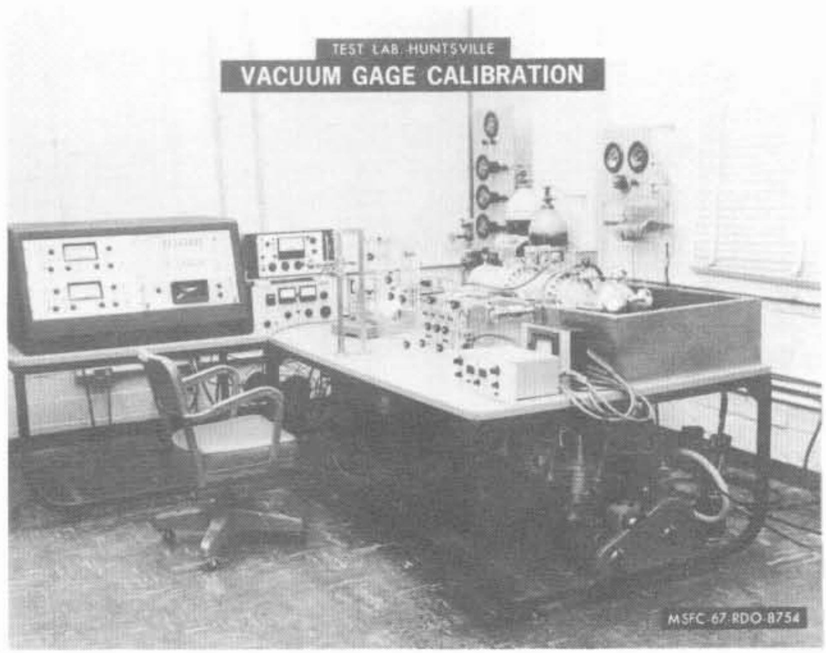

TEST LAB HUNTSVILLE
TELEMETRY ROOM—WEST AREA BLOCKHOUSE
MSFC-67-RDO-8750


TEST LAB-HUNTSVILLE
DIGITAL DATA ACQUISITION SYSTEM
MSFC-67-RDO-8749

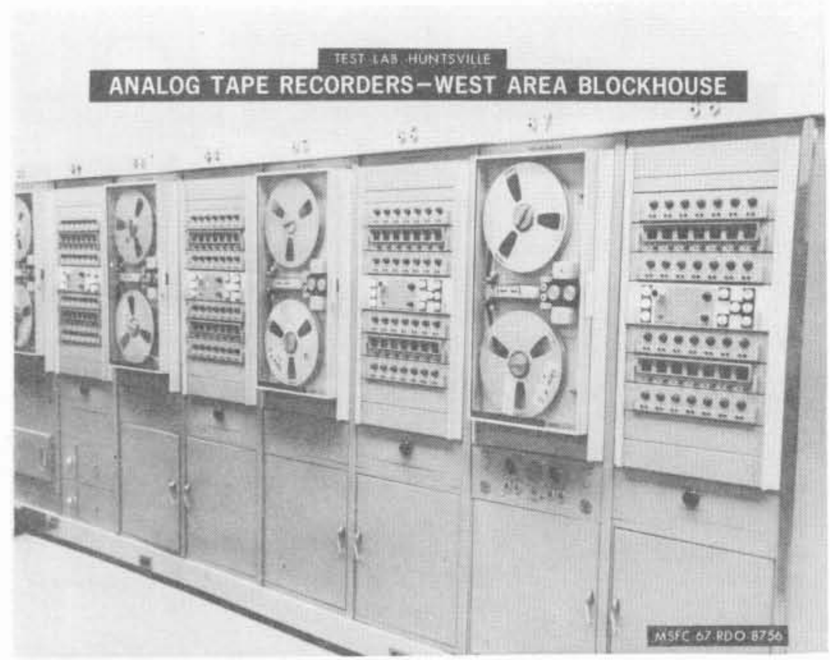

TEST LAB-HUNTSVILLE
DIGITAL DATA ACQUISITION SYSTEM
EAST AREA BLOCKHOUSE
MSFC-67-RDO-8751

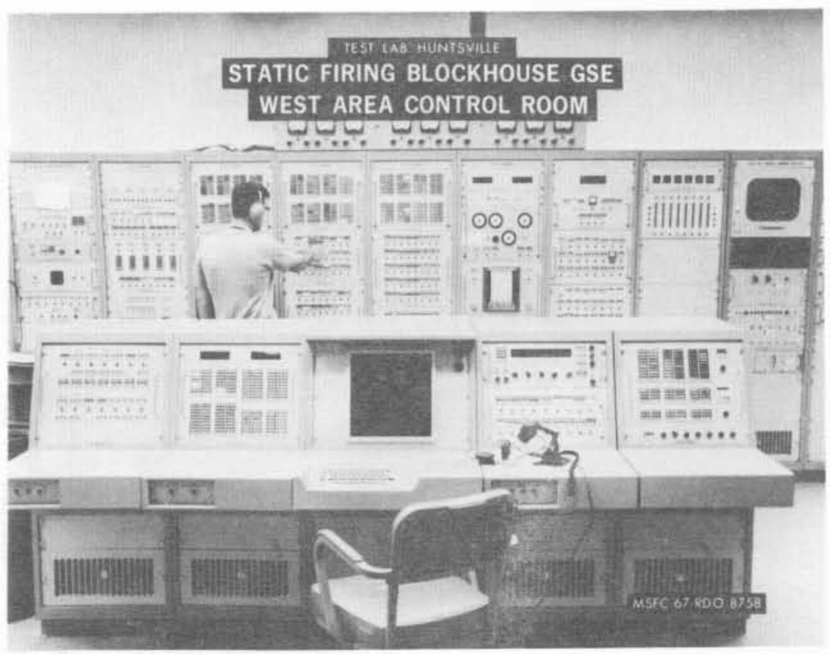

TEST LAB HUNTSVILLE
AUTOMATIC PRESSURE TRANSDUCER CALIBRATION SYSTEM
MSFC-67-RDO-8752

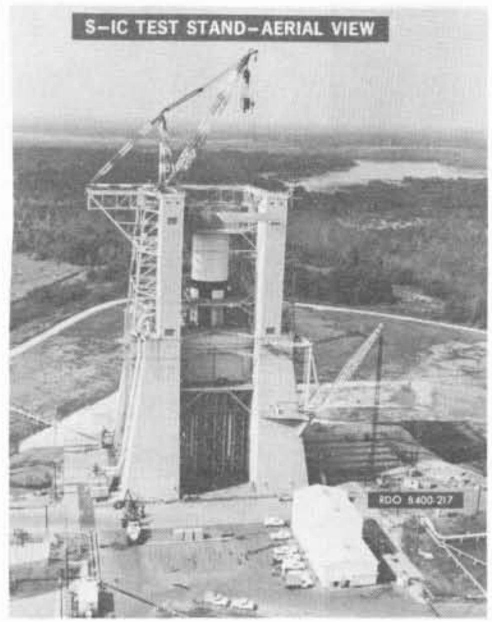

TEST LAB HUNTSVILLE
ACCELEROMETER CALIBRATOR
MSFC-67-RDO-8753


TEST LAB HUNTSVILLE
VACUUM GAGE CALIBRATION
MSFC-67-RDO-8754

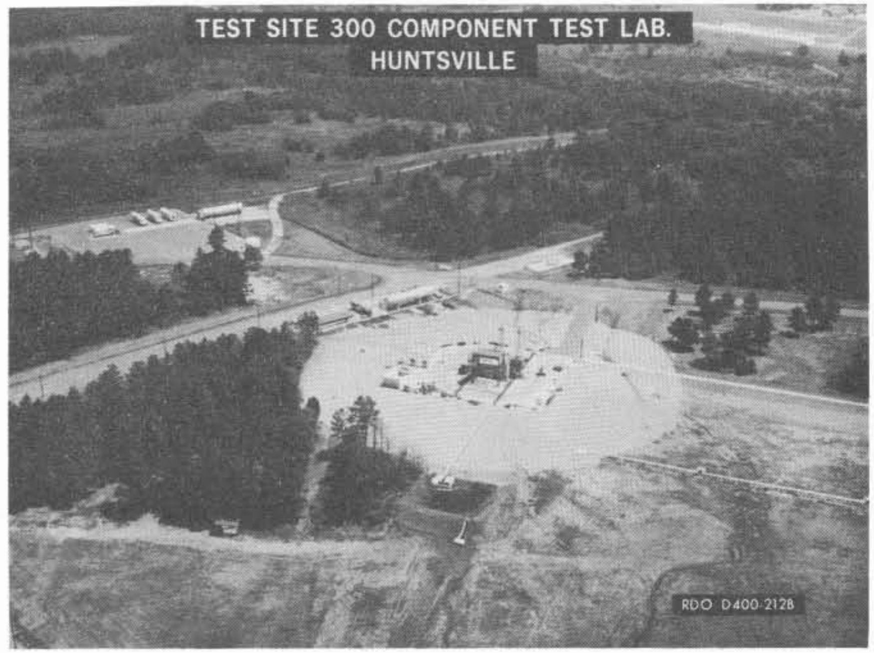

TEST LAB HUNTSVILLE
PROGRAMABLE PATCH BOARDS–WEST AREA CONTROL ROOM
MSFC 67-RDO-8757


TEST LAB HUNTSVILLE
ANALOG TAPE RECORDERS–WEST AREA BLOCKHOUSE
MSFC 67-RDO-8756

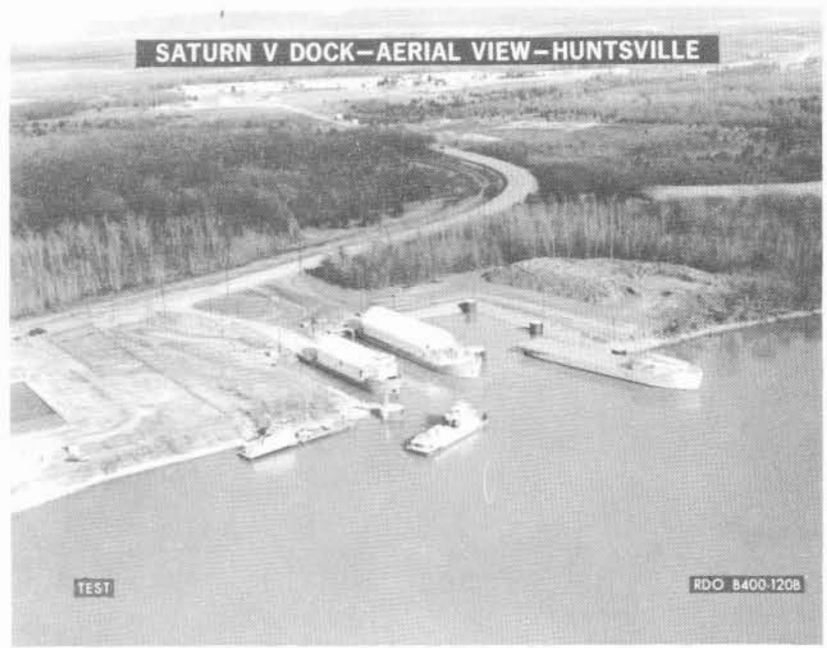

TEST LAB HUNTSVILLE
STATIC FIRING BLOCKHOUSE GSE
WEST AREA CONTROL ROOM
MSFC 67-RDO-8758


S-IC TEST STAND-AERIAL VIEW
RDO 6400-217

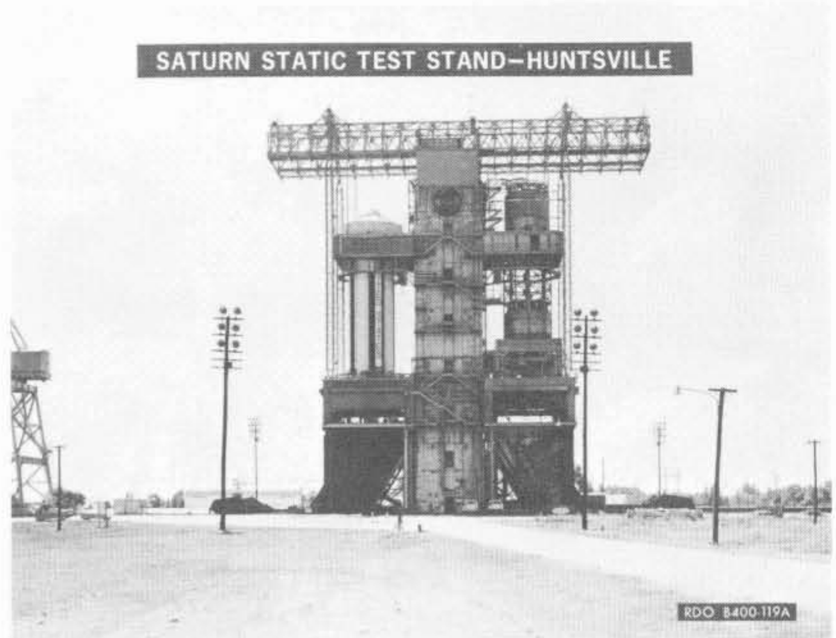

SATURN SUPPORT TEST AREA—HUNTSVILLE
COMPUTATION LAB.
TRANSPORTATION HANGAR
SAT. V SUPPORT BLDG
SAT. V GSE ASSY BLDG
F-1 PREPARATION BLDG
TEST LAB
RDO B400-128C


TEST SITE 300 COMPONENT TEST LAB.
HUNTSVILLE
RDO D400-212B


DUAL POSITION LH_2 TEST STAND—HUNTSVILLE
RDO D400-187-1

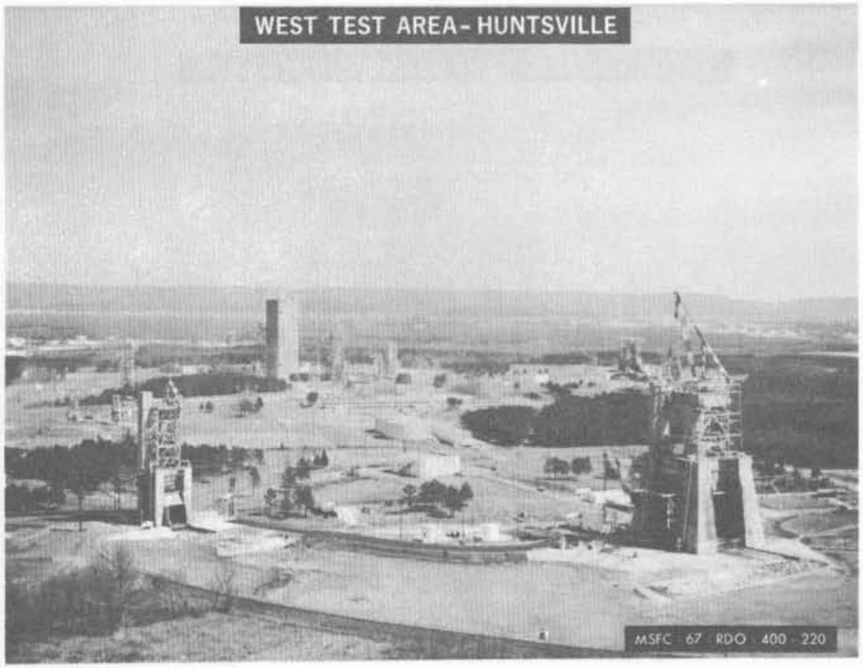

SATURN V DOCK—AERIAL VIEW—HUNTSVILLE
TEST
RDO B400-120B


S-IC DEVELOPMENT TEST
STAND-HUNTSVILLE
RDO 8400-94 G


SATURN STATIC TEST STAND-HUNTSVILLE
RDO 8400-119A

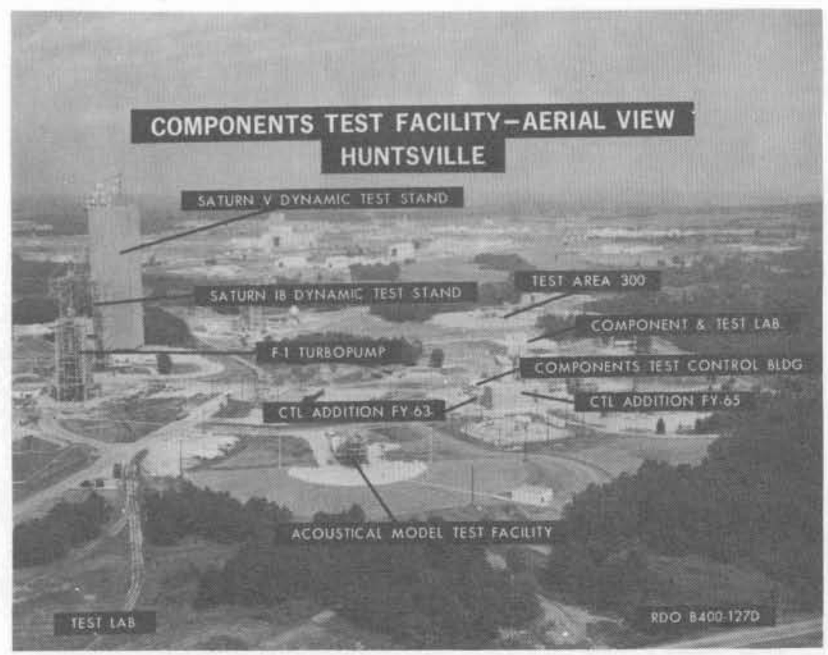

S-IVB/J-2 TEST STAND
HUNTSVILLE
RDO 8445 1

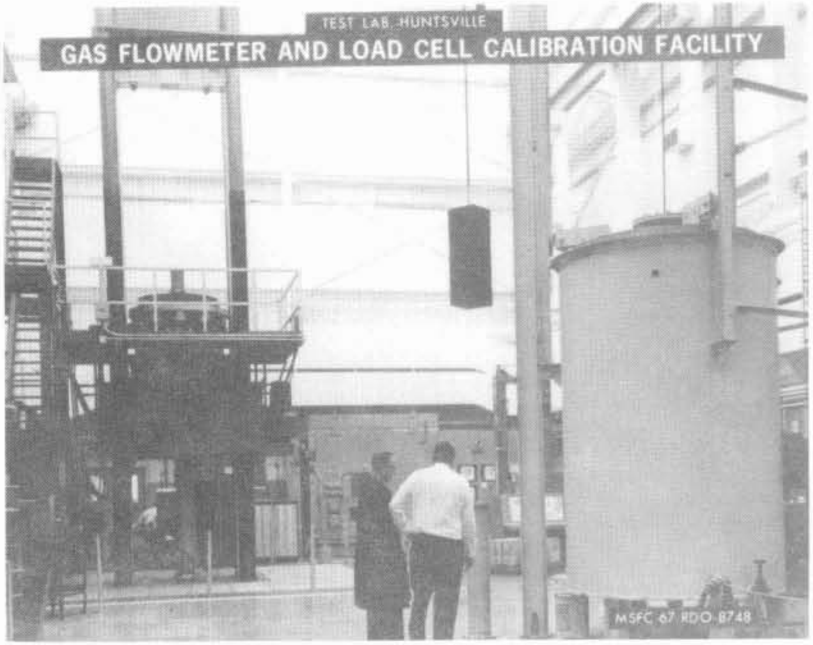

F-1 ENGINE SYSTEMS TEST
STAND-HUNTSVILLE
RDO 8400-95 G

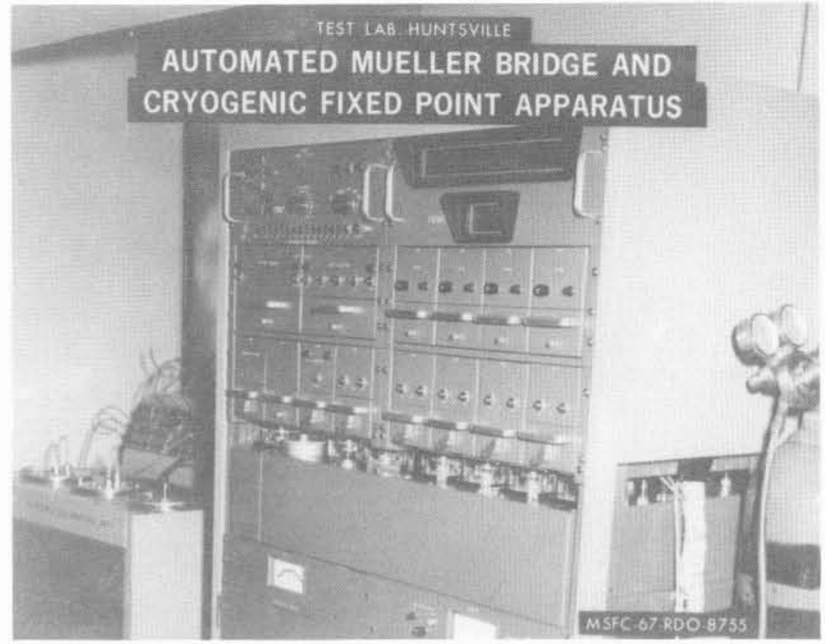

WEST TEST AREA - HUNTSVILLE
MSFC 67 RDO 400 220

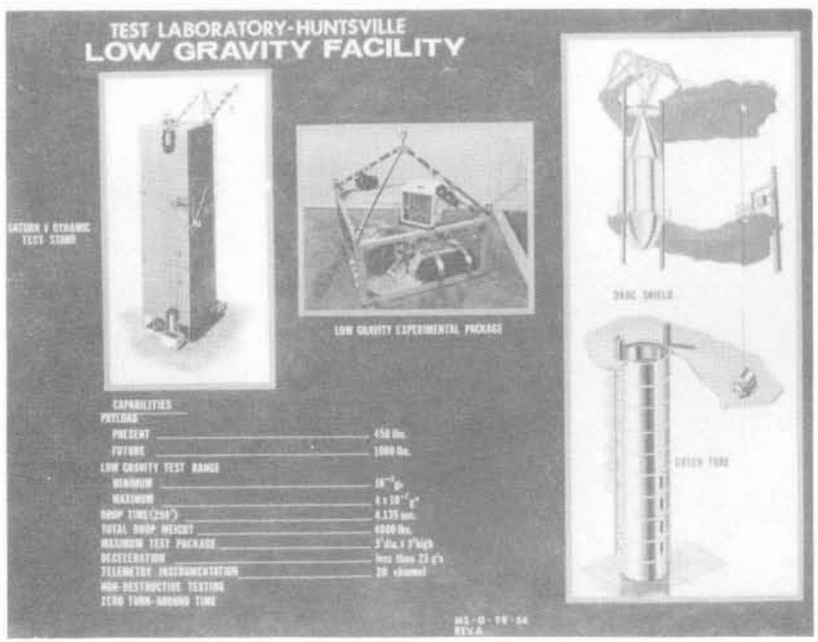

EAST TEST AREA - HUNTSVILLE
MSFC 67 RDO 400 221


SATURN DYNAMIC TEST STANDS - HUNTSVILLE
SAT V
SAT IB
F-1 TURBOPUMP
COLD CALIBRATION
RDO B432-N


COMPONENTS TEST FACILITY—AERIAL VIEW
HUNTSVILLE
SATURN V DYNAMIC TEST STAND
SATURN IB DYNAMIC TEST STAND
TEST AREA 300
COMPONENT & TEST LAB
F-1 TURBOPUMP
COMPONENTS TEST CONTROL BLDG
CTL ADDITION FY-63
CTL ADDITION FY-65
ACOUSTICAL MODEL TEST FACILITY
TEST LAB
RDO B400-127D


TEST LAB. HUNTSVILLE
GAS FLOWMETER AND LOAD CELL CALIBRATION FACILITY
MSFC-67-RDO-8748


TEST LAB. HUNTSVILLE
AUTOMATED MUELLER BRIDGE AND
CRYOGENIC FIXED POINT APPARATUS
MSFC-67-RDO-8755


TEST LABORATORY-HUNTSVILLE
LOW GRAVITY FACILITY
SATURN V DYNAMIC TEST STAND
LOW GRAVITY EXPERIMENTAL PACKAGE
DRAG SHIELD
CAPABILITIES
PAYLOAD
PRESENT 450 lbs.
FUTURE 1000 lbs.
LOW GRAVITY TEST RANGE
MINIMUM
MAXIMUM
DROP TIME 4.135 sec.
TOTAL DROP WEIGHT 6000 lbs.
MAXIMUM TEST PACKAGE
DECELERATION less than 25 g's
TELEMETRY INSTRUMENTATION 20 channel
NON-DESTRUCTIVE TESTING
ZERO TURN-AROUND TIME
REV A

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MARSHALL SPACE FLIGHT CENTER FACILITIES

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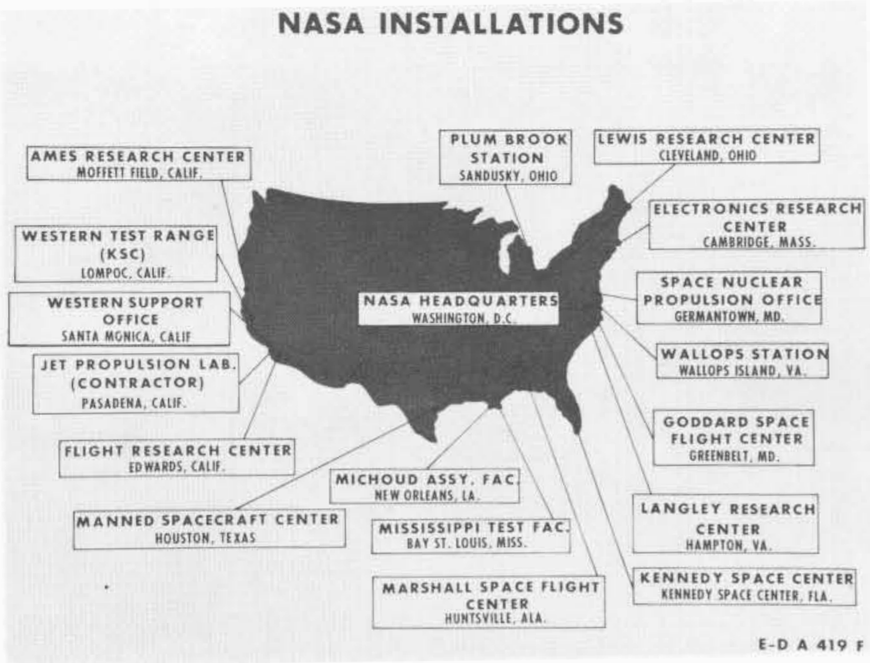
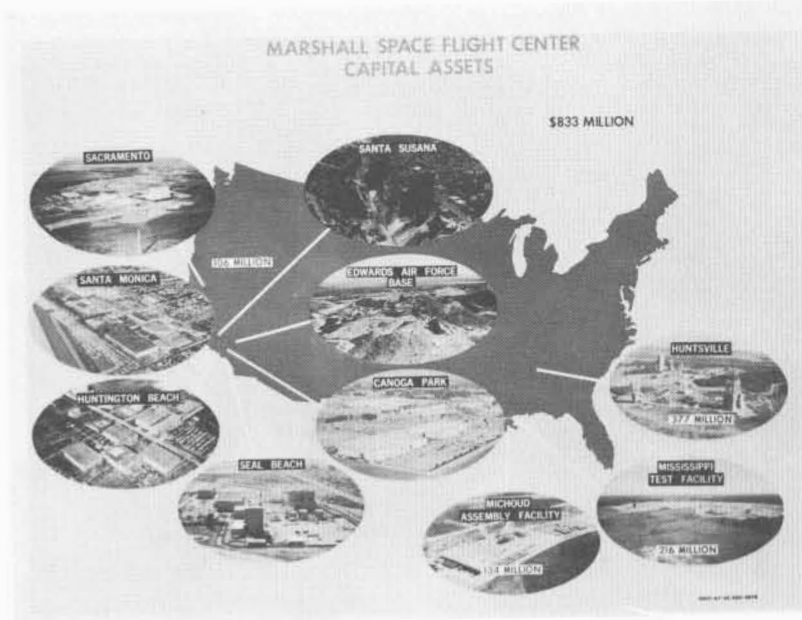
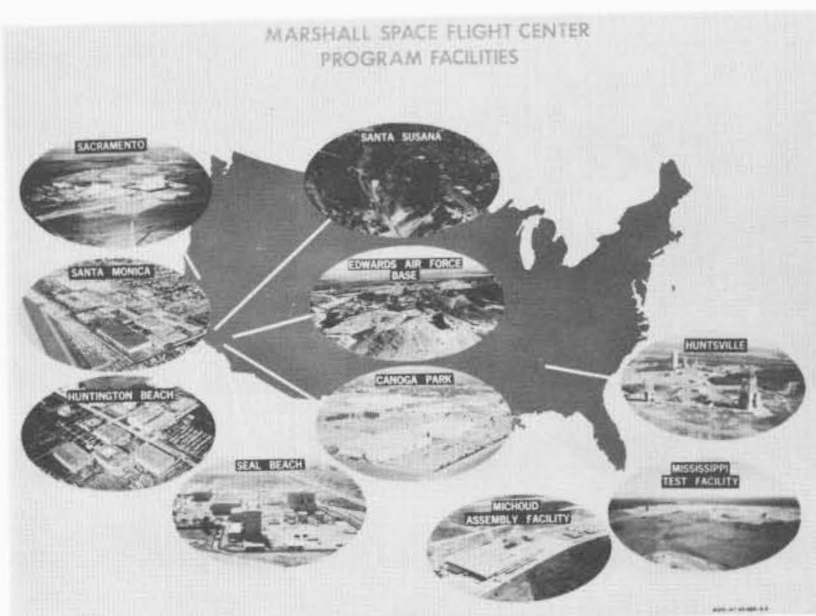
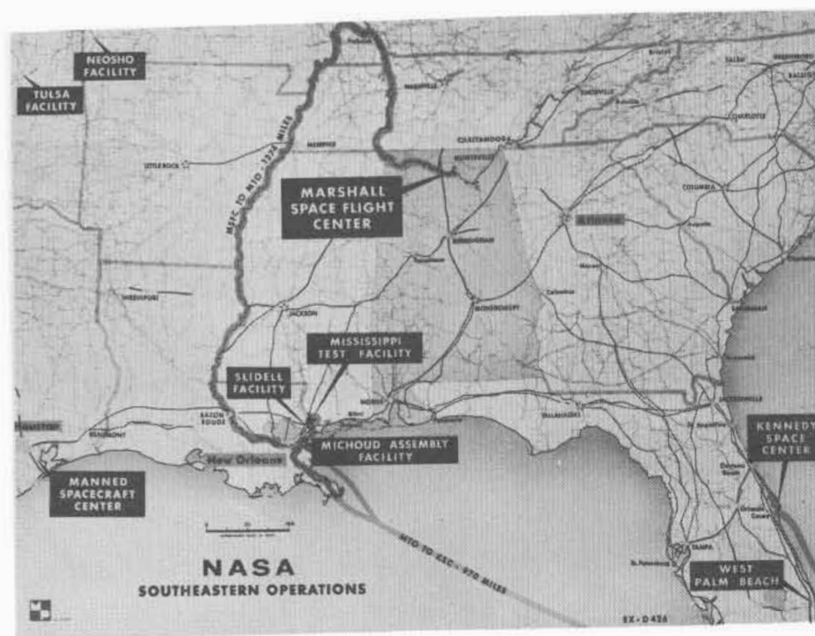
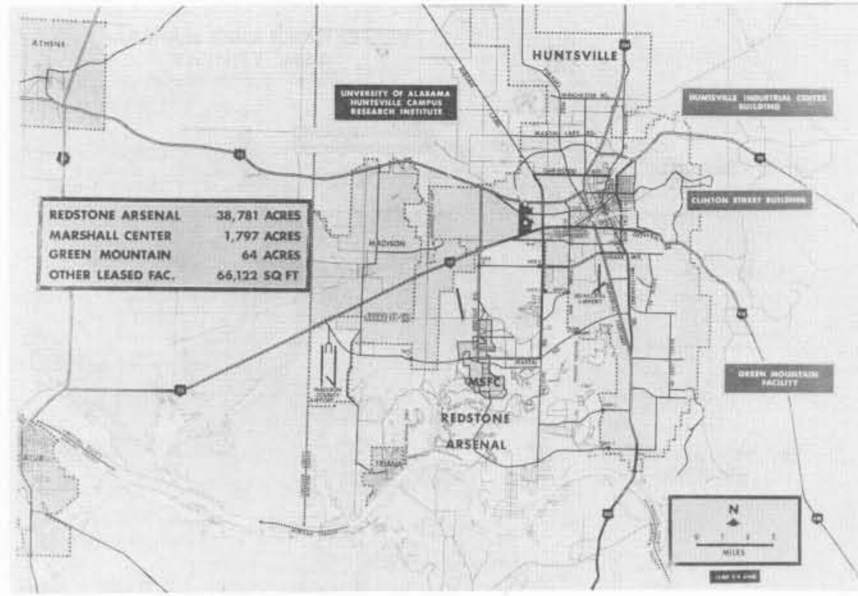

NASA INSTALLATIONS
AMES RESEARCH CENTER
MOFFETT FIELD, CALIF.
PLUM BROOK STATION
SANDUSKY, OHIO
LEWIS RESEARCH CENTER
CLEVELAND, OHIO
WESTERN TEST RANGE (KSC)
LOMPOC, CALIF.
ELECTRONICS RESEARCH CENTER
CAMBRIDGE, MASS.
WESTERN SUPPORT OFFICE
SANTA MONICA, CALIF
NASA HEADQUARTERS
WASHINGTON, D.C.
SPACE NUCLEAR PROPULSION OFFICE
GERMANTOWN, MD.
JET PROPULSION LAB. (CONTRACTOR)
PASADENA, CALIF.
WALLOPS STATION
WALLOPS ISLAND, VA.
GODDARD SPACE FLIGHT CENTER
GREENBELT, MD.
FLIGHT RESEARCH CENTER
EDWARDS, CALIF.
MICHOUD ASSY. FAC.
NEW ORLEANS, LA.
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
MISSISSIPPI TEST FAC.
BAY ST. LOUIS, MISS.
LANGLEY RESEARCH CENTER
HAMPTON, VA.
KENNEDY SPACE CENTER
KENNEDY SPACE CENTER, FLA.
MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALA.
E-D A 419 F

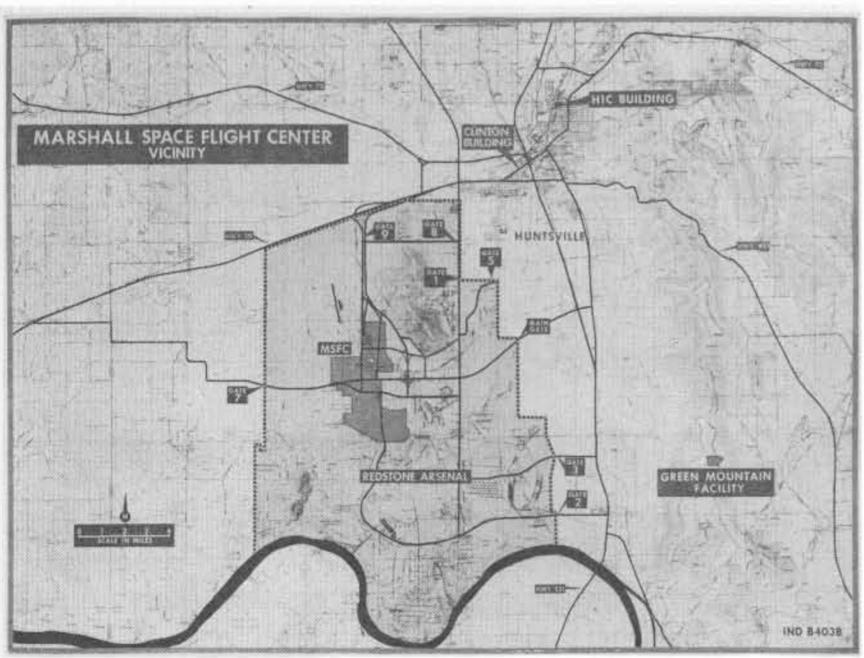

MARSHALL SPACE FLIGHT CENTER
CAPITAL ASSETS
$833 MILLION
SACRAMENTO
SANTA SUSANA
SANTA MONICA
EDWARDS AIR FORCE BASE
HUNTSVILLE
HUNTINGTON BEACH
CANOGA PARK
377 MILLION
SEAL BEACH
MISSISSIPPI TEST FACILITY
MICHOUD ASSEMBLY FACILITY
216 MILLION

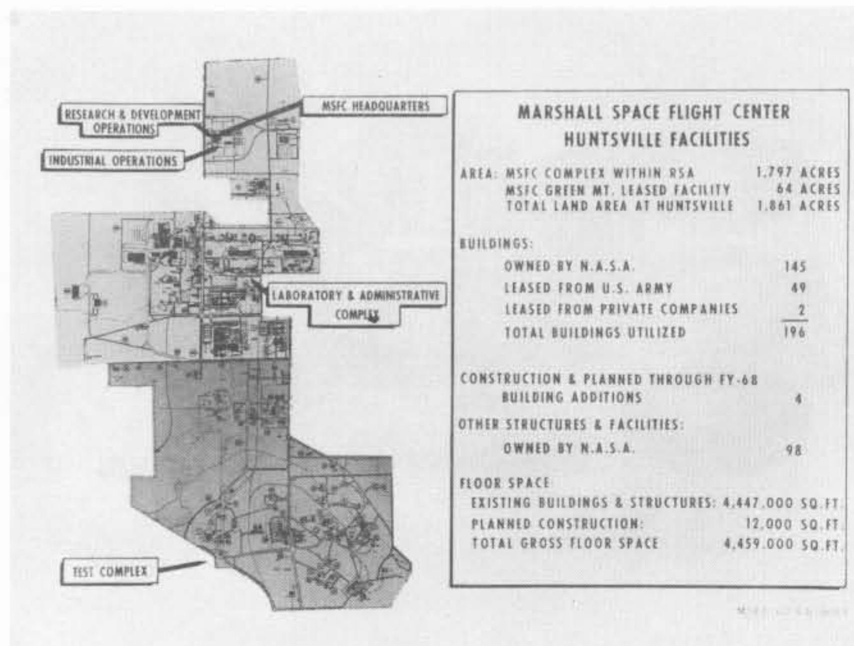

MARSHALL SPACE FLIGHT CENTER
PROGRAM FACILITIES
SACRAMENTO
SANTA SUSANA
SANTA MONICA
EDWARDS AIR FORCE BASE
HUNTSVILLE
CANOGA PARK
HUNTINGTON BEACH
SEAL BEACH
MISSISSIPPI TEST FACILITY
MICHOUD ASSEMBLY FACILITY


NEOSHO FACILITY
TULSA FACILITY
MSFC TO MTO - 1374 MILES
MARSHALL SPACE FLIGHT CENTER
MISSISSIPPI TEST FACILITY
SLIDELL FACILITY
MICHOUD ASSEMBLY FACILITY
New Orleans
MANNED SPACECRAFT CENTER
KENNEDY SPACE CENTER
MTO TO KSC - 970 MILES
NASA
SOUTHEASTERN OPERATIONS
WEST PALM BEACH
EX-D 426


MARSHALL SPACE FLIGHT CENTER
SITE PLAN
TEST AREA
WEST AREA
EAST AREA
TEST SUPPORT AREA
ENGINEERING & LABORATORY AREA
PROPULSION & VEHICLE ENGINEERING
MANUFACTURING & QUALITY
ASTRIONICS AND GENERAL SUPPORT
HEADQUARTERS AREA


HUNTSVILLE
UNIVERSITY OF ALABAMA HUNTSVILLE CAMPUS RESEARCH INSTITUTE
HUNTSVILLE INDUSTRIAL CENTER BUILDING
CLINTON STREET BUILDING
REDSTONE ARSENAL 38,781 ACRES
MARSHALL CENTER 1,797 ACRES
GREEN MOUNTAIN 64 ACRES
OTHER LEASED FAC. 66,122 SQ FT
MADISON
MSFC
REDSTONE
ARSENAL
GREEN MOUNTAIN FACILITY
N
MILES


MARSHALL SPACE FLIGHT CENTER
VICINITY
HIC BUILDING
CLINTON BUILDING
HUNTSVILLE
MSFC
REDSTONE ARSENAL
GREEN MOUNTAIN FACILITY
SCALE IN MILES
IND 84038


RESEARCH & DEVELOPMENT OPERATIONS
MSFC HEADQUARTERS
INDUSTRIAL OPERATIONS
LABORATORY & ADMINISTRATIVE COMPLEX
TEST COMPLEX
MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE FACILITIES
AREA: MSFC COMPLEX WITHIN RSA 1,797 ACRES
MSFC GREEN MT. LEASED FACILITY 64 ACRES
TOTAL LAND AREA AT HUNTSVILLE 1,861 ACRES
BUILDINGS:
OWNED BY N.A.S.A. 145
LEASED FROM U.S. ARMY 49
LEASED FROM PRIVATE COMPANIES 2
TOTAL BUILDINGS UTILIZED 196
CONSTRUCTION & PLANNED THROUGH FY-68
BUILDING ADDITIONS 4
OTHER STRUCTURES & FACILITIES:
OWNED BY N.A.S.A. 98
FLOOR SPACE
EXISTING BUILDINGS & STRUCTURES: 4,447,000 SQ.FT.
PLANNED CONSTRUCTION: 12,000 SQ.FT.
TOTAL GROSS FLOOR SPACE 4,459,000 SQ.FT.


RESEARCH AND DEVELOPMENT OPERATIONS FACILITIES
R & DO HEADQUARTERS
ADVANCED SYSTEMS OFFICE
AERO - ASTRO HEADQUARTERS
MANUFACTURING ENGINEERING
QUALITY & RELIABILITY ASSURANCE
RESEARCH PROJECTS
AERO - ASTRODYNAMICS
ASTRIONICS
PROPULSION & VEHICLE ENGINEERING
COMPUTATION
TEST
GREEN MOUNTAIN

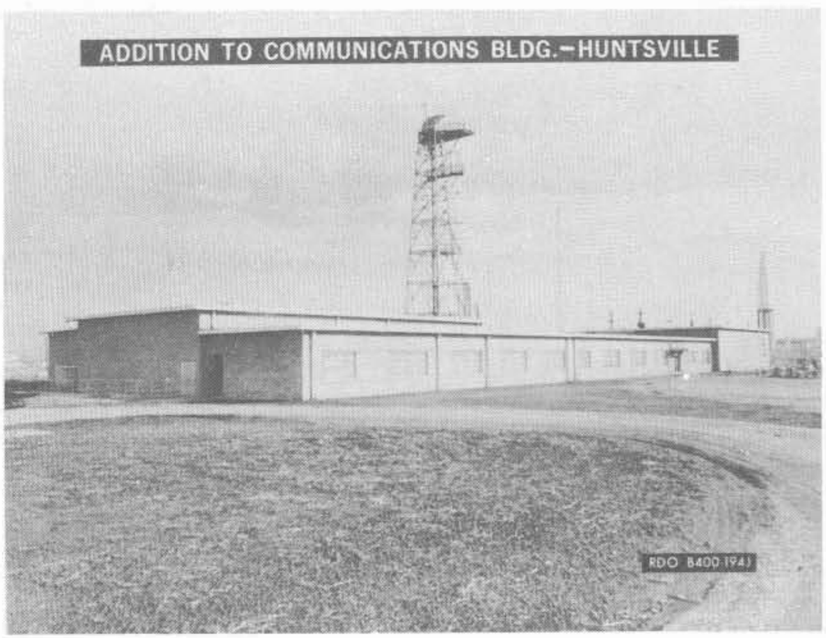

MSFC HEADQUARTERS COMPLEX
HUNTSVILLE
PROJECT OFFICE
ENG & ADMIN BLDG
CENTRAL LAB & OFFICE BLDG
MSFC · 67 · RDO · 400 · 96J

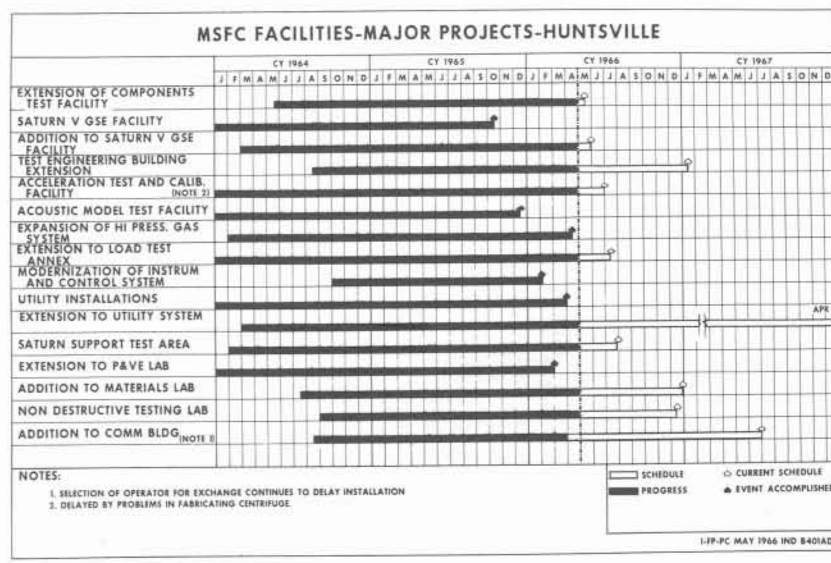

PROJECT ENGINEERING BUILDING–HUNTSVILLE
RDO B400-116L

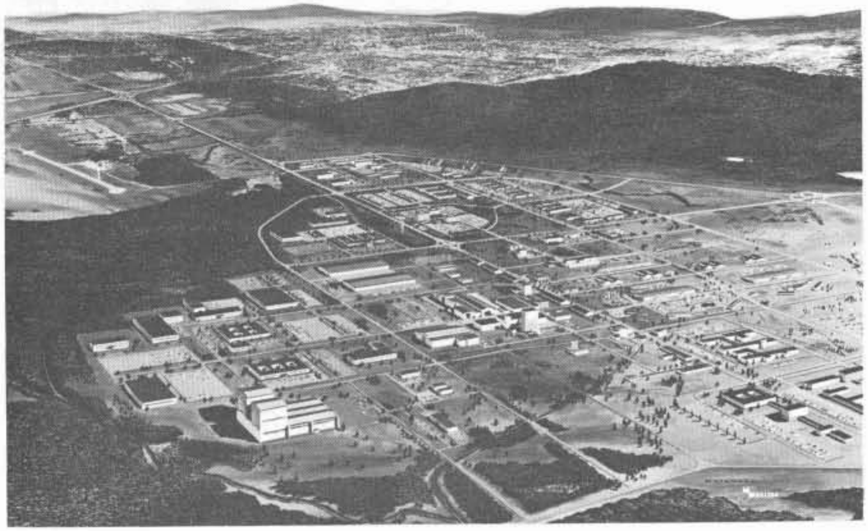

AERIAL VIEW, ADMINISTRATION & MANUFACTURING AREA
MSFC–HUNTSVILLE
MSFC · 67 · RDO · 400 · 14D

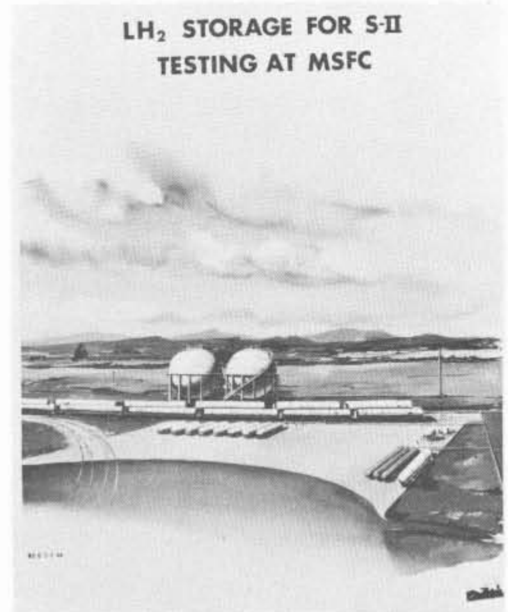

AERIAL VIEW, TEST & MANUFACTURING AREA
MSFC-HUNTSVILLE
10/65 E-D P400-15 D


TECHNICAL SERVICES—HUNTSVILLE
MEDICAL CENTER
TECHNICAL SERVICES
RDO B400-124C

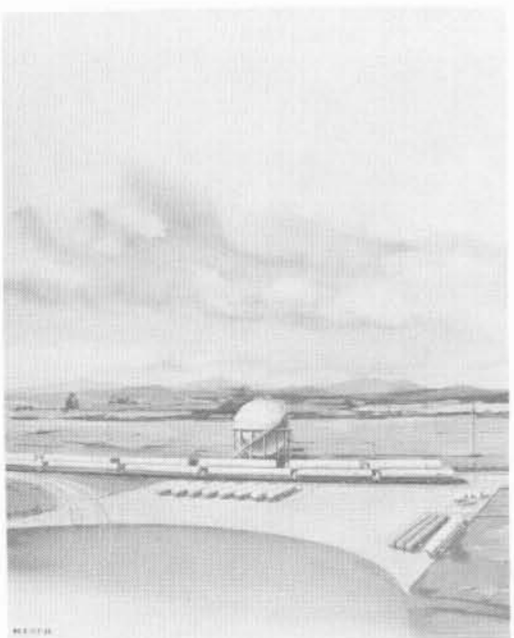

ADDITION TO COMMUNICATIONS BLDG.-HUNTSVILLE
RDO B400-194J

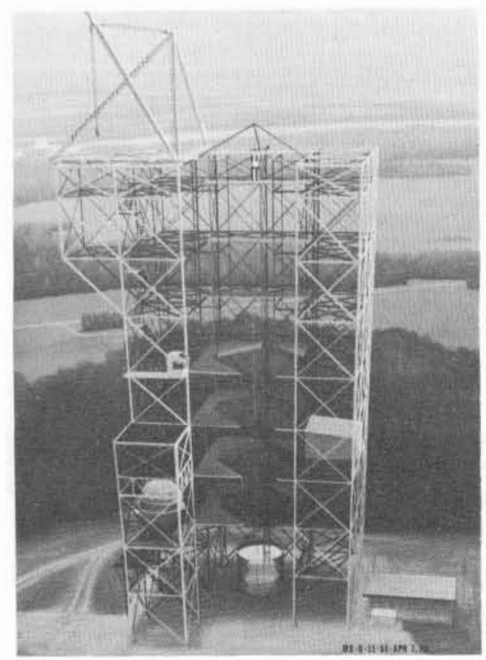

MSFC FACILITIES-MAJOR PROJECTS-HUNTSVILLE
CY 1964
CY 1965
CY 1966
CY 1967
EXTENSION OF COMPONENTS TEST FACILITY
SATURN V GSE FACILITY
ADDITION TO SATURN V GSE FACILITY
TEST ENGINEERING BUILDING EXTENSION
ACCELERATION TEST AND CALIB. FACILITY (NOTE 2)
ACOUSTIC MODEL TEST FACILITY
EXPANSION OF HI PRESS. GAS SYSTEM
EXTENSION TO LOAD TEST ANNEX
MODERNIZATION OF INSTRUM AND CONTROL SYSTEM
UTILITY INSTALLATIONS
EXTENSION TO UTILITY SYSTEM
APR 1968
SATURN SUPPORT TEST AREA
EXTENSION TO P&VE LAB
ADDITION TO MATERIALS LAB
NON DESTRUCTIVE TESTING LAB
ADDITION TO COMM BLDG (NOTE 1)
NOTES:
1. SELECTION OF OPERATOR FOR EXCHANGE CONTINUES TO DELAY INSTALLATION
2. DELAYED BY PROBLEMS IN FABRICATING CENTRIFUGE
SCHEDULE
PROGRESS
CURRENT SCHEDULE
EVENT ACCOMPLISHED
I-FP-PC MAY 1966 IND B401AD

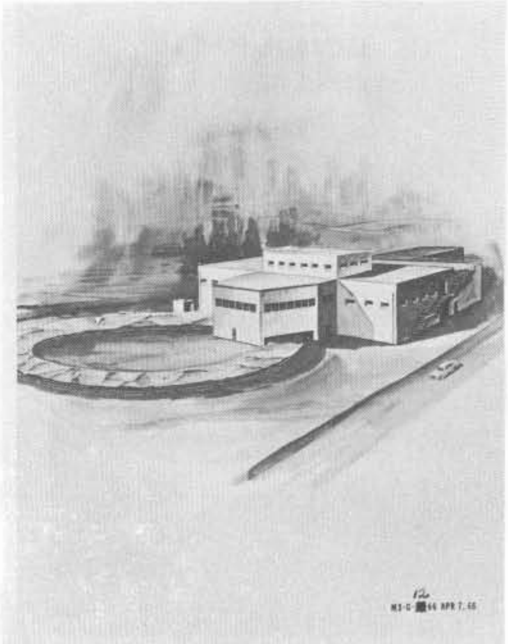


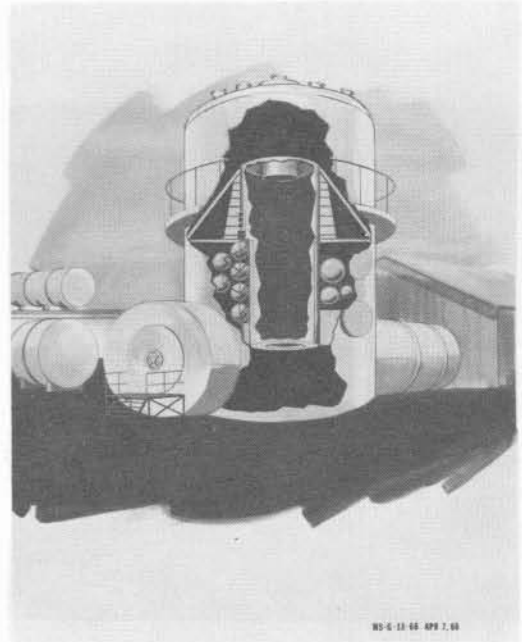


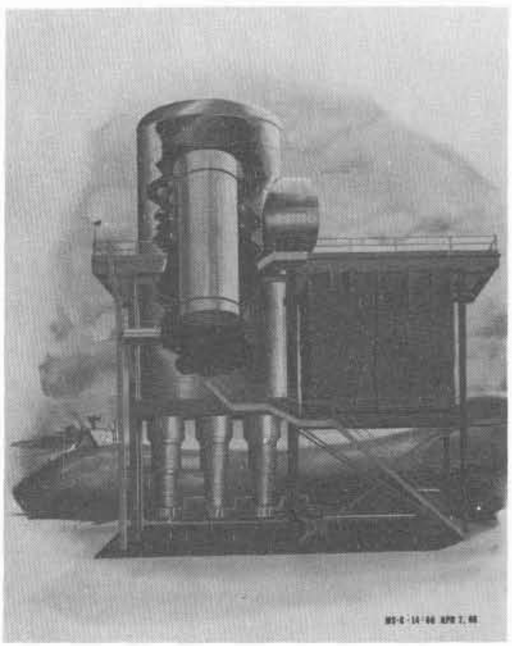
LH2 STORAGE FOR S-II
TESTING AT MSFC





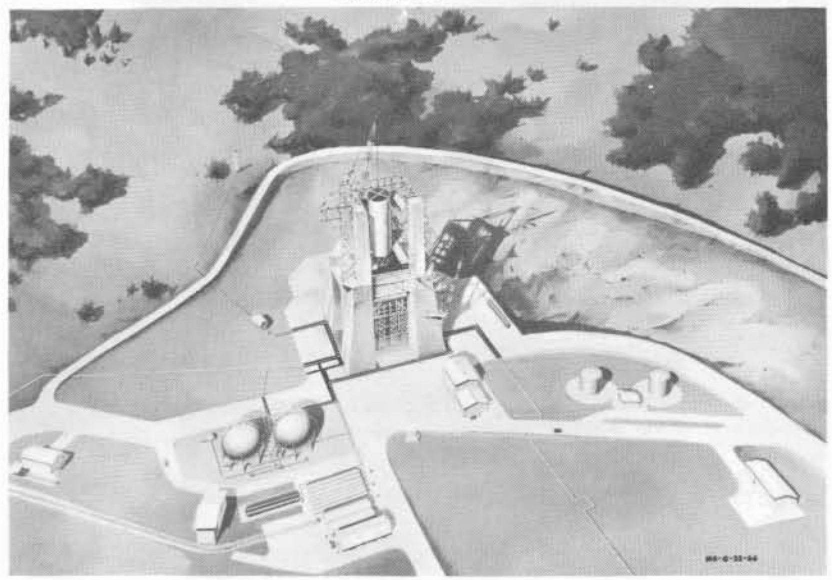






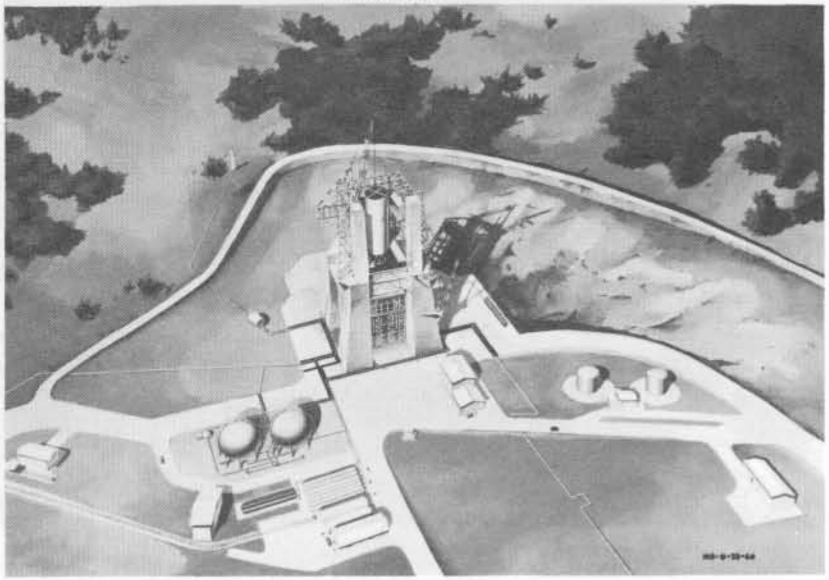
LH_2 UPPER STAGE COLD FLOW TEST FACILITY

GENERAL VIEW



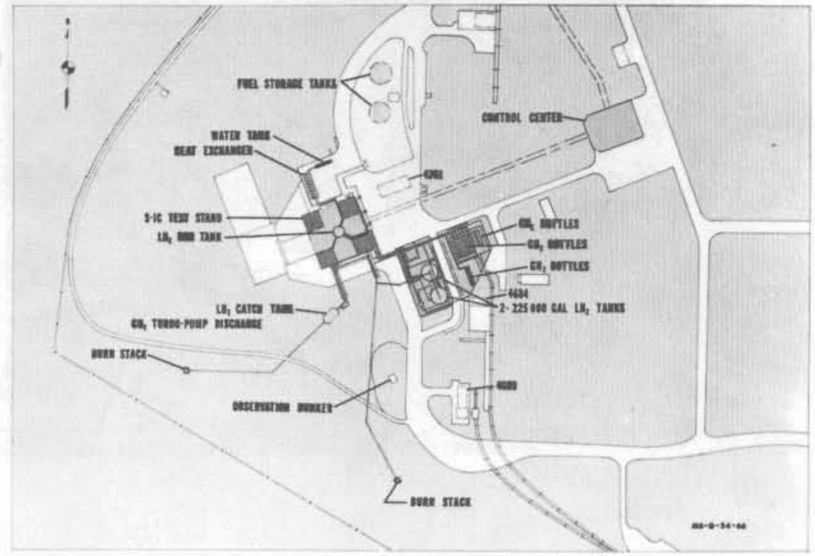
LH_2 UPPER STAGE COLD FLOW TEST FACILITY

GENERAL VIEW

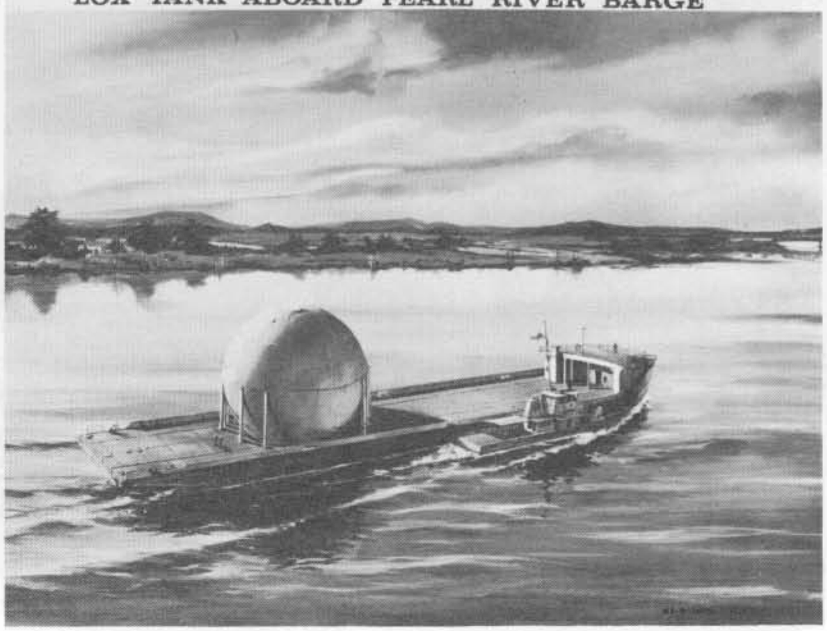


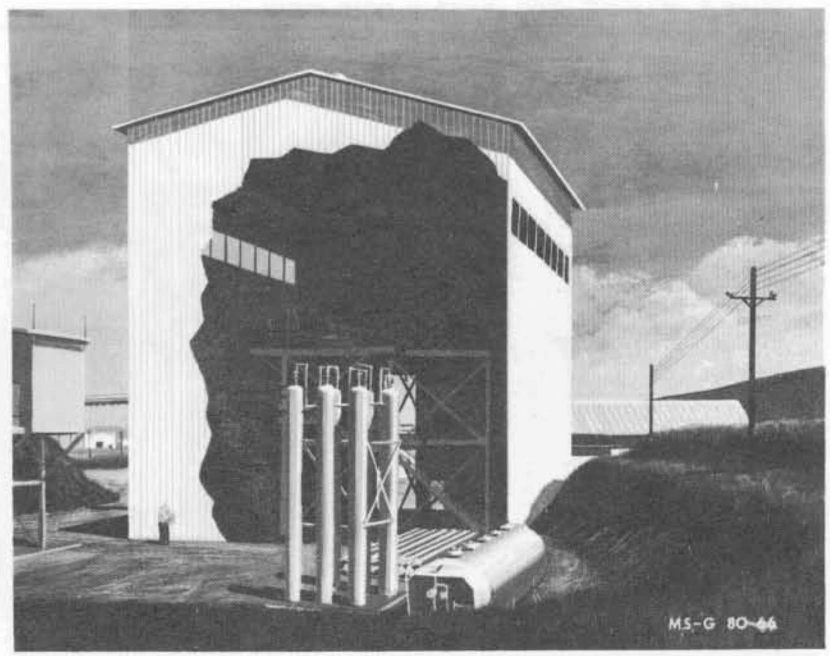
LH_2 UPPER STAGE COLD FLOW TEST FACILITY

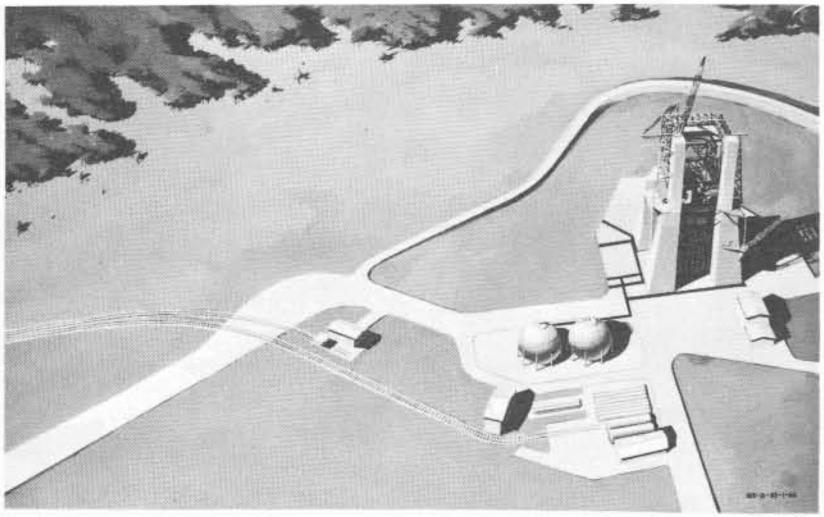
SITE PLAN

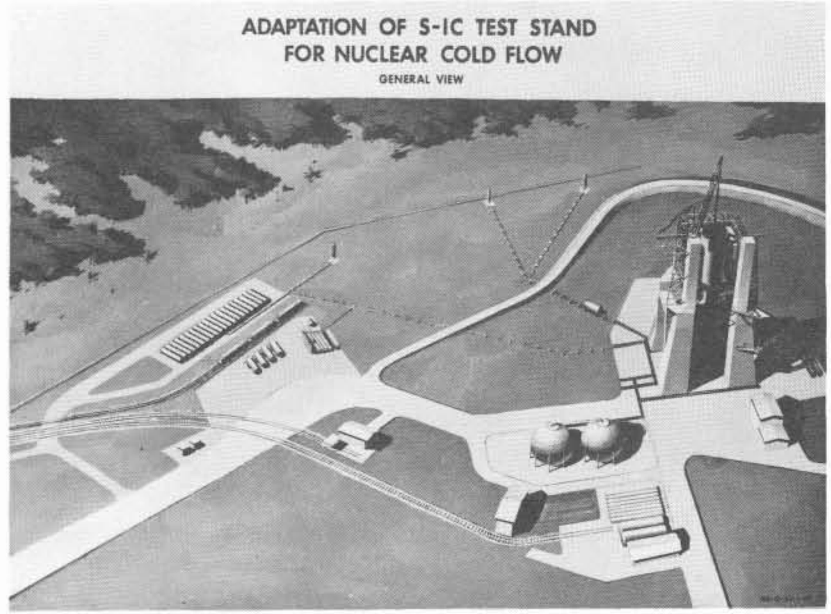


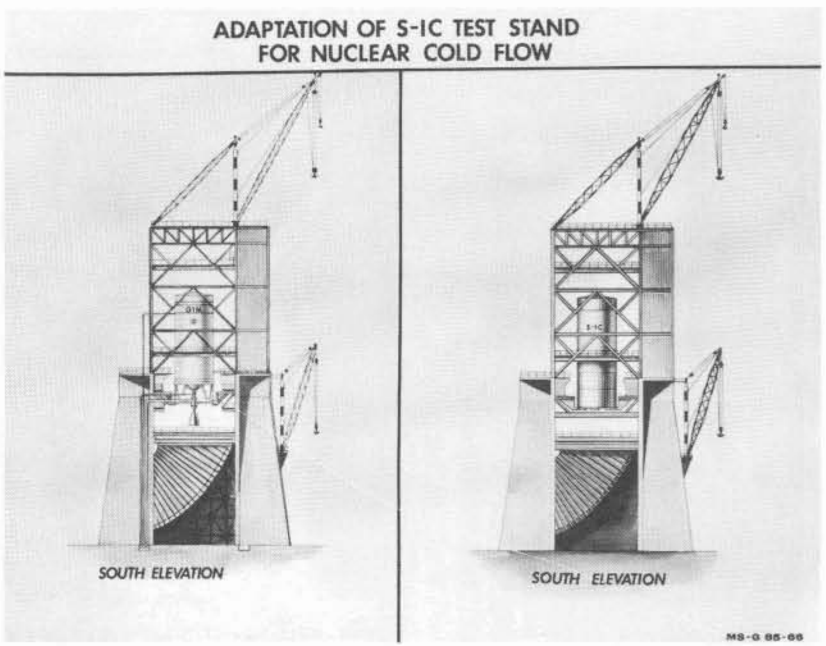
LOX TANK ABOARD PEARL RIVER BARGE

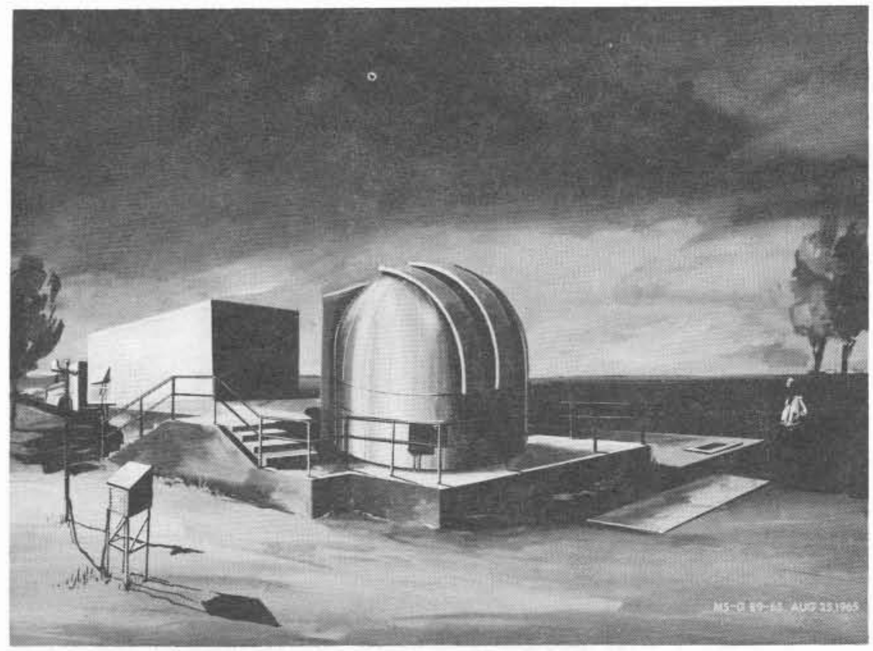


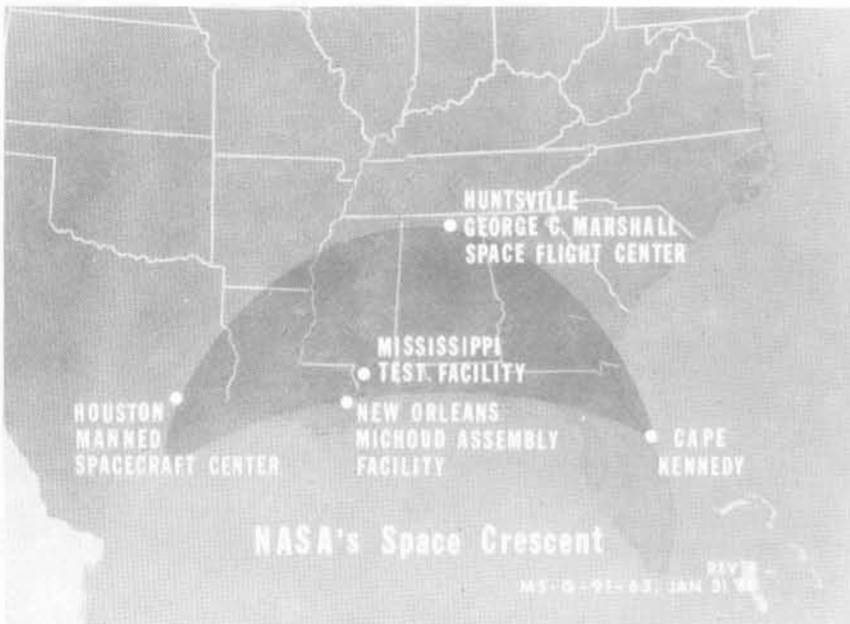





ADAPTATION OF S-IC TEST STAND
FOR NUCLEAR COLD FLOW
GENERAL VIEW


ADAPTATION OF S-IC TEST STAND
FOR NUCLEAR COLD FLOW
SOUTH ELEVATION
SOUTH ELEVATION
MS-G 85-66




HUNTSVILLE
GEORGE C. MARSHALL
SPACE FLIGHT CENTER
MISSISSIPPI
TEST FACILITY
HOUSTON
MANNED
SPACECRAFT CENTER
NEW ORLEANS
MICHOUD ASSEMBLY
FACILITY
CAPE
KENNEDY
NASA's Space Crescent

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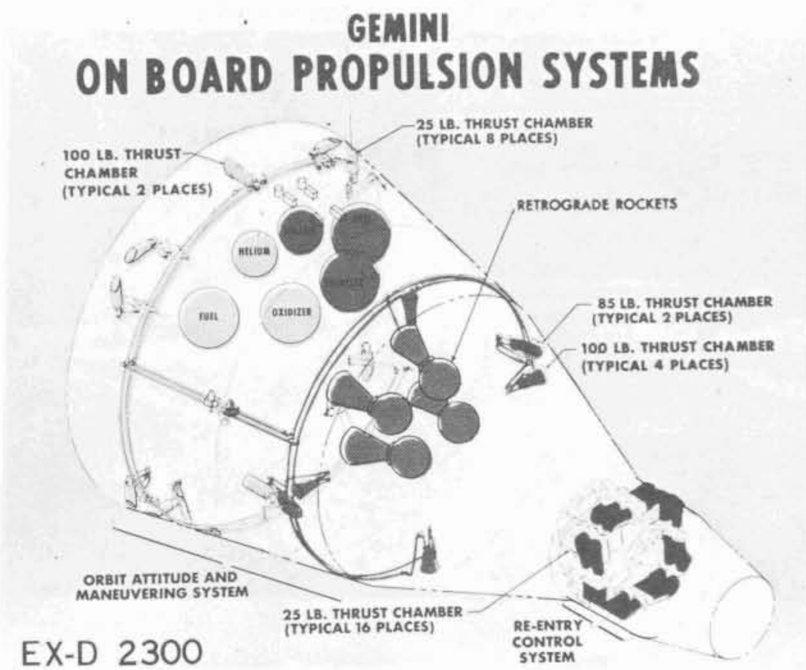
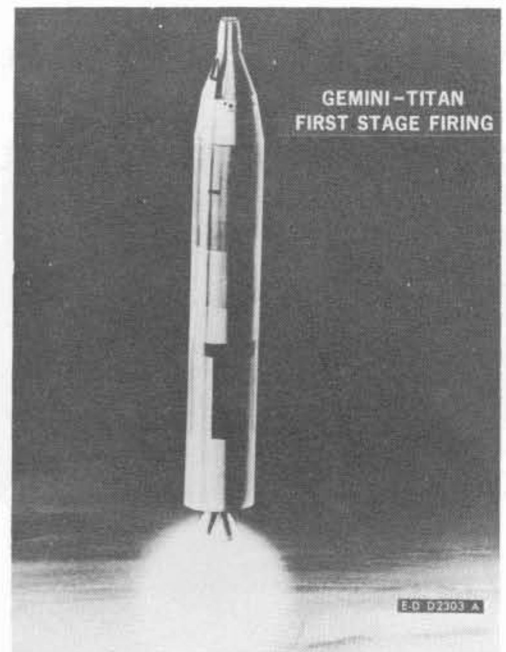
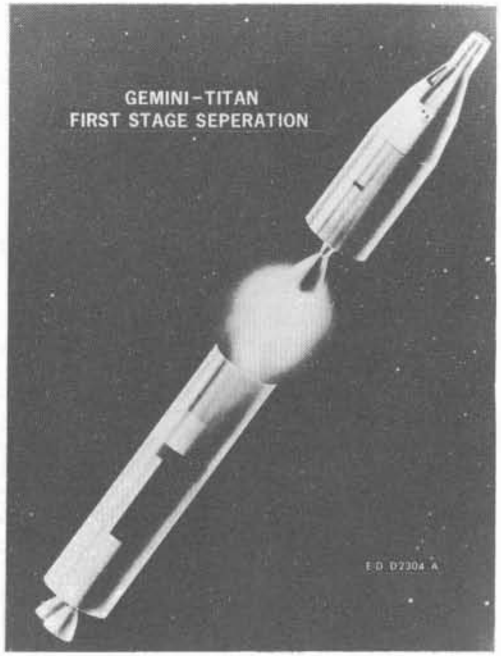
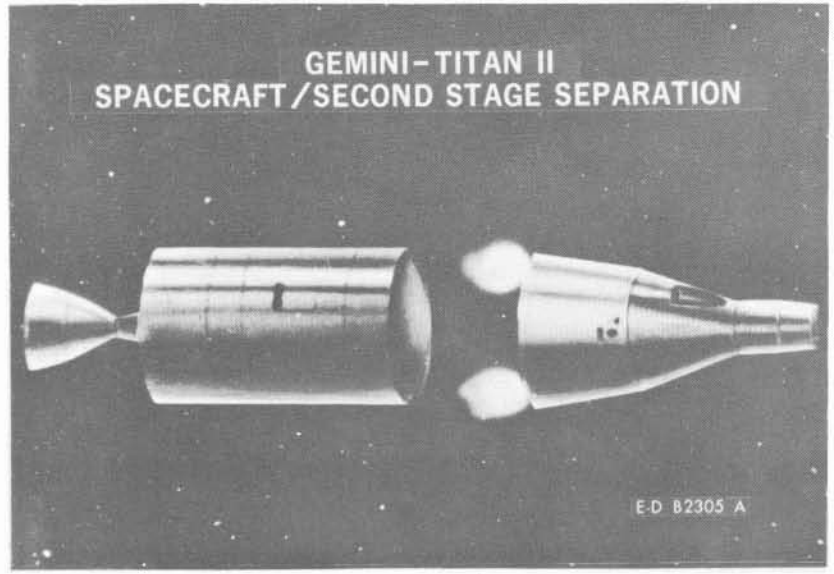

GEMINI
ON BOARD PROPULSION SYSTEMS
100 LB. THRUST CHAMBER (TYPICAL 2 PLACES)
25 LB. THRUST CHAMBER (TYPICAL 8 PLACES)
RETROGRADE ROCKETS
HELIUM
FUEL
OXIDIZER
85 LB. THRUST CHAMBER (TYPICAL 2 PLACES)
100 LB. THRUST CHAMBER (TYPICAL 4 PLACES)
ORBIT ATTITUDE AND MANEUVERING SYSTEM
25 LB. THRUST CHAMBER (TYPICAL 16 PLACES)
RE-ENTRY CONTROL SYSTEM
EX-D 2300

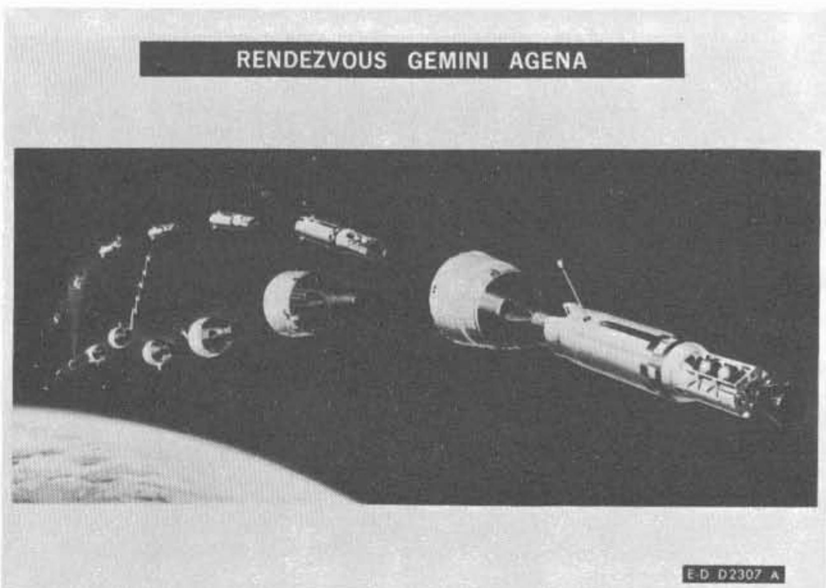

GEMINI CAPSULE
E-D B2301 A

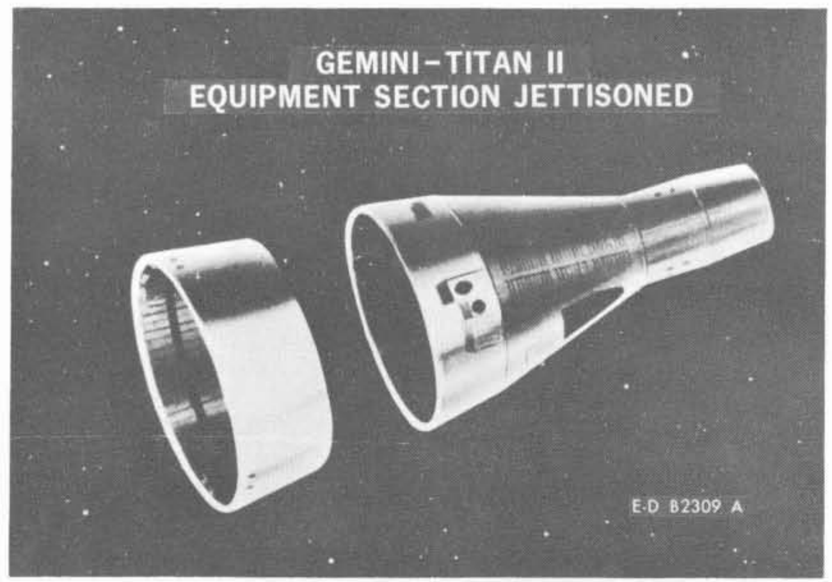

GEMINI-TITAN
ON PAD
E-D D2302 A


GEMINI-TITAN
FIRST STAGE FIRING
E-D D2303 A


GEMINI-TITAN
FIRST STAGE SEPERATION
E-D D2304 A


GEMINI-TITAN II
SPACECRAFT/SECOND STAGE SEPARATION
E-D B2305 A

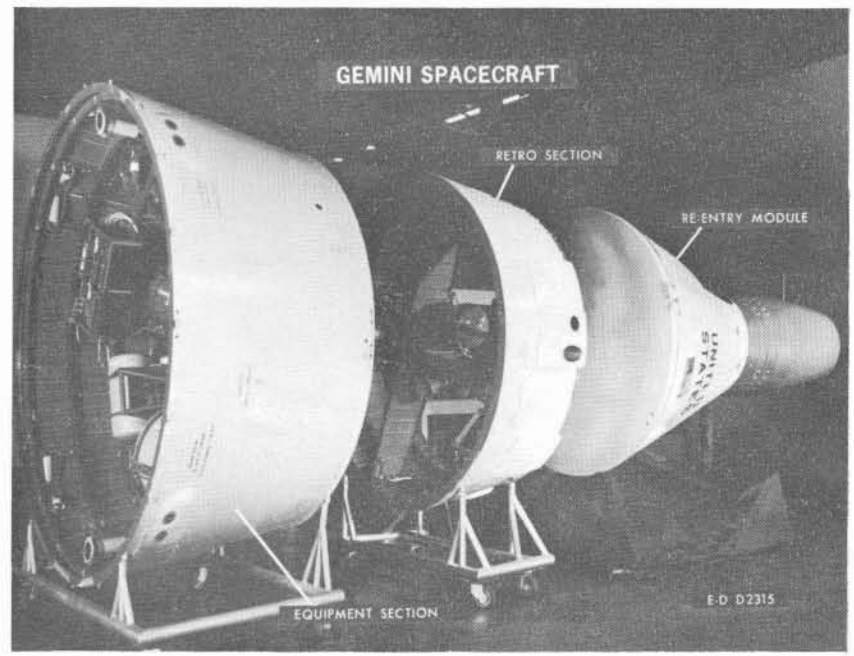

RENDEZVOUS GEMINI AGENA
E-D D2307 A


GEMINI-TITAN II
EQUIPMENT SECTION JETTISONED
E-D B2309 A


GEMINI-TITAN II
RETRO-FIRING FOR RE-ENTRY
E-D B2310 A

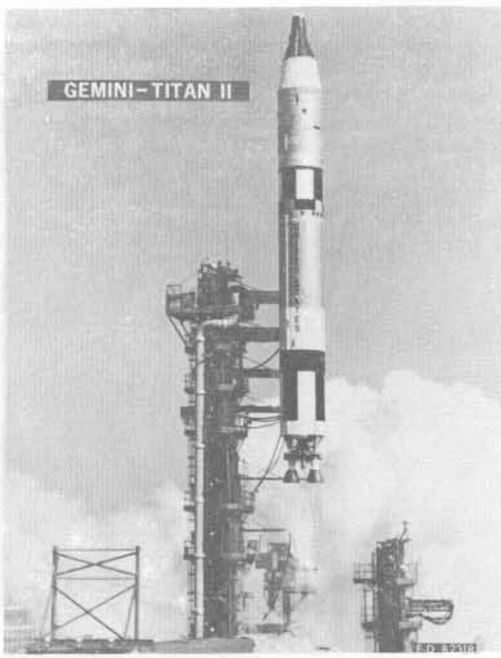

GEMINI SPACECRAFT LANDING
E-D D2312 A

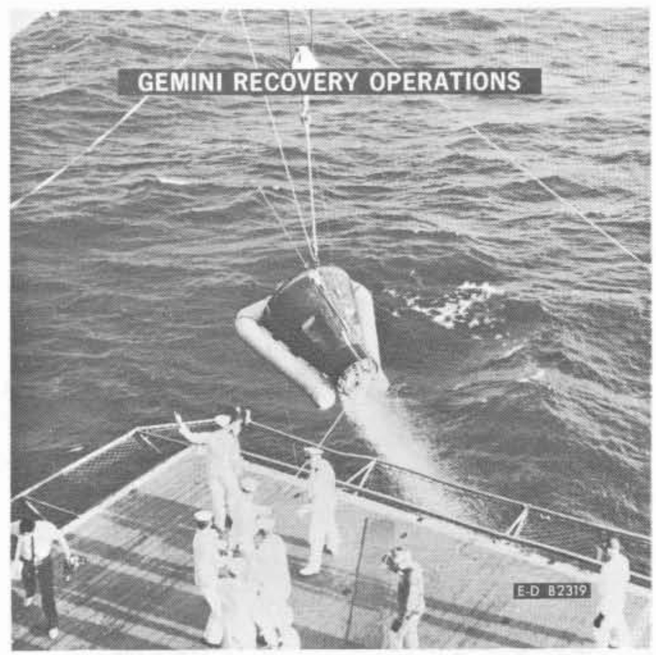

GEMINI RE-ENTRY HEATING
E-D D2314


GEMINI SPACECRAFT
RETRO SECTION
RE-ENTRY MODULE
EQUIPMENT SECTION
E-D D2315

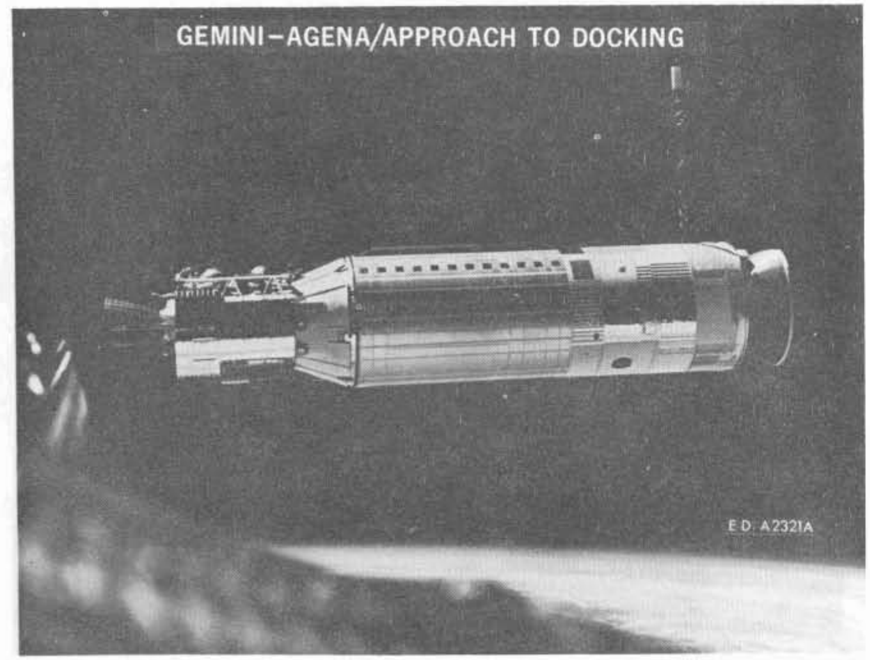

GEMINI
EXTRA-VEHICULAR SPACE ACTIVITIES
E-D D2316

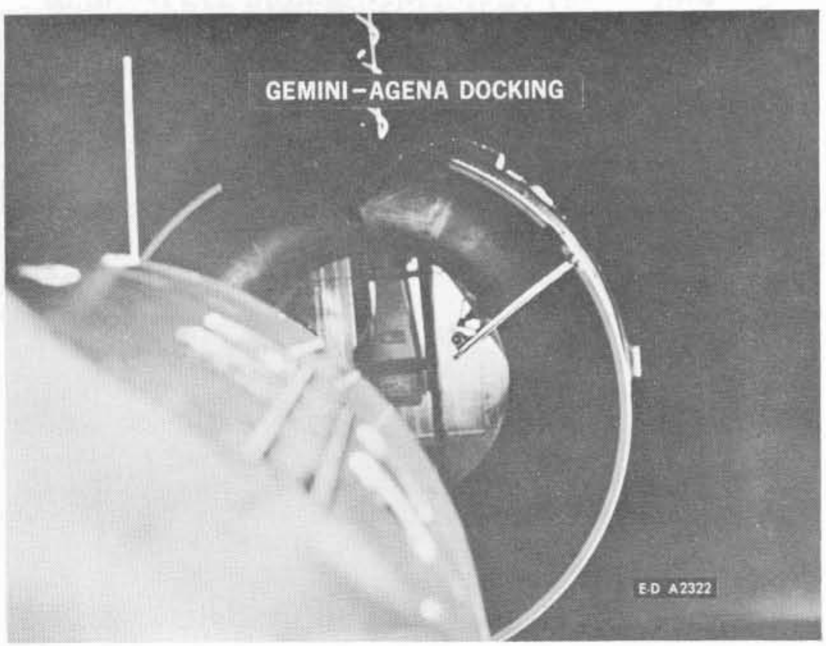

GEMINI
ASTRONAUT WHITE'S WALK IN SPACE

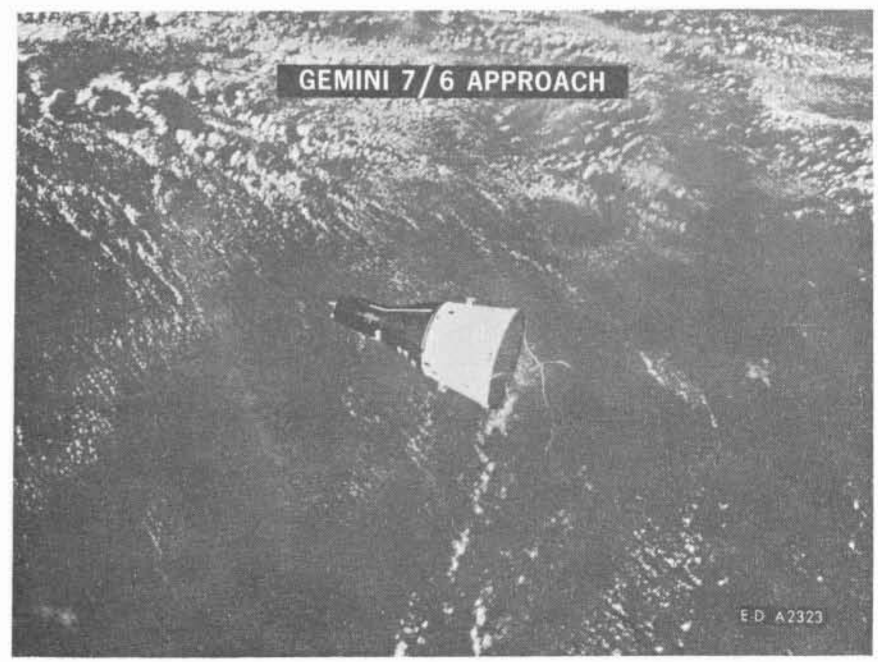

GEMINI-TITAN II

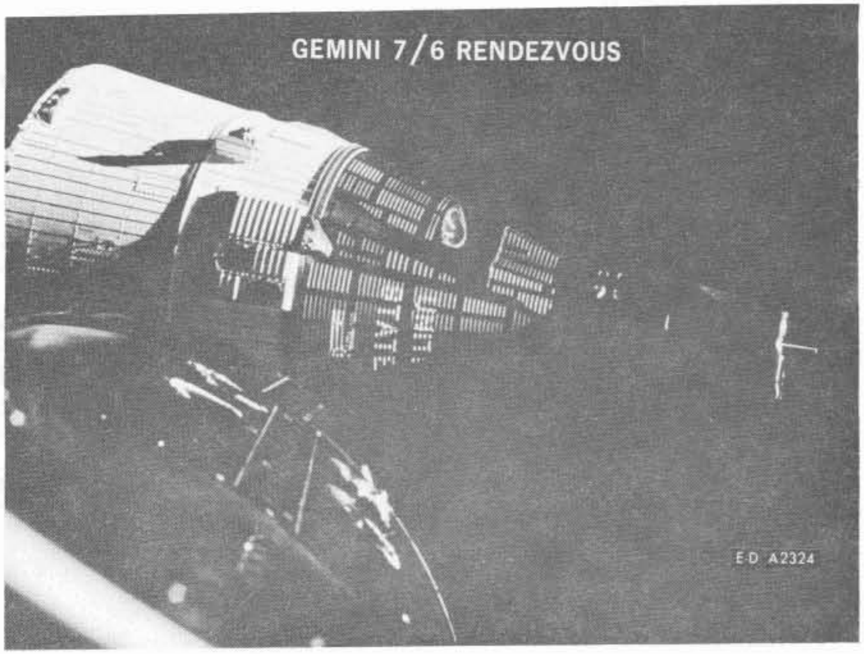

GEMINI RECOVERY OPERATIONS
E-D 82319


GEMINI SPACESUIT
E-D A2320

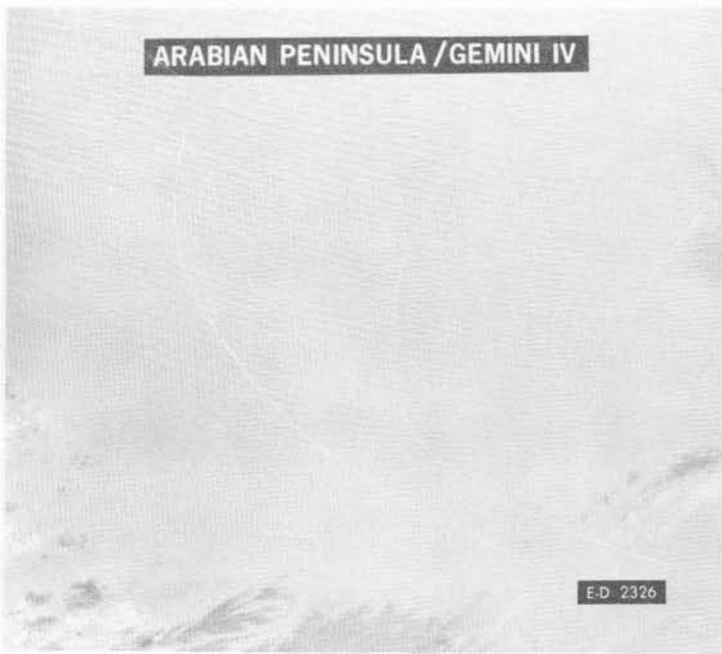

GEMINI–AGENA/APPROACH TO DOCKING
E-D A2321A

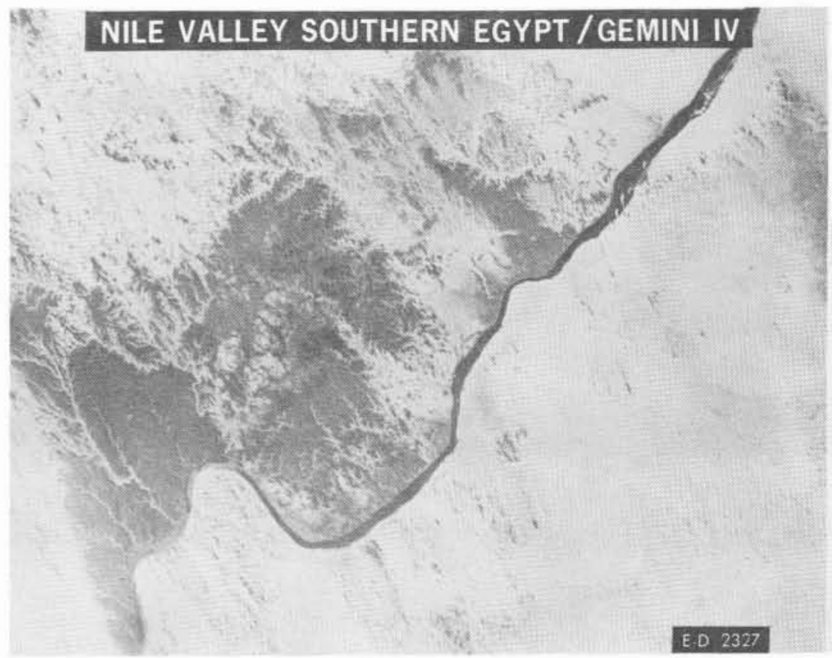

GEMINI–AGENA DOCKING
E-D A2322


GEMINI 7/6 APPROACH
E-D A2323


GEMINI 7/6 RENDEZVOUS
E-D A2324

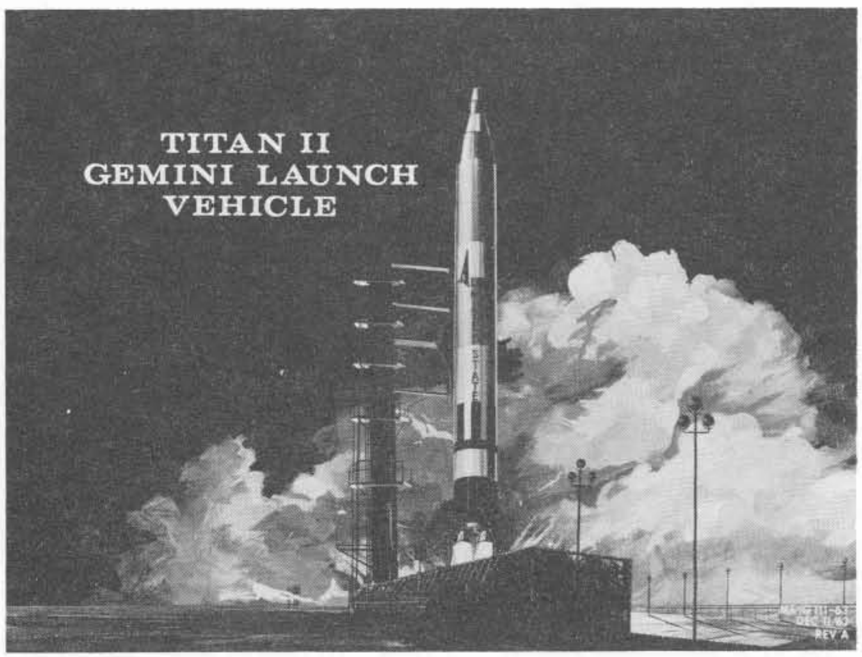

EGYPT'S NILE DELTA/GEMINI IV
E-D 2325

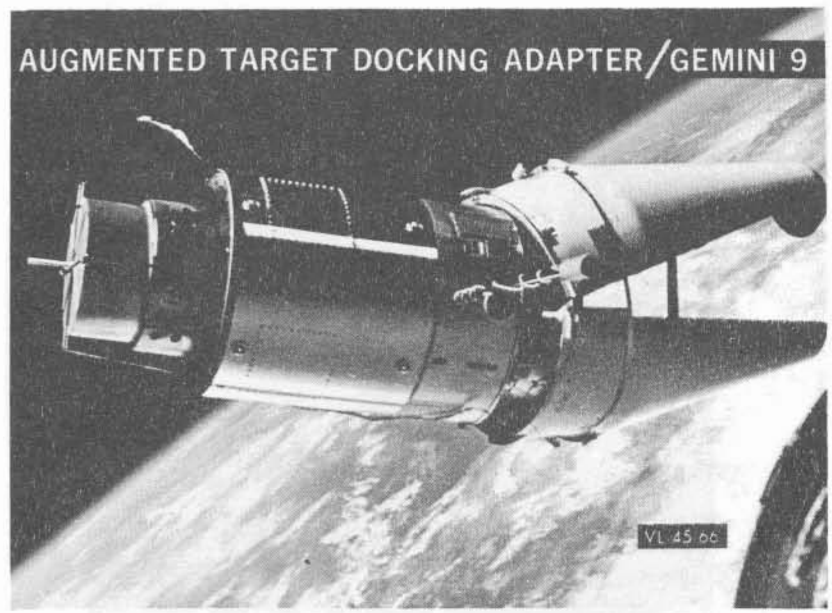

ARABIAN PENINSULA/GEMINI IV
E-D 2326

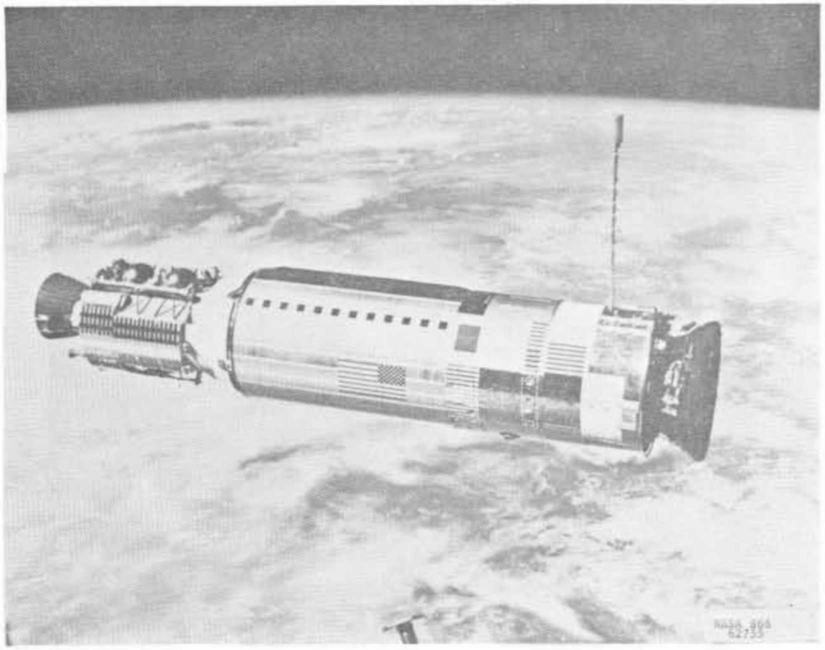

NILE VALLEY SOUTHERN EGYPT/GEMINI IV
E-D 2327

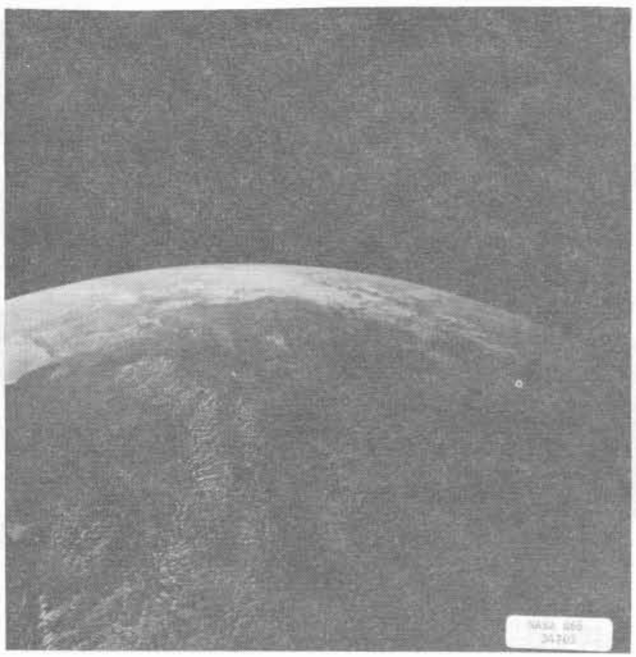

NILE RIVER ASWAN DAM AREA / GEMINI IV
E-D 2328

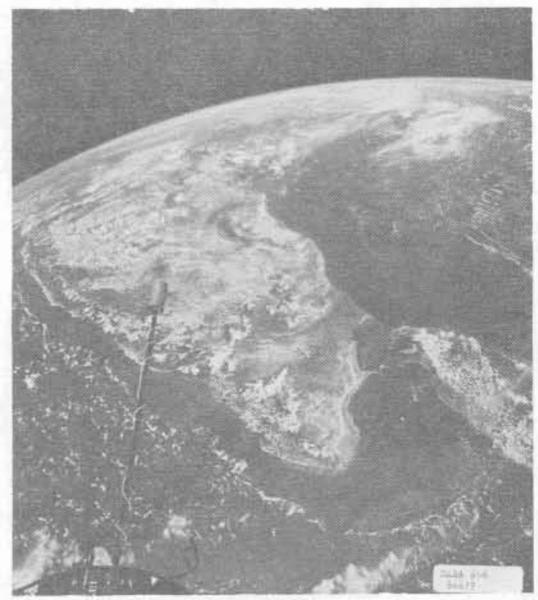

SOUTHERN EGYPT & RED SEA / GEMINI IV
E-D 2329


TITAN II
GEMINI LAUNCH
VEHICLE


AUGMENTED TARGET DOCKING ADAPTER/GEMINI 9
VL 45 66



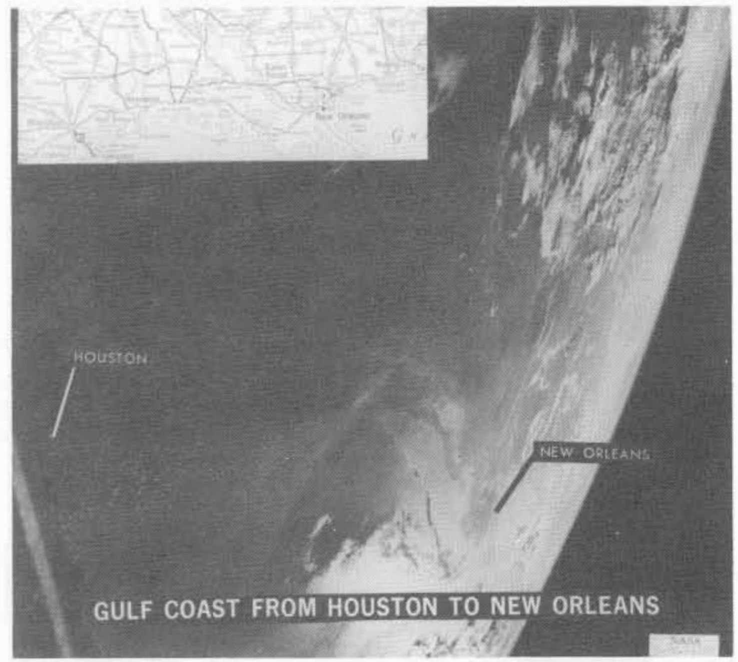


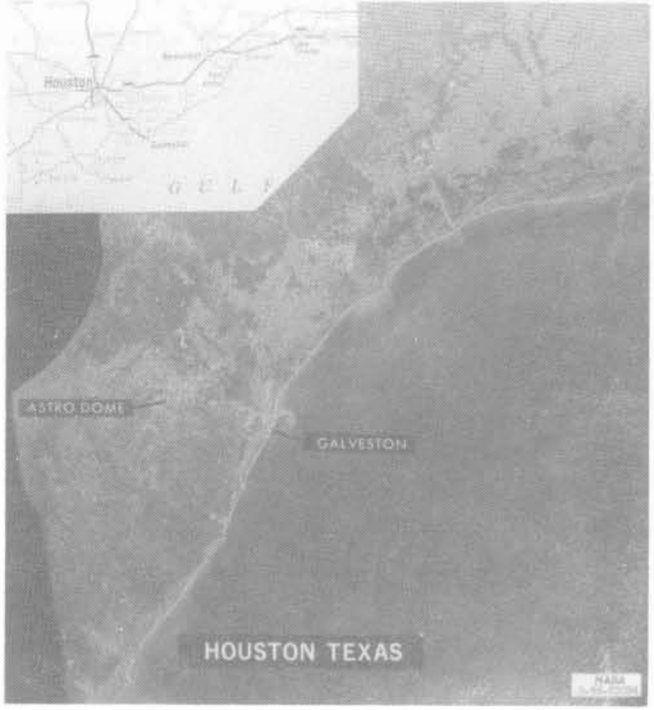


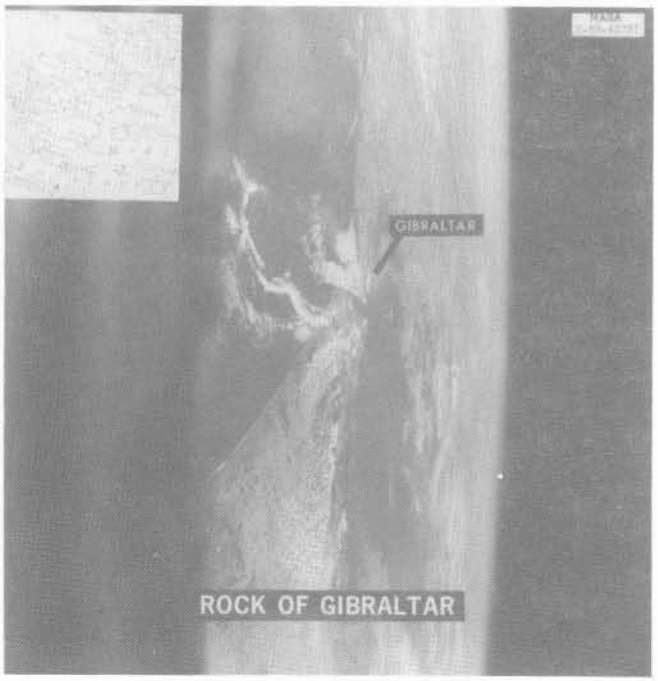

ISRAEL

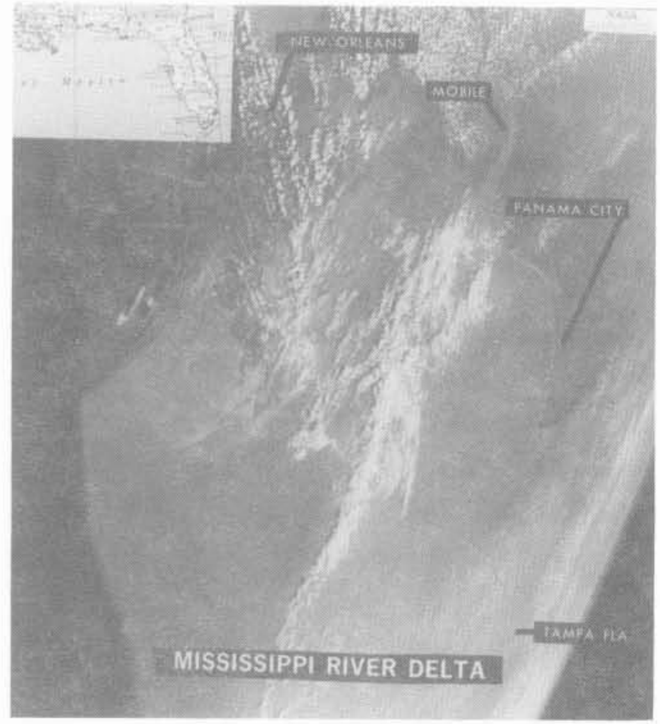

SPACE PHOTOGRAPHS PROVIDE MEANS OF IMPROVING MAPS
CHIMBOTE AREA, NORTH COAST OF PERU
PHOTOGRAPH TAKEN JUNE 5, 1966 BY THOMAS STAFFORD AND EUGENE CERNAN FROM GEMINI IX AT AN ALTITUDE OF ABOUT 150 MILES. PHOTOGRAPH 66-38298.
OPERATIONAL NAVIGATIONAL CHART N-25 NORTH COAST OF PERU REGION
25 MILES
The coast line, mountain configuration, and especially stream valley course and location can be plotted more accurately on the map by use of the photograph.


K.S.C.
FLORIDA LOOKING SOUTH
NASA


HOUSTON
NEW ORLEANS
GULF COAST FROM HOUSTON TO NEW ORLEANS
NASA


Houston
ASTRO DOME
GALVESTON
HOUSTON TEXAS
NASA


NASA
GIBRALTAR
ROCK OF GIBRALTAR


NEW ORLEANS
MOBILE
PANAMA CITY
TAMPA FLA
MISSISSIPPI RIVER DELTA

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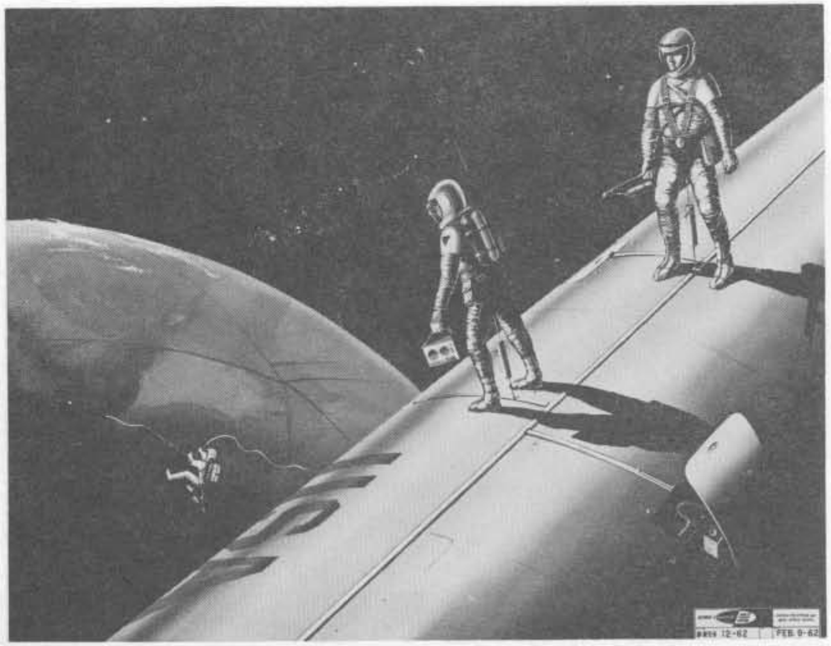
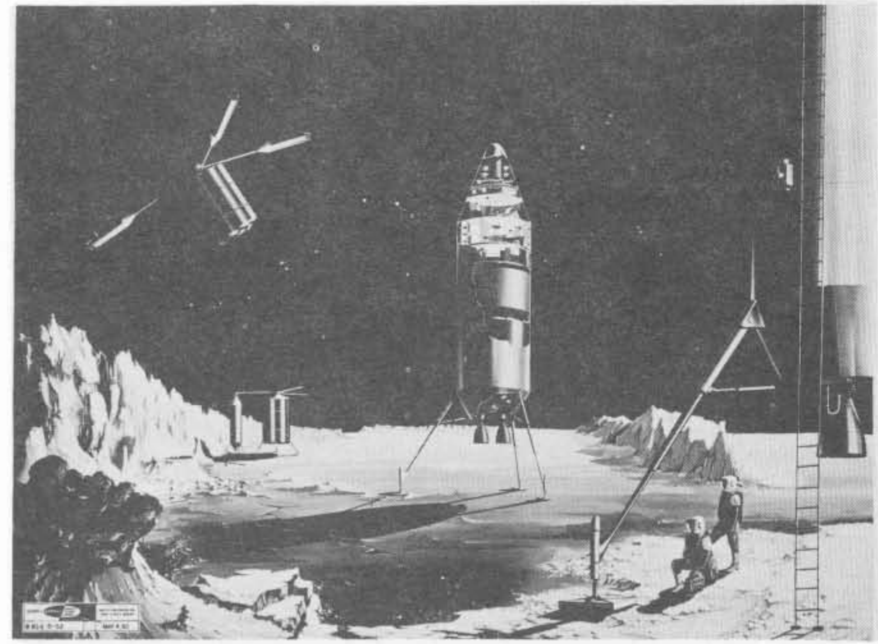
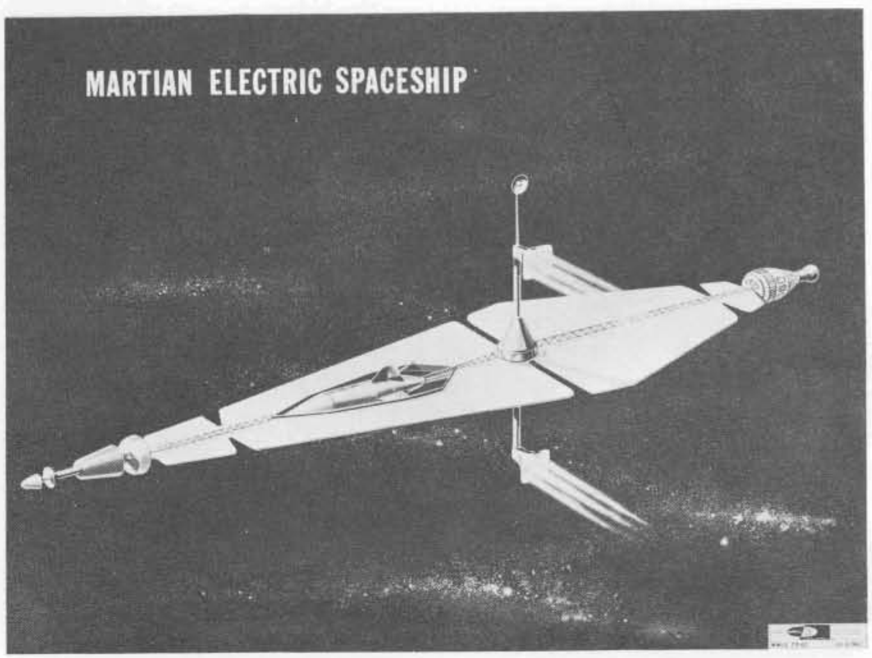
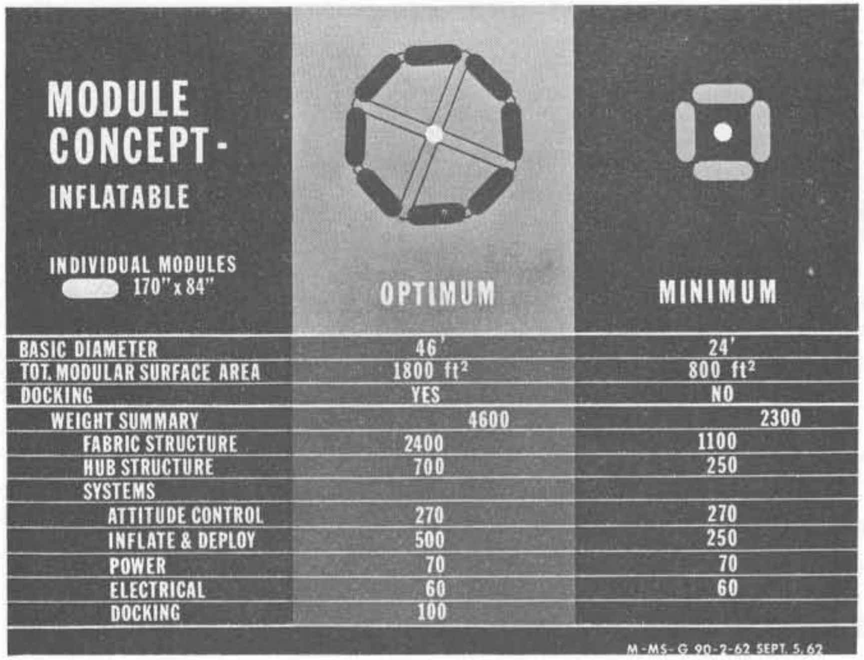


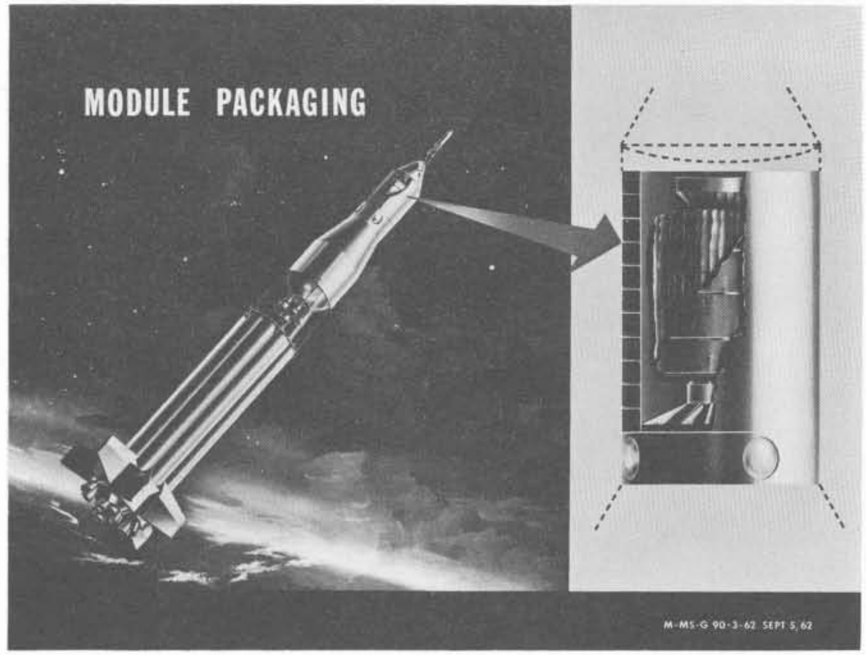


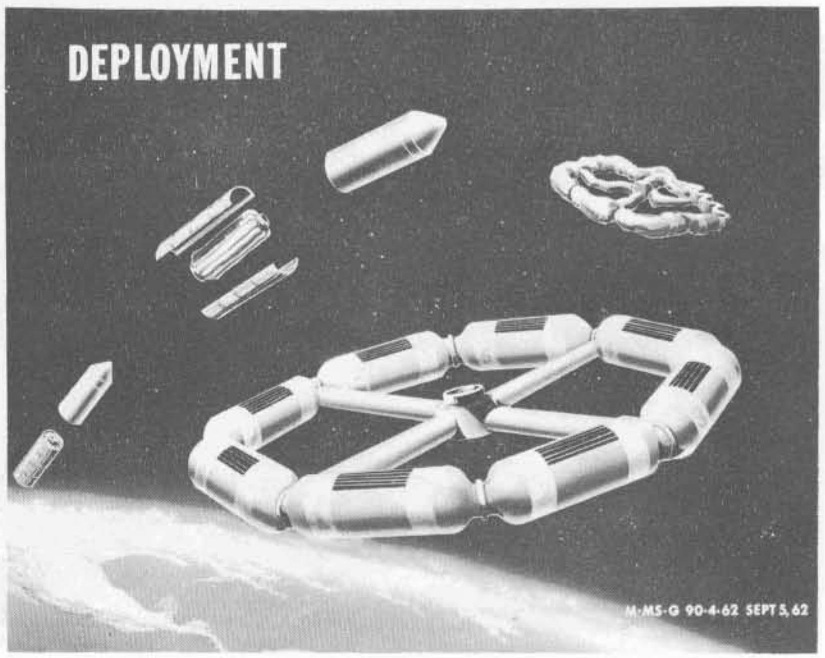

MARTIAN ELECTRIC SPACESHIP

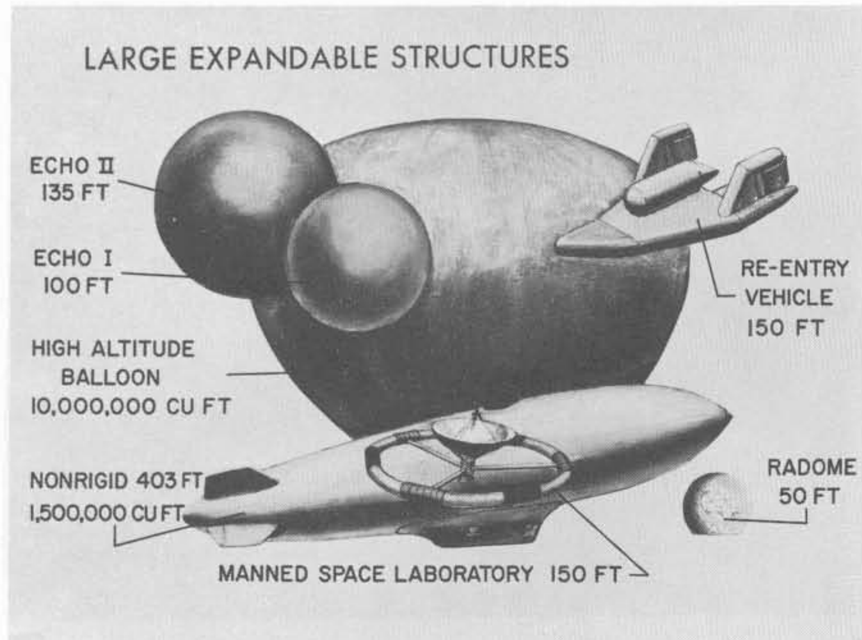

FREE WORLD SPACE STATION

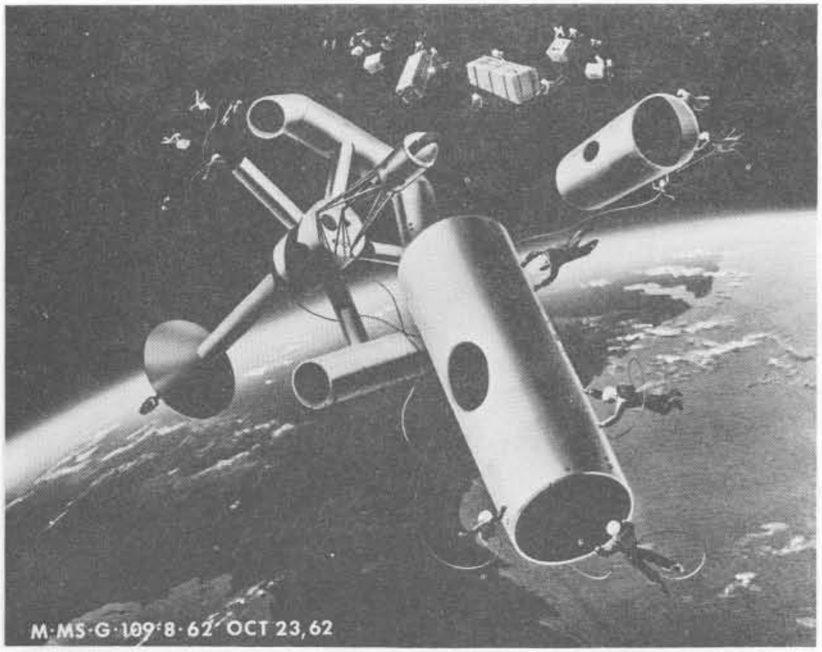


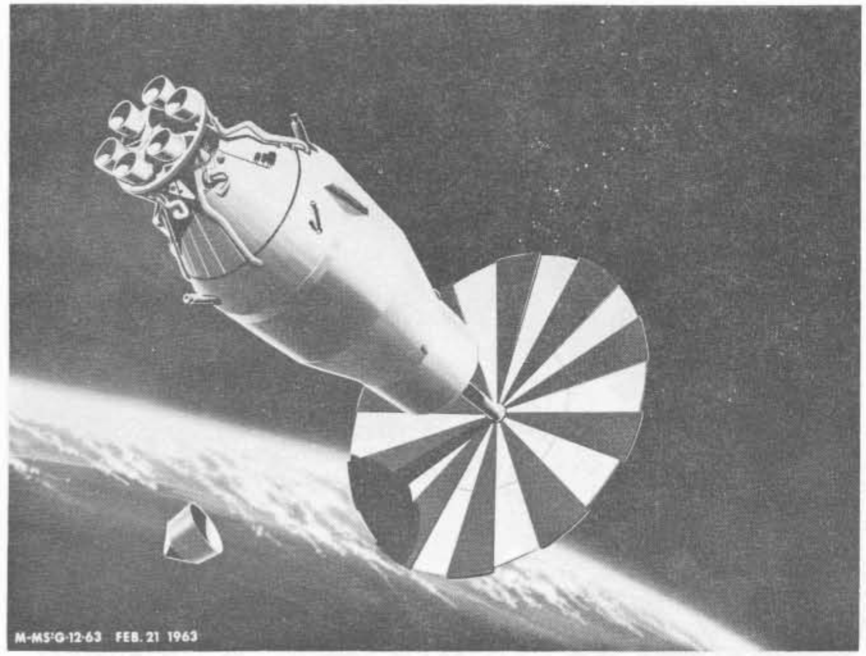
	OPTIMUM	MINIMUM
BASIC DIAMETER	46'	24'
TOT. MODULAR SURFACE AREA	1800 ft²	800 ft²
DOCKING	YES	NO
WEIGHT SUMMARY	4600	2300
FABRIC STRUCTURE	2400	1100
HUB STRUCTURE	700	250
SYSTEMS		
ATTITUDE CONTROL	270	270
INFLATE & DEPLOY	500	250
POWER	70	70
ELECTRICAL	60	60
DOCKING	100	

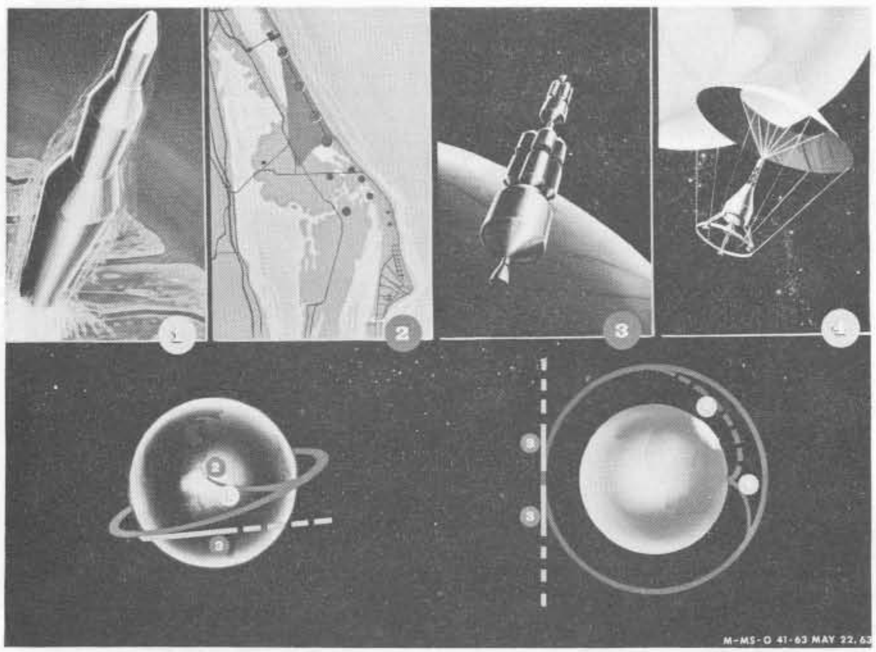


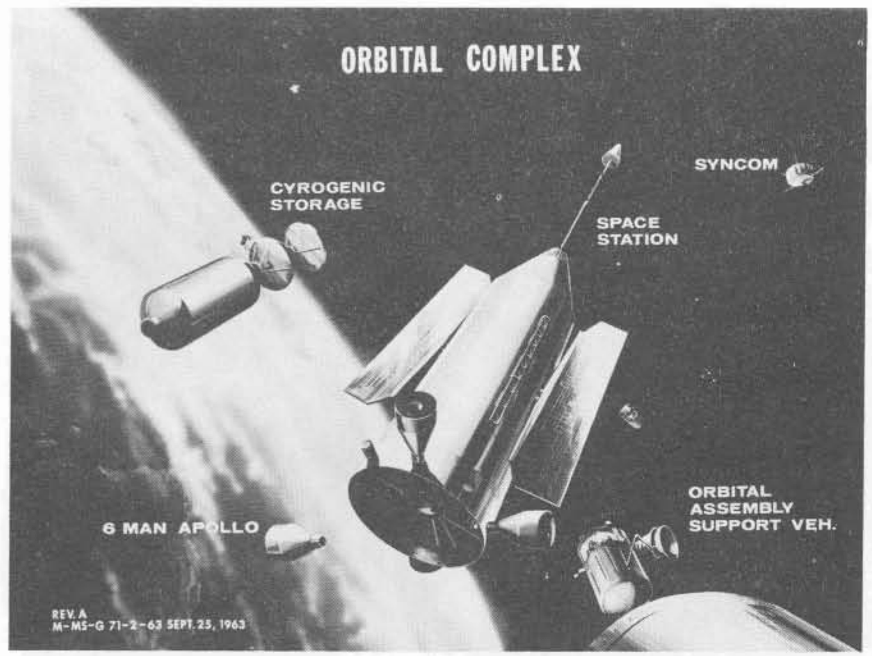


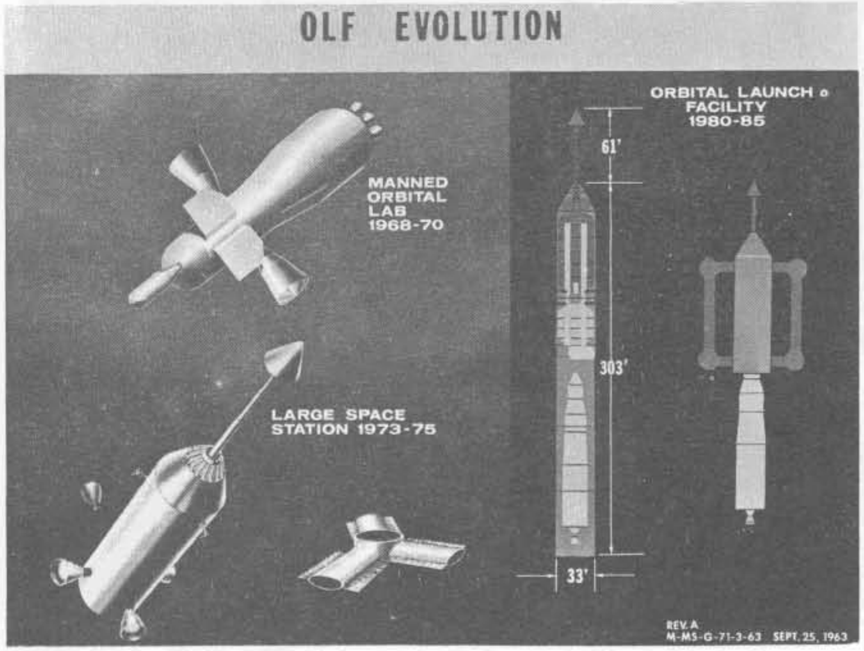


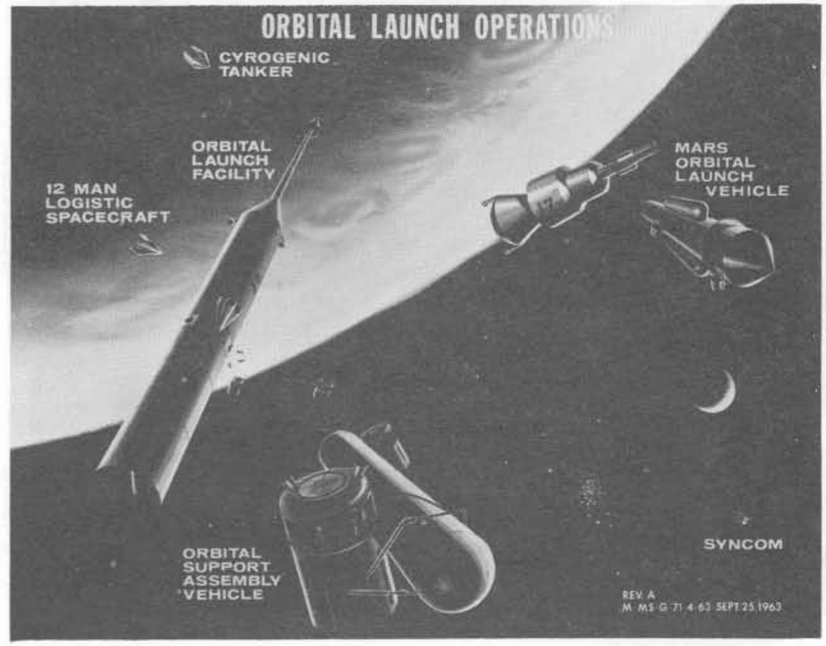

M·MS·G·109·8·62 OCT 23,62

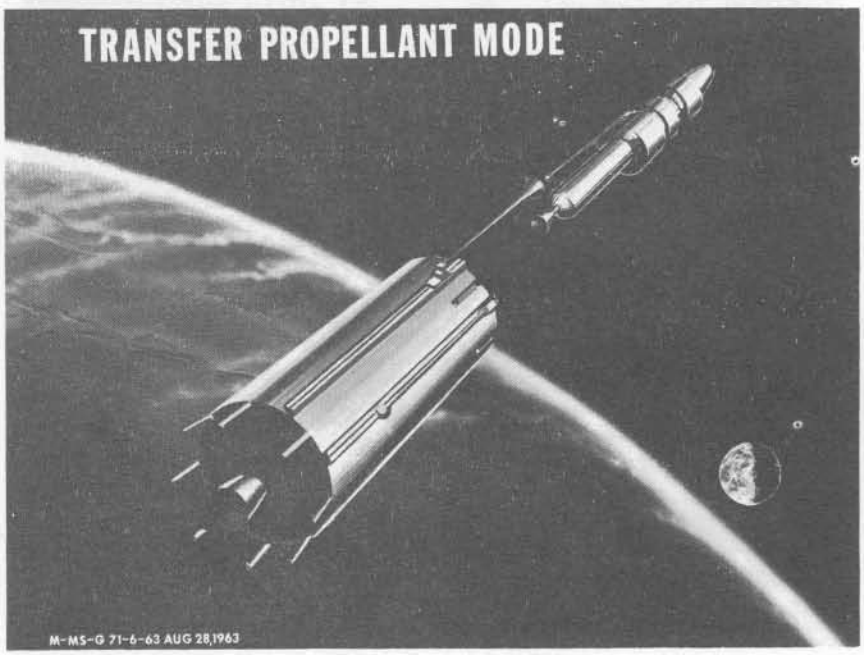

M-MS-G-12-63 FEB. 21 1963

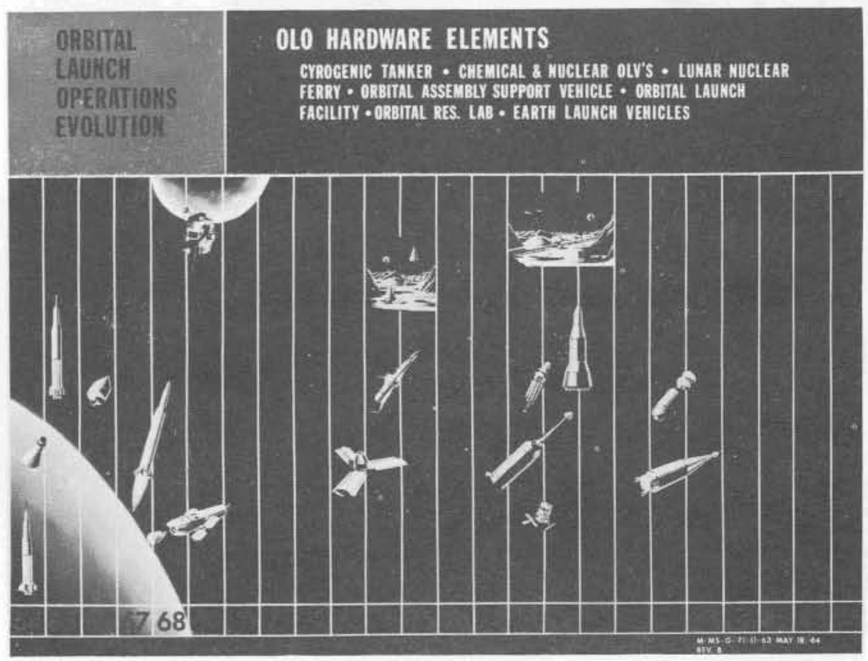

2
3
M-MS-G 41-63 MAY 22,63

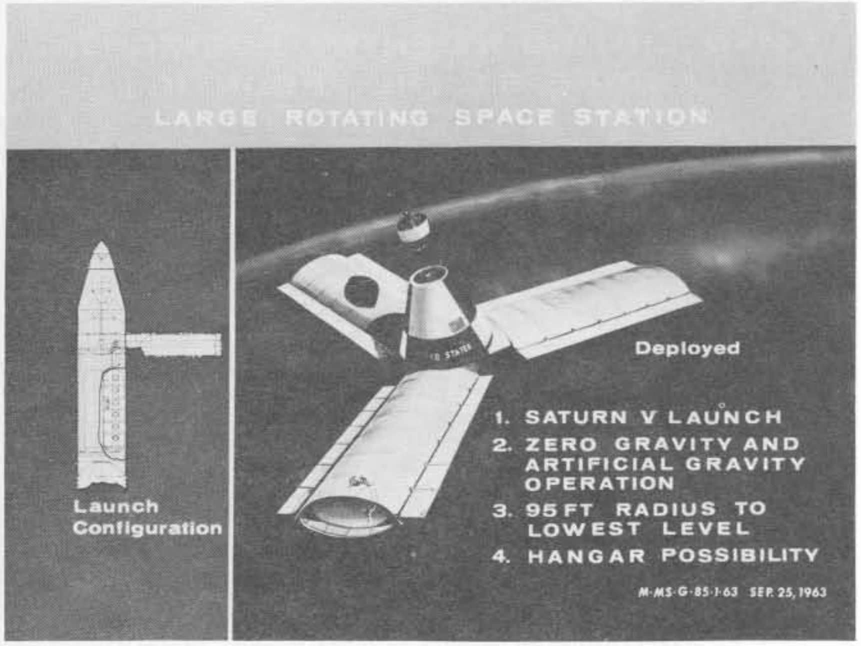

ORBITAL COMPLEX
SYNCOM
CYROGENIC STORAGE
SPACE STATION
6 MAN APOLLO
ORBITAL ASSEMBLY SUPPORT VEH.
REV. A
M-MS-G 71-2-63 SEPT. 25, 1963

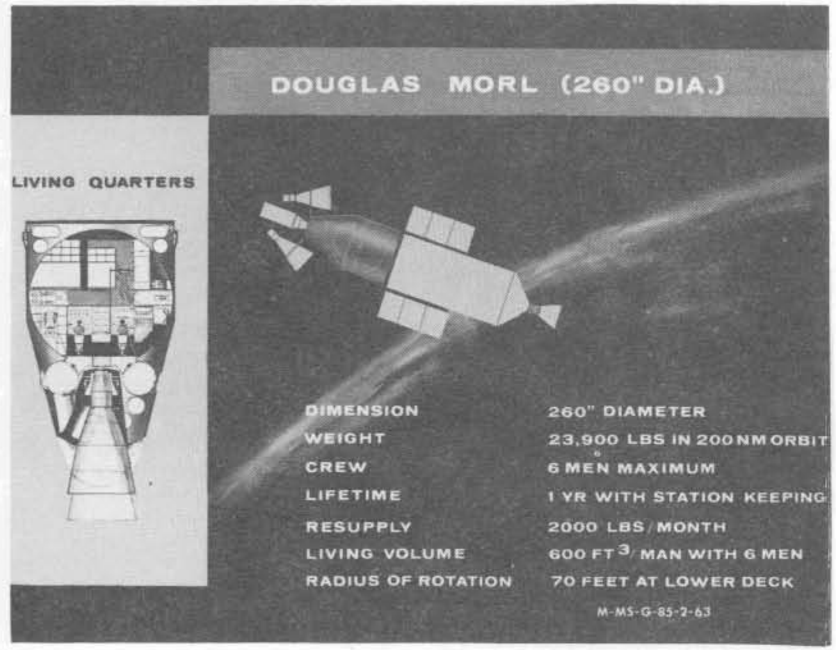

OLF EVOLUTION
MANNED ORBITAL LAB 1968-70
LARGE SPACE STATION 1973-75
ORBITAL LAUNCH FACILITY 1980-85
61'
303'
33'
REV. A
M-MS-G-71-3-63 SEPT. 25, 1963


ORBITAL LAUNCH OPERATIONS
CYROGENIC TANKER
ORBITAL LAUNCH FACILITY
12 MAN LOGISTIC SPACECRAFT
MARS ORBITAL LAUNCH VEHICLE
ORBITAL SUPPORT ASSEMBLY VEHICLE
SYNCOM
REV. A
M MS G 71 4-63 SEPT.25,1963


TRANSFER PROPELLANT MODE
M-MS-G 71-6-63 AUG 28,1963

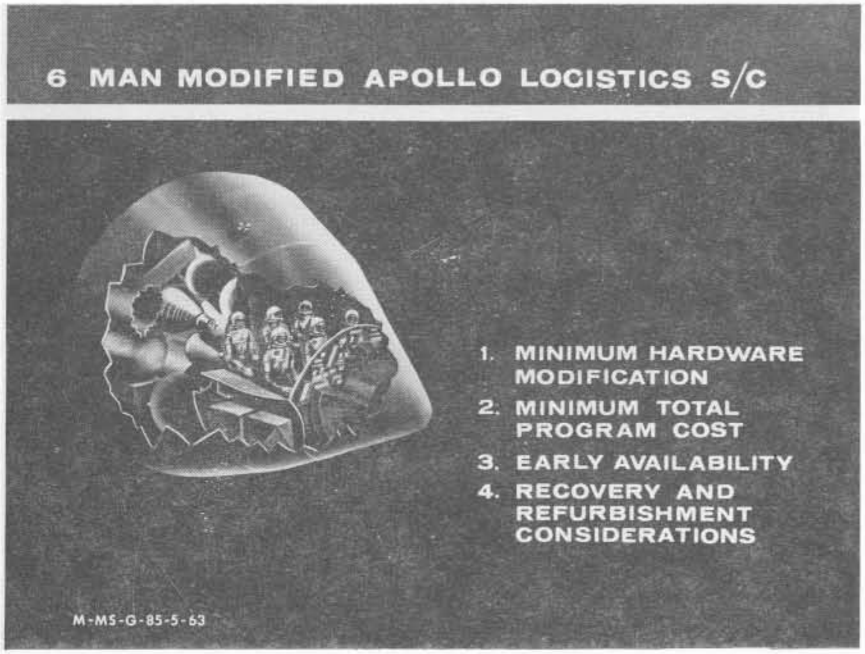

ORBITAL LAUNCH OPERATIONS EVOLUTION
OLO HARDWARE ELEMENTS
CYROGENIC TANKER • CHEMICAL & NUCLEAR OLV'S • LUNAR NUCLEAR FERRY • ORBITAL ASSEMBLY SUPPORT VEHICLE • ORBITAL LAUNCH FACILITY • ORBITAL RES. LAB • EARTH LAUNCH VEHICLES
'67 68

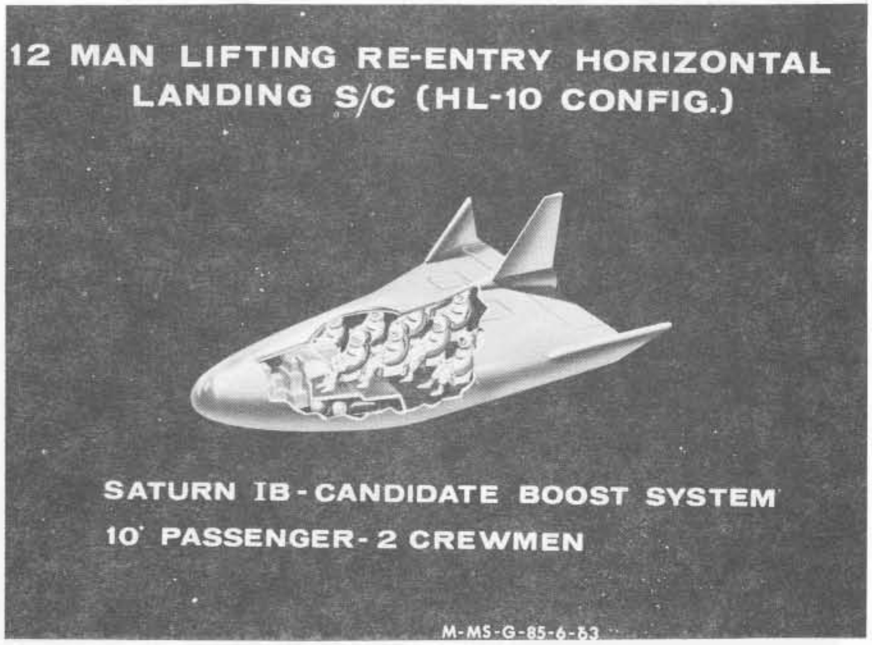

LARGE ROTATING SPACE STATION
Launch Configuration
Deployed
1. SATURN V LAUNCH
2. ZERO GRAVITY AND ARTIFICIAL GRAVITY OPERATION
3. 95 FT RADIUS TO LOWEST LEVEL
4. HANGAR POSSIBILITY
M-MS-G-85-1-63 SEP. 25, 1963

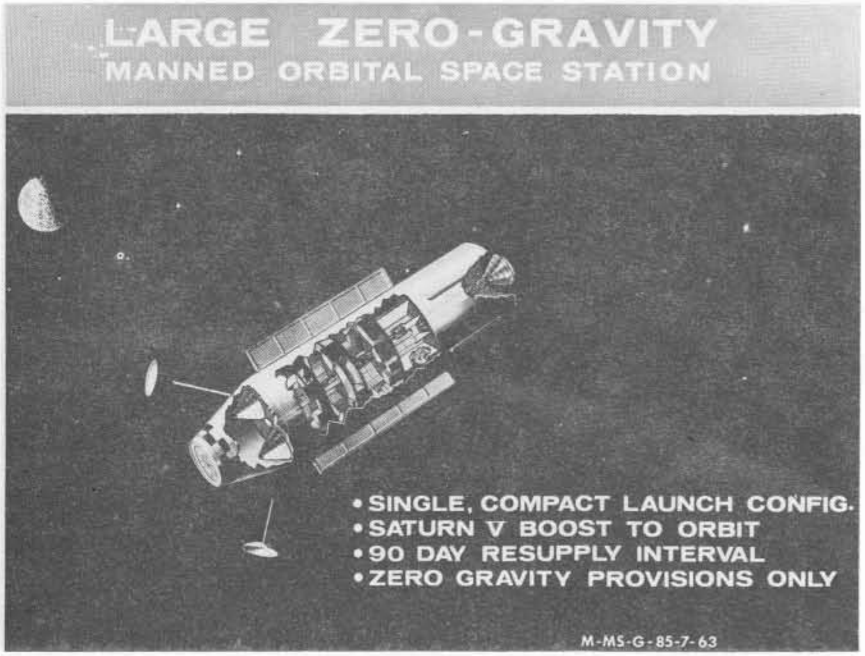

DOUGLAS MORL (260" DIA.)
LIVING QUARTERS
DIMENSION 260" DIAMETER
WEIGHT 23,900 LBS IN 200 NM ORBIT
CREW 6 MEN MAXIMUM
LIFETIME 1 YR WITH STATION KEEPING
RESUPPLY 2000 LBS/MONTH
LIVING VOLUME 600 FT3/MAN WITH 6 MEN
RADIUS OF ROTATION 70 FEET AT LOWER DECK
M-MS-G-85-2-63


BOEING MORL (154" DIA.)
CREW COMPARTMENTS
DIMENSION 154" DIAMETER
WEIGHT 15,780 LBS
SPIN RADIUS 52.5 FT
LIFETIME 1 YR WITH STATION KEEPING
LIVING VOLUME 278 FT3/MAN WITH 4 MEN
RESUPPLY CYCLE 90 DAYS
M-MS-G-85-3-63 SEPT 25, 1963

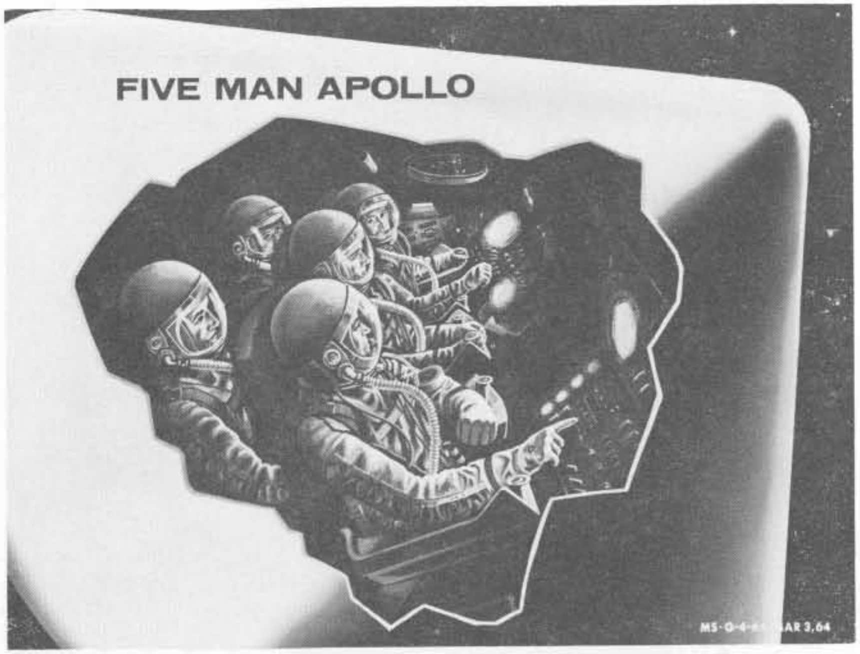

12 MAN BALLISTICS RE-ENTRY LOGISTICS SPACECRAFT
Candidate Boost System
Saturn IB
10 Passengers
2 Crewmen
M-MS-G-85-4-63

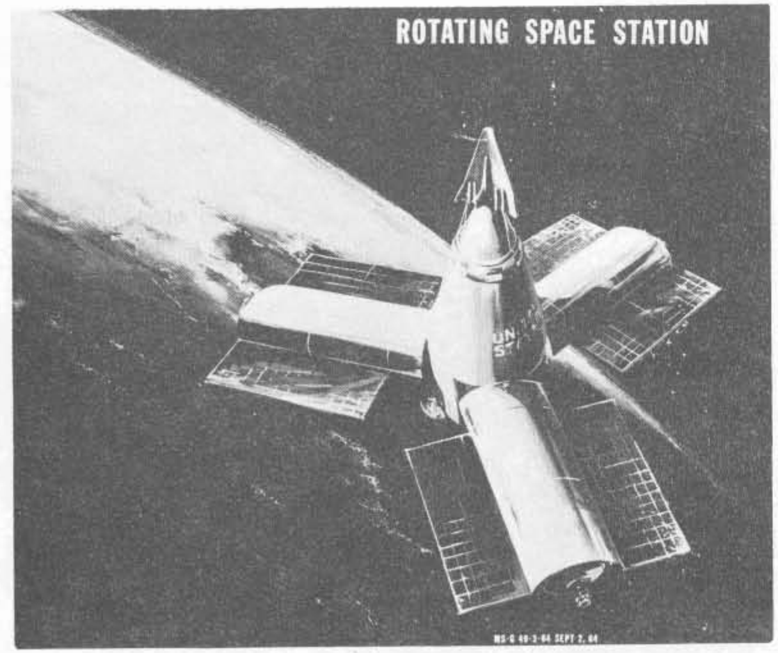

6 MAN MODIFIED APOLLO LOGISTICS S/C
1. MINIMUM HARDWARE MODIFICATION
2. MINIMUM TOTAL PROGRAM COST
3. EARLY AVAILABILITY
4. RECOVERY AND REFURBISHMENT CONSIDERATIONS
M-MS-G-85-5-63

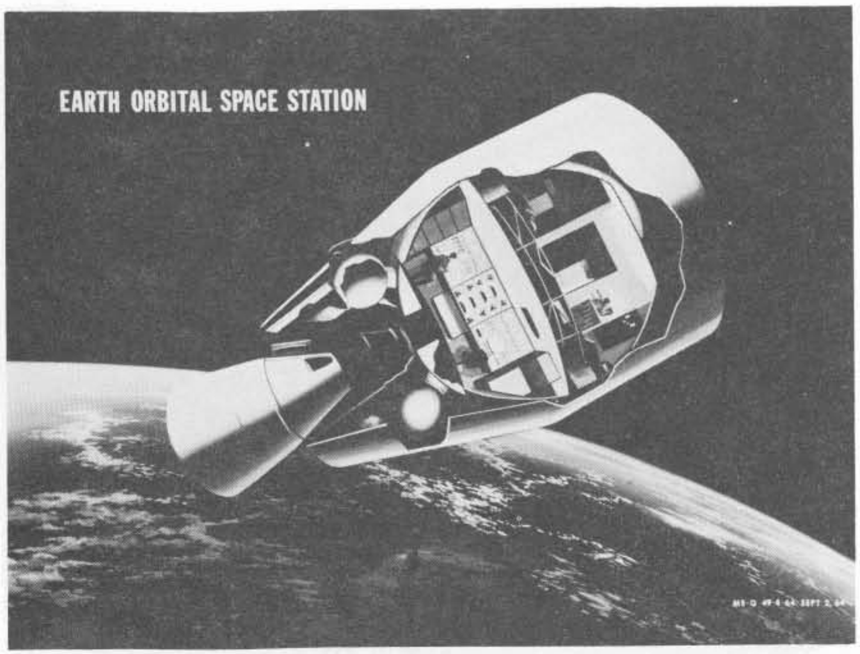

12 MAN LIFTING RE-ENTRY HORIZONTAL LANDING S/C (HL-10 CONFIG.)
SATURN IB-CANDIDATE BOOST SYSTEM
10 PASSENGER-2 CREWMEN
M-MS-G-85-6-63

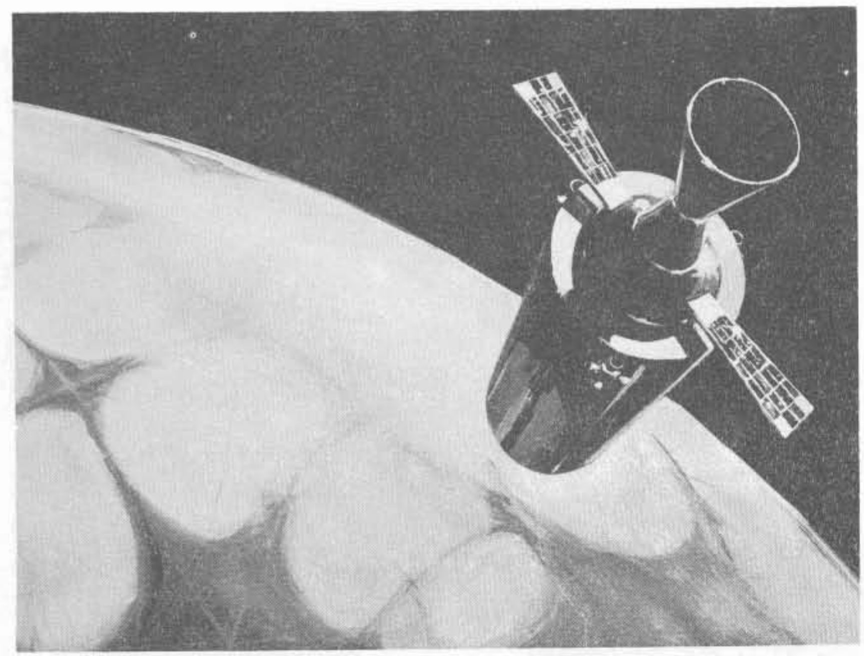

LARGE ZERO-GRAVITY
MANNED ORBITAL SPACE STATION
• SINGLE, COMPACT LAUNCH CONFIG.
• SATURN V BOOST TO ORBIT
• 90 DAY RESUPPLY INTERVAL
• ZERO GRAVITY PROVISIONS ONLY
M-MS-G-85-7-63

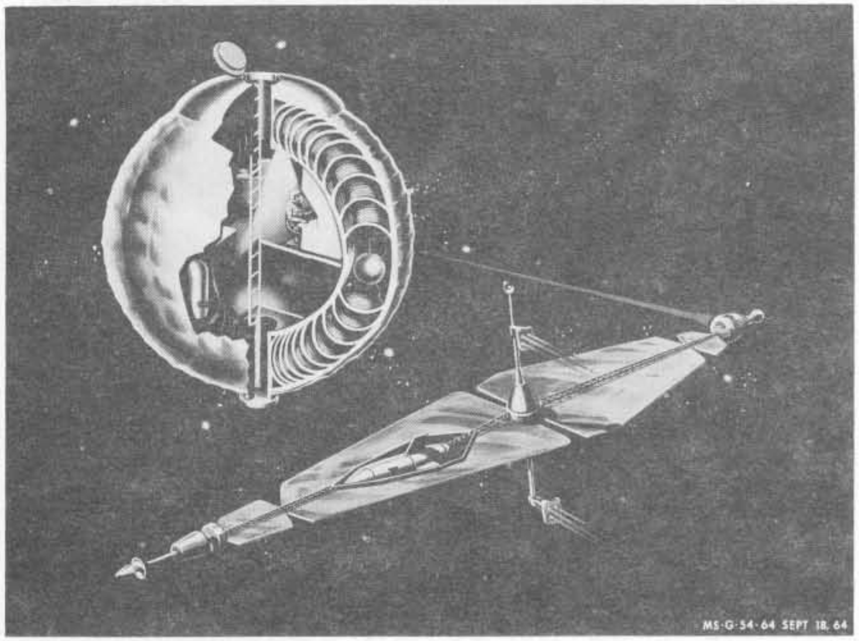

PROJECT "EMPIRE"
OCT 30, 1963 MS-G 93-63

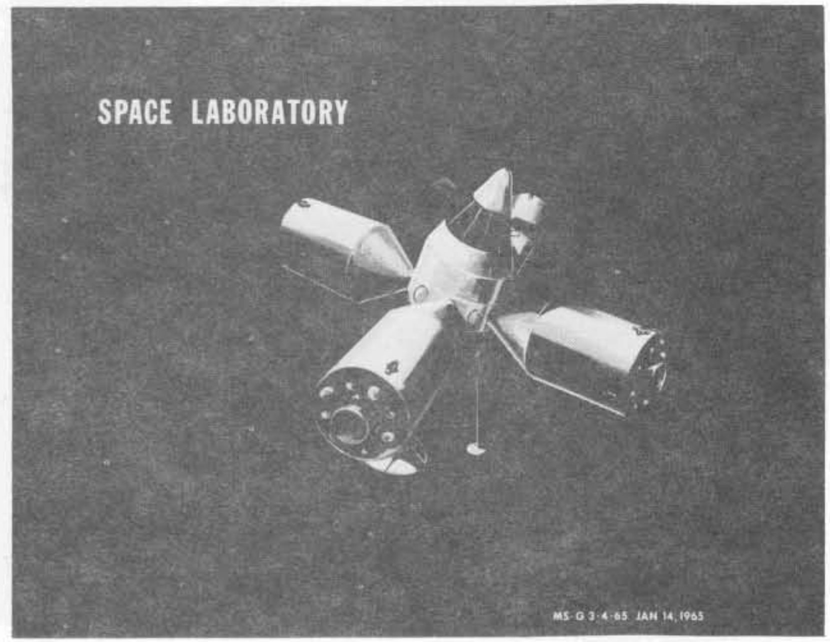

FIVE MAN APOLLO

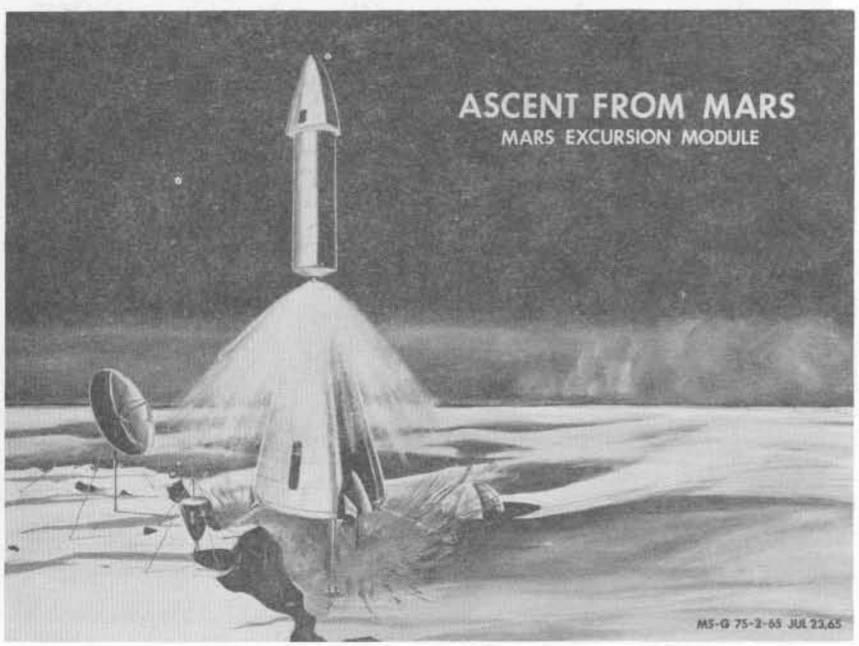

ROTATING SPACE STATION

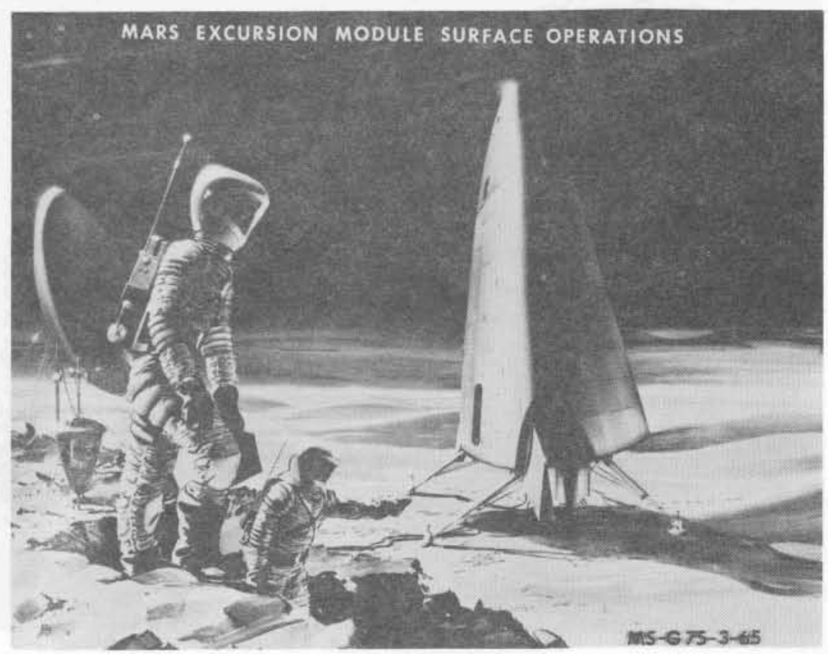

EARTH ORBITAL SPACE STATION

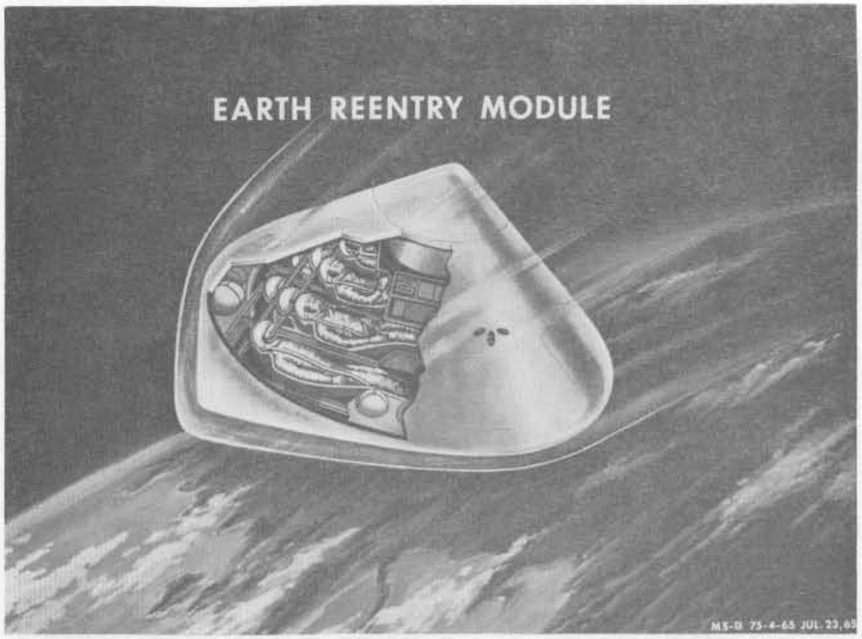



MS-G-54-64 SEPT 18, 64

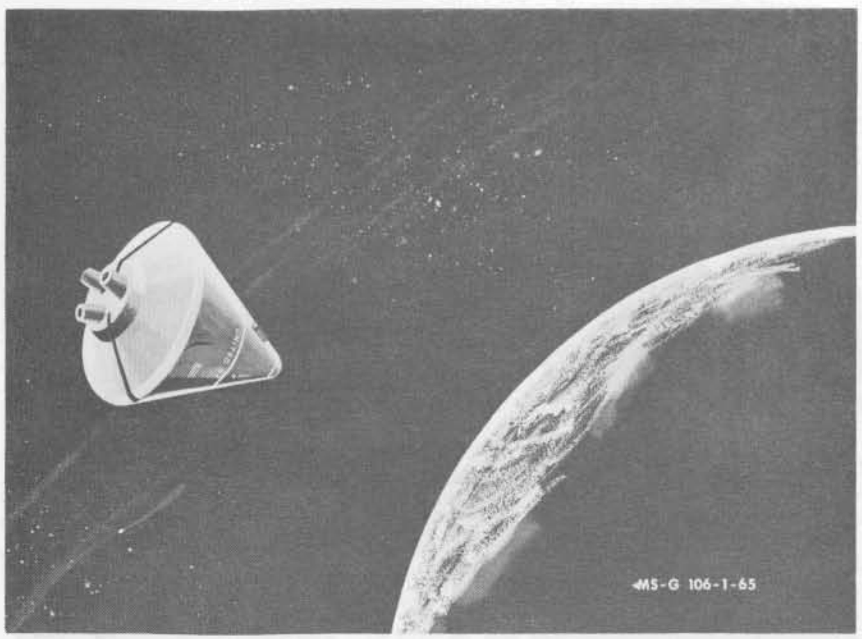

SPACE LABORATORY
MS-G 3-4-65 JAN 14, 1965

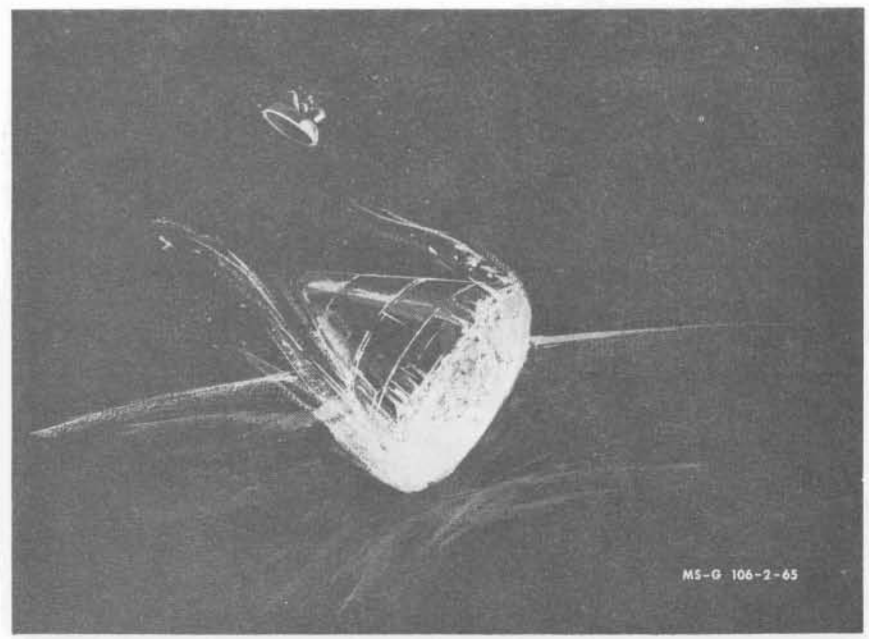

ASCENT FROM MARS
MARS EXCURSION MODULE
MS-G 75-2-65 JUL 23,65

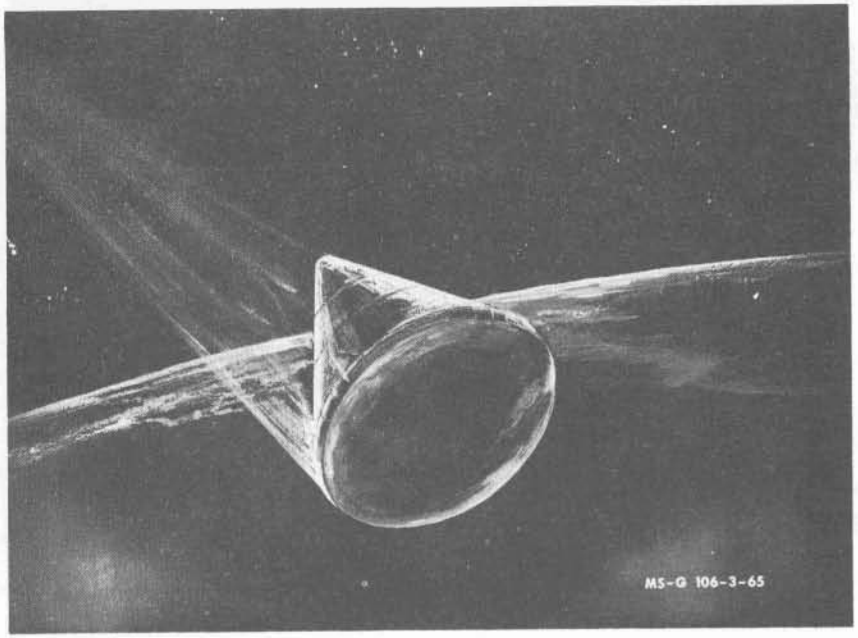

MARS EXCURSION MODULE SURFACE OPERATIONS
MS-G 75-3-65

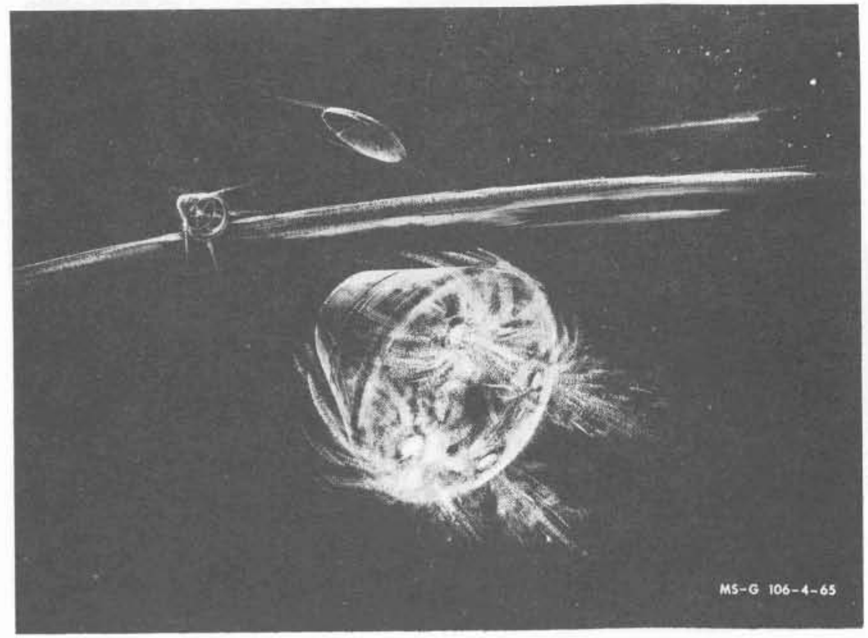

EARTH REENTRY MODULE
MS-G 75-4-65 JUL. 23,65

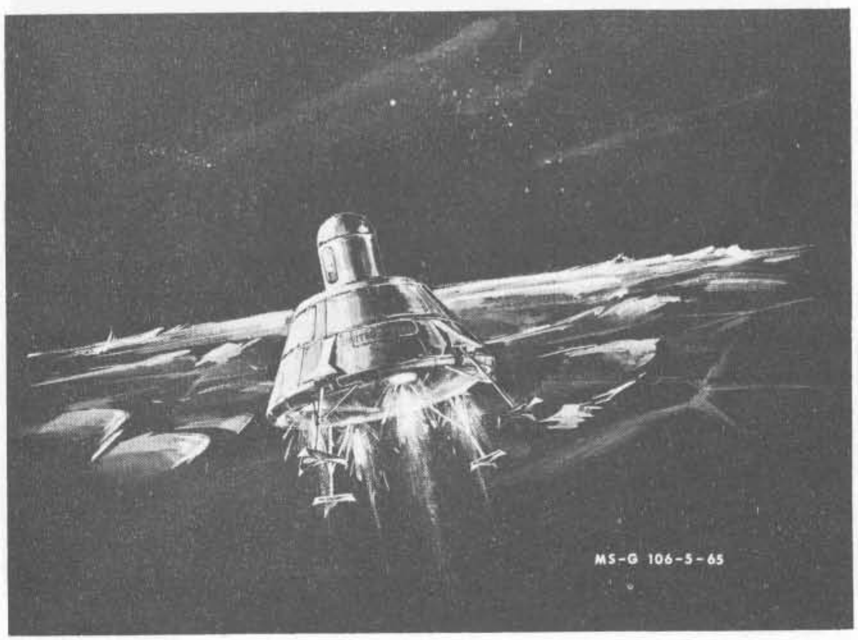

EARLY SYNODIC BASE ON MARS
MS-G 75-5-65 JUL 23,65

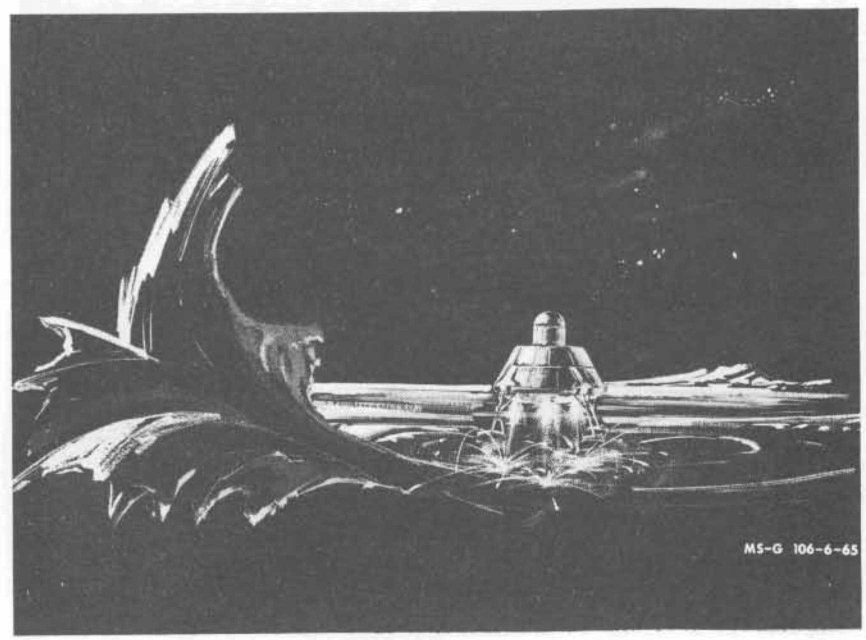

MS-G 106-1-65

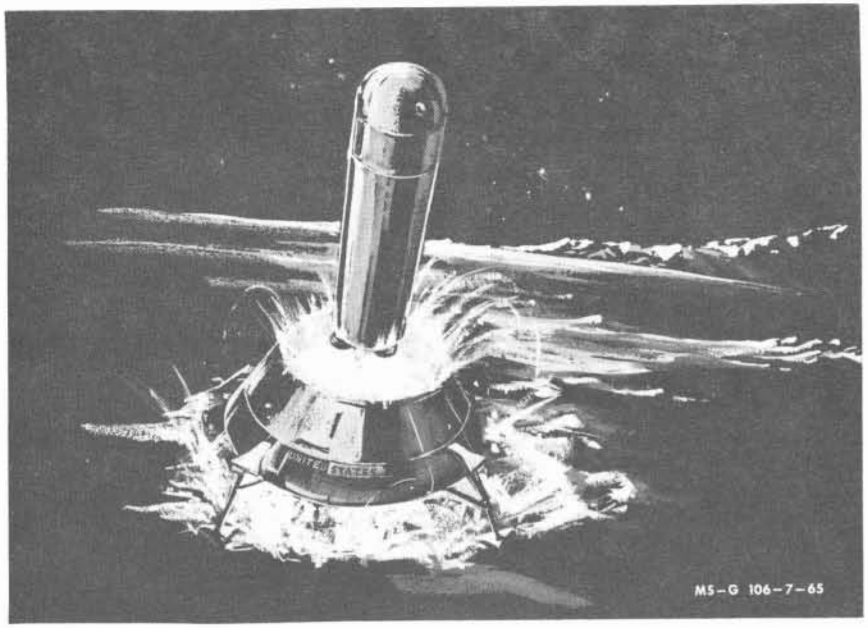

MS-G 106-2-65

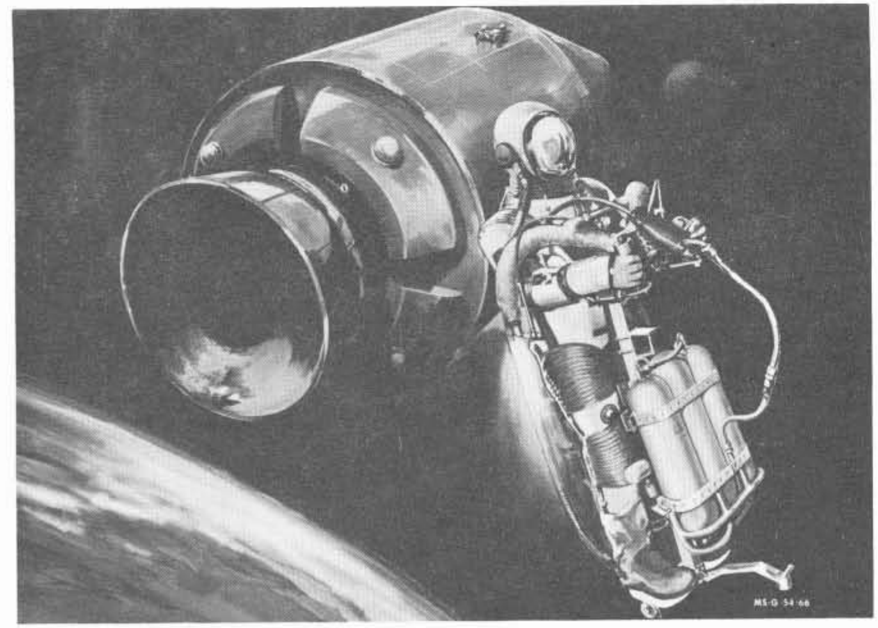

MS-G 106-3-65


MS-G 106-4-65


MS-G 106-5-65


MS-G 106-6-65


MS-G 106-7-65


MS-G 54-66

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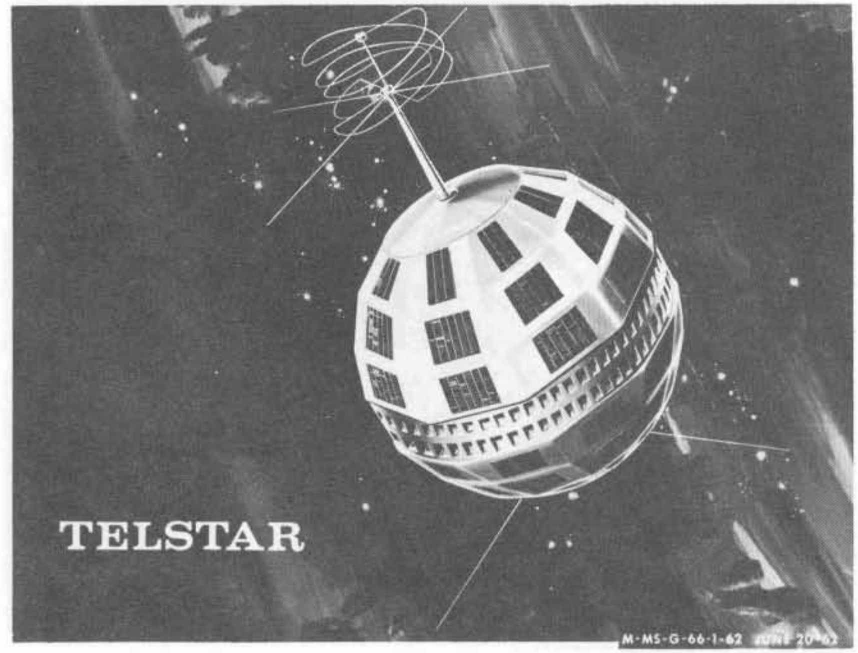
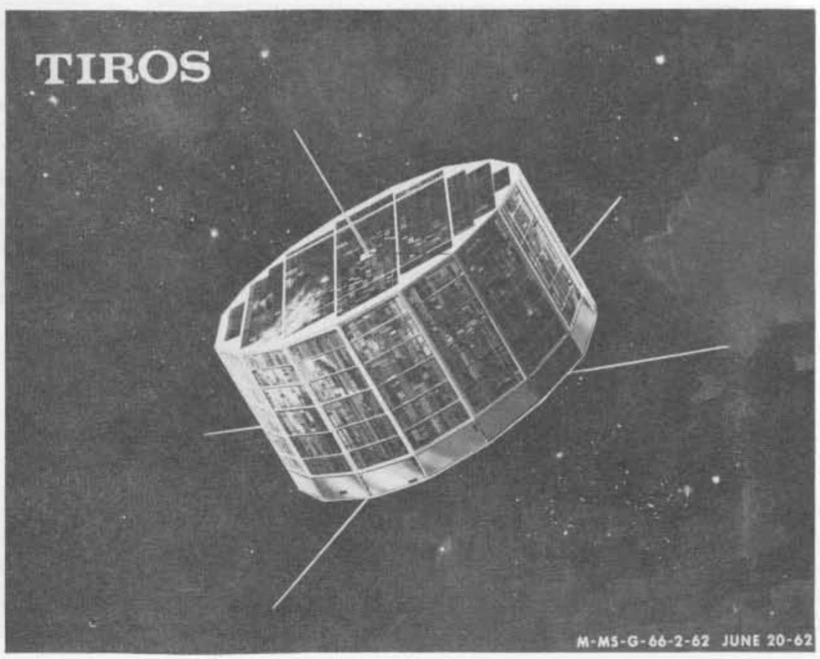
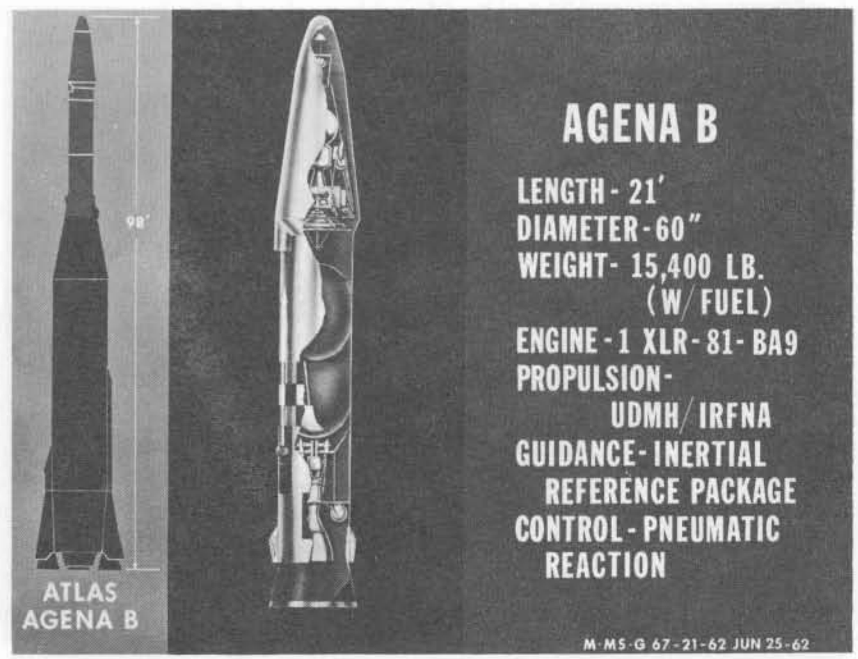
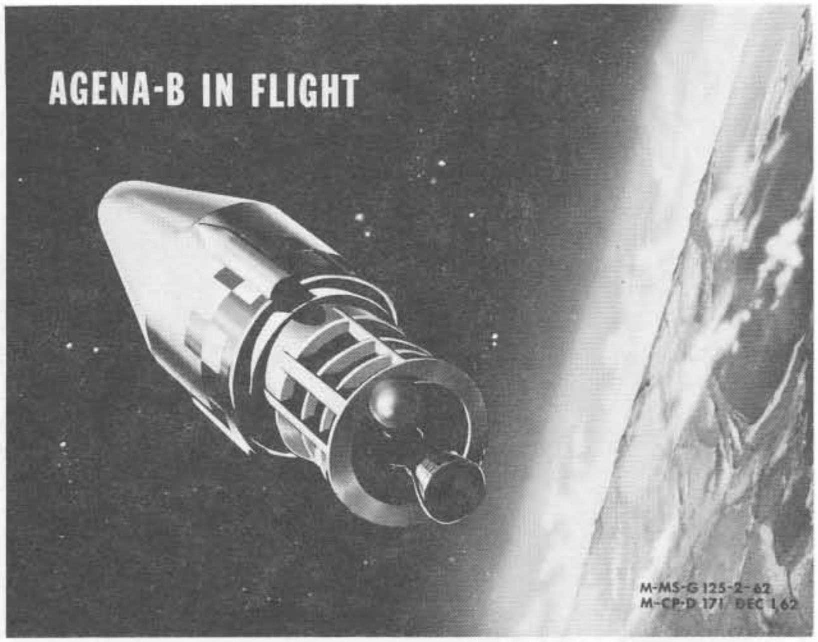
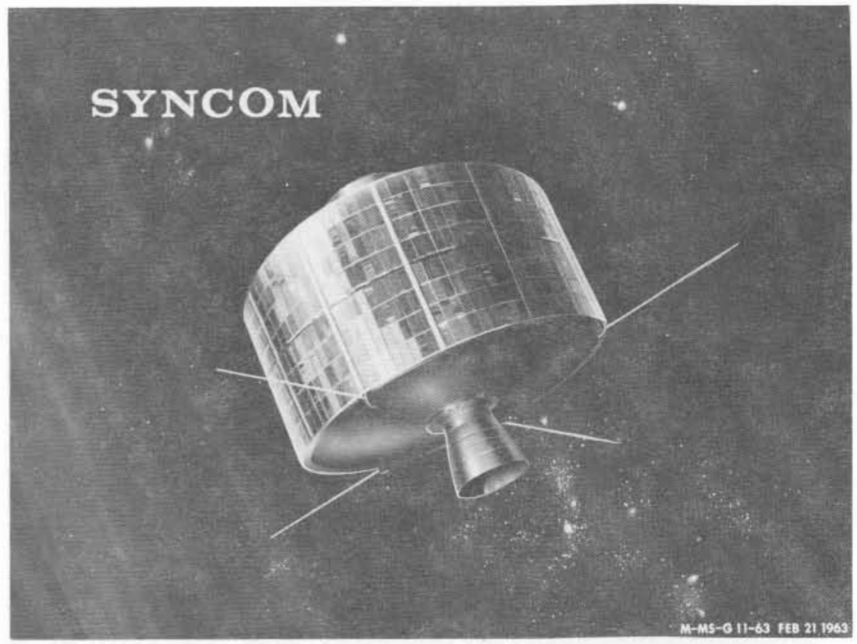
TRANSIT 1B
M-MS-G-52-62 APR. 8, 1962

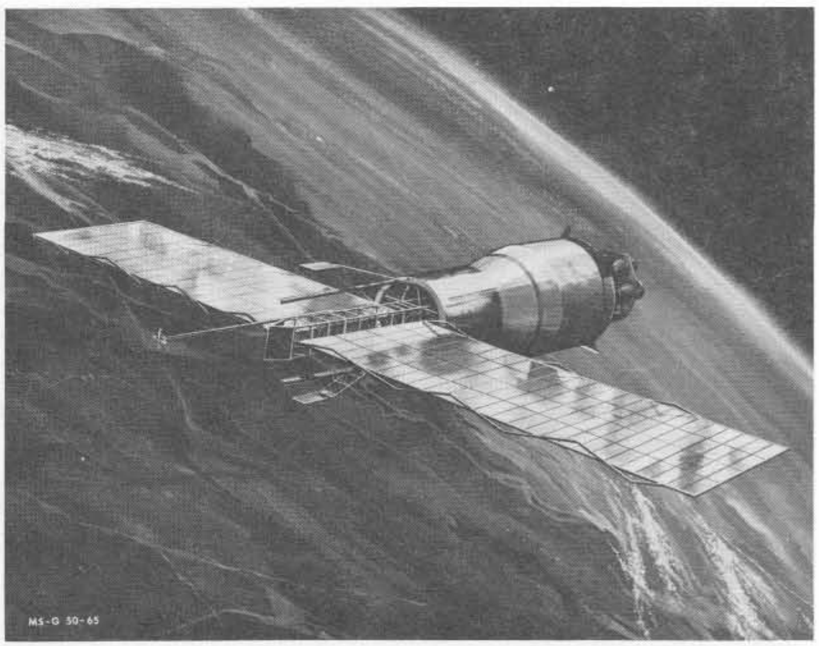

TELSTAR
M-MS-G-66-1-62

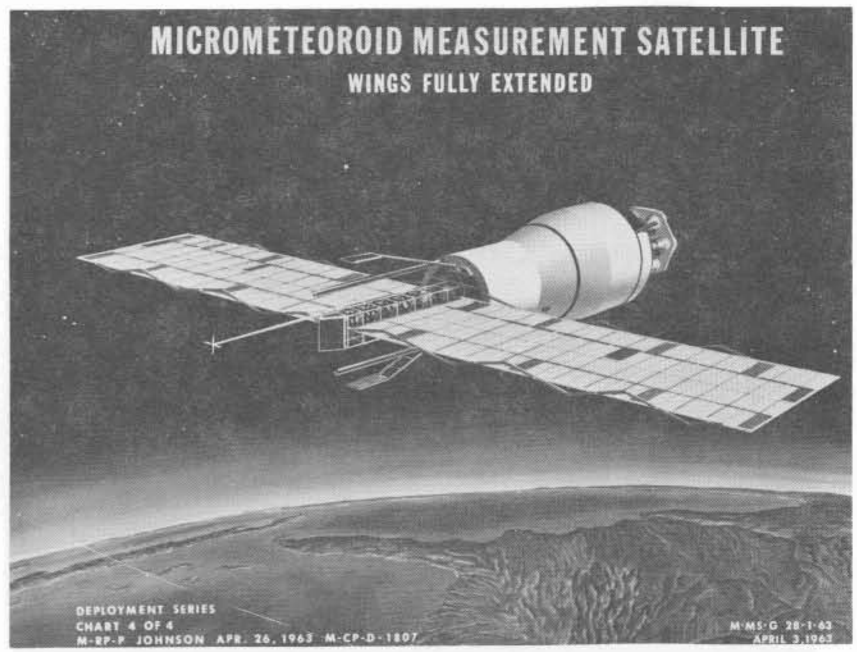

TIROS
M-MS-G-66-2-62 JUNE 20-62

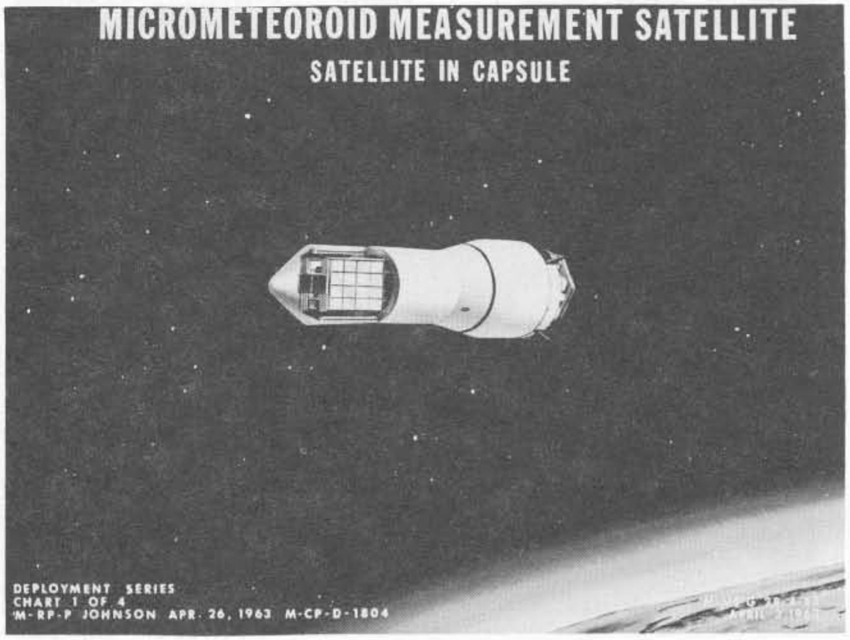

98'
ATLAS
AGENA B
AGENA B
LENGTH - 21'
DIAMETER - 60"
WEIGHT - 15,400 LB.
(W/FUEL)
ENGINE - 1 XLR - 81 - BA9
PROPULSION -
UDMH/IRFNA
GUIDANCE - INERTIAL
REFERENCE PACKAGE
CONTROL - PNEUMATIC
REACTION
M-MS-G 67-21-62 JUN 25-62

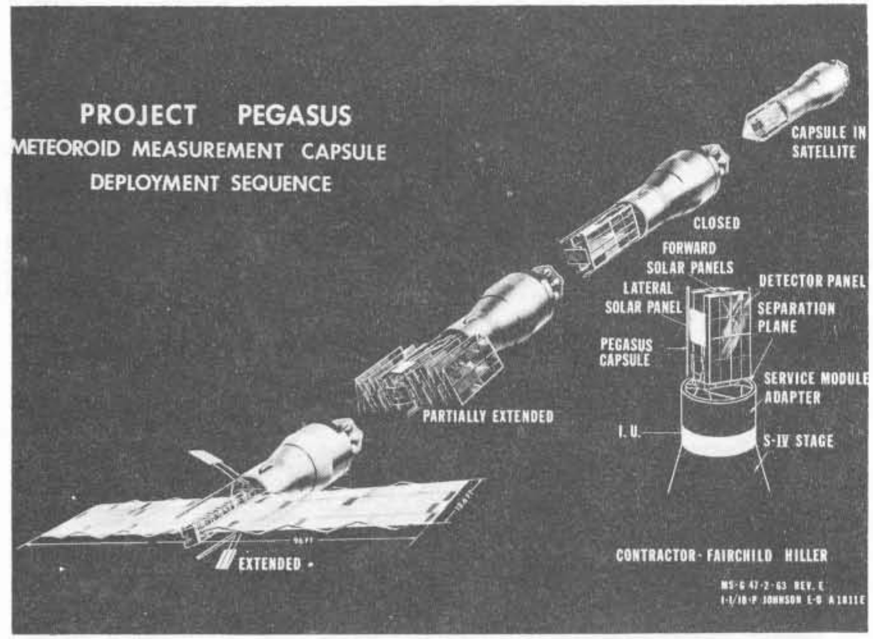

AGENA-B IN FLIGHT
M-MS-G 125-2-62
M-CP-D 171 DEC 1,62

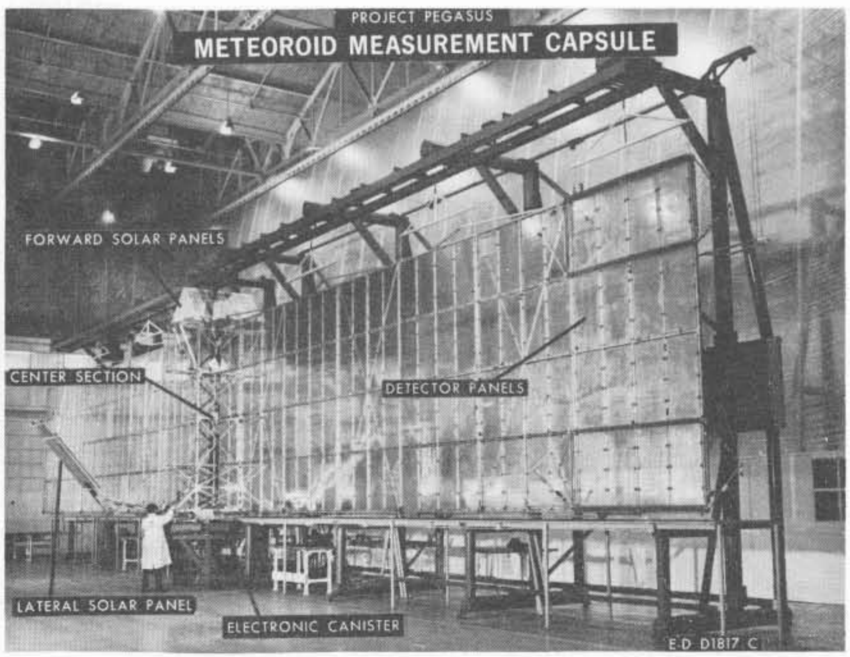

SYNCOM
M-MS-G 11-63 FEB 21 1963

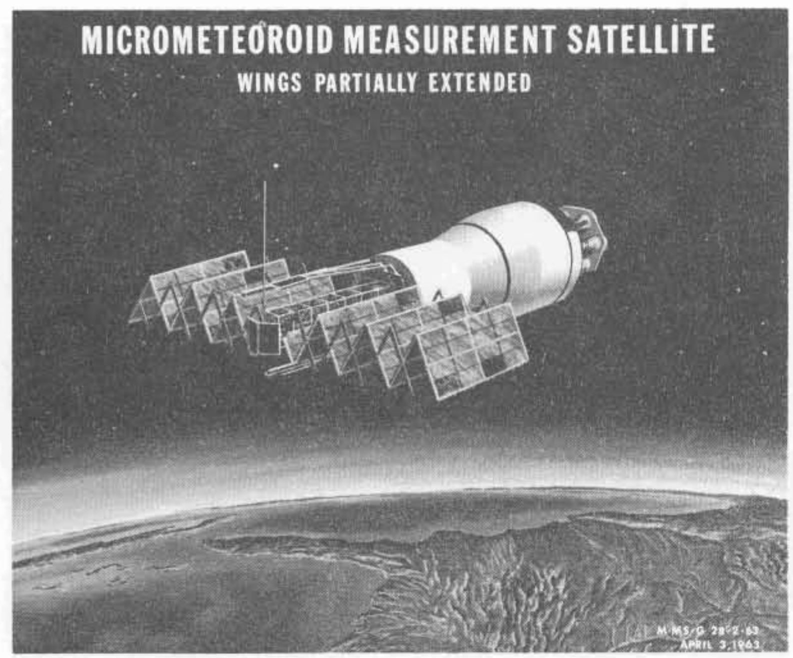

MS-G 50-65

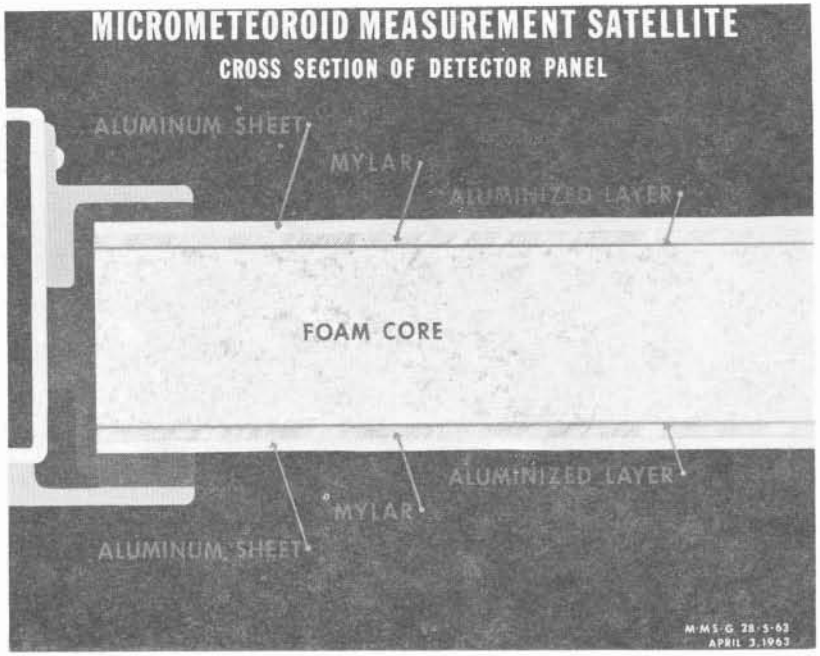

MICROMETEOROID MEASUREMENT SATELLITE
WINGS FULLY EXTENDED
DEPLOYMENT SERIES
CHART 4 OF 4
M-RP-P JOHNSON APR. 26, 1963 M-CP-D-1807
M-MS-G 28-1-63
APRIL 3,1963

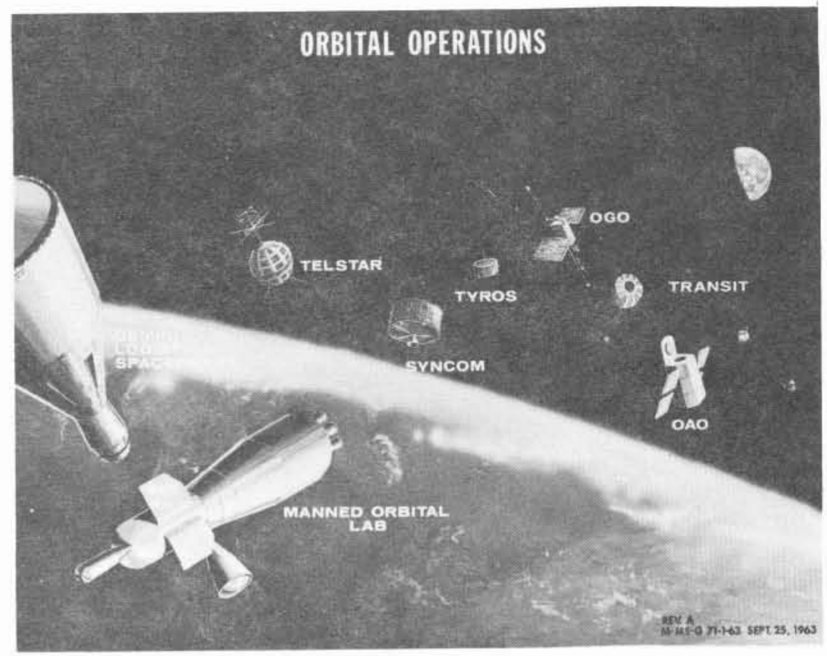

MICROMETEOROID MEASUREMENT SATELLITE
SATELLITE IN CAPSULE
DEPLOYMENT SERIES
CHART 1 OF 4
M-RP-P JOHNSON APR. 26, 1963 M-CP-D-1804

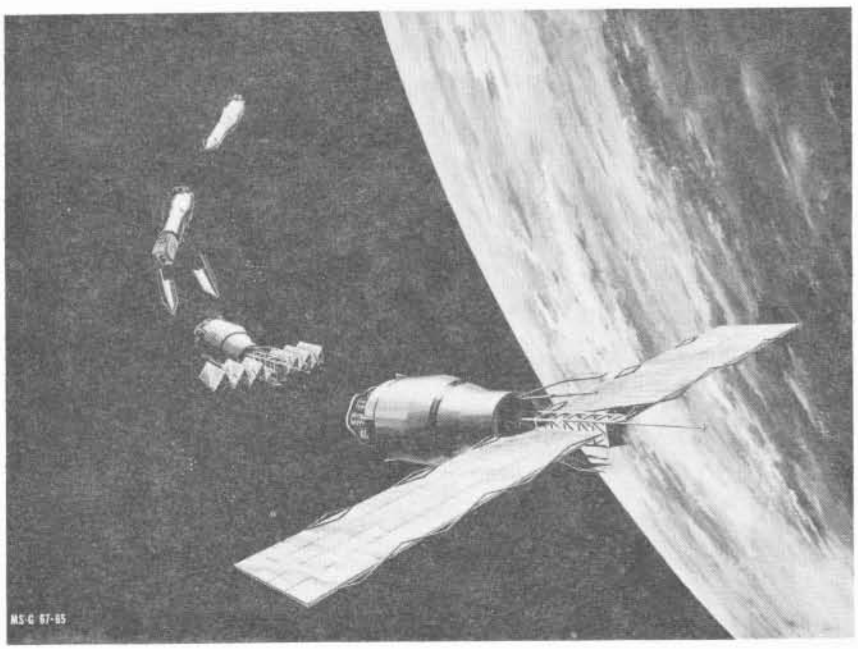

PROJECT PEGASUS
METEOROID MEASUREMENT CAPSULE
DEPLOYMENT SEQUENCE
CAPSULE IN SATELLITE
CLOSED
FORWARD SOLAR PANELS
DETECTOR PANEL
LATERAL SOLAR PANEL
SEPARATION PLANE
PEGASUS CAPSULE
SERVICE MODULE ADAPTER
PARTIALLY EXTENDED
I. U.
S-IV STAGE
EXTENDED
CONTRACTOR- FAIRCHILD HILLER


PROJECT PEGASUS
METEOROID MEASUREMENT CAPSULE
FORWARD SOLAR PANELS
CENTER SECTION
DETECTOR PANELS
LATERAL SOLAR PANEL
ELECTRONIC CANISTER
E.D. D1817 C


MICROMETEOROID MEASUREMENT SATELLITE
WINGS PARTIALLY EXTENDED
M-MS-G 28-2-63
APRIL 3, 1963


MICROMETEOROID MEASUREMENT SATELLITE
CROSS SECTION OF DETECTOR PANEL
ALUMINUM SHEET
MYLAR
ALUMINIZED LAYER
FOAM CORE
ALUMINIZED LAYER
MYLAR
ALUMINUM SHEET
M-MS-G 28-5-63
APRIL 3, 1963


ORBITAL OPERATIONS
OGO
TELSTAR
TYROS
TRANSIT
SYNCOM
OAO
MANNED ORBITAL LAB
REV A
M-MS-G 71-1-63 SEPT 25, 1963


MS-G 67-65

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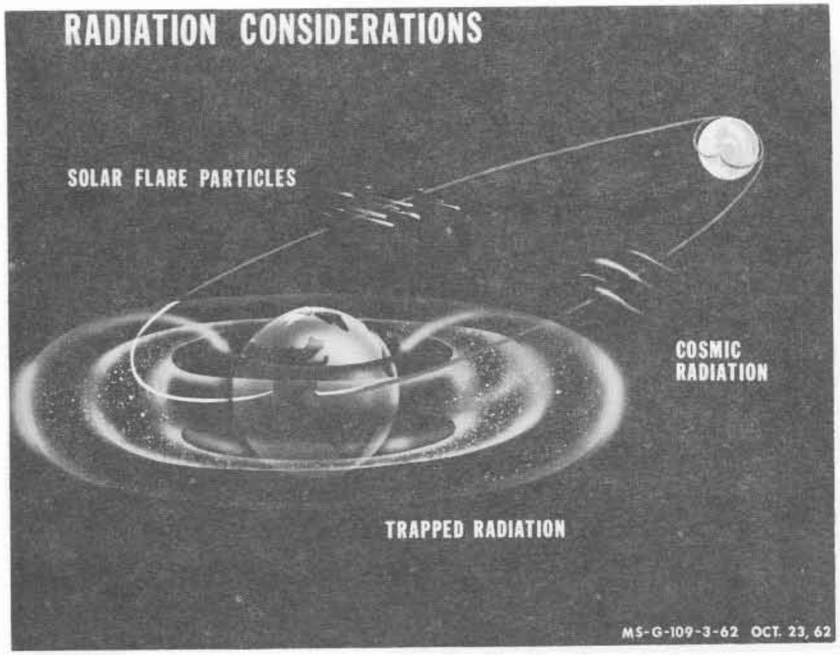
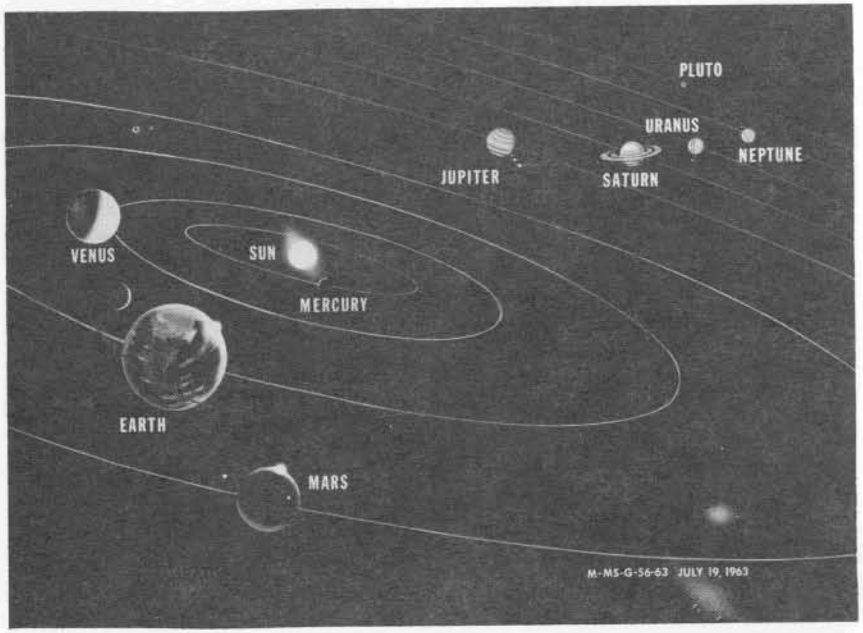
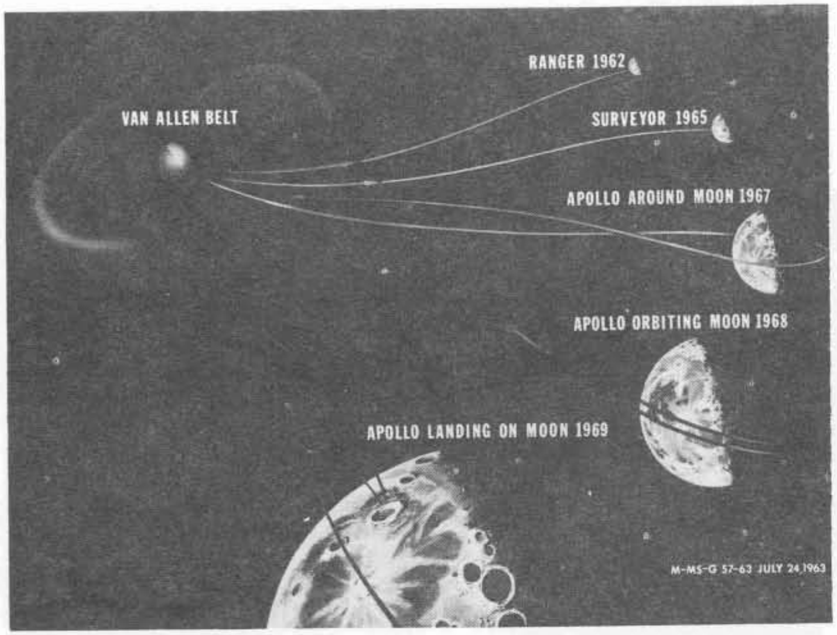
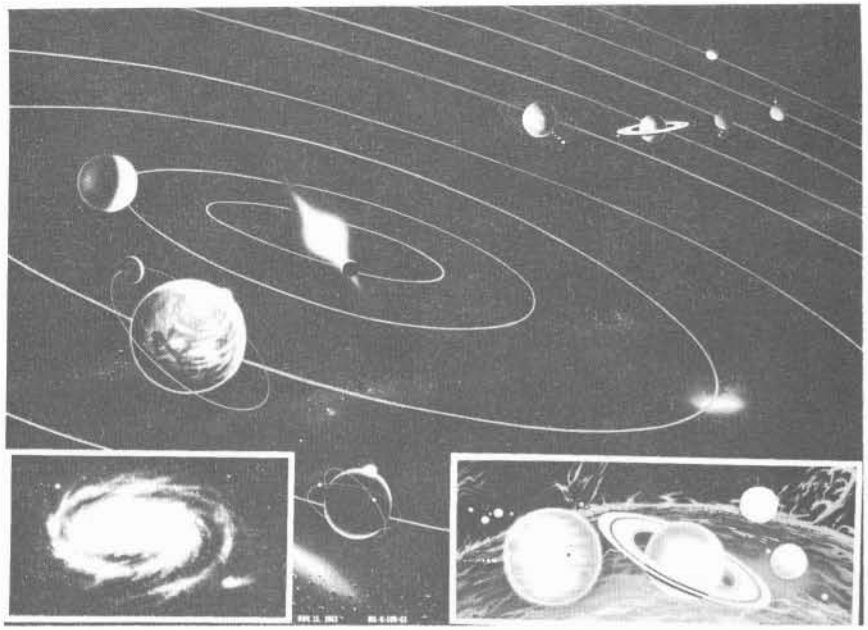
THE OBJECTIVE...
M-MS-G 67-2-62 JUNE 25,1962

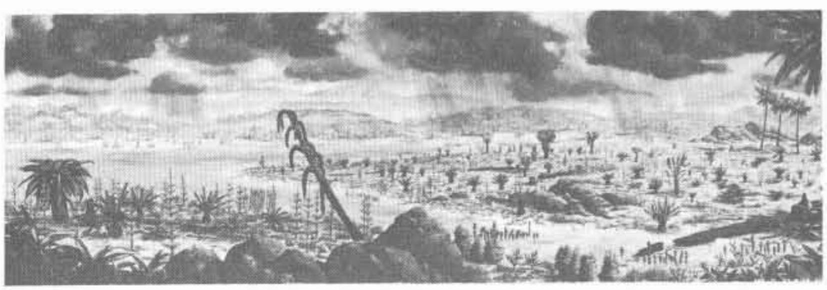

RADIATION CONSIDERATIONS
SOLAR FLARE PARTICLES
COSMIC RADIATION
TRAPPED RADIATION
MS-G-109-3-62 OCT. 23, 62

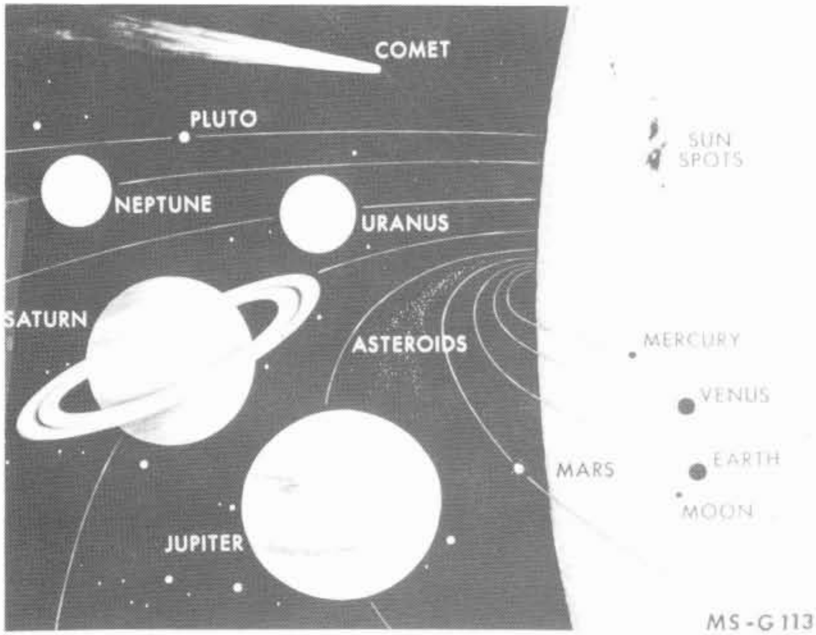

PLUTO
URANUS
NEPTUNE
JUPITER
SATURN
VENUS
SUN
MERCURY
EARTH
MARS
M-MS-G-56-63 JULY 19, 1963

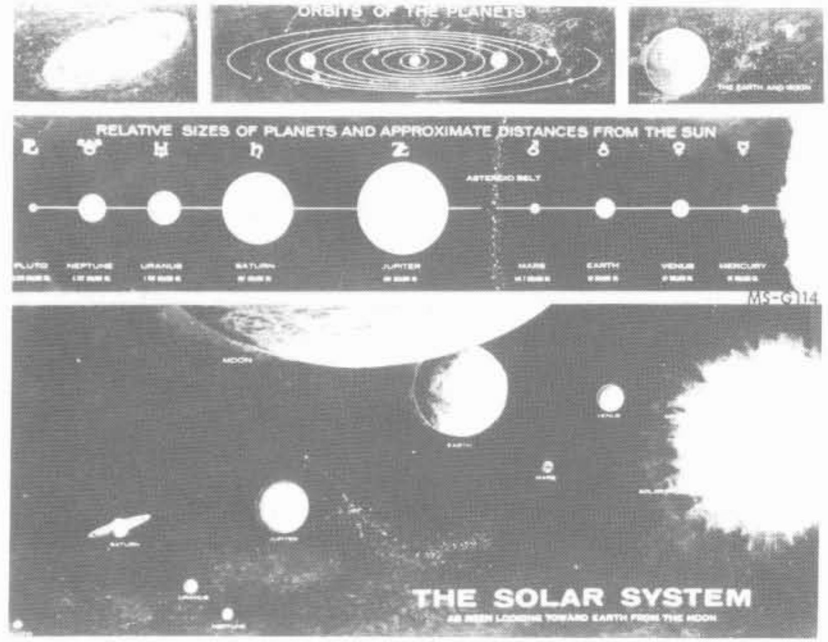

RANGER 1962
VAN ALLEN BELT
SURVEYOR 1965
APOLLO AROUND MOON 1967
APOLLO ORBITING MOON 1968
APOLLO LANDING ON MOON 1969
M-MS-G 57-63 JULY 24,1963



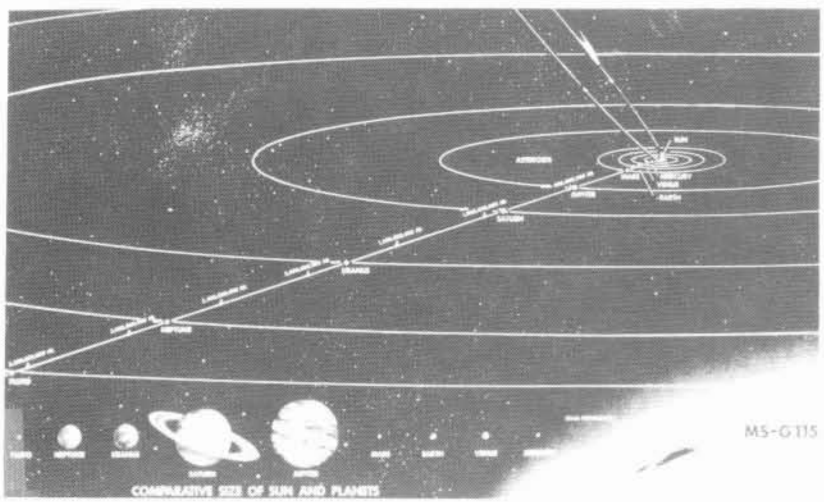

MS-G 56-65
JUNE 14, 1965

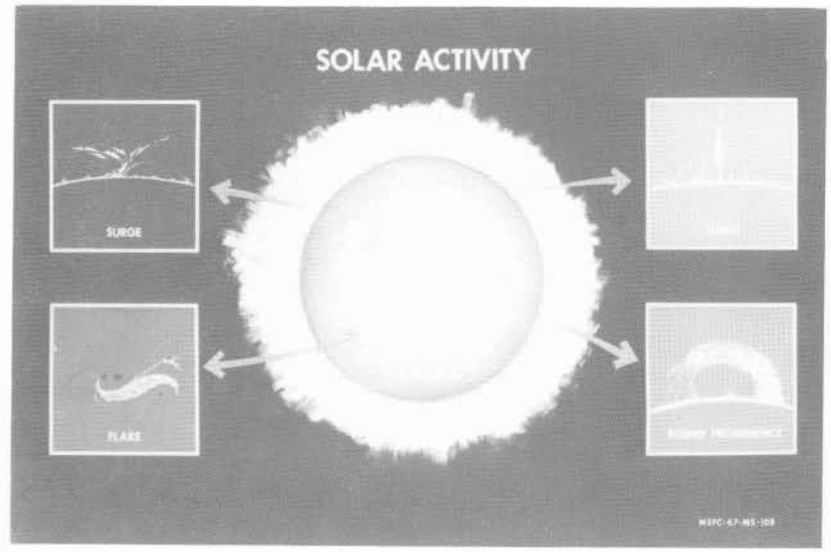






THE SOLAR SYSTEM





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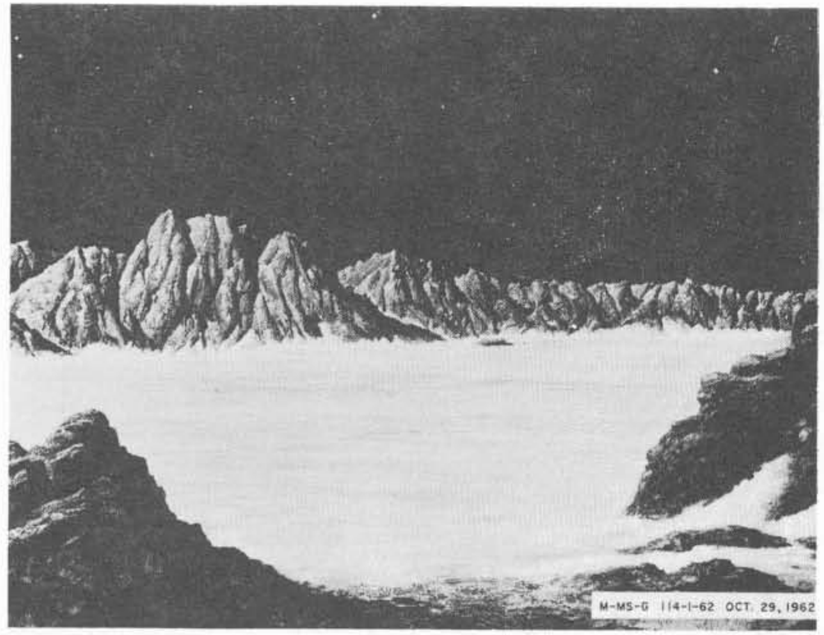
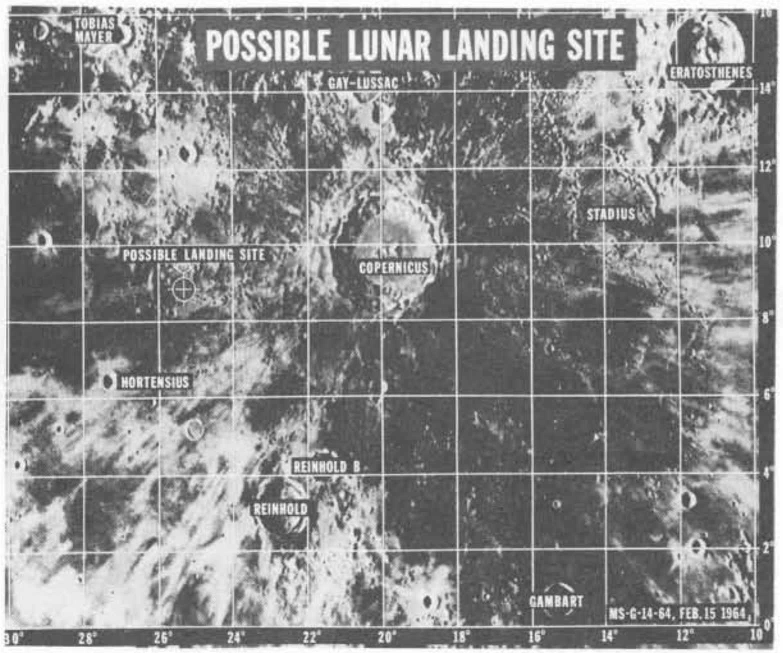
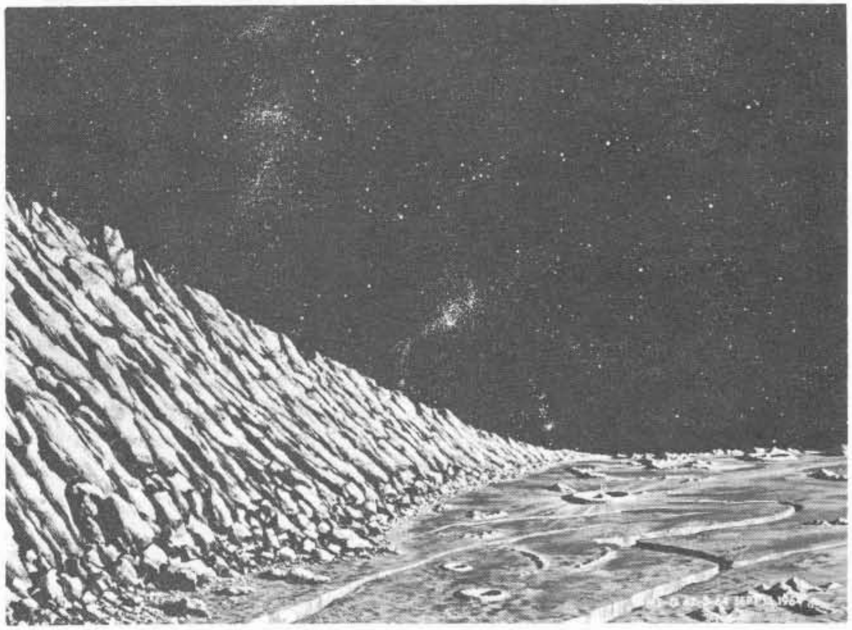
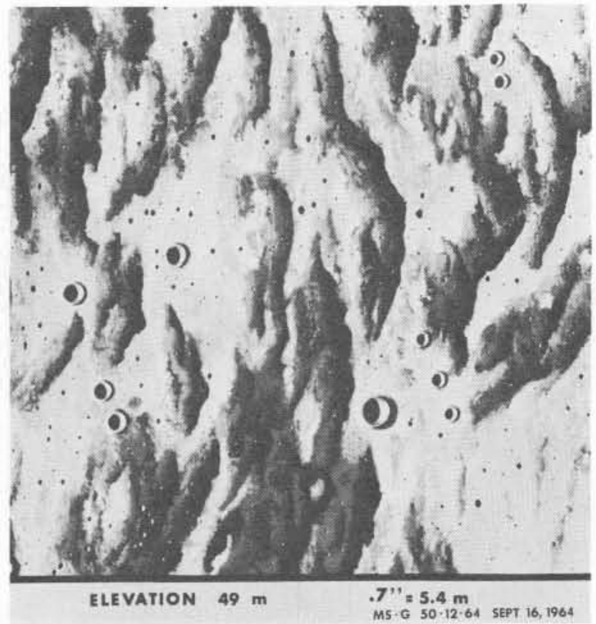
THE MOON
MS-G 112-62

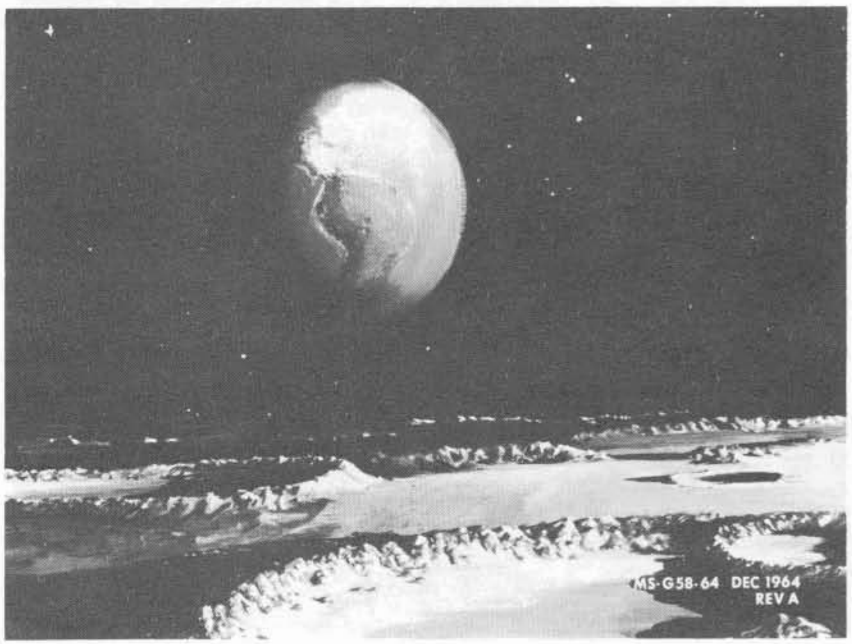

M-MS-G 114-1-62 OCT. 29, 1962

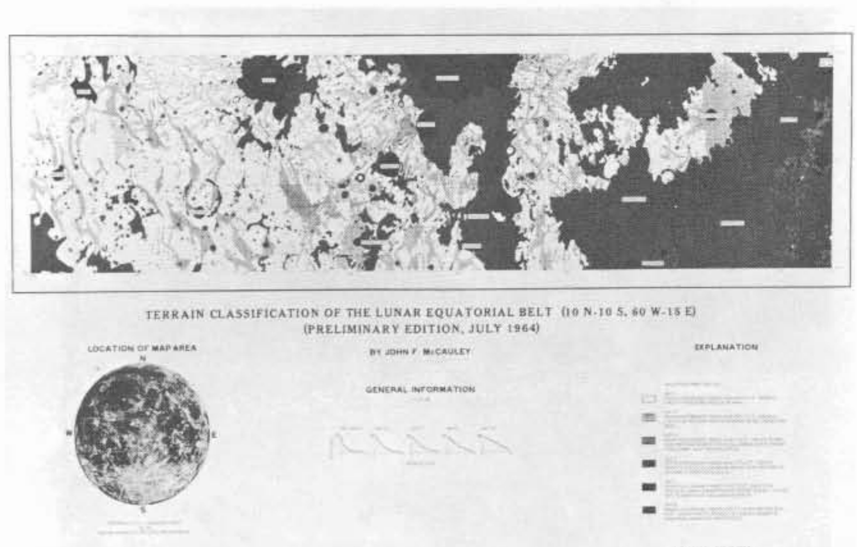

POSSIBLE LUNAR LANDING SITE
TOBIAS MAYER
GAY-LUSSAC
ERATOSTHENES
STADIUS
POSSIBLE LANDING SITE
COPERNICUS
HORTENSIUS
REINHOLD B
REINHOLD
GAMBART
MS-G-14-64, FEB. 15 1964

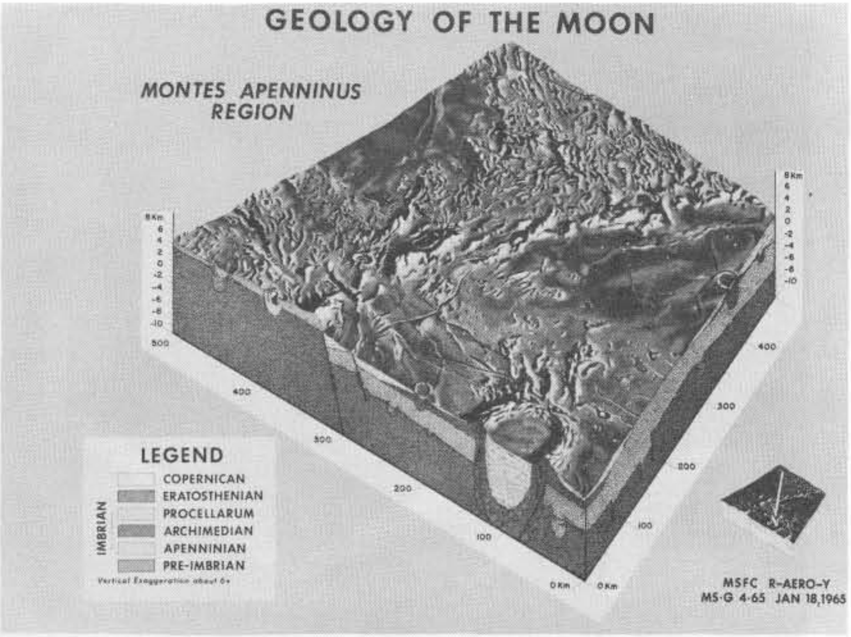

MS-G 47-1-64 SEPT 13, 1964

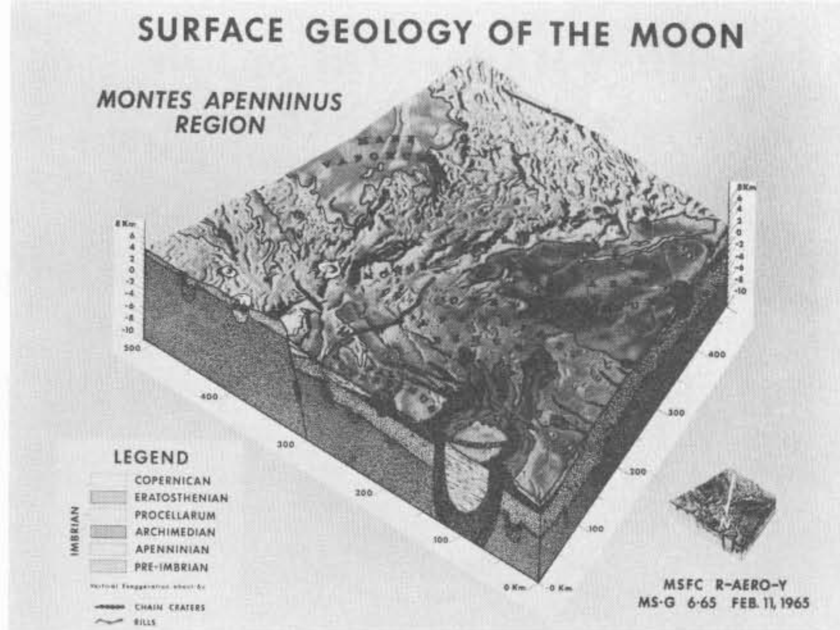


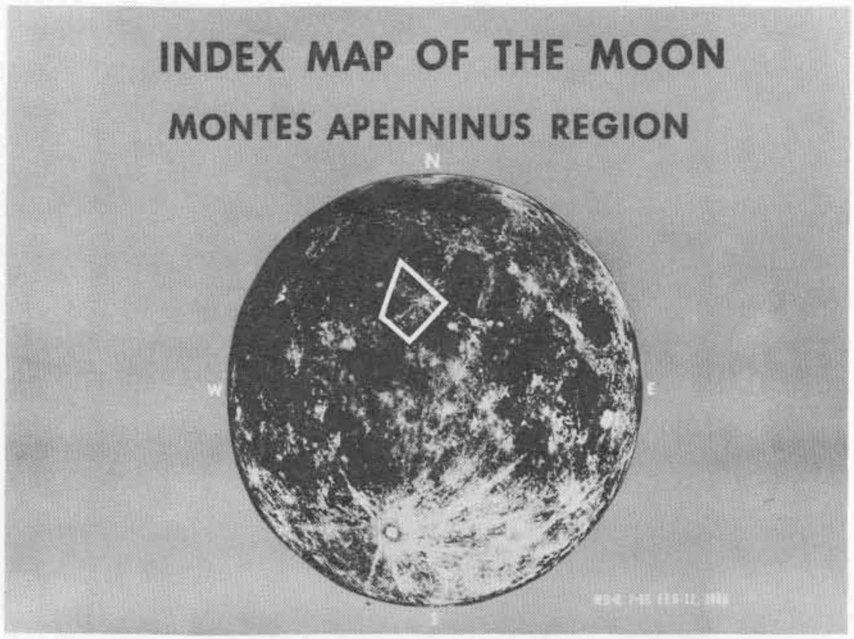

ELEVATION 49 m
.7'' = 5.4 m
MS-G 50-12-64 SEPT 16, 1964

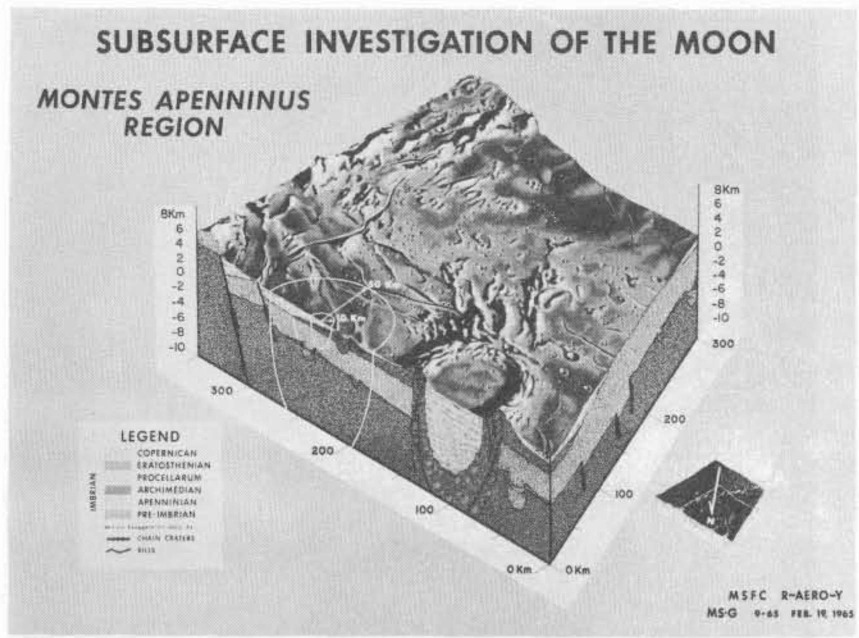

MS-G58-64 DEC 1964
REV A

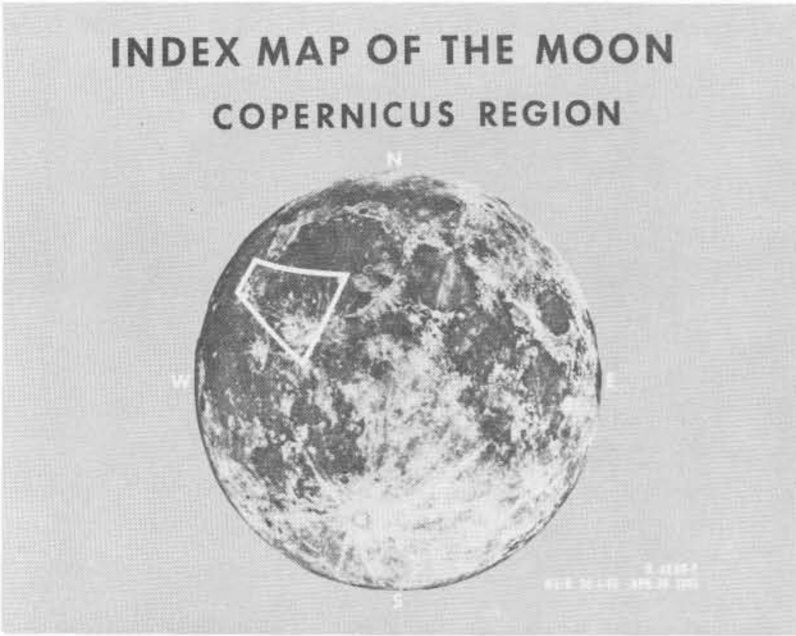

TERRAIN CLASSIFICATION OF THE LUNAR EQUATORIAL BELT (10 N-10 S, 60 W-15 E)
(PRELIMINARY EDITION, JULY 1964)
LOCATION OF MAP AREA
BY JOHN F. McCAULEY
EXPLANATION
GENERAL INFORMATION
N
W
E
S

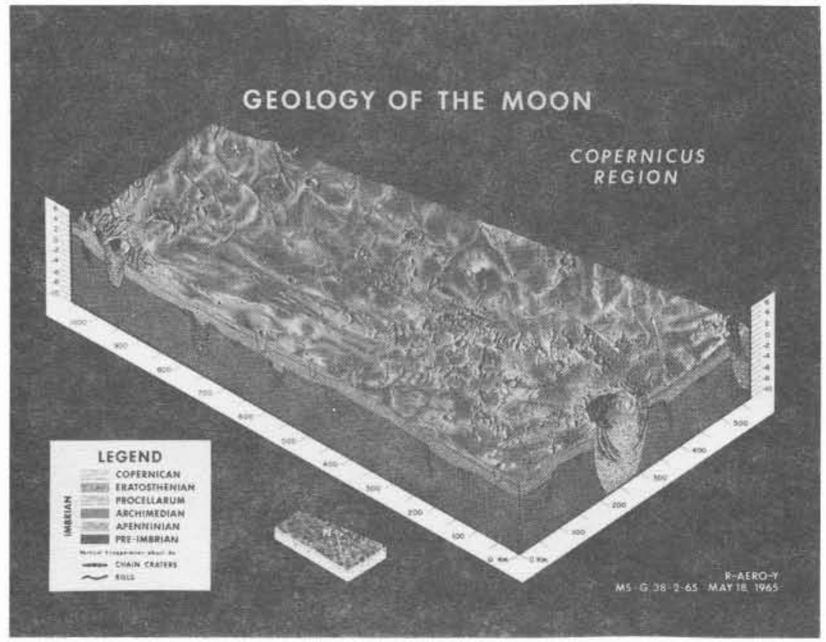

GEOLOGY OF THE MOON
MONTES APENNINUS REGION
8Km 6 4 2 0 -2 -4 -6 -8 -10
500
400
300
200
100
0 Km
0 Km
100
200
300
400
LEGEND
COPERNICAN
ERATOSTHENIAN
PROCELLARUM
ARCHIMEDIAN
APENNINIAN
PRE-IMBRIAN
IMBRIAN
MSFC R-AERO-Y
MS-G 4-65 JAN 18,1965

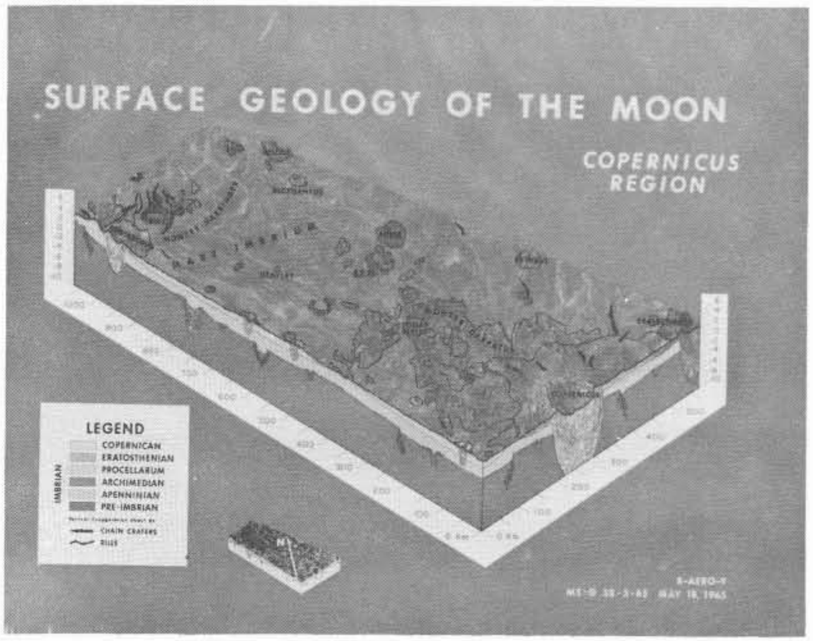

SURFACE GEOLOGY OF THE MOON
MONTES APENNINUS REGION
8Km 6 4 2 0 -2 -4 -6 -8 -10
500
400
300
200
100
0 Km
0 Km
100
200
300
400
LEGEND
COPERNICAN
ERATOSTHENIAN
PROCELLARUM
ARCHIMEDIAN
APENNINIAN
PRE-IMBRIAN
IMBRIAN
CHAIN CRATERS
RILLS
MSFC R-AERO-Y
MS-G 6-65 FEB. 11, 1965

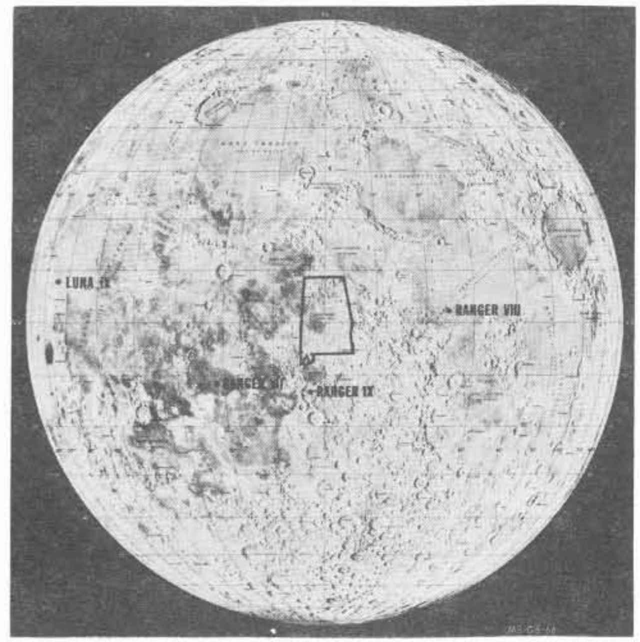

INDEX MAP OF THE MOON
MONTES APENNINUS REGION
N
W
E
S

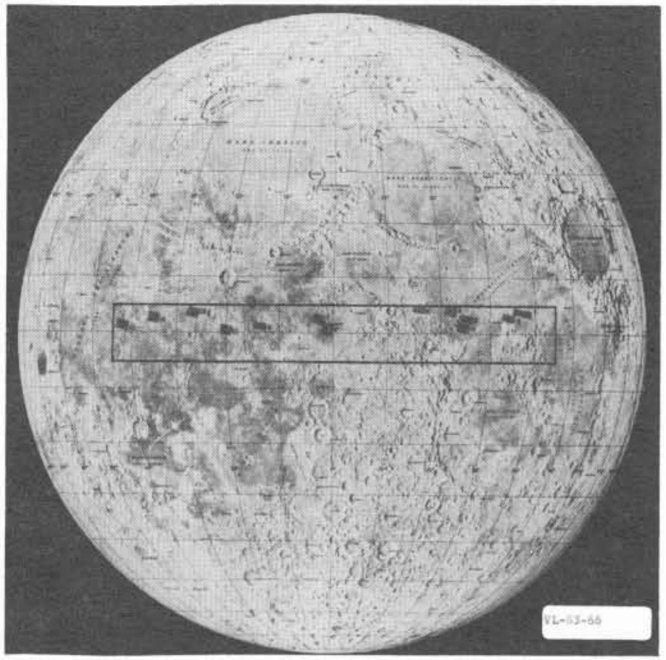

SUBSURFACE INVESTIGATION OF THE MOON
MONTES APENNINUS REGION
8Km 6 4 2 0 -2 -4 -6 -8 -10
300
200
100
0 Km
0 Km
100
200
300
LEGEND
IMBRIAN
MSFC R-AERO-Y
MS-G 9-65 FEB. 19, 1965

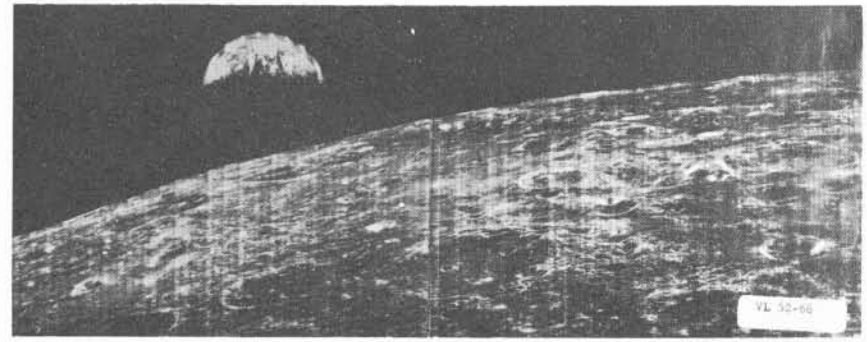

INDEX MAP OF THE MOON
COPERNICUS REGION
N
W
E
S

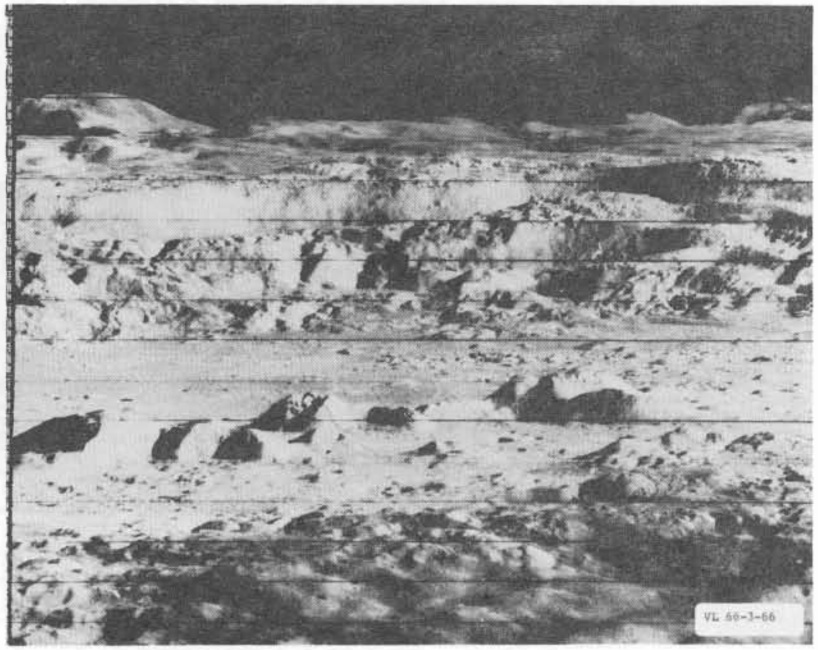

GEOLOGY OF THE MOON
COPERNICUS
REGION
LEGEND
COPERNICAN
ERATOSTHENIAN
PROCELLARUM
ARCHIMEDIAN
APENNINIAN
PRE-IMBRIAN
IMBRIAN
CHAIN CRATERS
RILLS
R-AERO-Y
MS-G 38-2-65 MAY 18, 1965

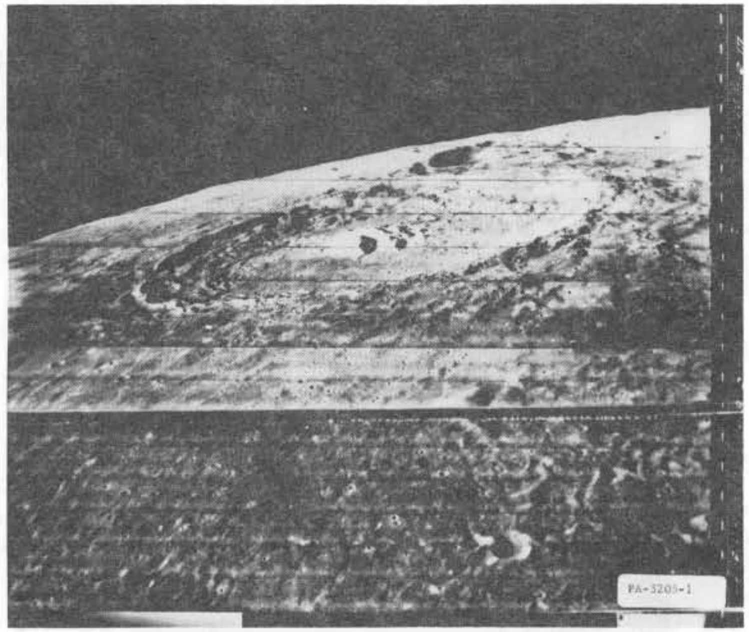

SURFACE GEOLOGY OF THE MOON
COPERNICUS
REGION
LEGEND
COPERNICAN
ERATOSTHENIAN
PROCELLARUM
ARCHIMEDIAN
APENNINIAN
PRE-IMBRIAN
IMBRIAN
CHAIN CRATERS
RILLS

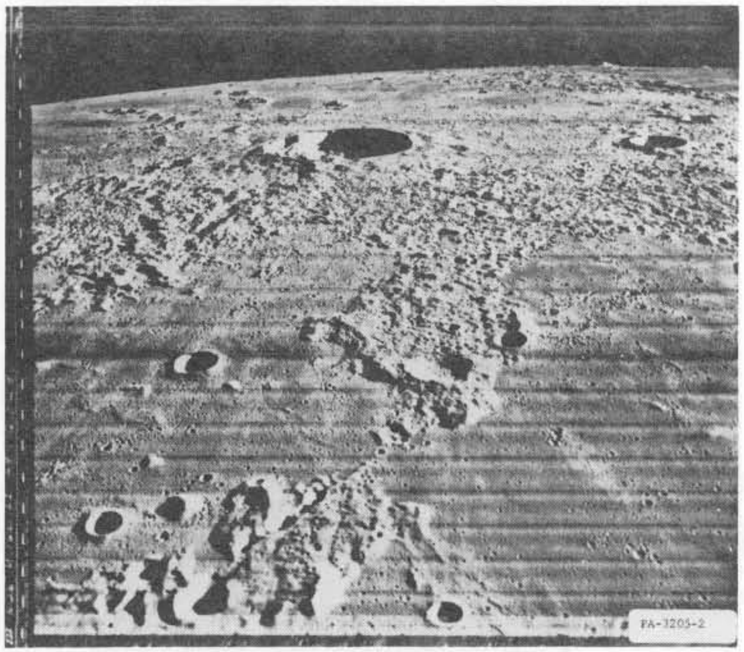

LUNA IX
RANGER VIII
RANGER IX

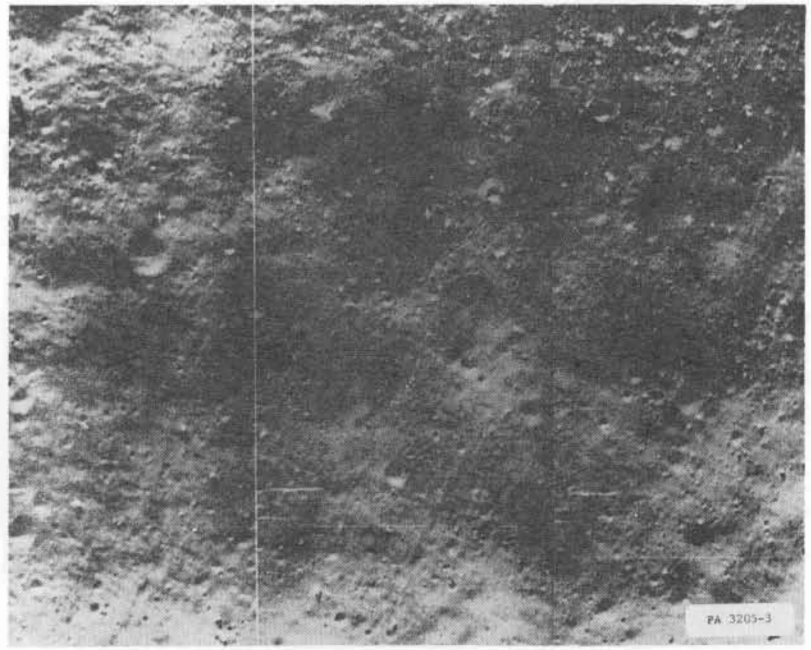


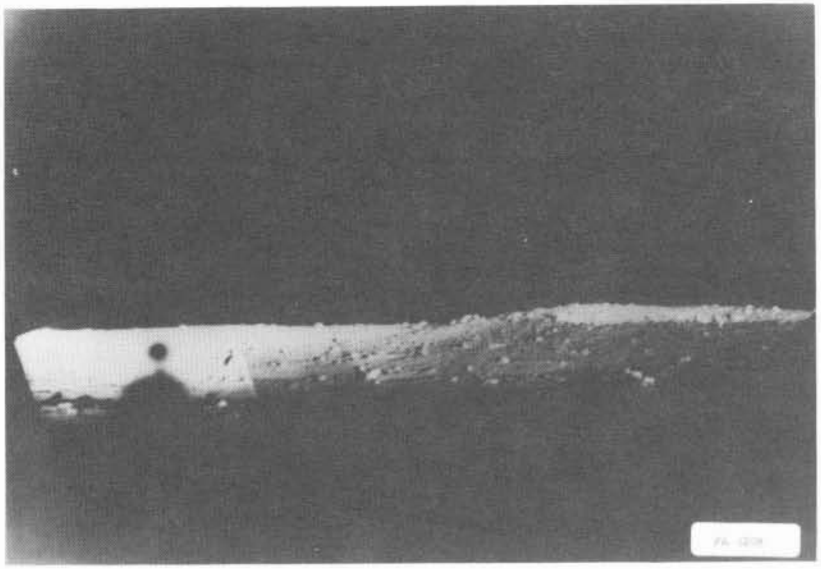

VL 52-66

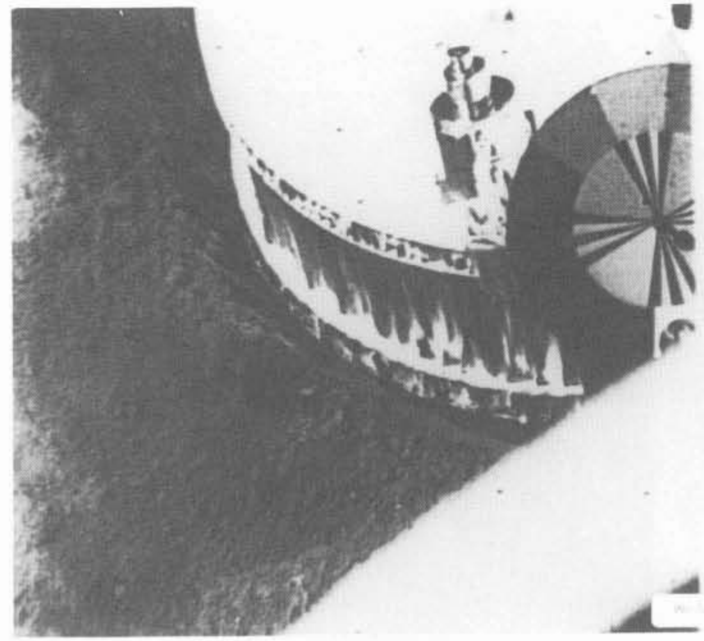

VL 66-3-66


PA-3205-1


PA-3205-2

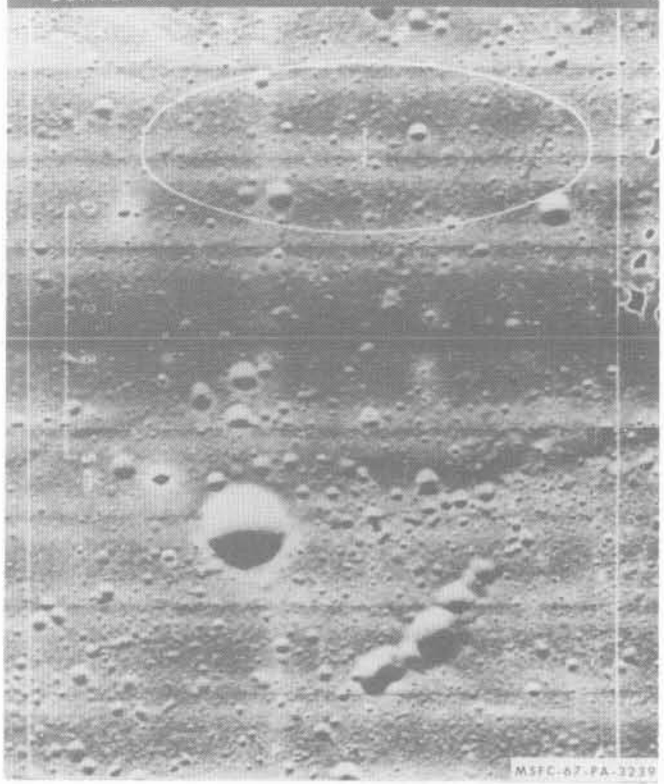

PA 3205-3



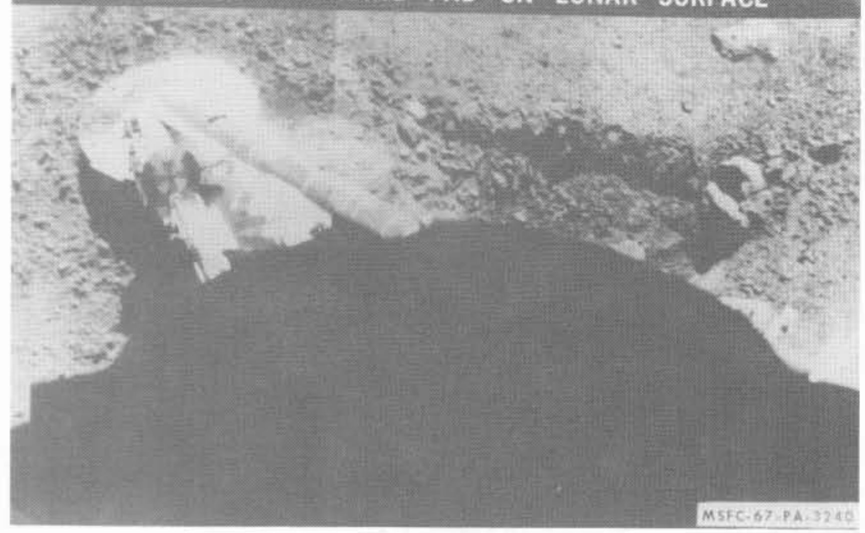



RIMLESS CRATERS PHOTOGRAPHED BY SURVEYOR V
MSFC-67-PA-3243

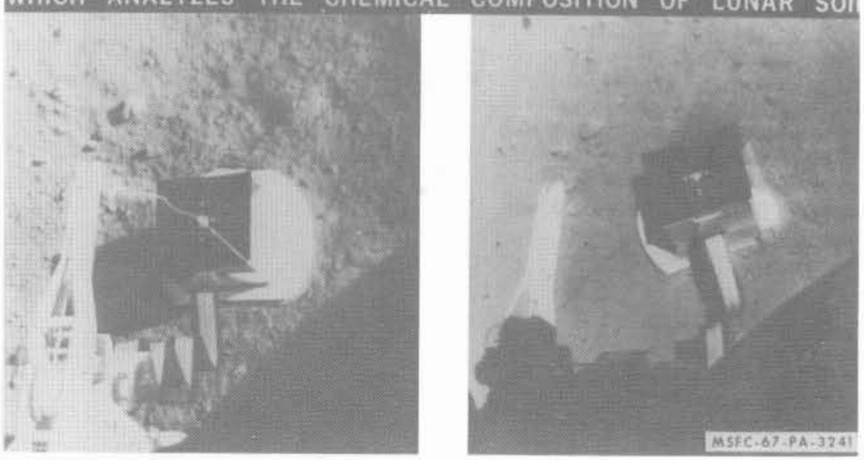
SURVEYOR V LOCATION ON LUNAR SURFACE



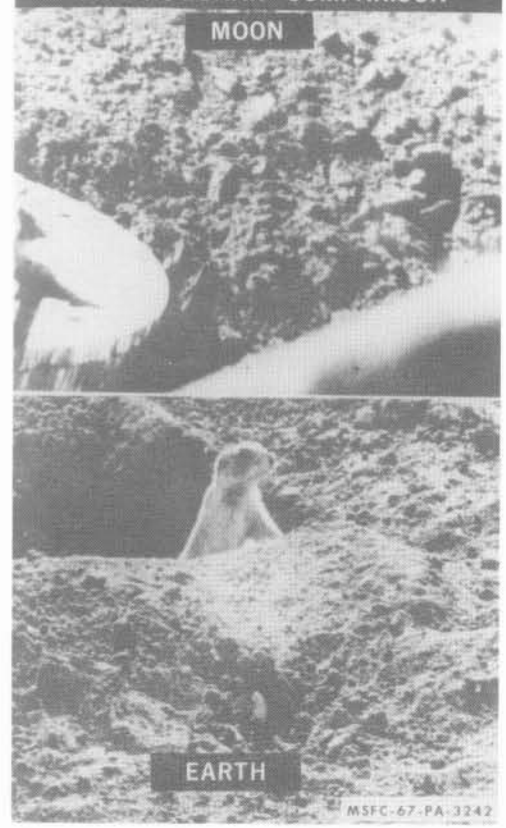
SURVEYOR V LANDING PAD ON LUNAR SURFACE



SURVEYOR V's ALPHA SCATTERING INSTRUMENT WHICH ANALYZES THE CHEMICAL COMPOSITION OF LUNAR SOIL



EARTH / LUNAR COMPARISON



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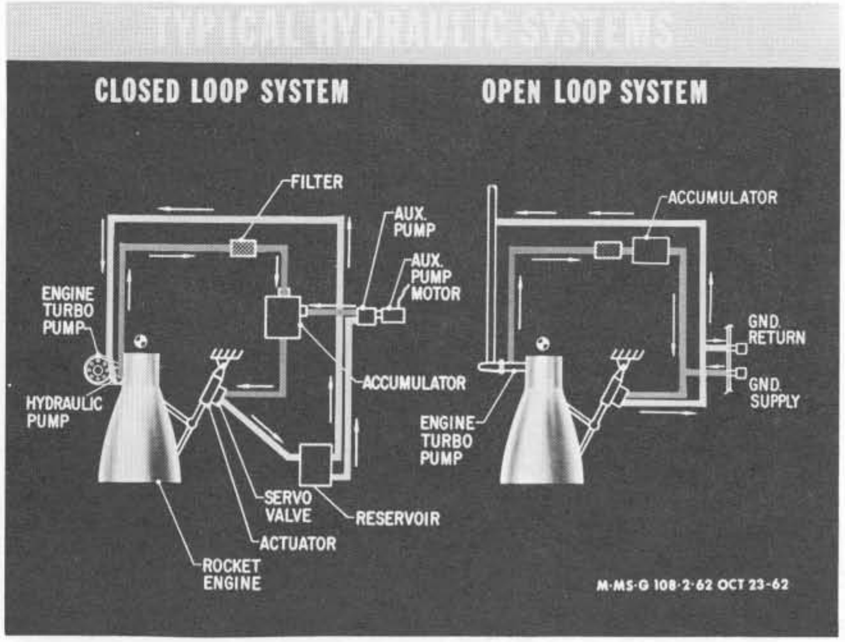
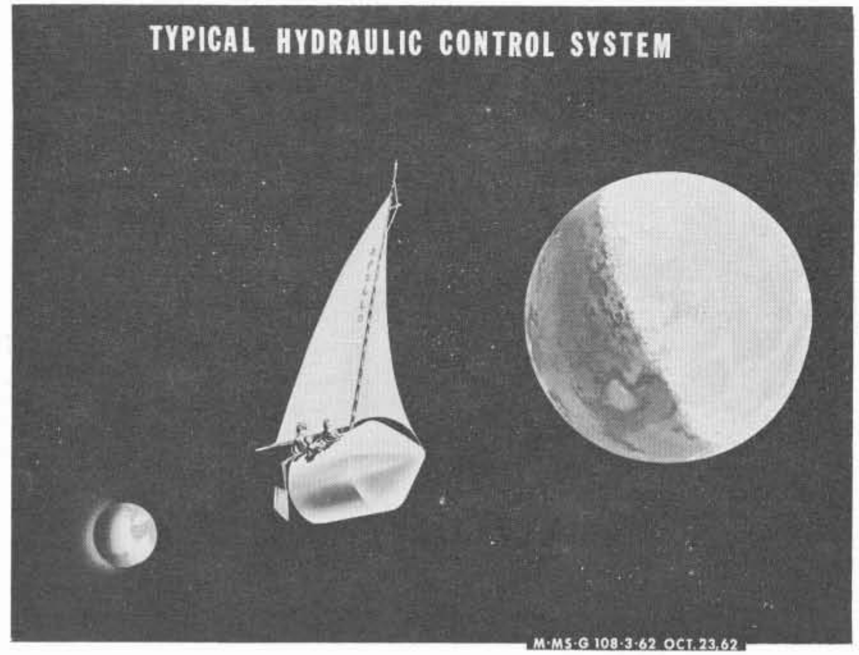
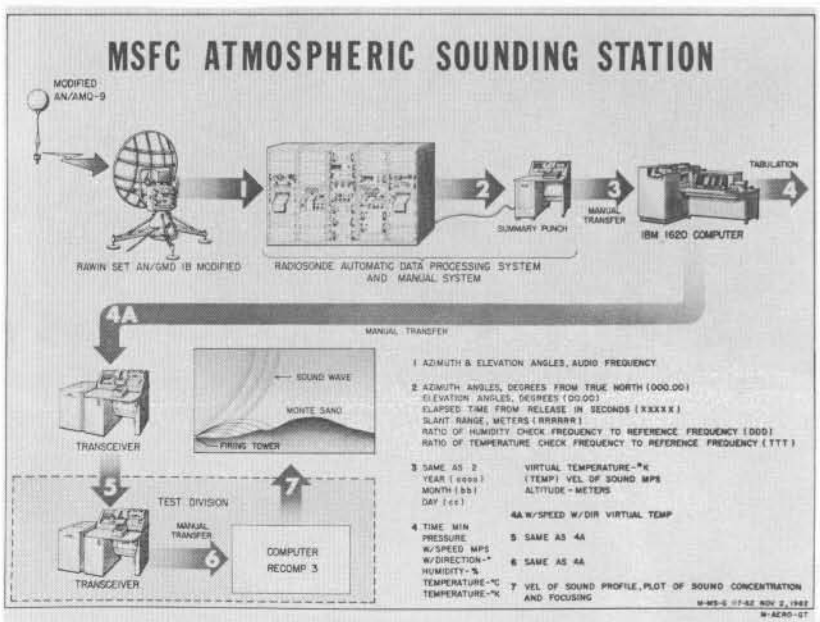
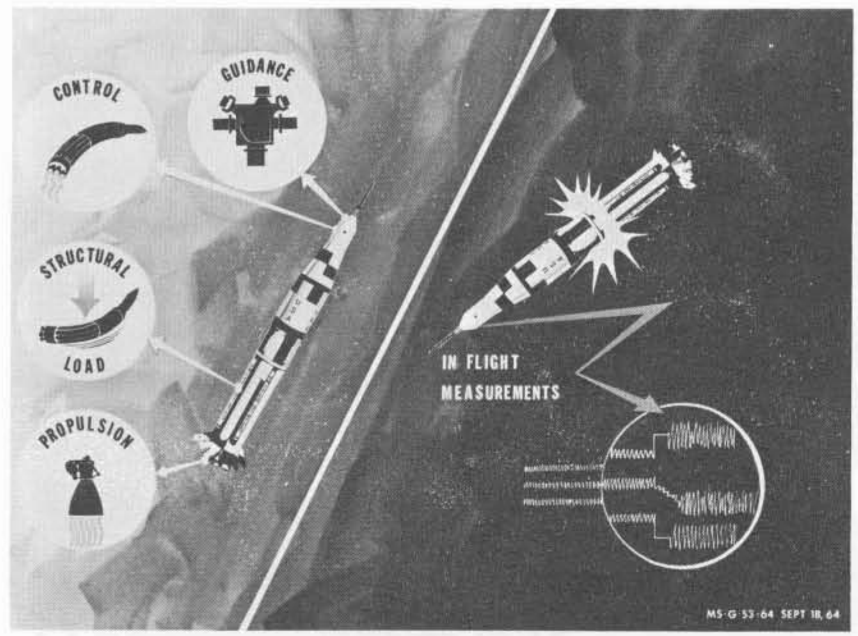
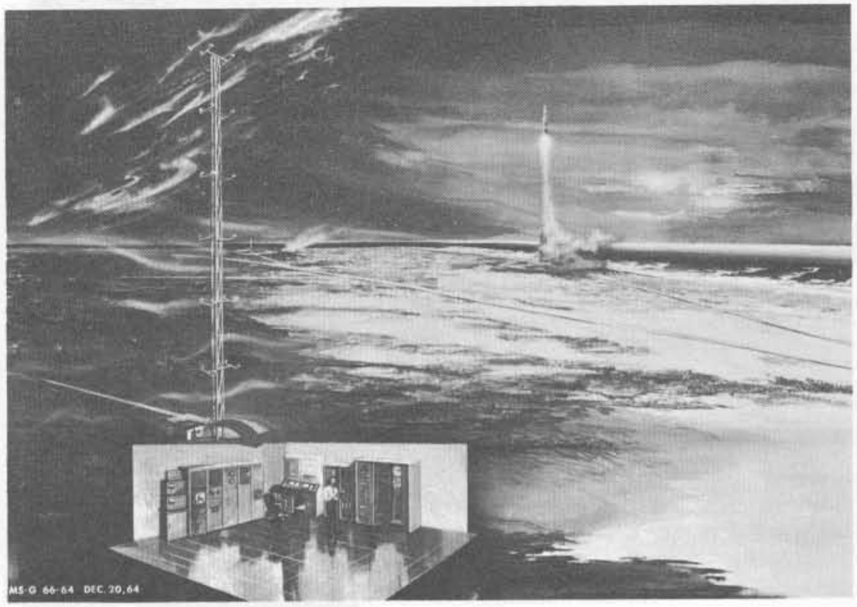
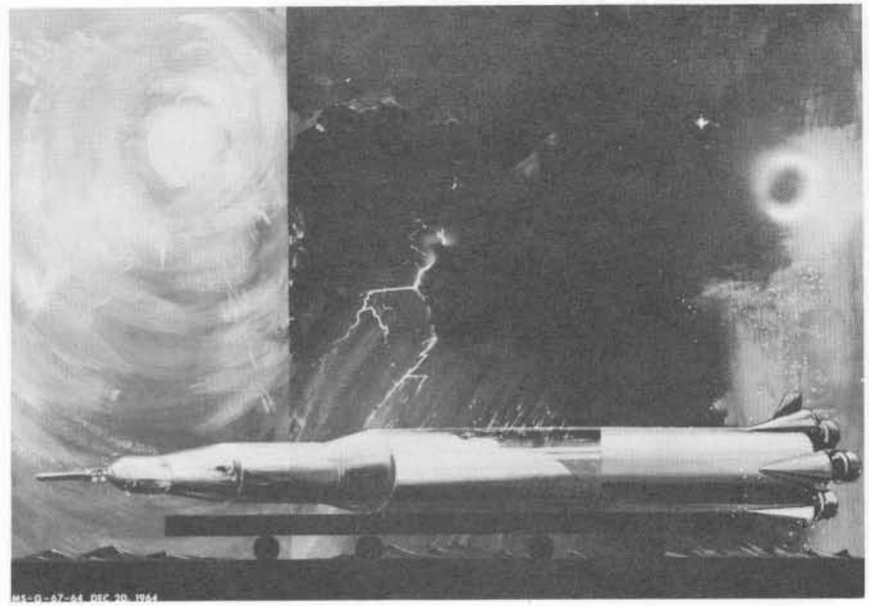

TYPICAL HYDRAULIC SYSTEMS
CLOSED LOOP SYSTEM
OPEN LOOP SYSTEM
FILTER
AUX. PUMP
AUX. PUMP MOTOR
ENGINE TURBO PUMP
HYDRAULIC PUMP
ACCUMULATOR
SERVO VALVE
RESERVOIR
ACTUATOR
ROCKET ENGINE
ACCUMULATOR
GND. RETURN
GND. SUPPLY
ENGINE TURBO PUMP
M-MS-G 108-2-62 OCT 23-62

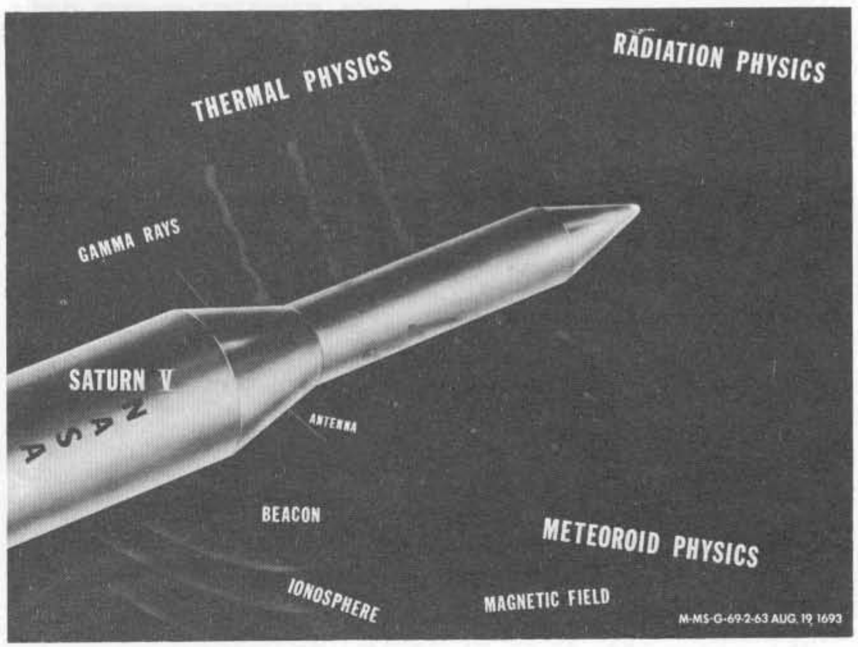

TYPICAL HYDRAULIC CONTROL SYSTEM
M-MS-G 108-3-62 OCT. 23,62

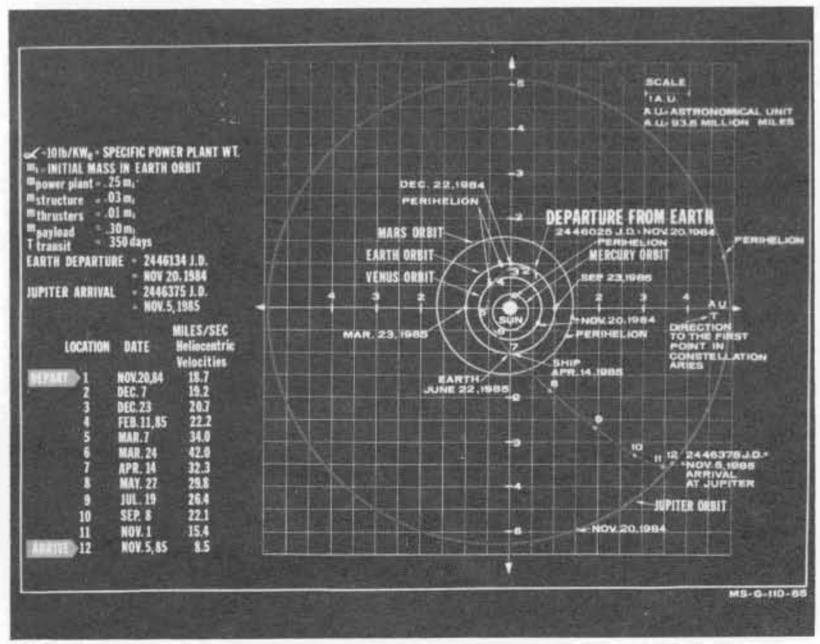

MSFC ATMOSPHERIC SOUNDING STATION
MODIFIED AN/AMQ-9
RAWIN SET AN/GMD 1B MODIFIED
RADIOSONDE AUTOMATIC DATA PROCESSING SYSTEM AND MANUAL SYSTEM
SUMMARY PUNCH
MANUAL TRANSFER
IBM 1620 COMPUTER
TABULATION
4A
MANUAL TRANSFER
TRANSCEIVER
SOUND WAVE
MONTE SANO
FIRING TOWER
TEST DIVISION
MANUAL TRANSFER
COMPUTER RECOMP 3
TRANSCEIVER
1 AZIMUTH & ELEVATION ANGLES, AUDIO FREQUENCY
2 AZIMUTH ANGLES, DEGREES FROM TRUE NORTH (000.00)
ELEVATION ANGLES, DEGREES (00.00)
ELAPSED TIME FROM RELEASE IN SECONDS (XXXXX)
SLANT RANGE, METERS (RRRRRR)
RATIO OF HUMIDITY CHECK FREQUENCY TO REFERENCE FREQUENCY (DDD)
RATIO OF TEMPERATURE CHECK FREQUENCY TO REFERENCE FREQUENCY (TTT)
3 SAME AS 2
YEAR (aaaa)
MONTH (bb)
DAY (cc)
VIRTUAL TEMPERATURE-°K
(TEMP) VEL OF SOUND MPS
ALTITUDE - METERS
4A W/SPEED W/DIR VIRTUAL TEMP
4 TIME MIN
PRESSURE
W/SPEED MPS
W/DIRECTION-°
HUMIDITY-%
TEMPERATURE-°C
TEMPERATURE-°K
5 SAME AS 4A
6 SAME AS 4A
7 VEL OF SOUND PROFILE, PLOT OF SOUND CONCENTRATION AND FOCUSING
M-AERO-GT

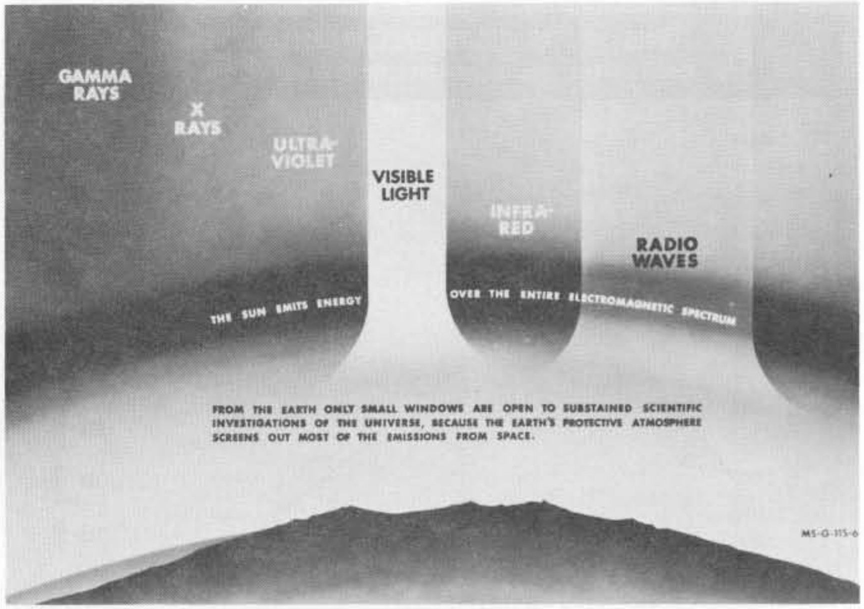

CONTROL
GUIDANCE
STRUCTURAL
LOAD
PROPULSION
IN FLIGHT MEASUREMENTS
MS-G 53-64 SEPT 18, 64

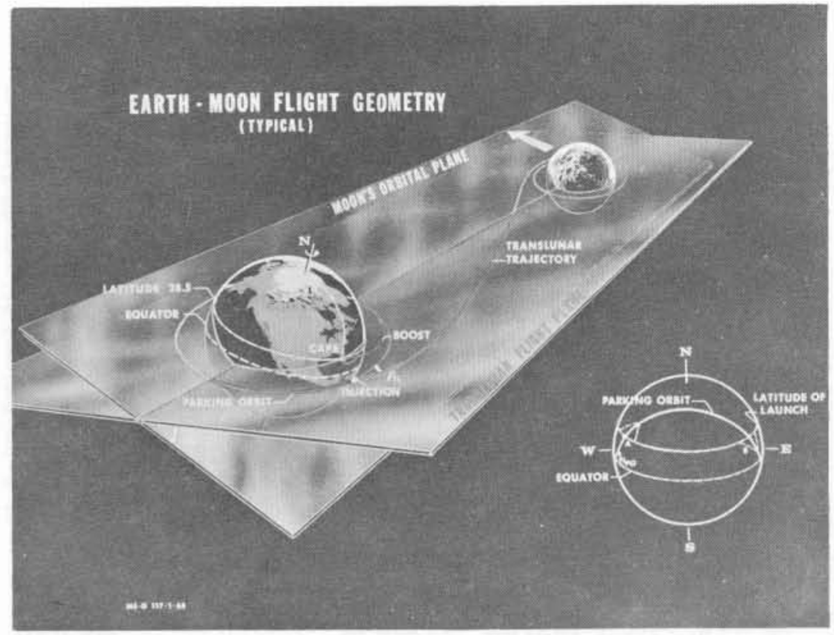

MS-G 66-64 DEC. 20, 64

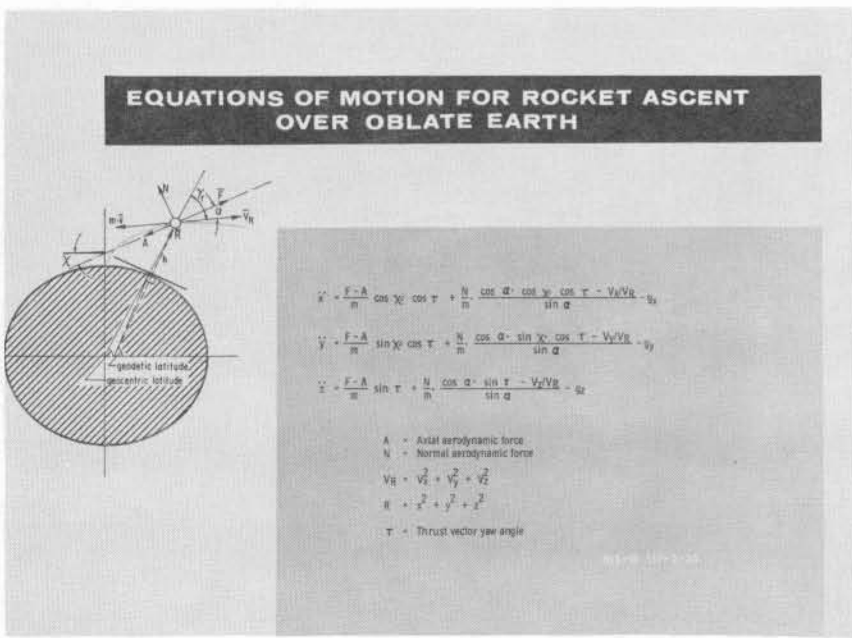

MS-G-67-64 DEC 20, 1964


THERMAL PHYSICS
RADIATION PHYSICS
GAMMA RAYS
SATURN V
NASA
ANTENNA
BEACON
METEOROID PHYSICS
IONOSPHERE
MAGNETIC FIELD
M-MS-G-69-2-63 AUG. 19 1693


α = 10 lb/KWe = SPECIFIC POWER PLANT WT.
mi = INITIAL MASS IN EARTH ORBIT
m power plant = .25 mi
m structure = .03 mi
m thrusters = .01 mi
m payload = .30 mi
T transit = 350 days
EARTH DEPARTURE = 2446134 J.D.
= NOV 20, 1984
JUPITER ARRIVAL = 2446375 J.D.
= NOV. 5, 1985
LOCATION DATE MILES/SEC Heliocentric Velocities
DEPART 1 NOV.20,84 18.7
2 DEC. 7 19.2
3 DEC. 23 20.7
4 FEB. 11,85 22.2
5 MAR. 7 34.0
6 MAR. 24 42.0
7 APR. 14 32.3
8 MAY. 27 29.8
9 JUL. 19 26.4
10 SEP. 8 22.1
11 NOV. 1 15.4
ARRIVE 12 NOV. 5, 85 8.5
SCALE
1 A.U.
A.U. = ASTRONOMICAL UNIT
A.U. = 93.8 MILLION MILES
DEC. 22, 1984
PERIHELION
DEPARTURE FROM EARTH
2446025 J.D. = NOV. 20, 1984
PERIHELION
MARS ORBIT
EARTH ORBIT
MERCURY ORBIT
VENUS ORBIT
SEP 23, 1985
PERIHELION
SUN
NOV. 20, 1984
PERIHELION
MAR. 23, 1985
DIRECTION TO THE FIRST POINT IN CONSTELLATION ARIES
A.U.
SHIP
APR. 14, 1985
EARTH
JUNE 22, 1985
12 2446375 J.D. = NOV. 5, 1985 ARRIVAL AT JUPITER
JUPITER ORBIT
NOV. 20, 1984
MS-G-110-65







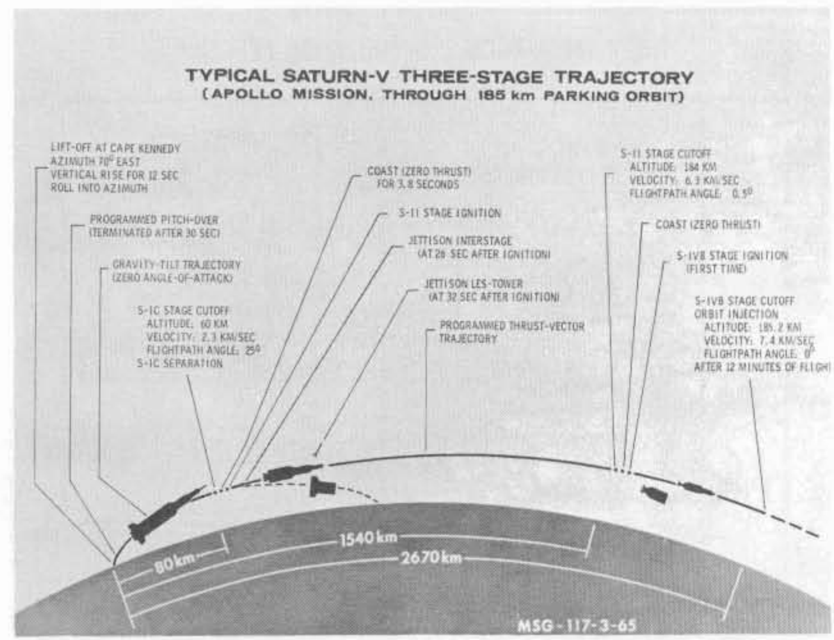
$$\ddot{x} = \frac{F-A}{m}\cos\chi\cos\tau + \frac{N}{m}\cdot\frac{\cos\alpha\cdot\cos\chi\cos\tau - V_x/V_R}{\sin\alpha} - g_x$$

$$\ddot{y} = \frac{F-A}{m}\sin\chi\cos\tau + \frac{N}{m}\cdot\frac{\cos\alpha\cdot\sin\chi\cos\tau - V_y/V_R}{\sin\alpha} - g_y$$

$$\ddot{z} = \frac{F-A}{m}\sin\tau + \frac{N}{m}\cdot\frac{\cos\alpha\cdot\sin\tau - V_z/V_R}{\sin\alpha} - g_z$$

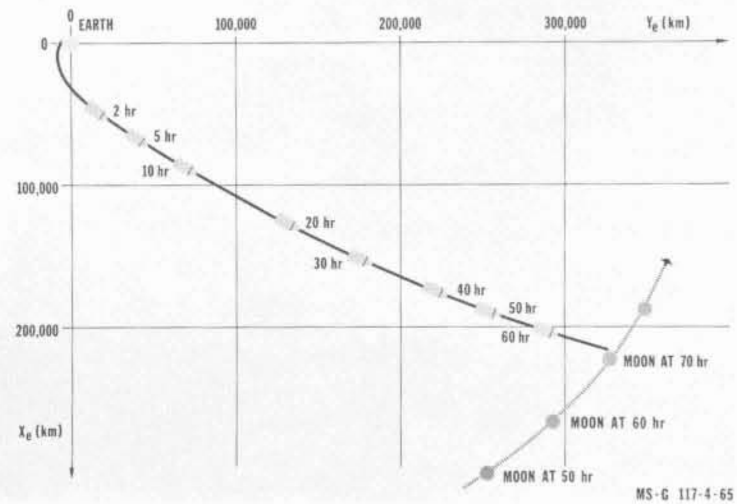
$$V_R = V_x^2 + V_y^2 + V_z^2$$

$$R = x^2 + y^2 + z^2$$



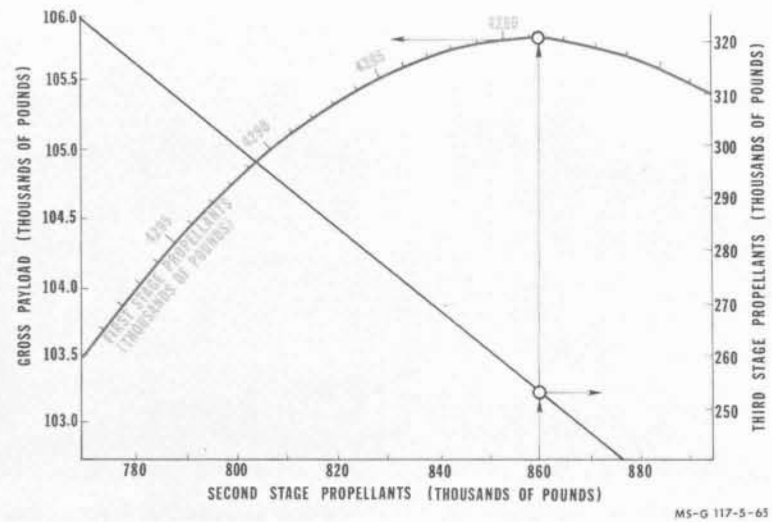
TYPICAL 70-HR. EARTH-MOON TRAJECTORY

(IN NON-ROTATING X_eY_e COORDINATES)

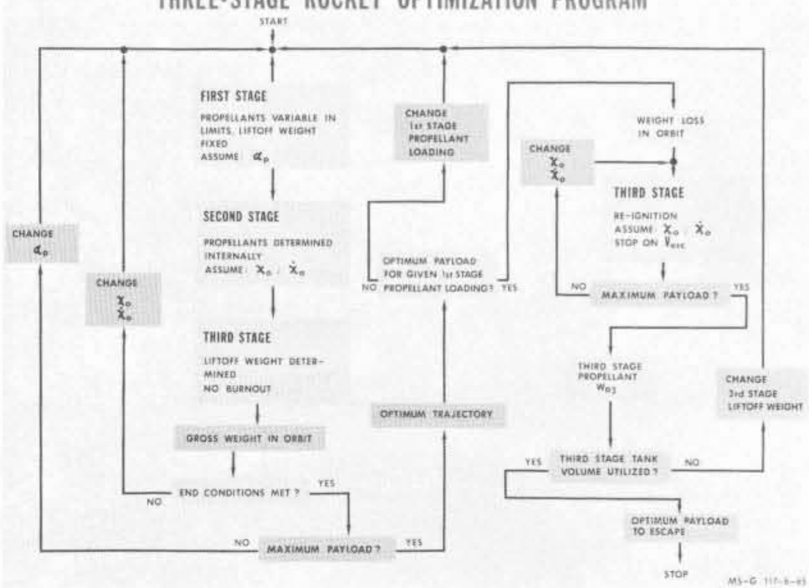


GROSS PAYLOAD VERSUS STAGE PROPELLANT LOADING

(THREE STAGE VEHICLE THROUGH 185 km WAITING ORBIT AND TO LUNAR INJECTION, RUBBERIZED STAGES)



THREE-STAGE ROCKET OPTIMIZATION PROGRAM



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MSFC TECHNOLOGY UTILIZATION

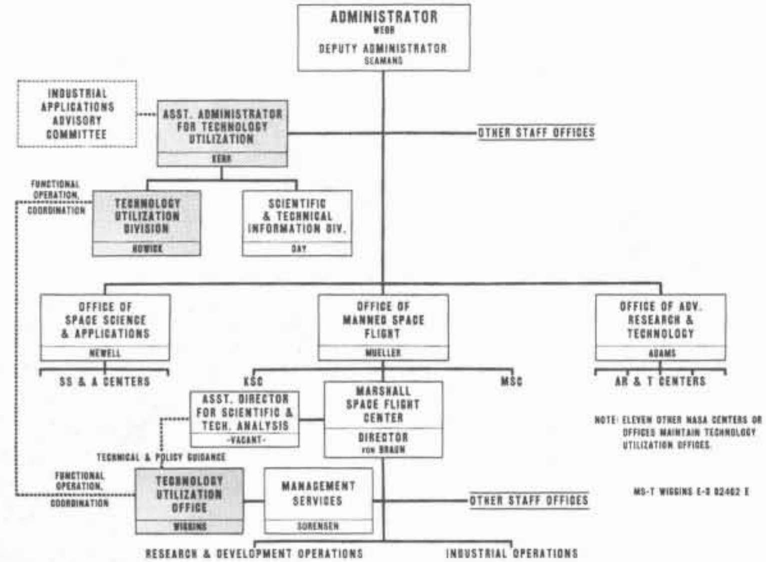
TECHNOLOGY UTILIZATION PROGRAM

- **MISSION** TO TRANSFER TO THE CIVILIAN ECONOMY, ESPECIALLY NON-AEROSPACE INDUSTRY, ALL NEW TECHNOLOGY RESULTING FROM NASA CONTRACTOR AND IN-HOUSE RESEARCH AND SPACE PROGRAMS.
- **OPERATION**
  - TWELVE NASA CENTERS AND OFFICES MAINTAIN TECHNOLOGY UTILIZATION OFFICES, COLLECTING AND EVALUATING CONTRACTOR & IN-HOUSE NEW TECHNOLOGY.
  - SEVEN RESEARCH INSTITUTES ASSIST NASA IN INDUSTIAL APPLICATIONS, TECHNOLOGY EVALUATIONS, TECHNOLOGY DISSEMINATION, AND PREPARATION OF TECHNOLOGY REPORTS.
  - OFFICE OF TECHNOLOGY UTILIZATION, NASA HQS., EDITS AND PUBLISHES EVALUATED INFORMATION.
  - EIGHT UNIVERSITIES OR RESEARCH CENTERS ACT AS "APPLICATION AND DISSEMINATION CENTERS" TO DELIVER INFORMATION TO USERS.
  - TECHNOLOGY UTILIZATION OFFICE, HEADQUARTERS, INITIATES AND ADMINISTERS SPECIAL APPLICATIONS ANALYSIS TECHNOLOGY SURVEY CONTRACTS.

MS-T WIGGINS E-D B 2400 A

MSFC TECHNOLOGY UTILIZATION

NASA/MSFC ORGANIZATION-TECHNOLOGY UTILIZATION PROGRAM

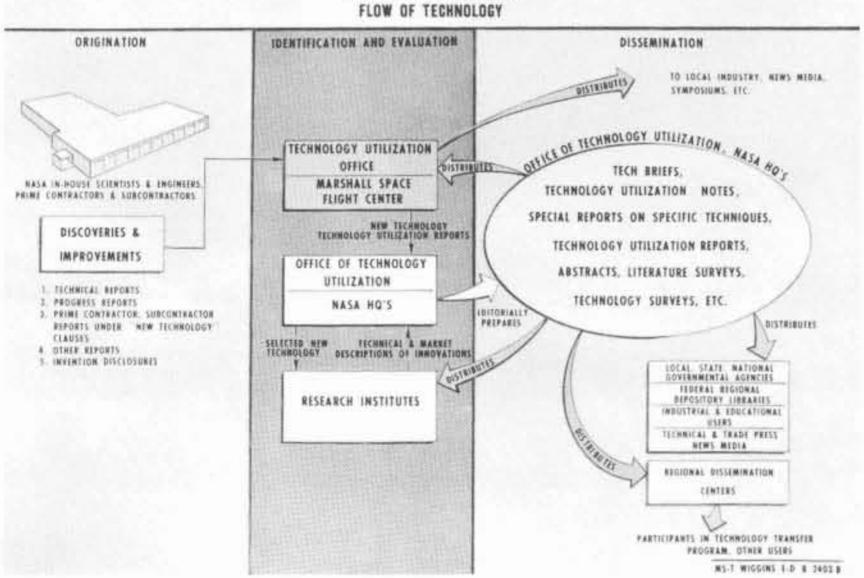


NOTE: ELEVEN OTHER NASA CENTERS OR OFFICES MAINTAIN TECHNOLOGY UTILIZATION OFFICES.

MS-T WIGGINS E-D B2402 E

MSFC TECHNOLOGY UTILIZATION

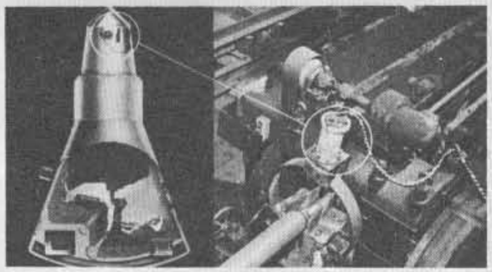
FLOW OF TECHNOLOGY



MS-T WIGGINS E-D B 2403 B

TECHNOLOGY UTILIZATION

PRODUCTION SENSOR



- SMALL INFRA-RED SENSORS, DEVELOPED FOR THE MERCURY CAPSULE, SCANNED THE HORIZON BY LOCATING THE EDGE OF THE "HOT" EARTH AGAINST THE "COLD" SKY AND GENERATED SIGNALS TO STABILIZE THE CAPSULE RELATIVE TO THE HORIZON.
- THE DEVELOPER NOW MAKES A MEASURING GAUGE FOR STEEL RODS. THE GAUGE SENSES THE ROD EDGES AGAINST ITS BACKGROUND AND THEN TAKES PRECISION MEASUREMENTS OF THE ROD. MEASUREMENTS CAN BE TAKEN EVEN WHEN THE ROD IS TRAVELING 35 TO 75 MILES PER HOUR.

E-D B 2404

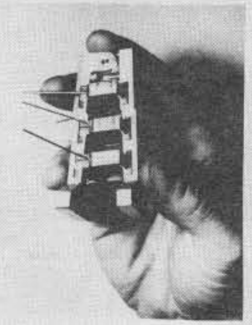
MSFC TECHNOLOGY UTILIZATION

HAND TOOL FOR BENDING ELECTRICAL COMPONENT LEADS

TOOL AND ELECTRICAL COMPONENTS

- ELECTRICAL COMPONENTS TO BE MOUNTED ON PRINTED CIRCUIT BOARDS MUST HAVE THEIR LEADS BENT TO MATCH THE HOLE SPACING ON THE BOARDS. BENDING THE LEADS WITH PLIERS SOMETIMES CAUSES DAMAGE.

- MARSHALL SPACE FLIGHT CENTER DEVELOPED A HAND-OPERATED DIE SET THAT BENDS COMPONENT LEADS TO EXACTLY MATCH CIRCUIT BOARD HOLES. THE COMPONENT RESTS IN A RECESSED LOWER DIE; THE UPPER DIE IS CLOSED TO BEND THE LEADS. DIES ARE REPLACEABLE TO ACOMMODATE DIFFERENT SIZES.
- THE TOOL SPEEDS UP ASSEMBLY OF CIRCUITS AND REDUCES COMPONENT DAMAGE.

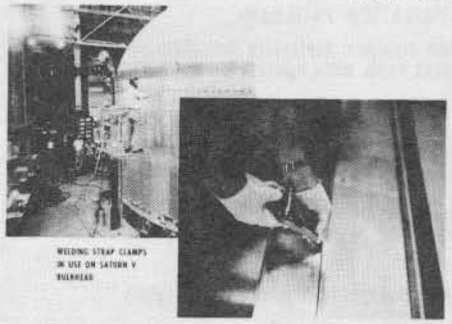


TOOL IN USE

E-D D 2405

MSFC TECHNOLOGY UTILIZATION

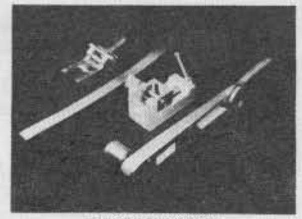
WELDING STRAP CLAMP



WELDING STRAP CLAMPS IN USE ON SATURN V BULKHEAD

- PREVIOUSLY , LARGE TANK PARTS WERE HELD TOGETHER BY AN EXPANDING "SPIDER" DURING WELDING. THE LARGE SIZE OF SATURN TANKS MADE USE OF THE SPIDER IMPRACTICAL AND TOO COSTLY.

- A STRAP CLAMP UNIT WAS DEVELOPED TO ALIGN MATING PARTS FOR WELDING CLAMPS POSITIONED ON EITHER SIDE OF THE PARTS AND CONNECTED BY A STEEL STRAP, ALIGN AND HOLD THE PARTS FOR WELDING.
- NO ADAPTATION IS NECESSARY FOR COMMERCIAL USE. (A BEER TANK MANUFACTURER IN NAIROBI, KENYA, EAST AFRICA HAS REQUESTED INFORMATION ON THIS ITEM.)

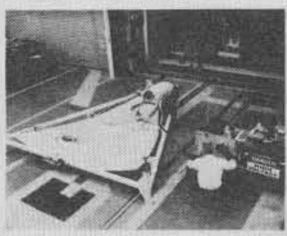


WELDING STRAP CLAMP COMPONENTS WITH TORQUE WRENCH

E-D D 2406

MSFC TECHNOLOGY UTILIZATION

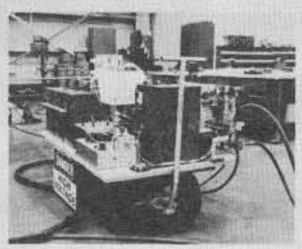
METAL FORMING WITH A "MAGNETOMOTIVE HAMMER"



USE OF MAGNETOMOTIVE HAMMER ON SATURN V GORE SEGMENTS

- MARSHALL SPACE FLIGHT CENTER DEVELOPED A "MAGNETOMOTIVE HAMMER" WHICH, BY MEANS OF AN INTENSE MAGNETIC FIELD, MOVES METAL UNIFORMLY WITHOUT MARRING THE SURFACE.
- THIS MAGNETOMOTIVE HAMMER WAS USED TO REMOVE DISTORTIONS FROM GORE SEGMENTS THAT ARE MADE INTO SATURN V BULKHEADS. PREVIOUSLY, NO KNOWN METHOD EXISTED TO DO THIS. USE OF THE MAGNETOMOTIVE HAMMER RECLAIMED REJECTED SEGMENTS AT A SAVING OF $30,000 EACH. MARSHALL USES THE HAMMER EXTENSIVELY IN OTHER METAL SHAPING OPERATIONS.

- FOUR MARSHALL-BUILT UNITS ARE BEING USED BY NASA CONTRACTORS ON SATURN COMPONENTS.
- THE U.S. MARITIME ADMINISTRATION, PASCAGOULA, MISS., IS CONSIDERING MAGNETIC HAMMER USE AT INGALLS SHIP BUILDING CO. OTHERS INDICATING INTEREST INCLUDE FORD, GENERAL MOTORS, AND ROLLS ROYCE.



MAGNETOMOTIVE HAMMER POWER UNIT

E-D D 2407

TECHNOLOGY UTILIZATION

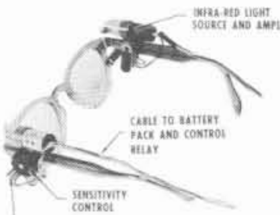
AIR-BEARING BALLISTOCARDIOGRAPH

- MISSILE AND SPACE TECHNOLOGY UTILIZES AIR BEARINGS FOR SUPPORTING GUIDANCE COMPONENTS AND FOR SIMULATING THE WEIGHTLESSNESS OF SPACE.
- THESE BEARINGS FLOAT MATERIAL ON A FILM OF AIR TO PROVIDE FRICTION-LESS, VIBRATION-FREE SUPPORT.
- USING THIS TECHNOLOGY, A MANUFACTURER DEVELOPED A BALLISTOCARDIOGRAPH SYSTEM FEATURING AN AIR-SUPPORTED TABLE. BALLISTOCARDIOGRAPHY RECORDS THE ACCELERATIONS THE HEART GIVES TO THE BODY AND PROVIDES A METHOD OF DETECTING HEART CONDITIONS IN STAGES TOO EARLY FOR OTHER METHODS.
- THE AIR-SUPPORTED TABLE MAKES POSSIBLE PRECISE MEASUREMENTS FREE FROM THE EXTERNAL VIBRATIONS OF OTHER SUSPENSION SYSTEMS.

E-D D 2408

TECHNOLOGY UTILIZATION

SIGHT SWITCH



- MOVING THE IRIS OF THE EYE OPERATES A SIGHT SWITCH DEVELOPED FOR MARSHALL SPACE FLIGHT CENTER. MOUNTED ON AN EYEGLASS FRAME, THE DEVICE HAS AN INFRA-RED SOURCE AND A RECEIVER. THE EYE'S IRIS ABSORBS INFRA-RED RAYS; OTHER PARTS REFLECT THE RAYS. ABSORPTION OF THE RAYS ACTIVATES THE SWITCH. EYE MOVEMENT CAN BE USED TO CONTROL EQUIPMENT.

- POSSIBLE AEROSPACE USES ARE TO OPERATE SPACECRAFT CONTROLS UNDER HIGH-GRAVITY CONDITIONS.
- THE SIGHT SWITCH CAN HELP OTHERWISE DISABLED PERSONS TO COMMUNICATE AND TO OPERATE MOTORIZED WHEEL CHAIRS, HOSPITAL BEDS, ETC.
IT OFFERS POSSIBILITIES FOR OTHER MEDICAL, SCIENTIFIC, AND INDUSTRIAL USES.

TECHNICAL UTILIZATION

FIBER GLASS TANK TRAILER

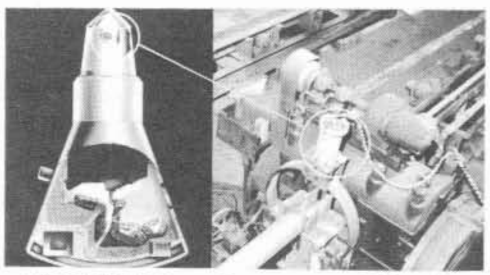
- AEROSPACE WEIGHT VS. STRENGTH REQUIREMENTS DEVELOPED THE TECHNOLOGY TO PRODUCE LARGE TANKS MADE FROM FILAMENT-WOUND FIBER GLASS BONDED WITH PLASTIC RESINS.

- TANK TRAILERS ARE BEING PRODUCED FOR BULK HAULING OF LIQUIDS AND OFFER SIGNIFICANT WEIGHT REDUCTIONS.

- THIS TANK IS 38 FEET LONG, OVER 5 FEET IN DIAMETER, AND HOLDS AROUND 5,650 GALLONS. UNLOADED WEIGHT OF THE TANK AND TRAILER IS 5.6 TONS; A COMPARABLE METAL UNIT WOULD WEIGH OVER 7 TONS.

E-D D 2410

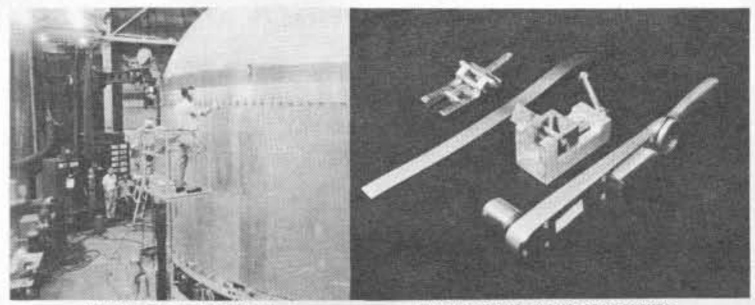
INFRA-RED SENSOR



- **AEROSPACE** - Sensor stabilized Mercury spacecraft in relation to horizon.
- **INDUSTRIAL** - Sensor used as measuring gauge for steel rods.

E-D 02412

WELDING STRAP CLAMP



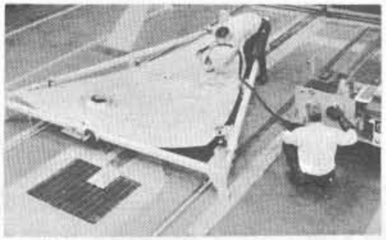
WELDING STRAP CLAMPS IN USE ON SATURN V BULKHEAD

WELDING STRAP CLAMP COMPONENTS WITH TORQUE WRENCH

- **AEROSPACE** - Clamp developed to align huge tank sections for welding.
- **INDUSTRIAL** - Interesting possibilities. A beer tank manufacturer in Nairobi, Kenya, has requested information.

E-D 02413

METAL FORMING WITH A "MAGNETOMOTIVE HAMMER"



- **AEROSPACE** - Hammer developed to remove distortions from launch vehicle tank sections.
- **INDUSTRIAL** - Interested companies include U.S. Maritime Administration, Ford, General Motors and Rolls Royce.

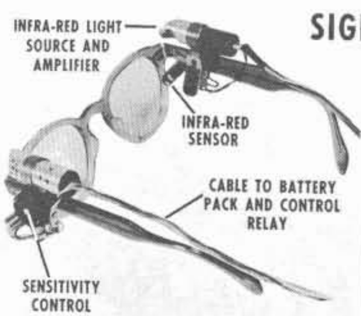
E-D 02414

AIR BEARINGS

- **AEROSPACE** - Air bearings developed to support guidance components and to simulate weightlessness.
- **MEDICAL** - Bearings applied to air-supported table used for heart examinations.

E-D 02415

SIGHT SWITCH



- **AEROSPACE**- May be used to operate spacecraft controls under high-gravity conditions.
- **OTHER POSSIBILITIES**- Scientific, industrial, medical. Example: enable a disabled person to operate a motorized wheelchair.

E-D 02416

FIBER GLASS TANKS

- **AEROSPACE** - Weight vs. strength requirements of launch vehicles resulted in large tanks made of filament-wound fiber glass bonded with plastic resins.
- **INDUSTRIAL** - Tank trailers for bulk hauling of liquids.

E-D 02417

BONDING OF FABRICS

GEMINI SUIT

AEROSPACE - Space suit fabrics caused problems in seam joining. New laminating techniques developed to bond seams properly.

INDUSTRIAL - Lingerie manufacturer adapted process to join seams of "see-through" bras.

CIVILIAN USE

E-D 02418

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MSFC COST REDUCTION

S-IC HANDLING RING

HANDLING RING BEING ATTACHED TO SIMULATOR

PROBLEM

- AN ALUMINUM HANDLING RING, MADE TO EXACTING REQUIREMENTS, IS USED WITH THE SATURN S-IC STAGE. ATTACHED TO THE STAGE, IT PROVIDES A HOOK-UP POINT FOR HANDLING EQUIPMENT. EACH RING COSTS $710,000.
- THIS RING WAS ALSO USED ON THE S-IC SIMULATOR, A FRAME-WORK MOCK-UP USED TO CHECK CLEARANCES OF BARGES, ROADS, AND FACILITIES.

SOLUTION

- A STEEL HANDLING RING WAS MADE TO LESS RIGID SPECIFICATIONS FOR THE SIMULATOR. IT COST $15,000 AND RELEASED AN ALUMINUM RING FOR USE ON THE S-IC STAGE.

SAVING

- $695,000

MSFC COST REDUCTION

PRIME MOVERS

PROBLEM

- TEN PRIME MOVERS WERE NEEDED FOR SATURN TRANSPORTATION FOR USE AT VARIOUS LOCATIONS. EACH MUST BE CAPABLE OF A 60,000 POUND DRAWBAR PULL.
- NEW COMMERCIAL VEHICLES MEETING REQUIREMENTS WOULD COST $30,000 EACH FOR A TOTAL OF $300,000.

TRANSPORTING S-1 STAGE

SOLUTION

- THE PRIME MOVERS WERE OBTAINED FROM ARMY SURPLUS AND ARE BEING RENOVATED AT A COST OF $2,000 EACH.

SAVING

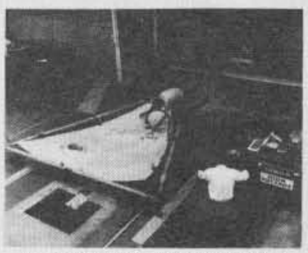
- $280,000

MSFC COST REDUCTION

"MAGNETIC HAMMER" REWORK OF GORE SEGMENTS

PROBLEM

- WHEN WELDING FITTINGS INTO SATURN V GORE SEGMENTS, LOCAL SHRINKAGE OF WELD AREAS SOMETIMES CAUSED REJECTION OF THE SEGMENTS.
- TWO POSSIBLE SOLUTIONS WERE INVESTIGATED BUT HAD LIMITED SUCCESS:
  - STRETCHING SEGMENTS MECHANICALLY BY A PROCESS CALLED " PLANISHING " TO RE-FORM THE SEGMENTS.
  - CRYOGENICALLY SHRINKING FITTINGS TO BE WELDED INTO THE SEGMENTS TO REDUCE METAL EXPANSION AND SUBSEQUENT DISTORTION.



USE OF MAGNETIC HAMMER ON SATURN V GORE SEGMENTS

SOLUTION

- A "MAGNETIC HAMMER" WAS DEVELOPED USING AN EXISTING COMPACT CAPACITOR POWER SYSTEM. THIS "HAMMER" CREATES AN INTENSE MAGNETIC FIELD WHICH MOVES METAL UNIFORMLY WITHOUT MARRING THE SURFACE.
- PREVIOUSLY REJECTED GORE SEGMENTS HAVE BEEN RESTORED FOR USE. THE HAMMER IS ALSO BEING USED TO REWORK OTHER COMPONENTS. CONTRACTORS ARE US'NG OR WILL RECEIVE ADDITIONAL UNITS.

MAGNETIC HAMMER POWER UNIT

SAVING

- $2,130,000 AT MSFC AS OF DECEMBER 28, 1964. SATURN V UPPER FUEL BULKHEAD CAP FITTING WAS RE-SIZED FOR ESTIMATED SAVING OF $1,500,000. $630,000 WAS SAVED ON SATURN V GORE SEGMENTS WITH TOTAL SAVINGS OF $6,300,000 PROJECTED ON THIS USE ALONE.

MSFC COST REDUCTION

SELF-PROPELLED CRANE CARRIERS

PROBLEM

- HEIGHT AND WEIGHT OF MANY S-IC STRUCTURAL COMPONENTS EXCEEDED BRIDGE CRANE CLEARANCES AND CAPACITIES IN ASSEMBLY BUILDINGS. TRANSPORTING LARGE COMPONENTS BETWEEN BUILDINGS CAUSED ADDITIONAL PROBLEMS.
- RAISING ROOFS OF PRINCIPAL ASSEMBLY BUILDINGS AND INCREASING CRANE CAPACITIES WOULD COST $1,000,000 TO $1,500,000 AND REQUIRE 2-2 1/2 YEARS.

"C" FRAME MOVING SATURN V THRUST ASSEMBLY

"C" FRAME TRANSPORTING S-IC TANK

SOLUTION

- TWO LOW-BED, SELF-PROPELLED, GANTRY-TYPE CRANE CARRIERS WERE DEVELOPED TO OPERATE WITHIN BUILDING CLEARANCES. THESE "A" AND "C" FRAMES ALSO MOVE COMPONENTS BETWEEN BUILDINGS. BOTH FRAMES HAVE A SAFE LIFT CAPABILITY OF 50 TONS. THEY WERE BUILT TO BASIC MSFC SPECIFICATIONS AND DELIVERED IN 12 MONTHS.

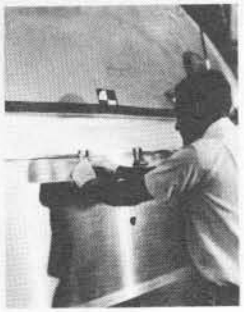
SAVING

- $750,000

E-D B 3603 A

MSFC COST REDUCTION

WELDING STRAP CLAMP



STRAP CLAMP IN USE ON WELDING SATURN V BULKHEAD TO "Y" RING

PROBLEM

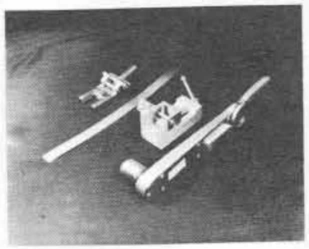
- PREVIOUSLY, AN EXPANDING "SPIDER" WAS USED TO HOLD TANK PARTS TOGETHER BEFORE THEY WERE WELDED.
- THE LARGE SIZE OF THE SATURN TANKS MADE USE OF THE SPIDER INADEQUATE AND TOO COSTLY.

SOLUTION

- A STRAP CLAMP WAS DEVELOPED TO ALIGN MATING PARTS FOR WELDING. NASA CONTRACTORS NOW USE THIS METHOD.

SAVING

- $2,000,000 ON SATURN V TANKS



STRAP CLAMP COMPONENTS

E-D B 3504 A

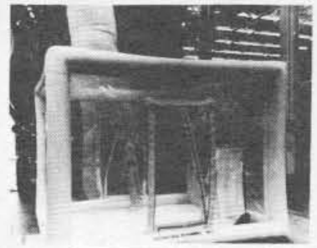
MSFC COST REDUCTION

PORTABLE CLEAN ROOMS

PROBLEM

- CLEANED FUEL TANKS MUST SOMETIMES BE OPENED AND ENTERED FOR MODIFICATIONS OR TO INSTALL "LATE DELIVERY" MATERIAL. THIS CREATES CONTAMINATION PROBLEMS.
- BUILDING ORDINARY "CLEAN ROOMS" TO CONTAIN TANKS WOULD BE EXTREMELY EXPENSIVE.

PORTABLE CLEAN ROOM SYSTEM



AIR LOCK ENTRANCE FOR PORTABLE CLEAN ROOM

SOLUTION

- PORTABLE, AIR-SUPPORTED PLASTIC ROOMS ARE CONNECTED WITH SPECIALLY DESIGNED ENTRANCE SLEEVES. THE ROOMS PROVIDE "AIR LOCKS" FOR ACCESS. FILTERED CLEAN AIR PREVENTS ENTRY OF AIR-BORNE CONTAMINANTS.

SAVING

- $1,400,000 OVER COST OF CONVENTIONAL CONSTRUCTION.

MSFC COST REDUCTION

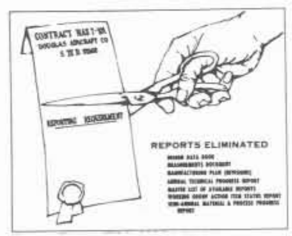
COST REDUCTION AND VALUE ENGINEERING PROGRAM

DECEMBER 1963:	LETTERS TO 1100 NASA CONTRACTORS FROM THE PRESIDENT AND MR. WEBB ENCOURAGING COST REDUCTION EFFORTS.
MARCH 1964:	32 CONTRACTORS SELECTED FOR CONTINUING COST REDUCTION PROGRAM WITH 11 ASSIGNED TO MSFC. 14 ARE NOW ASSIGNED TO MSFC: BOEING, BROWN, CHRYSLER, DOUGLAS, GENERAL ELECTRIC, HAYES, IBM, MANAGEMENT SERVICES, MASON-RUST, NORTHROP, SPACO, SPERRY-RAND, VITRO, AND UNITED AIRCRAFT.
APRIL 1964:	MSFC COST REDUCTION AND VALUE ENGINEERING OFFICE ESTABLISHED.
JULY 1964:	FY-64 GOAL OF $4,000,000 SAVINGS EXCEEDED, WITH REPORTED SAVINGS OF $8,796,000. MSFC ASSIGNED FY-65 GOAL OF $42,000,000.
JULY 1964:	VALUE ENGINEERING TRAINING COURSE HELD FOR 30 MSFC PERSONNEL.
JUNE 1965:	FORMAL EVALUATION OF CONTRACTORS' COST REDUCTION PROGRAMS COMPLETED ON THE 11 CONTRACTORS ORIGINALLY ASSIGNED TO MSFC.
JULY 1965:	FISCAL YEAR 1965 SAVINGS REPORTED TO NASA HQS. - $82,453,275. $56,576,000 ACCEPTED BY HQS. - 134% OF ASSIGNED GOAL.

E-D B 3506 C

MSFC COST REDUCTION

S-IVB CONTRACTOR REPORTS



RESULTS OF DOCUMENTATION ANALYSIS

PROBLEM

- MANAGING THE S-IVB STAGE PROGRAM REQUIRED COMPREHENSIVE REPORTS FROM THE CONTRACTOR, DOUGLAS AIRCRAFT COMPANY, BASED ON REQUIREMENTS OF PREVIOUS PROGRAMS.
- EXPENSE OF THESE CONTRACTUALLY REQUIRED DOCUMENTS CONTRIBUTE TO PROGRAM COSTS.

SOLUTION

- A DETAILED ANALYSIS OF DOCUMENTATION NEEDS ELIMINATED SEVEN MAJOR RECURRING REPORTS PREPARED OR TO BE PREPARED.

SAVING

- $532,000 FOR FY-65
- $3,411,000 THROUGH PROGRAM COMPLETION

E-D B 3507

MSFC COST REDUCTION

DUAL POSITION, POST-FIRING CHECKOUT FACILITY–SACTO

PRESENT S-IVB ACCEPTANCE TEST STAND-SACTO

PROBLEM

- APPROVED CONSTRUCTION OF FACILITY PLANS CALLED FOR BUILDING A THIRD ACCEPTANCE TEST STAND FOR THE S-IVB STAGE AT DOUGLAS AIRCRAFT'S SACRAMENTO TEST SITE

SOLUTION

- FACILITY USAGE AND NEED DATES WERE EVALUATED AGAINST CHANGED DELIVERY REQUIREMENTS. BUILDING A POST-FIRING CHECKOUT FACILITY INSTEAD OF THE THIRD STAND WILL MEET REQUIREMENTS AND PROVIDE GREATER FLEXIBILITY FOR PRODUCTION RATE INCREASES

ARTIST'S CONCEPT-SATURN IVB VEHICLE CHECKOUT LABORATORY-SACTO

SAVING

- $5,390,000 IN FY-65 CONSTRUCTION OF FACILITY BUDGET

E-D B 3509

MSFC COST REDUCTION

MSFC COST SAVINGS SUMMARY

(THIRD QUARTER TOTAL, FY-66, AS REPORTED TO NASA HQS.)

ORGANIZATION	NUMBER OF REPORTS	SAVINGS BY TYPE OF FUNDING			TOTAL
		RESEARCH & DEVELOPMENT	CONSTRUCTION OF FACILITIES	ADMINISTRATIVE OPERATIONS	
STAFF & SERVICES	88	$312,612	$1,100	$1,443,663	$1,757,375
RESEARCH & DEVELOPMENT OPERATIONS	40	5,545,059	25,000	107,766	5,677,825
INDUSTRIAL OPERATIONS	58	48,876,808	——	68,995	48,945,803
TOTAL	186	54,734,479	$26,100	$1,620,424	$56,381,003

FY 1966 GOAL-$43,000,000

CR 4/20/66 E-D B 3511 E

MSFC COST REDUCTION

STAFF AND SERVICES COST SAVINGS

(FISCAL YEAR 1966, AS REPORTED TO NASA HQS.)

ORGANIZATION	NO. OF REPORTS		SAVINGS	
	SECOND QUARTER	YEAR TO DATE	SECOND QUARTER	YEAR TO DATE
PUBLIC AFFAIRS				
CHIEF COUNSEL				
LABOR RELATIONS				
EXECUTIVE STAFF		3		$15,257
MANAGEMENT SERVICES	16	17	$150,924	153,352
PURCHASING		10		200,602
TECHNICAL SERVICES		8		401,090
MANPOWER UTILIZATION & ADMINISTRATION	3	3	79,000	79,000
FACILITIES & DESIGN	1	1	21,000	21,000
FINANCIAL MANAGEMENT	1	7	30,320	107,936
TOTAL	21	49	$281,244	$978,237

CR 1/20/66 E-D D 3512 D

MSFC COST REDUCTION

RESEARCH & DEVELOPMENT OPERATIONS COST SAVINGS

(FISCAL YEAR 1966, AS REPORTED TO NASA HQS.)

ORGANIZATION	NO. OF REPORTS		SAVINGS	
	THIRD QUARTER	YEAR TO DATE	THIRD QUARTER	YEAR TO DATE
ADVANCED SYSTEMS OFFICE				
TECHNICAL SYSTEMS OFFICE				
TECHNICAL STAFF OFFICE				
OPERATIONS MANAGEMENT OFFICE	1	2	$4,445	$35,716
AERO-ASTRODYNAMICS LABORATORY	2	6	22,117	1,439,106
ASTRIONICS LABORATORY	3	11	1,405,500	2,206,667
COMPUTATION LABORATORY	2	2	338,000	338,000
MANUFACTURING ENGINEERING LABORATORY	5	6	23,240	383,240
PROPULSION & VEHICLE ENGINEERING LABORATORY		2		195,000
QUALITY & RELIABILITY ASSURANCE LABORATORY	2	2	244,575	244,575
RESEARCH PROJECTS LABORATORY				
TEST LABORATORY		9		835,521
TOTAL	15	40	$2,037,877	$5,677,825

CR 4/20/66 E-D B 3513 D

MSFC COST REDUCTION

INDUSTRIAL OPERATIONS COST SAVINGS

(FISCAL YEAR 1966 AS REPORTED TO NASA HQS.)

ORGANIZATION	NO. OF REPORTS		SAVINGS	
	THIRD QUARTER	YEAR TO DATE	THIRD QUARTER	YEAR TO DATE
CONTRACTS OFFICE	6	12	$1,396,530	$12,316,825
FACILITIES PROJECTS OFFICE				
MISSION OPERATIONS OFFICE				
PROJECT LOGISTICS OFFICE		1		3,650
RESOURCES MANAGEMENT OFFICE				
SATURN I/IB PROGRAM OFFICE	1	6	253,000	591,580
SATURN IB/CENTAUR PROGRAM OFFICE				
SATURN V PROGRAM OFFICE	7	25	28,423,000	34,335,280
ENGINE PROGRAM OFFICE		10		1,613,443
MICHOUD ASSEMBLY FACILITY	3	4	25,025	85,025
MISSISSIPPI TEST FACILITY				
TOTAL	17	58	$30,097,555	$48,945,803

CR 4/20/66 B 3514 D

MSFC COST REDUCTION

MSFC ACCEPTED COST SAVINGS, FY-1965

(IN MILLIONS OF DOLLARS)

TYPE OF FUNDING	SUBMITTED BY MSFC TO HQS.	ACCEPTED BY HQS.	MSFC GOAL*	% OF GOAL ACCEPTED
RESEARCH & DEVELOPMENT	$67.29	$46.10	$32.00	144%
CONSTRUCTION OF FACILITIES	9.04	6.61	2.00	330%
ADMINISTRATIVE OPERATIONS	6.12	3.87	8.00	48%
TOTAL	$82.45	$56.58	$42.00	134%

OFFICE OF MANNED SPACE FLIGHT TOTAL GOAL WAS $84 MILLION. ACCEPTED SAVINGS WERE $100 MILLION OR 119% OF GOAL.

* ESTABLISHED BY ASSOCIATE ADMINISTRATOR, MANNED SPACE FLIGHT, NASA HQS.

CR E-D B 3515

MSFC COST REDUCTION

MSFC COST SAVINGS CATEGORIES

(FISCAL YEAR 1966, AS REPORTED TO NASA HQS.)

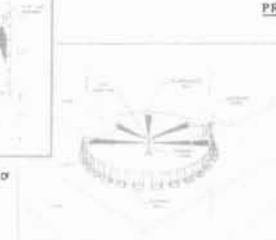
HEADQUARTERS - ESTABLISHED CATEGORIES	THIRD QUARTER SAVINGS	SAVINGS, YEAR TO DATE
I. IMPROVING PROCUREMENT PRACTICES	$774,800	$1,260,690
II. UTILIZATION & RECLAMATION OF IDLE GOVERNMENT INVENTORIES	$1,293,317	$14,329,067
III. IMPROVING MANPOWER UTILIZATION	6.0 MANYEARS	74.9 MANYEARS
IV. ADMINISTRATIVE MANAGEMENT	$212,997	$800,236
V. CONTROL OF TECHNICAL DATA AND REPORTS	$18,204	$103,823
VI. DESIGN ENGINEERING & RESOURCES	$245,675	$920,336
VII. TECHNICAL GUIDANCE TO CONTRACTORS	$1,383,980	$3,983,671
VIII. REASSESSMENT OF REQUIREMENTS	$28,985,597	$34,983,180

CR 4/20/66 E-D 3516

MSFC COST REDUCTION

PORTABLE RADIATION SHIELDING

PORTABLE RADIATION SHIELD



RADIATION SHIELDING IN PLACE

PROBLEM

- RADIOGRAPHIC INSPECTION OF WELDS ON THE S-II STAGE, NORTH AMERICAN AVIATION PLANT, SEAL BEACH, CALIFORNIA, REQUIRED RADIATION PROTECTION FOR PERSONNEL.
- PROPOSED SOLUTION WAS TO ADD A 1/8 - INCH LEAD SHIELD TO THE SEPARATION WALLS BETWEEN STATIONS REQUIRING 7,680 SQUARE FEET OF LEAD AT AN ESTIMATED COST OF $290,700.

SOLUTION

- PORTABLE, SEGMENTED, LOCALIZED SHIELDING UNITS WERE DESIGNED AND BUILT FOR ALL WELD STATIONS, PROVIDING THE REQUIRED RADIATION PROTECTION AT A COST OF $16,200.

SAVING

- $274,500

E-D B 3508

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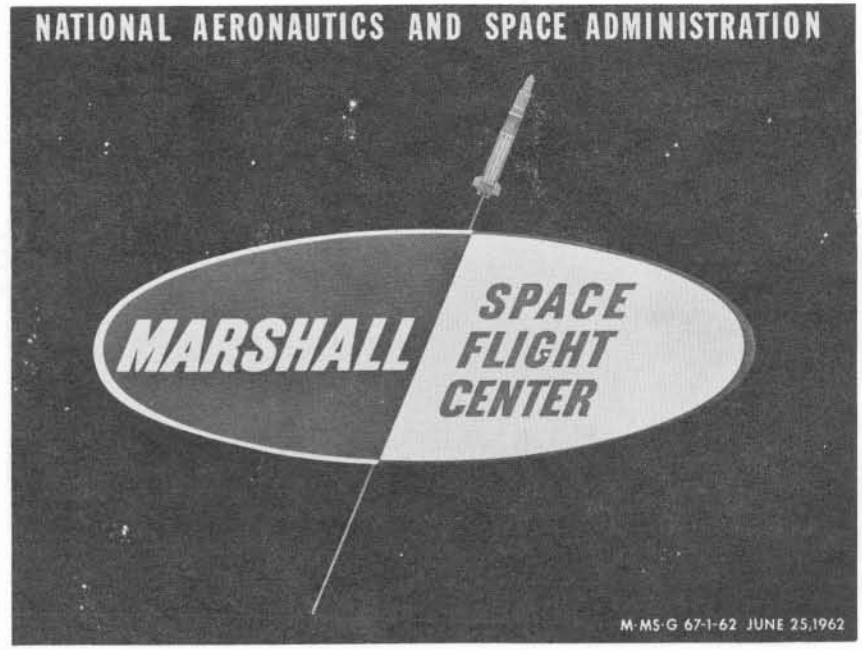
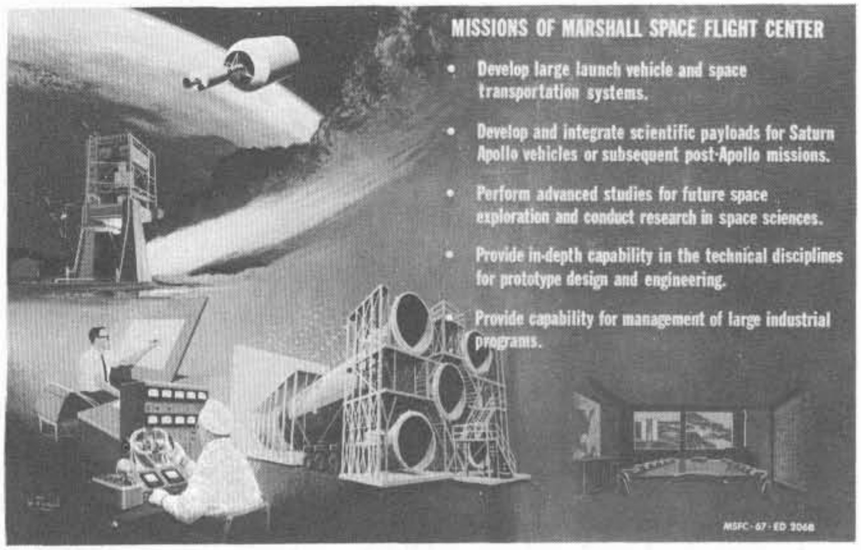
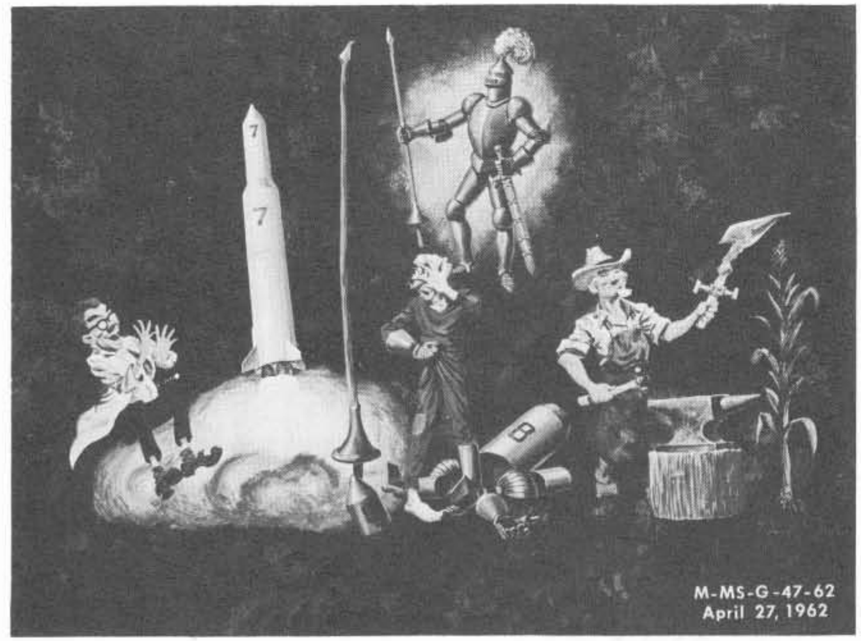
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL
SPACE FLIGHT CENTER
EX-D-201
REV. A
MS-G 67-33-62 NOV. 15, 1963


NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MARSHALL
SPACE FLIGHT CENTER
M-MS-G 67-1-62 JUNE 25,1962

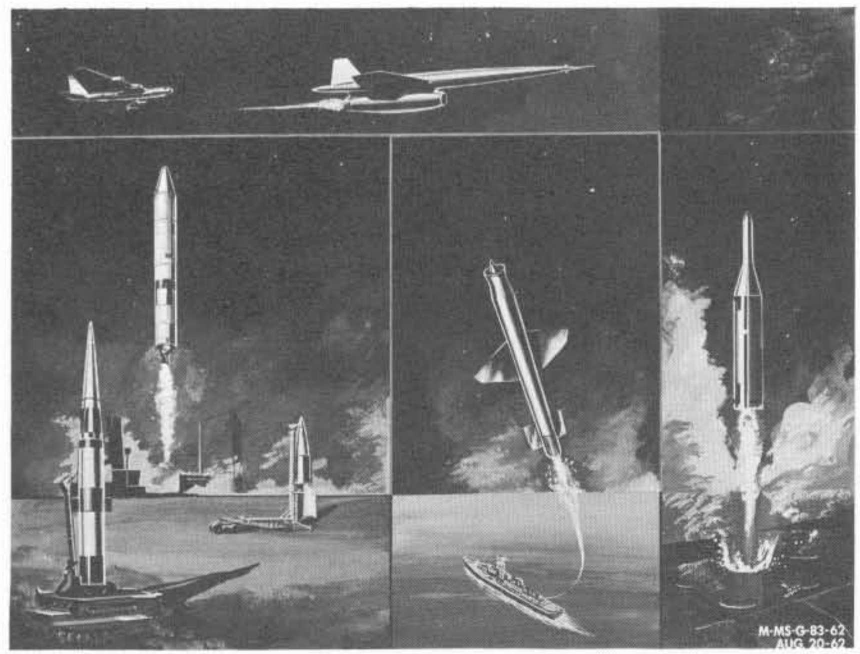

OBJECTIVES OF NASA
• Preserve the United States as a leader in aeronautics, space sciences, and technology.
• Further international cooperation and understanding through the use of space.
• Develop a capability for manned and unmanned operations in space.
• Expand human knowledge of the atmosphere and space.
• Conduct research and technology programs.
• Make available discoveries of military significance to national defense agencies.
• Transfer new scientific knowledge and technology to the civilian economy.


MARSHALL SPACE FLIGHT CENTER
PRIMARY MISSION
DEVELOPMENT OF LAUNCH VEHICLES
ED A 204 D


MISSIONS OF MARSHALL SPACE FLIGHT CENTER
• Develop large launch vehicle and space transportation systems.
• Develop and integrate scientific payloads for Saturn Apollo vehicles or subsequent post-Apollo missions.
• Perform advanced studies for future space exploration and conduct research in space sciences.
• Provide in-depth capability in the technical disciplines for prototype design and engineering.
• Provide capability for management of large industrial programs.
MSFC-67-ED 2068


M-MS-G-47-62
April 27, 1962


NASA
M-MS-G 59-63 AUG 8, 1963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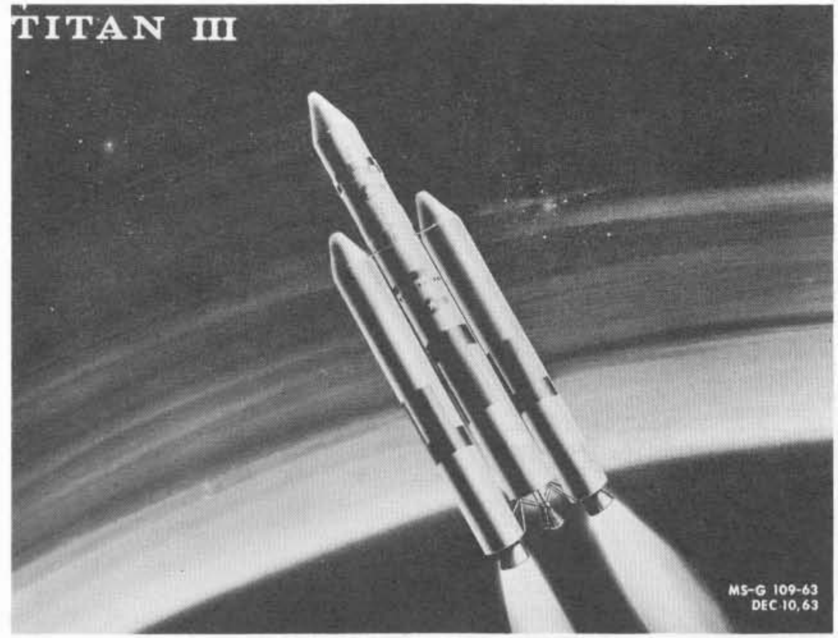
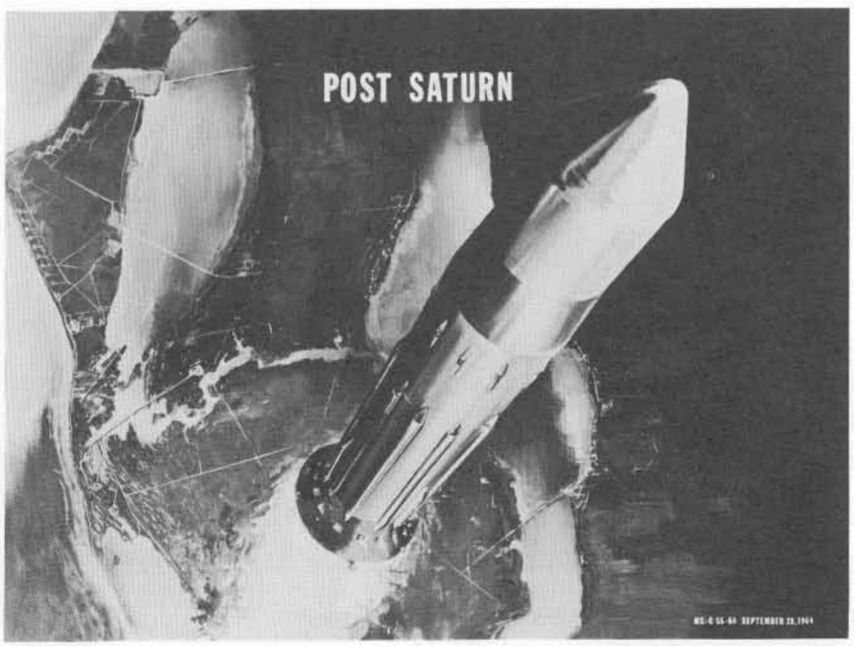
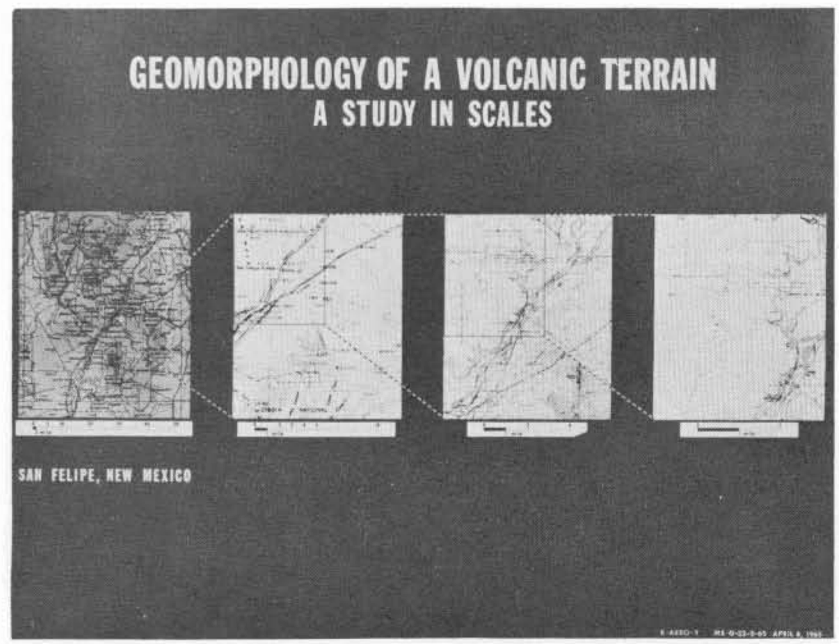
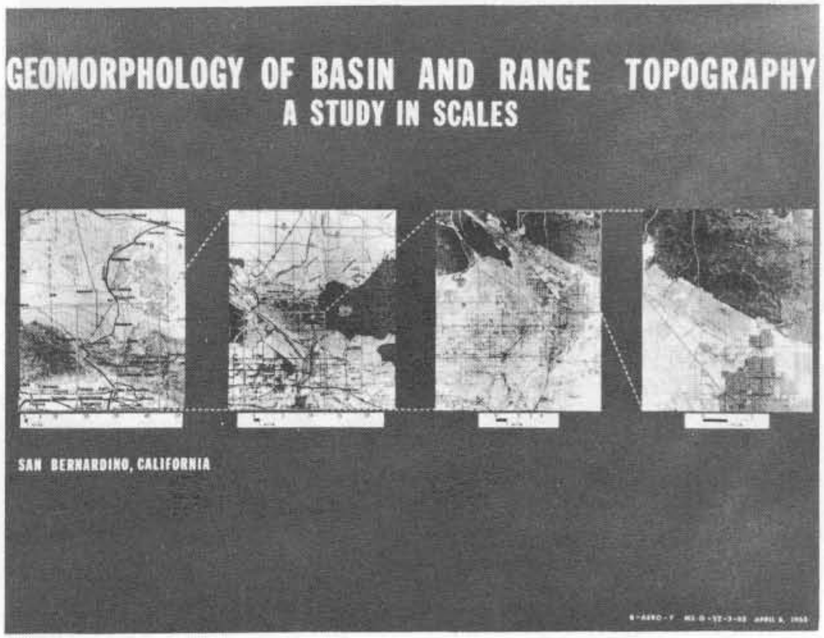
AUG 20-62

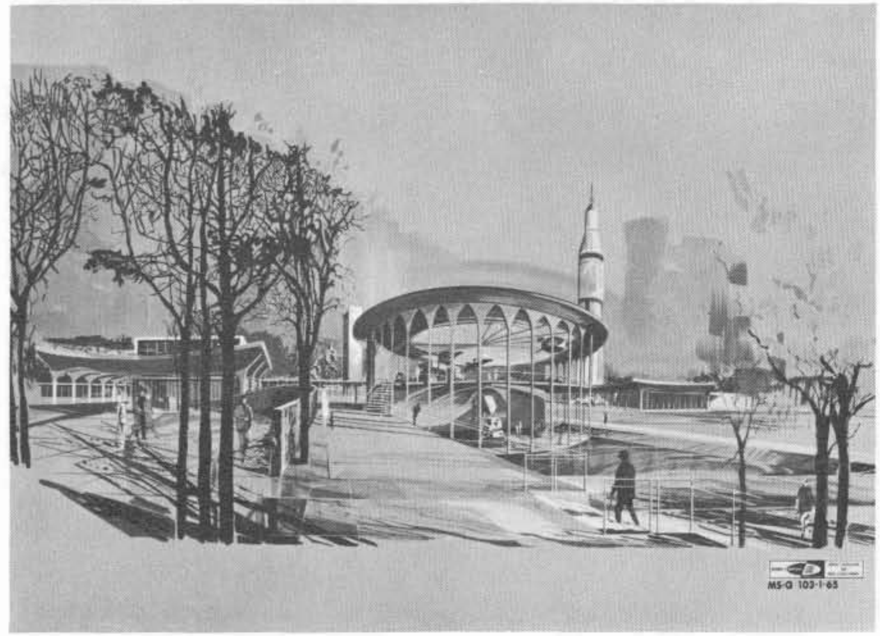

STATIC TEST FIRING
WARNING
FIRING CYCLE
HAS COMMENCED

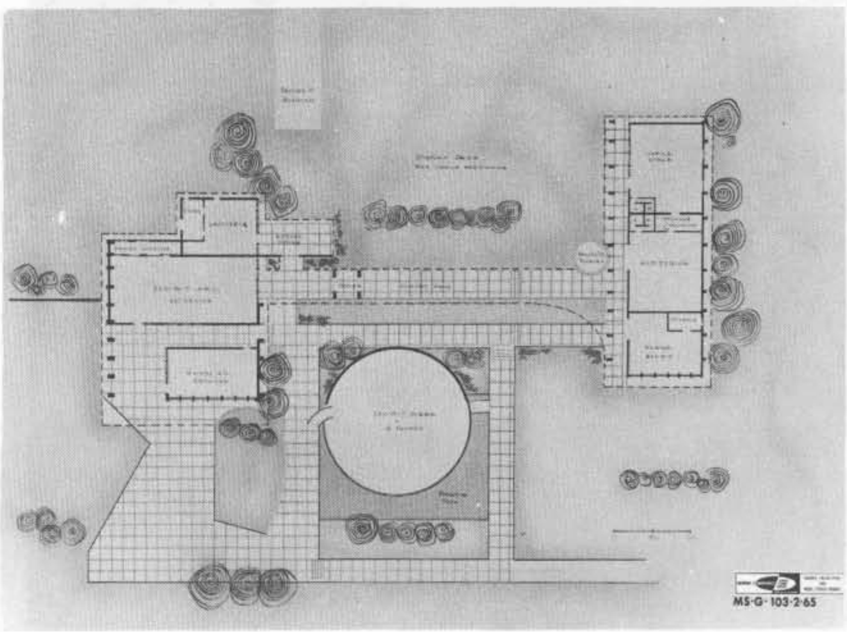

TITAN III
MS-G 109-63
DEC 10,63


POST SATURN


GEOMORPHOLOGY OF A VOLCANIC TERRAIN
A STUDY IN SCALES
SAN FELIPE, NEW MEXICO


GEOMORPHOLOGY OF BASIN AND RANGE TOPOGRAPHY
A STUDY IN SCALES
SAN BERNARDINO, CALIFORNIA


MS-G 103-1-65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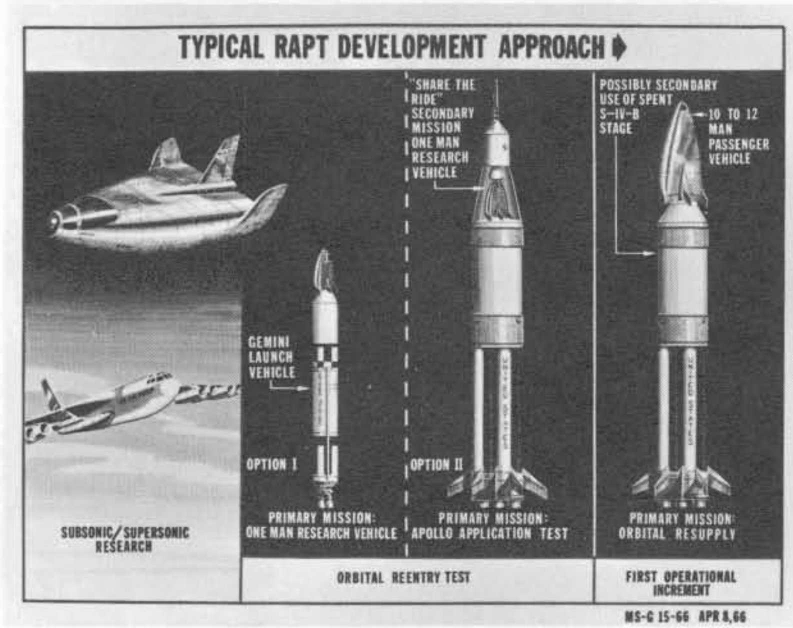
TYPICAL RAPT DEVELOPMENT APPROACH
"SHARE THE RIDE" SECONDARY MISSION ONE MAN RESEARCH VEHICLE
POSSIBLY SECONDARY USE OF SPENT S-IV-B STAGE
10 TO 12 MAN PASSENGER VEHICLE
GEMINI LAUNCH VEHICLE
OPTION I
OPTION II
SUBSONIC/SUPERSONIC RESEARCH
PRIMARY MISSION: ONE MAN RESEARCH VEHICLE
PRIMARY MISSION: APOLLO APPLICATION TEST
PRIMARY MISSION: ORBITAL RESUPPLY
ORBITAL REENTRY TEST
FIRST OPERATIONAL INCREMENT
MS-G 15-66 APR 8,66

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