

Jan 2, 1968

~~4-30-68~~

NOTES
MR. GORMAN'S COPY
JAN 2 1968

with comments

*Haeussermann notes
to Urgent boy*

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2.16
7.2/19

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

2/15 97A
B 2/16

TO Dr. Wernher von Braun, DIR DATE January 26, 1968

FROM Director, Research and Development Operations
R-DIR

SUBJECT Lucas NOTES 1-2-68, reference to 1108 computer availability

The events which led to the Lucas NOTES on 1-2-68 with reference to 1108 computer service availability have been investigated. There appears to have been misunderstanding as to the requirements from P&VE and the exact schedule of the 1108 installation. I will meet with Lucas and Hoelzer to review the problem and to minimize any impact on AAP.

Hermann K. Weidner

Hermann K. Weidner



1/2 OF 3

1. S-II 403 TEST ("C" SPECIMEN): The first major milestone in the structural qualification testing of the S-II-4 type lightweight design was reached with the successful completion of the aft skirt ultimate load test in the Structures Division Test Facility. This was a full-scale flight type hardware test involving elevated temperatures, cryogenic temperatures and body loads. The forward ring of the skirt was chilled to -310°F using LN_2 and the thrust cone area adjacent to the skirt was cooled to -20°F with GN_2 . Stringers on the skirt and the interstage were heated to $+190^{\circ}\text{F}$ to simulate flight aerodynamic thermal environments. 959 channels of data were recorded including 608 strain measurements, 41 load cells, 143 deflection indicators and 167 thermocouples. Data system performance was excellent with only 1.8% of the measurements failing during test. ✓

2. MULTIPLE DOCKING ADAPTER (MDA): The MDA Preliminary Design Review (PDR) is scheduled for January 16-17, 1968. The board meeting is scheduled for January 25-26, 1968. The MDA PDR data packages have been sent to MSC, KSC, and NASA Headquarters and distributed within MSFC. ✓

3. AS-502 SEQUENCE CHANGES: Due to the AS-501 S-IVB fuel tank repressurization anomaly in which a significant ullage pressure collapse occurred during the restart preparations, a significant change in the AS-502 restart sequence is being recommended by P&VE and by MDC. The change in the sequence will allow a better evaluation of the pressure collapse on AS-502 if it occurs and also will maximize the chance of a successful repressurization to assure S-IVB restart. The sequence changes will possibly cause a launch delay due to the impact on the software delivery to KSC.

4. HUMAN FACTORS ENGINEERING: (a) We have interested a sizeable number of our engineers to participate in the simulation testing activities as test subjects. The basic training will be done essentially outside of regular work hours. This will considerably enlarge the pool of available test subjects from civil service ranks, and provide our Human Factors Engineering Group greater latitude to select and match subjects physiologically and psychologically for task evaluation purposes. It will also enhance the understanding of the human engineering problems by our design engineers. (b) The training of 12 test subjects for the ATM Pointing and Control System Simulation Phase I at the Computation Laboratory has been completed. The Phase I simulation is an investigation of the manual backup to the Automatic Inertial Holds and Maneuver Mode. Regular data taking test runs are scheduled later this week. ✓

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Bonnie
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How to
Looks like our equipment change over planning Wash'F so good.

Please comment. Also, what can we do to minimize AAP impact?
LB

1/2 953

1. PERSONNEL: Recent discussions between the Personnel Office (Mr. Wible) and R-DIR (Mr. Cook) have been unable to satisfactorily resolve a pending loss of key personnel in my Resources Management Office because of proposed downgrading of the top positions there. I call this to your attention since such a loss, coupled with impending RIF actions, is absolutely certain to severely impact our ability to implement our ATM and other AAP and Saturn responsibilities which are vitally supported by the personnel affected.

The positions involved are Chief, Resources Management Office; Deputy Chief, Resources Management Office; Chief, Facilities Engineering Group; and Chief, Industrial Resources Group.

I feel strongly that improvements which we have been able to make in the past several years in our ability to manage our affairs in this area must not be destroyed by choosing to downgrade these positions.

As a result of these proposed downgrading actions, the key personnel of this office are actively seeking employment elsewhere and success in all cases appears certain. Consummation of the proposed personnel actions will cripple this group to the extent that a major impact will be felt and all of our programs will have a serious adverse effect. Your assistance in helping me to sustain the requested grade structure is needed. For additional information, refer to Mr. Shepherd's copy of my December 11 memo to Mr. Weidner on this subject.

2. I have information that Dr. Badgley from NASA Headquarters has recently accepted a position with Gulf Oil Company.

Harry Susman

Can we help?
B

OFFICE OF DIRECTOR - MSFC

CODE	NAME	INIT.	<input type="checkbox"/> ACTION	<input type="checkbox"/> INFORMATION
FIN-R	Mr. Goans			

REMARKS

Please note Mr. Newby's handwritten note in the margin on the attached page.

CODE	DEP-A	NAME	Jean M.	DATE
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MSFC - Form 495 (Rev August 1963)

*1-2-68
w/ly
note*

NOTES Stuhlinger 1-2-68

1. PEGASUS SATCON TRANSFER: As mentioned in my Notes of 12-4-67, the Quality and Reliability Assurance Laboratory is interested in taking over the Pegasus SATCON operation in order to continue to monitor the life characteristics of the various electronic elements of the three Pegasus spacecraft in a space environment. The SATCON station is an onboard systems monitoring and data recording station, not a satellite tracking station. The SATCON equipment has been demonstrated to QUAL engineers in the operating mode, and arrangements are nearing completion for a total transfer of all equipment and records from SSL to QUAL.
2. DR. REES' TIGER TEAM: Dr. Rees has requested that Mr. Harvell Williams of SSL join his team on the West Coast. This will be accomplished, and Mr. Williams will begin his work with Dr. Rees' team on January 8. Mr. Williams was previously responsible for overseeing the operations of the Pegasus SATCON station. The transfer of SATCON to QUAL will allow him to join Dr. Rees.

Mr. Sam Jones
Kin.
Maybe we
can subtract
the 10,000
rolls of tape
that was
discussed
in the
audit mtg.
this A.M.
Henry
1-3-68

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NOTES 1/2/68 BALCH

1/2 AS

S-II-504 Testing - Stage contractor has implemented a recovery schedule to reduce impact of late delivery of modification hardware. Target dates for S-II-504 milestones are as follows: Tanking test, January 16, 1968; static firing, January 24, 1968; removal from test stand, March 5, 1968; ship to KSC, March 17, 1968. ✓

S-II-503 Modifications - S-II-503 was shipped to KSC on December 21, 1967, and arrived on December 24, 1967. ✓

S-IC-D Stage - Anti-Vortex modification was completed on December 18, 1967. Additional changes were incorporated on December 20, 1967, and final testing was completed on December 28, 1967. Return of stage to original configuration and removal from test stand is scheduled for January 5, 1968. ✓

GE Service Contract - Amendment 122 to Contract NASw-410, Modification MSFC-1, was received at MTF on December 20, 1967. The amendment was approved by NASA Headquarters subject to "Support Services Adjustment Article" clause inclusion. This clause is not acceptable to General Electric, and distribution of Amendment 122 is being withheld pending resolution. Discussions with General Electric are continuing. ✓

NOTES 1/2/68 BELEW

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ORBITAL WORKSHOP ENGINEERING MOCKUP: The OWS engineering mockup is nearing completion at McDonnell Douglas, Huntington Beach, California. Shipment of the mockup to MSFC is still scheduled for January 3, 1968, but the "Super Guppy" developed some difficulties after take-off with the S-IVB 503 from Sacramento, and returned to investigate. The pilots heard unidentifiable noises thought to be originating from the Guppy cargo compartment while they were in flight. The cause of the noises has since been determined to be in the hydraulic coupling system. Hence, shipment of the OWS engineering mockup may be delayed for a short time. ✓

AAP PROGRAM REVIEW: The following are the highlights of a meeting between Dr. Mueller, Messrs. Mathews, Belew, Trimble, Thompson, and others, during which the total AAP program was reviewed. It appears that two options exist. The first is basically what we have been pursuing except that a 56-day flight has been inserted between AAP 1-2 and AAP 3-4, to eliminate the biomed-astronomy controversy on AAP 3-4. In addition, we would proceed with two or three revisits to the first cluster and follow these with a dry launched Workshop which is not necessarily derived from an S-IVB stage. The other option is to proceed with the first wet OWS with a questionable number of revisits followed by a dry launched OWS differing from the first OWS only as the mission dictated; however, the ATM will be integrated into this Workshop. The mission would be planned for one to one and one-half years using 56-day CSM's for resupply. This would be followed by a dry launched Workshop as described in option 1 above. Also of significance is that AAP-1A, the Applications Experiment Package, which was to precede the first cluster, was deleted from the program. ✓

MSC's continued concern about the LM and the way it is employed in the cluster and, in turn, what type dry launched Workshop to pursue has prompted Dr. Mueller and Mr. Mathews to establish two teams to analyze the LM problems and define a dry Workshop. The LM team consists of Dr. Mueller, George Trimble (MSC), and Ludie Richard. The Workshop team is headed by Doug Lord of Headquarters, with Frank Williams supplying the primary MSFC input. Both teams are to provide Dr. Mueller and Mr. Mathews on January 5, an outline of how each team will conduct their respective tasks. ✓

NOTES 1-2-68 BROWN

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H-1 ENGINE The H-1 Engine Production Support Contract, which has been in NASA Headquarters since August 28, 1967, is now being reviewed by Mr. B. Moritz. (Mr. Webb has appointed Mr. Moritz as Assistant Administrator for Special Contracts Negotiations and Review.) We were questioned by telephone on 12/26 by a group (including Paul Baron, C. King, and George Wood) who were preparing a presentation to Mr. Moritz. The questions dealt with the time period of the contract (four years; through the flight of AS-219) and the relationship between the support contract and the current production contract. After their briefing to Mr. Moritz, we received additional questions on 12/28. Mr. Moritz does not disagree with the contract on major issues, but feels he must be in position to answer questions that may be asked by a congressional committee when Congress reconvenes. I will be in Washington on January 5 and plan to contact Mr. Moritz personally if the problem is not resolved before then. As you may recall, Rocketdyne has been operating without a contract since July 1, 1967. In the interim they are operating on Corporate funds. Through December, they have gone to Corporate for money four times and have expended in excess of \$1.7 M of their own money to keep the production support effort "alive". ✓

J-2 ENGINE Four successful S-II simulation tests were conducted at AEDC on 12/21 in support of the fracture mechanics problem resolution. The fifth test was cancelled due to failure of the fuel tank vent valve solenoid and consequent inability to maintain proper fuel pump inlet conditions. The next test is scheduled for 1/3/68. Present planning calls for the fuel inlet duct (S-IVB type) now being used at AEDC to be replaced with an S-II duct the first week in February. Use of the S-II duct is necessary to confirm the reduced fuel inlet pressure for S-II-503. It is expected that we will have sufficient data to make a decision for 503 by March 1. This date will support the 503 schedule. Use of this S-II duct will also facilitate the testing being done to establish the minimum fuel inlet pressure at which the engine can start and operate.

The J-2 engine modification on AS-204 (replacement of the helium purge valve with an alike item containing an inlet filter) has been accomplished. Leak checks have been completed. Two sequence tests are yet to be accomplished: One during FRT and one prior to CDDT. This modification and subsequent sequence tests will not impact the launch schedule. ✓

NOTES 1/2/68 CONSTAN

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Nothing of special significance.

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NOTES 1/2/68 FELLOWS

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Union Suit for Injunction, MSFC RIF Action: MSFC was notified December 29, 1967, by telecon from the NASA Deputy General Counsel that motions had been filed against the Civil Service Commission for preliminary and final injunctions against the current MSFC Reduction In Force actions. Six R&DO personnel are named in the enjoining motions; two from R-ME, two from R-P&VE, one from R-TEST, and one from R-COMP. Backup information is being assembled for NASA Headquarters today. ✓

1. Saturn V Liftoff Dynamics: Studies are presently being initiated to determine liftoff clearances for the AS-502 vehicle. Data being used in the study are a combination of presently available measured values for AS-502, results from AS-501, and specification values where measured data are not available. AS-501 results indicate the liftoff acceleration was slightly lower than expected resulting in clearing ground support equipment later than predicted. Misalignment of the center engine (31 min) on AS-501 was less than predicted (57 min). Misalignment of the outboard engines on AS-501 was slightly greater than the value used in preflight studies (0.15 deg compared to 0.13 deg). The misalignment of the center engine for AS-502 is predicted to be 29 min. With these results being used to analyze AS-502, it is expected that liftoff clearances for AS-502 will be approximately the same as predicted envelopes for AS-501. This will again require that close attention be given to the alignment of the inertial platform and engine null shifts for AS-502 during prelaunch tests. ✓ Preliminary liftoff studies for the AS-502 vehicle are expected to be complete the latter part of January with updates made as measured data become available. ✓

2. MSC "Low g" Slosh Request: Re: letter to you from Dr. Gilruth on MSFC Capabilities in area of low "g" propellant sloshing work. Dr. Cox of MSC was contacted by Mr. McNair the week of 12/11/67, and briefed on the MSFC strong points in this area. The main emphasis was that MSFC has probably the best available low "g" slosh model and also a three dimension (3-D) program (which includes the S-IVB control system characteristics) that could easily be adopted to the S/C analyses. ✓ Dr. Cox was told that MSFC could assist MSC in adopting the programs to the S/C needs and also perform some computer runs/analyses, if desired. ✓ Some data was promised to Dr. Cox to give him a more detailed understanding of the models, analyses, and other aspects of MSFC work. We have also offered to arrange a meeting with MSFC and MSC personnel, and have given an open invitation to contact us on any questions they may have. ✓ We expect to hear from Dr. Cox after he has reviewed some of the MSFC data which we supplied him. We will continue to pursue the problem and keep you informed of results. ✓

1/295A

1. RADIOGRAPHIC INSPECTION OF MATED ELECTRICAL CONNECTORS: We are continuing to investigate the feasibility of radiographic inspection of mated electrical connectors. MSC personnel recently visited MSFC to discuss and coordinate efforts in this area. They were briefed on MSFC investigations to date, and were provided several photographs that exhibited the quality of pictures we are achieving. The MSC personnel also visited the R-QUAL X-Ray Facility, and arrangements were made for future exchanges of information. ✓
2. QUALITY REQUIREMENTS TRAINING AT KSC: We were required to cancel the class in quality requirements, which was scheduled January 23, 1968, at KSC, due to the loss by RIF of the key civil service employee associated with this effort. His loss will impact our quality requirements training area significantly. When we can get someone else better grounded in this field, we will recontact KSC to offer further assistance. !

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S-1B

Friday, December 29, 1967, the Michoud Contracts Office had received a request from I-1/IB-S1/S-1B for a change order to be issued to Chrysler with instructions to proceed with the combustion instability tests on S-1B-11. The request included both a schedule for planning the first bomb test on January 9, 1968, and the duration acceptance test for February 27, 1968, and the changing of approximately 32 'Huckbolts' in the thrust structure for bolts of larger size. ✓

S-1VB (MSFC)

Test S-1VB-048S was conducted at the S-1VB Test Stand (MSFC) on December 21, 1967, using J-2S engine S/N J108. The duration of the test was 15 seconds. All test objectives were met. ✓

ML-3 DAMPER ARM

The test program for ML-3 Damper Arm assembly was completed prior to Christmas; however, several components will require re-working and re-testing. In addition, a few product improvement type changes will be made and tested prior to removing the assembly from the test area. ✓

Reference your question on 12/11/67 NOTES, copy attached. The engineers who have resigned were not directly affected by the RIF, but certainly considered the RIF action and its effect on in-house capability prior to accepting new employment. We believe this trend of experienced engineers resigning will continue for several months. ✓

NOTES 1-2-68 HOELZER

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NEGATIVE REPORT.

NOTES 1/2/68 JOHNSON

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Negative report.

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S-II Structural Test Tank:

The circumferential weld joining the S-IC upper portion to the S-II lower portion was completed on December 19. Since then, inspections of the weld by X-ray and by dye penetrant methods have been completed; mechanical measurements of offset and peaking have also been made. The weld is free of defects and has required no repairs. This weld joining two different aluminum alloys (2014 and 2219) was made using the pulsed arc MIG process. The process was used after an evaluation of samples by P&VE who completed this work in less than one week.

George Lewis and Norm Wilson from NAR/S-II Manufacturing witnessed the welding of the outside pass and also studied the X-rays of the inside pass and of the completed weld. They were sufficiently impressed to request us to study methods of joining the J-ring (2219 alloy) to cylinder #1 (2014 alloy) in the S-II stage. The welding will have to be performed from the outside of the cylinder only. A two-sided process cannot be used there because the spacing between the cylinder wall and the common bulkhead is less than 1/2" in that region. This is a circumferential weld which is subject to low stress levels only but nevertheless has given cause for concern because of porosity and offset. NAR will provide representative samples of material and we will then start a process development program. ✓

Q-Ball Differential Pressure Transducers: At the request of the Saturn I/IB Office and the Astrionics Laboratory, a review of welding equipment and fixturing for the Q-Ball Pressure Sensor was made at the Rosemount Engineering Company, Minneapolis, Minnesota. Failures of the Q-Ball differential pressure transducers have been caused by metal particles expelled from spot welds. Some improvement has been made in recent weeks in the quality of the welds as seen from the samples submitted to us by Rosemount. After this week's visit however our assessment is that the weld preparation and fixturing are still inadequate to locate the parts as accurately as is necessary. We plan to look further into the tooling concepts used. We are also investigating weld power supplies other than that used so as to allow the manufacturer to control the weld energy input to the precise level and pulse shape which will give a sound weld without metal expulsion. ✓

1/2 954

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Hsu. G.
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Please comment. Also, what can we do to minimize AAP impact?
B

NOTES/1/2/68/MAUS

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FY-69 BUDGET STATUS - Latest information available to us on the FY-69 Budget is as follows:

NASA Request	\$4,760.3 M
BOB "Mark"	<u>4,247.8 M</u>
Reduction	\$ 512.5 M

NASA Reclama	~	\$ 200 M
BOB Allowance		\$ 82 M

BOB Approved NASA Total	~	\$4,330 M
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The distribution of this total is not yet available to us except that Apollo received the major share (~\$67 M) of the additional allowance of \$82 M granted by BOB and that the total to appear in the FY-69 budget for AAP will likely be \$439 M barring further reductions by the President. ✓

NASA HEADQUARTERS RESTRUCTURING - Mr. Webb has approved a revised organization chart (attached) for NASA which provides the authorized framework under which he plans to proceed during the transition period. In a brief cover memorandum, he explains assignments given to Messrs. Newell, Finger and Shapley. The revised structure leaves much room for conjecture. ✓

ORGANIZATION PROPOSAL - A proposal has been submitted through Dr. Mueller to Mr. Webb for approval of the MSFC Safety Office. This proposal also contains a request for deletion of the Voyager Office and Facilities Projects Office in IO. Art Daly will become a member of General O'Connor's staff as an advisor for program oriented facilities projects and activities. Ludi Richard's office title officially becomes Systems Engineering and Chris Andressen's office title is changed to Planning and Resources Office. ✓

TASK WORK PACKAGE - During the review by the MSF Task Work Package Team, headed by Jerry Kubat, MSFC was asked to provide a proposed format and level of detail for submission of Task Work Packages to MSF. As a product of the efforts of our internal Task Work Package Working Group and discussions involving Messrs. Gorman, Newby, Hueter, and Cook, we submitted a proposal on December 28, 1967. ✓

B 1/9

NOTES 1/2/68 RICHARD

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Spacecraft Guidance of the S-IVB IU out of Orbit: When I was at MSC on Dec. 20, 1967, I was approached by Chris Kraft and others about what our reaction might be to their possible proposal that the spacecraft guidance not be used as an alternate for steering out of orbit on the lunar mission. As you know the present program specification calls for this redundant mode. Their reason for this change is the heavy effort required by MIT and MSC to get all of the other software-hardware system ready in the spacecraft and LM. I told them I felt under the present circumstances that this was a reasonable approach, although in the long run it would still be good to have this redundancy if we could work it in on later flights. ✓ They will make a formal proposal to MSF to delete this capability from the program requirements later this month. ✓

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NOTES 1-2-68 RUDOLPH

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1. AS-502:

- o Significant schedule of events for AS-502 are as follows:
 - 17 - 18 Jan. 68 - My Preflight Review
 - 14 - 15 Feb. 68 - Flight Readiness Test at KSC
 - 20 - 21 Feb. 68 - Gen. Phillips' Flight Readiness Review at KSC
 - 26 - 29 Feb. 68 - Countdown Demonstration Test at KSC
- o S-IVB changes: Commitment as to the technical changes required for S-IVB-502 as a result of AS-501 flight evaluation was reviewed on Friday, 29 Dec. 67, and changes to software approved. Details of these changes will be reviewed with you in a meeting set for Thursday, 4 Jan. 68, 2:00 pm, in the 10th Floor Conference Room, Building 4200. ✓

2. AS-503:

Status of AS-503 stage deliveries:

- S-IC Stage - On dock KSC 27 Dec. 67
- S-II Stage - On dock KSC 24 Dec. 67
- S-IVB Stage - On dock KSC ~~20~~³⁰ Dec. 67
- IU - Ready for shipment to KSC. Delay in delivery due to weather - Delay will create no problem for KSC. ✓

3. General:

Dr. Mueller is convening a structural Design Certification Review (DCR) for S-II-2/S-II-3 to be held at MSFC on Wednesday, 10 Jan 68 (day following MCM). ✓

1. MISSION RULES GUIDELINES: Mr. Schneider conducted a meeting at D. C. on 12/20/67 to review the draft of proposed Mission Rules Guidelines (MRG). All MSF Center Program and Operations Offices were represented. Specific items covered in the MRG are engineering and flight control measurements both in the vehicle and on ground; vehicle redlines; and ground operational support. It is felt that the meeting achieved its major purpose to give more visibility to the rationale underlying existing criteria and to improve understanding and consistency of individual Centers' guidelines. It was agreed that all mandatory items must be related to Center-developed mandatory test objectives and that these objectives need to be reviewed against common standards. No specific mission or specific mandatory items were discussed. It is not expected that the new MRG (still being reviewed by the Centers) will significantly change MSFC's redlines or mandatory measurements. ✓

2. APOLLO 5 MISSION DIRECTOR'S SUPPORT REVIEW: The Apollo 5 Support Review was held at KSC on December 21, 1967. Both KSC and GSFC are now fully prepared to support the Apollo 5 Mission. To help relieve the heavy overtime workload on the support agencies, MSFC has changed somewhat the data delivery requirements. The 12 hour data package and Bermuda insertion data will still be expedited. Mr. Schneider, in his summation, reemphasized the need for MSFC and MSC to maintain rigid control on support requirements. The Manned Space Flight Network (MSFN) is one of the primary constraints on the Apollo program and any schedule impact on an oncoming mission will result in a subsequent schedule impact on all remaining missions. He pointed out that changing data requirements after a mission (as was experienced on Apollo 4) could result in a slippage in preparation for an upcoming mission and therefore impact the entire program. ✓

3. AS-204/LM-1 FRT: The AS-204/LM-1 Flight Readiness Test (FRT) was successfully completed on December 22, 1967. HOSC support was provided for T-4 hours at 6:00 AM CST until simulated S-IVB cutoff at 5:13 PM CST. Seven support conferences were established between the LCC and MSFC engineers. There were 4 holds during the test totaling 6 hours and 13 minutes. The holds were due to (a) power supply failure, (b) countdown clock procedural error and (c) problem with flight control computer. ✓

4. AS-204/LM-1 FLIGHT MISSION RULES: Of the eight flight mission rule open items presented in the PFR, six were unacceptable since they cannot be implemented at the MCC-H; one was approved with modifications and one item (auxiliary hydraulic pump fails to turn off at TB4+3.7 sec) is still open with anticipated close-out today. ✓

NOTES Stuhlinger 1-2-68

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AS-204 FLIGHT READINESS TEST AND FLIGHT READINESS REVIEW:

The AS-204 Flight Readiness Test was completed the night of December 22, 1967. There were no major malfunctions or problems. The Flight Readiness Review is scheduled for Wednesday, January 3, 1968, at KSC. As of this time there are no open items that will impact the presently scheduled launch date, which is January 17, 1968. ✓

CCSD LONG LEADTIME CONTRACT: On Thursday, December 28, 1967, Headquarters approved a 90 day extension of the CCSD (Chrysler)

Schedule VI Contract for long leadtime materials, parts, components, and engineering service for S-IB flight stages for SA-~~203~~²¹³ through SA-216. On Friday afternoon, we completed negotiations with Chrysler for this effort for approximately \$1.7 million for the 90 day period. This will support approximately 200 people on the long leadtime effort. ✓

Jan 8, 1968

NOTES
MR. GORMAN'S COPY

JAN 8 1968

with comments

None for DEP.A.

10 - WCEA

MSFC ROUTING SLIP					
	CODE	NAME	INIT.	<input type="checkbox"/> A <input type="checkbox"/> C <input type="checkbox"/> T <input type="checkbox"/> I <input type="checkbox"/> O <input type="checkbox"/> N	<input type="checkbox"/> I <input type="checkbox"/> N <input type="checkbox"/> F <input type="checkbox"/> O <input type="checkbox"/> R <input type="checkbox"/> M <input type="checkbox"/> A <input type="checkbox"/> T <input type="checkbox"/> I <input type="checkbox"/> O <input type="checkbox"/> N
1	DIR	Dr. von Braun			
2					
3		<i>B</i> <i>4/16 direct</i>			
4		<i>2/11</i>			

REMARKS

This is sent in response to your request on paragraph 2 of my notes dated 1-8-68.

file

WRL

CODE R-P&VE-DIR	NAME W. R. Lucas	DATE 2/8/68
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January 22, 1968

TO: Dr. von Braun/Mr. Weidner

This is a follow-on to my Weekly Notes of January 22, 1968.

One of the major problems that impacts this effort (or may) is the fact that Mathews/Cortright/Mueller do not all see this effort in the same light - we are getting conflicting guidance. This was brought to the attention of the group in the presentation of the Configuration Task Team.

Also, Doug Lord would like to "manage" the follow-on - - whatever it turns out to be - - and if we come up with a "B Configuration", it would/and probably should be taken over by Mathews. This is compounded by the uncertainty of what the Thompson Committee impact will be.

Things are moving and thus far, under control. If I feel they are getting out of hand, I will let you know.

F. L. Williams

B 2/14

1. Saturn IB/Service Module Package: Work is underway to provide you with the "first cut" set of data on the Saturn IB plus Service Module data for an early planetary mission. The NAR people who prepared the material which was presented to you last week will be here for 2 or 3 days, starting the morning of Jan. 22, for a review and working session. A meeting is scheduled to review the material with you and Mr. Weidner at 4:00 p.m., January 24. ✓
2. Dry Launch Work Shop Meeting and Activity: Mathews and Cortright were presented the results (thus far), status, and plans of the DLWS Task Group at MSFC, on Jan. 19. The meeting was attended by personnel involved and a good cross section of MSFC people. In general the meeting went very well. There has been considerable work done to date, and much more is required. The Advanced Systems Operations (ASO and Co-located) are devoting well in excess of 50% of our total effort on this task, and laboratory and other office support is being applied where necessary. We are still in the early phases of the effort. ✓ Additional participation will be applied as needed. We will give you a more complete rundown on the details Wednesday. ✓

Configurations: I am concerned that the B Configuration (B = early/simple evolutionary step from the Wet Work Shop) is being pushed as "a replacement for the first ATM mission rather than a follow-on". I don't consider this a critical issue at this time (however, "NASA politics" could play a significant role in such a decision). It is something that must be watched very closely. ✓ Configuration C is being pushed to the point that is very sophisticated, costly, and probably too late to be a good choice. The difference between B and C may be so large that we may be asked to go back and come up with something that "fits in between the two". This would cause a delay and further complicate the situation, although Mathews has said that he expects and wants to see a difference in program cost of 2 - 3 times between B and C. ✓

Logistics: The logistics picture is very interrelated with Cluster I for the B Configuration. A "dormant CSM" appears attractive for B; however, it does not fit with the current Cluster I design and would necessitate 2 developments (a 56-day CSM and a dormant CSM) during the next 3 years. Mr. Sporey (MSC) presented a possible cut to this dilemma - namely, don't develop a 56-day CSM, only a dormant CSM. This would save considerable money during FY 68 and 69. However, also coupled with this is: (1) Only fly a 14-day mission on the Wet Work Shop and a 14-day bio-med revisit. It is too early to tell what the IB vs I III picture looks like for logistics. We will watch this item closely. (2) Postpone the ATM and its revisits to the DLWS because you would only stay 14 days/visit. Additionally, we could also omit the LM as part of the ATM thus saving even more '68 & '69 dollars. ✓

Experiments: As usual, the experiments people want a major experimental activity which, in my judgment, is excessive at this time. The cost, schedule, interfaces, etc. will help to get this back more in line as we dig in deeper. ✓

Resources/Schedules: We had hoped to get a good cut at what the cost picture was; however, it didn't come out in a clear enough picture to show what we are really up against so that things could be placed in a good perspective. I hope that in 2 weeks the data will be developed such that proper realism can be factored into the study. The schedule data gave a good hint at what might be obtainable; however, without the cost, it did not give the proper impact.

The Planning Group will meet in Wash., Jan 26, and the total group will meet on Feb. 2. Since R&D Council is on Jan. 26, I will sit in on the Wash. meeting for Mr. Weidner. ✓

NOTES 1-8-68 LUCAS

988
2-16
B 1/12
11.2/19

1. AEROSPIKE CHECKOUT SERIES IS COMPLETED: The last of four aerospike tests to verify chamber modifications was successfully run for 7.5 seconds at Rocketdyne last week. Post test inspection of hardware revealed no visible damage and available data indicated that performance was satisfactory. ✓

2. SATURN V MODEL TESTING: In order to study the localized structural responses to the aerodynamic noise environment, a 1/10 scale model of the Saturn V space vehicle has been fabricated and mounted on a track test sled, and is ready for shipment to AFMDC, Holloman Air Force Base, New Mexico. The sled and payload will undergo three weeks of ground vibration testing. Another two weeks will be needed to install the instrumentation. The first of 12 scheduled test firings is expected to take place during the first half of March 1968. ✓

3. MDA DOCKING PORTS: Work is continuing on the investigation of the structural problems associated with a retractable probe part of the MDA. At this time, three preliminary concepts have been completed and are being reviewed. An additional concept utilizing an expansion bellows is being investigated. In order to help us to better understand the problems connected with the Apollo docking mechanism, the AAP Mechanical Panel has arranged for a 4-hour briefing to our design engineers by North American Aviation on 1-9-68. Hopefully, full scale hardware will be available for the review. ✓

4. LEM STRESS CORROSION: We have been in close contact with the MSC people on the LEM stress corrosion problem. We have proposed that a team of MSC and our people go to Grumman Aircraft Engineering Company and do a stress corrosion survey of the LEM on the spot. This idea was received enthusiastically by MSC working people, and they will recommend this to their management. ✓ I believe such an activity could be accomplished in a few weeks and could eliminate not only the current problem but other problems before they arise. ✓

5. ASTM FALL SYMPOSIUM: James Kingbury agreed to sponsor a session at the Fall ASTM meeting in Atlanta under the theme "Government Research Pays Off." ✓ Public Affairs has given oral approval. We were recommended to the ASTM Symposium Chairman by George Deutsch, OART. ✓

6. ORBITAL WORKSHOP MOCKUP: The Orbital Workshop Mockup was scheduled for shipment by Guppy from Douglas to MSFC on 1-3-68. Because of adverse weather conditions, the aircraft has been grounded and the earliest projected shipping date is 1-12-68. ✓

B.L.
Could you send me some sketches and/or photos of this test setup? B

Have P. - pls check. This C has some photos, needs some maintenance. ml

OFFICE OF DIRECTOR - MSFC

CODE	NAME	INITIALS	INFORMATION
	<i>Briefing</i>	<i>by the</i>	INFORMATION
	<i>Bornue</i>	<i>in weekly</i>	
	<i>C. File</i>	<i>NOTES of</i>	
		18/68	N

REMARKS

I expect a briefing on their Saturday meeting in Washington (Contractor presentations on new re-usable launch vehicle concepts) by Geidner (Williams) Becker. No hurry, but please accommodate on my schedule during this week.

Cancelled by File 1/10/68

95B

Set up w/ meeting for Friday, 1/12/68, 2:30 - 3:30

13h/8

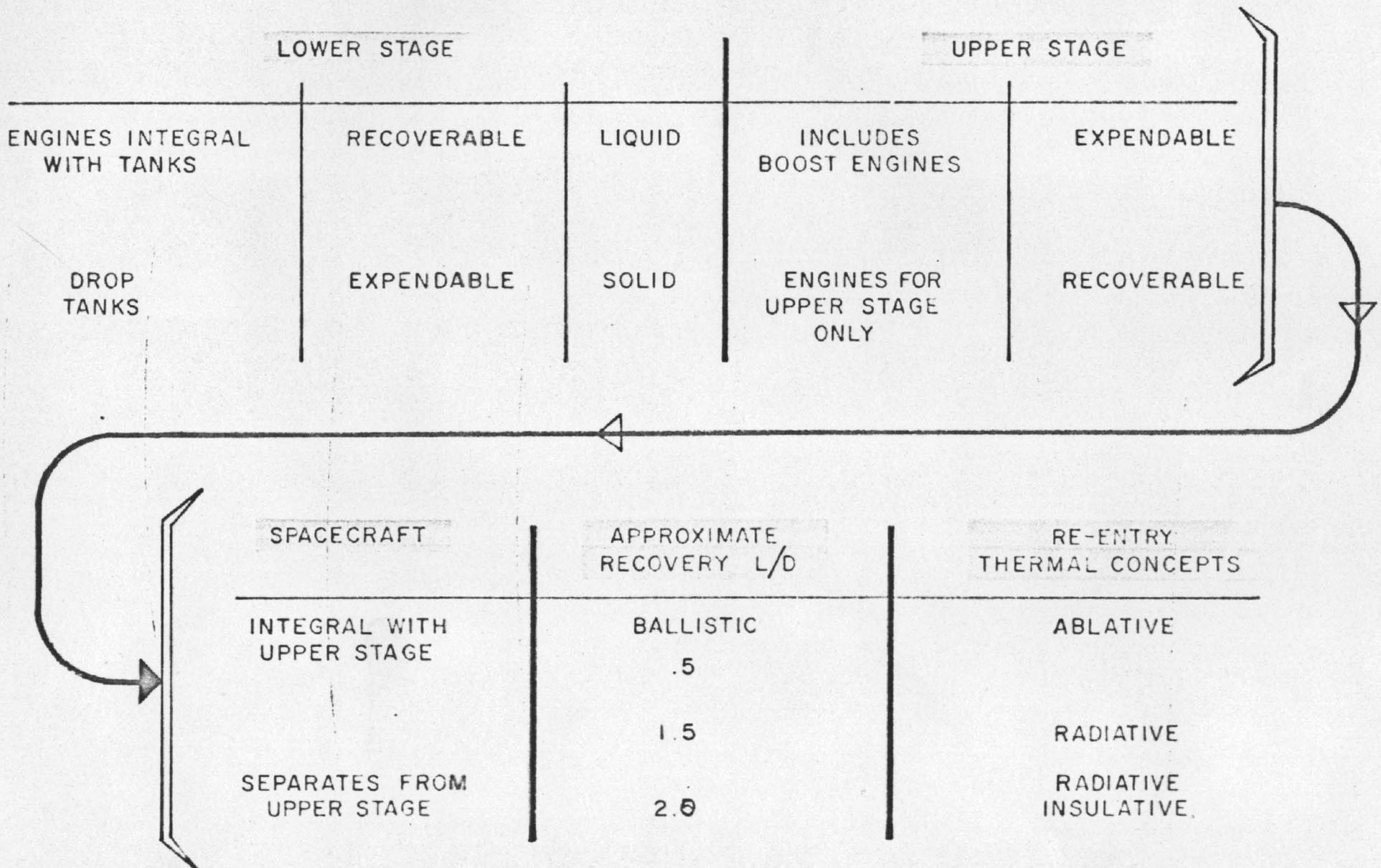
CODE	NAME	DATE
	<i>B</i>	<i>1/7</i>



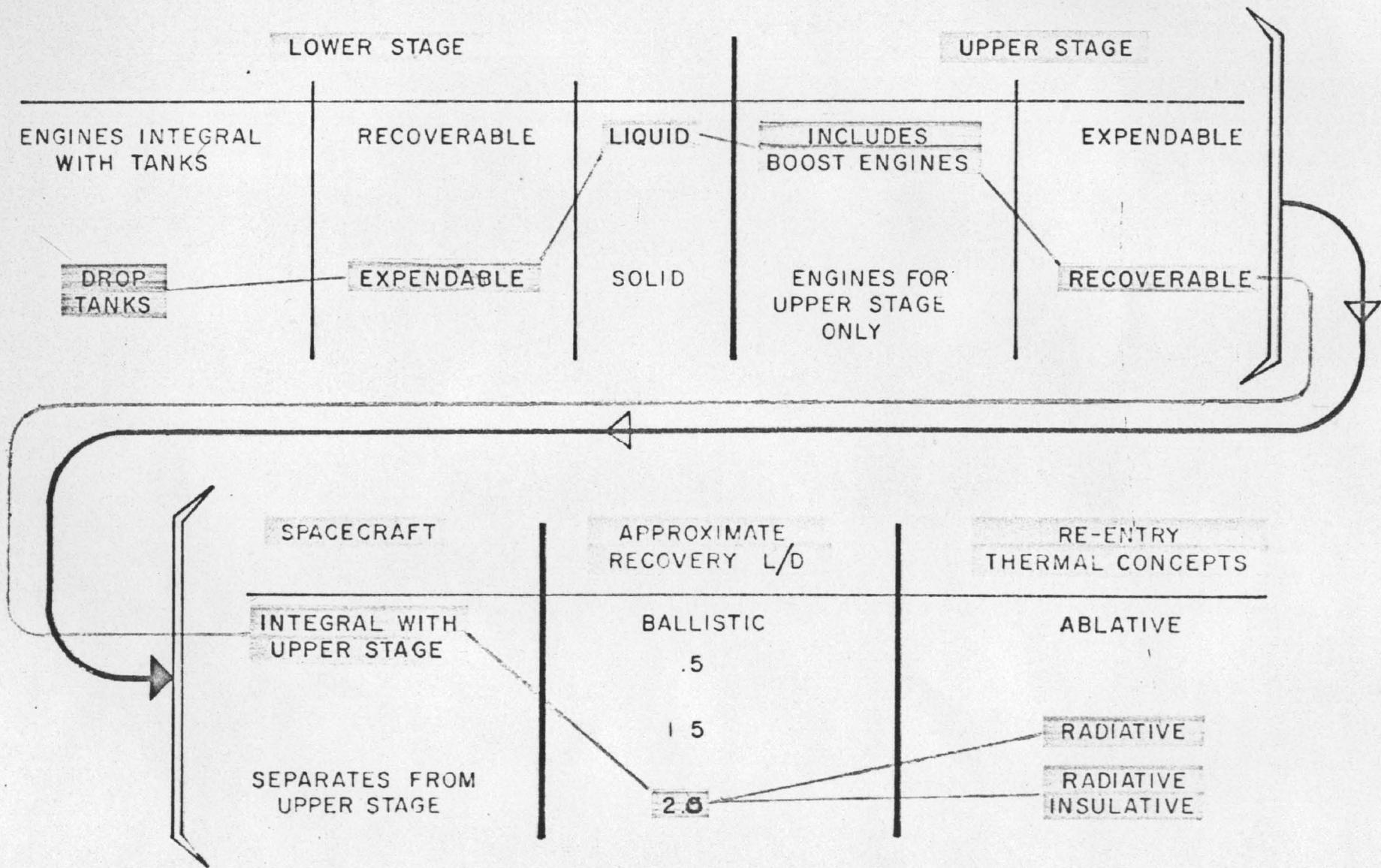
SPACE
TRANSPORT
AND
RECOVERY
SYSTEM

1. Weekly notes

SCOPE OF LOW COST SPACE TRANSPORTATION POSSIBILITIES

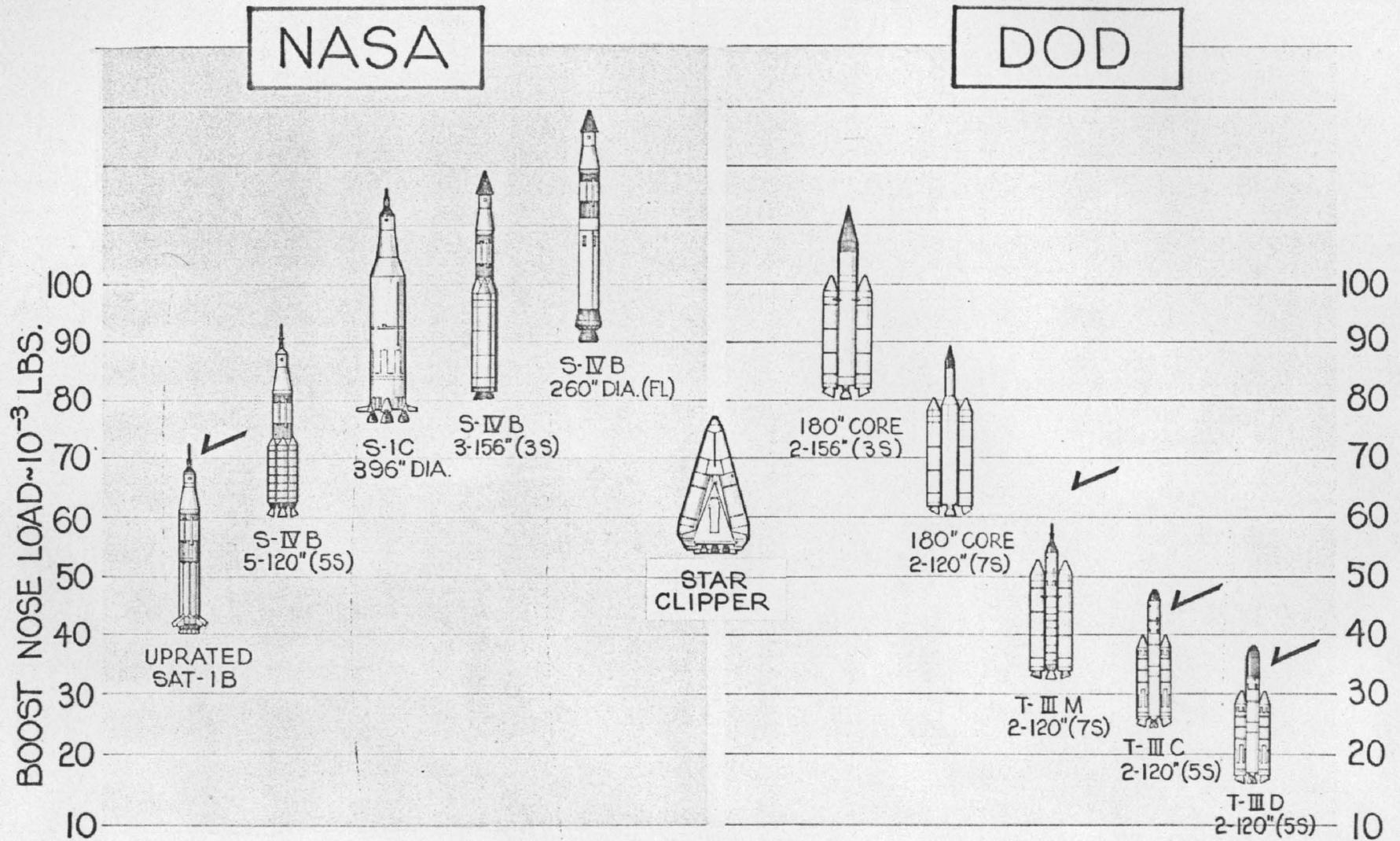


SCOPE OF LOW COST SPACE TRANSPORTATION POSSIBILITIES



MAJOR STAR CLIPPER PARAMETERS

SITUATION



POSTULATED SYSTEM REQUIREMENTS

CONSIDERATION	REQUIREMENT													
• P/L (INCL. PWR/CREW SPACE)	26,000 LBS. 3,315 CU. FT.													
• ALTITUDE	80 NM PERIGEE 600 NM APOGEE													
• 1 PASS MISSIONS	CONSTRAINED ETR OR WTR LAUNCH - COVERAGE ANY POINT & RETURN TO ZI													
• RESUPPLY/RENDEZVOUS	CO-ORBITAL 90°i 6HR LAUNCH ALERT													
• INSP. DELIV. (MOTHER SHIP)	CO-ORBITAL 45-90°i 3HR. LAUNCH ALERT													
• MANNED C & C	9 MEN INCLUDING FLT. CREW-30 DAYS ON ORBIT													
• ATTITUDE CONTROL	<table border="1"> <thead> <tr> <th></th> <th>ACCURACY</th> <th>RATE</th> </tr> </thead> <tbody> <tr> <td>PITCH</td> <td>3.3 M RAD</td> <td>0.10 M RAD/SEC.</td> </tr> <tr> <td>ROLL</td> <td>3.3 M RAD</td> <td>0.15 M RAD/SEC.</td> </tr> <tr> <td>YAW</td> <td>1.65 M RAD</td> <td>0.10 M RAD/SEC.</td> </tr> </tbody> </table>		ACCURACY	RATE	PITCH	3.3 M RAD	0.10 M RAD/SEC.	ROLL	3.3 M RAD	0.15 M RAD/SEC.	YAW	1.65 M RAD	0.10 M RAD/SEC.	
	ACCURACY	RATE												
PITCH	3.3 M RAD	0.10 M RAD/SEC.												
ROLL	3.3 M RAD	0.15 M RAD/SEC.												
YAW	1.65 M RAD	0.10 M RAD/SEC.												
• NAV. & GUIDANCE	±0.2 NM IN TRACK & CROSS TRACK ~ ±0.06 NM ALTITUDE													

OPERATIONAL CONCEPT

ZERO LOAD SEPARATION

FLEXIBLE ORBITAL OPERATIONS

SATELLITE
COMMAND
CENTER

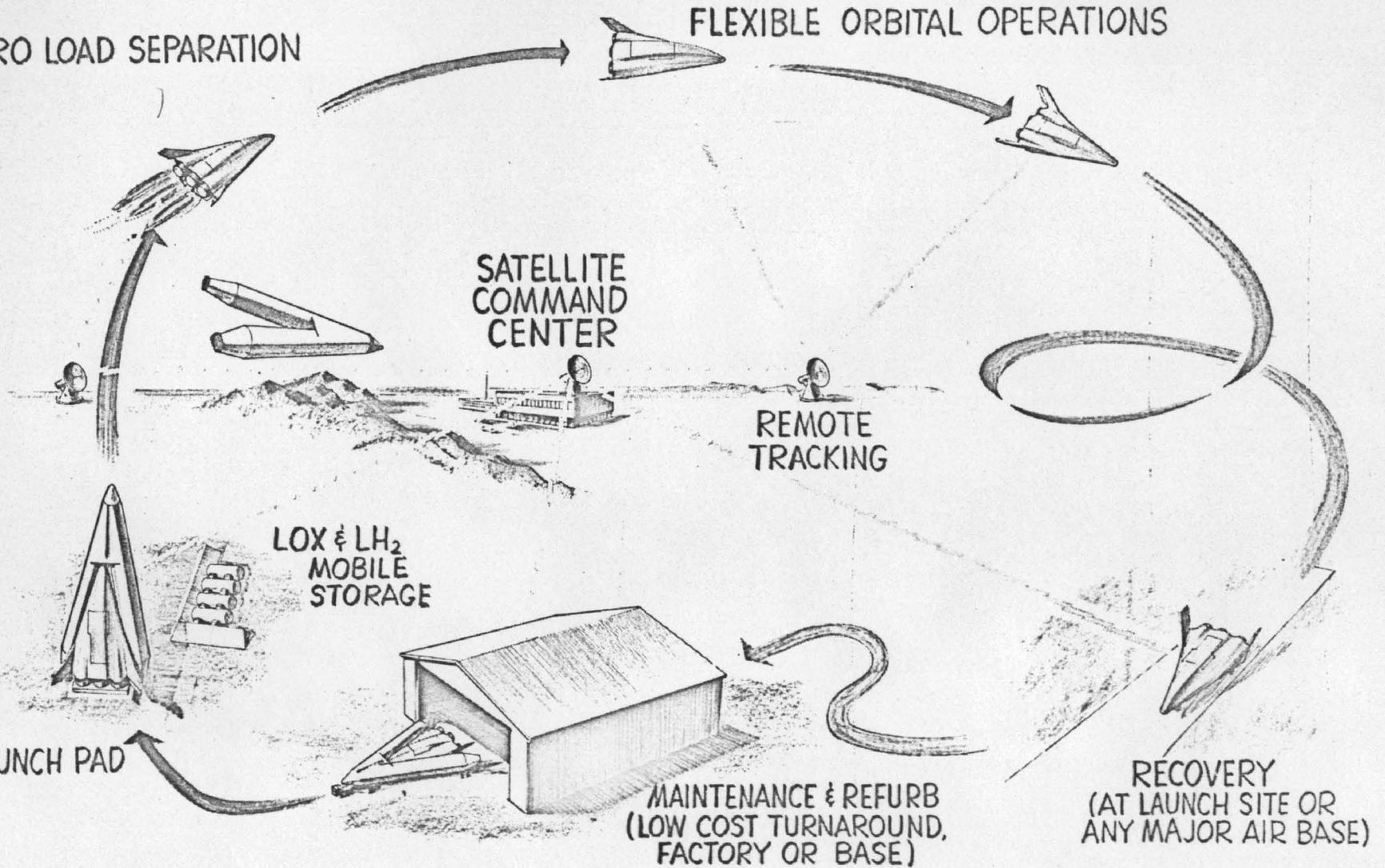
REMOTE
TRACKING

LOX & LH₂
MOBILE
STORAGE

LAUNCH PAD

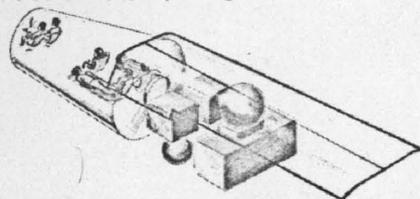
MAINTENANCE & REFURB
(LOW COST TURNAROUND,
FACTORY OR BASE)

RECOVERY
(AT LAUNCH SITE OR
ANY MAJOR AIR BASE)



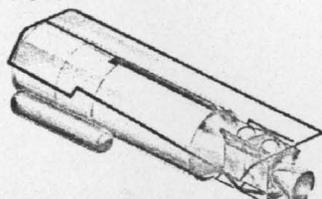
STAR CLIPPER

PAYLOAD A+C



CARGO 7,260
PERSONNEL (7) 1,260

PAYLOAD D



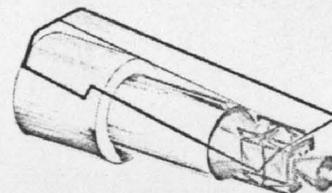
CARGO 19,900

PAYLOAD E



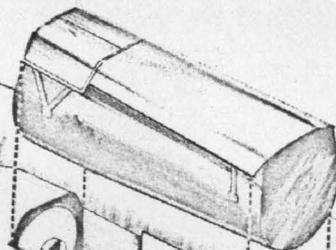
EQUIPMENT 11,760
PERSONNEL (7) 1,260

PAYLOAD F

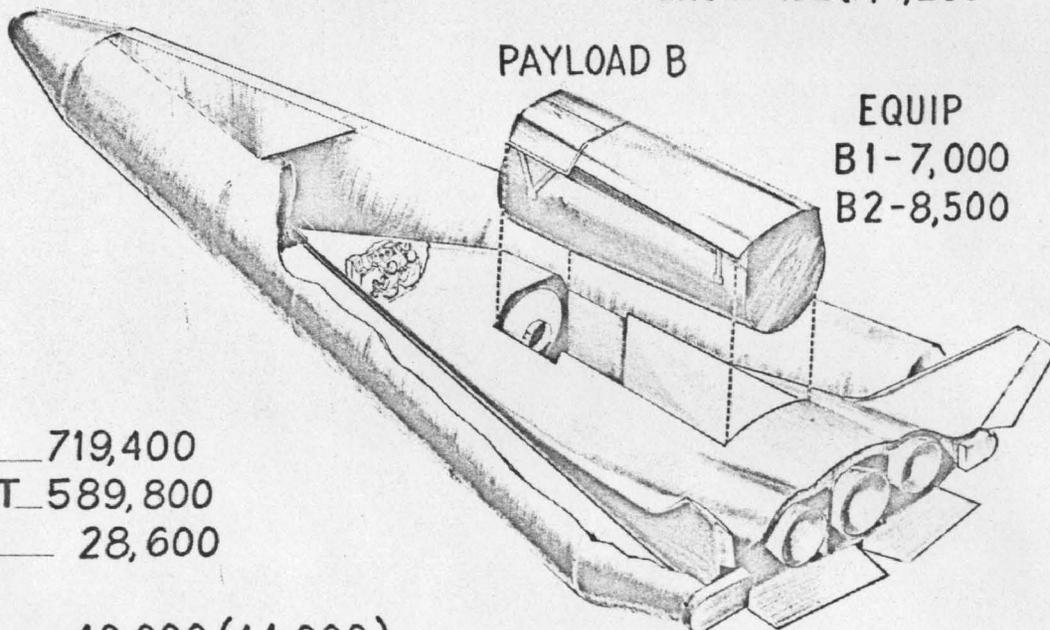


CARGO 22,000

PAYLOAD B

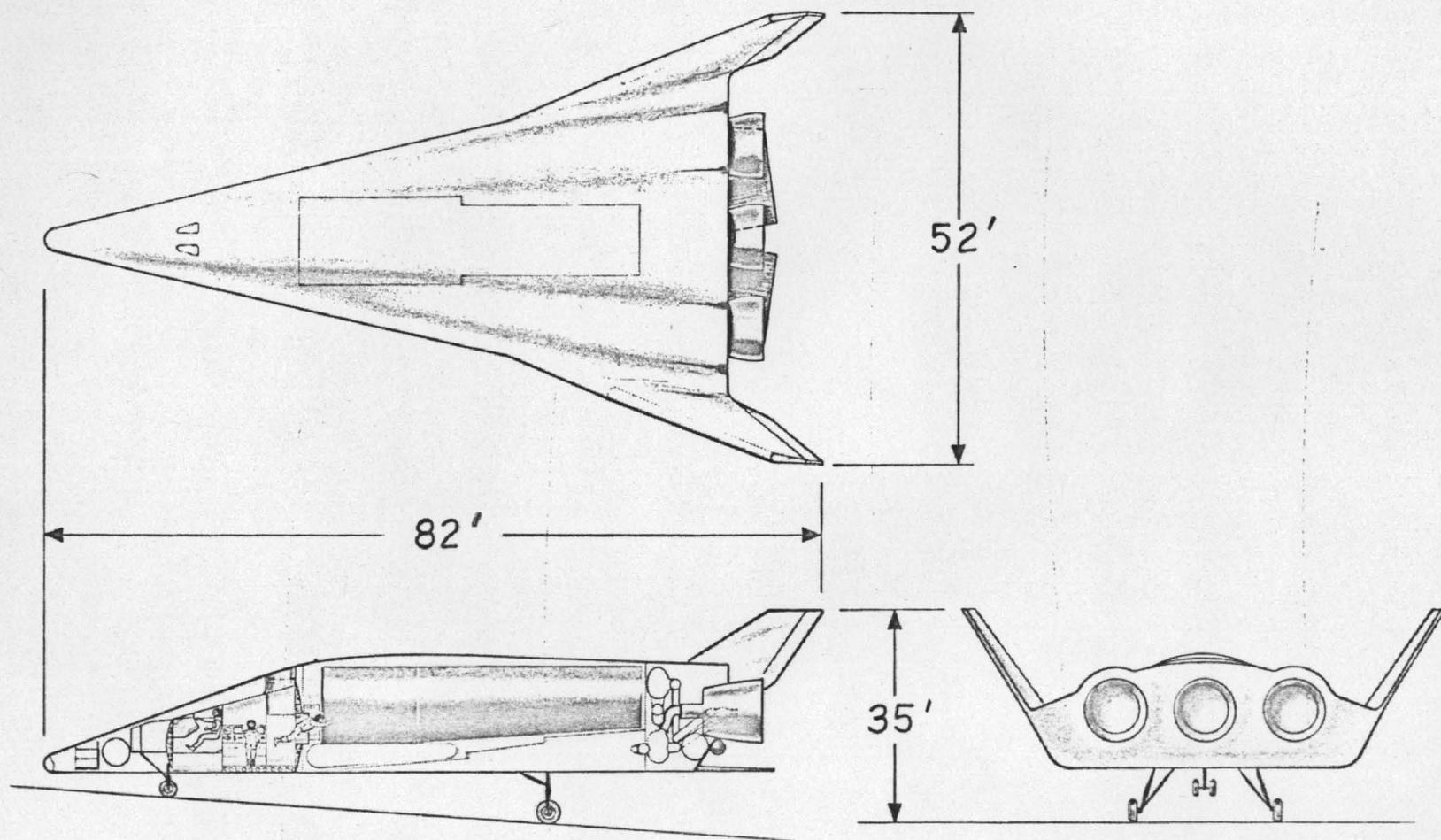


EQUIP
B1-7,000
B2-8,500

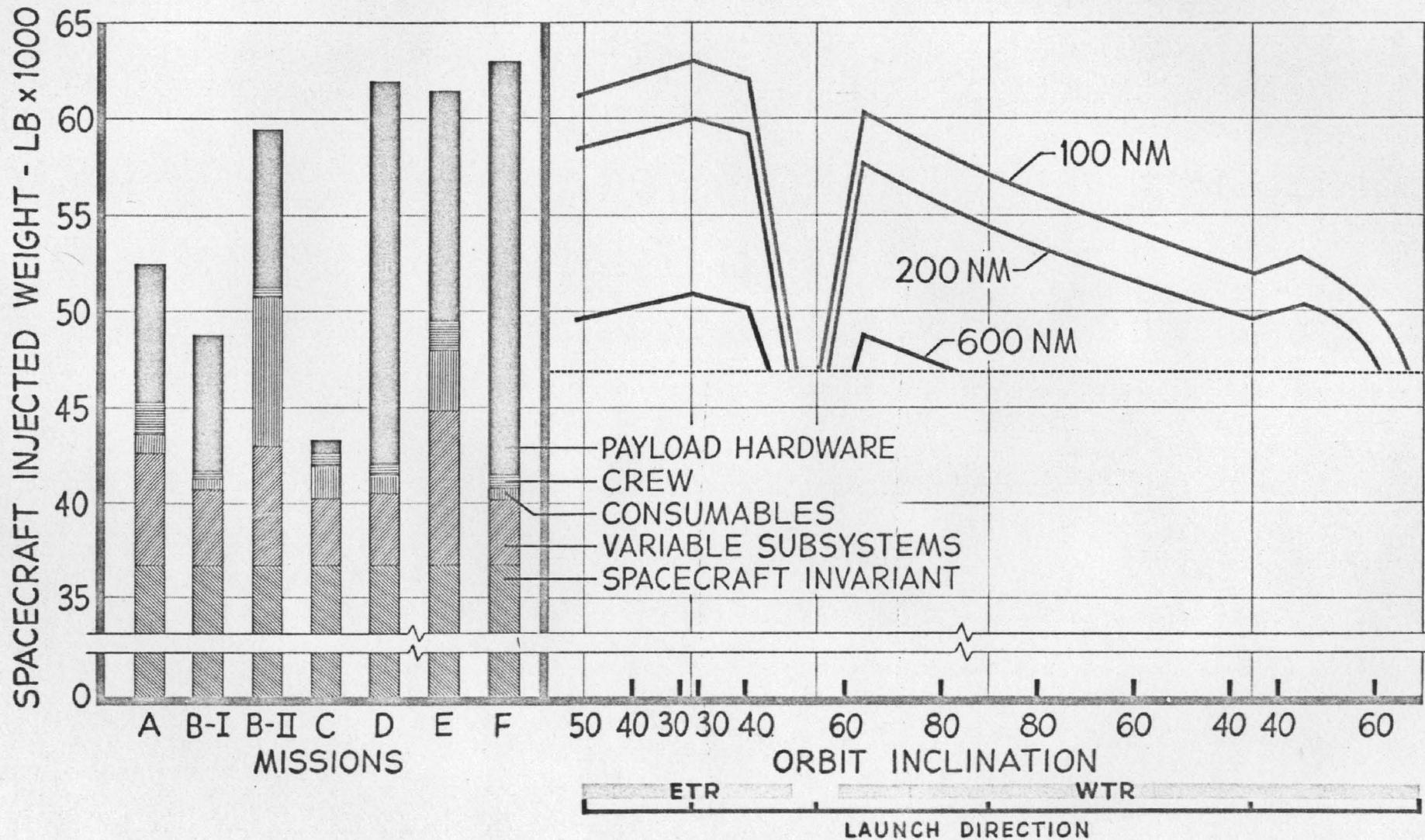


- TOTAL WEIGHT__ 719,400
- PROPELLANT WT_ 589,800
- DROP TANK WT___ 28,600
- SPACECRAFT
- INERT WT_____ 40,000 (44,000)
- PROPELLANT WT__ 50,000

GENERAL ARRANGEMENT



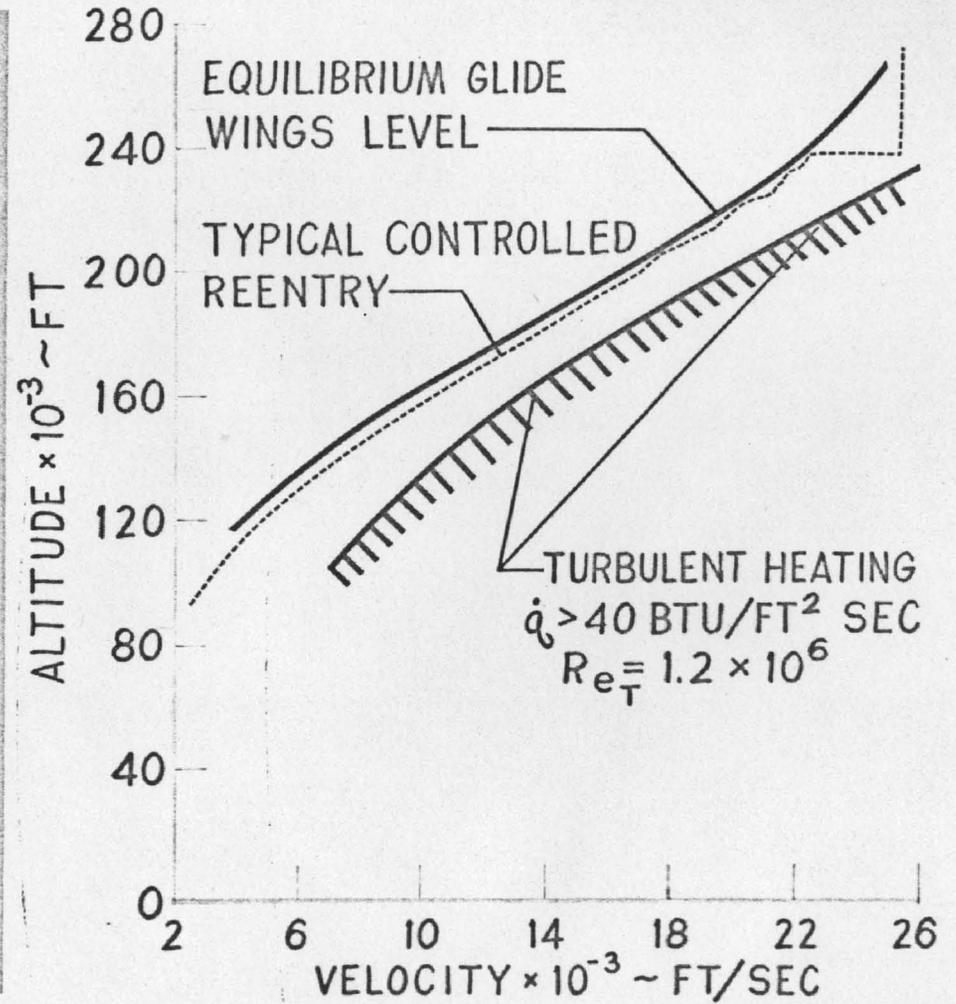
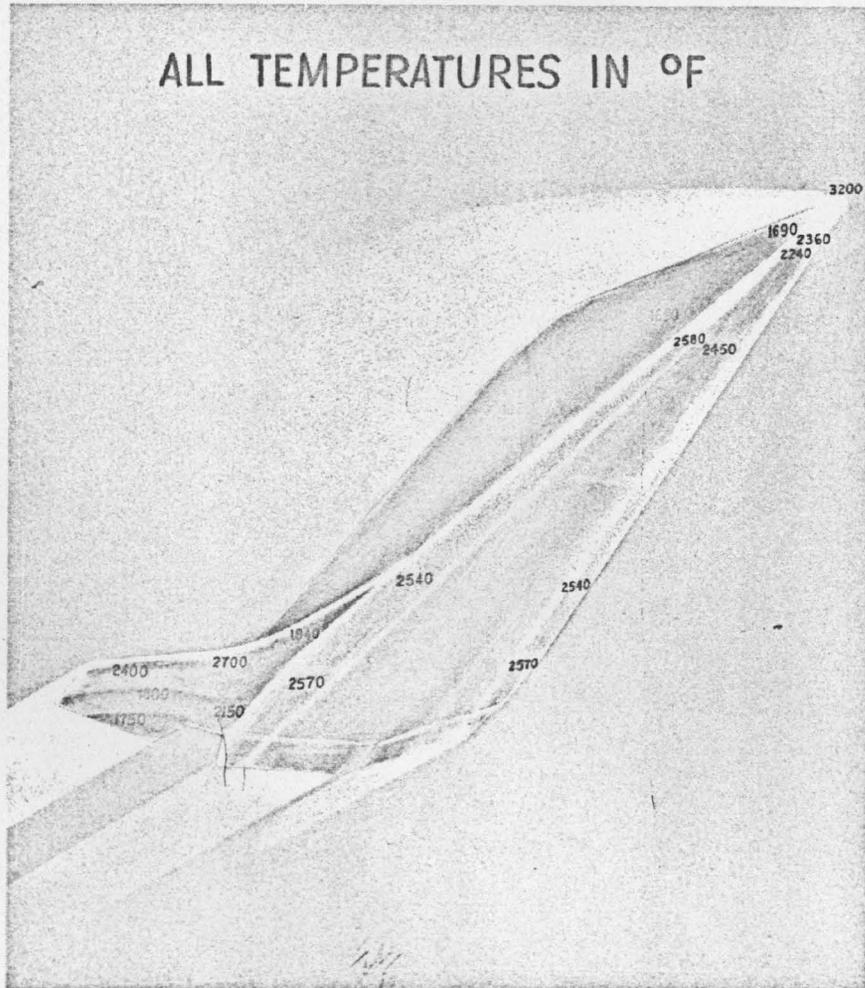
STAR CLIPPER PERFORMANCE



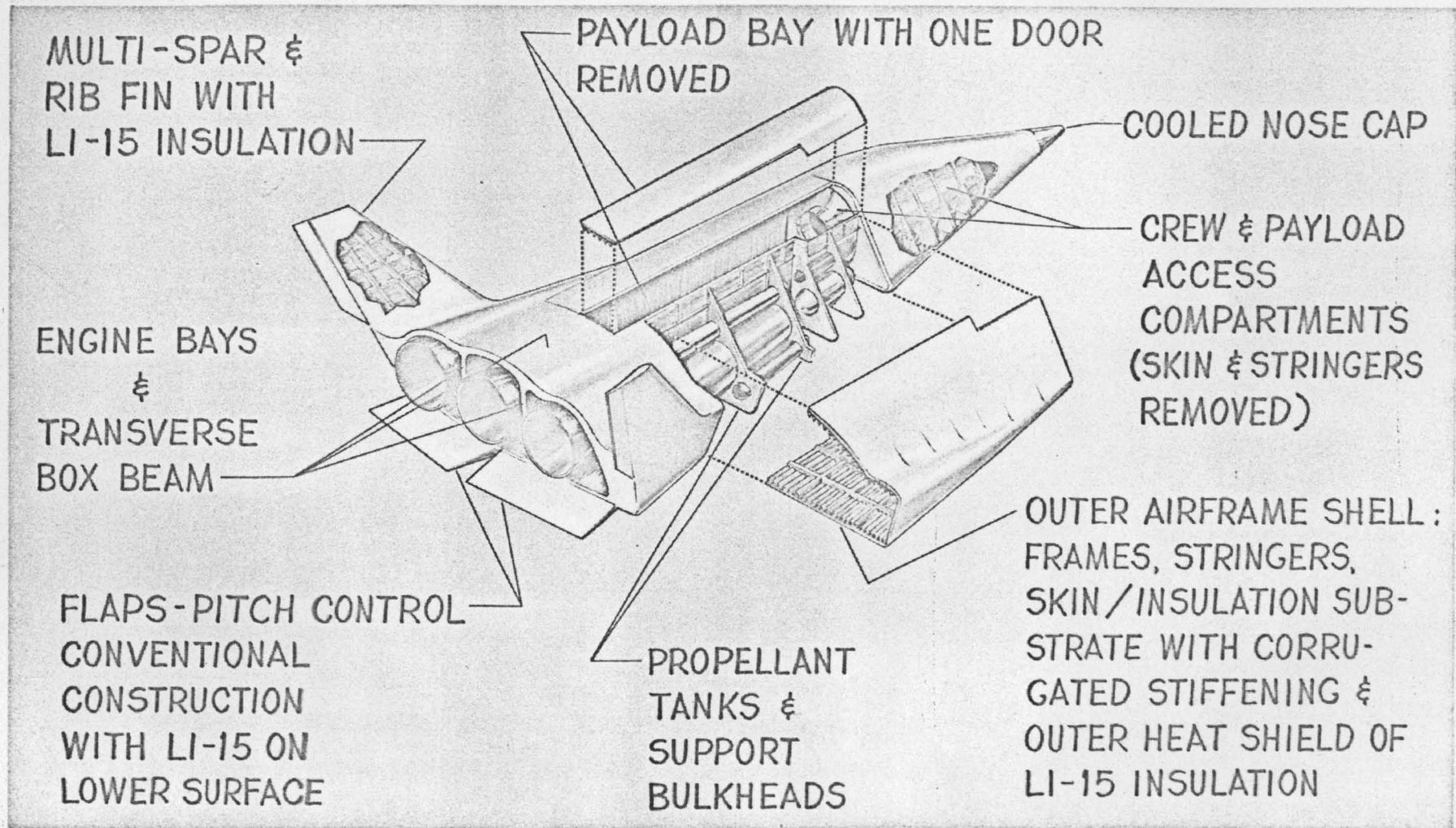
KEY TECHNICAL REQUIREMENTS

- ENGINES
 - REUSABLE THERMAL PROTECTION
 - LONG LIFE SUBSYSTEMS
 - MODULAR PAYLOADS
 - LOW COST DROP TANKS
 - SHAPE DERIVATION
 - PREDICTABLE RECOVERY
 - ON-BOARD CHECKOUT SUB-SYSTEM
 - CENTRAL C/C
-

REENTRY & THERMAL ENVIRONMENT

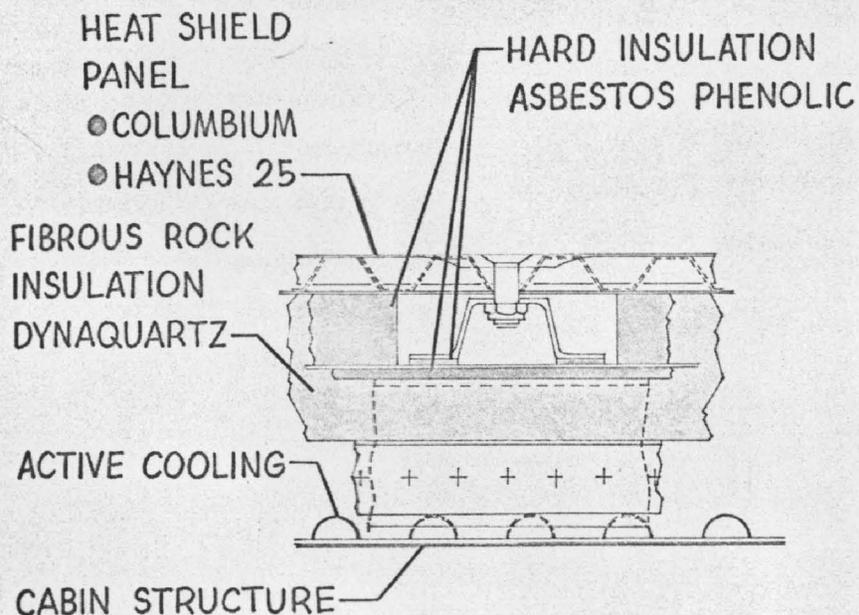


MAJOR STRUCTURAL COMPONENTS



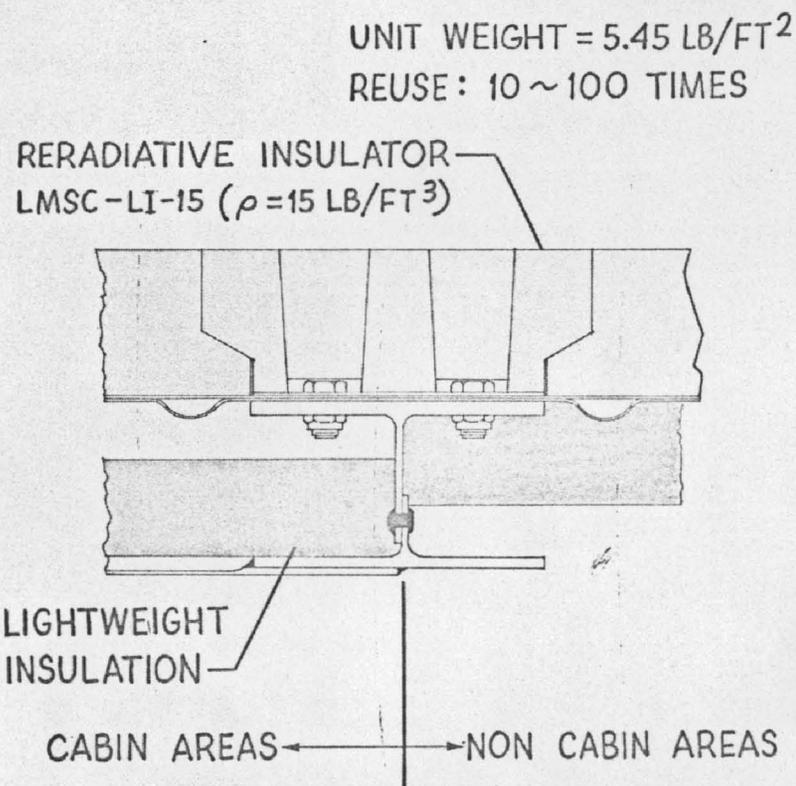
HEAT SHIELD OPTIONS

RERADIATIVE HOT STRUCTURE (ACTIVE COOLING)

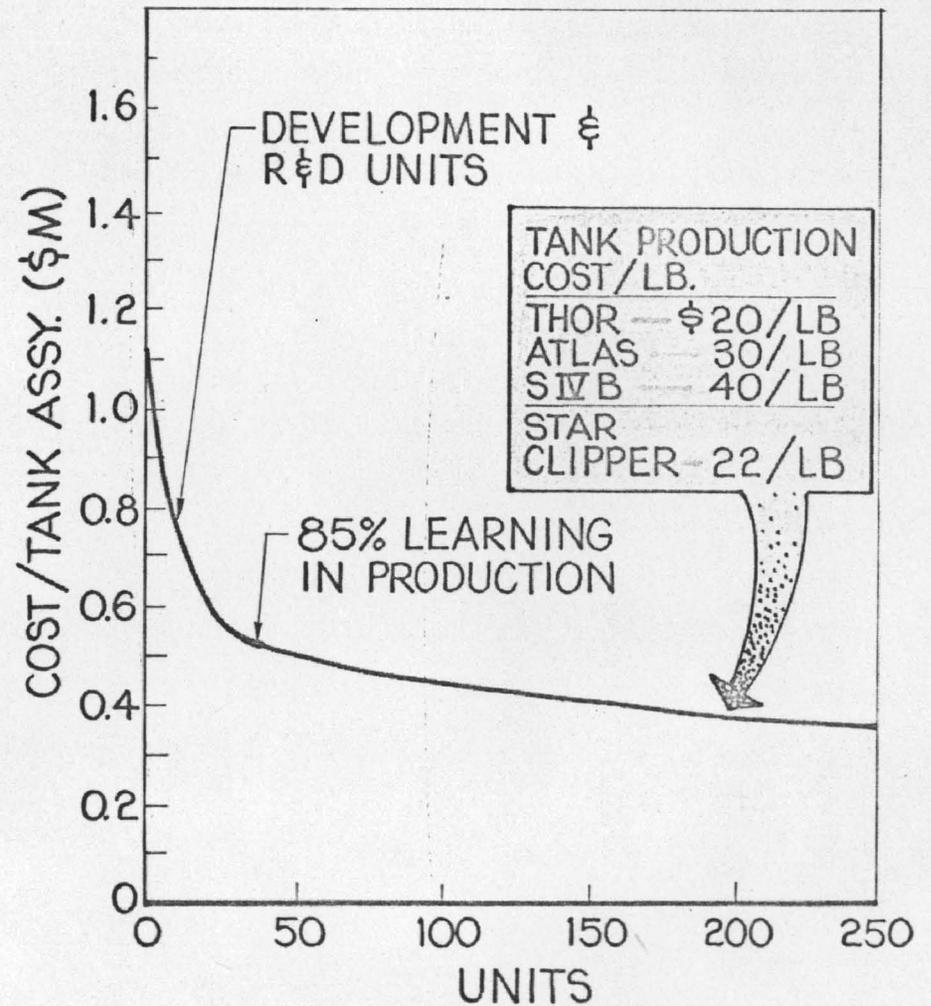
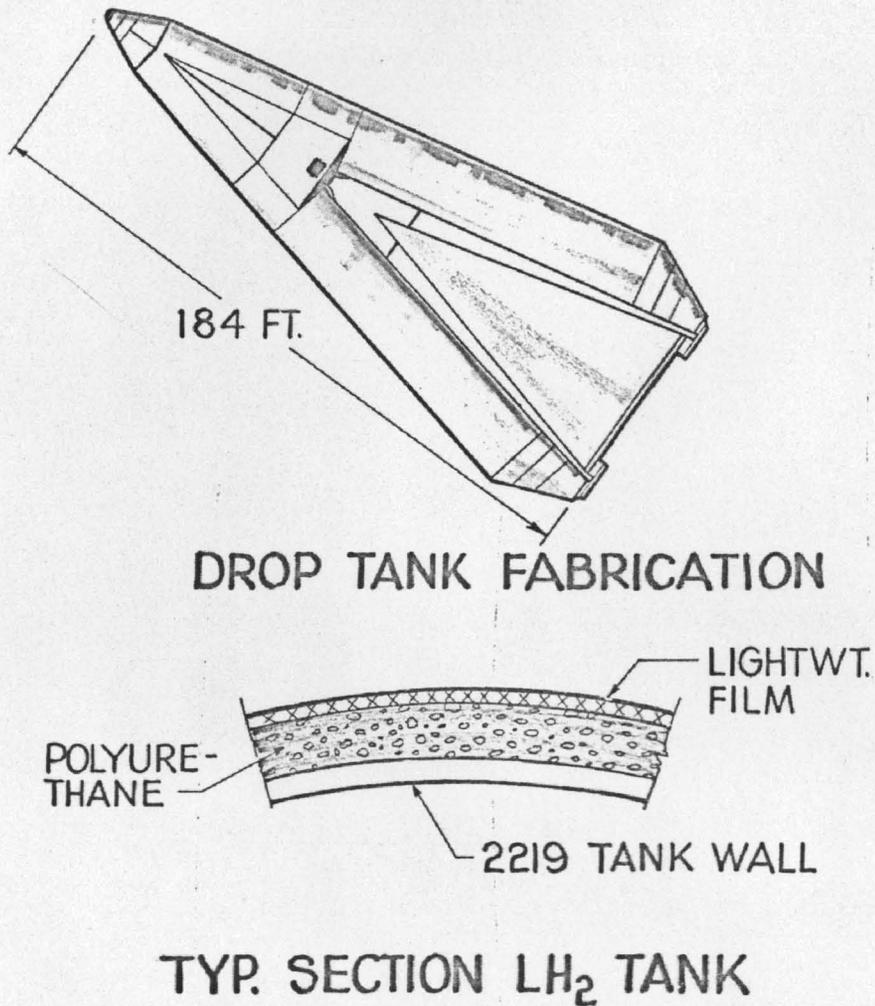


UNIT WEIGHT = 6.5 LB/FT²
REUSE: 10 ~ 100 TIMES

RERADIATIVE-INSULATIVE STRUCTURE (PASSIVE COOLED)



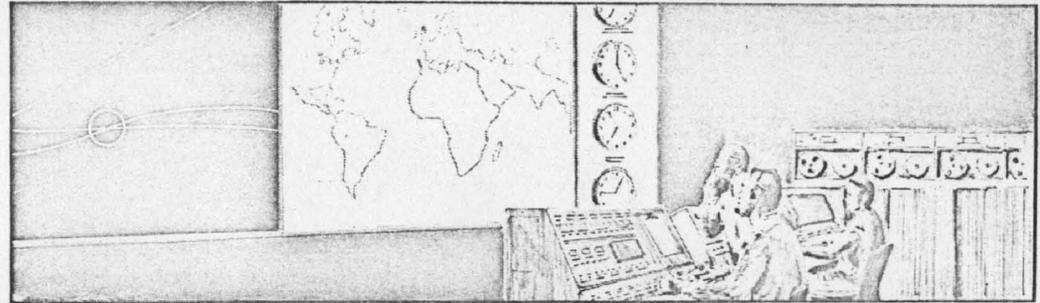
DROP TANK FABRICATION & COST



SUPPORT CONCEPT

COMMAND CENTER

- COMMAND CLEARANCE & TAKEOFF
- PROGRAM & MONITOR MISSION
- PROGRAM & UPDATE GUIDANCE
- DATA MONITORING & STORAGE
- DIRECT RE-ENTRY

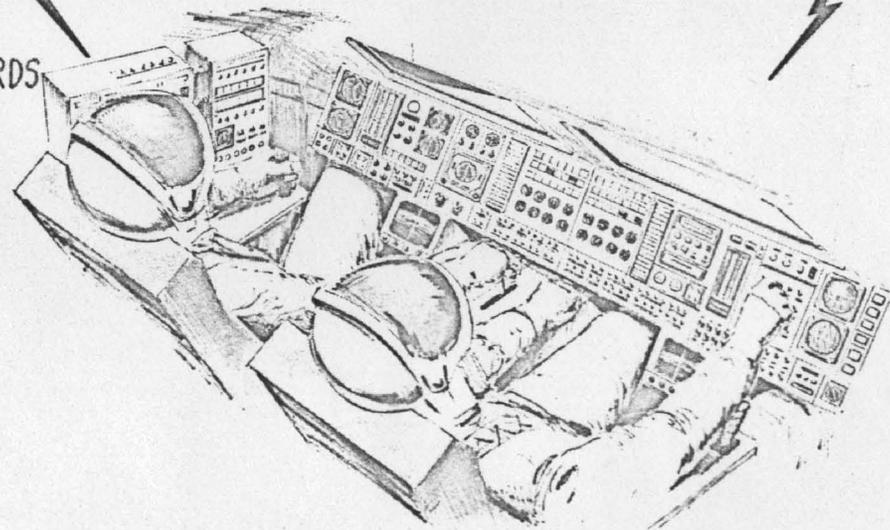


SPACECRAFT

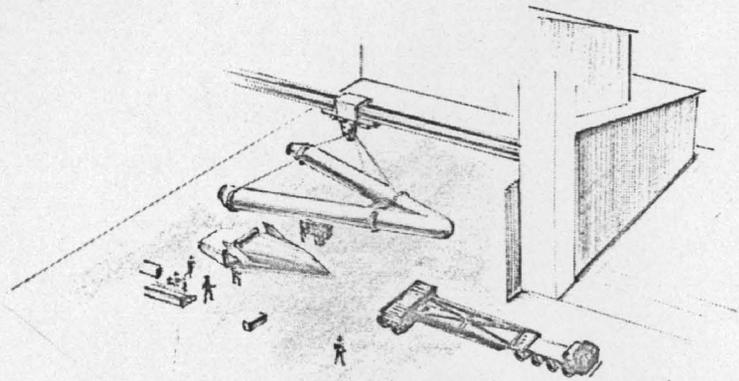
- TWO MAN CREW
- PROGRAMMABLE AUTOMATIC EQUIP
- PROGRAMMABLE MONITORING CIRCUIT B'RDS
- PROGRAMMABLE CONTROL CIRCUIT B'RDS
- MALFUNCTION DETECTION
- PERFORMING
 - SUBSYSTEM TESTS
 - SYSTEM TESTS
 - PROGRAMMED TAKEOFF
 - FLIGHT SUPPORT
- DATA RELAYED VIA RF
- FLY AWAY DISCONNECTS

REPEATER STATION
(GROUND)

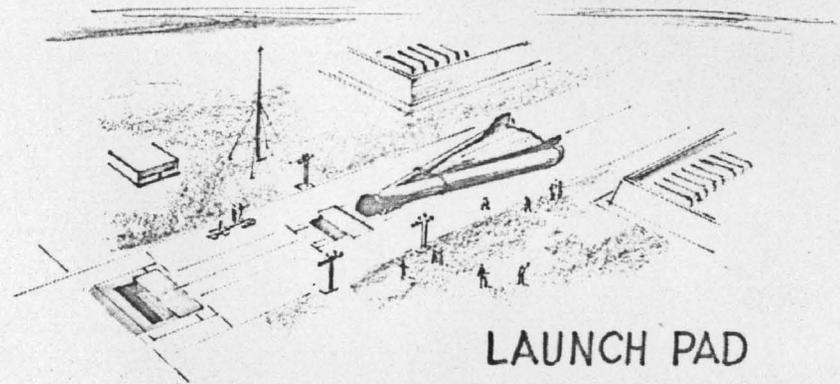
TRACKING STATION
(AIRBORNE)



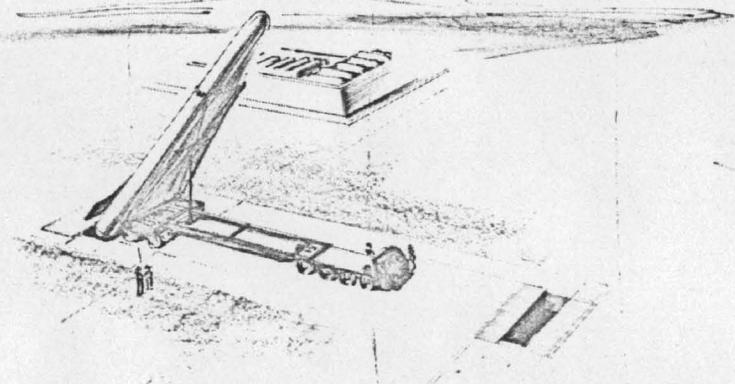
PRODUCTION ASSEMBLY TO LAUNCH CONCEPT



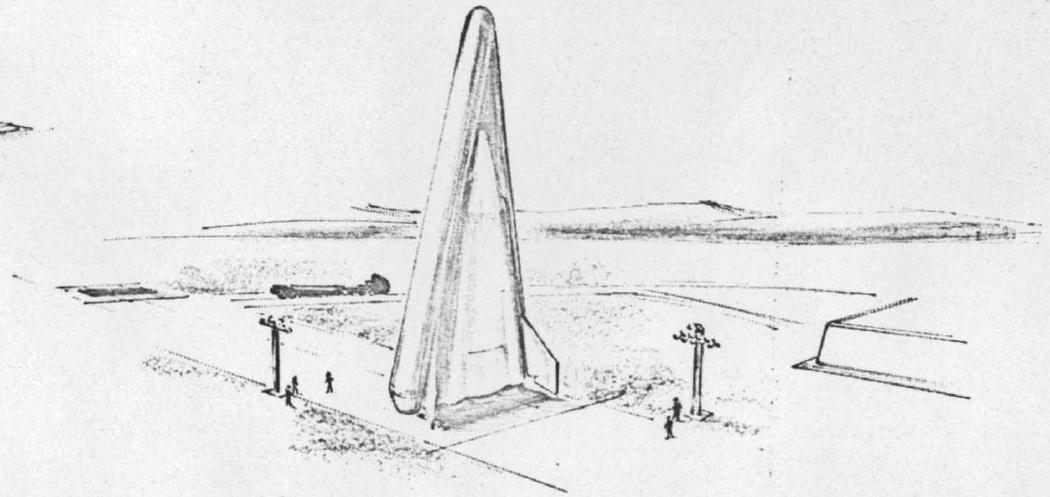
VEHICLE ASSEMBLY IN THE
HORIZONTAL ASSEMBLY BUILDING



LAUNCH PAD

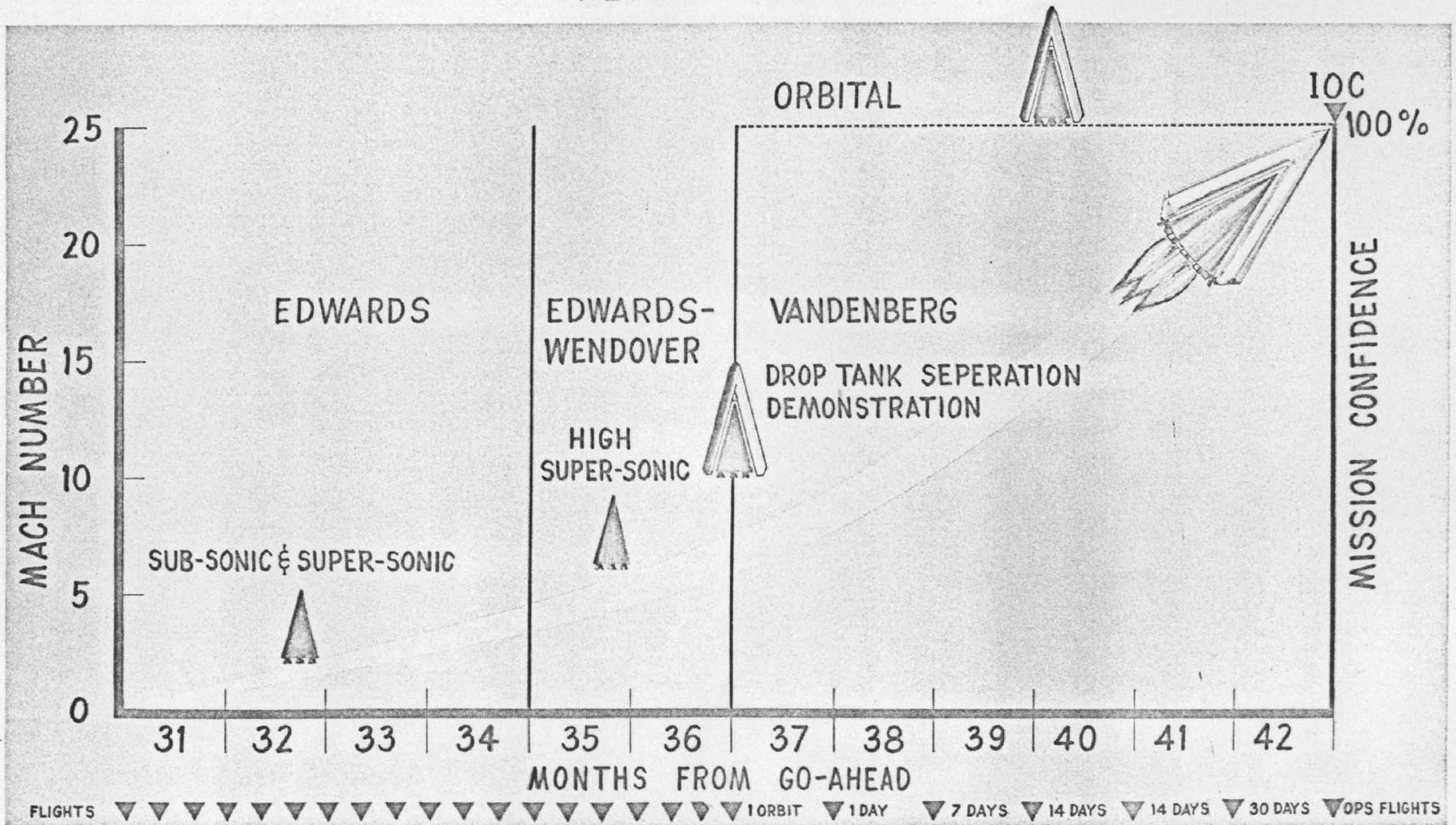


VEHICLE ERECTION

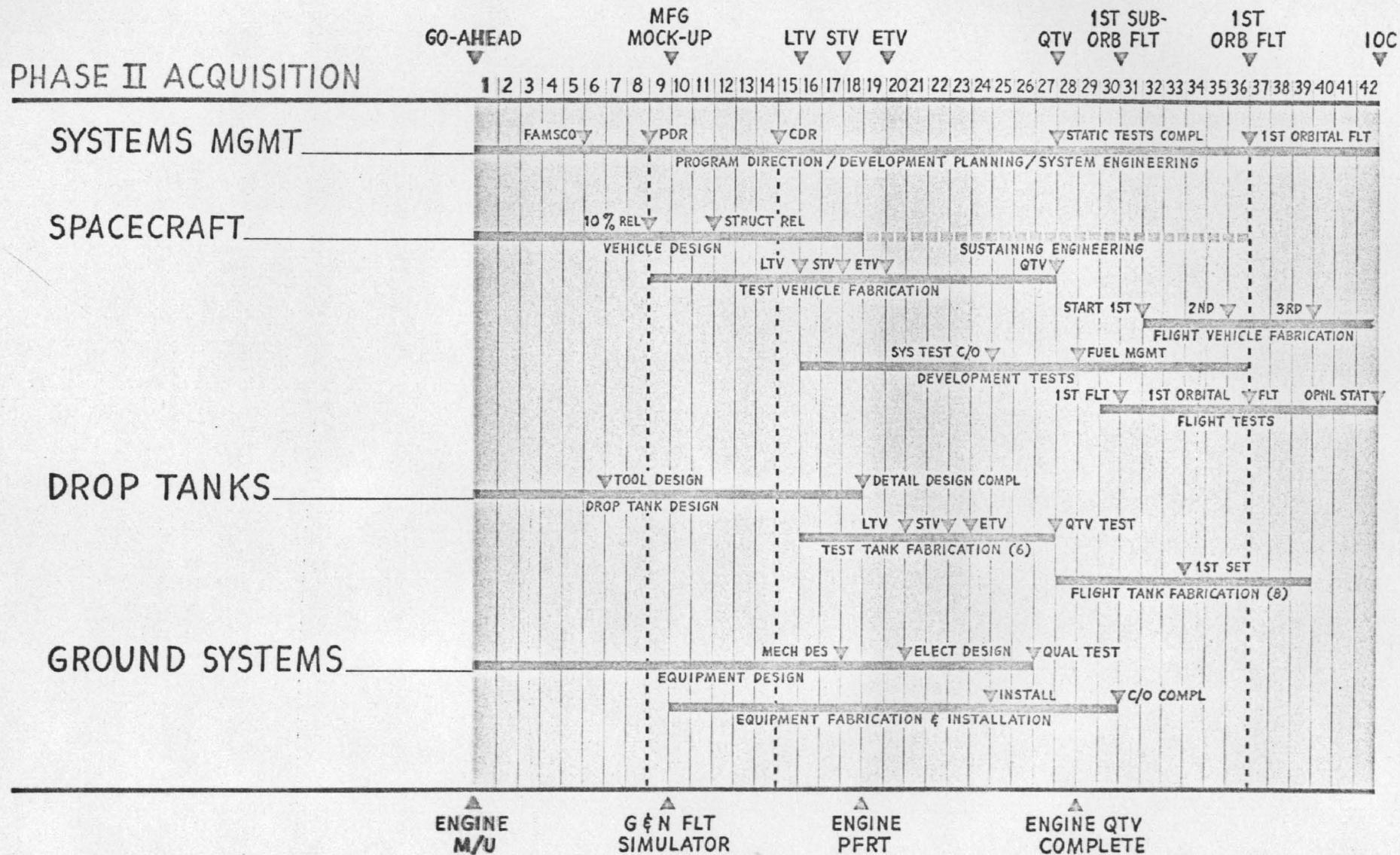


SYSTEM DEVELOPMENT PLANNING

FLIGHT TESTS



RDT & E SCHEDULE

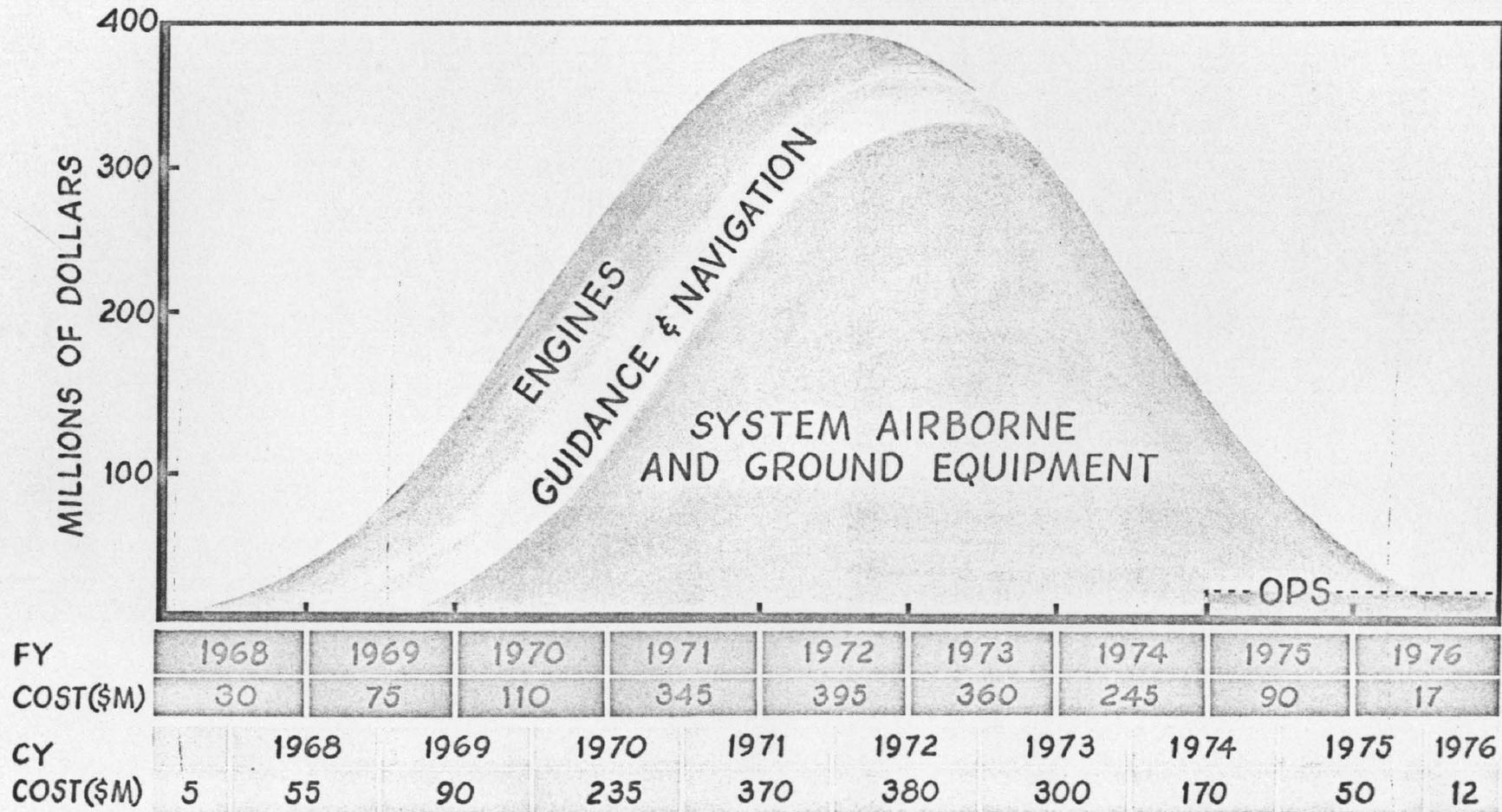


RDT & E COST ESTIMATES

(\$ IN MILLIONS)

	PRIME	ASSOCIATE	SUBCONTRACT	TOTAL
PROGRAM DIRECTION				
PROGRAM MANAGEMENT	\$ 30			\$ 30
SYSTEMS ENGINEERING	80	\$ 40		120
MISSION ANALYSIS	50	30		80
SPACE SYSTEM				
SPACE CRAFT	477	450	\$ 200	1127
DROP TANKS	200			200
GROUND SYSTEMS				
LAUNCH OPERATIONS	50		20	70
MISSION OPERATIONS	20			20
REFURBISHMENTS	20			20
TOTALS	\$ 927	\$ 520	\$ 220	\$ 1,667

TOTAL SYSTEM COSTS



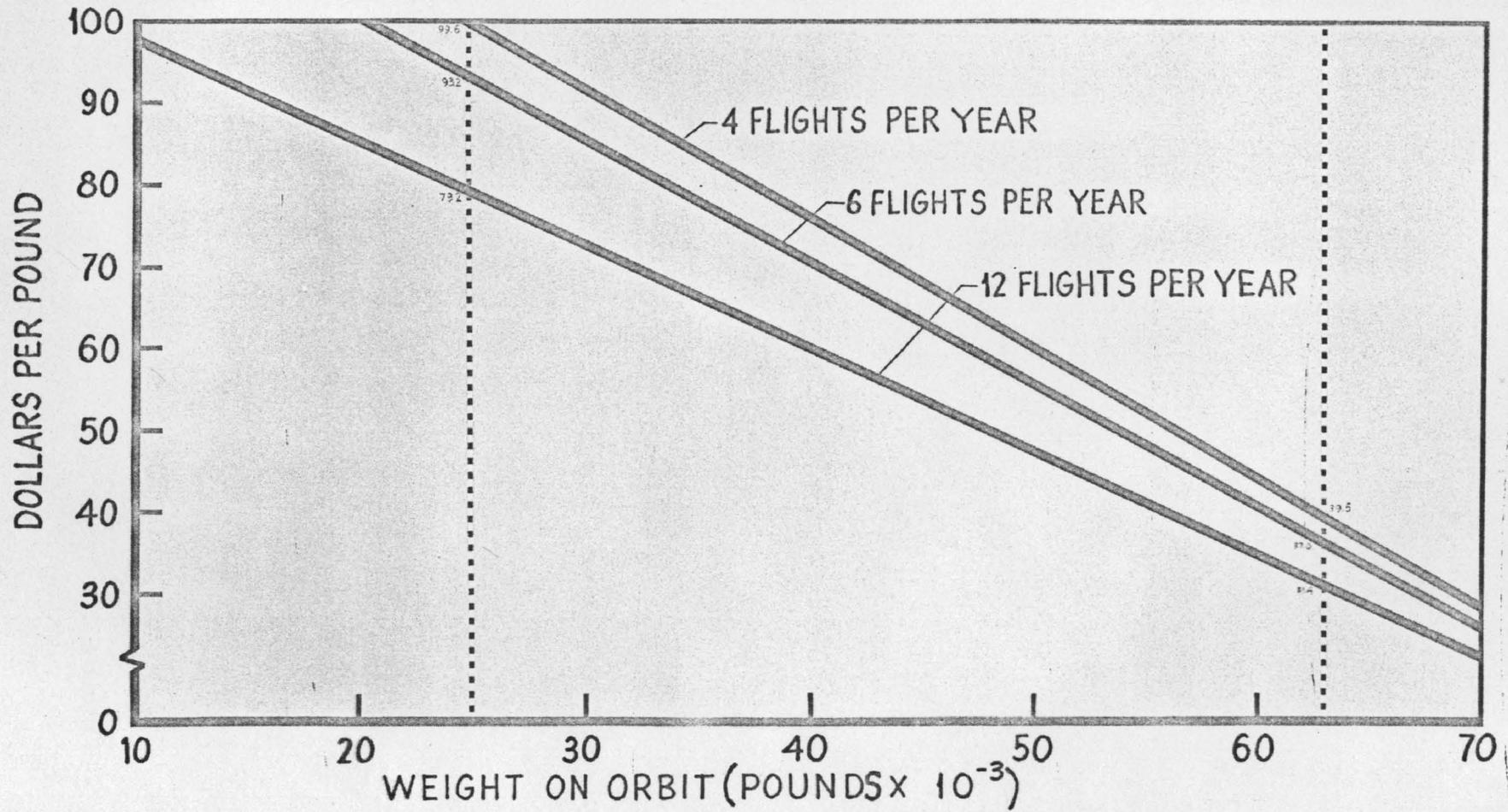
OPERATIONAL COST

DOLLARS IN MILLIONS

COST FUNCTION ELEMENT	NUMBER OF FLIGHTS PER YEAR		
	4	6	12
VEHICLE (AMORTIZATION - 50 FLIGHTS)	\$ 0.70	\$ 0.70	\$ 0.70
LAUNCH OPERATIONS	.53	.35	.18
MISSION OPERATIONS	.20	.20	.20
REFURBISHMENT & SUPPORT	1.06	.98	.90
TOTAL COST PER FLIGHT	\$ 2.49	\$ 2.33	\$ 1.98

OPERATIONAL COSTS

100 MILE ORBIT



MCDONNELL DOUGLAS

2273

MCDONNELL

1/11/68

PRESENTATION TO
MARSHALL SPACE FLIGHT CENTER

ON ADVANCED ORBITAL TRANSPORTATION

BY

MCDONNELL DOUGLAS CORPORATION

18 DECEMBER 1967

ORDER OF PRESENTATION

○ ECONOMIC CONSIDERATIONS

○ SPACECRAFT CONSIDERATIONS

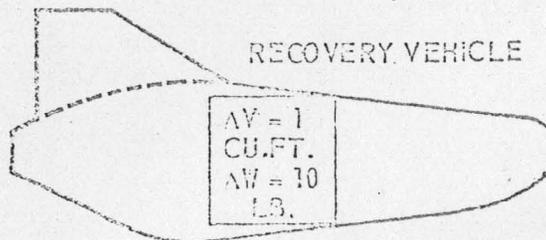
○ ORBITAL TRANSPORT SYSTEMS

ECONOMICS OF EQUIPMENT RECOVERY

EQUIPMENT

Δ VOLUME
1 CU.FT.

RECOVERY VEHICLE



RE-ENTRY VEHICLE HARDWARE COST/LAUNCH

$$\frac{\$2700/\text{LB.} \times 10 \text{ LB./CU.FT.}}{20 \text{ REUSES}} = \$1350/\text{FT.}^3$$

RE-LAUNCH COST

$$0.1\% \text{ OF VEHICLE HARDWARE COST} = .01 \times 2700 \times 10 = \$270/\text{FT.}^3$$

BOOSTER COST/LAUNCH

$$\$850/\text{LB.} \times 10 \text{ LB./CU.FT.} = \$ 8,500/\text{FT.}^3$$

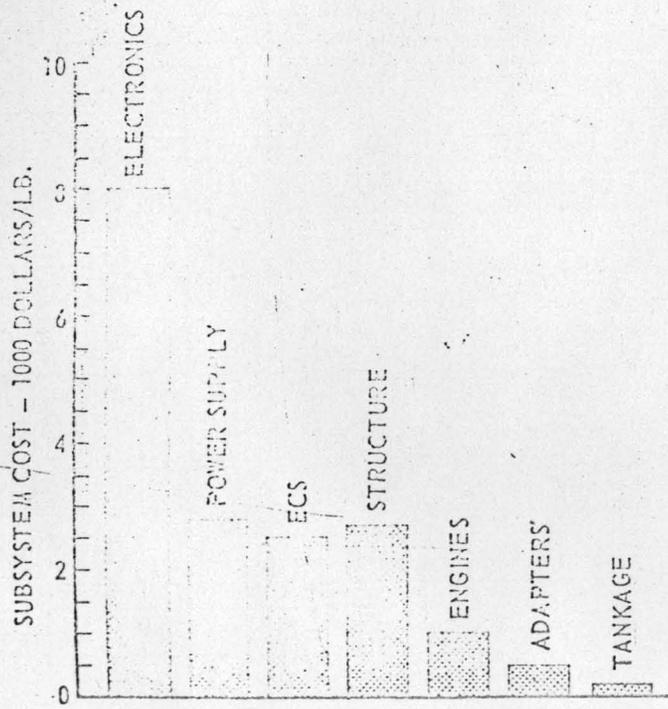
TOTAL COST FOR EACH RECOVERY

$$= \$10,120/\text{FT.}^3$$

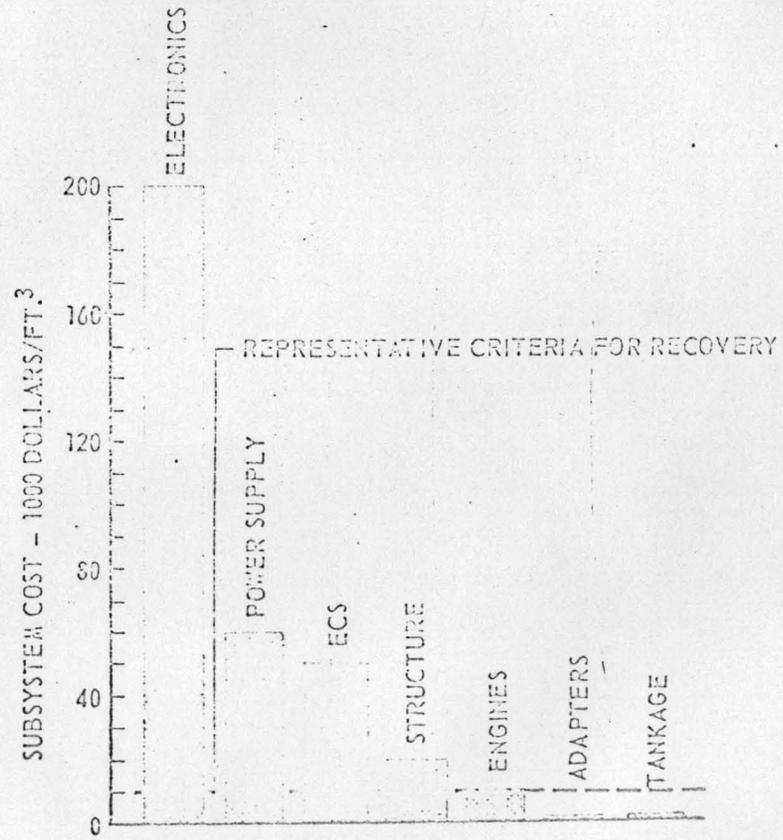
CONCLUSION: EQUIPMENT SHOULD BE RECOVERED IF EQUIPMENT COST IS > \$10,000/FT.³

SUBSYSTEM ACQUIRING COSTS

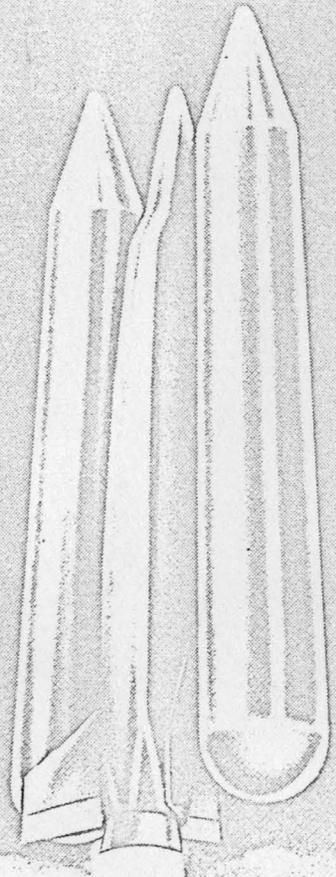
BY WEIGHT



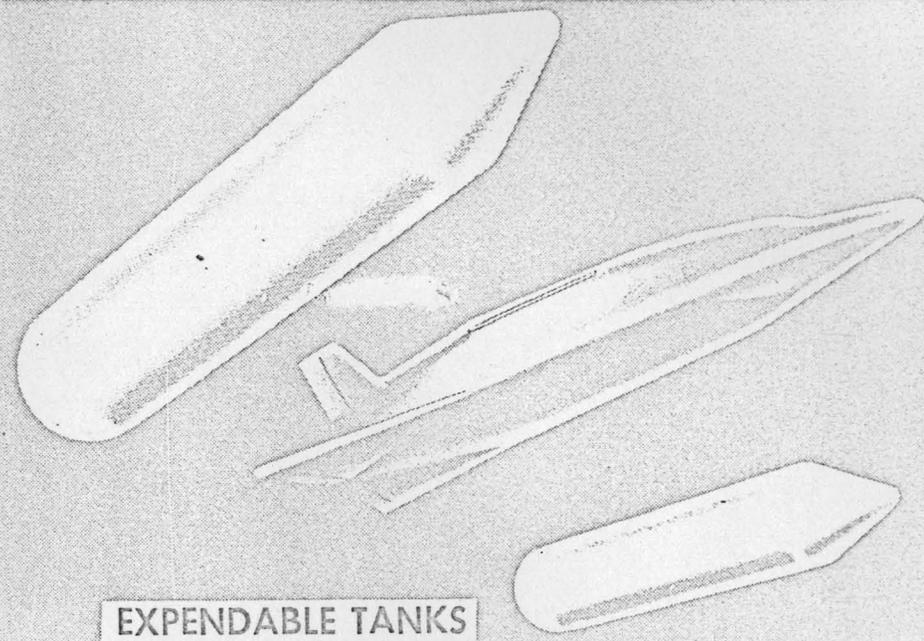
BY VOLUME



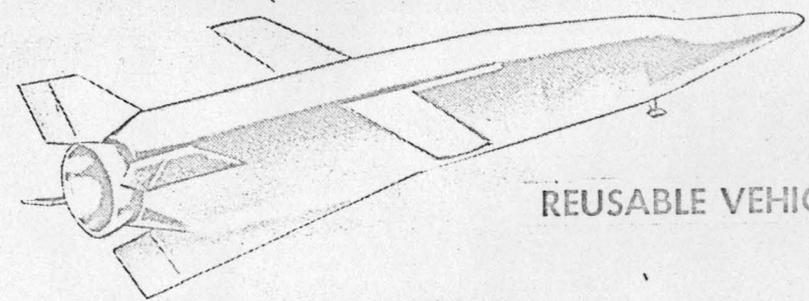
TIP TANK ORBITAL VEHICLE CONCEPT



INTEGRATED
LAUNCH/RE-ENTRY VEHICLE



EXPENDABLE TANKS



REUSABLE VEHICLE

MCDONNELL DOUGLAS

MCDONNELL

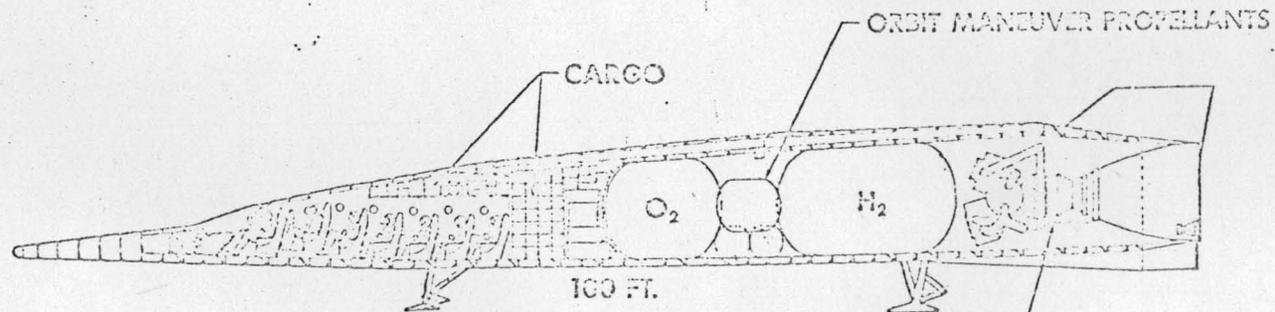
PROPRIETARY

MODEL 1721 9-1-63
CONCEPT

MODEL 1761 ORBITAL SUPPORT SPACECRAFT

MISSION PAYLOAD: 12 MEN + 5,000 LBS. CARGO

	WEIGHT (LBS.)
SPACECRAFT WEIGHT LESS USABLE PROPELLANT	46,000
TOTAL SPACECRAFT FUELED WEIGHT	82,000
FUELED TIP TANKS	580,200
LAUNCH WEIGHT	633,000



- THRUST: 850,000 LB. VACUUM
- CHAMBER PRESSURE: 3000 PSI
- AREA RATIO: 40

PROPRIETARY

ADVANCED CONCEPTS COMPARISON

MISSION PAYLOAD = 10,000 LBS (12 MEN + 6600 LBS CARGO)

TWO STAGE FULLY
RECOVERABLE CONCEPT
LAUNCH WEIGHT 1,100,000 LB

TIP TANK CONCEPT
LAUNCH WEIGHT 630,000 LB.

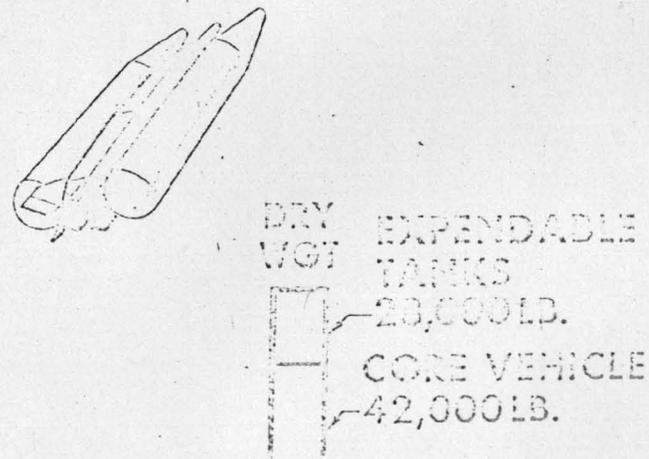
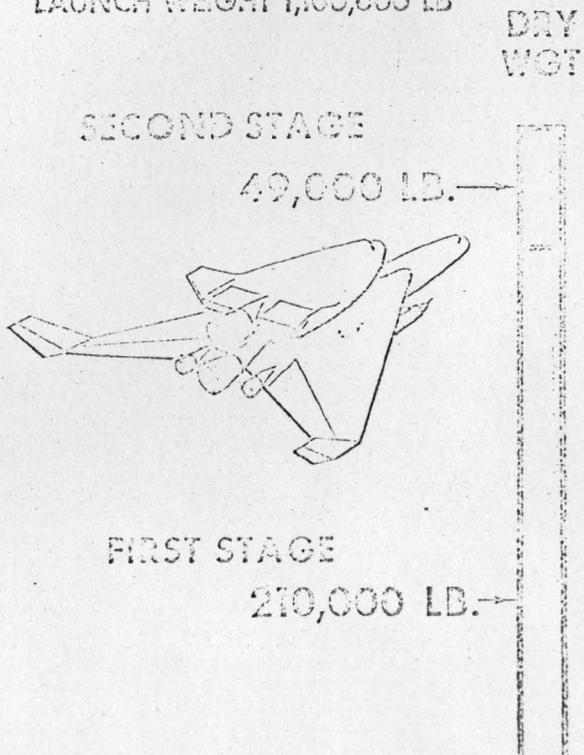


FIGURE 6

MCDONNELL DOUGLAS

MCDONNELL

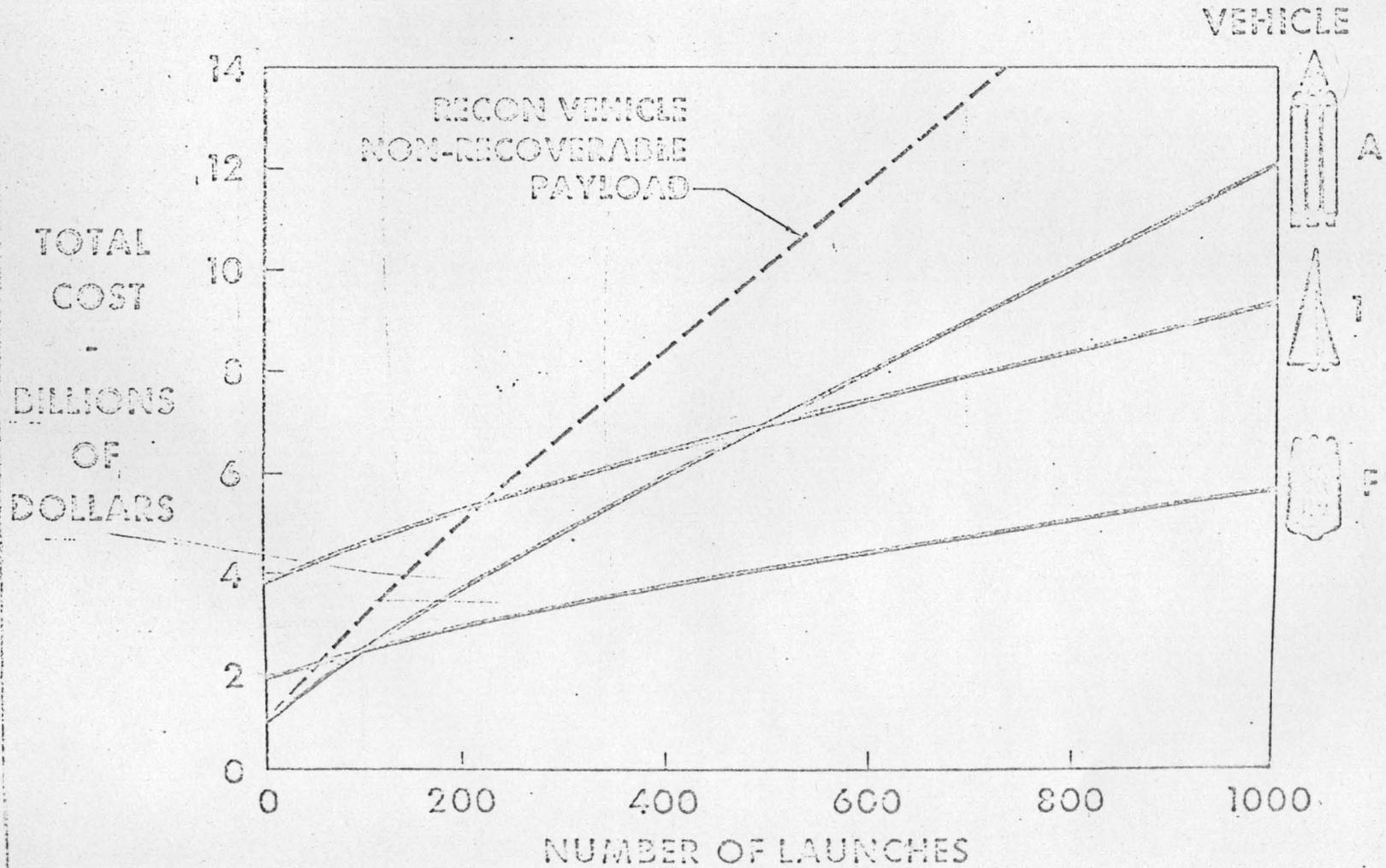
DEFINITION OF ICA VEHICLES SUPPLIED BY MCDONNELL

	TWO STAGE REUSABLE	TITAN III-C REUSABLE S/C	MCDONNELL TIP-TANK CONCEPT
			
PROPULSION			
1ST STAGE	ROCKET	TITAN III-C	TIP-TANKS
RE-ENTRY VEHICLE	ROCKET	NONE	ROCKET
STAGING VELOCITY FT/SEC	9,000	25,600	13,000
LIFT-OFF WT-LB	920,000	1,725,000	680,000
INERT WT-LB			
1ST STAGE	127,000	200,000	29,000
RE-ENTRY VEHICLE	41,000	15,000	41,000

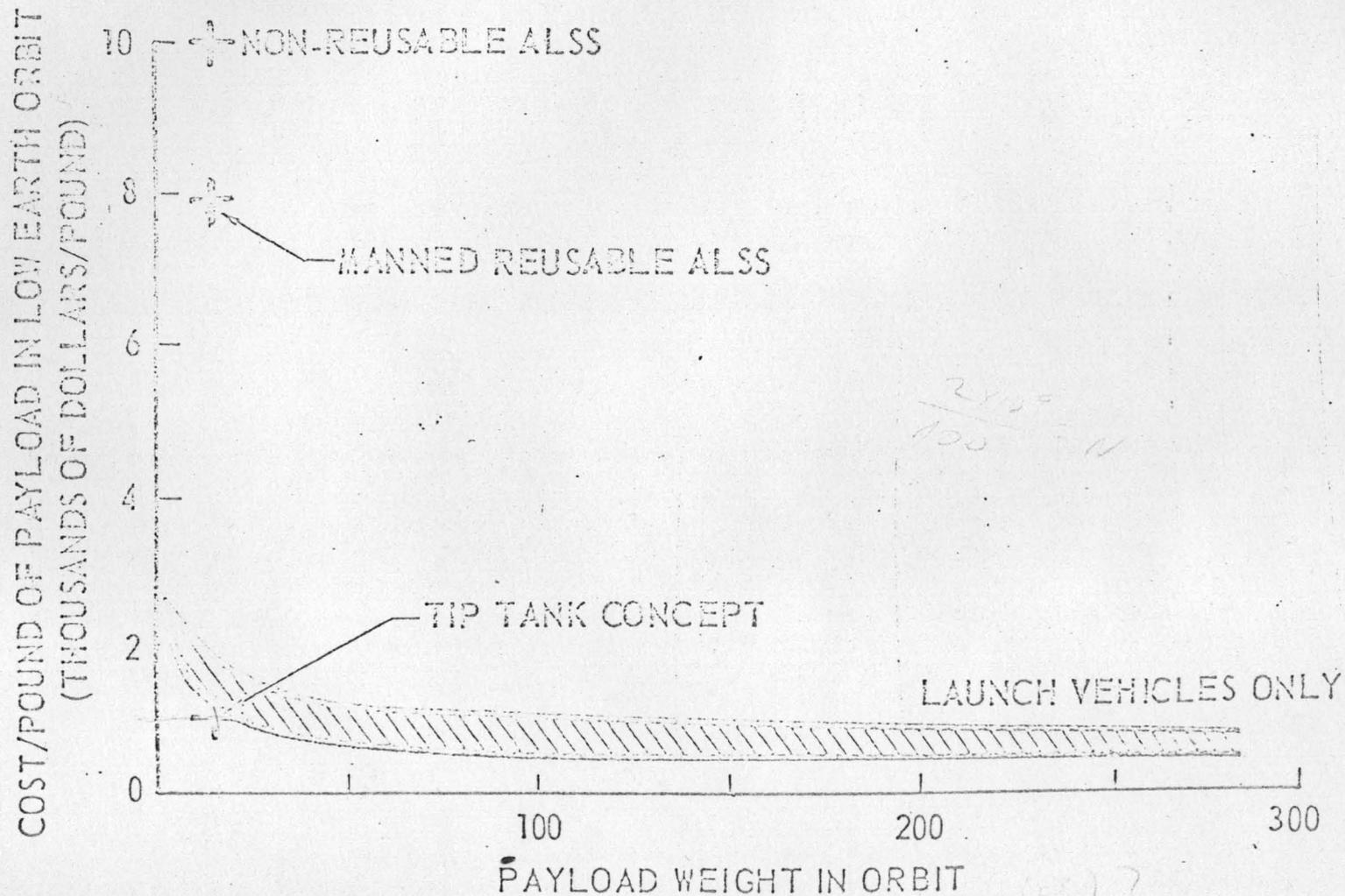
PROGRAM COST COMPARISON

10 YEAR PROGRAM

MCDONNELL COST ESTIMATING PROGRAM



COST/POUND OF PAYLOAD IN LOW EARTH ORBITS



MCDONNELL DOUGLAS

MCDONNELL

SPACECRAFT
CONSIDERATIONS

KEY POINTS

MRLS

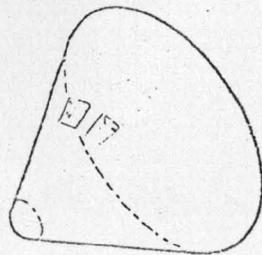
- BALLISTIC BEST IF MANEUVERABILITY NOT REQUIRED
- VARIABLE GEOMETRY BEST HORIZONTAL LANBER
- NON RECOVERED HARDWARE ARE MAJOR COST ITEMS

MAC176

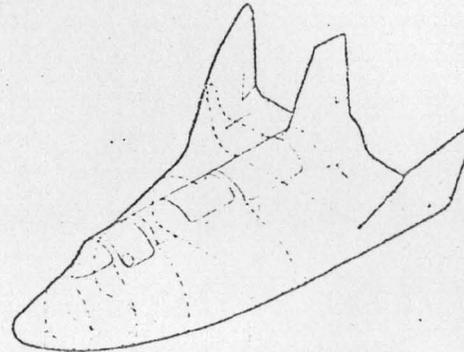
- TIP-TANKS PLUS VARIABLE GEOMETRY MINIMIZES
NON RECOVERABLE HARDWARE COST

SPACECRAFT CONFIGURATIONS

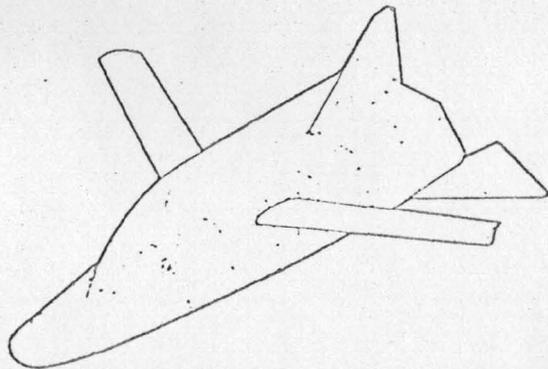
BALLISTIC SPACECRAFT



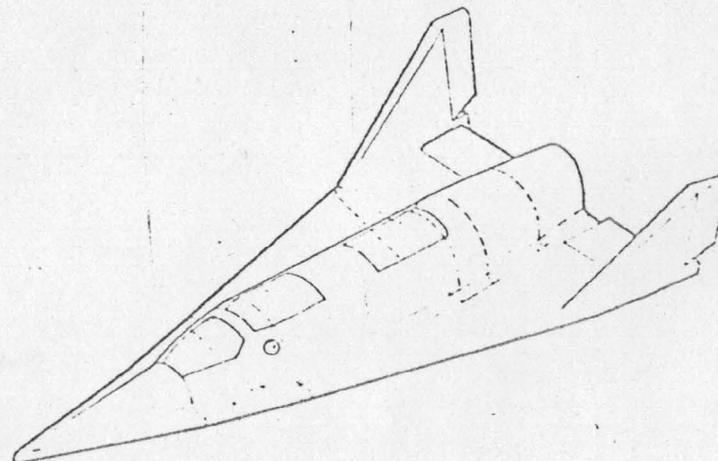
HL-10 SPACECRAFT



VARIABLE GEOMETRY SPACECRAFT



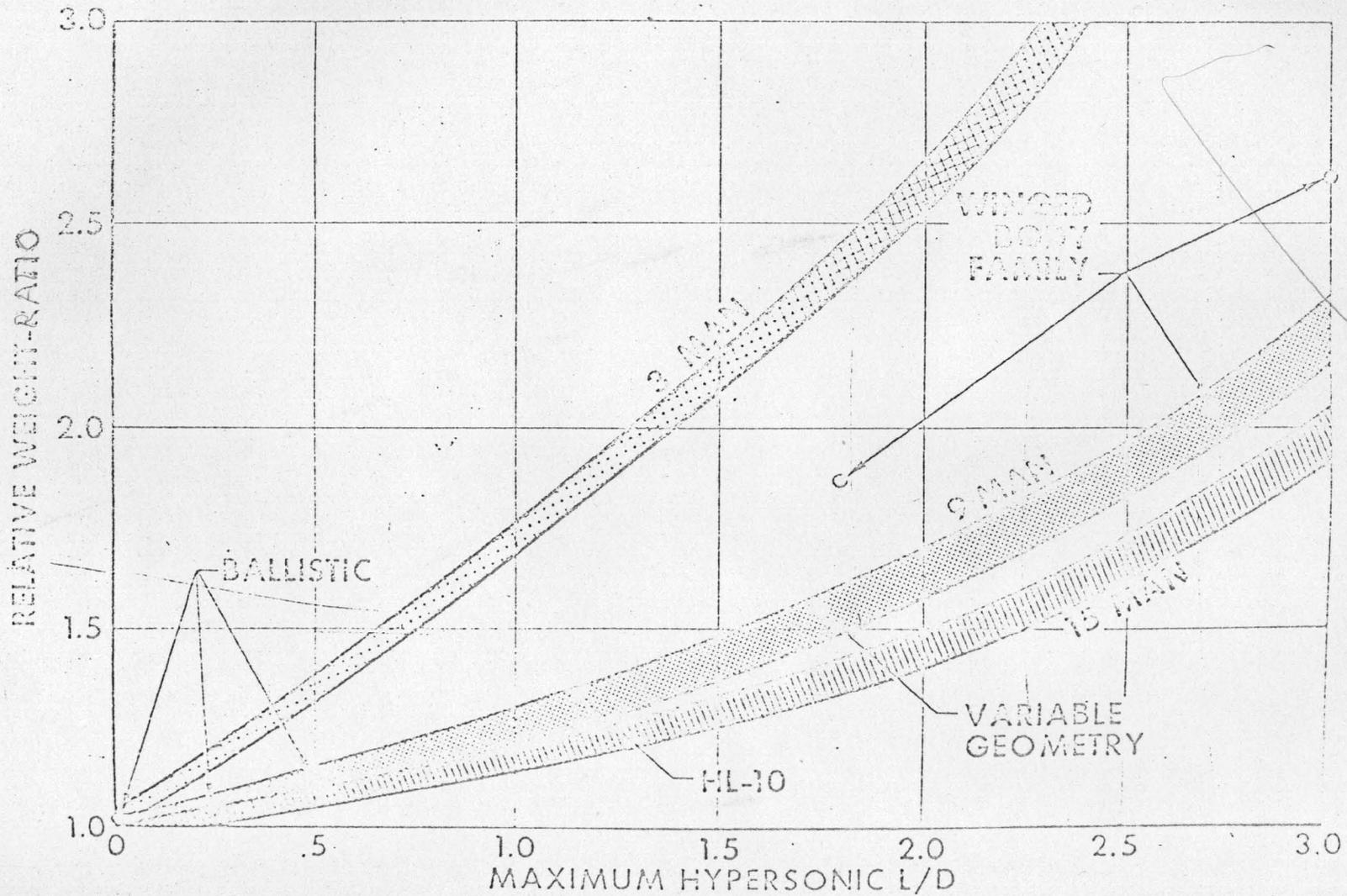
WINGED BODY SPACECRAFT



MCDONNELL DOUGLAS

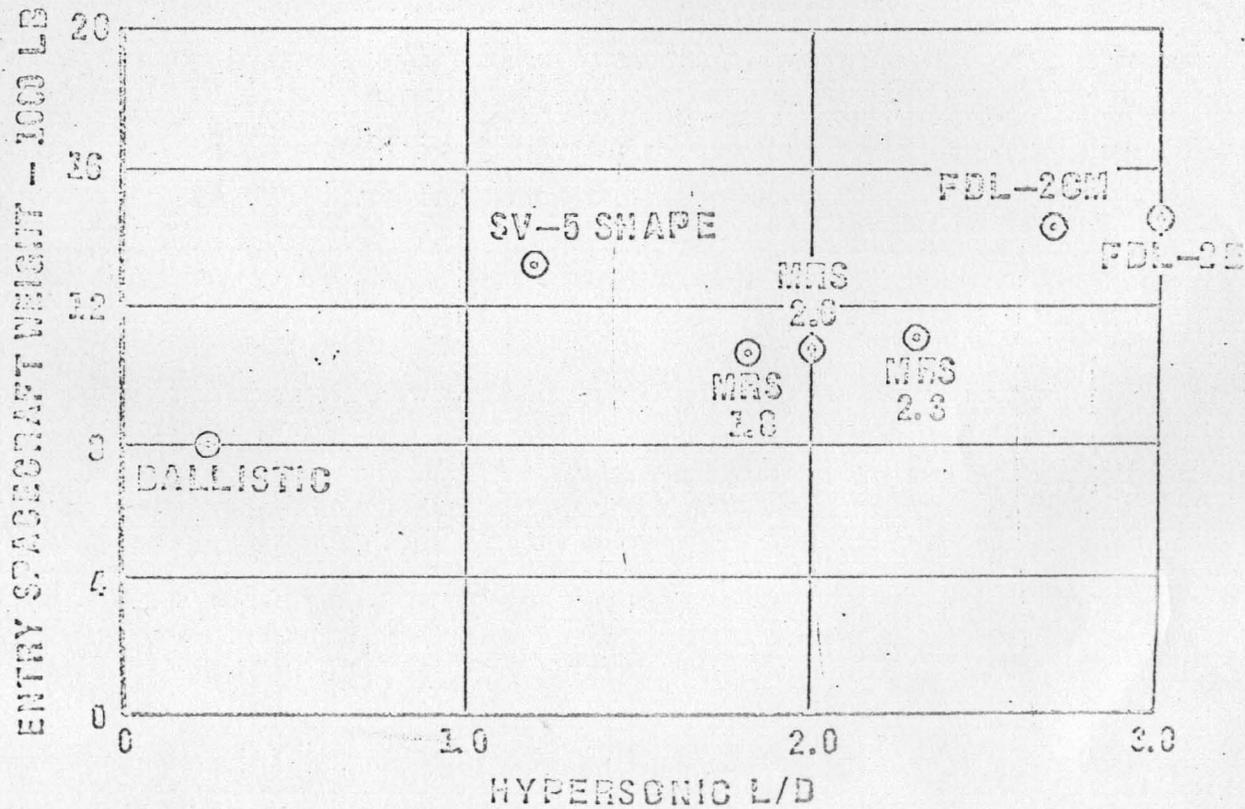
MCDONNELL

VALUATION OF WEIGHT WITH HYPERSONIC L/D



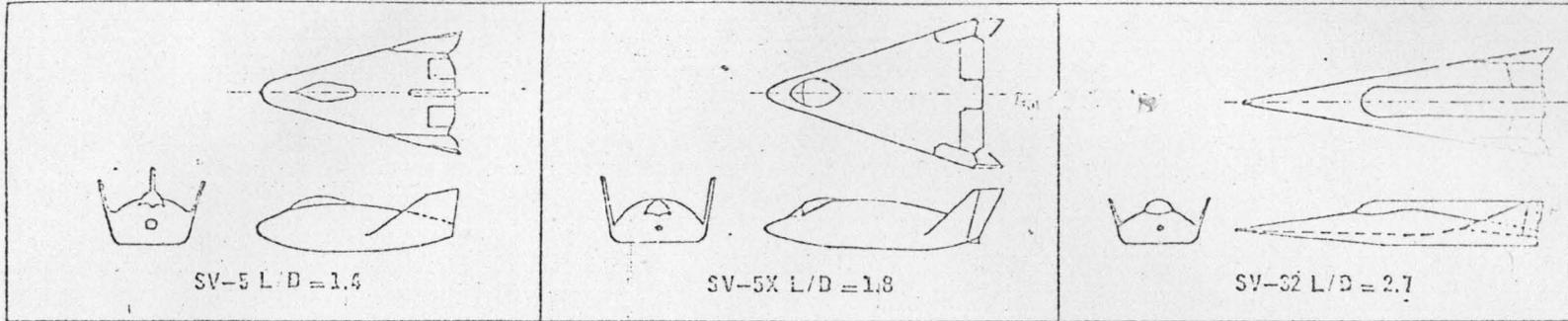
MCDONNELL

INITIALLY CALCULATED WEIGHTS- LOGISTICS MISSION

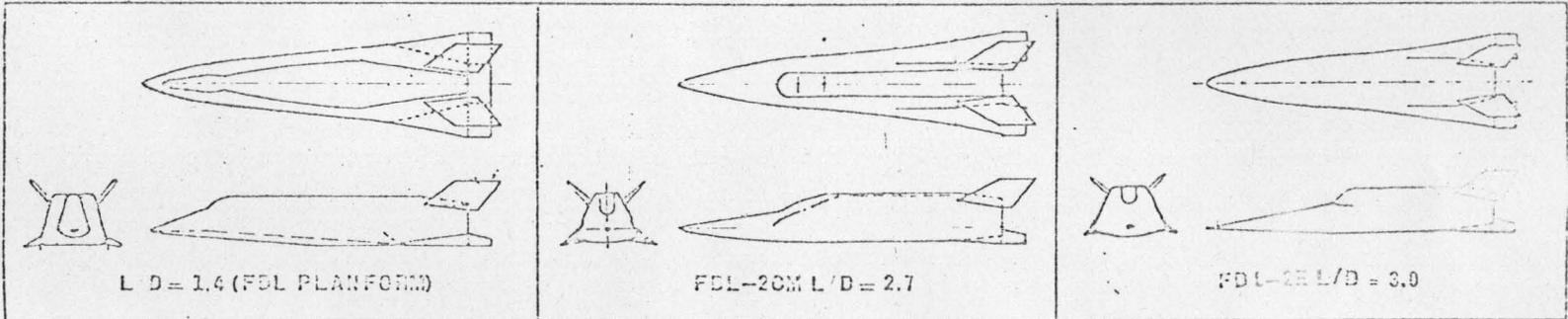


GEOMETRICALLY SIMILAR CONFIGURATIONS

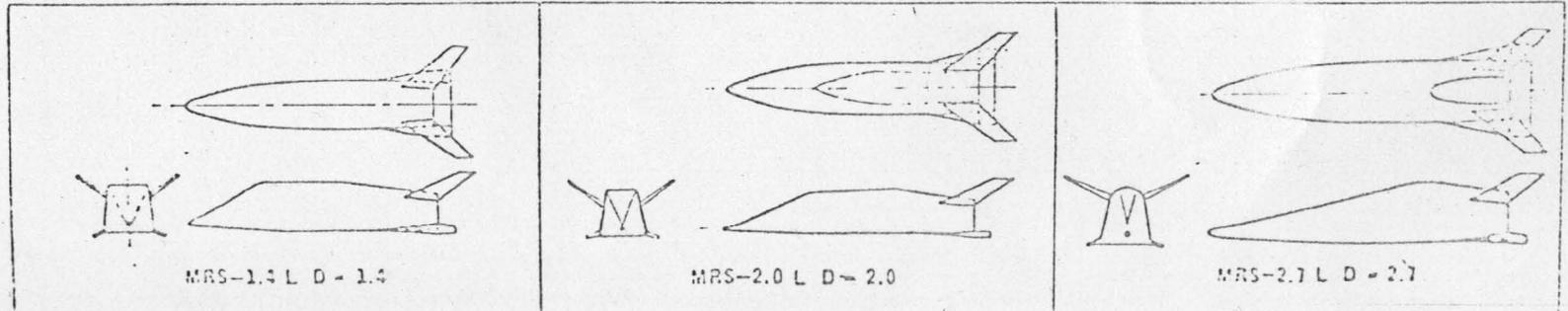
SV FAMILY



FDL FAMILY

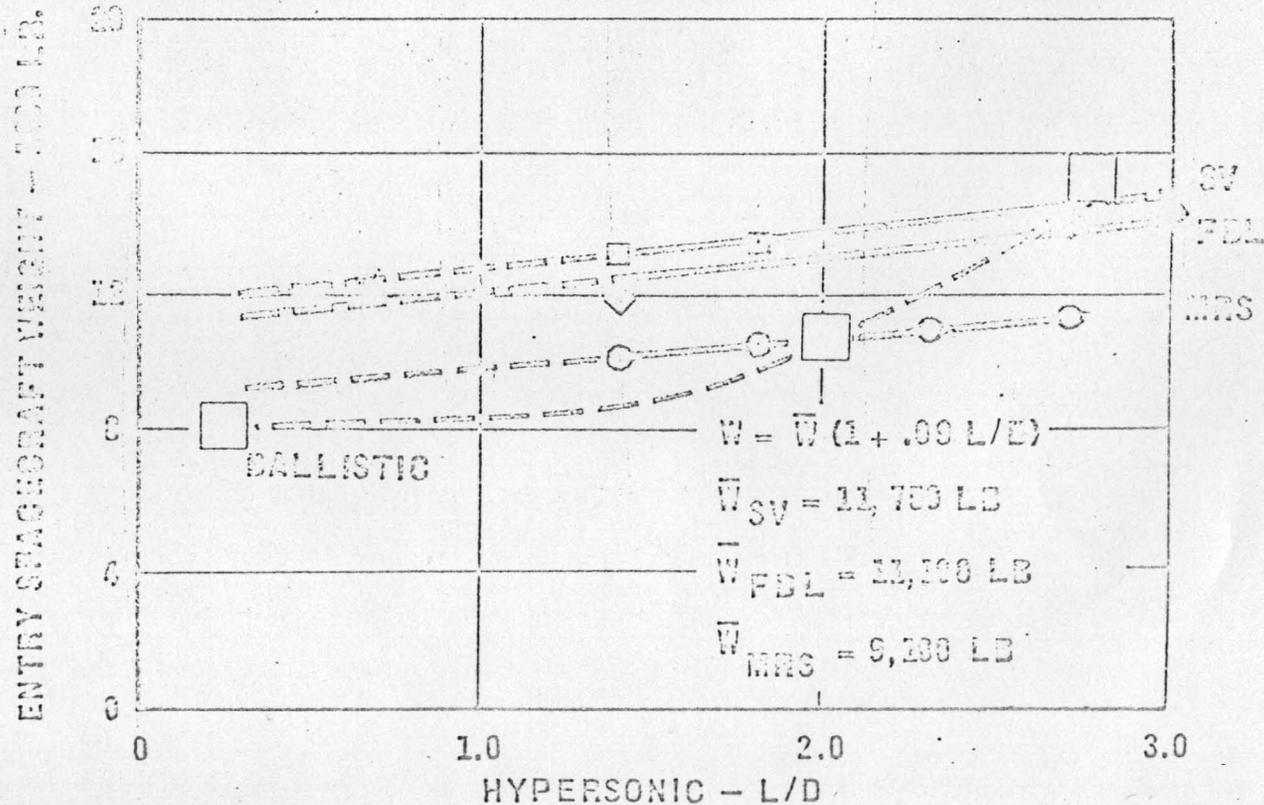


MRS FAMILY

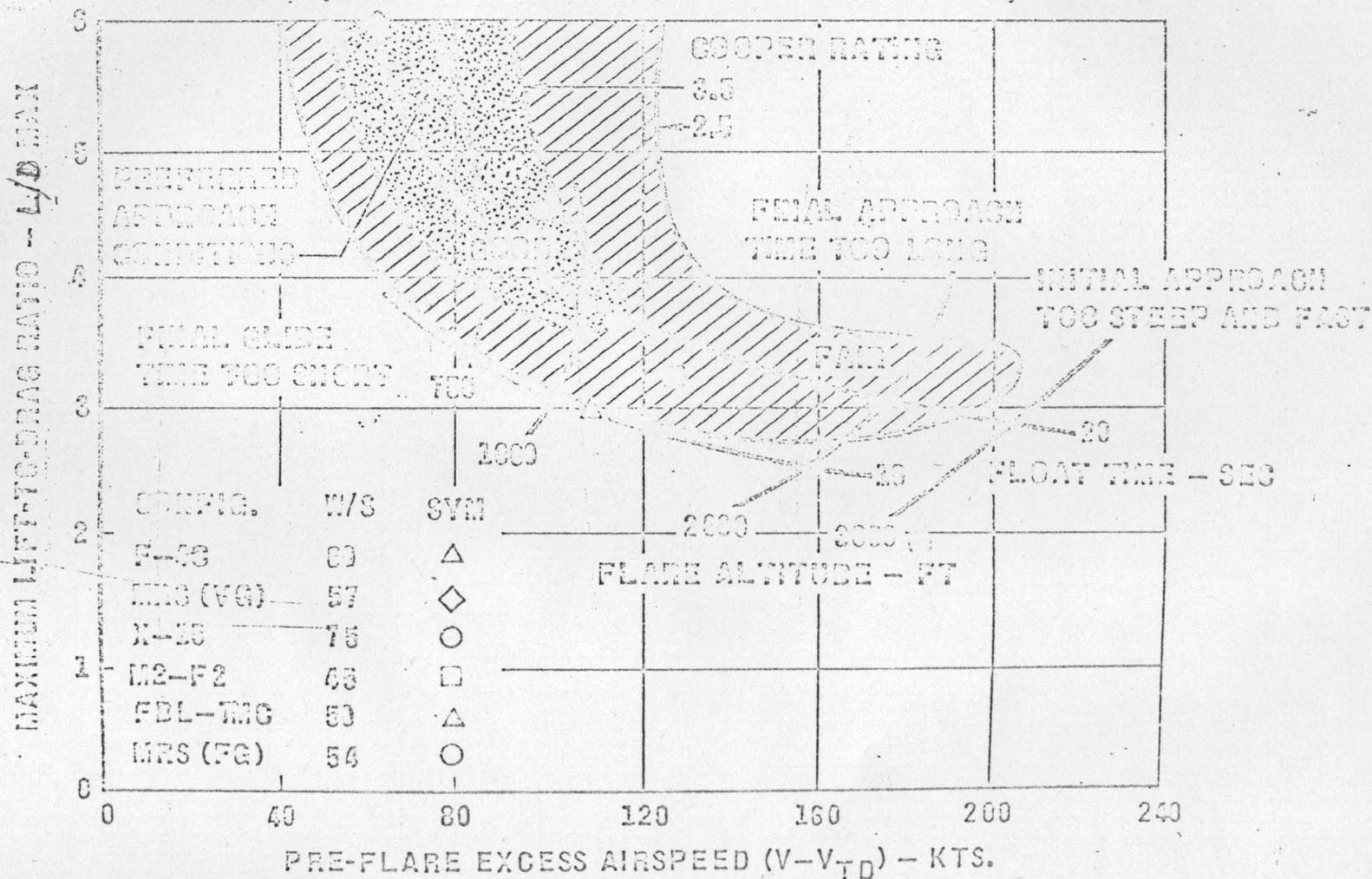


WEIGHT MORE AFFECTED BY CONFIGURATION THAN BY L/D LOGISTICS MISSION - TASK A

□ POSSIBLE SPURIOUS TREND BY ANALYZING POINT DESIGNS



HORIZONTAL LANDING CRITERIA - POWER OFF
(IDEAL LANDING CONDITIONS)



MCDONNELL DOUGLAS

MCDONNELL

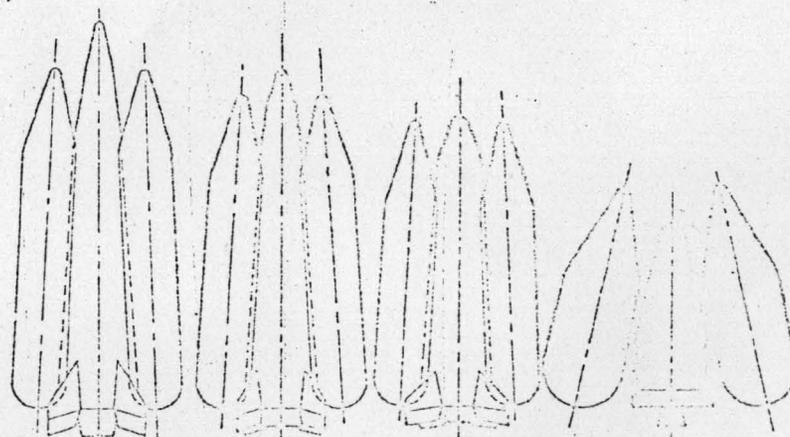
ORBITAL TRANSPORT SYSTEMS

MCDONNELL DOUGLAS

ALTERNATIVE CONFIGURATIONS STUDY FOR THE ABLE BOMB LAUNCHER WITH
MISSION PAYLOAD = 10,000 LBS

HIGH BUSINESS CASE CONFIGURATIONS

CLASS-2002



HYPERSONIC L/D	3.0	2.1	1.5	1.5
VEHICLE DRY WEIGHT - LBS	42,000	30,000	35,400	37,400
TIP TANKS DRY WEIGHT - LBS	20,000	25,000	22,000	22,000
LAUNCH WEIGHT - LBS	650,000	552,000	542,000	627,000

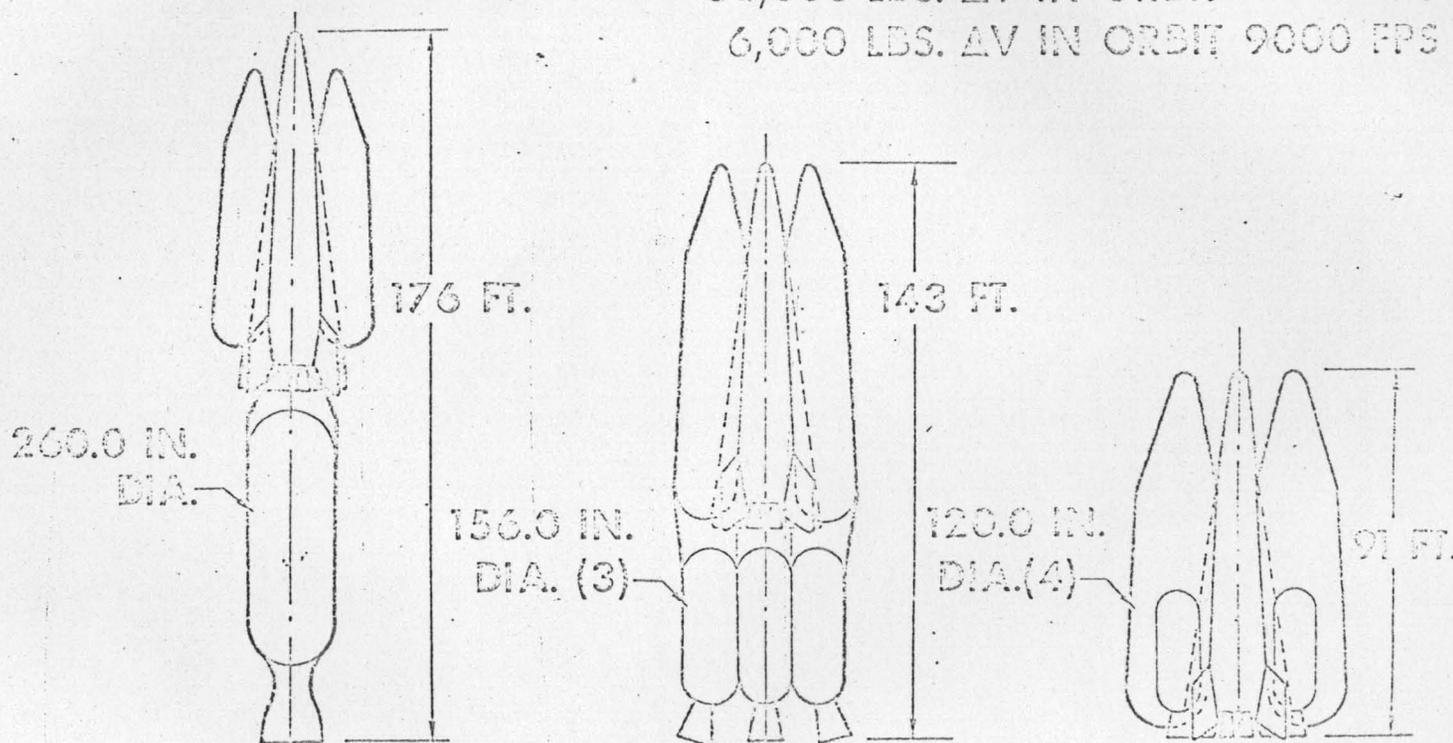
ALTERNATE TIP TANK APPROACHES

MCDONNELL

MISSION PAYLOAD IN 300 NA. MI. EASTERLY ORBIT:

38,000 LBS. AV IN ORBIT 1450 FPS

6,000 LBS. AV IN ORBIT 9000 FPS

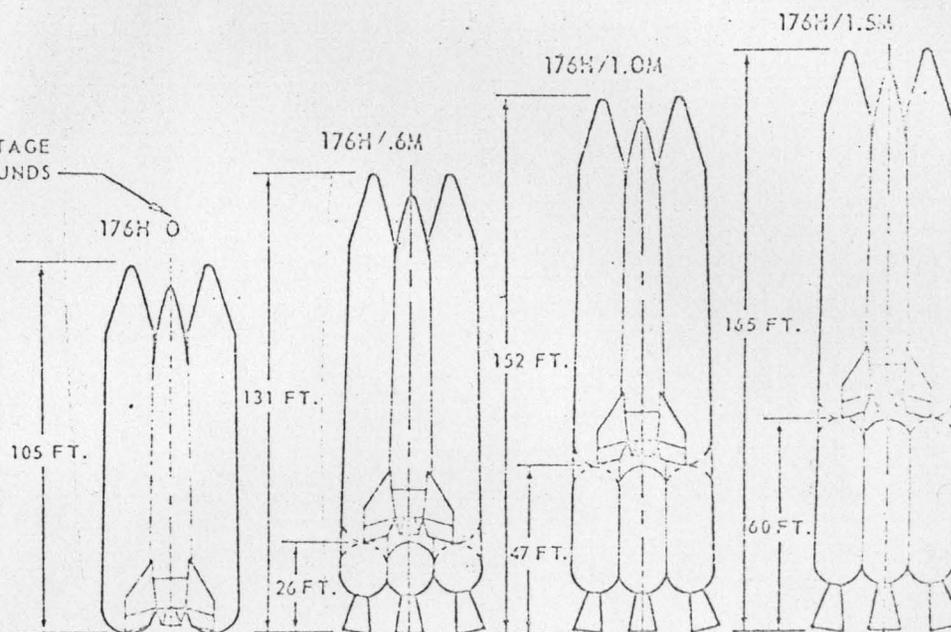


WEIGHTS

MODEL 176 LOADED.....	110,600	110,600	110,600
TIP TANKS LOADED.....	356,400	554,000	712,400
SOLIDS + ADAPTER.....	1,861,500	1,003,290	802,660
LAUNCH WT.....	2,328,500	1,667,890	1,625,660

MODEL 176H LAUNCH CONFIGURATIONS

DESIGNATES WEIGHT OF FIRST STAGE
SOLID ROCKET MOTORS IN MILLIONS OF POUNDS



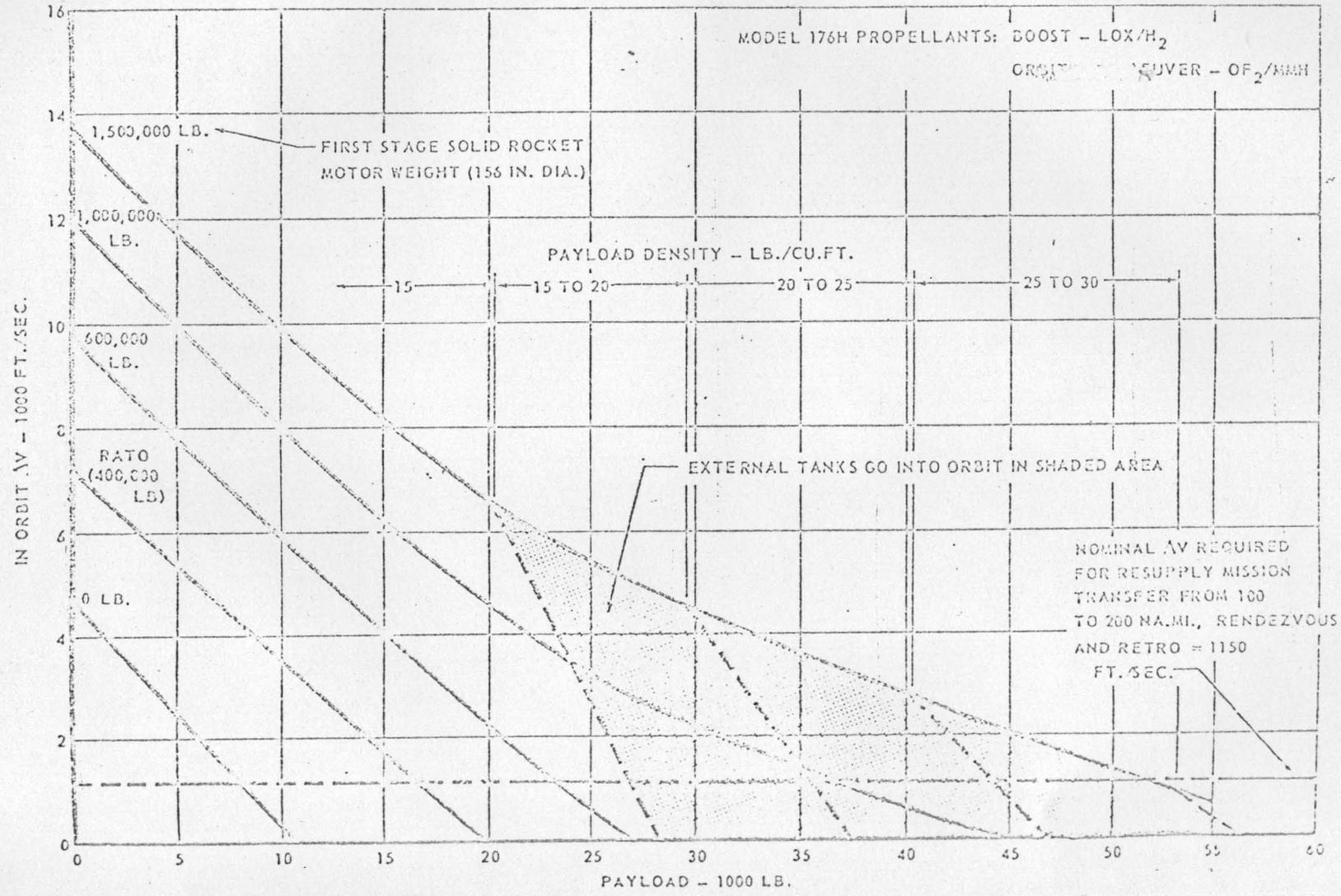
NOTE: ALL SOLID BOOSTERS ARE 156 IN. DIAMETER.
ALL WEIGHTS ARE IN POUNDS.

	WEIGHT - LB			
MODEL 176 WITH 3 MAN CREW	35,100	35,100	35,100	35,100
MISSION PAYLOAD (LB) ΔV IN ORBIT (FPS)	5,000 2,600	5,000 7,850	5,000 10,000	5,000 11,800
MODEL 176 LOADED	83,000	101,000	111,000	120,000
EXTERNAL TANKS LOADED	633,000	654,000	665,000	675,000
SOLID BOOSTERS - ADAPTER	-	603,000	1,003,000	1,504,000
LAUNCH	633,000	1,257,000	1,668,000	2,179,000

MCDONNELL DOUGLAS

MCDONNELL

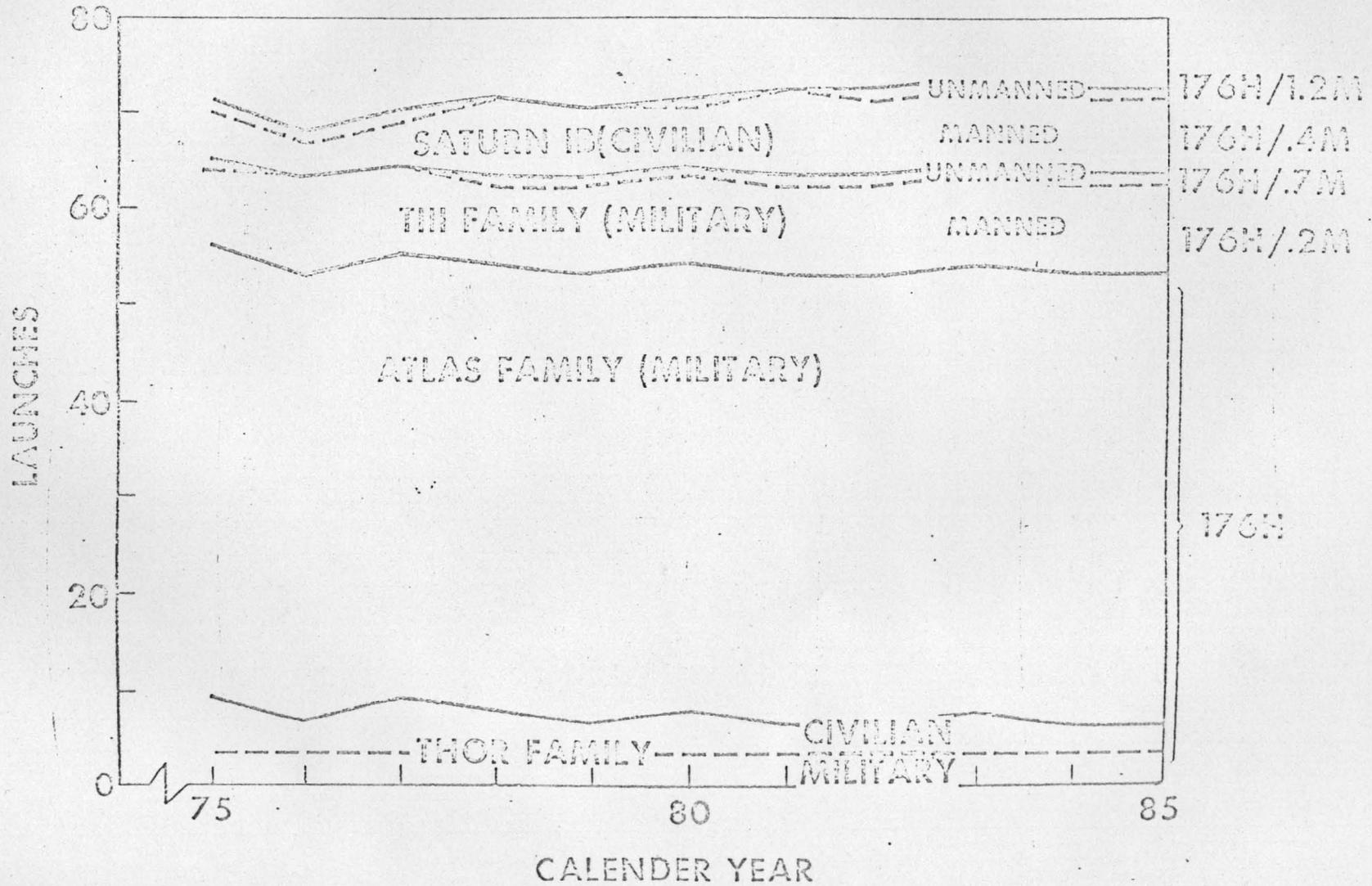
MODEL 176H PERFORMANCE 3 MAN CREW - 100 NA.MI. E. ORBIT *



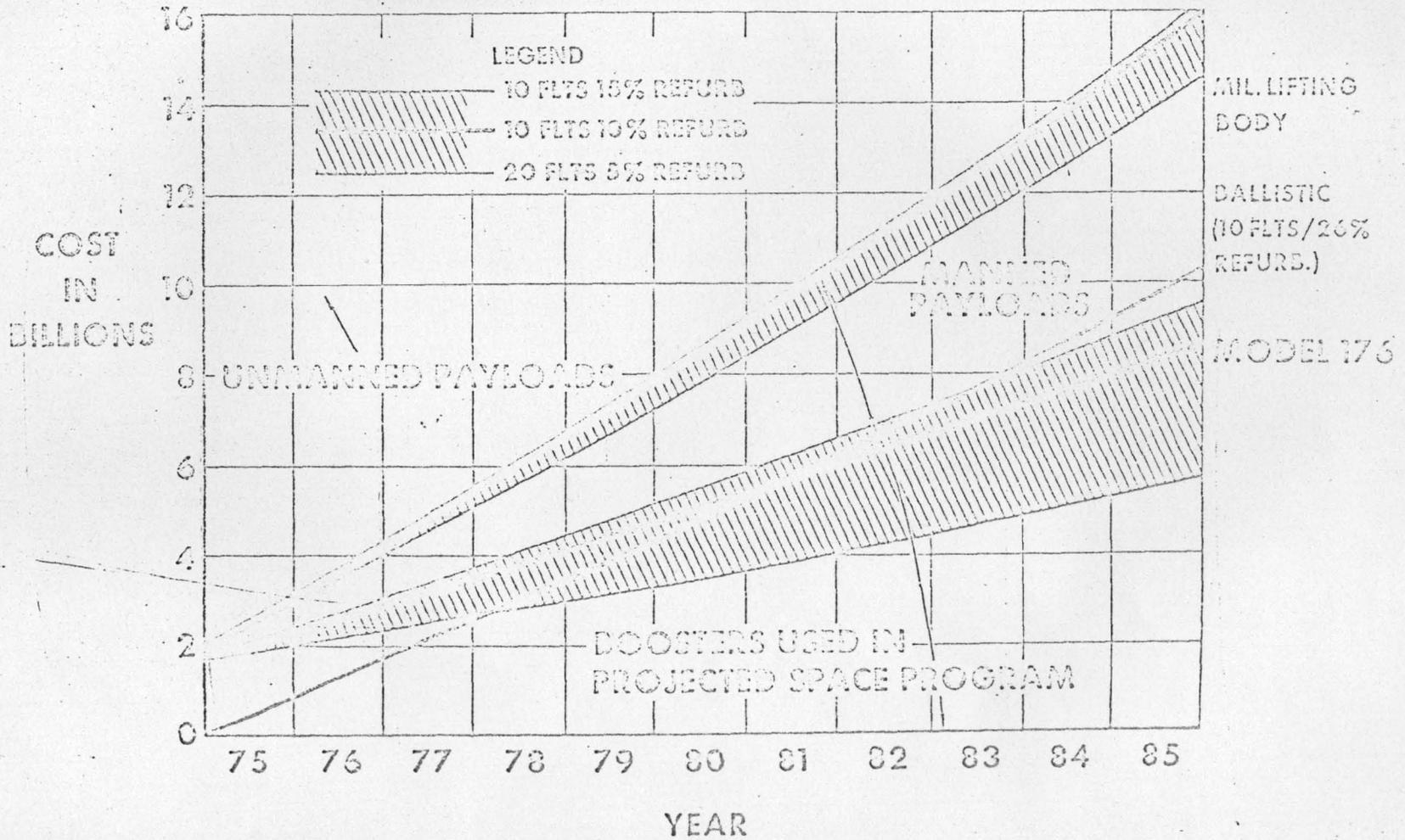
* ALL PERFORMANCE BASED ON AV = 29,400 FT./SEC.
EXCEPT FOR 176H J WHICH IS BASED ON AV = 30,400 FT./SEC.

MCDONNELL DOUGLAS

PROJECTED LAUNCHES TO LOW EARTH ORBIT



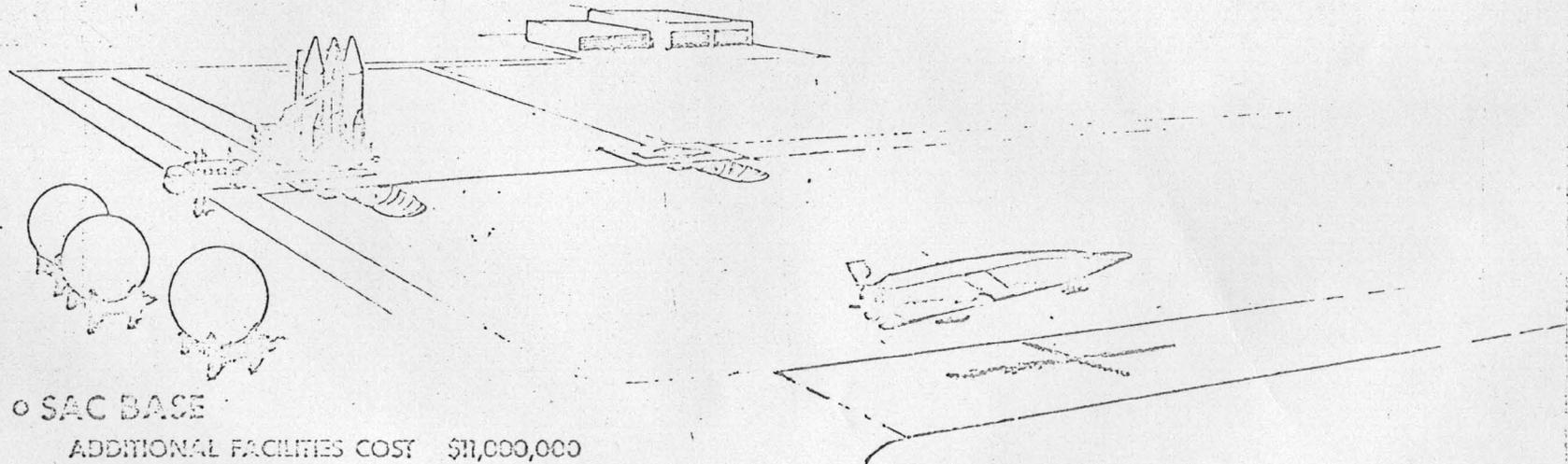
PROGRAM COST COMPARISON



MCDONNELL DOUGLAS

MCDONNELL

MODEL 176 LAUNCH AND LANDING BASE



B 1/12

NOTES 1/8/68 BALCH

1/8/68

S-II-504 Testing - Stage contractor remains on schedule for tanking test on 1/16/68 and static firing on 1/24/68. ✓

S-II-505 Stage - Stage contractor is continuing with GSE and facility modifications on the A-1 test stand in preparation for arrival of the S-II-505, scheduled for 2/9/68. ✓

S-IC-D Stage - Stage contractor is removing modifications from stage to return the stage fuel anti-vortex device to flight stage configuration. Six additional water flow tests are planned on the flight stage configuration and other selected modified configurations to verify data previously obtained. Current schedule calls for removal of stage from stand on 2/1/68. ✓

S-IC-506 Stage - Stage contractor is planning for arrival of stage from Michoud on 3/1/68 and installation of stage in stand on 3/5/68. ✓

GE Service Contract - Distribution of Amendment 122 covering the second through fourth quarters of Fiscal Year 1968 is still delayed pending resolution of GE's objection to the "Support Services Adjustment Article" clause required by the Director of Procurement, NASA Headquarters. Request for proposal covering extension from 7/1/68 to 9/30/69 is now expected to be submitted to GE by 1/15/68. ✓

Congressional Inquiry on Damage Claims from Stage Firings - An inquiry has been received from Senator Stennis on behalf of Messrs. Otho Rester and James Rester, whose claims against the Government for damages to their properties from static firings at MTF were denied. We have made an interim reply to Senator Stennis and referred the matter to the MSFC Counsel Office for further handling, since that office made the final determination on the claims. ✓

ORBITAL WORKSHOP ENGINEERING MOCKUP: The delivery of the OWS S-IVB mockup to MSFC slipped to January 9, 1968, due to weather conditions for Super Guppy flights and Saturn 503 shipping priority and then was bumped again to January 12 (earliest) by an Apollo heat shield delivery. ✓
MULTIPLE DOCKING ADAPTER (MDA) PRELIMINARY DESIGN REVIEW (PDR): PDR Data Package reproducibles were sent to MSC, KSC, and NASA Headquarters December 22, 1967. The technical review of the hardware documentation will be held January 16, followed by a crew systems technical review on January 17.

The plan is to utilize the basic ground rules for conduct of a PDR which were published for use during the December 6 MSC Airlock PDR. The PDR Board will meet January 25. ✓

MDA STRUCTURAL TEST ARTICLE DELAY: P&VE and ME Laboratories have identified a potential 2-month delay in completion of the MDA structural test article. The primary reason for the delay is redesign of the docking port area for higher docking loads. The bending movement design criteria was increased from approximately 335,000 in. lbs. to 500,000 in. lbs. (limit value) during the AAP Mechanical Panel meeting held on November 21.

The impact of this delay does not affect the flight hardware schedule. ✓ It does, however, cause a delay in the start of the combined Airlock/MDA structural static test program. A later Airlock delivery may permit McDonnell to initially install the mass simulators, instead of after static test, so that the delivered configuration will allow start of dynamic testing immediately after structural static test. ✓

A possible affect of the MDA delay is to cause a slip in the start of ATM dynamic testing. ✓

INTEGRATION CONTRACT: We are continuing our efforts toward a letter contract with Martin January 15 through June 30, 1968; although we have not as yet received Headquarters approval to go this route.

The formulation of the Phase D Scope of Work is difficult and is a little behind schedule. We may also have an uphill fight with Headquarters to keep the planned integration manpower level. ✓

CLUSTER SYSTEMS REVIEW: We are proceeding with R&DO in preparation for a Center level Cluster Systems Review. ✓

ATM CONTROL AND DISPLAY: The second ATM Control and Display Integration meeting will be held at Grumman on January 12. The integration of the control and display console into the LM will be discussed with primary emphasis on the structural and thermal areas. ✓

ATM PRELIMINARY REQUIREMENTS REVIEW (PRR): Preparations are being made to hold the ATM PRR during the week of January 22 including a crew station review on the third day. The PDR is scheduled for May. ✓

EVA TASK TEAM: The first meeting of an intercenter EVA Task Team established by Chuck Mathews will be held at Headquarters on January 9. Representatives of the AAP Office, Advanced Systems Office and P&VE will attend. The purpose of the meeting is to review those experiments in the cluster which require EVA and/or astronaut maneuvering in preparation for the January meeting of the MSFEB, to review a total EVA development plan, and to define the need for and functions of a permanent working group. ✓

1/8/68

B1/12

H-1 ENGINE Reference my Notes of 1-2-68. In an effort to expedite the approval of the H-1 production support contract, I arranged a briefing for Mr. Moritz and his staff in Washington on 1/5/68. Among those attending from MSFC were Gen. O'Connor and Messrs. H. Gorman, T. Burton, W. Brown, and T. P. Smith. During the meeting Mr. Moritz expressed his willingness to approve the contractual action provided Mr. Wood, MSP, document the requirement for such a lengthy period of performance (4 years). Mr. Wood completed this assignment on the afternoon of 1/5/68. I plan to check the progress on this action with Mr. Moritz and provide any additional information he may require. ✓

J-2 ENGINE Five successful tests were conducted at AEDC on 1/4/68, in the reduced fuel pump inlet pressure testing program. Next tests scheduled for 1/10/68. ✓

During the SA-502 Overall Test Sequence (OATS) on 12/28/67 an erroneous cutoff signal was recorded on the center engine on S-II-502. While additional sequence tests were being conducted to determine the cause of this erroneous signal, two other anomalies were found:

(1) The augmented spark igniter and gas generator spark signals dropped out 5 milliseconds after "mainstage" signal for a 20-millisecond period on the center engine.

(2) An erroneous cutoff signal was recorded on an outboard engine. As a result of (1) above, the Electrical Control Assembly (ECA) on the center engine was replaced on 1/7/68 (without schedule impact) and the removed ECA has been returned to Rocketdyne for failure analysis. The erroneous signal on the outboard engine was traced to the stage Electrical Support Equipment. However no explanation has yet been found for the original anomaly (erroneous cutoff signal on the center engine).

Per agreements reached during the AS-501 PFR the J-2 engine start tank emergency vent valve has been qualified for flight and hardware delivered to KSC for AS-502. This valve will provide an emergency venting system which does not require venting through the engine turbines and into the interstage in the event of failure of the normal vent system. A decision has now been made, however, to withhold incorporation of the new emergency vent valve until AS-205 and AS-503. ✓

BB

Critical?

B

NOTES 1/8/67 CONSTAN

Nothing of special significance.

1/8/67

B_{1/12}

1/8/68

B 1/12

KSC Safety Organization

KSC has forwarded their proposal to Headquarters in which they propose to move the safety function to the Directors level. It will include three branches - Operations, Industrial, and Safety Technology - and the tentative staffing will require 25 people. ✓

Motivation Program

Mr. Lederer wants to make the motivation program, including Manned Flight Awareness, a part of the Safety effort. A meeting is being planned to discuss the motivation program with all MSF Centers at MSFC some time during the last week of January or first week of February. ✓

Safety Program Planning at Contractors

A visit was made to Grumman on December 20 to review their Safety Program. Headquarters (Mr. Lederer), MSFC (Mr. Neubert), MSC (Mr. Bond), and KSC (Mr. Atkins) as well as other NASA representatives were present. Grumman is progressing with the development of a Safety organization and documented safety plans and procedures. A similar meeting is being planned to be held at North American Rockwell during the month of February. ✓

NOTES 1/8/68 FELLOWS

1/8/68

B 1/12

1. Critical Vacancies in R&DO: When the scheduled Reduction In Force (RIF) is completed on January 13, there will be critical vacancies within R&D organizations that will require immediate attention to alleviate the shortage of critical skills. All R&D laboratories and offices have been requested to submit a priority list of critical vacancies in order to provide the maximum possible lead time for the Personnel Office to fill the vacancies. Vacancies created by the RIF and by termination for other reasons since announcement of the RIF are to be considered in the determination of critical vacancies. ✓

2. S-II Structural Test Program: The RIF action assessed against Test Laboratory has created a shortage of instrumentation and electrical technicians required to complete the S-II structural test program on schedule. Fifteen technicians will be provided from other laboratories on a 90-day loan basis to maintain the schedule for the S-II test program. Personnel are to be made available to Test Laboratory this week. ✓

NOTES 1/8/68 GEISSLER

B 1/12

1/89 GB

S-II Insulation: A wind tunnel program is being planned, for the S-II-8 spray foam insulation, to determine the insulation's ability to withstand aerodynamic loads and decompression, with and without simulated defects. ✓ Test conditions were to be the same as those on the investigation of the present honeycomb insulation. NAR/SD will supply 10" X 10" test panels, with simulated defects (tears, debonds, hammer blows) put in by P&VE - structures. Tests will be scheduled as soon as the specimens are received, and results should be available shortly thereafter. ✓

B 11/2

1/8 9/6/3

1. SA-204 CERTIFICATES OF QUALIFICATION (COQ): Component testing has been completed on SA-204 and all COQ's have been or are in the process of being signed. ✓
2. GSE: RCA (Huntsville) is manning and training to start repair work on Ampex module boards used in the RCA computer complex. Tests recently concluded show the boards to be subject to cracked solder joints very much like the RCA-110A computer printed circuit boards. Some 9,000 boards are involved in the rebuild which is expected to be completed by September 1968. We had completed extensive tests on sample boards prior to approval of RCA repair procedures. ✓

D.F.

at KSC, too?

Why was this not caught in our general RCA-110A cleanup?

B

1/8 9/8/68

B412

1. ATM Design. Two items were resolved last week in order to allow the designs to proceed and the schedules met. These were:

a. Incorporation of the TV downlink for the NRL XUV telescope using digital sampling and an ATM telemetry link. This change requires the addition of a tape recorder and some signal conditioning boxes. Since the capability to record other TV data (HCO $H\alpha$, ATM $H\alpha$ and NRL white light) can be accomplished very easily by building in the switching networks, TV downlink data from those experiments will also be available to the principal investigators. ✓

b. Film/camera accessibility on the launch pad was a desirable operational feature. However, incorporation of this design feature caused several design impacts and compromises and it was therefore concluded that the cameras with film would have to be loaded in the experiments prior to stacking on the launch pad. ✓

The decision to incorporate a TV system in the HAO white light coronagraph has not been completely resolved but is most probable that TV will be incorporated in this experiment. This is a requirement which the astronauts have taken a strong position. ✓

2. ATM Procurement Actions. The ATM star tracker procurement package was sent to Headquarters on December 28, 1967. The digital computer procurement package was sent to Headquarters on October 27, 1967. No reason is known for the holdup on release of this procurement action. ✓

1/8/68

MODERATE DEPTH LUNAR DRILL

Testing on the compressor will resume next week on a modified exhaust valve. RFQ's have been sent out on the hammer assembly designed by Northrop under the existing contract. ✓

MOBILITY TEST ARTICLES

The obstacles fabricated for the MTA test program have been received in Test Laboratory. Testing of the vehicles will begin when weather and manpower conditions permit. ✓

S-1C STAGE (MSFC)

A lox loading test was performed January 3, 1968, to optimize lox geyser suppression procedures for KSC. ✓

S-1C STAGE (MTF)

After analysis of test data, it was decided to install the old anti-vortex devices and perform six more fuel drain tests on S-1C-D next week. The lox drain tests have been cancelled. ✓

S-11 STRUCTURAL TEST PROGRAM

The facility construction and preparation of test support equipment continues on schedule. It appears that delivery of the test article to R-TEST has been delayed to May 22, 1968. Boeing plans 6 weeks of 3 shift operation at R-TEST to finish the instrumentation by July 3, 1968. ✓

S-1B (MSFC)

Engines in Position No. 1 and No. 7 have been removed from stage S-1B-11 in preparation for replacement with R&D engine which will be "bombed" in the forthcoming special tests on the stage. Test SA-49 is tentatively scheduled for January 26, 1968. ✓

1/8 9/8

1. CONCLUSION OF SYSTEMS PROGRAMMING FOR ADCOMED: A SDS-910 digital computer is connected to the Advanced Checkout Methodology and Engineering Development (ADCOMED) facility at Quality Laboratory for controlling tests and designing test procedures. Computation Laboratory designed and implemented the system programs (software) which are essential for the operation of this computer system. It contains about 25,000 instructions. This system allows the test engineer via on-line graphic console to:

- a. Translate test procedure statements written in checkout language ATOLL I into SDS-910 machine code;
- b. To call up test procedures from a library tape and execute them;
- c. To interact during a test run when in semi-automatic control mode;
- d. To monitor discrete signals;
- e. To process recorded test data.

The implementation of this software system which is comparable to the Boeing and IBM automatic checkout system was finished last month with an effort of only 22 man-months on schedule and to the satisfaction of the sponsor at Quality Laboratory. ✓

2. RELEASE OF 7010 COMPUTER: Computation Laboratory plans to turn in one of the IBM 7010 systems to IBM due to workload reduction. This reduction is due to the conversion of Data Center computer systems to the UNIVAC 1108. This will result in an approximate savings of \$1,000 per day, and is the first significant recognizable reduction in computer cost since acquisition of the UNIVAC 1108. ✓

NOTES 1/8/68 JOHNSON

1/8/68

B 1/12

Negative report.

1/895A

B 1/12

1. S-IC/S-II Structural Test Tank: After successful completion of the weld which joins the S-IC and S-II halves of this structure, we are now engaged in the installation of a splice ring and stiffeners inside the container which provides for a proper connection of the stringers of the S-IC half to the rib pattern of the S-II container. The work is progressing on schedule. On the systems installation for this structure - mainly on the LOX Fill and Drain installation - are still 16 line items from NAR missing. The next major operation in the fabrication of this test structure is the installation of 7000 measuring points for strain measurements. This operation is to be performed by The Boeing Company. It appears that this operation has not been planned in sufficient detail to guarantee completion in the planned time frame. We are working with The Boeing Company for schedule assurance. The final phase in the manufacture of this structure is the application of spray foam insulation on the upper bulkhead and sidewalls of the container. ✓

2. Boiler Plate Payload for AS-503: Modifications for the LEM Simulator LTA-B and Boiler plate Command and Service Modules have been completed on schedule. Both items have been shipped to KSC last week. ✓

1. AEROSPIKE CHECKOUT SERIES IS COMPLETED: The last of four aerospike tests to verify chamber modifications was successfully run for 7.5 seconds at Rocketdyne last week. Post test inspection of hardware revealed no visible damage and available data indicated that performance was satisfactory. ✓

2. SATURN V MODEL TESTING: In order to study the localized structural responses to the aerodynamic noise environment, a 1/10 scale model of the Saturn V space vehicle has been fabricated and mounted on a track test sled, and is ready for shipment to AFMDC, Holloman Air Force Base, New Mexico. The sled and payload will undergo three weeks of ground vibration testing. Another two weeks will be needed to install the instrumentation. The first of 12 scheduled test firings is expected to take place during the first half of March 1968. ✓

3. MDA DOCKING PORTS: Work is continuing on the investigation of the structural problems associated with a retractable probe part of the MDA. At this time, three preliminary concepts have been completed and are being reviewed. An additional concept utilizing an expansion bellows is being investigated. In order to help us to better understand the problems connected with the Apollo docking mechanism, the AAP Mechanical Panel has arranged for a 4-hour briefing to our design engineers by North American Aviation on 1-9-68. Hopefully, full scale hardware will be available for the review. ✓

4. LEM STRESS CORROSION: We have been in close contact with the MSC people on the LEM stress corrosion problem. We have proposed that a team of MSC and our people go to Grumman Aircraft Engineering Company and do a stress corrosion survey of the LEM on the spot. This idea was received enthusiastically by MSC working people, and they will recommend this to their management. ✓ I believe such an activity could be accomplished in a few weeks and could eliminate not only the current problem but other problems before they arise. ✓

5. ASTM FALL SYMPOSIUM: James Kingbury agreed to sponsor a session at the Fall ASTM meeting in Atlanta under the theme "Government Research Pays Off." ✓ Public Affairs has given oral approval. We were recommended to the ASTM Symposium Chairman by George Deutsch, OART. ✓

6. ORBITAL WORKSHOP MOCKUP: The Orbital Workshop Mockup was scheduled for shipment by Guppy from Douglas to MSFC on 1-3-68. Because of adverse weather conditions, the aircraft has been grounded and the earliest projected shipping date is 1-12-68. ✓

B.L.
Could you
send me
some sketches
and/or
photos
of this
test
setup?

NOTES/1/8/68/MAUS

1/8/68

B/12

WORK PACKAGE SYSTEM - Jerry Kubat has informed us that he has received the proposals from the centers of what data would be furnished by the centers to MSF in a Task Work Package System. By the end of this week, MSF plans to have a first draft of the consolidated proposals for review with the centers. Present plans are that the centers would receive a call for an input by the end of January with the submission to be made by the end of March. ✓

NOTES 1/8/68 RICHARD

1/8/68

B 1/12

No submission this week.

1/899A

B 4/12

1. AS-502 Launch Vehicle at KSC:

o My Pre-Flight Review for AS-502 has been changed to avoid conflicts with the AS-204 launch activities. The review, scheduled for 17-18 Jan 68, is now scheduled for Tues-Wed, 16-17 Jan 68, in the 10th Floor Conference Room, Building 4200. ✓

o Last Fall, KSC had to place a major portion of their manpower on the AS-501 launch activities. As a result, the AS-502 mod kit installation has fallen behind. At present, there are over 440 mod kits (300 are GSE) awaiting installation on AS-502. Over 80% of these changes were effective for AS-501 and subsequent. As a result of this backlog, KSC is now questioning the necessity of these changes, even though MSFC has previously declared them to be mandatory.

R.R.

You are the boss!
Let me know if

2. AS-503 Launch Vehicle at KSC: The Pre-Delivery (KSC turnover) Review on the BP-30 spacecraft (which will be used for the AS-503 un-manned launch) was held at MSFC on Wed, 3 Jan 68. Only 16 hours of work is being transferred to KSC. The spacecraft was delivered on-dock KSC on Fri, 5 Jan 68. ✓

You need any help in making your decisions shide, I'll be ready to

3. S-II Fracture Mechanics:

o The installation of a dual vent valve on S-II-3 stage at KSC is impacting the work schedule by several days. KSC wants to leave this modification out of S-II-3 for the un-manned launch and has mentioned this to NASA Headquarters. We believe the modification should be scheduled now in order to qualify the change before it is flown on a manned mission.

write a letter to Sam Phillips in case

o The cryogenic proof testing of S-II stages will probably be discussed again during the S-II-3 DCR, scheduled Wed, 10 Jan 68, at MSFC. To cryogenic proof test all manned S-II structures would delay the entire S-II Program several months. In addition, the proof test would probably result in a lower overall confidence level in the S-II stages as most attention and resources would be diverted to the hydrogen tank which would increase the possibility of missing a problem in some of the other systems. ✓

you think he leans too much toward the KSC line.

4. Saturn V Flight Manual: A Saturn V Flight Manual is being developed to assist the astronauts in better understanding the operational and performance characteristics of Saturn V. Preliminary copies of the manual are being reviewed by MSC and R&DO and final distribution is scheduled about 1 April 68. ✓

B

NOTES - SPEER - 1/8/68

B
1/12

1. AS-204 FLIGHT CONTROL: Principal agreement has been reached on all flight mission rules and operating procedures. ✓ We are working hard to catch up with formal concurrences by all involved. ✓ Our MCC-H team under W. L. Brady and W. H. Hooper is ready for flight. Two contractor flight controllers were deployed on 1/2 to Carnarvon, Australia, and to the Coastal Sentry Quebec ship. ✓

2. AS-204 ALDS SOFTWARE: MSC mentioned at the AS-204/LM-1 Flight Readiness Review a problem with the Apollo Launch Data System (ALDS). The basic problem is in the ALDS software and could result in an inability to receive switch selector information at MCC-H just after vehicle liftoff. A fix which requires two programming changes is being attempted. The impact for MSFC flight controllers if the fix is unsuccessful is the probable lack of verification of certain S-IVB power flight functions. This would be highly undesirable but not sufficient reason to reschedule launch. ✓

1. EMR STUDY: A draft of the "High Energy Astronomy Payload Proposed for ATM-B" report is currently being reviewed. The final report is scheduled for completion on January 15, 1968.

Conceptual design is being initiated on an Advanced High Energy Astronomy Payload (EMR-II) and a Large Aperture Optical Telescope Payload (LAOT). These two payloads will not be restricted to the LM/ATM Rack structure concept, but rather will be studied as science packages for the Dry Workshop utilizing ATM subsystems. This will permit flexibility in the payload design. ✓

2. LUNAR DRILL: The 10-foot lunar drill (ALSD) was successfully tested for MSC in SSL's large UHV system in Building 4331 last month. ✓ Most of the required data have been reduced and sent to MSC, U. S. Bureau of Mines, NASA Headquarters, and the Martin Company in Baltimore. No malfunctions occurred during the two drilling tests. Over 45 cm of vesicular basalt was drilled in about 13 minutes. ✓ The UHV system pressure at the start of drilling for each run was about 3×10^{-7} Torr and rose linearly to about 8×10^{-6} Torr as drilling progressed. Complete documentation films were made for analysis. ✓

3. JOINT COMMITTEE ON ATOMIC ENERGY: Two members of the staff of the Joint Committee on Atomic Energy have expressed a desire to visit Marshall on January 16 to discuss space electric power and electric propulsion. The visitors are Edward Bowser, Deputy Director of the JCAE, and John Radcliffe, staff member. Plans are being made to meet with SSL, ASTR, ASO, and EO personnel involved in the technology areas of interest. Also a short meeting with you, and a tour of MSFC points of interest are being arranged.

4. VISIT OF NAS DIRECTOR: Dr. T. H. Curry, Director of Special Programs of the National Academy of Sciences (National Research Council), and Dr. M. Zubon, Administrative Associate, will visit SSL on January 18/12 to meet with all of MSFC's NAS associates, their supervisors, Dr. Shelton, me, and all other interested personnel. A luncheon has been arranged at the Officer's Club at 12:30 on that date, (If the Staff and Board Meeting adjourns early, you may like to join the group for lunch.)

5. IMPACT OF RIF: The Resources Management Office, SSL, which is providing all the administrative, budgeting, programming, procurement, contract administration, etc. for the Laboratory, will lose four positions by abolishment, and six by bumping. Only one-third of SSL's Resources Management Office will remain unaffected. ✓

Will be on West Coast B

→ Sorry, tied up B

NOTES 1/8/68 TEIR

1/8/68

B11/12

SA-204 STATUS: The LM hypergol propellant loading that was scheduled to start Friday, January 5, was delayed approximately two days due to leaks in the GSE hypergol lines. As of this time leak problems have been solved and descent stage loading started early this morning. This delay will probably impact the launch date by two days, although no official schedule has yet been established. Earliest possible launch date now appears to be January 20, 1968. As of this time we have no known launch vehicle problems that would impact this date. ✓

ORBITAL WORKSHOP MOCKUP: Due to problems with the Super Guppy nose section latches (which have now been repaired) and subsequent poor flying weather, the aircraft is slightly behind schedule. This will result in the Orbital Workshop Mockup being delivered to MSFC on or about January 10, 1968, instead of January 4, 1968. ✓

NOSECONE/SLA COMPATIBILITY: During the Flight Readiness Review, compatibility of the Nosecone/SLA interface and hardware was discussed. General Phillips indicated he would like to have a final review made of the nosecone interface documentation and hardware. A meeting has been scheduled at KSC on January 8, 1968, to review the hardware and engineering data to assure that the nosecone and SLA are compatible and will satisfy mission requirements. Our office and P&VE will be represented as well as the appropriate people from MSC. ✓

B 1/12

1/8

1. Agency-wide Task Group for Early Space Station: The special task force was established by C. Mathews (ltr of 12/22/67), headed by D. Lord, to make a study on what comes after Cluster I ('71 thru '73). NASA key people and elements involved held an organizational meeting in Washington on 1/5/68. A proposed plan and study approach was presented to Mathews/Cortright who agreed. We are activating the effort. I will distribute all details in a few days. Following is a summary of significant items:

Frank W.
Please
update
me every
2 weeks or
so on
progress
made

- a. A planning group under Mathews will direct effort, consisting of: OMSF Hdqs - D. Lord, Chairman; Howard (Bellcomm), Secretary; Culbertson (AAP); Ginter (OART); Foster (OSSA); Gardner (LRC); Faget (MSC), Stoney - alt.; Morgan (LSC), Hock - alt.; and Weidner (MSFC), Williams - alt. ✓
- b. Work will be accomplished by Task Teams (MSFC has representatives on each): Experiment Payload, Gardner, LRC, Chairman; Mission Analysis, Fielder, MSC, Chairman; Configurations, Becker, MSFC, Chairman; Resupply Logistics, Stoney, MSC, Chairman; Schedules & Decision Milestones, Huber, MSFC, Chairman; and Resources, Rafel, NASA Hdqs., Chairman. ✓
- c. "Planning Group" schedule: (1) meet every 2 wks, starting 1/19; (2) study complete/final presentation 3/1; (3) written report 3/16; (4) all Task Teams at MSFC 1/10 thru 1/12 for detailed definition of the job. ✓
- d. Guidelines, assumptions, etc. developed to date are compatible with current MSFC thinking with possible exception of use of Titan III. Mathews/Cortright invited DOD's participation and directed us to consider Titan III.

My appraisal of the situation: a. A meaningful and worthwhile effort - will greatly benefit NASA & MSFC. ✓ b. It will be the catalyst for getting the Dry Launch Workshop into focus and going. ✓ c. MSFC has been assigned key positions and jobs and must (will) play a leading role. ✓

2. Symposium of 1/6/68 on Orbital Transportation Concepts - Low Cost Operations (Integrated Launch/Reentry Vehicle Systems; Round-trip Operations): Mr. Weidner, H. Becker, M. Akridge, and I attended. Program included: introduction by Mr. Schnyer; one-hour presentations by Lockheed, Boeing, General Dynamics, McDonnell Douglas, and Martin. Contractors previously had been informed of Dr. Mueller's apparent interest in stage-and-a-half concepts. It appears that Lockheed & McDonnell precipitated Dr. Mueller's interest (see our Notes of 12/11/67). Lockheed & McDonnell repeated recommendations of lifting entry s/c with variable geometry for landing, with expendable "tip tanks" (stage-and-half concept). GD was inconclusive with exception of suggested consideration of how aircraft type operations could reduce R&D/operational costs. Martin recommended lifting entry s/c with Titan III or growth variations of T-III. Boeing treated the subject parametrically, showing that certain classes of equipment appear inherently high-cost and are candidates for recovery and reuse, and certain other concepts may inherently be low-cost items, appropriate for expendability, and concluded showing that a reusable spacecraft used with a "big dumb booster". The panel was not a discussion but a summary of opinions and conclusions relating to the background and organization of the individuals (as requested by Mr. Schnyer). The panel consisted of H. Barfield, OSD/DDR&E; H. Becker, NASA/MSFC; M. Faget, NASA/MSFC; A. Greenberg, Aerospace; H. Hornby, NASA/ARC-MAD; E. Love, NASA/LRC; F. Orazio, USAF/ASD; A. Tischler, NASA Hq/RP. Dr. Faget strongly recommended a solid boost S-IVB with a ballistic s/c. We were asked to summarize overall system aspects and our remarks are enclosed. It appears that the meeting was inconclusive. Dr. Mueller apparently was interested in obtaining background and opinions regarding potential extremely low cost (< \$50 per/lb. in orbit) logistic systems without concern for R&D costs. ✓

Encs.
as stated

WHERE DO WE STAND

- o FEASIBILITY GENERALLY ESTABLISHED FOR REUSABILITY (MUCH DATA ON MANY CONCEPTS)
- o UNCERTAIN MARKET DEMANDS & OPERATIONAL REQUIREMENTS
- o R&D COSTS FOR FULLY REUSABLE SYSTEMS APPEAR HIGH (INCLUDING INCREMENTAL DEVELOPMENT APPROACHES)
- o PERSONNEL & CARGO SPACECRAFT SEEM TO DOMINATE EARTH-TO-ORBIT LOGISTICS COSTS
- o R&D COSTS FOR NEW LOGISTICS SYSTEM ARE IN COMPETITION WITH \$ TO DEVELOP PAYLOADS/MARKET (\$ ARE SCARCE)
- o COST PROJECTIONS FOR NEW SYSTEMS SEEM TO BE BASED ON BALLISTIC APPROACHES & MAY NOT APPLY TO "AIRCRAFT" TYPE SYSTEMS OR CRUDE EXPENDABLE CONCEPTS

WHAT SHOULD WE DO

- o MAJOR EFFORT SHOULD BE CONTINUED TO DEVELOP PAYLOADS/LOGISTIC MARKET
- o INITIATION OF MAJOR DEVELOPMENT EFFORT ON FULLY REUSABLE SYSTEM IS NOT CURRENTLY WARRANTED
- o LOGISTIC PERSONNEL & CARGO SPACECRAFT WARRANT COST REDUCTION EFFORTS (INCLUDING DETERMINATION OF OPERATIONAL REQ'TS, SIZE & REUSE)
- o DETERMINE "REAL" RDT&E AND OPER REQ'TS FOR AIRCRAFT (LIFTING) & CRUDE EXPENDABLE CONCEPTS

REUSABILITY CONCEPTS SHOULD PROVIDE RECOVERY OF HARDWARE & CHECKOUT
PURCHASED PRIOR TO LAUNCH

Jan 15, 1968

NOTES
MR. GORMAN'S COPY

1/15/68 With comments
(none for DEP-A)

B
1/22

NOTES 1/15/68 BALCH

1/17/68

S-II-504 Testing - Stage contractor is still on schedule for tanking test on 1/16/68 and static firing on 1/24/68. ✓

S-II-505 Stage - Information has been received that current estimated ship date from Seal Beach may advance arrival date at MTF from 2/9/68 to 2/7/68. ✓

S-IC-D Stage - Stage contractor remains on schedule for removal of stage from test stand on 2/1/68. ✓

S-IC-506 Stage - Stage contractor has published a working schedule which calls for arrival of stage at MTF on 3/1/68; installation of stage in stand on 3/5/68; static firing on 4/30/68; removal of stage from stand on 5/15/68; and shipment to Michoud on 5/16/68. ✓

GE Service Contract - Amendment 122 covering the second through fourth quarters of Fiscal Year 1968 was distributed on 1/10/68, after acceptance by GE of the "Support Services Adjustment Article" clause required by the Director of Procurement, NASA Headquarters. ✓

Request for proposal covering extension from 7/1/68 to 9/30/68 was issued to GE on 1/9/68. ✓

Public Affairs - A significant article on the status and capabilities of MTF appeared in the 1/10/68 issue of the Wall Street Journal. It was written by Mr. James C. Tanner of the Dallas Bureau, who visited MTF in October 1967, at the invitation of General Electric. ✓

1/17/68

PROCUREMENT PLAN: This office has been informally notified that the Orbital Workshop Procurement Plan has been signed by Mr. Webb. The S-IVB Contracts Office has indicated that official approval of the Procurement Plan and a signed copy of the D&F must be received by Marshall prior to the issuance of the RFQ to MDC. ✓

GENERAL EXPERIMENT SPECIFICATION: A General Experiment Specification has been received from Headquarters for MSFC review and comment. R&DO and IO comments will be consolidated and submitted by telephone since Headquarters is pushing for early release of Section 3 (Performance). ✓

ACE FOR ATM MEETING: The meeting with KSC on using ACE at KSC for ATM checkout was held on 1/11/68. KSC indicated that although it is possible to work with the MSFC proposed Manual Electrical Support Equipment (MESE) at KSC, they consider that future operational considerations dictate the use of ACE based checkout equipment for all proposed AAP payloads. It was agreed that MSFC would proceed with the MESE approach for use at MSFC and the T/V test facility. An action was identified on MSFC to identify the impact on ATM design and operations if the use of ACE equipment was dictated for KSC. MSFC will study this question and meet with KSC again in about two weeks. ✓

ATM CONTROL AND DISPLAY MEETING: A control and display meeting was held on 1/11/68, at GAEC to define the electrical and mechanical interface between the control and display panels and the LM. It appears that it will be necessary to actively cool the panels. ✓

H-ALPHA TELESCOPES CONTRACT: The contract with Perkin-Elmer for the ATM H-Alpha telescope has been signed and is now in effect. Perkin-Elmer engineers visited MSFC 1/12/68, for a kick-off meeting. ✓

ORBITAL WORKSHOP MISSION: Current plans call for Mr. Loewy to make a brief presentation of his findings at the OWS Delta PDR Board Meeting in mid-February, following his report January 21. The Martin Company will also submit a report which will discuss the implementation of the Loewy recommendations.

Bonnie

Intuitively planned for Mar. 27-28. Bhi 1/23

If possible, I'd like to attend this after my return from Europe. Please check w/ Lee Belew for acceptable date

B

NOTES 1-15-68 BROWN

1/17 JTB

B
1/22

H-1 ENGINE We have received by Datafax a letter from NASA Headquarters (Mr. Vecchietti) approving the four-year H-1 Engine Support Contract NAS8-19541. Minor changes requested by NASA Headquarters will be worked out with Rocketdyne. (Reference my notes of 1/8.) ✓

F-1 ENGINE Water shipment of three F-1 engines will be made in January from Seal Beach, California, to MAF to study the effects of this mode of shipment on engines. Sending engines as supplemental cargo to S-II stage shipments will save approximately \$6,200 per engine over truck shipment.

Data from the AS-501 flight indicated the need to reorifice the LOX heat exchangers to provide higher output temperatures due to higher than predicted stage demand. New orifices will be installed on S-IC-2 without schedule impact. ✓

J-2 ENGINE Five successful tests were conducted at AEDC on 1/10 in the reduced fuel pump inlet pressure testing program. Testing in support of this program will be deferred (approximately three weeks) until a simulated S-II stage center engine duct is installed. In the interim, testing will be conducted in support of the 80-minute restart program. ✓

Reference my Notes of 1/8 regarding replacement of the J-2 engine ECA because of erroneous cutoff and intermittent spark signals on S-II-2. The problem has been traced to a faulty transistor within a timer circuit. ✓

NOTES 1/15/68 CONSTAN

B
1/22

Nothing of Special Significance. 1/17 ^{9/78}

NOTES - 1/15/68 - EVANS

1/17/68

B 1/22

NASA/MSF Safety Organization

The structure of the current NASA/MSF Safety Organization is given on the attached sheet. ✓

Management Instruction

A meeting was held at MSFC on Tuesday, January 9, 1968, with representatives present from Headquarters (Bolger), MSFC (Neubert), KSC (Pope) and MSC (Horton) to discuss the draft of a management instruction which sets forth the requirements for the formulation and conduct of all motivation programs within the office of Manned Space Flight. Each Center was requested to forward written comments and recommendations to Mr. Lederer. ✓

NOTES 1/15/68 FELLOWS

B.1122

1/17/68

U. S. Army MICOM Foundry Services: R&DO has been advised by Mr. Katz (MS - CH) that the U. S. Army MICOM will not provide foundry services to MSFC after July 1, 1968. MICOM is phasing the foundry service out because of reductions in manpower ceilings. MSFC currently uses 92.3 percent of the capacity. Principal users of the foundry service within R&DO are ME and ASTR laboratories. All laboratories will be advised of the planned phase out by MICOM and alternate sources for foundry services will be developed by July 1, 1968. R&DO will work with Management Services and MICOM to effect an orderly phase out of this activity. ✓

1/15/68

1. AAP Cluster: The recent cluster schedule (ML-13), showing the addition of the AAP-3A Mission between AAP-1/2 and AAP-3/4 and the addition of several more revisit missions after AAP-5, will require an orbital lifetime for the OWS of 506 days. This will require an increase in altitude for the AAP-2 from 230 nautical miles to 240 nautical miles if the same guarantee (2 sigma) on orbital lifetime is needed. This additional altitude will aggravate the payload performance problem. The altitude would not have to be increased if only the AAP-3/4 Mission were guaranteed and the revisit missions were based upon nominal lifetime predictions. If the ML-13 schedule slips another 3 months, then the AAP-5 revisit mission could also be guaranteed (2 sigma) without increasing the altitude. ✓

2. AS-501 Flight Evaluation: The Flight Evaluation Working Group (FEWG) report on AS-501 has been completed on our planned schedule and is ready for reproduction. This has been accomplished even with the unplanned loss of one week's work between Christmas and New Years due to a number of civil service personnel being on leave. The support given by the labs and the contractors, including the newly participating companies, Boeing and North American, has been outstanding. A most significant factor in being able to meet this schedule has been the extraordinary work of the Boeing FEWG technical staff. ✓

3. Removal of Air Scoops from S-1C Stage: Base heating results of the AS-501 flight have shown that we were successful in eliminating the burning of turbine exhaust near the base. Thus gas temperatures were low, and convection had a cooling effect at altitudes below 30 km. We have therefore requested that the air scoops in the valleys between the 4 engine shrouds be removed from all subsequent S-1C stages. The consequent changes of base pressure, engine hinge moments, base plate loads, etc. are acceptable. We had carried these scoops up to now as a cheap life insurance, though they proved somewhat troublesome from the viewpoint of accessibility and lift-off clearance. No schedule impact is expected, since the scoops were attached with bolts. ✓

1/1795

1. J-2 ENGINE PROGRAM: A recent shutdown of a J-2 engine on AS-502 during engine sequence test at KSC was traced to the ECA package on the engine. The package was replaced and returned to Rocketdyne for failure analysis. The failure was duplicated at Rocketdyne and traced to the 3.3 second timer in the ECA package. The component part within the timer has not yet been isolated, but is thought to be a CK65A transistor, and the failure is suspected to be caused by nucleonic growth "whiskers" within the transistor. Since the transistor is used in all four timers within the ECA package and such a failure could occur at any time, and in light of previous problems with this type transistor, we will likely recommend that the ECA packages on all J-2 engines on flight stages 204, 502, and subsequent be replaced with ECA packages which include the so called "Interim Timers." These timers have been qualified by Rocketdyne and MSFC and due to the quality of parts used have proven to be a more reliable timer. ✓

2. AS-502 UNSATISFACTORY CONDITION REPORTS (UCR): On January 10 daily UCR status meetings for AS-502 significant problems began and will continue to launch. At present, approximately 20 significant UCR's are open for flight readiness for AS-502. In addition, approximately 31 significant problems occurring on other vehicles must be cleared for flight readiness of AS-502. Most of these problems are only open pending incorporation of design changes. ✓

NOTES 1/15/68 HAEUSSERMANN

B 1/22

1/17/68

1. ATM TV Downlink. (Reference NOTES 1/8/68 HAEUSSERMANN) Last week's notes stated that we were proceeding with the incorporation of a TV downlink primarily for the NRL XUV data. Mr. Mathews apparently has taken a strong position against the implementation of a TV downlink and Mr. Belew is attempting to resolve this point with Mr. Mathews. ✓
2. ATM PRR. Next week, we will hold the Preliminary Requirements Review (PRR) with MSC personnel. The PRR is the formal discussion on each of the ATM subsystems and their interface with the astronaut operation. It is the predecessor to the Preliminary Design Review (PDR). ✓
3. Integration Contractor Tasks. The total ATM package, as well as the Astrionics' tasks for the OWS and Systems Engineering, were reviewed last week with the R&DO organizations with full resolution and agreement. ✓
4. Future CMG Systems. Under a research contract, Dr. Manteuffel of GE has developed a brushless D.C. torquer for gyro accelerometers and a very efficient and comparatively simple brushless D.C. motor for the flywheel of a CMG. We have tested this motor in our laboratories with a flywheel of the present ATM-CMG size. Continuing efforts will be applied in this activity for future applications of CMG control systems. ✓

NOTES 1/15/68 HEIMBURG

1/17/68

B 1/22

S-1B

The R&D engines for the special instability tests on stage S-1B-11 have been installed in Position No. 1 and No. 7. Modifications to the in-board engine thrust structure, involving change out of "hulkbolt" type fasteners, have been completed. The first "bomb" test (SA-49) is tentatively scheduled for January 26, 1968. ✓

ok.
psh
1/23

Bonnie, I'd like to attend this test if in town
B

S-1C STAGE (MSFC)

Functional checks of the handling equipment for removing and installing the F-1 engine main valves were made for evaluating the design. These checks were made at the request of Rocketdyne. ✓

S-1C STAGE (MTF)

Further fuel tank drain tests on S-1C-D are scheduled for this week. Additional changes are being made to the tank anti-vortex device. ✓

F-1 ENGINE

Mr. Lundy will travel to Rocketdyne's Santa Susana Test Facility this week to investigate a more efficient utilization of their existing facilities in view of the reduced production schedule. ✓

MODERATE DEPTH LUNAR DRILL

Two tests were conducted on the compressor with a modified exhaust valve. ✓

NOTES 1-15-68 HOELZER

B/122

1. IMPLEMENTATION OF CONVERSATIONAL MODE COMPUTING ON THE UNIVAC 1108:

In the area of interactive graphics, work has begun on a basic graphics "handler" for the UNIVAC 1108. It will service both the graphics and the alphameric terminals which UNIVAC is supplying to MSFC and will complement UNIVAC's own developments in this area. Preliminary experiments will be carried out on a Digital Equipment Corporation (DEC) 339 graphics terminal scheduled for delivery in January. In addition, a final report on an applications study of graphics requirements at MSFC will be delivered in January by representatives of Lockheed Corporation. The purpose of these activities is to help insure that some suitable graphics software is ready in time to operate the graphics consoles which UNIVAC plans to deliver later this year. The B-5500/UNIVAC 1108 version of the AMTRAN interactive programming system is being converted from the B-5500 computer to the UNIVAC 1108. It can presently be operated through teletypes attached to the B-5500. A new type of low-cost graphics terminal has been developed and is now operating. Hopefully, such terminals will make feasible a wider distribution of computer input stations than is currently planned. ✓

JAN 15 1968

EXPERIMENTS OFFICE
WEEKLY NOTES

Johnson

1/17 945

B 1/22

SRT PROCUREMENTS -- This item was reported as a minor problem in the Staff and Board meeting. If the hold on procurement is continued much longer it will have two effects;

a. The number of actions to be completed will be more than can be completed this Fiscal Year.

b. Effort basic to planning and carrying out sound research in some areas in FY 69 will not get done.

We understand from several of the sub-program managers in Headquarters that other centers are obligating SRT funds. We are attempting to confirm this and, if true, find out how. If there is some scheme which can be used to get essential (not emergency) work going prior to release of the freeze, we will try to find and use it. I will keep you advised. The problem becomes severe if not relieved by about February 1, 1968. ✓

B 1/22

1/17/68

1. Titanium Tanks for LEM Descent Stage: MSC recently established a policy that any new contract or subcontract resulting in the manufacture of hardware shall include an agreement on the manufacturing plan for the hardware. The manufacturing plan establishes the requirements for facilities and equipment, proposed tooling concepts and manufacturing techniques to be used. MSC has repeatedly asked our personnel for support in review of such manufacturing plans prior to letting a contract. Last week we were asked to aid in the evaluation of a contractor proposed manufacturing plan for the weight reduction modification of Titanium pressure vessels for the LEM. The modification consists of replacement of a bolted cover by a welded close-out cover. The problem is complicated by the fact that the present manufacturer is not willing to continue the production and Houston and Grumman do not agree on the selection of the new vendor. We were able to clearly analyze the manufacturing proposals and consequently to support the MSC opinion. A report is being written on our evaluation, a copy of which will be forwarded to Dr. Rees who has expressed concern about this modification. This is only one example of many cases of our support to the Apollo program. We do not report these activities because the total number of man-years spent on this support is not very substantial and the contributions of our personnel are in the area of prevention of the manufacture of hardware of substandard quality. Such support is not very glamorous and usually does not earn great recognition anyway. ✓

2. S-II Spray Foam Insulation Test at SACTO: Test No. 3, consisting of a 20 cycle pressurization test of the new test container, was aborted last week when a blind flange of the container sprang a leak. No problem was encountered so far with the performance of the insulation. ✓

3. Zero "g" Simulation Activities: A partial Operational Readiness Review was conducted last week on the facility for our small Neutral Buoyancy test equipment presently in operation. The review was made under the direction of Colonel Fellows and no major weakness or shortcoming was discovered.

W.K.
 But it is of utmost importance to the program that we continue to render this type of support
 B

NOTES 1-15-68 LUCAS

B 1/22

1/17 XLS

1. 501 TYPE LH₂ PRESSURIZING DISTRIBUTOR BAG FAILS IN TEST: During the S-IVB/501 flight, an anomaly was noted in the LH₂ tank repressurization and pressurization during second burn. A possible cause was identified as a rupture of the nylon bag on the LH₂ pressurizing distributor. It was discovered that the bag had never been "qual-tested." The first test on the first sample was run on 1-7-68, and a 2 X 2-inch tear in the bag was noted after completion of the first test. This failure adds significantly to our confidence that the ruptured bag caused the 501 problem. ✓
2. AS-503 BP-30 SERVICE MODULE TANK COLLAPSE: One fuel tank in sector 6 of BP-30 Service Module was damaged in two locations about 8 feet up from the bottom - one 8-inch deep dent, 2½ to 3 feet in diameter, and one 4 to 5-inch deep dent of smaller diameter. No creases were apparent. The damage occurred after leak test during draining operation. P&VE and QUAL sent personnel to KSC to review the situation. The tank was filled with water and the dent disappeared. Dye penetration inspection indicated no damage. The forward skirt of the tank may require structural stiffening which would probably impact the schedule. ✓
3. EARLY SPACE STATION EXPERIMENT COMPATIBILITY ANALYSIS: Our Advanced Studies Office has been investigating the experiment/space station compatibility factors and operational constraints associated with a multi-discipline space station. Some of the areas given specific attention are the following: Sequencing of experiments to a space station; Reorientation parameters of a space station; EVA opportunities; Time over Manned Space Flight ground stations; and Influence of orbit inclination on land and water areas covered. ✓
4. C-1 ENGINE ACOUSTIC LINER IMPROVES STABILITY: On a very low priority, a C-1 engine has been equipped with an acoustic liner and test fired at MSFC. Our design consists of a single row of small holes at the injector periphery which act as Hemholtz resonators tuned to suppress pressure oscillations over a fairly narrow band of frequencies. In a series of tests, this design was consistently stable under those conditions where combustion instability occurs in the motor as designed by Reaction Motors Division of Thiokol. The Thiokol C-1 Program ended without a satisfactory solution to the instability problems. The program in R&DO has been supported by a minimum of manpower and has cost approximately \$11,500. ✓
5. USAF ANNOUNCES CONTINUED WORK ON HIGH PRESSURE BELL ENGINE: The U. S. Air Force has announced the award of a contract to Pratt and Whitney Aircraft for further work on the advanced high pressure bell engine. This engine concept, employing LOX/LH₂ propellants, has been investigated by Pratt and Whitney since 1962 under contracts awarded by both NASA and the USAF. This new contract is a continuation of work started in 1966 by the USAF oriented to an engine in the 250,000 lb. thrust class as part of the joint NASA/USAF Advanced Cryogenic Rocket Engineering Program. The new work is sponsored by the Air Force Rocket Propulsion Laboratory at Edwards Air Force Base in California and will involve the design, fabrication, and test of a full scale engine system. Funding for FY-68 will be \$3.4 million. ✓
6. AIAA APPOINTMENT: Mr. Charles R. Ellsworth, R-P&VE-AA, has been appointed to the AIAA Spacecraft Technical Committee for 1968. Dr. R. D. DeLauer, Vice-President, TRW Systems Group, is the Chairman of this committee. ✓

B.L.
Sound investment if it really helps us to recover from the \$30 M loss on the C-1.
B

Would this engine, if it leads to light hardware, be SII and SIVB compatible?
B

NOTES 1/15/68 MAUS

1/17 953

B
1/22

MANAGEMENT OF MAJOR SYSTEM PROGRAMS Dr. Mueller has requested the preparation of a descriptive and appealing document on MSF Management of Major System Programs for use in his forthcoming annual report to Mr. Webb, the Congress, and independently to the University community. The document will be developed by a task force composed of Field Center and Headquarters personnel. It will stress the excellence of the existing MSF management system in principle and practice for Gemini, Apollo, and AAP as well as a proven capability that can be applied to any major "Apollo-like" national program. MSFC is tentatively assigned the job of developing that portion of the document pertaining to how program management is executed, across the board, for the total MSF program. ✓

OCEANOGRAPHY Last week in Washington, J. Foster was present when Mr. Webb commented to the effect that Oceanography could utilize NASA capabilities if the "red tape" could be untangled and some or all of the program be assigned to NASA. Independently, it was learned that Mr. Webb, last week, had a two hour briefing from Gulf Oil Co. on the National Oceanography program. ✓

NOTES 1/15/68 RICHARD

R/22

1/17 JCS

LM-ATM Review Team: We have iterated a first cut agenda with George Trimble's people. The approach has been to plan to discuss any aspect of this mode and the use of the LM which has been considered marginal or controversial by any element in the MSF family. In addition, it appears that it will be used by Dr. Mueller to bring himself up-to-date on ATM systems and activities. With this approach MSC will get a considerable amount of the action since they apparently feel that there are more questions about this mode than we do. We will have a better feeling about the final agenda after Dr. Mueller gives us his inputs this week. ✓

1/17 JSD

1. AS-502 Launch Vehicle at KSC:

o The space vehicle Overall Test #2 (Plugs-Out Test) has been rescheduled from Fri., 19 Jan 68, to Wed., 24 Jan 68, to avoid conflict with the AS-204 launch activities. This delay may further impact rollout and subsequent AS-502 launch preparations.

o The MSFC requirement to conduct a Pull Test on AS-502 with swing arms disconnected (in order to calibrate the strain gages measuring tensile, compressive and bending moment stresses in the vehicle) was waived by MSF, as the test would cause a delay in AS-502 checkout activities. On Thurs., 11 Jan 68, I spoke to George Hage (who is replacing Col. James as Deputy Director for Apollo Program, NASA Hqs), and he indicated the Pull Test might be reinstated if some other problem caused a delay in AS-502 activities, and it was possible to work in the Pull Test without impact. R&DO is now investigating the possibilities of conducting the Pull Test with the swing arms attached during the delay period caused by the AS-204 conflict (mentioned above). ✓

A.R.

I presume!

B

2. AS-502 Launch Vehicle at KSC:

o S-IC-3 Stage was erected on LUT 1 on Sat., 30 Dec. 67.

o Other stages have almost completed low bay checkout and will be erected as follows:

- S-II-3: Wed., 17 Jan. 68
- S-IVB-3: Thurs., 18 Jan. 68
- S-IU-3: Thurs., 18 Jan. 68.

o The propellant tanks on the Service Module of Boilerplate-30 spacecraft (which will be used as the payload on AS-503 unmanned flight) were partially buckled when a vacuum occurred during water draining following a leak check. The tanks were inspected by R&DO and tanks were satisfactorily popped-out when pressure was applied on Sat., 13 Jan. 68. Dye-penetrant inspection has been completed and no cracks or other flaws have been detected. ✓

Welcome to
the Club!
B

NOTES - SPEER - 1/15/68

B 1/22

1/17/68

1. AS-204/LM-1: Latest status on progress of launch operations is being issued daily via Mission Director's Report and through HOSC mission status recordings. ✓

2. LM SUBORBITAL ABORT: You will remember that on AS-204 there are five mission rules to abort the LM from the S-IVB prior to achieving orbital capability for such LM malfunctions that would very soon terminate the LM mission. Two of these rules relate to environmental control, three to power systems. We have verified that no less than three cues are available in each case and that abort decisions will be based on no less than two consistent cues. ✓

3. AAP OPERATIONS: An Operations Review for the ATM Experiment S-054, X-Ray Spectrographic Telescope, was conducted on 1/10. Participation included MSFC laboratories and program office and American Science and Engineering, as well as MSC. This meeting represents a milestone in our efforts defining ground operations for S-054. There was no evidence for system design incompatibilities with operations requirements on S-054. Such reviews are planned on all experiments and systems of the first cluster. Working sessions with P&VE and MDC were held this week in the area of workshop (OWS) and docking adapter operations definition, specifically regarding flight control parameters. For the OWS this encompassed only the activation and habitation system; other systems will be treated at a later date. ✓

4. VISITORS TO THE HOSC: The MSF Program Review being held at MSFC resulted in several visitors to the Huntsville Operations Support Center (HOSC) during the week. Mr. Alibrando (OMSF, PA) was given a tour on 1/10, and on 1/11 Mr. Ross (Deputy Director for Center Operations at KSC) visited the HOSC. Both expressed a great deal of interest and appeared to be favorably impressed. I requested Miles Ross' support for obtaining DEE-6 data for the HOSC. ✓

1/17/68

WORKSHOP TASK FORCE: Jim Downey has been assigned to the payloads subgroup in the Dry Workshop Joint Action Group. He will be supported by a number of other SSL members. SSL's contributions will concern the planning of astronomical and other scientific payloads, the radiation hazard, and some aspects of nuclear-electric power sources (SNAP-8 reactor with thermoelectric converter). ✓

In view of the variety of orbital inclinations and orbital altitudes being considered for Workshop flights, a "radiation hazard analysis" appears as important as structural and thermal analysis studies. Fortunately, SSL's previous extensive work in space radiation studies will enable us to contribute effectively to this part of the Workshop study. ✓

NOTES 1/15/68 TEIR

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1/17/68
AS-204 STATUS: The AS-204 appears to be on schedule to begin preparations for CDDT at 1:00 PM this afternoon. T-0 for CDDT will be Friday, January 19. Launch is scheduled for Monday, January 22. ✓

It was necessary to make two more changes to the launch vehicle during the last week. As reported by General O'Connor in last Friday's Staff and Board meeting, it developed that as a result of the tubelet repair of the PC boards in the control signal processor that insufficient clearance remained between two adjacent PC board contacts and it appeared possible that they could short out during vehicle vibration. We removed the control signal processor and returned it to Martin-Orlando for installation of a fiberglass spacer to prevent the possible shorting. The unit was returned to KSC and re-installed in SA-204 yesterday and the unit checked out. The second change was to replace tube assemblies having MS fittings in the S-IVB LOX pressurization system with tubes having the proper MC fittings. The MS fittings were susceptible to stress corrosion but were installed in the vehicle during modification at SACTO as a suitable replacement for the MC fittings. They were discovered as a result of a review of all fittings on the SA-204 S-IVB stage after a crack was discovered in such a fitting about 10 days ago. The change out was completed Saturday with no schedule impact. We are investigating why the change was made at SACTO and will also check the other stages. ✓

Admiral Middleton suggested and we have agreed to the use of flight batteries for SA-204 CDDT. We will work with Astrionics to have life tests performed on the batteries after CDDT. It is hoped that the extra flight type batteries activated for the SA-502 launch will also be available for testing. We will study the requirements and results of these tests to determine whether the use of flight batteries for CDDT will be made a permanent policy. ✓

NOTES 1/15/68 WILLIAMS

1/17 XA

B 1/22

1. Negative response.

Jan. 22, 1968



notes

Mr. Gouman

1-22-68 w/comments

None marked for DEPA

Dr. von Braun:

Notes file

You read Mr. Williams' Notes, but did you read his follow-on which was attached to the top? If so, please initial it or Frank will think you didn't read it.

B

BH
2/16

January 22, 1968

✓ TO: Dr. von Braun/Mr. Weidner

B₂/17

This is a follow-on to my Weekly Notes of January 22, 1968.

One of the major problems that impacts this effort (or may) is the fact that Mathews/Cortright/Mueller do not all see this effort in the same light - we are getting conflicting guidance. This was brought to the attention of the group in the presentation of the Configuration Task Team.

Also, Doug Lord would like to "manage" the follow-on - - whatever it turns out to be - - and if we come up with a "B Configuration", it would/and probably should be taken over by Mathews. This is compounded by the uncertainty of what the Thompson Committee impact will be.

Things are moving and thus far, under control. If I feel they are getting out of hand, I will let you know. ✓

F. L. Williams

B 2/14

1. Saturn IB/Service Module Package: Work is underway to provide you with the "first cut" set of data on the Saturn IB plus Service Module data for an early planetary mission. The NAR people who prepared the material which was presented to you last week will be here for 2 or 3 days, starting the morning of Jan. 22, for a review and working session. A meeting is scheduled to review the material with you and Mr. Weidner at 4:00 p.m., January 24. ✓

2. Dry Launch Work Shop Meeting and Activity: Mathews and Cortright were presented the results (thus far), status, and plans of the DLWS Task Group at MSFC, on Jan. 19. The meeting was attended by personnel involved and a good cross section of MSFC people. In general the meeting went very well. There has been considerable work done to date, and much more is required. The Advanced Systems Operations (ASO and Co-located) are devoting well in excess of 50% of our total effort on this task, and laboratory and other office support is being applied where necessary. We are still in the early phases of the effort. ✓ Additional participation will be applied as needed. We will give you a more complete rundown on the details Wednesday. ✓

Configurations: I am concerned that the B Configuration (B = early/simple evolutionary step from the Wet Work Shop) is being pushed as "a replacement for the first ATM mission rather than a follow-on". I don't consider this a critical issue at this time (however, "NASA politics" could play a significant role in such a decision). It is something that must be watched very closely. ✓ Configuration C is being pushed to the point that is very sophisticated, costly, and probably too late to be a good choice. The difference between B and C may be so large that we may be asked to go back and come up with something that "fits in between the two". This would cause a delay and further complicate the situation, although Mathews has said that he expects and wants to see a difference in program cost of 2 - 3 times between B and C. ✓

Logistics: The logistics picture is very interrelated with Cluster I for the B Configuration. A "dormant CSM" appears attractive for B; however, it does not fit with the current Cluster I design and would necessitate 2 developments (a 56-day CSM and a dormant CSM) during the next 3 years. Mr. Stoney (MSC) presented a possible out to this dilemma - namely, don't develop a 56-day CSM, only a dormant CSM. This would save considerable money during FY 68 and 69. However, also coupled with this is: (1) Only fly a 14-day mission on the Wet Work Shop and a 14-day bio-med revisit. It is too early to tell what the IB vs T III picture looks like for logistics. We will watch this item closely. (2) Postpone the ATM and its revisits to the DLWS because you would only stay 14 days/visit. Additionally, we could also omit the LM as part of the ATM thus saving even more '68 & '69 dollars. ✓

Experiments: As usual, the experiments people want a major experimental activity which, in my judgment, is excessive at this time. The cost, schedule, interfaces, etc. will help to get this back more in line as we dig in deeper. ✓

Resources/Schedules: We had hoped to get a good cut at what the cost picture was; however, it didn't come out in a clear enough picture to show what we are really up against so that things could be placed in a good perspective. I hope that in 2 weeks the data will be developed such that proper realism can be factored into the study. The schedule data gave a good hint at what might be obtainable; however, without the cost, it did not give the proper impact.

The Planning Group will meet in Wash., Jan 26, and the total group will meet on Feb. 2. Since R&D Council is on Jan. 26, I will sit in on the Wash. meeting for Mr. Weidner. ✓

NOTES 1/22/68 BALCH

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2/14

1/22 958

S-II-504 Testing - LOX/LH₂ tanking was successfully accomplished on 1/16/68. Rubber doublers for LH₂ sidewall insulation panels were severely damaged as a result of tanking. Extensive repairs required have made it necessary to reschedule the firing date from 1/24/68 to 1/29/68. Impact on ship date to KSC has not yet been determined. ✓

S-II-505 Stage - Information has been received that there is a potential delay in arrival of stage at MTF because of tank weldment discrepancies discovered at Seal Beach. Last estimated date for arrival at MTF prior to this trouble was 2/7/68. ✓

S-IC-D Stage - Fuel flow drain tests were completed as scheduled. Data review is in process. Removal of stage from the test stand is still scheduled for 2/1/68. ✓

S-IC-506 Stage - Arrival of stage at MTF is still scheduled for 3/1/68. ✓

Storage Planning for S-II Stages - A meeting was held at MTF this past week to further define the criteria for proposed storage of S-II stages at MTF. The meeting was attended by a NASA representative of MTF, a NASA representative from the MSFC Test Laboratory, and GE-MTSD Engineering representatives. ✓

Public Affairs - We have received work from Dave Schumacher, CBS News in Washington, that he is working on a space special for Walker Cronkite with the theme "Is the U. S. Forfeiting the Space Race to the Russians?" Mr. Schumacher has read the recent Wall Street Journal article about MTF and wants to arrange a visit here in the near future to talk with me and film some scenes for use in connection with the Walter Cronkite special. ✓

We have invited 43 members of the New Orleans Consular Corps to visit MTF for the S-II-4 firing. ✓

NOTES 1/22/68 BELEW

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B2/14

ORBITAL WORKSHOP MOCKUP: The OWS engineering mockup arrived at MSFC January 17 and is being prepared for the Crew Station Review, which will be held during the week of February 12, 1968. ✓

MULTIPLE DOCKING ADAPTER PRELIMINARY DESIGN REVIEW: The MDA Preliminary Design Review (Technical Review portion) was conducted on January 16-17. A total of 77 visitors from other organizations (KSC, MSC, Headquarters, McDonnell-St. Louis and Martin-Denver) attended, including 50 from MSC. There were 110 Review Item Discrepancies (RID's) submitted. These will be answered by MSFC and reviewed by a composite inter-Center PDR Board on January 26. As you see by MSC's participation, considerable momentum has built up behind MDA, OWS, and ATM as a result of actively engaging in tangible commitments. ✓

MARTIN COMPANY CONTRACT: The letter contract for Phase "D" with Martin has been executed effective January 16, 1968. ✓

APOLLO LUNAR EXPLORATION OFFICE: Captain Lee Scherer expects to move to MSF as of January 26, to establish his office which combines previous lunar exploration functions from Apollo, AAP, Advanced Studies Office, and OSSA. ✓ A chart of his organization is attached (Dr. von Braun's copy only). Capt. Scherer has an agreement that funding for follow-on lunar hardware through FY-69 will be provided by the AAP office. He wants to start final definition work on a lunar roving vehicle and a lunar flying unit. ✓ He plans to visit MSFC and MSC during the week of February 5 and is targeting February 7 as the date to be here to review our past, current, and future plans. We would like to schedule a time for a short discussion with you during his visit if at all possible. ✓

NOTES 1-22-68 BROWN

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1/22 95A

H-1 ENGINE Per a directive received from NASA Headquarters, we are to cooperate with North American Rockwell and the Air Force in the move of all NASA engine production from Air Force Plant No. 65, Neosho, Missouri, to Canoga Park, California. The move is to be made as expeditiously as possible with H-1 engine delivery being terminated in January 1968 and delivery being reinstated at Canoga Park in September 1968 at the rate of one engine per month. ✓

F-1 ENGINE Reference my Notes of 1/15/68, concerning water shipment of F-1 engines. The number of engines to be shipped in the initial water shipment has been changed from three to one.

The fifth of nine scheduled stability sampling tests of production injectors was conducted on 1/10. The injector damped the bomb induced disturbance in 28 milliseconds, well within the Model Specification of 45 ms.

Incorporation of an improved bracket on three hydraulic control line assemblies on the F-1 has been approved (with Saturn V Office concurrence) for AS-502 and subsequent. These new brackets significantly reduce the vibration level which was contributing to fatigue cracking around the weld joints of the control lines. There is no schedule impact resulting from this change.

The F-1 Quarterly Review will be conducted at Canoga Park on 1/24. ✓

J-2 ENGINE The J-2 engine performed satisfactorily in one restart cycle conducted at AEDC on 1/16 in support of the 80-minute restart program. The remainder of the test series was cancelled as a result of not being able to condition the start tank after the second test. A post test review revealed a pneumatic leak in the start tank vent and relief valve which prevented the valve from opening sufficiently to allow the start tank to be cooled. The next test in support of this program is scheduled for 1/23. ✓

A decision was made at a meeting attended by Rocketdyne, R&DO, and I. O. personnel to launch vehicles SA-204 and SA-502 with the existing electrical control assembly timers. The basis of this decision was:
(1) An overall reliability of the timer assembly of 0.99993 with a 50% confidence level.
(2) A review of the engine sequence data at KSC.
(3) The schedule impact to retrofit the two vehicles. It was the R-QUAL position that SA-502 be retrofitted with the improved timer so a one-flight demonstration could be made on the timer prior to the possible manned flight of SA-503. ✓

NOTES 1/22/68 CONSTAN

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1/22/68

Nothing of Special Significance.

NOTES - 1/22/68 - EVANS

1/22 JES

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2/14

Nothing of special significance to report.

NOTES 1/22/68 FELLOWS

1/22/68

B_{2/14}

Neutral Buoyancy Simulator Operational Readiness Inspection (ORI):

The Operational Readiness Inspection (ORI) of the existing (small) Neutral Buoyancy Simulator has been completed for four of the six basic areas of inspection in preparation for activation of the simulator. The six basic areas are:

- * I Simulator
- * II Organization
- III Operations
- IV Test Support
- * V Life Support Equipment
- * VI Instrumentation

Completed inspections are marked by asterisks.

Inspections have been conducted by the ORI Committee in accordance with criteria furnished by Dr. Gilruth in his letter of November 21, 1967, so that the astronauts will be able to engage in pressure suit activities within the simulator. ✓

Mr. Louie Richard of MSC will be here this week to go into the specifics of our completed inspections and our planning for the remaining inspection activities. ✓

1. Radiation "Hump" in SA-501 First Stage Base Heating: This note may clarify some questions you asked during a recent presentation on SA-501 flight results: While the radiative base heating of the S-IC behaved as expected at 0-15 km and 50 km through cut-off, it showed an unexpected "hump" at 15-50 km, whose peak at 30 km overshoot even the sea level values. Nothing like this has ever been observed before. Our chances of finding the cause of this "hump" are low, unless we are more or less satisfied with conjectures. This is due to our unsatisfactory capability to rationaly predict jet plume radiation, especially on our first stages. Our hot-scale model test results cannot be converted to full scale radiation intensities, for lack of proper scaling. We must therefore use analytical approaches. This requires solving two basic problems: #1. The fluid mechanics problem of determining shape and thermodynamic state of our burning, colliding, and chemically recombining jet clusters; #2. The radiation problem of emission and absorption in this inhomogeneous plume. MSFC sponsored work of the past few years has given us solutions to problem #2. (It has lead to the recent Specialist Conference on Molecular Radiation here at MSFC, and will this year produce a handbook on jet and flame radiation.) Our bottleneck is the determination of the plume properties, where few acceptable tools are available. A recently developed model of afterburning kerosene jet (jet afterburning controls low altitude jet radiation) may give us a solution for altitudes up to, say, 10 km. Attempts to determine analytically the near-flow-fields of engine clusters at high altitudes, intended for 1st stages near cut-off and for upper stages, met only with partial success. We are now once more eying an experimental route; proper probing methods are here the difficulty. Neither lead is likely to solve this "hump" problem. Continued work is necessary in this jet plume area, and we hope that our management can support us. ✓ Our present methods are relatively crude. On the first stages we calculate sea level intensities with empirical shell models of our jets, based on F-1 ground tests; these are then extrapolated vs. altitude on the basis of previous flight experience (Saturn I up to now; SA-501, etc. in the future). On our upper stages we use crude flow field estimates combined with our gas radiation data. The beneficiaries of further work would be the safety of Saturn (through complete understanding) and any future Saturn modifications or new designs. We will be glad to give you a briefing if you wish. By the way, solid propellant people are in worse position than we are, due to high condensed-phase content of their jet exhausts. ✓

2. Saturn V Launched Orbital Workshop: Considerable support is being provided to the two-month OMSF study program by our Advanced Studies Office, co-located in ASO, primarily to the Logistics Systems Task Team and the Mission Analysis Task Team. Preliminary performance data for a stable of logistics vehicles covering a spread of orbital inclinations and altitudes were prepared for the second Planning Group meeting with Mr. Lord on Friday, January 19, as well as a qualitative assessment of the abort problem during direct Saturn V ascent to a 240 n.mi. orbit. Detailed data on vehicle performances, abort considerations and other trajectory constraints such as ground trace analysis will be generated during the following two weeks and finalized for the March 1 deadline. ✓

E.F.

Yes, please
arrange
thru
Bonnie

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Noted.
1/24/68

NOTES 1-22-68 GRAU

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1. GSE: In regard to your question on NOTES 1-8-68 GRAU (copy attached), the existence of questionable solder joints on the Ampex module boards has been known since early 1966, but was not considered as serious as the problem with RCA 110A boards. About eight months ago, RCA conducted tests on the Ampex boards from which they concluded that the solder joints problem was of a significant nature. In December 1967 a contract was signed with RCA to add tubelets under the solder joints for reinforcement very much the same as on the RCA 110A computer module boards. The 9000 Ampex boards to be reworked between now and September 1968 come from all 24 systems including those at KSC. ✓
2. S-II PROGRAM: S-II-6 stage status at turn over to Test and Operations for checkout was as follows: 89 open EO's, 12 shortages, 5 Quality Control and 1 NASA squawk, 4 Modification Requests, 662 open items (feedlines, prevalves, etc.), and approximately 2200 open man-hours of manufacturing time/work remaining to be accomplished. ✓
3. ATM PROGRAM: The ATM Telemetry PCM Ground Station and other miscellaneous station equipment procured by R-ASTR has arrived. R-ASTR and R-QUAL will jointly perform functional acceptance at this Laboratory prior to integration into the R-QUAL checkout complex. ✓

NOTES 1-8-68 GRAU

1. SA-204 CERTIFICATES OF QUALIFICATION (COQ): Component testing has been completed on SA-204 and all COQ's have been or are in the process of being signed. ✓
2. GSE: RCA (Huntsville) is manning and training to start repair work on Ampex module boards used in the RCA computer complex. Tests recently concluded show the boards to be subject to cracked solder joints very much like the RCA-110A computer printed circuit boards. Some 9,000 boards are involved in the rebuild which is expected to be completed by September 1968. We had completed extensive tests on sample boards prior to approval of RCA repair procedures. ✓

Dis.
at least, too?
Why was this not
caught in our general
RCA-110A cleanup?
P

1. ATM Design Status. The R&DO monthly status review was held last week. We have baselined the Electrical Equipment List and will apply configuration control against that list. This in effect will freeze the number of electronic boxes and their sizes, which will allow the PQVE Lab to finalize a physical layout and perform a thermal analysis of the rack-mounted boxes. A weight allocation document is also being established and each electronic box and structural sub-assembly will have a control weight. The control weights for each of the cluster modules (ATM, LM, CSM, etc.) have been recently established by NASA Headquarters. ✓

1/22/68

S-IVB (MSFC)

Test No. S-IVB-049S and S-IVB-050S were conducted on January 17 and January 19, 1968, respectively, using the J-2S engine S/N J108. Test No. S-IVB-049S was erroneously cutoff by the automatic cutoff device ("stall monitor") at 5.9 seconds after ignition. This test was planned for 70 seconds. The cause of the erroneous cutoff is being investigated. Test No. S-IVB-050S was a successful 70 seconds duration test. The stall monitor's active cutoff circuit had been disconnected for this test. All test objectives were met and the engine operated satisfactorily. ✓

S-IC STAGE (MTF)

Boeing conducted four fuel tank drain tests during the past week on the S-IC-D stage. If the data looks good, no further tests will be made for evaluating the anti-vortex device. ✓

S-II STRUCTURAL TEST PROGRAM

The facility construction progress, though slowed, is ahead of the recently revised schedule for delivery of the stage to Test Laboratory. ✓

S-IB (MSFC)

Routine checkout operations are in progress to conduct the first "bomb" test on stage S-IB-11. The test is still scheduled for January 26, 1968, however, efforts are being made so the test could still be conducted on Thursday, January 25, 1968. ✓

S-II-4 (MTF)

The LH₂/lox tanking test was successfully completed on January 16, 1968. The full duration acceptance static firing test which was originally scheduled for January 24, 1968, has been rescheduled for the week of January 29, due to problems with the rubber doublers on the sidewall insulation. ✓

NOTES 1-22-68 HOELZER

B 2/14

1/22 JAS

NEGATIVE REPORT.

NOTES 1/22/68 JOHNSON

1/22 J/L

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SRT Authority - Mr. C. Williams of OMSF (MT) has confirmed that release of authority to the Centers for the planned supporting development (and experiments definition) activity for FY 68 has now been approved. Distribution of authority to the Centers was in progress Thursday and Friday (18th and 19th). This distribution does not lift the procurement freeze. However, we should be able to justify and proceed fairly rapidly with the J-2 Improvement (S & X) effort, once authority is available locally. ✓

Experiments List - The Experiments Review Board, the Laboratories, and the Experiments Office working together have been reviewing and screening our lists of experiments in definition. It is now down (from a peak of 91) to some 35-38 experiments which appear supportable. Some of the activities listed as experiments were felt to be development of operational procedures and equipments. They are still being pursued where reasonably firm requirements are found to exist, but are no longer being subjected to the formal experiment channels. Other activities were felt to be still in a "research" (pre-experiment) phase and were converted to that category. Some fifteen experiments were discontinued because of changed conditions (loss of manpower, finding of low feasibility, decrease in timeliness and interest, etc) since their inception. The experiments remaining are shaping up into a very attractive program. ✓

B 2/14

1/22 JS

1. Q-Ball Pressure Sensors: A further visit to the Rosemount Engineering Company was made this week by Mr. Parks and Dr. Siebel of our laboratory, together with Colonel LaHatte (IO) and Mr. Currie (ASTR). Following several visits by an R-ME welding specialist within the last few weeks, the company has improved its welding methods to some extent. Despite sporadic success and many promises the company, however, has so far been unable to establish a satisfactory spot welding schedule. The company has not recognized that suitable production tooling is required to assure that truly high quality instruments are manufactured reproducibly. In addition to support in the welding efforts, we have offered the services of our Tool Engineering Branch for a tool design endeavor. The checkout and calibration equipment used is excellent in contrast to the production equipment. This critical item once again shows the importance of early manufacturing engineering involvement in the vendor contacts and continuing attention to the production methods and tooling used. Last minute emergency measures under extreme schedule pressures are never likely to produce wholly satisfactory results.

W.K.
Letter to
company
president
indicated?
if you con-
sider it
desirable,
please
prepare one
with Bill
LaHatte
B

2. Training for Tube Flaring: An orientation and training program in set-up, operation, and checkout of "orbital" tube flaring (so named because in this process the tube is stationary and the flaring tools "orbit" around the tube) was conducted a week ago for six employees of The Boeing Company, Huntsville Operations. A complete flaring machine, tools and accessories have been transferred to Boeing to provide flaring capability to the MC-146 design standard for a swing arm retrofit task for KSC. ✓

3. S-IVB OWS Mockup: The mockup has been finally received from MDC last week and is being set up in Building 4755. The assembly of the floor structure and aft section have been completed. The first use of this mockup will be made next week for a lighting study of the crew quarters which will then be followed by a design walk-through review of the crew station. ✓

4. S-II Structural Test Tank: This "A" structure was turned over last week to The Boeing Company for installation of approximately 7,000 strain gages although the required mechanical installations inside the LOX container had not been completed as planned because of missing components from NAR. Boeing has stated that they would need 13 weeks for this strain gage installation working with approximately 40 men on three shifts. An analysis by our planning engineers indicates that the job could be done in nine weeks if all documentation and material were on hand. There is apparently a lack in The Boeing Company in the day-by-day planning of the work as we are accustomed to do. ✓

1. MDA PDR: The Multiple Docking Adapter (MDA) Preliminary Design Review (PDR) was held at MSFC on Jan 16-17, 1968. Total attendance was 128 of which 60 were from MSC (including McDonnell Douglas personnel). A total of 110 review item discrepancies (RIDS) were written. A recommended R&DO disposition will be available for the MDA PDR Board Meeting 1-26-68. After a preliminary review of RIDS, it appears that experiment pointing and access to AM controls from MDA are major areas which require MSFC attention. ✓
2. ORBITAL WORKSHOP (OWS) MOCKUP UPDATING: The mockup arrived by Guppy at MSFC early on 1-17-68. It has been erected in a vertical position in Building 4755 for the lighting test scheduled for 1-23-68. Then, the mockup will be separated into two parts and equipped with all experiments for the planned Crew Station Review the week of 2-12-68. The Mockup will be in Washington for public display during the week of 3-3-68. For the review, the mockup will be inverted and in one piece. An additional door, opposite the present, has to be incorporated for exit of visitors. An area near the Smithsonian Institute will be selected, and this requires that the mockup be separated into two pieces and transported by helicopter from the airport to a nearby parking lot. Helicopter transportation can only be accomplished on a weekend and the Mockup has to be shipped a week earlier. This may eliminate the crew station review prior to shipment. ✓
3. BP-30 PROBLEMS: The BP-30 collapsed tank and the relief valve have been fixed, the mechanical checkout successfully completed, and the spacecraft is being stacked today. We have concluded that the collapsed tank forward skirt does not have to be beefed up for flight; the aft skirt which was undamaged has sufficient strength to support the total load. The spacecraft-complete is scheduled to be mated to launch vehicle on 1-25-68. ✓
4. NEUTRAL BUOYANCY SIMULATION: A neutral buoyancy simulation of internal LM astronaut operations such as drogue removal, LM forward hatch egress, and utilization of astronaut docking telescope was begun on 1-15-68 in the ME Laboratory neutral buoyancy facility for the LM/ATM mission. The purposes of these simulations are to determine possible interference problems with the proposed control and display envelope and to establish acceptable envelope dimensions. ✓
5. LEM STRESS CORROSION SURVEY: We have agreed with the materials people at MSC to begin a survey of stress corrosion susceptible materials in the LEM beginning next week at Grumman. We believe that two people from our Materials Division and two from MSC will be sufficient to cover this task, considering a 2-3 week period. Grumman personnel have been at work several days getting material ready for the survey. Bob Johnson, MSC, will be here Tuesday to discuss our plan of action in this survey. This is in support of Dr. Rees. ✓
6. OWS COLOR SCHEME: In response to Dr. Loewy's recommendation that we attempt to improve the appearance of the interior of the OWS, we are well along in developing thermal control paints in a broad range of pastel colors.
7. NUCLEAR TECHNOLOGY: Dr. Keith Boyer, head of the Rover development program at Los Alamos Scientific Laboratories, and members of his staff will visit our Vibration and Acoustics Branch on Wednesday, 1-24-68. Dr. Boyer requested this visit to obtain advice on several recent facility failures (apparently acoustically induced) at Nuclear Rocket Development Station during reactor firing tests, and to discuss plans for acoustic measurements during the 5000 megawatt test in May. ✓

NOTES 1/22/68 MAUS

1/22/68

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2/14

MSFC SUPPORT TO KSC: The following up-dates my memorandum of January 4 on this subject:

a. KSC's Recruiting at MSFC: KSC has made 62 firm offers of employment with 43 firm acceptances, 13 declinations, and 6 pending decision.

b. Design Liaison Group: This Group has been established and is operational at KSC.

c. Detail of MSFC People into KSC's Organization: The KSC requirement for detail of MSFC people into the Kennedy organization on a long term TDY basis has been established at 79 positions with 61 in LVO, 14 in Spacecraft Operations, and 4 in the Technical Support Directorate. Of those 79 positions, we have so far filled 32, of which 16 are already on board at KSC. The remaining 47 positions are now being negotiated with IO and R&DO.

NOTES 1/22/68 RICHARD

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2/14

1/22/68

AS-502 S-IVB Stage: In a meeting held on January 16, 1968, a decision was reached between AERO Lab and P&VE Lab not to install the S-IVB flutter kit on AS-502. It was agreed to reduce the vent area in the forward skirt from 200 sq. in. to 150 sq. in. to minimize any possible chance of panel flutter. After the AS-204 and AS-502 flights are analyzed, a decision will be made for future vehicles.

Note: AS-503 has the flutter kit installed. ✓

AS-503: At Mr. Schneider's request, a study has been initiated by I-V-E through Boeing, to assess the launch vehicle system failures which, if experienced on AS-502, would make it necessary to fly AS-503 unmanned. At the moment this appears to be a rather ambitious task. This office will assist as required. ✓

Our approach to the problem also includes the establishment of an anomalies check list and accelerates processing of 502 flight data so as to quickly arrive at a complete understanding of 502 anomalies. It is believed that 503 planning can then proceed on expedited grounds which compliment preplanned contingencies. ✓

S-II-503: We are in the process of concluding the fast fill for S-II-503 deliberation and expect to have resolution by next week. ✓

1/22/68

B
2/141. S-II Fracture Mechanics:

o During re-X-ray of the S-II-5 Stage at Seal Beach, a crack (.170 inches long) was found which had not been detected during the initial X-ray of the stage. The crack was previously hidden beneath a honeycomb joint.

o A F&VE team is at NAR to recheck X-rays on the S-II-2 Stage (this stage has been X-rayed twice).

o On Saturday afternoon, 20 Jan 68, Dr. Lucas, Mr. Godfrey, and I spoke with Dr. Mueller, Gen. Phillips, and Mr. Hage about this problem. It was decided that we would re-X-ray the S-II-3 Stage which is currently in the Low Bay at KSC. Work was started by KSC this weekend.

o Dr. Lucas is to determine what pressures will be used for a limited cryogenic proof testing on S-II-4 and subsequent stages.

o If it is determined that the AS-503 flight will be a manned mission, the S-II-3 Stage will be returned to MTF for the limited cryogenic proof test.

2. Operation and Maintenance of selected GSE at KSC:

o We plan to meet with Adm. Middleton (KSC) on Wed., 24 Jan 68, to discuss ways to improve the contractual relationships between the KSC prime contractors charged with the responsibility for the operation and maintenance of the selected GSE and the designer and manufacturer of the equipment furnished by MSFC (Example: RCA 110A Computer). Our goal is to insure proper maintenance and logistic support of these critical items of equipment to insure minimum or no down time of the equipment during critical periods (CDDT, launch, etc.). I will keep you informed of our progress in these negotiations with KSC.

3. Modification Kits at KSC:

o In our 1-8-68 Notes, we indicated that KSC was quite delinquent on the modification kit installation work. Since that time we have met with Adm. Middleton and Col Petrone, and KSC is devoting correct management attention to the problem and the situation is much improved.

WEEKLY NOTES SPEER 1/22/68

B 2/14

1/22/68

1. AS-204 CDDT: Test was scrubbed on 1/19 at T-20 min due to 2nd failure of RCA-110 AGCS power supply regulator. Hold history: 3:00 (hr:min) at T-7 hr for IU battery change out and functional catch up; 7:20 at T-3 1/2 hr for extension of built-in 6 hr hold due to functional catch up and LOX revert problem (GSE); 6:04 at T-50 min for suspected LOX leak in S-IB LOX Bay Area and 1st loss of RCA-110 (AGCS) power supply regulator; 0:27 at T-20 min for completion of LOX loading. HOSC supported the CDDT in 40 problem conferences. Launch is scheduled for 14:00 EST today. ✓

2. SA 204 ORBITAL LIFETIME: GSFC will maintain track on S-IVB/IU until impact (expected approximately 16 ± 2 hours after launch). Both real-time predictions and actual impact coordinates must be cleared through OMSF before GSFC issue these data. GSFC will also monitor the L/V telemetry systems for system lifetime. ✓

3. MSFC FLIGHT CONTROL OFFICE: Our Flight Control Office has been notified during an MSC-wide exercise that unless justification for keeping contractors on-site is provided the contractors may be moved off-site. We have prepared such a justification. We presently have 11 IBM and 4 MDC contractors on-site due to their integrated function as flight controllers. This is consistent with MSC's approach regarding S/C contractors. Any significant move would have a serious impact on MSC's and our flight control capability. ✓

NOTES 1-22-68 Stuhlinger

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1/22/68

1. ORBITAL MISSION PLANNING TASK FORCE: SSL is actively participating in the Experiments Panel (chaired by Bob Piland, MSC), and the Payload Configuration Panel (chaired by Hal Becker, ASO). It has been relatively easy to prepare data and to present experiments which we feel are good scientific candidates for the Saturn V launched workshop, but it is difficult to insure that a satisfactory payload is being configured in view of the many ramifications and mutual influences of the various scientific objectives. ✓

A radiation hazard analysis is urgently needed in view of Headquarters' desires to consider 50° and 90° orbits for the Dry Workshops. Russ Shelton and his co-workers have begun such an analysis. ✓

2. VISITORS FROM HEADQUARTERS: Dr. Allenby and Dick Wilmarth, both of whom are now members of Lee Scherer's Lunar Exploration Program Office, visited SSL to discuss status and continuation of tasks presently underway, among them our gravimeter development for lunar and planetary use, our gravity gradiometer development for orbital use, and our infrared sensor development for lunar and planetary observations. The visitors seemed well satisfied, and promised continuing support. ✓

3. VISIT BY MEMBERS OF JCAE: Mr. Bauser and Mr. Radcliffe from the Joint Committee on Atomic Energy, and Mr. Vorhees from the Senate Space Committee, met with members of Astrionics Laboratory, ASO, EO, P&VE, and SSL to discuss the situation of nuclear-electric space power supply developments. They were greatly interested in our views with respect to power requirements, and they particularly appreciated your interest and encouragement during their brief visit in your office. Your earlier letter to Dr. Mac C. Adams on the subject of space power requirements has found a lot of attention in the JCAE. ✓ We are presently preparing a follow-on letter for your signature in which power requirements for workshop-type space stations are spelled out in more detail. ✓

NOTES 1/22/68 TEIR

1/22/68

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2/14

PROCUREMENT PLANS: NASA Headquarters has approved the procurement plans for the four-vehicle-follow-on effort for the S-IB and S-IVB stages. Also approved was the orbital workshop effort. Signed copies of the procurement plans are expected this week. ✓

B 2/14

1. Saturn IB/Service Module Package: Work is underway to provide you with the "first cut" set of data on the Saturn IB plus Service Module data for an early planetary mission. The NAR people who prepared the material which was presented to you last week will be here for 2 or 3 days, starting the morning of Jan. 22, for a review and working session. A meeting is scheduled to review the material with you and Mr. Weidner at 4:00 p.m., January 24. ✓
2. Dry Launch Work Shop Meeting and Activity: Mathews and Cortright were presented the results (thus far), status, and plans of the DLWS Task Group at MSFC, on Jan. 19. The meeting was attended by personnel involved and a good cross section of MSFC people. In general the meeting went very well. There has been considerable work done to date, and much more is required. The Advanced Systems Operations (ASO and Co-located) are devoting well in excess of 50% of our total effort on this task, and laboratory and other office support is being applied where necessary. We are still in the early phases of the effort. ✓ Additional participation will be applied as needed. We will give you a more complete rundown on the details Wednesday. ✓

Configurations: I am concerned that the B Configuration (B = early/simple evolutionary step from the Wet Work Shop) is being pushed as "a replacement for the first ATM mission rather than a follow-on". I don't consider this a critical issue at this time (however, "NASA politics" could play a significant role in such a decision). It is something that must be watched very closely. ✓ Configuration C is being pushed to the point that is very sophisticated, costly, and probably too late to be a good choice. The difference between B and C may be so large that we may be asked to go back and come up with something that "fits in between the two". This would cause a delay and further complicate the situation, although Mathews has said that he expects and wants to see a difference in program cost of 2 - 3 times between B and C. ✓

Logistics: The logistics picture is very interrelated with Cluster I for the B Configuration. A "dormant CSM" appears attractive for B; however, it does not fit with the current Cluster I design and would necessitate 2 developments (a 56-day CSM and a dormant CSM) during the next 3 years. Mr. Stoney (MSC) presented a possible out to this dilemma - namely, don't develop a 56-day CSM, only a dormant CSM. This would save considerable money during FY 68 and 69. However, also coupled with this is: (1) Only fly a 14-day mission on the Wet Work Shop and a 14-day bio-med revisit. It is too early to tell what the IB vs T III picture looks like for logistics. We will watch this item closely. (2) Postpone the ATM and its revisits to the DLWS because you would only stay 14 days/visit. Additionally, we could also omit the LM as part of the ATM thus saving even more '68 & '69 dollars. ✓

Experiments: As usual, the experiments people want a major experimental activity which, in my judgment, is excessive at this time. The cost, schedule, interfaces, etc. will help to get this back more in line as we dig in deeper. ✓

Resources/Schedules: We had hoped to get a good cut at what the cost picture was; however, it didn't come out in a clear enough picture to show what we are really up against so that things could be placed in a good perspective. I hope that in 2 weeks the data will be developed such that proper realism can be factored into the study. The schedule data gave a good hint at what might be obtainable; however, without the cost, it did not give the proper impact.

The Planning Group will meet in Wash., Jan 26, and the total group will meet on Feb. 2. Since R&D Council is on Jan. 26, I will sit in on the Wash. meeting for Mr. Weidner. ✓

Jan 29, 1968



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NOTES
MR. GORMAN'S COPY

1-29 with comments

Hollzer notes to U Box
2-7-68

OFFICE OF DIRECTOR - MSFC

CODE	NAME	INIT.	<input type="checkbox"/> ACTION	<input type="checkbox"/> INFORMATION
MA-CH	Mr. Wible	<i>fw</i>		

REMARKS

These notes are sensitive. Please return to DEP-A for filing.

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NOTES 1/29/68 GEISSLER

1. AS-204 Flight Evaluation: The first meeting of the FEWG for AS-204 was held on January 24th. No problems were identified as yet with the exception of a guidance reasonableness test failure just prior to liftoff. This caused a 0.5 m/s error in the cross range velocity but did not affect the mission. Preliminary data available at this time indicates the propellant dump experiment was completely successful. The flutter measurements installed on the S-IVB forward skirt appeared to operate properly. The levels of response during the flutter region appear small.
2. Personnel Losses: Since December 1, 1967, we have lost 13 of our people. Four of these people were on the RIF list and one was on the bump list. In addition to these 13, we have four additional people on the RIF list; are aware of two people who were to bump into our lab. who have resigned from their organizations; and we have given release dates for three of our people to transfer to other Government agencies and two to transfer internally at MSFC, giving us a total loss of 22 people. In addition, we are concerned, as our MSFC management is, that many of our young engineers and scientists at the GS-7, -9, and -11 grade level will be leaving because of the promotion freeze and RIF scare. Because of these critical losses, I am vitally concerned that we be allowed to recruit for replacements as soon as possible in order to maintain an acceptable level of competence for meeting laboratory commitments.
3. Saturn V, S-II-8 Spray Foam Insulation Aerodynamic Test: Results of these tests, as outlined in Notes 1/8/68 Geissler, are as follows: Sample panels of S-II-8 insulation provided by NAR and P&VE were flush mounted in the sidewall of the MSFC 14" trisonic wind tunnel and subjected to aerodynamic loads which closely simulated the maximum dynamic pressure region of Saturn V flight. Panels coated with a "Hypolon" vapor seal and uncoated panels were tested. Various types of defects were introduced to test the failure characteristics of the insulation under the test conditions. The only major failure occurred on panels containing a 5" diameter debond between the foam and aluminum skin. This was caused by differential pressures of approximately 10 psi to 1 atmosphere which occurred across the debonded area when the pressure in the tunnel was reduced from one atmosphere to the static pressure of the test, in the order of 1/10 atmosphere. Failure of a debonded section appears to be a function of the length of time that a debonded area may be subjected to a differential pressure and may also be a function of the number of cycles, although only one cycle will occur during a given vehicle flight. A debonded area that failed ejected a plug of material but did not propagate to the surrounding area, even under the influence of maximum q conditions. The tests do not simulate skin temperatures that occur late in actual flights. The debonded areas were introduced because of the possibility of this happening in fabrication where surface preparation is a critical element. Furthermore, cryogenic temperatures could possibly result in this same effect.
4. AS-204 Operational Support: The Mission Operations Office requested that we provide additional support during the flight of AS-204/LM-1. We fulfilled this request by providing quick-look orbital parameters, periodic post-launch orbital lifetime predictions, and ground station acquisition and loss times.

Wils

*WKLs NOTES
1/29/68*

1. Welding Success at Seal Beach: NAR welded the S-II-9 cylinder #6 to the LH₂ dome on January 19 using the TIG welding process with two weld passes from one side. The welding was performed in the new environmentally controlled weld station using the turntable instead of skate welding. The X-ray and dye penetrant inspection revealed that the entire weld was totally within specification. There were only 18 places where minor deviations in offset had occurred which were consequently waived by inspection. This is the first horizontal weld produced on the S-II where all defects were within design specifications (with the exception of very small offsets). A challenge and competition from the government in optimization of manufacturing techniques and tooling for production of high quality hardware seems to pay dividends.

2. Research and Development Television Program: Through arrangements made by Captain Fortune of our Technology Utilization Office, Mr. James Orr with two guests, Mr. Lou Frost of North American Rockwell and Mr. Phil Saperstein of the Illinois Institute of Technology, appeared on a one hour television show entitled, "Research and Development Review of Metal Joining Methods". The subjects covered were the effects of fusion welding on materials, cleaning of materials prior to welds, electron beam welding in space, out of vacuum electron beam welding, portable electron beam chamber application, high frequency resistance welding, narrow gap welding, friction welding, explosive welding, tooling development for welding, pulsed arc welding, exothermic brazing, and others. Mr. Frost and Mr. Phil Saperstein have both performed manufacturing research and development contracts for NASA and were in a good position to discuss them technically on the television show. Mr. Orr, of course, spoke of our work here at Marshall and some work done by research contractors. The host of the show was Dr. Al Hibbs, Senior Staff Scientist at Jet Propulsion Laboratory. The program will appear in most of the larger cities of the United States and will be shown extensively in California. It is an educational series on research and development. Mr. Orzchowski of the NASA Public Affairs Office on the West Coast coordinated this program.

3. Visitor from NASA Headquarters: Mr. Larry Hall, OSSA, who is in charge of planetary quarantine in Dr. Orr Reynolds' directorate, visited our laboratory and discussed with us our efforts in the decontamination and sterilization of components and systems. In subsequent discussions in Dr. Johnson's (EO) office we expressed our willingness to develop the necessary technology base in this field for future NASA missions within our manpower capabilities and within the OSSA funding support.

4. Personnel Losses: ME Laboratory has lost 22 employees by attrition during the last two weeks, 14 of whom had received RIF action notification from Personnel Office in December. This kind of reduction is of course entirely uncontrolled and must result in a more and more unbalanced organization with less and less efficiency.

M. W. White ||

NOTES - 1/29/68 - BALCH

B
1/31

S-II-504 Testing - Repairs of sidewall insulation have been completed. Insulation leak-checks to verify repairs are in process. Static firing, which was targeted for today, is now set for tomorrow, 1/30/68. Present schedule calls for removal of stage from test stand on 3/12/68 and shipment to KSC on 3/26/68. This takes into account the time required for the proof-pressure test of the LH₂ tank; however, a potential requirement for X-raying the LH₂ tank after static firing and prior to the proof-pressure test could impact this schedule.

S-II-505 Stage - Because of tank weldment discrepancies, shipment from Seal Beach has been delayed, and estimated date for arrival at MTF has been changed from 2/7/68 to 2/17/68. ✓

S-IC-D Stage - Removal of stage from test stand is still set for 2/1/68. ✓

S-IC-506- Stage is still scheduled to arrive at MTF on 3/1/68. ✓

Legal Affairs - Senator Stennis' assistant called this office to inquire about the claims of Messrs. Otho Rester and James Rester for damages to their properties from static firings at MTF. When our limited authority with respect to claims was explained to him, he requested the telephone number of the MSFC General Counsel, which we gave to him. ✓

Mr. Wolf Haber of NASA Headquarters has informed this office that NASA has been served papers in connection with a suit by the widow of John Stell, who was killed in an accident at MTF. The suit is being tried in Federal Court in New Orleans, and Mr. Haber requested that this office reply to both the Department of Justice and the local U. S. Attorney. ✓

Public Affairs - Dave Schoumacher, CBS News, Washington, was at MTF with a film crew on 1/25/68 in connection with a Walter Cronkite news feature on the space program. While at MTF, Mr. Schoumacher filmed a six-minute interview with me and shot scenes of the S-IC Booster Preparation Area, S-II Test Complex, and the North Entrance Gate. It is understood that the entire space program news feature will take about four minutes on a forthcoming Walter Cronkite evening news show and possibly will involve conversation excerpts from interviews they have held with several NASA field managers of which this is one. ✓

B 11/31

ORBITAL WORKSHOP EMISSIVITY COATING: During a McDonnell Douglas/MSFC design meeting at MSFC January 23, McDonnell Douglas presented results of testing efforts on the MD-19 coating applied to the aluminum foil liner. Due to unsatisfactory test results, another material will be used as an emissivity coating within the OWS. Aluminum foil (.003 inch) with Alodine 407-47 is now the prime candidate. Test plans for the Alodine coating include outgassing tests of the coating in the 8-foot test tank and 3-foot specimens with coated aluminum foil. MDC will have schedule and cost data on several alternatives available on February 2. S-IVB stage 211 has .002 inch aluminum foil installed and there appears to be no acceptable fix, as .003 inch aluminum is required with Alodine. Another stage will probably have to be designated and modified as the OWS backup. One problem is locating a vacuum facility with H2 capabilities for the 8-foot test tank. ✓

ATM PRELIMINARY REQUIREMENTS REVIEW (PRR): The ATM PRR was successfully conducted last week. A large number of Review Item Discrepancies were written of which the majority are meaningful comments which deserve serious consideration. However, the incorporation of some could have a significant impact on the ATM design, such as additional redundancy, automation of astronaut functions, redesign of control and displays, etc. The most significant impact could be in the control and display area wherein use of the digital address system has been seriously questioned by MSC. Since the comments in the control and display area were so diverse from the current design approach, a working group was established between the two Centers to resolve the differences, assess the impact, and report their recommendations by February 15. ✓

L.B.
Looks like this display business (ATM) is growing into a major potential problem area between MSC and MSFC. I believe brought this up in a recent meeting with VEM and myself

ACCEPTANCE CHECKOUT EQUIPMENT (ACE) HARDWARE: We have learned from a telephone conversation with Jack Sperry of Mathew's office that Mr. Webb has approved procurement of 2 1/2 more ACE stations for Apollo use at KSC. They are pushing to divert one of the stations to MSFC. ✓

MULTIPLE DOCKING ADAPTER PRELIMINARY DESIGN REVIEW (PDR): The MDA PDR Board met last week with Messrs. Mathews, Thompson, and Belew present. Major concern centered on three areas: (1) adding a crew control station in the Airlock (MSC request); (2) long life probe storage; and (3) pointing and control methods and procedures for the cluster. ✓

MEETING WITH MR. MATHEWS: Astrionics presented the ATM XUV TV downlink story and Chuck Mathews wanted to study it further. Mr. Ise and Mr. Horton covered the major changes in ATM design approach requested by MSC. The formal board date will probably be adjusted to his availability. ✓

B

H-1 ENGINE Reference my Notes of 12/11/67, concerning stability testing of H-1 engines on S-IB-211. CCSD agreed to the program and two specially instrumented R&D engines were installed in the stage (one inboard and one outboard). Five bomb tests are programmed as follows: B 2/2

<u>Date</u>	<u>Duration</u>	<u>Remarks</u>
Jan 25	15 sec.	Inboard engine bombed
Feb 6, 13, 20, & 27	15 sec.	Bomb both inboard and outboard engines

In the test conducted on 1/25, the bomb detonated on schedule and the engine damped well within specification requirements. Data is being evaluated to assure that the test had no adverse affect on the stage structure or on the other engines.

F-1 ENGINE The 23rd NASA F-1 Program Review was held at Canoga Park, Calif. on 1/24/68. The more significant items discussed were:

The F-1 Engine Instant Release (Saturn V launch) Study - Earlier analyses had indicated that the F-1 engine was the limiting factor in instant release. Preliminary findings now indicate instant release of the F-1 engine may be acceptable. The study is to be completed in March.

Problems in fit-checking of thermal insulation have resulted in development of several fit-up procedures and design of special adapters for field use.

As a result of continuing problems in the area of adequate process specifications for materials (stemming from state-of-the-art limitations), application of a recently developed process control for Rene 41 and a cracking problem in bellows joints in the pressurization lines of four production engines were reviewed. The bellows problem may extend to some engines in the field but does not involve AS-502 or 503.

J-2 ENGINE Two successful restart couples were conducted at AEDC on 1/24, in support of the S-IVB 80-minute restart requirement. An additional test was conducted in support of the S-II reduced fuel pump inlet pressure program. Engine performance was satisfactory. The next test period is scheduled for 1/31, in support of 80-minute restart.

A failure in the electrical control assembly (ECA) on the J-2 engine at AEDC was traced to an unwetted solder connection in the ignition phase timer. The unit will also be inspected to determine if whisker growth is present in the transistor that caused the timer failure in the J-2 engine on AS-502.

At a meeting on 1/26 (attended by representatives of IO and R&D)), the decision was made to retrofit all J-2 engine ECAs with improved timers prior to any future flight. There will probably be some schedule impact on SA-502 and 503. A detailed assessment of the impact is underway. The timer problem has been identified as a pure metal crystallization (whisker growth) from the tin in the transistor container plating to the transistor circuitry. The growth is accelerated by moisture and the silica-gel desiccant used in the transistor container. Apparently, non-noble metals in the presence of an electrical field are susceptible to whisker growth, with tin, lead and lead-tin alloys being the worst offenders, especially, when silica-gel is present. (Our improved units use gold plated transistor containers.) Quality Division is making a survey of stage, instrument unit, and ground support equipment electronic circuitry to determine if a similar problem exists. Also, the MSC has been notified of this failure mode.

Interesting

NOTES 12-11-67 BROWN

GENERAL Two significant conferences are planned for this week with HQ personnel: (1) Doug Lord briefing on J-2 S - Mr. Doug Lord, who will be here as a part of the HQ Task Review Team, has expressed an interest in a briefing on the J-2 S. In conjunction with the P&VE Lab, we are tentatively planning this briefing on Thursday or Friday evening. (2) Dr. Dorman/Del Tischler review of Production Support and briefing on J-2 S - As a result of questions raised by Mr. Finger relative to Production Support and/or Sustaining Engineering, Dr. Dorman has been asked to make an in-depth review of the methodology used for selecting the level of production support and how this level relates to other facets of the program, such as production rates. Of specific interest is a differentiation between: (a) sustaining engineering (so called) in support of production, (b) research and development, (c) product improvement, and (d) other related work. In addition, Dr. Dorman and Mr. Tischler will be briefed on the J-2 S engine work being done under SRT and its relationship to our overall program. Dr. Dorman will go from here to Rocketdyne to get their views on Production Support. (Incidentally, I understand that the review of engines is only "round one" and that a similar look will be taken at our vehicle programs.)

F-1 ENGINE The fourth of nine scheduled production configuration thrust chamber injectors was bomb tested on 11/27 under the stability sampling program. The injector damped in 28 milliseconds, which is well within the Model Specification of 45 milliseconds.

J-2 ENGINE Five successful tests were conducted at AEDC on 12/7 in support of the S-II stage fracture mechanics problem. No anomalies were noted in engine performance for these tests.

H-1 ENGINE Reference TEIR Notes of 11/27/67 concerning stability testing of H-1 engines on S-IB-211. Rocketdyne has concurred in these tests. However, CCSD has questioned Rocketdyne's evaluation of the thrust oscillations resulting from the bomb induced instability. Tests are being conducted at MSFC and Neosho to further evaluate the impact of the instability tests on the stage. It is anticipated that CCSD will agree to the stability test program if the projected loads are within stage design limits.

B 2/2

NOTES 1/29/68 CONSTAN

Nothing of Special Significance.

Apollo Program Office (APO) System Safety Program

The first APO System Safety meeting was held at Headquarters on January 24 and 25. This was a program level meeting with civil service representation from Headquarters, KSC, MSC and MSFC, and TIE contractor representation from Headquarters, MSC and KSC.

The significant item of the meeting was the presentation by Boeing/TIE from Headquarters on their proposal for the use of the logic diagram analysis of potential accident situations. The overall analysis program would be carried out at Headquarters by Boeing with the necessary supporting analyses from each field center. The effort being proposed is restricted to Apollo/Saturn V. ✓

The conclusion reached during the meeting was that only a limited part of the analysis could be completed by the time AS 503 is launched. As a result, Boeing/TIE at Headquarters will establish a priority list of the potential accident situations to be investigated and then Headquarters will request the support analysis required from each Center (KSC, MSC and MSFC). ✓

NOTES 1/29/68 FELLOWS

B
2/2

Laboratory Support Contract Renewals: R&DO laboratories are preparing procurement requests to exercise options to renew the laboratory support services contracts. Off-site support contractor fabrication effort is being withheld from the renewal options to permit the Purchasing Office to investigate the possibility of a separate off-site fabrication contract(s) that would increase competition in bidding and reduce costs for the services. ✓

B 2/2

NOTES 1/29/68 GEISSLER

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B
1. SPACECRAFT COMPONENTS: We recently received six component sub-assemblies from the AS-501 Flight Apollo Spacecraft Command and Service Module for examination and analysis. It is believed that components were all vendor supplied to NAR; however, drawings were not available and this could not be positively established. It was found that soldered connections, in general, conformed to MSFC requirements. Welded connections were of good quality; however, packaging design could reduce the total number of welds. Crimp type connections were well constructed and metallurgical cross-sectioning revealed no evidence of problem areas. Corrosion (passive or progressive) was not detected on the interconnect ribbon, stranded wire or part leads. The foam encapsulate provided effective protection for the circuits involved even though a small number of void areas were discovered. No evidence of thermal overload was detected in the foam, epoxy encapsulate or the thermoplastic wire insulation. A complete report of specific findings is being provided Dr. Rees. ✓
 2. SECOND BREAKDOWN IN POWER TRANSISTORS SEMINAR: On January 15, this Laboratory sponsored a seminar entitled "Second Breakdown in Power Transistors". The seminar, which consisted of four technical papers, equipment demonstration, transistor manufacturers' comments, and a round table discussion, was well attended with all major power transistor manufacturers and many power transistor users present. The papers and manufacturers' comments were well received with many pertinent questions asked by the attendees. All equipment demonstrations were successful with some very interesting testing techniques revealed and discussed. A special film on infrared techniques for the determination of second breakdown sites on transistors was also shown. The seminar was highly successful, and exceeded expectations in achieving the dissemination of information on this important problem area. ✓

1. ATM Preliminary Requirements Review. The ATM Preliminary Requirements Review (PRR) was completed at NSPC last week except for the PRR Review Board meeting which is scheduled for Thursday of this week. General and detailed presentations covering all ATM subsystems were conducted the first three days of the PRR and the Pre-Board meeting was completed the fourth day at 10:30 P.M. Approximately 40 representatives attended from MSC and 13 from Headquarters/Bellcomm. KSC was represented by six attendees.

Approximately 121 Review Item Discrepancies (RID's) were generated and processed covering the entire spectrum from excellent suggestions to nonapplicable/trivial ones. The scientific experiments and the electrical support equipment for prelaunch checkout were not reviewed. The senior MSC representative was Mr. Tom McElmurry of Deke Slayton's office with Astronaut Cooper and Scientist-Astronauts Owen Garriott and Ed Gibson. Mr. Roge Machell represented Mr. Bob Thompson's office and Mr. Kovitz represented Mr. Kraft's office.

The trend of the more important RID's indicated an MSC desire for more redundancy in ATM, less reliance on astronaut utilization in degraded mission modes (such as loss of star tracker or digital computer), many more hard wired switches on the ATM Control and Display Panel, much less use of the digital keyboard address, greater similarity between ATM and Airlock Module electrical subsystems, and more measurements stored on the tape recorder and dumped to ground.

The hardest hit, so to speak, was the ATM Control and Display Console in the LM. The MSC representatives with whom we have had almost weekly visits and guidance in this area obviously have not succeeded in bringing the positions of the Astronaut Office and Flight Operations Office. Some of the basic design philosophies on which we thought we had agreement and understanding were severely challenged. The ATM Control and Display will probably require complete redesign and a larger area in the LM.

W.H.
Silent
hold me
the old
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pilot
types like
Gordo Cookes are
just more in favor of
mode selector
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the more
scientific
inclined
Scientist-astronauts
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It has now been proposed by MSC that two ad-hoc working groups be formed to work beginning immediately in the Control and Display area and the Pointing Control area to overcome as many of the MSC objections as practicable. Agreements reached in the ad-hoc working groups would be taken up in the appropriate AAP panels to make the commitments between the Centers.

Mr. Mathews was briefly advised of the above results of the PRR prior to this departure from NSPC last Friday.

2. ATM Procurements. The digital computer procurement has been totally approved by NASA Headquarters and we are planning to release the RFQ as soon as possible. The star tracker procurement documents are at Headquarters and are being expedited. We intend to proceed with these two actions and update any changes to these hardware items as soon as the above mentioned RID's have been formally accepted and the total program impact has been assessed. Further resolution on these items will probably be necessary with NASA Headquarters.

3. Mr. Neudatschin, for whom Dr. Haws predicted just one more year of life in December 1966, returned home from a checkup by Dr. Maxfield and reported that Maxfield found him in such good condition that there is no need to do anything further for him.

S-IVB (MSFC)

Test S-IVB-051S was conducted at the S-IVB Test Stand on January 23, 1968, using engine J-2SE, S/N J-108, for a scheduled duration of 75 seconds (one second idle mode and 74 seconds mainstage). All objectives were met and all parameters appeared normal. ✓

S-IB (MSFC)

Test SA-49, a 15 seconds test with bombing of one R&D engine (Position No. 7) was successfully performed on January 25, 1968. Preparations are underway to modify the thrust structure above the R&D engine in Position No. 1 which is also to be "bombed" in the next test. ✓

S-11-4 (MTF)

The pre-firing readiness review meeting for S-11-4 was held at MTF on January 25, 1968. All test procedures and non-conformances were reviewed and the stage was considered acceptable for the acceptance static firing test scheduled for January 30, 1968. ✓

MODERATE DEPTH LUNAR DRILL

Two tests were conducted on modified exhaust valves for Northrop compressor. Operation of the valves was inadequate and the problem is presently being investigated. ✓

APOLLO TELESCOPE MOUNT

Received present schedule from R-ASTR on delivery of test beam hardware to be tested. Component testing is scheduled to begin February 6, 1968. Also agreed to fabricate component test fixture for air pad testing. It is presently being fabricated by R-TEST-B and will be completed in time for testing February 6, 1968. ✓

SATURN V DAMPER ARM (SET 3)

Testing on the Saturn V Damper Arm (Set 3) was completed on January 22, 1968. The hardware was removed from the test area and returned to M.E. Laboratory on January 25, 1968. Although the Damping, Retract & Reconnect System (DRRS) hardware, as tested, met the test criteria, we feel that the redundant hook switch modification should have been incorporated and tested prior to removing the hardware from the test area; however, the KSC need date of March 1, 1968, for the Set 3 DRRS did not allow sufficient time for it to be accomplished. This is the last of the DRRS hardware scheduled to be tested at Test Laboratory. The test facility will be put in a standby condition to support future testing as required. ✓

J-2 Rocket Engine Supporting Development Program: Agreement was reached between IO and R&DO to fund the J-2S effort at Rocketdyne for \$9.0M (904 SRT funds) on an interim basis to insure contractual continuity. Additional funding is to be considered for implementing the J-2X effort on or about March 15, 1968. A decision on implementing the J-2X effort will be made after further impact studies on cost, schedule and technical risks. ✓

SRT Procurement: In my note of 1/15, I reported that the procurement freeze was creating a problem which would become severe if not relieved by 2/1. Bonnie advised me by note of 1/23 of your having discussed the subject with Dr. Mueller and his indicating he would have it looked into. This action helped clear some points of vagueness and uncertainty and the machinery is now in motion. Thanks. ✓

Because of the compressed procurement processing time we must now work against, I am having Mr. Miles spend a few days in Headquarters each week to track and push our actions through. In addition, representatives of R-EO are working closely with Laboratory contacts in making final adjustments in the FY 68 program caused by a number of relatively minor changes in the funding guidelines. As these guidelines are firmed up, a basis for FY 69 program planning will be established to make the most of the FY 69 SRT funding; preliminary guidelines of which were received recently. ✓

1. Welding Success at Seal Beach: NAR welded the S-II-9 cylinder #6 to the LH₂ dome on January 19 using the TIG welding process with two weld passes from one side. The welding was performed in the new environmentally controlled weld station using the turntable instead of skate welding. The X-ray and dye penetrant inspection revealed that the entire weld was totally within specification. There were only 18 places where minor deviations in offset had occurred which were consequently waived by inspection. This is the first horizontal weld produced on the S-II where all defects were within design specifications (with the exception of very small offsets). A challenge and competition from the government in optimization of manufacturing techniques and tooling for production of high quality hardware seems to pay dividends. ✓

2. Research and Development Television Program: Through arrangements made by Captain Fortune of our Technology Utilization Office, Mr. James Orr with two guests, Mr. Lou Frost of North American Rockwell and Mr. Phil Saperstein of the Illinois Institute of Technology, appeared on a one hour television show entitled, "Research and Development Review of Metal Joining Methods". The subjects covered were the effects of fusion welding on materials, cleaning of materials prior to welds, electron beam welding in space, out of vacuum electron beam welding, portable electron beam chamber application, high frequency resistance welding, narrow gap welding, friction welding, explosive welding, tooling development for welding, pulsed arc welding, exothermic brazing, and others. Mr. Frost and Mr. Phil Saperstein have both performed manufacturing research and development contracts for NASA and were in a good position to discuss them technically on the television show. Mr. Orr, of course, spoke of our work here at Marshall and some work done by research contractors. The host of the show was Dr. Al Hibbs, Senior Staff Scientist at Jet Propulsion Laboratory. The program will appear in most of the larger cities of the United States and will be shown extensively in California. It is an educational series on research and development. Mr. Orzchowski of the NASA Public Affairs Office on the West Coast coordinated this program. ✓

3. Visitor from NASA Headquarters: Mr. Larry Hall, OSSA, who is in charge of planetary quarantine in Dr. Orr Reynolds' directorate, visited our laboratory and discussed with us our efforts in the decontamination and sterilization of components and systems. In subsequent discussions in Dr. Johnson's (EO) office we expressed our willingness to develop the necessary technology base in this field for future NASA missions within our manpower capabilities and within the OSSA funding support. ✓

4. Personnel Losses: ME Laboratory has lost 22 employees by attrition during the last two weeks, 14 of whom had received RIF action notification from Personnel Office in December. This kind of reduction is of course entirely uncontrolled and must result in a more and more unbalanced organization with less and less efficiency.

W.K.

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1. AS-204 FLIGHT EVALUATION (S-IVB FORWARD SKIRT): The magnitude of the response on the strain gages on the forward skirt of the S-IVB Stage (flutter measurements) have not been evaluated. However, it appears that the response in the high dynamic pressure region of flight was less than that response in the acoustic environment at liftoff. Quick-look data show oscillating stress levels of ± 4500 psi. These stress levels were approximately 20% of the stress levels observed on the S-IVB AEDC wind tunnel panel flutter test. ✓
2. SATURN IB COMBUSTION STABILITY TEST PROGRAM BEGUN ON S-IB-11: The first test, of a series of 5 to investigate the dynamic combustion stability characteristics of the H-1 engine in the S-IB flight stage, was completed on 1-25-68, for the planned duration of 15 seconds. Preliminary review of data indicates a damp time of approximately 15 milliseconds (100 milliseconds in maximum allowable). ✓
3. S-II INSULATION RUBBER DOUBLERS: As a result of the cryogenic tanking of S-II-504 at MTF, nearly 200 rubber doubler (covering purge ducts in insulation) defects were identified. It was also observed that the defects occurred each time that the LH₂ tank was pressurized. The weather conditions were more severe (colder with little or no wind) than on any previous tanking, and this is thought to be the primary cause of failure. Although it is believed that the warmer days and high winds at KSC make the probability of success on CDDT and launch very high with the rubber doublers, this cannot be proved yet. A configuration change may be required. North American Rockwell (NAR) is studying schedule impact currently for changing rubber doublers to a more suitable material. Analyses of the rubber doubler materials reveal that the silicone rubber is exceptionally good, but that the doubler-adhesive composite shows the effects of embrittlement around -60°F. Thus, the material is, at best, marginal for the stage application. ✓
4. S-IB-204 CORROSION SURVEY: Just prior to the launch of AS-204 (Apollo 5) CCSD personnel made a thorough inspection of the S-IB stage and reported no corrosion problems despite the fact that the stage had been exposed to the Cape environment for about a year and a half. ✓
5. LUNAR MODULE (LM) STRESS CORROSION SURVEY: Two people from our Materials Division are at Grumman, with MSC personnel, to make a survey of the use of stress corrosion susceptible materials in the LM. Several days will be required. ✓
6. MULTIPLE DOCKING ADAPTER PRELIMINARY DESIGN REVIEW (MDA PDR) BOARD MEETING: The MDA PDR Board Meeting was held at MSFC 1-26-68. The major issue discussed at the Meeting was the MSC proposal to establish the control station in the MDA. This control station would be utilized by the astronauts to "fly" the Cluster utilizing the S-IVB ACS. Additionally, many of the Airlock controls and displays will be located in this area. Chuck Mathews was very pointed in his statements that the MDA is primarily a storage area and not a control station. As a result of the PDR, it became evident that MSFC continues to apply more stringent criteria for elimination of the flammable materials than MSC. MSC is permitting the use of RTV 90 and several other "Category B" materials in the lower section, for which they have cognizance, even though Category A materials are available and are being used in the MSFC portion. ✓
7. MDA DOCKING PORTS: Our work has been completed on the preliminary concepts for the retractable probe port for the MDA. Possible solutions included in our evaluation were: dual purpose LM, retractable docking port, retractable probe, docking port cover, SLA fairing and a flush MDA port. A presentation was made to Chuck Mathews on Friday, but a selection will not be made until a unmanned docking study by MSC is completed in about one month. ✓

Shep
then can
I get
that
promised briefing
on drose/probe
problem? B

The President's budget message will be released at noon January 29, 1968. A pre-release press conference was held in Washington on Saturday, January 27, where Mr. Lilly, Dr. Naugle, Dr. Mac Adams, Dr. Mueller, Mr. Truszynski, and Mr. Webb (very briefly at the end) discussed the FY-69 budget request. Major points brought out during this conference included the following:

The total budget request is \$4.370 B down from \$4.588 B appropriated in 1968.-- The AO total is \$648 M as compared to \$640 M (\$628 M plus pay raise) in 1968. The 1969 increase is only to cover the effects of the pay raise and an additional personnel space allocation to Goddard (155) and ERC (150). The Goddard increase is to replace support contractors on two specific contracts which are being terminated as a result of the Civil Service Commission findings. -- The budget contains nothing for Voyager per se. -- A planetary (Mars) exploration program, as an extension of Mariner, is included. Total program cost is estimated at \$500 M. The program includes four orbiters (two in 1971 and two in 1973) and two rough landings in 1973. The program will use the Titan launch vehicle, possibly with a Centaur upper stage. Langley will manage this program. -- No development of an earth resources satellite will be initiated. However, studies will be conducted. -- The OART program includes funds for development of a 65K to 75K thrust nuclear engine based on Phoebus technology. Stage decision expected in one or two years. Completion of ground testing of nuclear engine expected by 1975. -- B-70 and X-15 to be closed out. -- A Saturn V launched ground outfitted dry workshop is included. It includes an integrally mounted ATM. Launch time estimated as 1972 or 1973. -- "Reasonable chance" to achieve manned lunar landing by 509 stated by Dr. Mueller. Earliest possible manned lunar landing chance was stated by Dr. Mueller to be "maybe by 507." Total cost of Apollo and associated Manned Space Flight capabilities was quoted as \$23.9 B. Dr. Mueller estimated the prime contractor lay-off rate to be 4000 per month. -- In answer to a question on the plan for civil service manpower, Mr. Webb stated that only the stretchout of Apollo and the delay of AAP prevented a request for additional people. NASA can do program as now planned with total civil service complement as requested in the budget. (This includes the 305 additional spaces for Goddard and ERC.) -- Mr. Webb estimated the proportion of total budget which will go outside the agency to go down from about 94% to the 85% to 90% range, depending upon the total appropriation granted. ✓

A copy of the handout given to reporters at this briefing is available. A summary comparing the FY-67 and 68 appropriations to the FY-69 budget request. ^{is attached:} The total federal budget to be submitted by the President is planned including the 10% tax increase. If the increase is not forthcoming, budgetary adjustments will be in order. ✓

SUMMARY OF FY-69 PRESIDENT'S BUDGET

FOR NASA

(In Millions of Dollars)

	Appropriation <u>FY-67</u>	Appropriation <u>FY-68</u>	President's Budget <u>FY-69</u>
TOTAL NASA	4967.583	4588.773	4370.400
R&D TOTAL	4235.100	3910.600	3677.200
MSF	3024.000	2809.200	2483.400
Gemini	15.200	---	---
Apollo	2922.600	2556.000	2038.800
Apollo Applications	80.000	253.200	439.600
Advanced mission studies	6.200	---	5.000
SS&A	576.100	552.850	538.200
AR&T	268.150	318.700	336.800
OTDA	270.850	275.850	304.800
OTU	5.000	4.000	4.000
AO TOTAL	647.483	640.373	648.200
(MSFC)	(128.701)	(123.218)	(118.178)
C of F TOTAL	85.000	37.800	45.000

Only during launch
phase?
Or will LM
descent engine
help in deboost
into circumlunar
orbit?
B
Or only 502??

502 Spacecraft Weight Shift: Due to an internal structural problem, MSC will shift 6000 lbs. of propellants from the CSM to LEM. Preliminary studies indicate no impact to launch vehicle. This is, of course, based on no trajectory or targeting change for the launch vehicle. The detailed studies required to impact this change on the operational trajectory will be made when I-V receives final data from MSC. ✓

S-II LOX Loading Problems: There is a growing feeling here that the S-II LOX loading problems at KSC may consume more time than previously anticipated before agreement is reached between KSC and MSFC. A meeting is scheduled for January 31, 1968, at KSC to try to resolve the technical problems. ✓

LM/ATM Review: The present plans are to have the bulk of the presentations on this subject in the second week of March. Details of locations and exact dates are yet to be worked out, but it appears that about four sessions will be required. A special session on ATM subsystems and experiments may have to be scheduled to bring Mr. Trimble on board and bring Dr. Mueller up to date. ✓

MSC Quote on LM Flight on AS-204: "A normally operating computer shut off a normally operating engine when it shouldn't have." This turned out to be use of wrong operational data. We have worked to prevent such a happening in our systems at MSFC by making sure the software people and their customers constantly communicate and climax this effort with a mission engineering review as late in the schedule as possible to make sure we all agree with the program that is going to fly. Further review of our activities in the constants area will be accomplished to make sure that we do not have an error such as this occur in our system. ✓

NOTES 1-29-68 RUDOLPH

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1. J-2 Engine ECA Package Modifications for AS-502/AS-503:

o On Thurs, 25 Jan 68, another timer failure was encountered in the J-2 Engine ECA package (this failure occurred in the S-II Battleship Program at Santa Susanna). As a result, we consider it mandatory that the ECA packages on AS-502 and AS-503 be modified to eliminate the faulty timer. ✓

o Initial indications from Rocketdyne were that the ECA packages for AS-502 could not be modified and returned to KSC prior to Sat, 17 Feb 68, which would impact the KSC checkout and launch schedule by one day.

o At a meeting Fri, 26 Jan 68, with Mr. Grau, Mr. Brown, and others, it was determined that through expeditious action on the part of all concerned, the timers for AS-502 can be modified and back on dock KSC by Tues, 13 Feb 68, which will avoid impacting the launch schedule. ✓

o For AS-503, the timers must be modified and back on dock KSC by 4 April 68.

o We are reviewing all other areas in the Saturn V vehicle and its GSE to determine where else we are using the same Tempo timers and Raytheon transistors. ✓

2. S-II Fracture Mechanics:

After preliminary discussions with Gen. Phillips last week, planning is proceeding to cryogenic proof test S-II-3 (if manned) and subsequent stages. A final commitment will be made after agreements have been reached with R&DO and schedule adjustments approved by Gen. Phillips. We expect to complete these actions this week. ✓

3. AS-502 Launch Vehicle at KSC: Roll out is currently scheduled for Tues, 6 Feb 68 (no ceremony of any sort is planned by KSC for this event). ✓

4. AS-503 Launch Vehicle: The re-X-ray of the S-II-3 stage is nearing completion and no additional flaws have been detected. The stage is scheduled for erection on Wed, 31 Jan 68. ✓

1. AS-204 GROUND COMMANDS: During the AS-204 mission three ground commands were transmitted by the Booster Systems Engineer. The first command was issued through Canary Island because the TM indication for SLA deploy (Physical monitor) was not received. Relays A and B discretes indicated deployment and the command was issued as a pre-cautionary measure. The second and third commands were transmitted at the end of the second revolution from the Cape (MILA) since the LOX vent closed discrete was not received prior to the ambient helium dump. The command was issued twice; however, it was rejected by the ground computer in each case. Subsequent information indicated that we had loss of signal from MILA immediately prior to the first transmission. Somewhat later, the CSQ ship reported normal operation of this valve. ✓
2. AS-204 ORBITAL LIFETIMES: The S-IVB/IU reentered the atmosphere 15 hr 20 min after liftoff. General impact area was the South Pacific with the following approximate coordinates: 27 deg latitude South; 142 deg longitude West. Last confirmed station contact to the IU was from Hawaii 10 hr 40 min after liftoff. The LM ascent stage impacted West of Hawaii at the end of its mission; the descent stage is orbiting with an estimated life of 14 days. ✓
3. AS-204 HOSC SUPPORT SUMMARY: The HOSC support for the AS-204 launch and flight was successful. In addition to the scheduled joint MSC-MSFC wind simulation reports the HOSC supported the launch on 21 problem conferences. The LIEF switchboard processed 523 calls with 92 of these originating at KSC. The HOSC was manned by 159 support engineers (including 40 contractors). Support to the Supporting Staff Room in the Mission Control Center was provided by the HOSC consoles continually during the orbital portion of the mission. ✓

NOTES 1-29-68 Stuhlinger

B_{2/2}

No submission this week.

AS-206/LM-2: I received the following tentative decision regarding the AS-206/LM-2 flight from General Phillips last Saturday. He is confirming it by TWX today.

Evaluation of the Apollo 5 mission on the basis of the 72-hour reports indicates that a second unmanned lunar module flight may not be required. Apollo organizations concerned will proceed as follows:

1. Neither LM-2 nor Saturn IB 206 will be shipped to KSC but will be maintained in a condition such that the lunar module can be shipped within 3 days and the launch vehicle within 14 days if required by decisions on either 6 February 1968 or 6 March 1968. ✓

2. KSC, MSC, and GSFC must stay in a position to proceed to operationally support a 206 launch if required by a later decision. ✓

3. Each operational element will retain the support documentation and necessary software required for an AS-206/LM-2 mission in their current status of preparation such that a launch is possible approximately 3 1/2 months following the decision. ✓

Further decision points are:

1. On 6 February 1968 when the MSF Management Council will be briefed on the program office decision which at that time will be based on evaluation of the Apollo 5 10-day report. ✓

2. On 6 March 1968 when the Design Certification Review Board will consider the manned-rating of LM-3. ✓

RCA 110-A COMPUTER: A meeting is tentatively scheduled for Tuesday, February 6, 1968, with RCA and MSFC to discuss RCA computer reliability enhancements and what can be done to minimize failures such as the ones that occurred during 501 and 204 support activities. This meeting is intended to provide recommendations for corrective action, improvements, timeframes and rough costs in enough detail so that MSFC can make a presentation to General Phillips with recommendations for improving computer reliability. This meeting will be chaired by Ludie Richard and Porter Dunlap. ✓

1. Unmanned Planetary:

Due to a last minute change in plans, Luke Spears and I did not visit OSSA last week to go over the IB and Service Module data on planetary mission potentials. I am setting up meetings for this week (1:30 p.m., Thursday, February 1) including Oren Nicks to discuss the overall Launch Vehicle picture at OSSA. I have sent you a separate note on this item, a letter which Newell sent to Webb. ✓

Our plans are to continue our inhouse studies on unmanned planetary systems. ✓

2. Dry Launch Workshop:

The various task teams of the workshop group are continuing to generate additional data aimed at our next meeting in Washington, D. C. on February 2. I feel (as we discussed in our internal review) that our real problem is to force ourselves into a narrowing-down process and start concentrating on the real concepts/systems that we will be forced to live with because of the money, schedule and manpower constraints during the next few years. ✓

F.W.

Couldn't agree more!

B