

1. LVOD - LOC - As I mentioned to you Friday evening, I think MSFC Divisions are still apprehensive about the arrangement which puts LVOD on the LOC payroll. While MSFC concurrence on promotions, assignments, and reassignments may strengthen the ties to MSFC, it could work to the detriment of the MSFC/LOC engineering relations. Take for example the reassignment or promotion of a key figure. If one of the MSFC divisions should disagree, somebody will be unhappy regardless of the final outcome. Repeat this over a period of time and the umbilical cord is beginning to weaken. Finally, someone will decide that continuing the practice of getting MSFC concurrence in promotions is hurting the relationships instead of helping them. I have the following suggestion which would do no violence whatsoever to the LOC organization as you approved it Friday, but is made with the idea of giving permanency to the "solid" engineering line. Establish as an element of MSFC, directly under Lange, a resident project manager at the Cape. His functions and responsibilities with respect to LOC would be substantially different from a project manager at the R&D contractors' plants. He would be there primarily to look after the interests of the Saturn/Apollo project as a whole and the interests of MSFC engineering in particular. His office would provide the MSFC image and a home for MSFC engineering personnel while at the Cape. We would assign an MSFC contract man to handle the MSFC contract changes (a point Rees referred to Friday). Although all his support would come from LOC as a project representative, he would be an MSFC entity. His primary job would be to keep the channels open at the working level and to make certain the "solid" line remains intact. He should have stature in grade and even his own separate MSFC facility.

H.F.

I think there may be a lot of merit to this suggest.  
Suppose we discuss it first with Ebohard. If he  
agrees, let us try it out on Jurek.

Please carry the ball  
B

\* 1. SELECTION OF A-E FIRM

gcm

The August-Perez and Associates of New Orleans was selected for negotiations to design an office building of approximately 500,000 sq. ft. to house contractor office and engineering personnel at Michoud. ✓

2. VISIT OF GENERAL COUNSEL

Mr. John A. Johnson, General Counsel, NASA Headquarters will visit Michoud Operations on February 4, 1963. The purpose of his visit is to become acquainted with the NASA facilities at Michoud Operations. ✓

\* 3. S-1 QUARTERLY REVIEW

gcm

The third S-1 Quarterly Review will be held at Michoud Operations on February 5 and 6. ✓

NOTES 2-4-63 DEBUS

B<sub>2/5</sub>

1. CTL: Jupiter 106 operations were supported, terminating with the successful launch on Tuesday, 22 January 1963. (See TWX report) ✓

2. SA-4: A scheduling meeting was held to draft a daily work schedule for SA-4. Two days have been allowed to accomplish the Cantilever wind tests as finally agreed upon by Aeroballistics. Extra time is also required for the installation of the S-IV mods in the inter-stage area. To help compensate for the above extras on SA-4, we have eliminated a fuel loading test and have scheduled several Saturdays. Our working launch date is March 27, 1963. However, I understand the barge may not arrive on schedule due to adverse weather enroute. ✓

3. Work Stoppage on Complex 37: Meetings were held with Baxley (Union representative on Project Stabilization Agreement) and Nipper (Asst. Business Agent for Millwrights) at 10:00 a. m. on January 22 concerning a possible walk-off of the Millwrights on Complex 37. The Millwrights objected to NASA Civil Service personnel making alterations and adjustments on the launcher pedestal. This work had previously been done by the Millwrights and was accepted by a NASA inspector. After a test was made by NASA, it was determined that alterations would have to be made. At approximately 10:00 a. m. on the 22nd, 8 Millwrights left Ingalls Steel Company on Complex 37. In the afternoon of the same day, 4 Millwrights left Noble Construction Company and 4 more from Complex 13. All Millwrights were back to work the morning of January 23, but at 10:00 a. m. on that date, the 8 Millwrights from Ingalls and the 4 from Noble again left Complex 37. Meetings concerning this are being held by NASA personnel at the present time. A temporary restraining order was issued 24 January restraining AFL/CIO members from engaging in a strike for the purpose of enforcing Noble Company and Blount Brothers to cease doing business with NASA unless NASA assigns the work of installing the launcher plates to members of the above-named union. Hearing date was set for 5 February. Work in dispute is being performed as of this date. ✓

1. MATING OF INTERSTAGE TO S-II STAGE AT MTF

\* *gem* Confirming brief discussion of Friday evening--While in Cape Canaveral, Cdr. Burtschell, LOC Staff, inquired as to the possibility of the S-II interstage being mated to the S-II at MTF. There may be a space problem for handling it at the Cape. Our working group will look into it. ✓

2. REQUIREMENT FOR KEY TEST PERSONNEL AT MTF TO KEEP HAND IN ACTUAL HOT FIRING OF STAGES

*Agreed.* Heimburg is concerned about key test personnel at MTF losing feel for static firing, since they will be in a Monitoring rather than operating role. This must be considered, not only for C-5 era immediately ahead of us, but for the next propulsion generation ahead when engines may be too large for test at MSFC. Interchange between Marshall and MTF will then be even more critical. It is not an immediate problem with regard to Mississippi Test Operations but should be considered not only as to the future functions to be performed there but also as to the selection of NOVA or "New Bright Star" engines. If these are too large for MSFC, perhaps a primary static firing stand at MTF should be reserved for government operation.

3. COMMUNITY DEVELOPMENT ADJACENT TO MTF

Mayor John Scafide of Bay St. Louis has written to us for help in cleaning up sanitation deficiencies around the bay, which will be intensified once population growth starts because of MTF. I will follow this up with appropriate NASA Headquarters and other government agency personnel when I am in Washington Tuesday and Wednesday, in connection with our support contractor plans.

↓  
W.F.

Suggest we hold a meeting on this  
(you, Heimburg, myself) B

→ Hope they have desegregated sewer lines to be eligible for federal support!

\* 95m  
1. Detailed Wind Shear & Turbulence Measurements for Control & Structural Studies: (a) Arrangements have been made with NASA Launch Operations Office at P. M. R. to conduct a series of detailed wind profile measurements using the FPS/16 Radar Spherical Balloon technique, starting in February. Cooperation of all organizations involved has been excellent. Due to P. M. R.'s interests in the program, the only cost to us is the price of the spherical balloons. Basically this is a research effort since we now have no vehicles scheduled for launch from P. M. R. ✓

(b) To our knowledge, the funds for the special FPS/16 Spherical Balloon Radar Tracking Facility requested by LOC in their FY-63 C of F Budget and approved by Dr. Seamans and OMSF, have not been released. This is a continuation of the delays experienced for the past 6 months. We understood in December that "this project required notification to Congress prior to release of funds" - (Agenda Item 6 of Dec. 1962 Space Council Minutes) - What do we do now? Our plans for incorporation of this facility into the C-5 prelaunch monitoring scheme are rapidly reaching a critical point in time. ✓

2. SA-4 Tilt Program: The tilt program to be flown in SA-4 has been finalized. The decision was made to fly on an eight engine tilt program biased for the mean wind (tailwind) for the month of March. The wind biased trajectory enables the vehicle to withstand about 8 m/sec more wind around the high dynamic pressure region of flight than that achieved by flying on an eight engine gravity turn trajectory program (75 m/sec compared to 67 m/sec). Aeroballistics Division will furnish Astrionics the tilt program for SA-4 by February 1, 1963. Astrionics feels the "S-shaped" tilt program under consideration for SA-4 might jeopardize the passenger flight of the ST-124 platform. Therefore, Aeroballistics Division has dropped this program for SA-4. ✓

3. Lunar Logistics Study: The next milestone in LLS work has been established as April 4th. A comprehensive MSFC report will be available by that date describing the mission and vehicle concept of the C-5 LLS. Description will be focused on the A Configuration although the other configurations will also be treated. ✓ C-1B 3rd stage (S-VI), lunar-return stage (R-III), and Cryogenic Service Module (CSM) will be shown as by-products. This document may then be used by the Special Project Office for the PDP Chapter entitled "Technical Approach". ✓

4. NASA Committee on Fluid Mechanics: Subject committee met at MSFC on Jan. 28 & 29, 1963. A copy of the agenda, and a list of attendees and guests is attached. The Marshall presentations were well received and triggered lively discussions. Some committee members (Hertzberg & Liepmann) felt that in the study of base heating phenomena, greater emphasis should be given to an attempt to solve certain simplified fundamental processes first and using them later for synthesizing complex phenomenon we are dealing with - as contrasted to the attempt to simulate the total process. While it was not made very apparent in what specific fashion this could be done, there was no argument about the desirability of a more academic approach in addition to our more heuristic method. But we had to point out that wherever there is competition for manpower & funds, the practical approach has to be given priority, even if it means getting solutions of a less general nature. (Maybe the Research Institute can be of real help in getting more fundamental answers.) ✓ A brief facility tour and a model display gave the committee members an impression of the size of vehicles MSFC has to deal with. ✓

E.F.  
We placed this item into my notes by D.B. Holmes  
Please follow up w/ Rosen direct and keep me posted.  
B

- J.F.*
- Please show it to me when operational*
- B*
- \*1. SA-6 PRE-STATIC CHECKOUT: Status check and electrical continuity testing have been completed and the S-I Stage of the SA-6 vehicle was transferred to the Building 4705 Test Cell facilities on Tuesday, January 29, 1963. Pressure testing is progressing on the engines and pressure switches with the electrical measuring calibration being performed on a non-interference basis. Approximately 20 measurements have been accepted by noon, Thursday, January 31, 1963. ✓
  2. SATURN INSTRUMENT UNIT MOTION SIMULATOR (SIUMS): The SIUMS was inspected in detail, shipped from the contractor (Chrysler) and arrived at MSFC on February 1, 1963. The expected completion date of installation and checkout of the complete system is March 23. ✓
  3. QUALITY ASSURANCE REPRESENTATIVE TO SATURN SYSTEMS OFFICE: To supplement existing essential working level contacts, the Quality Assurance Division will station Mr. Russell Gramer as its representative in the Saturn Systems Office. In this assignment, he is responsible to the Director, Quality Assurance Division, and will spend some time here to keep abreast of internal matters. He will participate in the staff meetings of both organizations and advise the Saturn Systems Office on quality requirements for contract negotiations. ✓
  - \*4. ROCKETDYNE QUALITY PROGRAM PLAN: A trip was made to Rocketdyne to review the Rocketdyne Quality Program Plan and the Air Force Quality Assurance and Inspection Plan. After several requested changes, which were agreed to, the plan should be approved and implemented the first part of February. The Air Force Plan is 90% completed and should be submitted soon. Additional Air Force personnel will be required for implementation of this Plan. Rocketdyne's compliance to NPC 200-2 (Quality Assurance Provisions for Space Systems Contractors) was investigated and is progressing satisfactorily. This program is being implemented with practically no addition in cost. ✓✓
  - \*5. MIT QUALITY CONTROL SPECIFICATION: A Quality Control specification, prepared by Massachusetts Institute of Technology and some interested contractors, was reviewed by the Quality Assurance Division at the request of Manned Spacecraft Center, Houston, Texas. This specification was proposed to be applied in lieu of NASA Quality Publication NPC 200-3 (Inspection System Provisions for Suppliers of Space Materials, Parts, Components and Services). The document was considered weak and very unsatisfactory and we recommended that it not be used. Mr. Weiss of NASA Headquarters was advised of our views on the document and it is hoped that a united approach to contractors of space materials will be maintained instead of many different approaches to quality. ✓

NOTES - HAEUSSERMANN 2/4/63

B2/5

No submission for this week.

\* 1. TRANSPORTATION ACTIVITIES: States Marine Line vessel, PALMETTO STATE, with DAC S-IV stage (for SA-D5/VLF-37B wet tests) deck-loaded, arrived at Navy Dock, Cape Canaveral, 10 a.m., 2/1. Two-day delay in departure from California due to fog. Shipment OK. ✓

Barge PROMISE arrived Ft. Pierce, 6 p.m., 1/31, following rough voyage. Telephoned information stated barge sustained rolls of up to 14.5° with periods of 8 seconds. Maximum of 1.5 g force was recorded. Stage and related cargo arrived in good order. PROMISE arrived at LOC dock, 4:30 p.m., 2/2. ✓

Aerospace Lines, Inc., are completing their refinancing; interim financing already provided by new investors. Engineering and final modifications underway on Pregnant Guppy aircraft. Information as of Thursday indicated that old fuselage top has been largely cut away and new fuselage cut with tail section removed to provide for loading. ✓

2. S-1-5: Preparations for firing are proceeding on schedule, with first firing planned the week of 2/18. ✓

\* 3. GSE-S-IV SWING ARMS: Five test runs were made on DAC Swing Arms No. 2 and 3, using LH<sub>2</sub> and LN<sub>2</sub> for propellants with simulated vehicle lift-off. Results of tests are satisfactory (would not damage vehicle and required functions achieved), except for the consistent failure of the pneumatic release system. Release has been accomplished by the secondary hydraulic system. Arms due at Cape, 3/1, for installation on VLF-37B (SA-D5) for wet tests. ✓

\* 4. MTF: Negotiations with S&P for brick and mortar final design contract for S-1C and S-11 test complexes were concluded by Mobile District on 2/1. Contract award remains scheduled for 2/8. Procurement request for all technical systems at MTF has been submitted to Procurement and Contracts for initial processing, pending receipt of fund authorization anticipated during week of 2/18. ✓

5. DAC A-3 BATTLESHIP TESTING: Twelfth hot firing now scheduled for 2/5. Previously scheduled for 1/31, but scrubbed due to weather and hardware difficulties. ✓

6. RL10-A1 ENGINE, MSFC: Successful 174-second duration firing conducted 2/1, using LOX trailer to obtain extended duration. Dual cold flow and one hot firing scheduled this week using ambient pressure start in diffuser. ✓

(SEE LAST WEEK'S NOTES, ATTACHED): Firing to be made using LOX fed directly from trailer because LOX stand tank capacity limits firing to 40 seconds duration. ✓

H.H.  
Would like  
to visit  
facility.  
Nos. of  
articles  
out till  
April?  
B

1. ORBITAL DOCKING SIMULATION PROJECT: The Orbital Docking Simulation Project is well underway. Several test runs, with instrument control, have been made in the last two weeks. The visual display system is scheduled for completion in April 1963. A complete report on progress to date is now being prepared. ✓
2. EXTENDED FLIGHT SIMULATION LABORATORY: No hardware has been installed in the Flight Simulation Laboratory, as yet. Installation of the support structure for the Celestial Body Motion Simulator is to begin this week. The simulator itself should be delivered in March. The contractor is about six weeks behind schedule on this project. ✓
3. ARMY COMPUTATION CENTER SIMULATION PROJECTS: Requests for assistance from the Army Computation Center on simulation projects, for which they lack facilities, have been received and are being honored as the workload permits. ✓

\* 1. C-1/AGENA: A TWX from OSS dated 1-28 asked that effort be discontinued on the C-1/Agena preliminary design study. OSS will review the requirements for such a vehicle again in June or July. The Special Assignments Office will prepare a summary of the progress made during the limited life of the study. ✓

H.H. → Should we not invite someone from Shea's office (maybe Shea himself) to attend? LLV

\* 2. C-1B/3RD STAGE: The OSS/MSFC Spacecraft/Saturn launch vehicle meeting is now planned for 2-21 in the Director's conference room. The latest tentative agenda is attached. Mr. Cortright and Dr. Morrison will be among the OSS attendees. OSS has also invited personnel from JPL, GSFC and Lewis (enter the Centaur). It is interesting to note in the OSS comments to the originally proposed agenda that they plan to discuss only their long range plan and the Voyager status. Apparently other program plans are not firm. → Super Surveyor vs LID as explained to me by de Fries? B

requirements (LIA stage) vs S VI should be major consideration! B

The agenda proposed for an OSS/MSFC Spacecraft/Saturn launch vehicle meeting was discussed with MSFC divisions and LOC representatives on 1-31. The discussions covered background information leading to the planned meeting, the launch vehicle scope of the agenda and the organizations which should be responsible for the presentation of the various agenda items.

One additional item was included in the agenda, a presentation by LOC on approved and planned facility availability and loading during the period 1965 through 1970. The remainder of the agenda which pertains to the launch vehicle was not changed.

Also attached is a letter from OSS pertaining to the anticipated study of the C-1B/high energy third stage.

3. LLV: Special Assignments Office is continuing efforts to gain familiarity and getting on board in the LLV program. Additionally, we are beginning to coordinate and pull together the various support from the divisions to prepare the sections of the Project Development Plan. ✓

4. AGENA TRANSFER ACTIVITIES: 27 employees from the Agena Office were on TDY at Lewis during the past week for transferring the Agena program to that Center. Approximately 23 will return to Cleveland for the week of 2-4. It is anticipated that after the week of the 4th, the number of MSFC employees required at LeRC will be reduced considerably. ✓

We are continuing to support the SLV-3B (Standard Atlas) task team effort with MSFC personnel at AFSSD in Los Angeles. LeRC has had one man assigned to the Reliability Task Group since 1-25. It is anticipated that LeRC will assign additional personnel to these groups during the week of 2-4 and hopefully, after the week of 2-11, all of the MSFC personnel can be relieved for return to Huntsville. ✓

2 Enc:

1. Agenda
2. Letter from OSS

Hope this includes our latest LLV thinking (de Fries final report) B  
 ↑  
 just saw next page Agenda of 21 Feb meeting. Looks o.k. B

AGENDA  
OSS/MSFC SPACECRAFT/SATURN LAUNCH VEHICLE MEETING  
February 21, 1963

B215

1. Introduction - SPA - Mr. Hueter ✓
2. Saturn Launch Vehicle System - C-1, C-1B, C-5 ✓
  - a. Technical Description - P&VE
  - b. Schedules - SSO ✓
3. LLV - Studies - AERO - Mr. deFries ✓
4. Past and Current MSFC Studies in Relation to Three-Stage C-1 and C-1B - P&VE ✓
  - a. Performance Data C-1, C-1B, and C-5  
(Lunar, Venus, Mars, Jupiter)
  - b. Guidance Aspects of a C-1B/Three Stager - ASTR ✓
5. Facilities - LOC ✓
6. OSS Long Range Program: - OSS ✓
  - a. Long Range Plan
  - b. Voyager Status ✓
7. MSFC's General Comments to the C-1/Agenda and C-1B/Third Stage Studies - SPA - Mr. Hueter ✓
8. Discussion
9. Establishment of a OSS Requirements Coordination Group for Saturn Class Vehicles

RECEIVED

In reply refer to: SV

JAN 8 0 1963

1963 FEB 1 PM 3 40

M-LM  
From: NASA Headquarters  
To: Marshall Space Flight Center  
(Att: Mr. Hans Hueter)  
Subject: Saturn CI-B third stage study

The projected requirements of the Lunar and Planetary Program show a need for a vehicle capable of placing a spacecraft weighing a minimum of approximately 6200 pounds on a Mars or Venus transfer trajectory. This spacecraft designated Voyager is approved for study only. The vehicle selected to do this job is the Saturn CI-B with an appropriate upper stage. To maintain a coordinated program, it is necessary that the third stage for the Saturn CI-B vehicle be investigated. ✓

The recently completed ILS study conducted by OMSF will undoubtedly contribute greatly to this effort. ✓ There is no desire to repeat the ILS work. ✓ However, it is believed that more thought must be given to the stages which evolved from the ILS study and are adaptable to the CI-B in order that the requirements of the Voyager mission be satisfied.

It is requested that MSFC determine by February 20, what additional study efforts are required to provide a suitable vehicle and prepare by February 28, a preliminary development plan leading to an operational three stage Saturn CI-B to satisfy the following launch requirements.

CY	1967	1968	1969	1970
Launch date	May	Jan., Aug. & Dec.	Jan., Feb., March & Nov.	June, July & Sept.
No. of Vehicles	2	3	4	3

*Alfred M. Nelson*  
Alfred M. Nelson  
Chief, Advanced Projects  
Launch Vehicles and Propulsion  
Programs, Office of Space Sciences

B2/5

1. PAST WEEK ACTIVITY

The highlight of the past week was a two-day review on Advanced NOVA concepts. The following groups participated: RAND/STL/Aerojet/GD/A/Douglas and Martin. It is quite clear now that such a large vehicle (any concept!) will not come easy! We are writing minutes on this meeting and a summary of results. You will get this summary and a one-hour presentation on this subject February 28.

2. LARGER MANNED SPACECRAFT

MSC has initiated studies on three larger spacecraft for SATURN B:

- a. A five-man APOLLO modification for earth orbital flights.
- b. A scaled-up APOLLO for 12 men. (tourist class!)
- c. A 12-man spacecraft with new configuration permitting larger L/D and thus reducing maximum accelerations.

All these studies are being carried out in connection with the space station project.

We probably will also have to look into possible "product improvements" for the SATURN B, such as larger nozzle expansion ratio in the SIV-B stage, to squeeze out some more performance. This vehicle will be needed in the years from 1967 through about 1975. A space station project would be our best customer for SATURN B's. We will follow the MSC studies closely, and Mr. Olling will use Dr. Kuettner as the main channel for up-to-date SATURN data.

3. FY 1963 FUNDING SITUATION

At this time we have received from

OMSF (Lord)	\$ 675,000
OMSF (Rosen)	\$1,950,000
OART (Stoney)	\$ 665,000
OART (Konecci)	\$ 200,000
	<u>\$3,490,000</u>

We have proposed several studies above and beyond those approved, which amount to another million dollars. As it looks today, we have been successful in securing our share for vehicle and system studies, which will keep us moving at a steady pace.

H.H.K.  
We are doing this (Weidner). They've shelved it only for time being because of engine lead times.

what? (CIB) new name for

\*  
9cm

1. ME Working Group Meeting at S&ID: The 4th Manufacturing Engineering Working Group meeting for discussions of S-II tooling and manufacturing problems was held at Los Angeles last week. The complete tooling program, forming and welding processes for fabrication of the common bulkhead, was reviewed with emphasis on three problem areas:

*Plus first sentence of each paragraph*

a. Sizing of the upper shell prior to bonding by the age forming process using an Aluminum Mandrel (as discussed with you in the last briefing), S&ID has been authorized to go ahead with a scaled-down (54") test program for verification of the concept. Details of the test mandrel design were discussed. Results of this program are expected by the middle of April. ✓

b. Fabrication of Gore Segments by explosive forming. Rocketdyne Division is in charge of this program. A review of the tooling and the process revealed that Rocketdyne does not have the necessary experience in this field. The dies as presently designed and already built will not work because of lack of understanding of the forming process. We are in close contact with Rocketdyne trying to save the dies by making modifications. The whole effort of Rocketdyne is poor in this field and I have informed Mr. Parker of our great concern here. ✓

c. Sizing of Gore Segments after explosive forming by the glass-rock age forming process. This is an important back-up program to obtain good Gore Segments if the explosively formed parts do not meet design specifications. Progress in this area, carried out in full scale, is encouraging. ✓

Welding techniques and equipment has also been reviewed. No problem areas exist with S&ID in this field.

2. S-IC Stage: The Lafayette, Indiana Works of the Aluminum Company of America began extrusion on January 13, 1963 of 2014 aluminum alloy cylinders measuring 21.687" in outside diameter, 18.312" in inside diameter, and 232" finished length. The extrusion is considered an advancement in the state of manufacturing technology. It is believed to be the greatest volume of metal ever extruded into a large diameter cylinder by any firm in the United States and it is doubtful that any country in the world has produced such an extrusion. These cylinders are to be fabricated, by the Martin-Marietta Corporation, into high pressure helium storage bottles which will be used for in-flight pressurization of the RP-1 fuel tank of the C-5 Saturn S-IC Stage. ✓✓

3. Assembly and Hydrostatic Test Tower: a. Together with Facility Engineering Office we are probing sub-contractors to assure that materials and equipment are on order, and to coordinate deliveries so that we are able to maintain the recently approved accelerated completion schedule. b. Steel erection is progressing on schedule. ✓

1. G.E. Contract - Status report summary, see Attachment 1.
2. C-1: S-IV Battleship - As reported last week the Helium heater failed to ignite during the first static firing with A-3 engines on 1-26-63. The heater valves were slow to open, probably due to an accumulation of moisture in the solenoids during the period of change over to A-3 engines and also due to exposure to cold environment during extended holds. For protection the valves will be wrapped in plastic, until modification can be made. The next hot firing, originally scheduled for 1-31-63, had to be postponed further, partially due to weather and technical reasons. ✓  
Pregnant Guppy - Aero Space Lines Inc. is proceeding with the modifications to the B-377. Completion of modifications is expected by 3-15-63. Flight tests and flight certification are expected to be complete approximately 4-15-63, after which the aircraft will be available for use by NASA. ✓
- \* 3. C-5: S-IC Contract Status - According to verbal information on 2-1-63 the Contract NAS8-5608 has not yet been approved by Hdqtrs. The contractor will be authorized by Contracting Officer's letter to continue for one week. ✓  
Deliverable S-IC/F-1 Engine Peculiar GSE - A final compilation for MSFC, Michoud, MTF and AMR is being drafted to be included in F-1 engine Production Contract. The contract is presently scheduled for negotiation within the first two weeks in February 63. A letter contract has been issued to contractor for initiation of deliverable items. ✓  
S-II - Dr. Seamans (NASA) visited NAA/S&ID on 1-30-63 to discuss the S-II Program with Mr. Parker and to review the construction status of the Seal Beach Vertical Assembly Facility and the common bulkhead fabrication facility. ✓  
\* On 1-30-63, an additional \$21.8M was forwarded to NAA/S&ID to fund the S-II program through 6-30-63. This constitutes final funding action for FY 63 with the exception that \$5.4M is being reserved to fund program changes, engineering changes, and a potential facilities overrun. ✓  
S-IVB - On 1-29-63, M-ASTR, M-QUAL, DAC, & M-SAT agreed that DAC would be permitted to use germanium components in their GSE and be authorized to purchase unscreened components for circuit boards for two sets of GSE (Systems Integration Area and Huntington Beach check-out). Both agreements are subject to MSFC approval of the DAC list of parts. The chairmen of M-SAT-WE (Mr. Fichtner) and M-SAT-WC (Mr. R. L. Smith, M-QUAL) were requested to propose a MSFC position on the use of screening specifications for procurement of components. ✓
4. Your request on 1-28-63 notes: C-1B - Draft of cost, performance and reliability data presented to Headquarters for transmission to Air Force was furnished with separate memo on 2-1-63. ✓

B 2/5

STATUS REPORT  
G. E. APOLLO SUPPORT OPERATION IN  
HUNTSVILLE, ALABAMA

Last week the total G. E. personnel in Huntsville increased by 8, so that there are now located here a total of 118 G. E. personnel. The utilization of these people is shown in the table below. This total is still lagging considerably behind our present requirements, which are also shown:

Date:	On board as of		Requested as of:	
	February 1, '63	February 1, '63	Feb. 1, '63	March 1, '63
TOTAL	118	230*	276**	
Checkout	65	176	197	
Integration	11	12	14	
Reliability	3	20	22	
LOC	5	12	13	
All others	34	10	30	

\* Firm requirements per Task Orders  
\*\* Forecast

Due to MSFC complaints about the lag in G. E. build-up, Messrs. Shetler, Records and Wright of G. E. visited the SATURN Systems Office and committed 165 additional people to MSFC-LOC support by 3/15/63, 100 of which are to be available by 3/1/63. Total manpower on 3/15/63 is scheduled to be 276, and detailed in the table above.

To support this commitment, G.E. has extended written offers to 181 people during the past week and 37 have accepted. (These figures are up from 101/20 for the previous week) Recruiting for all other GE-Apollo Support Operations (Daytona, Houston, Cape), has been stopped during the Huntsville campaign.

Approximately 30 G.E. men, many accompanied by their wives, were flown into Huntsville by chartered aircraft last Thursday for local interview and orientation. Walter Wiesman "sold" the community and cultural activities at one of these meetings.

Also discussed at the Shetler meeting were the facility requirements in support of the Checkout Fabrication tasks. These tasks are not as yet approved by OMSF, however G. E. was requested to prepare a detailed plan for such a shop facility in connection with engineering support activities. A decision will be made after the G. E. plan has been examined.

Attachment 1

NOTES 2-4-63 MAUS

B2/5

1. COMBINED STAFF AND BOARD MEETINGS - I have assigned Ray Kline to handle the agenda and publish minutes for future Staff and Board Mtgs. ✓

2. OMSF SCHEDULING AND REVIEW PROCEDURES - The final portion of MSFC submission to the OMSF Program Schedules as requested by Mr. Holmes, was delivered to OMSF January 31. ✓

Reference agenda item 6 (Schedules and Scheduling Procedure) in the January Management Council Meeting, we are preparing guidelines for updating the schedules for the February 26 & 27 Mgmt Council Meeting. ✓

An internal MSFC presentation and dry run is scheduled for 8:30 February 19 in the Director's Conference Room. ✓

3. REVIEW CYCLE FOR RD&O INSTITUTIONAL REQUIREMENTS - We have been advised that headquarters (Brainerd Holmes) will hold future reviews of installation RD and O institutional requirements on a quarterly basis. Our next submission with supporting data (which must include as backup data, a discussion of planned use of previously authorized resources as compared with our additional requirements) is due in headquarters by April 10 in order to be included in the next review. ✓

4. DISCUSSION WITH REPRESENTATIVE MILLER - We will have a briefing folder for your discussion with Representative Miller delivered to you in Washington. ✓ *I hear this meeting is off. B*

\* 5. OTDA PROGRAM REVIEW - Mr. Clarence Morrison of OTDA will be here February 7 for review of the OTDA programs. An M-CP representative will participate with Mr. Hoberg, M-ASTR, in these discussions. ✓

\* 6. PROPELLANT REQUIREMENTS - There has been a significant change in our propellant plans. It does not appear necessary to provide a small business set aside on LOX, and hence the total LOX requirement, 150 tons per day in first phase and 300 tons per day in second phase, will be obtained from the main supplier. ✓

7. MANPOWER - Don Cadle's office notified by phone that our FY 64 personnel ceiling would be 7492 permanent and 210 temporary; a total of 7702. A reclama, to get the 300 summer students added to the ceiling was signed by Mr. Gorman January 30. This would increase our temporary ceiling from 210 to 510, in both FY 63 and FY 64. Headquarters has forwarded a letter to BOB supporting our reclama. ✓

*H.M. suggest close coop. w. Laufe → This Man Council Meetg. provides golden opportunity to reconcile schedules & funding B*

B2/5

\* 1. S-VI STAGE (THIRD STAGE FOR C-1B) DESIGN GUIDELINES: Guidelines for the S-VI Stage study are being prepared. This should define the envelope which is available for packaging the S-VI Stage and associated guidance and payloads. ✓

260" dia?  
B

2. TITAN III - SATURN COMPARISON: Mr. Lawrence and associates of the Boeing Company visited on 1-30-63. It is suspected that the Boeing Company is trembling because of the anticipated visit by Secretary of Defense McNamara in about three weeks. There appears to be a connection between Secretary McNamara's visit to the Boeing facility and the TITAN III - SATURN comparison. *You bet there is! B*

\* 3. C-1 INSTRUMENT UNIT: The release of drawings for SA-8 and subsequent instrument units was originally scheduled for 12-15-62. Due to recent input by Manned Spacecraft Center, incorporating additional length of the payload to a total of 409 inches and a better definition of weight to be 22,500 + 6,600-pounds, the drawings were actually released 1-15-63; however, a notice was given on 12-13-63 that changes would be required to the window for ST-124. Information is being assembled now so that modifications may be made to the structure, and modification drawings are scheduled to be released 2-15-63. ✓

4. GENERAL: Mr. Charles Ellsworth has been appointed to serve on the NASA-Army-Navy Interagency Working Group for Design Automation of Solid Propellant Rocket Motors. ✓ *Shakes that is. B*

5. CONTINGENCY PLAN FOR APOLLO PROJECT: Dr. Shea's office is currently engaged in preparing a Contingency Plan for APOLLO. Their plan will summarize development problems which potentially can prove to be stumbling blocks in the project.

An attempt will be made to uncover the problems and to delineate backup or alternate approaches which can reasonably be undertaken to circumvent or by-pass these problems should they arise.

This activity was kicked off in early December in a brainstorming session in which I represented the Center.

Directives and the minutes of this meeting arrived this week. A copy of the minutes is attached. → *W.M.*

Mr. Hans Palaoro has invited the divisions involved to participate in a working level meeting this coming week.

I was not able to make this announcement at the executive session. ✓ *I'm sorry for my harshness. We just had to come to grips with that LOC / LVOB problem B*

6. SNAP 8 PROJECT: Reference NOTES 1-28-63 MRAZEK, paragraph 2, copy attached, see Attachment #3. Detailed drawings are available. ✓

7. KIWI B: Reference NOTES 1-28-63 MRAZEK, paragraph 7, copy attached. Members of this evaluation group from the Propulsion and Vehicle Engineering Division are Mr. Aubrey Smith, Mr. Garland Johnston, and Mr. Lowell Zoller. Mr. Walter McNabb from Test Division also participated. ✓

- Attachment #1: NOTES 1-28-63 MRAZEK
- Attachment #2: Minutes of APOLLO Meeting
- Attachment #3: SNAP 8 Project

B 1/31

1. USAF/NASA WORKING GROUP ON LAUNCH VEHICLE STRUCTURES: During the last meeting of this working group, the co-chairmen, Lt. Col. Marcus, and E. E. Goerner initiated discussion on the advisability of proposing to NASA Headquarters and the proper Air Force authority that the group be dissolved in the near future. The discussion during that meeting resulted in the general opinion of the group to continue the activity. Objectives of the group's activity, as stated in the charter, should undergo some changes. The membership list and the chairmanship will have to be changed. Present Air Force and NASA co-chairmen will have to resign from the group because of changes in their job assignments.

Final decision on this matter will be made during the meeting scheduled for 2-7-63 after the opinions and requirements of the sponsoring agencies are known. (I still think it should be dissolved.)

2. SNAP 8 PROJECT: Layouts have been started to adapt the SNAP 8 payload to the C-1B Instrument Unit. This work is being coordinated through the Vehicle Systems Integration Office.

3. SA-6 AND SA-7 INSTRUMENT UNIT: The SA-6 and SA-7 Instrument Unit has been reanalyzed due to higher loads caused by changes of the APOLLO. Longitudinal stiffeners will be required and additional 5/16 diameter bolts incorporated in both the upper and lower rings of the instrument unit.

4. MEASUREMENT OF SA-7 PAYLOAD: The Structures Branch coordinated with the Astrionics Division and Manned Spacecraft Center the requirements for measurements on SA-7 payload. The program was prepared to utilize the instrument unit telemetry to obtain APOLLO measurements, but is being held pending an agreement between Manned Spacecraft Center and Marshall Space Flight Center as to which agency will buy and install the equipment.

5. RIFT: We have been informed that Lewis Research Center (LeRC) is continuing in earnest with a proposal for a facility in which RIFT could be space tested without leaving the ground and eliminate, according to LeRC, requirement for a flight program. Dr. Silverstein is supposedly going to take this proposal to Headquarters within the week.

Rumors are floating to effect that RIFT is to be transferred to LeRC. We know of no basis for these rumors and have been unable to track them to source.

6. ROVER PROGRAM: Nick Golovin visited Lockheed recently, presumably to discuss possible missions for nuclear rockets. Lockheed reports that the meeting under the prodding of Golovin, degenerated into a soul-searching discussion of all identifiable problem areas of ROVER, both organizational and technical. Golovin was apparently impressed since most of the information he has received to date has come from Harry Finger. Dr. James Quill of Lockheed was scheduled to give the Nuclear Vehicle Project Office a detailed briefing on the visit on Sunday, 1-27-63, on his way to Washington to brief Harry Finger. Of significance, Golovin concurs in the desirability and practicability of nuclear missions but thinks the KIWI reactor is "15 years away." (And he might be about right.)

7. KIWI B: The evaluation of problems of the KIWI B (NERVA Reactor) has been broadened to include testing as well as structural and material problems. This Division and the Test Division are in the evaluation Group. Attached is a copy of the program ground rules.

8.  earmarking OF FUNDS: As requested by you, I informed Dr. Hardeyman of your decision and of the necessity to earmark funds not only for operation, engineering services, etc. but also Advanced Technology (Dry Lake Area) and Hydrogen Technology.

W.M.  
Request briefly B  
C if you prefer in short write up with sketch

W.M.  
I talked to Dr. Silverstein before about this. He knows the numbers but promised me to check

Who? (Name?)

Attachment #1: Ground Rules

Attachment #1

12502

: MINUTES OF APOLLO CONTINGENCY PLANNING MEETING  
AT HEADQUARTERS, OMSF, DECEMBER 4, 1962

## Attendance:

ME - Dr. J. F. Shea, Chairman  
 MES - Dr. W. A. Lee; Mr. W. B. Taylor; Mr. D. R. Lord;  
           Dr. M. Eimer, Dr. M. W. Lund  
 MEE - Dr. M. Yarymovych; Mr. E. Hall  
 MEG - Mr. C. W. Cole; Mr. G. Robillard  
 ML - Mr. M. W. Rosen; Dr. H. Hall  
 MSFC - Mr. W. A. Mrazek  
 MS - Mr. M. Savage  
 MSC - Mr. M. A. Faget  
 MM - Dr. G. M. Knauf; Mr. J. Nolan  
 MI - M. Liccardi  
 MP - Mr. W. E. Lilly  
 Bellcomm - Mr. W. D. Lewis; Mr. J. M. West

① Willy Mrazek

see my remarks

② Ernst Geisler

for your info,  
should interest  
de Fries, too.

## A. There are 4 major problem areas to be considered:

- I - Mission Profile (e.g. - launch on time, checkout in orbit, rendezvous, landing, reentry) ✓
- II - Subsystem Development (e.g. - specific problems on spacecraft, launch vehicles, GOSS; ground test, launch and checkout facilities; biomedical) ✓
- III - Gross program problems (e.g. - Launch vehicle delays, spacecraft delays, facility delays, performance incompatibilities) ✓
- IV - Gross Non-Apollo Problems (e.g. - failures in unmanned programs, Russians landing on moon first, loss of National support, Gemini-derived problems) ✓

## B. Class I - Mission Profile Problems

1. Narrow, infrequent launch windows (One/month vice every day) may present possible gains. Launch Vehicle is in "permanent readiness" with continuous checkout. (LH<sub>2</sub> stages can hold for 6 hours). This would present no apparent problem for spacecraft and also presents a potential saving on GOSS. Consider a direct approach rather than earth orbital injection. Consideration should also be given to a relaxation of a free-return

attachment # 2

- trajectory. The effects of single azimuth launch against costs in tracking and communications systems should be investigated. ✓
2. Launch Escape System - Probably no better way. ✓
  3. Engine-out capability - Now included in 1st and 2nd stages as an aid for selecting the abort point. A study is required to determine if engine-out capability is actually an asset or detriment comparing cost-benefit relation. ✓
  4. Guidance during Ascent - A suggestion was made to use the S/C guidance system as back-up to the Launch Vehicle Guidance system during ascent. Dr. Shea is to discuss this at the System Review Meeting. ✓
  5. After the LES is jettisoned, a contingency of an alternate escape system to SM propulsion does not seem warranted based on the results of tests using Atlas vehicles. ✓
  6. If the S-II fails, can the S/C be inserted into Earth Orbit by igniting the S-IV B? Can the S-II be staged from the S-IV B on command? ✓✓  
*Depends on when S-II fails B*
  7. Orbital stay-time of S-IV B - Involves problems on: (a) super-insulation for cryogenic storage, (b) guidance updating and (c) power supply. The S-IV B should have the capability of being checked out from the ground while it is in orbit. ✓ A study is desired on super-insulation for cryogenic storage in space. A study is required on maximum stay-time in orbit of S-IV B. ✓  
*→ We've got plenty of those B*
  8. After injection, bug is repositioned. No contingency plan identified. ✓
  9. Midcourse propulsion - Study required on alternate mid-course propulsion systems for SM to preclude breaking seals. Desirable to break seals at last possible moment because leaks can be a problem. Possibly stage SM propulsion system into trans-lunar and transearth. Might present dynamics and structural problems. Possible use of LEM propulsion system for abort after injection. Bears on free-return trajectory. || |

10. Meteoroid Protection - Study needed to verify validity of current estimates of the probability of meteoroid puncture using present model. MSC and MSFC have experiments planned using Atlas and Saturn. What is best means of verifying if model and puncture theory is correct? ✓
11. Radiation - To provide shielding CM weight must be redistributed. Equipment shift difficult because of L/D requirement. Study required to determine:
- (a) validity of current prediction techniques
  - (b) effect on CM L/D if equipment is relocated
  - (c) adequacy of current crew protection plans
  - (d) alternate personnel shielding methods (energy flux techniques)
  - (e) dose rate effects (high, low, average)
  - (f) validity of data-shielding models (including secondary radiation) ✓
12. Thermal (cold) problems - particularly when heat shield is pointed away from sun. Consideration of slow spin to stabilize heat. What are attitude control problems (programmed tumbling)? Is current passive thermal protection enough? What is adequacy of thermal control design? ✓
13. Weightlessness - Consider alternatives in spacecraft design; consider alternatives in training and conduct critical experiments. Considerations discussed to provide artificial gravity (put crew in LEM and tumble). Careful selection of astronauts discussed. What is effect of weightlessness of equipment, e.g., heat transfer characteristics. ✓
14. Deboost to Lunar Orbit - Backup to CM/SM using a LEM guidance system. SM and LEM propulsion systems will rely on ablative chamber. (See item 32) ✓
15. Lunar Orbit - Study to determine effects on Apollo trajectories of current uncertainties in selenodetic constants and what improvements can be expected. ✓
16. Lunar Descent - Equiperiod orbit vs. direct descent from 100 miles. LEM deep throttlable engine (8 to 1) vs. continuous burn (3 to 1, no restart). We should not require a beacon for

landing purposes, but it could be a by-product of Surveyor or LLS. If it is there, then no hardware modifications to Apollo Guidance System are required to use it. Beacons should be included in all subsequent unmanned payloads. Photographic surveillance of landing area mandatory. ✓

17. Lunar Landing - Major uncertainties of surface characteristics are dust, bearing strength, slopes, roughness, chemical activity, radar reflectivity. Impact on design requires landing gear adequacy and landing control. Tradeoff study is required between landing gear and hover time. ✓
18. Surface Operations - Need thermal protection in contact points on suit (feet, knees, gloves). Mobility must be maintained. Meteoroid protection should be considered. Landing in day or at night can be handled according to present plans, however, it is easier at night. Expendable coolant may be required in day time. Tilt of takeoff surface must be considered; that is, LEM may have to be leveled up. Consider using adjustable legs. Study required on in-flight and on-surface maintenance of LEM. ✓
19. Launch From Lunar Surface - Should emergency optical navigation be considered, such as putting a beacon in orbit approximately 200 miles ahead of Command Module? ✓
20. Lunar Orbit - Consider leaving LEM in lunar orbit (a) deboost back to moon, (b) instrumented for data gathering. Consider cannibalizing LEM equipment for CM. Take LEM or part of it back for backup guidance. ✓
21. Reentry - L/D of 0.5 may not be possible. Consider (a) reshaping heat shield, (b) select other landing site, (c) choose water landing. With aerodynamic braking L/D problem is very delicate. Skip trajectory into earth orbit results in better L/D. *in more range would be a better term (?)*  
a. Heat Shield Consider reexamining Project FIRE for responsiveness in helping solve problems such as cold cycling, mechanical

EF.  
Don't understand  
2. should  
what he  
means.  
B  
B

strength, bonding, etc., using Apollo materials. Our own test program is late.

- b. Reentry guidance is backed up by crude manual system within the CM giving safety, but accuracy is not as great.
  - c. Even though communication during reentry is not required according to MSC, feasibility and cost benefit relation should be investigated.
22. Earth Landing - Water landing can give relief in L/D problem. Water is best for landing, providing better shock attenuation. Additional shock absorbers are apparently not required. 2 B
23. Parachutes vs. Paragliders - Six months ago NAA was directed to eliminate paragliders. Now considering multiple guided chutes with alternatives (a) single chute, (b) small retro rockets.

C. Class II - Subsystem Development Problems--Spacecraft

24. Alternative exists of changing SM propulsion to cryogenic. SM propulsion system is more amenable to change than LEM propulsion systems. Although bigger  $\Delta V$  would result with LEM use. Consider using RL-10 A-3 for SM or LEM lander.
25. Meteoroid and Radiation Shielding - Changes would impose major delays. Attachable panels for meteoroid protection proposed. Study required on best technique for providing protection--at least partial shielding of particular vulnerable points. ✓
26. Early manned CM earth orbital tests would be delayed if SM propulsion system availability were delayed. Consider using solid retro-pack as back-up program. ✓
27. Attitude Stabilization Control - Consider a monopropellant back-up system of bi-propellant system reliability requirements. Similar problem, with similar consideration, should be given to LEM and S-IV B as well.

W. Mrazek  
hope you  
supplement  
this. B

28. Guidance - NAA and MSC recently completed study. Concluded that back-up system for LEM should be reduced in sophistication and performance. It is generally aimed at safe return (abort) rather than continuation of mission. Study needed. ✓
29. Life Support and Environmental Control - Problems with regard to 5 psi O<sub>2</sub> suit: Physiological effects--probably nil; fire hazard--may require change. Two gas system requires higher pressure restricting mobility. (Apollo guidelines call for shirtsleeve mobility.) O<sub>2</sub> in helmet and N<sub>2</sub> in suit poses problems due to leaks and waste management. Present system saves 200# in CM. Meteorite penetration may pose problem. We should have non-exposure contingency plan. Consider hard suits. Injured astronaut retrieval may pose problem. ✓
30. Communication and Tracking - 210' dishes for DSIF may become available for Apollo. Need study of possible benefits on S/C antennas and power requirements. ✓
31. Power - Current P&W program going well. Adequately backed up by GE (Gemini) system and Marquardt reciprocating engine on cryogenics. Consider using SNAP-type Alpha emitters for secondary power or back packs. ✓
32. LEM Propulsion - Ablative cooled chambers presently are not compatible with high Isp. Contingency plan should consider regeneratively cooled system (more weight) or reduced Isp (performance loss), or go to cryogenic regenerative system. Deep throttling may be complicating factor. If cryogenics are to be used, MSC recommended initial use in LEM landing stage because reliability of this stage has least effect on crew safety. ✓

Goes for  
SM also!  
B

see item 24  
B

#### Subsystem Development Problems--Launch Vehicles

33. F-1 Engine - Now has combustion instability problems. Increased funding in injector program might help. Solid Booster Back-up program would be very expensive but is probably only alternative; however, the F-1 must work. DOD/AF program ✓

should be sized as F-1 back-up. Study should be run considering alternatives of de-rating F-1 (1.3 M lbs) and using 6 engines instead of 5, or attach solid rockets. Problems with 6 engines--base heating, side-force, facilities cooling funds. Decision time is critical.

W.M.

Are we implementing this suggestion?  
B

34. J-2 Engine - During ignition transient, side kick forces occur in atmospheric tests. These might be helped by reshape bell (extension skirts). No instability problems. De-rating would not involve big penalty. ✓

35. Hydrogen Technology - Insulation problems. Possibly need more flight or ground experiments. Space storage is problem. ✓

Absolutely yes. B

36. Launch vehicle hardware - Might go back-up procurement routes for launch vehicle hardware. ✓

Small items, yes, total stages out, funding limitations!

37. Metallurgy - Redesign of C-5 using alternate materials might result in structural members which would ultimately achieve overall 2000# gain in payload. ✓

38. General - Should we go for an early lunar orbital mission for scientific or political purposes? ✓

D. Portions of Section II and most of Sections III and IV were not discussed due to a lack of time. ✓

W.M.  
Action?  
B

SNAP 8 PROJECT

At a meeting on January 23, 1963, Mr. Allman of Lewis Research Center requested Marshall Space Flight Center to make a feasibility study of using the C-1B vehicle to put the "SNAP 8" payload into a 500 nautical mile orbit. The project is being coordinated at MSFC by Mr. McClard of the Saturn Systems Office and Mr. Lawson of Vehicle Systems Integration Office, Propulsion and Vehicle Engineering Division. The payload is being developed by Lewis Research Center.

The Layout Section, Vehicle Engineering Branch, was requested to make a layout proposal showing the payload installed on a C-1B vehicle.

Mr. McClard requested the Aeroballistics Division to determine whether the C-1B vehicle is capable of placing the SNAP 8 payload into the designated orbit.

For the proposed mission, the S-1B and S-1VB Stages would place the payload into the 500 nautical mile orbit. A nose cone fairing will be required over the payload during ascent. This fairing will be jettisoned sometime during the powered flight (the exact time has not been determined). A sketch of the trajectory is attached.

The SNAP 8 payload is capable of generating 30 KW of power by means of a reactor, turbine, and alternator. The reactor is located at the most forward part of the payload (and vehicle) and is shielded from the vehicle by a mass of heavy metal (possibly lead). Radiator coolant tubes are installed along the support structure to dissipate the heat produced. The electrical energy will be dissipated in a payload which is attached to the lower end of the support structure.

A layout (SK10-3884) has been completed showing the payload assembled to the instrument unit of the C-1B vehicle. Prints of this have been given to Mr. McClard for coordinating with the Aeroballistics Division. When the aerodynamic loads on the fairing are estimated by the Aeroballistics Division, a fairing weight will be estimated for use in determining the maximum weight limitation for the payload.

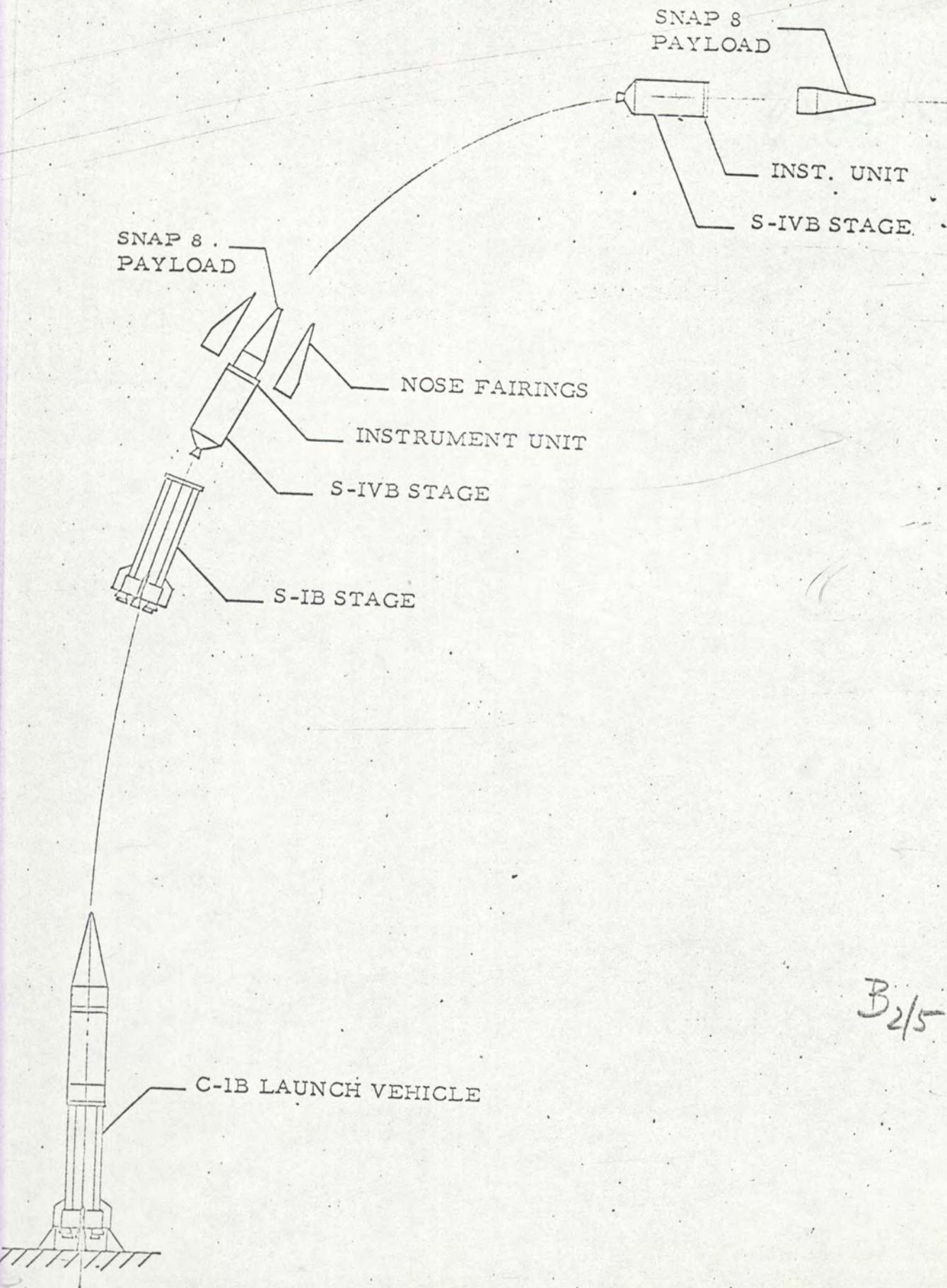
RPD

If the power is used to produce light, this flight could be used for the relativity experiment. Orbit is certainly high enough. How do you feel about this?

B 2/5

1 Enc:  
a/s

Attachment #3



B2/5

RUSH

B<sub>2/5</sub>

A.R.  
We reached agreement on Sat I and Sat IB missions but Sat V is still unresolved. Latest Shea plans still meets w/ violent MSFC opposition. We agreed in Man Council 29 Jan to hold a separate meeting on Sat V mission schedule!  
B

1. Flight Mission Assignments

a. In accordance with (Low's) Milestone Charts, the "Preliminary Apollo (Saturn) Flight Mission Assignments" will be issued 15 Feb 63 by Holmes under the titles "Saturn I, Saturn IB and Saturn V Flight Mission Assignment Summaries." My office is revising these charts to reflect agreements reached in the 29 Jan 63 Management Council Meeting. ✓

I will have a final review of those with Shea and Gautraud, etc. on 12 Feb 63 (before Shea's submission to Holmes for official approval and distribution). I will provide a set of slides for you.

b. I am proposing that Shea's System Review Meeting be the official medium for effecting changes to the Flight Mission Assignments, subject to final approval by the Management Council (as in the recent meeting).

2. Apollo System Test Plan - Project Level No. 3

The consolidation of this plan has been assigned to me. (Flight Mission Assignment Charts are part of it).

Therefore, I and staff members are in touch with your people - and my counterpart in MSC - to establish a useful instrument. Will keep you informed. ✓

3. Reference Item 2, Notes 1-21-63 Rudolph (Chrysler Corporation Presentation to Office of Systems)

"Chrysler Corp. is going to make a presentation to Office of Systems (Douglas Lord, Asst Dir. for Program Planning, etc.) on the Chrysler Lunar Vehicle R&D Program. The introduction will be made by L. Lawrence Jr. - Director of Chrysler's Advanced Projects Organization." ✓

Mr. L. Lawrence, Jr. indicates he would be pleased to give a presentation to you at your convenience (after the 11th of Feb 63). Regular presentation takes 1 1/2 hours. Please let me know how much time you will have available and when, and I will notify Lovell Lawrence. ✓

That's the roving surface vehicle I presume B

4. Steering Committee for Drawings & Design Standards ✓ → 1 hr. B

a. Above Committee under cognizance of Sloan's Office held meeting at MSFC last week.

b. One of my staff members attended as observer and reports:

Holmes has expressed strong interest in progress made by this Committee, intends to review status with Sloan in about two weeks. Concern was expressed by Sloan's rep in the apparent lack of centralized authority within the Centers (MSFC!); multiple representation by the Centers' various organizational segments result in lack of "single point" decisions.

→ That's strictly with (Contact Wozek!)

PSVE!  
B

B 2/5

\* 1. MICROMETEOROID PROJECT: Dr. Bisplinghoff, Mr. Ames, and Mr. D'Aiutolo were well satisfied with the organization of the Micrometeoroid Project at MSFC, and with our meeting on February 2. They requested continuing close, but informal contact between Mr. Ames' office and our Micrometeoroid Satellite Project Office. ✓

2. MMSP - Office: RPD has established, with the help of Central Planning Office, a "Micrometeoroid Satellite Project Office", which includes all full-time members of the project. The charter has been submitted to your office for signature. ✓

3. LLS MANPOWER FOR DR. SHEA: Messrs. Mrazek, Hueter, Williams (FPO), deFries, Bucher, and I met to discuss a possible loan of manpower to Dr. Shea in support of LLS planning work. I will meet with Dr. Shea on February 4 and offer a task force of 10 men, headed by deFries. The members of this task force will spend two to twelve weeks in Washington. ✓

4. MOVE OF RPD TO BLDG. 4481: We were informed on January 29 that RPD will not move into the new office building as previously planned, but into Warehouse 4481. Very unfortunately, we did not have an opportunity to present our case before this decision was made. We are trying now, together with Facilities Engineering Office, to accommodate RPD in the rooms available in Bldg. 4481. ✓

Hasty said you did.  
to him, that is.  
B

E.S.

RUSH

Did you consult with Geissler before committing us to de Fries??  
As far as I know he opposed this particular commitment vigorously!!

B

B 2/5

1. F-1 PROGRAM: An MSFC group of ten arrived at Rocketdyne this past week to assist in evaluating F-1 instability test data. This group will remain at Rocketdyne for periods of one to three months. ✓ Jerry Thomson of this Division will be the senior supervisor. ✓

A presentation to Mr. D. Brainerd Holmes on the F-1 combustion stability problems was held 1-31-63 in Washington. Mr. Holmes received the presentation very favorably and reemphasized that the F-1 is considered top priority within the Office of Manned Space Flight. ✓

On 1-30-63, a meeting was held at NASA Headquarters to discuss a deficit of approximately \$3.3 million in F-1 FY-63 total facility requirements. Top priority was given to the F-1 facilities requirement. ✓

An injector featuring a series of makeshift provisions designed to reduce oscillations on the liquid side has been successfully run on engine 009 three times. This includes one 114-second duration run. ✓

One of the injectors suggested by Dr. R. Priem, Lewis Research Center, and referenced in the recent communication via Seaman, Holmes, and you, was tested for the first time on thrust chamber stand. It went rough immediately and destroyed itself just prior to reaching full thrust. ✓

A second experimental injector was run on 2-2-63 on test stand 2A. This injector, incorporating a splash ring, was run for approximately 700-milliseconds mainstage with an explosion occurring in the dome area causing damage to the LOX line. Preliminary information indicates the probable cause to be contamination with indications that the run was stable up to the time of explosion. It is estimated that test stand 2A will be in operation within one week. This configuration is considered to be worthy of further R&D by NASA and Rocketdyne. ✓

2. J-2 ENGINE: Rocketdyne has been advised that no nozzle extension work will be accomplished for the current engine. The second altitude stand will be built to accommodate a 45-to-1 nozzle engine. This is with little extra funding and allows for future engine improvement. ✓

3. EXPERIMENTAL INJECTOR TEST PROGRAM: Hardware build-up and preparations for the in-house experimental injector test program in support of the F-1 engine combustion instability program are proceeding on schedule. Testing should begin approximately 2-15-63. The program will evaluate (in model size) the relative performance and stability characteristics of three experimental injector configurations - two concentric orifice designs and one micro orifice design. A fourth injector, modeling the present F-1 design, will serve as the reference standard. The combustion stability characteristics of each injector will be determined by pulsing the fuel feed line shortly before cutoff. All tests will be conducted at the 4,000-pound thrust level at 1,000 psia chamber pressure using LOX/RP-1 propellants. ✓

4. S-IV STAGE BATTLESHIP HOT FIRING: A full-duration hot firing with closed-loop propellant utilization system operation and LH<sub>2</sub> tank step pressurization planned for 2-2-63 was rescheduled for 2-5-63. ✓

Poor fellow!



INFO Copy(ies) to D. McCall, M-DEP-R+D,  
Cap Fortune

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON 25, D.C.

cy to Mr. Newby  
Mr. Shepherd  
Mr. Kent

FEB 7 1963

IN REPLY REFER TO: M-CM 9436.018



Dr. Wernher von Braun, Director  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Huntsville, Alabama

Dear Wernher:

In discussions with Captain Fortune regarding immediate problems at Mississippi Test Facility, he brought up the need for minimal support services pending selection of a plant support contractor.

It is my understanding that these services consist of a few guards and custodial people for the minor facilities that now exist at MTF. Should you elect to use Mason-Rust for these services, their manpower should be limited to about six to eight people on a temporary month-to-month basis. I would hope this arrangement will solve the immediate problem.

I am pleased to tell you that the material your staff prepared on the MTF technical and plant support requirements is of real assistance in reaching a speedy resolution of this matter.

Sincerely yours,

Brainerd  
D. Brainerd Holmes  
Director of Manned Space Flight

Harry  
He doesn't ask for it, see!  
B



# OFFICE OF DIRECTOR

MSFC ROUTING SLIP					
	CODE	NAME	INIT.	<input type="checkbox"/>	<input type="checkbox"/>
1	<i>Mason</i>			A	I N F O R M A T I O N
2				C	
3				T	
4				O N	

REMARKS

*For Notes of 2/18/63  
With Comments*



CODE <i>M-DIR</i>	NAME	DATE <i>3-6-63</i>
----------------------	------	-----------------------

1. "DRY LAKE" SUPPORTING TECHNOLOGY: In view of overall FY-1963 funding limitations, Saturn Systems Office has advised us that the 4.8M technology program, which had been set up to cover supporting research requirements in the "dry lake" area, cannot be implemented to the planned level. At present, approximately 1.3M worth of procurement actions have been processed through Saturn Systems Office to P&C on this program.

RPD reviewed the requirements on this program and determined that approximately .8M worth could be deferred until the next fiscal year without damaging the program too severely. Saturn Systems Office has questioned the appropriateness of including Advanced Propulsion Technology tasks (.9M) in this program. This question has not yet been resolved. After some more details have been clarified, SSO and RPD may ask you for a decision.

*I understand that you've reached understanding with SAT that we'll reduce the 4.8 to 3.8M*

*Correct?*

*E.S.*

*I'll have to see the task definitions to determine appropriateness. Links into Saturn project*

\*2. RESEARCH INSTITUTE: Research Institute support from NASA is still uncertain. Dr. Shelton asked Dr. Harvey Hall to look into the possibility that unnecessary delays are impending. If so, further pressure on the Office of Research Grants and Contracts may be necessary if funding is to occur before FY '64. We will keep you informed of further developments.

*its growth potential must be evident!*

3. ACTIVITIES OF APPLICATIONS OFFICE: On February 13, Mr. Thompson made a presentation to the Director of Industrial Applications, Office of Applications, NASA Headquarters, and members of his staff on the MSFC Applications Program. Three displays are being prepared in cooperation with the ME Division and Georgia Tech for the Office of Applications to use in presentations to Congress.

Contracts have been let by the MSFC Applications Office with Southern Research Institute to evaluate the impact of magnetic metal forming on the metal forming industry, and with Hayes Aircraft to prepare a welding handbook based upon welding developments at MSFC.

4. MANPOWER LOAN TO DR. SHEA'S OFFICE: Reply to your question on the NOTES of 2-4-63 (Attachment 1): Dr. Geissler agreed on January 29 to let Mr. deFries join Dr. Shea's staff on a temporary basis for not more than six weeks. Checking with Dr. Geissler again on February 8, I was assured that he is still willing to commit Mr. deFries for this limited time.

*I'll discuss this whole question with Shea again, suggest*

\*5. MSFC-OMSF RESEARCH PROGRAM: On December 10, you signed a letter to Brainerd Holmes, requesting improvement of the very unsatisfactory MSFC-OMSF research programming mechanics. So far as we can learn, a reply has not been received. Plans for the FY '64 Research Programs are now being made; the number of persons at OMSF with veto power for our research program is increasing, but we need somebody at OMSF who accepts responsibility for an early and expeditious implementation of our program. Our proposal in the December 10 letter is still considered the most desirable solution. Could you bring this to Mr. Holmes' attention? ACTION REQUIRED.

*You keep hands off till I'll see if you want to come out*

6. MICROMETEOROID SATELLITE PROJECT: Negotiations between the contractor (Fairchild Stratos Corp.) and MSFC continued through the entire past week. The contract will be signed by Fairchild on Tuesday of this week.

*no reply yet. 3/11/63*

Attachment #1 NOTES 2-4-63  
\*Attachment #2 Letter dated December 10, 1962

*Bonnie Please look up if reply has been received in either case place our letter of Dec 10 on my desk. I'll call Holmes*

1. MSPC - MICROMETEOROID PROJECT: Dr. Bieplinghoff, Mr. Ames, and Mr. ... were ... with the organization of the Micrometeoroid Project of MSPC, and with our meeting on February 2. They requested continuing close, but informal contact between Mr. Ames' office and our Micrometeoroid Satellite Project Office. ✓
2. MSPC - OFFICE: RPD has established, with the help of Central Planning Office - a "Micrometeoroid Satellite Project Office", which includes all full-time members of the project. The charter has been submitted to your office for signature. ✓
3. LLS MANPOWER FOR DR. SHEA: Messrs. Mrazek, Hlatky, Williams (EPO), deFries, Bacher, and I met to discuss a possible loan of manpower to Dr. Shea in support of LLS planning work. I will meet with Dr. Shea on February 4 and offer a task force of 10 men, including my services. The members of this task force will spend two to twelve weeks in Washington. ✓
4. MOVE OF RPD TO BLDG. 4481: We were informed on January 19 that RPD will not move into the new office building as previously planned, but into warehouse 4481. Very unfortunately, we did not have an opportunity to present our case before this decision was made. We are trying now, together with Facilities Engineering Office, to accommodate RPD in the rooms available in Bldg. 4481. ✓

Hasty said you did.  
 to him, that is.  
 B

E.S.

RUSH

Did you  
 consult with  
 Geissler before  
 committing us  
 to de Fries??  
 As far as I know  
 he opposed this  
 particular commitment vigorously!!

attach #1

B



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
GEORGE C. MARSHALL SPACE FLIGHT CENTER  
HUNTSVILLE, ALABAMA

IN REPLY REFER TO:

M-DIR

DEC 1 1962

Mr. D. Brainerd Holmes, Director  
Office of Manned Space Flight  
National Aeronautics and Space Administration  
Washington 25, D. C.

Dear Brainerd:

This letter is a follow-up to our discussion of the OMSF-MSFC supporting research program at the November 27 Management Council Meeting. During this discussion I pointed out that only six tasks out of about 200 requested tasks had been authorized for contract action to date. Considering that only four months are now left in FY 1963 for contract processing, and that about six months were lost while we were waiting for task approval and funding authorization by OMSF, we cannot help being gravely concerned about our supporting technology program. Many of the tasks of this program are of vital importance to our C-5 program. No less than one third of our FY 1962 projects, for which continuation funds were needed at the beginning of FY 1963, are still without funding authorization. We are now in severe danger of losing these projects.

This deplorable situation makes it obvious that a better system of program approval by OMSF is required. A brief summary of our efforts during the past six months to resolve this difficulty is attached.

Actually, we had to struggle with two distinct problems during the past year: an unworkable task approval system; and a lack of support in the area of Systems Technology Improvement, our "dry lake" area, in which research activity is most urgently needed.

Attch #2

Mr. D. Brainard Holmes

First, let me talk about the task approval system. It succeeded in giving us six tasks in six months, out of 200 requested tasks. This extremely cumbersome system, which included even Bob Seamans personally, was established for fear of wasteful duplication. In the past, not only NASA, but also DOD, ARPA, the Army, and other government agencies have shown varying degrees of concern over possible duplication in government sponsored research. I am very firmly convinced that the fear of the duplication spectre has cost our country a multiple in money, manpower, time, and frustration, of what this anti-duplication campaign may ever have saved by eliminating really wasteful duplication.

It has been my experience through many years that proposers of worthwhile new research projects are usually intimately familiar with all work going on in their professional fields, and that they have no ambition whatsoever to merely duplicate or repeat another author's work. If they do, this should be taken as an indication that they face a really critical research problem, and that a dual approach to its solution, by two teams and from two directions, is very desirable.

Besides, we should not forget that there are Chevrolets and Fords; there will be Saturns and Titan III's; and there were Sputniks and Explorers. If there should really be two \$50 thousand contracts underway for the development of a mass flow meter for liquid hydrogen, would it be worth a \$2 million per year campaign to avoid it? Upon closer scrutiny, we would even find that one flow meter is for use on static test stands, and the other one for use on space vehicles during flight.

The present procedure of task approval is a very unfortunate example of the situation where a man, or a Center, is assigned full responsibility for accomplishment, but without authority to take action.

I urgently recommend that responsibility and authority for task selection and for fund authorization be assigned to the Center Director. He is held responsible for the wise spending of much greater sums of money for development projects, facilities, and manpower. He should

Mr. D. Brainerd Holmes

DEC 10 1964

enjoy enough confidence from his superiors to spend much smaller sums for those supporting research projects which, in his judgment, are vitally needed to make his development projects a success.

Headquarters offices should give broad guidelines with respect to the areas of research and development in which Center activity is desired, in compliance with overall NASA plans. Furthermore, Headquarters offices should compile data of research tasks on an information basis, to be made available to all the Centers. However, this information function should not become a function of task approval and disapproval.

Second, I wish to talk about the "dry lake" problem. It turned out earlier this year that OMSF was interested in research projects immediately associated with current OMSF projects, while research tasks pertaining to far-out projects of the future easily found support by OART. However, most of the tasks on our supporting research program fall in between these two areas, where they formed the "dry lake of homeless tasks." Belonging to the area of Systems Technology Improvement, these tasks are orphans for OART and for OMSF. For MSFC, however, these tasks are in need of the most urgent attention.

For your convenience, I quote from the minutes of the November 27 Management Council Meeting:

"Dr. Shea said that the situation is apparently not under good control and illustrated this by discussing several of some 117 proposed MSFC studies which have not been picked up by either OART or OMSF this year.

"He suggested that we should consider dividing the research field into the following areas in future years. First, there would be the advanced system studies clearly falling under the cognizance of OMSF. The second large area would concern itself with research and technology in which there would be three subgroups: First, the far advanced supporting research and technology which would be funded by OART; second, that SRT which would be required to support current OMSF projects and would be funded by OMSF; and third, that which falls in the 'dry lake' area. He suggested that this latter area might be handled by budgeting a percentage of the overall program and allocating these funds to the Centers for

Mr. D. Brainerd Holmes

SRT considered necessary by the Centers. The percentage that would be budgeted for this area would have to be resolved by an 'intellectual decision' and might be in the neighborhood of 1% of the program."

It appears to me that something along this line is the only practical way to proceed. Unless the Centers are given direct control of a certain amount of money for research, we will always run into the "dry lake" problem. It seems to me that OART will fund research of a more long-range nature, and that OMSF must fund research in direct support of its development projects, and also research which will improve and advance the present state of the art on which these projects are based. Following Bob Seamans' wishes, it would still be possible, and even desirable, to give OART the responsibility of checking with OMSF and with the Centers to uncover areas of undesirable duplication. This checking, however, should not be done on a task-by-task basis, but only on the basis of broad areas of activity.

Funding for the "dry lake" area, as suggested by Dr. Shea, should be allocated to the Centers as a fixed amount at the beginning of the fiscal year. I would recommend that this amount should be one to two percent of the development program funds. Information on the use of these funds will be provided OMSF and OART as soon as decisions regarding research tasks have been made by the Centers. Also, progress and final results of these research tasks will be reported to OMSF, and to OART, on a periodic basis.

Acceptance of our recommendations would solve the two major problems in our research program implementation: the task approval problem, and the dry lake problem. It is too late now to recover any of the time and the manpower lost in FY 1963. However, if you could obtain approval of our recommendations from Bob Seamans soon enough to make them applicable for the FY 1964 program which is in preparation right now, we could relieve a considerable number of members of this Center of the frustrating job of "research program implementation", and reassign them to "research program execution"; we could begin our FY 1964 research program in July 1963 instead of December 1963; and we could approach our C-3 launching dates with much more confidence of success than we can at the present time.

Enc: a/a:

Copies to:

Code ML, Mr. Rosen  
and Mr. Smolensky  
Code MES, Dr. Lord  
Code MLT, Dr. Hall

Sincerely yours,

Original Signed by  
Werner von Braun

Werner von Braun  
Director

November 24, 1962 \*

BRIEF SUMMARY OF RESEARCH PROGRAM ACTIONS (OMSF)

- March 15: "Big Book" MSFC Supporting Research Requirements for FY-63 (task forms) submitted to OART, with copy to OMSF, and with request that OART and OMSF should "split the cake" and indicate funding levels to MSFC.
- April 11: Mr. Rees and personnel of the Marshall's Central Planning Office stimulated OMSF to indicate funding plans to MSFC.
- May 2: Dr. Stuhlinger and associates, Mr. Miles, and Mr. Downey visited OART to expedite coordination between OART and OMSF.
- June 1: OART representatives visited MSFC; we repeated our request for coordination between OART and OMSF.
- June 8: Mr. Richard Canright indicated that no guidelines for an OMSF-MSFC research program existed as yet; asked us to establish \$6.5M list out of "Big Book".
- June 19: Mr. Norman Rafel of OMSF gave us rough guidelines for OMSF program (\$6.5M).
- June 27: Mr. Miles of MSFC presented our \$6.5M program during 1st Quarterly Review Meeting at OMSF.
- July 18: Mr. Canright, upon our request, promised to authorize part of our 1st Quarterly funds for contract negotiation. However, this could not be done.
- July 28: Mr. Rafel submitted 2 lists of about \$2.M each (Propulsion and Vehicle Technology) to Dr. Seamans for task-by-task approval. Each list contained about \$1.M for MSFC tasks.
- July 31: Trip to Washington by Dr. Stuhlinger; Mr. Rafel did not yet have "a machinery to work with" for research program implementation. Each task, with details, must be authorized by Dr. Seamans.
- August 8: Dr. Lord, OMSF, visited MSFC and discussed our research program. Approval in general, but no progress of funding authorization.
- August 20: CPO prepared briefing for Dr. von Braun, for his discussion of research situation at Semi-Annual Management Meeting.

\* Last 3 items added to up-date this list to 12-3-62.

Enc. 1

BRIEF SUMMARY OF RESEARCH ACTIONS (OMSF) (Con't)

- August 23: Dr. Seamans authorized four tasks in Vehicle Technology (\$0.315M), and one task in Advanced Studies (\$0.400M). This amount (.715 total) is all that has been authorized by OMSF until now, November 26.
- August 29: Upon Rafel's request, a new \$1 million list was submitted for Dr. Seamans' authorization (with task-by-task details). This list has not been sent to Dr. Seamans as yet.
- Sept. 28: MSFC wrote to Rafel, expressed disappointment because second package had not been submitted to Dr. Seamans.
- Oct. 16: Second Quarterly Review Meeting. Dismal situation of OMSF-MSFC research program was presented by Stuhlinger. ("Dry Lake".) Rosen promised that "no control will be exercised below project level."
- Oct. 17: Dr. von Braun met with Mr. Holmes, discussed with him the research program situation. Mr. Holmes asked Dr. von Braun for package submission of OMSF-MSFC program.
- Nov. 7: The package requested by Mr. Holmes, with more detail information than asked for, was handcarried by Miles and Dunlap of CPQ to Rosen. It was unacceptable to Rosen because of lack of details which he wanted for his personal review.
- Nov. 8: Rosen called MSFC and indicated that Dr. Seamans was still insisting on task-by-task approval, and that Dr. Seamans requires more detailed information from OMSF than OMSF requires from MSFC.
- Nov. 19: MSFC received a letter from Rosen (dated November 5) saying, "We support MSFC in the concept of obtaining approval for supporting technology by project (i.e., Vehicle Supporting Technology and Propulsion Supporting Technology) rather than by individual tasks."
- Nov. 21: A complete set of task forms with all details, brought up to date by the Divisions in MSFC, and containing \$6.05M for Vehicle Technology and \$1.8M (with \$2.5 as an alternate) for Advanced Studies, was handcarried by Miles to Smolensky at OMSF. No reaction from Rosen received so far.
- Nov. 26: Dr. Stuhlinger followed up with a phone call to OMSF.
- Nov. 30: Mr. Rees called Mr. Rosen and learned the Research Program package was taken on Mr. Holmes' desk.
- Dec. 3: Dr. Stuhlinger phoned Mr. Smolensky, who said he expected Mr. Holmes to sign it "today".

1. ANALOG COMPUTER

The TACE-231-R Analog Computer has arrived and is being installed at the Computer Facility in Slidell, La. This console is expected to be operational within two weeks. ✓

*9am*  
\* 2. TELECOMPUTING SERVICES, INC.

The Telecomputing Services, Inc. has 40 personnel on board at the Computer Facility. Their projected personnel strength by the end of June is 45. ✓

*9am*  
\* 3. HOUSE SPACE COMMITTEE CONSULTANT

Lt. Col. Harold Gould, Corps of Engineers, visited Michoud Operations on February 11, 1963 to receive a general orientation and tour of Michoud Operations. Lt. Col. Gould is a consultant for construction to the House Space Committee. Lt. Col. Gould replaces Lt. Col. Peacock. ✓

4. VISIT OF LEAD TASK GROUP FOR PROJECT 60

Lead Task Group for Project 60 (Joint NASA/DOD project for establishing uniform field contract management) will visit Michoud Operations February 20, 1963 to receive a general orientation and tour of Michoud Operations. ✓

5. S-IC PROGRAM REVIEW

It is planned to have an S-IC program review at Michoud Operations on March 5, 1963. ✓

6. "Y" RING

Final cuts on the "Y" ring are presently being made with .150 inch for finish cut. Difficulty is being encountered with tool chatter and material galling. By use of various tools and smaller finish cuts, this problem is expected to be resolved. ✓

*9am*  
\* 7. AUGUST-PEREZ NEGOTIATIONS

Negotiations with August-Perez, who has been selected to do the A-E design for the engineering and office building, are expected to be completed this week. ✓

NOTES 2/18/63 DEBUS

B 2/19

No NOTES received from Dr. Debus this date.

B2/19

1. GUARDS FOR MTF

Brainerd Holmes letter of February 7th confirmed his statement to me that we could hire a few local people for immediate needs. Best way to set up a security and fire patrol seems to be with Hancock County, not Mason-Rust. We are moving in that direction. ✓

\*2. HELICOPTER TOUR OF MTF

pin

Bell Aircraft provided two helicopters for demonstration of their utility around MTF, on 14th February. It was a very illuminating, worthwhile tour. The scope of our fee area and buffer zone, the varied land management considerations, numerous plantations or estates (two with swimming pools and tennis courts) with which we must deal, and many other aspects certainly have not been evident from previous ground-level observations. Helicopter requirements for VIP transportation, to take injured to hospital, for surveillance of fires or before and after static-firings, will eventually warrant procurement by service-type contract. *Suggest you prepare a letter to Hq. requesting permission to contract for one. Shall*

WF

3. COMMUNITY DEVELOPMENT IN MTF AREA

Hancock, Harrison and Pearl River counties are underway, finally, in taking on industrial planners, civic development assistance, etc., to try to anticipate impact of MTO. This will necessitate close contact on our part. Marion Kent and I had encouraging discussions down there Thursday and I will spend latter part of this week talking it over with all three groups. ✓

*be glad to endorse it. Suggest you include definite contact suggestions*

Note: JPL has such an arrangement. Suggest you get details from them and propose a similar deal.

B 2/19

1. Major Cause of Vehicle Bending Moments: Recent Boeing studies show the engine deflection angle,  $\beta$ , to be primary contributor to vehicle bending moments during C-5 boost flight. These results are contradictory to P&VE statements that the major contributor is angle of attack. This problem illustrates the importance of a thorough establishment of optimum booster control criteria. Systematic related efforts hereto have been underway for some time in our advanced research contracts where we started off by analyzing so called "time optimal control systems" and redirected towards introduction of new parameters to be optimized, for instance linear combinations of angle of attack and engine deflection. ✓

E.G.  
Hope you've notified P&VE  
B

2. NASA Committee on Fluid Mechanics: Reference item 4 on Notes 2/4/63 Geissler, subject as above, (copy attached). The letter (copy also attached) from Mr. Gessow, Secretary of the NASA Research Advisory Committee on Fluid Mechanics, supports our previous comments.

\* 3. SA-5 Orbital Lifetime: The nominal SA-5 apogee and perigee of 368 km and 200 km respectively correspond to an estimated nominal lifetime of 12 days. Considering all predictable performance deviations and the uncertainty of the lifetime estimate, the probability of achieving at least one day lifetime may be as low as 85%. However, this estimated lower limit is very sensitive to the confidence level of the performance dispersions assumed. To be conservative with regard to lifetime we will have to change the SA-5 trajectory. Depletion cutoff and off-loading some ballast are being investigated. ✓

Jim

4. Lunar Logistics System: After Mr. deFries' visit to Washington last week and considering the brief analysis that was made in the MSFC Study Groups of the LEM Truck, he recommends that: (a) MSFC support the LEM Truck idea as the initial Logistics vehicle (extending staytime to two weeks). (b) That it be followed up with approximately 18-24 months spacing by C-5 LLS for more extensive exploration (staytime several months). (c) That MSFC and MSC jointly manage the LEM Truck vehicle with Houston making the LEM modifications--MSFC taking charge of the payloads and incorporating the G&C in the payload support structure on top of the descent stage. (d) That Marshall continue study of the C-5 LLS and enter in the Fall of 1963 into preliminary design with possible support from industry. *Shall discuss 20 Feb.* ✓

5. Study on Optimal Trajectory Programming: The enclosed report by Mr. Burns, MTP-P&VE-F-63-2, is another example of continued activities in our area which belongs clearly into the mission of Aero Division. (Please note the reference to adaptive guidance.) Mr. Burns works with Dr. Krause and in turn has some people working with him. The support by Computation Division for this work should also be considered. In addition to the psychological effect upon our people we should consider the effects on outsiders (see wide external distribution). I do not think that this helps MSFC in asking for more manpower. I urge strongly that these people be given a choice between joining Aeroballistics Division or changing their field of activity. *Let's discuss this again!* ✓

\* Attached to left side of folder.

B

1. Detailed V Shear & Turbulence Measurements for Control & Structural Studies: (a). Arrangements have been made with NASA Launch Operations Office at P. M. R. to conduct a series of detailed wind profile measurements using the FPS/16 Radar Spherical Balloon technique, starting in February. Cooperation of all organizations involved has been excellent. Due to P. M. R.'s interests in the program, the only cost to us is the price of the spherical balloons. Basically this is a research effort since we now have no vehicles scheduled for launch from P. M. R. ✓

(b) To our knowledge, the funds for the special FPS/16 Spherical Balloon Radar Tracking Facility requested by LOC in their FY-63 C of F Budget and approved by Dr. Seamans and OMSF, have not been released. This is a continuation of the delays experienced for the past 6 months. We understood in December that "this project required notification to Congress prior to release of funds" - (Agenda Item 6 of Dec. 1962 Space Council Minutes) - What do we do now? Our plans for incorporation of this facility into the C-5 prelaunch monitoring scheme are rapidly reaching a critical point in time. ✓

2. SA-4 Tilt Program: The tilt program to be flown in SA-4 has been finalized. The decision was made to fly on an eight engine tilt program biased for the mean wind (tailwind) for the month of March. The wind biased trajectory enables the vehicle to withstand about 8 m/sec more wind around the high dynamic pressure region of flight than that achieved by flying on an eight engine gravity turn trajectory program (75 m/sec compared to 67 m/sec). Aeroballistics Division will furnish Astrionics the tilt program for SA-4 by February 1, 1963. Astrionics feels the "S-shaped" tilt program under consideration for SA-4 might jeopardize the passenger flight of the ST-124 platform. Therefore, Aeroballistics Division has dropped this program for SA-4. ✓

3. Lunar Logistics Study: The next milestone in LLS work has been established as April 4th. A comprehensive MSFC report will be available by that date describing the mission and vehicle concept of the C-5 LLS. Description will be focused on the A Configuration although the other configurations will also be treated. C-1B 3rd stage (S-VI), lunar-return stage (R-III), and Cryogenic Service Module (CSM) will be shown as by-products. This document may then be used by the Special Project Office for the PDP Chapter entitled "Technical Approach". ✓

4. NASA Committee on Fluid Mechanics: Subject committee met at MSFC on Jan. 28 & 29, 1963. A copy of the agenda, and a list of attendees and guests is attached. The Marshall presentations were well received and triggered lively discussions. Some committee members (Hertzberg & Liepmann) felt that in the study of base heating phenomena, greater emphasis should be given to an attempt to solve certain simplified fundamental processes first and using them later for synthesizing complex phenomenon we are dealing with - as contrasted to the attempt to simulate the total process. While it was not made very apparent in what specific fashion this could be done, there was no argument about the desirability of a more academic approach in addition to our more heuristic method. But we had to point out that wherever there is competition for manpower & funds, the practical approach has to be given priority, even if it means getting solutions of a less general nature. (Maybe the Research Institute can be of real help in getting more fundamental answers.) A brief facility tour and a model display gave the committee members an impression of the size of vehicles MSFC has to deal with. ✓

EF  
Krat's  
LOC's  
comment?  
Suggest  
you ask  
Harry  
Gorman  
for  
personal  
assistance  
to  
break  
it loose  
B  
with  
direct  
landing  
capa-  
bility  
I hope!  
B



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
WASHINGTON 25, D.C.

IN REPLY REFER TO:

RRP

1 FEB 1963

B 2/19 7 FEB 1963

Mr. Werner Dahm  
NASA George C. Marshall Space  
Flight Center  
Huntsville, Alabama

Dear Mr. Dahm:

Dr. Resler and I would like to thank you, Mr. Riddick, Mr. Holcombe and all the other MSFC personnel for your hospitality and efforts in making our Fluid Mechanics Advisory Committee Meeting a worthwhile and pleasant experience. The information that was presented and the tour of your facilities was most informative and interesting and I am sure that the entire Committee shares this feeling. In fact, quite a few of the members made a point of telling me this.

In turn, I hope that the discussions following the talks will shed some light on the fluid mechanics problems involved in your booster program. Also, the discussions might stimulate the interest of the NASA Research Centers in such problems and could provide support for the initiation of an in-house basic research program in booster fluid mechanics at MSFC.

Sincerely yours,

A handwritten signature in cursive script that reads "Alfred Gessow".

Alfred Gessow  
Secretary, NASA Research  
Advisory Committee on  
Fluid Mechanics

4-1  
(A)

B 2/19

1. RIFT Control Studies: S-IC/RIFT control study results indicate that fin area should be increased from 75 ft<sup>2</sup>/fin to 140 ft<sup>2</sup>/fin in order to maintain same factor of safety as S-IC. However, safe flight can be obtained by flying when wind speed is less than 55 m/sec at q max. ✓
2. Working Group for Mission Control Center: Proposed membership approaches fifteen although we tried to keep the number down. A final list of names and a proposed charter will be submitted for your approval within one week. ✓
3. Flight Evaluation Working Group: A working group meeting was held in Culver City to discuss in detail with DAC the establishment of unique post flight trajectories for Block II vehicles. ✓
4. OFC Analysis by Bellcomm: Bellcomm has analyzed the RCA report on Operational Flight Control for Dr. Shea. They conclude that the advantages offered by OFC are out weighed by the penalties. They suggest that the area which appears most promising for continued study is an integration of the three on-board guidance systems, the ground-based tracking system, and the ground-based computers into back-up guidance systems. (Memo by Mr. Fordyce is attached). ✓
5. Centaur Wind Design Criteria: Mr. Marvin White, STL, visited MSFC this week to acquire a better understanding of wind design criteria. Lewis' problem of wind criteria for use in the Centaur program has not been solved, according to Mr. White. Mr. Silverstein stated recently, "I do not want to hear the word 'probability' used again; all I want to know is whether or not the Centaur will fly when the button is pushed." (Current wind criteria are based on probability levels.) STL has the job of resolving the problem and making recommendations to LeRC. GD/A still avocates the Avidyne approach of using a sample of measured wind speed profiles, rather than constructing synthetic profiles based on statistics of wind speed and gradients (as we do). The STL representative indicated that the recommendation will again be made to Lewis that the MSFC wind design inputs be used. ✓
6. Embedded Jet Phenomena: You might be interested in the fact that this phenomena, now recognized by the scientific community, was first recognized, identified and defined by personnel of our Aerophysics and Astrophysics Branch. Several outstanding investigators are now studying and incorporating this in their concepts and analyses of clear air turbulence, wind profile characteristics, etc. The physical mechanism which produces embedded jets, their relationship to the total wind field, probability of occurrence, etc., is still not understood. Other vehicle design groups, e. g. Douglas Aircraft, have since noted the existence of angle-of-attack excursion on past test vehicles which might be explained by encountering such phenomena during flight. ✓

E.F.  
 hope you coordinate this w/ Hansen's man. He plans to discuss direct CO-ax cable Houston - Huntsville Cape with MSFC B

Very interesting



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
WASHINGTON 25, D.C.

IN REPLY REFER TO:

M-C L 0520.009

February 1, 1963

TO : Marshall Space Flight Center  
Attention: Dr. Fridtjof Speer  
FROM : Office of Manned Space Flight  
SUBJECT : Operational Flight Control

*B2/19*

Three copies of the analysis of OFC by the office of the Director of Systems Engineering (MEE) are enclosed for your information.

You have done an excellent job in directing the study effort of RCA--particularly in view of the initial difficulties of orienting the RCA personnel to the problem at hand. Also the expeditious review of the study by ARINC under your direction was most beneficial.

In spite of the decision to discontinue further effort on the OFC, I am sure that the benefits already derived will enhance the reliability of the Saturn vehicles and, therefore, contribute measurably to the Manned Space Flight Program.

I enjoyed working with you.

*Richard A. Schmidt*  
Richard A. Schmidt  
Chief, Launch Support  
Launch Vehicles & Propulsion

Enclosures (3) a/s

cc: Capt. Holcomb

MLO/RASchmidt:es

B2/19

1. ARCHITECT-ENGINEER FOR MICHLOUD ENGINEERING BUILDING -

Our first meeting with August Perez and Associates to negotiate a contract for the design of the Michoud Engineering Building resulted in Perez making a strong protest to Congressman Morrison of Louisiana. His protest was based on (1) cost breakdown that we normally get from architect-engineers, and (2) he claimed that he was being browbeaten into accepting a lower fee. At Washington's request, I met with him on Wednesday of last week. We agreed to meet with him in New Orleans on Tuesday to negotiate a contract after he had an opportunity to prepare his cost breakdown. We will pay him a reasonable fee based on our experience at Huntsville. We do not feel justified in paying Mr. Perez a premium fee, and I have so advised Mr. Perez and Washington Headquarters. ✓

2. LOAD TEST ANNEX - Received teletype stating that additional funds would probably not be available until March 1. P&C contacted low bidder concerning extension of bid to March 10. Contractor would extend to March 1 but has not committed on going beyond that date. We may have to send a UA message on this item. ✓

3. MISSISSIPPI TEST FACILITY - As a result of fires springing up in the fee area, probably set by disgruntled Mississippians, I asked Fortune and Kent to approach Hancock County on the proposition that they provide under contract with Marshall a group of law enforcement officers who could protect the government's interest. Fortune and Kent met with the County officials last week. The County Board of Supervisors is meeting today to consider the proposition. If the Board of Supervisors adopts the idea, we are prepared to enter into a contract for the guard service. There are a number of advantages to this:

(a) It is probably cheaper than Mason-Rust guards.

(b) The guards supplied by the County will no doubt have authority to make arrests with prosecution by the County where this is necessary.

(c) Outsiders, whether the FBI, U. S. Marshals, or Mason-Rust, will probably meet with some opposition from the local people. Since Brainerd Holmes had expressed an interest in his letter of February 7 in obtaining these services from Mason-Rust, I tried to call Brainerd on Friday afternoon with respect to the above plan of action but was unable to reach him. I will get in touch with either him or Bothmer today to explain the situation. Our contract, if we make one, with the County would be an interim solution. However, we might want to consider perimeter guard service on a permanent basis, with our support contractor providing "interior" guard duty. In other words, Hancock County would provide about the same services as the AMC provides at the Arsenal, i. e., traffic control, road patrol, and the protection of NASA borders, etc. (Copy letter from Mr. Holmes attached.)

→ Not necessarily! He agrees with this solution, but would certainly make Sen. Stennis happier if he took Mississippians.



INFO Copy(ies) to D. McCall, M-DEP-R+D,  
Capt Fortune

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON 25, D.C.

cc to Mr. Newby  
Mr. Shepherd  
Mr. Kent

FEB 7 1963

IN REPLY REFER TO: M-CM 9436.018



Dr. Wernher von Braun, Director  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Huntsville, Alabama

Dear Wernher:

In discussions with Captain Fortune regarding immediate problems at Mississippi Test Facility, he brought up the need for minimal support services pending selection of a plant support contractor.

It is my understanding that these services consist of a few guards and custodial people for the minor facilities that now exist at MTF. Should you elect to use Mason-Rust for these services, their manpower should be limited to about six to eight people on a temporary month-to-month basis. I would hope this arrangement will solve the immediate problem.

I am pleased to tell you that the material your staff prepared on the MTF technical and plant support requirements is of real assistance in reaching a speedy resolution of this matter.

Sincerely yours,

Brainerd  
D. Brainerd Holmes  
Director of Manned Space Flight

Harry  
He doesn't ask for it, see!<sup>12</sup>  
B



B 2/19

\*1. SA-5 STATIC TESTING: Pre-static measuring calibration on SA-5 is continuing at the Static Test Stand with 532 measurements completed to date. Forty-six of these measurements were completed at the test stand. ✓

\*2. SA-6 PRE-STATIC CHECKOUT: Pressure and functional testing is continuing with satisfactory results. Pre-static measuring calibration is continuing in the Building 4705 pressure cell, with 180 measurements completed to date. Four actuators have been received and accepted to date, and all actuators are expected by completion of pressure testing and will be installed for roll checks in Building 4708. ✓

\*3. RIFT QUALITY PROGRAM: Considerable progress has been made by the contractor (Lockheed Missiles and Space Company) in the development of a satisfactory plan for the RIFT Quality Program. This is probably due to the fact that Lockheed has assigned a full-time man to plan development, and the Quality Assurance Division representative has been on hand to advise the contractor and review his efforts. ✓

\*4. S-II STAGE: The third Quality Assurance Interface Meeting was held in Houston, Texas in early January with representatives of the Manned Spacecraft Center and the Marshall Space Flight Center to define a common NASA quality approach to NAA, our contractor for both the S-II and Apollo. Discussions included NASA Soldering Certification Philosophy, Configuration Control, NASA Stamp Procedure, Government Source Inspection and Implementation of NPC 200-2.

We have reviewed an NAA/S&ID Budgetary and Planning Estimate outlining additional cost of \$570,000, due to difference of December 1961 version of NPC 200-2 and the latest April 1962 version. In addition to this figure NAA/S&ID has submitted a budget estimate for special processes involving soldering training and certification to both the MSC for the Apollo contract and the MSFC for the S-II program, which, when combined, exceeds 10 million dollars. A fourth meeting with MSC will tentatively be held on February 28 to resolve this unrealistic situation. A joint MSC/MSFC approach to the quality assurance problem would be most beneficial. ✓

\*5. QUALITY ASSURANCE TRAINING PROGRAM: Mr. James Koppenhaver, Director of Quality Assurance and Reliability, NASA Headquarters visited the Quality Assurance Division on February 14, 1963 to discuss the quality assurance training program and possible financial support by his office. NASA Headquarters has agreed to provide financial support for the remainder of FY '63 and FY '64. This training program would be utilized by inspection and engineering personnel of the entire NASA and should elevate the quality of inspection in all NASA Centers. Twenty courses are planned.

✓ Mr. Gran: I think marking all 5 items for Holmer may be overdoing it a bit. Jan 2-18

B 2/19

NOTES-HAEUSSERMANN, 2/18/63

1. MSFC TO CONSIDER REMOTE STATION ASSOCIATED WITH MSC INTEGRATED MISSION CONTROL CENTER: On 2/20, members of the MSC will present a description of their proposed Integrated Mission Control Center (IMCC). The following day personnel of both MSFC and MSC will discuss the IMCC approach, and MSFC will initiate discussion of the possibility of establishing a remote station at Huntsville. The purpose of this station would be to conduct orbital checkout of the S-IVB Stage and Instrument Unit directly from Huntsville. This station would be connected, presumably by coaxial cable, directly to both the Houston IMCC and Cape Canaveral (it is assumed that the Houston-Cape Canaveral link will pass very close to Huntsville: this assumption will be discussed with MSC). The advantage of this approach also will be discussed. *No discussed by phone B*

2. STATUS OF CRYOGENIC GYRO RESEARCH: During Dr. Bisplinghoff's visit, you remarked that more satisfactory R&D funding would have helped in having this activity further advanced than it is today. Actually, from the viewpoint of feasibility, application of this technique looks very dim.

By the end of the present fiscal year, total expenditure for the activity is in the order of 1.0 M dollars. Considerable progress has been made in investigating the behavior of superconductivity in materials and prototype gyros, but the cryogenic gyro looks to be more remote than it did four years ago. During the last Status Review Meeting (at G.E., Dec. 1962) we decided to spend the balance of allocated funds on further material research instead of improving the present prototype. Actually, an improvement cannot be obtained if the knowledge about superconductive materials, particularly their critical field strength and losses as a function of a.c. and d.c. fields, cannot be widened, and if the present limitations cannot be removed.

I should mention that the results of the superconductive behavior of materials for gyroscopic applications are not applicable to cryogenic digital computers because different characteristic properties are required in both applications.

From a research viewpoint, I am still in favor of continuing our contract with G.E. ✓

Belig

\*1. S-1-5: Firing preparations have been delayed to remove engine H-5006 (position 4) based on retrospective review of Rocketdyne's "green-run" pump data. Unsatisfactory No. 3 roller bearing may be present; therefore, Rocketdyne recommended removal. Initial firing will slip approximately five days, to week of 2/25. Propellant loading test has been completed and corrective actions are being taken. ✓

\*2. H-1 TESTING, MSFC: Engine, S/N 1022 (165K, SA-4 spare), was cutoff on Saturday, 2/9, by rough combustion monitor at eight seconds of a planned 40-second firing. Damage was confined to injector and thrust chamber. Unusually high lox injector delta P was measured on this firing in comparison to the last firing on this engine at Test Division. Possibility of plugged LOX injector was confirmed by finding unusual amount of material identified as dessicant in the lox pump. Test facility had been thoroughly cleaned and inspected prior to and after this firing without finding any unusual contamination. Conclusion then is that dessicant was in this engine when delivered to Test Division, and that it entered sometime after previous firing and before this firing. Remedy is to restress carefulness on the part of people. ✓

3. RL10A-1 TESTING, MSFC: A 20-second duration test was successfully run on the RL10 engine with the diffuser at atmospheric pressure. Measured side loads to the engine under start were of the same magnitude as when the engine was fired with vacuum in the diffuser system. This test indicated only that static test programs possibly could be run at sea level conditions, but additional testing will be necessary to prove feasibility. ✓

K.H. Suggest not to assign these funds

4. MTF: Mobile District is awaiting approval of Chief of Engineers Office to award S&P a contract for the final design of the Saturn V test complexes brick and mortar. Informal information has been received that funds for studies of future stage (NOVA) vehicle test programs at MTF have been approved with authorization anticipated late February or early March.

\*5. Negotiations with L&N Railroad for laying railroad spur to the MTF southern boundary have been concluded and contract has been forwarded to L&N for signature. In the meantime, the Southern Railroad has submitted a proposal to MSFC offering a spur line to the northern boundary of MTF at no expense to, nor guarantee by, the government. Consideration is being given for dual railroad service at MTF. ✓

to Corps of Eng. but use it for contracted handling studies in coop w/ Koelle B.

5. GSE SWING ARMS, LC-37B: Preliminary tests were satisfactorily completed on swing arms No. 2 and 3 for use during the wet tests on LC-37B with SA-D5. Additional tests remain to be run prior to these arms being considered satisfactory for use with SA-5. Arm No. 1 has been shipped to the Cape and arms No. 2 and 3 are being prepared for shipment on 2/26.

The second set of swing arms are being installed in the test position and testing is scheduled to start on 3/1. ✓

6. MARINE ACTIVITIES: Barge PROMISE returned from a roundtrip to the Cape, requiring 28 days, 2/17. This turn-around during one of the worst weather months of the year was made to evaluate roundtrip scheduling when shipping schedules are denser. ✓

B 2/19

1. ORBITAL DOCKING SIMULATION PROJECT: The system which can now be demonstrated simulates a complete instrument controlled maneuver, from a range of 30 KM to contact. A visual display of the position of the target represented as a point on a simulated window is also provided. No attitude variations of either vehicle are simulated. The major axes of the two vehicles are held parallel to each other throughout the maneuver. When the system is completed in April, attitude changes will be included and a realistic presentation of the image of the target vehicle will be provided. Demonstration of the complete system at that time would be more interesting.

H.H.

OK, please notify me  
B

H.H.  
Very good.  
Heartily endorsed and encouraged!  
B

2. LUNAR LANDING SIMULATION PROJECT: At the request of Astrionics Division, some investigations of the problem of simulating an earth controlled lunar landing have been made. The major problem is simulating an image of the lunar surface as it appears to a television camera, in a vehicle descending to the surface from an altitude of 1000 KM. A breadboard flying spot scanner system is being improvised which will permit simulation of a portion of the descent (altitude variation of 2:1) and test the feasibility of this approach. Preliminary results are expected by March 1. ✓

- \*3. ANALOG COMPUTER INSTALLATION AT SLIDELL: The first console of analog computers has been installed at Slidell. The remaining three were checked out at the manufacturer's plant in New Jersey last week and will be installed at Slidell the week of February 25. Four Computation Division personnel were at New Jersey, and two were at Slidell checking these computers last week. ✓

4. IBM 7090 CONVERSION: Computation Division's 7090 Nr 1 was converted to a 7094 during the period February 5-13. A sample tape containing a cross section of Computation Division problems was prepared and run on the 7094. It resulted in about 37% saving in machine time using the 7094 as a 7090. When our problems are converted and using the 7094 features such as floating point double precision hardware, more index registers, etc. the time comparison will be much greater especially on those problems which have a lot of computing and not much tape handling. The second 7090 will not be converted to 7094 until after the SA-4 is launched and reduced. ✓

- \*5. ADP COMPUTER EVALUATION AT MSC: Two members of the ADPS Branch recently visited the Manned Spacecraft Center to assist in the evaluation of their ADP computer. Their participation was requested by Mr. Eugene Brock, Director of Computation and Data Reduction Division, who formerly was the Manager of the General Electric Huntsville Computer Center here. The Technical Evaluation of all computers proposed resulted in the following being recommended as highest IBM 1410, Honeywell 400, and NCR-315. The final selection was left to the Manned Spacecraft Center. ✓

2

6. PERSONNEL: Mr. Moore, Data Reduction Branch Chief has resigned, more on this next week. ✓

B 2/19

\*  
gem  
1. SATURN C-1B/3RD STAGE: The OSS/MSFC Spacecraft/Saturn launch vehicle meeting will convene at 9:00 A. M. February 21 in the Director's conference room. You are tentatively scheduled to Welcome (See attached Agenda). Confirmed visitors include Mr. Cortright, Dr. Morrison, Mr. Nelson, Mr. Salmanson, Mr. Harth, Mr. Johnson, of OSS, Mr. Taylor, OMSF, Mr. Stewart, Mr. Hurlan and Mr. Blomeyer, JPL. A dry run of the MSFC presentations will be made February 19 at 1:00 P. M. in the conference room, Building 4481.

omit  
gem

Work has begun on a preliminary Project Development Plan for the conduct of the C-1B/3rd Stage study. OSS has requested submittal of this PRDP by February 28 and it will be used for the preparation of the Project Approval Document. ✓

Have attended this

2. LUNAR LOGISTICS SYSTEM: Planning effort continues to organize the support by the Divisions in the preparation of a preliminary development plan. The extent of the exercise will be determined when the decision relative to LLV is established. During the past week, development costs presented in the December letter to Dr. Shea have been revised and will be discussed in a meeting with Dr. Rees on Wednesday. In addition, in preparation for the meeting with Dr. Rees, Mr. deFries, in coordination with our office, will discuss the total information to be considered as a final pitch to Headquarters to defend the LLV approach. We are also preparing for discussion the recommendation that MSFC be assigned management responsibility for the Logistics Program even if LEM is selected.

H.H.  
Let's  
discuss  
this  
B

\*  
gem  
3. AGENA TRANSFER: The Agena transfer to Lewis continues in an orderly planned fashion. In the week of February 10, only part of the Agena personnel were either on TDY with Lewis people or stationed at Lewis. The rest were released by Lewis Research Center. In the week of February 17, the number of Agena/MSFC people support dropped to 7 as more and more initiative is exercised by Lewis. It is expected that MSFC support will be terminated in about four weeks. ✓

Enc:  
Agenda

B 2/12

\*1. HIGHLIGHTS OF THE PAST WEEK

gen

We had a presentation from Martin/Denver on the subject of thrust increase by secondary airflow (air scooping) which shows considerable promise for the future. Some experimental work has already been done at Langley and Tullahoma with positive results. Air augmentation requires some tricks, however, and the process is not yet fully understood. A very fruitful area for supporting research! We will follow up on it, together with P&VE and Aeroballistics. ✓

2. HIGHLIGHT OF THIS WEEK

We have scheduled a general discussion on Thursday with Dr. Wolfbein, Deputy Assistant Secretary of Labor, on the subject of scientific manpower and human resources. We want to discuss the possibility of our being concerned with this problem in some of our future system studies - where practical and appropriate. ✓

3. HEADQUARTERS STUDIES

\*  
gen

We have observed a tendency by Headquarters to plan more and more technical studies to be supervised by Dr. Shea's office, with emphasis on lunar activities. Also, Bellcom will contribute more and more to Government planning. Last week Mr. Lord's office denied our request for funds on a study entitled "Lunar Base Transportation Requirements." While this is not catastrophic, it is a matter of concern to us. This trend has to be watched and actively resisted. We cannot keep a competent staff at the Center if Headquarters continues to take over this function. Unfortunately, that is exactly what Dr. Shea is preparing to do. We'll have a general meeting on this subject shortly. I'm well aware of it, have just discussed it at site. H.H.K.

4. FY 1964 FUNDING SOURCES

Our funding support in FY 1963 is as follows with respect to Project Office distribution:

<u>\$10<sup>3</sup></u>	<u>Authorized</u>	<u>Requested, Not Authorized</u>
OART	865	100
OMSF (Shea)	675	200
OMSF (Rosen)	1950	300
Subtotal	3490	600
NOVA (Rosen)	3500	0
Total	6990	600

Mr. Lord had originally budgeted \$1,700,000 for MSFC studies; as yet only \$675,000 have found their way to us. This fact supports my point No. 3.

it's well aware of it, have just discussed it at site. H.H.K.

B2/21

1. S-IC Manufacturing:

\* Jan

a. (1) We are starting to fall behind schedule due to late design documentation from Boeing and due to new quality requirements such as use of dye penetrant inspection on all tank parts not "wetted" by Lox. New requirements such as dye penetrant inspection cause delays because they require additional equipment and tooling. (2) The welding station for gore segments (apex to knuckle) is now operational. Our main problem now is de-bugging the weld seam tracking system for the bulkhead assembly fixture. ✓

b. A team from Marshall visited Wichita this week and we are very pleased with the quality of the first gore segments manufactured. ✓ Boeing is presently attempting to hydroform some segments that have been pre-sculptured. The problem here is the unequal stretching of the material due to different thicknesses. Some interesting statistics on the hydraulic forming dies:

	<u>Gore Base</u>	<u>Gore Apex</u>
Die Weight	85 Tons	85 Tons
Clamping System Weight	14 Tons	12 Tons
Weight of Welding Rod	14 Tons	16 Tons
Miles of Welding Passes	16 Miles	19 Miles
Weight of Plastic Inserts	4.5 Tons	4.5 Tons
Forming Force	16,500 Tons	15,000 Tons

c. We were able to bring DAC and NAA personnel together at Wichita for informal discussions on gore manufacturing. We are investigating the possibility of having Boeing make gore segments for the S-II bulkheads from the existing dies at Wichita. Also this interchange proved helpful to DAC since they are involved in a similar program for the S-IVB. ✓✓

2. Facilities: The C-5 Mock-up shelter was turned over for beneficial occupancy and mock-up work is progressing in this area. ✓

3. Saturn I: Number 4 Engine on SA-5 had to be exchanged on the test stand due to turbopump difficulties. By working around the clock we hope to have the spare engine ready and prevent a schedule delay. ✓



\*1. SATURN I-B: The procurement plan for the S-1B stage was submitted to Headquarters for approval on 1-8-63. As of today, the plan has not been approved. ✓

S-IV Battleship - Due to technical difficulties during turbine spin test on 2-14-63, the test is now scheduled for 2-18-63 and the hot firing for 2-20-63. ✓

\*2. SATURN V: S-IC - It is anticipated that the contract will be ready to be delivered to Hq's for approval approximately 2-20-63. ✓

A task force has been formed to probe the problem of late documentation releases to support ME's S-IC schedule. Representatives of P&VE, Boeing and ME are studying ways and methods of "work arounds" and possible schedule impacts. ✓

Due to a decision to dye penetrant test S-IC structural parts in Wichita, etching facilities may be required. ✓

The S-IC Quarterly Review is scheduled for 3-5-63 at Michoud. ✓

Boeing has been notified that there will be a maximum of \$14,453,000 available to complete their plant modifications and other new construction items for FY 62, 63 and 64. ✓

S-IVB - A meeting between DAC, NAA and MSFC decided to increase the length of the S-IVB interstage by 3 inches to avoid the interference of the S-IVB J-2 engine with the S-II stage bulkhead. ✓

B 2/21

1. OMSF PROGRAM REVIEW

Arrangements have been made with OMSF for MSFC to have 15 representatives at the OMSF Program Review Meeting next week. ✓

Our updated schedule submission will be hand carried to OMSF Wednesday. ✓

We have arranged to brief you on this material tomorrow, February 19, 1963. ✓

2. PRELIMINARY FY 65 BUDGET ESTIMATE

Part I of the Preliminary FY 65 Budget Estimates, which includes dollar estimates for R&D and Coff for on-going programs thru run-out, is required to be submitted to the headquarters' program offices Wednesday, February 20. ✓

Next submission will be February 27 and will include manpower requirements and proposed FY 65 Institutional Facilities projects. ✓

\* 3. PERT  
gem

Arrangements have been completed for a 28 hour PERT workshop to be held here beginning March 25. Martin Offenbergl, who led the Executive Seminar on PERT, is scheduled to be the instructor. ✓

This course is designed for middle management type people, who work on a routine basis with PERT. Approximately 30 people will attend. ✓

We have been co-sponsors with MSC for the 9 PERT workshops that have been held in New Orleans during the last four months; 124 MSFC people attended these workshops. ✓

B2/21

1. APOLLO MECHANICAL INTEGRATION PANEL - THIRD MEETING: See attachment #1. ✓

2. COMPOSITE BONDED STRUCTURES: A Marshall Space Flight Center Steering Committee for Composite Bonded Structures was established, with Mr. G. A. Kroll of this division as chairman, to coordinate and direct the activities of three existing panels: ✓

- a. Composite Structures Panel, Propulsion and Vehicle Engineering Division.
- b. Working Group for Bonded Structures, Manufacturing Engineering Division.
- c. Committee on Bonding, Quality Assurance Division. ✓

W.M.

center coordination (MSFC)

MSC/LOC

Suggest to change designation. B

\* 3. S-II MEASURING PROGRAM: The proposed North American Aviation, Inc. SATURN S-II-2 measurement list has been reviewed. Comments to the effect that requested strain gages and bending mode measurements are not included have been forwarded to the Astrionics Division. It is strongly recommended that efforts be made by the Instrumentation Working Group to insure that these measurements are included in the measurement program. ✓

Kalder  
Häussermann  
R.J.I.  
B

4. SATURN V: The original release date (2-1-63) for the Water Evaporator Specification of the S-IVB Instrument Unit Cooling System has slipped because firm design data has not been received from the Astrionics Division. ✓

5. RIFT: Initial results from a Lockheed RIFT mission study indicate that the current propellant loading of 176,000 pounds is too high, and should be reduced. This reduction in size would considerably reduce the incompatibility in bending moments with the SATURN V boost vehicle. Study results are due the first week in March, and apparently are consistent with similar studies conducted by Mr. Orillion of this division. ✓

6. S-VI STAGE: Reference NOTES 2-4-63 MRAZEK, paragraph 1 (see attachment #1). Envelope for S-VI Stage is based on 260-inch diameter. ✓

7. MANNED NUCLEAR INTERPLANETARY MISSION: Preliminary analysis on Manned Nuclear Planetary Mission requirements for the 1975 period, along the lines of the EMPIRE studies, has indicated that the initial orbital launch requirements may be very large, i.e., on the order of two to four million pounds or higher. ✓

Attachment #1: APOLLO Mechanical Integration Panel--Third Meeting  
Attachment #2: NOTES 2-4-63 MRAZEK

APOLLO MECHANICAL INTEGRATION PANEL - THIRD MEETING

B 2/21

Structural and environmental design data were resolved for the Block II - Saturn I Vehicle. ✓

Interim Interface Control Documentation was accepted as generated by North American Aviation, Inc. until Marshall Space Flight Center generated documentation becomes available. ✓

A design study was generated for structural support of the Lunar Excursion Module on its four or five legs on top of the S-IVB. This might give more favorable overall structural weights. ✓

The Q-ball angle of attack meter will be flown for measuring purposes on all R&D vehicles and will have to contain its own adjustment and alignment provisions due to the tight tolerances which are not required for the Launch Escape System. ✓

A problem area exists in the dynamics spacecraft for SA-10. Manned Spacecraft Center cannot deliver a flight-type command module on schedule; Marshall Space Flight Center insists on this. The Saturn Systems Office and the Dynamics Panel will work this out. ✓

a few months ago they insisted on flying SA-10 manned! B

so does OMSF!

S-II Stage

The forward fuel recirculation scheme was decided upon. The LOX conditioning will be by natural convection. The boattail environment was settled (warm boattail). A heat shield design problem was uncovered. ✓

S-IV Stage

Contamination in LOX suction lines and possibly the engine was uncovered and postponed continuation of Battleship testing. Possibly all engines might have to be removed. Problems with the helium heater valves are still with us. Request to incorporate the high pressure backup system on SA-5 and SA-6 has been made to the Saturn Systems Office. ✓

Presume you are talking about the "saber" situation, meanwhile resolved?

B

WM

Hope the legs can take the accelerations towards end of boost!

B

1. Preliminary Flight Mission Assignments

On Thurs., Feb 14, 1963, Mr. Holmes "signed off" on the Preliminary Flight Mission Assignments for:

Apollo/Little Joe II  
Apollo/Saturn I

Apollo/Saturn IB  
Apollo/Saturn V

You will find that the charts depict the decisions of the Management Council and will therefore be satisfactory to you. Fifty copies will go to MSFC. In addition, I am furnishing you with a set of slides for your personal use. ✓

2. Apollo System Specification Review ("Bellcomm" Specs)

From Mon., 25 Feb, thru Fri., 1 March, representatives from Office of Systems Engineering and from Bellcomm will visit MSFC and meet with Palaoro and other cognizant members of your staff to review above. Part of the time, Mr. Gautraud (Director, Systems Engineering) and Mr. West (Bellcomm) will attend. I have apprised Mr. Neubert of these meetings. He approved. ✓

From 4 thru 6 March similar meetings will be held at Houston with MSC. ✓

3. Next Systems Review Meeting

The next Systems Review Meeting is scheduled for Wed., 13 March 1963 at MSFC in the Director's Conference Room. Tentative agenda is as follows:

Primary Item: LLS

Secondary Items:

- will Shea be here? A.R.  
If so, I'd like to attend. B
- (a) Flight Mission Assignments
  - (b) Unresolved System Specification Items (fallout from the Spec Review - See 2 above)
  - (c) Description of OMSF documents (Milestone Charts will be used as examples regarding activities of Office of Systems)

I have apprised Erich Neubert and the Saturn System Office. ✓

B 2/21

\* 1. F-1 PROGRAM: Test stand 2A (combustion chamber only) at Edwards Air Force Base was damaged on 2-2-63 due to an unusually long period of unstable operation. The stand was scheduled to be back in operation the week of 2-10-63. ✓

Three additional tests, scheduled for 150-seconds duration, have been fired with engine 009-1 and the 5U flat-face modified injector since 2-7-63. The first test was terminated at 133.5 seconds due to a small fire caused by a fuel leak in a high pressure flexible line. The second test was terminated at 108.8 seconds because the LOX pump seal leaked and cavity pressure exceeded the red-line limit. The third test was terminated at ten seconds because a facility pressure regulator exceeded the red-line limit. ✓

The F-1 Engine 009 was run two full-duration, full-thrust tests on Friday within a 12-hour period. All looks fine. ✓

Dr. Crocco will work on our F-1 problems about five days per month. We are trying to rush his contract through. ✓

\* 2. RL10A-3 BATTLESHIP TESTING: We have learned the cold-flow spin-up test at SACTO was not run on 2-16-63 because of overtime restrictions (not enough people on the job on Saturday). The earliest hot firing now has slipped to 2-20-63. Is there anything we can do? ✓

SAT  
→ ?  
B

3. H-1 PROGRAM: Engine H-1022, allocated as the spare inboard engine of SA-4, being hot-fired at Power Plant Test Stand on 2-9-63 experienced a rough combustion cutoff at about eight seconds. ✓

Severe injector and thrust chamber damage resulted but this appeared to be the extent of the damage. An internal LOX dome fire triggered by contamination is one possible cause. The engine was damaged beyond use, therefore, the decision was made and documentation has been released to use Engine 1030 as the spare inboard engine of Vehicle SA-4. SA-4 is the last flight with non-baffled injector. ✓

\* 4. J-2 PROGRAM: Engine system testing for this report period consisted of two successful tests for durations of 50 and 220 seconds. ✓

One mainstage test for one second duration under simulated altitude conditions (80,000 feet) was also conducted. ✓

5. RL10 PROGRAM: An RL10A-1 engine was fired on 2-8-63 under initial sea-level conditions into a diffuser. Diffuser self-pumping started satisfactorily and the test was successful. This test demonstrated the ability to fire an RL10 engine at sea level without a steam ejector. ✓

Sixteen low idle-mode firings of the RL10 engine have been conducted to date. During these tests, the engine was started in the idle-mode, cooldown of the pump was accomplished during idling, and the engine was accelerated to full thrust. Thrust was then decreased to the idle mode prior to shutdown. ✓

6. RL10 ENGINE IMPROVEMENT PROGRAM: A number of improvements have been successfully ground-tested for adaption into the production version. The earliest delivery for such "modified" engines will make them fly first in SA-111. The significance of this flight makes it undesirable to introduce any modifications without good reasons. Unless modifications are introduced now, I question advisability of incorporating them at all. ✓

So do I  
B

FEBRUARY 25, 1963

*gan*  
\* 1. PROJECT 60

The lead task group for Project 60 visited Michoud Operations on February 20, 1963. The purpose of their visit was to receive a briefing on the organization and mission of Michoud Operations. ✓

2. S1-C QUARTERLY REVIEW

A quarterly review will be held at Michoud Operations on March 5 and 6 for the S-1C stage. ✓

*Will not be able to attend*

3. "Y" RING

The first "Y" Ring was finally completed on February 19, 1963 and accepted for MSFC by Michoud Operations quality representatives. The requirement for die penetrate inspection was waived by Manufacturing Engineering Division. The ring is scheduled to be "on dock" at MSFC on or about March 1, 1963. ✓

*gan*  
\* 4. FOUNDATION FOR THE SA-8 ENGINE ALIGNMENT FIXTURE

Engine alignment fixture is complete and the installation of the alignment fixture has begun. The estimated completion date is on or about May 1, 1963. ✓

NOTES 2-25-63 DEBUS

B 3/1

1. SA-4: Prelaunch checkout of Saturn SA-4 is proceeding on schedule with no problem areas existing at this time. ✓

Diodes?! B

\*  
Dismantling of the CTL equipment is in progress with equipment disposition waiting instructions from MOAMA. A representative from Aerospace has contacted LOC to obtain information for a study contract utilizing the available Jupiters as boosters for space vehicles. Three upper stages are considered: Agena-B, Delta and Able Star. ✓

Willy  
Mozack  
Fy. B

3. Military Tour Extensions: Rocco Petrone's tour with LOC has been extended for three years. Ray Clark's tour has been extended for two. ✓✓

B 3/1

1. CORPS OF ENGINEERS MATTERS

Thursday a. m. 21 Feb. I visited Mobile District Office, (MDO)  
C of E. Significant items discussed were:

- \*  
Jan a. Custody of real property at MTF - MDO holds this now but will turn over to us when we are ready to assume responsibility, probably next Fiscal Year. ✓
- b. Land Management - NASA Hdqtrs <sup>not familiar with this letter! B</sup> letter on this was shown to MDO. They asked that we define what we want them to do, then they can comment better, but they do have somewhat similar set-up at certain reservoirs. They also suggested I talk to Col. Davidson, RSA, about Post Engineers duties. ✓
- c. Fire losses - \$4200.00 in wages have been spent fighting fires instead of working on design projects at MTF, recently. ✓
- \*  
Jan d. Criticality of schedule for S-II stand <sup>Subdrump + Parcel</sup> - (they will make presentation to MSFC on this tomorrow but MDO staff felt S&P could not do all their other jobs concurrently and meet S-II BOD. <sup>beneficial occupancy date.</sup>

\*  
Jan 2. INSPECTION OF NAVAL CONSTRUCTION BATTALION WAREHOUSES AT GULFPORT

Thursday p. m. I looked these over. They can not now lease us a complete warehouse but offered to accept, preserve, store and issue when required any material we want to send. 120,000 feet of dehumidified storage, 300,000 square feet of enclosed area, are available, for machine tools, construction materials, instrumentation needs, etc. Nav-Compt manual specifies reimbursement procedures. ✓

3. INTERSTATE HIGHWAY 10 DISCUSSIONS

Friday both Harrison and Hancock Company personnel indicated a common stand to have Is 10 routed directly East from presently planned crossing of East Pearl River, tying in with State Highway 43 and 90. The latter should be 4-laned to Bay St. Louis bridge. This would give 4-lanes across most of Mississippi coast and offer a good interim solution until remainder of Is 10 can be built around Bay St. Louis circa 1972 when bonds are retired on present bridge. It is in our best interest to support this since it will be further from Fee area than presently planned, <sup>if Bureau of Public Roads</sup> says it will not require further funds from us. State Legislature will meet in special session in next few days on this. ✓

- \*1. Shroud Design for S-I/S-IVB Interstage: Per your suggestion, we have conducted a design study to clarify the shroud design for the S-I/SIVB interstage (coke bottle shape vs. cylindrical shape). Our recommendation is to use a cylindrical fairing. Recent DAC study results make the same recommendation, and show that a cylindrical fairing is optimum with respect to payload. ✓
2. Flight Evaluation Working Group: In connection with our commitment to send Saturn Block II postflight trajectories to DAC within 36 hours after launch for flight evaluation purposes, a successful data transmission test via TWX was performed on February 12, 1963, between Culver City and Huntsville. Out of 2,000 TWX characters transmitted, only one error was detected after a round trip message transmission. ✓
3. Conversation with Mr. Charles Stuart of OMSF - 2/15/63: Mr. Stuart is a member of Doug Lord's office. He called us asking whether Marshall would be willing to support them with a study on the following subject: The C-5 LLS could supply 2 - 3 men on the Moon for 30 - 100 days. If man were transported by LOR it would require one vehicle to take them there, and another one would have to go and bring them back. The question they are raising, and for which they would like to have a study conducted is, "Can a C-5 Direct manned vehicle stay for up to 100 days on the Moon and bring the explorers back with the same capsule with which they arrived, and what elements of a C-5 LLS and C-5 Direct vehicle of this type are the same." In other words, is this more economical including the new developments than the C-5 LLS plus two LOR vehicles per exploration period.

We promised to call him back next Tuesday and indicated that this matter would have to be discussed with Dr. von Braun, and in case of manpower being available at Marshall the study should be initiated by a letter from Dr. Shea to Dr. von Braun.

It is our recommendation to offer them a brief study beginning April 15, 1963, that is, after we have completed our present LLS work, Phase II.

E.F. I agree. You may  
commit us to this course  
of action. B 311

NOTES 2-25-63 GORMAN

B 3/1

NEGATIVE

- \* 1. SA-5 STATIC TEST OPERATIONS: Removal of engine in position #4 from SA-5 booster at the test tower was necessitated by a review of Rocketdyne records which indicated excessive temperature rise rates on No.3 bearing during the first green run at Rocketdyne. Spare engine has been modified, tested, accepted and installed. To date, 510 measurements have been completed and 30 measurements will be rechecked due to the engine removal. ✓
- \* 2. SA-6 PRE-STATIC CHECKOUT: Pre-static pressure and functional testing of the SA-6 booster has been completed and the vehicle was moved to Building 4708 on February 19th to begin alignment checks. A total of 197 measurements were completed and 124 measurements were partially completed in the Building 4705 pressure cell. Unavailability of hydraulic actuators prior to initiation of pressure and functional testing resulted in re-programming the roll clearance checks during the alignment operation. Several mechanical systems must be retested after performance checkout due to problems with components and incorporation of recent design changes. ✓
3. ARINC RELIABILITY ASSESSMENT: Three representatives of the ARINC Corporation are in the Quality Assurance Division to perform reliability assessment work on the SA-5 booster under a NASA Headquarters contract. They will be with us for the next 4 - 6 months and will closely monitor all operations and tests performed on this vehicle. After completion of checkout in this Division they will follow SA-5 to Cape Canaveral. A similar operation is being performed by ARINC on the S-IV-5 stage at Douglas Aircraft Company plants in Santa Monica and Sacramento. ✓
4. S-IV STAGE: The S-IV-5 stage is scheduled for checkout during the first week of March. As of February 20, 1963, one engine has been installed on the vehicle and the other five engines are in checkout. Quality Assurance Division personnel are on site observing assembly and checkout. ✓
5. CENTAUR: Firm release dates for Quality Assurance Division Representatives at GD/A, San Diego, California, have been established in a letter from Mr. E. V. Manganiello, Deputy Director of Lewis Research Center, as of February 18, 1963. Our senior representative will leave on or about June 1, 1963, while our other two representatives will leave on or about March 1, 1963. ✓

\*1. SA-4 G&C SYSTEMS: Final control system analysis and simulation with the flight control computers and control signal processors for SA-4 have been completed. Astrionics personnel will participate in the guidance and control check out at AMR to resolve any difficulties which may occur due to the use of body fixed accelerometers for angle of attack control. ✓

2. EVALUATION OF SKYBOLT GUIDANCE: The Department of Defense requested NASA to assist in the evaluation of the Skybolt Guidance System. Dr. Dryden's office nominated five people (three from MIT/IL, Mr. R. Chilton of MSC, and Mr. Fritz H. Weber of MSFC). Department of Defense accepted these nominations; I approved Weber's participation. The effort will require five working days; 2/28 - 3/1 for presentations by Nortronics and 3/4 - 3/6 for report writing. ✓

3. IMCC DISCUSSIONS BETWEEN MSC, LOC, MSFC: On 2/20 members of MSC described their proposed Integrated Mission Control Center (IMCC). Attendees included Mr. Christopher Kraft, Dr. Debus, Dr. Gruene, Dr. Speer, and myself. The following day, essentially the same group (Mr. Walter Williams joined the group this day) discussed the MSC presentation in general. It was mutually concluded that MSFC should establish a station in Huntsville to conduct orbital check out of the S-IVB and Instrument Unit from this location. ✓ MSC agreed to provide as much desired data as possible to the Huntsville station (over a high speed data link). A similar link between Huntsville and the Atlantic Missile Range should also be established. (Dr. Debus stated that he intends to make daily use of this link.) The major disagreement between MSC (on the one hand) and MSFC and LOC (on the other) is the degree of support the IMCC will require of the Huntsville station. This point was not resolved, nor is it likely to be in the immediate future because of the stoutly different opinions. Nonetheless, MSC (and LOC) will support the establishment of MSFC's proposed station. ✓ In the immediate future MSC will present a letter to MSFC recommending the establishment of an IMCC Working Panel. It was agreed by those present at the meeting that such a panel is required. Furthermore, MSC proposed participation of MSFC engineers at the next Mercury flight simulation tests and also proposed their familiarization with Gemini equipment for IMCC. We accepted the offer.

W.H.  
What action will OMSF do you recommend? Col F project? All R&D?

W.H.  
I don't understand this sentence. Do they fear we'll put too much of a load on the IMCC, or do they want us to do more work in support of the IMCC that we are not ready to take on?

B

B 3/1

1. S-I-5 ACCEPTANCE FIRING:

Engine H-5005 has been installed on this stage in place of engine H-5006. New inboard exhaust ducts have also been installed and preparation for firing has been resumed contingent upon the qualification of this new duct design in component tests currently being performed. Firing is now scheduled for Wednesday, 2/27/63. ✓

2. S-IV BATTLESHIP TESTING, DAC, SACTO:

A successful turbine spin test was made on Saturday, 2/23/63. Hot firing scheduled today for full duration. ✓

\* 3. TRANSPORTATION ACTIVITIES:

gem

Air movement for S-IV (Pregnant Guppy) - General engineering review meeting took place all day, 2/12, by FAA Western Region Office. Present besides Aerospace Lines and Strato Engineering Company (Pregnant Guppy modification designers) were three Edwards FRC and one MSFC observer. Aerospace Lines expects aircraft modification and FAA certification by first half of April. ✓

A model of the SS NEW GRAND HAVEN was placed in the Director's office. The model is on loan from the owners, West India Fruit and Steamship Company, West Palm Beach, Florida.

Barge PROMISE is in port, MSFC. Barge PALAEMON is enroute to New Orleans with the SA-5 "mock-up". It is due in New Orleans Saturday, 3/2/63. ✓

4. MTF:

Mobile District Corps of Engineers awarded contract, 2/18/63, to Curtis & Davis, New Orleans, Louisiana, for design of Communications Building at MTF. Procurement request is being processed at M-P&C covering the initial requirements for cryogenic fluids at MTF. ✓ RE NOTES 2/18/63 (ATTACHED), funds for studies of future stage (NOVA) vehicle test programs will be utilized in cooperation with Future Projects Office by M-P&C modification to existing A-E contract with Sverdrup & Parcel and Associates, Incorporated. ✓

ATTACHMENT  
Notes 2/18/63 Heimburg

Scope of these NOVA impact studies should include but go beyond impact just on MTF. See my remark on NOTES 2/18/63 S & P o.k. with me. B

K.H.  
What action re FY64 do you recommend? Has OMSF been rounded out (Freitag)? B

*B 2/19*

\*1. S-1-5: Firing preparations have been delayed to remove engine H-5006 (position 4) based on retrospective review of Rocketdyne's "green-run" pump data. Unsatisfactory No. 3 roller bearing may be present; therefore, Rocketdyne recommended removal. Initial firing will slip approximately five days, to week of 2/25. Propellant loading test has been completed and corrective actions are being taken. ✓

\*2. H-1 TESTING, MSFC: Engine, S/N 1022 (165K, SA-4 spare), was cutoff on Saturday, 2/9, by rough combustion monitor at eight seconds of a planned 40-second firing. Damage was confined to injector and thrust chamber. Unusually high lox injector delta P was measured on this firing in comparison to the last firing on this engine at Test Division. Possibility of plugged LOX injector was confirmed by finding unusual amount of material identified as dessicant in the lox pump. Test facility had been thoroughly cleaned and inspected prior to and after this firing without finding any unusual contamination. Conclusion then is that dessicant was in this engine when delivered to Test Division, and that it entered sometime after previous firing and before this firing. Remedy is to restress carefulness on the part of people. ✓

3. RL10A-1 TESTING, MSFC: A 20-second duration test was successfully run on the RL10 engine with the diffuser at atmospheric pressure. Measured side loads to the engine under start were of the same magnitude as when the engine was fired with vacuum in the diffuser system. This test indicated only that static test programs possibly could be run at sea level conditions, but additional testing will be necessary to prove feasibility. ✓

*K.H.  
Suggest  
not  
to  
assign  
these  
funds*

4. MTF: Mobile District is awaiting approval of Chief of Engineers Office to award S&P a contract for the final design of the Saturn V test complexes brick and mortar. Informal information has been received that funds for studies of future stage (NOVA) vehicle test programs at MTF have been approved with authorization anticipated late February or early March.

\*5. Negotiations with L&N Railroad for laying railroad spur to the MTF southern boundary have been concluded and contract has been forwarded to L&N for signature. In the meantime, the Southern Railroad has submitted a proposal to MSFC offering a spur line to the northern boundary of MTF at no expense to, nor guarantee by, the government. Consideration is being given for dual railroad service at MTF. ✓

5. GSE SWING ARMS, LC-37B: Preliminary tests were satisfactorily completed on swing arms No. 2 and 3 for use during the wet tests on LC-37B with SA-D5. Additional tests remain to be run prior to these arms being considered satisfactory for use with SA-5. Arm No. 1 has been shipped to the Cape and arms No. 2 and 3 are being prepared for shipment on 2/26.

The second set of swing arms are being installed in the test position and testing is scheduled to start on 3/1. ✓

6. MARINE ACTIVITIES: Barge PROMISE returned from a roundtrip to the Cape, requiring 28 days, 2/17. This turn-around during one of the worst weather months of the year was made to evaluate roundtrip scheduling when shipping schedules are denser. ✓

NOTES 2/25/63 HOELZER

B 3/1

No Report.

- \* 1. OSS SATURN 1B/3RD STAGE VEHICLE: Based upon brief subsequent discussions, the February 21 Spacecraft/Saturn Launch Vehicle presentation was apparently well received by OSS. This office will continue contact with OSS to further stimulate their interest in the propulsion module and to obtain early approval for the OSS Saturn 1B/3rd stage study. Such approval is expected prior to March 15. ✓
2. LUNAR LOGISTICS VEHICLE: The revised LLV costs exercise was completed and presented to Dr. Shea Saturday afternoon. Dr. Shea's attitude relative to these new figures was indeterminate. This office will continue low level effort in preparation of a Project Development Plan and a draft of a management approach for the Lunar Logistics Program assuming the selection of the CLEM wherein payload management by MSFC is proposed and substantiated. ✓
- \* 3. AGENA TRANSFER: The transfer of the Agena Program to LeRC is progressing satisfactorily. Five MSFC people were on TDY to Cleveland last week; some for the full week, others for a shorter period. Five other MSFC personnel assisted LeRC in outside meetings. The MSFC assistance for the next few weeks will be at this level or possibly somewhat less. LeRC has assumed program operation in all areas except Plans and Programs. This one area is lagging due to late availability of personnel. Personnel now have been selected and will be available for duty shortly. Five MSFC personnel are presently requested by LeRC for the week of February 25 - March 1. ✓

1. NUCLEAR PULSE VEHICLE (ORION)

We have not yet been able to break loose from OART the \$100,000 for the mission study of ORION. When we discussed this subject on February 8, it was decided to write a letter over your signature to Dr. Bisplinghoff. This was done. I suggest following this up with a telephone call, if you find time. At the same time, I recommended that Tom Dixon be called on the same subject, and concerning the possibility of going on record with DOD that NASA has definite interest in the nuclear pulse vehicle and is now studying its mission potential. Maybe this is a good time to call Dixon. → He's leaving NASA shortly! B

2. MSFC STANDING IN ADVANCED SYSTEM STUDIES.

Dr. Seamans has given industry a list of approved system studies, published last week in Missiles and Rockets. It is interesting to note that, according to this list, MSFC will perform 12 out of 23 studies. This amplifies the public's impression that MSFC is second to none in the field of advanced vehicle and system studies. We will try to stay on top of the pole, but it is very easy to be toppled! By whom? HHH

3. WASHINGTON SALES TRIP.

Next week we (Koelle, Williams and Huber) will go to Washington for a full week to open our sales campaign for FY 1964 and 1965. We have to sell each study project on an individual basis to one of the program offices. Our shopping list shows 41 study projects for FY 1964 and 49 studies for FY 1965. The total dollar volume is 6.65 million for 1964 and 8.65 million for 1965. Our usual loss rate before the battle is over is approximately 50 per cent. We will give you a rundown of our list and the results of our Washington trip, during our office review on March 14, 1963. Not if you don't bite off more than you can chew! B

4. TRANS-STAGE ON SATURN IB FOR SPACE STATION LOGISTICS.

Here is one more application for our new high-energy trans-stage. As you know, MSC is studying a scaled-up APOLLO capsule for 12 men on the SATURN IB. We will definitely need the trans-stage for vernier, orbital transfer, and deorbiting to meet this requirement. I suggest that R&VE and Aero look into this application. This three stager will also be a good vehicle for carrying 24-hour satellites. ✓

\* 5. ANNUAL CARGO DELIVERY RATE.

Recently I added up the total weight of all satellites transported into orbit each year. To my great surprise, I found that last year, for the first time, we equalled, or surpassed, the Russian performance. We have orbited 50 metric tons of satellites and the Russians only 41 tons, if my information is correct. I believe this fact escaped our statisticians. ✓

Bonnie  
Please  
get me  
Dr. B.  
on phone,  
have  
copy of  
our  
Orion  
letter  
ready  
B

O.K.  
B

Yes.  
Seissler,  
Mrazek  
Pyi  
B

Bart →

1. Saturn I, S-I Stage: Upper Turbine Exhaust Ducts for Block II failed in qualification tests. As a consequence the ducts previously installed on SA-5 had to be exchanged. New ducts with heavier wall thickness of the bellows had been fabricated by Flexonics and delivered to us last Saturday. Installation was accomplished by our test stand support group over the week end. ✓

\* 2. Saturn V, S-II Stage: Rocketdyne has not been able to accomplish a first shot in explosively forming gore segments for the S-II bulkhead due to the deficiencies of the die design. Sealing arrangements for the vacuum are inadequate and have been modified several times. It also becomes more and more apparent now that the mechanical gripping of the material without using hydraulic power will not work--as we predicted. We will know more about this after the first forming attempts have been made. As a back-up we are investigating the possibility of utilizing the hydraulic bulge forming dies at Boeing, Wichita, for forming S-II gore segments by using die inserts to accommodate the S-II shapes. This seems feasible at least for the Apex segments. ✓

1. FUNDING: It has been agreed among M-RP, M-DEP-R&D (James) and M-SAT that the \$4.800 Mill line item for SATURN V Technology will be reduced to \$3.800 Mill. ✓ M-DEP-R&D (James) instructed M-SAT to process all items up to a total of \$3.800 Mill and then stop. In analysing and verifying the purchase requests against this item "SATURN V Technology", M-SAT finds numerous items which are clearly support of plant and equipment buildup, rather than true technology. *Dannenberg was present when Div Directors confronted with this fact justified the reasons for it*

2. SATURN I & SATURN IB - The procurement plan for the modification of the Chrysler Contract to include the S-IB Stage was approved by Dr. Seamans on 2-20-63. The modification changes the scope from delivery of 21 stages to 20 stages (8 for SATURN I and 12 for SATURN IB) and extends the length of the contract for approximately a year. ✓

The design responsibilities for the S-IB Stage to be assigned to CCSD will be outlined in the contract modification. ✓

S-IV - Battleship - Three turbine spins have been run. The chill down valves did not work properly since they do not have optimum timing and have to be selectively fitted. Hot firing is scheduled for 2-25-63. ✓

3. SATURN V: The technical direction clause in the Boeing Contract has not been changed per discussion with Dr. von Braun. Language for the clause was prepared by M-SAT; however, Chief of P&C will not amend the clause per request of M-SAT.

\* S-IC - Contract NAS8-5608 was approved by Headquarters on 2-21-63.

During demonstration to MSFC of bulge forming pre-sculptured gore segments in Wichita, the sample gore failed from excessive thin-out.

Boeing has not submitted re-design of the lower bulkheads (Fuel and LOX) for P&VE appraisal, although Wichita has already been informed.

Status of Boeing/MSFC Task Force efforts on late S-IC structural documentation will be reviewed at MSFC on 2-27-63.

First "Y" Ring was completed and accepted by Michoud Operations Quality for MSFC and will be delivered about 3-1-63. Dye penetrant inspection was waived by ME. ✓

\* S-II - During the week of 2-11-63, a series of specialized S-II Stage Technical-Orientation presentations were given to MSFC's divisions supervisory and project personnel by instructors of S&ID Logistic Training Department. The briefings were well attended and proved to be beneficial. ✓

In 2-20-63 meeting at LOC it was agreed that the 114 ft. roof height in the low bay area of VLF 39 would be adequate for mating the S-II Stage and interstage before progressing to the high bay area. ✓

*O.L.!*  
*That's*  
*this*  
*all*  
*about.*  
*B*

*it*  
*B*

B 3/1

NOTES 3-25-63 MAUS

1. MANPOWER - Manpower estimates to be included in the FY 65 budget submission this week will reflect manpower trends as follows:

	End of:					
	<u>FY 63</u>	<u>FY 64</u>	<u>FY 65</u>	<u>FY 66</u>	<u>FY 67</u>	<u>FY 68</u>
on going programs	7357	8150	8350	8000	7700	7100
<u>or</u>						
with reasonable capability for new programs	7357	8300	8700	9000	9200	9500

2. FEBRUARY PROGRAM REVIEW MEETING - Our FY 65 Preliminary Budget submission to OMSF shows a \$91.2 million "deficit" for MSFC in FY 64 as compared with the schedule books which reflect FY 64 ceilings in the Saturn area. The deficit is additional requirements that have materialized after the January 31, 1963 cut-off date for the schedule book.

The MSFC Project Managers are aware that the schedules and funding charts to be shown Mr. Holmes in the Program Review meeting do not reflect the deficit, and they will explain these differences during their presentations.

We sent a teletype to Lilly and Rosen advising that if these funds are not provided we will experience at least a 4 to 6 week slippage in our Saturn IB and Saturn V programs.

Hans Maus

Suggest we crank this 91.2 M deficit into the proposed "revised" overall schedule which allows for a stronger QVAL and Reliability program (at the cost of some minimized program slippage)

(I discussed this with

B 3/1

Holmes and got grudging approval)

B 3/1

1. NUCLEAR HAZARDS STUDY: Lockheed has been directed to reorient the Operational Nuclear Vehicle Hazards Study specifically toward the SATURN V/Nuclear vehicle. ✓

2. SATURN IB CIRCUMLUNAR MISSION: (Presented orally to Drs. von Braun and Mrazek, 2-18/19-63) Circumlunar mission via SATURN IB appears to be possible. ✓ *Bot not with Apollo Command Module! Gemini has no hyperbolic reentry capability* ✓

\* 3. MICROMETEROID CAPSULE: Stress analysis has been initiated on the design of the support structure for the micrometeroid capsule. Preliminary investigation has revealed that only minor stress analysis problems will be encountered. ✓

4. SATURN V: Twelve F-1 engine acoustic tapes containing acoustic data from several F-1 firings have been received from Rocketdyne. They will be analyzed and used in prediction of the SATURN V environment. ✓

\* 5. S-II STAGE INSTRUMENTATION ENCLOSURES: Studies have revealed that the enclosures located in the forward skirt can be nonpressurized. ✓ A weight reduction can now be realized since fiber glass instead of aluminum can be used for the enclosure material. ✓ *Douglas?*

6. S-IV STAGE PROBLEMS: Problems which this actuator-accumulator-reservoir design has encountered are (a) Servo valve body forgings rejected; (b) Markite potentiometers rejected; (c) Dirty servo valves; (d) Excessive leakage across bypass valve -- new bypass valves made; (e) High-pressure drop through filter cavity, caused by restriction--spacer and snap-ring employed as fix; (f) Piston rods scoring during velocity-load tests.

The assemblies presently being received by Douglas Aircraft are severely contaminated. With the above delays and present unqualified status of this hardware, there is little hope that this system can be employed for SA-5 or SA-6.

7. NUCLEAR TECHNOLOGY COURSE: The General Electric Company will teach a Nuclear Technology course beginning 2-28-63. Each class will meet for four hours, one day a week, for eleven weeks. It is anticipated that each session will have about 50 students. The title of the course is "Introduction to Nuclear Propulsion," and is basically aimed at showing the possible impacts of nuclear propulsion on launch vehicle technology. The first session of the course will be held in the Propulsion and Vehicle Engineering Division conference room.

\* 8. F-1 INJECTOR PROBLEMS: The Engineering Materials Branch has attempted electron beam welding of copper to 347 stainless steel as a possible solution to F-1 injector problems. Preliminary results indicate that these two materials cannot be welded satisfactorily by this method. Other material combinations will be investigated in conjunction with Rocketdyne. ✓

9. X-RAY INSPECTION OF LAUNCH FACILITIES AT ATLANTIC MISSILE RANGE: The Engineering Materials Branch is participating in the x-ray inspection of launch facilities at Atlantic Missile Range for Launch Vehicle Operations Division. A number of weld cracks were found in some of the base quadrants. These have been repaired and are being x-rayed by a contractor. An x-ray technician from this branch is reviewing the x-ray films produced by the contractor. Increasing requirements are being placed on the Engineering Materials Branch by Launch Vehicle Operations Division for review of such items at Atlantic Missile Range having poor workmanship and inferior quality. ✓

W.M.

reentry capability  
B

W.M.

Anything good at all??  
B

W.M.

How's schedule on Moog alternate?  
B

Can I get a 1 hr capsule presentation?  
B

\* gm

NOTES 2-25-63 Rudolph

B<sub>3</sub>/1

No Report.

B 3/1

NOTES 2-25-63 Stuhlinger

\*1. SATURN SUPPORTING TECHNOLOGY: As a result of Dr. Rees' decision last week to reduce the Saturn-V Supporting Technology Program from 4.8 M to 3.8 M, RPD and the divisions reviewed the program requirements again and compiled a new list of tasks to fit within the 3.8 M limitation. To date, RPD has processed to Saturn Systems Office approximately 1.6 M in requirements against this program. ✓

2. MICROMETEOROID SATELLITE PROJECT: Contract negotiations between Fairchild Stratos Corporation and MSFC were concluded last week. Work at Fairchild will begin immediately. Some technical details will be further discussed this week and next. ✓

During the past two weeks, Mr. Thompson, Chairman of the Source Evaluation Board, de-briefed Northrop, Martin Company, and Ling-Temco Vought on the selection of the contractor (Fairchild Stratos Corp.) for the micrometeoroid satellite. STL will be de-briefed this week. ✓

Dr. Johnson and I will give a presentation of the Micrometeoroid Satellite Project (Fairchild contract) to Dr. Bisplinghoff and Mr. Holmes on March 5 upon their request. Who else from MSFC do you think should participate (Saturn Systems Office, Central Planning Office)? ACTION REQUIRED.

3. MOVE OF RPD: Last week, Harry Gorman, Jim Corbett, and members of RPD discussed in detail the space requirements of RPD. The bulk of RPD will move into Warehouse 4481. As it now looks, some experimental work (lunar surface physics) will be done in Bldg. 4331; additional experimental work (reaction kinetics in rarefied atmospheres) will be done in Bldg. 4708 where we will be guests of Astrionics; for other experimental work (gamma ray scattering and shielding), space will hopefully be found soon. The Office of Applications, now in Bldg. 4723, will move to Warehouse 4481 as soon as sufficient room becomes available there.

We realize that this solution is about the best possible under existing circumstances. However, this widely scattered operation of RPD makes a new RPD building even more desirable.

Dr. Stuhlinger,  
you should decide  
this + take  
action -  
9pm 2-25  
↑  
I agree  
B

E.S.

Request briefing on specific plans  
- for the present (scattered operation)  
- proposed for future (centralized RPD building)

B

\* 1. H-1 PROGRAM: The Turbopump Review Meeting held at Rocketdyne on *Jan* 2-14-63 resulted in the formulation of a plan to be followed to solve the bearing problems. Records of all H-1 turbopump bearing temperatures were reviewed. It was discovered that two turbopumps exhibited unusual temperature rises during their green runs. One of these pumps was installed in engine 5006 on SA-5. The other was built into engine 1010 and fired in the SA-T4 booster. ✓

The SA-5 booster engine has been removed and the pump prepared for shipment to Rocketdyne. ✓

2. S-IV BATTLESHIP TESTING: A dual turbine spin (LH<sub>2</sub> and LN<sub>2</sub>) test run on 2-18-63 was unsuccessful because engine #4 fuel pump discharge pressure was low. Gaseous helium engine purge prior to test was thought to be inadequate in removing GN<sub>2</sub> from engine resulting in cooldown valves freezing in partially open position. A second spin using proven GN<sub>2</sub> purge prior to test was run the following day and results were again unsatisfactory. This time engine #2 was low on performance. In addition to purge procedure, Douglas Aircraft is investigating possible water contamination of cooldown valves through vent stack. Latest report: Changes in Douglas Aircraft purge procedures allowed an acceptable cold flow test to be run on 2-23-63. Hot run test is scheduled for today. Past two weeks were mainly used to improve engine and vent stack purging techniques. The spent time therefore should not be charged to the "water contamination" problem. ✓

3. RL10 IMPROVEMENT PROGRAM: Decisions were made last week concerning the configuration of RL10 engines, scheduled for delivery in January 1964, to be used for the first manned SATURN I flights and for the first operational CENTAUR missions. Fourteen improvements currently being perfected in the R&D program were discussed in detail to determine which improvements could be incorporated into the January 1964 and subsequent deliveries.

To maintain a "common engine" between SATURN and CENTAUR, eight of the improvements were approved and six were omitted; they are all minor in nature. ✓

4. PHYSICAL SPACE: Due to buildup of Brown Engineering Company, Inc. personnel in the Propulsion and Mechanics Branch, additional space is urgently required at the Huntsville Industrial Center Building #3. A request for approximately 11,000 square feet was recently denied due to prior allocation of space. This buildup is contracted for and we are having to refuse some personnel due to lack of space.

*Harry*  
*please*  
*look*  
*into this*  
*B*