

AG'S FREE

Dec 7, 1964

IMAGE



ELITE

H-1 ENGINE

During Chrysler post static of SA-10, engine H-5030 was damaged at Michoud on December 4, 1964, due to human error. This is the second incident of thrust chamber tube damage on outboard engines at Michoud during the past two weeks.

Engine H-5022 on vehicle SA-8 was damaged in the first incident and was replaced by the SA-8/SA-10 spare engine H-5032. Since this is the only available spare engine to support these two vehicles, engine H-5030 must be removed, repaired, hot fired, and reinstalled on the vehicle. Because of the heavy production/retrofit schedules at Neosho, it is anticipated that this repair will be accomplished at MSFC. NASA Management at Michoud is investigating the circumstances of these accidents and will initiate corrective action. No impact on vehicle schedules is anticipated at this time.

Ed O'Connor

Would a stern letter to Chrysler be in order?

B

J-2 ENGINE

An apparently successful 12 second mainstage test was conducted on the J-2 engine in the S-IVB Battleship stand DAC/SACTO on Tuesday, December 1. A review of the reduced data indicated the fuel pump crossed the stall line at the end of the hydrogen gas battle spin-down. Rocketdyne is evaluating the run data relative to pre-start condition recommendations prior to the next firing, which is tentatively scheduled for tomorrow.

Production engine 2010 was delivered to S&ID last week for use in their Battleship program. This was the second engine of the required five.

A single engine firing was conducted on the S-II Battleship stand November 26, 1964. The test was scheduled for mainstage but was cut off by an observer when the fuel and LOX inlet temperatures exceeded redline values (too warm). A detailed review of the run data is being conducted and another test is scheduled for December 8, 1964.

Two fuel turbopumps with thick turbine wheels have been tested. One turbopump has accumulated 2500 seconds of run time and the other 75 seconds. Inspection of the turbine wheels after 1500 seconds of test time indicates no failure. Testing is continuing to further verify the redesigned wheels.

F-1 ENGINE

FRT is proceeding satisfactorily with both the safety limits and calibration engines operating as planned. Present target date for completion of FRT is December 31, 1964, two weeks in advance of the milestone date of January 15.

A point of interest, Mr. James E. Webb and personnel of the Life Magazine Executive Space Tour witnessed a 140 second firing of FRT engine 2006 at RETS, EAFB, on Monday, November 30, 1964.

Delivery of the T-Stage engines continues on schedule with engine F-2007 in the second electrical and mechanical checkout at Canoga Park, and engine F-2005 being delivered to MSFC on December 7, 1964. To date, a total of 5 fireable engines have been accepted by the government, two of which were GFE'd to Rocketdyne for the FRT series.

RL10 ENGINE

The Saturday launch AC-4 was cancelled due to weather conditions. The countdown proceeded to T-5 minutes at which time the Safety Range Officer ordered the shot cancelled. Due to a conflict with a Gemini launch, which has priority over Centaur, the earliest AC-4 launch date is now set for approximately one week later.

Two mockups of the RL10A-3-3 engine were shipped to General Dynamics/Astronautics last week. These will be used to check out minor tube routing differences between the uprated RL10 engine and the Centaur Stage. First flight of the Centaur with the uprated Isp engine will be early in 1966.

C-1 ENGINE (100-Pound Thruster)

Seven (7) proposals for the C-1 Engine Program were received November 30. Evaluation is in process and will continue throughout the month of December.

1. S-IVB STAGE BATTLESHIP TEST SUCCESSFUL: This 10-second test on 12-1-64, was the first successful mainstage test on the J-2 at a stage contractor's facility. Rocketdyne is evaluating the engine to determine if re-orificing is required prior to the next test, a 50-second firing scheduled for 12-5-64. ✓

2. FIRST F-1 BLOCK II ENGINE ACCEPTED FOR DELIVERY: Engine F-2005 will be the first production Block II engine to be delivered and is allocated to S-IC-T. ✓

3. SATURN IB/MINUTEMAN: Due to funding complications, the original five-month Saturn IB/Minuteman program definition phase has been redrafted into a two-part six-month study. Part I, lasting through January 1965, is to be funded from Apollo funds and is currently under negotiation with CCSD. Part II, which would be conducted during the subsequent four months, would be funded from funds other than Apollo. This Part I above will not result in a "Program Definition." The expression "Engineering Definition" used in a teletype from Gen. Phillips, NASA Headquarters, to Col. James, MSFC, on this subject, dated 11-25-64 should not be misinterpreted with Program Definition. ✓

4. NUCLEAR PULSE (ORION): (Reference NOTES 11-23-64 CLINE, paragraph 1) If you agree that this program belongs to MSFC if NASA is willing to go forward, we recommend the following steps:

a. Dr. Seamans should be contacted and made aware that unless NASA takes an affirmative position now, with respect to the Nuclear Pulse Concept, this program will be dead by the end of this year. ✓

b. It should not be necessary to convince Dr. Seamans that MSFC, being the launch vehicle developing center of NASA, would be the proper center to be put in charge of this program if NASA Headquarters decides to push it forward. ✓

5. MOVE FROM HIC: This past weekend (12-5/6-64) the civil service personnel of the Propulsion Division, which has been located in the HIC since 1961, was moved to Building 4610. Next weekend (12-12/13-64) the remaining contractor personnel will be moved to Buildings 4610 and 4481. This will leave the Structures Division as the only P&VE element in the HIC facility. ✓

Frank B.
let's
discuss
this
B

B 12/13

1. LIFE MAGAZINE-SPONSORED VISIT TO MSFC/MICHOUD OPERATIONS

Eighteen of the nation's business leaders, on a Life Magazine sponsored tour of the space facilities across the country, visited MSFC/Michoud Operations on December 3, 1964, accompanied by Mr. Webb, NASA Administrator, and Dr. von Braun. The executives were briefed by Dr. von Braun and Dr. Constan and were given a tour of the plant. ✓

2. VISIT OF CONGRESSMAN THOMAS M. PELLY

Representative Thomas M. Pelly (R-Wash), member of the Committee on Science and Astronautics, U. S. House of Representatives, accompanied by his wife, will visit MSFC/Michoud Operations on December 7, 1964, for an orientation and tour of the plant. ✓

3. SOURCE EVALUATION BOARD FOR SUPPORT SERVICES AT MSFC/MICH

The SEB for Support Services at MSFC/Michoud Operations has completed its evaluation of the proposals received by NASA for a firm to provide support services at the NASA MSFC/Michoud Operations. The Chairman of the Board, M. Keith Wible, will present the Board's findings relative to this procurement to the Director MSFC on December 7, 1964, to the Associate Administrator on December 9, and to the Administrator on December 10, 1964. ✓

4. S-I/IB

Damage to Engine on S-I-10. A bag of tools was dropped on the outboard engine thrust chamber of S-I-10. Approximately 5 dents were made on the thin wall tubing of the thrust chamber. One of the dents was deep enough to create a hole through the tubing. The engine will be removed, sent to Huntsville, repaired, static fired, and returned to CCSD by December 11 or 12, 1964. This will allow installation back into S-I-10 prior to post static checkout. ✓

NOTES 12-7-64 DANNENBERG

B 12/13

1. Configuration Coordination Office - On 12-2-64, the responsibility for the processing of Change Action Memoranda (CAM's) was transferred from P&VE to the CCO. ✓ Existing procedures in effect at the time of the transfer will remain in effect until provisions of NPC 500-1 are implemented into the Boeing contract. ✓
2. Experiments - MSC has prepared a letter to Dr. Kuettner for Mr. Faget's signature requesting a MSC Zero G LH₂ tank experiment (about 500 lbs), for a Saturn IB flight. (Letter was not received yet)
3. Crew Safety - The S-II stage logic for failure of two adjacent control engines will be such that the remaining engines will be shut down to prevent possible structural breakup. ✓
4. Saturn V EDS Design Criteria - Have been agreed upon by MSC and MSFC and will be released as an ICD. ✓
5. S-II Design Review - The MSFC/NAA series of design reviews is starting slowly. The first design review to be held on thermal control was cancelled due to insufficient data provided by the contractor. Approximately 18 of these reviews are scheduled for the next six months. It should be understood that IO will take the lead in establishing these reviews with R&D Operations providing full technical support and technical validation. ✓
Previously reported problem of technical validation of the contractor design by R&D Operations has been solved by authorizing sign off by the Laboratory Project Offices. ✓

1. Feedback from Monday's review of S-II test stand and related facilities. Lt. Gen. Welling Told Brig. Gen. Wilhoit that your message to the construction contractors accounted for most of the benefit derived from the review and inspired the contractors to bring their problems into the open. I think his objective comments helped, also. Koppers later indicated to Paul Styles that they would sign the Project Stabilization Agreement, but Leavell seemed to need more convincing, which Paul hoped to do in Washington this week. Paul asked that Col. Marshall and I meet with other non-signatories to explore their objections to signing. Marshall said he would join me in this.

2. Gen. McKee, Brig. Gen. Jones, Tom Bell, Col. O'Connor and Ray Kline visited MTO by helicopter Tuesday a.m. They were briefed on our construction, activation and organizational concepts, given a quick tour of the S-IC - S-II test stand area, then flown to Michoud and turned over to George Constan.

3. Facility Managers Visit Wednesday, December 2 - Approximately sixty facilities engineering and program management personnel from different NASA activities came out here Wednesday morning under escort of Col. Sollohub from NASA Headquarters. Lt. Col. Beatty and I greeted them in the Corps Headquarters conference room, discussing construction, activation and management items, then took them on a tour of the site. I had to bow out to intercede in an argument between the State Highway Commissioner and the State Motor Vehicle Comptroller on charges to be assessed overweight

trucks utilizing a small portion of Highway 43 enroute to the test stand area. Fortunately, the Governor and Attorney General sided with us and things were ironed out that afternoon along lines reported in my last notes. ✓

4. Thursday's presentations to the Life Executive Space Group pleased Mr. Webb - he told George Constan and me afterwards. ✓ All of the guests and myself, as well, gained a great deal from your philosophies on the utilization of space. ✓ I had a chance to discuss the S-IC-F status with the Boeing Project Manager during the tour, and confirmed that PERT is still indicating the dates Heimburg and I mentioned to you Monday. Will keep in touch with the Stage Manager's Office on this. ✓

E.F.
Please
make
little
sketch,
next
NOTES
B

1. Saturn I Interstage Debonding in Flight: A Flight Evaluation Working Group meeting was held on 12/4 to review the problem of panel debonding of the Saturn I interstage shortly after separation. In each of the three past flights the structure seems to have deflected inboard at about 2 sec after separation, always at the same location (between fins I and IV). In SA-5 and SA-7 this deflection was immediately followed by debonding of one specific panel. This was detected only by use of on-board cameras (including one recovered from SA-7 after hurricane). There is speculation that the yielding of the structure may be connected with the retro-rocket burning. Therefore, a thorough investigation of this phenomenon may be of importance for Saturn IB and V. A task group was set up to identify and recommend new instrumentation on SA-9, 8, and 10. ✓

2. Apollo Extension Systems: The status of the Apollo Extension Systems (Lunar Surface) as presented to the R&DO Council Meeting (12/4/64) is as follows: Basic Elements - Shelter (modified LEM ascent Stage), Local Reconnaissance Module (small manned rover 1,000 - 1,500 lb.), Manned Flying System (Hopper), and Scientific Equipment; Schedule - Above elements for operation in CY 1971 - Mobile Laboratory to be delayed until CY 1974 at earliest; Funding - FY 65 - \$7.55 M (including ≈ 4.0 supporting development), FY 66 - \$15.835 M (estimated). A presentation is scheduled for December 9, 1964 at NASA Headquarters (MSF) to Mr. E. Z. Gray concerning MSFC plans for handling of FY-65 AES activity. ✓

H. Weidner
I think
our
course of
action
should
depend
on
scheduling
requirements
(65 or 71)

3. Cislunar Pegasus: The three week "guide look" study on the Cislunar Pegasus indicates that the mechanical portion of the Pegasus - C can be used with minor modifications. Major modification to most of the electronic equipment will be required. With the work done inhouse, the cost is estimated at \$8.5 M and 413 Man Years, and out of house cost is estimated at \$19.5 M total cost for a two flight mission. All figures are plus or minus 50%. This was presented to the R&D Council on December 4, and it was decided to recommend that the work be done out of house.

4. Orbital Debris Meeting: An Orbital Debris Meeting was held at MSFC on December 3, 1964. Orbital Debris system for the Saturn IB and V were discussed. Douglas Aircraft Co. discussed the technical, schedule, and cost problems associated with the preliminary solution that had been proposed by Lockheed (Huntsville) and also for their retro proposal System. The Douglas proposed system (retros installed in aft thrust structure on pad access doors - see attached chart) seems to be the most practical for the Saturn IB vehicles. Lockheed discussed their preliminary retro solutions for the Saturn V Systems. It is planned that Douglas will by Feb. 1, 1965, make a recommendation of a retro system and installation on the S-IVB stage that can be used for both the Saturn IB and Saturn V vehicles. It was felt by Dr. Mrazek that we should go ahead at that time and plan to make the necessary structural modifications to accomodate the debris system. This would probably be scar weights of 100 lbs. or less. ✓

Preliminary information was obtained from Douglas that indicates that the use of the APS or the restart of the J-2 engine for orbital debris purposes doesn't seem practical. (Dr. Mueller requested information on these two schemes). Detailed pros and cons will be available on these two schemes by Feb. 1, 1965. ✓

1. S-IC-T HARDWARE: Additional overtime has been expended to process a backlog of hardware through receiving inspection in order to forestall a possible schedule delay in S-IC-T assembly. Unavailability of documentation started to cause delays; however, improvement has been noted as a result of a meeting held with cognizant segments within the Center. ✓
2. DIGITAL EVENTS EVALUATOR (DEE) IMPLEMENTATION: NAA submitted a cost proposal of \$3,200,000 less fee, for implementation of DEE's as compared to DAC's estimate of \$1,016,327 including fee (NAA will spend approximately \$234,000 more on procurement of the units). In both cases, the contractor had units scheduled for MILA. An interesting point here is that in many cases, NAA's impact is three (3) times greater than other contractors - other examples ATOLL, MOD-80 (which implemented the All-Up schedule), Instrumentation Simulator.
Maxe Neubert
FY1 B
3. CALIBRATION ACTIVITY: With reference to your remarks to paragraph 3 of the NOTES 11-26-64 GRAU (copy attached): It was not intended to give the impression that MSFC is falling behind. It was intended to show the considerable interest of KSC and MSC in this field which means for MSFC to keep on going. ✓
4. UNSATISFACTORY CONDITION REPORT (UCR) FEEDBACK: A UCR system computer printout of all discrepancies and failures reported on S-IV Stages while at KSC is now provided the Senior Quality and Reliability Assurance Laboratory Representative at DAC on a bi-weekly basis. This printout will aid in improving the inspection work performed by Air Force personnel at DAC. ✓
5. NASA/DOD RELIABILITY AND QUALITY COMMITTEE MEETING: The NASA/DOD Reliability and Quality Committee held its fourth meeting November 24, 1964, at NASA Headquarters. The meeting was chaired by NASA for the first time. Agenda items included the status of DOD manpower support for NASA, the NASA Quality and Reliability Training Program, and the DOD Calibration Program. ✓
6. ADVANCED ORBITAL LAUNCH OPERATIONS STUDY: The Contractor's, Ling-Tempco Vought, Progress Report was received and a quote is presented from this report: "Quality control, as presently practiced by industry, will have to be bettered by one or more orders of magnitude before launching large booster systems can become a routine affair (which is required for operational systems)." ✓ *I agree.*

Attachment 1 (NOTES 11-23-64 GRAU) Dr. von Braun and Mr. Weidner's copies only.

B 12/13

1. MALFUNCTION OF GYRO ON ST-124 FOR S-IU-8: A gyro failure on the ST-124 platform for S-IU-8 has emphasized the necessity for continuing to perform accuracy tests at Cape Kennedy. The gyro that failed was nearly two years old, having been accuracy tested the first time in 5/63 by EP-Bendix. It had logged a total of 270 operating hours, 95 hours on the S-IU-8 platform, before the failure occurred in the form of excessively high drift. When the gyro was opened, a metal chip was found in the gap of the gas bearing. We believe the chip was generated during original assembly of the gyro and came from a screw used to connect the flex leads to the gyro.

The malfunction was discovered in an additional accuracy test of the platform performed as a check of the test stand. The platform had already been certified for delivery to R-QUAL for final checkout with S-IU-8. ✓

1. F-1 ENGINE (MSFC):

Engine F-1002-1 was removed from the Static Test Tower West (STTW) on 12/3/64, for main injector replacement. This is the third Block I injector that has been damaged by lox rings cracking at MSFC. An investigation to determine means of solving this problem is in process here and at Rocketdyne.

The 1500 seconds mandatory inspection of the turbine hanger brackets of F-1002-1 revealed a crack approximately six inches long between two brackets. This will be weld repaired prior to reinstalling the engine in the STTW. Modifications are in the "pipe line" to correct this trouble. ✓

2. S-IVB BATTLESHIP:

A 10-seconds test was successfully conducted on 12/1/64. Data evaluation revealed that the fuel pump operated during transition in the stall region. Because of this, Rocketdyne requested more time for data analysis; and the 50-seconds test, scheduled for 12/5/64, has been postponed until 12/8 or 12/9/64. ✓

3. S-II BATTLESHIP:

Preparations are continuing for the 10-seconds firing presently scheduled for 12/8/64. ✓

4. S-IC-T:

Attached is a copy of the Memorandum of Agreement reached with Boeing as a result of the 11/23/64, meeting. Dr. Rees has specifically asked for further information on this subject. These copies are for your retention and/or destruction. A meeting was held on 11/24/64, during which the qualification of S-IC-T hardware was discussed. The results of this meeting are presently being documented. (Copies to Dr. von Braun, Mr. Weidner, and Dr. Rees only.) ✓

TASK GROUP FOR STUDY OF FINANCIAL SUPPLY AND PROCUREMENT

ACTIVITIES: A Task Group has been established by Mr. Newby, composed of members of the Computation Laboratory, Financial Management Office, Technical Services Office, and Purchasing Office. The purpose of the Task Group is to explore interim improvements in the procurement cycle and plan for integrated mechanized systems for the long range period. The Group is chaired by a member of the Computation Laboratory and will seek to make interim improvements in current computer use by the three line organizations involved in the procurement cycle as follows:

1. Identify applications now on computers in these areas and document them in a manner that will provide visibility to and facilitate understanding of the applications by the Task Group.

2. Identify areas of possible improvement such as cost reductions, reducing procurement lead time, savings of personnel and more timely reports. Target date for completion of this step is February 1, 1965.

3. Make a proposal for revisions of present systems and present to management for consideration. Target date is March 1, 1965.

4. Convert present applications to new generation computers as feasible. Target date is January 1, 1966. ✓

PEGASUS:

Pegasus "A" Electronic Canister Test - All testing of the canister (ambient and thermal/vacuum) has been completed in Bladensburg and the canister was shipped to Hagerstown on 12/3/64. ✓ It was mounted in the center structure of the spacecraft on 12/5/64. ✓

Pegasus "A" Spacecraft - Systems tests of the complete spacecraft are expected to be completed in Hagerstown so that the spacecraft may be shipped to GE on 12/15/64 and then to KSC two weeks later. ✓

Detector Panels - All panels required for the first flight unit, Pegasus "A", have been received and installed. ✓

Seventh Program Review - The 7th Program Review is scheduled in Hagerstown on 12/9/64. ✓

RCA 110A COMPUTER: Work on the first two computers has been temporarily halted while a team from MSFC Quality inspects workmanship on the two systems. The team began inspection 12/4/64. IO representatives are at RCA to determine program impact caused by the Quality problem as well as the checkout problem and a report will be made next week. ✓

S-IVB BATTLESHIP:

A scheduled 10 second mainstage firing test was successfully performed 12/1/64. Side loads dampened to a negligible value within 7 seconds. The GG heat blanket was turned on at the moment that LOX was detected at the inlet to the engine and turned off just prior to initiation of sequence start. The GG bleed valve was opened during LH₂ tank loading when the 50% level was reached. The recirculation pumps were turned on at T - 3 1/2 minutes. ✓

A 50 second mainstage firing test planned for 12/5/64 was postponed. Analysis of the 10 second firing data revealed a stall condition in the LH₂ pump during start transients. ✓

The engine had satisfactorily recovered but the condition was serious enough that Rocketdyne requested a delay for further analysis and study of the chilldown procedures and conditions. Rocketdyne has scheduled a meeting 12/7/64 to make recommendations to chilldown procedures. If Rocketdyne recommendations are available today and agreeable to MSFC and DAC, the firing will be attempted 12/8/64. ✓

SATURN IB/MINUTEMAN STUDY: (DR. MRAZEK) A meeting was held between MSFC and CCSD to revise the preliminary statement of work for the strap-on study. Revised scope of work will reflect a two months study with a review presentation planned for 1/11/65. Selective information from this review will be presented to the January Management Council. Arrangements were made by Contracts 12/4/64 to permit CCSD to proceed with the study while negotiations are in process. ✓

B 12/13

NOTES 12-7-64 Koelle

1. SATURN IMPROVEMENT STUDIES: We have word that Dr. Seamans has approved a total of \$1,400,000 (within the advanced systems study allocation of Ed Gray) for the continuation of our contractor studies on potential IB and V improvements. ✓ This is the first approval of FY 65 money. We have yet to get the money transferred to MSFC. Next week we have a detailed mid-term review of all study contracts concerning the Saturn V improvement. Most of the present contracts are running out in April. With the new money we can extend them through this calendar year. ✓

HHK
Request
details
B

2. UNIVERSAL "DEPENDENT CAN": MSC is expected to sign soon a preliminary design and mockup contract (\$300,000) with Boeing for the famous "universal can" which will offer more volume for all AES missions.

3. NEW NASA FIVE-YEAR PLAN: There must be somebody else within NASA who is not completely happy with the present state of affairs in the area of long-range planning. I quote the following sentence from Aviation Week of 11-16-64: "A working-level complaint at NASA these days is that to get money in the new budget the concept has to look like Apollo, feel like Apollo, and smell like Apollo."

HHK We need both: long-range planning and Apollo ad-ons. The trouble at the moment is, that for the momentum built up with the main-stream Apollo program, there has been too little of the latter, with resulting immediate dangers to the stature of the program,
B

B 12/13

1. Correction of Distortion Resulting from Weld Shrinkage: When in the welding process the molten metal solidifies, it shrinks with the result of locked-in stresses and distortion. Presently two methods are applied to counteract or correct this distortion: (a) shrink fitting of components prior to welding which can, however, only be applied to circular outlet welds and is being used by S&ID and Boeing, and (b) aging after welding in restraining fixtures which can only be applied to 2219 alloy and to sub-assemblies of medium size. Two more manufacturing processes are now being added for correction of distortion and removal of residual stresses: roll planishing and the magnetic hammer. (c) Roll planishing has been used in industry for many years. Application of this process was up to now not approved by MSFC and Boeing engineering because of lack of knowledge and data as to the effect on such properties of 2219 material as notch sensitivity, stress corrosion, fatigue, life, etc. Extensive test and studies during the last year have now provided this data, and the process now has the approval of P&VE and Boeing. As expected, the weld joint strength for 2219 material is being increased by approximately 20% with elongation still being good. This could potentially result in a decrease of weld lands and weight savings or at least increases the reliability of our weld joints. We have already built a special machine for planishing the outlet welds and will use this method on gore segments for S-IC-502. (d) The magnetic hammer, developed by Mr. Schwinghamer, has already repeatedly been used in our shops on actual gore segments which could be salvaged in this manner, because distortion caused by weld repairs carried out after aging could not be corrected by other means. S&ID experienced severe weld distortion recently in their girth welds of cylindrical LH₂ sections. We have shipped one magnetic hammer with a movable power supply to Seal Beach. They succeeded in correcting all the distortion and are quite enthusiastic about this method. ✓

1.0. | 2. Negotiation with IBM for IU's: Negotiations with IBM for the IU with regard to Item VI Manufacturing were discontinued December 2, 7:00 PM. At this time, there were approximately 83,000 manhours difference in IBM's position and Manufacturing Engineering Laboratory's position. Most of this difference was in the Manufacturing Engineering hours. ME Laboratory and IBM have previously reviewed their respective estimates and have determined that a common base line was used to arrive at the estimate. IBM agreed to re-evaluate their proposal and establish a new position. Negotiations will resume Monday, December 7, 1964 at 9:00 AM. Indications are that we will not be able to agree on manhours for Item VI of proposed contract NAS8-1400 with IBM.

3. S-IC-T Manufacturing Milestones: Joining of Thrust Structure to the Fuel Container has been completed, and Lox Suction Lines have been installed. This unit has been painted over the weekend and will be moved to Bldg. 4705 for splicing with the Intertank/Lox Container/Skirt Section Unit. ✓

NOTES 12/7/64 MAUS

B 12/13

1. EXECUTIVE STAFF REVIEW - On Friday, December 4, I conducted an Executive Staff Activity Review. Dr. Rees and Mr. Gorman participated with me in this review, and Mr. Frank Williams was present for a portion of the review. We reviewed past, present and planned activities for each element of Executive Staff. It required most of the day, but I believe that it was very profitable. I will be glad to repeat all or an abbreviated portion of this review for you if you desire. ✓

H.M.
Yes, please
1 1/2 hours
enough?

2. FY-65 MSFC SUPPORTING DEVELOPMENT PROGRAM - A group of people from Manned Space Flight are at MSFC December 7 - 9 to help develop an aggressive plan to attain maximum obligations by March 31, 1965, for the MSF supporting development program. Apparently, Dr. Mueller feels that since the FY-64 program was essentially not implemented until June 1964, very little FY-65 funding should be required. According to Bill Lilly, Dr. Mueller will consider any unobligated balances in these programs after March 31 as available for withdrawal. ✓

3. RESTRICTIONS ON AVERAGE GRADE AND AVERAGE SALARY - Dr. Seamans has prepared and given to Mr. Webb a package of data for Mr. Webb to use in discussions with Mr. Kermit Gordon, Director, Bureau of the Budget, on BOB restrictions on grades and salaries of NASA and other federal agencies; the meeting is planned to be held end of this week. ✓

H.M.
Request
short briefing
during
14 Dec
Staff
luncheon
B.

4. GENERAL SCHRIEVER VISIT - Ray Kline as project officer, is planning an agenda and making arrangements for the visit of Gen. B. A. Schriever December 18, 1964. The December 18 Staff and Board meeting is being cancelled. ✓

Never mind.
Gen. Schriever cancelled
for Dec. 18th. Bob
12/14

B
12/13

1. R&D OPERATIONS' STAFF COORDINATOR, S-II STAGE: To enhance staff coordination of technical project matters interfacing between IO and R&D Operations, R-DIR has, in coordination with IO management, established a staff coordinator for the S-II Stage. The coordinator will afford a central point of contact, within the R-DIR staff, for coordination of S-II technical requirements with power and financial resources on all matters requiring an R&D Operations' position. In this way, R&D Operations can augment the support now provided to IO, without duplicating IO project management responsibilities. Existing channels of communications between IO and the laboratories for technical information and assistance will not be affected. The S-II Staff Coordinator, Mr. Van King, has been detailed from R-SA to R-RM for a period of six months. During this period, the staff coordinator concept will be evaluated. If the approach proves satisfactory, the concept could be extended to other major vehicle stages. ✓

2. FY-65 Obligations: In the 10/12/64 NOTES, the status of 1st quarter FY-65 initiations against program authority for R&D Operations showed 58%. Status of initiations as of November 30 is shown in the table below. (Dollars shown in thousands.) This information continues to receive close review at the monthly R&D Council meetings.

	<u>PLAN</u>	<u>INITIATIONS</u>	<u>% INITIATIONS OF PLAN</u>
SATURN I	\$ 13, 716	\$ 8, 131	59
SATURN IB	24, 912	15, 762	63
SATURN V	93, 461	60, 842	65
Sub-Total	132, 089	84, 735	64
SR&T	11, 724	7, 148	61
ADVANCED STUDIES	-0-	-0-	-
Sub-Total	11, 724	7, 148	61
TOTAL R&DO PROGRAM	\$143, 813	\$ 91, 883	64

3. CONFLICT OF INTEREST PRESENTATION: As a followup to Mr. Newby's presentation to the Marshall Staff, Conflict of Interest Presentations are being conducted for first-line supervisors of R&D Operations. Personnel from the Public Affairs Office, Purchasing Office, and Facilities and Design Offices have also attended sessions. These presentations are being conducted by Mr. William E. Guilian, MSFC Chief Counsel; Mr. R. E. Wood, and Mr. G. L. McAvoy of the NASA Inspection Office. A separate presentation was conducted for Contractor Officer representatives. This program began on November 25 and will be completed today. ✓

B12/13

NOTES 12/7/64 RUDOLPH

1. Software Schedule Meeting - A meeting was held with representatives of MSF, Bellcomm and MSFC on December 2, 1964, concerning the selection and monitoring of milestones in the development of computer programs. Headquarters is expected to request that such software milestones be reported in each monthly SARP Report, possibly beginning in December 1964. ✓
2. S-IC-S Stage LOX Bulkhead - The replacement S-IC-S LOX bulkhead manufactured by ME Laboratory has been welded on the meridian welder, joined to the Y-ring, and has the polar cap welded on. The entire time required for assembly including the installation of fittings into the gore has been less than one month. This established a new and noteworthy MSFC assembly record for a bulkhead. ✓
3. S-II Stage LH₂ Tank Insulation - On December 2 and 3, 1964, representatives from NAA/S&ID visited MSFC to present the results of their studies to establish the optimum configuration for the LH₂ Tank Insulation. Comparative results were presented on the Double Seal Insulation Concept and the Light-weight 1.6 inch Urathane Foam Helium Purged Concept. MSFC is currently evaluating this data and a decision should be made this week. ✓
4. Saturn V Operational Displays - The contract for the Saturn V Operational Displays has been at NASA Headquarters since November 13, 1964. It has been learned that we cannot expect it be signed by Headquarters before the third week in December. The contract has several other reviews to pass before final approval by Headquarters, meanwhile, Sanders Associates have started on the basis of a letter of anticipatory cost issued by the Contracting Officer. ✓

A.R.
Whatever
that is
B

B 12/13

Mississippi S-II Seminar: It is too early to accurately measure the results of the meeting at Mississippi. However, it was very apparent to everyone in attendance that you consider the S-II Stand at Mississippi to be on the critical path. It was the general consensus that your presence and talk made the meeting worthwhile in that it enhanced the creation of esprit de corps and placed everyone on notice of your personal concern of the progress at Mississippi. A total of 87 people attended the meeting, represented as follows: 36 contractors, 29 Corps of Engineers and 22 MSFC. ✓

MSF Facilities Task Group: A task group from MSF consisting of Messrs. Smolensky, Disher, Lord and Diaz visited us December 4, to discuss various problems and method of doing the facilities work. Additional details were given to them on (1) requirements for the Research Projects Laboratory Building by Dr. Stuhlinger, (2) requirements for the Green Mountain Facility by Messrs. Kroeger and Hoberg, (3) results of the S-II MTF scheduling given to you on the airplane to Mississippi, (4) a general briefing on how we conduct our facilities program at Huntsville to maintain the physical plant in a modern condition. The meeting appeared to be well received by the Washington people. ✓ The presentation on the S-II schedule will be given to Bill Lilly and Sam Phillips December 9 for their decision. The material presented by Mr. Hoberg justifying the Green Mountain requirements did not completely convince the Headquarters people that MSFC needed such a station. Astrionics is preparing additional information for further talks with Headquarters. ✓

FY-66 CofF Budget: The BOB has returned their first markup on the NASA CofF Budget. The following is a summary of actions:

	To BOB (In thousands)	BOB Approved (In thousands)
Huntsville	8,365.1	3,360.5
MTF	2,121.0	2,121.0 ✓
Michoud	300.0	300.0 ✓
Various Locations	10,128.0	5,000.0
	<u>21,257.1</u>	<u>10,781.5</u>

A detailed summary is attached. A reclama has been made by NASA of all the cuts. Bill Lilly is not very optimistic about the BOB reinstating any of the deleted items. A final markup is expected by the end of this week. ✓

Attachment (Dr. von Braun's copy only)

NOTES 12-7-64 Stuhlinger

B 10/12

1. ART/SRT PROGRAM STATUS: The status of the FY-65 ART/SRT program under the cognizance of RPL is, as of December 4, as follows:

	<u>ANNUAL PLAN</u>	<u>AUTHORIZED</u>	<u>PROCESSED TO FMO</u>	<u>OBLIGATED</u>
OMSF	10,777,000	10,777,000	920,578	72,254
OSSA	475,000	475,000	935	0
OART	9,769,000	6,650,000	4,096,614	1,879,000
	<u>21,021,000</u>	<u>17,902,000</u>	<u>5,018,127</u>	<u>1,951,254</u>

2. AES SCIENTIFIC SYMPOSIUM: It appears that the symposium which we are expecting to host next year may be delayed to prevent a possible conflict of interest situation from arising. If scientists are now named by NASA from the scientific community to sit on AES scientific panels formed to judge and select experiments for AES missions, the scientists forming the panel will be in a very favorable position.

Dec 14, 1964

J-2 ENGINE

A 54 second mainstage firing was conducted on the S-IVB Battleship stand on Wednesday, December 9, and a 10 second mainstage center engine firing was conducted on the S-II Battleship stand on Friday, December 11. Both tests were apparently successful. ✓

Two production engines are undergoing hot firing acceptance testing. One is a flight configuration engine scheduled for S-IVB Battleship testing; the other, a ground test configuration engine for S-II Battleship testing. ✓

One fuel turbopump with redesigned turbine wheels has accumulated 5,000 seconds of test time in the component pit without apparent damage. The turbopump is being disassembled for inspection and evaluation. ✓

The first restart demonstration was conducted on R&D engine 015 last week. This is an FRT configuration engine which has accumulated 2800 seconds of run time, including four 500-second runs. ✓

H-1 ENGINE

Engine H-5030 on Vehicle SA-10, which was damaged at Michoud, was shipped to MSFC, repaired, and successfully hot fired. The engine will be returned to Michoud on December 14, 1964, for reinstallation on the stage. ✓

The H-1 Engine Program Review Meeting was conducted December 8 and 9, 1964. ✓

RL10 ENGINE

Centaur AC-4 (first two-burn mission) was launched Friday morning (December 11). The first burn of Centaur was satisfactory and a near perfect orbit was achieved. The vehicle started to roll sometime during the coast period. The prestart signal for the second burn was received by the vehicle boost pumps; however, the hydrogen boost pump oversped, presumably because there was no hydrogen over the sump due to the excessive roll. The LOX boost pump started satisfactorily. The RL10 engines do not appear to be involved in the malfunction. AC-5 has a one-burn mission and will proceed on the planned schedule. Next two-burn mission is AC-8, scheduled in mid 1965. ✓

F-1 ENGINE

A major part of the FRT has been accomplished in that the calibration test series has been successfully completed on engine 2006. The calibration engine achieved a total of 11 starts and 1350 seconds of which 7 of these tests were for rated duration. No significant difficulties were encountered in the entire series. The safety limits test series is well past the half way point (18 or more tests accomplished). ✓

During testing at MSFC, injector ring cracking has been experienced on three injectors. The problem is under investigation at both Rocketdyne and MSFC. One puzzling aspect is the absence of cracking in injectors of engines fired at RETS, EAFB. No conclusive results have been obtained to date. ✓

B 12/16

1. SATURN I-IB: (Reference NOTES 11-16-64 CLINE, paragraph 2) The problems referenced in this note have been resolved between CCSD and MSFC personnel. ✓

2. SATURN IB/MINUTEMAN: Part I of the Saturn IB/Minuteman program definition, which is being funded solely from Apollo funds, has been rescheduled to end on 1-31-65. This portion is expected to provide the definition of a preliminary Saturn IB/Minuteman configuration, a cost estimate for program implementation, the impact on Saturn IB schedules, an identification of long leadtime items, the impact on launch facilities as well as the overall Apollo program, and establish the requirements for modified or new production and tooling facilities. ✓

Although Part I will not be complete, the contractor will present study results up to 1-11-65 to MSFC so that an appropriate presentation may be given to the January Management Council Meeting. ✓ Cost negotiations for Part I have not been completed, but the cost is anticipated to be approximately \$150,000. ✓

Negotiations with the contractors for the Part II phase of the study have been deferred until the certainty of funding has been established. Estimated cost for Part II is on the order of \$1,000,000. ✓

3. S-II STAGE BATTLESHIP TEST ABORTED ON 12-9-64: The scheduled 10-sec. firing was aborted due to loss of engine start bottle pressure prior to start. Inspection showed a crack, which necessitates bottle repair or replacement before the next test. ✓

4. S-IVB STAGE BATTLESHIP 50-SEC. FIRING SUCCESSFUL ON 12-9-64: Preliminary evaluation showed no evidence of fuel pump stall. ✓ Gas-generator combustion temperature spiked to 1600°F, but stabilized at 925°F. Mainstage combustion pressure was 710 psia. The next test is scheduled for 150 seconds on 12-15-64. ✓

5. S-IC-T PARTS AND COMPONENTS QUALIFICATION DATES: S-IC-T parts and components qualification dates are still slipping. Will meet with Boeing on 12-18/21-64 for detailed review and further recommendations. ✓

6. MANAGEMENT OF DYNAMIC TESTING: In May 1964, the three laboratories concerned with dynamic testing of the Saturn IB and V had several meetings, of which the main purpose was to find a solution for working together and to get the job underway. At that time, arguments were presented against a manager for carrying out operations reporting to a committee. It was felt that this committee would be good for planning and requirements but was not the group to be responsible for operations. In the interest of harmony, concessions were made to operate under the plan presented to you on 12-8-64. To date it has worked.

Herb. Teicher
I suggest you come to an understanding with the I.O. that assures - continued harmonious work - closing the money loop

F.C.I.

It was I who raised that argument. Since we are employing CC and Boeing to do this work under their systems support contracts, the manager must be accountable to the IB and V prog. managers for the cost incurred by the contractors. The Committee is fine to define the test program and evaluate the result and to re-direct the program if necessary, but it is not in that vital accountability loop!

B 12/16

1. S-I/IB

Assembly & Checkout - Proceeding on schedule with no significant new problems. ✓

Quarterly Review - The tenth Quarterly Review of S-I/IB Programs is scheduled to take place at Michoud Operations at 9 a. m. Thursday, December 17, 1964. ✓

Spider Beam Qualification S-IB - A load test was made on the spider beam to evaluate the cross beam fix to determine the load carrying capability of the LOX tank fitting which had been overstressed in previous tests. This area was loaded to 140% of design load without any apparent failure. ✓

2. S-IC

S Vehicle Thrust Structure - Shipped to MSFC, Huntsville, on December 5, 1964. ✓

Tank Welding - A successful fuel tank bulkhead to skin weld was made with only minor weld repairs necessary. ✓

3. Support Services

Mason-Rust was selected by NASA Headquarters for negotiation for support services contract at Michoud Operations. ✓

B 12/16

1. Working Groups. R-SA is presently investigating the situation and charter of the Working Groups, which need updating. ✓ You will be briefed on our proposal. ✓
2. Experiments. In the Experiments Coordination meeting of December 10, 1964, details of the "experimentation compartment" for LEM were discussed. Prior to the next Manned Space Flight Experiments Board meeting (January) a conceptual design will be available based on (a) materials and (b) Zero G fluid experiments. ✓
3. S-II Manpower Survey. IO was furnished Civil Service manpower figures of R&DO which show 120 direct man months (1/10 of S-IC). The situation is being investigated. ✓

!!

B 12/16

NOTES 12-14-64 FORTUNE

1. Congressman Thomas Pelly (R - Wash.) - accompanied by Mr. E. C. Vogel, Chief, Public Relations, Boeing Company, (Michoud), and Mr. James Funkhouser from Michoud Operations visited MTO December 7, 1964. They were briefed on the status of the facility and taken on a tour. Cong. Pelly's questions primarily concerned the role of Boeing at MTF. ✓

2. Gainesville Museum Committee Formed - in an effort to gain greater support from some critical areas surrounding us, we invited four prominent citizens to screen historical data on our local site (the county seat for many years of all lower Mississippi) to recommend what should be retained for display in the Logtown Post Office building which will serve as a museum. They have met, formed a committee, and will assist us, at no cost to the government. ✓ ✓

3. GE officials visit - Southeastern Region Vice President, Thomas K. Edenfield from Atlanta, and his counterpart from the Southwestern Region (Dallas Headquarters) Edwin H. Howell, spent Thursday at the site. They reviewed GE operations, then after lunch asked that I give a short description of MTO, our construction progress, activation and operating plans followed by a tour of the sites. Their functions seem to be advisory, not in direct line, but to analyze and assist across all GE elements. I believe Edenfield might sometime be of help to us. ✓

4. Eleven Governors visit Mississippi - Governors from petroleum producing states met in Biloxi Thursday regarding interstate Oil Compacts. Gov. Paul Johnson held a banquet that night, which I attended. ✓ He specifically mentioned NASA contributions to state economy and culture in a short talk. ✓ Several Governors wanted to come out to see our installation Friday, but heavy rains prohibited, stopping most MTF external work, also. The out-of-staters were pleasantly surprised at their Mississippi reception and how a major conference could be held down here without notoriety or incident. ✓

1. Saturn IB/Centaur High Inclination Orbits: Re: your recent note concerning Saturn IB/Centaur performance to high inclination orbits of various altitudes. A study has just been completed by Lockheed for us on the performance of both the Saturn IB and the Saturn IB/Centaur to circular parking orbits of various inclinations between 185 km and 555 km. Direct boosts into orbit with 3 dimensional optimum deflection program were considered. The most significant results are shown in the two attached payload graphs. (We will be glad to send you the whole report, if you so desire.) Extension to coasting orbits (Hohmann transfers, etc.), orbital transfers and rendezvous considerations is underway and we suggest a briefing about this subject around the middle of January. ✓

2. Saturn IB, SA206 "LEM ALONE" Mission: NASA Headquarters has asked for the impact on the launch vehicle of flying a "LEM Alone" mission on Saturn IB, SA-206 as proposed by MSC in event a Block II CSM is not available. The mission will be an unmanned launch to test a complete, fueled LEM for verification of LEM sub-systems operation. The following possible configurations are proposed: (1) Apollo, having an external configuration identical to the operational vehicle but utilizing a light weight CSM (BP #16 type) which would be jettisoned with the LES; (2) Modified Apollo consisting of a 3600 lb. LEM Adapter with modified nose cap from aerodynamic shroud used on IB/LH₂ Experiment. The 750 lb. nose cap would be jettisoned in orbit prior to LEM adapter deployment. To technically evaluate impact of "LEM Alone" mission, a two month study will be conducted to be completed on Feb. 10, 1964. R-AERO is lead lab. for this study. A meeting was held on Dec. 10, 1964, to outline the activities and schedules. ✓

3. Results of AES Monthly Meeting - NASA Hq., Dec. 8, 9: FY-65 AES funds are being held by Dr. Seamans, pending action by BOB on NASA Hq. submission for FY-66. Approval was given by NASA Hq. (Mr. Taylor) to redirect Bendix and Boeing to reduce study effort on MOLAB in favor of a lunar "golf cart." ✓ Informal direction (to be formally confirmed in two weeks) has been given to both Bendix and Boeing. The next AES meeting is scheduled at MSFC Feb. 3 - 4, to be attended by personnel from NASA Hq., MSC, KSC, and MSFC. ✓

4. Effect of Mixture Ratio Steps on Guidance: Detailed investigations of the effect of programmed mixture ratio on guidance by R-AERO have revealed two significant problems. (a) At this time there is no signal from the S-IVB to the IU telling the guidance system when the step in mixture ratio has occurred. Thus, if the mixture ratio shift occurs at other than the nominal time, the guidance system treats the resulting variation in thrust as a perturbation and does not correctly predict the optimum path to fly. Due to this effect, a 2% error in loading LOX on the S-IVB stage of SA-201 will produce a payload loss of 460 lb, with similar results for other perturbations. This problem may be largely eliminated by providing a discrete signal from the S-IVB to the IU at the time of the shift. ✓ (b) After the mixture ratio step, DAC has indicated that the propellant utilization system will introduce a transient in mixture ratio of up to 120 sec duration. This transient produces a payload loss of about 250 lb on SA-201 and, in addition, will introduce a slow oscillation with about a 15 deg amplitude into the attitude motion of the S-IVB. If the transient is reasonably predictable, modification to the guidance equations can be made which should substantially reduce the payload loss and attitude deviations.

Studies thus far have concentrated on the Saturn IB/S-IVB. It is not immediately obvious that the solution to problem (a) will be as simple for the S-II stage of Saturn V. R-ASTR and R-P&VE are aware of these studies.

Lee
Belew
Hans
Pawl
FYI

Should
be
simple
B

B 12/16

1. S-IU-8 INSTRUMENT UNIT CHECKOUT: There has been some delay in checkout of the S-IU-8 Instrument Unit due to non-availability of the F-6 Telemetry Assembly and problems with the RCA-110 Drum Memory. Checkout is now progressing satisfactorily, however, lost schedule time will be recovered. ✓
2. S-IV PROGRAM: The S-IV-8 stage is undergoing post-static checkout in the Engineering and Development Building at Sacramento. The S-IV-10 stage is in the test stand at Sacramento undergoing preparations for static test. A dessicant sack ruptured in the chilldown ducts, deposited dessicant material in two of the engines on this stage. The engines will be replaced by spares. DAC estimates about ten days for this change, however; parallel work will continue and only two or three days schedule time should be involved in the incident. ✓
3. S-IVB PROGRAM: The S-IVB Battleship was static fired at Sacramento on December 9 for a duration of 50 seconds. No fuel pump stall was indicated as in the 10 second firing. One hot spot was noted in the flame bucket, but further investigation will be necessary to determine the extent of this problem. If review of data and other considerations permit, a full duration (150 seconds) firing will be conducted December 15, 1964. ✓
4. F-1 ENGINE PROGRAM: F-1 Engines 2007 and 2008 are undergoing final acceptance checkout at Canoga Park. It is of note that only one Material Review action was written against Engine 2007 and no Material Review actions were written against Engine 2008 during the acceptance test at Edwards. Engines 2004 and 2006 are undergoing FRT at Edwards and the progress is satisfactory. After the fifth firing, erosion was noted on the Injector of 2004 at a point near the center ring to baffle mating point. The injector was removed and inspection indicated that passages through the baffle were clogged resulting in a loss of coolant at the point eroded. A replacement injector was installed and testing is continuing. ✓
5. APOLLO RELIABILITY AND QUALITY ASSURANCE PUBLICATION NPC 500-5: During the visit of Mr. George Lemke and Dr. Harvey Hall (MSF Reliability and Quality Assurance Office) on December 10, agreement was reached concerning the format of the MSFC plan for implementation of this document. A draft of the MSFC plan will be available by January 15, 1965. Results of an impact study of the reporting requirements of NPC 500-5 on the reliability operations at MSFC were presented and indicate that the requirements are excessive and that under the existing capability, not more than 5-10% of the information requirements can be met. The visitors agreed to reconsider and detail negotiation will begin early in January. However, although the requirements are excessive, a large gap exists between the present capability and a practical information requirement which needs to be closed in MSFC. Those who manage resources in the Center have to keep this high on the priority list. You will hear about this more in 1965.

DF
 No new static run necessary?
 B

H. Weidner,
 Dieter
 Grau
 Request
 briefing
 B

B 12/16

1. ELECTRICAL SYSTEMS TECHNOLOGY CONFERENCE: An Electrical Systems Technology Conference was held by NASA's Office of Advanced Research and Technology (OART) in Washington, D. C. on 12/9 and 10. Mr. R. J. Boehme, R-ASTR-E, served as technical coordinator for MSFC's contribution to this conference. The following MSFC representatives presented the listed topics.

Mr. L. H. Wood - R-RP-N

Power Conditioning for Electric Propulsion

Mr. Whit Brantley - R-ASTR-A

Advanced Studies of Power & Distribution Requirements

Mr. R. J. Boehme - R-ASTR-E

High Power Switching Devices

Motor Driven Switches

Bifilar Wound Relays

Relay Specifications

Advanced Electrical Control & Distribution

EBW Systems

Solid State Relaying

Electrical System Transients

Mr. Dwight Baker - R-ASTR-E

Inverter for Pump Motors

Inverter - SCR Type

Measuring Voltage Supplies

Mr. Carl Winkler - R-ASTR-R

Precision 3 Phase Inverter System

Integrated Power Amplifier

100 Ampere Transistor Switch

The primary purpose of this conference is the exchange of information among the NASA Centers on Advance Research Technology. ✓ *Very useful! B*

2. RESEARCH ADVISORY COMMITTEE MEETINGS: Last week I participated for two days in a meeting of the Research Advisory Committee on Control, Guidance and Navigation and for one day at the G&C Steering Group at Lewis Research Center. The presentations covered research work at the various Centers. I got the impression that we, at R-ASTR, are limited in research for several reasons more than any other Center. Also, a stronger control from OART and MSF is desirable to avoid multiple redundancy in research. A typical area is R&D on sensors for space vehicle control.

WH
 → *Probably true. OART favors their own centers, and MSF's first business is the man on the moon. What items you feel particularly hot about do you think we should fight for? I'm willing to pitch in and help. B*

B 12/16

1. F-1 ENGINE: Engine F-1002-2 was installed in the Static Test Tower West (STTW) on 12/10, and preparations were begun for an initial test date of 12/17. This engine has the FRT injector and the modified lox dome. Testing will be conducted without the 16:1 thrust chamber extension installed, due to the incompatibility of the FRT injector and the Block I extension. ✓
2. S-II BATTLESHIP: The 10-second firing scheduled for 12/8, was rescheduled for 12/9, when an intermittent overspeed trip cutoff occurred with no immediate solution evident.

The test had to be scrubbed again on 12/9 at approximately T-1 second as a result of a cracked weld on the start bottle. A successful 10-second firing was conducted on 12/11. ✓

KH
Let's redesign the bag!!
B

3. S-IV-10: The stage was installed in test stand 2B on 12/5. Inspection revealed rupture of the desiccant bag in one of the chilldown ducts releasing numerous pellets into the ducting and consequently into the two associated engines. These two engines will be replaced. No serious impact on the scheduled acceptance firing date of 1/20/65 is anticipated.
4. S-IVB BATTLESHIP (SACRAMENTO): A 50-second mainstage test was successfully conducted on the S-IVB battleship at DAC's Sacramento Test Site on 12/9. A 150-second mainstage test is planned for 12/15. ✓

5. SATURN I (SA-110): An H-1 flight engine (S/N 5030) chamber was accidentally damaged at the Michoud Plant necessitating chamber repair and refiring of engine. The engine was fired at MSFC on 12/10, and shipped back to Michoud on 12/11. ✓

6. MTF WORKING GROUP:

Jimm Shepard
FYI
B

S-II GSE Installation at MTF: North American (S&ID) has issued a stop order on their design contract with Aetron affecting approximately 40% of the GSE on the first S-II stand. Since we have agreed to a MSFC contract with Aetron for the installation itself, this delay in delivery of S&ID design drawings would obviously affect our completion date. It appears that the effect would be an 8-week slippage, from 9/1 to 11/1/65. This information was received informally from the S&ID project engineer. However, MTF Working Group has contacted Mr. Roy Healy and requested that these revised dates be furnished officially through channels.

I think we shouldn't accept any delay. We just steamed

7. S-IC-T: Attached is a copy of the memorandum of agreement reached with Boeing on the qualification of S-IC-T hardware. The status of this hardware will be covered by Mr. Hellebrand in Mr. Cline's NOTES. (Copies for Mr. Weidner and Dr. von Braun only.) ✓

8. S-IC TEST FACILITY (WEST AREA): During the past week, 3 major cracks have developed in the welds for the holddown arms. The cause of these cracks and the solution therefor are presently being investigated and you will be kept informed. ✓

Up the construction contractors and the Corps. Let's not slip now on the outfitters! B

Jerry Mc
incredible,
eh? B

1. POTENTIAL SAVINGS IN COMPUTER RENTAL: Our Business Applications Group has conducted machine studies in the peripheral computer equipment area and has found potential savings of nearly \$5,000 per month by exchanging some IBM equipment for Remington-Rand Univac equipment. These computers would be used to support the larger computers by card reading, card punching, and printing. We plan to order this cheaper equipment as rapidly as possible.

2. COMPUTATION LABORATORY FACILITIES: The extension to Building 4663, now under construction, will be ready for occupancy on the following dates: "A" Wing, February 17, 1965; "B" Wing, January 16, 1965; "C" Wing, January 1, 1965. We expect to utilize most of the personnel space in these new extensions to bring back our Data Reduction people from the HIC Building.

B 12/16

NOTES 12/14/64 JAMES

PEGASUS A: Electrical systems tests of the assembled spacecraft have been completed in Hagerstown. Remaining spacecraft testing is scheduled to be completed and the spacecraft will arrive at GE this week and then to KSC approximately two weeks later. ✓

S-IVB BATTLESHIP: A scheduled 50 second mainstage firing test was successfully performed on S-IVB Battleship on 12/9/64. No major problems are apparent from a quick look at oscillograph and strip chart data. All facility and stage hardware functioned satisfactorily with only minor discrepancies noted at this time. Thrust chamber side loads were somewhat higher on this test than the previous test (10 sec.) but satisfactorily dampened out in approximately 8 seconds. Scorching of flame bucket paint was noted above the impingement area on the back side of the bucket. This area (approx. 2' x 4') was just above the area scorched on the last test in which additional holes (240) were drilled. It is planned to drill approximately 200 holes in this area prior to the next test. The next test is scheduled for 150 seconds duration on 12/15/64. This test is planned to be followed by the first full duration test on 12/19/64. ✓

S-IVB QUALIFICATION TEST PROGRAM: Reference Grau's notes 11/16/64 on slippage of S-IVB qualification test program - see attached. ✓

RCA 110A COMPUTERS: RCA is experiencing difficulties in obtaining high reliability semiconductor parts from vendors on the Saturn IB computers. Delivery of these components could create as much as a ten week slippage in computer deliveries going to KSC for the Saturn IB program. KSC is conducting a study to determine if facility checkout tests can be performed without using these computers. Results of this study should be available within a week. If computers are not required for wet tests, there will probably be no program impact. If computers are required for wet tests and deliveries are delayed, program impact will probably result. Latest allowable date at KSC has been requested and status of these computers will be monitored to attempt to meet an acceptable delivery schedule. ✓

FLIGHT MISSION ASSIGNMENT DOCUMENT: (MRAZEK) Reference your question on my 11/23/64 notes as to the configuration to be flown on 206 - the probable 206 configuration will be the Apollo configuration consisting of LES, C/M, S/M, LEM adaptor and LEM. MSC requests either a common configuration on 203 and 206 or the Apollo configuration on 206. ✓ We are preparing for the Apollo configuration on 206 since preliminary study indicates we will have control problems on 203 if we attempt to fly the 206 external configuration. ✓

- Attachment #1: Grau's Notes 11/16/64 (Mr. Grau and Dr. von Braun only).
- Attachment #2: S-IVB Qualification Test Program (Mr. Grau and Dr. von Braun only).
- Attachment #3: James' Notes 11/23/64 (Dr. von Braun only).

B 12/19

1. THIS WEEK'S HIGHLIGHTS: We have a two-day review this week on our Saturn V improvement studies. This is the mid term review of six contracts. We have scheduled a management type summary for Thursday (2 hours). ✓

Mr. E. Z. Gray and his senior staff will be here on Wednesday for a review of advanced studies, primarily on policy matters. We are prepared for some 12 topical reports (15 minutes each) from which he is expected to choose. He will arrive Wednesday morning and the meeting will start at 11:00 a.m. (not at 10:30 as previously announced). We will have sandwiches in the 10th Floor Conference Room, in order to conserve time. The policy discussion will begin around 1:00 p.m. when you are scheduled to join us. ✓

2. "RETURN ON INVESTMENT": We have developed a calculation procedure which attempts to assess the expected "return on the investment" of any space program and can suggest the relative standing of alternative space program plans. It is based on the "weighted objective list," which was derived by group judgment of senior MSFC personnel. Forty-four yield indices are available to correlate the yield of a space program with the given objectives. Each of the objectives is represented by a "worth estimating relationship." The number of terms in each equation is proportional to the weight of the objective. The individual terms are nonlinear and produce a devaluating effect with increasing time and transportation volume.

The calculation procedure is simple enough to be explained to people not specializing in the "numbers racket." We are now testing this procedure to find out how useful and valuable it might be as a planning tool.

The purpose of this limited effort is to gain more insight in "what makes the space program tick," and not to derive at a new space program by analytical procedures.

If we think we learned something, we will let you know.

HHK
 Although I'm sure you know as well as I do that the "political feasibility" of space programs depends not only on logic, but on such unfathomable elements as President Kennedy's election or NASA/AF relations, I am in complete agreement with you that it is absolutely necessary that we proceed in our long-range plans with as much logic and care as we can muster. Let's make sure that we discuss progress in this area at regular intervals, And don't get discouraged. B

B 12/19

1. Results of Your Top Local Meeting with Boeing on November 19: Here are some noticeable and important results from the "Summit Meeting" with Boeing last month:

a. There is a marked attitude change on the part of the Boeing people on all levels of supervision. A willingness to work with MSFC for the project and not for a contract only is now evident. ✓

b. Several -T CAM meetings have been held to defer or plan incorporation of changes within given time schedule. Memo's of firm agreements have been concurred in by MSFC and The Boeing Company. It is now recognized by Boeing and MSFC that change control has to start in the beginning of the change cycle in design engineering and has then to continue until the modifications are incorporated into the hardware. Actions for procurement, tooling, and fabrication have to be initiated as the design of the configuration change proceeds, not waiting for final approval of the CAM. Cost and schedule impacts must be accepted during the change development period. ✓

c. The manufacturing organization of The Boeing Company at Michoud has been reorganized. Four functional divisions have been established, each reporting to the Director of Operations, Mr. Bud Coenen. This will result in faster response to changing program requirements and a more efficient operation. ✓

d. MSFC and The Boeing Company have established procedures for negotiation of late documentation on parts. ✓

e. Delinquency of component delivery has substantially improved. The Boeing Company count of delinquent parts was 319 line items for -T on November 19. The count was 165 line items on December 10. ✓

2. Manufacturing Milestones for S-IC-T Stage: The Thrust Structure/Fuel Container unit for -T has been removed from the tower building. The horizontal splicing with the Intertank/Lox Container/Skirt has been accomplished in Building 4705. ✓ The air bearing support of the forward unit during the alignment operation of the two units operated very satisfactorily. ✓ Proper tooling, providing for good control of tolerances of mating surfaces, made all our splicing operations in the structure very easy without using time consuming optical setups. The horizontal alignment before the mechanical fasteners were inserted took only a few hours. This proves that horizontal assembly of structures of this size is entirely feasible and economical. We are now catching up on our time schedule for -T and are now confident to deliver the Test vehicle by March 1, 1965. ✓ The first F-1 engine for the -T vehicle was received last Monday, December 7, 1964. ✓

WK → Maybe vertical assembly wasn't necessary, eh?
 In Michoud B

B 12/19

1. UTILIZATION OF DOD PERSONNEL - We are reviewing Joe Dickerson's draft of report to Dr. Mueller on use of DOD personnel and will furnish comments to Dickerson later this week. We plan to discuss this in detail with you in meeting on redistribution of manpower resources, which is being postponed beyond December 18, 1964. ✓
2. MSF MISSION OPERATIONS ORGANIZATION - Mr. Webb approved the MSF mission operations organization, and according to Mr. Christensen, an announcement will be released soon. Christensen promises to issue for comments, a detailed proposal on functions and interfaces, within the framework of the approved organization. ✓
3. PERT IMPLEMENTATION MANUAL - In response to a request from the Management Information Systems Division in hdqs, we reviewed and furnished comments on the PERT Implementation Manual which was developed, for government-wide use, by the U.S. Gov't PERT Coordinating Group. We concluded that the requirements of the manual are too detailed for application in NASA, under the current NASA policy of requiring only summary level PERT input from contractors. Specifically, We feel: PERT/Costs are too detailed, "Three Estimates" requirement is unnecessary, and Definitions of Costs differ from our definitions. ✓
4. MANPOWER - The NASA Congressional budget personnel distribution by center for FY65 and 66 shows no request or requirement for additional civil service spaces in FY66 for NASA except 300 for Electronics Research Center. Since MSC and KSC are fast approaching their ceilings, any additional requirements for those two centers would have to be filled from within NASA. According to St. Croix, who handles manpower for MSF, we can expect pressure to relinquish spaces. ✓
 Headquarters in the same action has also reduced our military requirement from 65 to 44 for both FY65 and FY66. (MSFC now has 50 military on board). We are trying to determine the reason for this. There is no ceiling on military, and the requirement should be established by us, not headquarters. ✓
5. S-II MANPOWER AND ACTIVITY SURVEY - Chris Andressen is working with Col. O'Connor to establish plan of action for this survey. Jack Sharkey who is also assigned to this survey, returned from S&ID today, and Chris predicts the plan can be completed this week. ✓
6. NATIONAL LAUNCH VEHICLE STUDY - AACB is meeting at 2:30 today. Joe Malaga will make a presentation on results of the Cost Panel's study. Woody Bethay reviewed the draft of Malaga's report in hdqs. last Friday; his summary comments are attached for your information. ✓

H.M.
 More use of DOD spaces is the obvious and only answer
 B

NATIONAL LAUNCH VEHICLE STUDY - A draft of the cost study report prepared by the Cost Panel for the AACB was reviewed by J. A. Bethay in Washington on December 11. (We were unable to obtain a copy for a more general review at Marshall. However, Mr. Malaga stated that if the AACB sees fit the report will be distributed after it is presented by the Cost Panel to the AACB.) The conclusions which are drawn in the report are as follow:

a. There is not a significant difference (less than 1%) between the total costs of the launch vehicle mixes (numbers/combinations of vehicles) considered.

Meaning?
B

b. Analysis of the cost of individual vehicle families in each of the options indicates the probability of a less expensive option by optimizing assignment of vehicles in the medium and heavy mission categories.

c. The present accounting and reporting structures do not provide data which is consistent with a unit hardware cost approach to estimating future requirements. This required the contractors and the Cost Study Panel to do considerable proration into the structure established for this study.

The most significant statement from Marshall viewpoint in the report immediately precedes the conclusions. This statement is as follows:

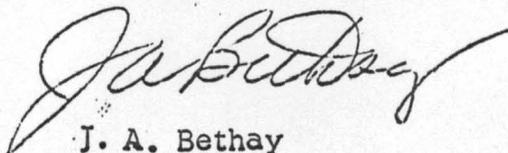
"From the above discussion the probability of a more cost sensitive option than the ones examined so far is indicated. Specifically, it appears that a better option, from a cost standpoint at least, could be developed by assigning Atlas vehicles to all medium class missions and using Titan III C's to the maximum extent possible in lieu of Saturn IB's on all heavy class missions."

The average unit cost for launched 2-stage Saturn IB's as presented in this draft report varies from \$19.6 M in the maximum quantity to \$29.2 M in the minimum quantity. Similarly, the Titan III C cost varies from \$10.5 M in the maximum quantity to \$12.8 M in the minimum quantity.

Considering the conclusion b. presented above, it appears that there is a need for effort to insure that any future mission models which are studied appropriately consider payload capabilities and limitations of the various vehicles to insure that payloads for Saturn IB include all of those which should be flown on Saturn IB.

Frank Williams

Please see me on this
B 12/19



J. A. Bethay

B 12/19

NOTES 12/14/64 McCartney

1. SOURCE EVALUATION BOARD ACTIVITIES: The Source Evaluation Board Reports of Findings for each of the 10 R&D Operations' laboratories and offices have been completed. Mr. Cook will present these findings to the Associated Administrator on December 14 and to the Administrator on December 17. ✓
2. CONFLICT OF INTEREST PRESENTATIONS: The Conflict of Interest presentations, initiated by Dr. McCall, have been completed in R&D Operations. The presentations were timed so that they were completed prior to the Christmas season to prevent possible violations. First - line supervisors, COR's, and other key management personnel attended as follows: COR's - 150, AERO - 65, ASTR - 46, COMP - 43, ME - 33, P&VE - 50, QUAL - 37, RP - 26, and TEST - 67. ✓
3. RESOURCES MANAGEMENT CONFERENCE: On December 8, the eighth Resources Management Conference was held. Among the problems discussed was the need to prepare, by laboratory, plans which consolidate budget and manpower requirements to stage and section level, including vehicle support. R-RM has completed such a plan for R&D Operations as a whole, and is now developing similar plans for each laboratory which will be coordinated with the appropriate laboratory Resources Management Offices. ✓
4. CONTRACTOR COST SURVEY: On December 2-4, an R-RM representative participated in a survey of Lear-Siegler (Santa Monica) performed by Col. Fellows' Contractor Cost Evaluation Team. (This survey is part of a NASA-wide effort to evaluate the cost reduction programs of selected contractors.) During January, the team plans to completed its planned surveys by visits to Hayes (Birmingham) and Brown (Huntsville). ✓

B 12/19

NOTES 12/14/64 RUDOLPH

1. S-II Battleship Status - The S-II Battleship test #004, previously scheduled for Tuesday, 8 December 64, was successfully conducted on Friday, 11 December 64, with a planned 10 second duration. Events leading to the requirement for rescheduling to Friday were: (1) Firing countdown was stopped Tuesday due to a false cutoff signal from the fuel turbine over-speed trip device. Trouble was isolated to an electrical "Box" which was replaced. Test was rescheduled for Wednesday. (2) Countdown on Wednesday was stopped just short of ignition due to a drop in start bottle pressure. This was later found to be caused by a leaky weld in the GH₂ line near the start bottle. The test was then rescheduled for Friday to allow time to repair or replace this start bottle. ✓

2. S-II Test Stand A-2 at MTF - A plan to recover the schedule of Test Stand A-2 at MTF to support the delivery of S-II-F to MTF was presented to Mr. William Lily and Major General Sam Phillips at NASA Headquarters December 9. The plan was that the test stand would be able to accept the S-II-F when delivered by exercising a number of work arounds on the high pressure gas systems, high pressure industrial water systems and Cryogenic systems and certain "in scope" redirection of the Technical Systems Contractor. The plan requires no additional funding. NASA Headquarters concurred in the MSFC Recovery Plan. ✓

3. RCA 110A Computer:

The expected delivery date for the RCA 110A Computer for R-Qual Test and Checkout Station is now January 15, 1965, six (6) weeks later than the last reported delivery date estimate and eleven (11) weeks later than the Boeing demand date. The latest delay was caused by soldering problems. ✓

A task team of R&DO and IO personnel visited RCA on December 4, 1964, for the purpose of evaluating the report from R-QUAL that the quality of soldering on the RCA 110A computer for the S-IC checkout station was very poor. The findings were that the soldering was indeed far from acceptable in many instances and a pin by pin inspection of the entire machine was started. Some cabinets have been turned over to RCA for rework. Upon completion of the rework, the computer will be reinspected and then the in-plant acceptance tests will be performed. The urgency at this time is to place enough inspectors at the RCA plant to complete this inspection with a minimum of delay. It would seem advisable at this time that a resident Quality Laboratory representative be assigned to the RCA plant for the duration of the NAS8-5423 and NAS8-13007 contracts. ✓

↓
Dicto Hall
FYI B

NOTES-12-14-64-SHEPHERD

B 12/19

S-II Complex Schedule - MTF: On December 9, General Phillips, Mr. Lilly and members of their staff were briefed on the status of, and the Marshall position in regard to the S-II test complex at Mississippi. This briefing consisted of essentially the same points presented to you on the flight to MTF on November 30. The analysis of the schedule had shown that the S-II F complex would be capable of performing all of the tests on the S-II F by November 1, 1965, with no additional cost. The S-II F is presently scheduled to arrive at MTF October 1. There is a possibility that this date will slip two or more weeks. To accelerate the construction so that the test complex would be capable of performing all tests on October 1 would result in a cost of \$5 million. General Phillips and Mr. Lilly both accepted the Marshall position that no expediting funds should be spent at this time. ✓

Contractor Claims on F-I Test Complex at EAFB (Edwards Air Force Base): The prime construction contractor has requested reimbursement for additional costs approximating \$6.5M for himself and his sub-contractors. The Contracting Officer (Los Angeles District Engineer) has voiced an initial reaction of attaching no validity to the contractors' claims. We will assist the District Engineer in reviewing the contractors' requests and intend to take a very firm position regarding any additional allowable costs. If the contracting officer disallows any or all of the contractors' requests, the latter's only recourse is to submit a formal claim under the "Disputes" clause of his fixed-price contract. ✓

B 12/19

1. OMSF SUPPORTING DEVELOPMENT PROGRAM: Members of OMSF visited RPL last week to discuss possible ways of obligating OMSF Supporting Development funds faster in order to meet Dr. Mueller's wishes for complete obligation by March 31. At the same time, I met with Ed Gray at OART to describe our situation, and to repeat our request for authorization of the remaining tasks.

The present dilemma of belated obligations is caused mainly by the late authorization (June - July) and consequently late obligation (1 August - September), of FY-64 funds. Most of the FY-65 tasks are continuations of '64 tasks. Since it does not appear desirable to negotiate a contract continuation before at least the first semi-annual program report has been obtained, the earliest obligation date for a considerable portion of the '65 program would be April or May 1965, provided that we receive the remaining authorizations which are presently in Dr. Seamans' office awaiting his action. ✓

A letter to Dr. Mueller explaining this situation in more detail has been prepared for your signature. ✓

This state of affairs should not detract from the requirement of expedient actions by our Laboratories. Commitment procedures are sometimes slow after funds are authorized even for new tasks. RPL has sent sub-workorders for all authorized tasks to the Labs, with the urgent request for expedient commitment actions. ✓

Our last report on the funding situation (NOTES 12-7-64) unfortunately contained a misleading figure; a new report will be submitted on December 21. ✓

2. METEOROID DETECTOR EXPERIMENTS: The RPL Thermophysics Laboratory has completed the first series of experimental runs on the meteoroid detector panel in the thermo-space environmental chamber. The purpose of the study is to subject a panel to simulated space conditions including solar radiation simulation, measure the temperatures throughout the panel and their variation with time, and compare the results with theoretical calculations. The study was highly successful in that expected behavior of the panels was observed. ✓✓

3. MEETING OF FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY: As you had requested, I attended the above meeting on "The Environment of the Federal Laboratory" in Washington on December 7. Many complaints were leveled at the Civil Service Commission because of "inflexibility" of its rules; however they were all countered by the statement that "Civil Service rules permit all the flexibility a laboratory could possibly wish to have, provided that the laboratory director has the desire, the ingenuity, the stamina, and the courage to interpret the rules according to his needs." A more detailed trip report is being distributed.

Harry J.
What a challenge for you! B

Dec 21, 1964

fw 1/2

H-1 ENGINE

B 12/24

Retrofit of the SA-201 engines is in progress at Neosho. Completion of the retrofit is forecast on schedule (in January). ✓

*F-1 ENGINE

A significant milestone was accomplished last week by the successful completion of the FRT (Flight Rating Tests) on the F-1 engine. This particular milestone was one of a dozen important events to be accomplished in CY 1964, which were officially committed to Congress by NASA. Two engines were used in the testing. The first was F-2004 used for demonstrating a minimum of 20 start tests simulating various unexpected but potential malfunctions and limits operation. Because of an injector change, this series took 23 starts to successfully accomplish. The second engine was F-2006 and was used to demonstrate the minimum lifetime expected of 1350 seconds. This was accomplished using a total of eleven (11) tests to accumulate this time. The entire series on both engines was conducted in exactly one month with only minor difficulties being experienced. A detail piece by piece inspection will be conducted on the engine which demonstrated 1350 seconds life, following its post functional and leakage check-outs. ✓

*J-2 ENGINE

^{or it} _{fw} A 150 second mainstage firing was conducted on the S-IVB Battleship stand on Tuesday, December 15, 1964. A preliminary review of the data indicates a successful test. A 480 second test is scheduled for Tuesday, December 22, 1964. ✓

Production engine 2011 has completed hot firing acceptance testing and is currently undergoing post test inspection and checkout prior to delivery. This engine will be delivered to S&ID for the S-II Battleship program. ✓

The fuel turbopump with the redesigned turbine wheels has been disassembled and inspected after accumulating 5,500 seconds of test time. Inspection of the turbine wheels revealed no cracks or other indications of failure. Another turbopump with the redesigned turbine wheels is being tested to further verify the design. ✓

Engine 2013, a flight configuration engine scheduled for S-IVB Battleship testing, suffered a gas generator failure during acceptance testing on December 17. A triangular piece of metal about the size of a quarter came out of the bottom of the GG body after 88.5 seconds of mainstage firing. All engine parameters were normal; i.e., GG temperature and pressure. About two seconds prior to an observer cutting the run, the GG pressure dropped, indicating a leak in the GG body. Electrical harnesses, the high pressure fuel duct, the main fuel valve, and the fuel turbopump/gas generator assembly will be replaced. Testing will continue while the damaged GG body undergoes an extensive metallurgical analysis. This is apparently a random structural failure. ✓

RL10 ENGINE

Fredline Show the importance of SA-203!! ✓

Additional information from the flight of AC-4 indicates that the unbalanced forces probably caused by venting of liquids during coast - after the first burn of the Centaur Stage - caused a yaw moment greater than the attitude control system could overcome, and resulting in tumbling in yaw (rather than roll as originally thought). The RL10 engines went thru the prestart sequence for the second burn and the igniters fired for 10 seconds at the correct time. The chamber pressure on one engine built up to 20 psia at one second after start signal, apparently due to the trapped propellants in the engine, and then decayed. The pressure of the engine powered vehicle hydraulic system also increased on this engine indicating a brief spin-up of the turbopump machinery. Apparently hydrogen was not available at the H₂ Boost pump inlet. ✓

7w12
21

NOTES 12-21-64 CLINE

B 12/24

1. SATURN IB/MINUTEMAN: On 12-17-64 CCSD held the first informal review session covering the work done to date on Part I of the Saturn IB/Minuteman program definition phase.

After examination of preliminary performance data, CCSD has been instructed to place major emphasis on the four-Minuteman configuration during the remainder of Part I and to fully document the work done up until this time on the two-Minuteman configuration. No further technical effort is to be expended on this latter configuration. ✓

Preliminary results indicate that only a slight payload advantage will result from jettisoning the spent Minuteman cases prior to S-IB burnout due to rather severe weight penalties incurred by providing the separation/jettison device; however, CCSD will attempt to define a satisfactory separation/jettison mechanism prior to 1-5-65 and will furnish cost estimates for both jettison and non-jettison cases in their final cost estimates. ✓

2. S-IVB STAGE BATTLESHIP 150-SEC. FIRING PERFORMED ON 12-15-64: Gas-generator temperature spiked twice to approximately 2020°R, but stabilized at 1430°R. The next firing is scheduled to be full duration on 12-22-64. ✓

3. J-2 ENGINE SCHEDULED FOR S-IVB BATTLESHIP DAMAGED DURING TEST ON 12-17-64: Engine J-2013 experienced a gas-generator burn-thru at 90 seconds mainstage during a scheduled 250-second run, which was the third and last test in acceptance series. Cause has not been determined. ✓

4. AC-4 ACHIEVES PRIMARY OBJECTIVE---PLACES DUMMY PAYLOAD INTO ORBIT: The secondary mission--restarting the RL-10 engines after an extended coast period in orbit--was not successful. Preliminary evaluation indicates the absence of hydrogen at the pump inlets. The hydrogen may have been centrifuged by vehicle tumbling, which started approximately 270 seconds after cutoff. Tumbling may be attributed to hydrogen venting. Detailed evaluation should be available early next month. ✓

B 12/26

1. S-I/IB

Quarterly Review - The tenth S-I/IB Quarterly Review was held on December 17, 1964, at the MSFC/Michoud Operations in New Orleans. The program is proceeding in an orderly manner with no major deficiencies regarding cost and schedule. There is a significant backlog of documentation directives that need to be cleared up. Michoud Operations will make a concerted effort during the next quarter to reduce this backlog. ✓

Status of S-I-8 - Post static checkout of S-I-8 is approximately 95% complete. ✓

Reliability Program - The Chrysler Corporation S-I/IB Reliability Program Plan has been received from Chrysler and is being coordinated with the appropriate organizational elements of the Marshall Center. ✓

Critical Components - A meeting was held between MSFC and Chrysler Corporation Space Division to discuss requalification of critical components to the recently revised vibration, acoustic, and shock specifications. It was agreed that Chrysler would compile test information on all S-IB critical components to determine which components require requalification testing. This information is readily available and will be coordinated with appropriate organizational elements of Marshall in the very near future. ✓

2. S-IC

F-1 Engine. The first F-1 engine (FM-105) to be delivered at MSFC/Michoud Operations is scheduled for early January. All necessary ground support equipment required is being received this month and there are no problems foreseen. ✓

3. Support Services Contract

Action has been initiated to extend the existing contract with the Mason-Rust for a period of 60 days. During this period of time a new contract will be negotiated with incentive award provisions. ✓

4. Computer Services Contractor

Negotiations were completed with Telecomputing Services, Incorporated, to provide a one year extension of their existing contract with NASA for computer services at the Michoud/Slidell Computer Office. The contract will run from January 7, 1965, through January 7, 1966, with a total estimated cost, including fee, of about \$2,175,000. ✓

5. GAO Report

A draft report on excessive costs incurred by purchasing supplies from commercial sources rather than from the General Services Administration by the Mason-Rust has been issued by the Comptroller General. ✓

The Mason-Rust is preparing its reply to this report.

B 4/26

6. S-IB-D/F and S-IVB-D

The S-IVB-D is scheduled to arrive at Michoud late on December 21, 1964. The S-IB-D/F and the S-IVB-D will be loaded onto the PROMISE on December 22, 1964, and will depart for Huntsville. ✓

tw
21

NOTES 12-21-64 DANNENBERG

B 12/24

1. Saturn V - Preflight - A proposed Saturn V Program Directive for analysis of logistics, spare parts, maintenance and acceptance testing at all field installations has been reviewed by R&DO and a plan for implementation of this work by Boeing has been formulated. ✓
2. Manned Flight Awareness Program - MSFC manned flight awareness displays were shipped to Michoud and viewed by 20,000 people including S-IB and S-IC workers at the plant. ✓
3. S-II Design Reviews - The first S-II Design Review was held at NAA on December 17, 1964, on the thermal control system. IO and R&DO participants report that this review was successful. We are watching these reviews carefully since they are intended to replace the control drawing review system. ✓

fw 12/21

B 12/25

NOTES 12-21-64 FORTUNE

1. Visit to Downey, Seal Beach and Santa Susanna - Monday and Tuesday I spent with Eric Neubert at these S&ID activities, going over the Electro-Mechanical Mock-up, related GSE, the manufacturing, assembly and check-out facilities, Battleship and All-Systems Test Stands. Discussion with Gengelbach indicated need for agreements in quality assurance areas involved in stage movements from Seal Beach to MTF to MILA. Present indicated status of the S-II-F confirms earlier MSFC decisions not to spend money unnecessarily accelerating S-II Test Stand. ✓

2. Bi-Weekly Coordination Meeting with GE - was held Friday reviewing GE's functions in support of Aetron's Phase I Tech. Systems contract; plans for occupying the Lab. & Engineering Building when BOD is received; technical personnel recruiting results and Equal Employment Opportunity matters. GE feels they have about exhausted the market for Electronic Technicians and has requested approval for relocation funding of Non-Exempt (technician) personnel. MSFC position thus far is to disapprove until need is positively demonstrated. ✓

3. Activation - GE takes over operation of the Central Heating Plant Monday 21, December. This brings to 12 the number of buildings, facilities or other construction packages we have accepted from the Corps of Engineers. S&ID has begun its on-site personnel buildup in the documentation area. The pace of such activities will accelerate from this point on. One of our present noteworthy problems is that the present constraints applied to Civil Service staffing are continuing to hamper our ability to fill the technical positions with the quality and experience necessary to plan and implement activation. ✓

4. Messrs. Kewshew and Armstrong, from Apollo Programs Office NASA Headquarters, visited MTO Friday a.m. - They were at Michoud for a Program Review and wanted to see our Test Site. Armstrong had been of help to Henry Dyer and myself when we were called up to Washington for presentation to Bureau of the Budget. ✓

Beles

Tw 12/21

1. Saturn I Interstage Debonding in Flight: Per your request noted on item 1, Notes 12/7/64 Geissler, copy attached, the enclosed sketch is furnished. ✓
2. Saturn IB/Centaur Dynamic Tests: Our best estimates of the actual cost of the dynamic test of the Saturn IB/Centaur configurations are as follows: (a) Actual Dynamic Test Costs: Materials 0.4 million, Special Test Equipment 0.7, Facilities 1.2, Astrionics Tests 0.1, Total 2.4. (b) Test Vehicle Costs: Procurement from GD/A 1.7, Total Modifications at MSFC (shrouds, adapters, support mechanisms, snubbers, etc.), 2.7, Total 4.4. The vehicle in question is also required for facilities checkout, static testing, and for cryogenic testing; therefore, the total cost of the vehicle cannot be tied to the dynamic testing. Even if there were no dynamic testing, the vehicle would be required for these other tests. ✓
3. Orbital Debris: Representatives of LASL (Los Alamos), Dr. King and Dr. Petchek and Mr. G. P. Dix of AEC-NASA Space Nuclear Propulsion Office (SNPO) NASA Headquarters discussed at MSFC on Thursday, December 10, 1964, the possible use of a nuclear device to dispose of the spent hardware (S-IVB stage, etc.) during earth lunar transit. The political aspects of using a nuclear device on space vehicles appear to be softening. The nuclear device would be located on the S-IVB stage and weight approximately 100 lbs. Potential problem areas in using this scheme are (1) assuring no contact of hardware fragments with the spacecraft, earth, or moon and (2) hazards during destruct for mission abort prior to earth lunar injection. LASL has been working in the area of Peaceful Application of Nuclear Energy in space (PANES). This meeting was the first contact of MSFC with LASL personnel in the area of PANES. MSFC was requested by SNPO to supply an official expression of interest in this work as a condition for its continuation in the near future. However, this work in the area of Peaceful Application of Nuclear Energy in Space would not require MSFC or NASA Headquarters to provide funding to LASL (Los Alamos). It is recommended that MSFC and NASA Hq support this work on a long lead time Saturn V effort; NASA Headquarters would be contacted for guidelines and liaison. ✓
4. Tabaka Study: We have had a series of meetings with Personnel Office representatives and Mr. Tabaka concerning the new job classification procedure to be implemented here at MSFC. We discussed the shortcomings of the analytical approach of factor degree evaluation which ought to be complemented by the integral consideration of the man in a job. Even though there appears a definite risk of a too mechanical use of factor evaluation by people not knowing the job well enough, we feel this approach will be an improvement over the past system. Whether it will be worth the large amount of time required by all of our people, remains to be seen. ✓
5. Lunar Surface Program: The enclosed letter by Mr. L. Helms of the Bendix Corporation about a visit to Dr. Seamans may be of interest to you because of Dr. Seamans' reaction to the Lunar Surface Program. We will be glad to follow with a more detailed briefing. (We would appreciate the return of the enclosed drawing). ✓

PLEASE LIMIT Notes to 1 page - which should include
 a summary of item 5 if you think it is of sufficient importance.
 picked it. ✓

Frank

Where is
 it? B

Tw

B 12/26

July
21

1. RELIABILITY SURVEYS: Reliability surveys were performed recently at Pratt and Whitney Aircraft, West Palm Beach, and at Rocketdyne, Canoga Park. General conclusions were that the Pratt and Whitney reliability organization is weak and should be reorganized into one central organization if their present contracts are to be expanded appreciably. The Rocketdyne reliability effort is comprehensive and effective, but should be revised at the next contract negotiation to include additional reliability techniques. ✓
2. AUTOMATED MEASUREMENT EQUIPMENT: A Ferranti Sheffield, Co-Ordinate Inspection Machine has recently been received and is now installed and ready for use in Building 4711. This is the first piece of automated equipment to be obtained by the Mechanical Analysis Branch for dimensional measurement of machined parts. ✓
3. S-IVB PROGRAM: The S-IVB Battleship stage was test fired at Sacramento on December 15 for a duration of 150 seconds. Thrust chamber side loads were somewhat higher than the previous 10 second firing, but satisfactorily dampened out in approximately eight seconds. Preliminary results indicate that this was a very successful firing in all other respects. A full duration firing of approximately eight minutes is tentatively scheduled for December 22, 1964. ✓
4. PEGASUS: The completed spacecraft for Flight No. 1 (Pegasus A) is scheduled to begin checkout under environmental conditions at General Electric, Valley Forge, Pennsylvania, this week. Checkout under ambient conditions was completed at Hagerstown last week. ✓
5. S-IC PROGRAM: Considerable problems have been encountered with the S-IC fuel tank pressurizing valves. Five of these valves have been received from Consolidated Controls and all have been rejected during acceptance functional testing. Considerable redesign is expected to be required before the pressurizing valves will be acceptable for flight vehicle use. At the present time, no pressurizing valves have been accepted for installation on the S-IC-T stage. ✓

*Urly's
Heinsberg
what are
you doing
about
this?*
6. H-1 ENGINE PROGRAM: Difficulty has recently been experienced in maintaining the required lubricating pressures during green run of the turbopumps from engines of the SA-201 Vehicle, which were returned to Neosho, Missouri, for retrofit. To date, two turbopumps have been disassembled and in each case, two plugged lube jets were discovered. The jets were plugged with a brown, hard material. Investigation is underway to determine the source of the material. ✓

*Bill Lucas
Hrus Paul*

7/12/21

B 1/14

NOTES 12/21/64 HAEUSSERMANN

1. SUGGESTED PRESENTATION ON LAUNCH SITE SYSTEMS: In the past months we have had presentations on launch site hardware deliveries and software requirements. It appears that a visibility-type presentation to top management is needed in the ground systems area. Such a presentation to you would take about 2-1/2 hours. It would cover Apollo mission requirements for ground systems, fundamental layout concepts, basic design criteria, interface design philosophies, and the resulting hardware-software system. ✓

.At the same time we could discuss the automation plans for SA-201 as you requested. ✓

Would you be interested in this presentation and can you spare the necessary 2-1/2 hours?

Yes, please arrange thru Bonnie
B

Tw 12/21

NOTES 12/21/64 HEIMBURG

B 1/14

*fw 1. F-1 ENGINE:

Tests TWF-040 and TWF-041 were conducted on 12/17 and 12/18, respectively. A solution of 30% by weight methyl alcohol and water was utilized instead of sodium nitrite as a thrust chamber prefill. This change was made to determine if the sodium nitrite is the cause of the three instances of injector cracking experienced at MSFC. An important milestone was achieved during test TWF-041 as this was the first time the F-1 engine was gimballed utilizing the S-IC actuator system. ✓

2. S-IVB BATTLESHIP:

A 150-second "hot test" was conducted on the S-IVB Battleship at the DAC's Sacramento Test Site 12/15/64, with no apparent major problems. ✓

A duration test is planned for Tuesday, 12/22/64. ✓

3. TURBOPUMP INDUCER TEST PROGRAM:

The first cavitation test on a new "hubless" inducer for turbopumps was conducted recently at Test Position 100, CTL. Preliminary results indicate that the NPSH is considerably better than the H-1 "hub type" inducer. The tests are being conducted using water. At 3,000 GPM and 6,500 RPM shaft speed, the new inducer had a minimum NPSH (at 2% head loss) of approximately 15 feet. Under identical conditions the H-1 inducer has a minimum NPSH of approximately 25 feet. The indicated significance is the possibility of applying this inducer to future pumps thereby allowing lower vehicle tank pressures and consequently lower gross weight. The test results will be verified at various flow rates. ✓

7/12/21

NOTES 12-21-64 HOELZER

B 1/19

VISUAL SIMULATION FACILITIES:

Arrangements were completed this week for the USAF transfer to MSFC of an SMK-23 Visual Landing Simulator; delivery is expected in May 1965. Odgen Air Materiel Area estimates that within 60 days contractual arrangements will be completed for the manufacturer, Link to proceed with final assembly of the SMK-23 designated for MSFC.

This device will be used with general purpose computers and a two-man cockpit structure for simulation studies of lunar surface vehicles, reusable or piloted boosters, and advanced spacecraft vehicles. The SMK-23 provides visual six-degrees-of-freedom of a terrain view by use of a 3,000 to 1 scale model and a high-light intensity television projection system.

The USAF is transferring this state-of-the-art visual simulator for approximately one-fourth the original purchase cost. It is understood that this is possible due to a reduction in the number of SMK-23's required by the Air Force. Funds were obtained under an OMSF Research Task to study electro-optical simulation of manually controlled vehicles. ✓

NOTES 12/21/64 JAMES

B11/19

July
21

*fw PEGASUS "A" SPACECRAFT: Test and checkout of Pegasus "A" was successfully completed 12/17/64 at Hagerstown. Shipment made to GE, Valley Forge, Pa., 12/18/64, which was 2 days later than scheduled. Delay was result of a number of documentation and procedural shortcomings such as log books not being complete and formal test procedures not having been brought up-to-date. These were cleared up. Hardware functioned properly with only minor correctable errors being experienced. Vibration tests at GE were highly satisfactory and completed ahead of schedule through use of 2 GE crews. Vacuum tests will start ^{12/21} today and, with success and good weather, the shipment to KSC will be 12/23/64 instead of 12/27/64 as originally planned. ✓

PEGASUS "A" GSE: The blockhouse GSE has been installed except for a few data readout panels (expected next week). Power has been applied to the GSE and checks were performed satisfactorily. ✓

S-IVB DYNAMIC TEST STAGE: Stage is due to arrive at New Orleans on 12/21/64 for barge shipment to MSFC. ✓

*fw S-IVB BATTLESHIP: A scheduled 150 sec. test was successfully performed on S-IVB B/S on 12/15/64. No major problems are apparent from a quick look at the oscillograph and strip chart data. Side loads at start were somewhat lower than on previous test (50 sec.) and satisfactorily dampened out in 5 - 6 sec. Max load estimated to be 30-35K based on strip chart data and previous test data. Engine was chilled identically as on 50 sec. test (open GG bleed valves at 50% level in LH₂ tank, 50 min. chamber chill, 10 min. recirculation prior to start, and turn off GG heater blanket at T - 10 min.) and there was no indication of LH₂ pump stall during start transit. LH₂ tank pressurization module was used for first time on a mainstage test and functioned satisfactorily. LOX press module not installed, however a substitute pressurization system will be installed for next test. Based on preliminary data, engine performance was normal with no problems at this time. All start parameters were well within start requirements. The next test is schedule for full duration, approximately 420 sec., 12/22/64. Countdown will be initiated 12/21/64 at 4:18 AM. ✓

RCA 110-A COMPUTERS: MSFC personnel have made concerted efforts to improve workmanship and delivery schedules of first 7 RCA 110-A computers which are presently 1 - 6 weeks behind need dates. R-OUAL personnel are now fulltime at RCA and together with I-I/IB have waived certain specifications on MSFC located computers to expedite deliveries. Some items, like power supplies, will be exchanged at MSFC.

LH₂ EXPERIMENT: After discussion with Astrioncs, the low-G accelerometers have been dropped in favor of using the IU platform for these measurements. I am concerned, however, about the state of some other instrumentation, e. g., liquid/vapor sensors and the quality meter (determination of % gas/liquid vented). DAC has asked MSFC to consider placing some LH₂ Experiment instrumentation on S-IV-8 and S-IV-10. This investigation will be initiated and detailed LH₂ instrumentation status report will be set up for you in mid-January. ✓

B 1/14

7/12
21

1. SATURN S-II USE AS A SPACE STATION: During our review with Ed Gray last week you made a new proposal to design an equipment core to the S-II, which can be inserted into the S-II when emptied. In this connection, it might be of interest to you to know that we do have a study with NAA entitled "Utilization of Spent Stages" for \$100,000. This study was begun in September 1964. The mid term review is in January 1965 and the final presentation is here in April 1965. If you desire, we can send you the work statement issued to the contractor (which is quite general); we also intend to send you a copy of the charts used in the mid term briefing which should be available in about 4 weeks. I would like to propose waiting until April, after the final review of the contract, before we initiate an inhouse study. I would propose further that, at about that time, you assign (through our office) a task to Mr. Goerner's Group, who supervise the present NAA contract, to make a layout of your specific approach. The number of manhours and target date for completion can be fixed at that time. In my mind, there is no question with respect to the feasibility of your idea, but rather how well it compares with alternate approaches which have been studied already. We can do this comparative analysis relatively easy, provided a high enough priority is established by you.

2. FY 1965 STUDY PLAN: Mr. Gray has prepared a new version (about no. 8 this year) of his plan as to how to spend the 26 million allocated by Congress for advanced systems studies. The subtotals are as follows:

I. Apollo Extensions	\$14,000,000
II. Related Systems	1,550,000
III. Saturn Improvements	2,650,000
IV. Space Stations	2,700,000
V. Extended Lunar Exploration	2,700,000
VI. Planetary Exploration	1,500,000
VII. General Studies	900,000
	\$26,000,000

Of these, Dr. Seamans has approved only \$2,400,000. He is expected to approve another increment in January.

MSFC might receive the following amounts:

Lunar Surface Experiments	\$1,600,000
Lunar Pegasus	550,000
Saturn Improvements (approved)	1,400,000
Saturn IB Centaur	1,000,000
Reusable Orbital Transport	500,000
Launch Vehicle Criteria	250,000
Orbital Tanker Vehicle	150,000
Extended Lunar Exploration	2,400,000
Planetary Exploration	800,000
	\$8,650,000

Inhouse distribution of these funds would be approximately as follows:

IO/P&VE, Saturn IB - Centaur and Lunar Pegasus	\$1,550,000
Mr. deFries Office*	\$2,600,000
Future Projects Office	\$4,500,000

* Plus about 4 million dollars supporting research money.

NOTES 12-21-64 KUERS

B 1/14

July 21

1. Review of Manufacturing Plan for Re-design of S-II Container:

The re-design of the S-II Lower Lox Dome, which failed in hydrostatic testing a few weeks ago, consists mainly in providing heavier weld lands for all weld seams, a bigger (9' dia.) center piece, and integrally milled flanges for systems outlets. This re-design requires re-tooling and modification of manufacturing processes for forming the heavier gore segments and welding of heavier gages. We have not established formal tool design or manufacturing plan reviews, but work rather close together with S&ID manufacturing engineers in daily discussions of the inherent manufacturing problems. A final informal review and discussion of the design of the new Meridian Weld Fixture, which is required for the new dome configuration, were conducted last week. We are in full agreement with the design concept of this tool which reflects all experience gained so far in the area. It is interesting to note that S&ID manufacturing plans to perform the meridian welds this time without the use of back-up bars. This requires a very close control and programming of all welding parameters in order to achieve proper penetration. We are also using this technique in our shop. We plan to have our experts analyse and review every phase of the manufacturing plan in order to help minimize schedule impact of re-design and achieve high quality hardware. ✓

2. S-IC-T Progress: The cable fabrication and installation for S-IC-T is in full progress. We are presently working 40% overtime in our electrical shop and have "borrowed" four (4) Boeing electricians to help us in the installation of cabling. With only very few exceptions, the connectors of the 370 cables are not soldered any more but have hollow pins to which the wires are crimped. The crimping is done by semi-automatic tools, thus the human factor is eliminated to a great extent. ✓

fw
12
21

NOTES 12/21/64 MAUS

B
1/14

1. NATIONAL LAUNCH VEHICLE STUDY - Joe Malaga presented the results of the Cost Panel's study to the AACB on the 14th. We have learned that no new instructions or directions were given to the Cost Study Panel by the AACB. The Launch Vehicle Panel requested a two week period to integrate cost and technical aspects. We will maintain contact with Mr. Malaga's office for latest developments. ✓
2. SATURN IB/CENTAUR - A Saturn IB/Centaur (including Cislunar Pegasus) Project proposal was forwarded to Dr. Seamans by Dr. Mueller on November 22, 1964. A modified Apollo Project Approval Document (PAD) asking for approval and obligational authority to proceed with project definition on Saturn IB/Centaur and Pegasus, as a part of the Apollo Program, was attached.

Dr. Seamans has sent a memo to Dr. Mueller notifying that the PAD for Voyager, which includes the Saturn IB/Centaur, has been approved. This authorization is for program definition only. ✓

| A letter has been prepared to DOD for Mr. Webb's signature to obtain concurrence to establish the Saturn IB/Centaur as a National Launch Vehicle. ✓ |

NOTES 12/21/64 McCartney

B_{1/14}

July
21

1. S-II DESIGN REVIEWS: A master schedule has been established for the forthcoming series of MSFC/S&ID data package deliveries and design reviews. The schedule was jointly developed by the laboratories, IO, and the R&D Operations' S-II Coordinator. (Assignment of the S-II Coordinator was referenced in my 12/7/64 NOTES, attached.) Fifteen systems reviews and about 30 GSE reviews are scheduled from mid-December 1964 to December 1965. R&D Operations will be represented in each review by an individual who is responsible for internal coordination and who has full signoff authority. The first review (Thermal Control System) has been completed. ✓

2. COMMITMENT SCHEDULE FOR FY-65 SUPPORTING DEVELOPMENT PURCHASE REQUESTS: The R&D Operations' laboratories are being requested to forward FY-65 supporting development program procurement actions to R-RP by a cutoff date of January 5, 1965. Procurement actions received after that date will be processed as received, although the possibility exists that MSF may withdraw program authority prior to contract signature on the late submissions. A cutoff date of February 15, 1965, has been established for receipt of purchase requests, less than \$2,500, for materials or equipment for in-house tasks or tasks to be contracted to out-of-house Government sources. ✓

3. SUPPORT CONTRACTOR PERFORMANCE EVALUATION GUIDELINES: In conjunction with the Purchasing Office, R-RM is preparing a MSFC Regulation and Procedure and a handbook regarding the evaluation of support contractors' performance. These documents are scheduled to be completed and staffed by December 31, and will be submitted to NASA Headquarters for approval. These two documents will constitute the Performance Evaluation Plan which you promised to Dr. Mueller in your letter to him, dated November 23, 1964, (signed by Mr. Gorman). ✓

fw 12/21

B
1/14

NOTES 12/21/64 RUDOLPH

1. Saturn V Dynamic Test Vehicle Test Program - Negotiations with Boeing for the Saturn V Dynamic Test Vehicle Test Program, Phase I, have been completed. The Boeing proposed cost was \$4,620,253. The negotiated cost including fee was \$3,135,976. ✓
2. Boeing Office and Shop Space Requirements in the Huntsville Area are currently being assessed. An internal MSFC detail review is being planned for early January 1965, prior to the scheduled Boeing session on this subject on January 15, 1965. Areas being investigated are: (1) total Boeing manpower required for Saturn in the Huntsville area (2) that portion which is to be housed within MSFC Labs (3) the negotiated commitment that has been made for Government furnished shop space (4) any phase over of S-IC into the Michoud area (5) any additional space on the Arsenal. ✓
3. PSAC Meeting at S&ID/NAA on January 11-12, 1965 - Dr. N. E. Golovin, member of the Space Technology Panel of the Presidential Scientific Advisory Committee (PSAC), has requested a meeting at S&ID/NAA on January 11-12, 1965, for the purpose of reviewing the developmental and testing experience to date with Apollo mission hardware on the probability of mission success and crew safety. Mr. Jewel W. Moody, Chief, Saturn V Reliability and Quality Office, has been appointed as the MSFC coordinator and has enlisted the aid of R&DO in arriving at a uniform MSFC position. General Phillips called a meeting in Washington on December 18, 1964, to discuss NASA-Apollo positions and to establish a tentative agenda for the meeting. Mr. Moody and Mr. Field, S-II Stage Office, attended the meeting. The discussion centered around any differences of position among Headquarters, MSC and MSFC. Conclusions were that differences in positions were justifiable and reconcilable from the program and technical viewpoints. ✓
4. S-IC Stage GSE - For some time now, GSE for the R-QUAL Test and Checkout Station has been pacing the delivery of the S-IC-1 Flight Stage to KSC. A special Task Force is being established, similar to the "T" Task Force, to concentrate in accelerating R-QUAL GSE components and activation. ✓
5. S-II Stage Common Bulkhead - The common bulkhead for the common bulkhead test tank (CBTT) was removed from the autoclave Monday, December 14, 1964, after bonding of the forward facing plate to the honeycomb core and aft facing plate assembly. Visual and preliminary inspection techniques indicate a sound assembly was achieved. It will now be ultrasonically inspected and processed (cleaned) prior to transfer to the vertical assembly building for final assembly operations of the CBTT. This marks the completion of the manufacturing assembly cycle for the second common bulkhead of the S-II Program. ✓

fw 17/21

NOTES-12-21-64-SHEPHERD

B 11/14

Potential Coff Budget Cut, FY-66: (Reference your attached note dated 12-7-64) The requested Coff Budget of \$10.128M for Various Locations (West Coast) will possibly be reduced by the Bureau of Budget to \$5.0M. The basis of the \$10.128M was primarily a level-of-effort to be available for unforeseen requirements during FY-66. The cut means that if our proposed budget was correct, the difference (\$5.128M) must be made available from R&D funds. If there are no major program changes we do not consider this cut will have any appreciable impact on the vehicle or engine programs. By Bureau of Budget not specifying where the cuts are to be made, we will budget within the \$5.0M for the projects we consider most likely to require FY-66 funding. The impact is less with an unspecified cut than when specifics are mentioned. This permits us to budget as we see the program requirements with the remaining balance.

An Addendum is forthcoming.
 Bl
 12/21/64

July 21

B 1/14

NOTES 12-21-64 Stuhlinger

1. HEADQUARTERS PRESENTATION ON ADVANCED PROPULSION: Harold Finger and his associates gave a very interesting presentation on nuclear propulsion, electric propulsion, and electric space power at NASA Headquarters. The Nerva II project was given particular emphasis; Orion and Helios, although very attractive because of high specific impulse, are vulnerable in view of the test ban treaty. Electric propulsion was shown to be very attractive as third stage on a chemical-nuclear-electric manned Mars vehicle. Present efforts in the nuclear-electric space power program were described; it was my feeling again that a determined and vigorous effort for the development of a 300 to 1000 kwe source is badly needed.

2. AES SCIENTIFIC EXPERIMENTS: We are currently in the process of preparing work statements for several of the study contracts to be let under RPL's AES scientific activities. The subjects include:

- a. Lunar Drill \$600K
- b. Emplaced Scientific Station \$200K
- c. Subsurface Probe \$100K
- d. LEM/Shelter Sample Analysis Equipment \$200K
- e. Optical Equipment \$ 40K

In preparing these statements, we received valuable help from JPL. For two other work statements (Optical Astronomy and Radio Astronomy) we expect to receive help from members of the Goddard Space Flight Center.

3. PROPOSED \$1.5M ART, SPACE VEHICLE SYSTEMS WITHDRAWAL: This Office has been informally advised that 1.M is being withheld from our Space Vehicle Systems Program until March 31. The 1.M is in reserve for a possible Pegasus overrun. If the funds are available after March 31, our Space Vehicle Systems is still in jeopardy as it will impose a voluminous work load on all concerned, especially P&C. The chances of the 1.M being obligated by June 30 if not committed before March 31 are very slim.

4. ART/SRT PROGRAM STATUS: The status of the FY-65 ART/SRT Program under the Cognizance of RPL is, as of December 18, as follows:

	<u>ANNUAL PLAN</u>	<u>AUTHORIZED</u>	<u>PROCESSED TO FMO</u>	<u>OBLIGATED BY P&C</u>
OART	9,729,000	6,660,000	4,538,687	1,880,000
OMSF	19,000,000	10,777,000	2,111,967	84,798
OSSA	475,000	475,000	18,570	0
	<u>29,204,000</u>	<u>17,912,000</u>	<u>6,669,224</u>	<u>1,964,798</u>

✓

Dec 28, 1964

- 1- Send Clive's note
to Davis for action
 - 2- Send Haussermann's
note to Sanderson
for info.
 - 3- Show Mr. H.
the two notes
- did so jh

B 12/29

F-1 ENGINE

F-1 production is now at a rate of two deliverable engines a month. The two "December" engines (F-2007 & F-2008) have been acceptance tested and have completed their final checkouts. Both engines will be air shipped via the "Pregnant Guppy" aircraft next week. ✓

The two "January" engines (F-2003 & F-2009) are on schedule. F-2003 has finished acceptance testing and has been sent back to Canoga Park (December 22, 1964) for final checkout. F-2009 went into Test Stand 1D for acceptance testing December 19, 1964. These two engines will complete the 5-engine "set" for the S-IC-T Stage. A spare engine (F-2010) is scheduled for delivery in February.

Karl
Heimbets
Just to remind
you that these
are on the
Critical Path
B

J-2 ENGINE

The J-2 engine was fired for a programmed 411 seconds of mainstage operation on the DAC/SACTO S-IVB Battleship test stand on Wednesday, December 23. Review of preliminary data indicates a successful firing. ✓

The second fuel turbopump with the redesigned turbine wheels has accumulated 2,260 seconds of test time. Visual inspection of the turbine wheels indicates no cracks. ✓ The turbine wheels will undergo a dye-penetrant inspection and then be reinstalled for additional testing. ✓

The previously reported structural failure of the gas generator body on production engine 2013 has been reevaluated after extensive metallurgical analysis of the damaged parts. The gas generator injector was misaligned during fabrication, causing maldistribution of film coolant fuel to the walls of the gas generator body, resulting in a "hot spot" or localized overheating. Engine 2013 has been repaired and is scheduled for acceptance firings next week. ✓

Testing has resumed on FRT configuration engine 015. To date, this engine has accumulated 4064 seconds of test time in 27 tests. ✓

RL10 ENGINE

The development of the A-3-3 uprated version of the engine is proceeding on schedule. A total of 52 firings for 7735 seconds have been accomplished on three active A-3-3 engines.

Lloyd Blomeyer of JPL was here last week to ordinate Saturn IB/Centaur-Voyager vehicle/payload studies. JPL is using performance of the RL10A-3-3 engine for their Voyager payload studies. ✓

1. BOEING DUPLICATION CONTRACTS: We have had an indication from Bill Davidson (MSFC man in Houston) that Boeing may be selling MSC work already contracted for with MSFC. We are trying to obtain a copy of the proposed contract to evaluate. The subject is "Apollo Analytical Representations and Contractor Requirements for Dynamic Loads Analysis." It was submitted in response to RFT MSC-64-1428-T. We are just bringing this up as a "possible." There may be other areas and other contractors who are doing this.

Harry
FYI
and
Comment
B

1. MICHOUD FATALITY

B 12/29

On December 21, 1964, Mr. Edward Williams, sheet metal worker employed by Erectors, Inc., subcontractor to Martin K. Eby, the construction contractor for the stage test facility for the Boeing Company, was fatally injured at Michoud Operations. Mr. Williams was hoisting steel siding when the hoisting device overbalanced, throwing a board down on top of Mr. Williams. Boeing is investigating the accident by means of a board of inquiry. ✓

Frank

Please prepare a condolence letter to widow or other relatives inform Constans & Boeing. B

NOTES 12/28/64 DANNENBERG

B 12/29

Negative Report

NOTES 12/28/64 FORTUNE

B 12/29

Negative Report.

1. Management of Dynamic Testing: (Ref: Notes, 12/14/64, Cline) In supplement to Mr. Cline's note, there are explained below several management structures which were proposed and the reasons for the choice of structure which was made in May 1964. There was general agreement that the requirements, test and measuring methods and similar principal technical questions should be defined by the Control Dynamics and Structural Feedback Committee. Also, the need to have one person in charge to direct the contractor in technical questions was established. As to the choice of the organizational structure and the selection of a qualified, available person, the following possibilities were considered:

(a) Management and responsibility assigned to Test Laboratory; rejected because no personnel were available. (b) The Chairman of the Committee to double as Technical Manager for testing, which obviously would eliminate the dual line of command with resulting uncertainty for the Technical Manager. This was turned down by ASTR and P&VE because of the limited time the Chairman could make available for this added responsibility. (c) Wholesale delegation of authority to a person working in the line organization under the Chairman, or appointing such a person as Technical Manager, which would also have created clear lines of command, was turned down also as no agreement on a competent and available person could be reached. (d) The offer of P&VE to make Mr. Sterett available on a full-time basis was accepted. Unfortunately, he was not relieved to the hoped for extent from his other duties; the resulting overburdening has apparently impaired somewhat the efficiency of his managing of the test operation.

Jerry McCall
Please read my comments on this page

2. LIEF Meeting at KSC: A LIEF presentation was given to Dr. Debus and his staff on 12/15/64. Dr. McCall and Mr. Balch were present. Dr. Debus questioned if the support facilities being provided now are not out of proportion to the actual needs and emphasized his belief that in the future much of the support KSC needs would have to come from the stage contractors rather than from MSFC directly. (perhaps somewhat overlooking MSFC's continuing role in systems engineering). He also requested clarification about the role of the Program Offices during times of active LIEF support and the potential conflict between configuration control and such reconfigurations as might become necessary during final launch preparations. Dr. Debus' third principal question concerned the presumable effect that the new MSF Operations Organization will have on LIEF. Although Dr. Debus' principal attitude was somewhat skeptical towards LIEF, he instructed all KSC personnel to proceed with LIEF implementation as planned and to develop jointly with MSFC all necessary operations procedures. It is felt that the briefing essentially fulfilled the intended purpose, i. e. to improve visibility and understanding for LIEF at

That's precisely why MSFC must remain in the loop and can't leave it up to KSC to make configurations changes with contractors directly

Why don't you take this up with Weidner or McCall?

to have the Committee charge Test Lab with execution of the Committee-specified test programs, - and to transfer Mr. Sterett to Test. Without Test's day-to-day support, he's helpless anyway. So he might as well "belong to the Club". B

E.F.

I don't think anyone has criticized Mr. Sterett for not having done a fine job in managing this test program. The whole issue of whether or not it was a wise and satisfactory management arrangement to have Mr. Sterett report to the Committee, was precipitated by my question to Mr. Sterett himself. His answer, as I expected was "hedgy". I think the clearest line of responsibility would be

6. MANAGEMENT OF DYNAMIC TESTING: In May 1964, the three laboratories concerned with dynamic testing of the Saturn IB and V had several meetings, of which the main purpose was to find a solution for working together and to get the job underway. At that time, arguments were presented against a manager for carrying out operations reporting to a committee. It was felt that this committee would be good for planning and requirements but was not the group to be responsible for operations. In the interest of harmony, concessions were made to operate under the plan presented to you on 12-8-64. To date it has worked.

3/12/29

1. S-IU-8 INSTRUMENT UNIT CHECKOUT: Simulated Plug Drop Test was run 12-23-64 and record evaluation is now underway. The checkout is on schedule with an expected Laboratory release date of January 7, 1965. ✓
2. S-IV PROGRAM: Regarding your question about the S-IV-10 stage on NOTES 12-14-64 GRAU (copy attached). The replacement engine and system integrity will be verified during the acceptance firing presently scheduled for January 20, 1965. ✓
3. SUPER INSULATION INSPECTION: Concept studies performed by this Laboratory have now advanced to the point that a Purchase Request has been initiated for the design and fabrication of an eddy-current concept to measure the thickness, thermal conductivity, and quality of high performance insulation under conditions of vacuum and atmospheric pressure. ✓
4. ELECTROMAGNETIC COMPATIBILITY (EMC) CONTROL TASK: The Quality and Reliability Assurance Laboratory proposed EMC Task (Improvement of Vehicle Reliability by Electromagnetic Compatibility Control) was presented in a meeting of the Electromagnetic Interference sub-panel of the Instrumentation and Communications Panel December 15-16, 1965. NASA Headquarters requires approval of the sub-panel prior to considering a task. MSC did not desire to participate; therefore, the sub-panel disapproved the task. *What action do you recommend? Let's not give up! This is important.*
5. SOFTWARE REPORTING REQUIREMENTS: NASA Headquarters with the support of BELLCOMM has developed a list of milestones to be used for reporting software status on a monthly basis through the Schedule Appraisal Review Procedure (SARP) system. The system does not fulfill our need in that progress is expressed in per cent of completion with no reference or base point from which to evaluate remaining efforts in terms of time or effort. Further, in that software milestones are not included in PERT, no PERT/SARP comparison can be made. Development of the information is expected to have a major impact on IO, R&D and Saturn stage contractors. On June 2, 1964, this Laboratory requested from the stage contractors, for our own use, information which would assist in the required reporting. To date, only DAC has replied. Still to be answered is who in MSFC is to complete, consolidate and edit this information. *(Executive meeting with FEM?)*
6. BOEING RELIABILITY STATUS REPORT: A detailed review of the Boeing "Saturn S-IC Reliability Status Report" has been completed. It was found less than satisfactory, requiring a general cleanup to eliminate errors and to update the document. ✓

interesting B

This is important. B (Executive meeting with FEM?)

Jerry McCall

I think the principles laid down in "SOFTWARE" for IU 201 at MSFC SF 201 at KSC SA 501 at KSC

"SOFTWARE" page 171-174 is a much more realistic and effective approach to Software Schedule Control. Suggest a separate briefing of G.E.M. after we have a presentable counterproposal based on these principles. B

ATTACHMENT: NOTES 12-14-64 GRAU. Copies to Dr. von Braun and Mr. Weidner ready

B 12/16

1. S-IU-8 INSTRUMENT UNIT CHECKOUT: There has been some delay in checkout of the S-IU-8 Instrument Unit due to non-availability of the F-6 Telemetry Assembly and problems with the RCA-110 Drum Memory. Checkout is now progressing satisfactorily, however, and lost schedule time will be recovered.
2. S-IV PROGRAM: The S-IV-8 stage is undergoing post-static checkout in the Engineering and Development Building at Sacramento. The S-IV-10 stage is in the test stand at Sacramento undergoing preparations for static test. A dessicant sack ruptured in the chilldown ducts, deposited dessicant material in two of the engines on this stage. The engines will be replaced by spares. DAC estimates about ten days for this change, however; parallel work will continue and only two or three days schedule time should be involved in the incident.
3. S-IVB PROGRAM: The S-IVB Battleship was static fired at Sacramento on December 9 for a duration of 50 seconds. No fuel pump stall was indicated as in the 10 second firing. One hot spot was noted in the flame bucket, but further investigation will be necessary to determine the extent of this problem. If review of data and other considerations permit, a full duration (150 seconds) firing will be conducted December 15, 1964.
4. F-1 ENGINE PROGRAM: F-1 Engines 2007 and 2008 are undergoing final acceptance checkout at Canoga Park. It is of note that only one Material Review action was written against Engine 2007 and no Material Review actions were written against Engine 2008 during the acceptance test at Edwards. Engines 2004 and 2006 are undergoing FRT at Edwards and the progress is satisfactory. After the fifth firing, erosion was noted on the Injector of 2004 at a point near the center ring to baffle mating point. The injector was removed and inspection indicated that passages through the baffle were clogged resulting in a loss of coolant at the point eroded. A replacement injector was installed and testing is continuing.
5. APOLLO RELIABILITY AND QUALITY ASSURANCE PUBLICATION NPC 500-5: During the visit of Mr. George Lemke and Dr. Harvey Hall (MSF Reliability and Quality Assurance Office) on December 10, agreement was reached concerning the format of the MSFC plan for implementation of this document. A draft of the MSFC plan will be available by January 15, 1965. Results of an impact study of the reporting requirements of NPC 500-5 on the reliability operations at MSFC were presented and indicate that the requirements are excessive and that under the existing capability, not more than 5-10% of the information requirements can be met. The visitors agreed to reconsider and detail negotiation will begin early in January. However, although the requirements are excessive, a large gap exists between the present capability and a practical information requirement which needs to be closed in MSFC. Those who manage resources in the Center have to keep this high on the priority list. You will hear about this more in 1965.

DP
No new static run necessary
B

H. Feldman,
Dieter Grau
Request checking
B

-R Chandler with Woodson with R.D.O.
V: 12/22

OFFICE OF DIRECTOR - MSFC

CODE	NAME	INIT.	<input type="checkbox"/> ACTION	<input type="checkbox"/> INFORMATION
	Dr von Brzun			

REMARKS

Re Häussermann's Note # 1

Suggest Weidner pull together
a complete "Technical" briefing &
have it mated with an IO briefi
covering the "Program" (Cost/schedule etc)
aspects. Then have the complete
package presented to you.

Agree completely. Please
 tell Weidner + Häussermann,

B 12/29 tw 12/28

B12/29

1. CISLUNAR PEGASUS: Mr. Weidner informed me that Dr. G. Mueller intends to be briefed on this subject in the second half of January. May we give you a one hour prebriefing? I consider it necessary because the Cislunar Pegasus has quite different power and communication requirements than the present Pegasus.

Fred W. See attached slip B

2. TABAKA STUDY: The introduction to the new job classification procedure is very painful and time consuming. R-ASTR-E met with representatives of the Personnel Office and tried to correct five of the benchmark positions after having furnished 14 benchmark positions of the 88 within the Astrionics Laboratory. The results of effecting changes in certain factor ratings were disappointing since the people charged with performing the evaluation lack the understanding of the jobs they were trying to rate, and our engineers are not perfectionists in selecting the proper words for the job analysis. Thus one is subjected to a two hour session on how to write the new position records with questionable results as far as guidelines are concerned. I doubt that the effort and time are justified in view of our technical work which will suffer again by the extensive loss of manhours for the survey.

Harty
How do the other labs respond to the Tabaka study? B

3. RESEARCH ADVISORY COMMITTEE MEETINGS: (Reference your comments to Item 2, Notes of 12/14, copy attached*) The main reason for our research limitation is manpower shortage. We have the following obligation for manpower reduction and reassignments:

- Reduce manpower strength from Oct 64 to 1 July 65 by 53
- Assign additional personnel to West Coast contractors 5
- Assign additional personnel to IMCC 5
- Additional needs for ESE and System Engineering within Lab 10

So it is not that anyone denies us the right to do research! It's that we can't free people to do it!

In the last two years we had pulled out personnel from areas such as guidance computer R&D, attitude control system R&D, and attitude sensors (horizon seeker) R&D; the personnel had to be reoriented to system management, contract supervision, etc. In the meantime, other Centers, especially Ames, Langley, and now ERC, have been able to build up their research capabilities in the same areas despite the fact that there is no direct need evident.

I really and earnestly hope that you will initiate a hard-hitting plan of implementation

I have asked Mr. Horton to investigate how we can streamline and concentrate on our R&D efforts; I do not see that we can efficiently handle contracting of more R&D task assignments than we presently have without increasing our own manhours for this purpose.

Witt.

unless you give bigger chunks away

Comment:

support contractor's feet and look upon IBM as a kind of second

Astrionics' only answer is to make a real determined effort to move the I.U. (with all it contains) over to IBM as a full-fledged

I am not convinced that everybody in Astrionics has his heart in this objective, in fact, I believe many

* Attachment provided DIR and R-DIR only.

stage contractor, - and as fast as possible. You still have over 800 contracts (not counting parts vendors) out of Astrionics direct!! That's one area where you unnecessarily tie up your manpower. With all your civil service people, plus the Sperry Support Contract, plus the local IBM facility for the I.U., no one can tell me that you have too few people to do research. Too many just cling too long to the old stuff they won't let go!!

O.P.

B 12/16

1. ELECTRICAL SYSTEMS TECHNOLOGY CONFERENCE: An Electrical Systems Technology Conference was held by NASA's Office of Advanced Research and Technology (OART) in Washington, D. C. on 12/9 and 10. Mr. R. J. Boehme, R-ASTR-E, served as technical coordinator for MSFC's contribution to this conference. The following MSFC representatives presented the listed topics.

Mr. L. H. Wood - R-RP-N

Power Conditioning for Electric Propulsion

Mr. Whit Brantley - R-ASTR-A

Advanced Studies of Power & Distribution Requirements

Mr. R. J. Boehme - R-ASTR-E

High Power Switching Devices

Motor Driven Switches

Bifilar Wound Relays

Relay Specifications

Advanced Electrical Control & Distribution

EBW Systems

Solid State Relaying

Electrical System Transients

Mr. Dwight Baker - R-ASTR-E

Inverter for Pump Motors

Inverter - SCR Type

Measuring Voltage Supplies

Mr. Carl Winkler - R-ASTR-R

Precision 3 Phase Inverter System

Integrated Power Amplifier

100 Ampere Transistor Switch

The primary purpose of this conference is the exchange of information among the NASA Centers on Advance Research Technology. ✓ *Very useful!* B

2. RESEARCH ADVISORY COMMITTEE MEETINGS: Last week I participated for two days in a meeting of the Research Advisory Committee on Control, Guidance and Navigation and for one day at the G&C Steering Group at Lewis Research Center. The presentations covered research work at the various Centers. I got the impression that we, at R-ASTR, are limited in research for several reasons more than any other Center. Also, a stronger control from OART and MSF is desirable to avoid multiple redundancy in research. A typical area is R&D on sensors for space vehicle control.

→ *WH*
Probably true. OART covers their own centers, and MSF's first business is the man on the moon. What items you feel particularly hot about do you think we should fight for? I'm willing to pitch in and help. B

B 12/29

1. S-IVB BATTLESHIP (SACRAMENTO):

A duration test (415 seconds) was conducted on the S-IVB battleship at the DAC Sacramento Test Site on 12/23/64, with no apparent major problems. ✓

O. Lause

2. F-1 ENGINE:

Water was discovered in the lox pump of engine F-1002-2 during posttest (TWF-041) inspection. A Photocon pressure transducer located in the lox suction duct (90" point) to determine pressure oscillations had failed, permitting the transducer temperature conditioning water to enter the lox pump. The entire lox system will be cleaned and dried and the lox pump's primary seal replaced on the test stand in time to meet a firing scheduled for 1/7/65. ✓

O. Holess

First time
I hear of a
case where
a transducer
failure could
endanger the
propulsion
system and
thus the flight.

3. S-IC TEST STAND:

Operation of the cranes on the stand were checked out on 12/22/64, when the stage simulator was lifted from the S-IC transporter, erected in a vertical position, moved into the stand, and then replaced on the transporter. Total time for this operation was less than five hours, and no major problems were encountered. ✓

Have we
ever
systematically
scrutinized
the entire
system for
such poten-
tial hazards?

Reference NOTES 12/14/64 HEIMBURG (copy attached to Dr. von Braun's and Mr. Weidner's copies only). Work is progressing on the repair of the cracks found in the load platform welds. The cracks are being gouged out, rewelded, and stress relieved. The integrity of the holddown arms will be verified by the load test scheduled early in 1965. ✓

B

NOTES 12-27-64 HOELZER

Negative Report

B 12/29

PEGASUS "A" SPACECRAFT: The vibration and vacuum tests were completed at General Electric 12/22/64 with very satisfactory results. ✓ The Spacecraft was instrumented for shipment and shipped to Johnsville Naval Air Station on 12/23/64 to await the transport aircraft. Inclement weather grounded the Pregnant Guppy aircraft on the West Coast for several days. The aircraft is now scheduled to arrive at Johnsville at 2:10 p. m., 12/28/64. Departure from Johnsville to KSC is expected to be around midnight, 12/28/64. Unloading at KSC is expected early in the morning, 12/29/64. ✓

SATURN IB DYNAMIC TEST HARDWARE: The S-IB-D/F and S-IVB-D departed Michoud on 12/22/64 on schedule. The tow is expected to arrive at MSFC on 1/4/65. The three-stage tow creates a multiple locking requirement at each dam. This situation increases the shipping time about four days. ✓

S-IVB BATTLESHIP: The S-IVB Battleship was successfully fired for a planned full duration (416 seconds) on Wednesday, 12/23/64, at approximately 6:08 p. m. Huntsville time. ✓ From information available at the completion of the test, there was no indication of trouble. Prevalves worked properly, engine preconditioning was normal and there was no indication of pump stall. More information will be available after further evaluation of test data. The entire countdown and test run were highly successful. The next firing is scheduled for the first week in January (full duration for flight stages will be approximately 480 seconds). ✓

LH₂ EXPERIMENT: We have scheduled an LH₂ Instrumentation briefing for you on 1/7/65. ✓

1. STATISTICS: This year, according to my statistics, you called or attended, 22 meetings at MSFC dealing with "Future Projects," which totaled 34 hours. You initiated 16 of these meetings, taking 26 out of the 34 hours; I was responsible for the rest. I am very happy with this record. I thought, early this year, that you would not be able to spend that much time in this area. ✓

Sodo 1.

2. FOLLOW-ON HYDROGEN EXPERIMENT: We all feel strongly that more flight experiments should follow the 203 flight. ✓ I would like to suggest that consideration be given to building a four container tankage package as originally designed for the Multipurpose Mission Module (MMM). There is a mock-up in Mr. Kuers shop. We can test four different insulations and possibly LH₂ and Lox together. We would not need the RL10 engines, but should replace them with thermodynamical dummies, producing the same leakage and radiation pattern. This tank stage can be attached to the LEM ascent stage (possibly minus the engine), which needs only its attitude control system supplied by the LEM tanks for maneuvering. The MMM stage, LEM ascent stage, command module, and the partially loaded service module would thus provide a versatile orbital propellant laboratory with test times of up to one month. This approach would offer a fringe benefit, namely the tankage for a lunar landing stage as well as for a cryogenic service module eventually. One flight each in 1967 and one in 1968 appear to be appropriate. This could possibly be a complete in-house job, with Mr. Kroll doing the tankage design in detail. I think he would love such a job and be available soon.

HHK

→ Read you loud and clear! I think it's an "intriguing" idea. But let us think this thing through as an honest cryogenic experiment (under the manned Apollo experiment program) before we sell it. Because of its obvious "growth potential" it may be shot down as a "sneak attempt to get in through the back door." Yet if we play it right, we may be able to sell it.

B

B
12/29

1. Welding Equipment Problem at Michoud: The welding equipment The Boeing Company purchased from Airco as the lowest bidder is not performing adequately at the higher power levels beyond 150-180 Amps. They cannot obtain consistent weld penetration at the higher power levels because of periodic voltage variations. NAA had experienced the same problem with the same type equipment some time ago resulting in procurement of new Sciaky power supplies. This time the Airco Company believes to have found a solution for this problem which has, however, not yet been proven out at Michoud. ✓

2. Status of Structural Test Article S-IC-S: The Intertank section and the "light weight" Thrust Structure for -S have been received from Boeing. The Fuel Container is practically complete with all 5 Lox Tunnels being welded. Chemical cleaning and hydrostatic testing will start the first week in January. The lower half (dome plus 2 skin segments) of the Lox Container has been completed. Today we will start on preparations for joining the second skin section to the upper Lox dome in the tower. The present working schedule for this -S vehicle will be met or even bettered. ✓

3. General Remarks on Progress in Our Programs: Looking back at the progress and delays of the Saturn V stages during the last year I would like to remark that the progress in development of satisfactory manufacturing techniques has been tremendous. ✓ This is, of course, not reflected in the schedule delay status, but should give us confidence that all the stages will slip less--if at all--in the coming year. I believe that the rate of slippage we have experienced in our program is directly proportional to the extension of the state-of-the-art in engineering and manufacturing that we are confronted with. ✓

4. Holiday Greetings: May I extend to you and all who read these notes my best wishes for a merry holiday season and a happy new year. ✓

Vice versa ✓
B

NOTES 12/28/64 MAUS

B 12/29

1. MSFC RESPONSE TO MSF CONGRESSIONAL SUMMARY & ANALYSIS - We have prepared the MSFC response to this subject based on inputs from various R&D labs. We will review the response with Mr. Weidner and forward for Mr. Gorman's signature today if possible. ✓
2. UTILIZATION OF DOD PERSONNEL - We forwarded the MSFC response on the proposed DOD support report to Joe Dickerson at MSF on Wednesday, December 23, 1964. Our response was essentially as reviewed with you on December 18. ✓
3. PROJECT FORECAST - We have prepared for your signature a letter containing the MSFC comments on the Air Force Project FORECAST Reports. We will arrange for a briefing on these comments if you desire. ✓

*Have read them
(and signed the
letter)* B

1. PREVENTATIVE INSPECTIONS: As part of the Conflict of Interests Awareness Program initiated by Dr. McCall, arrangements have been made with the NASA Inspection Office to conduct preventative inspections, within R&D Operations, in potential problem areas. The inspections, to begin after the first of the year, will be conducted in the following areas (listed in order of priority):

Outside Employment

Financial Interest

Time and Attendance: Overtime

Contracting Officer Representatives Code of Conduct

Political Participation

Use of Government Equipment and Material

Conflict of Interests

Contractor Relationships (Nonpersonal Services) ✓

2. FY-67 CofF Budget: The F&D Office has requested a listing of R&D Operations' proposed FY-67 CofF projects by mid-January. The laboratories have been requested to provide preliminary program requirements. These will be consolidated by this office and a recommended program presented to Mr. Weidner and the R&D Council early in January. ✓

NOTES 12/28/64 RUDOLPH

B 12/29

1. PSAC Committee Meeting at S&ID/NAA on January 11-12, 1965 - Instructions were sent to S&ID/NAA by Colonel O'Connor, on December 22, 1964 stating the proposed agenda and topics to be presented by S&ID at the January 11-12, 1965 meeting with the Space Technology Panel of the Presidential Scientific Advisory Committee. North American was requested to make a presentation (dryrun) of their portion of the proposed agenda at Marshall Space Flight Center on January 4, 1965 at 9:00 am, 10th floor conference room, Building 4200. ✓

2. Modification of Boeing Contract NAS-5608 to include Saturn V Systems Engineering and Integration Support was approved by NASA Headquarters on December 23, 1964. This contract extension of \$89,935,619 includes the Saturn V Breadboard Facility Operations, but excludes the Dynamic Testing and GSE engineering support.

A.R.

Why? Is that covered separately?
B

3. S-II Stage Design Reviews - The first of a series of proposed S-II Stage Design Reviews was successfully accomplished at NAA/S&ID on December 17, 1964. The system which was reviewed was the "Thermal Control" system. At the outset of the meeting a genuine difference in opinion existed between the contractor and NASA regarding certain aspects of the design approach. Through mutual understanding and the willingness of both parties to cooperate in reaching a common objective, the problems were resolved to the satisfaction of each. Three additional Design Reviews are scheduled for January 1965. ✓

NOTES-12-28-64-SHEPHERD

No Notes

B 12/29

B 12/29

1. SUPPORT OF RPL ACTIVITIES: R&D assigned 11 Civil Service spaces to RPL in order to better enable this Laboratory to accomplish work in those projects in which RPL (and MSFC) has heavy commitments. The spaces will be used in the following projects: consolidation of research programs; documentation of research results; support of Pegasus; analysis of Pegasus data; cis-lunar Pegasus study; and scientific mission planning for AES.

2. RESEARCH LABORATORY BUILDING: We learned that the Bureau of the Budget has turned down our Research Laboratory Building for FY-66. We will make a new attempt for FY-67.

Even the reclama?
B

E.S.

When do you plan to hold the first review meeting on research results that we discussed a few months ago? What is the status of the overall plan to get more visibility into this area of "research at Marshall"?

B