

April 3, 1967

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NOTES 4-3-67
WITH COMMENTS

MR. GORMAN'S COPY

NO DEP-A ACTION
ITEMS.

NOTES BALCH 4/3/67

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S-II-2 Testing - First static firing was rescheduled for Friday, 3/31/67. Countdown was underway as planned, but it was necessary to terminate the test at T minus 7 minutes when the LH₂ prevalves on Engines 1 and 5 failed to close. Firing is now set for Thursday, 4/6/67. ✓

S-IC-T Shipment - Stage was removed from test stand on 3/30/67 and shipped to Michoud early the following morning for reshipment to MSFC. ✓

S-IC-4 Planning - Tentative plans now call for shipment of the S-IC-4 to MTF tomorrow, 4/4/67, and installation in the B-2 position of the S-IC stand the following day. ✓

S-II A-1 Test Stand - Integrated test of facility and GSE with simulated stage is still scheduled for 4/15/67. Numerous punch-list items still remain to be worked off by the Corps of Engineers contractor, but none of these would constrain present and planned preparations to receive a stage or subsequent stage testing. ✓

NOTES 4/3/67 BELEW

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LUNAR PROJECTS: MSFC lunar projects (LSSM, lunar drill, and flying vehicle) were discussed with Astronaut Joe Engle during his visit to MSFC on March 30. He has been assigned the task of following lunar engineering and lunar geology in the AAP program along with Astronaut Jack Schmidt, who has previously participated in LSSM and other MSFC lunar projects. ✓

ATM: Short form procurement plans for three H-Alpha telescopes are currently in process. We anticipate RFQ's to be released by May 1 and contract go-ahead by July 1.

A meeting with Ball Brothers Research Corporation and Harvard College Observatory was conducted at MSFC on March 28 to discuss results of the thermal analysis performed by BBRC under their OSSA contract. All elements involved in the subsequent discussions agreed that frequent ATM thermal meetings are necessary. We have requested OSSA to transfer the aforementioned contract to MSFC, so that we can extend it to include a more detailed ATM thermal analysis and evaluation. ✓

PAYLOAD INTEGRATION CONTRACTOR EVALUATION: The Source Evaluation Board for Phase "D" Payload Integration met on March 29. Evaluation criteria and the scoring system to be used by the committees were baselined and approved. Proposals are due on or before April 7, 1967. ✓

MISSION OPERATIONS: MSC is expected to propose the following modifications to the MSF network to accommodate the AAP missions: (1) permanent dual Unified "S" Band Site at Tananarive, (2) dualize the Watertown tracking ship Unified "S" Band and modify it for communications satellite terminal capability, (3) provide a 15 minute turn-around capability for MSF network stations (provide switching from AAP to Apollo) and (4) provide six stations with a six-channel continuous voice capability. The modifications are expected to be discussed in a meeting at NASA Headquarters' on April 11. A representative of Dr. Speer's office is planning to attend. ✓

MISSION REQUIREMENTS DOCUMENT (MRD): We had a meeting with MSC here on March 28 for initial discussion on preparation and contents of a MRD covering the first four flights (AAP-1 through 4). It was agreed that in order for work to proceed with mission planning, on a relatively firm basis, a document of this type must be prepared as soon as possible using all known baseline data or establishing baselines as required. MSC and MSFC will tentatively get together on April 6 to review the MRD preparation status. ✓

GENERAL: We attended an AAP integrated test review and schedules assessment with Mr. Mathews at MSF on March 30 and 31 covering AAP-1 through 4. I will send you, by separate memorandum, a summary of this meeting. Mr. Mathews indicated that he wants additional schedule status information from MSC for further assessment prior to discussions with Dr. Mueller. ✓

NOTES 4-3-67 BROWN

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J-2 ENGINE There was a successful 360-second test on the S-II Battleship Friday, 3-31-67. The test included propellant utilization and gimbal programs. The countdown was completed without a hold and there were no discrepancies identified during the test. ✓

The initial acceptance test of S-II-502 was aborted 17 minutes before ignition when a stage pre valve failed to close. Repeated attempts at closing the valve failed and the test was terminated. There were no apparent engine problems during the countdown. ✓

Environmental conditions expected on the J-2 engine in the S-II application will be simulated tomorrow (4-4-67) in a test at AEDC. ✓

F-1 ENGINE F-1 engine F-6058 (3rd engine for S-IC-8) was accepted by MSFC on 3-14-67. F-1 engines are being stored at Canoga Park, Calif. with the possibility of ten engines being stored before engine production and deliveries have been reduced to meet The Boeing Company on-dock requirements. There are presently three production F-1 engines in storage. ✓

F-1 engine F-6049, which was shipped from Rocketdyne to MSFC by truck, exhibited a sea level thrust which was approximately 24K below the acceptance test thrust value recorded at Rocketdyne. Rocketdyne is providing a new LOX orifice, and the Test Lab will retest the engine. The reason for the thrust loss is not yet determined. The #2 LOX high pressure duct was replaced at MSFC due to galling of some inserts. This change could account for the difference. The fuel pump inlet pressure was also below nominal during the firing. The engine will have additional instrumentation during the retest to better evaluate the effects of the reorificing. ✓

H-1 ENGINE A LOX seal cavity "swab check" is being conducted on all engines at Michoud as a consequence of the moisture discovered in the four outboard engines of S-IB-II. Engines in Vehicles S-IB-8, -9, -10, -11, and -12 (partially) and spare engines have been inspected. No additional LOX seal moisture contamination other than that reported last week has been identified.

An H-1 engine program review was conducted at Rocketdyne/Canoga Park on 3-28-67. One of the items of special interest was a Rocketdyne recommendation to delete a number of checkout requirements in the field to reduce chances of damaging or contaminating engines. These recommendations will be evaluated by MSFC. ✓

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VISITS TO MICHLOUD ASSEMBLY FACILITY

A NASA (Col. Sweet) Headquarters group of 10 persons was briefed Thursday, March 30, 1967, on the operation of MSFC/Michoud Assembly Facility. After a tour of the installation, a discussion period was held so that their specific interest could be served. ✓

Thirty-nine members of the NATA Military Committee visited MSFC/Michoud Assembly Facility Thursday, March 30. They were briefed and then taken on a tour of the plant. ✓

The Apollo Executive Meeting scheduled for April 6-9 in New Orleans has been cancelled. ✓

STATUS OF UPDATED SATURN I BOOSTER STAGES

S-IB-4 - At KSC. MAF equipment to support de-erection of S-IB-6 and movement of S-IB-4 from LC-34 to LC-37B has been delivered to KSC.

S-IB-5 - In storage at MAF.

S-IB-6 - At KSC. S-IB-6 scheduled to depart KSC on April 1, 1967, for storage at MAF.

S-IB-7 - Stand-by for return to final checkout.

S-IB-8 - Post-Static Checkout Operations.

S-IB-9 - In Post Static Modifications Operations.

S-IB-10- Preparation for shipment to MSFC.

S-IB-11- Pre-Static Checkout Operation.

S-IB-12- Final Assembly Operation.

S-IB-13

S-IB-16- Request for Proposal issued - Proposal expected April 24, 1967.

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1. Logistic Management Training: During the last several months, Mr. Lowell Dennis, R-OM, has been working with the Training Branch and the University of Alabama in trying to establish a full-length Logistic Management Course at the Huntsville campus. ✓ The first major step toward fruition of this goal is that the University of Alabama will have a one-week "Logistics Management Training Program" beginning July 17. Dr. Stanley of the Logistics Plans Department, Ohio State University, has agreed with the University of Alabama to develop and present that course. Dr. Mack, Chairman of Industrial Engineering and Associate Director of the Logistics Program at Wright-Patterson Air Force Base has accepted an invitation to assist Dr. Stanley in this program. Ohio State will provide other faculty members for the course of instruction. ✓

2. R&DO Manpower Planning and Utilization Reviews: The current R-DIR periodic Manpower Reviews were begun last week, March 28 and 29, with AERO and TEST. Laboratory preparation for those reviews was excellent and indicated sound planning for the shifting workload emphasis for the present and the forthcoming year. The next Review is with ASTR on April 4 and the other laboratories and offices will follow with a scheduled completion date for this cycle of reviews the first week in May. ✓

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1. Inflight S-IVB Panel Flutter Tests: In view of the new IB mission planning and vehicle assignments, R&DO recommended to IO that the AS-204 (LM mission) S-IVB forward skirt vent area be increased from 100 in² to 150 in² (sublimator requirement). Even though the increased vent area will produce a more favorable environment for panel flutter, the R&DO recommendation is to fly 204 without a flutter kit, since the vehicle is unmanned and already instrumented to obtain inflight panel flutter data. In addition, R&DO recommended that AS-206 be instrumented to obtain inflight panel flutter data. (If 204 test results are favorable, then AS-206 vent area may be increased to 200 in².) This would provide a back-up for 204, no crew risk will be involved, and results of a favorable test could lead to the decision of deleting the requirement for flutter kits on most of the subsequent Saturn V and IB vehicles. IO was in agreement with the idea of obtaining panel flutter data as early as possible and made a counter proposal to instrument S-IVB 502 instead of S-IVB 206, primarily since we could then obtain test results sooner and total program cost would be less since 502 has R&D instrumentation whereas 206 is an operational vehicle and does not have R&D instrumentation. R&DO agreed with IO's counter proposal, and efforts are currently underway to instrument 502 for panel flutter tests. ✓

2. Guidance Switchover Activities: The proposed schedule of tasks, for analysis of the mission contingency of guidance switchover while in earth orbit coast mode (reference Notes 3/13/67 Geissler), has been prepared jointly by Astrionics and Aero-Astroynamics Laboratories (i. e., switchover from L/V to S/C system in the event of L/V platform failure prior to second S-IVB burn). The plan is now being reviewed by the two laboratories, and no problems are anticipated on a finalization of a plan acceptable to both laboratories. There is some question as to whether MSC will agree, since the plan calls for some effort on their part. The plan will be presented and discussed in detail with MSC at the 20th Flight Mechanics Panel Meeting on April 19-20, 1967. We shall keep you informed on this subject. ✓

3. Apollo/Titan: During a recent meeting with ARO, Inc. personnel at Arnold Engineering Development Center, it was disclosed to personnel of Aero-Astroynamics Laboratory that the Martin Company, under Air Force sponsorship, has conducted static stability and control, load distribution, and aeroelastic tests of the Titan IIIC with several bulbous payloads, including the Apollo configuration. ARO indicated that any additional related information would have to be obtained from the Air Force. We shall try to obtain additional information through available contacts, in order to gain more insight into Air Force plans and test results. ✓

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1. SOLDER CRACKING PROBLEM: A meeting was held March 24, 1967, at Astrionics Lab to resolve the similarities between the R-ASTR and R-QUAL proposed contracts to investigate and resolve the solder cracking problem being experienced by MSFC. Personnel in attendance were from Astrionics and Quality Laboratories and R&D Operations Administrative Management. It was concluded that the two proposed contracts would be combined, incorporating the needs of both Laboratories. It was further agreed that the contract would be administered by Astrionics Laboratory and an individual from R-QUAL assigned as alternate C.O.R. All necessary alterations have been made to the ASTR purchase request and agreed to by all responsible segments of Marshall. ✓
2. ATM PROGRAM: The final Quality and Reliability Plans from American Science and Engineering, Inc., the contractor for the X-ray Spectrographic Telescope, have been received by the Laboratory and are under review. Delegations to Government Agencies for Inspection Services at all Principal Investigators have been prepared, problems over format resolved with the contracts office, and the delegations should go out without further delay. ✓
3. CLEANING SOLVENT ANALYSIS: An instrument, the nephelometer, for determining nonvolatile residue (NVR) content of cleaning solvents has been received and is being installed in this Laboratory. The nephelometer was developed by IIT Research Institute on an MSFC contract for replacing the gravimetric method of analysis for NVR in cleaning solvents. Successful usage of the nephelometer will result in a more accurate NVR analysis and a reduction of analysis time from an average of two and one-half hours to twenty minutes per sample. After a brief qualification test program, it is planned to release all technical data to MSFC prime contractors for implementation of the nephelometer as a NASA standard analysis instrument. ✓

NOTES 4/3/67 HAEUSSERMANN

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1. ATM RCS Impingement. Reference Notes 3/27/67 Haeussermann. Meeting with MSC representatives resulted in the following agreements and decisions.

a. Provide thrust deflectors and do not cant the engines.

b. Redesign the ATM solar array to be retractable with a minimum number of retractions (approximately 5) and occurring during the first week or so of the mission.

MSC and MSFC will continue to explore in more detail the problems (thermal and control) associated with firing the engines with the array deployed but the above approach is to be considered the primary solution.

2. ATM Roll Reference and Computation. MSC and Headquarters are pushing the Hughes developed star tracker for ATM. This was a \$15M development which has no present Apollo application. Hughes was included in our bid list and the proposals are being evaluated. Use of either of the LM computers (MIT/Raytheon or TRW) is also being evaluated by MSC and MSFC for possible use by ATM to perform the roll reference computation, momentum desaturation management and other digital-type computations. ✓

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F-1

Rocketdyne and P&VE have decided to re-orifice F-1 engine S/N 6049 (truck delivered flight spare) which is now installed in the West Area F-1 Test Stand. Another test will be conducted, when the ECP has been approved and the orifice received from Rocketdyne. ✓

S-IC (MTF)

The S-IG-T stage was removed from the test stand at MTF on March 30, 1967, and departed ~~from~~ MSFC on March 31, 1967. The S-IC-4 stage is scheduled to arrive at MTF April 5, 1967, and be installed in the test stand April 6, 1967. ✓

S-II (MSFC - West Area)

Site grading for the S-II stage structural test facility started on March 25, 1967, and continues. ✓

S-IVB (MSFC)

An O₂/H₂ Burner test was conducted on March 30, 1967, for a duration of 37 seconds. The O₂/H₂ burner started, ran, and cut off properly; however, a wiring error prevented proper operation of the flight LOX and LH₂ tank re-pressurizing system. ✓

S-II-2 (MTF)

The first static firing was attempted on S-II-2 on March 31, 1967. The first auto sequence was held up at approximately T-7 minutes when the engine start tanks did not pressurize. The problem was located in the isolation valve from the S7-41, which had been closed to re-set the start tank regulator, then was not reconnected to the correct circuit. A second auto sequence was stopped when the No. 1 engine fuel pre-valve did not close and the No. 5 LH₂ recirculation pump inverter failed. The firing was scrubbed but a chamber chill was conducted and disclosed a problem when the No. 3 engine chamber did not chill down. ✓

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K.H.

File this doesn't look so good!
Procedure or
hardware
problem? B

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H.H.
Request a
short,
easily under-
standable
description.
Not more
than 2 pages

1. ACOUSTIC ANALYSIS SYSTEM: The Acoustic Analysis System, constructed to MSFC specifications by Bruel and Kjaer and integrated by the Vibration Data Section to include a data reproduction system, high speed analog to digital converter, and necessary software for the IBM 7094, is unique to the free world. The system is highly automated to provide rapid processing of data, producing three dimensional plots and tab output. The system is presently being utilized to reduce and analyze the Arnold Engineering Development Center Saturn 4% wind tunnel data. ✓

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2. ELECTRONIC CIRCUIT ANALYSIS PROGRAM: Electronic Circuit Analysis Program (ECAP) is a digital computer program for analyzing an electronic circuit. ECAP was originally developed by IBM and Norden Division of United Aircraft. This program allows a circuit designer to describe any electronic circuit by an easy-to-use input language. The designer may then use ECAP to perform AC, DC, or transient analysis on the circuit. ECAP is now available for use on our IBM 7094 computers. ✓

3. COMPUTER PROGRAM CONVERSION: The Data Center Division, R-COMP-A, had planned to reduce the conversion effort to the third generation computer system through resources sharing with MSC, as they have recently converted to the UNIVAC 1108. Trips were made to MSC by three groups to review their mechanized systems. It was found that the ADP systems developed for MSFC are considerably more advanced than those at MSC. None of the systems presently in use at MSC would satisfy the requirement of the customers or users at MSFC.

It was originally estimated that R-COMP-A would save fifty man-months of conversion effort through resources sharing with MSC. Attempts will be made to absorb this effort within the existing resources. ✓

4. SUPPORT OF ARMY MISSILE COMMAND: Funds in the amount of \$100,000 have been transferred from the AMC to MSFC for analog computer support to the Advanced Systems Laboratory, AMC. The work supports the monitoring of contractor's analyses of the LASAM project and is conducted on a non-interference basis by R-COMP-RS. The AMC does not have adequate facilities in-house for the evaluation. ✓

5. HYBRID COMPUTER SYSTEM: The EAI 8900 hybrid system has been accepted and is being utilized approximately 12 hours per day. ✓

6. COMPUTATION LABORATORY TMB SUB-STORE: This Laboratory has been advising through the von Braun Notes each week about the initiation of the Computation Laboratory sub-store. As a closing note, this sub-store is in operation and appears to be effective and very satisfactory to the Laboratory. ✓

NOTES 4-3-67 JOHNSON

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Nothing of significance to report.

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1. LOX Vent Line Problem for 'S-II Stage: Last week we reviewed at The Solar Company the manufacturing techniques for the LOX vent lines which were found to be of substandard quality on S-II-1, -2, and -D. Manufacturing operations and tooling were thoroughly analyzed together with Solar production personnel. As a result, it was recommended by us to improve the welding equipment by using a voltage-controlled welding head in order to provide for more consistent energy input for the welding arc. The general conclusion of the review, however, has been that the tooling and welding processes presently in use are adequate to produce quality welds. The real cause of the defects had been carelessness of shop personnel. Of course, quality control by Solar personnel and by the Government must catch such defects at the proper time in order to prevent the use of substandard components on our stages. ✓

Hesim. Heidner
Gerard Kuers

PLEASE
don't rock the
Voyager boat
at this critical
time with
allowing rumors
of such MSFC
plans to leak
out*). Let us
take a look
at the overall
situation when
we know the
FY 68
Voyager
budget picture

2. Voyager Spacecraft: We have submitted a proposal to Mr. Weidner that the Voyager Spacecraft be handled as an in-house hardware program; that is, a Phase D contractor would be responsible for the engineering design of the spacecraft as well as for the design and fabrication and checkout of the launch GSE. MSFC would fabricate and assemble from parts mostly supplied from industry the ground test and flight spacecraft. The checkout and testing of the spacecraft would, of course, also be performed at MSFC. The Voyager programs schedule requires a continuous engineering effort but an intermittent hardware effort. A good deal of hardware has to be built from 1969 to 1972 but none in 1973, 1975, or 1977. A prime contractor would therefore have to disband his crews in those years and all learning would be lost to the detriment of reliability. The MSFC crew, however, would be kept together and used on other programs. Furthermore, with the hardware located at MSFC the design laboratories could penetrate the technical aspects of the spacecraft as deeply as necessary to insure success. Since R&DO is not bound by contracts, we could respond quickly to required changes and lend the program the necessary flexibility. The hardware and facilities cost picture is, of course, also favorable in the proposed approach. IO would be helped considerably by having ready access to manufacturing checkout and test schedules. The effect on MSFC would be that we will maintain and enhance our technical skills through many years to come.

3. Personnel: Mr. Robert J. Schwinghamer has been accepted by MIT for the Sloan Fellowship Program.

Congrats
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Also: Dave Newby
for info.

*) Such rumors have a way to fly, regardless of how few people participate in such studies!! Industry has its antennas up, to hear OSEA!

NOTES 4-3-67 LUCAS

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1. VISIT OF MR. HITTINGER: Mr. W. C. (Bill) Hittinger, President of Bellcomm, on assignment from General Phillips, visited the laboratory on March 28 to review Saturn V and Saturn IB pressure vessel safety factors. We spent about six hours briefing him and showing him Saturn hardware. At the end of his visit, he appeared satisfied with the data he received (showing safety factors of 2.0 or greater for all high pressure bottles). Previously, he had spent a day at KSC and a day at MSC on the same subject. He wanted to see you (saw Harry Gorman instead) to get your general appraisal of titanium pressure bottles. We are preparing some back-up information for you. ✓
2. S-II-1 LOX TANK INTERNAL VENT LINE REPLACEMENT: Replacement completed at KSC over the week-end. ✓
3. 501 AUXILIARY DAMPER: Today, there will be a final walk-around inspection of the Auxiliary Damper hardware prior to shipment. Representatives from R-QUAL, R-ME, R-TEST, R-P&VE, and IO will be present. The on-dock delivery date to KSC, April 5, appears realistic at this time. ✓
4. 70-INCH DIAMETER LH₂ TANK: The 70-inch diameter LH₂ tank is being spray-foam insulated by R-ME with the CPR-369-3 foam material. It is our intent to have at least one LH₂ test completed prior to the Center-wide meeting on spray foam scheduled for April 7, 1967. ✓
5. ATM MATERIALS CRITERIA: The Materials properties criteria for the ATM has been established and documented by memorandum - R-P&VE-MEV-67-50. This memo delineates the properties judged to be critical from the standpoint of contamination as well as from the standpoint of function degradation. ✓
6. RACK/PAYLOAD MODULE: From discussions with MSC, March 21 and 22, it is apparent that the RACK/PM program remains undefined. The latest proposal is for three RACKS of present design (30M12640), one for test, and two for possible flight in mid-1968. MSC (Mr. Bruce Jackson) agreed to provide a TWX by March 27, 1967, requesting one RACK for test by July 15, 1967, and two for flight scheduled for March 1968 delivery. It was further agreed that when received, the TWX would be considered as a firm request and R&DO would immediately "move out" to deliver the hardware. A TWX was received on March 27, but it was not in accordance with the above arrangement. MSC has been asked to clarify the TWX. ✓
7. LSSM DRIVE MECHANISMS: Since the drive mechanisms developed under the LSSM Phase B contract have not proven satisfactory, our Materials Division proposed an alternate drive system utilizing DC torque motors to replace the failing harmonic drives and gearing systems. The LSSM committee has decided to fund our proposal on a contract independent from the LSSM contract studies. Torque motors are currently being modified for test in-house. ✓
8. SATURN V THRUST TAILORING: A joint study was made with R-AERO to evaluate the effect of thrust tailoring the S-IC for lunar missions. Preliminary indications are that not only would the flight loads be reduced (at q x d max), but the lunar transfer injection weight would be increased by over 2,000 pounds as well. These findings are being compiled for a presentation. ✓
9. NASA-HIGH PRESSURE GASEOUS HYDROGEN WORKING GROUP: This working group will prepare a final report to Dr. Seamans and disband. The working group, composed of representatives from LeRC, SNPO, OART Headquarters, and MSFC Materials Division, received no financial support from any segment of NASA (other than J-2 engine office of MSFC which supported the MSFC program); therefore, the group was ineffective in implementing a comprehensive program. We heartily endorsed the disbanding of the committee. ✓

B.L.
I'm
greatly
interested
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(More
power
to you!)

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1. FY-68 RESOURCES - We have received a directive from Dr. Mueller that we develop a plan which would enable Marshall to hold \$75 M FY 68 R&D funds in a management reserve. This reserve must come from the total MSF program at MSFC of \$1390.8M. The MSF POP 67-1, which is in the final stages of completion, will not identify this reserve amount. ✓

2. INVESTIGATION BY HOUSE CIVIL SERVICES AND POST OFFICE COMMITTEE INTO MANPOWER UTILIZATION - In response to a request from MSF, we have submitted MSFC policies, procedures, legal opinions, management structure, cost studies and other related material to Mr. Paul Dembling, NASA General Consul, who will use this material in preparation for the investigation into manpower utilization. The investigation will cover both civil service and support contractors. ✓

3. FACILITY CONSOLIDATIONS - Mr. Gorman, John Goodrum, and Jay Foster presented the F-1 & S-IVB static test relocation study and the broader consolidation philosophy paper to Dr. Mueller on March 29th. Dr. Mueller seriously questioned consolidations on the following grounds:

1. Early costs for facility modifications.
2. Relatively small savings in relation to the total program effort.
3. Loss of flexibility if increased production is ever desired.
4. Loss of leverage in no longer being able to compare efficiency from one location to another.

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Additionally, Dr. Mueller expects General Phillips and Chuck Mathews to recommend discontinuation of static firing for both Saturn IB and Saturn V for the post Apollo vehicles. This question should be resolved prior to making firm consolidation decisions regarding MTF. Dr. Mueller requested that:

- ✓ 1. The F-1 study be uncoupled from the S-IVB and the philosophy paper.
2. The follow-on RFQ and Procurement Plan for the F-1 be modified to incorporate two options - the current way of doing business and the relocation to MTF and Huntsville. ✓
3. A list of specific consolidations to be studied in other contract areas be prepared. ✓
4. MSFC return to MSF with this information in one month. ✓

NOTES 4/3/67 RICHARD

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Mueller Visit: Another meeting was held in preparation for the Dr. Mueller visit to discuss the MSFC budget. The date of the Mueller meeting has now slipped to April 29 and 30. The tentative agenda was revamped and action items tentatively assigned to IO or R&DO. The Mueller visit must be very tactfully handled to prevent Dr. Mueller from "ground ruling" out some important tasks. The presentation of this agenda to you will be made on April 5 at 2 p.m. and a pre-meeting for this will be held on April 4. A dry run for the Dr. Mueller presentation will be held on April 25. ✓

AAP Weight and Performance: We met Monday with Saturn Apollo Applications Program Office, P&VE, and MSC representatives to discuss weights and mass characteristics data exchange and schedules of availability. During the meeting, the present weight status numbers were reviewed. Both sides seemed to be in substantial agreement. All missions of the Cluster have current weight problems. MSC AAP in apparently not going to go the route of Apollo in having North American Aviation do all their weights and mass work. They are going to develop an "in-house" capability.

A small discussion developed with the Saturn IB Program Office. The officially released performance data will be lower than the previously quoted figures, only a matter of about 300 pounds on 2, 3, and 4 flights, but down 1000 pounds on 1. The Saturn IB Program Office feels that it has good, solid justification for the background data for these numbers, and sees no likelihood of the numbers being revised upward or downward. We will air this some more. ✓

Leddie Richard

See Bill Lucas' NOTES 4-3-67, par. 8, "Thrust tailoring".
Could we get a little extra payload out of the Sat IB
by doing the same thing? Seems very effective on Sat II!

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4/61. S-II-2 Stage at MTF:

- Captive firing preparations on Friday, 31 March 67, were stopped at T-8 minutes (about 7:45 pm) when the pre-valve on the Number 1 engine would not close. In addition, the recirculation pump inverter on the center engine (number 5) had low RPM and was in a marginal condition. ✓
- Firing is now scheduled for Thursday, 6 April 67. ✓

2. S-II Resident Management Office at S&ID, Downey:

- On Saturday, 1 April 67, the S-II Resident Management Office was moved from Downey, Calif., to the new S&ID Office Building at Seal Beach.
- The NASA Administrator has approved the transfer of the NASA-O personnel to the MSFC and MSC Resident Offices at S&ID - to be effective on Sunday, 9 April 67. The S-II Resident Management Office will increase by approximately 75 personnel (mostly inspectors) as a result of this transfer. ✓

3. MSFC Modification of Apollo Spacecraft - Boilerplate #30:

- The Command Module arrived at MSFC on Thursday, 30 March 67; but could not be unloaded from the Pregnant Guppy until Friday, 31 March 67, because of high winds. The Service Module arrived on Saturday, 1 April 67. ✓
- possibly for 501*
boiler plate

4. S-II-4 Stage at Seal Beach:

- It has been determined that the LH₂ tank walls of S-II-4 are less than required thickness in certain areas. Discussions with P&VE (Dr. Lucas) indicated tank strength will be adequate if pressure is reduced by 3 PSI. This results in a 265 pound payload loss which can be accepted. Similar problems on other S-II Stages are being investigated. ✓

5. S-IC-1 Stage at KSC:

- When the distributors were opened to replace the contaminated Union Switch Company relays, foam growth was discovered. Quality Lab and Boeing are working on the problem. ✓

NOTES 4/3/67 SPEER

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1. AAP DATA FLOW: We hosted a mid-term AAP Data Flow Committee meeting on March 28. The meeting was chaired by Sam Fordyce, AAP Office, MSF. The committee has made 6 task assignments as follows: (1) Estimate of experiment data generation (Bellcomm); (2) Design and Development of space borne signal processing equipment (payload integrators); (3) Plans for in-flight experiment control (MSC); (4) Plans for post-flight data handling (MSFC); (5) Plans for archival storage of results (MSFC); and (6) Coordination and assembly of the AAP data flow plan (Bellcomm). Mr. Felder (R-COMP) is leading the MSFC effort on items (4) and (5). We are coordinating with I-S/AA, R&DO Labs, and MSC on the operations aspects of the task assigned to MSFC. ✓

2. VOYAGER MISSION OPERATIONS: JPL has published detailed plans for the development of the Voyager Mission Operation Systems (not including prelaunch or launch operations). The development effort will address all support facilities, organizations and operations. The effort will be carried out by the Mission Operations Complex Design Team consisting of approximately 18 personnel representing JPL, the various Centers and the Voyager project. A total of seven groups have been proposed for the following areas: Design Management Control; Operations; Tracking; Telemetry; Command; Video; and Simulation. I have made arrangements to discuss details of these plans and MSFC's participation with W. Eichwald, Acting Voyager Space Flight Operations Director. ✓

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1. ATM: In response to our request, MSC has named Mr. George Bonner as "Mr. ATM" as far as ATM science is concerned. He will work closely with the astronauts, particularly Drs. Michel and Gibson. SSL's contacts with Mr. Bonner will be in connection with the scientific objectives of ATM, and with the contamination studies and experiments. ✓
2. ATM - FILM FOGGING: Our investigation of the effects of proton radiation on ATM films, based on the data accumulated by Dr. Vette (now at GSFC), and the measurements of a number of experimenters (GSFC, AF), has provided a set of data for dosage rates for various altitudes, inclinations, and shield thicknesses. Together with the data to become available from our experiments on film exposure to proton and gamma radiation, we will soon be able to define the problem quantitatively, and to recommend solutions. ✓
3. ATM- CONTAMINATION: SSL's program to define the optical contamination about the spacecraft is progressing satisfactorily. P&VE completed and distributed a list of Materials Properties Criteria which will form the basis of the Materials Management portion of the program. Ball Brothers Research Corporation's final report of their contamination study was distributed to all concerned. This contractor effort is being slightly reoriented and continued under a follow-on contractual arrangement. ✓
4. EMR: One of the proposed experiments, an image converter system for far UV spectra developed by NRL (Dr. Friedman, Dr. Carruthers), was flight-tested in an Aerobee rocket flight on March 16. The flight was a full success. All eight targets (mainly in Orion) were achieved with three exposures (1, 3, and 10 seconds) per target. The longest exposures had spectra from stars as faint as fourth magnitude. The all-reflecting image converter spectrograph was designed to operate in the range from about 850 to 1400 A. Spectra below Lyman alpha were obtained, and were weak, as expected. The resolution was 1.0 A. The equipment was recovered in such excellent condition that another flight is planned for this summer. ✓
5. EMR FUNDING: We have been advised that the AAP Headquarters Office has issued a FY-68 funding guideline of 7 M for EMR. There is an additional 2 M for stellar ATM. ✓
6. MSC LUNAR DRILL: Mr. Hoyt Weathers of SSL participated in the Critical Design Review (CDR) of the MSC 10-foot drill at the Martin Company plant in Baltimore, Maryland. The result of the review was a probable slippage in the program of six weeks. It was also learned that there is a possible change in the Apollo program to allow both astronauts out of the LEM on the surface at the same time. ✓

NOTES 4/3/67 TEIR

SA-204: S-IB-4 is scheduled to be de-erected on April 6 and erected on LC 37-B on April 7. S-IVB-204 and S-IU-204 have been de-erected and are scheduled to be erected on LC 37-B on April 10 and 11 respectively. ✓

SA-206: IU-206 is back in the IBM, Huntsville Facility. S-IB-206 is enroute to Michoud and is expected to arrive there on April 8. S-IVB-206 is being prepared for shipment and is scheduled to depart KSC via Supper Guppy on April 12. ✓

S-IVB FLUTTER PREVENTION MODIFICATION: R&DO has revised their recommended approach to solve the potential flutter problem and we and Saturn V are considering the following: Flutter prevention kit will not be installed on S-IVB-502. Forward skirt of S-IVB-502 will be instrumented in similar manner as S-IVB-204 to determine the magnitude of flutter. The forward skirt vent area of S-IVB-204 will be increased from 100 sq. in. to 150 sq. in. The size of the S-IVB-502 forward skirt vent area will be determined after review of the S-IVB-204 flight data; the decision will be to either leave the vent area at 200 sq. in. or reduce it to 150 sq. in. DAC will provide three kits for installation on subsequent stages if S-IVB-204 and S-IVB-502 indicate a need for flutter prevention. ✓

BETA III TEST STAND REPAIR: Mr. Gorman and representatives of the S-IVB Stage Office discussed Beta III Test Stand repair with Dr. Mueller at Headquarters on March 29. Dr. Mueller approved MSFC recommendations and the project request was forwarded to Dr. Seamans for final approval. ✓

H-1 ENGINE LOX CAVITY CONTAMINATION: (Reference Mr. Brown's notes of 3/27/67, copy attached.) All engines on S-IB-5, S-IB-7, S-IB-8, S-IB-9 and S-IB-10, have been checked and no contamination was found. Disposition of the contaminated outboard engines on S-IB-11 has not been made pending completion of Rocketdyne tests on an R&DO engine to determine if the LOX seals can be dried with a purge or if the seals will have to be removed from the engines; inboard engines on S-IB-11 were not contaminated. All engines allocated to S-IB-12 and all spare engines at MAF have been checked and no contamination was found. Check of the engines on S-IB-4 and S-IB-6 is not currently planned pending review of CCSD's findings. ✓

CORROSION INSPECTION AND CONTROL GROUP: Initial criteria has been developed by the group and transmitted to prime contractors for use in preparation of their inspection plan. A request is being transmitted to KSC today for a detailed inspection of the stage interfaces to be made during the erection of SA-204 stages on LC 37-B. ✓

B
4/6

NOTES 4/3/67 WILLIAMS

4/3/67

1. Voyager:

We have been asked to name representatives and to participate in the following Voyager Working Groups: (1) Mission Design, (2) Science, (3) Facilities, (4) Reliability and Quality, (5) Technology, and (6) Project Control, (including "panels" as a part of Nos. 1 and 6). A list of recommended RDO participants is in process for concurrence/approval. ✓

2. FY-67 Voyager Funds:

After discussions with D. Newby and Lab people, we have initiated a request to Hearth to release to us \$590K (\$540K for propulsion tests, \$50K for R-RP).

The status of other tasks/funds is:

- | | | | |
|----|-------------------|-------------|--|
| a. | <u>AERO</u> tasks | <u>285K</u> | (Funds here; procurement actions in process.) ✓ |
| b. | <u>ASTR</u> task | <u>125K</u> | (Request and task definition were premature; will pick up with FY-68 funds.) ✓ |

APR 10 1967

4/10/67 w/ comments

NOTES 4-10-67
WITH COMMENTS

MR. GORMAN'S COPY

No DEP-A ACTION

OFFICE OF DIRECTOR - MSFC

CODE	NAME	INIT.	<input type="checkbox"/> ACTION	<input type="checkbox"/> INFORMATION
<i>Dip-A</i>	<i>Mr. Serman</i>			

REMARKS

All Recipients of Weekly Notes:

Dr. von Braun did not make any annotations on the Weekly Notes of March 13; therefore, they will not be reproduced and distributed.

CODE DIR	NAME J. T. Shepherd	DATE 4-10-67
-------------	------------------------	-----------------

NOTES BALCH 4/10/67

4/10/67

9/11

S-II-2 - First static firing was conducted Thursday afternoon, 4/6/67. Firing was programmed for full duration and was manually terminated at 362 seconds, four seconds after the 2% fuel level was reached.

Preliminary information indicates that the test was acceptable and that no major hardware damage resulted from the test. Second static firing is tentatively scheduled for 4/15/67, pending final review of data and assessment of hardware damage. ✓

S-IC-4 Testing - The S-IC-4 stage arrived at MTF from Michoud on 4/4/67 was installed in the B-2 position of the S-IC test stand on 4/5/67. Stage power-up is scheduled for 4/20/67 but is expected to be accomplished ahead of schedule. Firing is scheduled for 5/11/67.. ✓

S-II A-1 Test Stand - Integrated test of facility and GSE with simulated stage has now been rescheduled from 4/15/67 to 4/17/67. Punch list items are still being worked off by Corps of Engineers contractor. Punch list items for interior and exterior of core are expected to be complete by 5/15/67, and remaining site work is expected to be complete by 6/1/67. ✓

GE Contract - During the past week, presentation was made to MSFC on the FY-1968 contract with GE. Main topics covered were contract management, incentive evaluation, and work breakdown structure. As required by Article 1 of their contract, GE has presented their proposal for FY 1968. This proposal is on a CPFF basis. Total estimated cost is \$31,210,000, and total proposed fee is \$1,650,000. ✓

4/10 JSA

B
4/11

ATM: We are currently assessing the use of Lunar Module (LM) computers as a part of the ATM pointing control system. With the impact of the vernier gimbal and the increase in commands to be computed, the pointing control system will require additional computing capability. Personnel from R&DO are visiting MSC this week to discuss details and uses of the LM primary and abort computers. ✓

We held follow-up discussions on March 30 with MSC and Grumman Aircraft Engineering Corporation concerning overheating of Rack components and the solar array from the LM Reaction Control System (RCS) plume. An agreement was reached that the use of deflectors eliminates both problems, provided the solar array is retracted. We are currently designing a retractable array and determining the optimum deflector size and mounting location; i.e., whether to mount them on the LM or Rack. We also understand from MSC that if free flight of LM/ATM is required, the array must be retracted because of control limitations. ✓

LOCAL SCIENTIFIC SURVEY MODULE (LSSM): Mr. Vecchiotti signed the LSSM Procurement Plan this past week. It is expected to be on Dr. Mueller's desk sometime this week. We are doing preliminary work on preparing the Request for Proposal, (including specification and development plan guidelines), in anticipation of procurement plan approval. ✓

MPTF ACTIVITIES: A meeting of the Mission Planning Task Force (MPTF) was held in Washington on April 5 and 6. Mr. Mathews outlined alternatives during the meeting and requested that the centers pursue these and be prepared to present their results to him on April 27. After this, Mr. Mathews anticipates having a review of the 1969 mission plans with Dr. Mueller and the center directors. ✓

AAP PANELS: An organizational meeting of the Systems Integration Panel will be held at MSC on April 12. Membership of this panel includes the co-chairmen of all the other panels. ✓

NOTES 4-10-67 BROWN

4/10/67

B 4/11

Ad 4/12
Meeting
Bonnie
Let me
call
Dr. Debus
about
this
B
4/11
URGENT

F-1 ENGINE Reference BROWN Notes, 3-27-67, which stated that KSC would not allow Rocketdyne to perform F-1 Engine Field Inspection Requests (EFIR's) #22 and #23. A datafax transmission from Mr. E. R. Mathews, KSC, to Mr. M. Urlaub, I-V-SIC, was received on 3-28-67, again confirming KSC's position that these requests be disapproved. Subsequently, word was received on 4-4-67, that the hypergol manifold assembly on engine 3015 had been removed, rather than inspected in compliance with the EFIR F1-22. This action was taken although KSC had been informed that the F-1 Project Manager did not concur in this approach. In addition, Rocketdyne personnel were not notified of this action and did not witness the replacement. It's obvious from this that we still have not resolved the overall KSC/MSFC/Rocketdyne interface. I understand, however, that you and Dr. Debus had some discussion on the subject of Rocketdyne involvement, last week in Washington which may lead to some resolution soon.

During routine installation of high reliability transducer modification kits on S-IC-1 engines at KSC, corrosion and other discrepancies were noted in various electrical harness connections. The resulting inspection performed by the Boeing (BATC) personnel yielded 63 discrepancies from 155 connectors inspected. These include 28 missing O-rings, 9 examples of corrosion and various other problems.

An EFIR (Engine Field Inspection Request) has been prepared to have Rocketdyne personnel inspect all electrical connectors on S-IC-2 and S-IC-3 engines. Electrical harness connections on S-IC-1, S-IC-2, and S-IC-3 engines were broken for inspection or mod kit installation after delivery of the engines to MSFC and MAF. Rocketdyne reinspection, to an approved procedure, of the control harness connectors on S-IC-1 engines may also be desirable. This action involving Rocketdyne personnel will, in all probability, be met with resistance by KSC-LVO.

H-1 ENGINE Corrective action for the engines at Michoud with moisture in the LOX seal cavity consists of dehydrating the cavity with a vacuum drying procedure, and the disassembly required to replace the LOX seal. Rocketdyne recommends that the four outboard engines in S-IB-11 and one engine in S-IB-8 be corrected in this manner. CCSD and Rocketdyne are continuing their investigation to resolve a question concerning two engines in S-IB-7 and five engines in S-IB-12. ✓

J-2 ENGINE A successful acceptance test was accomplished on S-II-502 at MTF 4-6-67. The firing was for 364 seconds duration. All engine parameters and hardware appeared normal. ✓

There were four successful tests at AEDC 4-4-67. Two tests were nominal-type first burns and the other two were restarts; one at nominal conditions, the other a simulated second orbit restart. The next two test periods will be used to investigate extreme start conditions for S-II-501. ✓

NOTES 4/10/67 CONSTAN

4/10 JES

B 4/11

Negative Report.

NOTES 4/10/67 FELLOWS

4/10/67

B
4/11

MSC Neutral Buoyancy Trainer: In a continuation of cooperation between MSC and MSFC for those jobs to which special skills can be applied to mutual advantage, MSC has requested fabrication by MSFC of a Neutral Buoyancy Trainer with a target delivery date of May 6. Funding requirements for this job are approximately \$160 K. Following R&DO discussions concerning proper financial arrangements for this task, the IO AAP Office is contacting Houston for a firm declaration of intent with regard to providing the funds. Upon receipt of either the MSC affirmative declaration of intent or the funds themselves, fabrication of the Neutral Buoyancy Trainer would begin immediately. ✓

4/11

1. AS-503 Mission (Highly Elliptical Orbit, 107 X 3950 N. M.) with Residual Propellant Problem: As you know, MSFC is trying to identify a solution to the problem of the residual propellant (70,000 - 80,000 lbs.) after S-IV B second burn, for 503. (Nominal lunar type mission has only \approx 7500 lbs. residual propellant.) The only solution we've found thus far is to continuously vent LH₂ during post-injection coast to minimize propellant slosh. (A problem even exists in this case when the LOX propulsive vent occurs since the thrust vector is not through the center of gravity - discussed later in this note.) We asked MSC via the Flight Mechanics Panel to evaluate this possibility, and they responded that they believe it is a feasible approach, and agree that it is the only method identified to date which is applicable to Saturn V alternate missions (real time contingencies) in earth orbit which result in excessive S-IV B propellant residuals. MSC is expected to present their final position in the April 19 - 20 Flight Mechanics Panel meeting. The propulsive LOX vent on AS-503 causes a LOX slosh problem since the LOX vent thrust is not aligned through the center of gravity for the case of such excessive residuals. Although the control system maintains vehicle control, the resulting motion is above the tolerances acceptable for CM separation to soft dock, completion of hard docking, and LM extraction. We have been investigating this problem and it appears that the best solution would be to eliminate the propulsive LOX vent and make it non-propulsive. We are considering suggesting this possible solution to L.O.

2. Natural Environment Criteria Monographs: Previous requests from OART for our assistance in the preparation of natural environment criteria monographs have been politely refused due to lack of manpower to properly accomplish the tasks. However, at a recent meeting here attended by representatives of OART and GSFC (lead center for environment monographs), Mr. Charak of NASA Headquarters offered to make funds available to us for contract support in the preparation of selected monographs. Accordingly, we plan to offer to help Headquarters by technically supervising the contractors who will prepare monographs in the areas of ground atmospheric extremes, and in-flight and orbital atmospheric models, inasmuch as we would eventually have to expend additional efforts in these areas anyway. Mr. W. Vaughan, Chief of our Aerospace Environment Division, is the official contact with OART for MSFC participation in natural environmental criteria monograph formulation, including planetary, lunar, and terrestrial environments. ✓

3. Thermosphere Launching Data: Data from four of our six thermosphere (120 km - 350 km neutral and electron density measurements) launchings at KSC on the 24th of January have been reduced. They show significant departures from current model atmosphere values. We have received a letter from Dr. Jacchia (Smithsonian Observatory) requesting that we present the results of these six unique launchings at the international COSPAR (Committee on Space Research) meeting in London next July. An abstract is being prepared for submission to Dr. Jacchia. ✓

E.F.
 Do we have the same problem in future 3-burn flights into synchronous orbit?
 During the 5 1/2-hr coast to apogee the SIV B tanks still carry a substantial H₂ and O₂ load!
 B

4/10 GTS

B
4/11

1. QUALITY ASSURANCE MANAGEMENT: The Government Accounting Office (GAO) is beginning a review of NASA quality assurance management practices. Relationship of Headquarters to Centers, management inside the Centers, and relationship of the Centers to the contractors are to be looked into. Dr. John E. Condon, Office of Reliability and Quality Assurance, Code KR, is the main point of contact for NASA; I am in close contact with him. Speedy close-out of some of the pending problems appears to be highly advisable, such as the fragmentation problem which was discussed in the meeting with you last Wednesday, and the formalization of the quality assurance participation in the procurement cycle, which is a concerted effort of R-QUAL and the R&D Operations Management Office. ✓
2. S-IC PROGRAM: The previously reported problem of sta-foam expansion in S-IC distributors (NOTES 3-6-67 GRAU, copy attached) has not been solved. The foam in S-IC-2 distributors had been trimmed to proper size, but has grown again to a magnitude which deflects and covers components. It now appears new distributors, potted with LOCKFOAM which has been used in other programs, will be fabricated to replace the four critical units on S-IC-1, and the four critical units on S-IC-2. ✓
3. ATM PROGRAM: A decision was reached recently between P&VE, Astrionics, and this Laboratory that a combined vibration/checkout facility at P&VE was not feasible since the ATM must be removed from the vibration setup and placed in a stringently controlled environmental area for alignment checks. Therefore, efforts will be reoriented toward combining the ATM alignment and post-manufacturing checkout operations at this Laboratory. ✓
4. SUPPORT TO KSC: You will recall that in January an agreement was made with KSC to provide Quality Control Support from MSFC to Dr. Gruene to cover the anticipated high density of stages in residence at KSC. Due to changes in the launch schedule KSC reassessed the support requirements and advised that Dr. Gruene's organization can support the now planned stage density. Therefore, MSFC personnel will be withdrawn on an orderly basis. This new agreement has a provision that should the stage density at KSC increase beyond Dr. Gruene's capability we will again respond with needed support within our resources. ✓

ATTACHMENT: NOTES 3-6-67 GRAU (Dr. von Braun's and Mr. Weidner's copies only)

NOTES 4/10/67 HAEUSSERMANN

B 9/11

4/10/67

1. ATM Computer. Further discussions were held with MSC last week concerning the possibility of using either the LM primary or abort guidance computers for ATM functions. The abort computer is essentially unavailable to ATM because of planned LM functions. A certain capacity within the primary computer can possibly be made available for ATM function. However, MSC personnel do not believe that a specific allocation of memory can be made in order to allow a separate but coordinated computer program development. This would mean that ATM functions would have to be defined so that a single integrated computer program covering ATM, as well as all other requirements, could be developed by MSC. Judging from past experience on the development and verification of flight programs, it is feared that the above arrangement could lead to a hopeless entanglement of functions resulting in unmanageable inter-center interfaces. ✓ The matter is still being pursued and some official statement from MSC on the matter is expected in the near future. In the meantime, the possibility of providing a separate ATM computer is being further considered. At the suggestion of Chuck Mathews of NASA Headquarters, the technical characteristics and availability of the IBM Gemini computer are being investigated for possible utilization. Newly developed computers also are being investigated. ✓

4/10 JKB

B
4/11F-1

During preliminary checkouts in preparation for test FW-061 with F-1 engine S/N F-6049, the gas generator ball valve developed a leak. This test will be delayed until the valve is serviced and re-installed. ✓

S-1C (MTF)

The S-1C-4 stage was installed in the test stand at MTF on April 5, 1967. The tentative schedule is (1) propellant load test on May 2, (2) static firing on May 9, and (3) removal from the test stand on May 16, 1967. ✓

S-11-2 (MTF)

A 365 second duration firing was conducted at MTF on April 6, 1967. Cutoff was given manually at 4 seconds after reaching the 2% LH₂ level. The planned lox low level cutoff would have been reached approximately 1/2 second later. The P.U. valve reached null position at 295 seconds; the mixture ratio at cutoff was 4.47. The analog data was on slow speed until five seconds after start due to confusion caused by a 19 second "hold" at engine start minus 10 seconds when the lox fill line drain temperature was out of limits. The digital events evaluator (C7-77) was saturated during the firing due to excessive cycling of the ignition detection on engine No. 3, and cycling of the LH₂ tank pressure switches. A second firing is planned for April 14, 1967. ✓

S-1B

Stage S-1B-10 is due to arrive at the Redstone Arsenal docks this morning. The stage will be installed in the Static Test Tower East on April 11, 1967. An eddy current test of the engine turbines first stage wheels is scheduled for April 12, 1967. ✓

NOTES 4-10-67 HOELZER

4/10 950

B
4/12

NEGATIVE REPORT.

Notes
4/11

NOTES 4/10/67 JOHNSON

B
4/11

URGENT

Bill S.

Shall I
discuss the
wisdom of
this
decision
with Phillips?

looks like
it adds
work for
us, and
forces us to
tear into
well
checked-out
circuits!

B

1. Experiments removed from Apollo - General Phillips has removed all proposed Apollo experiments from the mainstream Apollo flights. To fly these experiments, Dr. Mueller has proposed to Dr. Seamans that the first Saturn IB vehicle released to the AAP program be used to carry these Apollo experiments. This flight would not be part of the OWS. In attempting to carry a number of experiments previously assigned to three flights on one flight, there will most likely be integration problems.

In addition to Apollo experiments, we believe some of our experiments that are carried in the I. U. (X-Ray Mapping and Hydrostatic Gas Bearing) will be proposed for this flight. Due to mounting limitations, only one may be carried. This one should be the X-Ray Mapping experiment provided none of the Apollo experiments obstruct its field of view and it can be deployed early (as soon as orbit is achieved and CSM undocked) in the flight. For deployment, the CSM must have been undocked from the I. U.

2. Project ACRE (Advanced Cryogenic Research Engine) - Thursday morning of last week, Mr. Miles of this office discussed this subject briefly with Dr. Al Eggers. At that time, Dr. Eggers did not know that the Technical Development Plan had been rewritten by P&VE and resubmitted Tuesday to Del Tischler's office. Dr. Eggers was extremely sensitive about the subject, and threatened to withdraw the 1.4M (received at Marshall March 2) program authority from Marshall if it appeared that we could not obligate it by June 30. That afternoon, Mr. Miles learned from Mr. Wilcox of Del Tischler's office that he and Tischler felt that the revised TDP, with some slight revisions, will be acceptable. It appears that P&VE did a good, fast job of re-writing over last weekend.

✓

↑

This is the toroidal H₂/O₂ engine, isn't it?
B

4/10 952

B 4/11

S-II Welding: On April 3-4, R-ME personnel made a horizontal weld joining two 33 foot diameter cylinders of the same material (2014 Al) and wall thickness as the S-II stage at the LH₂ dome to cylinder #6 joint. Key personnel from S&ID Manufacturing, Engineering and Quality were present to witness the whole operation from the start of cleaning to the final evaluation of the X-rays. The cylinders were mounted on our turntable. The technique used for the weld was, after cleaning and hand tacking, to weld first from one side and then from the other. We used the MIG pulsed-arc process at 45" per minute. (S&ID use the TIG process at 12" per minute and from one side only. Also they use welding skates and not a turntable.) The result of the demonstration was a weld:

- a. requiring no repairs (only four questionable areas).
- b. with all offset well below the permissible amount.
- c. with physical properties (strength and elongation) comparable with TIG welds at room and at cryogenic temperatures.

S&ID personnel took many weld samples back to Los Angeles for analysis and test. They took many notes on our techniques of actually performing a welding operation and of overcoming difficulties as they occur. For example, the upper cylinder was made 0.5" smaller in circumference than the lower one and we purposely trapped two complete straps as well as a small piece of another during tacking to demonstrate a technique for their removal. The success of this operation may be attributed to the practiced teamwork of our crews, to the use of a turntable, to the excellent weld cleaning techniques, and also to a large extent to the comparatively forgiving nature of the newly introduced pulsed-arc MIG process which allowed us to get a practically flawless weld despite the presence of 10 - 20 observers around the hardware at all times. ✓

The low degree of offset is due to the technique of tacking used and to the welding from alternate sides -- at no time is any part of the joint melted through and therefore unconstrained. On the other hand when a penetration is made from one side then the two abutting parts are free to move in relation to each other in the molten zone. ✓

B 9/11
4/10/67

1. SATURN V ABORT PROBABILITY: In support of the Crew Safety Panel, we are analyzing the probability of an abort on the pad prior to ignition and from lift-off to lift-off plus 30 seconds. This information will be used in conjunction with Manned Spacecraft Center (MSC) failure studies and land abort impact studies. MSC has a problem regarding the probability of crew survival in conjunction with land impact. The analysis will be completed by April 14, 1967. ✓
2. 501 DAMPER: R-QUAL, R-P&VE, R-ME, and IO made a walk-around inspection of the Auxiliary Damper hardware Monday, April 3. Boeing representatives attended as observers of the inspection. The Auxiliary Damper hardware was shipped April 4 to KSC via enclosed van and arrived at KSC before noon Wednesday, April 5. ✓
3. HIGH PRESSURE LH₂ PUMP: The high pressure hydrogen pump being built and tested by Pratt and Whitney Aircraft under NASA contract was successfully run for the first time to design conditions on March 29. Significant data for test was:

Pump Speed-----	39,500 rpm
Flowrate-----	11,300 gpm
Pressure rise-----	5,654 psi
Shaft horsepower-----	57,300 hp
Efficiency-----	64.6 %

Five seconds of the thirty second test were run at maximum conditions. Post test evaluation shows no anomalies. ✓

4. NASA-AIR FORCE COORDINATION MEETING ON TITANIUM PRESSURE VESSELS: Jim Kingsbury attended a joint NASA-Air Force coordination meeting on titanium pressure vessels at MSC on March 30. The AF had been holding all Titan and Trans-stage launches because the pressure vessels (0.050-inch wall thickness) were made of titanium (6 Al-4 V alloy) welded with commercially pure titanium wire. After reviewing the AF data, it was the NASA position that the AF did not have a problem. In this thickness, sufficient mixing of the pure titanium and the titanium alloy occurs. ✓

5. SAA-2 (S-IVB WORKSHOP): In a brief discussion with a member of Advanced Systems and Technology Division (ASTD) at MSC, it was indicated that ASTD had developed and proposed a 'contingency' plan for the S-IVB Workshop. This proposal assumes the stage cannot be pressurized once in orbit and that the experiments are conducted in the MDA. The forward 6½ feet of the MDA would be used to package and conduct experiments and a crew quarter type arrangement was indicated in the next 6½ feet (all above the MSFC/MSC interface line). It was indicated that this proposal had been well received by Mr. Thompson of the AAP Office at MSC and will be forwarded to OMSF (Mathews). We now have the assignment to study this proposal with MSC.

6. ATM CONTAMINATION STUDIES: Ball Brothers Inc. has requested design drawings of our vacuum-weight loss determination apparatus which we shall provide. ✓

7. FUEL JACKET PURGE CHECKVALVE FAILS ON S-II-2: Subsequent to cancellation of the static test of S-II-2 on March 31, 1967, it was discovered that the thrust chamber of engine position number 3 could not be properly chilled. Investigation revealed excessive pressure drop through the fuel jacket purge checkvalve. The valve was replaced. Failure analysis of the discrepant valve revealed that an extraneous teflon valve seat had been installed in the valve on assembly. Inspection of all valves by X-ray will be requested to prevent a future occurrence. ✓

ee
Below
small
cave-
thing
here.
B

NOTES 4/10/67 MAUS
4/10/68

B 4/15

Negative Report

NOTES 4/10/67 RICHARD

B 4/15

4/10/67

L.R.
I agree.
Need any
help? B

S-IVB Second Burn: We have been "beating the drums" for a visible MSFC determination to have a first orbit restart capability in Saturn V. The potential advantages to the Apollo program as well as the long range Saturn requirements make it a necessary part of the operational Saturn. I believe we should give P&VE, the Engine Office, and the Program Offices all the support and encouragement we can in this matter. ✓ It becomes quite clear that we (MSFC) need to get this restart time down to at least 35 minutes. ✓ I feel the goal at MSFC should be to work toward a 15-minute restart capability. ✓

Technical Systems Council: We have initiated a Technical Systems Council for AAP. The first meeting was held April 4. Our intention is to utilize the Technical Systems Council as a forum to get immediate attention within R&DO and IO to significant problems, and to establish the R&DO work plan attended to Headquarters-assigned Marshall action items. ✓

AAP Panels: The AAP Panels are beginning to function, two Panels having already met. The Systems Integration Panel will meet in Houston this coming Wednesday for the purpose of establishing operating concepts and Panel functions. As you may recall, the membership on the Systems Integration Panel is largely the co-chairmen of the other Panels. ✓

NOTES 4/10/67 RUDOLPH

4/10/67

B 4/15

1. S-II-2 Stage at MTF:

- o The first captive firing of the S-II-2 Stage was successfully completed (363 seconds) on Thursday, 6 April 67. ✓
- o The second firing is scheduled for Saturday, 15 April 67. ✓

2. Beta III Test Stand Repair at SACTO:

- o We have received informal information from MSF that Dr. Seamans has approved the plans to proceed with the full repair of the Beta III Test Stand. ✓ Written confirmation is expected by Wednesday, 12 April 67. ✓

3. AS-500F Dynamic Test:

- o The de-stacking of the complete Dynamic vehicle (Configuration I) was completed Tuesday, 4 April 67. ✓
- o Configuration II stacking (S-II Stage and up) is now underway and will be completed on Saturday, 22 April 67. ✓

4. Saturn V Flight Vehicle Damper:

- o The Auxiliary Damper System was delivered on dock KSC, Wednesday, 5 April 67. ✓

5. Mr. Ishmail Akbay, Configuration Management Engineer in the Saturn V, S-IC Stage Office, served as interpreter for the First Lady of Turkey during the President of Turkey's visit to KSC on Wednesday, 5 April 67. ✓

I'm sure they talked Turkey
B.

NOTES 4/10/67 SPEER

4/10/68

B 4/15

1. VOYAGER MISSION OPERATIONS: I met last week with Drs. Rehtin, Renzetti, Burcham, and Walt Eichwald at JPL for preliminary discussions on Voyager Mission Operations. While clearly in the lead role for flight operations JPL indicated a firm intention that MSFC personnel perform all spacecraft flight control functions for Voyager, from establishment of requirements through conduct of the mission. ✓ Langley will do the same for the lander, and JPL will provide the overall flight operations coordination, flight path analysis, and control facilities from planetary injection on. They agreed fully with the need for remote support from MSFC design elements (through HOSC). A more nebulous area concerns possible flight control of the launch vehicle from liftoff to injection. JPL does not feel primary responsibility for this flight period, but is concerned about how it will be handled. I will take action to get this area clarified. We will have to comment on more detailed plans concerning the Mission Operations Systems (MOS) and are expected to appoint very soon a lead MSFC engineer on the MOS Design Team. I toured the Space Flight Operations Facility (unmanned counterpart to MCC-H) and believe JPL is planning a major augmentation of this facility for Voyager. ✓

2. MISSION OPERATIONS REVIEW: The Quarterly Review of MSFC Mission Operations activities was held on April 4. All current activities were reviewed; participation was good. ✓

3. REORGANIZATION OF MSF MISSION OPERATIONS OFFICE: AS you probably know a reorganization of Stevenson's office has been in preparation for some time. He announced the major outline to his personnel on 4/7/67. It is anticipated that the Flight Operations Offices (Holcomb and Edwards) presently under the Program Directors will become a part of Stevenson's office. There will be three major groups: Mission Operations (Hubbard), Systems Integration (Holcomb), and Program Control (Brown). Stevenson will have a special assistant for Apollo (unnamed) and for AAP (Edwards). I understand that a Bellcomm group will be assigned to the office. It is expected that the changes will be effective on 4/23/67. It appears that Headquarters Mission Operations is finally getting ready for business. ✓

4/10/68

B 4/15

1. ATM, PRESENTATION TO DR. MUELLER: On April 4, the five PI's presented a short status report on their experiments. They explained that their accuracy requirements had not substantially changed since ATM was conceived. Dr. Tousey, NRL, (who flew UV instruments on a V 2 in 1946) gave these arguments for an absolute pointing requirement of 2.5 arc sec: "The astronauts onboard the spacecraft have images of the sun in the extreme UV, X-ray, and $H\alpha$. The PI on the ground has images in CaK and $H\alpha$, and he has magnetographic information. Besides, the ground observer has more experience, more time, and the support of computers, charts, etc. It is mandatory that frequent conversations between astronauts and PI's take place, and that the astronauts have an absolute reference system on the solar disc (2.5 arc sec) which allows them to locate points on the disc which are identified by the PI by coordinate figures." Dr. Reeves, Harvard College Observatory, supported these statements. ✓

No objections against these arguments were raised by members of OMSF or OSSA. However, Dr. Mueller again stated that he is doubtful whether the design of ATM as presently planned will provide the required pointing accuracy of 2.5 arc sec mainly because of the severe thermal problems. Dr. Tousey mentioned that from the astronomer's viewpoint, this accuracy is modest and that he hopes that MSFC will succeed in providing it. ✓

2. ATM, RADIATION DANGER: The problem of radiation danger to ATM films was touched only briefly in Dr. Mueller's briefing on April 4. It was discussed more thoroughly in the PI meeting at NRL on April 5. Upon request by D. Forsythe and D. Halpern of Headquarters to designate a "Mr. Particle Radiation" for the ATM project, Dr. Russell Shelton of SSL was named as the focal point and responsible coordinator of this effort. It is expected that he will come up with an assessment of the particle radiation danger to ATM films within two or three weeks. ✓

↑
E.S.

The Lockheed people in Sunnyvale shared me quite a bit of work they've done in this field under our AAP integration contract. Suggest Shelton contact Glad Pott at Lockheed.

B

4/10/67

B 4/15

S-IVB RESTART FOR AAP: At the AAP mission planning task force meeting in Headquarters last week on the cluster missions, one of the most significant problems discussed was the negative payload margins available with the Saturn IB vehicle. It was recommended that MSFC look into the possibility of restarting the S-IVB for the unmanned missions as a means of gaining payload to the higher orbits. Realizing this is a significant change in thinking, Chuck Mathews indicated he would like to look at the feasibility of such a change. As a result of this meeting, R&DO has indicated they would take action to initiate an analysis of the feasibility. ✓

BETA III TEST STAND REFURBISHMENT: Dr. Seamans has approved refurbishment of the Beta III Test Stand. We expect a TWX from OMSF today approving the project. ✓

PROPELLANT DUMP EXPERIMENT ON S-IVB-204: (Reference my notes of 3/27/67, copy attached.) Based on a Saturn V Program requirement for this experiment, approval of this experiment on AS-204 has been given by General Phillips and a TWX is expected today giving formal Level I CCB approval. ✓

B.T.

How is my "Sandbagging study" coming?

B

4/10/67

B 4/15

Orbital Station

A configuration and status review was held at Douglas on the Orbital Station activity (next generation workshop) on April 3 and 4. R&DO (ASO, TSO, and Labs), IO, Headquarters, and MSC representatives were present. The contracted effort has been underway for 2 weeks, and within the next 2 weeks MSFC will select those configurations to be considered for further study. This initial selection (of about 8 configurations) will be worked until June, and then a further narrowing down (to about 3 configurations) will be made for more detailed work for the remaining 5 months.

This review emphasized the desirability to coordinate the DAC activities closely with efforts of MSFC's integration contractors. ASO is in the process to arrange with AAP/Belew for cross-feed of information from MSFC's workshop activities, especially in the areas of experiments definition, computerized mathematical models, and similar analytical tools being developed under the integration activity. ✓

Improved Lunar Cargo and Crew Delivery Systems Study

Negotiations were successfully completed April 5 with Lockheed, LMSC, for the Improved Lunar Cargo and Crew Delivery Systems Study, an FY-66, 981 effort. MSC participation in the technical negotiations confirms their interest and their intent to technically support this study, especially the crew transport aspects. The contracted effort is expected to commence on or about May 1, 1967, and continue through 1967. ✓

April 14, 1967

1/7/67 W/Comments

NOTES 4-17-67
WITH COMMENTS

MR. GORMAN'S COPY

see von B. note to Fellows
about excess property items

No DEP Action

Notes
4-17

File

TO: Mr. Shepherd, DIR

MAY 15 1967

FROM: Col. Fellows, R-OM-DIR

RE: Reduction of Supplies Inventory

In response to your attached request for supporting information, I have obtained from Lou Crouch the following data for this fiscal year:

	<u>Line Items</u>	<u>Value</u>
Alabama A&M College	22	\$ 8,242
University of Alabama	115	\$44,161
Auburn University	21	\$28,758

Oakwood College is eligible to draw excess supplies; however, they have not yet elected to do so.

The Space Museum screens and is given all requested items of a historical nature. In addition, local trade schools and high schools have been given some 5,250 line items of miscellaneous surplus valued at \$1,625,000.

We have also furnished supplies to other colleges and universities throughout the country.

Please let me know if further information is required.

W. S. Fellows
W. S. Fellows

1 Enc:
As stated



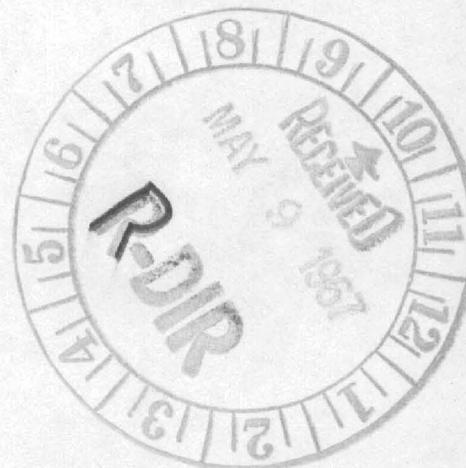
OFFICE OF DIRECTOR - MSFC

CODE	NAME	INIT.	<input type="checkbox"/> ACTION	<input type="checkbox"/> INFORMATION
R-OM DIR	Carolyn			
	<i>Napper</i>			
	<i>W 5/9</i>			

REMARKS

Mr. Shepherd asked if Col. Fellows would attach a list of items that have been furnished to each of the educational organizations listed in Dr. von Braun's note. Thanks.

nancy
5-9-67



CODE	NAME	DATE

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

TO : Dr. von Braun, DIR

DATE MAY 5 1967

FROM : Director, Operations Management Office, R-OM-DIR

SUBJECT : Disposal of excess property

In the 4/17/67 NOTES you asked if we could assist local Educational Organizations by transferring supplies and equipment which were found to be excess to MSFC requirements.

Current Supply Regulations provide for the reporting of excess items which are \$100 and under per line item in value to Health, Education and Welfare Institutions for their screening for possible use. If needed, the Educational Institution will place a requirement thru General Services Agency (GSA) for release by the NASA Center having the items.

Excess items of over \$100 in line item value are circulated to other NASA Centers, Department of Defense, and other Government Agencies prior to disposal. If there are "no takers", these items may then be offered to Health, Education and Welfare Institutions.

In checking with Davis Foxworthy's people I find that the procedure is pretty well known by the local educational organizations and is working satisfactorily.

W. S. Fellows
W. S. Fellows



NOTES 4/17/67 FELLOWS

4/19/68

B
4/21

Reduction of Supplies Inventory: A number of steps have been taken within the Center, with R&DO participation, to implement the President's September 16, 1966, direction that we reduce cost in procurement, supply, and property management. A "walk-through" inspection to identify obvious excesses in equipment in all laboratories and offices of R&D Operations was recently completed. Action is well under way for the turn in and proper redistribution or disposal of that equipment. The Technical Services Office's Technical Materials Branch has a well established means of circulating lists for review of need for excess equipment whose value is \$100 or more per item. However, there is a large volume of items whose individual value is less than \$100. In recognition by all concerned of the need for critical review of these latter "small" items, as well as the larger ones, to further enhance our supply posture, a committee was formed by mutual consent of the principals to assure that all MSFC material and equipment users are furnished current property lists and that objective reviews are accomplished within approximately 30 days. Mr. Lowell Dennis, R-OM, was appointed chairman of the Property Review Committee with membership from each of the laboratories, DEP-A, Technical Materials Branch, and the Saturn IB and V Program Offices. The overriding principle within which this committee functions (as with all other excess property evaluations) is that property which can be used by on-coming programs must be identified and retained. Only items truly excess to our present and immediate-future programs are to be disposed of through established government procedures.

Can't we also help local educational organizations such as

- U of Fla
- Research Institute
- A&M + Oakland Colleges
- Schools
- Nav Space ?
Museum

#136

MSFC ROUTING SLIP

	CODE	NAME	INIT.	<input type="checkbox"/> ACTION	<input type="checkbox"/> INFORMATION
1		Mr Napper			
2		Demaris			
3		(See note)			
4					

REMARKS

Frank -

7/28/67

As per Scott's attached note, would you please prepare a memo from him to UB on the attached.

Bob 4/28 1:50

CODE	NAME	DATE

OFFICE OF DIRECTOR - MSFC

CODE	NAME	INIT.	<input type="checkbox"/> A <input type="checkbox"/> C <input type="checkbox"/> T <input type="checkbox"/> I <input type="checkbox"/> O <input type="checkbox"/> N	<input type="checkbox"/> I <input type="checkbox"/> N <input type="checkbox"/> F <input type="checkbox"/> O <input type="checkbox"/> R <input type="checkbox"/> M <input type="checkbox"/> A <input type="checkbox"/> T <input type="checkbox"/> I <input type="checkbox"/> O <input type="checkbox"/> N
R-01M-DIR	Jellison			
	Simpson			

REMARKS

Note VB action on your
 4-17 Notes. (Will ask Woffen/Dewine
 to prepare reply for May 1 notes)

vs

OK for reply.

I think a separate
 reply might be
 more appropriate to
 avoid using notes
 as mail center, I
 should have anticipated
 VB's remarks knowing of
 his desire to help other
 groups with excess equip.

CODE DIR	NAME	DATE 4-25-67
-------------	------	-----------------

4/17 952

Reduction of Supplies Inventory: A number of steps have been taken within the Center, with R&DO participation, to implement the President's September 16, 1966, direction that we reduce cost in procurement, supply, and property management. A "walk-through" inspection to identify obvious excesses in equipment in all laboratories and offices of R&D Operations was recently completed. Action is well under way for the turn in and proper redistribution or disposal of that equipment. The Technical Services Office's Technical Materials Branch has a well established means of circulating lists for review of need for excess equipment whose value is \$100 or more per item. However, there is a large volume of items whose individual value is less than \$100. In recognition by all concerned of the need for critical review of these latter "small" items, as well as the larger ones, to further enhance our supply posture, a committee was formed by mutual consent of the principals to assure that all MSFC material and equipment users are furnished current property lists and that objective reviews are accomplished within approximately 30 days. Mr. Lowell Dennis, R-OM, was appointed chairman of the Property Review Committee with membership from each of the laboratories, DEP-A, Technical Materials Branch, and the Saturn IB and V Program Offices. The overriding principle within which this committee functions (as with all other excess property evaluations) is that property which can be used by on-coming programs must be identified and retained. Only items truly excess to our present and immediate-future programs are to be disposed of through established government procedures. ✓

Can't we also help local educational organizations such as

- U of Fla
- Research Institute
- A + M + Oakwood Colleges
- Schools
- New space ?
Museum B

2070

MEMORANDUM

From

HANS MAUS

Handwritten: - 4 9 (1)
513

Handwritten: File K/17 NOTES

To Dr. von Braun

5-2-67

Subject: Your comments regarding Headquarters use of the Apollo Cost Study

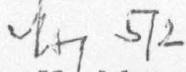
Despite our objections, Headquarters has come to use the Cost Study Model for two understandable reasons:

1. Often, it is necessary to cost out a variety of delivery schedules in a short period of time to evaluate various trade-off situations. The computer model was specifically developed for this purpose.
2. It is an established fact that BOB accepts the results of this model without any question.

Consequently, it is unrealistic to assume that Headquarters will discontinue the practice of using the model. We are trying to protect ourselves by:



1. Encouraging Headquarters to obtain Center comments on cost figures before they are used in a budget plan.
2. Preparing our inputs to the cost model in such a manner that model outputs for the various schedules can be considered reasonable. This can be done by running our inputs through our computer using a copy of the Headquarters Cost Study Model.


Hans H. Maus

APOLLO COST STUDY - The Apollo Cost Study of the Apollo Cost Study has been completed. The study revealed a reduction in most of the stage cost for the Saturn V, but the overall cost increased. This net increase was due to the decision to drop engine development cost from the budget which necessitated a corresponding increase in production support to the vehicle cost. In the case of the Saturn V, the overall increase amounts to approximately \$1.5 billion or 35% for the cost of Saturn V approximately \$4.2 billion or 173% for the cost of Saturn V. Although we agree the Apollo Cost Study has value and should be used for making broad program cost comparison studies, we do not feel it should be used for establishing budgets. We feel sure, however, that the Saturn V contractors will use this study for the FY-69 budget for launch vehicle procurement funds as was the case in FY-68.

MM
Any
Ad hoc
suggested?
3

RESOURCES MANAGEMENT STUDY - Resource Management activities throughout the Center have continued to expand in spite of the leveling off or decreasing of budget and manpower ceilings. Mr. Gorman has requested the Executive Staff to conduct a study of the utilization of the Manpower Utilization and Administration Office and other Center elements to ascertain whether these responsibilities are being carried out in the most effective manner.

FACILITIES ACQUISITION AND MAINTENANCE STUDY - A center-wide study of organizational elements engaged in facilities acquisition and maintenance activities has been completed and the results were presented to Mr. Gorman and other members of management, April 13. No major problems with respect to organization, staffing, and operating methods were found. Several recommendations for improvements were made during the course of the study and appropriate action is being taken by operating and staff elements.

NOTES BALCH 4/17/67

4/17/67

B 4/21

S-II-2 Testing - Second static firing was conducted late Saturday evening 4/15/67. Firing was programmed for full duration and was automatically terminated at 368 seconds by LOX depletion on Engines 1 and 4. At approximately two minutes after start of the firing, a power fluctuation resulting from a short in a transformer outside the test complex caused the termination of the engine gimbaling program and a very slight loss of data. Neither the termination of the engine gimbaling nor the data loss significantly impaired the adequacy of the test. Preliminary examination indicates that all major test objectives were met and that there was no significant hardware damage. ✓

S-IC-4 Testing - Stage electrical power-up previously scheduled for 4/20/67, was accomplished on 4/14/67, and GSE and stage component checkout is now underway. No problems are currently apparent that would impact the static firing, which is still scheduled for 5/11/67. ✓

S-II A-1 Test Stand - Integrated test of facility and GSE with simulated stage has now been rescheduled from 4/17/67 to 4/26/67. Punch list items are still being worked off by the Corps of Engineers contractor. ✓

Damage Claims from Static Firing - Two formal claims have been presented for damages from static firing of the S-II stage, one for the replacement of a home (\$12,000) and other for structural repair to a home (\$2,000). The assistance of structural experts at MSFC has been requested to investigate these claims in greater detail. ✓

NOTES 4/17/67 BELEW

4/17/67

B
4/21

ATM: We (Astrionics Lab) are continuing to look at an active thermal system for ATM and are also studying the application of louvers.

The ATM design is critical with respect to the weight of the LM ascent stage in that informal information from MSC indicates they are still considering a weight of approximately 8500 pounds (resupply add on), whereas our current weight statements show 5400 pounds. Our structural design has been stressed for the lower weight and, therefore, there is a significant impact if the LM weight increases.

It appears a three-foot structural section (IU structure) on the ATM vehicle between the IU and the SLA may be desirable in order to provide sufficient space for the ATM experiments package and improve astronaut accessibility. ✓

INTERFACE MEETING WITH GRUMMAN-LUNAR PROJECTS: MSC plans to redirect a portion of the current Grumman study effort towards an unmanned carrier for equipment such as the LSSM and Lunar Drill. Effort on studying uprating of the descent stage has been completed. The primary approach will be the use of a stripped lunar module for cargo carrying and a modified extended-life LM for personnel transport for the first dual-launch AAP mission in 1971. ✓

AAP PANELS: The organization meeting of the AAP Systems Integration Panel was held at MSC on April 12. (All MSFC AAP panel co-chairmen attended.) MSC agreed to use the present Interface Control Document (ICD) system, including the MSFC respository. ✓

ORBITAL WORKSHOP PRELIMINARY DESIGN REVIEW (PDR): In order to conform to your desire to attend, the review is now scheduled for May 8, 9, and 10. MSC interest is indicated by a planned attendance of 42, including Chris Kraft, Max Faget, and Dr. Berry. ✓

At a meeting with Mr. Rees, Mr. Weidner, and most of the laboratory directors on Friday, April 14, I was requested to chair the review board, which will include Mr. Neubert, Mr. Weidner, Dr. Lucas, and possibly others. ✓

KL 4/17

F-1 ENGINE We have not received any further word from KSC regarding the Engine Field Inspection Request (EFIR) F1-23, dated 3-9-67, a mandatory inspection, requirement of the F-1 engine 4-way control valves. Also, EFIR F1-25, which requests Rocketdyne inspection of electrical connectors on S-IC-2 and S-IC-3, has not been approved by KSC. It is understood that BATC (Boeing at the Cape) with KSC approval is preparing work orders for the accomplishment of this effort. Rocketdyne inspection to an approved procedure, with MSFC participation, was requested to preclude further damage to the electrical connectors and to fix the origin of discrepancies found on S-IC-1.

Bill B.
I had a long talk w/ Debuss again. KSC does not oppose the principle of Rocketdyne inspections at KSC, but says MSFC must put some suitable wording into the existing MSFC contracts w/ our stage contractors to establish clear interface between stage contractor's and engine contractor's responsibilities. Suggest you get in touch w/ Ollie Hirsch (with whom I discussed the problem in detail) and Monty.

In the course of installing the thermal insulation on S-IC-1 it was found that manually gimbaling the engine yielded more working space. On engine F-2013, a 3.5 foot work ladder was left under the No. 2 main fuel valve. When the engine was returned to the null position the main fuel valve forced the ladder through the work platform grating approximately 0.5 inches. BATC is performing this work. Preliminary analysis indicates the force required to cause this to be on the order of 3000 ft. -lbs. An analysis is being made to assure that no problem exists.

Engine F-6060 (4th engine for vehicle S-IC-8) was accepted at Canoga Park, Calif., on 4-9-67. ✓

H-1 ENGINE After transfer of the SA-204 vehicle from Launch Complex 34 to 37, a complete functional check of the engine was repeated. The turbine on engine H-4062 would not break loose after torquing to the current max allowable of 150 in. -lbs. Also, engine H-4058 exhibited a metallic "clicking" sound apparently originating from the gearbox during the torque test. The other six engines checked out okay. Rocketdyne has been requested to review the data and send a special team to KSC to get first hand information and make recommendations for resolution of these problems. ✓

J-2 ENGINE An apparently successful 368-second test of S-II-502 was conducted late Saturday (4-15-67). The test was delayed approximately four hours awaiting arrival from Rocketdyne of new brackets for the ASI LOX lines for all five engines. The old design clamps broke on two of the five engines on the previous test; however, no one in my office was made aware of this problem until Friday afternoon. Consequently, the firing was delayed.

Testing at AEDC was canceled last week due to a facilities problem (split steam ejector). The S-II-501 simulation (4 tests) have been rescheduled for tomorrow (4-18-67). ✓

B

NOTES 4/17/67 CONSTAN

4/17/67

B4/21

NATO MILITARY COMMITTEE MEMBERS VISIT MICHOU

On April 13, 1967, sixteen high-ranking members of the North Atlantic Treaty Organization (NATO) Military Committee, escorted by five Naval Officers, visited Michoud as part of a six-day tour of industrial and military installations in the Eastern United States. The group was briefed by Dr. Constan and then taken on a tour of the facility. ✓

NOTES 4/17/67 FELLOWS

B
4/21

4/17 952

Reduction of Supplies Inventory: A number of steps have been taken within the Center, with R&DO participation, to implement the President's September 16, 1966, direction that we reduce cost in procurement, supply, and property management. A "walk-through" inspection to identify obvious excesses in equipment in all laboratories and offices of R&D Operations was recently completed. Action is well under way for the turn in and proper redistribution or disposal of that equipment. The Technical Services Office's Technical Materials Branch has a well established means of circulating lists for review of need for excess equipment whose value is \$100 or more per item. However, there is a large volume of items whose individual value is less than \$100. In recognition by all concerned of the need for critical review of these latter "small" items, as well as the larger ones, to further enhance our supply posture, a committee was formed by mutual consent of the principals to assure that all MSFC material and equipment users are furnished current property lists and that objective reviews are accomplished within approximately 30 days. Mr. Lowell Dennis, R-OM, was appointed chairman of the Property Review Committee with membership from each of the laboratories, DEP-A, Technical Materials Branch, and the Saturn IB and V Program Offices. The overriding principle within which this committee functions (as with all other excess property evaluations) is that property which can be used by on-coming programs must be identified and retained. Only items truly excess to our present and immediate-future programs are to be disposed of through established government procedures. ✓

Can't we also help local educational organizations such as

- U of Fla
- Research Institute
- A + M + Oakland Colleges
- Schools
- New Space ?
Museum B

1. Mission Planning Task Force (MPTF) Members of Aero-Astrodynamic Laboratory made two major presentations at the April 6 MPTF meeting at NASA Headquarters. First, a mission decision logic flow diagram was shown. It is a first, but significant step toward the development of a systematic method for analyzing and evaluating alternate approaches, and the impact of having made the right or wrong decisions. ✓ It was well received by the participants, especially Mr. Matthews (AAP Director), who stated that similar methods were used in some Gemini missions. He made suggestions concerning further development of the concept, and warned of the problems involved in its expansion to more sophisticated AAP cluster missions. As next step, it is intended to implement the method in some more specific way for the 1969 missions and subsequently for the 1968 cluster. ✓

Secondly, a parametric set of S IB performance capabilities for various orbital shapes and inclinations was presented. ✓

Among the other agenda items and discussions, of special interest for MSFC was the question of a second ignition of the IB - S IVB stage to provide a circularization kick at apogee of a highly eccentric orbit. The purpose, improved payload, depends primarily on the cut-off, boil-off, and re-ignition losses. They will reduce a potential gain of 10k lbs to about 6 k lbs, but possibly to zero. AERO & P&VE are jointly looking into this possibility. Also, the idling mode of the J-2 engine might result in similar gains, if it can be introduced in time. Such a payload gain might help significantly to keep the spent S IV-B stage in the early space station, rather than replacing it by an Airlock Module/ Multiple Docking Adaptor combination.

The MPTF meeting resulted in the selection of seven candidate missions: Profile 1, the re-use of the 1968 cluster including ATM; Profile 2: Single re-visit of the 1968 cluster (same for profiles 2, 3 & 4) followed by a high inclination launch for the App. A (meteorology & earth resources) package and establishing a new cluster in low inclination orbit; Profile 3: Establishing a new cluster, including App. A in high inclination orbit; Profile 4: Like profile 3, but jettisoning the S-IVB stage at low energy and using only the Airlock Module and Multiple Docking Adaptor as station in order to relieve payload constraints; Profiles 5, 6, & 7 are identical to profiles 2, 3, & 4, except the re-visit of the 1968 cluster is omitted. ✓

2. Institute of Environmental Sciences (I. E. S.): Mr. George West of our Aerospace Environment Division, attended the recent annual meeting of I. E. S. and presented a paper entitled "The Atmosphere of Mars: A Derivation of Parameters for Engineering and Design Applications." ✓

3. 1600 ft. Meteorological Tower Facility: We are beginning to receive average and peak wind profile data from the 1600 ft. Meteorological Tower Facility at Oklahoma City, operated by the National Severe Storms Laboratory (NSSL). This unique data source will provide detailed wind profile characteristics, using fixed anemometers, up to 1600 ft. The NASA Meteorological Tower at KSC provides data to the 500 ft. level. ✓

4/17/67

1. S-II PROGRAM: Failure analysis and testing of the S-II-2 prevalve, which caused the postponement of the first static firing, has indicated that moisture in the valve actuator froze when subjected to cryogenic temperatures, causing the valve not to actuate. This failure mode was duplicated at SCID when water was injected into the valve actuator mechanism. Action has been taken to have MTF purge the system and prevalues to insure a dry system to prevent recurrence of this failure. It is not yet known what condition caused the moisture or water to be present in the prevalue before the failure occurred. ✓
2. KSC QUALITY TRAINING: At the request of the Director of Quality Assurance and Safety, KSC, a representative of this Laboratory visited KSC to assist in determining their quality training requirements. In the past KSC has participated in quality seminars we have conducted in Huntsville, and on several occasions we have furnished instructors to KSC to conduct special courses at the Cape. After study of KSC's requirement, it appears that training will be needed in several areas including Quality Management, Reliable Electrical Connections, and Checkout Computer Applications. Over 200 people will be trained in various courses. KSC plans to continue scheduling personnel into our seminars on an interim basis until they can develop their training capability. We plan to assist them by admission to our seminars and in preparation of their training courses. ✓
3. METROLOGY AUDIT: The Apollo Interlaboratory Comparison Summary Report has been received from NASA Headquarters (MAR-Q). This report presents findings of a metrology audit comparing measurements made by laboratories on 12 basic standards against measurements made by the National Bureau of Standards on the same items. Participating organizations were the metrology labs at MSFC, KSC, MSC, and MTF. A comparison audit of this type is very useful for revealing weaknesses in a laboratory's measurement capabilities in order that needed corrective actions may be taken. Our metrology laboratory performed well in this audit, comparing very favorably with other participants, all of whom have larger labs than MSFC. In all measurement areas but one, we were well within our stated estimated uncertainty. The one area where we exceeded our estimated uncertainty was in vibration measurements at the lower frequency levels; however, even here our total deviation from the National Bureau of Standards was not excessive. ✓

NOTES 4/17/67 HAEUSSERMANN

B 4/21

1. Postdoctoral Fellowship/National Academy of Science. In order to get response to this program, I have contacted 14 universities and institutes of technology (Germany, Austria, Switzerland, England and Japan). The response has been that 7 potential candidates are interested in areas of Astrionics technical disciplines and of these 7, there are 2 who are now formally applying. They are Dr. Frik of Stuttgart and Dr. Miura of the University of Tokyo. ✓
2. Astrionics Reliability Review Team. The Astrionics Reliability Review Team has completed the review for all IU Astrionics components of the Saturn Program. ✓
3. Contract NAS8-11673, (ITT). Contract NAS8-11673, ITT, has resulted in an experimental prototype of a laser guidance system for rendezvous and docking. This system is presently being tested at the rendezvous and docking simulator at Martin-Denver. At the conclusion of these tests, demonstrations of the system in operation on the simulator will be held during April 25, 26 and 27. ✓

B
4/21

4/17/67

F-1

The gas generator ball valve on F-1 engine S/N F-6049 was removed and is being serviced due to a leak on the fuel side. A test to verify acceptable engine performance after re-orifice (GG Lox) is tentatively scheduled for next week. ✓

S-IVB (MSFC)

On April 14, 1967, the burner was fired for approximately 300 seconds, test S-IVB-H03. Burner start, run, and cutoff parameters appeared normal. ✓

S-IB (MSFC)

Stage S-IB-10 arrived at Redstone docks on April 10, 1967, and was installed in the Static Test Tower East. ✓

S-IC (MTF)

Preparation for the S-IC-4 stage acceptance firing is progressing slowly. The procedures are approximately 70 per cent complete. Power up was accomplished last week, but no components checks have been made. ✓

S-II (MSFC)

The site grading for the propellant and gaseous hydrogen storage area was completed during the past week. Excavation and grading in the test stand pad area is pending approval of the plan for construction. ✓

S-II-2 (MTF)

A 368 seconds duration firing was conducted at MTF, A-2 Stand on Saturday, April 15, 1967, at 11:25 p.m. Power was lost to part of the ground support equipment because of failure of an AC power transformer at the High Pressure Gas Facility. This resulted in a voltage transient throughout the site and caused ground support equipment power supplies to kick out. This resulted in loss of part of the gimbal program, digital events recording and T/M calibration at the end of the test. Two major delays occurred in start of countdown. The first was caused by delivery of parts from Rocketdyne to modify all ASI lox line bracket (line to lox valve brace). This delay was greatly exaggerated because the washers were not included in the kit even though specifically called out on the list of parts. The second deficiency in the kit was a bolt which was too short to use. This was a ridiculous situation when viewed in the light that these parts were especially flown to MTF by Sabreliner to meet the firing schedule. The second delay in the countdown was due to a burst disc rupture on the lox barge tank. Rupture occurred at lower than operating pressure. The disc was replaced with a blind flange and the countdown continued. This is an acceptable procedure because the burst diaphragm is designed to protect against a third order failure. ✓

NOTES 4-17-67 HOELZER

B 4/21

4/17/67

1. 3-G PROGRAM AND FILE CONVERSION: Initial contact was made last week with Georgia Tech in connection with the UNIVAC 1108 machine time that will be made available by UNIVAC for program and file conversion for the third generation computer system. Logistics problems associated with operating a computer at a remote location indicates that special transportation from Huntsville to Atlanta will be required to support the necessary turn-around time. A memorandum requesting a chartered aircraft for this transportation has been forwarded to Chief, Technical Services Office. ✓
2. NASA PANEL FOR VISUAL SIMULATION: The NASA Panel for Visual Simulation met in Washington, D. C., on March 28, 1967 with DOD and the Federal Aviation Agency (FAA) to initiate a conference in the late fall on simulation technology. This conference is tentatively scheduled to be held at Ames Research Center, San Francisco, California. Computation Laboratory personnel plan to present papers on "Lunar Driving Simulation" and "Wide Angle Optical Systems". ✓

NOTES 4-17-67 JOHNSON

4/17/67

B 4/21

Heat Pipe Experiment - A heat pipe, similar to the one planned for flight on AS 207, was flown during the week of April 3 - 8 by the AF. Dr. Grover, Los Alamos, reports that early indications are that the experiment was successful and that the unit behaved as predicted. A detailed report, together with recommendations for modification of our planned experiment, will be forwarded to us this week. ✓

Gravity Substitute Workbench - Work on the workbench in which a holding force (substitute gravity) is induced by means of airflow is proceeding on schedule in-house. Chrysler has proposed incorporating into the experiment a system for producing the holding force thru induced electrostatic fields. Their proposal, now firm, is being reviewed for technical merit - with particular emphasis on the possible creation of hazards due to the electrical potentials required. ✓

Class D and F's for the FY-68 SRT Program - P&C has recently initiated action to prepare a class determination and findings statement to support procurements and contracts planned for the FY 68 supporting research and technology program. Mr. E. A. Lively, of P&C, has been advised that Dr. Seamans will not consider new D&F's for efforts not already included in executed Project Approval Documents. This policy, if enforced, will make an orderly implementation of the FY 68 SRT program nearly impossible. We will work with P&C to get the situation better defined and inform you, later, of the results of this effort. ✓

4/17/67

B
4/21Polyurethane Foam Insulation Evaluation on a Large Cryogenic Tank Structure:

R-ME, in support with R-P&VE, successfully demonstrated the feasibility of spray-foaming polyurethane insulation on a large cryogenic tank structure simulating S-II requirements.

A surplus aluminum alloy test vessel 70" in diameter and approximately 15' long was spray foam coated with Upjohn 396-3 polyurethane foam to a depth in excess of 2". The tank surfaces were primed and the spray foam was applied manually to the bulkhead surfaces and automatically to the tank sidewalls which were in a vertical position at the time of spraying. The sidewall insulation was subsequently machine sanded to a desired thickness of approximately 1" and epoxy sealer was sprayed onto both bulkhead and sidewall surfaces.

Problems incurred during the foaming operation can be identified as isolated porosity which required localized repairs and problems in controlling foam thickness during the sanding operation. The first problem has been resolved by improved techniques of operating the foaming equipment and the second problem shows promise of being successfully resolved by use of a transducer proximity control system that was previously developed for a welding application. Modifications to the earlier welding proximity mechanism have been breadboarded and are being tested.

The insulation as applied to this tank was subsequently successfully tested by R-P&VE and R-TEST during a single unpressurized LH₂ fill and drain cycle. The only problem identified during this first test was some minor cracking in the area of the foam repairs (improved repair techniques are in work).

In conclusion, much information in manufacturing technology was gained while insulating and repairing the 70" tank, the first large vessel of this type and size to be processed at the MSFC facility. The demonstration gave no indication that the present spray foam techniques and materials, with some modifications, will not be applicable for insulating larger diameter tanks such as the S-II structure.

Industrial Operations has requested this Laboratory to assist them in obtaining a second 70" diameter tank for North American Aviation so that that organization can spray foam and cryogenically test the insulation system to the requirements of the S-II stage. ✓

4/19/67

1. ATM THERMAL DESIGN: The impact of the latest ATM configuration and experiment power dissipations is being determined in terms of shroud temperature vs time. Results will be transmitted to the experimenters within a week. Analyses show that the spar is adequately stable and that acceptable temperature levels can be maintained on the experiments with the present thermal control system concept. Since the experimenters cannot yet define the allowable or the expected temperature gradients, we are doing in-house studies to define expected gradients and will have initial results in one to two weeks. As a result of the experimenters concern and Dr. Mueller's concern about lack of flexibility of the present system, we are updating and expanding the past work on the active thermal control system. Because of the complexity, development time, and potential unreliability of the active system, we will not recommend it unless later information shows the present system to be clearly inadequate. All possible action is being taken to quickly resolve this question.
2. CONTACT WITH VENTILATION EXPERTS REGARDING ORBITAL WORKSHOP: Personnel of the Navy Department (Submarine Desk) and Langley Research Center have been visited regarding crew comfort and ventilation criteria. Generally, it was found that the familiar American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) as well as NASA criteria are heavily relied upon by both organizations. On April 13, 1967, we visited Case Institute of Technology, ASHRAE consultants. ✓
3. MULTIPLE DOCKING ADAPTER (MDA): Structural assembly drawings have been changed to reflect the docking port relocation which resulted from the relocation of the solar panels. Details of the interface ring, intermediate ring, (beneath radial docking ports) and shell have been released to Manufacturing Engineering Lab. These details apply to the test item. ✓
4. OMSF-OART STRESS-CORROSION MEETING: Gene Cataldo attended the joint OMSF-OART meeting in Headquarters this week to present our stress corrosion plans to OART in response to Dr. Mueller's request that OMSF get OART to fund these. MSC did not participate, although invited. It appears that although the OART people concede that they should be funding much of our work, they have not been given budgetary means by which to do this. The minutes of the meeting will reflect this situation. ✓
5. APOLLO TELESCOPE MOUNT (ATM): Following lead laboratory decisions, structural, layout, thermal, and human factors designs are proceeding on the basis of adding an IU structure between IU and Spacecraft Lunar Adapter (SLA). ✓

4/17/67

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4/21

APOLLO COST STUDY, 1967 - The MSFC 1967 update of the Apollo Cost Study has been completed. The study reflected a reduction in most of the stage costs from last year, however, the vehicle overall cost increased. This net increase was caused by the imposed requirement to drop engine development cost as a line item in the budget which necessitated adding engine development cost as engine production support to the vehicle cost. In the case of Saturn IB, the overall increase amounts to approximately \$.8M or 35.3M and in the case of Saturn V approximately \$3.8M or 173.6M. These amounts exclude fee. Although we agree the Apollo Cost Study has value and should be used for making broad program cost comparison studies, we do not feel it should be used alone for establishing budgets. We feel sure, however, that MSF and NASA Headquarters will use this study for the FY-69 budget for launch vehicle procurement funds as was the case in FY-68. ✓

RESOURCES MANAGEMENT STUDY - Resources Management activities throughout the Center have continued to expand in spite of the leveling off or decreasing of budget and manpower ceilings. Mr. Gorman has requested the Executive Staff to conduct a study with participation of the Manpower Utilization and Administration Office and other Center elements to ascertain whether these responsibilities are being carried out in the most effective manner. ✓

FACILITIES ACQUISITION AND MAINTENANCE STUDY - A center-wide study of organizational elements engaged in facilities acquisition and maintenance activities has been completed and the results were presented to Mr. Gorman and other members of management, April 13. No major problems with respect to organization, staffing, and operating methods were found. Several recommendations for improvements were made during the course of the study and appropriate action is being taken by operating and staff elements. ✓

H.M.
Any
action
suggested?
B

NOTES 4/17/67 RICHARD

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4/21

4/17/67

AS-501 Yaw Bias: We are now awaiting a final General Phillips' decision on the use of the yaw bias for tower clearance on AS-501. He became interested in this subject in the program meeting at KSC on March 10.

Our position on this matter is that the vehicle can clear the tower without the yaw bias on AS-501, but that later flights will require it. We have said that leaving it out on AS-501 would mean one less item to worry about the first time the vehicle flies, but it is implemented and can be used if this option is required. ✓

KSC still wants the bias utilized since it reduces the swing arm environment down to practically no problem at all.

Dr. Rudolph is seeking a final ruling from General Phillips this week. ✓

A/M 9TS

B
4/211. S-II-2 Stage at MTF:

- o The second captive firing of the S-II-2 Stage was successfully completed on Saturday, 15 April 67, at 11:30 pm, with a duration firing of 367 seconds.
- o Refurbishment of the stage is now underway; and stage is scheduled to be "on-dock" KSC, on Friday, 19 May 67. ✓

2. Beta III Test Stand Repair at SACTO:

- o Dr. Seamans has given formal approval to the MSFC plans for repairing the test stand. ✓
- o Stand activation is scheduled to be completed by mid-October 1967. ✓

3. AS-501 Launch Vehicle at KSC:

- o KSC will conduct a Pull Test on AS-501 on Tuesday, 18 April 67, in order to adjust the range of 79 strain measurements. ✓

4. Contingency Payload for Saturn V Missions:

- o Action is well underway in the R&DO Labs to prepare Boilerplate-30 spacecraft as a contingency payload for either AS-501 or AS-502 missions. The BP-30 spacecraft is to be ready for shipment to KSC on Monday, 15 May 67, in order to support the AS-501 launch date. ✓

5. S-II-3 Stage at Seal Beach:

- o The stage is scheduled to leave Seal Beach on Friday, 21 April 67, and will arrive at MTF on Saturday, 6 May 67. ✓

NOTES 4-17-67 Stuhlinger

4/17/67

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4/21

No report this week.

NOTES 4/17/67 SPEER

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4/21

4/17/67

1. OPERATIONS RETREAT MEETING: Gen. Stevenson has scheduled an Operations Retreat for April 28 through 30 at New Orleans. The attendees will be Center operations personnel (Kraft, Petrone, Speer), the Mission Directors and representatives of Stevenson's staff. The agenda includes discussions on: (1) Scientist Astronaut Program; (2) Change Control Board Operations; (3) Concept of Flight Control and Information for Long Duration Missions; (4) Ground Communications Configuration Control; (5) Test Schedule Coordination; and (6) Launch Mission Rules Processing Schedules and Problems. I have been asked to give a presentation on the Huntsville Operations Support Center (HOSC) Configuration and Capabilities. We have arranged for the group to tour Michoud and MTF on April 29. ✓

2. AAP Flight Operations: We have been attempting to define MSFC's role in AAP Flight Operations and are documenting it in an "MSFC AAP Flight Operations Management Plan" which is to be used as a proposal to Gen. Stevenson. To obtain full support of this Plan a coordination meeting was held on April 12, with I-SAA, R-ASTR, R-P&VE, and R-TO. A draft copy of the Plan has now been circulated for comments. ✓

B
4/24

AAP WEIGHT AND PERFORMANCE: (Reference is made to Mr. Richard's notes of 4/3/67). This office, the Saturn Apollo Applications Program Office, and the Technical Systems Office are now in agreement on the payload commitment numbers for AAP-1, -2, -3, and -4. These payload commitment numbers use projected weights as the basis for performance which include all anticipated weight increases plus a modest growth allowance. This is the same way we handled mission planning numbers in mainstream Apollo and I feel we have benefited by this practice. The cluster missions' weight and performance numbers will require increased surveillance to reduce the negative payload margins. ✓

BETA III TEST STAND REPAIR: Dr. Seaman's approval for refurbishment of the test stand has been received and DAC has been directed to proceed with the repair. Activation of the stand is now scheduled for mid-October 1967, with first use by S-IVB-210. ✓

BETA I BLAST PROTECTION: (Reference is made to my notes of 3/20/67). Blast protection is being achieved by a combination of using wire mesh more extensively throughout the critical areas and by relocation or repositioning of equipment to minimize blast effect. This work is proceeding on schedule for an April 17, 1967, completion. The acceptance firing of S-IVB-503 (new) is scheduled for April 26, 1967. ✓

CCSD SUPPLIER WORKSHOPS: The supplier workshop method being utilized by CCSD was mentioned by Dr. Farish in the April 5 presentation to you on contractor/vendor quality control. CCSD has held four workshops thus far at Los Angeles, Scottsdale, Dallas, and Huntsville. Saturn IB personnel attending these workshops have been favorably impressed by the presentations and by the interest shown by the vendors.

H-1 ENGINE LOX CAVITY CONTAMINATION: The investigation of all engines at MAF has been completed. LOX cavities of five engines (four engines installed on S-IB-11 and one engine on S-IB-7) definitely were found to be contaminated with leak detector. As a result of Engine Program Office's recommendation, the LOX seal on these engines will be replaced. ✓

LC-37B UPDATE FOR AS-204 MISSION: GE engineering has completed and released all update mod kits for fabrication. This constitutes a five-day schedule improvement. GE fabrication is currently projecting the shipment of all mod kits not later than April 20, 1967, which will be an eight-day schedule improvement over the date which MSFC committed to KSC. GE was authorized unlimited overtime for this effort; however, it is projected that they will be able to accomplish it with approximately 10% overtime. ✓

B.T.
Gilmore's interested in using this method among S&D's and Gramma's vendors and subs. Reeves a briefing on how CCSD runs these workshops.

What's the basic problem here? B

4/17/67

B
4/21

1. Voyager Spacecraft Propulsion Test Funds (FY-67):

Don Hearth has asked for further review and discussion of the MSFC proposed tests (\$540 K FY-67 funds) before making a decision. Will Jordan and Jerry Thomson will meet with Hearth and Project Office people in Pasadena on April 19, 1967. Final decision will still be dependent, however, on a review of Voyager 67 budgets in Hearth's meeting with all system managers, to be held at LaRC on April 25-26, 1967.

April 24, 1967

67
w/Comments

NOTES 4-24-67
WITH COMMENTS

MR. GORMAN S COPY

NO DEP-A

COMMENT

NOTES BALCH 4/24/67

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4/24/67

S-II-2 Stage - Effects of momentary power fluctuating during second static firing on the A-2 test stand are being investigated and documented. Quick look at Beckman data indicates quality of data is good. S&ID's data review is scheduled for today. Decision has been made that a third firing is not required, and shipment to KSC is scheduled for 5/15/67. As a result of damage to the transfer switches on the high voltage feeders, all power to the S-II TCC was lost this morning. Cause of the power loss and possible impact on S-II-2 post-static checkout and shipment schedules have not been determined. ✓

✓ test stand (is that what you mean?)

S-IC-4 Testing - Action has been initiated to analyze and investigate possible irregularities in the S-IC power and control systems which may result from a power interruption such as occurred during the second static firing of the S-II-2 stage. Review and approval of acceptance test and operating procedures continued. To date, 94 of 105 procedures have been submitted, of which 92 have been reviewed and 85 approved. Test stand main derrick motor generator is scheduled for reinstallation on 5/1/67. Propellant load test is planned for 5/3/67 and 5/4/67, and static firing is still scheduled for 5/11/67. ✓

S-II A-1 Test Stand - Turnover of the A-1 stand to S&ID was completed on 4/15/67, and integrated test of facility and GSE with simulated stage is still scheduled for 4/26/67. ✓

GE Contract - Present plans are to extend the current Cost-Plus, Fixed-Fee contract to provide 90 days coverage in FY 1968 and to have a Cost-Plus, Award Fee contract in effect the remainder of FY 1968. ✓

ORBITAL WORKSHOP PRELIMINARY DESIGN REVIEW (PDR): A task team from MSC headed by Bill Petynia (former Project Engineer on the AS-204 Spacecraft) visited MSFC on April 18 and 19 for some rather detailed discussions of subjects to be covered in the Preliminary Design Review.

The Preliminary Design Review will be preceded by an Astronaut "Walk-Through" on May 3, 4, and 5 for an exhaustive examination of the man-machine interface. ✓

SATURN V 3-BURN MODIFICATIONS: I understand General Phillips has approved the three long-lead, in-line S-IVB changes to provide S-IVB-510 through S-IVB-515 with the provisions to permit modifications (by kits) to accomplish a 3-burn synchronous orbit. ✓

EXPERIMENT INTERFACE MEETING: A meeting on the S069, X-Ray Astronomy, (MSC PI and development center) experiment is planned for April 25-26 at MSFC between the PI, MSC and MSFC. The current design approach has the experiment operated in the MDA with the sensor on the MDA exterior gimbal mounted in two planes. (MSC has the responsibility for this experiment.) ✓

M486B, ASTRONAUT MANEUVERING UNIT: Headquarters has requested that the Astronaut Maneuvering Unit (AMU) presently used weighing 130 pounds be replaced with a lighter Maneuvering Unit that is being developed by Ling-Temco-Vought, 40 pounds. ✓

ATM: Dr. Tousey of Naval Research Laboratory has requested the incorporation of a XUV television "down link" into the ATM.

Mr. Mathews has requested a briefing on April 27 in Washington concerning the proposed star tracker procurement. We have completed evaluation of the star tracker proposals and are continuing to analyze the star tracker usage. At Headquarters' request, the MSC star tracker developed by Hughes Aircraft Company is being investigated. A determination of what computer to select to satisfy additional computing requirements is also underway.

A meeting has been scheduled on April 25 with MSC, KSC and Headquarters to discuss impacts of adding a 3-foot IU section to the ATM launch vehicle. We also plan to discuss weights and performance of AAP-3 and 4 with MSC on the same day. ✓

Members of this Center met with MSC training and simulation personnel on April 19 to brief them on the ATM system and to discuss astronaut functions. MSC will digest the information given to them and begin defining training and simulation requirements. ✓

AAP WEIGHTS & PERFORMANCE: Based on the latest MSFC and MSC data, the payload weights exceed the L/V capability on each flight (except AAP-1) by as much as 2,300 pounds (AAP-4). Discussion during in-house meetings resulted in some suggestions to ease this situation. Some are (1) SLA panel jettisoning during powered flight, (2) re-shaping the AAP-3/4 profile, and (3) utilizing elliptical orbits. R&DO will pursue these items to determine their feasibility. ✓

LOCAL SCIENTIFIC SURVEY MODULE: Dr. Mueller signed the LSSM Procurement Plan April 19 and has been forwarded to Dr. Seamans. ✓

LM PAYLOAD CAPABILITIES FOR 515-516 LUNAR SURFACE MISSION: Preliminary information has been received from Grumman describing payload volumes for lunar missions utilizing a stripped LM carrier. The available space appears compatible with the LSSM and 30 meter lunar drill. ✓

4/24/67

F-1 ENGINE Engine Field Inspection Request (EFIR) F1-23 was coordinated with KSC on 4-17-67, to have Rocketdyne inspect the spools on the 4-way control valves on vehicles 501 and 502. The work was scheduled to begin at 8 a. m., 4-20-67. ✓

H-1 ENGINE The special Rocketdyne/NASA investigating team completed the surveillance and testing of the turbines on engines H-4058 and H-4062 of the SA-204 vehicle at KSC. Upon retesting, the turbine on H-4062 broke loose at slightly less than the maximum 150 inch-pound specification limit. However, it was decided to remove it along with the noisy turbine from H-4062 and send both back to Neosho for inspection and analysis. Providing that no turbine wheels or nozzles are replaced, it is planned to reassemble, hot fire to prove the turbine integrity, and reinstall on the engines at KSC. Engine performance will not be affected as long as the wheels and nozzles are not replaced. ✓

J-2 ENGINE Based on a unified R&DO recommendation, it is necessary that 50 pneumatic control assemblies on J-2 engines be reworked or changed out. This change affects engines delivered for vehicles through Saturn V-503 and Saturn IB-208. A detailed stage impact is presently being assessed with the stages project offices.

There were four successful tests at AEDC on 4-18-67. The tests conditions, S-II-501 simulations, varied from expected nominal to worst case temperatures (hot and cold) and start bottle conditions (high and low). Each of the tests achieved intended duration 30 seconds, 5 seconds, 5 seconds and 5 seconds, respectively. Results were as generally predicted. The next test period, a four test S-II-501 simulation, is planned for 4-27-67. ✓

GENERAL We were informed by NASA Headquarters personnel, Charlie King's office, last Friday (4-21-67) that Senator Margaret Chase Smith had read into the Congressional Record a report concerning J-2 and F-1 spare engines and spare engine philosophy. The context of this report was verbatim to the information furnished the GAO earlier this year. Senator Smith did not ask any questions that could not be easily answered. ✓

NOTES 4/24/67 CONSTAN

4/24 KΔ

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4/26

Nothing of special significance.

A/24/67

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4/26

R&DO Manpower Planning and Utilization Reviews: Last week, R-DIR completed the Manpower Reviews scheduled with Quality and ME laboratories. The laboratories were very well prepared and, as has been typical of this current series of reviews, the manpower planning to meet the shifting work requirements within R&DO was comprehensive and realistic. As of 4/22/67, reviews have now been completed for nine of the 14 R&D Operations organizational elements. The P&VE review began this morning, and the sequence of reviews is scheduled for completion during the first week in May, with the R&DO Staff Offices and SSL. ✓

B
4/26

1. Saturn IB and V Mission Definition: At the Flight Mechanics Panel meeting held at MSC on April 19 - 20, Mr. Kaskey of OMSF presented current NASA Headquarters thinking on IB and V missions. He stated that Headquarters plans to release a preliminary new Flight Mission Assignments Document around May 1, 1967, containing new mission descriptions and schedules in sufficient detail to provide the centers with a basis for future mission planning. Of particular interest were Mr. Kaskey's remarks concerning the mission plans for AS-503 and subsequent flights. As presently planned by Headquarters, the primary mission for AS-503 will be a CSM-LM development flight consisting of a single burn of the S-IVB into a low earth parking orbit (previously designated AS-503C). AS-504 will be a lunar mission simulation using the old AS-503A profile, i. e., two burns of the S-IVB stage into a 107 x 3950 n. mi. elliptical orbit. AS-505 and subsequent vehicles will be designated as lunar landing missions. ✓

2. Residual Propellants In 3-Burn Flights Into Synchronous Orbits: Re: your question on Notes 4/10/67 Geissler, item 1: AS-503 Mission (Highly Elliptical Orbit, 107 x 3950 n. mi.) with Residual Propellant Problem (copy attached). The problem for the synchronous orbit missions is similar to that for 503: under low g conditions, say $10^{-5}g$ as the case for continuous venting, we can reasonably well predict the fluid behavior and probably can handle the resulting slosh problems, however, our knowledge of fluid behavior for zero-g conditions is completely inadequate and it must be assumed that uncontrollable fluid motions will occur. Consequently, we would plan for continuous venting during the long coast to apogee of which you speak. Fortunately, the synchronous mission with the three burn S-IVB profile does not have high residuals after the 3rd cutoff. They will be similar to residuals left on board in the Lunar Landing Mission, i. e., in the neighborhood of 7 to 8Klbs. usable propellant. Hence, if the crew can transverse and dock in the Lunar Landing Mission they should be able to transverse and dock in the synchronous mission. However, the synchronous mission will require some slosh baffle relocation since levels will be different from the nominal Lunar Landing Mission loading. ✓

3. Tether Dynamics: In response to your request on Notes 3/6/67 Geissler, we are preparing a short briefing for you on the subject of "Tether Dynamics." ✓✓

4. 4% Acoustic Model Data: Mr. Wade Dorland called from MSC and expressed intense interest in the data from our 4% AEDC acoustic model tests. As part of the Apollo disaster inquiry, recommendations were made to give the spacecraft and service module a complete and thorough series of acoustic environmental tests. MSC would like to get our help in this area because of the 4% model data. They are sending a letter through official channels requesting these data. ✓

E.S.
Does this mean that during transposition and docking, RCS of the CSM firing, we must keep the SIVB H₂ vent open? Not hazardous because of lack of ambient air? B

4/24/68

B 5/1

1. SATURN IB PROGRAM: Personnel of this Laboratory met recently with Chrysler personnel to discuss S-IB and S-IVB stage optimum test programs for stage 213 and subsequent. Since according to the present ground rule these stages will not undergo static firing, a study is being performed to determine what will have to be done to "beef-up" post-manufacturing checkout since post-static checkout will no longer exist. ✓ A comparison is being made of the two checkouts to arrive at the optimum test program. One primary weakness of post-manufacturing checkout is lack of operating pressures. ✓

D.F.

Remember my previous remark on your NOTES? What's the answer?
B

2. RCA-110 P.C. BOARDS: RCA/Huntsville has received a contract modification for the remaining tubelet rework on the printed circuit boards for the RCA-110 computers. This work covers nine systems and will amount to approximately 350 boards per week until January 1968. We have been requested to provide surveillance inspection with the DCAS performing in-line inspection duties. The main effort is scheduled to begin on May 1, 1967. ✓

3. S-II WELDING: This Laboratory performed radiographic analysis of the ME Laboratory developed pulse-arc MIG weld simulating the circumferential skin welds for the S-II stage. Personnel of this Laboratory, who have first-hand knowledge of weld quality at Seal Beach, evaluated the film and in their judgment the ME Laboratory weld is by far superior to the current production welding at Seal Beach.

URGENT

Bill Lucas

I understand you still have some reservations

re pulse-arc MIG welding.

What's the issue? When can we have a decision?

I think we should leave no stone unturned to avoid filling up the S-II pipelines with tanks of less than the best available quality.

B

B5/1

4/24 JS

1. Visit to Boulder, Colorado. A visit to the Boulder area in connection with ATM and related activities is being planned for early June. The itinerary is presently as follows:

FIRST DAY

- 8:30 - 10:00 A.M. High Altitude Observatory (HAO), University of Colorado, Boulder. Host: Dr. Gordon Newkirk, HAO, Principal investigator for the Coronagraph Experiment on ATM.
- 10:00 - 11:30 A.M. National Center for Atmospheric Research (NCAR), Boulder. Host: Dr. G. Newkirk, HAO.
- 11:30 - 12:30 Lunch - NCAR
- 1:00 - 3:00 P.M. Environmental Space Science Administration (ESSA), National Bureau of Standards. Host: Mr. Robert Knecht, Chief, Space Disturbance Laboratory. (Mr. Knecht is also the city Mayor of Boulder, Colorado.)
- 3:00 - 5:00 P.M. Ball Brothers Research Corporation (BBRC). Review of ATM experiment hardware (3 experiments). Host: Dr. Mercure, General Manager and Vice-President, BBRC, Boulder.

SECOND DAY

- 8:00 - 5:00 P.M. HAO Field Observatory, Climax, Colorado (1 1/2 hour drive from Boulder into eastern Rockies). Solar observations in H Alpha. Host: Dr. W. Curtis, Director, Climax.

Yes, would love to go along.

I believe you would find this trip quite informative. If there are some specific dates which would best suit your schedule and you are interested, let me know and I will try to arrange the time accordingly.

2. Problem with Command and Communication System (CCS) Transponder. The CCS Transponder has failed repeatedly during Vibration Qualification Testing. Some of the failures have been capacitors breaking loose, resistors coming unstaked, transformer leads breaking and failed transistors. We feel the problem is mainly in poor workmanship, but, requalification might be necessary. The Astrionics and Quality Labs are working together for resolution of the problem. All 501, 502 and 503 transponders will be reworked by Motorola which could result in schedule problems. For the 501 mission, the CCS transponder is in the highly desirable category and is not mandatory for launch.

W.H.

Bowling Noted: 1/2/67 5/2

*I would prefer 1 and 2 June.
Second option 8 and 9 June.*

FYI

Suggest you reserve the fullstream for the trip. In option 2 I MAY come from Washington to Boulder direct (commercial) but return w/ you on eve of 9 June. B

4/24 GFS

B 5/1

F-1

Test FW-061 was conducted on the West Area F-1 Test Stand with F-1 engine S/N F-6049 on April 20, 1967, for a mainstage duration of 31 seconds. Cutoff was initiated by the facility panel operator as programmed. Primary purpose of this test was to verify acceptable engine performance after re-orificing. This spare flight engine will be sent to Quality Laboratory. ✓

MODERATE DEPTH LUNAR DRILL PROJECT

A RFQ has gone to Joy Manufacturing Company for their review and proposal. ✓

S-1C STAGE (MTF)

Very little progress was made during the week. The procedures for S-1C-4 stage acceptance firing are approximately 80% completed. The acceptance firing is scheduled for May 11, 1967. ✓

S-1VB (MSFC)

Test S-1VB-042, a simulation of the S-1VB-503 (New) acceptance test conditions, was conducted at the S-1VB Battleship Test Stand (MSFC) on April 21, 1967. All test objectives were met successfully and all systems performed and operated satisfactorily. ✓

S-1VB (SACTO)

DAC is progressing satisfactorily toward the static firing of S-1VB-503 on April 26, 1967. DAC will do some modifications to the S-1VB-503 O₂/H₂ burner post-fire. These modifications are to bring the burner up to the latest flight configuration. ✓

S-11 (MTF)

S-11-2 automatic checkout is delayed pending checkout of the automatic gear. The mechanical leak checks are being conducted during this period. ✓

PRIMARY DAMPER ARM

Part of the damper arm ML-2 was delivered to the test area on March 23, 1967, for testing. This assembly is the test bed for the redundant hoist for use on ML-1 which is at MILA. The redundant hoist system is presently being manufactured at ME Lab and was scheduled for delivery to Test Lab on April 19, 1967. This has slipped to April 26, 1967. The ML-2 damper arm will be modified to incorporate the redundant hoist, the hoist tested and then removed for delivery to the Cape for incorporation on ML-1. If the April 26 delivery to Test Lab is met, the tests should be completed and the hardware delivered back to ME Lab by May 27, 1967, for an on-dock KSC date of June 15, 1967. ✓

NOTES 4-24-67 HOELZER

4/24 JES

B5/1

RESOURCES SHARING: The Missions Operations Office (I-MO) requested a system to update and maintain the 2600 section (data delivery requirements) of the program support requirements document. This section of the document contains over 1,200 characters of information per data item, all of which are subject to change. The computer system makes possible an easier method of managing the data flow than was possible under the manual system. The system was so successful at MSFC that it was adapted for use at Goddard and MSC in its entirety. ✓

4/24/67

Experiments Removed from Apollo - Reference my notes of 4-10 (copy attached). Studies are currently underway to define requirements if changes to the I. U. to accommodate experiments like ^{the} Wisconsin X-Ray Mapping experiment are made at KSC using mod kit components. Such mods to the I. U. appear possible; however, they are probably more expensive to effect and possibly result in a slightly less overall reliable system than if the required changes were engineered into the I. U. during initial assembly. Therefore, two routes are being pursued:

1. A request to effect modification of I. U.'s 211 (now in assembly) and subsequent to permit standardized interface of passenger experiments is being processed thru AAP channels. This change request is identical to the one rejected by Phillips.

2. Preliminary engineering of "mod kit" for use at KSC in the event the flight vehicle assigned for Wisconsin experiment is SA207 (as AAP-O). ✓

Project ACRE - Reference my notes of 4-10. This is the toroidal H₂/O₂ engine. Tischler has received the revised Technical Development Plan; has reviewed and approved it. Authority to proceed with the FY67 SRT program in this area is being forwarded to MSFC ---- hopefully this week. This is now the largest uncommitted effort remaining in the FY67 SRT program. ✓

AAP 1/AAP 2 Operations Briefings - Messrs. Yost and Lineau of ME and Ousley of this office participated in briefings on proposed workshop experiments at MSC on 4/13-14. Questions and suggestions from MSC personnel will probably result in minor modifications in the experiments to improve operations and increase safety. No impact on costs or schedules is expected. ✓

Bk 5/2
No, it isn't.
This is Arthur Ousley. She
one you met in Paris. (she)
Silbert. Bk 5/2 cc: Von Braun

Is this the Ar. Ousley who ran the NASA office in Paris? I was his house guest. Is he now on the MSFC payroll??

B

NOTES 4-24-67 KUERS

4/24/67

B 5/1

Review of Electrical Manufacturing and Installation Practices for Apollo:

The ME Laboratory engineer, Martin Chetron, assigned to support the Apollo spacecraft program in residence at Downey, participated in a critical review of the Apollo electrical systems wiring. The ME Laboratory participation was at the request of the MSC Resident Program Manager in accordance with the MSFC-MSFC agreement to provide manufacturing engineering support to MSC programs.

The review team was composed of electrical specialists from DAC, Aerospace, Northrup-Norair, FAA, Hayes, Aerojet General, and representatives from NASA.

Of particular interest is the lightweight wire used on the Apollo Block II modules. It has teflon insulation, only 4 mils thick with a 250 micron ML coating which is very susceptible to damage if improperly handled.

The problem areas reviewed and discussed by the team included damage in hot impression wire marking, bulky harnesses, sizing of clamps, lacing practices, sharp edges on supports and structures, wire fabrication area cleanliness, and protection of harnesses during subsequent mechanical installation or checkout. Numerous suggestions for improvements were generated during this review and the information relating to manufacturing and handling procedures was subsequently disseminated to Grumman, AC Electronics, Kollsman Instruments, and Raytheon.

- 4/24/67
1. S-II ENGINE DEFLECTION (REFERENCE NOTES 3-6-67): For S-II-1 through S-II-3 the problem was corrected. ECP 4393 was implemented; it increases the precant from 1° to 1.8° and provides for a mechanical gimbaling limit device to protect the scissor bellows. S-II-4 and subsequent will probably require more precant due to the light weight structure. Some minor redesign of the actuators is required to obtain this capability. No program delay is anticipated. We are trying to resolve this now. ✓
 2. CLUSTER WEIGHTS: Cluster configuration and mass data were discussed in a meeting at MSC. We have now established satisfactory contact for the exchange of mass data between the centers thru the AAP Mechanical Panel. It is apparent that we have payload weight problems. All 4 AAP-Cluster missions are overweight (program decisions are required to achieve compatibility between weight, performance and mission requirements). ✓
 3. AAP MECHANICAL PANEL: The first meeting of the AAP Mechanical Panel will convene at MSC on April 25, 1967. ✓
 4. DEVELOPMENT OF IMPROVED DRY FILM LUBRICANTS: MLR-2 dry film lubricant, developed recently by this Laboratory, provides about 6 times the wear life of standard dry film lubricants on gears and other machinery. The improved wear life is attributable to the tough film produced by the resin. The new dry film lubricant is resistant to oxidation, vacuum exposure, and high energy radiation. Because of this development, dry film lubricant will be used on gear trains for the ATM. ✓
 5. S-II FRACTURE MECHANICS TEST PROGRAM: Representatives of R-P&VE-M and -S visited LeRC on April 20, 1967, to review the planned fracture mechanics program. Participation which can be expected from LeRC was discussed. Additionally, we accepted the proposal by LeRC personnel to prepare specimens containing built-in defects to ascertain the capability of S&ID to locate such defects with production inspection techniques. ✓ The specimens will be available for shipment to S&ID via MSFC on or about April 28, 1967. ✓
 6. RESULTS OF J-2 ENGINE/S-II 502 PROPULSION SYSTEM EVALUATION: Preliminary evaluation of data from final acceptance test of the S-II-2 stage indicates that all J-2 engines performed satisfactorily. One anomaly was noted which will require a modification to the present static test procedure of initiating engine cutoff at the time LOX level cutoff sensors are uncovered. LOX pump cavitation was encountered on engine number four approximately 300 milliseconds prior to engine cutoff. Pump inlet redlines were not violated; however, it is suspected that the number four engine inlet duct was not flowing full. Action is being initiated to avoid this condition on future static tests of the S-II stage, and the situation is being appraised with respect to flight conditions. ✓
 7. MULTIPLE DOCKING ADAPTER (MDA): The access requirements for the experiments mounted inside the MDA were developed. Twelve of those require prelaunch (after vehicle mating) access for installation, calibration, service, and checkout. ✓
 8. NOSE CONES: The mating of the MSFC designed and manufactured Nose Cone for 204 was accomplished this week. No problems were encountered except for the MSC furnished bolts, nuts were bottoming out. They were exchanged. (ICD hardware out of specification). ✓

REVIEW OF PROPOSED MSF DIRECTIVES - On Friday, April 21, we forwarded to General Bowman by datafax transmission, MSFC comments to five proposed NASA Management Directives. These directives constitute the nucleus of papers which Dr. Mueller is required to deliver to Congress. No major objectionable features were found during our review of these directives. Our comments included inputs from Dr. Rees, Mr. Gorman, Mr. Weidner and General O'Connor. The proposed directives commented upon are as follows:

1. Center Responsibilities in The Apollo Program ✓
2. MSF Mission Directives ✓
3. MSF Safety ✓
4. MSF Quality Control Audit and Reporting ✓
5. MSF Test Procedure Preparations Reporting ✓

Additional documents of this nature are being sent to all of the MSF Centers for comment. ✓

FY-67 AO FUNDS INCREASE - During a visit to MSFC on April 18, Mr. G. D. Heater, OMSF, agreed to increase of \$270K in FY-67 AO funds from \$127.754M to \$128.024M. In addition, he agreed in an increase of \$1.225M in personal services ceiling from \$87.729M to \$88.954M. These changes provide adequate funds to cover our personnel costs through the end of FY-67 (end of year ceiling is 7114) without significant impact upon the operation of installation funds (approximately \$1.0M transferred to personal services.) ✓

MANAGEMENT PLANNING FOR NEW PROGRAM - In support of the Voyager project we are developing, assimilating and apply management systems early in the planning stage. Our efforts to date have centered upon the development of a Work Breakdown Structure and the preparation of a Master Planning Network.

The Work Breakdown Structure is a system that inputs the segregation of the total work assignment into packages of manageable size. It is a communications device, as well as a basis for contract structuring, cost collection and reporting. ✓

The Master Planning Network is a schedule device to highlight the need dates and constraints on all types of data/information required during the "pre-hard-ware" phases of project work. The system integrates all actions required of the Project Manager and displays these requirements so that he will be able to see what needs to be done, who is responsible and when the action is required. ✓

B 5/1

NOTES 4/24/67 RICHARD

4/24/67

Inter-center AAP Testing Meeting: A meeting was held at KSC during April 19-21 to discuss prelaunch testing for AAP 1-4 missions and to determine a means for working inter-center testing requirements. Representatives of MSFC, MSC, and KSC were in attendance. The meeting accomplished both of its objectives and represented a good start toward solving inter-center test problems. Friday was spent in defining the functions necessary to define and plan the testing and GSE activities. These efforts resulted in the signing of a "Memorandum of Agreement" which will be forwarded to the three program offices. The program directors should then decide whether these functions should be handled through a panel or as a group outside a panel. ✓

4/24/67

B 5/1

1. SA-501 Launch Vehicle at KSC:

- o Launch Vehicle Overall Test #2 (Plugs In) was completed on Tuesday, 18 April 67. ✓
- o SA-501 "pull test" was completed on Wednesday, 19 April 67. ✓

2. Flight Stage S-IVB-503 (new) at SACTO:

- o Acceptance firing (single burn) is scheduled Wednesday, 26 April 67. ✓

3. Yaw Bias for AS-501 Vehicle Tower Clearance:

- o MSFC has determined that tower collision is not a problem on AS-501, and yaw bias is not required.
- o KSC has stated that severe damage can be done to LUT if yaw bias is not used.
- o Approval of yaw bias in AS-501 has been requested from Headquarters. ✓

4. Saturn V Flight Vehicle Damper:

- o R&DO delivery schedule for ML-2 primary damper and redundant hoist on-dock date has slipped from Thursday, 8 June 67 to Thursday, 15 June 67. The Apollo Program Office (Saturn Systems Office) has been requested to furnish their latest need date for these two systems. ✓

5. S-II Stage Insulation Closeout Problems:

- o Insulation closeout on all S-II Stages must be re-worked by replacing the rubber doublers with a nylon facing sheet and tedlar covering as doublers cracked during firing of S-II-2. ✓
- o S-II-1 (at KSC) and S-II-2 (at MTF) rework is being accomplished without schedule impact. ✓
- o S-II-3 rework is causing a 4 day slip in schedule; stage will now leave Seal Beach on Saturday, 29 April 67. ✓

1. MEETING WITH KRAFT (4/20): I met with Kraft and Hodge at MSC for another discussion on MSFC's participation in AAP flight operations. Kraft has changed his previous position significantly: (1) MSFC's direct participation in AAP systems and experiment flight control and planning is desired, however in a somewhat different mode; (2) MSFC L/V flight control for all programs and missions was accepted; (3) The full utilization of HOSC for AAP operations support was accepted; (4) Kraft still does not accept a formal Flight Operations Panel; however, he agreed to resumption of specific subpanel activities and agreed to joint Ad-hoc MSC-MSFC flight operations meetings to be held alternately at MSC and MSFC. - I consider Kraft's new position as an acceptable baseline which I shall try to improve as we go along. ✓

2. AS-501 FLIGHT RULES: Several meetings with the Saturn V Office and R&DO elements have been held in the past two weeks concerning AS-501 Flight Rules and contingency actions. Agreement has been reached on most items. We can identify no malfunction cases (e.g., loss of chilldown) with sufficient risk of catastrophic failure to justify inhibiting an S-IVB restart attempt during orbit. This position is presently being formalized. However, further discussion is required concerning flight dynamics abort limits for both power flight and second S-IVB burn. The principle question is whether MSFC agrees to aborting the spacecraft if safe recovery limits are exceeded due to gross flight path deviations. Tentative agreement was reached that the conditions proposed by MSC are so far outside "normal" vehicle excursions that launch vehicle objectives would not be significantly enhanced by continuing to fly outside these limits. However, there is some feeling that MSFC should not agree to aborting under any circumstances on AS-501 for the purpose of safe spacecraft recovery. I feel that such extreme position is not justified and that S/C abort under some conditions should be considered valid alternate mission objectives. ✓ Aside from technical considerations, the public image aspects of a S/C loss must be kept in mind. ✓ We are working toward an agreement on all open items. ✓

3. APOLLO SECURITY: Based on our recommendation, Gen. Phillips has established a requirement on implementing a crew controlled enable/disable switch for the IU command system on AS-503/CSM-102 and subsequent Saturn V flights. Since implementation of this switch is not necessarily restricted to Saturn V - Apollo we have proposed to investigate possible application to Saturn IB/AAP flights. ✓

4. VOYAGER MISSION OPERATIONS: We are currently reviewing with the other cognizant Center elements the JPL proposals for design and conduct of Voyager Mission Operations. Preliminary review indicates an approach basically consistent with the current MSFC responsibilities. However, the degree of remote support to be provided from the HOSC and extent of MSFC responsibility in the area of real time flight path analysis and control operations are significant areas requiring definitive delineation. We are working to have a well coordinated MSFC position by mid-May, prior to beginning work with JPL on Mission Operations Complex design. ✓

NOTES 4-24-67 Stuhlinger

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4/24/67

1. EMR: A presentation was given to Mr. Weidner about the EMR on April 12 after the PSAC meeting here at MSFC. Subsequent to this meeting, Mr. Weidner has requested the preparation of a PDP. ✓

Dr. Friedman presented the large area X-ray experiment to a special committee convened by Dr. Roman of OSSA for the purpose of reviewing this particular experiment. (Dr. Friedman's experiment had previously received a favorable review by the Astronomy Subcommittee of OSSA, but apparently there was still some question regarding the feasibility and desirability of this proposed EMR experiment.) The impression of the NRL people was that the committee is very favorably disposed toward this experiment. The only valid criticism raised by the committee was that better background rejection could be obtained by shielding the sides and ends of the counters. NRL's comment was that they would certainly do this and the modification would increase the sensitivity of the experiment and hence the number of identifiable sources. (SENSITIVE) ✓

E.S.

What do you mean by that?

B

2. ATM: As a follow-up of the recent ATM meeting in Boulder concerning ground observer experience in flare detection and TV displays, SSL is planning to prepare (together with ASTR.) a simple solar observatory-TV setup. This will allow to (a) produce direct images of the sun in whitelight and hydrogen alpha of about 4 dia (b) to view these images through various TV cameras planned by ASTR. for the ATM. The astronauts are seriously concerned about the problem of recognizing solar features on TV and we intend to work with them. ✓

NOTES 4/24/67 TEIR

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SATURN IB S-IVB RESTART BACKUP MISSION: In considering possible alternate missions, we requested DAC to analyze the possibility of an S-IVB restart mission on Saturn IB. DAC, in cooperation with Rocketdyne, determined it to be feasible. After a presentation on the results, Dr. Rees requested that all of the planning (up to cutting hardware) be performed to permit the mission to be conducted on a three month decision point prior to launch in the event trouble is encountered on Saturn V. The planning time-frame of the possible mission is mid-November 1967 to mid-April 1968. ✓

BETA TEST STAND BLAST PROTECTION: (Reference your question on my notes of 4/10/67.) Since the S-IVB-503 incident, DAC, R-TEST, and I.O. personnel have investigated various methods of providing more effective blast protection for "on stand" GSE items at SACTO. During the months of February and March 1967, several methods of providing suitable protection were studied, i. e., sand bags, hard protection in the form of blast plates and honeycomb panels, soft protection in the form of wire mesh screens and GSE relocation. These studies culminated in a presentation to Mr. Hueter on 3/21/67 in which recommendations were made to utilize wire mesh screens and where feasible move critically located GSE items. The recommendations were accepted and the contractor so directed. ✓ Sand bags and hard protection measures were determined not to be technically feasible due to their unknown effects on pressure from a blast as a result of the frontal area increases and the effect of sand (after rupture of the bags) under high pressure on the equipment. The contractor is proceeding on a priority basis on Beta I and, as of this date, has accomplished all agreed upon top priority items to satisfy the static firing date for S-IVB 503 (new). The balance will be accomplished prior to static firing Stage S-IVB 209. The contractor's approach to blast protection of Beta III will be similar except more extensive efforts are being made to move as much GSE as possible out of potential blast areas. This effort is proceeding concurrently with stand rehabilitation, with completion targeted prior to the first static firing on the rehabilitated stand. ✓

FLIGHT MISSION ASSIGNMENT DOCUMENT (FMAD) REVISION: Headquarters is working to a May 1, 1967, milestone for revision of the FMAD to be available for Mr. Webb's new schedule and program commitments to Congress. This revision will have to be concurred in by Mr. Webb before release to the Centers. We are working the Saturn IB portion of the document with Bellcomm. ✓

AAP PANEL MEMBERSHIP: We have submitted our nominees for AAP panel membership to Ludie Richard's office. This action is required now since significant changes to the Saturn IB launch vehicle are being identified as a result of AAP cluster requirements. Early program office participation is required to insure minimum program impact. ✓

NOTES 4/24/67 WILLIAMS

B 5/11

4/29/68

1. VOYAGER: Will Jordan, Al Orillion, plus P&VE Propulsion people met with Don Hearth (OSSA-IPO) on Wednesday to discuss MSFC proposal for FY-67 funded space-craft propulsion testing. It was a good meeting; final decision by Hearth expected by end of next week. ✓

Several inter-Center activities are scheduled for next week:

(1) Meeting of Voyager Management Committee at LaRC, April 25 and 26 (Newby and Chambers); (2) Voyager Directors' Meeting, April 27 (Dr. von Braun ? and D. Newby); and (3) Voyager Mission Design Panel Meeting, April 27 and 28 (Spears, Woodcock, and a few people from Labs.). Considerable effort in process, preparing for these meetings. Voyager Quarterly Review is scheduled for May 8 (in Pasadena).

Budget Planning - We are beginning to review our cost estimate contained in POP 67-1 as a revised version of that document is due out sometime next month. Input from the laboratories will be taken into account in this updating. We are also maintaining an actual monthly status of manpower expended by laboratory and measuring it against the requirement projections. In this regard, March's breakout is as follows:

<u>LAB</u>	<u>MANMONTHS</u>	<u>LAB</u>	<u>MAN MONTHS</u>
ASO	9	P&VE	28
TSO	1	AERO	20
ASTR	8	OTHERS	12

2. ADVANCED VOYAGER PAYLOADS: Two representatives of JPL visited the Lunar Mobility Definition Group on April 20 to discuss interchange of mobility data which might be applicable to a roving vehicle for the Voyager program. Their current guidelines indicate a vehicle including payload in the order of 1,000 pounds. We supplied two sets of reports on LSSM and other appropriate data and established the necessary contact channels. ✓

F.W.
Request
a
20-min
briefing
B

3. POGO: The Pogo vehicle and associated hardware are undergoing final assembly and checkout at Bell Aerosystems Co., Niagara Falls, N. Y. On Wednesday, April 26, this equipment will be shipped to Langley Research Center, where, for the following two weeks, de-bugging operations and initial checkout with the LaRC equipment will be done. On or about May 10, actual flight tests will begin. We expect the LaRC facilities to be available for this program without interruption. Four weeks of test flights are planned, beginning first in shirt-sleeve environment, then proceeding to an operator wearing the soft-suit and hard-suit. ✓

Noted
above

4. CONTRACTUAL ACTIONS: Three new contracts were signed this week.
 1. Saturn V Launch Vehicle with 260" SRM Strap on NAS8-4105. (Boeing)
 2. Study of uprated Saturn IB Phase III NAS8-21107. (Chrysler).
 3. Definition of Astrionics System Modifications Required to Implement Selected Vehicle Configurations NAS8-21076. (IBM) ✓

APR 4 1967

DEP-A

Mr. Wesley L. Hjernevik
Assistant Director for Administration
Manned Spacecraft Center
National Aeronautics and Space Administration
Houston, Texas 77058

Dear Wes:

In looking through our files I find only one formal memorandum, dated September 20, 1961, which deals with the so-called von Braun Notes. At the time of the 1961 memorandum, Jerry McCall was the Assistant to Dr. von Braun. He was replaced by Frank Williams. Frank was replaced by Jim Shepherd, who is the present incumbent. In looking over the file, I find there have been regular and periodic ad hoc instructions issued by McCall, Williams, and Shepherd, in the form of limited distribution memoranda. Since there is a fair amount of repetition, I will attempt to summarize the content rather than send you the memoranda.

1. Von Braun has disciplined himself to read the Notes very promptly and make appropriate distribution of his comments. In case he is away from the office and cannot read them, he either temporarily relieves the participants from the requirement to submit the Notes or assigns action to the Acting Director. Editorially, I would comment that this prompt action by the "boss" is important if one expects the subordinates to be diligent and prompt in preparation of the Notes.

2. Periodic purging of the Notes is necessary to remove complaints; particularly against other individuals in the organization.

3. There is a need to periodically review the list of participants to make certain that the coverage is complete, but not excessive. Examples: In the early days, the program managers, (Rudolph, James, and Belew) were not included. This was changed in 1963. At the present time, all program managers submit notes regularly.

*1 a
weekly notes*

*CHR
IC MISC*

APR 4 1967

Mr. Wesley L. Hjernevik

2

At one time, I collected and reported on all administrative and support activities. It turned out that the "deficiencies" in administrative and support areas were reported very promptly by line elements affected. Administrative and support issues are now handled on an exception basis. However, certain specialized functions continue to be reported on an ad hoc basis. For example, on labor matters, individuals who regularly submit weekly Notes avoid analysis of a labor problem. If von Braun needs a briefing on a labor problem, Paul Styles prepares the briefing and coordinates it with other interested individuals, usually outside the weekly note routine.

The Mechanics

1. Notes are limited to one page. If attachments are necessary, they are referred to but are not actually submitted with the Notes.
2. Sufficient margins have to be maintained to permit handwritten comment in the margin.
3. A wide distribution of the Notes is not made. However, if more than one individual is involved in a given situation, copies are made for all interested individuals.
4. If designated individuals do not have anything to report a negative response is required.
5. The timing is religiously adhered to. The Notes are prepared on Friday and must be submitted to von Braun before Noon on Monday. He reads and annotates before the following Friday.
6. Some individuals attempt the "special treatment routine" by submitting interim notes. This, of course, tends to louse up the routine and is actively discouraged.

I have reproduced some of the more recent notes to give you some idea of the kinds of items being reported and how von Braun annotates and uses the Notes. The Notes are effective but policing is necessary.

APR 4 1967

Mr. Wesley L. Hjernevik

3.

The Notes are just as good as the boss's interest and, finally, a certain degree of "immunity" and confidence has to be observed by all participants. Otherwise the system breaks down. i. e. If a guy gets clobbered for reporting something he is going to be more careful the next time

Sincerely yours,

ORIGINAL SIGNED BY,
HARRY H. GORMAN

Harry H. Gorman
Deputy Director, Administrative

6 Enc

1. Memo of Sep 20, '61
- 2 thru 6. Copies of NOTES 2/27/67