

July 10, 1967

SCIENCE CENTER  
STATION

FILE



1967

7110167 w/ comments Gorman

NOTES  
MR. GORMAN'S COPY  
JUL 10 1967

Scott Fellows notes  
w/ comment by  
Dr VB — to Mr Gorman's  
urgent boy  
8-1

B-7/14

NOTES 7/10/67 FELLOWS

7/10/67

1. Advanced Initiations for FY-68: Since the FY-67 R&DO budget was executed in its entirety earlier than heretofore, R&DO was able, before the end of June, to initiate funds against approved authority for FY-68. Advanced FY-68 initiations through June 30 for Saturn IB were \$2.6M and for Saturn V, \$15.8M. All R&DO organizations will continue to consider with extreme care all procurement requests in order to have the soundest possible program throughout the fiscal year with the reduced funding levels we are to have. ✓

2. Increased Contractor Cost Awareness: In view of the increasing importance of cost control and the wide-spread and high-level interest in cost effectiveness, the Single Support Contractor Performance Evaluation Board is undertaking, with the participation of all concerned, to emphasize the management of contractor costs. ✓ The approach being taken is to increase the effects of cost management by increasing the relative weight of that factor in the evaluation process for determining contractor award fee. ✓ Additionally, cost effectiveness, in a purely technical sense, will receive additional consideration by the laboratory and office technical evaluators. On the whole, the present evaluation system has been satisfactory, but this new cost management emphasis should increase the effectiveness of the evaluation system. ✓



S.F.

This course of action is extremely timely and important in view of GAO's critical report on contracted work that could also be done by Civil Service. It wouldn't hurt at all to tell our service contractors that their cost performance and cost effectiveness may well secure their own future. Suggest you check approach to be taken with Harry Forman who had been deeply involved in this GAO exercise. B

w/ply note

NOTES 7/10/67 BALCH

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S-IC-5 Testing - Propellant load test and static firing can still be accomplished on previously reported dates of 7/25/67 and 8/8/67, respectively, although a slippage of a day or two is indicated for both dates. Removal of stage from stand has been tentatively rescheduled from 8/17/67 to 8/24/67, pending approval of engineering change proposal to apply interstage coating at MTF instead of at Michoud after static firing. ✓

S-II-3 Stage - Stage is still expected to arrive at MTF about 7/29/67, and the S-II A-1 stand is still expected to be ready to receive the stage when it arrives. ✓

NOTES 7/10/67 BELEW

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ORBITAL WORKSHOP COST AND SCHEDULE REVIEW WITH  
MCDONNELL DOUGLAS CORPORATION (MDC):

A detailed review of Orbital Workshop definition, cost estimates, and schedules was conducted at MDC, Huntington Beach, California, last week by representatives of this office, the S-IVB stage office, and P&VE. The information developed will be used to construct a program within the expected budgetary restraints. ✓

APOLLO TELESCOPE MOUNT (ATM) PRINCIPAL INVESTIGATOR  
(P. I.) MEETING:

The July P. I. meeting has been scheduled for July 11 and 12 at the Lockheed Rye Canyon Research Center, Burbank, California. Pertinent items on the agenda are thermal control, radiation status, experiment times lines and demonstration of an H-Alpha display. ✓

LOCAL SCIENTIFIC SURVEY MODULE (LSSM):

Chuck Mathews tells us that as a result of his meeting with Dr. Seamans last week, the LSSM will not have to be reopened for competition. ✓ This will be confirmed in writing. Funding for the project will of course be reduced in consonance with the overall budget picture. ✓

NOTES 7-10-67 BROWN

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H-1 ENGINE Engine H-2038 has been selected for a quality assurance teardown inspection to determine the ageing effects of hardware and soft goods in order to evaluate the proposed one year extension of engine service life. This obsolete 188K engine was delivered in October 1963. It has the same basic seal configuration and materials as the present 200K and 205K engines in the field.

The engine was recently subjected to an electrical and mechanical checkout, hot fired, passed receiving inspection, and is now in process of teardown inspection at MSFC. Approximately 50% of the seals have been removed to date and visually appear to be in good condition. Laboratory analysis of the seals will begin next week. Metal components of the engine are also being inspected and analyzed for possible ageing effects.

The quality assurance teardown inspection will be repeated on two other obsolete engines -- one is scheduled for May 1968 and the other for May 1969. ✓

J-2 ENGINE Testing was resumed at AEDC on Thursday, July 6, after a four week down time for annual facility maintenance. Four successful tests simulating S-II start conditions were conducted.

Rocketdyne and MSFC are continuing their investigation of helium regulator cycle life. No problem has been found to date. The six regulators removed from the 501 engines were cycled several hundred times upon return to Rocketdyne. One regulator was cycled to failure, which occurred after 2000 cycles. R&DO has been requested to make a recommendation on change out of regulators on 204 and 502 by July 15. ✓

NOTES 7/10/67 CONSTAN  
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Nothing of special significance.

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1. S-II Stage Second Plane Separation: At a recent meeting with S-II Stage Office, TSO & NAA, discussions were held concerning possible S-II stage failure, in the event second plane separation fails to occur. NAA studies indicate that due to excessive temperatures on the thrust cone, only five to ten seconds are available after failure of second plane separation until safety factor of 1.0 is reached (a safety factor of 1.0 is defined as a catastrophic failure for EDS purposes). For unmanned flights, ten to fifteen seconds are required to analyze ground display data, give command, and abort to save spacecraft, or continue with an alternate mission. For manned flights this time will be as long as 30 seconds since crew reaction, communication, and verification are also required. With redundant sensing, crew could react and abort within the available five to ten seconds. Consequently, these recommendations were made: For unmanned 501 and 502, provide adequate ground display data at MCC, Houston, to determine if and when abort is required (thrust cone temperature to aid determination); for manned flights 503 and subs, provide redundant signals with voting logic and displays within the spacecraft. ✓ Manual abort would be initiated on two cues indicating that second separation did not occur. Consequently, the following action items were generated: (1) mission rules will be modified to include adequate procedures; ✓ NAA will tell us measurements available for separation signals and temperature monitoring; ✓ additional EDS hardware requirements and MSC interface for manned configuration will be conducted by crew safety panel. ✓

2. Representative at Voyager Interim Projects Office (VIPO):

Mr. Frederick A. Jandebour, of my staff, has been named as Aero-Astrodynamic Laboratory's Voyager project representative at VIPO, Pasadena, California. He was officially on duty in this capacity July 3, 1967, and is participating in mission analysis activities in a group headed by Dr. Rhodes Stevenson of JPL. ✓

NOTES 7-10-67 GRAU

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1. S-II: We visited the Martin Company together with NAA/SD Quality management in order to observe and study their Martin Automatic Reporting System (MARS) which tracks and assures timely corrective action on all discrepancies reported in the Titan program. Mr. Ahern, SD S-II Quality Manager, was favorably impressed and is studying the impact of establishing a much needed similar system. He will present his conclusions to us shortly. ✓
2. ENGINE PROGRAM: A vendor quality symposium was held at Rocketdyne with about 50 vendors. We believe this will go a long way in motivating the Rocketdyne vendors to do a better job. ✓

NOTES 7-10-67 HAEUSSERMANN

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1. ATM Experiments - Design Review. We have been working with IO in establishing the charter for the Design Review of the ATM Experiments. This effort was specially requested by Dr. Mueller during his last visit to MSFC. Mr. James Taylor, R-ASTR-R, will chair the activities of the review team. ✓
2. PI Meeting. PI meeting will take place this week at Rye Canyon (Burbank, California) where TV display demonstration will take place. Items of discussion will include the thermal and radiation problems. ✓

NOTES 7/10/67 HEIMBURG

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#### F-1 ENGINE

F-1 engine S/N F-5038-1 was replaced with F-3T1 on the West Area F-1 Test Stand. Engine S/N F-3T1 will be subjected to a calibration test prior to installation in S-IC-T. ✓

#### MODERATE DEPTH LUNAR DRILL PROJECT

Mr. Lundy and Mr. Tepool visited Nortronics Division of Northrop Corporation on July 6, 1967. Northrop is on schedule and delivered drawings on the new compressor design on July 7, 1967. Joy Manufacturing Company began work on Contract No. NAS8-20839 as of June 29, 1967. The contract duration is 10 months. Total contract price is \$107,615. The completion of the Westinghouse contract negotiations is pending official approval of the Definition and Finding document from Headquarters and approval of early FY 68 funds. ✓

#### S-IVB (SACTO)

The S-IVB-504 (New) stage was installed on the Beta I Test Stand on July 7, 1967. The acceptance firing is scheduled for August 15, 1967. ✓

#### S-IC STAGE (MTF)

The major effort is toward completion of travelled work on S-IC-5. Power-up scheduled for July 12, 1967. ✓

#### S-II STRUCTURAL TEST PROGRAM

Phase I construction work is progressing. Excavation for the test pad is scheduled to begin today, weather permitting. ✓

#### S-IVB (MSFC)

Test No. S-IVB-046 was conducted at the S-IVB Test Stand on July 6, 1967, for a duration of 435 seconds. All objectives were met and the system operation and performance were satisfactory. ✓

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COMPUTER PRESENTATION: Personnel from Texas Instruments will give a presentation concerning the Illiac IV in the Computation Laboratory, Building 4663, M-wing Conference Room, Friday, July 14, 1967, 9 a.m. Illiac IV, a computer capable of performing  $10^9$  operations per second and consisting of 64 processors working in parallel, is implemented in Large System Integration (LSI) which integrates several hundred logic circuits on one monolithic block. Such a technology and advanced system design will make it possible to put a computer as powerful as present large ground computers on board a flight vehicle during the 1970's. This computer is expected to be operational in two years and will be one of the fastest conceived by 1969. ✓

H.H.

Such a computer could be immensely useful for earth resources surveys from orbit. They would permit sating out the "junk" in orbit, thus reducing the data transmission load back to earth. Suggest you arrange a Texas Instruments briefing to the MSC "resources" people. Computer may also be useful for later Voyages missions, say after '75. B

NOTES 7/10/67 JOHNSON

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1. OMSF Supporting Development Quarterly Review: MSFC is hosting the Review scheduled for Tuesday, 7/11. We have worked closely with George Trimble and his staff in planning the Review and expect it to be a very productive session. Attendees include: Mr. Trimble and his immediate staff, representative from OART, representatives from MSC and KSC. MSFC elements represented will include: Executive Staff, S/AA, ASO, and EO. Results of particular significance will be summarized in next week's Notes. ✓
  
2. Manned Space Flight Experiments Board (MSFEB) 67-3: The third meeting of the MSFEB for CY 67 scheduled for May was cancelled. However, the material prepared on items planned for the meeting was circulated among the members and certain actions have been taken. A report on these actions has been received and of particular interest to MSFC are the decisions by Hqrs. AAP Office to: (1) jettison the SLA Panels; and (2) accept Experiment #42 (TO23) for flight (Surface Adsorbed Material Collection). ✓

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1. S-II Wire Harnesses: The S-II wire harnesses are made by a helical lay method. This method is not used in any other major flight vehicles in the Saturn/Apollo project except for one single cable in the LM (standard cabling is used on Apollo). In addition, the S-II harnesses are covered after manufacture by a woven braid; this is not done on the LM cable. Grumman however use many helically laid and braided harnesses for their aircraft. The advantage of the helical lay method is that the resulting harnesses are very flexible. As a consequence they require more closely spaced supports than conventional harnesses. This difficulty is reflected in the recent R-QUAL report. As regards 3-dimensional manufacture of wire harnesses this may be divided into two aspects:

a. Local areas; e.g., sharp bends around protrusions or into connectors. With very flexible cabling such as this, 3-dimensional harness boards are generally not required and in fact GAEC use only 2-dimensional boards except in a very few special cases.

b. Overall lay-out for length, routing, avoidance of interference with other systems and spacing from sharp edges, etc. A systems installation hard mock-up is required for this.

The original wire harnesses for the S-II-T were in fact laid out on the EMM (Electro Mechanical Mock-up) at Downey and check-out tapes were prepared from this system. Wiring changes have since then been incorporated on the basis of prior vehicle experience and by drawings only. Some lengths were checked on production vehicles but a general lay-out was not checked on an EMM for new lengths, clamping interferences, etc. The EMM which had an obsolete structural configuration was not updated nor was it moved to Seal Beach. It is now proposed to use the S-II-T thrust structure as a substitute EMM as soon as it becomes available. (This thrust structure is presently being used to slave the S-II-3 stage in manufacture.) In the interim period the S-II-6 thrust structure is being used to check the cabling length, supports, routing, etc., for S-II-6 and subs which incorporate many electrical system changes. Very little cabling is left in the forward skirt area. This cabling is being checked on production hardware.

Our electrical shop foreman has spent a week at S&ID and has reported no major items of concern -- the shop and vehicle installation methods appear to be generally well developed and satisfactory. Some minor areas of concern were discussed and will be taken care of. We are following up using our resident electrical engineer at S&ID and also coordinating with our engineer at GAEC. ✓

2. Pulsed Arc MGA Welding: Reference your reply to my notes 6-23-67. (Copy attached for DIR and R-DIR). P&VE have completed an engineering analysis of the comparative properties of TIG and P/A MGA welds in 2014-T6 material and state that at the 3 temperatures considered (Room,  $-320^{\circ}\text{F}$  and  $-423^{\circ}\text{F}$ ) the P/A MGA welds are equivalent or superior to the S-II TIG welds in joint strength and toughness. We strongly urge again the adoption of the P/A process for the S-II LH<sub>2</sub> bulkhead to #6 cylinder weld and the necessary speed up of the S&ID evaluation and process qualification programs to make this possible. ✓

W.K. → Looks like you won after all!  
Congrats. B

1. SATURN V MAINTAINABILITY: The requirement and feasibility of limited, selected post-hydrogen loading maintenance at KSC will be discussed in a meeting at KSC on 7-14-67. Present KSC policy prohibits maintenance after hydrogen is loaded. Malfunctions, therefore, necessitate propellant down-loading and mission scrub. With proper preplanning, vehicle components could, if necessary, be serviced during this regime. The purpose of the meeting is to agree upon those circumstances wherein post-loading vehicle servicing may be performed and to initiate further studies. ✓
2. LOX TURBOPUMP SEAL PURGE AT KSC: We have recommended an RP-1 loading sequence for KSC that is similar to one used for static firing. The recommendation was based on a statement from KSC that RP-1 would be tanked one week prior to launch. This presented a problem with supplying the lox turbopump seal purge for that long. The new procedure involves draining RP-1 below the prevalves which would negate the need for the purge. The Boeing Company has made a similar request. ✓
3. USAF AEROSPIKE THRUST CHAMBER TEST FAILURE: The third test conducted on July 2 by Rocketdyne for the USAF on a stainless steel tube wall aerospike thrust chamber at the Nevada (Reno) Test Facility resulted in rather severe damage to the chamber and injector. Preliminary indications are that a facility problem starved the chamber of about 25% of the required fuel flow causing a severe mixture ratio excursion. Two previous checkout tests on this 250,000 lb. thrust aerospike chamber had been successful at mixture ratio of 5.0 (oxygen/hydrogen) and chamber pressures of 500-600 psia. This test series is being conducted for the USAF by Rocketdyne as part of the current joint NASA/USAF Advanced Engine (Aerospike) Program. The test series to be conducted for NASA on a similar thrust chamber at Rocketdyne's Santa Susana Test Facility is currently scheduled to begin July 14. The start of this series will be delayed, if necessary, until the exact cause of the USAF chamber failure is determined. ✓
4. PAYLOAD MODULE (PM)/RACK: Design requirements have changed for the docking collar; the cable stowage receptacles on two of the three drogue attach fittings have been modified and the drogue attach fittings have been relocated as a result of the spacecraft design modifications. Details of the modifications are expected to be available about 8-15-67, according to MSC report. Another requirement calls for tin plating four small areas in the latch contact zone of the docking collar, but the exact size of area, orientation, and MIL specification for the tin plating data are unknown. It appears that most of the modifications apply only to surface treatment of the docking collar. Work on the second docking collar (ready for shipment) has been suspended pending instruction for rework from MSC. ✓
5. EVALUATION OF MSC WELDMENTS: In response to a request from Dr. Gilruth at the June Management Council Meeting, we have reviewed x-rays of the Lunar Landing Training Vehicle and Lunar Landing Research Vehicle for MSC. Our evaluation of the fillet welds used in the tubular structure of these vehicles indicates that some repairs (about 30) are necessary; however, we are not as concerned as MSC about what they had been told by others was lack of penetration. Fillet weld x-ray film are always difficult to read with respect to lack of penetration, but it is our opinion that there is not an extensive lack of penetration in these welds. ✓ The x-rays show extensive weld drop-through which is irregular and does give the appearance of lack of penetration. We are writing our evaluation to MSC after having given our opinion by phone. ✓

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7/10/67

FY-68 BUDGET - The House/Senate conference to resolve differences between their respective versions of the NASA Authorization Bill has been delayed from the original date of July 11. It is now anticipated to occur about July 20. The House conferees (all members of the Sciences and Astronautics Committee) are: Congressmen Miller, Teague, Karth, Heckler, Daddario, Fulton, Bell, Roudebush, and Mosher. The Senate conferees have not been announced.

LAUNCH VEHICLE PRODUCTION COSTS - During his visit to Michoud Dr. Seamans and his staff received data from Boeing on the relative annual cost for producing S-IC's at a rate of 2 per year as compared to 4 per year. General Bogart requested Marshall's comments on the Boeing statements and the response was given by phone by Dr. Rees. The essence of our response was that we agree with the Boeing estimate which shows that the annual cost for producing the S-IC at a 2 per year rate would be about 66% of that for a 4 per year rate. However, this annual cost for producing the complete Saturn V Vehicle at 2 per year would be about 75% of that for producing 4 per year.

H.M.  
Have we passed this on to Bogart? If not, let's do it  
B

GODDARD VISIT TO MSFC- Dr, John Clark and eleven of his top people will arrive in Huntsville at 4:40 p.m., July 12 to receive an indoctrination similar to that given MSFC visitors to Goddard on May 19.

The group will tour R&D laboratories on the morning of the 13th, and will be given technical program briefings in the Center Conference Room during the afternoon. Our emphasis will be on Marshall's technical and scientific capabilities.

APOLLO MANAGEMENT SYSTEM - By letter from General Phillips to General O'Connor, MSFC has been requested to identify two persons to work as team members with MSF Headquarters and other Centers to describe the Apollo Management System at the Apollo Program Office, the Center, and the contractor levels. The resulting document(s) will be used as a basis for presentations to Congress, to professional management and interested organizations.

Representatives have been assigned from IO and Executive Staff.

NOTES 7/10/67 RICHARD

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7/10/67

Dr. Mueller's note to Trimble (MT) of June 15, 1967: The question Dr. Mueller posed to Trimble concerned tradeoffs of reserve fuels between the L/V stages and S/C. A call to Mr. Trimble's office (Mr. Arnold Schnyer) was helpful in discovering what Dr. Mueller was after. According to Mr. Schnyer, Dr. Mueller is very unfamiliar with our philosophy concerning residuals and reserves (FPR and FGR), and he was apparently asking to be educated. Mr. Schnyer is sending down a group of questions for us to help him answer. There did not seem to be an urgency at the moment to answer the Mueller note, but we offered any assistance desired. Unless you advise differently, we will put together a short presentation on this subject for Dr. Mueller to be given at his convenience. ✓ The question of utilization of additional payload capability (including excess reserves) was studied and resolved by the Flight Mechanics Panel. The interface weight transfer plan to transfer excess reserves across the L/V-spacecraft interface at time of launch was recently sent to Gen. Phillips. ✓

Saturn V Product Improvement Plan: We are on your calendar on July 26, 2 - 5 p. m., for a presentation on this subject. Advanced Systems Office, IO, and R&DO Lab effort has gone into the study and formulation of a vehicle improvement plan which we feel is worthy of top management review and direction. The presentation will be given to Mr. Weidner, Gen. O'Connor, Mr. Belew, and Dr. Rudolph in the 6th floor conference room (Building 4202) on July 19 at 9:30 a. m. Everyone is lined up for this presentation. ✓

7/10/67

B 7/11

1. AS-501 System Safety Evaluation:

- o The AS-501 System Safety Evaluation commenced at KSC on Wednesday, 5 July 67. The evaluation encompasses configuration control and safety operation requirements from countdown demonstration test (CDDT) through launch countdown. ✓
- o Dr. Mrazek, MSFC, and Mr. Rigell, KSC, are Co-chairmen of the Task Team composed of MSFC, KSC and Contractor personnel. ✓
- o Contractor task teams were established for each stage plus an integration task team. ✓
- o The stage task teams are evaluating the stage and all GSE associated with the pre-launch operation of that stage. The integration task team is evaluating the launch vehicle interfaces, launch vehicle GSE and is assuring the stage task team evaluations are complete from stage to stage. ✓
- o MSFC's stage and SE&I contractors were assigned as the lead evaluation contractor with members assigned from applicable KSC and MSFC support contractors. ✓
- o MSFC and KSC have provided technical consultants to each task team. ✓
- o The evaluation is to be completed with the final report issued by Friday, 11 August 67; and a briefing will be arranged to present the results to KSC/MSFC top management by mid-August 67. ✓

2. Three-dimensional jigs for cable build-up at Seal Beach: Reference your comments on Notes 6/19/67 Grau (copy attached) on the Space Division's use of three dimensional jigs for cable build-up. Planning is underway at Seal Beach for making three-dimensional mock-ups and improving the new cable layout for the first operational telemetry configuration on S-II-6. Non-flight hardware, such as the S-II-T aft skirt, will be used. Joint teams composed of Space Division engineering, NAA Corporate Office, MSFC Laboratories, and the MSFC Resident Office, will insure that the new layouts, manufacturing jigs, procedures, Quality Control and other installation controls are correct. You will be kept informed of progress in this area since this is one of our most important actions now underway with Space Division. ✓

1 Attachment: Notes 6/19/67 Grau (DIR, I-DIR & R-DIR's copy only)

NOTES 7/10/67 SPEER

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1. AS-501 LAUNCH WINDOW: MSC has developed a means for increasing the AS-501 launch window (previously  $3\frac{1}{2}$  hours) and still maintain the S/C thermal conditioning requirement for reentry. The MSC scheme would change the orbital soak attitude values in the S/C guidance computer during the countdown. By providing two sets of attitude values a window of approximately 6 hours can be obtained, with the daylight launch and daylight recovery requirements becoming the constraining factors. Kraft is preparing a memo to Gen. Bolender outlining this plan and the wider launch window is being reflected in the Mission Rules.

2. AAP TECHNICAL SUPPORT TO MSC FLIGHT OPERATIONS: MSC (Kraft) has requested technical personnel support from MSFC for AAP flight operations. Their proposal called for the complete integration of these people into their organization. Although it is agreed that this support is advantageous to both Centers, their request was not acceptable. We have in turn made a counter proposal and early indications are that MSC is receptive. The major points of our proposal are: (a) the MSFC engineers (3 or 4) would maintain their professional and organizational identity by serving as a single operating unit; (b) the MSFC lead engineer would ensure that the group responds to the technical requirements of the MSC Experiment Systems Branch; and (c) the group would function in areas of ATM, MDA, OWS and other MSFC future AAP payloads.

7/10/68

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1. ATM FILM FOGGING: Representatives of Lockheed gave a presentation on possible remedies in the film fogging problem. By application of certain development techniques customary in photographic laboratories, details of images can be brought out even when the film has been improperly exposed, or when a background fog exists. This method would work well as far as our H alpha pictures of portions of the solar surface are concerned; however, it would not be applicable to photograph the spectra with weak lines which must be photometrically evaluated in a quantitative manner. NRL's Experiment B requires this evaluation. We are still facing the full problem in this case. GSFC's experiment is in a similar situation; however, Jim Milligan seems to be willing to accept some degradation of films.

2. SOLAR TELESCOPE: A small plot of land north of SSL's Building 4481 has been acquired from the Army, and development (grading, installation of water and electricity) will begin this week. We hope to have the solar telescope ready for the testing of ATM components in late August or early September.

E.S.  
Please  
invite  
me  
when  
it's ready  
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3. FUTURE SPACE POWER REQUIREMENTS: We have established an appointment through Bonnie for Dr. Joseph D. LaFleur, Jr., Assistant for Application and Requirement, Space Nuclear System Division, U. S. Atomic Energy Division, Washington, to meet with you on August 2 at 10 a. m.

Dr. LaFleur is concerned with determining the development needs for nuclear space power systems in the forthcoming years. He is very desirous for MSFC to make an estimate of the needs for electric power in future space missions. Dr. LaFleur feels that if MSFC, going through NASA Headquarters, defines its estimated power needs to him, he will be able to use the information in establishing AEC development programs for space nuclear power systems. Dr. LaFleur visited MSFC several weeks ago, and met with personnel from SSL and ASTR at that time.

Bonnie o Kosh 7/31

Please place Xerox copy of par. 3 (LaFleur visit) on my desk before LaFleur sees me (2 Aug.)

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SECOND SOURCE FOR ACTUATOR POTENTIOMETERS: Reference is made to my notes of 3/27/67 (copy attached) concerning two potentiometers on S-IB-11 exceeding the upper limits of the specification for total resistance due to a resistive plastic element (a proprietary item of Markite) increasing its resistance at the rate of 3 or 4 ohms per day. Astrionics and Moog have been hoping to utilize Computer Instruments Corporation (CIC), who has been doing developmental work for Saturn actuator applications, as a second source for the potentiometers. CIC has problems but the entire company from the president on down seem ready to do whatever is necessary to correct the present deficiencies. We should know the outcome in about 5 weeks. CIC's eagerness was quite refreshing after fighting Markite's lack of interest. At Markite, details for the "fix" on the resistance growth problem have been finalized. A different potting compound will be utilized with special precautions against outgassing. Despite the closeout of this problem at Markite, development of a second source still appears desirable. ✓

SA-204 LCC AND LVDC SOFTWARE: All known LVDC software changes have been directed to IBM to meet the scheduled August 22 delivery of a verified flight program to KSC. A final delivery of the LCC programs has been made. ✓

AS-204/LM-1 PULL TEST: Reference is made to my notes of 7/3/67 (copy attached) concerning rework of the pull test ring. Rework of the pull test ring has been completed (Mr. Jenkins of MSC inspected the ring on July 7 and stated the ring was acceptable to MSC) and the ring is being prepared for shipment this morning. The ring will be leaving MSFC by truck this morning and should be at KSC by noon tomorrow. The pull test has been tentative scheduled for this week if it can be worked into the schedule. R-ME and transportation personnel are to be commended on the excellent effort and cooperation they put forth to meet a very tight schedule. ✓

MINUTEMAN STRAP-ON STUDY: Reference is made to my notes of 7/3/67 (copy attached) and Ludie Richard's notes of 6/26/67 (copy attached) concerning a possible tradeoff problem related to the mounting location of the solids and the impact on the pad facilities. This was reviewed with CCSD on July 6. A configuration has been defined that places the Minuteman nozzle exit plane at vehicle station 76.6 and KSC is defining the modifications to the launch complexes. At this time there are no identifiable launch complex problems with the Minuteman motors mounted at station 76.6. The presentation to Mr. C. Mathews and Dr. Mueller on this subject has been rescheduled from July 14 and 15 to the early part of August. This will permit us to formulate a firmer center position since the detail study being performed by CCSD will be almost completed by that time. Our center dry run will be rescheduled. ✓

NOTES 7/10/67 WILLIAMS

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7/10/67

1. George Trimble Visit:

Mr. Trimble plans to visit MSFC on July 11, 12 and 13. The first day will be devoted to SRT activities and is being handled by Bill Johnson. The second and third days will be devoted primarily to Advanced System study activities; however, since Mr. Trimble has not visited the Center in several years, we are planning a tour of the facilities to give him an up-to-date feel for what we are doing throughout the Center.

One of the major items that we plan to cover during the visit is our involvement in the Management Council Retreat (Hideaway Meeting) and the material we are preparing. I discussed our current thinking with Mr. Weidner on July 6 and will let the two of you know the outcome of our discussions.

Mr. Weidner plans to see George on July 12, and I feel it would be desirable for you to see him near the conclusion of his visit, (Thursday afternoon, July 13) if at all possible. ✓

## NOTES 7/17/67 BALCH

S-IC-5 Testing - Stage electrical systems checkout was completed on 7/13/67. Propellant load test is scheduled for 7/25/67 and 7/26/67. Previously reported date of 8/8/67 for static firing remains firm, and removal of stage from stand is still tentatively scheduled for 8/24/67.

S-II-3 Stage - Stage is now expected to arrive at MTF about 7/26/67 instead of 7/29/67, as previously reported.

GE Support Contract - Supplemental agreement covering first quarter of Fiscal Year 1968 is being reviewed for approval in NASA Headquarters. GE's CPAF proposal for remainder of Fiscal Year 1968 is expected within about a week. Draft of Incentive Evaluation Plan for the CPAF contract has been prepared and is to be reviewed at MTF by MSFC Contracts Office representatives this week.

Visit by Air Force ROTC Students - A total of 251 Air Force ROTC students, from 42 states visited MTF for an orientation, briefing and tour on 7/12/67. The students are in summer training at Keesler Air Force Base nearby

NOTES 7/17/67 BELEW

MISSION PLANNING TASK FORCE (MPTF) ACTIVITIES: A status review of the material being prepared for the July 25 MPTF indicates that MSFC will have very little payload responsibility during the one-year Cluster A reuse. Also, in the event that the AAP Alternate Mission (launch new cluster at 50° inclination) is initiated, MSFC will only have responsibility for the Orbital Workshop and Multiple Docking Adapter part of the cluster.

Prior to the July 25 meeting, I would like to brief Center management on the MPTF presentation in order to determine the MSFC position in the payload area.

LUNAR DRILL: Mr. Gene Simmons, Massachusetts Institute of Technology, discussed the moderate depth lunar drill development program during his visit at MSFC on July 12. Mr. Simmons is on the geophysics sub-panel (Space Science Academy) that will convene July 31 - August 12 at Santa Cruz, California, to discuss the scientific need for moderate depth drill(s) and lunar roving devices (LSSM). MSFC's representatives are planning to attend this conference.

LUNAR MODULE/APOLLO TELESCOPE MOUNT (LM/ATM) INTERFACE MEETING: The LM/ATM interface meeting was held at Grumman Aircraft Engineering Corporation (GAEC) on July 7 between their representatives and MSFC to discuss LM and ATM physical interfaces. Although the meeting was primarily an information exchange, some pertinent points of the meeting are: (1) GAEC has performed an orientation trade off study of the LM/ATM and the cluster which indicates that the present orientation (docked to port #1, locking at port #4) is satisfactory from the LM radiation and EVA visibility standpoint. GAEC is conducting a study of LM structural strength capabilities during Command Module (CM) docking axially to the cluster. The results of this study will be fed into the mechanical panel. (2) GAEC suggested a fold-down approach for the ATM control and display panel and has suggested that the soft mockup of the panel be sent to MSFC for evaluation.

ATM FOLLOW-ON PROGRAM STUDY: OSSA has identified five scientific missions for the immediate ATM follow-on program. OSSA has requested that MSFC conduct an integration analysis for the identified missions. This analysis will use the present ATM vehicle as a baseline, and outline the modifications required to accommodate the various payloads. If we are to undertake this, it should reflect a top management position at the conclusion of the effort. I would like to discuss this with you at your earliest convenience.

ATM EXPERIMENTS SCHEDULE REVIEW: A meeting called by Chuck Mathews was conducted in Boulder, Colorado, with representatives of the Harvard College Observatory (HCO), Naval Research Laboratory (NRL), and High Altitude Observatory (HAO) experiment on July 13 for the purpose of discussing methods of reducing delivery schedules for these experiments. NRL and HCO claimed a necessity for an additional slip of six to nine months. This results in equipment deliveries in second quarter CY 1969. (Required date for flight unit is October 1968.) The High Altitude Observatory schedules were shown to be compatible with current launch dates.

PAYLOAD INTEGRATION CONTRACT NEGOTIATIONS: An MSFC negotiation position has been forwarded by TWX to MSF requesting permission to proceed with final negotiation.

## NOTES 7-17-67 BROWN

F-1 ENGINE As mentioned in our Notes of 7-3-67, two hypergol manifold assemblies were removed as a result of over pressurization of the ignition monitor valve (IMV) during S-IC-2 sequence tests at KSC. The assemblies were subjected to 80 psig rather than the 30 psig specified. The two valves were replaced with acceptable hypergol manifold assemblies from the spares program. Analysis of the removed valves indicated that the 80 psi pressure was not detrimental and removal of the remaining three valves from Vehicle 501 would not be necessary. An increase in the allowable checkout pressure to 150 psig is being evaluated since this is the supply pressure utilized by the stage contractor for checkout and hypergol simulator actuation.

The third and fourth F-1 engines for vehicle S-IC-8 were delivered on dock to The Boeing Company at MAF in New Orleans, La., on 7-13-67. Engine F-6058 left Canoga Park, Calif., by air ride low-boy on 7-10-67, and engine F-6059 left Canoga Park, Calif., 7-12-67, by Super Guppy aircraft.

J-2 ENGINE Based on test experience at MSFC and Rocketdyne, R&DO recommends that the removal and replacement of pneumatic package be discontinued on all stages. The tests conducted to date have not produced any results that would conclude that the regulator is marginal for stage static testing or flight use.

The first engine for S-II-511 was delivered last week. This was the 117 engine of the total procurement for Apollo of 155.

There were five successful tests (a new record for a single air-on period) at AEDC, Friday, 7-14-67. All the tests were 500-series S-IVB simulation. Preliminary review of the data revealed no discrepancies.

NOTES 7/17/67 CONSTAN

Nothing of special significance.

## NOTES 7/17/67 FELLOWS

R&DO Supporting Justification Task Book for FY-68 Budget: In support of the R&DO effort planned for FY-68 in the Saturn V and Saturn IB Programs, a book of detailed technical justification has been prepared to augment other information in the Program Operating Plan (POP) 67-2. The book includes narrative statements of work, justification of tasks, impact statements, and estimates of cost for the several functional areas planned by the laboratories. This Task Book contains substantially the same type of material which was used successfully last year in providing visibility to R&DO and IO management for work planned during FY-67. Additional visibility of planned effort for FY-68 is being provided by another technical justification book which includes planned support contractor personnel usage and costs.

NOTES 7/17/67 GEISSLER

1. Maximum Longitudinal Acceleration for Saturn V: A review of the potential maximum longitudinal acceleration problem for Saturn V (discussed in Item #1, Notes 7/3/67 Geissler) was conducted during the Twenty-First Flight Mechanics Panel Meeting held at MSFC on July 12 and 13. MSC stated that a structural problem does exist with the AS-502 (Block I) spacecraft (service module aft propellant tank bulkhead), and action will be taken by MSC to provide a solution to the problem. Agreement was reached and recorded in the minutes that no effort or changes are required by MSFC in the solution to this problem.

NOTES 7-17-67 GRAU

No submission this week.

1. Optical Experiment Facility. Dr. L. Gilchrist, OART, made a presentation to Dr. Seamans earlier this month concerning a Smithsonian Facility being established at Mt. Hopkins in southern Arizona and recommended participation by Goddard and MSFC at that site. Dr. Seamans apparently has concurred in this proposal. This location has some serious disadvantages in that it is small (190 acres) and very steep (rising 1,000 feet in 4/10 of a mile) in some cases. Walter Carrion, Goddard, has agreed to use the Mt. Hopkins facility for immediate and interim needs; however, he does not feel that this site is adequate for the future. This subject was discussed with Dr. Clark during his visit here last week and he considers the Smithsonian site an interim measure because of the present budget situation. We have his support for a future project at some other location. Dr. Gilchrist's presentation to Dr. Seamans has had the effect of stopping any progress on the Preliminary Engineering Report (\$50,000) and the site survey which was to be made this summer. This subject was discussed with Mr. Sullivan, OART, after Dr. Clark's visit and we will attempt, this week, to obtain his concurrence to proceed with the Preliminary Engineering Report.

2. ST124-M Platform Problems at KSC. The ST124-M platform was removed from AS204 IU at KSC July 12. It has been confirmed that the Y accelerometer has side balance errors which exceed unit specifications. The replacement unit has been taken to KSC and was changed out on July 13. Laboratory tests on this system are scheduled for July 18 and platform reinstallation on July 21. No schedule impact is anticipated by KSC. The replaced accelerometer will be returned to Astrionics on July 18 for testing and analyses.

3. PI Meeting, July 11, Rye Canyon, Lockheed Observatory. Two action items from the MSFC thermal presentation are:

a. The PI's will deliver data to MSFC which determines the average mean temperature and the limits within which each experiment can successfully operate. The present PI requirement of 70 plus or minus 5°F will probably be significantly tightened.

b. MSFC will define the environment and environmental control techniques which would be necessary to meet the new requirement.

Status on the radiation effects are:

a. Dr. Stuhlinger's Lab has concluded their film fogging study analysis and will document these results .

b. Based on this data, the PI's will decide how much film fogging will occur and how much can be tolerated.

The meeting was concluded on July 12 with a live demonstration of the spectral laboratory H alpha interference filter in a telescope.

4. Ball Brothers/PI ATM experiment status review on July 13 by Mr. Mathews at Boulder. HCO, NRL, HAO, MSFC and OSSA personnel attended. The PI's presented an impending schedule delay of several months in both the HCO and NRL instrument delivery under their current concepts of design. The NRL/B flight unit will be delivered in September 1969 and HCO/B flight unit will be delivered in August 1969 with the NRL/A and HCO/A instruments planned for delivery about two months earlier. It should be emphasized that the above schedules do not include the increased thermal management problem due to the wide temperature variations of the ATM shroud. Mr. Mathews clarified for the PI's that the MSF position is currently one of being unable to accept the foregoing schedules because of incompatibility with launch dates and the budgetary program. The PI's stated that all technical improvement and conception changes planned to improve the above schedules have been incorporated and a total redefinition of the instrument objectives and design will be necessary to modify the schedules significantly.

S-1C STAGE (MTF)

Power was applied to the S-1C-5 stage on July 13 and acceptance test preparations remain on schedule.

S-1C STAGE (MSFC)

Test preparations and checkouts are being performed for the scheduled S-1C-T firing July 27, 1967. The center engine, F-3T1, was installed July 14. The new forward handling ring will be installed on S-1C-T today. Pneumatic console rework continues.

S-11 STRUCTURAL TEST PROGRAM

Phase I construction work is progressing. Excavation for the test pad was delayed two weeks due to the wet weather, but should commence today.

F-1 ENGINE

Test FW-067 was conducted on the West Area F-1 Test Stand with Engine S/N F-3T1 on July 12, for a mainstage duration of 41 seconds as planned.

MODERATE DEPTH LUNAR DRILL

The contract with the Westinghouse Electric Company still has not been signed. The holdup is in NASA Headquarters. It is extremely difficult to obtain good information from Washington, but the rumor is that Headquarters would like to go competitive on this contract. I feel that should this happen, it may eliminate any possibility of success for this concept.

NOTES 7-17-67 HOELZER

Negative Report.

NOTES 7/17/67 JOHNSON

1. S-027/Galactic X-Ray Mapping Experiment: The experiment P. I., Dr. Krashaar, U. of Wis., will visit Space Craft, Inc. on 7/17 and MSFC on 7/18. During his visit to MSFC, data reduction and viewing angle relationship to gimbal angle will be discussed and an informal review of the experiment will be conducted. Work is proceeding on schedule and within planned funding. At this time AS-206 is being considered as the carrier. On the basis of the current launch schedule, U. of Wis. work (experiment itself) will be completed 10 to 12 months in advance of launch, allowing ample time to complete experiment and vehicle systems integration.

2. Inflight Experimenters' Meeting: The 10th meeting was held in Hqrs. 7/13 with representatives of NASA Hqrs., Centers, scientific community, and contractors attending. MSC representative's presentation on their Experimenter Guidelines document was not too well received - particularly by representatives of experimenters. They considered the document a hindrance - not a help. As a consequence, the group requested (and MSC agreed) that it have an opportunity to review and recommend changes before the document is released.

MSFC was requested by Dr. Jocelyn R. Gill to host the 11th Inflight Experimenters' Meeting to be held sometime late in Oct. or early in Nov. This office has informed Dr. Gill that MSFC would be happy to host the meeting. When the dates are selected a formal invitation to Dr. Gill and her group will be extended.

3. OMSF Supporting Development (SD) Quarterly Review: The Quarterly Review was held at MSFC on 7/11, with representatives from Hqrs. (George Trimble and his immediate staff), MSC, KSC, and MSFC. The stated purpose was to discuss budget planning for the FY68 and FY69 Programs, and complete technical planning for formulation of the FY69 Program. Financial histories of the FY67 Program were presented and problem areas discussed. This implementation record was utilized to emphasize the effort and planning which will be required for OMSF to initiate a \$50M level Supporting Development Program, which is currently programmed for FY69.

Closer and continuous working relationship between advanced studies and supporting development groups was emphasized as being needed to formulate more meaningful future supporting development programs. A follow on meeting is planned for 8/11 in Hqrs. to discuss program planning guidelines and requirements. Center representatives of advanced studies and supporting development groups will attend. A planning and reporting format is to be jointly developed by the Center groups and presented at the meeting for review and acceptance by Hqrs.

NOTES 7-17-67 KUERS

No significant items to report.

1. S-II SIDEWALL INSULATION TELEVISION COVERAGE: It is very desirable to visually observe the S-II sidewall insulation for defects. Existing TV capability appears to be adequate from the LUT side of the vehicle. The opposite side is covered only by general surveillance cameras not capable of high resolution and close-up evaluation of defects. Major improvements in coverage are required. Negotiations with KSC have been initiated.
2. S-II INSULATION: During the S-II-1 weld inspection, the sidewall insulation was removed in certain areas to facilitate inspection. After restacking the stage on July 11, the sidewall insulation was reverified for CDDT by a 5 psi test. The insulation successfully passed the test on the first attempt.
3. S-II DUCTS: It has been decided by MSFC and NAA/SD that the lox fill and drain duct and the LH<sub>2</sub> suction ducts will be redesigned. For 501 the lox fill rate is being reduced from 5000 gpm to 3500 gpm, and all ducts are being x-rayed and visually inspected.
4. S-II FRACTURE TOUGHNESS PROGRAM: The S-II Stage Fracture Toughness Program suffered a major setback when it was discovered that the welded panels prepared by NAA/SD Manufacturing have excessive weld peaking. The panels are being inspected to determine how much, if any, of the welded material may be used in the fracture toughness study. NAA/SD has found panels of 2014-T6 of 0.310 inch thickness which are being prepared to replace the ruined specimens; a new delivery schedule is to be given to NASA today.
5. SATURN V ORDNANCE: An explosion occurred at Explosive Technology, Inc., Santa Clara, California, resulting in two deaths and destruction of the linear shape charge facility. Explosive Technology is the vendor producing the Saturn V S-II stage first and second plane separation linear shape charge and the Saturn V common ordnance confined detonating fuse (CDF) manifold and tee. Initial feedback from the vendor does not indicate that the accident will impact delivery of hardware to meet Saturn V schedules. Responsible Space Division and MSFC personnel will continue to monitor hardware status.
6. ORBITAL WORKSHOP: Preliminary planning for the OWS Delta PDR includes the following significant events:
  - July 28 - Status review to NASA Hq.
  - August 1-8 - Review and approve Part I CEI Specs.
  - August 18 - Second status review to NASA Hq.
  - September 12-15 - Delta PDR (Spec and Drawing Review)
  - July 28-Sept 28 - Update OWS Mockup
  - September 28-Oct 4 - Crew Station Review
  - October 17-19 - Delta PDR Design Review Board
7. SATURN 501 LOX REPRESSURIZATION: The S-IVB-501 lox tank repressurization module has been re-orificed and the repressurization period extended in order to reduce the repressurization gas velocity such that low gravity surface instabilities will not be encountered. The problem of low gravity surface instabilities has been emphasized, and the Saturn-501 modifications result from knowledge gained from our supporting technology program "Project Thermo."

POP 67-2

MSF is developing new AAP program guidelines for POP 67-2, as a result of Congressional actions to date, which indicate a substantial reduction, between \$75.M and \$120.M, from the MSF request of approximately \$455.M for AAP in FY 68. Because of this change in baselines, the submission date for POP 67-2 will be delayed by 2 weeks to August 7.

NATIONAL ACADEMY OF SCIENCES SUMMER STUDY ON SPACE APPLICATIONS.

We have arranged, at your request, MSFC participation at the Woods Hole Study being conducted by the NAS. After our people return this week, we will prepare a summary that will bring you up to date on the Summer Study - its objectives, content, mode of operation, participants, expected results, etc.

MINIMIZING COST OF POST APOLLO PROCUREMENT.

On May 10, General O'Connor sent you a Memo implementing a study of MSFC resources utilization, with John Goodrum selected as chairman for this effort. The broad objective of this study was to determine the most efficient utilization of our facilities and resources in order to minimize costs at a reduced vehicle delivery schedule.

Beginning this month and the next month, our prime contractors will be submitting proposals for the Post Apollo vehicles. We feel sure, that if our contractors were aware of the Goodrum study and that he had full Center support, their proposals would be influenced towards a lower target cost. To gain full psychological advantage of this study effort, it appears that the Goodrum study should be given emphasis in such a manner that the contractors will learn about it while preparing their proposals.

With this in mind, Goodrum should be officially and openly identified with this effort and be expected to check into all program aspects susceptible to cost reductions.

NOTES 7/17/67 RICHARD

IU/S-IVB Debris Study: As a result of this study, which was discussed at a meeting with the R&DO laboratories and IO on Friday, the following conclusions were reached:

a. There is a high probability that the S-IVB stage will explode after we lose control unless something is done to prevent it. This will occur sometime after spacecraft separation and the 7 1/2 hour I. U. lifetime.

b. For all LOR missions, if it does not explode, the probabilities are that 38 percent will impact the moon. Of the 62 percent that miss the moon, 50 percent will re-enter and impact the earth on the first pass. The probability of earth re-entry increases with successive passes.

There is definitely a hazardous situation involved for which a solution does not presently exist. To guarantee a solution to eliminate the above risks will involve considerable work and hardware impact. At present no groundrules or directives exist on which to make a sound decision about eliminating either. It would not be desirable for R&DO to spend a lot of effort on solutions unless we have some assurance that we will be allowed to implement. A lunar-earth impact solution proposal was made some time ago by Aero-Astrodynamic Laboratory and was turned down.

Dr. Rudolph's people are aware of the problem as discussed in the July 14 meeting. We are currently drafting a memo to him with our recommendation that the Program Office take the necessary steps to establish mission groundrules to accept the hazards as they exist, or to put all S-IVB stages in a safe condition following spacecraft separation and eliminate spent stage lunar impact or earth re-entry for all LOR missions. Once this is done, R&DO will then proceed to take action as required.

NOTES 7/17/67 RUDOLPH

1. AS-501 Launch Vehicle at KSC:

- o Roll-out has been rescheduled from Monday, 7 August 67 to Monday, 14 August 67, due to spacecraft problems. All subsequent events, including launch will be delayed 7 days.
- o S-II-1 Stage insulation was successfully proof tested to 5 psig on Wednesday, 12 July 67.

2. AS-502 Launch Vehicle at KSC:

- o S-II Stage was erected on Tuesday, 11 July 67.
- o S-IVB Stage was erected on Thursday, 13 July 67.
- o IU was erected on Friday, 14 July 67.
  - Inspection of EDS distributors revealed 3 broken screw heads which had been glued (epoxy) back in place. All IU distributors are now being inspected for similar discrepancies.

3. S-IC-T Stage at Huntsville: A static firing of the stage is scheduled for Thursday, 27 July 67.

4. S-II-3 Stage: Was shipped from Seal Beach on Wednesday, 12 July 67 and is scheduled to arrive at MTF, Thursday, 27 July 67.

5. Automatic Fault Isolation: The Saturn V Program Office, in conjunction with the Boeing Company and the R&DO Labs have developed the automatic fault isolation techniques to the demonstration phase. About two weeks ago Dr. Gruene witnessed a demonstration of the technique and appeared quite impressed. Dr. Debus is now scheduled to hear the presentation and later see the fault isolation demonstration (at the Breadboard) on Thursday, 20 July 67.

## NOTES 7/17/67 SPEER

1. AS-501 LAUNCH VEHICLE SOFTWARE INTERFACE TEST (SIT): The MSFC Flight Control Team for AS-501 participated in the SIT on July 11. The test included command system and telemetry testing from the MILA site and the Mission Control Center (MCC-H). No major compatibility discrepancies between the launch vehicle and the flight control network were detected during the test, however the launch vehicle cutoff command for an overspeed case may require an onboard software change before the command will be honored in the time period near the computed time of cutoff. Due to several holds, crew fatigue and an interface problem associated with the RCA 110A and the LVDC the last phase of the test was rescheduled for July 12 and completed on that date.
2. AS-501 MISSION RULES REVIEW: The review of AS-501 Mission Rules (both launch and flight) to be conducted by General Phillips and General Bolender is now scheduled for August 15 at KSC. We still have a number of flight rule items being worked within MSFC. It is understood that the Saturn V Program Office is nearing a recommendation on the MSC request that provisions be made to save the spacecraft in the event of a J-2 engine hardover condition prior to or during second burn. The flight control action (if any) associated with an S-II second plane separation failure also must be addressed prior to the review.
3. AS-204/LM-1 LAUNCH MISSION RULES: The preliminary launch mission rules for AS-204/LM-1 have been published by KSC. The package is now being reviewed by all affected MSFC elements. Comments and final inputs are due to KSC on July 28, and we expect to meet this date.
4. LAUNCH COMPLEX 39 ANEMOMETER DATA: The latest information from KSC is that the capability to transmit pad 39 anemometer data to MSFC will be implemented by September 1, 1967.
5. LUNAR LANDING MISSION OPERATIONS REVIEW: The first session of a review of the Lunar Landing Mission Operations by the Science and Technology Advisory Committee, an advisory group to Dr. Mueller chaired by Dr. Townes, was held on July 9 and 10 at JPL. MSFC presentations were given by Mr. Richard and Mr. McCool of R&DO and Mr. Crenshaw of the Saturn V Program Office on the launch vehicle and by Mr. Kurtz of our office on the Huntsville Operations Support Center. The MSFC presentations seemed well received. The second session on this subject will be held sometime in September.

NOTES 7-17-67 Stuhlinger

1. ATM: The major subject of discussion at the PI meeting at the Lockheed Research Laboratory (Rye Canyon) on 7/11-12 was the thermal design situation. At the 7/13 ATM review by Chuck Mathews at Boulder, Mr. Mathews sized up the situation by saying: "The ATM is in serious trouble." One PI (AS&E) solved the problem for his instrument by a brute-force approach (compensatory internal heating with considerable power consumption); GSFC is relatively insensitive to the thermal environment and does not require an active heating system; the other three PI's, together with members of Ball Brothers Corporation, made a very urgent request for a decision regarding the approach to be taken in the thermal design; for a more meaningful description of the thermal environment inside the canister; and for a better coordination between individual thermal design efforts by PI's.

2. EMR: Jesse Mitchell's letter of 6/28, requesting MSFC to make a study of astronomical payloads for ATM-type missions, was followed by a visit by Dick Halpern and Roland Chase (Halpern's successor) of OSSA to IO (Jack Waite) on 7/13. William D. Green of Chuck Mathews' office also discussed Mr. Mitchell's letter during his visit to MSFC on 7/12. Mr. Green will serve as the OMSF coordinator for the requested study. Members of ASO and SSL attended the meetings with the visitors. The study should cover the following missions: a second ATM-A flight; 2 EMR-type flights; a 40" stellar telescope; and a large solar telescope. It is interesting to note that the most recent version of the OSSA Prospectus planning shows the following tentative flight sequence: ATM-A; EMR-1; ATM-B; 40" stellar ATM; EMR-2; 32" solar ATM; one flight per year.

ATM-A vehicle and cluster concepts should be retained as much as possible in the follow-on ATM astronomical payloads. Overall responsibility of the study is with IO; major support must come from ASO, SSL, and other labs. Inputs from GSFC, Princeton, and other places will be needed in connection with the 40" telescopes. The primary purpose of the study is to enable Dr. Seamans to approve a follow-on Manned Astronomy Program, a program in which this Center is vitally interested.

3. EMR VEHICLE MODE: In reply to your recent verbal question: The first integration contractor study of EMR, finished a few weeks ago, suggested as the preferred mode a two-vehicle flight (revisits to the first cluster) which would carry the manned CSM, resupplies, rack with EMR systems, and LM. We are preparing for you a note which describes this mode in more detail. We have been working closely with IO in connection with the EMR mission planning. The EMR concept has been presented to the OMSF Mission Planning Task Force and another EMR presentation is scheduled later this month to the MPTF.

## NOTES 7/17/67 TEIR

APOLLO 5 (SA-204/LM-1) WORKING SCHEDULE: The working schedule was received from Gen. Phillips on 8/12/67. The LM-1 ascent stage has been returned to Grumman Aircraft Engineering Corp. for repair of excessive leakage in the oxidizer ball valves causing an approximate two week slippage in the launch date. The following revised working schedule major milestones have been established; LM/LV mechanical mate 8/29/67; CDDT 10/2-4/67; and FRT 10/9-12/67.

AS-207/206 DUAL LAUNCH MISSION: It is anticipated that the planning pace of this mission will quicken since we now have a firm schedule as defined by APD 4-G, and since APD 4-G states we will continue with both the hardware and software development and production for this mission as if it were the primary mission rather than an alternate for AS-503. MSC has recently stated they want to plan an on-time launch for this mission and not utilize the 14 minute launch window on the first launch day opportunity. They have stated that on the third day opportunity they would be willing to utilize part of the launch window. The basis of this is primarily due to the complexities associated with the rendezvous using launch windows. The launch on time capability that has been discussed in Saturn V will also have to be pursued on the Saturn IB.

OVERALL TEST (OATS) ELECTRICAL SUPPORT EQUIPMENT: We have identified OATS equipment at LC-34 and LC-37B which does not have an officially recognized design center. These items should be under MSFC cognizance since OATS equipment and stage configuration are inseparable. Because most of the OATS equipment is the responsibility of MSFC, we proposed to KSC that we assume the responsibility of the remaining OATS equipment and odd items for proper control. KSC accepted our proposal in principle and G.E. is currently preparing interface control documentation and other documentation on those items which did not have proper drawings.

BETA TEST STANDS ESCAPE SYSTEMS: Reference is made to my notes of 7/3/67 (copy attached) on escape systems for possible use on Beta Test Stands at SACTO. McDonnell-Douglas Corp. will install the slide-wire type system on both test stands. The system, as presently planned, will consist of four wires, two exiting the tenth level and two exiting the fourth level. These wires will be located at corners opposite the stand stairways. A "fireman's pole" between the fourth and sixth levels will provide rapid access to the fourth level wires. These locations were determined by an analysis of the troubleshooting which could be required after the stage is fueled. Effort is being expended to have the system completed on Beta I by the scheduled 8/16/67 S-IVB-504N firing.

NOTES 7/17/67 WILLIAMS

1. George Trimble Visit:

We had a very profitable three-day meeting with Mr. Trimble on July 11, 12 and 13. The areas of activities covered included SRT/ART, Advanced Studies and Future Plans (long-range plans). He expressed a strong desire to tie these three areas much closer together, i.e., study those things which are associated with the long-range plans as well as devote much of the SRT/ART effort in support of the Advanced Study related design/systems.

During Mr. Trimble's visit, we also worked out the overall plans for his portion of the Hideaway Meeting. I reviewed what we propose that MSFC present and he agreed with our plans.

July 24, 1967

124/67 w/ comments barman

NOTES  
MR. GORMAN'S COPY  
JUL 24 1967

No comments marked  
for DEP-A

NOTES 7/24/67 BALCH

B 7/28

S-IC-5 Testing - Propellant load test is still scheduled for 7/24/67 and 7-26-67. Target date for static firing has been changed from 8/8/67 to 8/9/67. Stage is still expected to be removed from stand on 8/24/67. ✓

S-II-3 Stage - Stage is now expected to arrive at MTF on 7/27/67 and to be installed on the A-1 test stand the following day. ✓

B-1 Position of S-IC Test Stand - Tentative completion dates for various portions of the B-1 position of the S-IC test stand have been received from the Corps of Engineers. All except work on the grounds is expected to be complete by 12/1/67. ✓

GE Support Contract - NASA Headquarters approval of supplemental agreement covering first quarter of Fiscal Year 1968 is expected this week. GE's CPAF proposal for remainder of Fiscal Year 1968 is expected today. Draft of Incentive Evaluation Plan for the CPAF contract has been reviewed by MSFC representatives, and their comments were favorable. ✓

Railroad Strike - Nationwide railroad strike last Monday, 7/17/67, did not impact delivery of any MTF mission critical materials. ✓

B 7/28

MDA DOCKING PORT PROBE/SLA CLEARANCE: Among the solutions developed for the MDA docking port probe/SLA clearance problem was to "flush mount" port #1 (LM port) and extend LM docking tunnel by about 15 inches. This was proposed to MSC through the Structures Sub Panel and will probably be rejected due to LM mods. An alternate is to build a new payload shroud consisting of a "203 type" nose cone and a cylindrical section approximately 12 feet long.

ORBITAL WORKSHOP (OWS) AUXILIARY ATTITUDE CONTROL SYSTEM:

The current baseline includes an Auxiliary Attitude Control System (AACS) to stabilize OWS for docking and to effect a  $\pm 20^\circ$  local vertical hold for OWS in the gravity gradient mode. Also, we are looking at such a system to effect a solar vector orientation of the OWS during Mission A to help solve thermal and power problems of the OWS. McDonnell Douglas Corp. (MDC) and IBM are studying bi-propellant systems, and Martin/Bendix are looking at a control moment gyro system possibly augmented with a small cold gas system for docking stabilization. Studies are due to be completed by Aug. 15. I will provide additional details by separate memo.

MDA/AM FLIGHT ITEM ALTITUDE CHAMBER TEST: At Mr. Thompson's (MSC) request, we agreed to examine an MDA/AM flight hardware integrated altitude chamber test (MSC proposes to do this at McDonnell). Subsequent to our agreement, Mr. Mathews forwarded a TWX indicating his desire that such a test be conducted at McDonnell.

CLUSTER THERMAL COMPUTER MODEL: The computer tapes for the Cluster thermal model, developed by MSFC and the Payload Integration Contractors, have been transmitted to MSC for their use.

LOCAL SCIENTIFIC SURVEY MODULE (LSSM): Mr. Webb visited the Bendix Plant at Ann Arbor, Michigan, July 20, while attending a symposium at the University of Michigan, and drove the LSSM powered mockup. (Photograph attached).

A five day Lunar Shelter and Extravehicular Manned Test was conducted at Lockheed, Sunnyvale, in June 1967. Boarding and debarking tests, with the subject at 1/6 g. (simulated) in a pressurized hard-suit, were easily accomplished.

ONE "G" TRAINER FOR MSC: MSC has agreed to the MDC cost estimates and requirements for the one "g" Orbital Workshop trainer. Estimated delivery date for the trainer is mid-December 1967.

TWO-LEVEL ORBITAL WORKSHOP: A review of Two-Floor Level OWS held at MSFC July 18 resulted in a coordinated MSFC/MSC recommendation to be presented at the Delta Preliminary Design Review Status meeting on July 28 here at MSFC.

SEB PRESENTATIONS: SEB presentations on the Payload Integration contractor for Phase "D" were made to Dr. Mueller/Mr. Webb on July 19 and 20. Both contracts were previously extended until Sep. 5. No word is available on when the final selection will be announced.

Attachment: For Dr. von Braun's copy only

Loss  
Change of  
overall  
vehicle  
aerodynamics  
configuration?  
How serious  
is that  
in Aero-Astros  
view?  
B

Please  
do B

Please  
describe  
B

F-1 ENGINE Negotiation of the F-1 engine delivery contract stretch-out which extends the Apollo engine deliveries five and one-half months was completed on July 20, 1967. The stretch-out allows the engine delivery rate to remain at two engines per month rather than increasing to three and would offset a production gap between future procurements. Negotiations were terminated in April 1967 because of an unacceptable overhead pricing technique used by the contractor. A revised method of pricing was accepted by the Government in the subsequent negotiation. ✓

H-1 ENGINE The stability test program is continuing. Engines will be tested at Neosho and at MSFC in order to isolate whether the instability is facility oriented.

LOX seal cavity inspection for corrosion in H-1 engines installed on SA-204 has been completed. Laboratory analysis being performed at Michoud to determine if there are any corrosion products present will not be completed until early next week. ✓

NOTES 7/24/67 CONSTAN

B  
7/28

The prime and two backup crews for the AS-205 mission visited the Michoud Assembly Facility Wednesday, July 19, for a technical briefing on the Up-rated Saturn I first stage. The astronauts were welcomed by Dr. Constan and briefed by Chrysler personnel. The astronauts were Walter Schirra, Donn Eisele, Walter Cunningham, Tom Stafford, Eugene Cernan, John Young, William Pogue, John Swigert and Ronald Evans. Representing MSFC were Col. Tier, Jim Stamy, Art Thompson and Jim Sisson.

After attending the dedication ceremonies of the new Paris Road Bridge, Gov. John J. McKeithen visited the Michoud Assembly Facility Friday, July 21, for a brief tour conducted by Dr. Constan and Chrysler and Boeing officials. Accompanying the Governor were Mr. Gus Weill and Mr. H. D. Ruffin of his office and Mr. James W. Moore, vice chairman of the Louisiana Board of Highways Mississippi River Bridge Authority. ✓

NOTES 7/24/67 FELLOWS

B  
7/28

1. Research and Development Plan for the Lunar Drill: On July 20, R-DIR approved a Research and Development Plan (RDP) for distribution and use as the "first issue" RDP for the Lunar Drill. Some portions of the plan cannot be completed during the current Phase B while the two concepts, rotary and rotary percussive, are still being considered. However, following the selection of one concept at the beginning of Phase C, during the first of CY-68, a complete RDP will be issued for the remaining phases (C & D) of the Lunar Drill Project. ✓
2. MSFC/KSC Mutual Assistance Program: On July 14, Mr. Siepert forwarded the first request to Marshall for Saturn launch support by R&DO people within the intent of your agreement with Dr. Debus. This initial request contained the names, work statements, and other pertinent information concerning the proposed duties at KSC in support of the Saturn 501 launch by 13 specified laboratory technical people. The laboratories have been asked to respond at the earliest possible time whether or not the selected individuals can be released from their present duties for the length of time requested by KSC and have been encouraged to do so. Where selected individuals cannot, for some reason, be released, the laboratories have been asked to propose highly qualified alternates. ✓

1. Flight Mechanics Panel Meeting: The Twenty-First Meeting of the FMP was held at MSFC on July 12 and 13, 1967. A resume of some of the more important items from the meeting is as follows: 1. The L/V and S/C Program Managers are being requested to emphasize the formulation of checkout procedures, etc., to accommodate an on-time (or near-on-time) launch which is required for the Apollo/Saturn rendezvous mission.

2. The FMP will expedite studies on the following AS-503 candidate profiles and make a recommendation on which one to implement for the mission: (a) S-IVB restart for a 10 sec burn with S/C attached ~ 90 min. after orbital insertion (in the event that S/C checkout requires more than 90 min. the second burn will occur at ~ 180 min.). (b) S-IVB restart for a 30 to 40 sec burn, S/C attached, with a  $45^\circ$  yaw attitude ~ 90 min. after orbital insertion and a second restart after LV/SC separation. (c) Perform two S-IVB restarts after LV/SC separation, with a first burn of ~ 50 sec. Due date for the FMP recommendation is August 14, 1967.

3. The FMP will coordinate a meeting for an overall review of Apollo/Saturn IV and V (i.e. L/V and S/C) one-engine-out and EDS problems. This will include Crew Safety Panel, Mechanical Panel and other MSFC & MSC personnel. Date for the meeting is Thursday, August 10, 1967, at MSFC.

4. MSC agrees that the S/C has no requirement to reduce the maximum S-IC longitudinal acceleration on AS-502 below a  $3 \sigma$  value of  $4.840g$ 's. (The service module aft bulkhead problem is being "fixed" by MSC).

5. The LV/SC interface signals relating to flight mechanics are being reviewed and updated on all Apollo/Saturn IB and V missions. The minutes of the meeting have been distributed in Memo R-AERO-P-286-67, dated July 13, 1967. ✓

B  
7/28

1. NAA/SD RELIABILITY & QUALITY ASSURANCE CONTRACT REQUIREMENTS:  
A meeting will be held here on July 26, 1967, with NASA Headquarters, Code KR (Weiss) and MAR (White), KSC, and MSC to discuss commonality of reliability and quality assurance requirements for the CSM and S-II stage. ✓
2. KSC QUALITY AND RELIABILITY ASSURANCE EVALUATION: For the next two weeks we, together with MSC, will be participating in a quality and reliability assurance evaluation of KSC which is being chaired by NASA Headquarters. This evaluation is to be geared to determine the effectiveness or weaknesses of the Q&RA operation at KSC. After the completion of their evaluation all NASA Centers except MSFC will have been evaluated, and it is expected that MSFC will be evaluated sometime in October. ✓ The MSC evaluation, in which we also participated, was completed in June. The primary finding of the evaluation of MSC was the lack of a single or central organization to assure implementation of NASA's Q&RA policies and directives within the Center and associated contractors. ✓
3. FLIGHT CONTROL COMPUTER: IU-503 computer experienced a failure during checkout which is attributable to a cracked solder joint. On further inspection, many other cracked joints were found on this unit. This is the first functional failure we have seen on flight hardware due to cracked solder joints. We are inspecting additional computers and the findings may require the computers from IU-204 and IU-501 to be removed and inspected. The failure mode appears to be similar to what we experienced on the RCA-110A, i.e., excess stress through thermal expansion without stress relief. The fix may consist of re-soldering with a "Berkebile sleeve" (tubelet), in order to reduce the stress per unit area. Astrionics is working on this problem with I.O. and ourselves. ✓
4. PRINTED CIRCUIT BOARD SOLDERING: Tests are in progress to determine the limits of the tubelet repair method. After more than 200 cycles from  $-55^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$  no cracks could be observed. Control samples without tubelets under the same conditions experienced 92% cracks. At the completion of these tests we plan to obtain a specification change which would require the use of the tubelet to reinforce unsolderable component leads such as Kovar, nickel, or brass to prevent costly malfunctions and repairs. ✓

DF

I hope the  
Wojtalik  
action gets  
on top of  
this, so  
there won't  
be a  
schedule  
impact  
B

B  
7/25

1. Visit with Mr. Mathews. In addition to the ATM experiment problems, which we discussed with you on Friday, we also reviewed with Mr. Mathews the ATM Star Tracker. He concurred in our contractor selection but directed that we should not commit any money for this procurement action until the budget situation is resolved. ✓ He also indicated that the most recent budget submission showed a two months schedule slip and on that basis holding up procurement on the Star Tracker would not impact the launch schedule. ✓ Based on similar reasoning, Mr. Mathews also stated that no money should be committed for the 4 Pi computer. We will proceed with these actions short of signing the contracts. ✓

2. Control Computer for AS-503. During tests at IBM, the spare unit operated intermittently in one channel. This malfunction was due to a cracked solder joint around a relay pin. The unit has been returned to the Astrionics Laboratory and, together with the Quality Laboratory, we will attempt to determine the cause of the cracked joint. Dependent upon our findings, it may be necessary to reinspect the computer for AS-501. ✓

S-IVB (MSFC)

The flight type (503) burner was received last week. Testing will begin this week. ✓

MODERATE DEPTH LUNAR DRILL PROJECT

The Westinghouse contract on the Rotary Concept of the drill is waiting for approval of the D&F from Headquarters procurement. ✓

S-IVB (SACTO)

The acceptance firing of S-IVB-504(N) remains on schedule for August 15, 1967. McDonald Douglas Corp. plans to have the "slid-wire" stand escape system installed prior to the acceptance firing of S-IVB-504(N). ✓

S-IC STAGE (MTF)

The S-IC-5 stage lox tank was entered last week for pre-loading inspection of the lower lox anti-slosh baffle at the fill and drain inlet. Propellant load test is scheduled for July 25 and 26. The working schedule for the static firing is August 3, but the official firing date is August 9. ✓

S-IC STAGE (MSFC)

Test preparations and checkouts are being performed for the scheduled S-IC-T firing. ✓

S-II STRUCTURAL TEST PROGRAM

The test pad excavation and preparation to pour the slab is progressing rapidly. ✓

DAMPER ARM

The test on the ML-2 redundant hoist and control console was successfully completed Friday, July 21. Present schedule is for this equipment to be on dock KSC August 14. The schedule for the complete ML-3 system calls for an on dock KSC delivery of October 24, 1967. ✓

SATURN IB APOLLO ACCESS ARM

The modified prototype environmental chamber to mate with the modified Apollo Command Module door was received on July 18, for test. The access arm components are being assembled for installation into the test stand and preliminary checkout is scheduled to start August 2, and be completed by September 20, 1967. ✓

HOLDDOWN ARMS

The test on Holddown Arm No. 2, which had minor cracks repaired by welding at ME Lab successfully passed the load and functional test. Arms 4 and 6 are still at ME Lab and welding difficulties are being experienced on Arm 6 due to cracks after welding. ✓

KSC has requested Jack Connor and three key test engineers to support them at KSC. This will impact the testing of Lanyard Mods for 502, the swing arm simplification program, and the Flow 3 Tail Service Masts. Based on our knowledge of the situation, it appears that these people could be more help to the program here rather than at KSC. We will let KSC know of the problems they are creating here and let them decide which activity is most important. ✓

NOTES 7-24-67 HOELZER

B 7/28

NEGATIVE REPORT.

1. Manned Space Flight Experiments Board (67-4 Meeting): MSFEB met on 7/17. Items of major significance to MSFC are:

a. Dr. Mueller asked, and the Board agreed, that henceforth, as part of the compatibility assessment conducted by the Flight Program Office, an assessment of experiment development and integration costs as well as the sources for such funds and their potential availability be presented to the MSFEB. ✓

b. Efforts to establish an experiment priority or ranking are continuing. Each Program Office (OSSA, OART, OMSF, DOD) is to submit to Doug Lord, MT, a list which ranks each of their sponsored experiments. Doug Lord will convene a working group of senior representatives, to be designated by each Program Office, for the purpose of inter-mixing each list into a consolidated priority or ranking. ✓

c. An EVA Committee will be established at MSC to come up with an integrated EVA test and experimentation plan which will be distributed to other agencies for modification and review. Also discussed was the establishment and membership of a committee on space contamination (beyond the ATM problems) as a general category of interest. ✓

2. S-027 Galactic X-Ray Mapping Experiment: As reported in Notes of 7/17, an informal review of the experiment was scheduled with Dr. Kraushaar and MSFC representatives for 7/18. The meeting covered all aspects of the work and a number of action items were identified. Generally, work is progressing satisfactorily; however, there is a potential data transmission problem due to limited contact time over any one station (approximately 8 minutes) at the planned orbital altitude. Astrionics is looking into this matter. ✓

3. ATM Contamination (MSFC Experiment # 66): Status of work was reviewed last week in a meeting with SSL and Dave Novik of OART. It is planned to complete the necessary documentation in time to have the experiment on the agenda for the Sept. MSFEB. ✓

4. Gravity Substitute Workbench (MSFC Experiment # 57): Experiment initially was based on forced air in an enclosed cabinet creating a gravity like work surface. Chrysler later proposed an electrostatic technique and the experiment - combining both schemes (either/or at any given time) - has received preliminary approval from OMSF. Experiments Office of OMSF is now attempting to locate 50K to fund Chrysler design effort. ✓

B-7/29

NOTES 7-24-67 KUERS

1. LEM Ascent Engine: ME Laboratory personnel participated in the review of the instability and manufacturing problems of the LEM ascent engine at Bell Aerosystems Company, Buffalo, New York. Our preliminary findings from the manufacturing standpoint are that the injector nozzle, which is made of 2219 aluminum, is assembled with far too many welds which make it very difficult to prevent the injector head from distorting during fabrication. Additionally, we feel improvements can be made in the drilling of the orifice holes and in some of the machining aspects. It is doubtful if the injector in its present design can ever be satisfactorily manufactured. Surveillance will be maintained by this Laboratory to aid in solving problems. ✓

2. Neutral Buoyancy Facility: The floor pad (foundation) for the new neutral buoyancy tank has been completed in the mock-up building. Delivery of the preformed steel for the side walls of the tank is expected in approximately 3 weeks. ✓

3. Out-of Vacuum Electron Beam Welding: The development of this equipment at Westinghouse was supported by SR&T funds from ME Laboratory. The first welding machine of this kind was delivered to us recently and a successful demonstration of welding of 1/4" aluminum plate was performed in our shop last week. ✓

W.K.

What's the principle of this method. I had thought a vacuum was mandatory for electron beam welding  
B

NOTES 7-24-67 LUCAS

B 7/29

1. PARTS PROGRAM: Mr. E. W. Bisson, General Electric Company, who is preparing an AAP Parts Program Plan for NASA Headquarters, visited MSFC and discussed his draft with some of our parts council members. Their approach to the parts program is the same as ours. The MSF centers will implement this plan by placing requirements upon the Experiment Development centers, contractors, and other AAP participants.
2. S-II PNEUMATIC CONSOLE SET (S7-41): The full open failure of a secondary regulator during A-1 test stand check-out at Mississippi Test Facility (MTF) has led to emergency action by Industrial Operations. Full flow relief valves will be required in all stage oriented circuits in the S-II stage ground support equipment. Installation is mandatory at ML-1 prior to SA-501 flight and at MTF A-1 stand prior to S-II-3 static firing.
3. S-IC GOX FLOW CONTROL VALVE SEALS: Dr. Rudolph decided to fly S-IC-1 with the lox incompatible seals because the valve delivery schedule to KSC would not support the 501 schedule. Materials Division has passed six sets of twelve of the fourteen seals. The other two have one reaction out of twenty and are recommended for use. Materials Division will also certify the seals to meet MSFC SPEC-106 except for the two which will be waived.
4. S-II SPRAY FOAM INSULATION: The 8-foot diameter tank has been completed and shipped to McDonnell/Douglas Corporation (MDC) for testing. A meeting is scheduled at MDC on 7-24-67 to finalize the test procedure and schedule.
5. S-IC PNEUMATIC CONSOLE: A relief valve system to protect the ground support equipment and stage must be installed for 501, and a 10-day launch delay is predicted.
6. NUCLEAR GROUND TEST MODULE: A meeting between MSFC, SNPO-Cleveland and SNPO-Washington was held at Germantown on Monday, July 17. Specific topics were the Interface Control Documentation Specification and NERVA engine-to-stage interface. The MSFC proposed interface policies were generally accepted without adverse comment.
7. S-IVB ORBITAL WORKSHOP: Meetings were held to further define the Orbital Workshop crew quarters configuration for two levels. The configuration that will be proposed to Mr. Mathews on July 28 will be the present aft location in the tank with crew quarters inverted to provide a common floor for alternate use of opposite sides.
8. AS-204 PULL TEST: The second pull test on AS-204 was run on 7-17-67. The real time display of bending moment at the LIEF was successful. Strain data indicated that the strain-to-load relationship was satisfactory. Pull tests on AS-204 indicated that the vehicle is stiffer than previously expected.
9. SATURN V LEM-A ENGINE STABILITY: Mr. Bob Richmond of P&VE has been assigned to Bell Aircraft at Buffalo to participate in the LEM-A stability work. The injector system is unacceptable due to four factors: (1) Injector does not damp consistently with a bomb induced instability. (2) Gouging of the ablative material near the injector face. (3) Isp deficiency of 1.2 seconds. (4) Manufacturing reproducibility has not been achieved.

A. Rudolph  
What risk  
is in -  
volved  
here?  
B

CURRENT STATUS: UPRATED SATURN IB VERSUS TITAN III-

PRODUCTION RATES - There are feelings in both OSSA and NASA Headquarters that a 4x4 rate (4 Uprated I's and 4 Saturn V's) is overly optimistic. Therefore, we are currently developing cost estimates based on a 3x3/4x3 rate using the same logic as applied in your letter to Dr. Mueller. ✓

MSFC ACTION ITEM - OSSA SENIOR COUNCIL MEETING AT LERC, JUNE 13, 1967.- As you know, MSFC received an action item to send Dr. Newell a set of Saturn cost figures. Vince Johnson informs us that the figures contained in the Mueller memo to Newell will suffice. However, he did express interest in cost rates based on a 3x3/4x3 production rate, which we intend to furnish. ✓

KSC LAUNCH COST FOR A FIFTH SATURN I PER YEAR - Norm Rafel, MSF, has expressed doubts regarding the \$2.9 M cost to launch one additional Saturn I per year. We have asked Mathews, KSC, to reconfirm the KSC estimate which he had done. ✓

UNFAVORABLE PUBLIC STATEMENTS - As you have noted, recently there have been several published articles regarding the preference of Titan III and the cost being 1/2 that of an Uprated Saturn I. Reference also: Statements made by KSC's Director for unmanned launches. To effectively change this image of a 1 to 2 cost ratio, between Titan III and Saturn I, we might have to revise the cost distribution presently contained in our budget for the follow-on program. This would require Center internal agreement as well as agreement with Headquarters. ✓

→ Please go about this  
B

B-7/29

NOTES 7/24/67 RICHARD

S-IVB/IU-LEM-CSM Checkout: With regard to the discussions Friday on checkout practices of MSC and MSFC, we have reconfirmed the following facts with Dr. Speer's people and with KSC:

a. The ACE remote equipment is removed from the LEM about 21 hours before liftoff on AS-204. (This reduces checkout activities to after-liftoff type control.) !!

b. The ACE remote equipment is removed from the S/C 54 hours prior to liftoff on AS-501. but astronauts are in S/C! ✓

c. The S-IVB/IU will have approximately 200 flight control measurements. ✓

d. The LEM and S/C will have about 400 each flight control measurements. (The LEM measurements are not used until we are through with the S-IVB/IU on the lunar mission.) ✓

Checkout in the KSC sense ends -54 hours on the CSM and -21 hours on the LEM. The LEM won't be looked at again thoroughly until after it is manned.

↳ in circumlunar orbit!!  
B

B 7/29

1. AS-501 Launch Vehicle at KSC:

o Major schedule problem developed Thursday, 20 July 67, as result of KSC assessment of S-IC/S-II mandatory pneumatic changes outstanding against AS-501. Impact initially stated Thursday, 20 July 67, as 19 day launch delay.

o Revised Friday, 21 July 67, impact 8 to 10 day launch delay.

o Expect KSC to complete hard look by Wednesday, 26 July 67, for firm schedule position.

o R&DO looking at alternates that might offer schedule relief yet not compromise the safety aspects. ✓

o Level 1 (Phillips) decision required if all schedule impact cannot be eliminated. Briefing folder prepared over week end for Monday, 24 July 67, 10:00 am, delivered to you per Shepherd's request. ✓

It's down to zero days, according to a call I had from Debus B

2. S-II Stage Pulse Arc MIG Welding: We have established high priorities on completing the certification for Pulse Arc MIG welding for the #6 cylinder to LH<sub>2</sub> bulkhead. The program has been shortened by using the test results from MSFC weld samples. The certification of S&ID weld samples is still pending; expect completion 10 November 67. Efforts are underway to accelerate this activity, including development of a work plan by S&ID and MSFC which, for example, could base earlier approval for the use of MIG on 70% successful test results. High level support to S&ID from ME Laboratory is mandatory to accelerate the use of MIG. ✓

3. S-II-3 Stage - will be on-dock MTF on Thursday, 27 July 67. ✓

4. S-IC-T Stage - will be test fired on Thursday, 27 July 67, at MSFC. ✓

5. SA-502 Launch Vehicle at KSC - Electrical mate of all stages is scheduled for Monday, 24 July 67. ✓

6. The July Performance Report for AS-504 shows a 100K payload capability. ✓

NOTES 7/24/67 SPEER

B 7/29

1. LUNAR LANDING MISSION OPERATIONS REVIEW: The second session of the Science and Technology Advisory Committee review of the Lunar Landing Mission Operations will be held on August 11 and 12 at the Santa Cruz campus of the University of California. This session will cover the mission from earth launch through lunar touchdown. MSC has requested Mr. Casey of our Flight Control Office to present (on August 11) the flight operations functions of the Booster System Engineers for the lunar mission. This is being coordinated with R-TO and I-V. ✓

2. AAP TECHNICAL SUPPORT TO MSC FLIGHT OPERATIONS: MSC (Kraft) has responded to our counter proposal on the method of providing AAP technical support to MSC Flight Operations. Kraft accepted our proposal in principal. We have now to work out the details of the support and make a recommendation for modifications to the MSC/MSFC Inter-Center agreement on flight control. ✓

3. TV SURVEILLANCE OF S-II INSULATION: A R-P&VE initiated test was conducted at KSC on 7/17/67 to determine the possibility of detecting failures in the S-II insulation (cracks, bubbles, debonds) with TV cameras looking at the 501 vehicle. Video was relayed from KSC to the HOSC for viewing by P&VE engineers. Although all of the scheduled cameras could not be used due to lighting limitations, the viewers termed the test as being quite successful. Necessary actions to determine feasibility and possible implementation at the pad are being conducted by R-P&VE and the Program Office. ✓

NOTES 7-24-67 Stuhlinger

B 7/20

1. SATCON: H. Williams and Chisholm conducted tests on July 20 at SATCON to determine if possible the breakdown of Pegasus A. By varying the sequence of commands they found that a certain command sequence enabled them to get information in and out of memory which seems to indicate the problem is in a faulty gate circuit. The command sequence has been changed and the memory of Pegasus A will remain useful. ✓

2. VOYAGER: Dr. Hale gave a presentation to the Voyager Team on Voyager Science Package Development on July 20, 1967. He also gave the same presentation on July 21, 1967, to the Voyager Monitor Coordinators. He conducted a meeting dealing with photo imaging on July 21, 1967. The central point of the presentation was that we need to consider very specialized materials for the Voyager scanning platform and that the present anticipated rates of data return (15,000 bits per second) severely constrain the photo imaging experiment. ✓

3. ANNUAL LEAVE: I will be on vacation from July 24 through August 11. Mr. Gerhard Heller will be in charge of SSL during my absence. ✓

SA-204 PULL TEST: Pull test operations on SA-204 vehicle commenced on July 17, 1967, and were completed on July 18, 1967. The operations consisted of both a static load test and a dynamic response test. Preliminary real time observation and analysis indicates that the SA-204 vehicle is stiffer than theoretically determined. The expected effect of this vehicle condition is considered to be generally beneficial. The impact of this added stiffness on vehicle dynamics and wind launch criteria will require detailed analysis before any official conclusions can be published. ✓

ASTRONAUTS VISIT TO MICHLOUD: CCSD conducted an S-IB-5 stage briefing which included a hardware inspection for the AS-205 prime and backup crews at Michoud on July 19, 1967. The CCSD briefers did an excellent job and the crew left well pleased not only with the material presented but also were quite impressed with the safety, reliability, and design concepts of the booster as well as the confidence CCSD and MSFC have in their hardware. ✓ Crew participants included the prime crew (Schirra, Cunningham, Eisele) and two backup crews (Stafford, Cernan, Young, and Pogue, Swigert, Evans). Art Thompson, Jim Sisson, and I attended from Huntsville. ✓

S-IB STAGE HYDRAULIC SYSTEM CONTAMINATION: We continue to have problems with contamination of the hydraulic fluid by particles below ten microns in size. It has been determined that the ground support equipment at Michoud is the primary generator of the contamination. Also, it is felt that the type of fluid used may contribute to the contamination. CCSD has initiated action to tear down, clean, and install three micron filters and dehydrators in all GSE used for filling and checking out the hydraulic systems. They have also initiated action to change the fluid in all flight systems on S-IB-4 and subs. The new fluid will have a rust inhibitor. Two systems on S-IB-4 have been reserviced at KSC by KSC GSE which has been determined to be clean. The other two systems will be reserviced prior to launch. ✓

NOTES 7/24/67 WILLIAMS

B -  
7/29

1. Nothing of significance to report.

July 31, 1967

NOTES 7/31/67 BALCH

7/31/67

B  
8/12

S-IC-5 Testing - Propellant load test was started on 7/25/67 but was discontinued when it was discovered during RP/1 loading that the stage fuel emergency drain duct had collapsed. Replacement duct is on hand and will be installed as soon as the findings of investigation to determine cause and corrective action have been verified. RP-1 loading is tentatively rescheduled for 8/2/67, with LOX the following day, but prospects of meeting this schedule are marginal. Target date for static firings has been changed from 8/9/67 to 8/11/67 because delay in completion of propellant load test. ✓

S-II-3 Testing - Stage arrived at MTF on 7/27/67 and was installed in the A-1 Test Stand on 7/28/67. Power-up is scheduled for 8/11/67 with LOX/LH<sub>2</sub> tanking on 9/2/67 and first static firing (50 seconds) on 9/11/67. ✓

Maintenance Management Plan - The MTF Maintenance Management Plan has been published and is ready for distribution. Arrangements are complete for conducting a training session on the plan for appropriate NASA, Boeing, North American and General Electric personnel. ✓

G. E. Support Contract - Supplemental agreement covering first quarter of Fiscal Year 1968 has been approved by NASA Headquarters for July, with approval also of the options for August and September. Total estimated cost for entire quarter is \$8,407,000, including a fixed fee of \$398,000. GE's CPAF proposal was received on 7/24/67, and evaluation of proposal is expected to be completed today. Target date for transmission of our pre-negotiation position to MSFC is 8/4/67. ✓

7/31/67

B 8/12

ATM FOLLOW-ON PROGRAM STUDY: A meeting will be held at MSFC on Aug. 7 with OSSA, Princeton, Northwestern, Arizona, Smithsonian, GSFC, and MSFC to discuss spacecraft requirements and telescope specifications for a follow-on ATM. ✓

ATM EXPERIMENTS: During an ATM thermal meeting at MSFC July 26 between MSFC and Ball Brothers Research Corporation (BBRC), it appeared that a workable thermal solution may be reached within the next month. Both MSFC and BBRC will study this subject further with another meeting the middle or latter part of August. ✓

ATM ACE/MANUAL TRADE OFF: Met with Lockheed on results of ACE versus manual checkout trade-off studies requested by Mr. Mathews for ATM. Either approach is feasible, dependent upon the availability of an ACE station and added funding (\$6.0M). The manual system will probably be used for ATM. ✓

DR. MUELLER'S REVIEW WITH PRINCIPAL INVESTIGATORS (P. I. 'S): Dr. Mueller and Mr. Mathews met, July 27, with four of the ATM P. I. 's to review the Harvard College Observatory (HCO) proposal for a down-graded experiment on the first ATM flight. Mr. Jesse Mitchell from OSSA was there. The HCO proposal was considered acceptable to all of the P. I. 's and particularly favored by GSFC and American Science & Engineering. Naval Research Laboratory was requested to provide a similar proposal to NASA by Aug. 4. MSFC was requested to review its position for doing the simplified HCO experiment in-house. If this is not possible, HCO favors going to BBRC. ✓

AAP HEADQUARTERS'S LUNAR MISSION STUDY TEAM: The Ad Hoc Lunar Mission Study Team presented to Dr. Mueller on July 29 its recommendation that work start at once on an unmanned LM, an extended manned LM, and lunar surface exploration equipment; i. e. LSSM, Lunar Drill, and Lunar Flying Unit. Suggestions were made on how the AAP lunar program should be approached, and a desire was expressed to show a better flow of the science activities from Apollo to AAP. We will provide a separate briefing sheet on this topic. ✓

AAP SUMMER CONFERENCE ON LUNAR SCIENCE AND EXPLORATION: The 1967 AAP Lunar Summer Conference sponsored by MSC, which will provide a specific update of lunar exploration requirements from the 1965 Falmouth Summer Conference Program, will be held July 31 to August 12 in Santa Cruz, Calif. A small exhibit showing our projects and present work on LSSM, Lunar Drill, and Lunar Flying Unit will be on display. ✓

PAYLOAD INTEGRATION CONTRACT: Plans are being made to negotiate the Payload Integration contract with Martin-Marietta Company on Aug. 9 to reach a go-ahead date of Sept. 5 on the Phase "D" scope. ✓

MULTIPLE DOCKING ADAPTER (MDA): We received from McDonnell-Douglas Corporation the MDA/AM interface drill template last week. ✓

J-2 ENGINE The Saturn V Level II Change Control Board disapproved Engineering Change Proposal (ECP) 603, checkout of the helium regulator at 1500 psi (min.). This means Rocketdyne will not verify engines for flight. Extensive testing has shown that regulator diaphragm life is greatly reduced when the regulator is cycled at pressures below 1500 psi, A Center meeting will be arranged with Dr. Rees in an attempt to resolve this problem.

Eberhard  
Result?  
B

The second test of a planned four-test series at AEDC last Wednesday, July 26, was cutoff by the GG over-temperature device. This condition was attributed to an over-chilled GG LOX line, resulting from interaction with the chill systems of nearby components. Inspection of the fuel turbine revealed some erosion. The fuel turbopump must be replaced prior to the next firing; however, the engine may be replaced as it has well exceeded its expected life. In either event, we should be firing again next week. ✓

H-1 ENGINE LOX cavity inspection has been completed on all H-1 engines installed on S-IB-4, -7, -8, -9, and -10. All engines on S-IB-5 and -6, and part of the engines on S-IB-11, and -12 remain to be inspected. The recently completed inspection of S-IB-4 revealed that one engine must be returned to Neosho for cleaning of the LOX and lube seal cavities while two engines require additional inspection at KSC to provide positive assurance that they are in satisfactory condition. The other five engines on S-IB-4 have been dispositioned as satisfactory.

A current production configuration engine was fitted with 24 channels of quick response, high frequency instrumentation for use in the instability program at Neosho. A calibration test and a bomb test were conducted on this engine on July 26. The calibration test was normal, and indicated a sea level thrust of 208K. The bomb test damped satisfactorily. The test was terminated by a recorder observer just milliseconds after it damped. Instrumentation in the engine was damaged by the detonation delaying additional bomb tests until instrumentation repairs are completed.

A new 205K engine is being instrumented with quick response, high frequency instrumentation for instability tests at MSFC early next week. ✓

F-1 ENGINE The fifth engine for S-IC-8 was delivered on dock at MAF on July 25, 1967. This was the second engine delivered to MAF by truck. ✓

NOTES 7/31/67 CONSTAN

7/31/95

B 8/12

Nothing of special significance.

NOTES 7/31/67 FELLOWS

B 2/12

7/31/67

1. MSFC Conference on Support Services Contracts: On July 27, approximately 300 laboratory and Center staff representatives attended this conference to bring everyone concerned up to date on our achievements, deficiencies, and policies related to the management of the support services contracts. The key points made were that although MSFC has done a real good job in managing the services contracts, there have been aspects which we can improve on; and that cost control, both in fact and appearance, has significantly increased in importance and will be increasingly emphasized in the management of these contracts. The findings of the General Accounting Office have far-reaching affects on our activities, and Mr. Gorman reminded the conferees of the courtesies which should be observed and the manner in which Marshall employees should respond to GAO requests for information. NASA Headquarters was represented at the conference by Mr. George Vecchetti, Director of Procurement; Mr. Donald Kornreich, Office of Industry Affairs, Policy and Regulations Division; Mr. Neil Hosenball, Assistant General Counsel for Procurement Matters; and Mr. Ron Schwartz, Attorney in the Office of General Counsel. Informal comments following the conference indicated an increased appreciation of the scope of national interest and the consequences of the manner in which these contracts are managed. ✓

2. MSFC/KSC Mutual Assistance Program: Two requests, for a total of 47 people, have been received thus far from KSC for AS-501 support. The first request was for 13 selected individuals and the second was for 34 jobs without names. The laboratories are identifying qualified individuals to match the jobs in the latter request. The first R&DO representative in this support program is expected to depart for KSC on August 7. Details of response status will be furnished separately to your office. ✓

7/31/67

B 2/12

1. Mission Planning Task Force: Highlights of the MPTF meeting at Headquarters on July 24, 25, and 26 are: Several alternate profiles for Cluster II at  $50^{\circ}$  inclination were reviewed. While dual launch of the OWS plus CSM is accepted, a launch of the OWS two to three months prior to the CSM launch will reduce the launch facility congestion. MSC presented a CSM designed for 90 days weighing approximately 47,500 lbs. which for  $50^{\circ}$  inclination is about 5000 pounds more than the capability of the Saturn IB with minutemen strap-ons. Mr. Mathews emphasized the need to keep CSM modifications to a minimum, relying more on OWS supplies; especially power supplies. The MSC proposals for a 2 1/2 stage ascent to orbit to gain payload for manned flights, and the "cluster without workshop" essentially developing a new space station from an integrated Airlock - Multiple Docking Adapter were presented again, but somewhat de-emphasized by Mr. Mathews. The technical merits of both are questionable because the 2 1/2 stage ascent to orbit would result in structural problems and the space available in the MDA is not comparable to that in the workshop. Mr. Mathews expects MSFC to work on an Apogee kick without waiting for an official assignment. This would hopefully solve the still existing payload squeeze, e.g. OWS + App-A has a 3000# deficit, ATM-B plus App-B has a 5000# deficit for  $50^{\circ}$  inclination even when Minuteman strap-ons are used. Further systems analysis work is required from MSFC: Mounting of larger solar arrays on the S-IVB; Review of equipment and experiment locations for possible inclusion into OWS instead of the CSM, AM, MDA as proposed by MSC; Analysis of data handling and communication subsystems; and determination of the capability to launch the OWS a couple of months prior to the CSM flight. ✓

NOTES 7-31-67 GRAU

B8/12

7/31/67

No submission this week.

B 2/12

1. Saturn Solder Connection Investigation. The systematic investigation of mission critical electronic assemblies has been initiated as per your direction. The investigation will be essentially limited to an inspection of solder connections or printed circuit modules and will provide additional information on the present quality of our designs. Based on Dr. Rees' request, a more complete status report on this subject is being written and will be available on 8/1/67. ✓

2. ATM Thermal. Representatives from Ball Brothers (BBRC) and NRL visited MSFC last week to discuss the thermal problems of the NRL experiment. BBRC personnel expressed concern about the defocusing of their prime mirror due to thermal gradients from the solar energy. Use of ultra low expansion (ULE) material from Corning is expected to solve this problem. A closer nominal shroud temperature of 60 plus or minus 3°F has also been stated as a goal to minimize any defocusing based on the ground calibration temperature. Previously, BBRC indicated a plus or minus 1°F shroud temperature change for 15 minutes was necessary for acceptable experiment bending limits. The newly stated requirement is plus or minus 10°F per orbit (approximately 92 minutes) from the nominal temperature. MSFC will size the thermal system based on these requirements. Your call last Friday to Dr. Mercure seemed to have a very significant effect and the atmosphere at our meeting was conducive to a good technical interchange. ✓

3. ATM Experiments. Dr. Mueller called a meeting with the PI's in Washington on Thursday. Representatives from MSFC attended. He cited the new Harvard position, i.e., to fly a less sophisticated instrument on the first ATM. The planning is to fly a modified OSO-D experiment and the changes are to take advantage of the astronaut to allow offset pointing and also obtain photographic data. NRL (Mr. Purcell and Dr. Brueckner) agreed to provide a less sophisticated instrument for the first ATM and considerations mentioned were Aerobee experiments and modified NRL "A" or NRL "B" experiments. Dr. Tousey will return from Europe this week and he will formulate a definitive NRL posture. Dr. Mueller assured the PI's that a second ATM would fly and that the presently planned sophisticated instruments could fly on that vehicle. Present planning should be based on a late CY-69 launch for the first ATM and a year later (at the earliest) for the second ATM. Dr. Reeves of Harvard stated that schedules for the sophisticated HCO experiment for the second ATM are essentially impossible citing the prospect of reduced funding and the BBRC capacity. The capacity of BBRC was frequently discussed. MSFC personnel will be at Harvard this week to get details on the modified OSO-D experiment. In so far as it is technically sound, MSFC will standardize the ATM design and make only minor changes for the second ATM. ✓

4. ATM Task Team. Since the definition of the HCO and NRL experiments has been somewhat occluded, I am requesting by memo to Mr. Belew that the Task Team efforts be held in abeyance until there is a clearer base from which to work. ✓

B 8/12

7/31/67

S-1C STAGE (MTF)

Collapse of the fuel emergency drain duct on the S-1C-5 stage at MTF during fuel loading July 25, 1967, caused the propellant load test to slide until August 2 and 3. The duct failure was attributed to a vacuum created during facility fuel recirculation. Static firing is now scheduled for August 11, 1967. ✓

S-1C STAGE (MSFC)

Test preparations and checkouts of the S-1C-T were performed last week to the point that all systems are approaching readiness for the static firing scheduled for August 1, 1967, at 3 p.m. ✓

S-11 STRUCTURAL TEST PROGRAM

The S-11 structural test pad and associated facilities construction is progressing on schedule. ✓

S-1VB (SACRAMENTO)

The acceptance firing of S-1VB-504 (N) has slipped one day to August 16, 1967, due to a modification to the J-2 engine P.U. valve. No other delays are anticipated. ✓

S-11-3 (MTF)

S-11-3 arrived at MTF on July 27, 1967, and was positioned in the A-1 Test Stand on July 28, 1967, without any problems. S-11-3 Processing Plan Review was conducted July 26, 1967. Space Division revealed that 5,663 hours of work consisting of TAR's CNC's, and MCR's remained to be completed. Only 2,737 hours were reported at the Seal Beach turn-over meeting.

*K.H. Shalever that  
got led back stands  
for!  
B*

S-1VB (MSFC)

The first O<sub>2</sub>H<sub>2</sub> burner test (S-1VB-H05) 503 flight type, was conducted on the S-1VB Test Stand on July 25, 1967. O<sub>2</sub>H<sub>2</sub> burner cutoff occurred prematurely at 166.4 seconds (planned duration 250 seconds). The cause of cutoff is under investigation. ✓

ACCIDENT IN VALVE SHOP

Mr. Phillips, Valve Mechanic, suffered a fractured skull as the result of a fall while working on a valve at the shop. ✓

*K.H.*

*Please prepare get-well letter  
for my signature B*

NOTES 7-31-67 HOELZER

7/31 XΔ

B 8/12

NEGATIVE REPORT.

NOTES 7/31/67 JOHNSON

7/31/67

B 8/12

Nothing of significance to report.

7/31/68

B 8/12

Stainless Steel Ducts at Solar:

Following our rule of management by exception, we surveyed the manufacturing techniques for the fabrication of various stainless steel ducts at Solar because a high number of discrepancies in manufacturing had been found recently at this place. This survey was done jointly with members of NAA, P&VE, and QUAL. We reviewed thoroughly with our welding and tooling engineer the total manufacturing plan. Here are the major results of the review:

a. It was found that the tooling was very marginal for production of quality hardware. The mechanically expanded back-up bars would not exert enough pressure to prevent distortion and offset during welding. Concepts and sketches for pneumatically operated, segmented internal back-up bars (as being used at ME and NAA) were forwarded and discussed. Solar has started immediate redesign of their tooling. ✓

b. Approximately 90% of the welding is being done by hand. We recommended and Solar agreed to use more automatic welding techniques in the future. Automatic welding requires more and better tooling and more expensive welding equipment, but would result in better and more consistent weld quality. It would also require more precision to be built into the component parts for a weldment. ✓

c. It was recommended to roll planish the welds. Solar will establish a program for incorporation of this technique into their manufacturing program. ✓

d. It was also found that the method of measuring weld offset was not very good and accurate. Solar accepted the recommendation to investigate the use of an offset measuring device presently in use for the S-II circumferential welds. ✓

In general, the Solar Company has been very responsive to the recommendations of this joint NASA/NAA team. We will follow up on the actions taken by Solar and expect visible quality improvements soon. We plan to survey more companies where records of excessive MRB actions or other deficiencies exist. ✓

9/11/31

B 8/12

1. F-1 ENGINE - R&D INJECTOR SUSTAINS SELF INDUCED INSTABILITY: An R&D injector incorporating increased baffle coolant sustained an undamped, self-induced instability during a test at Rocket Engine Test Site, Edwards Air Force Base on July 24, 1967. Three previous tests had been conducted successfully on the injector. The thrust chamber was damaged considerably, and the injector baffles were bent up to 3/4 inch. The present F-1 production injector configuration is unaffected by this incident. ✓
2. FIRST NASA AEROSPIKE THRUST CHAMBER TESTS: The first two aerospike thrust chamber tests in the NASA Advanced Cryogenic Rocket Engine Project (NAS8-20349) were conducted on July 25 and 26. Test conditions were set conservatively in view of the recent thrust chamber test failure in the USAF Advanced Development Program. Achieved conditions in the first test were 550 psi chamber pressure, mixture ratio of 2.2, and run duration of 200 milliseconds. The test hardware appeared undamaged and data records indicated chamber operation was satisfactory. The second test was scheduled for 600 psi chamber pressure, 2.5 mixture ratio, and a duration of 700 milliseconds. Preliminary indications are that the test was successful. ✓
3. ORBITAL WORKSHOP - CREW QUARTERS: As a result of the PDR, MSC was assigned an action (RID B-2a) to revise the crew quarters (CQ) floor plan for the one-level Orbital Workshop. At the invitation of MSC, we participated in a review of the redefined CQ floor plan on July 24, 1967, at MSC. Three primary areas reviewed were the food management (FM)/waste management (WM) areas and the location of FM/WM equipment. Astronaut Jack Lousma and the Crew Systems Division personnel recommended installation of all required functional equipment in the MSFC Orbital Workshop mockup and that a 3 to 7 day simulation be conducted. The astronauts have volunteered to be crew members during the simulation. ✓
4. S-II-1 INSULATION WIND TUNNEL TESTS: Preliminary results of wind tunnel tests made by R-AERO on S-II-1 type insulation panels with simulated defects have resulted in no defect propagation. ✓ Similar wind tunnel tests by NAA started on July 27. ✓
5. FRACTURE MECHANICS PROGRAM FOR S-II: Our program is essentially complete with the Tiffany (Boeing) data being the only really outstanding data to be included. We have been promised the Tiffany data, in a preliminary state, on or about August 15, 1967. We will send people to Boeing/Seattle to be present when Tiffany does his testing (scheduled for August 10-12). Although we have not received any data from LeRC, we have done the same thing they will do, and our work is complete. According to Bill Brown's man who visited us on July 13, the LeRC specimens are so small, 1½ x 3/4 inch, that he believes our data are more accurate than his. ✓
6. SATURN V DYNAMIC TEST PROGRAM: On July 26, 1967, the last test time point was completed on the DTV program. (Configuration II time point 16, pitch mode). This latest series of tests, i.e., Configuration II testing, with the command/service module interface modified with four additional sway braces, has indicated that the stiffness in roll has been improved considerably and the longitudinal to roll coupling virtually eliminated. ✓ The DTV facility will be maintained, intact, until after the launch of AS-502, as agreed between R&DO and IO. Final test reports will be submitted by Boeing during the next 90 days. ✓

NOTES/7/31/67/MAUS

7/31/68

B 8/12

DEPARTMENT OF DEFENSE'S (DOD) MANAGEMENT CONTROL  
SYSTEM DOCUMENT

At the request of NASA Headquarters, we are currently coordinating the review and evaluation of a DOD developed specification which describes the government's management information requirements which large DOD contractors will be required to meet. In general, it is expected that these requirements will be applied to new R&D programs in excess of \$25 million and production programs in excess of \$100 million.

The principal objective of the system documentation package is to establish a common set of procedures that can be used by all government agencies involved in large industrial procurement activities. ✓

VOYAGER MANPOWER - According to the agreement between OSSA and OMSF on the Voyager Project, MSFC's level of direct manpower at the end of FY-67 would be within 50 to 75. MSFC charged 124.5 personnel to the Voyager Project during the month of June 1967, which is 49.5 over the agreed level. ✓

H.M.

→ Probably alright as long as we stay below the final level

B 8/12

B 8/12

NOTES 7/31/67 RICHARD

7/31/67

AS-501 Plugs-in Space Vehicle Test: This test was run last Friday with some unexpected results in the launch vehicle area. The first portion of the run was intended to test early staging of the S-II off of the S-IVB. Because a wrong time bias was used in the system (between the LVDC and the ground computer) the command to early stage was given during the S-IC burn and was ignored by the system. The crew faked the engines out on the S-II, but the stored test program continued to show five engines burning. This impossible conflict, plus the missing early staging command, caused the system computations to "blow up."

The time bias has been corrected, and the test procedure altered. The test is being rerun again today. We are working with the Cape to get Saturn V detailed testing methods in line with the system capabilities, but this particular set of circumstances caused this result.

L.R.

Do we have a reasonable assurance that we catch all possible flaws of this nature prior to launch?

B

## NOTES 7-31-67 RUDOLPH

7/31/67

B 8/12

1. SA-501 Pneumatic System (GSE) Changes - Your phone call to Dr. Debus and my phone call to Mr. George Stoner served to get the right attention to the pneumatic system (GSE) changes. ✓ KSC presented a solution within present schedule and mutual commitment was agreed to on Wed., 26 July 67. I consider the issue closed unless some unforeseen problem comes up. Follow-up is established in both the S-II and S-IC stages. Mr. Doug Lamb was appointed by P&VE for special technical follow-up during change installation. Mr. Sparkman and Mr. Fanning were named by KSC to a similar technical follow-up. ✓
2. Saturn V Flight Control Computer - Cracked Solder Joints - As you are aware, we experienced a flight control computer failure in S-IU-503. This failure was attributable to a cracked solder joint. Inspection resulted in determination that over 50% of all relay leads to PC board solder connections were cracked. Mr. Fred Wojtalik (R-ASTR) has been appointed the technical manager to solve this problem. R-ASTR and R-QUAL laboratory personnel have developed a flange tubelet method to fix the problem which, based on successful qualification, will be implemented on SA-501 spare flight control computer, beginning 31 July 67. The spare computer is now in ECI, St. Petersburg, Fla., undergoing preparation. We are working to complete the rework, acceptance testing and return the computer to KSC by 9 August 67. The currently installed flight unit will then be reworked at ECI and allocated as the SA-501 spare. KSC is aware of this problem and assessing the impact against their overall schedule. ✓
3. AS-501 Launch Vehicle at KSC - KSC encountered problems in running the space vehicle overall test (OATS #1). As a result, a decision was made Fri., 28 July 67, by KSC to re-run limited parts of the OATS #1 test today, Mon., 31 July 67, to obtain additional required data. ✓
4. S-II Sidewall Insulation TV Coverage - (Reference NOTES 7-24-67 Speer, copy attached) We have initiated a requirement with KSC for additional TV camera coverage to detect insulation cracks on the side away from the LUT for evaluation of possible defects which may occur, prior to the launch of AS-501. ✓
5. S-IC-T Captive Firing - Has been rescheduled to Tue., 1 August 67. ✓

7/31/67

B 8/12

1. OPERATIONAL COMMUNICATION SYSTEMS AUDIT: The NASA Audit Office at KSC has performed an audit of several operational communication systems including LIEF. The draft report recommends certain cuts in communication lines and a re-assessment of the need for LIEF. Some of the reasoning is based on incomplete knowledge of our actual need and some is due to the fact that the lines were used much less than expected due to launch delays in 1967. We have prepared necessary corrections to the draft and will attend a meeting to discuss the report with OTDA on 8/1. Due to the short time available, complete coordination with KSC has not been possible, however, we have discussed and agreed with Rod Middleton (John Shinkle's successor) on the principal course of action. It appears that Dr. Debus is in favor of a reassessment of LIEF at a later time and he may approach you on the subject in coming weeks. I hope we can prevent undesirable perturbations on LIEF as we are approaching some of the most important missions to date. ✓

2. AAP OPERATIONS: Concerning your question to my notes of 6/26 (copy enclosed); it is not deemed necessary to bring up the necessity of an AAP Operations Panel at the forthcoming hideaway. I will inform you separately in more detail on the approach we have agreed to take within MSFC. ✓

3. DR. GATES VISIT: Dr. Gates, JPL was here on 7/27 for a one-day visit to discuss his plans for the Voyager Mission Operations System and pertinent interface areas with MSFC and with spacecraft vehicle systems. Mr. Newby, Dick Smith and others attended. We agreed that some of the material Dr. Gates presented would be of great value for our engineering personnel (e.g. recognized pitfalls in the ground operation of earlier JPL spacecraft designs) and that such material, suitably expanded, would be presented to interested MSFC personnel. ✓

4. REORGANIZATION OF NATIONAL RANGE DIVISION: DOD has replaced the National Range Division (NRD) with a new organization headed by Gen. Huston. He will be in charge of operations for the Air Force Space Command and will have seven directorates. The Ranges and Space Support Directorate is in effect the old NRD. Gen. Huston will also serve as the DOD Manager for Manned Space Flight which will include Eastern Test Range (ETR), Western Test Range (WTR) and Department of Defense Manned Spaceflight Support Office. Davy Jones will be in charge of ETR and will also be Deputy DOD Manager for Manned Space Flight. ✓

1. ATM: I attended the PI meeting with Dr. Mueller on July 27. OSSA was represented by Jesse Mitchell and the members of the ATM Program Office. This meeting seemed to be the basis for a decisive clarification of the ATM Program. The major points are (a) two ATM flights should be considered with approximate flight dates in December 1969 for the first, and a year later for the second flight. (b) Harvard intends to fly the present ATM experiment on flight 2 and a simpler experiment similar to the UV Experiment of OSO-D on ATM flight #1. This has been endorsed by OMSF and OSSA and Harvard has been asked to submit their proposal. They had already begun work on this at the time of the meeting. Jesse Mitchell will initiate action with the Solar Physics Subcommittee. I have a report of the OSO-D payload and I am going to distribute copies to ASTR and IO. (c) NRL has not made a commitment for flight #1. They intend to fly their present instruments on flight #2. Present thinking of NRL for flight #1 goes in the direction of utilizing the same scientific flight objectives and the same hardware presently designed. The main change is that not all the goals have to be met for the first flight. NRL will begin work on a proposal after the return of Dr. Tousey on July 31. NRL emphasized that the thermal design effort should continue intensively in order to meet the requirements for the thermal environment of the instruments. (d) High Altitude Observatory was not represented at the meeting. (They can meet the schedule for the first flight, except for the unresolved thermal interface.) (e) The other PI's of AS&E and GSFC agreed to the Harvard proposal. Both PIs can meet the first flight without changes and are not affected by the change of the Harvard instrument. (f) The ATM-H $\alpha$  telescope was discussed and fully endorsed and requested by all PI's. Harvard intends to fly the H $\alpha$  telescope #1 as presently planned, with a field of view of 10 to 15'. The ATM-H $\alpha$  telescope should provide an image of the whole sun for the astronaut, with a field of view of 30 to 35'. ✓
2. WILMARTH VISIT: SSL was visited on July 26 by Mr. Vern Wilmarth of the OSSA Lunar and Planetary Program Office. Mr. Wilmarth has been sponsoring four SR&T studies within SSL, three of which may lead to direct flight experiments. He seemed to be well impressed with our work and favorably inclined toward continuous support. ✓

NOTES 7/31/67 TEIR

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7/31/67

INSPECTION OF ENGINE LOX CAVITIES ON S-IB-4: Reference is made to Mr. Brown's notes of 7/3/67 (copy attached) on H-1 engine LOX cavity contamination investigation. Inspection of the engines on S-IB-4 via boroscope and vacuum sweep has been completed. The results are that five engines will be used as is; the LOX seal will be removed from two engines (No. 1 & 4) this week for inspection and cleaning of the LOX cavities; and one engine (No. 8) will be returned to Neosho, torn down, the turbopump lube cavity cleaned, a "green run" performed on the turbopump, reassembled and return to KSC for reinstallation on S-IB-4. The turn-around for this engine is three weeks and the KSC Program Office has stated that this will not impact the launch schedule. ✓

REVISED KSC ON-DOCK DATES FOR SA-205 STAGES: A teletype was received from Gen. Phillips on July 28, 1967, revising the control milestones for the SA-205 stage deliveries to KSC from 11/30/67 to 12/31/67. This revision is based on a 12/31/67 CSM-101 delivery to KSC. ✓

ASTRONAUT OPERATIONAL HANDBOOK: At the S-IB-5 CCSD briefing for the astronauts, the astronauts asked if there was a book that could be used by them for orientation and training purposes. We have initiated action to provide such a handbook utilizing existing launch vehicle documents. It is anticipated that the handbook will be available by 11/1/67. ✓

NOTES 7-31-67 WILLIAMS

7/31/67

B 8/12

Negative report.