

August 5, 1968

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NOTES file

SEP 13 1968

NOTE TO : Dr. von Braun, DIR

FROM : Manager, Saturn/Apollo Applications Program, I-S/AA-MGR

The following is in reply to your question to I-S/AA Weekly Notes dated August 5, 1968, "What is Part II?", with reference to the ATM Follow-on Study.

The objectives of the ATM Follow-on Study are to assess the degree of maintainability which is feasible and its potential impact on the mission success probability, to determine the implications of operating follow-on ATM missions in conjunction with advanced Orbital Workshop configuration, and to consider operating modes.

The study is composed of three phases:

1. Phase I involved the generation of conceptual design alternatives for the first four missions, i.e., attached stellar UV, detached stellar UV, attached solar, and detached solar. Astronomical telescopes under consideration were studied from the standpoint of servicing and maintainability in space. (Presentation for Phase I is scheduled for September 23, 1968)

2. Phase II will provide more thorough analysis and design studies on four design concepts selected from Phase I. Complete mission and operational analysis will be performed covering each mission. A conceptual design systems engineering analysis and a resources, development, test and engineering plan will be provided for each of the four selected concepts. A preliminary analysis of the complement of x-ray and gamma-ray collectors is included. (Expected completion date is mid-December 1968)

3. Phase III will involve an in depth analysis of one preferred mission mode for each of the three mission areas--solar, stellar UV and high energy astronomy--selected in Phase II. (Expected completion date is mid-March 1969)

Dr. von Braun:

Lee answers your question. However, this is an area of a follow-on study or follow-on project that would more logically be handled in our new organization under the Science Directorate. This is another example that lends support to the need for a reorganization.

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Belew

Helen Weidner (closed envelope)

JTS
9-17-68



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NOTES 8/5/68 BALCH

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S-II-5 - Static firing has inadvertently terminated by a redline observer on 8/1/68 after 7.54 seconds from ignition. During the countdown, problems were experienced with instrumentation and the LOX vent valves, but these problems were overcome, and at the time of cut-off, all systems were operating normally. When the GN₂ purge initiated immediately after cut-off, a facility relief valve in the N₂ storage area opened and stack open for 11 minutes, rapidly depleting the GN₂ supply. Emergency dump procedures for both LOX and LH₂ were employed. Next static firing is tentatively set for 8/8/68. ✓

S-II-6 - Mods to Augmented Spark Ignition (ASI) lines have been completed on all engines except for required verification retests. Start of LOX screen mods was delayed until today. Power-up is still set for today and current schedules calls for cryogenic proof pressure test on 9/5/68 and static firing on 9/13/68. ✓

S-IC-6 - All POGO modification hardware has been received and installed. RP-1 loading is scheduled for 1:00 p.m. this afternoon, and static firing is set for tomorrow, 8/6/68. ✓

GE Service Contract - Amendment N0. 143 covering services during the 15-month period 7/1/68 through 9/30/68 was approved to NASA Headquarters on 7/26/68 and has been returned to MTF. ✓

Visit of General Accounting Office Representatives - Mr. G. F. Smith from General Accounting Office and Mr. Odom of the MSFC S-II Stage Office were at MTF this past week to discuss the S-II-T incident, as a part of the overall General Accounting Office review of selected Apollo accidents. ✓

Public Affairs - Mr. George Hunt and Mr. Charles Phillips of LIFE Magazine photographed the few seconds of the S-II-5 static firing on 8/1/68. ✓

Mr Jacques Tizion, French writer, editor and publisher, and his brother Michelle, photographer, visited MTF on 7/31/68 to update their information on activities here. ✓

NOTES 8/5/68 BELEW

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ATM EXPERIMENT: The Critical Design Review (CDR) for the Naval Research Laboratory (NRL) S-082 A & B experiments was held in Boulder, Colorado, July 29 through August 2. In addition to the NRL CDR, a Delta CDR was held for the High Altitude Observatory instrument. ✓

EVA RECOMMENDATIONS: The recommendation from the EVA Working Group chairmen to baseline EVA out of the LM hatch and to relocate the workstations has been sent to MSC for signature and should be to the Program Managers (Belew and Thompson) next week. ✓

WASTE MANAGEMENT SYSTEM PROPOSAL: An unsolicited proposal has been received from Republic Aviation (Division of Fairchild-Hiller) for the Saturn I Workshop Waste Management and Personal Hygiene Systems. The proposal is based on the interim operation of the Waste Management System in the MDA. Republic will submit the proposal to MSC also. ✓

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SATURN I WORKSHOP INTERFACE ID REPORT: A revised edition of the Saturn I Workshop Interface Identification Report was received from Martin-Denver last week. The report was reviewed with the MSFC AAP Inter-center Panel Co-chairman (Mechanical, Electrical, I&C) and was favorably received as a good means to status the total ICD situation. Pending further review, they may recommend expanding the scope to include the Airlock/MDA and the other flights associated with AAP. The report will be given wide distribution to obtain review comments from those involved in hardware design and definition. ✓

ATM FOLLOW-ON STUDY: A meeting was held at Martin-Denver on August 1 to discuss the ATM Follow-on Study with Dr. N. Roman, Mark Aucremanne, Roland Chase, and Bill Green of NASA Headquarters. Dr. Roman was favorably impressed with the study results to date. Of particular interest was the discussion of man maintainability studies presently being conducted for the six solar and one stellar experiments identified by Headquarters as contenders for future astronomy missions. The Headquarters people were informed about the criticality of the Part II tasks at Martin Company and a request was made for letter and financial support of this effort by OSSA. Mr. Aucremanne will discuss the possibility of supporting this study with Mr. Mitchell; however, he indicated that OSSA would hope that this study can be maintained under AAP funding since its results are not limited to astronomy alone but contribute to the definition of man's capabilities in space operation in general. ✓

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CSM PRELIMINARY REQUIREMENTS REVIEW: The Preliminary Requirements Review for the Command and Service Module was held at North American last week. The review covered mission and system requirements. Configuration of the modifications will be reviewed at a Preliminary Configuration Review to be held in September. ✓

NOTES 8-5-68 BROWN

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H-1 ENGINE - The current model of H-1 Engine Initiator which was developed by Special Devices, Inc. (SDI) to replace earlier models which are no longer in production, has passed all qualification requirements at Rocketdyne and a sample lot was forwarded to Franklin Institute for radio frequency (RFI) testing. Testing at Franklin Institute did not result in any failures; however, calculations indicated that a failure might be induced in the installed mode if a frequency of 50mega Hz was induced at a power level of 100 watts per square meter. Franklin Institute could not simulate this condition due to limitations of their test equipment. They also stated that it would be very difficult to do this and that the possibility of such an occurrence was very remote. Therefore, Rocketdyne and MSFC requested a waiver for this component which was forwarded to KSC on May 14, 1968. The KSC rejection of the waiver request was received at MSFC ten weeks later on August 2, 1968. A modification has been developed by MSFC to prevent inducement of RFI power into the initiator. This fix consists of grounding the cable shielding (which acts as a power receiving antenna) to the initiator body and engine. The fix can be installed in one shift at KSC without affecting the launch schedule. Formal approval by KSC is expected next week. ✓

F-1 ENGINE - All engines on S-IC-6 are ready for static test with the exception of the potentiometer on #1 Main Fuel Valve of engine 6044. This potentiometer has a slow closing time and was changed on Friday, August 2 with no impact on stage schedule. ✓

J-2 ENGINE - The analysis of the J-2 engine pressure transducer problem has revealed eight failures out of approximately two thousand transducers manufactured by Statham. The failure mode is a crack in the weld of a tube stub out to the transducer. Five of the failures have been attributed to a lack of penetration in the electronic beam weld. The other three failures have been determined to be caused by stress corrosion in the heat affected portion of the same weld. The stress corrosion failures have all been limited to the gas generator chamber pressure transducer which has a stress corrosion environment.

Rocketdyne has devised a mechanical backup seal that would prevent or minimize leakage in the event of either defined failure. This fix is being tested at Rocketdyne and the results will be known August 6. In the event the test results are favorable, this fix will be applied to seven transducers that could have mission impact on AS-205. ✓

The ultimate solution will be the incorporation of a high reliability transducer that has already been developed but is not available in sufficient quantity at this time to remedy the overall transducer problem. ✓

NOTES 8/2/68 CONSTAN

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Nothing of Special Significance.

8/5/68
1. Effect of Early S-IC Center Engine Cutoff on Base Heating: Re: Your question on item 3 of Notes 7/15/68 Geissler, copy attached. The effect of an early center engine cutoff ($T_1 + 125.2$ sec) for S-IC-503 on base heating has been investigated. Based on AS-501 and 502 flight data the early center engine cutoff increases the heating rates up to 30% in selected regions of the base for the remainder of the S-IC burn (nominally about 25 sec). This observed increase falls within the flight to flight variation and is at a low level of approximately 4.5 watts/cm^2 . At center engine cutoff, a momentary spike is observed in the base heating rates which decays in 2 to 3 seconds. The AS-501 flight operated for 15 seconds with the center engine off and the observed heating rates were no greater than AS-502 for the same period with all five engines operating. It is concluded that the $T_1 + 125.2$ sec center engine cutoff for S-IC-503 will not impose any more severe thermal environment than that encountered on the first two Saturn V flights. ✓

2. Advanced Degree: Judson A. Lovingood, Deputy Chief of the Astrodynamics and Guidance Theory Division, will receive his Ph.D. from the University of Alabama this month. The topic of his dissertation was, "Dynamical Polysystems as Generalizations of Control Systems." ✓

3. AAP Performance Improvements: Studies are presently underway to identify performance improvements that will help to alleviate the performance problem that exists on AAP-2. The plan of action consists of MSFC, Headquarters and MSC listing the potential improvements and associated system impacts for joint discussion at MSC on August 7, 1968. A potential improvement that is particularly promising is the utilization of an elliptic orbit which, in some cases, can yield payload gains of 3000 pounds. Some of the associated systems problems that need investigation relevant to the Cluster Mission are: a. Rendezvous Operations. b. Control moment gyro impacts, dump schemes, etc. c. Thermal environment. d. Availability of sunlight on an orbit by orbit basis (power and thermal considerations). e. WACS impulse requirements. f. Cosmic radiation effects on personnel and film. Studies to assess the impacts have been initiated. ✓

8/5/68

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1. PROPELLANT UTILIZATION SYSTEM EFFORTS: Activities of the PU System quality analysis teams are well underway. Teams are presently in the field investigating cleanliness control, quality control, and manufacturing activities at vendors, McDonnell-Douglas, North American-Rockwell, and Rocketdyne. The teams are scheduled to report findings and recommendations August 15, 1968. ✓
2. LEM PROGRAM: Personnel from Grumman Aircraft Corporation and Navy inspection personnel recently visited this Laboratory at the request of LEM program management of MSC for a briefing on the cracked solder joint phenomenon. The MSFC determined theoretical and actual cause of the cracking was illustrated and exhibited in detail. In addition, lengthy discussions were held on the MSFC developed "fixes" and inspection techniques to detect cracking. ✓
3. IBM-HUNTSVILLE DCAS SURVEY: A recent survey of DCAS at IBM-Huntsville revealed that DCAS is weak in the areas of receiving inspection and vendor control (subletters of delegation). DCAS stated additional personnel would be assigned to these areas. DCAS was found to be above average in the High Bay Area (manufacturing and installation). These areas are well controlled by DCAS with qualified, experienced personnel and a very good working system. ✓
4. SUPPORT TO MSC: As previously reported, at the request of MSC, this Laboratory is maintaining the quality efforts of Grumman, McDonnell-Douglas, North American-Rockwell, IBM, and Wyle Laboratories on Shell Stability Tests at Wyle Lab. The work is expected to be conducted on a 24-hour basis, seven days a week until the middle of September. ✓

8/5/68

1. CDR For NRL Experiments. The Critical Design Review for the NRL experiments was held last week at Boulder. No major problem areas were identified and the designs were in good shape. ✓
2. CSM PRR. The CSM Preliminary Requirements Review was held last week at NAA in Downey. One of the significant problems which was identified was relative to the landing impact and the problem associated with the ATM cameras violating the astronaut couch clearance envelop. This problem had been identified by MSC prior to the PRR and we have been in close technical discussions with MSC to get this problem resolved. ✓
3. S-IC Actuators. In reply to your comment on Col. James' 7/22 Notes, since late 1964, ASTR, QUAL and P&VE have been interchanging information and opinions on the problems associated with stress corrosion in the Saturn actuators, especially those for the S-IC stage. From the beginning, P&VE has recommended changing the actuator material to 7075-T73 aluminum, which, while less susceptible to stress corrosion, does not completely eliminate the problem. Redesign of the S-IC actuators was studied and several engineering problems arose such as contour, stage armoured harnesses and heat treating difficulties. In view of this fact and the lack of any failure experience on hydraulic actuators attributed to stress corrosion on other aircraft and missile programs, we took the stand that redesign was not necessary. This is documented in my memo to Mr. Weidner, dated July 26, 1966. However, manufacturing process changes recommended by Boeing as minimum requirements were implemented to reduce the susceptibility of the present materials to stress corrosion. These were closer machining prior to heat treatment, shot peening of certain surfaces and painting the exterior with a special paint. Four actuators on 501 and 502 had this complete modification and four had only the external painting. However, since recent test results have again raised the question of actuator failures because of stress corrosion, an agreement was reached on March 20, 1968, to have the actuators redesigned using 7075-T73 aluminum alloy. This has been implemented by Boeing change order and will be implemented on 506, 503, 504 and 505 will have Boeing actuators with the preventive modifications mentioned above. This note has been coordinated with the P&VE Materials Lab and we have, at all times, maintained close contact and cooperated with this lab in this and related matters. ✓

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ACCESS ARM NO. 9 Acceptance tests on Access Arm No. 9 (Flow 3) were successfully completed and the arm was removed from the test tower on 8/1/68. The Environmental Chamber was removed from the arm for shipment to KSC via Guppy on 8/3/68. The arm structure, hinges, consoles, accumulator racks, etc., were shipped via truck to KSC on 8/5/68. The next Arm 9 (Flow 1) will be available from Boeing for testing on 8/13; the control console will be available 9/1/68. ✓

S-II STRUCTURAL TEST PROGRAM The S-II (V7-21) stage fill and drain/cryogenic proof test Phase IV, was performed on 7/29/68. The stage service life cycling at ambient conditions, Phase VA, is scheduled for 8/6/68. The delay from 8/2/68 was engendered by the finding of two cracks in the LH₂ tank and the installation of additional instrumentation in the crack areas. ✓

Karl.H.

It looks to me like MTF

S-II-5 (MTF) The acceptance firing was attempted on 8/1/68, but was erroneously aborted by a redline chart observer after 4 seconds of main-stage. Prior to the firing, the special test No. 1 on the LH₂ vent relief settings were satisfactory. Test No. 2 on the common bulkhead showed no pressure spikes as seen previously. At T-1 minute 30 seconds the lox vent valve opened erroneously which delayed the test. No reason for this occurrence has been found. ✓

procedures still

F-1 TURBOPUMP (POGO) Modifications to incorporate a fuel suction line pulsing system were completed last week. We plan to run tests with fuel suction line pulsing on 8/6/68. P&VE has requested additional pulsing tests on the lox system which we will accomplish at the completion of the fuel pulsing system tests. ✓

F-1 ENGINE Work continued on the fuel pulsing system for the West Area F-1 Test Stand. ✓

S-IB (MSFC) Stage S-IB-12 is scheduled for removal from the Static Test Tower East on 8/6/68. ✓

MOBILITY TEST ARTICLES FOR LSSM Initial checkout tests on the Bendix and General Motors vehicles were completed. ✓

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8/5/68

1. STATUS OF THIRD GENERATION: Acceptance testing of Phase I of the UNIVAC 1108 system was resumed on July 24, 1968, following a period of several days in which the system had been declared down due to lack of improvement in the stability of the operating system (EXEC VIII) and lack of implementation of additional contractually required features in EXEC VIII. ✓

Since July 24th, the following improvements have been noted: (1) The stability of the system has improved. For the past three days (ending August 2nd) the mean time between system failure exceeds three hours while multiprogramming from 4 - 6 programs. (2) At least seven of twenty-three previously unimplemented features have now been implemented. ✓

Checkpoint/restart continues to be a major EXEC VIII feature which is not working.

In the area of programming languages, FORTRAN has only one known remaining error but COBOL continues to contain errors which seriously hamper the conversion effort.

UNIVAC personnel locally are presently working on a later version of EXEC VIII released by systems programming in St. Paul. After adapting this system to our 1108 configuration the system will be turned over to NASA. It is anticipated that NASA will receive this EXEC VIII system within about one week. ✓

2. MANAGEMENT DISPLAY SYSTEM (MDS) FOR HEADQUARTERS: The MSF Program Control Office and the Apollo Program Office are "upgrading management techniques" and have solicited a proposal from MSFC to:

- a. Provide a basic graphic terminal tied into the MSFC computer.
- b. Convert a computerized Management Display System (MDS) developed by General Electric to the UNIVAC 1108.
- c. Convert Program Operating Plan (POP) files to MDS format.

This office will work with the Executive Staff in responding to this request. ✓

3. PRINCE/APIC: The cancellation of the PRINCE/APIC effort has enabled Computation Laboratory to remove from rental computer storage and access equipment which had been dedicated to this system. Savings in computer component rental will be approximately \$8,200 per month. ✓

8/5/68

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1. S-II-5 Static Firing:

S-II-5 static firing on August 1, 1968, was inadvertently cutoff by a redline observer after 8 seconds. All systems were normal at time of cutoff. The S-IC-6 firing schedule for August 6, 1968, has priority because of the "POGO" confidence tests; therefore the S-II-5 firing is tentatively rescheduled for August 8, 1968.

Tests on the original LH₂ vent valves (involved in the S-II-5 abort of July 25, 1968) which were returned to the West Coast indicate that the valves are functioning normally. It appears that a combination of moisture, seal leakage, and an orifice upstream of the vent valve control opening resulted in marginal opening control pressure. ✓

2. S-II Battleship Testing:

S-II Battleship testing has been suspended pending evaluation of problems recently encountered. A team of MSFC (R&DO, I. O. and RMO), NR/SD, and Rocketdyne is currently engaged in evaluating problems and will make recommendations for future tests. A schedule of testing will be published following this review. ✓

3. POGO Decision Criteria:

The POGO Decision Criteria Document is being forwarded to Washington this date for distribution to the DCR members. (Copy handcarried to you and Dr. Rees today.) ✓

4. POGO Hardware:

All hardware for the POGO fix has been qualified except the Flodyne valve (helium flow control). Qualification is expected to be complete by September 15, 1968.

The prevalve ECP (#446, "Helium Prevalve Cavity Pressurization System) is complete in S-IC-3 except for the two (2) Flodyne valves and miscellaneous hardware. Installation will be completed to support the Sequence and Malfunction Test of AS-503 now tentatively scheduled for September 11, 1968. ✓

ECP 446 is also complete in S-IC-6 except for nitrogen control tubing. Installation will be completed to support the static firing on August 6, 1968. ✓

8/5/68

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OMSF Supporting Development Funding - In response to a request from Doug Lord, we have developed some budget and program alternatives for the FY-69 Supporting Development Program. They are: A program limited to \$7.5M total, of which \$3M is reserved for J-2S Engine and associated work. The remaining \$4.5M is divided to cover continuing nuclear power systems, thermal and environmental control systems and miscellaneous areas. The alternative program, limited to \$7.5M, deletes the J-2S activity and increases the funding for both continuations and new starts. In both programs, all existing university type contracts are continued; however, some of them will be reduced to levels below original plans. Two other programs planned at the \$10.5M level are also being submitted. The first allows the J-2S effort at \$3M plus the second alternative within the \$7.5M plan. Its alternative program is essentially the original submission of the Center less the J-2S work. ✓

OART Guidelines - Our conversations with OART are beginning to develop new guidelines for FY-69 at a total of approximately \$10.5M. Major decreases from the original plans are in the Nuclear Rockets, Chemical Propulsion and Space Power areas. The Space Power Program plan has been reduced by 75 percent. We are adjusting the program to fit within the OART guidelines except in the Space Power area. In this program we are attempting to establish a basis for discussion and reclamation. Although it is not a completely traceable relationship, the OMSF request to OART to review direct manpower use on their programs within the MSFC apparently has impacted the budgetary planning of OART, particularly in the Space Power area. We are investigating this and will report more fully later this week.

OMSF Experiment Definition Program - We were advised this week that OMSF is planning a total Experiment Definition Program of \$850K to \$1M in FY-69. The current plan provides about \$550K to MSFC; however, only one of the areas, (Manufacturing in Space), for which funding is provided has been coordinated within the Center and is a Center agreed to experiment activities area. We will try to get agreement with Headquarters to retain the total planned budget, but to apply it differently from their proposal. ✓

B. J.
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 Please furnish
 details

8/5/68

1. Contingency Payload for SA-503: As reported last week, we are engaged in the fabrication of two 51" diameter and two 45" diameter ballast tanks for this payload. All the domes for the bigger tanks and two domes for the 45" diameter tanks have been received from G&G Metal Spinners, Inc. The cylindrical sections have been fabricated in our shops. We build these containers with very soft tooling, using plywood, strap clamps from the S-IC tank fabrication, etc. Because of the extremely tight schedule, we work in two shifts on this job including last Saturday. Shipping date is September 3 for support of present launch schedule of SA-503. ✓
2. Review of S-II Tooling at Seal Beach: Recently, several cases have been reported of deviations in meeting tolerances and specifications for S-II structural assemblies and sub-assemblies. The Resident Manager at Seal Beach has now requested that a review of structural tooling be conducted on site. The purpose of the review is to determine whether at this time tooling is still in proper alignment and whether improvements can be made for avoidance of human errors. This will be a joint review by NAR Manufacturing and ME Laboratory personnel. Mr. Franklin is supporting this activity at Seal Beach this week. ✓
3. Neutral Buoyancy Simulation: Because of the reduction of Single Support Contractor personnel (Hayes), we are in the process of taking over this operation completely by Civil Service personnel. The target of changeover is October 1. In order to avoid interruption and to utilize Hayes experience to the maximum extent, training courses have been arranged for the month of August to be conducted by Hayes in the small simulator for the newly assigned Civil Service personnel. No tests were conducted in the large simulator during the last week because of lack of hardware caused by design changes and limited shop capacity. ✓

8/10/68

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1. POGO: Qualification testing of the solenoid valve for the AS-503 POGO fix was interrupted because of operational failures. During cold soak test, the valve failed to cycle in both open and closed positions. It has been concluded that the frictional loads (in/lbs) at low temperature are marginal with solenoid capability. A fix has been implemented and qual testing should be completed on 8-6-68. Valves to be shipped to KSC for AS-503 have failed acceptance tests due to excessive leakage. Problem is currently being investigated. ✓
2. SHORT STACK STATIC TEST (SSST): Our representative attended a status meeting of the SSST at Wyle Laboratories on 7-30-68. The primary area of our concern has been the test sequencing and the use of static equivalent loadings rather than actual dynamic excitation. Our recommended sequencing, using static equivalent loadings, was finally accepted by MSC as the proper method for testing. We are following this whole program very closely so as not to jeopardize the test structure. A Test Requirements Board has been formed as the controlling body for all aspects of the testing. H. R. Coldwater from our Structures Division is co-chairman. Also, a Test Readiness Review Board was established, with G. Kroll as our representative. ✓
3. MARL TESTING OF THE EXPERIMENTAL SHROUD AND INERT MASS AT MTF: Fabrication of the experimental shroud and inert mass has been completed by the R-ME Laboratory (Ref, Kuers Notes 7-29-68, Payload Simulator). Suspended within the shroud from eight outriggers is a simulated payload, a water-filled tank weighing 23,000 lbs. At MTF, it will be instrumented and exposed to several stage static firings on the Mobile Acoustics Research Laboratory (MARL). The primary purpose of this testing is to determine the extent to which payloads, such as LM, ATM, and MDA, respond in their rigid body modes when the external shroud is exposed to engine generated acoustics. ✓
4. S-II STRUCTURAL TEST: "A" Structure Test - Test Phase IVB (cryogenic proof pressure test) was run 7-29-68; test time was 11 hours. The foam insulation on the LH₂ tank wall and bolting ring experienced some cracking and debonding. The damaged areas will be repaired before the next cryogenic test is run. The Hazardous Gas Detection System (HGDS) was used to monitor the common bulkhead for leakage during the test. An indication of a hydrogen leak in the bulkhead was detected which, toward the end of the test, reached a maximum concentration of 1.3%. The HGDS operation was excellent. Test Phase VA (room temperature service life cycling) will be run 8-2-68. This will put the testing of the "A" structure back on schedule. ✓
5. FIRST 265K TEST ON J-2S ENGINE: The first 265K thrust test for J-2S III was conducted 7-25-68. This engine incorporates all features currently identified with the J-2S configuration. ✓ During the test, the 265K thrust level was exceeded due to orificing error, but the test was termed successful. ✓
6. AAP-MDA: The incompatibility of schedules in the AAP program is of great concern. It is apparent that the AM, MDA, and parts of the Spent Stage are far in advance of the Command Module and the Experiments. It makes little sense to have design reviews and cut hardware for part of a program without knowing what the other parts will be and when they will be available. Our immediate concern is the MDA. The test hardware and the crew station review is in advance of sound design concepts and criteria for experiments to be carried and operated in the MDA. We don't even have a firm experiments list. The test hardware and tests as well as the crew station reviews could be invalidated by this situation. ✓

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MSF R&D POP 68-2 REVIEW AT MSFC:

General Phillips, Jerry Kubat and Hal Luskin will visit MSFC August 13th to review the R&D POP and FY-69 funding problem. Specifically they are to review actions which could be taken to achieve a reduction in the range of \$35 to \$100 M. These funds would be applied to FY-69 spacecraft overruns which are estimated by MSC to be in excess of \$200 M. The MSC problem is a FY-69 problem while a \$100 M reduction in MSFC's FY-69 funding could result in a major problem in FY-70. ✓

MSFC MANPOWER FOR OART PROGRAMS:

On request of Dr. Mueller OART has estimated MSFC manpower requirements for FY-69 in the order of 138-170 man years. This contrasts with our original estimate of 293 man years (June 68 actual was 272.2 man months). We are requested by MSF to proceed based on the OART estimate. ✓

HM.

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Bill Johnson's

NOTES 8/5/68

ROSEN STUDY:

To our understanding, Mr. Rosen has advised Mr. Webb that the cost figures presently available for the Saturn IB and competitive vehicles are not on a compatible basis and should not be used in making program decisions. ✓
Mr. Malaga and Mr. Rosen are organizing an effort to establish a comparable cost basis. Mr. Rosen has indicated he will request MSFC assistance. ✓

NASA OVERSIGHT COMMITTEE:

Congressman Teague has directed Mr. Wilson and Mr. Gerardi of his Oversight Committee Staff to perform a review of Apollo management systems in lieu of the usual summer study of Apollo and AAP program status. The goal of the study is to assess the potential of management systems developed in Apollo for application to other uses. ✓

NOTES 8-5-68 MURPHY

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NASA Safety Director's Visit:

Mr. Bob P. Helgeson, NASA Safety Director, will be here on Friday, August 9, 1968, to give a brief presentation at the MSFC Staff and Board Meeting on the NASA Safety Program. After his presentation, he will be given a tour of MSFC activities.

NOTES 8/5/68 RICHARD

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No Notes this week.

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1. Lunar Debris: In response to a request from OMSF (Schneider) an MSFC recommendation relative to S-IVB/IU-Spacecraft recontact and the disposal of the spent stage was formulated. The MSFC position is to obtain a slingshot trajectory by dumping residual propellants through the engines at a fixed time after spacecraft separation. Attitude control would be maintained prior to and throughout the dumping sequence. This slingshot trajectory will avoid Spacecraft recontact as first priority, earth impact as second priority and lunar impact as third priority. R-AERO is performing additional studies associated with the implementation and refinement of this disposal method and to arrive at various tradeoffs options between earth and lunar impact probabilities. ✓

2. Mission D CCS Test: An integral part of our previous Saturn V flight control activities has been the performance of flight/ground interface tests of the Launch Vehicle Command and Communications System (CCS). Although, sufficient earth orbit CCS test data were obtained on Apollo 6, planned testing during the transit phase was not accomplished when second S-IVB ignition failed. A new test has been formulated for Mission D and these requirements have been transmitted to MSC for implementation. The intent of the test on Mission D is to obtain this deep space evaluation data. ✓

3. LIEF Communications: We have made a special review of the LIEF communication requirements, along with Management Services, in order to evaluate possible cost reductions. It was decided to reduce the video call-up requirements, LIEF station termination, and utilize FTS lines for PAO-type countdown commentary. This will result in FY69 cost reduction of approximately \$75K. Additional potential cost savings presently being investigated are: (a) turning down voice lines between non-operational periods and (b) transfer of a data circuit to common user requirements (i. e. long distance xerox - LDX). The usefulness and need for the LIEF concept has been fully demonstrated during and after the Apollo 6 operation as attested by various communications from our contractors. ✓ We reviewed these reductions carefully to assure that no significant adverse effect on the basic operational capability will result. ✓

4. Bell Telephone Visit: Mr. L. E. Rast, Vice President Operations, South Central Bell, and other telephone company management personnel were given a tour of the HOSC at their request. ✓

B 2/2

8/6/68

1. NEUTRON ALBEDO FLIGHT EXPERIMENT (Your question on NOTES of 7-22-68, copy attached): The neutron albedo flight experiment data are still in the process of evaluation. This evaluation will be completed following the completion of the calibration of the neutron detector in the isochronous cyclotron at ORNL. The highest neutron energy the detector was subjected to before flight was ~ 22 mev. The calibration will continue commencing August 5, 1968, for a three-day period with hopes of subjecting the detector to neutrons of energies ~ 40 mev.

The data taken at 1.06×10^5 ft. altitude look promising, showing a good pulse height spectrum. The spectrum will have more meaning following the detector calibration. The ORNL instrument package was apparently over-insulated thermally and will require some modification to prevent overheating in the next flight.

Present plan, if balloons are available, is to return to Palestine in latter October or early November 1968 for two consecutive flights with both the existing gamma and neutron detectors.

2. SEISMIC WAVE COMMUNICATION SYSTEM: During your visit to SSL on 7/22, you asked about the possibility of using seismic waves for communication on the Moon. A Ph.D. thesis on a closely related subject was written by T. E. Owen, University of Texas, in 1964. It appears that carrier frequencies from 3 to 70 Hertz could be used to transmit some information as far as 20 kilometers with transmitter power of the order of 100 kilowatts. Because the corresponding bandwidth would enable transmission from 4 to 16 bits of information per second, this implies that only a telegraphic type of communication is possible. This system could be feasible only by assuming that it is possible to take advantage of strong wave guiding properties of the medium, i. e., using Rayleigh and Stoneley waves in a similar manner as it is possible on earth. Information about elastic wave propagation on the moon is not available at this time. In this aspect, therefore, there is an uncertainty until sufficiently detailed seismic studies are carried out on the moon.

References
Tom Barr,
Mr Powell
and friends;
This
answer the
question
I raised
w/ you
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3. RESEARCH ON SUPERCONDUCTIVITY: The AEC is organizing a committee composed of representatives of various government laboratories to assist in the coordination of superconductivity research and applications programs. Mr. Urban of SSL has been asked to participate and will attend the first meeting of the committee in Washington on August 14. Apparently this committee is being formed in reaction to the critical state of the entire superconductivity R&D effort in the country. Recently several very active groups, including Avco-Everett and Westinghouse, have drastically reduced their staffs. Other companies are uneasy, and we foresee a serious loss of national capability in this just burgeoning field. In particular, Atomics International, Oak Ridge National Laboratory, and the RCA Sarnoff Labs are probably justifying their continuing strong activity by means of research contracts from SSL (funds from OART through Warren Keller).

NOTES 8/5/68 TEIR

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I. U. STRUCTURE: Reference is made to my notes of July 29, 1968, (copy attached) concerning the existence of documentation discrepancies in the North American/Rockwell (NAR), Tulsa, records on the I. U. structure. An IBM, Huntsville, team is at NAR, Tulsa, and was scheduled to read the I. U. -205 structure X-rays over the past weekend. As of this time, we have no report from them. I will forward their findings to you as soon as they are received. ✓

AS-205 PAYLOAD: Reference is made to my notes of July 15, 1968, (copy attached). As stated in referenced notes, George Low requested an additional 300 lbs. payload commitment which would increase payload commitment to 36,600 lbs. for the AS-205 mission. R&DO laboratories have now completed the new operational trajectory using the open loop Propellant Utilization and the increased payload. This new operational trajectory results in a usable residual of 1450 lbs. of S-IVB propellant or approximately a 2.3 sigma flight performance reserve. I plan to inform Gen. Phillips and Dr. Mueller of this information at the Management Council meeting tomorrow and state that we will agree that the 2.3 sigma FPR is adequate for the AS-205 mission. ✓

NOTES 8/5/68 WILLIAMS

8/5/68

B 2/2

1. Saturn V Derivative Study: Our request for quotation on the Saturn V Derivative Study was released on 7/30/68. We expect a response from Boeing not later than August 12, 1968. This study for \$250,000 covers the analysis and preliminary design efforts of an S-IC/S-IVB/IU Launch Vehicle System responsive to a wide variety of manned and unmanned mission requirements. A parametric comparison will be made of a spectrum of such vehicles and a sensitivity analysis performed. ✓
2. Earth Orbital Experiment Program: Based on Mr. Wuenschler's work, we are incorporating "Manufacturing in Space" experiments into our forecasting and advanced workshop and space station studies in a joint effort with ME Laboratory personnel to determine the impact of these manufacturing experiments on future station configurations and program alternatives. ✓
3. Nuclear Program: Carl Schwenk, SNPO, related that Dr. Paine will review all the major line items in the NASA budget (Apollo, AAP, Nuclear, etc.) on August 5 and 6. It appears that, in Mr. Webb's mind, funding for NERVA will depend on the Agency's position on the Saturn V program, i. e., whether or not there is a stretchout or an identified point of shutdown. ✓
4. Saturn V Workshop: Discussions were held with the Advanced Manned Missions personnel, Headquarters, on forthcoming studies of a "Second Generation Space Station" (called Earth Orbital Space Laboratory or "Space Lab."). It was concluded that approximately \$7.5M FY-69 funds can be made available to initiate phase A/B definition of the "Space Lab." Also, approximately \$28M of FY-70 funds is anticipated for use in final systems definition (Phase C). It is our understanding that Chuck Mathews is in agreement with this funding level. ✓ In subsequent discussions between Chuck Mathews, Hal Becker, and Jim Madewell, Mr. Mathews made the following points: (a) He expects studies on subsystems to be initiated in late fall; (b) systems definition studies beginning late spring by two or more contractors; (c) is uneasy with the Saturn IB version of the Space Lab because of close weight margins which could preclude application of the "Big Dumb Spacecraft" technique leading to the need for continued optimization problems that would be required to stay within the weight allowance; and (d) he does not anticipate approval of a new, complete logistics system (L/V and S/C) during ~ the first year of this program (station launch ~ 1974). ✓

August 12, 1968

Direct
JIS 9/5
mp

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

TO Dr. von Braun, DIR DATE SEP 3 1968

FROM Manager, Mission Operations Office
I-MO-MGR

SUBJECT AS-503 Command System Inhibit

Reference item 1 of Speer Notes dated 8/12/68 (attached).

On AS-503, the IU command system is inhibited from accepting ground commands during powered flight phases by both a hardware and software inhibit.

The hardware inhibit is accomplished by opening a relay between the command decoder and the digital computer (LVDC) such that ground commands will not reach the LVDC for execution. This inhibiting relay is operated by a switch in the spacecraft. The system will normally be inhibited, but can be opened by the crew to accept commands as required and prescribed by mission rules and crew procedures. This hardware inhibit is effective during both powered and orbital flight phases, and was added to AS-503 and subsequent Saturn V vehicles at the direction of General Phillips.

In addition, the LVDC software is presently programmed not to recognize ground commands during powered flight phases (including second S-IVB burn) even if the hardware inhibit is removed by opening the crew switch. This software inhibit has been utilized on all previous vehicles (they did not have the hardware inhibit feature), and was inserted because there was generally no requirement for commands during powered flight and the inhibit eliminated the need to check out the command software during powered flight. However, the software inhibit was modified on previous flights to permit specific commands during specific time intervals where firm requirements existed (e.g., abort and early S-IVB staging).

Effective with AS-503, the software inhibit is redundant to the more flexible hardware inhibit and is no longer technically needed. System flexibility would be gained without it; however, its elimination would require a configuration change which will be made only if a valid requirement for powered flight command capability can be established. Several potential mission rules requiring command action during powered flight have been proposed for AS-503 and are being assessed. Current evaluation by R&DO indicates most of them will not warrant making the change.



One principal question at present is whether we need the safety capability to cut off the S-IVB during an unmanned restart (following contingency S/C separation) to prevent land impact in the event of a gross trajectory deviation. We do not have this capability during unmanned restarts (the crew can do it during manned burns).



F. A. Speer

1 Enc:

As stated

cc:

I-DIR, General O'Connor

I-V-MGR, Col. James

R-SE-DIR, Mr. Richard

NOTES - 8/12/68 - BALCH

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S-II-5 - Static firing was successfully accomplished at approximately 4:12 p. m. on 8/9/68, with a duration of 366.9 seconds. Secure was completed at 2:30 a. m. 8/10/68. Preliminary examination of data indicates that all test objectives were met. ✓

S-II-6 - Power-up was accomplished on 8/5/68. LOX screen mods and final closeout of LOX tank have been completed. Cryogenic proof pressure test is still scheduled for 9/5/68. ✓

S-IC-6 - Fuel loading was performed on 8/5/68 in preparation for static firing on 8/6/68. During preparation for start of LOX loading on 8/6/68, word was received from the stage contractor that test activities were cancelled because of failure of the POGO valve panel and associated tubing during qualification test. Fuel was detanked, and all systems were returned to standby configuration. Modified POGO valve panel has been completed and is being installed. Present schedule calls for static firing at 3:00 p. m. tomorrow, 8/13/68, with fuel loading today.

Public Affairs - I talked with Robert Sherrod on 8/6/68 during his visit to MTF in connection with a novel he is writing to be titled, "Conquest of the Moon." ✓

Wasn't this the title of my 2nd year old Viking Press book (1955) with Bonachelli's cover? If so, let's alert Viking to correct title.

Fifty-three students of Children's International Village, representing eleven foreign countries, visited MTF on 8/5/68. Story was released to local and state press, and pictures are being provided to students for release to news media in their home countries. ✓

8/12/68

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BIOMEDICAL EXPERIMENT LOCATION STUDY: A study was made of the eight AAP-2 biomedical experiments from the standpoint of the specific advantages and disadvantages of transferring these experiments into the Saturn I Workshop versus leaving them in the MDA. Results of the study indicate that five of the experiments. (M052, Bone and Muscle Evaluation; M053, Human Vestibular Function; M055, Time and Motion Studies; M056, Non-Gravimetric Mass Measurement; and M058, Human Mass Measurement Device) must be operated in the Saturn I Workshop to avoid serious compromises. The other three (M050, Metabolic Costs; M051, Cardiovascular Function; and M018, Vectorcardiogram) have some latitude for choice, but the study indicates that major advantages will be realized if these three are also transferred into the Saturn I Workshop.

ZERO "G" HARDWARE: The major part of the zero "g" hardware manufacturing has been completed by MDA C (McDonnell Douglas Aerospace Corporation) and is ready for shipment to MSFC on August 12, 1968.

SATURN I WORKSHOP THERMAL CONTROL SYSTEM: McDonnell Douglas Corporation has completed their analysis of the impact on the Airlock Module of the Integrated Thermal Control System concept. At this point the ITCS looks very attractive relative to system performance, cost and weight.

AAP WEIGHT AND PERFORMANCE MEETING: Representation of the three Centers met with Mr. Luskin at MSC on August 7 to review the AAP-2 weight/performance problem and potential solutions. MSC and MSFC agreed that weight growth margin of about 3000 pounds should be considered as a minimum at this time for AAP-2. Considering the present negative margin, we need to "find" about 3800 pounds of performance. It appears that we can accomplish this through a combination of weight reductions and performance improvements (the latter refers primarily to lowering the Saturn I Workshop altitude and certain flight mechanics schemes).

REVIEW OF LM-A CONFIGURATION: The MSFC review of current LM-A configuration requested in the AAP Baseline review is continuing with emphasis on providing comments to MSC baseline configuration and deriving information which would lead to alternate configurations to provide mission simplicity, cost reduction or schedule improvement.

The Systems Engineering Office and Laboratories have agreed to provide a list of areas to be considered further prior to August 20 and we have tentatively arranged for 2 or 3 persons to go to Grumman on August 21 to gain more detail in these specific areas. We have agreed to work this review with the MSC Program Office to provide a dual Center input on feasibility and desirability on continuing the current baseline or suggesting alternate configurations based on updated program guidelines.

MSFC

See below
Please include run-down on

MS in next baseline review meeting

elliptical orbit?

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8/12/68
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H-1 ENGINE - The retrofit program to replace the vented LOX pump lip seals with vented bellows seals and the subsequent leak checks were successfully completed on August 8 without schedule impact. ✓

F-1 ENGINE - A Rocketdyne shakedown inspection of the F-1 engines on S-IC-3 was completed August 3. A total of 138 minor discrepancies consisting mostly of missing or broken safety wire, reparable damaged harnesses, boots, and overmolds, hard line harness interference and improperly installed line clamps. No interference with the vehicle schedule is anticipated during work-off of these discrepancies. ✓

In reference to the GG oscillation experienced in conjunction with the bomb test, as described in my notes of 7-22-68, your question "Would this oscillation level be critical if it occurred in flight?" Rocketdyne has analyzed all previous test data and concluded that there is very little possibility of a critical failure during flight should a GG oscillation occur. ✓ Further review of all test experience indicates a very low probability of thrust chamber induced GG oscillation, such as occurred in this bomb test. (Zero self triggers in 113 tests on the Qual I injector). Additional investigation of possible related influences, such as ball valve resonant frequency, is continuing and is planned to be completed by September 1. ✓

J-2 ENGINE - The J-2 engine pressure transducer mechanical backup seal, being developed due to weld cracks previously reported, has now successfully passed pressure tests at 1500 and 5000 psia. These tests used R&D hardware to prove the concept. Flight-type hardware undergo verification testing this week. Sufficient kits will be available to support modification of the seven critical transducers on AS-205. ✓

The Quality Maintenance Program being conducted at MSFC by the Quality Laboratory has revealed contamination of the start tank discharge valve bellows seal. The contamination is generated internally during valve assembly by silver particles stripped from a silver plated helicoil by the bolt attaching the seal. The assembly procedure has been revised to preclude this condition in future assemblies; however, the Quality Laboratory and Rocketdyne recommend cleaning the valves on all engines assigned to restart missions. A final decision has not yet been made to implement this change on AS-503 since restart is not required for primary mission objectives and impact assessments are not yet available. ✓

The flexible line qualification and verification test effort is progressing satisfactorily and all AS-205 launch constraints should be lifted by August 21. ✓

NOTES 8/9/68 CONSTAN

8/12/68

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Nothing of Special Significance.

B 8/17

8/12/68

1. AS-502 High Altitude Unsteady Separated Flow Phenomenon: Re: Your request on item 2 Notes 7/29/68 Geissler (copy attached). Due to the extreme uncertainty, as well as the lack of accurate information concerning this phenomenon, an inflight fluctuating pressure experiment has been proposed. A formal request for this experiment is being prepared and will be ready by August 12, 1968. This experiment will consist of 10 to 20 fluctuating pressure measurements which will be located in the intertank region of the S-IC Stage. This experiment is designed to provide detailed fluctuating pressure environments from which more realistic dynamic loading conditions can be determined. At present, the dynamic loading conditions have been deduced solely from a pictorial analysis of the flame front ("ALOTS" chase plane film) associated with the separated flow region. The resulting loads, because of the nature of the analysis and the assumptions involved, are highly questionable. The proposed inflight experiment will provide detailed unsteady pressure environment and will result in realistic dynamic loading conditions due to this separated flow phenomenon.

RUSH

Lodie
Richard

Request
Impact
assessment -
most of
such a
highly
desirable)

Instrumentation
package

502

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2. AAP Cluster Mission: Lifetime information has been generated for launch periods to 1972. It appears that with a slip to mid-1971, it is now possible to go to a 205 nm orbit to guarantee a 240-day lifetime. This is due to the decrease in solar activity. This will provide approximately 1200 lbs. of payload above the 220 nm altitude which was previously under investigation. Other means of gaining payload are being investigated. ✓

3. Lateral Longitudinal Coupling of AS-502: In notes 7/29/68 Geissler, copy attached, we presented results of our simulation of the lateral longitudinal coupling observed on AS-502. On August 5, 1968, we presented these results to the Structural Assessment Committee. Professor Ashley of Stanford recommended that we step the IEM frequency down at 133 seconds to simulate the SLA panel failure and see if our results did not compare with the flight records showing the added dampening and beating. This we have done with good results as shown on the attached time trace. We feel that our model of the lateral longitudinal coupling through the LEM adequately describes the phenomenon observed on AS-502. This leads us to draw two major conclusions:

E.F.

That seems
to be the
answer to
the SLA
failure

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(Let's give
the man
who found
it suitable
credit.)

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a. The prime mechanism of the observed lateral LEM acceleration consists of longitudinal (structural POGO) oscillations which are cross-coupled through the LEM suspension and drive the LEM which acts as an oscillator. b. Removal of the driving function (i.e., detuning the POGO oscillation) will eliminate the lateral LEM acceleration. At present no other sufficient longitudinal force has been identified; however, to avoid feeding the dangerous lateral LEM oscillation from some unforeseen force, it would be very desirable that the cross-coupling mechanism be destroyed in addition to eliminating the forcing function. ✓ However, most of the committee members did not feel this fix was really necessary. In response to your comment on the 7/29/68 Notes, we are planning to report also in the next Boeing POGO Tie Teleconference. ✓

B 2/17

IMPORTANCE OF THE QUALITY EFFORT: Under the present condition with shrinking funds, and the resulting reduction and turnover in personnel, lack of enthusiasm, stretching out of programs, unplanned ageing of components and stages, the effort in support of quality is even more important than ever and is the last one which can stand cuts because even under these adverse conditions the vehicles are supposed to perform their functions, and NASA will depend on success even more than in the past. ✓ This point I made wherever I could during the last two weeks when I visited the majority of our prime contractors and the MSFC resident offices, to be specific: Chrysler (Michoud), Boeing (Michoud), Rocketdyne (Canoga Park), McDonnell Douglas (Huntington Beach and Sacramento), North American Rockwell (Seal Beach), and Ball Brothers (Boulder). I would appreciate it if you take up this subject also whenever there is an opportunity.

will do B

Step
Please
disuss
desirability
of a
contractor-
wide letter
to be
signed by
myself. If
Ed/C thinks
this is a
good idea
please
draft one
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It might be of interest to you to hear that all involved prime contractors fully endorse the MAVE effort (Modification and Verification Evaluation) which was introduced by us as the result of shortcomings detected with the 502 flight. They unanimously praise the visibility it has provided concerning areas which need more attention for 205, 503, and all subsequent flights. Also, most contractors believe that shortcomings and anomalies detected in the quality maintenance program already have paid for the program by elimination of potential launch delays. ✓ Specific information on this subject was solicited from the participating contractors and will be forthcoming.

During the trip suggestions were received from some contractors which will have some streamlining effect on the two mentioned efforts, and observations were made which will lead to some improvements of our operations in the field. ✓

NOTES 8/12/68 HAEUSSERMANN

8/12/68

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1. AAP2 Payload Capability. A meeting was held last week at MSC with Mr. Luskin and representatives from MSC, MSFC and Headquarters. Many areas of definite or promising solutions for solving the AAP2 payload problem were presented by MSFC. MSC presented two broad solutions: weight reduction on the airlock hardware and mission configuration. With respect to mission configuration, MSC showed areas for AAP2 weight reductions if ATM was flown in the decoupled mode (docked to the CSM). The solutions presented by MSFC provided sufficient gain in payload margin and using drastic approaches such as making the decoupled mode the only mode of ATM operation to achieve AAP2 payload margin is certainly not warranted. We would like to broadly state the Astrionics Laboratory position relative to flying ATM in the cluster and/or decoupled modes of operation:

a. The preferred mode of operation for ATM is the clustered mode. ✓

b. The capability to operate ATM either in the clustered or decoupled mode should be retained to keep flexibility in mission planning. ✓

The ATM is being designed for both modes of operation. ✓

2. ATM Star Tracker. Contract negotiations have been completed on the star tracker. MSFC Legal Office has approved the contract and the contract has been sent to Bendix in Teterboro for final signature. ✓

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J-2 THRUST CHAMBER On 8/9/68, during a J-2 Thrust Chamber test (pressure fed), a failure occurred which resulted in thrust chamber burnout. Preliminary investigation indicates that the engine high pressure fuel duct was the primary failure. This duct is R&D hardware furnished by Rocketdyne during August 1966, and used during 27 short duration thrust chamber firings. Since only R&D hardware is involved in the failure, no impact on flight hardware is anticipated. A detailed investigation is underway and after data and hardware evaluation is complete, a formal failure report will be issued. ✓

S-11 STRUCTURAL TEST PROGRAM The S-11 (V7-21) Stage Structural Test, Phase VA (Room Temperature Service Life Cycling) was successfully accomplished on 8/6/68. Test Phase VB (Cryogenic Service Cycling) has been delayed for F-1 engine firings and rescheduled for 8/22/68. ✓

ACCESS ARM NO. 9 As reported last week the test program on Arm 9 (Flow 3) has been completed and the hardware shipped to KSC. There was no test activity last week since we are waiting on delivery of the Arm 9 (Flow 1) hardware from Boeing. The arm, hinges, and environmental chamber are scheduled to enter the test area on 8/13/68, however, the control console will not be available from Boeing until 8/31/68. ✓

F-1 TURBOPUMP (POGO) Two POGO tests were successfully conducted on 8/7/68 using fuel suction line pulsing. The first test was at a lox pump inlet pressure of 118 psia and a fuel pump inlet pressure of 44 psia; the second test was at a lox pump inlet pressure of 106 psia and a fuel pump inlet pressure of 39 psia. During both tests the fuel suction line was pulsed from 1-25 cps. These tests verified that the fuel suction line can be pulsed without detrimental effects during an engine test. ✓

F-1 ENGINE Final preparations were made for fuel pulsing tests at the West Area F-1 Test Stand. Test FW-096 was cancelled due to problems with a flexhose in the pulse system line. The test has been tentatively rescheduled for 8/13/68. ✓

S-11-5 (MTF) A full duration acceptance firing was successfully conducted on the S-11-5 stage on 8/9/68. One special test, an LH₂ vent valve relief check was also performed. The position microswitches on the vent valve did not perform satisfactory. ✓

S-1B STAGE (MSFC) Stage S-1B-12 was removed from the Static Test Tower East on 8/7/68, and is enroute to Michoud Assembly Facility. Chrysler Corporation Space Division is phasing out of the Static Test Tower East. ✓

MODERATE DEPTH LUNAR DRILL The experimental percussive diamond bits designed and fabricated by the Corps of Engineers have been tested by the Bureau of Mines. Two bits were tested, one of each style, with failure in each case occurring before the entire series was completed. Additional bits will be tested, but with less severe test conditions. ✓

NOTES 8-12-68 HOELZER

8/12/68

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NEGATIVE REPORT.

8/12 JTS

1. S-II Structural Tests:

NR and MSFC are currently re-evaluating the loads and test sequence to be employed in the remaining "A" and "B" structural tests. This is being conducted to (a) insure that proper loads are being supplied and (b) that the proper sequence of loading is applied to give the greatest assurance of meeting the total test objectives. We are attempting to resolve both the loads and the applied fix between MSFC and NR the week of August 12, 1968. ✓

2. S-II-5 Static Firing:

S-II-5 underwent a successful full duration firing at MTF on Friday, August 9, 1968. Evaluation of test data is underway at MTF this morning. ✓

3. Postponement of Meetings:

At General Phillips' request, the following meetings have been postponed:

AS-503 DCR scheduled for August 23, 1968 (Also dry run scheduled for August 15, 1968)

POGO Teleconference scheduled for August 16, 1968

Effort is underway to define the new schedule dates for the above meetings. ✓

4. AS-503 Work Load Review by General Phillips at KSC:

On August 8, 1968, a review was conducted of KSC work load by General Phillips. Primary concern was the ability of KSC to accomplish the changes scheduled for the spacecraft and launch vehicle. General Phillips stressed again that only mandatory changes could be processed. In the work load and schedule review, the LM now appears to be the pacing item, but problems with any one element could slip the very tight working schedule for AS-503. ✓

The Service Module arrived on dock KSC on August 10, 1968, and the Command Module is currently expected to arrive on dock KSC August 14, 1968. ✓

Shortly after delivery of the complete spacecraft to KSC a more firm working schedule is expected from KSC. ✓

NOTES 8/12/68 JOHNSON

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Manufacturing in Space - Interest in this area is continuing to grow, internally and externally. ✓ P&VE, Materials Division is working on a proposal which will reflect the laboratory's views on most feasible efforts for initial phase with projection of recommended follow-on work. SSL has shown interest in the research end of the program. ✓ Briefing to Dr. Stuhlinger by the ME/EO team is planned for Tuesday, August 13 to acquaint him with the status and plans. ✓

GE R&D representatives visited last week to learn more about the subject and discuss how GE might fit into the picture in view of their prior efforts and knowledge. ✓

Battelle representative was advised of the market analysis survey that would be needed to identify specific research and process experimentation which would satisfy interests of potential customers. Because of its background in this type effort and its industry group research programs, Battelle would be a candidate for such a survey. On August 20 Battelle will give MSFC a presentation on how they would approach the market analysis survey. ✓ On August 26, they will give a presentation on a crystal growth program. ✓

A representative of the Research Triangle Institute (RTI) contacted us on this general subject. Dr. Robert Berger of RTI will visit MSFC August 21 to learn more of the status and plans. ✓

Portable Light for Space Stations - MSC has indicated that the OWS does not have sufficient light for photo coverage. The ongoing work by ME on the Microdot Light could provide a portable light as auxiliary to cover this requirement. The work has progressed to the point that flight hardware can now be developed. Incorporating the light into the OWS is being explored with I-S/AA. ✓

Low Cost Booster Study - Stanford Research Institute representatives presented a progress report for MSFC personnel on the Cost Comparison Study of pressure-fed Liquid and Solid Rocket Booster stages being performed for Headquarters, OART. The presentation was attended by 50 personnel from R&DO and IO. The message of this presentation was that our development programs for future booster systems should be simple, low cost in fabrication, with reasonable quality control requirements and developed so that large savings can be achieved in the use costs of the booster; i. e., as to checkout, documentation, etc. This study will identify that technology which must be developed in order to support this philosophy. ✓

Often contradictory!

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8/12 JVS

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1. Saturn V Damper System: We are still engaged in procurement actions and cutting hardware for the Damper Arm System. For the third system, ML-3, we are now also providing Mod Kits identical to those we built for ML-1. ✓

2. Insulation on RIFT-9 Tank: The spray foam insulation for this tank which is to be used for radiation tests for nuclear stages has been completed in our shops. We are presently installing strain gauges and thermocouples on this tank for the instrumentation program. We hope to complete this job by the end of this week. ✓

3. Contingency Payload for SA-503: The welding of the two 51" diameter tanks for this BP-30 boiler plate payload has been successfully completed and a few required repairs, as determined by X-ray evaluation, are in progress. All bulkheads for the 45" diameter tanks have been received. Fabrication of all skin weldments for both of these tanks is complete. We are confident now of meeting the required delivery date. ✓

4. Neutral Buoyancy Simulation:

a. Test personnel completed the first trial attempt to run two pressurized subjects in the water simultaneously. This test was conducted using only one communication system. Interference did not seem to be overly taxing to the subject and support personnel. It was apparent that simultaneous testing can now be accomplished. This is of particular significance considering the schedule slippages experienced to date because of hardware shortages and the proposed deactivation of the small tank. ✓

b. A section of the diving bell floor was removed in compliance with MSC's recommendation. We are building a new ladder for the diving bell. ✓

c. The second Scuba diving course was completed this week. The class consisted of 14 enrollees from R-ME-MS, R-P&VE, and the Safety Office. ✓

d. Development of cardiometer for near real time monitoring of the test subject heart rate in neutral buoyancy simulation continues at a satisfactory rate. The concept has been demonstrated with a breadboard model. ✓

NOTES 8/12/68 MAUS

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RESEARCH ON SOCIO-POLITICAL ATTRIBUTES OF SCIENTIFIC COMMUNITIES:

Dr. Jack Holmes, Professor of Political Science, University of Tennessee, will return to Huntsville August 12 - 15, 1968 in conjunction with the University of Tennessee study (under NASA grant) of civic attributes of scientists and engineers they are conducting in Huntsville. This work is a comparison study to one presently under way at Oak Ridge, Tennessee. Dr. Holmes will meet with members of Mr. Styles' staff; Messrs. Smith and McInnis of Executive Staff; and Col. Mohlere to discuss possible MSFC participation. ✓

ASSISTANCE TO HUNTSVILLE MODEL CITY PROGRAM:

Mr. Joe Reed, during off duty hours, has rendered assistance to the Model City Program on invitation of Mr. King, local Model City Director. His efforts have been directed at "neighborhood" group interviews which have been considered extremely helpful by the City, Atlanta Region, and Washington. ✓

NOTES 8-12-68 MURPHY

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Nothing of significance to report.

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NOTES 8/12/68 RICHARD

8/12/68

Real-Time (In-Flight) Target: A meeting was held on August 6, 1968 to discuss the MSFC efforts on L/V real-time (in-flight) target update. ASTR, AERO, and I-V-E were represented at this meeting.

The on-board software capability for real-time target update has been implemented and will go through checkout/verification as part of the flight program.

The tasks which have not been completed are implementation and verification of the MSC Real-Time Computer Complex (RTCC) programs for real-time target update, verification of the ground systems operation for this procedure and rather extensive analyses on what can be achieved with/without a target update, how this can best be achieved, and the impact of providing it.

The primary agreements/guidelines outlined at the subject meeting were:

a. It is both desirable and necessary to continue our target update work in order to determine the possible gains and the total impact of providing this capability to an acceptable confidence level. However, this task should not be permitted to compromise the work required to support the nominal mission in the primary flight mode.

b. The vehicle effectivity will remain open until the problem is well scoped (manpower, schedule, and cost requirements) such that a commitment can be made with reasonable assurance that it can be met. The first vehicle on which real-time target update could possibly have any meaningful application is the F (lunar orbit) or G (lunar landing) mission.

c. The RTCC schedules must be considered, but should not constitute an end date that would preclude sufficient analyses of all attendant problems.

d. The question of whether this is a requirement for the Apollo Program can be re-addressed if the impact of providing the capability is, in our opinion, excessive when compared with the potential gain.

We will keep you informed of development in this area. ✓

NOTES 8/12/68 SPEER

B 8/17

8/12/68

1. AS-503 Command System Inhibit: On AS-503, the IU command system contains both a hardware and software inhibit. The hardware inhibit (new on AS-503) is controlled by a switch in the spacecraft and can be removed by the crew upon ground request if mission rules require that a command be sent. The software inhibit prevents LVDC interruption by a command during powered flight phases and has been used on past vehicles also. Several flight mission rules have now been proposed on AS-503 which would require commanding during S-IVB powered flight (any of the three burns). We have discussed this with Lee James and have asked R-SE to evaluate these rules and whether or not they warrant removal of the software inhibit. The question will be worked closely with I-V-E and the concerned laboratories.

F.S.
Please explain in a little more detail. (1 page)
B

2. DEE-6 Data at HOSC: During the past several months we have been negotiating with KSC on the transmission of Digital Event Evaluator (DEE-6) data to the HOSC. The coordination on this requirement has included R-SE, R-ASTR and the KSC L/V people. A formal request to implement the data transmission was submitted to KSC after the coordination was completed. This week the requirement was turned down by Dr. Debus (in writing from Adm. Middleton) stating cost and possible system degradation as the primary reasons. Neither of these reasons apply in this case, particularly when viewed in the light of the benefits to be derived during launch operations. It appears that we will have to accept the KSC decision unless you would be willing to take up the case with Dr. Debus. We are drafting a letter for your signature and can arrange a briefing on the pros and cons of this issue.

initial request

Stop
Please arrange
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3. ALSEP: Gen. Bogart has signed a directive assigning ALSEP ground control responsibility to MSC and reducing their original proposal by approximately \$1 M. KSC's proposal - although less expensive - was not accepted since some of the equipment was not available within the given time limit. The ALSEP issue is now closed.

B 8/17

NOTES 8-12-68 Stuhlinger

8/12/68

1. X-RAY ASTRONOMY. Members of OSSA (Roman, Aucremanne, Halpern) held a meeting at MSFC on 8/7 on the X-ray astronomy project. Several potential PI's and their representatives were present (Giacconi and Gursky of AS&E, Levin and Clark of MIT, Angel and Van der Bout of Columbia, Byram of NRL, Boldt of GSFC). Present plans visualize a "national X-ray facility," to be developed by NASA; the PI's would provide their sensing instruments. The basic facility would be a grazing incidence telescope with about 75 cm (30") diameter.

Present activities include the establishment of specifications; the definition of an advanced technology program; and the organization of the effort within NASA. OSSA is looking toward this Center for systems responsibility. Mr. Fred Daniels, ASTR, has been MSFC's representative for this project.

2. ASTRONOMY MISSIONS BOARD (AMB). The Optical Panel of the AMB, chaired by Dr. Lyman Spitzer, met at MSFC on 8/8 and 8/9. Main topics were NASA's and MSFC's advanced planning work, and MSFC's inhouse capabilities. Presentations included the following:

- Optical Technology Satellite, OTES, (OART, ASTR)
- Astronomy work at LaRC (Graves, Howell)
- Astronomy work at ERC (Ingrao)
- ATM Follow-on Studies (ASO)
- ASTRA Project (OSSA)
- Inhouse work at MSFC (ASTR, SSL)

LaRC and ERC have considerable inhouse programs and contracted work under way for active optics (segmented mirrors and thin mirrors controlled by servo systems), pointing control systems, heat control systems, IR sensors, radiation effects, mirror alignment, detector cooling systems, mirror grinding, etc.

The chairman requested information about the overall planning and coordination of the activities at the various Centers and Headquarters Program Offices, about the decision-making procedures within NASA, about the basic missions of the various Centers in astronomy projects, about the role of NASA's contractors in the planning of astronomical programs, and about the relationship between ASTRA and OTES. All panel members were greatly interested in our neutral buoyancy work; Dr. Whipple and Dr. Roman inspected our big water tank.

I believe that the overall impression which the panel received of MSFC's efforts and capabilities was not unfavorable.

E.S.
So do I
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NOTES 8/12/68 TEIR

8/17

SA-205 STATUS AT KSC: At this time we know of no major problems. ✓
Testing is generally still on the working schedule presented at the August Management Council. There are several minor launch vehicle problems in the process of being dispositioned. During replacement of the H-1 engine LOX seals with the bellows seals a straight 3" piece of safety wire was discovered in the LOX pump of Engine #6. Preliminary information indicates this wire was dropped into the pump during seal checkout. A possible incompatibility of cable connectors (Bendix with Cannon) in the S-IB-5 Stage instrumentation system has been reported. Ten measurements have failed intermittently since arrival of the stage. Preliminary data indicates that cleaning of the lubricant may be a possible solution. If changeout is required, only those connectors which involve flight control measurements or redline measurements without a backup will be changed out. Latest information received by this office on the IU-205 structure core density problem indicates that all structural problems relative to IU-205 have been resolved. Review of the X-rays revealed that the proper core material was used in the proper locations in all segments of the IU-205 structure. ✓

GUIDANCE AND PERFORMANCE (G&P) SUBPANEL MEETING: Several items discussed at the subject panel meeting held at MSFC on August 7 are of general interest. ✓

AS-205

1. MSFC reported that a 20 sec. longer burn time associated with the new AS-205 operational trajectory (as a result of flying the propellant utilization system open loop) results in a change of the acquisition and loss times for the various ground stations by approximately 8 seconds. It was determined that this is insignificant and does not require a flight software update. This is what we expected the case to be. ✓
2. MSC reported that the crew has changed the duration of the attitude control takeover test on AS-205 from 7 minutes to 3 minutes to enhance complete station coverage and also save time in their already crowded timeline. ✓
3. MSC reported that they still plan a 10:00 AM liftoff with a 5 hour launch window. ✓

AS-276

Although MSFC is proceeding to perform whatever is required for a 276 mission to fulfill a 6 month decision point, MSC comments at this meeting indicated that they are doing no work on this mission. ✓

NOTES 8/12/68 WILLIAMS

B 8/17

8/12/68

1. Launch Vehicle Programs (Rosen Working Group): A draft final report on "Launch Vehicle Alternatives for Manned Missions" was transmitted to Les Fero on 8-4-68. After discussions with Mr. Rosen on 8-6-68, Fero has requested that we write up MSFC inputs to Rosen Working Group in form suitable for publication as an appendix to a summary report, to be prepared by Rosen, Fero, Mahon. There will also be KSC and LeRC appendices. This is a switch in approach from last week's effort (condense all the material into a single summary report), and will require more work. Our report is now due to Rosen by 8-16-68. It is understood that Rosen will hold a Working Group meeting on or about 8-19-68, for final review and adoption of the Summary Report. We have received copies of LeRC initial to Rosen. Some significant points: (a) They stress the importance of continuing several competing vehicles - in order to maintain the cost benefits of a continuing competitive situation; (b) Will continue to require Centaur, HOSS, or equivalent stage; (c) Will need Titan III (Cost of Saturn IB's too high); (d) SLV-3X (Fat Atlas) is desirable and warranted.

2. Lunar Program: We have been requested to initiate necessary procurement action with AC Electronics/Defense Research Laboratory (AC/DRL) on our MTA remote control study. This study is to define the necessary modifications on the GM built MTA to conduct remote driving tests that would simulate earth controlled operations of a lunar roving vehicle. This is to be a sole source study to AC/DRL in the amount of approximately \$20K. With some luck and no problems, the contract could begin about mid-September. ✓

3. Unmanned Planetary Program: On Tuesday, August 6, 1968, we invited representatives from McDonnell-Douglas in to discuss results of their Langley study contract entitled "Mars Soft Lander Study." McDonnell had given the final presentation to Langley on July 30, and essentially repeated it here in a shortened version. The scope of the study included design and analysis of a Mars soft lander for the '73 Mars mission plus an in-house study of launch vehicles for planetary programs. ✓

4. BioLab Study: A presentation on the Biotechnology Laboratory Study (OART) is scheduled at MSFC on September 12, 1968. A management level presentation can be arranged at your convenience. The Biotechnology Laboratory is an integrated life sciences laboratory designed to serve the research needs of Earth Orbital Biomedicine, Biotechnology, and Bioscience aboard a space station from 1975 onward. MSFC has a distinct potential for receiving major development and/or integration responsibilities for the laboratory - if we want it and work toward that end. ✓

5. Space Lab: It is understood that Dr. Newell tabbed the name Earth Orbital Space Laboratory (Space Lab) on the follow-on workshop activities. ✓ We will be using this name in our forthcoming publications and discussions. ✓

6. Other Technical Program Related Data: The Optical Astronomy Panel of the Astronomy Missions Board chaired by Dr. L. Spitzer met at MSFC August 8 & 9. MSFC presentations on OTES, ATM Follow-on, and basic in-house research which supports optical astronomy were well received. The Panel was interested in the OTES Program Approach which forces NASA-wide cooperation. Spitzer said that NASA doesn't have a "general" in charge of Astronomy. We knew this and defined our OTES Program with this fact in mind. ✓

Notes on 8/12/68

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August 19, 1968

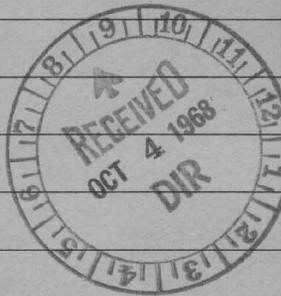
NOTES

10/14

ROUTING SLIP

MAIL CODE	NAME	ACTION	
		APPROVAL	
DIR	Dr. von Braun	CALL ME	
		CONCURRENCE	
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		INFORMATION	
		INVESTIGATE AND ADVISE	
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		NOTE AND RETURN	
		PER REQUEST	
		PER TELEPHONE CONVERSATION	
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STS
10/A



Reference your August 29 note expressing concern as to whether experiment T027, Contamination Measurement, would fly.

The experiment is very high on the Headquarters priority list, falling just below the biomed and DOD experiments, and it has the full support of MSC, MSFC, and Headquarters.

We have resolved all major integration problems and have been successful in getting the Scientific Airlock baselined for AAP-2. We are now confident that T027 will fly on AAP-2. ✓ B10/14

We will inform you if any new problems arise.

MAIL CODE	NAME	TEL. NO.	DATE
I-S/AA-MGR	S. R. Reinartz Leland F. Belew	6-2350	OCT 1 1968

NOTES - 8/19/68 - BALCH

8/19/68

B 8/29 N.B.

S-II-5 - Formal data presentation of the static firing on 8/9/68 was accomplished on 8/15/68, and significant discrepancies have been called to the attention of appropriate MSFC personnel. Removal of stage from the A-1 Test Stand to the Vertical Checkout Building for modification is planned for late August. After completion of modifications, it is to be returned to the A-1 Test Stand for completion of post-static checkout. Shipment to KSC, previously scheduled for 10/24/68, has now been postponed approximately one month. ✓

S-II-6 - Cryogenic proof pressure test is still scheduled for 9/5/68. Information has been received from the MSFC S-II Stage Office that a new schedule is being considered that calls for a change in the on-dock KSC date from 12/15/68 to 1/31/69, which would extend the ship date from MTF approximately six weeks. ✓

S-IC-6 - Full-duration static firing was successfully accomplished on 8/13/68. POGO modifications worked as planned during the firing, and visual inspection of the modification immediately after the firing indicated no damage. On the morning of 8/15/68, it was discovered that a piece of ring baffle had become lodged in the prevalve in the LOX emergency dump line. Inspection of the LOX tank that afternoon revealed that a large area of the web on the lower ring baffle had broken away. The only other discrepancy noted was a crack in the panel adjacent to the major damaged area in the same ring baffle. At this time, no decision has been made as to a fix or corrective action to be taken to remedy this problem. ✓

Legal - Eleven telephone complaints of alleged property damage by the static firing of the S-IC-6 stage were received at MTF on the evening of 8/13/68, shortly after the firing. The complainants were advised to contact the NASA Legal Office at MTF the following morning. Four of them wanted to leave their names and addresses, and letters have been written to these enclosing claim forms and advising them of the procedure to follow in order to file a claim against the Government. No further word has been received from the remaining seven complainants. ✓

Public Affairs - Mr. Robert Claveyrolas, French scientist, visited MTF on 8/12/68. ✓

I spoke to approximately 125 members of the Kiwanis Club in Jackson, Mississippi, on 8/14/68. ✓

8/19/68

AAP-2 AND AAP-4 PAYLOAD SHROUD: We have received information from Phil Culbertson advising that Dr. Mueller has questioned the plan to build a new payload shroud for AAP-2 and AAP-4. Dr. Mueller's concern was expressed in a note to Mathews/Luskin/Disher after Disher mentioned the plans to go to the new shroud in the last Management Council Meeting. Mr. Luskin now has the task of assembling additional information to review this subject with Dr. Mueller. ✓

ALTERNATE MISSION FOR BACKUP SATURN I WORKSHOP: On August 14, we briefed Headquarters on two mission options which we are investigating. Both options have as primary emphasis "maintenance and repairs" in space, with secondary mission for scientific emphasis under option 1 for stellar astronomy and option 2 for earth resources experiments. Representatives from ML, MT, Bellcomm and KSC were in attendance. It was generally agreed that these two mission options are attractive and that the investigations should continue. ✓ In addition, it was recommended by Phil Culbertson, MLA, that a third option be considered. This mission would be oriented to evaluation of man's capability to perform effectively in space, experiments in repair and maintenance, and space manufacturing experiments. Before this mission can be defined, additional experiment definition work is required.

The next review with Headquarters is planned for lately October 1968. ✓

LM-A SYSTEMS TECHNICAL MANAGEMENT MEETING: The second LM-A Systems Technical Management meeting at MSC on August 15 was attended by a representative of my office. Several questions involving MSFC data came up during the meeting. Examples are: (1) the worst case trajectory for SLA jettison studies is required by GAEC. (Pressure and temperature analysis); (2) controls and display vibration data from Bendix are required; (3) a closer coordination is required with ATM Principal Investigators to design camera and cassette stowage areas (Crew provisions stowage module). These and other questions will be discussed in detail with the appropriate MSFC project and systems engineering personnel. ✓

KC 135 ZERO "G" TESTING: The zero "g" tests for LM/ATM translation between work stations and LM end work station planned for early August, will be delayed approximately two months due to aircraft being grounded. ✓

CONTROL MOMENT GYRO (CMG) TESTING: The first CMG and inverter assembly, which was received from Bendix earlier this year, has successfully completed functional and vacuum tests. Electro-magnetic Interference (EMI) tests are presently in progress. The CMG will be installed in the Astrionics torque measuring fixture within two weeks if no EMI problems are found. ✓

Mtd. 8/21/68

L.B.

I'd like to attend this if schedule permits

B

8/19/68

B 8/29

GENERAL - On August 13, an order was issued to Rocketdyne to stop work on all remaining H-1 engines. This order was superseded by a partial termination notice on 27 engines on August 15. Detailed cost data and the rationale for this action were provided by TWX to Dr. Mueller on August 16. In regard to the F-1 and J-2, we have accelerated studies which have been underway for several weeks to evaluate the most economical mode for partial termination of hardware which is no longer needed (per the latest decisions by the Administrator). Preliminary information indicates that eight F-1 and three J-2 engines can be terminated prior to final assembly. The components and subassemblies will be carried to an economical state of completion based on optimizing the dollar savings and the integrated requirements for spare parts, ground test and production support (sustaining engineering) hardware needed for the balance of the Apollo Program. At this point it appears that we can complete our study in time to be responsive to General Phillips' request for a recommendation from MSFC by August 27. ✓

F-1 ENGINE - All F-1 engines performed satisfactorily during the scheduled 125 second firing of S-IC-6 August 13 at MTF. The special gas generator oscillation instrumentation installed for this test (the first stage test with the POGO accumulator fix installed) indicated stable GG operation. Engine performance was well within specification requirements.

Because of our inability to satisfactorily simulate flow in the lines on the F-1 engine, the bellows verification test program is being done on the engine system at RETS. The first three tests for 426 seconds have been conducted to establish the resonant frequencies of the bellows. The test program requires 2250 seconds while dwelling at the bellows resonant frequencies. During the bellows verification testing, the heat exchanger lines will be qualified at the increased flow rates found to be required as a result of the AS-501 and AS-502 flights. A third objective, the evaluation helium inlet bellows from two particular lots which developed cracks during production engine acceptance testing earlier this year, is also being accomplished. ✓

J-2 ENGINE - A successful 320-second acceptance test of S-II-505 was conducted on August 9. All J-2 engine performance was satisfactory; however, a thrust shift was experienced on engine J-2076 due to flow disturbance in the gas generator LOX bootstrap line. This phenomena has been experienced over the years in the J-2 engine program and has been thoroughly investigated. Analysis by Rocketdyne and R&DO have shown the thrust shifts to be of no concern to the engine or vehicle. ✓

8/19/68

B 8/29

LABOR RELATIONS

The union contract between The Boeing Company and the International Association of Machinists and Aerospace Workers (IAM) expires midnight, October 1, 1968. According to report from Boeing, negotiations are currently being conducted and progressing satisfactorily, hopefully leading to a new three year contract prior to contract expiration. Additional information will be furnished in future Notes on the status of negotiations. ✓

1. Deficiencies of LM-A for Unmanned Rendezvous:

From information derived from a careful reappraisal of the July 23 presentation on Unmanned Rendezvous (U/MR) by MSC, it appears that LM-A as designed may be incapable of performing U/MR by reasons of deficiencies associated with the Primary Guidance Navigation and Control System (PGNCS). MSC makes the following two statements:

- (1) "Ground update of LM-A state vector following insertion is desirable."
- (2) "Catch-up phase of rendezvous will be ground controlled (automatic onboard backup using PGNCS)." The MSC proposed ground control technique would use new procedures to be attempted experimentally in the AS-205 Mission for the first time. Even with this ground update the LM-A state vector can not be determined as accurate as that of the IU inertial system and we have found by error analysis that the IU was inadequate due to cumulative system errors to do the job unless a radar update method was employed. Additionally, the AAP/LM-A Requirements Document, Revision E., July 3, 1968, states U/MR will conform to PGNCS limitations rather than PGNCS be modified to meet U/MR requirements. Furthermore, there is no assurance that the LM-A is capable of living within U/MR propellant allocations, because the MSC error analysis did not include provisions for launch windows. The adequacy of the simplified steering scheme as proposed for the LM-A has not been validated to be suitable for the longer burns needed in AAP. A final selection at this time of the U/MR configuration should not be made. ✓ We need some time to validate the LM-A system or suggest an alternate. ✓ If the LM-A system should be chosen at this time, before verification of the suitability of the system, we run the risk of having to accept the decoupled mode for the ATM. We plan to send a group of people to work this problem further with the Gruman Aircraft Company at the detailed engineering level as required. This action is currently being planned for August 21, 1968. ✓

Ludie
Richard

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late!

2.. MSFC Thermosphere Measurement Program: Two papers which were generated in the preliminary analysis of MSFC Thermosphere probe data were presented at the Eighth International Science Symposium in London, July 1967, and have been published in the book, "Space Research VIII," (COSPAR proceedings). The two papers are entitled: "Diurnal Survey of the Thermosphere: (I) Neutral Particle Results," by Mr. R. E. Smith, and "Diurnal Survey of the Thermosphere: (II) Charged Particle Results," by Mr. W. T. Roberts. Continued analysis of the Thermosphere probe data has provided additional information concerning the temperature and chemical composition of the atmosphere which will be very helpful in our studies for a more refined upper atmosphere dynamics model for use in the MSFC orbital studies. ✓

8/19/68

B 8/29

ENGINE CONTAMINATION: In regard to your question on NOTES 7-29-68 BROWN (copy attached), our investigation into the cause of the engine contamination cited in your note reveals that in both instances the contamination could have been generated by sources external to the engine. At KSC, the installation of an antivortex screen stiffener and changeout of the stage PVC duct were the contributors; at Santa Susana, a facility pre-valve lip seal was the culprit. Lack of periodic maintenance on the facility pre-valve apparently resulted in over use and resulting fatigue failure of the lip seal. However, we have been concerned about contamination of engines for some time. In March 1967, we conducted a comprehensive survey at Canoga Park in this area finding several factors contributing to contamination problems. Rocketdyne resolved these discrepancies to our satisfaction, established a contamination awareness program for indoctrination of their personnel, and a working group to monitor and improve contamination control wherever possible. We have continued to monitor the contamination control program at Rocketdyne and generally considered it was being operated satisfactorily. However, we frequently find contamination in engines. Recently, J-2 Engine 2131 was received in this Laboratory for quality verification. This engine was a flight version routed to this Laboratory in lieu of NAR/SD, the original consignee. The engine, although perfectly acceptable when subjected to ambient test, consistently exhibited excessive leakage in critical valves when subjected to cryogenic tests. The leakage was determined to be caused by contamination, apparently "self-generated" due to design of the J-2 engine. We believe that contamination of engines can be attributed to: (1) Sources external to the engine (stages, facilities, equipment); (2) human failure (safety wire, tools, nuts, bolts, etc., not accounted for); (3) design of certain components which make them generators of contamination or "self-contaminators", a problem which cannot be solved until design is changed; (4) lack of complete reassessment of contractors' design, manufacturing, assembly, and modification processes toward elimination and prevention of contamination; and (5) personnel have still not recognized the importance and necessity for contamination control. We are presently collecting our personnel with expertise in this area from other work assignments, and together with P&VE Laboratory personnel, plan an immediate reassessment at Rocketdyne, Canoga Park, in an effort to locate and correct any existing deficiencies. We plan a similar reassessment of our stage contractors after completion at Rocketdyne. ✓

IU STRUCTURE: We have three people at KSC conducting an analysis of AS-205 and AS-503 IU structures to assure that the honeycomb core to skin bonding has not deteriorated and is flightworthy. The investigations conducted to date include Eddy-sonic, X-ray, and ultrasonic tests in accessible areas. The results of these tests are as follows: IU-205 has four areas suspected of debond; one area approximately 3/4" wide by 15" long, one approximately 3/4" wide by 18" long and two circular areas approximately 1" diameter and 4" diameter. In addition, the access door was tested and found to be debonded along the top edge. IU-503 has six small suspect areas which appear to be minor. Record traces were examined at Tulsa and the structure appeared to be acceptable at time of manufacture. IBM/Huntsville has a representative participate in the inspection with our people. IBM and North American, Tulsa, had people scheduled to arrive at KSC August 16, 1968, to verify our findings. Should our findings be confirmed that there are debond areas, repairs can be made in the stacked position. ✓

ATTACHMENT: NOTES 7-29-68 BROWN (Dr. von Braun's and Mr. Weidner's copies only)

NOTES 8/19/68 HAEUSSERMANN

B 8/29

8/19/68

1. Advanced Stellar Astronomy. Dr. Roman of OSSA has made an informal request that the Astrionics Laboratory determine, with the aid of potential principal investigators, the requirements which should be placed on an orbiting stellar imaging X-ray telescope. This work would be very interesting to pursue and could lead to an important project for this Center. In order to determine what would be involved, a meeting was held on 8/7/68 with Dr. Roman and some of the potential principal investigators. The investigators with whom we met were Dr. E. A. Boldt, Goddard Space Flight Center; Mr. E. T. Byram (representing Dr. H. Friedman), Naval Research Laboratory; Dr. G. W. Clark, Massachusetts Institute of Technology; Dr. R. Giacconi, American Science and Engineering Company; and Dr. R. Novick, Columbia University. ✓

ACCESS ARM NO. 9 The Flow 1 Access Arm (AA-09-01) was installed in the Test Area on 8/12; the Environmental Chamber was delivered on 8/13. The Control Console is due from Boeing on 8/29. We are now in the process of checking out the Environmental Chamber. ✓

J-2 THRUST CHAMBER On 8/9, during a J-2 thrust chamber throttling test at Test Position 502, a failure occurred which resulted in thrust chamber burnout (reference NOTES 8/12/68). The subsequent investigation has shown that engine fuel valve body breakage was the primary failure. A detailed examination of the fuel valve revealed no faulty or malfunctioning parts. Neither was there any evidence of slag or other discontinuities in the body casting which could have weakened it. All test data indicated this was a normal test until the valve body separated. Both instrumentation and control data verify that the valve was fully open and remained fully open until the failure occurred. This fuel main shutoff valve was an early J-2 valve used on J-2S R&D tests at Rocketdyne. Because of the start sequence used in our chamber tests, the valve is thermally shocked from ambient to about -400 F, at the same time the full fuel pressure is applied (pressure fed system). This is the only difference from the J-2 flight engine application. A flash report is being prepared. P&VE are continuing the investigation. This failure is not expected to impact the Saturn V program. ✓

F-1 ENGINE Five F-1 engine tests were conducted this week, FW-096 through FW-100. On 8/13, tests FW-096, -097 and -098 were utilized to investigate, with an upstream pulser, the fuel suction side oscillations. On 8/16, tests FW-099 and -100 were conducted to obtain additional data on the lox suction side utilizing the S-1C-503 POGO fix. ✓

F-1 TURBOPUMP (POGO) No test activity last week; next test scheduled 8/27. ✓

S-II STRUCTURAL TEST PROGRAM The S-II (V7-21) Structural Test, Phase VB, was rescheduled by R-P&VE from 8/22 to 8/26, to allow R-P&VE to complete the final testing on the "C" Structure prior to further testing on the V7-21 Stage. ✓

S-1B (MSFC) Chrysler Corporation Space Division has approximately ten people left at the Static Test Tower East. ✓

S-1VB (SACTO) S-1VB-507 was installed in Test Stand Beta III for pre-static checkout. The acceptance firing is planned for late September 1968. ✓

MOBILITY TEST ARTICLE Two test series were conducted this week on the Bendix Unit. Additional testing was scheduled for the week of 8/19, but the chase truck boom was damaged slightly during a demonstration drive of the General Motors Unit. Testing will resume as soon as the condition can be corrected. ✓

NOTES 8-19-68 HOELZER

8/19/68

B 8/29

NEGATIVE REPORT.

8/19/68

B 8/29

1. S-IC-6 Static Firing:

A piece of a slosh baffle was found when the emergency drain valve was removed to inspect for stress corrosion of ring baffles in the LOX tank. Boeing has made a thorough inspection of the tanks and confirmed that the failure occurred due to loads sustained during LOX filling. It is anticipated that a longer slow fill time will be required in the future prior to going to fast fill. Action required on S-IC-3 is still under study. ✓

2. S-II Battleship:

The S-II Battleship is tentatively scheduled to be fired August 26, 1968, based on Rocketdyne's delivery of the repaired engine, J2078, on August 17. This test is to verify the Sump Baffle Removal and the new Sump Screen installation. Reviews of test site operations and controls have been completed by Test Laboratory Team chaired by Mr. Elmer Ward. Corrective actions required by this review and earlier reviews performed by the resident office are scheduled to be completed prior to the next firing. ✓

3. S-II "C" Structure Test:

The "C" Structure one engine out test without external heat, which previously failed, was completed August 14. The remaining one engine out test with external heat applied is scheduled for August 20. These tests will verify the adequacy of the thrust structure modifications now being installed in S-II-4 at KSC. ✓

4. MSFC Resident Office at KSC:

We have combined the Saturn V and IB functions of the MSFC Resident Office into a single Resident Saturn Program Office. Jack Lee is chief, with Dick Shute as deputy. ✓

NOTES 8/19/68 JOHNSON

8/19 JS

B 8/29

Nothing of significance to report.

B 8/19

8/20/68

1. Contingency Payload for SA-503: All necessary weld repairs have been made on both 51" diameter tanks; the first of these tanks has passed hydrostatic test while the second tank has been installed in the hydrostatic tower. Also, the first 45" diameter tank has been welded. Weld repairs for this tank are in process. We have worked in two shifts on these tanks during the week and also worked all Saturday on this job in order to meet the extremely tight schedule for delivery on September 3, 1968. ✓

2. Review of Structural Integrity of IU-205 and -503: Mr. B. K. Davis from our laboratory, in a joint effort with QUAL Laboratory, reviewed these two structures at KSC. All records of work accomplished at Cape Kennedy on both units were examined and a visual review of the structures was conducted. No significant problems were found. Some doubts were raised by QUAL Laboratory representative on soundness of bonding in a few areas, based on ultrasonic testing. Investigation of these indications is continuing. ✓

3. Neutral Buoyancy Simulation:

a. Hardware for fireman's pole stowage and installation was received and installed in the Neutral Buoyancy Simulator. Test runs for two different methods of installation from the stowed position to the deployed position have been made last week with several test subjects. The next scheduled test, sealing of the aft dome penetration, will begin on August 20. This test has been delayed six weeks because of late delivery of the sealing hardware from MDC. ✓

b. Arrangements have been made with MSC to train four of our civil service personnel as recompression chamber operators. They will travel to Houston this week for eight days of qualification training. ✓

4. Support to MSC: Several weeks ago, MSC had called on us to evaluate 25 contract change proposals for them with respect to manufacturing and manpower requirements. Twenty-three of the reviews were completed last week. The NR estimate on these proposals totalled approximately 198,000 manufacturing manhours. The recommendations of our personnel were 171,000 hours, or a reduction of 27,000 hours. ✓

Wik.
This is a very valuable type of

contribution to Apollo and its funding problems

B

8/20/68

B 8/20

1. S-IC-506 RING BAFFLES: Post static firing inspection of S-IC-506 LOX tank revealed a broken piece of baffle approximately 4 x 8 inches in the LOX sump.
2. CRACK IN LOX SUCTION LINE FLANGE (S-IC-4): A crack has been detected in one of the floating flanges of the LOX suction line of S-IC-4. Stress corrosion is suspected; investigation is being conducted by The Boeing Company and our Materials Division.
3. POGO: S-IC-6 was fired successfully for 125 seconds on 8-13-68. The POGO accumulators functioned as predicted according to "quick-look" data. Complete data to fully evaluate the system should be delivered to R-COMP today. A five-line accumulator POGO analysis shows AS-503 to be a very stable vehicle. The smallest in-phase open loop gain margin calculated, using nominal data, was approximately 9 db in the second mode.
4. SA-501 AUXILIARY PROPULSION SYSTEM (APS) ANOMALY TESTS: Latest testing has revealed that the probable cause of the low chamber pressures noted on several of the engines during early flight and prior to the excessive heating was restriction of propellant flow in the engine injector oxidizer feed passages. Tests in which engines and an injector were exposed to propellants in a sea level "burp firing" and then held at atmospheric conditions for a period of time simulating the launch pad hold times show that these conditions cause the restrictions in the oxidizer feed tubes. Examination of an engine and injector revealed that deposits of some material probably caused by a reaction between the oxidizer (N₂O₄), moisture in the air, and the engine injector material were clogging the entrance to the feed tubes. The solution to the problem would be to restrict the exposure of the injector to propellants. This has resulted in the recommendation to delete "burp firing" at KSC. Further tests and analyses are underway in order to provide a more definitive explanation of the phenomena.
5. CENTAUR STAGE RESTART FAILURE: We have been invited by Lewis Research Center (LeRC) to participate (as observer) in the investigation of this failure which occurred on 8-10-68 and we are responding positively. Preliminary analysis indicates that freezing of H₂O₂ due to a cryogenic leak may have been the cause.
6. EXPERIMENT No. 42: A call was received from NASA Headquarters relative to how much it would cost to stop work on our experiment No. 42, "Surface Adsorbed Gases." The reason for considering stoppage is cost saving. In consideration of the total costs of AAP, cancellation of austere, in-house programs seems somewhat whimsical.
7. ATM EVA WORK STATION RELOCATION: Based on an assessment of the most effective approach to conducting EVA, the LM/ATM EVA Working Group has recommended that the sun-end and the LM-end work stations be relocated. At the request of R-ASTR, we are generating an ECR to describe the change. Subsequently, cost and schedule impact will be considered.
8. AAP-2 COROLLARY EXPERIMENTS: We understand that Mr. Luskin will base-line an AAP-2 experiments list by approving one of the following options at the next meeting of the Blue Ribbon Committee: (1) A joint MSFC/MSRC recommended experiment list within 3550 lbs. control weight; (2) Similar to Option 1 except the control weight will be reduced by 500 lbs.; (3) A list which includes all six proposed Earth Resource experiments. We are presently establishing experiment control weights for the three options. These weights will be coordinated with MSC when completed.
9. SUPERSONIC TRANSPORT PROGRAM: Personnel from NASA Headquarters, the FAA, and JPL visited this week to review our Seals work in support of the SST. They seemed to be especially impressed and pleased with the scope and variety of our polymer synthesis effort. The accomplishments to date seemed to insure continuation of funding for our work.

B.L.
Have we informed MSC about this?
B

B.L.
If I can help, please furnish me the data to defend this experiment
B

→ Please get me a membership list
B

8/20 JTB

B 8/29

NATIONAL ACADEMY OF SCIENCE RESEARCH GRANT:

Dr. Robert Guest, Dartmouth College, has completed three weeks of field research at MSFC on how MSFC has organized and is managing the ATM Project. The objective of his study is to document how NASA manages complex technologies for possible consideration by managers of complex programs in industry and other government agencies and as an aid in updating university instruction in management at the graduate level. Dr. Guest was quite impressed with the competence of the ATM managers interviewed, with the spirit exhibited by the people working on ATM, and with the work accomplished under present NASA budget and program uncertainties. ✓ Dr. Guest also commented on the uniqueness of the ATM organizational arrangement and relationships within the Center. The study, undertaken under a grant from Mr. Webb to the National Academy of Science, is being directed by Dr. Leonard Sayles, Columbia University professor and consultant to the Administrator. → Dr. Guest will have a first draft of his study to discuss with MSFC the latter part of September or the first part of October. ✓

Dick
CookFYI
BSTANDARDS OF PERFORMANCE:

Dr. Mueller has initiated a study of housekeeping activities at the MSF Centers. It is intended that the task group will establish "standards of living" in the areas of: Common Supply, Custodial, Printing and Reproduction, Facilities Maintenance, Security, Transportation and Utilities. ✓✓

Since it is recognized by Headquarters that MSFC has made drastic reductions in these areas, the task team first visited MSFC to collect data from which standards may be developed for application to the other Centers. It is not expected that this study will make further cuts necessary at MSFC. ✓

NOTES 8-19-68 MURPHY

8/20/68

B 8/29

MSF Safety Survey of MSF Contractors: An MSF Team, which is composed of Messrs. Lederer, Bolger, McGuire, and Myers will make a Safety Survey of the MSF Contractors (NAR and McDonnell Douglas) in California, August 20 - 23, 1968. I will accompany them. ✓

Some of the areas to be reviewed are:

- Contract safety requirements.
- NASA and contractor documentation of safety program requirements.
- System hazard analyses and control.
- Risk management programs.
- Accident/incident reporting and investigations.
- Needs for safety standards and guidelines.
- Fatigue as a factor in risk management.
- Manned space flight awareness programs.
- Any safety problems encountered by contractors in meeting NASA requirements or in interface with other contractors. ✓

NOTES 8/19/68 RICHARD

8/20

B 8/29

No notes this week.

NOTES 8/19/68 SPEER

B 8/20

8/20/68

1. AAP Ground Command Requirements: Reference my notes 7/29, same subject (copy attached). The total AAP 1-4 onboard systems now have 1270 single command functions that could be addressed from the ground. In coordination with MSC and R&DO we have identified 663 of these functions which the ground may have a need to access. This includes all modules and the CSM. Because of the complexity of the total mission and the ground network check-out problems involved, only one universal ground command program will be written, programmed, and validated for the entire AAP 1-4 mission sequence. This tends to increase the command requirements when considering a single mission. The present requirement is well within the technical capability of the ground systems. It does exceed, however, the somewhat arbitrary ceiling of 500 established by MSC for their Flight Control Team. An MSC/MSFC Ad-Hoc Working Group is now actively working this problem with a goal of mid-September for the final identification of AAP ground command requirements essentially within the above ceiling.

F.S.
What do you mean by that?
B

F.S.
Could I get a briefing on this just with statistical figures, but

a selection of typical command functions and attendant problems?
B

Please arrange for 3000

Noted 9/3

2. Lunar Debris Policy: Based on MSC and MSFC recommendations, OMSF has established a lunar debris policy which adopts the MSFC S-IVB/IU post separation trajectory (slingshot). In addition, OMSF is requesting that OSSA adopt a more realistic position with respect to lunar impact. The present OSSA policy does not distinguish between LM landing and booster impact and confines both to the Apollo Landing Zone (+ 5° latitude, + 45° longitude). This policy is obviously impractical to enforce. ✓

3. Target Update: We are participating in the joint MSFC-MSFC effort related to real-time target update implementation. During the meeting at MSC on 8/15, test and verification procedures for the real-time computer (RTCC) were developed and - as a principal guideline - it was agreed that no target update would be considered if it affected in any way the L/V switch selector functions. ✓

4. Mission Failure Contingency Planning: We have discussed the MSFC contingency planning with the Safety Office (Jim Murphy) to provide his participation in any mission failure investigation. ✓

1 Attachment

as stated (Dr. von Braun's copy only)

1. TESTING OF ATM-A INSTRUMENTATION: Thermal-vacuum studies and tests of the ATM-Goddard experiment (X-ray telescope) are presently under way in our sun-simulating thermal environment facility; the tests are conducted by Astrionics Lab and the ATM Project Office. Test items include the front end of the telescope with the solar heat shield, the filters, and the film camera. So far, it appears that the camera is in good shape; the filters may require more protection. ✓

2. CONTAMINATION EXPERIMENT T027: This experiment, consisting of a sample carrier exposing optical samples to the environment, and a photometer recording light scattered by contaminants, is presently in some danger of being removed from its scheduled flight on AAP-2 because of general weight and integration problems. Dr. Mueller has expressed renewed interest in contamination experiments. MSC is supporting us strongly in this project. It will be the only experiment for the scientific airlock; there is a possibility that the airlock will be located in the structural transition section (STS) rather than in the MDA. A meeting will be held on 8/22 with Hal Luskin in which we hope to obtain a go-ahead signal. Jack Waite and Lee Belew are giving this project full support.

Lee Belew
What's the best on this?
Clearly, this experiment is important for ATM and all follow-on space astronomy projects.

3. HIGH ENERGY ASTRONOMY EXPERIMENTS FOR ATM FOLLOW-ON: Results of this study, an outgrowth of the EMR Project, were presented to members of OSSA and to the Optical Panel (Dr. Spitzer) of the Astronomy Missions Board on 8/8. Subsequently, OSSA requested a list of advanced technologies which will be required in connection with X-ray, gamma ray, and far UV space experiments. We are presently compiling this list with the support of ASTR and ASO.

Following the High Energy ATM Follow-on Briefing to OSSA, the Phase II effort of the study has gotten into full swing (SSL with Brown Engineering). Some significant milestones which have tentatively been established are:

- September 3, 1968 Freeze of experiments definition
- October 15, 1968 Review of final report outline and major items of each section
- November 5, 1968 Draft of final report and in-house briefing ✓
- November 15, 1968 Completion of the study. ✓

E.S.
Please include me
B

4. VISITOR FROM ERC: Dr. Hector Ingrao visited here last Friday in connection with his attendance of the Astronomy Missions Board Meeting as a member of ERC. He has become an employee of NASA/ERC, but he still maintains a desk at Harvard College Observatory. Ingrao has the task to build up an experimental astronomy program at ERC. Bill Jones discussed our new lunar thermal model, and Ingrao agreed that it was the right approach. ✓

E.S. let's cooperate in joint objectives, rather than permit a 'roles & mission fight' to develop B

8/20/68

B 8/29

SA-205 PMPFR AND PFR: Due to the requirement to coordinate with many events to be held by Headquarters, other centers, and MSFC, to assure proper support and representation, we have had to again shift our PFR dates. The PFR is now scheduled to be held September 5 and 6, 1968. We have also scheduled backup dates of September 16 and 17, 1968, for the PFR and would plan to shift to these dates if the CDDT slips at an early date. The PMPFR is still scheduled for August 27 and 28, 1968, and will be held at LIEF.

DOCUMENTATION REDUCTION: As you will remember, during the POP 68-2 budget discussion with Gen. Bogart and Gen. Phillips the subject of documentation reduction for cost reduction was discussed. The following is an example of what we are doing in the Saturn IB G. E. ESE contract. We have now taken action to eliminate from the contract Documentation Requirements List 29 line items during the first three months of the follow-on contract which begins October 1, 1968, and 39 line items during the nine month period which begins January 1, 1969. We estimate that this action will save at least \$117,000.00 during the contract year.

SATURN IB POST-^{PRO}REDUCTION/POST-APOLLO LAUNCH PERIOD:

As a second priority only to AS-205 activity, we in the Saturn IB Program Office are working to develop a plan for the Saturn IB post-^{PRO}reduction/post-Apollo launch period. This will be a plan directed towards minimum post-production annual cost for maintaining the Saturn IB in storage with as close to a "zero" change policy as possible. This will have to be done in conjunction with a minimum cost procurement plan for 213 and 214 and with minimum funding in FY-69 and FY-70. The production periods for the various stages will be different because of contractor considerations. We will undoubtedly produce S-IB stages early and will follow Saturn V production on the other stages. This plan will be the initial input for the joint MSFC/KSC team to be co-chaired by Col. LaHatte on this subject.

NOTES 8/19/68 WILLIAMS

B
8/29

8/20/68

1. Lunar Program: Ben Milwitzky and Mike Gruber (MTL) visited MSFC on August 14, 1968, to discuss changes to LRV ^{Lunar Landing Vehicle} Work Statement, which was rewritten accordingly. Mr. Milwitzky was briefed on MSFC material to be presented to the LLV ^{Lunar Landing Vehicle} Working Group on August 28. A tentative MSC meeting has been set with MSFC and Grumman on August 21, 1968, to review LM/LRV interface and design data. ✓

August 1968

NOTES 8/26/68 BALCH

B
8/27

8/26/68

S-IC-6 - Static Firing Evaluation was conducted on 8/19/68. There were no unusual anomalies, and those minor ones which did exist have been properly dispositioned. Engine performance was excellent in the area of thrust level repeatability. There were no problems with the POGO modification during firing, and inspection after firing revealed no detrimental effect to the POGO hardware. Of primary concern was the damaged lower ring baffle in the LOX tank, previously reported. In a meeting at Michoud on 8/22/68, it was decided that rework of the ring baffle will be accomplished at Michoud. Shipment of the stage to Michoud is planned for 8/29/68. ✓

S-II-5 - Removal of stage from the A-1 Test Stand for installation in the Vertical Checkout Building is set for 9/6/68. Reinstallation in the A-1 Test Stand is planned for 10/10/68, and shipment to KSC has now been rescheduled for 10/22/68. ✓

S-II-6 - Cryogenic proof pressure test and static firing, previously scheduled for 9/5/68 and 9/17/68, respectively, have been tentatively rescheduled for 9/12/68 and 9/24/68, respectively. ✓

H-Layer Project - This project is being conducted by R-AERO and involves the installation and operation of a phase doppler network. The main receiver will be at MTF, and transmitters will be located at Michoud, Keesler AFB, and Picayune, Mississippi. Initial installation of the Banjo Antenna System at MTF has been completed. ✓

University Research - We have furnished Mr. D. H. Newby at MSFC a list of additional research activities for review by R&DO and IO to determine what projects could be assigned to MTF for performance by Louisiana State University and Mississippi State University. Dr. Whitehurst of Louisiana State University was at MTF this past week to discuss the performance of research activities for NASA at MTF. ✓

Navy Activity at MTF - Mr. Richard Holton of the Navy Oceanographic Office arrived at MTF on 8/20/68 to run test of computer software programs on the SDS-930 and the SC-4020 film plotter at the Data Handling Center. ✓

BOMEX Program - MTF personnel visited Wallops Island this past week in connection with the data system for the BOMEX Program. MTF presented a plan for a totally automatic system, and Wallops presented a plan using a manual system. ESSA indicated that the automatic system was most acceptable. ✓

Regional Work by GE MTSD - We have received from GE MTSD a request to use certain MTF data and calibration facilities and specifically to do work under contract for the Bureau of Commercial Fisheries at Pascagoula, Mississippi. Action is being taken to favorably expedite this request under the correct formula to assist regional economy. ✓

NOTES 8/26/68 BELEW
8/26/68

B 8/27

LM-A PRELIMINARY DESIGN REVIEW: The PDR for the LM-A has tentatively been established for the week of October 7, at Bethpage, New York. MSFC and MSC are reviewing preliminary Grumman documentation leading to this review. It is expected that, if Mr. Webb approves the LM-A Project transfer early in September, the formal changeover of the LM-A Project Management would be effected at this PDR through MSFC/MSFC co-chairmanship of the review. MSC is proceeding in preparing a procurement plan for effort beyond the current contract (approximately October 15) and we are coordinating this procurement plan with them. It is expected that it may be necessary to extend the effort on a letter contract or letter of intent basis beyond mid October, pending approval of the procurement plan and completion of the procurement cycle. ✓

OK
8/27
Bennie
I'd like to visit Grumman in connection with my visit of IRI Congress.
Purpose: LM-A familiarization.
Please explore schedule possibilities w/allow to
Shep

ATM PRELIMINARY DESIGN REVIEW (PDR): The ATM PDR has now been scheduled for the week of September 23. In conjunction with this, we have scheduled the pre PDR crew operation briefing (COB) for September 12-13. ✓

I'd like to attend this
B

BALL BROTHERS RESEARCH CORPORATION (BBRC) RESIDENT

REPRESENTATIVE: Mr. Bob Groeneveld, our new resident representative at BBRC reported on location August 12. ✓

SCIENTIFIC AIRLOCK LOCATION: During the August 22 MDA Task Force Meeting, Mr. Luskin "baselined" a sun-side Scientific Airlock on AAP-2. He asked for a firm recommendation regarding location (either in the Airlock STS or the MDA) within one month. Location in the MDA precludes use of the Scientific Airlock during the 3-4 mission. Location in the Airlock STS would require relocation of two other experiments mounted on the Airlock Module Position 1 truss. McDonnell Douglas Astronautics Company will study this change and report status during the September 10 Airlock Management Meeting. ✓

WUSH

ZERO "G" HARDWARE: The major items of zero "g" Workshop hardware have been delivered to MSFC from McDonnell Douglas Astronautics Company. Preflight tests and operational procedures checkout will be performed by MSFC prior to shipment to Wright Patterson Air Force Base in September.

Shep
Let's look at this stuff before I go to WPAFB
B

LOEWY/SNAITH MID TERM REPORT: We have received one copy of the Loewy/Snaith Mid Term Report for their nine month habitability study. The mid term presentation is scheduled for September 5, 9:00 in the 10th Floor Conference Room, Building 4200. A full scale mockup of the Food Management Compartment will be available for review, after the presentation, in Building 4619.

Bennie
Can I attend this, or is there a collision w/RS 205 PFR? B

8/26/68

3 8/27

TERMINATION ACTIVITIES - Partial termination of 27 H-1 engines is proceeding satisfactorily at Rocketdyne. However, we have not yet reconciled our differences with Headquarters regarding the six engines which we recommended to be assembled. Headquarters has directed that no further work be accomplished on any H-1 hardware. We have requested that they reconsider these six substantially complete engines based on: 1) all components and subsystems (with a few minor exceptions) are completed and all that remains is to bolt the engines together; 2) reevaluation of the minimum manpower required has indicated that this can be done for about \$6K; and 3) assembly of the engines would permit storage in an approved shipping container (the engine container), whereas no approved container exists for storage of the components and subsystems. ✓

Our studies of a partial termination of F-1 and J-2 hardware continues. Based on information available as of 8/23, I feel that we can recommend partial termination of at least eight F-1 engines, three J-2 engines and related auxiliary parts and items (such as the F-1 thermal insulation). Savings from such action have been estimated at about \$4.0M in FY69 and \$7.0M to \$8.0M in FY70. (As you may recall, at the 8/13 meeting with Generals Bogart and Phillips, we had a rough estimate which indicated that the FY69 saving might be as much as \$6.0M.) To the extent possible, the terminated materials and components will be reprogrammed to offset future spare parts and production support hardware requirements. A TWX is being prepared to General Phillips notifying him of the above findings and recommending the partial termination. ✓

PROPOSED INTEGRATED SCHEDULE - Analysis of the draft "Integrated Schedule" proposed by Mr. Kubat indicates that serious consideration should again be given to storage of Saturn V stages prior to installation of the engines. This would be especially applicable to the stages for vehicles 512 and subsequent. The key advantages are: 1) Significant cost saving in FY69 and FY70 by delaying part of the stage assembly work and stage static firing to later years; 2) Elimination of many dual inspections, rework, etc., since there will assuredly be a thorough inspection and some updating of the stages when the "mothball fleet" is removed from storage; 3) Storage of stages less engines gives needed flexibility in that it would offer us the opportunity to select the engine which best meets the mission requirements for a particular flight or series of flights. Thus, we could select from inventory a "standard engine," a specially selected or specially calibrated engine and/or a J-2S (hopefully). ✓

RETRENCHMENT AT ROCKETDYNE - Rocketdyne announced late last week that they are planning to reduce their employment by about 800 personnel within the next two to three weeks. Upon further checking, I was told that 300 of these will be from the Engineering Department and of the 300, about 100 are what Rocketdyne terms "technical" engineers, i. e., design and development engineers. It is very unfortunate that such substantial reductions must be made at such a critical time in the Saturn program. ✓

Ed DC
This makes a lot of sense to me. Since FEM seems to have different ideas, I suggest we first try to sell this plan to Forrest Waller, MSF's new Logistics Division chief.
B

8/26/68

B5/27

Transfer of Michoud Assembly Facility Personnel

Mr. Arlin G. Smith, Assistant to the Manager for Quality Assurance and Reliability, has accepted a position at the Kennedy Space Center; and Mr. James M. Funkhouser, Chief, Public Affairs Office, has accepted a position in the Public Affairs Office, NASA Headquarters. The effective transfer date of these personnel is August 25, 1968. ✓

B 8/27

8/26/68

1. OART Environment Criteria Monographs: Mr. Mason Charak, OART, visited our Aerospace Environment Division to discuss work on design criteria monographs which are concerned with inflight winds, ground winds, orbital atmosphere models, inflight atmosphere models, surface atmospheric extremes and lunar environment models. Our efforts are on schedule. OART is somewhat uncertain as to the technical depth of the material that they would like in each monograph. Our revised Environment (Terrestrial and Space) Criteria Guideline Documents may contribute to resolving this question for OART. ✓

2. Jimsphere Turbulence Program: Our FPS 16 Radar/Jimsphere system is continuing to be used to support a laser radar/atmospheric turbulence detection program being conducted by Dr. J. D. Lawrence, Jr., and Mr. Stewart Ocheltree, of LRC at Wallops Island, Virginia. The LRC personnel have indicated that the Jimsphere wind data are of great value to them in their investigation of the laser detection system's capabilities. The Jimsphere data will be used to provide an indication of turbulent regions of the atmosphere to about 18 km. The data will then be correlated with survey aircraft response data and laser radar returns. Dr. Lawrence and Mr. Ocheltree have indicated they plan to visit our Aerospace Environment Division for the purpose of discussing the program. ✓

3. AAP-2 Performance Improvements: Elements of the Mission Requirements Panel met at MSFC on August 21, 1968, to pursue an optimum flight mechanics scheme for AAP-2 utilizing passivation impulses thru the J-2 engine and CSM RCS boost for circularization. This action is part of the total effort to increase the AAP-2 payload margin by $\sim 4,000$ pounds. Two schemes were adopted in the meeting for further study: (a) Insert at perigee, dump residuals at perigee, and circularize the resulting elliptical orbit with the CSM RCS approximately one day later after the CSM has docked with the OWS; (b) Insert at perigee, coast to apogee, dump residuals at apogee, and circularize the resulting elliptical orbit with the CSM RCS approximately one day later after the CSM has docked with the OWS. Three hundred (300) pounds of RCS propellant are available for both schemes. Scheme 3 (no coast) yields $\sim 1,100$ to $1,400$ pounds of payload gain depending on how much propellant is allocated for orbit dispersions caused by residual dumping (10 n.mi. vs 5 n.mi.). Scheme 2 (1/2 orbit coast) provides $\sim 1,900$ to $2,400$ pounds of payload gain using the same logic. Items of concern about scheme 2 are propellant unseating at the time of residual dumping and operational perturbations associated with the coast period. It appears that scheme 2 combined with a lower AAP-2 insertion orbit (205 to 215 n.mi.), recalibrated J-2 engine, and weight reductions which are now in progress will yield the required payload margin increase for the AAP-2 vehicle. ✓

8/26/68

B 8/27

1. P.U. PROBE SURVEY: The P.U. probe survey at Minneapolis Honeywell, Minneapolis, Minnesota, MDC-Santa Monica, MDC-Huntington Beach, and NAR-Seal Beach has been completed. The team investigated manufacturing, testing, shipping, and storage of the probes. Numerous discrepancies were found; the most significant being poor packaging and handling of the S-IVB probes at both Santa Monica and Huntington Beach. ✓
2. S-IB PROGRAM: Electrical discontinuity and high milli-volt drop have been observed on S-IB-205 where Bendix PT1H-8-4P (Pigmy) and Cannon KPTO-6E-4S connectors are mated together. Investigations to date indicate that the two connectors are not compatible due in part to a coating of wax Bendix places on solder contact pins, and due to the Cannon sockets not being specifically designed to cut through the wax. Cannon-Bendix combinations on S-1B-5 used in critical applications, or previously having indicated discontinuity, will be replaced. Continued investigation is in process and an ALERT is being prepared to minimize recurrence. ✓
3. BALL BROTHERS RESEARCH CORPORATION (BBRC) QUALITY SURVEY: A survey of the Reliability and Quality Assurance Program at BBRC conducted recently showed a very good overall program. No discrepancies were found in the reliability areas and the ones found in the quality assurance area are not considered to be of a critical nature. BBRC took on-the-spot action to correct others. Some of the items, however, were left open and may require direction from MSFC. ✓

B 8/27

8/26/68

1. Fuel Cells for AAP. Mr. Richard Boehme of Hans Fichtner's Electrical Systems Integration Division was requested by MSC to participate in a proposal evaluation for the qualification of the Allis Chalmers fuel cell for the AAP missions. The evaluation team consisted of NASA Headquarters and MSC personnel. The general consensus of the team was that the A-C system was the best available for AAP missions and that it was developed to a state worthy of attempting a formal qualification for 1500 hours service. Several problems still must be resolved by MSC and are concerned with the integration aspects with the CSM. The requirements must be firmed up and the associated problems with the radiator, cyrogenic tanks and water to be condensed must be resolved. Schedules, limited funds and documentation and test requirements also present problems.

During the review, the MSC Project Manager for fuel cells and John Marsh from Headquarters discussed the possibility of MSFC contributing R&D hardware and some testing support. Their concern was funds may be limited and MSFC support possibly could relieve the situation. No commitments were made and if there is further consideration for this support it would be submitted through formal channels.

With

The Astrionics personnel who developed this system are pleased that their R&D contributions and efforts will result in a program application of the system. Time has proven the correctness of their early convictions on what constitutes a good fuel cell system and which now is the best system for AAP.

So am I
B

2. National Academy of Sciences Research Associates. There are presently three Research Associates on board in Astrionics - the first will be leaving in November of this year. The breakdown of associates at MSFC is: five - SSL; one - P&VE; one - AERO; and three - ASTR. These associates would appreciate a chance to meet with you sometime before the first one leaves.

Shep
Please
artaise
B

NOTES 8/26/68 HEIMBURG

B 8/27

ACCESS ARM NO. 9-1 Subsystem tests on the Environmental Chamber are continuing on schedule and should be completed by 8/29. The Control Console is due from Boeing on 8/29. After receipt of the Control Console we will start arm swing tests. At present, we do not anticipate any problems in meeting the test completion date. ✓

F-1 ENGINE (POGO) Two tests were conducted on 8/21, (FW-101 and FW-102) at the West Area F-1 Test Stand. Test FW-101 was a repeat of test FW-099 in which a failure of the lox POGO fix was assimilated. After pre-charging the lox prevalve, the gaseous helium supply was shut off for the remainder of the test. Test FW-102 was a fuel inlet pulse test in which the primary purpose was to obtain the natural frequency of the inlet suction duct. Data from both tests are being analyzed. The F-1 Test Stand will be down for repair to the deflector and also to permit tests to be conducted on the S-II Structural Test Stand. ✓

← simulated?
I guess?
B

F-1 TURBOPUMP (POGO) No test activity last week. The critical tests in the lox system POGO Program have been successfully completed. We are working with P&VE to define additional tests required to support AS-503 and subsequent vehicles. ✓

S-II LH₂ TANK ENTRY TEST (MSFC) The S-II-ID and the S-IVB-D are stacked in the Dynamic Test Stand at MSFC awaiting NAR final test plans and schedules. The test procedure was received from North American Space Division on 8/22, and is presently being reviewed. All Test Laboratory responsible work is proceeding on schedule as support equipment is made available. ✓

K.H.
What's that tank entry test for? → P.U. probe repairs?
B

S-II-5 (MTF) Having completed the acceptance static firing test, S-II-5 is scheduled to be removed from MTF Test Stand A-1 on 9/6, and installed in the Vertical Checkout Building (VCB) on 9/9. Modification and LH₂ tank inspection will be completed in the VCB after which the stage will be re-installed in the test stand on 10/10, for post-static checkout. ✓

S-II-6 (MTF) S-II-6 is presently undergoing checkout in the MTF A-2 Test Stand for a cryogenic proof pressure test scheduled for 9/12. The acceptance static firing test is scheduled for 9/24. ✓

MR. WILLIAM E. MARSALIS, Chief of our Technical Support Division, died from a heart attack on 8/24. The funeral will be at 10:00 a.m. on 8/27. Place is undecided at this time. ✓

NOTES 8-26-68 HOELZER

8/26/68

B 8/27

NEGATIVE REPORT.

8/26/68

B 8/27

1. S-IC-6 at MTF:

The data from S-IC-6 static firing shows that all performance requirements were met. The stage will be removed from the stand on Aug 28, 1968, and returned to Michoud for refurbishment.

An MSFC/Boeing review on the slosh baffle failure was held at Michoud on August 22, 1968. It was agreed that no changes would be made on S-IC-3 and 4 but that a change from .023" (7079-T6 material) thickness to .063" (6061-T6 material) in the lower slosh baffle 8 ft. section would be considered on S-IC-5 and subsequent. ✓

2. IU-205/IU-503 Structures:

A team composed of personnel from IO, QUAL, ME, P&VE, IBM and NAR are at KSC to evaluate the possible de-bond condition in the subject structures. This team will initiate positive action, as required, to correct the condition. Inspection equipment and procedures adequate to do the job are currently being agreed upon.

Repair procedures are available and will be implemented by IBM if the decision is made to repair the suspect area. ✓

3. C' Mission:

In order to get the C' mission under control our Systems Engineering Office is displaying in the Saturn V Control Room all open questions, problems, changes and major mission decisions so we will have a common baseline to build on. ✓ In addition, Ludie Richard, representative of the design labs and our office, will be at MSC Tuesday to seek decisions on the above. ✓

4. S-II "C" Structure:

During the final test of the "C" Structure, on August 21, two external stringers cracked, and rivets pulled out of the external ring frame cap at Station 1704. Station 1704 is the location of the first ring frame from the base of the thrust structure. This failure occurred at 122 % of the limit load. 130 % was the test requirement. P&VE and NR are assessing the loads applied at the time of failure for total per cent of qualification. It is planned to restore the damaged area for additional tests as necessary. Repairs are expected to take no longer than 4 days. ✓

NOTES 8/26/68 JOHNSON

8/26/68

B 8/27

Nothing of significance to report.

8/26/68

B 2/27

1. Manufacturing Support to SSL by ME: Dr. E. Stuhlinger and I have agreed on the following manufacturing support to SSL: ME Laboratory will operate a small "Spur Shop" at SSL, staffed in the beginning by four civil service personnel. A similar shop, also operated by ME personnel, has been in existence for sometime at AERO Laboratory with satisfactory results. In addition to this on-the-spot support we have organized a quick response manufacturing service for small (8 hour) jobs for SSL which has already been in operation for some time. These arrangements were made in accordance with discussions with Mr. Weidner and Mr. Cook as a result of the manpower review of our laboratory. In order to preserve the capabilities of our shops and to overcome the critical shortage of a number of skills, especially machinists, needed for manufacturing support to other laboratories, we are planning a training program for wage board personnel whereby younger wage board personnel from low or even unskilled levels would be trained to become highly skilled craftsmen. ✓

2. Development of Manufacturing Technology in Space: As you know Mr. H. Wuenscher has studied for more than a year and discussed with many companies the advantages and unique effects of a zero g environment on some specific manufacturing processes. We have now started to develop concepts and layouts of a special experimental chamber for levitation melting. ✓ These ideas and the results of unsolicited studies of several companies in this new field will be presented and discussed in the next Manufacturing Technology Meeting, organized and conducted by Mr. P. Maurer at MSFC. This meeting is presently planned for October 24, 1968.

3. ATM Cold Plate for Thermal Test: Preliminary resistance seam welded panels were made using 6061-T6 aluminum alloy for the "cold plate thermal test ATM". The purpose was to determine if resistance seam welds in aluminum will hold Helium gas under vacuum tests to the allowable leakage set by design of 1×10^{-7} SCC/S, using a mass spectrometer for testing. A satisfactory panel was made that held Helium gas to 3.9×10^{-10} SCC/S. Further tests will be made to certify the seam welding machine also using 5052 aluminum alloy. ✓

8/26/68
I'd like
to attend
this B

RUS 14

NOTES 8-26-68 LUCAS

B 2/27

8/26/68

B. L.

Please make absolutely sure that we don't have a surprise come out

1. POGO: F-1 engine tests conducted on August 13, 16 and 21, which included pulsing of the fuel suction duct, showed a fuel pump inlet pressure resonance frequency of 11 to 11.5 Hz. This frequency is self generating (w/o pulsing) at pump inlet pressures of 27 psig. It can be attributed to a pump generated oscillation at 11.5 Hz. The final evaluation of these tests will clarify if the observed 11 - 11.5 Hz frequency is the resonant frequency of the fuel feed duct, and will establish the amplitude of the resultant thrust oscillations. The preliminary results indicate a thrust amplitude of approximately ± 3 k lbs for this frequency. We do not expect that the dynamic loads analysis will result in loading conditions exceeding the design conditions for launch vehicle and spacecraft, if the above ± 3 k lbs thrust amplitudes are used in the 10 to 15 Hz band.

Ed O'C

Maybe you want to call Bob Greer about this

B

2. S-II STRUCTURAL TEST "B" STRUCTURE: The replacement forward skirt for the "B" structure was mated to the tankage of the test article at Santa Susana, and bolting and shimming measurements were made. The skirt was inadvertently dropped while being destacked 8-21-68. The extent of the damage is being assessed. Visual inspection indicates repairs can be accomplished at Santa Susana.

3. "C" STRUCTURE: Ultimate load condition 4, sequence 3 simulates flight loads which could occur from the loss of one control engine during S-II flight, assuming full gimbal corrective motion of the remaining engines. This condition was successfully tested on 8-14-68, to 130% without simulating the thermal environment. This same ultimate load test condition was repeated 8-21-68, including the thermal environment and failure occurred at approximately 122% of limit load. We and North American Rockwell/Space Division (NR/SD) are evaluating the data to determine the cause of the failure. It will be necessary to repair the failed portions of the structure since further testing will be required, but further evaluation and review with NR/SD will be required before a decision on the advisability of rerunning the failure case can be established.

4. AAP CAUTION AND WARNING SYSTEM CRITERIA: The AAP Caution and Warning System Criteria ICD has been prepared and transmitted to MSC for signoff by the cochairman of the AAP Systems Safety Panel. It will be returned to MSFC for approval of the Program Manager prior to release.

of the woodworks during the

DDX Pogo on 5 Sept

B

5. J-2 FUEL VALVE FAILURE OCCURRENCE AT TEST LABORATORY: (Notes 8-19-68 Heimburg) The J-2 fuel valve which ruptured during a pressure fed thrust chamber firing has been thoroughly examined during the past week along with its operating history and usage during the test failure. Additional metallographic examination has failed to indicate a progressive or fatigue failure mode and the failed material appears to be basically sound and free from stress concentrating flaws. The most likely cause of failure is considered to be thermal shock of the valve, which is unrealistic to its flight utilization. In subsequent tests there will be a chill bleed to or through the valve prior to full fuel flow from the facility shutoff valve.

6. S-IC-6 LOWER SLOSH BAFFLE DAMAGE: The low slosh ring baffle damage which occurred on S-IC-6 at MTF resulted in a hole 20" x 30" in the baffle above the fill and drain line. The cause of the problem has been attributed to fluid impingement during loading. This problem started on S-IC-4 when a weight savings suggestion was incorporated to reduce the baffle thickness from 0.040" to 0.032". The baffle in S-IC-4 has been replaced with the original configuration. Therefore, S-IC-3 and S-IC-4 are satisfactory. For S-IC-5 and subs, the baffle thickness will be increased to 0.063" for additional safety.

B.L. Are we sure that the failure of the S-IC-3 (it did fail, baffle did not wash any debris into the pumps?)

8/26/68

B 8/27

LOGISTICS: Dr. Mueller has established a Logistics Management Division within MSF Management Operations, headed by Mr. Forrest E. Waller. The objectives of this division are to incorporate into future MSF programs the logistics requirements and systems developed to manage the Apollo Logistics Program and to advance the integration and utilization of logistics resources within and between MSF Centers.

Dr. Mueller asked that we designate a key representative to assist in meeting these objectives and John Goodrum has been named for this assignment. We are also setting up a team to study logistics functions within the Center. This study will provide you with the basis and recommendations for any needed adjustments or changes to Center logistics management, and for compatibility with the MSF logistics function. John Goodrum and Stretch Schneider (who will head the study team) met with Forrest Waller in Washington on August 22-23rd to take part in preliminary discussions, and assist in setting up a Logistics Management Steering Group.

NASA WORKLOAD AT ARNOLD ENGINEERING & DEVELOPMENT CENTER (AEDC): Last week Congressman Evins (D-Tenn.) requested a status report on NASA work being performed at AEDC, and a forecast of future efforts at Tullahoma. Our reply was channeled through Capt. Freitag's office to NASA Office of Legislative Affairs. Marshall's input, based on I.O. and R&DO data and forecasts, was that at the present time we expect various testing operations, principally on the J-2 engine, to continue at AEDC through CY-70. However, only current year effort is specifically defined at this time. The NASA summary was given to Congressman Evins with the clear qualification that forecast data is based on presently anticipated budget levels.

H.M.
Evins is
Chairman
of Appropri-
ations
Subcommittee
for Independent
Offices.
Let's lean
over
backwards
to support
this request!
B

8/26/68

1. Contractual Implementation of System Safety: During my visit to our West Coast Contractors which included North American Rockwell (NAR) at Downey, it became apparent since MSC now has a System Safety Plan on contract with NAR that OMSF will expect us to have completed our System Safety contractual negotiations at an early date. ✓
We have previously delayed going on contract with the "generalized" plan that was proposed by NAR and accepted by MSC. ✓

After working with I. O. and the Program Offices, we feel that they now have arrived at very definitized System Safety requirements to which the contractors can respond. These requirements use our current contractual items such as quality maintenance, reliability, configuration, etc., and specifically emphasize System Safety. By this method, I feel that we will:

- a. Avoid duplication with current contractual items
- b. Arrive at an early negotiated contract with very few dollars involved, and
- c. Have a basis for later survey of our contractors' accomplishments.

After explanation of this concept of placing System Safety on contract, Mr. Lederer agreed that this should be a logical method of implementation by MSFC, providing negotiations are accomplished at an early date. I. O. and the Program Offices are working hard to complete their negotiations. ✓

2. Personnel Certification: Personnel certification for special jobs like handling of equipment, techniques and operations, console operators, both at the test sites and the Cape, were of special concern to the MSF Safety Team in their survey of the stage contractors.

With our reduced budgets, the turnover of personnel will become far greater on the Saturn - Apollo Program; Dr. Mueller wants a more formal program of training for these special jobs. We are working with OMSF on this project. ✓

NOTES 8/26/68 RICHARD

8/26/68

B 8/27

No Notes this week.

NOTES 8/26/68 SPEER

B 8/27

1. AS-205 Systems Interface Test: The AS-205 Launch Vehicle - Mission Control Center Interface Test (SIT) was successfully completed on 8/22. All commanding sequences were successful with no anomalies. In spite of this good performance, I consider the SIT a test of great importance for our L/V flight control team and would be very reluctant to agree with deleting this end-to-end test in its entirety as recently proposed by KSC. ✓

F.S.

Concur with you

2. MSFC On-Site Operations Support to KSC: We have succeeded in standardizing our on-site operations support to KSC, starting with AS-205 and AS-503. In either case 11 MSFC engineers will be required to assist LVO organizations at well defined positions for both CDDT and launch. With only one exception, MSFC is asked to determine the best qualified engineer for this support. ✓

3. Network Support: Past flights have demonstrated that reliable communications with a ground station can be obtained from horizon to horizon due to refractive bending of the RF signal. This can increase our planned support from each ground station pass by approximately 20%. However, such early acquisition of the RF signal causes sidelobe tracking by the ground stations, leading to a weak RF signal and more frequent dropouts which could be critical for flight control actions. Therefore, proper preflight predictions are needed as procedural aid to signal acquisition. We are devoting some special attention to this area of network operations for future flights to insure the best possible vehicle communications. ✓

NOTES 8-26-68 Stuhlinger
8/26/68

B 8/27

1. CONTAMINATION PROGRAM: Several of my associates and I visited Ball Brothers and Martin in Boulder and Denver to obtain briefings on their contamination study work, and on the status of the TO27 optical contamination flight experiment. Both companies have considerable efforts underway to understand, measure, and control contamination effects on optical space instrumentation. We expect that the data analysis of the returned samples, and of the photometer recordings and films, of Experiment TO27 will be a joint effort between SSL, the Martin Company, and guest experimenters.

Dr. Mueller, through our AAP Office, requested a contamination briefing at the next MSFEB meeting. Dr. Dozier will probably give the principal presentation. If you should like a briefing on extent and status of the contamination study effort, perhaps in the second half of September, please advise.

↳ E.S.
Yes, please arrange thru Bonnie
B

Noted. Bk 8/27.

SA-205 PMPFR AND PFR: The PMPFR will be held Tuesday and Wednesday of this week in the HOSC Conference Room. The PFR for your Review Board is still scheduled for September 5 and 6. ✓

SA-205 STATUS: Space vehicle electrical mate is still scheduled for August 28. At this time there are no known outstanding problems on either the launch vehicle or spacecraft that should affect the schedule. You are aware that we have been conducting a complete review of the I. U. structure. ✓ This review indicated four areas of debonding on the I. U. 205 structure. Three of these were behind the ST-124M platform and could not be reached with the normal eddysonic equipment for positive verification of debonding. A long probe was fabricated and a team composed of personnel from I. O., R-Qual, R-ME, R-P&VE, IBM and North American-Rockwell went to KSC Saturday to evaluate this debonding condition. Final results of this evaluation show the bonding in these areas to be satisfactory. ✓ This evaluation confirms the adequacy of the I. U. structure without repairs. ✓ Chrysler has now completed both the qualification test and reliability demonstration test of the LOX seal drain line temperature sensors. No problems were encountered. ✓

ELIMINATION OF S-IVB APS PRELAUNCH BURP FIRING: The results of recent tests conducted by MDC-WD and MSFC show detrimental effects of sea level burp firings on the APS engine performance. Based on these results, it can be tentatively concluded that degradation of APS engine performance is highly probable after a sea level firing and a hold period. The extent of the degradation appears to be influenced largely by the number of burp firings, ambient conditions, and duration of the hold period. Action has been initiated to eliminate burp firings on SA-205 and subs and SA-503 and subs. ✓

S-IVB STAGE STORAGE ENCLOSURE: The first S-IVB stage storage enclosure was inflated at Huntington Beach Facility on August 14, 1968. The first stage to be placed into long term storage will be S-IVB-208. A photograph of the enclosure is attached for your information and retention. ✓

S-IB STAGE ACTUATOR INTERLOCK: A briefing was held per the direction of the AS-205 DCR Board by telecon with George Hage at Washington, Bill Schneider at KSC, and Chris Kraft at MSC. Upon conclusion of the briefing Chris Kraft stated that he capitulated on the need for an interlock of the S-IB stage actuator position. ✓ A copy of the briefing charts will be transmitted to the DCR Board for the record. ✓

B 8/27

1. Launch Vehicle Working Group: Mr. Huber, Mr. Stucker, E-R, and Mr. Doherty, I-V-P, spent August 19 & 20 in Washington reviewing a draft of Mr. Rosen's final report. Each of the participating Centers (MSFC, KSC, LeRC, GSFC, and LaRC) reviewed the report and independently met with Mr. Rosen to discuss their comments. Mr. Rosen was quite receptive to changes and will try to incorporate as many as possible in the published report which is due at the printer's on August 23. The report does favor continued use of Saturn with a compacted base for the manned missions, however, it recommends development of the Titan III D/Centaur for unmanned missions. ✓
2. Lunar Program: J. Belew attended a meeting at MSC on 8/21/68 regarding: (a) Science and mission profile for LRV Statement of Work, and (b) LRV working group meeting data, to be presented jointly by MSFC/MSFC in Washington during week of August 26. A good "first cut" of the science was obtained. MSC agreed to perform additional work for MSFC's LRV Statement of Work. Also, a very good document on the LM/LRV interface had been generated by Grumman. MSC agreed to expand this in order to meet MSFC's requirements for the LRV Statement of Work. ✓
3. Saturn V Workshop: Following the recent series of comprehensive intermediate space station presentations made at MSFC by Grumman Aircraft and their supporting contractors, they were invited to receive a brief review of our efforts with emphasis being placed on specific problem areas where future study efforts are required. This meeting was on 8/22/68 with presentations by Messrs. von Tiesenhausen, Brown, Perry, and Cramblit. Those attending from Grumman included: E. Z. Gray, Asst. to President, Don Ingram, Future Systems Mgr., J. Mockoviak, Jr., Program Management, R. McCaffrey, D. Sullivan, A. Adelman (IBM), C. Guarneri, D. Stein, P. Henton, H. Burn (RCA), G. Yorke, Warner-Lunde, A/E, J. Stark, Manager, Space Vehicle Development. Informal discussion session regarding configuration approaches, systems engineering, data management, and general subsystems approaches were quite beneficial. GAEC discussed some preliminary thinking they are doing regarding potential use of their deep sea submersible vehicle as a space station simulator. They propose to outfit the interior with the necessary space station facilities, closed life support systems, etc., and run long-term tests in a submerged condition, allowing the crew to perform all normal functions, including fault isolation, maintenance/repair, etc. under independent conditions closely resembling the isolation and hazards of the space environment. ✓
4. Other Technical Program Related Data: The first of three meetings in which both contractors (Chrysler and Perkin Elmer), the various Headquarters elements (OART, OSSA, OTOA and OMSF), and the various participating centers (GSFC, LaRC, ERC, and MSFC) will cooperate to assist the Project Manager (John Tidd) and the COR (Reinbolt) in achieving the very best and most meaningful program plan for Optical Communication within the constraints of time and money is scheduled for September 10, 11, and 12 at MSF C. ✓

File.
interesting
How
useful
do you
think
this
simulation
is?
B