

August 7, 1967

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7/67
w/ comments
Borman

NOTES
MR. GORMAN'S COPY
AUG 7 1967

w/ comments

Grass notes marked
by Dr w B for Mr Gorman.
To "Urgent Boy"
8-21-67 3pm

NOTES 8/7/67 BALCH

B 8/14

S-IC-5 Testing - It has been determined that a collapse of stage fuel emergency drain duct on 7/25/67 was caused by reduced pressure in the duct created by recirculating fuel through the facility drain line. The stage fuel emergency drain duct, fuel emergency drain valve, and fuel fill and drain duct have been replaced, and a flapper valve has been added to the facility fuel piping system to prevent recurrence of the problem. Start of propellant load test was rescheduled for today, but it is certain to slip at least one day and possible two. Static firing is now scheduled for 8/18/67, and removal of stage from stand is targeted for 8/31/67. ✓

S-II-3 Testing - All LH₂ feed ducts have been inspected for wrinkles and found in satisfactory condition. Power up is now expected on 8/9/67 instead of 8/11/67, as previously reported, with LOX/LH₂ tanking still set for 9/2/67. First static firing (50 seconds) has been rescheduled from 9/11/67 to 9/12/67. End Item test plan and acceptance specifications have been distributed. ✓

Stage Handling Derricks - Preliminary report from team conducting failure mode and effects analysis on S-IC derricks revealed that only six functional sub-assemblies of approximately forty-five have a failure mode which could endanger the load and that all these failure modes are corrected by activation of the emergency stop button. Action has been initiated to form a team to conduct a failure mode analysis on the S-II stage handling derricks at MTF. Preliminary report from this team is expected about 8/30/67. ✓

GE Support Contract - Draft of our pre-negotiation position on CPAF proposal covering second through fourth quarters of Fiscal Year 1968 was transmitted to MSFC on 8/4/67, and discussions on the proposal between MTF and MSFC representatives will be held this week at MSFC. ✓

SYNCHRONOUS ORBIT MISSIONS: The McDonnell Douglas Corporation (MDC) study to determine S-IVB stage modification for the 3-burn capability and the study of S-IVB stage modifications to provide for a spent stage Orbital Workshop in synchronous orbit have been completed. MSFC is presently reviewing these reports to determine what, if any, additional action is required to assure synchronous capability on S-IVB stages 510 and 515. ✓

SECOND AAP MECHANICAL PANEL MEETING: A possible Lunar Module (LM) structural problem exists with present Command Service Module (CSM) and LM/ATM docking arrangement on the Cluster due to loads induced in the LM during CSM docking. Grumman is performing a study of the problem and possible remedies. ✓

ORBITAL WORKSHOP DESIGN REVIEWS: The status of action items generated during the initial Orbital Workshop Preliminary Design Review (PDR) was reviewed with NASA Headquarters, MSC, KSC, and MDC on July 28.

A decision was made to redirect the Orbital Workshop crew quarters toward a two-floor concept. The crew quarters will be installed beneath a double floor with provisions for "carry on" laboratory or crew quarters additions above the floor on later missions. ✓

GRUMMAN AIRCRAFT ENGINEERING CORPORATION/MSFC MANAGEMENT MEETING: We are regularly participating in the monthly Grumman/MSFC management meeting as it relates to LM modifications for ATM. ✓

ATM HARVARD COLLEGE OBSERVATORY AND NAVAL RESEARCH LABORATORY EXPERIMENT PROPOSALS: A follow-up meeting was conducted August 1 and 2 to more thoroughly explore Harvard College Observatory's backup proposal to fly a modified OSO-D experiment on the initial ATM flight. Also discussed were rough drafts of the Design and Performance Specification and interfaces required by the new equipment. Naval Research Laboratory was also requested to make a similar presentation on August 4 which described their proposal for an experiment which could be available for the initial ATM flight. ✓

ATM NEUTRAL BUOYANCY TEST ARTICLE: A design review was conducted with Lockheed for fabrication of an ATM neutral buoyancy test article. The review was satisfactory and good progress has been made. The article is scheduled for delivery the first week in September. ✓

LUNAR EXPLORATION AND SCIENCE SUMMER CONFERENCE: A summary of the summer conference on Lunar Surface Exploration being held at Santa Cruz, California, will be presented to Dr. Mueller at Santa Cruz on Saturday, August 12. Headquarters' plan is to present these results along with the results of the AAP Lunar Ad Hoc Committee to Dr. Seamans prior to the end of August. (A briefing sheet on the conference is attached for your information.) ✓

Attachment: For Dr. von Braun's copy only

H-1 ENGINE The engine that was recently disassembled at MSFC to inspect the soft goods was part of a study which includes evaluating one engine each year for a three-year period. The last engine tested will have been in storage for seven years with an additional year of installed life of the soft goods. The test program consists of a detailed visual inspection, a leak and functional checkout, a full duration firing, system disassembly, component testing, component disassembly, and laboratory analysis of the soft goods. The first engine completed its pre-firing checkouts, and was static fired at Neosho with no soft goods problems. It was disassembled at MSFC, and the components were tested by Qual Lab. These tests were completely satisfactory. The components were then disassembled and the soft goods provided to the P&VE Materials Division. As a result of these tests, P&VE increased the installed life of soft goods for S-IB-204 from sixteen quarters to 20 quarters which removes this restriction on the launch through September 1968. MSFC specification 105-A is being revised to permit 20 quarters of installed life. ✓

J-2 ENGINE After coordination with P&VE and Rocketdyne on the inspection of the first stage hydrogen turbine wheel it was agreed to fire engine 2052 at AEDC again without replacing the hydrogen turbopump. Four tests were conducted last Friday to simulate 80-minute restart conditions and were apparently successful. The hydrogen and oxygen turbines will be inspected prior to the next test.

All five ECA's have been replaced and checked out on S-II-503 at MTF. There are no major open work items on the engines. ✓

GENERAL Rocketdyne's assumption of a broader role in engine field activity is progressing satisfactorily at all locations. ✓ Rocketdyne's increased responsibilities at KSC have been accomplished with the exception of the operation of a new consolidated engine spare parts warehouse, which is currently scheduled for early September. ✓

NOTES 8/7/67 CONSTAN

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Nothing of special significance.

NOTES 8/7/67 FELLOWS

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MSFC/KSC Mutual Assistance Program: Final mutual agreements between MSFC and KSC are rapidly solidifying. Five R&DO representatives have already officially begun work on tasks requested by KSC. Two men were at KSC on other assignments and remained there to begin work on their launch support tasks. The other three men departed for the Cape during the past weekend. Eight additional names and need dates have just been established and others are being processed on a day to day basis. ✓

NOTES 8/7/67 GEISSLER

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1. ODYSSEY: Recent feasibility studies have suggested a package of four earth orbital aeronomy experiments which include the passive sphere ensemble, the paddlewheel/diffuse sphere/smooth sphere combination, the densitometer and a mass spectrometer. Reference mission plans (not to be confused with actual mission which requires a launch date) have been outlined and preliminary project definition studies of a possible experiment implementation concept have been completed. Thermal analyses have been conducted on the passive sphere ensemble and the paddlewheel satellite resulting in temperature time histories and heat rates for several surface locations at orbital environments. Unsteady aerodynamic design criteria have been generated related to a possible piggy-back experiment carrier onboard a Saturn launch vehicle. A project proposal to NASA Headquarters is being prepared here. "Pre-selling" discussions were held with Mr. Lord and Dr. Harvey Hall, OMSF, MTX. They suggested a more fundamental approach be taken in a "pre-selling" campaign to include informal discussions with members of OSSA. Consequently, Mr. Edgar M. Cortwright, OSSA Dep. Assoc. Admin, was contacted and arrangements were made to hold discussions with Dr. Fellows, Chief of the Planetary Atmospheres Office, OSSA. These discussions were held on August 2, 1967. Dr. Fellows suggested that we prepare in great depth the objectives of the experiments, how we plan to conduct them, and what we expect to gain from them. He also suggested that the plan of experiment implementation along with estimated costs, manpower and schedules, be included in the presentation to his Planetary Atmospheres Committee. We plan to prepare the information for a January 1968 committee meeting. ✓

B 8/14

1. Guidance Systems. I plan to be at MIT this week, along with representatives from MSC, to review the Apollo guidance system. A visit to ERC will also be made to discuss the subject of advanced computer development. ✓
2. ATM Experiments. MSFC representatives visited with Harvard College and NRL last week to get detailed engineering data on the proposed simplified experiments. The basic NRL plan is to essentially stay with the present design of the "A" experiment and concentrate efforts to deliver on schedule (early 1969). The "B" experiment R&D would continue but at a lower priority. This instrument will therefore most likely fly as a dummy instrument on the first ATM. (NOTE: The original OSSA philosophy for ATM was to fly only four of the five PI's with schedules determining who would fly.) However, the XUV monitor portion of the "B" experiment has a high probability of being ready for the first ATM flight. Dr. Friedman (NRL), through Dr. Tousey, has expressed the thought that the XUV (with an added TV down-link) would be a significant increase to the solar data gathering capability of ATM. With respect to Harvard, the changes for the "modified" OSO-D can be expressed as being significant and the summation of the changes represents a major impact to the OSO-D experiment. From the ATM systems point of view, the basic NRL approach is better than Harvard's approach in that the interface for the first, and second ATM's is essentially identical. Both groups wanted MSFC to take on hardware activities for these experiments. The Astrionics workload, in the specific technical disciplines, plus the planned reduction of the Sperry support contract efforts, does not allow any major effort to be assimilated. We will take on the TV camera efforts and the photographic camera requirement for the modified OSO-D experiment. A summary of the experiment simplification approach is that it will compound the MSFC problems. ✓

W.H.

Do you have any specific suggestions
to go another route?

B

F-1 ENGINE

F-1 Engine S/N F-5038-1 was installed in the F-1 Test Stand and preparations were started for the next series of tests (lox depletion). ✓

S-1C STAGE (MTF)

Discovery of a vacuum condition in the fuel transfer system and other minor problems have attributed to additional schedule slippage for S-1C-5 stage at MTF. Presently, the propellant load test is tentatively scheduled for August 8 and 9, 1967; static firing August 18, 1967; and stage removal August 31, 1967. ✓

S-1C STAGE (MSFC)

The S-1C-T/4 stage was static fired three times during the week. On Tuesday, August 1, test S-1C-20 was cut off inadvertently after 2 seconds of mainstage by a redline observer who failed to use the redundant measurement. On Thursday, August 3, test S-1C-21 was cut off after 3.6 seconds of mainstage by a redline observer when a transducer failed. In this case, the man thought he observed the flickering of the pre-valve open light (his redundant indication). Records did not validate this point. Test S-1C-22, a successful 40 seconds static firing, was conducted Thursday, August 3, at 7:22 pm. All test objectives were achieved. To prevent reoccurrence of this performance, two approaches are being taken (a) evaluate placing more redlines into the computer and (b) take a good look at the arrangement of recorders and lights from a human engineering point of view, which definitely can stand some improvement. ✓

S-II STRUCTURAL TEST PROGRAM

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

NOTES 8-7-67 HOELZER

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MARSHALL VEHICLE ENGINEERING SYSTEM: The Computation Laboratory will honor a request received from Goddard Space Flight Center to install at their facility the trajectory oriented computational system developed by MSFC. The Marshall Vehicle Engineering System (MARVES) will provide GSFC a proven tool for solution of problems involving differential equations. The use of MARVES at MSFC has resulted in a considerable reduction in trajectory program development time with a resulting decrease in turn-around time between problem formulation and solution. ✓

B 8/14

ART/SRT Program Status - As of 31 July the ART/SRT Programs were:

OART has issued \$11.99M of authority against an annual plan of \$31.01M (which includes \$11.89M NGTM effort). \$2.37M worth of new effort has been processed to FMO/P&C; against a first month plan of \$7.53M. ✓

OMSF has issued \$2.62M of authority against an annual plan of \$9.50M (which does not include \$4.50M J-2X effort). \$4.90M worth of new effort has been processed to FMO/P&C against a first month plan of \$0.70M. The J-2X effort is scheduled to be processed this week. ✓

OSSA has issued \$0.075M authority against an annual plan of \$2.19M and OTDA \$0.40M against an annual plan of \$1.0M. No new effort has been processed to FMO/P&C in either of these programs; since the funding plans in both program offices are being reviewed. ✓

Our best estimates on annual plans at the present time are:

OART a downward adjustment to \$28.5 - 29.0M total program (including NGTM)

OMSF an upward adjustment to \$13.0 - 13.5M total program (including J-2X)

OSSA a downward adjustment to \$1.75 - 1.85M total effort. This does not include Voyager mainstream effort and late identification Voyager connected Supporting Research.

OTDA no change

The current plan is to have all programs, except the NGTM effort, totally committed by 1 January, 1968. About \$2. M of the NGTM effort will have to await definition of requirements but will be committed by 31 March, 1968. We are planning for 90% obligation of the entire program by that date. ✓

Project Odyssey (Experiments 44, 46, and 47) - AERO Laboratory personnel briefed OSSA and GSFC personnel on planning for the three Aeronomy experiments making up the proposed project "Odyssey" package. The reaction was generally favorable.

The plan is to complete feasibility studies in sufficient depth to permit presentation of the proposal to the Aeronomy Sub-Committee of the Space Science Steering Committee at their January, 1968 meeting. ✓

Maurice Dubin wants a detailed analysis of the Saturn pod (experiment Bus) concept completed by that time. He appears to favor having OMSF develop such a bus to accommodate this and other potential OSSA "piggy-back" experiments. The feasibility study will look at other launch concepts (including other launch vehicles in the Thor Delta Class) as well as the Saturn pod. ✓

Out-of-Vacuum Electron Beam Welding: In answer to your question, Notes 7-24-67 Kuers: In conventional electron beam welding a vacuum is required for several reasons: (1) the emitting filament must be protected, (2) the electron emitted must be accelerated in a vacuum to permit focusing, (3) the beam will tend to scatter by collision effects unless it operates in a vacuum. In order to allow the beam to emerge from the vacuum system into the atmosphere a "window" must be designed. The principle of the window designed for our system is this: The beam is generated, accelerated and electrostatically focused in a chamber held at 10^{-4} torr. It emerges from this chamber through a small orifice into a second chamber held at 0.04 torr hence through small orifices and two more pumped chambers (0.4 and 9 torr) to atmosphere.

To permit the out-of-vacuum E/B welder to operate the beam is accelerated to 150KV which is a higher than conventional voltage. The beam is refocused between the 2nd and the 3rd chamber and the atmosphere into which the beam emerges is Helium. All three factors reduce scattering. Some scattering still occurs and members which carry the orifices are heated by the halo of the beam, but nevertheless the gun efficiency is 80 - 90%.

The helium gas at the exit also serves to shield the weld which is located less than 1/4" from the final orifice. On emerging the beam scatters more than it does in a vacuum chamber so that the weld configuration is slightly different. In vacuum E/B welds the molten zone is of approximately even thickness through the material; in out-of-vacuum E/B welds the weld has a slightly enlarged molten zone at the beam entry side--the molten zone looks in cross-section rather like a nail. Nevertheless weld speeds of 240"/min. in 1/4" aluminum have been attained with moderate power. The use of this gun which is light enough to be moved in operation may make possible the welding by the E/B process of large structures which cannot be accommodated in a vacuum chamber. ✓ This process also will potentially reduce costs since set-up times and tooling complications will be much diminished. ✓

B 8/14

1. S-IC STAGE: During the Quarterly Review meeting at Boeing-Michoud on 7-26-67, KSC representatives stated that they would not do the slow-release mechanism torque test on AS-502 empty vehicle because of schedule impact.

This test is required to determine the actual spring constant of the slow-release mechanism and adjacent structure. If the test is not done, all 16 mechanisms on AS-501 vehicle will have to be torqued subsequent to propellant loading (except LH₂) to insure that the deflection due to propellant load will not relieve the 40 kip preload. KSC is aware of this requirement if the stiffness test is not done but, as of this date, KSC has not agreed to the test on AS-502. *Bill* *Suggest you get Randolph into the act*

2. CLUSTER POWER REQUIREMENTS: The power required by the Cluster apparently cannot be provided by the solar arrays in a gravity gradient mode of operation. Studies on attitude control for maximum power are continuing, and studies are underway to establish the weight of the Auxiliary Propulsion System to fly a sun oriented mission. ✓ *B 8/14*

3. ORBITAL WORKSHOP: Items from the 7-28-67 status review meeting with Mr. Mathews are summarized: (a) Approval was obtained for configuration change to the double floor concept. This involves inversion of the present crew quarters, provision of the double-sided floor, and provision for in-orbit kit installation of potential crew quarters equipment or support on the forward side of the floor. (b) Decision on thermal vacuum tests for the Orbital Workshop was withheld until further information is provided on mission objective degradation as a result of not performing tests and comparison of full scale test errors with analytical errors. ✓

4. FEDERAL AVIATION ASSOCIATION (FAA) SEAL DEVELOPMENT: We have been asked by OART to support FAA in the development of seal materials for the SST program. Since the requirements are similar to those we have in long-term exposure of seals to working media, we have consented to discuss this possibility with FAA. FAA and OART allegedly have considerable money for this effort. ✓

5. PAYLOAD MODULE (PM)/RACK: The cancellation of AAP-#1A has not affected yet the PM/RACK program at MSFC nor the hardware delivery schedules. We are still trying for the September 15 delivery date of the test RACK to MSC. Urgency of delivery is associated with the scheduled use of the Apollo Test Facility at MSC. Use of that facility has been scheduled by MSC-TE to do a systems test (PM, SLA, RACK, CSM) September 15 to November 1, 1967. After this period, the test facility will not become available again until June 1968. ✓

B 8/14

MANAGEMENT RESEARCH AND APPLICATION - MSFC is sponsoring a NASA/Northwestern University Management Workshop on October 24 and 25 and the first NASA symposium on management research and application which begins at the conclusion of the workshop on October 25 and continues through October 26, at MSFC. The workshop will serve as an information exchange forum, identify problems requiring mutual consultation, and establish criteria for formation of research projects and team efforts. The symposium represents a further effort for promoting a university/industry/NASA environment for professionalizing management. Select representatives from Southeastern universities and colleges, associated NASA contractors, and other government agencies are being invited to the symposium. To emphasize major NASA interest in organizational development, managerial development, and the role of management research, recognized authorities in these areas have accepted speaking engagements. Dr. Harper North, Vice-President for R&D for TRW, Inc., the dinner speaker, will discuss technological forecasting; Dr. H. H. Meyer of GE's Behavioral Research Service will discuss the role of applied behavioral science; Dr. David I. Cleland of the Air Force Institute of Technology will discuss total systems concepts of organizational developments; and Dr. Fremont Shull of Southern Illinois University will discuss the theory and application of matrix organization. NASA Headquarters, MSFC, MSC, KSC, Langley, ERC, Goddard, and Lewis personnel will attend both the workshop and the symposium. ✓

NOTES 8/7/67 RICHARD

B 8/14

Deflectors for Minuteman Strapons for AAP: Reference my notes of 6/26/67 on this subject. A KSC contracted effort to Martin-Marietta resulted in a "Design Handbook for Protection of Launch Complexes from Solid Propellant Exhaust" which concludes that a deflector can be fabricated for solid strapons within the physical limits afforded by the launch pedestal and the S-IB. Cursory calculations indicate approximately 1/2 inch of Fondu-Fyre would be eroded from a 30° deflector after each launch. The design handbook also shows that the "elbows" from Rocketdyne would aggravate the ignition overpressure pulse, and the 42 inch diameter would not fit the launch complex. However, after review of all this data, we, KSC, and I-IB feel that the deflector problem is not as severe as originally thought and deflectors can be configured to fit the launcher complex at reasonable cost. ✓

NOTES 8-7-67 RUDOLPH

B 8/14 R.R.

1. Saturn V Solder Connection Problems - SA-501:

- o Flight control computer rework completed at ECI, St. Petersburg, Fla., on Sat., 5 August 67. Flange tubelet method used. Inspection and test now in process at ECI.
- o Altitude control relay modules - Rework completed.
- o Control Signal Processor - Rework by Martin Company (Orlando, Fla.) using same method/as ECI now underway.
- o Expect return of these SA-501 units to KSC on 9 or 10 August 67. Change out will be made of the currently installed flight units. KSC has unofficially estimated a one-day schedule impact for re-verification of systems after installation.

Please advise re the new troubles (solder dripping down) and the final solution

2. Change Out of J-2 Engine/Stage Thrust Bolts:

- o The S-II and S-IVB Stage thrust mount attach bolts connecting the J-2 Engine to the Stages on SA-501 will be replaced with bolts which are certified to meet Rockwell hardness requirements as agreed to by MSFC and respective contractors.
- o The hardness and lot number will be identified for each replacement bolt. KSC has agreed that there will be no schedule impact for this change.

3. Updated SA-501 Flight Program Deliveries: SA-501 Flight Program which was scheduled for delivery to KSC on Sun., 6 August 67, was actually delivered on Sat., 5 August 67.

B 8/14

F.S.
 Maybe you can make this out during Rod Kiddleton's becoming visit to MSFC. Let me know if you need my help.
 (B)

1: HOSC MONITORING OF BLOCKHOUSE OIS: Based on our experience in the first Saturn IB launches and requests from MSFC personnel involved, we have been attempting for some time to improve our capability to monitor specific Operational Intercom System (OIS) channels during countdown activities. Our HOSC support engineers have felt handicapped by our past capability to monitor only one channel at a time. An improvement was approved and implemented for AS-204 prior to the accident, and augmented AS-501 requirements were submitted officially in March. The augmented capability, including that already implemented for AS-204, has now been disapproved by KSC, contrary to earlier informal assurances. Disapproval appears based upon a combination of KSC sentiment against LIEF, the scrubdown of OIS after the 204 accident, and politics between internal KSC elements. Our requirements are modest and no different from approved requirements for spacecraft support. We have talked with KSC personnel, including Dr. Gruene, but have been unable to resolve the problem. I am trying to establish a meeting with Petrone, Mathews, and Gruene.

2: NASA AUDIT OFFICE REPORT ON LIEF: The NASA Audit Office at KSC recently distributed for review a draft report on NASA operational communications, which included LIEF. We participated in a conference concerning the report at NASA Hq on last Tuesday with representatives from OMSF, OTDA, GSFC, MSC, KSC, and the GSFC, KSC, and Hq Audit Offices. The conference showed that the report in all areas was based largely on superficial, incomplete, and in many cases incorrect data. MSFC and KSC are preparing rebuttal comments which will be consolidated and backed by OMSF and transmitted to the Audit Office. Audit Office personnel at the Tuesday conference agreed to consider our comments and take another look at the report. ✓

3. AS-501 PLUGS OUT OVERALL TEST (OAT) #2: The HOSC was activated for the AS-501 space vehicle OAT on August 3 and 4 for facility checkout and for R-ASTR to perform prelaunch guidance computer checks in support of their studies to determine cause and effects of the LVDC/Ground computer interface problem noted during the plugs-in test last week. ✓

4. DAC FLIGHT OPERATIONS STUDIES: Ted Smith of Douglas was at MSFC on July 31 to discuss his proposal for Flight Operations Support Activities. This activity would be done at Huntington Beach with approximately 20 people involved. The proposed activities include more systematic operations planning, operations analysis, training program and validated inputs to our flight control documentation. Properly supported by the R&DO Labs, this effort is urgently needed by our Flight Control Office. Results will feed directly into Flight Mission Rules, Flight Control Measurements, inflight redlines, and potential alternate flight sequences. In addition, the analysis may result in improvements of both stage hardware and operations sequences. The S-IVB Stage Office is coordinating the MSFC evaluation of this proposal. ✓

5. ALABAMA IN SPACE: The next local TV show on 8/8 will feature a discussion of mission operations. ✓

1. ATM FOLLOW-ON STUDY: Jim Downey's Scientific Payloads Division of SSL is deeply involved in the ATM Follow-on Study being managed by Lee Belew's Office in IO and Dick Halpern in OSSA. We have approximately 15 support contractor personnel working on the study in addition to our SSL personnel, and are concentrating upon the definition of experiments and systems of ATM Follow-on payloads, as described in Lee Belew's recent memorandum to you on the subject. ✓
2. SPACE NUCLEAR POWER: Dr. LaFleur of the AEC expressed his satisfaction and appreciation that MSFC is defining its expected needs for space nuclear power in the future. He was very pleased with your position expressed in our August 2 meeting, where members of ASO, ASTR, and SSL participated. ✓
3. ATM: Mr. Heller attended an ATM meeting in Headquarters about the NRL experiments on August 4. This was the follow-up to the PI meeting on the Harvard experiments held by Dr. Mueller on July 27. The August 4 meeting was on the NRL experiments. It was conducted by Phil Culbertson for Dr. Mueller. Dr. Newell was represented by Dr. J. Naugle, Dr. Henry Smith, Mr. Jesse Mitchell, Mr. D. Forsythe and others. Since the word "degradation of science" has been mentioned in several ATM meetings such as the July 13 meeting at Boulder, Dr. Newell and his staff at OSSA are very deeply concerned about this. Dr. Newell plans to write a memo to Dr. Mueller about this point. Henry Smith worded the purpose of the letter somewhat as follows: Dr. Newell insists that Goldberg and Tousey will get their scientific requirements met. The August 4 meeting started with a presentation by Dr. Tousey on the NRL position and the NRL proposal for the two ATM flights. The following is a summary of the NRL proposal and the discussion. NRL wants to retain the same scientific objectives for both ATM flights. However for ATM-A they are willing to accept a somewhat lower performance even if it affects the science. Priority will be on Experiment A and the XUV monitor. Experiment B lower priority for ATM-A. NRL wants to use essentially the same hardware for ATM-A and B. The differences should be as small as possible. NRL wants to have an identical ATM design and interface for ATM-A and B. These points were essentially adopted by all concerned. NRL would like to have the thermal interface settled as soon as possible. A promise was given to them for end of August. NRL would like to have MSFC take on several jobs which are critical path items and for which MSFC has already shown considerable interest: The complete XUV monitor experiment and a back-up of a film camera using Schumann-type roll film. The XUV job was turned down by MSFC except for the TV tube already committed. Designs of ATM film cameras furnished by MSFC for other PI's will be given to NRL. ✓

I think that the meeting cleared the way for a successful flight of ATM-A on schedule with scientific goals acceptable to Dr. Tousey. There is still no agreement that ATM-B could be flown one year after A. ✓

B 8/14

SA-204 PREFLIGHT REVIEW (PFR)/FLIGHT READINESS REVIEW (FRR):

Based on the most recent official schedule and previously published Headquarters guidelines, the FRR would occur 10/16/67. Accordingly, we have scheduled the PFR for 9/26/67 and 9/27/67. However in view of the AS-501 planning and the LM progress, we still consider these as very tentative dates. Statements made at the 8/3/67 ALOC meeting indicated that the LM-1 is at least 10 days behind schedule. → ?

AS-205 RENDEZVOUS MISSION: To implement the rendezvous mission the most critical problem from a schedule viewpoint appeared to be the safing of the S-IVB stage prior to the rendezvous. The primary problem was the addition of the non-propulsive vent system and "fail in the last position" vent valves. This has been solved by utilizing the Saturn V O₂H₂ burner liquid oxygen shutoff valve which is a "fail in the last position" valve in the LH₂ and LO₂ tanks non-propulsive vent systems. This valve is scheduled to fly on S-IVB-503 for the first time but the valve has undergone approximately 200 test firings and completion of the formal qualification of the valve is scheduled for January 1968 (indications are that this date can be advanced). Also, the internal actuation mechanisms of this valve are identical to those in the continuous vent modules being flown on S-IVB-501 and S-IVB-502. It appears that this modification can be installed prior to shipment of the stage to KSC. ✓

S-IB STAGE FOLLOWON PROPOSAL WITH MINUTEMAN STRAP-ONS: CCSD has informed us that they intend to submit an unsolicited proposal for S-IB-13 through S-IB-28 with strap-ons. In view of the present status of AAP schedule planning, we asked them to base their proposal on the most economical approach and to submit an alternate proposal based on delivery of S-IB-13 and S-IB-14 in mid-March 1969, in the event that the strap-ons are required for the first cluster. CCSD's target date for submission of these proposals is 10/9/67, which coincides with the date for submission of the final report for the present Minuteman study. ✓

SATURN IB MINUTEMAN STRAP-ONS: A very productive meeting was held 8/1/67 at the Wasatch Division, Thiokol Chemical Corp., with MSFC, KSC, and CCSD personnel in attendance. A method for thrust termination of the Minuteman motor in flight was discussed and it appears to be an acceptable design and can be accomplished within the timeframe that we are working to. ✓

B 8/14

1. FY-67 Advanced Manned Missions Program: D&F authority covering all FY-67 981 studies (Advanced Manned Missions) has been approved by Dr. Seamans. As you remember from our pre-Lake Logan discussions with you last week, we feel that the entire FY-67 advanced studies program should be re-evaluated and refocused as a result of recent events and clarifications of our FY-68 budget. We brought this to the attention of Mr. Trimble, and MSC (Mr. Stoney) apparently feels the same. We are awaiting information from you regarding the Lake Logan Meeting to determine the most appropriate manner to pursue this item.

Hal B
 Let's wait till we know 68 Appropriation
 At the moment, everything is in a state of flux and no decision would stick
 B

2. Space Story Tapes: We are working with PAO to come up with a series of 15-minute tapes on advanced systems activities. These tapes are released by NASA Headquarters to more than 2000 radio stations throughout the country as a public service. We plan to have one tape on overall ASO activities and others on specific studies/concepts, etc.

Let's discuss this subject URGENT (w/ PAO participation)

3. OSSA Launch Vehicles Advanced Studies: Mr. J. McGoldrick of OSSA Launch Vehicles and Mr. B. Davis of Battelle spent Aug. 2 and 3 visiting us to discuss potential studies for FY-68. Mr. McGoldrick appeared pleased with the discussions and requested that we target for an FY-68 680 program of slightly less than \$.5M, with appropriate in-house tasks.

4. SRT/Advanced Studies Planning: In response to action items resulting from the July 1967 Quarterly Review of OMSF Supporting Development, W. Whitacre, C. May, and D. Paul have proposed a working arrangement with Dr. Johnson's Office and a documentation format. This would allow ASO mission groups to establish a relationship between potential future missions and required technology developments. In preparation for an OMSF meeting at HQ (Aug. 8), these proposals were presented to Dr. Johnson. We are working toward a closer tie between Advanced Studies and Supporting Development/SRT which should benefit both of our offices. As one step toward this, we are going to insure that Dr. Johnson's office be notified of all mid-term and final reviews of contracted and in-house studies.

5. Lunar Flying Vehicles: We received a letter from Headquarters (Lt. Col. Grosz - currently heading lunar activities in Geo. Trimble's group) asking if MSFC was interested in a project to develop lunar flying vehicles, if approved for AAP. A letter (dated July 31, 1967) was prepared and coordinated with Mr. Weidner's office stating that we would be interested in conducting further studies in this area and would like to handle the program if approved.

6. Advanced Workshop: An Early Orbital Space Station (EOSS) preliminary design review was held at MDC (August 2-4) in which each subsystem was reviewed. A configuration has evolved accommodating approximately 75% of all experiments MSF has postulated for the 1971-1973 time frame. It has a six man crew with an orbital lifetime of 1-2 years. The principal elements of the configuration are:

- a modified MDA with airlock type subsystems
- a "dry" S-IVB outfitted for habitation, command and control, biomedical, bioscience, and physical experiments
- the S-II/S-IVB interstage modified for astronomy and earth resources experiments.

This configuration would be launched on a single Saturn V, 2 stage to orbit and affords a maximum man/experiment interface, particularly in astronomy and earth resources, with minimum EVA. Details will be covered in the August 31 presentation to you.

August 14, 1967

*Direct
8/22*

August 22, 1967

*Ho
8/26
N. Bh 8/28*

file

Comments to Weekly Notes 8-14-67 Lucas No. 2 & 4

1. S-IVB Forward Skirt Temperatures

As per George Hopson, P&VE-P, there is no problem as of today. No insulation is required. ✓

The matter started with the addition of the panel flutter kits on the S-IVB forward skirt. Boeing estimated a new heating environment with flutter kits on, by memo of 20 July 1967. The environment was first questioned by Douglas and others, but was finally accepted by MSFC (memo R-AERO-A of 2 August 1967). The new environment raised structural temperatures somewhat beyond the prevailing design criteria. ✓ The solution alternatives were raising the design criteria, or application of a small amount of Thermolag. P&VE-S decided to raise the allowable temperatures. ✓

2. S-IC Engine Fairings

Boeing/Huntsville produced the present heating environment by memo of 22 July 1966. The document was passed to Boeing/Michoud around 1 January 1967. Boeing/Michoud did not use this environment for its temperature calculations until recently; as a result, the increased temperatures showed up only recently. Calculation of structural temperatures is the responsibility of P&VE, and not of AERO!

The problem has meanwhile been solved by raising the design criteria, i. e., raising the permitted temperatures. ✓

Submitted by Dr. Geissler

Thanks. I'm relieved!!

*B
8/22*



B 8/21

1. S-II-1 FRACTURE MECHANICS REVIEW: Plans have been completed for a working session to prepare for the dry run on this subject for you on 8-23-67 in preparation for the SA-501 Flight Readiness Review. Representatives from NAA/SD and LeRC will be at MSFC on 8-16-67. The meeting was scheduled around the availability of the LeRC representative, Bill Brown, who at first declined to participate but under pressure ultimately agreed to come. ✓ We believe we have sufficient data to present a clear and favorable assessment of fracture toughness at -423°F of the S-II-1 structure. ✓

2. S-IVB-501 FORWARD SKIRT STRINGER INSULATION: R-AERO has identified a new inflight temperature environment for the structure of S-IVB-501 forward skirt. These new temperatures exceed the allowable forward skirt stringer structural limits in the air flow gap regions of the flutter panel assemblies. We have initiated a mandatory S-IVB-501 change and data package.

3. H-1 ENGINE ROUGH COMBUSTION CUTOFF: On the fourth bomb test in a series of six at Neosho on R&D engine H-159, a rough combustion cutoff occurred. The instability self-damped in 144 milliseconds (specification value is maximum of 100 milliseconds). This is the second out-of-specification instability in this test series. Site thrust at bomb detonation was 204.7K, which is about 1.5K lower than previous out-of-specification instabilities reported by Rocketdyne in the 8-3-67 presentation. ✓

4. S-IC ENGINE FAIRINGS: R-AERO has informed us that at maximum heating (and maximum heating trajectory), the temperature on the aluminum portion of the engine fairings may be almost 200°F above the design environment. Apparently, Boeing does not agree, but we are using the R-AERO values to determine structural effects on the fairings. Since maximum heating occurs near the end of S-IC powered flight and maximum load occurs about T plus 80 seconds, the fairings may be able to take the maximum heating without catastrophic failures. If our studies conclude that a failure would occur at maximum heating, insulation will be required on S-IC-1 and this would impact the launch schedule. The Program Office (I-V-S-IC) and Boeing have been alerted to the possible requirement for insulation.

5. COLD HELIUM FILL MODULE AND LOX TANK PRESSURIZATION MODULE: During an investigation of the Cold Helium Fill Module (I-2) and the LOX Tank Pressurization Control Module (I-3) failures on S-IVB-209 static firing, MDC discovered that the poppet seals in both modules had been changed from teflon to flouragold. The flouragold seal was added as a product improvement by the vendor without MDC's knowledge. The problem arises from the fact that flouragold has a friction coefficient significantly higher than teflon. The possibility that the 209 I-2 and I-3 failures resulted from the increased friction between the poppets and the walls of the modules is under investigation by MDC. ✓

6. AAP CLUSTER: The third AAP ECS/Thermal Sub-Panel meeting between MSC and MSFC was held August 8-9, 1967. Typical of more than 50 technical items discussed were: (a) Thermal influences affecting MDA docking port assignments. (b) Adverse influences (thermal consideration) of flying Mission A with similar orientation as Mission B. (c) Cluster fluid requirements. (d) Feasibility of using LEM ECS fluids in ATM for thermal control. MSC and MSFC personnel and contractors apparently are working in harmony. ✓

URGENT
AERO
Is any
does
all this
alarming
info
come in
so late??
501
is
ready
for
launch.
How
critical is
all this?
B

B.L.
Has serious
a change?
B
Schedule
impact.
Is
"Thermolag"
a possible
quick-fix?
B

1. RF
2. 501
Arthur Rudolph
I.O.
Dewitt
8-22
2123
Its
1-26
N. Boh 8/28

FYI B 8/22

NOTES file

NOTE

TO Dr. von Braun, DIR DATE August 22, 1967
FROM Mr. Grau, R-QUAL-DIR
SUBJECT My NOTES of 8-14-67, "Safety Evaluation of 501"

1. For the remainder of the 501 evaluation the requirement has been included in the scope of work to the contractors. Action is up to I.O.
2. Statements as to the degree of compliance or noncompliance have been made by the contractors in the evaluation report which was submitted August 14. For the procedures which already have been reviewed a re-review cannot be accomplished before the procedure would be required for use. Although the entire exercise has been a very worthwhile effort with good results, we have to realize that the review could not be a 100% one. The success of what has been proposed for corrective action will depend on the follow-on effort to be exercised by the Saturn V Program Office, which received a full presentation during the dry run for the Preflight Review Meeting which took place on August 17/18.
3. Every attempt should be made to encourage active participation in the safety evaluation by more KSC personnel. It is understood that the activities for the on-going launch preparations did not allow participation to the desired degree at this time.

Dieter Grau

DG
cc:
R-DIR, Mr. Weidner



B n/21

1. SAFETY EVALUATION OF 501: Personnel of this Laboratory continued to support the Safety Evaluation of the Saturn 501 Vehicle at KSC. Work is progressing at an average pace on definition of integrated procedures for future evaluation. Few of the contractors are performing an end-to-end review as was required by MSFC. MSFC has established requirements for end-to-end evaluation and has asked the contractor to state the degree of compliance or noncompliance. All problem sheets are coming in late, which has necessitated the use of overtime by some personnel assigned to this effort.

2. QUALITY MAINTENANCE PROGRAM: Due to present and projected overload work conditions, portions of the inhouse Quality Maintenance Program had to be discontinued. Inhouse testing, teardown, and evaluation of Rocketdyne engines was one of the eliminated functions. However, we have since reached a working agreement with Test Laboratory whereby they are providing engineering and technician support to this effort. Consequently, the function has been reinstated, and the first H-1 engine has been received by this Laboratory and is presently undergoing engine checkout prior to disassembly. ✓

3. ELECTRIC STORAGE BATTERY (ESB) QUALITY SURVEY: The NAA/SD survey of ESB, Raleigh, North Carolina, was recently completed. Three MSFC personnel participated in the survey as part of an effort to obtain information on all Saturn V battery vendors. ESB was not cooperative in assisting the survey team. Generally, ESB has inadequate facilities, and conditions were more serious than those found last May when NAA/SD performed a survey. The Government Representative and NAA source inspector were instructed not to accept batteries ready for shipment until some of the more critical discrepancies were corrected.

D.G.
Shall I call
Debus, or
what action
do you
recommend?

B
URGENT

(Revise at
once, not
thru next NOTES)

D.G.
Shall I call
the company
president, or
write him a
strong letter?
B

File
Talk to Johnson
So did
8-23-67

NOTES 8-14-67 JOHNSON

Voyager Technology Panel Meeting - The Voyager Technology Panel met in Washington on August 9. The purpose of the meeting was to discuss FY68 technology requirements and to establish "fall-back" positions for each of the alternate plans (budget positions) developed during the management meeting at VIPO on August 4. The meeting was somewhat unproductive; as have been the past three meetings of the Panel. The basic problem seems to be a lack of clear distinction between mainstream, line management responsibilities for the identification and pursuit of development programs by the participating Centers and the responsibilities of the Panel, with representatives from the participating NASA elements, to support the individual managers as required. Mr. Glahn has been attempting to use the Panel as a management element to outline and schedule all facets of the Voyager technical development program. Both Langley and Marshall have tried to draw out and establish the distinctions in responsibility. To date, success has been limited. Properly used, the Panel could be of invaluable aid to the program management. Therefore, it should be continued; however, discussions by the "Board of Directors" may be required to properly define its missions.

Class D & F's - Class Determinations and Findings are required for all procurements equal to or greater than \$100K. These D&F's are approved by Dr. Seamans. Purchasing cannot solicit bids until the D&F's are approved. At the present time 24 procurement requests, involving \$3.5M dollars, in the SRT program are blocked pending D&F action. This constitutes about 50% of the planned SRT early initiation action to be accomplished by this date. A long delay will badly disrupt our procurement schedule and nullify the effect of advanced initiation of the programs. E. O. and Purchasing are investigating the problem with Headquarters.

ATM/A Contamination Experiments - Presentations were made to Dr. Dubin (OSSA) and to the OART Experiment Review Board to secure approval action on the proposed flight experiment. Dubin, speaking as an individual, stated that other perhaps more scientifically acceptable, experiments already planned for other measurements would probably accomplish the mission of this proposal, assuming development and flight could be completed prior to ATM/A flight. Speaking as Chairman of the Advisory Committee on Contamination, he was not sure that the Committee should involve itself in the selection of pre-ATM support measurements and had not yet decided to convene the Committee for this purpose. OART-ERB was quite receptive to the proposals. Several members stated that the OART decision to sponsor should not be contingent upon a Dubin committee action. Mr. Ginter's office is reluctant to proceed to the MSFEB without OSSA (Dubin) blessing. Presentation to the MSFEB in its Sept. 17 meeting is required if development schedules are to be met.

1. Wkly notes

NOTES 8/14/67 BALCH

B 8/21

S-IC-5 Testing - Propellant load test was completed on 8/10/67, and no major problems were encountered. In prestatic firing review meeting on 8/11/67, date for static firing was changed from 8/18/67 to 8/23/67 to give more time for the performance of several open items of work. On 8/12/67, LOX tank was entered to inspect lower ring baffles and screens on LOX feed ducts. No discrepancies were found. Estimated date for removal of stage from stand is now 9/6/67. ✓

S-II-3 Testing - Stage power-up was accomplished on 8/8/67 without any major problems. LOX/LH₂ tanking is still scheduled on 9/2/67 and first static firing on 9/12/67. ✓

GE Support Contract - A presentation of the NASA/MTF criteria and method of evaluation for the CPAF contract covering the second through the fourth quarters of FY 1968 was made to MSFC and NASA Headquarters personnel at M.SFC on 8/10/67 and 8/11/67. ✓

Public Affairs - On 8/8/67, 43 students of the Columbia University Summer Institute in Space Physics visited MTF. ✓

B_{2/21}

INTEGRATION CONTRACT NEGOTIATIONS: Negotiations with Martin-Denver were started August 9. All terms, conditions, and costs were negotiated by August 11. Meetings between R&DO, Contractor, and Project Office personnel are scheduled for the purpose of "work plan" preparation. A work plan for each package of work defined in the contract statement of work will be prepared by the Contractor utilizing all available input and guidance from MSFC functional elements. A draft of the work plan is now scheduled to be submitted on August 26 by Martin for MSFC review. September 5 is our target date for approval of the work plans. ✓

UTILIZATION OF AUTOMATIC CHECKOUT EQUIPMENT (ACE) FOR ATM: The answer to Mr. Mathews' question concerning utilizing ACE for ATM has been completed. In summation, the results were we could use ACE or manual system, however, ACE would require approximately \$6.0M additional program funds for mods and new equipment. If ACE is to be used, the decision is needed by October 1 and the ACE station at MSFC by April 1, 1968. We are currently proceeding on the assumption that manual checkout will be used. ✓

ATM EXPERIMENTS: Initiation of the Harvard College Observatory proposed alternate experiment for the first ATM flight is being held pending approval by OSSA. This approval should be available this week. Contractual initiation of this work is to be achieved via a no-cost supplemental agreement with Harvard College Observatory permitting a 2-month definition effort. Costs for this effort will be negotiated 30 days after initiation. A budgetary estimate submitted by Harvard College Observatory indicates a cost of approximately \$300,000 is required for this definition phase. Initiation of the Naval Research Laboratory proposal alternate experiment for the first ATM flight is also being held pending approval by OSSA. Since no major changes in hardware are required in this alternate plan, no changes of the existing Defense Purchase Request are anticipated. ✓

ORBITAL WORKSHOP DELTA PRELIMINARY DESIGN REVIEW (PDR) PLANNING: McDonnell Douglas Corporation (MDC) has prepared a schedule of events for updating the Orbital Workshop engineering mockup that involves shipping the mockup from MSFC to MDC, Huntington Beach, and returning it to MSFC after updating. ✓ The recommendations for performing the mockup rework at MDC or inhouse will be made next week. ✓

LB.
I'd like to take a copy home for study in the evening. Please arrange w/ Bonnie B

B₂/21

H-1 ENGINE Reference my notes of 7/31/67. Engine H-4061 has been inspected at Neosho for LOX/Lube Cavity Contamination, found to be clean, and will be returned to KSC for reinstallation on SA-204 on/or before August 23, 1967. All other H-1 engines on this vehicle have been inspected, determined to be clean and in flightworthy condition. ✓

F-1 ENGINE R&D engine 036 has been equipped with the step thrust prototype parallel oxidizer bypass lines and a flight configuration valve in the bypass line. Two tests have been satisfactorily performed with the engine thrust stepped from 1570K lbs. to 1522K lbs. ✓

On 8/9/67 at MTF during S-IC-5 stage timing check, four fuel valve potentiometers were slow actuating. Though not a critical failure mode, this has been a nagging problem for some time. (An earlier fix - a stronger spring - has apparently failed to correct the problem.) In an effort to better understand the problem a failure analysis is being conducted by both MSFC and Rocketdyne. ✓

J-2 ENGINE While checking the cleanliness of the injector on engine J-2025 (S-IVB 204) at KSC, a Rocketdyne inspector fell, but was not injured, even though the helium purge was on and his face mask apparently leaked. However, a tool on the ladder caused minor dents in two engine thrust chamber tubes. No repair is anticipated.

Engine checkout activities at KSC for AS-501 and 204 are continuing normally and no impacts are expected. ✓

GENERAL Justification of our production support effort continues to require an inordinate amount of manpower as is indicated by: 1) A TWX from Chuck Mathews requesting a formal presentation at 1:00 PM on August 22, at Headquarters. (This will be the fifth formal presentation to Headquarters in 16 months.) 2) Informal information indicating that Harold Finger will not concur in the J-2 AAP Procurement Plan without better visibility into the whole production support effort and the justification therefor. As a Center, we need to get this whole question solved with Headquarters.

1.0. |
That
action
do you
advise
to take?
B

EEO CONTRACT COMPLIANCE REVIEW

On August 9, 1967, a DCAS Headquarters team arrived to conduct a review of the prime contractors compliance with Equal Employment Opportunity requirements. ✓

S-IB HYDRAULIC SYSTEM CONTAMINATION

Recent notes from Colonel Teir made reference to contamination of the vehicle hydraulic system. The following information is supplied concerning corrective measure to overcome the problem.

Hydraulic oil samples taken from S-IB-10 indicate the presence of small particles of contamination (less than 10 microns) in the hydraulic system. This contamination has been traced to the servicing equipment at Michoud and is believed to be rust particles from iron parts in the equipment. Servicing equipment at the static test stand and at KSC have been checked and are clean.

CCSD is in the process of rebuilding and cleaning the servicing equipment at Michoud. ✓ The equipment will be refilled with an oil containing a rust inhibitor and a dehydrator will be used to remove any water that may get into the oil. This should eliminate the source of the small particle contamination. ✓

S-IB-4 hydraulic systems have been serviced with the equipment at KSC. Samples taken from these systems indicate acceptable cleanliness of the systems. CCSD is planning to reservice and purge the systems on stages S-IB-5 and subsequent with the equipment now being rebuilt at Michoud. The above actions taken by CCSD should eliminate future problems with the small particle contamination in the S-IB hydraulic systems. ✓

NOTES 8/14/67 FELLOWS

B_{2/21}

MSFC/KSC Mutual Assistance Program: MSFC support for two additional tasks has been requested by KSC. That makes a current total of 43 tasks. To date, 64 names of qualified individuals have been referred to KSC for their selection or confirmation. Eighteen individuals have thus far been selected by KSC, and dates established for their support of the KSC tasks. Six R&DO people are now on the job, and others are to begin participation according to the mutually agreeable schedule. ✓

NOTES 8/14/67 GEISSLER

B 2/21

No significant items this week.

NOTES 8/14/67 HAEUSSERMANN

B 8/21

1. Cracked Solder Problem. We are continuing to keep Dr. Rees and General O'Connor advised of developments concerning the cracked solder problem. You will be advised by special note from Fred Wojtalik later this week. ✓

B
8/21F-1 ENGINE

Preparations were initiated for test FW-068 scheduled at the West Area F-1 Test Stand on August 16, 1967. Primary test objectives will be to establish a baseline engine performance for the lox depletion test series. ✓

S-1C STAGE (MTF)

The propellant load test on the S-1C-5 stage was conducted with fuel loading on August 9, 1967, and lox loading on August 10, 1967. The acceptance test firing is still scheduled for August 18, 1967. ✓

H-1 ENGINE

Test PI-498 was conducted on August 9, 1967, (engine 4067, 205K) at the Power Plant Test Stand for a duration of 140 seconds. This test was a calibration run for the purpose of initiating a series of bombing tests to study the recent instability problem of the 205K H-1 engine. Due to a deflector coolant problem, the next test will not be conducted until August 18, 1967. ✓

NOTES 8-14-67 HOELZER

B 8/24

NEGATIVE REPORT.

B8/21

Voyager Technology Panel Meeting - The Voyager Technology Panel met in Washington on August 9. The purpose of the meeting was to discuss FY68 technology requirements and to establish "fall-back" positions for each of the alternate plans (budget positions) developed during the management meeting at VIPO on August 4. The meeting was somewhat unproductive; as have been the past three meetings of the Panel. The basic problem seems to be a lack of clear distinction between mainstream, line management responsibilities for the identification and pursuit of development programs by the participating Centers and the responsibilities of the Panel, with representatives from the participating NASA elements, to support the individual managers as required. Mr. Glahn has been attempting to use the Panel as a management element to outline and schedule all facets of the Voyager technical development program. Both Langley and Marshall have tried to draw out and establish the distinctions in responsibility. To date, success has been limited. Properly used, the Panel could be of invaluable aid to the program management. Therefore, it should be continued; however, discussions by the "Board of Directors" may be required to properly define its missions.

B.N.
o.k.
let's
do
that
B
(Please
prepare
agenda
point w/
Dave
Newby)

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Shep
Maybe
you
want
to
take
this
up
w/
Frank
Bogart,
after
thorough
discussion
w/ Ollie
Hirsch
B

B 8/21

1. Overload of Work in ME Machine Shops: The work program for our manufacturing shops has changed during the recent years from work on one major project or stage to a "Special Job Shop" operation where some flight hardware together with a great variety with test hardware for all kinds of projects are being manufactured. The special work we are performing is characterized by its extreme urgency, incompleteness of definition and requiring a great variety of special skills. For sometime we have encountered a serious overload in our machine shops. This situation is aggravated by a reduction of the manufacturing services of our Single Support Contractor and by the lack of funds for competitive subcontracting of our overflow of work. The impact on delivery schedules of various test hardware, such as the ATM rack, ATM spar, S-II structural test articles, hardware for experiments, wind tunnel models, etc. is being reviewed jointly with R&DO and the project lead laboratories. ✓

2. Redundant Hoist for Damper Arm System: The Redundant Hoist System for support of AS-502, consisting of two structural arms with hydraulic cylinders and the hydraulic control console, has been completed in our shops last week and is to be shipped to KSC today. ✓

NOTES 8/14/67 MAUS

B 8/24

MANAGEMENT RESEARCH AND APPLICATION - As already reported in our notes to Mr. Webb, Marshall will sponsor the second NASA/Northwestern University Management Workshop on October 24 and 25 in continuation of a management research program initiated last year.

This workshop will be combined with a NASA symposium on Management Research and Application which begins at the conclusion of the Northwestern Workshop on October 25 and continues through October 26 at MSFC.

The symposium represents a further effort for promoting a university/industry/NASA environment for professionalizing management. Select representatives from Southeastern universities and colleges, associated NASA contractors, and other government agencies are being invited to the symposium.

Dr. Harper North, Vice President for R&D for TRW, INC., Dr. H. H. Meyer of GE's Behavioral Research Service, Dr. David I. Cleland of the Air Force Institute of Technology, and Dr. Fremont Shull of Southern Illinois University are among the recognized authorities in management research who will speak at the sessions. NASA Headquarters, MSC, KSC, Langley, ERC, Goddard, Lewis, and MSFC representatives will attend. ✓

NASA Headquarters has become increasingly interested in the success of these meetings. Mr. McInnis of my office will be in Washington August 14 to discuss planning details with Mr. Bingman, Ray Romatowski's deputy. ✓

NOTES 8/14/67 RICHARD

B_{8/21}

No submission this week.

B 8/21

1. Communications with KSC:

o Although we had an apparent communications problem with KSC on the IU access door, I personally want to assure you that our overall relationship and communications with KSC are good. We have satisfactorily worked out hundreds of Saturn V problems (both technical and managerial) with KSC. My Deputies and I are in daily contact with either Petrone, Gruene, or Mathews. As soon as his new position was announced, I asked Middleton to meet with us to review our relationship, organization, communication channels, etc., and he is to spend some time with us to do that very soon. Our Staff/Stage Managers and our resident office personnel have likewise established daily communications and visits with their counterparts at KSC.

o Inasmuch as the AS-501 launch date is getting near, everyone is reviewing all open actions to be sure they are closed. In fact, we now work each major AS-501 problem in our Saturn V Program Control Center, using the same techniques as we developed in tracking weight and performance and other items. Since the AS-501 is a new vehicle, additional surprise problems are bound to develop between now and launch; but I think our present communication channels with KSC provide for thorough and timely resolution of all problems.

2. AS-501 Launch Vehicle at KSC:

o Swing Arm tests were successfully completed on Thurs., 10 August 67, and Roll Out is now scheduled for Mon., 21 August 67.

o The MSFC Pre-Flight Review is still scheduled for Tues. - Wed., 29 - 30 August 67; but will now be held in the LIEF Conference Room.

3. Saturn V IU Program:

o Reference NOTES 8-7-67 GRAU concerning use of overtime on checkout of IU-504 to meet the contract schedule while present plans require storage of the stage after acceptance.

o We have taken contractual action to stop overtime and second shift operation on checkout of IU-504; however, MSF has previously been requested to grant relief to the IU checkout schedule and make it more compatible with the KSC on-dock date. If our request is not granted, even greater amounts of overtime will be required on IU-505 and subsequent.

1. MEETING WITH MSC ON AS-501 FLIGHT OPERATIONS: A meeting was held on August 9 at MSFC between personnel of Flight Control Division/ MSC and MSFC to discuss AS-501 contingencies. MSC was represented by John Hodge and G. Lunney (AS-501 Flight Director). The meeting resulted in the following agreements: (a) based on R-AERO study of Tower Collision and Pad Fall Back MSC will most likely not agree to take action for this contingency case, (b) S-IVB early staging will be commanded upon determination of a S-II second plane separation failure, (c) loss of chilldown or repressurization prior to S-IVB restart will not require contingency action, and (d) S-IVB restart will be inhibited by spacecraft separation command at ignition minus 30 seconds in the event of an engine hardover during orbital coast or as soon as possible if the hardover condition occurs between ignition minus 30 seconds and ignition. In addition to these contingency cases the MSFC requirement for a Command Communications System (CCS) Test during power flight was discussed and Hodge agreed to review the MSFC requirement and inform us of the final MSC position by August 15. The participation and cooperation of the MSFC Labs in covering the technical details of the cases discussed was excellent and Hodge expressed his complete satisfaction with this meeting. ✓

2. AS-501 SUPPORT REQUIREMENTS REVIEW: The AS-501 Mission Director's Support Requirements Review, chaired by Chet Lee, was held at KSC on August 9. Although still faced with the usual minor support problems associated with any launch there are only very few major open items. The outstanding open item for MSFC is the inadequacy of the Insertion Ship (Vanguard) to fulfill all MSFC's support requirements. This ship is listed as mandatory in the Mission Rules. We are considering moving the Powered Flight Ship to provide the required mandatory coverage. The Apollo aircraft support for 501 is still questionable, but will not create a problem for MSFC. Engineering photography support for 501 is still not firmly committed by KSC, but the system is expected to be operational by mid-September. Agreement was reached on HOSC monitoring of Blockhouse Operational Intercom System (OIS); information channels to the HOSC are now considered adequate (Ref. Notes Speer 8/7). ✓

3. STAC MEETING: The second in a series of three operations reviews of the lunar mission by the Science and Technology Advisory Committee (STAC) was held on 8/11 at Santa Cruz. C. Casey of our Flight Control Office at MSC presented the L/V orbital checkout portion. Some discussion developed on S-IVB/IU lifetime limitations. No action items resulted for MSFC. ✓

F.S.

Could I

have a

1 hr

briefing on

this subject, at Mr. Casey's

convenience? B

noted.
8/22

B 8/21

1. CONRAD SWANSON: Conrad's sudden death last week has been a severe shock to all of us in SSL. Not only will he be missed as a friend and pleasant co-worker, but we will be hard-pressed to fill the gap left in many of the astronomy projects in which Conrad was deeply involved.

2. PEGASUS: Dr. Dozier attended the COSPAR meeting in London July 24-29. He presented a paper covering meteoroid penetration measurements from the Pegasus satellites; it was the only paper dealing with penetrations. Most of the other papers dealt with meteoroid collection and detection. The Pegasus data are particularly important in light of the continuing discrepancies and uncertainties in the data obtained from other detection methods.

Messrs. Holland and Barkley of SSL will present a paper entitled "Theory and Observation of the Rotational Motion of the Pegasus Satellites," at the AIAA Guidance, Control and Flight Dynamics Conference tonight at the Sheraton Motel in Huntsville. This paper is a direct result of our continuing Pegasus data evaluation activities.

to Br v8
4-22-68
↓
E.S.

SSL has just published an interim summary report on the results obtained from the Pegasus satellites to date. The report is entitled "Scientific Results of Project Pegasus," TMX 53629. This report will be distributed throughout MSFC and to many persons outside MSFC.

I'd like to have a copy

3. ATM: Mr. Heller wrote a memo to Dr. Haeussermann with a copy to Mr. Weidner stating our SSL position about Jim Taylor's ATM review team. He also had several additional discussions with Messrs. Kroeger, Hoberg, Taylor, Gilino of ASTR, with Dozier, Snoddy, and Arnett of SSL, to prepare for greasing the skids with the PI's to obtain their inputs and their full support of the review. Kroeger and Hoberg feel that any official request to the PI's to spend manpower on it or to direct the contractor would have to come from IO. Mr. Heller learned from Bill Parkinson that Chuck Mathews has written personal letters and given directives to the PI's about the review.

Don't understand the issue
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B 8/21

S-IB-3 FLIGHT PERFORMANCE: The contracting officer's final determination regarding the flight performance incentive for S-IB-3 was delivered to CCSD this week. Because the stage exceeded the maximum altitude agreed upon prior to flight, CCSD will receive fee for a reduced mission. The difference between this fee and the maximum fee is approximately \$80,000. It is expected that CCSD will appeal the decision. ✓

INSPECTION OF ENGINE LOX CAVITIES ON S-IB-4: Reference is made to my notes of July 31, 1967 (copy attached) concerning this subject. Inspection of LOX cavities of Engines No. 1 and No. 4 revealed no contamination. Engine No. 8 which was returned to Neosho for cleaning of the turbopump lube cavity is scheduled to be returned to KSC on August 21, 1967. It is understood that no contamination was found in the lube cavity. ✓

S-IVB-204: During the cleaning of the injector on the J-2 engine, an MDC worker apparently was overcome by inhalation of purge gases (helium) and fell from the ladder. The ladder fell into the engine bell and dented the tubes in two places. An evaluation of the damage by Rocketdyne is in process. As of now no decision as to what action may be needed has been made. There is a possibility that the dents may have to be repaired by a patch or weld, or the disposition might be made to use "as is." The worker was not injured. The worker was wearing a breathing apparatus but was wearing it over his glasses which apparently prevented a good seal. ✓

LIGHTENING STRIKING LAUNCH COMPLEX 37-B: As a result of the observation of lightening striking the service structure at the Adjustable "5" Level of Launch Complex 37-B on July 27, 1967, KSC initiated a series of inspections and tests to determine if any damage was done to either the launch vehicle or GSE. With the completion of Plugs-in Overall Test on August 8, 1967, KSC states that no damage was found. ✓

B 8/21

1. Space Biology Subcommittee Meeting:

Dr. Hilchey and Mr. Ed Weaver (R-DIR) attended the quarterly meeting of the Space Biology Subcommittee at Berkeley, California, on August 7 and 8. This policy level advisory group for OSSA strongly endorses some type of earth orbital facility to carry on biological research in space. Clear-cut science programs for such a facility have yet to be defined. ✓

2. Orbital Astronomy:

A special formal presentation on the Orbital Astronomy Support Facility (OASF) was conducted at NASA Headquarters on August 1. The purpose of this presentation was to acquaint Headquarters personnel with the study approach and methodology which was used in formulating the astronomical observation program which constitutes the basis for the remainder of the study. Among those attending from OSSA were Jesse Mitchell, Nancy Roman, W. Foster, V. Spriggs, Henry Smith, P. Thome, and A. Crobaugh. Attendees from OMSF included George Trimble and many of his people, Frank Williams, Hal Becker, Herman Hamby, and Jean Olivier from MSFC (ASO). ✓

The reaction was generally favorable. The OSSA personnel expressed a desire to maintain close coordination with the study as it progresses and were hopeful that the results would provide answers to many important questions relating to the nature of man's role in future orbital astronomy missions. We are incorporating inputs from these types of discussions in the review you requested on the next steps in space astronomy. ✓

P 8/22

August 21, 1967

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8/21/67 w/ comments Barman

NOTES
MR. GORMAN'S COPY
AUG 21 1967

With Comments

Stuhlinger notes to

U Boy 8-23-67

NOTES 8/21/67 BALCH

9/21/21
B 8/22

S-IC-3 Testing - Boeing has determined that the actuators for Engines 2, 3 and 4 must be replaced. Because of this, static firing, which was set for tomorrow, 8/22/67, is now tentatively rescheduled for Thursday, 8/24/67, pending receipt of replacement actuators from Michoud. ✓

S-II-3 Testing - Late delivery of modification hardware and late completion of preliminary tests have made the LOX/LH₂ tanking date of 9/2/67 marginal. A potential slippage of 3 to 6 days is indicated by the latest promised delivery date for the hardware. Possible impact to static firing still scheduled for 9/12/67 is being evaluated. ✓

B-I Position of S-IC Test Stand - Completion of construction is now scheduled for the first part of December 1967. Certain modifications will need to be accomplished by separate contract after this date, and it is expected that these modifications can be furnished to the Corps of Engineers next month for award of the necessary contract. ✓

GE Service Contract - NASA Headquarters approval of our pre-negotiation position on the CPAF proposal covering the second through the fourth quarters of Fiscal Year 1968 has been received by telephone via MSFC Contracts Office. Preliminary fact-finding discussions with GE/MTSD were initiated on 8/15/67 ✓

NOTES 8/21/67 BELEW

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HCO AND NRL ALTERNATE ATM EXPERIMENT PLANS:

A proposed work statement has been sent to the Harvard College Observatory (HCO) to cover the definition phase for their recently proposed alternate instrument to be flown on the first ATM flight. The Naval Research Laboratory (NRL) proposed alternate plan for the first ATM flight will be submitted to MSFC next week. ✓

The Space Science Steering Committee has given interim approval for both NRL and HCO alternate plans for the first ATM flight. ✓ A letter confirming this approval is enroute to MSFC. This approval now clears the way for proceeding with appropriate procurement activities. ✓

STATUS OF FY 68 PROGRAM AUTHORITY:

To date in FY 68, we have received \$35.750 million under continuing resolution. This amount provides for no new starts but is adequate to carry the program through September. The most serious problem is that it does not provide start-up costs for the Martin Phase "D" effort. We have asked for \$3.0 million for Martin which would permit them to lease a facility and relocate personnel to Huntsville plus the cost of integration effort through October 31, 1967. Provision of the \$3.0 million is being delayed at Headquarters pending determination of the MSF FY 68 budget level. ✓

Guidelines for POP 67-2 have not been received; however, Headquarters' AAP Program Office is attempting to gain a release of guidelines this week based on their Plan "J." ✓

GENERAL:

Major recommendations of the 1967 Conference on Lunar Science and Exploration at Santa Cruz, California, were: (1) the development of mobility systems is essential to future lunar exploration. (This recommendation included the development of the dual launch capability, a lunar flying unit, and an LSSM.); (2) the development of scientific instrumentation is essential to success of the AAP program; (3) a sample return capability of 250 pounds is a requirement for all dual and late single AAP missions; (4) more lunar orbital data is necessary before conducting advanced AAP landing missions; and (5) continuing study is needed to complete comprehensive AAP program. Study groups should consider further: Difficult sites; mobility systems; and mission plans. ✓

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NOTES 8-21-67 BROWN

H-1 ENGINE The recently negotiated H-1 Production Support Contract (NAS8-19541) has been signed by the Contractor, and is being processed through MSFC for signature. This contract covers a four-year period, and incorporates a severe overriding fee penalty if there should be a flight failure (because of H-1 engines) in S-IB-204 thru S-IB-219. ✓

F-1 ENGINE The AS-501 preoperational system safety review resulted in 77 problem sheets concerning the F-1 engine. Sixteen of these were considered significant enough to warrant Project Office follow up for final disposition, and exception was taken to only four of the team recommendations. All except two of the F-1 problem sheets may be corrected with procedural changes. No F-1 engine hardware changes are required. ✓

J-2 ENGINE Based on helium leak testing of the LOX turbopump primary seals, a possible out of specification leakage is causing us concern on vehicle 501. The helium to LOX conversion factors for the leakage were developed based on seal test data. Rocketdyne has a program in process to obtain data from seven samples of LOX pumps to confirm actual pump leakage and the helium/LOX conversion factors. To date data from pumps were an order of magnitude lower than the seal factors. This program is scheduled for completion on August 23. In the meantime a back-up design is in process to dump the primary seal leakage overboard. We will keep you informed as this thing develops. ✓

This work is being reviewed by the J-2 team. We will keep you informed as this thing develops. 9/18/21

NOTES 8/21/67 CONSTAN

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Nothing of special significance.

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NOTES 8/21/67 FELLOWS

1. MSFC/KSC Mutual Assistance Program: Twenty-three individuals have been selected for KSC support, from the MSFC list of sixty-four qualified personnel. To date, twenty-two personnel have departed for KSC. Negotiations are in process on six additional personnel. ✓
2. KSC Support for MSFC Special Projects: The MSFC/KSC sub-agreement for KSC support of MSFC special Projects (reported in my NOTES 6/12/67, copy attached) has been rewritten, at Dr. Debus' request, to include MSFC support of KSC special projects. The revised sub-agreement has been signed by KSC and will be transmitted to MSFC this week for staffing and signature. ✓

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1. MSFC/MSFC Engine-Out and EDS Analyses Meeting: Subject meeting, sponsored by the Flight Mechanics Panel, was held on August 10, 1967, at MSFC. A brief summary is as follows: (1) The one-engine-out is the most serious EDS failure mode at this time and particularly on Saturn V. Saturn IB has control capability for one-engine-out and there are no major S/C problems; however, on Saturn V, we have loss of control for one-engine-out from about 60 to 80 sec., and the S/C has structural problems for one-engine-out for a major portion of S-IC stage flight (and in some cases the S/C failure occurs even in the absence of winds). (2) There is a problem of L/V breakup after abort on Saturn IB and V (again Saturn V is more serious). This is due to the tension loads which occur \approx .3 sec. after engine cutoff. This L/V breakup and possible resulting explosion violate the MSC desired explosion constraint of at least 2 sec. for most of the first stage flight. Also Command Module weight increases (from \sim 11,000 lbs, to \sim 13,000 lbs) are resulting in less separation distances for aborts since the LES capabilities aren't materially changing. These problems are being pursued on an urgent basis and we will keep you informed of developments. ✓

2. Thermosphere Probe Launches: Mr. Robert E. Smith attended the recent COSPAR meeting held in London, England, July 24 - 29, 1967, where he presented a paper outlining the results of the recent MSFC thermosphere probe launches from Cape Kennedy. Several other papers were presented on individual measurements of the upper atmospheric parameters, which tended to show differences with the current atmospheric models. These variations point out the need for more measurements of the diurnal type made by MSFC, as well as a need for modifying the measuring gauges to extend down at least to the 120 km boundary. Current MSFC plans are for continuation of the quarterly day-night combinations of thermospheric probe launches to follow the solar cycle variation, along with another series of several launches in a 24 hour period to further tie down the diurnal variations. The possibility of extending the measurement range down to 120 km altitude is also being investigated. ✓

3. AS-501 Orbital Debris Analysis: Lockheed has completed their study of the orbital debris hazard for AS-501 flight. The predicted probability of a casualty to the world population resulting from impacting debris from a failure in parking orbit is 4.74×10^{-3} . This means that in 1,000 similar mission profiles to the AS-501 that 4 to 5 casualties could be expected. This is about the same as we had for the original AS-204 manned mission. ✓

NOTES 8-21-67 GRAU

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No submission this week.

NOTES 8/21/67 HAEUSSERMANN

B 8/22

1. ATM Redefinition Status. Based on the redefinition of the ATM experiments, the apparent schedule delay and the tight budget situation, there are impacts on the ATM system which have occurred or are being assessed. The most significant are as follows:

a. The schedule delay has caused the sole source justification for the IBM 4Pi computer to be invalid. An open bid with source evaluation board will now be necessary. ✓

b. The accuracy obtained from the star tracker is not required for the first ATM flight due to the reduced requirements from the experiments. An assessment must be made to determine what the best course of action is for the two ATM's, i.e., fly the tracker on both or just on the second ATM. ✓

c. Thermally, the two systems will be different and the thermal system for the two flights will require a different design for optimum effects. ✓

We have not received any formal redefinition of the two ATM's or the new schedules but are working together with IO/AAP on assumptions which seem to be reasonable in order to make the ATM systems redefinition as timely as possible. ✓

NOTES 8/21/67 HEIMBURG

8/21/67
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S-1C STAGE (MTF)

The S-1C-5 stage has been prepared for static firing. The fuel loading is planned for today and static firing is tentatively planned for tomorrow. ✓

S-1C STAGE (MSFC)

The S-1C-T stage electrical distributors were removed and inspected for printed circuit card solder cracks. A few minor cracks were found. The distributors were re-installed without repair. As time permits, the defective PC cards will be replaced. The S-1C-T stage was prepared for lox load tests to investigate the lox tank ullage pressure collapse noted at MTF during lox loading at the initiation of helium bubbling. The load tests are planned for August 21 and 22, 1967. ✓

S-11 STRUCTURAL TEST PROGRAM

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

F-1 ENGINE

Test FW-068 was conducted on the West Area F-1 Test Stand with F-1 Engine S/N F-5038-1 for a mainstage duration of 41 seconds on August 16, 1967. Primary purpose of this test was to establish engine baseline performance for the lox depletion test series. ✓

MODERATE DEPTH LUNAR DRILL PROJECT

Word was received from NASA Headquarters that FY 1968 funds for 945 projects were not to be spent until further word. This freezes all Lunar Drill Funds, immediately affecting the Westinghouse Concept and possibly eliminating them as a prime contractor. ✓

H-1 ENGINE

Engine S/N 4067 (205K) will be subjected to a series of bomb tests starting today, August 21, 1967. ✓

SATURN V GSE

Dr. Rees and Dr. Rudolph were in a meeting at KSC on August 16, 1967, to discuss 502 schedule with Gen. Phillips and Dr. Debus. The Swing Arm Lanyard Modifications were determined to be a pacing item and were impacting the schedule. KSC said that Test Lab was responsible for the delay. Test Lab was not represented in the meeting, therefore, could not present the true story. Adm. Middleton visited us on Friday, August 18, 1967, to check the situation. We presented the facts and it was obvious to him that we were doing everything we could, but that the KSC/Boeing design organization had caused the delay. We agreed to give him a status report twice a week. He was satisfied and said they would try to make up the time at KSC. ✓

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NOTES 8-21-67 HOELZER

NEGATIVE REPORT.

NOTES 8/21/67 JOHNSON

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7/8/21

1. ATM/A Contamination Experiment: As a follow-up to 8/14 Notes, OART has accepted this experiment for sponsorship (now designated TO 27) and will present it to the MSFEB in its 9/17 meeting. ✓
2. Experiments Review Board: The second meeting of the MSFC ERB, since being reconstituted in May, is scheduled for 9/21. Five experiment proposals will be presented to the Board for evaluation and recommendations. Review packages of the material to be discussed at the meeting will be distributed to the ERB members on 9/7. ✓
3. Space Nuclear Propulsion (SNP): During the visit of Mr. Dave Miller of SNPO, HQs 8/18, discussions were held with P&VE on NGTM and QUAL on FY68 SRT submission. QUAL's future role in the Nuclear Flight Module was also discussed. Although no FY68 SRT funds will be issued to QUAL in this area the discussions regarding QUAL's future work were profitable. ✓

9/8/21

NOTES 8-21-67 KUERS

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1. Review of Single Support Contractor Activity: We conducted a review of all schedule orders and appendices of our Single Support Contractor in order to eliminate any direct or indirect supervision of contractor personnel by Civil Service employees. Two areas in our operations were found where supervisory responsibilities appeared to be doubtful: in the maintenance and trouble shooting of equipment and the operation of the neutral buoyancy equipment. Both weak areas were corrected and new procedures established to assure a clear mission type operation. ✓

2. Pulsed Arc Welding at Seal Beach: Two welds have been accomplished at Seal Beach on 33 foot cylindrical test sections using this welding process. We have supported this activity, besides having an observer at the shop, by furnishing complete step by step operational data which NAA personnel followed very closely. The first weld performed was almost perfect with only one X-ray film showing defects. The result of the second weld was of much lower quality because of a number of human errors that had occurred during the operation. We will cover the next test weld by sending out two welding engineers and two technicians to participate in the two shift operation. This time I have made an agreement with Mr. Ralph Ruud and Mr. George Lewis that our men will have the authority to stop the operation any time when they feel the job is not carried out correctly. ✓

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1. LUNAR MODULE/APOLLO TELESCOPE MOUNT: An astronaut review of the LM End Film Retrieval Workstation Concept was held in the Task Analysis Facility, building 4335 on 8-15-67. Three astronauts (Major Engle, Dr. Garriott, Commander Bean) participated in the review under both 1-g and 6 degrees of freedom conditions. Comments on designs of the astronaut interface were obtained in a debriefing session following the review. ✓
2. S-II-501 INSULATION: Results of the ambient temperature blow-down test on the S-II-501 insulation indicate that a pressure differential across the insulation face sheet of 7.5 psi can be expected at about 60 seconds into flight. NAA proposes to cut a new manifold in the insulation five feet below the existing forward manifold and interconnect the two manifolds with four vertical channels. ✓ Calculations indicate that this fix may not reduce the peak pressure differential below the allowable 5 psi. ✓ We might have to add another manifold. ✓
3. SPACECRAFT LEAKAGE: Design studies are in progress to protect the IU and S-IVB forward skirt from hypergolic propellants leaking from the spacecraft. We will use "drop cloths" over the equipment during the critical periods of spacecraft tanking or detanking. Review of other methods to protect the stage equipment is underway. ✓
4. S-IVB-501 ENGINE GIMBAL SYSTEM MOTOR LINER CORROSION PROBLEM: Corrosion was noted on wire terminals and flakes of material coming off a liner between the motor housing and motor cartridge. However, the possibility of corrosion products entering a vital area in the motor is remote. Additional protection is gained from a teflon shroud over the motor brush cavity and forced air circulation. Thus, it appears that the present pump-motor is adequate. ✓
5. S-IC MAXIMUM HEATING ENVIRONMENT: Tests were conducted on engine fairing specimens (see Lucas Notes 8-14-67) at TBC, at maximum temperatures, loads, and heating rates. Results showed that the aluminum and titanium fairing components are acceptable for flight. ✓ ✓
6. S-IVB-501 FORWARD SKIRT STRINGER INSULATION: McDonnell Douglas Corporation personnel reevaluated with P&VE the stringer stress analysis and temperature. The temperatures were confirmed. The stringer analysis considered three areas: (1) AS-501 mission loads, (2) center engine-out prior to S-IC cutoff, and (3) new allowable stress data for the S-IVB forward skirt materials. Analysis showed that the stringer factor of safety is 1.25 or greater. Therefore, we will not have to insulate this area for SA-501. ✓ ✓
7. SATURN IB/MINUTEMAN STRAP-ONS: The adaptation of the Minuteman for use on the Saturn IB will require a fairly extensive solid motor qualification program, and many S-IB components will require redesign and requalification due to increased severity of vibration, acoustic and thermal environments. ✓

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NOTES/8/21/67/MAUS

UNIVERSITY GRANTS- Mr. Hagen, of my office, is serving as a Consultant to Mr. Vecchiotti, NASA Director of Procurement, on a grant to investigate "Extra-contractual Influences." In the course of research, Mr. Hagen found that Dr. Edward Roberts, Associate Director, MIT, is preparing a dossier for Senator Kennedy which he hopes will aid Senator Kennedy in bringing some of the meaningless rituals of current government R&D procurement practices to the attention of Congress. ✓

Of singular importance is the finding that most competitive R&D awards in the \$100,000 to a few million dollar range, apparently go to the firms originally preferred by the technical evaluators. ✓ Requests for proposal appear to be merely an expensive and time consuming ritual to provide defense against Congressional investigation. ✓

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NCTES 8/21/67 RICHARD

STAC Meeting at Santa Cruz, Calif., Aug. 11-12, 1967: The presentations were made by the MSC Operations people and the astronauts. The subject was the lunar mission from liftoff-to-lunar touchdown. Mr. Casey was the only MSFC presenter. Although the discussions were extensive, the significant points of discussion involving Saturn V were injection guidance philosophy and vehicle lifetime.

a. The operations people stated that the launch vehicle guidance system would be prime to go out of orbit, and J. McDivitt described the onboard methods that would be used to monitor its operation. He also discussed the operation of the spacecraft system if it is made active because of a launch vehicle platform failure detected before the injection phase.

L.R.
I'm glad to see MSC going on record on this matter
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b. The orbital and overall lifetime specification versus capability came up because the astronauts said they couldn't do a final activity timeline until they had some actual orbital flight experience with the spacecraft. They (the astronauts) said during and after the meeting that they felt we had enough time built into the system, but they still don't know how much of it they will need. We, likewise, stated that our true capability can be judged only after some flight experience. (After preliminary discussions with the presentors, we went there prepared to discuss our early restart limitations, but because of this turn of events, the subject never came up.) I feel, after we all have some flight experience data and have narrowed down the spectrum of possible orbital activities to those essential to the mission, that first orbit restarts will become the requirement.

AAP Cluster Dynamics: An R&DO/IC meeting was held this date for the purpose of establishing an agenda for a presentation on this subject to Dr. von Braun in the near future. Action in furtherance of this requirement has been assigned to the Control Dynamics and Structures Feedback Committee with support by the Technical Systems Office. The establishment of a date for presentation on this subject to Dr. von Braun is dependent on the results of the Committee's activities.

NOTES 8-21-67 RUDOLPH

9/18/21

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1. AS-501 Launch Vehicle at KSC:

o The S-II insulation blow down test conducted on Sat., 12 Aug. 67, indicated that an in-flight peak delta pressure of 7.6 psi could occur in the insulation. As a result, it was necessary to install two additional manifolds in the insulation to assure that in-flight pressure will remain below 5 psi proof pressure levels. This modification has resulted in a delay in rollout from Mon., 21 Aug. 67, to Mon., 28 Aug. 67. ✓

o The IU Stage flight control computer cracked solder joint problem was reviewed at ECI, St. Petersburg, Florida, on Wed., 16 Aug. 67. The fix has been determined; the flight control computer will be reworked by ECI, tested at MSFC, and delivered to KSC in time to support the Count Down Demonstration Test. ✓

o IBM, MDC, and MSFC are jointly working on a method for protecting the IU/S-IVB area from potential hypergol leaks from the LM and Service Module. ✓

o There are indications that GOX leakage past the LOX turbine shaft on the J-2 Engine is greater than had been anticipated. This leakage is normally ducted to the engine bell and discharged. Inasmuch as the increased quantity would create dangerous LOX concentration in the inter-stage area, it may be necessary to duct leakage overboard. Rocketdyne is conducting tests on this problem and S-II and S-IVB stage contractors are developing modifications which can be incorporated at the pad in the event it is necessary.

o Simulated Flight Test was successfully completed on Thurs., 17 Aug. 67. ✓

o Your MSFC Pre-Flight Review is still scheduled for Tues. - Wed., 29 - 30 Aug. 67, in the LIEF Conference Room. ✓

o Further analysis and testing have indicated that the S-IVB 501 forward skirt stringer insulation and the S-IC engine fairing heating problems mentioned in Lucas 8-14-67 Notes are not as bad as originally anticipated and modifications will not be required for AS-501. ✓

2. S-IVB-504 Stage at SACTO: Captive firing scrubbed on Wed., 16 Aug. 67, due to ground instrumentation problems. Firing is now scheduled for Tues., 22 Aug. 67. ✓

3. S-IC-5 Stage at MTF: Captive firing is scheduled for Tues., 22 Aug. 67 ✓

1 Attachment: Notes 8-14-67 Lucas (DIR, I-DIR & R-DIR's copy only)

NOTES 8/21/67 SPEER

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1. CCS TEST ON AS-501 POWER FLIGHT: Further discussion with MSC and R-ASTR have led us to the decision not to insist on a special test requirement for the Command and Communications System (CCS) during power flight. The orbital and post-injection tests will be conducted as planned, MSC refuses to send any command message during the powered flight unless it is required for contingency action or they are overruled by Headquarters. Also, there is no existing requirement for CCS command during power flight beyond the unmanned Saturn V flights. ✓

2. OPERATING MANAGEMENT MEETING: MSF (General Stevenson) has scheduled an Operations Management Meeting for August 30, 1967, at KSC. The planned agenda is: (a) Status of Range Instrument Aircraft and Vanguard (Insertion Ship) for AS-501; (b) Apollo Ship Management Plan; (c) The new role of NASA Mission Director; (d) AAP Status; (e) Lunar Launch Window; and (f) Impact of night launch of lunar mission on recovery and support. We have informed General Stevenson that the scheduled date conflicts with the MSFC Pre-flight Review for AS-501. ✓

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SACTO BETA I TEST STAND ESCAPE SYSTEM: Reference is made to my notes of 7/3/67 (copy attached) on this subject. The slide wire escape system was installed on August 10, 1967, and dead weight testing was completed on August 12. The system was tested with several single man slides to the satisfaction of California and MDC safety officials on August 14 and has been declared operational for a single man slide. Additional testing will be performed after the S-IVB-504 static test to establish that the system is acceptable for more than one man sliding down the wire at the same time. ✓

IBM-OWEGO TRI-ANNUAL REVIEW: The tri-annual review for LVDC/LVDA was held this week at Owego. There appear to be no significant hardware problems. I believe you are aware that we have an overrun condition on this contract, and all the schedule incentives have been lost; therefore, it will not be necessary to renegotiate the schedule incentives. Recognizing this condition, IBM stated that their current approach is to minimize cost and to address true program need dates. I heartily endorse this approach. We have set up a communication channel within our office and keep an up-to-date schedule requirement with them. ✓

PROTECTION AGAINST HYPERGOL LEAKS: P&VE, IBM, and MDC have agreed on an approach of applying curtains to the I. U. walls and covering the forward bulkhead to protect against possible hypergol spillage from the spacecraft. ✓ We have given the contractors authorization to provide this interim protection on 204 and 501. ✓ We have not heard from MSC on their plans for a permanent solution. ✓

NOTES 8/21/67 WILLIAMS

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1. Technology Requirements: ASO is continuing to coordinate technology requirements for advanced systems with Experiments Office to assure a common approach and format for our interfaces with Headquarters. It is hoped that a draft of the systems/subsystems technology requirements resulting from our systems studies for all mission areas (Earth Orbit, Lunar, Planetary, and Launch Vehicles) can be ready by the end of September. ✓

August 28, 1967

w/ comments Gorman

NOTES
MR. GORMAN'S COPY
AUG 28 1967

w/ comments



*Lucas notes to
Urgent box 9-6-67*

NOTES 8/28/67 RICHARD

8/28/67
B 8/31

Review of AS-501 Test Activities at KSC: We have reviewed the testing activities and results that have occurred so far on AS-501 with Dr. Gruene and his people. We generated joint action items to clear up remaining open items on AS-501 and correct operations on AS-502 and subsequent vehicles. Generally, testing difficulties have been irritating to the massive testing organization involved but no "show stoppers" were identified. Major problems stem from KSC's evolved testing philosophy (which we essentially agree with) and the present design of the vehicle system for operation in prelaunch testing. While our flight hardware-software systems are made to handle failures and off-nominal situations, our simulated flight systems are limited in this respect. A lot of the difficulty has come from expecting the vehicle to "fly" well on the ground with engine out, early staging, etc. We will present an Astrionics-IBM software proposal to KSC to get around this difficulty (in 3-4 weeks) on subsequent vehicles. Other areas of problems we are jointly working are minor hardware problems, better communications, a change in procedure writing which will allow for event timing changes, alternate modes for redline monitoring, more automated support of testing by the GSE, etc. ✓

Saturn V Launch Vehicle Performance: Reference Dr. Mueller's note to Mr. Trimble, dated June 15, 1967. In our NOTES to you, dated July 10, 1967, we mentioned preparing a presentation for Dr. Mueller on our Saturn V fuel residual and reserver picture. In subsequent telephone contacts and a letter from Mr. Trimble's office, we have a better definition of what Dr. Mueller wants, i.e., vastly improved visibility of what he really has in the Saturn V launch vehicle for missions beyond Apollo. Coupled with any potential performance gains, he also is asking for maximum stack weights ^{above} the I. U. with the current structure and first stage propulsion. We are working with the R&DO laboratories and the Program Office to put together this presentation, with a late September target. ✓

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Voyager Working Group Meeting: The fifth and final meeting of the Voyager Mission Test and Facilities Working Group was held at VIPO, Pasadena, on August 16. The meeting essentially summarized the basic positions of the systems representatives in the area of scheduling and schedule incompatibilities. An item which was discussed following the scheduled meeting was the continuance of test information interchange and how this could be done. It was decided that this could possibly be done through the use of inter-center panels such as have been used on AAP. We plan now to write up a synopsis of the activities of the working group for distribution to Center Voyager personnel. ✓

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LOR S-IVB Debris: Bellcomm, through Mr. Bob Beaman, I-V-E, requested some numbers from AERO Laboratory on lunar impact/earth re-entry studies. AERO Lab also had some numbers on probabilities of stage disposal via "slingshot into solar orbit. Bellcomm is presenting these numbers to General Phillips today to appraise him of the problem and possible solution. Bellcomm understands that the capability to implement is not currently in the hardware. ✓

B 8/31

NOTES 8/28/67 BALCH

8/28/67

S-IC-5 Testing - A full-duration 125-second firing was accomplished late Friday afternoon, 8/25/67. No major problems were encountered, and preliminary indications are that all test objectives were met. Data is currently being processed, but initial input looks good. Removal of S-IC-5 from stand is tentatively set for 9/6/67, with arrival of the S-IC-6 at MTF expected the same day. ✓

S-II-3 Testing - Stage and engine leak checks were completed on 8/26/67 stage electrical control checkout is now in progress. Late arrival of modification hardware continues as a pacing item against scheduled firing date of 9/12/67, but completion of seventeen required tests within the next five days is the major constraint to accomplishment of the LOX/LH₂ tanking test scheduled for 9/2/67. Detailed Test Plan for tanking test has been approved, but potential slippage of a least 3 days is still indicated. ✓

MTF Transportation - Mr. Foxworthy, Mr. Morrow, and Mr. Hirsch are expected at MTF on Tuesday, 8/29/67, for discussions relative to MTF transportation activities. This visit is a forerunner to a General Services Administration study to be performed in October 1967, to determine feasibility of assigned transportation responsibilities at MTF to General Services Administration effective July 1, 1968. ✓

LUNAR MAPPING AND SURVEY SYSTEM (LM&SS) - RACK: Dr. Mueller has chosen the most economical option in closing out the LM&SS program; namely, to discontinue all manufacturing operations at once and to store the parts in their present condition. ✓

LUNAR FLYING UNIT: We have been asked by MSC's AAP Program Office to work with the MSC individuals involved in flying unit activities to determine what configuration should be studied for integration into the Lunar Module. A meeting on this subject is scheduled in early September between MSC, MSFC, and Grumman. ✓

CLUSTER SYSTEMS DYNAMICS: In response to your request for a run-down on cluster dynamics, we are prepared for about three hours presentation the latter part of September. ✓ A tentative agenda includes: (1) Cluster Mission Characteristics and Orbital Configurations (as relates to Cluster Dynamics); (2) Control System Design Inputs (Flow Diagram); (3) Control System Design Status; (4) Bending Dynamics Analysis; (5) Dynamic Test Requirements. ✓✓

ASTRONAUT FILM RETRIEVAL WALK THROUGH: A 1 "G" ATM/LM end film retrieval walk through was conducted at MSFC on August 15. Astronauts Allen Bean, Joe Engle, and Owen Garriott performed hard suit experiment simulation operations and work task evaluation. The astronaut review was very helpful and many minor points of design improvement were identified. ✓

ATM 3-AXIS SIMULATOR: We participated in a design review of the Langley Research Center Pointing Control System 3-Axis Simulator at Langley on August 23. A visit was also made to American Optical (AO) in Pittsburgh to obtain status on the MSFC 3-axis simulator. Both designs appear to be progressing satisfactorily. ✓

ATM EXPERIMENT DESIGN REVIEW TEAM: I have arranged with Chuck Mathews to postpone the ATM Experiment Design Review scheduled for August 28-31. ✓

HARVARD COLLEGE OBSERVATORY (HCO) ALTERNATE EXPERIMENT: A no-cost supplemental agreement covering the new HCO-C experiment effort has been prepared and mailed to HCO for signature. Formal (legal) initiation of the new effort should occur next week. ✓

DATA RETURN CAPSULE: A presentation on this subject was made to Mr. Mathews on August 23. There is a definite limitation of the Command Module experiment data return capability on AAP-1/2 and AAP-3/4 which will be further compounded when the Command Module changes, as a result of the accident, have been incorporated. Mr. Mathews was in favor of a Data Return Capsule for the first cluster mission; however, budget problems will require considering this work as an in-house MSFC project.

TWO-LEVEL CREW QUARTERS WORK STATEMENT: MSC is preparing a recommendation on the two-level crew quarters floor plan and the coordination (MSC/MSFC) should be completed within the next two weeks. To avoid unnecessary delay in the McDonnell Douglas Corporation (MDC) work effort, a work statement on the crew quarters change is being processed and the floor plan will be provided to MDC when it is available. ✓

GENERAL: A team representing General Bogart is at Marshall Monday, Tuesday and Wednesday of this week, to make an assessment of various schedule proposals and prepare recommendations. Main effort is to reduce FY 68 budget requirements and bring schedules in line with dollar availability. ✓

L.B.
If so, we should use the well-asked AF. Discoverer capsule.
B

8/28 N/S

B 8/31

H-1 ENGINE Teardown inspection of the Quality Assurance Test Engine has progressed to disassembly of the turbopump without significant problems other than a small amount of hydrocarbon (1.16 milligrams) was recovered from a seal cavity swab. Rocketdyne and R&DO are continuing the investigation to determine if we had a LOX seal cavity problem with this engine. ✓

F-1 ENGINE In response to an MSFC query regarding age limitations of elastomers used in the F-1 engine, Rocketdyne has stated that soft goods data for the H-1 program "are directly applicable to the F-1 engine and should be taken to include the F-1 program." Therefore, Rocketdyne recommended that the installed life of elastomers be extended from 16 quarters to 24 quarters. The recommendation is primarily based on data obtained by Rocketdyne in the years 1957-1964 from analysis of soft goods removed from 31 Jupiter, Thor and Atlas engines with service lives ranging from 36 months to 62 months from date of DD-250. P&VE, Materials Div., has concurred with Rocketdyne but recommends 20 quarters rather than 24 quarters. Materials Division has granted a waiver to 20 months for vehicle 501 and is recommending revising MSFC-STD-105A (the standard for age control of synthetic rubber) accordingly. ✓

J-2 ENGINE Reference my Notes of 8/21/67. The LOX turbopump primary seal leakage has developed into a retrofit action on 501. Based on the data obtained by Rocketdyne from the seven sample LOX pump seal leakage test program, conclusive LOX/helium correlation factors could not be established because of wide scatter in the data. Consequently, to insure a safe boattail environment Rocketdyne has designed a seal drain line to the stage interface. The kit is to be at KSC early next week. The stage contractors are designing the line to carry the leakage overboard and the hardware should be available in approximately 10 days. The overboard drain is being designed to handle a flow of 20,000 scims with a back pressure of 12 psig at the interface.

Four successful tests, consisting of two 30-second first burns, simulated 80-minute coast periods and two 5-second restarts, were conducted at AEDC on 8/22/67. Two more test periods (four tests), primarily for 80-minute restart verification, are planned prior to an engine change. Rocketdyne's LOX pump primary seal overboard drain hardware mentioned above will be checked out during these tests and a tank passivation test (S-IVB workshop) will be performed after the last test. ✓

The SACTO acceptance firing of the 504 N stage was terminated on 8/22/67, after 51.3 seconds of mainstage operation because of a fire detection indication. Post test investigation revealed that a section of the stage installed burn wire was improperly positioned and was touching the fuel turbine inlet duct at a point where the temperature is estimated to be about 500-600°F. Since the fire detection system is triggered at approximately 170-200°F, a "fire" indication was received in the control center. The test was repeated on 8/26/67 for 438 seconds and was successful. ✓

NOTES 8/28/67 CONSTAN

8/28/68

B 8/31

Nothing of special significance.

B 8/31

NOTES 8/28/67 FELLOWS

9/28 958

MSFC/KSC Mutual Assistance Program: A total of twenty-seven
personnel have been selected by KSC for the MSFC/KSC mutual
assistance program. Twenty-five of these personnel have
reported to KSC to date. ✓

8/29/67

1. S-II Insulation: The study has been completed concerning the impact of pieces of S-II insulation on downstream components. The particles will accelerate to high local velocities and will not be deflected by local flow fields to prevent protuberance impact. However, it is found that penetration does not take place of even the most critical fairings such as the 0.05" fiberglass H₂ feedline shroud. The engine shrouds and fins are even less susceptible to damage. ✓ Another area of concern was the effect of debris injected into the base through the aft-end scoops. This is not considered to be hazardous since the momentum of the material is absorbed by impact on the scoops. ✓ The only precaution is that the physical size of a single piece of debris not create a total load on a shroud that exceeds the load carrying capacity of the shroud. The results of the analytical study are being published in a technical memorandum. Wind tunnel impact tests have been completed and confirm the fact that no penetration takes place. The experimental and analytical results will be published in a NASA technical note. What saved us was the low density of the impacting particles. ✓
2. AAP Cluster: The Martin integration contract effort on mission analysis for the cluster mission (AAP-2 and AAP-4) will involve orbital analysis relating to timelines, data management, orbital contingency plans, subsystem usage timelines, tracking, and other orbital analyses which MSC would probably prefer that MSFC not do. We wish to have some voice, however, in the orbital mission planning and use the Martin analyses since these reflect the manner that MSFC would prefer to see the mission performed. Ideally, it would be nice if MSC would work with us to make the Martin analyses more meaningful and useful to both Centers. ✓ Interface efforts in this direction will be attempted through the Mission Requirements Panel. ✓
3. Vehicle 501 Roll Out: During 501 roll out and subsequent stay time on the pad prior to launch, we shall assist P&VE by furnishing an engineer to insure that appropriate wind data are recorded. Data will be used during analysis of vehicle responses during roll out. ✓

E.G.

I hope this conclusion is valid also for the US Spray On Coating (effective SII-B)

B

8/28/68

B 2/31

1. SA-501 QUALIFICATION CERTIFICATION: The Qualification Certification Program for S-IC-501 is 96.6% complete. The only open items are five engine bolts which were recently added and have not yet been received from the contractor. The IU 501 program is completed. The S-II-501 program is approximately 98% complete. Certificates of qualification have not yet been issued on a LH₂ engine feed line assembly, a helium regulator, and a center engine bolt. Tests are in progress. The S-IVB-501 program is 96% complete. Eight certificates of qualification have not yet been issued. Work continues on resolution of problems affecting the completion of the remaining items. ✓
2. H-1 ENGINES: H-1 Engine S/N 2038, which was disassembled for soft good evaluation after having been in storage for four years, has been reassembled and is ready to return to Rocketdyne. All discrepancies noted by this Laboratory were minor and could not be attributed to prolonged storage. ✓ R-P&VE will evaluate the soft goods and issue a report on the conditions found. ✓
3. ELECTRIC STORAGE BATTERY (ESB): With regard to your question on item three of NOTES 8-14-67 GRAU (copy attached), I believe a letter of this nature would have beneficial results. Accordingly, we are preparing such a letter for your signature. ✓
4. UNION SWITCH CONTAMINATION PROBLEM: Relay contamination problem at Union Switch has been resolved and is considered closed. ✓ Rejection rate is negligible and delivery is on schedule. ✓ During the contamination investigation, Bendix also discovered that Union Switch acceptance test equipment was badly in need of overhaul and repair, as well as out of calibration. Bendix had not correlated their acceptance test equipment with Union Switch's since the Bendix pre-award survey. A recent relay was acceptance tested at Union Switch, Bendix and R-ASTR and met the same criteria at all three facilities. Bendix source representatives, itinerant and resident, have been instructed to give specific attention to test equipment validation and calibration on other suppliers of critical Saturn hardware. ✓

ATTACHMENT: NOTES 8-14-67 GRAU (Dr. von Braun's and Mr. Weidner's copies only)

B 8/31

ATM SOLAR PANEL DEPLOYMENT TESTS

Initial hardware has been received and testing will begin early in September, 1967. These tests will supply data which Astrionics requires to finalize their design of the complete test fixture. ✓

S-IC STAGE (MSFC)

A series of lox loading tests was conducted on the S-IC-T during the week to determine the extent of the pressure decay experienced in the lox tank during tanking at MTF and to determine methods of preventing or minimizing the effects of this pressure decay. ✓ An interim solution to support S-IC-5 static firing at MTF was decided upon, but future tests are planned to further define the most optimum lox tanking methods for MTF and KSC. ✓

S-IC STAGE (MTF)

The S-IC-5 stage was successfully static fired for 125 seconds at 6:12 pm, Friday, August 25, 1967, after nearly a month of firing schedule delays. Present plans are to remove S-IC-5 stage from the test stand September 6, and install S-IC-6 on September 7, 1967. ✓

H-1 ENGINE (MSFC)

Four tests of the instability test series (PI-500 through PI-503) were conducted with engine S/N 4067 at the Power Plant Test Stand. Tests PI-500 through PI-502 (205K) were tested with 50 grain bombs. The engine instability dampened within the specification limits during each of the bombing tests. Test PI-503 was a calibration run at 210K in preparation for the next bomb test to be conducted today, August 28, 1967. ✓

S-11-3 (MTF)

Pre-static checkout of S-11-3 is progressing satisfactorily at MTF test stand A-1. ✓

S-1VB-504N (SACTO)

S-1VB stage 504N was satisfactorily acceptance fired at the Sacramento Test Center on August 26, 1967. ✓

8/28/67

1. PAPERS PRESENTED AT ACM SYMPOSIUM: The following papers have been prepared and will be presented at the ACM Symposium on the Design and Implementation of Interactive Systems for Experimental Applied Mathematics, Washington, D.C., August 26-28:

- a. C.Ely, R.Seitz, and L. Wood, AMTRAN - Pushbutton Route to Instant Mathematics.
- b. Eugene Burton, Certain AMTRAN Integration Routines Using Variable Step-Size.
- c. A. V. Jett, Jr., AMTRAN - Implications of an Interactive Mathematical Computer System for an Educational Institution.
- d. Alan G. Collier and Joyce P. Harmon, Why Develop a New System?
- e. Richard J. Plocica, What's Different About AMTRAN? ✓

2. AIAA COMPUTER COMMITTEE ACTIVITIES: On August 15, 1967, Dr. Robert N. Seitz attended a meeting of the AIAA Computer Committee (formerly AIAA Sub-Committee on Computers). The AMTRAN group gave a presentation of AMTRAN to the AIAA Computer Committee August 15, 1967. ✓

3. THIRD GENERATION COMPUTER: The acceptance period for the interim (Phase A) UNIVAC 1108 system began on July 8, 1967. The Phase A acceptance period was successfully completed on August 6, 1967, and the system was accepted as of the first day of the successful performance period. The 1108 system met the specified standard of performance while operating at an average effectiveness level of 93% for the 30-day acceptance period. ✓

4. TAPE MAINTENANCE AND ASSEMBLY SYSTEM (TAME): An assembly system for the RCA-110A computer has been completed by MSFC and implemented at KSC. The system consists of a loader and operating system, a symbolic and binary editor, and an assembler. By incorporating input and output queueing techniques and making efficient use of the computer's priority interrupts system, a time savings ratio of more than 8:1 was accomplished over the assembly/edit system which had previously been used. ✓

5. TECHNICAL ASSISTANCE TO THE NIKE-X PROJECT OFFICE: The Nike-X Project Office requested the assistance of Mr. Clayton McGee, Data Center Division, as a member of the Technical Proposal Evaluation Committee dealing with planned computer support. This assignment would be for a two-week period, and in keeping with the reciprocal support arrangements, we plan to make Mr. McGee's services available to the Nike-X Project Office. ✓

NOTES 8/28/67 JOHNSON

8/28/67

B 2/31

Voyager Technology Panel - Reference my note of August 14, 1967. Dave Newby and I have discussed this and in the light of the budget and possible total reorganization of the Voyager Program when it is initiated we see no need for any further pursuit of this matter at this time. ✓ If the Technology Panel is continued, a representative from both the Voyager Office and my office will work with the Panel. ✓

8/29/67

ATM Project: ME Laboratory is presently engaged in actual manufacturing activities in this program with the following hardware items:

a. Fabrication of Racks: Major tooling has been designed in house, fabricated by Hayes, and is presently being installed in Building 4755. There are approximately 200 more or less complex fittings to be machined for each Rack which are made from 2219 aluminum heavy plate or block forgings. Most of the design for the fittings is on hand and material is available. There is only an overload problem in our machine shop if our present schedules are valid. ✓

b. Spar and Canister: Some test hardware is being fabricated. Final design definition has not been established with respect to mounting of equipment, location of ribs, and thermal insulation. This is high precision and typical development work. ✓

c. Solar Panels: Here we are engaged in fabricating 80 small bonded panels per month on which solar cells are to be mounted. Many hundreds of these small panels will later be assembled into a big panel. ✓

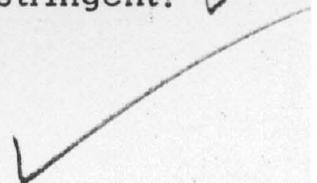
d. Control Moment Gyro Test Fixture: We have already completed the fabrication of this test fixture for Astrionics Laboratory. A second different fixture is being planned. ✓

e. Optical Alignment Chamber: This is again equipment we are building for Astrionics Laboratory. It consists of three sections each, 10' long 80" diameter, which are joined together to form a vacuum chamber. A mirror finish is required inside. Material is stainless steel. It is to be leak proof tested for 10^{-6} Torr. ✓

f. Checkout Consoles: Two consoles for R-QUAL are presently being fabricated including electrical wiring. ✓

g. Structural Test Fixtures: Two load test fixtures are in fabrication for P&VE Laboratory. ✓

h. Portable Clean Room: We are also building a portable 10K clean room for final system installation. The cleanliness requirements for the final assembly of the canister are very stringent! ✓



B 8/21

8/28/67

MANPOWER FREEZE - In response to Congressional action on the NASA FY-68 Budget, Dr. Seamans has directed a reassessment of plans for utilization of civil service manpower and placed a freeze on all new hiring, except for existing firm commitments, until the reassessment is made. MSFC is required to submit reports on August 28 and 31 as a follow-up to this directive. ✓

ADMINISTRATIVE OPERATION REDUCTION - Advance information from MSF indicates that our new FY-68 AO Ceiling is \$125,884 K, which is \$1,195 K below POP 67-3 ceiling. A comparison of the forthcoming guidelines to POP 67-3 ceiling is depicted below:

(Dollars in Thousands)

<u>Fund Source</u>	<u>Forthcoming MSF Guidelines</u>		<u>Ceiling</u>
Personnel Compensation-F.S. #1	88,708	-1,096	89,804
Limitation Travel -F.S. #2	2,973	- 258	3,231
Operation of Installation-F.S. #3	34,203	+ 159	34,044
Total	125,884	-1,195	127,079

SCHEDULE STUDY - As a part of Gen. Bogart's study of program schedules, a team of twelve Headquarters people will visit Marshall beginning Monday, August 28. Specific questions and schedules which this group plans to consider were received on Friday, August 25. At the request of Headquarters, we will run the schedules through the Apollo Cost Study Computer Model to help in the cost analysis. ✓

Review of AS-501 Test Activities at KSC: ^{8/28 JRS} We have reviewed the testing activities and results that have occurred so far on AS-501 with Dr. Gruene and his people. We generated joint action items to clear up remaining open items on AS-501 and correct operations on AS-502 and subsequent vehicles. Generally, testing difficulties have been irritating to the massive testing organization involved but no "show stoppers" were identified. Major problems stem from KSC's evolved testing philosophy (which we essentially agree with) and the present design of the vehicle system for operation in prelaunch testing. While our flight hardware-software systems are made to handle failures and off-nominal situations, our simulated flight systems are limited in this respect. A lot of the difficulty has come from expecting the vehicle to "fly" well on the ground with engine out, early staging, etc. We will present an Astrionics-IBM software proposal to KSC to get around this difficulty (in 3-4 weeks) on subsequent vehicles. ✓ Other areas of problems we are jointly working are minor hardware problems, better communications, a change in procedure writing which will allow for event timing changes, alternate modes for redline monitoring, more automated support of testing by the GSE, etc. ✓ B 8/31

Saturn V Launch Vehicle Performance: Reference Dr. Mueller's note to Mr. Trimble, dated June 15, 1967. In our NOTES to you, dated July 10, 1967, we mentioned preparing a presentation for Dr. Mueller on our Saturn V fuel residual and reserver picture. In subsequent telephone contacts and a letter from Mr. Trimble's office, we have a better definition of what Dr. Mueller wants, i. e., vastly improved visibility of what he really has in the Saturn V launch vehicle for missions beyond Apollo. Coupled with any potential performance gains, he also is asking for maximum stack weights about the I. U. with the current structure and first stage propulsion. We are working with the R&DO laboratories and the Program Office to put together this presentation, with a late September target. ✓ L.R.
2, B

Voyager Working Group Meeting: The fifth and final meeting of the Voyager Mission Test and Facilities Working Group was held at VIPO, Pasadena, on August 16. The meeting essentially summarized the basic positions of the systems representatives in the area of scheduling and schedule incompatibilities. An item which was discussed following the scheduled meeting was the continuance of test information interchange and how this could be done. It was decided that this could possibly be done through the use of inter-center panels such as have been used on AAP. We plan now to write up a synopsis of the activities of the working group for distribution to Center Voyager personnel. ✓

LOR S-IVB Debris: Bellcomm, through Mr. Bob Beaman, I-V-E, requested some numbers from AERO Laboratory on lunar impact/earth re-entry studies. AERO Lab also had some numbers on probabilities of stage disposal via "slingshot into solar orbit. Bellcomm is presenting these numbers to General Phillips today to appraise him of the problem and possible solution. Bellcomm understands that the capability to implement is not currently in the hardware. ✓

8/28/67

1. AS-501 Launch Vehicle at KSC

o AS-501 is now on the pad. The journey from the VAB began at 6:23 am, EDT, Saturday, 26 August 67, with arrival on the pad at 5:25 pm, EDT. ✓

o On Thursday night, 24 August 67, the S-II insulation was pressure tested to 4.0 psi and a blowdown test conducted. Extrapolation from the test data indicated the inflight peak pressure would be about 5.5 psi, which was above the previous proof pressure test conducted at KSC. At 2:00 am, 25 August 67, we ordered a proof pressure test at 5.75 psi. At approximately 4:00 am, the pressure was achieved, which gives us good confidence that the insulation will withstand the inflight pressures. ✓

o The combined detonating fuse (CDF) assembly on the S-IC LOX tank jammed in the guide channel during installation. Efforts to free the assembly may have overstressed the CDF; therefore, it will be replaced on the pad. We will advise you further on this item at your Pre-Flight Review on Tuesday, 29 August 67. ✓

2. S-II Spray Foam Insulation Test at SACTO: We have been conducting S-II Spray Foam Insulation Tests on a THOR tank (8 feet diameter, 20 feet length) at SACTO. On Friday, 25 August 67, while undergoing a 100% limit flight test, the forward bulkhead of the THOR tank ruptured at a pressure of 77 psi (test was to have gone to 79 psi). The tank was filled with LH₂ at the time but there was no explosion, other than the bulkhead separation. This bulkhead is a bolt-on type which appears to be replaceable. Dr. Lucas is reviewing the fracture mechanics aspects of the failure. ✓

3. S-IC-5 Stage at MTF: Acceptance firing was made on Friday, 25 August 67, for full duration of 125 seconds. ✓

4. S-IVB-504 (N) Stage at SACTO: Acceptance firing was conducted on Friday, ~~25~~^{SAT} 26 August 67, for full duration of 435 seconds. Mixture ratio was shifted from 5.5:1 to 5.0:1 at 191 seconds as planned. ✓

NOTES 8/28/67 SPEER

8/29/67

B 8/31

1. APOLLO MISSION FAILURE CONTINGENCY PLAN: We have received an advance copy of the revised MSF plan and are reviewing the impact on existing MSFC failure investigation provisions. The plan covers the time period from beginning of countdown to completion of recovery operations and is based on the AS-204 experience. It provides two levels of accident reviews, Center Boards of Inquiry (KSC, MSFC, MSC, GSFC or DOD) and an OMSF Accident Review Board. Both types of boards will be supported by a group of pre-designated Working Groups in a fashion similar to the previous plan. MSFC (and the other Centers) are requested to (a) establish a Center Board of Inquiry; (b) establish our participation in investigating Working Groups; (c) maintain a current list of all elements capable of supporting a failure investigation; (d) prepare for a local action center to be manned continuously during the investigation. Most of these items are addressed in the present MSFC Mission Failure Contingency Plan (dated May 2, 1967); however, some additions and modifications will be required. I shall proceed to identify all these changes in preparation for whatever additional Center action you may consider necessary. ✓

F.S.

Any suggestions?
B

2. AS-501 LAUNCH MISSION RULES REVIEW: The Program and Mission Directors Review of mandatory mission rule items for Launch of AS-501 was held at KSC on August 22. Primary among results are actions assigned by Gen. Phillips to reduce the number of mandatory items being monitored and providing basis for hold during automatic sequence. Individual mandatory measurements have been eliminated during the automatic sequence and the number of redlines during this period has been reduced substantially. ✓ The Mission Director will subsequently review all mandatory telemetry links and we have initiated our own action in preparation for this review and in line with Gen. Phillips guidelines. Gen. Phillips also requested a re-definition of the mandatory category for missions beyond AS-501 with the intent of distinguishing between items that cannot be weighed during final countdown under any circumstances and those subject to waiver under certain realtime conditions. At the direction of Dr. Rees, Mr. Neubert is also reviewing the AS-501 mandatory items. I plan to summarize current status during the Preflight Review on 8/29. ✓

3. OMSF MISSION OPERATIONS OFFICE: Gen. Stevenson's organization has been formalized by NASA Management Instruction on 8/14 (NMI 1138.10). The only significant change is the assignment of the Mission Directors to the Program Directors. ✓

B 8/31

1. ATM FOLLOW-ON STUDY: SSL, at the request of IO and with good support from Brown Engineering, is presently conducting the ATM Follow-On Study requested by Jesse Mitchell. Overall study management and interfacing with Headquarters is being performed by IO. Recent changes in guidelines have made our assignment much more involved. For example, we now have three EMR-type payloads to define - EMR-I Option I, EMR-I Option II, and EMR-II or Follow-On EMR. This study is scheduled to be completed by December 1. In the late half of this study effort, Martin, the AAP Integration Contractor, will become involved and make contributions relative to systems analysis and overall mission planning. ✓

E.S.
Can't see a copy?
B

2. ATM OPTICAL CONTAMINATION STUDIES: The "ATM Optical Environment Contamination Control and Abatement Plan" has been completed by SSL; it is presently being circulated for concurrence to R&DO Laboratories and IO Offices. The following steps will be taken to implement the Abatement Plan: (a) Contractually make the acceptable/unacceptable materials list a part of the Experiment Implementation Document as a materials guideline, (b) Contractually require submission of materials lists by PI's and subcontractors for MSFC review against the guidelines lists, (c) Discuss and negotiate MSFC opinions as a result of above review, and (d) Implement resultant required changes contractually.

Execution of these steps will be in the hands of Gene Cagle, ATM Project Office, who will work closely with SSL, IO, and Purchasing Office. ✓

3. Ph.D. DEGREE: Larry Wood, SSL, received the Ph.D. degree in physics from the University of Alabama on August 18. His thesis work dealt with a problem of plasma physics. ✓

Bonnie
Let's
write
him a
congrats
note
B

4. JOINT NASA-AF "THERMAL CONTROL WORKING GROUP": This meeting was organized within NASA by OART and had the written endorsement of Mueller, Newell and M. Adams. It brought out many of the thermal problems of spacecraft projects and of still open research problems. Flight results from satellites or probes beyond the near earth orbits, such as Lunar Orbiter and Mariner, showed a much stronger effect of the space environment than predicted from UV degradation tests in the Laboratory. There was no agreement about the causes of the increased degradation. Solar wind protons and alpha-particles are a very likely cause and should be investigated more thoroughly. Synergistic effects of protons and UV irradiation could also account for the damage. The most space-stable materials used in space projects so far are polished metals covered with an inorganic dielectric thin film or second surface mirrors. The problem here is the lacking technology for large surface application. They were, e. g., ruled out for Pegasus because of the high cost and severe scheduling problems. Another area that found considerable attention is the lack of knowledge of the solar radiation flux. No direct measurement from space has yet been made! SSL has in preparation a flight experiment measuring the solar flux with high precision. We hope that it can be implemented in CY1968. ✓

E.S.
Maybe some area where
M.E. could make a contribution.
Please explore. B

TEIR 8/28/67 NOTES

8/28/67

B 8/31

AS-204 STATUS AT KSC: All launch vehicle stages are within one day of being on schedule, however, the Lunar Module (LM-1) is now tracking about 26 days behind schedule. We have been informed that LVO-KSC plans to request a new launch date from Headquarters which will slip the launch date the entire 26 days that they are now behind schedule. Solutions to fuel and oxidizer leak problems and heat exchanger modifications are still required. SA-204 S-IB stage engine number 8 that was sent to Neosho for teardown and inspection for contamination was found to be clean and was returned to KSC on 8/21/67. It has been re-installed in the stage and engine checks are in process. The J-2 engine bell which was damaged slightly when the man fell in the S-IVB stage has been determined to be acceptable for use. Another vehicle corrosion inspection has been completed on SA-204 with no major problems resulting. ✓

MINUTEMAN STRAP-ON PRESENTATION: The status presentation of the Minuteman Strap-On Study was given to Headquarters (John Disher, Mel Savage, and others) on 8/22/67. The status was well presented by MSFC and CCSD personnel and favorably received. ✓ Chuck Mathews was unable to attend due to last minute scheduling of budget meetings. (We have been advised that subsequent to our presentation Mr. Mathews was briefed by Mr. Savage. Mr. Mathews agrees with the approach we have taken and is still quite interested in the early delivery date. He is still concerned with the payload weight of AAP #3 and would like to consider first using the Minuteman on the unmanned AAP #2.) ✓ John Disher pointed out that implementation of the Minuteman program and scheduling is dependent on results of the present budget exercise which should be more firm prior to our October briefing. ✓

In reference to your comment to Dr. Lucas' notes of 8/21/67 (copy attached), we have been aware that the new S-IB tanks and several other components will require requalification testing under new environments and a considerable portion of the planned funding is for this purpose. Retesting was discussed during our MSFC rehearsal for the Headquarters briefing and there was no great concern expressed by laboratory people present that the necessary qualification test programs were not provided for in the planned program. As many as 10 Minuteman rocket firing tests will be required; however, it is hoped that some can be conducted using excess Air Force motors with required modifications. ✓

1. OSSA Launch Vehicle Studies:

Mr. McGolrick (Vince Johnson's Office, OSSA Headquarters) called to say that he had reviewed our letter on proposed FY-68 studies (see my notes of 8/7/67). He said that the tasks, funds, manpower, etc. look very good. Due to funding picture, he said, "Don't be surprised if some mods come later." He asked us to proceed as outlined in our letter. We are sending revised 1122's to McGolrick on 8/25/67. ✓

2. MOL Briefing:

McDonnell Douglas Corporation presented the results of their study with MSC on the applications of the Air Force MOL to satisfy the objectives of NASA missions during the 1971-1972 time frame at MSFC on August 24 and at Headquarters on August 25. The briefing was classified CONFIDENTIAL, and some of the results will be discussed with you next Thursday at the advanced workshop presentation. ✓ This study should be highly significant particularly in view of the recent Congressional and PSAC comments regarding combining the NASA and Air Force earth orbital activities. We intend to use the data generated from this study for comparing the effectiveness of candidate systems (MOL, Workshop, EOSS, etc.) for performing 1970-1975 earth orbital operations. Headquarters has also requested that we and MSC evaluate all contenders in a coordinated effort with Headquarters. ✓

3. Space Story Tape:

The taped discussion of the Space Task and Manipulator Studies by an ASO representative (see our notes of August 7) has been completed by PAO for the "NASA SPACE STORY" Headquarters series of radio programs. We have relayed your request for discussion of this subject to PAO, and we have requested your secretary to arrange to place us on your schedule for this purpose. ✓