

NOTES 7/7/69 BALCH

7/7/69

S-IC-11 - Present plans call for refurbishment of the stage at Michoud. Engines 2, 3, and 5 are to be replaced. No definite decision has yet been made with respect to refurbishment or replacement of engines 1 and 4. Stage is tentatively scheduled to be removed from the test stand on 7/11/69 for shipment to Michoud.

S-II-9 - Stage is in the A-1 Test Stand undergoing post-static checkout. Removal from the test stand is scheduled for 8/8/69.

S-II-10 - Stage is expected to arrive at MTF on 7/11/69.

BOMEX - Phase III observations were completed on 7/2/69, and all five ships departed for Bridgetown on 7/3/69. Refurbishment and replenishment, which was scheduled to start on 7/4/69, started on 7/5/69.

Edgewood Arsenal Project - Transfer of additional funds from Edgewood Arsenal to MSFC in the amount of \$229,130.00 for follow-on work was confirmed on 6/30/69. Funds received by NASA from Edgewood Arsenal to date for this project now total \$378,673.00. It is understood that approximately \$250,000.00 for more follow-on work will be transferred during Fiscal Year 1970.

With reference to comments by Dr. Rees on Brown NOTES of 6/16/69:

The igniter circuitry error for the S-IC stages was in the GSE and not the facility as indicated in the Brown NOTES. The error was in the placement of the current-limiting resistors for the 500-volt power supply for engines 2 and 3 only. The circuitry installation was in accordance with the engineering drawings and would cause no problem unless some unusual condition developed, such as the accumulation of moisture in a connector or an unusually conductive path through the gases in the igniters, to permit electrical conduction between the 28-volt and the 500-volt circuits. On the S-IC-4 through the S-IC-8 stages, no such condition developed to reveal this slight design deficiency. The igniter circuitry was corrected prior to the static firing of the S-IC-11, and there was no indication of early ignition for that stage.

7/7 9/A

SPACE STATION

Contract Evaluation: SEB activities are still in progress and Messrs. Brooksbank and Dannenberg are still in Washington and will probably be there for at least one more week. In response to questions by many of the NASA people, gathered for the evaluation, about MSFC's participation in the Space Station Study, we were able to show our inhouse "Space Station Program Plan," and we received complimentary remarks that it is the best plan anyone has seen yet of an organized Center involvement.

Mr. G. Pedigo will spend four days at MSC next week (July 7-11) to participate in the proposal evaluation for two phase B Interim Logistic Module Studies (Big G and CSM type). These will be add-ons to existing MSC contracts. We prepared common scopes of work and will co-monitor the contractors with MSC. Our intention is to have the two efforts under contract approximately one month prior to the Space Station Phase B contract to enable us to furnish an early data package to the two Station study contractors.

Information Management: Dr. K. F. Peltzer and Mr. Jack Schwartz of the Goddard Space Flight Center presented their plans to MSFC for the Data Relay Satellite System. The Data Relay Satellite System will support both Space Station and Space Shuttle with communication links. Approximately 25 people attended the meeting. We had good exchange of ideas and requirements.

In-House Mockup: The six light-weight S-II Stage tank sections which were released from the Apollo Program for our use in fabricating an engineering development model of the Space Station are en route from Seal Beach. They are expected to arrive at Michoud by the middle of July. They will then be shipped to Huntsville by barge on a space-available basis and are now expected to arrive at the Center in late summer.

SPACE SHUTTLE: Mr. Art Henderson and Mr. R. Rainey of the Langley Research Center gave a presentation to MSFC on 7-2-69, subject: HL-10 Flight Vehicle. This was an excellent presentation on the history of the HL-10 from conception through flight test (21 flights to date), and will be very helpful to MSFC personnel in understanding and sizing the necessary extensive aerodynamic test program that will be required to develop the Space Shuttle. The LaRC personnel repeatedly emphasized Langley's desire to work closely with MSFC in the development of the Space Shuttle. After the presentation, working sessions were held on: a) preliminary design of concepts for a two-stage fully reusable Space Shuttle utilizing the HL-10, b) aerodynamics, c) thermal protection, d) lateral range potential of HL-10, and e) propulsion integration. We believe that we have established a good working relationship with this group at Langley and we will continue to pursue this to obtain the maximum support from that Center in our Space Shuttle work.

7/7/69

MOL CONTRACTS: All contracts were checked for applicability to AAP with representation of PM, PD and S&E. There was no specific coordination with Mr. Gorman prior to release of the AAP Program Office TWX to Bill Schneider.

PDR SCHEDULES, GENERAL: Bob Schwinghamer has been planning to support PDR's on M171, Metabolic Activity, and M092, Inflight LBNP, in early August, but in a discussion with Reg Machell and Ken Hecht on July 1, 1969, we learned that MSC is thinking in terms of October or November. Their rationale is that Martin has just received a contract which includes the M092 plethysmographs and the primary gas analyser for M171, and since AAPO conducts reviews for entire experiments, MSFC will be constrained by availability of Martin's PDR data.

WET WORKSHOP SLOWDOWN: A Resident Contracting Officer's letter was issued June 30, 1969, issuing a Stop Order on S-IVB modifications associated with Stage S-IVB-212, with the following exceptions:

1. Procurement and fabrication of hardware will proceed
2. Workshop accommodation modifications will proceed

This Stop Order was issued to prevent the mainline mods from being incorporated in the interstage and forward and aft skirts pending a decision regarding the Dry Workshop Program.

A TWX from the Contracting Officer was sent July 2, 1969, which authorized redirection of activity away from strictly Wet Workshop tasks as requested by Bill Schneider's letter.

Revised General Electric ESE Proposal: General Electric delivered the revised ESE Proposal on July 2, 1969. Copies have been distributed within S&E. A meeting will be held today (7/7/69) to establish the MSFC technical position.

This contract is in essence applicable to both Dry or Wet definitions. Therefore, we plan to forward our prenegotiation position to Headquarters requesting approval to proceed with final negotiations based on the revised proposal. We would also stipulate that if the decision is "Dry" all efforts deleted by that decision would be stopped. Our basic reason for pursuing this plan is that we have no contract to fulfill preliminary design work for items other than ATM, and because of MSFC funding approval ceiling, the manpower on ATM cannot be increased as it needs to be during August 1969.

Lower Body Negative Pressure

NOTES 7-7-69 BROWN

7/7/69

F-1 ENGINE - Assessment of damage incurred by F-1 engines in the S-1C-11 incident is continuing. Three engines sustained significant damage and must be replaced. Also, because of unknowns associated with the fire, consideration is being given to replacing the remaining two engines.

H-1 ENGINE - Goddard Space Flight Center has requested MSFC to provide Rocketdyne assistance to Douglas in determining the advisability and economy of using unallocated H-1 engines in the production of THOR vehicles for the DELTA Program. The study is to be completed in approximately 60 days. A scope of work for the Rocketdyne portion of the study will be completed and contractual arrangements accomplished next week.

J-2 ENGINE - The S-IVB Vent and Relief Valve was tested on July 2, 1969. The test did not produce any valve chatter or obvious 45 cycle vibration. Testing will continue. Two vent valve test periods per week are possible if engine tests are not conducted. Consequently, to obtain the maximum number of tests on the vent valve prior to the launch of AS-506, J-2 S testing has been excluded until the launch.

NOTES CONSTAN 7-7-69

7/7 9/15

Nothing of special significance.

NOTES 7-7-69 DOWNEY

7/7 J/S

1. EXPERIMENT AND PAYLOAD PLANNING: Mr. Bill Armstrong and Dr. Rod Johnson of MSF (Payloads Office, Advanced Manned Missions) visited PD to discuss experiments and payload planning for future manned missions. Mr. Armstrong identified the Centers he considers primarily responsible for providing experiment definition in the various discipline areas. His comments were as follows:

<u>Area</u>	<u>Center With Primary Responsibility</u>
Lunar Experiments	MSC
Astronomy	MSFC
Space Physics	MSFC, except Cosmic Ray Research Laboratory for Space Station (MSC)
Life Sciences	MSC (with support from Ames and MSFC)
Earth Applications	MSC
Advanced Technology & Material Science & Processing	MSFC (with support from LaRC)

Mr. Armstrong has an assignment from Mr. Donlan to prepare suggested revisions to the payload planning associated with the MSF Integrated Plan. Mr. Armstrong's planning is more conservative (and more realistic in my opinion) than the payload plans indicated in the earlier versions of the Integrated Plan. Mr. Armstrong shares the MSF position that Super Explorer (High Energy) experiments should be incorporated on a workshop mission, e.g. DWS #2, rather than on an unmanned satellite. OSSA and MSF appear to be on a collision course on this matter. Either approach is reasonable in our opinion.

2. SPACE BIOLOGY SUBCOMMITTEE MEETING: Dr. Hilchey attended a meeting of the Space Biology Subcommittee of OSSA on June 21-23. OSSA Subcommittee participation is very valuable in providing guidance for planning experiments and payloads for future missions.

3. GULF STREAM DRIFT MISSION: The Ben Franklin departed West Palm Beach about noon 7-3-69 for a full crew test. Mr. Chet May was aboard in connection with NASA's mission objectives, including the physiological and microbiological experiment programs. The test was successful, and the Ben Franklin returned to West Palm Beach on the afternoon of 7-4-69. The boat will be taken out of the water for inspection and service and then loaded for the Drift Mission, which is now scheduled for 7-14-69.

7/7 4/8

STUDY OF MSFC MEDICAL PROGRAM - As a result of rather serious illnesses of two MSFC employees, Dr. Haeussermann and Mr. Heimburg questioned whether our Medical Center is doing everything possible in the way of diagnosing potential health problems. In response to this question, Mr. Newby asked that Center Plans & Resources Office make an in-depth study of our Occupational Health Program. On June 26, Ray Crouch reported on the results of this study to Dr. Rees, Mr. Weidner, Dr. Lucas, Mr. Newby, Mr. Shepherd, Dr. Haeussermann, Mr. Heimburg and other members of Center management.

Mr. Crouch reported (1) that the scope and content of our Occupational Health Program is in accord with government criteria and guidelines for occupational health programs developed and published by the American Medical Association (AMA); (2) that the quality of MSFC's program was certified in January 1969 by the Occupational Health Institute, the AMA's accrediting agency; (3) that relationships with the private medical sector have improved measurably over the past two years; and (4) our medical center is now doing about everything possible, within the ethics of the medical profession, in the way of preventive.

In the two cases in question, our medical staff had diagnosed potential health problems and referred the employees to their private physicians for further examination by specialists. The private physicians had failed to prescribe the diagnostic exams suggested by our medical center. Dr. Frierson, our Medical Director, has now set up a follow-up system on referrals to assure, within his legal and ethical rights, that, where health problems are indicated, the employee does report to his private physician and that the physician does, in fact, have the special diagnostic tests run.

OBLIGATION STATUS AS OF JUNE 30, 1969 - FY 1969 obligations were achieved as planned for both the R&PM (Formerly AO) and R&D Appropriations. All but the reserve which approximates \$25K of the 116.4 million available for the R&PM Appropriation was obligated as planned. The reserve is maintained to absorb obligational adjustments to prevent an overobligation. All but \$3 million was obligated of the \$700 million R&D program. The unobligated portion was in the SRT area.

NOTES 7/7/69 GEISSLER

7/7/69

1. MSFC Upper Atmospheric Model Improvement Symposium: The MSFC Upper Atmospheric Model Improvement Program consists of a total of twelve studies that are currently being conducted by in-house NASA personnel of our Aerospace Environment Division, as well as mission support and separate study contractor personnel. A symposium is planned for July 9, 1969, (Building 4610, S&E-AERO Conference Room) to review the progress of the contributing contractors and to give each investigator a better understanding of the entire study program. It is anticipated that the symposium will contribute significantly to study programs and strengthen the coordination of the various studies. Informal papers will be presented in the areas of (1) satellite drag density determination and analysis, (2) thermosphere probe data analysis, (3) upper atmospheric model development (statistical and theoretical), and (4) nightglow temperature measurements.
2. AS-506 Accelerometer Failure Contingency: As a result of a recent analysis done by Boeing, we would probably go ahead with the TLI burn with an accelerometer failure prior to S-IVB re-ignition. This is a change to the mission rule of the past where the TLI burn was to be inhibited for an accelerometer failure into or during parking orbit. The only factor which seems to possibly be in the way of the change is that IBM has not verified the flight program for an accelerometer failure during boost to earth parking orbit, with a subsequent navigation update.
3. Clear Air Turbulence: Recently released by Plenum Press, New York City, is a book entitled, "Clear Air Turbulence and Its Detection," edited by Dr. Pao and Dr. Goldberg of Boeing Scientific Research Laboratories. The book is divided into six parts and contains invited papers (chapters) on a variety of topics related to the subject. An invited chapter entitled, "Detailed Wind and Temperature Profiles" was prepared by Dr. Fichtl, Mr. Camp, and Mr. W. Vaughan of this Laboratory. One of the book's conclusions includes the recommendation for coordinated simultaneous measurements of clear air turbulence with a variety of techniques including our MSFC developed FPS-16 Radar/Jimsphere system.

NOTES 7-7-69 GOERNER

7/7/69

REACTOR-THERMOELECTRIC SYSTEM: Mr. Brantley, PD-DO-E, attended an AEC presentation given to OMSF, 7-1-69, on the Reactor-Thermoelectric System on 1975-77 Space Station (R_x -TE/SS). Those in attendance were:

Dr. G. Mueller, OMSF	Mr. Woodward, OART	Mr. Johnson, AEC
Mr. C. Mathews, OMSF	Mr. Klein, AEC	Mr. Kitterman, AEC
Mr. Donlan, OMSF	Mr. Newby, AEC	Mr. Brantley, MSFC

MSFC attendance was at the request of Mr. Klein, agreed to by Mr. Mathews. We were invited because of inhouse MSFC study efforts over the past year of this power system into a candidate space station. The presentation was given by Carl Johnson with several viewgraphs, basically from the mid-December R_x -TE/SS review document conducted by MSFC/AI. Dr. Mueller had several questions and comments. One of his major comments was that reactor power systems might best be used on a lunar orbiting space station. Two of his more significant questions and the basic answers given by us were:

(1) Q. Have we considered use of fuel cells with the resupply of H_2 and O_2 by the low cost logistics vehicle?

A. Yes, for auxiliary power, due to the 56 to 90-day, 2 kWe limitation of present fuel cells they have not been considered for primary power.

(2) Q. Wouldn't the R_x cause problems with station based experiments, earth resources and astronomy?

A. The reactor contributes approximately 1/2 the radiation to film/experiment equipment at the ambient background at 270 n. mi. 50° inclination. In the ATM program, lower radiation sensitive films were chosen and film vaults for long term storage were considered. The reactor would mean increased vault wall thicknesses on a space station. If remote modules were not used with a reactor-powered station, a perpendicular-to-the-orbit-plane station mode would likely be used with the astronomy module looking into the hemisphere of space opposite to the reactor, and the earth resources module looking perpendicular to the station longitudinal axis along the earth's local vertical.

For the most part, the presentation appeared to be introductory to Dr. Mueller. He did not offer specific views on the space power concepts and avoided formal commitment to AEC that reactor power system would be flown on the 1975-77 space station. Subsequent discussions by Mathews, Donlan, and with AEC personnel closed with the intent that OMSF would forward to AEC a letter indicating the need for continued AEC efforts toward a reactor system option for the 1975 space station with firm requirements for the 1980 space base.

NOTES 7-7-69 GRAU

7/7 JNB

No submission this week.

NOTES 7/7/69 HAEUSSERMANN

7/7 J/S

Saturn V. Workshop Review to Management Council: A 3-1/2 hour preview of the subject presentation was given by CSE to Bill Schneider last Wednesday. The general response was favorable; however, there is a strong indication that MSC will attempt to change the groundrules which are the basis for any cost savings to be realized with the dry workshop, such as the quiescent CSM and the single attitude (Solar inertial) throughout the mission.

Verification for Dry Workshop AAP: The verification plan for the Dry Workshop AAP has been laid out in major block form and coordinated throughout S&E. We believe this is a "first" within MSFC. Discussions with KSC spacecraft people indicate a willingness for early participation, thus increasing probability of non-redundant test flow in the entire program. A preliminary breakout of major module and integrated system testing has also been made which provides a minimum test, non-redundant major section of the plan. S&E Management reviewed the Verification Plan July 3; this review resulted in general agreement with the plan, agreement that an integrated systems test is required, the probability that the ATM Prototype will become the flight article, and several actions to attempt to remove or reduce problem areas.

NOTES 7-7-69 HEIMBURG

7/7/69

1. DRY WORKSHOP DESIGN STUDY: After approximately 4 weeks of intensive study of the Saturn V Dry Workshop, our conclusions are that the benefits to be derived significantly outweigh the problems developed. However, to meet the schedules suggested by MSF, we have initiated a new philosophy of design for minimum testing. All new hardware (that not included in the Wet Workshop program) will be designed with an ultimate safety factor of 3.0, thus, negating the need for structural load testing. Furthermore, in some instances flight hardware may be used as test hardware where reduced test levels are used. With this approach, we believe the MSF schedules can be met without compromising reliability. This approach has been worked in detail with all S&E organizations.
2. S-IC HYDRAULIC ACTUATORS: Earlier stress corrosion failures of S-IC actuators prompted a major effort to redesign these actuators. It was the program intent to include these on S-IC-6. Development problems precluded an S-IC-6 effectivity and a level II CCBD changed the effectivity to S-IC-8. The actuators completed qualification in June and are available for installation on S-IC-7 and since 5 actuators on S-IC-7 are now $3\frac{1}{2}$ years old, we are urging the program office to change the new actuator effectivity to S-IC-7 before that vehicle leaves the VAB. The necessity for this change is predicated on actuator stress corrosion failures which occurred on S-IC-1 and -2 causing change out of these components at the launch pad.
3. S-IC-11 GEYSERING SUPPRESSION SYSTEM PERFORMANCE: Our investigation of the LOX interconnect duct failure after shutdown of the S-IC 511 static firing shows: Pressure surges from two geysers in suction line #5 approximately 270 and 400 seconds after cutoff caused the failure. The geysers occurred as a result of the procedures used after engine cutoff and not by the additional heat input from the fire.
4. CONFERENCE ATTENDANCE: Our Materials Division has been requested by OART to represent NASA at an Advisory Group for Aeronautical Research and Development (AGARD) meeting to be held this fall in Turkey. The subjects of "stress corrosion" and "composite materials" are to be major topics of the meeting.

NOTES 7-7-69 Heller

7/7/69

1. SCIENTIFIC TEAM FOR SOIL MECHANICS INVESTIGATION FOR THE G-MISSION: Dr. N. Costes is participating in the Apollo 11 mission as the leader of a team of four scientists. They are, in addition to Dr. Costes: Dr. Mitchell, University of California-Berkeley; Dr. Scott, California Institute of Technology; and Dr. Carrier, MSC. During the "G-Mission" Dr. Costes will be located in the Science Support Room at MSC. Last week he gave a 30-minute presentation on his Apollo 11 activities to the S&E Council. Some of the soil mechanics investigations to be carried out by the astronauts as part of their mission schedule have a direct bearing on the Lunar Roving Vehicle with respect to trafficability, in addition to their scientific value.

NOTES 07-07-69 HOELZER

7/7 JVB

NEGATIVE REPORT.

NOTES HUBER 7/7/69

7/9 97/8

1. OMSF FY-70 ADVANCED STUDY PROGRAM: A meeting was held in Washington on July 1 to formulate this program, and to obtain Center agreement on the studies to be accomplished and the funding distribution. Task descriptions were prepared on each study.

A draft PAD was received from MSF (Waugh) on July 3 which contains the task descriptions and the proposed Center responsibilities. These were not discussed at the meeting, and we are preparing to send comments back to MSF.

The general content of the program is as follows:

FY 1970 ADVANCED STUDIES CONTRACTS

<u>TITLE</u>	<u>RESPONSIBLE CENTER</u>	<u>FUNDING</u>
1. Lunar Surface Exploration (includes USGS)	HQ	350K
2. Lunar Orbit Station	MSC	250K
3. Lunar Base System Synthesis	MSFC	350K
4. Nuclear Shuttle	MSFC or MSC	300K
5. Space Tug Concepts	MSC or MSFC	250K
6. Manned Planetary Requirements (Joint w/OSSA)	HQ	300K
7. Lunar Mission Safety and Rescue	MSC	300K
8. Space Base Nuclear Safety (Joint with AEC/OART)	MSFC	200K
9. Advanced Mission Management Analysis	MSC	<u>200K</u>
		2500K

Further discussion with MSF indicates that the Nuclear Shuttle will probably be a MSFC assignment. The Space Tug will probably be split since it involves both a crew compartment and a propulsion module.

The Advanced Study Program does not include funds for Space Station or Space Shuttle which are separate programs in FY 70.

7/7/69

SATURN

1. AS-506 Status: All CDDT anomalies have been cleared on AS-506 and the status is as follows:

S-IC - The LOX fill line bellows between the umbilical and swing arm cracked during CDDT. The line is being replaced with a spare and failure analysis should be completed this week.

S-II - The S-II GSE hydrogen chiller inlet valve performed sluggishly during CDDT. The valve packing was found to be too tight and has been adjusted.

S-IVB - The S-IVB LH₂ recirculation system flowmeter was found to have a bad pickup coil. The spare has been installed. The LH₂ vent system is being purged to dry out the vent and relief and continuous vent valves after detecting moisture in the vent ducts. Cracked paint was found in the LH₂ tank area and extensive repainting was required over the weekend to insure proper thermal control during orbital coast. Investigation is under way to determine cause of the paint failure.

2. S-IC-11: Boeing plans to return the S-IC-11 stage to Michoud July 5 - 7, where a complete inspection of fire damage will be made. S-IC-12 through 15 will be kept on their present delivery schedule. Although no firm recovery schedule has been accepted, the S-IC-11 will probably be completely refurbished and scheduled to follow the S-IC-15 to MTF for restatic firing. Because of this incident, The Boeing Company will lose incentive fee of \$6,500/day for 30 days. In addition, Boeing will accrue additional costs from the rework required. These additional costs are not yet determined.

3. DDAS: We have basically confirmed that a cracked solder joint problem exists on the Saturn V ESE DDAS printed circuit boards. Findings thus far indicate that the DDAS boards will definitely have to be reworked. A complete rework plan is being developed. It will take approximately six months to rework all the boards for all sites. For AS-507 we are taking the same action taken on AS-506 of only changing out those PC boards in critical circuits.

LRV

The RFP was prepared and signed off by all Center elements on schedule - July 2. However, the Administrator chose not to approve release of the RFP until he receives further briefings, now scheduled for July 10.

NOTES 7/7/69 JOHNSON

7/7/69

FY-70 SRT Program Authority - Initiation authority and operating guidelines have been received from Headquarters. Since a continuing resolution situation exists, the funding levels of the initiation authority are limited to a percentage of the FY-70 guidelines:

<u>Program Office</u>	<u>FY-70 Guideline</u>	<u>Initiation Authority</u>	<u>% of Guideline</u>
OART	13,463	6,130k	43
OMSF	7,000	1,950k	28
OSSA	1,152	150k	13
OTDA	400	100k	25

Initiation has begun. This should reduce the traditional fourth quarter obligation squeeze.

Combining Experiments - TO27/SO73/S149 - The modification to the Martin Company contract to allow the combination of the three experiments was finalized late last week:

TO27 - Contamination Measurements - by Mr. T. C. Yarbrough, (S&E-SSL-SP).

SO73 - Geggenshein Zodiacal Light - by Mr. E. P. Ney of the University of Minnesota.

S149 - Particle Collection - by C. L. Hemenway of Dudley Observatory.

The contract with Dudley Observatory was already in effect. The estimated total cost is about 25% higher than the amount now budgeted by Headquarters. Reduced hardware quantities and documentation are being looked into as a means of holding to the amount budgeted.

Special Issue of "Applied Optics." - In support of a forthcoming special issue of "Applied Optics" magazine, four manuscripts were sent to Dr. Paul of Goddard Space Flight Center this week:

1. "Dual Beam Photometer for Optical Thin Film Measurements" by Donald B. Griner (S&E-ASTR).
2. "Optical Scanning of Infrared Emission Aids Microcircuit Reliability" by M. J. Berkebile and F. Laracuate (S&E-QUAL).
3. "Laser Doppler Detection Systems for Gas Velocity Measurement" by Robert M. Huffaker (S&E-AERO).
4. "Passive Optical Detection of Meteorological Parameters in Launch Vehicle Environment" by Fritz R. Krause (S&E-AERO) and others.

Other articles are in preparation and will be forwarded by July 11. A special issue of the journal, devoted entirely to optics in NASA, will be published in January.

NOTES 7/7/69 MOHLERE

7/7/69

Nothing of special significance.

Dr. von Braun:

Mr. Shepherd wanted to point out about this item 4. in Moore's notes -- Astronautics Lab found out about this problem a couple of years ago and has worked on it. He feels that Astrionics should have gone to them to get their help rather than just bringing it up to everyone in the NOTES. Mr. Shepherd wondered if you might send a little note to Mr. Weidner about Labs working problems with each other. Many times another Lab can help another if they would just ask. He (Shepherd) suggested to Jim Kingsbury that he go to Astrionics about it, but Kingsbury declined to do so unless Astrionics asked.

BH 7/7/69

NOTES 7/7/69 MOORE

7/7/69

1. C of F FY 1971 Projects: The MSFC Architect-Engineer (A&E) Selection Board has selected A&E firms for Astrionics' Advanced Electrical Power Laboratory and the Electro-Optical Development Facility. The selected A&E's will prepare a Preliminary Engineering Report on each of these facility additions and, if the projects are authorized and funded, will design the facilities. The Preliminary Engineering Report already in hand from prior year C of F on the Research Antenna Range will be up-dated by the Facilities Office. We are very much counting on these projects being funded in order to adequately support future projects such as the Space Station and Space Shuttle.
2. ATM Thermal System Unit: General Electric, Huntsville, completed the electrical design of the ATM Thermal System Unit (TSU) on schedule and delivered the documentation package to Astrionics for this ATM ground test article on June 30. The design is under review within S&E. Inhouse effort is underway to qualify a 61 pin electrical connector type to be used for the penetration interface with the MSC thermal vacuum chamber.
3. Solar Cell Module Bakeout: In order to prohibit ATM optical contamination, solar cell modules from one manufacturer (Spectrolab) must be baked out in vacuum to alleviate molecular outgassing of adhesives used in the cell construction. The first eight such ATM modules have been baked, inspected, and electrically tested satisfactorily. The next 24 are currently undergoing bake-out. Approximately 413 modules for ATM will be baked in-house over the next 2 - 3 months and environmentally stored in special trailers at ME Lab. A similar number of modules from a second manufacturer (S&J Industries) do not require bakeout. It is anticipated that Orbital Workshop modules, not yet on contract, will not require bakeout.
4. ATM Solar Array Deployment Bearings: It has been determined through testing that a large reduction in friction is obtained by "running-in" the ATM solar array deployment bearings which are fabricated of teflon and which mate with a metal surface. The bearings will be run-in approximately 1000 cycles to generate a deposition of teflon on the mating surface.
5. Laser Research: Voice communications and heterodyne operation have been established using the CO₂ laser link between Building 4487 and Madkin Mountain. We are now in the process of measuring atmospheric transmission parameters at the 10.6 micron wavelength. Data runs are being taken over a wide variety of conditions - time of day, temperature, visibility - which cause variations in the atmospheric transmission. This data will then be analyzed regarding functions of interest concerning laser technology.
6. PhD Candidate: Ted Paludan of our I&C Division returned last week from the University of Denver where he has been studying for his doctorate in Geography (particular emphasis is on remote sensing of earth resources). He will complete his dissertation here and receive his degree by the end of the year.

NOTES 7-7-69 MURPHY

7/7/69

Nothing of significance to report.

NOTES 7-7-69 SIEBEL

7/7/69

1. Alabama Space Science Center: The S-IC-D and S-II-D have been moved into display position at the museum. The Mercury-Redstone and Juno II displays at Marshall Orientation Center have been removed and transported to the ME shops for modification and refurbishment. Motor cranes required in the erection of S-IB are being moved to the museum for boom installation and load test.
2. S-II Pogo: Due to a breakdown of some test hardware, we have been required to manufacture, on an overtime basis, replacement parts for the shaker installation at the S-II Structural Test Facility.
3. Vehicle Ascent Simulator Chamber: Present cryogenic and other insulation requirements indicate a need for developing high performance insulation systems from one to eight inches thick. Venting of purge gases is expected to be a major problem with thick insulation application. Perforating the material allows good gas venting but also degrades the thermal performance of the insulation system. Because of these requirements and problems it was requested by ASTN that we design, develop and build a vacuum chamber and pumping system that would closely simulate a typical Saturn pressure decay curve to determine the time required for adequate evacuation of insulation samples. The system that has now been built duplicates the pressures encountered by the insulation material if it were in an ascending Saturn V space vehicle to a height of 7.0 nautical miles (10^{-5} Torr). The pressure decay thereafter (to 10^{-6} Torr) is somewhat slower than the actual pressure decay in flight. The chamber size is 4 x 4 x 1 ft. The pumping system incorporates several roughing pumps and a turbo-molecular pump. The pressure decay (versus time) can be programmed to simulate the flight profiles corresponding to vehicles other than the Saturn V. The first series of tests, for which sample holding fixtures are being designed and built, will be the super insulation for the MDA. Because of the suspected problem of dust release from the insulation, a means of dust collection must be provided. This is a new requirement.

roughing
(time)
to vehicle
to box

NOTES 7/7/69 SPEER

7/7 983

1. Apollo 11 Countdown Demonstration Test (CDDT): MSFC support of the Apollo 11 Wet CDDT was provided from the HOSC on July 2. The CDDT was successfully completed at 11:51 am CDT with two unscheduled holds totaling 3 hours and 19 minutes. A hold totaling 3 hours and 18 minutes was required to repair a leaking ground system valve which supplies LH₂ to the S-IVB tank. A 1 minute hold was required to allow additional chilldown for the S-II. The Dry CDDT was completed on schedule at 8:32 am CDT on July 3. No problems were encountered during the dry test.

2. Apollo 11 Operations Review: The following are noteworthy items from MSC's Apollo 11 Operations Review during which I presented the L/V portion: (1) The EASEP is susceptible to dual interrogation from the ground and could execute unintentional commands; procedures are being developed, and it has been determined that there is no crew risk during deployment. (2) The LM ascent stage will not be impacted on the lunar surface after crew transfer to the CSM. (3) All fresh food has been deleted from the crew menu. (4) The total lunar landing errors (navigation plus execution) have increased on the basis of most recent analyses: the semi-major axis of the landing ellipse is in the order of five miles.

3. Prelaunch Wind Monitoring: On past Apollo flights, MSC has sent a structures representative to MSFC as a member of the HOSC prelaunch wind monitoring team. MSC has now developed and successfully tested on Apollo 10 their own computer simulations for spacecraft loads using the same Jimsphere data we do. On Apollo 11 and subsequent missions, they plan to use their own simulations and support the HOSC wind team by telecon from Houston rather than sending a team member here. This change in procedures is acceptable to us and is not expected to change the effectiveness of the HOSC team or the GO-NO GO determination.

NOTES 7-7-69 Stuhlinger

7/7 JTB

No submission this week.

July 14, 1969



THE WHITE
ASSOCIATION
OF COLLEGE
LIBRARIANS

NOTES 7/14/69 BALCH

B-7/20

S-IC-11 - Stage was removed from the test stand on 7/11/69 and shipped to Michoud early today, 7/14/69, as previously planned. Present plans call for a second static firing of the stage at MTF after refurbishment at Michoud. ✓

S-IC-12 - Stage is scheduled to arrive at MTF on 7/16/69 and to be installed in the test stand on 7/18/69. ✓

S-II-9 - Stage is in the A-1 test stand undergoing post-static checkout. Removal from the test stand is scheduled for 8/8/69. ✓

S-II-10 - Stage arrived at MTF late Thursday, 7/10/69, and was installed in the A-2 Test Stand the following day. "Power-up" is scheduled for 7/21/69. ✓

BOMEX - Final operational phase (Phase IV) is now underway and is scheduled to be completed on 7/21/69. Processing of Phase I data is almost complete, and portions of Phase II data have been processed. None of Phase III data has been processed. ✓

Legal Affairs - Notice has been received that five of the six suits against the Government evolving from the MTF static test firing activities have been scheduled for pretrial on 8/5/69 before Judge Nixon in Federal District Court, Southern District of the State of Mississippi. The cases have been set for trial on 9/15/69 and 9/16/69. ✓

B
2/20SPACE SHUTTLE

1. Present plans call for the Space Shuttle Phase B studies to be under contract by 10/24/69. The Statement of Work must be finished and presented to the Source Evaluation Board (SEB) by 8/4/69, and released to the Contracts Office by 8/11/69. The SEB must be established and in session for work statement approval by 8/4. The Request for Proposal will be released to industry by 8/13 and their proposals are due by 9/12. The proposal evaluation, including the SEB activities, must be completed by 10/14. Briefing to Center Directors is scheduled for 10/15, to MSF on 10/16, and to Administrator on 10/17. The Administrator's decision should be made 10/21, with negotiations and award of letter contract by 10/24. This is a very tight schedule and will require some shortcuts to normal procurement cycles. ✓
2. Space Shuttle Study Contract teams will meet at MSFC on 7/14 to present their requirements for the main engine. Discussions are anticipated on thrust level, mixture ratio, and throttle requirements, as well as competing engine concepts and their vehicle capability. DOD (USAF) and other NASA Center representatives will participate. ✓
3. We are deriving a configuration evaluation plan to select by rational methods the three configurations to be carried into Phase B. This plan should be completed by 7/15. We will review the plan with Dr. Lucas prior to presentation to Leroy Day. Our plan involves participation of key technical people from appropriate NASA Centers in discipline-oriented working groups. These groups should be in operation by the first week in August.
4. The Space Shuttle Task Group has prepared a Technology Program Plan that identifies the research and technology effort required to initiate development (Phase D) of the Space Shuttle in FY-72. The technology program is to be implemented in FY-70 & 71. S&E has been requested to review the document. Also, S&E has been requested to structure a Research & Technology Program to be conducted in FY-70/71, in support of the Space Shuttle effort, which is not constrained by budget and which meets the schedule requirements set forth. This information is to be available 7/18. Dr. Johnson (S&E-R-DIR) and Dr. Thomason (PD-DO) will evaluate the S&E Research and Technology Objective Plan (RTOP) submissions in conjunction with the laboratory initiators. It is planned to present the MSFC Technology Program Plan to Center Management on 7/21. ✓

SPACE STATION

1. SEB activities are entering the final stages now. Visits to contractor plants have been completed; results are being evaluated for a final presentation to the full SEB on 7/11/69. Chuck Mathews has an appointment with Dr. Paine the week of 7/21 to present findings to the Administrator to select 2 of the 3 proposers for negotiation (with Grumman, McDonnell-Douglas, and North American Rockwell). ✓

B-7/20

MISSION REQUIREMENTS DOCUMENT: We have had two meetings with MSC regarding the Mission Requirements Document (MRD) for the dry workshop mission and are discussing a final draft with them at the present time. The most significant open item is the operational altitude. MSC is using Schneider's quote of 260 nautical miles as being the requirement, while we understood that it was only a place to start and that a lower altitude is permissible with a guaranteed minimum of 210 nautical miles at the end of the mission. ✓

DRY WORKSHOP INTERFACE CONTROL DOCUMENTS (ICD's):

In preparation of the dry workshop program redefinition, we have revised the ICD's required to support the program and the list of contractors that prepare the ICD's. The revised lists will be available for distribution on July 16, 1969. Additionally, the baselined ICD Matrix will be available for Level II CCB signature on July 16, 1969. ✓

CLUSTER REQUIREMENTS SPECIFICATION: The Cluster Requirements Specification with the redline changes to reflect the dry workshop configuration has been revised as a result of comments received from MSC and CSE. The final version is due to be published July 16, following an additional review by CSE and this office on July 14. ✓

HARVARD COLLEGE S055 EXPERIMENT: Vibration retesting of the Harvard College S055 primary mirror subassembly is being conducted at Ball Brothers this week. This test is considered critical to the S055 overall schedule since this subassembly has experienced two failures during previous vibration testing. ✓

EXPERIMENT M073, BIOASSAY OF BODY FLUIDS, PRELIMINARY REQUIREMENTS REVIEW BOARD: During the board meeting on July 9, 1969, there was a great deal of discussion relative to the method of collecting and processing urine to support this experiment. There seems to be very little applied research relative to this experiment going on at MSC, consequently, MSFC is ending up having to make decisions on the Habitability Support System hardware development which could be impacted at a later date. ✓

HABITABILITY SUPPORT SYSTEM REQUIREMENTS: A meeting was held at Huntington Beach, California, on July 2, 1969, to finalize the design concept for the urine collection and urine processing subsystems and to review the MDAC response to the new AAP Food definition. MDAC has also been directed to develop the freezing capability in parallel with thermal vacuum drying process technique for urine storage since MSC cannot state the effect of the drying process on the acceptability of the medical data at this time. ✓

NOTES 7-14-69 BROWN

B-7/20

F-1 ENGINE - Final acceptance testing of F-1 Engine 6096 was satisfactorily completed by Rocketdyne at RETS on July 9. Only two more F-1 production engines now remain to be tested (hot fired) under the present contract. ✓

J-2 ENGINE - Reference my notes of July 7 concerning the S-IVB Vent and Relief Valve testing at AEDC. Two air-on periods were conducted this past week and some useful data was recorded. On one occasion the valves chattered simultaneously during tank pressurization, but the digital tapes were not turned on. From the quick-look oscillograph it is estimated that this chatter was in the 30 to 35 cps range. Later during this test run, one valve did produce a 45 cycle vibration and it appeared that both together produced about 35 cycles. During subsequent test runs quick-look data indicated that both valves chattering simultaneously produced about 30 to 32 cycle vibrations. Future testing is undecided at this time. Astronautics Lab personnel are presently analyzing the data. ✓

SATURN V FOLLOW-ON PROGRAM - A procurement plan for F-1 and J-2 engines to support the Saturn V Follow-on - Vehicles 516 - 521 - is being staffed within MSFC and we plan to submit it to Headquarters for approval within a week. ✓

NOTES 7/14/69 CONSTAN

B 7/20

Negative.

B 7/20

1. EXPERIMENT MODULE STUDY: The initial orientation meeting with the contractor, General Dynamics/Convair, was held here on July 9. The primary emphasis at this meeting was a discussion of the various experiment input data. ✓
2. HIGH ENERGY ASTRONOMY OBSERVATORY (SUPER EXPLORER): It appears that the Super Explorer effort has been given another new name by OSSA, High Energy Astronomy Observatory (HEAO). I am informed that this new program terminology has now been approved by Dr. Naugle and should stick for awhile. ✓

I was very pleasantly surprised regarding Dr. Mueller's response to Dr. Naugle concerning the High Energy Astronomy Program, particularly Dr. Mueller's agreement for MSFC's continuing involvement. ✓

Dr. Mueller cautions us, on the second page of his letter to Dr. Naugle, that we should not jeopardize the experimental activity being planned by Dr. Alvarez (who is working with Dr. Hagge of MSC in planning a cosmic ray laboratory for the Space Station/Space Base). I am under the impression that Dr. Alvarez is fully aware of the HEAO cosmic ray experiment plans. Dr. McDonald of GSFC, who has a proposed cosmic ray experiment for HEAO, is working quite closely with MSFC in the overall HEAO experiment definition activity. Dr. McDonald has met jointly with Dr. Hagge and others from MSC to discuss cosmic ray experiment planning. Dr. McDonald's experiment is complementary to Dr. Alvarez' experiment in my opinion. Dr. McDonald is primarily interested in analyzing cosmic rays (intensity, charge spectrum, energy determination, direction, etc.) whereas Dr. Alvarez is interested in using the extremely high energy, primary cosmic rays available in the space environment as a "research tool" for studying high energy nuclear interactions. We will, however, investigate this matter very carefully to assure that there is no potential conflict between the McDonald and Alvarez experiments. ✓

3. GULF STREAM DRIFT MISSION: The mission status remains the same with the Drift scheduled to start Monday, July 14. All NASA programs are ready. ✓

MSF PROGRAM GUIDELINES - Several weeks ago we received MSF programmatic guidelines from Dr. Mueller in lieu of a POP 69-1 "mark" as follows: (1) Maintain a \$15M FY 1970 Apollo obligation and cost reserve; (2) Additional FY 1970 funds required for qualifying the J-2S Engine by June 30, 1971 will be absorbed within Apollo; (3) Apollo to fund approximately \$8M AAP Saturn IB requirements; (4) AAP Experiment Development effort will be limited to flight assigned experiments, and (5) The Habitability Support System's total runout effort will be limited to \$11.2M. ✓

Our response to these guidelines on July 10 included the following key points:

1. Acceleration of the J-2S engine qualification cannot be accomplished within existing funds. Earlier qualification and stage installation will require \$28M to \$44M additional FY-70 funds. ✓
2. The Preliminary Requirements Review of the Habitability Support System resulted in significant design changes. Therefore this experiment will require more than the \$11.2M runout guideline. ✓
3. Our FY 1970 Apollo submission (\$510M) reflects the downward funding trends of recent years and does not have enough surplus to absorb further reductions. ✓
4. Assuming the planned Apollo schedule change after AS-506 will be made on a timely basis, we anticipate an Apollo FY-70 surplus up to \$20M. ✓

UNIVERSITY OF ALABAMA RESEARCH INSTITUTE (UARI) CONTRACTS - In April 1969, you discussed with Dr. Stuhlinger, Harry Gorman, Dave Newby, Ed Mohlere, and others the possibility of funding certain research projects for UARI from program funds. After working with S&E and PM, six research projects that will aid our technical posture for future work were identified. As of June 30, these projects totaling \$200K were finalized and the funds obligated. ✓

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1. Fluctuating Pressure Environment for the Biconic Configuration/Dry Workshop: Inflight fluctuating pressure environments have been generated for the AAP-2 and AAP-4 configurations. These environmental estimates also apply as preliminary environments for the nose cone area of the Saturn V/dry workshop configuration. These estimates indicate that the unsteady loading will be very severe during transonic flight, and consequently the structural integrity of equipment (MDA, ATM, etc.), structures, and other components in the nose cone area will be critical during that time of flight. A question was raised recently concerning the IU and whether it would also be subjected to a more severe acoustic environment. We have found that for the present dry workshop configuration (a straight cylindrical extension forward of the IU), that the external fluctuating pressure environment at the IU position will be less severe than similar IU's which have been flown on previous flights, i. e., AS-501. Of course, the internal acoustics and vibration propagation through the structure need also be considered, to assure the structural integrity of the IU for this configuration.

2. Earth Orbital Atmospheric Model Research: On Wednesday, July 9, 1969, an all-day symposium on this subject was conducted under the direction of Dr. Leonard DeVries of our Aerospace Environment Division. Approximately 40 people attended, which represented a number of S&E groups, plus local contractors, Air Force, and ESSA. The symposium consisted of nine briefings on efforts being accomplished under our direction on upper atmosphere modeling and research. These included papers by Dr. K. Moe, McDonnell Douglas; Dr. Paul Hase, University of Michigan, Dr. A. Nagy, University of Michigan; Mr. R. Bruce, Aerospace Corporation; and representatives from Aero-Astrodynamics Lab, Northrop, and Lockheed. A lot of material was covered and the discussions were of considerable value. While there are still several significant improvements that can be made in our earth orbital atmospheric models, it appears that our current models are still among the best presently available. It was evident from the discussion by the participants that our six thermosphere probes (which we fired in a 24-hour period at KSC in 1967), have provided some valuable information on diurnal variations at high altitudes (above 100 km). In addition, we are working with the University of Michigan on an Airglow Measuring System which will enable us to remotely sense from the ground, temperature, and under some conditions, mass transport, at selected altitudes near 100 km and 250 km. This is an economical means of acquiring the data and it should provide us with a good research base to conduct improvements in our engineering models. We feel the symposium was a success and served to improve the exchange of information between the participants. ✓

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NOTES 7-14-69 GOERNER

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Nothing of significance to report.

NOTES 7-14-69 GRAU

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NEUTRON RADIOGRAPHY: With regard to Dr. Rees' questions about this subject on NOTES 6-30-69 GRAU: The maximum practical thickness resolution that may be achieved with X-rays is approximately one percent. Present specifications require two percent of thickness. Neutron radiography would not be of value for S-II weld analysis due to the exceptional transparency of aluminum to neutrons. The mass absorption coefficient of X-rays increase regularly with increasing atomic number, while the variation for neutron absorption is irregular. For example, elements with low atomic numbers such as hydrogen, lithium, and boron have high cross-sections and are relatively opaque to neutrons, while aluminum, titanium, and steel have low cross-sections and are relatively transparent. Neutron radiography is of significant value for imaging materials having high cross-sections which are encased in metal of low cross-sections. Thus, it can be used for examining ordinance devices, existence, and positioning of "O" rings in valves and other components, determination of boron rich areas in semiconductors, etc., where X-rays are not effective. Neutron sources consist of atomic piles and electrostatic generators. Prices for the equipment and facilities range from about \$200K up. Neutrons are especially dangerous, and typical shielding for an electrostatic generator producing a low level flux of 2×10^5 n/cm²/sec., which would be a minimum for neutron radiography, requires a 2½ foot thick wall of water and boron solution and two inches of lead. ✓

NOTES 7/14/69 HAEUSSERMANN

No submission this week

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NOTES 7-14-69 HEIMBURG

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1. WASTE MANAGEMENT EXPERIMENT: We are considering a fecal collector experiment for mainline Apollo using MOL hardware. A proposal is being formulated and it is planned to present this to you and other Center management August 14. ✓
2. SPACE SUIT AND BIOMED EXPERIMENTS: At the Experiment Support System (ESS) PRR, MSC Program Office participants casually dropped the information that the astronauts would be using the constant volume suit (also referred to as the AES or Advanced EVA Suit) in all AAP missions. This disclosure surprised even the Medical Directorate, who obviously were not aware of this change either. We immediately scheduled a meeting at MSC to assess the impact of the new suit on the biomed experiments. Results of this meeting indicate that, fortunately, the changes to our metabolic analyzer design will be not as extensive as we had first feared. ✓
3. REQUEST FOR REPORT FROM RUMANIA: A report by Dr. H. G. Lackner, formerly of Test Laboratory, has been requested by the Rumanian Institute of Atomic Physics. The report entitled, "The Use of the Mössbauer Effects and Laser Interferometry to Determine Extremely Small Amplitudes for Vibration Measurements and Calibration," has been forward through channels. This is the second request we have received in recent years for information from behind the Iron Curtain. ✓
4. DRY WORKSHOP: Mr. R. E. Jewell of this laboratory visited the Lockheed-Sunnyvale Acoustic Facility to discuss potential utilization of the facility for full scale integrated acoustic exposure and vibration tests of the cluster payload ATM/MDA/AM/PS, and of the S-IVB Dry Workshop. It was determined that the schedule and level of effort estimates previously given by this laboratory for preliminary budgeting and scheduling are agreeable to Lockheed. It was further determined that Lockheed has a most unique and complete facility to carry out the proposed programs. Several modifications which increase the environmental control and flexibility of the facility have been designed and are currently in fabrication. ✓
5. GULFSTREAM DRIFT MISSION: As a result of a last minute cooperative effort and discussions between the MSFC participants at West Palm Beach, S&E-ASTN-M and Dr. Ferguson of MSC, a preliminary microbiological survey oriented along space station requirements guidelines will also be attempted. The study will partially assess closed ecological implications with regard to crew health, crew activities, and life support systems performance with special emphasis on microbiological sampling as the main means of assessment. ✓

NOTES 7-14-69 Heller

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1. APOLLO 11: The 506 mission is the most important event for SSL, as it is for everyone else. In terms of direct involvement during the mission, I have already reported in last week's Notes on Dr. Costes' scientific activity as leader of the soil mechanics team. Dr. Dalins will measure the seismic waves due to the launching with six seismometers. This is a joint SSL-UAH Research Institute research task. ✓

2. RADIATION ANALYSES: As you well know, SSL has a scientific capability in depth in the area of shielding and the physics of the interaction of high speed particles with matter. We are presently participating in many MSFC activities which require radiation analyses. Here are some examples:

Mr. Burrell and Dr. Hollis are working on a conceptual design for a possible electrostatic shield for electrons in synchronous orbit.

We continued our radiation shielding studies for the OWS. Funding has been obtained through ASTN for a contract with Lockheed for the design analysis of radiation shielding for film depositories aboard the Workshop. This should allow storage of film for extended periods in connection with ATM-A and similar projects carried on AAP flights.

Mr. Burrell has made a radiation analysis for the joint NASA/AEC study to incorporate a nuclear reactor in the space station.

Radiation analysis work is carried out for PD in connection with studies on the High Energy Explorers and for the radiation mapping of the fission products from a NERVA engine. ✓

NOTES 07-14-69 HOELZER

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NEGATIVE REPORT.

NOTES 7/14/69 HUBER

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NEGATIVE REPORT

SATURN:

1. AS-506 Status: AS-506 is proceeding on schedule with no significant unresolved Launch Vehicle problems. ✓
2. S-IVB LH₂ Tank Vent and Relief Valve Testing at AEDC (45 Hz Oscillation on Apollo 10): The second and third series of tests were conducted on July 9 and July 10, 1969, after facility equipment mods were accomplished to permit simulation of LH₂ tank pressurization gas flow rates. The tests produced obvious valve chatter (both valves and one valve at a time) with attendant oscillations in the 30-45 Hz frequency range. We are satisfied that these tests do prove that the 45 Hz vibrations are the result of LH₂ vent valve chatter. As reported at the Flight Readiness Review, 45 Hz oscillation is of no concern regarding the structure or venting systems. ✓
3. S-IC-11: S-IC-11 is enroute to Michoud today, 14 July, for inspection and refurbishment. ✓
4. S-II-10 Center Engine LOX Line Accumulator: Reference my notes of 5/26/69 which stated that we planned to incorporate the center engine LOX line accumulator on S-II-10 for a static firing test even though the center engine cutoff would probably be accepted as a permanent fix. Hardware and engineering availability for the accumulator installation do not support the August 21, 1969, S-II-10 scheduled firing. Workarounds are being developed to support the firing date although we still do not plan to utilize overtime in this area. We are considering rescheduling the accumulator test to the S-II-11 static firing. ✓
5. General Distribution of Apollo Technology: General Phillips has requested the Centers (MSC, MSFC, KSC) to supply selected Center existing Apollo documentation for publication by the Government Printing Office (GPO) and subsequent dissemination to other government agencies and industry. In carrying out this action, we plan to request pertinent MSFC elements and staff offices (S&E, Technical Utilization, etc.) to support and assist in the selection of suitable and worthy material for release to the GPO. Headquarters has established September 1, 1969, as a tentative date for submittal of selected material. Final selection and submittal of all pertinent Center documentation to GPO for publication is October 1, 1969. The final selection of the material to be submitted to GPO will be made by a board composed of Headquarters personnel and one member from each Center. ✓

LRV: All required approvals from Headquarters were received Friday, July 11, 1969, and the RFP's were released same date. ✓

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Pegasus III Reactivation - OTDA has authorized GSFC to attempt to turn on again the Pegasus III telemetry and to run a system check. Re-entry is currently predicted to occur August 8-9. MSFC, OART and Headquarters Reliability Office are interested in collecting a very short data set of subsystem operation parameters, if this is possible. ✓ MSFC is also interested in any tracking data obtained in order to complete orbital decay studies and trajectory studies initiated at the time of design of the payloads. ✓

Gallactic X-Ray Mapping Experiment - The MSFEB, on July 7, approved modification of the original experiment to permit detection of the softer (down to 200 ev) x-rays. The changes approved were not completely those requested by Dr. Kraushaar. However, he appears reasonably happy with the compromise. The next major hurdle may be working around changes in the AAP flight program which could modify plans for the launch vehicle on which his experiment is scheduled. ✓

Program Submission to OART - Copies of a proposed program for OART sponsorship in FY-70 were carried to Headquarters on July 11. The proposal includes work in several areas essential to the Shuttle and Space Station for which OART has not yet offered support. It therefore is about a 60% larger program than that for which OART has given us guidelines. Subsequent to some negotiation of details, the submission will be redrafted and resubmitted as the approved OART-MSFC FY-70 program. ✓

We have already received approval to proceed with about 45% of the guideline effort proposed and are initiating procurements as required to carry out that plan. ✓

NOTES 7/14/69 MOHLERE

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Nothing of special significance.

NOTES 7/14/69 MOORE

B 7/20

1. Workshop Teleprinter: A meeting was held with MSC personnel on the uplink teleprinter. The cost impact to both MSC and the MSFN is \$228,000 for the alpha-numeric capability and \$460,000 for the dot/row (facsimile) capability. A detailed report will be prepared for NASA Headquarters via PM/AAP. ✓
2. ST124-M Platform Specifications: During AS 505 preflight tests, the X accelerometer scale factor exceeded the specification value. Detailed analysis indicated that the mission would not be effected by this out-of-spec condition. Further analysis has shown that presently planned Saturn missions can accept a larger value of the X accelerometer scale factor for KSC testing. The specification is in process of being changed and can be effective for the AS 507 launch. ✓
3. Hybrid Computer Test Station: The Raytheon 520 Hybrid Computer Test Station received from Slidell has been experiencing difficulties. The maintenance personnel from Comp Lab have been doing their utmost to correct the problems. The test station is an important item for the overall Astrionics Laboratory simulation efforts and we are concerned about the reliability and efficiency of the equipment. A detailed report is being prepared on the evaluation of the equipment and will include some recommendations for improvements. ✓

NOTES 7/14/69 MURPHY

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Nothing of significant to report.

NOTES 7-14-69 SIEBEL

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1. ATM Rack: The assembly of the structural test rack is complete and has been turned over to QUAL. The rack will be transferred to ASTN as soon as QUAL releases it. ✓
2. S-II: The cylinder 5-6 weld on S-II-14 was made on July 8, 1969. This is another horizontal weld that was totally within X-ray specification. The disciplines and techniques used today make these the best horizontal welds ever on the S-II program. ✓
3. Alabama Space Science Center: We have erected the S-IB at the museum and installed all fins. Work is now being accomplished toward guying off the stage at eight points. These eight points will be equipped with permanently installed 50K load cells so that tension in the guy lines can be accurately applied and also checked at intervals in the future. The remaining stages of the S-IB should be erected by early this week as well as the Juno II and Mercury Redstone. ✓

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NOTES 7/14/69 SPEER

1. AS-506 Flight Mission Rules: Final changes to the AS-506 Flight Rules reflecting the relaxed S-IVB restart criteria were completed last week. The most significant change provides procedures for S-IVB restart in the event of any IU accelerometer failure. The resulting guidance errors at TLI have been shown to permit an acceptable lunar mission and, for some cases, a lunar landing. The crew will utilize manual cutoff if necessary. ✓

2. Dry Workshop Utilization of Intelsat IV: NASA Headquarters, with participation from MSFC, MSC, Bellcomm and Comsat Corporation, reviewed this past week the possible utilization of Intelsat IV to support MSF advanced programs with the intention of eliminating some MSFN ground stations and the GSFC proposed Data Relay Satellite System (DRSS). In a surprise move, it was proposed to utilize Intelsat IV as an operational test on the Dry Workshop. The original problem was to decide between the use of the DRSS and Intelsat IV which will be launched in the 1971-72 time period. Since the cost of two 36 MHz channels on Intelsat over the next decade is expected to cost less than \$100 million in contrast to an estimated \$350 million for the DRSS, Dr. Mueller has given his tentative approval to the use of Intelsat IV. The use of this system on the Dry Workshop requires the installation of a 6 GHz transmitter, a 4 GHz receiver and a directable antenna system on the Dry Workshop which will undoubtedly have a technical impact on the program (funding external to AAP). Two working groups with MSFC representation have been formed. The first group will be chaired by Sam Fordyce (OMSF) and is concerned with the implementation and operation of this system on AAP and plans to report to the August Management Council Meeting. The second group, chaired by Mr. McClanahan of MSF Mission Operations, is concerned with the use of this system on the space station and possibly the space shuttle. This report is due in September. ✓

3. ETR Range Safety Trajectory Data: We have initiated an effort with AERO and KSC to reduce the large amounts of range safety trajectory data sent routinely to the Air Force Eastern Test Range (AFETR) for each Apollo flight. Negotiations with AFETR have resulted in a reduction of their requirements and an agreement to use previously submitted data from past flights when applicable. Preliminary indications are that the AS-506 data already furnished AFETR will meet all, or nearly all, the requirements for AS-507. ✓

NOTES 7-14-69 Stuhlinger

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7/20

1. APOLLO LANDING SITE SELECTION BOARD: This board, chaired by General Phillips, met for a full day on July 10 to discuss landing sites after Apollo 11. Dr. Donald Wise gave an excellent review of scientific objectives and plans of lunar exploration (he will be Science Seminar speaker at MSFC in August). Twenty-four potential sites were described, including Tycho (42° south) and Schroeter's Valley near Aristarchus (24° north), and 10 sites were chosen for closer study. Except for Sites #2 and #3 (for Apollo 11 and 12), all sites will require careful landing maneuvers because of roughness of terrain; all of them are distinguished by a considerable variety of geological and geographical features within an area of a few kilometers diameter. Scientific equipment and a roving vehicle are urgent requirements. The vehicle must be able to negotiate steep slopes, boulders, crevices, and other rough surface features, and it must be prepared to transport instruments and samples over distances of several kilometers. Detailed briefing material is available upon request (453-3033). ✓

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2. HIGH ENERGY SATELLITE: Dr. Mueller's positive reply to Dr. Naugle's request for MSFC support of a high-energy astronomy satellite project aroused great appreciation in OSSA. In all likelihood, the first satellite in this project will be unmanned; later flights will be in conjunction with the manned space station. This project, besides being a most promising and cost-effective contribution to the space astronomy program, will certainly play the role of a very successful bridge-builder between the manned and the unmanned space programs. ✓

July 22 1969



BALCH NOTES 7/22/69

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7/22 950

S-IC-12 - Stage arrived at MTF on 7/16/69 and was installed in the test stand on 7/18/69 as planned. "Power-up" is scheduled for 7/25/69. ✓

S-II-9 - Stage is in the S-1 Test Stand undergoing post-static checkout and insulation repair and modification. Removal from the test stand is scheduled for 8/8/69. ✓

S-II-10 - Stage is installed in the A-2 Test Stand undergoing pre-static check-out and modification. "Power-up", which was originally scheduled for 7/21/69, was completed on 7/17/69. ✓

BOMEX - Quick-look data for the third observational period has been processed. Indications are that the Scanwell radar was functioning properly on all three ships on which it is installed, but Rawinsonde data shows distortion in the low frequency signals for all ships. This distortion will not affect digitizing. Software procurement is nearing completion, with 15 of the 23 partial programs accepted. ✓

NOTES 7/22/69 BECKER

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B 7/24

DUAL MODE LUNAR ROVING VEHICLE (DLRV): A meeting was held with Headquarters at MSFC on 7/17. Discussion included Headquarters (1) personnel assignments (2) desired program milestones (3) potential FY70 supporting development/technology, and (4) potential efforts with JPL and USGS. JPL and USGS have been funded for several years on DLRV related activities. We were asked to consider how we would propose to take on management of tasks assignment^{ed} to these groups. We believe that, if MSFC has Agency responsibility for the DLRV, all pertinent efforts should be under our authority. Management of efforts of others can be quite sensitive. We intend to think this one out thoroughly and would like to review our response with you at the proper time. ✓

Discussions also included our situation regarding (1) organization and attempts to restaff the Task Team (2) Phase B contract status and (3) FY69 supporting development/technology program status and the potential FY70 program in these areas. During these discussions, we were told that Dr. Paine has transmitted the integrated program plan approach to Dr. Mueller to President Nixon and Dr. Dubridge (not Dr. Newell's plan). Dr. Naugle's planned visit on 7, 8 Aug. was described as an attempt to gain support for his managing all science payloads (manned and unmanned). It was also reported that Dr. Paine asked Dr. Mueller, during a recent presentation, about the relationship of the Manned Only LRV to the Dual Mode vehicle. Dr. Mueller stated that the Manned vehicle program is NOT being structured to automatically grow to the DLRV. Dr. Paine is reported to support the DLRV and has a significant interest in it. ✓

ARTIFICIAL "g" EXPERIMENT: As I mentioned last week at Staff & Board Meeting, we have been working on definition of this experiment. We have been addressing the basic need and requirements, and program and configuration approaches. We will recommend a plan of attack and have raised some very basic issues which relate not only to the experiment, but also to the '75 Space Station/Space Base. We intend to review this shortly with Dr. Lucas and can bring it to you after that time. ✓

SPACE SHUTTLE: A meeting of the joint NASA/DOD Space Shuttle Main Engine Requirements Panel, Mr. Weidner, chairman, was held on July 14 - 15 at MSFC. The panel recommendation is an engine of one million pounds sea-level thrust and a minimum vacuum Isp of 450 sec. Eighteen other engine parameters were also defined. Panel recommendations will be transmitted to Mr. L. Day. ✓

We received a message from Mr. L. Day changing Phase B contract "go ahead" from 10/24/69 to 12/24/69. We are presently examining the details of this change and are working on a counter proposal. ✓

SPACE STATION: We are preparing material for contract negotiations. Documentation and data requirements are being reviewed with MSC with the intent of a reduction. Data to be furnished by NASA are being finalized and an MSFC study plan is in preparation to assure inhouse activities are compatible and/or complimentary to contracted effort. Baseline management schemes to assure compatibility of the MSC/MSFC efforts and to document differences in approach and/or concept between the two studies are under investigation and will be discussed with MSC on July 18. ✓

NOTES 7/22/69 BELEW

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7/24

7/22 9/25

DRY WORKSHOP, GENERAL: Based on Bill Schneider's input last Friday that Dr. Paine has signed off on the Dry Workshop (to be officially released Wednesday), we are continuing to move out with contractors and in house with appropriate program directives (Cluster Requirements Specs., etc.) establishing the Dry Workshop as the program. ✓

Dr. Mueller has called all PI's (ATM included) to Washington for a briefing today, July 22, on the Dry Workshop. I understand in his meeting last Saturday with the STAC Group, Dr. Goldberg expressed a concern for not being more informed or involved in the evolution of wet to dry. This, I think, prompted the meeting today. ✓

LUNAR MODULE: We are prepared to take appropriate action to terminate the LM contract as soon as a decision is received from Headquarters. ✓

AAP DRY WORKSHOP ORIENTATION: An AAP Dry Workshop orientation was held at MSFC on July 17, 1969, for AAP astronauts and MSC engineers. Attendees from MSC were: Astronauts, Russell Schweickart, Vance Brand, Karl Heinze, Bob Parker; and Engineers, Arthur Thiberville and Anibal Da Silva. The orientation session was held in the AAP Management Center in which CSE made the Dry Workshop presentation. The presentation was followed by a visit to the AAP simulation facilities, i. e., NB tanks, 1G mockups and the ATM C&D facility in the Computation Laboratory. ✓

7/22 JS

B 7/24

SATURN V FOLLOW-ON PROCUREMENT - The procurement plan for 30 F-1 engines and a combination of 36 J-2 and J-2S engines was approved at MSFC and forwarded to NASA Headquarters on July 18, 1969. The plan covers the total engine requirements, including mission support, for Saturn V vehicles AS-516 through AS-521. At present it is contemplated that the hardware (engines and spares) will be procured under a fixed price incentive (FPI) contract. The mission support effort will provide continuity of Apollo type mission support through the launch of AS-521. Because of the nature of the mission support activities, this effort will probably be procured under a cost plus fixed fee (CPFF) contract. ✓

Reduced total effort is being achieved by batching F-1 and J-2 engine production to better utilize production machine capabilities, and by combined procurement of raw materials for the total production lot. Also, significant reductions in total cost are being achieved by 1) reducing the total physical plant at Rocketdyne, 2) combining or eliminating of departments to reduce manpower, and 3) revising the mode of operation from a development/production mode to a production only mode. ✓

The total cost is estimated to be approximately \$150,000,000. ✓

J-2 ENGINE - On July 17, the ninth bomb test on J-2S engine J113D at Santa Susanna resulted in a premature cutoff by the rough combustion monitor. The bomb ignited at approximately 1000 psia P_c , generated a 3300 Hz instability (second tangential), but did not damage the engine. ✓

Also, on July 17, J-2S engine J112-1E at AEDC had a premature cutoff on the rough combustion monitor during transition from low thrust idle mode to mainstage. Data analysis for both incidents is incomplete at this time. The instability test plan is also being reviewed. ✓

CONSTAN NOTES 7/18/69

7/22/69

B 7/24

MAF Visitors.

- The Michoud Assembly Facility was host to the following visitors during the past week. These guests were given orientation briefings and tours of the facility.

General Giorgio Fea, Director of Italian Meteorological Society, visited MAF on July 14, 1969. ✓

"La Trentaine, Bruxelles" represented by 118 persons, some of whom were top officials of the Belgium government, visited MAF on July 15, 1969. This group had visited MSC, Houston, on Monday, July 14, and departed Michoud for KSC to view the Apollo II launch on Wednesday. ✓

Mohammed Ly, Secretary General, Federation of Public Works, Hydraulic Workers Union, Senegal, Africa, visited MAF on July 15, 1969. ✓

S-IC

The S-IC stage (S-IC-1) damaged by fire during static testing was received at MAF on Monday, July 14. All five F-1 engines will be removed and returned to Rocketdyne for refurbishment. Stage refurbishment is receiving Quality Assurance coverage by a special task group, and disposition of all hardware, including Material Review Board actions, is to be given an engineering review. ✓

NOTES - 7-21-69 - DOWNEY

7/22 9/13

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7/24

GULF STREAM DRIFT MISSION: The Ben Franklin mission started with the dive commencing at 8:56 PM on July 14. After initial check out and evaluation, the craft has been moving at speeds varying between .5 and 5 knots and at depths of 650 feet and 1650 feet. Thursday afternoon she was 50 miles due east of the Cape. On Friday a "go" decision for 30 days was made. Our reports indicate that the crew spirits are "soaring" and that the mission situation is "beautiful". The major mission highlights included:

1. July 16, a 250 watt light illuminated many plankton varieties. Also a 30 foot medusa was observed which caused considerable excitement.

2. A message was sent from the crew to the Apollo 11 astronaut room; "We all wish you fair wind and a following sea, good luck!" I do not know if the message was transmitted to the Apollo crew or not.

3. The only significant problem reported is that colds have spread among five of the crew. ✓

Shep
Please see
to it that
they get it.
B

7/22 gts

B 7/24

MSF COMPUTER STUDY

As a follow-on to the computer symposium which you attended at the Cape in March, Dr. Mueller is organizing an extensive study of MSF's ground-based computer functions and requirements for the period 1972 and beyond. The study will cover computer activities in the areas of Launch, Flight, Recovery, Scientific, Engineering and Management Operations. The goals include centralized computer systems to satisfy all center requirements, completely compatible in hardware and software and mutually supporting between centers; centrally-controlled program design; and maximum use of advanced computer technology. ✓

Mr. Neubert, Chairman of the ADP Management Decision Group, will represent MSFC on a Steering Group for the study and task group representatives will be named later. Computation Laboratory is assembling comments on the proposed study for submission to Dr. Mueller. ✓

AF-MOL OFFICER ASSIGNMENT

The meeting between Gen. Smart and the Air Force scheduled for July 16 to discuss assignment of MOL Officers to NASA was postponed. It is now expected to take place some time during the week of July 21. At present the Air Force is conducting a survey to determine which of the MOL Officers they will retain. At present there is no indication by the Air Force of even a gross number that would be available for assignment to NASA. However they have indicated that they may be willing to assign an additional number of non-MOL officers to NASA. In addition to the 41 requested by MSFC, the NASA request includes:

MSC - 20 by name plus about 40 by skill
KSC - 0
MSF - about 35 by name and skill

These cannot be added together for a total because some of the officers are requested by more than one organization. ✓

Di. von Braun

NOTES 7/21/69 GEISSLER

7/22 955

B 7/24

1. Aircraft Trailing Vortices: Re: your comment to NOTES 6/2/69 GEISSLER regarding aircraft trailing vortex detection, employing laser doppler heterodyne measuring techniques (copy attached). As you pointed out the real problem for aviation is the generation of the trailing vortex by very heavy aircraft in the 700,000 lb. gross weight class (C-5A and 747) during take off and landing, and their possible effects on lighter aircraft cleared to land or take off from the same runway. These heavy aircraft will, of course, make an existing problem even more serious and the need for quantitative data to make vortex detectors a really useful operational device is certainly required. The experimental program at MSFC (Redstone airfield) will consist of measuring the trailing vortex velocity distribution thereby obtaining a velocity "signature" for various aircraft types. The aircraft to be employed here will be moderate to light in weight (DC-3, C-130, Caribou, Gulfstream). It is believed that if the existing system can be demonstrated to detect the vortex of these lighter aircraft, then the problem will be less severe for detecting vortices generated by heavier aircraft. We would expect to begin testing in August or September of 1969. ✓
2. AS-506 (Apollo 11) Slingshot: The AS-506 S-IVB/IU was targeted for slingshot and in real time a decision to allow the APS to burn for the full programmed 280 seconds was made. This decision was based on real time calculations. A preliminary post slingshot maneuver tracking vector received from GSFC on July 16 indicates the S-IVB/IU will pass within about 3400 km of the lunar surface. The resulting heliocentric orbit will be similar to AS-505 (Apollo 10). ✓
3. MSFC/MSC Natural Environment Criteria Meeting: Representatives of our Aerospace Environment Division and Mr. Robert Lavender (PD-SS) met with MSC technical personnel of the Space Physics Division and the Advanced Project Office to discuss the natural environment criteria needed for the 1975 Space Station Program. Mr. Tim White and Mr. G. Cour-Palais of the MSC Space Physics Division are currently conducting studies in the areas of solar radiation and meteoroids, but MSC is not currently involved in studies related to the atmosphere above 90 km altitude, the ionosphere, or the magnetic field. MSC personnel expressed a general agreement with the information given in NASA TM-X-53798, "Space Environment Criteria Guidelines for Use in Space Vehicle Development (1968 Revision)," with exception of the meteoroid model. They do, however, agree with the new meteoroid model which is currently being developed by Mr. R. Naumann, S&E-SSL-P. A plan of action was established for the development of a Space Environment Criteria Document for the 1975 Space Station. MSC will contribute to the document in the radiation and meteoroid areas only. MSFC will compile a draft of the document by August 15 for review by both Centers. ✓
4. NASA/NRC Postdoctoral Research Associateship: Dr. Edward J. Miranda, Assistant Professor at St. John's University, New York City, will join our Astrodynamics and Guidance Theory Division about August 15, 1969. He will be with us for at least one year as a NASA/NRC Postdoctoral Research Associate. His activities will center around optimization theory. ✓

NOTES 7-22-69 GOERNER

B 7/24

NOTHING OF SIGNIFICANCE TO REPORT?

7/22

NOTES 7-22-69 GRAU

7/22 95A

B 7/24

No submission this week.

NOTES 7/22/69 HAEUSSERMANN

B-7/24

7/22 JSD

Static Firing Termination: One of the guidelines for the MSFC's decision to terminate static firing at 515 on the S-IC and S-II and the 511 on the S-IVB was the requirement to retain the static firing capability for all stages. There are many factors involved in determining where and how this capability will be retained, and we have requested the Test Division of ASTN, in conjunction with QUAL, to make the analysis of where this capability should be maintained. We expect to have this for presentation to MSFC management and Program Management in the next few weeks. ✓

K.H.
 Let's pin
 this down
 as precisely
 as possible.
 We must know
 whether there's
 more behind
 this, that
 calls for checks
 or remedies
 in 507.
 B

1. AS-506 LOX ULLAGE DECAY: An unusual decay was observed in S-IVB lox tank ullage pressure during S-IVB-506 orbital coast and also during passivation after Trans Lunar Injection (TLI). Lox residuals were above nominal; therefore, the pressure decay was due to either ullage gas cooling by excessive heat transfer across the common bulkhead or by a moderate ullage gas leak. Preliminary order of magnitude estimates of leakage are .5 to 5 actual cubic feet per minute. ✓
2. S-II STAGE: NR/SD has re-evaluated the value of the cryproof test for the S-II stages in the light of current knowledge and experience. Their conclusions are that the plastic strains occurring during pneumostatic testing are sufficient to insure elastic performance during subsequent cryogenic pressure cycles. Also, this will detect flaws far below the critical flaw size, as determined by fracture toughness studies. Past cryproof inspections have not revealed new flaws or flaw growth, but this does occur in pneumostatic testing. NR proposes to delete the cryproof test and a formal presentation to MSFC is tentatively scheduled for July 29. ✓
3. ZERO G SIMULATION TEST: Engineering results of recent zero-g simulation testing in the KC-135 aircraft on (1) MDA package removal, (2) Mobility and stability aides, (3) Manual and power tools used in the package removal, and (4) Maximum force loadings anticipated on EVA handrails, was held July 14, for the primary benefit of the engineering disciplines involved in the design of hardware. The tests were most successful in helping to define weaknesses in our hardware as well as verifying selected design concepts. ✓
4. ATM NEUTRAL BOUYANCY TESTING: Although some minor modifications are still being made to the hardware, MSFC test subjects are "in the water" in SCUBA and making preliminary test runs. Crewman "Rusty" Schweickert, who was recently assigned to AAP, is expected to try the system in SCUBA. The schedule calling for suited crew participation the week of July 28 still stands. ✓
5. EFFECT OF DRY WORKSHOP ON MDAC RELEASED DRAWINGS: MDAC-WD has reviewed the status of SIW drawings which have already been released to Manufacturing, and the effect of this release if they are given the authority to proceed with the Dry Workshop. Of the 810 drawings already released, 318 would be eliminated by going "dry"; 430 drawings would continue in effect with no changes required; and MDAC would have to modify 62 of the released drawings. ✓
6. PUBLICATIONS:
 - a. Mr. Jerry Patterson has co-authored a paper with Dr. N. Bilow (Hughes Aircraft) entitled, "Polymers from Siloxane-Containing Epoxides," for the Journal of Polymer Science: (Part A-1) Vol. 7: 1089-1110 (1969). Mr. Patterson is the major contributor. This is a tightly refereed journal and we believe that the article is a significant contribution to the field of polymer research. ✓
 - b. A technical paper entitled "Numerical Analysis of Finite Axisymmetric Deformations of Incompressible Elastic Solids of Revolution," by Dr. J. T. Oden and Mr. J. E. Key, has been accepted for publication in the International Journal of Solids and Structures. ✓

NOTES 7-22-69 Heller

7/23/71

B 7/24

Negative report.

B-724

NOTES 7-22-69 HOELZER

7/23 JFA

APOLLO 11 MISSION: The UNIVAC 1108 successfully supported the pre-launch (T-14), launch (T-0), and post-launch orbital monitoring (T+3) of AS-506 in real time. Post-flight data reductions are processing rapidly on the UNIVAC 1108, requiring no support from the GSA 7094's. ✓

7/23 90

1. OUTER PLANETS MISSIONS: Following our review with you on July 10, 1969, we have confirmed plans for informal presentation of our "project plan" to Don Hearth of O SSA who has agreed to come to MSFC for briefings and discussions. The following members of Hearth's staff will probably accompany him: Dr. Don Rea (Hearth's Deputy), Mr. R. Kraemer (head of "Advanced Programs and Technology", under Hearth and leader of their Outer Planets work), and Mr. Kennedy (specific assignment within Hearth's office not yet known to us). Key members of S&E, PM, and A&TS have been invited to join us in the meeting with Hearth and staff. The meeting was originally scheduled for July 22, 1969, but had to be cancelled; a new date should be established this week. ✓

2. NUCLEAR SHUTTLE VEHICLE STUDIES: Space Nuclear Propulsion Office, (SNPO) and OMSF have both indicated interest and availability of funds to support a Nuclear Ferry Vehicle Design and Operations Study which would support Dr. Mueller's Integrated Plan. SNPO (Carl Schwenk) favors funding a precursor study, at approximately \$150K, sole-sourced to Aerospace Corporation (Non-competitive Air Force Contractor). This study would be initiated in September and run for about five months. The OMSF study would follow, and would be contracted competitively at about \$300K. SNPO and OMSF would like for MSFC to run these studies. ✓

3. TRIBRID ENGINE DEVELOPMENT: Lockheed Propulsion Company under contract to LaRC has built and fired a rocket motor (1500 lb thrust) at an I_{sp} approaching 500 sec. This was attained by using solid fuel (reported to be 80-90 percent lithium) with fluorine as the oxidizer, and liquid hydrogen injected into the aft end of the combustion chamber. A propulsion system of this type may ultimately find application as a small upper stage for very high-energy missions. ✓

B 7/24

SATURN:

7/23 SFS

LBJ
Congrats!
B

1. AS-506 Quick Look: From the quick-look evaluation of AS-506, no major anomalies were observed in the Launch Vehicle. However, six deviations in the expected performance were noted; five of which were observed to occur on previous vehicles. The first cutoff of the S-IVB established a parking orbit determined from tracking to be 103.1 X 103.4 N.M., as compared to 103 X 103 N.M. predicted. The difference is less than the possible error in the orbit determination made at this time and within the predicted guidance error. The second cutoff of the S-IVB (TLI) established the spacecraft on a lunar trajectory requiring a 21.3 ft/sec midcourse maneuver at 26:44:58 GET. This translates to an equivalent velocity error at TLI of less than one ft/sec. The allowable launch vehicle guidance error at TLI was 17 ft/sec. The actual S-IVB restart was essentially identical to that predicted by the HOSC simulation performed during earth parking orbit. The burn was only 0.3 seconds longer than predicted by the HOSC simulation. The slingshot maneuver into sun orbit was successful. ✓

2. Elimination of Stress Corrosion Materials: Reference your comment on Heimburg's 6/23/69 notes concerning the elimination of stress corrosion susceptible materials from S-II-16 and subsequent and the resultant cost savings. ECP 6412 which removes the stress corrosion susceptible material for S-II-16 and subsequent is expected in next week. The cost of this change including documentation and retesting is expected to be under \$200,000, but an overall savings would result from elimination of inspections. We are favorably considering this change and will make a careful assessment prior to a decision. ✓

3. LVDC/LVDA Activities: The assembly and final test of LVDC/LVDA P-32, which is the last system under the present buy, will be moved from Owego to Huntsville and, in parallel, establish a "depot repair" capability locally. This will place us in an optimum position to support the DA/DC activities during the schedule stretchout period and provide for a smooth phaseover into the IU-516 follow-on. ✓

LRV:

The LRV Bidders' Conference will be held on Wednesday, July 23, at Michoud. RFP's have been released to 24 contractors. ✓

NOTES 7/22/69 JOHNSON

7/23 9:55

B 7/24

Nothing of significance to report.

NOTES 7/21/69 MOHLERE

Nothing of special significance.

7/23 9/10

B-74

NOTES 7/22/69 MOORE

B 7/24

7/23/69

1. AS-506 Propellant Utilization Computer: The PU computer on AS-506 had to be replaced during the prelaunch operations. The contractor (Douglas) attributed the failure to a potentiometer. However, based on the information we have received from the contractor, our conclusion at this time is that the exact cause of the failure has not been determined. We will pursue this further. ✓

2. Qualification Testing of the ATM X-Ray Telescope (Goddard): The thermal vacuum testing of the X-ray telescope has been initiated. The vacuum chamber has been pumped down and is functioning properly. The program is being performed on the planned 24-hour per day operation. The results of these tests will be a significant milestone of the inhouse efforts for design and development of this telescope. ✓

NOTES 7-22-69 MURPHY

7/23 9/21

B 7/24

Nothing of significance to report.

NOTES 7-22-69 SIEBEL

7/23 JAS

B-7/24

Negative reply.

NOTES 7/22/69 SPEER

B 7/24

Negative Report

7/23 981

NOTES 7-22-69 Stuhlinger

No submission this week.

7/23/69

B 7/24

July 28, 1969

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8-1

NOTES 7-28-69 BALCH

7/28 JAS

S-IC-12 - "Power-up" was rescheduled from 7-25-69 to 7-28-69 because of documentation problems. Static firing has been tentatively rescheduled from 9-3-69 to 9-9-69 to permit a propellant load test, which is scheduled for 9-3-69 and 9-4-69. ✓

S-II-9 - Stage is in A-1 Test Stand undergoing post-static checkout and insulation repair and modifications. Removal from the test stand is scheduled for 8-8-69. ✓

S-II-10 - Stage is installed in the A-2 Test Stand undergoing pre-static checkout and modification. Cryogenic proof pressure test is scheduled for 8-15-69, with static firing set for 8-28-69. ✓

BOMEX - Schedule calls for completion of ESSA field operations on 7-31-69 and completion of NASA field roll-up operations on 8-10-69. Arrangements are being made to transfer the Signal Conditioning and Recording Devices (SCARD's) as follows: 3 to ESSA; 1 to NASA, Wallops Island; 1 to NASA MTF for backup of the SCARD/Decommuation unit being utilized in data processing. ✓

Valve Testing at MTF for KSC by Chrysler - Provisions have been made for the Chrysler Corporation to use the Component Test Facility at MTF for the performance of valve testing under a contract they have with KSC. Crew familiarization with the systems to be utilized is expected to start this week. ✓

Legal Affairs - Approximately 20 claims for damages from static test firings are currently outstanding. Some of these claims were forwarded this past week to the MSFC Chief Counsel for final disposition, and the balance will be forwarded this week. Denial has been recommended in each instance, with the exception of 3 claims. Portions of these 3 claims involved broken glass and china, for which payment has been recommended. ✓

Hancock County Officials - It is our understanding that a local delegation of Hancock County officials sought out a meeting with Dr. Paine and Senator Stennis. The meeting with them at 2 p. m. today indicates their concern over the MTF employment situation. ✓

NOTES 7/28/69 BECKER

7/28 (S)

B₈₋₁

7/28

SPACE STATION

1. Contract Negotiations: As you are aware, the Administrator announced assignment of McDonnell-Douglas Astronautics Corporation as the MSFC Phase B study contractor. In our estimation, the team that MDAC proposes, headed by Ted Smith, is an extremely strong one with experience gained on launch vehicles, the AAP Workshop, and the MOL. Negotiations will take place in Washington on August 6 and 7. Chuck Mathews and Dave Lang have promised a September 1 contract go-ahead (assuming the negotiations are completed as planned). Extensive in-house preparation has been underway and will be completed on schedule. ✓
2. Mockup Engineering: The S-II light-weight tank sections for Space Station soft mockups are en route from Michoud and will arrive at the Center in the afternoon of August 31. It is our intent to make liberal use of cardboard and plywood during our Phase B effort to reinforce our concept decisions on floor layouts, habitability, man-machine relationships, etc. Our eventual goal is a high fidelity mockup suitable for long-term simulation (closed loop life support "live-in" tests). ✓

USE OF THE INTELSAT IV AS A DATA RELAY SATELLITE FOR AAP: A presentation was made on 7/23/69 to representatives of S&E-ASTR, PM-MO, and PM-AA concerning studies relative to the possible use of the INTELSAT IV capability to function as a data relay satellite during AAP missions.

L.S.
Fizzled,
didn't it?

B

MDAC-ED "DRY" CONFIGURATION EFFORT: A meeting was held this week at MDAC-ED as follow-on discussions on several items related to the conversion from the wet to the dry Workshop configuration. Documents to be reviewed and discussed will be the Mission Requirements Document and the Cluster Requirements Specification. ✓

NOTIFICATION TO MDAC-ED ON "DRY" CONFIGURATION: A TWX was sent to MDAC-ED this week as official notification of NASA Headquarters' decision to reorient the Saturn IB launched Workshop to the Saturn V launched Workshop. ✓

LM-A CONTRACT TERMINATION: A TWX and letter have been sent to Grumman (July 23) to terminate the LM-A Contract. ✓

NASA HEADQUARTERS VISIT TO BBRC: Mr. Bill Schneider and other Headquarters representatives will be at Ball Brothers Research Corporation on July 29 to review the status of the ATM experiments being manufactured at that location. My office will be represented. ✓

DRY WORKSHOP NOTIFICATION TO P.I.'S: The P.I.'s have been notified of the dry workshop decision and have been advised of a special P.I. meeting to be held in Washington August 4, as a follow-up meeting to the one on July 22, as reported in last week's notes. The purpose of the meeting is to permit Mr. Schneider to relate to the P.I.'s the logic behind changing to the dry workshop and to give Marshall an opportunity to present appropriate dry workshop preliminary design details. ✓

NOTES 7-28-69 BROWN

7/28/69

B 8-1

J-2 ENGINE - The J-2 engine procurement plan for the Apollo Program has been updated to include qualification of the J-2S engine and procurement of J-2S engines for S-IVB stages 514 and 515. It is now being staffed through the Center. The plan must be submitted to Headquarters by August 1, 1969, and approved by them not later than September 1, 1969, if we are to meet the engine need dates for S-IVB 514 and 515. ✓

7/28/69

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8-1

DAMAGE OF BOILER AT MICHLOUD

Boiler No. 3 of the main plant at the Michoud Assembly Facility was severely damaged by an internal explosion at about 9:30 a. m., Friday, July 25, 1969. Preliminary investigations indicate that an accumulation of gas in the combustion chamber ignited causing the damage. An intensive investigation is underway to determine the exact cause. At this time it is estimated that the boiler is a total loss and will have to be replaced. The preliminary cost estimate for replacement is \$150,000.00. There were no injuries to personnel and operation of the plant has not been impaired. ✓

LRV BIDDERS CONFERENCE

The Lunar Rover Vehicle Bidders Conference was held at the Michoud Assembly Facility on Wednesday, July 23, 1969. ✓

B.D.

I hope he doesn't mean a telescope permanently attached to the DWS like the ATM. What we should have for stellar work is the "plug-in, but free-floating" type. Please verify B

NOTES - 7-28-69 - DOWNEY

B 2-1

7/28 95Δ

1. ASTRONOMY MISSION PLANNING: I am informed from various sources that Dr. Mueller is enthusiastic about the possibility of incorporating a 60" stellar telescope on the second workshop mission. He discussed this idea with Dr. Goldberg, Dr. Whipple and others at the recent STAC meeting. The very interesting subject of diffraction limited optics for this telescope was pursued without any specific resolution. If diffraction limited performance becomes a firm requirement, the schedule will be very tight or perhaps completely unrealistic. Furthermore, a 1 meter diffraction limited instrument is being planned by OSSA for an OAO flight at about the same time.

Optical stellar astronomy in space is a particularly fertile field, as is evidenced by the excitement in the scientific community over the OAO-A 2 results. Dr. Mueller's motivation is apparent, and we will certainly look into various possibilities of incorporating a 60" stellar telescope on the second DWS. However, I believe we should continue to consider as a candidate for this mission a follow-on solar telescope payload using the ATM-A hardware to the maximum extent practical. ✓ Previously we have studied the large stellar telescope (1 1/2 - 3 meters) as a Space Station payload, probably to be incorporated in a fly-away experiment module. ✓

2. GULF STREAM DRIFT MISSION: The mission is going well. Monday, July 28 will mark two weeks of submerged time. The crew's colds have improved. Temperature is down to 57° F and the crew is commenting about the difficulty of working at this temperature. The battery budget is being maintained and at this time everything looks "go" for 30 days submergence. ✓

NOTES 7/28/69 FOSTER

7/28 FJS

B
8-1

APOLLO PROGRAM DIRECTIVE APD 4k - The Apollo Office released a directive (APD 4k) July 10, 1969, containing two plans, an Apollo Baseline Plan predicated on recurrent lunar landing attempts through AS 515 and an Alternate Plan based on success on Apollo 11. Delivery of all flight stages remain on the base plan until an official decision is made to implement the Alternate Plan (expected in August). The J-2S effort will proceed on the basis of implementing the J-2S on the S-IVB stage for AS 514 delivery in January 1972. ✓

The Alternate Plan stresses lunar exploration with vehicles 507-510 on 4 month launch centers, with 507 launched in November 1969. These lunar "H" missions (32 hours staytime/12 hours EVA) include basic ALSEP's and technological objectives in support of a lunar base. Lunar exploration "J" missions with vehicles 511-515 launched on five month centers, will extend CSM lifetime to 16 days, and provide lunar surface mobility. MSFC is to proceed with the development and procurement of the Lunar Rover. This procurement includes four flight units with delivery of the first unit by April 1971, for a flight readiness launch on SA 512 in September 1971. ✓

NASA RESEARCH AND ADVISORY COMMITTEES - We have received a letter from Mr. Bruce Lundin, regarding MSFC representation on the NASA Research and Technology Advisory Committees. Mr. Lundin requests concurrence for four MSFC employees, which he has named, and the nomination of another for representation on five committees. We would like to have greater participation on these committees and are working with Dr. Weidner to propose qualified nominees. Dr. Weidner has this subject for discussion during the S&E Council Meeting and will input the results to us for the response to OART. ✓

SEVERANCE PAY - The last severance pay resulting from the RIF action has now been made. The total severance payroll for the 73 persons involved amounted to \$319,464.03. The first of these severance payments was made December 16, 1967. ✓

7/28/69

B 8-1

1. S-II POGO Model: Efforts to achieve a sufficient S-II structural model for use in the POGO simulation have finally met with some success. Criteria used to evaluate the model (determined from AS-504 flight data) are: (1) phasing between inboard and outboard engine mounts and S-II LOX bulkhead and (2) oscillation amplitudes. Present analysis of the model has met the criteria and indicated the mode should be adequate for POGO simulation. The model was derived from Boeing 3-D analysis. This was an in-house effort in which the extension of the Boeing model included: (a) spring mass S-IVB LOX tank, (b) two degrees-of-freedom S-II LOX bulkhead representation from the Mini-test, and (c) cross beam stiffness from static test. This structural model will be incorporated into our time response, coupled simulation (propulsion and suction line) in an effort to duplicate the AS-503 and AS-504 flight conditions. Our criteria for success will be: (a) nonlinear propulsion system wave form, (b) limit cycle, (c) stability boundaries, (d) frequency shift, and (e) oscillation amplitude ratios between thrust and center engine gimbal and thrust and LOX bulkhead sump acceleration. ✓

Fred
SpeerI thought
shipping
KAS
advised
about
impact areas?

2. AS-506/C - S-IC Entry: A West German ship returning home from Savannah, Georgia, reported at 13:45 GMT (9:45 EDT) July 16, 1969, "We sighted numerous pieces of the S-IC Apollo 11 entering the water around us." From the enclosed sketch it can be seen why. The dashed line is the instantaneous impact trace for a launch along a 72 degree flight azimuth. The X inside the predicted S-IC stage impact ellipse is the coordinate of the ship at 9:45 EDT. !!

3. Pegasus C/SA-10: Pegasus C/SA-10, according to a latest orbital lifetime analysis, is in its final stages of orbital decay and should reenter the earth's atmosphere around the end of July 1969. This prediction is based on a random tumble orientation as its true orientation is not known. ✓

4. Apollo 11 Debriefing: Otha H. Vaughan, Jr. of our Laboratory, will participate as a member of the Apollo 11 Photography and Science Debriefing Teams at MSC. ✓

5. Atmospheric Diffusion - Toxic Fuels: A study on toxic fuel - atmospheric diffusion by the GCA Corporation (originally Geophysics Corporation of America), for our Aerospace Environment Division, is nearing completion. This effort was conducted under the funding sponsorship and request of OART - Chemical Propulsion Division (Mr. Tischler). Although there are not any specific plans to use toxic fuel (fluorine, for example) on the Saturn, the subject does come up periodically. This work will provide a basis for comparison of probable toxic gas concentrations under various atmospheric conditions for the KSC area. In addition, it complements our other studies on atmospheric turbulence. It does not impose any significant additional work-load, but still keeps us rather knowledgeable on the subject. ✓

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B-1

NOTES 7-28-69 GOERNER

7/28/69

SPACE SHUTTLE ENGINES EVALUATION: In response to a request from the Space Shuttle Task Team, an effort has been initiated to evaluate the several alternatives associated with the bell-type and airframe integrated engines, including competitive contract aspects and considering possible development and contractual approaches. This evaluation request, precipitated by a request from Mr. L. E. Day, Manager, Space Shuttle Task Group (Headquarters) originally implied a completion date in time for Dr. Mrazek to discuss the results with Mr. Day on August 1, 1969. Subsequently, the tentative target date for the completed evaluation was changed by Dr. Mrazek to August 15, 1969. Following a discussion with Dr. Mrazek on July 18, 1969, it was established that the evaluation should involve an assessment of the pros and cons associated with the feasibility of integrating a clustered arrangement of aerospike engines (buttons) into an airframe initially designed to accommodate an equal number of bell-type engines. Effort has been initiated within this Office which would first evaluate the Lockheed stage-and-one-half configuration in the aforementioned context. ✓

NOTES 7-28-69 GRAU

7/28 JDS

B-1

No submission this week.

NOTES 7/28/69/HAEUSSERMANN

7/28/69

B-1

During the preflight planning for AS-506, a change was made in the procedure for implementing the mixture ratio shift in the S-II stage for the purpose of providing multi-engine out guidance capability and as a means of more optimally managing residual propellants resulting from off-nominal stage operation. With the new system, the mixture ratio shift time would be established as a function of reference velocity (T11) in the LVDC, rather than as a preplanned, discrete time originated in the switch selector.

Subsequent to the flight of AS-506, it became apparent that some elements of North American Rockwell (NAR) were not aware that the change had been made. As a result, concern was expressed over the apparent discrepancy between the actual shift time and the preflight prediction and, further, how such a change could be made without NAR's knowledge. Investigation revealed that such a misunderstanding should not have occurred since several sources of information were available to NAR which specified the new implementation of the mixture ratio shift. This change had been documented in the Flight Sequence ICD, numerous documents which are supplied to NAR under the auspices of the Vehicle Dynamics and Control Working Group, and was further discussed in various preflight reviews which NAR representatives attended.

To provide assurance that this type of occurrence will not happen again, it has tentatively been agreed that a splinter meeting of the Vehicle Dynamics and Control Working Group will be held approximately 6 weeks prior to each scheduled launch to discuss the sequencing and performance aspects which affect the S-II stage.

Beri

7/28/69

1. AS-506 FLIGHT EVALUATION: The boost phase of the AS-506 mission was very nominal. No problems have been uncovered to date from examination of the quick-look data. No oscillations were apparent during S-IVB burn as experienced on AS-505. Slight oscillations were noted on the S-IVB during S-II burn; however, nothing was seen in any S-II parameters. ✓

The IU/RF system experienced erratic signal strength sometime after TLI. There was a similar occurrence on AS-505. The probable cause is a coaxial switch which will be supplied by a different vendor on AS-507 and subs. ✓

2. S-IC FOLLOW-ON STAGE: The Boeing Company has proposed several changes to reduce cost on the follow-on stages. Deletion of the prevalues, lox emergency drain valve, and lox interconnect system has been proposed. With the elimination of static firing, we agree to delete the prevalues and emergency drain valves. The deletion of the interconnect system is being analyzed. ✓

3. S-II COMMON BULKHEAD HYDROSTATIC TEST REQUIREMENTS: North American Rockwell has suggested to delete requirements for hydrostatic testing of the S-II stage common bulkheads. The proof pressure test of the common bulkhead would be incorporated into the pneumostatic test procedure. This seems to be a reasonable suggestion; however, we are surprised that NR states that no cost savings will be realized. It is hard to believe that deleting an operation the size of the hydrostatic test of the common bulkhead will not result in cost savings.

Roy Gooden
Please comment!
B

4. DRY WORKSHOP: In an effort to reduce the impact on KSC, a layout drawing was started for the dry workshop showing the MDA and payload shroud decreased approximately 80 inches in length. This would eliminate changes on the MSS or LUT, but cause an additional shading of the S-IVB solar arrays by the ATM solar arrays and relocation of the radiator from the MDA to the lower shroud cylinder. The layout should be ready for discussion with all organizations within a week. ✓

5. BIOASTRONAUTICS ACTIVITY: The Bioastronautics Office of this laboratory is having increasing difficulty with maintaining the schedule required to meet either the wet or dry OWS commitment. Recent contractual agreements between MSC-AAPO and the Martin Company have seriously impacted the modus operandi and the latitude of operation in Medical Research and Operations Directorate. There is the general impression at MSC that schedule relief to the extent of 1 to 2 years has resulted from the decision to go dry OWS. Consequently, the AAPO is withholding funds desperately needed to move out on long lead time items. We are optimistic this problem can be resolved within the next 3 to 4 weeks. If not, our hands are tied.

Lee Belew
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B

6. ILRV ENGINE TECHNOLOGY REVIEW: A concentrated effort is underway with personnel from Pratt and Whitney, Aerojet and Rocketdyne to assess engine technology for the ILRV program. A team of Astronautics Laboratory personnel visited Pratt & Whitney in Florida and a review of the design and supporting technology for the 1000K sea level thrust ILRV engine was initiated. This engine design, having just been started, is still quite conceptual and fluid. A review with Aerojet is in progress at MSFC and will be concluded this Friday. Rocketdyne personnel will be at MSFC on July 28 and 29, 1969 ✓

7/28/69

1. ATM-B STUDIES: I visited Dr. Harold Zirin of Cal Tech for discussions on their solar astronomy activity. They are presently building an observatory at Bear Lake (San Bernardino Mountains) about 200 meters from shore. Their specialty is the study of solar dynamic activities at excellent resolution. Meetings were held to discuss studies of the photoheliograph of Cal Tech for ATM. The telescope is planned for a spatial resolution of 0.2 arc sec. Present for the meeting were members of PD, ASTR Lab, CSE and, from Headquarters, members of OMSF (Bill Armstrong) and OSSA (Dixon Forsythe, Goetz Oertel, Roland Chase). In summary: The photoheliograph looks like a promising experiment for an ATM-type mission. Both OMSF and OSSA would like for MSFC to initiate studies for an ATM-B as a potential payload to be flown on the DWS. Other experiments to be included are the B instrument of the UV spectrometer by Harvard, originally intended for ATM-A, and a new version of a grazing incidence X-ray telescope by S&E. The studies will be initiated by PD. The unresolved problem is that OSSA would not like to use their SRT funding in support of this project unless there is an assurance from OMSF that an ATM-B is indeed flown on a WS and that the photoheliograph is the prime experiment on ATM-B. To me the ATM-B looks like a very desirable assignment for MSFC because of the background in science and technology we have built up in connection with ATM-A.

F.H.

To me, too.

But see

Downey NOTES

7-28-69.

Your comment is invited

3

2. SOLAR MAGNETOGRAPH: Dr. Hagyard has begun her series of observations at Kitt Peak National Observatory. She has requested and obtained an assignment of time for observations of line profiles of the 5250 Å FeI line in sunspots. She is using the McMath Solar Telescope at Kitt Peak and works closely with one of the Kitt Peak astronomers, Dr. Harvey. Presently measuring results are being evaluated by Dr. Hagyard using special measuring equipment of Kitt Peak, such as their automated microdensitometer which permits much faster data reduction than we can do here. The results will be applicable to the software for the data reduction of the Real Time Solar Magnetograph of Marshall.

NOTES 07-28-69 HOELZER

7/28 JDS

B8-1

Negative Report.

NOTES 7-28-69 HUBER

7/28/69

B8-1

OUTER PLANET EXPLORATION PLAN: The presentation of the MSFC Outer Planet Exploration Implementation Plan to OSSA scheduled for July 22, 1969, was cancelled due to an unavoidable change in Don Hearth's schedule. The presentation has been rescheduled for August 8, 1969, at MSFC. The Program Development critique of the document has been completed; however, a new version will not be typed until the OSSA comments are received. ✓

SATURN:

NOTES 7/28/69 JAMES

B8-1

7/28 JTS

1. Apollo 12 and 13: On Friday, July 25, we received the TWX from Headquarters we were expecting which officially stretches out the Saturn delivery and launch dates. Launch readiness dates for the next launches are as follows:

Apollo 12 - Prime: Nov. 14, 1969 Alternate: Nov. 16, 1969
Landing Site: Prime: Site 7 Alternate: Site 5

Apollo 13 - March 9, 1970 ✓

2. Deletion of Static Firing, S-IVB Stage 212: As a result of the dry workshop decision, contract action has been initiated to delete requirements for static firing stage 212. We expect to move a set of automatic GSE from SACTO to equip the S-IVB battleship stand at MSFC to receive flight stages. It now appears that the first flight stage to be static fired at MSFC would be S-IVB-514 with the J-2S engine. ✓

3. Saturn IB Breadboard Operation: We have taken action to stop using the Saturn IB System Development Breadboard Facility (SDBF) for the Saturn V Program. We began reconverting the Saturn IB SDBF to the SA-206A configuration on July 22 to support later AAP flights. This effort is scheduled for completion on August 9, 1969. We plan to have the IB Breadboard ready for complete shutdown by August 29, 1969. The Saturn V Breadboard can continue with the Saturn V requirements, and due to the relaxed schedules will probably revert shortly to a one-shift operation. ✓

LRV:

LRV Bidders' Conference: The pre-proposal bidders' conference for the LRV took place at Michoud on July 23. Contractors attending were North American Rockwell, Boeing, General Motors (AC), TRW, Westinghouse, Bendix, Allis Chalmers, Grumman, and Chrysler. The limited attendance leads us to believe that the stringent schedules may have discouraged bidders who have not already invested some effort in Rover type vehicles. ✓

NOTES 7/28/69 JOHNSON

7/28/69

B₈₋₁

Nothing of significance to report.

NOTES 7/28/69 MOHLERE

7/28 JS

B8-1

Nothing of special significance.

1. WORKSHOP COMMUNICATION: A meeting was held at MSFC with AAP Headquarters and MSC personnel concerning the use of the Intelsat IV relay satellite system. The proposal is to make use of an Intelsat System which is planned to be launched in calendar year 1971 and would provide continuous coverage. Use of this system would also eliminate the need for additional ground stations and ultimately reduce the number presently in operation. The concept for the vehicle depicted the antenna on a boom. The antenna would have to be continuously articulated and would also have to reacquire each one of the three satellites every orbit. Indications by the headquarters' personnel were that this would be presented at the August Management Council Meeting. We can provide more details if you so desire. ✓

Please do. B

2. ATM Digital Computer: (Reference red line item note of 6/30/69, copy attached). An overrun of \$1.4 million by IBM on the ATM digital computer was reported. A meeting was held July 25 with IBM representatives, Dr. Rees, Lee James, Lee Belew and others and the present estimate of the overrun is \$1.99 million. The reasons for the overrun given in referenced note are still valid. In addition, part of the overrun is due to an increase in the IBM overhead rates. The problem will be further analyzed in conjunction with IBM in an attempt to decrease the projected overrun.

Although the overruns presently being discussed are not the result of technical changes, we are most concerned that extensive modifications to adapt the computer system to the Dry Workshop/Integrated ATM will cause a significant increase in cost. Some of the potential changes to adapt the system to the extended mission time and to operate the thruster attitude control system are summarized as follows: (a) Additional hardware will be required since the digital computer should be redundant (duplex or perhaps triplex). (b) Changes to the computer and input/output hardware will be required (memory is doubled from 8K to 16K and more input/output is required). (c) An additional black box will be required to do the switching from one computer to the redundant computer and to house some of the overflow of input/output hardware. (d) The software will be more complex. In response to Dr. Mueller's desires, the ATM software is presently being generated inhouse; however, with the more complex integrated ATM/Workshop system we may not be able to handle the total software inhouse. The cost of the above increases is estimated between \$5 and \$8 million.

The potential cost increases in the IBM contract will be offset to some extent by the elimination of the need for a separate Workshop Attitude Control System (WACS). However, since IBM is already in an over-run situation we will have to watch very closely the potential contract modifications.

Eberhard R.

Let's discuss this
B



NOTES 7/28/69 MURPHY

7/28/69

B8-1

Explosion in Steam Boiler at Michoud: At 9:05 a.m. on Friday, June 25, 1969, an explosion occurred in the Facility Power Plant gas fed No. 3 boiler at Michoud.

The boiler shut down for an unknown reason and the explosion occurred during its automatic process of relighting. There were no personnel injuries; preliminary estimates of property damage is \$75,000. There is no impact to the Apollo Program.

Based on our recommendations, Dr. Constan has established a Board of Investigation, in addition to the contractor (Mason Rust) appointed Board. As soon as details become available, we will advise you. ✓

7/28/69

B 8-1

1. ATM Crew Station Review: We are continuing fabrication of hardware for the August 11, 1969, Crew Station Review. This hardware is being installed in the ASTN mockup and includes the EVA Roll Lock Mechanism, 45 degree section of the Solar Shield, Astro platform, handrails, and protective shield right side EVA work station, and dummy wood models of sine generator, digital multiplexer, electronic assembly, detonator block, retraction motor, and camera control unit. ✓
2. Alabama Space Science Center: We have completed the erection of all Marshall Center hardware and have assisted the Army in erection of their missiles and rockets. Our work at the museum should be complete this week, with the exception of the installation of engines on S-IC-D and this will commence August 4, 1969. ✓
3. Astronauts' Testing on ATM: MSFC Scuba runs on the ATM translation and film retrieval study were completed this report period. Astronauts Schweickart, Brand, Parker, and Henritz visited the facility on July 17, entered the tank in Scuba gear, and inspected the hardware. Pressure suited runs on the ATM study are currently in progress with MSFC test subjects. These runs are being made in an A-7L suit provided by MSC. Dr. Smith and Mr. J. Joerns from MSC are witnessing this series of tests. At the request of MSC, suited astronaut runs have been rescheduled beginning August 5, 1969. Crewmen Schweickart, Cunningham, Garriott, and Parker have been tentatively identified as participants in these tests. ✓
4. Cleaning Prior to Welding: The Illinois Institute of Technology Research Institute (IITRI) performed a basic study the objective of which was to identify and classify the major contaminants, surface irregularities, etc., which contribute to porosity in aluminum welds. "Surfaces prepared using conventional procedures in the aerospace industry were characterized in terms of weld-defect potential. As machined surfaces result in defect-free welds. All other treatments induce some degree of weld impairment." (Quotation from Final Report.) The next logical step in surface preparation was to develop a mechanical device that would reduce the "human" variation in metal removal from weld joints. This has been accomplished by IITRI who report that the cleaning device is (1) practical; (2) capable of preparing surfaces with a low defect potential; (3) adaptable to components of varying size and configuration; and (4) capable of maintaining the dimensional tolerances required in advanced aerospace structures. The device was delivered to ME this week and will now be evaluated for refinement and application in space vehicle manufacturing. ✓

NOTES 7/28/69 SPEER
7/28/69

B 8-1

Negative Report

NOTES 7-28-69 STUHLINGER

B8-1

7/28/69

1. Heartiest congratulations on the fabulous success of all phases of the Saturn - Apollo 11 mission! ✓

2. ASTRONOMY MODULE ON DRY WORKSHOP: In a discussion with Dr. Mueller at the Cape on 7/16, he indicated his great interest in flying a stellar telescope of advanced design on an early Dry Workshop, and he requested me to have a short presentation prepared by appropriate members of MSFC, possibly with input from Dr. L. Goldberg. I am planning to discuss various possibilities with Dr. Goldberg on 7/30, and with members of the PSG Astronomy Panel on 7/29. ✓

3. MANNED MARS PROJECT: Numerous studies on low-acceleration space trajectories, plus considerable progress with solar cells during recent years, have led members of OART, JPL, and other organizations to the belief that solar electrically propelled systems should also be considered among the possible versions of manned Mars vehicles, provided that total mission times of 550 to 600 days are acceptable. I would be happy to brief you on these possibilities, if you so desire. ✓

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Please do
B