

OFFICE OF DIRECTOR - MSFC

CODE	NAME	INIT.	<input type="checkbox"/> A C T I O N	<input type="checkbox"/> I N F O R M A T I O N
DIR	Dr. von Braun			

REMARKS

Reference your comments to me concerning CSE staffing on Dr. Haeussermann's notes 8-18-69, copy attached.

The recent agreements in the Manpower Management Council concerning the utilization of CSE in the Shuttle and other Phase B studies will provide the basis for S&E/CSE to establish staffing patterns.

In a broader sense, I have asked Dick Cook to set up a visit to CSE for you to review the overall implementation and activities of CSE. ✓
 Dick agrees but would like you to visit Astronautics and Aero-Astro dynamics first since you haven't been there in some time and to allow S&E to do more detailed planning in the Phase B support area. We will arrange on your calendar as your schedule permits. ✓

cc: Mr. Weidner
 Dr. Haeussermann

with emphasis on work CSE is doing in shuttle and space station area.

Copy sent to Cook/Haeussermann 10-10-69

Juy

Bi/18

CODE	NAME	DATE
DIR	J. N. Foster	10-6-69

NOTES 10/6/69 BALCH

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S-IC-12 - Stage pressurization checkout is approximately 4 days behind schedule, but recovery operations are under way to avoid impact to the propellant load test scheduled for 10/15/69 and 10/16/69 and static firing scheduled for 10/22/69. ✓

S-II-9 - The static firing skirt has been removed and replaced with a slave unit. The static firing skirt will be shipped to Seal Beach for use on a subsequent stage. Shipment of the S-II-9 stage to KSC is scheduled for 1/8/70. ✓

S-II-10 - Full duration static firing was successfully accomplished on 10/1/69. Preliminary examination of data indicates that all systems are acceptable. Removal from the test stand (A-2) is scheduled for 11/6/69. ✓

S-II-11 - "Power-up" was accomplished on 9/29/69. Cryogenic proof pressure test and static firing remain scheduled for 10/18/69 and 10/29/69, respectively. ✓

Change in S-II Stage Processing Plan - The S-II-10, S-II-11, and S-II-12 stages will be given a modified post-static checkout after static firing and then placed in storage in the S-II Stage Checkout and Storage Building. Prior to shipment, these stages will be placed in the test stand again for completion of post-static checkout. This change is expected to cause some revisions to present stage processing plans. ✓

GE Service Contract - Final distribution has been made of Amendment No. 188, which provides for continuation of general support services at MTF for an additional 3 months from 10/1/69 through 12/31/69. ✓

B 10/22

ORBITAL WORKSHOP (OWS) DRY WORKSHOP DELTA PROPOSAL:

MDAC-WD technical portion of the proposal for conversion from "wet" to "dry" Orbital Workshop configuration was received at MSFC on Sept. 29. Technical evaluation of the MDAC-WD "dry" Workshop delta proposal is in progress, and is targeted for completion on October 17. The cost and schedule portion of the MDAC-WD "dry" Workshop delta proposal is to be delivered to MSFC Oct. 6. ✓

OWS-1 DELIVERY SCHEDULE: Planning data from the MDAC-WD indicates an impact of OWS-1 delivery capability, due to late availability of Thruster Attitude Control System and Solar Array System hardware. The predicted schedule impact is based on late authorization to proceed relative to lead time for TACS valve and SAS solar cell procurement. Based on an October 1 authority to proceed (ATP), the MDAC-WD assessment of schedule impact is approximately four to twelve weeks, respectively, for TACS and SAS hardware. We have notified Bill Schneider, both formally and informally, of this urgent need but he has not been able to obtain a procurement go-ahead for out-of-house and is holding us to preliminary design only. ✓

"DRY" AIRLOCK PROPOSAL: The MDAC-ED firm cost proposal on the "dry" Workshop configuration of the Airlock was distributed to the S&E project engineers and all AAP offices last Monday (Sept. 29) for their evaluation and comment. A two-hour briefing was given to these people by MDAC-ED to explain the structure of the proposal and the technical content of each item in considerable detail. ✓

ATM MONTHLY STATUS REVIEW: The monthly ATM Status Review with all of the S&E Labs was held on Sept. 30 and Oct. 1. Although significant progress continues to be made in several areas (basic structure, star tracker, charger battery regulator modules, solar arrays, etc.), the necessary definition to proceed with detail design in the electrical network and rack layout areas is missing. More specific black box definitions of some of the changed or new components need to be developed and a revised equipment list baselined. The total ATM status will be reviewed with Center management later this month. ✓

PROTON SPECTROMETER FOR SWS: A memo from S&E-DIR to SSL-DIR dated Sept, 25, 1969, designated the SSL the responsibility to develop a complete package of hardware, electronics and detector head to make a measurement of the high energy protons that will be encountered by the SWS. ✓

ATM DEPLOYMENT DESIGN REVIEW TEAM: A design review team has been assembled from CSE, S&E and PM to review the design concepts for ATM deployment. The team will review the two joints, fixed and free, to determine which one will be recommended Oct. 15. The team is meeting with MDAC regularly the next two weeks to continually assess the two designs. ✓

NOTES 10/6/69 BETHAY

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FY 1971 Budget Estimates To BOB - NASA is planning to submit a FY 1971 \$4.494B budget estimate to BOB which will support Option #2 of the Space Task Group's report to the President. Included in this total are a \$702M R&PM level and an \$80M C of F program. Of the remaining \$3.712B for Research and Development, MSF's level is \$2.109B which is a \$198.7M decrease from the preliminary FY 1971 budget estimates presented at the September MCM. This decrease in the MSF R&D estimates by programs is shown below:

(Millions of Dollars)

<u>Program/Project</u>	<u>Prelin. FY 1971 Budget Estimate</u>	<u>△</u>	<u>NASA BOB Submission</u>
Apollo Lunar Exploration	\$1,160.0	\$ 0	\$1,160.0
Lunar Exploration Program #2	100.0	- 40.0	60.0
Follow-on Production (Sat. V)	157.0	- 57.0	100.0
Apollo Applications	480.7	+ 19.3	500.0
Saturn Workshop #2	64.0	- 46.0	18.0
Advanced Development	30.0	- 11.5	18.5
Advanced Missions	10.0	- 7.5	2.5
Space Station	90.0	- 10.0	80.0
Space Shuttle	216.0	- 46.0	170.0
Total MSF R&D	\$2,307.7	-\$198.7	\$2,109.0

Revised GS-14 And Above Ceilings - We have been informed by MSF that Marshall's FY-70 end of year ceiling for GS-14 and above positions will be cut to 1155. A comparison of the revised ceilings for each MSF Center with the previous ceiling is shown below:

	<u>Previous Ceiling</u>	<u>△</u>	<u>Revised Ceiling</u>	<u>% Reduction</u>
MSFC	1174	-19	1155	1.6%
MSC	923	-23	900	2.5%
KSC	479	-14	465	2.9%

MSF Review of the Center's R&PM FY 1970 Operating Plan (POP 69-3) - The Center's FY 1970 R&PM Program Operating Plan was reviewed by Headquarters representatives on October 2, 1969. Although there is little optimism that Headquarters is sympathetic toward our total deficit of \$3,999,000, it does appear that they will support a portion of the unfunded requirement. The review concentrated on the areas of Civil Service Personnel requirements, ADP Rentals, Support Contractor effort and R&A Projects. ✓

NOTES 10-6-69 BROWN

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J-2 ENGINE - Representatives of the MSFC Contracts and Legal Offices and the J-2 Engine Project Office have met with the DCAA auditors several times during the past few weeks concerning a potential defective pricing problem on the J-2 Engine production contract. These meetings have been devoted to assembling the facts in the case as a prelude to issuing a Letter of Determination to the contractor. The contractor will be at MSFC on 10/7/69 to discuss a settlement which, if effected, will preclude issuance of a determination letter. ✓

GENERAL - Reference is made to Dr. Mueller's letter to you on 6/13/69 wherein he required a re-examination of the overall Rocketdyne funding level prior to completion of negotiations on the F-1 contract extension. We consider that this action was completed concurrent with the POP 69-2C review with OMSF Headquarters personnel on 10/2/69. Written approval from Dr. Mueller to proceed on engine contracts is anticipated contingent upon NASA's overall FY-71 budget posture. There are indications that major contracts which require FY-71 funds might be held up pending the outcome of discussions of the FY-71 budget with the BOB. ✓

Enclosure DIR's cy only



ACTION COPY TO PM-DIR w/enc. - 6-16-69
 LFO Copy(ies) to Dir, DEP-T, DEP-M, S&E, PD,
 A&TS, A&TS-CP
 NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 WASHINGTON, D.C. 20546

Return to FMS

REPLY TO
 ATTN OF:

JUN 1 2 1969

Dr. Wernher von Braun, Director
 National Aeronautics and Space Administration
 George C. Marshall Space Flight Center
 Marshall Space Flight Center, Alabama 35812

PM-E-MSG / PM-CO-INT (C. P. G.)
W. C. ...
PM-EE-MSG

Dear Wernher:

The enclosed Justification for Noncompetitive Procurement and Negotiation D&F for continuation of F-1 Engine Production Support under the North American Rockwell Contract NAS8-18734 have been approved.

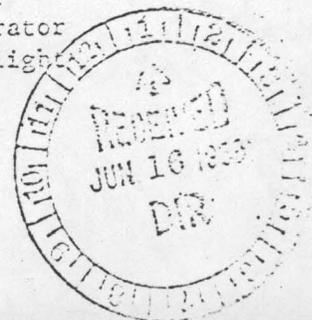
However, the amount to be committed and obligated to this procurement continues to be a matter of unresolved concern. Consequently, the overall Rocketdyne funding level should be re-examined in order that the amount to be used for Production Support can be firmed. With your help, the Apollo Program Office will conduct this review as soon as possible. You are authorized to proceed with all necessary procurement actions short of obligation of funds until the review has been completed and the amount to be obligated is established.

In our recent teletype to you, relative to your using the CPFF mode in a similar extension of J-2 Operational and Flight Support, we furnished some relevant considerations regarding the broad choice of contract types to be considered in future situations involving procurement of sustaining engineering requirements for the Apollo Program. Considering the lapse of time since approval of the original Procurement Plan for this requirement in January, 1966, the method of contracting for this extension of F-1 Engine sustaining engineering should be reviewed in light of the guidelines mentioned above. In any event, a prenegotiation position review is requested.

Sincerely,

[Signature]
 George E. Mueller
 Associate Administrator
 for Manned Space Flight

Enclosures: A/S



DOWNEY

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1. HIGH ENERGY ASTRONOMY OBSERVATORY: I have been informed (unofficially) by OSSA that the HEAO has been approved by Dr. Paine as a new start in FY-71. Apparently HEAO is the only major new start in the OSSA Physics and Astronomy area for FY-71. (I assume that ATM-B will be funded by MSF, not OSSA.) We are continuing to work toward the goal of letting Phase B definition contracts for HEAO by April of next year. FY-71 Phase C/D funding will probably be limited to a few million dollars. ✓

2. ASTRONOMY PLANNING: The OAO Follow-On was not approved for an FY-71 start. However, we are continuing to work with Mr. Purcell and others at GSFC. We are considering the interfaces between the large optical space telescopes being planned for the future and the Space Station/Space Base and the Shuttle. It seems that the 120-inch diffraction limited telescope will fit rather nicely into the 15' diameter x 60' long Shuttle cargo compartment. I believe the telescope will be a snug fit from the standpoint of both diameter and length. We hope that the Shuttle cargo compartment does not shrink and the telescope does not grow during further conceptual studies. (The astronomers have specified a spatial resolution requirement equivalent to that of a 120-inch diffraction limited telescope as a goal for the National Astronomical Space Observatory. If diffraction limited optical performance is not obtained, it will be necessary to build larger aperture and longer telescopes, e.g. 200-inch aperture perhaps, to provide the performance of a 120-inch diffraction limited system. However, the bigger telescopes will not fit into the Shuttle. This speaks for a need to develop diffraction limited optical technology, which is an objective of OART's OTES Project.) ✓

3. TECHNOLOGY EXPERIMENTS: We are beginning to consider an experimental payload for the Second Workshop mission which would support the design or operation of certain subsystems planned for the Space Station/Space Base. For example, it would seem very appropriate to investigate in orbit maintenance techniques on various prototype or mockup Space Station/Base subsystems which could be installed on DWS II as experiments, not as mission critical subsystems. Mr. Carey of my Office has discussed a few possibilities with Mr. Novik of OART and Mr. Armstrong of MSF. They were enthusiastic and receptive. However, our definition of these possibilities is very preliminary at present. We will be working closely with the Space Station Task Team to better define requirements and to establish reasonable approaches. We are not considering any technology experiments that would significantly impact the DWS II design, other than the widely discussed and somewhat controversial artificial "g" experiment. ✓

JF, 10/6

B 10/22

1. AERODYNAMIC TESTING OF SHUTTLE CONFIGURATIONS: Most of the Shuttle configurations are geometrically unsuitable for quick analytical appraisal of the aerodynamic characteristics. It is therefore necessary to rely heavily on wind tunnel testing even during the early screening phase where we used to be able to make reasonable predictions based on analysis alone. With this realization in mind, we are heavily involved in many test programs mostly in cooperation with the various contractors. The following is a brief summary of these efforts:

General Dynamics

- (1) Entry configuration - Static stability and control characteristics at transonic and supersonic Mach numbers in the MSFC 14" TWT
- (2) Entry configuration - Static stability and control characteristics at $M = 10$ in the AEDC von Karman Facility
- (3) Two stage configuration - Static stability and control characteristics will be determined for a composite two stage configuration at transonic and supersonic Mach numbers in the MSFC 14" TWT
- (4) Entry configuration (body + elevon + ruddervators + swingwing) - Static stability and control characteristics will be determined for variations of this configuration at transonic and supersonic Mach numbers in the MSFC 14" TWT ✓

Lockheed

- (1) Entry configuration - Static stability and control characteristics at transonic and supersonic Mach numbers in the MSFC 14" TWT
- (2) Entry configuration - Static stability and control characteristics at $M = 10$ in the AEDC von Karman Facility
- (3) Two stage configuration - Static stability and control characteristics at transonic and supersonic Mach numbers in the MSFC 14" TWT
- (4) Entry configuration - A second entry with modifications to the rudders to obtain static stability and control characteristics and flow visualization data is in progress ✓

Program for the Martin configuration is presently being planned. ✓

2. LUNAR EXPLORATION PROGRAM PLANNING: At the request of PD-AP (Mr. R. Stewart), Mr. O. H. Vaughan and Mr. Paul Larsen of our Aerospace Environment Division are preparing a list of proposed Lunar exploration sites for the follow-on Apollo missions (21 thru 28) as well as a list of missions and payloads to be used at these sites. These data will be presented to Mr. Ben Milwitsky, NASA Headquarters, sometime this month. ✓

3. PRESENTATION: Mr. Bob Ryan of Dynamics and Control Division gave a presentation on "Space in the 70's" to the Louisville Rotary Club, September 25, 1969. There were approximately 500 in attendance. The speech was well received. ✓

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SATURN:

NOTES 10/6/69 GODFREY

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1. S-II-14 LH₂ Forward Bulkhead Incident: During inverted cleaning operation of LH₂ tank on 9/20/69, a 4-1/2 pound spray nozzle became detached from the cleaning tool and fell 40 to 45 ft. impacting the LH₂ forward bulkhead. An accurate assessment of damage has not been made but there is a 1-1/2 inch fracture in the bulkhead and about five abrasions within 100 inches of the manhole. An MSFC Investigation Board has been convened to investigate the incident. Mr. Jack Franklin from the ME Lab will chair the Board. The spray nozzle and associated tooling have been impounded, but NR was given go-ahead to continue cleaning of the tank and determining extent of damage. The Investigation Board will convene at NR today (10/6/69). ✓
2. S-II-10 Static Firing was conducted successfully on October 1, 1969, and cutoff was as programmed. First reports indicate that the center engine accumulator system functioned as expected, and LOX pump inlet pressures were stable throughout the run. Detailed analysis will be accomplished when accelerometer data becomes available. ✓
3. AS-507 FRT. The AS-507 FRT was completed on Tuesday, Sept. 30, 1969. A simulated liftoff occurred at 1:43 p.m. CDT. During the test, an automatic cutoff occurred at T-7 seconds due to failure in an igniter substitution box (GSE) on Engine #103 on the S-IC stage, resulting in a hold of 2 hours and 20 minutes. It was decided to jumper the igniter problem and troubleshoot after the FRT. ✓
4. Cracked Brackets on S-IC Stages: There are 32 brackets arranged in groups of 4 which join the pressurization tunnel and the electrical tunnel to the external stage structure. During subassembly of S-IC-14, three brackets were found to be cracked. Inspections this weekend revealed four brackets cracked in S-IC-7 (two cracked brackets are part of a group of four). Structural analysis by Boeing/Michoud indicates that three cracked brackets in any group of four is a structurally marginal condition. Accelerated stress corrosion tests completed this weekend confirm the cause of the cracks to be stress corrosion. A bracket reinforcement design is available and is being considered for installation prior to launch. The re-design will be available today for MSFC review. Mod kits will be shipped to KSC to be incorporated on a non-interference basis with current activities. Preliminary coordination with KSC indicates that the modification can be incorporated next weekend, October 11 and 12.

LRV: The demonstration of the Bendix and Grumman LRV's during the STAC meeting last week at Flagstaff, Arizona, was a complete success. The two Roving Vehicles were operated on Apollo 11 site terrain model and a lava flow obstacle course. The mobility capability demonstrated by these vehicles greatly impressed the group. The capability to negotiate deep craters, slopes and rocks was well demonstrated by both vehicles and generally the entire group was favorably impressed. The vehicles were driven by several individuals from the group including Dr. Gilruth, Jim McDivitt, Jack Schmitt (Astronaut), Rocco Petrone, and Dr. Mueller.

9/10/6

SPACE SHUTTLE CONFIGURATION WEIGHT EVALUATION

Personnel of the Aerospace Corporation are assisting us in determining an analytical normalization approach to assess the Space Shuttle contractors' weight proposals. The approach which has been selected is basically taking the contractors' design data, adjusting the data to a common basis and then applying weighting factor relationships that have been developed from previous Shuttle vehicle designs and also from historical data of past NASA and Air Force programs. It should be noted that this approach does not actually assess the validity of the particular vehicle configuration but only compares design characteristics of this configuration to past vehicle designs and to those of other configurations. The assessment will be first made using the 3.5M pound gross liftoff weight vehicle data and, if these results prove to be useful, an assessment will be made using the 50K payload data that was supplied by the contractors in August. Because of the extensive amount of data to be accumulated and analyzed, the results of these studies will not be available until sometime in November.

Aerospace Corporation has also agreed to provide us with their computer programs which assess subsystem weights with respect to vehicle configurations. The assistance from Aerospace is contractually covered by the NASA-DOD contract.

INFORMATION MANAGEMENT STUDY FOR SPACE STATION/BASE

An Information Management Study (at a level of \$400 K for a year) is being conducted by Mitre Corporation to consider the overall process of acquisition, computation and processing, flow, storage, display and distribution of information and data among a Space Station/Base and associated vehicles, the telecommunications to the ground and the ground data and control centers. The reason for placing emphasis on "Information Management" is to force early planning on the rational control of the large volume of data expected to be created by a Space Station/Base. Charles Beers, MSC, is COR and C. D. Carlile, PD-DO-E, MSFC, is alternate COR.

MSC was awarded conduct of the study since the responsible people in Doug Lord's shop (Dr. Jack Wild, and Ed Meyers) liked their work statement.

In a sole source award review prior to the contract, Dr. George Mueller expressed much dissatisfaction to the Mitre approach, but agreed to let them perform 25% of the study (total \$400 K). Then, he would review the study and make a decision to proceed or cancel it. The Decision Review Presentation was held 9-25-69. At the presentation, Dr. Mueller did not express any satisfaction with Mitre's effort. However, on 9-30-69, he gave permission for Mitre Corporation to proceed with the study.

9/10/6

1. QUALITY MAINTENANCE PROGRAM VENDOR SURVEY ACTIVITIES: During the period of March 1967 through May 1969, Saturn prime contractors conducted 440 surveys of 164 separate vendors which resulted in the detection of over 2000 discrepancies. These discrepancies typically fell in such areas as documentation, inspection and testing, control of manufacturing processes, specifications, calibration, traceability and procurements. A significant number of cases involving the use of wrong materials was found. Management visibility of survey activities was insured through program monitoring from pre-survey planning efforts through vendor implementation of corrective action. MSFC participation was utilized to assess prime contractor source operations and performance of Government Agency (GA) personnel delegated surveillance responsibility. NASA trip reports were forwarded to MSFC where Quality Laboratory personnel evaluated survey performance and vendor/GA discrepancies. I feel confident that the detection of these discrepancies at their source and the resulting expeditious correction afforded by the vendor survey program has averted events which could have adversely impacted mission accomplishment.
2. SPACE SHUTTLE: MSFC Drawing 85M03928, "Parts Selection and Control Requirements for Space Shuttle Vehicle and Engine", has been completed and is in the process of being released. This document establishes the minimum requirements for parts selection and control which include parts selection, quality and reliability assurance requirements, specification and procurement controls, and failure analysis. Minimum screening requirements for electronic and electromagnetic parts are given in appendixes.
3. RELIABILITY PROGRAM REVIEW: A Reliability Program Review and Survey was conducted at Bendix Corporation, Teterboro, New Jersey, during the period of September 15 through September 19, 1969. The reliability programs for contracts NAS8-30105 on ATM Star Tracker and NAS8-20661 for ATM Control Moment Gyroscope (CMG), Inverter, and Control Computer Assemblies were found to be inadequate in that Bendix has not established the controls necessary to assure effective, consistent implementation of the reliability program requirements. The report is in preparation at this time.

9/10/6

1. Cost Comparison of the Apollo Inertial Measuring Unit (IMU) and the Saturn ST-124: MSC is negotiating for an additional order of 100 gyros in support of the present Apollo Program. This will again add to the cost per flight, which has been about 13 Million dollars per IMU against 3.3 Million dollars per ST-124 if all costs such as for development, manufacturing, repair and replacement of components are included. We intend to give you a more complete presentation at the next Staff and Board Meeting.

2. Automation of Redlines: CSE-GC observed the first launchsite run of the Redline Monitor Program during terminal count sequence of the AS-507 Flight Readiness Test. The program properly recognized all Redline out-of-tolerance conditions expected on this test and performed exceptionally well. No problems were encountered. The program will be used (in passive mode) again on CDDT and launch.

981016

1. S-11-14 LH₂ TANK DAMAGE: During the inverted cleaning operation of S-11-14 at Seal Beach, a cleaning spray nozzle became detached and impacted the forward LH₂ bulkhead. The incident occurred at 4:10 p.m., 9-30-69. The immediate quick look inspection revealed a hole, a gouge, and five abrasions, all in the vicinity of 100" from the manhole adjacent to a weld land. Preliminary review of the information available would indicate the possibility that replacement of the damaged gore or gores will be required.
2. J-2S ENGINE DEVELOPMENT TESTING: The I-beam injector, which was designed to eliminate the 4400 Hz vibration source, was tested Monday night at Rocketdyne. The injector did not eliminate the 4400 Hz vibration, nor did it change any of the significant parameters associated with this problem. Because of this unsuccessful test, a special "Blue Ribbon Team" headed by Matt Ek, Chief, Engineer, was formed by Rocketdyne to expedite the solution of the 4400 Hz vibration problem. We are planning a NASA team to participate with Rocketdyne in the solution of this problem.
3. COMMERCIAL ADOPTION OF OUR NON-DESTRUCTIVE TESTING (NDT): As a result of considerable orientation demonstrations by our NDT facility personnel, Fairchild-Hiller personnel have indicated a strong interest in adopting our technique which came to their attention in one of our reports. In a test of Fairchild-Hiller honeycomb panels in which only they were aware of the location of the defects, our eddy sonic techniques discovered the flaws easily. These panels are used in quantity in their aircraft production.
5. MSC TRACE GAS CONTAMINANT DETECTION INSTRUMENTATION CONTROVERSY: We have discovered that MSC has on hand about seven of the special instruments (chromatographs) which have the capability of measuring accurately up to 50 trace contaminants. The instruments were designed and built to have been used in the Apollo Program, but never were. They are currently in storage at MSC. When we inquired about obtaining two of the instruments for use in SWS, the initial response was favorable, but after "bucking it up the line" we were told "they're being saved for later programs." In view of the austerity under which the AAP program has to function, it seems eminently logical to use these instruments in an application now, when they are vitally needed.
6. APOLLO (OWS) FECAL COLLECTION EXPERIMENT: The design of the Apollo fecal collection unit has progressed as far as possible without participation by MSC personnel. Several items, such as the mechanical and electrical interface problems, require immediate resolution to prevent schedule impact. Informal attempts to obtain information have not met with success. If the official approval of the project is not given shortly, the chances of flying the experiment on Apollo 14 will be jeopardized..

7/10/6
1. HOLOGRAPHY: SSL has built up an impressive holography capability in Bob Naumann's Division. John Williams and Bob Kurtz are the key people in this endeavor. Both are working toward Ph.D.'s. Dr. Tom Gee from the University of Tennessee Space Institute has worked with us this summer as a summer professor and has been a valuable help to us. Although we are application oriented, we emphasize the theoretical understanding of the complex Fourier optics to guide our experimental efforts. Ed Klingman, another of our Ph.D. candidates, assisted Dr. Randall of Astrionics in teaching the seminar in Fourier Optics conducted recently in Astrionics Lab. There are numerous applications of this holographic capability to MSFC programs. The fact that holograms can be used to detect changes in position on the order of fractions of optical wavelengths allows nondestructive testing of numerous objects, both large and small, under various load, no-load conditions. This load may be thermal, vibration, stress, etc. At the present time we are developing holographic nondestructive testing techniques for the following laboratories in the following areas: Astronautics Lab - various honeycomb bonds and epoxy joints; Quality Lab - honeycomb structures, various welds, and analyzing stress in solder joints on printed circuit boards. We showed some of these experiments to the BOB during their recent visit, and they seemed to be well impressed. Holographic interferometry (holometry) is being used in our own laboratory for detecting thin films of contaminants forming on optical surfaces and for flash holograms of hypervelocity projectiles in flight. I discussed this work with Hermann Kurzweg of OART. He is very interested and asked us to prepare material for possible inclusion in his next Congressional hearing presentation. We would welcome the opportunity of briefing you on our holography work at your convenience.

2. VISIT OF PROF. DR. COURTES: Dr. Courtes, Director of Laboratoire d'Astronomie Spatiale du CNRS, visited MSFC on September 29 and 30. His stellar astronomy experiment has been approved by the OSSA Astronomy Subcommittee and is recommended for a flight on the Dry WS. Dr. Johnson's office is in charge. Harry Atkins of SSL is acting as experiment scientist. Dr. Courtes is using an interesting new optical concept which he calls "insect eyes." Dr. Courtes seems to be a "space astronomer" with considerable hardware experience and with a sizable staff. It looks to me that this is a desirable involvement for MSFC and that it is worthwhile to make the necessary studies required for writing an EIP and for MSFEB approval. The Scientific Airlock seems to be a good possibility to accommodate the interfaces with French hardware. Dr. Courtes intends to study galactic arm dynamics and other galaxies by the UV radiation (1500 to 3600 Å) from H II regions (hydrogen clouds ionized by O or B type stars).

9/10/69

1. MEETING OF COMPUTER USAGE TEAM NO. 1: Dr. Seitz, S&E-COMP-CM, attended the Computer Usage Team (No. 1 of five Teams) in conjunction with Dr. Mueller's Fourth Generation Advanced Computer Study. The chairman of the Computer Usage Team is Mr. James Constantino, Office of Manned Space Flight, NASA Headquarters. The task of the Computer Usage Team is to size the proposed fourth generation computer, based upon workload considerations. Mr. Constantino split the Computer Usage Team into four task groups as follows:

- a. Baseline Data.
- b. Forecasting Methodology.
- c. Liaison (with Teams 2, 3, and 5).
- d. Integration and Publication.

Mr. Constantino's final report is scheduled for submission to Mr. James Turnock December 1, 1969.

2. PERSONNEL: Mr. Bobby C. Hodges, Computer Systems Division, Computation Laboratory, has returned after receiving the degree Master of Science in Engineering (Computer Science Major) from the University of Florida. He is scheduled to give a presentation of his thesis research titled "A Computerized University Student Health Service Information System" at the 7th Annual Meeting of Engineering Science to be held in St. Louis, Missouri on November 3-5, 1969.

3. MANPOWER SYSTEM 1108: The Manpower Personnel Administration System on the 1108 EXEC VIII became operationally current October 1, 1969.

The Personnel Administration System is a computerized personnel record for each employee. Data includes current employment status, organizational location, and personal and educational data on each employee. System was designed to output a variety of statistical reports required by Center Management and Headquarters.

System provides basic personnel information to the Security, Medical, Training, Incentive Awards, and Insurance Systems. The processing cycle for this System is weekly, monthly, quarterly, semi-annually, and annually and is composed of 19 separate programs producing 62 different reports.

4. FINANCIAL MANAGEMENT OFFICE MONTH END CLOSING ON 1108: The monthly closing of accounts and subsequent financial reports by Financial Management Office will be done on the Univac 1108 EXEC VIII System for the first time starting October 2, 1969. This is a significant management application and requires large blocks of machine time for several days. It will come at a time when priority scientific machine processing is also critical, and will be a good test of how the Center can stand conflicting priorities on our third generation system.

5. STATUS COMPUTER SYSTEM: A text and Form Editing System being developed for Research Planning Office is now printing modified supporting and technology forms, which allows Dr. Johnson to respond to specific management questions immediately. Purchasing and Financial Management Offices are developing input programs for current updating of the system.

NOTES 10-6-69 HUBER

1. SPACE TUG: One of the key ingredients of the Integrated Space Program is a "Space Tug", built around a cryogenic (Triple-M type) propulsion module. In the Space Task Group's maximum pace program, the Space Tug would be used in conjunction with Saturn V and a lunar orbit station beginning in 1976 (14-28 day missions on lunar surface). In STG Plans I and II/III, however, the Tug and Lunar Orbit Station are deferred until introduction of the Nuclear Shuttle in 1978/1981. The latter plans would not only defer introduction of the Tug, but would mean further extension (to 1978-81) of lunar exploration limited by marginal capabilities of the Apollo hardware.

2. INTERNATIONAL CONFERENCE: Mr. Georg von Tiesenhausen, PD-SA-O, attended the International Orbiting Laboratory and Space Science Conference at Cloudcroft, New Mexico, on 9-28-69 to 10-2-69. Participants from Spain, France, Germany, Russia, Italy and the USA presented a great variety of interesting papers. The conference was relatively small (about 70 persons), and provided an opportunity for several personal discussions. A more detailed report on the conference will be prepared soon.

9F.1016

MANNED FLIGHT AWARENESS SEMINAR: This seminar at MSC on September 25-26 (which you could not attend) had the motto "After the Moon - What?" I think it was very successful in pointing out our difficulties of the past as to human factors, and those we can expect ahead of us, as well as some ways to overcome them. Rocco Petrone and Lee James successfully pointed out recent problems where human shortcomings could easily have led to failures. Significant thoughts evolving during the meeting include 1) each successive launch, like Apollo 12 and subsequent, will be individual missions and can draw little from the successful past as far as human factors are concerned, inclusive discipline, devotion to job, and attention to details; 2) motivation of the individual, in the environment of declining manpower at contractors and cutting costs, as proposed by the top management of our primes (McDonnell Douglas, NAR, TBC), and most emphatically expressed by Bill Bergen was "get the supervisors out of their offices and on the floor where the hardware is built." I agree that without close supervision and utilizing the experience of the direct supervisor (be it design, manufacturing, qual), we will not tackle the problems connected with the mental condition of a worker facing discharge and still working on vital jobs.

S-II-14 FORWARD BULKHEAD INCIDENT: An MSFC Board of Investigation has been appointed to determine the cause and circumstances surrounding the detachment of the spray nozzle which resulted in the fuel tank damage during the detergent cleaning operations at Seal Beach on September 30, 1969. Chairman is Jack Franklin of ME.

FIRE PREVENTION WEEK: As you are aware, October 5-11 is established nationally as Fire Prevention Week which is to be observed by emphasizing the importance of preventing fires which cause an annual fatality rate of 12,000 people and property damage or loss in excess of \$2 billion. We will observe the week by increased training and orientation effort through several demonstrations scheduled for the laboratories and by distribution of "Safety Talks" for supervisors as well as reminders in our weekly bulletin and the Marshall Star.

NOTES 10/6/69 JOHNSON

9/10/6

UV Astronomy Package - Drs. Courtes and Authier and Mr. Laget of the Laboratoire d'Astronomie Spatiale, CNRS, visited MSFC on September 29, 30, in connection with their UV sky survey proposal. Dr. Nancy Boggess of OSSA participated in a part of the discussions. We have agreed to provide them data sufficient to permit them to complete preliminary design of their equipments compatible with the AAP-1 configurations. OSSA has agreed to sponsor them before the MSFEB. They will require no funding support from NASA for development of the experiment hardware.

Space Power System Activities - Mr. Youngblood, Astrionics Laboratory, and I visited the Lewis Research Center on October 2, for discussions on the Nuclear Power System development work at LeRC with Messrs. Slone, English and Nehles of Lewis, and Mr. Rothen and Dr. Schulman of OART. It was tentatively agreed, subject to further discussions and approvals by center managements, that:

(1) Lewis would provide to MSFC an early model Brayton Cycle Turbo-Alternater unit for experimental use.

(2) Lewis and MSFC would work out a limited "exchange visit program" involving carefully selected power system engineers in both organizations for the purpose of transferring design and test knowledge between the two power system groups.

(3) OART would initiate planning to support MSFC-OMSF system integration information requirements through provision of either design information or additional machinery from the OART research centers.

It became increasingly apparent during the discussions that there is inadequate exchange between the two Centers. They possess a vast array of nuclear power system performance and design information which we are not systematically tapping. And we are exposing them only to "air brush engineering" level requirements for total system integration in the Phase A-B study efforts in which they are participating.

The Plumbrook facility is impressive. If you have not visited it recently, you would probably enjoy doing so when it is convenient.

(Lucas)
NOTES 10-6-69 ADVANCED PROJECTS (PD)

9/10/6

1. SPACE SHUTTLE DESIGN CRITERIA REVIEW (DCR): OMSF has scheduled a Space Shuttle DCR for 10-18-69 in Washington to review and resolve major Space Shuttle issues. NASA and DOD representatives will participate in this session; contractors will not be present. MSF has limited the attendance to this meeting to the Management Council, the speakers, and three representatives of each Center. Based on this DCR, a new schedule for the Phase B vehicle and engine activities has been established:

	<u>Engine</u>	<u>Vehicle</u>
Phase B RFP release to industry	Oct. 31, 1969	Dec. 1, 1969
Phase B Proposal submittal to NASA	Dec. 12, 1969	Jan. 2, 1970
Phase B Letter Contract award	Jan. 26, 1970	Feb. 13, 1970

2. SPACE SHUTTLE TECHNOLOGY STEERING GROUP: This group (Tischler Committee) will meet in Washington on 10-6-69 to review the present total recommended program list, funding requirements, and proposed Center assignments. The purpose of the meeting is to agree on a program plan and to define funding deficiencies with the view of requesting needed funds. Dr. Mrazek, as a member of the Steering Group, and Jerry Thomson will attend this meeting.

3. SPACE SHUTTLE PROPULSION TECHNOLOGY PANEL: Representatives of MSFC, MSC, LeRC, and USAF met on 10-1, 2-69 to establish the detail plan for auxiliary propulsion (APS) technology. Agreement was reached on the details and funding requirements.

4. SPACE STATION BRIEFING: Chuck Mathews has requested that MSFC arrange to give him a status briefing on our inhouse Space Station activities similar to that given by Bob Marshall at the Douglas orientation sessions. Bob will give this to Chuck at Houston the evening of 10-9-69. At the same time, MSC will give Chuck the results of the inhouse Space Base activity.

5. SPACE STATION STUDY PLAN: MSFC review of the MDAC Study Plan has been completed, and the plan was approved subject to the incorporation of several minor changes which have been discussed with MDAC. It will be issued on 10-22-69.

NOTES 10/6/69 MOHLERE

8/10/6

No submission this week.

NOTES 10/6/69 MOORE

- 9F 10/6
1. LUNAR ROVING VEHICLE: The G&C Division in Astrionics has several inhouse ~~efforts~~ underway in both the manned and dual mode LRV navigation subsystems. Objectives are development and test of a navigation system meeting the requirements of accuracy, power, weight, volume, and operability on an LRV. One inertial system, consisting of a directional gyro, processor, odometer, and position and heading display should be ready for operational field tests by November 15, 1969. Other systems designed and being fabricated are radiation balance sun sensor, solar aspect sensor and a two-gyro inertial system. We are negotiating with the Navy for the loan of a complete inertial system (SYP811, Heading and Attitude Reference System). Navigation test beds for the above systems will be available by November 1. One will be modified for brushless dc motors for wheel drive and will have remote control. A sun compass, for use by the astronaut as an emergency navigation aid, has been fabricated. Field tests are underway with results to date looking encouraging.
 2. EARTH RESOURCES POINTING: This laboratory has studied the capability of the Saturn Workshop (SWS) attitude control and power systems to perform Z-axis in the local vertical (Z-LV) pointing in support of earth resources experiments. Results indicate that these systems could adequately support the required total of 15 orbits of Z-LV with a pointing accuracy of approximately $\pm 2^\circ$. A major constraint is that Z-LV pointing must not be done for periods longer than one orbit at a time and that at least two orbits of solar inertial attitude must occur between Z-LV orbits. This constraint is due to thermal heating and battery depth of discharge considerations. A presentation to Mr. Bill Schneider is planned early in October after the subject has been reviewed by the AAP Mission Requirements Panel.
 3. SATURN V BREADBOARD: The Saturn V Breadboard is now working one operational shift per day (40 hour week). This is allowed by a reduction of the number of software changes and the stretch-out in the launch schedule. The Breadboard concluded its support of AS-507 on September 24 and commenced support of AS-508 computer software debug on September 29.
 4. SPACE STATION GUIDANCE AND CONTROL: A study has been initiated to determine modifications to Control Moment Gyros for use on the Space Station. Modifications such as long life, maintenance capability, tie-in to a data bus concept, and elimination of gimbal stops are being studied.

NOTES 10-6-69 SIEBEL

JK 10/6

1. ATM: The degree of cleanliness required on the ATM is at present a serious consideration in firming up schedules and manufacturing methods. The investigators require a minimum of particles (size and quantity) and a minimum of outgassing from, for example, residual hydrocarbon deposits on the hardware. The specifications for the acceptable levels have not been finalized. From our side, and together with the Materials Division of ASTN, we are studying what are the best cleanliness levels we can attain within our resources of manpower, facilities and budget and within the schedule. We are also attempting to assess the effects upon the ATM environment in space of that attainable level. Meanwhile, we are precleaning to LOX levels of cleanliness all the parts to be used on the ATM prototype. We propose to perform some subassembly operations in clean rooms, but are limited by the conditions in our main assembly area (4755) pending its conversion to a 100,000 level clean area by the installation of an airlock at the entrance. We may overcome this problem by enclosing, temporarily, some major assembly fixtures in plastic clean "tents".
2. Space Experiments: The M-479 Zero-Gravity Flammability flight experiment, designed by H. Kimzey of MSC, has been officially approved by the MSF Experiments Review Board for the orbital workshop. The experiment will be performed in the M-512 Space Manufacturing experiment facility. MSFC is the development center for the combined experiments package; MSFC is responsible for the M-512 experiment and MSC retains responsibility for the M-479 experiment.
3. Gravity Substitute Workbench (Flight Experiment M-507): The Engineering Prototype of the Aerodynamic Bench has been tested at 5.3 psi pressure in the AERO Laboratory pressure chamber. The design was proven; screen size, motor speeds, etc., were verified and the design appears to be satisfactory. The formal report is in preparation. All materials submitted to ASTN by Chrysler Corporation Space Division on the electrostatic portion of the workbench have been approved.

NOTES 10/6/69 SPEER

PK 10/6

1. LIEF Presentation: We presented our plans for continued LIEF operation and a 44% overall cost reduction to Gen. Stevenson and a group of Headquarters personnel on 10/3. We mentioned briefly the potential use for AAP (MSC has an action to define the degree of support they want from us). The presentation was well received and our proposal accepted.
2. OWS Flight Control Parameters: The flight control parameters and the operational redlines for Orbital Workshop (OWS) were baselined this week as a part of the overall instrumentation baseline conducted by S&E-ASTR. The Cluster System Branch of the MSC Flight Control Division participated in the review and made significant contributions to the parameter determination. The review resulted in 159 measurements being identified as flight control parameters and 65 as redline measurements (including interlocks). This is a slight increase from our baselined Wet Workshop list, which is consistent because of increasing ground support requirements. We feel we now have a good workable baseline for OWS and are hopeful of defining the ATM requirements within the next few weeks.
3. AAP Data Redundancy Removal: With the increasing demand for data processing and analysis, because of the longer duration missions, more efficient and economical techniques have become a mandatory requirement. MSC has proposed for the AAP a data redundancy removal technique which would be accomplished at the remote sites. This technique has already been successfully used by the Air Force in some of their satellite programs. Basically, it transmits only measurement changes and eliminates repeated transmission of the same measurement value. Although we at MSFC consider this technique feasible we are not yet convinced that it is the best way to satisfy the majority of our requirements. We along with PD, CSE and COMP are evaluating various other alternatives along with this one, such as onboard data compression, various special recording techniques and data compression at the data processing center. We are striving to reach a consolidated MSFC position within the next four weeks.

NOTES 10/6/69 STAMY

9/29/69

FATALITY AT MICHLOUD: Louis L. Vaughn, a Boeing employee, was fatally injured at the Michoud Assembly Facility on Monday, September 29, 1969. A Boeing Board of Investigation has been appointed with representatives of NASA and Mason-Rust participating as observers due to the potential liability to the government and Mason-Rust. The investigation report is expected to be available in draft form by October 10, 1969.

PRESENTATION BY THE BOEING COMPANY: Representatives of the Boeing Company made a presentation to MSFC officials in Huntsville on Tuesday, September 30, 1969, concerning their proposal as subcontractor to Litton for building the superstructures for the DD-963 type destroyers for the Navy. In accordance with direction received in Huntsville, some facets of the presentation are being revised and a letter is being prepared to inform NASA Headquarters on the proposed job.

NOTES 10-6-69 Stuhlinger

1. DR. TELLER'S VISIT: ^{9/30/69} Dr. Edward Teller, Director of the University of California Radiation Laboratory in Berkley, visited MSFC on September 30 to learn details of NASA's work on nuclear propulsion and nuclear-electric power. Representatives of the AEC-NASA Space Nuclear Propulsion Office and several NASA contractors also attended to make presentations and to participate in the discussions.

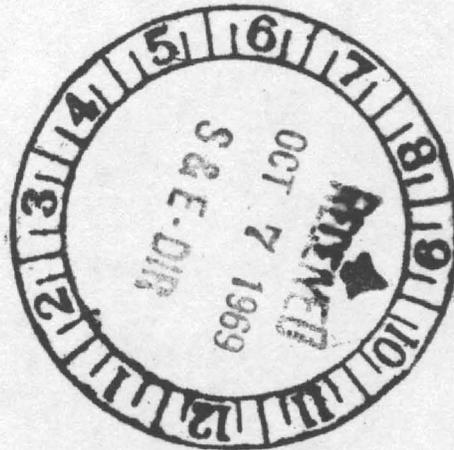
Dr. Teller's remarks indicate that he now has more confidence in the use of nuclear propulsion for manned planetary missions and that his concerns about shielding problems have been eased considerably. He also pointed out the value of electric propulsion for freight transportation to Mars. I feel that his visit was very worthwhile.

OFFICE OF DIRECTOR - MSFC

CODE	NAME	INIT.	<input type="checkbox"/> ACTION	<input type="checkbox"/> INFORMATION
S&E-DIR	Mr. Cook			

REMARKS

I have sent this note to Dr. von Braun this morning with copies to Mr. Weidner and Dr. Haeussermann. I have forwarded both copies to you in the event you would wish to add any additional comments.



CODE DIR	NAME <i>J.</i> J. N. Foster	DATE 10-7-69
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Oct 13, 1969

V.B.

NOTES 10/13/69 BALCH

B 10/14

7/12/13

S-IC-12 - All phases of stage processing are now on schedule for propellant load test on 10/15/69 and 10/16/69 and static firing on 10/22/69. However, a proposed change to provide for automatic in lieu of manual checkout of the servo-actuators may delay the propellant load test one day and static firing two days.

S-II-9 - Stage is in the vertical position in the S-II Stage Checkout and Storage Building with environmental enclosure installed. A final modification period is scheduled from 11/3/69 through 12/17/69, and shipment to KSC remains scheduled for 1/8/70.

S-II-10 - Stage is in the A-2 Test Stand undergoing post-static checkout and modifications. As a result of overall revisions to the S-II stage processing plan to provide for storage of the S-II-10, S-II-11, and S-II-12 stages at MTF, the date for removal of the S-II-10 stage from the test stand was changed from 11/6/69 to 11/4/69. ✓

S-II-11 - Stage is in the A-1 Test Stand undergoing pre-static checkout. The overall revisions to the S-II stage processing plan mentioned above changed the date for cryogenic proof pressure test from 10/18/69 to 10/29/69 and the date for static firing from 10/29/69 to 11/13/69. ✓

University Research - The Atlas Vernier Engine was successfully test-fired for a planned duration of 15 seconds on 10/8/69 as a part of one of the research tasks of Louisiana State University. Data acquisition was satisfactory, and the processed data was of good quality. ✓

NOTES 10/13/69 BELEW

BELEW YF 10/13

B 10/14

HARDWARE MAKE OR BUY: On Oct. 10, during his visit to MSFC, Mr. Schneider gave me verbal approval to proceed with MSFC's plan for the prime contractors to supply the TACS Thruster System, OWS Solar Array, Payload Shroud and MDA integration and assembly/checkout. We are directing the contractors accordingly since long lead procurement has to be initiated on TAC and Solar Array hardware. ✓

LEVEL II BOARD MEETING: The meeting was held with Bill Schneider, MSC and KSC representatives in attendance to decide on two items. The first (hardware relocations on the Airlock and Workshop and clocking the deployed position of the ATM) was to facilitate EVA by providing a line of sight for observation and film transport between the Airlock hatch and the ATM side workstation. The change was approved for submittal to Level I with recommendation for Schneider's formal approval. The second (substituting a 1-g hard grid ceiling and providing a side access door in the OWS) was to greatly facilitate in-plant assembly and checkout as well as to improve KSC testing and launch preparation accessibility. The Board favorably received the change but requested some additional data on testing requirements prior to approval for submission to Level I. ✓

INTEGRATED SYSTEMS TEST: At a meeting involving S&E and PM top management on Oct. 7, it was concluded that cost and schedule constraints dictated that the integrated test of AAP 1-2 orbital hardware should be performed at KSC. Desire for test configuration validity places the center of gravity of the testing in the stacked configuration, with such exceptions as firm requirements may dictate. Under the technical leadership of CSE, working with KSC and MSC, the test definition is to be essentially complete in two months. We are discussing management aspects of the testing with General Morgan and the involved elements at MSFC. ✓

CLUSTER SYSTEM DESIGN REVIEW: The purpose of this review (Dec. 1-5) is to insure that all AAP modules are updated to the dry Workshop configuration and to close out open areas in the Cluster Requirements Specification. This combined review replaces a number of individual preliminary design reviews previously planned for updating the system. ✓

THERMAL SYSTEM UNIT PROCEDURES: We have developed a matrix of events with organizational responsibility covering procedures, hardware delivery, and software delivery in connection with the thermal vacuum test of the ATM thermal unit at MSC. This matrix will be used to identify and track the events leading to a successful conclusion of this test. ✓

DEPLOYMENT ASSEMBLY: A meeting between S&E and MDA C-ED was held Oct. 6 to discuss the design of the Deployment Assembly. The MDA C-ED presented five "free" joint concepts and one rigid concept to S&E with the results of deciding on one each. This week, both S&E and MDA C-ED are conducting independently an objective trade-off between the two remaining configurations. Today, MDA C-ED will present to MSFC their study and recommendation. The MSFC must decide by Oct. 15 to obtain a firm cost proposal by Oct. 31. ✓

BETHAY 9/10/13

B 10/14

OMSF R&D FUNDING CONTROLS - OMSF has provided MSFC, MSC, and KSC FY-70 and FY-71 funding controls for use in preparing FY-71 Budget data. These controls indicate major cuts for the Centers' requirements as recently submitted in POP 69-2C. Reductions for each Center are as follows:

(Dollars in Millions)	MSFC	MSC	KSC
<u>FY 1970</u>			
POP 69-2C	\$793.0	\$1,029.7	\$285.1
Control	713.8	934.4	285.1
△	-79.2	-98.0	0
<u>FY 1971</u>			
POP 69-2C	\$832.7	\$1,083.9	\$262.3
Control	687.2	847.9	243.7
△	-145.5	-236.0	-18.9
Total Reductions	-\$224.7	-\$334.0	-\$18.9

MSC's FY-70 reduction of \$98M was primarily \$64M in Apollo/Lunar plus \$17M and \$16M in AAP and Lunar Exploration Program Number 2 respectively. In FY-71, MSC received major cuts in Apollo/Lunar (\$128M) and Lunar Exploration Program Number 2 (\$110M) with other reductions in Advanced Development (\$4M) and Advanced Missions (\$1M). KSC received no FY-70 reduction. The \$19M reduction in FY-71 was primarily in their Apollo/Lunar Program. Marshall's reduction by programs is reflected as follows:

	FY 1970			FY 1971		
	POP 69-2C	Control	△	POP 69-2C	Control	△
Apollo/Lunar	\$503.5	\$503.0	-\$.5	\$365.0	\$300.0	-\$ 65.0
Follow-on Prod.	46.0	46.0	0	179.4	100.0	- 79.4
AAP	171.4	154.2	- 17.2	253.5	278.3	+ 24.8
Adv. Development	71.0	7.0	- 64.0*	24.0	8.0	- 16.0
Adv. Missions	1.1	.9	- .2	10.8	.9	- 9.9
Space Station	**	2.7	+ 2.7	**	**	---
Space Shuttle	**	**	---	**	**	---
	\$793.0	\$713.8	-\$79.2	\$832.7	\$687.2	-\$145.5

*The FY-70 \$64M reduction in Advanced Development would not be as severe an impact to the Center as would the reductions to the Apollo/Lunar and Apollo Applications Programs.

**Dollars amounts being included by OMSF.

Mr. Gorman called Lt. Gen. Bogart and sent a TWX to MSF outlining program impact and requesting that funding controls by Centers not be made prior to the POP Review with Dr. Mueller and discussion with Dr. von Braun. ✓

ESTABLISHMENT OF NUCLEAR STAGE PROJECT OFFICE AT MSFC - Mr. Milton Klein, manager of the SNPO, has contacted Dr. Mueller about establishing a Nuclear Stage Task Team or Project Office at MSFC. Contact was made by letter dated August 7, 1969, through Mr. Lundin, OART. The Task Team would receive institutional support from OMSF, and program support and direction from SNPO. Mr. Klein emphasizes the need to move ahead in developing total requirements for the nuclear propulsion system, and the importance of focusing all nuclear rocket stage activities at one office.

NOTES 10-13-69 BROWN

B 10/14

9F10/13

F-1 Engine Pump Configuration: The F-1 development program experienced several LOX pump explosions which were never fully explained. The prime suspect was (and is) fatigue of the pump impeller. Following the last explosion the impeller life has been limited to 3500 seconds. As a backup, a 6 x 6 (six full vanes and six half vanes) impeller was developed. The 6 x 6 impeller development has gone well and has now been qualified through about 450 starts and 12 turbopumps. It has the potential of moving the pump operating limitation up to 1800K (sea level) but it has no flight experience. We had recommended that this and several other rotating machinery changes be included in the follow-on engines to Dr. Petrone in the LDX on low cost vehicles on September 12. Dr. Petrone suggested that we reconsider whether a change from a pump configuration that has such a successful flight history should be made.

A meeting was held on October 7 with the Astronautics Laboratory to reconsider incorporation of the improved turbopump rotating parts in the follow-on engines. On the assumption that we will not be asked to uprate the F-1 engine, it has been decided that the rotating machinery changes will not be included in the follow-on engines. ✓

J-2 Engine Electrical Control Assembly: The ECA for the J-2 engine is based on technology at least 10 years old. It has no redundancy and it has been the most troublesome subsystem of any of our engines. Many of the ECA component parts (transistors, resistors, etc.) in the current ECA are no longer manufactured. The follow-on J-2 engine buy will therefore require some design changes, rebalancing, and requalification.

The J-2S development program has pursued the "welded module" design approach in its ECA. In conjunction with S&E, we have decided to build follow-on J-2 engine ECA's with the welded module technology. The change is more extensive and more expensive but the price is small in relation to the increased engine reliability which the welded module will provide. ✓

B 10/14

9K 10/13

1. ASTRONOMY SUBCOMMITTEE MEETING: I attended a meeting of the Astronomy Subcommittee of OSSA's Space Science and Applications Steering Committee. The primary purpose of this meeting was to review proposals submitted by the scientific community in response to a Flight Opportunities Announcement for OSO's I, J, and K. OSO-I is scheduled for flight in FY-73. Although it is not represented as a "new start," OSO-I will provide a significant increase in spacecraft payload capability relative to the present OSO design.

The OSO spacecraft includes a pointed section and a wheel or rotating section. Both sections accommodate experiments. Most of the experiments proposed for the OSO-I wheel section are stellar rather than solar experiments. There was a significant response from the scientific community for X-ray experiments in the low energy region of the spectrum (1 Kev to 0.1 Kev). Observations of such low energy celestial radiation are valuable in obtaining information on interstellar absorption and on the intergalactic medium. The OSO experiments are small and are not comparable to the experiments being considered for the High Energy Astronomy Observatory.

There will be a special meeting of a few members of the Astronomy Subcommittee later this year to evaluate a few lunar surface astronomy experiments. A group from MSC is proposing an 0.5 meter lunar surface telescope to operate in conjunction with an advanced ALSEP system. ✓

2. GULF STREAM DRIFT MISSION: The data reduction activity at Grumman is proceeding satisfactorily. Mr. May is technically supervising this effort. Mr. May has been requested to make a presentation late this month to MTF on the Gulf Stream Drift Mission. He plans to accommodate this request. Many such requests are being received and we desire to support as many of these requirements from NASA and NASA contractors as our time and travel funding permit. Several talks can be provided during a single trip to the west coast. ✓

3. ASTRONOMY MISSIONS BOARD PRESENTATION: Dr. Mueller has requested and is now committed to make a presentation on Stellar ATM to the Astronomy Missions Board on October 17 or 18. I understand that the primary purpose of this presentation is to convince the AMB that ATM-B should be stellar rather than solar. This will be a most difficult point to make with the AMB. I understand that Dr. Mueller will not be able to make the presentation and he has asked others to make it. I understand that the "buck is being passed" and for various reasons I hope it doesn't get passed to MSFC. We are ill prepared for this, since we do not know what Dr. Mueller's Stellar ATM is yet and haven't studied it. The purpose of putting this in the Weekly Notes is to suggest that MSFC should avoid participation in this presentation if possible. To date, we have only been asked to provide a small amount of data to MSF, and I hope that our required participation does not increase. We should not volunteer participation. ✓

4. HEAO: Dr. Naugle has signed but not yet released the Flight Opportunities Announcement Document for HEAO. ✓

9/10/13

B 10/14

1. SPACE SHUTTLE AERODYNAMIC TESTING: An aerodynamic study program of the Martin concept of the Space Shuttle is being outlined to cover the period up to initiation of the Phase B contracts. A data package of available aerodynamic information from the Martin reports has been assembled. The booster cruise capability is considered to be inadequate; therefore, a joint analytic study and test program with Martin will be emphasized. A test program has been established as follows:

a. A composite model to be supplied by Martin will be tested in the MSFC 14-inch TWT from $M = 0.2$ to 5.0, beginning November 3. Six-component, low angle-of-attack stability data will be obtained on the orbiter, booster and launch configurations.

b. Martin will provide a model capable of testing parametrically, geometric variations. This will be available in mid-December for testing in the MSFC wind tunnel.

c. We are presently working with Martin on additional large scale, booster and orbiter tests both at low speeds and hypersonically at various angle-of-attack. ✓

2. MEETING OF THE PLANETARY ATMOSPHERES SUBCOMMITTEE: Dr. Leonard L. DeVries of our Aerospace Environment Division attended a meeting of the OSSA Planetary Atmospheres Subcommittee last week as an observer. The primary purpose for this meeting was to evaluate proposals (30 proposals received) for experiments to be carried on Explorer AE-C and AE-D spacecraft. These spacecraft missions are planned for 1972 and 1973 and will be launched by Delta-class vehicles. The spacecraft will weigh about 600 pounds, not including propellants, and will accommodate about 100 pounds of scientific instrumentation. The primary objective of these missions is to investigate the chemical processes and energy transfer mechanism which control the structure and behavior of the Earth's atmosphere and ionosphere in the altitude region 120-400 km. ✓

3. WORLD-WIDE CLOUD STATISTICS: The Earth Resources Division at MSC has requested a copy of our World-wide cloud statistics for use in assessing the impact of cloud cover on various future Earth Application missions. These statistics have been furnished to the requestor. ✓

4. ARTICLE IN HUNTSVILLE TIMES ON S-IVB LUNAR IMPACT: An article appeared in the Huntsville Times on October 7, 1969, concerning the impacting of the AS-508 S-IVB/IU on the lunar surface. An accuracy of 10 miles was quoted for targeting to the impact point. Actual expected accuracy is between about 95 and 190 nm. The reporter who wrote the article received his information at a lecture given by Mr. Don Beattie, OMSF-MAI. Mr. Jones of PAO has been informed that this accuracy is not possible, and he has agreed to relay this information to the reporter at the Huntsville Times. ✓

5. THESIS FOR MASTER'S DEGREE: The University of Virginia has approved a thesis entitled "Effect of Wall Roughness on the Damping of Liquid Oscillations in Rectangular Tanks," submitted by Frank Bugg of our Dynamics and Control Division. The approval of this thesis marks the completion by Mr. Bugg of all academic requirements for the degree of Master of Science in Mechanical Engineering. The degree will be awarded in June 1970. ✓

AC

NOTES 10/13/69 GODFREY

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SATURN:

1. Cracked Brackets on S-IC Stages: The hardware change on S-IC-7 to correct the tunnel platform cracked brackets has been reviewed and approved by MSFC. Representatives of Astronautics Laboratory reviewed the change in detail. Mod kits, which consisted of adding support to the tunnel platforms, were delivered to KSC on October 9 and installed during the period of October 10 - 12. This fix will be effective through S-IC-13. Stages S-IC-14 and subsequent will be corrected in production. ✓
 2. S-II-14 LH₂ Forward Bulkhead: Two methods of repair of the bulkhead were discussed at a joint MSFC/NR meeting on October 10. One was a doubler repair of the bulkhead and the other was exchanging bulkheads with S-II-15. NR recommended a doubler repair. After discussion, MSFC agreed. S-II-15 tank is assembled down to ring 3, and a large amount of cutting and rewelding would be required to exchange bulkheads. We will not permit NR to cut the bulkhead in preparation for the doubler until we have jointly agreed on a doubler configuration and are satisfied that a pull test program has established the validity of the doubler. The repair and verification program can be accomplished without delivery impact. Some overtime will be required. ✓
 3. Potter-Brumfield Relay Failure IU-507: After 507 FRT, the relay in the Switch Selector Power Control Circuit was found inoperative. The relay was replaced by one from another lot and reverified over the weekend. Failure analysis has indicated a burned coil. Tests on other relays from the same lot (6707) have shown that heavy overloads (example 40 volts for 10 minutes) are required to burn the coil. Data surveys have shown that one other relay of the same lot failed on acceptance test because of low coil resistance. All data indicates this is a relay coil problem, not a system problem. Analysis is continuing - no impact on 507. ✓
 4. Saturn Program Technical Audit: The audit began October 6 with the Quality and Manufacturing Team at IBM, Huntsville, and the Checkout Team at North American Rockwell, Seal Beach. The teams are making good progress with excellent cooperation by the contractors. Each team has a member from our five prime contractors. The mix of government and contractor team membership is giving a positive benefit to the team and to the contractor being audited. Weekly progress reports in more detail will be distributed to interested parties. ✓
- LRV: Formal LRV negotiations begin today with Boeing and Bendix. Informal meetings between project personnel and both contractors have occurred during the past week in an effort to clear up certain gross technical and management points. Current plans call for letter contracts signed by each contractor to be presented to Dr. Paine for final source selection in late Oct. ✓

NOTES 10-13-69 GOERNER

9/13

B 10/14

HIGH ENERGY ASTRONOMY OBSERVATORY (HEAO)

The Preliminary Design Office is currently preparing the technical portion of the Phase B work statement for the HEAO and will submit a first draft to Mr. Carroll Dailey, PD-MP-S, on October 20, 1969. The HEAO schedule calls for release of the Phase B RFP during the first week of January 1970, and we will conclude our Phase A inhouse study activity and associated documentation in time to make the results available to prospective bidders prior to the RFP release date.

Two subsystem supporting contracts are now in the procurement cycle and technical work should start in the very near future; both are funded by OSSA. Bendix will study the attitude control and aspect sensing problem and the Applied Physics Laboratory will investigate magnetic torquing devices.

Our in-house effort now includes brief analyses of two alternative configurations in addition to the baseline HEAO. The baseline has fixed, body-mounted solar arrays and spins about the transverse axis. The first alternative employs both fixed and deployable solar arrays and spins about the transverse axis; the second alternative employs both fixed and deployable solar arrays and spins about the longitudinal axis. Pertinent characteristics of each configuration are being defined and the advantages and disadvantages of each will be assessed. Mr. Carroll Dailey informed us on October 8, that in view of the marginal spacecraft power capability which we have encountered, the Program Manager in OSSA and the Project Scientist at GSFC have agreed that the galactic plane scan which required substantial displacement from the solar vector and attendant power degradation should not be considered as a priority requirement and, thereby, configuration driver. Assessment of the alternative configurations will be made on this basis. ✓

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10/14

JF 10/13

LARGE SCALE INTEGRATION (LSI): Based on the question you asked Dr. Shea last Monday concerning LSI, I thought you might like to have some more background information. Widespread use of LSI on the Space Shuttle and other new space programs will allow: (a) weight reductions of 10 to 1 in electrical systems. In the supersonic transport, a weight reduction of 2000 pounds will be possible through the use of LSI multiplexers to monitor sensor data, (b) volume reductions of 12 to 1 are possible, and power consumption is cut in half, (c) drastic reductions in the number of external connections in an electronic system are possible. The end result is an increase in system reliability; and (d) improved maintainability of complex systems is accomplished. ✓

A typical integrated circuit contains up to 15 gates built into one chip, and mounted in a package with 14-16 leads. LSI is a higher level of complexity in which a complete silicon wafer (1½ inches in diameter) is mounted in a package with up to 156 external leads. Up to 3000 electronic elements including transistors, diodes, and resistors are built into the silicon wafer and are interconnected on the surface to form the equivalent of over 200 computer logic gates. There is no definite agreement as to what level of complexity constitutes LSI; however, a complexity of over 200 gates is generally accepted. ✓

LSI circuits can be divided into bipolar and metal-oxide-semiconductor (MOS) types. Texas Instruments, Inc., Motorola, and Fairchild Semiconductor are the leading manufacturers of bipolar LSI. General Instruments, Inc., American Microsystems and Autonetics lead in the field of MOS LSI. Although the technology is far from perfect, LSI circuits are being used by the Air Force and the National Security Agency. Raytheon in Massachusetts has developed a computer for Rome Air Development Center that uses Texas Instruments LSI. ✓

Some major problems remain to be solved to allow full exploitation of LSI. System designers need to adjust to the new design concepts using LSI instead of discrete parts and microcircuits. Multiple-lead hermetic packages need to be developed to protect the circuits and permit full utilization of their performance and reliability potential. A reliable, inexpensive method for assembling and interconnecting must also be developed. In addition, most LSI circuits produced to date are custom made at high cost. ✓

The Technology Division of the Astrionics Laboratory and the Future Programs and Technology Office of this Laboratory work closely together in this field, which I believe needs to get even more attention in preparation for forthcoming space programs. A proposal on how to get this increased attention will be made to S&E-DIR in the near future. ✓

9/10/13

1. AAP Integrated Cluster Test: The alternatives under consideration for an AAP integrated systems test were presented by CSE to MSFC management on October 7. It was determined that the integrated systems test would be conducted at KSC rather than at MSFC. The desirability of conducting the subject test in the stack at the VAB versus the assembly in the MSOB was left unresolved pending further studies. CSE is to perform an indepth study to arrive at the best possible configuration and location at KSC. Among the considerations of this study will be requirements, constraints, limitations, and program impacts of each test configuration. ✓
2. AAP Emergency & Warning System Meeting: A meeting was held at MSFC on October 8 with the astronauts and other MSC personnel to discuss Appendix H, Emergency & Warning System Design Integration Requirements, of the Cluster Requirements Specification document. It was learned that the astronauts official comments to Appendix H had not been included at all during the MSC review of the document. They are basically opposed to almost everything contained in the specification and intend to issue an Engineering Change Request to get the document modified. Their changes would result in major impacts to the present system design. ✓
3. 108K Payload Capability Study: In June of this year MSFC received a request to study the possibility of increasing the Saturn V launch vehicle payload capability to approximately 108,000 pounds. A study was initiated within S&E and preliminary results indicate that the 108,000 pounds is not achievable by using the current Saturn V vehicle plus certain "easy to obtain" payload improvement items. To increase the payload capability to the desired level, several modifications have been introduced into the study; incorporation of the dual thrust F-1 engine and higher operating thrust level for the F-1 engines. In the dual thrust mode the F-1 engines would be operated at a thrust level of approximately 1.57 million pounds each during the first half of the S-1C stage burn. In the higher operating thrust level mode the F-1 engines would be operated at a thrust level of approximately 1.55 million pounds each throughout the S-1C stage burn. In either case, the payload gain would be approximately 1,400 pounds. If, after the incorporation of either of the above, the vehicle does not produce 108,000 pounds of payload capability, we will either request a lower payload requirement or incorporate vehicle changes that may be considerably more costly or less easily obtained. ✓

NOTES 10-13-69 HEIMBURG

B 10/14

1. S-II-14 LH₂ FORWARD BULKHEAD: The contractor presented his recommended disposition of the damaged forward bulkhead to MSFC on 10-10-69. The contractor recommended using a doubler for repair. The basis for this recommendation is because the membrane and weld land of the damaged and adjacent gores are on the high side of the thickness tolerances. This gives a factor of safety higher than the minimum. Therefore, a doubler can be installed without degrading the factor of safety below an acceptable level. This laboratory is in agreement with this recommendation. ✓
2. NEW DIAGNOSTICS CAPABILITY IN MATERIALS DIVISION: After several months of trying to obtain an electron paramagnetic and cyclotron resonance spectra of aluminum, we have finally found a technique by which to accomplish both. This accomplishment now gives us the ability to determine the effects of stress, strain, and corrosion, as well as aging and working parameters, on orbital and free electrons within the crystal lattice of aluminum and its alloys. It is our belief that with the use of the above resonance techniques we may be able to establish exactly what the stress corrosion process is and how it causes rapid failure in materials. ✓
3. SHUTTLE ACTIVITY: In an effort to update and improve the welding technology required for shuttle, we have now TIG welded Columbian panels .015" thick at 8-1/4 inches per minute, using an Argon covergas. As a result of this activity, we see no basic problems in assembling corrugated heat shield panels for the space shuttle. ✓
4. NEUTRON RADIOGRAPHY: Our ion accelerator has been modified to make it acceptable for neutron radiography studies. According to the manufacturer of the accelerator, this is the only such accelerator in the country that is so modified and they are quite interested in it because of possible commercial applications. We are studying applications in a joint effort with QUAL laboratory. Although the technique appears extremely promising and superior to X-ray techniques for many special applications, we would suggest caution in using it at this time for acceptance criteria, simply due to the immaturity of the technique, the lack of standards, etc. ✓
5. NICKEL SHORTAGE: It appears that there may be a rather serious shortage of nickel in the next few years. Much of this is attributed to the strikes at INCO, but the steel producers have been publicizing the fact that not enough nickel is being mined and that there is simply more demand than supply. Top defense department ratings are required for procurements. Although NASA also has a high rating, we could be in some difficulty with future procurements of high nickel alloy engine components and with procurements of materials for evaluation and development of space shuttle superalloy hardware. Orders will be very slow in coming. The situation may certainly influence our selection of materials for space shuttle components. ✓

7/2/70
 K.H.
 Can someone explain to me in 15 min, how this works? In basic elementary terms
 B

NOTES 10-13-69 Heller

B 10/14

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1. OSSA SENIOR COUNCIL, OCTOBER 7-8: This meeting was very interesting from many viewpoints. It was especially important for me because it touched on future programs, future Headquarters-Center relationships, and the "new way of doing business." I hope that we can cash in on Dr. Paine's endorsement of the value of NAS research associates. A doubling of the quota from 12 to 24 would be very beneficial for MSFC. ✓

GH.
Do we have a decision on that respect?
J

2. VISIT TO A. D. LITTLE: I visited the A. D. Little Company on October 9 to see the experimental hardware they have built for the AESAP and ALSAP. This hardware includes: Retro-Reflector Array, Thermal Probe (P.I., Langseth), and Gravimeter (P.I., Weber). The latter two experiments are H mission experiments. While at A. D. L., I talked to two of the lunar P.I.'s, Mark Langseth (Lamont Observatory) and Gene Simmons (MIT), about the role of P.I.'s and of Center scientists. They are looking forward to working with MSFC on experiments carried on Lunar Rovers. They are strong advocates of the Dual Mode LRV. ✓

3. ENVIRONMENTAL CRITERIA: SSL has furnished inputs to AERO in connection with the updating of the environmental criteria. AERO is in the process of preparing a document entitled "Supplemental Natural Environment Criteria for the NASA Space Station Program." SSL has the responsibility for three areas for all MSFC projects: particle radiation, meteoroids, and thermal radiation environment. Members of SSL also participated in a meeting at MSC where the interplanetary environment was discussed. ✓

9/10/13

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18/14TECHNICAL PAPERS:

Dr. H. Kerner and Mr. L. Gellman presented a paper on "Memory Reduction for Spaceborne Computers" at the AIAA Computer Conference, September 1969, in Los Angeles, California. The method proposed is of significance especially for interplanetary missions. ✓

Dr. R. Seitz is co-authoring a paper entitled "Text Editing and Management Information Displays Using Low-Priced Graphic Terminals" with Dr. D. Robert Parker, Brown Engineering Company. The paper will be given on October 16, 1969, at the Sheraton Inn in Huntsville at a symposium entitled "The Engineer and Computer Graphics." The symposium is a part of the 7th Annual Conference and Short Course of the Huntsville Chapter of the American Institute of Industrial Engineers. ✓

NOTES 10/13/69 HUBER

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NUCLEAR STAGE/PAYLOADS STUDIES: The first formal progress reviews on three current study contracts (Lockheed, McDonnell Douglas, and North American-Rockwell) were held at MSFC during the week of October 6. Studies of potential unmanned missions/payloads (Outer Planets, Mars Surface Sample Return, Barium Cloud Experiment) are included, in addition to nuclear stage definition studies. All three contractors seem at this point to be doing a good job. Several interesting approaches for alleviation of nuclear shielding problems were presented, including standpipes and dual-wall tanks. ✓

SNPO has been instructed by Dr. Paine to re-orient the NERVA program to support the Nuclear Shuttle concept, and to target toward a 1977 test flight date. ✓ Accordingly, we will direct the three stage study contractors to concentrate the remaining study effort on the Nuclear Shuttle, for operational use beginning in the 1978 time period. Initial Study efforts were concentrated on expendable nuclear stage concepts. ✓

Some MSC personnel have indicated a strong interest in the Nuclear Shuttle recently. Two MSC representatives attended the study reviews here. Some comments have been made regarding similarity of the Nuclear Shuttle to the anticipated MSC responsibility for the orbital stage of the Space Shuttle. ? ? ! B

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NOTES 10/13/69 HUETER

JF. 10/13

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DOCUMENTATION OF APOLLO ACCIDENT/INCIDENT EXPERIENCE: General Electric has been given a task by Headquarters to accumulate accident/incident knowledge for the Apollo program. The desire is to document our experience as well as the experience of the contractors. Mr. Chuck McGuire, of Mr. Petrone's office, and Mr. George Cranston, the GE representative, to head the task team effort, visited Marshall on Thursday, October 9, to discuss the requirements on MSFC and its prime contractors for this effort. We are currently coordinating plans to support this effort with the concerned MSFC organizations. ✓

NOTES 10/13/69 JOHNSON

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Freeze on FY-70 Obligation in Space Vehicles - Bruce Lundin, in a TWX on October 9, froze all procurement actions in the Space Vehicle, Aerothermodynamics and Structures Programs sponsored by OART and directed decommitment of funds not already obligated. We had already obligated \$108,000 in the Structures Subprogram. The residual funds \$1,650,000 have been frozen pending a review by OART on Shuttle and Space Station requirements and resubmission of proposals from this Center to OART. ✓

In a telephone conversation on October 10 with E. O. Pearson of the OART Space Vehicles Program Office, he directed that the further submission of requirements to OART be delayed pending an analysis of the OART budget and the issuance of a new guideline to the Center. In the same conversation, he gave technical approval for the release of authority by OMSF to the Center for the conduct of a Supporting Development Program in the area of structures. The work to be undertaken is to be selected by the Center from lists of individual tasks approved by Messrs. Love and Anderson of Langley and does not include any of the work originally contemplated by MSFC in its submission to OMSF on June 1. ✓

NOTES 10-13-69 ADVANCED PROJECTS (PD)

B 10/14

9/20/13
SPACE STATION MONTHLY REVIEW MEETING: The first Monthly Review Meeting with McDonnell Douglas Astronautics Co. on the Phase B Space Station Study was held at the LIEF Center on 10-8-69 with the Field Director's Review Group (fog prevented Col. Borman's attendance), NASA Headquarters, other participating Centers, AEC, Air Force, and many MSFC personnel. A similar review took place the next day at MSC with NAR. The Review group was pleased with the progress of both contracts, and no action assignments resulted. Chuck Mathews participated in the MSC review and verified the launch readiness date of Mid-75 for the first Space Station module. ✓

Statement of Work
Mr. Hamon was one of the many Headquarters attendees at the first Monthly Review on 10-8-69. He is a member of the MSF Space Station Task Force and he requested a separate discussion during the afternoon concerning the programmatic implications of the FY 71 budget request that Dr. Paine presented to the BOB. He indicated that Dr. Paine requested \$80M for the Space Station in FY 71 and that Mr. Mathews, for the time being, was holding firm to a launch readiness date of mid-75. According to Mr. Hamon, because of imposed budget ceilings, the Headquarters Apollo people had included no funds in FY 71 for the following Space Station related items: a) Intermediate 20 Launch Vehicle, b) Intermediate 21 Launch Vehicle, c) J-2S Engines for the S-II Stage (identified as a baseline in the SOW), d) Space Tug. The Intermediate Logistics System initially included a Tug function for the orbital assembly and buildup of the Space Base. It was also intended for use in maneuvering the free-flying and the docking of separate experiment modules to the Space Station. With the drastic reduction and reorientation of the Phase B Intermediate Logistics System effort, this effort has disappeared from the program. Therefore, a capability for performing the functions described above is not being provided for in current plans. ✓

DUAL MODE LUNAR ROVING VEHICLE STATUS: Four days of review were held last week with Grumman and Bendix to assess the status of the Dual-Mode (manned-remote controlled) Lunar Roving Vehicle. Both contractors have proceeded well into the definition of a specific configuration and plan to submit a vehicle specification, development plans, a preliminary design, and a detailed cost estimate prior to the end of the study in Feb. 70. Preliminary information will be supplied to us prior to that time so that the final reported data will represent at least one detailed NASA iteration. Both contractors believe that a Dual-Mode LRV can be developed for launch in 1973 on one of the first of the "new buy" of Apollo hardware. Both configurations are expected to benefit greatly from the Manned LRV (MLRV) development and the Bendix version will be a direct modification of the MLRV provided they are selected for that contract. Both Grumman and Bendix cost estimates will include the development and production of four units, plus one equivalent spare and associated ground support equipment, facilities and launch support. In addition, the Bendix cost proposal will designate the cost delta required to develop the dual mode roving vehicle using the MLRV as a basis. ✓

NOTES 10/13/69 MOHLERE

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9/10/13
REDSTONE SCIENTIFIC INFORMATION CENTER: Dr. Juilian S. Kobler of the Research and Development Directorate in the Missile Command will shortly assume full time responsibilities as Director of the RSIC. ✓

RSIC ECONOMY MEASURES: The Information Center has recently suffered a rather drastic reduction in its personnel ceiling. This is the direct result of stringent economies dictated from Washington. This situation has caused the RSIC to review the services offered its patrons. Essentially these changes will result in patrons doing a bit more for themselves in taking advantage of the library services. For example, the library will now be unable to respond to telephone requests for reproduction of articles from journals and for delivery of books. Of course, the governing regulations for the RSIC make provisions for over the counter services anyway, so these new restrictions cannot be considered as degrading services. ✓

NASA/ASEE SYSTEMS DESIGN PROGRAM: As a result of several faculty members from South Dakota State University participating in the NASA/ASEE Systems Design Program conducted by Auburn University at MSFC, that university will initiate a systems design program patterned after this. ✓

REQUEST FROM TALLADEGA COLLEGE: We received a request from Dr. Bacon of Talladega College to use on a non-interference basis an electron microscope in connection with work on grant from the Public Health Department. We are indebted to Astrionics in general and Jim Taylor in particular for their cooperative attitude in agreeing to Bacon's use of their scanning microscope. This falls nicely into place in fulfillment of Federal policies towards universities. ✓

ASSIGNMENT OF DR. CUTCHINS: This Office with assistance of the Director, A&TS, and very tangible assistance from the Program Management Directorate arranged with Auburn University for the assignment at MSFC of Dr. Malcolm Cutchins, Professor in the Aerospace Department, for the period September 15 to June 15, 1970. Cutchins' assignment is in Technology Utilization area with specific responsibility for preparing a report which will outline methods and techniques for appropriate classroom instruction in the Systems Approach, i. e., Systems Engineering. ✓

- 9/10/13
1. ATM WIRE: Astrionics has established firm recommendations as to which hookup wire is to be used on ATM flight black boxes. This culminates an extensive effort to select a wire which does not outgas and which is acceptable from solderability and weight aspects. The wire is nickel plated copper, jacketed with teflon and coated with polyamide. The recommended wire has good resistance to flammability and is also acceptable for use inside crew compartment areas. Packaging specs to maintain the required wire cleanliness have also been established. ✓
 2. SLUSH HYDROGEN POINT LEVEL SENSOR: We have completed a prototype discrete level sensor for slush hydrogen and we are preparing it for shipment to the National Bureau of Standards, Boulder, Colorado, for test. This unit utilizes a change of capacitance to detect slush quantity and could be applicable to Space Shuttle and/or long term orbital storage. ✓
 3. SHUTTLE SENSOR MEETING: At the request of Dr. Tischler, OART, and Mr. Wedan, ECR, we have scheduled a meeting at MSFC this week to firm up a sensor technology plan which includes the requirements of the Space Shuttle working groups such as structures, life support, and propulsion in an integrated fashion. The results will be incorporated into our support of Mr. Wedan's Integrated Electronics Working Group which meets again on October 21. ✓
 4. VISIT TO MSC REF SHUTTLE AVIONICS: Along with others from MSFC, Dr. Haeussermann and I visited MSC on 10/9/69 to discuss the Space Shuttle avionics system. MSC presented their avionics system concept as well as some hardware technology efforts which could support the avionics system development. The concept presented included the digital data bus method of intercommunication and the sharing of the onboard computation between two central computers and smaller computers located in each major subsystem. Portions of the system were identified as being potentially common between the booster and orbiter (identical design with a different set of hardware in each stage) while other items would be tailored to the specific stage application. We are in general agreement with the technical concepts which are similar to those being proposed by several contractors. ✓

In a special meeting with Bob Gardiner (Max Faget's Assistant Director for Electronics Systems) and some of his key personnel, we found a completely receptive attitude concerning the possibility of splitting between MSC and MSFC the responsibility for development of common avionics system components which would be used in an MSC orbiter and MSFC booster. ✓ We agreed that the overall concepts and subsystem interface specifications would have to be mutually derived and then each element assigned to one of the centers for development. ✓ While it is too early to arrive at a detailed definition of the split of assignments, the atmosphere seems conducive to further pursuit of the arrangement. ✓ With your concurrence, I would like to continue these discussions with Bob Gardiner to further develop a definition of avionics responsibilities for your consideration. ✓

B.M. ↑

I'm glad to hear this. Good luck
with your future talks with Bob Gardiner. Please keep Bill Lucas
posted all the time B

NOTES 10-13-69 SIEBEL

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10/14

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1. Orbital Workshop Solar Array System (SAS): To develop the cable configuration in the area of the hinges between the individual solar panels a fixture was developed and built. Flat cables are to be used; the routing, the tie-down points, the location of wiring junction boxes, cable lengths and an acceptable configuration for integration with the structure have to be determined. The fixture consists of a beam fairing segment and three hinged solar array panels. During informal discussions, MDAC-WD have indicated that this fixture would be extremely useful to them during preliminary development of the SAS. They have been assured that we will complete it in-house and furnish it to them as soon as contract negotiations are complete. ✓

2. Space Processing and Manufacturing Meeting: This meeting is scheduled for October 21 and 22 in the Morris Auditorium. Thirty-one technical papers are to be presented by people from industry, government, and universities as well as from MSFC. The response to our invitations has been gratifying. In addition to the 31 people giving presentations we have had acceptances from 109 people-from industry (40 companies); 8 people from universities (8 universities); 12 people from government agencies (7 agencies) and 26 people from other NASA Centers and Headquarters. Quite a few MSFC people have also indicated their intention to attend. We expect press coverage from a few technically oriented magazines. We sincerely hope that your schedule will permit you to make the opening address on October 21. ✓

NOTES 10/13/69 SPEER

B 10/14

9/10/13

1. AS-507 Flight Rules Review: Chet Lee as Apollo Mission Director conducted a review of the AS-507 Flight Rules by telecon on 10/8/69. We discussed the relaxation of the S-IVB/IU TLI GO-NO GO criteria and the resulting rule changes which were accepted. Additional data on slingshot maneuver capabilities and the operational procedures for executing the maneuver were requested and have been provided. ✓
2. Second Burn Coverage: Our request to Headquarters for action regarding the deficiency in full launch window second burn telemetry coverage by the Apollo Aircraft has been rejected. This means we have to accept a certain risk (10% of the total available launch window on both days) performing the second burn with no data retrieval or subsequent malfunction analysis and also without voice relay to the crew. It is not apparent to me that this is a necessary risk at this point in our program; however, we have accepted the Headquarters decision on this flight because of the low risk involved. ✓
3. Advanced Computer Study: Dr. Turnock met with the team chairmen on 10/10 to review program and schedules. Concern was expressed about travel funds and schedules. Dr. Turnock promised help and announced a Steering Committee meeting on or about 11/13. ✓
4. Space Shuttle Operations: The Space Shuttle Operations Panel met at MSFC to identify additional configuration evaluation criteria. The most promising new factor, not previously considered, is related to the intact abort philosophy and pertinent flight sequences, especially at lower altitudes. ✓

NOTES 10/13/69 STAMY

B 10/14

Nothing of special significance. ^{9/10/13}

NOTES 10-13-69 Stuhlinger

B 10/14

No submission this week. 9/10/13

Oct 20, 1969

B 10/22

NOTES 10/20/69 BALCH

JF 10/20

S-IC-12 - Propellant load test was completed on 10/17/69. Noteworthy discrepancies were as follows, with disposition as indicated:

Flight LOX vent valve closed indication did not function properly. The factory representative will adjust prior to static firing.

During fuel tanking, the discrete switches at the 4% and 55% level picked up and dropped out intermittently. During detanking, the fuel level was adjusted above and below this discrete point, with no further discrepancies.

The No. 3 LOX interconnect valve failed to close during simulated wet countdown on T+0 day. The valve has now been replaced and sent to Michoud for further analysis.

Static firing is now scheduled for 10/24/69.

S-II-9 - Stage is in the vertical position in the S-II Stage Checkout and Storage Building awaiting start of final modification period on 11/3/69. Shipment to KSC remains scheduled for 1/8/70. ✓

S-II-10 - Post-static firing checkout and instrumentation removal is proceeding on schedule for removal of stage from the A-2 Test Stand on 11/4/69. ✓

S-II-11 - Stage is in the A-1 Test Stand undergoing pre-static checkout. All work is on schedule to support cryogenic proof pressure test on 10/29/69 and static firing on 11/13/69. ✓

GE Service Contract - Pre-solicitation documents in connection with proposed procurement from the General Electric Company of general support services at MTF for the 15-month period from 1/1/70 through 3/31/71 have been forwarded to MSFC for review and approval. ✓

Lee Jones
I hope Boeing Michoud will tighten up their qual. testing before we eliminate static firing. This record is awful. B

NOTES 10/20/69 BELEW

B10/22

EXPERIMENT S056, X-RAY TELESCOPE, REVIEW: A program review of the GSFC S056 experiment will be held today. Jim Milligan, Principal Investigator, will attend the meeting. ✓

DEPLOYMENT ASSEMBLY: A meeting between S&E and MDA C-ED was held October 13 to discuss the deployment assembly (DA) design. The MDA C-ED presented an objective trade-off between a "free" joint concept and a rigid concept. The decision was made at the meeting to proceed with a free joint design and direction was then given to MDA C-ED. The DA firm cost proposal is expected to accompany the Payload Shroud proposal on October 31, 1969. ✓

AAP OPERATIONAL DATA GROUP: The first meeting with MSC to establish the Operational Data Group (ODG) was held at MSFC on October 17, 1969. MSC briefed the MSFC participants on the ODG functions, responsibilities and procedures for acquiring and validating data. The Operational Data Group specifications were left with MSFC for review. The next working session is scheduled for October 31, 1969. ✓

B 10/22

9/10/20

FY 1970 R&PM OPERATING PLAN - During the review of POP 69-3 MSF Headquarters personnel indicated that they would increase our R&PM allocation by 2.6 million from \$118,486,000 to \$121,125,000. Later, they confirmed this amount by phone and requested that we use this amount for FY 1970 in developing the FY 1971 budget estimates. ✓

The 2.6 million increase covered most of the serious funding problems but still leaves \$1,444,000 unfunded. We are continuing our review of all requirements that will alleviate this situation and we think it can be resolved. ✓

MSF R&D POP 69-2C REVIEW - On October 14, Dr. Mueller reviewed the Centers' R&D POP 69-2C. Although an official Mark has not been reviewed, indications are that MSF will change FY-70 and FY-71 funding controls previously provided for preparing FY-71 Budget data as shown below:

	<u>FY 1970</u>	<u>FY 1971</u>
<u>MSFC:</u>		
Indicated MARK	<u>\$712.7M</u>	<u>\$657.4M</u>
Change From Budget Control	- 1.1	- 29.8*
Change From POP Submit.	- 80.3	-175.2
<u>MSC:</u>		
Indicated MARK	<u>\$922.1M</u>	<u>\$879.7M</u>
Change From Budget Control	- 12.3	+ 31.8*
Change From POP Submit.	-107.6	-204.2
<u>KSC:</u>		
Indicated MARK	<u>\$278.9M</u>	<u>\$243.4M</u>
Change From Budget Control	- 6.2	0
Change From POP Submit.	- 6.2	- 18.9
<u>HQS & OTHER:</u>		
Indicated MARK	<u>\$122.9M</u>	<u>\$328.7M</u>
Change From Budget Control	+ 19.5**	- 2.0
Change From POP Submit.	+ 14.0	-106.7

*MSFC's FY 1971 Control reduced Apollo \$20.0M and AAP \$9.8M to provide for increase to MSC.

**Centers reduced in FY 1970

Although programmatic changes in connection with the above Mark have not yet been firmed up, indications are as follows:

- (1) J-2S effort to continue on an "as can" basis within Apollo mark.
- (2) Maintain AEDC if our budget allows.
- (3) Consider lowest cost of closing MTF.
- (4) No increase to support contractor levels.
- (5) Maintain planning for both a two and three vehicle per year follow-on program till Congress approves the FY-70 budget. ✓

NOTES 10-20-69 BROWN

B
10/22

3/10/20

F-1 Engine - Deletion of the auxiliary instrumentation package resulted in removal of the backup measurements for the LOX dome purge and turbopump intermediate seal. Since these are pre-launch redlines, this was identified as a potential problem during the AS-507 Engine Flight Readiness Review. A procedure has been developed by the S-IC Project Office and The Boeing Company whereby pressure transients in GSE can be utilized to determine that purge is operating if the primary instrumentation fails for the two redlines. ✓

A change has been made to the fuel loading sequence for AS-507. The change involves loading fuel without hydraulic pressure being applied to the F-1 engine hydraulic control system. MSFC has agreed to this change and appropriate documentation changes are being made. ✓

J-2 Engine - The J-2 engine propellant feed duct corrosion problem reported in recent weeks, was presented to Dr. Petrone in the Flight Readiness Review. The ducts on AS-507 have successfully passed a detailed leak check and a report check will be performed after CDDT. Upon completion of the duct leak check the engines are assessed ready for the AS-507 launch. ✓

B 10/22

2 F 10/20

1. HIGH ENERGY ASTRONOMY OBSERVATORY: A working meeting was held here last week involving Mr. Halpern, the OSA Program Manager, Drs. McDonald and Fichtel of GSFC, and various groups at MSFC involved in the HEAO definition effort. The purpose of this meeting was to brief key HEAO program personnel on current MSFC activities and to discuss project plans in general. The impact of anticipated funding limitations in FY-71 was discussed, and obviously some schedule slippage will result.

I was pleased with this meeting since the visitors were impressed with our efforts and progress. Our technical penetration has increased significantly as a result of the activity and enthusiastic involvement of some people in Mr. Goerner's Office. Other Offices in Program Development participated in the meeting, and Mr. Casey of the Mission Operations Office and Dr. Parnell of SSL also participated. This meeting provided Mr. Halpern's first opportunity to meet many of the people who are working "behind the scenes" on HEAO.

Drs. McDonald and Fichtel are respected scientists and have extensive experience in instrumentation development and scientific project management. They are making many valuable contributions. If a convenient opportunity should arise at some time in the future, you might mention to Dr. Jack Clark that we very much appreciate the assistance of Drs. Frank McDonald and Carl Fichtel on HEAO.

Will do B

2. CARNEGIE MELLON UNIVERSITY: I understand that you have a scheduled speaking engagement at Carnegie Mellon University (CMU) on October 29. Since the people whom you will be addressing are under contract to MSFC, I would like to take this opportunity to recall for you the following information regarding our contract with CMU.

One of the senior Mechanical Engineering courses at CMU is a one-credit course entitled "Uses of Outer Space." MSFC is sponsoring this course this year with a \$12,350 contract, which is used by CMU to defray expenses such as phone calls, trips, publications, etc. The mechanics of the course are such that during the Fall Semester each senior student presents a technical paper to the remainder of his class on a self-chosen subject under the overall theme of "Uses of Outer Space." During the second semester, the students work in groups on specific analytical or design projects which have been identified during the first semester. Mr. Jim Clingman of my Office is the COR on the study. He has been working very closely with both the faculty and the students in orienting the study in such a way that it should be appropriate for the University's purpose and beneficial to us.

Dr. William S. Grouse, who until a few weeks ago was responsible for this contract at CMU, has been granted leave of absence from the University. We understand the reason for his leave of absence is to join Dr. DuBridge's Advisory Committee to the President. Dr. Milton Shaw, Head of the Department of Mechanical Engineering, is now the focal point for our contract and for this course.

Bonnie
Please place a copy of this in my Pittsburgh travel folder B

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10/22

9/10/20

1. LASER DOPPLER VELOCITY SYSTEM: To determine if our Laser Doppler Velocity System could detect aircraft trailing vortices, flight tests were performed at the RSA airstrip on October 9, 13 and 15. Langley Research Center provided a C-47 on Oct. 9, and the MSFC C-47 was used Oct. 13 and 15. Very well developed vortices were generated and were made visible by using smoke grenades held on an aluminum pole. The Laser Doppler System was directed approximately 15 feet upwind from the smoke tower and approximately 10 feet closer to the aircraft flight path than the tower in order to allow the Laser to "see" the vortex before the visual observation. About 15 passes were made during which good vortices were produced in the region visible to the Laser system. Tentative results: In all cases, a velocity distribution was measured by the system which on first analysis correlates very well with that expected from a vortex. Normal wind velocity and the spread in wind velocity (turbulence) were monitored before each aircraft pass. The vortex velocity distribution "signature" was differentiated and easily visible. Approximately six runs were made without smoke and similar vortex signatures were obtained. The present system has a manual angular and range scanning capability; automatic scanning is being incorporated into the system. Further flight tests are planned Oct. 23 and 24, conducted by our Aerophysics Division. ✓
2. SATURN V PERFORMANCE INCREASE STUDY: In the subject evaluation of the capability of the Saturn V to boost a 108,000-pound payload to translunar injection for a baseline lunar landing mission, Boeing determined - during Part I of the study - the maximum payload capability of the "108K" vehicle at TLI to be 104,739 pounds in excess of the Flight Geometry (20 m/s) and Flight Performance Reserves (2σ). Primary differences between the "108K" vehicle and the current Saturn V (SA-507) are in the area of engine cutoff timing to minimize propellant residuals, and in mission plan. The latter modifications would consist of provision of only one TLI opportunity, and of reductions in the reserves, i.e., from 3σ to 2σ for FPR and from 39 m/s to 20 m/s for FGR. We are proposing to reduce the FGR even further, to 10 m/s, as one of several additional possibilities. ✓
3. PROFESSIONAL PUBLICATIONS: A paper entitled "The Characteristics of Atmospheric Turbulence as Related to Wind Loads on Tall Structures" by Dr. Fichtl, Mr. Kaufman and Mr. W. Vaughan of this laboratory has been accepted for publication by the AIAA Journal of Spacecraft and Rockets. A second paper, "Longitudinal and Horizontal Lateral Spectra of Turbulence in the Atmospheric Boundary Layer" by Dr. Fichtl has been accepted by the Journal of Applied Meteorology. The laboratory is also well represented at the Fourth NASA Inter-Center Control Systems Conference at MIT, Nov. 4 and 5, where Mr. Steve Winder will present "Steering Laws for Double Gimbal Control Moment Gyros" and Mr. John Livingston will give a paper entitled "The Development and Design of Load Reducing Flight Systems." Personnel from Astrionics Laboratory will also present two papers. ✓
4. TECHNICAL SHORT COURSES: We are strongly interested in short-course training programs to be offered by the University of Tennessee Space Institute beginning in January 1970. On a recent trip to Tullahoma, Dr. Teuber of this laboratory accompanied Mr. Jim Dowdy, Training Office, and others to discuss the potential of the University of Tennessee sending faculty members to Huntsville to teach selected short courses. Dr. Teuber found the trip both interesting and informative. ✓

RC ✓

B 10/22

SATURN:

9/10/20

1. Apollo 12 Flight Readiness Review (FRR): The Apollo 12 FRR was conducted at KSC on October 12, 1969. Launch vehicle related problems were reviewed, and it was concluded that the Apollo 12 launch vehicle is flight ready and is capable of achieving all objectives. MSFC received only one action item and that was to determine seat material for S-II stage GSE pneumatic console GH₂ regulators. A comparative test program of two materials, nylon and vespel, is underway by NR. We expect the testing to be complete this weekend. We are required to provide KSC with a decision today. ✓
2. Consolidated Launch Vehicle Ground Support Equipment (LVGSE) Procurement: Proposals for consolidated LVGSE were received on October 15 from (1) Boeing, (2) General Electric, (3) Chrysler, and (4) IBM. The Source Evaluation Board is currently evaluating these proposals and are targeting for completion of this evaluation by mid-December 1969. We are encouraged by the quality of the proposals and good trends in the costs. ✓
3. Relays: Relay failures have occurred recently in three different makes of launch vehicle relays. In each case, the failure was localized at the junction of the lead wire to the coil body. Two failures, the Babcock and Potter Brumfield, were identified as isolated cases and cleared at the Flight Readiness Review. The third failure in a Filtor relay in the Range Safety Controller had been experienced earlier by North American in S-II usage. The special temperature tests developed by them to screen out relays with poor soldered joints are being considered for use on the Range Safety Controllers used on all three stages of AS-507. We will resolve the AS-507 action required this week and do not anticipate any impact on AS-507. One common element between all three failures was lack of adequate process control and quality control, although the relays were the best available when procured. We will resolve a course of action with S&E-ASTR and S&E-QUAL to apply to later launches and Saturn V follow-on procurement. ✓
4. Saturn V Payload: A review of Saturn V payload capability was presented by CSE on October 17. The payload capability was baselined without static firing of the stages or use of the J-2S engines. A payload of approximately 107,500 lbs. TLI is projected without significant changes for vehicles through AS-515 and the follow-on. The present requirements are stated by MSC at 106,500. We are to review the payload commitments at Headquarters on October 31 with MSC and MSF. ✓
- LRV: Formal LRV letter contract negotiations with Boeing and Bendix were completed last week. The SEB will make its evaluation this week and present its finding to Dr. Paine on October 27. A contractor selection and letter contract approval is anticipated. ✓

NOTES 10-20-69 GOERNER

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NOTHING OF SIGNIFICANCE TO REPORT.

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JF 10/20

1. ATM PROGRAM: Thermal Mechanical Unit Experiments S-054 and S-056 (both X-ray telescopes) and the four Alpha Telescopes have been received. Visual inspection is being accomplished prior to the start of acceptance testing. All eight Thermal System Unit Experiments are now in the process of inspection and test. It appears that it will be necessary to waive configuration verification on these experiments due to lack of inprocess verification of configuration. ✓

2. UNIVAC 1108: Laboratory personnel met with ME Laboratory recently to discuss the use of their Univac 1108 terminal for S&E-QUAL requirements. Information was exchanged about the programs each laboratory had which could be run on the terminal. Some problems of coordination may arise, and priorities may have to be established if the workload on the terminal increases significantly. These problems do not appear to be great, however. The cooperation of ME Laboratory personnel and the use of their terminal will help to alleviate our problem of not having a terminal in our building. ✓

3. SPACE SHUTTLE PROGRAM: We have initiated discussions with the FAA Office in Atlanta relative to the techniques they utilize to control quality of commercial aircraft. Although our relationship to the manufacturer is different (FAA is not the customer; they are a regulating agency set up to protect the public), many of their quality control methods, such as production certification, airworthiness certification, auditing methods, etc., can have application to our future work. We hope to benefit from their long experience in this field. ✓

NOTES HAEUSSERMANN 10/20/69

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NO NOTES THIS WEEK.

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JF 10/20

1. J-2S INSTABILITY: An MSFC technical team recently went to Rocketdyne to evaluate the plans and actions necessary to evaluate the 4400 Hz oscillation problem in the J-2S thrust chamber. Two of three of the J-2S injectors experienced these oscillations. One of the three has yet to exhibit the 4400 Hz. The differences between the injectors are minor primarily in the film cooling area. Several areas were tackled in approaching the solution to the problem, but only two areas of investigation appeared to be helpful in affecting the 4400 Hz. These areas were in (1) subjecting cold hydrogen into the tapoff manifold, which reduced the amplitude for the 4400 Hz, and (2) by increasing the film coolant. The specific cause of the 4400 Hz has not yet been pinned down. It was agreed to put into test an MSFC and Rocketdyne design of 3200 Hz and 4400 Hz resonators for a solution to the problem. ✓

2. ORBITAL WORKSHOP (OWS) HABITABILITY SUPPORT SYSTEM (HSS): At a meeting last week in NASA Headquarters, Dr. Mueller evidenced concern that the OWS results might not be applicable to the Space Station unless options were provided in "mission critical" HSS gear. Sleep restraints were mentioned as an example where several concepts might be carried in the OWS for evaluation. Dr. Mueller felt that the food management area of the OWS was too cramped. MDC had studied combining the food management area with the old DOD sleep restraint area into a "wardroom." Also, MSC favors inverting the crew quarters to permit the launch floor to remain the floor in orbit. PM also expresses the belief that a \$25-30 million saving in operations cost would result from inverting the crew quarters and incorporating a door in the S-IVB tank wall. We had studied this with CSE, ASTR, and AERO and concluded that although the inverted OWS had the advantages noted above, there were significant design changes from the wet OWS configuration and thus we dropped the idea.

3. ILRV THERMAL PROTECTION MATERIALS: On October 27, a special meeting will be held at NASA Headquarters to discuss the potential application of TD NiCr in the shuttle thermal protection system and the support by NASA to the Fansteel Corporation to maintain a production capability for this material. Based on data we have received from various sources, we have some serious reservations toward the expenditure of large sums of NASA money to subsidize this material. We plan to have a representative at this meeting. ✓

K.H.
Is that
final??
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1. Transfer of ATM PI to MSFC: As you know, Jim Milligan, the PI for the S-056 experiment, has applied to join SSL. He has in the meantime obtained the release from Les Meredith at Goddard. I intend to discuss this with Les, with Jack Clark and with Jesse Mitchell to assure that the transfer will be done with the agreement of all involved. This is especially important to provide continuity for Jim Milligan's role as PI of ATM. SSL will continue to provide support to Jim Milligan. Actually our job in SSL will be simpler and less time consuming if the PI is in SSL. Brooks Moore and members of ASTR who are building the hardware for Jim Milligan's experiment are also looking forward to having Jim as a member of SSL. ✓
2. Lunar Surface Experiments: I am sending 8 Experiment Proposals (EP's) to the Lunar Exploration Office in OMSF to the attention of Dick Allenby who handles the lunar science for Lee Scherer. Dr. Stuhlinger has reviewed the proposals and recommended in a memo to S&E that I should handle the submission of EP's at this stage of the game. Dick Allenby told me that the competition will be very keen, with an expected number of 200 EP's. The pattern probably will develop in the direction of a few instruments to be flown, but many PI's will participate as a team. Members of SSL probably have a chance to become team members and maybe team leaders. We obtained a lot of help in connection with the EP preparation by Dr. Stuhlinger's office, Dr. Johnson's office, and PD. As requested, we are preparing a briefing to you as soon as we have a feedback from OMSF as to the outcome of the selection and the nature of our involvement. ✓
3. Real Time Solar Magnetograph: This inhouse scientific activity in support of ATM is coming along very well. Here is a short status report: Dr. Haggard continues to work on developing the complex theory and, together with COMP, is going through the final checkout of the preliminary data evaluation and display routines. Dr. Reisig of COMP wants to study data compression techniques. The 30 cm telescope has been placed into a supporting saddle. The ME-operated machine shop in our building did a fine job in modifying this saddle. The optical collimation of the telescope has begun. The pre-filter of the full 30 cm diameter is in the final checkout at Perkin-Elmer. This is a first-of-its-kind filter with 230 Å bandwidth centered at the iron line 5250. We are preparing everything for the delivery and 2 weeks' checkout of the 240K electronic system, including the SEC tube, from EMR. Delivery will be next month. The 1108 terminal in Building 4331 is being exercised to get ready for the trial runs of the RTSM late this year. ✓

NOTES 10-20-69 HOELZER

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Negative Report.

NOTES 9/20/69 HUBER

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10/22

1. STG REPORT: As Dr. Paine stated at the OSSA Senior Council Meeting on October 7, Program Option II of the STG Report has been established as a baseline. This means that in Earth orbit there is no planned manned mission between DWS #1 (1972) and the Space Station (1977). It would appear that there is more justification for DWS #2 in this stretched out program than in the Maximum Pace Program Option, where DWS #2 is in 1974 and the Space Station in 1975. ✓

As pointed out in my 10/6/69 notes, a similar gap appears in the lunar program, where 14-28 day lunar surface staytimes are not planned until 1981 in Option II. It does not appear desirable to fly extended LM's for the whole decade. We are studying possible ways to fill this gap with increased capability. ✓

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B 10/22

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VISIT OF AVIATION SAFETY PERSONNEL - On Wednesday, October 15, Mr. George E. Cooper, NASA's Acting Assistant Director of Safety (Aviation), and a party of five visited MSFC as part of their tour of NASA field installations to review aviation activities preparatory to development of a NASA Flight Operations Manual applicable to all aircraft for which NASA has responsibility. ✓

A manual has already been developed and is in use for administrative aircraft, but there is no NASA manual for the other classes of NASA aircraft (i. e., program support, R&D and proficiency) and the objective is to develop minimum standards for all. It turns out that the Technical Services Office support contract with MSI requires a higher minimum standard for flight personnel than the (e. g., ATR rating required for pilots) minimum specified in the NASA manual for administrative aircraft, so the work of Mr. Cooper's team should not impact the MSFC administrative aircraft operation. Mr. Bill Martin, the MSFC Air Operations Officer, and the MSI aviation personnel did a splendid job of explaining the MSFC administrative aircraft operations. The team appeared well pleased. ✓

The team also talked with Mr. Carl DeNeen, COR of the MSFC contract with Aerospace Lines, operators of the Pregnant and Super Guppies, to get a better understanding of his activities. Since these aircraft are "public aircraft," they do not come under FAA surveillance and it is up to NASA to establish regulations and provide the surveillance normally provided by FAA. PM is presently in negotiation with FAA Western Division to get FAA technical surveillance similar to certified aircraft, with NASA still being responsible for enforcing FAA-found shortcomings in technical condition and operation.

Mr. Scott Fellows, the MSFC member of the newly formed NASA Aviation Safety and Standardization Committee (NASSC) of which Mr. George Cooper is chairman, was MSFC coordinator for the visit. ✓

9/10/20

B 10/22

Fourth NASA Microelectronics Symposium - Langley Research Center will host this intra-agency symposium February 10-12, 1970. On-going work, recent accomplishments and trends in microelectronics technology (essentially OART sponsored) are presented by center researchers and engineers during these symposia and, consequently, they provide a very good means for Centers to periodically exchange technical information in this technology area.

With more and more emphasis being placed on the applications aspect of the technology programs, the symposium planning committee settled on the following key items accordingly:

Theme: Microelectronics in the 70's - Materials to Systems

Sessions:

- I - Materials - Chairman, Dr. Klaus H. Behrndt, ERC
- II - Processes - Chairman, Mr. Jeffrey J. Bowe, ERC
- III - Devices - Chairman, Mr. William C. Nieberding, LeRC
- IV - Reliability - Chairman, Mr. Robert V. Powell, JPL
- V - Systems - Chairman, Mr. John B. Chase, MSFC

Invited Papers:

- 1. Earth Resources Satellites
- 2. Extreme Temperature Environment of Systems for the Outer Planets Program
- 3. Space Shuttle - Integrated Electronics
- 4. Aircraft Electronics

Of the six abstracts of papers submitted by MSFC, five were selected to be presented. In addition, MSFC has been asked to present an invited paper with the suggested topic being, "Space Shuttle - integrated Electronics."

We certainly hope that circumstances (i. e., travel funds) will permit strong participation in the symposium by MSFC personnel. ✓

9/10/20 (LUCAS)

B 10/22

1. SPACE SHUTTLE THERMAL PROTECTION: Reference Advanced Projects notes of 9-29-69, item 2 and your question concerning the statement: "Their studies indicate that the thermal environment is less for a high L/D vehicle flying at high angle of attack (~ 60) than a low L/D vehicle flying the same angle of attack."

As concerns aerodynamic heating, the L/D in the hypersonic flight regime is not directly involved except that the vehicle shape changes with L/D. For given re-entry conditions, the peak heating is primarily a function of planform loading (W/SC_L) and angle of attack. The lift parameter (SC_L) determines the altitude-velocity trajectory with high values of W/SC_L resulting in higher heat transfer rates. A low L/D vehicle, as compared to a high L/D vehicle, will have a smaller lift parameter (SC_L) and a higher planform loading at a given angle of attack. Generally, the low L/D vehicle can be associated with the case for a body rapidly penetrating the atmosphere, whereas the high L/D vehicle glides down more slowly through the atmosphere. The more rapid penetration by the low L/D vehicle would give higher heating rates than the case of the high L/D. The high L/D vehicle will have a longer period of heating and the attendant longer heat soak. The high L/D vehicle appears to be the best approach for obtaining lateral or cross range.

2. LeRC and LaRC SPACE STATION ORIENTATION: At the invitation of Mr. Henry Slone, LeRC, and Mr. Paul Hill, LaRC, we visited these two centers to receive extensive briefings on their capabilities and activities relating to Space Station efforts and the status of technology and hardware developments. At LeRC, flight-type hardware of a Brayton Cycle Reactor power plant was shown. This hardware was developed for an advanced MOL (20 KW) and has undergone considerable testing. A flight-type mockup was available. A systems test, except for the reactor, was just started in their huge, fabulous new chamber at Plumbrook. In discussions with Dr. Lubarsky and Dr. Silverstein, full support and assistance was promised for Space Station and Space Base nuclear power development. Several MSC personnel were also on this trip to LeRC.

Mr. Hill had arranged an exceedingly interesting all-day of LaRC. In 19 separate briefings, practically all activities directly related to the Space Station were brought to the attention of the visiting group. Personnel from Headquarters, MSC, and some North American people were present. Much of their advanced work appears directly applicable to our efforts.

3. WORKING MEETINGS WITH SPACE STATION CONTRACTOR (MDAC):

We are experiencing great difficulties in establishing working meetings with MDAC and our SE&I people due to the travel money situation. We have cancelled several planned working sessions and apparently will not be able to arrange for technical splinter sessions prior to the next Monthly Review Meeting as we had envisioned. The next meeting is on the West Coast on 11-5., 6-69.

NOTES 10/20/69 MOHLERE

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No submission this week.

NOTES 10/20/69 MOORE

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1. NRL ATM TV CAMERA: The flight model of the television camera for the ^{9/10/20} NRL XUV ATM experiment was completed last week and shipped to Ball Brothers Research Corporation. This camera subsystem was designed and fabricated inhouse MSFC. ATM Principal Investigators using TV cameras in their experiments are being furnished this equipment GFE in order to reduce costs and standardize the ATM TV hardware. ✓
2. NRL EXPERIMENT FILM: Combined environmental tests of NRL ATM film strip in its holders were completed at MSFC last week. This test support was requested by NRL to determine if any adverse effects would occur because of the 180° change in orientation of the film at launch (a change required by the Dry Workshop launch configuration). No failures were apparent from the tests; however, a more detailed inspection will be performed by NRL. ✓
3. ATM H-ALPHA TELESCOPE FILM CAMERA: Acceptance tests were satisfactorily completed at Perkin Elmer on the qualification model of the ATM H-alpha telescope film camera. This camera is an MSFC inhouse product. Plans and procedures are being developed for qualification tests of the entire telescope including the film camera. These tests are to begin in early December. ✓
4. ERGOMETER ELECTRONICS: The breadboard electronics for all three modes of the Ergometer experiment in the Dry Workshop have been completed and were delivered to MSC last week. ✓
5. FUEL CELL TECHNOLOGY: Personnel of our Electrical Division met last week with MSC personnel to establish a coordinated fuel cell development effort directed towards the space shuttle power requirements. A joint contract work statement and a joint RTOP were prepared to reflect the total coordination of this technology task. Both MSFC and MSC will make major contributions to the R&D program. A meeting is scheduled this week with Mr. Wedan of ERC to review all technology planning for the shuttle. All interested Centers will participate in Washington. ✓

NOTES 10-20-69 SIEBEL

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Neutral Buoyancy Simulator: Reference my Notes 9-29-69.* Concerning your query on patient's condition, Mr. Flippo, the diver, is showing some improvement. It is, however, minor toward his total recovery which will take some time. His condition was complicated considerably by the period of time (some six hours) occurring between discovery of his symptoms and beginning of the decompression cycles in the hyperbaric chamber. The patient had complete paralysis of the lower body as a result of spinal cord lesion at waist level from too rapid decompression while diving. During the first cycle in our chamber some minimal improvement occurred. No improvement occurred in the last two treatments and doctors in attendance decided to stop the chamber treatments. The patient was then moved to a local hospital. Since that time, he has shown some recovery of sensory perception in his limbs but very little motor improvement. Because his recovery will be very slow, the extent to which he overcomes his paralysis is still uncertain. ✓

*Copy attached for DIR and S&E-DIR:

NOTES 10/20/69 SPEER

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9/11/20

1. Apollo 12 Mission and Debriefing Milestones: Per your request at the 10/15 MCM, the major Apollo 12 mission and post crew recovery milestones as referenced to nominal launch on 11/14/69 at 10:22 a.m. CST are as follows:

Mission Profile Summary

<u>Event</u>	<u>Date</u>	<u>Time (CST)</u>
		<u>Hr:Min (24-Hour Clock)</u>
Launch	14 Nov	10:22
Lunar Orbit Insertion	17 Nov	21:51
Lunar Landing	19 Nov	00:45
Begin EVA 1	19 Nov	05:02
Begin EVA 2	19 Nov	23:37
LM Liftoff	20 Nov	08:27
Transearth Injection	21 Nov	14:49
Landing	24 Nov	14:49 ✓

Debriefing Schedule

<u>Day from Recovery</u>	<u>Event</u>
R plus 5 (29 Nov)	Arrive LRL
R plus 9 (3 Dec)	Program and Project Debriefing
R plus 17, 18* (11 or 12 Dec)	Release from LRL ✓

*tentative date

2. DOD Support of Apollo 12: On 10/16/69 DOD reviewed their operational readiness for support of the Apollo 12 mission. No special problems were identified. One significant difference from previous missions is the special precaution being taken in the event of an accident with the RTG fuel element. Also, major emphasis is on cutting the support forces to the bare minimum and still provide required support, for example:

<u>MA-9</u>	<u>Apollo 7</u>	<u>Apollo 12</u>
171	49	55 aircraft
28	13	9 ships
18,000	7,195	6,928 personnel

Of special interest to MSFC is that DOD will fly TLI data directly back to Huntsville. This will enable us to have all critical data within 48 hours after liftoff. ✓

NOTES 10/20/69 STAMY

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AEC SNPO VISIT TO MICHLOUD: At the request of the AEC Space Nuclear Propulsion Office, Cleveland (SNPO-C) on Tuesday, October 14, 1969, representatives of SNPO-C, North American Aviation, Lockheed, Aerojet General, McDonnell Douglas, accompanied by Mr. Art Daly, PM-DIR, visited Michoud and were briefed on MAF facilities and potential capabilities to support the NERVA acceptance testing. After the briefing the group was given a tour of the facility. ✓

VISIT OF VICE PRESIDENT AGNEW TO NEW ORLEANS: According to Mr. Gerald Gallinghouse, a local attorney in charge of arrangements for the Vice President's visit to New Orleans, a Leadership Conference is scheduled for 10:00 AM, Monday, October 20, 1969. The local civic group sponsoring this visit has submitted the topics of "Michoud, Slidell, and MTF" to the Agnew staff for discussion at this conference. Mr. Gallinghouse has informed us that the Secret Service has limited this group to 100 civic leaders and attendance will be strictly by invitation. ✓

HOUSE OVERSIGHT COMMITTEE STAFF VISIT TO MICHLOUD: Mr. James E. Wilson and Mr. H. A. Gould, members of the House Subcommittee on NASA Oversight, will visit Michoud on Tuesday, October 21, 1969. In conjunction with their study of "Future Manned Space Flight Effort and Launch Vehicle Rate," Boeing and Chrysler have been requested to brief this group on varying levels of effort as they affect current and future programs of respective contractors. ✓

B 10/22

9/10/22
ASTRONOMY MISSIONS BOARD MEETING 10/17: In the first part of the meeting, the STG Report and the situation of the space sciences were discussed. Dr. Naugle noted three new starts for 1971 in his area: the HEAO; the Navigation and Traffic Control Satellite Project (in cooperation with European nations); and the Earth Resources Technology Satellite Project (ERTS). Scientists inside and outside NASA were reported concerned and disappointed about the low level of scientific activities in the proposed 1971 program. Dr. Goldberg noted that the STG report did not reflect the recommendations to NASA which the AMB had worked out with considerable effort and great care during past months (except the HEAO Project), and he questioned the effectiveness and even the utility of the AMB as well as that of the Lunar and Planetary Missions Board. He expressed the hope that MSFC, in cooperation with GSFC, may be able to help close the gap between manned and unmanned space sciences, and he asked whether MSFC is really serious about working with GSFC to make the OAO Follow-on Program and the shuttle project converge (I stated that this is our firm intent). ✓

In the second part of the meeting, Phil Culbertson gave a brief technical description of the Dry Workshop design and launch scheme. The DWS No. 2 is scheduled for January 1974. Dr. Mueller then joined the AMB for about one hour and gave a presentation on the stellar ATM on DWS 2. He described with very broad and fundamental statements the importance of stellar space astronomy, the advantages of the DWS for stellar astronomy, and the preference of stellar over solar astronomy. The stellar ATM telescope will have a 72" mirror, 385" focal length, better than 0.1 arc seconds resolution, and it will cover the range from 1,000 to 10,000 Å. Dr. Mueller asked the Board for guidance as to whether this system should be studied further. ✓

There were numerous questions from the Board regarding reasons for switching from the solar to a stellar ATM-B; cost and schedule of a stellar instrument; technical details of the system; and trade-off between stellar and solar ATM. However, a discussion of these subjects did not develop. Dr. Mueller stated that MSFC is studying all these points in great depth, and that a report will be completed in six months. Dr. Goldberg requested that the study of the solar ATM-B, which had been recommended by the AMB and by OSSA, should be continued as a parallel study to the stellar ATM-B. The AMB should then compare and judge both systems for their scientific value, their ability to provide results, their cost effectiveness, their time schedules, and their desirability in view of other astronomy projects.

I would like to discuss this subject with you in more detail at your earliest convenience. ✓

Discussion
was held already.
Bh 10/30

B10/28

NOTES 10/27/69 BALCH

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S-IC-12 - Static firing, tentatively rescheduled from 10/24/69 to 10/28/69 because of the threat of Hurricane "Laurie," has now been definitely scheduled for 10/29/69. A problem with the fuel loading probe circuit, which showed up during propellant load test as intermittent fuel level indication, has reoccurred and will have to be resolved or dispositioned prior to static firing. A thorough check of the circuit is now being conducted. ✓

S-II-9 - Stage is in the vertical position in the S-II Stage Checkout and Storage Building awaiting start of final modification period on 11/3/69. Removal of environmental enclosure was completed on 10/23/69. Shipment to KSC remains scheduled for 1/8/70.

S-II-10 - Removal of static firing instrumentation and disconnect from the A-2 Test Stand has been completed. Removal from the test stand remains scheduled for 11/4/69.

S-II-11 - Stage is in the A-1 Test Stand undergoing pre-static checkout. Cryogenic proof pressure test has been rescheduled from 10/29/69 to 10/31/69 because of the rescheduling of the static firing of the S-IC-12 to 10/29/69. Static firing of the S-II-11 remains scheduled for 11/13/69. ✓

Hurricane "Laurie" - On 10/19/69, this hurricane became a sufficient threat to MTF to warrant the implementation of certain emergency plans. At 2:00 p. m., on this date, the site was placed in "Condition 4" status, with the result that all site tenants received notification of the impending threat and began "tie down" operations in preparation for high winds. On 10/20/69, at approximately 5:40 p. m., the threat to MTF having increased, the site was placed in "Condition 3." This set in motion several actions for the protection of MTF facilities against the storm, such as the movement and securing of barges. By mid-day on 10/21/69, the storm had begun to veer away from MTF, and the emergency status of the site was changed back to "Condition 4." By 5:45 p. m., the same date, the "all clear" was announced. All MTF tenants except Boeing required their employees to work regular hours on the work days during which emergency conditions existed. Boeing personnel, except emergency crews, were excused from work on 10/21/69. ✓

Throughout the period of the Hurricane Laurie's presence near MTF, improved emergency plans which were developed following Hurricane Camille were being readied for use to better cope with conditions resulting from such a storm. ✓

NOTES 10/27/69 BELEW

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EXPERIMENT M509, ASTRONAUT MANEUVERING EQUIPMENT:

The Preliminary Design Review (PDR) for this experiment is scheduled to be conducted at Martin/Denver on October 27 through October 30. A crew review of the mockup will be held the first day, the documentation review on the second and third day, and the board review on Contractor (MMC) program status the fourth day. The Astrionics Lab., Quality Lab., and Program Office at MSFC will be represented at the PDR. ✓

SECOND WORKSHOP AD HOC GROUP: The third meeting of the Ad Hoc groups will be held at KSC on October 27 and 28. The purpose is to define study plans and mission definition activities leading to a Phase B study in FY '71. Various MSFC elements will be represented. ✓

STATUS OF AS&E SOUNDING ROCKET FLIGHT: The Aerobee rocket carrying the AS&E payload was installed in the launch tower at White Sands and began a flare watch on October 22. The rocket is being held at T-2 minutes in the countdown sequence and will be launched when a flare occurs. ✓

HABITABILITY SUPPORT SYSTEM CREW QUARTERS: The Habitability Support System (HSS) Crew Quarters arrangement reevaluation, previously scheduled for October 30, 1969, has been rescheduled for November 13, 1969. The rationale for this delay is to await the possible impacts resulting from the October 27, 1969 review with Mr. Schneider, of the proposed Ward Room change. ✓

ATM CONTROL & DISPLAY (C&D) INSTALLATION: On Monday, October 20, Martin-Marietta personnel visited MSFC to present their recommendations on where to locate the ATM C&D panel in the MDA. The configuration suggested was a forward facing panel utilizing a column stool between the ATM C&D panel and the existing C&D panel located in the Structural Transition Section (STS) of the Airlock Module. MSC is considering establishing a firm requirement to position the astronaut at the C&D panel to face in the aft direction so that he could simultaneously observe the STS C&D panel while manning the ATM C&D panel in the MDA. The total problem of orientation and crew restraints must be looked at by all parties affected. We will arrange a meeting in the very near future on this subject. ✓

NOTES 10/27/69 BETHAY

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BOB REVIEW OF NASA BUDGET - We have been informed by MSF that the BOB examiners are scheduled to review the FY 71 NASA Budget with BOB management on November 3. A BOB mark for the FY 71 Budget is expected about mid-November. ✓

TRAVEL FUNDS - Travel per diem was increased from \$16 to \$25 by Congressional action last week, but the President has not yet signed the bill. Assuming that the President approves the bill, the increase in our travel costs for the balance of FY 1970 will be approximately \$280,000. Whether we will have to absorb this increase within our already tight travel money has not been determined. ✓

ASSIGNMENT OF AIR FORCE MOL OFFICERS TO NASA - Keith Wible has informed us that the NASA request to the Air Force for assignment of MOL officers to NASA has been turned down by the Air Force. The NASA request included 42 officers for MSFC for AAP. On the same day we received a letter from General Smart requesting us to submit any requirements for military personnel in medical and associated life support and life sciences areas. General Smart is developing total NASA requirements for military personnel and will present these to the Department of Defense, for possible reassignment of officers that may be available from any of the armed services. ✓

MATHEWS MANPOWER ASSESSMENT - Center assessments of manpower were reviewed with Mr. Mathews October 17, 1969, by Dr. Rees and Dr. Lucas. Significant points contained in the MSC data are:

1. MSC indicated in FY 74 about 5600 people (1600 civil service and 4000 support contractors) will be available and adequate for their preferred list of projects based on the STG Option II. This is about half of their total direct manpower level projected for FY 74. As you recall, this is about the same ratio we (MSFC) had projected in our data. ✓
2. MSC's preferred projects include: (1) Space Shuttle Orbiter, (2) Space Station, (3) Lunar Orbit Station, (4) Lunar Surface Base, (5) Space Tug except for the Cargo Module, (6) Lunar Flying Unit and (7) Planetary Exploration Vehicles except for the Nuclear Shuttle. Both MSC and MSFC included the Space Station and Space Tug in their list of preferred project responsibilities. ✓

NOTES 10-27-69 BROWN

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F-1 Engine - The last F-1 production engine, F-6098, was delivered to the Government on October 21, 1969. Rocketdyne is still occupied with the refurbishment of damaged S-1C-11 engines which will extend through FY-70. ✓

The F-1 engine for display at the World Exposition in Osaka is ready for shipment and is awaiting final transportation instructions from the U.S. Information Agency. Approximately \$5000 damage was incurred by engine and GSE hardware during the recent shipment of an F-1 engine to the Paris Air Show. Special efforts are underway to assure adequate technician coverage during handling of the Osaka bound engine in order to prevent damage during this shipment. ✓

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1. HIGH ENERGY ASTRONOMY OBSERVATORY (HEAO): Mr. Dailey of my Office and Dr. McDonald of GSFC made a presentation on HEAO to the Ad Hoc Committee on Cosmic Ray Research. This is an advisory planning committee formed initially under OSSA auspices and includes participation by NASA and by various individuals in the scientific community.

Dr. Luis Alvarez is the most prestigious person on the Committee. Apparently a rift is developing between Dr. Alvarez' group and other members of the Committee. The major difference of opinion concerns the relative merits of Dr. McDonald's ionization calorimeter and the type of cosmic ray experiment being recommended by Dr. Alvarez which requires a superconducting magnet for particle analysis. Dr. Alvarez' experiment is the more powerful from a scientific standpoint, but it is certainly more complex. Dr. Alvarez also expresses criticisms which are directed at OSSA, the OSSA experiment selection process, the "scientific cliques" which influence OSSA thinking, etc. He may not be directly challenging the HEAO program, but he realizes that his experiment is not compatible with a spinning spacecraft and the early flight date of the HEAO-A mission. (In the Committee meeting there was perhaps a tendency to use the terms "cosmic ray physics experiments" and HEAO synonymously. We should not lose sight of the fact that the cosmic ray physics experiment is only one of several experiments being considered for HEAO and that the primary purpose of HEAO is for X-ray and gamma ray astronomy.) We have been planning Dr. Alvarez' experiment (or laboratory) as a key payload in our Space Station/Space Base and have been also considering a precursor Alvarez experiment (not yet defined) for SWS II. I understand that Dr. Alvarez will receive (or has received) 1.4M of FY-70 Space Station experiment definition funding.

Dr. Alvarez had planned a trip to MSFC in November to discuss his experiment program, the Space Station, SWS II, etc., but he informed Mr. Dailey that he has decided against a visit to MSFC in the immediate future. He says he must now see Dr. Paine. I am very disturbed about this matter, but my information is limited at present. Dr. Paine certainly does not need another Nobel Laureate "on his back" at the present time. I hope that either you or Dr. Stuhlinger can persuade Dr. Alvarez to reconsider and to visit MSFC. Dr. Mueller is very anxious that we establish and maintain an amicable relationship with Dr. Alvarez. ✓

2. ASTRONOMY MISSIONS BOARD RECOMMENDATIONS: As a result of Dr. Mueller's recent presentation to the Astronomy Missions Board, MSFC will be asked in the very near future to accomplish a 6-month in-house study effort to further define both the Solar and Stellar ATM-B alternatives for the SWS II mission. This effort should be scoped to analyze subsystems, configuration, operating modes, crew interface and costs.

Also, the AMB will request a third study be accomplished which involves development of a module concept to accommodate OAO's along the lines of our recent conversations with Joe Purcell of GSFC. ✓

NOTES 10/27/69 GEISSLER

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1. LASER DOPPLER VELOCITY SYSTEM: NASA Headquarters personnel (Deputy Associate Administrator Charles W. Harper, OART/RD-A, et al.) have requested a review of the Laser Doppler programs here at MSFC on November 6, primarily of the clear air turbulence and aircraft trailing vortices detection systems reported to you last week (NOTES 10/20/69 GEISSLER, attached). It is expected that Langley Research Center will provide an aircraft for transportation and for cooperative fly-bys at the trailing vortex testing site at RSA airstrip. We have arranged with Mr. Foster to give you a 30 minute presentation on these studies on Oct. 31. ✓
2. SPACE SHUTTLE INHOUSE EFFORTS: The various organizations within the laboratory participating in the inhouse design effort on the Space Shuttle have mustered their capabilities and organized for action. Tasks defining the required work and manpower level associated with the specific work have been established, to be submitted along with other laboratories' requirements to obtain the anticipated support from the Boeing Company. Mr. Heinz Struck of the Aerophysics Division has arrived at a preliminary configuration that will serve as a starting point. AERO and ASTN have begun work on configuration definition in the area of the engines. ✓
3. SPACE STATION PHASE B CONTRACTOR SUPPORT: After reviewing our needs in the launch vehicle area of the subject studies, PM has agreed for us to contract with Boeing to the extent of \$250K to analyze up to 8 configurations in areas of flight mechanics, aerodynamics, weights and mass properties, loads, control, and thermal and acoustic environments. To expedite the work, we have agreed to perform the requested flight performance analyses inhouse. Questions arising from the Boeing and inhouse studies pertaining to the S-II stage would be answered by North American under \$100K contract to PM's S-II Stage Project Office. ✓
4. EUROPEAN PRESENTATIONS: Mr. Jesco von Puttkamer of my office presented a paper on "Recent Trends in Launch Vehicle Recovery - Ballistic and Lifting" at the AGARD/DFVLR/DGLR Symposium on Aerodynamic Deceleration, Sept. 15-19, at Braunschweig, Germany. The paper, given in the German language, was very well received; particularly its discussion of the general concept of the Space Shuttle, its missions and pertinent development proposals caused considerable interest and a lively dialogue. Press coverage by newspapers and radio networks was extensive, attesting to the keen interest of the public in matters of space. Mr. von Puttkamer had an opportunity to visit a number of universities and research centers for technical discussions. At the Porz-Wahn institute of the "Deutsche Forschungs-und Versuchsanstalt fuer Luft-und Raumfahrt" (DFVLR) he learned from Dr. A. Heyser and his staff that the institute had been invited by NASA-HQ through official channels to participate in the Space Shuttle development and to come up with appropriate proposals for presentation at the recent Space Shuttle conference at the Smithsonian's Museum of Natural History, Oct. 16-17. ✓ To this end, all current Space Shuttle technical reports had been made available to the DFVLR which has outstanding new wind tunnel facilities at Porz-Wahn. The surprise and excitement at DFVLR over the invitation was considerable, their questions numerous, and their chagrin at the lack of sufficient preparation time noticeable. Mr. von Puttkamer also gave a number of PR presentations on Apollo 11 and the Apollo Program with movies and slides: At Braunschweig (250 persons), Hamburg (2000 p.), German Army Missile School Eschweiler (500 p.), Aachen (500 p.), Porz-Wahn (200 p.), Seefeld/Austria (100 p.). ✓

Geissler

NOTES 10/20/69 GEISSLER

1. LASER DOPPLER VELOCITY SYSTEM: To determine if our Laser Doppler Velocity System could detect aircraft trailing vortices, flight tests were performed at the RSA airstrip on October 9, 13 and 15. Langley Research Center provided a C-47 on Oct. 9, and the MSFC C-47 was used Oct. 13 and 15. Very well developed vortices were generated and were made visible by using smoke grenades held on an aluminum pole. The Laser Doppler System was directed approximately 15 feet upwind from the smoke tower and approximately 10 feet closer to the aircraft flight path than the tower in order to allow the Laser to "see" the vortex before the visual observation. About 15 passes were made during which good vortices were produced in the region visible to the Laser system. Tentative results: In all cases, a velocity distribution was measured by the system which on first analysis correlates very well with that expected from a vortex. Normal wind velocity and the spread in wind velocity (turbulence) were monitored before each aircraft pass. The vortex velocity distribution "signature" was differentiated and easily visible. Approximately six runs were made without smoke and similar vortex signatures were obtained. The present system has a manual angular and range scanning capability; automatic scanning is being incorporated into the system. Further flight tests are planned Oct. 23 and 24, conducted by our Aerophysics Division.
2. SATURN V PERFORMANCE INCREASE STUDY: In the subject evaluation of the capability of the Saturn V to boost a 108,000-pound payload to translunar injection for a baseline lunar landing mission, Boeing determined - during Part I of the study - the maximum payload capability of the "108K" vehicle at TLI to be 104,739 pounds in excess of the Flight Geometry (20 m/s) and Flight Performance Reserves (2σ). Primary differences between the "108K" vehicle and the current Saturn V (SA-507) are in the area of engine cutoff timing to minimize propellant residuals, and in mission plan. The latter modifications would consist of provision of only one TLI opportunity, and of reductions in the reserves, i.e., from 3σ to 2σ for FPR and from 39 m/s to 20 m/s for FGR. We are proposing to reduce the FGR even further, to 10 m/s, as one of several additional possibilities.
3. PROFESSIONAL PUBLICATIONS: A paper entitled "The Characteristics of Atmospheric Turbulence as Related to Wind Loads on Tall Structures" by Dr. Fichtl, Mr. Kaufman and Mr. W. Vaughan of this laboratory has been accepted for publication by the AIAA Journal of Spacecraft and Rockets. A second paper, "Longitudinal and Horizontal Lateral Spectra of Turbulence in the Atmospheric Boundary Layer" by Dr. Fichtl has been accepted by the Journal of Applied Meteorology. The laboratory is also well represented at the Fourth NASA Inter-Center Control Systems Conference at MIT, Nov. 4 and 5, where Mr. Steve Winder will present "Steering Laws for Double Gimbal Control Moment Gyros" and Mr. John Livingston will give a paper entitled "The Development and Design of Load Reducing Flight Systems." Personnel from Astrionics Laboratory will also present two papers.
4. TECHNICAL SHORT COURSES: We are strongly interested in short-course training programs to be offered by the University of Tennessee Space Institute beginning in January 1970. On a recent trip to Tullahoma, Dr. Teuber of this laboratory accompanied Mr. Jim Dowdy, Training Office, and others to discuss the potential of the University of Tennessee sending faculty members to Huntsville to teach selected short courses. Dr. Teuber found the trip both interesting and informative.

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SATURN:

1. Relays: A Filtors Inc. relay failed in a Range Safety Controller on S-IC-8. Failure analysis revealed a failure at the coil - lead wire junction. Opening additional relays added to the concern and led to a thermal cycle test of the Range Safety Controllers and a set of S-IC relays. No failures have been found in the testing. Present position is to fly 507 with thermal tested Controllers and other hardware as is. ✓
2. S-IC-12 Static Firing: The S-IC-12 Static Firing Readiness Review was held at MTF on Wed, Oct. 22, 1969. The review confirmed the readiness of the stage for firing and the competence of the test crew to conduct the firing which is now scheduled for Wed, Oct. 29. ✓
3. S-II Stage GSE Regulator: During testing of the GN₂ regulator for AS-507 on Thurs, Oct. 23, the new Vespel seat material failed. As covered in the Flight Readiness Review, the backup nylon seat material will be used for CDDT and launch. An additional test series on nylon, Kel F and Vespel seat materials is scheduled for completion today, Oct. 27. ✓
4. Saturn V Follow-On Procurement: On October 20, 1969, NASA Headquarters approved the release of RFP's for production contracts for AS-516 through AS-521, contingent on getting parallel proposals for three-per-year and two-per-year delivery rates. We anticipate release of all stage RFP's by October 31, 1969, with a requirement for contractor proposals 60 days later. ✓

LRV:

The LRV Source Evaluation Board is scheduled to make its presentation to Dr. Paine today (Mon, Oct 27) for contractor selection and letter contract approval. ✓

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NOTHING OF SIGNIFICANCE TO REPORT.

NOTES 10-27-69 GRAU

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1. QUALITY PROGRAM REQUIREMENTS: Representatives of this Laboratory visited the General Electric Jet Engine facility in Evandale, Ohio, to obtain information on the quality program they employ in the manufacture of commercial jet engines. As in the case with Pratt and Whitney reported in NOTES 9-2-69 GRAU, we found that by comparison our space hardware quality requirements are not nearly so demanding as many have professed. I think it is evident now that if we hope to obtain the reusability contemplated for the Space Shuttle, testing and other provisions beyond those which we have been willing to impose in the past are going to be required. One interesting item picked up during the trip is the fact that the new, large jet engine (TF 39) costs more than the F-1. We now plan to visit airframe manufacturers to find how they impose quality requirements on the engine manufacture, and what testing they do on the delivered engine. We should have a final report with recommendations within the next 30 days. ✓

2. TECHNOLOGY: Dr. F. Thomas Wooten and Dr. George Hayne of the Engineering and Environmental Science Division of the Research Triangle Institute, Durham, North Carolina, visited this Laboratory recently seeking ideas and processes adaptable to medical use. They were shown various non-destructive testing equipment, and potential medical applications were discussed at length. The potential for a complete, solid state radiographic imaging system weighing less than 30 pounds and of briefcase size was of great interest for fluoroscopic and X-ray use in military and civilian field hospitals, as no comparable system is available today. Medical applications of the neutron radiographic direct viewing television system, now under development by Zenith for MSFC, were discussed. This system has a combination of high sensitivity and good resolution at low radiation levels in both its X-ray and neutron sensing versions. These characteristics cannot be matched by any other presently known equipment and are considered noteworthy accomplishments for potential medical application. The eddy current metal proximity measuring device has potential for detection of metallic objects buried in the human body; particularly for rapid location of the IUCD coil birth control device. Mr. Brown, the inventor of this equipment, and Dr. Wooten discussed several improvements to the equipment and the IUCD coil to increase detection capabilities. ✓

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Saturn V Direct Ascent Capability: In an attempt to determine feasible ways to improve the Saturn V performance capability, a review of direct ascent data, generated in 1966, has been conducted by CSE. The conclusions which were reached at that time are:

1. From a hardware viewpoint, the present launch vehicle configuration has direct ascent capability. New software would have to be developed to support the launch vehicle digital computer for the direct ascent mod; however, sufficient lead time exists for this development for follow-on vehicles.

2. A payload gain of as much as 6000 pounds can be realized, if no hardware changes are made, depending upon the mission constraints which are established. The amount of payload gain that can be obtained is dependent on the constraints which establish the launch window. Lighting constraints at launch in the abort areas in the Atlantic and at the lunar landing site have tended to severely restrict the duration of the daily launch window for the direct ascent mode. Some relaxation of these constraints may now be in order by MSC and MSFC based on experience gained during the preceding Apollo flights. Monthly launch opportunities for the direct ascent mode occur only during the summer months, using the present groundrules which are based on at least three consecutive daily launch windows of at least 1-1/2 hours duration occurring during a given month. In view of the success that has been demonstrated in launching a Saturn V "on time", some revision in these groundrules may also be in order. A reevaluation of the constraints and groundrules mentioned above will undoubtedly result in a considerably improved launch opportunity.

3. Trans-Lunar Injection will occur in the Atlantic in an area where tracking facilities are not normally available. In general, ground based tracking stations would still be able to observe the entire boost phase until orbital velocity is achieved. Continuous communications with the crew may be obtained during powered flight through the use of Apollo Range Instrumentation Aircraft. It appears that operational procedures can be incorporated, along with optimum ship and aircraft placement, to provide tracking and communications coverage which is acceptable for the conduct of the mission. ✓

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B 10/29

1. POGO WORKING GROUP MEETING: A POGO Working Group Meeting was held at MSFC on October 16. Stability assessments were reviewed for the AS-507 (Apollo 12) vehicle. There was unanimous working group agreement that adequate POGO stability should be expected during the powered flight of the S-IC, S-II and S-IVB stages of AS-507. ✓

2. LUNAR ROVING VEHICLE (LRV): Analyses are continuing to define potential thermal control schemes for the LRV. Results from the study thus far are (1) Temperature in the shade of the Lunar Module could easily be as low as -150°F. Therefore, fluid lubricated wheel-drive units may not be feasible. (2) Results indicate that relatively light lunar dust coverage can significantly affect radiator performance and that dust removal by brushes, etc., is not feasible. Therefore, it is suggested that radiators on temperature sensitive components be covered during LRV operation. Phase change materials (such as hexadecane) could be used to store the heat generated by these components until the radiators are uncovered during idle periods. (3) The utilization of a phase-change material (such as lithium) in the wheel motor casing may be appropriate to prevent excessive motor temperature during high load or stall conditions. ✓

3. SATURN WORKSHOP FLAMMABILITY ASPECTS: As a result of considerable joint discussions and comparison of test data, MDAC has decided to follow our advice to use the MSFC developed "Micatex" paint for the workshop interior. Although the MDAC September progress report stated that this paint was deleted from the program, they have now determined that it is the practical material for MDAC to use. Their primary backup material will be Teflon coated foil for the fire-retardant liner. We think this is an excellent example of an MSFC/contractor mutual resolution of a difficult flammability problem. ✓

4. OUTGASSING CRITERIA FOR WORKSHOP MATERIALS: A decision has been reached, among most of the laboratories concerned, on a criteria for evaluating the outgassing characteristics of materials. This criteria specifies that materials which have a specific surface area and which are a specific distance from the line-of-sight with optical surfaces, shall be evaluated according to the MSFC 50M02442 specification. We are conducting specific tests to determine the validity of the surface/area figures quoted. Also, a specification has been prepared to define the procedures required to determine the contamination potential of the space simulation chamber at MSC which is to be used for the thermal/vacuum test of the ATM. ✓

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1. UAH RESEARCH INSTITUTE: I had discussions with Dr. W. Kubitzka, Dean of Engineering and Acting Director of the Research Institute, and also with Dr. Rush and a new full professor in physics, Dr. Castle, who just joined the UAH. The purpose of the discussion was to get better acquainted and to explore possibilities for further cooperation. We can expect from both Kubitzka and Castle an increased desire to participate in SSL activities and to bid for tasks which presently go to other universities or industry. I am pleased with this initiative from the UAH. One of the possibilities we explored which looks promising: The UAH wants to hire a Ph.D. civil engineer to teach courses. We could offer him contracted experimental research work in Dr. Costes' soil mechanics lab in SSL. This would help us to do vital work in connection with the Lunar Roving Vehicle. I hope we can work out the details with the help of Ed Mohlere. ✓
2. MANUFACTURING-IN-SPACE CONFERENCE: I think Mat Siebel's conference was an outstanding success. ✓ It attracted a wide spectrum of people from industry (like Dr. Porter of G.E.), universities (like Dr. Burkhard, head of the Physics Department of University of Georgia), and from NASA Headquarters. I am glad members of SSL and our contractors, such as the University of Alabama Research Institute, had a small, but I think an important, contribution to the conference (5 papers). ✓
3. COOPERATION WITH HEADQUARTERS: Dr. Nash, who is with Hermann Kurzweg in OART, had requested a TLA of Gary Arnett to Headquarters for one year. This is a high compliment for Gary and, I think, for SSL because they want him to develop and direct new basic programs such as optical contamination in vacuum chambers and crystal growth for manufacturing and other applications. The Headquarters people in OART are full of praise for how we approach problems, address ourselves to a real need in the space effort, and formulate a program which goes in depth. ✓
4. SCIENTIFIC ENGINEERING DIVISION, SSL-S: Dr. Sieber is doing an excellent job as chief of SSL-S. The support provided to our scientific people is appreciated by all members of SSL. Dr. Sieber is also providing vital links to other Labs of S&E and other offices. Considering that Dr. Sieber has only a small division, the benefits for SSL, but also for many others at MSFC, are tremendous. ✓
5. APOLLO 11 RESULTS: Dr. Costes will give a two-hour lecture on results of his Apollo 11 investigations of the lunar soil and applications to the Lunar Roving Vehicles at the Space Science Seminar on October 28. ✓

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MSFC CONFIGURATION MANAGEMENT REMOTE TERMINAL STATUS:

Progress is continuing toward implementing the remote terminals to be tied into the MSFC Configuration Management UNIVAC 1108 computer data base. Successful transmission of test data has been made between the MSFC UNIVAC 1108 and IBM 1050 remote terminals located at Seal Beach, California and KSC. Full implementation of these remote terminals in a production mode is scheduled to occur during the first quarter of 1970. This will allow these remote sites to input and retrieve data from the MSFC Configuration Management data base. ✓

NOTES 10/27/69 HUBER

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No submission this week.

NOTES 10/27/69 HUETER

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No submission this week.

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NOTES 10/27/69 JOHNSON

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Nothing of significance to report.

NOTES 10-27-69 ADVANCED PROJECTS (PD)

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1. SPACE STATION MONTHLY CONTRACTOR REVIEW: The next review is scheduled for 11-6-69 at Huntington Beach. Due to the shortage of travel money, we have not scheduled specialized working sessions involving large numbers of technical specialists. Task Team members and some key S&E and PD people are expected to attend the review. Two areas--Information Management and Safety/Long Life Subsystems Assurance-- will be treated in detail at this review. Working sessions are planned here at MSFC during the next few weeks on the following subjects: Space Base dynamics and attitude control, test philosophy and long life systems assurance, man/machine and crew integration, environmental control and life support systems, and electrical power application and distribution. Some of these sessions will include experts from other centers in order to assist MDAC in obtaining the best information available within NASA. We have arranged for an information exchange meeting on 10-28-69. ✓
2. FINAL PHASE "B" REVIEW - DUAL MODE ROVING VEHICLE: The final review of the current Phase "B" Dual Mode Roving Vehicle Studies being performed by Bendix and Grumman will be conducted during the week of November 3 at the contractors' plants. Key MSFC organizations as well as the Task Team will be represented. Both contractors expect to proceed with their final reporting and documentation after this review and will submit a draft of the documentation to us by mid-December. This will permit at least one NASA iteration prior to receipt of the final reports in mid-February. ✓
3. LUNAR TECHNOLOGY AND HARDWARE DEFINITION REVIEW: Ben Milwitzky and others of Headquarters will be here on 10-29, 30-69 to review our FY 70 program. We hope to obtain approval for FY 70 funding and a decision concerning the desirability of extending the Grumman and Bendix effort through a preliminary design of a specified configuration to enable start of development late next year. ✓
4. LUNAR DRILL POWER SYSTEM: It appears that a newly developed Allis-Chalmers fuel cell system may be directly applicable as a power system for the early lunar drill being defined by Jim Downey's office. The fuel cell produces high output and would use residual cryogenics from the lunar module. An integrated lunar drill development program will be discussed with Ben during his visit next week. ✓

NOTES 10/27/69 MOHLERE

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DEVELOPING INSTITUTIONS PROGRAM: We have been informally advised by the Office of University Affairs of their interest in enhancing the Developing Institutions Program. As one step, they are proposing the establishment of a "little" Sustaining University Program at several of the black institutions. In order to implement such a plan, Marshall would be asked to allocate \$15K to each institution it would wish to sponsor. The Office of University Affairs, in turn, would allocate a matching amount plus \$30K in escrow for each institution to provide for step-funding. Very simply, this would mean that for every \$15K Marshall would provide, there would be \$45K from Office of University Affairs. It is to be hoped that funds can be found within MSFC for this worthy endeavor that will result in benefits far out of proportion to the monies invested.

E.M.
Please discuss feasibility with Natty Forman and Dick Cook, and let me know what came out. B

PRESIDENT SEARCH UAH: After a lapse of two weeks or so, active search of president for the University of Alabama, Huntsville resumes. The campaign has been set back by the illness of Mr. John Caddell who is now well on the road to recovery. The length of time required for this endeavor is becoming a matter of serious concern since the absence of a permanent guiding hand is becoming more and more noticeable. The interim president has just too many diverse duties to attend to to give the president's office force and the vigor which it so urgently demands. Dr. Hallows and I plan another meeting with appropriate board of trustees representation to indicate our concerns. Our ex officio participation is being watched to assure that we do not become susceptible to the charge of undue government influence.

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1. OPTICAL COMMUNICATION EXPERIMENTS PROGRAM: A proposal for an Optical Communication Experiment for the ATS-G Synchronous Satellite, is now being prepared jointly by MSFC and ERC. Dr. Randall of MSFC is to be the Principal Investigator with Dr. Karp of ERC as Co-Principal Investigator. The experiment will propose a visible laser communication system which has the objectives of studying atmospheric propagation effects and determining how well optical communication systems perform in the aerospace environment. The proposal is now being prepared and will be submitted to OSSA by November 1, 1969. The ATS-G flies in late 1973. The proposed ATS-G experiment would follow a series of approved high altitude aircraft (U-2) optical communication experiments that are planned to begin at MSFC in early 1971. The aircraft experiments will be conducted between the aircraft at 70,000 feet and the Madkin Mountain Optical Facility, which houses a 24-inch telescope with optical communication transceiver. MSFC and ERC are jointly involved in the aircraft tests as well. The aircraft experiments followed by the satellite experiments allow for a systematic study of the problems associated with optical communications and should give the communication system designers the information needed to determine if optical communication systems best fulfill various mission requirements.

2. SPACE SHUTTLE INTEGRATED ELECTRONICS TECHNOLOGY: The OMSF-OSSA Space Shuttle Integrated Electronics Technology Planning Committee met in Washington last week and consolidated the technology program in this area. A NASA program of \$3.5 million for FY-70 was adopted. Dr. Tischler designated a new chairman, Mr. Cline Frazier of MSC, who is to recommend how the "pie" is to be split between the various centers. Mr. Frazier promises to visit MSFC to obtain information on our capabilities to do some of this technology work. The magnitude of the FY-70 program is disappointing to us, especially in the area of guidance and control hardware. The strap-down platform work which we have been carrying at a low level was not included in the technology program. Your support may be needed to identify local sources of funds for this important shuttle effort.

B.M.
Keep me advised on specific actions suggested B

3. SPACE SHUTTLE DATA MANAGEMENT/DATA BUS SYSTEM: The data management/data bus system (referred to as Integrated Electronics for the Space Shuttle) is probably the most significant technical area which we are concerned with in the Astrionics Laboratory. We would like to give you a technical briefing on this subject in approximately four weeks at your convenience. One aspect which we have been exploring is to define and build a typical data bus breadboard in order to familiarize ourselves with the technical problems of such a system. To get the system established quickly, we intend to utilize Saturn type hardware (e.g., the switch selector, ST-124, telemetry multiplexer) and with proper interfacing equipment, tie these items to the data bus. A computer will also be necessary and since the Saturn computer is not fast enough, we are exploring means of obtaining one of the IBM 4II computers from the cancelled MOL program. The computers are declared surplus equipment but we may have difficulty prying one of them loose from the Air Force. We have worked this request through the established route, Mr. Belew, for obtaining MOL surplus equipment. Telephone discussions with Mr. Kopf at the Pentagon (AF-AD-ACB) suggested that a letter to Secretary Seamans with adequate justification would be a means to help pry one of the computers loose. We are preparing a letter to the Air Force for your signature for this purpose.

Lee Belew
What do you advise?

Could require HQ concurrence B

NOTES 10-27-69 SIEBEL

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1. Space Processing and Manufacturing Meeting: The meeting took place on October 21 and 22. We were very happy that you could deliver the keynote address and that you were able to attend several of the papers and a luncheon. Of 350 attendees, approximately 250 came from organizations other than MSFC. The general reaction to the 30 papers which were presented was one of enthusiasm and a great degree of acceptance of this new idea of manufacturing in space. We will have printed copies of the proceedings and will mail them to those interested ✓

2. Russian Welding Experiment in Space: Gordon Parks, head of our Welding Branch, made a telephone call to Dr. Boris Paton, Director, Paton Institute, Kiev, Ukraine. Dr. Paton, who is responsible for the welding experiments, was friendly but not very communicative. He suggested that we read the October 17 issue of Pravda for the details of his experiments and then write to him for any further information. We are having a translation and transcript made of the conversation and of the Pravda article and will certainly write to Dr. Paton. If you are interested we shall be glad to send you copies of the transcripts and letters.

3. Neutral Buoyancy Tank: During routine sampling, an accelerated rate of fungus growth was discovered recently in the Neutral Buoyancy tank. An increased concentration of chlorine over a few days appears to have solved the problem. So far as the cleanliness of the water itself is concerned, no fungi can now be detected in the water and the concentration of other organisms is negligibly low. A very thorough sampling of scrapings from the walls and of sections of rubber mats and rubber guards has revealed that the rubber parts provide nutrition and shelter for certain organisms and therefore should be removed from the tank when not needed. These investigations were carried out by our microbiologists in cooperation with the Medical Center and Dr. Ahern, Professor of Microbiology at the Georgia State University. Inspection of the tank shows that the walls are slightly coated with a sort of sediment and that the paint has peeled in a number of areas. Consequently, after determining that we are able to avoid an impact on the AAP test program (we are using this period to update our mock-ups), we are draining the tank, will clean it, repaint it where needed, and refill it so as to be back in operation by the middle of November. The tank has now been in operation for approximately 18 months, and really needs this kind of maintenance. ✓

M.S.
This must be done through NASA Hq. Office for International Affairs (Fulkin)
↑ B
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NOTES 10/27/69 SPEER

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1. Windband Communications Working Group: This office has been asked by OTDA to participate (and attended the first meeting) in a special working group to evaluate use of COMSAT satellites as a primary relay link between all ground stations and a central computing facility in the U.S. Other working group members include OMSF, MSC, GSFC, JPL, and COMSAT Corporation. The concept being studied would reduce all ground stations essentially to the function of receiving a vehicle data stream and relaying it in total through a communications satellite to a central U.S. facility, where the data would be stripped out, processed, and distributed to data users. This concept is an extension of a limited OMSF proposal for use of Intelsat IV on AAP, and would apply to all NASA ground stations for manned and unmanned programs. ✓
2. Apollo 12 Operations Review: Kraft held his regular pre-mission review of Apollo 12 operation on October 21 at MSC. No special problems were noted, but emphasis items included (1) thorough safety review and cautious approach to the planned crew operations with Surveyor III on the lunar surface; and (2) the MSC CCB decision to stow the black-and-white TV camera in LM due to interference problem with color camera (color can still be re-stowed after CDDT if interference problem solved). We presented a brief AS-507 summary. MSC PAO noted that press interest seems as high on Apollo 12 as on Apollo 11, but centered more around the MCC than Cape Kennedy this time. ✓
3. Saturn IB Recycle Time: Reference your question at the AAP Review on 11/23 on Saturn IB launch turnaround time. Current planning, based on the AS-205 Scrub/Turnaround Plan, permits a recycle within a 20-hour period after a launch scrub. This period includes time for crew rest and actual work procedures, i.e., cryogenic draining, drying, and catchup activities. The 20-hour turnaround time, which is consistent with presently identified launch windows, considers that the problem causing the scrub can be corrected parallel to the recycle operations. ✓

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HOUSE OVERSIGHT SUBCOMMITTEE: On October 21 and 22, 1969, staff members of the House Oversight Subcommittee visited Michoud Assembly Facility in connection with their staff study, "Future Manned Space Flight Effort and Launch Rate." Presentations were given by the prime contractors, The Boeing Company and Chrysler Corporation Space Division. A presentation on the Mississippi Test Facility capability and utilization was also conducted during the visit at Michoud. ✓

NOTES 10-27-69 Stuhlinger

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1. ASTRONOMY MISSIONS BOARD: In the Executive Session of the AMB, following the open session in which Dr. Mueller made his presentation on 10/17, members of the AMB voiced grave doubts about the feasibility of forcing the development of a 72", high resolution stellar telescope with instrumentation for an ATM-B flight in 1974. No details of this system have become known to the Board as yet. MSFC is expected to make a six months study of this project with enough detail to permit a careful comparison between the proposed solar ATM-B and this new stellar ATM-B. I would like to discuss this situation with you at your convenience. ✓

2. AEROSPACE MEETINGS: I had the opportunity to attend three significant meetings recently: the "International Workshop Meeting" in Cloudcroft; the IAF Congress in Mar del Plata; and the AIAA Annual Meeting in Anaheim. There was a remarkable coincidence in the emphasis on several issues, among them the importance of a very active, aggressive, and imaginative earth resources program; the necessity of studying the various aspects of life in a space capsule with great care, including such factors as microflora, work programs, and psychological effects (simulation in underwater stations such as Tektite seems to be very useful); satisfaction about the prospect of low-cost earth-to-orbit transportation (shuttle); concern about the fact that the STG Report, while emphasizing shuttle, space station, and nuclear stage, says - and does - almost nothing about the payloads that are to be transported in the big spacelift operation; and, finally, disappointment because the sound of the space sciences has almost dropped below the level of perception in the "new NASA program." ✓