



OCTOBER 5, 1964

J-2 ENGINE

R&D engine J010K was successfully tested twice this week. This engine is a flight configuration engine and is being tested in preparation for FRT. ✓

The second J-2 engine/S-IVB stage chilldown test was conducted Friday, October 2, and was quite successful. ✓ The hydrogen system was chilled by using the forward flow recirculation system and the one inch bleed valve. (A 1-1/2 inch bleed valve will be on flight engines.) The test will be repeated on October 14. ✓

A meeting among MSFC, Lewis and Rocketdyne personnel will be held at Rocketdyne tomorrow (October 6) to discuss the recently discovered hydrogen pump turbine cracking problem and review plans for various approaches to solving the problem. ✓

In view of the turbine wheel cracking and gas generator difficulties, the PFRT is being dropped in order to give more emphasis and effort to these pressing problems. Production engine 2008, originally planned for PFRT, will be GFE'd to Rocketdyne for their use in R&D limits testing. This will provide added confidence in the configuration hardware being used by DAC and S&ID and also provide additional knowledge needed for the FRT program. ✓

RL10 ENGINE

A contract for the continued RL10 Development Program (October 1, 1964, to September 30, 1965) has been negotiated and was signed by Headquarters on Wednesday. This contract provides for continued Saturn and Centaur flight support and continued development of the RL10A3-3 (uprated Isp) version to provide a payload increase of approximately 250 pounds for the Centaur vehicle. ✓

F-1 ENGINE

During this report period, the 084E type injector continued to demonstrate acceptable performance and stability. To date, five 084E type injectors have been tested in five different engine systems, including production engine F-2004, for a total of 27 starts and 2080 seconds without instability. ✓✓

An F-1 Program Technical Review is scheduled for October 7-8, 1964, at Rocketdyne, Canoga Park, California. Following the review, the new F-1 production test stands and associated facilities at Edwards Air Force Base will be dedicated on October 9, 1964. ✓

Engine F-1002 was remounted in MSFC's Test Tower West on October 1, 1964. The next scheduled firing is programmed for Friday, October 9. The turbopump has received the latest modifications and the thrust chamber struts have been modified to comply with recommendations resulting from calculations performed by R-P&VE's Stress Analysis Branch. ✓

Engine F-2004 is currently at Edwards undergoing acceptance firings prior to delivery to MSFC for S-IC-T testing. ✓

B 10/6

NOTES 10-5-64 CLINE

1. STATUS OF SATURN V AND SATURN IB IMPROVEMENT STUDIES: (Presented to Mr. L. Fero of NASA Headquarters, Washington, D. C., 9-30-64) Mr. Fero approved the procedures and methods to be followed on these two study programs. He requested that arrangements be made soon to present the study program, particularly the ground rules and study philosophy being used, to NASA Headquarters personnel, especially Dr. Mueller. A presentation is being put together for Future Projects Office to give in the next few weeks. ✓
2. F-1 ENGINE: Low natural frequencies inherent in the new Edwards Air Force Base F-1 Engine acceptance stand 1-D preclude full flight rating test gimbal demonstration. Investigations are underway to determine if this problem exists on stands 1-C and 1-E which are scheduled for hot firing very soon. ✓
3. 156-INCH SOLID MOTOR FIRING: The second firing of the 156-inch solid motor took place on 9-30-64 at the Lockheed Propulsion Company, Potrero Ranch test site, California. The firing was successful, duration 140 seconds, thrust approximately 1.2 million pounds, and jet tabs exercised according to program. Propulsion and Vehicle Engineering Laboratory measurements on heat flux and acoustics were obtained. ✓
4. S-IVB: The forward flow recirculation test was successfully performed on the S-IVB battleship on 10-2-64. ✓ This was the first test using the hydrogen recirculation pump. ✓ The proper propellant conditions for engine start were reached within approximately one minute. The system configuration closely resembled the flight configuration for S-IVB-IB. As expected the LOX recirculation test was also successful. ✓

Other objectives successfully accomplished were:

- a. Filling of hydrogen start bottle and helium control bottles.
- b. LH₂ and LOX overflow sensors activation.
- c. Hydrogen bleed ignitor test.
- d. Engine bell diffuser purge and H₂O flow test.
- e. Flame deflector water flow.
- f. Thrust chamber chill. ✓

B10/6

1. HURRICANE HILDA

Michoud experienced 75 - 80 MPH winds Saturday night and Sunday. Damage was held to a minimum due to the exceptional cooperation and efforts of all contractors and the precautionary measures that were taken. The biggest damage sustained was to the New Engineering and Office Building and to the S-IC final Stage Checkout Building. Two free standing brick walls in the cafeteria and mechanical-electrical equipment room area were demolished. The metal ceiling of the cafeteria and reception area overhang were destroyed. The final stage checkout building now under construction had about 75% of the sheet metal siding torn off. The overall plant fared quite well, and is in full operation today. A detailed report on damage is in preparation. ✓

2. GENERAL

Preparations are underway for the expected visit of President Johnson on October 9, 1964. ✓

S-I/S-IB

Status of SA-D-5 - Work is proceeding on the fuel and LOX tanks and second stage adapter. The tail assembly (thrust section) was moved from sub-assembly area and is being located in the main clustering fixture. ✓

Status of SA-8 - Vehicle alignment has been completed. Electrical continuity and meggar check of cables and harness is being accomplished. Modifications are being worked. ✓

Status of S-IB-1 - Work is in process on the GOX flow control lines and valve, fuel and LOX lines, and manifold lines on 2nd stage adapter. Modification bulletins are being accomplished throughout vehicle. ✓

Status of S-IB-2 - The 2nd stage adapter was moved into final assembly area and was mated to 105" center LOX tank. Alignment operations on 2nd stage adapter are being performed. Assembly buildup of the 70" fuel and LOX tanks is being accomplished. ✓

S-IC

The evaluation of the defects on the inside of the S-IC-S upper LOX bulkhead have been completed. A DAR is being prepared; it will recommend weld repair in three different areas. Evaluation of the defects on the outside of the bulkhead is presently in progress. ✓

Meridian Weld Station - The meridian weld station which has been undergoing certification problems is now certified. Action was underway Thursday and Friday (Oct. 1 and 2) to start welding the first skin for the S-IC-D. ✓

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NOTES 10-5-64 DANNENBERG

1. Tri-Center Meeting on GSE/Panels - was held 10-1-64. It was agreed to continue to handle L/V-ESE vs S/C ESE interface in Electrical Systems Integration Panel (Mr. Fichtner), but power supplies (AC and DC) interfaces in Launch Operations Panel. This requires appeal of Dr. Mueller's PRB decision to handle all GSE in Launch Operations Panel. ✓

2. Experiments - Members of MSC have made unofficial inquiries regarding a Zero-g experiment for 500 lb. cryogenic tank (back-up development for S/C) to be carried on our L/V. We are exploring this. (Not to be discussed officially yet since Dr. Gilruth may not be aware of this.) ✓

3. Crew Safety - A meeting was held in R-ASTR to review the EDS test program with Chrysler Corp. Basically, three samples of each item of EDS hardware will be subjected to 50 hours of simulated flight environment. ✓

4. S-II Qual Program - An R&D Operations group visited S&ID last week for the purpose of defining a complete list of components and required tests for qualification on the S-II stage. Other action items discussed were: Bench mark qualification, and incorporation of P&VE 63-2 specification (Vibration, Shock & Acoustics). ✓

5. S-II Proposed Design Review Procedure - R-SA completed memo to I-V-S-II, outlining the schedule of systems oriented design reviews, listing appropriate R&D personnel having drawing sign-off authority and identifying required elements of a technical data package for design review purposes. ✓

NOTES 10/5/64 FORTUNE

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1. GAO Survey of MSFC Communications included inquiry into the MTO permanent telephone system studies and decisions and will be inquired into further at NASA Headquarters. ✓

2. GAO Survey of General Electric Contract will start at MTO October 5, 1964. Mr. Herbert Kittrell will represent the GAO. This survey is routine and is similar to previous surveys of other MSFC support contracts. ✓

3. Administrative Leave at MTO was authorized at 2:25 p.m. Friday for all personnel living south of the Test Site due to the abnormal tide situation created by Hurricane Hilda. Corps of Engineers and construction contractors secured at noon. ✓

4. Preliminary Survey at MTO from Hurricane Hilda this morning indicated only a few felled trees and considerable broken limbs but no detectable damage to equipment, structures or sites. Approximately 4 inches of rainfall was recorded over the weekend. Major effect on construction is reduced work force available this morning due to their having to move back home after the weekend evacuation. Eleven shrimp boats utilized the MTO harbor as a haven. ✓

B 1076

1. National Science Foundation Briefing: Our Systems Concepts Planning Office is giving an informal briefing to the members of the National Science Foundation (Office of Antarctic Programs) on the Apollo Experiments Support. The briefing will provide a general introduction to MSFC, the AES - including in particular MOLAB, Lunar Flying Vehicle, typical scientific experiments and observations being considered for lunar surface and other logistics planning. ✓
 A short tour of MSFC is also being arranged for the visitors. ✓ During the briefing, areas of mutual interest will be discussed, primarily in regard to the degree that the experience from polar exploration can be utilized in AES. ✓ This informal briefing will be held on October 13, 1964, in room 329 at 9:00 a. m. ✓

E. G.
 Let me say hello to them B

2. Orbital Debris: Preliminary designs of retro systems to control S-IVB reentry for the Saturn IB have been made by Lockheed (Huntsville). Two system designs using retro motors attached to forward portion of S-IVB were given to DAC on July 9, 1964, so they could assess the full impact of employing either of them on the S-IVB stage for IB. Preliminary report was given to MSFC by DAC on Sep. 25, 1964. Several technical disadvantages may preclude the use of retros on the forward portion of the S-IVB. DAC is looking at possibilities of installing retro systems at the rear of S-IVB. Another meeting is planned with DAC during late October, depending upon progress of DAC work. Studies showed the solid retro rockets to be the long lead time item. This development time is estimated at approximately 16 to 18 months. Selection of a retro system is expected by the end of this year. A retro system for Saturn V is in the preliminary study phase by Lockheed (Huntsville) Plans are to turn over the preliminary design to DAC at the end of October. It is also planned to speed up the Saturn V studies in order to allow for a common motor selection (if possible) for IB and V. One big difficulty in defining an Orbital Debris System is the reluctance of both MSFC and contractor personnel to recognize debris as a potential problem that could possibly prevent flights if such a system weren't installed on the vehicles. Statements such as in the attached enclosure add to the reluctant attitudes of our engineers in designing such a system. ✓

G. F.
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 controlled re-entry
 henceforth.
 I'll be glad to
 talk to you
 Phillip's again
 Meanwhile
 keep working B

3. Bureau of Budget Meeting: On Tuesday, September 29, the BOB team headed by Mr. Don Crabill and accompanied by NASA Headquarters escort team visited this laboratory for a general orientation and review of our activities. We gave them a run-down on the functions and typical work areas for each of our organizational elements. Their questions centered around the following areas: (1) What work are we doing in the advanced studies area; (2) What is the status of our ALSS work (which was given by Mr. de Fries); (3) Some general questions on existing aerodynamic facilities (e. g. cost, when built, capabilities, etc.); (4) Status of our proposed Fluid Mechanics Facility (a brief run-down was given to BOB by Mr. Crobaugh of Headquarters); (5) Our manpower and funding requirements estimating procedures; (6) Our relationship with Computation Laboratory and a review of our internal controls on the use of computer time. It appeared that they were satisfied with our explanations and pleased with the meeting in general. ✓ At the request of Mr. Crabill, Dr. Speer gave a presentation on Project LIEF and at the request of Mr. Crobaugh and our Mr. Shepherd, Mr. May talked on our proposed Fluid Mechanics Facility, both during the C of F presentation on Thursday afternoon

Dr. Geissler I read v. Brown's remarks after we talked about this subject in the plane from New York. I suggest to have a meeting with v. Brown, Resinger etc from R & D and with the IO people as soon as you have results. E. Pees

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NOTES 10-5-64 GRAU

1. S-IC CHECKOUT FACILITY: Beneficial occupancy of the S-IC control room structure, building 4708, was provided Boeing on schedule (October 1, 1964). Boeing activity on the installation, checkout and calibration program for the GSE began immediately after turnover. ✓
2. S-IC-T HYDROSTATIC TEST: The S-IC-T Lox tank was pressure tested to 60 psig successfully and post test structural inspection is now in process. ✓
3. S-IV PROGRAM: Shipment of the S-IV-9 stage from Sacramento to KSC is presently scheduled for October 20, 1964. No major rework or modifications are to be made on the stage at SACTO; therefore, there will be no re-run of the Simulated Flight Test prior to shipment. The S-IV-10 stage is undergoing checkout at Santa Monica. Electrical Subsystem, Propulsion and Instrumentation checkout is in progress and is approximately 90% complete. ✓
4. GOVERNMENT INSPECTION AGENCY (GIA) ACTIVITY NAA/TULSA: Government Inspection Agency coverage at NAA/Tulsa continues to improve. ✓ Four (4) additional Air Force Quality Control personnel have now been added to the GIA staff of NAA/Tulsa in support of the S-II program. The total Air Force personnel for this activity is now 23, with space authorization existing for three (3) additional personnel. Of the above Air Force personnel, seven (7) have completed the MSFC Field Representative Course, two (2) are currently attending and four (4) are scheduled to attend in the near future. ✓

NOTES 10-5-64 GRUENE

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Negative report.

NOTES 10/5/64 HEIMBURG

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1. STAGE S-1-10:

Data evaluation of test SA-23 revealed that the thrust values for all eight engines were well within specification. Hydraulic actuator problems on two engines are being corrected in preparation for the long-duration test. Test SA-24 is now scheduled for 10/6/64 (was 10/7/64), with an intended duration of approximately 145 seconds. ✓

2. Engine F-1002-1 was installed in the test stand, Thursday, 10/1/64. A new injector, thrust chamber, and lox pump impeller were installed. Tests are planned for October 9 and 10, 1964. ✓

SATURN I SCHEDULES: I have received a letter from Petrone's office requesting that the stages for SA-9 be shipped to arrive at KSC 16 weeks before launch to reduce overtime required for checkout. The letter stated launch date would be approximately 7 1/2 weeks after arrival of Pegasus. Shipping dates of stages will be established which will generally agree with KSC request. Definitive shipping date for Pegasus will be established as soon as possible. ✓

PEGASUS: General Phillips called Friday and indicated he had heard from Bisplinghoff. He requested that we quietly start estimating the savings in the SA-10 stages and in launch costs (not to include Pegasus) by not flying SA-10 and by flying SA-9 and SA-8 on the SA-8 and SA-10 schedule, respectively. The savings of the official schedule cost will not be a large amount due to the continuing requirements of Chrysler static test crew for S-IB stages, the phaseover of DAC personnel at SACTO to S-IVB and the launch crew at the Cape continuing as planned. ✓

SATURN IB CENTAUR COST ESTIMATES: Dr. Seamans requested that we submit to Headquarters (due October 12) estimates for Saturn IB Centaur development and flight costs for FY66 through FY69 (Voyager). Planning includes 2 alternate flights and development schedules. One schedule provides 2 Voyager flights to Mars in 1969 followed by 2 more in 1971, with other flights to follow at each succeeding conjunction. The other schedule is the same as above except initial flights are in 1971. Cost estimates will include development, procurement, spacecraft integration, and launch operations. In each case we will show necessary test flights prior to operational test flights. ✓

DE-ORBIT EXPERIMENT: Better definition of hardware, cost, lead-time, implementation, and performance degradation have been requested from DAC. Could be incorporated in 205 or later if deemed necessary. ✓

VENTING OF H₂ FOR SA-8 AND SA-10: Three main approaches (described below) were considered for venting of gas (H₂) for SA-8 and SA-10. The approach described in (3) below was accepted. (1) Venting through precool lines of four RL-10 engines. (2) Burn to LH₂ depletion. (3) The last approach having a high volume nonpropulsive vent line, discarding enough H₂ so that the low volume nonpropulsive vent lines can take care of the pressure development, was found acceptable and was accepted. ✓

S-IVB BATTLESHIP CHILLDOWN TESTS: Loading operations for engine chilldown tests were started on Oct. 2 at 1:45 p.m. and completed at 3:12 p.m. Two forward flow engine chilldown tests using LOX and LH₂ recirculation pumps were successfully completed with the engine conditions being well within the "start box". ✓ Another test to obtain full flight conditions will be tried and then we will investigate the earliest time for a hot firing. ✓

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NOTES 10/5/64 HAEUSSERMANN

1. VISIT TO IBM AND MIT: Dr. Duncan of MSC and I visited IBM and MIT on 9/30 to 10/2 for a review of the launch vehicle digital computer and data adapter and the MIT guidance system. ✓

IBM is progressing satisfactorily on the development of the digital computer and data adapter. ✓ The small electronic logic modules (unit logic devices) are being produced at a rate of 2,000 per month which meets their target schedule. They are experiencing difficulty, however, in the manufacture of the multi-layer interconnecting back panels. Because of the close spacing of the conducting lines (.010" wide with 0.010" gap) on these large boards (5 1/2" x 11" and 11" x 14"), the process control has not been perfected sufficiently to provide a satisfactory yield. An additional step has been introduced in the etching process which is expected to improve the yield. This problem has caused a 5-weeks schedule slippage on the first two digital computers. The first simplex prototype computer is now expected at MSFC on 12/1. This computer will be used for program development and debugging. ✓

W.H.

The half-automatic manufacturing processes at IBM are very impressive; I would like to recommend that you visit Poughkeepsie and Fishkill, N. Y. occasionally. ✓

Will do!
B

MIT's Instrumentation Laboratory, with 1200 employees (700 of these solely for Spacecraft Guidance and Control), still has to exactly define lunar guidance phases. Considerable research and development is going on to improve the system flexibility. The Block II system with a smaller stabilized platform and redesigned electronics will be used first on 206 and 503. ✓

MSC had requested a combined review of slip ring problems experienced on the Gemini (Honeywell/Centaur type) platform. All of their wired stabilizers have required at least one slip ring capsule exchange, some up to seven exchanges. Failures were different from our experience. They plan to adopt our gimbal rotation method for cleaning the slip rings each time the platform is switched on. ✓

W.H.

This trip had been rescheduled for months. Regrettably I had not been informed about the IBM Contract Review meeting last Friday, thus I could neither participate nor did I have a chance to ask for shifting the meeting. ✓

I've
missed
you!
B

(Make sure that you attend the FE review, 16 Oct, 1:30 pm)

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10/6

1. SLIDELL ANALOG COMPUTER FACILITY: The Simulation Branch is continuing to provide technical assistance to the Slidell facility. During the past weeks six measured winds, which were provided in tabular form, were processed and recorded as analog signals on magnetic tape. The tape and a portable tape recorder were then shipped to Slidell for use in a simulation program being performed by Chrysler. A tape recorder is now being procured for the Slidell facility, to be used in this and similar problems. ✓
2. NASA WORKING PANEL ON VISUAL SIMULATION TECHNOLOGY: Mr. F.T. Shaver, Chief of the Simulation Branch, attended the meeting of this Panel on September 29 and 30 at the Manned Spacecraft Center. Inspection of the extensive visual simulation facilities at Houston was the highlight of the meeting. Mr. Fred Pearce of MSC was elected Panel Chairman for the next year. A program was planned to correlate results of docking simulation studies at several NASA facilities, including the one at Marshall, in an attempt to define the visual simulation requirements for such studies. Responsibility for coordinating this program was assigned to Mr. Ralph Stone of Langley. ✓
3. PRESENTATION OF COMPUTER CONTROLS AND LEASE VERSUS PURCHASE OF COMPUTERS TO THE BUREAU OF THE BUDGET: A presentation was made to the Bureau of the Budget on October 2, 1964, outlining the controls which have been revised and which are being instituted by Marshall and the Computation Laboratory. These controls are to assure that those jobs which go on computers are reasonable and necessary, and that all purchase of computers and/or services at Marshall is agreed to by Computation Laboratory. Seemingly, the presentation was well received and very revealing to both MSFC officials and the Bureau of the Budget. It is felt by the Computation Laboratory that reinitiation of the second extension to the Computation Laboratory Building might be well received at this time. ✓

B w/o

1. ADJUSTMENT IN FY 65 LAUNCH VEHICLE STUDIES (Earmarked for MSFC):

The following study tasks have been submitted by Mr. Gray's office to Dr. Mueller:

Launch Vehicle Systems Criteria	\$ 400,000
Saturn Improvement Studies	800,000
Launch Vehicle Cost Studies	250,000
Cryogenic Orbital Tanker Studies	150,000
Reusable Orbital Transport	800,000
Post-Saturn Launch Vehicle Systems	<u>500,000</u>
Total	<u>\$2,900,000</u>

This is a reduction by \$150,000 if compared with the status 2 months ago, and a 50% reduction if compared with the FY 1964 level of effort. Dr. Mueller, Dr. Seamans and the Fleming Review Board still have to sign off on these studies.

The funds are not expected to be available before December. ✓

Gray 2

2. PRIORITY LIST FOR ADVANCED STUDIES: Responding to a request from Mr. Weidner, I have drafted a priority list for all our advanced systems studies, in such cases where several studies compete for the same talent. This list will be forwarded this week through Mr. Weidner to you for adjustment and concurrence. ✓

3. PLANETARY MISSIONS MEETING: This Tuesday and Wednesday a joint MSF, ART and SSA meeting will take place in Washington chaired by Dr. Dixon (Ed Gray's office). The purpose of the meeting is an interchange of the latest study results on planetary mission studies. We have about two hours of presentation to the entire group (approximately 40 people) and will concentrate on our inhouse flyby study. Dr. H. Ruppe will be the presenter and the senior MSFC representative. ✓

1. S-IC-T Status: Two major areas of delays in the assembly of S-IC-T can be distinguished: Thrust Structure assembly and Container fabrication.

The Thrust Structure itself is about 1 to 2 weeks behind the recovery schedule (Plan VII plus 14 weeks). This is caused by missing components created by CAM's (Change Action Memos). However, our major concern is the systems installation phase where we will install ducts, pressure volume compensators, prevalves, tubing, inter-connect lines, control valves, pressure switches, etc., prior to joining the Thrust Structure to the Fuel Container. A thorough analysis of the documentation and delivery status of the many thousands of components revealed a great number of parts still being critical. The time is not available to determine the final routing and supports of cable trunks and tubing on mock-ups at Michoud or here, but many details will be determined only at installation on S-IC-T. This will, of course, add more delays to the already existing and foreseen delays in delivery of components. It is our opinion that the Thrust Structure is, for these reasons, still the pacing item. ✓

Corrective actions on cracked welds in the Container fabrication for -T has been almost completed. In the Lox Container we are already proceeding with installation of level sensors and other measuring equipment. All defects on the Fuel Container have been repaired except on the inner side of the upper bulkhead. ✓

1. UTILIZATION OF DOD PERSONNEL - Mr. Joe Dickerson, who was appointed by Dr. Mueller to head a task group for study and improvement of MSF's utilization of available DOD support, is scheduled to visit MSFC during the week of October 12 to review Marshall's requirements for DOD manpower. Preparations for the visit and for development of the MSFC position are being coordinated by Jay Foster. ✓
2. NATIONAL LAUNCH VEHICLE STUDY - For the Saturn IB-Titan IIIC technical comparison, the October 5 date for completion of the AACB (Aeronautics Astronautics Coordinating Board) study has slipped and no new date has been set. The technical aspects to be covered are three fold: launch readiness, safety, and performance. We have received for comments, a copy of a draft joint NASA-AF statement on launch readiness; a copy has been furnished to Frank Williams. We expect to receive the joint statement on safety sometime this week. ✓
3. FY 66 NASA BUDGET - In a letter of August 26, 1964, Mr. Kermit Gordon, Director, Bureau of Budget, gave Mr. Webb a planning guideline of \$4.82 billion as the FY 66 NASA funding level. Last week, in a letter dated Oct. 1, 1964, Mr. Webb notified Mr. Gordon that the present outlook is for a FY 1966 NASA budget of \$5.563 billion, including \$190 million as the minimum required for new project activities. No increase in personnel over the projected FY 1965 level was shown, except for the 300 positions for Electronics Research Center. ✓

A copy of Mr. Webb's Oct. 1, 1964, letter is attached for your information. (Dr. von Braun's copy only) ✓

4. PROGRAM ADDITIONS, FY66 BUDGET SUBMISSION - Dr. Seamans has advised Dr. Mueller that he proposes to include in the FY66 budget submission, the initiation of a Voyager project utilizing the Saturn IB-Centaur as a new project in FY66. ✓ Current planning includes two alternate flight and development schedules; one provides the first two Voyager flights to Mars in 1969; the alternate schedule slips the first two flights until 1971. Dr. Seamans has requested MSF to provide Saturn IB-Centaur cost estimates from FY66 thru FY69 for both of these schedules. These cost estimates are to include all development, procurement, spacecraft integration and launch operations costs related to the development and flight of the Saturn IB-Centaur. The estimates are to provide for any necessary test flights prior to the operational flights. ✓

We received a telephone request from Bill Lilly's office last Friday to prepare these estimates; due in MSF Oct. 12. The SAT-IB Program Office is preparing, assisted by Mr. deFries. ✓

The Honorable Kermit Gordon
Director
Bureau of the Budget
Washington, D. C. 20503

1) Ho Weidner Oct 1, 1964

2) Dr. Koelle

FY1
B 10/6

Dear Mr. Gordon:

The programs and funding requirements of the National Aeronautics and Space Administration for FY 1966 have been reviewed in accordance with the guidance contained in your letter of August 26, 1964. It is the purpose of this letter to inform you that I and my associates are currently reviewing programs which, if approved in detail, would require a NASA budget for FY 1966 of \$5.563 billion NOA. These programs could be conducted with no increase in personnel over the projected FY 1965 level of 33,800 except for the previously planned addition of 300 positions at the Electronics Research Center now being activated.

The on-going NASA projects and activities have been reviewed to identify areas suitable for deferment or cancellation in the interest of over-all program economy. The results of this review indicate that \$5.373 billion are required for the conduct of on-going activities to meet current objectives. We are currently considering the individual merits of a minimum number of new project starts to augment the capabilities of and enhance the future returns from aeronautical and space activities now under way. These review and our final recommendations must await the outcome of the NASA review of future national space program possibilities requested earlier this year by the President, the joint NASA/DOD review of possible modifications and additions to the national space launch vehicle program, and other interagency discussions now under way. Pending the outcome of these studies and reviews it is our judgment that approximately \$190 million of new project activities should be undertaken in FY 1966.

One of the new projects under consideration would provide for future un-manned explorations of the planet Mars to expand the observations to be initiated by the Mariner launches scheduled for November of this year. The \$190 million for new projects in FY 1966 restricts funding of this project to a level which would not permit follow-on flights until 1971. We have grave reservations that this approach may be unduly cautious

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when considered in the context of the over-all national interest. Inasmuch as NASA has already announced that it will not attempt any further flights to Mars in 1966 and inasmuch as we have decided in the interest of economy not to engage in further flights to Venus in the foreseeable future, the pros and cons of deferring further planetary exploration for the next seven years merits the utmost attention by pertinent elements of the Executive Department. We shall be most anxious to discuss the possibilities of augmenting our planetary exploration activities beyond the levels now being considered.

This agency has carefully reviewed the impact of conducting an over-all program at a FY 1966 funding level of \$4.82 billion, which was furnished as a planning guideline in your letter of August 26, 1964. If we are required to conduct our FY 1966 operations at this level it would be necessary to abandon consideration of any new project starts. Such an action would have a detrimental effect on the development and utilization of our growing national capabilities in aeronautics and space. Furthermore, it would be necessary to severely curtail or eliminate many elements of the on-going NASA program to achieve this operational level. The approximately \$550 million reduction below estimated funding requirements for on-going programs could not be absorbed without a marked impact on our currently stated national goals. In addition to severe reductions in levels of program activity associated with the development of an improved and expanded technological base for the conduct of future space activities, it would be necessary to cancel on-going scientific space flight projects aimed at an improved comprehension of the properties and problems associated with the space environment. It would, in addition, be necessary to restrict resources available to the manned space flight program to a degree that would unquestionably delay the accomplishment of the manned lunar landing beyond this decade.

Detailed information concerning the programs and projects now under consideration for inclusion in the NASA budget are being made available to your staff for their concurrent review. We are prepared to discuss this information with them at your convenience.

Sincerely yours,

Original signed by
James E. Webb

C O P Y

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10/61. CONTRACTUAL INCLUSION OF CONTINUITY OF SERVICE CLAUSE:

A Continuity of Service Clause has been developed to assure continuous support for the laboratories during the phase-over period from existing support contractors to single support contractors. Most of our present contractors have accepted inclusion of this clause in their contracts. (The clause is being incorporated at the same time that modifications are issued to extend the period of performance.) The Brown Engineering Company has, however, refused to accept modifications which include the Continuity clause. The Purchasing Office has advised that Mr. Gorman will negotiate with Brown in an effort to resolve the matter. ✓

2. MANPOWER MANAGEMENT: To continue implementation of the R&D Operations' manpower management system, a new Contractor Employee Location Report form has been prepared and provided to the laboratories for a trial run. The form will pin-point the location of contractors in the Huntsville area and will allow better management of the Single Support Contractors. ✓

3. MANPOWER AUDIT ACTION ITEMS: A total of 63 action items were developed during the recent R&D Operations' manpower audits. To date, 19 of these have been completed. Close follow-up continues of the remaining items, although several of these are expected to continue until the middle of next year. ✓

4. SOURCE EVALUATION BOARD ACTIVITIES: Last week, the Board's Business and Technical committees completed evaluation of the TEST proposal. The Board will begin final evaluation this week. Proposals were reviewed and evaluation begun of proposals for the Technical Services Office and the Facilities and Design Office. Proposals are to be received this week for the Management Services Office and AERO. All Board activities continue on schedule. ✓

5. COST REDUCTION PROGRAM: The Center's Cost Reduction goal of \$42M has been broken down into quotas of \$10M from Administrative Operations, \$2M from Construction of Facilities, and \$30M from R&D. ✓ The \$30M R&D goal represents about 2% of Marshall's \$1, 636M appropriation. R&D Operations has been assigned a cost reduction goal of \$5.75M from the R&D appropriation. By the ground-rules for this exercise, credit is given for either hard savings and for cost avoidance. Accrued savings are understood to be available for reprogramming. ✓

OCTOBER 12, 1964

B W/15

RL10 ENGINE

The A-3-3 engine FX-146, with 57:1 expansion ratio, has completed the firings to evaluate diffuser capabilities during the start transient. Results indicate that a slight increase in diffuser cross-sectional area of 3.5% will be adequate for the 57:1 nozzle. The first 347 stainless steel A-3-3 thrust chamber is being incorporated in the engine during rebuild for demonstration and check firings at the A-3-3 pressure levels. The engine is scheduled for vibration and gimbal tests following the firings. ✓

H-1 ENGINE

The last of the 188K H-1 engines were static fired on October 6, 1964, in stage S-I-10. Preliminary analysis of the records indicate all engines operated satisfactorily. These engines are the third group which were retrofitted with new LOX domes at Rocketdyne-Neosho. This increases the confidence in retrofitted S-I-8 and S-I-9 engines which will not be static tested in the stage prior to launch.

Negotiations will be reopened on October 20 for the conversion of the existing H-1 engine production contract at CPIF. ✓

F-1 ENGINE

The delivery of 2004 to MSFC is expected this month.

A series of major meetings were held at Rocketdyne, Canoga Park and EAFB, California. These included the F-1 Turbopump Ad Hoc Committee meeting on October 6, the F-1 Program Review on October 7 and 8, and ceremonies dedicating the F-1 Rocket Engine Test Site at EAFB on October 9, 1964.

Three full duration firings on three different engines were successfully conducted on October 9. ✓

J-2 ENGINE

Successful J-2 thrust chamber chill tests were conducted at DAC/SACTO last Friday. The required thrust chamber temperature (-250°F) was achieved in approximately nine (9) minutes using cold helium. A total of four (4) chill tests were conducted. An engine ignition test is scheduled for October 21 and a mainstage test for October 28.

The cause of the major problem pacing the development and production programs, cracking of the hydrogen pump turbine couplings, has been resolved. Changing from a honeycomb type turbine seal to a solid seal, made a few months ago, has apparently caused the cracking. A return to the honeycomb seal will be the interim fix, and a thicker turbine wheel is under design for ultimate use. ✓

The gas generator explosion on engine 2005 (previously reported) resulting from premature opening of the GG propellant valves, was caused by inadvertent pressure buildup in the GG control valve housing. A pressure "equalizing" line has been incorporated between the GG control valve housing and the pneumatic control system vent manifold to prevent recurrence of this. ✓

L.B.

⊗ plus a spacer (spreader)
between the two turbine wheels!

B

B
10/15

1. KIWI-B4E: Disassembly of the KIWI-B4E reactor core has been completed. In the peripheral region, 14 of the elements were found to be broken, some or all of which were apparently related to the peripheral corrosion. The observed hot-end corrosion was as anticipated in the fuel elements that were not modified to minimize such corrosion. ✓
2. NRX A-2: The rerun is now tentatively set for 10-15-64. ✓
3. TIG VERSUS MIG WELDING PROCESS EVALUATION: At the insistence of the Materials Division of this Laboratory, Douglas Aircraft Company (DAC) was directed to evaluate TIG welding of 0.100-inch thick 2014-T6 aluminum to replace the MIG process currently used. On the basis of that evaluation, reported this week, DAC has agreed that the advantages of the TIG welding process for the alloy and thickness involved warrant its application in the fabrication of S-IVB stages. Consequently, DAC will begin using TIG welding on the common bulkhead meridian welds on S-IVB-2 (vehicle 502). DAC will continue the evaluation of each joint in the S-IVB and complete this study so as to incorporate additional desirable changes in vehicle 504. ✓

1. HURRICANE HILDA DAMAGE. As stated last week (10-5-64), damage was relatively light, however, repair and replacement to the ceiling of the lobby and cafeteria of the new Engineering and Office Building is estimated to cost \$50,000 approximately. ✓

2. S-IC. The meridian weld station (gore to gore weld) for tank bulkheads is not operating satisfactorily to date, even though Boeing reported certification last week. In the meantime three pairs of gores have been welded. The first exhibited 95 areas contained defects; the second 110, and the third, which incorporated an Argon purge, has not been completely inspected. The meridian weld problem appears to pace the D assembly, thus delays in obtaining a solution to proper weld head settings, etc., will definitely affect deliveries. We are attempting to do everything possible to alleviate the situation, however, it appears that "D" will slip Plan VII by 12+ weeks, as of today. ✓

3. S-I/IB.

Status of SA-D-5 - Work in process on fuel and LOX tanks, second stage adapter, splice angles around 105" center LOX tank. Alignment of vehicle in process. ✓

Status of SA-8 - Work in process on engine cables. Modifications and inspection squawks are being worked, final NASA shakedown now in process where possible. Electrical continuity and meggars almost complete. ✓

Status of S-IB-1 - Work is in process on the GOX flow control lines and valve, fuel and LOX lines, and manifold lines on 2nd stage adapter. Modification bulletins are being accomplished throughout vehicle. ✓

Status of S-IB-2 - Alignment operations on 2nd stage adapter complete. Work in process on splice angles attaching the 105" tank; alignment is in process on tail section, assembly buildup of the 70" fuel and LOX tank. ✓

4. SATURN V. Negotiations were completed with The Boeing Company for the performance of Saturn V engineering and integration support at MSFC. Negotiated amount including fixed fee is \$89,946,619. Modification is being prepared at the present time for transmittal through MSFC to NASA Headquarters for approval. The target date of transmittal is October 19, 1964. ✓

B 10/15

NOTES 10-12-64 DANNENBERG

1. Saturn V Systems Studies - At the request of IO, a Weight and Performance Trend Analysis Study has been initiated by R&D Operations with GE support. Also, a study on "Manned Readiness Criteria and Manned Flight Go/No Go Criteria" is being undertaken. Close cooperation with MSF in this area is taking place. Initial study results are expected by 11-30-64. We will keep you informed about the outcome. ✓
2. Panel Review Board Meeting 10-19-64 - In a pre-meeting with Dr. Rees, Mr. Fichtner, etc., it was decided to appeal Dr. Mueller's decision to transfer all GSE interfaces to the Launch Operations Panel. ✓ The proposed solution (to keep S/C GSE - L/V GSE interfaces in the Mechanical and Electrical Panels) will be backed by all three Centers. ✓
3. Crew Safety Panel - This panel (with new MSC chairmanship) will review the present EDS requirement for automatic abort on two or more "engines-out" during first stage flight. Also, the present design requirement to shut off all J-2 engines if two fail on S-II will be reviewed. ✓
4. Data Management - Plan for implementation of NPC 500-6 has been agreed upon by the Data Managers of R&D Operations, IO, and Central Staff. Additional contractor support, which is an extension of the current GE contract (NASw-410) is being requested through IO. Draft copy of MSFC Data Management Instructions and Preliminary CADI (Center Apollo Documentation Index) are in process of review by R-SA. ✓

NOTES 10/12/64 FORTUNE

B 10/15

Eberhard
Pretty
lively
activity
for a
"dead
duck"!
B

1. Visit by GDA Chief of Test, Sycamore Canyon - Bill Chana, whom I have known from previous West Coast contact, came by Friday, October 2, after having looked in on Pratt and Whitney at Palm Beach. He was interested in Pratt & Whitney's Floxing the RL-10 Engine, having recently supervised General Dynamics' Flox tests, reportedly successfully tanking an Atlas with 30% mixture, intends to try up to 60%. He said Pratt & Whitney was experiencing no difficulties to speak of in their work. He was naturally hopeful this overall approach would continue to give added life to Atlas and more capability to Centaur if needed.

2. GAO Opened Two Months Audit October 6 - E. J. Candilora and Herb Kittrell from the New Orleans regional office checked in Tuesday for general review of our operations with particular emphasis on support services. They have made some contacts with the Mobile District Office, Corps of Engineers, on our C of F contracts as well as the Bay St. Louis office on real estate. They will ask their Atlanta office to look into technical systems procurement at Huntsville. Walt Weaver has been designated GAO Liaison Representative for MTF keeping Sam Goan of MSFC apprised of GAO progress. ✓

3. IO Holds Manpower Review at MTF - Hans Hueter, John Stone and several other MSFC visitors spent Friday with us, listening to Henry Auter's and my general presentations, then detailed manpower requirements analysis by key organizational personnel. For the full time loan of fine quality supervisors for our technical positions pending formalization of organization grades and spaces, we owe Heimburg a great deal. ✓

B
10/15

1. Flight Control Operations Panel: The 10th meeting was held in Huntsville on 10/7. The following agreements were reached: (1) There is no operational requirement for ground command capability to the S-IVB/IU on SA-201 (e. g. attitude correction or cutoff backup); (2) There is a requirement for abort capability after LES jettison (This raises several problems for S-IVB/IU communications and tracking after abort due to adapter panels folding back.); (3) There is presently no MSFC requirement for ground command capability to the S-IVB/IU during launch vehicle power flight; (4) There is no ground command requirement to the S-IVB/IU (Saturn IB and Saturn V) from any DSIF site (85' dishes); (5) Revised KSC membership was approved.

2. Fluid Mechanics Facility: Mr. J. Foster, Executive Staff, received a phone call from Mr. Stan Smolensky, MSF. The Fluid Mechanics Facility was turned down by Dr. Seamans as a result of a letter from Dr. Bisplinghoff which stated that OART felt that there was no justification for the Marshall facility. Dr. Bisplinghoff stated that OART could perform all the work for MSFC. Mr. Smolensky will be in Huntsville on Monday, October 12, 1964, and will have a copy of the Bisplinghoff letter with him. There is also to be a MSF Review Board Meeting at Marshall on October 27, 1964. MSF wants to put the Fluid Mechanics Facility on the agenda for this meeting. Last Monday, we discussed the possibility of joint facility usage with Dr. Hermann. It turned out that the objectives of the planned facilities are too far apart to make a combination financially attractive. But we agreed to encourage mutual usage of our facilities in specific cases. Detailed minutes of this meeting are being published. We shall send you a copy. ✓

3. Orbital Debris: Reference your and Dr. Rees' comments on Notes 10/5/64 Geissler, copy attached as enclosure. At the present time four retro systems to control S-IVB re-entry for the Saturn IB are under final consideration. None of the proposed retro systems can be attached to the S-IVB stage in kit form without structural modifications and installation of electrical wiring in the home factory. These changes must be added to the stage in order to have the option of flying or not flying the vehicle with retro motors. The lead time for the necessary changes depends on the system which is chosen. Total retro system weight (payload reduction) ranges from 745 to 1143 lbs. for the proposals under study. It is presently planned to have DAC give their design proposal for the IB system, and Lockheed give results of their preliminary Saturn V studies during first week of November. This will be a status meeting and you may want to attend for information. ✓ After this, DAC will begin working on the Saturn V system, with final results to be available at end of the year. At this second meeting, decisions will have to be made and we shall request your participation.

E.F.

But what will be the scar weights, i.e., structural re-inforcements and cabling, but no retro rockets? B
(Just to protect the option to put them in)

B 10/15

NOTES 10-12-64 GRAU

1. S-IU-9, BOILERPLATE NO. 016 ALIGNMENT: Alignment of the S-IU-9 Instrument Unit to Boilerplate No. 016 was accomplished with minor interference at two (2) bolt hole positions. Corrective action will be accomplished at MSFC. ✓
2. S-II PROGRAM: Meetings were held with S&ID, Downey, California, during the week of September 28, 1964, to further define and carry out realignment of the S-II Qualification Test Program. A new benchmark has been established as Flight Readiness at a lesser, but more realistic degree than S&ID has originally proposed. This benchmark will allow installation of flight certified components earlier than the 70% confidence level originally planned. Neither the reliability test program nor the overall test program has changed. ✓
3. S-IVB PROGRAM: The second run of the Engine Chillover test on the S-IVB Battleship at SACTO was so successful that a scheduled third test will not be performed. ✓ A complete Blowdown test is tentatively scheduled for the week of October 19, followed by a 10 second static firing tentatively scheduled for the week of October 26, 1964. DAC seems to be moving ahead at a good pace to recoup some of the time lost in building and testing this stage. ✓

NOTES 10-12-64 GRUENE

B_{copy} 15

Negative report.

NOTES 10/12/64 HAEUSSERMANN

B w/15

1. STATUS OF PEGASUS PROJECT REVIEW: Astrionics Task Group which was at Fairchild from 9/28/64 - 10/9/64, has returned to this Laboratory and is now in the process of preparing a report to be given to you, Mr. James, and others on 10/16/64. The briefing on this report given to me by Mr. Currie on 10/9 indicates that the Pegasus Project is in worse shape than was reported earlier. It is believed that needed changes can be made in time for a March launch if decisions and actions are initiated without delay. It is questionable that this date can be met if we get into a long decision cycle.

I consider it imperative that you and others to be involved in a course of action decision be present at the 10/16 briefing. *Will attend: 11:30 am* B

2. AGARD/NATO PRESENTATION: The presentation at Advisory Group for Aeronautical Research and Development (AGARD)/North Atlantic Treaty Organization (NATO) on the "Status of Guidance and Control Methods, Instrumentation, and Techniques as Applied in the Apollo Project" originally intended to be given by Dr. Mueller and me will now be given by Dr. Duncan and me. We both leave Saturday, 10/17. I will add some annual leave and will be back 11/17. ✓

1. S-1-10 STAGE:

Test SA-24 was performed on 10/6. Inboard engine cutoff occurred at 149.93 seconds after ignition, and was initiated by lox low level sensor in one of the lox tanks. Outboard engine cutoff came 4.55 seconds later, with thrust failure occurring first on engine 4 as a result of lox depletion. Data evaluation revealed that the thrust values for all engines were well within specification. Flight hardware damage was limited to warpage of one of the radial injector baffles on engine position 8. Repair is planned at Michoud after stage return. ✓

2. F-1 ENGINE TESTING:

TWF-034 was conducted on 10/9 for a duration of 19.19 seconds. This was a shake-down test after engine rebuild. Gox was used for the first time to pressurize the lox system. ✓

Test TWF-035 was conducted on 10/10 for a duration of 127.65 seconds. GN₂ was used to supplement the gox for the pressurization of the lox system. This was a planned lox depletion test, with cutoff scheduled when the lox temperature at the lox tank outlet reached -288°F. However, possibly due to vortex formation, gas entered the system and the engine was depleted of lox before the redline value of -288°F was reached. ✓

B 10/15

NOTES 10-12-64 HOELZER

1. MANNED ORBITAL LABORATORY (MOLAB) VISUAL SIMULATOR:

A proposal was presented on September 28 to the MSFC MOLAB Study Committee to develop a simulation facility for evaluation of proposed design concepts of MOLAB steering, controls, and mobility. Tentative approval was given to begin development of this simulation facility and it is estimated that six months and \$225,000 will be required.

H.H.
By whom?
I'm not
aware of
any funds
assigned to
this.
URGENT.
B

The facility will simulate the effects of vehicle operations maneuvering the MOLAB over a typical lunar surface and will provide a television projected view that the simulator operator observes through the vehicle windows. The television view will change in accordance with the operator's steering and will show the dynamics of the vehicle reacting under lunar gravity forces.

There's
such a
facility
at
FRUMMAN
B

It is planned to develop this facility by utilization of existing simulation equipment wherever possible. The major components are on-hand or will be on-hand within three months. They consist of: a two-man cockpit simulator structure, a visual landing simulator (designated SMK-23 by the USAF), and general purpose computers existing in the Simulation Branch. The estimated value of the proposed simulator is \$1.1 million; however, additional expenditure amounts to approximately one-fourth this value because of the utilization of existing equipment.

2. DATA MANAGEMENT MEETING IN NEW ORLEANS: Computation Laboratory was represented at a Data Managers Meeting in New Orleans on October 1 and 2 along with representatives of NASA Headquarters, KSC, MSC, and GE-Daytona to resolve problems in the Apollo Documentation Index System (ADI). This will be a continuing joint effort of organizations represented for the control of Apollo documentation. ✓

3. EXCHANGE VISIT WITH HILL AIR FORCE BASE, UTAH: A representative of the laboratory recently stopped over at Hill Air Force Base, Utah, to discuss Air Force computer aspects of Configuration Management. While there, Air Force personnel inquired about the possibility of your visiting the Salt Lake City area. A separate memorandum concerning this will be forwarded to your office shortly.

Too busy!
B

4. FACILITIES: The extension to Building 4663, Computation Laboratory, now under construction, is, in the contract, supposed to be completed by November 14, 1964. There is, at present, in process a request for a 19 day extension as a result of some change orders made to the original contract. The contractor is approximately 6 weeks behind schedule. Movement of some of the present equipment plus furniture, etc., together with change orders to the contract makes February 1, 1965, a reasonable occupancy date. ✓

B10/15

PEGASUS: The preprototype canister passed the acceptance test procedure (ATP) at ambient temperature with good results. Full scale thermal vacuum test should start the latter part of next week, slightly ahead of the forecast schedule. The Pegasus "A" data system has passed subsystem tests at ambient temperature, high and low voltage. The communications system test is now in process and appears to be functioning satisfactorily. The ASTR review team headed by Mr. Roy Currie has completed their technical review at Fairchild and are returning to Huntsville to prepare the report of their findings and I will meet with Dr. Haeussermann on Oct. 15 to determine future actions. Detector panel production will provide sufficient panels for Pegasus "A" by Nov. 9, 1964 to meet the current spacecraft delivery schedule. ✓

S-IVB BATTLESHIP: Four satisfactory special chamber chilldown tests to comply with $-200 + 50^{\circ}\text{F}$ redline requirement at time of engine start were made Oct. 10 since the test on Oct. 2 was not entirely satisfactory. The engine ignition test (TR 1016) will be attempted about Oct. 22-24. The 10 second mainstage firing would then be made the latter part of week ending Oct. 31. ✓

S-IV: The refurbishment of the S-IV Hydrostatic Dynamics Vehicle for the LH₂ blast test program has been approved. Delivery of the vehicle to Edwards Air Force Base is expected by January 1, 1965. ✓

SATURN I GSE: The Saturn I SDF (Breadboard) is now in a configuration to support S-IB-201 static test stand programs for the purpose of proofing test tapes (software). ✓

SATURN IB: A problem has arisen concerning the fold-back panels of the LEM adapters on SA-201 and 202. In case of an abort after the LES has been jettisoned (L.O. + 171 seconds) the panels must deploy to allow the SM to pull the CM away. Since the panels cover the C-band antennas which receive the destruct signal, there can be no destruct capability of the S-IVB /IU. The fold-back panel problem is expected to be remedied by SA-203. The I/IB office was not aware of an abort requirement for SA-201 and 202 until the Flight Control Operations Panel meeting. Also, we understood the EDS system would be flown open loop on SA-201 and 202. ✓ Both these questions need clarification and I/IB will propose to R&DO an overall Saturn IB design review in November to resolve these and other panel and working group open areas. ✓

L.O.
wasn't
either
B

SATURN I: After a brief look into the possibility of a secondary payload on SA-10, a formal letter of request was received from the Nike-X Project Office. The request specified a rigid, 1 to 3 meter, metal sphere be placed in orbit for the Nike-X system radar calibration. A letter has been forwarded to R&DO, Mr. Weidner, asking for a two week "quick-look" impact. ✓ If the results look promising, a more detailed study will follow. ✓

NOTES 10-12-64 KOELLE

B/10/15

1. ART ADVANCED SYSTEMS STUDIES FOR FY 1965: So far, the following three studies which fall in the area of advanced systems studies have been approved.

HK
Let's discuss concepts and objectives
B

a.	Mission-Oriented Engine Optimization (for NERVA II)	\$ 50,000
	This is an addition to an existing study	
b.	Modular Nuclear Stage (using NERVA II)	360,000
c.	Nuclear-Electric Space Vehicle for Manned Mars Missions (continuation of FY 1963)	120,000
		<hr/>
		\$530,000

This compares with a total of approximately \$800,000 in this category last year.

2. MSF AUTHORIZATION FOR ADVANCED SYSTEMS STUDIES - FY 1965: You wanted to know (last week's notes) why we cannot expect release of funds for this fiscal year earlier than December. The reason is that things are still very fluid in Washington. The uncertainty of the FY 1966 budget has a feedback on our FY 1965 program. As you know, Ed Gray has set aside about 12 million dollars of advanced study funds for new starts. These new starts, however, are strongly influenced by the FY 1966 planning. Thus, Dr. Seamans is hesitant to sign off on any new systems studies at this time. I still believe that authorization will not come before December.

3. LAST WEEK'S HIGHLIGHTS: We had a two-day review (first FY 1965 progress report) on the reusable orbital transport and systems criteria for advanced launch vehicles. The following companies are working this package: NAA, BOEING, LOCKHEED and GD/A. No new, big surprises came up; briefing charts are available if desired. We also had a review with MARTIN and GD/FW on cost element investigations with respect to launch vehicle development and operation.

→ suggest not at this time
B

4. THIS WEEK'S HIGHLIGHT: We have scheduled a progress report on our "Launch Vehicle Cost Model" by GD/FW on Tuesday and a LOCKHEED report on "Launch Vehicle Component Cost" on Wednesday.

5. NASA ADVISORY COMMITTEE ON ADVANCED LAUNCH VEHICLES: This committee is scheduled to be here on October 30. We plan to give four presentations in the morning:

- a. Launch Vehicle Applications
- b. Saturn Improvement Studies
- c. Reusable Orbital Transport Studies
- d. Post-Saturn

Bonnie Bk ok, 10/16
I'd like to attend this meeting. I think it's all day. B

Each will be a 45 minute presentation with a 15 minute discussion period. There will be a tour in the afternoon.

BW/15

1. S-IC-T Hardware Problems: Manufacturing and qualification problems at the major sub-vendors of Boeing and MSFC are still determining the speed of the S-IC stage development. For illustration, I will name a few examples out of many cases:

a. Fuel Pre-valves, built and delivered by Whittaker, showed severe corrosion. The anodizing and cleaning processes at a sub-vendor of Whittaker were not properly done. We had to take these valves apart, re-anodize and re-assemble them in our valve clinic for support of F-1 tests in R-Test Laboratory.

b. Outboard Lox Compensators failed during impulse testing. P&VE and Arrowhead are working together to change the test procedure to a more realistic simulation of flight conditions. Assembly of a new PFCT unit is now scheduled for completion on December 14, 1964.

c. The Potter Meter Company is unable to furnish crack-free turbines for the flow meters for Lox pre-valves. A decision was reached that this part will have to be made from a forging. Unless five crack-free turbines can be located now, this could develop into a problem for S-IC-T.

d. One major problem at the West Coast now appears to be at Solar. It is our opinion that good parts are practically impossible to obtain as long as Boeing does not change design criteria. Solar is, for example, not permitted to increase the wall thickness of a duct that has failed--because of adding weight to the assembly.

We are working on all these and many other problems together with P&VE and Boeing. We are confident that all these problems will be solved satisfactorily; however, these component developments require more time than originally provided for in our schedules.

2. S-IC-1: It has become apparent that the design specifications for the Fuel Exclusion Riser are inadequate. From our experience on -T, we know that, using existing specifications for adhesives, for glue line tolerances, for foamed blocks, etc. we cannot produce an acceptable exclusion riser for S-IC-1. This is a very critical item since we are already welding the lower fuel bulkhead for this vehicle now. We have brought this to the attention of Mr. Dunigan of Boeing, and have formed a committee with Boeing Engineering, Boeing Manufacturing, P&VE and ME personnel to develop new documentation for this item.

3. Visitors from MSC: Three people from Structures and Mechanics Division, MSC, visited ME Laboratory and Dr. Lucas last week. The purpose of this visit was to familiarize MSC personnel with our methods and ways of evaluation and support of manufacturing activities of our Prime Contractors. ✓

4. S-IC-T Manufacturing Milestone: Last week we assembled the Skirt Section to the Lox Container. ✓

WK.

The S-IC begins to look better than the SIC!

any recommendations?

B

NOTES 10-12-64 MAUS

BW/15

1. DOD SUPPORT MANPOWER - Mr. Joe Dickerson, Col. A. L. Greenhorn, and Mr. Stan Smolensky are visiting this week, Oct. 12-16, to discuss current and planned use of DOD (military and civil service) personnel. MSFC current estimates are:

	<u>9/30/64</u>	<u>6/30/65</u>	<u>6/30/66</u>
I. Contract or Management Support	811	1058	953
II. Corps of Engineers/Bureau of Docks	953	1006	659
III. Installation Support (Local & Edwards AFB)	452	452	452
IV. Logistics Support (Military Sea Transport Service, and Propellants)	150	230	300
V. Other DOD Support	<u>181</u>	<u>205</u>	<u>205</u>
TOTAL	2547	2951	2569

Goal of the group is to understand existing procedures and requirements, expand use of DOD support (primarily category I above), and develop uniform policy and procedures. ✓

2. MOVIE FOR GSA - We have received a request from Mr. Eckenbach of GSA for a three-minute movie on you and your data console to be used as a part of a nation-wide government course on information for management decision. The course will be directed at the GS-16 level and above. The "juke box" was suggested to GSA by Wally Velander of Jack Young's office in headquarters. ✓

O.K. B

3. LOGISTICS MANAGEMENT INSTITUTE - The Board of Directors of the Logistics Management Institute which advises Secretary MacNamara on logistics management will visit MSFC on Friday, October 16. Among others, the group will include General Magruder, Lt. General Eckert, and Lt. General McNamara, all retired. Dr. Rees will welcome the group and chair the meeting. You will join them for a thirty-minute discussion at 10:30 on Friday morning. ✓

4. VISIT OF EARL COOPER - Mr. Earl Cooper, Senior Staff Member of the Senate Appropriations Committee, is visiting various NASA contractors and centers during the month of October. Although he is arranging his itinerary as he goes along, he will probably visit MSFC and Michoud after October 19. His visit has no specific objectives; he just wants to look around generally. ✓

5. PERT ASSESSMENT - At the request of NASA Headquarters, we are initiating an assessment of the major PERT applications of MSFC. Included will be all stages, engines, and project related facilities. The assessment will be performed jointly with Industrial Operations and will involve on-site audits at prime contractor plants. The report which was scheduled for the October Program Status Review has been postponed. ✓

1. MSF REVIEW OF R-RP FY-66 FACILITY PROJECT: Captain Freitag, Mr. Smolensky, and other MSF representatives, will visit Marshall on October 27, to review Research Projects' proposed FY-66 CofF Project, the Space Vehicle Research Lab. Particular emphasis will be placed on how the facility would enhance RP's mission. Dr. Stuhlinger will conduct the presentation to the MSF team. The purpose of the visit is to increase MSF's capability of defending the project before Bureau of Budget and Congress. Dr. Seamans has approved the project. Captain Freitag may plan on discussing other subjects which are unknown to us at present. ✓

2. GREEN MOUNTAIN FACILITY: Representatives of this office met with Astrionics to review the current status of the Green Mountain facility. Briefly, purchase is out (Dr. Seamans deleted the CofF project and Mr. Gorman ruled against purchase). The Purchasing Office is attempting to extend the lease, at the present rental, until July 1965; this would allow local approval, thus allowing extension of the lease before its November 5 termination. The Chief Counsel advises that work can be performed at the site, if the work is minor in nature and incidental to the cost of the technical equipment. However, because of the cost, such improvements as a water well and sanitary facilities, do not appear possible at this time. ✓

3. INCENTIVE EVALUATION BOARD: The Incentive Evaluation Board for the General Electric/Computation Laboratory contract met on October 8 to evaluate the contractor's performance (March 30 through September 30, 1964) and to arrive at a recommended award fee for that period. Although this was our first incentive evaluation of a support contractor, the evaluation procedures worked out pretty well. At your convenience, the Board recommendations will be presented to you for approval. ✓

4. FY-65 OBLIGATIONS: An analysis of the first quarter FY-65 R&D Operations' initiations and obligations was presented at the October 9 R&D Council meeting. The analysis indicated that an average of 58% of the first quarter authority had been initiated. Mr. Weidner emphasized the need for increased attention to this matter by the Laboratory Directors and requested that a similar review be presented at each subsequent R&D Council meeting. ✓

OK
10/16
Bonnie
Please
lay on
(15 min)

B

NOTES-10-12-64-SHEPHERD

B10/15

No Notes

Boeing

1. Systems Engineering and Integration Support Contract - The fee for the subject contract was negotiated on October 7, 1964. The negotiated fee was \$5,560,000 which is 6.98 per cent of the total negotiated cost of \$89,935,699. This cost includes funds for the Saturn V Systems Development Breadboard Facility but excludes costs for the Saturn V Dynamic Test Program and Saturn V Vehicle and Launch Site GSE Support. ✓

2. S-IC-T Hardware Qualification - (Reference Notes 9/28/64 Kuers, copy attached) The progress in qualification of S-IC-T hardware is obviously unsatisfactory. The S-IC-T has an estimated 350 parts requiring qualification and only 20 parts were qualified as of October 1, 1964. In the specific case of the S-IC-T, each item of unqualified hardware which presents a problem to an assembly activity in the ME Lab is reviewed and either approved or disapproved for installation by the S-IC-T Task Force Chairman, Mr. Heimburg.

The following actions are being taken to improve the S-IC hardware qualification status:

- (a) Establish a Qualification Control Board ✓
- (b) Vendors of hardware who are having difficulty in qualification of hardware will be brought into Michoud or other appropriate installations and receive help from Boeing and MSFC technical personnel. ✓
- (c) Visits to be made to vendors' plants by qualified technical personnel to better understand the vendors' problems and provide appropriate assistance. ✓
- (d) Expedite the completion of Boeing's laboratories which are to be used in qualification testing. ✓

3. S-II LOX Tanks Slosh Baffle - (Reference Notes 9/21/64 Geissler, copy attached) Aeroballistics of R&DO has presented data so that the manufacture of the Upper Slosh Baffle can be authorized through contracts. Change Order 160 was issued for S&ID to design the baffle for 815,000 LOX loading. Because NAA/S&ID has stated verbally that the flight stages S-II-1 through S-II-3 are not structurally capable of utilizing a LOX loading of 815,000 pounds LOX, S&ID is being directed to provide a LOX Slosh Baffle which provides the maximum damping consistent with payload trade-offs. The LOX Slosh Baffle shall provide a minimum of 3% damping at six inch slosh amplitude for both the 781K and 815K LOX loading. NAA is being directed to insure that S-II-4 and subsequent are structurally capable of using a LOX loading of 815,000 pounds LOX so that the performance increase may be obtained. ✓

4. S-IVB Stage:

Incentive Contract - A meeting is scheduled for October 15, 1964, at DAC to discuss Incentive Contract Criteria and to formulate a plan of action to convert the present CFFF Contract to an Incentive Contract. ✓

Qualification Test Program - A review of DAC's Qualification Test Program will be made on October 29, 1964, by MSFC personnel.

- Attachments: 1. Notes 9/28/64 Kuers (to Dr. von Braun's & Mr. Weidner's copy only).
2. Notes 9/21/64 Geissler (to Dr. von Braun's & Mr. Weidner's copy only). ✓

B 10/15

NOTES 10-12-64 Stuhlinger

1. MSF SUPPORTING DEVELOPMENT PROGRAM: Out of an annual plan of \$19,000,000 (28 tasks), 13 tasks have been approved, totalling \$8.965M. Program authority has been received for \$4,000,000, leaving a balance of \$10.035M. A resubmission presently being prepared for the balance of the program will include as first priority, \$4.5M for AES, leaving a balance of \$5.535M. The remaining unfunded requirements (Saturn Support, AES Support, and Propulsion Technology) requires \$9.1M and is being prepared for submission to Ed Gray's Office by October 15 together with AES proposal of \$9.3M (\$4.5M from SD Program and \$4.8M from Dr. Koelle's Advance Studies funds). ✓

2. SI UNITS: A training course on SI Units set up by Dr. Mechtly, and Mr. Parks of Training Branch, was attended by 302 MSFC personnel. The Brown Engineering Company generously contributed the services of Mr. Palmer, senior technical editor, who taught the course, and 600 copies of a SI Unit training manual which Dr. Mechtly and Mr. Palmer prepared. Mechtly's NASA Special Publication 7012 on SI Units, the basis of the training manual has arrived from the Government Printing Office and is being distributed. ✓

Bonnie AOK
I'd like to have
a personal copy. B
Bzh
10/16/64

October 19, 1964

B 11/5

RL10 ENGINE

We are taking a look at what RL10 effort will be required to support the Saturn IB/Centaur program. It appears that an engine test program will be required at P&W to substantiate the differences in the temperature and vibration environment, flight sequence, control requirements, and GSE differences in using the Centaur on the Saturn IB vehicle as opposed to flying the Centaur on the Atlas or Saturn I. ✓

H-1 ENGINE

During Phase III testing of the type 5582 injector, two units, which had accumulated approximately 2300 seconds of engine testing, failed to damp when bombed at thrust levels of approximately 216K. To preclude further difficulties with the higher performance injector, a backup program is being pursued with a type 5602. The 5602 has the same performance as the 5582 and stability characteristic appears to be very good based on one sample tested. ✓

*fw C-1 ENGINE (100-LB. THRUSTER)

The Request for Proposal (RFP) was released October 16, 1964. Copies are being forwarded to Dr. Mueller for MSF^{FTRK} review. The Bidders' Conference is scheduled for October 27, 1964, with proposals due November 30, 1964. ✓

*fw J-2 ENGINE

A successful 500 second test was conducted on an R&D engine utilizing a honeycomb seal in the hydrogen turbine. Several thousand seconds of run time have also been accumulated on hydrogen turbines with honeycomb seals. These results increase our confidence in the return to the honeycomb seal being an interim solution to the turbine cracking problem. In answer to your question on last week's notes, the vibration damper ring (spacer between the two turbine wheels) may not be needed. Development of such a ring is underway, as well as testing to determine the requirement for it. ✓

*fw Informal PFRT testing was initiated on production engine 2008 this week. A successful 475 second test was conducted including a gimbal demonstration. Forty percent of the run was made at high mixture ratio (5.3). The hydrogen turbine on this engine had cracked couplings. An inspection of the turbine is being made to see if the cracks progressed. ✓

*fw Increased consumption of propellants by the F-1 program the past few weeks has caused a temporary shortage of LOX which may affect J-2 testing. The total propellant situation is being assessed and you will be kept informed. ✓

*fw F-1 ENGINE

The first S-IC-T engine, F-2004, successfully completed acceptance testing at Edwards on October 12, 1964. It was removed from test stand 1D on October 13 and returned to Canoga for final inspection prior to delivery to MSFC. ✓

Engine F-2005 (the second S-IC-T engine) was moved to Edwards on October 14, 1964, for acceptance firing. ✓

The following is indicative of the degree of maturity now building in the F-1 engine as it approaches FRT:

1. 15 of the 21 tests conducted between October 1 and October 15 were for full duration. ✓
2. 13 consecutive full duration tests were conducted, of which 4 were conducted in one day. ✓
3. One third of the total seconds accumulated to date in the F-1 program have been accumulated in the past four months. ✓

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B115

NOTES 10-19-64 CLINE

include in
this immediately
other Galbraith
notes

1. NRX-A2 REACTOR TEST: The NRX-A2 reactor was rerun on 10-15-64 by Westinghouse at the Nuclear Rocket Development Station. The test demonstrated a modified startup technique and met all test objectives. This reactor will now be disassembled for postmortem examination. ✓

2. F-1 ENGINE DESIGN REVIEW AND TURBOPUMP AD HOC MEETINGS HELD: The following decisions were made during the subject meetings on 10-6/8-64:

a. The 1000-sec. life limit on the F-1 impellers was eliminated; the pumps will be periodically inspected. ✓

b. The turbopump speed redline was raised from 5800 to 6000 revolutions per minute to simulate flight speeds, although testing at MSFC will be maintained at 5800 revolutions per minute. ✓

c. Flight rating tests will begin on or about 11-15-64. ✓

3. J-2 ENGINE J-2003 INSPECTION SHOWS NO CURVIC COUPLING CRACKS: This engine has the honeycomb seal on the first stage. The fact that no cracks occurred substantiates the theory that the honeycomb seal eliminates the curvic coupling failure problem. ✓

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1. S-I/IB

Status of SA-8 - Entered Electrical Checkout on October 13, 1964. ✓

Status of S-IB-1 - Assembly continuing. Engines are being removed for shipment to Rocketdyne for modification. ✓

Status of S-IB-2 - Tank clustering is complete. Tubing installations in tail section in process. ✓

Status of SA-D-5 - Clustering of 70" LOX and fuel tanks expected to start today. ✓

Qualification and Reliability Testing - The S-IB spider beam, which is being set up for structural tests was damaged at one of the splice joints. During setup and checkout of the structural test fixture, a valve in the hydraulic loading equipment failed to close properly and inadvertently loaded the beam. It appears possible to repair the beam splice joint in place, with minimum schedule impact. ✓

2. Support Services - Six proposals were received in response to the RFP for the support services contract at Michoud Operations. The Source Evaluation Board is in session to review them. ✓

fw 10/19

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NOTES 10-19-64 DANNENBERG

1. Liquid Hydrogen Experiment at Zero G - Mr. Cline, P&VE, will present a final report, based on vehicle 204 to you prior to the November Management Council Meeting. ✓

2. Matrix Study of Systems Engineering in Four Major Contracts - A matrix for systems engineering tasks in Boeing, Chrysler, IBM, and GE contracts is being prepared for presentation to you. Duplications and overlaps will be identified and recommendations for correction will be included in the presentation. ✓

3. Saturn/NIKE-X Payload Study - Colonel James has requested R-SA to update the PDP prepared 18 months ago for a polished metal sphere as a bonus payload for the SA-7 vehicle. The Army would like to use this same concept to support NIKE X as a bonus payload for SA-10. Data is to be provided Colonel James by 10-23-64. ✓

4. Saturn IB - Titan III Comparisons -
Cost - AF material to the NASA/DOD study group is still incomplete. Saturn data is still being questioned on how relatively high R&D costs are reduced to low follow-on costs. ✓

Technical - NASA/DOD combined statements to the AACB on launch readiness, performance, fast reaction, reliability and safety are being prepared by MSF. MSFC has been requested to comment only on launch readiness. TWX giving MSFC comments sent last week fw ✓

NOTES 10/19/64 FORTUNE

B 11/5

Jan 19/19

1. Contract with Mississippi Power Company: appears likely in near future. Wednesday, Vic Daniels, their Vice President, John Stevens, his assistant, and James Eaton, Company Attorney, met with our representatives. Last year's negotiations by the Corps of Engineers had been unsuccessful, partly because of timing, partly because of differences in Corps and NASA contractual procedures. We reviewed current contract requirements, gave them sample documentation and arranged for Eaton to contact myself or Ed Ling in ten days for formalizing their permanent service to us. We will initiate similar discussions with United Gas Company at an early date. ✓

2. Presentation to Bureau of Budget Representatives - was made Thursday in Washington by Henry Dyer, Test Lab, and myself, on request from Gen. Phillips' office to Executive Staff. Questions came up at their exit interview in Huntsville regarding MTF activation and how NASA, Boeing, North American and General Electric would operate and their time did not permit sufficiently detailed answers. The Saturn V Office reported Friday that Don Crabill appeared well satisfied with MSFC planning and our progress to date. Report has been submitted to I.O. on the presentation. ✓

1. Mission Design Parameters for 201 and 202. The finalization of mission design parameters like propellant loadings, weights, etc., and mission profile for 201 and 202 has been recently requested by Col James. However, due to very recent inputs from MSC, even the mission profile of 201 may have to undergo drastic changes. In contrast to previous agreements, MSC now insists on abort capability for the capsule; this forces us to impose constraints on the ascent trajectory (g-load reentry flight corridor) which require a shape substantially different from an optimum performance ascent and will consequently put the burden of a substantial additional workload on both Aero and Astrionics Labs with a consequent slip in schedule. The reluctance by some MSC people to phase us in early to their mission planning has caused the late identification of this problem area and the resulting extreme time pressure. I have discussed the matter with Dr. Shea, who promised me to use his influence on some of our counterparts. The matter will be negotiated in a forthcoming meeting of the Flight Mechanics, Guidance, and Control Panel, October 20 through 22, at Houston. We hope that MSC eliminates its requirement for this abort capability. At the Panel Meeting, flight profiles for 201 and 202 will be discussed. Also, a definition of the responsibilities and a streamlining of the information flow between both centers will be attempted. The Panel Review Board meeting on October 19 will cover the Flight Mechanics Panel activities but is not expected to bring clarification of the issue since it precedes our Panel Meeting at Houston. ✓

2. Fin Mounted Angle of Attack Measurements (SA-7): Preliminary analysis of the first angle-of-attack measurements using sensors mounted on the fins of SA-7 indicate that the experiment was basically successful. The fin measurements appear to be in good agreement with the Q-Ball measurements from about 25 to 95 seconds of flight. Differences were of a low frequency oscillatory nature with the average differences through the max. Q. region being on the order of 0.2 deg. and the maximum being 0.9 degrees. The magnitude of the oscillations in the fin measurements gradually increased after about 70 seconds of flight. Two additional flight tests for these sensors are scheduled on SA-9 and SA-10. ✓

3. Orbital Debris: Reference your comment on Notes 10/12/64 Geissler, copy attached as enclosure. The estimated structural reinforcement weights range from about 60 to 170 lbs. and the cabling and electronics weights range from 10 to about 100 lbs. for the systems under study. This means about 70 to 270 lbs. reduction in payload when the retro motors are not installed. ✓

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NOTES 10-19-64 GRAU

1. S-I-9 TESTING: The S-I-9 stage was released to this Laboratory October 12 through October 15, 1964 for pressure and functional testing. As a result of missing components and rework, approximately 104 measurements were not completely verified. Eighty (80) of these measurements are associated with the fire detection system which is being flown as a passenger on this stage. ✓

2. S-IV PROGRAM: The S-IV-9 stage is in storage at Sacramento. Scheduled shipping date is October 20, 1964. Preparation for static test of the S-IV-8 stage at SACTO is continuing along with installations and modifications. Static firing is scheduled for November 24, 1964. Simulated Flight Test is presently being conducted on the S-IV-10 stage at Santa Monica. This marks the end of S-IV stage efforts in the Los Angeles area except for clean-up activities. ✓

3. RELIABILITY AND QUALITY ASSURANCE AT MSC: Reference: Your remark to paragraph 4 of NOTES 9-21-64 GRAU, copy attached. As you have noted in the MSC presentations last Wednesday, MSC has now organized some Reliability and Quality Assurance Offices, one on Dr. Gilruth's staff, one in the Apollo Project Office, and one in the Gemini Project Office. I got three (3) stories, one from Mr. Low, one from Dr. Shea, one from a member of said staff office. Unfortunately, the stories do not match. In a brief discussion I had with Dr. Gilruth on the subject, I mentioned to him that I would like to return soon for the purpose of getting acquainted with these offices and the people involved and of establishing close contact between MSFC and MSC in these areas. He encouraged me very much to do so. I'll work it in. ✓

NOTES 10-19-64 GRUENE

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1. SA-9 Countdown Demonstration Tests: During preparation of SA-7 for launch, we tried for the first time to combine our cryogenic loading with a countdown demonstration. Results showed that not enough time was left between this test and the actual launch to evaluate the cryogenic loading. For SA-9, we will run the cryogenic loading tests two weeks before launch and run a countdown demonstration test without repeating the cryogenic loading, but will include in this test participation of the Range, radio frequency interference, etc., which should give us a pretty good idea of problems to be expected during the launch countdown. ✓

2. Trip to Michoud: My top operational people and I will go to Michoud on Thursday, October 22, to inspect the S-IC mockup in regard to accessibility for operations. This visit was coordinated with P&VE and IO. ✓

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NOTES 10/19/64 HAEUSSERMANN

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No submission this week.

NOTES 10/19/64 HEIMBURG

B 11/5

10/19/64

1. F-1 ENGINE:

Records from Test TWF-035 (127.65 seconds duration) conducted on 10/10 indicated that this was the first real lox depletion ever accomplished on the F-1 engine in S-1C propellant line configuration. There was no damage to the engine. ✓

Test TWF-036 was conducted on engine F-1002-1 on 10/15 for a main-stage duration of 117.06 seconds. ✓

There is a problem with the magnets dropping out of the lox potter-meter blades, and the next run will not be scheduled until all hardware has been checked. ✓

2. MTF WORKING GROUP:

Installation of the S-11 GSE at MTF will be accomplished by direct government contract with Aetron. This has been worked out with the Saturn S-11 office and NAA (S&ID). NAA has already awarded a subcontract to Aetron for the design of the S-11 GSE installation. A modification to the NAA S-11 stage contract is in process to delete the GSE installation requirement. Basic reason for this change is the need for concurrent technical systems and S-11 GSE installation and occupancy at the work site(s) at MTF. ✓

NOTES 10-19-64 HOELZER

7w 10/19
B 11/5

1. MSFC DATA CENTER: The MSFC Data Center produced a mechanized print-out of the Saturn V Specification Tree. The production of this listing, which shows the inter-relationships of the Saturn V specifications, demonstrates the Data Center's adaptability to the Configuration Management Requirement. ✓

2. MANNED ORBITAL LABORATORY (MOLAB) VISUAL SIMULATOR PROPOSAL: The proposal for development of a simulation facility in support of the MOLAB project, which was mentioned in the Notes of October 12, was presented to the MSFC MOLAB Study Committee. It has been included in this Committee's list of study projects for which OMSF funding is being requested. Simulation Branch activities in this area have been limited to planning and feasibility studies. Availability of other facilities, such as the one at Grumman, will be investigated. ✓

NOTES 10/19/64 JAMES

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LEM ADAPTER PANEL DEPLOYMENT: Reference my notes 10/12/64 on the problem of fold-back panels on the LEM adapter. The MSC/MSFC Task Force (chaired by Mr. Golden, MSFC and Mr. Jenkins, MSC met at MSFC on Oct. 14. Tentative solutions are as follows: (1) Prior to LEM Flights (201-202) - Deploy 4 panels 45° and separate the CM/SM from the adapter. MSC is to define if this can be effected on 201. (2) LEM Flights and Subs (2-6/502 & subs) - MSFC evaluate antenna problems associated with deploying 2 panels 170° ; MSFC evaluate antenna problems associated with deploying 4 panels 170° ; MSFC will propose to MSC in one month the recommended method of above. It was determined that deploying the panel 90° is not acceptable to either MSFC or MSC. (Mrazek) ✓

S-IB LIGHTWEIGHT SPIDER BEAM STRUCTURAL TEST: A failure of the lightweight spider beam occurred during structural qualification test setup. The load system was being calibrated prior to commencement of actual test. A valve in the hydraulic control system which was supposed to isolate the load jacks from hydraulic pressure during calibration failed to seat, allowing a load to be inadvertently applied. Instrumentation was on but not recording so actual load applied was not determined. An attempt will be made to determine the load applied by calculated and calibration data. There is some concern that the load applied was less than 140% design loads. The attached photographs show the failure points. The bracket which cracked is an S-I Stage Block II configuration. The beams are lighter weight than those on Block II. Upon completion of evaluation of the incident, impact on structural test program and the design loads will be reported. ✓

PEGASUS: The meeting with you Friday on Pegasus was very constructive in obtaining what I hope is final direction for this program. As I understand the results of the meeting, we will propose to Dr. Mueller that we fire all three Pegasus payloads, the first on a test article basis where we worry not so much about the reliability of the shot but about false indications of hits only. We will not remove part of the mission as recommended by Currie and the black boxes associated therewith, but we will attempt to incorporate as many of Currie's other recommendations as feasible depending somewhat on the vibration test to be run in about 30 days. We have not yet worked out the management relationships with Astrionics to get their local support at Fairchild. I will get together with Mr. Kroeger in the near future on this. ✓

(Enclosures attached to Dr. von Braun's copy only)

B 11/5

7/10/19

1. FIRST QUARTER FY 1965 MAN-HOUR COUNT: The man-hour charges for the first quarter are available now and can be summarized as follows for the area of "Advanced Systems Studies," MSF - Charge Account 981:

a. We have a monthly average of 142 people charging direct to this account, of which 89 percent are professional personnel. This compares to 152 as the average for last year.

b. Our overtime rate is 4.9 percent.

c. Area proration of the 142 men:

Project Management	15.7%
Orbital Systems	7.3%
Lunar Systems	28.6%
Planetary Systems	5.4%
Launch Vehicles	38.3%
Program Integration	4.7%
	<u>100.0%</u>

d. If one adds the projects of immediate interest, such as:

- Saturn IB - 3-stage,
- Saturn IB - uprating,
- Saturn V - uprating,
- Apollo Experiment Support,

this would amount to 61 percent of the total.

This makes it clear that the majority of our work is in the near future and not in the distant future, as some people like to think. ✓

2. MANNED SPACE FLIGHT SCORE: The last USSR manned orbital flight changed the statistics in this area as follows:

Indicator	US	USSR	USSR/US
Number of Flights	4	7	1.75
Number of Man-Trips	4	9	2.25
Number of Flight Hours	52	456	8.77

If we want to be first in space, and also in manned space flights, we have a long way to go to catch up, according to these statistics which are indicative of where we stand. ✓

3. FY 65 STUDY PROGRAM: Our program has suffered another setback. Dr. Seamans has issued new study guidelines which probably will eliminate all advanced launch vehicle studies, extended lunar surface activities, large space station and manned interplanetary flight mission studies. If we get 25 percent of the funds we got this year, ✓ we will probably be lucky. ✓

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Jan 19/64

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NOTES 10-19-64 KUERS

1. Comments on Our Visit to MSC: One interesting aspect of MSC's mode of operation was the extent of their in-house test programs. This concept required, as Dr. Shea had pointed out, a high initial density in the hardware program to fulfill all the needs for ground testing. It makes a project less vulnerable to mishaps in manufacturing and emphasizes the need to "fill-up the pipelines" with plenty of components. The high demand for test hardware of components and complete structures exists, of course, in every major project. For this reason, our parallel efforts for the S-IC stage here and at Michoud pay real dividends since they allow us to build -1 and -D, and also -2 and -F, parallel. ✓

2. Visit of VIP from Lockheed: Mr. Monesmith, Vice President for Manufacturing of the Lockheed Corporation (Burbank, California office), visited with us for two days last week. He was very interested in our tooling concepts and the manufacturing program for the S-IC stage. ✓

3. Manufacturing Milestone for S-IC-T: The weld repairs and subsequent replacement of the fuel exclusion riser in the fuel container have been completed. Today we will move this container to the hydrostatic test station for a repeat hydrostatic test and cleaning operation. At the same time, we begin the joining operation of the Lox Container and Intertank Section in Station #1 of the tower building. ✓

3415

fw 10/19

1. POP 64-4 GUIDELINES - Guidelines for Program Operating Plan 64-4 for R&D, AO and C of F were received from MSF Oct. 14. The change in name from Program Obligation Plan to Program Operating Plan is due to the inclusion of cost data as well as obligation data. Due to the change in guidelines we do not feel we can meet the Nov. 1 suspense date. We informed headquarters of this and are requesting that the due date be slipped to Nov. 10. The FY-65 funding guidelines for POP 64-4 are as follows:

Apollo	\$1,475.90M
Supporting Development	19.00M
Advanced Studies	<u>10.35M</u>
Total	\$1,505.25M

The \$1,475.9M for Apollo reflects a \$68.3M cut which is to be distributed among the Saturn and Engine Projects. Included in the \$19.0M for Supporting Development is \$4.0 for the 100 lb thrust engine development. This is the first time we have been informed that the 100 lb thrust engine must be funded out of our Supporting Development money. ✓

2. DOD SUPPORT MANPOWER - Mr. Dickerson's task group, which visited MSFC last week, reached no firm conclusions on increasing utilization of DOD personnel or standardizing MSF policy pending a review at MSC and KSC. However, several trends are apparent:
 - a. Under existing MSFC policy we could use additional DOD support in pre-award surveys, pricing and audit.
 - b. Major problem is in obtaining DOD support in a timely manner at the working level.
 - c. MSFC could free existing MSFC personnel and spaces through a policy shift by delegating: (1) Contract administration "per se" to DOD rather than specific functions such as inspection, audit, etc., (2) More inspection to DOD such as Michoud and MTO.

This approach leads to major problems of reassignment, skill translation, etc.

Internal investigations are continuing; the task group plans to convene in Washington November 2 - 6 to draft conclusions and recommendations. ✓

3. NINTH NASA MANAGEMENT CONFERENCE - The November 19 and 20 dates for the Ninth NASA Management Conference have been cancelled by Mr. Webb's office. No new date scheduled. ✓

4. NATIONAL LAUNCH VEHICLE COST STUDY - Attached for your information is a summary of the National Launch Vehicle Cost Study. We should develop an MSFC position within the next several days. *This has been included as an agenda point for the Mueller visit.* ✓

fw.

July 10/19

B 11/5

1. ANNUAL R&D OPERATIONS' REVIEW: As you are aware, two formal review and analysis exercises were held in R&D Operations during this Calendar year. One was the R&D Operations Director's Review (April 1964) which examined organization, funding, and overall mission activities of the laboratories. The other was the Manpower Audit (Aug 1964). As a follow-on to these two activities, it is planned to hold an Annual Review which will encompass all of the management considerations applicable to the laboratories. Such a review is now being planned for early Spring 1965. ✓

2. COORDINATION OF RESOURCES MANAGEMENT WITH NEW STARTS: With the increased activity resulting from preparation of Project Development Plans for New Starts, the need is apparent for careful integration of the budget, manpower, facility data, and the overall management arrangement. In the development of these plans, R-RM will provide support and assistance to the Project Coordinators in this area. In the future, Resources Management input will represent an overall R&D Operations' position, with due consideration given to the successful completion of currently assigned programs. ✓

WEIDNER
MAUS

3. REPRODUCTION AND DISTRIBUTION OF DOCUMENTATION: A survey of laboratory requirements for reproduction and distribution of documentation has been completed in conjunction with personnel from Management Services Office. Primarily, this survey covered drawings and specifications and resulted in a revised and updated distribution list which will eliminate duplication within organizational segments, purge obsolete requirements, and reduce unnecessary copies. The revised distribution list will be coordinated with the laboratories concerned prior to final publication. ✓

B 1115

10/19/64

*fw 1. Saturn V Program Development Plan (PDP) - A revised Saturn V PDP will be submitted to MSF on November 2, 1964. ✓

2. S-IC Stage:

Change of Documentation System for S-IC - (reference Notes 9/28/64 Kuers) The Engineering Release Documentation System utilizing automatic data processing equipment has been implemented by The Boeing Company for the S-IC Project. Errors located within the system have created manufacturing problems at both MSFC and The Boeing Company. To solve these problems, special effort is being exerted by P&VE and Boeing documentation personnel in the areas of special training sessions on the new system within Boeing and MSFC, special assistance to ME Lab to resolve specific problems, and preparation and distribution of a report (D5-11979) to describe the new system. All "bugs" are expected to be out of the new release system by mid-December 1964. ✓

*fw Reliability Program Status Review - An S-IC Reliability Program Status Review has been established for October 29, 1964 at 9:00 am, Room 409, Building 4200. ✓

*fw S-IC-T Status - The weld repairs for the S-IC-T propellant tank have been completed and the LOX Tank has been re-hydrostatic tested and cleaned. Preparations are under way to re-hydrostatic test and clean the Fuel Tank. Vertical joining of the LOX Tank and the Forward Skirt is completed with intertank connection to be completed in two weeks. Overall schedule status for S-IC-T is now 18 weeks behind the December 1963 schedule. This is a one week improvement over our last report. The Thrust Structure continues as a pacing item. ✓

*fw 3. S-II Stage Battleship Test - Preparation of the Battleship for test initiation is progressing rapidly. The fuel tank and the LOX tank have been closed. The engine was installed last week. Total systems checkout and cryogenics testing is scheduled to begin this week. The first single engine ignition test is still scheduled for November 1, 1964. ✓

4. IBM Instrument Unit Mission Contract Negotiations are continuing. The scope of work negotiations were completed on October 15, 1964. Cost negotiations will begin on Monday, October 26, 1964. ✓

Attachment: Notes 9/28/64 Kuers (Dr. von Braun's & Mr. Weidner's copy only)

NOTES-10-19-64-SHEPHERD

7-20-19/4
B 11/5

Seal Beach Facility: Commander Charles Curione has replaced Commander Dunnells as the Resident Officer in Charge of Construction at Seal Beach. Commander Dunnells has been transferred to Australia. The new Commander appears to be extremely capable. ✓

Construction of the second position of the Vertical Checkout Facility started on August 13. This is located on the recently acquired 5 acres. Total cost for this facility is \$2.8M and is scheduled to be completed July, 1965. Our remaining work at Seal Beach includes a warehouse to be constructed with FY-65 funds and a possible expansion to the Bulkhead Fabrication Facilities Building. ✓

Acquisition of Real Estate for MTF: There are 3,367 tracts in the fee and buffer zones. Of these, acquisition has been completed on 3,221 tracts and the remaining 146 tracts are in administrative channels or the courts for settlement. The current estimate of completion cost is \$470,000 more than available funds IF the contingency allowance for deficiency judgements on unsettled tracts is continued at 40%. Trial and settlement experience to date has averaged 31%. Therefore, it is not deemed necessary to consider obtaining additional funds. As the remaining settlements are completed, we will maintain a continuous check on the estimate of remaining costs as compared to the remaining funds. ✓

OMSF Facilities Review Board Visit: Messrs. Lilly, Freitag, Bothmer, Phillips, Gray, Smolenski and Diaz will meet at Huntsville on October 27. They have asked to review: Site Development Planning methods; additional justification for the proposed (FY-66) Space Vehicle Research Laboratory for Dr. Stuhlinger; and facility modernization requirements at Huntsville. Information on a proposed uniform method of budgeting non-recurring Capital Type Rehabilitation work will also be presented. ✓

NOTES 10-10-64 Stuhlinger

7-10/19
B 11/5

1. REVISED FY-65 SUPPORTING DEVELOPMENT PROGRAM: We have submitted to Ed Gray (OMSF) a revised FY-65 program plan (\$22,585,000) for Supporting Development. \$8.965M is already approved (out of our original annual plan of \$19M); the remainder covers AES, Propulsion technology, launch vehicle technology, and support of AES. ✓
2. SRT PROLONGED STORAGE AND CRYOGENIC APPLICATIONS: Dr. Bisplinghoff asked RPL to report on MSFC's R&D SRT Programs related to prolonged storage and use of cryogenic liquids. He has requested the information from LRC, MSC, and GSFC, as well as MSFC, for the purpose of evaluating the adequacy of the current and planned NASA Programs. ✓
3. GATLINBURG RADIATION SYMPOSIUM: Dr. Shelton and some of his co-workers attended the Second Symposium on Protection Against Radiation in Space at Gatlinburg, October 12-14. Mr. Burrell and Mr. Urban presented papers on proton shielding calculations, and on charged particle motion in magnetic fields. ✓
4. EXPLORER 22: Explorer 22 (S-66) satellite was launched into orbit October 9, 1964. The 20, 40, and 41 mc transmitters are functioning properly but not the 360 mc transmitter. The A&M and Green Mountain stations are operational. Trouble is experienced with the 41 mc receiver at Green Mountain not locking on the signal until closest approach. RPL (Dr. Mechtly) is participating in this satellite project with an ionosphere experiment. ✓
5. RESEARCH BUILDING: The final review of preliminary design for the RPL building has been held. Funds for the detailed design study have been appropriated; the study will begin soon. ✓

SECTION

FILE



OCTOBER 26, 1964

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F-1 ENGINE

Casting difficulties with the electrical interface panel have resulted in a severe shortage of panels. In an effort to rectify this situation, a second vendor has been engaged. Present recovery plan indicates that the first panel with good castings is scheduled for the first week of December (for engine 2011) with retrofit of prior engines being completed by March 1965. Alternate designs which can be fabricated are being studied. A meeting is planned at Michoud on October 28 to explore an alternate design. ✓

*fw FRT engine, F-2006, was moved from Canoga to NASA Rocket Engine Test Site test stand 1D on October 19, 1964, preparatory to beginning of FRT. ✓

The second S-IC-T engine, F-2005, is on test stand 1C, being prepared for acceptance testing. ✓

*fw RL10 ENGINE

The first A-3-3 reduced throat engine system was fired successfully on October 20. Two firings (3 and 120 seconds, respectively) have been accomplished. The engine is now in inspection. ✓

H-1 ENGINE

Negotiation of the H-1 development (uprating to 200K and improved injector) has been completed. Reopening of negotiation of the H-1 production contract has been delayed, at Rocketdyne's request, for about 2 more weeks, to provide time for modification of their proposal. Improved performance injector testing is continuing with the bombing of the type 5602 injector. Thrust chamber/injector compatibility and performance verification testing will commence on October 27, 1964. ✓

J-2 ENGINE

The J-2 engine ignition test planned at DAC/SACTO for last Friday was cancelled due to failure of both propellant pre-valves on the battleship stand. The valves will be replaced and the test has been rescheduled for late this week. ✓

An additional gimbal demonstration was made this past week utilizing FRT configuration hardware. ✓

PFRT testing is scheduled to resume this week after replacement of the LH₂ turbopump on engine 2008. After a short test and a 500 second test, the turbine cracks had progressed sufficiently to warrant replacement. ✓

July 19/66

NOTES 10-26-64 CLINE

B 10/28

Lee J. AMB
Kryzelski

1. LH₂ EXPERIMENT, SATURN IB SA-203, 204: Participation of Douglas Aircraft Company personnel was initiated immediately. Douglas Aircraft Company will receive authorization for the initiation of engineering design, procurement of long lead-time items, and installation of bracketry in the tank. This is presently in process. ✓ To meet the SA-203 launch schedule, installation of one 30-foot dish at each of the four tracking stations would have to be accomplished about 3-6 months earlier than the present installation schedule. This might become a problem. Negotiations with NASA Headquarters are under way. The expected completion date for this effort will be available within one week. ✓

2. BOMB TESTS ON 200K H-1 ENGINE UTILIZING TYPE 5582 INJECTOR END IN ROUGH COMBUSTION CUTOFF: Three tests on two samples of the Type 5582 injector (selected for Phase III of Improved I_{sp} Testing) ended in rough combustion cutoff during bombing at thrust levels about 215K. A parallel effort has been initiated on the Type 5682 injector, which has approximately the same performance as the 5582 and has damped successfully after bombing at thrust levels up at 221K. ✓

Eberhard
Please
look into
this
B

3. MECHANICAL SUPPORT EQUIPMENT MISSION CONTRACTS: When the decision was made that this Laboratory should utilize The Boeing Company (Saturn V) and Chrysler Corporation (Saturn IB) for mission contractors, 11-1-64 was contract award target date. This date was later placed at 12-1-65, and now it appears that this date will slip, particularly in the Saturn IB area. Some action must be taken to speed these contracts toward finalization. To continue to work under task assignments is cumbersome so far as turning over the mission responsibility to each respective party.

FC
What??
B

I hope this
is a
printing error!
B

10/26

1. S-I/IBB
10/28

Status of SA-8 - In checkout. ✓

Status of S-IB-1 - Fitup of wiring, tubing and ducting to all engines has been completed, and the engines are being removed for shipment to Rocketdyne for retrofit of LOX domes. ✓

Status of S-IB-2 - Clustering complete and installation of tubing, wiring, etc., underway in tail and spider beam area. ✓

Status of SA-D-5 - LOX tanks clustered. Normal assembly continuing. ✓

S-IB Pressurization System: Design review of the LOX pressurization system shows that the LOX tanks are not satisfactorily protected from overpressure. The present fuel vent valve will be redesigned for cryogenic service to provide a mechanical vent capability. The redesign will be completed in time for tests on S-IB-3 static firing and qualified in time for installation before post static checkout of S-IB-3. ✓

2. S-IC

Meridian Welding - The weld station has improved with the last two welds having one and six defects, respectively. The Boeing Task Force, headed by Mr. McCellan, has provided a much more systematic approach to welding problems and a concentrated system of follow-up to insure permanent resolution to this problem. ✓

KSC Visitors - A group of NASA personnel from KSC, including Dr. Hans Gruene, visited Michoud Operations Thursday, October 22, for orientation and discussion of S-IC Stage access after delivery to KSC. Dr. Gruene stated that Boeing should study and document, for their own use, details on the change-out of all critical components on an S-IC Stage, including access equipment and time required. He will request his Project Office to contact I-V-SIC in order to officially transmit this information. ✓

"S" Thrust Structure - In order to meet the presently scheduled ship date of November 18, 1964, many parts would have to be left off the Thrust Structure. Some of these parts could be retrofit by December 2, 1964, at MSFC. However, there are approximately 36 assemblies which cannot be retrofit until after the first of the year, based on presently committed Change Action Memos (CAMs) of which about 18 could be as late as May or June of next year. MSFC personnel (R&D) are studying the entire problem in order to determine which parts are unnecessary for inclusion on the "S" Thrust Structure. ✓

3. General

We were informed by Boeing that Congressman Garner E. Shriver (R-Kan) will visit Michoud October 26, 1964, for a briefing on Boeing work in the Saturn V Program. ✓

Jan 19 / 26

BW/22

NOTES 10-26-64 DANNENBERG

1. Saturn IB Improvement Studies - Recommendations of CCSD and DAC studies are as follows in order of priority:

- CCSD - a. Extended tanks, 220K H-1 engines for S-IB; 225K J-2 for S-IVB
- b. Same configuration as a. with four strap-on Minuteman boosters.
- DAC - a. 260 " dia. solid booster to replace the S-IB.
- b. The present S-IVB as second stage or an S-IVB with 225K J-2s. ✓

2. Liquid Hydrogen Experiment at Zero G - Gen. Phillips has now requested that this experiment be performed on SA-203. R-ASTR is studying the tracking problem. ✓

3. Saturn IB/Titan III C Comparison - The final technical summary report was made to Dr. Mueller on 10-21-64. Cost - Headquarters Team (Mr. Malaga) continues to question MSFC costs. They are manipulating our costs to fit a computer cost model being tested this week. General - Word is going around that AF is pushing for all unmanned missions on Titan III and all manned missions to NASA, except MOL. ✓

4. Panel Review Board Meeting (10-19-64), which was chaired by General Phillips in the absence of Dr. Mueller, went smoothly. Gen. Phillips emphasized utilization of Bellcomm for trajectory work of Flight Mechanics Panel. He also requested establishment of realistic "Requirement Dates" for the release of Repository ICD's (Interface Control Documentation). During his visit at Huntsville, Dr. Mueller accepted our appeal of his earlier decision (to handle all GSE in the Launch Operations Panel) based on a three-Center recommendation to keep part of it in Mr. Fichtner's Elec. Systems Panel. ✓

5. Experiments - "Quick Look" study of Army proposal to fly a 1 m target sphere for Nike X on Saturn I or IB indicates feasibility. We are following up. ✓

6. S-II Design Review - Agreement on first Review scheduled for 11-12-64, at S&ID, was reached between IO and R&D Operations. First system to be reviewed will be "Thermal Control Installation." Modification Studies - We understand NAA is preparing a proposal to modify the S-II stage for seven J-2 engines to increase payload capacity. ✓

7. Saturn IB/V Systems Studies - At the request of IO, three (limited effort) systems studies are underway at R&D Operations; one referring to trend analysis of weight and performance, the others to "Manned Flight Readiness Criteria" and "Manned Vehicle Go/No-Go Criteria." ✓

8. S-II Manpower Survey - R&D Operations will send approximately 45 people from the laboratories for at least 1 week, starting on 10-26-64. ✓

NOTES 10/26/64 FORTUNE

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1. Non-payment of Logtown Marina Leaseholders became a NASA Headquarters Issue sometime ago without MTO or MSFC knowing about it until quite recently. The Chief of Engineers Office apparently took it up with Lilly's personnel in September, finding no legal way to pay 29 fishing shack owners for their lessee rights. Several congressional inquiries were made and NASA Headquarters attorneys suggested some possible courses of action but either the Corps of Engineers or the Department of Justice found objectives to each of them. Jerry Hlass from Diaz's office told us Tuesday that Mr. Webb had suggested the Corps extend the leases until 1 January, to permit a relief bill to be drafted to legalize payment, if Sen. Stennis or one of the objecting Congressmen would care to sponsor it. The extension of lease rights to permit retention of the shacks on what is now government property will be all right but the owners should not be allowed to live in them. Otherwise several requests the Corps turned down might flare back against the established policy of removing all habitation by 31 October, 1964. ✓

2. Local Community Advisory Meetings - were held with Hancock County, Picayune and Slidell elected officials and civic leaders in attempt to better our communications, and we are establishing a list of participants from each community. ✓

3. Flight in Bell Air Cushion Vehicle - Wednesday convinces me the British have done a good experimental job but I believe these machines need extended development and exploration of application before we trust a stage to one for transport. Runway snow and pebble clearance could be an immediate use.

Sounds a bit expensive!

B

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Frank W.
Ay B

1. Flight Operations: Mr. Kraft (MSC Flight Operations) and Dr. Speer discussed the formulation of a MSC-MSFC agreement on organizational placement, responsibilities, and authority of the MSFC flight controller team to be located in Houston. The meeting went very well and it appears that an acceptable draft can be submitted to both Centers within one week. ✓

2. Flight Operations Support Requirements: A special meeting was called by MSF (McClanahan, Hibbert) in Houston to make a final determination on the need for an S-band station on Canary Island. This MSC request is supported by MSFC and was generally accepted by the MSF representatives. We were also informed by MSC that the planned Apollo site Corpus Christi, Texas will probably not be implemented but replaced by one or two 85' dishes near Austin. A serious problem seems to have developed in S-band updata coverage to the CSM during power flight in case of abort. A number of additional S-band sites may be required downrange ETR. ✓

3. Briefing to Dr. Mueller on Orbital Debris: During the briefing on the status of the orbital debris studies for Saturn IB and Saturn V which was given to Dr. Mueller on October 23, 1964, by members of Aero-Astrodynamics Laboratory and Lockheed Corporation, he made the following comments: 1. In addition to the systems presently investigated (solid rocket motors), we should thoroughly analyze the use of existing on board systems, i. e. (a) reignition of the J-2 engine, (b) use of the APS. Although statements were made that solution (a) requires a weight increase of about 1000# and (b) would probably be unsatisfactory because of the low thrust level and that both (a) and (b) will probably have a larger impact on present hardware and most likely will involve a larger scarweight, he asked that a closer analysis on those cases be made. 2. With respect to the question of the desired probability of successful reentry control (which becomes especially important, if we consider using propellant residuals in main tank) he stated that he does not want to establish any goal now, but is primarily concerned with the psychological impact of having some system for debris disposal aboard. ✓

→ Please elaborate, next NOTESp

4. Status of New Starts: Attached is a tabulation* of the status of the "New Starts Program" which was prepared by the Washington Task Force for submission to Dr. Seamans on Monday, October 26, 1964. Substantial changes can still be expected to this list. The major purpose of the list is to show the new distribution of the FY 65 funds with an indication of how the efforts would continue in FY 66. Also the total expected money for each item is shown without giving the FY 67, etc., monetary figures. It is entirely unclear how this money is going to be divided into advanced studies and supporting development funds or whether it would at all be taken entirely out of the category. ✓

*Tabulation included in Dr. von Braun's and Mr. Weidner's copies only.

→ E.G. I suggest we lay on a briefing, supported by charts and to be given during one of next Review Board meetings in Washington rather than to extend the Lockheed contract at this time. B

← Please tie Market in

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- * 1. S-IV PROGRAM: The S-IV-9 stage was flown from Sacramento to KSC on October 21, 1964. The S-IV-8 stage is at SACTO undergoing preparation for static firing. No significant problems have been encountered to date and the vehicle is on schedule. The S-IV-10 stage is at Santa Monica. Simulated Flight Tests have been accomplished and installation of modifications is underway. Approximately 270 installation hours remain, of these about 100 hours will be transferred to SACTO. The stage appears to be on schedule with no significant problems outstanding. ✓
2. MISSISSIPPI TEST FACILITY QUALITY CONTROL AND RELIABILITY INDIVIDUAL ACTIVATION PLAN: The Quality Control and Reliability Individual Activation Plan 136 submitted by General Electric as part of their Technical Support Operations Contract for MTF, was reviewed and comments submitted to Mississippi Test. Basically, the plan contained adequate quality assurance provisions. ✓
3. MOBILE CALIBRATION VAN: This Laboratory placed into service this week a mobile pressure van. It will be utilized for "on site" calibration and repair of pressure and vacuum instrumentation in fixed consoles and fixtures throughout MSFC. ✓
4. DEPARTMENT OF DEFENSE MANPOWER UTILIZATION: Colonel Greenhorn from NASA Headquarters was very complimentary on record keeping system that Quality and Reliability Assurance Laboratory utilized for maintaining records of DOD manpower. He indicated that similar records by other DOD users would give us a system to record actual DOD manpower utilization. ✓
5. DAC/TULSA QUALITY PROGRAM PLAN: A review has been completed of DAC/Tulsa Quality Program Plan, TU QM-720, dated September 4, 1964. Seven principal discrepancies were discovered. Action has been initiated to advise the contractor to make the necessary revisions and re-submit the plan within 30 days. ✓

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NOTES 10/26/64 HAEUSSERMANN

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1. INTERFACES BETWEEN KSC, MSC, AND MSFC: During the Panel Review Board Meeting in September, it was decided by Dr. Mueller that all interfaces between KSC, MSC, and MSFC be handled through the Launch Operations Panel. This decision did not satisfy the needs of the Apollo-Saturn Electrical Systems Integration Panel. Key representatives of the three centers: Ike Rigell from KSC, Ralf Lanzkron from MSC, and H. J. Fichtner from MSFC met on 10/1/64, at the request of the Launch Operations Panel to discuss this issue further. The three center representatives made a joint recommendation which was presented to the Panel Review Board on 10/19/64, with General Phillips chairing the meeting. The Panel Review Board was in agreement with the recommendation presented by Mr. Fichtner, but General Phillips did not want to revise Dr. Mueller's decision.

During Dr. Mueller's visit to MSFC the matter was presented to Dr. Mueller and he agreed with the recommendation and revised his previous decision. ✓ The minutes of the Panel Review Board will include the final decision by Dr. Mueller. ✓

NOTES 10/26/64 HEIMBURG

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1. F-1 ENGINE:

Test TWF-037 was conducted on October 23 for a mainstage duration of approximately 119 seconds. Cutoff was given when the lox pump inlet temperature (90" point) exceeded redline of -285°F . Prior to test TWF-037, (REFERENCE HEIMBURG NOTES 10/19/64 Attachment No. 1) it was determined that the lox flowmeter could be utilized for further testing with no danger of the magnets separating from the blades. They usually separate from the blade when first subjected to LN_2 or lox. Post-test inspection revealed three holes in the exhaustorator. Upon further investigation it was discovered that a 7" long bracket in the heat exchanger had become loose and caused this damage to the exhaustorator. The heat exchanger will be removed, examined, and possibly modified. The next test will be conducted on November 10. Modifications have to be made to the engine thrust frame to allow full gimbal capability (6° on actuator). The deflector restricts gimbaling to approximately $1\frac{1}{2}^{\circ}$, however, it is desired to have full gimbal capability in event a malfunction occurs in the control system. ✓

2. REFERENCE YOUR REMARKS ON MR. KUERS' NOTES 10/12/64, ATTACHMENT NO. 2:

We do not understand your conclusion. We have been testing S-1C flight hardware with the single F-1 engine here for the past year. In this respect, the S-11 will not have even accomplished this with their first battleship firings (scheduled for first week in November) since they won't have flight hardware until later in the program. We have had thirty-seven tests with two engines and one rebuilt. This week we are installing gimbal equipment having installed flight suction lines some time past.

K.H.

3. Barge Palaemon:

I am referring to the Qual Test program for SIC parts which is badly falling behind. Can you brief me on this, or who can?

The reactivation work and installation of the remote control pilot house was completed on 10/24. Vessel left New Orleans for Huntsville 10/25, arriving here 10/30. ✓

B

- ATTACHMENTS: 1. NOTES 10/19/64 HEIMBURG (Dr. von Braun's copy only.)
2. NOTES 10/12/64 KUERS (Dr. von Braun's copy only.)

1. CENTRAL DATA SWITCHING SYSTEM (I.T.T. TYPE ADX - 7300):

Recent advances in systems offered by the common carriers (Bell Companies and Western Union) completely modify the technical requirements for a centralized data switching facility. A comprehensive study must be performed to determine just what will be needed, if anything. The present configuration will be completely unsuited to our needs after twelve to eighteen months.

The ADX - 7300 is currently handling some specialized tele-type circuits for data collection, switching some high-speed data circuits, performing code conversions for several otherwise incompatible data handling devices, and will soon handle data collection for the T.M.B. automated system. The communication common carriers are now building computer oriented switching devices of their own and are offering high-speed data switching, along with their standard transmission systems. These things, in themselves, do not necessarily eliminate the need for a Government-owned centralized system, but may reduce it to an uneconomical size. ✓

2. TELEVISION GUIDANCE SIMULATOR: The Flying Spot Scanner, which is the major component of this system, has been constructed and successfully operated by the Simulation Engineering Unit of the General Electric Analog and Engineering Suboperation. The scanner is to be used in conjunction with the other facilities of the Simulation Branch to simulate remote-controlled lunar landing. Approximately one more month will be required for final adjustments and preparation of an acceptable set of slides to make the Television Guidance Simulator fully operational. ✓

3. SPACE TECHNOLOGY LABORATORY'S PRESENTATION: The Simulation Branch sponsored a presentation by Mr. H. Meisinger of STL, recognized authority in the simulation field for many years. It was attended by Dr. Hoelzer and representatives of several other laboratories, in addition to Simulation Branch personnel. Simulation of manned spaceflight and simulation of remotely controlled lunar landing were discussed with particular emphasis upon the measurement of human performance, and the modeling of a human operator's transfer function. ✓

NOTES 10/26/64 JAMES

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S-IB SPIDER BEAM STRUCTURAL TEST: In order to determine if the spider beam which failed is underdesigned, it has been decided to isolate certain sections and run special tests on the damaged beam today. If tests prove the beam is underdesigned, redesign and rework of the beams for S-IB-1, 2, 3 and test beam will be required. A schedule impact can be made after special test. Your office will be informed of the results of the test. ✓

*fw S-I-9 AND S-IU-9: The S-I-9 and S-IU-9 departed Huntsville via barge October 19 for KSC. ✓

*fw S-IV-9: The S-IV-9 was shipped via Pregnant Guppy on October 21 and arrived at KSC on October 22. ✓

*fw PEGASUS: The preprototype canister passed the thermal vacuum test Oct. 20 with minor discrepancies. The results were considerably better than previously experienced. ✓ The canister stabilized at an average low temperature 43.1°F which is approximately 27° higher than previously experienced. ✓ During the high temperature portion of the test, the temperature stabilized at 80.8°F. ✓ This canister will now be shipped to Hagerstown for fit check with the capsule structure and subsequently for functional tests. ✓

The first flight subsystems tests for the Data Communications and Power subsystems were completed Oct. 22 with good results being experienced. System will be ready to assemble for canister test prior to November 1 schedule. ✓

LEM ADAPTER PANEL DEPLOYMENT: Instrumentation & Communications Panel meeting was held at Houston on Oct. 21-22. With regard to the LEM adapter panel deployment problem, MSC agreed to go along with the solution of the panels deployed 45° for the non-LEM flights. This includes vehicle 201 through 205. There may be a problem in getting this solution in on vehicles 201 and 202 but MSC was not able to give a positive statement on this at this time. By using this solution for the non-LEM flights we have additional time (3 to 4 months) to come up with a solution for 206 and 501. (MRAZEK) ✓

It is planned that this would be finalized during the Saturn IB Design Review scheduled for December 2, 1964. ✓

*fw S-IVB BATTLESHIP: Initial test on S-IVB Battleship scheduled for Saturday was not accomplished due to problems with pre-valves. LOX and LH₂ were loaded without difficulty. ✓ When an attempt was made to cycle the pre-valves manually, the LOX pre-valve would not open; the fuel pre-valve was sluggish, and dual signals (both open and close) were showing on the fuel valve console lights. The pre-valves were pulled on Sunday ^(10/25) and another fuel pre-valve will be installed ^{on 10/26} today and LOX pre-valve will be installed ^{on 10/27} tomorrow. Countdown for ignition test will begin on ^{10/28} Wednesday with the next attempt probably ~~Friday~~ ^{10/30} Friday. ✓

NOTES 10-26-64 Koelle

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Jul 10/26

You requested a "bird's eye view" on our FY 1964 contract package earlier this year when all the results were in. Here are some pertinent statistics:

a. Open Competition Studies

Study Projects with Open Competition	22
Study Contracts Awarded	26
Average Dollar Value Per Award	\$223, 000
Companies or Company Divisions Proposing	42
Proposals Received and Evaluated	108
Least Number of Proposals Per Study	1
Most Number of Proposals Per Study (3 studies)	9
Average Number of Proposals Per Study	~ 5
Company with Most Effective Proposals - General Dynamics	
7 awards out of 11 proposals - 63.6%	
(GD/FW 5 awards out of 5 proposals - 100%)	
Company with Least Effective Proposals - STL	
0 awards out of 6 proposals	
Average Number Proposals Submitted Per Company	2.6
Average Number of Awards Per Company	.7
Percent of Companies Responding Receiving at Least 1 Award	33.3
Percent Total Proposals Submitted Which Are Successful	24.1
Average Effectiveness of Proposals	$\frac{\text{Sum of Percent Successful}}{\text{No. of Companies}}$ 16.8

		<u>Total Proposed</u>	<u>Awards</u>
24 Companies Submitted	1 Proposal	24	3
8 Companies Submitted	2 Proposals	16	3
2 (GE/M&S and LOCK/M&S)	4 Proposals	8	3
2 (GD/FW and Martin/D)	5 Proposals	10	7
2 (GD/A and STL)	6 Proposals	12	2
2 (Lock/Calif and Martin/Balt)	7 Proposals	14	1
1 (Boeing)	11 Proposals	11	5
1 (NAA)	13 Proposals	13	2
<u>42 Companies and Divisions</u>		<u>108</u>	<u>26</u>

b. Limited and Sole Source Studies

Study Contracts Initiated with Limited Competition (GD/A and Martin)	1
Post-Saturn - \$1, 500, 000	
Study Contracts Initiated As Sole Source (mostly follow-on's)	18
Average Dollar Value of Sole Source Award	\$131, 000



NOTES 10-26-64 KUERS

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Feb 19/26

Art Rudolph
comment

Comparison of Status of Development of S-II vs. S-IC: (Reference: Your comments to my NOTES, dated 10-12-64; copy attached.) I was at Los Angeles last week and reviewed the manufacturing status of the S-II. From this visit, I drew the following conclusions: On paper (bar charts and PERT), the S-II seems indeed to look presently to be a little less in delay than the S-IC stage. However, looking closely at hard facts, the true status appears in a different light:

a. In the S-IC Program, we have already completed and hydrostatically tested 2 Fuel Containers and 1 Lox Container (two times). One Fuel Container has been in structural load tests by Boeing for approximately 6 months. This has not yet been accomplished in the S-II Program. ✓

b. In the assembly of the -T vehicle for the S-IC, we have been for some time in the process of making systems installations in the Thrust Structure and Fuel and Lox Containers, such as PV compensators, ducts, tubing and other equipment. Similar assembly operations for the All Systems Test vehicle for the S-II will only start next year. ✓

c. For the S-IC Program, we already have good visibility on component development at sub-contractors. It is true that we encounter a great number of design and manufacturing problems in this area for the S-IC right now. But, I think, we are now aware of these problems and can vigorously push for solutions and corrections. It is my impression that this visibility is still lacking at the S-II. This is partly due to a different assignment of responsibilities in the organization of S&ID. The Manager of Manufacturing, Mr. van Leuven, does not have similar responsibilities in this area as Mr. Coenen has at Boeing.

with NAA, too? →
B

d. The time period allotted for systems installation for the S-II is only 5 weeks which is, in my opinion, unrealistically short. This makes the bar charts and PERT look better, but is in fact deceiving. We have allotted 12 weeks for these operations, and we believe this already to be very optimistic. DAC has recently also readjusted their time period for this work based on S-IV experience.

e. The GSE status for the S-II looks very bad and is approximately 4 months in delay. There are strong indications, due to numerous and basic design changes, that the GSE for the S-II will suffer serious additional delays. This area seems to be, as far as I can see, in much better shape for the S-IC.

Arthur Rudolph
Max Neubert

My recommendations for improving the control of the S-IC program: I feel that we are still falling short in achieving a really joint effort between IO and the R&D Laboratories for initiation and follow-up on corrective actions for all our many problems in the development of the S-IC stage. Because of its deep penetration and involvement in the S-IC Program, ME Laboratory is in a position to discover many problem areas; but we are not in a position to obtain expeditious solutions for these problems from our Laboratory alone, because of overlapping aspects in the different departments of the Boeing organization and its counterparts at MSFC. A more concerted effort by MSFC would certainly help to expedite the development of this stage.

This is Kuers's rebuttal of my (meeting) statement that the S-II looked better to me, schedule-wise, than the S-IC. Your comment is invited.
B

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1. NATIONAL LAUNCH VEHICLE STUDY - J.A. (Woody) Bethay of this office made a presentation to Dr. Mueller on October 21 on the cost portion of the Saturn IB - Titan IIC Comparison Study. This included a general review of the study, current status, current schedule, and points of concern to MSFC. Dr. Mueller stated that he had asked Mr. Malaga on several occasions about the results of the study, and had only been told the study was not complete. Bethay is in Washington to get first hand results of the trial run of the computer program, which was expected to be available today. ✓
2. APOLLO PROGRAM DEVELOPMENT PLAN (PDP) - We forwarded on October 23 the improved version of the Apollo Management Plan to Paul Cotton, MSF, who is revising it at your and Dr. Mueller's request. We will brief you on this revised plan if you desire when available. ✓
3. APOLLO SUBSYSTEMS MANAGEMENT PLAN - Copies of MSC's recently developed Apollo Subsystems Management Plan have been reviewed, and found to be somewhat similar to the MSFC-KSC agreement. It is an agreement between the project offices and operating divisions, and spells out what the divisions are responsible for and how they are to approach the prime contractors. Mr. Andressen is working with Dr. McCall and Messrs. Stone and Yarchin to decide an approach for MSFC to develop similar management plans. ✓
4. APOLLO EXTENSION TASK FORCE - Dr. Seamans has established a task force of about 30 headquarters people (including MSF, OSS, and OART) to document NASA's proposed plans for utilization of Apollo spacecraft and launch vehicles through 1971. One very significant possibility being considered is a revision of the Apollo Manned Lunar Landing Program to include only the vehicles necessary to carry out a success program; the remaining vehicles would be made available for assignment to the Apollo Extension Support (AES) Missions.

At the request of MSF, Bud Abbott and Ray Butler are working with the task team to prepare an FY 66 New Starts Budget request. Dr. Mueller was briefed on this Saturday, and it was planned that the presentation would be given to Dr. Seamans today, October 26, and to Mr. Webb tomorrow. ✓
5. MANPOWER - GRADE JUSTIFICATION - In response to one TWX and several phone calls from Clyde Bothmer, we supplied a breakout of MSFC's FY 65 and FY 66 proposed grade increases for GS-14 and above, with written justification. The submission also included a comparison of our grade increase to the increases in Center's resources and responsibilities. This info was required for a BOB review of MSF requirements Friday, October 22. ✓
6. STATUS REPORT - UTILIZATION OF DOD MANPOWER - See attachment. ✓

Yes, please lay out with Bonnie B

That's what I've always suggested, I'm glad Seamans now goes along. B

STATUS REPORT - UTILIZATION OF DOD MANPOWER SUPPORT - In the current exercise to evaluate and plan for improving and increasing DOD manpower support, the following categories of contract administration are individually considered:

Audit
Industrial Property
Industrial Security

) MSFC currently delegates full
) responsibility. ✓
)

Quality Assurance

MSFC currently delegates inspection at prime contractors, and inspection and quality engineering at sub-contractors. ✓

Pre-award Surveys

are delegated if time permits. ✓

Post-award Production Surveillance

essentially no delegation presently.

Compliance with Contract

This includes functions such as approval of sub-contracts, make or buy plans, contract changes, allow-ability or allocability of cost, and accounting and purchasing systems. MSFC presently delegates little or none of this responsibility.

This, of course, is the hard core of our assigned mission. How much of this can we delegate? B

MSF intent is to increase the delegation as a means to free MSFC manpower for other tasks, and as a way of improving DOD responsiveness by assigning greater responsibility to DOD rather than by piecemeal tasks which currently warrant little senior DOD management attention.

We are developing an MSFC position with Mr. Gorman and would like to review this with you next week prior to convening of the MSF task group for finalizing recommendations to Dr. Mueller. ✓

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1. R&D OPERATIONS' CONTRACT ADMINISTRATION: To clarify responsibilities for contract administration for the Instrument Unit, Industrial Operations had been provided a listing of those contracts for which R&D Operations has management and technical supervision. A second listing was also provided which included those contracts to be managed by IO but technically supervised by R&D Operations. Investigation has confirmed that Contracting Officer Representatives have been assigned in the laboratories for each contract under R&D Operations' contract administration. These lists should help relieve problems recently encountered in processing a few contractual documents between IO and R&D Operations. Mr. Davis has been requested by Mr. Cook to publish a policy statement regarding contract administration, with improved delineation of activity between the Purchasing and the Contracts Offices. ✓

2. SOURCE EVALUATION BOARD: All of the RFP's have been received and evaluation is under way, except for the R-RP proposals; these are scheduled for receipt on November 3. Board activities are proceeding substantially on schedule. ✓

3. RESOURCES MANAGEMENT CONFERENCE: The Sixth Resources Managers Conference was held last week. Among the problems discussed was the present need for each laboratory to use FY-65 funds within their presently approved manpower ceilings. The laboratories were urged to examine contracting possibilities closely, because engineering support manpower could easily become a controlling factor in accomplishing our business this year. ✓

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NOTES 10/26/64 RUDOLPH

1. Vortex Shedding (Dr. Mrazek): KSC memorandum TR-89, "Design to Control Saturn V Vehicles' Response due to Vortex Shedding", concludes that for the Saturn V while setting empty on the launcher and experiencing 3 σ wind conditions, that the Command Module could experience response amplitudes of oscillation up to + 65 inches. Since the Saturn V has a design criteria limit of \pm 10 inches in deflection, it is concluded that the Saturn V vehicle is vulnerable to high wind velocities and steps must be taken that will limit or minimize the amplitude of the wind-induced oscillations.

E. Weisler
Is elasticity of LVT platform taken into consideration in KSC study, - or what accounts for these differences?
B

The following is the MSFC position as to the above:

a. The magnitude of oscillations quoted by KSC is in disagreement with MSFC studies (much to large).

b. MSFC is performing a comprehensive wind tunnel investigation of the vortex shedding phenomena on scale models of Saturn V. If these studies indicate that the wind-induced oscillations are of sufficient magnitude to be injurious to the vehicle, studies will be initiated to determine methods of alleviating of minimizing the effects of the phenomena.

c. Both Saturn IB and Saturn V Launch Facility Checkout Vehicles will be exposed to the KSC prevailing winds to determine if the vortex shedding phenomena causes oscillations of a magnitude injurious to the vehicle. ✓

2. Boeing Systems Engineering and Systems Integration Support - The final contractual document for the subject support effort should have completed our in-house review and be ready for handcarry to MSF for their approval during the week of November 2, 1964. ✓

3. S&ID Manpower and Activity Survey - Review of the S&ID survey task descriptions by MSFC has been completed. The manpower evaluation team is starting their review at S&ID today, Monday, October 26, 1964. ✓

4. S-II Stage:

Battleship Status - Continuity checks are now in process. Integrated checkout (sequential countdown) is expected to begin today, October 26, 1964, three days behind schedule. In view of this, the November 1, 1964 firing date appears doubtful. ✓

Common Bulkhead Hydrostatic Testing - A leak developed during the hydrostatic testing of the common bulkhead forward facing plate for the common bulkhead test tank. Repair of the leak was accomplished in a small area of under-tolerance thickness material on Sunday, October 25, 1964. This article will now be hydrostatically tested again to certify the repair. ✓

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NOTES-10-26-64-SHEPHERD

FY-66 CofF: The Engineering studies for FY-66 CofF projects are well along toward completion. The following is a list of projects which have been completed with a corresponding list of projects which are underway and the dates of completion noted.

Completed:

User

Space Vehicle Research Laboratory	RPL
Engineering & Laboratory Building	Astrionics
Test Engineering Building Extension	Test
LOX Storage for F-I Test Stand	Test
Extension to High Pressure Gas Systems	Test
Additions to Materials Laboratory	P&VE
General Support Facilities	MTF

Not Completed:

Non-destructive Test Facility - Nov. , 1964	P&VE
Improvements to Storm Drainage Sys. - Jan. 65	Michoud
Utilities Systems Study - Jan, 1965	Michoud

The preliminary engineering reports will serve as a basis for Headquarters' backup during the BOB reviews. ✓

NOTES 10-26-64 Stuhlinger

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1. PROJECT PEGASUS: Dr. Mueller asked me last Friday to give a presentation to Dr. Bisplinghoff and himself on the status of Pegasus sensor testing on October 26. In particular, the test results of the Langley group, and of our own contractors, should be compared. ✓
2. PEGASUS DATA EVALUATION: Considerable time was devoted to refinement of the Pegasus Data Evaluation Plan and Pegasus related work. A brief presentation on Data Evaluation was made by Dr. Dozier to Dr. Mueller during the Pegasus review. The Plan was also discussed in detail with Mr. D'Aiutolo during his visit. ✓
3. PEGASUS THERMAL DESIGN: Mr. Heller, Mr. Snoddy, and Mr. Bannister attended a review of the overall thermal design of Pegasus at Bladensburg, Maryland, on October 19, 1964. The conclusions at this time are that the overall thermal design appears to be in fairly good shape; however, there are a number of points that must be investigated further by MSFC and Fairchild. ✓
4. CONSOLIDATED RESEARCH PROGRAM OFFICE: Comments and recommendations concerning the proposed consolidation of research programs have been received from most Laboratories and Offices. As soon as all replies are in, I will discuss the comments with Mr. Weidner and Dr. McCall. ✓
5. LUNAR SHELTER-LABORATORY: After completing our report on the scientific missions of MOLAB (copy sent to you on October 26), we were asked by Mr. Don Beattie of OMSF to direct our thoughts toward scientific missions of a shelter-laboratory (non-moving). Fortunately, most of the results of our previous work can be directly applied to this study. ✓
6. LUNAR TECHNOLOGY: Dr. Daniel Hale, who has been working on the lunar scientific mission, bound meteoric fields, lunar exploration sites, and lunar laser altimetry, has been appointed the MSFC representative to OART for lunar technology. ✓