

NOTES 6/6/66 BALCH

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S-II Test Stand A-2 Damage Assessment and Recovery - A Damage Assessment and Recovery Planning Group was set up by the MTF Manager on 5/31/66, with responsibility for providing damage assessment and orderly recovery of the A-2 Test Stand to an operating posture. By 6/3/66, this group was required to provide the MTF Manager an initial report of damage assessment and recommendation for required recovery actions. This initial report was submitted on 6/2/66 and indicated significant progress in carrying out its functions. All S-II-T stage debris has been removed from the stand and stored in a bonded area at the S-II Vehicle Service Building. Work by S&ID to convert the GSE from the S-II-T to the S-II-1 configuration has begun in areas that are clear for work. Planning is substantially complete with respect to proposed contractual arrangements for accomplishment of the repair and replacement of facility items, technical systems, and GSE, and good progress has been made in the development of preliminary scopes of work and cost estimates. An H-Order in the amount of \$250,000.00 has been submitted to the Mobile District of the Corps of Engineers authorizing them to proceed with specific structural and electrical repair of the test stand. ✓

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Technical Systems, Phase II - Amendment No. 64 to Contract NASw-410, MSFC-1, which provides for Phase II Technical Systems completion, has been forwarded to Huntsville for review. Present indications are that S-II Test Stand A-1 access need dates for technical systems installation will permit technical systems completion dates required to support a stage on stand by 2/1/66. ✓

Labor Relations - Because of failure of the IAM and two General Electric subcontractors to negotiate collective bargaining contracts, picketing by the union by today became a real possibility. However, arrangements were completed to present the disputes to the President's Missile Sites Labor Commission on Tuesday or Wednesday of this week, and the union has agreed to take no strike action pending the results of this move. ✓

Proposed Air Service for MTF - Word has been received from Southern Airways that on 5/31/66, they filed their application to serve MTF. ✓

NOTES 6/6/66 BELEW

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AAP CONTRACTORS' VISIT: We are having informal discussions with the two selected payload integration contractors, Martin-Denver and Lockheed-Sunnyvale, on June 7-8. The major purpose of the sessions is to obtain an understanding with these contractors on the need for flexibility during the course of the study and to bring them up-to-date on the latest mission assignment and experiment planning. They will use this opportunity to pass on additional ideas since their submission. Negotiations will be conducted by the end of June with two contracts planned for early July initiation. ✓

AAP FY-68 BUDGET: Guidelines for POP 66-3 are being prepared and will be distributed through Executive Staff this week. This POP will reflect the last MSFC formal submission prior to finalization of the FY-68 budget. Even though some major assignments have not been made, such as, ATM, EO-2, etc., it is planned to formulate budget requirements which reflect the assignment of these AAP jobs to MSFC. ✓

S-IVB WORKSHOP: A short list of S-IVB mods were processed to DAC during the week. A notification was made to General Phillips by Lee James that he planned to make the basic changes to protect the Workshop option on 209 and subsequent vehicles. ✓

MSC's 3 study contractors for SSESM (support module) should make a final presentation on 6/17 at MSC. MSFC SEB members are Messrs. D. Newby and Leroy Roberts. Mr. R. Schwinghamer (R-ME) is Co-chairman, Technical Committee. MSFC is furnishing one member on each of the 2 business and 3 technical panels. ✓

APOLLO TELESCOPE MOUNT (ATM): We still have not received any indication about Dr. Mueller's success or lack of success with Dr. Newell on reaching an agreement about assigning responsibility for development and integration of ATM. Apparently Dr. Mueller is handling the entire thing personally and has recently been occupied with Gemini 9 and other urgent problems. Meanwhile, we are complying with his instructions from the 5/18 meeting which means (1) continuing with in-house effort on defining LEM fixed solar astronomy package controlled by means of large (3') control moment gyros and (2) initiating study with Grumman to study integration of above combination into the LEM. The "kick off" meeting with Grumman is scheduled at GAEC for 6/8. The GAEC effort is being covered as an addendum to an existing study contract from MSC. We are now receiving good cooperation from MSC on this. ✓

JTB 6/6

C-1 ENGINE

An analytical model of the engine combustion process, now operational on the analog computer, has provided information regarding the change in combustion mode processes of the engine. Evaluation is being made of sensitivity to propellant distribution, propellant temperature, and supply pressure. Correlation with test data is being made as it becomes available.

The incentive endurance milestone scheduled for May 31, 1966 has slipped to June 4, 1966 due to problems encountered in getting RMD's new automated R4 test complex operational. ✓

H-1 ENGINE

LOX seal retrofit program has been completed with the installation on S-IB-6 engines.

Installation of Thrust-O.K.-Pressure-Switches (TOPS) on S-IB-4 and S-IB-6 completed the TOPS retrofit program.

Engine requalification testing is continuing at Canoga. Twelve duration tests and ten malfunction tests have been completed. The only problems so far encountered are minor mechanical failures associated with the main fuel valve, heat exchanger, and turbine exhaust duct. Failure analysis of these components is in progress. ✓

F-1 ENGINE

Engine F-5038, which experienced slight injector baffle bulging, was accepted at Canoga Park on June 2, 1966, and will be delivered to MSFC for an accelerated testing program to evaluate the Qual II injector baffle bulging problem under MSFC stage test conditions. ✓

J-2 ENGINE

At the J-2 Program Review held June 1 and 2 at Rocketdyne, it was decided to replace the ASI LOX line on all delivered J-2 engines with the new double-welded, shot-peened line. It appears all replacements can be made without any schedule delay. ✓

A successful acceptance test of S-IVB 205 was conducted June 2, 1966. The test was for 437.5 seconds and included gimbal and Propellant Utilization programs. ✓

A 230K fuel turbopump was destroyed in a component pit on June 3, 1966. The pump was 60 seconds into a planned 500 second run when a facility electrical power failure occurred, allowing the main fuel valve to close. The gas generator went LOX rich and burned up the unit. The pump was a complete loss and the facility will be down approximately two weeks. An emergency power system is being investigated to prevent reoccurrence of the problem. ✓

The Chief Counsel's Office has reviewed our negotiated J-2 contract, NAS8-19 and changed a clause. This change will probably require reopening of the contract, further delaying delivery of the package to Headquarters for approval. ✓

Two expended J-2 engines were delivered to the Center this week along with a full-scale mockup of a J-2 toroidal engine. One of the expended engines will be displayed in the MSFC Space Museum and the other in the Smithsonian Institute. The J-2 toroidal engine will be displayed when a suitable location is found. ✓

I'd like to see it
B

NOTES 6/6/66 CONSTAN

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B 6/10

Negative Report

NOTES 6/6/66 FELLOWS

6/26/66

B6/10

1. Certification of R&DO Visitors to Hazardous Areas at KSC: At the request of Col. Montgomery (IO Resident Office at KSC), we are establishing single points of contact for him in each R&DO laboratory and office to certify requirements for special access badging of R&DO visitors to specified hazardous areas at KSC. Hazardous areas identified by KSC are: Launch Complexes 39-A, 39-B, 37, 34, and 16; KSC cryogenic areas; KSC hypergolic areas; mobile launcher; mobile service structure; white room; firing rooms; data evaluation areas; and MSO control rooms. A 1,000-foot radius control area is established on launch complexes and a 200-foot radius control area is established around any area where toxic propellants are stored, contained, or transferred. Toxic propellants are: Nitrogen tetroxide (N_2O_4) oxidizer and hydrazine blend (A-50, UDMH and MMH) fuels. There are also different types of badges required, depending on the hazardous conditions to which a visitor might be exposed and whether or not he is a frequent visitor. All those matters will be channeled through the established R&DO points of contact, relieving Col. Montgomery of a recent flood of administrative details. ✓

2. R&A Project for Research Projects Laboratory Addition: On June 3, we were advised that Mr. Lilly had approved the \$250,000 R&A project for the Research Projects Laboratory addition. ✓ Bid invitations will go out today. The bid opening is scheduled for June 22, which should leave enough time to make the award using FY-66 AO funds. Ted Hardeman is reviewing year end AO position and is optimistic about the availability of funds for this project. In the event FY-66 funds cannot be found, the contract will be awarded on July 1 using FY-67 funds. ✓

NOTES 6/6/66 GEISSLER

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6/26/66

1. Revised Apollo Meteoroid Criteria Model: MSFC-IO has reached an agreement with OMSF-Bellcomm on the revision of a meteoroid model to be specified in the Headquarters document, "Natural Environment and Physical Standards for the Apollo Program." The MSFC-AERO proposed model, which gives a non-linear relation between the logarithms of mass-cumulative flux and particle mass, will be specified by OMSF for use outside the mass interval 10^{-8} to 10^{-2} grams. Within this mass interval, the OMSF-Bellcomm linear model, which is in very close agreement with our proposed model, will be employed. ✓
2. Weather Radar at MTF: The CPS-9 Weather Radar, obtained at essentially no cost to NASA by our Aerospace Environment Division, has been installed at MTF, and is operational. As MSFC's Meteorological Coordinator, Mr. R. Turner of Aerospace Environment Division, still exercises approval on all related procurement actions, and provides MTF with back-up resources and technical assistance when necessary. ✓
3. Low-g Slosh Tests in Orbit: We are discussing with P&VE the possibility of using the MSFC drop test tower in the near future, to test a model of a pendulum-type low-acceleration measuring device (Acronym AZTEC: almost zero-g test environment calibrator). This device is planned for use with low-g slosh tests in orbit. The concept of meeting the need for this device was put forth by our Dynamics and Flight Mechanics Division. ✓

B 6/10

S-IC

The S-IC-2 stage pre-static checkouts are progressing on schedule for the static firing tomorrow. This test is scheduled for 125 seconds mainstage at 3 p.m. and is the only acceptance firing planned. ✓

S-IB-6

S-IB-6 was installed in the Static Test Tower East on Tuesday, May 31, 1966. Five TOP switches were replaced due to contamination found in Michoud. Eight TOP switches were removed for X-ray inspection and one of them was found contaminated and replaced. All lox pump shaft seals were removed and replaced by vented type seals. Functional checks are in progress. The propellant loading test is scheduled for June 16, 1966, and the short duration test for June 22, 1966. ✓

S-IVB (SACTO)

A successful 437 seconds mainstage duration static acceptance firing of Vehicle 205 was accomplished at 2:36 p.m. PST at the Douglas Aircraft Company's Sacramento Test Center. ✓ Cutoff was automatically initiated by the lox depletion sensors at 1.9% residuals. ✓ An apparent slight GH_2 leak indication was picked up during transition and sporadically noted throughout the run on the LH_2 tank pressurization module. No major anomalies occurred and preliminary indications are that all objectives were successfully achieved. ✓

S-IVB-501-502

Vehicle 501 is undergoing post-static checkout on Test Stand Beta I. Vehicle 502 which arrived at STC on June 1, 1966, will be installed on Beta I after 501 is removed to the Vertical Checkout Laboratory. DAC estimates a mid-July firing date. ✓

Swing Arm Test Program

Swing Arm presentation to General Phillips was held at KSC on June 2, 1966. Three items of significance were presented to him:

1. Due to late deliveries from Hayes, arm refurbishment after testing may have to be performed by KSC after the arm is installed on LUT #1 to support 501. This is a feasible solution to allow more test time. Refurbishment would consist of propellant line cleaning and faulty component replacement. ✓

2. Flight disconnect arms presently supporting 500-F would be returned to MSFC for testing. This would be done after the activation of Pad B or June 1967, according to present schedules. ✓

3. A potential problem exists due to inadequate spare part support. KSC plans to use the third set of arms as spares until KSC funding problems can be resolved and parts contracted. This may impact testing of third set of arms. ✓

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NOTES 6-6-66-HOELZER

AS616

BENDIX 3 AXIS FLIGHT TABLE: The Bendix 3 Axis Flight Table has been declared surplus and has been shipped to the Naval Ordnance Test Station, China Lake, California. Shipping date was May 23, 1966. It is to be used in Sidewinder Development Programs. ✓

NOTES 6/6/66 JAMES

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ELIMINATION OF STATIC FIRING: (Reference Mr. Grau's Notes 5/23/66, copy attached as Enclosure 1.) Mr. Grau expressed concern over the "push toward elimination of these tests under the guise of cost reduction." Elimination of static firing of stages after SA-212 for cost reduction is not a "guise," it is the primary purpose. This is not to say it is being done indiscreetly but I think you are well aware of our recent efforts to project a reliable, cost-competitive Saturn IB.

For quite some time there have been considerable discussions with the labs concerning the elimination of static firing. These discussions led to the decision to eliminate static firing at SA-213. This will give us something in excess of twenty "flights" each for the S-IB and S-IVB stages. This analogy considers the ten S-I flights in the Saturn I Program and the twelve S-IVB flights in the Saturn IB Program with about eight S-IVB flights in the Saturn V Program. This exceeds the "target" of fifteen flights which Mr. Grau himself set in his April 14 memorandum to Dr. Mrazek (copy attached as Enclosure 2) concerning the elimination of Saturn V static firing. One study proposed the possibility of eliminating static firing earlier than SA-213. I opposed this proposition for much the same reasons Mr. Grau outlined in his memorandum.

As a matter of interest, I understand that GLV-1, the booster for GT-1 (unmanned), was static fired at KSC. No other GLV's have been static fired.

Our current plans are to proceed toward the elimination of static firing for SA-213. Experience with the remaining eleven Saturn IB vehicles (as well as the Saturn V vehicles) could undoubtedly influence these plans.

RCA COMPUTERS: No problems were experienced last week with the LC 37-B computers after the majority of the boards were changed out. We met with RCA personnel Thursday and Friday to review the total problem area again. I understand the MSF party that will be on the west coast this week for the cost studies will also visit RCA to review the computer problems. Mr. Dunlap, of my office, will be with this group.

SA-203: Sequence malfunction test was successfully completed and the propellant loading test is scheduled for tomorrow. We plan to deliver the "updated" flight tape today which is critical to the current launch date.

vs order incentive contracts. (If contractor, as he does, advises reduction of test staffs, we cannot compel him). I'm inclined to side with Lee James, but

Enclosure 1: Mr. Grau's Notes 5/23/66.

Enclosure 2: Mr. Grau's memorandum to Dr. Mrazek dated 4/14/66, subject: Proposed elimination of Saturn V static testing.

your comments are invited, nevertheless
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*Dickel
Grau
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reduce
the cost
of the
Sat IB,
we
cannot
make it
cost-
competitive,
and may
get it
cancelled
altogether.
Also, over-
staffing
of
static
tests is
not easily
stopped by*

9/26/66

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6/16

Work Programs of ME Laboratory: We are presently in a transition period from working for one major in-house project (S-IC) to a multi-project operation. In many respects, it is more difficult to work on a number of various small jobs with short delivery targets, and of course less glamorous, than to work for one main stage where everybody can observe the progress and the accomplishments are very visible. We will suffer continuously from an overload of work for the next three or four months. However, this peak load or wave in front of us never seems to level out and is currently regenerated by new demands of present or future projects. Following are some examples of jobs we are presently working on: (a) Mainstream Efforts: S-IC-501 and 502; IU-Breadboard and environmental test; damping arms for Saturn V; airlock; nosecones; support to prime contractors. (b) Support to Other Laboratories: Wind tunnel models for AERO; support to RPL; support to P&VE (flutter panel model, deflection test cylinders, 3-axial stress cylinders); adaptor ring; and LH₂ piping for TEST. (c) Joint P&VE-ME Structural Development Projects: Toroidal and semi-toroidal tanks; superinsulation; bonded shroud panels. (d) Mock-up and Models: LEM mock-ups for exhibition; 1/10 scale models (2 each) of Saturn V vehicle; LEM-rack mock-up; astronomy experiments mock-up. (e) SR&T Projects: welding, bonding, forming technology; S-IVB workshop experiments.

It is difficult to control all of these many jobs and also to keep all manufacturing departments (electrical shop, machine shop, etc.) loaded to their capacity. To improve this control, we plan the installation of a data collecting and processing system, designed and tailor made for a job shop. A special problem exists presently in subcontracting the overflow workload, mainly in machine work. We are using up the fabrication man-hours in our Single Support Contract (Hayes) at a 100% higher rate than planned. In fall, we will have no fabrication services left in the contract for the remaining part of the year. Mr. Cook has been informed of the problem and is working to find a solution.

Eberhard Kees

Suggest you give this problem complex your personal attention. I have no doubt in my mind that this is the kind of activity ME has to learn to live with during the next few years. And the sooner they adapt themselves organizationally to this new way of life, the better it will be.

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NOTES 6-6-66 LUCAS

B 6/10

1. EXPERIMENT #2 - The Thermal Coating Experiment has been accepted by IO Configuration Control Board and will be incorporated into the AS-206 flight vehicle. The cost of incorporation into the IU is approximately \$80K. Unfortunately, one of the events to be covered (measurement of contamination during separation) will be lost now due to the decision to change nose cones on AS-206, which eliminates the LES. ✓

Can we repeat it on a later flight?
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2. HUMAN FACTORS VISUAL SIMULATION STUDY - These studies are done for our Human Factors organizations by NAA under contract NAS8-20283. Results are put into the Computation Laboratory overall simulator and are used for human factors engineering evaluation of two lunar roving vehicle concepts. The 19 visiting Astronauts were given a demonstration, and several of them participated in driving the simulated vehicle over a representative lunar terrain. They were quite enthusiastic about the simulation. ✓

3. SATURN IB - The exteriors of electronic boxes in the 203 IU were not painted as required for proper thermal control. It is mandatory to correct this deficiency. By close cooperation with KSC, it should be possible to paint sufficient areas without schedule impact. ✓

4. MECHANICAL GSE - Responsibility for 1687 line items in the Mechanical GSE area have been transferred to the Technical Materials Branch, Technical Services Office, which will do the warehousing, shipping, and receiving for IO. ✓

5. AS-500F - The ground winds and vehicle response measurement program started at KSC with roll-out of the AS-500F vehicle. Due to the relatively calm winds during the first week, efforts are being made to extend the test program from a total of 2 weeks to 3 weeks. In order to determine if a damper system for AS-501 is a firm requirement, winds in the range of 30 - 50 n. miles are required at the 60 ft. level. ✓

6. HIGH FORCE TESTS - S-II low level acoustic test runs are scheduled for June 8 - 9. The first S-IVB tests will be conducted on the forward skirt assembly, June 10 - July 7. Boattail assembly testing is scheduled for July 8 - October 7. ✓

7. ACCEPTANCE TEST OF S-IVB-501 STAGE - On 5-26-66, a successful acceptance test was conducted on the S-IVB-501 stage. This test represents the first ground start-stop-restart test conducted on a S-IVB flight stage. Initial indications are that all stage systems performed satisfactorily. ✓ First burn duration was 150.7 seconds at the 5.5:1 mixture. Second burn duration was 301.1 seconds. During second burn, the engine mixture ratio was 5.5:1 for the first 100 seconds, and then dropped to a mixture ratio of 5.0:1 for the remainder of the test. Thrust chamber pressure traces showed a smooth transition with little evidence of thrust variations. ✓✓

8. ORBITAL MISSION NO. 2 - As a result of our vehicle compatibility study, two layouts have been completed integrating the experiments of Orbital Mission No. 2 into a phase I LEM lab and a service module pallet, respectively. ✓

NOTES 6/6/66 RICHARD

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Operations at Complex 37: Tests at Complex 37 are proceeding with much improved support from the ground computer system. The board change-out has worked out well. Major overall testing on SA-203 begins this week. ✓

Incidentally, even though the requirements on the system were not as great on Complex 34 as Complex 37, the total operational support time lost during May on Complex 34 due to computer problems was one hour. ✓

NOTES 6/6/66 RUDOLPH

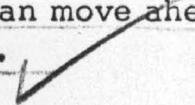
B410

ADL/4

MSFC/KSC Contract Supplement - Reference Notes 5/16/66 Rudolph (copy attached) which informed you of a meeting with General Phillips to review the KSC Supplements and of our major disagreement with KSC concerning the S-IC Stage and stage peculiar GSE work. The referenced meeting with General Phillips was held at KSC on Thursday and Friday, June 2 and 3, 1966.

KSC has now agreed to break out the S-IC work statement as requested. Additionally, the S-IC Stage Manager (Matt Urlaub) will actively participate in the negotiations of this contract as it pertains to his work statement.

As a result of this meeting among General Phillips, KSC, and MSFC, I feel that our Saturn V requirements have now been satisfied, and that we can move ahead to finalize the contract supplements at the earliest possible time.



Attachment: a/s (DIR, I-DIR and R-DIR's copy only)

B 6/10

NOTES 6/6/66 SPEER
SDB 4/6

1. MSFC LAUNCH OPERATIONS ON-SITE SUPPORT PERSONNEL FOR AS-203: The KSC requirement for MSFC personnel for direct support of the AS-203 Launch Operations has been received. The requirements is for a total of 8 personnel for the launch and 4 personnel for the Countdown Demonstration Test (CDDT). Of the 8 MSFC personnel for support during launch countdown 4 will be physically located in the Central Instrumentation Facility (CIF) and 4 in the Blockhouse. This compares with a total of 20 personnel on AS-201. The reduction is the result of the AS-201 experience. ✓

2. OTDA ADMINISTRATION'S PROGRAM REVIEW: Mr. Golden, I-MO-R, represented MSFC at the Tracking and Data Acquisition portion of the NASA Administrator's Program Review of OTDA. NASA's Tracking Network status and plans, automatic data processing equipment plans, long range program support requirements, and resources were among the primary review items. Mr. Webb emphasized the need for standardizing the design of onboard space vehicle equipment between different programs to minimize ground system requirements. He complimented OTDA on their successful utilization of incentive contracts, which he appeared to strongly support. ✓

NOTES 6-6-66 Stuhlinger

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KS/L

1. PEGASUS: No changes, We are planning to request OART to permit us to continue operation of the Pegasus satellites after the 18 months of scheduled space operation time. ✓ First, this will provide us valuable data on longtime environmental effects; second, we will be able to obtain a better indication of meteoroid directionality and of meteoroid shower effects. ✓

2. AAP - EARTH ORBIT: Dr. Herb Friedman, principal investigator for the X-ray experiment which we are planning for an Electro-mechanical Radiation Satellite (EMR Satellite), will visit us on June 13-14 for discussions. Dr. Gibbons, investigator for the gamma ray experiment, was here recently for discussions. ✓

AAP - LUNAR EXPLORATION: Mr. V. R. Wilmarth, OSSA, agreed last week to transfer \$890,000. of "no-year" funds to MSFC for lunar experiments (540 k for lunar surface, 350 k for lunar orbit). Although the total amount is relatively small, it will provide us with extremely valuable seed money to initiate experiment definition, to buy components, and to continue 1965 contracts which otherwise would have come to an untimely end. ✓

3. LUNAR ASSIGNMENTS TO MSC AND MSFC: Phil Culbertson, OMSF, gave me recently over the telephone a tentative list of lunar program assignments to MSC and to MSFC, requesting verbal comments. He plans to call a meeting between MSC and MSFC in the framework of Don Beattie's "Lunar Exploration Working Panel" (see Weekly Notes of 5-16-66 attached), to discuss these assignments further. I will work out a preliminary reply with ASO and H. Weidner, but I feel that the FPPB should then hold a meeting on this subject before we pass our proposals on to OMSF. ✓

↑
I agree
B

NOTES 6-6-66 WILLIAMS

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1. Flyby Planning Exercise: Headquarters has brought RAND into the act to support them in the area of costing the long range MSF programs. RAND has requested data from us. We have had very bad experiences in the past and are therefore being somewhat cautious. ✓

F.W.
May kill it.
Voyages
talks
about
1.5B
B

2. Cost of Flyby Spacecraft: MSC has developed a new cost estimate of the flyby spacecraft development (~\$7 billion) that is considerably higher than their previous numbers. This was done on their spacecraft cost model that we helped them develop. They hope to get MSC management approval today on the new numbers. We will attempt to use their approved numbers in our presentation on June 9, 1966 if we can get them in time. ✓

3. SAA Program Control: We have been requested by Pem Field to make another run on the SAA Planning and Control Model the week of June 13, 1966. This run will reflect the latest changes in the model development. The primary objective of this run is to update the present model data bank and include additional experiments that have been defined since our last run. Field has asked us to make the distribution on this run and the distribution list has now grown to about 100. ✓

4. Mobility Test Article: Schooling on the Bendix MTA operation for Aberdeen Proving Ground and MSFC personnel took place June 1-3, 1966. A demonstration of the Bendix MTA to the press is scheduled for 2:00 p.m. June 7, 1966, next to Building 4755. ✓

June 13 1966

Direct 9/23 6/27 *Notes 6-13* 1717

SATURN I/IB PROJECT OFFICE

MEMORANDUM

DATE June 23, 1966

TO: ~~Dr. von Braun, DIR~~ *B6/30*

SUBJECT: Oscillating shock phenomenon effected on the SA-203 nosecone

Reference your comment on my notes of June 13, 1966 (copy attached).

We have been working with R&DO on the potential problem resulting from the predicted shock phenomenon on the nosecone of SA-203. The attached is an R&DO response to our request that they complete an evaluation prior to the Flight Readiness Review at KSC.

Lee B. James
for Lee B. James

2 Enc: a/s

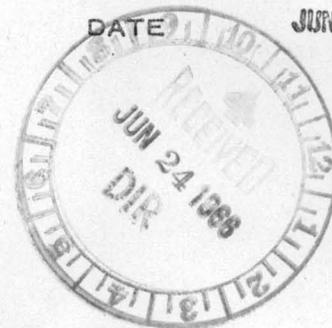


Memorandum

TO : Col. James, I-I/IB-MGR

FROM : Director, Research & Development
Operations, R-DIR

SUBJECT: AS-203 induced flight environments



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6/30

Reference is made to the following:

- a. I-I/IB-U-471-66, dated June 16, 1966, "AS-203 induced flight environments"
- b. R-AERO-AU-66-45, dated April 26, 1966, "Saturn IB AS-203 IU external acoustic environment"
- c. R-AERO-AU-66-36, dated April 8, 1966, "Effects of the external acoustic environment on EDS rate gyro and control accelerometers during the Saturn IB 201 flight"
- d. R-P&VE-SVE-66-135, dated June 7, 1966, "Revised AS-203 Instrument Unit flight vibration criteria"

The potential problem area of induced environments on the Saturn IB (203) vehicle has been investigated by R&DO. Results of this investigation and the accompanying assessment of flight readiness of S-IU-203, as requested in reference (a), are discussed in the following paragraphs.

An increase in the acoustical environment on the S-IU-203 has been predicted (see reference (b) and (c)). This increase is localized to the IU area and was based on flight evaluation of AS-201, available wind tunnel data and theoretical analysis. The major contributor to this increase in acoustical environment is an oscillating shock phenomenon caused by flow expansion around the nose cone/IU interface. This situation is aggravated by the relative bluntness of the AS-203 nose cone. Acoustical levels are therefore increased from 156dB, as experienced on S-IU-201, to 164dB.

As would be expected, an increase in acoustical environment produces an increase in predicted vibration levels. A conservative approach was used to establish the levels predicted in reference (d) because of the significantly increased acoustic spectra and the lack of definition of the shock duration. The flight exposure time was assumed to occur from Mach 1 to maximum Q (17 seconds), and because the spectral composition indicated a significant low frequency energy content, maximum structural response was assumed. The resultant predicted vibration levels were therefore higher than those published in IN-P&VE-S-63-1.

Coner

Subsequent investigations have determined that the duration of the oscillating shock on AS-203 should be about the same as experienced on AS-201 (3.5 to 4.5 seconds). This will not reduce the predicted vibration levels but does substantially reduce the exposure period and the probability of maximum structural response. In addition, a review of AS-201 flight measurements revealed that there was no significant increase in vibration levels in the Instrument Unit during the shock exposure period. Furthermore, the overall sound pressure levels used to predict the vibration specifications contained in IN-P&VE-S-63-1 were not exceeded during the flight of AS-201.

In summary, there is a strong possibility that an oscillating shock environment will be experienced during the flight of AS-203. However, although a resulting higher vibration level is predicted, failure of critical components is not expected. Therefore, it is the considered opinion of R&DO that S-IU-203 is flight worthy and should be committed to flight.


Hermann K. Weidner

cc:

I-I/IB-U, Mr. Simmons
R-P&VE-DIR, Dr. Lucas
R-AERO-DIR, Dr. Geissler
R-ASTR-DIR, Dr. Haeussermann
R-OM-DIR, Col. Fellows
R-TO-DIR, Mr. Richard

NOTES 6/13/66 BALCH

6/13 958

B 6/17

S-II Test Stand A-2 Damage and Recovery - Assignments have been made for accomplishment of the recovery work. The Director of S&ID at MTF has been assigned the lead responsibility for effecting a complete work control system, including the planning, scheduling, and monitoring of all activities related to the recovery and modification effort, and for the management integration of all participating agencies. A six-man Task Force of NASA/MTF personnel has been established, with responsibility for overall management of these activities, approval of the integrated schedule, and enforcement of schedule discipline. One man each from S&ID, GE, and the Corps of Engineers is to be appointed to serve in an advisory capacity to this Task Force. C of F funds in the amount of \$1,000,000 have been allocated by NASA Headquarters for accomplishment of the recovery program, and it appears that this will cover all work identified to date. ✓

Preparations for S-II-1 Stage - A complete integrated PERT net has been completed showing the activity from now until the arrival of the S-II-1 stage. Backup networks and bar charts have been completed identifying the effort required in all the various areas. ✓

Technical Systems, Phase II - Amendment No. 64 to Contract NASw-410, MSFC-1, covering Phase II Technical Systems completion, has been reviewed in Huntsville and hand-carried to NASA Headquarters for approval. Because of slippages in scheduled access dates for S-IC technical systems installation based on projected Brick and Mortar completion dates, slippage of approximately one month is presently indicated in technical systems completion dates required to support the S-IC-T stage in Test Stand Position B-2 by 11/1/66. ✓

Labor Relations - Dispute between the IAM and the James N. Travirca Company, a GE subcontractor, is to be considered by the President's Missile Sites Labor Commission on 6/23/66 and 6/24/66. It is believed that the union will not strike on this issue pending action by the Commission. The IAM also had difficulty in negotiations with the H. R. Morgan Company, another GE subcontractor, but this was finally cleared up on Friday night. The Federal Mediation and Conciliation Service is continuing to participate in the efforts to resolve the issues between the IAM and the Travirca Company. ✓

GE Support Contract - MTF continues to refine its position relative to next year's GE contract terms. Involved is a substantial reduction in work force and much sharper clarity of their various functions. Contract direction for an initial reduction in work force has already been given. ✓

S/AAP INTEGRATION CONTRACTS: Meetings were held last week with the study managers of Lockheed and Martin to brief them on changes to Saturn/Apollo Applications Program Payload Integration Project and to learn of their activities since they submitted their proposals. A revised definition plan commensurate with a one year study was presented to them. Both contractors will be back this week to discuss their revised task plans. Negotiations are scheduled for the week of 6/20. The negotiated contracts should be ready for internal coordination on 6/27. ✓

S-IVB SPENT STAGE: P&VE is conducting an in-house study on micro-meteoroid protective devices. Preliminary results indicate that the 400 pounds of internal coating (may be dynatherme) will be useful only as a flame retardant to give the astronaut a few extra minutes to either extinguish the fire or exit the Workshop. ✓ The four SLA panels will be studied for positioning outside the LH₂ tank as a micrometeoroid bumper. This will cover about 65% of the area. The remaining area may require a special lightweight shield (may be a black plastic sheet). This topic will receive an urgent effort within P&VE. ✓ The goal is to raise the Workshop probabilities of penetration to that equal to the Apollo Command Module. ✓ The above proposed fixes will be fully investigated to arrive at the desired results. ✓

We will have a representative, Mr. Woodson Weaver, participating as a member of the Spent Stage Experiment Support Module (SSES) Source Evaluation Board cost panel. He will spend two weeks and possibly three at MSC.

APOLLO TELESCOPE MOUNT: MSFC is proceeding with the in-house effort on studying fixed mount concept on the LEM. As you are probably aware, Dr. Mueller has apparently concluded that some more "middle level" selling to OSSA may be helpful in reaching an agreement with Dr. Newell and has requested that MSFC brief Mr. Mitchell and Mr. Forsythe (OSSA). Such a presentation is tentatively planned on 6/20 or 6/21. A general review of MSFC effort in this area is scheduled with OMSF SAA Project Office personnel at MSFC on 6/16. ✓

On 6/8, Grumman was given the go-ahead by MSC to study LEM aspects of the fixed mount concept. The study includes (1) analysis of alternate mounting locations; (2) physical installation of the complete system including the control moment gyros, and (3) investigation of means for establishing compatibility between the solar telescopes and LEM in areas of contamination and operational procedures. This study is to conclude 7/31/66 and serve as an additional input to the integration effort. ✓

6/13 JB

B
6/17S-IB Quarterly Review

The 16th CCSD-Quarterly Review is scheduled for June 16, 1966, at the Michoud Assembly Facility - Major agenda items will be the overall program status, engineering changes, cost saving, certificate of flight worthiness, the hardware qualification program and static firing results. ✓

S-IC Follow-on Contract

Boeing submitted their proposal for the five follow-on stages (S-IC-11 through 15) on April 29, 1966; target cost proposed was \$131,331,638. ✓

Status of S-IB Stages

S-IB-2 and -3 Are at KSC undergoing pre-launch checkout.

S-IB-4 Completed - awaiting shipment to KSC - scheduled for shipment on July 25, 1966.

S-IB-5 In final checkout.

S-IB-6 Undergoing static firing at Huntsville.

S-IB-7 Undergoing pre-static checkout.

S-IB-8 Is undergoing final assembly.

S-IB-9 Is in final stage of structural assembly operation, clustering scheduled for June 20, 1966.

S-IB-10 Is undergoing structural assembly operation, clustering scheduled for August 30, 1966.

S-IB-11 Is undergoing sub-assembly operations, clustering scheduled for November 1, 1966.

S-IB-12 Is undergoing sub-assembly operations, clustering scheduled for December 30, 1966. ✓

Status of S-IC Stages

S-IC-3 Post manufacturing checkout was resumed June 10 and is on schedule. ✓

S-IC-4 Installation of components is progressing on schedule in the horizontal assembly position. ✓

S-IC-5 Hydrostatic test of the LOX tank was begun on June 9 three days behind scheduled date. This test should be complete on 2nd shift of June 10. The fuel tank has had all LOX tunnels re-installed and will be cycled through the hydrostatic test position during the next reporting period. The forward skirt, intertank and thrust structure are complete. This stage is expected to be delivered to the government in advance of contract schedule. ✓

S-IC-6 The thrust structure is 50% complete; intertank 40% complete and forward skirt 20% complete. Fuel tank is closed out and the welds are being X-rayed. LOX tank bulkheads have been fabricated. The three remaining skin rings necessary for the completion of this unit have been fabricated. (On schedule.) ✓

S-IC-7 The thrust structure center engine support is approximately 80% complete. The lower fuel bulkhead has been fabricated and the upper bulkhead is 82% complete. Five skin rings for the fuel and LOX tanks have been fabricated. (On schedule.) ✓

NOTES 6/13/66 FELLOWS

9/13/66

B
6/17

1. Single Support Contractor Performance Evaluations: The second cycle of performance evaluation for single support contractors is proceeding smoothly. The first contractor for this six-month period, Sperry Rand Corporation (ASTR), has accepted MSFC's performance evaluation and has been paid their award fee. The Performance Evaluation Board has also completed evaluations and Reports of Findings for Spaco, Inc. (QUAL), Hayes International Corporation (ME), Rust Engineering Company (F&D), Brown Engineering Company (P&VE), and Northrop Corporation (AERO). Evaluations by the Board of the remaining single support contractors are on schedule. Laboratory-provided information on which evaluations are based is steadily improving, and the contractors are now evidencing a high level of knowledge and acceptance of our evaluation methods and procedures. ✓

2. Computation Laboratory Support Requirement: Negotiations were completed on May 28 with the two companies selected by Mr. Webb for negotiations, Computer Sciences Corporation and General Electric Company. Evaluations of their revised proposals are nearing completion by the Source Evaluation Board. It is presently planned to present the Board's findings to Mr. Webb on June 23, following Mr. Gorman's approval. ✓

3. R&D Operations Functions and Manpower Reviews: The Functions and Manpower Reviews of the R&D Operations laboratories and offices were completed by Mr. Weidner on June 7. Resulting action items are in process of correction. A summary of the results of those Reviews is being prepared for presentation to you at a time to be scheduled in the next few weeks. ✓

JFS 6/13

1. S-IC-1 CHECKOUT AND TESTING: Checkout of the S-IC-1 stage is approximately eight days behind schedule. A major hydraulic leak at the umbilical, detected during mechanical systems testing, resulted in power being removed from the stage during the period June 1-7. A 58 hour work week has been initiated and it is expected that we will regain the slippage in the next few weeks. One item remains to be qualified on the S-IC-1 qualification test program. ✓
2. RCA-110A AT LC-37B: All printed circuit boards in Computer 519 (LCC at 37B) have been replaced as of June 6, 1966. Approximately 250 boards are still required for complete changeout of boards in the AGCS Computer #520. No parity errors have been reported from KSC since the computers were placed back in operation with reworked PC boards. ✓
3. DEPARTMENT OF DEFENSE QUALITY PROGRAM: The Honorable Paul Ignatius, Assistant Secretary of Defense (Installation and Logistics), and the Honorable John Foster, Jr., Director of Defense Research and Engineering, are sponsoring a conference of senior DOD Quality and Reliability Management personnel at the U. S. Naval Academy on August 2-3, 1966. These personnel will consider current and anticipated problem areas in the quality and reliability field and recommend to the sponsors, the short and long range DOD posture considered necessary to improve operations. NASA, as one of the DOD prime "customers" in the contract administration area, has been invited to participate. A representative from this Laboratory was named by NASA Headquarters as a participant and attended a preliminary meeting in Philadelphia, Pa., this week. In view of the dependence placed upon DOD elements by MSFC in achieving our quality and reliability goals, the opportunity to participate directly in this effort is considered of importance. ✓ It is understood that Dr. Seamans and Mr. Rieke are being invited to be present at the conference when findings and recommendations are presented to the sponsors. ✓

6/13 958

1. AS-203 CONTROL ACCELEROMETER PROBLEM: As a result of an apparent discrepancy which occurred on a control accelerometer test in AS-203 on June 6, KSC prematurely concluded and reported at the Flight Readiness Review that the problem was caused by a "sticking seismic mass" in the accelerometer. The accelerometer which allegedly malfunctioned has undergone extensive testing in Astrionics with no indication of erratic performance. In the meantime, another similar erratic measurement was obtained during testing of another accelerometer in the vehicle at KSC. Additional trouble shooting there revealed that the actual output of the control accelerometer was correct, while the blockhouse meter reading was 50% low. The problem was then isolated to a DDAS measuring rack. Although analysis will continue, we are reasonably certain that the originally reported accelerometer problem was also caused by the same DDAS difficulty. ✓

2. STATUS OF 500FS TESTS: Two vacuum tests have been attempted. The first test was abandoned because of control valve malfunction in the Environmental Control System. The second test could not be completed because of an erratic failure of an analog to digital converter at 10^{-7} psi. Equipment will be exchanged and test schedule be picked up 6/13. ✓

3. MSFC EXPERIMENT #16 - OPTICAL GUIDANCE SYSTEM FOR RENDEZVOUS: Word has been received from NASA Headquarters to resubmit the proposed experiment under MSFC sponsorship. OART is of the opinion that its role in the program will end with the tests to be made this summer. Applied Research Branch has agreed to this suggestion and the necessary paperwork will be prepared. It is hoped that action can be taken by the MSFEB at the September meeting. ✓

4. GENERAL ELECTRIC LIGHT FOR LH₂ EXPERIMENT (as mentioned in the SA-203 Review):

We have contacted the manufacturer, General Electric, and emphasized the importance of the 300 watt, 30 volt GE quartzline lights for the LH₂ program. Our enthusiasm for trying to find the cause of the failures has come to the attention of Mr. Jack S. Parker, Vice President of General Electric Aerospace Division. Mr. Parker may call you about this problem. ✓

F-1

9/13 6/13

F-1 engine S/N F-4T2 was removed from the West Area F-1 Test Stand on June 9, 1966, and S/N F-5038 (Qualification configuration) was installed on June 11, 1966. The series of tests on this engine will begin on June 17, 1966. ✓

S-1C

A successful acceptance firing, 126.3 seconds of mainstage, was performed on the S-1C-2 stage on June 7, 1966. Preparation is underway to remove the stage from the test stand on June 16, 1966, and transport to R-ME for refurbishment. ✓

S-1B

Preparation for the propellant loading test continued during the week. Torque checks and leak checks were performed and calibration of static test measurements is in progress. The propellant loading test is scheduled for June 16, 1966. ✓

S-1VB (SACTO)

S-1VB-501 - Vehicle 501 has been moved from the Beta I test stand to the Sacto VCL for post static checkout operations. The NASA/DAC buyoff meeting was held on Friday, June 10, 1966 at STC. ✓

S-1VB-205 - Vehicle 205 is undergoing post static checkout on the Beta III test stand. Results of the static firing on S-1VB-205 are as yet incomplete, but two discrepancies are worthy of note. Oscillations were noted on the lox tank ullage pressure during the first part of the second burn. These oscillations were approximately +2 p.s.i. at 1 c.p.s. DAC, as yet, has no definite answer to the anomaly. Also, the Q-meter did not provide data during the acceptance firing. This meter is similar to the one now installed on S-1VB-203 at KSC. ✓

S-1VB-502 - Vehicle 502 was installed on the Beta I test stand on June 6, 1966. The acceptance firing of this stage is tentatively scheduled for July 26, 1966. ✓

S-1VB-206 - Delivery of Vehicle 206 to the Sacramento Test Center (STC) is planned for July 1, 1966, with an estimated mid-August acceptance firing date. ✓

NOTES 6-13-66 HOELZER

QTS 6/13

B 6/17

NEGATIVE REPORT

NOTES 6/13/66 JAMES

B6/17

QJBC/13

AS-203: The Overall Test (OAT) Plugs-in #1 was run Friday. The test is an abbreviated plus time (about 2 1/2 hours rather than 7 hours). Several minor discrepancies, including ground power and programming problems, occurred during minus time. The RCA 110A computers performed satisfactorily. ✓

Meaning? B

The complex was down Saturday and Sunday for planned E. O. incorporation. OAT Plugs-in #2, with a full plus time and MSC in the loop, is scheduled for today. OAT Plugs-out is scheduled for Wednesday, June 16. The Flight Readiness Test is scheduled for Friday, June 17. MSFC delivery of the final flight tape by noon on the 16th is critical for this test. The Flight Readiness Review is scheduled for Wednesday, June 22. ✓

AS-203 TV CAMERA PURGE: It was reported in the Preflight Review that lens fogging occurred during the propellant loading test last week. The adequacy of the purge at KSC was questioned. We learned this morning from our Resident Office at KSC that KSC has now stated they had no purge at all because of a plugged line. ✓ Further details of the discrepancy are not available at this time. ✓

LVDC MEMORY MODULES: A potential major problem relative to the LVDC memory module exists. Approximately 9 months ago it was discovered that IBM, Owego, had used a bad lot of material in manufacturing the multi-layer boards of the memory modules. At that time all boards in process and the bad lot of material was purged, however, it now appears that some boards made from this material held in stock were overlooked. Thirteen modules in the field have been identified as having the above boards. Two of the thirteen memory modules are in the IU-203 LVDC. If action is required on IU-203, we will obtain two good memory modules from IBM, Owego, and accomplish a change out when the 203 LVDC is pulled for program loading on June 16. We are working the problem with R&DO and IBM and a decision should be made by mid-week. ✓

GEMINI IX DEBRIEFING: The Gemini IX Flight Crew Systems Debriefing has been scheduled at MSC for June 15. Saturn IB Program and R&DO representatives will participate. ✓

SATURN IB PAYLOAD DISCUSSION WITH ARMY (ARPA): Following discussions with MSF and ARPA in Washington, we talked with ARPA representatives last week concerning a proposed radar calibration payload. ✓ After discussions on IB payload capabilities, we referred them to the IO AAP people for further detail planning discussions. ✓

6/13 SFS

B6/17

Formation of a Contamination Control Panel:

In February this year we had conducted here at MSFC a Contamination Control Conference with participants from our Prime Contractors, other companies of the aerospace industry, MSC, KSC and NASA Headquarters. Subsequent to this meeting participants from OMSF had suggested and recommended that the three Centers involved should form a contamination control panel. The purpose of this panel is to establish, identify, and document mutual problems in the area of contamination as it affects the operation of the three NASA Centers. After proper coordination within each Center, the panel will recommend standardization of procedures, specifications and standards in contamination control work to be used by the three Centers and their contractors. As an example, the following case might illustrate the present situation: A LOX Valve for Ground Equipment, ordered from the same manufacturer by different Centers, had to be cleaned by different procedures as a result of different LOX Cleanliness Specifications. This Contamination Control Panel has now been established. The members, serving as chairman in rotation, are:

Mr. Quintin Ussery, Manned Spacecraft Center

Dr. John Gayle, Kennedy Space Flight Center

Mr. Frederick Beyerle, Marshall Space Flight Center, R-ME

In the first meeting of this panel, held last month at Houston, the panel format was established. The second meeting was conducted here at Huntsville last week. Specific areas requiring immediate attention were established as follows: (1) Standardization of Clean Room Specifications, (2) Standardization of Cleaning Processes, (3) Apollo Contamination Control Handbook, and (4) A NASA Contamination Handbook for Design and Manufacturing Engineers. ✓✓

B6/17

9/8 6/13

LB James
I hope
you
are
aware
of this
B

1. S-IB - The last structural test required to verify the integrity of the thrust structure design for manned flight was completed successfully. 186% of design limit load was reached before a structural failure occurred in the connection of the inboard engine thrust beam to the aft ring of the thrust structure barrel. ✓
2. INSTRUMENT UNIT - The oscillating shock, flow phenomenon predicted by R-AERO for the double angle nose cone on AS-203 results in a low frequency, high intensity vibration environment for a relatively short time, which is higher than contained in our vibration spec IN-P&VE-S-63-1. New specs were forwarded to R-ASTR. A potential structural problem in the mounting of the ST-124 guidance package is being investigated in more detail.
3. HYDROGEN/OXYGEN BURNER - The full duration (4½ hours) tests which were attempted last week were prematurely terminated when the injectors flamed out in the first test at 90 and 128 min. respectively. An explosion at the last flame-out blew a 12" X 6" hole into the burner casing. A second burner is being flow-calibrated now. ✓
4. S-II-T - Detailed analysis of the S-II-T fragments is still underway. This includes piecing together fragments from the common and upper LH₂ domes and the LH₂ tank. Latest reports indicate that the location of origin of failure may be the LH₂ fill and drain attach point. All stress lines seem to focus on this location. A flex line had to be stretched 5" during installation to connect to the attach point. Simulation tests are underway. ✓
5. S-IVB HYDROSTATIC TESTS - The S-IVB hydrostatic tests involving 10 pressure cycles to limit load and one cycle to 140% design load have been completed successfully. The results of these tests relieve the concern over the adequacy of the common bulkhead toe weld to the aft LOX dome. Modification of the weld areas will not be required on flight stages where the weld quality is at least as good as the test specimen. ✓
6. MAN-SYSTEM TASK ANALYSIS FOR LUNAR SURFACE EXPERIMENTS - For the purpose of generating design criteria for lunar surface missions in the area of man-system integration, MSFC has acquired a treadmill required for shirt sleeve and pressure suit calibrations (metabolic baselines) of test subjects. The treadmill and the mock-up of the Kollsman Optical Astronomy Package have been installed in our Task Analysis Facility. The objectives of this activity are to establish guidelines for lunar surface mission planning within the constraints of the ASTRONAUT life support system (duration and suit cooling capacity). Under nominal assumptions, a back pack has 2800 BTU suit cooling - 3 hour capacity. ✓
7. AS-203 IU - The C-Band Antenna was relocated and checked out on Saturday. ✓

9/13/13

1. INTER-SERVICE COMMITTEE ON TECHNICAL FACILITIES (ISCTF) - The quarterly meeting of the Inter-Service Committee on Technical Facilities (ISCTF) will be held at MSFC on August 15 and 16, 1966. The ISCTF was organized to promote the cooperative use of facilities, exchange scientific knowledge among member agencies, and to minimize duplication of effort and equipment. Recently, member agencies have used the ISCTF as a medium to make known the availability of temporarily idle technical and manufacturing facilities. Oak Ridge Operations, AEC, for example, has been able to reduce costs by finding customers to temporarily utilize idle facilities and manpower. ✓

2. VISIT BY PAUL BARRON, ASSISTANT DIRECTOR FOR PROCUREMENT, NASA HEADQUARTERS - Mr. Paul Barron visited Marshall on June 7 for the express purpose of reviewing STOIC. As a result of this meeting, we were requested to present STOIC at the August 2-3 incentive contract workshop in Houston involving NASA & DOD. ✓

3. STATUS OF NASA FY-67 LEGISLATION - The status of the NASA bill is unchanged. The Conference Committee will be appointed later this week upon the return to Washington of Congressman George Miller who has been campaigning for re-election. It is expected that the membership of the Conference Committee will be the same as in previous years; that is, the four top Democratic and the top Republican members of the Space Committees in both the House and the Senate. ✓

B 6/17

NOTES 6/13/66 RICHARD

CRS 6/13

Lightning in the Cape Area: This material was extracted from a lightning report by GE for Complex 39.

Review of isoceraunic (frequency of thunderstorms) maps indicate that structures in the Cape area will experience most severe exposure to thunderstorms and lightning. The 40-year average isoceraunic map shows that the West Coast of the USA experiences five or less thunderstorm days per year, and this number progresses toward the east until it reaches a peak in Florida. The Tampa area is highest with a frequency of 90 thunderstorms per year, and the Cape area is between 70-80.

Actual records indicate that the occurrence of a lightning stroke to structures approaching 150 meters high in the Cape area is 3.5 to 5.5 times per year, with summer months being the most critical.

Average lightning currents of 30,000 amperes carrying 30 coulombs can be expected with extreme strokes of 200,000 amperes carrying 150 coulombs occurring rarely. Induced voltages reach 1,000 kilovolts.

GE recommended the use of a lightning rod for the mobile launcher, which resulted in a lightning rod being used. We will review this decision with KSC to understand it and make sure it is the most reasonable and practical approach. ✓

NOTES 6/13/66 RUDOLPH

B 6/17

6/13/66

1. SA-500F - Vehicle was moved to the VAB on Wednesday, 8 June 66, for protection from Hurricane Alma. On Friday, 10 June 66, the vehicle was returned to the pad. Winds experienced in transit to the VAB were 54 to 68 m.p.h. at the 200' level. Bearing temperatures on the crawler climbed to 500° F requiring a halt in movement. Special measures were taken (fire truck flushing) to reduce temperatures to acceptable values.

Move into VAB Wednesday, June 8, midnight.

Return to pad began at 11:00 a.m. on Friday, June 10, and completed at midnight.

Estimate approximately five to six days lost time due to Hurricane Alma. ✓

2. S-IC-2 - Stage was captive fired at 6:45 p.m., on Tuesday, 7 June 66, for 126.3 seconds mainstage duration. The engine gimbal system functioned as planned, with all outboard engines gimballed ± 2 degrees. No apparent damage occurred to the stage or test stand. ✓

The countdown was stopped several times due to minor problems:

- o Fuel tank vent valve failed to close, causing a countdown stop at X-8 seconds at about 3:30 p.m.
- o Water valve for the flame deflector failed to open electrically. After scientific methods failed, a persuasive "kick" by a trained technician corrected the problem.
- o Purge system trouble on the turbopump LOX seal and calorimeter.

3. S-II - S-II-1 stage shipment from Seal Beach is planned for 13 July. This date is compatible with the availability of the refurbished A-2 test stand at MTF. ✓

General - Discussions with MTF (Mr. Balch, Artley, and others), covering the the incentive contract/operational interfaces were conducted Friday, June 10, by representatives of S-II. Follow-up discussions are planned to establish with MTF a better understanding of constraints, flexibility, and operations under incentive contract arrangements. ✓

NOTES 6/13/66 SPEER

8/26/13

B 6/17

1. AS-203 FLIGHT CONTROL ACTIVITIES: The command interface test, including the initiation of commands from the Mission Control Center - Houston (MCC-H) flight control consoles to the launch vehicle on the launch pad, ~~was successfully completed on June 8~~. All of the planned commands for AS-203 were transmitted to the vehicle with only one rejection. This was determined to be due to a documentation error in a data word of the S-IVB Tape Dump Command. A manual correction was made and the command was successfully transmitted. Verification was received at the MCC-H and at the blockhouse that the commands were received and verified by the Launch Vehicle Digital Computer (LVDC). ✓
2. AS-203 GROUND SUPPORT: The ship we had requested for post-insertion telemetry coverage will be replaced by instrumentation aircraft. This is less desirable but acceptable. ✓
3. HOSC MISSION STATUS ROOM: The AS-203 mission status can be obtained from the Huntsville Operations Support Center by calling phone 876-0145, effective 6/15 through launch. ✓

B 6/17

9/8 1/13

1. PEGASUS: General Phillips recently requested a review of the Pegasus Program and its results from Milton Ames. We are furnishing the necessary information and data to Milton Ames' Office for this review. ✓

2. AAP - EARTH ORBIT: Several RPL experiments for early AAP flights are taking shape now. OART is in the process of providing FY 66 funds for the Solar Spectroreflectometer experiment, the Coupon Recovery experiment, and the Heat of Fusion Radiator experiment. These efforts are being closely coordinated with Dr. Johnson, ASO, ASTR, and P&VE. Also, the Heat Pipe experiment has a good chance of being ready for an early flight. ✓

Dr. Joe Lundholm, MSF, requested our participation in the effort of integrating scientific payloads in the radiation environment arising from radioisotope and natural space radiations. We are coordinating our reply with Lee Belew. ✓

LUNAR EXPLORATION: Phil Culbertson and Don Beattie from MSF, and several members of MSC (Bill Stoney) will be here on June 13 to discuss (1) the division of responsibilities for lunar exploration between MSC and MSFC, and (2) MSFC's contribution to the Joint Task Force review on August 1. Mr. Weidner requested that ASO and RPL handle this visit. We hope that a satisfactory agreement between MSC and MSFC can be achieved. ✓

The current MSF plan, recently resubmitted to the Bureau of the Budget, reflects four AAP lunar orbital missions starting in 1969 and ending in 1975, and five AAP lunar surface missions starting in 1970 and ending in 1975. This is very close to our own inhouse planning for lunar exploration flights. ✓

NOTES 6-13-66 WILLIAMS

B 6/17

9/8 6/13

1. Lunar Planning Exercise: Dr. Costes (RPL), Dave Paul (ASO - MIMOSA Study COR), and I had a good meeting with Ed Gray and Phil Culbertson (Gray's lunar study man) at Lockheed last Monday. We reviewed the MIMOSA (Mission Modes Systems Analysis for Lunar Exploration) work, and Ed basically agreed to our proposal to use this work as the nucleus of the Lunar Planning Exercise. Ernst Stuhlinger, Bill Stoney (MSC), Culbertson and I will have a meeting today, June 13, 1966, to come up with a proposal on how to handle the effort in total.

2. Planetary Planning Exercise (JAG - Joint Action Group): The fourth meeting of the JAG was held in Washington, Thursday, June 9, 1966, and I feel that MSFC made a fine showing. The following are some of the items decided for the baseline system for further study and definition:

a. The 180K-lb spacecraft weight will be used. This is about what MSFC's numbers show to be required.

b. The MSFC recommended Earth-launched vehicle (Saturn V with elongated S-IC stage tanks and 4 x 120" solid motor strap-ons) and orbit-launched vehicle were selected as presented for the flyby missions. The orbit-launched vehicle consisted of 2 x modified S-IVB stage for the 1975 window-chemical, and the Nerva 2 - nuclear module for 1977 and 1979. At this time, our recommendation is a further uprated Saturn V (improved J-2 engines in the S-II stage) for the 1982 and later landing missions, and this was also accepted.

c. The 1975 missions would involve a complete set of hardware for a Venus attempt about June 1975, and a second complete set for a Mars attempt in September 1975. MSFC and MSC were asked to recommend a pair of missions (two separate) for 1977 and 1979. We have a meeting with MSC here today to resolve this question.

We hope to have a more complete cut at the total planetary mission plan including cost, etc. in about three weeks. We have a meeting with JPL (Pickering and some of the Voyager people) on Wednesday. Ed Gray, Frank Dixon from Ed's shop, Bill Stoney and Jim Carter will attend. The purpose is to get JPL on-board in our planetary planning activity, particularly in the probe and science area.

3. Status of ASO FY 66 Funds:

Planned	Available	Initiated	Obligated
\$11.292M	\$9.052M	\$8.152M	\$2.765M

The difference of approximately \$2.7 between planned and available will probably be carried over to 1967 due to some \$ joggling in Headquarters. Most of the availability \$ or approval to initiate has been very late in reaching MSFC and the proposal/procurement leadtime are the reasons the obligations are low. This is not the Purchasing Office's fault; they are doing a good job for us.

June 20, 1966

OFFICE OF DIRECTOR - MSFC

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

REMARKS

*Hausman, Ad, (in some suitable
Wernher: say) to convince him that action is
being taken and his NOTES get attention*

You may recall - about six months ago you asked me to do something about the deadwood at MSFC. As I remember, Walter was one of the most outspoken at that particular meeting, saying if we could fire the people who were not working we would have plenty of personnel spaces, or words to that effect. We can't say that we're adopting a performance rating system just to get rid of deadwood. Our plan, hopefully, will do more than that:

- a. Identify our non-producing and ineffective personnel at all levels, (probably 10% will be involved).
- b. Identify our top people at all levels and promote them at a faster rate (probably 20% will be involved).
- c. Somehow rate the in-between 70% in such a way that promotions and advancement can be made at the right frequency to the right people.

To do this, we have to develop a system.

CODE	NAME	DATE
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SENSITIVE

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7-13
7.7.13*

*6/20/66
NOTES file*

OFFICE OF DIRECTOR - MSFC

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REMARKS

2.

We set it up on a phased basis.

1. We researched every system we could find, including the systems used to rate military personnel.

2. We made a trial run using a few organizations within MSFC - 400 people were rated. In the process the system was radically changed.

3. The next step is a complete dress rehearsal, rating all personnel. The results will not go into the official records - but it's the only way we can get the system anywhere near a workable one.

4. The last step is, of course, to rate everyone officially from the best to the worst.

For example, we have learned that a single system approach will not work. We are going to have to have several applications - perhaps as follows:

(1) Excepted positions, P. L. 313,

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REMARKS

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GS 16's and some GS 15's (i. e. key center personnel). This will probably be a narrative rating.

(2) Even the people covered by (1) may be rated differently - one to the other, tailored to the individual, so to speak. For example, you would no doubt use factors to rate Gorman that would not apply to Weidner at all.

(3) Less flexibility will be needed for the next tier.

(4) At some point, perhaps for the direct workers, we will have to standardize.

(5) We will have to get acceptance from employees.

In light of the above comments, let me attempt to answer Walter's points in order:

(a) No argument. An announcement is being revised. I rejected an earlier version.

(b) No argument. We need a better system than the one we have now, which is no system

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REMARKS

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at all.

(c)

(1) I am well aware that it is complicated and time consuming. Even George Washington became discouraged, but he finally came up with a system which, conceptually, is still used today as a means of rating officers in the military.

(2) and (3) Agree - we must expect lengthy discussions and changes.

(4) Negative - Walter is not properly informed.

(5) Do not agree - Our examination of other agencies and industry tells us this is not so. This comment by Walter seems to contradict (b).

(6) The community and society in general must rate a "man" off the job, assuming his conduct does not interfere or reflect on his job.

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REMARKS

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(d) The answer to this is relatively simple. We do not have the system yet and will not until we get inputs from all levels and general acceptance, particularly from supervisors, across the board.

(e) PREP is complete except for the final decisions regarding down-grading. PREP cannot do this.

Response to Walter's recommendations:

- a. That is the way it's being handled.
- b. This has been done.
- c. The full dress rehearsal will take longer.
- d. Agree, only after full dress rehearsal.

In my opinion there is an overriding reason for making haste slowly. Regardless of the immediate objective of identifying the free loaders and the really good guys, we are about five to ten years behind industry and certain other government agencies in the development of a performance

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REMARKS

appraisal system. Industry has found that they can't keep the people they need without such a system. ✓ For large companies such as GE, Boeing, and not so large - such as TRW, it is an important part of company planning and employee motivation, particularly with respect to professional personnel in both technical and administrative work.

The final reason for moving ahead, but with caution, is that Headquarters is coming out soon with a new system approach. I want to have a head start on something to help us at MSFC.


 Harry

CODE DEP-A	NAME H. H Gorman	DATE 7-11-66
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B-7/1

6/20/66

1. GE LIGHT FOR LH₂ EXPERIMENT: (*Reference discussion in SA-203 Review and Item 4 of my notes of 6/13 reprinted below). Last week, GE engineers participated in the application and failure analysis review of the GE 300 watt lights. Tentative conclusions were: (a) lamp housing assembly and purge system are satisfactory, and (b) lamps may be improved through better assembly techniques at the factory. GE is now assembling 15 new lamps of improved quality. ASTR representative will pick these up at GE - Cleveland 6/22 and they will be shipped to KSC 6/23 following laboratory test to verify improved characteristics. Working arrangement with KSC allows change out after prelaunch checkout 6/25 or 6/26. ✓

*From 6/13/66 Notes

4. GE LIGHT FOR LH₂ EXPERIMENT: We have contacted the manufacturer, General Electric, and emphasized the importance of the 300 watt, 30 volt GE quartzline lights for the LH₂ program. Our enthusiasm for trying to find the cause of the failures has come to the attention of Mr. Jack S. Parker, Vice President of General Electric Aerospace Division. Mr. Parker may call you about this problem. ✓

2. EMPLOYEE APPRAISAL PROGRAM: A number of orientation sessions for various supervisory levels have been conducted in Astrionics by Personnel Office representatives. In addition a representative gave a presentation on the subject in our 6/13 staff meeting. Impressions and conclusions include: (a) No official announcement has been received concerning the requirement to change appraisal systems. (b) The present automated system is inadequate; an objective, more meaningful system is needed (c) The new system has some merits but also some serious shortcomings, such as: (1) It is a complicated time-consuming procedure. (2) Lengthy discussions on the procedures and rating points can be expected. (3) Too fine a point spread to adequately evaluate differences in employees. (4) In spite of the initial exercise being described as a trial run it is to be used for merit promotions, etc. (5) Unfavorable effect on morale can be expected. (6) No provisions for evaluating an employee who is a good worker but a trouble maker outside his duty hours. (d) It is understood that considerable time and effort went into the formulation of the new system and it is intended to conduct a pilot exercise initially to test the system. Why then must the entire center be involved at this time and why must it be accomplished by 7/1. (e) Time spent by Personnel Office could have been better spent on completing PREP. I recommend that: (a) the new system be considered strictly as a proposed change, (b) a trial run be conducted on a limited basis with a few Center elements involved, (c) a reasonable period of time be allowed to complete the trial run (4 to 6 months), and (d) announcements and publicity program be initiated to acquaint all employees with the new system after successful trial run.

Harry Forman

Any comments you may want to make?

B-7/7



NOTES 6/20/66 BALCH

JB 6/20

B 6/27

S-II Test Stand A-2 Refurbishment and GSE Modification - Detailed schedules covering all refurbishment work and the modification of the GSE from the S-II-T to the S-II-1 configuration are complete. All work is proceeding satisfactorily, with expected completion dates in support of S-II-1 stage arrival at MTF in late July or early August. ✓

Test Plan and Detailed Operating Procedures for S-II-1 Stage - End Item Test Plan for the S-II-1 stage has been reviewed by NASA/MTF and action taken to obtain and incorporate in the test plan the requirement of appropriate elements of MSFC. List of detailed operating procedures is being obtained for selection of those which will require NASA/MTF review and approval. ✓

Technical Systems, Phase II - On S-IC technical systems installation, second shift has been discontinued because of slippage in scheduled access dates. ✓

Labor Relations - Negotiations have been successfully completed between the IAM and the H. R. Morgan Company, one of the five GE subcontractors for whose employees the IAM is the bargaining agent. This leaves only the negotiations with the J. N. Travirca Company still to be completed. ✓

Five?

Electricians of the Ace Electric Company walked off the job on 6/15/66 in protest of a work assignment made by Malan-Koppers to pipefitters. The work involved equipment having both pneumatic and electrical components, and the electricians contended that the work crew should have included both electricians and pipefitters. The electricians returned to work the following morning, 6/16/66, on the condition the International Representatives of their union and of the pipefitters' union would meet to resolve the issue and that installation of the kind of equipment involved in the dispute would be discontinued in the meantime. Meeting between the International Representatives of the two unions is set for Tuesday, 6/21/66. ✓

Visit of U. S. Senators and Congressmen to MTF - Plans are complete for visit to MTF today of Senators Eastland and Stennis and Congressman Colmer of Mississippi and Senator Sparkman and Congressman Buchanan of Alabama. ✓

NOTES 6/20/66 BELEW

AAPQ 6/20

B 6/27

Still his view! ATM: OSSA's Jesse Mitchell was briefed June 17 on status of MSFC's ATM Study. The objective was to convey greater confidence in the LEM fixed-mount approach and to display the emphasis MSFC is putting into working out the questions related to this approach. Mitchell's reaction was: The gimbal mount is still OSSA's primary approach and they will continue to try to get approval for the PAD which has been held up in Dr. Seamans' office. However, he recognized some of the longer range advantages of the fixed-mount approach (for larger telescopes) and also indicated greater confidence in this concept for use with the ATM as a result of the work MSFC is now doing. ✓

SSESM: The three SSESM study contractors presented their study proposals at MSC on June 17. All MSFC SEB members, led by Mr. Dave Newby, were present. The following is the optimistic target schedule of events leading to a SSESM hardware contract:

- June 17, 1966 - Study proposals received
- June 27, 1966 - Begin negotiations with contractors
- July 1, 1966 - Complete negotiations
- July 5, 1966 - Present SEB results to Dr. Gilruth
- July 13, 1966 - Present SEB results to Dr. Mueller
- July 15, 1966 - Present SEB results to Mr. Webb
- July 18, 1966 - Sign a contract ✓

9/13/66

H-1 ENGINE The planned test program for H-1 engine requalification was completed June 16, 1966, accumulating 2766 seconds in 38 starts. This time is composed of: a. Acceptance Tests - 4 for 285 seconds; b. Calibration & Vibration - 12 for 1870 seconds; c. Safety Limits - 22 for 621 seconds.

Three problems arose during testing. They are: a. Cracked Turbine Exhaust Duct - Two cracks were discovered in the liner at the point where the bellows joins, and one crack in the weld that joins the two shells of the duct. The duct was replaced after ten tests (1560 seconds). There appears to be a fit-up problem on the duct. Analysis indicates that no remedial action is necessary on delivered hardware if total test time does not exceed 1000 seconds. b. The main fuel valve was replaced after 13 tests (1680 seconds) because of lip seal leakage. Both the original seal and a replacement seal leaked prior to replacing the valve. Laboratory analysis of the valve is in progress. c. Heat Exchanger - A pressure drop-off test revealed slight coil leakage which resulted from chaffing between the coil and support bracket. This unit completed the engine Qual test program without serious degradation. The chaffing was noted on earlier R&D units but not to the extent of leakage within Qual life. A design fix is in progress. We are time limiting the component to 1000 seconds.

The completion of engine requalification testing is an incentive milestone and maximum fee reward could have been attained if the Qual testing had been completed by June 15, 1966.

G-1 ENGINE As previously reported, the several design changes made to the prototype injector appear to have solved the problem of unstable operation. However, recent altitude ignition tests with the modified injector resulted in a detonation in the oxidizer injector manifold that damaged the injector. Indications are that the fuel-lead incorporated in the modified injector is the cause of the problem. This is the first test of an injector with a fuel-lead. Subsequent testing with simultaneous or oxidizer lead injection were free of these detonations. RMD has not previously experienced this problem on injectors with oxidizer-lead. MSC and Marquardt have experienced this problem several times on the S/M RCS engine, which has a fuel-lead. The exact nature of the combustion process resulting in the detonations is not yet known.

J-2 ENGINE The initial "Air-on" operation was accomplished (evacuation to 1.7 PSIA) at the J-4 cell at AEDC this week. The initial LH₂ will be delivered next week for storage and transfer system checkout.

North American Aviation, Inc. has signed the combined J-2 Contract NAS8-19 conditioned upon the removal of certain wording relative to the Vehicle Schedule Delay Clause. The wording in question was put into the contract, after negotiation, based upon the recommendations of the legal office which is of the opinion that it adds favorably to the contract from the Government point of view.

The fourth 230K engine for S-II 504 and the 230K for the S-IVB 504 were delivered this week.

The ASI LOX line with shot-peened weld areas was installed June 15 on S-IVB 203 at KSC.

An interlocking relay system has been installed in the fuel turbopump component facility to guarantee a fuel rich cutoff in case of an electrical power failure. This change will preclude an incident such as the destruction of the 230K pump reported in my notes of 6-6-66.

NOTES 6/20/66 CONSTAN

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Negative Report

NOTES 6/20/66 FELLOWS

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1. Automated Budget Process: This office, assisted by the Computation Laboratory, has developed a more fully automated budget preparation budget. It is conservatively estimated that a net annual savings of \$10,000 will result from this improvement by reducing laboratory manpower required for budget preparation. ✓

2. Discriminate Attrition: Upon receipt of Mr. Gorman's memorandum, June 7, 1966, subject: Discriminate Attrition, R-OM contacted all the offices and laboratories of R&D Operations and made arrangements for submission of personnel actions to apply against the 150 spaces authorized R&D Operations. These actions will be delivered to R-OM Wednesday of this week and will be processed on an expedited basis with Keith Wible's office. ✓

6/20

1. S-II-1 CHECKOUT: The S-II-1 checkout at Seal Beach is unofficially 8 to 10 days behind schedule. The new shipping date has been established as approximately July 13, 1966. Nineteen of 36 tests required have been performed, but due to very slow test data evaluation, only three tests have been accepted by NASA. Efforts are being made by resident Laboratory personnel to speed up this evaluation cycle. Manual mechanical checkout is essentially complete and TDY support personnel have returned to MSFC. The buildup of E. O.'s and rework required to be accomplished prior to stage shipment to MTF is a continuing problem that is under constant surveillance.
2. S-IU-501 CHECKOUT: Checkout of IU-501 is progressing satisfactorily. All G&C hardware scheduled for IU-501 use in manufacturing checkout is available at IBM. Some of the hardware is nonflight.
3. S-IVB-206 CHECKOUT: A successful postmanufacturing checkout has been completed on the S-IVB-206 stage at Huntington Beach. As previously reported, this stage entered checkout in very good condition; therefore, it is not expected that postmanufacturing modification will invalidate any of the tests which were conducted. The turnover exercise is presently scheduled for June 24 with subsequent shipment to Sacramento scheduled for July 1, 1966.

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F-1

Test FW-033 was postponed until June 20, 1966, due to a series of tests on the S-II-T fuel tank vent and relief valve. ✓

S-1C

The S-1C-2 stage was removed from the test stand on June 16, 1966, and transported to R-ME for refurbishment. The on-stand time was 30 days establishing a minimum time record for stage acceptance testing. ✓

S-11 (MSFC)

A series of tests were conducted Friday, June 17, 1966, on a "Leonard" LH₂ tank vent valve. This was the vent valve which was installed on S-II-T at the time the LH₂ tank ruptured at MTF. Eleven separate tests were conducted with the valve installed on the lox tank of the F-1 Single Engine Test Stand. These tests were designed to verify the operation of the valve, such as relief cracking pressure, over-ride boost open and relief characteristics with back pressure applied to the main poppet. The back pressure was secured by closing a blocking valve downstream of the vent valve which caused the pressure between the two valves to build up from leakage through the main poppet of the vent valve. ✓

Conclusions:

1. The valve functioned normally during all phases of the tests with the blocking valve open.
2. When the blocking valve was closed, with the tank pressurized, the pressure between the two valves increased due to the valve leakage until it equaled the tank pressure at approximately 15 seconds. During further pressurization at a flowrate equal to the tank pressure increase determined from the S-II-T test, this pressure increased at the same rate as the tank pressure and the vent valve never left the closed position. ✓

NOTES 6-20-66 HOELZER

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Q18 6/20

NEGATIVE REPORT

NOTES 6/20/66 JAMES

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AS-203: Because of the rework resulting from the S-IVB-203 fuel pressurization line failure, KSC has re-evaluated the remaining work to launch and have developed a plan with several alternatives for launching either on June 29, June 30, or July 1. The plan to launch on June 29 would require that the launch vehicle stay in a certain configuration after completion of the CDDT (ordnance items installed, etc.). This plan has not been completely evaluated. The other alternatives would be to proceed with the launch preparation and countdown in an effort to reach a hold point at about T minus 12 hours late on the 29th of June (no cryogenics aboard). Currently there is a range conflict for June 30 because of the launch of IMP. Should this launch be scrubbed late, it would then be possible to continue the count and launch on the 30th. Otherwise, the hold would be sustained at this point for an additional 24 hours and we would launch on July 1. ✓

All of the rework on the S-IVB stage was completed over the weekend. The OAT Plugs-out was run successfully on Sunday. The Flight Readiness Test is scheduled for Thursday and the CDDT is expected to start Saturday. ✓

I will go from the Management Council to KSC for the FRR (Wednesday) and plan to stay the remainder of the week. ✓

IU-203 LVDC: I mentioned last week in my notes the possibility of having to changeout a memory module in the LVDC because of a materiels problem with the multi-layer boards. This module was changed out early this week with no impact involved. ✓

TV SYSTEM LIGHTS: You will recall some discussion in the Preflight Review concerning failures with the G. E. TV system lights in the S-IVB stage. We have been in contact with management personnel of the Lamp Division of G. E. on this problem and their people have been working with Mr. Barr of Astrionics. Failed lamps were returned to G. E. for failure analysis. We are currently negotiating a time with KSC as late as possible in the launch preparation to install fresh "bulbs." ✓

6/20/66
KJ1. West Coast Visit:

a. Last week DAC had arranged a review at Huntington Beach of a 180° rear skirt S-IVB mock-up where the normal cable harnesses were replaced by flat cables. This mock-up showed, in a striking manner, the main advantages of flat cables in the clean and simple installation concept and in weight and volume saving aspects. A short discussion with main participants (Dr. Rees, Dr. Haeussermann, Mr. Angele, and Dr. Hill from DAC) on possibilities of introduction of flat cables into the main program and some of the minor open problems followed the presentation. ✓

b. I also visited with Dr. Rees the explosive forming facility of NAA at El Toro where some new developments in forming techniques over male dies and in compacting heavy metals from powder were very interesting. A development for possible application of explosive forming for DC-9 wing panels by NAA is also underway at this facility. ✓

c. A shortage control method, recently introduced by DAC for the S-IVB, which uses big control boards showing the organizational elements responsible for imminent delays in bright colors was reviewed. This method is interesting because of the psychological method for stimulating action and also because DAC is considering the use of this method for their present airplane production program. ✓

2. Support of IU Tests for 203: The electronic controller which controls the water/methanol flow valve and which had failed in the environmental tests at Huntington Beach was handcarried with other spare parts to L.A. and installed on the IU-500 F.S. Also, an H₂O accumulator has been modified for P&VE and then provided with insulation because of some concern about possible H₂O system freeze-up during flight. This unit was shipped to DAC last Thursday. ✓

B6/27

1. AS-203 FLIGHT - Flight controllers for the 203 flight have begun deploying to remote sites preparatory to the launch. P&VE has provided people from a very critical area of our Propulsion Division for this purpose. These personnel have been away from their jobs for 3 months for training purposes at MSC. ✓

2. S-IVB CALIPS SWITCHES - P&VE is reviewing the minimum accuracy requirements for these switches again. The DAC cost quote for modification of GSE to obtain the presently desired accuracies is approximately \$2 million. We believe this is excessive and should be more like 100K. S-IC and S-II GSE has been modified as required. ✓

3. AUGMENTED SPARK IGNITER ON J-2 ENGINE - A redesigned ASI line has been approved, and all engines with old lines will be retrofitted. This is the line which caused cut-off on the second attempted long duration test and resulting fire burned cables, etc. ✓

4. PROJECT THERMO - Seven industry proposals have been received in answer to our RFP for Project Thermo and are being evaluated. A plant survey and technical negotiations with the two leading contenders are scheduled to begin next week, and we had hoped to get a contract prior to July 1, 1966 to use on FY-66 money. In the meantime, the FY-66 funds were cancelled and returned to IO-IB in exchange for FY-67 money. Hopefully, this will delay our contract by only a few days and will not reduce our total available FY-66 and FY-67 funds. ✓

5. SATURN IB/V - Human factors program reviews were conducted by personnel from our Vehicle Systems Division at NAA, S&ID, and Boeing. Apparently, human factors programs are being curtailed by each contractor. The efforts of all three contractors in human factors coverage need to be assured in order to reduce incidence of human error and assure ease of operability and maintainability. ✓

6. S-IVB - Plume impingement from the #72 Ullage engines of S-IVB causes significant heating of the J-2 engine coincident with restart. The impact of these increased temperatures on engine restartability and the ground test program is being assessed. ✓

7. S-IC-SII INTERSTAGE - The environmental control system for the electronic boxes located within the S-II, S-IC interstage require changes from the current design. Changes in equipment thermal limits and an expected 40°F colder environment are factors causing the change. Simple fixes for 501 to avoid schedule impact appear possible. Permanent fix for 502 and subsequent is being investigated and should be established within 4 weeks. ✓

8. S-IC-2 ACCEPTANCE - The B engines that were out of specification thrust-wise (2 low, 1 high) will be reorificed. The high thrust engine, after reorificing, will be hot-fired on the F-1 engine test stand. This can be accomplished without a detrimental effect on schedule as it had been decided previously to pull this engine from the stage for insulation fit-up. ✓

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INTEGRATION OF NASA/DOD ACTIVITIES - We are informed that Chet Holifield, Chairman, Military Operations Sub-Committee, House of Representatives in a letter to Dr. Seamans urges NASA and DOD to support better integration in five specific areas regarding the space program. These areas are:

1. Integration of the MOL and Saturn Apollo Applications effort.
2. Standardization of instrumentation on satellite system.
3. Mutual use and single management of supply functions.
4. Review of cost sharing policies and cost reimbursement methods.
5. Standardization of instrumentation on tracking vessels.

These items were among the recommendations of the Holifield Committee in its study of Missile and Space Ground Operations dated March 21, 1966. The one significant change is item #1 above which suggests that MOL and AAP be "integrated."

How? B

CONTROLLED USE OF ATTRITION OF MSFC NON-TECHNICAL MANPOWER - Marshall is proceeding with the implementation of the MSFC manpower policy, announced June 7, 1966. This policy will provide spaces for imposed manpower cuts and for required additional technical skills through the attrition of non-technical positions. Non-technical positions frozen under this policy amount to approximately one-half of Marshall's total strength, and affects major organizational elements as follows:

- IO - approximately one-fourth
- R&DO - approximately one-half and
- Staff - approximately three-fourths

✓

NOTES 6-20-66 RICHARD

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NEGATIVE REPORT

NOTES 6/20/66 RUDOLPH

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1. S-IC Stage - Back-up source (Aerojet) for CALIPS type pressure switches has proven unsuccessful. Contract from Boeing to Aerojet has been closed. A second back-up with Consolidated Controls Corp is promising. Southwest Industries remains as the primary source. ✓

S-IC-2 - Transferred to ME Lab from Test Lab on Thursday, 16 June 66, eleven days ahead of schedule. ✓

S-IC-5 - Replacement of collapsed upper fuel dome has been completed and stage is back on schedule. Additional safety procedures and warning devices have been installed to prevent recurrence. ✓

2. S-II Ullage Motors - Due to critical problem in ullage motor development, a decision was made to implement a back-up development through S&ID. S&ID will be directed to engage Thiokol to load existing hardware with a flight proven propellant and demonstrate an acceptable motor system by January 67. Details will be presented as special topic in the Management Council Meeting on Tuesday, 21 June 66. ✓

S-II CPIX Contract negotiations - started on Tuesday, 14 June 66, with emphasis placed initially on terms, conditions and documentation. Anticipated that cost negotiations will commence on Wednesday, 22 June 66. ✓

S-II-F - MSFC expects to obtain S-II-F Stage from KSC on 12 September 66 to 31 January 67 (entire vehicle tests). 19 July 67 and on (vehicle tests without S-IC). ✓

3. Flight Stage S-IVB-501 - Turnover meeting has been tentatively established for Thursday, 21 July 66. ✓

4. SA-500F - KSC expects to make-up lost time due to Hurricane Alma by Saturday, 13 August 66. ✓

B 6/27

6/20 9B

1. LIEF READINESS REVIEW: A review of the LIEF status for AS-203 was presented to Gen. O'Connor on June 16. Modifications based on the AS-201 experience are on schedule and LIEF will be ready for AS-203 launch. ✓
2. DEPARTURE OF OVERSEAS FLIGHT CONTROLLERS: MSFC Flight Controllers assigned to overseas remote sites for the AS-203 mission have departed for their duty stations in Australia, Mexico, and Bermuda. All of the AS-203 flight controllers should be on site by June 19. ✓
3. AS-203 SUPPORT REQUIREMENTS MEETING: A meeting to review the AS-203 Support Requirements was held at KSC on June 14. The meeting was chaired by Rod Middleton, the AS-203 Mission Director. In general, support commitments and ready status for meeting MSFC requirements look good. Continuing efforts are underway to resolve remaining loose-end data items. ✓
4. AIMP LAUNCH SCHEDULE: The Anchored Interplanetary Monitoring Platform (lunar orbit) is to be launched on a Thor-Delta vehicle on one of four consecutive days starting June 30 with 3 min launch window each day. This has resulted in rescheduling AS-203 for 6/29. In case of a 203 launch slip it will take a minimum of one day after AIMP launch before we can phase over the required GSFC computer facilities. ✓
5. OPERATIONS SCHEDULE COORDINATION CENTER: An all-day meeting, chaired by Chet Lee (MO) was held on 6/13 at OMSF to discuss the present procedures and interfaces of scheduling Apollo prelaunch tests, launch operations, ground networks and mission control. KSC is proposing a single point of scheduling authority to the Eastern Test Range (ETR) while GSFC is insisting on a second independent communication channel to DOD and ETR. Both sides gave convincing reasons for their respective viewpoints. OTDA appeared to be strongly opposed to KSC's proposal. Operations scheduling is actually conducted primarily by three groups, the MSC Flight Operations Scheduling Office; the GSFC Network Control Group; and the KSC NASA Requirements Branch. Coordination between these groups does not appear to be complete. MSF was unable to make a decision at this time. It was felt that much of the disagreement would disappear if and when KSC and GSFC can finally come to some resolution on their respective ground network responsibilities. ✓
6. LIEF CIRCUIT SHARING: The first wide-band circuit sharing operation of our LIEF datalink to KSC was completed with the recent launch of OGO.* GSFC expressed satisfaction with the operation and we expect to continue the program with future OGO and Atmospheric Explorer (AE) satellites. ✓
7. RECOVERY OF SPACE OBJECTS: Two space objects have been found that could have come from SA-5. One object appears to be the command destruct antenna and the other a suction line. Headquarters will bring these objects to MSFC next week. We have requested the proper Lab people to aid in establishing positive identification of the parts. ✓

*Orbiting Geophysical Observatory.

1. PEGASUS: The three satellites have recorded 887 penetrations through the 0.04 mm panels ($0.16/m^2$ -day), 56 penetrations through the 0.2 mm panels ($0.016/m^2$ -day), and 273 penetrations through the 0.4 mm panels ($0.004/m^2$ -day). Pegasus I has shown some irregularities in one wing recently which have led to a temporary halt in data analysis. 6/20
RB
6/27
2. OSSA PROSPECTUS: In studying the OSSA Prospectus we were greatly surprised to find that it showed no funding for lunar surface exploration beyond Apollo. This omission probably is a result of OSSA's desire for MSF to bear the cost burden for the lunar science program beyond Apollo. ✓
3. CULBERTSON VISIT: Phil Culbertson, OMSF, visited MSFC on 6/13 together with Bill Stoney (MSC) to discuss our work for the Joint Action Group (first presentation around Aug. 1). In essence, ASO and RPL will jointly prepare material for a lunar surface exploration program; manned lunar orbiter programs will be essentially in MSC's hands. We will also work out a preliminary program for planetary exploration.
4. VISIT BY RAMSEY AND MAYALL: Drs. Ramsey and Mayall visited part of our Laboratory (Bldg 4331) and showed considerable interest in what we are doing, in particular the highly specialized optical equipment, the solid state physics experiments, and the gamma ray shielding work. Special interest was expressed in lunar surface applications of our research. ✓
5. VISIT AT OAK RIDGE: Upon invitation by Dr. A. Weinberg, I attended a symposium at ORNL on the status of controlled thermonuclear fusion experiments, and superconductivity experiments. Most of the thermonuclear experiments concern the problem of plasma stability. The status can be summarized as follows: within a few years, it should be known whether or not plasma stability of sufficient duration is principally possible; several years later, the experimental techniques for a laboratory experiment will be achieved, provided that stability is principally possible; years later, a technologically useful system could be accomplished. Experiments which show the existence of a fusion reaction during an extremely short time have been made at Los Alamos. These fusion reactions, however, are too short to prove or disprove the possibility of achieving a stable plasma over a sufficiently long time to make the reaction technically useful. ✓

In a private discussion, Dr. Weinberg expressed gravest concern about the failure of NASA to address itself sufficiently to the impending need of space-electric power supplies in the multikilowatt range, and to initiate or even continue proper development programs. Dr. Weinberg offered to come to Huntsville and talk to you about his concern, and about possible courses of action to implement a proper development program.

6. LABORATORY ACCIDENT: On June 15, a large Dewar vessel imploded in a RPL laboratory room in Bldg 4331 shortly after the vessel had been taken out of a container and placed on the work bench. Two persons received minor injuries from flying glass splinters. Safety officers inspected the scene immediately after the accident. Obviously, this must be classified as a "freak" accident; members of Oak Ridge National Laboratory, who have been working for many years with similar equipment and with whom I talked the next day, had never heard of an implosion accident of this kind. As a first measure, I directed that everyone working in RPL laboratories with cryogenic experiment must wear safety glasses. ✓

→ Ernst Before we invite him, we should make sure that we can really help in the present budget environment. Let's discuss this first. Please arrange thru Bonnie. B (See attached space Daily, June 27 66)

NOTES 6-20-66 WILLIAMS

6/20/66

B 0127

NEGATIVE REPORT.

NOTES 6/27/66 BALCH

B 6/30

^{NS 6/27}
S-II Test Stand A-2 Refurbishment and GSE Modification - All work is still proceeding satisfactorily, with some portions ahead of schedule. All structural siding has been replaced leaving only the sealing around the penetrations through the siding. All special tests on parts removed from the S-II-T stage have been completed, and reports are being submitted. ✓

S-II Test Stand A-1 - The GSE installation contractor is now in full swing in the TCC and test stand service core. ✓

S-IC Test Stand - The Corps of Engineers, with the assistance of NASA Quality Assurance personnel, has been in the process of aligning the S-IC actuators and hold-down arms preparatory to installation. ✓

Technical Systems, Phase III - In the Components Service Facility, the installation phase has started, but the number of craftsmen is being kept to a minimum until material is moved from the warehouse at Gulfport to the job site. Efforts are being made to expedite delivery of several overdue items to avoid any possibility of slippage in completion dates. ✓

Labor Relations - The IAM and the J. N. Travirca Company made considerable progress in negotiations which terminated late Friday, 6/24/66, but agreement could not be reached on several issues, the most important of which was rates of pay. All items on which agreement could not be reached were submitted to the Industrial Subcommittee of the President's Missile Sites Labor Commission. ✓

The international representatives of the electricians' and pipefitters' unions failed to resolve the jurisdictional dispute over installation of control panels having both pneumatic and electrical components. On 6/22/66, Malan-Koppers again started installing these control panels with a crew consisting entirely of pipefitters, and all electricians on site left their jobs. The problem was referred to the International Offices of the two unions, and on the morning of 6/23/66. the electricians returned to work in response to directive from the International Office of their union. ✓

Senator Eastland visited MTF on 6/20/66 accompanied by the various officers of the Tri-State Postmasters Association and the Mayor of Biloxi. ✓

→ Should not be an unprecedented problem!

B

NOTES 6/27/66 BELEW

AAP 6/27/66

B
6/30

PAYLOAD INTEGRATION CONTRACTS: Negotiations were conducted on June 23 and 24 with Lockheed and Martin, respectively. Agreements were reached with both contractors. Final contracts are being prepared and will be ready for Marshall management review this week. ✓ Contract should be in effect no later than July 10. ✓

AS-209 REVIEW: According to information received at the June 23 SAA Mission Planning Task Force Meeting at NASA Headquarters, the Headquarters SAA Project Office is considering calling an AS-209 project/mission review with the MSF centers in the near future (2 to 3 weeks). ✓

SAA Mission Planning: Disher/Taylor, Bob Thompson (MSC AAP Deputy) and MSFC personnel met last week on the overall implications of the present AAP baseline mission assignments and what planning and studies are required over the next several months prior to issuance of a firm flight directive for the first several missions. ✓

Mr. Thompson's comments on the total AAP program were along the line that MSC personnel have discussed over the last month, i.e. continued emphasis on any AAP elements except long duration flight. It appears MSC will push for a hard mainline program leading to the one year flight duration with other elements of AAP dovetailed into this effort as resources permit. Disher reiterated that AAP missions must be consistent with Agency goals which had nearly equal emphasis on experiments as compared to long duration flight. ✓

NS 6/27

C-1 ENGINE A meeting was held at MSC with RMD, MSFC, and MSC personnel to discuss the history of explosive reactions in the oxidizer injector which have occurred in the Marquardt SM/LEM engine and the C-1 engine. Plans for testing at both MSC and RMD of a C-1 system to verify the factors which influence this phenomenon are being finalized. Tests will begin next week. ✓

Eberhard
So they
did find
the
cause!
B

J-2 ENGINE The Electrical Control Assembly on AS-203 was replaced over the weekend when engine cutoff kept occurring during Flight Readiness checkout. The replaced ECA gave essentially the same results during checkout. Further trouble-shooting uncovered a faulty "summing" network in the stage telemetry system. Preliminary checkout of the removed ECA indicated no discrepancies.

The J-2 Engine Program Contract NAS8-19 (combined R&D and Production) is ready for final review and contracting officer signature, after which it will be forwarded to NASA Headquarters for final approval.

The initial LH₂ shipment was delivered and transferred into the Dewars at AEDC this week without incident. ✓

H-1 ENGINE Eight small dents were observed on the thrust chamber of engine H-7073 (Position No. 3 of S-IB-6) on June 22, prior to the static test scheduled that day. Welders were flown in to repair the thrust chamber the same night and stage static test was conducted the next day.

The dents were located about 12 inches forward of the return manifold on the inside of the thrust chamber. Cause of the damage has not been identified. Post-firing inspection indicates satisfactory repair.

Preliminary data indicate all engines operated satisfactorily on this first stage static test with 205K engines. ✓

F-1 ENGINE F-1 Production engine 038 was delivered to MSFC on June 5, 1966, replacing a July delivery engine allocated for ground testing. The engine originally scheduled for S-IC-5, was rescheduled for ground test purposes to evaluate a slight bulge on a radial baffle of the main injector which was discovered during acceptance testing at Edwards. The rescheduling was accomplished by mutual agreement between I-E-F and R-TEST. A test program is currently in progress to determine if there are any detrimental effects from the baffle bulges when the engine is operated under simulated vehicle conditions.

The engine with the bulged baffles was submitted to R-QUAL and received a thorough inspection, since it is considered to be an accurate sample of engines being shipped to Michoud for flight stages. With the exception of the baffle, no defects were found. ✓

NOTES 6/27/66 CONSTAN

B 6/30

9/28 6/27

Negative Report.

9/8 6/27

1. Cost Reduction Speech by the President: President Johnson is scheduled, in July, to make a White House television speech regarding cost reduction. MSFC has been invited by Mr. Webb to submit five cost reduction examples for his review in selecting an example for use by the President in his July speech. (Other centers may also submit examples.) Of the 66 cost reduction submissions this year by R&D Operations (totaling \$11,298,000), three items are expected to be recommended to Mr. Webb. ✓

a. Astrionics Laboratory - Flow soldering vs. hand soldering. ASTR recommended that the Brown Engineering Company revise its proposal to eliminate hand soldering and use flow soldering techniques for mounting electronic components. The contractor reduced his proposal by \$588,900. ✓

b. Astrionics Laboratory - Numerically controlled (tape) milling machine application. Flight simulation computer cams had been hand measured and marked for sawing and hand filing. By computerizing the engineering data and making a tape for use with a tape-controlled mill, errors were significantly reduced, and an annual saving realized of \$77,700.

c. Manufacturing Engineering Laboratory - Welding machine warm-up time reduction. The installation in the welding machine of a warming device saves three hours in warm-up time and reduces repair by preventing moisture accumulation. (\$1,100 annual saving)

In support of these three items, Management Services Office is providing art work, and Public Affairs Office is writing narratives. ✓

2. Computation Laboratory Support Requirement: On June 23, as Chairman of the Source Evaluation Board, I presented the Board's findings to Mr. Webb. He selected Computer Sciences Corporation (CSC) of El Segundo, California to provide support services for Computation Laboratory, effective July 1. The Continuity of Service Clause in the General Electric contract requires a phase-over period of up to 60 days. The only unsuccessful bidder for the Computation Laboratory support contract requesting a debriefing is the Wolf Research and Development Corporation of West Concord, Massachusetts. That debriefing is now planned for July 12. ✓

3. Research Projects Laboratory Addition: Bid opening on June 21 produced a favorable bid (\$220K vs. \$235K government estimate), and funds were made available for this project on June 23. It is planned that a contract will be awarded and FY-66 funds obligated to provide this long-needed improvement in Research Projects Laboratory. ✓

B 6/30

WS 6/27

1. Reusable Aerospace Passenger Transportation System (RAPT): In response to your question, raised at the June 13 Scramjet Technology Status presentation, concerning RAPT study funding, the following funding data, obtained from ASO, is furnished:

	FY 65	FY 66	FY 67	FY 68
Requested	?	\$300,000	\$250,000	\$500,000
Approved	yes	no	no	no
Obligated	\$378,100*	-	-	-

*Incremental systems study: \$327,100; VTO vs. HTO study: \$51,000

For FY-67, the RAPT study's objective will be to define options of a design and development plan of a RAPT system for progressive improvement of utility and effectiveness of earth to orbit shuttle transportation of personnel and cargo. On the basis of prior systems and development planning studies, the effort will include the following: (1) synthesize additional design concepts not considered in the previous incremental systems study; (2) put these systems in perspective with respect to previous incremental systems approaches and update systems selection; (3) establish design of the selected system in sufficient detail to provide subsystems planning data and requirements for supporting R&D work; and (4) up-date development plan and refine with respect to interfaces between incremental development steps.

EF.
Still hope to get the 250K, since we obviously get nothing in FY 66
B

2. Fifth U.S. National Congress of Applied Mechanics: A paper entitled "Nonlinear Dynamics of an Artificial Gravity Orbiting System," co-authored by Dr. McDonough and Mr. Worley of our Dynamics and Flight Mechanics Division, was presented at the Fifth U.S. National Congress of Applied Mechanics, at Minneapolis, Minnesota, during the week of June 13, 1966. This paper presented the dynamical aspects of providing an artificial gravity environment in an orbiting spent stage by use of a cable attached counterweight. This is part of a much more comprehensive in-house study which cannot be publicized externally because of the sensitive nature of our spent stage program.

NOTES 6-27-66 GRAU

9/15 6/27

B 6/30

Nothing of significance to report this week.

B 6/30

- 9/26/27
1. S-II EQUIPMENT CONTAINER VIBRATION TEST PROGRAM: The 223 container (containing destruct system packages and distributors) has not passed the vibration environment tests. Further tests have been postponed pending engineering assessment and decision on a "fix." Conclusion at this time is that the internal base plate has a resonance frequency which coincides with the sensitive frequency of the safing and arming (S&A) device. According to the environmental specification, S&A device critical resonance frequency is between 320 - 650 cps. If the base plate resonance frequency is reduced the EBW firing unit may fail since its critical resonance is between 40 - 200 cps. A decision is to be made in an S&ID engineering meeting 6/27 on the problem. MSFC participants in the meeting include representatives of the Resident Manager's Office (RMO) and specialists from ASTR and P&VE. NAA requires the "fix" to be on S-II-I and checked out prior to shipment from S&ID 7/13. P&VE is continuing the evaluation of S-II-T vibration data as a parallel effort to confirm S&ID engineering and qualification test data. ✓
 2. THE S-II PROPELLANT UTILIZATION (PU) COMPUTER VIBRATION TEST PROGRAM: The PU computer is having difficulties in meeting the acoustic portion of the qualification test. Vibration of the servoassembly induced by acoustic noise is causing potentiometer wiper chatter with resultant valve slewing. Efforts are being made to damp the vibration with layers of damping material. A retest is planned and results will be reported as soon as available. ✓
 3. STATUS OF 500FS TESTS: Test #3 was carried out last week with minimum heat input from infrared radiation. All I.U. equipment performed satisfactorily. ✓ Approximately one hour after the start of the translunar phase, most of the in-flight temperature measurements went out of scale and were considerably below the expected limits; however, we do not believe that we reached the operational temperature limits on any of our electronic equipment. Part of the test will be repeated after adjustment of the measuring ranges. ✓
 4. AZIMUTH ALIGNMENT TEST AT PAD 39A: Interim tests of the alignment system have been completed. The tests were conducted on a noninterference basis with the 500F vehicle; all theodolite loops were successfully closed from the alignment control station, temporarily located in the mobile launcher. ✓

F-1

JTB 6/27

Tests FW-033 through FW-036 were conducted on the West Area F-1 Test Stand with F-1 engine S/N F-5038. Primary test objective was to evaluate a qualification configuration engine. Test durations (mainstage) were 161 seconds, 161 seconds, 165 seconds, and 160 seconds, respectively, with cutoff by the facility panel operator on FW-033 and FW-034, the fuel depletion cutoff circuit on FW-035, and the lox depletion cutoff circuit on FW-036. Total engine mainstage time to date is 896 seconds (seven starts) with no abnormal performance or damage. ✓

S-1C

An official request was forwarded to Mr. Urlaub on June 23, 1966, to bring the S-1C-T stage to the test stand for further testing in support of the S-1C program. ✓

S-1B-6

Test SA-36 had to be postponed from Wednesday, June 22, 1966, because several dents were detected in tubes inside of the thrust chamber on Engine Position No. 3. Dents were repaired and Test SA-36 was performed on Thursday, June 23, 1966, at 4:40 p.m. for a duration of 35 seconds as scheduled. A record review held on June 24, 1966, indicated normal performance of all systems. The long duration test is scheduled for June 29, 1966. ✓

S-1VB (SACTO)

S-1VB-502 is undergoing pre-static checkout. ✓

B 6/20

JFS 6/27

1. SELECTION OF MISSION SUPPORT CONTRACTOR FOR COMPUTATION LABORATORY: Computer Sciences Corporation (CSC) has been selected to replace the General Electric Company (GE) as the Single Support Contractor for Computation Laboratory, effective July 1, 1966. The current contract with GE, expiring June 30, 1966, contains a 60-day phase-out provision. CSC and GE will negotiate this week regarding the man-hours, services, schedules, etc. that each company will provide during this phase-in/phase-out period. The CSC contract is for a level of effort build-up to approximately 475 people; first year cost for the CSC contract is estimated at \$5,378,000 plus an award fee ranging from 1.45% to 8.93%. The CSC contract will contain provisions for four one-year renewal options; negotiated cost for the second year of operation, for a continuous level of effort of 475 people, is \$5,980,000 plus the fee range stated above. ✓

2. THIRD GENERATION COMPUTER PROCUREMENT: The presentation of negotiation results to the Administrator, NASA, was held as scheduled on June 23, 1966. On June 24, 1966, the Administrator announced the award of the Third Generation Computer Contract to Univac, Division of Sperry Rand Corporation. The estimated purchase cost of the entire system is valued at \$26 million. Initial delivery, according to the phasing schedules, is for ten months following contract execution date with two phases to follow. All phases are scheduled for completion eleven months following Phase One. A very favorable contract to the Government was negotiated with Univac and consists of several major improvements over the standard GSA contract instrument. ✓

3. GSA-NASA ADP COMPUTER SHARING EXCHANGE: On June 17, 1966, NASA/MSFC signed an Interagency Agreement with the General Services Administration establishing MSFC as the ADP Sharing Exchange Center for Alabama, Mississippi, and Slidell, Louisiana. This Exchange Center will operate under the provisions of Public Law 89-306 (the Brooks Bill) in supporting Government agencies in the stated area. It will provide an exchange for ADP support for services upon request by other Government agencies and will assist in developing maximum use of all Government funded computers in the area. None of the activities will be permitted, in any way, to jeopardize the mission of the MSFC. Mr. Foster F. Oliver, Computation Laboratory, has been appointed manager for this ADP Sharing Exchange Center. ✓

NOTES 6/27/66 JAMES

B 6/30

6/27 JES

SA-203: During Overall (Plugs-out) Test and in subsequent testing at KSC, an unexplained S-IVB cutoff signal occurred. Although the exact cause was not determined at the time, the J-2 engine electrical control assembly (ECA) was the suspect. Rocketdyne shipped a new ECA to KSC and it was installed over the weekend. Cutoff signals repeated after the installation of the new ECA. The problem in this case was isolated to instrumentation and corrected. The Flight Readiness Test is in progress. The S-IVB cutoff problem will be followed closely. Current schedule is to run the Countdown Demonstration Test (CDDT) Wednesday and Thursday and to pick up the count Monday for a Tuesday, July 5, launch. ✓

70" LOX TANK QUALIFICATION STATUS: The continuing investigation which was initiated by the failure of the 70" LOX tank at 134% of maximum load condition when tested by Chrysler to the 212 loads, has led to a decision by the P&VE Laboratory that recent wind tunnel and flight data will allow a reduction of the present design loads for the S-IB Stage. This reduction means the tank is qualified to the 140% safety factor of the new loads. Mr. Lowrey, CCSD, stated in the June 16 meeting with you, and elsewhere, that the adoption of this position will reduce contract expenditures by some \$500,000.00. P&VE is being requested to update the loads criteria included in the CEI Part I for the S-IB Stage. ✓

OAT PLUGS-IN #2: (Reference your comment on my notes of June 13, copy attached.) "Minus time" and "plus time" was used to identify those portions of the Overall Test which occur before and after T-0. T-0 is liftoff in an actual launch sequence and simulated liftoff for these pre-launch tests. For your information, we have been requested by MSF to change the T-0 to correspond to ignition rather than lift off. This is being coordinated internally and with KSC and MSC. ✓

9/26/27

B 6/20

Common Bulkhead Back-up Program: About three years ago the feasibility of manufacture of common bulkheads in the S-II configuration appeared very doubtful to our laboratory and also to P&VE structural design engineers. Later, S&ID found a solution to the fit-up problem to achieve a good bonding by measuring the actual shape of the welded face sheet in an inflated condition and sculpturing the fiberglass honeycomb core accordingly. However, before this solution was found and developed, three different manufacturing concepts, based partially on modified joint designs of the gore segments, had been conceived at MSFC and development contracts as a back-up effort were started. The manufacturing concept of the first back-up is the "Strip Seal" design carried out by DAC using existing S-IV tooling. Here, the upper face sheet would not be bonded in one piece, but in gore segments to the honeycomb core which is already bonded to the lower face sheet. The gaps between these upper face gore segments would then be sealed by bonded strips. Use of this concept has resulted in an excellent bulkhead which will undergo final testing soon. The second back-up concept, also done by DAC, called for subassembled gore segments where lower and upper gore segments were bonded together with a honeycomb core in between. The subassembled gore segments were then welded together into a bulkhead by simultaneously welding of both face sheets. This concept has not produced a quality bulkhead and will not be further pursued. The third concept, carried out by Boeing-Seattle, has also been very successful and is based on a female bonding tool instead of a male form, the advantage being that both face sheets are being stretched into the form and not bonded under compression. No special fit-up or machining was required for this bonding operation. The net result of these back-up common bulkhead technology development contracts is that we have now two alternate manufacturing techniques which could be applied to different configurations, sizes, and materials in future programs. ✓

B
6/27

1. S-IVB AUXILIARY MOTOR PUMP - The Druger -505 version of the gas shaft seal failed in testing at BECO test labs after only 90 minutes of endurance testing. This is the same motor-pump that originally failed with the Borg Warner -503 seal several weeks ago and was reworked by Vickers, Inc. in Detroit. The -505 is the latest configuration that DAC has incorporated in this trouble-plagued component for flight use on 207 and subs and 501 and subs. ✓
2. S-IU-203 - The earlier reported potential problem on the IU due to the oscillating shock environment with the double angle nose cone has been resolved. The structural supports are sufficient. Although a higher vibration level is predicted, failure of critical components is not expected. ✓
3. TRACTOR-CRAWLER BEARING PROBLEM - Latest information received on the overheating of a bearing during roll-out of SA-500-F indicates this to be a direct result of under tolerance. KSC personnel believe that they can correct the overheating problem by tolerance corrections. ✓
4. MSC POSITIVE EXPULSION BLADDERS FOR WATER - MSC has asked for assistance in obtaining expulsion bladders for water. Existing silicone rubber bladders are permeable. We will try to assist them. ✓
5. EXPERIMENT/VEHICLE COMPATIBILITY - Our Vehicle Systems Division is making experiment/vehicle compatibility determinations for all experiments proposed, beginning with the 17 MSFC experiments for the Workshop. The work will consist of: (a) Vehicle/carrier integration (physical packaging, support equipment, installation, etc.) (b) Astronaut Task Analysis (determination of Astronaut requirements - what he does, how he does it, when he does it, etc.). This activity will be closely coordinated with MSC's Crew Systems Division with which we have excellent working relations. ✓✓
6. SSESM - The mission duration of the S-IVB Workshop with our MSFC simplified design is limited to approximately 20 days to the storage of cryogenics in existing hardware containers. Our in-house superinsulation program has progressed enough that we believe we can develop a larger tank with appropriate superinsulation to enable us to supply 30 and 45 day missions. Although the development time for 209 is too short, hardware could possibly be available for 211. ✓
7. S-IVB WORKSHOP - SSESM - S&ID recommended to MSC recently storage of fuel cell reactants in Sector I of the SM and internal interfaces with the fuel cells. This eliminates the requirement for external cryogenic umbilicals. Also proposed is the use of ECS in the CSM for atmosphere conditioning (CO₂ removal, etc.). Initial pressurization of Workshop requires storage of GOX on SSESM. This approach, if selected for AS-209, is well suited to a simplified SSESM as is under development at MSFC. Our design is readily adaptable to this concept for a nominal 30-day mission. The NAA proposal would make an extended CSM available earlier for AAP and would enhance the possibility of SSESM development at MSFC. ✓

NOTES 6/27/66 MAUS

B 6/30

9/27/67

1. VISIT OF DEANS - Twenty-five key officials from twenty-four of the nation's leading universities visited MSFC on June 21 to review NASA management concepts. Mr. Webb personally accompanied the group at MSC on June 20, but due to other commitments was unable to stay with the group at MSFC on June 21 and KSC on June 22. ✓

Of especial interest to the group were the GE Control Room, where the visitors could actually see control systems at work in a shirt-sleeve environment, and the tour of QUAL and TEST, where they enjoyed seeing and touching the hardware in the program. ✓

B 6/30

NOTES 6/27/66 RICHARD

RS 6/27

Turnover of GLV-11 from Martin-Baltimore to KSC: A delegation of R&DO personnel attended the turnover session of GLV-11 (Gemini Launch Vehicle) from the Martin-Baltimore plant to KSC last week. Representatives of Quality Laboratory, Operations Management Office, and this office attended. The turnover session provided a thorough review of the test history and documentation of the vehicle. Some of the more significant characteristics of the review were: (1) a review of all of the test data by the VAT (Vehicle Acceptance Team), (2) a review and close-out of all test discrepancies prior to shipment, (3) a visual inspection of the total vehicle, and (4) a validation of configuration management procedures by comparing onboard components to documentation. ✓

S-II Spacer: We are still investigating the feasibility of providing a spacer in the AS-501 stack in the VAB to be used to allow stage check-out of the S-IC, S-IVB, and IU until S-II-1 arrives at the Cape. One cable is all that is needed in the electrical area. In the mechanical area, P&VE is looking at the S-II simulator for possible use. The Cape estimated that this interim configuration could be used a maximum of six weeks. However, checkout of S-II-1 would still determine the final schedule. The scheme would allow more time to work with the system and allow for problems not now scheduled in the Cape operation. The factor of six weeks makes this a more attractive proposal than it once was. ✓

NOTES 6/27/66 RUDOLPH

B6/30

QTD 6/27

1. S-IC-11 thru S-IC-15 - The Boeing cost proposal has been received and evaluated. A pre-negotiation position presentation to General O'Connor and MSFC Management is scheduled for Tuesday, 28 June 66. ✓

(Rescheduling probably necessary, because of Cost Reduction Meetings by MSFC and with General Phillips and Dr. Mueller on Tuesday, 28 June 66.) ✓

2. S-II-1 and S-II-2 - As a result of the S-II-T incident and the subsequent confidence development testing program approved by Headquarters on Friday, 17 June 66, the following schedule revisions were made:

- o October 29, 1966 - S-II-1 on dock KSC. ✓
- o December 31, 1966 - S-II-2 on dock KSC.

Provided ... B

3. S-IVB Incentive Contract Status - S-IVB Incentive Contract, SA-800 was approved by NASA Headquarters on Wednesday, 22 June 66. ✓

NOTES 6/27/66 SPEER

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9/3 6/27

1. AS-203 FLIGHT READINESS REVIEW: I gave a LIEF readiness report during part II (Mission Operations) of this review. Part II resulted in the following agreements and actions: KSC will hold the countdown for weather reasons no longer than $\frac{1}{2}$ hour; the MSC cryogenic experiment measurements may not cause a hold; Gen. Phillips will establish policy on public release of experiment video tapes; he will also rule on Azusa tracking being mandatory for launch (see following item). ✓

2. AZUSA TRACKING ON AS-203: One of our original Launch Mission Rules had made Azusa-Glotrac high precision tracking mandatory for launch. This requirement was based on our needs for R&D guidance evaluation, potential malfunction analysis, and range safety. This requirement was questioned during the Flight Readiness Review and Gen. Phillips took action to resolve the problem. Subsequently, Dr. Rees reviewed this item again and it was decided to revise our requirement to "highly desirable" (hold only, no scrub). Main considerations were the critical immediate launch schedule, the fact that guidance evaluation can be performed on other missions, and the time-critical aspects of the LH₂ Experiment for the Saturn V program. ✓

3. BRIEFING OF AS-203 SUPPORT ENGINEERS: The support engineers who will be in the Huntsville Operations Support Center (HOSC) for the AS-203 launch and flight were briefed on June 24. The attendance of the briefing was very good. ✓

4. LOX VAPOR INTERFERENCE WITH AZIMUTH LAYING: The LOX vapors which are vented from the Saturn IB/V stages during launch countdown, cause fog which, under certain conditions, interferes with the ST-124 azimuth laying. We have requested KSC to provide meteorological and camera data during the last 3 hr of countdown for further study of this potential problem. This will be effective on AS-203. ✓

NOTES 6-27-66 Stuhlinger

B 6/30

9/27 6/27

1. PEGASUS: No substantial changes. ✓
2. LUNAR EXPLORATION: We had a very productive and pleasant two-day meeting with Dick Wilmarth (OSSA) and Don Beattie (OMSF) on lunar exploration tasks, and we expect to be in a close and efficient working relationship as soon as Drs. Mueller and Newell have sanctioned MSFC's active role in the OSSA program. Both Wilmarth and Beattie were pleased to see that RPL is deeply engaged in experimental laboratory work closely related to lunar and planetary physics. ✓
3. SENIOR RESEARCH COUNCIL: I found the meeting in Warrenton extremely interesting and valuable. In a number of personal talks (Newell, Cortright, Nicks, Mitchell, Waugh, Smith, Jack Clark), I gained the impression that OSSA is very willing and even eager to have MSFC play a significant role in the OSSA program, provided only that we can hold on to our commitments once we have accepted them. ✓ The remaining factor of uncertainty is not MSFC, but OMSF top management's directives to MSFC. ✓

During lunch on the first day, I had a short talk with Abe Silverstein on electric propulsion. As usual, he was violently against it, on the ground of non-technical arguments ("nobody wants more payload; chemical stages can do everything much better"). His negative attitude becomes more and more that of a "lone dissenter". His own people at LeRC, JPL, OART, GSFC, and slowly also OSSA, are paying increasing attention to the capabilities of solar-powered, electrically-propelled probes for various applications in the early and mid-seventies. ✓

NOTES 6-27-66 WILLIAMS

4/27 Q/S

B 6/30

1. Planetary Joint Action Group (JAG): The Planetary JAG will meet at KSC June 29 - 30, 1966 to finalize the baseline system and plan, as well as firm-up a schedule for the completion of the exercise. Tentatively, we will present the data resulting from this group to Dr. Mueller and the Center Directors in late July (~ July 26, 1966). ✓

2. Lunar JAG: The second meeting of the Lunar JAG will meet at KSC on July 1, 1966. The lunar work is tied closely to the Planetary JAG and will result in a similar type document/plan which will be compatible. ✓