FILM SCRIPT

for

SATURN I/IB QUARTERLY FILM REPORT

No. 15

(Covering January, February, March, 1963)

(Unclassified)

FILM	NARRATION
NASA seal:	Three heavy space vehicles are being developed by the National Aeronautics and Space Administration...
Match dissolve to Planet Saturn, with word "Saturn" superimposed across it:	...Under the project name "Saturn".
At left of screen, pop on outline of Saturn I, with words "Saturn I" beneath it.	The first configuration, known as Saturn I, consists of...
S-1 stage of outline becomes red, and words "S-I" pop on to left of it.	...a booster called S-1, with eight H-1 engines...
S-IV stage of outline becomes red, and words "S-IV" pop on to left of it.	...plus an S-IV stage, the instrument unit and payload.

FILM	NARRATION
Pop on outline of S-IB at right of screen, with words "Saturn IB" beneath it.	A second configuration, Saturn IB...,
S-1 Stage of outline becomes red, and words "S-1" pop onto right of it.	...consists of a S-1-B first stage...,
S-IVB stage of outline becomes red, and words "S-IVB" pop on to right of it.	...plus an S-IVB upper stage, an instrument unit and Apollo Space craft.
Pop on words "Quarterly Report No. 15" beneath drawing of Planet Saturn	This film report, No. 15, will cover progress on the Saturn I and IB during the period January through March 1963.

FILM	NARRATION
MCU of man seated at desk reading a copy of the "Marshall Star"--followed by ECU showing printed words "Saturns Get New Names: I, IB, and V"	Slight changes in the names of Saturn vehicles were announced by NASA during this quarter in the interest of simplification. New designations for the Saturn C-1, C-1B and C-V are now Saturn I, IB, and V, respectively.
Loading booster aboard the "Promise"; barge leaving dock; water scene en route.	The fourth Saturn I flight vehicle, SA-4, was shipped from Marshall Space Flight Center aboard the Saturn barge "Promise" on January 20th, bound for Cape Canaveral. En route, the barge encountered heavy seas in the Gulf and tied up briefly at Fort Pierce, Florida.
Barge arriving at Cape (stock)	It arrived at the Cape on February 2nd,...

FILM	NARRATION
Saturn vehicle fully erected on pad (stock)	...and was erected on the launch pad the following day.
SA-4 on pad just before launch	Highlighting this report period, on March 28th, was the successful launching--from Complex 34 at Cape Canaveral--of the fourth Saturn I launch vehicle, SA-4.
Interior of blockhouse during final countdown. (Stock footage)	Several minor technical difficulties during the countdown, mostly in ground support equipment, delayed the firing about 1 1/2 hours.

FILM	NARRATION
Lift-off and flight	(SOUND EFFECTS: VERY BRIEFLY, FULL SOUND OF SATURN FIRING: THEN, LOWER SOUND EFFECTS AND VOICE OVER--) While the SA-4 flight, shown in slow motion, was similar in many respects to that of earlier Saturns, there were several significant departures. At 100 seconds following liftoff, engine number 5 was deliberately cut off, but the vehicle held on course while the propellant distribution system channeled the remaining fuel into the other seven engines, extending burning time two seconds to compensate for loss of thrust. Several other changes in the vehicle will contribute to the development of the Block II version of Saturn. Some components of future Saturns were attached to the inert second stage. Control accelerometers were used actively for the first time.

FILM

ARRATION

Flown as a passenger was the engineering model of the ST-124 stabilized platform, which will be used actively beginning with the sixth Saturn, a Mistram system transponder was also flown on a passenger basis, a "Q-Ball" angle-of-attack device was mounted in the nose cone and several sections of new heat shield insulation at the tail section were tested. SA-4 reached maximum altitude of 81 miles, range of 232 statute miles, and peak velocity of 3847 miles per hour.

FILM	NARRATION
Static firing of SA-5	Meanwhile, at Marshall, three static firings of the booster for the fifth Saturn flight vehicle, SA-5, were conducted. The first, for 32 seconds, was successful. The second firing was conducted for a period of 143 seconds. However, propulsion system deficiencies appeared in data analysis and corrective action was taken. On March 27th, a third firing of 144 seconds was successfully performed. Results indicated that the deficiencies had been corrected.
Engineer footage showing instrumentation units	More than 1,000 measurements of propellant flow rates, temperatures, vibration levels and other data were recorded during the firing.

FILM	NARRATION
Static firing of SA-5	The SA-5 booster, first in the Block II series, is the initial flight booster to be static fired at full thrust of 1.5 million pounds.
LS of SA-D-5 in dynamic test stand	Dynamics Testing of the complete Block II vehicle, SA-D5, began at Marshall in January and was completed early in March.
MS of dynamic testing of SA-D5 showing booster action, cable, shake test.	Next quarter, dynamics tests will begin using Saturn I upper stage and boilerplate Apollo.
CU of cable showing shake test.	As the Saturn hangs on giant cables and coil springs, it is put through paces which simulate flight conditions.
MS of electro magnetic shake device	As the vehicle bends rhythmically, or vibrates, driven by a large electrical device,...

FILM	NARRATION
Show stress measuring devices and analog computer.	...stress measurements are taken at vital points all over the vehicle. Results of testing are fed into an analog-digital computer, which changes data into digital numbers on magnetic tape. The tape is then run through another computer which prints the results for immediate study.
Show removal of booster from Dynamics Test Tower	Following first phase testing, the booster was removed from the Test Stand and will be shipped to the Cape in April for use in Launch Complex 37B checkout. Complete vehicle testing will be resumed in June.

FILM	NARRATION
Overall shot of instrument unit mounted between the S-IV interstage and the spacecraft adapter	At Marshall's Propulsion and Vehicle Engineering Division, an SA-5-type instrument unit was mounted, for structural testing, between a Douglas-built forward interstage and a spacecraft adapter, simulating flight hardware.
Shot of inner loading arrangements. MCU of strain gauges and deflection indicators	Flight loads, incorporating adequate safety factors, are applied to assure proper structural performance in actual flight. These flight loads consist of aerodynamic, inertial, and internal pressure loads.
MCU of data processing system equipment	Stresses produced in this structure are measured at several hundred points and recorded for analysis. A duplicate of this instrument unit will be flown on SA-5.

FILM	NARRATION
Choose best scenes from sequence on testing of combination support and hold-down arms	Testing the new combination support and hold-down arms for Block II launch pedestals began at Marshall this quarter. The first set was delivered to Complex 37B in January. Testing of a second set was suspended when cracks were discovered on the upper part of five arm castings. Recheck of the set at Complex 37B, and a third set of arms under fabrication, showed no defects.
LS of interior of barge with SA-5 mock-up in place. (0789)	The SA-5 booster mock-up was shipped, by barge, on January 25th from the Marshall Center to its Michoud Operations at New Orleans.

FILM	NARRATION
Overall view of SA-5 mockup. (aft section) (use stock footage).	There the mock-up will be used by engineers in design verification and to and to familiarize assembly personnel with the Block II configuration.
Show pre-static checkout of SA-6 booster at Quality Division	The booster for the sixth Saturn I flight vehicle, SA-6, was completed this quarter at Marshall's Manufacturing Engineering Division. Several vendor-supplied parts, not available during assembly, are being installed during checkout, which is to be completed in early April.
SA-7 booster assembly (all tanks in place) (use stock footage)	Assembly of the booster for the seventh Saturn flight vehicle, SA-7--begun on January 7th--proceeded this quarter, with clustering of tanks completed, and installation of engines underway.

FILM	NARRATION
Fabrication of SA-9 booster (use stock footage to include shots of booster tail section and interstage adapter)	Meanwhile, fabrication of the booster thrust structure and interstage adapter for SA-9, the ninth Saturn flight vehicle, is complete.
Artist's drawing of SA-9 in flight, fading to a close-up showing satellite housed in service module	For SA-9 and SA-8 a two-ton meteoroid detection satellite is being developed by Fairchild Stratos Corporation, Hagerstown, Maryland.
	During launch the satellite will be housed in the service module. Flight experiment results will provide a better understanding of meteoroid hazards encountered in space flight.

FILM	NARRATION
SA-9 in flight with scene of ejection of boiler plate Apollo- extending the wings of meteoroid satellite. (Shade sections of wings to depict various thick-nesses and coating of mylar and vapor deposited aluminum)	After injection, and separation of the boiler plate spacecraft, the satellite remains attached to the S-IV stage and deploys two large flat wings, 10 feet wide with a total wing span of 96 feet, by a system of scissor-like links driven by an electric motor. The wings will be covered with sheets of aluminum of varying thicknesses up to sixteen one-thousandths of an inch. The back surface of the sheet is covered with a thin layer of mylar and its back surface coated with a thin layer of vapor-deposited aluminum. An electric potential is established between the outer skin and the inner aluminum coating, charging the entire unit making it a huge capacitor.

FILM	NARRATION
Artist's conception of close-up of metal section showing meteoroid striking surface--followed by vaporization of material	Each time the wings are penetrated by a meteoroid, the material removed by impact vaporizes and forms a conducting gas which discharges the capacitor. The pulse is stored in a memory circuit and transmitted to a ground station on command. Solar panels supply needed energy for power.
S-1-8 Tail Section Assembly---Scenes from Roll # 860	At Marshall's Michoud Operations, S-I-8 tail section assembly was completed this quarter. Assembly operations will begin in May.
S-I-10 barrel assembly--Scenes 4, 5, and 6 (Chrysler OM 810)	Meanwhile, S-I-10 barrel assembly has been completed and the outriggers and remainder of the tail structure are being assembled.

FILM	NARRATION
Mason-Rust Film Input "Roof Repairs" OM 8 Scenes 16 through 18	The Mason-Rust Company, support services contractor for Michoud, continued renovation work on the huge manufacturing plant.
Choose best scenes of modification work on Saturn I (S-1) static test stand.	On February 5th, a decision was made to modify the west side extension of the S-I Static Test Tower, originally designed to test S-I boosters. The extension will be slightly modified to test F-1 engines, enabling testing to take place several months earlier. After completion of Marshall's F-1 test stand, the west side will be re-converted for S-I static testing.
LS of Radio Frequency Test area--w/service tower moving back.	Radiation pattern testing of various Saturn antennae is being carried out at Marshall's Radio Frequency Test Range.

FILM	NARRATION
MS of mobile service tower w/operation-- followed by CU of operator	This service structure rolls on rails, is propelled by an electric motor, and is easily maneuvered by one man. Its purpose is to afford access to the model for positioning, adjusting, or making modificatio.
	The facility is used to measure and record the directional properties of the vehicle's antennae.
LS of antenna & pedestal-- followed by MS of Signal Service van.	The pedestal-mounted model is rotated continuously during the time that a radio frequency signal is being transmitted to a receiver at a fixed location. The varying amplitude of this signal is recorded at a console located in an adjacent building.

FILM	NARRATION
LS of H-1 engine cold gimbal test with operator. Engine gimbal full stroke & frequency response.	At Marshall's Astrionics Division, Saturn booster H-1 engines are being tested on the H-1 Engine Cold Calibration Test Stand--enabling engineers to simulate actual flight conditions of Saturn's S-I stage.
MCU of engine gimbal full stroke & frequency stroke	The hydraulic actuation control system positions the engine to the angle commanded by the vehicle guidance system.
MS of servo valves during gimbal test followed by MCU of same	This positioning is necessary for attitude control in the pitch, yaw and roll planes, stabilization, and to reduce bending of the vehicle.
MS of man at recorders, amplifier frequency response analyser and scope.	Test results will help determine if the flight control circuits and mechanical power converters are adequate to satisfy vehicle requirements for flight.

FILM	NARRATION
Scenes showing shipment and/or arrival of S-IV stage from Douglas to Cape Canaveral	The S-IV Facilities checkout stage was shipped from the Douglas Aircraft Company, Santa Monica, California to Cape Canaveral early this quarter. The stage is ready for use in checkout of facilities at Launch Complex 37B.
(OM-866) Choose best scenes from 23-31, 46-50	On February 1st, the All Systems Vehicle was shipped, by water and overland route, to the Sacramento Test Facility, for propellant loading tests on Test Stand 2B. After initial testing, the vehicle will be removed from the stand and equipped with RL10A3 engines for further testing.
Douglas Input 27 (Used in Rpt. Nr. 14) Scenes 1, 2, 3.	At SACTO, S-IV Battleship testing with with flight-type RL10A3 engines began in January. During this report period, 7 firings were performed, 4 successful and 3 partially successful, for a total of about 2000 seconds.

FILM	NARRATION
	Difficulties were encountered during February with helium heater ignition, engine purging, and small fires resulting from hydrogen leaks. After correction of these deficiencies in March, a series of 3 successful propellant depletion firings of over 460 seconds duration, were performed. Due to these problems, the Battleship firings have been extended through April.
ES, B-6 stand prior to stand checkout.	Checkout of a new test stand, designated B-6, has been completed this quarter at Pratt & Whitney Aircraft's Florida Research and Development Center.
MS, B-6 stand, showing area where turbopump is situated.	The stand is designed to permit both transient and steady-state tests of turbopumps without actually firing the RL10 engine.

FILM	NARRATION
CU, steam stacks LS, B-6 stand during test MS, turbopump area during test	Liquid hydrogen and liquid oxygen can be supplied to the turbopump, and high-pressure gas storage is available to to drive the turbine. Test results are recorded by automatic data equipment.
(OM865)	
MS, test engineer preparing to install accelerometers on engine prior to vibration test, LS revealing two other engineers checking out engine	Vibration tests were performed on the latest version of the RL10A-3 engine. Instrumentation for these tests included forty accelerometers plus load cells at the actuator arms and at gimbal spool.
MCU, of test engineer checking engine; (vehicle hydraulic pump is shown in red)	The tests were conducted with vehicle equipment, including the hydraulic pump, installed on the engine.

FILM	NARRATION
CU, engineer checking engine, CU, engine during vibration test, ES, engine during test, showing base of engine where it is attached to vibration rig	The engine was vibrated in axial and lateral planes to levels appreciably above those encountered in Saturn flights. No structural weakness has been discovered in these tests.
SC. 70	
MS of man in wood shop area checking mockup as it is being constructed	At Douglas, Santa Monica, a full scale S-IVB engineering mockup will be used to verify flight type system compatibility with Ground Support Equipment.
SC 71	
Aft dome is lifted and inverted for thrust structure installation	Both tank domes are now complete and are installed in handling jigs. The forward interstage structure is attached to the forward dome and the aft skirt to to the aft dome.

FILM	NARRATION
SC 74 MC of liquid hydrogen test facility at S. M. as man observes cryogenic test with other engineers.	The testing program for the S-IVB vehicle includes, research, development, qualification, production, and reliability verification testing.
LS, man lifts instrument unit from S-IVB model, shows it to camera, and replaces	The design concept for the Saturn IB instrument unit--which will be located between the S-IVB stage and the Apollo spacecraft--has been established by the Marshall Center, and detailed design work has begun on several components.
CU, man's finger points to "black boxes" around periphery of IU	All equipment will be mounted around the periphery of the unit, which is three feet high and 21 feet 8 inches in diameter.

FILM	NARRATION
CU, man's finger indicates panels through which coolant will flow	Circulation of a coolant through panels to which equipment is mounted will provide temperature control for the instrument unit, as well as for adjacent S-IVB stage equipment.
CU, high-angle view of IU interior	The instrument unit will house the major guidance and control, tracking, and telemetry systems.
CU, IU rotating	The unused volume in the center will allow the legs of the Apollo's Lunar Excursion Module to extend into the unit, thus making the total Saturn IB vehicle shorter.

FILM	NARRATION
(OM-845) Scenes 18-28 (J-2 Input)	At Rocketdyne, contractor for the J-2 engine, for the S-IVB Stage, a relatively new manufacturing technique in metal forming, called electrolytic erosion, is underway for production of J-2 injectors. This concept uses a forming die, made of compressed graphite, which in turn, acts as an electrode. As the erosion process reacts against the metal to be formed, a non-conductive oil removes the eroded material to planned tolerances.
Choose best scenes from film inputs-- (LC 34 & 37)	At Cape Canaveral work on Saturn launch sites in progressing as planned.
	Launch Complex 34's umbilical tower is near completion.
	Meanwhile, overall construction on Launch Complex 37 is on schedule, and Pad B is virtually complete.