Sampson

Film Scripts

FILM SCRIPT

for

SATURN QUARTERLY FILM REPORT NO. 12

(Covering April, May, June, 1962)

Unclassified

FILM	NARRATION
de in	OPENING MUSIC
UNCLASSIFIED Title	
Dissolve	
First Title:	
The GEORGE C. MARSHALL SPACE FLIGHT CENTER Presents	
Second Title:	
SATURN QUARTERLY FILM REPORT NO. 12 (Covering April, May, June, 1962)	
Sequence no. 1: ght shots of SA-2 on pad	At almost midnight on April 24th at Cape Canaveral's Launch Complex 34, the scheduled 10-hour-long countdown began for the launching of the <u>second</u> Saturn flight test vehicle, SA-2.
Sequence no. 2: Countdown activity	All automatic propellant loading and sequencing processes were conducted satisfactorily.
Sequence no. 3: More night shots on SA-2	The countdown proceeded without a single technical hold.

FILM	NARRATION
Sequence no. 4: More blockhouse activity	One 30-minute range hold was called, however, until a ship could clear the range area.
Sequence no. 5: SA-2 on pad just before launch; countdown clock	Shortly after 9 a.m. on April 25th--six months after the spectacularly successful first Saturn flight--the countdown for SA-2 had reached its final seconds.
Sequence no. 6: SA-2 ignition and lift off	(SOUND EFFECTS: FINAL 10 SECONDS OF COUNTDOWN. SA-2 IGNITION AND LIFT OFF. THEN, LOWER SOUND EFFECTS, AND VOICE OVER--)
Sequence no. 7: SA-2 in flight (several views)	Ignition, thrust build-up, and lift-off were normal. Objectives of the SA-2 launch included flight testing of the booster stage and operational testing of associated launch facilities. Structural integrity of the Block I air frame and aerodynamic characteristics were confirmed, and capabilities of the control system demonstrated. The propulsion system performed normally throughout powered flight.

FILM	NARRATION
Sequence no. 8: .ut to shot of men at telemetry consoles in blockhouse during flight	(OMIT PREVIOUS SOUND EFFECTS DURING THIS SCENE.) All electrical networks and instrumentation functioned properly, with very satisfactory telemetry signals received.
Sequence no. 9: SA-2 in flight	(RESUME BACKGROUND SOUND EFFECTS OF VEHICLE IN FLIGHT.) Maximum velocity of over 3,700 miles per hour was attained. The sloshing effects observed during the SA-1 flight was reduced to an acceptable level. Cut-off occurred at 110 seconds for inboard engines and 116 seconds for outboard, as predicted. In virtually every respect, the SA-2 flight was successful.
Sequence no. 10: Animation of SA-2 launch and flight path POP ON figure "65 miles"	SA-2 also carried out a secondary, or "bonus," scientific experiment known as "Project High Water." At an altitude of 65 miles, the vehicle -- whose dummy upper stages carried 23,000 gallons of
Animation of explosion	water as ballast -- was purposely exploded, to investigate the optical, ionospheric, and meteorological effects which water vapor has on the high atmosphere.

FILM	NARRATION
Sequence no. 11: Film of actual water burst	About 15 per cent of the water evaporated, and the remaining 85 tons formed a cloud of very small ice particles along the remainder of the vehicle trajectory.
Sequence no. 12: LS of lab set-up, showing vacuum chamber and control instrumentation (P-496); CU of Vacuum chamber, showing colored water in small test tube	Prior to SA-2's flight, laboratory experiments in connection with "Project High Water" were conducted at Marshall Center's Astrionics Division. Saturn flight conditions are simulated by using a vacuum chamber. To facilitate viewing, coloring is added to the water in the test tube.
equence no. 13: Slow motion -- CU of vacuum chamber, showing hammer striking <u>horizontal</u> tube and water escaping	In this experiment, the tube is suspended in a horizontal position. A solenoid-operated hammer breaks the tip releasing the water. Because of the low pressure, the water evaporates rapidly. Cooling is so fast that ice flakes form immediately. With the tube in this position, water boil-off is slow and sporadic.

FILM	NARRATION
Sequence no. 14:	
Slow motion -- CU of chamber, hammer breaking tip of vertical tube, etc.	In a second experiment, a vial is suspended vertically. The tip is broken, and a boiling reaction occurs. With the vial vertical, water boil-off is constant. In both experiments, pressure is so low that the ice which is formed has an unusually low temperature is very hard and elastic.
Sequence no. 15:	
Static test firing of SA-3 (include shots which show a lot of engine gimbaling) (0450 and 0453)	(SOUND EFFECTS: SATURN BOOSTER STATIC FIRING. THEN, LOWER SOUND EFFECTS, AND VOICE OVER--) Three static test firings of the third Saturn flight vehicle, SA-3, were held at Marshall this quarter, two of 30 seconds duration and the final one running 119 seconds. Defective bearings and mainshafts resulted in excessive turbo-pump vibration in the first test. Defective parts were replaced, and pumps and engines were satisfactorily re-tested before the engines were re-installed. Later firings encountered no difficulty.

FILM	NARRATION
Sequence no. 16: Final assembly of SA-4	Assembly of the booster for the fourth Saturn flight test vehicle, SA-4, was completed on May 28th, and the stage is now undergoing pre-static-test checkout.
Sequence no. 17: SA-5 thrust frame barrel assembly; men working on it	Fabrication of components and sub-assemblies, such as this thrust frame barrel assembly, for the fifth Saturn flight booster, SA-5--first of the Block II series--was carried out this quarter by Marshall's Manufacturing Engineering Division.
Sequence no. 18: New SA-5 spider beam fabrication fixture; then show completed spider beam (0478)	A number of new fabrication fixtures, such as this one for making Saturn spider beam assemblies, have been placed into service for Block II booster fabrication.
Sequence no. 19: Overall view of explosive forming tank and supporting equipment	Looking toward future fabrication techniques for Saturn or other space vehicles, Marshall engineers are investigating exploding bridge-wires in a fluid media as a means of forming and working metals.

FILM	NARRATION
Sequence no. 20: en loading metal stock onto die	In this test, a piece of flat stock aluminum is loaded onto a female die and securely mounted.
Sequence no. 21: Crane lifting die into tank	A crane hoists the die and stock into the forming tank, which is filled with water, and the exploding bridge-wire is properly positioned.
Sequence no. 22: Explosion in tank	(SOUND EFFECTS: INSERT CLAP-STICK SOUND AT APPROPRIATE TIME IN NARRATION--BUT NO SO LOUD AS TO DROWN OUT THE NARRATOR.) The ultra-fast discharge of a large capacitor bank explodes the bridge-wire, creating a high-energy shock wave in the water.
Sequence no. 23: Men removing die from tank; men removing cover to reveal formed metal	This shock wave, along with hydrodynamic pressure pulses, forms the metal into the previously evacuated die. Advantages of forming materials by this method lie in the control of forming and relative ease of operation.

FILM	NARRATION
Sequence no. 24:	
"stablishing shorts of Hayes International (sign) (0489 and 0477) (also, maybe 0494)	Hayes International, Inc. in Birmingham, is fabricating several Block II booster components, including fins, lower shrouds, and engine skirts.
Sequence no. 25:	
Overall view of fins mounted in jig fixture (0477); LS of large fin (0477)	Fin design utilizes the spar, rib, and skin type structure, which provides a high degree of structural reliability. Three basic fin configurations are used. Four large fins will be located at 90-degree intervals around the booster.
Sequence no. 26:	
LS of stub fins; CU of drawings of fins; then back to actual fin (0477)	Two configurations of stub fins will be located at right angles to each other between the large fins. Three of these have provisions for venting liquid hydrogen from the vehicle's second stage. In addition to providing flight stability, these eight fins have vehicle support and hold-down fittings.

FILM	NARRATION
Sequence no. 27: ˉower shroud (0477)	The lower shroud which Hayes makes for Saturn Block II boosters is basically a corrugated skin structure with continuous rings supporting the entire unit.
Sequence no. 28: Establishing shots of Republic Aviation (aerial and ground)	Republic Aviation Corporation, of Long Island, New York, is another prime example of industry at work for Saturn.
Sequence no. 29: Saturn manufacturing (tape-controlled machines, ˬU of tape, tape being loaded, milling machinery, welding, finished parts being carted away. (Film may run a bit longer than narration.)	One of the world's largest banks of numerical control machines--which operate from taped manufacturing instructions--is being put to use by Republic Aviation for fabrication of a large number of various Saturn components.
Sequence no. 30: Lox tank being moved into MSFC shop by rail car (0458 and maybe 0456)	The first of the Saturn Lox and fuel tanks manufactured by Ling-Tempco-Vought, near Dallas, Texas, were delivered to the Marshall Center this quarter.

FILM	NARRATION
Sequence no. 31:	
LS of shipping container; tank being removed from container	During transportation, the tanks are protected from damage by a custom-made shipping container.
Sequence no. 32:	
Men inspecting tank; man using leak probe in checking pressure leaks in tank	Marshall personnel thoroughly inspect each tank prior to acceptance. Tanks are subjected to an air pressure leak test, with freon used as a tracer gas. If leakage exists, an electronic instrument detects the area of escaping gas.
Sequence no. 33:	
Stock footage showing row of several H-1 engines in ME Division	Delivery of the H-1 engines, both inboard and outboard, for the SA-5 booster was accomplished early in April by the contractor, Rocketdyne Division of North American Aviation Company.
Sequence no. 34:	
Man machining inner chamber of model H-1 engine on lathe; welding; drilling; assembly of completed model	Small model rocket engines, such as this 500-pound-thrust H-1 model, are being fabricated by the Marshall Center's Test Division for use in gathering data about their real counterparts.

FILM	NARRATION
Sequence no. 35: Overall exterior view of high-altitude test chamber at Test Div., used for S-1/S-IV interstage separation studies (0454)	One-tenth scale models of the C-1 Saturn's booster and S-IV stage have been tested in a high-altitude chamber to study interstage separation problems.
Sequence no. 36: Interstage separation testing (engineering footage shot from inside chamber) (0454)	(SOUND EFFECTS: MODEL ENGINE STATIC FIRING. VOICE OVER--) Test objectives were to obtain data on pressure versus interstage separation distances, and to determine the effect of a modified conical flow deflector on the hot gas backlash.
Sequence no. 37: Men installing model of Block II booster and model of deflector plate	A 1/20th-scale model of a Block II Saturn booster was tested in conjunction with a model flame deflector of the type intended for use on the launch pedestal of Launch Complex 37, now under construction at Cape Canaveral.

FILM	NARRATION
Sequence no. 38: Static firing of lock II booster model	(SOUND EFFECTS: MODEL SATURN BOOSTER FIRING. THEN, VOICE OVER--) This test program enables engineers to study base region environmental pressures, temperatures, and heating rates, as well as flame deflector effectiveness under hot-firing conditions.
Sequence no. 39: New Block II booster assembly station (0476)	The new Block II Saturn booster assembly station was installed during this report period in Marshall's recently expanded Saturn assembly building, which now contains over 200,000 square feet of floor space.
Sequence no. 40: Men working on SA-5 tooling ring	The tooling ring for the SA-5 booster has been fabricated, and work is scheduled to begin in July on SA-5 booster assembly.
Sequence no. 41: Establishing shots of IBM plant, Owego, N. Y.	Selection of International Business Machines, Inc., Owego, New York, to develop the guidance computor for Saturn C-1 was announced this quarter. For test purposes, the computor will be aboard the SA-5.

FILM	NARRATION
Sequence no. 42:	
wo men examining camera pod; Section of spider beam; camera pod and recovery package being mounted into ejection cylinder; umbilical connection made	Also slated for initial use on SA-5 is a new camera-eject mechanism which will help to provide a photographic record of vehicle actions. Along the spider beam of the SA-5 booster, eight movie camera pods and para-balloon recovery packages will be mounted into ejection cylinders.
Sequence no. 43:	
Sphere pressure	In this laboratory test at the Marshall Center, gaseous nitrogen is used as a pressurant.
Sequence no. 44:	
Ejection of camera pod and recovery package	When sufficient pressure is attained, the firing switch is closed and the camera pod and recovery package are ejected. (SOUND EFFECTS: CLAP-STICK.)

FILM	NARRATION
Sequence no. 45: ɘmoval of SA-D upper stages and booster from dynamic test stand	SA-D, the test vehicle which had provided vital dynamic vibration data contributing to the success of the first two flight vehicles, was removed from Marshall's dynamic test stand this quarter, its mission completed. A new vehicle, SA-D-5, a simulation of SA-5, will be built at Marshall and later installed in the stand for testing.
Sequence no. 46: Removal of old Jupiter test position from MSFC static test stand (if footage available; if not, scene showing stand <u>after</u> removal)	Marshall's <u>static</u> test stand will soon be modified to accomodate <u>two</u> Saturn C-1 boosters simultaneously. The old test position in which Jupiter and Juno II rockets were once tested has already been removed in preparation for creating...
Sequence no. 47: Artist's drawing of modified Saturn static test stand	... a second Saturn booster test position in its place.

FILM	NARRATION
Sequence no. 48: ɔnstruction of new MSFC headquarters (steel framework) (0491)	Several major construction projects are changing the Marshall Center horizon. The nine-story Central Laboratory and Office Building, scheduled for completion next January, will be the Center's tallest building.
Sequence no. 49: New five-story P&VE building	Personnel of the Propulsion and Vehicle Engineering Division are due to begin occupying their new five-story addition in July.
˛equence no. 50: New ME Division building	And Manufacturing Engineering Division has already moved into its recently-finished addition.
Sequence no. 51: ME Division and Chrysler personnel at table (Chrysler people receiving orientation on Saturn) (0483)	At ME Division, a group of Chrysler engineers and technicians are presently receiving orientation on Saturn fabrication and assembly methods, in preparation for Chrysler's future C-1 booster manufacturing at Marshall's Michoud Operations plant near New Orleans.

FILM	NARRATION
Sequence no. 52: Establishing shots of new NASA building at Slidell, La. (0480)	Twenty miles from Michoud, at Slidell, Louisiana, this new two-million-dollar building has been acquired by NASA from the Federal Aviation Agency. The building, which contains 53,000 square feet of floor space, is being occupied by some 500 Chrysler employees, in a move to alleviate a critical office space problem at Michoud.
Sequence no. 53: Artist's drawings of Mississippi Test Facility)479 and 0482)	At the Mississippi Test Facility site, negotiations are now underway with some 200 land-owners in the construction area. The government's schedule calls for outright acquisition of title to the area by July 31st.
Sequence no. 54: Overall aerial view of VLF 37 (PL 62-66731)	Construction of Saturn Launch Complex 37 continued at Cape Canaveral during this report period.
Sequence no. 55: Service tower	Work includes construction of the mobile 3500-ton steel service structure...,

FILM	NARRATION
Sequence no. 56: Umbilical tower and launch pedestal	...268-foot-high umbilical tower and steel launch pedestal...,
Sequence no. 57: Blockhouse	...circular concrete blockhouse...,
Sequence no. 58: Lox and fuel storage facilities, and servicing facilities	...Lox and fuel storage facilities, and servicing facilities.
Sequence no. 59: Overall view of launch comples	Construction of major items is about 60 percent complete, and progressing on schedule.
Sequence no. 60: Artist's drawing of VLF 37 (0460)	When finished, Complex 37 will have two Saturn launch positions, utilizing a single control center and service tower.

FILM	NARRATION
Sequence no. 61: Choose from Scenes , 3, 4, Douglas Input no. 16 (Sacramento Test Stand no. 1)	At Douglas Aircraft Company, contractor for Saturn's S-IV stage, cold flow tests have been successfully completed at the Sacramento test facility, using a single RL-10 liquid-hydrogen, liquid-oxygen engine.
Sequence no. 62: Scenes 18 and 19, Douglas Input no. 21 (RL-10 engine)	Five additional engines were received this quarter from Pratt and Whitney. After acceptance checking at Santa Monica, the engines were shipped to Sacramento and installed in the battleship test vehicle in preparation for the second phase of the battleship test program.
Sequence no. 63: Choose from Scenes 8, 9, 10, Douglas Input no. 21 (Test Stand No. 2)	Modification of Test Stand No. 2, which will be used for the All-systems testing, continues on schedule.
Sequence no. 64: Choose from Scenes 11--16, Douglas Input no. 21 (Modification of Test and no. 21)	The steam system was being installed during this report period, and other necessary hardware is now available for completion of the stand.

FILM | NARRATION

Sequence no. 65:

(NOTE: Footage in this section is from Cornell Aeronautical Laboratory film entitled "Base Heating," plus additional footage of <u>six</u>-engine S-IV model supplied by Cornell.)

Establishing shots of Cornell Aeronautical Laboratory; animation of hand drawing sketch of base heating gases

The Cornell Aeronautical Laboratory, Buffalo, New York, has been conducting a series of tests with an S-IV model in an altitude chamber, looking toward solution of problems which occur when a portion of the engines' hot exhaust gas escapes from the exhaust plume and flows into the base region.

Sequence no. 66:

(NOTE: All the following sequences appear in same order as they do in the Cornell film, "Base Heating.")

During this test, which lasts for only five-thousandths of a second, pressure and temperature measurements are taken on the base plate of the model, using miniature, highly sensitive instruments. Piezo-electric (NOTE TO NARRATOR: PRONOUNCE IT "PIE-<u>EE</u>-ZO") pressure transducers are mounted behind orifices in the base plate at locations where pressure is to be read.

FILM	NARRATION
Continue action	Fragile thermometers consist of a thin film of metallic paint applied to a quartz button. When the surface of the button is heated by the gas, the electrical resistance of the metallic film changes. Then the output voltage signal of the thermometer denotes the instantaneous temperature of the particular location under survey.
Continue action	By observing the time history of this temperature, the local heating rate is determined.
Continue action	Fast-responding instruments such as these permit Cornell Aeronautical Laboratory Scientists to study rocket base heating problems in short-duration experiments.
Continue action	Such tests are better controlled and much more economical to perform than conventional techniques involving continuous operations.

FILM	NARRATION
Continue action	Here is one frame taken from a high-speed Schlieren motion picture film, showing shock waves created by the combusted gases exhausting into the vacuum chamber.
Sequence no. 67: Choose from Scenes 2506-2447, P&W April input (Preparation for firing)	Preliminary Flight Rating endurance testing of the S-IV stage's RL10A-3 engine was successfully completed on June 9th by the engine contractor, Pratt and Whitney, at West Palm Beach, Florida.
Sequence no. 68: Choose from Scenes 2719-2773, P&W April input (static firing)	(SOUND EFFECTS: RL10A-3 ENGINE STATIC FIRING. THEN, LOWER SOUND EFFECTS, AND VOICE OVER--) Twenty-six PFRT firings, totaling 4,096 seconds, were conducted. Initial inspection showed the engine to be in good condtion.
Sequence no. 69: Choose from Scenes 683-698, P&W April input (RL10A-3 engine gimbaling)	A series on non-firing gimbal tests of the RL10A-3, using Douglas Aircraft Company plumbing connections, was also carried out.

FILM	NARRATION
Sequence no. 70: Choose from Scenes 323-328, P&W April input (stress coating engine)	To test engines and hardware for possible structural weakness, a stress coat was applied on metal surfaces to locate areas of structural yield.
Sequence no. 71: Choose from Scenes 699-712, P&W April input (engine gimbaling)	Various gimbal angles and frequencies were applied to the engine to simulate the worst expected flight conditions.
Sequence no. 72: Choose from Scenes 779-788, P&W April input plumbing connections)	Both engine and vehicle plumbing withstood the tests satisfactorily.
Sequence no. 73: Choose from Scenes 1625-2647, P&W April input (Vertical stand and LH2 tank)	In support of the engine program, facilities completed at Pratt and Whitney's Research and Development Center this quarter included a new vertical single engine test stand...and a 90,000-gallon vacuum-jacketed liquid hydrogen spherical storage container.

FILM	NARRATION
Sequence no. 74: Artist's drawing, showing C-1 Saturn alongside Statue of Liberty	As progress continued this quarter on the Saturn C-1, shown alongside the Statue of Liberty in an artist's conception to dramatize its great size...,
Sequence no. 75: PULL BACK To show C-5 Saturn alongside C-1 and Statue	...work was also underway on the even larger Advanced, or C-5, version of Saturn. The C-5 will stand about 350 feet tall, as compared to 170 for C-1.
Sequence no. 76: Model of Saturn C-5	The C-5, shown in model form, will be able to hurl over 200,000 pounds into a 300-mile orbit. The vehicle could use two stages for earth orbit missions and three stages for escape missions. Launching of the first C-5 is expected in 1965.
Sequence no. 77: Latest construction shots at new static test stand site (0490)	At Marshall, construction is proceeding on the static test facility to be used for testing C-5 boosters. The concrete foundation for the massive stand plunges over 45 feet into the earth. Including its crane, the new test structure will be 405 feet tall.

FILM	NARRATION
Sequence no. 78: Boeing sign and entrance at HIC Building; employees entering; interior of building (0494)	Over 1,000 employees of the Boeing Company, contractor for the Saturn C-5 booster, are now at work in the Huntsville area. The company is expected to employ more than 1,500 there during 1962, most of whom will later be transferred to Marshall's Michoud Operations where the giant boosters will be manufactured.
Sequence no. 79: Establishing shots of North American Aviation headquarters nd plant	At North American Aviation's Space and information Systems Division, contractor for the Saturn C-5's S-II, or second stage, work this quarter included...
Sequence no. 80: Scene 5, S-II April input (model engines and flame deflector)	..."hot-flow" tests using scale model engines, with a model flame deflector of comparable scale, to determine optimum engine orientation for the five-engine S-II configuration.

FILM	NARRATION
Sequence no. 81: S-II April input (static firing of model engine)	(SOUND EFFECTS: MODEL ENGINE BEING STATIC FIRED. THEN, LOWER SOUND EFFECTS, AND VOICE OVER--) Secondary objectives of the tests include determination of various deflector parameters, wuch as pressure, temperature, and heat flux profiles, plus investigations of film coolant injection methods.
Sequence no. 82: Scene 7, S-II April input (Model engine and eflector after firing)	The scale model engines produce a total thrust of 5,000 pounds. The deflector is coated with zinc chromate paint, which burns away during firings to reveal areas of probable burn-through.
Sequence no. 83: Scenes 8, 9, 10, S-II April input (model of S-II stage)	Fabrication of an S-II stage and transporter model, designed to verify that the booster transporter will meet all maneuverability requirements, is now complete.

FILM	NARRATION
Sequence no. 84: Choose from cenes 24-32, S-II April input (Road gage survey)	Using a road gage fabricated to the same dimensions as the S-II transporter, a month-long survey has been conducted to determine the feasibility of routes proposed for overland transportation of the stage from Port Hueneme, (NOTE TO NARRATOR: PRONOUNCE IT "WAN--EE--ME") California, to North American's static test facility at Santa Susana, a distance of some 50 miles.
Sequence no. 85: Scenes 12,.13, 14, S-II April input (Making plaster model for lay-up die)	A plaster model has been made to serve as a tooling aid for constructing a female lay-up die, which will be used to form bulkhead gore segments for the S-II mockup. The sweeping frame employed in this operation will later be used to "sweep" the production tooling master.

FILM	NARRATION
Sequence no. 86: Scenes 15, 16, 17, 18, ^-II April input (C-5 antenna radiation pattern model)	Two antenna radiation pattern models of the C-5 Saturn have been completed, and one has been shipped to the Los Angeles Division, where initial testing will be performed until the S&ID antenna range is operational. The program will determine the numbers and types of antennas required for telemetry, command control, and tracking aids, and will establish specific locations and angular orientation of antenna types selected.
Sequence no:87: F-1 engine being installed in static test stand (P-487)	A highly significant advance in the Saturn program occurred this quarter when the mammoth F-1 engine--five of which will be clustered for the C-5 booster--underwent its <u>first full-duration</u> static test at full thrust of 1.5 million pounds. The test was conducted at the NASA High Thrust Area at Edwards, California, by the F-1's developer, Rocketdyne Division of North American Aviation.

FILM	NARRATION
Sequence no. 88:	
..atic firing of F-1 engine	(SOUND EFFECTS: F-1 ENGINE STATIC FIRING. THEN, LOWER SOUND EFFECTS, AND VOICE OVER--)
	The ground test was sustained for 151.8 seconds, approximately flight duration, before being terminated as programmed. It was the lognest test to date by the only single rocket engine known to have been operated above a million pounds of thrust.

END