

File

FILM SCRIPT

for

SATURN I/LB QUARTERLY FILM REPORT

No. 16

(Covering April, May, June, 1963)

(Unclassified)

FILM

NASA seal:

Match dissolve to Planet
Saturn, with work "Saturn"
superimposed across it:

Pop on words
"Quarterly Report No. 16"
beneath drawing of
Planet Saturn

NARRATION

Three heavy space vehicles are being
developed by the National Aeronautics
and Space Administration...

...under the project name "Saturn".

This film report, No. 16, will cover
progress on the Saturn I and IB during
the period April through June 1963.

Section 2

"Wet tests" at Launch Complex 37, Pad B.

FILM

Use input from the Cape on "wet tests". This should include shots of SA-D5 booster, Dynamics/Facilities stage and Ground Support Equipment.

PL 63-62-280

PL 63-61-935

NARRATION

A significant highlight of this report period was the checkout of Pad B facilities, Launch Complex 37 at Cape Canaveral using the SA-D5 booster, the S-IV Dynamics/Facilities stage and ground support equipment. "Wet tests" at Canaveral are designed to check out Complex equipment involved in propellant loading operations. Actual propellants are used in the tests. Simulated, manual loading methods are checked first; then, the entire loading sequence is performed automatically. Some difficulties were encountered during first phase testing, requiring additional components. Tests were resumed and successfully completed late in June.

Section 2

Following wet tests, inspection revealed two welts on the hydrogen side of the common bulkhead of the S-IV Dynamics/Facilities stage. However, the bulkhead showed no signs of leakage during the liquid hydrogen loading tests and the stage is acceptable for stratification tests scheduled next quarter at Marshall.

Section 3

Status of Launch Complex 34 & 37.

FILM

Choose best scenes
from film inputs
(LC 34 & 37 AMR)
for May-June.
PL 63-62
280, 356, 393,
394.

NARRATION

Also ^{at} the Atlantic Missile Range, work
on Saturn launch sites is progressing
satisfactorily.

Construction of Launch Complex 34's
Liquid Hydrogen Facility is on
schedule with completion expected
late next quarter.

The design work ^{on} ~~of~~ Pad A ^{Complex 37} to support
Saturn IB is on schedule.

The Saturn I Instrument Unit
Electrical Support Equipment for
Pad B ^{Complex 37} arrived at the Cape in late
May.

Section 4

Status of the Booster for the Fifth Saturn I Flight Vehicle.

FILM

Show post-static
checkout of SA-5
booster at
Quality Division

NARRATION

Meanwhile at Marshall, the booster for the fifth Saturn I flight vehicle, SA-5, entered post-static checkout early this quarter. During post-static checkout, discrepancies were discovered, particularly in the propulsion system. Re-work was necessary. Following completion of re-work, electrical systems checkout started in mid-May. The booster will be shipped for arrival at the Cape about two weeks before S-IV-5 stage arrival.

Section 5

The Saturn Instrument Unit Motion Simulator.

FILM

LS gimbaling set-up for Instrument Unit for SA-5.

MS of control panel with operators at work, followed by MS (side view) operators at control panel, unit gimbaling.

MCU of operator at ST-124 stabilizer & guidance monitor followed by MS of operator at control system monitoring console.

NARRATION

Located at Marshall's Quality Division is a Saturn Instrument Unit Motion Simulator used for attitude calibration of the stabilizer and control system of the SA-5 Instrument Unit. Positioning capabilities are in three axes, with displacement accuracy of one percent of displacement angle.

Positioning the unit for attitude calibrations and simulated flight position leaves all components in their respective flight configurations, eliminating loading effects from long cables and extraneous noise pick-up.

The control system has automation capabilities that can be computer controlled, permitting complete automated calibration and checkout of control systems.

Section 6

Static Firing of SA-6.

FILM

O-998

Saturn Booster static test firing (SA-6); use shots slightly different from those used in Rpt. Nr. 15

SA-6 booster undergoing post-static checkout at Quality Division. (Use stock footage for post-static checkout).

NARRATION

The booster for the sixth flight vehicle, SA-6, underwent two successful static test firings at Marshall's Test Division. The first for 35 seconds and the second for a period of 142 seconds. Post-test inspection revealed minor discrepancies, such as small fuel leaks and a torn GOX diffuser screen. Corrective action has been taken.

The SA-6 booster, second in the Block II series, is now undergoing post-static checkout at Marshall's Quality Division.

Section 7

Status of the booster for the seventh flight vehicle S-I-7.

FILM

Final assembly
of SA-7

NARRATION

Assembly of the booster for the seventh Saturn flight test vehicle, SA-7, was completed this quarter, and the stage is now undergoing pre-static test checkout.

Section 8

Status of SA-9 Flight Booster.

FILM

SA-9 booster
assembly.

(Use stock footage)

NARRATION

Structural fabrication of the
spider beam for the ninth
Saturn flight vehicle, SA-9,
is complete. Assembly
operations on the tail section
and clustering of tanks is
underway.

Section 12 9

Micro-Meteoroid (Fairchild Stratos).

FILM

OM-995

LS from the crane of
the wing section as it is being
lifted by the crane.

LS of the wing opening
up towards the camera.

LS of a capacitor being
sealed in a vacuum jar
for test purposes.

LS of an engineer testing
electronic components,
followed by CU of circuitry
under magnifying glass.

NARRATION

The Fairchild-Stratos Corporation
of Hagerstown, Maryland, is now
underway in the fabrication
of various components related
to the Micro-Meteoroid Measurement
device which will fly aboard
SA-9 and SA-8.

Manufacturing of the wing
panels for the mock-up is on
schedule.

Testing wing panel capacitors
is accomplished by using a
vacuum bell jar.

Electronic components are
subjected to rigid testing
prior to acceptance. Micro-
modules are inspected
through the use of powerful
magnifying equipment.

Section 9 / 0

Chrysler Production at Michoud (Saturn I/IB Boosters).

FILM

NARRATION

Stock footage of
clustering operations
or scenes from Chrysler
OM-1010

Chrysler Corporation, production
contractor for Saturn I/IB
boosters at Marshall's Michoud
Operations in New Orleans,
completed clustering of all
propellant containers for
the booster for the eighth
flight vehicle, SA-8, during this
quarter. Delivery has been made
of all H-1 engines for the stage.

OM-966
Scs. 12-13

Also, fabrication of the larrel
assembly and thrust and fin
outriggers for the tenth flight
vehicle, SA-10, is complete.

OM-966
Scs. 14

Fabrication of the spider beam and
thrust structure is underway.

Construction by Mason-Rust Co. at Michoud.

FILM

Mason-Rust Co. film
input on renovation
and construction
progress.

NARRATION

Also at Marshall's Michoud.
Operations, construction work
this quarter included the
building of an electronic
fabrication and checkout
facility and the installation
of air-conditioning systems in
various offices and laboratories.
All construction work is being
done under the direction of
Michoud's support services
contractor, the Mason-Rust
Company.

Dynamic Testing of the S-IV stage and Boiler Plate Apollo.

FILM

9-1012

LS of S-IV stage and boiler plate Apollo in upper area of Dynamics Test Stand.

MS of Dynamic testing of the S-IV stage and boiler plate Apollo, show cables, clevises.

Show LS of the booster for SA-D5 on lowboy.

NARRATION

Dynamic testing of the S-IV stage, instrument unit, with both the Jupiter Nosecone and the boiler plate Apollo spacecraft began at Marshall's Test Division early this quarter and was completed in late June.

The SA-D5 booster, at the Cape for Complex 37 facilities checkout was removed from Pad B in late June and will be returned to Marshall during the next quarter for additional dynamics testing.

Section 13 13

Super Clean Facility at Manufacturing Engineering Division.

FILM

0-943

LS white bench with
personnel working.

MS of part going into
oven, passing through first
station to second station

MS parts being checked
for dirt

MS parts being checked
for dirt

CU face and microscope.

NARRATION

A new clean facility was placed in
operation this quarter in Marshall's
Manufacturing Engineering Division.
The clean area is subjected to a higher
internal air pressure in order to
minimize the possibility of contaminants
entering the room from external sources.

Saturn vehicle parts to be cleaned
are disassembled and passed through
a drying oven....,

...then washed in an electronic
cleaning vat.

Filtering equipment removes contaminants
down to the 10 micron-or-less level.

A final check of the part is made
by using a microscope. After
completion of the cleaning process,
all parts are hermetically sealed,
then sent to the user.

Section 14

RL 10 Engine Hydraulic Actuator Simulator for the S-IV Stage.

FILM

LS of the RL10
Engine Hydraulic
Actuator Simulator
for the S-IV stage.

MCU of engine
hydraulic actuators.

MS of servo valves during
hydraulic actuator
operation, followed by
MCU of same.

MS of man at recorders,
amplifier frequency response
analyser and scope.

NARRATION

The RL10 Engine Hydraulic Actuator Simulator for the S-IV stage was tested this quarter at Marshall. For test purposes, an engine is not used, but is simulated by the masses pendulum.

Two hydraulic actuators, mounted 90 degrees to each other, represent either the vehicle's pitch or yaw axis.

The hydraulic actuator system reacts to the angle commanded by the vehicle's guidance system, allowing for attitude control in the pitch and yaw planes, stabilization, and reduction of vehicle bending.

Test analysis will help determine if the flight control circuits and mechanical power converters are adequate to satisfy vehicle requirements for flight.

Pratt & Whitney RL10 Engines.

FILM

OM 930-309

LS, two men wheel an RL10 engine into a booth for ultra-violet inspection.

MCU, man with ultra-violet lamp.

CU, inspection with light.

CU, inspection with light.

LS, engine is wheeled out of booth.

LS, weighing the engine

MS, weighing the engine

NARRATION

At Pratt & Whitney's Florida Research and Development Center at West Palm Beach S-IV stage RL10 engines are thoroughly inspected prior to acceptance. Each engine is inspected visually, then taken into a booth for a "black light" inspection.

Using an ultra-violet lamp, all pump inlets and valves are examined carefully for ^{defects} ~~leaks~~.

Utmost precautions are always taken with all parts associated with the RL10's cryogenic propellants.

After its final acceptance test, each RL10 engine is weighed with all equipment attached.

15a

LS, three men checking center
of gravity with engine in
horizontal position.

Note. Let above three
scenes run long enough to support
last two paragraphs of narration.

The vehicle manufacturer must
know the engine's center of
gravity, since this is a factor
which can strongly affect the
vehicle's guidance system.

Section 16

FILM

O-1023

Establishing shot of the
sound suppression stand.

Use long shot to include
engine and stand

CU (side view) showing
water fill pipes leading to
top of stand.

LS of H-1 engine firing.
(Use firing scene that
includes the four acoustic
towers in both the fore &
background.

NARRATION

At Marshall's Test Division,
construction work was completed
this quarter on a prototype sound
suppression stand which uses an
H-1 engine for testing.

The 165,000-pound-thrust engine is
fired into the suppressor tank.

Results of the firings will provide
data related to the basic acoustical
scaling laws. The sound suppression
facility will itself be a model for
much larger powerplant suppression
systems.

Acoustic measurements are made
during tests to check the effectiveness
of the sound suppressor.

Section 17

H-1 Furnace Brazed Thrust Chamber & Injectors.

FILM

NARRATION

H-1 Film Input

At Rocketdyne's Canoga Park Facility,

C-38, Scene

stainless steel furnace brazed thrust

39A or OM-988

chambers for H-1 engines are being

Scene 1

developed to provide longer test life

and more consistent manufacture of units.

OM-988

The first unit has successfully

Scene 5

completed 2,300 seconds of mainstage

engine test and the overall braze

operation is considered successful.

H-1 Film Input

Another development at Rocketdyne was

C-38

the testing of three types of injectors,

Scenes 106, 107,

the Low differential pressure fuel-LOX

112, 110, 111

injector....., the modified wagon

wheel injector with secondary cooling

posts, and..... the Low differential

pressure fuel injector.

The modified wagon wheel injector

exhibited high frequency instability

characteristics.

Section 17A

Status of S-IV Program (Including Pregnant Guppy)

FILM

Douglas Input (5360)
Douglas Sacramento Facility
Battleship Tank Hot Firing
Scenes 2-28

Douglas Input (5360)
Cold Gimbal Tests
Scenes 1 thru 7

NARRATION

^{S-IV}
On May 4th, the Battleship ~~Vehicle~~ test program was completed at Douglas' Sacramento Test Operations, with a final LOX depletion firing of 444 seconds. A total of 5440.1 seconds of engine firings were accomplished.

At the conclusion of the firing program, gimbal tests were run on the Battleship Vehicle to provide needed dynamic data on the engine actuation system. The Battleship tank was then stripped of accessories. Five of the engines and the tank were shipped to Marshall. The tank will be used for slosh tests, and the engines will be used on the S-IV Dynamics stage for further gimbaling tests.

Section 17B

FIIM

Douglas Input (5360)
All Systems Vehicle
removed from Stand #2
(Use best scenes
8 thru 16)

Douglas Input (5360)
Test Stand 2B
Structural Rework
(Choose best scenes
from 17 thru 25)

NARRATION

On April 1st, at SACTO, the initial All-Systems vehicle propellant loading test was aborted when a fill nozzle leak caused damage to the test stand. Corrective action was taken and the second test begun on April 9th. About one minute after storage pressure increase, observers noted tank canning in a vertical plane. Canning partially smoothed out after several seconds. Following necessary internal insulation repair, tanking procedures were modified and tests resumed. Problems encountered during detanking indicated leaks in the common bulkhead.

The vehicle was removed from the stand in mid-May for bulkhead weld and insulation patching. Additional tanking operations on Test Stand 1 will begin early next quarter.

Section 17C

FILM

Douglas Input (5360)
Transport of S-IV-5
Vehicle to Sacramento
Scenes 29-52

Douglas Input (5360)
Erection of S-IV-5 in
Test Stand 2-3

NARRATION

On April 16th, the S-IV-5 Flight Vehicle was moved from Douglas' Santa Monica plant to the docks at San Pedro. The stage was transported aboard a barge to begin its water journey to the Sacramento Test Facility. The stage arrived at its destination 5 days later and was checked out in the Engineering and Development building prior to being installed in Test Stand 2B.

The S-IV-5 was installed in Test Stand 2B and pre-static checkout began in late June. A full duration hot firing is scheduled for next quarter.

Section 19 18

Status of S-IVB Program.

FILM

Douglas Input R.3463
CS stretch forming parts
CS operator of stretch machine
CS of parts stretching- followed
by another angle of parts.

Roll 3463
General views of const. at
Huntington Beach

Roll 3463
Scenes- Assembly of
Battleship Tank-- Complex
Beta SACTO

NARRATION

At Santa Monica, Douglas successfully bulge-formed an aluminum sheet which ^{yielding} ~~yielded~~ two segments for the S-IVB Stage's bulkhead dome. ~~No slippage, cracks, or wrinkles occurred during forming.~~ ^{The} Bulge-die technique may be used to augment segment production on the stretch press.

^{Overall} Construction on the S-IVB ~~facility~~ ^{facilities} Assembly Tower at Huntington Beach is ~~underway~~ ^{continuing}. During this quarter the Fabrication and Assembly Building was completed and tooling installation was begun.

Chicago Bridge & Iron Company, sub-contractor for Douglas, shipped sections of the Battleship Tank to SACTO from its Salt Lake City facility. Fabrication of the tank started in April and is scheduled for completion in October.

Section 20-19

S-IVB Forward Section Mock-up.

FILM

O-1011

Choose best scenes from
footage on S-IVB Forward
Section Mock-up.

NARRATION

Douglas Aircraft Company has
shipped a full scale mock-up
of the forward dome and skirt
section of the S-IVB stage to
Marshall this quarter.

The mock-up will be used in
connection with design of the
Saturn IB Instrument Unit, which
will fly atop the S-IVB stage.

Section 20

Pregnant Guppy

FILM

Douglas Input (5360)

"Pregnant Guppy"

Scenes 53-62

NARRATION

A two month contract was let to Aero Spacelines Incorporated by Marshall to study the feasibility of using a modified Boeing C-97 for air transport of the S-IV Stage, 1.5 million-pound-thrust rocket engines, and other massive components. This mode of transportation would greatly reduce time required to move the cargo from the West Coast to points in the south and east. The modified Stratocruiser, now known as the B-377PG (Pregnant Guppy), has successfully transported an inert Saturn stage from Los Angeles to Edwards Air Force Base. The Guppy is now undergoing rigid testing to prove its take off --- in-flight --- and landing capabilities during Federal Aviation Agency qualification tests. These flights are expected to cut transportation time from three weeks, now required for barging cargo through the Panama Canal, to about 12 hours of flying time from coast to coast.