



1

00:00:13,799 --> 00:00:19,340

Saturn launch vehicle film report number 37 covers progress of the Saturn IB and Saturn

2

00:00:19,340 --> 00:00:23,869

V Programs during the period July, August, and September 1968.

3

00:00:23,869 --> 00:00:35,510

The fifth Saturn IB flight vehicle, scheduled

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00:00:35,510 --> 00:00:40,760

to launch the first manned Apollo spacecraft in mid-October, neared completion of its various

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00:00:40,760 --> 00:00:46,180

prelaunch preparations and checkout operations as this quarter closed.

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00:00:46,180 --> 00:00:51,420

At Launch Complex 34 of the Kennedy Space Center, mating of the launch vehicle, designated

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00:00:51,420 --> 00:00:59,899

SA-205, and it's Apollo 7 spacecraft had been completed on August 30.

8

00:00:59,899 --> 00:01:05,019

Launch vehicle flight software was also delivered from the Marshall Space Flight Center to KSC

9

00:01:05,019 --> 00:01:07,450

during August.

10

00:01:07,450 --> 00:01:12,790

In early September, the preflight review was concluded with no significant vehicle problems

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00:01:12,790 --> 00:01:14,340
revealed.

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00:01:14,340 --> 00:01:19,420

Then came the week long countdown demonstration
test simulating the actual countdown for the

13

00:01:19,420 --> 00:01:23,290

205 launch up to the moment of ignition.

14

00:01:23,290 --> 00:01:27,340

The flight readiness test was performed in
late September.

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00:01:27,340 --> 00:01:32,840

The flight readiness review, the final major
prelaunch event, was then successfully completed,

16

00:01:32,840 --> 00:01:36,190

confirming the vehicle's readiness for flight.

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00:01:36,190 --> 00:01:42,280

The Apollo 7 flight will carry astronauts
Walter Schirra, Donn Eisele, and Walter Cunningham

18

00:01:42,280 --> 00:01:49,200

into a 120x150 nautical mile Earth orbit in
a test of the spacecraft systems lasting up

19

00:01:49,200 --> 00:01:51,070

to ten days.

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00:01:51,070 --> 00:01:59,700

Saturn IB launch vehicles have performed flawlessly
in four previous unmanned missions.

21

00:01:59,700 --> 00:02:05,560

At the Marshall Center, S-IB-12 underwent
successful acceptance static firings, both

22

00:02:05,560 --> 00:02:08,840

short and long duration, during July.

23

00:02:08,840 --> 00:02:14,170

This booster is the last of the stages authorized in Marshall's first order of S-IB stages

24

00:02:14,170 --> 00:02:20,470

with the Chrysler Corporation.

25

00:02:20,470 --> 00:02:25,450

After post-static inspection, the stage was shipped in early August from MSFC to the Michoud

26

00:02:25,450 --> 00:02:31,450

Assembly Facility in New Orleans for post-static modification and storage.

27

00:02:31,450 --> 00:02:36,970

At Michoud, fabrication work continued on subsystems for the follow-on contract, S-IB

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00:02:36,970 --> 00:02:39,570

stage 13 and 14.

29

00:02:39,570 --> 00:02:44,500

Tentative plans for production of two additional stages for Apollo Applications Program requirements

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00:02:44,500 --> 00:02:49,060

have been dropped due to budgetary limitations.

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00:02:49,060 --> 00:02:53,930

In September, NASA announced termination of production of H-1 engines under contract with

32

00:02:53,930 --> 00:03:00,010

the Rocketdyne Division of North American Rockwell Corporation at Canoga Park, California.

33
00:03:00,010 --> 00:03:05,010
Of the sixty engines being produced, Rocketdyne has completed delivery on thirty-two to the

34
00:03:05,010 --> 00:03:07,680
Marshall Center.

35
00:03:07,680 --> 00:03:12,770
In August, S-IB-8 became the first IB stage to be locked into one of Michoud's new long

36
00:03:12,770 --> 00:03:17,650
term storage enclosures for hard storage.

37
00:03:17,650 --> 00:03:21,980
Tests were begun this quarter on the first components scheduled to be requalified under

38
00:03:21,980 --> 00:03:24,980
Chrysler's Quality Maintenance Program.

39
00:03:24,980 --> 00:03:29,660
Many of these components were qualified in the early part of the S-IB Program and are

40
00:03:29,660 --> 00:03:34,150
now being retested to ensure that the current quality and reliability are equivalent to

41
00:03:34,150 --> 00:03:37,290
that of the components as originally tested.

42
00:03:37,290 --> 00:03:43,950
A new long term storage enclosure for Saturn IB second, or S-IVB, stages underwent testing

43
00:03:43,950 --> 00:03:49,960
at the Huntington Beach facility of the McDonnell-Douglas

Corporation, S-IV prime contractor.

44
00:03:49,960 --> 00:03:54,740
The enclosure is furnished with all accessories necessary to maintain the required environmental

45
00:03:54,740 --> 00:03:59,740
conditions such as temperature, humidity, dew point, and absence of contaminants for

46
00:03:59,740 --> 00:04:02,110
extended storage periods.

47
00:04:02,110 --> 00:04:07,180
The instrument unit for the seventh Saturn IB flight vehicle was brought out of short

48
00:04:07,180 --> 00:04:13,739
term storage and entered the retrofit cycle in July at IBM's Huntsville facility.

49
00:04:13,739 --> 00:04:18,890
Other IUs for Saturn IB remained in storage.

50
00:04:18,890 --> 00:04:23,979
Also during this quarter, the three Earth-orbiting Pegasus meteoroid technology satellites, which

51
00:04:23,979 --> 00:04:31,130
were conceived by MSFC and launched by the Saturn I in 1965, were silenced by NASA after

52
00:04:31,130 --> 00:04:42,949
having successfully performed their missions and outlived their planned lifetimes.

53
00:04:42,949 --> 00:04:50,229
At KSC's Launch Complex 39, re-erection of the third Saturn V flight vehicles, AS-503,

54
00:04:50,229 --> 00:04:54,590
was accomplished early this quarter in the
Vehicle Assembly Building following completion

55
00:04:54,590 --> 00:04:59,370
of additional second stage testing and instrument
unit modification.

56
00:04:59,370 --> 00:05:04,789
These had been required when the AS-503 flight
was changed by NASA from and unmanned to a

57
00:05:04,789 --> 00:05:06,559
manned mission.

58
00:05:06,559 --> 00:05:12,270
AS-503 will orbit the Apollo 8 spacecraft
carrying astronauts Frank Borman, James Lovell,

59
00:05:12,270 --> 00:05:13,699
and William Anders.

60
00:05:13,699 --> 00:05:20,270
Checkout of the AS-503, which is scheduled
for launch in December, was proceeding satisfactorily

61
00:05:20,270 --> 00:05:22,520
at the end of the report period.

62
00:05:22,520 --> 00:05:27,069
Rollout to the pad was expected October 10.

63
00:05:27,069 --> 00:05:32,499
Saturn launch complex computer tapes and launch
vehicle digital computer tapes were delivered

64
00:05:32,499 --> 00:05:39,430
to KSC by the Marshall Center and updated
inputs were continuing as necessary.

65
00:05:39,430 --> 00:05:44,289
Acceptance testing of the Apollo command module access arm was also performed at Marshall

66
00:05:44,289 --> 00:05:49,589
prior to shipment of the arm to KSC for installation on the mobile launcher.

67
00:05:49,589 --> 00:05:59,430
During the flight of the second Saturn V launch vehicle, AS-502, last quarter, two major technical

68
00:05:59,430 --> 00:06:04,860
problems, the so-called pogo effect and ruptured ASI lines had developed.

69
00:06:04,860 --> 00:06:10,740
Under direction of the Saturn V Program manager, Lee B. James, NASA and contractor engineers

70
00:06:10,740 --> 00:06:20,960
concentrated on solutions to those problems during much of this report period.

71
00:06:20,960 --> 00:06:25,749
The solution to the pogo problem, excessive longitudinal oscillations originating in the

72
00:06:25,749 --> 00:06:32,500
S-IC stage, will be the use of accumulators, or small helium gas reservoirs in the liquid

73
00:06:32,500 --> 00:06:38,300
oxygen prevalues feeding the stage's five F-1 engines to change the frequency of oscillations

74
00:06:38,300 --> 00:06:41,369
in the propulsion system.

75
00:06:41,369 --> 00:06:46,659
Each pre valve located in the LOX duct just above the engine has a cavity in which a gas

76
00:06:46,659 --> 00:06:50,569
pocket will be maintained to serve as a shock absorber.

77
00:06:50,569 --> 00:06:57,240
The only modification required is a means of injecting the helium into the pre valve.

78
00:06:57,240 --> 00:07:01,770
This pulsar mechanism was used for measuring the frequency of the propulsive system in

79
00:07:01,770 --> 00:07:06,649
extensive testing to prove out the corrective action.

80
00:07:06,649 --> 00:07:12,860
In F-1 static firings, both at MSFC and at the Edwards test site in California, use of

81
00:07:12,860 --> 00:07:17,189
the accumulator method prove effective in damping oscillations occurring in the LOX

82
00:07:17,189 --> 00:07:18,759
feed ducts.

83
00:07:18,759 --> 00:07:22,800
This reduced the natural frequency of the propulsive system from four to two cycles

84
00:07:22,800 --> 00:07:27,439
per second, as compared to about four for the vehicle's structure.

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00:07:27,439 --> 00:07:33,159

A total of only 2.1 cubic feet of helium is needed to accomplish the fix.

86

00:07:33,159 --> 00:07:36,479

The helium will be fed initially from a ground source.

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00:07:36,479 --> 00:07:46,759

After launch, a small amount needed for replenishing will come from onboard helium vessels.

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00:07:46,759 --> 00:07:51,919

Engineering analysis of test data revealed that the fix was completely effective.

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00:07:51,919 --> 00:07:58,740

At the Mississippi Test Facility, a successful static firing in early August of the S-IC

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00:07:58,740 --> 00:08:04,509

stage for the sixth Saturn V flight vehicle incorporating the necessary fix modifications

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00:08:04,509 --> 00:08:07,559

demonstrated the effectiveness of the method.

92

00:08:07,559 --> 00:08:12,800

The being has already been applied to AS-503 and all other first stage engines are currently

93

00:08:12,800 --> 00:08:16,909

being modified.

94

00:08:16,909 --> 00:08:22,080

The other major AS-502 problem, a break in the fuel line to the J-2 engine's augmented

95

00:08:22,080 --> 00:08:27,689

spark ignitor was also resolved this quarter

with replacement of the former flexible line

96

00:08:27,689 --> 00:08:30,770

with a redesigned rigid ASI line.

97

00:08:30,770 --> 00:08:36,719

The new ASI line assemblies are being installed by Rocketdyne and S-II stages at MTC and the

98

00:08:36,719 --> 00:08:43,190

Seal Beach, California facility of North American Rockwell Space Division as well as an S-IVB

99

00:08:43,190 --> 00:08:49,490

stages at McDonnell-Douglas' Huntington Beach facility and Sacramento test site.

100

00:08:49,490 --> 00:08:56,190

The ASI fix had been subjected to extensive J-2 engine testing at Santa Susana, MSFC,

101

00:08:56,190 --> 00:08:59,730

and the Arnold Test Center in Tullahoma, Tennessee.

102

00:08:59,730 --> 00:09:04,920

In this Santa Susana firing, ASI assembly operating characteristics were verified by

103

00:09:04,920 --> 00:09:11,389

low pressure tests at ignition and high pressure tests at engine main stage operating conditions.

104

00:09:11,389 --> 00:09:18,160

S-II battleship stage firings to provide cluster engine data on the redesigned ASI assembly

105

00:09:18,160 --> 00:09:25,430

were also successfully performed at Santa Susana.

106

00:09:25,430 --> 00:09:29,900

The final test was accomplished at the Mississippi Test Facility during the acceptance firing

107

00:09:29,900 --> 00:09:34,980

of S-II-5, which had been modified to include the new fuel lines.

108

00:09:34,980 --> 00:09:39,040

All AS-502 problems have now been resolved.

109

00:09:39,040 --> 00:09:46,139

Meanwhile, by the end of September, all elements of the fourth Saturn V flight vehicle, AS-504,

110

00:09:46,139 --> 00:09:51,480

had been delivered to KSC and erection of the vehicle is expected at the beginning of

111

00:09:51,480 --> 00:09:54,100

next quarter.

112

00:09:54,100 --> 00:09:59,270

At the Michoud Assembly Facility, the Boeing Company continued assembly operations on S-IC

113

00:09:59,270 --> 00:10:04,670

stages 10 through 12 and subassembly work on stages 13-15.

114

00:10:04,670 --> 00:10:11,000

Follow-on procurement for S-IC stages, as well as other Saturn V vehicle stages, has

115

00:10:11,000 --> 00:10:14,879

not been approved by NASA Headquarters.

116

00:10:14,879 --> 00:10:20,190

In the three part S-II stage lightweight structural

test program, testing of the A structure at

117

00:10:20,190 --> 00:10:22,980

the Marshall Center is nearing completion.

118

00:10:22,980 --> 00:10:25,800

All tests to date have been successful.

119

00:10:25,800 --> 00:10:30,600

Testing of the A structure is expected to be finished next quarter.

120

00:10:30,600 --> 00:10:35,199

At Santa Susana, tests using the B structure are scheduled to be resumed by North American

121

00:10:35,199 --> 00:10:37,089

Rockwell in October.

122

00:10:37,089 --> 00:10:44,240

Most test preparations, including installation of the forward skirt, were completed in September.

123

00:10:44,240 --> 00:10:49,100

Assessment of data on a failure of the C structure in its final test in late August is continuing

124

00:10:49,100 --> 00:10:51,220

at the Marshall Center.

125

00:10:51,220 --> 00:10:56,430

Failure occurred at 122 percent load condition of the 130 percent test goal.

126

00:10:56,430 --> 00:11:01,420

However, due to the already long life of the test item, it is contemplated that no further

127

00:11:01,420 --> 00:11:05,129

C tests will be performed.

128

00:11:05,129 --> 00:11:10,069

In July, the structure for Saturn V instrument unit number 9 was reassigned for a dynamic

129

00:11:10,069 --> 00:11:16,740

test program for the Manned Spacecraft Center and designated SIU500 S-IV.

130

00:11:16,740 --> 00:11:21,800

After instrumentation, the unit was moved from the IBM Huntsville facility to Wyle Laboratory

131

00:11:21,800 --> 00:11:23,350

Huntsville for testing.

132

00:11:23,350 --> 00:11:29,089

While mated to the S-IVB stage and spacecraft lunar module adapter, tests got underway in

133

00:11:29,089 --> 00:11:32,850

September and will continue next quarter.

134

00:11:32,850 --> 00:11:38,839

MSFC's Saturn Program Office contributed significantly during the quarter to a NASA-wide

135

00:11:38,839 --> 00:11:44,040

launch vehicle working group study to examine NASA's present and future needs for launch

136

00:11:44,040 --> 00:11:49,060

vehicles, delineate various alternatives to meet these needs, and investigate practical

137

00:11:49,060 --> 00:11:52,610

needs to reduce the cost of launch vehicles.

138

00:11:52,610 --> 00:11:58,420

In summation, as the historic first manned missions loomed closer for both the Saturn