



1
00:00:05,710 --> 00:00:45,440

A

2
00:00:45,440 --> 00:00:51,269

history-making milestone in the Saturn Program was reached during this report period when

3
00:00:51,269 --> 00:00:56,730

the first Saturn flight vehicle, known as SA-1, was successfully launched from Cape

4
00:00:56,730 --> 00:01:00,269

Canaveral on the morning on October 27.

5
00:01:00,269 --> 00:01:06,590

Flight of the vehicle, consisting on the S-I booster, S-IV dummy second stage, S-V dummy

6
00:01:06,590 --> 00:01:12,939

third stage, and dummy payload, appeared perfectly normal and all test objectives were satisfactorily

7
00:01:12,939 --> 00:01:13,939

attained.

8
00:01:13,939 --> 00:01:20,920

For over a month before the actual launch, engineers and technicians of Marshall Space

9
00:01:20,920 --> 00:01:25,500

Flight Center's Launch Operations Directorate had been at work testing and checking out

10
00:01:25,500 --> 00:01:31,620

components of the complex vehicle in every way necessary to assure a successful test

11
00:01:31,620 --> 00:01:32,979

firing.

12
00:01:32,979 --> 00:01:42,540
Typical of the numerous tests conducted were
this LOX load test,

13
00:01:42,540 --> 00:01:50,659
cable mass eject test,

14
00:01:50,659 --> 00:01:55,909
and support and hold down arms checkout.

15
00:01:55,909 --> 00:02:01,070
In simulated flight tests, launch personnel
in the Saturn blockhouse went through all

16
00:02:01,070 --> 00:02:06,159
the motions of an actual launch to thoroughly
familiarized themselves with procedures and

17
00:02:06,159 --> 00:02:08,970
equipment.

18
00:02:08,970 --> 00:02:14,250
An important part of prelaunch preparation
of the vehicle was installation of heat shields

19
00:02:14,250 --> 00:02:20,250
to protect the booster engines, fuel pumps,
valves, instrumentation lines, control equipment,

20
00:02:20,250 --> 00:02:22,610
and other critical components.

21
00:02:22,610 --> 00:02:28,030
Temperatures around the booster's base would
reach about 2,500 degrees Fahrenheit during

22
00:02:28,030 --> 00:02:30,550
flight.

23
00:02:30,550 --> 00:02:35,160
Numerous static firings back at the Marshall Center had already tested various materials

24
00:02:35,160 --> 00:02:36,230
of the heat shields.

25
00:02:36,230 --> 00:02:43,500
A specially insulated fiberglass fabric was finally chosen.

26
00:02:43,500 --> 00:02:49,110
Structural tests were also run to determine flexibility and strength of the heat shield

27
00:02:49,110 --> 00:02:54,330
during gimbaling of the booster's four outer engines.

28
00:02:54,330 --> 00:02:59,660
For this initial Saturn research and development firing, the first of ten scheduled in the

29
00:02:59,660 --> 00:03:05,910
C-I Program, the inert upper stages were filled with water to simulate the weight of live

30
00:03:05,910 --> 00:03:06,910
stages.

31
00:03:06,910 --> 00:03:16,010
The total weight of SA-1 at liftoff was approximately 925five thousand pounds.

32
00:03:16,010 --> 00:03:23,030
Fueling of the SA-1 booster, or first stage, with RP-1 fuel began two days prior to launch

33

00:03:23,030 --> 00:03:25,730
time.

34
00:03:25,730 --> 00:03:30,430
The other part of the propellant loading operation,
addition of the liquid oxygen would begin

35
00:03:30,430 --> 00:03:33,840
only about five and a half hours before launch.

36
00:03:33,840 --> 00:03:42,540
At 11 PM Eastern Standard Time on Thursday
October 26, the ten hour countdown for the

37
00:03:42,540 --> 00:03:46,880
first Saturn launching began in the Saturn
blockhouse.

38
00:03:46,880 --> 00:03:52,400
Not a single technical hold interrupted the
countdown, although two holds were called

39
00:03:52,400 --> 00:03:57,580
because of low cloud layers, which would have
interfered with visual tracking and observation

40
00:03:57,580 --> 00:04:03,480
of the inflight vehicle.

41
00:04:03,480 --> 00:04:08,860
Automatic fueling and sequencing operations
were conducted satisfactorily.

42
00:04:08,860 --> 00:04:12,460
The countdown proceeded.

43
00:04:12,460 --> 00:04:45,719
Ten, nine, eight, seven, six, five, four,
three, two, one, zero.

44

00:04:45,719 --> 00:04:51,770

[Launch Sounds]

45

00:04:51,770 --> 00:05:04,530

At 10:06 AM Friday October 27, space history was written as the powerful 162 foot tall

46

00:05:04,530 --> 00:05:08,110

rocket roared from its launch pedestal.

47

00:05:08,110 --> 00:05:12,150

Liftoff came 3.9 seconds after beginning of ignition.

48

00:05:12,150 --> 00:05:18,710

As planned, only three-tenths seconds separation of all eight H-1 engines, which generated

49

00:05:18,710 --> 00:05:25,930

thrust levels of 165 thousand pounds each for a scheduled total stage thrust of 1.3

50

00:05:25,930 --> 00:05:27,699

million pounds.

51

00:05:27,699 --> 00:05:32,909

Overall performance of the booster during flight was considered highly satisfactory.

52

00:05:32,909 --> 00:05:37,900

Wind shear encountered near the region of maximum dynamic pressure resulted in a predicted

53

00:05:37,900 --> 00:05:40,759

four and a half degree engine deflection.

54

00:05:40,759 --> 00:05:45,310

The disturbance was handled by the control system without difficulty.

55
00:05:45,310 --> 00:05:49,030
Structural integrity of the booster was maintained throughout.

56
00:05:49,030 --> 00:05:52,389
Performance of the propulsion system was very good.

57
00:05:52,389 --> 00:05:58,610
Ignition, transitions, main stage, and cutoff were as expected, with the measured combustion

58
00:05:58,610 --> 00:06:13,090
chamber pressures showing no major deviations.

59
00:06:13,090 --> 00:06:19,020
After the firing, inspection of ground support equipment and firing accessories indicated

60
00:06:19,020 --> 00:06:24,669
only minor damage normally sustained for a flight of such nature was experienced.

61
00:06:24,669 --> 00:06:28,849
General condition of the GSE was better than expected.

62
00:06:28,849 --> 00:06:33,509
Post flight evaluation of telemetry tapes processed later back at the Marshall Center's

63
00:06:33,509 --> 00:06:39,270
Computation Division verified the near-perfect functioning of the SA-1 vehicle and its ground

64
00:06:39,270 --> 00:06:42,580
support equipment.

65

00:06:42,580 --> 00:06:54,199

[Sound of Engines Firing]

66

00:06:54,199 --> 00:06:59,879

Static test firing of the booster for the second Saturn flight vehicle, SA-2, was completed

67

00:06:59,879 --> 00:07:09,370

at Marshall this quarter with the final test on October 31.

68

00:07:09,370 --> 00:07:15,039

After static tests, modification and repair of the SA booster was carried out in Marshall's

69

00:07:15,039 --> 00:07:19,440

Manufacturing Engineering Division.

70

00:07:19,440 --> 00:07:26,160

Final checkout of the SA-2 booster began November 22 in the Quality Assurance Division.

71

00:07:26,160 --> 00:07:33,639

Launching of the SA-2 vehicle is scheduled for the first quarter of 1962.

72

00:07:33,639 --> 00:07:41,490

Assembly of the booster for the third Saturn vehicle, SA-3, was completed on December 26.

73

00:07:41,490 --> 00:07:46,740

Fabrication of the booster for the fourth vehicle, SA-4, is complete and assembly is

74

00:07:46,740 --> 00:07:49,999

due to be complete in January 1962.

75

00:07:49,999 --> 00:07:58,439

Current plans are for nine such boosters to be built at the Marshall Center.

76
00:07:58,439 --> 00:08:02,879
Approximately twenty more C-I boosters will
be made at Marshall's new Michoud Operations,

77
00:08:02,879 --> 00:08:07,960
fourteen miles east of New Orleans under a
contract recently negotiated with the Chrysler

78
00:08:07,960 --> 00:08:09,470
Corporation.

79
00:08:09,470 --> 00:08:14,680
Rehabilitation and modification of the fifty
million dollar facility, formerly the Michoud

80
00:08:14,680 --> 00:08:20,189
Ordinance Plant, began in mid-October, with
almost forty-three acres of usable area under

81
00:08:20,189 --> 00:08:21,379
one roof.

82
00:08:21,379 --> 00:08:24,839
Michoud is one of the nation's largest single
floor buildings.

83
00:08:24,839 --> 00:08:30,300
Chrysler's contract for approximately 200
million dollars and extending through 1966

84
00:08:30,300 --> 00:08:38,000
calls for the company to build, checkout,
and launch C-I first stages, an advanced Saturn

85
00:08:38,000 --> 00:08:43,450
booster, the S-IB with three million pounds
of thrust, or double that of a present S-I

86

00:08:43,450 --> 00:08:48,310

booster, will also be built at Michoud by a different contractor, the Boeing Company

87

00:08:48,310 --> 00:08:49,400

of Seattle.

88

00:08:49,400 --> 00:08:55,510

The 300 million dollar contract running through 1966 calls for development, construction,

89

00:08:55,510 --> 00:09:03,680

and tests of twenty-four flight boosters, plus several ground test versions.

90

00:09:03,680 --> 00:09:08,070

About fifty miles from Michoud in southwest Mississippi will be the site of a huge new

91

00:09:08,070 --> 00:09:13,460

static test facility for Saturn and Nova class launch vehicles.

92

00:09:13,460 --> 00:09:17,270

Operation of the site will be under direction of the Marshall Center.

93

00:09:17,270 --> 00:09:24,590

Construction will require two to three years with six or more large test stands planned.

94

00:09:24,590 --> 00:09:30,140

At Marshall, construction began this quarter on the center's new nine story, four million

95

00:09:30,140 --> 00:09:34,990

dollar central laboratory and office facility, nerve center for the direction of the Saturn

96

00:09:34,990 --> 00:09:41,250

Program as well as other NASA space programs,
for work done both by Marshall and its numerous

97

00:09:41,250 --> 00:09:47,950

contractors throughout the United States.

98

00:09:47,950 --> 00:09:54,530

At Douglas Aircraft, contractor for the S-IV
stage, the Cold Flow Test Program is underway

99

00:09:54,530 --> 00:10:03,620

with LOX flow from storage tank to battleship
tank, carried out this quarter.

100

00:10:03,620 --> 00:10:09,280

Installation of steam ejectors on test stand
number one at Sacramento was also accomplished.

101

00:10:09,280 --> 00:10:16,080

In operation, these ejectors create the high
altitude vacuum necessary to start the S-IV's

102

00:10:16,080 --> 00:10:20,330

engines at the proper exit pressures.

103

00:10:20,330 --> 00:10:28,160

The diffusers had already arrived from the
vendors and were installed in the test stand.

104

00:10:28,160 --> 00:10:34,030

Two hard mockup RL-10A-3 engines have been
received by Douglas from Pratt & Whitney Aircraft

105

00:10:34,030 --> 00:10:39,710

and installed on the S-IV stage mockup.

106

00:10:39,710 --> 00:10:45,100

At Pratt & Whitney's Florida research and
development center in West Palm Beach, the

107

00:10:45,100 --> 00:10:51,790

RL-10A-1 engine, prototype of the A-3, successfully completed its preliminary flight rating test

108

00:10:51,790 --> 00:10:52,870

on November 4.

109

00:10:52,870 --> 00:10:57,640

[Sound of Engines Firing]

Including acceptance tests, there were 26

110

00:10:57,640 --> 00:10:59,370

firings, totaling 3,204 seconds.

111

00:10:59,370 --> 00:11:08,320

The total elapsed time to complete the PFRT endurance test was less than five days.

112

00:11:08,320 --> 00:11:16,470

Prior to successful completion of the PFRT, the RL-10A-1 design was subjected to 712firings,

113

00:11:16,470 --> 00:11:17,990

totaling over seventy thousand seconds.

114

00:11:17,990 --> 00:11:19,170

[Sound of Engines Firing]

115

00:11:19,170 --> 00:11:23,990

These tests included firing in vertical as well as horizontal attitudes with several

116

00:11:23,990 --> 00:11:27,360

runs lasting over ten minutes.

117

00:11:27,360 --> 00:11:32,370

The success of these firings was primarily attributed to many hours of component development

118

00:11:32,370 --> 00:11:38,760

testing, such as this propellant injector flow calibration.

119

00:11:38,760 --> 00:11:46,570

The torch ignition system was proven reliable in over 150 firings in an ignition rig.

120

00:11:46,570 --> 00:11:51,770

The A-3 version of the RL-10 liquid hydrogen rocket engine, a mockup of which is shown

121

00:11:51,770 --> 00:11:56,830

at left alongside an A-1 engine, is being developed with higher specific impulse for

122

00:11:56,830 --> 00:12:04,250

the Saturn S-IV stage and advance Centaur vehicles.

123

00:12:04,250 --> 00:12:11,350

Minimum modifications to the A-1 engine, such as this propellant utilization valve

124

00:12:11,350 --> 00:12:18,670

and this hydrogen collector manifold are being incorporated into the A-3 for improved performance.

125

00:12:18,670 --> 00:12:23,440

The north engine test complex of the Pratt & Whitney center has been modified to test

126

00:12:23,440 --> 00:12:33,350

the A-3 engines at Saturn S-IV conditions.

127

00:12:33,350 --> 00:12:38,630

Looking further to the future, development of an S-II upper stage for the C-III version

128

00:12:38,630 --> 00:12:44,140
of Saturn has been contracted to North American
Aviation's Space and Information Division

129
00:12:44,140 --> 00:12:49,830
at Downey, California.

130
00:12:49,830 --> 00:12:55,490
The new stage will use five liquid oxygen-hydrogen
engines, delivering a total thrust of one

131
00:12:55,490 --> 00:13:00,330
million pounds, which are being built by the
Rocketdyne Division of North American under

132
00:13:00,330 --> 00:13:03,730
a separate contract.