1
00:00:05,320 --> 00:00:03,040
we're pleased to share with you today

2
00:00:08,650 --> 00:00:05,330
some really unique video coverage from

3
00:00:11,230 --> 00:00:08,660
last week's Ares 1x launch a Cessna

4
00:00:13,150 --> 00:00:11,240
skymaster aircraft flying at 12,000 feet

5
00:00:15,580 --> 00:00:13,160
in the vicinity of booster splashdown

6
00:00:18,910 --> 00:00:15,590
and equipped with a gyro stabilized

7
00:00:20,529 --> 00:00:18,920
camera captured this video this footage

8
00:00:22,750 --> 00:00:20,539
gives us some extremely valuable

9
00:00:25,000 --> 00:00:22,760
engineering data as well as spectacular

10
00:00:28,540 --> 00:00:25,010
footage of the recovery sequence in

11
00:00:30,730 --> 00:00:28,550
rarely seen detail first a few words to

12
00:00:32,740 --> 00:00:30,740
preview what you will see after booster

13
00:00:35,229 --> 00:00:32,750

burnout as some of the events happen

14
00:00:37,479 --> 00:00:35,239
quickly first you'll see the thrust

15
00:00:39,639 --> 00:00:37,489
plume diminish followed by a brief flash

16
00:00:42,370 --> 00:00:39,649
which is the firing of the booster

17
00:00:44,229 --> 00:00:42,380
deceleration motor then a smaller flash

18
00:00:46,930 --> 00:00:44,239
on the side of the booster which is the

19
00:00:48,940 --> 00:00:46,940
tumble motor firing then after a couple

20
00:00:50,979 --> 00:00:48,950
of minutes of descent you will see the

21
00:00:54,280 --> 00:00:50,989
drogue chute deployed to stabilize the

22
00:00:56,080 --> 00:00:54,290
booster tail down then the forward skirt

23
00:00:57,940 --> 00:00:56,090
assembly is jettisoned and the drove

24
00:01:00,340 --> 00:00:57,950
pulls it up and away from the booster

25
00:01:02,200 --> 00:01:00,350
the three main parachutes follow

26
00:01:04,899 --> 00:01:02,210
immediately and you will be able to see

27
00:01:07,450 --> 00:01:04,909
how one deflates and the second remains

28
00:01:09,730 --> 00:01:07,460
only partially inflated right before

29
00:01:11,770 --> 00:01:09,740
water impact if you look closely at the

30
00:01:14,109 --> 00:01:11,780
nozzle you'll see the jettison or the

31
00:01:16,690 --> 00:01:14,119
nozzle extension and then boost your

32
00:01:18,340 --> 00:01:16,700
splashdown finally you will see the

33
00:01:20,440 --> 00:01:18,350
drogue lowering the forward skirt

34
00:01:23,200 --> 00:01:20,450
assembly in a second splashdown event

35
00:01:25,359 --> 00:01:23,210
just to the left of the booster the

36
00:01:27,730 --> 00:01:25,369
first stage flew very precisely and

37
00:01:30,370 --> 00:01:27,740
smoothly through a set our primary

38
00:01:33,160 --> 00:01:30,380

interest honest included vehicle control

39
00:01:35,980 --> 00:01:33,170
margins roll stability and also an

40
00:01:38,050 --> 00:01:35,990
assessment of thrust oscillation we saw

41
00:01:40,780 --> 00:01:38,060
very positive results with respect to

42
00:01:42,910 --> 00:01:40,790
controllability the roll control system

43
00:01:44,920 --> 00:01:42,920
only fired three times during all of a

44
00:01:47,140 --> 00:01:44,930
set while our pre-flight analysis

45
00:01:49,210 --> 00:01:47,150
predicted as many as 20 firings of the

46
00:01:52,420 --> 00:01:49,220
rock system so this is an excellent

47
00:01:54,550 --> 00:01:52,430
outcome also we saw minimal vibration

48
00:01:57,249 --> 00:01:54,560
due to thrust oscillation both in the

49
00:01:59,020 --> 00:01:57,259
data and from onboard cameras the

50
00:02:01,090 --> 00:01:59,030
pressure oscillations from the Ares 1x

51
00:02:03,850 --> 00:02:01,100
booster were well within historical

52
00:02:06,490 --> 00:02:03,860
levels seen on shuttle flights as the

53
00:02:08,469 --> 00:02:06,500
booster burns out you see a flash during

54
00:02:10,929 --> 00:02:08,479
the firing of the booster deceleration

55
00:02:11,370 --> 00:02:10,939
motor then you see the firing of the

56
00:02:16,130 --> 00:02:11,380
boost

57
00:02:18,810 --> 00:02:16,140
rotate and separate from the upper stage

58
00:02:21,720 --> 00:02:18,820
you notice also that the upper stage

59
00:02:23,610 --> 00:02:21,730
begins to rotate this was expected as

60
00:02:26,820 --> 00:02:23,620
the upper stage did not have a control

61
00:02:29,190 --> 00:02:26,830
system in fact the separation event for

62
00:02:31,890 --> 00:02:29,200
Ares 1x was more challenging than for

63
00:02:33,930 --> 00:02:31,900

the Ares one designed conditions because

64
00:02:36,090 --> 00:02:33,940
we only had four segments of propellant

65
00:02:38,760 --> 00:02:36,100
we burned out at a lower altitude and

66
00:02:41,610 --> 00:02:38,770
higher dynamic pressures 90 pounds per

67
00:02:43,740 --> 00:02:41,620
square foot for Ares 1x as compared to

68
00:02:46,500 --> 00:02:43,750
only 10 pounds per square foot for the

69
00:02:48,420 --> 00:02:46,510
Ares one design so this resulted in a

70
00:02:51,570 --> 00:02:48,430
stress case separation and was very

71
00:02:53,640 --> 00:02:51,580
successful one thing to watch during the

72
00:02:56,100 --> 00:02:53,650
descent of the booster is the trailing

73
00:02:58,350 --> 00:02:56,110
smoke from the nozzle this helps us to

74
00:03:00,420 --> 00:02:58,360
see the flight path of the descent which

75
00:03:03,120 --> 00:03:00,430
initially is horizontal to the earth and

76
00:03:05,670 --> 00:03:03,130
later as the vehicle slows will become

77
00:03:08,310 --> 00:03:05,680
more vertical early on in our

78
00:03:09,810 --> 00:03:08,320
engineering assessment for Ares 1x we

79
00:03:12,330 --> 00:03:09,820
were concerned we might have a nose

80
00:03:13,770 --> 00:03:12,340
first re-entry of the booster because of

81
00:03:16,410 --> 00:03:13,780
the forward in weight of the fifth

82
00:03:18,390 --> 00:03:16,420
segment simulator after several

83
00:03:20,490 --> 00:03:18,400
refinements to our weight and balance of

84
00:03:22,710 --> 00:03:20,500
the booster we got our predictions down

85
00:03:25,110 --> 00:03:22,720
to only a three percent probability of a

86
00:03:27,840 --> 00:03:25,120
nose first re-entry which proved to be

87
00:03:30,000 --> 00:03:27,850
valid our 1x flight test as the vehicle

88
00:03:32,520 --> 00:03:30,010

stabilized nozzle down for most of the

89
00:03:35,010 --> 00:03:32,530
descent several oscillations can be seen

90
00:03:37,170 --> 00:03:35,020
in the booster orientation and a speed

91
00:03:39,000 --> 00:03:37,180
decreases the flight path becomes nearly

92
00:03:41,460 --> 00:03:39,010
vertical as seen by the trailing smoke

93
00:03:43,920 --> 00:03:41,470
plume it is interesting to note that

94
00:03:45,720 --> 00:03:43,930
during the vertical descent there was a

95
00:03:47,400 --> 00:03:45,730
slow oscillation and the booster is

96
00:03:49,140 --> 00:03:47,410
actually at about a hundred and ten

97
00:03:52,199 --> 00:03:49,150
degree angle of attack to the flight

98
00:03:54,570 --> 00:03:52,209
path and the drogue chute deploys this

99
00:03:56,490 --> 00:03:54,580
results in several dramatic oscillations

100
00:03:58,440 --> 00:03:56,500
under the drogue but it performed

101
00:04:01,100 --> 00:03:58,450
beautifully and the booster stabilizes

102
00:04:03,720 --> 00:04:01,110
nicely after about four oscillations

103
00:04:05,610 --> 00:04:03,730
watch closely at the top of the booster

104
00:04:07,590 --> 00:04:05,620
the forward skirt extension is

105
00:04:10,350 --> 00:04:07,600
jettisoned and pulled away by the droge

106
00:04:12,180 --> 00:04:10,360
this entrains the risers of the three

107
00:04:14,370 --> 00:04:12,190
main parachutes for their initial

108
00:04:31,690 --> 00:04:14,380
inflation to the reef or partially

109
00:04:36,220 --> 00:04:33,940
all three shoots make it to a first

110
00:04:39,040 --> 00:04:36,230
inflation position but the shoot on the

111
00:04:40,840 --> 00:04:39,050
left quickly deflates and fails trailing

112
00:04:43,060 --> 00:04:40,850
a streamer which appears to strike the

113
00:04:46,960 --> 00:04:43,070

shoot in the middle perhaps damaging it

114
00:04:48,760 --> 00:04:46,970
as well so just prior to water entry we

115
00:04:51,370 --> 00:04:48,770
essentially have one and a half shoots

116
00:04:53,740 --> 00:04:51,380
suspending the booster also at this

117
00:04:55,570 --> 00:04:53,750
point you can see the nozzle extension

118
00:04:57,690 --> 00:04:55,580
pyro technically severed at the bottom

119
00:04:59,980 --> 00:04:57,700
of the booster just before water entry

120
00:05:02,380 --> 00:04:59,990
the booster hits at a higher velocity

121
00:05:04,600 --> 00:05:02,390
than planned which causes a hard slap

122
00:05:07,240 --> 00:05:04,610
down and buckling the aft segment motor

123
00:05:09,550 --> 00:05:07,250
case this has also been experienced in

124
00:05:11,710 --> 00:05:09,560
the shuttle program a total of eleven

125
00:05:13,780 --> 00:05:11,720
chute deployment failures have occurred

126
00:05:17,410 --> 00:05:13,790
in the life of the shuttle program most

127
00:05:19,950 --> 00:05:17,420
recently on sts-128 so we have abundant

128
00:05:23,290 --> 00:05:19,960
data to resolve this for future missions

129
00:05:26,080 --> 00:05:23,300
Ares 1x was also a parachute stress test

130
00:05:28,540 --> 00:05:26,090
as the booster was nearly 40,000 pounds

131
00:05:30,400 --> 00:05:28,550
heavier than an Ares 5 segment booster

132
00:05:33,310 --> 00:05:30,410
due to the hardware in the fifth segment

133
00:05:36,490 --> 00:05:33,320
simulator the parachutes were a world

134
00:05:38,380 --> 00:05:36,500
record-setting 150 foot diameter and

135
00:05:42,520 --> 00:05:38,390
were tested at a total payload weight

136
00:05:43,960 --> 00:05:42,530
for the first time during Ares 1x now

137
00:05:46,030 --> 00:05:43,970
that the booster is down in the water

138
00:05:48,250 --> 00:05:46,040

watch for the drogue and forward skirt

139
00:05:50,740 --> 00:05:48,260
extension to enter into the image just

140
00:05:53,100 --> 00:05:50,750
to the left of the booster all of these

141
00:05:55,630 --> 00:05:53,110
sequences worked exactly as designed

142
00:05:57,760 --> 00:05:55,640
today the booster is on dock at Cape

143
00:06:00,310 --> 00:05:57,770
Canaveral and is undergoing teardown

144
00:06:02,110 --> 00:06:00,320
inspections in the next few days we'll

145
00:06:04,870 --> 00:06:02,120
be able to recover the data recorders