
NASA LIVE
ARTEMIS I
HOT FIRE TEST

1
00:00:04,550 --> 00:00:02,790
t minus 15 seconds

2
00:00:05,430 --> 00:00:04,560
guidance is internal

3
00:00:06,470 --> 00:00:05,440
12

4
00:00:07,670 --> 00:00:06,480
11

5
00:00:09,030 --> 00:00:07,680
10

6
00:00:11,509 --> 00:00:09,040
9

7
00:00:12,549 --> 00:00:11,519
ignition sequence start

8
00:00:13,509 --> 00:00:12,559
5

9
00:00:14,549 --> 00:00:13,519
4

10
00:00:15,509 --> 00:00:14,559
3

11
00:00:21,349 --> 00:00:15,519
2

12
00:00:26,630 --> 00:00:23,910
you're looking at the historic b test

13
00:00:29,189 --> 00:00:26,640

complex at nasa's stennis space center

14
00:00:31,990 --> 00:00:29,199
where we're about to do a second green

15
00:00:34,310 --> 00:00:32,000
run hot fire test firing up the core

16
00:00:35,670 --> 00:00:34,320
stage of our new space launch system

17
00:00:38,549 --> 00:00:35,680
rocket

18
00:00:40,389 --> 00:00:38,559
good afternoon i'm lee d'angelo

19
00:00:42,389 --> 00:00:40,399
this stage we're testing today will be

20
00:00:44,630 --> 00:00:42,399
part of the rocket which will soon

21
00:00:46,869 --> 00:00:44,640
launch from nasa's kennedy space center

22
00:00:49,590 --> 00:00:46,879
on the artemis 1 mission

23
00:00:52,229 --> 00:00:49,600
that launch will send an uncrewed orion

24
00:00:53,189 --> 00:00:52,239
spacecraft beyond the moon and back to

25
00:00:55,510 --> 00:00:53,199
earth

26
00:00:57,590 --> 00:00:55,520
it's the first flight of the artemis

27
00:01:00,549 --> 00:00:57,600
program which will return american

28
00:01:03,189 --> 00:01:00,559
astronauts to the moon and pave the way

29
00:01:05,670 --> 00:01:03,199
for exploration of mars

30
00:01:08,070 --> 00:01:05,680
the space launch system will be the most

31
00:01:10,390 --> 00:01:08,080
powerful rocket in the world and is the

32
00:01:13,270 --> 00:01:10,400
only rocket that can send the orion

33
00:01:17,030 --> 00:01:13,280
spacecraft astronauts and supplies

34
00:01:19,749 --> 00:01:17,040
safely beyond the moon in one launch

35
00:01:21,510 --> 00:01:19,759
now we first tested this core stage on

36
00:01:24,870 --> 00:01:21,520
january 16th

37
00:01:27,910 --> 00:01:24,880
that marked a major milestone firing all

38
00:01:30,550 --> 00:01:27,920

four rs-25 engines together for the

39
00:01:33,749 --> 00:01:30,560
first time for about a minute

40
00:01:36,710 --> 00:01:33,759
however it ended earlier than planned so

41
00:01:38,069 --> 00:01:36,720
nasa and boeing decided to do a second

42
00:01:40,310 --> 00:01:38,079
test

43
00:01:42,230 --> 00:01:40,320
teams have been working hard to get to

44
00:01:44,630 --> 00:01:42,240
this point and the test countdown

45
00:01:46,950 --> 00:01:44,640
actually started a couple of days ago

46
00:01:49,109 --> 00:01:46,960
here to update us on where things stand

47
00:01:51,429 --> 00:01:49,119
is nasa public affairs officer catherine

48
00:01:53,670 --> 00:01:51,439
hamilton and headquarters green run

49
00:01:56,950 --> 00:01:53,680
manager bill robel in one of our test

50
00:01:59,590 --> 00:01:56,960
control centers here catherine

51
00:02:01,910 --> 00:01:59,600
thanks lee we're inside a secondary test

52
00:02:03,590 --> 00:02:01,920
complex outside of the control room and

53
00:02:05,109 --> 00:02:03,600
we're listening in to provide you

54
00:02:07,190 --> 00:02:05,119
updates as the team progresses through

55
00:02:09,589 --> 00:02:07,200
their steps for this operation we

56
00:02:10,790 --> 00:02:09,599
believe we're within about 45 minutes of

57
00:02:13,190 --> 00:02:10,800
the hot fire

58
00:02:16,070 --> 00:02:13,200
the team actually started two days ago

59
00:02:17,510 --> 00:02:16,080
powering up the avionics on march 16th

60
00:02:19,910 --> 00:02:17,520
and they checked out all the systems

61
00:02:21,910 --> 00:02:19,920
that they had tested on previous tests

62
00:02:24,869 --> 00:02:21,920
earlier this morning they conducted a go

63
00:02:26,949 --> 00:02:24,879

no-go poll to proceed into the test and

64
00:02:28,710 --> 00:02:26,959
i have bill robel here with me to tell

65
00:02:30,229 --> 00:02:28,720
us a little bit more bill can you tell

66
00:02:31,910 --> 00:02:30,239
us about how the operations have

67
00:02:33,910 --> 00:02:31,920
progressed today

68
00:02:35,910 --> 00:02:33,920
yeah sure will so

69
00:02:38,550 --> 00:02:35,920
at this point we've been in uh kind of

70
00:02:41,670 --> 00:02:38,560
replenish mold mode for both the liquid

71
00:02:44,869 --> 00:02:41,680
oxygen and liquid oxygen liquid hydrogen

72
00:02:47,509 --> 00:02:44,879
we've got at this point 540 000 gallons

73
00:02:50,229 --> 00:02:47,519
of liquid hydrogen on board and another

74
00:02:51,110 --> 00:02:50,239
200 000 gallons of liquid oxygen on

75
00:02:52,710 --> 00:02:51,120
board

76
00:02:54,710 --> 00:02:52,720
and they're in the conditioning process

77
00:02:56,470 --> 00:02:54,720
right now we're trying to get that uh

78
00:02:57,990 --> 00:02:56,480
temperature down as low as we can get it

79
00:02:58,710 --> 00:02:58,000
within the start box

80
00:03:00,149 --> 00:02:58,720
uh

81
00:03:01,990 --> 00:03:00,159
and we're also doing the same thing on

82
00:03:04,149 --> 00:03:02,000
the engine side of things

83
00:03:05,910 --> 00:03:04,159
and what's important about all of this

84
00:03:07,110 --> 00:03:05,920
is that you know this timeline that

85
00:03:09,509 --> 00:03:07,120
we're going through here will help

86
00:03:11,830 --> 00:03:09,519
inform the operations that'll take place

87
00:03:13,110 --> 00:03:11,840
down at kennedy space center where not

88
00:03:14,710 --> 00:03:13,120

only do they have these things to worry

89
00:03:16,710 --> 00:03:14,720
about but then they've also got to do

90
00:03:18,550 --> 00:03:16,720
things where they're getting people on

91
00:03:19,910 --> 00:03:18,560
board and taking care of all the other

92
00:03:21,670 --> 00:03:19,920
extraneous things that they have to do

93
00:03:23,910 --> 00:03:21,680
down there

94
00:03:25,589 --> 00:03:23,920
so for for us here right we've also been

95
00:03:27,750 --> 00:03:25,599
monitoring things like the battery

96
00:03:29,350 --> 00:03:27,760
charging uh they're they're basically up

97
00:03:31,990 --> 00:03:29,360
to speed at this point

98
00:03:33,910 --> 00:03:32,000
and then we've got the the redundant

99
00:03:35,990 --> 00:03:33,920
inertial navigation unit

100
00:03:38,229 --> 00:03:36,000
wet checkout which is basically you know

101
00:03:39,830 --> 00:03:38,239
mounted up in the lox dome area and so

102
00:03:41,190 --> 00:03:39,840
they're looking to see how it behaves

103
00:03:42,630 --> 00:03:41,200
relative to the low temperatures that

104
00:03:44,309 --> 00:03:42,640
we're seeing now in that in that

105
00:03:46,229 --> 00:03:44,319
compartment

106
00:03:47,750 --> 00:03:46,239
and so at this point too the teams are

107
00:03:49,910 --> 00:03:47,760
basically looking at all their data

108
00:03:51,750 --> 00:03:49,920
making sure that uh their systems are

109
00:03:53,990 --> 00:03:51,760
are where they're supposed to be

110
00:03:57,990 --> 00:03:54,000
uh and ready to go for uh proceeding

111
00:04:01,750 --> 00:03:59,750
thanks bill and can you tell us a bit

112
00:04:04,869 --> 00:04:01,760
how the timeline is different for

113
00:04:06,470 --> 00:04:04,879

today's test than uh for uh for launch

114
00:04:08,630 --> 00:04:06,480
and how is determining the time of the

115
00:04:11,110 --> 00:04:08,640
hot fire different from you know setting

116
00:04:13,110 --> 00:04:11,120
the time for a launch

117
00:04:15,030 --> 00:04:13,120
yeah so for us it's it's actually uh

118
00:04:16,469 --> 00:04:15,040
we're in a pretty good spot we're trying

119
00:04:18,870 --> 00:04:16,479
to at this point

120
00:04:21,110 --> 00:04:18,880
uh maximize the amount of commodities

121
00:04:21,990 --> 00:04:21,120
that we've got here in the test facility

122
00:04:22,710 --> 00:04:22,000
so

123
00:04:23,990 --> 00:04:22,720
uh

124
00:04:26,230 --> 00:04:24,000
we're playing a little bit of a game

125
00:04:27,430 --> 00:04:26,240
where you we've got crews that now that

126
00:04:29,670 --> 00:04:27,440
have been on for

127
00:04:31,990 --> 00:04:29,680
a number of hours and

128
00:04:33,590 --> 00:04:32,000
12 hours roughly they'll timeout

129
00:04:35,270 --> 00:04:33,600
we want to make sure that we don't have

130
00:04:37,189 --> 00:04:35,280
to end the operation any other than that

131
00:04:39,270 --> 00:04:37,199
so we're really trying to maximize that

132
00:04:40,870 --> 00:04:39,280
so then the process of working that with

133
00:04:45,270 --> 00:04:40,880
the nitrogen and

134
00:04:47,030 --> 00:04:45,280
helium liquid oxygen and liquid hydrogen

135
00:04:48,950 --> 00:04:47,040
the other part of it is right the beauty

136
00:04:52,390 --> 00:04:48,960
of us is we're in a test we're not going

137
00:04:54,710 --> 00:04:52,400
anywhere today and so um we don't have a

138
00:04:57,350 --> 00:04:54,720

destination our destination is is right

139
00:04:58,870 --> 00:04:57,360
here and the difference right at kennedy

140
00:05:01,189 --> 00:04:58,880
is they've got you know the orbital

141
00:05:02,870 --> 00:05:01,199
mechanics uh the their destination is to

142
00:05:05,029 --> 00:05:02,880
where they're going to go and so they

143
00:05:08,230 --> 00:05:05,039
have to work basically all those details

144
00:05:09,830 --> 00:05:08,240
in to their uh exact launch window our

145
00:05:11,350 --> 00:05:09,840
our launch window is basically when we

146
00:05:13,590 --> 00:05:11,360
start the test and and that doesn't

147
00:05:15,110 --> 00:05:13,600
matter too much today but but they do

148
00:05:17,029 --> 00:05:15,120
have a you know they have they've got a

149
00:05:19,510 --> 00:05:17,039
real time hack that they have to hit so

150
00:05:21,909 --> 00:05:19,520
they'll have uh built-in holds into

151
00:05:23,990 --> 00:05:21,919
their process and procedures down there

152
00:05:26,230 --> 00:05:24,000
and that'll inform them kind of how they

153
00:05:27,670 --> 00:05:26,240
move through the next steps

154
00:05:30,629 --> 00:05:27,680
we just are fortunate we don't have to

155
00:05:34,230 --> 00:05:32,390
great thanks so that means that we don't

156
00:05:36,070 --> 00:05:34,240
have a specific hot fire target time

157
00:05:37,430 --> 00:05:36,080
right now at this moment

158
00:05:40,070 --> 00:05:37,440
but we'll keep listening in and we'll

159
00:05:41,830 --> 00:05:40,080
provide updates uh we do know that the

160
00:05:43,670 --> 00:05:41,840
test remains to be projected within the

161
00:05:45,830 --> 00:05:43,680
test window and we believe we're within

162
00:05:47,749 --> 00:05:45,840
about 45 minutes and so uh we'll

163
00:05:56,150 --> 00:05:47,759

continue to listen in here and i'll turn

164
00:05:59,029 --> 00:05:57,670
thanks catherine and bill and we will

165
00:06:00,710 --> 00:05:59,039
come back to you in just a few minutes

166
00:06:02,629 --> 00:06:00,720
like you said to take us all the way to

167
00:06:04,790 --> 00:06:02,639
the test or sooner if you have any

168
00:06:06,070 --> 00:06:04,800
updates for us we will be listening in

169
00:06:06,950 --> 00:06:06,080
and i'll head right back to you if you

170
00:06:09,670 --> 00:06:06,960
do

171
00:06:11,510 --> 00:06:09,680
now if you are just joining us welcome

172
00:06:13,270 --> 00:06:11,520
we're live at nasa's stennis space

173
00:06:15,830 --> 00:06:13,280
center in mississippi and we're

174
00:06:18,230 --> 00:06:15,840
following the second green run hot fire

175
00:06:19,670 --> 00:06:18,240
test of the space launch system rockets

176
00:06:24,309 --> 00:06:19,680
core stage

177
00:06:28,070 --> 00:06:24,319
rocket that includes two propellant

178
00:06:31,110 --> 00:06:28,080
tanks and four rs-25 engines miles of

179
00:06:33,670 --> 00:06:31,120
cables all of the avionics electronics

180
00:06:35,749 --> 00:06:33,680
computers the brains of the rocket and

181
00:06:37,830 --> 00:06:35,759
all of the plumbing that work together

182
00:06:40,150 --> 00:06:37,840
to launch the rocket during the first

183
00:06:42,870 --> 00:06:40,160
eight minutes of the mission

184
00:06:45,350 --> 00:06:42,880
the green in green run refers to new

185
00:06:48,309 --> 00:06:45,360
untested rocket hardware so this is a

186
00:06:50,950 --> 00:06:48,319
comprehensive series of tests of all the

187
00:06:53,350 --> 00:06:50,960
core stage hardware for the sls rocket

188
00:06:56,230 --> 00:06:53,360

to demonstrate it's ready for launch

189
00:06:58,790 --> 00:06:56,240
culminating with today's hot fire

190
00:07:01,189 --> 00:06:58,800
the core stage will power every sls

191
00:07:04,070 --> 00:07:01,199
mission so this test is important not

192
00:07:06,550 --> 00:07:04,080
just for artemis one but for all future

193
00:07:09,510 --> 00:07:06,560
sls launches as well

194
00:07:12,309 --> 00:07:09,520
those rs-25 engines are expected to fire

195
00:07:14,390 --> 00:07:12,319
up shortly here at stennis space center

196
00:07:24,550 --> 00:07:14,400
before that happens let's get a closer

197
00:07:29,909 --> 00:07:27,189
super heavy lift rocket and provides the

198
00:07:33,189 --> 00:07:29,919
foundation for human exploration and

199
00:07:35,430 --> 00:07:33,199
scientific missions to the moon mars and

200
00:07:38,309 --> 00:07:35,440
beyond

201
00:07:41,830 --> 00:07:38,319
powered by two solid rocket boosters and

202
00:07:44,550 --> 00:07:41,840
four rs-25 engines this rocket provides

203
00:07:47,350 --> 00:07:44,560
unprecedented power and capability

204
00:07:50,150 --> 00:07:47,360
designed to reach 23 times the speed of

205
00:07:53,589 --> 00:07:50,160
sound and an altitude of more than 100

206
00:07:57,189 --> 00:07:53,599
miles in just over 8 minutes offering

207
00:07:59,990 --> 00:07:57,199
more energy volume capacity and payload

208
00:08:02,550 --> 00:08:00,000
mass than any rocket built today under

209
00:08:05,270 --> 00:08:02,560
the launch abort system orion and the

210
00:08:07,749 --> 00:08:05,280
upper stage and between two solid rocket

211
00:08:10,629 --> 00:08:07,759
boosters is the heart of every sls

212
00:08:15,430 --> 00:08:10,639
configuration the core stage towering

213
00:08:18,950 --> 00:08:15,440

212 feet with a diameter of 27.6 feet

214
00:08:23,029 --> 00:08:18,960
and storing 537 000 gallons of liquid

215
00:08:26,150 --> 00:08:23,039
hydrogen and 196 000 gallons of liquid

216
00:08:28,230 --> 00:08:26,160
oxygen this is the world's largest core

217
00:08:30,790 --> 00:08:28,240
stage ever built

218
00:08:33,670 --> 00:08:30,800
the core stage for artemis one fires up

219
00:08:36,550 --> 00:08:33,680
for the first time at nasa's historic v2

220
00:08:41,350 --> 00:08:38,949
the core stage was designed by nasa's

221
00:08:44,470 --> 00:08:41,360
sls program at our marshall space flight

222
00:08:46,790 --> 00:08:44,480
center in huntsville alabama then built

223
00:08:48,870 --> 00:08:46,800
by lead contractor boeing using

224
00:08:50,710 --> 00:08:48,880
state-of-the-art manufacturing just down

225
00:08:53,509 --> 00:08:50,720
the road at nasa's mishu assembly

226
00:08:55,990 --> 00:08:53,519
facility in my hometown new orleans and

227
00:08:58,230 --> 00:08:56,000
it includes engines manufactured by

228
00:09:01,269 --> 00:08:58,240
aerodyn aerojet rocketdyne with

229
00:09:04,710 --> 00:09:01,279
contributions from more than 1100 large

230
00:09:07,110 --> 00:09:04,720
and small businesses in 44 states

231
00:09:09,829 --> 00:09:07,120
it was shipped up here onto stennis on

232
00:09:12,230 --> 00:09:09,839
the pegasus barge in january of last

233
00:09:14,870 --> 00:09:12,240
year and then installed on the b2 test

234
00:09:16,790 --> 00:09:14,880
stand where you see it here today

235
00:09:19,350 --> 00:09:16,800
engineers then begin activating the

236
00:09:21,750 --> 00:09:19,360
stage's components one by one and taking

237
00:09:24,710 --> 00:09:21,760
it through the series of tests that make

238
00:09:27,110 --> 00:09:24,720

up the green run over the past year

239
00:09:29,509 --> 00:09:27,120
each test built upon the previous one

240
00:09:31,829 --> 00:09:29,519
and added a little more complexity

241
00:09:34,630 --> 00:09:31,839
so today's hot fire builds on all of

242
00:09:37,350 --> 00:09:34,640
that work for a full test of the entire

243
00:09:39,990 --> 00:09:37,360
integrated system that will simulate all

244
00:09:50,310 --> 00:09:40,000
parts of the core stage working together

245
00:09:55,990 --> 00:09:53,030
today's test will take us from extreme

246
00:09:58,470 --> 00:09:56,000
cold to extreme hot as the team loads

247
00:10:00,710 --> 00:09:58,480
cryogenic our super cold propellants

248
00:10:02,710 --> 00:10:00,720
into the fuel tanks and then fires up

249
00:10:05,430 --> 00:10:02,720
the engines to drain the propellant from

250
00:10:07,910 --> 00:10:05,440
the tanks to simulate launch

251
00:10:10,550 --> 00:10:07,920
now the hottest part of the test today

252
00:10:12,630 --> 00:10:10,560
will be those four rs-25 engines at the

253
00:10:15,829 --> 00:10:12,640
bottom of the core stage

254
00:10:18,550 --> 00:10:15,839
these rs-25s we are testing today are

255
00:10:21,110 --> 00:10:18,560
repurposed from the shuttle program

256
00:10:23,590 --> 00:10:21,120
these four engines flew on some pretty

257
00:10:25,750 --> 00:10:23,600
iconic shuttle missions including one of

258
00:10:28,389 --> 00:10:25,760
the hubble space telescope servicing

259
00:10:31,670 --> 00:10:28,399
missions the historic return to space of

260
00:10:34,150 --> 00:10:31,680
mercury astronaut and senator john glenn

261
00:10:38,150 --> 00:10:34,160
six flights to the space station and the

262
00:10:40,550 --> 00:10:38,160
final shuttle space mission in 2011.

263
00:10:43,030 --> 00:10:40,560

so you can trace a direct line from that

264
00:10:45,430 --> 00:10:43,040
final shuttle flight to the first flight

265
00:10:46,870 --> 00:10:45,440
of sls

266
00:10:49,670 --> 00:10:46,880
we've worked with our partners at

267
00:10:51,829 --> 00:10:49,680
aerojet rocketdyne to upgrade the 16

268
00:10:54,949 --> 00:10:51,839
shuttle main engines which will power

269
00:10:58,230 --> 00:10:54,959
the first four artemis flights

270
00:11:00,069 --> 00:10:58,240
and now we're building 24 new engines

271
00:11:02,790 --> 00:11:00,079
using 3d printing and other

272
00:11:06,150 --> 00:11:02,800
manufacturing innovations to reduce cost

273
00:11:08,550 --> 00:11:06,160
complexity and manufacturing time

274
00:11:10,550 --> 00:11:08,560
of course all of this work is building

275
00:11:12,949 --> 00:11:10,560
towards that artemis one launch from

276
00:11:15,030 --> 00:11:12,959
kennedy space center later this year

277
00:11:17,430 --> 00:11:15,040
here's a closer look at that mission and

278
00:11:20,470 --> 00:11:17,440
how it paves the way for future

279
00:11:21,509 --> 00:11:20,480
exploration beyond

280
00:11:22,470 --> 00:11:21,519
three

281
00:11:27,110 --> 00:11:22,480
two

282
00:11:32,150 --> 00:11:29,509
artemis 1 will lift off from launch pad

283
00:11:35,350 --> 00:11:32,160
39b at nasa's kennedy space center in

284
00:11:37,670 --> 00:11:35,360
florida with 8.8 million pounds of

285
00:11:39,829 --> 00:11:37,680
thrust provided by the most powerful

286
00:11:43,110 --> 00:11:39,839
rocket in the world our space launch

287
00:11:46,150 --> 00:11:43,120
system rocket or sls the uncrewed flight

288
00:11:48,870 --> 00:11:46,160

will be the first integrated test of sls

289
00:11:50,870 --> 00:11:48,880
our new orion spacecraft and exploration

290
00:11:53,350 --> 00:11:50,880
ground systems at kennedy

291
00:11:57,269 --> 00:11:53,360
artemis one will send orion beyond the

292
00:12:00,550 --> 00:11:57,279
moon 280 000 miles from earth farther

293
00:12:02,710 --> 00:12:00,560
than any human spacecraft has ever flown

294
00:12:04,470 --> 00:12:02,720
this is not nasa doing this this is the

295
00:12:06,550 --> 00:12:04,480
united states of america doing this this

296
00:12:08,470 --> 00:12:06,560
program the artemis program and there

297
00:12:10,550 --> 00:12:08,480
are companies all across our country

298
00:12:11,990 --> 00:12:10,560
that have a part in it so there is kind

299
00:12:13,750 --> 00:12:12,000
of this wave of excitement being

300
00:12:15,430 --> 00:12:13,760
generated just by saying we're going

301
00:12:17,110 --> 00:12:15,440
back to the moon

302
00:12:19,350 --> 00:12:17,120
after the upper stage of the rocket

303
00:12:21,269 --> 00:12:19,360
separates from orion the upper stage

304
00:12:23,110 --> 00:12:21,279
will deploy small satellites over

305
00:12:24,550 --> 00:12:23,120
several days to perform science

306
00:12:25,829 --> 00:12:24,560
experiments and technology

307
00:12:28,310 --> 00:12:25,839
demonstrations

308
00:12:30,389 --> 00:12:28,320
orion will make its multi-day outbound

309
00:12:32,550 --> 00:12:30,399
trip to the moon propelled by a service

310
00:12:33,590 --> 00:12:32,560
module provided by the european space

311
00:12:35,750 --> 00:12:33,600
agency

312
00:12:38,389 --> 00:12:35,760
engineers will test orion's systems on

313
00:12:41,190 --> 00:12:38,399

the way to the moon then orion will fly

314
00:12:43,350 --> 00:12:41,200
about 60 miles above the lunar surface

315
00:12:45,430 --> 00:12:43,360
using the moon's gravity and engines on

316
00:12:47,430 --> 00:12:45,440
the surface module to enter a lunar

317
00:12:49,829 --> 00:12:47,440
orbit

318
00:12:52,470 --> 00:12:49,839
after about a month and a total distance

319
00:12:55,269 --> 00:12:52,480
of over a million miles orion will

320
00:12:58,389 --> 00:12:55,279
return home faster and hotter than any

321
00:13:01,590 --> 00:12:58,399
spacecraft has before a primary goal of

322
00:13:04,310 --> 00:13:01,600
artemis 1 ensure orion safely returns to

323
00:13:06,389 --> 00:13:04,320
earth before we fly with humans when we

324
00:13:09,110 --> 00:13:06,399
do we'll build our capability for

325
00:13:11,269 --> 00:13:09,120
sustainable lunar exploration preparing

326
00:13:15,269 --> 00:13:11,279
us for missions farther into the solar

327
00:13:19,350 --> 00:13:17,110
initially what we'd like to do is start

328
00:13:20,629 --> 00:13:19,360
establishing a presence on the moon so

329
00:13:22,550 --> 00:13:20,639
we're going to establish going back

330
00:13:25,110 --> 00:13:22,560
there on a regular basis and then we'll

331
00:13:27,509 --> 00:13:25,120
end up setting up gateway and we would

332
00:13:31,030 --> 00:13:27,519
launch to the gateway and from gateway

333
00:13:35,350 --> 00:13:33,430
we are there for you know weeks months

334
00:13:36,710 --> 00:13:35,360
on end and there we're gonna be able to

335
00:13:38,710 --> 00:13:36,720
test out all the hardware and the

336
00:13:41,189 --> 00:13:38,720
habitats and the hatches and the suits

337
00:13:44,150 --> 00:13:41,199
and the rovers that'll allow us to prove

338
00:13:47,110 --> 00:13:45,750

the moon will lead the way to mars and

339
00:13:48,530 --> 00:13:47,120
we should be there you know within the

340
00:13:53,189 --> 00:13:48,540
next couple decades

341
00:13:56,870 --> 00:13:54,710
just amazing

342
00:13:58,550 --> 00:13:56,880
and now we are going to hand things over

343
00:14:00,829 --> 00:13:58,560
to catherine and bill again in the

344
00:14:03,509 --> 00:14:00,839
control center

345
00:14:05,670 --> 00:14:03,519
catherine thanks lee we are in the

346
00:14:07,590 --> 00:14:05,680
secondary test control

347
00:14:09,350 --> 00:14:07,600
and uh outside the control room here

348
00:14:11,509 --> 00:14:09,360
listening in so that we can provide you

349
00:14:13,910 --> 00:14:11,519
updates uh bill can you give us an

350
00:14:16,230 --> 00:14:13,920
update on how things are progressing

351
00:14:18,790 --> 00:14:16,240
yeah so they're uh in the process now of

352
00:14:21,350 --> 00:14:18,800
uh going through the final checks are

353
00:14:23,750 --> 00:14:21,360
everything's really nicely

354
00:14:25,910 --> 00:14:23,760
going really great today so uh

355
00:14:27,110 --> 00:14:25,920
everything's right on schedule nominal

356
00:14:28,550 --> 00:14:27,120
they're trying to do this thing what

357
00:14:29,829 --> 00:14:28,560
they call right now is jump the clock

358
00:14:31,430 --> 00:14:29,839
which is trying to work it a little bit

359
00:14:33,509 --> 00:14:31,440
ahead so they're in the process of

360
00:14:35,030 --> 00:14:33,519
resetting the clock and making sure that

361
00:14:36,710 --> 00:14:35,040
when they get to that 10 minute point

362
00:14:38,150 --> 00:14:36,720
that it doesn't continue to count down

363
00:14:40,150 --> 00:14:38,160

because that's that's where they have to

364
00:14:41,990 --> 00:14:40,160
go that pole well ahead of that so

365
00:14:44,949 --> 00:14:42,000
they're working on setting that stuff up

366
00:14:45,829 --> 00:14:44,959
right now

367
00:14:48,230 --> 00:14:45,839
all right

368
00:14:50,710 --> 00:14:48,240
so we'll continue to stand by and listen

369
00:14:52,550 --> 00:14:50,720
and provide updates and as we mentioned

370
00:14:55,350 --> 00:14:52,560
earlier the team previously conducted a

371
00:14:57,030 --> 00:14:55,360
hot fire test in january the engines did

372
00:14:59,670 --> 00:14:57,040
shut down earlier than planned during

373
00:15:01,110 --> 00:14:59,680
that test but the january 16th test

374
00:15:03,430 --> 00:15:01,120
successfully completed several

375
00:15:04,949 --> 00:15:03,440
operations for the first time

376
00:15:07,030 --> 00:15:04,959
they were able to transition to the

377
00:15:08,470 --> 00:15:07,040
automated launch sequence

378
00:15:11,030 --> 00:15:08,480
operated by the core stage flight

379
00:15:12,550 --> 00:15:11,040
computer and the green run test software

380
00:15:13,910 --> 00:15:12,560
they completed the terminal countdown

381
00:15:15,350 --> 00:15:13,920
sequence that is like the launch

382
00:15:16,870 --> 00:15:15,360
countdown

383
00:15:18,629 --> 00:15:16,880
they also pressurized the tanks and

384
00:15:20,389 --> 00:15:18,639
delivered the propellant to the engines

385
00:15:22,870 --> 00:15:20,399
and demonstrated the performance of the

386
00:15:26,710 --> 00:15:22,880
core stage as main propulsion system

387
00:15:28,150 --> 00:15:26,720
firing the engines at 109 power and they

388
00:15:30,310 --> 00:15:28,160

operated the thrust vector control

389
00:15:33,110 --> 00:15:30,320
system that steers the engines

390
00:15:35,829 --> 00:15:33,120
so it's a smooth countdown so far today

391
00:15:37,829 --> 00:15:35,839
and we'll keep standing by we'll take a

392
00:18:58,980 --> 00:15:37,839
pause for here for a moment and we'll

393
00:18:58,990 --> 00:20:23,350
[Applause]

394
00:20:27,029 --> 00:20:26,230
the b1 b2 test stand that you're seeing

395
00:20:29,110 --> 00:20:27,039
there

396
00:20:31,909 --> 00:20:29,120
is a dual position vertical firing

397
00:20:34,630 --> 00:20:31,919
facility with the b1

398
00:20:37,669 --> 00:20:34,640
side equipped for single engine tests

399
00:20:39,270 --> 00:20:37,679
and the b2 side designed for

400
00:20:41,230 --> 00:20:39,280
rocket stages

401
00:20:44,549 --> 00:20:41,240
the stand is anchored to the ground with

402
00:20:46,070 --> 00:20:44,559
144 feet of steel and concrete

403
00:20:49,750 --> 00:20:46,080
we talked a little bit about the history

404
00:20:51,510 --> 00:20:49,760
of the rs25 engines and the b2 stand

405
00:20:53,510 --> 00:20:51,520
which is where the sls core stage is

406
00:20:55,029 --> 00:20:53,520
secured now also has quite a bit of

407
00:20:57,590 --> 00:20:55,039
history

408
00:21:00,070 --> 00:20:57,600
it was used in the 1960s to test saturn

409
00:21:02,390 --> 00:21:00,080
v rocket stages that carried humans to

410
00:21:04,230 --> 00:21:02,400
the moon during the apollo program

411
00:21:06,789 --> 00:21:04,240
and the space shuttle main propulsion

412
00:21:08,710 --> 00:21:06,799
test article consisting of

413
00:21:10,950 --> 00:21:08,720

an external tank and three main engines

414
00:21:16,149 --> 00:21:10,960
linked together with a simulated shuttle

415
00:21:18,950 --> 00:21:16,159
orbiter was also tested on the v2 stand

416
00:21:21,350 --> 00:21:18,960
the b2 stand has been modified to test

417
00:21:23,029 --> 00:21:21,360
the sls core stage for the artemis

418
00:21:24,230 --> 00:21:23,039
program that will return humans to the

419
00:21:26,950 --> 00:21:24,240
moon

420
00:21:29,029 --> 00:21:26,960
with a new steel superstructure added

421
00:21:32,149 --> 00:21:29,039
for testing the sls core stage the stand

422
00:21:33,669 --> 00:21:32,159
is now almost 350 feet high

423
00:22:19,909 --> 00:21:33,679
ranking it as one of the tallest

424
00:22:23,669 --> 00:22:22,230
for a little bit more about the rs25

425
00:22:29,029 --> 00:22:23,679
engines

426
00:22:30,710 --> 00:22:29,039
size of a compact car if the engine were

427
00:22:33,430 --> 00:22:30,720
turned on its side

428
00:22:35,430 --> 00:22:33,440
standing up they are each 14 feet tall

429
00:22:37,350 --> 00:22:35,440
and eight feet in diameter

430
00:22:39,350 --> 00:22:37,360
they each weigh about eight thousand

431
00:22:41,669 --> 00:22:39,360
pounds

432
00:22:44,510 --> 00:22:41,679
the rs-25 is designed to operate in

433
00:22:47,190 --> 00:22:44,520
extreme temperatures from negative

434
00:22:49,990 --> 00:22:47,200
423 degrees fahrenheit to

435
00:22:52,230 --> 00:22:50,000
6000 degrees fahrenheit and as we

436
00:22:55,590 --> 00:22:52,240
mentioned today's test will go from

437
00:22:57,990 --> 00:22:55,600
extreme cold to extreme hot

438
00:22:59,110 --> 00:22:58,000

when the hot gases exit the rs-25s

439
00:23:01,590 --> 00:22:59,120
nozzle

440
00:23:04,070 --> 00:23:01,600
they travel at 13 times the speed of

441
00:23:06,710 --> 00:23:04,080
sound which is fast enough to travel

442
00:23:09,590 --> 00:23:06,720
from los angeles to new york city in

443
00:23:12,549 --> 00:23:09,600
about 15 minutes

444
00:23:13,510 --> 00:23:12,559
the core stage itself stands 212 feet

445
00:23:17,430 --> 00:23:13,520
tall

446
00:23:20,390 --> 00:23:17,440
and at a diameter of 27.6 feet and

447
00:25:40,070 --> 00:23:20,400
weighs about 2.3 million pounds when

448
00:25:45,590 --> 00:25:41,990
so the next major milestone coming up

449
00:25:47,110 --> 00:25:45,600
will be the pull for the terminal count

450
00:25:48,310 --> 00:25:47,120
it's the last 10 minutes of the

451
00:25:50,230 --> 00:25:48,320
countdown

452
00:25:51,830 --> 00:25:50,240
bill can you tell us a little bit about

453
00:25:53,669 --> 00:25:51,840
what we can expect to hear during the

454
00:25:54,710 --> 00:25:53,679
terminal count

455
00:25:56,310 --> 00:25:54,720
yeah so

456
00:25:58,390 --> 00:25:56,320
just ahead of terminal account we'll

457
00:25:59,669 --> 00:25:58,400
hopefully get that call they'll do a

458
00:26:01,750 --> 00:25:59,679
poll

459
00:26:03,190 --> 00:26:01,760
which is all the members of the team

460
00:26:05,830 --> 00:26:03,200
basically getting their go for going

461
00:26:09,190 --> 00:26:05,840
into that terminal account sequencer and

462
00:26:11,990 --> 00:26:09,200
then once we actually get into it

463
00:26:14,630 --> 00:26:12,000

there's at least 500 different events

464
00:26:16,310 --> 00:26:14,640
that take place in that last 10 minutes

465
00:26:17,190 --> 00:26:16,320
so i'll not uh go through each one of

466
00:26:19,350 --> 00:26:17,200
those

467
00:26:21,190 --> 00:26:19,360
with you but i there are some uh pretty

468
00:26:23,110 --> 00:26:21,200
good ones i think that highlight you

469
00:26:24,710 --> 00:26:23,120
know kind of what what the major ones

470
00:26:26,149 --> 00:26:24,720
should be or are

471
00:26:30,310 --> 00:26:26,159
we've got

472
00:26:34,070 --> 00:26:32,789
and then we've also got

473
00:26:37,669 --> 00:26:34,080
to

474
00:26:40,710 --> 00:26:37,679
operations which is where they'll

475
00:26:42,870 --> 00:26:40,720
pressurize the hydrogen tank

476
00:26:44,230 --> 00:26:42,880
it'll start doing that on its own as

477
00:26:46,870 --> 00:26:44,240
well

478
00:26:48,870 --> 00:26:46,880
initiate ground helium spin start supply

479
00:26:50,630 --> 00:26:48,880
to the cappus so initially when the

480
00:26:52,230 --> 00:26:50,640
kappas come up they'll be running off of

481
00:26:59,909 --> 00:26:52,240
uh

482
00:27:01,029 --> 00:26:59,919
the engines when they when they come up

483
00:27:03,909 --> 00:27:01,039
as part of the place a little bit about

484
00:27:06,149 --> 00:27:03,919
what the capos are yeah so that's

485
00:27:08,230 --> 00:27:06,159
the core stage auxiliary power units

486
00:27:10,549 --> 00:27:08,240
they're variants of the uh ones that

487
00:27:12,070 --> 00:27:10,559
were flown on shuttle the difference is

488
00:27:13,909 --> 00:27:12,080

is that where those were hydrazine

489
00:27:15,190 --> 00:27:13,919
powered uh these are basically runoff

490
00:27:17,510 --> 00:27:15,200
inert gas

491
00:27:19,590 --> 00:27:17,520
and then into hydrogen off of the

492
00:27:21,110 --> 00:27:19,600
engines when they get into the plus

493
00:27:23,590 --> 00:27:21,120
count

494
00:27:25,590 --> 00:27:23,600
so it's it's basically the

495
00:27:27,990 --> 00:27:25,600
it's basically a turbine system

496
00:27:30,870 --> 00:27:28,000
that uh spins a uh

497
00:27:32,870 --> 00:27:30,880
a pump and that pump then in turn uh

498
00:27:35,830 --> 00:27:32,880
pressurizes the uh

499
00:27:37,590 --> 00:27:35,840
the oil in that system and through a

500
00:27:39,350 --> 00:27:37,600
series of valves and commands they could

501
00:27:40,549 --> 00:27:39,360
then go ahead and actuate the actuators

502
00:27:43,350 --> 00:27:40,559
that are mounted to each of the engines

503
00:27:49,430 --> 00:27:46,549
after that we'll get into

504
00:27:51,430 --> 00:27:49,440
the liquid oxygen terminate uh and

505
00:27:52,789 --> 00:27:51,440
liquid oxygen replenish will stop that

506
00:27:53,750 --> 00:27:52,799
operation

507
00:27:54,710 --> 00:27:53,760
um

508
00:27:56,630 --> 00:27:54,720
and then

509
00:27:58,950 --> 00:27:56,640
we'll go into caffu starts and that's

510
00:28:00,789 --> 00:27:58,960
where each one of this those

511
00:28:03,590 --> 00:28:00,799
core stage auxiliary power units will be

512
00:28:05,350 --> 00:28:03,600
powered up and that takes you know on

513
00:28:06,789 --> 00:28:05,360

the order of about 30 seconds to bring

514
00:28:08,710 --> 00:28:06,799
each one of those units up they're done

515
00:28:10,310 --> 00:28:08,720
individually

516
00:28:12,950 --> 00:28:10,320
and then they they

517
00:28:15,029 --> 00:28:12,960
basically move into

518
00:28:17,350 --> 00:28:15,039
transitioning until the lox tank

519
00:28:20,789 --> 00:28:17,360
pressurization operations

520
00:28:23,269 --> 00:28:20,799
they do a tvc

521
00:28:24,310 --> 00:28:23,279
gimbal profile on helium so that's

522
00:28:25,669 --> 00:28:24,320
actually

523
00:28:27,430 --> 00:28:25,679
something different that you won't see

524
00:28:30,549 --> 00:28:27,440
in the plus count in other words we do a

525
00:28:32,630 --> 00:28:30,559
lot of actuation of the tvc system in

526
00:28:35,269 --> 00:28:32,640
that but we don't move it as far because

527
00:28:36,230 --> 00:28:35,279
of the limits we've got in the stand for

528
00:28:38,630 --> 00:28:36,240
how hard

529
00:28:39,510 --> 00:28:38,640
are you moving it relative to having you

530
00:28:42,470 --> 00:28:39,520
know the

531
00:28:44,230 --> 00:28:42,480
the engines burning at that time so in

532
00:28:46,149 --> 00:28:44,240
the pre-count we'll basically get the

533
00:28:48,549 --> 00:28:46,159
full movement the full gimbal full

534
00:28:49,909 --> 00:28:48,559
displacement and then uh once they get

535
00:28:51,909 --> 00:28:49,919
into the plus count they will not do

536
00:28:54,310 --> 00:28:51,919
that but they'll do some other things

537
00:28:55,269 --> 00:28:54,320
um and then uh after after that's

538
00:28:56,830 --> 00:28:55,279

complete

539
00:29:00,310 --> 00:28:56,840
uh they'll basically

540
00:29:02,950 --> 00:29:00,320
um bring the actuators into their null

541
00:29:06,389 --> 00:29:04,549
basically they'll go ahead and make sure

542
00:29:08,470 --> 00:29:06,399
the engines are ready to go ahead and

543
00:29:09,990 --> 00:29:08,480
start

544
00:29:12,230 --> 00:29:10,000
they will then

545
00:29:13,269 --> 00:29:12,240
transition the core stage to internal

546
00:29:15,590 --> 00:29:13,279
power

547
00:29:17,350 --> 00:29:15,600
uh they they do have what they've

548
00:29:19,669 --> 00:29:17,360
redundant inertial navigation unit

549
00:29:21,590 --> 00:29:19,679
they've got a gyrocompass alignment that

550
00:29:24,470 --> 00:29:21,600
they'll that they'll finish up

551
00:29:26,630 --> 00:29:24,480
and uh that's when we get into the next

552
00:29:28,630 --> 00:29:26,640
big sequence which is the go for the

553
00:29:31,590 --> 00:29:28,640
automated launch sequencer and that'll

554
00:29:33,269 --> 00:29:31,600
start roughly at 33 seconds

555
00:29:35,669 --> 00:29:33,279
so that's that's uh that's kind of the

556
00:29:38,789 --> 00:29:35,679
big steps to take place up to that point

557
00:29:40,950 --> 00:29:38,799
and um what's what what happens once we

558
00:29:43,190 --> 00:29:40,960
get into that als is that if we have to

559
00:29:45,430 --> 00:29:43,200
recycle and that's a that's a big deal

560
00:29:48,789 --> 00:29:45,440
it's probably not something we can

561
00:29:50,630 --> 00:29:48,799
recover from that easily on on day of um

562
00:29:53,190 --> 00:29:50,640
but ahead of that we can basically

563
00:29:54,389 --> 00:29:53,200

recycle back to the 10 minute mark

564
00:29:56,470 --> 00:29:54,399
uh and then

565
00:29:57,909 --> 00:29:56,480
it would take us probably an hour to to

566
00:29:59,750 --> 00:29:57,919
get back into position where we could go

567
00:30:02,789 --> 00:29:59,760
through it again but that that's kind of

568
00:30:05,590 --> 00:30:04,310
thank you so it sounds like the majority

569
00:30:07,510 --> 00:30:05,600
of the calls are actually going to come

570
00:30:08,549 --> 00:30:07,520
in the last five minutes of the terminal

571
00:30:10,230 --> 00:30:08,559
count

572
00:30:11,269 --> 00:30:10,240
um

573
00:30:13,269 --> 00:30:11,279
and so

574
00:30:15,590 --> 00:30:13,279
we're waiting to hear when we are ready

575
00:30:17,430 --> 00:30:15,600
for the the poll for the go no go into

576
00:30:18,950 --> 00:30:17,440
the terminal count

577
00:30:20,310 --> 00:30:18,960
so we'll stand by for a little bit here

578
00:38:28,710 --> 00:30:20,320
and then we'll come back when we have

579
00:38:33,750 --> 00:38:30,630
for the artemis one launch there will be

580
00:38:35,190 --> 00:38:33,760
a built-in hold before the go no go pull

581
00:38:37,270 --> 00:38:35,200
to go into the terminal count with the

582
00:38:39,670 --> 00:38:37,280
last 10 minutes of the countdown this

583
00:38:41,349 --> 00:38:39,680
isn't quite the same but it is similar

584
00:38:43,510 --> 00:38:41,359
the team takes a look at the data from

585
00:38:44,870 --> 00:38:43,520
the vehicle and the facility and ensures

586
00:38:47,109 --> 00:38:44,880
that everything looks good before

587
00:38:48,550 --> 00:38:47,119
proceeding into the terminal count

588
00:38:50,790 --> 00:38:48,560

so we're just a little more than 10

589
00:38:52,470 --> 00:38:50,800
minutes away from our t0 time now to

590
00:38:54,470 --> 00:38:52,480
fire up the engines

591
00:38:56,310 --> 00:38:54,480
and when those engines fire up the team

592
00:38:58,550 --> 00:38:56,320
is looking to get at least four minutes

593
00:39:00,550 --> 00:38:58,560
of data to support the test objectives

594
00:39:02,870 --> 00:39:00,560
needed to confirm that sls is ready to

595
00:39:04,870 --> 00:39:02,880
launch artemis missions from there they

596
00:39:06,390 --> 00:39:04,880
will continue to let the engines fire

597
00:39:07,990 --> 00:39:06,400
and to burn through all of the fuel in

598
00:39:09,990 --> 00:39:08,000
the tanks and possibly pick up

599
00:39:11,750 --> 00:39:10,000
additional data for some secondary test

600
00:39:13,109 --> 00:39:11,760
objectives

601
00:39:14,950 --> 00:39:13,119
during launch and ascent for artemis

602
00:39:16,710 --> 00:39:14,960
missions we expect the engines to fire

603
00:39:18,950 --> 00:39:16,720
for about eight minutes to drain the

604
00:39:20,790 --> 00:39:18,960
tanks of the propellant before what is

605
00:39:21,990 --> 00:39:20,800
uh called the main engine cutoff or

606
00:39:23,190 --> 00:39:22,000
mikko

607
00:39:24,630 --> 00:39:23,200
so

608
00:39:28,470 --> 00:39:24,640
bill tell us a little bit about what we

609
00:39:30,390 --> 00:39:28,480
can expect after hot fire starts

610
00:39:32,950 --> 00:39:30,400
okay so uh the other thing i'd say is

611
00:39:34,230 --> 00:39:32,960
i'm also listening in so we if we get to

612
00:39:36,230 --> 00:39:34,240
the point where they're gonna call for

613
00:39:38,550 --> 00:39:36,240

the poll i'll just tell you to pick it

614
00:39:40,790 --> 00:39:38,560
up at that point but so where i left off

615
00:39:43,270 --> 00:39:40,800
was with als start so that's roughly 30

616
00:39:44,950 --> 00:39:43,280
seconds before they actually start we

617
00:39:46,390 --> 00:39:44,960
would then bring on the hydrogen burn

618
00:39:48,150 --> 00:39:46,400
off igniters

619
00:39:49,670 --> 00:39:48,160
which are basically a series of flares

620
00:39:52,230 --> 00:39:49,680
that are built into the stand to pick up

621
00:39:54,069 --> 00:39:52,240
any residual hydrogen and basically

622
00:39:56,390 --> 00:39:54,079
dissipate all that

623
00:39:57,430 --> 00:39:56,400
they'll finish with the uh renew

624
00:39:59,990 --> 00:39:57,440
redundant

625
00:40:02,550 --> 00:40:00,000
alignment navigation mode

626
00:40:04,550 --> 00:40:02,560
um and then basically they go into at

627
00:40:08,150 --> 00:40:04,560
roughly six minutes

628
00:40:10,950 --> 00:40:08,160
they'll do the rs25 starts and those uh

629
00:40:12,550 --> 00:40:10,960
they bring up one at a time and uh

630
00:40:15,510 --> 00:40:12,560
roughly it's at

631
00:40:17,430 --> 00:40:15,520
five six seconds they'll start that at

632
00:40:19,670 --> 00:40:17,440
five six one second they'll be up and

633
00:40:22,230 --> 00:40:19,680
running at 100

634
00:40:25,589 --> 00:40:22,240
and uh

635
00:40:29,670 --> 00:40:25,599
with that i think we're getting ready to

636
00:40:32,150 --> 00:40:31,510
but um

637
00:40:36,829 --> 00:40:32,160
as

638
00:40:40,150 --> 00:40:36,839

of it we'll hear the

639
00:40:41,990 --> 00:40:40,160
uh basically the the the engines will

640
00:40:43,510 --> 00:40:42,000
come to 109

641
00:40:46,550 --> 00:40:43,520
thrust level

642
00:40:48,710 --> 00:40:46,560
and then we'll go into the first

643
00:40:50,950 --> 00:40:48,720
poll at

644
00:40:53,030 --> 00:40:50,960
the gimbal profile so i think what we

645
00:40:55,510 --> 00:40:53,040
should do at this point is switch over

646
00:41:01,910 --> 00:40:55,520
if we can pick that part of it up all

647
00:41:06,550 --> 00:41:04,390
correct uh time pack as the seat puncher

648
00:41:09,589 --> 00:41:06,560
steps through there reminder to

649
00:41:11,670 --> 00:41:09,599
everybody we after we get past 557 and

650
00:41:13,990 --> 00:41:11,680
after we terminate lh2

651
00:41:16,230 --> 00:41:14,000
system securing we only have two minutes

652
00:41:17,829 --> 00:41:16,240
35 seconds at full time before we have

653
00:41:19,589 --> 00:41:17,839
to recycle back

654
00:41:21,510 --> 00:41:19,599
also another reminder to everybody when

655
00:41:24,069 --> 00:41:21,520
we do the switch to internal power we

656
00:41:25,030 --> 00:41:24,079
will get the christmas tree effect on

657
00:41:27,190 --> 00:41:25,040
the uh

658
00:41:29,349 --> 00:41:27,200
avionics screen so that is

659
00:41:31,510 --> 00:41:29,359
normal that is to be

660
00:41:32,950 --> 00:41:31,520
expected so just remind everybody that

661
00:41:40,309 --> 00:41:32,960
we look at that christmas tree effect

662
00:41:43,670 --> 00:41:41,349
all right

663
00:41:44,790 --> 00:41:43,680

right sequencer on your

664
00:41:46,309 --> 00:41:44,800
on your command let's go ahead and

665
00:41:49,670 --> 00:41:46,319
initiate the terminal count sequencer

666
00:41:50,790 --> 00:41:49,680
for sub step alpha and record uct utc

667
00:41:58,550 --> 00:41:50,800
time please

668
00:41:58,560 --> 00:42:02,870
okay kecount has resolved

669
00:42:09,589 --> 00:42:05,589
and give us a utc real quick please

670
00:42:12,870 --> 00:42:11,589
copy zero seven seven twenty twenty

671
00:42:56,790 --> 00:42:12,880
seven twelve

672
00:42:56,800 --> 00:43:07,430
see my assignments

673
00:43:11,270 --> 00:43:09,030
all right it sounds like we actually

674
00:43:12,950 --> 00:43:11,280
missed the poll so we are in the

675
00:43:14,630 --> 00:43:12,960
terminal count sequence now and we are

676
00:43:56,710 --> 00:43:14,640
standing by and listening as they

677
00:43:56,720 --> 00:44:56,470
he might say man

678
00:45:00,630 --> 00:44:59,030
t-minus seven minutes

679
00:45:21,270 --> 00:45:00,640
let's place your reporters into

680
00:45:56,870 --> 00:45:24,470
and we're about six and a half minutes

681
00:46:56,630 --> 00:45:58,950
and t my six minutes starting lh2

682
00:47:28,870 --> 00:46:59,030
t minus five minutes initiating tvc spin

683
00:47:34,069 --> 00:47:31,270
yeah so so at this point uh they

684
00:47:35,910 --> 00:47:34,079
basically initiated uh kappu start

685
00:47:38,549 --> 00:47:35,920
uh and and basically those will be

686
00:47:39,990 --> 00:47:38,559
coming up on helium they'll go into a

687
00:47:42,150 --> 00:47:40,000
what we call the wiggle test which is

688
00:47:44,630 --> 00:47:42,160

where they'll gamble the engines

689
00:47:47,349 --> 00:47:44,640
um and then so so that's uh

690
00:47:49,270 --> 00:47:47,359
basically coming up here in uh

691
00:47:52,870 --> 00:47:49,280
just a couple of minutes

692
00:47:54,790 --> 00:47:52,880
uh on the on the plus side of of that

693
00:47:56,470 --> 00:47:54,800
uh you know once we get into the engine

694
00:47:57,910 --> 00:47:56,480
starts um

695
00:48:01,109 --> 00:47:57,920
t minus four minutes

696
00:48:02,870 --> 00:48:01,119
start starting l02 securing okay so l2

697
00:48:04,870 --> 00:48:02,880
is being secured now so that they're

698
00:48:08,710 --> 00:48:04,880
getting they're really moving forward in

699
00:48:08,720 --> 00:48:16,230
still roughly at t minus

700
00:48:16,240 --> 00:48:18,710
three minutes

701
00:48:22,950 --> 00:48:21,349
and so with that we should be seeing the

702
00:48:25,910 --> 00:48:22,960
um

703
00:48:30,630 --> 00:48:25,920
tvc gimbal profile here in about uh half

704
00:48:36,150 --> 00:48:33,670
basically at this point they've got uh

705
00:48:38,309 --> 00:48:36,160
the water system all turned on you can

706
00:48:40,790 --> 00:48:38,319
go see that in some of the views

707
00:48:42,230 --> 00:48:40,800
and that'll basically take care of uh

708
00:48:44,230 --> 00:48:42,240
not only the heat coming off of the

709
00:48:45,589 --> 00:48:44,240
engines but also dampen uh the

710
00:48:49,670 --> 00:48:45,599
tremendous amount of noise that will be

711
00:48:53,990 --> 00:48:51,670
as mentioned earlier hydrogen burn-off

712
00:48:56,309 --> 00:48:54,000
igniters uh will come on

713
00:48:58,069 --> 00:48:56,319

at about 12 seconds

714
00:48:59,910 --> 00:48:58,079
uh t-minus three minutes starting with

715
00:49:01,750 --> 00:48:59,920
psn4

716
00:49:04,470 --> 00:49:01,760
the uh

717
00:49:05,589 --> 00:49:04,480
navigation mode uh will be complete at

718
00:49:07,670 --> 00:49:05,599
about 10

719
00:49:08,790 --> 00:49:07,680
t minus 10 seconds

720
00:49:11,190 --> 00:49:08,800
and then

721
00:49:12,790 --> 00:49:11,200
basically the enable command for als at

722
00:49:14,870 --> 00:49:12,800
9.2 seconds

723
00:49:16,470 --> 00:49:14,880
and then we go into engine start roughly

724
00:49:18,230 --> 00:49:16,480
at six seconds

725
00:49:19,670 --> 00:49:18,240
those uh take about five seconds to come

726
00:49:21,109 --> 00:49:19,680
off the full operating

727
00:49:23,109 --> 00:49:21,119
uh pressures

728
00:49:25,190 --> 00:49:23,119
and uh basically at that point the stage

729
00:49:27,190 --> 00:49:25,200
controller we go for launch

730
00:49:28,390 --> 00:49:27,200
or go for test in this case at two

731
00:49:31,829 --> 00:49:28,400
seconds

732
00:49:36,549 --> 00:49:31,839
and um basically we go forward into our

733
00:49:39,109 --> 00:49:37,589
all right

734
00:49:56,470 --> 00:49:39,119
we're coming up on twitter again we'll

735
00:49:56,480 --> 00:50:00,790
two minus two minutes

736
00:50:04,230 --> 00:50:02,309
so a call was they just announced that

737
00:50:06,470 --> 00:50:04,240
t-minus two minutes uh which is

738
00:50:08,390 --> 00:50:06,480

basically they have finished uh the

739
00:50:09,829 --> 00:50:08,400
gimbal test with the actuators and

740
00:50:11,750 --> 00:50:09,839
they're bringing them back into the null

741
00:50:13,589 --> 00:50:11,760
position

742
00:50:16,069 --> 00:50:13,599
and then basically at this point they

743
00:50:20,470 --> 00:50:16,079
basically are getting ready for powering

744
00:50:24,470 --> 00:50:23,510
again core stage transitions to internal

745
00:50:26,710 --> 00:50:24,480
power

746
00:50:28,069 --> 00:50:26,720
at roughly a minute and 30 seconds out t

747
00:50:30,549 --> 00:50:28,079
minus one thirty switching internal

748
00:50:38,069 --> 00:50:32,950
and then uh if renewed our compass

749
00:50:44,950 --> 00:50:40,549
and then we'll have to go for uh als and

750
00:50:44,960 --> 00:50:57,190
that t-minus 33 seconds

751
00:51:18,230 --> 00:50:58,710
t minus one minute following personnel

752
00:51:26,870 --> 00:51:19,910
basically the water system has come on

753
00:51:30,950 --> 00:51:29,510
all right you might think we're an als

754
00:51:33,910 --> 00:51:30,960
and you just got the

755
00:51:35,910 --> 00:51:33,920
the official start of als

756
00:51:38,870 --> 00:51:35,920
next up is the hydrogen burn-off

757
00:51:46,950 --> 00:51:38,880
igniters come on at 12 seconds before

758
00:51:46,960 --> 00:52:03,030
is on go for engine start h-boys

759
00:52:03,040 --> 00:52:57,990
in control

760
00:53:25,109 --> 00:53:00,150
for 60 seconds starting cbc profile

761
00:53:25,119 --> 00:53:42,069
okay first time we've got a fire

762
00:53:42,079 --> 00:53:58,069
i can't pull it off

763
00:53:58,079 --> 00:54:03,220

remember

764
00:54:03,230 --> 00:54:30,309
[Music]

765
00:55:47,829 --> 00:55:29,589
a

766
00:55:47,839 --> 00:56:06,020
you

767
00:56:06,030 --> 00:56:27,510
[Music]

768
00:56:27,520 --> 00:56:37,750
profile

769
00:56:37,760 --> 00:56:58,150
16.

770
00:56:58,160 --> 00:57:31,829
keep watching

771
00:57:58,150 --> 00:57:33,510
we're just over five and a half minutes

772
00:57:58,160 --> 00:58:11,430
six minutes

773
00:58:11,440 --> 00:58:32,549
16.

774
00:58:32,559 --> 00:58:48,829
thank you

775
00:59:26,950 --> 00:58:51,030
violations we're coming up on seven

776
00:59:57,670 --> 00:59:28,789
and two plus seven thirty seconds our

777
00:59:57,680 --> 01:00:16,069
people hate man available

778
01:00:21,510 --> 01:00:17,349
all right

779
01:00:25,349 --> 01:00:21,520
rea i can ever rea on channel 16.

780
01:00:29,630 --> 01:00:27,510
ra on channel 16

781
01:00:32,630 --> 01:00:29,640
engine

782
01:00:35,750 --> 01:00:32,640
foreign shutdown standby correct correct

783
01:00:38,150 --> 01:00:35,760
personnel that takes us to page 656 all

784
01:00:43,190 --> 01:00:38,160
personnel go to page 656 to start the

785
01:00:47,030 --> 01:00:44,789
all right

786
01:00:48,470 --> 01:00:47,040
personnel um bill as you said earlier as

787
01:00:50,230 --> 01:00:48,480
we talked about earlier the team was

788
01:00:52,470 --> 01:00:50,240

hoping to get at least four minutes of

789
01:00:57,430 --> 01:00:52,480
data

790
01:00:57,440 --> 01:01:13,589
um

791
01:01:18,470 --> 01:01:15,829
all right they are proceeding with the

792
01:01:19,829 --> 01:01:18,480
their shutdown procedures now as we said

793
01:01:21,589 --> 01:01:19,839
earlier the team was hoping to get at

794
01:01:23,349 --> 01:01:21,599
least four minutes of data and they did

795
01:01:25,270 --> 01:01:23,359
get more than ten then eight minutes

796
01:01:27,030 --> 01:01:25,280
excuse me so they should have gotten

797
01:01:28,789 --> 01:01:27,040
what they need the team will obviously

798
01:01:31,270 --> 01:01:28,799
need to look at that data but based on

799
01:01:32,789 --> 01:01:31,280
what we've seen uh bill tell us more

800
01:01:35,910 --> 01:01:32,799
about what would it look like to you

801
01:01:37,589 --> 01:01:35,920
yeah so they uh clearly got the

802
01:01:39,190 --> 01:01:37,599
full duration that they were after which

803
01:01:40,950 --> 01:01:39,200
is really great news and i think you

804
01:01:42,630 --> 01:01:40,960
heard the applause they had you know the

805
01:01:44,789 --> 01:01:42,640
commander shut down which is exactly

806
01:01:47,750 --> 01:01:44,799
what they were looking for they had no

807
01:01:49,750 --> 01:01:47,760
tcc violations uh test commit criteria

808
01:01:51,829 --> 01:01:49,760
violations that would have prompted an

809
01:01:54,069 --> 01:01:51,839
early shutdown so that was really good

810
01:01:55,510 --> 01:01:54,079
news um you know clearly there's a lot

811
01:01:58,069 --> 01:01:55,520
of data now that's going to have to be

812
01:01:59,670 --> 01:01:58,079
analyzed the engineers got to see

813
01:02:02,069 --> 01:01:59,680

what worked what didn't or what needs to

814
01:02:04,950 --> 01:02:02,079
be tweaked and what doesn't but that

815
01:02:07,190 --> 01:02:04,960
said i think the applause says a lot

816
01:02:08,549 --> 01:02:07,200
about how the team feels

817
01:02:09,190 --> 01:02:08,559
you know that they got through the test

818
01:02:14,710 --> 01:02:09,200
and

819
01:02:19,349 --> 01:02:17,109
yeah so um

820
01:02:21,589 --> 01:02:19,359
there was some uh you know observed uh

821
01:02:24,069 --> 01:02:21,599
burning on the aft end uh one of the

822
01:02:25,990 --> 01:02:24,079
things that boeing had done uh pri after

823
01:02:28,630 --> 01:02:26,000
the last test was to apply

824
01:02:30,710 --> 01:02:28,640
uh a lot of extra cork to the aft end

825
01:02:32,470 --> 01:02:30,720
because we're we aren't gonna

826
01:02:34,630 --> 01:02:32,480
we didn't unfortunately with this test

827
01:02:36,950 --> 01:02:34,640
right we're not flying through uh the

828
01:02:38,230 --> 01:02:36,960
thin air as you as we ascend

829
01:02:39,349 --> 01:02:38,240
and so we knew we were going to have

830
01:02:41,190 --> 01:02:39,359
more of that and that was one of the

831
01:02:43,910 --> 01:02:41,200
reasons why they added that they also

832
01:02:45,670 --> 01:02:43,920
put a tape covering over the top of that

833
01:02:47,589 --> 01:02:45,680
we knew that you know if the tape gets

834
01:02:49,190 --> 01:02:47,599
hot enough that adhesive layer below the

835
01:02:51,430 --> 01:02:49,200
tape surface is going to start burning

836
01:02:53,349 --> 01:02:51,440
him so we clearly saw a lot of that

837
01:02:54,950 --> 01:02:53,359
but there was nothing that prompted a

838
01:02:57,510 --> 01:02:54,960

shutdown early which was which was

839
01:02:59,270 --> 01:02:57,520
really good news

840
01:03:01,190 --> 01:02:59,280
great thank you bill i think that's all

841
01:03:02,470 --> 01:03:01,200
the updates that we'll have for you here

842
01:03:04,069 --> 01:03:02,480
as the team proceeds through their

843
01:03:08,150 --> 01:03:04,079
shutdown procedures so we'll turn it

844
01:03:11,670 --> 01:03:10,549
thank you catherine congratulations to

845
01:03:13,829 --> 01:03:11,680
the team

846
01:03:16,710 --> 01:03:13,839
so as the engineers gather the data from

847
01:03:19,349 --> 01:03:16,720
today we look ahead to the next steps

848
01:03:21,510 --> 01:03:19,359
this core stage will be refurbished and

849
01:03:23,190 --> 01:03:21,520
sent by barge to our kennedy space

850
01:03:25,510 --> 01:03:23,200
center in florida

851
01:03:27,510 --> 01:03:25,520
there it will be stacked in the iconic

852
01:03:30,710 --> 01:03:27,520
vehicle assembly building with other

853
01:03:33,270 --> 01:03:30,720
elements of the sls rocket including the

854
01:03:35,349 --> 01:03:33,280
twin solid rocket boosters which our

855
01:03:37,430 --> 01:03:35,359
teams are have already begun stacking on

856
01:03:39,670 --> 01:03:37,440
the mobile launcher

857
01:03:42,069 --> 01:03:39,680
the core stage and boosters will then be

858
01:03:44,390 --> 01:03:42,079
stacked with the upper stage and the

859
01:03:46,549 --> 01:03:44,400
orion spacecraft

860
01:03:49,829 --> 01:03:46,559
all of this work putting us on track to

861
01:03:53,190 --> 01:03:49,839
roll out to launch pad 39b for a liftoff

862
01:03:54,950 --> 01:03:53,200
later this year on artemis one

863
01:03:56,150 --> 01:03:54,960

we've got several other firsts on the

864
01:03:59,029 --> 01:03:56,160
horizon

865
01:04:01,990 --> 01:03:59,039
this year the first of our commercial

866
01:04:03,990 --> 01:04:02,000
lunar payload services or clips missions

867
01:04:06,470 --> 01:04:04,000
begin with two companies delivering

868
01:04:08,870 --> 01:04:06,480
instruments to the lunar surface

869
01:04:11,029 --> 01:04:08,880
the golf cart sized viper rover will

870
01:04:14,950 --> 01:04:11,039
search for water at the moon's south

871
01:04:17,750 --> 01:04:14,960
pole and a small cubesat called capstone

872
01:04:21,430 --> 01:04:17,760
will head to the moon scouting the orbit

873
01:04:23,829 --> 01:04:21,440
to be used on later human missions

874
01:04:25,670 --> 01:04:23,839
meanwhile the hardware for the next two

875
01:04:27,829 --> 01:04:25,680
artemis missions which will carry

876
01:04:30,390 --> 01:04:27,839
astronauts to the moon is coming

877
01:04:33,270 --> 01:04:30,400
together the orion spacecraft for

878
01:04:35,990 --> 01:04:33,280
artemis ii is down at kennedy undergoing

879
01:04:38,789 --> 01:04:36,000
assembly and the spacecraft for artemis

880
01:04:40,870 --> 01:04:38,799
iii as well as the rockets for artemis

881
01:04:44,870 --> 01:04:40,880
two and three are also being

882
01:04:47,270 --> 01:04:44,880
manufactured right now at mishu

883
01:04:49,750 --> 01:04:47,280
so that wraps it up for us here today

884
01:04:51,829 --> 01:04:49,760
after a major milestone on america's

885
01:04:55,029 --> 01:04:51,839
return of astronauts to the lunar

886
01:04:58,630 --> 01:04:55,039
surface a successful test of the core

887
01:05:00,549 --> 01:04:58,640
stage of the space launch system rocket

888
01:05:02,710 --> 01:05:00,559

up next we'll be replaying the test and

889
01:05:05,910 --> 01:05:02,720
we will have a post-test briefing in

890
01:05:07,589 --> 01:05:05,920
about two hours here on nasa television

891
01:05:10,549 --> 01:05:07,599
we invite you to follow all of our

892
01:05:13,029 --> 01:05:10,559
progress online at nasa.gov artemis

893
01:05:15,829 --> 01:05:13,039
program or join the conversation online

894
01:05:17,990 --> 01:05:15,839
with at nasa artemis and at nasa

895
01:05:31,270 --> 01:05:18,000
underscore sls

896
01:05:35,589 --> 01:05:33,109
panel personnel we've got engine

897
01:05:37,589 --> 01:05:35,599
starting for the plus account one

898
01:06:33,029 --> 01:05:37,599
to monitor your system and grass is in

899
01:06:33,039 --> 01:07:16,549
second starting profile

900
01:07:16,559 --> 01:07:32,549
i can't pull it off

901
01:07:32,559 --> 01:07:37,740
remember

902
01:07:37,750 --> 01:08:04,789
[Music]

903
01:08:44,190 --> 01:08:06,590
m

904
01:08:44,200 --> 01:09:04,070
[Applause]

905
01:09:04,080 --> 01:09:29,829
three and a half minutes

906
01:09:29,839 --> 01:10:32,630
okay

907
01:10:32,640 --> 01:11:06,310
people

908
01:11:32,310 --> 01:11:07,990
we're just over five and a half minutes

909
01:11:32,320 --> 01:11:45,910
people six minutes

910
01:11:45,920 --> 01:12:19,830
15.

911
01:12:19,840 --> 01:12:24,390
thank you

912
01:13:01,430 --> 01:12:25,910
we're coming up on seven minutes of

913
01:13:40,310 --> 01:13:02,709

and two plus seven minutes thirty

914
01:13:43,750 --> 01:13:41,590
all right so we're just over eight

915
01:13:53,430 --> 01:13:43,760
minutes into the plus count

916
01:13:53,440 --> 01:13:57,430
rea on channel 16.

917
01:13:57,440 --> 01:14:05,110
all right

918
01:14:05,120 --> 01:14:23,830
shut down standby

919
01:14:29,910 --> 01:14:27,750
68 and 1972 america launched nine human

920
01:14:32,149 --> 01:14:29,920
missions to the moon six of which