Episode 17:
Abort!

November 2019

@NASAKennedy
#NASARocketRanch

New episodes every month!

1
00:00:04,220 --> 00:00:02,149
Rockets are dangerous and before we

2
00:00:06,320 --> 00:00:04,230
strap our star sailors in we need to

3
00:00:21,950 --> 00:00:06,330
know there is a proven escape plan next

4
00:00:23,750 --> 00:00:21,960
on the rocket ranch both of our

5
00:00:25,880 --> 00:00:23,760
Commercial Crew program partners Boeing

6
00:00:27,950 --> 00:00:25,890
and SpaceX are busy getting ready to

7
00:00:30,140 --> 00:00:27,960
transport humans safely to and from the

8
00:00:31,550 --> 00:00:30,150
International Space Station but I

9
00:00:32,930 --> 00:00:31,560
managed to get a few minutes with a

10
00:00:35,209 --> 00:00:32,940
couple folks who provided some insight

11
00:00:38,000 --> 00:00:35,219
on critical test flights that are just

12
00:00:40,010 --> 00:00:38,010
around the corner but first a few

13
00:00:42,020 --> 00:00:40,020

episodes back we had John Cowart in the

14
00:00:44,750 --> 00:00:42,030
booth to talk about a NASA owned abort

15
00:00:46,220 --> 00:00:44,760
test we wanted to tap into his wealth of

16
00:00:49,220 --> 00:00:46,230
knowledge to provide a little bit of

17
00:00:50,299 --> 00:00:49,230
context alright I'm back now in the

18
00:00:52,160 --> 00:00:50,309
booth with John Cowart thanks for

19
00:00:53,510 --> 00:00:52,170
joining me again John my pleasure to be

20
00:00:56,150 --> 00:00:53,520
here love this hey so we're shifting

21
00:00:57,830 --> 00:00:56,160
focus a little bit and looking ahead to

22
00:01:00,229 --> 00:00:57,840
test flights for our Commercial Crew

23
00:01:03,110 --> 00:01:00,239
partners coming up soon so we have two

24
00:01:04,280 --> 00:01:03,120
major major tests coming up can you

25
00:01:06,740 --> 00:01:04,290
explain kind of what's gonna be

26
00:01:08,270 --> 00:01:06,750
happening for those two tests so the the

27
00:01:10,250 --> 00:01:08,280
first one so we'll just start with

28
00:01:12,530 --> 00:01:10,260
Boeing and we'll talk about their pad

29
00:01:15,380 --> 00:01:12,540
abort test and what they intend to do is

30
00:01:17,270 --> 00:01:15,390
set the vehicle down and then they're

31
00:01:19,130 --> 00:01:17,280
going to pretend like it's a bad day on

32
00:01:20,990 --> 00:01:19,140
the ground and they will do what's

33
00:01:22,340 --> 00:01:21,000
called a pad abort they will fire the

34
00:01:24,080 --> 00:01:22,350
abort engines which would carry the

35
00:01:26,120 --> 00:01:24,090
vehicle away in the event of an

36
00:01:27,800 --> 00:01:26,130
emergency that occurred on or very close

37
00:01:29,929 --> 00:01:27,810
to the ground and this gives you a lot

38
00:01:33,020 --> 00:01:29,939

of good data this is a test that SpaceX

39
00:01:35,090 --> 00:01:33,030
did back in 2015 so they SpaceX has got

40
00:01:37,039 --> 00:01:35,100
that one under their belt the next test

41
00:01:39,020 --> 00:01:37,049
that's coming up is by SpaceX and that's

42
00:01:40,789 --> 00:01:39,030
the in-flight abort test that's where

43
00:01:45,230 --> 00:01:40,799
we're going to our SpaceX is going to

44
00:01:47,330 --> 00:01:45,240
launch a reused Falcon 9 vehicle with a

45
00:01:48,620 --> 00:01:47,340
dragon capsule on top of it they will

46
00:01:50,630 --> 00:01:48,630
get to right around what's known as

47
00:01:52,340 --> 00:01:50,640
max-q that's where the combination of

48
00:01:54,020 --> 00:01:52,350
just ambient air pressure as well as the

49
00:01:56,120 --> 00:01:54,030
air pressure of the air hitting the

50
00:01:58,520 --> 00:01:56,130
vehicle as you fly through it very much

51
00:02:00,499 --> 00:01:58,530
faster that pressure on the vehicle is

52
00:02:02,330 --> 00:02:00,509
at its greatest they're going to try to

53
00:02:04,160 --> 00:02:02,340
abort off of the rocket like there's a

54
00:02:06,830 --> 00:02:04,170
bad day there and get away from the

55
00:02:09,499 --> 00:02:06,840
rocket - at that particular time so so

56
00:02:10,820 --> 00:02:09,509
you mentioned John that Boeing or I

57
00:02:12,229 --> 00:02:10,830
didn't hear you mention an in-flight

58
00:02:13,670 --> 00:02:12,239
abort test for Boeing are they going to

59
00:02:15,559 --> 00:02:13,680
be doing one of those later

60
00:02:16,940 --> 00:02:15,569
bowing is not going to do an in-flight

61
00:02:19,220 --> 00:02:16,950
abort test they're just going to do the

62
00:02:20,780 --> 00:02:19,230
ground when they think that they can get

63
00:02:22,850 --> 00:02:20,790

enough data and then extrapolate that

64
00:02:25,130 --> 00:02:22,860
out with good analytical techniques that

65
00:02:27,050 --> 00:02:25,140
that we've endorsed they will go and do

66
00:02:29,030 --> 00:02:27,060
it in that particular way versus SpaceX

67
00:02:31,069 --> 00:02:29,040
which is going to do both we knew about

68
00:02:32,990 --> 00:02:31,079
this up front both Boeing and SpaceX

69
00:02:34,250 --> 00:02:33,000
when they proposed their contracts to us

70
00:02:36,710 --> 00:02:34,260
and said this is how we're going to get

71
00:02:38,809 --> 00:02:36,720
to real flights we understood exactly

72
00:02:40,550 --> 00:02:38,819
and we bought into it we think and we

73
00:02:42,530 --> 00:02:40,560
agree with them that they can get all

74
00:02:45,140 --> 00:02:42,540
they need from a pad of pad for testing

75
00:02:46,520 --> 00:02:45,150
and John I want to kind of point out

76
00:02:48,830 --> 00:02:46,530
specifically that you're you're very

77
00:02:51,649 --> 00:02:48,840
carefully choosing your pronouns the

78
00:02:53,449 --> 00:02:51,659
Wiis in the Vaes and the US is and this

79
00:02:55,129 --> 00:02:53,459
actually creates a huge kind of

80
00:02:56,839 --> 00:02:55,139
complexity to the Commercial Crew

81
00:02:58,970 --> 00:02:56,849
program indeed it does yeah how NASA

82
00:03:02,210 --> 00:02:58,980
really engages with these partners so

83
00:03:05,300 --> 00:03:02,220
how does that work with NASA kind of not

84
00:03:06,710 --> 00:03:05,310
owning the work were very much invested

85
00:03:11,030 --> 00:03:06,720
in it how does that play out in test

86
00:03:13,309 --> 00:03:11,040
flights so they own the flight test and

87
00:03:14,899 --> 00:03:13,319
they own even even when they start

88
00:03:16,339 --> 00:03:14,909

flying up to the space station they own

89
00:03:19,670 --> 00:03:16,349
the spaceship and they own the rocket

90
00:03:22,280 --> 00:03:19,680
but these particular tests they own them

91
00:03:26,089 --> 00:03:22,290
which means we will consult with them

92
00:03:28,039 --> 00:03:26,099
but in the end they are the ones who own

93
00:03:29,689 --> 00:03:28,049
the tests and the results now they've

94
00:03:31,460 --> 00:03:29,699
got to bring that so as part of their

95
00:03:33,949 --> 00:03:31,470
certification they've got to bring the

96
00:03:36,020 --> 00:03:33,959
data from those tests to us before they

97
00:03:37,250 --> 00:03:36,030
can go fly our astronauts on board and

98
00:03:38,899 --> 00:03:37,260
we've got to say that yeah you got the

99
00:03:40,970 --> 00:03:38,909
right amount of data and that the data

100
00:03:43,250 --> 00:03:40,980
is good and that the vehicle will

101
00:03:44,930 --> 00:03:43,260
perform correctly but yeah this is the

102
00:03:46,939 --> 00:03:44,940
thing that's kind of different from the

103
00:03:49,369 --> 00:03:46,949
way NASA has done business in the past

104
00:03:52,699 --> 00:03:49,379
we don't own the rocket we don't own the

105
00:03:54,379 --> 00:03:52,709
spaceship so therefore we are it's

106
00:03:57,619 --> 00:03:54,389
something more than consulting and

107
00:03:59,059 --> 00:03:57,629
something less than owning it is a

108
00:04:01,280 --> 00:03:59,069
delicate balancing and we've had to work

109
00:04:03,289 --> 00:04:01,290
real hard with with both the providers

110
00:04:06,110 --> 00:04:03,299
on this and so thinking about kind of

111
00:04:09,020 --> 00:04:06,120
just the nature of government versus

112
00:04:11,629 --> 00:04:09,030
commercial do you see a big difference

113
00:04:13,099 --> 00:04:11,639

in approach to test flights obviously

114
00:04:15,140 --> 00:04:13,109
we're we're still into the test flight

115
00:04:16,909 --> 00:04:15,150
phase we're not flying operationally

116
00:04:19,370 --> 00:04:16,919
that's not for a little while still to

117
00:04:21,259 --> 00:04:19,380
go so is there a difference interest

118
00:04:23,330 --> 00:04:21,269
that an air an approach to these four

119
00:04:25,070 --> 00:04:23,340
commercial companies I I don't think so

120
00:04:26,840 --> 00:04:25,080
I think they we've worked with them

121
00:04:28,790 --> 00:04:26,850
enough and they in

122
00:04:31,550 --> 00:04:28,800
they both know what we're interested in

123
00:04:34,070 --> 00:04:31,560
knowing and and we've helped them

124
00:04:36,350 --> 00:04:34,080
characterize the data that they need so

125
00:04:38,180 --> 00:04:36,360
they understand what has to happen in a

126
00:04:39,830 --> 00:04:38,190
flight test there you got to remember

127
00:04:42,110 --> 00:04:39,840
these folks I mean while they don't have

128
00:04:44,000 --> 00:04:42,120
NASA on their front door they're still

129
00:04:45,410 --> 00:04:44,010
very very smart people yeah and we've

130
00:04:47,600 --> 00:04:45,420
been working with both of them for a

131
00:04:51,020 --> 00:04:47,610
long time now we know how smart they are

132
00:04:52,700 --> 00:04:51,030
so they've got this I feel very

133
00:04:53,900 --> 00:04:52,710
confident that when they do these flight

134
00:04:56,660 --> 00:04:53,910
tests they'll get the data that they

135
00:04:57,950 --> 00:04:56,670
need and will be happy with it so I'm

136
00:04:59,420 --> 00:04:57,960
gonna ask this question I don't think

137
00:05:02,420 --> 00:04:59,430
it's gonna have a yes-or-no answer but I

138
00:05:04,790 --> 00:05:02,430

want to ask anyway does everything have

139
00:05:06,200 --> 00:05:04,800
to go perfectly in order for them to get

140
00:05:08,300 --> 00:05:06,210
the data they need and to really achieve

141
00:05:10,550 --> 00:05:08,310
that certification level there will be

142
00:05:12,890 --> 00:05:10,560
some aspects of the test which I'm sure

143
00:05:14,660 --> 00:05:12,900
have to go pretty well in order to

144
00:05:17,140 --> 00:05:14,670
characterize it for example let's just

145
00:05:20,420 --> 00:05:17,150
say the the SpaceX in flight abort tests

146
00:05:22,370 --> 00:05:20,430
they've got to be somewhere near max Q

147
00:05:23,720 --> 00:05:22,380
that maximum aerodynamic pressure in

148
00:05:25,220 --> 00:05:23,730
order to get the kind of data that

149
00:05:26,960 --> 00:05:25,230
you're looking for that defines the

150
00:05:29,210 --> 00:05:26,970
corners of the performance envelope but

151
00:05:31,280 --> 00:05:29,220
otherwise you can other things can go

152
00:05:32,630 --> 00:05:31,290
very very differently and you get

153
00:05:34,820 --> 00:05:32,640
slightly different day because what

154
00:05:36,710 --> 00:05:34,830
you've done is you've modeled this thing

155
00:05:39,020 --> 00:05:36,720
you have a computer model of how

156
00:05:40,550 --> 00:05:39,030
everything should work as it goes

157
00:05:42,530 --> 00:05:40,560
through this flight test but whatever

158
00:05:44,930 --> 00:05:42,540
the test may be you've got a model and

159
00:05:46,790 --> 00:05:44,940
so if you are planning to do it at this

160
00:05:48,290 --> 00:05:46,800
XY coordinate and you happen to be at

161
00:05:49,820 --> 00:05:48,300
ones that are slightly different well

162
00:05:51,560 --> 00:05:49,830
you can take your model in and back it

163
00:05:53,630 --> 00:05:51,570

up and go okay well if it happened here

164
00:05:55,310 --> 00:05:53,640
and and so you can you can still compare

165
00:05:56,930 --> 00:05:55,320
your model and that and so that's really

166
00:05:59,360 --> 00:05:56,940
what you're doing with these flight

167
00:06:01,010 --> 00:05:59,370
tests is you're correlating your model

168
00:06:02,780 --> 00:06:01,020
to the actual flight performance so as

169
00:06:05,050 --> 00:06:02,790
long as you can connect the dots between

170
00:06:08,300 --> 00:06:05,060
what you were expecting and what you got

171
00:06:10,340 --> 00:06:08,310
somehow you can make that model work and

172
00:06:13,250 --> 00:06:10,350
see how reliable and predictable it is

173
00:06:14,960 --> 00:06:13,260
so when I think about modeling I often

174
00:06:17,690 --> 00:06:14,970
think about we do the modeling and then

175
00:06:19,580 --> 00:06:17,700
we do the test flight correct is it fair

176
00:06:21,920 --> 00:06:19,590
to say that the test flight is helping

177
00:06:24,020 --> 00:06:21,930
us calibrate that model for future work

178
00:06:27,200 --> 00:06:24,030
to do that is a hundred percent correct

179
00:06:29,000 --> 00:06:27,210
yes that the flying the test gives you

180
00:06:31,190 --> 00:06:29,010
the data that what we call is it

181
00:06:33,410 --> 00:06:31,200
anchoring the model okay if you've got

182
00:06:36,170 --> 00:06:33,420
real hard data which is better than just

183
00:06:37,730 --> 00:06:36,180
a model you've got all that you need you

184
00:06:40,580 --> 00:06:37,740
you have Ankur that's why we say you

185
00:06:42,320 --> 00:06:40,590
have anchored the model in testing and

186
00:06:46,010 --> 00:06:42,330
you can go validate everything all of

187
00:06:48,080 --> 00:06:46,020
your requirements and as as NASA do we

188
00:06:49,670 --> 00:06:48,090

end up kind of wading through this data

189
00:06:50,990 --> 00:06:49,680
with the partners or do they just have

190
00:06:53,600 --> 00:06:51,000
specific pieces that they have to bring

191
00:06:55,580 --> 00:06:53,610
to us for the certification process so

192
00:06:57,980 --> 00:06:55,590
they will not have to bring all the data

193
00:06:59,570 --> 00:06:57,990
but but there is a subset and and by and

194
00:07:01,310 --> 00:06:59,580
large we discussed this with them

195
00:07:04,250 --> 00:07:01,320
upfront and we and they know what data

196
00:07:07,010 --> 00:07:04,260
we need some of the stuff is is rather

197
00:07:08,780 --> 00:07:07,020
low level we may not need pressures and

198
00:07:10,940 --> 00:07:08,790
temperatures at every single point along

199
00:07:13,520 --> 00:07:10,950
a certain curve but we do want to see

200
00:07:16,250 --> 00:07:13,530
some aspect of that and it helps like I

201
00:07:17,690 --> 00:07:16,260
said to validate their model and their

202
00:07:20,659 --> 00:07:17,700
requirements that they've got to go do

203
00:07:23,060 --> 00:07:20,669
so yeah we've worked it out with them

204
00:07:24,890 --> 00:07:23,070
and I think we're good and just thinking

205
00:07:26,650 --> 00:07:24,900
about the the listeners out there and

206
00:07:28,159 --> 00:07:26,660
just those that will be viewing these

207
00:07:30,200 --> 00:07:28,169
hopefully they're getting to see these

208
00:07:31,730 --> 00:07:30,210
test flights yeah what what do you

209
00:07:34,670 --> 00:07:31,740
encourage people to look for like what's

210
00:07:37,100 --> 00:07:34,680
the takeaway for them as they literally

211
00:07:39,110 --> 00:07:37,110
see these things happen well that that's

212
00:07:40,310 --> 00:07:39,120
that's a tough one if you're not used to

213
00:07:43,430 --> 00:07:40,320

looking at these sort of thing I know

214
00:07:45,740 --> 00:07:43,440
even on the spacex pad abort test when

215
00:07:48,380 --> 00:07:45,750
that happened one of the engines did not

216
00:07:50,810 --> 00:07:48,390
perform nominally and just seeing their

217
00:07:52,279 --> 00:07:50,820
and watching it real-time I didn't pick

218
00:07:54,020 --> 00:07:52,289
up on that but when you go back and look

219
00:07:55,940 --> 00:07:54,030
at the video afterwards and clearly when

220
00:07:57,830 --> 00:07:55,950
you have the data from the performance

221
00:07:59,840 --> 00:07:57,840
of the engine itself it becomes obvious

222
00:08:01,760 --> 00:07:59,850
so it's hard to see obviously some

223
00:08:04,460 --> 00:08:01,770
things if they go bad that'll be really

224
00:08:06,860 --> 00:08:04,470
obvious for you especially on on the pad

225
00:08:09,230 --> 00:08:06,870
or other the SpaceX in-flight abort test

226
00:08:11,600 --> 00:08:09,240
when that thing's going up there and and

227
00:08:12,980 --> 00:08:11,610
somewhere around max-q somewhere in the

228
00:08:14,390 --> 00:08:12,990
neighborhood of about a minute into the

229
00:08:16,460 --> 00:08:14,400
flight you're going to see something

230
00:08:18,620 --> 00:08:16,470
you've never seen happen on a SpaceX

231
00:08:20,420 --> 00:08:18,630
Falcon 9 rocket before you're gonna

232
00:08:22,370 --> 00:08:20,430
sudden that capsule come popping off

233
00:08:24,379 --> 00:08:22,380
that'll be a really cool thing to see

234
00:08:25,430 --> 00:08:24,389
depending especially what time of day

235
00:08:26,330 --> 00:08:25,440
I'm sure we want to do that in broad

236
00:08:27,620 --> 00:08:26,340
daylight guys we're gonna have a bunch

237
00:08:29,510 --> 00:08:27,630
of cameras trained on it we're trying to

238
00:08:31,580 --> 00:08:29,520

get all the data that we can and visual

239
00:08:33,589 --> 00:08:31,590
data is just as important pad abort

240
00:08:35,300 --> 00:08:33,599
tests for our Boeing once again just

241
00:08:37,100 --> 00:08:35,310
look for four good thrusts coming off

242
00:08:39,469 --> 00:08:37,110
the vehicle and that it seems to perform

243
00:08:40,610 --> 00:08:39,479
and fly pretty straight they've you

244
00:08:42,560 --> 00:08:40,620
gotta remember on a pad abort test

245
00:08:45,620 --> 00:08:42,570
you're over land you need to get over

246
00:08:47,000 --> 00:08:45,630
water that's that's in order to have

247
00:08:48,470 --> 00:08:47,010
your best performance so you're hoping

248
00:08:50,090 --> 00:08:48,480
you watch that thing arc off in the

249
00:08:51,440 --> 00:08:50,100
right direction so you take it over

250
00:08:53,050 --> 00:08:51,450
water that's referring to when you're

251
00:08:53,769 --> 00:08:53,060
actually flying right

252
00:08:55,570 --> 00:08:53,779
they're doing it out in the middle of

253
00:08:57,640 --> 00:08:55,580
the desert for the pad abort test

254
00:08:58,570 --> 00:08:57,650
exactly right so when you do that test

255
00:08:59,710 --> 00:08:58,580
in the middle of desert you want to make

256
00:09:01,690 --> 00:08:59,720
sure it follows the right trajectory

257
00:09:02,950 --> 00:09:01,700
would have gotten you out over the wall

258
00:09:05,290 --> 00:09:02,960
okay perfect

259
00:09:06,730 --> 00:09:05,300
thanks for that correct yeah no listen

260
00:09:08,830 --> 00:09:06,740
I'm learning too this is phenomenal so

261
00:09:09,820 --> 00:09:08,840
good job viously were excited for

262
00:09:11,350 --> 00:09:09,830
commercial crew in their work we're

263
00:09:12,400 --> 00:09:11,360

excited for these test flights so thank

264
00:09:13,900 --> 00:09:12,410
you once again for joining me here in

265
00:09:15,519 --> 00:09:13,910
the booth my pleasure I hope everybody

266
00:09:16,540 --> 00:09:15,529
gets to see one of the tests it'll be

267
00:09:18,100 --> 00:09:16,550
really cool I know you'll be able to see

268
00:09:23,050 --> 00:09:18,110
it on on the computer somewhere but

269
00:09:24,850 --> 00:09:23,060
seeing them live it's really cool first

270
00:09:28,180 --> 00:09:24,860
up for our partners is Boeing's Alicia

271
00:09:30,310 --> 00:09:28,190
Evans on their pad abort test all right

272
00:09:32,500 --> 00:09:30,320
so I am in the boot today however my

273
00:09:35,829 --> 00:09:32,510
guest is joining me by phone

274
00:09:39,250 --> 00:09:35,839
I have Alicia Evans who is a I believe

275
00:09:42,880 --> 00:09:39,260
test article integration lead for

276
00:09:45,250 --> 00:09:42,890
Boeing's cst-100 Starliner Alicia thanks

277
00:09:47,710 --> 00:09:45,260
for joining me thanks for having me

278
00:09:49,900 --> 00:09:47,720
Joshua did I get all that correct yeah

279
00:09:53,769 --> 00:09:49,910
I'm the test article integration lead

280
00:09:57,400 --> 00:09:53,779
for Commercial Crew Starliner for our

281
00:09:58,930 --> 00:09:57,410
pad abort test article which which is

282
00:10:00,840 --> 00:09:58,940
awesome like you're working on a

283
00:10:04,510 --> 00:10:00,850
spacecraft like that's pretty cool

284
00:10:06,850 --> 00:10:04,520
absolutely I always enjoy getting to

285
00:10:10,750 --> 00:10:06,860
tell people I test spaceships for a

286
00:10:12,520 --> 00:10:10,760
living a brief update since this

287
00:10:14,470 --> 00:10:12,530
interview was recorded alicia has

288
00:10:16,630 --> 00:10:14,480

actually been promoted her job is now

289
00:10:19,390 --> 00:10:16,640
flight director for star liners pad

290
00:10:21,640 --> 00:10:19,400
abort test and I know you were telling

291
00:10:23,650 --> 00:10:21,650
me a little bit earlier about your

292
00:10:25,660 --> 00:10:23,660
history actually working on other

293
00:10:27,550 --> 00:10:25,670
spacecraft can you give me kind of a

294
00:10:29,710 --> 00:10:27,560
quick overview of the kinds of things

295
00:10:33,000 --> 00:10:29,720
you've done in your career so far yeah

296
00:10:36,520 --> 00:10:33,010
I've gotten to work on two major

297
00:10:39,370 --> 00:10:36,530
projects for satellites so the very

298
00:10:42,160 --> 00:10:39,380
first program I got to work on is a NOAA

299
00:10:44,410 --> 00:10:42,170
NASA project called doze it's our

300
00:10:47,790 --> 00:10:44,420
geostationary operational environmental

301
00:10:51,370 --> 00:10:47,800
satellite this is a satellite that

302
00:10:54,540 --> 00:10:51,380
monitors the earth continuously 24 hours

303
00:10:58,000 --> 00:10:54,550
a day seven days a week 365 days a year

304
00:11:01,020 --> 00:10:58,010
watching our weather and for those that

305
00:11:04,060 --> 00:11:01,030
are really concerned about hurricanes

306
00:11:06,199 --> 00:11:04,070
this is the the satellite that creates

307
00:11:10,639 --> 00:11:06,209
those beautiful satellite imagery

308
00:11:14,419 --> 00:11:10,649
of hurricanes but it does far more than

309
00:11:19,609 --> 00:11:14,429
that have search-and-rescue capability

310
00:11:23,090 --> 00:11:19,619
on it gets data on how weather is

311
00:11:26,059 --> 00:11:23,100
developing every single day rate which

312
00:11:29,119 --> 00:11:26,069
feeds into our model predictions for

313
00:11:31,609 --> 00:11:29,129

weather forecasting and then in addition

314
00:11:34,009 --> 00:11:31,619
to that it watches our space weather so

315
00:11:36,079 --> 00:11:34,019
it looks at the Sun and our local

316
00:11:37,549 --> 00:11:36,089
environment and tells us what type of

317
00:11:40,189 --> 00:11:37,559
space weather earth is going to be

318
00:11:42,319 --> 00:11:40,199
impacted by that's awesome yeah

319
00:11:45,109 --> 00:11:42,329
obviously us being in Florida on the

320
00:11:46,179 --> 00:11:45,119
Space Coast and then the launching of

321
00:11:47,900 --> 00:11:46,189
the Starliner being here as well

322
00:11:49,869 --> 00:11:47,910
hurricanes are a big deal because

323
00:11:52,280 --> 00:11:49,879
weather is a huge factor for launch

324
00:11:54,139 --> 00:11:52,290
but you actually the reason you're

325
00:11:56,269 --> 00:11:54,149
coming to us by phone is because you're

326
00:11:58,129 --> 00:11:56,279
not where we're gonna launch the

327
00:11:59,600 --> 00:11:58,139
Starliner into space you're somewhere

328
00:12:01,489 --> 00:11:59,610
very different can you explain where you

329
00:12:02,650 --> 00:12:01,499
are and kind of what activity you're

330
00:12:06,259 --> 00:12:02,660
kind of going through right now

331
00:12:08,749 --> 00:12:06,269
absolutely so today I'm actually in New

332
00:12:09,829 --> 00:12:08,759
Mexico we're at the White Sands Missile

333
00:12:14,329 --> 00:12:09,839
Range

334
00:12:18,769 --> 00:12:14,339
it's an army base in South New Mexico

335
00:12:22,429 --> 00:12:18,779
where we are going to be conducting the

336
00:12:26,539 --> 00:12:22,439
Starliner pad abort test so essentially

337
00:12:27,949 --> 00:12:26,549
we are executing our flight tests of the

338
00:12:30,530 --> 00:12:27,959

Starliner vehicle that's going to

339
00:12:32,900 --> 00:12:30,540
demonstrate the fact that we can say for

340
00:12:36,410 --> 00:12:32,910
our astronauts in the case of a really a

341
00:12:37,879 --> 00:12:36,420
bad day scenario with our rocket right

342
00:12:40,429 --> 00:12:37,889
so we want to make sure that our

343
00:12:42,400 --> 00:12:40,439
astronauts are stays safe and this is a

344
00:12:44,480 --> 00:12:42,410
demonstration of that capability so

345
00:12:46,340 --> 00:12:44,490
before we get into the test some more

346
00:12:48,079 --> 00:12:46,350
can you kind of talk me through so

347
00:12:50,389 --> 00:12:48,089
people have a pretty good picture of

348
00:12:52,669 --> 00:12:50,399
what a rocket on a launch pad looks like

349
00:12:55,429 --> 00:12:52,679
so let's say that this bad day scenario

350
00:12:59,840 --> 00:12:55,439
plays out what are people gonna see from

351
00:13:02,329 --> 00:12:59,850
the launch pad on this day so you know

352
00:13:05,509 --> 00:13:02,339
at the launch pad rate you have the

353
00:13:08,929 --> 00:13:05,519
rocket standing next to its gantry you

354
00:13:11,749 --> 00:13:08,939
have a launch vehicle adapter which

355
00:13:14,840 --> 00:13:11,759
essentially is structural hardware that

356
00:13:16,999 --> 00:13:14,850
adapts the launch vehicle to the

357
00:13:19,069 --> 00:13:17,009
Starliner so that's how we interface to

358
00:13:19,740 --> 00:13:19,079
it then you have the Starliner sitting

359
00:13:22,620 --> 00:13:19,750
on top of the

360
00:13:25,920 --> 00:13:22,630
rocket and we have a service module as

361
00:13:30,020 --> 00:13:25,930
well as a crew module which is the

362
00:13:33,090 --> 00:13:30,030
Starliner so two two parts and during a

363
00:13:36,750 --> 00:13:33,100

abort right if there was to be an

364
00:13:40,410 --> 00:13:36,760
accident with the rocket and we needed

365
00:13:43,560 --> 00:13:40,420
to safe the crew what what happened is

366
00:13:47,130 --> 00:13:43,570
we have four large launch abort engines

367
00:13:49,380 --> 00:13:47,140
that fire in conjunction with several

368
00:13:52,020 --> 00:13:49,390
more smaller thrusters called our

369
00:13:54,720 --> 00:13:52,030
orbital maneuvering and attitude control

370
00:13:58,140 --> 00:13:54,730
thrusters and that combined collection

371
00:14:02,630 --> 00:13:58,150
of thrusters lifts the Starliner away

372
00:14:05,580 --> 00:14:02,640
from the rocket and outside of any

373
00:14:08,130 --> 00:14:05,590
debris or blast zone that might be

374
00:14:10,710 --> 00:14:08,140
created by a rocket no no when you say

375
00:14:13,020 --> 00:14:10,720
lift I'm assuming that if you're talking

376
00:14:16,470 --> 00:14:13,030
about an exploding rocket lift is

377
00:14:19,500 --> 00:14:16,480
actually at really high speeds is that a

378
00:14:21,630 --> 00:14:19,510
fair assessment it is it is I actually

379
00:14:24,240 --> 00:14:21,640
don't have the speeds directly in front

380
00:14:28,650 --> 00:14:24,250
of me but those four big engines don't

381
00:14:32,070 --> 00:14:28,660
launch abort engines are firing 40,000

382
00:14:34,920 --> 00:14:32,080
pounds of thrust each and then each of

383
00:14:37,340 --> 00:14:34,930
those smaller thrusters and we have

384
00:14:40,380 --> 00:14:37,350
twelve of them are adding an additional

385
00:14:42,720 --> 00:14:40,390
1500 pounds of thrust so it is moving

386
00:14:46,550 --> 00:14:42,730
very very quickly away from that rocket

387
00:14:49,800 --> 00:14:46,560
and so thinking about that scenario

388
00:14:51,960 --> 00:14:49,810

obviously you're out in New Mexico where

389
00:14:54,390 --> 00:14:51,970
you don't have a rocket so what's this

390
00:14:55,860 --> 00:14:54,400
test look like without a rocket so what

391
00:14:59,640 --> 00:14:55,870
we've done is we actually have a launch

392
00:15:04,500 --> 00:14:59,650
stand that represents the height of the

393
00:15:07,140 --> 00:15:04,510
rocket but ula our Atlas rocket provider

394
00:15:09,030 --> 00:15:07,150
has provided us with flight hardware

395
00:15:11,820 --> 00:15:09,040
that we're interfacing with so we have

396
00:15:16,590 --> 00:15:11,830
what we call a centre-forward adapter as

397
00:15:18,329 --> 00:15:16,600
well as a launch vehicle adapter and as

398
00:15:20,130 --> 00:15:18,339
part of our launch vehicle adapter we

399
00:15:23,730 --> 00:15:20,140
have an arrow skirt and that's all

400
00:15:26,910 --> 00:15:23,740
flight hardware from ula that'll be part

401
00:15:29,970 --> 00:15:26,920
of this test and so it'll adapt to our

402
00:15:32,040 --> 00:15:29,980
test stand and then the Starliner will

403
00:15:33,610 --> 00:15:32,050
sit on top of the launch vehicle adapter

404
00:15:38,950 --> 00:15:33,620
just like it would

405
00:15:41,020 --> 00:15:38,960
launch day and so on this for this pad

406
00:15:45,010 --> 00:15:41,030
abort test where where will you be

407
00:15:46,930 --> 00:15:45,020
obviously kind of your integration so in

408
00:15:48,070 --> 00:15:46,940
my mind I picture you working more to

409
00:15:50,590 --> 00:15:48,080
kind of make sure things are in place

410
00:15:54,370 --> 00:15:50,600
come test day do you have a function on

411
00:15:56,740 --> 00:15:54,380
that day so that's a great question I'm

412
00:16:01,180 --> 00:15:56,750
really hoping to be a spectator on that

413
00:16:04,840 --> 00:16:01,190

day but we will see what role I might

414
00:16:07,750 --> 00:16:04,850
ultimately fill launch day itself our

415
00:16:10,380 --> 00:16:07,760
launch team is actually going to be a

416
00:16:12,610 --> 00:16:10,390
few miles away from the launch pad

417
00:16:16,210 --> 00:16:12,620
roughly about four or four and a half

418
00:16:20,770 --> 00:16:16,220
miles away and we are at a facility

419
00:16:23,500 --> 00:16:20,780
called the whismur Cox range facility

420
00:16:26,890 --> 00:16:23,510
and we'll be doing all of our operations

421
00:16:28,420 --> 00:16:26,900
from there and so thinking about that

422
00:16:30,190 --> 00:16:28,430
launch team is that the same team that

423
00:16:36,010 --> 00:16:30,200
will be present for actual flights of

424
00:16:37,450 --> 00:16:36,020
Starliner absolutely so we'll have kind

425
00:16:40,270 --> 00:16:37,460
of break the team down into different

426
00:16:41,950 --> 00:16:40,280
groups we have a Mission Control team

427
00:16:43,930 --> 00:16:41,960
that is located in Houston they're

428
00:16:47,050 --> 00:16:43,940
participating in this flight test just

429
00:16:49,420 --> 00:16:47,060
like they will for a real mission and

430
00:16:50,890 --> 00:16:49,430
our two other test flights the orbital

431
00:16:52,660 --> 00:16:50,900
flight tests as well as the crew flight

432
00:16:54,220 --> 00:16:52,670
test so they're in Houston and they're

433
00:16:57,610 --> 00:16:54,230
going to stay in Houston for all three

434
00:17:02,740 --> 00:16:57,620
of these activities then we have our

435
00:17:06,760 --> 00:17:02,750
local Star liner test team and their job

436
00:17:08,500 --> 00:17:06,770
is to power the star liner itself and

437
00:17:12,630 --> 00:17:08,510
get it configured for launch and ready

438
00:17:16,360 --> 00:17:12,640

to hand over to start start the test and

439
00:17:19,930 --> 00:17:16,370
that team is going to participate in all

440
00:17:21,670 --> 00:17:19,940
of our flights getting us ready for the

441
00:17:24,370 --> 00:17:21,680
pad abort test as well as the orbital

442
00:17:26,860 --> 00:17:24,380
flight test the crew flight test and all

443
00:17:28,120 --> 00:17:26,870
of our future missions and their job is

444
00:17:31,140 --> 00:17:28,130
to make sure that the vehicle is

445
00:17:35,080 --> 00:17:31,150
configured and ready so that when T 0

446
00:17:37,150 --> 00:17:35,090
happens liftoff that it we I think we

447
00:17:40,030 --> 00:17:37,160
actually hand over a few minutes before

448
00:17:41,350 --> 00:17:40,040
over to the mission ops folks but

449
00:17:43,320 --> 00:17:41,360
they've made sure that the vehicle is

450
00:17:46,870 --> 00:17:43,330
fully configured and ready to launch

451
00:17:47,560 --> 00:17:46,880
cool so obviously there's a big

452
00:17:49,150 --> 00:17:47,570
difference

453
00:17:51,340 --> 00:17:49,160
your work with satellites to the

454
00:17:52,900 --> 00:17:51,350
Starliner the biggest difference

455
00:17:55,960 --> 00:17:52,910
probably being the fact that humans are

456
00:17:59,320 --> 00:17:55,970
on board the craft when we fly to space

457
00:18:01,120 --> 00:17:59,330
which has got to be pretty cool are they

458
00:18:02,740 --> 00:18:01,130
involved in this test are you gonna have

459
00:18:06,400 --> 00:18:02,750
astronauts present whether it be in the

460
00:18:08,650 --> 00:18:06,410
spacecraft or locally nearby so I

461
00:18:09,790 --> 00:18:08,660
actually haven't closed with the crew to

462
00:18:12,430 --> 00:18:09,800
find out whether or not they're going to

463
00:18:14,350 --> 00:18:12,440

be here to witness they are not going to

464
00:18:16,780 --> 00:18:14,360
be in the vehicle so during the pad

465
00:18:22,980 --> 00:18:16,790
abort test is same as the orbital flight

466
00:18:25,270 --> 00:18:22,990
test we're gonna have an ATV it's a I

467
00:18:30,460 --> 00:18:25,280
call them a crash-test dummy but

468
00:18:36,880 --> 00:18:30,470
essentially an anthropomorphic test yeah

469
00:18:40,480 --> 00:18:36,890
what's what's the last letter yeah we'll

470
00:18:43,410 --> 00:18:40,490
have an anthropomorphic it might be test

471
00:18:47,260 --> 00:18:43,420
dummy hey let's go with that for now

472
00:18:49,600 --> 00:18:47,270
participating as our pilot for both the

473
00:18:51,970 --> 00:18:49,610
pad abort test and the orbital flight

474
00:18:55,180 --> 00:18:51,980
test and so we're actually getting him

475
00:18:59,740 --> 00:18:55,190
integrated today okay all checked out

476
00:19:03,250 --> 00:18:59,750
this morning and later this week we'll

477
00:19:05,740 --> 00:19:03,260
actually get them in the feet that's

478
00:19:07,810 --> 00:19:05,750
awesome so is this as a star liner is

479
00:19:10,060 --> 00:19:07,820
this a is this a full-up star liner or

480
00:19:15,850 --> 00:19:10,070
is this a mock-up this is a full-up star

481
00:19:18,190 --> 00:19:15,860
liner so it's been built up specifically

482
00:19:22,330 --> 00:19:18,200
for this test but because we were

483
00:19:25,390 --> 00:19:22,340
testing the integrated system it has all

484
00:19:29,790 --> 00:19:25,400
of the systems required for the pad

485
00:19:34,300 --> 00:19:29,800
abort test and will it's full up

486
00:19:36,520 --> 00:19:34,310
avionics capability propulsion there's a

487
00:19:38,620 --> 00:19:36,530
handful of things that we've mocked up

488
00:19:41,440 --> 00:19:38,630

just because we wanted to keep the

489
00:19:46,960 --> 00:19:41,450
flight Hardware for for later use so

490
00:19:48,940 --> 00:19:46,970
because our our pilot is a APD and

491
00:19:54,310 --> 00:19:48,950
doesn't have any eyes like our

492
00:19:56,980 --> 00:19:54,320
integrated crew panel which is what the

493
00:19:58,870 --> 00:19:56,990
crew uses to keep tabs of what's

494
00:20:00,029 --> 00:19:58,880
happening on the vehicle that's been

495
00:20:02,940 --> 00:20:00,039
locked up so

496
00:20:04,950 --> 00:20:02,950
a math simulator gearing this launch

497
00:20:07,799 --> 00:20:04,960
just because we want to keep the real

498
00:20:09,989 --> 00:20:07,809
flight hardware for use later so I know

499
00:20:13,560 --> 00:20:09,999
that the Starliner in general has been

500
00:20:15,599 --> 00:20:13,570
designed for reuse and so will this

501
00:20:17,399 --> 00:20:15,609
Starliner have an opportunity to fly

502
00:20:19,529 --> 00:20:17,409
into space later or is this one really

503
00:20:21,239 --> 00:20:19,539
kind of a it's a full star liner for

504
00:20:23,909 --> 00:20:21,249
this very specific use and then it will

505
00:20:26,310 --> 00:20:23,919
be retired so to speak that is a great

506
00:20:28,799 --> 00:20:26,320
question we're still debating about it

507
00:20:31,409 --> 00:20:28,809
okay this vehicle actually has the

508
00:20:34,109 --> 00:20:31,419
capability to fly again later although

509
00:20:37,379 --> 00:20:34,119
right now I believe in our planet to

510
00:20:40,589 --> 00:20:37,389
single use okay and so thinking about

511
00:20:43,349 --> 00:20:40,599
cruise not being involved on this day do

512
00:20:44,879 --> 00:20:43,359
crews actually train in some way for

513
00:20:46,349 --> 00:20:44,889

this kind of a scenario obviously we

514
00:20:49,259 --> 00:20:46,359
hope we never have to use these kind of

515
00:20:50,609 --> 00:20:49,269
skills but are they training for what

516
00:20:53,369 --> 00:20:50,619
I'd like to go through this sort of a

517
00:20:56,639 --> 00:20:53,379
situation absolutely right so the the

518
00:20:59,879 --> 00:20:56,649
crew goes through significant amount of

519
00:21:03,450 --> 00:20:59,889
training and a lot of what they're going

520
00:21:07,320 --> 00:21:03,460
to be training for is what to do in the

521
00:21:10,440 --> 00:21:07,330
case of an abort test right and so they

522
00:21:12,539 --> 00:21:10,450
go through and see prepare themselves

523
00:21:15,869 --> 00:21:12,549
for the sequence of activities that are

524
00:21:17,460 --> 00:21:15,879
going to happen and then the only real

525
00:21:19,680 --> 00:21:17,470
difference I think in their training is

526
00:21:21,659 --> 00:21:19,690
going to be whether or not they they

527
00:21:23,460 --> 00:21:21,669
don't really get to experience the G's

528
00:21:28,139 --> 00:21:23,470
that they're gonna feel in the abort

529
00:21:31,379 --> 00:21:28,149
test but so much of how we design the

530
00:21:34,979 --> 00:21:31,389
system represents what they're already

531
00:21:36,839 --> 00:21:34,989
going to feel for flight that it's not

532
00:21:38,279 --> 00:21:36,849
going to be significantly different for

533
00:21:39,749 --> 00:21:38,289
them sitting in their their seat

534
00:21:41,999 --> 00:21:39,759
compared to what they're gonna

535
00:21:45,149 --> 00:21:42,009
experience during a real flight but what

536
00:21:47,190 --> 00:21:45,159
we do train them for is how to handle

537
00:21:50,580 --> 00:21:47,200
you know how to know that they need to

538
00:21:52,950 --> 00:21:50,590

trigger an abort what to expect as soon

539
00:21:54,719 --> 00:21:52,960
as import is triggered because

540
00:21:58,799 --> 00:21:54,729
aborts can be triggered both

541
00:22:01,589 --> 00:21:58,809
autonomously from the vehicle sensing an

542
00:22:04,820 --> 00:22:01,599
issue from the Starliner sensing an

543
00:22:07,950 --> 00:22:04,830
issue from the rocket sensing an issue

544
00:22:12,089 --> 00:22:07,960
both of those send signals across our

545
00:22:13,670 --> 00:22:12,099
interface and tell the other system hey

546
00:22:15,770 --> 00:22:13,680
we need to abort

547
00:22:19,220 --> 00:22:15,780
and then initiates an automated sequence

548
00:22:21,500 --> 00:22:19,230
there's also two manual capabilities so

549
00:22:22,370 --> 00:22:21,510
the crew themselves can actually wait

550
00:22:23,990 --> 00:22:22,380
and abort

551
00:22:27,560 --> 00:22:24,000
we have an abort handle that they have

552
00:22:30,440 --> 00:22:27,570
to pull to initiate an abort or the

553
00:22:33,380 --> 00:22:30,450
ground crew at the Mission Control

554
00:22:35,870 --> 00:22:33,390
Center can say hey there's something

555
00:22:38,000 --> 00:22:35,880
happening we need to abort the mission

556
00:22:40,390 --> 00:22:38,010
and save the crew and they can send a

557
00:22:44,930 --> 00:22:40,400
command that will also initiate an abort

558
00:22:45,980 --> 00:22:44,940
and so once that happened the crew now

559
00:22:47,570 --> 00:22:45,990
knows okay

560
00:22:50,150 --> 00:22:47,580
I'm going to get the following sequence

561
00:22:51,500 --> 00:22:50,160
of events and they're going through

562
00:22:55,430 --> 00:22:51,510
training that prepares them for what

563
00:22:58,220 --> 00:22:55,440

that looks like great as you think about

564
00:23:00,830 --> 00:22:58,230
this day approaching and you hopefully

565
00:23:03,560 --> 00:23:00,840
getting to be a spectator as you said do

566
00:23:05,180 --> 00:23:03,570
you what kind of feeling do you think

567
00:23:07,850 --> 00:23:05,190
this this is gonna have for you like as

568
00:23:09,950 --> 00:23:07,860
you watch this thing fly and hopefully

569
00:23:12,110 --> 00:23:09,960
everything goes brilliantly well what's

570
00:23:14,720 --> 00:23:12,120
that feeling like for you I'm very

571
00:23:19,310 --> 00:23:14,730
excited about this test right this is a

572
00:23:21,280 --> 00:23:19,320
full demonstration of our of our landing

573
00:23:23,720 --> 00:23:21,290
sequence right we have done a lot of

574
00:23:25,430 --> 00:23:23,730
subsystem tests of our landing sequence

575
00:23:28,100 --> 00:23:25,440
to show that each component works

576
00:23:30,560 --> 00:23:28,110
individually and in addition to showing

577
00:23:34,490 --> 00:23:30,570
that our propulsion system works to safe

578
00:23:37,010 --> 00:23:34,500
the crew away from the rocket the second

579
00:23:40,390 --> 00:23:37,020
half the abort test is that at lands on

580
00:23:44,000 --> 00:23:40,400
land the way it would during an actual

581
00:23:46,610 --> 00:23:44,010
return from flight and so what we were

582
00:23:49,630 --> 00:23:46,620
going to see is the service module

583
00:23:51,650 --> 00:23:49,640
separating from the crew module

584
00:23:53,510 --> 00:23:51,660
nominally you don't get to see that

585
00:23:56,840 --> 00:23:53,520
because that happens as the vehicle

586
00:23:58,790 --> 00:23:56,850
enters orbit as the service module burns

587
00:24:00,500 --> 00:23:58,800
up in the atmosphere and the crew module

588
00:24:02,690 --> 00:24:00,510

comes in safely through through the

589
00:24:05,120 --> 00:24:02,700
atmosphere so this will be a opportunity

590
00:24:09,110 --> 00:24:05,130
for us to actually see that separation

591
00:24:10,100 --> 00:24:09,120
event and then the four heat shield

592
00:24:13,070 --> 00:24:10,110
pulls away

593
00:24:14,750 --> 00:24:13,080
we got parachutes that fire and then

594
00:24:17,930 --> 00:24:14,760
pull that forward heat shield away which

595
00:24:20,600 --> 00:24:17,940
expose our main parachutes and then

596
00:24:24,890 --> 00:24:20,610
we'll get to actually see our parachutes

597
00:24:26,910 --> 00:24:24,900
deploy and below out as you know the

598
00:24:30,330 --> 00:24:26,920
reefers allow it to

599
00:24:32,910 --> 00:24:30,340
bellow and see the crew module starting

600
00:24:34,770 --> 00:24:32,920
to float down as we get closer to the

601
00:24:37,170 --> 00:24:34,780
ground we'll see the base heat shield

602
00:24:39,780 --> 00:24:37,180
separate which exposes our airbags and

603
00:24:43,070 --> 00:24:39,790
then as we get closer to the ground the

604
00:24:45,380 --> 00:24:43,080
airbags inflate and that entire sequence

605
00:24:49,340 --> 00:24:45,390
this will be the first time that's

606
00:24:53,670 --> 00:24:49,350
demonstrated as on flight hardware in

607
00:24:56,940 --> 00:24:53,680
the air so I'm very excited to watch all

608
00:25:00,390 --> 00:24:56,950
of that take place and then land under

609
00:25:05,600 --> 00:25:00,400
parachutes on air bags on on land which

610
00:25:08,220 --> 00:25:05,610
is the first American vehicle to do that

611
00:25:11,460 --> 00:25:08,230
we should just hear you explain that as

612
00:25:13,770 --> 00:25:11,470
a spectator it's really it's a fun thing

613
00:25:16,470 --> 00:25:13,780

to get to watch this happen successfully

614
00:25:19,290 --> 00:25:16,480
and you saying all that makes me

615
00:25:23,000 --> 00:25:19,300
appreciate even more how involved and

616
00:25:26,820 --> 00:25:23,010
difficult this is so huge

617
00:25:29,070 --> 00:25:26,830
congratulations now and for the future

618
00:25:30,900 --> 00:25:29,080
for you and your team we're excited to

619
00:25:32,480 --> 00:25:30,910
see this thing fly and obviously we're

620
00:25:34,290 --> 00:25:32,490
excited for you guys to transport humans

621
00:25:38,310 --> 00:25:34,300
safely to and from the International

622
00:25:40,980 --> 00:25:38,320
Space Station sooner than later thank

623
00:25:43,620 --> 00:25:40,990
you yeah I can't wait for this play and

624
00:25:46,170 --> 00:25:43,630
our next two test flights and get into

625
00:25:47,640 --> 00:25:46,180
future missions awesome Alicia I

626
00:25:49,500 --> 00:25:47,650
appreciate your time thank you so much

627
00:25:52,800 --> 00:25:49,510
for joining us today thank you for

628
00:25:54,750 --> 00:25:52,810
having me because Alicia got promoted to

629
00:25:57,060 --> 00:25:54,760
flight director for this test she won't

630
00:25:58,680 --> 00:25:57,070
be able to be just a spectator but we

631
00:25:59,900 --> 00:25:58,690
wish her and the entire Starliner team

632
00:26:02,450 --> 00:25:59,910
good luck

633
00:26:05,380 --> 00:26:02,460
and now on the SpaceX side here's Benji

634
00:26:07,730 --> 00:26:05,390
Reed to talk there in flight abort test

635
00:26:10,910 --> 00:26:07,740
alright I am not actually in the booth

636
00:26:12,980 --> 00:26:10,920
now with Benji Reed because he is coming

637
00:26:15,200 --> 00:26:12,990
to us live from SpaceX headquarters in

638
00:26:16,880 --> 00:26:15,210

Hawthorne California Benji I understand

639
00:26:18,350 --> 00:26:16,890
you're the director of crew mission

640
00:26:21,170 --> 00:26:18,360
management is that right that's right

641
00:26:22,460 --> 00:26:21,180
and can you explain kind of what exactly

642
00:26:24,620 --> 00:26:22,470
does that mean I know that you work a

643
00:26:28,340 --> 00:26:24,630
lot with Commercial Crew but what's your

644
00:26:29,720 --> 00:26:28,350
function really like so ultimately my

645
00:26:31,640 --> 00:26:29,730
job is kind of help make sure the

646
00:26:33,890 --> 00:26:31,650
contract is executed well the whole

647
00:26:35,870 --> 00:26:33,900
mission and overall program work well

648
00:26:36,950 --> 00:26:35,880
it's coordinating all of them you know

649
00:26:38,930 --> 00:26:36,960
the great engineers that we had here

650
00:26:40,430 --> 00:26:38,940
SpaceX and all the great engineers that

651
00:26:42,710 --> 00:26:40,440
are at NASA and make sure that they work

652
00:26:44,450 --> 00:26:42,720
together to ultimately get our system

653
00:26:46,040 --> 00:26:44,460
reviewed and certified for flight and

654
00:26:47,570 --> 00:26:46,050
then of course doing the operations

655
00:26:49,040 --> 00:26:47,580
because then we have our whole

656
00:26:50,960 --> 00:26:49,050
operations team that works with the crew

657
00:26:52,820 --> 00:26:50,970
to go fly those station and bring them

658
00:26:54,620 --> 00:26:52,830
home yeah so excited obviously that's

659
00:26:56,810 --> 00:26:54,630
why we're here today talking you guys

660
00:26:59,360 --> 00:26:56,820
have your in-flight abort test coming up

661
00:27:02,480 --> 00:26:59,370
and we'll kind of explain why in a

662
00:27:04,430 --> 00:27:02,490
minute but you guys lost a crew Dragon

663
00:27:07,460 --> 00:27:04,440

capsule earlier this year and throughout

664
00:27:09,950 --> 00:27:07,470
the course of human space exploration we

665
00:27:12,200 --> 00:27:09,960
have seen a history of these kinds of

666
00:27:14,900 --> 00:27:12,210
seeming like just setbacks these

667
00:27:16,790 --> 00:27:14,910
difficult moments proving to make us

668
00:27:18,020 --> 00:27:16,800
smarter and make us better and improve

669
00:27:19,520 --> 00:27:18,030
our hardware have you really seen that

670
00:27:21,410 --> 00:27:19,530
happen with SpaceX over the course of

671
00:27:22,790 --> 00:27:21,420
the past few months absolutely I think

672
00:27:23,720 --> 00:27:22,800
that was phase X over the many years

673
00:27:25,280 --> 00:27:23,730
that I've worked here

674
00:27:27,230 --> 00:27:25,290
you know I'm he'll on said the other day

675
00:27:28,460 --> 00:27:27,240
that if you're if you're not breaking

676
00:27:33,350 --> 00:27:28,470
things you're probably not testing hard

677
00:27:34,760 --> 00:27:33,360
enough and the tests and tests we don't

678
00:27:36,020 --> 00:27:34,770
always like to break things and of

679
00:27:38,780 --> 00:27:36,030
course the anomaly that we had earlier

680
00:27:40,340 --> 00:27:38,790
this year was tough but it was as has

681
00:27:42,680 --> 00:27:40,350
also been said a number of times it was

682
00:27:44,120 --> 00:27:42,690
a gift because we learned a lot we

683
00:27:45,950 --> 00:27:44,130
learned a lot about our system but we

684
00:27:47,750 --> 00:27:45,960
learned a lot about the nature of the

685
00:27:50,150 --> 00:27:47,760
materials and how these systems work in

686
00:27:51,290 --> 00:27:50,160
interaction that it's actually gonna be

687
00:27:54,020 --> 00:27:51,300
industry-leading and help all

688
00:27:55,880 --> 00:27:54,030

spacecrafts become safer so for sure we

689
00:27:56,990 --> 00:27:55,890
need when you have problems that you you

690
00:27:58,430 --> 00:27:57,000
jump right into them you get a lot of

691
00:27:59,990 --> 00:27:58,440
data and you get better for it

692
00:28:01,040 --> 00:28:00,000
that's so awesome and the reason I kind

693
00:28:03,230 --> 00:28:01,050
of bring that up actually if I

694
00:28:04,730 --> 00:28:03,240
understand correctly that crew Dragon

695
00:28:06,590 --> 00:28:04,740
was supposed to be the one flying on in

696
00:28:07,820 --> 00:28:06,600
flight aboard is that true and can you

697
00:28:09,770 --> 00:28:07,830
kind of speak to what's been the process

698
00:28:11,330 --> 00:28:09,780
in light of that moving forward to

699
00:28:12,200 --> 00:28:11,340
obviously keep charging ahead sure

700
00:28:13,500 --> 00:28:12,210
absolutely

701
00:28:14,820 --> 00:28:13,510
that was the caps

702
00:28:16,500 --> 00:28:14,830
was originally plated to be per in

703
00:28:18,510 --> 00:28:16,510
flight aboard in fact that's why we were

704
00:28:20,130 --> 00:28:18,520
doing the testing was we're basically

705
00:28:22,080 --> 00:28:20,140
initiating the Draco's and then also the

706
00:28:25,260 --> 00:28:22,090
super Draco engines on that vehicle to

707
00:28:27,660 --> 00:28:25,270
in a static fire arrangement getting

708
00:28:29,700 --> 00:28:27,670
ready for it in flight of work tests and

709
00:28:31,350 --> 00:28:29,710
the number one impact of course is hey

710
00:28:33,480 --> 00:28:31,360
we got to figure out what went wrong and

711
00:28:35,850 --> 00:28:33,490
we've done that now and then figure out

712
00:28:37,320 --> 00:28:35,860
what the best way is to mitigate that

713
00:28:39,270 --> 00:28:37,330

anomaly and make sure that it's not

714
00:28:40,950 --> 00:28:39,280
going to happen again on the future and

715
00:28:44,160 --> 00:28:40,960
and that's that's your very first

716
00:28:45,780 --> 00:28:44,170
concern of course and then you know kind

717
00:28:47,160 --> 00:28:45,790
of a close second is alright so what are

718
00:28:48,780 --> 00:28:47,170
we going to go fly for the inflatable

719
00:28:51,540 --> 00:28:48,790
work test the good news is that we have

720
00:28:54,540 --> 00:28:51,550
lots of capsules in build here all the

721
00:28:55,920 --> 00:28:54,550
time and so we had the next capsule in

722
00:28:59,550 --> 00:28:55,930
line which had been originally slated

723
00:29:01,740 --> 00:28:59,560
for the demo to test coming up soon and

724
00:29:04,230 --> 00:29:01,750
then also other capsules beyond that so

725
00:29:07,590 --> 00:29:04,240
we just shifted the whole capsule line

726
00:29:09,120 --> 00:29:07,600
assignments ahead one so that what had

727
00:29:10,770 --> 00:29:09,130
been for demo two is now going to fly in

728
00:29:12,180 --> 00:29:10,780
flight afford the crew one an

729
00:29:14,910 --> 00:29:12,190
operational mission will now be for demo

730
00:29:16,800 --> 00:29:14,920
two and so on and it was great we're

731
00:29:18,600 --> 00:29:16,810
able to do that and that's a that's a

732
00:29:21,240 --> 00:29:18,610
real testament to our production team

733
00:29:22,770 --> 00:29:21,250
and their ability to function yeah so

734
00:29:24,120 --> 00:29:22,780
cool so thinking about the in-flight

735
00:29:26,370 --> 00:29:24,130
abort test because obviously that's the

736
00:29:28,530 --> 00:29:26,380
next big one on the Commercial Crew path

737
00:29:30,390 --> 00:29:28,540
here can you kind of talk our listeners

738
00:29:31,500 --> 00:29:30,400

through like what should they expect to

739
00:29:33,750 --> 00:29:31,510
see when this mission takes place

740
00:29:35,190 --> 00:29:33,760
because this is not a normal thing right

741
00:29:38,040 --> 00:29:35,200
that's exactly right

742
00:29:40,620 --> 00:29:38,050
it's you know it is a test number one

743
00:29:42,030 --> 00:29:40,630
and it's it's a test of our escape

744
00:29:44,160 --> 00:29:42,040
system which we hope to never actually

745
00:29:46,740 --> 00:29:44,170
use sure might be this game set

746
00:29:48,180 --> 00:29:46,750
simmons-howe with the crew away from the

747
00:29:49,170 --> 00:29:48,190
launch vehicle in case something's going

748
00:29:51,210 --> 00:29:49,180
wrong and we want to get them away

749
00:29:54,270 --> 00:29:51,220
really fast and bring them back home on

750
00:29:56,820 --> 00:29:54,280
parachute safely and and so so what

751
00:29:58,320 --> 00:29:56,830
you're gonna see is it first will look a

752
00:29:59,850 --> 00:29:58,330
lot like a normal launch right there's

753
00:30:02,520 --> 00:29:59,860
going to be a dragon on top of a full

754
00:30:04,530 --> 00:30:02,530
Falcon nine that Falcon 9 will launch

755
00:30:07,200 --> 00:30:04,540
off with 39a just like we've seen before

756
00:30:11,340 --> 00:30:07,210
like we did on demo one which just flew

757
00:30:13,800 --> 00:30:11,350
back here in the spring and and that

758
00:30:16,320 --> 00:30:13,810
launch will go off and a little ways

759
00:30:18,090 --> 00:30:16,330
into flight will initiate the launch

760
00:30:20,940 --> 00:30:18,100
escape system those super Drago's will

761
00:30:23,250 --> 00:30:20,950
fire dragon will separate from Falcon

762
00:30:25,320 --> 00:30:23,260
and and the dragon will move very

763
00:30:27,030 --> 00:30:25,330

quickly away from Falcon and then come

764
00:30:28,590 --> 00:30:27,040
back on parachutes

765
00:30:31,860 --> 00:30:28,600
in terms of what people will be able to

766
00:30:34,200 --> 00:30:31,870
see it will be probably not a lot it

767
00:30:37,170 --> 00:30:34,210
depends on how clear the day is and the

768
00:30:40,050 --> 00:30:37,180
weather fundamentally yes so are you

769
00:30:42,240 --> 00:30:40,060
guys gonna be trying to return this

770
00:30:44,010 --> 00:30:42,250
Falcon or are you gonna be simulating

771
00:30:46,350 --> 00:30:44,020
like a full up like hey we had a really

772
00:30:48,210 --> 00:30:46,360
bad day oh that's a fair question so

773
00:30:49,770 --> 00:30:48,220
we're not going to necessarily simulate

774
00:30:52,350 --> 00:30:49,780
something going wrong with the Falcon

775
00:30:53,790 --> 00:30:52,360
right a goal to say well the system has

776
00:30:55,650 --> 00:30:53,800
detected something has gone wrong with

777
00:30:57,240 --> 00:30:55,660
Falcon and now it's going to get those

778
00:30:59,670 --> 00:30:57,250
astronauts away safely that's the

779
00:31:01,590 --> 00:30:59,680
simulation so the main thing is testing

780
00:31:03,930 --> 00:31:01,600
the dragon can't get away safely from

781
00:31:06,510 --> 00:31:03,940
the conditions that it's in on on the

782
00:31:09,300 --> 00:31:06,520
Falcon however that said we do expect

783
00:31:11,130 --> 00:31:09,310
that this Falcon will break up the

784
00:31:13,530 --> 00:31:11,140
Falcons are designed to get us to go to

785
00:31:14,670 --> 00:31:13,540
orbit and then and and come back home

786
00:31:16,560 --> 00:31:14,680
and land but you're not necessarily

787
00:31:18,390 --> 00:31:16,570
designed - halfway through their ascent

788
00:31:19,830 --> 00:31:18,400

have their payload pop off so we're

789
00:31:22,740 --> 00:31:19,840
going to we're going to expect to see

790
00:31:25,980 --> 00:31:22,750
that the Falcon will probably break up

791
00:31:28,710 --> 00:31:25,990
at some point after dragon initiates in

792
00:31:29,820 --> 00:31:28,720
to escape and so does this mean there's

793
00:31:31,740 --> 00:31:29,830
a physical button that somebody's gonna

794
00:31:34,560 --> 00:31:31,750
hit or is this a timed activity it's a

795
00:31:36,000 --> 00:31:34,570
timed activity okay and and then you

796
00:31:39,090 --> 00:31:36,010
mentioned the dragons gonna come back on

797
00:31:41,190 --> 00:31:39,100
parachutes are we are we gonna see a

798
00:31:43,380 --> 00:31:41,200
recovery like we saw with demo 1 or are

799
00:31:45,000 --> 00:31:43,390
we gonna see a full-on simulation of the

800
00:31:47,130 --> 00:31:45,010
recovery effort as if there were people

801
00:31:48,240 --> 00:31:47,140
on board you know that's a great

802
00:31:49,410 --> 00:31:48,250
question in fact we've already had a

803
00:31:52,230 --> 00:31:49,420
chance to practice this if you remember

804
00:31:54,000 --> 00:31:52,240
back in 2015 we did a patent work test

805
00:31:55,980 --> 00:31:54,010
where we did the same thing where

806
00:31:58,530 --> 00:31:55,990
initiated the launch escape system on

807
00:32:00,390 --> 00:31:58,540
Dragon but from the pad and that was

808
00:32:02,100 --> 00:32:00,400
about four years ago and we were able to

809
00:32:02,910 --> 00:32:02,110
learn a lot from that including the

810
00:32:05,460 --> 00:32:02,920
recovery effort

811
00:32:07,950 --> 00:32:05,470
so that Dragon launch escaped from the

812
00:32:10,170 --> 00:32:07,960
pad and then came back down into the

813
00:32:11,640 --> 00:32:10,180

water on parachutes and we had our

814
00:32:14,000 --> 00:32:11,650
recovery team go out and pick it up

815
00:32:17,490 --> 00:32:14,010
we'll do something similar in this case

816
00:32:19,800 --> 00:32:17,500
where we'll have our recovery team and

817
00:32:22,380 --> 00:32:19,810
their vessels staged and ready to go

818
00:32:24,990 --> 00:32:22,390
we'll also actually have the search and

819
00:32:27,480 --> 00:32:25,000
rescue forces who would be on call for

820
00:32:30,270 --> 00:32:27,490
an actual you know escape or or you know

821
00:32:31,950 --> 00:32:30,280
a phenomenal landing as we call it you

822
00:32:35,160 --> 00:32:31,960
know we want to have everybody to take

823
00:32:36,620 --> 00:32:35,170
the opportunity to practice and do a lot

824
00:32:39,790 --> 00:32:36,630
of what they would do kind of around

825
00:32:40,810 --> 00:32:39,800
this event they won't do the full

826
00:32:42,370 --> 00:32:40,820
we'll be treated as a full

827
00:32:43,390 --> 00:32:42,380
search-and-rescue practice mission we've

828
00:32:45,730 --> 00:32:43,400
actually already been doing a lot of

829
00:32:47,950 --> 00:32:45,740
that over the last number of years but

830
00:32:50,830 --> 00:32:47,960
everybody will be staged and able to

831
00:32:53,650 --> 00:32:50,840
exercise some of what they would do in a

832
00:32:55,090 --> 00:32:53,660
real situation that's that's really cool

833
00:32:57,090 --> 00:32:55,100
will you'll be playing to you reuse this

834
00:33:00,430 --> 00:32:57,100
crew dragon at some point yeah certainly

835
00:33:02,500 --> 00:33:00,440
you know we'll bring it back and we'll

836
00:33:03,670 --> 00:33:02,510
we'll meet in the first most important

837
00:33:05,890 --> 00:33:03,680
priorities we'll get all the data off of

838
00:33:07,570 --> 00:33:05,900

it from the tests we'll inspect it

839
00:33:09,010 --> 00:33:07,580
understand you know how the whole

840
00:33:10,600 --> 00:33:09,020
vehicle looks and then we'll eventually

841
00:33:11,980 --> 00:33:10,610
I imagine we'll probably refurbish it

842
00:33:15,670 --> 00:33:11,990
and decide to in figure out what we

843
00:33:16,540 --> 00:33:15,680
would use it for that's yeah I'm just

844
00:33:17,530 --> 00:33:16,550
envisioning like this whole thing

845
00:33:21,870 --> 00:33:17,540
happening it's gonna be pretty awesome

846
00:33:24,250 --> 00:33:21,880
are you I understand that this the abort

847
00:33:26,260 --> 00:33:24,260
simulation is supposed to happen around

848
00:33:29,440 --> 00:33:26,270
the time of max Q or maximum dynamic

849
00:33:31,240 --> 00:33:29,450
pressure is there a reason that you guys

850
00:33:34,300 --> 00:33:31,250
chose that moment and are you expecting

851
00:33:36,850 --> 00:33:34,310
that there's gonna be any any sort of

852
00:33:39,220 --> 00:33:36,860
negative impacts to the the crew dragon

853
00:33:40,960 --> 00:33:39,230
as a result of that good question so no

854
00:33:43,780 --> 00:33:40,970
we don't and part of the point of this

855
00:33:45,250 --> 00:33:43,790
test is to validate the crew Dragon will

856
00:33:47,200 --> 00:33:45,260
withstand this test and withstand this

857
00:33:50,530 --> 00:33:47,210
event and again bring the crew home

858
00:33:51,460 --> 00:33:50,540
safely in terms of the timing of it and

859
00:33:54,040 --> 00:33:51,470
that's actually a really interesting

860
00:33:57,160 --> 00:33:54,050
point so it happens just a little bit

861
00:33:58,870 --> 00:33:57,170
after max q and what we've done is we've

862
00:34:02,140 --> 00:33:58,880
looked at all of the different places

863
00:34:04,030 --> 00:34:02,150

where you really care about you know the

864
00:34:06,220 --> 00:34:04,040
intense forces intense aerodynamic

865
00:34:07,600 --> 00:34:06,230
forces and that are going on in the

866
00:34:09,250 --> 00:34:07,610
vehicle you know there's these different

867
00:34:12,040 --> 00:34:09,260
places where you could look you know

868
00:34:14,740 --> 00:34:12,050
right at initiation of the you know

869
00:34:17,440 --> 00:34:14,750
shutdown of the primary engines you can

870
00:34:19,480 --> 00:34:17,450
look at where your parachutes are going

871
00:34:20,950 --> 00:34:19,490
to deploy and there's this whole range

872
00:34:23,080 --> 00:34:20,960
of well I could test here I could test

873
00:34:25,780 --> 00:34:23,090
there and what we've done is we've tried

874
00:34:27,880 --> 00:34:25,790
to optimize for the maximum opportunity

875
00:34:30,340 --> 00:34:27,890
across all of these different areas so

876
00:34:32,760 --> 00:34:30,350
we've chosen a time a point in the time

877
00:34:36,040 --> 00:34:32,770
line that kind of gives us the best

878
00:34:38,260 --> 00:34:36,050
representation of a tough scenario for

879
00:34:40,810 --> 00:34:38,270
all of those different things that can

880
00:34:42,909 --> 00:34:40,820
be stressed in the system and then and

881
00:34:44,320 --> 00:34:42,919
that's that's optimized so that we kind

882
00:34:47,470 --> 00:34:44,330
of get the biggest bang for our buck out

883
00:34:48,669 --> 00:34:47,480
of this test so it sounds like you're

884
00:34:49,840 --> 00:34:48,679
kind of saying this is like the worst

885
00:34:52,060 --> 00:34:49,850
case scenario of the worst case

886
00:34:53,470 --> 00:34:52,070
scenarios is that a fair assessment we

887
00:34:55,419 --> 00:34:53,480
try to it

888
00:34:57,250 --> 00:34:55,429

I wouldn't I know if I quite classify it

889
00:34:58,480 --> 00:34:57,260
that way because that's often drives you

890
00:35:00,190 --> 00:34:58,490
to what we call the corner of a box

891
00:35:02,950 --> 00:35:00,200
right it's better to take this most

892
00:35:04,810 --> 00:35:02,960
extreme case sure and and you go test

893
00:35:06,190 --> 00:35:04,820
there and the reality is is that in a

894
00:35:09,510 --> 00:35:06,200
timeline like this there's a lot of

895
00:35:12,270 --> 00:35:09,520
corners of the box and instead of like

896
00:35:14,680 --> 00:35:12,280
you know testing one of those corners

897
00:35:15,910 --> 00:35:14,690
for this test we want to make sure that

898
00:35:18,310 --> 00:35:15,920
we actually get a good representation

899
00:35:21,130 --> 00:35:18,320
across as many years as we can so we've

900
00:35:22,420 --> 00:35:21,140
optimized in that way okay and you

901
00:35:23,680 --> 00:35:22,430
mentioned that this was a bridge this

902
00:35:26,710 --> 00:35:23,690
crew Dragon was originally planned for

903
00:35:27,280 --> 00:35:26,720
demo - obviously plans changed a little

904
00:35:29,320 --> 00:35:27,290
bit

905
00:35:31,960 --> 00:35:29,330
so is will this crew Dragon be fully

906
00:35:33,640 --> 00:35:31,970
built out or will it kind of be more of

907
00:35:35,290 --> 00:35:33,650
like an essential package to test these

908
00:35:38,470 --> 00:35:35,300
critical systems for a launch abort

909
00:35:40,900 --> 00:35:38,480
scenario sure so the vehicle is complete

910
00:35:42,730 --> 00:35:40,910
as far as needed for the test there are

911
00:35:44,590 --> 00:35:42,740
a few elements that aren't installed

912
00:35:45,070 --> 00:35:44,600
because they're completely unrelated to

913
00:35:47,650 --> 00:35:45,080

the test

914
00:35:49,240 --> 00:35:47,660
for example the docking system as you

915
00:35:51,970 --> 00:35:49,250
recall that that really cool docking

916
00:35:55,300 --> 00:35:51,980
system developed and it was tested on

917
00:35:57,160 --> 00:35:55,310
the demo one flight back in March day

918
00:35:59,109 --> 00:35:57,170
there's no need to have a docking system

919
00:36:01,810 --> 00:35:59,119
on this on this particular test vehicle

920
00:36:04,599 --> 00:36:01,820
right so we've removed that system and

921
00:36:06,520 --> 00:36:04,609
and haven't placed a mass simulator so

922
00:36:08,440 --> 00:36:06,530
we get all the same forces all the same

923
00:36:09,520 --> 00:36:08,450
effects of having that mass there on top

924
00:36:11,140 --> 00:36:09,530
but it doesn't need to be an actual

925
00:36:12,609 --> 00:36:11,150
mechanism that works so that's one

926
00:36:13,870 --> 00:36:12,619
example of something that we've that

927
00:36:16,960 --> 00:36:13,880
we've taken off of that vehicle but

928
00:36:19,720 --> 00:36:16,970
otherwise it's a complete dragon that's

929
00:36:21,760 --> 00:36:19,730
that's great so for for launch day for

930
00:36:22,930 --> 00:36:21,770
in-flight abort test where will you be

931
00:36:24,580 --> 00:36:22,940
are you gonna be out here at the Kennedy

932
00:36:26,109 --> 00:36:24,590
Space Center are you gonna be on console

933
00:36:27,010 --> 00:36:26,119
somewhere what's your role that day oh

934
00:36:30,400 --> 00:36:27,020
absolutely

935
00:36:32,099 --> 00:36:30,410
I plan to be at Kennedy and and in

936
00:36:35,250 --> 00:36:32,109
firing room before where we'll be

937
00:36:37,810 --> 00:36:35,260
running the mission this is a launch and

938
00:36:40,390 --> 00:36:37,820

know we've asked all of our teams to

939
00:36:42,970 --> 00:36:40,400
view this as a full-on mission and it

940
00:36:46,120 --> 00:36:42,980
doesn't quite make it to orbit and it's

941
00:36:47,560 --> 00:36:46,130
not a long-duration dragon mission but

942
00:36:50,320 --> 00:36:47,570
it is a mission we are launching a

943
00:36:51,580 --> 00:36:50,330
rocket and something very exciting is

944
00:36:54,580 --> 00:36:51,590
happening at the payload halfway through

945
00:36:56,470 --> 00:36:54,590
that event so we're treating this as a

946
00:36:58,080 --> 00:36:56,480
full-on launch we'll be in the firing

947
00:37:00,310 --> 00:36:58,090
room and I'll be out there at Kennedy

948
00:37:02,650 --> 00:37:00,320
but just as I was when we did that pad

949
00:37:05,280 --> 00:37:02,660
abort test back in 2015 and as we were

950
00:37:07,470 --> 00:37:05,290
there for demo one and and you know it's

951
00:37:08,700 --> 00:37:07,480
I'll be out at Kennedy next week we get

952
00:37:10,740 --> 00:37:08,710
to come out there a lot and we have a

953
00:37:12,630 --> 00:37:10,750
strong team that's resident there and a

954
00:37:14,520 --> 00:37:12,640
lot of my folks get to go there a lot

955
00:37:18,180 --> 00:37:14,530
and right now in fact down at Kennedy

956
00:37:22,590 --> 00:37:18,190
are our teams or integration teams are

957
00:37:26,850 --> 00:37:22,600
just going gangbusters working on the

958
00:37:28,200 --> 00:37:26,860
Dragons both of course the in flight

959
00:37:29,430 --> 00:37:28,210
aboard dragons are getting ready you

960
00:37:32,040 --> 00:37:29,440
know getting ready for that to move into

961
00:37:34,770 --> 00:37:32,050
our static fire test they're also

962
00:37:37,050 --> 00:37:34,780
getting ready for upcoming CRS dragon

963
00:37:39,780 --> 00:37:37,060

missions cargo dragon missions so our

964
00:37:42,450 --> 00:37:39,790
work both at Cape Canaveral Air Force

965
00:37:44,550 --> 00:37:42,460
Station as well as Kennedy it's

966
00:37:46,620 --> 00:37:44,560
constantly ongoing yeah it never seems

967
00:37:48,780 --> 00:37:46,630
to stop obviously you guys have a high

968
00:37:50,790 --> 00:37:48,790
rate of launch here that's great I know

969
00:37:52,620 --> 00:37:50,800
for demo one I believe you guys had a

970
00:37:54,960 --> 00:37:52,630
and you'll have to forgive me I'm

971
00:37:57,570 --> 00:37:54,970
blanking on the technical term you had a

972
00:37:59,340 --> 00:37:57,580
dummy onboard that's quite smart Ripley

973
00:38:02,280 --> 00:37:59,350
I believe are you doing anything like

974
00:38:03,930 --> 00:38:02,290
that for in flight aboard that's right

975
00:38:05,850 --> 00:38:03,940
we did we did we had Ripley on board for

976
00:38:08,280 --> 00:38:05,860
demo one which which allowed us to

977
00:38:11,490 --> 00:38:08,290
gather a lot of data and we are we're

978
00:38:12,780 --> 00:38:11,500
having doing similar data gathering for

979
00:38:14,910 --> 00:38:12,790
the in flight of work test we have a lot

980
00:38:16,500 --> 00:38:14,920
of sensors in place we have a lot of

981
00:38:18,030 --> 00:38:16,510
sensors of what the crew would see in

982
00:38:20,430 --> 00:38:18,040
the field so we're doing a similar

983
00:38:22,530 --> 00:38:20,440
process where we gather data and I know

984
00:38:24,870 --> 00:38:22,540
this this whole test is definitely a

985
00:38:26,640 --> 00:38:24,880
part of getting to that point where we

986
00:38:29,460 --> 00:38:26,650
have that confidence in sending crew

987
00:38:31,530 --> 00:38:29,470
aboard crew dragon so what are some of

988
00:38:33,540 --> 00:38:31,540

the things kind of the highlights of the

989
00:38:35,610 --> 00:38:33,550
challenges of going from demo one to

990
00:38:39,390 --> 00:38:35,620
demo two other than obviously this test

991
00:38:42,360 --> 00:38:39,400
absolutely so the biggest thing of

992
00:38:46,200 --> 00:38:42,370
course is building out the vehicle as a

993
00:38:49,380 --> 00:38:46,210
first step I'd say that of equal

994
00:38:51,060 --> 00:38:49,390
priority and importance is is having the

995
00:38:52,520 --> 00:38:51,070
crew ready to go and our ground drink

996
00:38:54,690 --> 00:38:52,530
team is ready to go in terms of training

997
00:38:56,670 --> 00:38:54,700
we need to make sure that all of our

998
00:38:59,280 --> 00:38:56,680
qualification testing has been complete

999
00:39:00,780 --> 00:38:59,290
and and then finally make sure that all

1000
00:39:02,220 --> 00:39:00,790
of our certification is complete so you

1001
00:39:03,690 --> 00:39:02,230
kinda have to build the whole system

1002
00:39:05,160 --> 00:39:03,700
that's going to launch us there right

1003
00:39:08,790 --> 00:39:05,170
there's right Alcon in the dragon in the

1004
00:39:10,140 --> 00:39:08,800
ground systems and then there's having

1005
00:39:12,030 --> 00:39:10,150
and having all of that tested and

1006
00:39:14,040 --> 00:39:12,040
complete there's having all of the

1007
00:39:15,650 --> 00:39:14,050
Operations teams ready to go the crew

1008
00:39:17,970 --> 00:39:15,660
themselves ready to go all of that

1009
00:39:18,930 --> 00:39:17,980
operations procedures and practice and

1010
00:39:20,550 --> 00:39:18,940
training in place

1011
00:39:21,839 --> 00:39:20,560
and then there's a certification of the

1012
00:39:24,660 --> 00:39:21,849
whole thing the hardware the software

1013
00:39:27,150 --> 00:39:24,670

and all of that operations ready to go

1014
00:39:28,620 --> 00:39:27,160
so it's been a lot of work to to

1015
00:39:31,589 --> 00:39:28,630
complete that process but the good news

1016
00:39:33,960 --> 00:39:31,599
is is we had a ton of it done leading up

1017
00:39:35,490 --> 00:39:33,970
to demo one obviously you guys have a

1018
00:39:38,910 --> 00:39:35,500
series of missions that you're

1019
00:39:41,490 --> 00:39:38,920
uncontacted Commercial Crew for missions

1020
00:39:43,589 --> 00:39:41,500
to the space station but what is what's

1021
00:39:45,599 --> 00:39:43,599
life for cruise dragon beyond that I'm

1022
00:39:47,339 --> 00:39:45,609
assuming that there's more to it than

1023
00:39:50,579 --> 00:39:47,349
that with SpaceX as goals and missions

1024
00:39:52,290 --> 00:39:50,589
absolutely you know the point of the

1025
00:39:55,109 --> 00:39:52,300
Commercial Crew program from NASA itself

1026
00:39:58,260 --> 00:39:55,119
is to help foster commercialization of

1027
00:40:00,270 --> 00:39:58,270
low-earth orbit and and that's part of

1028
00:40:01,800 --> 00:40:00,280
this program and so the ultimate goal is

1029
00:40:03,630 --> 00:40:01,810
that we can take all of these great

1030
00:40:05,609 --> 00:40:03,640
assets that we've developed and start to

1031
00:40:08,130 --> 00:40:05,619
put together you know commercial access

1032
00:40:10,260 --> 00:40:08,140
to space for private passengers and

1033
00:40:11,910 --> 00:40:10,270
commercial passengers and and whatnot

1034
00:40:13,440 --> 00:40:11,920
and we're already having conversations

1035
00:40:15,990 --> 00:40:13,450
on along those lines to look for those

1036
00:40:17,309 --> 00:40:16,000
kinds of missions awesome yes so

1037
00:40:18,240 --> 00:40:17,319
thinking about our listeners Benji is

1038
00:40:20,550 --> 00:40:18,250

there anything else you want to kind of

1039
00:40:22,319 --> 00:40:20,560
leave them with obviously an exciting

1040
00:40:24,210 --> 00:40:22,329
year ahead of us but I'll kind of let

1041
00:40:25,440 --> 00:40:24,220
you have the last word here great yeah

1042
00:40:26,760 --> 00:40:25,450
you know first of all I appreciate the

1043
00:40:29,520 --> 00:40:26,770
time and appreciate the opportunity on

1044
00:40:30,960 --> 00:40:29,530
your podcast and just keep your eyes

1045
00:40:33,510 --> 00:40:30,970
wide open it's going to be an exciting

1046
00:40:35,400 --> 00:40:33,520
next few months coming up cool

1047
00:40:36,839 --> 00:40:35,410
Benji Reed director of Crew mission

1048
00:40:37,349 --> 00:40:36,849
management for SpaceX thanks so much

1049
00:40:41,790 --> 00:40:37,359
Benji

1050
00:40:43,890 --> 00:40:41,800
thank you I'm Joshua Santora and that's

1051
00:40:46,020 --> 00:40:43,900
our show thanks for stopping by the

1052
00:40:47,370 --> 00:40:46,030
rocket ranch special thanks to our

1053
00:40:49,650 --> 00:40:47,380
guests Jon Cowart

1054
00:40:50,609 --> 00:40:49,660
Alicia Evans and Benji reading to learn

1055
00:40:53,670 --> 00:40:50,619
more about the Commercial Crew program

1056
00:40:55,500 --> 00:40:53,680
visit nasa.gov slash Commercial Crew and

1057
00:40:57,000 --> 00:40:55,510
to learn more about everything going on

1058
00:41:00,329 --> 00:40:57,010
at the Kennedy Space Center go to

1059
00:41:01,650 --> 00:41:00,339
nasa.gov slash Kennedy check out NASA's

1060
00:41:03,000 --> 00:41:01,660
other podcast to learn more about what's

1061
00:41:06,930 --> 00:41:03,010
happening at all of our centers at

1062
00:41:09,030 --> 00:41:06,940
nasa.gov slash podcasts a special shout

1063
00:41:10,920 --> 00:41:09,040

out to our producer John Sackman our

1064
00:41:12,960 --> 00:41:10,930
sound engineers Michelle stone and Lorne

1065
00:41:15,420 --> 00:41:12,970
mentoring editor Michelle stone and

1066
00:41:17,970 --> 00:41:15,430
special thanks to Stephanie Martin cord

1067
00:41:22,319 --> 00:41:17,980
McClendon Murray Lewis Jen Wolfinger

1068
00:41:24,450 --> 00:41:22,329
Jessica londa and Ava Baron and remember

1069
00:41:25,570 --> 00:41:24,460
on the rocket ranch even the sky isn't