

ORION FLIGHT TEST



1
00:00:07,349 --> 00:00:04,950
good afternoon and welcome to the orion

2
00:00:09,270 --> 00:00:07,359
flight test status and overview briefing

3
00:00:10,870 --> 00:00:09,280
we are less than two days away now from

4
00:00:12,230 --> 00:00:10,880
launch and we've got a great lineup here

5
00:00:13,990 --> 00:00:12,240
to tell you a little bit about what to

6
00:00:17,109 --> 00:00:14,000
expect on launch day so we're going to

7
00:00:21,910 --> 00:00:17,119
start here with the nasa

8
00:00:27,910 --> 00:00:23,509
and then we'll hear from the lockheed

9
00:00:28,870 --> 00:00:27,920
martin orion program manager mike haws

10
00:00:31,669 --> 00:00:28,880
and then

11
00:00:33,750 --> 00:00:31,679
we will wrap up with the united launch

12
00:00:35,750 --> 00:00:33,760
alliance director of mission management

13
00:00:37,350 --> 00:00:35,760

ron ron fortson

14

00:00:39,110 --> 00:00:37,360

so we'll start with some opening remarks

15

00:00:42,310 --> 00:00:39,120

from all of them and then we'll take

16

00:00:43,910 --> 00:00:42,320

questions here in the room so mark

17

00:00:45,670 --> 00:00:43,920

good afternoon thanks for coming i've

18

00:00:47,990 --> 00:00:45,680

got a few slides i want to talk a little

19

00:00:49,510 --> 00:00:48,000

bit about what orion is i think some of

20

00:00:51,029 --> 00:00:49,520

you most of you know that so i'll go

21

00:00:52,709 --> 00:00:51,039

through those fairly quick and then

22

00:00:54,310 --> 00:00:52,719

we'll talk a little bit about

23

00:00:55,590 --> 00:00:54,320

um about some of the stuff that's

24

00:00:57,510 --> 00:00:55,600

happening and then i'll pass it on to

25

00:00:58,389 --> 00:00:57,520

mike so this is a picture of the crew

26

00:01:00,869 --> 00:00:58,399

module

27

00:01:02,630 --> 00:01:00,879

uh when it was in the onc before we put

28

00:01:03,990 --> 00:01:02,640

the launch abort system on it and before

29

00:01:06,070 --> 00:01:04,000

it rolled out

30

00:01:08,390 --> 00:01:06,080

to the pad and so i like this picture

31

00:01:10,070 --> 00:01:08,400

because the eft-1 is really about

32

00:01:12,630 --> 00:01:10,080

fundamentally about the crew module it's

33

00:01:13,990 --> 00:01:12,640

the core of orion and those are the key

34

00:01:16,070 --> 00:01:14,000

systems that we're testing on this

35

00:01:17,830 --> 00:01:16,080

flight it's also a great picture of the

36

00:01:19,990 --> 00:01:17,840

back shell tiles

37

00:01:21,990 --> 00:01:20,000

let's go to the next page

38

00:01:24,070 --> 00:01:22,000

so on this flight we're on a delta iv

39

00:01:26,710 --> 00:01:24,080

heavy and i'll let ron talk about that

40

00:01:28,870 --> 00:01:26,720

but this is a great rocket for this test

41

00:01:30,390 --> 00:01:28,880

it gets us to the high altitude and the

42

00:01:32,069 --> 00:01:30,400

velocities we need to test the heat

43

00:01:33,270 --> 00:01:32,079

shield which is the primary objective of

44

00:01:34,710 --> 00:01:33,280

the test

45

00:01:36,550 --> 00:01:34,720

and it's a beautiful rocket we were out

46

00:01:38,950 --> 00:01:36,560

there seeing it today and it'd be a lot

47

00:01:40,550 --> 00:01:38,960

of fun on thursday to see it go so next

48

00:01:43,830 --> 00:01:40,560

page

49

00:01:45,910 --> 00:01:43,840

um this is a picture of orion uh in the

50

00:01:47,510 --> 00:01:45,920

flight configuration this is actually

51
00:01:49,030 --> 00:01:47,520
the way it'll look on em1 the next

52
00:01:50,950 --> 00:01:49,040
flight because this actually shows the

53
00:01:53,270 --> 00:01:50,960
solar rays and the radiators on the

54
00:01:55,190 --> 00:01:53,280
service module that we'll actually have

55
00:01:56,630 --> 00:01:55,200
uh by the next flight but it gives you a

56
00:01:59,350 --> 00:01:56,640
sense of what the integrated system

57
00:02:01,109 --> 00:01:59,360
looks like in flight orion's built

58
00:02:03,429 --> 00:02:01,119
basically to go beyond lower thor but

59
00:02:05,590 --> 00:02:03,439
it's an exploration spacecraft and in

60
00:02:07,109 --> 00:02:05,600
concert with the space launch system

61
00:02:08,389 --> 00:02:07,119
which gets us to those destinations

62
00:02:10,469 --> 00:02:08,399
we're going to be able to explore the

63
00:02:13,110 --> 00:02:10,479

regions around the moon and then out

64

00:02:14,550 --> 00:02:13,120

into the solar system including mars so

65

00:02:15,670 --> 00:02:14,560

thursday is the beginning of that

66

00:02:17,990 --> 00:02:15,680

journey

67

00:02:19,750 --> 00:02:18,000

testing key systems the riskiest systems

68

00:02:21,910 --> 00:02:19,760

i would say for orion

69

00:02:23,350 --> 00:02:21,920

before we have any people on it next

70

00:02:24,070 --> 00:02:23,360

chart

71

00:02:25,589 --> 00:02:24,080

so

72

00:02:27,430 --> 00:02:25,599

michael go through more of these details

73

00:02:28,790 --> 00:02:27,440

but we're going to test separation

74

00:02:30,390 --> 00:02:28,800

events

75

00:02:32,470 --> 00:02:30,400

there's several of those like the

76
00:02:33,750 --> 00:02:32,480
service module fairings the launch abort

77
00:02:35,830 --> 00:02:33,760
system

78
00:02:36,949 --> 00:02:35,840
jettison heat shield is the big one

79
00:02:38,949 --> 00:02:36,959
because we

80
00:02:40,790 --> 00:02:38,959
the delta iv gets us high enough to push

81
00:02:42,470 --> 00:02:40,800
on the heat shield about 84 percent of a

82
00:02:43,830 --> 00:02:42,480
lunar entry velocity so very close to

83
00:02:45,350 --> 00:02:43,840
what we expect to see

84
00:02:46,790 --> 00:02:45,360
we're going to see high radiation events

85
00:02:48,630 --> 00:02:46,800
as we go through the vanilla belts it's

86
00:02:50,229 --> 00:02:48,640
good to test the avionics

87
00:02:51,830 --> 00:02:50,239
and the parachutes of course are key for

88
00:02:53,430 --> 00:02:51,840

slowing us down

89

00:02:54,710 --> 00:02:53,440

a key part of keeping the crew safe when

90

00:02:56,869 --> 00:02:54,720

we return to earth and so we'll be

91

00:02:58,630 --> 00:02:56,879

testing that system too

92

00:03:01,430 --> 00:02:58,640

next page

93

00:03:04,309 --> 00:03:01,440

uh i think this is a this is an example

94

00:03:06,149 --> 00:03:04,319

of this shows you the full configuration

95

00:03:07,430 --> 00:03:06,159

of eft-1 and i was going to point out a

96

00:03:09,589 --> 00:03:07,440

little bit about

97

00:03:11,030 --> 00:03:09,599

what's on eft-1 compared to what we're

98

00:03:15,110 --> 00:03:11,040

eventually going to have when we fly

99

00:03:19,350 --> 00:03:17,190

the launch abort system on eft-1 is

100

00:03:21,190 --> 00:03:19,360

basically a flight launch abort system

101

00:03:23,910 --> 00:03:21,200

except for the abort there's no abort

102

00:03:25,350 --> 00:03:23,920

motor and no uh attitude control motor

103

00:03:27,030 --> 00:03:25,360

because we don't we're not going to test

104

00:03:29,350 --> 00:03:27,040

the boards on this flight

105

00:03:30,949 --> 00:03:29,360

uh the third motor which is a jettison

106

00:03:33,350 --> 00:03:30,959

motor which is the motor that actually

107

00:03:35,670 --> 00:03:33,360

pulls the last off the top of the crew

108

00:03:37,750 --> 00:03:35,680

module in a nominal flight that one will

109

00:03:39,350 --> 00:03:37,760

be active on eft-1 and will actually be

110

00:03:40,949 --> 00:03:39,360

firing that jettison motor about six

111

00:03:43,750 --> 00:03:40,959

minutes after liftoff

112

00:03:45,910 --> 00:03:43,760

so but the structure is exactly what we

113

00:03:48,229 --> 00:03:45,920

expect to fly with people crew module i

114

00:03:49,110 --> 00:03:48,239

talked about before is the guts of this

115

00:03:51,910 --> 00:03:49,120

test

116

00:03:53,830 --> 00:03:51,920

uh it's a re it's a heat shield primary

117

00:03:55,830 --> 00:03:53,840

structure back shell tiles parachutes

118

00:03:56,949 --> 00:03:55,840

guidance navigation computers all the

119

00:03:58,789 --> 00:03:56,959

things that we're going to fly people

120

00:04:01,030 --> 00:03:58,799

with eventually those are the things

121

00:04:02,630 --> 00:04:01,040

we're flying on eft-1 and those that's

122

00:04:05,589 --> 00:04:02,640

the core of the test

123

00:04:06,390 --> 00:04:05,599

uh next chart shows the service module

124

00:04:08,949 --> 00:04:06,400

um

125

00:04:11,750 --> 00:04:08,959

for eft-1 it's primarily a structure

126

00:04:13,350 --> 00:04:11,760

it's the we're testing the the how it

127

00:04:16,229 --> 00:04:13,360

interfaces with the crew module and that

128

00:04:18,949 --> 00:04:16,239

we can effectively do a cm a crew module

129

00:04:20,949 --> 00:04:18,959

service module separation which involves

130

00:04:22,950 --> 00:04:20,959

six power bolts firing

131

00:04:24,150 --> 00:04:22,960

that's a key part of the test so the

132

00:04:26,870 --> 00:04:24,160

server but the rest of the service

133

00:04:28,469 --> 00:04:26,880

module is fundamentally just a structure

134

00:04:30,629 --> 00:04:28,479

along with the fairing so we're testing

135

00:04:34,390 --> 00:04:30,639

fairing separation and and crew module

136

00:04:36,469 --> 00:04:34,400

sm separation on emt1 on em1 and beyond

137

00:04:38,230 --> 00:04:36,479

uh the back end of the service module

138

00:04:39,510 --> 00:04:38,240

will actually be provided the back end

139

00:04:40,310 --> 00:04:39,520

of that piece that's highlighted right

140

00:04:42,150 --> 00:04:40,320

now

141

00:04:44,230 --> 00:04:42,160

which would include the prop system the

142

00:04:46,629 --> 00:04:44,240

radiators and the solar rays will

143

00:04:48,550 --> 00:04:46,639

actually be provided by esa so that's

144

00:04:52,070 --> 00:04:48,560

the big change as we go from eft one

145

00:04:53,830 --> 00:04:52,080

em-1 is adding isa as a partner on orion

146

00:04:56,390 --> 00:04:53,840

the next chart just shows you the

147

00:04:58,230 --> 00:04:56,400

adapter and the fairings the fairings

148

00:04:59,749 --> 00:04:58,240

are actually the picture's a little

149

00:05:01,430 --> 00:04:59,759

deceiving the fairings are actually

150

00:05:02,550 --> 00:05:01,440

wrapped around the service module in the

151

00:05:04,550 --> 00:05:02,560

middle when it flies and they're

152

00:05:06,150 --> 00:05:04,560

actually jettisoned that jettison is

153

00:05:07,749 --> 00:05:06,160

something we will we will test on the

154

00:05:09,830 --> 00:05:07,759

ft1

155

00:05:10,790 --> 00:05:09,840

uh the next page i think that might be

156

00:05:13,430 --> 00:05:10,800

it

157

00:05:15,830 --> 00:05:13,440

yeah i did want to say so thursday is a

158

00:05:17,590 --> 00:05:15,840

huge day for us obviously flying orion

159

00:05:19,110 --> 00:05:17,600

it's the beginning of exploration it's

160

00:05:20,629 --> 00:05:19,120

the beginning of actually putting orion

161

00:05:22,310 --> 00:05:20,639

into space

162

00:05:24,550 --> 00:05:22,320

uh it's a the beauty of it is it's a

163

00:05:26,230 --> 00:05:24,560

flight test it's an unmanned flight test

164

00:05:28,870 --> 00:05:26,240

um you know a part of me hopes that

165

00:05:30,950 --> 00:05:28,880

everything is perfect we land high fives

166

00:05:32,870 --> 00:05:30,960

everybody has a great time but really on

167

00:05:35,029 --> 00:05:32,880

a flight test like this you know if

168

00:05:37,029 --> 00:05:35,039

there are subtleties in how the vehicle

169

00:05:38,790 --> 00:05:37,039

behaves with the environments or

170

00:05:40,790 --> 00:05:38,800

subtleties with how systems actually

171

00:05:42,310 --> 00:05:40,800

behave with one another during flight i

172

00:05:44,070 --> 00:05:42,320

my hope is that we find that on this

173

00:05:45,990 --> 00:05:44,080

test flight that's what it's all about

174

00:05:47,670 --> 00:05:46,000

we want to discover things that are

175

00:05:49,990 --> 00:05:47,680

beyond our modeling capability and

176
00:05:52,150 --> 00:05:50,000
beyond our expertise so we can learn it

177
00:05:53,670 --> 00:05:52,160
and fix it uh before we put people on

178
00:05:55,749 --> 00:05:53,680
board so that's why thursday is so

179
00:05:57,189 --> 00:05:55,759
important for us so with that i'll pass

180
00:05:59,430 --> 00:05:57,199
to my cause

181
00:06:00,710 --> 00:05:59,440
and i'm glad that mark kind of ended on

182
00:06:03,430 --> 00:06:00,720
that theme of the test flight because

183
00:06:06,950 --> 00:06:05,110
you know it's different doing a test

184
00:06:09,990 --> 00:06:06,960
flight than doing a mission

185
00:06:11,189 --> 00:06:10,000
and this whole flight profile has been

186
00:06:13,029 --> 00:06:11,199
structured

187
00:06:15,189 --> 00:06:13,039
to do test flight

188
00:06:16,550 --> 00:06:15,199

activities and so that's that's kind of

189

00:06:18,870 --> 00:06:16,560

key to how this whole thing has come

190

00:06:21,270 --> 00:06:18,880

together

191

00:06:22,790 --> 00:06:21,280

it is a big deal and from the standpoint

192

00:06:24,309 --> 00:06:22,800

where mark says it's the first step to

193

00:06:26,550 --> 00:06:24,319

exploration

194

00:06:29,830 --> 00:06:26,560

so this is the first human rated

195

00:06:31,590 --> 00:06:29,840

spacecraft that's gone beyond leo in 42

196

00:06:35,110 --> 00:06:31,600

years by my count

197

00:06:37,590 --> 00:06:35,120

and so it is a big deal to get out

198

00:06:39,830 --> 00:06:37,600

beyond the van allen belts to to get out

199

00:06:41,270 --> 00:06:39,840

in that space environment so

200

00:06:42,950 --> 00:06:41,280

why the test flight

201
00:06:45,029 --> 00:06:42,960
the test flight is to be able to take

202
00:06:47,430 --> 00:06:45,039
critical technologies and pieces and

203
00:06:49,909 --> 00:06:47,440
test them in that space environment

204
00:06:50,790 --> 00:06:49,919
not just in the leo environment but

205
00:06:51,909 --> 00:06:50,800
out

206
00:06:53,830 --> 00:06:51,919
further

207
00:06:56,150 --> 00:06:53,840
where we see things like the effects of

208
00:06:57,589 --> 00:06:56,160
the van allen belts and and we fully

209
00:06:59,110 --> 00:06:57,599
expect to see

210
00:07:01,189 --> 00:06:59,120
effects of those whether or not we

211
00:07:03,749 --> 00:07:01,199
actually get computer upsets or not

212
00:07:07,110 --> 00:07:03,759
we've designed a system that recovers

213
00:07:10,469 --> 00:07:07,120

from those that is uh you know tuned to

214

00:07:11,670 --> 00:07:10,479

be able to have that response so

215

00:07:13,430 --> 00:07:11,680

so that's what's driven this whole

216

00:07:15,830 --> 00:07:13,440

mission and if you show the the graphic

217

00:07:18,790 --> 00:07:15,840

that i have just gives you a real

218

00:07:20,950 --> 00:07:18,800

top-level sense of the mission we launch

219

00:07:22,390 --> 00:07:20,960

here on thursday morning we do one close

220

00:07:25,670 --> 00:07:22,400

in orbit

221

00:07:28,830 --> 00:07:25,680

and then the upper stage of the delta iv

222

00:07:31,909 --> 00:07:28,840

pushes us out and that's about 3 600

223

00:07:33,350 --> 00:07:31,919

miles and as mark said when we re-enter

224

00:07:36,070 --> 00:07:33,360

from there we separate from the upper

225

00:07:38,710 --> 00:07:36,080

stage orion re-enters and we get about

226

00:07:40,710 --> 00:07:38,720

84 percent of a lunar re-entry

227

00:07:43,110 --> 00:07:40,720

velocity which translates into the heat

228

00:07:44,950 --> 00:07:43,120

load which tests the uh the heat shield

229

00:07:47,909 --> 00:07:44,960

so

230

00:07:49,670 --> 00:07:47,919

using the delta iv heavy

231

00:07:52,230 --> 00:07:49,680

the systems that are included in orion

232

00:07:53,029 --> 00:07:52,240

for this flight are all about those test

233

00:07:54,469 --> 00:07:53,039

flight

234

00:07:56,230 --> 00:07:54,479

parameters

235

00:07:57,749 --> 00:07:56,240

mark mentioned several of them the key

236

00:08:00,950 --> 00:07:57,759

separation events

237

00:08:03,510 --> 00:08:00,960

the the heat shield performance

238

00:08:05,029 --> 00:08:03,520

but we're also

239

00:08:07,990 --> 00:08:05,039

you know we're using our propulsion

240

00:08:11,430 --> 00:08:09,510

line up for

241

00:08:14,550 --> 00:08:11,440

the uh

242

00:08:16,550 --> 00:08:14,560

uh positioning we're flying with

243

00:08:17,749 --> 00:08:16,560

much of the software that we'll fly when

244

00:08:20,550 --> 00:08:17,759

we fly crew

245

00:08:22,790 --> 00:08:20,560

so we're actually demonstrating

246

00:08:24,070 --> 00:08:22,800

much of the system's capability of the

247

00:08:25,029 --> 00:08:24,080

crew module

248

00:08:27,270 --> 00:08:25,039

but

249

00:08:29,110 --> 00:08:27,280

demonstrating those key technologies in

250

00:08:31,029 --> 00:08:29,120

the space environment where uh where

251

00:08:32,630 --> 00:08:31,039

it's very difficult to duplicate that on

252

00:08:33,750 --> 00:08:32,640

the ground

253

00:08:35,269 --> 00:08:33,760

uh some of the things that we're not

254

00:08:37,350 --> 00:08:35,279

doing obviously is we don't have the

255

00:08:39,670 --> 00:08:37,360

full human systems in this capsule and

256

00:08:41,350 --> 00:08:39,680

those will come come later in terms of

257

00:08:42,310 --> 00:08:41,360

both the displays and controls for the

258

00:08:45,030 --> 00:08:42,320

crews

259

00:08:47,269 --> 00:08:45,040

and the the habitation kind of support

260

00:08:52,389 --> 00:08:47,279

systems as well

261

00:08:56,389 --> 00:08:53,990

there's an aspect of this mission that

262

00:08:58,630 --> 00:08:56,399

is also very different from a nasa

263

00:08:59,990 --> 00:08:58,640

lockheed relationship standpoint

264

00:09:01,829 --> 00:09:00,000

and that when

265

00:09:05,030 --> 00:09:01,839

nasa

266

00:09:07,269 --> 00:09:05,040

decided that they wanted to insert eft-1

267

00:09:09,670 --> 00:09:07,279

into the program

268

00:09:11,030 --> 00:09:09,680

they chose to do that by tasking

269

00:09:13,190 --> 00:09:11,040

lockheed

270

00:09:15,190 --> 00:09:13,200

to be the mission management function to

271

00:09:18,949 --> 00:09:15,200

actually

272

00:09:21,910 --> 00:09:18,959

purchase the delta iv heavy from ula

273

00:09:23,990 --> 00:09:21,920

and one of the other aspects of that is

274

00:09:25,030 --> 00:09:24,000

that we chair the mission management

275

00:09:26,949 --> 00:09:25,040

team

276

00:09:28,150 --> 00:09:26,959

for these flights and so the mission

277

00:09:29,990 --> 00:09:28,160

management team

278

00:09:31,030 --> 00:09:30,000

we actually started our meeting sunday

279

00:09:34,150 --> 00:09:31,040

night

280

00:09:36,790 --> 00:09:34,160

as a prep for the recovery ships leaving

281

00:09:38,150 --> 00:09:36,800

port so we started sunday night

282

00:09:39,350 --> 00:09:38,160

we've been meeting

283

00:09:41,350 --> 00:09:39,360

each day

284

00:09:43,750 --> 00:09:41,360

we mark and i go right from here to the

285

00:09:46,870 --> 00:09:43,760

day the meeting today

286

00:09:48,470 --> 00:09:46,880

and we'll meet again tomorrow

287

00:09:50,710 --> 00:09:48,480

even though we're back on console about

288

00:09:51,910 --> 00:09:50,720

midnight tomorrow to to get ready for

289

00:09:53,430 --> 00:09:51,920

launch

290

00:09:55,269 --> 00:09:53,440

so that's been a unique aspect but we've

291

00:09:56,790 --> 00:09:55,279

also tried to do that

292

00:09:59,509 --> 00:09:56,800

as effectively

293

00:10:02,310 --> 00:09:59,519

as we can we have not created additional

294

00:10:05,990 --> 00:10:04,710

just because we had this role so for

295

00:10:08,150 --> 00:10:06,000

example

296

00:10:09,829 --> 00:10:08,160

our friends here in kennedy the the

297

00:10:11,829 --> 00:10:09,839

ground systems development office are

298

00:10:14,150 --> 00:10:11,839

our interface to the recovery forces for

299

00:10:16,310 --> 00:10:14,160

the us navy they're also in charge of

300

00:10:18,230 --> 00:10:16,320

the transport back from

301
00:10:19,269 --> 00:10:18,240
the uh

302
00:10:21,430 --> 00:10:19,279
us

303
00:10:22,949 --> 00:10:21,440
the the navy station in san diego back

304
00:10:24,150 --> 00:10:22,959
here to florida

305
00:10:25,590 --> 00:10:24,160
uh

306
00:10:28,949 --> 00:10:25,600
the jsc

307
00:10:29,750 --> 00:10:28,959
uh flight control team in the mcc

308
00:10:32,230 --> 00:10:29,760
is

309
00:10:34,550 --> 00:10:32,240
the jsc team we're not creating an extra

310
00:10:35,750 --> 00:10:34,560
team we have added support to them

311
00:10:38,389 --> 00:10:35,760
we have our

312
00:10:40,069 --> 00:10:38,399
lockheed martin engineering support

313
00:10:41,910 --> 00:10:40,079

that is independent but

314

00:10:43,590 --> 00:10:41,920

everywhere can where it makes sense we

315

00:10:45,430 --> 00:10:43,600

use this blended team and i think that

316

00:10:47,190 --> 00:10:45,440

that's something that when we get done

317

00:10:48,870 --> 00:10:47,200

with this flight mark and i and our

318

00:10:50,150 --> 00:10:48,880

teams will have to sit back and say what

319

00:10:52,470 --> 00:10:50,160

worked really well

320

00:10:53,509 --> 00:10:52,480

what would we change how would em-1 look

321

00:10:56,150 --> 00:10:53,519

different

322

00:10:58,389 --> 00:10:56,160

from this so it's not just a flight test

323

00:10:59,430 --> 00:10:58,399

of a spacecraft but it's also a flight

324

00:11:00,630 --> 00:10:59,440

test of

325

00:11:02,310 --> 00:11:00,640

how

326
00:11:04,790 --> 00:11:02,320
we interact

327
00:11:05,590 --> 00:11:04,800
between nasa and the lockheed martin

328
00:11:08,470 --> 00:11:05,600
team

329
00:11:09,670 --> 00:11:08,480
and with that then i'll pass it on

330
00:11:11,590 --> 00:11:09,680
thanks

331
00:11:13,269 --> 00:11:11,600
hello i'm ron fordson with united launch

332
00:11:14,710 --> 00:11:13,279
alliance and i just want to say you know

333
00:11:16,150 --> 00:11:14,720
we're really thrilled and honored to be

334
00:11:18,790 --> 00:11:16,160
a part of this uh

335
00:11:21,350 --> 00:11:18,800
this this mission uh the delta iv heavy

336
00:11:24,310 --> 00:11:21,360
was selected by lockheed martin to to

337
00:11:26,150 --> 00:11:24,320
launch the uh nasa's eft one and we

338
00:11:28,310 --> 00:11:26,160

couldn't be more more excited to get

339

00:11:29,750 --> 00:11:28,320

this opportunity to do this today it's

340

00:11:31,590 --> 00:11:29,760

been a lot of a lot of teamwork

341

00:11:33,269 --> 00:11:31,600

tremendous you've heard it from all the

342

00:11:34,710 --> 00:11:33,279

other two folks the teamwork has been

343

00:11:36,470 --> 00:11:34,720

the key to success to get to where we

344

00:11:39,030 --> 00:11:36,480

are right now thousands of people been

345

00:11:40,630 --> 00:11:39,040

working thousands of hours to uh to get

346

00:11:43,110 --> 00:11:40,640

here you know we started about two and a

347

00:11:45,269 --> 00:11:43,120

half years ago with with lockheed martin

348

00:11:46,710 --> 00:11:45,279

we kicked off this uh this mission and

349

00:11:49,829 --> 00:11:46,720

started the production out in our

350

00:11:51,269 --> 00:11:49,839

decatur facility in in alabama about two

351

00:11:53,750 --> 00:11:51,279

years ago building this building this

352

00:11:56,710 --> 00:11:53,760

heavy heavy rocket you know it consists

353

00:12:00,150 --> 00:11:56,720

of uh three common booster cores uh with

354

00:12:02,550 --> 00:12:00,160

an rs each has an rs68 uh rocketdyne lj

355

00:12:04,389 --> 00:12:02,560

rocketdyne engine on the bottom of it

356

00:12:06,550 --> 00:12:04,399

and uh you know we're looking

357

00:12:10,230 --> 00:12:06,560

to take that along with the second stage

358

00:12:12,230 --> 00:12:10,240

which is an rl10 aerox on rl10 second

359

00:12:13,910 --> 00:12:12,240

stage and uh and deliver them where they

360

00:12:15,910 --> 00:12:13,920

need to go that's that's really i know

361

00:12:17,590 --> 00:12:15,920

you've heard about this is a test flight

362

00:12:20,150 --> 00:12:17,600

but from from ul's perspective this

363

00:12:22,230 --> 00:12:20,160

isn't a test for us

364

00:12:23,990 --> 00:12:22,240

our objective is to deliver them right

365

00:12:25,670 --> 00:12:24,000

where they need to be so they can start

366

00:12:27,750 --> 00:12:25,680

their activities so that's what it's all

367

00:12:29,030 --> 00:12:27,760

about for ula i would like to show a

368

00:12:30,389 --> 00:12:29,040

short video of

369

00:12:32,150 --> 00:12:30,399

some of the launch processing that's

370

00:12:33,509 --> 00:12:32,160

occurred since we've uh

371

00:12:35,590 --> 00:12:33,519

delivered the hardware here you can see

372

00:12:36,949 --> 00:12:35,600

that's the mariner it delivered the

373

00:12:39,350 --> 00:12:36,959

hardware it took eight days to get here

374

00:12:41,030 --> 00:12:39,360

from decatur uh basically we offloaded

375

00:12:43,030 --> 00:12:41,040

that uh that's one of the common booster

376

00:12:45,269 --> 00:12:43,040

cores coming off and we're we basically

377

00:12:46,870 --> 00:12:45,279

got on our transporter and and and we

378

00:12:48,550 --> 00:12:46,880

transported down to the horizontal

379

00:12:50,470 --> 00:12:48,560

integration facility that you see right

380

00:12:52,710 --> 00:12:50,480

there once we get in there we start

381

00:12:54,389 --> 00:12:52,720

doing initial processing of that

382

00:12:56,550 --> 00:12:54,399

we basically take the you know the three

383

00:12:58,949 --> 00:12:56,560

cores that i talked about the core and

384

00:13:00,389 --> 00:12:58,959

starboard and port uh common booster

385

00:13:01,509 --> 00:13:00,399

ords and we made them together you can

386

00:13:03,030 --> 00:13:01,519

see that's happening there we're

387

00:13:05,350 --> 00:13:03,040

basically attaching three rockets

388

00:13:07,110 --> 00:13:05,360

together uh then we go ahead and mate

389

00:13:09,190 --> 00:13:07,120

the uh the second stage which is going

390

00:13:10,310 --> 00:13:09,200

to put it into that elliptical orbit

391

00:13:12,870 --> 00:13:10,320

that they need in order to meet all

392

00:13:14,470 --> 00:13:12,880

their objectives we make the made that

393

00:13:15,829 --> 00:13:14,480

then we attach it to the launch mount

394

00:13:19,269 --> 00:13:15,839

unit you can see at the very bottom

395

00:13:21,509 --> 00:13:19,279

there it gets transported out to the pad

396

00:13:23,350 --> 00:13:21,519

takes takes quite a few hours it's only

397

00:13:24,790 --> 00:13:23,360

traveling five miles an hour but it we

398

00:13:26,389 --> 00:13:24,800

got to be careful make sure we get it

399

00:13:28,069 --> 00:13:26,399

there once we get it there there's a

400

00:13:29,910 --> 00:13:28,079

fixed pad erector that's underneath the

401
00:13:31,509 --> 00:13:29,920
uh underneath the rocket right there and

402
00:13:33,910 --> 00:13:31,519
you can see essentially lift the lifts

403
00:13:35,430 --> 00:13:33,920
the vehicle vehicle up those launch

404
00:13:37,030 --> 00:13:35,440
mounts that on the very bottom of the

405
00:13:38,790 --> 00:13:37,040
rocket that's basically what we're going

406
00:13:40,949 --> 00:13:38,800
to launch it off of uh those get

407
00:13:43,269 --> 00:13:40,959
attached you can see here there's the

408
00:13:45,670 --> 00:13:43,279
the orion capsule coming out

409
00:13:48,310 --> 00:13:45,680
to the pad we we basically lift it up

410
00:13:50,470 --> 00:13:48,320
you can see it's being lifted into the

411
00:13:53,670 --> 00:13:50,480
into the mobile service tower and then

412
00:13:54,710 --> 00:13:53,680
we stack it on top and and uh you know

413
00:13:56,150 --> 00:13:54,720

and then

414

00:13:57,670 --> 00:13:56,160

on thursday this is what we're looking

415

00:13:59,509 --> 00:13:57,680

to do

416

00:14:01,110 --> 00:13:59,519

put them up in orbit so

417

00:14:03,189 --> 00:14:01,120

so it's been a really a really great

418

00:14:04,629 --> 00:14:03,199

effort you know we've had quite a few

419

00:14:05,750 --> 00:14:04,639

readiness reviews getting to here

420

00:14:07,509 --> 00:14:05,760

yesterday we had our system

421

00:14:09,670 --> 00:14:07,519

certification review

422

00:14:12,069 --> 00:14:09,680

where we our technical team went through

423

00:14:14,069 --> 00:14:12,079

all the risk of this mission

424

00:14:16,550 --> 00:14:14,079

and all the hardware mission analysis

425

00:14:19,189 --> 00:14:16,560

all the design activity associated with

426

00:14:20,710 --> 00:14:19,199

this mission and we're good to go

427

00:14:22,069 --> 00:14:20,720

this morning we completed our launch

428

00:14:24,150 --> 00:14:22,079

readiness review

429

00:14:25,910 --> 00:14:24,160

with the customer uh we looked at our

430

00:14:27,430 --> 00:14:25,920

launch vehicle making sure it's ready as

431

00:14:29,189 --> 00:14:27,440

well as a spacecraft and then we looked

432

00:14:31,269 --> 00:14:29,199

at all the range assets that everything

433

00:14:33,590 --> 00:14:31,279

that's here to support this mission and

434

00:14:35,110 --> 00:14:33,600

uh we're ready to go so it's we're

435

00:14:36,629 --> 00:14:35,120

really excited about that you know at

436

00:14:38,629 --> 00:14:36,639

the launch pad right now there's a few

437

00:14:40,550 --> 00:14:38,639

things going on uh we're doing all our

438

00:14:42,069 --> 00:14:40,560

final safety walk downs with all with

439

00:14:44,069 --> 00:14:42,079

with the rocket making sure everything's

440

00:14:45,829 --> 00:14:44,079

good like as was mentioned by mark we

441

00:14:47,670 --> 00:14:45,839

had opportunity to go out there this

442

00:14:49,590 --> 00:14:47,680

morning and uh it looks it looks really

443

00:14:52,150 --> 00:14:49,600

good it's in good shape and we're really

444

00:14:53,750 --> 00:14:52,160

excited to uh to launch this on thursday

445

00:14:56,389 --> 00:14:53,760

so we're finishing that up we're closing

446

00:14:58,069 --> 00:14:56,399

out all the all the compartments and uh

447

00:14:59,829 --> 00:14:58,079

you know tomorrow evening we'll have a

448

00:15:01,829 --> 00:14:59,839

weather briefing which weather's looking

449

00:15:03,670 --> 00:15:01,839

looking pretty good uh we'll go ahead

450

00:15:05,990 --> 00:15:03,680

and roll the we'll move the mobile

451
00:15:08,310 --> 00:15:06,000
service tower out and a little bit

452
00:15:10,870 --> 00:15:08,320
before midnight folks will team will get

453
00:15:13,590 --> 00:15:10,880
on console around midnight or so and and

454
00:15:16,470 --> 00:15:13,600
then we'll we'll start the countdown uh

455
00:15:18,389 --> 00:15:16,480
in preparation for the 705 a.m launch so

456
00:15:21,110 --> 00:15:18,399
we're really uh really looking forward

457
00:15:22,870 --> 00:15:21,120
to that you know uh it's as i mentioned

458
00:15:24,389 --> 00:15:22,880
it's been a great teamer team effort

459
00:15:26,550 --> 00:15:24,399
from all of us uh you know one of the

460
00:15:28,230 --> 00:15:26,560
things from united launch alliance is

461
00:15:30,550 --> 00:15:28,240
you know we really focus on perfect

462
00:15:32,949 --> 00:15:30,560
product delivery uh it's very important

463
00:15:34,870 --> 00:15:32,959

that we get everything right and uh you

464

00:15:36,949 --> 00:15:34,880

know we have a relentless focus on

465

00:15:38,550 --> 00:15:36,959

mission success because uh you know it

466

00:15:40,550 --> 00:15:38,560

doesn't doesn't do any good if we don't

467

00:15:41,910 --> 00:15:40,560

put the customers where they want to be

468

00:15:43,910 --> 00:15:41,920

and that's that's really what it's all

469

00:15:46,150 --> 00:15:43,920

about so once again it's a pleasure to

470

00:15:47,990 --> 00:15:46,160

be part of this team uh and we're

471

00:15:49,910 --> 00:15:48,000

looking forward to an exciting launch on

472

00:15:51,829 --> 00:15:49,920

thursday thank you

473

00:15:52,949 --> 00:15:51,839

maybe we should give them a ron did a

474

00:15:54,710 --> 00:15:52,959

really good job of describing that we

475

00:15:55,910 --> 00:15:54,720

had the lrr today

476
00:15:58,389 --> 00:15:55,920
maybe we should just let everybody know

477
00:16:00,710 --> 00:15:58,399
where we are as far as getting

478
00:16:04,230 --> 00:16:00,720
preps for launch so that we have our our

479
00:16:05,990 --> 00:16:04,240
mmt I minus two mmt today at three

480
00:16:07,829 --> 00:16:06,000
uh mike and i will be there lock your

481
00:16:09,829 --> 00:16:07,839
chair but nasa is a part of that and i

482
00:16:12,310 --> 00:16:09,839
expect maybe three or four pieces of

483
00:16:15,189 --> 00:16:12,320
open paper which are really wrapping up

484
00:16:16,790 --> 00:16:15,199
reports of tests and and the last pieces

485
00:16:18,230 --> 00:16:16,800
of closing the hatch and those kind of

486
00:16:19,350 --> 00:16:18,240
things so it's very

487
00:16:23,430 --> 00:16:19,360
very

488
00:16:25,350 --> 00:16:23,440

not working any any issues for the

489

00:16:28,230 --> 00:16:25,360

flight the the the folks that are

490

00:16:30,470 --> 00:16:28,240

recovering orion left yesterday the the

491

00:16:31,670 --> 00:16:30,480

navy ships they will both be on site

492

00:16:33,430 --> 00:16:31,680

tomorrow

493

00:16:35,590 --> 00:16:33,440

um the recovery weather is also

494

00:16:38,550 --> 00:16:35,600

projected to be very good

495

00:16:39,910 --> 00:16:38,560

with six foot wave heights 11 11 second

496

00:16:42,150 --> 00:16:39,920

period so that's really good for

497

00:16:43,670 --> 00:16:42,160

recovery looks good for us so we're

498

00:16:45,749 --> 00:16:43,680

green for the recovery conditions at

499

00:16:47,749 --> 00:16:45,759

least that's a prediction for today

500

00:16:49,269 --> 00:16:47,759

excuse me it's today's prediction for

501
00:16:50,629 --> 00:16:49,279
thursday

502
00:16:52,470 --> 00:16:50,639
just to be clear and ron mentioned

503
00:16:54,069 --> 00:16:52,480
though the weather here at the site uh

504
00:16:55,590 --> 00:16:54,079
as far as getting the rocket off on

505
00:16:58,310 --> 00:16:55,600
thursday also looks good there's some

506
00:16:59,910 --> 00:16:58,320
constraints with some rain coming in but

507
00:17:01,590 --> 00:16:59,920
all of that looks really really good and

508
00:17:03,110 --> 00:17:01,600
so it's all ticking down and we'll of

509
00:17:04,710 --> 00:17:03,120
course we'll have the mmt today and then

510
00:17:06,470 --> 00:17:04,720
one tomorrow just to make sure but it

511
00:17:07,909 --> 00:17:06,480
all looks really clean at this point and

512
00:17:09,590 --> 00:17:07,919
we would remind folks that for this

513
00:17:11,990 --> 00:17:09,600

flight you know we have a two and a half

514

00:17:13,750 --> 00:17:12,000

hour launch window so even though even

515

00:17:15,429 --> 00:17:13,760

the potential for rain that's coming

516

00:17:17,270 --> 00:17:15,439

thursday is likely

517

00:17:19,189 --> 00:17:17,280

you know the likelihood of finding a

518

00:17:20,789 --> 00:17:19,199

spot in that two and a half hour window

519

00:17:21,909 --> 00:17:20,799

to launch i think is pretty good yeah

520

00:17:23,350 --> 00:17:21,919

it's a really good point because you're

521

00:17:25,429 --> 00:17:23,360

used to space station launches where you

522

00:17:26,630 --> 00:17:25,439

have a very tight window we don't have

523

00:17:28,710 --> 00:17:26,640

that we've got about two and a half

524

00:17:30,549 --> 00:17:28,720

hours the fir we we launch as early as

525

00:17:32,390 --> 00:17:30,559

we can so we have a light here so we can

526

00:17:34,070 --> 00:17:32,400

see the separation events

527

00:17:35,669 --> 00:17:34,080

and then we're also there's also a

528

00:17:37,830 --> 00:17:35,679

thermal

529

00:17:39,430 --> 00:17:37,840

constraint beta angle solar angle

530

00:17:41,430 --> 00:17:39,440

constraint on the upper stage and then

531

00:17:43,270 --> 00:17:41,440

on also on the far back end we have we

532

00:17:44,950 --> 00:17:43,280

want to give the guys in off the coast

533

00:17:46,950 --> 00:17:44,960

of baja enough time to recover in the

534

00:17:48,310 --> 00:17:46,960

daylight so that's kind of the window

535

00:17:49,750 --> 00:17:48,320

but as mike said that gives us a lot of

536

00:17:50,710 --> 00:17:49,760

flexibility if it's raining right at the

537

00:17:52,710 --> 00:17:50,720

beginning the window we just wait a

538

00:17:53,430 --> 00:17:52,720

little bit until it clears and then go

539

00:17:57,350 --> 00:17:53,440

so

540

00:17:59,110 --> 00:17:57,360

we have a lot of flexibility on thursday

541

00:18:00,630 --> 00:17:59,120

okay i think now we're ready to take

542

00:18:02,470 --> 00:18:00,640

some questions so if i could just get

543

00:18:04,230 --> 00:18:02,480

you to uh state your name and

544

00:18:06,150 --> 00:18:04,240

affiliation before you start your

545

00:18:07,270 --> 00:18:06,160

question uh we'll open it up and when we

546

00:18:08,470 --> 00:18:07,280

start here

547

00:18:10,950 --> 00:18:08,480

thanks

548

00:18:13,590 --> 00:18:10,960

irene klotz with reuters uh for either

549

00:18:15,909 --> 00:18:13,600

mr house or mr guyer is the entire uh

550

00:18:17,430 --> 00:18:15,919

four and a half hour flight um

551
00:18:19,029 --> 00:18:17,440
pre-programmed is there going to be any

552
00:18:21,430 --> 00:18:19,039
kind of real-time

553
00:18:23,430 --> 00:18:21,440
controlling of the spacecraft or if

554
00:18:25,990 --> 00:18:23,440
anything is going amiss is there

555
00:18:27,510 --> 00:18:26,000
anything anybody can do and also aside

556
00:18:30,150 --> 00:18:27,520
from

557
00:18:31,669 --> 00:18:30,160
key events like parachute deploying and

558
00:18:35,029 --> 00:18:31,679
seeing that the heat shield keeps the

559
00:18:37,029 --> 00:18:35,039
spacecraft together to re-enter

560
00:18:39,990 --> 00:18:37,039
will you need to recover

561
00:18:41,830 --> 00:18:40,000
the the capsule to be able to tell if

562
00:18:43,750 --> 00:18:41,840
there was a computer out or anything

563
00:18:45,430 --> 00:18:43,760

like that or i guess kind of what i'm

564

00:18:47,590 --> 00:18:45,440

asking is what sort of real-time

565

00:18:49,990 --> 00:18:47,600

information will you be getting and will

566

00:18:51,990 --> 00:18:50,000

you be able to uh to uh

567

00:18:53,669 --> 00:18:52,000

take control of yeah those are great

568

00:18:55,110 --> 00:18:53,679

questions

569

00:18:57,350 --> 00:18:55,120

so there's there's a couple aspects of

570

00:18:59,350 --> 00:18:57,360

that that the

571

00:19:00,710 --> 00:18:59,360

orion is programmed for the full

572

00:19:02,230 --> 00:19:00,720

sequence today

573

00:19:04,870 --> 00:19:02,240

so it can

574

00:19:07,430 --> 00:19:04,880

control the whole mission today

575

00:19:09,830 --> 00:19:07,440

the uh but there are a series of we call

576

00:19:11,669 --> 00:19:09,840

them contingency commands that we have

577

00:19:13,750 --> 00:19:11,679

worked the whole nasa lockheed team has

578

00:19:15,909 --> 00:19:13,760

worked that the flight control team in

579

00:19:17,270 --> 00:19:15,919

houston has if there are

580

00:19:19,990 --> 00:19:17,280

things that we want to do if we want to

581

00:19:21,669 --> 00:19:20,000

reconfigure systems uh to put ourselves

582

00:19:23,029 --> 00:19:21,679

in the best posture for re-entry for

583

00:19:25,270 --> 00:19:23,039

example

584

00:19:26,950 --> 00:19:25,280

the team has the ability to do that and

585

00:19:27,750 --> 00:19:26,960

there's a couple tiers of those some of

586

00:19:29,270 --> 00:19:27,760

those

587

00:19:31,830 --> 00:19:29,280

for some mission management team

588

00:19:33,110 --> 00:19:31,840

discussion about taking those actions

589

00:19:34,630 --> 00:19:33,120

some of those are right within the

590

00:19:35,990 --> 00:19:34,640

flight rules that we have all agreed

591

00:19:37,909 --> 00:19:36,000

between us that

592

00:19:40,630 --> 00:19:37,919

mike serafin as the flight director and

593

00:19:43,430 --> 00:19:40,640

his team can go off and do

594

00:19:45,750 --> 00:19:43,440

in terms of the data collection

595

00:19:48,549 --> 00:19:45,760

i would interpret the second question

596

00:19:50,549 --> 00:19:48,559

in a broader form of data collection

597

00:19:53,510 --> 00:19:50,559

we do get some real-time data but a lot

598

00:19:56,310 --> 00:19:53,520

of the data is recorded on board

599

00:20:00,070 --> 00:19:56,320

for post mission analysis

600

00:20:01,669 --> 00:20:00,080

there is also then the

601
00:20:03,909 --> 00:20:01,679
the need to

602
00:20:05,990 --> 00:20:03,919
the desire to get the capsule back both

603
00:20:07,190 --> 00:20:06,000
for that recorded data and also for the

604
00:20:08,950 --> 00:20:07,200
physical

605
00:20:10,310 --> 00:20:08,960
evidence of how we got through the test

606
00:20:12,870 --> 00:20:10,320
flight in fact we're having the debate

607
00:20:14,789 --> 00:20:12,880
now of whether we take core samples of

608
00:20:16,390 --> 00:20:14,799
the heat shield right there basically on

609
00:20:18,630 --> 00:20:16,400
the dock or whether we wait till we get

610
00:20:20,710 --> 00:20:18,640
back to florida so so getting the data

611
00:20:22,789 --> 00:20:20,720
back we're going to actually offload the

612
00:20:24,549 --> 00:20:22,799
data

613
00:20:26,390 --> 00:20:24,559

and do some processing at a lockheed

614

00:20:28,870 --> 00:20:26,400

martin facility there in san diego so

615

00:20:30,870 --> 00:20:28,880

that we can get quick look data

616

00:20:33,270 --> 00:20:30,880

as quick as we can and we're looking at

617

00:20:35,270 --> 00:20:33,280

possibly taking some samples out there

618

00:20:38,789 --> 00:20:35,280

and then the rest of that will happen

619

00:20:40,390 --> 00:20:38,799

when we get the capsule back here to ksc

620

00:20:41,590 --> 00:20:40,400

yeah so as far as your question about

621

00:20:43,110 --> 00:20:41,600

the computer

622

00:20:44,950 --> 00:20:43,120

we have the full range of telemetry

623

00:20:46,789 --> 00:20:44,960

telemetry so we're going to know what

624

00:20:48,549 --> 00:20:46,799

systems are up what's running what's not

625

00:20:50,549 --> 00:20:48,559

and so that gives us the input to know

626
00:20:52,149 --> 00:20:50,559
whether we want to send any contingency

627
00:20:53,590 --> 00:20:52,159
commands to change

628
00:20:55,110 --> 00:20:53,600
any of the strings that kind of so we're

629
00:20:57,750 --> 00:20:55,120
going to know exactly how the vehicle is

630
00:20:59,350 --> 00:20:57,760
behaving as far as the flight systems

631
00:21:01,590 --> 00:20:59,360
and as mike said we have what we call

632
00:21:03,990 --> 00:21:01,600
dfi which is 1200 sensors that's

633
00:21:05,270 --> 00:21:04,000
measuring temperatures vibration

634
00:21:07,029 --> 00:21:05,280
acoustics

635
00:21:08,230 --> 00:21:07,039
we even had a radiometer on the heat

636
00:21:10,549 --> 00:21:08,240
shield that's measuring the temperature

637
00:21:11,669 --> 00:21:10,559
of the plasma those are recorded and not

638
00:21:13,669 --> 00:21:11,679

sent down

639

00:21:14,549 --> 00:21:13,679

so that's that there are two types of

640

00:21:15,909 --> 00:21:14,559

data

641

00:21:17,990 --> 00:21:15,919

that we have and so as mike said we need

642

00:21:19,830 --> 00:21:18,000

to get the capsule back to get that dfi

643

00:21:21,270 --> 00:21:19,840

those 1200 measurements but as far as

644

00:21:22,549 --> 00:21:21,280

how the vehicle is going to go how it's

645

00:21:23,430 --> 00:21:22,559

operating we're going to know that as we

646

00:21:26,230 --> 00:21:23,440

fly

647

00:21:31,029 --> 00:21:28,710

associated press two questions the first

648

00:21:33,750 --> 00:21:31,039

is how quickly will you get the capsule

649

00:21:34,950 --> 00:21:33,760

back post flight to kennedy

650

00:21:36,710 --> 00:21:34,960

and

651
00:21:39,029 --> 00:21:36,720
secondly it's going to be four years

652
00:21:41,270 --> 00:21:39,039
before another orion flies three more

653
00:21:43,110 --> 00:21:41,280
years potentially before people climb on

654
00:21:44,470 --> 00:21:43,120
board how frustrating is it to have to

655
00:21:45,990 --> 00:21:44,480
wait so long

656
00:21:47,029 --> 00:21:46,000
after your first

657
00:21:50,549 --> 00:21:47,039
debut

658
00:21:52,230 --> 00:21:50,559
so um the the guys at in they'll they'll

659
00:21:54,630 --> 00:21:52,240
pick up the orion they'll get it back to

660
00:21:56,230 --> 00:21:54,640
the pier so if we launch on the fourth

661
00:21:58,310 --> 00:21:56,240
or fifth we'll be back here before

662
00:22:00,310 --> 00:21:58,320
christmas with the capsule they'll

663
00:22:02,549 --> 00:22:00,320

basically truck it they'll get it off

664

00:22:04,149 --> 00:22:02,559

the ship put on a put on a truck that

665

00:22:05,270 --> 00:22:04,159

has all the licenses and everything else

666

00:22:06,870 --> 00:22:05,280

you need to ship something like that

667

00:22:08,470 --> 00:22:06,880

across the country so it'll be back here

668

00:22:10,230 --> 00:22:08,480

before christmas

669

00:22:12,310 --> 00:22:10,240

we will unload the data as mike said

670

00:22:14,310 --> 00:22:12,320

even before we leave and we're looking

671

00:22:16,310 --> 00:22:14,320

at taking some samples even before it

672

00:22:18,870 --> 00:22:16,320

gets on the truck but we'll have it for

673

00:22:20,230 --> 00:22:18,880

christmas here

674

00:22:22,230 --> 00:22:20,240

yeah we

675

00:22:24,630 --> 00:22:22,240

you know there is a gap between these

676

00:22:26,230 --> 00:22:24,640

flights and we recognize uh you know

677

00:22:29,510 --> 00:22:26,240

that's really a budget-driven question

678

00:22:31,350 --> 00:22:29,520

it's not a matter of ability to to build

679

00:22:32,710 --> 00:22:31,360

these capsules and to analyze them it's

680

00:22:34,390 --> 00:22:32,720

a budget thing we understand where the

681

00:22:36,310 --> 00:22:34,400

budget is and that

682

00:22:39,029 --> 00:22:36,320

the budget's tight for everybody we we

683

00:22:42,070 --> 00:22:39,039

feel really fortunate uh to be in the

684

00:22:43,909 --> 00:22:42,080

budget plan um a bipartisan agreement on

685

00:22:46,230 --> 00:22:43,919

the budget plan and our job is to

686

00:22:47,669 --> 00:22:46,240

execute to that plan so yeah i wish they

687

00:22:49,590 --> 00:22:47,679

would go faster

688

00:22:50,950 --> 00:22:49,600

uh but i think this is a good plan given

689

00:22:52,390 --> 00:22:50,960

the budget we've got and i think the

690

00:22:54,549 --> 00:22:52,400

team's doing a great job executing to

691

00:22:57,270 --> 00:22:54,559

that plan so but i would add we're we're

692

00:22:58,470 --> 00:22:57,280

doing work for that next crew module

693

00:23:01,190 --> 00:22:58,480

right now

694

00:23:02,470 --> 00:23:01,200

in terms of getting the the primary

695

00:23:04,070 --> 00:23:02,480

structures

696

00:23:06,310 --> 00:23:04,080

uh

697

00:23:08,230 --> 00:23:06,320

formed machined

698

00:23:10,549 --> 00:23:08,240

uh getting some of the avionics a lot of

699

00:23:12,230 --> 00:23:10,559

the the tripoli parts getting ordered in

700

00:23:15,430 --> 00:23:12,240

fact we've actually already delivered

701
00:23:17,590 --> 00:23:15,440
some cards to esa and airbus

702
00:23:19,830 --> 00:23:17,600
uh for their use so there's actually a

703
00:23:22,549 --> 00:23:19,840
lot of stuff that's already in a design

704
00:23:25,190 --> 00:23:22,559
and production mode for the em1 crew

705
00:23:28,870 --> 00:23:27,029
hi clara moskowitz with scientific

706
00:23:30,710 --> 00:23:28,880
american can you tell us more about the

707
00:23:32,789 --> 00:23:30,720
heat shield what's new about this heat

708
00:23:35,430 --> 00:23:32,799
shield compared to materials that have

709
00:23:37,110 --> 00:23:35,440
been used on apollo and shuttle and

710
00:23:39,190 --> 00:23:37,120
besides just looking to see that it

711
00:23:40,950 --> 00:23:39,200
survives re-entry what sort of testing

712
00:23:43,190 --> 00:23:40,960
will you do to see how the heat shield

713
00:23:44,950 --> 00:23:43,200

performs thanks

714

00:23:46,630 --> 00:23:44,960

the material itself is called avcode

715

00:23:49,269 --> 00:23:46,640

it's similar to apollo though there were

716

00:23:51,029 --> 00:23:49,279

some constituents in the previous

717

00:23:52,710 --> 00:23:51,039

version

718

00:23:54,470 --> 00:23:52,720

that allowed you to form it that were

719

00:23:55,909 --> 00:23:54,480

carcinogenic so we had to change some of

720

00:23:58,230 --> 00:23:55,919

that stuff and that actually does change

721

00:24:00,470 --> 00:23:58,240

the properties but more than that it's a

722

00:24:04,070 --> 00:24:00,480

much bigger heat shield

723

00:24:07,430 --> 00:24:04,080

you know apollo was on what 3.7 meters

724

00:24:09,269 --> 00:24:07,440

ours is five and the orion is bigger so

725

00:24:10,630 --> 00:24:09,279

the landing loads are heavier they're

726

00:24:12,950 --> 00:24:10,640

harder right

727

00:24:14,549 --> 00:24:12,960

and so that changes a lot of the

728

00:24:16,310 --> 00:24:14,559

properties that the heat shield has to

729

00:24:17,430 --> 00:24:16,320

survive on landing so the loads are

730

00:24:20,789 --> 00:24:17,440

different

731

00:24:22,149 --> 00:24:20,799

those are the big things so one is how

732

00:24:26,789 --> 00:24:22,159

how

733

00:24:28,789 --> 00:24:26,799

we have a lot of models that guess

734

00:24:30,789 --> 00:24:28,799

they're good models and we've done some

735

00:24:32,470 --> 00:24:30,799

arc jet testing out in california so we

736

00:24:34,070 --> 00:24:32,480

have guests about how much

737

00:24:36,230 --> 00:24:34,080

of the arc jet will actually ablate

738

00:24:38,149 --> 00:24:36,240

during the process and where it'll where

739

00:24:39,990 --> 00:24:38,159

it'll be the thinnest so the key part of

740

00:24:41,669 --> 00:24:40,000

the test is seeing whether those

741

00:24:43,110 --> 00:24:41,679

aerodynamic models were correct and we

742

00:24:44,630 --> 00:24:43,120

guessed the right because that affects

743

00:24:45,750 --> 00:24:44,640

the thickness and the mass overall that

744

00:24:46,710 --> 00:24:45,760

we're going to use that's a big part of

745

00:24:47,990 --> 00:24:46,720

the test

746

00:24:49,510 --> 00:24:48,000

and we also have a different structure

747

00:24:51,350 --> 00:24:49,520

for this heat shield than they used in

748

00:24:53,590 --> 00:24:51,360

apollo we have a composite

749

00:24:57,269 --> 00:24:53,600

yeah the supporting structure is a

750

00:24:59,510 --> 00:24:57,279

composite shell on a titanium skeleton

751

00:25:01,269 --> 00:24:59,520

and so that's a different methodology

752

00:25:03,029 --> 00:25:01,279

than they were able to use in apollo so

753

00:25:05,110 --> 00:25:03,039

it's looking at the whole integrated

754

00:25:07,269 --> 00:25:05,120

system is is key to that as well not

755

00:25:10,789 --> 00:25:07,279

just how well the the material ablates

756

00:25:15,590 --> 00:25:13,669

hi i'm miriam kramer with space.com uh

757

00:25:17,909 --> 00:25:15,600

and this question is for whoever would

758

00:25:19,830 --> 00:25:17,919

like to answer it but um i'm curious

759

00:25:21,590 --> 00:25:19,840

first of all how many people are you

760

00:25:25,990 --> 00:25:21,600

expecting to sort of view the launch

761

00:25:28,070 --> 00:25:26,000

from ksc uh and also i i know there have

762

00:25:29,830 --> 00:25:28,080

been a couple different numbers but just

763

00:25:32,870 --> 00:25:29,840

if you could give a general estimate of

764

00:25:36,070 --> 00:25:32,880

how much this eft one test

765

00:25:37,590 --> 00:25:36,080

costs then that would be great

766

00:25:39,669 --> 00:25:37,600

so i'm not sure what the current

767

00:25:41,430 --> 00:25:39,679

projection is thousands yeah thousands

768

00:25:43,669 --> 00:25:41,440

but i don't know exactly how many to

769

00:25:46,310 --> 00:25:43,679

expect we're hoping for a lot yeah it's

770

00:25:47,590 --> 00:25:46,320

a lot of a lot of energy so yeah eft one

771

00:25:50,470 --> 00:25:47,600

cost the

772

00:25:52,149 --> 00:25:50,480

the the cost that we calculated and uh

773

00:25:54,390 --> 00:25:52,159

when we talked about this flight was

774

00:25:56,630 --> 00:25:54,400

around 370 million dollars that's the

775

00:25:58,390 --> 00:25:56,640

cost of the rocket plus

776

00:26:01,350 --> 00:25:58,400

pieces of the orion that we're not going

777

00:26:02,470 --> 00:26:01,360

to reuse you know things we use one time

778

00:26:04,390 --> 00:26:02,480

um

779

00:26:05,830 --> 00:26:04,400

so that's basically the

780

00:26:08,149 --> 00:26:05,840

the cost that we've been talking about

781

00:26:09,750 --> 00:26:08,159

the rest the capsule itself we actually

782

00:26:11,350 --> 00:26:09,760

reuse so we're going to use it on

783

00:26:13,350 --> 00:26:11,360

another flight test

784

00:26:15,029 --> 00:26:13,360

and another key part about i think

785

00:26:16,789 --> 00:26:15,039

overall cost is

786

00:26:19,110 --> 00:26:16,799

that you know if we were done with

787

00:26:20,870 --> 00:26:19,120

development and we had an orion totally

788

00:26:22,950 --> 00:26:20,880

certified and we were making copies it'd

789

00:26:25,029 --> 00:26:22,960

be very easy to say okay this copy cost

790

00:26:27,269 --> 00:26:25,039

me x million dollars but we're in the

791

00:26:28,710 --> 00:26:27,279

middle of development so it's not that

792

00:26:29,990 --> 00:26:28,720

we're just building software we're

793

00:26:31,190 --> 00:26:30,000

actually developing the software

794

00:26:33,430 --> 00:26:31,200

processes

795

00:26:35,510 --> 00:26:33,440

and and ringing out part so it's part of

796

00:26:38,789 --> 00:26:35,520

what we call design development test and

797

00:26:41,269 --> 00:26:38,799

evaluation ddt e so we don't split ddt e

798

00:26:44,390 --> 00:26:41,279

by flight so we don't calculate it that

799

00:26:47,190 --> 00:26:44,400

way we are as part of

800

00:26:49,110 --> 00:26:47,200

part of a process for our

801
00:26:51,190 --> 00:26:49,120
stakeholders we are doing an assessment

802
00:26:52,630 --> 00:26:51,200
it's called key decision point c

803
00:26:54,870 --> 00:26:52,640
sls went through it you might remember

804
00:26:57,110 --> 00:26:54,880
there was a memo out for sls after the

805
00:26:59,110 --> 00:26:57,120
pdr where we'll do the same thing and we

806
00:27:01,350 --> 00:26:59,120
will we will estimate and and do

807
00:27:02,390 --> 00:27:01,360
independent cost estimates of our total

808
00:27:05,590 --> 00:27:02,400
cost

809
00:27:06,710 --> 00:27:05,600
through uh em2 and we'll so once we have

810
00:27:09,269 --> 00:27:06,720
that and we've done our independent

811
00:27:11,430 --> 00:27:09,279
estimates that will be uh published as

812
00:27:13,190 --> 00:27:11,440
the full cost both ddt and the cost of

813
00:27:15,029 --> 00:27:13,200

the flights through em2 so we're in the

814

00:27:17,350 --> 00:27:15,039

process of really bringing that out

815

00:27:21,750 --> 00:27:19,590

hi james dean florida today

816

00:27:24,310 --> 00:27:21,760

um i think for for mark um i wonder if

817

00:27:26,710 --> 00:27:24,320

you could just give any more sense of of

818

00:27:28,630 --> 00:27:26,720

how big the stakes are for this mission

819

00:27:30,310 --> 00:27:28,640

in the sense that you already described

820

00:27:32,070 --> 00:27:30,320

you're you're working on it on a second

821

00:27:35,990 --> 00:27:32,080

vehicle already

822

00:27:38,230 --> 00:27:36,000

um you've got you know the long gap so a

823

00:27:40,230 --> 00:27:38,240

lot of time to work with uh from this

824

00:27:42,149 --> 00:27:40,240

mission to the next so

825

00:27:44,950 --> 00:27:42,159

you know just in the unlikely event that

826

00:27:47,430 --> 00:27:44,960

things don't go well um how badly do you

827

00:27:50,310 --> 00:27:47,440

need you know the data from this to

828

00:27:51,909 --> 00:27:50,320

you know get a vehicle that you can fly

829

00:27:55,029 --> 00:27:51,919

for em-1

830

00:27:56,870 --> 00:27:55,039

or um you know if you had a just

831

00:27:58,710 --> 00:27:56,880

a worst-case scenario where the the heat

832

00:27:59,750 --> 00:27:58,720

shield just utterly failed you know does

833

00:28:01,430 --> 00:27:59,760

that

834

00:28:02,870 --> 00:28:01,440

you know going to be a major setback or

835

00:28:04,870 --> 00:28:02,880

just have time to

836

00:28:06,149 --> 00:28:04,880

to deal with it you know to keep on

837

00:28:07,669 --> 00:28:06,159

schedule

838

00:28:09,909 --> 00:28:07,679

okay so good questions because there's a

839

00:28:11,830 --> 00:28:09,919

lot a lot to that question let me say

840

00:28:14,549 --> 00:28:11,840

first of all so this is a very very

841

00:28:17,430 --> 00:28:14,559

important flight test for us because we

842

00:28:19,190 --> 00:28:17,440

while the uh we have great models and we

843

00:28:20,630 --> 00:28:19,200

are we are fortunate and that we have

844

00:28:22,310 --> 00:28:20,640

some of the smartest people on the on

845

00:28:23,430 --> 00:28:22,320

the planet as part of this program and

846

00:28:25,110 --> 00:28:23,440

have a lot of experience with space

847

00:28:27,669 --> 00:28:25,120

flight um

848

00:28:29,990 --> 00:28:27,679

you need to take those designs and

849

00:28:31,590 --> 00:28:30,000

estimates and actually fly them and see

850

00:28:32,710 --> 00:28:31,600

whether in the environment that we're

851
00:28:34,149 --> 00:28:32,720
flying there's something that you don't

852
00:28:36,549 --> 00:28:34,159
expect so that's why it's so big you

853
00:28:38,310 --> 00:28:36,559
know we expect it to go fine

854
00:28:41,110 --> 00:28:38,320
but you really have to fly it to test it

855
00:28:43,350 --> 00:28:41,120
out um mike mentioned as far as the next

856
00:28:45,510 --> 00:28:43,360
flight um and i'll get your contingency

857
00:28:47,590 --> 00:28:45,520
question we've already started em-1 we

858
00:28:49,669 --> 00:28:47,600
started em-1 a year and a half ago

859
00:28:51,990 --> 00:28:49,679
uh and a lot of that was started based

860
00:28:53,990 --> 00:28:52,000
on lessons we learned on building eft-1

861
00:28:56,549 --> 00:28:54,000
long before we fly it right when you

862
00:28:57,750 --> 00:28:56,559
learn a bunch by building the first unit

863
00:28:58,950 --> 00:28:57,760

we learned a bunch about building the

864

00:29:00,230 --> 00:28:58,960

first heat shield and some things that

865

00:29:01,590 --> 00:29:00,240

we want to do differently for the next

866

00:29:02,870 --> 00:29:01,600

one we learned about things we can do

867

00:29:04,630 --> 00:29:02,880

cheaper we learned about things we can

868

00:29:06,310 --> 00:29:04,640

do lighter we learned about things that

869

00:29:07,990 --> 00:29:06,320

we can make the performance better all

870

00:29:09,750 --> 00:29:08,000

of those things we rolled into m1 which

871

00:29:11,110 --> 00:29:09,760

have already started about a year and a

872

00:29:12,630 --> 00:29:11,120

half ago

873

00:29:15,430 --> 00:29:12,640

so um

874

00:29:17,190 --> 00:29:15,440

and and i would say uh we're not

875

00:29:19,590 --> 00:29:17,200

we're not sitting back with our feet up

876

00:29:21,430 --> 00:29:19,600

on our desks uh working em-1 i mean we

877

00:29:23,669 --> 00:29:21,440

are slamming that we are we are now

878

00:29:25,510 --> 00:29:23,679

working that one uh it is we are on the

879

00:29:27,029 --> 00:29:25,520

critical path to get em1 done teams

880

00:29:28,870 --> 00:29:27,039

working very hard so based on the budget

881

00:29:30,310 --> 00:29:28,880

we have we are working full time to get

882

00:29:31,830 --> 00:29:30,320

that next one done so i don't want to

883

00:29:33,909 --> 00:29:31,840

confuse people there's a lot of margin

884

00:29:35,830 --> 00:29:33,919

to get to m1 there's not based on the

885

00:29:38,310 --> 00:29:35,840

plan we have today

886

00:29:40,310 --> 00:29:38,320

as far as what happens it'll depend

887

00:29:42,310 --> 00:29:40,320

it'll depend on what happens uh as far

888

00:29:44,230 --> 00:29:42,320

as what that means we know em1 is an

889

00:29:47,669 --> 00:29:44,240

unmanned flight

890

00:29:49,430 --> 00:29:47,679

there's not people on it so it seems to

891

00:29:51,350 --> 00:29:49,440

me we could find something very well

892

00:29:52,549 --> 00:29:51,360

could find something eft one and still

893

00:29:53,909 --> 00:29:52,559

decide

894

00:29:55,990 --> 00:29:53,919

that we just go ahead and move on to

895

00:29:57,430 --> 00:29:56,000

em-1 we can fix those things and it's

896

00:29:59,590 --> 00:29:57,440

still an unmanned flight and we don't

897

00:30:01,830 --> 00:29:59,600

have to refly eft-1 but it'll depend on

898

00:30:03,430 --> 00:30:01,840

what we find and the key about e-m1 is

899

00:30:04,470 --> 00:30:03,440

now we're on the big rocket too so

900

00:30:05,669 --> 00:30:04,480

there'll be different different

901
00:30:06,830 --> 00:30:05,679
environments and other things that we

902
00:30:08,470 --> 00:30:06,840
find

903
00:30:09,909 --> 00:30:08,480
so

904
00:30:12,789 --> 00:30:09,919
did that answer your question james do

905
00:30:15,990 --> 00:30:14,789
i guess if if i

906
00:30:17,750 --> 00:30:16,000
attempt to be maybe a little more

907
00:30:20,549 --> 00:30:17,760
specific i mean clearly again the heat

908
00:30:23,669 --> 00:30:20,559
shield is is um

909
00:30:25,110 --> 00:30:23,679
the the key focus of the test right so

910
00:30:26,950 --> 00:30:25,120
is that the thing where you're most

911
00:30:29,029 --> 00:30:26,960
hoping to get some

912
00:30:31,510 --> 00:30:29,039
specific you know some some real results

913
00:30:32,310 --> 00:30:31,520

that will inform the design of the next

914

00:30:34,950 --> 00:30:32,320

one

915

00:30:37,590 --> 00:30:34,960

um or are there many other systems that

916

00:30:39,350 --> 00:30:37,600

you know might be modified you know as a

917

00:30:41,350 --> 00:30:39,360

result of what you see yeah this week

918

00:30:42,950 --> 00:30:41,360

yeah great question that the emo the

919

00:30:46,389 --> 00:30:42,960

heat shield is the one where we needed

920

00:30:48,310 --> 00:30:46,399

this orbit right this 3 600 miles this

921

00:30:49,750 --> 00:30:48,320

84 percent of the lunar entry velocity

922

00:30:52,310 --> 00:30:49,760

that's what drove

923

00:30:54,149 --> 00:30:52,320

that specific parameter of the test but

924

00:30:55,590 --> 00:30:54,159

the heat shield is only one system of

925

00:30:57,350 --> 00:30:55,600

many that we're really

926
00:30:59,509 --> 00:30:57,360
testing on this flight these separation

927
00:31:02,070 --> 00:30:59,519
events pulling the lass off jettisoning

928
00:31:03,509 --> 00:31:02,080
the fairings on the service module and

929
00:31:05,509 --> 00:31:03,519
all the entry navigation into guidance

930
00:31:07,669 --> 00:31:05,519
make sure the computers are working

931
00:31:10,149 --> 00:31:07,679
survive the radiation that our all our

932
00:31:12,389 --> 00:31:10,159
guidance algorithms are correct we're

933
00:31:14,230 --> 00:31:12,399
operating the rcs system correctly all

934
00:31:15,590 --> 00:31:14,240
the parachutes deploy

935
00:31:17,190 --> 00:31:15,600
you know all of those we've tested

936
00:31:18,870 --> 00:31:17,200
individually

937
00:31:21,029 --> 00:31:18,880
certainly test it on the ground but to

938
00:31:22,710 --> 00:31:21,039

see them actually work in the flight

939

00:31:23,990 --> 00:31:22,720

environment that's

940

00:31:25,669 --> 00:31:24,000

that's what that's what this test so

941

00:31:27,269 --> 00:31:25,679

there's a lot of things other than just

942

00:31:28,230 --> 00:31:27,279

the heat shield that we're testing so

943

00:31:29,350 --> 00:31:28,240

again

944

00:31:31,190 --> 00:31:29,360

i do hope

945

00:31:32,950 --> 00:31:31,200

uh if there are unusual things in the

946

00:31:35,190 --> 00:31:32,960

environments uh

947

00:31:36,389 --> 00:31:35,200

with the vehicle and we have missed

948

00:31:37,430 --> 00:31:36,399

those in the models i hope we'd learn

949

00:31:39,590 --> 00:31:37,440

them on this flight because that's the

950

00:31:40,950 --> 00:31:39,600

whole idea but if we do have a failure

951
00:31:42,950 --> 00:31:40,960
of something we've got to look about

952
00:31:44,389 --> 00:31:42,960
what it was specifically and then we'll

953
00:31:48,230 --> 00:31:44,399
make a determination as to how that

954
00:31:51,350 --> 00:31:49,830
bill harvard cbs news with two quick

955
00:31:53,029 --> 00:31:51,360
ones um

956
00:31:54,630 --> 00:31:53,039
the the launch weather criteria for the

957
00:31:56,630 --> 00:31:54,640
delta iv heavy were there any

958
00:31:58,870 --> 00:31:56,640
modifications or changes because this is

959
00:32:01,190 --> 00:31:58,880
eft-1 in terms of visibility

960
00:32:03,269 --> 00:32:01,200
requirements for example uh number one

961
00:32:05,269 --> 00:32:03,279
and number two i'm still a little fuzzy

962
00:32:07,350 --> 00:32:05,279
on what real-time video we're gonna we

963
00:32:09,029 --> 00:32:07,360

can expect from the spacecraft during

964

00:32:10,950 --> 00:32:09,039

the mission versus what's recorded on

965

00:32:12,870 --> 00:32:10,960

board and and

966

00:32:13,909 --> 00:32:12,880

if all else fails and we rely on what's

967

00:32:15,350 --> 00:32:13,919

on board

968

00:32:16,549 --> 00:32:15,360

it's a question for brandy when would we

969

00:32:18,310 --> 00:32:16,559

expect

970

00:32:19,669 --> 00:32:18,320

you guys to get that back to put out on

971

00:32:20,870 --> 00:32:19,679

the satellite for those of us to see

972

00:32:23,190 --> 00:32:20,880

that day so

973

00:32:24,710 --> 00:32:23,200

just some visibility questions

974

00:32:26,389 --> 00:32:24,720

so so first question make sure you

975

00:32:28,310 --> 00:32:26,399

understand in terms of the

976
00:32:29,669 --> 00:32:28,320
launch constraints you said in terms of

977
00:32:30,789 --> 00:32:29,679
visibility

978
00:32:33,110 --> 00:32:30,799
i just was curious are there any

979
00:32:35,110 --> 00:32:33,120
differences for eft one versus what you

980
00:32:36,950 --> 00:32:35,120
normally do for a delta iv sure or is it

981
00:32:39,269 --> 00:32:36,960
just exactly the same sure there are

982
00:32:40,789 --> 00:32:39,279
some differences uh obviously uh you

983
00:32:42,710 --> 00:32:40,799
know you can look at what's on top it's

984
00:32:44,789 --> 00:32:42,720
a it's going to be an unfair type of

985
00:32:46,950 --> 00:32:44,799
payload that we're we're flying which is

986
00:32:49,909 --> 00:32:46,960
different so uh you know it required us

987
00:32:51,909 --> 00:32:49,919
to do some uh some extensive uh

988
00:32:54,230 --> 00:32:51,919

uh wind tunnel testing to make sure we

989

00:32:56,630 --> 00:32:54,240

understood that you know we're flying

990

00:32:58,149 --> 00:32:56,640

flying this type of uh payload uh what

991

00:33:00,950 --> 00:32:58,159

the effects it would have on the rocket

992

00:33:02,549 --> 00:33:00,960

so there was some some work done there

993

00:33:04,549 --> 00:33:02,559

there's a lot of mission unique type

994

00:33:07,750 --> 00:33:04,559

analysis work that we had to do because

995

00:33:09,190 --> 00:33:07,760

of this uh how we command through some

996

00:33:10,950 --> 00:33:09,200

of the commanding and the sequencing of

997

00:33:12,789 --> 00:33:10,960

the the flight profile there was some

998

00:33:15,110 --> 00:33:12,799

some changes we had to do there to to

999

00:33:17,750 --> 00:33:15,120

support some of the unique requirements

1000

00:33:18,630 --> 00:33:17,760

of this this mission uh also you know

1001
00:33:22,630 --> 00:33:18,640
from a

1002
00:33:24,070 --> 00:33:22,640
you know there were some unique

1003
00:33:26,230 --> 00:33:24,080
requirements from an environmental

1004
00:33:28,230 --> 00:33:26,240
control system that we had

1005
00:33:30,470 --> 00:33:28,240
to meet for the uh which required us to

1006
00:33:31,909 --> 00:33:30,480
add another swing arm we had to modify

1007
00:33:34,149 --> 00:33:31,919
our swing arm uh so that we could

1008
00:33:35,909 --> 00:33:34,159
provide them the these the environmental

1009
00:33:38,470 --> 00:33:35,919
control systems that they needed to

1010
00:33:39,509 --> 00:33:38,480
support their their payload and then you

1011
00:33:41,750 --> 00:33:39,519
know we actually had to do some

1012
00:33:43,590 --> 00:33:41,760
structural changes to the to the pad

1013
00:33:45,669 --> 00:33:43,600

itself because we normally carry a four

1014

00:33:47,830 --> 00:33:45,679

meter and five meter type payload and

1015

00:33:48,950 --> 00:33:47,840

and the orion payload is it was five and

1016

00:33:51,590 --> 00:33:48,960

a half or

1017

00:33:54,230 --> 00:33:51,600

meters and uh so basically it was too

1018

00:33:56,950 --> 00:33:54,240

small so we had to basically modify our

1019

00:33:58,549 --> 00:33:56,960

platforms to to allow it uh to be able

1020

00:34:00,470 --> 00:33:58,559

to accommodate that so so those are the

1021

00:34:02,070 --> 00:34:00,480

type of changes you know we made in

1022

00:34:03,909 --> 00:34:02,080

order to accommodate that but you know

1023

00:34:05,190 --> 00:34:03,919

most of those but for for the most part

1024

00:34:07,269 --> 00:34:05,200

though the rocket

1025

00:34:08,950 --> 00:34:07,279

you know the is pretty much the same but

1026
00:34:12,310 --> 00:34:08,960
just we had to do some unique analysis

1027
00:34:14,230 --> 00:34:12,320
to support uh support this mission so

1028
00:34:16,149 --> 00:34:14,240
does that answer your question

1029
00:34:17,589 --> 00:34:16,159
actually it was extremely useful but it

1030
00:34:19,030 --> 00:34:17,599
wasn't really what i was asking about

1031
00:34:21,109 --> 00:34:19,040
okay all right

1032
00:34:22,629 --> 00:34:21,119
so maybe okay it was useful no i was

1033
00:34:24,310 --> 00:34:22,639
interested in the in the launch weather

1034
00:34:26,149 --> 00:34:24,320
criteria for adults is there any

1035
00:34:27,190 --> 00:34:26,159
difference from a weather standpoint in

1036
00:34:29,430 --> 00:34:27,200
terms of being able to see the

1037
00:34:31,990 --> 00:34:29,440
spacecraft as you go uphill that was one

1038
00:34:33,430 --> 00:34:32,000

and then no and two for us for mark or

1039

00:34:35,430 --> 00:34:33,440

just on visit what we're going to see

1040

00:34:37,270 --> 00:34:35,440

during the mission

1041

00:34:39,270 --> 00:34:37,280

okay from the weather perspective

1042

00:34:41,430 --> 00:34:39,280

there's no it's the same constraints we

1043

00:34:43,669 --> 00:34:41,440

we have obviously lightning is something

1044

00:34:45,349 --> 00:34:43,679

that we're concerned about uh you know

1045

00:34:47,190 --> 00:34:45,359

precipitation we can't fly through

1046

00:34:49,270 --> 00:34:47,200

precipitation at certain altitudes those

1047

00:34:51,829 --> 00:34:49,280

are constraints we also have constraints

1048

00:34:53,430 --> 00:34:51,839

with wind uh you know the weather right

1049

00:34:54,950 --> 00:34:53,440

now is predicted to be you know the

1050

00:34:56,710 --> 00:34:54,960

winds aren't going to be too high so we

1051
00:34:59,430 --> 00:34:56,720
shouldn't have any trouble you know at

1052
00:35:00,950 --> 00:34:59,440
liftoff but those are all the type of

1053
00:35:02,550 --> 00:35:00,960
constraints from a weather perspective

1054
00:35:04,710 --> 00:35:02,560
we're looking at right now

1055
00:35:06,870 --> 00:35:04,720
we don't expect to have any of those uh

1056
00:35:07,670 --> 00:35:06,880
type of issues for us but none of them

1057
00:35:11,270 --> 00:35:07,680
are

1058
00:35:15,829 --> 00:35:12,390
yeah

1059
00:35:18,390 --> 00:35:15,839
the cameras i think i know but i sure

1060
00:35:19,910 --> 00:35:18,400
said um so we of course will have the

1061
00:35:22,630 --> 00:35:19,920
great launch views that you're used to

1062
00:35:24,390 --> 00:35:22,640
um then once it gets going we'll get we

1063
00:35:26,710 --> 00:35:24,400

think views from the cameras on the

1064

00:35:28,630 --> 00:35:26,720

service module that show us the fairings

1065

00:35:30,310 --> 00:35:28,640

the protective panels

1066

00:35:31,750 --> 00:35:30,320

being separated uh that's about six

1067

00:35:34,069 --> 00:35:31,760

minutes in and right after that the

1068

00:35:35,990 --> 00:35:34,079

launch abort system jettisons and that

1069

00:35:37,750 --> 00:35:36,000

uncovers the crew module so we'll start

1070

00:35:39,109 --> 00:35:37,760

getting views from the cameras inside

1071

00:35:41,670 --> 00:35:39,119

the crew module after that looking out

1072

00:35:43,190 --> 00:35:41,680

the windows so um you know sometimes

1073

00:35:45,990 --> 00:35:43,200

we'll be in the dark just like we are

1074

00:35:48,069 --> 00:35:46,000

with the space station and sometimes um

1075

00:35:49,510 --> 00:35:48,079

it'll orion will be rotating so we'll be

1076
00:35:50,870 --> 00:35:49,520
looking out to space rather than down at

1077
00:35:53,349 --> 00:35:50,880
the earth but we're hoping to get some

1078
00:35:55,430 --> 00:35:53,359
really good earth views and then we have

1079
00:35:57,430 --> 00:35:55,440
an unmanned aircraft that's going to try

1080
00:35:58,550 --> 00:35:57,440
and get video of the

1081
00:35:59,829 --> 00:35:58,560
crew module coming down under the

1082
00:36:01,349 --> 00:35:59,839
parachutes at the end of the mission as

1083
00:36:02,870 --> 00:36:01,359
well so hopefully we're gonna have a lot

1084
00:36:04,710 --> 00:36:02,880
of good video for you

1085
00:36:06,150 --> 00:36:04,720
um a lot of it is kind of dependent on

1086
00:36:07,829 --> 00:36:06,160
on everything working right just like

1087
00:36:08,550 --> 00:36:07,839
the rest of the flight test

1088
00:36:10,230 --> 00:36:08,560

but

1089

00:36:11,750 --> 00:36:10,240

for the recorded video there's some

1090

00:36:13,829 --> 00:36:11,760

about an hour into the flight that we're

1091

00:36:15,349 --> 00:36:13,839

going to try and get down some of the

1092

00:36:16,630 --> 00:36:15,359

recorded video of the launch abort

1093

00:36:18,790 --> 00:36:16,640

jettison

1094

00:36:20,630 --> 00:36:18,800

and if we get that we hope to play it

1095

00:36:22,150 --> 00:36:20,640

for you by the end of the mission but if

1096

00:36:27,670 --> 00:36:22,160

we're not able to of course we'll get it

1097

00:36:32,950 --> 00:36:29,829

more questions here

1098

00:36:34,870 --> 00:36:32,960

i've got one back there

1099

00:36:37,109 --> 00:36:34,880

okay

1100

00:36:38,390 --> 00:36:37,119

uh sawyer rosenstein with talking space

1101

00:36:40,550 --> 00:36:38,400

a lot of people are comparing this to

1102

00:36:41,510 --> 00:36:40,560

the early apollo test missions and some

1103

00:36:43,829 --> 00:36:41,520

people are saying that you know we've

1104

00:36:46,550 --> 00:36:43,839

done this before with these what makes

1105

00:36:48,150 --> 00:36:46,560

this mission so special that um

1106

00:36:49,510 --> 00:36:48,160

or what can we learn in particular from

1107

00:36:52,310 --> 00:36:49,520

this mission that we can't learn from

1108

00:36:53,750 --> 00:36:52,320

something say an apollo and also uh

1109

00:36:55,990 --> 00:36:53,760

after this the focus switches a lot more

1110

00:36:59,190 --> 00:36:56,000

to sls but what will be the future in

1111

00:37:02,950 --> 00:37:00,870

i think the key difference between

1112

00:37:04,630 --> 00:37:02,960

apollo is that the inside of the capsule

1113

00:37:05,910 --> 00:37:04,640

is totally different

1114

00:37:07,270 --> 00:37:05,920

and you can think of the computers

1115

00:37:08,870 --> 00:37:07,280

themselves we know

1116

00:37:10,150 --> 00:37:08,880

how much computing power has changed

1117

00:37:12,550 --> 00:37:10,160

since the 60s so we have

1118

00:37:14,630 --> 00:37:12,560

state-of-the-art computers on orion that

1119

00:37:15,750 --> 00:37:14,640

not only help this unmanned craft but

1120

00:37:18,710 --> 00:37:15,760

eventually

1121

00:37:20,710 --> 00:37:18,720

allow the crew to have incredible access

1122

00:37:22,069 --> 00:37:20,720

to the systems on board which you'll

1123

00:37:23,270 --> 00:37:22,079

need when they're further and further

1124

00:37:24,790 --> 00:37:23,280

away from earth and need to be more and

1125

00:37:26,630 --> 00:37:24,800

more independent

1126

00:37:28,230 --> 00:37:26,640

uh the the interesting things about

1127

00:37:29,829 --> 00:37:28,240

computers now

1128

00:37:31,190 --> 00:37:29,839

is although they are much more powerful

1129

00:37:32,790 --> 00:37:31,200

they're also more susceptible to

1130

00:37:35,510 --> 00:37:32,800

radiation than the than the earlier

1131

00:37:37,670 --> 00:37:35,520

computers so we're we have a more

1132

00:37:39,270 --> 00:37:37,680

powerful system but it's susceptible to

1133

00:37:40,550 --> 00:37:39,280

different kind of environments than the

1134

00:37:41,589 --> 00:37:40,560

apollo system so i think it's a good

1135

00:37:43,750 --> 00:37:41,599

example

1136

00:37:44,950 --> 00:37:43,760

we're flying this particular design even

1137

00:37:46,470 --> 00:37:44,960

though it's going through the same

1138

00:37:47,990 --> 00:37:46,480

region of space

1139

00:37:49,190 --> 00:37:48,000

it's got a different capability and it's

1140

00:37:50,310 --> 00:37:49,200

going to have different reactions to

1141

00:37:51,990 --> 00:37:50,320

it's the same with the heat shield it's

1142

00:37:53,270 --> 00:37:52,000

bigger as mike said the structure is

1143

00:37:54,790 --> 00:37:53,280

different it's going to it's going to

1144

00:37:56,310 --> 00:37:54,800

react different

1145

00:37:57,910 --> 00:37:56,320

same with the parachute system has some

1146

00:38:00,790 --> 00:37:57,920

fundamental differences

1147

00:38:02,790 --> 00:38:00,800

um the back shell tiles on orion are

1148

00:38:04,710 --> 00:38:02,800

shuttle like where on apollo they were

1149

00:38:07,190 --> 00:38:04,720

more av coat right so for mass we got a

1150

00:38:08,630 --> 00:38:07,200

shuttle light tile so again it's it's

1151

00:38:11,990 --> 00:38:08,640

state of the art

1152

00:38:16,630 --> 00:38:12,000

in the environment of space so i expect

1153

00:38:21,430 --> 00:38:18,870

i uh in the back rory o'neill with i

1154

00:38:24,390 --> 00:38:21,440

heart radio uh first to clarify to this

1155

00:38:25,990 --> 00:38:24,400

liberal arts major the uh 86 percent of

1156

00:38:27,190 --> 00:38:26,000

lunar velocity could you just explain

1157

00:38:29,910 --> 00:38:27,200

what that term is and the second thing

1158

00:38:32,470 --> 00:38:29,920

is uh on the radiation exposure what's

1159

00:38:33,910 --> 00:38:32,480

the concern and and how much of an x

1160

00:38:36,390 --> 00:38:33,920

factor is it do you know what to expect

1161

00:38:38,150 --> 00:38:36,400

uh going out there so that yeah the the

1162

00:38:39,510 --> 00:38:38,160

full lunar so if you were coming back

1163

00:38:41,190 --> 00:38:39,520

from the moon

1164

00:38:42,630 --> 00:38:41,200

uh you'd have a certain velocity and

1165

00:38:43,589 --> 00:38:42,640

you're gonna hit the atmosphere at that

1166

00:38:45,270 --> 00:38:43,599

speed

1167

00:38:46,550 --> 00:38:45,280

um and then you're gonna uh and your

1168

00:38:47,990 --> 00:38:46,560

heat shield needs to be able to handle

1169

00:38:49,589 --> 00:38:48,000

that well we're not gonna go all the way

1170

00:38:51,750 --> 00:38:49,599

to the moon with the delta iv heavy we

1171

00:38:53,349 --> 00:38:51,760

need we need sls to do that

1172

00:38:57,030 --> 00:38:53,359

but delta iv does a great job of getting

1173

00:38:58,390 --> 00:38:57,040

us close so the 84 was really the

1174

00:39:00,310 --> 00:38:58,400

where we could get to with a with the

1175

00:39:02,550 --> 00:39:00,320

delta iv heavy which is pretty darn

1176
00:39:04,630 --> 00:39:02,560
close and we actually are

1177
00:39:06,710 --> 00:39:04,640
transitioning

1178
00:39:09,349 --> 00:39:06,720
the physics of reentry

1179
00:39:10,790 --> 00:39:09,359
um change as you go faster in fact it

1180
00:39:12,710 --> 00:39:10,800
becomes more of a radiate of heating

1181
00:39:14,790 --> 00:39:12,720
this plasma behind the heat shield or

1182
00:39:16,390 --> 00:39:14,800
behind the shock layer starts heating

1183
00:39:18,069 --> 00:39:16,400
the heat shield differently

1184
00:39:20,069 --> 00:39:18,079
and you need to get fast enough to start

1185
00:39:21,750 --> 00:39:20,079
seeing that it's much different than a

1186
00:39:23,430 --> 00:39:21,760
entry from leo

1187
00:39:24,950 --> 00:39:23,440
so we need to get to this region and

1188
00:39:26,790 --> 00:39:24,960

that's what delta iv is able to do for

1189

00:39:27,829 --> 00:39:26,800

us so i hope it answered that question

1190

00:39:29,109 --> 00:39:27,839

and i'm sorry what was your other

1191

00:39:31,109 --> 00:39:29,119

question

1192

00:39:33,589 --> 00:39:31,119

oh yeah so we we have a lot of systems

1193

00:39:35,510 --> 00:39:33,599

that go out to geo excuse me uh

1194

00:39:37,030 --> 00:39:35,520

geosynchronous orbit got a lot of com

1195

00:39:39,510 --> 00:39:37,040

sides so we cut we kind of know what

1196

00:39:41,589 --> 00:39:39,520

this radiation band looks like

1197

00:39:43,829 --> 00:39:41,599

um the difference is this these

1198

00:39:45,270 --> 00:39:43,839

particular computers chips

1199

00:39:46,470 --> 00:39:45,280

we've tested them on the ground in

1200

00:39:47,829 --> 00:39:46,480

certain conditions there's some

1201

00:39:49,910 --> 00:39:47,839

universities that have some labs that

1202

00:39:51,829 --> 00:39:49,920

can do that but you really need to fly

1203

00:39:53,910 --> 00:39:51,839

them to go through that and what happens

1204

00:39:56,390 --> 00:39:53,920

is this radiation can actually

1205

00:39:58,870 --> 00:39:56,400

cause what we call an upset it can cause

1206

00:40:00,950 --> 00:39:58,880

a glitch in the data the computers are

1207

00:40:03,910 --> 00:40:00,960

smart enough to know if they've got

1208

00:40:04,790 --> 00:40:03,920

funny data and they'll stop and reset

1209

00:40:06,390 --> 00:40:04,800

so

1210

00:40:08,470 --> 00:40:06,400

they're smart enough to do that our

1211

00:40:11,109 --> 00:40:08,480

computers will reset we actually have

1212

00:40:12,230 --> 00:40:11,119

two computers uh if they both reset

1213

00:40:14,309 --> 00:40:12,240

there's another

1214

00:40:16,309 --> 00:40:14,319

uh memory system that lets those

1215

00:40:17,349 --> 00:40:16,319

computers go okay i reset but here's the

1216

00:40:18,470 --> 00:40:17,359

state of the vehicle because they need

1217

00:40:20,630 --> 00:40:18,480

to know what the state of the vehicle is

1218

00:40:21,750 --> 00:40:20,640

when they stopped so we've accounted for

1219

00:40:24,630 --> 00:40:21,760

that

1220

00:40:25,670 --> 00:40:24,640

part of what you have to think through

1221

00:40:26,950 --> 00:40:25,680

when you know this is kind of

1222

00:40:27,910 --> 00:40:26,960

environment you go through and as we go

1223

00:40:29,190 --> 00:40:27,920

to the moon we're going to go through

1224

00:40:33,270 --> 00:40:29,200

this region

1225

00:40:37,829 --> 00:40:35,430

diversity and steam had a few different

1226

00:40:40,630 --> 00:40:37,839

questions first of all uh in the trial

1227

00:40:43,589 --> 00:40:40,640

by fire video uh they mentioned uh the

1228

00:40:46,790 --> 00:40:43,599

computers on port orion uh performing uh

1229

00:40:48,710 --> 00:40:46,800

480 million instructions per second

1230

00:40:50,790 --> 00:40:48,720

um is there a way that you can translate

1231

00:40:53,510 --> 00:40:50,800

that into um

1232

00:40:55,670 --> 00:40:53,520

like a more compute uh consumer friendly

1233

00:41:00,870 --> 00:40:55,680

uh

1234

00:41:04,870 --> 00:41:02,309

i think that whole thing was an attempt

1235

00:41:06,550 --> 00:41:04,880

to communicate to computer people

1236

00:41:10,230 --> 00:41:06,560

uh how fast they were

1237

00:41:14,870 --> 00:41:12,870

are there any parts of uh em-1 that

1238

00:41:19,270 --> 00:41:14,880

you're holding off building

1239

00:41:24,550 --> 00:41:23,190

is uh the delta iv heavy the only uh

1240

00:41:25,990 --> 00:41:24,560

vehicle

1241

00:41:27,910 --> 00:41:26,000

uh capable

1242

00:41:30,790 --> 00:41:27,920

of making the uh

1243

00:41:32,950 --> 00:41:30,800

of uh flying to these altitudes

1244

00:41:35,430 --> 00:41:32,960

or flying orion to these altitudes

1245

00:41:38,630 --> 00:41:35,440

rather and can you go into some

1246

00:41:39,829 --> 00:41:38,640

specifics on um

1247

00:41:41,270 --> 00:41:39,839

the way that you're going to be

1248

00:41:42,950 --> 00:41:41,280

collecting data

1249

00:41:44,470 --> 00:41:42,960

on um

1250

00:41:46,829 --> 00:41:44,480

what what would have been

1251

00:41:50,630 --> 00:41:46,839

crew exposure to the

1252

00:41:53,270 --> 00:41:50,640

radiation so we have uh

1253

00:41:55,670 --> 00:41:53,280

for this test flight the delta iv was

1254

00:41:57,829 --> 00:41:55,680

was the most capable system

1255

00:41:59,349 --> 00:41:57,839

that we had that could get us that range

1256

00:42:02,150 --> 00:41:59,359

of altitude and the way mark just

1257

00:42:04,150 --> 00:42:02,160

described it as having that transition

1258

00:42:06,309 --> 00:42:04,160

where you see the the plasma heating

1259

00:42:07,829 --> 00:42:06,319

behind the the shock layer that's

1260

00:42:09,990 --> 00:42:07,839

where we're driving to

1261

00:42:12,069 --> 00:42:10,000

the space launch system certainly could

1262

00:42:13,510 --> 00:42:12,079

but uh we want to do this test before

1263

00:42:15,990 --> 00:42:13,520

we're gonna have the space launch system

1264

00:42:17,349 --> 00:42:16,000

available to us but it's the delta iv is

1265

00:42:20,309 --> 00:42:17,359

the largest thing we have today that

1266

00:42:24,390 --> 00:42:22,390

the

1267

00:42:25,829 --> 00:42:24,400

we do have a lot of radiation sensors on

1268

00:42:27,109 --> 00:42:25,839

board

1269

00:42:28,710 --> 00:42:27,119

that's a great segue though because it

1270

00:42:31,349 --> 00:42:28,720

gives me the opportunity to let folks

1271

00:42:33,109 --> 00:42:31,359

know that our student engineer and

1272

00:42:34,390 --> 00:42:33,119

design competition winners are around

1273

00:42:36,710 --> 00:42:34,400

the side of the room here from the

1274

00:42:40,309 --> 00:42:36,720

governor's school in hampton virginia

1275

00:42:41,829 --> 00:42:40,319

so lockheed and nasa ran a

1276
00:42:43,670 --> 00:42:41,839
a competition and one of the things we

1277
00:42:45,190 --> 00:42:43,680
wanted to focus on was the radiation

1278
00:42:49,349 --> 00:42:45,200
susceptibility

1279
00:42:52,150 --> 00:42:49,359
so we had teams all over the country

1280
00:42:53,510 --> 00:42:52,160
and down selected to five teams that

1281
00:42:55,030 --> 00:42:53,520
just at

1282
00:42:56,710 --> 00:42:55,040
in april at the science and engineering

1283
00:42:58,150 --> 00:42:56,720
festival in d.c

1284
00:42:59,030 --> 00:42:58,160
announced the governor's school as the

1285
00:43:01,430 --> 00:42:59,040
winner

1286
00:43:03,270 --> 00:43:01,440
so they have designed a payload that's

1287
00:43:07,109 --> 00:43:03,280
inside the capsule now

1288
00:43:09,829 --> 00:43:07,119

that has a radiation monitor inside of

1289

00:43:11,510 --> 00:43:09,839

several different shielding

1290

00:43:13,510 --> 00:43:11,520

materials to look at how well can we

1291

00:43:15,109 --> 00:43:13,520

shield against radiation for that so

1292

00:43:17,430 --> 00:43:15,119

that's a number of experiments that were

1293

00:43:19,510 --> 00:43:17,440

actually flying inside

1294

00:43:21,670 --> 00:43:19,520

to to demonstrate different material

1295

00:43:23,670 --> 00:43:21,680

properties and different radiation

1296

00:43:28,630 --> 00:43:23,680

shielding

1297

00:43:33,030 --> 00:43:30,550

hi ken kramer for universe today in

1298

00:43:34,550 --> 00:43:33,040

america space for um mark and mike can

1299

00:43:37,670 --> 00:43:34,560

you tell us a little bit more about the

1300

00:43:40,710 --> 00:43:37,680

actual schedule to build em1

1301

00:43:44,309 --> 00:43:40,720

and when will it appear here can you

1302

00:43:46,790 --> 00:43:44,319

also meet a 2017 december 2017 launch

1303

00:43:49,190 --> 00:43:46,800

date and the last question is more about

1304

00:43:51,030 --> 00:43:49,200

the lessons learned i understand you're

1305

00:43:52,829 --> 00:43:51,040

considering changing the heat shield

1306

00:43:55,510 --> 00:43:52,839

what can you tell us about that thank

1307

00:43:57,670 --> 00:43:55,520

you well i can speak to the schedule

1308

00:43:59,589 --> 00:43:57,680

since i've spoken to it before

1309

00:44:02,470 --> 00:43:59,599

um at this point you know we have a lot

1310

00:44:04,870 --> 00:44:02,480

of challenges to september 17 so that's

1311

00:44:06,309 --> 00:44:04,880

we won't be there at september 17. a

1312

00:44:08,870 --> 00:44:06,319

part of that was

1313

00:44:10,550 --> 00:44:08,880

as we talked about getting eft-1 done we

1314

00:44:11,910 --> 00:44:10,560

learned a ton about getting it done but

1315

00:44:14,150 --> 00:44:11,920

some of it took us a little bit longer

1316

00:44:15,670 --> 00:44:14,160

than we expected and we've also added

1317

00:44:17,270 --> 00:44:15,680

isa as a partner and they're doing a

1318

00:44:18,790 --> 00:44:17,280

terrific job

1319

00:44:21,190 --> 00:44:18,800

coming up to speed

1320

00:44:23,750 --> 00:44:21,200

but their delivery schedule also will

1321

00:44:25,270 --> 00:44:23,760

will push us past september the exact

1322

00:44:26,950 --> 00:44:25,280

date

1323

00:44:29,030 --> 00:44:26,960

uh that we're going to hit excuse me

1324

00:44:30,230 --> 00:44:29,040

december december 17th the exact date

1325

00:44:32,470 --> 00:44:30,240

we're going to hit is still something

1326

00:44:34,230 --> 00:44:32,480

we're working through and because i know

1327

00:44:35,349 --> 00:44:34,240

whenever we announce a new date people

1328

00:44:36,550 --> 00:44:35,359

are going to want to make sure that we

1329

00:44:37,589 --> 00:44:36,560

have a lot of confidence in it because

1330

00:44:39,349 --> 00:44:37,599

you don't want to be changing that all

1331

00:44:41,030 --> 00:44:39,359

the time so we're working that with

1332

00:44:42,950 --> 00:44:41,040

headquarters doing an assessment of that

1333

00:44:44,390 --> 00:44:42,960

based on the risks that we have today

1334

00:44:45,910 --> 00:44:44,400

and that's again part of that that'll

1335

00:44:47,190 --> 00:44:45,920

come out as the announcement after our

1336

00:44:49,270 --> 00:44:47,200

kdpc

1337

00:44:51,349 --> 00:44:49,280

but it's not holding us up we know

1338

00:44:52,390 --> 00:44:51,359

in in this year we know exactly what we

1339

00:44:53,910 --> 00:44:52,400

need to be working we know what the

1340

00:44:55,430 --> 00:44:53,920

critical path is and every day we're

1341

00:44:57,430 --> 00:44:55,440

working those off so it's not that

1342

00:44:59,109 --> 00:44:57,440

decision and determination of the final

1343

00:45:00,230 --> 00:44:59,119

day just not slowing us down we're

1344

00:45:02,309 --> 00:45:00,240

moving

1345

00:45:04,630 --> 00:45:02,319

and we're machining primary structures

1346

00:45:07,990 --> 00:45:04,640

for the next crew module so those are

1347

00:45:09,829 --> 00:45:08,000

out at our suppliers now being worked

1348

00:45:12,870 --> 00:45:09,839

so that within i think they start

1349

00:45:14,630 --> 00:45:12,880

showing up at math in march

1350

00:45:16,230 --> 00:45:14,640

and then we'll start assembling that

1351

00:45:17,750 --> 00:45:16,240

capsule and it's

1352

00:45:18,790 --> 00:45:17,760

towards the end of the year early 16

1353

00:45:21,589 --> 00:45:18,800

that we actually have another crew

1354

00:45:24,790 --> 00:45:21,599

module showing up in florida

1355

00:45:29,589 --> 00:45:26,150

uh the heat shield trade do you want to

1356

00:45:30,710 --> 00:45:29,599

talk to you yeah so we're still you know

1357

00:45:32,550 --> 00:45:30,720

a lot of the

1358

00:45:33,990 --> 00:45:32,560

discussion we've had is about what we

1359

00:45:35,430 --> 00:45:34,000

learned when we built the first one and

1360

00:45:37,349 --> 00:45:35,440

when we built the first one which will

1361

00:45:38,710 --> 00:45:37,359

work great for eft one we learned that

1362

00:45:40,150 --> 00:45:38,720

the material properties were a little

1363

00:45:41,510 --> 00:45:40,160

different than we expected it wasn't

1364

00:45:43,349 --> 00:45:41,520

quite as strong

1365

00:45:45,109 --> 00:45:43,359

as we expected that it would be so when

1366

00:45:46,870 --> 00:45:45,119

we're looking at that we know that that

1367

00:45:48,630 --> 00:45:46,880

is the material itself the f code itself

1368

00:45:51,190 --> 00:45:48,640

and as mike talked about the loads are

1369

00:45:52,870 --> 00:45:51,200

pretty high for landing and entry

1370

00:45:55,030 --> 00:45:52,880

especially now it's on this composite

1371

00:45:56,950 --> 00:45:55,040

structure so the teams look at a lot of

1372

00:45:59,349 --> 00:45:56,960

things one is to get more confidence in

1373

00:46:00,950 --> 00:45:59,359

the material properties find out why

1374

00:46:02,870 --> 00:46:00,960

it was a little weaker than we expected

1375

00:46:04,470 --> 00:46:02,880

or look at other or look at other

1376

00:46:05,589 --> 00:46:04,480

designs and there's another way you can

1377

00:46:07,030 --> 00:46:05,599

build a heat shield where you actually

1378

00:46:08,790 --> 00:46:07,040

build it in blocks

1379

00:46:10,230 --> 00:46:08,800

and attach the blocks to the heat shield

1380

00:46:12,829 --> 00:46:10,240

and then you've got some seams that

1381

00:46:14,870 --> 00:46:12,839

you've got to fill so we're looking at

1382

00:46:16,630 --> 00:46:14,880

both uh and the key thing is we're going

1383

00:46:18,150 --> 00:46:16,640

to fly eft-1 and learn how that

1384

00:46:19,910 --> 00:46:18,160

performed as well as a key part of there

1385

00:46:21,430 --> 00:46:19,920

was a question about you know are we are

1386

00:46:22,870 --> 00:46:21,440

we waiting on anything we're not waiting

1387

00:46:24,630 --> 00:46:22,880

on eft-1 but we're certainly going to

1388

00:46:27,349 --> 00:46:24,640

get the data from eft-1 and that'll help

1389

00:46:29,270 --> 00:46:27,359

inform that that trade yeah and part of

1390

00:46:31,109 --> 00:46:29,280

that was just the manufacturability of

1391

00:46:32,309 --> 00:46:31,119

the heat shield it's uh

1392

00:46:34,710 --> 00:46:32,319

the current

1393

00:46:37,349 --> 00:46:34,720

form which we refer to as monolithic is

1394

00:46:38,230 --> 00:46:37,359

is really labor intensive and and

1395

00:46:39,990 --> 00:46:38,240

yeah

1396

00:46:43,990 --> 00:46:40,000

it's you know you can't see it now but

1397

00:46:45,030 --> 00:46:44,000

if you you saw it back 15 months ago or

1398

00:46:47,030 --> 00:46:45,040

so

1399

00:46:50,950 --> 00:46:47,040

the

1400

00:46:52,309 --> 00:46:50,960

apollo command modules that's around in

1401
00:46:54,390 --> 00:46:52,319
the museums you can see this little

1402
00:46:56,069 --> 00:46:54,400
honeycomb structure and you realize that

1403
00:46:57,670 --> 00:46:56,079
this material is injected like a

1404
00:46:59,589 --> 00:46:57,680
caulking gun into every single one of

1405
00:47:01,910 --> 00:46:59,599
those little honeycomb cells and then

1406
00:47:03,750 --> 00:47:01,920
it's all machined well it's it's cured

1407
00:47:05,670 --> 00:47:03,760
and then it's all machined

1408
00:47:07,829 --> 00:47:05,680
and spot repaired and all this stuff so

1409
00:47:10,470 --> 00:47:07,839
it's a very intensive process so one of

1410
00:47:12,950 --> 00:47:10,480
the things we look at for all of these

1411
00:47:14,950 --> 00:47:12,960
systems is are there manufacturing

1412
00:47:16,790 --> 00:47:14,960
lessons learned and that's where we're

1413
00:47:19,349 --> 00:47:16,800

looking at whether blocks are a better

1414

00:47:20,390 --> 00:47:19,359
manufacturing solution as well

1415

00:47:21,910 --> 00:47:20,400
we've done that on the primary

1416

00:47:23,589 --> 00:47:21,920
structures we've gone from the number of

1417

00:47:24,950 --> 00:47:23,599
panels that we've formed that need to be

1418

00:47:28,630 --> 00:47:24,960
welded together

1419

00:47:30,950 --> 00:47:28,640
changes in in the weld process so

1420

00:47:32,630 --> 00:47:30,960
right now each crew module we build is a

1421

00:47:34,950 --> 00:47:32,640
little bit different because it's you

1422

00:47:36,710 --> 00:47:34,960
know it's a little bit lighter it's a

1423

00:47:38,309 --> 00:47:36,720
few you know a different

1424

00:47:39,750 --> 00:47:38,319
set of panels and all of those are to

1425

00:47:46,549 --> 00:47:39,760
help inform them

1426
00:47:50,630 --> 00:47:48,950
hi robert perlman with collectspace.com

1427
00:47:51,990 --> 00:47:50,640
mark i may have misheard but i think you

1428
00:47:54,230 --> 00:47:52,000
said that one of the things remaining to

1429
00:47:56,710 --> 00:47:54,240
be done is to close orion's hatch if

1430
00:47:58,950 --> 00:47:56,720
that's true is there what is left to be

1431
00:48:00,630 --> 00:47:58,960
done inside and a more general question

1432
00:48:02,630 --> 00:48:00,640
i don't think we've seen any photos

1433
00:48:05,589 --> 00:48:02,640
showing or video showing the in what the

1434
00:48:07,589 --> 00:48:05,599
inside of the eft-1 orion looks like

1435
00:48:08,950 --> 00:48:07,599
can you basically describe if someone

1436
00:48:10,230 --> 00:48:08,960
was to look through the hatch what they

1437
00:48:12,870 --> 00:48:10,240
would see

1438
00:48:14,870 --> 00:48:12,880

yeah so the uh sorry the hatch is on and

1439

00:48:16,470 --> 00:48:14,880

the the launch abort system hatch is

1440

00:48:18,549 --> 00:48:16,480

also on so we were out there today and

1441

00:48:21,430 --> 00:48:18,559

it's it's all sealed up so those are

1442

00:48:22,790 --> 00:48:21,440

done they're doing their last um

1443

00:48:24,390 --> 00:48:22,800

we call it bridge wire checks just

1444

00:48:26,549 --> 00:48:24,400

basically make sure the pyros are all

1445

00:48:27,910 --> 00:48:26,559

set right and that's all and we close

1446

00:48:29,349 --> 00:48:27,920

out the last piece of paperwork so

1447

00:48:31,190 --> 00:48:29,359

that's all we have left to do it's all

1448

00:48:32,470 --> 00:48:31,200

really really good if you were to look

1449

00:48:34,230 --> 00:48:32,480

inside

1450

00:48:35,030 --> 00:48:34,240

the crew module fundamentally what you'd

1451

00:48:37,270 --> 00:48:35,040

see

1452

00:48:39,670 --> 00:48:37,280

is the the the back shell which is

1453

00:48:40,790 --> 00:48:39,680

basically a structural component that

1454

00:48:42,870 --> 00:48:40,800

lays out

1455

00:48:44,630 --> 00:48:42,880

um volumes where we put the computers

1456

00:48:46,630 --> 00:48:44,640

and the computers are mounted in there

1457

00:48:49,270 --> 00:48:46,640

then we also have the thermal control

1458

00:48:51,990 --> 00:48:49,280

system so you'd see some valves

1459

00:48:54,549 --> 00:48:52,000

uh and and the the tubes that keep the

1460

00:48:56,549 --> 00:48:54,559

cold that supply uh cooling for the cold

1461

00:48:59,670 --> 00:48:56,559

plates that's what you would see inside

1462

00:49:01,030 --> 00:48:59,680

then you'd see a couple of bags of flags

1463

00:49:02,309 --> 00:49:01,040

and stuff that you normally fly on a

1464

00:49:03,750 --> 00:49:02,319

mission like that and you see a lot of

1465

00:49:05,510 --> 00:49:03,760

wiring

1466

00:49:06,790 --> 00:49:05,520

because the computers inside are

1467

00:49:08,790 --> 00:49:06,800

controlling

1468

00:49:10,790 --> 00:49:08,800

uh the thermal control system as well as

1469

00:49:12,390 --> 00:49:10,800

the prop system and and the other

1470

00:49:14,390 --> 00:49:12,400

avionics that are many of which is

1471

00:49:15,190 --> 00:49:14,400

outside the vehicle so that's what you'd

1472

00:49:16,549 --> 00:49:15,200

see

1473

00:49:18,549 --> 00:49:16,559

we don't have

1474

00:49:20,470 --> 00:49:18,559

seats so to speak but we do have mass

1475

00:49:21,430 --> 00:49:20,480

simulators inside that

1476

00:49:23,030 --> 00:49:21,440

that

1477

00:49:25,829 --> 00:49:23,040

make the vehicle

1478

00:49:27,349 --> 00:49:25,839

feel like it had a seat there you'd also

1479

00:49:28,549 --> 00:49:27,359

see a mass simulator for the displays

1480

00:49:30,470 --> 00:49:28,559

and control panel because we're trying

1481

00:49:32,069 --> 00:49:30,480

to make sure that the strut we know how

1482

00:49:33,190 --> 00:49:32,079

the structure reacted to that mass

1483

00:49:35,270 --> 00:49:33,200

because it kind of hangs off the

1484

00:49:37,030 --> 00:49:35,280

structure so you see a mass simulator

1485

00:49:39,270 --> 00:49:37,040

for that so that's that's the way it

1486

00:49:40,870 --> 00:49:39,280

would look inside

1487

00:49:43,270 --> 00:49:40,880

okay

1488

00:49:44,710 --> 00:49:43,280

eureka rush the voice of america russian

1489

00:49:47,750 --> 00:49:44,720

service

1490

00:49:49,589 --> 00:49:47,760

uh i have sort of contingency question

1491

00:49:52,150 --> 00:49:49,599

what if things

1492

00:49:53,990 --> 00:49:52,160

don't go with the sls exactly as

1493

00:49:56,950 --> 00:49:54,000

expected what if there are some

1494

00:49:59,430 --> 00:49:56,960

technical or budgetary issues

1495

00:50:02,710 --> 00:49:59,440

resulting in the serious program delay

1496

00:50:05,990 --> 00:50:02,720

will you be able to modify orion so that

1497

00:50:07,109 --> 00:50:06,000

it could fly as sort of autonomous space

1498

00:50:08,630 --> 00:50:07,119

station

1499

00:50:10,950 --> 00:50:08,640

at least for a while

1500

00:50:12,549 --> 00:50:10,960

and continue being launched by delta iv

1501

00:50:15,190 --> 00:50:12,559

thank you

1502

00:50:18,710 --> 00:50:15,200

yeah our plan is sls we need sls to do

1503

00:50:20,549 --> 00:50:18,720

these these uh long range missions so we

1504

00:50:22,230 --> 00:50:20,559

don't have any contingencies to use

1505

00:50:23,829 --> 00:50:22,240

another rocket delta four is great for

1506

00:50:26,950 --> 00:50:23,839

this flight but it won't do the other

1507

00:50:28,710 --> 00:50:26,960

missions that we need

1508

00:50:30,470 --> 00:50:28,720

of course they burped with diversity and

1509

00:50:31,910 --> 00:50:30,480

steam once again and i know you

1510

00:50:33,109 --> 00:50:31,920

mentioned some of the manufacturing

1511

00:50:35,670 --> 00:50:33,119

processes

1512

00:50:36,710 --> 00:50:35,680

and um the heat shield already but

1513

00:50:38,710 --> 00:50:36,720

they're uh

1514

00:50:40,950 --> 00:50:38,720

whether it be any other

1515

00:50:44,150 --> 00:50:40,960

areas of um

1516

00:50:45,750 --> 00:50:44,160

of em1 that that you'll be

1517

00:50:48,069 --> 00:50:45,760

just kind of hanging back and waiting

1518

00:50:49,109 --> 00:50:48,079

for the ft-1 data before you went ahead

1519

00:50:50,470 --> 00:50:49,119

with

1520

00:50:53,349 --> 00:50:50,480

the the major

1521

00:50:54,950 --> 00:50:53,359

systems that aren't flying are not as

1522

00:50:56,630 --> 00:50:54,960

much because we're waiting on design

1523

00:50:58,470 --> 00:50:56,640

data as it is

1524

00:50:59,750 --> 00:50:58,480

we just phase those later in the program

1525

00:51:01,750 --> 00:50:59,760

for development because they're more

1526

00:51:04,069 --> 00:51:01,760

associated with the human flight

1527

00:51:06,390 --> 00:51:04,079

so things like the displays and controls

1528

00:51:07,829 --> 00:51:06,400

and some of the habitation equipment

1529

00:51:10,710 --> 00:51:07,839

isn't flying on this flight but that

1530

00:51:13,190 --> 00:51:10,720

strictly has been a budget phasing

1531

00:51:14,470 --> 00:51:13,200

discussion uh between us and nasa in

1532

00:51:18,230 --> 00:51:14,480

terms of

1533

00:51:23,349 --> 00:51:21,990

okay any other questions here

1534

00:51:25,190 --> 00:51:23,359

all right then i think that will wrap up

1535

00:51:26,870 --> 00:51:25,200

our briefing for today but of course as

1536

00:51:29,589 --> 00:51:26,880

usual you want to stay tuned to nasa tv

1537

00:51:33,109 --> 00:51:29,599

we've got a a big day coming up tomorrow

1538

00:51:34,790 --> 00:51:33,119

for I minus one uh starting at six a.m

1539

00:51:37,190 --> 00:51:34,800

eastern time with interviews with nasa

1540

00:51:38,390 --> 00:51:37,200

administrator charlie bolden at 10 a.m

1541

00:51:40,230 --> 00:51:38,400

we'll have our regular space station

1542

00:51:42,470 --> 00:51:40,240

live programming and that'll be followed

1543

00:51:44,150 --> 00:51:42,480

by another briefing at 11 a.m a

1544

00:51:46,150 --> 00:51:44,160

pre-launch briefing to go over the final

1545

00:51:48,150 --> 00:51:46,160

details and then we'll wrap it up at 1

1546

00:51:49,430 --> 00:51:48,160

pm with the nasa social so stay tuned

1547

00:51:52,309 --> 00:51:49,440

and then in the meantime you can also