1
00:00:06,389 --> 00:00:04,309
welcome to the pre-launch press

2
00:00:08,950 --> 00:00:06,399
conference for nasa's lunar atmosphere

3
00:00:10,470 --> 00:00:08,960
and dust environment explorer or aladdi

4
00:00:12,470 --> 00:00:10,480
i'm keith kohler news chief here at

5
00:00:14,789 --> 00:00:12,480
nasa's wallace flight facility on

6
00:00:17,430 --> 00:00:14,799
virginia's eastern shore lady is

7
00:00:20,310 --> 00:00:17,440
scheduled to launch at 11 27 pm eastern

8
00:00:22,470 --> 00:00:20,320
time tomorrow night september 6 on a u.s

9
00:00:25,589 --> 00:00:22,480
air force minotaur 5 rocket from the

10
00:00:27,269 --> 00:00:25,599
mid-atlantic regional spaceport's pad 0b

11
00:00:29,910 --> 00:00:27,279
i would like to introduce today's panel

12
00:00:31,669 --> 00:00:29,920
members first we have john grinsfeld

13
00:00:33,590 --> 00:00:31,679

associate administrator for the science

14
00:00:35,750 --> 00:00:33,600
mission directorate at nasa headquarters

15
00:00:38,869 --> 00:00:35,760
in washington d.c

16
00:00:43,030 --> 00:00:38,879
next is pete warden center director ames

17
00:00:45,430 --> 00:00:43,040
research center moffett field california

18
00:00:48,310 --> 00:00:45,440
bill robel facility director here at

19
00:00:51,189 --> 00:00:48,320
nasa wallace flight facility

20
00:00:53,590 --> 00:00:51,199
butler hein lady project manager ames

21
00:00:55,990 --> 00:00:53,600
research center

22
00:00:58,150 --> 00:00:56,000
and sarah daugherty test director here

23
00:00:59,670 --> 00:00:58,160
at wallops

24
00:01:01,189 --> 00:00:59,680
we'll have each of our panel members say

25
00:01:03,349 --> 00:01:01,199
a few words and then we will take

26
00:01:05,270 --> 00:01:03,359
questions here in the auditorium and

27
00:01:07,190 --> 00:01:05,280
also from those calling in if you'd like

28
00:01:08,149 --> 00:01:07,200
to join in the conversation via social

29
00:01:10,550 --> 00:01:08,159
media

30
00:01:12,390 --> 00:01:10,560
you can send your questions to

31
00:01:14,149 --> 00:01:12,400
ask nasa

32
00:01:15,830 --> 00:01:14,159
john if you would like to begin

33
00:01:18,870 --> 00:01:15,840
sure well first of all i'm thrilled to

34
00:01:20,870 --> 00:01:18,880
be here uh at wallops the home of

35
00:01:23,190 --> 00:01:20,880
our research aircraft scientific

36
00:01:25,670 --> 00:01:23,200
ballooning and suborbital rockets but in

37
00:01:28,070 --> 00:01:25,680
particular here for the latte

38
00:01:29,670 --> 00:01:28,080

launch uh to help unravel the mysteries

39
00:01:32,230 --> 00:01:29,680
of the universe which is our science

40
00:01:34,069 --> 00:01:32,240
mission on its mission to the moon

41
00:01:35,830 --> 00:01:34,079
this is a mission uh that i'm really

42
00:01:37,910 --> 00:01:35,840
excited about uh you may have heard me

43
00:01:39,350 --> 00:01:37,920
say previously i love this mission

44
00:01:40,870 --> 00:01:39,360
because there's so many great things

45
00:01:43,670 --> 00:01:40,880
about it

46
00:01:46,389 --> 00:01:43,680
we've studied the moon extensively

47
00:01:48,310 --> 00:01:46,399
since the apollo astronauts last left

48
00:01:49,190 --> 00:01:48,320
over 40 years ago

49
00:01:50,950 --> 00:01:49,200
and

50
00:01:53,749 --> 00:01:50,960
when we left the moon we thought of it

51
00:01:56,230 --> 00:01:53,759
as a as a you know atmosphere-less you

52
00:01:58,709 --> 00:01:56,240
know ancient you know surface and since

53
00:02:00,550 --> 00:01:58,719
then uh with our lunar reconnaissance

54
00:02:02,310 --> 00:02:00,560
orbiter with the grail spacecraft with l

55
00:02:03,910 --> 00:02:02,320
cross uh

56
00:02:05,590 --> 00:02:03,920
you know we've discovered that the moon

57
00:02:07,749 --> 00:02:05,600
in a sense scientifically is still very

58
00:02:10,389 --> 00:02:07,759
much alive it's still evolving

59
00:02:12,630 --> 00:02:10,399
and in fact has a kind of atmosphere an

60
00:02:14,070 --> 00:02:12,640
exosphere and we'll hear more about that

61
00:02:17,110 --> 00:02:14,080
as we go down

62
00:02:19,910 --> 00:02:17,120
and the lady mission is going to give us

63
00:02:21,910 --> 00:02:19,920

you know whole new vistas on our nearest

64
00:02:23,990 --> 00:02:21,920
neighbor and i'm very excited about that

65
00:02:26,550 --> 00:02:24,000
we've studied obviously the surface with

66
00:02:27,830 --> 00:02:26,560
astronauts the interior with grail

67
00:02:29,350 --> 00:02:27,840
extensively

68
00:02:31,869 --> 00:02:29,360
photographed the surface with the lunar

69
00:02:33,430 --> 00:02:31,879
reconnaissance orbiter so now we get the

70
00:02:34,949 --> 00:02:33,440
exophisphere

71
00:02:36,869 --> 00:02:34,959
atmosphere

72
00:02:39,430 --> 00:02:36,879
and uh and this is an exciting launch

73
00:02:42,229 --> 00:02:39,440
for the for the wallops facility as well

74
00:02:45,110 --> 00:02:42,239
and extremely uh exciting for the ames

75
00:02:47,110 --> 00:02:45,120
research center uh which uh dr warden

76
00:02:49,430 --> 00:02:47,120
will talk a little more about as the

77
00:02:51,509 --> 00:02:49,440
first large you know complex spacecraft

78
00:02:53,509 --> 00:02:51,519
but more importantly to me is that it

79
00:02:54,869 --> 00:02:53,519
was designed as a modular spacecraft and

80
00:02:56,869 --> 00:02:54,879
i think pete will probably say something

81
00:02:58,790 --> 00:02:56,879
about that as many of you know i'm a big

82
00:03:00,149 --> 00:02:58,800
advocate for modular

83
00:03:01,670 --> 00:03:00,159
spacecraft

84
00:03:03,270 --> 00:03:01,680
i worked a little bit on one called the

85
00:03:05,030 --> 00:03:03,280
hubble space telescope which was

86
00:03:06,630 --> 00:03:05,040
designed to be modular although a

87
00:03:07,430 --> 00:03:06,640
one-off

88
00:03:11,430 --> 00:03:07,440

for

89
00:03:16,949 --> 00:03:11,440
the

90
00:03:18,949 --> 00:03:16,959
nervous i can say one thing for certain

91
00:03:20,949 --> 00:03:18,959
about the latte spacecraft which is you

92
00:03:23,750 --> 00:03:20,959
know at the tip of the spear

93
00:03:26,070 --> 00:03:23,760
on the rocket ready to go glad he's not

94
00:03:28,149 --> 00:03:26,080
nervous at all

95
00:03:29,830 --> 00:03:28,159
it's a spacecraft but i know there are

96
00:03:31,430 --> 00:03:29,840
many nervous people here and very

97
00:03:33,910 --> 00:03:31,440
excited and tomorrow night's going to be

98
00:03:36,229 --> 00:03:33,920
a great night for for science

99
00:03:37,350 --> 00:03:36,239
and and for the the team members i just

100
00:03:39,509 --> 00:03:37,360
want to uh

101
00:03:41,910 --> 00:03:39,519
identify a few folks in the audience our

102
00:03:43,830 --> 00:03:41,920
program executive joan salute

103
00:03:45,830 --> 00:03:43,840
sarah noble our program scientist and

104
00:03:47,750 --> 00:03:45,840
jim green our division director for

105
00:03:49,589 --> 00:03:47,760
planetary science they're probably

106
00:03:51,750 --> 00:03:49,599
nervous so with that i'd like to hand it

107
00:03:53,270 --> 00:03:51,760
over to dr warden

108
00:03:54,470 --> 00:03:53,280
thank you john

109
00:03:56,789 --> 00:03:54,480
well uh

110
00:03:57,830 --> 00:03:56,799
not being a spacecraft i'm nervous

111
00:04:00,149 --> 00:03:57,840
uh

112
00:04:02,949 --> 00:04:00,159
particularly so as this has been a you

113
00:04:05,350 --> 00:04:02,959

know exciting path to hear this as john

114
00:04:07,110 --> 00:04:05,360
mentioned is the first spacecraft

115
00:04:08,949 --> 00:04:07,120
designed developed

116
00:04:10,470 --> 00:04:08,959
built integrated and tested at nasa's

117
00:04:13,110 --> 00:04:10,480
ames research center

118
00:04:14,710 --> 00:04:13,120
we're one of ten centers at nasa

119
00:04:16,150 --> 00:04:14,720
we started out as an aeronautics center

120
00:04:17,670 --> 00:04:16,160
so it's just been the last few years

121
00:04:19,590 --> 00:04:17,680
we've gotten into

122
00:04:22,230 --> 00:04:19,600
space efforts but this is our third

123
00:04:25,110 --> 00:04:22,240
lunar mission so the moon is our friend

124
00:04:26,629 --> 00:04:25,120
uh but i also want to thank uh the team

125
00:04:27,670 --> 00:04:26,639
across nasa that helped make this

126
00:04:29,909 --> 00:04:27,680
possible

127
00:04:32,070 --> 00:04:29,919
the lunarquest program we report to at

128
00:04:33,030 --> 00:04:32,080
marshall space flight center uh our

129
00:04:36,629 --> 00:04:33,040
partner

130
00:04:39,270 --> 00:04:36,639
been the goddard space flight center and

131
00:04:41,030 --> 00:04:39,280
the wallops flight facility uh that

132
00:04:42,790 --> 00:04:41,040
we've worked close together on and i i

133
00:04:44,390 --> 00:04:42,800
want to say this is the second

134
00:04:46,710 --> 00:04:44,400
uh lunar mission that we've done with

135
00:04:48,629 --> 00:04:46,720
goddard so uh we hope this team is a

136
00:04:49,830 --> 00:04:48,639
good one uh and we're looking to john

137
00:04:51,350 --> 00:04:49,840
maybe we'll get some more missions

138
00:04:54,550 --> 00:04:51,360

jointly with with god we're pretty

139
00:04:56,950 --> 00:04:54,560
excited about it uh as mentioned this is

140
00:04:58,469 --> 00:04:56,960
a modular spacecraft

141
00:05:00,070 --> 00:04:58,479
butler will probably tell you a lot more

142
00:05:02,950 --> 00:05:00,080
detail about it

143
00:05:05,270 --> 00:05:02,960
but it is really designed to try to

144
00:05:07,510 --> 00:05:05,280
lower the cost and speed up the ability

145
00:05:09,670 --> 00:05:07,520
to put together spacecraft

146
00:05:12,629 --> 00:05:09,680
in the past we've tried to build modular

147
00:05:14,710 --> 00:05:12,639
buses this is the the spacecraft uh

148
00:05:17,110 --> 00:05:14,720
component that that supports the the

149
00:05:19,670 --> 00:05:17,120
mission uh but the trouble is one size

150
00:05:21,830 --> 00:05:19,680
never fits all so the idea that we came

151
00:05:24,790 --> 00:05:21,840
up with at ames uh

152
00:05:26,310 --> 00:05:24,800
about uh six years ago was why not build

153
00:05:27,749 --> 00:05:26,320
it kind of like your desktop computer

154
00:05:29,590 --> 00:05:27,759
where you've got

155
00:05:31,270 --> 00:05:29,600
slices that you can put together if you

156
00:05:32,870 --> 00:05:31,280
need more memory you put a bigger slice

157
00:05:34,390 --> 00:05:32,880
there if you need more propulsion you

158
00:05:36,790 --> 00:05:34,400
put a bigger slice if you need more

159
00:05:38,390 --> 00:05:36,800
science you put a bigger slice we think

160
00:05:41,110 --> 00:05:38,400
this will give us

161
00:05:43,110 --> 00:05:41,120
the capability to do a number of

162
00:05:45,029 --> 00:05:43,120
low-cost uh

163
00:05:47,510 --> 00:05:45,039

rapidly uh

164
00:05:49,110 --> 00:05:47,520
producible space missions so we're very

165
00:05:51,029 --> 00:05:49,120
very excited about it and we're looking

166
00:05:52,710 --> 00:05:51,039
forward to a great mission uh just the

167
00:05:54,550 --> 00:05:52,720
final message of course

168
00:05:55,749 --> 00:05:54,560
is as nasa says with anything going on a

169
00:05:58,309 --> 00:05:55,759
long journey

170
00:06:00,390 --> 00:05:58,319
uh god speed so godspeed laddie thank

171
00:06:01,749 --> 00:06:00,400
you

172
00:06:03,990 --> 00:06:01,759
thanks pete

173
00:06:05,670 --> 00:06:04,000
uh well so as most of you probably have

174
00:06:07,430 --> 00:06:05,680
noticed it's pretty exciting and very

175
00:06:09,909 --> 00:06:07,440
busy time uh here at wells flight

176
00:06:11,270 --> 00:06:09,919
facility you hear the aircraft overhead

177
00:06:13,590 --> 00:06:11,280
so there's a lot going on on the

178
00:06:16,629 --> 00:06:13,600
aircraft side of things we've got two

179
00:06:18,950 --> 00:06:16,639
global hawks here that nasa owns and

180
00:06:21,189 --> 00:06:18,960
operates that are flying the hurricane

181
00:06:23,110 --> 00:06:21,199
severe storm sentinel mission

182
00:06:24,870 --> 00:06:23,120
we've got a c-130 that we're preparing

183
00:06:25,990 --> 00:06:24,880
to go to greenland for a mission up

184
00:06:28,390 --> 00:06:26,000
there

185
00:06:30,629 --> 00:06:28,400
we've got our scientific balloon field

186
00:06:32,710 --> 00:06:30,639
out in new mexico preparing for comet

187
00:06:35,590 --> 00:06:32,720
ison mission coming up

188
00:06:37,189 --> 00:06:35,600

and then antares in less than two weeks

189
00:06:38,870 --> 00:06:37,199
so hopefully we'll see a number of you

190
00:06:40,070 --> 00:06:38,880
back here for that

191
00:06:42,070 --> 00:06:40,080
and obviously the reason we're here

192
00:06:44,629 --> 00:06:42,080
today is for lady

193
00:06:46,790 --> 00:06:44,639
a lot a lot going on final preparations

194
00:06:49,270 --> 00:06:46,800
uh nearly complete

195
00:06:51,350 --> 00:06:49,280
you know after the 3 000 mile trip from

196
00:06:53,029 --> 00:06:51,360
from ames here to wallops uh they

197
00:06:54,070 --> 00:06:53,039
arrived kind of in the early june time

198
00:06:55,749 --> 00:06:54,080
frame

199
00:06:58,230 --> 00:06:55,759
there's been uh you know a number of

200
00:07:00,469 --> 00:06:58,240
tests that that have been performed

201
00:07:02,710 --> 00:07:00,479
and uh our job working with ames has

202
00:07:06,070 --> 00:07:02,720
been to try to get it ready for the the

203
00:07:08,629 --> 00:07:06,080
next 250 or so thousand miles uh that

204
00:07:10,390 --> 00:07:08,639
that next big step and so we're all kind

205
00:07:11,589 --> 00:07:10,400
of looking forward to that

206
00:07:13,510 --> 00:07:11,599
um

207
00:07:14,950 --> 00:07:13,520
since arriving uh obviously the

208
00:07:16,469 --> 00:07:14,960
spacecraft has

209
00:07:18,950 --> 00:07:16,479
done a number of tests

210
00:07:22,070 --> 00:07:18,960
we've gotten the propellant loaded at

211
00:07:23,270 --> 00:07:22,080
our v-55 facility down on the island

212
00:07:24,469 --> 00:07:23,280
and then it underwent some spin

213
00:07:26,950 --> 00:07:24,479

balancing

214
00:07:29,350 --> 00:07:26,960
to get it ready it's uh

215
00:07:31,270 --> 00:07:29,360
basically then the vehicle was

216
00:07:32,230 --> 00:07:31,280
assembled by orbital sciences in the air

217
00:07:34,150 --> 00:07:32,240
force

218
00:07:35,990 --> 00:07:34,160
uh the payload was stacked i think about

219
00:07:37,670 --> 00:07:36,000
the 24th of august

220
00:07:38,790 --> 00:07:37,680
and it's been sitting there since and i

221
00:07:40,870 --> 00:07:38,800
echo

222
00:07:42,950 --> 00:07:40,880
beats i'm nervous too

223
00:07:45,189 --> 00:07:42,960
like a lot of us are it's kind of goes

224
00:07:47,350 --> 00:07:45,199
with the industry

225
00:07:49,909 --> 00:07:47,360
and i did want to at least

226
00:07:51,350 --> 00:07:49,919
show you one slide so if i could have

227
00:07:53,270 --> 00:07:51,360
the one slide on the launch vehicle

228
00:07:54,869 --> 00:07:53,280
please

229
00:07:56,950 --> 00:07:54,879
and this one was

230
00:08:00,309 --> 00:07:56,960
taken yesterday

231
00:08:05,589 --> 00:08:03,909
minotaur 5 vehicle on the pad

232
00:08:07,510 --> 00:08:05,599
buttoned up ready to go i did see some

233
00:08:09,029 --> 00:08:07,520
technicians out there working on some

234
00:08:11,189 --> 00:08:09,039
closeout items

235
00:08:12,950 --> 00:08:11,199
here a little while ago on the closed

236
00:08:14,869 --> 00:08:12,960
circuit television

237
00:08:16,550 --> 00:08:14,879
and a little bit about the minotaur 5

238
00:08:18,390 --> 00:08:16,560

it's uh you know basically a

239
00:08:19,510 --> 00:08:18,400
decommissioned peacekeeper missile that

240
00:08:22,390 --> 00:08:19,520
has been

241
00:08:24,629 --> 00:08:22,400
re recommissioned for for doing small

242
00:08:28,230 --> 00:08:24,639
payloads and to orbit or obviously in

243
00:08:30,390 --> 00:08:28,240
this case to the moon for laddie

244
00:08:32,389 --> 00:08:30,400
yesterday we completed our range

245
00:08:33,990 --> 00:08:32,399
readiness review and i'm still happy to

246
00:08:37,110 --> 00:08:34,000
report that we're not tracking any major

247
00:08:39,110 --> 00:08:37,120
items so i think that that's good news

248
00:08:41,909 --> 00:08:39,120
it's been a real pleasure

249
00:08:43,430 --> 00:08:41,919
for us to kind of work across the agency

250
00:08:45,430 --> 00:08:43,440
with ames

251
00:08:47,990 --> 00:08:45,440
goddard space flight center that we're

252
00:08:50,310 --> 00:08:48,000
obviously a part of

253
00:08:52,389 --> 00:08:50,320
the kennedy space center folks at launch

254
00:08:53,670 --> 00:08:52,399
services program and obviously

255
00:08:54,550 --> 00:08:53,680
headquarters

256
00:08:57,829 --> 00:08:54,560
here

257
00:08:59,590 --> 00:08:57,839
the teams are working great together

258
00:09:01,750 --> 00:08:59,600
it's also been

259
00:09:04,389 --> 00:09:01,760
our pleasure to collaborate again

260
00:09:06,310 --> 00:09:04,399
with the mid-atlantic regional spaceport

261
00:09:08,870 --> 00:09:06,320
the u.s air force on the on the launch

262
00:09:10,630 --> 00:09:08,880
vehicle orbital sciences and i'd be

263
00:09:13,190 --> 00:09:10,640

remiss if i didn't introduce louis

264
00:09:17,750 --> 00:09:13,200
amorosi with orbital sciences and

265
00:09:18,790 --> 00:09:17,760
colonel gillespie in the back with smc

266
00:09:21,269 --> 00:09:18,800
also

267
00:09:23,269 --> 00:09:21,279
teams are again working great

268
00:09:25,590 --> 00:09:23,279
and i'm confident we're going to have a

269
00:09:27,590 --> 00:09:25,600
good showing here tomorrow evening and

270
00:09:30,150 --> 00:09:27,600
so if you as you've heard ladies and ge

271
00:09:31,430 --> 00:09:30,160
got a number of firsts for us it's the

272
00:09:33,350 --> 00:09:31,440
first mission

273
00:09:35,110 --> 00:09:33,360
uh this lunar out of the wall flight

274
00:09:36,949 --> 00:09:35,120
facility and i don't know whose idea it

275
00:09:39,110 --> 00:09:36,959
was to come up with the uh the moon pies

276
00:09:40,790 --> 00:09:39,120
but it was kind of neat and so uh for

277
00:09:42,870 --> 00:09:40,800
folks that have seen those or are

278
00:09:45,509 --> 00:09:42,880
participating that's pretty neat uh

279
00:09:48,470 --> 00:09:45,519
first minutes or five um so that's a

280
00:09:50,550 --> 00:09:48,480
that's also a big first and then uh as

281
00:09:53,350 --> 00:09:50,560
you'll hear more about uh first test of

282
00:09:55,509 --> 00:09:53,360
high uh data rate laser communications

283
00:09:58,150 --> 00:09:55,519
um and so with that uh i'd like to pass

284
00:10:00,470 --> 00:09:58,160
it over to butler hine and uh thank you

285
00:10:01,829 --> 00:10:00,480
all very much for for coming

286
00:10:05,269 --> 00:10:01,839
uh thanks bill

287
00:10:07,590 --> 00:10:05,279
so uh as as uh john and pete mentioned

288
00:10:10,150 --> 00:10:07,600

this is a modular spacecraft bus this

289
00:10:13,190 --> 00:10:10,160
actually was an idea

290
00:10:15,430 --> 00:10:13,200
that we had a while back about how to

291
00:10:17,590 --> 00:10:15,440
drive down the costs of developing

292
00:10:19,190 --> 00:10:17,600
spacecraft and if you bring up my first

293
00:10:21,590 --> 00:10:19,200
slide you can you can see the modules

294
00:10:23,509 --> 00:10:21,600
this is kind of a blow up view of the of

295
00:10:25,990 --> 00:10:23,519
the lady spacecraft you can see the

296
00:10:27,509 --> 00:10:26,000
modules uh separated

297
00:10:29,430 --> 00:10:27,519
there's a couple of key features of this

298
00:10:32,949 --> 00:10:29,440
spacecraft bus one is it doesn't have

299
00:10:35,590 --> 00:10:32,959
deployed wings for solar panels that's a

300
00:10:37,590 --> 00:10:35,600
very nice way to get a lot of power but

301
00:10:40,230 --> 00:10:37,600
it makes your design fairly complicated

302
00:10:42,150 --> 00:10:40,240
and makes your uh your ability to keep

303
00:10:43,829 --> 00:10:42,160
the spacecraft safe you know more

304
00:10:45,350 --> 00:10:43,839
complicated so one of the things you'll

305
00:10:46,790 --> 00:10:45,360
notice in this is these modules when you

306
00:10:48,230 --> 00:10:46,800
put them together they have solar arrays

307
00:10:50,550 --> 00:10:48,240
all around the body of the spacecraft

308
00:10:52,470 --> 00:10:50,560
this means that it can it can face

309
00:10:54,550 --> 00:10:52,480
pretty much any orientation and generate

310
00:10:55,829 --> 00:10:54,560
power so that that means it's inherently

311
00:10:58,630 --> 00:10:55,839
safe

312
00:11:00,389 --> 00:10:58,640
the other thing is you'll notice that

313
00:11:03,190 --> 00:11:00,399

we've clustered things together in

314
00:11:05,590 --> 00:11:03,200
different ways the top module has all of

315
00:11:07,269 --> 00:11:05,600
the active electronics in it uh that

316
00:11:09,030 --> 00:11:07,279
that are the brains of the spacecraft

317
00:11:11,110 --> 00:11:09,040
and the communications of the spacecraft

318
00:11:13,509 --> 00:11:11,120
so that top module can actually fly by

319
00:11:15,670 --> 00:11:13,519
itself in some designs

320
00:11:17,110 --> 00:11:15,680
when we're carrying science payloads uh

321
00:11:19,910 --> 00:11:17,120
obviously we have the payload module

322
00:11:21,430 --> 00:11:19,920
that's where the two main payloads are

323
00:11:24,630 --> 00:11:21,440
are positioned on either side for

324
00:11:26,389 --> 00:11:24,640
balance and then that that third module

325
00:11:27,990 --> 00:11:26,399
is stretchable it can be a single or a

326
00:11:29,269 --> 00:11:28,000
double this in latte's case it's a

327
00:11:31,190 --> 00:11:29,279
double height

328
00:11:32,870 --> 00:11:31,200
and it contains the propulsion system

329
00:11:34,710 --> 00:11:32,880
inside it you can adjust the propulsion

330
00:11:36,790 --> 00:11:34,720
system to the type of mission so this

331
00:11:38,310 --> 00:11:36,800
this modular bus was designed for a

332
00:11:41,910 --> 00:11:38,320
variety of missions

333
00:11:44,230 --> 00:11:41,920
which is is unusual at nasa normally you

334
00:11:45,670 --> 00:11:44,240
you say where you're going you say the

335
00:11:47,030 --> 00:11:45,680
science you're going to do the science

336
00:11:49,110 --> 00:11:47,040
defines the instruments you're going to

337
00:11:51,190 --> 00:11:49,120
carry and then that defines how you

338
00:11:52,710 --> 00:11:51,200

design the spacecraft bus

339
00:11:55,110 --> 00:11:52,720
in this case we designed a bus for

340
00:11:56,870 --> 00:11:55,120
multi-purpose so it can it can do lunar

341
00:11:58,949 --> 00:11:56,880
orbit missions lunar landing missions

342
00:12:00,470 --> 00:11:58,959
you can do asteroids rendezvous missions

343
00:12:02,389 --> 00:12:00,480
you can do lagrange missions a whole

344
00:12:05,110 --> 00:12:02,399
variety of missions that aren't too far

345
00:12:06,150 --> 00:12:05,120
away because it is solar powered

346
00:12:08,629 --> 00:12:06,160
and

347
00:12:11,350 --> 00:12:08,639
we're really excited that laddie uh the

348
00:12:13,350 --> 00:12:11,360
the first attempt uh to use this bus is

349
00:12:15,509 --> 00:12:13,360
going to be a around the moon in a in a

350
00:12:17,110 --> 00:12:15,519
low orbit around the moon we're carrying

351
00:12:18,470 --> 00:12:17,120
four instruments on board there's three

352
00:12:20,629 --> 00:12:18,480
science instruments there's a neutral

353
00:12:23,030 --> 00:12:20,639
mass spectrometer and an ultraviolet

354
00:12:24,870 --> 00:12:23,040
visible spectrometer uh and then there's

355
00:12:26,870 --> 00:12:24,880
an in-situ dust detector the neutral

356
00:12:28,710 --> 00:12:26,880
mass spectrometer is built by nasa

357
00:12:30,790 --> 00:12:28,720
goddard uh the ultraviolet visible

358
00:12:32,949 --> 00:12:30,800
spectrometer is built by nasa ames and

359
00:12:35,190 --> 00:12:32,959
then the lunar dust experiment the dust

360
00:12:36,069 --> 00:12:35,200
detector is built by university colorado

361
00:12:37,910 --> 00:12:36,079
lasp

362
00:12:40,470 --> 00:12:37,920
we're also carrying a fourth instrument

363
00:12:42,790 --> 00:12:40,480

that's a technology demonstration it's a

364
00:12:44,470 --> 00:12:42,800
laser communications demonstration uh

365
00:12:46,550 --> 00:12:44,480
this is a very important technology has

366
00:12:47,910 --> 00:12:46,560
a lot of promise in the future right now

367
00:12:49,829 --> 00:12:47,920
most of our missions are all of our

368
00:12:51,590 --> 00:12:49,839
mission to use radio frequency to

369
00:12:54,230 --> 00:12:51,600
communicate to the ground

370
00:12:56,790 --> 00:12:54,240
but optical communications can transmit

371
00:12:59,430 --> 00:12:56,800
a whole lot more information uh in this

372
00:13:01,509 --> 00:12:59,440
case it's around 622 megabits per second

373
00:13:03,990 --> 00:13:01,519
back from the moon so you think of it as

374
00:13:06,389 --> 00:13:04,000
a fiber optic line that forms the trunk

375
00:13:07,990 --> 00:13:06,399
lines around the us

376
00:13:09,750 --> 00:13:08,000
for internet traffic so that's what

377
00:13:11,269 --> 00:13:09,760
we're trying to demonstrate in this

378
00:13:13,670 --> 00:13:11,279
technology

379
00:13:15,750 --> 00:13:13,680
if you go to the next slide you can see

380
00:13:17,030 --> 00:13:15,760
what the ladder spacecraft looks

381
00:13:18,629 --> 00:13:17,040
it's it's

382
00:13:20,069 --> 00:13:18,639
in the fairing right now at the top of

383
00:13:21,910 --> 00:13:20,079
the nose cone of the rocket right now so

384
00:13:23,030 --> 00:13:21,920
you can't see it but this is what it

385
00:13:26,230 --> 00:13:23,040
looks like

386
00:13:28,949 --> 00:13:27,350
and uh

387
00:13:31,269 --> 00:13:28,959
although uh

388
00:13:32,790 --> 00:13:31,279

john says spacecraft don't worry

389
00:13:34,949 --> 00:13:32,800
the way we've set up the spacecraft it

390
00:13:36,949 --> 00:13:34,959
actually emails us it emails us i've

391
00:13:39,670 --> 00:13:36,959
just got an email from it a few minutes

392
00:13:41,430 --> 00:13:39,680
ago and it tells us how it's doing

393
00:13:43,189 --> 00:13:41,440
so think of it like you've sent your

394
00:13:44,389 --> 00:13:43,199
kids off to summer camp and they send

395
00:13:46,230 --> 00:13:44,399
you a letter saying they're doing great

396
00:13:47,509 --> 00:13:46,240
but you still worry about them so that's

397
00:13:49,030 --> 00:13:47,519
what the spacecraft's doing right now

398
00:13:50,389 --> 00:13:49,040
it's telling us it's doing great and

399
00:13:52,470 --> 00:13:50,399
we're the ones worrying about it on the

400
00:13:54,710 --> 00:13:52,480
ground

401
00:13:56,069 --> 00:13:54,720
so if you play the animation i can

402
00:13:57,189 --> 00:13:56,079
explain how we're going to get to the

403
00:14:00,310 --> 00:13:57,199
moon

404
00:14:02,069 --> 00:14:00,320
so when we launch out of out of wallops

405
00:14:04,150 --> 00:14:02,079
we don't go into earth orbit we go

406
00:14:07,750 --> 00:14:04,160
directly into a translunar injection

407
00:14:09,990 --> 00:14:07,760
orbit and we uh we do three uh two and a

408
00:14:11,670 --> 00:14:10,000
half or so eccentric orbits around the

409
00:14:13,910 --> 00:14:11,680
earth and every every orbit around the

410
00:14:15,990 --> 00:14:13,920
earth we boost our our uh distance

411
00:14:18,150 --> 00:14:16,000
higher and higher until finally on that

412
00:14:20,150 --> 00:14:18,160
that third pass we're up around where

413
00:14:22,069 --> 00:14:20,160

the moon is the moon sweeps around and

414
00:14:24,470 --> 00:14:22,079
and grabs us its gravity field grabs us

415
00:14:26,230 --> 00:14:24,480
whips us around behind it uh and then as

416
00:14:28,230 --> 00:14:26,240
soon as we come out from behind the moon

417
00:14:30,310 --> 00:14:28,240
we do a big burn with that main engine

418
00:14:32,230 --> 00:14:30,320
you see at the bottom that big burn is

419
00:14:35,110 --> 00:14:32,240
what captures us around the moon if we

420
00:14:36,949 --> 00:14:35,120
don't do that burn we sail off into the

421
00:14:38,790 --> 00:14:36,959
earth moon system and we don't capture

422
00:14:40,949 --> 00:14:38,800
around the moon so that's an important

423
00:14:44,470 --> 00:14:40,959
event for us once we capture around the

424
00:14:45,910 --> 00:14:44,480
moon we spend about uh 40 days in in

425
00:14:48,150 --> 00:14:45,920
what's called a commissioning orbit it's

426
00:14:50,069 --> 00:14:48,160
about 250 kilometers uh

427
00:14:51,750 --> 00:14:50,079
and it's it's high enough where we don't

428
00:14:53,430 --> 00:14:51,760
have to spend fuel to maintain it but

429
00:14:55,269 --> 00:14:53,440
that's where we check out the science

430
00:14:57,350 --> 00:14:55,279
instruments that's where the the laser

431
00:14:59,509 --> 00:14:57,360
com does its primary experiment once

432
00:15:02,069 --> 00:14:59,519
everything's done at that point we drop

433
00:15:05,269 --> 00:15:02,079
down in a very low orbit uh the the

434
00:15:07,350 --> 00:15:05,279
orbit varies from 20 to 60 kilometers

435
00:15:09,269 --> 00:15:07,360
above the lunar surface so it's very low

436
00:15:10,470 --> 00:15:09,279
lunar the the moon has a very lumpy

437
00:15:12,470 --> 00:15:10,480
gravity field so when you're flying that

438
00:15:14,389 --> 00:15:12,480

low you're burning fuel just to keep

439
00:15:16,389 --> 00:15:14,399
yourself from crashing into the moon and

440
00:15:17,829 --> 00:15:16,399
that's where we do our primary science

441
00:15:19,590 --> 00:15:17,839
at the end of the mission

442
00:15:21,430 --> 00:15:19,600
we don't try to boost back up we use

443
00:15:23,509 --> 00:15:21,440
every drop of fuel to do the science

444
00:15:25,829 --> 00:15:23,519
observations and then after about 100

445
00:15:27,829 --> 00:15:25,839
days we we terminate the mission by

446
00:15:29,030 --> 00:15:27,839
intentionally crashing into the lunar uh

447
00:15:31,430 --> 00:15:29,040
lunar surface

448
00:15:33,509 --> 00:15:31,440
so that's the that's the the mission in

449
00:15:34,550 --> 00:15:33,519
a nutshell and we're very excited about

450
00:15:36,710 --> 00:15:34,560
it uh

451
00:15:38,550 --> 00:15:36,720
the team's been working hard for for a

452
00:15:40,470 --> 00:15:38,560
number of years to prove out this uh

453
00:15:42,550 --> 00:15:40,480
this design and build this spacecraft

454
00:15:44,069 --> 00:15:42,560
and do this science and we're eager to

455
00:15:46,470 --> 00:15:44,079
give it a shot and the weather looks

456
00:15:48,389 --> 00:15:46,480
great speaking of that let

457
00:15:50,310 --> 00:15:48,399
sarah talk about range operations and

458
00:15:51,910 --> 00:15:50,320
some of the weather we're looking at

459
00:15:54,550 --> 00:15:51,920
thanks butler

460
00:15:56,310 --> 00:15:54,560
i'll go ahead and kick it off from where

461
00:15:58,230 --> 00:15:56,320
he kind of started and i'll bring it all

462
00:16:00,230 --> 00:15:58,240
the way back down to earth before we

463
00:16:04,069 --> 00:16:00,240

actually get to the moon so if you'll

464
00:16:07,189 --> 00:16:04,079
play uh my first animation here

465
00:16:09,509 --> 00:16:07,199
you can see uh imagine ourselves here

466
00:16:11,910 --> 00:16:09,519
tomorrow night

467
00:16:14,949 --> 00:16:11,920
sitting here at the pad we're on a

468
00:16:17,110 --> 00:16:14,959
minotaur 5 rocket the lady spacecraft is

469
00:16:19,590 --> 00:16:17,120
on top of it we're at the mid-atlantic

470
00:16:21,670 --> 00:16:19,600
regional spaceport pad 0b right here at

471
00:16:24,629 --> 00:16:21,680
nasa wallace flight facility

472
00:16:27,110 --> 00:16:24,639
so the the rocket takes off uh liftoff

473
00:16:29,189 --> 00:16:27,120
it travels uh vertically for just

474
00:16:31,189 --> 00:16:29,199
several seconds and then it pitches over

475
00:16:34,150 --> 00:16:31,199
and heads down range

476
00:16:37,110 --> 00:16:34,160
and you can see here that our wallops

477
00:16:39,189 --> 00:16:37,120
tracking antennas telemetry and radar

478
00:16:39,990 --> 00:16:39,199
picking up the vehicle track right off

479
00:16:42,069 --> 00:16:40,000
of

480
00:16:45,430 --> 00:16:42,079
the pad and then we also have some down

481
00:16:47,670 --> 00:16:45,440
range sites in coquina north carolina

482
00:16:51,430 --> 00:16:47,680
that also pick up track

483
00:16:53,910 --> 00:16:51,440
just a few seconds after liftoff

484
00:16:56,150 --> 00:16:53,920
here you're seeing the first stage event

485
00:16:58,710 --> 00:16:56,160
happen stage one separation and stage

486
00:17:00,790 --> 00:16:58,720
two start to burn

487
00:17:02,790 --> 00:17:00,800
in a few moments you'll see

488
00:17:06,309 --> 00:17:02,800

our bermuda

489
00:17:08,230 --> 00:17:06,319
ground station pick up the track as well

490
00:17:10,309 --> 00:17:08,240
the range team has spent a lot of time

491
00:17:12,309 --> 00:17:10,319
over the past several weeks testing all

492
00:17:14,150 --> 00:17:12,319
these systems here at wallops and

493
00:17:15,990 --> 00:17:14,160
bermuda and coquina

494
00:17:18,710 --> 00:17:16,000
getting ready for the launch so we've

495
00:17:21,189 --> 00:17:18,720
done system checkouts and practice

496
00:17:23,429 --> 00:17:21,199
countdowns and rehearsals to get those

497
00:17:26,230 --> 00:17:23,439
assets ready for launch so they're all

498
00:17:28,789 --> 00:17:26,240
tested and configured and ready

499
00:17:33,510 --> 00:17:28,799
to go tomorrow

500
00:17:37,270 --> 00:17:36,310
and we're progressing down range

501
00:17:39,909 --> 00:17:37,280
here

502
00:17:41,909 --> 00:17:39,919
out over the atlantic ocean

503
00:17:43,750 --> 00:17:41,919
so stage three

504
00:17:46,230 --> 00:17:43,760
burnout

505
00:17:48,630 --> 00:17:46,240
and now the tdrs which is the tracking

506
00:17:49,830 --> 00:17:48,640
and data relay satellite systems picked

507
00:17:51,430 --> 00:17:49,840
up link

508
00:17:53,029 --> 00:17:51,440
that system will help us communicate

509
00:17:56,950 --> 00:17:53,039
with the spacecraft once our

510
00:18:01,909 --> 00:17:56,960
ground-based systems can no longer see

511
00:18:07,029 --> 00:18:04,870
now the the final two stages here fourth

512
00:18:07,750 --> 00:18:07,039
stage and fifth stage

513
00:18:11,669 --> 00:18:07,760

will

514
00:18:16,150 --> 00:18:13,590
right now we're at an altitude of

515
00:18:17,830 --> 00:18:16,160
approximately 250 kilometers above

516
00:18:20,630 --> 00:18:17,840
earth's surface

517
00:18:22,710 --> 00:18:20,640
stage five spins up

518
00:18:25,830 --> 00:18:22,720
here let's get the spacecraft spinning

519
00:18:27,750 --> 00:18:25,840
for stabilization

520
00:18:30,070 --> 00:18:27,760
in the background you see we're now at

521
00:18:33,830 --> 00:18:30,080
the lego flight that's actually slightly

522
00:18:40,150 --> 00:18:37,029
and now stage five is burned out

523
00:18:43,430 --> 00:18:40,160
and we'll see the d spin happen here to

524
00:18:45,430 --> 00:18:43,440
slow the spacecraft down

525
00:18:47,430 --> 00:18:45,440
and the next event will be

526
00:18:49,110 --> 00:18:47,440
payload separation and then orbit

527
00:18:50,870 --> 00:18:49,120
insertion

528
00:18:51,990 --> 00:18:50,880
for us so

529
00:18:53,830 --> 00:18:52,000
and then

530
00:18:57,669 --> 00:18:53,840
where butler showed you his animation

531
00:18:59,909 --> 00:18:57,679
will head on to the moon from there

532
00:19:02,549 --> 00:18:59,919
just want to touch on the weather for

533
00:19:05,590 --> 00:19:02,559
tomorrow talking about launch operations

534
00:19:07,990 --> 00:19:05,600
so our launch weather officer has

535
00:19:11,350 --> 00:19:08,000
predicted a wonderful

536
00:19:14,310 --> 00:19:11,360
forecast for us at t-0

537
00:19:16,390 --> 00:19:14,320
looking like mostly clear skies

538
00:19:18,950 --> 00:19:16,400

visibility is going to be great there's

539
00:19:22,549 --> 00:19:18,960
a slight chance of clouds but

540
00:19:26,870 --> 00:19:22,559
overall is a 95 percent chance of a good

541
00:19:29,669 --> 00:19:26,880
launch weather at t-0 tomorrow evening

542
00:19:31,669 --> 00:19:29,679
so all systems are go and the weather is

543
00:19:35,190 --> 00:19:31,679
looking good so hopeful for a great

544
00:19:38,630 --> 00:19:37,110
okay thank you sarah we'll now take

545
00:19:41,029 --> 00:19:38,640
questions we'll start here first from

546
00:19:43,190 --> 00:19:41,039
the audience if you can raise your hand

547
00:19:44,630 --> 00:19:43,200
we will get a mic to you

548
00:19:46,710 --> 00:19:44,640
and if you could state your name

549
00:19:48,549 --> 00:19:46,720
affiliation and of course who on the

550
00:19:52,870 --> 00:19:48,559
panel you would like to answer your

551
00:19:57,190 --> 00:19:54,950
hey thanks keith uh stephen clark with

552
00:19:58,310 --> 00:19:57,200
space flight now a couple of questions

553
00:20:00,310 --> 00:19:58,320
um

554
00:20:01,750 --> 00:20:00,320
first of all could one of you go over uh

555
00:20:03,750 --> 00:20:01,760
what's going on at the launch pad right

556
00:20:05,270 --> 00:20:03,760
now uh some of the activities overnight

557
00:20:07,190 --> 00:20:05,280
and what'll be happening during the

558
00:20:08,710 --> 00:20:07,200
countdown tomorrow

559
00:20:11,110 --> 00:20:08,720
when it begins and some of the

560
00:20:12,870 --> 00:20:11,120
activities leading up to t-zero also for

561
00:20:15,669 --> 00:20:12,880
general warden a question about the

562
00:20:19,190 --> 00:20:17,750
are there any other missions out there

563
00:20:20,630 --> 00:20:19,200

that are planning to use this bus are

564
00:20:21,830 --> 00:20:20,640
they approved are they in the proposal

565
00:20:23,110 --> 00:20:21,840
process

566
00:20:25,510 --> 00:20:23,120
and

567
00:20:29,750 --> 00:20:25,520
what sort of destinations could this bus

568
00:20:34,710 --> 00:20:32,149
so out at the pad today

569
00:20:37,190 --> 00:20:34,720
they're doing final arming operations so

570
00:20:39,350 --> 00:20:37,200
uh there's a lot of explosive ordnance

571
00:20:41,590 --> 00:20:39,360
on both the rocket and on the spacecraft

572
00:20:43,990 --> 00:20:41,600
and uh and they're designed to enable

573
00:20:47,110 --> 00:20:44,000
certain functions uh or disable certain

574
00:20:49,270 --> 00:20:47,120
functions uh and uh and they're usually

575
00:20:51,270 --> 00:20:49,280
involved with the safety systems so what

576
00:20:53,510 --> 00:20:51,280
you what you do to handle the ordinance

577
00:20:55,750 --> 00:20:53,520
safely is you you put uh

578
00:20:57,590 --> 00:20:55,760
inhibits in there that prevent the

579
00:20:59,029 --> 00:20:57,600
ordnance from ever going off while

580
00:21:00,870 --> 00:20:59,039
you're working on the rocket or while

581
00:21:02,789 --> 00:21:00,880
you're working on the spacecraft but

582
00:21:05,110 --> 00:21:02,799
right before launch at l minus one day

583
00:21:06,870 --> 00:21:05,120
which is today uh you remove those

584
00:21:08,710 --> 00:21:06,880
inhibits and you actually arm the

585
00:21:10,870 --> 00:21:08,720
vehicle so uh that's what the teams have

586
00:21:12,950 --> 00:21:10,880
been doing today uh the spacecraft team

587
00:21:14,470 --> 00:21:12,960
has been arming the spacecraft uh

588
00:21:16,310 --> 00:21:14,480

ordinance and then the launch vehicle

589
00:21:18,470 --> 00:21:16,320
team from orbital has been arming the

590
00:21:20,549 --> 00:21:18,480
launch vehicle ordinance that's the main

591
00:21:22,549 --> 00:21:20,559
activity for today and it's a it's a

592
00:21:23,990 --> 00:21:22,559
touchy activity so you want to take your

593
00:21:26,310 --> 00:21:24,000
time do it right

594
00:21:28,789 --> 00:21:26,320
and then l minus zero tomorrow

595
00:21:31,990 --> 00:21:28,799
we really don't have any any

596
00:21:34,230 --> 00:21:32,000
key activities uh

597
00:21:35,510 --> 00:21:34,240
we're prepping things but it's not hands

598
00:21:37,669 --> 00:21:35,520
on the vehicle there's not a lot of

599
00:21:40,789 --> 00:21:37,679
hands on the vehicle at the at the day

600
00:21:48,470 --> 00:21:44,070
yeah i can answer the questions about uh

601
00:21:51,350 --> 00:21:48,480
future for the modular bus uh of course

602
00:21:52,630 --> 00:21:51,360
until this uh is proven which is

603
00:21:54,470 --> 00:21:52,640
hopefully tomorrow

604
00:21:56,070 --> 00:21:54,480
uh you know

605
00:21:57,110 --> 00:21:56,080
it's not likely we're gonna get you know

606
00:21:59,830 --> 00:21:57,120
that

607
00:22:02,070 --> 00:21:59,840
another mission assigned however uh we

608
00:22:03,990 --> 00:22:02,080
are in discussions with uh several

609
00:22:06,950 --> 00:22:04,000
offices at nasa headquarters uh the

610
00:22:09,110 --> 00:22:06,960
science uh mission directorate the the

611
00:22:11,510 --> 00:22:09,120
uh human exploration mission directorate

612
00:22:13,430 --> 00:22:11,520
and the technology mission directorate

613
00:22:17,750 --> 00:22:13,440

about potential future missions later

614
00:22:19,669 --> 00:22:17,760
this decade uh as butler noted this

615
00:22:20,950 --> 00:22:19,679
architecture is ideal for the inner

616
00:22:22,870 --> 00:22:20,960
solar system

617
00:22:24,549 --> 00:22:22,880
uh it

618
00:22:26,230 --> 00:22:24,559
as we look at potential asteroid

619
00:22:28,390 --> 00:22:26,240
missions as we look at more lunar

620
00:22:30,470 --> 00:22:28,400
missions as we look at mars missions and

621
00:22:32,789 --> 00:22:30,480
potentially to the moons of mars

622
00:22:35,270 --> 00:22:32,799
as well as science missions in earth

623
00:22:37,430 --> 00:22:35,280
orbit this is a very interesting concept

624
00:22:38,310 --> 00:22:37,440
i might also add that

625
00:22:42,630 --> 00:22:38,320
that

626
00:22:45,669 --> 00:22:42,640
know future emissions would not be

627
00:22:47,270 --> 00:22:45,679
constructed in-house uh that we would

628
00:22:49,270 --> 00:22:47,280
transition this technology to the

629
00:22:52,070 --> 00:22:49,280
private sector we've been in discussion

630
00:22:54,390 --> 00:22:52,080
with a number of different groups uh

631
00:22:57,590 --> 00:22:54,400
to to pick up this technology

632
00:22:59,750 --> 00:22:57,600
so we hope it'll uh it'll enable a new

633
00:23:01,190 --> 00:22:59,760
era of lower cost more flexible

634
00:23:03,830 --> 00:23:01,200
spacecraft

635
00:23:06,710 --> 00:23:03,840
uh and indeed several of the

636
00:23:08,149 --> 00:23:06,720
uh google lunar xprize teams have been

637
00:23:10,789 --> 00:23:08,159
discussed in discussion with us we have

638
00:23:13,990 --> 00:23:10,799

transitioned some of the data to them so

639
00:23:15,830 --> 00:23:14,000
i think you can look to see a lot of

640
00:23:18,870 --> 00:23:15,840
possibilities in the next decade for

641
00:23:21,350 --> 00:23:19,830
thank you

642
00:23:23,110 --> 00:23:21,360
before we go to our next question we do

643
00:23:24,789 --> 00:23:23,120
want to mention that this launch is

644
00:23:27,029 --> 00:23:24,799
going to be highly visible if we have

645
00:23:29,110 --> 00:23:27,039
clear skies up and down the east coast

646
00:23:31,110 --> 00:23:29,120
we expect that it will be visible from

647
00:23:33,190 --> 00:23:31,120
the carolinas all the way up into maine

648
00:23:35,190 --> 00:23:33,200
and also west to pittsburgh

649
00:23:38,710 --> 00:23:35,200
and west virginia if you go to the

650
00:23:40,710 --> 00:23:38,720
orbital website at www.orbital.com

651
00:23:42,070 --> 00:23:40,720
and then click on the mission update and

652
00:23:43,269 --> 00:23:42,080
the graphic that we have on the screen

653
00:23:45,269 --> 00:23:43,279
you'll see that

654
00:23:46,870 --> 00:23:45,279
plus they also have various graphics

655
00:23:48,470 --> 00:23:46,880
there cartoons that will show you what

656
00:23:50,310 --> 00:23:48,480
to be looking for so

657
00:23:52,630 --> 00:23:50,320
this is going to be a really great show

658
00:23:55,110 --> 00:23:52,640
for the for the entire east coast

659
00:23:57,190 --> 00:23:55,120
okay now we can go to our next question

660
00:24:00,390 --> 00:23:57,200
yes okay hi ken kramer for universe

661
00:24:02,710 --> 00:24:00,400
today uh two questions uh one um maybe

662
00:24:05,269 --> 00:24:02,720
john or bill you can answer this

663
00:24:07,190 --> 00:24:05,279

do you foresee any future for uh other

664
00:24:09,029 --> 00:24:07,200
science or planetary missions launching

665
00:24:11,350 --> 00:24:09,039
here from wallops

666
00:24:12,950 --> 00:24:11,360
and i also like to know um

667
00:24:14,870 --> 00:24:12,960
if someone could talk about a little bit

668
00:24:16,310 --> 00:24:14,880
more the conversion work done to convert

669
00:24:17,750 --> 00:24:16,320
the peacekeeper

670
00:24:19,510 --> 00:24:17,760
into uh

671
00:24:22,390 --> 00:24:19,520
into the minotaur five

672
00:24:25,590 --> 00:24:23,669
well i'll just

673
00:24:28,310 --> 00:24:25,600
once again say that you know we launch

674
00:24:30,950 --> 00:24:28,320
about 20 science missions a year from

675
00:24:33,269 --> 00:24:30,960
wallops um they're suborbital missions

676
00:24:36,070 --> 00:24:33,279
but they're still significant

677
00:24:37,909 --> 00:24:36,080
and when we launch the antares mission

678
00:24:39,750 --> 00:24:37,919
that commission will be carrying science

679
00:24:41,830 --> 00:24:39,760
up to the international space station

680
00:24:44,549 --> 00:24:41,840
and so that's an orbital mission

681
00:24:45,510 --> 00:24:44,559
i think you know this is a pathfinder

682
00:24:46,870 --> 00:24:45,520
you know when

683
00:24:48,870 --> 00:24:46,880
you know we don't i don't know if we

684
00:24:51,430 --> 00:24:48,880
have anything on the manifest

685
00:24:53,669 --> 00:24:51,440
uh at the moment but i'm sure

686
00:24:56,070 --> 00:24:53,679
you know wallops has a bright future

687
00:24:58,390 --> 00:24:56,080
so from my perspective i'd say i hope so

688
00:25:00,149 --> 00:24:58,400

um and so i mean we'd look forward to it

689
00:25:02,230 --> 00:25:00,159
i think with the with the capabilities

690
00:25:03,750 --> 00:25:02,240
that are put in here now um you know

691
00:25:04,950 --> 00:25:03,760
we've got something to show for it and

692
00:25:06,870 --> 00:25:04,960
especially if we have a good showing

693
00:25:07,750 --> 00:25:06,880
here tomorrow night

694
00:25:09,190 --> 00:25:07,760
um

695
00:25:10,870 --> 00:25:09,200
relative to your question on the launch

696
00:25:12,149 --> 00:25:10,880
vehicle i mean luke can correct me if i

697
00:25:15,029 --> 00:25:12,159
miss anything but

698
00:25:17,269 --> 00:25:15,039
it's it's basically the basic motor set

699
00:25:18,149 --> 00:25:17,279
from the peacekeeper stages one two and

700
00:25:20,310 --> 00:25:18,159
three

701
00:25:22,789 --> 00:25:20,320
uh four and five are are commercial

702
00:25:25,750 --> 00:25:22,799
assets that orbital uh has used a number

703
00:25:28,230 --> 00:25:25,760
of times or or are available elsewhere

704
00:25:30,310 --> 00:25:28,240
the electronics are all different than

705
00:25:31,669 --> 00:25:30,320
what the peacekeeper flies

706
00:25:33,350 --> 00:25:31,679
a lot of staging events and obviously

707
00:25:34,710 --> 00:25:33,360
the fairing would be a would be a big

708
00:25:35,830 --> 00:25:34,720
departure not i don't know if there's

709
00:25:36,630 --> 00:25:35,840
anything else you wanted to add there

710
00:25:40,950 --> 00:25:36,640
lou

711
00:25:47,669 --> 00:25:42,789
okay uh do we have another question here

712
00:25:56,070 --> 00:25:50,149
if not do we have any questions on the

713
00:26:00,390 --> 00:25:58,310

hi good morning sorry i'm constance i'm

714
00:26:02,070 --> 00:26:00,400
here with the nasa social group earlier

715
00:26:04,310 --> 00:26:02,080
this morning you guys told us about some

716
00:26:06,390 --> 00:26:04,320
of the various systems on the laddie uh

717
00:26:08,390 --> 00:26:06,400
specifically the star field navigation

718
00:26:10,789 --> 00:26:08,400
system would one of you please go a

719
00:26:12,549 --> 00:26:10,799
little more in depth as to how that is

720
00:26:14,470 --> 00:26:12,559
going to help laddie navigate itself

721
00:26:16,390 --> 00:26:14,480
around the lunar robert

722
00:26:17,669 --> 00:26:16,400
sure i can answer that

723
00:26:19,830 --> 00:26:17,679
what you're referring to are star

724
00:26:22,870 --> 00:26:19,840
trackers they're they're instruments

725
00:26:24,630 --> 00:26:22,880
that are basically specialized cameras

726
00:26:27,669 --> 00:26:24,640
and they are designed to look at the

727
00:26:28,870 --> 00:26:27,679
night sky when you're flying and uh

728
00:26:32,789 --> 00:26:28,880
precisely

729
00:26:35,269 --> 00:26:32,799
uh tell you what what orientation you

730
00:26:37,590 --> 00:26:35,279
are in space it's it's very similar to

731
00:26:39,510 --> 00:26:37,600
how ancient mariners used to navigate

732
00:26:41,510 --> 00:26:39,520
the oceans they would look at the stars

733
00:26:43,590 --> 00:26:41,520
and navigate by the stars

734
00:26:46,070 --> 00:26:43,600
so we do uh

735
00:26:48,149 --> 00:26:46,080
use star uh star trackers to basically

736
00:26:50,630 --> 00:26:48,159
determine the attitude of the spacecraft

737
00:26:52,230 --> 00:26:50,640
so it doesn't tell you uh where you are

738
00:26:53,669 --> 00:26:52,240

in space but it tells you what what

739
00:26:55,510 --> 00:26:53,679
rotation you are

740
00:26:57,510 --> 00:26:55,520
which is which is very important and

741
00:27:00,230 --> 00:26:57,520
then the the the where you are in space

742
00:27:01,510 --> 00:27:00,240
comes from radio ranging so we range

743
00:27:03,430 --> 00:27:01,520
radio signals

744
00:27:05,110 --> 00:27:03,440
from the spacecraft that tells precisely

745
00:27:07,110 --> 00:27:05,120
how far away it is

746
00:27:08,950 --> 00:27:07,120
but the attitude is done by star

747
00:27:12,710 --> 00:27:08,960
trackers mainly it's the most precise

748
00:27:20,630 --> 00:27:15,110
next question either social or media

749
00:27:25,669 --> 00:27:22,630
hello i'm teresa from the cape gazette

750
00:27:26,789 --> 00:27:25,679
blues delaware um i was wondering uh

751
00:27:29,269 --> 00:27:26,799
with the

752
00:27:31,430 --> 00:27:29,279
evolution of the commercial aspect of

753
00:27:33,510 --> 00:27:31,440
space flight how do you think that will

754
00:27:36,149 --> 00:27:33,520
affect especially this immediate area

755
00:27:38,230 --> 00:27:36,159
the peninsula can you give some thoughts

756
00:27:41,029 --> 00:27:38,240
about that

757
00:27:43,909 --> 00:27:41,039
uh i mean generally um it's it's it's

758
00:27:46,389 --> 00:27:43,919
been a big improvement since uh mars uh

759
00:27:48,470 --> 00:27:46,399
helped just what back in the 90s to

760
00:27:50,230 --> 00:27:48,480
basically set up the space port

761
00:27:52,549 --> 00:27:50,240
so that that kind of gave some basic

762
00:27:55,190 --> 00:27:52,559
infrastructure uh with what's gone on

763
00:27:57,190 --> 00:27:55,200

with antares uh more recently with the

764
00:28:00,630 --> 00:27:57,200
development of pad 0a

765
00:28:01,830 --> 00:28:00,640
also the investments made by

766
00:28:04,470 --> 00:28:01,840
the federal government the state

767
00:28:06,149 --> 00:28:04,480
governments and orbital sciences

768
00:28:08,070 --> 00:28:06,159
have all kind of contributed to try to

769
00:28:10,710 --> 00:28:08,080
stand up a you know pretty decent

770
00:28:12,149 --> 00:28:10,720
infrastructure here um so i you know i'd

771
00:28:13,590 --> 00:28:12,159
have to say it looks it looks pretty

772
00:28:14,870 --> 00:28:13,600
good providing you know the missions

773
00:28:16,710 --> 00:28:14,880
continue to come i mean the good thing

774
00:28:18,789 --> 00:28:16,720
right now was with space station

775
00:28:22,389 --> 00:28:18,799
resupply i'd say that the future looks

776
00:28:22,399 --> 00:28:29,269
okay next question

777
00:28:33,269 --> 00:28:31,750
okay see no further questions uh that

778
00:28:35,430 --> 00:28:33,279
concludes today's pre-launch news

779
00:28:37,430 --> 00:28:35,440
conference aladdin science briefing will

780
00:28:39,590 --> 00:28:37,440
begin at 4 pm also here in the

781
00:28:41,909 --> 00:28:39,600
auditorium on nasa tv

782
00:28:45,269 --> 00:28:41,919
live coverage of the launch will begin

783
00:28:47,190 --> 00:28:45,279
on nasa tv at 9 30 pm tomorrow night

784
00:28:49,990 --> 00:28:47,200
you can also follow the coverage on

785
00:28:51,029 --> 00:28:50,000
social media facebook twitter and the

786
00:28:52,789 --> 00:28:51,039
like

787
00:28:56,070 --> 00:28:52,799
finally you can get more information on