1
00:00:04,230 --> 00:00:03,350
engine ignition two

2
00:00:05,670 --> 00:00:04,240
one

3
00:00:08,390 --> 00:00:05,680
zero

4
00:00:10,790 --> 00:00:08,400
relate and liftoff

5
00:00:12,629 --> 00:00:10,800
as the countdown to mars continues the

6
00:00:14,789 --> 00:00:12,639
perseverance of humanity launching the

7
00:00:21,269 --> 00:00:14,799
next generation of robotic explorers to

8
00:00:25,910 --> 00:00:23,189
and we have good indication of srb

9
00:00:27,349 --> 00:00:25,920
jettison of all four srvs

10
00:00:29,349 --> 00:00:27,359
we have good indication of payload

11
00:00:31,269 --> 00:00:29,359
fairing

12
00:00:40,549 --> 00:00:31,279
and we have successful separation of

13
00:00:45,430 --> 00:00:43,590

and welcome to nasa's post-launch press

14
00:00:47,830 --> 00:00:45,440
conference here at the kennedy space

15
00:00:50,389 --> 00:00:47,840
center i'm darrell nail and as you just

16
00:00:52,869 --> 00:00:50,399
saw there was a successful launch of an

17
00:00:54,069 --> 00:00:52,879
atlas 5 rocket by united launch alliance

18
00:00:56,630 --> 00:00:54,079
and nasa

19
00:00:58,950 --> 00:00:56,640
sending the mars perseverance rover to

20
00:01:01,430 --> 00:00:58,960
the red planet we have some special

21
00:01:04,469 --> 00:01:01,440
guests here now to talk about the launch

22
00:01:05,750 --> 00:01:04,479
and i want to get to those right now

23
00:01:08,149 --> 00:01:05,760
to my left

24
00:01:09,750 --> 00:01:08,159
we begin with jim bridenstine the nasa

25
00:01:12,390 --> 00:01:09,760
administrator

26
00:01:15,749 --> 00:01:12,400
we also have thomas zurbukin

27
00:01:17,910 --> 00:01:15,759
nasa's science associate administrator

28
00:01:19,910 --> 00:01:17,920
lori glaze is here

29
00:01:23,590 --> 00:01:19,920
she is the planetary science division

30
00:01:26,070 --> 00:01:23,600
director at nasa headquarters

31
00:01:28,550 --> 00:01:26,080
and we have matt wallace deputy project

32
00:01:30,710 --> 00:01:28,560
manager with nasa's jet propulsion

33
00:01:33,670 --> 00:01:30,720
laboratory

34
00:01:37,590 --> 00:01:33,680
omar baez he is our launch director at

35
00:01:41,190 --> 00:01:37,600
nasa's launch services program

36
00:01:43,270 --> 00:01:41,200
and torrey bruno president and ceo of

37
00:01:45,670 --> 00:01:43,280
united launch alliance

38
00:01:47,350 --> 00:01:45,680

thank you all for being here

39
00:01:48,950 --> 00:01:47,360
we're going to get started with our

40
00:01:51,190 --> 00:01:48,960
administrator and a few comments of

41
00:01:53,109 --> 00:01:51,200
course it was an incredible launch here

42
00:01:55,109 --> 00:01:53,119
at the kennedy space center and a

43
00:01:57,590 --> 00:01:55,119
successful one at that sending the rover

44
00:01:59,510 --> 00:01:57,600
on its way we understand there is a

45
00:02:01,350 --> 00:01:59,520
small communication issue with the

46
00:02:03,350 --> 00:02:01,360
spacecraft and we're going to let jim

47
00:02:06,149 --> 00:02:03,360
start us off and talk about that jim oh

48
00:02:07,830 --> 00:02:06,159
you bet thank you darrell um so first of

49
00:02:09,029 --> 00:02:07,840
all it was an amazing launch very

50
00:02:11,270 --> 00:02:09,039
successful

51
00:02:13,750 --> 00:02:11,280
uh it went right on time

52
00:02:16,630 --> 00:02:13,760
and of course it uh it is it is on a

53
00:02:19,990 --> 00:02:16,640
trajectory that is um that has been done

54
00:02:23,430 --> 00:02:20,000
now with pinpoint accuracy uh the the

55
00:02:26,790 --> 00:02:23,440
the spacecraft rotates so it's stable

56
00:02:28,790 --> 00:02:26,800
and it is in fact on its way to mars

57
00:02:30,790 --> 00:02:28,800
you mentioned the communications issue

58
00:02:32,070 --> 00:02:30,800
and i you can we can call it an issue i

59
00:02:34,550 --> 00:02:32,080
know there's maybe some folks in the

60
00:02:36,229 --> 00:02:34,560
media that would call it an issue

61
00:02:38,470 --> 00:02:36,239
but really it's it's uh it's something

62
00:02:40,869 --> 00:02:38,480
that we've seen before um with other

63
00:02:43,110 --> 00:02:40,879

mars missions as a matter of fact and

64
00:02:45,190 --> 00:02:43,120
and and and what's happening is you know

65
00:02:47,670 --> 00:02:45,200
we're using the deep space network to

66
00:02:50,150 --> 00:02:47,680
receive the signals from uh from the

67
00:02:51,270 --> 00:02:50,160
spacecraft right now well the deep space

68
00:02:54,070 --> 00:02:51,280
network

69
00:02:56,309 --> 00:02:54,080
is a very sensitive receiver it's it's

70
00:02:59,110 --> 00:02:56,319
designed to capture

71
00:03:00,550 --> 00:02:59,120
you know uh very faint signals from deep

72
00:03:07,030 --> 00:03:00,560
space

73
00:03:08,949 --> 00:03:07,040
good distance from the earth

74
00:03:11,030 --> 00:03:08,959
but it is not the distance that we would

75
00:03:13,270 --> 00:03:11,040
normally be receiving from using the

76
00:03:15,509 --> 00:03:13,280
deep space network so what this what

77
00:03:18,550 --> 00:03:15,519
this does is it puts us in a position

78
00:03:21,509 --> 00:03:18,560
where um the the carrier wave is

79
00:03:23,910 --> 00:03:21,519
actually we have a strong carrier wave a

80
00:03:25,990 --> 00:03:23,920
strong signal um but we haven't been

81
00:03:28,309 --> 00:03:26,000
able to to lock onto the modulation of

82
00:03:29,670 --> 00:03:28,319
that signal to receive the data this is

83
00:03:33,270 --> 00:03:29,680
not unusual

84
00:03:35,670 --> 00:03:33,280
everything is going according to to plan

85
00:03:38,070 --> 00:03:35,680
we do need to um you know

86
00:03:40,229 --> 00:03:38,080
fine tune our receiving stations on the

87
00:03:42,710 --> 00:03:40,239
ground and do some things to to capture

88
00:03:44,390 --> 00:03:42,720

that signal and lock on

89
00:03:46,949 --> 00:03:44,400
but i think we're in great shape it was

90
00:03:48,630 --> 00:03:46,959
a great day for nasa and i just want to

91
00:03:50,789 --> 00:03:48,640
say thank you to our

92
00:03:53,190 --> 00:03:50,799
partners at united launch alliance tori

93
00:03:55,670 --> 00:03:53,200
bruno your team did an absolute

94
00:03:58,070 --> 00:03:55,680
magnificent job it couldn't have gone

95
00:04:00,789 --> 00:03:58,080
any better from a launch perspective and

96
00:04:02,710 --> 00:04:00,799
of course our our team at jpl

97
00:04:05,110 --> 00:04:02,720
which has worked so hard to put this

98
00:04:06,470 --> 00:04:05,120
mission together so the whole nasa team

99
00:04:08,550 --> 00:04:06,480
is grateful for

100
00:04:11,190 --> 00:04:08,560
uh the the people that made this made

101
00:04:12,949 --> 00:04:11,200
this come together so thank you daryl

102
00:04:14,470 --> 00:04:12,959
and look forward to

103
00:04:16,469 --> 00:04:14,480
hearing from the others and answering

104
00:04:18,949 --> 00:04:16,479
questions absolutely and thank you jim

105
00:04:21,189 --> 00:04:18,959
uh let's start with you dr z um

106
00:04:23,670 --> 00:04:21,199
successful launch there's still a lot to

107
00:04:25,430 --> 00:04:23,680
go what are your feelings now after uh

108
00:04:27,110 --> 00:04:25,440
experiencing this and uh seeing this

109
00:04:28,550 --> 00:04:27,120
science mission on its way

110
00:04:30,390 --> 00:04:28,560
i'm relieved

111
00:04:31,909 --> 00:04:30,400
it's a space mission now right it used

112
00:04:34,070 --> 00:04:31,919
to be an engineering project on the

113
00:04:35,749 --> 00:04:34,080

ground it's a space station space

114
00:04:37,350 --> 00:04:35,759
mission now and it's on the way to mars

115
00:04:38,550 --> 00:04:37,360
that's exactly what we hope we will be

116
00:04:39,670 --> 00:04:38,560
at right now

117
00:04:41,670 --> 00:04:39,680
and uh

118
00:04:43,830 --> 00:04:41,680
you uh you know the one thing that i

119
00:04:46,070 --> 00:04:43,840
want to do also is just add my gratitude

120
00:04:47,749 --> 00:04:46,080
you know launch services united launch

121
00:04:50,550 --> 00:04:47,759
alliance you know getting this done of

122
00:04:53,430 --> 00:04:50,560
course jbl uh you know and that many

123
00:04:55,590 --> 00:04:53,440
partners both international and domestic

124
00:04:57,350 --> 00:04:55,600
commercial partners that got us there

125
00:04:58,790 --> 00:04:57,360
and i just really want to thank i want

126
00:05:01,029 --> 00:04:58,800
to also tell you about something else

127
00:05:03,029 --> 00:05:01,039
i'm proud of and that is that this

128
00:05:04,550 --> 00:05:03,039
entire launch from the beginning with

129
00:05:05,590 --> 00:05:04,560
all the uncertainty that the launch

130
00:05:08,390 --> 00:05:05,600
brings

131
00:05:09,749 --> 00:05:08,400
through now we do so with

132
00:05:12,230 --> 00:05:09,759
cameras on

133
00:05:14,230 --> 00:05:12,240
and we communicate clearly and directly

134
00:05:15,909 --> 00:05:14,240
and openly we believe

135
00:05:18,150 --> 00:05:15,919
and i'm i know we

136
00:05:20,950 --> 00:05:18,160
feel exactly the same way jim is that

137
00:05:23,189 --> 00:05:20,960
inspiration comes from taking that risk

138
00:05:24,790 --> 00:05:23,199

and making it really clear and open what

139
00:05:27,029 --> 00:05:24,800
uh

140
00:05:29,350 --> 00:05:27,039
all the successes are and every once in

141
00:05:31,990 --> 00:05:29,360
a while you know where we need

142
00:05:33,909 --> 00:05:32,000
two attempts to get this down uh and uh

143
00:05:37,189 --> 00:05:33,919
you know on the green and down you know

144
00:05:39,749 --> 00:05:37,199
so so the point is um this is just a

145
00:05:42,550 --> 00:05:39,759
space mission i i look at uh 100 space

146
00:05:46,070 --> 00:05:42,560
missions or so each day and my email and

147
00:05:48,950 --> 00:05:46,080
uh issues of that type and others occur

148
00:05:51,510 --> 00:05:48,960
and uh we communicate that

149
00:05:53,270 --> 00:05:51,520
openly and uh and i just think that's

150
00:05:55,590 --> 00:05:53,280
where the inspiration comes from i was

151
00:05:58,070 --> 00:05:55,600
so excited for example to meet these two

152
00:06:02,230 --> 00:05:58,080
seventh graders that uh did name

153
00:06:03,830 --> 00:06:02,240
perseverance and uh and ingenuity and uh

154
00:06:07,270 --> 00:06:03,840
just learned from them how inspired they

155
00:06:09,909 --> 00:06:07,280
were from this launch so uh i really uh

156
00:06:11,510 --> 00:06:09,919
just so grateful and so excited for this

157
00:06:13,110 --> 00:06:11,520
mission and you can certainly tell they

158
00:06:15,189 --> 00:06:13,120
enjoyed their time here watching from

159
00:06:17,270 --> 00:06:15,199
the fifth floor and uh getting all the

160
00:06:19,350 --> 00:06:17,280
excitement that goes into watching

161
00:06:20,390 --> 00:06:19,360
something they helped name go up into

162
00:06:22,150 --> 00:06:20,400
space

163
00:06:23,670 --> 00:06:22,160

lori let's get to you now you've got uh

164
00:06:25,990 --> 00:06:23,680
something a little fun planned for us

165
00:06:29,029 --> 00:06:26,000
right i do but before we get to that i

166
00:06:32,550 --> 00:06:29,039
want to just uh take a moment also to

167
00:06:34,230 --> 00:06:32,560
thank um of course ula and lsp and jpl

168
00:06:36,390 --> 00:06:34,240
and the entire all of the scientists and

169
00:06:38,309 --> 00:06:36,400
engineers that worked on the march 2020

170
00:06:40,629 --> 00:06:38,319
project all of them that got us here

171
00:06:43,670 --> 00:06:40,639
today we wouldn't be here without the

172
00:06:44,469 --> 00:06:43,680
entire team so thanks go to all of them

173
00:06:46,150 --> 00:06:44,479
um

174
00:06:48,070 --> 00:06:46,160
i do have something a little special for

175
00:06:49,749 --> 00:06:48,080
folks today

176
00:06:52,309 --> 00:06:49,759
we are of course with this mission

177
00:06:55,270 --> 00:06:52,319
taking the whole world with us on uh on

178
00:06:58,230 --> 00:06:55,280
our way to mars and and as part of that

179
00:07:00,150 --> 00:06:58,240
uh we ran a campaign with jpl uh to

180
00:07:03,430 --> 00:07:00,160
invite the world to help us with the

181
00:07:06,950 --> 00:07:03,440
countdown to mars and so

182
00:07:09,430 --> 00:07:06,960
what i'd like to do is is share that a

183
00:07:11,029 --> 00:07:09,440
little short video that we've put

184
00:07:12,469 --> 00:07:11,039
together with

185
00:07:15,280 --> 00:07:12,479
the help of

186
00:07:28,870 --> 00:07:15,290
folks all around the world

187
00:07:28,880 --> 00:07:33,860
let's

188
00:07:33,870 --> 00:07:55,909

[Music]

189
00:07:59,909 --> 00:07:57,830
the perseverance of humanity launching

190
00:08:02,750 --> 00:07:59,919
the next generation of robotic explorers

191
00:08:20,390 --> 00:08:02,760
to the red planet

192
00:08:21,960 --> 00:08:20,400
[Music]

193
00:08:31,749 --> 00:08:21,970
yes

194
00:08:35,750 --> 00:08:33,909
well that was great lori great really

195
00:08:37,509 --> 00:08:35,760
enjoyed seeing all those kids from

196
00:08:39,509 --> 00:08:37,519
around the world

197
00:08:42,149 --> 00:08:39,519
helping out and contributing uh some of

198
00:08:44,070 --> 00:08:42,159
their creative genius to our mission

199
00:08:46,389 --> 00:08:44,080
here we want to turn now our attention

200
00:08:48,389 --> 00:08:46,399
to uh matt wallace the deputy project

201
00:08:50,389 --> 00:08:48,399
manager who uh looks like you were doing

202
00:08:51,509 --> 00:08:50,399
some communicating yourself over there

203
00:08:53,990 --> 00:08:51,519
tell us

204
00:08:55,829 --> 00:08:54,000
what the latest is with the rover yeah i

205
00:08:57,910 --> 00:08:55,839
was i was just getting an update um let

206
00:09:00,150 --> 00:08:57,920
me just start though by saying uh

207
00:09:01,910 --> 00:09:00,160
express my gratitude and gratitude to

208
00:09:03,110 --> 00:09:01,920
the team for the the people over here to

209
00:09:05,190 --> 00:09:03,120
my right

210
00:09:07,110 --> 00:09:05,200
uh which have supported this project for

211
00:09:08,710 --> 00:09:07,120
uh seven eight years for a long long

212
00:09:11,190 --> 00:09:08,720
time especially over the last couple

213
00:09:13,269 --> 00:09:11,200

months when we were going through the

214
00:09:15,269 --> 00:09:13,279
you know the very strenuous period uh

215
00:09:17,509 --> 00:09:15,279
dealing with the pandemic it really took

216
00:09:19,910 --> 00:09:17,519
the entire agency to step up

217
00:09:21,990 --> 00:09:19,920
uh and and help us and they didn't

218
00:09:24,630 --> 00:09:22,000
hesitate and they did it and we really

219
00:09:26,230 --> 00:09:24,640
appreciate that i also want to just

220
00:09:30,389 --> 00:09:26,240
say you're going to hear from the ula

221
00:09:32,310 --> 00:09:30,399
and launch services team after me but

222
00:09:34,470 --> 00:09:32,320
they gave us a perfect launch this

223
00:09:36,310 --> 00:09:34,480
morning right down the middle

224
00:09:39,030 --> 00:09:36,320
i couldn't have couldn't have aimed us

225
00:09:40,550 --> 00:09:39,040
any better we looked great coming off

226
00:09:42,150 --> 00:09:40,560
the centaur

227
00:09:43,910 --> 00:09:42,160
and uh and

228
00:09:45,509 --> 00:09:43,920
they really pushed hard to keep us on

229
00:09:48,550 --> 00:09:45,519
this limited

230
00:09:50,230 --> 00:09:48,560
planetary launch window in 2020

231
00:09:52,470 --> 00:09:50,240
as most of you know if you miss this

232
00:09:54,389 --> 00:09:52,480
window you gotta wait a couple years and

233
00:09:55,430 --> 00:09:54,399
so it was critically important for us to

234
00:09:57,350 --> 00:09:55,440
hit this

235
00:09:58,870 --> 00:09:57,360
and uh i can't say enough about the

236
00:10:00,790 --> 00:09:58,880
professionalism and the support they

237
00:10:02,870 --> 00:10:00,800
gave us over the last couple months in

238
00:10:04,230 --> 00:10:02,880

particular

239
00:10:05,990 --> 00:10:04,240
and then also i just want to i want to

240
00:10:07,670 --> 00:10:06,000
thank the team you know the team out

241
00:10:09,590 --> 00:10:07,680
there thousands of people

242
00:10:12,550 --> 00:10:09,600
uh that have really stepped up and and

243
00:10:13,590 --> 00:10:12,560
made this a special mission um

244
00:10:15,030 --> 00:10:13,600
and uh

245
00:10:16,630 --> 00:10:15,040
as as people have alluded to

246
00:10:18,389 --> 00:10:16,640
perseverance has become a pretty good

247
00:10:20,470 --> 00:10:18,399
name

248
00:10:22,550 --> 00:10:20,480
for this mission

249
00:10:24,069 --> 00:10:22,560
so let me talk a little bit about the

250
00:10:26,150 --> 00:10:24,079
what we're

251
00:10:27,350 --> 00:10:26,160
we've been we've been dealing with just

252
00:10:29,110 --> 00:10:27,360
today

253
00:10:31,670 --> 00:10:29,120
as i said the spacecraft looked great

254
00:10:33,750 --> 00:10:31,680
pre-launched we went into launch mode we

255
00:10:35,430 --> 00:10:33,760
get telemetry

256
00:10:36,630 --> 00:10:35,440
via the launch vehicle

257
00:10:38,949 --> 00:10:36,640
uh uh

258
00:10:41,590 --> 00:10:38,959
telemetry communication uh all the way

259
00:10:44,150 --> 00:10:41,600
through separation of the upper stage

260
00:10:46,310 --> 00:10:44,160
uh and then we go into a period where we

261
00:10:48,230 --> 00:10:46,320
have to wait until we come out of the

262
00:10:50,069 --> 00:10:48,240
eclipse of the earth essentially the

263
00:10:51,990 --> 00:10:50,079

earth is shadowing

264
00:10:54,630 --> 00:10:52,000
the sun and therefore the spacecraft

265
00:10:56,630 --> 00:10:54,640
doesn't have a lot of power

266
00:10:58,870 --> 00:10:56,640
and so we don't turn on our high power

267
00:11:00,870 --> 00:10:58,880
transmitter and we wait until

268
00:11:03,269 --> 00:11:00,880
we're in a better power situation to do

269
00:11:09,030 --> 00:11:06,550
so at about 9 15 or so this morning as

270
00:11:11,350 --> 00:11:09,040
expected the transmitter turned on

271
00:11:15,030 --> 00:11:11,360
the signal strength looked very good at

272
00:11:17,430 --> 00:11:15,040
the received station um

273
00:11:18,389 --> 00:11:17,440
there were really no indications of any

274
00:11:21,030 --> 00:11:18,399
issues

275
00:11:22,630 --> 00:11:21,040
the navigation signal signal the doppler

276
00:11:25,190 --> 00:11:22,640
that we analyzed to make sure we're on

277
00:11:27,509 --> 00:11:25,200
the right trajectory look very good

278
00:11:28,630 --> 00:11:27,519
uh the one the one problem we had is we

279
00:11:30,230 --> 00:11:28,640
couldn't uh

280
00:11:33,269 --> 00:11:30,240
the terminology that we use is we

281
00:11:36,710 --> 00:11:33,279
couldn't lock up our telemetry and so

282
00:11:38,550 --> 00:11:36,720
basically what that means is that um

283
00:11:40,710 --> 00:11:38,560
we have to modulate our telemetry on a

284
00:11:43,590 --> 00:11:40,720
subcarrier and then we have to

285
00:11:46,389 --> 00:11:43,600
demodulate that subcarrier and and which

286
00:11:48,790 --> 00:11:46,399
sounds pretty technical um but basically

287
00:11:51,590 --> 00:11:48,800
it allows us to read the information and

288
00:11:53,670 --> 00:11:51,600

the data coming from the spacecraft

289
00:11:54,790 --> 00:11:53,680
now it turns out that the deep space

290
00:11:56,629 --> 00:11:54,800
network

291
00:11:59,269 --> 00:11:56,639
uh is really designed to talk to

292
00:12:01,110 --> 00:11:59,279
spacecraft that are a long long way away

293
00:12:03,590 --> 00:12:01,120
you know spacecraft like voyager which

294
00:12:05,030 --> 00:12:03,600
are tens of billions of miles away

295
00:12:08,310 --> 00:12:05,040
and so they have very sensitive

296
00:12:11,590 --> 00:12:08,320
receivers um very big antennas

297
00:12:13,430 --> 00:12:11,600
and to configure them in fact

298
00:12:15,030 --> 00:12:13,440
to talk to a spacecraft that is this

299
00:12:18,790 --> 00:12:15,040
close to the earth is a little out of

300
00:12:21,269 --> 00:12:18,800
the ordinary and so um and so we know

301
00:12:23,910 --> 00:12:21,279
and and we have had uh issues in the

302
00:12:26,470 --> 00:12:23,920
past before in fact the the last mission

303
00:12:29,269 --> 00:12:26,480
i worked on the curiosity mission

304
00:12:31,350 --> 00:12:29,279
uh which launched in 2011 had this issue

305
00:12:32,470 --> 00:12:31,360
where we were basically saturating the

306
00:12:35,030 --> 00:12:32,480
receiver

307
00:12:36,629 --> 00:12:35,040
at the ground station and so it takes us

308
00:12:39,030 --> 00:12:36,639
a little while

309
00:12:41,110 --> 00:12:39,040
to essentially figure out

310
00:12:43,910 --> 00:12:41,120
how to configure the ground station such

311
00:12:46,470 --> 00:12:43,920
that we were able to demodulate that

312
00:12:48,629 --> 00:12:46,480
telemetry signal and get the information

313
00:12:50,470 --> 00:12:48,639

from the spacecraft and uh and that's

314
00:12:52,949 --> 00:12:50,480
what we've been working through

315
00:12:54,550 --> 00:12:52,959
uh over the last hour

316
00:12:56,389 --> 00:12:54,560
hour hour and a half or so since the

317
00:12:58,550 --> 00:12:56,399
transmitter turned on

318
00:12:59,670 --> 00:12:58,560
um i did just as the administrator was

319
00:13:01,910 --> 00:12:59,680
speaking

320
00:13:04,389 --> 00:13:01,920
i did just get a text that we were able

321
00:13:06,069 --> 00:13:04,399
to lock up on that telemetry

322
00:13:08,389 --> 00:13:06,079
and so we'll be starting to get some

323
00:13:10,550 --> 00:13:08,399
information on spacecraft and spacecraft

324
00:13:13,110 --> 00:13:10,560
health uh very soon

325
00:13:14,790 --> 00:13:13,120
uh the good news though is that uh you

326
00:13:16,310 --> 00:13:14,800
know all the indications that we have

327
00:13:18,310 --> 00:13:16,320
and we have quite a few are that the

328
00:13:22,069 --> 00:13:18,320
spacecraft's just fine

329
00:13:24,150 --> 00:13:22,079
um it's a very stable spacecraft it's um

330
00:13:26,790 --> 00:13:24,160
it's a spinning spacecraft our our

331
00:13:28,629 --> 00:13:26,800
centaur upper stage in fact spins us

332
00:13:30,230 --> 00:13:28,639
at about two and a half revolutions per

333
00:13:31,990 --> 00:13:30,240
minute which means

334
00:13:33,670 --> 00:13:32,000
it the spacecraft is hard to kind of

335
00:13:36,710 --> 00:13:33,680
knock off course it's like a spinning

336
00:13:38,550 --> 00:13:36,720
top you can't knock it over and so so

337
00:13:40,629 --> 00:13:38,560
it's very stable we know it's getting

338
00:13:42,949 --> 00:13:40,639

good power we know as i said the

339
00:13:45,110 --> 00:13:42,959
transmitter is on

340
00:13:46,629 --> 00:13:45,120
and so it's really just taking a look

341
00:13:49,189 --> 00:13:46,639
now at the telemetry which we've now

342
00:13:51,430 --> 00:13:49,199
locked up on and getting a health health

343
00:13:53,750 --> 00:13:51,440
status from the team and so that'll

344
00:13:55,350 --> 00:13:53,760
happen uh shortly

345
00:13:57,670 --> 00:13:55,360
thank you very much for that update that

346
00:13:59,509 --> 00:13:57,680
is great news to hear let's turn now to

347
00:14:01,269 --> 00:13:59,519
omar baez the

348
00:14:03,110 --> 00:14:01,279
launch director from nasa's launch

349
00:14:06,150 --> 00:14:03,120
services program getting a lot of

350
00:14:07,750 --> 00:14:06,160
accolades so mark how how did you feel

351
00:14:11,350 --> 00:14:07,760
the team performed today

352
00:14:12,870 --> 00:14:11,360
oh fantastic um honored

353
00:14:14,949 --> 00:14:12,880
proud

354
00:14:16,790 --> 00:14:14,959
those are the kind of words that

355
00:14:20,949 --> 00:14:16,800
i can think of right now

356
00:14:28,389 --> 00:14:25,350
it was a very quiet count for us

357
00:14:30,550 --> 00:14:28,399
about the only excitement was a couple

358
00:14:31,269 --> 00:14:30,560
instruments dropping out with the range

359
00:14:33,509 --> 00:14:31,279
and

360
00:14:35,829 --> 00:14:33,519
then that at about 20 minutes matt came

361
00:14:36,470 --> 00:14:35,839
over to us and and said hey we just had

362
00:14:55,590 --> 00:14:36,480
a

363
00:15:01,590 --> 00:14:55,600

the vehicle

364
00:15:05,670 --> 00:15:04,230
we released them at just over 25 000

365
00:15:07,430 --> 00:15:05,680
miles an hour so we'll make that

366
00:15:10,550 --> 00:15:07,440
separation distance

367
00:15:14,710 --> 00:15:10,560
in a couple of days that you need for uh

368
00:15:15,670 --> 00:15:14,720
for locking on uh it'll become easier

369
00:15:16,550 --> 00:15:15,680
um

370
00:15:21,430 --> 00:15:16,560
so

371
00:15:24,550 --> 00:15:21,440
proud to be a part of this

372
00:15:27,430 --> 00:15:24,560
i've been with this um with matt and

373
00:15:29,350 --> 00:15:27,440
company and so has the predecessor to

374
00:15:30,069 --> 00:15:29,360
launch services program

375
00:15:32,230 --> 00:15:30,079
uh

376
00:15:34,389 --> 00:15:32,240
from when we did sojourner

377
00:15:36,550 --> 00:15:34,399
we had less gray hair then

378
00:15:38,389 --> 00:15:36,560
but

379
00:15:40,790 --> 00:15:38,399
it's just a proud moment

380
00:15:43,670 --> 00:15:40,800
and i'm glad to be a part of it and i'm

381
00:15:45,509 --> 00:15:43,680
glad that our program um

382
00:15:48,389 --> 00:15:45,519
could could provide

383
00:15:50,230 --> 00:15:48,399
what they needed to get this on its way

384
00:15:52,310 --> 00:15:50,240
congratulations again to your team you

385
00:15:54,310 --> 00:15:52,320
certainly had a good partner in this

386
00:15:56,949 --> 00:15:54,320
effort united launch alliance and so now

387
00:15:59,509 --> 00:15:56,959
we'll turn to torrey bruno the ceo and

388
00:16:02,150 --> 00:15:59,519

president of ula torre you said that

389
00:16:04,870 --> 00:16:02,160
this rocket would leap off the pad and

390
00:16:06,310 --> 00:16:04,880
indeed it did that thing got out of here

391
00:16:09,749 --> 00:16:06,320
in a hurry

392
00:16:11,189 --> 00:16:09,759
yes it did it was a beautiful day as you

393
00:16:13,590 --> 00:16:11,199
saw in the video

394
00:16:16,230 --> 00:16:13,600
and the winds were nearly dead calm out

395
00:16:19,670 --> 00:16:16,240
at the pad and so as you heard we

396
00:16:21,829 --> 00:16:19,680
ignited the atlas performed really

397
00:16:24,230 --> 00:16:21,839
nominally throughout the mission and we

398
00:16:26,470 --> 00:16:24,240
ended with just an extraordinarily

399
00:16:28,310 --> 00:16:26,480
accurate orbital insertion

400
00:16:30,629 --> 00:16:28,320
and really the only

401
00:16:32,790 --> 00:16:30,639
excitement that we had today at all is

402
00:16:34,389 --> 00:16:32,800
what omar referred to where people in

403
00:16:36,629 --> 00:16:34,399
california thought they felt an

404
00:16:39,110 --> 00:16:36,639
earthquake but really they were just

405
00:16:42,470 --> 00:16:39,120
feeling mighty atlas crouching down to

406
00:16:46,150 --> 00:16:44,150
thank you very much story we appreciate

407
00:16:49,030 --> 00:16:46,160
that a little rumble in california and

408
00:16:51,670 --> 00:16:49,040
some rumble here in florida all right we

409
00:16:53,590 --> 00:16:51,680
are now going to go to the phones and uh

410
00:16:57,590 --> 00:16:53,600
get some questions from our media

411
00:16:59,509 --> 00:16:57,600
members out there and uh we'll also take

412
00:17:03,030 --> 00:16:59,519
questions from social media at the

413
00:17:05,110 --> 00:17:03,040

hashtag countdown to mars we will begin

414
00:17:08,309 --> 00:17:05,120
with paul brinkman who's on the phone

415
00:17:11,350 --> 00:17:08,319
who's with upi paul go ahead

416
00:17:13,029 --> 00:17:11,360
hi yeah thanks very much um so

417
00:17:16,309 --> 00:17:13,039
we're talking about launch here but all

418
00:17:18,069 --> 00:17:16,319
this is aimed at uh proper mars arrival

419
00:17:20,230 --> 00:17:18,079
um in seven months so can i ask one of

420
00:17:22,150 --> 00:17:20,240
you i guess matt wallace um

421
00:17:24,470 --> 00:17:22,160
to talk about that next big step in this

422
00:17:26,949 --> 00:17:24,480
process how do you verify that the craft

423
00:17:28,390 --> 00:17:26,959
has properly arrived at mars and then

424
00:17:29,909 --> 00:17:28,400
for the entry and landing is this

425
00:17:33,110 --> 00:17:29,919
basically a

426
00:17:37,669 --> 00:17:33,120
a total copy of the edl for our

427
00:17:42,070 --> 00:17:40,150
yeah sure i can i can uh take a shot at

428
00:17:43,830 --> 00:17:42,080
some of those um

429
00:17:45,669 --> 00:17:43,840
well we'll spend the next uh six and a

430
00:17:47,750 --> 00:17:45,679
half months or so in cruise and we'll do

431
00:17:48,950 --> 00:17:47,760
a lot of engineering checkouts and

432
00:17:50,870 --> 00:17:48,960
health checks and make sure the

433
00:17:52,470 --> 00:17:50,880
spacecraft is

434
00:17:55,110 --> 00:17:52,480
ready to go for entry descent and

435
00:17:57,350 --> 00:17:55,120
landing it is definitely by far the most

436
00:17:59,430 --> 00:17:57,360
difficult part of the mission

437
00:18:01,990 --> 00:17:59,440
you know the spacecraft has to perform

438
00:18:03,830 --> 00:18:02,000

the entire process of getting down to

439
00:18:06,070 --> 00:18:03,840
the surface autonomously there's no

440
00:18:08,710 --> 00:18:06,080
human interaction with uh with the

441
00:18:11,270 --> 00:18:08,720
spacecraft during that period of time

442
00:18:13,669 --> 00:18:11,280
uh and basically we start we start

443
00:18:15,110 --> 00:18:13,679
prepping for it maybe eight days out or

444
00:18:17,270 --> 00:18:15,120
so

445
00:18:19,350 --> 00:18:17,280
and as we get closer and closer to uh

446
00:18:20,710 --> 00:18:19,360
the outer atmosphere

447
00:18:22,950 --> 00:18:20,720
there's more and more autonomy

448
00:18:24,310 --> 00:18:22,960
especially this spacecraft essentially

449
00:18:27,350 --> 00:18:24,320
starts to

450
00:18:30,950 --> 00:18:27,360
what it needs to do on its own without

451
00:18:36,950 --> 00:18:32,150
and then

452
00:18:39,350 --> 00:18:36,960
similar to a curiosity we're able to

453
00:18:40,789 --> 00:18:39,360
leverage a lot of the investment we made

454
00:18:43,350 --> 00:18:40,799
in that mission

455
00:18:44,870 --> 00:18:43,360
getting curiosity down the gale crater

456
00:18:46,950 --> 00:18:44,880
so we come in

457
00:18:51,669 --> 00:18:46,960
you know on the order of 12 000 miles an

458
00:18:53,350 --> 00:18:51,679
hour our entry capsule will slow us down

459
00:18:56,150 --> 00:18:53,360
we will steer that entry capsule

460
00:18:59,909 --> 00:18:56,160
hypersonically so that we aim right at

461
00:19:01,270 --> 00:18:59,919
our landing uh our landing site

462
00:19:03,510 --> 00:19:01,280
and then when we're still moving at

463
00:19:06,150 --> 00:19:03,520

about mach 2 we inflate our big

464
00:19:07,750 --> 00:19:06,160
supersonic parachute it's about a 70

465
00:19:10,230 --> 00:19:07,760
foot shoot

466
00:19:11,909 --> 00:19:10,240
that's that's an exciting moment uh in

467
00:19:13,029 --> 00:19:11,919
in the mission and that'll slow us down

468
00:19:16,150 --> 00:19:13,039
to maybe

469
00:19:17,830 --> 00:19:16,160
150 miles an hour or so

470
00:19:19,430 --> 00:19:17,840
and then the heat shield the bottom of

471
00:19:21,270 --> 00:19:19,440
the entry capsule

472
00:19:22,630 --> 00:19:21,280
drops off when we start to acquire the

473
00:19:24,230 --> 00:19:22,640
ground

474
00:19:25,669 --> 00:19:24,240
at this point we do do something a

475
00:19:28,070 --> 00:19:25,679
little bit different

476
00:19:29,830 --> 00:19:28,080
than curiosity did we have a new

477
00:19:32,710 --> 00:19:29,840
capability it's a hazard avoidance

478
00:19:35,190 --> 00:19:32,720
capability and it's a very powerful

479
00:19:37,110 --> 00:19:35,200
uh new system we call it terrain

480
00:19:39,350 --> 00:19:37,120
relative navigation and it's actually

481
00:19:41,430 --> 00:19:39,360
enabled us to target

482
00:19:43,430 --> 00:19:41,440
jezreel crater which is a location we

483
00:19:46,470 --> 00:19:43,440
could not have gotten into

484
00:19:47,669 --> 00:19:46,480
with the curiosity msl

485
00:19:49,669 --> 00:19:47,679
mission

486
00:19:51,669 --> 00:19:49,679
there are just too many landing hazards

487
00:19:55,029 --> 00:19:51,679
but the way it works is is we take a

488
00:19:58,310 --> 00:19:55,039

picture as as we're coming down

489
00:20:01,750 --> 00:19:58,320
and then we we find ourselves in a map

490
00:20:05,190 --> 00:20:01,760
that we have stored on board

491
00:20:07,510 --> 00:20:05,200
from orbital imagery and once we know

492
00:20:09,350 --> 00:20:07,520
where we are in that map

493
00:20:11,909 --> 00:20:09,360
we essentially divert the spacecraft

494
00:20:13,830 --> 00:20:11,919
away from the hazards that could be

495
00:20:16,470 --> 00:20:13,840
dangerous to it during landing and we do

496
00:20:18,710 --> 00:20:16,480
that during what we call power descent

497
00:20:21,350 --> 00:20:18,720
we have something called a descent stage

498
00:20:22,950 --> 00:20:21,360
which carries the rover with eight big

499
00:20:25,110 --> 00:20:22,960
main engines

500
00:20:27,590 --> 00:20:25,120
down to the surface as the rover gets

501
00:20:29,669 --> 00:20:27,600
close to the surface it deploys down on

502
00:20:31,909 --> 00:20:29,679
a tether that's a maneuver we call the

503
00:20:33,830 --> 00:20:31,919
sky crane maneuver

504
00:20:35,830 --> 00:20:33,840
the rover will touch down on its wheels

505
00:20:38,870 --> 00:20:35,840
we'll we'll cut the tether and we'll be

506
00:20:41,029 --> 00:20:38,880
ready to go on the surface so um

507
00:20:42,710 --> 00:20:41,039
so there are a lot of similarities

508
00:20:44,789 --> 00:20:42,720
but we have some new

509
00:20:46,950 --> 00:20:44,799
capabilities as well to help us get into

510
00:20:49,510 --> 00:20:46,960
these more scientifically

511
00:20:50,870 --> 00:20:49,520
interesting sites like jezreel

512
00:20:52,230 --> 00:20:50,880
all right thank you very much the only

513
00:20:53,750 --> 00:20:52,240

thing is we have to wait six and a half

514
00:20:56,230 --> 00:20:53,760
months for all this thanks for

515
00:20:58,549 --> 00:20:56,240
describing um those exciting moments

516
00:21:01,990 --> 00:20:58,559
that will uh be happening uh in that

517
00:21:04,390 --> 00:21:02,000
time february 18th right 2021. our next

518
00:21:07,029 --> 00:21:04,400
question comes to us from marcia dunn

519
00:21:09,909 --> 00:21:07,039
with associated press go ahead marcia

520
00:21:12,310 --> 00:21:09,919
yes hi um probably for mad i'm i'm

521
00:21:15,510 --> 00:21:12,320
wondering um provided this lock on the

522
00:21:17,510 --> 00:21:15,520
data stays solid when how much longer do

523
00:21:19,990 --> 00:21:17,520
we have to wait to get a full read on

524
00:21:21,830 --> 00:21:20,000
the spacecraft health and i'm wondering

525
00:21:24,950 --> 00:21:21,840
up until you got the time you got that

526
00:21:27,270 --> 00:21:24,960
text a few minutes ago uh if this led to

527
00:21:29,750 --> 00:21:27,280
some extra sweaty palms a little bit of

528
00:21:33,669 --> 00:21:29,760
heart fluttering until uh

529
00:21:37,909 --> 00:21:36,230
i'm not sure her i heard the entire

530
00:21:39,590 --> 00:21:37,919
question but i i think the first part

531
00:21:41,510 --> 00:21:39,600
was associated with how long it would

532
00:21:43,750 --> 00:21:41,520
take before we had some spacecraft

533
00:21:45,590 --> 00:21:43,760
telemetry uh the team will be pouring

534
00:21:48,549 --> 00:21:45,600
through that telemetry you know as we

535
00:21:50,149 --> 00:21:48,559
speak i would say another 30 to 60

536
00:21:52,390 --> 00:21:50,159
minutes or so we'll have a pretty good

537
00:21:54,149 --> 00:21:52,400
understanding of uh you know

538
00:21:55,909 --> 00:21:54,159

the different spacecraft systems they'll

539
00:21:57,510 --> 00:21:55,919
be looking at

540
00:22:00,070 --> 00:21:57,520
the power production out of the solar

541
00:22:01,750 --> 00:22:00,080
arrays they'll look at the uh

542
00:22:04,470 --> 00:22:01,760
the temperatures around the spacecraft

543
00:22:06,230 --> 00:22:04,480
the thermal conditions um

544
00:22:09,190 --> 00:22:06,240
we'll obviously be taking a look at the

545
00:22:11,110 --> 00:22:09,200
uh telecommunication systems

546
00:22:13,590 --> 00:22:11,120
be looking for any other faults or

547
00:22:14,870 --> 00:22:13,600
anomalies obviously on the spacecraft

548
00:22:16,870 --> 00:22:14,880
but um

549
00:22:18,710 --> 00:22:16,880
i i would say on the order of 30 to 60

550
00:22:20,230 --> 00:22:18,720
minutes or so from now

551
00:22:22,310 --> 00:22:20,240
we'll we'll have a

552
00:22:23,430 --> 00:22:22,320
have an update probably and the second

553
00:22:24,870 --> 00:22:23,440
part of our question was how are you

554
00:22:26,549 --> 00:22:24,880
feeling after

555
00:22:27,590 --> 00:22:26,559
the successful launch in this first part

556
00:22:30,870 --> 00:22:27,600
of the mission

557
00:22:33,270 --> 00:22:30,880
uh you know it's uh um

558
00:22:35,110 --> 00:22:33,280
it is always a bit of relief

559
00:22:37,990 --> 00:22:35,120
when you you know when you get through

560
00:22:39,750 --> 00:22:38,000
the launch uh cycle and uh and the

561
00:22:42,149 --> 00:22:39,760
spacecraft separates you know the

562
00:22:44,549 --> 00:22:42,159
spacecraft is really designed to operate

563
00:22:46,549 --> 00:22:44,559

um as i think thomas was saying

564
00:22:47,350 --> 00:22:46,559
in space that's where it's happiest you

565
00:22:49,909 --> 00:22:47,360
know

566
00:22:51,990 --> 00:22:49,919
uh the most of the most the problems we

567
00:22:53,909 --> 00:22:52,000
run into are because we're in a test

568
00:22:56,390 --> 00:22:53,919
configuration that's that's not really

569
00:22:58,230 --> 00:22:56,400
flight like interestingly enough and so

570
00:22:59,590 --> 00:22:58,240
i think the team is obviously very

571
00:23:00,870 --> 00:22:59,600
relieved to

572
00:23:03,029 --> 00:23:00,880
be on our way

573
00:23:05,590 --> 00:23:03,039
and uh and the spacecraft is generally

574
00:23:07,990 --> 00:23:05,600
uh is as well so yeah

575
00:23:12,149 --> 00:23:08,000
very good our next question comes to us

576
00:23:13,750 --> 00:23:12,159
from lauren grush with the verge lauren

577
00:23:15,510 --> 00:23:13,760
hi thank you so much for taking my

578
00:23:18,310 --> 00:23:15,520
question and congrats on the launch

579
00:23:20,230 --> 00:23:18,320
today um i'm curious is there any extra

580
00:23:21,909 --> 00:23:20,240
risk introduced by not being able to

581
00:23:24,230 --> 00:23:21,919
communicate with the spacecraft right at

582
00:23:26,310 --> 00:23:24,240
the time of signal acquisition or is it

583
00:23:28,789 --> 00:23:26,320
really just peace of mind ahead of your

584
00:23:30,070 --> 00:23:28,799
first big maneuver and also had you

585
00:23:32,149 --> 00:23:30,080
prepped for the possibility of this

586
00:23:35,990 --> 00:23:32,159
communication problem since it happened

587
00:23:37,270 --> 00:23:36,000
with curiosity thank you

588
00:23:39,029 --> 00:23:37,280

was the first part of the question i

589
00:23:40,789 --> 00:23:39,039
couldn't she was asking about the you

590
00:23:43,669 --> 00:23:40,799
know the communication with the

591
00:23:45,269 --> 00:23:43,679
spacecraft in terms of um

592
00:23:47,029 --> 00:23:45,279
getting that acquisition to signal is it

593
00:23:48,870 --> 00:23:47,039
a problem that you don't lock in

594
00:23:50,470 --> 00:23:48,880
initially

595
00:23:52,870 --> 00:23:50,480
no well as i said you know the

596
00:23:54,950 --> 00:23:52,880
spacecraft is is as i just finished

597
00:23:57,430 --> 00:23:54,960
saying um is really designed to be in

598
00:23:59,269 --> 00:23:57,440
space it's a very inherently stable

599
00:24:00,470 --> 00:23:59,279
spacecraft you know we've got plenty of

600
00:24:02,549 --> 00:24:00,480
time

601
00:24:04,230 --> 00:24:02,559
to work through the communication

602
00:24:07,110 --> 00:24:04,240
issues there's nothing that we need to

603
00:24:07,990 --> 00:24:07,120
do urgently in fact we got such a good

604
00:24:09,430 --> 00:24:08,000
um

605
00:24:10,549 --> 00:24:09,440
you know uh

606
00:24:12,149 --> 00:24:10,559
insertion

607
00:24:13,669 --> 00:24:12,159
from the launch vehicle you know we've

608
00:24:15,750 --> 00:24:13,679
got plenty of time before we have to

609
00:24:16,870 --> 00:24:15,760
make our first trajectory correction

610
00:24:19,029 --> 00:24:16,880
maneuver

611
00:24:21,350 --> 00:24:19,039
nominally it's about 15 days after

612
00:24:23,830 --> 00:24:21,360
launch but we probably have time well

613
00:24:26,390 --> 00:24:23,840

beyond that based on how well we did

614
00:24:28,390 --> 00:24:26,400
uh so we got plenty of time to uh you

615
00:24:30,230 --> 00:24:28,400
know to get the signal and to start uh

616
00:24:32,710 --> 00:24:30,240
interacting with the spacecraft and

617
00:24:35,029 --> 00:24:32,720
doing those sorts of things all right

618
00:24:38,549 --> 00:24:35,039
let's turn now to irene klotz who is

619
00:24:41,590 --> 00:24:38,559
with aviation week irene go ahead

620
00:24:43,350 --> 00:24:41,600
thanks very much um i may have uh

621
00:24:46,870 --> 00:24:43,360
i'm not sure if i heard this correctly

622
00:24:50,950 --> 00:24:46,880
but once the spacecraft reaches is it 25

623
00:24:53,269 --> 00:24:50,960
000 miles that this issue becomes

624
00:24:55,750 --> 00:24:53,279
whether or not you're able to

625
00:24:59,510 --> 00:24:55,760
do the columns by modulating the signal

626
00:25:03,110 --> 00:25:01,510
and that's for matt in other words how

627
00:25:05,830 --> 00:25:03,120
far away does

628
00:25:08,230 --> 00:25:05,840
um perseverance need to be before it

629
00:25:10,310 --> 00:25:08,240
enters the true deep space mode of

630
00:25:12,630 --> 00:25:10,320
communications

631
00:25:14,310 --> 00:25:12,640
yeah i think i think it was uh torrey or

632
00:25:16,950 --> 00:25:14,320
maybe omar that said the spacecraft's

633
00:25:18,950 --> 00:25:16,960
moving pretty fast 25 000 miles an hour

634
00:25:20,950 --> 00:25:18,960
when it comes off that upper stage and

635
00:25:22,149 --> 00:25:20,960
so the point that they were making is

636
00:25:23,909 --> 00:25:22,159
that we're

637
00:25:25,909 --> 00:25:23,919
you know we're putting distance between

638
00:25:27,590 --> 00:25:25,919

uh the spacecraft and the earth pretty

639
00:25:29,510 --> 00:25:27,600
quickly and so

640
00:25:32,710 --> 00:25:29,520
that helps a lot with respect to the

641
00:25:34,870 --> 00:25:32,720
saturation of the ground station um

642
00:25:37,510 --> 00:25:34,880
you know uh radios

643
00:25:39,190 --> 00:25:37,520
and so really within hours you know the

644
00:25:41,830 --> 00:25:39,200
power will drop

645
00:25:43,510 --> 00:25:41,840
uh and and that that can help uh

646
00:25:44,630 --> 00:25:43,520
certainly yeah

647
00:25:47,029 --> 00:25:44,640
and real quick omar what were the

648
00:25:50,070 --> 00:25:47,039
numbers on on the release of the

649
00:25:52,230 --> 00:25:50,080
spacecraft it's just over 25 000

650
00:25:54,950 --> 00:25:52,240
per hour okay very good

651
00:25:57,590 --> 00:25:54,960
all right let's turn now to russell pins

652
00:26:00,149 --> 00:25:57,600
who is with pacific rim media russell go

653
00:26:02,149 --> 00:26:00,159
ahead and ask your question

654
00:26:05,029 --> 00:26:02,159
good morning yeah that's russell pounds

655
00:26:07,750 --> 00:26:05,039
uh calling from alaska today and uh this

656
00:26:10,149 --> 00:26:07,760
is for uh administrator bridenstine

657
00:26:14,310 --> 00:26:10,159
uh the question is you know when does

658
00:26:16,149 --> 00:26:14,320
the uh light go on for students uh that

659
00:26:19,190 --> 00:26:16,159
uh america's investment in space

660
00:26:21,510 --> 00:26:19,200
exploration is worth the money and then

661
00:26:23,830 --> 00:26:21,520
as a follow-up for adults if it's a

662
00:26:27,110 --> 00:26:23,840
different kind of time when they realize

663
00:26:29,590 --> 00:26:27,120

oh this this is worth our while uh when

664
00:26:31,510 --> 00:26:29,600
is it that that happened oh i think it's

665
00:26:32,710 --> 00:26:31,520
already happened and i think

666
00:26:34,710 --> 00:26:32,720
you know when you think about mars

667
00:26:35,669 --> 00:26:34,720
perseverance that's evidence that it has

668
00:26:38,549 --> 00:26:35,679
happened

669
00:26:41,110 --> 00:26:38,559
you know uh we we just had a a few folks

670
00:26:43,590 --> 00:26:41,120
here on the panel talk about sojourner

671
00:26:45,510 --> 00:26:43,600
um and its success and then of course

672
00:26:48,149 --> 00:26:45,520
spirit and opportunity and the success

673
00:26:50,070 --> 00:26:48,159
of those robots and then curiosity and

674
00:26:51,990 --> 00:26:50,080
and now perseverance look every single

675
00:26:54,630 --> 00:26:52,000
one of these missions

676
00:26:56,789 --> 00:26:54,640
gets more complex and more sophisticated

677
00:26:59,830 --> 00:26:56,799
and right now we have the single most

678
00:27:01,830 --> 00:26:59,840
sophisticated complex robot ever sent to

679
00:27:03,990 --> 00:27:01,840
another world and

680
00:27:06,549 --> 00:27:04,000
and so we're very excited about it but i

681
00:27:09,269 --> 00:27:06,559
think i think the the american people

682
00:27:11,830 --> 00:27:09,279
see the benefit of of these activities

683
00:27:13,590 --> 00:27:11,840
um not just in terms of science but also

684
00:27:15,590 --> 00:27:13,600
in the the development of technology

685
00:27:19,350 --> 00:27:15,600
that we all benefit from so

686
00:27:21,990 --> 00:27:19,360
um i i think as far as as far as the the

687
00:27:25,269 --> 00:27:22,000
american public goes um there's a lot of

688
00:27:27,830 --> 00:27:25,279

enthusiasm for these for these missions

689
00:27:29,350 --> 00:27:27,840
and of course as far as children go

690
00:27:31,590 --> 00:27:29,360
uh you know these are the kind of

691
00:27:33,430 --> 00:27:31,600
moments where people decide you know

692
00:27:35,430 --> 00:27:33,440
young folks can decide wow that's

693
00:27:37,590 --> 00:27:35,440
something i want to do when i when i

694
00:27:40,549 --> 00:27:37,600
grow up and they go into the stem fields

695
00:27:41,909 --> 00:27:40,559
and they get interested in in in stem

696
00:27:44,870 --> 00:27:41,919
activities so

697
00:27:46,630 --> 00:27:44,880
um i i think uh i think all of america

698
00:27:48,789 --> 00:27:46,640
is very proud and excited about this

699
00:27:49,830 --> 00:27:48,799
mission and the ones that in fact came

700
00:27:52,630 --> 00:27:49,840
before it and the ones that are

701
00:27:53,830 --> 00:27:52,640
operating on on mars right now today we

702
00:27:55,430 --> 00:27:53,840
certainly got a sample of that from

703
00:27:58,230 --> 00:27:55,440
lori's video and some of the kids that

704
00:27:59,909 --> 00:27:58,240
we uh that we saw there um

705
00:28:02,230 --> 00:27:59,919
let's pause for a second and ask a

706
00:28:03,909 --> 00:28:02,240
question to omar while we are waiting

707
00:28:06,389 --> 00:28:03,919
for these seven months

708
00:28:09,350 --> 00:28:06,399
for mars perseverance to land what is

709
00:28:11,190 --> 00:28:09,360
next for lsp

710
00:28:14,230 --> 00:28:11,200
so lsp

711
00:28:17,269 --> 00:28:14,240
lsp's next launch is uh the michael fry

712
00:28:20,630 --> 00:28:17,279
lex sentinel 6 mission

713
00:28:22,789 --> 00:28:20,640

out of vandenberg and that's in november

714
00:28:24,789 --> 00:28:22,799
but we do have a

715
00:28:28,230 --> 00:28:24,799
very full manifest

716
00:28:29,590 --> 00:28:28,240
of other missions that are

717
00:28:30,549 --> 00:28:29,600
in

718
00:28:32,789 --> 00:28:30,559
um

719
00:28:33,830 --> 00:28:32,799
so so yeah next up in the lineup for

720
00:28:35,669 --> 00:28:33,840
launch

721
00:28:39,110 --> 00:28:35,679
uh sentinel six

722
00:28:41,750 --> 00:28:39,120
um and quite a few other missions um to

723
00:28:44,230 --> 00:28:41,760
fly out in a year later

724
00:28:47,830 --> 00:28:44,240
good to hear the manifest is uh is full

725
00:28:49,990 --> 00:28:47,840
over there um for tori uh ula uh has

726
00:28:51,990 --> 00:28:50,000
launched four previous missions to mars

727
00:28:54,789 --> 00:28:52,000
on atlas v was there anything different

728
00:28:56,149 --> 00:28:54,799
that you did with this configuration uh

729
00:28:58,149 --> 00:28:56,159
that was different than the others yeah

730
00:29:00,149 --> 00:28:58,159
there was so there were probably two

731
00:29:02,470 --> 00:29:00,159
important things that were different the

732
00:29:04,549 --> 00:29:02,480
first was that the planetary protection

733
00:29:07,110 --> 00:29:04,559
requirements in terms of cleanliness and

734
00:29:08,710 --> 00:29:07,120
biological contamination were updated

735
00:29:10,549 --> 00:29:08,720
for this mission

736
00:29:13,350 --> 00:29:10,559
making this probably the cleanest

737
00:29:15,669 --> 00:29:13,360
spacecraft that has ever gone to space

738
00:29:18,230 --> 00:29:15,679

that was a significant challenge

739
00:29:21,029 --> 00:29:18,240
and then we combined that with another

740
00:29:23,269 --> 00:29:21,039
new thing which was to bring in

741
00:29:26,070 --> 00:29:23,279
the nuclear battery the multi-mission

742
00:29:29,430 --> 00:29:26,080
radio isotope thermoelectric generator

743
00:29:32,149 --> 00:29:29,440
laid into the flow and actually breach

744
00:29:34,149 --> 00:29:32,159
that encapsuled volume where we keep the

745
00:29:37,110 --> 00:29:34,159
ultra clean spacecraft where it was

746
00:29:40,070 --> 00:29:37,120
prepared in its own facility in order to

747
00:29:42,470 --> 00:29:40,080
install the battery out near the pad in

748
00:29:45,029 --> 00:29:42,480
what is essentially an outdoor

749
00:29:47,750 --> 00:29:45,039
vertical integration facility and so

750
00:29:50,149 --> 00:29:47,760
that meant constructing a clean room

751
00:29:52,950 --> 00:29:50,159
that could be put onto the vif

752
00:29:54,549 --> 00:29:52,960
on a platform and then have people come

753
00:29:57,350 --> 00:29:54,559
in there and do that work while

754
00:29:59,990 --> 00:29:57,360
maintaining all of those protocols

755
00:30:02,789 --> 00:30:00,000
both handling of the plutonium as well

756
00:30:04,710 --> 00:30:02,799
as protecting mars from the spacecraft

757
00:30:05,909 --> 00:30:04,720
itself so that the experiments could be

758
00:30:07,669 --> 00:30:05,919
successful

759
00:30:09,669 --> 00:30:07,679
so that was a pretty big challenge for

760
00:30:11,669 --> 00:30:09,679
our people and of course they had to do

761
00:30:12,870 --> 00:30:11,679
it in the midst of kovid just like your

762
00:30:15,669 --> 00:30:12,880
teams did

763
00:30:18,389 --> 00:30:15,679

and i could not be more proud

764
00:30:20,310 --> 00:30:18,399
and and more humbled by the courage and

765
00:30:22,310 --> 00:30:20,320
the dedication of my

766
00:30:23,430 --> 00:30:22,320
my launch team that just pulled all that

767
00:30:25,909 --> 00:30:23,440
off

768
00:30:27,669 --> 00:30:25,919
and congratulations on that great work

769
00:30:29,750 --> 00:30:27,679
gonna go back to the phone bridge now

770
00:30:33,750 --> 00:30:29,760
and we'll get a question from leo

771
00:30:36,149 --> 00:30:33,760
enright who is with irish television

772
00:30:37,669 --> 00:30:36,159
uh thanks very much and congratulations

773
00:30:39,909 --> 00:30:37,679
on the launch today

774
00:30:42,470 --> 00:30:39,919
a couple of questions one for the rocket

775
00:30:45,750 --> 00:30:42,480
people as it were about spacecraft

776
00:30:49,190 --> 00:30:45,760
separation we we saw a blink and you

777
00:30:50,549 --> 00:30:49,200
miss it video uh of spacecraft sep i

778
00:30:52,870 --> 00:30:50,559
just wondered

779
00:30:54,630 --> 00:30:52,880
if we're going to see any further video

780
00:30:57,269 --> 00:30:54,640
or is that it

781
00:30:59,269 --> 00:30:57,279
and then for matt wallace if i may

782
00:31:01,990 --> 00:30:59,279
could you be a bit specific about what

783
00:31:04,549 --> 00:31:02,000
time of day you're planning to land on

784
00:31:06,310 --> 00:31:04,559
mars it helps us tv people

785
00:31:08,710 --> 00:31:06,320
plan ahead

786
00:31:13,830 --> 00:31:08,720
is it morning noon or middle of the

787
00:31:18,230 --> 00:31:16,310
uh yeah well for as far as the landing

788
00:31:20,149 --> 00:31:18,240

goes off to get you the specific

789
00:31:21,509 --> 00:31:20,159
information um make sure i don't give

790
00:31:24,310 --> 00:31:21,519
you the wrong time

791
00:31:26,870 --> 00:31:24,320
uh and i'll let omar and and tori answer

792
00:31:28,630 --> 00:31:26,880
the other question i can go yeah so we

793
00:31:30,630 --> 00:31:28,640
have a little bit more video than that i

794
00:31:33,909 --> 00:31:30,640
mean we can certainly make it available

795
00:31:37,110 --> 00:31:33,919
but what you saw is what you saw it came

796
00:31:38,710 --> 00:31:37,120
off very very clean two and a half rpm

797
00:31:41,430 --> 00:31:38,720
and it just gets further and further

798
00:31:43,990 --> 00:31:41,440
away until it disappears but what i will

799
00:31:46,070 --> 00:31:44,000
commit to do for you as i always do for

800
00:31:48,630 --> 00:31:46,080
every mission i will publish the

801
00:31:50,310 --> 00:31:48,640
bullseye chart as we call it that shows

802
00:31:51,590 --> 00:31:50,320
you all of the significant orbital

803
00:31:53,509 --> 00:31:51,600
parameters

804
00:31:55,190 --> 00:31:53,519
relative to the error that we were

805
00:31:58,149 --> 00:31:55,200
allowed that would have been within the

806
00:31:59,750 --> 00:31:58,159
spacecraft's capability to correct its

807
00:32:01,750 --> 00:31:59,760
trajectory

808
00:32:03,269 --> 00:32:01,760
it's going to be pretty close to plus or

809
00:32:05,669 --> 00:32:03,279
minus perfect

810
00:32:07,509 --> 00:32:05,679
and i will tweet that probably in the

811
00:32:09,830 --> 00:32:07,519
next day or two once we get it all

812
00:32:14,230 --> 00:32:09,840
processed looking forward to that report

813
00:32:18,070 --> 00:32:16,149

the video of it separating is one thing

814
00:32:19,750 --> 00:32:18,080
but the video we're gonna get kind of

815
00:32:21,269 --> 00:32:19,760
new imagery that we've never been able

816
00:32:24,149 --> 00:32:21,279
to get before on the entry descent

817
00:32:26,710 --> 00:32:24,159
landing can you talk about that

818
00:32:28,789 --> 00:32:26,720
this mission has more cameras on it than

819
00:32:30,310 --> 00:32:28,799
any mission we've ever sent before and i

820
00:32:32,310 --> 00:32:30,320
think the uh

821
00:32:33,909 --> 00:32:32,320
the images and the video that we're

822
00:32:35,669 --> 00:32:33,919
going to get back uh from the

823
00:32:37,029 --> 00:32:35,679
perseverance rover during that entry

824
00:32:38,710 --> 00:32:37,039
descent and landing and then once it's

825
00:32:41,350 --> 00:32:38,720
on the surface as well is just going to

826
00:32:43,750 --> 00:32:41,360
be absolutely stunning we'll be able to

827
00:32:44,950 --> 00:32:43,760
capture uh what what it looks like

828
00:32:47,029 --> 00:32:44,960
coming down i believe there's cameras

829
00:32:49,269 --> 00:32:47,039
looking up to get the the parachute

830
00:32:52,149 --> 00:32:49,279
we've got uh you know it is extremely

831
00:32:53,190 --> 00:32:52,159
well equipped and i think it's again you

832
00:32:54,549 --> 00:32:53,200
know

833
00:32:55,990 --> 00:32:54,559
going to be something that we can feel

834
00:32:57,669 --> 00:32:56,000
like we're actually there riding along

835
00:32:59,750 --> 00:32:57,679
with perseverance on the way down i see

836
00:33:02,310 --> 00:32:59,760
images of the sky crane

837
00:33:04,149 --> 00:33:02,320
we are yeah and in fact um

838
00:33:06,470 --> 00:33:04,159

what the administrator is referring to

839
00:33:08,389 --> 00:33:06,480
is we we took some ruggedized commercial

840
00:33:10,870 --> 00:33:08,399
cameras the type of kind of sport

841
00:33:12,950 --> 00:33:10,880
cameras you might see an extreme sport

842
00:33:14,549 --> 00:33:12,960
enthusiast and that type of thing

843
00:33:17,110 --> 00:33:14,559
and we basically

844
00:33:18,870 --> 00:33:17,120
distributed them around the spacecraft

845
00:33:21,430 --> 00:33:18,880
and so we will in fact be able to see

846
00:33:24,070 --> 00:33:21,440
that big 70 foot supersonic parachute

847
00:33:25,909 --> 00:33:24,080
inflate in a tenth of a second and we'll

848
00:33:27,430 --> 00:33:25,919
be able to see the uh

849
00:33:29,509 --> 00:33:27,440
we'll be able to see those big main

850
00:33:31,909 --> 00:33:29,519
engines fire on the descent stage and

851
00:33:32,789 --> 00:33:31,919
the road the rover drop down on its

852
00:33:34,230 --> 00:33:32,799
tether

853
00:33:36,870 --> 00:33:34,240
or we'll be able to see the rover

854
00:33:39,190 --> 00:33:36,880
touchdown and the descent stage fly away

855
00:33:40,710 --> 00:33:39,200
and um and i do want to say that one of

856
00:33:42,470 --> 00:33:40,720
the reasons one of the things that

857
00:33:44,389 --> 00:33:42,480
inspired us to add these cameras were

858
00:33:47,990 --> 00:33:44,399
the terrific imagery that we see coming

859
00:33:49,590 --> 00:33:48,000
off the launch vehicle you know um uh we

860
00:33:52,149 --> 00:33:49,600
uh it was

861
00:33:54,789 --> 00:33:52,159
you know it was it was time uh to uh

862
00:33:56,630 --> 00:33:54,799
have the opportunity to see a spacecraft

863
00:33:58,549 --> 00:33:56,640

land on another planet for the first

864
00:33:59,669 --> 00:33:58,559
time it was time to do that and we were

865
00:34:02,070 --> 00:33:59,679
pleased to be able to get them on the

866
00:34:03,990 --> 00:34:02,080
spacecraft i've seen video from a rocket

867
00:34:05,509 --> 00:34:04,000
landing on earth and now to see this

868
00:34:07,350 --> 00:34:05,519
video landing on another planet it's

869
00:34:09,030 --> 00:34:07,360
just uh something i'm really looking

870
00:34:11,270 --> 00:34:09,040
forward to and of course stay tuned to

871
00:34:12,230 --> 00:34:11,280
nasa's social media accounts you will

872
00:34:15,430 --> 00:34:12,240
likely

873
00:34:17,990 --> 00:34:15,440
see it there uh pretty quickly

874
00:34:20,710 --> 00:34:18,000
we're going to go now to lori

875
00:34:22,230 --> 00:34:20,720
to tell us about uh the mars helicopter

876
00:34:23,349 --> 00:34:22,240
ingenuity

877
00:34:24,550 --> 00:34:23,359
all right

878
00:34:27,030 --> 00:34:24,560
um so

879
00:34:29,669 --> 00:34:27,040
this is going to be a a fantastic

880
00:34:31,909 --> 00:34:29,679
experiment i think uh we're we're really

881
00:34:33,669 --> 00:34:31,919
really looking forward to this i'm not

882
00:34:36,470 --> 00:34:33,679
sure that people really can sometimes

883
00:34:37,829 --> 00:34:36,480
grasp just how difficult it is

884
00:34:38,869 --> 00:34:37,839
to fly

885
00:34:40,550 --> 00:34:38,879
and this is going to be of course our

886
00:34:42,470 --> 00:34:40,560
first ever demonstration of powered

887
00:34:45,510 --> 00:34:42,480
flight on another planet

888
00:34:47,589 --> 00:34:45,520

but if you think what's required to fly

889
00:34:50,149 --> 00:34:47,599
to get lift from a wing

890
00:34:52,550 --> 00:34:50,159
you need air to do that of course and

891
00:34:54,389 --> 00:34:52,560
the atmosphere on mars is about one

892
00:34:56,550 --> 00:34:54,399
percent of the density of earth's

893
00:34:58,470 --> 00:34:56,560
atmosphere and so without that air

894
00:34:59,829 --> 00:34:58,480
getting lift and being able to actually

895
00:35:01,270 --> 00:34:59,839
fly

896
00:35:02,710 --> 00:35:01,280
is something that's extremely

897
00:35:03,510 --> 00:35:02,720
challenging

898
00:35:06,230 --> 00:35:03,520
but

899
00:35:08,950 --> 00:35:06,240
the engineers out at jpl demonstrated

900
00:35:11,990 --> 00:35:08,960
that they could actually get that lift

901
00:35:13,910 --> 00:35:12,000
and fly a helicopter in that very very

902
00:35:15,750 --> 00:35:13,920
low density

903
00:35:17,829 --> 00:35:15,760
type of atmosphere

904
00:35:20,150 --> 00:35:17,839
and so we are really really excited to

905
00:35:21,270 --> 00:35:20,160
do this and demonstrate that capability

906
00:35:23,030 --> 00:35:21,280
i think

907
00:35:25,510 --> 00:35:23,040
going forward for scientific purposes

908
00:35:27,109 --> 00:35:25,520
and also in preparation for human land

909
00:35:29,829 --> 00:35:27,119
human exploration

910
00:35:31,910 --> 00:35:29,839
i think these types of aerial

911
00:35:34,950 --> 00:35:31,920
robotic capabilities are really going to

912
00:35:37,670 --> 00:35:34,960
add to the type of science we can do

913
00:35:40,470 --> 00:35:37,680

we'll be able to use such uh such a

914
00:35:42,310 --> 00:35:40,480
helicopter to do things like do some

915
00:35:44,069 --> 00:35:42,320
pre-surveillance do some reconnaissance

916
00:35:46,310 --> 00:35:44,079
of various areas that we want to decide

917
00:35:48,630 --> 00:35:46,320
do we really want to drive over or go

918
00:35:50,950 --> 00:35:48,640
over and look over there send them into

919
00:35:52,950 --> 00:35:50,960
areas that perhaps are of such

920
00:35:54,950 --> 00:35:52,960
scientific

921
00:35:55,910 --> 00:35:54,960
specialty that we don't really want we

922
00:35:57,430 --> 00:35:55,920
really want to make sure we don't

923
00:35:58,790 --> 00:35:57,440
contaminate them in any way so we're

924
00:36:01,030 --> 00:35:58,800
going to send something over there to do

925
00:36:04,069 --> 00:36:01,040
a special experiment and bring it back

926
00:36:06,310 --> 00:36:04,079
so we don't have to take everything over

927
00:36:08,390 --> 00:36:06,320
i think these are really going to expand

928
00:36:10,630 --> 00:36:08,400
and change the way we think about doing

929
00:36:12,870 --> 00:36:10,640
exploration on other planetary surfaces

930
00:36:15,030 --> 00:36:12,880
so really really looking forward to this

931
00:36:16,870 --> 00:36:15,040
very excited to see that as well lori

932
00:36:19,190 --> 00:36:16,880
okay let's uh go back to the media phone

933
00:36:22,310 --> 00:36:19,200
bridge now and take a question from joey

934
00:36:24,550 --> 00:36:22,320
roulette with reuters joey

935
00:36:25,910 --> 00:36:24,560
hey uh thanks for doing this um i was

936
00:36:27,910 --> 00:36:25,920
just wondering what is the total

937
00:36:30,150 --> 00:36:27,920
distance perseverance will travel in the

938
00:36:32,550 --> 00:36:30,160

next seven months and how patient will

939
00:36:34,550 --> 00:36:32,560
the team at jbl have to be during that

940
00:36:37,349 --> 00:36:34,560
time and i also just wanted to follow up

941
00:36:39,510 --> 00:36:37,359
on marcia's question earlier to matt

942
00:36:40,390 --> 00:36:39,520
what were the the feelings in the room

943
00:36:41,510 --> 00:36:40,400
when

944
00:36:43,910 --> 00:36:41,520
the teams were working through that

945
00:36:45,829 --> 00:36:43,920
comms issue after you know a long launch

946
00:36:48,069 --> 00:36:45,839
day were there sweaty palms or any

947
00:36:50,790 --> 00:36:48,079
nerves thanks

948
00:36:53,990 --> 00:36:50,800
uh dr z once you take the trip to mars

949
00:36:55,829 --> 00:36:54,000
how long is it

950
00:36:57,910 --> 00:36:55,839
distance six and a half months what's

951
00:36:59,990 --> 00:36:57,920
that you want he wanted in miles length

952
00:37:02,230 --> 00:37:00,000
of time the miles

953
00:37:02,950 --> 00:37:02,240
oh did he ask the distance i think oh

954
00:37:05,190 --> 00:37:02,960
yeah

955
00:37:07,510 --> 00:37:05,200
distance traverse million miles you know

956
00:37:09,510 --> 00:37:07,520
to travel from here to uh

957
00:37:11,750 --> 00:37:09,520
to mars and uh

958
00:37:13,430 --> 00:37:11,760
yeah the team that the team will uh

959
00:37:15,510 --> 00:37:13,440
they've got they still got plenty of

960
00:37:17,349 --> 00:37:15,520
preparation to do for entry descent and

961
00:37:19,030 --> 00:37:17,359
landing and surface operations so

962
00:37:21,430 --> 00:37:19,040
they'll be they'll be busy during that

963
00:37:23,270 --> 00:37:21,440

period of time for sure i do i do want

964
00:37:25,510 --> 00:37:23,280
to talk about the second question it's

965
00:37:27,910 --> 00:37:25,520
like how was it when we

966
00:37:29,349 --> 00:37:27,920
uh when the team addressed this issue

967
00:37:30,710 --> 00:37:29,359
i just want to tell you like it always

968
00:37:31,910 --> 00:37:30,720
says

969
00:37:33,430 --> 00:37:31,920
this is

970
00:37:34,710 --> 00:37:33,440
you want to be a rocket scientist this

971
00:37:36,950 --> 00:37:34,720
is what you do

972
00:37:39,670 --> 00:37:36,960
it's like it's not we're not just

973
00:37:43,589 --> 00:37:39,680
scoring all in once every time and what

974
00:37:45,750 --> 00:37:43,599
we do is we let the people work we had

975
00:37:48,230 --> 00:37:45,760
matt talking to us and we let him work

976
00:37:50,870 --> 00:37:48,240
and we listened uh what he had to say we

977
00:37:52,870 --> 00:37:50,880
we did not add data we listened what we

978
00:37:54,150 --> 00:37:52,880
had to say we communicated it like we

979
00:37:58,150 --> 00:37:54,160
always do

980
00:38:00,310 --> 00:37:58,160
mean you have to have a little bit of

981
00:38:02,390 --> 00:38:00,320
nerves if you're in that business

982
00:38:04,310 --> 00:38:02,400
but the point is that's why we love it

983
00:38:07,589 --> 00:38:04,320
so much it's because we solve problems

984
00:38:09,589 --> 00:38:07,599
together as teams right now i'm i know i

985
00:38:11,349 --> 00:38:09,599
do not see them right now but i feel

986
00:38:13,670 --> 00:38:11,359
them right now there are these amazing

987
00:38:15,829 --> 00:38:13,680
jpellers sitting there in pasadena

988
00:38:17,750 --> 00:38:15,839

there's some people right here solving

989
00:38:19,990 --> 00:38:17,760
this problem right now before i go to

990
00:38:22,230 --> 00:38:20,000
bed i will know what it is in detail

991
00:38:25,109 --> 00:38:22,240
i'll i'll take any bet with anybody who

992
00:38:28,310 --> 00:38:25,119
wants that right now why do i do that

993
00:38:29,670 --> 00:38:28,320
because i observe it every time and you

994
00:38:31,349 --> 00:38:29,680
know whether that's with jbl whether

995
00:38:33,510 --> 00:38:31,359
that's with goddard whether that's with

996
00:38:36,069 --> 00:38:33,520
lockheed martin this is the commitment

997
00:38:38,310 --> 00:38:36,079
that it takes and so for me uh it was

998
00:38:40,710 --> 00:38:38,320
exactly like it all this is it's just an

999
00:38:43,109 --> 00:38:40,720
issue it's rocket science

1000
00:38:45,430 --> 00:38:43,119
excellent no takers on that bet here uh

1001
00:38:48,870 --> 00:38:45,440
let's go back to the phone and marry liz

1002
00:38:51,190 --> 00:38:48,880
bender from inverse you have a question

1003
00:38:54,069 --> 00:38:51,200
yes thank you so much wow that was such

1004
00:38:57,270 --> 00:38:54,079
a beautiful launch today congratulations

1005
00:38:59,510 --> 00:38:57,280
um i am really excited about all of the

1006
00:39:01,750 --> 00:38:59,520
new functionality on this rover i've

1007
00:39:04,470 --> 00:39:01,760
been talking to the jpl engineers all

1008
00:39:06,310 --> 00:39:04,480
week about how we keep stepping up the

1009
00:39:08,390 --> 00:39:06,320
rover status and now i know we're

1010
00:39:11,349 --> 00:39:08,400
working toward getting to a place where

1011
00:39:14,390 --> 00:39:11,359
we can have huge rovers that can uh

1012
00:39:16,230 --> 00:39:14,400
assist humans in our exploration of mars

1013
00:39:19,589 --> 00:39:16,240

i'm just curious what are kind of the

1014
00:39:21,670 --> 00:39:19,599
steps that take us from here to there

1015
00:39:23,270 --> 00:39:21,680
i'm sure we don't know everything but

1016
00:39:26,069 --> 00:39:23,280
what do you kind of see is maybe the

1017
00:39:29,829 --> 00:39:26,079
next set of missions and how might they

1018
00:39:31,270 --> 00:39:29,839
improve on this one

1019
00:39:34,230 --> 00:39:31,280
i can take that one

1020
00:39:36,069 --> 00:39:34,240
um so i think the you know the next step

1021
00:39:38,790 --> 00:39:36,079
uh that's gonna

1022
00:39:40,069 --> 00:39:38,800
move us along towards uh human

1023
00:39:42,790 --> 00:39:40,079
exploration that we'd like to see at

1024
00:39:45,430 --> 00:39:42,800
some point in the decades to come here

1025
00:39:47,990 --> 00:39:45,440
is the mars sample return mission

1026
00:39:49,510 --> 00:39:48,000
this is uh the the very next mission to

1027
00:39:50,790 --> 00:39:49,520
mars that will follow on after

1028
00:39:52,630 --> 00:39:50,800
perseverance

1029
00:39:54,390 --> 00:39:52,640
and it's actually the next step in

1030
00:39:56,310 --> 00:39:54,400
trying to go back to mars and collect

1031
00:39:58,310 --> 00:39:56,320
the samples that that perseverance is

1032
00:40:00,069 --> 00:39:58,320
going to store on the surface for us and

1033
00:40:02,310 --> 00:40:00,079
that mars sample return mission is

1034
00:40:04,790 --> 00:40:02,320
actually going to demonstrate even more

1035
00:40:06,309 --> 00:40:04,800
capabilities that we're going to need

1036
00:40:09,109 --> 00:40:06,319
in order to

1037
00:40:10,550 --> 00:40:09,119
explore with humans at mars

1038
00:40:12,790 --> 00:40:10,560

first off that mission is going to have

1039
00:40:14,309 --> 00:40:12,800
to be able to demonstrate how to launch

1040
00:40:17,190 --> 00:40:14,319
from the surface of mars we're going to

1041
00:40:19,190 --> 00:40:17,200
send a rocket the mars ascent vehicle to

1042
00:40:20,870 --> 00:40:19,200
mars we're going to have to get those

1043
00:40:23,030 --> 00:40:20,880
samples and put them into that that

1044
00:40:24,230 --> 00:40:23,040
rocket and launch them into orbit

1045
00:40:26,950 --> 00:40:24,240
at mars and we certainly are going to

1046
00:40:28,309 --> 00:40:26,960
need that capability when we send humans

1047
00:40:30,470 --> 00:40:28,319
we're also going to demonstrate with

1048
00:40:32,630 --> 00:40:30,480
that mission the ability to rendezvous

1049
00:40:35,109 --> 00:40:32,640
in space around another planet we're

1050
00:40:36,790 --> 00:40:35,119
going to when we launch that sample into

1051
00:40:40,630 --> 00:40:36,800
orbit around mars we're going to have an

1052
00:40:42,950 --> 00:40:40,640
orbiter there also at mars and it will

1053
00:40:45,349 --> 00:40:42,960
hook up with that sample and capture it

1054
00:40:46,630 --> 00:40:45,359
into a capturing containment system on

1055
00:40:49,190 --> 00:40:46,640
the orbiter and then we'll have to

1056
00:40:51,030 --> 00:40:49,200
de-orbit at mars and return to earth and

1057
00:40:52,710 --> 00:40:51,040
all of those technologies and all those

1058
00:40:55,270 --> 00:40:52,720
capabilities are going to be necessary

1059
00:40:56,950 --> 00:40:55,280
when we send humans so i think we just

1060
00:40:59,750 --> 00:40:56,960
with each mission with each robotic

1061
00:41:01,510 --> 00:40:59,760
mission we uh demonstrate uh those next

1062
00:41:03,109 --> 00:41:01,520
capabilities that we're going to need

1063
00:41:05,109 --> 00:41:03,119

build build the bridge that we're going

1064
00:41:06,950 --> 00:41:05,119
to need to get to human exploration all

1065
00:41:08,470 --> 00:41:06,960
right thank you lori

1066
00:41:10,230 --> 00:41:08,480
yes sir

1067
00:41:11,829 --> 00:41:10,240
and that is that uh

1068
00:41:13,670 --> 00:41:11,839
you know there's three more things that

1069
00:41:15,670 --> 00:41:13,680
are really important uh

1070
00:41:17,750 --> 00:41:15,680
the first one is that actually roughly

1071
00:41:18,630 --> 00:41:17,760
in the same time frame we're uh trying

1072
00:41:21,430 --> 00:41:18,640
to

1073
00:41:22,950 --> 00:41:21,440
design an ice mapper one that is really

1074
00:41:24,950 --> 00:41:22,960
focused on actually finding water

1075
00:41:26,230 --> 00:41:24,960
resources because also that we want to

1076
00:41:28,390 --> 00:41:26,240
have available

1077
00:41:30,230 --> 00:41:28,400
for humans when we're going it's a part

1078
00:41:31,589 --> 00:41:30,240
of our budget that's under consideration

1079
00:41:33,109 --> 00:41:31,599
on the hill

1080
00:41:34,550 --> 00:41:33,119
i think the second thing i want to say

1081
00:41:36,630 --> 00:41:34,560
for the science community this is a

1082
00:41:37,670 --> 00:41:36,640
really interesting decadal that just

1083
00:41:39,349 --> 00:41:37,680
started

1084
00:41:40,309 --> 00:41:39,359
because this decadal

1085
00:41:43,030 --> 00:41:40,319
has

1086
00:41:45,190 --> 00:41:43,040
a lot more opportunity focused on

1087
00:41:46,069 --> 00:41:45,200
the collaboration with human exploration

1088
00:41:48,950 --> 00:41:46,079

than

1089
00:41:51,270 --> 00:41:48,960
in the past and the third piece is

1090
00:41:53,910 --> 00:41:51,280
increasingly as we

1091
00:41:55,670 --> 00:41:53,920
go to the moon uh with astronauts we

1092
00:41:58,069 --> 00:41:55,680
learn back all these

1093
00:42:00,950 --> 00:41:58,079
things that in the past perhaps we knew

1094
00:42:02,710 --> 00:42:00,960
but entirely new ways with commercial

1095
00:42:05,190 --> 00:42:02,720
partner with international partners

1096
00:42:07,750 --> 00:42:05,200
we're also going to learn how to build

1097
00:42:09,750 --> 00:42:07,760
these capabilities that actually bring

1098
00:42:12,630 --> 00:42:09,760
you know humans to mars in the late 30s

1099
00:42:14,470 --> 00:42:12,640
so for us that's really uh you know

1100
00:42:16,790 --> 00:42:14,480
these three things in parallel over and

1101
00:42:18,710 --> 00:42:16,800
above out of our sample return or just

1102
00:42:21,589 --> 00:42:18,720
you know really opening up the spectrum

1103
00:42:24,470 --> 00:42:21,599
on mars exploration to a level which no

1104
00:42:25,910 --> 00:42:24,480
other decade really has in the past

1105
00:42:27,430 --> 00:42:25,920
all right thank you dr z we have some

1106
00:42:28,950 --> 00:42:27,440
questions on social media that we're

1107
00:42:31,349 --> 00:42:28,960
going to get to in just a second but

1108
00:42:35,030 --> 00:42:31,359
first let's get a question in from eric

1109
00:42:37,510 --> 00:42:35,040
berger with ours technica eric

1110
00:42:38,710 --> 00:42:37,520
hi congratulations everyone um thanks

1111
00:42:41,109 --> 00:42:38,720
for doing this

1112
00:42:42,950 --> 00:42:41,119
wondering if someone there could clarify

1113
00:42:44,630 --> 00:42:42,960

whether the spacecraft is currently in

1114
00:42:47,030 --> 00:42:44,640
safe mode

1115
00:42:49,430 --> 00:42:47,040
and if that's normal procedure for this

1116
00:42:51,589 --> 00:42:49,440
time and you know when it's going to be

1117
00:42:55,510 --> 00:42:51,599
brought up to sort of regular operations

1118
00:42:58,390 --> 00:42:56,309
so

1119
00:43:01,109 --> 00:42:58,400
when we started uh this discussion we

1120
00:43:03,109 --> 00:43:01,119
weren't really sure um uh but it appears

1121
00:43:07,030 --> 00:43:03,119
as though we came off the um the launch

1122
00:43:07,990 --> 00:43:07,040
vehicle in uh our normal uh cruise mode

1123
00:43:10,069 --> 00:43:08,000
uh

1124
00:43:12,150 --> 00:43:10,079
i'm just getting some indications that

1125
00:43:13,670 --> 00:43:12,160
we had a minor transient temperature

1126
00:43:16,550 --> 00:43:13,680
transient that's

1127
00:43:18,630 --> 00:43:16,560
recovered that may have put us

1128
00:43:22,069 --> 00:43:18,640
into safe mode if so that's perfectly

1129
00:43:22,440 --> 00:43:22,079
fine the spacecraft is is happy there

1130
00:43:23,829 --> 00:43:22,450
but

1131
00:43:25,510 --> 00:43:23,839
[Music]

1132
00:43:27,270 --> 00:43:25,520
so the team is working through that

1133
00:43:29,750 --> 00:43:27,280
telemetry they're going to look through

1134
00:43:32,309 --> 00:43:29,760
the rest of the spacecraft health so far

1135
00:43:33,750 --> 00:43:32,319
everything i've seen looks good

1136
00:43:36,550 --> 00:43:33,760
and so

1137
00:43:38,710 --> 00:43:36,560
we'll know more in a little bit

1138
00:43:41,430 --> 00:43:38,720

and now to social media james on twitter

1139
00:43:44,710 --> 00:43:41,440
asks when is the landing date on mars we

1140
00:43:46,150 --> 00:43:44,720
know that to be february 18 2021 i think

1141
00:43:47,990 --> 00:43:46,160
at 3 30 eastern

1142
00:43:50,150 --> 00:43:48,000
something roughly like that stay tuned

1143
00:43:52,309 --> 00:43:50,160
on that one and then when is ingenuity's

1144
00:43:53,270 --> 00:43:52,319
first flight laurie

1145
00:43:54,550 --> 00:43:53,280
question

1146
00:43:56,309 --> 00:43:54,560
matt's going to have to

1147
00:43:58,710 --> 00:43:56,319
give me some help here but i believe

1148
00:44:01,349 --> 00:43:58,720
it's about 30 to 60 days into after we

1149
00:44:03,349 --> 00:44:01,359
land we're hoping uh to get it done

1150
00:44:06,790 --> 00:44:03,359
somewhere in that time frame maybe maybe

1151
00:44:09,030 --> 00:44:06,800
50 to 90 saws each day on mars we is is

1152
00:44:11,829 --> 00:44:09,040
called assault and so within the first

1153
00:44:14,150 --> 00:44:11,839
you know 50 to 90 mars days or so we

1154
00:44:16,790 --> 00:44:14,160
hope to fly start flying the helicopter

1155
00:44:19,190 --> 00:44:16,800
very good visage on twitter asks how

1156
00:44:22,230 --> 00:44:19,200
significant will it be to us humans if

1157
00:44:25,670 --> 00:44:22,240
we find signatures of ancient life or

1158
00:44:27,910 --> 00:44:25,680
maybe present life on mars

1159
00:44:29,829 --> 00:44:27,920
dr z

1160
00:44:31,190 --> 00:44:29,839
those are the kind of questions that

1161
00:44:33,589 --> 00:44:31,200
frankly

1162
00:44:35,349 --> 00:44:33,599
keep me up at night in excitement not in

1163
00:44:37,670 --> 00:44:35,359

worries like some other nights like the

1164
00:44:39,589 --> 00:44:37,680
last one

1165
00:44:42,790 --> 00:44:39,599
because

1166
00:44:47,430 --> 00:44:45,349
recognitions like that kind of

1167
00:44:49,109 --> 00:44:47,440
new insight like this

1168
00:44:50,950 --> 00:44:49,119
have transformed

1169
00:44:52,870 --> 00:44:50,960
not only how we think about ourselves

1170
00:44:55,109 --> 00:44:52,880
but frankly how we

1171
00:44:57,750 --> 00:44:55,119
think and act as humans right kind of

1172
00:45:00,069 --> 00:44:57,760
the recognition that the sun is the

1173
00:45:02,069 --> 00:45:00,079
center of the solar system not the earth

1174
00:45:04,630 --> 00:45:02,079
had tremendous impact

1175
00:45:05,670 --> 00:45:04,640
on earth and so for for me the life

1176
00:45:08,150 --> 00:45:05,680
question

1177
00:45:09,670 --> 00:45:08,160
is really quite uh foundational i'm

1178
00:45:11,030 --> 00:45:09,680
really interested what the administrator

1179
00:45:13,109 --> 00:45:11,040
says to this right you know for me as

1180
00:45:15,109 --> 00:45:13,119
kind of as a scientist it's really the

1181
00:45:17,109 --> 00:45:15,119
holy grail it's like you know when you

1182
00:45:19,829 --> 00:45:17,119
go from n equals one there's only one

1183
00:45:20,790 --> 00:45:19,839
life we've ever observed to n equals

1184
00:45:23,349 --> 00:45:20,800
many

1185
00:45:24,950 --> 00:45:23,359
multiple lives everything changes like

1186
00:45:27,270 --> 00:45:24,960
there's i mean you can do research you

1187
00:45:29,430 --> 00:45:27,280
can ask questions you have no clue how

1188
00:45:32,390 --> 00:45:29,440

to even start right it's it's like

1189
00:45:34,470 --> 00:45:32,400
opening up a whole new building of

1190
00:45:36,790 --> 00:45:34,480
exploration in a way you never could but

1191
00:45:38,470 --> 00:45:36,800
how do you feel about it well i i i

1192
00:45:40,390 --> 00:45:38,480
think there would be no bigger discovery

1193
00:45:42,790 --> 00:45:40,400
in the history of humanity than finding

1194
00:45:44,550 --> 00:45:42,800
life that is not on our own world and i

1195
00:45:46,710 --> 00:45:44,560
think it will fundamentally transform

1196
00:45:48,710 --> 00:45:46,720
how we do exploration in the future

1197
00:45:51,030 --> 00:45:48,720
we've been on this path of following the

1198
00:45:53,030 --> 00:45:51,040
water to determine if some place is

1199
00:45:56,230 --> 00:45:53,040
habitable or not now we know that there

1200
00:45:58,309 --> 00:45:56,240
was at one point in time habitability on

1201
00:45:59,990 --> 00:45:58,319
mars we don't know if it was inhabited

1202
00:46:02,870 --> 00:46:00,000
but if we were to make a discovery that

1203
00:46:04,550 --> 00:46:02,880
it in fact was i i would imagine you

1204
00:46:06,309 --> 00:46:04,560
know everything from that point forward

1205
00:46:08,069 --> 00:46:06,319
is going to be okay what other life is

1206
00:46:09,910 --> 00:46:08,079
out there how do we get to it how do we

1207
00:46:11,430 --> 00:46:09,920
study it how do we understand it it'll

1208
00:46:14,390 --> 00:46:11,440
be it'll be absolutely the biggest

1209
00:46:17,270 --> 00:46:14,400
discovery i think in in in history but i

1210
00:46:18,470 --> 00:46:17,280
also think um it it will enable us to do

1211
00:46:20,470 --> 00:46:18,480
more than we've ever been able to do

1212
00:46:22,630 --> 00:46:20,480
before because there will be such a

1213
00:46:26,390 --> 00:46:22,640

profound interest in going further and

1214
00:46:27,670 --> 00:46:26,400
doing more um so look i i mean i think

1215
00:46:30,710 --> 00:46:27,680
everybody's to have to answer that

1216
00:46:32,230 --> 00:46:30,720
question for themselves but certainly

1217
00:46:33,829 --> 00:46:32,240
there's a lot of interest in finding

1218
00:46:35,430 --> 00:46:33,839
life that's not on this world and that's

1219
00:46:37,430 --> 00:46:35,440
what we're trying to do

1220
00:46:38,550 --> 00:46:37,440
absolutely and thank you

1221
00:46:40,550 --> 00:46:38,560
for that

1222
00:46:43,349 --> 00:46:40,560
uh one more question from social media

1223
00:46:45,910 --> 00:46:43,359
dennis morrissette on facebook asks are

1224
00:46:47,589 --> 00:46:45,920
the cameras on board perseverance much

1225
00:46:49,990 --> 00:46:47,599
better than those on curiosity and we

1226
00:46:51,829 --> 00:46:50,000
understand that they are

1227
00:46:53,589 --> 00:46:51,839
they are yeah we have a number of

1228
00:46:55,430 --> 00:46:53,599
different cameras on board i talked

1229
00:46:57,349 --> 00:46:55,440
about the what we call the entry descent

1230
00:46:58,390 --> 00:46:57,359
and landing cameras those are those are

1231
00:47:02,950 --> 00:46:58,400
high

1232
00:47:05,030 --> 00:47:02,960
definition uh 1080p type video cameras

1233
00:47:06,470 --> 00:47:05,040
we also have a set of science cameras at

1234
00:47:07,589 --> 00:47:06,480
the top of the mass which are called

1235
00:47:11,109 --> 00:47:07,599
mastcam

1236
00:47:13,349 --> 00:47:11,119
z cameras and they're enhanced from

1237
00:47:15,990 --> 00:47:13,359
the curiosity cameras in that they have

1238
00:47:17,430 --> 00:47:16,000

a zoom capability uh and so those are

1239
00:47:19,109 --> 00:47:17,440
also better

1240
00:47:21,190 --> 00:47:19,119
we also have a set of engineering

1241
00:47:23,750 --> 00:47:21,200
cameras dispersed around the uh the

1242
00:47:25,910 --> 00:47:23,760
rover those engineering cameras we use

1243
00:47:27,589 --> 00:47:25,920
to um

1244
00:47:29,750 --> 00:47:27,599
to look at the surroundings to look for

1245
00:47:32,470 --> 00:47:29,760
hazards when we're driving

1246
00:47:35,190 --> 00:47:32,480
when we're doing our workspace

1247
00:47:36,790 --> 00:47:35,200
operations with our robot arm

1248
00:47:38,630 --> 00:47:36,800
and those sorts of things

1249
00:47:41,430 --> 00:47:38,640
and those are significantly higher

1250
00:47:43,349 --> 00:47:41,440
resolution than the ones on on curiosity

1251
00:47:45,190 --> 00:47:43,359
i i think they're on the order of about

1252
00:47:47,589 --> 00:47:45,200
20 megapixels

1253
00:47:48,790 --> 00:47:47,599
uh color cameras and uh curiosity

1254
00:47:50,870 --> 00:47:48,800
carried

1255
00:47:52,790 --> 00:47:50,880
one megapixel black and white cameras

1256
00:47:54,549 --> 00:47:52,800
just to give you a sense so

1257
00:47:56,230 --> 00:47:54,559
yeah we've kind of upgraded our cameras

1258
00:47:58,470 --> 00:47:56,240
across the board uh

1259
00:47:59,910 --> 00:47:58,480
on on the vehicle yeah

1260
00:48:02,390 --> 00:47:59,920
it's going to be like being there 20

1261
00:48:04,150 --> 00:48:02,400
megapixel yes it will be and we have a

1262
00:48:06,549 --> 00:48:04,160
might just add in you know we have a

1263
00:48:08,309 --> 00:48:06,559

microphone as well so not only will we

1264
00:48:10,069 --> 00:48:08,319
be able to see things but we'll be able

1265
00:48:12,150 --> 00:48:10,079
to hear them as well for the first time

1266
00:48:14,069 --> 00:48:12,160
and so uh it's it's going to provide a

1267
00:48:15,910 --> 00:48:14,079
real presence for us

1268
00:48:18,390 --> 00:48:15,920
that's outstanding all right let's go to

1269
00:48:21,109 --> 00:48:18,400
space.com and we have a question from

1270
00:48:23,270 --> 00:48:21,119
megan barteef go ahead megan

1271
00:48:25,670 --> 00:48:23,280
hi megan lapels from space.com here

1272
00:48:27,829 --> 00:48:25,680
thanks so much for taking my question um

1273
00:48:30,470 --> 00:48:27,839
the first part of it is for i think mr

1274
00:48:32,069 --> 00:48:30,480
bridenstine or dr blaise i was hoping

1275
00:48:34,710 --> 00:48:32,079
you could talk through sort of how

1276
00:48:37,109 --> 00:48:34,720
exciting it is to get a planetary

1277
00:48:39,030 --> 00:48:37,119
science mission like this off the ground

1278
00:48:40,790 --> 00:48:39,040
in the middle of a pandemic

1279
00:48:42,790 --> 00:48:40,800
and then for mr wallace if you could

1280
00:48:44,870 --> 00:48:42,800
talk a bit about what the next seven

1281
00:48:47,510 --> 00:48:44,880
months look like for the team

1282
00:48:49,750 --> 00:48:47,520
and any way that that has been chased or

1283
00:48:52,230 --> 00:48:49,760
affected by the pandemic as well thanks

1284
00:48:56,309 --> 00:48:54,390
sure um you know i'll i'll start and

1285
00:48:57,430 --> 00:48:56,319
then i'll let laurie take it from there

1286
00:48:58,630 --> 00:48:57,440
but um

1287
00:49:00,950 --> 00:48:58,640
you know when we think about this

1288
00:49:03,349 --> 00:49:00,960

particular mission uh when i first came

1289
00:49:05,190 --> 00:49:03,359
to nasa it was it was quite frankly in

1290
00:49:06,390 --> 00:49:05,200
trouble and people were worried about

1291
00:49:08,309 --> 00:49:06,400
whether or not we were going to be able

1292
00:49:10,630 --> 00:49:08,319
to launch in 2020 at all

1293
00:49:12,950 --> 00:49:10,640
um and and then you know we we made it

1294
00:49:15,589 --> 00:49:12,960
even more complex by saying hey we want

1295
00:49:17,349 --> 00:49:15,599
to put a helicopter on here as well

1296
00:49:20,309 --> 00:49:17,359
we gave it the resources we gave it the

1297
00:49:21,990 --> 00:49:20,319
attention jpl did a magnificent job

1298
00:49:23,829 --> 00:49:22,000
at one point we had a cracked heat

1299
00:49:25,510 --> 00:49:23,839
shield and of course lockheed martin and

1300
00:49:27,589 --> 00:49:25,520
our partners there you know moved

1301
00:49:29,750 --> 00:49:27,599
forward to get that fixed

1302
00:49:31,829 --> 00:49:29,760
so yes adversity all along the way but

1303
00:49:32,790 --> 00:49:31,839
this is true for any project of this

1304
00:49:35,270 --> 00:49:32,800
nature

1305
00:49:37,829 --> 00:49:35,280
uh but but you know what um

1306
00:49:39,829 --> 00:49:37,839
what we didn't expect uh was something

1307
00:49:41,430 --> 00:49:39,839
that is as you identified the the

1308
00:49:42,790 --> 00:49:41,440
pandemic

1309
00:49:44,790 --> 00:49:42,800
and so

1310
00:49:46,790 --> 00:49:44,800
you add all of the adversity in a

1311
00:49:49,190 --> 00:49:46,800
project like this together and then you

1312
00:49:52,069 --> 00:49:49,200
put on top of that the coronavirus and

1313
00:49:54,549 --> 00:49:52,079

people like a large fraction of nasa's

1314
00:49:57,190 --> 00:49:54,559
workforce and jpl's workforce in the ula

1315
00:49:59,589 --> 00:49:57,200
workforce actually staying at home

1316
00:50:01,990 --> 00:49:59,599
um and and and the other part you know

1317
00:50:03,670 --> 00:50:02,000
smaller parts of our organizations going

1318
00:50:06,230 --> 00:50:03,680
to work with personal protective

1319
00:50:08,790 --> 00:50:06,240
equipment socially distanced uh breaking

1320
00:50:10,829 --> 00:50:08,800
up uh you know the the the shifts so

1321
00:50:13,670 --> 00:50:10,839
that we can minimize the amount of

1322
00:50:15,750 --> 00:50:13,680
contact uh i'm not gonna lie it's it's

1323
00:50:16,790 --> 00:50:15,760
uh it's a challenge it's very stressful

1324
00:50:19,190 --> 00:50:16,800
um

1325
00:50:20,950 --> 00:50:19,200
but look at the the teams made it happen

1326
00:50:23,190 --> 00:50:20,960
and i will tell you i know

1327
00:50:26,309 --> 00:50:23,200
tori bruno said it earlier we could not

1328
00:50:28,150 --> 00:50:26,319
be more proud of of what these this

1329
00:50:30,630 --> 00:50:28,160
integrated team was able to pull off

1330
00:50:31,670 --> 00:50:30,640
here um so yes it's it's very very

1331
00:50:35,030 --> 00:50:31,680
exciting

1332
00:50:37,190 --> 00:50:35,040
lori and i'll just um echo some of what

1333
00:50:39,910 --> 00:50:37,200
what jim just said there um

1334
00:50:42,150 --> 00:50:39,920
you know our teams across the board um

1335
00:50:44,549 --> 00:50:42,160
this is you know within nasa at nasa

1336
00:50:46,150 --> 00:50:44,559
headquarters at multiple centers across

1337
00:50:49,589 --> 00:50:46,160
the country nasa centers across the

1338
00:50:50,390 --> 00:50:49,599

country at jpl all came together to try

1339
00:50:52,390 --> 00:50:50,400
and

1340
00:50:56,230 --> 00:50:52,400
make sure that we got mars 2020 to the

1341
00:50:58,950 --> 00:50:56,240
launch pad today it was truly a team

1342
00:51:00,549 --> 00:50:58,960
effort and in every single case everyone

1343
00:51:02,710 --> 00:51:00,559
stood up and said yes we want to do what

1344
00:51:05,829 --> 00:51:02,720
we can to help

1345
00:51:08,150 --> 00:51:05,839
whether it was providing aircraft to to

1346
00:51:09,349 --> 00:51:08,160
transport personnel or whether it was

1347
00:51:11,109 --> 00:51:09,359
you know trying to make sure that we

1348
00:51:12,870 --> 00:51:11,119
have the right protective equipment that

1349
00:51:14,630 --> 00:51:12,880
we were providing the support that the

1350
00:51:16,950 --> 00:51:14,640
teams needed

1351
00:51:19,349 --> 00:51:16,960
to to come in to work if they if they

1352
00:51:21,430 --> 00:51:19,359
were needed to to put hands-on

1353
00:51:24,069 --> 00:51:21,440
hardware

1354
00:51:25,829 --> 00:51:24,079
but it was not easy and and as jim says

1355
00:51:27,990 --> 00:51:25,839
a lot of our workforce has been working

1356
00:51:30,470 --> 00:51:28,000
from home and and trying to

1357
00:51:33,109 --> 00:51:30,480
to balance uh the work that had to get

1358
00:51:35,190 --> 00:51:33,119
done uh with uh sharing the

1359
00:51:36,630 --> 00:51:35,200
wi-fi bandwidth with their spouses who

1360
00:51:37,990 --> 00:51:36,640
are also trying to get their work done

1361
00:51:40,150 --> 00:51:38,000
and their kids are trying to do their

1362
00:51:42,710 --> 00:51:40,160
school work and get their work done

1363
00:51:44,710 --> 00:51:42,720

um it's been a real challenge and and i

1364
00:51:47,190 --> 00:51:44,720
have to say that um

1365
00:51:48,950 --> 00:51:47,200
i think all of us uh

1366
00:51:52,390 --> 00:51:48,960
within the planetary science division

1367
00:51:54,630 --> 00:51:52,400
are are so excited and so happy that we

1368
00:51:56,870 --> 00:51:54,640
were able to to pull this off to

1369
00:51:58,230 --> 00:51:56,880
actually get it done it was a lot of

1370
00:51:59,990 --> 00:51:58,240
work but we're

1371
00:52:02,390 --> 00:52:00,000
i'm proud of my team i'm proud of the

1372
00:52:05,270 --> 00:52:02,400
jpl team i'm proud of of every one of

1373
00:52:07,030 --> 00:52:05,280
them we we somehow we made it through

1374
00:52:08,390 --> 00:52:07,040
this

1375
00:52:12,230 --> 00:52:08,400
all right we'll get a question in from

1376
00:52:13,750 --> 00:52:12,240
keith cowing with nasa watch keith

1377
00:52:15,510 --> 00:52:13,760
uh thanks for

1378
00:52:17,030 --> 00:52:15,520
giving us this opportunity today right

1379
00:52:19,430 --> 00:52:17,040
now the nation's in the midst of a

1380
00:52:21,829 --> 00:52:19,440
pandemic nightmare and it's not going to

1381
00:52:24,790 --> 00:52:21,839
end anytime soon it's going to be a dark

1382
00:52:26,630 --> 00:52:24,800
scary winter with 328 million americans

1383
00:52:28,630 --> 00:52:26,640
going to be you know staring at their

1384
00:52:29,990 --> 00:52:28,640
computers and their tvs as well billions

1385
00:52:32,309 --> 00:52:30,000
of people around the world

1386
00:52:34,630 --> 00:52:32,319
nasa's sending an astrobiology droid to

1387
00:52:36,390 --> 00:52:34,640
mars to look for evidence of life it may

1388
00:52:37,670 --> 00:52:36,400

discover that we're not alone now how

1389
00:52:39,349 --> 00:52:37,680
cool is that

1390
00:52:41,109 --> 00:52:39,359
it's been nearly half a century since

1391
00:52:43,589 --> 00:52:41,119
the viking landers attempted much the

1392
00:52:46,069 --> 00:52:43,599
same task now the world could use some

1393
00:52:47,510 --> 00:52:46,079
good news right now how is nasa going to

1394
00:52:49,190 --> 00:52:47,520
involve the world in a way that speaks

1395
00:52:50,549 --> 00:52:49,200
to the way that we're all isolated yet

1396
00:52:52,470 --> 00:52:50,559
still connected

1397
00:52:54,630 --> 00:52:52,480
in essence how will nasa make the

1398
00:52:58,150 --> 00:52:54,640
perseverance mission a bright light

1399
00:52:59,589 --> 00:52:58,160
amidst an otherwise very gloomy winter

1400
00:53:02,630 --> 00:52:59,599
that's an important question i think the

1401
00:53:05,030 --> 00:53:02,640
word the key word that you use there

1402
00:53:06,870 --> 00:53:05,040
is the word astrobiology

1403
00:53:09,190 --> 00:53:06,880
um you know i don't even know if maybe

1404
00:53:11,670 --> 00:53:09,200
10 years ago we even used that word but

1405
00:53:13,349 --> 00:53:11,680
now it's it's it's very apparent that we

1406
00:53:16,470 --> 00:53:13,359
have water throughout our own solar

1407
00:53:18,390 --> 00:53:16,480
system um and and there are places in

1408
00:53:20,710 --> 00:53:18,400
our own solar system that could in fact

1409
00:53:22,549 --> 00:53:20,720
be habitable not just in the ancient

1410
00:53:26,069 --> 00:53:22,559
past but even today

1411
00:53:27,829 --> 00:53:26,079
and um and so so yeah i think that uh

1412
00:53:29,510 --> 00:53:27,839
you know putting together these kinds of

1413
00:53:31,430 --> 00:53:29,520

missions that could

1414
00:53:34,309 --> 00:53:31,440
not just inspire the next generations

1415
00:53:36,309 --> 00:53:34,319
but um inspire those of us that you know

1416
00:53:38,309 --> 00:53:36,319
are in the middle of our career or maybe

1417
00:53:40,710 --> 00:53:38,319
even retired these are these are the

1418
00:53:43,190 --> 00:53:40,720
kind of things that nasa can do in very

1419
00:53:45,030 --> 00:53:43,200
difficult times and uh and we're excited

1420
00:53:46,309 --> 00:53:45,040
about it and we have a follow-up to that

1421
00:53:48,309 --> 00:53:46,319
from dr z

1422
00:53:50,790 --> 00:53:48,319
i really appreciate that question uh

1423
00:53:53,030 --> 00:53:50,800
keith and you know uh talked about this

1424
00:53:54,950 --> 00:53:53,040
as a bright light uh i

1425
00:53:56,790 --> 00:53:54,960
i believe that so much and i think from

1426
00:53:58,630 --> 00:53:56,800
the beginning the administrator and i

1427
00:54:00,470 --> 00:53:58,640
talked about it just that in those words

1428
00:54:02,790 --> 00:54:00,480
pretty much and you know it's great to

1429
00:54:05,430 --> 00:54:02,800
hear from you also you talked about how

1430
00:54:07,030 --> 00:54:05,440
we're communicating uh with uh so many

1431
00:54:09,750 --> 00:54:07,040
uh people and i think

1432
00:54:12,390 --> 00:54:09,760
the one thing we share here and i i know

1433
00:54:14,069 --> 00:54:12,400
i speak for my friends on this panel uh

1434
00:54:16,630 --> 00:54:14,079
is that

1435
00:54:19,510 --> 00:54:16,640
we really want to aspire to open up the

1436
00:54:22,630 --> 00:54:19,520
communication in a more broad fashion to

1437
00:54:25,829 --> 00:54:22,640
more people to talk about the excitement

1438
00:54:27,670 --> 00:54:25,839

of uh stem research the excitement of uh

1439
00:54:29,750 --> 00:54:27,680
space research the opportunities that

1440
00:54:33,109 --> 00:54:29,760
come from that it's exciting and it's

1441
00:54:35,670 --> 00:54:33,119
also good for the world and so for us uh

1442
00:54:37,589 --> 00:54:35,680
the way we're doing that of course is we

1443
00:54:38,390 --> 00:54:37,599
as we innovate new missions we try to

1444
00:54:40,549 --> 00:54:38,400
innovate

1445
00:54:42,470 --> 00:54:40,559
new communications and i just want to

1446
00:54:44,069 --> 00:54:42,480
tell you one of the things that made me

1447
00:54:46,069 --> 00:54:44,079
very proud today

1448
00:54:48,470 --> 00:54:46,079
is the communication

1449
00:54:50,950 --> 00:54:48,480
efforts that were set up during the

1450
00:54:54,309 --> 00:54:50,960
entire week you know this team

1451
00:54:56,309 --> 00:54:54,319
at uh headquarters led by uh jim and his

1452
00:54:58,470 --> 00:54:56,319
uh his core group paul

1453
00:55:00,710 --> 00:54:58,480
one of your people there i think did

1454
00:55:04,069 --> 00:55:00,720
just an amazing job really telling the

1455
00:55:05,349 --> 00:55:04,079
story more broadly really yes it's a

1456
00:55:06,950 --> 00:55:05,359
launch

1457
00:55:09,430 --> 00:55:06,960
but it's the bright light we're talking

1458
00:55:11,190 --> 00:55:09,440
about yes it's a mission

1459
00:55:13,349 --> 00:55:11,200
but we're talking about transformative

1460
00:55:16,549 --> 00:55:13,359
science and transformative exploration

1461
00:55:17,349 --> 00:55:16,559
that goes beyond uh robotic exploration

1462
00:55:19,349 --> 00:55:17,359
and

1463
00:55:21,109 --> 00:55:19,359

we we think of this as a constant

1464
00:55:23,990 --> 00:55:21,119
challenge just like

1465
00:55:25,829 --> 00:55:24,000
the missions need to be reinvented

1466
00:55:27,430 --> 00:55:25,839
as we go because we want to do new

1467
00:55:30,470 --> 00:55:27,440
things we also need to reinvent

1468
00:55:33,030 --> 00:55:30,480
communication you know i think

1469
00:55:36,230 --> 00:55:33,040
the social media efforts that nasa has

1470
00:55:37,589 --> 00:55:36,240
are second to none but we we should not

1471
00:55:39,910 --> 00:55:37,599
sit still

1472
00:55:42,549 --> 00:55:39,920
we always want to go beyond that we want

1473
00:55:45,510 --> 00:55:42,559
to go to schools that have not heard

1474
00:55:48,069 --> 00:55:45,520
that because in that school room perhaps

1475
00:55:51,190 --> 00:55:48,079
in a place where none of us has ever

1476
00:55:54,230 --> 00:55:51,200
been is that kid whose life are changing

1477
00:55:56,549 --> 00:55:54,240
because she sees for the first time that

1478
00:55:58,630 --> 00:55:56,559
she too could be part of this amazing

1479
00:56:02,150 --> 00:55:58,640
thing or something that's exciting to

1480
00:56:04,549 --> 00:56:02,160
her which is just this big so i i really

1481
00:56:06,390 --> 00:56:04,559
appreciate the question uh keith kind of

1482
00:56:08,549 --> 00:56:06,400
yes it's exciting what we're doing here

1483
00:56:11,190 --> 00:56:08,559
but the communication and how we talk

1484
00:56:12,069 --> 00:56:11,200
about it is also really relevant and i

1485
00:56:14,390 --> 00:56:12,079
think

1486
00:56:17,109 --> 00:56:14,400
we understand that and we also recognize

1487
00:56:18,710 --> 00:56:17,119
that we need to as we go forward learn

1488
00:56:21,109 --> 00:56:18,720

and evolve

1489
00:56:23,270 --> 00:56:21,119
that was well communicated as

1490
00:56:24,470 --> 00:56:23,280
as well thank you dr z the toughest

1491
00:56:26,710 --> 00:56:24,480
question we're going to slip one more

1492
00:56:29,270 --> 00:56:26,720
and we only have a few minutes left uh

1493
00:56:30,870 --> 00:56:29,280
probably is the toughest we'll let jim

1494
00:56:33,270 --> 00:56:30,880
decide because it's going to you

1495
00:56:35,750 --> 00:56:33,280
facebook eva asks when do you project

1496
00:56:37,270 --> 00:56:35,760
astronauts will arrive on mars

1497
00:56:38,630 --> 00:56:37,280
well i think it could definitely be

1498
00:56:41,190 --> 00:56:38,640
technologically it could be the

1499
00:56:43,349 --> 00:56:41,200
mid-2030s

1500
00:56:45,430 --> 00:56:43,359
the the the risk here is not the

1501
00:56:46,950 --> 00:56:45,440
technology and not the amazing teams

1502
00:56:48,710 --> 00:56:46,960
that we have at nasa and with our

1503
00:56:49,670 --> 00:56:48,720
commercial partners and international

1504
00:56:51,589 --> 00:56:49,680
partners

1505
00:56:53,109 --> 00:56:51,599
the challenge is and always has been

1506
00:56:54,950 --> 00:56:53,119
political

1507
00:56:57,270 --> 00:56:54,960
to do these kinds of missions requires

1508
00:56:59,030 --> 00:56:57,280
budgets i will tell you this the the

1509
00:57:00,630 --> 00:56:59,040
president's budget request right now

1510
00:57:02,630 --> 00:57:00,640
that is being considered by the house

1511
00:57:04,390 --> 00:57:02,640
and the senate is the highest budget

1512
00:57:06,950 --> 00:57:04,400
that nasa has ever had in nominal

1513
00:57:08,630 --> 00:57:06,960

dollars the current budget that we have

1514
00:57:10,309 --> 00:57:08,640
is the highest budget that we've ever

1515
00:57:12,789 --> 00:57:10,319
had in nominal dollars and next year

1516
00:57:14,789 --> 00:57:12,799
it's going up even higher

1517
00:57:16,390 --> 00:57:14,799
so and that's with bipartisan support in

1518
00:57:18,549 --> 00:57:16,400
the house and the senate we have gotten

1519
00:57:20,950 --> 00:57:18,559
the budget that we have we and of course

1520
00:57:22,470 --> 00:57:20,960
next year we want to get even more and

1521
00:57:24,390 --> 00:57:22,480
we need more because we need to go to

1522
00:57:25,910 --> 00:57:24,400
the moon sustainably to prove that we

1523
00:57:27,910 --> 00:57:25,920
can live and work on another world for

1524
00:57:29,670 --> 00:57:27,920
long periods of time and we go to the

1525
00:57:31,030 --> 00:57:29,680
moon because it's always a three-day

1526
00:57:32,870 --> 00:57:31,040
journey home

1527
00:57:34,549 --> 00:57:32,880
and we can we can prove what we need to

1528
00:57:36,390 --> 00:57:34,559
prove there so that we can eventually

1529
00:57:38,230 --> 00:57:36,400
send humans to mars we've got the

1530
00:57:40,309 --> 00:57:38,240
robotic precursor missions which we've

1531
00:57:42,470 --> 00:57:40,319
been talking about today but we also

1532
00:57:45,670 --> 00:57:42,480
have human precursor missions at the

1533
00:57:48,309 --> 00:57:45,680
moon we love apollo the challenge with

1534
00:57:49,829 --> 00:57:48,319
apollo is that it ended

1535
00:57:51,030 --> 00:57:49,839
and now we're going back to the moon

1536
00:57:53,109 --> 00:57:51,040
with commercial partners and

1537
00:57:54,549 --> 00:57:53,119
international partners under the artemis

1538
00:57:56,549 --> 00:57:54,559

program

1539
00:57:58,789 --> 00:57:56,559
learning how to use the resources of

1540
00:58:00,390 --> 00:57:58,799
another world in this case the moon so

1541
00:58:03,510 --> 00:58:00,400
we can apply all of that for our

1542
00:58:05,109 --> 00:58:03,520
eventual long-duration mission

1543
00:58:06,549 --> 00:58:05,119
to mars

1544
00:58:08,390 --> 00:58:06,559
we can do it

1545
00:58:10,870 --> 00:58:08,400
and of course it's going to require you

1546
00:58:13,349 --> 00:58:10,880
know financial support um the house and

1547
00:58:16,470 --> 00:58:13,359
the senate are considering uh the budget

1548
00:58:18,549 --> 00:58:16,480
right now and i would just uh extend a

1549
00:58:19,430 --> 00:58:18,559
request that when they think about these

1550
00:58:21,349 --> 00:58:19,440
things

1551
00:58:23,270 --> 00:58:21,359
for the budget request think about what

1552
00:58:25,349 --> 00:58:23,280
happened today think about what's going

1553
00:58:27,430 --> 00:58:25,359
to happen in february when we land on

1554
00:58:30,069 --> 00:58:27,440
mars again this time with an

1555
00:58:32,390 --> 00:58:30,079
astrobiology mission and a helicopter

1556
00:58:33,990 --> 00:58:32,400
and an ability to convert carbon dioxide

1557
00:58:35,829 --> 00:58:34,000
into oxygen

1558
00:58:37,349 --> 00:58:35,839
think about what we just did with

1559
00:58:38,950 --> 00:58:37,359
launching american astronauts on

1560
00:58:40,630 --> 00:58:38,960
american rockets for the first time

1561
00:58:42,789 --> 00:58:40,640
since you know

1562
00:58:44,870 --> 00:58:42,799
nine years ago 2011 the retirement of

1563
00:58:47,190 --> 00:58:44,880

the space shuttles look

1564
00:58:49,510 --> 00:58:47,200
we can do these things they require

1565
00:58:51,349 --> 00:58:49,520
resources they require the american

1566
00:58:52,789 --> 00:58:51,359
public to believe in what we're doing

1567
00:58:54,470 --> 00:58:52,799
and of course it requires mission

1568
00:58:55,670 --> 00:58:54,480
success and i will tell you this team

1569
00:58:57,589 --> 00:58:55,680
has proven

1570
00:58:59,190 --> 00:58:57,599
that they can successfully accomplish

1571
00:59:01,349 --> 00:58:59,200
these missions if we were to receive the

1572
00:59:03,270 --> 00:59:01,359
budgets i'm very confident that we could

1573
00:59:05,589 --> 00:59:03,280
get there by the mid-2030s

1574
00:59:07,990 --> 00:59:05,599
all right and we will close on that note

1575
00:59:09,670 --> 00:59:08,000
we appreciate all of you being here our

1576
00:59:11,510 --> 00:59:09,680
special guest today we know you woke up

1577
00:59:13,750 --> 00:59:11,520
early so thanks for sticking around and

1578
00:59:15,750 --> 00:59:13,760
participating in this post-launch news

1579
00:59:17,750 --> 00:59:15,760
conference and thank you to all of our

1580
00:59:19,430 --> 00:59:17,760
social media participants as well as

1581
00:59:21,190 --> 00:59:19,440
members of the media for more

1582
00:59:23,190 --> 00:59:21,200
information on today's mission you can

1583
00:59:26,390 --> 00:59:23,200
go to nasa.gov

1584
00:59:28,789 --> 00:59:26,400
nasa.gov forward slash perseverance and

1585
00:59:31,589 --> 00:59:28,799
mars.nasa.gov

1586
00:59:33,430 --> 00:59:31,599
forward slash perseverance

1587
00:59:45,430 --> 00:59:33,440
thank you for joining us everyone have a

1588
00:59:48,789 --> 00:59:47,190

kelsey walker i'm a materials and

1589
00:59:50,710 --> 00:59:48,799
process design engineer for norfolk

1590
00:59:52,549 --> 00:59:50,720
grumman the lead contractor for the

1591
00:59:54,870 --> 00:59:52,559
solid rocket boosters of nasa space

1592
00:59:56,290 --> 00:59:54,880
launch system this is rocket science in

1593
00:59:58,789 --> 00:59:56,300
60 seconds

1594
01:00:01,109 --> 00:59:58,799
[Music]

1595
01:00:02,549 --> 01:00:01,119
these boosters produce 7.2 million

1596
01:00:04,470 --> 01:00:02,559
pounds of thrust during liftoff and

1597
01:00:06,230 --> 01:00:04,480
flight i work on the insulation that

1598
01:00:10,390 --> 01:00:06,240
protects the sls solid rocket booster

1599
01:00:14,390 --> 01:00:12,150
here in the insulation and component

1600
01:00:16,069 --> 01:00:14,400
workcenter the insulation a rubber based