1
00:01:06,149 --> 00:00:54,700
[Music]

2
00:01:11,429 --> 00:01:08,870
generation spacex cargo dragon

3
00:01:13,590 --> 00:01:11,439
today's launch a nasa mission to deliver

4
00:01:15,670 --> 00:01:13,600
critical supplies and research to the

5
00:01:17,990 --> 00:01:15,680
astronauts living and working aboard the

6
00:01:20,630 --> 00:01:18,000
international space station

7
00:01:22,550 --> 00:01:20,640
liftoff is scheduled for 11 17 a.m

8
00:01:24,070 --> 00:01:22,560
eastern time

9
00:01:26,230 --> 00:01:24,080
good morning and welcome to kennedy

10
00:01:28,710 --> 00:01:26,240
space center in florida i'm tori

11
00:01:30,390 --> 00:01:28,720
mclinden with nasa public affairs we are

12
00:01:32,550 --> 00:01:30,400
thrilled to have you join us during this

13
00:01:35,270 --> 00:01:32,560

holiday season to watch the newly

14
00:01:37,270 --> 00:01:35,280
redesigned cargo dragon spacecraft begin

15
00:01:39,510 --> 00:01:37,280
its debut flight

16
00:01:41,510 --> 00:01:39,520
today kicks off a new series of resupply

17
00:01:43,749 --> 00:01:41,520
missions to the space station

18
00:01:45,670 --> 00:01:43,759
the original dragon 1 spacecraft

19
00:01:48,389 --> 00:01:45,680
completed its 20th and final cargo

20
00:01:50,789 --> 00:01:48,399
resupply mission earlier this year now

21
00:01:52,550 --> 00:01:50,799
the upgraded dragon 2 will carry the

22
00:01:55,190 --> 00:01:52,560
torch with even more capacity for

23
00:01:57,749 --> 00:01:55,200
science payloads it will lift off on a

24
00:02:00,630 --> 00:01:57,759
spacex falcon 9 rocket from historic

25
00:02:02,469 --> 00:02:00,640
launch complex 39a

26
00:02:05,030 --> 00:02:02,479
we have teams across the country

27
00:02:07,990 --> 00:02:05,040
following today's operations from spacex

28
00:02:10,469 --> 00:02:08,000
headquarters in hawthorne california to

29
00:02:12,070 --> 00:02:10,479
mission control in houston and right

30
00:02:14,070 --> 00:02:12,080
here in florida

31
00:02:14,949 --> 00:02:14,080
we'll also have experts

32
00:02:16,309 --> 00:02:14,959
um

33
00:02:18,309 --> 00:02:16,319
talk with them about the science on this

34
00:02:19,990 --> 00:02:18,319
mission

35
00:02:22,390 --> 00:02:20,000
fueling is underway on the falcon 9

36
00:02:23,350 --> 00:02:22,400
rocket and there's a live view as we

37
00:02:24,550 --> 00:02:23,360
speak

38
00:02:26,949 --> 00:02:24,560

we are now at

39
00:02:28,390 --> 00:02:26,959
t minus 30 minutes and counting

40
00:02:30,470 --> 00:02:28,400
and as with all missions to the

41
00:02:33,030 --> 00:02:30,480
international space station the launch

42
00:02:35,270 --> 00:02:33,040
window today is instantaneous

43
00:02:37,830 --> 00:02:35,280
that means the rocket must launch at the

44
00:02:39,910 --> 00:02:37,840
exact second of the planned liftoff in

45
00:02:41,670 --> 00:02:39,920
order to reach the correct orbit to get

46
00:02:44,150 --> 00:02:41,680
to the space station

47
00:02:47,190 --> 00:02:44,160
cargo dragon will dock to the station at

48
00:02:48,309 --> 00:02:47,200
about 1 30 pm eastern time

49
00:02:49,990 --> 00:02:48,319
tomorrow

50
00:02:52,309 --> 00:02:50,000
and dragon is of course packed with

51
00:02:54,630 --> 00:02:52,319
critical supplies and research but also

52
00:02:57,030 --> 00:02:54,640
a few items to help make the crew feel a

53
00:02:58,550 --> 00:02:57,040
little more at home for the holidays

54
00:03:00,949 --> 00:02:58,560
we'll take a closer look at the science

55
00:03:04,070 --> 00:03:00,959
on board but first here are some basics

56
00:03:06,149 --> 00:03:04,080
on this mission

57
00:03:08,229 --> 00:03:06,159
this will be the first launch for spacex

58
00:03:10,710 --> 00:03:08,239
under nasa's second commercial resupply

59
00:03:12,390 --> 00:03:10,720
services contract and the company's 21st

60
00:03:13,910 --> 00:03:12,400
mission of its kind

61
00:03:15,910 --> 00:03:13,920
this will be the fourth flight for the

62
00:03:17,990 --> 00:03:15,920
falcon 9 first stage that will once

63
00:03:19,509 --> 00:03:18,000

again return to earth to be refurbished

64
00:03:21,910 --> 00:03:19,519
for its next mission

65
00:03:24,550 --> 00:03:21,920
cargo dragon will deliver more than 6

66
00:03:27,030 --> 00:03:24,560
400 pounds of research and supplies to

67
00:03:29,509 --> 00:03:27,040
the astronauts on board and this will be

68
00:03:31,589 --> 00:03:29,519
the first flight for the upgraded cargo

69
00:03:33,190 --> 00:03:31,599
dragon that will now perform automated

70
00:03:34,550 --> 00:03:33,200
rendezvous and docking with the space

71
00:03:37,910 --> 00:03:34,560
station

72
00:03:39,430 --> 00:03:37,920
crs-21 is unique in so many ways

73
00:03:46,050 --> 00:03:39,440
let's take a look at what makes this

74
00:04:31,310 --> 00:04:16,630
[Music]

75
00:04:52,070 --> 00:04:31,320
[Applause]

76
00:04:57,030 --> 00:04:54,629
and we are about t minus 27 minutes away

77
00:04:59,110 --> 00:04:57,040
from liftoff joining us now is nasa's

78
00:05:01,110 --> 00:04:59,120
joshua santora and marie lewis with an

79
00:05:03,029 --> 00:05:01,120
update on the launch hey guys give us

80
00:05:04,310 --> 00:05:03,039
some good news hey good morning yes we

81
00:05:05,909 --> 00:05:04,320
do have some good news for you we have

82
00:05:08,469 --> 00:05:05,919
increasingly improving weather

83
00:05:09,670 --> 00:05:08,479
conditions i'm joshua santora joined by

84
00:05:11,430 --> 00:05:09,680
marie lewis

85
00:05:12,870 --> 00:05:11,440
thank you it's it's exciting to be here

86
00:05:14,950 --> 00:05:12,880
i know we had a wave off yesterday

87
00:05:16,629 --> 00:05:14,960
because the weather at the booster

88
00:05:17,909 --> 00:05:16,639

recovery site wasn't looking too great

89
00:05:19,430 --> 00:05:17,919
but things are looking a lot better

90
00:05:21,430 --> 00:05:19,440
today yes we're going to take a look

91
00:05:23,590 --> 00:05:21,440
here at this graphic we've got currently

92
00:05:24,790 --> 00:05:23,600
a 70 percent chance of good weather

93
00:05:27,510 --> 00:05:24,800
conditions that means we have a 30

94
00:05:29,189 --> 00:05:27,520
percent pov as a common term present a

95
00:05:31,350 --> 00:05:29,199
percentage of violation of those weather

96
00:05:32,469 --> 00:05:31,360
constraints and it's some thick clouds

97
00:05:34,150 --> 00:05:32,479
that are moving through the area pretty

98
00:05:36,550 --> 00:05:34,160
quickly and that speed actually is

99
00:05:38,070 --> 00:05:36,560
really helping us uh it's like we're

100
00:05:39,270 --> 00:05:38,080
looking at what we've heard on these

101
00:05:41,510 --> 00:05:39,280
audio loops we're listening into the

102
00:05:43,590 --> 00:05:41,520
launch processing countdown things are

103
00:05:45,270 --> 00:05:43,600
proceeding well we're not expected to

104
00:05:47,350 --> 00:05:45,280
have any of those thick cloud pockets in

105
00:05:49,189 --> 00:05:47,360
the area but we still have a chance of

106
00:05:51,909 --> 00:05:49,199
that that coming from our launch weather

107
00:05:53,749 --> 00:05:51,919
officer melody lovin of the us space 4th

108
00:05:55,029 --> 00:05:53,759
45th space wing weather squadron

109
00:05:56,070 --> 00:05:55,039
appreciate those fine folks taking good

110
00:05:57,670 --> 00:05:56,080
care of us

111
00:06:00,629 --> 00:05:57,680
and as you heard torrey mentioned

112
00:06:03,029 --> 00:06:00,639
fueling began at t minus 35 minutes so

113
00:06:04,790 --> 00:06:03,039

it's well underway now that rp1 which is

114
00:06:07,830 --> 00:06:04,800
rocket-grade kerosene

115
00:06:10,070 --> 00:06:07,840
liquid oxygen fueling on the first stage

116
00:06:11,749 --> 00:06:10,080
well underway and then at t minus 16

117
00:06:12,710 --> 00:06:11,759
minutes so about 10 minutes from now

118
00:06:14,550 --> 00:06:12,720
we'll hear

119
00:06:15,670 --> 00:06:14,560
that liquid oxygen loading has begun on

120
00:06:17,189 --> 00:06:15,680
the second

121
00:06:20,070 --> 00:06:17,199
upper stage

122
00:06:21,749 --> 00:06:20,080
yeah we've got a full staff on board

123
00:06:24,230 --> 00:06:21,759
today from coast to coast here at the

124
00:06:25,909 --> 00:06:24,240
kennedy space center we are tracking

125
00:06:27,430 --> 00:06:25,919
this ourselves as well as there's a

126
00:06:29,510 --> 00:06:27,440
spacex team here

127
00:06:31,189 --> 00:06:29,520
and support from nasa as well with some

128
00:06:32,790 --> 00:06:31,199
telemetry communication

129
00:06:34,870 --> 00:06:32,800
out in houston texas at the johnson

130
00:06:36,950 --> 00:06:34,880
space center we have

131
00:06:38,790 --> 00:06:36,960
teams from nasa's mission control who

132
00:06:40,790 --> 00:06:38,800
also support space station there and

133
00:06:43,510 --> 00:06:40,800
then out in california on the west coast

134
00:06:45,590 --> 00:06:43,520
at hawthorne the spacex headquarters and

135
00:06:47,510 --> 00:06:45,600
mission control as well so teams keeping

136
00:06:48,390 --> 00:06:47,520
a close eye on things and they're liking

137
00:06:50,870 --> 00:06:48,400
what they're seeing

138
00:06:52,710 --> 00:06:50,880

so far absolutely and and so far things

139
00:06:55,029 --> 00:06:52,720
are looking green uh the range is green

140
00:06:56,710 --> 00:06:55,039
around the pad um and the area downrange

141
00:06:58,710 --> 00:06:56,720
the rocket is healthy we have not heard

142
00:07:01,189 --> 00:06:58,720
any uh any significant issues on the

143
00:07:02,390 --> 00:07:01,199
nets and uh you've you may have noticed

144
00:07:04,870 --> 00:07:02,400
when we're on that wider shot the

145
00:07:06,150 --> 00:07:04,880
booster uh looks like it's uh like it's

146
00:07:07,909 --> 00:07:06,160
seen better days but that's actually

147
00:07:09,670 --> 00:07:07,919
because it's been reused so many times

148
00:07:11,909 --> 00:07:09,680
yes yeah so this will be its fourth

149
00:07:13,990 --> 00:07:11,919
flight uh which we're excited for just

150
00:07:15,670 --> 00:07:14,000
that capability to use a flight proven

151
00:07:17,990 --> 00:07:15,680
booster um so there you see on your

152
00:07:19,749 --> 00:07:18,000
screen this will be the fourth flight uh

153
00:07:21,830 --> 00:07:19,759
if all goes according to plans today uh

154
00:07:23,749 --> 00:07:21,840
demo two our space dads bob and doug

155
00:07:25,430 --> 00:07:23,759
used to do the same booster earlier this

156
00:07:26,950 --> 00:07:25,440
year and then the anastasia flight and

157
00:07:28,870 --> 00:07:26,960
then a starling commission have all used

158
00:07:30,790 --> 00:07:28,880
this booster so here we go for number

159
00:07:32,309 --> 00:07:30,800
four yeah so uh this booster has

160
00:07:34,629 --> 00:07:32,319
certainly been put through its paces and

161
00:07:37,189 --> 00:07:34,639
the car the cargo dragon on top uh of

162
00:07:38,790 --> 00:07:37,199
course is the new upgraded cargo dragon

163
00:07:40,629 --> 00:07:38,800

and the commercial crew program is

164
00:07:42,710 --> 00:07:40,639
watching uh we'll be watching this

165
00:07:45,029 --> 00:07:42,720
mission really closely to see how this

166
00:07:47,270 --> 00:07:45,039
cargo dragon performs because it has so

167
00:07:49,430 --> 00:07:47,280
many similarities to the crew dragon

168
00:07:51,029 --> 00:07:49,440
that just launched uh that launched bob

169
00:07:53,189 --> 00:07:51,039
and doug earlier this year and launched

170
00:07:55,110 --> 00:07:53,199
the crew of four on crew one last month

171
00:07:57,350 --> 00:07:55,120
you'll see um on the bottom part of the

172
00:07:59,029 --> 00:07:57,360
capsule where the super dracos would

173
00:08:00,950 --> 00:07:59,039
have been for that launch escape system

174
00:08:03,830 --> 00:08:00,960
on the car the crew dragon does not

175
00:08:05,510 --> 00:08:03,840
exist on cargo dragon uh also inside

176
00:08:07,990 --> 00:08:05,520
there's no seats obviously because it's

177
00:08:09,749 --> 00:08:08,000
packed with cargo instead of people um

178
00:08:12,390 --> 00:08:09,759
and then there are no windows on the

179
00:08:14,790 --> 00:08:12,400
outside and only two or four uh fins on

180
00:08:16,790 --> 00:08:14,800
the the trunk the bottom half yeah and

181
00:08:18,390 --> 00:08:16,800
obviously the purpose of this mission

182
00:08:21,029 --> 00:08:18,400
today is to get cargo and rese and

183
00:08:22,469 --> 00:08:21,039
supplies to space station so that

184
00:08:24,070 --> 00:08:22,479
the dragon is really broken apart into

185
00:08:26,629 --> 00:08:24,080
two parts there's the capsule which is

186
00:08:29,670 --> 00:08:26,639
pressurized which holds about 9.3 cubic

187
00:08:32,230 --> 00:08:29,680
meters or 328 cubic feet of storage

188
00:08:33,750 --> 00:08:32,240

space um and so that's if you uh

189
00:08:35,829 --> 00:08:33,760
familiar with the size of a minivan

190
00:08:37,509 --> 00:08:35,839
that's roughly two minivans a little

191
00:08:39,509 --> 00:08:37,519
over two minivans packed full of stuff

192
00:08:42,149 --> 00:08:39,519
and then the trunk which you'll hear

193
00:08:44,070 --> 00:08:42,159
more about the nanoracks bishop airlock

194
00:08:45,910 --> 00:08:44,080
is taking good use of the vacuum storage

195
00:08:48,070 --> 00:08:45,920
space that's exposed to the vacuum of

196
00:08:51,030 --> 00:08:48,080
space as it takes off that's about 37

197
00:08:52,870 --> 00:08:51,040
cubic meters or 1300 cubic feet

198
00:08:54,790 --> 00:08:52,880
a couple other noteworthy things here we

199
00:08:56,470 --> 00:08:54,800
won't see solar arrays deployed during

200
00:08:58,310 --> 00:08:56,480
this flight that's not a part of the

201
00:09:01,110 --> 00:08:58,320
dragon 2 operation they have solar

202
00:09:02,870 --> 00:09:01,120
arrays that are actually make up half of

203
00:09:04,949 --> 00:09:02,880
the trunk the outside half of the trunk

204
00:09:06,470 --> 00:09:04,959
is the solar array and then the nose

205
00:09:08,790 --> 00:09:06,480
cone that will be kind of a big final

206
00:09:10,550 --> 00:09:08,800
milestone for us on our flight today is

207
00:09:12,630 --> 00:09:10,560
that nose cone being opened because as

208
00:09:14,070 --> 00:09:12,640
we need to dock with station we need a

209
00:09:15,910 --> 00:09:14,080
space to be able to dock with station

210
00:09:17,430 --> 00:09:15,920
and it's underneath the nose cone

211
00:09:19,350 --> 00:09:17,440
and one other real quick mention you can

212
00:09:22,070 --> 00:09:19,360
see in this wide shot the crew access

213
00:09:23,670 --> 00:09:22,080

arm that has retracted away already from

214
00:09:26,150 --> 00:09:23,680
cargo dragon this was the first time

215
00:09:28,470 --> 00:09:26,160
that spacex used that crew access arm to

216
00:09:29,910 --> 00:09:28,480
load cargo on a cargo resupply mission

217
00:09:31,750 --> 00:09:29,920
they've obviously used it before for the

218
00:09:33,829 --> 00:09:31,760
crew missions uh but this is the first

219
00:09:36,310 --> 00:09:33,839
time they used that arm to load cargo

220
00:09:38,949 --> 00:09:36,320
for a cargo resupply mission so we are

221
00:09:40,470 --> 00:09:38,959
now at t minus 23 minutes six seconds

222
00:09:43,750 --> 00:09:40,480
and counting again we have an

223
00:09:46,150 --> 00:09:43,760
instantaneous launch window at 11 17 and

224
00:09:48,470 --> 00:09:46,160
eight seconds this morning eastern time

225
00:09:50,710 --> 00:09:48,480
and spacex will attempt to land that

226
00:09:52,949 --> 00:09:50,720
first stage booster a fourth time this

227
00:09:54,630 --> 00:09:52,959
time over the atlantic ocean on the of

228
00:09:56,310 --> 00:09:54,640
course i still love you drone ship so

229
00:09:57,910 --> 00:09:56,320
we'll be keeping an eye on that about

230
00:10:00,150 --> 00:09:57,920
eight minutes and some change after

231
00:10:01,750 --> 00:10:00,160
launch but for now tori we will send it

232
00:10:03,350 --> 00:10:01,760
back to you

233
00:10:04,550 --> 00:10:03,360
thanks for the update we'll check back

234
00:10:05,990 --> 00:10:04,560
in with you later

235
00:10:08,630 --> 00:10:06,000
sounds like everything is looking good

236
00:10:11,030 --> 00:10:08,640
so far for today's launch cargo resupply

237
00:10:13,509 --> 00:10:11,040
missions from u.s companies like the one

238
00:10:15,509 --> 00:10:13,519

today ensure a national capability to

239
00:10:16,790 --> 00:10:15,519
deliver critical science research to the

240
00:10:18,949 --> 00:10:16,800
space station

241
00:10:21,030 --> 00:10:18,959
now this significantly increases nasa's

242
00:10:23,910 --> 00:10:21,040
ability to conduct new investigations in

243
00:10:27,030 --> 00:10:23,920
a microgravity environment at the only

244
00:10:28,710 --> 00:10:27,040
laboratory in space the iss national lab

245
00:10:31,350 --> 00:10:28,720
gives us a closer look at some of this

246
00:10:33,350 --> 00:10:31,360
groundbreaking research

247
00:10:34,870 --> 00:10:33,360
spacex's 21st commercial resupply

248
00:10:36,790 --> 00:10:34,880
services mission to the international

249
00:10:38,470 --> 00:10:36,800
space station is ready to launch from

250
00:10:40,389 --> 00:10:38,480
kennedy space center

251
00:10:42,150 --> 00:10:40,399
this mission will bring critical cargo

252
00:10:44,550 --> 00:10:42,160
research and technology demonstration

253
00:10:46,389 --> 00:10:44,560
payloads to the orbiting laboratory the

254
00:10:48,230 --> 00:10:46,399
iss national laboratory is proud to

255
00:10:49,750 --> 00:10:48,240
sponsor more than 15 payloads on this

256
00:10:51,430 --> 00:10:49,760
mission representing dozens of

257
00:10:53,110 --> 00:10:51,440
experiments to further fundamental and

258
00:10:54,550 --> 00:10:53,120
applied research through space-based

259
00:10:57,030 --> 00:10:54,560
inquiry and to engage the next

260
00:10:58,310 --> 00:10:57,040
generation of researchers and explorers

261
00:11:02,630 --> 00:10:58,320
here's a quick look at some of the

262
00:11:04,150 --> 00:11:02,640
payloads on spacex crs-21

263
00:11:05,910 --> 00:11:04,160

bristol-myers squibb a leading

264
00:11:07,910 --> 00:11:05,920
pharmaceutical company is launching a

265
00:11:09,990 --> 00:11:07,920
protein crystallization investigation

266
00:11:12,550 --> 00:11:10,000
aimed at improving drug formulation and

267
00:11:14,150 --> 00:11:12,560
delivery for patients on earth

268
00:11:15,829 --> 00:11:14,160
in this experiment the team will study

269
00:11:17,670 --> 00:11:15,839
the crystallization of monoclonal

270
00:11:19,910 --> 00:11:17,680
antibodies in space to improve their

271
00:11:21,910 --> 00:11:19,920
crystallization back on the ground

272
00:11:23,509 --> 00:11:21,920
monoclonal antibodies are lab created

273
00:11:25,750 --> 00:11:23,519
proteins designed to interact with

274
00:11:27,110 --> 00:11:25,760
specific targets called antigens and are

275
00:11:29,829 --> 00:11:27,120
used in the treatment of several

276
00:11:31,190 --> 00:11:29,839
diseases including cancer

277
00:11:32,710 --> 00:11:31,200
three projects on this mission are

278
00:11:34,389 --> 00:11:32,720
funded by the national institutes of

279
00:11:36,069 --> 00:11:34,399
health through its joint multi-year

280
00:11:38,310 --> 00:11:36,079
tissue chips and space initiative with

281
00:11:40,389 --> 00:11:38,320
the iss national lab tissue chips are

282
00:11:42,630 --> 00:11:40,399
small devices engineered to grow human

283
00:11:44,310 --> 00:11:42,640
cells on an artificial scaffold to model

284
00:11:46,550 --> 00:11:44,320
the structure and function of human

285
00:11:48,150 --> 00:11:46,560
tissues studying tissue chips in space

286
00:11:49,990 --> 00:11:48,160
may accelerate pathways for

287
00:11:52,550 --> 00:11:50,000
understanding disease and developing new

288
00:11:54,389 --> 00:11:52,560

treatments for use on earth and beyond

289
00:11:56,150 --> 00:11:54,399
to learn more about all iss national

290
00:11:59,010 --> 00:11:56,160
labs sponsored research on this mission

291
00:12:02,069 --> 00:11:59,020
please visit issnationallab.org

292
00:12:04,389 --> 00:12:02,079
[Music]

293
00:12:06,230 --> 00:12:04,399
among all of this life-changing science

294
00:12:09,030 --> 00:12:06,240
the heart tissue chips experiment is

295
00:12:10,629 --> 00:12:09,040
quite fascinating nasa's jasmine hopkins

296
00:12:12,710 --> 00:12:10,639
is standing by with a special guest who

297
00:12:14,790 --> 00:12:12,720
can tell us more jasmine

298
00:12:16,550 --> 00:12:14,800
thank you so much tori i'm jasmine

299
00:12:17,990 --> 00:12:16,560
hopkins and joining me to talk to us

300
00:12:20,470 --> 00:12:18,000
more about the cardinal heart tissue

301
00:12:22,230 --> 00:12:20,480
chip investigation is dr dilip thomas

302
00:12:24,150 --> 00:12:22,240
post-doctoral fellow from the stanford

303
00:12:25,990 --> 00:12:24,160
cardiovascular institute thank you for

304
00:12:27,829 --> 00:12:26,000
joining us dr thomas thank you jasmine

305
00:12:29,430 --> 00:12:27,839
for having me absolutely can you tell us

306
00:12:31,509 --> 00:12:29,440
what this investigation is about

307
00:12:33,350 --> 00:12:31,519
absolutely so the cardinal heartbreak

308
00:12:35,190 --> 00:12:33,360
citizenship research is born out of an

309
00:12:37,190 --> 00:12:35,200
academic collaboration between stanford

310
00:12:38,949 --> 00:12:37,200
cardiovascular institute

311
00:12:41,110 --> 00:12:38,959
university of california santa barbara

312
00:12:43,430 --> 00:12:41,120
bioservice based technologies and the

313
00:12:45,030 --> 00:12:43,440

iss national labs the research is funded

314
00:12:47,590 --> 00:12:45,040
by the national institutes of health and

315
00:12:50,230 --> 00:12:47,600
the national center of advances in

316
00:12:51,110 --> 00:12:50,240
translational sciences and we are a part

317
00:12:54,870 --> 00:12:51,120
of

318
00:12:57,350 --> 00:12:54,880
the leading

319
00:12:59,190 --> 00:12:57,360
cardiovascular groups in the nation we

320
00:13:01,110 --> 00:12:59,200
are interested in how

321
00:13:03,509 --> 00:13:01,120
a heart disease develop and how we can

322
00:13:05,030 --> 00:13:03,519
use better medications to treat them

323
00:13:07,190 --> 00:13:05,040
the cardinal heart experiment that's

324
00:13:09,670 --> 00:13:07,200
launching on the iss we are particularly

325
00:13:12,389 --> 00:13:09,680
interested in how microgravity affects

326
00:13:14,230 --> 00:13:12,399
the heart and we are doing so using an

327
00:13:15,750 --> 00:13:14,240
engineered heart tissue that is grown in

328
00:13:18,069 --> 00:13:15,760
the lab

329
00:13:20,790 --> 00:13:18,079
which is basically a small muscle strip

330
00:13:22,470 --> 00:13:20,800
of your heart that beats spontaneously

331
00:13:23,590 --> 00:13:22,480
now you may ask why is this research

332
00:13:26,790 --> 00:13:23,600
important

333
00:13:28,629 --> 00:13:26,800
so on earth we know that our heart takes

334
00:13:30,389 --> 00:13:28,639
the shape of the letter v

335
00:13:32,949 --> 00:13:30,399
and in microgravity it takes the shape

336
00:13:35,590 --> 00:13:32,959
of the letter o the reason being that a

337
00:13:37,670 --> 00:13:35,600
phenomena called mechanical unloading

338
00:13:39,990 --> 00:13:37,680

meaning that when we are on earth our

339
00:13:41,509 --> 00:13:40,000
heart has to work hard against gravity

340
00:13:42,470 --> 00:13:41,519
to push all that blood throughout our

341
00:13:45,189 --> 00:13:42,480
body

342
00:13:47,030 --> 00:13:45,199
and in and it's that exercise that keeps

343
00:13:49,590 --> 00:13:47,040
the heart healthy and fit

344
00:13:52,069 --> 00:13:49,600
and when we take that exercise away from

345
00:13:54,870 --> 00:13:52,079
the heart in microgravity it has to work

346
00:13:57,030 --> 00:13:54,880
very less and as a result over time long

347
00:13:59,030 --> 00:13:57,040
for long durations of time it can get

348
00:14:01,509 --> 00:13:59,040
weaker and lead to a condition called

349
00:14:03,430 --> 00:14:01,519
heart failure now in the united states

350
00:14:05,269 --> 00:14:03,440
there's about 6.2 million adults who

351
00:14:07,430 --> 00:14:05,279
suffer from this condition of heart

352
00:14:10,310 --> 00:14:07,440
failure so we want to use microgravity

353
00:14:13,750 --> 00:14:10,320
as a platform to study how this

354
00:14:16,470 --> 00:14:13,760
phenomena occurs and bring and test a

355
00:14:19,350 --> 00:14:16,480
new drugs that are fda approved

356
00:14:20,150 --> 00:14:19,360
to reverse the effects of the aging and

357
00:14:21,910 --> 00:14:20,160
such

358
00:14:23,269 --> 00:14:21,920
cardiac complications

359
00:14:24,069 --> 00:14:23,279
not only that

360
00:14:25,990 --> 00:14:24,079
the

361
00:14:27,269 --> 00:14:26,000
research will also provide us insights

362
00:14:29,430 --> 00:14:27,279
into how

363
00:14:31,269 --> 00:14:29,440

a heart may function during long-term

364
00:14:33,670 --> 00:14:31,279
space expeditions for astronauts and

365
00:14:36,150 --> 00:14:33,680
space explorers well that is fascinating

366
00:14:37,269 --> 00:14:36,160
and we know that our team in space is

367
00:14:38,949 --> 00:14:37,279
eager to get their hands on your

368
00:14:40,790 --> 00:14:38,959
research but can you tell us about your

369
00:14:43,829 --> 00:14:40,800
team on earth that helped you develop it

370
00:14:45,269 --> 00:14:43,839
absolutely so we as a team of scientists

371
00:14:47,750 --> 00:14:45,279
and engineers we are thrilled to be a

372
00:14:49,829 --> 00:14:47,760
part of the space biology community and

373
00:14:51,670 --> 00:14:49,839
it's always exciting to bring the

374
00:14:53,509 --> 00:14:51,680
research from the lab to the launch pad

375
00:14:55,269 --> 00:14:53,519
and we have come me and my team have

376
00:14:57,110 --> 00:14:55,279
come to an appreciation greater

377
00:15:00,389 --> 00:14:57,120
appreciation for how

378
00:15:03,269 --> 00:15:00,399
a billion parts has to be enabled to

379
00:15:05,189 --> 00:15:03,279
move this research to the iss

380
00:15:06,790 --> 00:15:05,199
and here i would like to acknowledge my

381
00:15:09,670 --> 00:15:06,800
team so if you can bring up the photo of

382
00:15:12,069 --> 00:15:09,680
my team so here from left to right we

383
00:15:15,509 --> 00:15:12,079
see dr louis zia from biosource space

384
00:15:16,470 --> 00:15:15,519
technologies my mentor dr joseph wu

385
00:15:24,069 --> 00:15:16,480
and

386
00:15:25,430 --> 00:15:24,079
so to celebrate all the teamwork that we

387
00:15:27,430 --> 00:15:25,440
have put into this cardinal heart

388
00:15:29,350 --> 00:15:27,440

experiment we have designed a cool

389
00:15:32,389 --> 00:15:29,360
mission patch which you can see on the

390
00:15:34,150 --> 00:15:32,399
screen that shows all our collaborators

391
00:15:36,150 --> 00:15:34,160
on this particular project and right at

392
00:15:37,670 --> 00:15:36,160
the center you see the cartoon of an

393
00:15:39,350 --> 00:15:37,680
engineered heart tissue that we are

394
00:15:41,509 --> 00:15:39,360
sending up to the space station so we

395
00:15:44,470 --> 00:15:41,519
are super excited and thrilled so go

396
00:15:46,710 --> 00:15:44,480
nasa go spacex go dragon

397
00:15:48,629 --> 00:15:46,720
awesome we are uh very excited to see

398
00:15:50,230 --> 00:15:48,639
your science launch to space so let's

399
00:15:52,790 --> 00:15:50,240
actually get back to tori in the studio

400
00:15:55,749 --> 00:15:52,800
for a launch update tori

401
00:15:57,590 --> 00:15:55,759
thanks jasmine we are now at t minus 16

402
00:15:59,590 --> 00:15:57,600
minutes and counting let's check in with

403
00:16:01,590 --> 00:15:59,600
spacex and hawthorne where the company

404
00:16:04,150 --> 00:16:01,600
designed and built its falcon 9 rocket

405
00:16:06,150 --> 00:16:04,160
and cargo dragon shiva bharadvaj is

406
00:16:08,310 --> 00:16:06,160
joining us live shiva how's it going on

407
00:16:10,550 --> 00:16:08,320
the west coast

408
00:16:12,790 --> 00:16:10,560
hey thanks tori mission control teams

409
00:16:15,110 --> 00:16:12,800
are wander monitoring the vehicle

410
00:16:17,670 --> 00:16:15,120
heading into launch but let's talk about

411
00:16:19,829 --> 00:16:17,680
the dragon spacecraft dragon debuted in

412
00:16:21,350 --> 00:16:19,839
2012 that the first private spacecraft

413
00:16:22,470 --> 00:16:21,360

in history to visit the international

414
00:16:24,069 --> 00:16:22,480
space station

415
00:16:27,189 --> 00:16:24,079
and actually since then dragons have

416
00:16:28,629 --> 00:16:27,199
made 23 trips to and from today it's

417
00:16:30,389 --> 00:16:28,639
actually one of the few vehicles that

418
00:16:32,389 --> 00:16:30,399
can deliver significant cargo to the

419
00:16:35,110 --> 00:16:32,399
space station and the only vehicle that

420
00:16:36,949 --> 00:16:35,120
can deliver cargo from the station now

421
00:16:38,949 --> 00:16:36,959
we've refreshed and updated dragon's

422
00:16:41,430 --> 00:16:38,959
design to fly people and we've actually

423
00:16:43,350 --> 00:16:41,440
done that twice this year on our demo 2

424
00:16:45,350 --> 00:16:43,360
and crew one missions but today's

425
00:16:47,430 --> 00:16:45,360
mission marks another first for dragon

426
00:16:50,069 --> 00:16:47,440
and that's the first flight of the cargo

427
00:16:51,910 --> 00:16:50,079
version of our updated dragon design now

428
00:16:53,829 --> 00:16:51,920
dragon was designed from the beginning

429
00:16:56,310 --> 00:16:53,839
to be reused to date we've actually

430
00:16:59,509 --> 00:16:56,320
flown nine dragon missions on with

431
00:17:01,670 --> 00:16:59,519
reused vehicles and this new version can

432
00:17:03,509 --> 00:17:01,680
support up to five flights to and from

433
00:17:05,590 --> 00:17:03,519
the space station as opposed to three on

434
00:17:08,230 --> 00:17:05,600
our previous design in addition it's

435
00:17:10,789 --> 00:17:08,240
about 20 percent larger boasts double

436
00:17:12,949 --> 00:17:10,799
the powered lockers on board so the

437
00:17:15,510 --> 00:17:12,959
space for powered science experiments

438
00:17:17,270 --> 00:17:15,520

biological life science experiments and

439
00:17:19,110 --> 00:17:17,280
it also splashes down in the atlantic

440
00:17:21,189 --> 00:17:19,120
ocean which allows us to return those

441
00:17:23,510 --> 00:17:21,199
scientific payloads within a few hours

442
00:17:25,110 --> 00:17:23,520
after landing now on the outside this

443
00:17:27,429 --> 00:17:25,120
vehicle looks very similar to what you

444
00:17:29,430 --> 00:17:27,439
may have seen on our demo 2 and crew 1

445
00:17:30,870 --> 00:17:29,440
missions but this vehicle is configured

446
00:17:33,029 --> 00:17:30,880
a little bit differently since we don't

447
00:17:35,669 --> 00:17:33,039
have people on board in the pressure

448
00:17:37,510 --> 00:17:35,679
section which is that top portion there

449
00:17:40,150 --> 00:17:37,520
what we've swapped out the seats and the

450
00:17:42,390 --> 00:17:40,160
crew displays for cargo racks and straps

451
00:17:44,470 --> 00:17:42,400
we've also removed the super draco

452
00:17:47,350 --> 00:17:44,480
engines those only being used to carry

453
00:17:49,909 --> 00:17:47,360
astronauts away from the falcon 9 in the

454
00:17:52,070 --> 00:17:49,919
unlikely event of a pad or launch abort

455
00:17:54,070 --> 00:17:52,080
and finally the environmental system has

456
00:17:56,549 --> 00:17:54,080
also been reduced in size and complexity

457
00:17:58,710 --> 00:17:56,559
since we don't have people on board

458
00:18:01,190 --> 00:17:58,720
now flying nasa astronauts and keeping

459
00:18:03,669 --> 00:18:01,200
the space station fully operational is a

460
00:18:05,750 --> 00:18:03,679
top priority for spacex this mission is

461
00:18:07,430 --> 00:18:05,760
actually the first operational resupply

462
00:18:10,070 --> 00:18:07,440
as part of nasa's second commercial

463
00:18:11,669 --> 00:18:10,080

resupply services contract and we're on

464
00:18:14,470 --> 00:18:11,679
contract to provide supplies through

465
00:18:17,029 --> 00:18:14,480
2024 and the whole team here is super

466
00:18:19,110 --> 00:18:17,039
excited to see this dragon arrive at the

467
00:18:21,830 --> 00:18:19,120
space station tomorrow and for the first

468
00:18:23,669 --> 00:18:21,840
time ever to see two dragons attached to

469
00:18:26,230 --> 00:18:23,679
the international space station

470
00:18:27,430 --> 00:18:26,240
so with that back to you tori

471
00:18:29,590 --> 00:18:27,440
thanks shiva

472
00:18:31,909 --> 00:18:29,600
these upgrades to the cargo dragon bring

473
00:18:34,310 --> 00:18:31,919
tremendous benefit to nasa and its

474
00:18:36,710 --> 00:18:34,320
ability to resupply the space station

475
00:18:38,870 --> 00:18:36,720
and conduct critical research joining us

476
00:18:40,470 --> 00:18:38,880
now is nasa's leah cheshire at johnson

477
00:18:44,230 --> 00:18:40,480
space center in houston to tell us more

478
00:18:48,230 --> 00:18:46,470
hi tori and thanks so much welcome to

479
00:18:51,029 --> 00:18:48,240
the international space station flight

480
00:18:52,950 --> 00:18:51,039
control room here in houston texas at

481
00:18:55,110 --> 00:18:52,960
johnson space center this is currently

482
00:18:56,870 --> 00:18:55,120
the orbit 2 team of flight controllers

483
00:19:00,549 --> 00:18:56,880
they are monitoring the systems aboard

484
00:19:02,789 --> 00:19:00,559
the international space station 24 7 365

485
00:19:05,270 --> 00:19:02,799
days a year and today they are led by

486
00:19:07,990 --> 00:19:05,280
flight director paul kanya this team

487
00:19:09,510 --> 00:19:08,000
will really jump into action tomorrow as

488
00:19:11,590 --> 00:19:09,520

cargo dragon approaches the

489
00:19:14,310 --> 00:19:11,600
international space station and enters

490
00:19:16,310 --> 00:19:14,320
the approach ellipsoid that's a

491
00:19:17,909 --> 00:19:16,320
an imaginary sphere around the

492
00:19:20,390 --> 00:19:17,919
international space station that helps

493
00:19:22,070 --> 00:19:20,400
us monitor vehicles as they arrive and

494
00:19:23,830 --> 00:19:22,080
depart as well

495
00:19:26,230 --> 00:19:23,840
currently living on the international

496
00:19:28,310 --> 00:19:26,240
space station we have seven people that

497
00:19:31,510 --> 00:19:28,320
consists of two russian cosmonauts

498
00:19:33,830 --> 00:19:31,520
sergey ryjikov and sergey kuzkov as well

499
00:19:36,310 --> 00:19:33,840
as our four nasa astronauts uh kate

500
00:19:39,510 --> 00:19:36,320
rubins mike hawkins victor glover and

501
00:19:40,710 --> 00:19:39,520
shannon walker and jaxa astronaut suichi

502
00:19:43,110 --> 00:19:40,720
naguchi

503
00:19:44,789 --> 00:19:43,120
once crew dragon cargo dragon arrives to

504
00:19:47,430 --> 00:19:44,799
the international space station it will

505
00:19:49,830 --> 00:19:47,440
be joining a crew dragon as well as four

506
00:19:52,789 --> 00:19:49,840
other vehicles that'll be two russian

507
00:19:55,270 --> 00:19:52,799
progress resupply spacecraft one russian

508
00:19:56,950 --> 00:19:55,280
soyuz spacecraft and northrop grumman's

509
00:19:58,789 --> 00:19:56,960
14th resupply mission to the

510
00:20:00,789 --> 00:19:58,799
international space station

511
00:20:02,710 --> 00:20:00,799
cargo dragon will remain onboard the

512
00:20:04,870 --> 00:20:02,720
international space station for about a

513
00:20:07,029 --> 00:20:04,880

month before being packed up with

514
00:20:09,270 --> 00:20:07,039
critical science and supplies and

515
00:20:11,270 --> 00:20:09,280
splashing down in the atlantic ocean

516
00:20:12,470 --> 00:20:11,280
delivering that science to be analyzed

517
00:20:14,549 --> 00:20:12,480
on earth

518
00:20:15,909 --> 00:20:14,559
when cargo dragon arrives tomorrow the

519
00:20:17,990 --> 00:20:15,919
crew aboard the international space

520
00:20:20,310 --> 00:20:18,000
station will not capture it as they have

521
00:20:23,270 --> 00:20:20,320
previously using the canadarm2 but

522
00:20:25,430 --> 00:20:23,280
instead nasa astronauts kate rubins and

523
00:20:27,270 --> 00:20:25,440
victor glover will monitor the arrival

524
00:20:28,710 --> 00:20:27,280
of cargo dragon

525
00:20:30,710 --> 00:20:28,720
everything is looking good here in

526
00:20:32,390 --> 00:20:30,720
mission control houston we're excited

527
00:20:35,270 --> 00:20:32,400
for launch today and we'll send it back

528
00:20:37,510 --> 00:20:35,280
to you at kennedy thanks leah

529
00:20:39,350 --> 00:20:37,520
we're excited for today's launch as well

530
00:20:41,510 --> 00:20:39,360
let's take an even closer look at some

531
00:20:44,070 --> 00:20:41,520
of the research the expedition 64 crew

532
00:20:46,149 --> 00:20:44,080
will be conducting

533
00:20:48,149 --> 00:20:46,159
bioasteroid is an experiment to study

534
00:20:50,789 --> 00:20:48,159
whether we can use microorganisms

535
00:20:53,190 --> 00:20:50,799
bacteria or fungi to extract

536
00:20:55,110 --> 00:20:53,200
economically interesting elements from

537
00:20:57,990 --> 00:20:55,120
asteroid material it's essentially what

538
00:21:00,310 --> 00:20:58,000

we would call a bio mining experiment in

539
00:21:02,230 --> 00:21:00,320
other words mining in support of the

540
00:21:03,909 --> 00:21:02,240
long-term human exploration and

541
00:21:06,549 --> 00:21:03,919
settlement of space

542
00:21:07,430 --> 00:21:06,559
brain organoid is a miniaturized version

543
00:21:09,830 --> 00:21:07,440
of

544
00:21:12,070 --> 00:21:09,840
developing human brains so this really

545
00:21:14,390 --> 00:21:12,080
mimics the early stages of a human brain

546
00:21:16,549 --> 00:21:14,400
development being able to perhaps

547
00:21:18,950 --> 00:21:16,559
accelerate these brain organoid

548
00:21:20,789 --> 00:21:18,960
maturation could help us make better

549
00:21:22,789 --> 00:21:20,799
human models for neurodegenerative

550
00:21:25,510 --> 00:21:22,799
disorders for which for most of them we

551
00:21:27,590 --> 00:21:25,520
don't have any treatments or cures

552
00:21:29,669 --> 00:21:27,600
if you go to a hospital or a clinic and

553
00:21:32,470 --> 00:21:29,679
you have a medical problem like an

554
00:21:34,470 --> 00:21:32,480
infection you often get a blood test

555
00:21:36,549 --> 00:21:34,480
called a white blood cell count and

556
00:21:38,950 --> 00:21:36,559
differential that's a capability we

557
00:21:40,950 --> 00:21:38,960
don't have right now in space flight so

558
00:21:43,510 --> 00:21:40,960
our objective is to

559
00:21:46,070 --> 00:21:43,520
test out this device that can be used in

560
00:21:48,900 --> 00:21:46,080
space so the astronauts can diagnose and

561
00:21:51,190 --> 00:21:48,910
treat their own medical problems

562
00:21:53,190 --> 00:21:51,200
[Music]

563
00:21:55,110 --> 00:21:53,200

and jasmine is joining us again this

564
00:21:57,110 --> 00:21:55,120
time with an expert from the iss

565
00:21:59,190 --> 00:21:57,120
national lab jasmine

566
00:22:01,270 --> 00:21:59,200
thank you tori yes here to talk to us

567
00:22:02,950 --> 00:22:01,280
about the u.s national lab is patrick

568
00:22:04,470 --> 00:22:02,960
o'neal thanks so much for being here

569
00:22:06,230 --> 00:22:04,480
patrick thanks jasmine appreciate it

570
00:22:07,750 --> 00:22:06,240
absolutely can you tell us about the

571
00:22:09,350 --> 00:22:07,760
amazing payload that you'll be managing

572
00:22:10,470 --> 00:22:09,360
on this mission yeah so right now we're

573
00:22:11,669 --> 00:22:10,480
excited to have more than 15

574
00:22:13,350 --> 00:22:11,679
investigations that are launching on

575
00:22:15,669 --> 00:22:13,360
this mission and the other day dr

576
00:22:17,270 --> 00:22:15,679
costello from the iss program uh he made

577
00:22:18,870 --> 00:22:17,280
mention of the fact that this was a very

578
00:22:20,470 --> 00:22:18,880
life science rich

579
00:22:22,310 --> 00:22:20,480
mission and he is spot on with that and

580
00:22:23,909 --> 00:22:22,320
from our perspective we're really seeing

581
00:22:25,510 --> 00:22:23,919
a wide array of life science

582
00:22:27,190 --> 00:22:25,520
investigations that are on this mission

583
00:22:29,510 --> 00:22:27,200
i believe we just saw a video from a

584
00:22:31,750 --> 00:22:29,520
brain organoid payload from a group over

585
00:22:33,430 --> 00:22:31,760
uc san diego but then on top of that we

586
00:22:35,190 --> 00:22:33,440
also have a variety of tissue chip

587
00:22:36,950 --> 00:22:35,200
investigations that are flying that are

588
00:22:38,390 --> 00:22:36,960

sponsored through one of the centers

589
00:22:39,909 --> 00:22:38,400
associated with the national institutes

590
00:22:41,350 --> 00:22:39,919
of health uh so we're really excited

591
00:22:42,630 --> 00:22:41,360
about that but also there's some

592
00:22:44,710 --> 00:22:42,640
microbial research that's going to be

593
00:22:45,669 --> 00:22:44,720
happening and then we also have some big

594
00:22:47,190 --> 00:22:45,679
pharmaceutical companies that are

595
00:22:49,029 --> 00:22:47,200
sending investigations on this mission

596
00:22:50,789 --> 00:22:49,039
so again it really does showcase the

597
00:22:52,630 --> 00:22:50,799
diversity that we have within the life

598
00:22:54,230 --> 00:22:52,640
science communities and and the types of

599
00:22:56,070 --> 00:22:54,240
research that's possible on the space

600
00:22:58,630 --> 00:22:56,080
station absolutely we know that uh the

601
00:22:59,990 --> 00:22:58,640
us national lab is managing more than 15

602
00:23:01,990 --> 00:23:00,000
payloads on this mission which is a

603
00:23:04,070 --> 00:23:02,000
pretty uh big lift so can you tell us is

604
00:23:05,110 --> 00:23:04,080
there anything that sticks out to you

605
00:23:06,310 --> 00:23:05,120
well what i would say that's really

606
00:23:07,830 --> 00:23:06,320
interesting about this mission is we're

607
00:23:09,990 --> 00:23:07,840
seeing a lot of investigations that are

608
00:23:12,390 --> 00:23:10,000
going up for the second or third time

609
00:23:14,230 --> 00:23:12,400
and so it's the idea of iteration so

610
00:23:15,270 --> 00:23:14,240
it's what we're able to see out of this

611
00:23:16,950 --> 00:23:15,280
is that they're learning something the

612
00:23:18,390 --> 00:23:16,960
first time they fly but then now they're

613
00:23:20,230 --> 00:23:18,400

able to extrapolate that and take that

614
00:23:21,990 --> 00:23:20,240
into their next investigations and maybe

615
00:23:23,750 --> 00:23:22,000
that leads to applied applications one

616
00:23:25,830 --> 00:23:23,760
day down the road for either benefiting

617
00:23:28,070 --> 00:23:25,840
life on earth or setting the foundation

618
00:23:29,669 --> 00:23:28,080
for a robust and thriving low earth

619
00:23:31,909 --> 00:23:29,679
orbit economy and then on top of that

620
00:23:33,350 --> 00:23:31,919
what i would say too is we have a lot of

621
00:23:34,710 --> 00:23:33,360
student investigations that are flying

622
00:23:36,630 --> 00:23:34,720
on this mission and i think that's one

623
00:23:38,390 --> 00:23:36,640
of the really exciting aspects of the

624
00:23:40,149 --> 00:23:38,400
national laboratory is the fact that we

625
00:23:41,430 --> 00:23:40,159
are opening access to all types of

626
00:23:43,510 --> 00:23:41,440
researchers whether you're a seasoned

627
00:23:45,110 --> 00:23:43,520
researcher or you're a young researcher

628
00:23:47,190 --> 00:23:45,120
the the notion that the space the

629
00:23:49,510 --> 00:23:47,200
foundation for a thriving low earth

630
00:23:51,190 --> 00:23:49,520
orbit economy patrick that is fantastic

631
00:23:53,110 --> 00:23:51,200
and we are so excited to see all this

632
00:23:54,950 --> 00:23:53,120
science launch to space today as let's

633
00:23:56,789 --> 00:23:54,960
take it back to tori for another launch

634
00:23:59,110 --> 00:23:56,799
update tori

635
00:24:00,630 --> 00:23:59,120
thanks jasmine i'm sure the astronauts

636
00:24:02,549 --> 00:24:00,640
on board the space station are eagerly

637
00:24:04,390 --> 00:24:02,559
awaiting their delivery and it looks

638
00:24:06,470 --> 00:24:04,400

like they won't have to wait much longer

639
00:24:08,549 --> 00:24:06,480
with just about eight minutes to go

640
00:24:10,310 --> 00:24:08,559
before launch let's head back over to

641
00:24:12,549 --> 00:24:10,320
joshua and marie to take us through

642
00:24:14,390 --> 00:24:12,559
liftoff guys how are we looking

643
00:24:16,230 --> 00:24:14,400
all right thank you so much tori well uh

644
00:24:18,149 --> 00:24:16,240
good news to report we've heard very

645
00:24:19,830 --> 00:24:18,159
little chatter on the nets and that's a

646
00:24:22,710 --> 00:24:19,840
good thing no news is good news it's

647
00:24:24,630 --> 00:24:22,720
been relatively quiet rocket is healthy

648
00:24:26,310 --> 00:24:24,640
again as you said uh well we're inside

649
00:24:28,630 --> 00:24:26,320
eight minutes now we're at t minus uh

650
00:24:29,750 --> 00:24:28,640
seven minutes and forty seconds yeah you

651
00:24:31,750 --> 00:24:29,760
always get a little bit anxious with

652
00:24:33,510 --> 00:24:31,760
that much quiet but again like you said

653
00:24:34,630 --> 00:24:33,520
it's it's a good thing yes we have to

654
00:24:36,630 --> 00:24:34,640
remind ourselves of that so we're

655
00:24:38,870 --> 00:24:36,640
excited to hear for this today uh we're

656
00:24:41,750 --> 00:24:38,880
expecting to hear a few things coming up

657
00:24:43,190 --> 00:24:41,760
one of them uh a call for internal power

658
00:24:44,870 --> 00:24:43,200
that would be the dragon moving to

659
00:24:46,230 --> 00:24:44,880
internal power meaning that it's prime

660
00:24:47,990 --> 00:24:46,240
and ready to live on its own apart from

661
00:24:50,230 --> 00:24:48,000
ground support equipment uh we're also

662
00:24:52,630 --> 00:24:50,240
looking for the engine chill to begin um

663
00:24:53,830 --> 00:24:52,640

in just a minute um actually in just

664
00:24:55,190 --> 00:24:53,840
about 15 seconds we should hopefully

665
00:24:57,190 --> 00:24:55,200
hear that that's the

666
00:24:59,110 --> 00:24:57,200
cooling of the

667
00:25:01,110 --> 00:24:59,120
merlin 1d engines at the base of the

668
00:25:03,110 --> 00:25:01,120
first stage as to prepare them to

669
00:25:03,909 --> 00:25:03,120
receive cryogenic fuel you don't want to

670
00:25:05,990 --> 00:25:03,919
run

671
00:25:07,110 --> 00:25:06,000
temperatures of negative 330 degrees

672
00:25:09,590 --> 00:25:07,120
below zero

673
00:25:12,950 --> 00:25:09,600
into lukewarm or atmospheric temperature

674
00:25:16,470 --> 00:25:15,029
and so we just heard that call uh for

675
00:25:18,789 --> 00:25:16,480
the engine chill so that came just

676
00:25:21,029 --> 00:25:18,799
inside of t minus seven minutes

677
00:25:23,029 --> 00:25:21,039
um in about t minus five minutes so less

678
00:25:24,789 --> 00:25:23,039
than two minutes from now uh we should

679
00:25:27,190 --> 00:25:24,799
hear that the rp1 again that's that

680
00:25:29,430 --> 00:25:27,200
rocket grade kerosene uh fueling will be

681
00:25:31,830 --> 00:25:29,440
complete and then the action will really

682
00:25:34,149 --> 00:25:31,840
start to pick up uh after that point the

683
00:25:35,750 --> 00:25:34,159
uh the transporter erector or strongback

684
00:25:37,510 --> 00:25:35,760
which provides fluid power and

685
00:25:39,590 --> 00:25:37,520
communication to the rocket

686
00:25:41,029 --> 00:25:39,600
that will kind of open its clamp and

687
00:25:43,029 --> 00:25:41,039
tilt back ever so slightly in

688
00:25:45,669 --> 00:25:43,039

preparation for liftoff

689
00:25:47,990 --> 00:25:45,679
again this this is the first uh cargo

690
00:25:50,470 --> 00:25:48,000
vehicle cargo dragon that will dock uh

691
00:25:52,710 --> 00:25:50,480
not just dock but doc autonomously to

692
00:25:54,470 --> 00:25:52,720
the international space station and so

693
00:25:56,230 --> 00:25:54,480
uh tomorrow afternoon it will be

694
00:25:58,470 --> 00:25:56,240
approaching and then docking to the node

695
00:26:00,149 --> 00:25:58,480
2 harmony zenith port

696
00:26:02,950 --> 00:26:00,159
that happens to be the same port that

697
00:26:03,909 --> 00:26:02,960
the crew dragon resilience will relocate

698
00:26:05,909 --> 00:26:03,919
to

699
00:26:08,149 --> 00:26:05,919
after this cargo dragon departs in

700
00:26:10,549 --> 00:26:08,159
january that will clear the node 2

701
00:26:12,470 --> 00:26:10,559
forward port for crew 2 arrival in the

702
00:26:14,310 --> 00:26:12,480
spring so if you uh remember that

703
00:26:15,990 --> 00:26:14,320
graphic uh that leah showed while she

704
00:26:17,590 --> 00:26:16,000
was talking it i mean it reminded me of

705
00:26:19,110 --> 00:26:17,600
a full parking lot

706
00:26:20,789 --> 00:26:19,120
this time at the space station so that's

707
00:26:22,390 --> 00:26:20,799
a good thing lots of visiting vehicle

708
00:26:24,070 --> 00:26:22,400
traffic at the space station and the

709
00:26:25,909 --> 00:26:24,080
cargo dragon just the next one to make a

710
00:26:27,750 --> 00:26:25,919
stop there yeah just a point of

711
00:26:29,110 --> 00:26:27,760
clarification uh we've obviously

712
00:26:31,190 --> 00:26:29,120
mentioned that there's been almost a

713
00:26:33,590 --> 00:26:31,200

couple dozen missions with the dragon to

714
00:26:35,110 --> 00:26:33,600
space station and those birthed they

715
00:26:36,950 --> 00:26:35,120
didn't dock and for those that aren't

716
00:26:39,430 --> 00:26:36,960
familiar uh that is a difference there

717
00:26:40,630 --> 00:26:39,440
so just to kind of make that point um

718
00:26:41,830 --> 00:26:40,640
the start of the show here in just about

719
00:26:43,430 --> 00:26:41,840
five and a half minutes is going to be

720
00:26:44,789 --> 00:26:43,440
the falcon so talking through this

721
00:26:47,350 --> 00:26:44,799
vehicle and what it can do it's a

722
00:26:49,350 --> 00:26:47,360
two-stage rocket roughly 230 feet tall

723
00:26:51,830 --> 00:26:49,360
12 feet in diameter at the base of that

724
00:26:53,909 --> 00:26:51,840
rocket you've got nine merlin 1d engines

725
00:26:55,990 --> 00:26:53,919
that will produce roughly 1.7 million

726
00:26:57,350 --> 00:26:56,000
pounds of thrust at liftoff and then

727
00:26:59,110 --> 00:26:57,360
that's the first two thirds of the

728
00:27:00,630 --> 00:26:59,120
rocket and then the next segment is a

729
00:27:02,070 --> 00:27:00,640
very dark black

730
00:27:03,830 --> 00:27:02,080
interstage adapter and that's connecting

731
00:27:06,230 --> 00:27:03,840
the first and second stage

732
00:27:08,149 --> 00:27:06,240
that actually houses the merlin vacuum

733
00:27:10,390 --> 00:27:08,159
engine which will power the second stage

734
00:27:11,510 --> 00:27:10,400
to the correct orbit

735
00:27:13,190 --> 00:27:11,520
there are great called dragons and

736
00:27:14,710 --> 00:27:13,200
terminal count that's what we're looking

737
00:27:18,950 --> 00:27:14,720
for

738
00:27:22,789 --> 00:27:20,389

there we go there's the internal call

739
00:27:24,549 --> 00:27:22,799
the internal power call officially um

740
00:27:27,029 --> 00:27:24,559
we also have hypersonic grid fins at the

741
00:27:28,789 --> 00:27:27,039
top of the first stage as well as carbon

742
00:27:30,789 --> 00:27:28,799
fiber landing legs which will help us

743
00:27:32,149 --> 00:27:30,799
successfully land this for hopefully the

744
00:27:34,149 --> 00:27:32,159
fourth time

745
00:27:36,070 --> 00:27:34,159
that will be really exciting to see and

746
00:27:37,669 --> 00:27:36,080
we haven't heard it just yet but we if

747
00:27:39,750 --> 00:27:37,679
we do momentarily i will just stop

748
00:27:41,750 --> 00:27:39,760
talking so i may stop mid-sentence but

749
00:27:44,389 --> 00:27:41,760
we expect to hear uh that the

750
00:27:46,470 --> 00:27:44,399
transporter erector at least see uh that

751
00:27:48,950 --> 00:27:46,480
clamp beginning to open

752
00:27:50,630 --> 00:27:48,960
uh in preparation to tilt back before

753
00:27:59,430 --> 00:27:50,640
liftoff so that should be happening any

754
00:28:02,710 --> 00:28:01,430
so while we're waiting there for that uh

755
00:28:04,789 --> 00:28:02,720
we're on our way to space station we've

756
00:28:06,710 --> 00:28:04,799
talked about that a good bit uh the

757
00:28:08,870 --> 00:28:06,720
space station is actually

758
00:28:11,510 --> 00:28:08,880
in the uh over top of the indian ocean

759
00:28:13,029 --> 00:28:11,520
headed on a west to east track about to

760
00:28:15,510 --> 00:28:13,039
kind of round around the southern

761
00:28:18,310 --> 00:28:15,520
portion of australia so we're roughly on

762
00:28:19,590 --> 00:28:18,320
a 24-hour intercept pace to get there

763
00:28:21,350 --> 00:28:19,600

but that's kind of a quick update for

764
00:28:23,750 --> 00:28:21,360
you

765
00:28:25,750 --> 00:28:23,760
and again when dragon docks uh it will

766
00:28:29,430 --> 00:28:25,760
be tomorrow december 7th at

767
00:28:30,789 --> 00:28:29,440
approximately 1 30 pm eastern time

768
00:28:32,389 --> 00:28:30,799
and there you see the transporter

769
00:28:34,149 --> 00:28:32,399
erector if you look to the right of your

770
00:28:36,789 --> 00:28:34,159
screen it's tilting back ever so

771
00:28:45,909 --> 00:28:38,710
and that again is what happens

772
00:28:45,919 --> 00:28:55,510
and that tilt continuing

773
00:28:59,350 --> 00:28:57,669
and looks like that is complete and just

774
00:29:01,750 --> 00:28:59,360
gorgeous skies surrounding the launch

775
00:29:03,110 --> 00:29:01,760
pad right now the thick clouds look as

776
00:29:04,310 --> 00:29:03,120
if they're staying offshore we can't see

777
00:29:05,990 --> 00:29:04,320
directly above the rocket which is the

778
00:29:08,870 --> 00:29:06,000
important part of the sky but things are

779
00:29:10,630 --> 00:29:08,880
looking really good at the moment

780
00:29:12,950 --> 00:29:10,640
all right we are just inside t minus

781
00:29:14,470 --> 00:29:12,960
three minutes now uh so in less than a

782
00:29:16,789 --> 00:29:14,480
minute we should hear that the range is

783
00:29:20,549 --> 00:29:16,799
go and uh stage two locks close out

784
00:29:24,470 --> 00:29:22,470
that was at stage one liquid oxygen

785
00:29:25,909 --> 00:29:24,480
closed out so the first stage is fueled

786
00:29:27,190 --> 00:29:25,919
uh and we should stop seeing that

787
00:29:28,870 --> 00:29:27,200
venting which you can see on your screen

788
00:29:30,470 --> 00:29:28,880

there if you see uh some of the

789
00:29:32,630 --> 00:29:30,480
condensation of the air forming around

790
00:29:34,470 --> 00:29:32,640
the rocket that's just a matter of the

791
00:29:42,470 --> 00:29:34,480
cryogenic temperature of the vehicle the

792
00:29:45,990 --> 00:29:44,630
we do fuel as close to zero as possible

793
00:29:47,669 --> 00:29:46,000
spacex fuels as close to zero as

794
00:29:49,510 --> 00:29:47,679
possible and that's because it's they're

795
00:29:50,789 --> 00:29:49,520
using densified liquid oxygen they're

796
00:29:52,870 --> 00:29:50,799
trying to pack literally as much as they

797
00:29:54,389 --> 00:29:52,880
can in there to maximize the performance

798
00:29:56,630 --> 00:29:54,399
of the vehicle to support the customer's

799
00:29:58,710 --> 00:29:56,640
needs

800
00:30:00,950 --> 00:29:58,720
we are closing in on t minus two minutes

801
00:30:15,510 --> 00:30:00,960
now and expect to hear a couple of calls

802
00:30:18,149 --> 00:30:16,950
stage two locks has closed down for

803
00:30:19,669 --> 00:30:18,159
flight

804
00:30:22,789 --> 00:30:19,679
and there's that stage two locks

805
00:30:33,190 --> 00:30:22,799
closeout call

806
00:30:37,590 --> 00:30:35,430
and we're now at t minus one minute 33

807
00:31:07,590 --> 00:30:37,600
seconds and counting and falcon 9 should

808
00:31:11,669 --> 00:31:09,590
okay nine from startup

809
00:31:13,590 --> 00:31:11,679
dragon is in countdown

810
00:31:15,830 --> 00:31:13,600
and there it is right on time falcon 9

811
00:31:18,149 --> 00:31:15,840
is in startup dragon is in countdown so

812
00:31:22,230 --> 00:31:18,159
we are at t minus 50 seconds and

813
00:31:27,269 --> 00:31:25,669

ld on countdown one go for launch

814
00:31:29,350 --> 00:31:27,279
there is that go for launch call we love

815
00:31:34,630 --> 00:31:29,360
to hear

816
00:31:39,430 --> 00:31:37,590
at t minus eighteen we will see

817
00:31:51,110 --> 00:31:39,440
sound suppression system begin to flood

818
00:31:51,120 --> 00:31:56,870
t-minus 15 seconds

819
00:31:58,870 --> 00:31:57,909
10

820
00:31:59,750 --> 00:31:58,880
9

821
00:32:00,710 --> 00:31:59,760
8

822
00:32:01,669 --> 00:32:00,720
seven

823
00:32:02,630 --> 00:32:01,679
six

824
00:32:03,509 --> 00:32:02,640
five

825
00:32:04,549 --> 00:32:03,519
four

826
00:32:05,590 --> 00:32:04,559
three

827
00:32:08,710 --> 00:32:05,600
two

828
00:32:15,269 --> 00:32:12,230
and liftoff of the falcon 9 and upgraded

829
00:32:21,830 --> 00:32:15,279
cargo dragon the first cargo capsule to

830
00:32:21,840 --> 00:33:05,830
stage one proportional is now

831
00:33:05,840 --> 00:33:10,760
falcon 9 is supersonic

832
00:33:10,770 --> 00:33:21,350
[Music]

833
00:33:24,789 --> 00:33:23,029
so there we go a couple really important

834
00:33:27,590 --> 00:33:24,799
calls supersonic obviously exceeding the

835
00:33:30,549 --> 00:33:27,600
speed of sound and then max q maximum

836
00:33:31,909 --> 00:33:30,559
aerodynamic pressure that's from passing

837
00:33:33,909 --> 00:33:31,919
through an atmosphere that is still

838
00:33:36,389 --> 00:33:33,919

fairly thick while increasing speed

839
00:33:37,990 --> 00:33:36,399
dramatically they throttle back slightly

840
00:33:39,830 --> 00:33:38,000
just to be able to make sure that the

841
00:33:41,509 --> 00:33:39,840
vehicle can handle those loads and then

842
00:33:43,269 --> 00:33:41,519
they'll accelerate back up uh a

843
00:33:44,950 --> 00:33:43,279
beautiful shot there on screen uh you

844
00:33:46,149 --> 00:33:44,960
can see the plume coming up in flight

845
00:33:47,909 --> 00:33:46,159
chill started

846
00:33:49,590 --> 00:33:47,919
you can see the plume coming off of the

847
00:33:51,909 --> 00:33:49,600
base of that first stage where the nine

848
00:33:53,990 --> 00:33:51,919
merlin 1d engines are firing we heard

849
00:33:56,149 --> 00:33:54,000
the chill call for the vacuum engine to

850
00:33:59,590 --> 00:33:56,159
begin as well uh preparing that to take

851
00:34:01,190 --> 00:33:59,600
the second stage to the correct orbit

852
00:34:04,230 --> 00:34:01,200
coming up here in about 30 seconds we're

853
00:34:05,590 --> 00:34:04,240
going to hear and see a rapid succession

854
00:34:07,269 --> 00:34:05,600
of things happening we're going to hear

855
00:34:08,710 --> 00:34:07,279
a call for miko that's the booster the

856
00:34:10,629 --> 00:34:08,720
main engine cutoff

857
00:34:12,149 --> 00:34:10,639
that's it's completing its its job of

858
00:34:14,710 --> 00:34:12,159
getting the

859
00:34:16,950 --> 00:34:14,720
spacecraft out of the atmosphere we'll

860
00:34:18,950 --> 00:34:16,960
also follow that up with the first stage

861
00:34:21,190 --> 00:34:18,960
being separated following a parabolic

862
00:34:23,349 --> 00:34:21,200
trajectory back towards the drone ship

863
00:34:25,589 --> 00:34:23,359

and then very shortly after that will be

864
00:34:27,190 --> 00:34:25,599
the second stage engine start that's

865
00:34:45,109 --> 00:34:27,200
that merlin vacuum engine we talked

866
00:34:45,119 --> 00:34:48,389
confirmed

867
00:34:51,190 --> 00:34:50,149
there you see a beautiful shot the first

868
00:34:56,790 --> 00:34:51,200
stage

869
00:35:00,870 --> 00:34:59,109
and that mvac ignition confirmed there

870
00:35:02,150 --> 00:35:00,880
you see it on screen you can see on the

871
00:35:03,990 --> 00:35:02,160
left side you can kind of see that plume

872
00:35:05,910 --> 00:35:04,000
coming out and you'll see that engine

873
00:35:08,550 --> 00:35:05,920
bell increasingly get more of that

874
00:35:10,310 --> 00:35:08,560
beautiful orange color to it that says

875
00:35:11,990 --> 00:35:10,320
we're just increasing the heat and

876
00:35:13,910 --> 00:35:12,000
picking up the pace the two camera

877
00:35:15,270 --> 00:35:13,920
angles you see here are on reverse sides

878
00:35:16,710 --> 00:35:15,280
of that engine so you're seeing a single

879
00:35:19,030 --> 00:35:16,720
engine there just from opposite

880
00:35:21,349 --> 00:35:19,040
directions as we continue on a nominal

881
00:35:24,550 --> 00:35:21,359
call we heard a number of those during

882
00:35:26,550 --> 00:35:24,560
the the uphill climb as well

883
00:35:28,390 --> 00:35:26,560
beautiful launch today just stunning and

884
00:35:30,310 --> 00:35:28,400
and again all the calls we've heard have

885
00:35:31,910 --> 00:35:30,320
been nominal up to this point so all

886
00:35:33,270 --> 00:35:31,920
things looking great

887
00:35:34,870 --> 00:35:33,280
there you see on the left hand side of

888
00:35:37,270 --> 00:35:34,880

your screen that first stage continuing

889
00:35:39,190 --> 00:35:37,280
on those hypersonic grid fins are now

890
00:35:40,870 --> 00:35:39,200
expanded those won't be usable until

891
00:35:42,710 --> 00:35:40,880
they re-enter the atmosphere

892
00:35:44,790 --> 00:35:42,720
obviously without the atmosphere that

893
00:35:46,470 --> 00:35:44,800
kind of directioning just isn't helpful

894
00:35:47,990 --> 00:35:46,480
but once they enter the atmosphere

895
00:35:50,470 --> 00:35:48,000
you'll see those begin to move pitch and

896
00:35:52,550 --> 00:35:50,480
roll uh to be able to target that

897
00:35:56,390 --> 00:35:52,560
pinpoint landing on of course i still

898
00:35:59,990 --> 00:35:57,910
we've got less than five minutes to

899
00:36:02,390 --> 00:36:00,000
expect to happen

900
00:36:03,910 --> 00:36:02,400
stage two propulsion is nominal

901
00:36:06,550 --> 00:36:03,920
a couple more great nominal call

902
00:36:09,349 --> 00:36:06,560
callouts there so just previewing what's

903
00:36:10,870 --> 00:36:09,359
ahead at about six and a half minutes

904
00:36:13,510 --> 00:36:10,880
into flight

905
00:36:15,109 --> 00:36:13,520
we're going to have the entry burn for

906
00:36:16,790 --> 00:36:15,119
the first stage headed towards that

907
00:36:18,230 --> 00:36:16,800
drone ship just acquisition of signal or

908
00:36:20,710 --> 00:36:18,240
bermuda

909
00:36:22,069 --> 00:36:20,720
so that's just a communication call

910
00:36:24,310 --> 00:36:22,079
you might hear more of those as we go

911
00:36:26,069 --> 00:36:24,320
through the process today that's just a

912
00:36:28,230 --> 00:36:26,079
matter of there are ground stations

913
00:36:29,910 --> 00:36:28,240

across the world literally that help

914
00:36:31,750 --> 00:36:29,920
pick up and track the vehicle as we send

915
00:36:33,270 --> 00:36:31,760
telemetry data back to earth for the

916
00:36:34,790 --> 00:36:33,280
mission for the controllers to be able

917
00:36:37,829 --> 00:36:34,800
to monitor progress and ensure

918
00:36:39,990 --> 00:36:37,839
everything is proceeding nominally

919
00:36:43,109 --> 00:36:40,000
and really noteworthy that booster uh

920
00:36:45,510 --> 00:36:43,119
just launched its fourth payload uh into

921
00:36:47,190 --> 00:36:45,520
space and one of those uh actually was

922
00:36:48,950 --> 00:36:47,200
more significant than a payload bob and

923
00:36:51,430 --> 00:36:48,960
doug earlier this year that that same

924
00:36:53,750 --> 00:36:51,440
booster launched two humans into space

925
00:36:55,829 --> 00:36:53,760
uh so really really great amazing

926
00:37:01,349 --> 00:36:55,839
accomplishment that that uh the same

927
00:37:04,950 --> 00:37:03,510
after we get that entry burn uh a couple

928
00:37:08,069 --> 00:37:04,960
minutes later we will have the second

929
00:37:10,550 --> 00:37:08,079
stage engine cutoff uh that puts us at

930
00:37:12,630 --> 00:37:10,560
having a roughly six minute burn of the

931
00:37:14,710 --> 00:37:12,640
second stage and then at almost the

932
00:37:16,710 --> 00:37:14,720
exact same instant we're expecting

933
00:37:18,630 --> 00:37:16,720
the uh the first stage landing to occur

934
00:37:20,230 --> 00:37:18,640
and then a few minutes more we'll see

935
00:37:21,990 --> 00:37:20,240
the separation of the dragon from that

936
00:37:24,710 --> 00:37:22,000
second stage we've seen some beautiful

937
00:37:25,990 --> 00:37:24,720
shots this morning uh in preparation for

938
00:37:27,430 --> 00:37:26,000

launch um so hopefully we'll get to

939
00:37:29,829 --> 00:37:27,440
bring you that live

940
00:37:30,870 --> 00:37:29,839
again beautiful to see that dragon just

941
00:37:33,270 --> 00:37:30,880
separate

942
00:37:36,470 --> 00:37:33,280
what feels like ever so gently at a at a

943
00:37:38,870 --> 00:37:36,480
cool 17 500 miles an hour oh yeah just a

944
00:37:40,150 --> 00:37:38,880
just a nice easy coast right um you know

945
00:37:44,950 --> 00:37:40,160
what's really

946
00:37:46,790 --> 00:37:44,960
and realize you know the dragon is on

947
00:37:49,109 --> 00:37:46,800
its way to the space station uh the

948
00:37:51,190 --> 00:37:49,119
first of nine cargo resupply missions

949
00:37:53,190 --> 00:37:51,200
under this brand new contract but it

950
00:37:56,390 --> 00:37:53,200
just so happens on this day in history

951
00:37:58,230 --> 00:37:56,400
22 years ago began the assembly of the

952
00:38:00,230 --> 00:37:58,240
international space station trajectory

953
00:38:02,230 --> 00:38:00,240
nominal

954
00:38:04,630 --> 00:38:02,240
obviously an incredible international

955
00:38:06,630 --> 00:38:04,640
collaboration uh and really we're we're

956
00:38:08,069 --> 00:38:06,640
kind of ushering in the era of having

957
00:38:10,470 --> 00:38:08,079
commercial companies contribute to that

958
00:38:12,230 --> 00:38:10,480
collaboration and so what a

959
00:38:14,230 --> 00:38:12,240
what a privilege it is to be a part of

960
00:38:16,470 --> 00:38:14,240
this portion of history of the space

961
00:38:18,230 --> 00:38:16,480
station and our exploration not only to

962
00:38:21,190 --> 00:38:18,240
low earth orbit but also into deep space

963
00:38:22,790 --> 00:38:21,200

yeah so 22 years later uh from the the

964
00:38:25,030 --> 00:38:22,800
very beginnings of the international

965
00:38:26,870 --> 00:38:25,040
space station now uh

966
00:38:28,950 --> 00:38:26,880
they're having to move spacecraft around

967
00:38:31,030 --> 00:38:28,960
to open up ports for uh all the new

968
00:38:33,270 --> 00:38:31,040
visiting vehicles so it's really really

969
00:38:35,750 --> 00:38:33,280
an amazing achievement uh result of the

970
00:38:38,310 --> 00:38:35,760
cooperation between so many nations uh

971
00:38:39,990 --> 00:38:38,320
government and industry together

972
00:38:41,510 --> 00:38:40,000
yeah marie pleasure to have you with me

973
00:38:43,990 --> 00:38:41,520
it's been fun hey john entry burn

974
00:38:45,190 --> 00:38:44,000
startup we're gonna we're gonna call it

975
00:38:46,790 --> 00:38:45,200
a day for us here but we're going to

976
00:38:48,550 --> 00:38:46,800
stay with the rest of the process and

977
00:38:51,030 --> 00:38:48,560
send it now back to spacex headquarters

978
00:38:52,550 --> 00:38:51,040
and hawthorne shiva congratulations to

979
00:38:53,990 --> 00:38:52,560
you and the spacex team they're on a

980
00:38:57,430 --> 00:38:54,000
great launch looking forward to the next

981
00:38:59,430 --> 00:38:58,829
yeah

982
00:39:01,990 --> 00:38:59,440
guys back to the shot of the the vehicle

983
00:39:05,990 --> 00:39:03,910
we're actually just in the middle of our

984
00:39:07,829 --> 00:39:06,000
entry burn um that's where we ignite

985
00:39:10,150 --> 00:39:07,839
three of the merlin 1d engines so we're

986
00:39:12,950 --> 00:39:10,160
slowing down the first stage as we come

987
00:39:14,790 --> 00:39:12,960
into contact with the atmosphere

988
00:39:17,190 --> 00:39:14,800

just shut that down so that burn lasting

989
00:39:19,349 --> 00:39:17,200
about 30 seconds from here on out um you

990
00:39:21,030 --> 00:39:19,359
can actually see the attitude control

991
00:39:23,190 --> 00:39:21,040
thrusters they're firing that's those

992
00:39:25,670 --> 00:39:23,200
little plumes of white gas and then the

993
00:39:27,589 --> 00:39:25,680
grid fins those as we get more and more

994
00:39:29,990 --> 00:39:27,599
atmospheric pressure on the vehicle will

995
00:39:32,230 --> 00:39:30,000
guide the first stage towards our drone

996
00:39:34,390 --> 00:39:32,240
ship named of course i still love you

997
00:39:37,109 --> 00:39:34,400
taking a look at the data for the second

998
00:39:39,030 --> 00:39:37,119
stage dragon is running right down the

999
00:39:41,270 --> 00:39:39,040
middle of the

1000
00:39:44,150 --> 00:39:41,280
projected orbit on the second stage

1001
00:39:47,109 --> 00:39:44,160
going for a roughly circular orbit

1002
00:39:48,390 --> 00:39:47,119
and then about t plus 11 minutes uh

1003
00:39:50,710 --> 00:39:48,400
eleven and a half minutes into flight

1004
00:39:53,589 --> 00:39:50,720
we'll expect to see dragon separation

1005
00:39:55,349 --> 00:39:53,599
at this point next event coming up uh so

1006
00:39:57,030 --> 00:39:55,359
on our screen right now is our shots of

1007
00:39:59,510 --> 00:39:57,040
the second stage but next event coming

1008
00:40:01,910 --> 00:39:59,520
up for the first stage

1009
00:40:04,309 --> 00:40:01,920
falcon 9's landing burn

1010
00:40:06,630 --> 00:40:04,319
that's about 30 seconds away we'll

1011
00:40:08,630 --> 00:40:06,640
ignite just a single center merlin

1012
00:40:11,109 --> 00:40:08,640
engine then shortly after that deploy

1013
00:40:13,430 --> 00:40:11,119

the landing legs and then attempt a soft

1014
00:40:15,030 --> 00:40:13,440
touchdown on our drone ship named of

1015
00:40:17,190 --> 00:40:15,040
course i still love you stationed out in

1016
00:40:19,829 --> 00:40:17,200
the atlantic

1017
00:40:21,190 --> 00:40:19,839
10 seconds out to our landing burn on

1018
00:40:24,069 --> 00:40:21,200
the first stage

1019
00:40:27,510 --> 00:40:24,079
second stage continuing to look nominal

1020
00:40:29,510 --> 00:40:27,520
stage one landing burn startup

1021
00:40:31,750 --> 00:40:29,520
call out there from the prop team so

1022
00:40:33,990 --> 00:40:31,760
this burn expects it to last about 25

1023
00:40:37,109 --> 00:40:34,000
seconds in the middle of this we'll also

1024
00:40:40,069 --> 00:40:37,119
have shutdown of the second stage's

1025
00:40:46,309 --> 00:40:42,230
coming up uh just a few seconds from now

1026
00:40:50,710 --> 00:40:47,750
so landing leg deployment on the first

1027
00:40:56,790 --> 00:40:50,720
stage hopefully stick the landing

1028
00:41:02,790 --> 00:40:59,670
stage and there is the fourth

1029
00:41:04,950 --> 00:41:02,800
successful landing of this falcon 9 uh

1030
00:41:07,190 --> 00:41:04,960
exciting news as well this is the 100th

1031
00:41:09,750 --> 00:41:07,200
successful flight

1032
00:41:11,670 --> 00:41:09,760
of falcon 9 it's our 68 successful first

1033
00:41:14,150 --> 00:41:11,680
stage you also heard the call out there

1034
00:41:16,309 --> 00:41:14,160
for nominal orbital insertion on the

1035
00:41:18,710 --> 00:41:16,319
second stage so that means dragon is in

1036
00:41:21,910 --> 00:41:18,720
the target orbit still attached to our

1037
00:41:24,390 --> 00:41:21,920
second stage uh 100 successful landings

1038
00:41:26,870 --> 00:41:24,400

of falcon 9 fourth landing of this

1039
00:41:29,670 --> 00:41:26,880
booster which first flew bob and doug to

1040
00:41:31,109 --> 00:41:29,680
space uh 35th landing actually on this

1041
00:41:33,670 --> 00:41:31,119
drone ship

1042
00:41:35,990 --> 00:41:33,680
coming up next in about two minutes from

1043
00:41:37,510 --> 00:41:36,000
now two minutes and 20 seconds we'll

1044
00:41:40,470 --> 00:41:37,520
expect to see

1045
00:41:42,790 --> 00:41:40,480
deployments of the dragon spacecraft

1046
00:41:44,150 --> 00:41:42,800
from the second stage now if you're just

1047
00:41:47,510 --> 00:41:44,160
joining us

1048
00:41:49,750 --> 00:41:47,520
we had an on-time liftoff at 11 17 a.m

1049
00:41:51,349 --> 00:41:49,760
eastern time successfully recovered the

1050
00:41:53,750 --> 00:41:51,359
first stage which you can see on your

1051
00:41:56,069 --> 00:41:53,760
screen dragon attached to the second

1052
00:41:58,150 --> 00:41:56,079
stage in orbit around the planet second

1053
00:42:00,150 --> 00:41:58,160
stage doing some checks right now

1054
00:42:02,230 --> 00:42:00,160
verifying that its attitude is

1055
00:42:05,270 --> 00:42:02,240
appropriate for dragon separation

1056
00:42:07,109 --> 00:42:05,280
shortly after all in all very nominal

1057
00:42:08,950 --> 00:42:07,119
missions so far

1058
00:42:11,510 --> 00:42:08,960
and just what we want to see

1059
00:42:12,630 --> 00:42:11,520
so with that i think we can actually

1060
00:42:15,430 --> 00:42:12,640
check in

1061
00:42:16,630 --> 00:42:15,440
with the flight controllers at nasa's

1062
00:42:18,470 --> 00:42:16,640
johnson space center who have been

1063
00:42:21,990 --> 00:42:18,480

monitoring the mission leah how are

1064
00:42:27,270 --> 00:42:24,550
hi shiva thank you an amazing launch and

1065
00:42:28,790 --> 00:42:27,280
things are going well over here too

1066
00:42:30,710 --> 00:42:28,800
flight controllers here are monitoring

1067
00:42:32,950 --> 00:42:30,720
the international space station and as i

1068
00:42:35,349 --> 00:42:32,960
mentioned earlier they will begin joint

1069
00:42:37,750 --> 00:42:35,359
operations tomorrow once cargo dragon

1070
00:42:39,109 --> 00:42:37,760
enters the approach ellipsoid or an

1071
00:42:40,710 --> 00:42:39,119
invisible sphere around the

1072
00:42:42,870 --> 00:42:40,720
international space station that's four

1073
00:42:44,630 --> 00:42:42,880
kilometers by two kilometers by two

1074
00:42:46,470 --> 00:42:44,640
kilometers and helps us monitor the

1075
00:42:47,910 --> 00:42:46,480
approach and departure of visiting

1076
00:42:50,630 --> 00:42:47,920
vehicles

1077
00:42:52,710 --> 00:42:50,640
we have seen second stage separation and

1078
00:42:54,950 --> 00:42:52,720
obviously that first stage landing on

1079
00:42:57,109 --> 00:42:54,960
the drone ship next major milestone

1080
00:42:59,910 --> 00:42:57,119
we'll be looking for is for second stage

1081
00:43:02,630 --> 00:42:59,920
cut off and then eventually second stage

1082
00:43:04,950 --> 00:43:02,640
separation from the cargo dragon when

1083
00:43:19,829 --> 00:43:04,960
cargo dragon will begin flying free on

1084
00:43:26,630 --> 00:43:21,510
we'll be looking for a separation to

1085
00:43:31,030 --> 00:43:29,270
shortly thereafter there will be some

1086
00:43:42,230 --> 00:43:31,040
checkouts performed on the service

1087
00:43:45,230 --> 00:43:43,589
at the time of launch today the

1088
00:43:48,470 --> 00:43:45,240

international space station was flying

1089
00:43:51,510 --> 00:43:48,480
257 statute miles over the southern

1090
00:43:52,870 --> 00:43:51,520
indian ocean west of perth australia as

1091
00:43:54,470 --> 00:43:52,880
we mentioned earlier we have a full

1092
00:43:57,109 --> 00:43:54,480
house aboard the international space

1093
00:43:58,870 --> 00:43:57,119
station of seven people and five

1094
00:44:01,270 --> 00:43:58,880
visiting vehicles that will turn into

1095
00:44:03,589 --> 00:44:01,280
six tomorrow as murray mentioned a full

1096
00:44:18,550 --> 00:44:03,599
parking lot home for the holidays

1097
00:44:23,589 --> 00:44:20,829
and with second stage separation

1098
00:44:26,230 --> 00:44:23,599
confirmed crew cargo dragon is now

1099
00:44:27,670 --> 00:44:26,240
flying free on its own continuing its

1100
00:44:35,190 --> 00:44:27,680
journey to the international space

1101
00:44:39,109 --> 00:44:37,190
next major milestone coming up in just a

1102
00:44:41,270 --> 00:44:39,119
few moments we'll begin the nose cone

1103
00:44:43,430 --> 00:44:41,280
deploy revealing those bulkhead

1104
00:44:45,670 --> 00:44:43,440
thrusters underneath those will be used

1105
00:44:48,230 --> 00:44:45,680
for some of the burns throughout

1106
00:44:49,829 --> 00:44:48,240
cargo dragon's next 24 hours as it

1107
00:45:12,069 --> 00:44:49,839
begins its approach to the international

1108
00:45:17,030 --> 00:45:14,470
and we've heard confirmation of nosecone

1109
00:45:18,870 --> 00:45:17,040
deploy and some good checkouts of those

1110
00:45:19,829 --> 00:45:18,880
thrusters next up we have a special

1111
00:45:21,670 --> 00:45:19,839
guest

1112
00:45:23,589 --> 00:45:21,680
jeff aaron the systems engineering

1113
00:45:25,430 --> 00:45:23,599

integration office manager of the

1114
00:45:27,510 --> 00:45:25,440
international space station is standing

1115
00:45:29,670 --> 00:45:27,520
by to tell us a little bit more about

1116
00:45:32,390 --> 00:45:29,680
today's mission thanks so much for

1117
00:45:35,190 --> 00:45:32,400
joining us jeff

1118
00:45:36,790 --> 00:45:35,200
i'm more more than happy to join you

1119
00:45:38,790 --> 00:45:36,800
i have a few questions for you so the

1120
00:45:40,790 --> 00:45:38,800
cargo dragon is now in route to the

1121
00:45:42,950 --> 00:45:40,800
station can you explain the differences

1122
00:45:44,870 --> 00:45:42,960
in simulator similarities for this

1123
00:45:47,270 --> 00:45:44,880
vehicle with the crew dragon vehicle we

1124
00:45:49,510 --> 00:45:47,280
saw arrive at the station last month and

1125
00:45:51,349 --> 00:45:49,520
any similarities and differences in the

1126
00:45:52,950 --> 00:45:51,359
rendezvous profile for an automated

1127
00:45:55,910 --> 00:45:52,960
docking

1128
00:45:57,349 --> 00:45:55,920
yeah i'd be happy to talk to that um so

1129
00:45:59,349 --> 00:45:57,359
just basically you know if you actually

1130
00:46:01,109 --> 00:45:59,359
just look at the vehicle the the outer

1131
00:46:02,950 --> 00:46:01,119
model line is essentially the same

1132
00:46:04,390 --> 00:46:02,960
there's actually some some minor

1133
00:46:06,470 --> 00:46:04,400
differences but

1134
00:46:08,230 --> 00:46:06,480
the average eye would not would not pick

1135
00:46:09,589 --> 00:46:08,240
up that there's any difference between

1136
00:46:11,829 --> 00:46:09,599
the uh

1137
00:46:13,750 --> 00:46:11,839
the cargo and the crude version of the

1138
00:46:15,109 --> 00:46:13,760

vehicle

1139
00:46:16,950 --> 00:46:15,119
but at the same time probably one of the

1140
00:46:19,670 --> 00:46:16,960
most important things is that from an

1141
00:46:21,910 --> 00:46:19,680
iss crew and vehicle safety perspective

1142
00:46:22,870 --> 00:46:21,920
the vehicles are identical so

1143
00:46:27,670 --> 00:46:22,880
they're

1144
00:46:29,190 --> 00:46:27,680
and crew

1145
00:46:32,550 --> 00:46:29,200
one of the differences one of the big

1146
00:46:34,550 --> 00:46:32,560
differences between crew and cargo is

1147
00:46:37,670 --> 00:46:34,560
there uh there's no there's no super

1148
00:46:39,430 --> 00:46:37,680
dracos on the cargo vehicle there's

1149
00:46:42,630 --> 00:46:39,440
there's no need for a launch escape

1150
00:46:44,550 --> 00:46:42,640
system to uh to protect the crew so that

1151
00:46:46,470 --> 00:46:44,560
that's that's probably the biggest

1152
00:46:47,910 --> 00:46:46,480
difference from a from an overall safety

1153
00:46:49,190 --> 00:46:47,920
point of view

1154
00:46:51,349 --> 00:46:49,200
um

1155
00:46:53,510 --> 00:46:51,359
this vehicle is uh is a little bit more

1156
00:46:56,309 --> 00:46:53,520
capable from a powered locker point of

1157
00:46:57,670 --> 00:46:56,319
view which helps us a lot on on science

1158
00:46:59,589 --> 00:46:57,680
and research

1159
00:47:01,510 --> 00:46:59,599
we have eight lockers eight powered

1160
00:47:03,990 --> 00:47:01,520
lockers going up 12

1161
00:47:06,470 --> 00:47:04,000
coming coming home or for the decent

1162
00:47:09,109 --> 00:47:06,480
cargo where the crude vehicle only has

1163
00:47:10,790 --> 00:47:09,119

about it only has four powered lockers

1164
00:47:12,950 --> 00:47:10,800
on the way home

1165
00:47:15,589 --> 00:47:12,960
um obviously a big piece is is we have

1166
00:47:16,710 --> 00:47:15,599
to remove the crew accommodations for

1167
00:47:25,750 --> 00:47:16,720
the

1168
00:47:27,030 --> 00:47:25,760
systems all those kind of all that kind

1169
00:47:28,790 --> 00:47:27,040
of hardware

1170
00:47:30,309 --> 00:47:28,800
in the in the cargo version of the

1171
00:47:31,829 --> 00:47:30,319
vehicle

1172
00:47:34,870 --> 00:47:31,839
um

1173
00:47:36,470 --> 00:47:34,880
let me see you also asked about uh

1174
00:47:39,510 --> 00:47:36,480
about the rendezvous profile so the

1175
00:47:42,390 --> 00:47:39,520
rendezvous profile and proxops are

1176
00:47:44,710 --> 00:47:42,400
essentially the same

1177
00:47:46,069 --> 00:47:44,720
between the two vehicles if independent

1178
00:47:47,829 --> 00:47:46,079
of which port they go to i would tell

1179
00:47:50,470 --> 00:47:47,839
you they're the same

1180
00:47:53,030 --> 00:47:50,480
the big difference for

1181
00:47:55,349 --> 00:47:53,040
for this mission is spacex 21 the cargo

1182
00:47:56,710 --> 00:47:55,359
version is going to our zenith port iss

1183
00:47:57,430 --> 00:47:56,720
zenith port

1184
00:48:02,390 --> 00:47:57,440
so

1185
00:48:06,549 --> 00:48:02,400
through what i would call rbar intercept

1186
00:48:08,870 --> 00:48:06,559
to um to actually where it it interfaces

1187
00:48:10,470 --> 00:48:08,880
or intercepts the velocity vector on

1188
00:48:12,549 --> 00:48:10,480

space station

1189
00:48:15,910 --> 00:48:12,559
um at that point that the vehicle will

1190
00:48:17,750 --> 00:48:15,920
be at about 220 meters out rather than

1191
00:48:19,990 --> 00:48:17,760
stopping on the v bar this vehicle is

1192
00:48:23,430 --> 00:48:20,000
just going to continue a 90 degree

1193
00:48:25,270 --> 00:48:23,440
pre-rotation above iss

1194
00:48:29,430 --> 00:48:25,280
and

1195
00:48:32,870 --> 00:48:29,440
r bar

1196
00:48:35,589 --> 00:48:32,880
about 200 meters out and from there

1197
00:48:38,390 --> 00:48:35,599
the vehicle will translate to its final

1198
00:48:41,510 --> 00:48:38,400
waypoint which we call waypoint

1199
00:48:43,670 --> 00:48:41,520
waypoint 2 which is 20 meters out

1200
00:48:45,190 --> 00:48:43,680
do a hold there and from there it'll

1201
00:48:48,470 --> 00:48:45,200
it'll uh

1202
00:48:50,230 --> 00:48:48,480
proceed to docking

1203
00:48:51,990 --> 00:48:50,240
hope that was all clear

1204
00:48:54,710 --> 00:48:52,000
yes it did come through thank you so

1205
00:48:57,829 --> 00:48:54,720
much so once cargo dragon docks we will

1206
00:48:59,349 --> 00:48:57,839
have two dragons for the first time at

1207
00:49:01,990 --> 00:48:59,359
adjacent ports on the international

1208
00:49:04,150 --> 00:49:02,000
space station how will nasa and spacex

1209
00:49:05,910 --> 00:49:04,160
teams handle the operations of both

1210
00:49:08,549 --> 00:49:05,920
vehicles from a timeline and

1211
00:49:11,190 --> 00:49:08,559
communication loop standpoint

1212
00:49:14,390 --> 00:49:11,200
yeah that's a really good question um

1213
00:49:16,549 --> 00:49:14,400

you know it turns out that

1214
00:49:17,510 --> 00:49:16,559
that you call the dueling dragons i

1215
00:49:20,150 --> 00:49:17,520
don't know if i've actually heard that

1216
00:49:21,750 --> 00:49:20,160
term that's interesting but um we we

1217
00:49:23,829 --> 00:49:21,760
kind of had to practice the teams had

1218
00:49:26,069 --> 00:49:23,839
quite a bit of practice uh on what i

1219
00:49:27,430 --> 00:49:26,079
would call dueling dragons even before

1220
00:49:29,750 --> 00:49:27,440
the launch

1221
00:49:31,750 --> 00:49:29,760
um and that was really it you know as in

1222
00:49:33,589 --> 00:49:31,760
preparations for the launch

1223
00:49:36,069 --> 00:49:33,599
there's a fair bit of communication

1224
00:49:38,309 --> 00:49:36,079
between the spacex team at hawthorne the

1225
00:49:40,630 --> 00:49:38,319
spacex team at ksc of course the other

1226
00:49:43,670 --> 00:49:40,640
folks at ksc

1227
00:49:46,150 --> 00:49:43,680
and and at times with iss

1228
00:49:49,030 --> 00:49:46,160
so even before

1229
00:49:51,750 --> 00:49:49,040
we've launched here with the with the

1230
00:49:54,309 --> 00:49:51,760
with the the cargo dragon on the pad and

1231
00:49:55,750 --> 00:49:54,319
at ksc there were some preparations that

1232
00:49:58,069 --> 00:49:55,760
we needed to do they just need to

1233
00:50:00,870 --> 00:49:58,079
configure their consoles set up their

1234
00:50:02,870 --> 00:50:00,880
commanding and and do their tone and

1235
00:50:05,910 --> 00:50:02,880
view their telemetry and make sure

1236
00:50:07,430 --> 00:50:05,920
they're communicating to cargo dragon

1237
00:50:10,870 --> 00:50:07,440
and not to

1238
00:50:12,549 --> 00:50:10,880

the crew dragon on iss

1239
00:50:13,750 --> 00:50:12,559
likewise uh

1240
00:50:15,589 --> 00:50:13,760
there was a

1241
00:50:17,990 --> 00:50:15,599
the um

1242
00:50:20,470 --> 00:50:18,000
the crew dragon every every 30 days or

1243
00:50:23,190 --> 00:50:20,480
so we wake it up but it basically is an

1244
00:50:25,190 --> 00:50:23,200
acquiescent mode when it's on iss

1245
00:50:27,589 --> 00:50:25,200
and every 30 days we do a health and

1246
00:50:30,950 --> 00:50:27,599
status check on that vehicle and so

1247
00:50:33,270 --> 00:50:30,960
again spacex and their team and the nasa

1248
00:50:35,589 --> 00:50:33,280
team needs to kind of reconfigure

1249
00:50:37,829 --> 00:50:35,599
their commanding and communication

1250
00:50:39,750 --> 00:50:37,839
method with each of the vehicles such

1251
00:50:42,870 --> 00:50:39,760
that it it actually now talks to the

1252
00:50:45,829 --> 00:50:42,880
crew dragon and not the cargo dragon

1253
00:50:48,230 --> 00:50:45,839
um so so they get some practice on that

1254
00:50:51,190 --> 00:50:48,240
even before um

1255
00:50:53,270 --> 00:50:51,200
spacex 21 will show up to iss

1256
00:50:54,790 --> 00:50:53,280
and as i kind of alluded to

1257
00:50:57,030 --> 00:50:54,800
um

1258
00:50:58,630 --> 00:50:57,040
the cargo dragon excuse me the crew

1259
00:51:00,710 --> 00:50:58,640
dragon we we basically put it in

1260
00:51:02,710 --> 00:51:00,720
non-quiescent mode

1261
00:51:04,630 --> 00:51:02,720
or excuse me into a quiescent mode when

1262
00:51:08,549 --> 00:51:04,640
it's on orbit so

1263
00:51:10,309 --> 00:51:08,559

as soon as cargo dragon shows up it gets

1264
00:51:11,510 --> 00:51:10,319
it basically gets the full attention of

1265
00:51:14,470 --> 00:51:11,520
the crew

1266
00:51:15,829 --> 00:51:14,480
and uh and the flight control team

1267
00:51:17,910 --> 00:51:15,839
um

1268
00:51:20,870 --> 00:51:17,920
much of its cargo needs to be removed

1269
00:51:23,270 --> 00:51:20,880
within within hours if not days

1270
00:51:26,230 --> 00:51:23,280
and uh with all the science and research

1271
00:51:28,470 --> 00:51:26,240
on board pretty much the it gets it gets

1272
00:51:30,470 --> 00:51:28,480
our undivided attention and the crews

1273
00:51:33,910 --> 00:51:30,480
uninvited attention from uh from a

1274
00:51:38,309 --> 00:51:36,630
that's great always prepared love it so

1275
00:51:40,150 --> 00:51:38,319
we've discussed the upgrades to this

1276
00:51:42,390 --> 00:51:40,160
vehicle and how it's very similar to

1277
00:51:44,870 --> 00:51:42,400
crew dragon carrying an increased amount

1278
00:51:46,390 --> 00:51:44,880
of research hardware and other payloads

1279
00:51:48,870 --> 00:51:46,400
so what does that mean for the

1280
00:51:50,470 --> 00:51:48,880
astronauts on station

1281
00:51:54,309 --> 00:51:50,480
um in a word

1282
00:51:55,910 --> 00:51:54,319
they're gonna be like extremely busy

1283
00:51:57,990 --> 00:51:55,920
um the

1284
00:52:02,309 --> 00:51:58,000
this vehicle is bringing almost a metric

1285
00:52:04,390 --> 00:52:02,319
ton of research science and uh and and

1286
00:52:07,589 --> 00:52:04,400
just all utilization items

1287
00:52:10,950 --> 00:52:07,599
about a metric ton worth of of cargo

1288
00:52:13,990 --> 00:52:10,960

much of which needs to be exercised and

1289
00:52:15,670 --> 00:52:14,000
um within the 30-day mission that 30

1290
00:52:17,349 --> 00:52:15,680
days or thereabouts i can't remember

1291
00:52:18,950 --> 00:52:17,359
exactly how many days were we're

1292
00:52:22,710 --> 00:52:18,960
planning for this vehicle

1293
00:52:25,109 --> 00:52:22,720
28-31 is what i'd guess but

1294
00:52:28,069 --> 00:52:25,119
most of that work needs to be done

1295
00:52:30,710 --> 00:52:28,079
while while the vehicle is there

1296
00:52:33,670 --> 00:52:30,720
so they only have the 30 days or so to

1297
00:52:36,150 --> 00:52:33,680
get everything off everything exercised

1298
00:52:37,910 --> 00:52:36,160
all the research completed

1299
00:52:40,150 --> 00:52:37,920
and then they need to pack it

1300
00:52:41,990 --> 00:52:40,160
that that exercise research they need to

1301
00:52:44,150 --> 00:52:42,000
pack that to come home so that we can

1302
00:52:45,589 --> 00:52:44,160
quickly turn it around and get it to the

1303
00:52:48,309 --> 00:52:45,599
labs on

1304
00:52:49,910 --> 00:52:48,319
on the ground here

1305
00:52:51,430 --> 00:52:49,920
so yeah they're going to be super busy i

1306
00:52:53,030 --> 00:52:51,440
guess is what i would tell you

1307
00:52:53,670 --> 00:52:53,040
and i'm sure they're looking forward to

1308
00:52:55,829 --> 00:52:53,680
it

1309
00:52:57,589 --> 00:52:55,839
the nanoracks bishop airlock will be the

1310
00:52:59,510 --> 00:52:57,599
first commercial module added to the

1311
00:53:00,790 --> 00:52:59,520
station so can you discuss how this

1312
00:53:02,790 --> 00:53:00,800
helps open

1313
00:53:04,710 --> 00:53:02,800

the station to more customers and

1314
00:53:06,549 --> 00:53:04,720
commercial companies

1315
00:53:09,109 --> 00:53:06,559
yeah that's a very good question as well

1316
00:53:10,790 --> 00:53:09,119
so you're right the nanoracks airlock

1317
00:53:13,589 --> 00:53:10,800
bishop airlock so it was conceived

1318
00:53:14,470 --> 00:53:13,599
designed and built um

1319
00:53:16,630 --> 00:53:14,480
buy

1320
00:53:18,390 --> 00:53:16,640
nanoracks to meet the needs of its

1321
00:53:20,230 --> 00:53:18,400
customers

1322
00:53:21,190 --> 00:53:20,240
nanoracks retains the ownership of this

1323
00:53:23,109 --> 00:53:21,200
airlock

1324
00:53:24,710 --> 00:53:23,119
and so they are really driven to find

1325
00:53:25,829 --> 00:53:24,720
payne customers

1326
00:53:27,510 --> 00:53:25,839
to uh

1327
00:53:28,950 --> 00:53:27,520
in order to make the commercial module

1328
00:53:30,470 --> 00:53:28,960
profitable

1329
00:53:32,470 --> 00:53:30,480
and these users will likely be

1330
00:53:33,990 --> 00:53:32,480
commercial customers

1331
00:53:35,670 --> 00:53:34,000
and these business-to-business

1332
00:53:37,589 --> 00:53:35,680
transactions

1333
00:53:39,510 --> 00:53:37,599
we're hoping and i think they will will

1334
00:53:41,670 --> 00:53:39,520
increase the economic development low

1335
00:53:43,990 --> 00:53:41,680
earth orbit

1336
00:53:45,030 --> 00:53:44,000
you know in the past the

1337
00:53:49,030 --> 00:53:45,040
the

1338
00:53:51,109 --> 00:53:49,040

japanese exposed module airlock

1339
00:53:52,309 --> 00:53:51,119
sometimes has been kind of a bottleneck

1340
00:53:53,190 --> 00:53:52,319
for us

1341
00:53:57,829 --> 00:53:53,200
to

1342
00:53:59,349 --> 00:53:57,839
and material science research certainly

1343
00:54:01,510 --> 00:53:59,359
all the jettisons of the various

1344
00:54:02,309 --> 00:54:01,520
satellites that we've been putting out

1345
00:54:04,309 --> 00:54:02,319
so

1346
00:54:08,069 --> 00:54:04,319
this is a larger volume it gives us the

1347
00:54:10,390 --> 00:54:08,079
opportunity to to do more deploys

1348
00:54:12,710 --> 00:54:10,400
a larger group at a time it also

1349
00:54:15,190 --> 00:54:12,720
provides some flexibility for orus that

1350
00:54:18,069 --> 00:54:15,200
we can't bring inside

1351
00:54:20,630 --> 00:54:18,079
um and so maybe we can we can stimulate

1352
00:54:22,950 --> 00:54:20,640
business in in that way as well

1353
00:54:24,549 --> 00:54:22,960
but uh to me it's an exciting time and

1354
00:54:26,230 --> 00:54:24,559
uh

1355
00:54:29,030 --> 00:54:26,240
and we're just looking forward to having

1356
00:54:33,190 --> 00:54:31,270
thanks so much jeff for joining us today

1357
00:54:35,670 --> 00:54:33,200
and sharing all of that information

1358
00:54:37,270 --> 00:54:35,680
about the mission with us we are still

1359
00:54:39,109 --> 00:54:37,280
here in the international space station

1360
00:54:40,950 --> 00:54:39,119
flight control room in houston flight

1361
00:54:43,109 --> 00:54:40,960
controllers are monitoring the status of

1362
00:54:45,589 --> 00:54:43,119
the station itself and what you can look

1363
00:54:47,589 --> 00:54:45,599

forward to tomorrow will be the arrival

1364
00:54:49,510 --> 00:54:47,599
of cargo dragon to the international

1365
00:54:51,510 --> 00:54:49,520
space station so once it crosses that

1366
00:54:53,829 --> 00:54:51,520
approach ellipsoid teams here will begin

1367
00:54:57,270 --> 00:54:53,839
joint operations with the spacex team in

1368
00:54:59,670 --> 00:54:57,280
hawthorne california nasa astronauts

1369
00:55:02,470 --> 00:54:59,680
victor glover and kate rubins will be

1370
00:55:04,870 --> 00:55:02,480
monitoring the approach and arrival of

1371
00:55:07,430 --> 00:55:04,880
cargo dragon as it makes the first

1372
00:55:09,910 --> 00:55:07,440
docking by a cargo dragon to the

1373
00:55:12,150 --> 00:55:09,920
international space station they will

1374
00:55:14,069 --> 00:55:12,160
begin working then to get the hatch open

1375
00:55:16,069 --> 00:55:14,079
on cargo dragon that'll take a couple of

1376
00:55:18,069 --> 00:55:16,079
hours because it includes pressurizing

1377
00:55:20,069 --> 00:55:18,079
the vestibule or the space between the

1378
00:55:22,710 --> 00:55:20,079
hatches on the international space

1379
00:55:24,390 --> 00:55:22,720
station and on cargo dragon itself but

1380
00:55:26,309 --> 00:55:24,400
for right now everything looking great

1381
00:55:28,230 --> 00:55:26,319
with a beautiful launch today and we're

1382
00:55:30,789 --> 00:55:28,240
looking forward to the arrival tomorrow

1383
00:55:32,710 --> 00:55:30,799
so that's our wrap here in houston and

1384
00:55:35,829 --> 00:55:32,720
back to you at ksc

1385
00:55:38,069 --> 00:55:35,839
thanks leah wow what a beautiful launch

1386
00:55:39,430 --> 00:55:38,079
and landing and by far one of my

1387
00:55:42,789 --> 00:55:39,440
favorite things on the space coast i

1388
00:55:44,630 --> 00:55:42,799

mean the rumble never gets old and cargo

1389
00:55:46,630 --> 00:55:44,640
dragon is now on its way to the

1390
00:55:49,430 --> 00:55:46,640
international space station with the

1391
00:55:51,190 --> 00:55:49,440
help of u.s companies like spacex and

1392
00:55:54,069 --> 00:55:51,200
our astronauts in space like the

1393
00:55:56,309 --> 00:55:54,079
expedition 64 crew nasa is using the

1394
00:55:58,150 --> 00:55:56,319
station to conduct cutting-edge research

1395
00:56:00,470 --> 00:55:58,160
and technology development

1396
00:56:04,069 --> 00:56:00,480
in preparation to send the first woman

1397
00:56:06,069 --> 00:56:04,079
and the next man to the moon in 2024 and

1398
00:56:07,750 --> 00:56:06,079
then we'll use what we learned there to

1399
00:56:09,750 --> 00:56:07,760
take the next giant leap sending

1400
00:56:11,510 --> 00:56:09,760
astronauts to mars

1401
00:56:14,630 --> 00:56:11,520
you can tune in to docking coverage on

1402
00:56:17,990 --> 00:56:14,640
nasa tv tomorrow starting at 11 30 a.m

1403
00:56:20,150 --> 00:56:18,000
eastern time with docking at 1 30 p.m

1404
00:56:22,150 --> 00:56:20,160
that's going to wrap up our coverage i'm

1405
00:56:24,390 --> 00:56:22,160
tori mclendon and from everyone here at

1406
00:56:26,309 --> 00:56:24,400
nasa's kennedy space center and our

1407
00:56:27,990 --> 00:56:26,319
colleagues across the country thank you

1408
00:56:29,510 --> 00:56:28,000
so much for joining us for more

1409
00:56:32,950 --> 00:56:29,520
information on this mission visit

1410
00:56:35,750 --> 00:56:32,960
nasa.gov forward slash station or

1411
00:56:37,589 --> 00:56:35,760
nasa.gov forward slash spacex we leave

1412
00:56:39,670 --> 00:56:37,599
you now with another look at today's

1413
00:56:45,270 --> 00:56:39,680

spectacular launch happy holidays

1414
00:56:47,270 --> 00:56:46,309
ten

1415
00:56:48,150 --> 00:56:47,280
nine

1416
00:56:49,109 --> 00:56:48,160
eight

1417
00:56:50,069 --> 00:56:49,119
seven

1418
00:56:51,030 --> 00:56:50,079
six

1419
00:56:51,990 --> 00:56:51,040
five

1420
00:56:52,950 --> 00:56:52,000
four

1421
00:56:53,990 --> 00:56:52,960
three

1422
00:56:57,190 --> 00:56:54,000
two

1423
00:57:03,670 --> 00:57:00,630
and liftoff of the falcon 9 and upgraded

1424
00:57:10,230 --> 00:57:03,680
cargo dragon the first cargo capsule to

1425
00:57:10,240 --> 00:58:06,410
stage 1 propulsion is now