1
00:00:05,710 --> 00:00:03,030
new possibilities are opening up for

2
00:00:16,230 --> 00:00:05,720
scientific cooperation between countries

3
00:00:16,240 --> 00:00:19,150
going

4
00:00:19,160 --> 00:00:27,760
through everybody

5
00:00:29,990 --> 00:00:28,020
[Music]

6
00:00:42,549 --> 00:00:30,000
[Applause]

7
00:00:44,470 --> 00:00:42,559
[Music]

8
00:00:46,630 --> 00:00:44,480
good morning or afternoon depending on

9
00:00:49,029 --> 00:00:46,640
where you're joining us from it's monday

10
00:00:51,430 --> 00:00:49,039
november 8th here at spacex headquarters

11
00:00:53,510 --> 00:00:51,440
in hawthorne california you're looking

12
00:00:55,590 --> 00:00:53,520
at a live view of the dragon endeavor

13
00:00:57,670 --> 00:00:55,600

spacecraft as we await its departure

14
00:00:59,830 --> 00:00:57,680
from the international space station on

15
00:01:01,990 --> 00:00:59,840
its way back to planet earth

16
00:01:05,789 --> 00:01:02,000
we expect endeavour to push away from

17
00:01:09,270 --> 00:01:05,799
the space station at 1105 am pacific or

18
00:01:11,750 --> 00:01:09,280
1905 gmt with our crew 2 astronauts

19
00:01:13,429 --> 00:01:11,760
including nasa astronauts shane kimbra

20
00:01:16,469 --> 00:01:13,439
and megan mcarthur

21
00:01:18,630 --> 00:01:16,479
jackson astronaut aki hoshide and issa

22
00:01:20,390 --> 00:01:18,640
astronaut toma pesque

23
00:01:22,230 --> 00:01:20,400
if you joined us earlier you'll know

24
00:01:24,789 --> 00:01:22,240
that the crew is suited up and the

25
00:01:27,190 --> 00:01:24,799
dragon and station hatches are sealed in

26
00:01:29,270 --> 00:01:27,200
preparation for departure my name is

27
00:01:32,230 --> 00:01:29,280
kate tyson i'm a senior certification

28
00:01:33,990 --> 00:01:32,240
engineer here at spacex it's a live

29
00:01:35,270 --> 00:01:34,000
production morning for us here on this

30
00:01:37,830 --> 00:01:35,280
monday morning so you might hear some

31
00:01:39,510 --> 00:01:37,840
noise as we broadcast but in any case

32
00:01:41,670 --> 00:01:39,520
i'm very excited to bring you live

33
00:01:44,149 --> 00:01:41,680
coverage of crew dragon completing its

34
00:01:47,350 --> 00:01:44,159
second trip to space with people on

35
00:01:49,030 --> 00:01:47,360
board as part of nasa's first official

36
00:01:51,109 --> 00:01:49,040
long duration mission

37
00:01:52,310 --> 00:01:51,119
for its commercial crew program

38
00:01:54,710 --> 00:01:52,320

joining me today from nasa

39
00:01:57,109 --> 00:01:54,720
communications is gary jordan hey super

40
00:01:59,350 --> 00:01:57,119
good to be here kate um once dragon

41
00:02:01,510 --> 00:01:59,360
departs the station the crew's flight

42
00:02:04,149 --> 00:02:01,520
home is expected to last just a little

43
00:02:06,389 --> 00:02:04,159
more than eight hours about an hour and

44
00:02:08,790 --> 00:02:06,399
a half of that journey will be dedicated

45
00:02:11,029 --> 00:02:08,800
to a fly-around maneuver where the crew

46
00:02:12,949 --> 00:02:11,039
ii astronauts will make a full loop

47
00:02:15,670 --> 00:02:12,959
around the station to take photographs

48
00:02:17,670 --> 00:02:15,680
of the outside of the orbiting lab

49
00:02:19,990 --> 00:02:17,680
upon completion of the fly around dragon

50
00:02:22,150 --> 00:02:20,000
will use its draco engines to thrust

51
00:02:24,229 --> 00:02:22,160
away from the station in a series of

52
00:02:26,390 --> 00:02:24,239
carefully choreographed maneuvers or

53
00:02:28,390 --> 00:02:26,400
four departure burns to increase the

54
00:02:29,750 --> 00:02:28,400
distance between the spacecraft and the

55
00:02:31,910 --> 00:02:29,760
space station

56
00:02:33,350 --> 00:02:31,920
dragon will also execute a phasing burn

57
00:02:36,550 --> 00:02:33,360
to lower its orbit and line the

58
00:02:39,270 --> 00:02:36,560
spacecraft up with this landing location

59
00:02:41,589 --> 00:02:39,280
next on its trip home is deorbit entry

60
00:02:44,070 --> 00:02:41,599
and landing which covers all operations

61
00:02:46,229 --> 00:02:44,080
after the final departure maneuver that

62
00:02:49,430 --> 00:02:46,239
includes trunk separation closure of the

63
00:02:51,670 --> 00:02:49,440

nose cone a deorbit burn deployment of

64
00:02:53,830 --> 00:02:51,680
drogue and main parachutes and finally

65
00:02:55,750 --> 00:02:53,840
of course splashdown off the florida

66
00:02:59,030 --> 00:02:55,760
coast at which point our teams will

67
00:03:01,030 --> 00:02:59,040
recover shane megan aki and tomah

68
00:03:03,110 --> 00:03:01,040
dragon is targeted to splash down off

69
00:03:05,910 --> 00:03:03,120
the coast of pensacola florida and the

70
00:03:09,430 --> 00:03:05,920
gulf of mexico tonight at 7 33 pm

71
00:03:11,350 --> 00:03:09,440
pacific 10 33 pm eastern followed by the

72
00:03:13,750 --> 00:03:11,360
crew getting picked up at sea by one of

73
00:03:16,390 --> 00:03:13,760
spacex's recovery vessels today on board

74
00:03:18,869 --> 00:03:16,400
the space station is the expedition 66

75
00:03:21,350 --> 00:03:18,879
crew led by roscosmos cosmonaut anton

76
00:03:23,990 --> 00:03:21,360
shkaplerov who just took over as station

77
00:03:26,229 --> 00:03:24,000
commander from tomoposque of issa now on

78
00:03:27,990 --> 00:03:26,239
board the crew dragon endeavor

79
00:03:29,910 --> 00:03:28,000
as a reminder just like its approach to

80
00:03:32,550 --> 00:03:29,920
the international space station dragons

81
00:03:34,309 --> 00:03:32,560
departure and deorbit including the fly

82
00:03:37,030 --> 00:03:34,319
around is designed to be fully

83
00:03:39,589 --> 00:03:37,040
autonomous requiring no action from the

84
00:03:41,190 --> 00:03:39,599
crew on board nasa astronaut mark vande

85
00:03:43,509 --> 00:03:41,200
high will be watching the undocking and

86
00:03:45,830 --> 00:03:43,519
departure from the cupola but the prime

87
00:03:47,830 --> 00:03:45,840
departure monitoring role falls on shane

88
00:03:50,070 --> 00:03:47,840

kimbrough and megan macarthur from

89
00:03:52,309 --> 00:03:50,080
inside the dragon mission controls in

90
00:03:53,190 --> 00:03:52,319
houston and in hawthorne will back them

91
00:03:55,429 --> 00:03:53,200
up

92
00:03:57,110 --> 00:03:55,439
so now let's go over to shaniqua varine

93
00:03:59,030 --> 00:03:57,120
at the johnson space center to talk a

94
00:04:01,589 --> 00:03:59,040
little bit about how the station crew

95
00:04:04,070 --> 00:04:01,599
has been preparing to send this crew

96
00:04:06,070 --> 00:04:04,080
home and what we can expect to hear

97
00:04:10,229 --> 00:04:06,080
from dragon as it departs from the

98
00:04:14,309 --> 00:04:12,390
thanks gary it's been a busy week during

99
00:04:16,229 --> 00:04:14,319
our indirect handover over the last

100
00:04:18,629 --> 00:04:16,239
several days the astronauts worked to

101
00:04:19,749 --> 00:04:18,639
pack dragon full of cargo for the return

102
00:04:21,749 --> 00:04:19,759
journey home

103
00:04:25,830 --> 00:04:21,759
along with our crew dragon will return

104
00:04:28,550 --> 00:04:25,840
more than 250 kilograms or 530 pounds of

105
00:04:30,550 --> 00:04:28,560
cargo back to earth the cargo includes

106
00:04:32,950 --> 00:04:30,560
some samples for continuing human

107
00:04:34,950 --> 00:04:32,960
research some hardware and some other

108
00:04:36,870 --> 00:04:34,960
items all of this cargo will get

109
00:04:39,110 --> 00:04:36,880
offloaded after we get the crew out

110
00:04:41,189 --> 00:04:39,120
following splashdown and the scientific

111
00:04:42,710 --> 00:04:41,199
samples will be sent to researchers for

112
00:04:44,790 --> 00:04:42,720
final analysis

113
00:04:46,950 --> 00:04:44,800

the crew also took some time to get

114
00:04:49,110 --> 00:04:46,960
their spacex suits unpacked

115
00:04:51,030 --> 00:04:49,120
and ready for the journey with aki and

116
00:04:53,749 --> 00:04:51,040
tomas suiting up inside the station

117
00:04:55,990 --> 00:04:53,759
prior to making their way into dragon

118
00:04:58,230 --> 00:04:56,000
since getting the hatchets closed shane

119
00:05:00,550 --> 00:04:58,240
kimbrough and megan mcarthur also suited

120
00:05:03,350 --> 00:05:00,560
up with all four astronauts now in their

121
00:05:05,350 --> 00:05:03,360
seats and standing by for undocking

122
00:05:07,029 --> 00:05:05,360
we've got a final go-no-go poll coming

123
00:05:09,110 --> 00:05:07,039
up in a few minutes where the joint

124
00:05:11,670 --> 00:05:09,120
spacex and nasa teams make their final

125
00:05:13,029 --> 00:05:11,680
call for dragon to do put to depart

126
00:05:14,550 --> 00:05:13,039
station

127
00:05:16,550 --> 00:05:14,560
this is one of many checkpoints in the

128
00:05:18,950 --> 00:05:16,560
return that will continue all the way up

129
00:05:20,950 --> 00:05:18,960
until just before the de-orbit burn

130
00:05:23,029 --> 00:05:20,960
giving mission managers multiple chances

131
00:05:25,189 --> 00:05:23,039
to assess the weather at the splashdown

132
00:05:27,189 --> 00:05:25,199
zones making sure everything is lining

133
00:05:28,950 --> 00:05:27,199
up before the dragon departs

134
00:05:31,350 --> 00:05:28,960
so we'll stand by for that final go no

135
00:05:34,150 --> 00:05:31,360
go poll but for now everything continues

136
00:05:35,830 --> 00:05:34,160
to look good for an on-time departure

137
00:05:38,469 --> 00:05:35,840
with that i'll throw it back over to you

138
00:05:41,189 --> 00:05:38,479

kate and gary in hawthorne

139
00:05:45,990 --> 00:05:41,199
thanks shaniqua so separation is set for

140
00:05:48,150 --> 00:05:46,000
approximately 1105 a.m pacific 1905 gmt

141
00:05:50,790 --> 00:05:48,160
uh just a few minutes from now

142
00:05:53,110 --> 00:05:50,800
at the moment dragon is in its final

143
00:05:55,029 --> 00:05:53,120
configuration before undocking and we're

144
00:05:57,270 --> 00:05:55,039
waiting for mission operators to conduct

145
00:06:00,309 --> 00:05:57,280
their go no-go poll on whether to move

146
00:06:01,189 --> 00:06:00,319
forward with the docking procedure

147
00:06:03,110 --> 00:06:01,199
now

148
00:06:04,790 --> 00:06:03,120
a note for on its trip home just like

149
00:06:06,629 --> 00:06:04,800
during its approach to the international

150
00:06:08,870 --> 00:06:06,639
space station dragons departure and

151
00:06:11,670 --> 00:06:08,880
deorbit is designed to be fully

152
00:06:13,510 --> 00:06:11,680
autonomous requiring no action from the

153
00:06:15,830 --> 00:06:13,520
crew on board

154
00:06:18,070 --> 00:06:15,840
once the docking sequence is complete

155
00:06:20,629 --> 00:06:18,080
dragon will use its draco engines to

156
00:06:23,189 --> 00:06:20,639
thrust away from the station in a series

157
00:06:25,270 --> 00:06:23,199
of carefully choreographed maneuvers or

158
00:06:26,629 --> 00:06:25,280
four departure burns and that'll

159
00:06:28,790 --> 00:06:26,639
increase the distance between the

160
00:06:30,870 --> 00:06:28,800
spacecraft and the space station

161
00:06:33,430 --> 00:06:30,880
from there a phasing burn will place

162
00:06:36,070 --> 00:06:33,440
dragon on a trajectory back to earth

163
00:06:38,070 --> 00:06:36,080

on its trip home is deorbit entry and

164
00:06:40,790 --> 00:06:38,080
landing which covers all operations

165
00:06:43,029 --> 00:06:40,800
after the final departure maneuver that

166
00:06:45,590 --> 00:06:43,039
includes trunk separation closure of the

167
00:06:47,670 --> 00:06:45,600
nose cone a deorbit burn deployment of

168
00:06:50,390 --> 00:06:47,680
the drogue and main parachutes and then

169
00:06:51,990 --> 00:06:50,400
finally splashdown off the florida coast

170
00:06:53,510 --> 00:06:52,000
at which point our teams will recover

171
00:06:55,909 --> 00:06:53,520
the crew two astronauts inside crew

172
00:06:58,550 --> 00:06:55,919
dragon from the water yeah so we are

173
00:07:01,270 --> 00:06:58,560
expecting the call for that go no go

174
00:07:02,550 --> 00:07:01,280
here in the next few minutes or so so as

175
00:07:05,589 --> 00:07:02,560
we mentioned before

176
00:07:07,909 --> 00:07:05,599
weather has been uh watching spacex

177
00:07:09,510 --> 00:07:07,919
final configurations for undock are

178
00:07:12,070 --> 00:07:09,520
complete and nominal

179
00:07:14,830 --> 00:07:12,080
round is go for undocking with the

180
00:07:16,950 --> 00:07:14,840
targeted undock sequence start time of

181
00:07:18,950 --> 00:07:16,960
1900 zulu

182
00:07:20,710 --> 00:07:18,960
please confirm visors are down and crew

183
00:07:32,629 --> 00:07:20,720
readiness for undock and departure at

184
00:07:42,870 --> 00:07:35,990
go for undock at 1900 zulu

185
00:07:42,880 --> 00:07:46,309
happy all thank you megan

186
00:07:51,110 --> 00:07:48,790
station houston on two for mark perform

187
00:07:55,909 --> 00:07:51,120
steps two through end of one decimal six

188
00:08:04,869 --> 00:07:57,670

happy future end and the isis crew is

189
00:08:09,510 --> 00:08:07,830
all right and with that using copies

190
00:08:12,070 --> 00:08:09,520
with that we just heard the confirmation

191
00:08:13,990 --> 00:08:12,080
that dragon is go for undock all of the

192
00:08:15,749 --> 00:08:14,000
team supporting are ready we're now

193
00:08:17,909 --> 00:08:15,759
waiting for that final undocking

194
00:08:20,629 --> 00:08:17,919
sequence to actually begin so once that

195
00:08:22,710 --> 00:08:20,639
happens uh right at uh 11 o'clock

196
00:08:24,230 --> 00:08:22,720
pacific uh it will take about five

197
00:08:25,670 --> 00:08:24,240
minutes for dragon to physically

198
00:08:27,350 --> 00:08:25,680
separate from the international space

199
00:08:28,869 --> 00:08:27,360
station which has been its home for the

200
00:08:31,110 --> 00:08:28,879
last six months

201
00:08:33,509 --> 00:08:31,120
this is the first step in the automatic

202
00:08:36,709 --> 00:08:33,519
undocking sequence um the first step is

203
00:08:38,790 --> 00:08:36,719
to uh release uh for those umbilicals to

204
00:08:40,870 --> 00:08:38,800
retract those umbilicals are what's

205
00:08:43,750 --> 00:08:40,880
connecting dragon systems to the space

206
00:08:45,829 --> 00:08:43,760
station transferring power telemetry and

207
00:08:48,230 --> 00:08:45,839
commands between the two vehicles

208
00:08:50,470 --> 00:08:48,240
throughout dragon's stay once that's

209
00:08:52,470 --> 00:08:50,480
complete dragon will unlatch itself from

210
00:08:54,949 --> 00:08:52,480
the space station by releasing the 12

211
00:08:55,910 --> 00:08:54,959
hard capture hooks in two separate

212
00:08:57,910 --> 00:08:55,920
phases

213
00:09:00,070 --> 00:08:57,920

all of that will take roughly four and a

214
00:09:01,990 --> 00:09:00,080
half minutes and then dragon will be

215
00:09:04,389 --> 00:09:02,000
ready to depart from station and begin

216
00:09:06,870 --> 00:09:04,399
to push itself further and further away

217
00:09:08,790 --> 00:09:06,880
using those draco thrusters dragon's

218
00:09:10,150 --> 00:09:08,800
initial departure from the station is a

219
00:09:12,310 --> 00:09:10,160
little different from other docked

220
00:09:14,150 --> 00:09:12,320
vehicles like the soyuz that rely on

221
00:09:16,310 --> 00:09:14,160
springs to push them away from the

222
00:09:18,949 --> 00:09:16,320
docking port dragon will actually

223
00:09:21,190 --> 00:09:18,959
execute two very short thruster firings

224
00:09:23,190 --> 00:09:21,200
to undock using a combination of the 12

225
00:09:24,630 --> 00:09:23,200
draco engines that are around the base

226
00:09:26,230 --> 00:09:24,640
of the capsule you can actually see some

227
00:09:28,230 --> 00:09:26,240
of them in this view

228
00:09:30,230 --> 00:09:28,240
with the first breaking any stiction

229
00:09:31,829 --> 00:09:30,240
between the dragon and the docking port

230
00:09:33,350 --> 00:09:31,839
and the second slowly backing the

231
00:09:34,870 --> 00:09:33,360
spacecraft away

232
00:09:36,870 --> 00:09:34,880
we're expecting the call for the

233
00:09:38,389 --> 00:09:36,880
undocking sequence to begin in the next

234
00:09:48,070 --> 00:09:38,399
couple of minutes or so maybe five

235
00:09:52,310 --> 00:09:50,389
since we've last been with you uh a lot

236
00:09:54,870 --> 00:09:52,320
has happened i think we uh went off air

237
00:09:57,430 --> 00:09:54,880
maybe about an hour and a half ago uh

238
00:10:00,070 --> 00:09:57,440

right when the dragon hatch was closed

239
00:10:02,069 --> 00:10:00,080
uh in that hour and a half mark van behi

240
00:10:04,389 --> 00:10:02,079
on the station side closed the a pass

241
00:10:06,710 --> 00:10:04,399
hatch or the hatch that's adjacent to

242
00:10:08,710 --> 00:10:06,720
that dragon hatch creating a vestibule

243
00:10:10,470 --> 00:10:08,720
in between the two hatches he also

244
00:10:12,949 --> 00:10:10,480
closed the hatch to the pressurized

245
00:10:15,350 --> 00:10:12,959
mating adapter three which is on uh the

246
00:10:18,310 --> 00:10:15,360
nader or the zenith side space-facing

247
00:10:19,990 --> 00:10:18,320
side of no two with all of that uh he

248
00:10:23,110 --> 00:10:20,000
was able to execute the uh

249
00:10:25,350 --> 00:10:23,120
depressurization between uh the station

250
00:10:27,750 --> 00:10:25,360
and the dragon uh the vestibule that

251
00:10:29,990 --> 00:10:27,760
middle part in between uh check putting

252
00:10:31,990 --> 00:10:30,000
it down to vacuum you can see them all

253
00:10:34,069 --> 00:10:32,000
suited up from this camera view inside

254
00:10:36,069 --> 00:10:34,079
the dragon they also performed a series

255
00:10:37,990 --> 00:10:36,079
of leak checks we had four good leak

256
00:10:39,750 --> 00:10:38,000
checks and of course uh just before we

257
00:10:41,190 --> 00:10:39,760
started this broadcast the vestibule

258
00:10:43,269 --> 00:10:41,200
leak check which is very important

259
00:10:45,509 --> 00:10:43,279
making sure that that vestibule is down

260
00:10:47,829 --> 00:10:45,519
to vacuum and there's no leaks that was

261
00:10:49,350 --> 00:10:47,839
performed and uh and we had a good leak

262
00:10:51,670 --> 00:10:49,360
check on theirs handing over to the

263
00:10:53,269 --> 00:10:51,680

spacex side to do a residual leak check

264
00:10:55,269 --> 00:10:53,279
uh now just really counting down to

265
00:10:57,590 --> 00:10:55,279
execute this undocking sequence again a

266
00:11:03,590 --> 00:10:57,600
five minute sequence here to start uh in

267
00:11:08,150 --> 00:11:05,829
like we said before those umbilicals are

268
00:11:10,150 --> 00:11:08,160
going to disconnect first

269
00:11:12,870 --> 00:11:10,160
that's what is connecting power and

270
00:11:15,269 --> 00:11:12,880
telemetry and communication

271
00:11:18,069 --> 00:11:15,279
to station and once those umbilicals are

272
00:11:21,430 --> 00:11:18,079
released uh we'll then begin to

273
00:11:26,389 --> 00:11:21,440
unlatch the uh hooks that are physically

274
00:11:31,430 --> 00:11:29,350
once again all four crew 2 astronauts

275
00:11:34,630 --> 00:11:31,440
are seated in their seats there inside

276
00:11:37,509 --> 00:11:34,640
dragon endeavor there we see a shot with

277
00:11:39,509 --> 00:11:37,519
pilot megan macarthur uh they're on the

278
00:11:41,110 --> 00:11:39,519
right-hand side and

279
00:11:44,150 --> 00:11:41,120
commander shane kimbrough on the

280
00:11:47,829 --> 00:11:45,990
they even have a view of their own

281
00:11:50,069 --> 00:11:47,839
dragon on the middle screen that is

282
00:11:52,629 --> 00:11:50,079
fantastic the dragon itself is on the

283
00:11:55,350 --> 00:11:52,639
space facing side of the international

284
00:11:57,590 --> 00:11:55,360
space station when it undocks it will

285
00:11:59,670 --> 00:11:57,600
perform those two undocking burns that

286
00:12:01,750 --> 00:11:59,680
we were talking about the next burn that

287
00:12:04,389 --> 00:12:01,760
it'll perform is called an impulsive

288
00:12:07,430 --> 00:12:04,399

retreat burn that burn sets it up in a

289
00:12:11,110 --> 00:12:07,440
position uh essentially at waypoint one

290
00:12:13,590 --> 00:12:11,120
which is at about 200 220 meters it'll

291
00:12:16,230 --> 00:12:13,600
do a short hold for about a minute

292
00:12:17,350 --> 00:12:16,240
before executing a fly-around maneuver

293
00:12:20,150 --> 00:12:17,360
and it will be in this fly around

294
00:12:22,710 --> 00:12:20,160
position for about an hour and a half

295
00:12:24,790 --> 00:12:22,720
going essentially around the station

296
00:12:26,550 --> 00:12:24,800
fully uh it's starting at the 12 o'clock

297
00:12:28,470 --> 00:12:26,560
position and then going uh full

298
00:12:29,829 --> 00:12:28,480
clockwise around until you hit the other

299
00:12:32,629 --> 00:12:29,839
12 o'clock position it's going to hit

300
00:12:34,870 --> 00:12:32,639
the aft side first uh so we'll see the

301
00:12:36,629 --> 00:12:34,880
aft and then the nader or the underside

302
00:12:38,389 --> 00:12:36,639
of the international space station

303
00:12:40,710 --> 00:12:38,399
that'll happen uh what's scheduled to be

304
00:12:42,790 --> 00:12:40,720
in an orbital night time uh so it'll be

305
00:12:44,389 --> 00:12:42,800
the the lights that are on the outside

306
00:12:46,629 --> 00:12:44,399
of the international space station that

307
00:12:48,470 --> 00:12:46,639
are illuminating it as the crew inside

308
00:12:50,230 --> 00:12:48,480
dragon take some photographs of the

309
00:12:53,430 --> 00:12:50,240
exterior of the station we haven't done

310
00:12:55,590 --> 00:12:53,440
this since a soyuz fly around in 2018

311
00:12:57,030 --> 00:12:55,600
when we did a fly around survey and the

312
00:12:59,430 --> 00:12:57,040
crew were able to take digital

313
00:13:01,829 --> 00:12:59,440

photographs of the outside it's really

314
00:13:03,269 --> 00:13:01,839
helpful for the analysis of the exterior

315
00:13:04,710 --> 00:13:03,279
and some of the integrity there's a lot

316
00:13:05,910 --> 00:13:04,720
of cameras on the outside of the space

317
00:13:08,069 --> 00:13:05,920
station in fact you're seeing one of

318
00:13:09,750 --> 00:13:08,079
them now providing a view a fantastic

319
00:13:12,069 --> 00:13:09,760
view of dragon but they can't see

320
00:13:13,430 --> 00:13:12,079
everything so this survey is going to

321
00:13:15,430 --> 00:13:13,440
provide uh

322
00:13:17,269 --> 00:13:15,440
fill in the gaps really between what the

323
00:13:19,750 --> 00:13:17,279
station cameras can provide and whatever

324
00:13:21,750 --> 00:13:19,760
the robotic arm is able to provide as it

325
00:13:23,590 --> 00:13:21,760
surveys the outside this will provide

326
00:13:25,350 --> 00:13:23,600
some of the latest data of what the

327
00:13:26,710 --> 00:13:25,360
status of the

328
00:13:28,790 --> 00:13:26,720
outside of the international space

329
00:13:31,750 --> 00:13:28,800
station now for those of you that might

330
00:13:34,389 --> 00:13:31,760
be unfamiliar with crude dragon

331
00:13:36,069 --> 00:13:34,399
and how it works there on your screen

332
00:13:39,030 --> 00:13:36,079
we're actually looking at crew dragon

333
00:13:41,189 --> 00:13:39,040
and to us it looks upside down um to the

334
00:13:43,269 --> 00:13:41,199
folks in space there is no right side up

335
00:13:45,189 --> 00:13:43,279
or upside down so while it looks to us

336
00:13:46,949 --> 00:13:45,199
like the crew might be sitting upside

337
00:13:49,269 --> 00:13:46,959
down they can't feel it as they are in

338
00:13:51,189 --> 00:13:49,279

microgravity but the part that is

339
00:13:53,590 --> 00:13:51,199
connected to the space station is the

340
00:13:56,069 --> 00:13:53,600
pressurized section uh which you see

341
00:13:57,350 --> 00:13:56,079
there uh the part that we saw in the

342
00:14:00,150 --> 00:13:57,360
previous view

343
00:14:01,829 --> 00:14:00,160
that was the dark cylinder underneath

344
00:14:04,230 --> 00:14:01,839
the pressurized section that is the

345
00:14:05,430 --> 00:14:04,240
unpressurized section also known as the

346
00:14:08,629 --> 00:14:05,440
trunk

347
00:14:09,829 --> 00:14:08,639
that portion of dragon will be

348
00:14:12,710 --> 00:14:09,839
jettisoned

349
00:14:14,389 --> 00:14:12,720
prior to re-entry by doing so we will

350
00:14:17,030 --> 00:14:14,399
expose the heat shield

351
00:14:19,829 --> 00:14:17,040
and allow for uh the heat shield

352
00:14:23,509 --> 00:14:19,839
uh to protect the capsule upon re-entry

353
00:14:25,670 --> 00:14:23,519
so just a just a little uh um a map of

354
00:14:28,069 --> 00:14:25,680
dragon if you will for folks that might

355
00:14:29,670 --> 00:14:28,079
be unfamiliar uh looks like we lost our

356
00:14:31,189 --> 00:14:29,680
view there but we'll we'll bring it back

357
00:14:33,350 --> 00:14:31,199
as soon as we can

358
00:14:35,269 --> 00:14:33,360
and it's very important uh all of those

359
00:14:37,750 --> 00:14:35,279
different parts of the dragon now now as

360
00:14:41,110 --> 00:14:37,760
we're undocking uh we do have word that

361
00:14:43,750 --> 00:14:41,120
we will not have ku or a video downlink

362
00:14:45,509 --> 00:14:43,760
of the dragon during undocking so

363
00:14:46,949 --> 00:14:45,519

there's a handover of satellites in

364
00:14:50,470 --> 00:14:46,959
between that time

365
00:14:52,230 --> 00:14:50,480
so we'll be able to uh confirm verbally

366
00:14:53,590 --> 00:14:52,240
and with the teams supporting in mission

367
00:14:54,949 --> 00:14:53,600
control houston and mission control

368
00:14:57,990 --> 00:14:54,959
hawthorne

369
00:15:00,629 --> 00:14:58,000
that uh that the sequence has begun and

370
00:15:16,870 --> 00:15:00,639
that the dragon has physically separated

371
00:15:20,710 --> 00:15:18,629
all right so right on time the uh

372
00:15:22,949 --> 00:15:20,720
undocking sequence has been commanded

373
00:15:25,030 --> 00:15:22,959
this sets an automatic uh series of

374
00:15:26,710 --> 00:15:25,040
events to unlatch all 12 hooks that are

375
00:15:28,629 --> 00:15:26,720
holding dragon in place

376
00:15:30,790 --> 00:15:28,639
you heard about the umbilical retraction

377
00:15:33,509 --> 00:15:30,800
and of course we'll confirm

378
00:15:38,949 --> 00:15:33,519
physical separation

379
00:15:42,470 --> 00:15:40,949
there we go okay so to take us through

380
00:15:44,629 --> 00:15:42,480
this sequence now that we are in the

381
00:15:47,269 --> 00:15:44,639
undocking sequence scheduled for an

382
00:15:49,110 --> 00:15:47,279
on-time uh undocking at 1105. let's send

383
00:15:57,030 --> 00:15:49,120
it over to shaniqua vareen over at

384
00:16:00,389 --> 00:15:58,629
thanks gary and we just heard

385
00:16:02,310 --> 00:16:00,399
confirmation that umbilical has

386
00:16:04,710 --> 00:16:02,320
retracted we are currently waiting for

387
00:16:08,310 --> 00:16:04,720
all those hooks to open and that's two

388
00:16:11,670 --> 00:16:08,320

sets of six so 12 total to unhook from

389
00:16:15,110 --> 00:16:11,680
the dragon before we are spacex

390
00:16:16,870 --> 00:16:15,120
repeating calls for tdrs the umbilicals

391
00:16:18,470 --> 00:16:16,880
are demated and the undock sequence has

392
00:16:25,350 --> 00:16:18,480
been commanded

393
00:16:25,360 --> 00:16:37,670
endeavor coffee's on the big

394
00:16:41,590 --> 00:16:39,829
and that was converse confirmation the

395
00:16:44,389 --> 00:16:41,600
umbilicals have retracted and we are

396
00:16:46,389 --> 00:16:44,399
waiting for all the hooks on to current

397
00:16:48,870 --> 00:16:46,399
hooks are driving and we are waiting for

398
00:17:09,990 --> 00:16:48,880
all of them to unhook before we have

399
00:17:10,000 --> 00:17:42,870
you'll hear from the corn hawthorne

400
00:17:42,880 --> 00:17:56,870
open

401
00:18:07,669 --> 00:17:58,630
and that was confirmation from the court

402
00:18:11,510 --> 00:18:09,669
we're about halfway there hooks of that

403
00:18:56,870 --> 00:18:11,520
one that first set are done we're

404
00:18:56,880 --> 00:19:55,430
hooks are still driving

405
00:19:58,549 --> 00:19:56,549
all hooks are open and we have

406
00:20:13,270 --> 00:19:58,559
confirmation

407
00:20:22,630 --> 00:20:14,950
dragon has started to push itself away

408
00:20:26,630 --> 00:20:25,110
and with that shane megan aki and tomah

409
00:20:34,870 --> 00:20:26,640
have completed their journey aboard the

410
00:20:39,350 --> 00:20:36,549
station on two dragon separation

411
00:20:39,360 --> 00:20:52,230
using copies and kickers

412
00:20:56,789 --> 00:20:54,630
confirm physical separation at 105 pm

413
00:21:14,950 --> 00:20:56,799

central time as the station was flying

414
00:21:18,789 --> 00:21:16,549
that was confirmed physical separation

415
00:21:21,750 --> 00:21:18,799
at 105 pm central time as the station

416
00:21:23,350 --> 00:21:21,760
was flying 259 statute miles off the

417
00:21:25,510 --> 00:21:23,360
coast of chile

418
00:21:27,750 --> 00:21:25,520
two good undocking burns and a nominal

419
00:21:29,990 --> 00:21:27,760
impulsive retreat burn next will be a

420
00:21:32,789 --> 00:21:30,000
brief hold at waypoint one before the

421
00:21:34,230 --> 00:21:32,799
fly around sequence is executed

422
00:21:35,830 --> 00:21:34,240
we'll be monitoring crew dragon

423
00:21:37,270 --> 00:21:35,840
throughout the departure sequence as it

424
00:21:43,350 --> 00:21:37,280
makes its way from the international

425
00:21:43,360 --> 00:21:51,350
godspeed to shane megan aki and tomorrow

426
00:21:54,149 --> 00:21:52,549
to take you through the rest of the

427
00:21:55,909 --> 00:21:54,159
departure sequence we'll send you back

428
00:21:58,310 --> 00:21:55,919
over to hawkers have converged and

429
00:22:00,310 --> 00:21:58,320
dragon is navigating on dragonite 2. we

430
00:22:07,190 --> 00:22:00,320
will time out of impulsive retreat one

431
00:22:07,200 --> 00:22:24,070
endeavor coffee

432
00:22:27,510 --> 00:22:25,669
dragon spacex we see the onboard

433
00:22:29,990 --> 00:22:27,520
warnings for dragon eye one

434
00:22:35,029 --> 00:22:30,000
no correction is required dragon is

435
00:22:35,039 --> 00:22:41,190
good

436
00:22:45,590 --> 00:22:43,430
and we're following along as the crew

437
00:22:47,430 --> 00:22:45,600
dragon endeavor

438
00:22:56,549 --> 00:22:47,440

is backing away from the international

439
00:22:59,510 --> 00:22:58,070
spacex copies

440
00:23:02,950 --> 00:22:59,520
and go to one

441
00:23:05,029 --> 00:23:02,960
and the ms's are doffing suits we will

442
00:23:14,549 --> 00:23:05,039
transition cameras to external only if

443
00:23:21,350 --> 00:23:15,590
and uh

444
00:23:21,360 --> 00:23:26,710
spacex copies

445
00:23:31,270 --> 00:23:28,470
the station onto the isis clusters are

446
00:23:31,280 --> 00:23:39,669
using copies

447
00:23:45,029 --> 00:23:42,070
so a lot happening there the dragon is

448
00:23:46,710 --> 00:23:45,039
about a hundred meters away

449
00:23:48,549 --> 00:23:46,720
from the international space station at

450
00:23:50,710 --> 00:23:48,559
this point

451
00:23:53,269 --> 00:23:50,720
gotten the crew inside have uh gotten

452
00:23:55,269 --> 00:23:53,279
the go to start doffing their suits now

453
00:23:57,430 --> 00:23:55,279
past the dynamic phase of undocking

454
00:23:59,029 --> 00:23:57,440
where the suits are required uh so

455
00:24:01,909 --> 00:23:59,039
they'll start doffing as they head out

456
00:24:04,149 --> 00:24:01,919
to waypoint one uh which is about

457
00:24:05,830 --> 00:24:04,159
another hundred meters away as they

458
00:24:08,070 --> 00:24:05,840
slowly make their way out they're going

459
00:24:09,430 --> 00:24:08,080
to waypoint one which is about 200

460
00:24:11,750 --> 00:24:09,440
meters away right at the edge of the

461
00:24:13,750 --> 00:24:11,760
keep out sphere and they'll hold for

462
00:24:17,669 --> 00:24:13,760
about a minute before starting the fly

463
00:24:19,990 --> 00:24:17,679

around maneuver uh starting at this very

464
00:24:22,230 --> 00:24:20,000
top or zenith position towards the

465
00:24:24,070 --> 00:24:22,240
space-facing side see them backing up

466
00:24:25,990 --> 00:24:24,080
they're about at this position actually

467
00:24:29,110 --> 00:24:26,000
right now about halfway then they'll

468
00:24:31,110 --> 00:24:29,120
execute a 50-second uh fly around burn

469
00:24:32,789 --> 00:24:31,120
one uh this will take them from the

470
00:24:35,190 --> 00:24:32,799
zenith or the space-facing side to the

471
00:24:37,430 --> 00:24:35,200
aft or the back of the station uh and

472
00:24:38,950 --> 00:24:37,440
cruise for a bit uh until they hit the

473
00:24:41,269 --> 00:24:38,960
aft portion

474
00:24:43,350 --> 00:24:41,279
it's expected that during this part of

475
00:24:45,909 --> 00:24:43,360
the flight uh we'll be in an orbital

476
00:24:48,149 --> 00:24:45,919
night time uh so write about these two

477
00:24:50,470 --> 00:24:48,159
burns uh fly around burns one and burn

478
00:24:52,149 --> 00:24:50,480
two we should be getting some views of

479
00:24:53,750 --> 00:24:52,159
the international space station maybe

480
00:24:55,669 --> 00:24:53,760
even of the dragon but they will be a

481
00:24:58,149 --> 00:24:55,679
little bit on the darker side then of

482
00:25:01,110 --> 00:24:58,159
course the uh next two burns burn three

483
00:25:03,590 --> 00:25:01,120
and burn four will be in the daylight

484
00:25:05,830 --> 00:25:03,600
and the whole maneuver itself will take

485
00:25:07,669 --> 00:25:05,840
about an hour and a half you can see the

486
00:25:09,669 --> 00:25:07,679
position of the dragon

487
00:25:12,230 --> 00:25:09,679
the very top portion of the dragon with

488
00:25:14,710 --> 00:25:12,240

the nose cone face down towards the

489
00:25:15,909 --> 00:25:14,720
international space station at all times

490
00:25:18,789 --> 00:25:15,919
this allows

491
00:25:20,630 --> 00:25:18,799
for the crew inside with a perfect

492
00:25:22,549 --> 00:25:20,640
window view looking down at the

493
00:25:24,789 --> 00:25:22,559
international space station to take

494
00:25:27,269 --> 00:25:24,799
digital photographs the entire way

495
00:25:29,190 --> 00:25:27,279
around it's a photographic survey

496
00:25:31,990 --> 00:25:29,200
opportunity of the exterior of the

497
00:25:34,630 --> 00:25:32,000
international space station allowing the

498
00:25:36,549 --> 00:25:34,640
crew to visualize some of the areas of

499
00:25:37,830 --> 00:25:36,559
the space station that can't normally

500
00:25:40,549 --> 00:25:37,840
see be seen

501
00:25:42,230 --> 00:25:40,559
by some of the external cameras on board

502
00:25:43,510 --> 00:25:42,240
not too long after it makes this full

503
00:25:45,190 --> 00:25:43,520
loop over the course of an hour and a

504
00:25:46,870 --> 00:25:45,200
half there are two departure burns

505
00:25:48,870 --> 00:25:46,880
departure burn zero that gets them

506
00:25:50,870 --> 00:25:48,880
outside of the keep out sphere which

507
00:25:53,430 --> 00:25:50,880
they will have been hugging uh for about

508
00:25:55,669 --> 00:25:53,440
uh uh an hour and a half and then depart

509
00:25:58,310 --> 00:25:55,679
burn one which sends them right outside

510
00:26:00,950 --> 00:25:58,320
the approach ellipsoid at that time we

511
00:26:02,470 --> 00:26:00,960
are outside of joint operations between

512
00:26:04,789 --> 00:26:02,480
the international space station flight

513
00:26:06,390 --> 00:26:04,799

control teams and the dragon teams here

514
00:26:08,870 --> 00:26:06,400
in mission control hawthorne they'll be

515
00:26:11,669 --> 00:26:08,880
taking control of dragon's journey for

516
00:26:13,669 --> 00:26:11,679
the remainder of its uh of its flight

517
00:26:16,149 --> 00:26:13,679
down to splash down off the coast of

518
00:26:20,230 --> 00:26:16,159
pensacola florida uh targeting an on

519
00:26:21,590 --> 00:26:20,240
time uh splashdown at 7 33 p.m pacific

520
00:26:23,669 --> 00:26:21,600
time tonight

521
00:26:25,590 --> 00:26:23,679
yeah so we've had an exciting morning so

522
00:26:28,230 --> 00:26:25,600
far the collets that we heard just a

523
00:26:30,870 --> 00:26:28,240
couple minutes ago was an indication uh

524
00:26:34,470 --> 00:26:30,880
that everything is looking good and that

525
00:26:36,950 --> 00:26:34,480
um both aki and tomah can doff or take

526
00:26:39,430 --> 00:26:36,960
off their spacesuit this will allow them

527
00:26:41,669 --> 00:26:39,440
to have a little better mobility about

528
00:26:43,830 --> 00:26:41,679
the cabin in order to take those photos

529
00:26:45,909 --> 00:26:43,840
uh like gary mentioned

530
00:26:49,830 --> 00:26:45,919
these photos will help basically fill in

531
00:26:52,390 --> 00:26:49,840
the blanks that the on-board cameras

532
00:26:54,310 --> 00:26:52,400
currently have on station as

533
00:27:02,470 --> 00:26:54,320
endeavor ms-1 is out of the suit ready

534
00:27:05,269 --> 00:27:04,390
spacex copies ms-1 is ready for fly

535
00:27:08,230 --> 00:27:05,279
around

536
00:27:11,510 --> 00:27:09,350
all right so there's that call

537
00:27:13,590 --> 00:27:11,520
indicating that tomah has removed his

538
00:27:15,269 --> 00:27:13,600

suit and he's ready to take some photos

539
00:27:18,549 --> 00:27:15,279
he'll be doing that

540
00:27:20,950 --> 00:27:18,559
as the nose cone is still currently open

541
00:27:23,909 --> 00:27:20,960
and so there's actually a very small

542
00:27:26,389 --> 00:27:23,919
circular window at the top of the

543
00:27:28,630 --> 00:27:26,399
forward hatch and uh he's going to be

544
00:27:30,310 --> 00:27:28,640
taking those photos of the station

545
00:27:32,470 --> 00:27:30,320
using it using that

546
00:27:35,110 --> 00:27:32,480
that port essentially and

547
00:27:36,789 --> 00:27:35,120
it is tight quarters so obviously being

548
00:27:38,230 --> 00:27:36,799
able to have a little better mobility uh

549
00:27:40,230 --> 00:27:38,240
will certainly be useful to him here

550
00:27:42,549 --> 00:27:40,240
coming up

551
00:27:43,830 --> 00:27:42,559
so again they're past that dynamic phase

552
00:27:45,909 --> 00:27:43,840
which is why they're getting out of

553
00:27:48,549 --> 00:27:45,919
their suits and they'll remain there um

554
00:27:51,029 --> 00:27:48,559
the dragon itself will fly autonomously

555
00:27:54,470 --> 00:27:51,039
the crew do have the ability to execute

556
00:27:57,029 --> 00:27:54,480
small um uh manual correction burns if

557
00:27:59,269 --> 00:27:57,039
necessary but for the most part dragon

558
00:28:00,830 --> 00:27:59,279
will uh will take that flight around the

559
00:28:03,430 --> 00:28:00,840
international space station

560
00:28:06,230 --> 00:28:03,440
automatically uh the flight computers

561
00:28:08,230 --> 00:28:06,240
themselves were uh programmed just ahead

562
00:28:10,310 --> 00:28:08,240
of undocking getting ready for that

563
00:28:11,830 --> 00:28:10,320

essentially fly around sequence uh for

564
00:28:13,990 --> 00:28:11,840
the flyer on secrets to begin it's a

565
00:28:15,669 --> 00:28:14,000
different set of burns to get them out

566
00:28:17,510 --> 00:28:15,679
to that hold point and then eventually

567
00:28:20,710 --> 00:28:17,520
around the station we are getting

568
00:28:22,470 --> 00:28:20,720
fantastic views uh from the uh dragon

569
00:28:25,269 --> 00:28:22,480
eye some of the dragon cameras that are

570
00:28:27,990 --> 00:28:25,279
on the forward end uh of dragon pointing

571
00:28:29,830 --> 00:28:28,000
down uh and that position will be held

572
00:28:31,750 --> 00:28:29,840
really throughout this entire fly around

573
00:28:33,950 --> 00:28:31,760
flight uh we're

574
00:28:36,230 --> 00:28:33,960
a little more than halfway there about

575
00:28:38,230 --> 00:28:36,240
130 meters at this point again we're

576
00:28:41,269 --> 00:28:38,240
getting to about 180

577
00:28:44,230 --> 00:28:41,279
to somewhere between 180 to 220 until we

578
00:28:46,070 --> 00:28:44,240
get to that 1.1 hold point we will not

579
00:28:48,070 --> 00:28:46,080
stay there for very long it's only about

580
00:28:50,149 --> 00:28:48,080
a minute and then if everything looks

581
00:28:51,750 --> 00:28:50,159
good which the flight control

582
00:28:54,549 --> 00:28:51,760
team are

583
00:28:56,630 --> 00:28:54,559
trying to uh determine uh right now if

584
00:28:58,870 --> 00:28:56,640
they're good to go to proceed uh they'll

585
00:29:00,070 --> 00:28:58,880
execute that fly around burn um pretty

586
00:29:01,590 --> 00:29:00,080
much immediately

587
00:29:03,750 --> 00:29:01,600
yeah so that shot that we just had

588
00:29:07,029 --> 00:29:03,760

inside the cabin uh you could actually

589
00:29:08,710 --> 00:29:07,039
see tomah there just underneath megan

590
00:29:10,950 --> 00:29:08,720
and shane

591
00:29:12,710 --> 00:29:10,960
taking these photos as we had indicated

592
00:29:14,870 --> 00:29:12,720
um hopefully we'll get that feedback

593
00:29:16,230 --> 00:29:14,880
momentarily but this video is no

594
00:29:18,549 --> 00:29:16,240
response required but we are going to

595
00:29:20,630 --> 00:29:18,559
clear the onboard dragon eye one and

596
00:29:21,990 --> 00:29:20,640
dragon eye like sensor crosscheck alerts

597
00:29:26,230 --> 00:29:22,000
from your board they are no longer

598
00:29:30,310 --> 00:29:28,470
yeah so this is a live view

599
00:29:31,510 --> 00:29:30,320
from dragon and there's that shot inside

600
00:29:33,909 --> 00:29:31,520
the cabin

601
00:29:36,230 --> 00:29:33,919
uh pilot megan macarthur on the right

602
00:29:38,149 --> 00:29:36,240
hand side commander shane kimbrough on

603
00:29:39,350 --> 00:29:38,159
the left-hand side and that's tomah

604
00:29:41,510 --> 00:29:39,360
pesquet

605
00:29:43,110 --> 00:29:41,520
basically the designated

606
00:29:45,190 --> 00:29:43,120
professional photographer of this

607
00:29:46,950 --> 00:29:45,200
mission um if you've been following

608
00:29:47,830 --> 00:29:46,960
along on his twitter account there have

609
00:29:48,950 --> 00:29:47,840
been

610
00:29:51,750 --> 00:29:48,960
absolute

611
00:29:54,710 --> 00:29:51,760
golden photos that he's really captured

612
00:29:56,950 --> 00:29:54,720
all along this mission uh and

613
00:29:58,870 --> 00:29:56,960

i'm excited to see you know what he

614
00:30:01,269 --> 00:29:58,880
might be putting his skills to uh here

615
00:30:02,789 --> 00:30:01,279
as he continues to survey the station

616
00:30:04,310 --> 00:30:02,799
during this fly around

617
00:30:06,630 --> 00:30:04,320
interestingly enough it looks like the

618
00:30:08,549 --> 00:30:06,640
photographic survey is beginning now

619
00:30:10,590 --> 00:30:08,559
even before the fly around now that they

620
00:30:13,990 --> 00:30:10,600
have uh they're only about

621
00:30:14,950 --> 00:30:14,000
140 meters away at this point uh but you

622
00:30:18,149 --> 00:30:14,960
can see

623
00:30:19,669 --> 00:30:18,159
an absolutely gorgeous view of the uh of

624
00:30:21,350 --> 00:30:19,679
the space facing side of the

625
00:30:22,710 --> 00:30:21,360
international space station really good

626
00:30:24,549 --> 00:30:22,720
to take pictures now because we're

627
00:30:27,029 --> 00:30:24,559
getting this view while we're in an

628
00:30:29,029 --> 00:30:27,039
orbital daytime it won't be long until

629
00:30:31,750 --> 00:30:29,039
we have a sunset here

630
00:30:34,549 --> 00:30:31,760
as we make that first uh burn maneuver

631
00:30:36,950 --> 00:30:34,559
to go from the very top or the zenith

632
00:30:39,510 --> 00:30:36,960
space facing side we're going to first

633
00:30:40,950 --> 00:30:39,520
go towards the after back of the space

634
00:30:42,070 --> 00:30:40,960
station towards the russian segment

635
00:30:44,230 --> 00:30:42,080
that'll be the

636
00:30:45,909 --> 00:30:44,240
first part of this journey around the

637
00:30:47,110 --> 00:30:45,919
space station to take this photographic

638
00:30:48,710 --> 00:30:47,120

survey

639
00:30:50,470 --> 00:30:48,720
now if you're looking at the screen and

640
00:30:51,669 --> 00:30:50,480
wondering what that red thing is

641
00:30:54,070 --> 00:30:51,679
floating

642
00:30:56,149 --> 00:30:54,080
near um toma's head and there's a blue

643
00:30:57,350 --> 00:30:56,159
one on the left hand side those are his

644
00:30:59,509 --> 00:30:57,360
ear pieces

645
00:31:02,470 --> 00:30:59,519
those are basically part of the uniform

646
00:31:05,029 --> 00:31:02,480
that's what allows him to hear

647
00:31:07,029 --> 00:31:05,039
communications during the mission uh not

648
00:31:08,549 --> 00:31:07,039
necessarily at this point in time

649
00:31:09,909 --> 00:31:08,559
but it looks kind of

650
00:31:11,909 --> 00:31:09,919
kind of silly to see them floating there

651
00:31:15,669 --> 00:31:11,919
so i just wanted to point those out

652
00:31:19,509 --> 00:31:17,190
right below the international space

653
00:31:21,669 --> 00:31:19,519
station is the south atlantic ocean we

654
00:31:23,190 --> 00:31:21,679
just passed the southern tip of south

655
00:31:27,509 --> 00:31:23,200
america and we're now heading on a

656
00:31:31,430 --> 00:31:29,830
the uh the terminator line uh that

657
00:31:32,789 --> 00:31:31,440
separates light from dark is right in

658
00:31:35,110 --> 00:31:32,799
the middle of the atlantic ocean right

659
00:31:38,470 --> 00:31:35,120
now so we're expecting sunset in uh

660
00:31:41,509 --> 00:31:38,480
about 15 minutes so uh

661
00:31:43,350 --> 00:31:41,519
tomato taking pictures of the

662
00:31:45,190 --> 00:31:43,360
space-facing side of the entire

663
00:31:46,789 --> 00:31:45,200

international space station while he can

664
00:31:48,389 --> 00:31:46,799
he's got about 15 minutes of daylight

665
00:31:50,230 --> 00:31:48,399
left

666
00:31:51,430 --> 00:31:50,240
live shot there of mission control

667
00:31:53,350 --> 00:31:51,440
center here

668
00:31:54,789 --> 00:31:53,360
at spacex headquarters in hawthorne

669
00:31:56,630 --> 00:31:54,799
california

670
00:31:59,110 --> 00:31:56,640
just to the side of us

671
00:32:00,630 --> 00:31:59,120
like i mentioned before it is a bustling

672
00:32:02,549 --> 00:32:00,640
monday morning

673
00:32:04,389 --> 00:32:02,559
here we are a live manufacturing

674
00:32:06,870 --> 00:32:04,399
environment so there is some background

675
00:32:09,430 --> 00:32:06,880
noise um as we're literally building

676
00:32:10,870 --> 00:32:09,440
rockets and spacecraft right behind us

677
00:32:17,990 --> 00:32:10,880
but yeah that's a shot of our mission

678
00:32:23,269 --> 00:32:20,389
so you're looking at the the uh control

679
00:32:25,269 --> 00:32:23,279
room right now because uh we are

680
00:32:26,710 --> 00:32:25,279
sort of in between the

681
00:32:28,310 --> 00:32:26,720
video coverage that we're getting from

682
00:32:29,590 --> 00:32:28,320
the international space station you see

683
00:32:30,710 --> 00:32:29,600
some of the views are absolutely

684
00:32:33,430 --> 00:32:30,720
gorgeous

685
00:32:36,549 --> 00:32:33,440
there is a data link between the space

686
00:32:38,950 --> 00:32:36,559
station and the uh dragon

687
00:32:41,110 --> 00:32:38,960
that provides high high bandwidth

688
00:32:43,590 --> 00:32:41,120

communications but for the most part a

689
00:32:45,669 --> 00:32:43,600
lot of that video from the dragon side

690
00:32:48,310 --> 00:32:45,679
will be when we go over ground stations

691
00:32:50,310 --> 00:32:48,320
uh from the space station side we use

692
00:32:52,230 --> 00:32:50,320
tdrs we're tracking and data relay

693
00:32:55,669 --> 00:32:52,240
satellites that are in geosynchronous

694
00:32:57,269 --> 00:32:55,679
orbit about 22 23 000 miles

695
00:32:59,110 --> 00:32:57,279
from earth to give you some perspective

696
00:33:01,509 --> 00:32:59,120
the dragon crew and the international

697
00:33:04,310 --> 00:33:01,519
space station crew is about 250 miles so

698
00:33:06,230 --> 00:33:04,320
so quite a bit but they provide that uh

699
00:33:07,350 --> 00:33:06,240
video coverage uh the video downlink

700
00:33:09,830 --> 00:33:07,360
that we're seeing from the outside of

701
00:33:12,070 --> 00:33:09,840
the station this is probably the longest

702
00:33:13,669 --> 00:33:12,080
period of of a

703
00:33:15,350 --> 00:33:13,679
handover between the satellites that

704
00:33:16,789 --> 00:33:15,360
we'll see throughout the flyover

705
00:33:18,950 --> 00:33:16,799
maneuver there's a couple of dips that

706
00:33:21,110 --> 00:33:18,960
we may see from video as they're making

707
00:33:23,430 --> 00:33:21,120
that uh their way around and we'll just

708
00:33:25,830 --> 00:33:23,440
see what we get as we as we make our way

709
00:33:27,590 --> 00:33:25,840
around we have that video coverage uh

710
00:33:30,789 --> 00:33:27,600
from the station camera so we may be

711
00:33:32,710 --> 00:33:30,799
able to see the the station side looking

712
00:33:35,029 --> 00:33:32,720
out at uh there we go we're already

713
00:33:37,669 --> 00:33:35,039

getting some of that fantastic um so you

714
00:33:39,750 --> 00:33:37,679
can see with the station cameras

715
00:33:42,310 --> 00:33:39,760
overexposed that aperture nice and wide

716
00:33:44,710 --> 00:33:42,320
we can actually see some of the draco

717
00:33:47,430 --> 00:33:44,720
engines uh firing those thrusters to

718
00:33:51,990 --> 00:33:47,440
stabilize dragon as it makes its retreat

719
00:33:53,509 --> 00:33:52,000
out to about 220 meters now at about 160

720
00:33:55,029 --> 00:33:53,519
looking straight down at the

721
00:33:56,789 --> 00:33:55,039
international space station of course

722
00:33:58,549 --> 00:33:56,799
they're looking straight up again we're

723
00:34:00,389 --> 00:33:58,559
about 10 minutes away from an orbital

724
00:34:02,470 --> 00:34:00,399
sunset you can see the the views a

725
00:34:05,110 --> 00:34:02,480
little bit even dark at this point it

726
00:34:06,950 --> 00:34:05,120
might be because of the overexposure

727
00:34:11,430 --> 00:34:06,960
just to see some of those

728
00:34:14,389 --> 00:34:13,109
and high definition views as well

729
00:34:15,909 --> 00:34:14,399
fantastic

730
00:34:18,069 --> 00:34:15,919
hopefully we get a lot of these kate as

731
00:34:19,750 --> 00:34:18,079
we make our way around the station again

732
00:34:22,149 --> 00:34:19,760
we are we're in some of the longer

733
00:34:24,629 --> 00:34:22,159
handover periods now but we may see it

734
00:34:26,710 --> 00:34:24,639
um the cameras themselves should be

735
00:34:28,389 --> 00:34:26,720
getting some good views of the dragon as

736
00:34:30,149 --> 00:34:28,399
it makes its way around some of the

737
00:34:31,589 --> 00:34:30,159
views from dragon looking down at the

738
00:34:32,950 --> 00:34:31,599

international space station that we were

739
00:34:35,430 --> 00:34:32,960
seeing towards

740
00:34:37,190 --> 00:34:35,440
very shortly after undocking we'll maybe

741
00:34:38,950 --> 00:34:37,200
get some of those as well so so this

742
00:34:40,230 --> 00:34:38,960
will be a very fun hour and a half yeah

743
00:34:41,589 --> 00:34:40,240
i want to point out real quick while we

744
00:34:43,190 --> 00:34:41,599
still have this view

745
00:34:45,430 --> 00:34:43,200
that the tiny

746
00:34:47,589 --> 00:34:45,440
light there in the center of the dark

747
00:34:50,550 --> 00:34:47,599
circle that is the window

748
00:34:52,950 --> 00:34:50,560
in which tomah is utilizing to

749
00:34:53,750 --> 00:34:52,960
take photos during the fly around

750
00:34:56,069 --> 00:34:53,760
so

751
00:34:58,230 --> 00:34:56,079
right now tama's looking back at us as

752
00:35:00,310 --> 00:34:58,240
we're looking at him

753
00:35:01,910 --> 00:35:00,320
once again you can see that nose cone is

754
00:35:04,230 --> 00:35:01,920
open it will remain open for the

755
00:35:07,030 --> 00:35:04,240
duration of the fly around uh and of

756
00:35:09,510 --> 00:35:07,040
course prior to re-entry it'll close um

757
00:35:11,990 --> 00:35:09,520
once we are completely done utilizing

758
00:35:13,829 --> 00:35:12,000
the draco thrusters located there uh at

759
00:35:15,829 --> 00:35:13,839
the forward hatch you can sort of see

760
00:35:18,710 --> 00:35:15,839
them too the outline of the four four

761
00:35:21,750 --> 00:35:18,720
forward uh bulkhead uh dracos those will

762
00:35:23,750 --> 00:35:21,760
be used for uh a lot of the the more

763
00:35:26,950 --> 00:35:23,760

important maneuvers i think the most

764
00:35:29,349 --> 00:35:26,960
important of which is the deorbit burn a

765
00:35:30,470 --> 00:35:29,359
very very important maneuver that is

766
00:35:32,630 --> 00:35:30,480
essentially

767
00:35:34,630 --> 00:35:32,640
committing dragon to re-entering the

768
00:35:36,150 --> 00:35:34,640
earth's atmosphere and splashing down

769
00:35:37,910 --> 00:35:36,160
right now we're still tracking weather

770
00:35:40,550 --> 00:35:37,920
and we will continue to do so over the

771
00:35:42,950 --> 00:35:40,560
next eight hours uh as we make our way

772
00:35:47,349 --> 00:35:42,960
down closer towards uh that splashdown

773
00:35:49,990 --> 00:35:47,359
time 7 33 p.m pacific 10 33 p.m eastern

774
00:35:52,230 --> 00:35:50,000
standard uh but those four drake ford

775
00:35:54,710 --> 00:35:52,240
book at draco's will fire for

776
00:35:57,750 --> 00:35:54,720
16 and a half minutes super critical

777
00:35:59,910 --> 00:35:57,760
time uh and that will put the dragon in

778
00:36:01,910 --> 00:35:59,920
a position to re-enter the earth's

779
00:36:03,910 --> 00:36:01,920
atmosphere

780
00:36:05,670 --> 00:36:03,920
this shot is also great because not only

781
00:36:07,990 --> 00:36:05,680
can we see the forward hatch so that's

782
00:36:09,990 --> 00:36:08,000
the hatch that's utilized to get in and

783
00:36:12,150 --> 00:36:10,000
out of crew dragon while it's on station

784
00:36:14,870 --> 00:36:12,160
but we can also

785
00:36:17,349 --> 00:36:14,880
slightly see the side hatch which is on

786
00:36:20,230 --> 00:36:17,359
the left hand side of the vehicle

787
00:36:22,790 --> 00:36:20,240
it's a square shape which doesn't look

788
00:36:24,390 --> 00:36:22,800

like a square from this angle however

789
00:36:26,230 --> 00:36:24,400
it's that panel there on the left hand

790
00:36:28,390 --> 00:36:26,240
side of the vehicle that of course is

791
00:36:29,750 --> 00:36:28,400
the hatch in which the crew uses to

792
00:36:31,670 --> 00:36:29,760
ingress or

793
00:36:33,750 --> 00:36:31,680
get on board dragon

794
00:36:35,510 --> 00:36:33,760
uh on day of launch and of course it

795
00:36:37,829 --> 00:36:35,520
will be the hatch that they use later

796
00:36:40,630 --> 00:36:37,839
this after excuse me later this evening

797
00:36:42,630 --> 00:36:40,640
to egress or exit the vehicle once the

798
00:36:44,550 --> 00:36:42,640
crew splashes down and is recovered by

799
00:36:46,790 --> 00:36:44,560
the spacex recovery team

800
00:36:49,069 --> 00:36:46,800
on one of our recovery vessels

801
00:36:51,270 --> 00:36:49,079
that will be open for the first time in

802
00:36:53,910 --> 00:36:51,280
199 days

803
00:36:57,510 --> 00:36:53,920
by the time that they splash down at 10

804
00:36:59,829 --> 00:36:57,520
33 pm eastern time they're only about

805
00:37:01,349 --> 00:36:59,839
seven hours shy of making it to that

806
00:37:03,270 --> 00:37:01,359
200-day mark

807
00:37:04,790 --> 00:37:03,280
but it will be 199 by the time they

808
00:37:06,630 --> 00:37:04,800
actually open up that hatch it's been

809
00:37:09,589 --> 00:37:06,640
closed the entire time that it's been on

810
00:37:12,950 --> 00:37:09,599
station a very important section of the

811
00:37:15,190 --> 00:37:12,960
dragon right towards towards us where

812
00:37:17,430 --> 00:37:15,200
we're looking at from this camera view

813
00:37:19,510 --> 00:37:17,440

towards essentially what is the top of

814
00:37:21,030 --> 00:37:19,520
that side hatch that's where the drogue

815
00:37:23,030 --> 00:37:21,040
parachutes are

816
00:37:25,030 --> 00:37:23,040
shortly after re-entering the earth's

817
00:37:27,430 --> 00:37:25,040
atmosphere mortals will fire to release

818
00:37:37,109 --> 00:37:27,440
those two drug shoots never spacex for

819
00:37:43,990 --> 00:37:39,829
all right endeavor you are go to command

820
00:37:46,470 --> 00:37:44,000
iss fly around once hold one is reached

821
00:37:48,550 --> 00:37:46,480
it is a required urgent command as soon

822
00:37:49,670 --> 00:37:48,560
as we enter hold one to limit crop

823
00:37:51,829 --> 00:37:49,680
consumption

824
00:37:58,150 --> 00:37:51,839
so repeating you are go to command fly

825
00:38:07,670 --> 00:38:00,790
endeavor copies go to initiate iss fly

826
00:38:13,270 --> 00:38:10,470
that is a very critical time um

827
00:38:15,670 --> 00:38:13,280
megan mcarthur the pilot of crew of the

828
00:38:17,829 --> 00:38:15,680
crew 2 mission uh by the time they

829
00:38:20,230 --> 00:38:17,839
actually get to the what they're talking

830
00:38:23,030 --> 00:38:20,240
about hold one that's waypoint one right

831
00:38:24,310 --> 00:38:23,040
now they're at about 185 meters from the

832
00:38:28,470 --> 00:38:24,320
international space station they're

833
00:38:30,470 --> 00:38:28,480
heading out to approximately 220

834
00:38:33,109 --> 00:38:30,480
at that point dragon will transition to

835
00:38:35,270 --> 00:38:33,119
hold mode or hold one whereas holding at

836
00:38:37,190 --> 00:38:35,280
that waypoint uh to limit the prop

837
00:38:38,950 --> 00:38:37,200
consumption as was mentioned over the uh

838
00:38:40,950 --> 00:38:38,960

dragon ground loops the the big loop

839
00:38:43,589 --> 00:38:40,960
actually right now as ever as uh even

840
00:38:45,349 --> 00:38:43,599
the station uh team is listening in the

841
00:38:47,589 --> 00:38:45,359
station crew mark vanda high namely

842
00:38:50,630 --> 00:38:47,599
who's monitoring these this sequence

843
00:38:52,390 --> 00:38:50,640
right now um that uh will be about a

844
00:38:54,790 --> 00:38:52,400
minute that they have from the time that

845
00:38:58,390 --> 00:38:54,800
they enter hold one to the time that the

846
00:39:01,030 --> 00:38:58,400
first uh fly-around burn is initiated uh

847
00:39:03,510 --> 00:39:01,040
that burn being uh the first of four

848
00:39:06,630 --> 00:39:03,520
it'll be a zenith to afterburn it's

849
00:39:09,430 --> 00:39:06,640
about a 50-second burn that maneuvers uh

850
00:39:12,310 --> 00:39:09,440
station the dragon into a position to

851
00:39:15,109 --> 00:39:12,320
essentially cruise uh down to right

852
00:39:23,270 --> 00:39:15,119
behind or at the aft section of

853
00:39:27,990 --> 00:39:25,430
so again you're seeing we were getting

854
00:39:29,829 --> 00:39:28,000
fantastic views of the dragon looking

855
00:39:31,510 --> 00:39:29,839
right up at it and uh kate you were

856
00:39:33,990 --> 00:39:31,520
perfectly describing that that tiny

857
00:39:36,069 --> 00:39:34,000
little hole that uh tomah is going to be

858
00:39:38,870 --> 00:39:36,079
taking photos out of you can see even

859
00:39:41,510 --> 00:39:38,880
after that first burn is executed um

860
00:39:43,910 --> 00:39:41,520
those burns will actually keep dragon in

861
00:39:45,670 --> 00:39:43,920
the position where that forward hatch

862
00:39:47,430 --> 00:39:45,680
what we're looking at right now with

863
00:39:49,510 --> 00:39:47,440

that bright circle at the very dead

864
00:39:50,630 --> 00:39:49,520
center that's where tomah pesquet will

865
00:39:52,950 --> 00:39:50,640
be taking some of the digital

866
00:39:54,710 --> 00:39:52,960
photographs that forward hatch will be

867
00:39:57,510 --> 00:39:54,720
pointing towards the international space

868
00:39:59,349 --> 00:39:57,520
station at all times as it makes its way

869
00:40:02,069 --> 00:39:59,359
around the international space station

870
00:40:03,750 --> 00:40:02,079
with again all four fly around burns

871
00:40:09,190 --> 00:40:03,760
to make that perfect loop all the way

872
00:40:13,750 --> 00:40:11,589
once again this flyover maneuver is

873
00:40:15,990 --> 00:40:13,760
brand new to crew dragon this is the

874
00:40:19,030 --> 00:40:16,000
first time that we will be executing it

875
00:40:22,069 --> 00:40:19,040
uh the maneuver itself is basically a

876
00:40:24,950 --> 00:40:22,079
photographic survey of the station

877
00:40:27,190 --> 00:40:24,960
uh yeah so there you can see uh kind of

878
00:40:28,069 --> 00:40:27,200
big picture uh dragon is going to be

879
00:40:30,790 --> 00:40:28,079
making

880
00:40:32,630 --> 00:40:30,800
one big loop around station uh and

881
00:40:34,710 --> 00:40:32,640
tomorrow pesky will be taking

882
00:40:37,510 --> 00:40:34,720
photographs through the

883
00:40:40,309 --> 00:40:37,520
uh the port window essentially there on

884
00:40:41,109 --> 00:40:40,319
the forward hatch of the station which

885
00:40:43,190 --> 00:40:41,119
will

886
00:40:44,630 --> 00:40:43,200
hopefully fill in some

887
00:40:46,870 --> 00:40:44,640
gaps that the

888
00:40:48,150 --> 00:40:46,880

currently exist in terms of

889
00:40:49,829 --> 00:40:48,160
the photographs that have taken up

890
00:40:52,309 --> 00:40:49,839
stations so even though there are many

891
00:40:54,309 --> 00:40:52,319
cameras on station unfortunately there

892
00:40:56,069 --> 00:40:54,319
are certain spots certain angles that

893
00:40:58,309 --> 00:40:56,079
can't be photographed just you know due

894
00:41:01,190 --> 00:40:58,319
to physical locations so

895
00:41:02,790 --> 00:41:01,200
tomah will be taking pictures

896
00:41:05,589 --> 00:41:02,800
and essentially dragon will be making

897
00:41:08,230 --> 00:41:05,599
one big loop a round station to perform

898
00:41:10,550 --> 00:41:08,240
this photographic survey

899
00:41:12,550 --> 00:41:10,560
this was a normal um this was a very

900
00:41:13,910 --> 00:41:12,560
standard procedure for the shuttle the

901
00:41:15,670 --> 00:41:13,920
shuttle used to undock from the

902
00:41:19,109 --> 00:41:15,680
international space station

903
00:41:21,589 --> 00:41:19,119
regularly survey uh the the station

904
00:41:23,349 --> 00:41:21,599
providing updates as particularly when

905
00:41:25,829 --> 00:41:23,359
it was under construction right it was a

906
00:41:27,829 --> 00:41:25,839
very dynamic phase uh that was more of

907
00:41:29,990 --> 00:41:27,839
the assembly phase of the international

908
00:41:32,150 --> 00:41:30,000
space station we're in

909
00:41:34,390 --> 00:41:32,160
pretty much the third the third decade

910
00:41:36,950 --> 00:41:34,400
after more than 20 years we are in it uh

911
00:41:38,950 --> 00:41:36,960
this is the time of maximum utilization

912
00:41:40,710 --> 00:41:38,960
so there have been a couple of additions

913
00:41:43,270 --> 00:41:40,720

recently to the international space

914
00:41:45,190 --> 00:41:43,280
station namely commercial modules i

915
00:41:46,710 --> 00:41:45,200
think most recently was the nanoracks

916
00:41:49,349 --> 00:41:46,720
bishop airlock

917
00:41:51,670 --> 00:41:49,359
which is uh essentially a way to deploy

918
00:41:54,390 --> 00:41:51,680
satellites it also removes trash it can

919
00:41:56,230 --> 00:41:54,400
also retrieve some orus or

920
00:41:58,630 --> 00:41:56,240
replacement unit spare parts from the

921
00:42:00,390 --> 00:41:58,640
outside with the help of the robotic arm

922
00:42:01,589 --> 00:42:00,400
so there are a couple of new elements

923
00:42:04,550 --> 00:42:01,599
and we'll be able to see that for the

924
00:42:06,790 --> 00:42:04,560
very first time after this fly around

925
00:42:09,190 --> 00:42:06,800
the last fly around that happened was on

926
00:42:11,430 --> 00:42:09,200
board a russian soyuz where drew feustel

927
00:42:13,190 --> 00:42:11,440
nasa astronaut used the state used a

928
00:42:16,470 --> 00:42:13,200
handheld camera to do the exact same

929
00:42:17,990 --> 00:42:16,480
thing as uh the as the soyuz uh undocked

930
00:42:19,670 --> 00:42:18,000
from the international space station it

931
00:42:21,750 --> 00:42:19,680
did the same thing did a photographic

932
00:42:23,829 --> 00:42:21,760
survey as it flew around and so those

933
00:42:25,589 --> 00:42:23,839
are from 2018 so this will be brand new

934
00:42:28,150 --> 00:42:25,599
uh 2021 and we'll get to see some of

935
00:42:30,390 --> 00:42:28,160
those new modules uh uh

936
00:42:31,589 --> 00:42:30,400
like the uh nanoracks airlock module as

937
00:42:33,910 --> 00:42:31,599
well as a couple of other things the

938
00:42:36,710 --> 00:42:33,920

bartolomeo external platform that's on

939
00:42:39,829 --> 00:42:36,720
the european space agency side so so

940
00:42:41,829 --> 00:42:39,839
this would be very important to see

941
00:42:44,069 --> 00:42:41,839
so there on your screen that is once

942
00:42:45,349 --> 00:42:44,079
again a live view of crude dragon

943
00:42:46,950 --> 00:42:45,359
endeavor

944
00:42:49,349 --> 00:42:46,960
departing the international space

945
00:42:51,990 --> 00:42:49,359
station with the crew 2

946
00:42:54,550 --> 00:42:52,000
crew on board and those pulses that you

947
00:42:57,430 --> 00:42:54,560
see are actually pulses coming from the

948
00:42:59,990 --> 00:42:57,440
draco thrusters on board dragon

949
00:43:01,430 --> 00:43:00,000
in order for dragon to hold position and

950
00:43:03,349 --> 00:43:01,440
maneuver like we said it's going to be

951
00:43:05,670 --> 00:43:03,359
performing this fly around maneuver

952
00:43:06,870 --> 00:43:05,680
those draco thrusters we can see

953
00:43:08,710 --> 00:43:06,880
activating

954
00:43:11,349 --> 00:43:08,720
in order to

955
00:43:13,030 --> 00:43:11,359
hold course

956
00:43:14,710 --> 00:43:13,040
looks very bright because the cameras

957
00:43:17,349 --> 00:43:14,720
themselves on the international space

958
00:43:19,270 --> 00:43:17,359
station are right now over exposed by

959
00:43:26,630 --> 00:43:19,280
doing so it allows us to see some of

960
00:43:29,910 --> 00:43:28,230
there it's becoming clearer now we're in

961
00:43:32,390 --> 00:43:29,920
an orbital we're about to enter into an

962
00:43:33,990 --> 00:43:32,400
orbital sunset so you you were getting

963
00:43:36,150 --> 00:43:34,000

some glimpses from the dragon we just

964
00:43:38,069 --> 00:43:36,160
got a second of it look like uh looking

965
00:43:40,790 --> 00:43:38,079
down at the space station still a little

966
00:43:42,790 --> 00:43:40,800
bit illuminated uh by the sun that will

967
00:43:44,550 --> 00:43:42,800
not last very long

968
00:43:47,430 --> 00:43:44,560
about two more minutes is when we're

969
00:43:51,430 --> 00:43:47,440
expected to hit that hold one point at

970
00:43:53,589 --> 00:43:51,440
about 220 meters we're at about 217

971
00:43:55,109 --> 00:43:53,599
at this point so we're slowing down uh

972
00:43:57,430 --> 00:43:55,119
getting ready to get to that whole point

973
00:44:00,950 --> 00:43:57,440
again meghan macarthur the pilot uh who

974
00:44:00,960 --> 00:44:03,510
here we go

975
00:44:08,630 --> 00:44:05,430
copy endeavor fly around is initiated we

976
00:44:12,470 --> 00:44:10,630
so a little bit earlier than expected uh

977
00:44:14,710 --> 00:44:12,480
but it seems like we did hit that hold

978
00:44:17,270 --> 00:44:14,720
point and it was very it was not long at

979
00:44:19,190 --> 00:44:17,280
all before megan macarthur uh initiated

980
00:44:22,069 --> 00:44:19,200
that burn right now we're in a 50-second

981
00:44:27,589 --> 00:44:22,079
burn uh the first of four to fly around

982
00:44:31,670 --> 00:44:29,670
dragon spacex on dragon to ground we see

983
00:44:33,670 --> 00:44:31,680
the onboard alerts

984
00:44:42,570 --> 00:44:33,680
or dragon eye time of flights are still

985
00:44:42,580 --> 00:44:46,710
[Music]

986
00:44:49,829 --> 00:44:48,230
repeating call

987
00:44:51,510 --> 00:44:49,839
we see the onboard alerts for dragon eye

988
00:44:53,750 --> 00:44:51,520

one

989
00:44:55,430 --> 00:44:53,760
and dragon i2 geometric filters

990
00:45:06,680 --> 00:44:55,440
the time-of-flight filters are still

991
00:45:11,190 --> 00:45:08,950
[Applause]

992
00:45:12,710 --> 00:45:11,200
and uh spacex still very difficult to

993
00:45:14,550 --> 00:45:12,720
hear um

994
00:45:16,390 --> 00:45:14,560
copy you see the messages i believe

995
00:45:19,109 --> 00:45:16,400
these are expected in this squadron is

996
00:45:21,430 --> 00:45:19,119
that correct

997
00:45:23,510 --> 00:45:21,440
that's affirmative endeavor the

998
00:45:25,030 --> 00:45:23,520
geometric filters

999
00:45:27,910 --> 00:45:25,040
have were lost but the time of flight

1000
00:45:30,069 --> 00:45:27,920
filters are still

1001
00:45:35,750 --> 00:45:30,079
converged so dragon is still in a good

1002
00:45:35,760 --> 00:45:45,670
i'll be good good

1003
00:45:50,069 --> 00:45:48,230
station houston for mark you are go to

1004
00:45:54,150 --> 00:45:50,079
stand down for monitoring dragon's fly

1005
00:45:58,550 --> 00:45:56,630
happy thanks much and uh to the dragon

1006
00:46:00,550 --> 00:45:58,560
crew i'll be looking for you if i get a

1007
00:46:02,150 --> 00:46:00,560
chance to see the outside but very

1008
00:46:02,870 --> 00:46:02,160
quickly wanted to say thanks to all of

1009
00:46:04,790 --> 00:46:02,880
you

1010
00:46:07,109 --> 00:46:04,800
sama thanks for being such a great guy

1011
00:46:08,790 --> 00:46:07,119
and inspiring famous person for friends

1012
00:46:10,470 --> 00:46:08,800
hockey you're a commander who knew

1013
00:46:12,150 --> 00:46:10,480

exactly when to be serious and when to

1014
00:46:13,589 --> 00:46:12,160
be funny

1015
00:46:16,390 --> 00:46:13,599
let me just stop talking if i'm talking

1016
00:46:19,910 --> 00:46:17,910
kane thanks for being such a great

1017
00:46:21,829 --> 00:46:19,920
example of what putting others first

1018
00:46:23,510 --> 00:46:21,839
looks like and megan thanks for becoming

1019
00:46:25,270 --> 00:46:23,520
a sister to me up here in space i'll

1020
00:46:29,430 --> 00:46:25,280
miss hearing your laughter and adjacent

1021
00:46:32,550 --> 00:46:31,030
hey mark we're really going to miss you

1022
00:46:34,390 --> 00:46:32,560
come had such a great time with you

1023
00:46:37,270 --> 00:46:34,400
learned a lot from you and i know you're

1024
00:46:38,550 --> 00:46:37,280
going to treat crew 3 really well and

1025
00:46:41,589 --> 00:46:38,560
let us know if we can do anything for

1026
00:46:43,030 --> 00:46:41,599
you take care

1027
00:46:45,190 --> 00:46:43,040
yeah get home safely it's been a great

1028
00:46:49,190 --> 00:46:45,200
park game it's been great being part of

1029
00:46:54,790 --> 00:46:50,870
hey carl's my friend

1030
00:47:00,790 --> 00:46:54,800
take care of anton and fielder for us

1031
00:47:06,150 --> 00:47:03,349
you were hearing uh nasa astronaut mark

1032
00:47:07,829 --> 00:47:06,160
vanda high the uh sole nasa astronaut

1033
00:47:10,309 --> 00:47:07,839
now on board the international space

1034
00:47:12,950 --> 00:47:10,319
station relieved of his duties to

1035
00:47:15,510 --> 00:47:12,960
monitor the retreat of dragon out to the

1036
00:47:17,510 --> 00:47:15,520
hold point and now he can stand down for

1037
00:47:20,630 --> 00:47:17,520
monitoring the fly around some wonderful

1038
00:47:24,309 --> 00:47:20,640

words uh from uh mark vande who got to

1039
00:47:26,630 --> 00:47:24,319
spend the entire 197 days that the crew

1040
00:47:29,349 --> 00:47:26,640
two astronauts spent on board the

1041
00:47:31,990 --> 00:47:29,359
international space station uh vanda

1042
00:47:35,270 --> 00:47:32,000
high uh being a crew member that's

1043
00:47:37,589 --> 00:47:35,280
staying on board for almost a year

1044
00:47:40,069 --> 00:47:37,599
as part of the soyuz rotation crew a

1045
00:47:42,309 --> 00:47:40,079
shout out to the crew three astronauts

1046
00:47:45,910 --> 00:47:42,319
who are set to launch just a few days

1047
00:47:47,510 --> 00:47:45,920
from now no earlier than november 10th

1048
00:47:49,349 --> 00:47:47,520
to make their way to the international

1049
00:47:50,390 --> 00:47:49,359
space station it will be mark vandehei's

1050
00:47:52,309 --> 00:47:50,400
job

1051
00:47:54,230 --> 00:47:52,319
to brief them on everything that the

1052
00:47:56,230 --> 00:47:54,240
space station uh everything about the

1053
00:47:57,990 --> 00:47:56,240
space station where things are about

1054
00:47:59,109 --> 00:47:58,000
emergency procedures so he'll do the

1055
00:48:14,390 --> 00:47:59,119
handover

1056
00:48:18,870 --> 00:48:16,630
as we mentioned previously

1057
00:48:21,910 --> 00:48:18,880
we prefer to do direct handovers from

1058
00:48:23,750 --> 00:48:21,920
crew to crew but the weather off of

1059
00:48:26,950 --> 00:48:23,760
space coast and just around florida in

1060
00:48:28,630 --> 00:48:26,960
general has been incredibly tricky the

1061
00:48:32,710 --> 00:48:28,640
last week really

1062
00:48:33,990 --> 00:48:32,720
so the teams at nasa and spacex

1063
00:48:35,750 --> 00:48:34,000

did reviews and jointly made the

1064
00:48:38,710 --> 00:48:35,760
decision that the best thing to do for

1065
00:48:41,910 --> 00:48:38,720
both crew 3 and crew 2 uh would to be

1066
00:48:43,750 --> 00:48:41,920
the crew bring the crew 2 crew home

1067
00:48:45,349 --> 00:48:43,760
before launching crew 3

1068
00:48:47,349 --> 00:48:45,359
purely because of of weather

1069
00:48:49,190 --> 00:48:47,359
restrictions we've been monitoring

1070
00:48:51,349 --> 00:48:49,200
splashdown conditions

1071
00:48:54,230 --> 00:48:51,359
on both sides of florida including wave

1072
00:48:57,190 --> 00:48:54,240
height and wind speed

1073
00:48:58,950 --> 00:48:57,200
and those are really primary

1074
00:49:00,390 --> 00:48:58,960
restrictions on allowing the crew to

1075
00:49:02,630 --> 00:49:00,400
splash down and

1076
00:49:04,630 --> 00:49:02,640
it just happens to be that today uh was

1077
00:49:06,309 --> 00:49:04,640
our best day to attempt that splashdown

1078
00:49:12,870 --> 00:49:06,319
and before undocking we did a weather

1079
00:49:17,829 --> 00:49:15,910
and uh the crew two astronauts will uh

1080
00:49:19,510 --> 00:49:17,839
are undocked today because they did a

1081
00:49:22,069 --> 00:49:19,520
weather brief of the prime landing site

1082
00:49:23,510 --> 00:49:22,079
pensacola and it looks fantastic uh even

1083
00:49:25,990 --> 00:49:23,520
with the trajectory it's about eight and

1084
00:49:27,349 --> 00:49:26,000
a half hours even fitting in this flyer

1085
00:49:29,589 --> 00:49:27,359
around maneuver which they're doing

1086
00:49:32,309 --> 00:49:29,599
right now so we just executed a good

1087
00:49:33,829 --> 00:49:32,319
50-second burn uh the first of four to

1088
00:49:36,230 --> 00:49:33,839

fly around the international space

1089
00:49:38,069 --> 00:49:36,240
station uh we're now in a cruise phase

1090
00:49:39,750 --> 00:49:38,079
between what's called the zenith or the

1091
00:49:41,750 --> 00:49:39,760
space facing side of the international

1092
00:49:43,670 --> 00:49:41,760
space station we're heading to aft

1093
00:49:45,430 --> 00:49:43,680
that's the russian segment of the

1094
00:49:47,030 --> 00:49:45,440
international space station we'll be

1095
00:49:48,630 --> 00:49:47,040
getting some great views the whole way

1096
00:49:51,109 --> 00:49:48,640
we're in an orbital night time so we're

1097
00:49:52,790 --> 00:49:51,119
relying on some of the external uh

1098
00:49:54,790 --> 00:49:52,800
floodlights on the outside of the space

1099
00:49:58,069 --> 00:49:54,800
station to illuminate those views and

1100
00:49:59,910 --> 00:49:58,079
tomatoes has his camera ready uh taking

1101
00:50:01,670 --> 00:49:59,920
some of those surveys we're getting some

1102
00:50:03,670 --> 00:50:01,680
views as we're going in and out of that

1103
00:50:04,390 --> 00:50:03,680
connection from drip between dragon and

1104
00:50:05,670 --> 00:50:04,400
uh

1105
00:50:07,589 --> 00:50:05,680
station but it looks like we have some

1106
00:50:09,750 --> 00:50:07,599
dragon views now you can see

1107
00:50:11,670 --> 00:50:09,760
a lot of particularly the habitable

1108
00:50:12,950 --> 00:50:11,680
volume of the space station is

1109
00:50:15,910 --> 00:50:12,960
illuminated

1110
00:50:17,910 --> 00:50:15,920
we'll be in this position uh for at

1111
00:50:19,910 --> 00:50:17,920
least this one from the

1112
00:50:21,829 --> 00:50:19,920
zenith or the space facing to the after

1113
00:50:24,390 --> 00:50:21,839

the back for about 20 minutes it's about

1114
00:50:27,030 --> 00:50:24,400
a 20 minute transit uh to get to that

1115
00:50:29,109 --> 00:50:27,040
next uh that next point which is

1116
00:50:30,950 --> 00:50:29,119
essentially right on the v bar or the

1117
00:50:32,950 --> 00:50:30,960
velocity bar that's

1118
00:50:34,470 --> 00:50:32,960
directly behind the international space

1119
00:50:36,069 --> 00:50:34,480
station there are no hold points

1120
00:50:38,069 --> 00:50:36,079
throughout this maneuver so right at

1121
00:50:40,390 --> 00:50:38,079
about that time they'll execute another

1122
00:50:42,150 --> 00:50:40,400
50 second burn that will do essentially

1123
00:50:44,309 --> 00:50:42,160
the same thing maneuver from the aft

1124
00:50:46,309 --> 00:50:44,319
section or the back uh to the very

1125
00:50:48,870 --> 00:50:46,319
underside of the international space

1126
00:50:50,549 --> 00:50:48,880
station we did hear mark vande high

1127
00:50:52,710 --> 00:50:50,559
actually mentioned that even though he's

1128
00:50:54,549 --> 00:50:52,720
not in a monitoring phase

1129
00:50:56,630 --> 00:50:54,559
for watching the fly around maneuver

1130
00:50:58,790 --> 00:50:56,640
he's been relieved of those duties uh

1131
00:51:00,150 --> 00:50:58,800
right on the earth-facing side of the

1132
00:51:02,230 --> 00:51:00,160
international space station is a

1133
00:51:05,270 --> 00:51:02,240
seven-bay window called the cupola

1134
00:51:07,670 --> 00:51:05,280
provides fantastic views uh of the earth

1135
00:51:09,589 --> 00:51:07,680
and it's used very frequently for

1136
00:51:10,950 --> 00:51:09,599
capture operations for some of the cargo

1137
00:51:12,950 --> 00:51:10,960
craft that come to and from the

1138
00:51:15,349 --> 00:51:12,960

international space station but it'll

1139
00:51:17,190 --> 00:51:15,359
also provide a very good view of his

1140
00:51:18,710 --> 00:51:17,200
crew mates who will be flying around the

1141
00:51:20,549 --> 00:51:18,720
international space station

1142
00:51:24,309 --> 00:51:20,559
station at that time on the underside or

1143
00:51:25,910 --> 00:51:24,319
on the earth-facing side of uh of the uh

1144
00:51:27,910 --> 00:51:25,920
international space station so we'll

1145
00:51:30,230 --> 00:51:27,920
hopefully get a couple of fantastic

1146
00:51:33,270 --> 00:51:30,240
shots from mark vande uh taking some of

1147
00:51:35,109 --> 00:51:33,280
those photos by about that time when the

1148
00:51:36,710 --> 00:51:35,119
dragon is directly underneath the

1149
00:51:38,870 --> 00:51:36,720
international space station we should

1150
00:51:40,790 --> 00:51:38,880
even be in an orbital sunrise so we

1151
00:51:43,510 --> 00:51:40,800
should get some sunrise photos as well

1152
00:51:45,270 --> 00:51:43,520
yeah a shot that we had a little earlier

1153
00:51:47,829 --> 00:51:45,280
with that nighttime view and all the

1154
00:51:49,829 --> 00:51:47,839
exterior lighting of station something

1155
00:51:51,750 --> 00:51:49,839
about it so black and white kind of

1156
00:51:54,630 --> 00:51:51,760
looks like it could be in a kubrick film

1157
00:51:56,630 --> 00:51:54,640
right yeah yeah

1158
00:52:00,470 --> 00:51:56,640
as we saw before oh right there it is

1159
00:52:03,750 --> 00:52:00,480
actually um it's uh we have some shots

1160
00:52:05,589 --> 00:52:03,760
there inside the crew dragon capsule um

1161
00:52:07,190 --> 00:52:05,599
you could when we get that back you

1162
00:52:09,990 --> 00:52:07,200
might notice that thomas pesquet has

1163
00:52:11,990 --> 00:52:10,000

taken off his spacesuit to allow him to

1164
00:52:13,990 --> 00:52:12,000
have better mobility while taking some

1165
00:52:16,150 --> 00:52:14,000
photos once again this fly around

1166
00:52:18,309 --> 00:52:16,160
maneuver is essentially a photographic

1167
00:52:20,790 --> 00:52:18,319
survey of station

1168
00:52:22,790 --> 00:52:20,800
and this is super helpful because as

1169
00:52:25,349 --> 00:52:22,800
gary mentioned before the last time this

1170
00:52:27,109 --> 00:52:25,359
was performed was 2018 i think you said

1171
00:52:30,069 --> 00:52:27,119
that's right and there have been lots of

1172
00:52:33,190 --> 00:52:30,079
new additions on station since then so

1173
00:52:34,150 --> 00:52:33,200
this is a new capability for crew dragon

1174
00:52:35,510 --> 00:52:34,160
this will be the first time we're

1175
00:52:39,030 --> 00:52:35,520
executing it

1176
00:52:41,750 --> 00:52:39,040
um today and uh yeah so tomorrow pesky

1177
00:52:42,630 --> 00:52:41,760
will be taking photos there in night

1178
00:52:45,190 --> 00:52:42,640
mode

1179
00:52:48,470 --> 00:52:45,200
inside crew dragon it's likely to limit

1180
00:52:49,829 --> 00:52:48,480
the glare from the uh lit cabin inside

1181
00:52:52,470 --> 00:52:49,839
the dragon

1182
00:52:54,390 --> 00:52:52,480
likely reflecting off of the single

1183
00:52:55,990 --> 00:52:54,400
window that tomah pesquet is using to

1184
00:52:57,589 --> 00:52:56,000
take those photographs we're in an

1185
00:52:59,190 --> 00:52:57,599
orbital nighttime right so the only

1186
00:53:01,270 --> 00:52:59,200
thing illuminating the outside of the

1187
00:53:03,670 --> 00:53:01,280
space station is the lights of the space

1188
00:53:06,230 --> 00:53:03,680

station itself so limit those glares and

1189
00:53:08,630 --> 00:53:06,240
get even better photographs uh i cannot

1190
00:53:10,630 --> 00:53:08,640
wait to see these these uh photographs

1191
00:53:12,829 --> 00:53:10,640
that uh tama is taking yeah you can kind

1192
00:53:14,390 --> 00:53:12,839
of think of it as you know imagine if

1193
00:53:16,630 --> 00:53:14,400
you're

1194
00:53:17,990 --> 00:53:16,640
in a car uh and you know somebody's

1195
00:53:19,030 --> 00:53:18,000
driving a car

1196
00:53:21,030 --> 00:53:19,040
in the middle of the night and you're

1197
00:53:23,430 --> 00:53:21,040
sitting in the passenger seat and you

1198
00:53:25,190 --> 00:53:23,440
turn the interior cabin lights on and

1199
00:53:26,870 --> 00:53:25,200
you try to take a picture of something

1200
00:53:28,150 --> 00:53:26,880
scenic outside

1201
00:53:29,829 --> 00:53:28,160
right you're probably not going to be

1202
00:53:31,510 --> 00:53:29,839
able to capture that because the

1203
00:53:33,990 --> 00:53:31,520
interior cabin lights are reflecting off

1204
00:53:35,190 --> 00:53:34,000
of your window so you turn the lights

1205
00:53:36,870 --> 00:53:35,200
off and

1206
00:53:38,549 --> 00:53:36,880
enable

1207
00:53:40,390 --> 00:53:38,559
night mode on your camera and and take

1208
00:53:42,069 --> 00:53:40,400
some pictures

1209
00:53:44,549 --> 00:53:42,079
i bet you they do the same thing during

1210
00:53:47,670 --> 00:53:44,559
crew sleep as well um

1211
00:53:50,230 --> 00:53:47,680
the crew 2 astronauts had about a

1212
00:53:52,470 --> 00:53:50,240
24-hour transit to the international

1213
00:53:54,470 --> 00:53:52,480

space station almost it was it was very

1214
00:53:56,390 --> 00:53:54,480
just shy of 24 hours

1215
00:53:58,549 --> 00:53:56,400
so as part of that was

1216
00:54:01,349 --> 00:53:58,559
an eight-hour sleep period uh so

1217
00:54:03,670 --> 00:54:01,359
everybody found a place inside dragon uh

1218
00:54:05,589 --> 00:54:03,680
either bunking up uh in the seats which

1219
00:54:07,990 --> 00:54:05,599
i think is more common or just finding a

1220
00:54:09,349 --> 00:54:08,000
random spot to strap yourself and float

1221
00:54:11,910 --> 00:54:09,359
uh but they get an eight-hour rest

1222
00:54:13,910 --> 00:54:11,920
period not on this flight because it is

1223
00:54:15,270 --> 00:54:13,920
a very short transit and so we're going

1224
00:54:17,030 --> 00:54:15,280
to be doing this for about an hour and a

1225
00:54:19,190 --> 00:54:17,040
half circling around the international

1226
00:54:20,950 --> 00:54:19,200
space station and then from there uh

1227
00:54:23,510 --> 00:54:20,960
you're really only at about what is it

1228
00:54:25,190 --> 00:54:23,520
six and a half hours maybe six hours

1229
00:54:27,030 --> 00:54:25,200
from the time that you execute that

1230
00:54:29,510 --> 00:54:27,040
first departure burn which is departure

1231
00:54:31,589 --> 00:54:29,520
burn zero to break out of the fly around

1232
00:54:33,349 --> 00:54:31,599
and then make your way uh towards uh

1233
00:54:36,309 --> 00:54:33,359
splashing down off the coast of florida

1234
00:54:38,309 --> 00:54:36,319
yeah so once again uh we have been

1235
00:54:40,390 --> 00:54:38,319
keeping an eye on weather we are

1236
00:54:42,630 --> 00:54:40,400
targeting a splashdown

1237
00:54:44,470 --> 00:54:42,640
off the coast of florida near pensacola

1238
00:54:47,990 --> 00:54:44,480

uh and we're

1239
00:54:50,549 --> 00:54:48,000
targeting that at 7 33 p.m uh pacific

1240
00:54:53,030 --> 00:54:50,559
time this evening so like gary said once

1241
00:54:53,990 --> 00:54:53,040
we complete the uh the fly round

1242
00:54:55,670 --> 00:54:54,000
maneuver

1243
00:54:57,589 --> 00:54:55,680
uh while it will be another six and a

1244
00:54:59,829 --> 00:54:57,599
half hours left big picture that's

1245
00:55:01,349 --> 00:54:59,839
actually a pretty quick trip home

1246
00:55:04,390 --> 00:55:01,359
and i'm sure that

1247
00:55:06,630 --> 00:55:04,400
after the 199 days that they have spent

1248
00:55:09,430 --> 00:55:06,640
in space they're all excited to get home

1249
00:55:10,789 --> 00:55:09,440
and see their families absolutely

1250
00:55:12,470 --> 00:55:10,799
so they're going to be splashing down

1251
00:55:14,390 --> 00:55:12,480
off the coast of florida and there's

1252
00:55:16,789 --> 00:55:14,400
going to be recovery teams there the go

1253
00:55:19,349 --> 00:55:16,799
navigator recovery ship will be

1254
00:55:21,510 --> 00:55:19,359
stationed out in the gulf of mexico uh

1255
00:55:23,430 --> 00:55:21,520
we'll see a lot of that action as we get

1256
00:55:24,950 --> 00:55:23,440
closer to that period about uh eight

1257
00:55:27,030 --> 00:55:24,960
hours maybe a little less than that at

1258
00:55:29,030 --> 00:55:27,040
this point from now until we actually

1259
00:55:31,190 --> 00:55:29,040
splash down off of the coast it's we're

1260
00:55:33,430 --> 00:55:31,200
going to see all the action it'll be a

1261
00:55:35,190 --> 00:55:33,440
nighttime splashdown unfortunately uh

1262
00:55:36,549 --> 00:55:35,200
but we did see a lot of that for crew

1263
00:55:37,349 --> 00:55:36,559

one and we did get some pretty good

1264
00:55:39,589 --> 00:55:37,359
views

1265
00:55:41,670 --> 00:55:39,599
of the fast boats going out and uh

1266
00:55:44,549 --> 00:55:41,680
really readying that capsule inside the

1267
00:55:46,390 --> 00:55:44,559
water uh to be picked up uh by uh the

1268
00:55:48,230 --> 00:55:46,400
a-frame which is on the back of the of

1269
00:55:50,390 --> 00:55:48,240
the go navigator and positioned inside

1270
00:55:52,390 --> 00:55:50,400
the dragon nest uh like you said kate

1271
00:55:53,750 --> 00:55:52,400
from there the crew themselves are going

1272
00:55:55,109 --> 00:55:53,760
to be extracted or they're going to

1273
00:55:57,910 --> 00:55:55,119
egress

1274
00:55:59,990 --> 00:55:57,920
the dragon spacecraft there are some

1275
00:56:01,829 --> 00:56:00,000
medical facilities that are on the boat

1276
00:56:03,829 --> 00:56:01,839
uh but what will likely happen is

1277
00:56:05,510 --> 00:56:03,839
they'll take a helicopter ride out to

1278
00:56:08,309 --> 00:56:05,520
the coast of florida where they'll have

1279
00:56:10,549 --> 00:56:08,319
uh different planes um stations ready to

1280
00:56:12,549 --> 00:56:10,559
take them home uh

1281
00:56:15,030 --> 00:56:12,559
three of the crew members uh shane

1282
00:56:17,190 --> 00:56:15,040
kimbrough megan mcarthur and aki hoshide

1283
00:56:18,870 --> 00:56:17,200
will take a plane out to houston uh will

1284
00:56:20,309 --> 00:56:18,880
they'll go undergo some a series of

1285
00:56:21,670 --> 00:56:20,319
additional medical checks and just make

1286
00:56:22,630 --> 00:56:21,680
sure they're ready to go and they'll be

1287
00:56:28,829 --> 00:56:22,640
they'll have a chance to see their

1288
00:56:33,670 --> 00:56:31,030

europe we're in the middle of a fly

1289
00:56:35,990 --> 00:56:33,680
around period now uh so we should be in

1290
00:56:37,990 --> 00:56:36,000
this period for it's a cruise phase uh

1291
00:56:39,829 --> 00:56:38,000
between the zenith of the space-facing

1292
00:56:41,910 --> 00:56:39,839
side until we get to the aft side we're

1293
00:56:44,549 --> 00:56:41,920
here for about another 10 minutes it's

1294
00:56:46,150 --> 00:56:44,559
about a 20-minute transit from the very

1295
00:56:47,750 --> 00:56:46,160
top or the r bar

1296
00:56:49,349 --> 00:56:47,760
essentially right in line with the top

1297
00:56:50,789 --> 00:56:49,359
of the international space station to

1298
00:56:52,150 --> 00:56:50,799
the aft position

1299
00:56:54,950 --> 00:56:52,160
there's going to be no stops along the

1300
00:56:56,789 --> 00:56:54,960
way it's a it's a very fluid transit

1301
00:56:58,549 --> 00:56:56,799
from each of these different periods but

1302
00:56:59,829 --> 00:56:58,559
once we get to the v bar we're

1303
00:57:01,910 --> 00:56:59,839
essentially right in line with the

1304
00:57:03,270 --> 00:57:01,920
velocity bar of the international space

1305
00:57:04,069 --> 00:57:03,280
station you can see it there it's the

1306
00:57:06,630 --> 00:57:04,079
point

1307
00:57:08,230 --> 00:57:06,640
directly uh to the back or to the aft of

1308
00:57:10,710 --> 00:57:08,240
the international space station right

1309
00:57:11,750 --> 00:57:10,720
there they'll execute another 50 second

1310
00:57:14,069 --> 00:57:11,760
burn

1311
00:57:15,670 --> 00:57:14,079
to enter into another cruise phase

1312
00:57:17,510 --> 00:57:15,680
it limits the prop right they need to

1313
00:57:19,589 --> 00:57:17,520

save a lot of that prop for some of the

1314
00:57:21,910 --> 00:57:19,599
departure burns and you can see two of

1315
00:57:24,309 --> 00:57:21,920
them are a part of this

1316
00:57:25,589 --> 00:57:24,319
fly around to actually break out from it

1317
00:57:27,349 --> 00:57:25,599
but this is essentially where we are

1318
00:57:29,349 --> 00:57:27,359
right now in fact we're about halfway

1319
00:57:30,710 --> 00:57:29,359
through the maneuver this position that

1320
00:57:32,390 --> 00:57:30,720
you're seeing right now in this graphic

1321
00:57:35,109 --> 00:57:32,400
is pretty much where they are about

1322
00:57:37,510 --> 00:57:35,119
halfway between the zenith or the space

1323
00:57:39,430 --> 00:57:37,520
facing most point and the aft or the

1324
00:57:43,430 --> 00:57:39,440
back most point of the international

1325
00:57:48,390 --> 00:57:45,829
and again a 50-second maneuver it's uh

1326
00:57:51,670 --> 00:57:48,400
just to limit prop after these 50-second

1327
00:57:54,950 --> 00:57:51,680
burns they enter into a cruise phase

1328
00:57:57,430 --> 00:57:54,960
so the next maneuver uh will be just

1329
00:57:59,349 --> 00:57:57,440
about another 20 minutes uh maybe a

1330
00:58:02,069 --> 00:57:59,359
little bit more than that 25 minutes to

1331
00:58:04,470 --> 00:58:02,079
get from the aft position to uh the

1332
00:58:05,990 --> 00:58:04,480
nader or the or the bottom position

1333
00:58:08,230 --> 00:58:06,000
right about that time they'll be

1334
00:58:09,589 --> 00:58:08,240
entering into just about this period

1335
00:58:12,069 --> 00:58:09,599
where you see the crew dragon on this

1336
00:58:14,950 --> 00:58:12,079
graphic that will be about where we see

1337
00:58:16,710 --> 00:58:14,960
an orbital sunrise so we'll be able to

1338
00:58:18,390 --> 00:58:16,720

photograph the underside of the space

1339
00:58:19,910 --> 00:58:18,400
station while it's lit and illuminated

1340
00:58:22,230 --> 00:58:19,920
by the sun

1341
00:58:24,230 --> 00:58:22,240
and about that time we should see mark

1342
00:58:25,589 --> 00:58:24,240
vande high will not see mark vande high

1343
00:58:28,710 --> 00:58:25,599
but it's about that time that mark van

1344
00:58:30,710 --> 00:58:28,720
gaal from out inside the space station

1345
00:58:32,470 --> 00:58:30,720
will be taking digital photographs of

1346
00:58:34,390 --> 00:58:32,480
the dragon as the dragon is taking

1347
00:58:36,630 --> 00:58:34,400
photographs of the cupola maybe we may

1348
00:58:38,630 --> 00:58:36,640
even get to see uh tomorrow vasquez take

1349
00:58:42,069 --> 00:58:38,640
a photo of the cupola

1350
00:58:43,750 --> 00:58:42,079
maybe seeing dragon uh um seeing mark

1351
00:58:45,829 --> 00:58:43,760
vanderhei inside

1352
00:58:47,829 --> 00:58:45,839
another 50-second burn right at the

1353
00:58:49,349 --> 00:58:47,839
bottom there at the nader position to

1354
00:58:51,030 --> 00:58:49,359
get over to the forward end of the

1355
00:58:51,990 --> 00:58:51,040
international space station all in the

1356
00:58:53,670 --> 00:58:52,000
daylight

1357
00:58:54,470 --> 00:58:53,680
so we should be getting some great views

1358
00:58:57,990 --> 00:58:54,480
of

1359
00:59:00,230 --> 00:58:58,000
at this point which is the u.s side us

1360
00:59:01,589 --> 00:59:00,240
os side uh we'll be getting to see some

1361
00:59:03,109 --> 00:59:01,599
of the u.s modules some of the

1362
00:59:04,630 --> 00:59:03,119
commercial modules that i was talking

1363
00:59:06,630 --> 00:59:04,640

about as well as the international

1364
00:59:09,670 --> 00:59:06,640
modules right about here uh you'll get

1365
00:59:11,750 --> 00:59:09,680
some great views of uh the nader the

1366
00:59:15,670 --> 00:59:11,760
underside as well as part of the forward

1367
00:59:17,270 --> 00:59:15,680
parts of the japanese module the gem as

1368
00:59:19,510 --> 00:59:17,280
well as the columbus module which is the

1369
00:59:21,589 --> 00:59:19,520
european module each with their own

1370
00:59:23,829 --> 00:59:21,599
respective external facilities the

1371
00:59:25,349 --> 00:59:23,839
japanese exposed facility uh has a lot

1372
00:59:26,870 --> 00:59:25,359
of experiments on the outside and then

1373
00:59:30,150 --> 00:59:26,880
we have the uh

1374
00:59:31,829 --> 00:59:30,160
commercial module bartolomeo a uh esa

1375
00:59:33,990 --> 00:59:31,839
european space agency astronaut an

1376
00:59:35,750 --> 00:59:34,000
airbus uh partnership uh which is

1377
00:59:38,390 --> 00:59:35,760
another external platform does a lot of

1378
00:59:39,829 --> 00:59:38,400
the same things uh external payloads so

1379
00:59:41,030 --> 00:59:39,839
we'll get to see some of those which

1380
00:59:42,630 --> 00:59:41,040
have been installed uh well the

1381
00:59:44,870 --> 00:59:42,640
bartolomeo at least has been installed

1382
00:59:48,830 --> 00:59:44,880
recently endeavor spacex on dragon to

1383
00:59:48,840 --> 00:59:57,430
[Applause]

1384
00:59:57,440 --> 01:00:01,589
go ahead on dragon to ground

1385
01:00:04,950 --> 01:00:03,109
you see on the ground that the cabinet

1386
01:00:07,190 --> 01:00:04,960
temperature has can been increasing

1387
01:00:09,510 --> 01:00:07,200
slightly and is at a little elevated

1388
01:00:10,789 --> 01:00:09,520

level we're wondering how you're feeling

1389
01:00:12,789 --> 01:00:10,799
in the cabin and if you'd like us to

1390
01:00:27,920 --> 01:00:12,799
take any commanding to cool the cabin

1391
01:00:27,930 --> 01:00:38,069
[Applause]

1392
01:00:43,109 --> 01:00:40,390
spacex our temperature is adequate at

1393
01:00:50,470 --> 01:00:43,119
this time

1394
01:00:55,109 --> 01:00:52,230
all right no need to adjust the

1395
01:00:57,750 --> 01:00:55,119
thermostat for the inside of endeavour

1396
01:00:59,829 --> 01:00:57,760
all the crew feeling pretty good um we

1397
01:01:02,069 --> 01:00:59,839
were seeing uh

1398
01:01:04,870 --> 01:01:02,079
commander shane kimbrough and and uh

1399
01:01:06,470 --> 01:01:04,880
pilot megan mcarthur inside uh

1400
01:01:09,109 --> 01:01:06,480
stationed in their same seats they were

1401
01:01:11,990 --> 01:01:09,119
still suited up uh we saw

1402
01:01:13,990 --> 01:01:12,000
pesquet dafter took off his suit

1403
01:01:15,750 --> 01:01:14,000
fairly quickly after undocking and some

1404
01:01:17,190 --> 01:01:15,760
of those uh initial burns the undocking

1405
01:01:19,990 --> 01:01:17,200
burn and the impulsive retreat burn

1406
01:01:21,510 --> 01:01:20,000
because it's his job uh to take photos

1407
01:01:23,349 --> 01:01:21,520
of the outside of the international

1408
01:01:25,270 --> 01:01:23,359
space station i thought i saw aki there

1409
01:01:28,630 --> 01:01:25,280
for for a bit i think with his suits

1410
01:01:31,190 --> 01:01:28,640
still on uh assisting um uh tomah

1411
01:01:33,430 --> 01:01:31,200
pesquet but uh we'll be in this position

1412
01:01:34,870 --> 01:01:33,440
for for quite some time the whole uh fly

1413
01:01:35,829 --> 01:01:34,880

around maneuver takes about an hour and

1414
01:01:37,670 --> 01:01:35,839
a half

1415
01:01:40,470 --> 01:01:37,680
now for those that might be unfamiliar

1416
01:01:42,230 --> 01:01:40,480
with how uh teams in space communicate

1417
01:01:43,910 --> 01:01:42,240
with those on ground

1418
01:01:46,789 --> 01:01:43,920
you have probably noticed by now that

1419
01:01:48,390 --> 01:01:46,799
there is a beep that precedes uh

1420
01:01:49,910 --> 01:01:48,400
communication this is known as the

1421
01:01:51,430 --> 01:01:49,920
quindar tone

1422
01:01:53,829 --> 01:01:51,440
if you've watched pretty much any space

1423
01:01:54,470 --> 01:01:53,839
movie ever you probably might recognize

1424
01:01:58,230 --> 01:01:54,480
it

1425
01:01:59,109 --> 01:01:58,240
but essentially that tone rings and then

1426
01:02:01,910 --> 01:01:59,119
the

1427
01:02:04,630 --> 01:02:01,920
destin so for example if i were calling

1428
01:02:06,950 --> 01:02:04,640
dragon here from spacex i would say

1429
01:02:09,750 --> 01:02:06,960
dragon spacex because i am calling

1430
01:02:12,549 --> 01:02:09,760
dragon and i am calling from spacex so

1431
01:02:16,230 --> 01:02:12,559
you basically identify the destination

1432
01:02:18,230 --> 01:02:16,240
uh first as well as the origin of the

1433
01:02:21,029 --> 01:02:18,240
communication as well

1434
01:02:23,750 --> 01:02:21,039
and then what loop you are calling on so

1435
01:02:25,349 --> 01:02:23,760
it's uh who you want to talk to who who

1436
01:02:27,349 --> 01:02:25,359
is calling who is doing the calling and

1437
01:02:29,990 --> 01:02:27,359
then what loop or you're essentially

1438
01:02:31,910 --> 01:02:30,000

talking on um for a while they were on

1439
01:02:33,670 --> 01:02:31,920
the big loop right so the international

1440
01:02:35,270 --> 01:02:33,680
space station could could hear them as

1441
01:02:37,510 --> 01:02:35,280
well and and you heard that term that's

1442
01:02:39,910 --> 01:02:37,520
where really every team is integrated

1443
01:02:43,430 --> 01:02:39,920
the uh dragon teams here in mission

1444
01:02:44,950 --> 01:02:43,440
control hawthorne the dragon crew uh

1445
01:02:46,230 --> 01:02:44,960
houston mission control which is

1446
01:02:47,829 --> 01:02:46,240
controlling the international space

1447
01:02:50,950 --> 01:02:47,839
station as well as a space station crew

1448
01:02:52,789 --> 01:02:50,960
themselves uh for once we exit outside

1449
01:02:54,549 --> 01:02:52,799
of the approach ellipsoid we will break

1450
01:02:59,750 --> 01:02:54,559
that off and we'll be relying namely on

1451
01:03:03,990 --> 01:03:01,829
so again we're in the uh cruise phase

1452
01:03:06,470 --> 01:03:04,000
between the nader or the space facing

1453
01:03:09,109 --> 01:03:06,480
side and the aft side we should be here

1454
01:03:11,750 --> 01:03:09,119
for another maybe six minutes or so

1455
01:03:13,430 --> 01:03:11,760
until we get to the aft most portion or

1456
01:03:14,549 --> 01:03:13,440
the very back of the international space

1457
01:03:16,549 --> 01:03:14,559
station

1458
01:03:19,109 --> 01:03:16,559
from there we'll do another 50-second

1459
01:03:20,789 --> 01:03:19,119
burn uh to get us from the after that to

1460
01:03:23,109 --> 01:03:20,799
the nader position which is at the very

1461
01:03:25,510 --> 01:03:23,119
bottom uh and right around that time we

1462
01:03:27,190 --> 01:03:25,520
should hopefully be seeing uh views from

1463
01:03:28,710 --> 01:03:27,200

the international space station or from

1464
01:03:30,630 --> 01:03:28,720
the dragon depending on the ground sites

1465
01:03:32,789 --> 01:03:30,640
and our coverage there but we should be

1466
01:03:34,789 --> 01:03:32,799
seeing an orbital sunrise as well yeah

1467
01:03:37,190 --> 01:03:34,799
so there on your screen a view of

1468
01:03:38,390 --> 01:03:37,200
mission control center here at spacex

1469
01:03:41,029 --> 01:03:38,400
hawthorne

1470
01:03:43,510 --> 01:03:41,039
this is where ground teams are

1471
01:03:46,069 --> 01:03:43,520
commanding dragon when necessary

1472
01:03:47,349 --> 01:03:46,079
but for the most part dragon is flying

1473
01:03:50,710 --> 01:03:47,359
itself

1474
01:03:53,589 --> 01:03:50,720
this whole process of undocking and

1475
01:03:56,150 --> 01:03:53,599
deorbiting every this whole journey is

1476
01:03:59,430 --> 01:03:56,160
intended to be autonomous dragon

1477
01:04:02,630 --> 01:03:59,440
essentially driving itself which is um a

1478
01:04:03,910 --> 01:04:02,640
super important capability

1479
01:04:05,829 --> 01:04:03,920
now you're seeing the commander and the

1480
01:04:07,589 --> 01:04:05,839
pilot when we do get those views shane

1481
01:04:09,829 --> 01:04:07,599
kimbrough as commander megan mcarthur as

1482
01:04:11,510 --> 01:04:09,839
pilot they're still in their um in their

1483
01:04:13,589 --> 01:04:11,520
designated positions the commander in

1484
01:04:15,109 --> 01:04:13,599
pilot seats and they are monitoring

1485
01:04:17,510 --> 01:04:15,119
every step of the way right even though

1486
01:04:19,990 --> 01:04:17,520
dragon is completely controlling itself

1487
01:04:21,270 --> 01:04:20,000
they have views of the dragon eye camera

1488
01:04:22,470 --> 01:04:21,280

which is looking down at the space

1489
01:04:23,829 --> 01:04:22,480
station you can see that on the

1490
01:04:25,670 --> 01:04:23,839
commander's side

1491
01:04:27,029 --> 01:04:25,680
they have views of the trajectories the

1492
01:04:28,549 --> 01:04:27,039
views of the earth they're looking at

1493
01:04:29,910 --> 01:04:28,559
all the thrusters they are checking

1494
01:04:32,150 --> 01:04:29,920
every step of the way to make sure that

1495
01:04:33,589 --> 01:04:32,160
the dragon is healthy uh but they also

1496
01:04:35,910 --> 01:04:33,599
have of course the teams here in mission

1497
01:04:37,349 --> 01:04:35,920
control hawthorne uh doing the same even

1498
01:04:39,270 --> 01:04:37,359
monitoring their cabin temperature

1499
01:04:43,430 --> 01:04:39,280
making sure they're at a they're very

1500
01:04:46,230 --> 01:04:45,510
yeah they still have a few hours left to

1501
01:04:48,710 --> 01:04:46,240
go

1502
01:04:50,630 --> 01:04:48,720
i can imagine that working at the sweat

1503
01:04:53,589 --> 01:04:50,640
at this point probably not the most

1504
01:04:59,109 --> 01:04:56,230
as we saw earlier tuma has actually

1505
01:05:01,270 --> 01:04:59,119
taken off his suit in order to perform

1506
01:05:03,270 --> 01:05:01,280
the photographic survey during this

1507
01:05:05,910 --> 01:05:03,280
fly-around maneuver

1508
01:05:08,710 --> 01:05:05,920
we did see aki

1509
01:05:10,630 --> 01:05:08,720
off to the side still in his suit and

1510
01:05:12,789 --> 01:05:10,640
like gary just said

1511
01:05:14,950 --> 01:05:12,799
both megan and

1512
01:05:18,710 --> 01:05:14,960
shane are still in their suits as well

1513
01:05:22,309 --> 01:05:19,990

and they'll be in this position for

1514
01:05:24,470 --> 01:05:22,319
quite some time um so again they're

1515
01:05:26,549 --> 01:05:24,480
they're going to uh just remain uh

1516
01:05:29,109 --> 01:05:26,559
really in a monitoring position and and

1517
01:05:30,470 --> 01:05:29,119
with tomoposque with the handheld camera

1518
01:05:31,990 --> 01:05:30,480
so we'll continue to provide the

1519
01:05:34,150 --> 01:05:32,000
coverage of that in fact we're going to

1520
01:05:36,069 --> 01:05:34,160
keep provide continuous coverage of the

1521
01:05:37,029 --> 01:05:36,079
journey home we'll be here for quite

1522
01:05:39,029 --> 01:05:37,039
some time

1523
01:05:41,349 --> 01:05:39,039
as we break out from the keep out sphere

1524
01:05:43,829 --> 01:05:41,359
and the approach ellipsoid and start

1525
01:05:46,069 --> 01:05:43,839
making some of those uh calculated burns

1526
01:05:48,789 --> 01:05:46,079
there are four burns to bring us home

1527
01:05:51,190 --> 01:05:48,799
first two happened pretty shortly after

1528
01:05:53,670 --> 01:05:51,200
the fly around maneuver there's no

1529
01:05:55,430 --> 01:05:53,680
holding it's just the fly around happens

1530
01:05:57,430 --> 01:05:55,440
around the space station and then if

1531
01:06:00,069 --> 01:05:57,440
they get the go they'll execute the

1532
01:06:02,230 --> 01:06:00,079
depart burn zero uh you can see here's

1533
01:06:03,910 --> 01:06:02,240
the entire maneuver from uh and this is

1534
01:06:07,109 --> 01:06:03,920
where we are right now after the 50

1535
01:06:09,510 --> 01:06:07,119
second burn the first quadrant of the uh

1536
01:06:12,230 --> 01:06:09,520
of the fly around going from the zenith

1537
01:06:14,069 --> 01:06:12,240
or the space facing to the aft most part

1538
01:06:17,029 --> 01:06:14,079

well each of these different points that

1539
01:06:19,589 --> 01:06:17,039
you see fly around fly around burns two

1540
01:06:21,750 --> 01:06:19,599
three and four will be 50 second burns

1541
01:06:23,190 --> 01:06:21,760
it's the same maneuver for each of these

1542
01:06:24,870 --> 01:06:23,200
different sections with the dragon

1543
01:06:26,870 --> 01:06:24,880
pointing towards the international space

1544
01:06:28,549 --> 01:06:26,880
station every step of the way

1545
01:06:30,470 --> 01:06:28,559
we should be getting the same dragon eye

1546
01:06:32,150 --> 01:06:30,480
camera views whenever we can we'll be

1547
01:06:34,069 --> 01:06:32,160
getting the external camera views from

1548
01:06:35,029 --> 01:06:34,079
the space station looking out at dragons

1549
01:06:37,670 --> 01:06:35,039
so we should get some pretty good

1550
01:06:52,390 --> 01:06:37,680
coverage spacex on the big loop the aft

1551
01:06:57,910 --> 01:06:54,630
and with the aft waypoint reached it

1552
01:06:59,990 --> 01:06:57,920
means we are in that burn so the the uh

1553
01:07:02,230 --> 01:07:00,000
burn the 50 second burn to get from the

1554
01:07:04,630 --> 01:07:02,240
atmos position to the nadir most

1555
01:07:20,950 --> 01:07:04,640
position so you see on this graphic fly

1556
01:07:25,670 --> 01:07:23,190
so if you've just joined us uh crew

1557
01:07:29,589 --> 01:07:25,680
dragon endeavor has departed the space

1558
01:07:32,390 --> 01:07:29,599
station uh with an untimed undocking uh

1559
01:07:34,710 --> 01:07:32,400
excuse me yeah undocking separation at

1560
01:07:37,829 --> 01:07:34,720
1105 am pacific

1561
01:07:40,309 --> 01:07:37,839
they have now moved away from station

1562
01:07:42,150 --> 01:07:40,319
and have begun the fly-around maneuver

1563
01:07:45,589 --> 01:07:42,160

which is essentially a photographic

1564
01:07:50,470 --> 01:07:47,589
and we did a confirmation that the full

1565
01:07:52,789 --> 01:07:50,480
50 second burn uh the

1566
01:07:54,230 --> 01:07:52,799
second of four burns has been completed

1567
01:07:56,470 --> 01:07:54,240
we have a good uh

1568
01:07:58,470 --> 01:07:56,480
fly around burn two or uh what's called

1569
01:08:00,230 --> 01:07:58,480
the aftonator burn so now we're in a

1570
01:08:02,870 --> 01:08:00,240
cruise phase uh and this cruise phase

1571
01:08:04,870 --> 01:08:02,880
will take place for about 25 minutes uh

1572
01:08:08,630 --> 01:08:04,880
we'll be cruising from the very back of

1573
01:08:10,870 --> 01:08:08,640
the station to the uh nader most point

1574
01:08:12,230 --> 01:08:10,880
uh we should be getting a sunrise here

1575
01:08:15,029 --> 01:08:12,240
soon as well

1576
01:08:16,789 --> 01:08:15,039
uh in about 11 minutes we should be

1577
01:08:18,229 --> 01:08:16,799
getting a sunrise so about halfway

1578
01:08:19,110 --> 01:08:18,239
through right about the position where

1579
01:08:21,269 --> 01:08:19,120
you see

1580
01:08:22,870 --> 01:08:21,279
uh the dragon in this graphic about

1581
01:08:24,390 --> 01:08:22,880
halfway between the atmos and the

1582
01:08:26,470 --> 01:08:24,400
nadermost point

1583
01:08:29,110 --> 01:08:26,480
will be about when we start seeing the

1584
01:08:31,030 --> 01:08:29,120
sun rise and start to illuminate

1585
01:08:33,430 --> 01:08:31,040
the underside of the international space

1586
01:08:35,189 --> 01:08:33,440
station so tomate should be getting some

1587
01:08:44,149 --> 01:08:35,199
fantastic shots

1588
01:08:50,070 --> 01:08:46,950

as we've mentioned before the blackout

1589
01:08:50,950 --> 01:08:50,080
on the video feed is expected

1590
01:08:52,309 --> 01:08:50,960
we

1591
01:08:54,229 --> 01:08:52,319
knew that this was going to happen a

1592
01:08:55,510 --> 01:08:54,239
number of times throughout the fly

1593
01:08:58,070 --> 01:08:55,520
around

1594
01:08:59,030 --> 01:08:58,080
partially due to ground station coverage

1595
01:09:01,110 --> 01:08:59,040
and

1596
01:09:02,229 --> 01:09:01,120
when we get those views back we will

1597
01:09:03,829 --> 01:09:02,239
bring them

1598
01:09:04,950 --> 01:09:03,839
back to you as soon as we have them as

1599
01:09:07,430 --> 01:09:04,960
well

1600
01:09:09,430 --> 01:09:07,440
but unfortunately um right now we don't

1601
01:09:12,870 --> 01:09:09,440
have those views inside dragon or of

1602
01:09:17,829 --> 01:09:14,630
now we should be getting some from

1603
01:09:19,510 --> 01:09:17,839
station hopefully soon uh where uh

1604
01:09:21,430 --> 01:09:19,520
and as well as the dragon you've been

1605
01:09:23,590 --> 01:09:21,440
seeing them very very sporadic through

1606
01:09:25,990 --> 01:09:23,600
this maneuver which is anticipated there

1607
01:09:27,910 --> 01:09:26,000
are some handovers it's a very long

1608
01:09:29,110 --> 01:09:27,920
maneuver about an hour and a half to get

1609
01:09:30,550 --> 01:09:29,120
from the

1610
01:09:32,630 --> 01:09:30,560
very top of the station and make

1611
01:09:34,149 --> 01:09:32,640
essentially what is a full loop

1612
01:09:36,309 --> 01:09:34,159
it's a whole hour and a half so through

1613
01:09:38,950 --> 01:09:36,319

that time we'll be i'll make essentially

1614
01:09:42,470 --> 01:09:38,960
what is a full orbit of the earth uh we

1615
01:09:45,030 --> 01:09:42,480
will uh we un let me see we undocked uh

1616
01:09:47,990 --> 01:09:45,040
right over the south pacific ocean i

1617
01:09:49,669 --> 01:09:48,000
believe um so and then right around the

1618
01:09:52,390 --> 01:09:49,679
time that the fly around maneuver was

1619
01:09:54,390 --> 01:09:52,400
executed we were over the south atlantic

1620
01:09:56,070 --> 01:09:54,400
um so right about that time we should be

1621
01:09:57,830 --> 01:09:56,080
somewhere over the south atlantic uh

1622
01:10:00,870 --> 01:09:57,840
right around the time the fly around is

1623
01:10:02,790 --> 01:10:00,880
uh is uh complete

1624
01:10:04,630 --> 01:10:02,800
but in the meantime uh let's learn a

1625
01:10:06,550 --> 01:10:04,640
little bit about the crew on board

1626
01:10:09,430 --> 01:10:06,560
starting with our commander shane

1627
01:10:12,390 --> 01:10:09,440
kimbrough uh he is the commander of crew

1628
01:10:14,709 --> 01:10:12,400
dragon spacecraft and the crew 2 mission

1629
01:10:17,189 --> 01:10:14,719
kimbrough is responsible for all phases

1630
01:10:20,070 --> 01:10:17,199
of flight from launch to re-entry

1631
01:10:22,390 --> 01:10:20,080
selected as a nasa astronaut in 2004

1632
01:10:24,390 --> 01:10:22,400
kimberle first launched aboard space

1633
01:10:26,030 --> 01:10:24,400
shuttle endeavour for a visit to the

1634
01:10:29,750 --> 01:10:26,040
station on the

1635
01:10:32,870 --> 01:10:29,760
sts-126 mission in 2008 and then aboard

1636
01:10:34,950 --> 01:10:32,880
a russian soyuz spacecraft for his first

1637
01:10:38,149 --> 01:10:34,960
long-duration mission for expedition

1638
01:10:41,270 --> 01:10:38,159

4950 in 2016.

1639
01:10:44,630 --> 01:10:41,280
after 199 days in space during

1640
01:10:48,310 --> 01:10:44,640
expedition 65 and 66 he has spent a

1641
01:10:50,950 --> 01:10:48,320
total of 388 career days in space the

1642
01:10:53,590 --> 01:10:50,960
fourth highest for any u.s astronaut and

1643
01:10:55,910 --> 01:10:53,600
performed nine career spacewalks

1644
01:10:57,990 --> 01:10:55,920
kimbrough is also a retired u.s army

1645
01:11:00,229 --> 01:10:58,000
colonel and earned a bachelor's degree

1646
01:11:02,470 --> 01:11:00,239
in aerospace engineering from the united

1647
01:11:04,790 --> 01:11:02,480
states military academy at west point

1648
01:11:06,709 --> 01:11:04,800
new york and a master's degree in

1649
01:11:10,310 --> 01:11:06,719
operations research from the georgia

1650
01:11:12,709 --> 01:11:10,320
institute of technology in atlanta

1651
01:11:14,790 --> 01:11:12,719
megan macarthur is the pilot of crew

1652
01:11:17,189 --> 01:11:14,800
dragon spacecraft and she's the second

1653
01:11:19,270 --> 01:11:17,199
in command for the mission macarthur is

1654
01:11:22,870 --> 01:11:19,280
responsible for spacecraft systems and

1655
01:11:24,709 --> 01:11:22,880
performance expedition 65 and 66 was her

1656
01:11:26,470 --> 01:11:24,719
very first trip to the international

1657
01:11:29,189 --> 01:11:26,480
space station she was selected as an

1658
01:11:31,189 --> 01:11:29,199
astronaut in 2000 and macarthur launched

1659
01:11:34,149 --> 01:11:31,199
on the space shuttle atlantis as a

1660
01:11:35,910 --> 01:11:34,159
mission specialist on sts-125 which was

1661
01:11:37,430 --> 01:11:35,920
the final hubble space telescope

1662
01:11:38,950 --> 01:11:37,440
servicing mission

1663
01:11:40,870 --> 01:11:38,960

in 2009.

1664
01:11:43,110 --> 01:11:40,880
macarthur operated the shuttle's robotic

1665
01:11:44,950 --> 01:11:43,120
arm over the course of the 12 days 21

1666
01:11:46,870 --> 01:11:44,960
hours that she spent in space on shuttle

1667
01:11:49,030 --> 01:11:46,880
capturing the telescope and moving the

1668
01:11:51,590 --> 01:11:49,040
crew members during the five space walks

1669
01:11:53,990 --> 01:11:51,600
needed to repair and upgrade the

1670
01:11:55,350 --> 01:11:54,000
telescope she holds a bachelor's degree

1671
01:11:57,669 --> 01:11:55,360
in aerospace engineering from the

1672
01:11:59,830 --> 01:11:57,679
university of california los angeles and

1673
01:12:02,310 --> 01:11:59,840
a doctorate in oceanography from the

1674
01:12:07,590 --> 01:12:02,320
university of california san diego she

1675
01:12:10,470 --> 01:12:07,600
now has a career of 212 days in space

1676
01:12:12,070 --> 01:12:10,480
akihiko hoshide is a mission specialist

1677
01:12:14,630 --> 01:12:12,080
for crew 2.

1678
01:12:16,790 --> 01:12:14,640
as a mission specialist he works closely

1679
01:12:18,790 --> 01:12:16,800
with the commander and pilot to monitor

1680
01:12:21,030 --> 01:12:18,800
the spacecraft during dynamic launch and

1681
01:12:23,270 --> 01:12:21,040
reentry phases of flight

1682
01:12:25,830 --> 01:12:23,280
hoshide joined the national space

1683
01:12:28,709 --> 01:12:25,840
development agency of japan

1684
01:12:31,590 --> 01:12:28,719
nazda which is currently jaxa

1685
01:12:34,229 --> 01:12:31,600
in 1992 and was selected as an astronaut

1686
01:12:36,229 --> 01:12:34,239
candidate in february 1999.

1687
01:12:40,310 --> 01:12:36,239
hoshide is a veteran of two space

1688
01:12:42,310 --> 01:12:40,320

flights in addition to expedition 6566

1689
01:12:44,110 --> 01:12:42,320
in june 2008 he flew to the

1690
01:12:47,030 --> 01:12:44,120
international space station on the

1691
01:12:49,990 --> 01:12:47,040
sts-124 mission to deliver the japanese

1692
01:12:52,550 --> 01:12:50,000
experiment module kibo to the station

1693
01:12:55,270 --> 01:12:52,560
from july to november 2012 he stayed on

1694
01:12:58,550 --> 01:12:55,280
the space station for 124 days as a

1695
01:12:59,430 --> 01:12:58,560
flight engineer for the expedition 3233

1696
01:13:01,430 --> 01:12:59,440
mission

1697
01:13:04,070 --> 01:13:01,440
the crew dragon will be the third

1698
01:13:05,910 --> 01:13:04,080
spacecraft that he has flown to the

1699
01:13:08,310 --> 01:13:05,920
orbiting laboratory

1700
01:13:11,189 --> 01:13:08,320
he commanded the station for expedition

1701
01:13:13,910 --> 01:13:11,199
65 and performed one spacewalk bringing

1702
01:13:17,590 --> 01:13:13,920
his career total to four

1703
01:13:20,390 --> 01:13:17,600
he spent a total of 340 days in space on

1704
01:13:23,870 --> 01:13:20,400
his three flights eight days short of

1705
01:13:26,709 --> 01:13:23,880
koichi wakata's record-setting mark of

1706
01:13:27,910 --> 01:13:26,719
348 days in space by a japanese

1707
01:13:30,390 --> 01:13:27,920
astronaut

1708
01:13:32,550 --> 01:13:30,400
tamafesque is also a mission specialist

1709
01:13:34,709 --> 01:13:32,560
for crew 2 working with the commander

1710
01:13:36,709 --> 01:13:34,719
and pilot to monitor the spacecraft

1711
01:13:39,430 --> 01:13:36,719
during the dynamic launch and re-entry

1712
01:13:41,750 --> 01:13:39,440
phases of flight he was selected as an

1713
01:13:44,470 --> 01:13:41,760

astronaut candidate by issa in may of

1714
01:13:46,070 --> 01:13:44,480
2009 and worked as a eurocom

1715
01:13:48,149 --> 01:13:46,080
communicating with astronauts during

1716
01:13:50,550 --> 01:13:48,159
space flights from the mission control

1717
01:13:53,510 --> 01:13:50,560
center he previously flew as part of

1718
01:13:56,390 --> 01:13:53,520
expeditions 50 and 51 launching aboard a

1719
01:13:59,189 --> 01:13:56,400
russian soyuz spacecraft in october 2016

1720
01:14:01,830 --> 01:13:59,199
and he spent 196 days in space returning

1721
01:14:04,550 --> 01:14:01,840
to earth in june of 2017.

1722
01:14:06,470 --> 01:14:04,560
his mission also included two spacewalks

1723
01:14:08,870 --> 01:14:06,480
to maintain the station one to replace

1724
01:14:11,189 --> 01:14:08,880
batteries on an electrical channel and

1725
01:14:13,189 --> 01:14:11,199
one to detect a cooling link and service

1726
01:14:15,030 --> 01:14:13,199
the robotic arm he performed an

1727
01:14:18,070 --> 01:14:15,040
additional four spacewalks for

1728
01:14:19,990 --> 01:14:18,080
expeditions 65 and 66 to outfit station

1729
01:14:22,470 --> 01:14:20,000
with new solar arrays bringing his

1730
01:14:24,070 --> 01:14:22,480
career total spacewalk to six he

1731
01:14:27,790 --> 01:14:24,080
commanded the station for a part of

1732
01:14:30,950 --> 01:14:27,800
expedition 66 and has a career total of

1733
01:14:33,430 --> 01:14:30,960
395 days in space the most amount of

1734
01:14:38,870 --> 01:14:33,440
time in space by any european space

1735
01:14:44,790 --> 01:14:40,830
so if you've just joined sorry go

1736
01:14:47,270 --> 01:14:44,800
ahead uh so we are now in uh still in a

1737
01:14:50,390 --> 01:14:47,280
fly around position uh we just passed

1738
01:14:53,110 --> 01:14:50,400

the first quadrant of four uh uh

1739
01:14:54,550 --> 01:14:53,120
detailing and surveying the first uh uh

1740
01:14:56,310 --> 01:14:54,560
i guess quarter

1741
01:14:58,310 --> 01:14:56,320
of the maneuver which is the

1742
01:15:00,950 --> 01:14:58,320
space-facing side to the aft most

1743
01:15:03,830 --> 01:15:00,960
portion uh that covers a lot of the very

1744
01:15:06,149 --> 01:15:03,840
top as well as the russian segment we

1745
01:15:08,630 --> 01:15:06,159
are now uh essentially underneath the

1746
01:15:10,550 --> 01:15:08,640
space station and now with the external

1747
01:15:12,630 --> 01:15:10,560
views of the space station cameras

1748
01:15:14,870 --> 01:15:12,640
themselves getting views of the crew

1749
01:15:17,350 --> 01:15:14,880
dragon as we are still in an orbital

1750
01:15:19,430 --> 01:15:17,360
night time seeing the navigation lights

1751
01:15:23,510 --> 01:15:19,440
as well as the little tiny hole in the

1752
01:15:25,510 --> 01:15:23,520
middle where um tamar pesquet is with a

1753
01:15:27,510 --> 01:15:25,520
digital camera surveying the

1754
01:15:29,030 --> 01:15:27,520
international space station and we

1755
01:15:30,390 --> 01:15:29,040
should be seeing sunrise soon so

1756
01:15:31,910 --> 01:15:30,400
hopefully we'll be getting some more

1757
01:15:33,830 --> 01:15:31,920
illuminated views of dragon as it

1758
01:15:37,270 --> 01:15:33,840
continues this maneuver

1759
01:15:40,149 --> 01:15:37,280
yeah so that small light that we saw

1760
01:15:41,990 --> 01:15:40,159
is actually a small window located on

1761
01:15:44,070 --> 01:15:42,000
the forward hatch

1762
01:15:46,550 --> 01:15:44,080
and like gary said that is the window

1763
01:15:48,790 --> 01:15:46,560

that tomah is utilizing in order to take

1764
01:15:50,550 --> 01:15:48,800
the photographs uh for this survey of

1765
01:15:53,270 --> 01:15:50,560
the station spacex we see the onboard

1766
01:15:54,950 --> 01:15:53,280
alert for dragonite no crew response at

1767
01:16:03,510 --> 01:15:54,960
this time we are still in the cruise

1768
01:16:08,070 --> 01:16:05,270
so as i was saying that's essentially a

1769
01:16:11,270 --> 01:16:08,080
shot of the top of dragon

1770
01:16:13,830 --> 01:16:11,280
and that small window is uh what the

1771
01:16:16,149 --> 01:16:13,840
crew is using in order to perform this

1772
01:16:18,950 --> 01:16:16,159
photographic survey um that we're doing

1773
01:16:21,350 --> 01:16:18,960
today on the fly around maneuver

1774
01:16:23,430 --> 01:16:21,360
that's right we got 15 minutes just

1775
01:16:26,870 --> 01:16:23,440
about of this uh

1776
01:16:29,189 --> 01:16:26,880
quadrant of the fly around maneuver uh

1777
01:16:31,590 --> 01:16:29,199
in about three or four minutes we should

1778
01:16:34,630 --> 01:16:31,600
be seeing an orbital sunrise so

1779
01:16:36,070 --> 01:16:34,640
we'll see the views of the dragon get a

1780
01:16:38,790 --> 01:16:36,080
little bit uh

1781
01:16:40,709 --> 01:16:38,800
brighter and of course from the inside

1782
01:16:42,070 --> 01:16:40,719
of dragon the international space

1783
01:16:43,910 --> 01:16:42,080
station will get a little brighter as

1784
01:16:44,709 --> 01:16:43,920
well making those photographs all the

1785
01:16:47,030 --> 01:16:44,719
more

1786
01:16:49,270 --> 01:16:47,040
useful for awareness dragon eye one time

1787
01:16:50,950 --> 01:16:49,280
of flight has reconverged but we will

1788
01:17:00,149 --> 01:16:50,960

leave it on the board in case it loses

1789
01:17:03,910 --> 01:17:01,750
they're just watching that dragon eyes

1790
01:17:06,790 --> 01:17:03,920
the forward most camera so so right from

1791
01:17:08,470 --> 01:17:06,800
that little hatch window is where uh

1792
01:17:11,350 --> 01:17:08,480
tomorrow pesky is taking the digital

1793
01:17:13,030 --> 01:17:11,360
photograph but also on that same side is

1794
01:17:15,510 --> 01:17:13,040
uh navigation guidance navigation

1795
01:17:19,270 --> 01:17:15,520
equipment called the dragon eye which um

1796
01:17:21,669 --> 01:17:19,280
provides a detailed survey or a detailed

1797
01:17:22,790 --> 01:17:21,679
look and guidance navigation guidance of

1798
01:17:24,950 --> 01:17:22,800
the uh

1799
01:17:28,310 --> 01:17:24,960
international space station and really

1800
01:17:30,870 --> 01:17:28,320
helps with this uh maneuver relying on

1801
01:17:33,189 --> 01:17:30,880
essentially watching the space station

1802
01:17:36,070 --> 01:17:33,199
making sure that it is in the predicted

1803
01:17:37,750 --> 01:17:36,080
uh uh orientation the predicted state as

1804
01:17:40,149 --> 01:17:37,760
it makes its way through this fly around

1805
01:17:43,030 --> 01:17:40,159
maneuver yeah and as we mentioned before

1806
01:17:45,430 --> 01:17:43,040
the fly around is basically a

1807
01:17:47,750 --> 01:17:45,440
photographic survey of the station

1808
01:17:49,270 --> 01:17:47,760
with all of the recent additions to

1809
01:17:52,550 --> 01:17:49,280
station

1810
01:17:55,030 --> 01:17:52,560
there are areas that the onboard cameras

1811
01:17:56,790 --> 01:17:55,040
are unable to photograph and the last

1812
01:18:00,390 --> 01:17:56,800
fly around maneuver was performed in

1813
01:18:03,189 --> 01:18:00,400

2018 by soyuz so this is the first time

1814
01:18:06,630 --> 01:18:03,199
that we are executing the fly around

1815
01:18:09,350 --> 01:18:06,640
with the crew dragon and tomah pesquet

1816
01:18:11,110 --> 01:18:09,360
is the designated photographer floating

1817
01:18:14,390 --> 01:18:11,120
about in the cabin

1818
01:18:16,390 --> 01:18:14,400
in any orientation he needs in order to

1819
01:18:18,550 --> 01:18:16,400
get the photographs required in order to

1820
01:18:20,470 --> 01:18:18,560
complete the survey

1821
01:18:22,790 --> 01:18:20,480
now you see when we get those views from

1822
01:18:24,709 --> 01:18:22,800
inside the dragon we're seeing

1823
01:18:26,870 --> 01:18:24,719
that the commander and pilot are still

1824
01:18:29,030 --> 01:18:26,880
in place they're still suited up they're

1825
01:18:30,310 --> 01:18:29,040
not pressurized there's no need to in

1826
01:18:31,030 --> 01:18:30,320
fact

1827
01:18:32,870 --> 01:18:31,040
for

1828
01:18:35,030 --> 01:18:32,880
nominal departure from the international

1829
01:18:36,950 --> 01:18:35,040
space station at this point all the crew

1830
01:18:38,390 --> 01:18:36,960
will have doffed their suits

1831
01:18:39,990 --> 01:18:38,400
but because we're inside the keep out

1832
01:18:41,270 --> 01:18:40,000
sphere and the commander and pilot are

1833
01:18:42,550 --> 01:18:41,280
in the monitoring phase they're just

1834
01:18:44,390 --> 01:18:42,560
going to hang tight for at least an hour

1835
01:18:45,669 --> 01:18:44,400
and a half and just uh take a look at

1836
01:18:47,669 --> 01:18:45,679
all the different views they're watching

1837
01:18:49,189 --> 01:18:47,679
the dragon eye they're watching the uh

1838
01:18:51,189 --> 01:18:49,199

dragons orientation they're watching the

1839
01:18:52,870 --> 01:18:51,199
thrusters making sure that the vehicle

1840
01:18:55,669 --> 01:18:52,880
that they're flying right now or rather

1841
01:18:57,189 --> 01:18:55,679
that is flying them uh is in a tip-top

1842
01:18:59,270 --> 01:18:57,199
shape as they make their way through the

1843
01:19:01,110 --> 01:18:59,280
uh through the maneuver after the hour

1844
01:19:04,149 --> 01:19:01,120
and a half fly around is done and they

1845
01:19:06,149 --> 01:19:04,159
perform the two d uh depart burns to

1846
01:19:07,990 --> 01:19:06,159
break out of the keep out sphere and the

1847
01:19:10,310 --> 01:19:08,000
approach ellipsoid at that time they'll

1848
01:19:12,149 --> 01:19:10,320
be able to doff or take off their suits

1849
01:19:13,830 --> 01:19:12,159
for a couple of hours

1850
01:19:15,430 --> 01:19:13,840
and they'll they'll make sure that

1851
01:19:17,189 --> 01:19:15,440
they're dry

1852
01:19:19,350 --> 01:19:17,199
and they'll put them in a temporary

1853
01:19:21,110 --> 01:19:19,360
stowed position before they have to put

1854
01:19:22,550 --> 01:19:21,120
them right back on again

1855
01:19:24,310 --> 01:19:22,560
because they have to get ready right

1856
01:19:26,310 --> 01:19:24,320
before the trunk separation and claw

1857
01:19:27,669 --> 01:19:26,320
separation put them right back on

1858
01:19:29,669 --> 01:19:27,679
because there's a

1859
01:19:31,990 --> 01:19:29,679
very uh fast sequence of events that's

1860
01:19:33,830 --> 01:19:32,000
going to happen um you're starting to

1861
01:19:35,189 --> 01:19:33,840
see views of the dragon now and in the

1862
01:19:37,430 --> 01:19:35,199
back as the trunk the trunk will

1863
01:19:40,070 --> 01:19:37,440

separate and then orient it for uh

1864
01:19:41,030 --> 01:19:40,080
re-entry and that very dynamic phase of

1865
01:19:49,510 --> 01:19:41,040
flight

1866
01:19:53,910 --> 01:19:51,669
sunrise in orbit we are seeing the uh

1867
01:19:56,149 --> 01:19:53,920
dragon capsule being illuminated by the

1868
01:19:58,149 --> 01:19:56,159
first glimpses of sunlight uh and we

1869
01:19:59,590 --> 01:19:58,159
should be able to see uh when we do get

1870
01:20:02,830 --> 01:19:59,600
those views from dragon looking down at

1871
01:20:05,669 --> 01:20:02,840
the international space station uh the

1872
01:20:07,430 --> 01:20:05,679
uh station itself being illuminated by

1873
01:20:09,510 --> 01:20:07,440
that light

1874
01:20:10,390 --> 01:20:09,520
this is a great view of the forward

1875
01:20:12,550 --> 01:20:10,400
hatch

1876
01:20:15,030 --> 01:20:12,560
of course the nose cone is configured

1877
01:20:17,910 --> 01:20:15,040
into the open position as we can see

1878
01:20:19,750 --> 01:20:17,920
but we can also see the four draco

1879
01:20:21,350 --> 01:20:19,760
thrusters located there

1880
01:20:22,470 --> 01:20:21,360
on the forward hatch these are what are

1881
01:20:25,030 --> 01:20:22,480
utilized

1882
01:20:27,270 --> 01:20:25,040
in order to move dragon away from

1883
01:20:28,629 --> 01:20:27,280
station those are the four larger

1884
01:20:30,790 --> 01:20:28,639
circles

1885
01:20:35,430 --> 01:20:30,800
in a rectangular shape there around the

1886
01:20:39,189 --> 01:20:36,950
this forward bulkhead dracos will

1887
01:20:41,830 --> 01:20:39,199
perform some of the more important

1888
01:20:45,189 --> 01:20:41,840

deorbit uh maneuvers or departing and

1889
01:20:47,110 --> 01:20:45,199
deorbit maneuvers uh namely the deorbit

1890
01:20:49,430 --> 01:20:47,120
burn which is a 16 and a half minute

1891
01:20:51,270 --> 01:20:49,440
burn very very essential

1892
01:20:53,270 --> 01:20:51,280
that those forward bulkhead dracos

1893
01:20:56,149 --> 01:20:53,280
execute that maneuver it commits them to

1894
01:20:58,229 --> 01:20:56,159
re-entering the earth's atmosphere

1895
01:21:01,110 --> 01:20:58,239
aiming for what is the prime location

1896
01:21:03,750 --> 01:21:01,120
now of pensacola florida very shortly

1897
01:21:05,189 --> 01:21:03,760
after that 16 and a half minute burn it

1898
01:21:07,430 --> 01:21:05,199
will only take a couple of minutes for

1899
01:21:09,189 --> 01:21:07,440
the nose cone which you're seeing uh

1900
01:21:11,510 --> 01:21:09,199
opened up here from this view at the

1901
01:21:13,030 --> 01:21:11,520
very top portion of your screen

1902
01:21:14,790 --> 01:21:13,040
that will only take a couple of minutes

1903
01:21:16,229 --> 01:21:14,800
to close and protect some of those

1904
01:21:17,990 --> 01:21:16,239
critical components including the

1905
01:21:19,189 --> 01:21:18,000
docking mechanism the forward bulkhead

1906
01:21:20,950 --> 01:21:19,199
draco some of the guidance and

1907
01:21:22,950 --> 01:21:20,960
navigation equipment

1908
01:21:25,430 --> 01:21:22,960
but for the remain for the most part

1909
01:21:28,070 --> 01:21:25,440
during this flight the nosecone will

1910
01:21:29,830 --> 01:21:28,080
remain open

1911
01:21:33,030 --> 01:21:29,840
and of course this camera that we have

1912
01:21:35,830 --> 01:21:33,040
here keeps having to readjust because uh

1913
01:21:38,629 --> 01:21:35,840

crew dragon is currently performing one

1914
01:21:40,310 --> 01:21:38,639
big loop of the station uh and of course

1915
01:21:44,870 --> 01:21:40,320
the camera has to readjust in order to

1916
01:21:52,950 --> 01:21:47,300
just coasting away

1917
01:21:56,709 --> 01:21:54,950
we're in this cruise phase for

1918
01:21:59,750 --> 01:21:56,719
a little less than 10 minutes

1919
01:22:01,189 --> 01:21:59,760
until we execute the third of four fly

1920
01:22:03,110 --> 01:22:01,199
around burns

1921
01:22:05,270 --> 01:22:03,120
this will take us from

1922
01:22:07,750 --> 01:22:05,280
the nadir or the very bottom portion of

1923
01:22:10,149 --> 01:22:07,760
the international space station

1924
01:22:12,229 --> 01:22:10,159
in between the station and the earth

1925
01:22:23,189 --> 01:22:12,239
another 50 second burn to bring it to

1926
01:22:29,350 --> 01:22:26,310
as we mentioned before uh megan and

1927
01:22:32,550 --> 01:22:29,360
shane are still in their suits and

1928
01:22:35,910 --> 01:22:32,560
buckled into their seats uh however tama

1929
01:22:38,950 --> 01:22:35,920
pesquet is taking photos um for this fly

1930
01:22:42,070 --> 01:22:38,960
around maneuver and aki is also out of

1931
01:22:43,990 --> 01:22:42,080
his seat assisting tomorrow at you know

1932
01:22:45,910 --> 01:22:44,000
to take these photos

1933
01:22:47,350 --> 01:22:45,920
as gary mentioned before

1934
01:22:49,030 --> 01:22:47,360
we will be

1935
01:22:51,350 --> 01:22:49,040
the crew will be taking off their suit

1936
01:22:53,669 --> 01:22:51,360
um and in a little while to get

1937
01:22:55,669 --> 01:22:53,679
comfortable and what's it's not really a

1938
01:22:57,669 --> 01:22:55,679

break period but

1939
01:23:00,070 --> 01:22:57,679
it is a small break in the action uh

1940
01:23:03,270 --> 01:23:00,080
before the dynamic events uh pick back

1941
01:23:05,669 --> 01:23:03,280
up again prior to re-entry uh but these

1942
01:23:07,510 --> 01:23:05,679
spacesuits are custom fitted

1943
01:23:08,950 --> 01:23:07,520
for each astronaut

1944
01:23:11,430 --> 01:23:08,960
they go through

1945
01:23:12,790 --> 01:23:11,440
a series of checkouts prior to leaving

1946
01:23:14,550 --> 01:23:12,800
the station

1947
01:23:16,790 --> 01:23:14,560
and so they'll do the same once again

1948
01:23:19,590 --> 01:23:16,800
when they put the suits back on

1949
01:23:21,510 --> 01:23:19,600
but as you mentioned before we saw tomah

1950
01:23:23,830 --> 01:23:21,520
get out of his suit pretty quickly

1951
01:23:26,070 --> 01:23:23,840
actually i was really surprised to see

1952
01:23:27,030 --> 01:23:26,080
how fast he popped up popped back up on

1953
01:23:29,830 --> 01:23:27,040
screen

1954
01:23:32,550 --> 01:23:29,840
ready to begin the fly around maneuver

1955
01:23:33,510 --> 01:23:32,560
and begin using that dslr camera to take

1956
01:23:35,189 --> 01:23:33,520
photos

1957
01:23:37,750 --> 01:23:35,199
and yeah so each of these suits are

1958
01:23:40,870 --> 01:23:37,760
custom fitted uh for each individual

1959
01:23:44,149 --> 01:23:40,880
astronaut so there is no there's no

1960
01:23:46,840 --> 01:23:44,159
option to switch around

1961
01:23:49,510 --> 01:23:46,850
you are committed to a suit yeah

1962
01:23:51,110 --> 01:23:49,520
[Music]

1963
01:23:53,270 --> 01:23:51,120

all right we got a little less than 10

1964
01:23:55,510 --> 01:23:53,280
minutes of this cruise phase until we

1965
01:23:57,830 --> 01:23:55,520
end until we execute that other burn

1966
01:23:59,750 --> 01:23:57,840
there's two more uh one that brings us

1967
01:24:02,709 --> 01:23:59,760
from the bottom portion uh the nader

1968
01:24:05,110 --> 01:24:02,719
position uh over to the forward position

1969
01:24:07,350 --> 01:24:05,120
through the remainder of this fly around

1970
01:24:10,149 --> 01:24:07,360
we should be in daylight so we'll get

1971
01:24:12,149 --> 01:24:10,159
fantastic views uh of both the dragon

1972
01:24:14,790 --> 01:24:12,159
and the international space station as

1973
01:24:17,189 --> 01:24:14,800
we acquire the signals from space to go

1974
01:24:19,189 --> 01:24:17,199
ahead and provide that to you

1975
01:24:21,430 --> 01:24:19,199
but we'll but again

1976
01:24:24,310 --> 01:24:21,440
tomorrow pesquet will be photographing

1977
01:24:26,950 --> 01:24:24,320
the uh station at this point of the

1978
01:24:29,430 --> 01:24:26,960
journey uh there is a chance that mark

1979
01:24:32,070 --> 01:24:29,440
vande on board the international space

1980
01:24:34,550 --> 01:24:32,080
station is inside the cupola

1981
01:24:36,229 --> 01:24:34,560
and we'll be able to capture some images

1982
01:24:38,870 --> 01:24:36,239
from the dragon now getting views from

1983
01:24:41,830 --> 01:24:38,880
inside dragon the cabin lights are still

1984
01:24:44,550 --> 01:24:41,840
off to reduce the glare

1985
01:24:45,350 --> 01:24:44,560
from the window which tomah pasquet is

1986
01:24:48,149 --> 01:24:45,360
at

1987
01:24:50,629 --> 01:24:48,159
to allow him to take some photos of the

1988
01:24:52,229 --> 01:24:50,639

international space station

1989
01:24:54,070 --> 01:24:52,239
very very clear now we're getting the

1990
01:24:58,070 --> 01:24:54,080
views of the dragon from the space

1991
01:24:59,830 --> 01:24:58,080
station absolutely beautiful

1992
01:25:02,709 --> 01:24:59,840
we're now over the north pacific ocean

1993
01:25:04,550 --> 01:25:02,719
about 260 statute miles

1994
01:25:21,680 --> 01:25:04,560
we just passed over the east coast of

1995
01:25:21,690 --> 01:25:51,590
[Applause]

1996
01:25:56,950 --> 01:25:54,790
this view here we have a great shot of

1997
01:25:58,070 --> 01:25:56,960
the forward hatch with that nose kona

1998
01:25:59,990 --> 01:25:58,080
open

1999
01:26:02,550 --> 01:26:00,000
as we've said before

2000
01:26:03,350 --> 01:26:02,560
and if you're looking closely you might

2001
01:26:04,709 --> 01:26:03,360
see

2002
01:26:06,229 --> 01:26:04,719
a little

2003
01:26:08,550 --> 01:26:06,239
there's a great side by side there of

2004
01:26:09,940 --> 01:26:08,560
the station and dragon

2005
01:26:11,350 --> 01:26:09,950
looking back at each other

2006
01:26:13,750 --> 01:26:11,360
[Music]

2007
01:26:15,110 --> 01:26:13,760
and that view of dragon you can actually

2008
01:26:17,350 --> 01:26:15,120
see the fins

2009
01:26:19,910 --> 01:26:17,360
of the dragon trunk so if you were

2010
01:26:22,229 --> 01:26:19,920
wondering what from this angle might

2011
01:26:23,910 --> 01:26:22,239
look might have looked like little

2012
01:26:26,229 --> 01:26:23,920
spikes coming out

2013
01:26:28,070 --> 01:26:26,239

from the side of dragon

2014
01:26:30,229 --> 01:26:28,080
they look like spikes from this angle

2015
01:26:33,430 --> 01:26:30,239
but there are actually fins

2016
01:26:35,590 --> 01:26:33,440
that are built into the trunk section or

2017
01:26:37,510 --> 01:26:35,600
the unpressurized section

2018
01:26:39,669 --> 01:26:37,520
of crude dragon

2019
01:26:41,350 --> 01:26:39,679
that trunk will be jettisoned

2020
01:26:44,629 --> 01:26:41,360
prior to

2021
01:26:46,390 --> 01:26:44,639
the capsule coming back once that trunk

2022
01:26:47,270 --> 01:26:46,400
is jettisoned that will expose the heat

2023
01:26:49,189 --> 01:26:47,280
shield

2024
01:26:51,350 --> 01:26:49,199
which is of course what we need in order

2025
01:26:53,990 --> 01:26:51,360
to re-enter the earth's atmosphere and

2026
01:26:56,310 --> 01:26:54,000
splash down

2027
01:26:59,030 --> 01:26:56,320
that heat shield has the very important

2028
01:27:01,669 --> 01:26:59,040
job of slowing the dragon from what is

2029
01:27:04,950 --> 01:27:01,679
essentially 17 000

2030
01:27:06,550 --> 01:27:04,960
miles per hour to about 350

2031
01:27:09,430 --> 01:27:06,560
miles per hour

2032
01:27:11,750 --> 01:27:09,440
a ton of energy as the dragon itself is

2033
01:27:14,470 --> 01:27:11,760
really engulfed uh in plasma that's

2034
01:27:17,830 --> 01:27:14,480
reducing that speed uh quite drastically

2035
01:27:19,590 --> 01:27:17,840
once it gets down to 350 miles per hour

2036
01:27:22,149 --> 01:27:19,600
it's really up to the parachutes in the

2037
01:27:23,750 --> 01:27:22,159
atmosphere itself to slow dragon down

2038
01:27:27,669 --> 01:27:23,760

through a series of drogue and main

2039
01:27:29,830 --> 01:27:27,679
parachutes down to a mere 15 16 miles

2040
01:27:34,070 --> 01:27:29,840
per hour before it splashes down off the

2041
01:27:38,950 --> 01:27:36,229
yeah while the temperatures

2042
01:27:43,270 --> 01:27:38,960
uh near the heat shield can

2043
01:27:46,229 --> 01:27:43,280
get close to 35 3500 degrees fahrenheit

2044
01:27:47,750 --> 01:27:46,239
the inside of the cabin stays a pretty

2045
01:27:51,270 --> 01:27:47,760
comfortable temperature

2046
01:27:52,950 --> 01:27:51,280
the crews that we have brought back home

2047
01:27:55,430 --> 01:27:52,960
have indicated that it's a it's actually

2048
01:28:02,310 --> 01:27:55,440
a pretty comfortable ride in crew dragon

2049
01:28:06,870 --> 01:28:04,470
wonderful side-by-side views uh we're

2050
01:28:08,629 --> 01:28:06,880
getting feeds from both the dragon and

2051
01:28:10,870 --> 01:28:08,639
the international space station from the

2052
01:28:13,430 --> 01:28:10,880
space station view you're seeing uh the

2053
01:28:15,189 --> 01:28:13,440
underside as the dragon spacecraft you

2054
01:28:17,830 --> 01:28:15,199
can see is wedged between the space

2055
01:28:20,070 --> 01:28:17,840
station uh and the uh

2056
01:28:22,390 --> 01:28:20,080
earth uh and by wedged i mean there's a

2057
01:28:25,910 --> 01:28:22,400
250 mile distance between those two

2058
01:28:29,350 --> 01:28:25,920
things but uh right now the dragon is

2059
01:28:30,629 --> 01:28:29,360
about 200 meters from the international

2060
01:28:31,910 --> 01:28:30,639
space station

2061
01:28:34,229 --> 01:28:31,920
and we're seeing some of the features

2062
01:28:35,910 --> 01:28:34,239
now cabin lights inside dragon as we get

2063
01:28:38,550 --> 01:28:35,920

some of those feeds as well still turned

2064
01:28:41,669 --> 01:28:38,560
off allowing the photographs

2065
01:28:43,830 --> 01:28:41,679
to be taken of the space station part of

2066
01:28:45,189 --> 01:28:43,840
this uh photographic survey of the

2067
01:28:46,790 --> 01:28:45,199
exterior

2068
01:28:50,149 --> 01:28:46,800
and of course we're getting wonderful

2069
01:28:52,430 --> 01:28:50,159
views uh from the station looking down

2070
01:28:55,990 --> 01:28:52,440
at the dragon capsule right below them

2071
01:29:07,110 --> 01:28:56,000
259 statute miles is the

2072
01:29:21,669 --> 01:29:09,270
endeavor spacex on the big loop later

2073
01:29:21,679 --> 01:29:28,550
and another copy

2074
01:29:32,470 --> 01:29:30,870
and we're now directly beneath the

2075
01:29:33,669 --> 01:29:32,480
international space station the nader

2076
01:29:36,149 --> 01:29:33,679
waypoint

2077
01:29:38,709 --> 01:29:36,159
we are now executing a 50-second burn to

2078
01:29:40,629 --> 01:29:38,719
maneuver from the nader point or the

2079
01:29:43,030 --> 01:29:40,639
earth-facing side of the space station

2080
01:30:03,910 --> 01:29:43,040
over to the forward end and that burn is

2081
01:30:07,510 --> 01:30:05,910
and that 50 second burn is complete you

2082
01:30:10,950 --> 01:30:07,520
can see we're essentially right below

2083
01:30:13,350 --> 01:30:10,960
the international space station

2084
01:30:14,950 --> 01:30:13,360
and we're getting some great coverage

2085
01:30:17,110 --> 01:30:14,960
both from the uh

2086
01:30:22,340 --> 01:30:17,120
space station side using tdrs satellites

2087
01:30:54,790 --> 01:30:49,930
[Applause]

2088
01:30:57,590 --> 01:30:56,390

right below this the uh dragon

2089
01:30:59,910 --> 01:30:57,600
spacecraft you were seeing some of the

2090
01:31:01,530 --> 01:30:59,920
coastline of the marshall islands in the

2091
01:31:12,690 --> 01:31:01,540
pacific ocean

2092
01:31:16,149 --> 01:31:14,550
[Applause]

2093
01:31:18,790 --> 01:31:16,159
once again the dragon endeavor

2094
01:31:21,590 --> 01:31:18,800
spacecraft is basically directly below

2095
01:31:24,709 --> 01:31:21,600
the station at this point in time

2096
01:31:27,990 --> 01:31:24,719
we are executing a fly-around maneuver

2097
01:31:30,709 --> 01:31:28,000
which is essentially one big loop around

2098
01:31:33,270 --> 01:31:30,719
the space station and the reason for

2099
01:31:36,629 --> 01:31:33,280
doing this is we're doing a photographic

2100
01:31:38,950 --> 01:31:36,639
survey of the station thanks to the

2101
01:31:41,270 --> 01:31:38,960
several new installations on station

2102
01:31:44,149 --> 01:31:41,280
over the last few years the last fly

2103
01:31:45,669 --> 01:31:44,159
around maneuver was performed in 2018

2104
01:31:47,590 --> 01:31:45,679
and unfortunately just because of

2105
01:31:50,470 --> 01:31:47,600
positioning of some of those onboard

2106
01:31:53,030 --> 01:31:50,480
cameras on station they can't quite see

2107
01:31:55,189 --> 01:31:53,040
everything so this photographic survey

2108
01:31:58,149 --> 01:31:55,199
will help fill in some of those blanks

2109
01:31:59,830 --> 01:31:58,159
of the exterior of the station so we're

2110
01:32:01,830 --> 01:31:59,840
about halfway through the maneuver once

2111
01:32:05,350 --> 01:32:01,840
again we are

2112
01:32:07,830 --> 01:32:05,360
directly below the station and uh thomas

2113
01:32:11,110 --> 01:32:07,840

pesquet the designated photographer on

2114
01:32:13,110 --> 01:32:11,120
board today is taking photos actually

2115
01:32:16,470 --> 01:32:13,120
right through that small

2116
01:32:19,350 --> 01:32:16,480
white hole um there in the center of

2117
01:32:21,590 --> 01:32:19,360
the hatch so what we saw there uh is the

2118
01:32:25,030 --> 01:32:21,600
forward hatch and that small white light

2119
01:32:27,430 --> 01:32:25,040
is a little window there in the forward

2120
01:32:29,590 --> 01:32:27,440
hatch and tomorrow pasquee is taking

2121
01:32:32,790 --> 01:32:29,600
photos out of that hatch of the station

2122
01:32:34,629 --> 01:32:32,800
to complete this photographic survey

2123
01:32:37,350 --> 01:32:34,639
on board the international space station

2124
01:32:39,669 --> 01:32:37,360
mark vande high the sole nasa astronaut

2125
01:32:42,390 --> 01:32:39,679
on board the orbiting laboratory has

2126
01:32:45,990 --> 01:32:42,400
been relieved of the duties to monitor

2127
01:32:48,310 --> 01:32:46,000
uh the undocking and retreat of the

2128
01:32:49,510 --> 01:32:48,320
spacex dragon and the endeavour crew

2129
01:32:51,910 --> 01:32:49,520
inside

2130
01:32:53,590 --> 01:32:51,920
but now is in a position

2131
01:32:54,950 --> 01:32:53,600
inside the cupola

2132
01:32:57,030 --> 01:32:54,960
he mentioned he was going to go over

2133
01:32:59,430 --> 01:32:57,040
with a digital camera from his side and

2134
01:33:01,990 --> 01:32:59,440
take some wonderful photographs of the

2135
01:33:04,229 --> 01:33:02,000
crew during their fly around maneuver

2136
01:33:06,149 --> 01:33:04,239
the cupola faces towards the earth and

2137
01:33:08,470 --> 01:33:06,159
provide some fantastic views of the

2138
01:33:10,950 --> 01:33:08,480

planet as they orbit the earth every 90

2139
01:33:12,310 --> 01:33:10,960
minutes it's also used for some

2140
01:33:15,270 --> 01:33:12,320
operational

2141
01:33:17,110 --> 01:33:15,280
reasons by capturing spacecraft

2142
01:33:19,270 --> 01:33:17,120
from inside the cupola they're able to

2143
01:33:20,390 --> 01:33:19,280
control the station's robotic arm and

2144
01:33:26,709 --> 01:33:20,400
get a good view of some of the

2145
01:33:30,870 --> 01:33:28,790
as gary mentioned before the remainder

2146
01:33:32,870 --> 01:33:30,880
of the fly round maneuver should be in

2147
01:33:35,350 --> 01:33:32,880
orbital daylight

2148
01:33:36,709 --> 01:33:35,360
and while it was pretty cool to have the

2149
01:33:38,550 --> 01:33:36,719
nighttime photos because we could

2150
01:33:42,310 --> 01:33:38,560
actually see

2151
01:33:44,470 --> 01:33:42,320
the pulses from the draco thrusters as

2152
01:33:49,270 --> 01:33:44,480
that was occurring gotta say these

2153
01:34:07,590 --> 01:33:50,709
and we'll see them for the remainder of

2154
01:34:10,790 --> 01:34:09,430
some pacific island chains that we're

2155
01:34:13,030 --> 01:34:10,800
seeing

2156
01:34:15,750 --> 01:34:13,040
as we head on a south easterly course

2157
01:34:17,590 --> 01:34:15,760
down the pacific ocean

2158
01:34:21,270 --> 01:34:17,600
heading towards the south pacific we'll

2159
01:34:21,990 --> 01:34:21,280
make our way up and cross over

2160
01:34:46,800 --> 01:34:22,000
the

2161
01:34:46,810 --> 01:34:58,870
[Applause]

2162
01:35:05,189 --> 01:35:01,590
if you've just recently joined us uh the

2163
01:35:07,350 --> 01:35:05,199

crew 2 crew is on board crew dragon

2164
01:35:08,629 --> 01:35:07,360
endeavour uh which we just had a view of

2165
01:35:10,470 --> 01:35:08,639
moments ago

2166
01:35:13,830 --> 01:35:10,480
they have departed the space station

2167
01:35:15,350 --> 01:35:13,840
they had an on-time separation at 1105

2168
01:35:18,070 --> 01:35:15,360
am pacific

2169
01:35:20,390 --> 01:35:18,080
and they are currently executing a

2170
01:35:21,910 --> 01:35:20,400
fly-around maneuver

2171
01:35:23,510 --> 01:35:21,920
around the station

2172
01:35:27,430 --> 01:35:23,520
and after that

2173
01:35:30,470 --> 01:35:27,440
they will be executing four uh burns

2174
01:35:31,830 --> 01:35:30,480
essentially a series of carefully

2175
01:35:34,550 --> 01:35:31,840
choreographed

2176
01:35:35,990 --> 01:35:34,560
maneuvers in order to put dragon on a

2177
01:35:38,470 --> 01:35:36,000
trajectory

2178
01:35:40,870 --> 01:35:38,480
back home we are anticipating a

2179
01:35:43,750 --> 01:35:40,880
splashdown at 7 33

2180
01:35:50,310 --> 01:35:43,760
pm pacific time this evening just off

2181
01:35:55,109 --> 01:35:52,229
we're getting high definition views from

2182
01:35:58,070 --> 01:35:55,119
the international space station

2183
01:35:59,669 --> 01:35:58,080
these cameras on a camera assembly which

2184
01:36:02,070 --> 01:35:59,679
includes high definition and standard

2185
01:36:04,149 --> 01:36:02,080
definition views

2186
01:36:06,629 --> 01:36:04,159
as well as the ability to manually

2187
01:36:08,229 --> 01:36:06,639
control each of the individual cameras

2188
01:36:09,750 --> 01:36:08,239

that are positioned on the station's

2189
01:36:11,270 --> 01:36:09,760
truss

2190
01:36:13,510 --> 01:36:11,280
there is a single position inside

2191
01:36:16,470 --> 01:36:13,520
mission control houston now

2192
01:36:18,470 --> 01:36:16,480
uh the cronus position a person who is

2193
01:36:22,830 --> 01:36:18,480
literally on the ground in houston

2194
01:36:27,990 --> 01:36:25,430
views the cronus has

2195
01:36:31,030 --> 01:36:28,000
full autonomy to position the cameras

2196
01:36:33,350 --> 01:36:31,040
wherever is needed to get views of the

2197
01:36:34,470 --> 01:36:33,360
action in this case is the fly around of

2198
01:36:35,910 --> 01:36:34,480
crew 2

2199
01:36:38,470 --> 01:36:35,920
and dragon endeavor around the

2200
01:36:40,070 --> 01:36:38,480
international space station

2201
01:36:40,950 --> 01:36:40,080
earlier you were seeing

2202
01:36:43,270 --> 01:36:40,960
that

2203
01:36:45,189 --> 01:36:43,280
same console position adjust the

2204
01:36:46,950 --> 01:36:45,199
exposure or the aperture of some of the

2205
01:36:49,430 --> 01:36:46,960
cameras

2206
01:36:51,270 --> 01:36:49,440
which allows the

2207
01:36:53,590 --> 01:36:51,280
some of the plumes coming from the draco

2208
01:36:56,629 --> 01:36:53,600
thrusters to be seen as the image is

2209
01:36:59,910 --> 01:36:56,639
overexposed but in this scenario with

2210
01:37:01,750 --> 01:36:59,920
the daylight we can very clearly see

2211
01:37:03,350 --> 01:37:01,760
the dragon making its way to the forward

2212
01:37:04,790 --> 01:37:03,360
end of the station

2213
01:37:06,470 --> 01:37:04,800

and we're seeing some features of the

2214
01:37:07,350 --> 01:37:06,480
space station itself right now you're

2215
01:37:09,350 --> 01:37:07,360
seeing

2216
01:37:10,229 --> 01:37:09,360
uh on the very bottom left of your

2217
01:37:14,310 --> 01:37:10,239
screen

2218
01:37:16,390 --> 01:37:14,320
uh the uh the gem this is the cronus

2219
01:37:18,629 --> 01:37:16,400
this is the individual the cronus

2220
01:37:20,470 --> 01:37:18,639
he's actually sitting there controlling

2221
01:37:23,750 --> 01:37:20,480
the cameras on the international space

2222
01:37:25,990 --> 01:37:23,760
station not a bad job to have

2223
01:37:27,510 --> 01:37:26,000
as he's uh he's

2224
01:37:29,990 --> 01:37:27,520
using some of the

2225
01:37:32,709 --> 01:37:30,000
trust cameras they're high definition

2226
01:37:34,790 --> 01:37:32,719
to check out some of these views

2227
01:37:37,669 --> 01:37:34,800
this is the japanese module you can see

2228
01:37:39,830 --> 01:37:37,679
on the very right of a flag of japan

2229
01:37:41,910 --> 01:37:39,840
clearly marked on that module right

2230
01:37:43,910 --> 01:37:41,920
above that towards the space-facing side

2231
01:37:45,430 --> 01:37:43,920
is the logistics module essentially the

2232
01:37:47,750 --> 01:37:45,440
storage area

2233
01:37:50,470 --> 01:37:47,760
and then uh the japanese module has its

2234
01:37:51,990 --> 01:37:50,480
own airlock to put out experiments it's

2235
01:37:54,229 --> 01:37:52,000
too small to fit humans we have bigger

2236
01:37:56,070 --> 01:37:54,239
airlocks for that but this airlock is

2237
01:37:57,830 --> 01:37:56,080
small enough to fit some of the payloads

2238
01:38:00,229 --> 01:37:57,840

or experiments many of which you see on

2239
01:38:01,350 --> 01:38:00,239
this external platform each with their

2240
01:38:03,830 --> 01:38:01,360
own

2241
01:38:05,910 --> 01:38:03,840
grappling fixture to allow the robotic

2242
01:38:08,070 --> 01:38:05,920
arm to maneuver it wherever it needs to

2243
01:38:10,149 --> 01:38:08,080
go one of the experiments on that

2244
01:38:11,830 --> 01:38:10,159
external platform is called

2245
01:38:14,629 --> 01:38:11,840
the oco3

2246
01:38:17,430 --> 01:38:14,639
or the orbit carbon observatory 3

2247
01:38:20,550 --> 01:38:17,440
as a space station covers about 85

2248
01:38:23,270 --> 01:38:20,560
percent of the inhabited earth that

2249
01:38:25,030 --> 01:38:23,280
one of the experiments is looking down

2250
01:38:27,430 --> 01:38:25,040
at the earth

2251
01:38:29,430 --> 01:38:27,440
monitoring carbon all across the planet

2252
01:38:31,590 --> 01:38:29,440
we're seeing that external facility as

2253
01:38:33,270 --> 01:38:31,600
well as the dragon come into the forward

2254
01:38:36,070 --> 01:38:33,280
end of the international space station

2255
01:38:42,709 --> 01:38:36,080
hovering about 200 meters away fantastic

2256
01:38:46,229 --> 01:38:44,550
and as we've mentioned earlier

2257
01:38:49,030 --> 01:38:46,239
the whole point for doing this fly

2258
01:38:50,550 --> 01:38:49,040
around maneuver essentially is to take

2259
01:38:52,629 --> 01:38:50,560
pictures of the station

2260
01:38:54,310 --> 01:38:52,639
there have been a number of new

2261
01:38:55,910 --> 01:38:54,320
installations

2262
01:38:57,910 --> 01:38:55,920
put on station

2263
01:38:59,910 --> 01:38:57,920

since the last fly around maneuver and

2264
01:39:02,070 --> 01:38:59,920
so this is a great opportunity to

2265
01:39:05,189 --> 01:39:02,080
document the exterior of the station

2266
01:39:06,550 --> 01:39:05,199
basically do a photographic survey and

2267
01:39:08,470 --> 01:39:06,560
be able to

2268
01:39:10,709 --> 01:39:08,480
see parts of the station that some of

2269
01:39:16,870 --> 01:39:10,719
the onboard cameras might not be able to

2270
01:39:21,350 --> 01:39:19,109
if you look closely you can still see

2271
01:39:22,629 --> 01:39:21,360
dragon they're just kind of off to the

2272
01:39:23,750 --> 01:39:22,639
right hand

2273
01:39:25,990 --> 01:39:23,760
uh

2274
01:39:34,070 --> 01:39:26,000
slightly right of center yeah you gotta

2275
01:39:37,510 --> 01:39:36,149
yeah i can see a little bitter there

2276
01:39:47,750 --> 01:39:37,520
pretty much directly in the center of

2277
01:39:52,070 --> 01:39:50,070
gary a lot of what you just mentioned

2278
01:39:55,189 --> 01:39:52,080
about all the different modules

2279
01:39:57,030 --> 01:39:55,199
and components of the space station uh

2280
01:39:57,910 --> 01:39:57,040
really highlight

2281
01:40:05,830 --> 01:39:57,920
the

2282
01:40:08,390 --> 01:40:05,840
international space station and all of

2283
01:40:09,109 --> 01:40:08,400
these experiments and modules

2284
01:40:10,629 --> 01:40:09,119
are

2285
01:40:13,189 --> 01:40:10,639
a really great representation of

2286
01:40:16,149 --> 01:40:13,199
teamwork also represented

2287
01:40:19,669 --> 01:40:16,159
by our crew members on board today

2288
01:40:22,470 --> 01:40:19,679

we have jaxa astronaut aki hoshide

2289
01:40:24,550 --> 01:40:22,480
european space agency astronaut thomas

2290
01:40:26,870 --> 01:40:24,560
pesquet and of course

2291
01:40:29,030 --> 01:40:26,880
two nasa astronauts shane kimbrough and

2292
01:40:30,790 --> 01:40:29,040
megan macarthur so

2293
01:40:33,510 --> 01:40:30,800
it's a great demonstration of

2294
01:40:35,510 --> 01:40:33,520
international effort

2295
01:40:37,109 --> 01:40:35,520
and cooperation really you were seeing

2296
01:40:39,189 --> 01:40:37,119
some of the features on the space

2297
01:40:41,590 --> 01:40:39,199
station themselves modules owned and

2298
01:40:43,430 --> 01:40:41,600
operated by different uh space agencies

2299
01:40:45,750 --> 01:40:43,440
we even have commercial modules as we're

2300
01:40:47,430 --> 01:40:45,760
transitioning to enable commercial

2301
01:40:49,030 --> 01:40:47,440
activities in low earth orbit all

2302
01:40:50,709 --> 01:40:49,040
enabled by this

2303
01:40:53,109 --> 01:40:50,719
orbiting complex

2304
01:40:55,910 --> 01:40:53,119
now getting some fantastic brand new

2305
01:40:58,470 --> 01:40:55,920
views from the dragon crew taking photos

2306
01:41:00,950 --> 01:40:58,480
of the outside all along the way being

2307
01:41:02,070 --> 01:41:00,960
able to capture for history this moment

2308
01:41:05,590 --> 01:41:02,080
in time

2309
01:41:08,870 --> 01:41:05,600
2021 as we uh have new modules that have

2310
01:41:11,510 --> 01:41:08,880
been added since the last photographic

2311
01:41:13,270 --> 01:41:11,520
survey which happened in 2018 aboard the

2312
01:41:15,830 --> 01:41:13,280
russian soyuz we added some commercial

2313
01:41:17,590 --> 01:41:15,840

modules uh some some

2314
01:41:19,830 --> 01:41:17,600
international and commercial

2315
01:41:21,430 --> 01:41:19,840
partnerships uh namely the commercial

2316
01:41:23,669 --> 01:41:21,440
module being the nanoracks bishop

2317
01:41:25,669 --> 01:41:23,679
airlock uh and then that in that

2318
01:41:27,510 --> 01:41:25,679
international commercial partnership

2319
01:41:29,910 --> 01:41:27,520
being the uh

2320
01:41:31,669 --> 01:41:29,920
bartolomeo platform an external platform

2321
01:41:33,430 --> 01:41:31,679
on the columbus side which we haven't

2322
01:41:36,629 --> 01:41:33,440
seen we've seen the external platform on

2323
01:41:39,350 --> 01:41:36,639
the on the japanese side but um from

2324
01:41:41,990 --> 01:41:39,360
this view uh now that the dragon is

2325
01:41:44,470 --> 01:41:42,000
approaching the very forward end of the

2326
01:41:46,310 --> 01:41:44,480
international space station uh which it

2327
01:41:49,350 --> 01:41:46,320
should be getting to here momentarily

2328
01:41:50,709 --> 01:41:49,360
about uh 10 minutes uh this is yeah

2329
01:41:53,030 --> 01:41:50,719
approximately the position where the

2330
01:41:55,030 --> 01:41:53,040
dragon is now a little more than halfway

2331
01:41:56,070 --> 01:41:55,040
to the very forward position but right

2332
01:41:57,830 --> 01:41:56,080
about that

2333
01:41:59,430 --> 01:41:57,840
uh position you they should be getting

2334
01:42:01,590 --> 01:41:59,440
some very good views of some of those

2335
01:42:03,669 --> 01:42:01,600
new modules including and and platforms

2336
01:42:05,910 --> 01:42:03,679
including bartolomeo and this will be

2337
01:42:08,629 --> 01:42:05,920
the first time that we've had uh views

2338
01:42:11,109 --> 01:42:08,639

like this of bartolomeo uh the uh as

2339
01:42:13,510 --> 01:42:11,119
part of an external survey uh part of

2340
01:42:15,990 --> 01:42:13,520
the ever-evolving uh international space

2341
01:42:20,310 --> 01:42:17,910
so they they're a great shot

2342
01:42:23,430 --> 01:42:20,320
looking top down from

2343
01:42:26,070 --> 01:42:23,440
the station at dragon

2344
01:42:28,470 --> 01:42:26,080
as the what appears to us as the bottom

2345
01:42:30,870 --> 01:42:28,480
part of crew dragon comes into view you

2346
01:42:32,870 --> 01:42:30,880
can actually see the side hatch door uh

2347
01:42:35,629 --> 01:42:32,880
which is where the crew

2348
01:42:39,270 --> 01:42:35,639
entered into the capsule um

2349
01:42:43,189 --> 01:42:39,280
199 days ago when they launched from

2350
01:42:45,830 --> 01:42:43,199
pad 39a at kennedy space center that

2351
01:42:47,750 --> 01:42:45,840
hatch has been closed since and it will

2352
01:42:49,990 --> 01:42:47,760
reopen tonight once after they splash

2353
01:42:53,109 --> 01:42:50,000
down off the coast of florida

2354
01:42:55,350 --> 01:42:53,119
and that will once that side hatch opens

2355
01:42:57,990 --> 01:42:55,360
that will basically be their

2356
01:43:01,090 --> 01:42:58,000
first breath of fresh air

2357
01:43:04,709 --> 01:43:01,100
since launching almost 200 days ago

2358
01:43:08,709 --> 01:43:06,709
i bet they are very excited to see their

2359
01:43:10,709 --> 01:43:08,719
families once again it won't be long

2360
01:43:13,510 --> 01:43:10,719
until they are recovered by the spacex

2361
01:43:16,310 --> 01:43:13,520
recovery teams uh their joint with nasa

2362
01:43:18,070 --> 01:43:16,320
and as well as some uh european doctors

2363
01:43:20,709 --> 01:43:18,080

that truly is an international effort

2364
01:43:22,229 --> 01:43:20,719
even out in the middle of the gulf uh to

2365
01:43:23,830 --> 01:43:22,239
recover some of these crew but it won't

2366
01:43:24,709 --> 01:43:23,840
be long until they're flown back to

2367
01:43:26,790 --> 01:43:24,719
shore

2368
01:43:28,470 --> 01:43:26,800
they'll have planes stationed for them

2369
01:43:48,390 --> 01:43:28,480
ready to get them back home

2370
01:43:53,830 --> 01:43:51,030
that is an incredible shot

2371
01:43:54,950 --> 01:43:53,840
there of the earthly horizon with crew

2372
01:43:57,109 --> 01:43:54,960
dragon

2373
01:44:01,830 --> 01:43:57,119
rising above

2374
01:44:08,020 --> 01:44:03,430
somebody at houston please give him a

2375
01:44:46,470 --> 01:44:36,440
[Applause]

2376
01:44:46,480 --> 01:45:09,750
now

2377
01:45:14,709 --> 01:45:12,470
it's a very slow and calculated maneuver

2378
01:45:17,350 --> 01:45:14,719
you can see all along the way

2379
01:45:19,430 --> 01:45:17,360
now that we have the view of the dragon

2380
01:45:22,070 --> 01:45:19,440
against the blackness of space with the

2381
01:45:25,109 --> 01:45:22,080
over exposed camera views from the

2382
01:45:27,590 --> 01:45:25,119
station cameras uh you can see that all

2383
01:45:30,950 --> 01:45:27,600
along the way the draco thrusters have

2384
01:45:33,109 --> 01:45:30,960
been firing to continue to keep a dragon

2385
01:45:34,310 --> 01:45:33,119
in the intended position along the way

2386
01:45:36,229 --> 01:45:34,320
we've been seeing

2387
01:45:37,830 --> 01:45:36,239
essentially the same view much like we

2388
01:45:39,750 --> 01:45:37,840

see the moon right we always see the

2389
01:45:40,870 --> 01:45:39,760
same face of the moon anywhere it is in

2390
01:45:43,430 --> 01:45:40,880
the sky

2391
01:45:46,310 --> 01:45:43,440
we are seeing the same face of the

2392
01:45:49,189 --> 01:45:46,320
forward end of the dragon uh as it is

2393
01:45:51,590 --> 01:45:49,199
critical that we have that uh same patch

2394
01:45:54,229 --> 01:45:51,600
with the windows facing uh this way to

2395
01:45:56,550 --> 01:45:54,239
allow tomorrow pesky to continue uh his

2396
01:45:58,470 --> 01:45:56,560
photographic survey it's only a few more

2397
01:46:00,470 --> 01:45:58,480
minutes that were in this

2398
01:46:03,030 --> 01:46:00,480
phase which is the cruise phase between

2399
01:46:04,550 --> 01:46:03,040
the nader and the forward positions

2400
01:46:06,629 --> 01:46:04,560
once we

2401
01:46:09,350 --> 01:46:06,639
meet that forward position on the v bar

2402
01:46:11,590 --> 01:46:09,360
the velocity bar essentially directly in

2403
01:46:13,590 --> 01:46:11,600
front of the international space station

2404
01:46:17,109 --> 01:46:13,600
dragon will automatically execute a

2405
01:46:19,750 --> 01:46:17,119
50-second burn uh the final uh fly

2406
01:46:21,669 --> 01:46:19,760
around burn the fourth of four

2407
01:46:24,070 --> 01:46:21,679
to move it from the forward end back to

2408
01:46:25,590 --> 01:46:24,080
the zenith end effectively doing a full

2409
01:46:26,390 --> 01:46:25,600
loop around the international space

2410
01:46:29,030 --> 01:46:26,400
station

2411
01:46:32,149 --> 01:46:29,040
uh the last quadrant from there there

2412
01:46:34,229 --> 01:46:32,159
are two departure burns where the dragon

2413
01:46:36,470 --> 01:46:34,239

and the crew will break away from this

2414
01:46:38,629 --> 01:46:36,480
fly around position about 200 meters

2415
01:46:40,629 --> 01:46:38,639
from the international space station and

2416
01:46:42,310 --> 01:46:40,639
start exiting the keep out sphere the

2417
01:46:45,270 --> 01:46:42,320
sphere which it's essentially been

2418
01:46:47,669 --> 01:46:45,280
hugging for this entire maneuver about a

2419
01:46:49,750 --> 01:46:47,679
200 meter circle around the space

2420
01:46:54,870 --> 01:46:49,760
station it'll exit the keep out sphere

2421
01:47:00,229 --> 01:46:56,790
there we have a graphic as we're getting

2422
01:47:02,709 --> 01:47:00,239
dual views of uh both the dragon capsule

2423
01:47:05,270 --> 01:47:02,719
as well as the uh maneuver itself you

2424
01:47:07,910 --> 01:47:05,280
can see we are in the third uh cruise

2425
01:47:09,830 --> 01:47:07,920
phase of four uh very shortly we'll be

2426
01:47:12,390 --> 01:47:09,840
executing that fourth burn maneuver you

2427
01:47:14,709 --> 01:47:12,400
can see uh at the far left of the

2428
01:47:16,310 --> 01:47:14,719
graphic that's the fourth maneuver it's

2429
01:47:18,790 --> 01:47:16,320
directly in front of the international

2430
01:47:21,109 --> 01:47:18,800
space station it's at that position

2431
01:47:22,470 --> 01:47:21,119
where that uh fourth burn maneuver is

2432
01:47:25,669 --> 01:47:22,480
executed that

2433
01:47:27,669 --> 01:47:25,679
is where the crew 3 dragon and the

2434
01:47:30,470 --> 01:47:27,679
endurance crew will be heading in just a

2435
01:47:32,149 --> 01:47:30,480
couple of days to the forward end to

2436
01:47:34,229 --> 01:47:32,159
meet up with the docking axis of the

2437
01:47:36,709 --> 01:47:34,239
forward port of the space station and

2438
01:47:38,790 --> 01:47:36,719

move into dock for their six-month stay

2439
01:47:40,629 --> 01:47:38,800
after that 50-second burn that is the

2440
01:47:42,709 --> 01:47:40,639
last cruise phase they'll meet up with

2441
01:47:45,990 --> 01:47:42,719
the same point where they started which

2442
01:47:47,350 --> 01:47:46,000
is essentially on the r bar or uh

2443
01:47:49,109 --> 01:47:47,360
it's a it's a

2444
01:47:50,550 --> 01:47:49,119
vertical line right through the middle

2445
01:47:52,709 --> 01:47:50,560
of the space station

2446
01:47:55,590 --> 01:47:52,719
uh where the dragon will automatically

2447
01:47:57,270 --> 01:47:55,600
execute uh the depart burns which you

2448
01:47:59,910 --> 01:47:57,280
can see on the graphic there department

2449
01:48:02,310 --> 01:47:59,920
zero and to parker one to get it outside

2450
01:48:04,070 --> 01:48:02,320
the approach ellipsoid it's uh

2451
01:48:05,590 --> 01:48:04,080
two kilometer by two kilometer by four

2452
01:48:07,910 --> 01:48:05,600
kilometer uh

2453
01:48:10,390 --> 01:48:07,920
oval shape uh that's around the space

2454
01:48:12,550 --> 01:48:10,400
station and once it exits there we'll

2455
01:48:15,350 --> 01:48:12,560
stop joint operations between the

2456
01:48:17,030 --> 01:48:15,360
station and dragon mission control teams

2457
01:48:19,750 --> 01:48:17,040
and from there on as really mission

2458
01:48:22,390 --> 01:48:19,760
control hawthorne that's taking the

2459
01:48:35,590 --> 01:48:22,400
crew to endeavor astronauts

2460
01:48:39,669 --> 01:48:36,950
the teams here in mission control

2461
01:48:40,950 --> 01:48:39,679
hawthorne have been busy over the last

2462
01:48:43,990 --> 01:48:40,960
several days

2463
01:48:46,550 --> 01:48:44,000

in preparation for dragon's departure

2464
01:48:48,310 --> 01:48:46,560
and of course the intended launch of the

2465
01:48:50,709 --> 01:48:48,320
crew 3 crew

2466
01:48:54,709 --> 01:48:50,719
so it's been pretty busy here

2467
01:48:57,910 --> 01:48:54,719
trying to juggle the opportunities to

2468
01:48:59,830 --> 01:48:57,920
both return crew and launch crew

2469
01:49:01,910 --> 01:48:59,840
of course if you've been following along

2470
01:49:03,590 --> 01:49:01,920
weather has

2471
01:49:05,830 --> 01:49:03,600
up until this point not been playing

2472
01:49:07,430 --> 01:49:05,840
very nice with us

2473
01:49:09,030 --> 01:49:07,440
but fortunately we do have an

2474
01:49:11,109 --> 01:49:09,040
opportunity obviously as we have

2475
01:49:12,070 --> 01:49:11,119
undocked we do have an opportunity

2476
01:49:17,990 --> 01:49:12,080
to

2477
01:49:20,870 --> 01:49:18,000
crew 2 crew home um and we're expecting

2478
01:49:24,470 --> 01:49:20,880
that splashdown to occur at 7 33 pm

2479
01:49:26,470 --> 01:49:24,480
eastern excuse me pacific time um and

2480
01:49:29,030 --> 01:49:26,480
while it is preferred that we launched

2481
01:49:30,790 --> 01:49:29,040
the next crew prior to bringing the

2482
01:49:32,390 --> 01:49:30,800
previous crew home

2483
01:49:34,550 --> 01:49:32,400
just because of those weather conditions

2484
01:49:37,350 --> 01:49:34,560
and limited opportunities

2485
01:49:38,870 --> 01:49:37,360
for splashdown going forward later in

2486
01:49:41,189 --> 01:49:38,880
the week

2487
01:49:43,270 --> 01:49:41,199
the teams jointly decided both spacex

2488
01:49:45,990 --> 01:49:43,280

and nasa worked together to determine

2489
01:49:49,109 --> 01:49:46,000
that the best course of action for both

2490
01:49:52,550 --> 01:49:49,119
crews uh was to bring crew two folks

2491
01:49:54,390 --> 01:49:52,560
home prior to uh letting the crew 3

2492
01:49:56,709 --> 01:49:54,400
launch proceed

2493
01:49:58,870 --> 01:49:56,719
that's right and as you mentioned uh

2494
01:50:01,030 --> 01:49:58,880
the reason that we're seeing crew 2

2495
01:50:03,589 --> 01:50:01,040
endeavor in this position right now

2496
01:50:05,669 --> 01:50:03,599
is we've uh we've done several weather

2497
01:50:07,669 --> 01:50:05,679
briefings throughout the week we did one

2498
01:50:09,510 --> 01:50:07,679
immediately before docking we want to

2499
01:50:11,109 --> 01:50:09,520
make sure that the weather at the

2500
01:50:13,589 --> 01:50:11,119
landing site the prime site which is

2501
01:50:16,390 --> 01:50:13,599
pensacola florida for today is looking

2502
01:50:19,109 --> 01:50:16,400
good and it continues to look good we'll

2503
01:50:22,070 --> 01:50:19,119
continue to hear weather updates through

2504
01:50:24,550 --> 01:50:22,080
the entire uh phase of flight all the

2505
01:50:26,470 --> 01:50:24,560
way down through just before committing

2506
01:50:28,070 --> 01:50:26,480
to that de-orbit burn we'll do another

2507
01:50:30,709 --> 01:50:28,080
weather briefing just to make sure that

2508
01:50:31,910 --> 01:50:30,719
everything down in the gulf looks a-okay

2509
01:50:33,830 --> 01:50:31,920
and part of the reason that we're seeing

2510
01:50:35,830 --> 01:50:33,840
this today is because it really does

2511
01:50:38,149 --> 01:50:35,840
look like the best opportunity for the

2512
01:50:39,830 --> 01:50:38,159
crews again the along the eastern

2513
01:50:41,990 --> 01:50:39,840

seaboard and the ascent corridor for

2514
01:50:44,229 --> 01:50:42,000
crew 3 not looking as great

2515
01:50:46,550 --> 01:50:44,239
but the gulf looks pretty good so we

2516
01:50:48,470 --> 01:50:46,560
transitioned to an indirect handover to

2517
01:51:06,470 --> 01:50:48,480
allow crew 2 to splash down first

2518
01:51:11,830 --> 01:51:09,109
my view there on your screen now coming

2519
01:51:15,910 --> 01:51:11,840
from the international space station uh

2520
01:51:17,109 --> 01:51:15,920
as crew dragon has departed and is

2521
01:51:19,589 --> 01:51:17,119
in the

2522
01:51:21,030 --> 01:51:19,599
final phases of completing the fly

2523
01:51:23,430 --> 01:51:21,040
around maneuver

2524
01:51:26,470 --> 01:51:23,440
which is basically a photographic survey

2525
01:51:28,390 --> 01:51:26,480
of the exterior of the space station and

2526
01:51:30,790 --> 01:51:28,400
uh we're like i said we're coming close

2527
01:51:32,550 --> 01:51:30,800
to the end of that maneuver

2528
01:51:35,430 --> 01:51:32,560
and we had some great views there we do

2529
01:51:37,350 --> 01:51:35,440
expect the video feed to come in and out

2530
01:51:39,589 --> 01:51:37,360
occasionally just due to uh ground

2531
01:51:41,350 --> 01:51:39,599
station coverage however we'll bring

2532
01:51:43,750 --> 01:51:41,360
those those views back to you now that

2533
01:51:45,270 --> 01:51:43,760
we're in daylight once again uh as you

2534
01:51:48,070 --> 01:51:45,280
just saw moments ago

2535
01:51:50,310 --> 01:51:48,080
we have some pretty incredible shots

2536
01:51:52,950 --> 01:51:50,320
we're in the final minutes of that uh

2537
01:51:54,790 --> 01:51:52,960
third cruise phase between the

2538
01:51:56,550 --> 01:51:54,800

nader side or the bottom portion to the

2539
01:51:58,070 --> 01:51:56,560
very forward end of the international

2540
01:52:00,229 --> 01:51:58,080
space station it's really a matter of

2541
01:52:03,030 --> 01:52:00,239
moments at this point before we hear

2542
01:52:05,030 --> 01:52:03,040
about the dragon and the crew here we go

2543
01:52:11,150 --> 01:52:05,040
ever spacex on the big loop the forward

2544
01:52:18,070 --> 01:52:13,750
[Applause]

2545
01:52:22,470 --> 01:52:20,149
and with that forward waypoint reached

2546
01:52:25,109 --> 01:52:22,480
the dragon is automatically executing a

2547
01:52:33,350 --> 01:52:25,119
50-second burn now in progress it's the

2548
01:52:37,030 --> 01:52:34,950
it should be a matter of moments until

2549
01:52:38,870 --> 01:52:37,040
it's complete and there it is looks like

2550
01:52:41,350 --> 01:52:38,880
the uh fly around burn the 50 second

2551
01:52:43,830 --> 01:52:41,360
burn is complete so that's it uh that is

2552
01:52:45,589 --> 01:52:43,840
the fire round it's

2553
01:52:47,830 --> 01:52:45,599
they still have that cruise phase of the

2554
01:52:49,669 --> 01:52:47,840
final quadrant uh that's not the forward

2555
01:52:51,830 --> 01:52:49,679
end to the zenith end so they'll be able

2556
01:52:53,510 --> 01:52:51,840
to survey the very forward end of the

2557
01:52:55,830 --> 01:52:53,520
space station they'll get a good look at

2558
01:52:57,350 --> 01:52:55,840
the forward uh docking port where crew 3

2559
01:52:58,470 --> 01:52:57,360
is going to be docking to in a couple of

2560
01:53:00,310 --> 01:52:58,480
days here

2561
01:53:02,229 --> 01:53:00,320
they'll be able to see the japanese

2562
01:53:03,990 --> 01:53:02,239
module the european module and you can

2563
01:53:05,669 --> 01:53:04,000

see they'll see a lot of the

2564
01:53:08,390 --> 01:53:05,679
united states orbiting segment which

2565
01:53:10,149 --> 01:53:08,400
includes a lot of the u.s modules as

2566
01:53:11,669 --> 01:53:10,159
well and they'll of course see the back

2567
01:53:14,229 --> 01:53:11,679
of the russian modules but they were

2568
01:53:16,149 --> 01:53:14,239
already surveyed as part of burns one

2569
01:53:18,070 --> 01:53:16,159
through three that's the final burn so

2570
01:53:20,070 --> 01:53:18,080
they're now in the cruise phase and

2571
01:53:23,189 --> 01:53:20,080
they'll continue to drift uh for the

2572
01:53:25,510 --> 01:53:23,199
next about 20-25 minutes until they

2573
01:53:26,870 --> 01:53:25,520
reach that depart burn zero

2574
01:53:29,350 --> 01:53:26,880
it'll be

2575
01:53:32,790 --> 01:53:29,360
essentially at the same point where that

2576
01:53:34,390 --> 01:53:32,800
first fly around burn was executed

2577
01:53:36,709 --> 01:53:34,400
right in that same position the

2578
01:53:39,189 --> 01:53:36,719
difference here is it'll be executing a

2579
01:53:40,950 --> 01:53:39,199
departure burn which means it'll break

2580
01:53:42,870 --> 01:53:40,960
away from the keep out sphere which it's

2581
01:53:44,629 --> 01:53:42,880
been pretty much hugging through this

2582
01:53:46,470 --> 01:53:44,639
whole fly around maneuver about 200

2583
01:53:48,790 --> 01:53:46,480
meters from the international space

2584
01:53:50,870 --> 01:53:48,800
station and then execute another one to

2585
01:53:53,669 --> 01:53:50,880
exit the approach ellipsoid which is an

2586
01:53:55,990 --> 01:53:53,679
imaginary marker that will effectively

2587
01:53:57,589 --> 01:53:56,000
end joint operations between the mission

2588
01:53:59,189 --> 01:53:57,599

control houston and mission control

2589
01:54:00,870 --> 01:53:59,199
hawthorne although houston will be

2590
01:54:02,790 --> 01:54:00,880
monitoring along the way it's really up

2591
01:54:05,030 --> 01:54:02,800
to the dragon teams here in hawthorne to

2592
01:54:06,390 --> 01:54:05,040
carry the crew home

2593
01:54:08,870 --> 01:54:06,400
there on your screen

2594
01:54:10,550 --> 01:54:08,880
while the shot was still overexposed

2595
01:54:14,310 --> 01:54:10,560
just a little bit now as well you can

2596
01:54:16,950 --> 01:54:14,320
actually see the draco thrusters firing

2597
01:54:18,790 --> 01:54:16,960
which of course are allowing dragon to

2598
01:54:20,709 --> 01:54:18,800
hold its position

2599
01:54:23,030 --> 01:54:20,719
during this

2600
01:54:35,750 --> 01:54:23,040
very carefully choreographed maneuver

2601
01:54:40,870 --> 01:54:38,470
and it's about 20 to 25 minutes that'll

2602
01:54:41,830 --> 01:54:40,880
uh the dragon will be in this drifting

2603
01:54:43,589 --> 01:54:41,840
phase

2604
01:54:45,750 --> 01:54:43,599
and like kate said we'll see the uh

2605
01:54:47,430 --> 01:54:45,760
draco engine engines firing along the

2606
01:54:49,990 --> 01:54:47,440
way just to keep it in that same

2607
01:54:52,390 --> 01:54:50,000
orientation making sure that forward end

2608
01:54:54,870 --> 01:54:52,400
uh the open hatch that you can see there

2609
01:54:58,629 --> 01:54:54,880
that's where the space the dragon was

2610
01:55:00,229 --> 01:54:58,639
docked to the station for 197 days uh

2611
01:55:02,229 --> 01:55:00,239
and it's also at the very center of

2612
01:55:05,189 --> 01:55:02,239
which you can see sort of a light at the

2613
01:55:07,750 --> 01:55:05,199

very center of that docking uh port or

2614
01:55:10,070 --> 01:55:07,760
the hatch that's where tomate is taking

2615
01:55:13,270 --> 01:55:10,080
some of those photos he's got about 20

2616
01:55:15,109 --> 01:55:13,280
to 25 minutes left of this uh before the

2617
01:55:17,910 --> 01:55:15,119
dragon automatically executes a

2618
01:55:19,510 --> 01:55:17,920
departure burn zero the entire way

2619
01:55:20,870 --> 01:55:19,520
should be in daylight so we should be

2620
01:55:22,070 --> 01:55:20,880
seeing great views as long as we have

2621
01:55:23,750 --> 01:55:22,080
coverage right we need the

2622
01:55:25,750 --> 01:55:23,760
geosynchronous satellites the tdrs

2623
01:55:27,830 --> 01:55:25,760
satellites to provide some of those uh

2624
01:55:29,109 --> 01:55:27,840
high bandwidth views to provide these

2625
01:55:30,870 --> 01:55:29,119
high definition

2626
01:55:32,870 --> 01:55:30,880
camera views from the station looking at

2627
01:55:34,470 --> 01:55:32,880
dragon we may even see some of the

2628
01:55:36,950 --> 01:55:34,480
similar views from dragon looking at

2629
01:55:38,790 --> 01:55:36,960
station but it's about 20-25 minutes

2630
01:55:40,709 --> 01:55:38,800
until we get to that point dragon will

2631
01:55:43,270 --> 01:55:40,719
automatically execute to part burn zero

2632
01:55:45,589 --> 01:55:43,280
and one and all crew members including

2633
01:55:47,510 --> 01:55:45,599
shane kimbrough and megan mcarthur who i

2634
01:55:49,109 --> 01:55:47,520
believe are still in their spacex

2635
01:55:51,030 --> 01:55:49,119
launcher entry suits and the commander

2636
01:55:52,790 --> 01:55:51,040
in pilot c monitoring this entire

2637
01:55:54,709 --> 01:55:52,800
maneuver uh they'll be able to take a

2638
01:55:56,390 --> 01:55:54,719

short break doff their suits for just a

2639
01:55:57,589 --> 01:55:56,400
little bit just a couple of hours until

2640
01:55:59,990 --> 01:55:57,599
they have to put them back on again

2641
01:56:03,430 --> 01:56:00,000
getting ready for the final phase of

2642
01:56:05,830 --> 01:56:03,440
flight which is the dynamic part of the

2643
01:56:07,990 --> 01:56:05,840
of the flight it is the deorbit burn and

2644
01:56:10,950 --> 01:56:08,000
the entry into earth's atmosphere

2645
01:56:16,670 --> 01:56:10,960
slowing down dragon from 17 000 miles

2646
02:08:41,510 --> 01:56:35,980
[Applause]

2647
02:08:45,750 --> 02:08:43,589
if you've just joined us recently the

2648
02:08:47,830 --> 02:08:45,760
crew dragon endeavor spacecraft has

2649
02:08:51,510 --> 02:08:47,840
departed the space station had an

2650
02:08:53,990 --> 02:08:51,520
on-time separation at 1105 am pacific

2651
02:08:56,069 --> 02:08:54,000
it is nearly done with the fly around

2652
02:08:57,990 --> 02:08:56,079
maneuver around the space station as a

2653
02:09:00,790 --> 02:08:58,000
photographic survey

2654
02:09:03,589 --> 02:09:00,800
and we are one step closer to bringing

2655
02:09:05,189 --> 02:09:03,599
the crew to croom back home to earth

2656
02:09:07,270 --> 02:09:05,199
later this evening expecting a

2657
02:09:11,270 --> 02:09:07,280
splashdown off the coast of pensacola

2658
02:09:13,030 --> 02:09:11,280
florida at 7 33 p.m pacific

2659
02:09:15,189 --> 02:09:13,040
that's right we're in the final stretch

2660
02:09:17,589 --> 02:09:15,199
about a little less than 10 minutes

2661
02:09:19,750 --> 02:09:17,599
remaining in this cruise phase

2662
02:09:21,510 --> 02:09:19,760
there were four burns that were executed

2663
02:09:23,990 --> 02:09:21,520

50 seconds each

2664
02:09:26,709 --> 02:09:24,000
at each quadrant of the fly around

2665
02:09:29,270 --> 02:09:26,719
starting at the zenith most or the space

2666
02:09:32,149 --> 02:09:29,280
facing side of the international space

2667
02:09:34,950 --> 02:09:32,159
station the zenith port on the harmony

2668
02:09:36,790 --> 02:09:34,960
module has been the home of crew dragon

2669
02:09:38,229 --> 02:09:36,800
endeavor for the international space

2670
02:09:40,350 --> 02:09:38,239
station

2671
02:09:44,310 --> 02:09:40,360
attached for the past

2672
02:09:46,069 --> 02:09:44,320
197 days it backed away making its way

2673
02:09:49,270 --> 02:09:46,079
from the docking position out to

2674
02:09:51,109 --> 02:09:49,280
waypoint one about 220 meters away from

2675
02:09:53,589 --> 02:09:51,119
the international space station into a

2676
02:09:56,069 --> 02:09:53,599
hold position and it was really a matter

2677
02:09:58,229 --> 02:09:56,079
of seconds that uh the pilot megan

2678
02:10:01,430 --> 02:09:58,239
macarthur on board the crew dragon

2679
02:10:03,990 --> 02:10:01,440
endeavor executed the first fly around

2680
02:10:07,350 --> 02:10:04,000
burn initiated dragon to automatically

2681
02:10:10,149 --> 02:10:07,360
enter into its fly around sequence again

2682
02:10:11,910 --> 02:10:10,159
50 second burns each at each quadrant

2683
02:10:13,910 --> 02:10:11,920
around the international space station

2684
02:10:15,669 --> 02:10:13,920
starting at the very top and working its

2685
02:10:17,589 --> 02:10:15,679
way towards the back of the station and

2686
02:10:19,669 --> 02:10:17,599
making its way around we're now in the

2687
02:10:21,990 --> 02:10:19,679
final 10 minutes in the cruise phase at

2688
02:10:24,310 --> 02:10:22,000

the forward most port making its way

2689
02:10:26,550 --> 02:10:24,320
back to the very top essentially the

2690
02:10:28,470 --> 02:10:26,560
starting position where we were just an

2691
02:10:30,629 --> 02:10:28,480
hour and a half ago

2692
02:10:33,109 --> 02:10:30,639
as i mentioned uh during this hour and a

2693
02:10:35,350 --> 02:10:33,119
half long maneuver uh the

2694
02:10:37,910 --> 02:10:35,360
crude the dragon uh and the

2695
02:10:40,629 --> 02:10:37,920
international space station have orbited

2696
02:10:43,189 --> 02:10:40,639
the earth one time so we started over

2697
02:10:45,510 --> 02:10:43,199
the south atlantic ocean and we are now

2698
02:10:47,430 --> 02:10:45,520
again over the south atlantic ocean

2699
02:10:49,430 --> 02:10:47,440
we're about to cross over the terminator

2700
02:10:51,990 --> 02:10:49,440
line uh which is the line between

2701
02:10:53,189 --> 02:10:52,000
orbital daytime and orbital darkness

2702
02:10:56,310 --> 02:10:53,199
that'll be

2703
02:10:58,550 --> 02:10:56,320
essentially the final end or the end of

2704
02:10:59,589 --> 02:10:58,560
the fly around maneuver and right about

2705
02:11:01,510 --> 02:10:59,599
at about

2706
02:11:04,709 --> 02:11:01,520
depart burn zero which is the first

2707
02:11:06,709 --> 02:11:04,719
departure burn of five uh departure

2708
02:11:08,709 --> 02:11:06,719
burns zero one two three to get us

2709
02:11:10,709 --> 02:11:08,719
outside of the international space

2710
02:11:12,629 --> 02:11:10,719
station roughly co-elliptic with the

2711
02:11:14,550 --> 02:11:12,639
international space station followed by

2712
02:11:17,109 --> 02:11:14,560
a fifth burn called the departure phase

2713
02:11:19,990 --> 02:11:17,119

burn uh that'll take us outside of the

2714
02:11:21,990 --> 02:11:20,000
same plane of the station and line up

2715
02:11:24,390 --> 02:11:22,000
with the landing location that is

2716
02:11:26,470 --> 02:11:24,400
pensacola florida

2717
02:11:29,030 --> 02:11:26,480
all the meanwhile uh

2718
02:11:31,430 --> 02:11:29,040
issa astronaut thomas pesquet has been

2719
02:11:33,990 --> 02:11:31,440
taking photographs uh

2720
02:11:36,790 --> 02:11:34,000
basically out of that small white

2721
02:11:37,910 --> 02:11:36,800
light that you see there at the top of

2722
02:11:40,069 --> 02:11:37,920
dragon

2723
02:11:41,830 --> 02:11:40,079
well it is the top but to us it looks

2724
02:11:44,149 --> 02:11:41,840
like it's the middle uh that is

2725
02:11:46,470 --> 02:11:44,159
essentially the middle of the forward

2726
02:11:49,430 --> 02:11:46,480
hatch it's a small window and tama

2727
02:11:51,270 --> 02:11:49,440
pesquet has been

2728
02:11:53,189 --> 02:11:51,280
basically positioned right there near

2729
02:11:55,030 --> 02:11:53,199
the hatch with a camera and taking

2730
02:11:57,270 --> 02:11:55,040
photographs through the hatch

2731
02:11:58,870 --> 02:11:57,280
that hatch window of the station

2732
02:12:01,750 --> 02:11:58,880
throughout the duration of this

2733
02:12:03,910 --> 02:12:01,760
fly-around maneuver uh nasa astronauts

2734
02:12:06,709 --> 02:12:03,920
uh commander shane kimbrough and meg

2735
02:12:08,390 --> 02:12:06,719
pilot megan macarthur have remained in

2736
02:12:11,030 --> 02:12:08,400
their suits and in their seats

2737
02:12:15,430 --> 02:12:11,040
throughout this time to monitor progress

2738
02:12:17,350 --> 02:12:15,440

and position and tomah and aki had the

2739
02:12:20,069 --> 02:12:17,360
opportunity to actually hop out of their

2740
02:12:22,870 --> 02:12:20,079
seats toma took off his suit to allow

2741
02:12:24,950 --> 02:12:22,880
better mobility and has been doing this

2742
02:12:27,270 --> 02:12:24,960
photo documentation of the exterior of

2743
02:12:30,390 --> 02:12:27,280
the space station for as you said gary

2744
02:12:31,830 --> 02:12:30,400
the last hour and a half or so

2745
02:12:33,510 --> 02:12:31,840
so we're in the final stretch here just

2746
02:12:36,629 --> 02:12:33,520
a few more minutes until we get to the

2747
02:12:38,790 --> 02:12:36,639
very top or the r bar

2748
02:12:40,550 --> 02:12:38,800
uh the is essentially a

2749
02:12:42,390 --> 02:12:40,560
invisible vertical line that goes right

2750
02:12:44,470 --> 02:12:42,400
through the middle of the space station

2751
02:12:46,470 --> 02:12:44,480
uh that is where

2752
02:12:49,109 --> 02:12:46,480
dragon will automatically execute the

2753
02:12:51,030 --> 02:12:49,119
first of five departure burns you see

2754
02:12:52,229 --> 02:12:51,040
departure burns zero there at the very

2755
02:12:54,149 --> 02:12:52,239
top

2756
02:12:56,550 --> 02:12:54,159
right in line with where that first fly

2757
02:12:58,950 --> 02:12:56,560
around burn was executed that was a 50

2758
02:13:01,430 --> 02:12:58,960
second burn departure burn zero is a

2759
02:13:04,550 --> 02:13:01,440
little shorter it's about 15 seconds its

2760
02:13:07,270 --> 02:13:04,560
job is to take dragon outside of the

2761
02:13:09,750 --> 02:13:07,280
keep out sphere the keep out sphere is

2762
02:13:13,350 --> 02:13:09,760
you can see almost a perfect circle it's

2763
02:13:15,270 --> 02:13:13,360

a 200 meter radius around the outside of

2764
02:13:17,430 --> 02:13:15,280
the international space station and that

2765
02:13:20,069 --> 02:13:17,440
is what dragon has been following it's

2766
02:13:21,750 --> 02:13:20,079
been pretty much uh 200 meters the whole

2767
02:13:24,069 --> 02:13:21,760
way give or take a little bit of

2768
02:13:25,589 --> 02:13:24,079
oscillation in either direction but for

2769
02:13:27,669 --> 02:13:25,599
the most part it's been following that

2770
02:13:29,669 --> 02:13:27,679
line now we're just minutes away from

2771
02:13:31,830 --> 02:13:29,679
executing that departure burn zero

2772
02:13:33,510 --> 02:13:31,840
that'll be an automatic maneuver to get

2773
02:13:34,950 --> 02:13:33,520
our crew members home and kate as you

2774
02:13:36,950 --> 02:13:34,960
said the commander and pilot have been

2775
02:13:38,069 --> 02:13:36,960
suited up monitoring this entire

2776
02:13:39,910 --> 02:13:38,079
procedure

2777
02:13:42,069 --> 02:13:39,920
really just not having the time to get

2778
02:13:43,669 --> 02:13:42,079
out but after this after the departure

2779
02:13:45,830 --> 02:13:43,679
burns uh

2780
02:13:48,229 --> 02:13:45,840
departure burn one i believe once

2781
02:13:50,629 --> 02:13:48,239
they're outside the approach ellipsoid

2782
02:13:52,310 --> 02:13:50,639
they'll have a chance to doff or take

2783
02:13:54,470 --> 02:13:52,320
off their spacesuits for just a little

2784
02:13:56,629 --> 02:13:54,480
bit before they have to put them back on

2785
02:13:58,470 --> 02:13:56,639
again it'll be about that time well

2786
02:13:59,430 --> 02:13:58,480
they'll have the ability to have a crew

2787
02:14:01,109 --> 02:13:59,440
meal

2788
02:14:02,550 --> 02:14:01,119

get some food in them endeavor spacex on

2789
02:14:04,629 --> 02:14:02,560
the big loop the forward way point has

2790
02:14:09,350 --> 02:14:04,639
been reached departure burn zero is in

2791
02:14:17,370 --> 02:14:11,109
endeavour copies we see depart zero

2792
02:14:24,310 --> 02:14:22,950
[Applause]

2793
02:14:26,629 --> 02:14:24,320
and you heard confirmation that that

2794
02:14:28,950 --> 02:14:26,639
depart zero burn has started it's also

2795
02:14:31,510 --> 02:14:28,960
just in time ended it's only a 15 second

2796
02:14:33,189 --> 02:14:31,520
burn very short to allow the dragon to

2797
02:14:40,470 --> 02:14:33,199
exit the keep out sphere which we'll be

2798
02:14:44,390 --> 02:14:42,390
as i've mentioned before

2799
02:14:46,870 --> 02:14:44,400
hawthorne here is

2800
02:14:48,790 --> 02:14:46,880
an active production facility so we've

2801
02:14:56,470 --> 02:14:48,800
got some physics departure burn zero was

2802
02:15:00,550 --> 02:14:58,390
all right good call out there indicating

2803
02:15:02,310 --> 02:15:00,560
that the first of the five

2804
02:15:05,030 --> 02:15:02,320
burns that we're going to execute today

2805
02:15:08,790 --> 02:15:05,040
was nominal um again that was a 15

2806
02:15:11,109 --> 02:15:08,800
second burn uh known as departure uh

2807
02:15:14,870 --> 02:15:11,119
burn zero again that is the first of

2808
02:15:18,950 --> 02:15:16,709
it's about five minutes from the next

2809
02:15:20,950 --> 02:15:18,960
departure burn departure burn one

2810
02:15:23,990 --> 02:15:20,960
the second in a series of five that

2811
02:15:26,550 --> 02:15:24,000
brings the uh crude dragon endeavor back

2812
02:15:28,950 --> 02:15:26,560
home to earth right before that deorbit

2813
02:15:31,510 --> 02:15:28,960

burn it's a very critical burn that'll

2814
02:15:33,510 --> 02:15:31,520
be that final 16 and a half minute burn

2815
02:15:35,030 --> 02:15:33,520
of the forward dracos that'll slow

2816
02:15:37,750 --> 02:15:35,040
dragon down enough

2817
02:15:39,589 --> 02:15:37,760
so that it enters the earth's atmosphere

2818
02:15:41,830 --> 02:15:39,599
there is atmosphere doing most of the

2819
02:15:43,830 --> 02:15:41,840
legwork to slow dragon down to a

2820
02:15:45,830 --> 02:15:43,840
reasonable speed right now

2821
02:15:51,910 --> 02:15:45,840
uh traveling at about 16 docking

2822
02:15:55,430 --> 02:15:54,069
spacex copies on dragon to ground suit

2823
02:16:07,430 --> 02:15:55,440
doffing and audio configuration

2824
02:16:11,669 --> 02:16:09,430
all right it's a good call out there uh

2825
02:16:12,950 --> 02:16:11,679
suit doffing that simply means taking

2826
02:16:14,790 --> 02:16:12,960
the suit off

2827
02:16:18,310 --> 02:16:14,800
uh so aki

2828
02:16:19,990 --> 02:16:18,320
shane and megan um will now be or have

2829
02:16:22,629 --> 02:16:20,000
taken their suits off

2830
02:16:24,390 --> 02:16:22,639
tomorrow already had his removed because

2831
02:16:25,750 --> 02:16:24,400
he removed it prior to beginning the fly

2832
02:16:28,310 --> 02:16:25,760
around maneuver

2833
02:16:29,830 --> 02:16:28,320
[Music]

2834
02:16:32,309 --> 02:16:29,840
so this should be outside the keep out

2835
02:16:33,669 --> 02:16:32,319
sphere at this point as well they're

2836
02:16:36,389 --> 02:16:33,679
just uh

2837
02:16:38,469 --> 02:16:36,399
minutes away from the second departure

2838
02:16:42,070 --> 02:16:38,479

burn that'll be depart burn one

2839
02:16:43,509 --> 02:16:42,080
department one is a little bit longer 21

2840
02:16:45,509 --> 02:16:43,519
seconds long

2841
02:16:48,150 --> 02:16:45,519
but it its job is to increase the

2842
02:16:50,150 --> 02:16:48,160
distance from between the international

2843
02:16:52,389 --> 02:16:50,160
space station and the crew dragon you

2844
02:16:54,950 --> 02:16:52,399
can see there it's a burn that uh just

2845
02:16:57,270 --> 02:16:54,960
slows it down and or orbital mechanics

2846
02:16:58,150 --> 02:16:57,280
does the rest uh allowing the

2847
02:17:01,030 --> 02:16:58,160
uh

2848
02:17:04,549 --> 02:17:01,040
dragon to reduce its altitude and by

2849
02:17:06,389 --> 02:17:04,559
doing so um it exits the approach

2850
02:17:08,870 --> 02:17:06,399
ellipsoid it's a four kilometer by two

2851
02:17:11,910 --> 02:17:08,880
kilometer by two kilometer uh

2852
02:17:15,030 --> 02:17:11,920
oval shape uh once it exits from there

2853
02:17:17,190 --> 02:17:15,040
uh the crew will be outside of joint

2854
02:17:19,830 --> 02:17:17,200
operations so the

2855
02:17:22,309 --> 02:17:19,840
houston teams and hawthorne teams will

2856
02:17:24,070 --> 02:17:22,319
now be uh they don't need to do the

2857
02:17:26,150 --> 02:17:24,080
joint operations anymore once we were

2858
02:17:28,469 --> 02:17:26,160
inside the vicinity of the international

2859
02:17:30,230 --> 02:17:28,479
space station which was really that

2860
02:17:31,830 --> 02:17:30,240
entire fly around maneuver each of the

2861
02:17:33,270 --> 02:17:31,840
teams was carefully monitoring that

2862
02:17:35,190 --> 02:17:33,280
procedure but once you're outside the

2863
02:17:36,549 --> 02:17:35,200

approach ellipsoid it's really up to the

2864
02:17:38,230 --> 02:17:36,559
dragon teams here in hawthorne that

2865
02:17:40,709 --> 02:17:38,240
you're seeing on your screen these teams

2866
02:17:42,389 --> 02:17:40,719
will be the one to carry the crew home

2867
02:17:47,110 --> 02:17:42,399
for the next few hours until we splash

2868
02:17:49,429 --> 02:17:47,120
down 7 30 3 p.m pacific time 10 33 p.m

2869
02:17:51,030 --> 02:17:49,439
eastern standard time over in the gulf

2870
02:17:53,110 --> 02:17:51,040
of mexico

2871
02:17:55,349 --> 02:17:53,120
yeah now like we said before these

2872
02:17:58,549 --> 02:17:55,359
departure burns that were executing a

2873
02:18:01,030 --> 02:17:58,559
total of five it's all a series of

2874
02:18:03,509 --> 02:18:01,040
carefully choreographed maneuvers in

2875
02:18:05,589 --> 02:18:03,519
order to safely

2876
02:18:08,309 --> 02:18:05,599
move dragon away from station and

2877
02:18:10,389 --> 02:18:08,319
essentially put it on a trajectory back

2878
02:18:11,830 --> 02:18:10,399
home to earth like we said before we're

2879
02:18:14,309 --> 02:18:11,840
gonna splash down off the coast of

2880
02:18:17,110 --> 02:18:14,319
pensacola florida but if you're familiar

2881
02:18:19,429 --> 02:18:17,120
with how long it takes to get to station

2882
02:18:20,389 --> 02:18:19,439
um you might have noticed by now that

2883
02:18:22,709 --> 02:18:20,399
it's

2884
02:18:25,270 --> 02:18:22,719
a lot faster to leave station than it is

2885
02:18:27,990 --> 02:18:25,280
to than it is to approach it um so at

2886
02:18:29,669 --> 02:18:28,000
this point in our journey today we're

2887
02:18:31,830 --> 02:18:29,679
kind of back into what you might

2888
02:18:35,349 --> 02:18:31,840

consider like a regular departure from

2889
02:18:36,870 --> 02:18:35,359
station that fly around maneuver was a a

2890
02:18:39,110 --> 02:18:36,880
special one like we said before just the

2891
02:18:40,389 --> 02:18:39,120
photo documentation of the exterior of

2892
02:18:41,830 --> 02:18:40,399
the station

2893
02:18:44,070 --> 02:18:41,840
so at this point in time we have kind of

2894
02:18:46,469 --> 02:18:44,080
moved back into those maneuvers that we

2895
02:18:48,469 --> 02:18:46,479
have seen previously on crew dragon

2896
02:18:50,629 --> 02:18:48,479
departures from station

2897
02:18:54,150 --> 02:18:50,639
and like i said before

2898
02:18:57,030 --> 02:18:54,160
total of five and um it's a lot faster

2899
02:18:59,110 --> 02:18:57,040
to leave than it is to arrive

2900
02:19:01,910 --> 02:18:59,120
there are some trajectories that take

2901
02:19:03,349 --> 02:19:01,920
about 18 or 19 hours that would have

2902
02:19:05,990 --> 02:19:03,359
been approximately what we would have

2903
02:19:07,589 --> 02:19:06,000
looked at if we were to depart yesterday

2904
02:19:09,110 --> 02:19:07,599
uh but again we are constantly

2905
02:19:10,870 --> 02:19:09,120
monitoring weather we were looking at

2906
02:19:12,709 --> 02:19:10,880
some of the splashdown zones there are

2907
02:19:14,389 --> 02:19:12,719
seven identified splat

2908
02:19:16,150 --> 02:19:14,399
splashdown zones around the coast of

2909
02:19:18,309 --> 02:19:16,160
florida that we were looking at and

2910
02:19:19,830 --> 02:19:18,319
weather just wasn't uh cooperating for

2911
02:19:23,110 --> 02:19:19,840
us some of the wind speeds were a little

2912
02:19:25,270 --> 02:19:23,120
on the high end so we deferred to today

2913
02:19:26,629 --> 02:19:25,280

did the same exact thing did a brief of

2914
02:19:28,790 --> 02:19:26,639
the weather making sure that everything

2915
02:19:30,870 --> 02:19:28,800
was good and then prior to undocking

2916
02:19:33,270 --> 02:19:30,880
today did a final weather brief to say

2917
02:19:34,790 --> 02:19:33,280
are we good to undock and splash down

2918
02:19:37,270 --> 02:19:34,800
off the coast of florida the answer was

2919
02:19:39,509 --> 02:19:37,280
yes uh that is not the final decision

2920
02:19:41,190 --> 02:19:39,519
right there is a scenario where uh we

2921
02:19:43,030 --> 02:19:41,200
could use some of these departures

2922
02:19:44,870 --> 02:19:43,040
spacex on the big loop

2923
02:19:46,549 --> 02:19:44,880
the part one burn is complete and

2924
02:19:48,389 --> 02:19:46,559
nominal

2925
02:19:50,710 --> 02:19:48,399
reminder that the ground will be

2926
02:19:52,290 --> 02:19:50,720
deactivating the big loop following exit

2927
02:19:59,349 --> 02:19:52,300
from the approach ellipsoid

2928
02:20:05,750 --> 02:20:02,710
and ever copies all

2929
02:20:08,550 --> 02:20:05,760
there you go a good depart burn one

2930
02:20:10,309 --> 02:20:08,560
that is a critical burn and you can see

2931
02:20:12,150 --> 02:20:10,319
a lot's happening after that burn now

2932
02:20:14,230 --> 02:20:12,160
that that burn has been executed it

2933
02:20:16,150 --> 02:20:14,240
really increases the distance between

2934
02:20:18,870 --> 02:20:16,160
the crew dragon and the space station a

2935
02:20:20,790 --> 02:20:18,880
21 second burn you heard that the crew

2936
02:20:23,190 --> 02:20:20,800
themselves have already doffed their

2937
02:20:25,590 --> 02:20:23,200
suits so they don't need it anymore for

2938
02:20:27,270 --> 02:20:25,600

this phase of flight but once we are

2939
02:20:29,110 --> 02:20:27,280
outside the approach ellipsoid which is

2940
02:20:31,830 --> 02:20:29,120
a four kilometer by two kilometer by two

2941
02:20:33,349 --> 02:20:31,840
kilometer uh oval shape will be outside

2942
02:20:35,510 --> 02:20:33,359
of joint operations which we're

2943
02:20:37,349 --> 02:20:35,520
currently in now so you have this

2944
02:20:40,469 --> 02:20:37,359
houston teams you have the international

2945
02:20:42,309 --> 02:20:40,479
space station dragon and hawthorne all

2946
02:20:44,230 --> 02:20:42,319
on the same communication loop called

2947
02:20:46,230 --> 02:20:44,240
the big loop once we're outside that

2948
02:20:47,910 --> 02:20:46,240
approach ellipsoid which we should be

2949
02:20:50,230 --> 02:20:47,920
very shortly now that we've executed to

2950
02:20:51,910 --> 02:20:50,240
part burn one will take down that loop

2951
02:20:54,630 --> 02:20:51,920
and we'll just be hearing dragon grounds

2952
02:20:56,950 --> 02:20:54,640
from here on out yeah so as gary said

2953
02:20:59,510 --> 02:20:56,960
we're now waiting for dragon to exit

2954
02:21:01,590 --> 02:20:59,520
that approach ellipsoid or ae as you

2955
02:21:03,270 --> 02:21:01,600
might hear it referred to as

2956
02:21:05,030 --> 02:21:03,280
and like we said that's another

2957
02:21:07,429 --> 02:21:05,040
imaginary shape

2958
02:21:09,190 --> 02:21:07,439
this time a three-dimensional ellipsoid

2959
02:21:11,270 --> 02:21:09,200
measuring four kilometers by two

2960
02:21:13,270 --> 02:21:11,280
kilometers by two kilometers

2961
02:21:15,110 --> 02:21:13,280
and it's in the same family as the keep

2962
02:21:17,750 --> 02:21:15,120
out sphere but one of the key

2963
02:21:20,309 --> 02:21:17,760

differences with the approach ellipsoid

2964
02:21:23,830 --> 02:21:20,319
is that vehicles outside of it have to

2965
02:21:26,950 --> 02:21:23,840
be on what we call a 24-hour safe free

2966
02:21:29,670 --> 02:21:26,960
drift trajectory so that basically means

2967
02:21:32,309 --> 02:21:29,680
that the spacecraft would not cross into

2968
02:21:33,270 --> 02:21:32,319
the approach ellipsoid for

2969
02:21:35,670 --> 02:21:33,280
would not

2970
02:21:38,790 --> 02:21:35,680
cross into the approach ellipsoid for at

2971
02:21:41,670 --> 02:21:38,800
least 24 hours and again even if it lost

2972
02:21:43,990 --> 02:21:41,680
all maneuvering uh even even if it lost

2973
02:21:46,630 --> 02:21:44,000
all that maneuvering so uh listen in for

2974
02:21:49,110 --> 02:21:46,640
that call uh i call out once we hear

2975
02:21:51,270 --> 02:21:49,120
confirmation that dragon is outside of

2976
02:21:57,750 --> 02:21:51,280
the approach ellipsoid which uh we're

2977
02:22:02,710 --> 02:22:00,309
this is a very uh choreographed

2978
02:22:05,670 --> 02:22:02,720
we'll call it a dance right every uh

2979
02:22:07,270 --> 02:22:05,680
every moment counts uh you heard even as

2980
02:22:09,030 --> 02:22:07,280
we were

2981
02:22:11,750 --> 02:22:09,040
undocking from the space station and

2982
02:22:14,230 --> 02:22:11,760
getting towards that hold point waypoint

2983
02:22:16,710 --> 02:22:14,240
one which is on the edge of the keep out

2984
02:22:18,309 --> 02:22:16,720
sphere and was really important to make

2985
02:22:20,309 --> 02:22:18,319
sure that we were ready to execute that

2986
02:22:22,230 --> 02:22:20,319
fly around maneuver it was really

2987
02:22:23,510 --> 02:22:22,240
moments we have to execute in a series

2988
02:22:25,349 --> 02:22:23,520

of moments because we're tightened

2989
02:22:26,790 --> 02:22:25,359
perfectly where all we have to do is

2990
02:22:28,950 --> 02:22:26,800
just a couple second bursts here and

2991
02:22:30,790 --> 02:22:28,960
there right we heard departure burn zero

2992
02:22:33,190 --> 02:22:30,800
which is a 15 second burst departure

2993
02:22:34,469 --> 02:22:33,200
burn one which is a 21 second burst all

2994
02:22:36,710 --> 02:22:34,479
of these are very

2995
02:22:38,309 --> 02:22:36,720
carefully choreographed to maximize fuel

2996
02:22:41,429 --> 02:22:38,319
efficiency making sure that we're not

2997
02:22:44,230 --> 02:22:41,439
burning like crazy um but as okay as you

2998
02:22:46,870 --> 02:22:44,240
said in the scenario now that we've done

2999
02:22:48,870 --> 02:22:46,880
this depart burn one uh in the scenario

3000
02:22:50,950 --> 02:22:48,880
if we were to for whatever reason lose

3001
02:22:53,590 --> 02:22:50,960
all control over those draken draco

3002
02:22:55,590 --> 02:22:53,600
thrusters we know that the trajectory

3003
02:22:57,830 --> 02:22:55,600
now that that burn is complete would

3004
02:23:00,710 --> 02:22:57,840
take the dragon outside of the approach

3005
02:23:02,389 --> 02:23:00,720
ellipsoid and we can pause there for at

3006
02:23:04,469 --> 02:23:02,399
least 24 hours like that was the safe

3007
02:23:07,110 --> 02:23:04,479
trajectory was 24 hours we can pause

3008
02:23:09,190 --> 02:23:07,120
there for a while to uh assess the

3009
02:23:11,429 --> 02:23:09,200
problem uh figure out how to recover

3010
02:23:13,110 --> 02:23:11,439
drake draco's thrusters and of course we

3011
02:23:15,910 --> 02:23:13,120
could stay there for a couple of days

3012
02:23:17,270 --> 02:23:15,920
the crew on dragon has meals for at

3013
02:23:19,030 --> 02:23:17,280

least three days

3014
02:23:20,309 --> 02:23:19,040
to find different landing opportunities

3015
02:23:21,990 --> 02:23:20,319
assess weather

3016
02:23:23,990 --> 02:23:22,000
all part of the backup plans that are

3017
02:23:26,070 --> 02:23:24,000
necessary for taking a crew home from

3018
02:23:27,510 --> 02:23:26,080
the international space station yeah and

3019
02:23:30,070 --> 02:23:27,520
like we mentioned before we are

3020
02:23:33,510 --> 02:23:30,080
expecting to bring the crew home today

3021
02:23:35,910 --> 02:23:33,520
we're anticipating a splashdown of 7 33

3022
02:23:37,510 --> 02:23:35,920
p.m pacific time and they'll be

3023
02:23:40,070 --> 02:23:37,520
splashing down off the coast of

3024
02:23:41,830 --> 02:23:40,080
pensacola florida so as we've said a

3025
02:23:43,670 --> 02:23:41,840
couple of times weather has been the

3026
02:23:45,750 --> 02:23:43,680
primary watch item

3027
02:23:47,910 --> 02:23:45,760
forcing us to wave off an attempt

3028
02:23:50,230 --> 02:23:47,920
yesterday like gary mentioned earlier

3029
02:23:52,230 --> 02:23:50,240
that would have been an 18-hour

3030
02:23:55,670 --> 02:23:52,240
journey home today it's really only

3031
02:23:58,309 --> 02:23:55,680
about eight hours so um i i imagine that

3032
02:24:01,910 --> 02:23:58,319
the crew themselves are excited that

3033
02:24:04,309 --> 02:24:01,920
they have more time on station uh with

3034
02:24:07,110 --> 02:24:04,319
their pal uh

3035
02:24:09,030 --> 02:24:07,120
pals on station and um now they have a

3036
02:24:11,750 --> 02:24:09,040
shorter journey to head home and

3037
02:24:13,990 --> 02:24:11,760
splashtown in the gulf coast

3038
02:24:15,510 --> 02:24:14,000

they stay shorter kate but it is a

3039
02:24:17,910 --> 02:24:15,520
number of hours and we're going to be

3040
02:24:21,270 --> 02:24:17,920
here with you the entire time until they

3041
02:24:23,750 --> 02:24:21,280
splash down at 7 30 uh p.m pacific time

3042
02:24:25,670 --> 02:24:23,760
which is uh a little bit more than six

3043
02:24:28,150 --> 02:24:25,680
hours from now so so that's a lot and

3044
02:24:30,150 --> 02:24:28,160
we'll be here with you the entire way so

3045
02:24:32,150 --> 02:24:30,160
uh during that journey we'll be giving

3046
02:24:34,790 --> 02:24:32,160
you periodic updates of the crew now

3047
02:24:36,469 --> 02:24:34,800
that the fly around maneuver um has been

3048
02:24:38,550 --> 02:24:36,479
completed that was pretty dynamic we

3049
02:24:39,910 --> 02:24:38,560
were getting some pretty fantastic views

3050
02:24:41,830 --> 02:24:39,920
uh but now things are gonna be a little

3051
02:24:44,070 --> 02:24:41,840
bit more spaced out again conserving

3052
02:24:45,670 --> 02:24:44,080
that those departure burns making sure

3053
02:24:47,910 --> 02:24:45,680
that we're maximizing the fuel

3054
02:24:49,750 --> 02:24:47,920
efficiency and staying right on target

3055
02:24:52,389 --> 02:24:49,760
so in the meantime over the next six

3056
02:24:54,070 --> 02:24:52,399
hours or so we'll answer as many

3057
02:24:55,990 --> 02:24:54,080
questions as we can from you we want to

3058
02:24:58,230 --> 02:24:56,000
make this an interactive program so if

3059
02:25:00,550 --> 02:24:58,240
you want to ask a question to us use the

3060
02:25:02,550 --> 02:25:00,560
hashtag asknasa and we'll do our very

3061
02:25:04,389 --> 02:25:02,560
best to answer as many of them as we can

3062
02:25:06,469 --> 02:25:04,399
in between some of these more

3063
02:25:07,990 --> 02:25:06,479

some of these very important phases of

3064
02:25:10,230 --> 02:25:08,000
flight of course the next one coming up

3065
02:25:12,469 --> 02:25:10,240
is the exit of the approach ellipsoid so

3066
02:25:14,230 --> 02:25:12,479
while we wait for a confirmation of that

3067
02:25:17,190 --> 02:25:14,240
exit let's go ahead and take a couple of

3068
02:25:20,230 --> 02:25:17,200
questions uh the first one that i see is

3069
02:25:22,790 --> 02:25:20,240
coming from neta who's asking the very

3070
02:25:25,830 --> 02:25:22,800
existential question of what is space

3071
02:25:27,190 --> 02:25:25,840
weather what is weather um space weather

3072
02:25:29,830 --> 02:25:27,200
funny enough you think about weather you

3073
02:25:30,710 --> 02:25:29,840
think rain you think thunder you think

3074
02:25:32,070 --> 02:25:30,720
wind

3075
02:25:33,910 --> 02:25:32,080
a lot of the things that we see on the

3076
02:25:36,870 --> 02:25:33,920
ground there is such a thing as space

3077
02:25:38,389 --> 02:25:36,880
weather it's not quite as

3078
02:25:40,630 --> 02:25:38,399
it's not quite as

3079
02:25:43,030 --> 02:25:40,640
or what you would think of as weather

3080
02:25:44,950 --> 02:25:43,040
here on earth but the main thing you

3081
02:25:48,150 --> 02:25:44,960
have to look out for for space weather

3082
02:25:51,190 --> 02:25:48,160
is cosmic rays uh cosmic particles are

3083
02:25:52,950 --> 02:25:51,200
are coming from the sun at all times and

3084
02:25:55,670 --> 02:25:52,960
there are of course solar events that

3085
02:25:57,590 --> 02:25:55,680
can happen in fact we had one just it

3086
02:25:59,349 --> 02:25:57,600
was last week or maybe the week before

3087
02:26:01,030 --> 02:25:59,359
where there was a total solar particle

3088
02:26:02,950 --> 02:26:01,040

event we're monitoring that looking at

3089
02:26:05,349 --> 02:26:02,960
all the systems and how that can affect

3090
02:26:06,469 --> 02:26:05,359
satellites or you know the international

3091
02:26:09,110 --> 02:26:06,479
space station

3092
02:26:11,830 --> 02:26:09,120
another one is galactic cosmic rays the

3093
02:26:13,670 --> 02:26:11,840
the uh these are general radiation

3094
02:26:16,150 --> 02:26:13,680
events that are happening all across the

3095
02:26:19,270 --> 02:26:16,160
uh galaxy and of course we are looking

3096
02:26:21,750 --> 02:26:19,280
at those as well so so weather just like

3097
02:26:23,750 --> 02:26:21,760
uh on earth in space can be a little bit

3098
02:26:25,670 --> 02:26:23,760
unpredictable so we just have to react

3099
02:26:27,190 --> 02:26:25,680
in time and so yeah space weather is one

3100
02:26:29,349 --> 02:26:27,200
of those things that we are constantly

3101
02:26:30,710 --> 02:26:29,359
uh looking at these are fantastic

3102
02:26:32,630 --> 02:26:30,720
questions and we're going to try to

3103
02:26:34,550 --> 02:26:32,640
continue to answer them here

3104
02:26:37,030 --> 02:26:34,560
as part of our continuous coverage until

3105
02:26:39,110 --> 02:26:37,040
we have splashdown so keep using that

3106
02:26:41,349 --> 02:26:39,120
hashtag ask nasa we'll do the very best

3107
02:26:43,110 --> 02:26:41,359
that we can for you

3108
02:26:46,150 --> 02:26:43,120
we have one more let's see hashtag ask

3109
02:26:48,790 --> 02:26:46,160
nasa this one says nasa spacex crew 2

3110
02:26:51,030 --> 02:26:48,800
returns home hatch closure of the crew

3111
02:26:53,349 --> 02:26:51,040
dragon spacecraft on youtube what kind

3112
02:26:56,070 --> 02:26:53,359
of solar power does the international

3113
02:26:58,630 --> 02:26:56,080

space station have to sustain a crew

3114
02:27:01,349 --> 02:26:58,640
like that very good question uh lots of

3115
02:27:02,469 --> 02:27:01,359
solar power uh it's a very uh good

3116
02:27:04,710 --> 02:27:02,479
observation

3117
02:27:08,230 --> 02:27:04,720
the international space station is

3118
02:27:10,710 --> 02:27:08,240
completely solar powered uh there are uh

3119
02:27:12,870 --> 02:27:10,720
uh eight sets of gigantic solar arrays

3120
02:27:15,349 --> 02:27:12,880
that are providing uh more than 200

3121
02:27:17,830 --> 02:27:15,359
kilowatts of power to really power the

3122
02:27:20,950 --> 02:27:17,840
entire international space station just

3123
02:27:23,670 --> 02:27:20,960
like solar arrays on earth uh solar uh

3124
02:27:25,349 --> 02:27:23,680
solar rays on station don't last forever

3125
02:27:27,429 --> 02:27:25,359
so we've seen a little bit of

3126
02:27:29,750 --> 02:27:27,439
degradation over the

3127
02:27:31,670 --> 02:27:29,760
20 years at this point that the uh

3128
02:27:34,230 --> 02:27:31,680
that the solar rays have been in orbit

3129
02:27:36,710 --> 02:27:34,240
so right now we are undergoing a series

3130
02:27:38,150 --> 02:27:36,720
of space walks to upgrade some of those

3131
02:27:40,870 --> 02:27:38,160
solar arrays and as you can imagine

3132
02:27:43,910 --> 02:27:40,880
solar ray technology increases uh

3133
02:27:45,830 --> 02:27:43,920
as time goes on so just recently the

3134
02:27:47,349 --> 02:27:45,840
crew 2 astronauts who are on board the

3135
02:27:50,389 --> 02:27:47,359
international space station right now

3136
02:27:52,070 --> 02:27:50,399
shane kimbrough and tomah pesquet did a

3137
02:27:54,150 --> 02:27:52,080
spacewalk during their six months on

3138
02:27:56,710 --> 02:27:54,160

board the international space station to

3139
02:27:59,590 --> 02:27:56,720
outfit and install brand new solar

3140
02:28:01,590 --> 02:27:59,600
arrays on the uh port truss uh with the

3141
02:28:03,510 --> 02:28:01,600
far port truss that's port six on the

3142
02:28:05,750 --> 02:28:03,520
very uh if you're looking at the space

3143
02:28:07,510 --> 02:28:05,760
station the the left side are looking at

3144
02:28:08,870 --> 02:28:07,520
from the behind the space station uh

3145
02:28:11,830 --> 02:28:08,880
there's two new solar arrays out there

3146
02:28:13,429 --> 02:28:11,840
they're called iss roll out solar arrays

3147
02:28:15,429 --> 02:28:13,439
and they'll continue to provide power

3148
02:28:17,270 --> 02:28:15,439
for some of the critical items

3149
02:28:19,510 --> 02:28:17,280
onboard the international space station

3150
02:28:21,030 --> 02:28:19,520
we'll continue those power upgrades for

3151
02:28:24,150 --> 02:28:21,040
the next couple of years to make sure

3152
02:28:27,110 --> 02:28:24,160
that station continues to operate as we

3153
02:28:29,270 --> 02:28:27,120
enter this third decade of utilization

3154
02:28:31,429 --> 02:28:29,280
science and even more exciting uh

3155
02:28:32,790 --> 02:28:31,439
commercialization we're seeing a lot of

3156
02:28:34,309 --> 02:28:32,800
unique activities on board the

3157
02:28:35,510 --> 02:28:34,319
international space station very good

3158
02:28:38,790 --> 02:28:35,520
question

3159
02:28:41,030 --> 02:28:38,800
oliver

3160
02:28:43,429 --> 02:28:41,040
how long will it take for this dragon

3161
02:28:45,830 --> 02:28:43,439
unit to be reusable

3162
02:28:48,950 --> 02:28:45,840
that is a great question

3163
02:28:51,270 --> 02:28:48,960

as you noted uh reusability is super

3164
02:28:53,910 --> 02:28:51,280
important actually this dragon capsule

3165
02:28:55,590 --> 02:28:53,920
was previously used on the demo two

3166
02:28:57,910 --> 02:28:55,600
mission uh

3167
02:29:01,510 --> 02:28:57,920
which flew of course bob benkin and doug

3168
02:29:04,469 --> 02:29:01,520
hurley uh on basically the initial uh

3169
02:29:06,389 --> 02:29:04,479
crew flight for crew dragon uh and so

3170
02:29:10,070 --> 02:29:06,399
this capsule was actually reused i

3171
02:29:12,630 --> 02:29:10,080
believe it was in august of uh 2020 that

3172
02:29:14,469 --> 02:29:12,640
that mission splashed down and then this

3173
02:29:16,630 --> 02:29:14,479
mission launched just a couple a couple

3174
02:29:18,870 --> 02:29:16,640
months ago so kind of get a feel for how

3175
02:29:20,790 --> 02:29:18,880
long it took to reuse this capsule

3176
02:29:22,790 --> 02:29:20,800
however this was the first time that we

3177
02:29:25,590 --> 02:29:22,800
did go through the reuse process on a

3178
02:29:27,030 --> 02:29:25,600
dragon cap crew dragon capsule

3179
02:29:30,309 --> 02:29:27,040
took a lot of our learnings from the

3180
02:29:32,950 --> 02:29:30,319
cargo program and reusability there

3181
02:29:34,309 --> 02:29:32,960
so each time we reuse a capsule it gets

3182
02:29:37,429 --> 02:29:34,319
more efficient

3183
02:29:39,190 --> 02:29:37,439
and takes less time so i'm not sure

3184
02:29:40,710 --> 02:29:39,200
which capsule this one will be assigned

3185
02:29:43,590 --> 02:29:40,720
to in the future i can't remember off

3186
02:29:45,830 --> 02:29:43,600
the top my head um but it will certainly

3187
02:29:47,349 --> 02:29:45,840
only be a matter of a couple of months

3188
02:29:49,429 --> 02:29:47,359

for the team to actually ready the

3189
02:29:52,469 --> 02:29:49,439
hardware um and then after that it's

3190
02:29:55,270 --> 02:29:52,479
just a mission timeline um but fun fact

3191
02:29:57,670 --> 02:29:55,280
about this capsule um as we mentioned

3192
02:30:00,389 --> 02:29:57,680
before megan macarthur is the pilot of

3193
02:30:03,270 --> 02:30:00,399
this capsule four crew two uh which we

3194
02:30:04,469 --> 02:30:03,280
mentioned earlier is uh named endeavour

3195
02:30:07,830 --> 02:30:04,479
her husband

3196
02:30:09,910 --> 02:30:07,840
um bob benkin was also the pilot sitting

3197
02:30:12,710 --> 02:30:09,920
in the the same position seat for the

3198
02:30:17,030 --> 02:30:12,720
demo 2 mission so um i'm sure bob is

3199
02:30:17,950 --> 02:30:17,040
super excited to get megan back home

3200
02:30:19,349 --> 02:30:17,960
for um

3201
02:30:21,850 --> 02:30:19,359
[Applause]

3202
02:30:23,590 --> 02:30:21,860
speaking of megan that's her voice now

3203
02:30:26,309 --> 02:30:23,600
[Applause]

3204
02:30:31,990 --> 02:30:26,319
endeavor this is spacex md standing in

3205
02:30:35,750 --> 02:30:33,910
hey md just like to ask you to step

3206
02:30:38,950 --> 02:30:35,760
outside for a few minutes uh while we

3207
02:30:38,960 --> 02:30:44,550
copy that we'll put that in work

3208
02:30:49,270 --> 02:30:47,349
all right so uh just a call there asking

3209
02:30:52,150 --> 02:30:49,280
uh to turn off the internal cameras on

3210
02:30:55,190 --> 02:30:52,160
board uh and on board crew dragon just

3211
02:30:57,270 --> 02:30:55,200
as the crew takes their uh suits off uh

3212
02:30:59,990 --> 02:30:57,280
and prepares for a little bit of a rest

3213
02:31:02,469 --> 02:31:00,000

period uh as i was saying um i'm sure

3214
02:31:05,349 --> 02:31:02,479
bob is super excited to have megan home

3215
02:31:07,190 --> 02:31:05,359
um he knows exactly what she has gone

3216
02:31:09,349 --> 02:31:07,200
through um also being the pilot for the

3217
02:31:11,750 --> 02:31:09,359
demo 2 mission that this capsule

3218
02:31:13,670 --> 02:31:11,760
specifically was reused on so like we

3219
02:31:15,590 --> 02:31:13,680
mentioned before we want to get through

3220
02:31:18,710 --> 02:31:15,600
as many questions as we can so be sure

3221
02:31:25,750 --> 02:31:18,720
to use the hashtag ask no response

3222
02:31:28,630 --> 02:31:26,830
all

3223
02:31:30,550 --> 02:31:28,640
right

3224
02:31:32,550 --> 02:31:30,560
and then just a confirmation of that

3225
02:31:34,790 --> 02:31:32,560
request coming from dragon as we

3226
02:31:36,790 --> 02:31:34,800
mentioned before uh when the ground

3227
02:31:38,950 --> 02:31:36,800
teams are communicating with the capsule

3228
02:31:40,710 --> 02:31:38,960
uh there is a

3229
02:31:44,550 --> 02:31:40,720
procedure of calling out so we hear that

3230
02:31:46,630 --> 02:31:44,560
quindar tone first uh and then the uh

3231
02:31:48,870 --> 02:31:46,640
destination of the call

3232
02:31:51,190 --> 02:31:48,880
so in that case megan was calling the

3233
02:31:54,150 --> 02:31:51,200
teams here in hawthorne um calling out

3234
02:31:55,910 --> 02:31:54,160
ground uh or spacex uh yeah they called

3235
02:31:57,750 --> 02:31:55,920
out spacex to

3236
02:31:59,750 --> 02:31:57,760
basically call here mission control

3237
02:32:03,910 --> 02:31:59,760
hawthorne and

3238
02:32:08,309 --> 02:32:06,630

all right as we await the exit of the

3239
02:32:10,630 --> 02:32:08,319
approach ellipsoid let's take one more

3240
02:32:12,710 --> 02:32:10,640
question from hashtag ask nasa this

3241
02:32:15,030 --> 02:32:12,720
comes from the launch pad how long

3242
02:32:17,270 --> 02:32:15,040
before splashdown do we normally see

3243
02:32:19,030 --> 02:32:17,280
deorbit burn a very good question we've

3244
02:32:21,349 --> 02:32:19,040
been talking about how each of these

3245
02:32:23,349 --> 02:32:21,359
burns are very carefully choreographed

3246
02:32:26,230 --> 02:32:23,359
so the burn itself has it has to be

3247
02:32:28,630 --> 02:32:26,240
executed at the precise moment

3248
02:32:32,870 --> 02:32:28,640
before the splashdown is predicted so

3249
02:32:36,469 --> 02:32:32,880
when we say 7 33 pm pacific time uh 10

3250
02:32:40,309 --> 02:32:36,479
33 pm eastern time that's what we mean

3251
02:32:42,950 --> 02:32:40,319
so it'll be precisely 53 minutes before

3252
02:32:44,950 --> 02:32:42,960
that time before uh before that

3253
02:32:48,469 --> 02:32:44,960
splashdown time that will execute the

3254
02:32:51,190 --> 02:32:48,479
deorbit burn the deorbit burn varies uh

3255
02:32:54,469 --> 02:32:51,200
based on the uh trajectory that is

3256
02:32:57,110 --> 02:32:54,479
predicted so for this very short uh

3257
02:32:58,550 --> 02:32:57,120
transit from the undocking port of the

3258
02:33:01,750 --> 02:32:58,560
or from the docking port of the space

3259
02:33:04,150 --> 02:33:01,760
station down uh to the uh coast of

3260
02:33:07,190 --> 02:33:04,160
florida off the gulf uh that will be

3261
02:33:09,349 --> 02:33:07,200
about a 16 and a half minute burn so not

3262
02:33:12,389 --> 02:33:09,359
only is the timing have to be precise

3263
02:33:13,830 --> 02:33:12,399

but the uh the burn itself has to burn

3264
02:33:16,070 --> 02:33:13,840
for that long to make sure that the

3265
02:33:17,910 --> 02:33:16,080
maneuver is uh is very carefully

3266
02:33:20,469 --> 02:33:17,920
executed very good questions and we'll

3267
02:33:22,550 --> 02:33:20,479
continue to answer them as much as we

3268
02:33:24,309 --> 02:33:22,560
can throughout our continuous coverage

3269
02:33:26,630 --> 02:33:24,319
as we get towards that point just about

3270
02:33:28,469 --> 02:33:26,640
six hours from now so stay with us using

3271
02:33:30,790 --> 02:33:28,479
the hashtag ask nasa and we'll be

3272
02:33:32,710 --> 02:33:30,800
providing some periodic updates namely

3273
02:33:34,230 --> 02:33:32,720
uh confirming the exited the approach

3274
02:34:52,630 --> 02:33:34,240
ellipsoid here soon we'll be back with

3275
02:34:57,190 --> 02:34:55,030
endeavor spacex on the big loop dragon

3276
02:34:59,990 --> 02:34:57,200
has exited the approach ellipsoid and is

3277
02:35:01,429 --> 02:35:00,000
on a safe free drift trajectory

3278
02:35:03,830 --> 02:35:01,439
houston will be taking down the big loop

3279
02:35:04,950 --> 02:35:03,840
shortly expect iss audio traffic to

3280
02:35:06,389 --> 02:35:04,960
cease

3281
02:35:09,510 --> 02:35:06,399
request that you swap your audio

3282
02:35:11,429 --> 02:35:09,520
destination to dragon to ground

3283
02:35:17,300 --> 02:35:11,439
and contact ground post swap for a comm

3284
02:35:17,310 --> 02:35:22,790
[Applause]

3285
02:35:28,230 --> 02:35:24,870
and with that the dragon and the crew

3286
02:35:29,750 --> 02:35:28,240
have exited the approach ellipsoid um so

3287
02:35:31,429 --> 02:35:29,760
now that they've exited the approach lip

3288
02:35:33,670 --> 02:35:31,439

sword or the ae which is another

3289
02:35:35,349 --> 02:35:33,680
imaginary shape this time a three

3290
02:35:36,870 --> 02:35:35,359
dimensional ellipsoid measuring four

3291
02:35:39,110 --> 02:35:36,880
kilometers by two kilometers by two

3292
02:35:42,710 --> 02:35:39,120
kilometers endeavor check on second to

3293
02:35:42,720 --> 02:35:48,790
spacex has you loud and clear endeavor

3294
02:35:52,389 --> 02:35:50,150
we have you loud and clear as well thank

3295
02:35:56,630 --> 02:35:54,550
now as commander shane kimbrough inside

3296
02:35:58,550 --> 02:35:56,640
the dragon confirming that communication

3297
02:36:00,550 --> 02:35:58,560
check now that they have exited the

3298
02:36:01,990 --> 02:36:00,560
approach ellipsoid they are no longer on

3299
02:36:04,230 --> 02:36:02,000
the big loop

3300
02:36:05,910 --> 02:36:04,240
which is a joint uh communication loop

3301
02:36:07,349 --> 02:36:05,920
between the hawthorne teams and the

3302
02:36:08,870 --> 02:36:07,359
teams in houston as well as the

3303
02:36:10,790 --> 02:36:08,880
astronauts on board the international

3304
02:36:12,389 --> 02:36:10,800
space station so now with that comm

3305
02:36:14,389 --> 02:36:12,399
check they are ready to go

3306
02:36:16,150 --> 02:36:14,399
again that approach ellipsoid measures

3307
02:36:18,070 --> 02:36:16,160
four kilometers by two kilometers by two

3308
02:36:19,349 --> 02:36:18,080
kilometers it's in the same family as

3309
02:36:20,950 --> 02:36:19,359
the keep out sphere which they've been

3310
02:36:23,349 --> 02:36:20,960
hovering through most of the flyover

3311
02:36:24,389 --> 02:36:23,359
maneuver or fly around maneuver one key

3312
02:36:26,389 --> 02:36:24,399
difference though with the approach

3313
02:36:28,230 --> 02:36:26,399

ellipsoid is that vehicles outside of it

3314
02:36:30,309 --> 02:36:28,240
have to be on what we call a 24-hour

3315
02:36:32,389 --> 02:36:30,319
safe free drift trajectory you heard

3316
02:36:35,030 --> 02:36:32,399
that confirmed over the loops this means

3317
02:36:37,429 --> 02:36:35,040
the spacecraft would not cross into the

3318
02:36:40,070 --> 02:36:37,439
approach ellipsoid for at least 24 hours

3319
02:36:41,830 --> 02:36:40,080
even if it lost all of maneuvering

3320
02:36:44,550 --> 02:36:41,840
so it's going to be some time

3321
02:36:46,870 --> 02:36:44,560
until we get to the next uh departure

3322
02:36:49,030 --> 02:36:46,880
burn it's about 40 minutes and that

3323
02:36:51,270 --> 02:36:49,040
that's the third departure burn called

3324
02:36:53,190 --> 02:36:51,280
uh departure burn 2.

3325
02:36:54,950 --> 02:36:53,200
the thrusters used are a combination of

3326
02:36:57,270 --> 02:36:54,960
the service section and the forward

3327
02:36:59,030 --> 02:36:57,280
bulkhead dracos it's a longer burn than

3328
02:37:00,950 --> 02:36:59,040
we've seen with some of the previous two

3329
02:37:03,830 --> 02:37:00,960
departure burns the first being 15

3330
02:37:07,190 --> 02:37:03,840
seconds departure one being 21 seconds

3331
02:37:09,270 --> 02:37:07,200
this departure burn 2 is 44 seconds so

3332
02:37:11,270 --> 02:37:09,280
it's done at the orbital apogee and it

3333
02:37:12,950 --> 02:37:11,280
lowers the dragon's perigee tube below

3334
02:37:15,190 --> 02:37:12,960
the space station to start bringing it

3335
02:37:18,630 --> 02:37:15,200
beneath and in front of the station's

3336
02:37:20,870 --> 02:37:18,640
orbit once you decrease uh the altitude

3337
02:37:23,110 --> 02:37:20,880
of the dragon orbital mechanics does the

3338
02:37:24,710 --> 02:37:23,120

rest and you actually end up passing the

3339
02:37:26,070 --> 02:37:24,720
space station you're going what seems

3340
02:37:27,429 --> 02:37:26,080
like a little bit faster even though

3341
02:37:30,070 --> 02:37:27,439
you're not but because you're at a lower

3342
02:37:31,670 --> 02:37:30,080
altitude um it it seems like you're

3343
02:37:33,270 --> 02:37:31,680
going faster so it'll actually go in

3344
02:37:36,070 --> 02:37:33,280
front of the international space station

3345
02:37:38,469 --> 02:37:36,080
and continue to do so uh as it preps for

3346
02:37:40,230 --> 02:37:38,479
some of those future de-orbit uh or

3347
02:37:42,469 --> 02:37:40,240
departure burns that's departure burn

3348
02:37:44,389 --> 02:37:42,479
two there's a departure burn three and

3349
02:37:46,630 --> 02:37:44,399
then a departure phase burn

3350
02:37:49,429 --> 02:37:46,640
then of course uh the exciting part

3351
02:37:52,790 --> 02:37:49,439
whenever we get to jettison the trunk

3352
02:37:55,910 --> 02:37:52,800
and uh essentially return crew dragon uh

3353
02:37:58,230 --> 02:37:55,920
back to earth in the deorbit burn um as

3354
02:38:01,190 --> 02:37:58,240
we've mentioned before we jettison the

3355
02:38:03,910 --> 02:38:01,200
trunk in order to reveal the heat shield

3356
02:38:06,870 --> 02:38:03,920
that is the component of the spacecraft

3357
02:38:08,710 --> 02:38:06,880
that is critical to helping slow the

3358
02:38:12,150 --> 02:38:08,720
spacecraft down it's essentially going

3359
02:38:13,830 --> 02:38:12,160
17 000 miles per hour right now and

3360
02:38:15,270 --> 02:38:13,840
we're going to be slowing it down using

3361
02:38:17,910 --> 02:38:15,280
the heat shield

3362
02:38:19,990 --> 02:38:17,920
and the friction caused by re-entering

3363
02:38:22,550 --> 02:38:20,000

the earth's atmosphere slow it down to

3364
02:38:24,309 --> 02:38:22,560
about 350 miles per hour

3365
02:38:26,870 --> 02:38:24,319
at which point we will then deploy

3366
02:38:29,590 --> 02:38:26,880
drogue parachutes as well as main

3367
02:38:31,510 --> 02:38:29,600
parachutes and essentially bring the

3368
02:38:33,750 --> 02:38:31,520
spacecraft down to a mere

3369
02:38:35,910 --> 02:38:33,760
uh 15 miles per hour or so for

3370
02:38:38,950 --> 02:38:35,920
splashdown once again we're targeting a

3371
02:38:40,630 --> 02:38:38,960
splashdown around 7 30 p.m pacific

3372
02:38:43,429 --> 02:38:40,640
this afternoon off the coast of

3373
02:38:46,550 --> 02:38:43,439
pensacola florida so right now the crew

3374
02:38:48,389 --> 02:38:46,560
has doffed or taken off their suits

3375
02:38:50,550 --> 02:38:48,399
and not too much activity going on at

3376
02:38:52,950 --> 02:38:50,560
the moment so we're going to go into a