



1  
00:00:02,720 --> 00:00:01,309  
[Music]

2  
00:00:22,250 --> 00:00:02,730  
foreign

3  
00:00:22,260 --> 00:00:34,549  
[Music]

4  
00:00:34,559 --> 00:00:43,970  
foreign

5  
00:00:47,030 --> 00:00:45,830  
good morning and welcome back to the

6  
00:00:49,490 --> 00:00:47,040  
International Space Station flight

7  
00:00:51,049 --> 00:00:49,500  
control room I'm NASA Shaniqua Vereen

8  
00:00:53,930 --> 00:00:51,059  
and you are watching live Mission

9  
00:00:55,970 --> 00:00:53,940  
coverage for the NASA SpaceX crew 4

10  
00:00:58,610 --> 00:00:55,980  
Mission today we are returning for

11  
00:00:59,930 --> 00:00:58,620  
astronauts home after a six-month

12  
00:01:07,250 --> 00:00:59,940  
science Mission aboard the International

13  
00:01:07,260 --> 00:01:13,130

with you on to Josh

14

00:01:19,250 --> 00:01:15,230

yeah as you've probably already heard uh

15

00:01:21,469 --> 00:01:19,260

sounded like uh uh there is no fire

16

00:01:24,350 --> 00:01:21,479

there and the uh Russian segment we've

17

00:01:28,190 --> 00:01:24,360

got zeros on our CSA CPS here in node

18

00:01:29,870 --> 00:01:28,200

two uh so if uh you agree I think we're

19

00:01:54,469 --> 00:01:29,880

stepping back into the dragon procedures

20

00:01:54,479 --> 00:02:04,910

we don't need

21

00:02:15,589 --> 00:02:07,069

Asian Houston on Space ground two for

22

00:02:20,449 --> 00:02:17,510

yep uh thank you again for that report

23

00:02:23,030 --> 00:02:20,459

we're waiting on our colleagues in the

24

00:02:26,270 --> 00:02:23,040

Russian segment to give us the csac

25

00:02:28,250 --> 00:02:26,280

teachings CP readings there other than

26

00:02:37,729 --> 00:02:28,260

that we will let you know when we are

27

00:02:45,970 --> 00:02:41,150

okay copy that we will stand by on

28

00:02:45,980 --> 00:03:17,750

good read

29

00:03:21,890 --> 00:03:19,670

again you're watching live Mission

30

00:03:24,050 --> 00:03:21,900

coverage of NASA SpaceX crew 4 Mission

31

00:03:25,190 --> 00:03:24,060

returning for astronaut's home from a

32

00:03:26,930 --> 00:03:25,200

six-month stay aboard the International

33

00:03:30,649 --> 00:03:26,940

Space Station

34

00:03:31,910 --> 00:03:30,659

Mission Control teams here and at SpaceX

35

00:03:34,130 --> 00:03:31,920

Mission Control in Hawthorne California

36

00:03:36,290 --> 00:03:34,140

have delayed today's undocking time

37

00:03:39,110 --> 00:03:36,300

moving it to the right about 30 minutes

38

00:03:41,630 --> 00:03:39,120

we're looking at 11 05 a.m central time

39

00:03:44,089 --> 00:03:41,640  
for an undocking the middle of a

40

00:03:46,610 --> 00:03:44,099  
one-hour undocking window to allow crew

41

00:03:49,070 --> 00:03:46,620  
on the International Space Station to

42

00:03:51,470 --> 00:03:49,080  
check the hatch alignment on the ISS

43

00:03:53,630 --> 00:03:51,480  
side of the docking interface

44

00:03:55,250 --> 00:03:53,640  
crews are proceeding now with vegetable

45

00:03:58,369 --> 00:03:55,260  
depressurization

46

00:04:12,949 --> 00:03:58,379  
and moving along towards that 1105 a.m

47

00:04:18,170 --> 00:04:16,069  
today's undocking is autonomous but will

48

00:04:19,430 --> 00:04:18,180  
be monitored by ground controllers here

49

00:04:21,469 --> 00:04:19,440  
in the International Space Station

50

00:04:24,170 --> 00:04:21,479  
flight control room and in Hawthorne

51  
00:04:26,870 --> 00:04:24,180  
California teams are being led here by

52  
00:04:30,350 --> 00:04:26,880  
flight director Adi boulos

53  
00:04:32,930 --> 00:04:30,360  
station Houston on the big loop letting

54  
00:04:34,909 --> 00:04:32,940  
you know that we did get confirmation

55  
00:04:40,310 --> 00:04:34,919  
that this was a false fire and we are

56  
00:04:40,320 --> 00:04:43,969  
and happy place

57  
00:04:49,430 --> 00:04:46,550  
education copies and we are in Step uh

58  
00:05:14,030 --> 00:04:49,440  
three decimal one of us hatch seal

59  
00:05:18,230 --> 00:05:16,189  
currently going to live view inside of

60  
00:05:19,790 --> 00:05:18,240  
SpaceX Dragon Freedom attached to the

61  
00:05:22,310 --> 00:05:19,800  
space facing Port of the harmony module

62  
00:05:26,390 --> 00:05:22,320  
dragon is returning to Earth later today

63  
00:05:29,090 --> 00:05:26,400

expected still at 3 55 PM Central Time

64

00:05:31,909 --> 00:05:29,100

returning a crew of four along with

65

00:05:34,010 --> 00:05:31,919

hundreds of pounds of return cargo

66

00:05:37,249 --> 00:05:34,020

we're looking for Dragon to depart the

67

00:05:38,629 --> 00:05:37,259

station again that's 1105 a.m Central

68

00:05:41,270 --> 00:05:38,639

Time

69

00:05:44,870 --> 00:05:41,280

upon undocking dragon wall have a small

70

00:05:46,790 --> 00:05:44,880

set of fight firings or Burns to push it

71

00:05:49,370 --> 00:05:46,800

away from the station again we're

72

00:05:52,430 --> 00:05:49,380

looking for a de-orbit burn to come a

73

00:05:55,689 --> 00:05:52,440

few hours later looking at a around a

74

00:05:58,370 --> 00:05:55,699

three o'clock de-orbit burn for a 355

75

00:06:01,249 --> 00:05:58,380

p.m Central Time

76  
00:06:27,469 --> 00:06:01,259  
Splashdown off the coast of Florida and

77  
00:06:32,510 --> 00:06:30,050  
Houston Station on two for hatch seal

78  
00:06:37,330 --> 00:06:32,520  
inspection of the Note 2 Zenith half

79  
00:06:37,340 --> 00:07:31,490  
Houston copies

80  
00:07:35,570 --> 00:07:33,650  
there are a couple Milestones we'll see

81  
00:07:37,550 --> 00:07:35,580  
Dragon meet this morning first those

82  
00:07:39,770 --> 00:07:37,560  
departure Burns but then it will cross

83  
00:07:42,050 --> 00:07:39,780  
the keep out sphere an invisible line

84  
00:07:44,210 --> 00:07:42,060  
around the station with a 200 meter

85  
00:07:46,070 --> 00:07:44,220  
radius it will keep heading away from

86  
00:07:47,330 --> 00:07:46,080  
the state Nation will stand by until it

87  
00:07:49,550 --> 00:07:47,340  
makes its way out of the approach

88  
00:07:51,170 --> 00:07:49,560

ellipsoid another invisible line

89

00:07:53,689 --> 00:07:51,180

considered the neighborhood of the

90

00:07:55,790 --> 00:07:53,699

station these invisible lines are where

91

00:08:00,050 --> 00:07:55,800

we have checkpoints for the vehicle on

92

00:08:05,510 --> 00:08:03,710

once that command to undock is sent we

93

00:08:06,830 --> 00:08:05,520

will be looking for two sets of six

94

00:08:08,870 --> 00:08:06,840

hooks from the International Space

95

00:08:10,550 --> 00:08:08,880

Station to be released from Dragon

96

00:08:13,129 --> 00:08:10,560

freedom

97

00:08:15,350 --> 00:08:13,139

after open two small undocking Burns

98

00:08:17,270 --> 00:08:15,360

that will last less than two seconds and

99

00:08:18,469 --> 00:08:17,280

will begin to see separation of the

100

00:08:21,110 --> 00:08:18,479

vehicle

101  
00:08:23,570 --> 00:08:21,120  
the spacecraft will start to slowly

102  
00:08:25,850 --> 00:08:23,580  
drift away next dragon will have a few

103  
00:08:28,610 --> 00:08:25,860  
departure Burns to get into the proper

104  
00:08:31,309 --> 00:08:28,620  
position away from station for its

105  
00:08:34,909 --> 00:08:31,319  
eventual deorbit burn scheduled later

106  
00:08:37,010 --> 00:08:34,919  
today at 301 PM Central Time

107  
00:08:38,990 --> 00:08:37,020  
that will slow Dragon down enough to

108  
00:08:41,329 --> 00:08:39,000  
drop it out of orbit and send it towards

109  
00:08:44,990 --> 00:08:41,339  
its Landing Zone splashing down at

110  
00:08:55,910 --> 00:08:45,000  
approximately 3 55 PM Central Time 4 55

111  
00:08:55,920 --> 00:12:25,490  
copy

112  
00:12:29,810 --> 00:12:27,410  
if you're just joining us the crew

113  
00:12:32,269 --> 00:12:29,820

Dragon Freedom along with crew 4 is

114

00:12:35,630 --> 00:12:32,279

ready to do to depart the space station

115

00:12:37,430 --> 00:12:35,640

having arrived on April 27th the crew

116

00:12:40,910 --> 00:12:37,440

consists of NASA astronauts Chell

117

00:12:42,470 --> 00:12:40,920

Lindgren Bob Hines Jessica Watkins and

118

00:12:44,509 --> 00:12:42,480

Issa astronaut Samantha Christopher

119

00:12:47,269 --> 00:12:44,519

ready

120

00:12:49,190 --> 00:12:47,279

Freedom SpaceX on the big loop for

121

00:13:27,050 --> 00:12:49,200

timeline impacts and return to Earth

122

00:13:31,790 --> 00:13:29,690

Freedom SpaceX on the big loop for

123

00:13:35,210 --> 00:13:31,800

timeline impacts and return to Earth

124

00:13:35,220 --> 00:13:39,290

right down the big one

125

00:13:43,430 --> 00:13:41,930

you tell we've got some time to talk

126  
00:13:45,350 --> 00:13:43,440  
here so I want to walk through the plan

127  
00:13:47,150 --> 00:13:45,360  
for the next few hours and give you a

128  
00:13:47,930 --> 00:13:47,160  
chance to ask any questions you might

129  
00:13:50,690 --> 00:13:47,940  
have

130  
00:13:52,610 --> 00:13:50,700  
first we expect about 20 minutes

131  
00:13:55,490 --> 00:13:52,620  
remaining here on the vestibule leak

132  
00:13:57,949 --> 00:13:55,500  
check complete around one five five zero

133  
00:14:00,590 --> 00:13:57,959  
after that we have some final vehicle

134  
00:14:03,650 --> 00:14:00,600  
reconfigurations prior to undock and our

135  
00:14:10,129 --> 00:14:03,660  
targeting 1600 for undock sequence start

136  
00:14:10,139 --> 00:14:15,050  
starts

137  
00:14:21,410 --> 00:14:18,230  
good copy uh some more words after we

138  
00:14:23,930 --> 00:14:21,420

undock we are targeting Jacksonville as

139

00:14:25,670 --> 00:14:23,940

primary with Tallahassee as an alternate

140

00:14:27,829 --> 00:14:25,680

24 hours later

141

00:14:31,190 --> 00:14:27,839

and to get down to Jacksonville we've

142

00:14:33,170 --> 00:14:31,200

got depart Burns one two and three one

143

00:14:35,750 --> 00:14:33,180

prop waste burn and then the deorbit

144

00:14:37,790 --> 00:14:35,760

burn expect all the events on your

145

00:14:40,370 --> 00:14:37,800

timeline through Department three to

146

00:14:43,069 --> 00:14:40,380

shift 30 minutes but the prop waistburn

147

00:14:50,090 --> 00:14:43,079

and yogurt burn timing is accurate how

148

00:14:50,100 --> 00:14:53,329

in the company

149

00:14:58,189 --> 00:14:56,030

continuing latest forecast in

150

00:15:01,069 --> 00:14:58,199

Jacksonville shows winds averaging below

151  
00:15:03,410 --> 00:15:01,079  
seven knots shallow waves no rain great

152  
00:15:06,110 --> 00:15:03,420  
weather to land our recovery vessel

153  
00:15:07,370 --> 00:15:06,120  
Megan is on site not tracking any issues

154  
00:15:08,030 --> 00:15:07,380  
they're ready to get you out of the

155  
00:15:09,829 --> 00:15:08,040  
water

156  
00:15:16,850 --> 00:15:09,839  
and I just got word from Rick on the

157  
00:15:16,860 --> 00:15:21,290  
and

158  
00:15:29,090 --> 00:15:22,490  
um

159  
00:15:33,470 --> 00:15:31,310  
and a few more words on timeline after

160  
00:15:35,569 --> 00:15:33,480  
we undock it's a bit of an expedited

161  
00:15:37,970 --> 00:15:35,579  
timeline to splash down you're out of

162  
00:15:40,129 --> 00:15:37,980  
suits for less than two hours I'm going

163  
00:15:42,710 --> 00:15:40,139

to leave it up to y'all to manage suit

164

00:15:46,730 --> 00:15:42,720

stowage as appropriate we're going to

165

00:15:48,290 --> 00:15:46,740

plan a PMC after depart burn two and

166

00:15:55,690 --> 00:15:48,300

I'll leave it up to you to take it or

167

00:16:00,350 --> 00:15:56,949

[Music]

168

00:16:05,449 --> 00:16:00,360

we've managed to received in the

169

00:16:11,750 --> 00:16:08,750

good copy continuing manual control of

170

00:16:14,629 --> 00:16:11,760

cabin temperature is not going to work

171

00:16:18,050 --> 00:16:14,639

through 4.080 as we start to cool the

172

00:16:19,430 --> 00:16:18,060

vehicle prior to the orbit and as a

173

00:16:23,090 --> 00:16:19,440

final note I'm going to have you step

174

00:16:25,189 --> 00:16:23,100

into 4.700 now to get a head start on

175

00:16:27,650 --> 00:16:25,199

cabin configuration for the deorbit

176

00:16:31,129 --> 00:16:27,660

sequence I've got two notes on that

177

00:16:33,889 --> 00:16:31,139

procedure the first is that pre-chill is

178

00:16:35,750 --> 00:16:33,899

not necessary in section one essentially

179

00:16:38,689 --> 00:16:35,760

skip that section

180

00:16:41,930 --> 00:16:38,699

second note floater cam inspection not

181

00:16:43,610 --> 00:16:41,940

necessary in section four so similarly

182

00:16:45,350 --> 00:16:43,620

to Suits we'll be looking to you to

183

00:16:47,389 --> 00:16:45,360

manage cargo and have the cabin

184

00:16:53,449 --> 00:16:47,399

configured for entry prior to suit leak

185

00:16:53,459 --> 00:16:59,749

recipients

186

00:17:08,090 --> 00:17:02,230

not the beginning

187

00:17:11,689 --> 00:17:08,100

as soon as your cargo prior to 1855.

188

00:17:13,730 --> 00:17:11,699

foreign copy on all and now a question

189

00:17:23,210 --> 00:17:13,740

for you do you have any questions for

190

00:17:23,220 --> 00:17:37,130

I would like to know

191

00:17:42,529 --> 00:17:39,830

and freedom we've got vanilla and orange

192

00:17:44,990 --> 00:17:42,539

guava sorbet here I don't expect you'll

193

00:17:49,130 --> 00:17:45,000

make it here this week but uh we'll see

194

00:17:52,130 --> 00:17:51,110

that's great I sure appreciate it we

195

00:17:54,169 --> 00:17:52,140

don't have any other questions we're

196

00:17:58,789 --> 00:17:54,179

looking forward to uh

197

00:18:02,330 --> 00:18:00,470

copy all Freedom we're looking forward

198

00:18:03,950 --> 00:18:02,340

to seeing you as well and I'll be back

199

00:18:10,070 --> 00:18:03,960

with you shortly on vestibular leak

200

00:18:15,230 --> 00:18:12,770

and with that Houston Station on two

201  
00:18:16,970 --> 00:18:15,240  
we've got the Note 2 overhead hatch and

202  
00:18:22,130 --> 00:18:16,980  
mpev close and you've already got the

203  
00:18:22,140 --> 00:18:34,370  
copy

204  
00:18:39,529 --> 00:18:37,070  
and you just heard a message from Jake

205  
00:18:42,230 --> 00:18:39,539  
vindal the corn SpaceX mission control

206  
00:18:46,250 --> 00:18:42,240  
the crew operations resource engineer

207  
00:18:48,950 --> 00:18:46,260  
reporting to uh dragon Commander Chell

208  
00:18:51,710 --> 00:18:48,960  
Lindgren that they do have a 30-minute

209  
00:18:53,750 --> 00:18:51,720  
delay into that in today's undocking

210  
00:18:57,049 --> 00:18:53,760  
time again we're moving that to the

211  
00:18:58,730 --> 00:18:57,059  
right to 11 05 a.m Central Time the

212  
00:19:01,370 --> 00:18:58,740  
middle of a one hour undocking window

213  
00:19:03,950 --> 00:19:01,380

and this allowed the crew on the ISS

214

00:19:07,190 --> 00:19:03,960

time to check the hatch alignment on the

215

00:19:11,090 --> 00:19:07,200

ISS side of the docking interface crews

216

00:19:14,210 --> 00:19:11,100

are currently in vestibule leak check

217

00:19:18,529 --> 00:19:14,220

and we're waiting to see that that moves

218

00:19:24,289 --> 00:19:20,990

NASA and SpaceX are still targeting at 3

219

00:19:26,630 --> 00:19:24,299

55 PM Central Time 4 55 PM Eastern Time

220

00:19:31,490 --> 00:19:26,640

splash down off the coast of

221

00:19:36,230 --> 00:19:33,470

wrapping up nearly six-month science

222

00:19:39,770 --> 00:19:36,240

mission for NASA astronauts Joe Lingert

223

00:21:32,330 --> 00:19:39,780

Bob Hines Jessica Watkins and Issa

224

00:21:32,340 --> 00:21:35,710

foreign

225

00:22:10,850 --> 00:21:37,970

when you have a chance give us a call on

226

00:22:15,169 --> 00:22:13,610

taking another live look at the SpaceX

227

00:22:17,990 --> 00:22:15,179

Dragon Freedom attached to the space

228

00:22:19,549 --> 00:22:18,000

facing Port of the harmony module dragon

229

00:22:24,289 --> 00:22:19,559

is returning to Earth later today

230

00:22:27,350 --> 00:22:24,299

expected at 3 55 PM Central Time 4 55 PM

231

00:22:29,450 --> 00:22:27,360

eastern time with about 500 pounds of

232

00:22:31,070 --> 00:22:29,460

research and returned cargo along with

233

00:22:33,710 --> 00:22:31,080

the crew for

234

00:22:35,690 --> 00:22:33,720

crew members about four hours after

235

00:22:37,789 --> 00:22:35,700

Dragon departs from the station it will

236

00:22:40,250 --> 00:22:37,799

conduct a de-orbit burn

237

00:22:42,770 --> 00:22:40,260

which will last about 16 minutes and 40

238

00:22:44,510 --> 00:22:42,780

seconds it'll then take about 30 minutes

239

00:22:46,490 --> 00:22:44,520

for Dragon to re-enter the Earth's

240

00:22:48,529 --> 00:22:46,500

atmosphere for its parachute assisted

241

00:22:51,169 --> 00:22:48,539

Splashdown off the coast of Jacksonville

242

00:22:54,529 --> 00:22:51,179

Florida again we're expecting that

243

00:22:57,950 --> 00:22:54,539

splashed on at 3 55 PM Central Time 4 55

244

00:23:01,909 --> 00:22:59,870

there are a couple Milestones we'll see

245

00:23:04,730 --> 00:23:01,919

Dragon meet this morning first those

246

00:23:06,590 --> 00:23:04,740

departure Burns but then it will get it

247

00:23:08,570 --> 00:23:06,600

will cross the keep out sphere in a

248

00:23:11,149 --> 00:23:08,580

visible line around the station with a

249

00:23:12,950 --> 00:23:11,159

200 meteor radius it will keep heading

250

00:23:14,630 --> 00:23:12,960

away from the station and will stand by

251

00:23:16,850 --> 00:23:14,640

until it makes its way out of the

252

00:23:19,010 --> 00:23:16,860

approach ellipsoid another invisible

253

00:23:21,110 --> 00:23:19,020

line considered the neighborhood of the

254

00:23:23,270 --> 00:23:21,120

station these invisible lines are where

255

00:23:25,549 --> 00:23:23,280

we have checkpoints for the via the

256

00:23:26,810 --> 00:23:25,559

vehicle on the way to and from the

257

00:23:29,330 --> 00:23:26,820

station

258

00:23:30,950 --> 00:23:29,340

once the command to undock is sent we

259

00:23:32,210 --> 00:23:30,960

will be looking for two sets of six

260

00:23:34,130 --> 00:23:32,220

hooks from the International Space

261

00:23:37,610 --> 00:23:34,140

Station to be released from Dragon

262

00:23:39,890 --> 00:23:37,620

freedom after open to small undocking

263

00:23:42,110 --> 00:23:39,900

Burns that will last less than two

264

00:23:44,930 --> 00:23:42,120  
seconds

265

00:23:48,049 --> 00:23:44,940  
and we'll see separation of the vehicle

266

00:23:49,669 --> 00:23:48,059  
from the International Space Station

267

00:23:50,990 --> 00:23:49,679  
the spacecraft will start to slowly

268

00:23:53,330 --> 00:23:51,000  
Drift Away

269

00:23:55,370 --> 00:23:53,340  
next we'll have a free a few departure

270

00:23:58,190 --> 00:23:55,380  
Burns to get into the proper position

271

00:24:00,830 --> 00:23:58,200  
away from the station for its eventual

272

00:24:04,789 --> 00:24:00,840  
deorbit and we're looking for deorbit

273

00:24:06,649 --> 00:24:04,799  
burn to be around 301 PM Central Time

274

00:24:08,510 --> 00:24:06,659  
that will slow Dragon down enough to

275

00:24:10,490 --> 00:24:08,520  
drop it out of orbit and send it toward

276

00:24:13,850 --> 00:24:10,500

the landing Zone splashing down at

277

00:24:16,010 --> 00:24:13,860

approximately 3 55 PM Central Time 4 55

278

00:25:20,890 --> 00:24:16,020

PM eastern time off the coast of

279

00:25:20,900 --> 00:25:27,769

office 2 for the timeline

280

00:25:27,779 --> 00:25:31,070

Houston's here on two

281

00:26:31,730 --> 00:25:33,409

okay I'm gonna go to uh fifth gown three

282

00:26:37,070 --> 00:26:33,710

if you're just joining us you're looking

283

00:26:39,230 --> 00:26:37,080

live inside of dragon Freedom where the

284

00:26:41,930 --> 00:26:39,240

crew 4 astronauts are preparing for

285

00:26:43,610 --> 00:26:41,940

undocking today returning after a

286

00:26:54,909 --> 00:26:43,620

six-month science Mission aboard the

287

00:27:00,169 --> 00:26:57,830

NASA and SpaceX are targeting an 1105

288

00:27:04,130 --> 00:27:00,179

a.m central time undocking from the

289

00:27:10,610 --> 00:27:07,070

with a Splashdown time of 3 55 PM

290

00:27:12,710 --> 00:27:10,620

eastern time Central Time 4 55 PM

291

00:27:46,330 --> 00:27:12,720

eastern time off the coast of

292

00:27:51,230 --> 00:27:48,710

we'll be providing continuous coverage

293

00:27:53,330 --> 00:27:51,240

through Splashdown and crew egress later

294

00:27:56,149 --> 00:27:53,340

today in just a few minutes our

295

00:27:57,830 --> 00:27:56,159

colleagues at Mission Control X or

296

00:27:59,390 --> 00:27:57,840

SpaceX Mission Control in Hawthorne

297

00:28:01,970 --> 00:27:59,400

California will be joining the broadcast

298

00:28:35,409 --> 00:28:01,980

and giving us some updates on what's

299

00:28:40,549 --> 00:28:37,909

dragon in International Space Station

300

00:28:43,610 --> 00:28:40,559

are currently flying 259 statute miles

301  
00:29:07,970 --> 00:28:43,620  
above the Pacific Ocean off the coast of

302  
00:29:12,890 --> 00:29:10,730  
again we should see and hear from our

303  
00:29:15,950 --> 00:29:12,900  
colleagues joining the broadcast from

304  
00:29:59,649 --> 00:29:15,960  
mccx space X's Mission Control in

305  
00:30:05,029 --> 00:30:02,630  
you're looking at a live view of the

306  
00:30:06,649 --> 00:30:05,039  
Dragon Freedom spacecraft as we await

307  
00:30:09,649 --> 00:30:06,659  
its departure from the International

308  
00:30:10,789 --> 00:30:09,659  
Space Station on its way back to planet

309  
00:30:13,730 --> 00:30:10,799  
Earth

310  
00:30:16,250 --> 00:30:13,740  
it's Friday October 14th here at SpaceX

311  
00:30:18,169 --> 00:30:16,260  
headquarters in Hawthorne California now

312  
00:30:21,250 --> 00:30:18,179  
we expect Dragon to push away from the

313  
00:30:24,889 --> 00:30:21,260

space station at 9 05 a.m Pacific or

314

00:30:27,289 --> 00:30:24,899

1605 GMT and that will be with our crew

315

00:30:30,350 --> 00:30:27,299

4 astronauts including Chell Lindgren

316

00:30:33,110 --> 00:30:30,360

Bob Heinz Jessica Watkins and European

317

00:30:35,690 --> 00:30:33,120

Space Agency astronaut Samantha Carissa

318

00:30:38,450 --> 00:30:35,700

Ferretti the crew is currently suited up

319

00:30:40,549 --> 00:30:38,460

and inside dragon and the station

320

00:30:42,710 --> 00:30:40,559

hatches are all sealed in preparation

321

00:30:44,510 --> 00:30:42,720

for departure

322

00:30:47,029 --> 00:30:44,520

thanks for tuning in to watch live

323

00:30:48,769 --> 00:30:47,039

coverage of crew Dragon completing its

324

00:30:51,409 --> 00:30:48,779

fourth official long duration mission

325

00:30:53,090 --> 00:30:51,419

for NASA's commercial crew program my

326

00:30:55,190 --> 00:30:53,100

name is Kate Tice and I'm the quality

327

00:30:57,289 --> 00:30:55,200

systems engineering manager here at

328

00:30:59,149 --> 00:30:57,299

SpaceX joining me today from NASA

329

00:31:02,090 --> 00:30:59,159

Communications is Sandra Jones welcome

330

00:31:04,850 --> 00:31:02,100

thanks for having me Kay it's great to

331

00:31:07,430 --> 00:31:04,860

be here so once Dragon depart station

332

00:31:10,310 --> 00:31:07,440

the cruise flight home is expected to

333

00:31:13,070 --> 00:31:10,320

last around five hours upon separation

334

00:31:15,350 --> 00:31:13,080

from station Dragon will use its Draco

335

00:31:18,049 --> 00:31:15,360

engines to thrust away from the station

336

00:31:21,049 --> 00:31:18,059

in a series of carefully choreographed

337

00:31:22,549 --> 00:31:21,059

Maneuvers or four departure Burns to

338

00:31:25,010 --> 00:31:22,559

increase the distance between the

339

00:31:27,289 --> 00:31:25,020

spacecraft and the space station Dragon

340

00:31:29,330 --> 00:31:27,299

will also execute a phasing burn to

341

00:31:31,610 --> 00:31:29,340

lower its orbit and line the spacecraft

342

00:31:34,669 --> 00:31:31,620

up with its Landing location

343

00:31:37,130 --> 00:31:34,679

next on its trip home is the orbit entry

344

00:31:39,830 --> 00:31:37,140

and Landing which covers all operations

345

00:31:42,230 --> 00:31:39,840

after the final departure maneuver that

346

00:31:45,110 --> 00:31:42,240

includes trucksumi trunk separation

347

00:31:47,630 --> 00:31:45,120

closure of the nose cone and orbit burn

348

00:31:50,690 --> 00:31:47,640

deployment of the drogue and Main

349

00:31:52,909 --> 00:31:50,700

parachutes and finally Splashdown which

350

00:31:55,130 --> 00:31:52,919

will be off the Florida coast at which

351

00:31:58,250 --> 00:31:55,140

point our teams will recover Chell Bob

352

00:32:00,470 --> 00:31:58,260

Jessica and Samantha later today dragon

353

00:32:04,190 --> 00:32:00,480

is targeted to splash down off the coast

354

00:32:08,269 --> 00:32:04,200

of Florida at 1 55 PM Pacific and that's

355

00:32:10,909 --> 00:32:08,279

today October 13th or 4 55 PM eastern

356

00:32:14,029 --> 00:32:10,919

time and followed by the crew getting

357

00:32:15,470 --> 00:32:14,039

picked up at Sea by one of the SpaceX

358

00:32:17,870 --> 00:32:15,480

recovery vessels

359

00:32:19,789 --> 00:32:17,880

that's right okay and today on board the

360

00:32:22,490 --> 00:32:19,799

International Space Station is the

361

00:32:24,710 --> 00:32:22,500

Expedition 68 crew they're currently

362

00:32:27,169 --> 00:32:24,720

being led by Rose Cosmos Cosmonaut

363

00:32:29,090 --> 00:32:27,179

Sergey prokopia who just took over as

364

00:32:30,529 --> 00:32:29,100

station Commander from Samantha

365

00:32:33,769 --> 00:32:30,539

Christopher ready who is coming home

366

00:32:35,149 --> 00:32:33,779

today on crew 4. and as a reminder just

367

00:32:37,730 --> 00:32:35,159

like its approach to the International

368

00:32:40,130 --> 00:32:37,740

Space Station dragon's departure into

369

00:32:42,409 --> 00:32:40,140

orbit is designed to be fully autonomous

370

00:32:45,529 --> 00:32:42,419

requiring no action from the crew on

371

00:32:47,269 --> 00:32:45,539

board NASA astronaut Nicole Mann helped

372

00:32:49,730 --> 00:32:47,279

the crew members prepare for departure

373

00:32:52,010 --> 00:32:49,740

earlier today and we'll be watching from

374

00:32:54,950 --> 00:32:52,020

the cupola but the prime departure

375

00:32:57,769 --> 00:32:54,960

monitoring role falls on Chell lingrin

376

00:33:00,169 --> 00:32:57,779

and Bob Heinz from inside dragon mission

377

00:33:02,870 --> 00:33:00,179

controls in Houston and Hawthorne will

378

00:33:05,029 --> 00:33:02,880

back them up so let's head over to

379

00:33:07,010 --> 00:33:05,039

Shaniqua Vereen at the Johnson Space

380

00:33:09,350 --> 00:33:07,020

Center to talk a bit about how the

381

00:33:11,269 --> 00:33:09,360

station crew have been preparing to send

382

00:33:13,610 --> 00:33:11,279

the crew home and what we can expect

383

00:33:19,509 --> 00:33:13,620

from here until Dragon departs from

384

00:33:23,210 --> 00:33:21,950

thanks Sandra and welcome back to the

385

00:33:25,070 --> 00:33:23,220

International Space Station flight

386

00:33:27,830 --> 00:33:25,080

control room at the Johnson Space Center

387

00:33:29,570 --> 00:33:27,840

in Houston Texas the flight control team

388

00:33:32,090 --> 00:33:29,580

is primed and ready for this morning's

389

00:33:33,769 --> 00:33:32,100

undocking operations today's orbit 2

390

00:33:36,950 --> 00:33:33,779

team is being led by NASA flight

391

00:33:39,230 --> 00:33:36,960

director ADI boulos since crew 5's

392

00:33:41,750 --> 00:33:39,240

arrival just last week it's been a busy

393

00:33:43,730 --> 00:33:41,760

week during our direct Handover

394

00:33:45,649 --> 00:33:43,740

over the last several days the

395

00:33:47,810 --> 00:33:45,659

astronauts worked to pack Dragon full of

396

00:33:50,330 --> 00:33:47,820

cargo for their return journey home

397

00:33:52,789 --> 00:33:50,340

along with the crew Dragon will return

398

00:33:55,549 --> 00:33:52,799

hundreds of pounds of cargo back to

399

00:33:57,830 --> 00:33:55,559

Earth the cargo inside includes some

400

00:34:00,649 --> 00:33:57,840

temples from continuing human research

401  
00:34:02,930 --> 00:34:00,659  
and some hardware and other items all of

402  
00:34:05,330 --> 00:34:02,940  
the cargo will be offloaded after we get

403  
00:34:07,190 --> 00:34:05,340  
the crew out following Splashdown and

404  
00:34:09,950 --> 00:34:07,200  
the scientific samples will then be sent

405  
00:34:12,349 --> 00:34:09,960  
to researchers for final analysis the

406  
00:34:14,389 --> 00:34:12,359  
crew also took time to get their SpaceX

407  
00:34:16,129 --> 00:34:14,399  
suits unpacked and ready for their

408  
00:34:18,290 --> 00:34:16,139  
journey home

409  
00:34:20,869 --> 00:34:18,300  
since getting the hatchets closed around

410  
00:34:22,909 --> 00:34:20,879  
9 20 a.m Central Time all four

411  
00:34:24,530 --> 00:34:22,919  
astronauts are now suited up and in

412  
00:34:27,829 --> 00:34:24,540  
their seats and standing by for

413  
00:34:30,409 --> 00:34:27,839

undocking we'll continue to through to a

414

00:34:32,869 --> 00:34:30,419

final go no-go poll coming up in just a

415

00:34:34,730 --> 00:34:32,879

few minutes where the joint SpaceX and

416

00:34:37,310 --> 00:34:34,740

NASA teams make their final call for

417

00:34:39,290 --> 00:34:37,320

Dragon 2 depart station this is one of

418

00:34:41,329 --> 00:34:39,300

many checkpoints in the return that will

419

00:34:43,849 --> 00:34:41,339

continue all the way until just before

420

00:34:45,710 --> 00:34:43,859

the deorbit burn giving Mission managers

421

00:34:48,109 --> 00:34:45,720

multiple chances to assess the weather

422

00:34:50,149 --> 00:34:48,119

at the Splashdown zones and making sure

423

00:34:52,369 --> 00:34:50,159

everything is lining up before dragging

424

00:34:54,589 --> 00:34:52,379

departs so we'll stand by for the final

425

00:34:57,290 --> 00:34:54,599

go no go but for now everything's

426  
00:35:00,530 --> 00:34:57,300  
continuing to look good here and on time

427  
00:35:02,210 --> 00:35:00,540  
departure of 1105 am Central Time with

428  
00:35:05,210 --> 00:35:02,220  
that I'll throw it back over to you guys

429  
00:35:07,430 --> 00:35:05,220  
over to you Kate and Sandra

430  
00:35:10,010 --> 00:35:07,440  
thanks Shaniqua all good news to hear

431  
00:35:14,990 --> 00:35:10,020  
now separation is set for approximately

432  
00:35:17,030 --> 00:35:15,000  
905 am Pacific or 1605 GM GMT which is

433  
00:35:18,589 --> 00:35:17,040  
just a couple minutes from now at the

434  
00:35:20,030 --> 00:35:18,599  
moment Dragon which you see there on

435  
00:35:22,790 --> 00:35:20,040  
your screen is in its final

436  
00:35:24,530 --> 00:35:22,800  
configuration before undocking and we

437  
00:35:26,990 --> 00:35:24,540  
are awaiting for Mission operators to

438  
00:35:28,670 --> 00:35:27,000

conduct their go no-go poll on whether

439

00:35:31,370 --> 00:35:28,680

to move forward with the undocking

440

00:35:32,810 --> 00:35:31,380

procedure and just like during its

441

00:35:35,690 --> 00:35:32,820

approach to the International Space

442

00:35:37,390 --> 00:35:35,700

Station dragons departure and deorbit is

443

00:35:39,710 --> 00:35:37,400

designed to be fully autonomous

444

00:35:41,690 --> 00:35:39,720

requiring no action from the crew on

445

00:35:43,490 --> 00:35:41,700

board which is even easier this time

446

00:35:45,530 --> 00:35:43,500

around since the crew won't have to stop

447

00:35:46,730 --> 00:35:45,540

at any waypoints like when we see a

448

00:35:49,190 --> 00:35:46,740

vehicle arrive

449

00:35:51,050 --> 00:35:49,200

now once the undocking sequence is

450

00:35:53,450 --> 00:35:51,060

complete Dragon will use its Draco

451  
00:35:55,730 --> 00:35:53,460  
engines to thrust away from the station

452  
00:35:58,849 --> 00:35:55,740  
in a series of carefully choreographed

453  
00:36:00,890 --> 00:35:58,859  
Maneuvers or four to Portuguese

454  
00:36:11,000 --> 00:36:00,900  
station Houston on Space to ground two

455  
00:36:11,010 --> 00:36:15,470  
[Music]

456  
00:36:21,650 --> 00:36:18,530  
go for exercise on two

457  
00:36:24,530 --> 00:36:21,660  
yeah until uh we complete undock um a

458  
00:36:27,109 --> 00:36:24,540  
red we have a nose or sorry a constraint

459  
00:36:29,810 --> 00:36:27,119  
on a red exercise so can you let Sergey

460  
00:36:35,170 --> 00:36:29,820  
know he has no go on a red and actually

461  
00:36:36,850 --> 00:36:36,460  
thank you

462  
00:37:01,190 --> 00:36:36,860  
[Applause]

463  
00:37:04,970 --> 00:37:03,109

now once the undocking sequence is

464

00:37:06,770 --> 00:37:04,980

complete Dragon will use its Draco

465

00:37:08,810 --> 00:37:06,780

engines which you see a couple of those

466

00:37:11,030 --> 00:37:08,820

thrust reports there on your screen

467

00:37:13,069 --> 00:37:11,040

it'll use those Draco engines to thrust

468

00:37:15,050 --> 00:37:13,079

away from the station in a series of

469

00:37:17,150 --> 00:37:15,060

carefully choreographed Maneuvers or

470

00:37:19,010 --> 00:37:17,160

four departure Burns to increase the

471

00:37:21,170 --> 00:37:19,020

distance between the spacecraft and the

472

00:37:23,329 --> 00:37:21,180

space station from there a phasing burn

473

00:37:24,170 --> 00:37:23,339

will place dragon on a trajectory back

474

00:37:27,470 --> 00:37:24,180

to Earth

475

00:37:40,849 --> 00:37:27,480

and next on its trip Freedom SpaceX on

476  
00:37:44,690 --> 00:37:42,770  
and continuing to step through those

477  
00:37:46,310 --> 00:37:44,700  
procedures ahead of undocking today

478  
00:37:48,650 --> 00:37:46,320  
hearing everything continues to move

479  
00:37:51,530 --> 00:37:48,660  
smoothly so next on its trip home

480  
00:37:53,870 --> 00:37:51,540  
following um what Kate just discussed is

481  
00:37:56,210 --> 00:37:53,880  
the orbit entry and Landing which covers

482  
00:37:58,430 --> 00:37:56,220  
all operations after the final departure

483  
00:38:01,190 --> 00:37:58,440  
maneuver so that includes trunk

484  
00:38:03,410 --> 00:38:01,200  
separation closure of the nose cone a

485  
00:38:05,990 --> 00:38:03,420  
deorbit burn deployment of the drogue

486  
00:38:08,150 --> 00:38:06,000  
and Main parachutes and finally splash

487  
00:38:10,190 --> 00:38:08,160  
down off the Florida coast at which

488  
00:38:12,410 --> 00:38:10,200

point our teams will recover the crew

489

00:38:14,569 --> 00:38:12,420

for astronauts inside crew dragon from

490

00:38:17,270 --> 00:38:14,579

the water it's always super exciting to

491

00:38:19,849 --> 00:38:17,280

follow along now we are expecting that

492

00:38:22,849 --> 00:38:19,859

go no-go poll to occur in about two

493

00:38:25,790 --> 00:38:22,859

minutes or so again that is basically

494

00:38:27,710 --> 00:38:25,800

the last Poll for the mission operators

495

00:38:30,490 --> 00:38:27,720

to basically make sure that everything

496

00:38:33,290 --> 00:38:30,500

both onboard dragon and onboard station

497

00:38:34,790 --> 00:38:33,300

uh to everybody to confirm between here

498

00:38:36,650 --> 00:38:34,800

and Mission Control and Hawthorne as

499

00:38:38,990 --> 00:38:36,660

well as mission control over at Nasa and

500

00:38:40,970 --> 00:38:39,000

at Johnson Space Center basically for

501  
00:38:43,430 --> 00:38:40,980  
all teams to make sure that everybody is

502  
00:38:45,109 --> 00:38:43,440  
thumbs up for undocking from the

503  
00:38:47,150 --> 00:38:45,119  
International Space Station

504  
00:38:50,210 --> 00:38:47,160  
and there's a first life look actually

505  
00:38:52,069 --> 00:38:50,220  
inside the capsule with our crew four

506  
00:38:54,589 --> 00:38:52,079  
astronauts there as you can see they're

507  
00:38:56,750 --> 00:38:54,599  
all buckled in their suits are on and uh

508  
00:38:59,930 --> 00:38:56,760  
everyone looks pretty comfy to me

509  
00:39:02,210 --> 00:38:59,940  
yep absolutely and the crew will remain

510  
00:39:05,030 --> 00:39:02,220  
in these suits during the dynamic phase

511  
00:39:07,310 --> 00:39:05,040  
of the mission so once they are undocked

512  
00:39:08,930 --> 00:39:07,320  
successfully and a little bit away from

513  
00:39:10,910 --> 00:39:08,940

the space station they will be able to

514

00:39:13,270 --> 00:39:10,920

take those suits off but we are

515

00:39:16,609 --> 00:39:13,280

targeting a pretty short phasing from

516

00:39:18,050 --> 00:39:16,619

undocking to Splash Zone so we heard a

517

00:39:19,430 --> 00:39:18,060

call earlier that they're only going to

518

00:39:21,230 --> 00:39:19,440

be out of their suits for about two

519

00:39:23,210 --> 00:39:21,240

hours or so and then they'll put them

520

00:39:25,130 --> 00:39:23,220

back on get suited and get ready for

521

00:39:27,050 --> 00:39:25,140

re-entry and Splashtown yeah now while

522

00:39:29,750 --> 00:39:27,060

they have their suits on

523

00:39:33,950 --> 00:39:29,760

um they are and as in in their seats as

524

00:39:36,109 --> 00:39:33,960

we see here they are plugged in to the

525

00:39:38,569 --> 00:39:36,119

umbilical which is basically the

526

00:39:40,670 --> 00:39:38,579

connection point between the suit and

527

00:39:42,829 --> 00:39:40,680

the seat uh and therefore the spacecraft

528

00:39:45,890 --> 00:39:42,839

as a whole so as they're sitting here

529

00:39:47,690 --> 00:39:45,900

they're able to be connected like with

530

00:39:50,210 --> 00:39:47,700

electronics avionics so those

531

00:39:52,690 --> 00:39:50,220

communication systems that we will hear

532

00:39:55,970 --> 00:39:52,700

as they speak back and forth to core

533

00:39:58,370 --> 00:39:55,980

here at SpaceX mission control but also

534

00:40:00,470 --> 00:39:58,380

they have fresh air being flowed through

535

00:40:02,450 --> 00:40:00,480

the suit so I don't have to worry about

536

00:40:05,510 --> 00:40:02,460

them really being uncomfortable because

537

00:40:08,089 --> 00:40:05,520

they have cool nitrox or nitrogen oxygen

538

00:40:09,650 --> 00:40:08,099

mixture being pumped through the suit to

539

00:40:11,810 --> 00:40:09,660

help you know regulate their body

540

00:40:14,329 --> 00:40:11,820

temperature and keep them comfy

541

00:40:15,770 --> 00:40:14,339

and speaking of umbilicals there are

542

00:40:17,390 --> 00:40:15,780

some other umbilicals that are going to

543

00:40:20,510 --> 00:40:17,400

come into play here in just a few

544

00:40:23,150 --> 00:40:20,520

minutes when we do have the undocking

545

00:40:24,530 --> 00:40:23,160

sequence that begins there's umbilicals

546

00:40:26,829 --> 00:40:24,540

that will retract and those are

547

00:40:28,849 --> 00:40:26,839

providing the power right now for Dragon

548

00:40:31,370 --> 00:40:28,859

once it does depart from the space

549

00:40:33,950 --> 00:40:31,380

station Dragon will receive power from

550

00:40:36,109 --> 00:40:33,960

the solar cells on Dragon which you may

551  
00:40:38,750 --> 00:40:36,119  
have seen when we had the view of dragon

552  
00:40:40,730 --> 00:40:38,760  
which is of course currently docked but

553  
00:40:42,589 --> 00:40:40,740  
won't be for very long we have the go no

554  
00:40:45,230 --> 00:40:42,599  
go poll coming up in just a couple of

555  
00:40:47,270 --> 00:40:45,240  
minutes from now and if all goes well

556  
00:40:54,650 --> 00:40:47,280  
then we'll undock just a short time from

557  
00:40:58,730 --> 00:40:56,630  
I would imagine at this point in time

558  
00:41:00,950 --> 00:40:58,740  
you know this crew has been on station

559  
00:41:02,329 --> 00:41:00,960  
for months right they I bet they're

560  
00:41:04,370 --> 00:41:02,339  
excited to come home and see their

561  
00:41:05,930 --> 00:41:04,380  
families but I would also imagine that

562  
00:41:08,150 --> 00:41:05,940  
this moment might be a little

563  
00:41:11,089 --> 00:41:08,160

Bittersweet Sandra like they're they're

564

00:41:14,210 --> 00:41:11,099

home away from home is uh on station and

565

00:41:16,790 --> 00:41:14,220

uh here they are buckled in and you know

566

00:41:19,849 --> 00:41:16,800

only hours away from from splashing down

567

00:41:21,770 --> 00:41:19,859

at this point so I could imagine that uh

568

00:41:23,990 --> 00:41:21,780

there is excitement but also a little

569

00:41:26,329 --> 00:41:24,000

bit of sadness that their journey in

570

00:41:27,770 --> 00:41:26,339

space is is coming to end at least for

571

00:41:30,349 --> 00:41:27,780

now

572

00:41:33,890 --> 00:41:30,359

yeah I'm sure they've been on station

573

00:41:35,390 --> 00:41:33,900

for 170 days actually which is uh just

574

00:41:37,190 --> 00:41:35,400

just shy of six months they arrived on

575

00:41:39,650 --> 00:41:37,200

April 27th

576

00:41:43,370 --> 00:41:39,660

um so the crew is actually completed

577

00:41:46,670 --> 00:41:43,380

over 2 720 orbits of Earth during their

578

00:41:49,550 --> 00:41:46,680

time on station and has traveled over 72

579

00:41:54,050 --> 00:41:49,560

million miles cumulative which is um

580

00:41:58,310 --> 00:41:55,970

but I'm sure you're right I bet there is

581

00:42:01,910 --> 00:41:58,320

some bitter sweetness to it excited to

582

00:42:04,069 --> 00:42:01,920

see your family but sad to be living on

583

00:42:06,770 --> 00:42:04,079

the big loop Final reconfigurations for

584

00:42:08,750 --> 00:42:06,780

undock are complete and nominal Houston

585

00:42:11,510 --> 00:42:08,760

and Hawthorne teams have pulled go for

586

00:42:15,290 --> 00:42:11,520

undock sequence start at one six zero

587

00:42:17,089 --> 00:42:15,300

zero and separation at 1605. confirm

588

00:42:32,890 --> 00:42:17,099

visors down and crew are ready for

589

00:43:17,950 --> 00:42:35,870

our advisors are all secured close and

590

00:43:23,690 --> 00:43:20,390

so we did just hear the confirmation

591

00:43:25,490 --> 00:43:23,700

that dragon has the go to undock so we

592

00:43:27,050 --> 00:43:25,500

are now waiting for that undocking

593

00:43:28,490 --> 00:43:27,060

sequence to begin

594

00:43:30,950 --> 00:43:28,500

um it should start in just about two

595

00:43:32,870 --> 00:43:30,960

minutes from now and once that sequence

596

00:43:34,790 --> 00:43:32,880

does begin it will take less than five

597

00:43:36,890 --> 00:43:34,800

minutes for Dragon to separate from the

598

00:43:39,770 --> 00:43:36,900

International Space Station it's home

599

00:43:42,050 --> 00:43:39,780

for nearly six months now the first step

600

00:43:44,030 --> 00:43:42,060

in that automatic undocking sequence is

601  
00:43:46,190 --> 00:43:44,040  
for the umbilicals to retract as Sandra

602  
00:43:47,930 --> 00:43:46,200  
mentioned earlier these umbilicals

603  
00:43:50,329 --> 00:43:47,940  
connect Dragon systems to the space

604  
00:43:52,250 --> 00:43:50,339  
station which transfer power Telemetry

605  
00:43:55,309 --> 00:43:52,260  
and commands between the two vehicles

606  
00:43:57,530 --> 00:43:55,319  
throughout Dragon stay and once that's

607  
00:44:00,470 --> 00:43:57,540  
complete Dragon will unlatch itself from

608  
00:44:03,950 --> 00:44:00,480  
the space station by releasing 12 hard

609  
00:44:06,050 --> 00:44:03,960  
capture hooks in two separate phases all

610  
00:44:08,150 --> 00:44:06,060  
of that combined will take roughly four

611  
00:44:10,250 --> 00:44:08,160  
and a half minutes and then Dragon will

612  
00:44:12,170 --> 00:44:10,260  
be ready to depart from station and

613  
00:44:15,050 --> 00:44:12,180

begin to move itself further and further

614

00:44:17,329 --> 00:44:15,060

away using its Draco thrusters

615

00:44:19,430 --> 00:44:17,339

and dragon's initial departure from

616

00:44:21,890 --> 00:44:19,440

station is a little different than other

617

00:44:23,990 --> 00:44:21,900

docked Vehicles like the soyuz that rely

618

00:44:26,450 --> 00:44:24,000

on Springs to push them away from the

619

00:44:29,450 --> 00:44:26,460

docking port Dragon will execute two

620

00:44:31,550 --> 00:44:29,460

short Thruster firings to undock using a

621

00:44:33,890 --> 00:44:31,560

combination of the 12 Draco engines

622

00:44:35,569 --> 00:44:33,900

around the base of the capsule with the

623

00:44:37,430 --> 00:44:35,579

first breaking any stiction between

624

00:44:39,470 --> 00:44:37,440

dragon and the docking port and the

625

00:44:42,050 --> 00:44:39,480

second slowly backing the spacecraft

626  
00:44:44,569 --> 00:44:42,060  
away so we're expecting the call for the

627  
00:44:47,030 --> 00:44:44,579  
undocking sequence to begin in just

628  
00:44:48,589 --> 00:44:47,040  
moments SpaceX on the big loop undock

629  
00:44:50,809 --> 00:44:48,599  
sequence commanded

630  
00:45:06,109 --> 00:44:50,819  
and there you heard it

631  
00:45:11,390 --> 00:45:09,109  
so live view bear of the Dragon capsule

632  
00:45:13,970 --> 00:45:11,400  
uh as we were talking a little bit

633  
00:45:16,190 --> 00:45:13,980  
before those are the solar panels uh

634  
00:45:18,349 --> 00:45:16,200  
that you see there on the trunk portion

635  
00:45:20,450 --> 00:45:18,359  
of dragon we will of course be

636  
00:45:26,750 --> 00:45:20,460  
separating Freedom SpaceX umbilical

637  
00:45:36,950 --> 00:45:35,329  
good news there sounds like we got

638  
00:45:39,050 --> 00:45:36,960

confirmation that those umbilicals that

639

00:45:42,230 --> 00:45:39,060

we were just talking about uh that help

640

00:45:48,710 --> 00:45:42,240

connect the station to Dragon Wallets on

641

00:45:53,270 --> 00:45:51,109

so as we said it will be less than five

642

00:45:56,329 --> 00:45:53,280

minutes from the point that sequence was

643

00:45:58,010 --> 00:45:56,339

sent which was at 9am so about four

644

00:46:00,829 --> 00:45:58,020

minutes from now we should be able to

645

00:46:04,250 --> 00:46:00,839

see some of the first movement as Dragon

646

00:46:06,410 --> 00:46:04,260

slowly backs away from the space station

647

00:46:08,809 --> 00:46:06,420

so as I was mentioning before the black

648

00:46:12,170 --> 00:46:08,819

portion that's there that is the trunk

649

00:46:14,870 --> 00:46:12,180

we will be separating uh that uh from

650

00:46:16,970 --> 00:46:14,880

the Dragon capsule the small silver line

651  
00:46:18,890 --> 00:46:16,980  
that you see at the bottom part of the

652  
00:46:21,349 --> 00:46:18,900  
Dragon Castle itself that's the heat

653  
00:46:23,210 --> 00:46:21,359  
shield which of course is necessary to

654  
00:46:26,150 --> 00:46:23,220  
reveal in order for them to make

655  
00:46:28,490 --> 00:46:26,160  
atmospheric re-entry uh so we will be

656  
00:46:30,650 --> 00:46:28,500  
after Dragon moves away from station we

657  
00:46:32,150 --> 00:46:30,660  
will be separating but I love this view

658  
00:46:34,309 --> 00:46:32,160  
that we have because it's such a

659  
00:46:37,069 --> 00:46:34,319  
gorgeous view of those solar panels uh

660  
00:46:39,410 --> 00:46:37,079  
which we make here in-house as well as

661  
00:46:41,329 --> 00:46:39,420  
the trunk itself so I love that we're

662  
00:46:43,790 --> 00:46:41,339  
able to to see that configuration

663  
00:46:46,370 --> 00:46:43,800

basically in its last time before it it

664

00:46:48,130 --> 00:46:46,380

uh deorbits and eventually you know

665

00:46:55,010 --> 00:46:48,140

burns up in the atmosphere

666

00:46:59,990 --> 00:46:57,710

so with dragon now getting ready to

667

00:47:01,609 --> 00:47:00,000

undock let's check in with Shanique

668

00:47:07,450 --> 00:47:01,619

Wolverine in Mission Control at the

669

00:47:12,950 --> 00:47:10,970

thanks Sandra and we do have that

670

00:47:15,470 --> 00:47:12,960

confirmation of umbilical has retracted

671

00:47:17,510 --> 00:47:15,480

and the command for undoc has been sent

672

00:47:19,970 --> 00:47:17,520

next up we'll be looking for umbilical

673

00:47:22,370 --> 00:47:19,980

retraction and look for two sets of six

674

00:47:39,170 --> 00:47:22,380

hooks to open that will take just a

675

00:47:39,180 --> 00:47:47,450

you got this

676  
00:47:53,150 --> 00:47:49,309  
and we have a first set of those hooks

677  
00:47:53,160 --> 00:48:00,470  
and the second set are moving

678  
00:48:06,349 --> 00:48:04,250  
the 6x6 hooks open and we're working on

679  
00:49:40,630 --> 00:48:06,359  
the next six a total of 12 hooks in all

680  
00:49:49,630 --> 00:49:43,730  
Dragon SpaceX on the big loop all hooks

681  
00:49:49,640 --> 00:49:53,809  
you see the girls

682  
00:49:53,819 --> 00:50:00,730  
and dragon separation confirmed

683  
00:50:08,210 --> 00:50:03,410  
thank you

684  
00:50:14,270 --> 00:50:10,430  
hooks all open and release confirmed at

685  
00:50:17,089 --> 00:50:14,280  
11 05 a.m central time while dragon and

686  
00:50:18,950 --> 00:50:17,099  
the International Space Station flew 259

687  
00:50:21,290 --> 00:50:18,960  
statute miles above the North Atlantic

688  
00:50:21,300 --> 00:50:28,180

foreign

689

00:50:33,430 --> 00:50:30,960

[Applause]

690

00:50:36,170 --> 00:50:33,440

[Music]

691

00:50:37,790 --> 00:50:36,180

landing and uh calm fees we're gonna

692

00:50:39,890 --> 00:50:37,800

miss you guys we're thankful for your

693

00:50:45,550 --> 00:50:39,900

mentorship enjoy your time with your

694

00:50:51,049 --> 00:50:48,710

it was uh absolute pleasure and

695

00:50:52,370 --> 00:50:51,059

privilege to serve on the same things in

696

00:50:54,349 --> 00:50:52,380

the past six months

697

00:50:56,270 --> 00:50:54,359

and I enjoy to get to work with you all

698

00:50:58,609 --> 00:50:56,280

uh for the past couple of weeks we know

699

00:51:00,470 --> 00:50:58,619

that you're gonna continue to do amazing

700

00:51:09,849 --> 00:51:00,480

things on season we look forward to

701  
00:51:14,630 --> 00:51:12,710  
and those were words from the crew on

702  
00:51:16,670 --> 00:51:14,640  
the ISS to the crew inside Dragon

703  
00:51:19,849 --> 00:51:16,680  
Freedom giving them fare Wills as they

704  
00:51:21,710 --> 00:51:19,859  
head on their journey to back to home on

705  
00:51:23,990 --> 00:51:21,720  
Earth

706  
00:51:29,809 --> 00:51:24,000  
Freedom SpaceX on the big loop depart

707  
00:51:29,819 --> 00:51:43,750  
coffee

708  
00:51:48,290 --> 00:51:46,309  
for astronauts time aboard the orbital

709  
00:51:50,589 --> 00:51:48,300  
Outpost is complete following a

710  
00:51:53,270 --> 00:51:50,599  
six-month science and research Mission

711  
00:51:56,150 --> 00:51:53,280  
undocking occurred at 11 05 a.m Central

712  
00:51:57,710 --> 00:51:56,160  
Time 1205 PM eastern time while the

713  
00:52:00,530 --> 00:51:57,720

International Space Station was flying

714

00:52:02,270 --> 00:52:00,540

over the North Atlantic Ocean next up

715

00:52:03,829 --> 00:52:02,280

will be a series of departure Burns to

716

00:52:06,349 --> 00:52:03,839

push Dragon further from the space

717

00:52:08,630 --> 00:52:06,359

station to take us through those Burns I

718

00:52:10,510 --> 00:52:08,640

will turn it back over to Hawthorne

719

00:52:13,130 --> 00:52:10,520

okay Sandra

720

00:52:15,349 --> 00:52:13,140

thanks Shaniqua I just want to point out

721

00:52:17,270 --> 00:52:15,359

that awesome view that we have that we

722

00:52:20,809 --> 00:52:17,280

had moments ago there it is that is a

723

00:52:22,370 --> 00:52:20,819

view from dragon as it leaves the

724

00:52:23,990 --> 00:52:22,380

International Space Station so it's

725

00:52:27,049 --> 00:52:24,000

incredible that it was just there

726  
00:52:29,450 --> 00:52:27,059  
moments ago and it's moving already as

727  
00:52:32,089 --> 00:52:29,460  
we can see further and further away

728  
00:52:35,750 --> 00:52:32,099  
and they were docked to the node to

729  
00:52:38,390 --> 00:52:35,760  
Zenith Port or space-facing Port and you

730  
00:52:40,790 --> 00:52:38,400  
did see a little bit of those Thruster

731  
00:52:43,690 --> 00:52:40,800  
firings take place already that was for

732  
00:52:46,549 --> 00:52:43,700  
burn zero which we did here was nominal

733  
00:52:48,349 --> 00:52:46,559  
lasted just a couple of seconds long but

734  
00:52:50,870 --> 00:52:48,359  
that little bit was enough to push it

735  
00:52:53,750 --> 00:52:50,880  
away from the space station and we are

736  
00:52:56,510 --> 00:52:53,760  
now awaiting departure burn one

737  
00:52:57,829 --> 00:52:56,520  
so there's a live view inside Dragon

738  
00:53:01,190 --> 00:52:57,839

freedom

739

00:53:03,290 --> 00:53:01,200

on the right hand side would be pilot

740

00:53:11,030 --> 00:53:03,300

Bob Hines and on the left hand side

741

00:53:17,210 --> 00:53:13,309

and they'll continue to monitor on the

742

00:53:19,250 --> 00:53:17,220

screens inside of crew Dragon Freedom as

743

00:53:20,809 --> 00:53:19,260

they continue the journey back home but

744

00:53:24,049 --> 00:53:20,819

we are hearing that everything is

745

00:53:26,450 --> 00:53:24,059

proceeding as expected we are targeting

746

00:53:28,670 --> 00:53:26,460

that departure burn one about two

747

00:53:31,670 --> 00:53:28,680

minutes from now

748

00:53:34,010 --> 00:53:31,680

departure burn one will increase that

749

00:53:37,130 --> 00:53:34,020

initial opening rate between crew dragon

750

00:53:39,890 --> 00:53:37,140

and the space station

751  
00:53:43,970 --> 00:53:39,900  
at this point in time we are utilizing

752  
00:53:45,230 --> 00:53:43,980  
the Draco thrusters which are on board

753  
00:53:47,089 --> 00:53:45,240  
Dragon

754  
00:53:53,930 --> 00:53:47,099  
um this departure burn we're expecting

755  
00:53:59,870 --> 00:53:57,290  
this point dragon is steering itself uh

756  
00:54:02,030 --> 00:53:59,880  
the approach and undocking

757  
00:54:03,770 --> 00:54:02,040  
um you know basically getting to station

758  
00:54:06,410 --> 00:54:03,780  
and leaving it are everything is

759  
00:54:08,750 --> 00:54:06,420  
autonomous however the crew is able to

760  
00:54:10,730 --> 00:54:08,760  
take over at any point in time if

761  
00:54:12,710 --> 00:54:10,740  
necessary but as you can see right there

762  
00:54:14,630 --> 00:54:12,720  
they're able to follow along with

763  
00:54:17,470 --> 00:54:14,640

everything happening with the capsule

764

00:54:19,790 --> 00:54:17,480

and their progress for their departure

765

00:54:21,829 --> 00:54:19,800

there on those screens that we saw

766

00:54:25,069 --> 00:54:21,839

moments ago

767

00:54:26,270 --> 00:54:25,079

yeah exactly right and during docking

768

00:54:28,309 --> 00:54:26,280

when we have a vehicle that's

769

00:54:29,870 --> 00:54:28,319

approaching space station it can take a

770

00:54:32,329 --> 00:54:29,880

little bit longer because we have these

771

00:54:34,790 --> 00:54:32,339

hold points that we wait at for safety

772

00:54:36,650 --> 00:54:34,800

purposes and precautions but during

773

00:54:38,690 --> 00:54:36,660

undocking it can happen a lot quicker

774

00:54:40,309 --> 00:54:38,700

and you really saw that they just

775

00:54:42,410 --> 00:54:40,319

undocked a few minutes ago and now

776

00:54:44,150 --> 00:54:42,420

they're already backing away we're

777

00:54:46,309 --> 00:54:44,160

moving into the next departure burn

778

00:54:47,870 --> 00:54:46,319

which we should hear the call out that

779

00:54:49,970 --> 00:54:47,880

it has begun

780

00:54:52,370 --> 00:54:49,980

um any second now and again you said

781

00:54:58,609 --> 00:54:52,380

this is a pretty short burn will only

782

00:55:13,069 --> 00:55:01,329

so standing by for the call that

783

00:55:26,030 --> 00:55:15,470

again departure burn one will last for

784

00:55:30,950 --> 00:55:28,910

[Applause]

785

00:55:39,170 --> 00:55:30,960

and we are hearing that the burn is

786

00:55:43,849 --> 00:55:42,049

so this burn is going to increase the

787

00:55:46,490 --> 00:55:43,859

initial opening rate between crew dragon

788

00:55:49,450 --> 00:55:46,500

and the space station and as you

789

00:55:52,010 --> 00:55:49,460

mentioned Kate that um this burn

790

00:55:57,410 --> 00:55:52,020

utilizes the service section draco's

791

00:56:02,450 --> 00:55:59,390

spin coated off suits per procedure

792

00:56:04,370 --> 00:56:02,460

4.012 if desired if you do take the

793

00:56:06,950 --> 00:56:04,380

suits off and Stow them we ask that you

794

00:56:08,510 --> 00:56:06,960

Stow with visors closed and finally a

795

00:56:10,790 --> 00:56:08,520

reminder that the big loop will be

796

00:56:26,770 --> 00:56:10,800

deactivated following dragon's exit from

797

00:56:26,780 --> 00:56:30,829

it looks like

798

00:56:30,839 --> 00:56:34,250

good copy

799

00:56:39,170 --> 00:56:36,470

and we did hear confirmation that that

800

00:56:42,109 --> 00:56:39,180

departure burn one is complete and went

801  
00:56:44,569 --> 00:56:42,119  
perfectly as expected it lasted 21

802  
00:56:47,030 --> 00:56:44,579  
seconds and use the service section at

803  
00:56:48,770 --> 00:56:47,040  
dracos we also heard some words from the

804  
00:56:50,150 --> 00:56:48,780  
ground up to the crew letting them know

805  
00:56:52,370 --> 00:56:50,160  
that they have the option to take off

806  
00:56:54,589 --> 00:56:52,380  
their spacesuits if they would like they

807  
00:56:56,690 --> 00:56:54,599  
don't have to though but if they would

808  
00:56:59,870 --> 00:56:56,700  
prepare to do so they're able to do so

809  
00:57:03,589 --> 00:56:59,880  
now at this point uh dragon is already

810  
00:57:05,990 --> 00:57:03,599  
about 175 meters away from the space

811  
00:57:07,970 --> 00:57:06,000  
station and so the next major Milestone

812  
00:57:10,730 --> 00:57:07,980  
that we're looking for is when Dragon

813  
00:57:13,609 --> 00:57:10,740

exits the keep out sphere that's that

814

00:57:16,370 --> 00:57:13,619

imaginary sphere or boundary 200 meters

815

00:57:18,410 --> 00:57:16,380

in radius around the space station and

816

00:57:20,750 --> 00:57:18,420

it is one of several safety zones set up

817

00:57:23,089 --> 00:57:20,760

to govern visiting spacecraft either

818

00:57:25,490 --> 00:57:23,099

arriving or departing the space station

819

00:57:27,589 --> 00:57:25,500

but before moving into the keep out

820

00:57:29,329 --> 00:57:27,599

sphere spacecraft have to be configured

821

00:57:32,150 --> 00:57:29,339

where they would not cross the imaginary

822

00:57:34,790 --> 00:57:32,160

boundary for at least four orbits even

823

00:57:38,390 --> 00:57:34,800

if the spacecraft lost all menu covering

824

00:57:43,069 --> 00:57:38,400

for some reason so the vehicle is now

825

00:57:46,069 --> 00:57:43,079

about 207 meters away so in Freedom

826  
00:57:55,010 --> 00:57:48,420  
external

827  
00:58:11,170 --> 00:57:57,470  
so that was SpaceX core which you see

828  
00:58:27,410 --> 00:58:12,829  
incredible

829  
00:58:32,750 --> 00:58:30,049  
sounded like some nice words uh there

830  
00:58:35,329 --> 00:58:32,760  
from Commander Chell Lindgren Freedom we

831  
00:58:37,130 --> 00:58:35,339  
appreciate those kind words uh we will

832  
00:58:40,430 --> 00:58:37,140  
miss you and we look forward to seeing

833  
00:58:48,109 --> 00:58:40,440  
you back home and ISS the dragon has

834  
00:58:48,119 --> 00:58:52,250  
foreign

835  
00:58:56,329 --> 00:58:54,289  
as you just heard there we just got word

836  
00:58:59,510 --> 00:58:56,339  
that Dragon exited the keep out sphere

837  
00:59:02,470 --> 00:58:59,520  
as Sandra mentioned uh it's an imaginary

838  
00:59:06,170 --> 00:59:02,480

boundary around the station

839

00:59:08,690 --> 00:59:06,180

the next event that we are standing by

840

00:59:10,730 --> 00:59:08,700

for is for Dragon to exit the approach

841

00:59:12,829 --> 00:59:10,740

ellipsoid um I just want to mention real

842

00:59:14,990 --> 00:59:12,839

quick that view on screen there is

843

00:59:17,390 --> 00:59:15,000

SpaceX mission control which is just to

844

00:59:19,910 --> 00:59:17,400

the left of Sandra and I

845

00:59:22,430 --> 00:59:19,920

um that's where SpaceX core or crew

846

00:59:24,349 --> 00:59:22,440

operations and resources engineer Jake

847

00:59:25,430 --> 00:59:24,359

vendel is standing by that is the

848

00:59:27,289 --> 00:59:25,440

primary voice that you hear

849

00:59:30,049 --> 00:59:27,299

communicating to the crew at least

850

00:59:32,630 --> 00:59:30,059

whenever they are speaking to Mission

851  
00:59:35,569 --> 00:59:32,640  
Control here in Hawthorne we also of

852  
00:59:38,089 --> 00:59:35,579  
course have Mission Control Houston over

853  
00:59:39,589 --> 00:59:38,099  
at NASA's Johnson Space Center and that

854  
00:59:42,410 --> 00:59:39,599  
was the voice that we heard just moments

855  
00:59:44,510 --> 00:59:42,420  
ago of Chell speaking too and there's

856  
00:59:47,450 --> 00:59:44,520  
that live view of Johnson Space Center

857  
00:59:50,329 --> 00:59:47,460  
Mission Control now so both teams are

858  
00:59:52,130 --> 00:59:50,339  
integrated and working together and

859  
00:59:56,510 --> 00:59:52,140  
communicating with station and with crew

860  
00:59:58,789 --> 00:59:56,520  
through as we have their departure or

861  
01:00:00,349 --> 00:59:58,799  
excuse me their departure now confirmed

862  
01:00:02,510 --> 01:00:00,359  
and they are now making their way

863  
01:00:04,190 --> 01:00:02,520

further and further away from the

864

01:00:06,829 --> 01:00:04,200

station

865

01:00:08,690 --> 01:00:06,839

now as I mentioned before as we are

866

01:00:11,510 --> 01:00:08,700

waiting for Dragon to exit the approach

867

01:00:14,530 --> 01:00:11,520

ellipsoid or AE as you hear it referred

868

01:00:16,970 --> 01:00:14,540

to another imaginary shape that we have

869

01:00:19,250 --> 01:00:16,980

this time it's a three-dimensional

870

01:00:22,549 --> 01:00:19,260

ellipsoid which measures four kilometers

871

01:00:24,470 --> 01:00:22,559

by two kilometers by two kilometers and

872

01:00:26,630 --> 01:00:24,480

that's in the same family as the keep

873

01:00:29,210 --> 01:00:26,640

out sphere one of the key differences

874

01:00:31,970 --> 01:00:29,220

with the approach ellipsoid is that

875

01:00:34,849 --> 01:00:31,980

Vehicles outside it have to be on what

876

01:00:37,069 --> 01:00:34,859

we call a 24-hour safe free drift

877

01:00:39,049 --> 01:00:37,079

trajectory that means that the

878

01:00:41,270 --> 01:00:39,059

spacecraft would not cross into the

879

01:00:43,970 --> 01:00:41,280

approach ellipsoid for at least 24 hours

880

01:00:45,650 --> 01:00:43,980

again even if it lost all of its

881

01:00:47,870 --> 01:00:45,660

maneuvering capability

882

01:00:50,809 --> 01:00:47,880

so we will be listening in for that call

883

01:00:53,150 --> 01:00:50,819

out once we hear confirmation uh that

884

01:00:55,970 --> 01:00:53,160

dragon is outside that approach

885

01:00:58,309 --> 01:00:55,980

ellipsoid or AE and that's a live view

886

01:01:01,430 --> 01:00:58,319

from the station looking at Dragon

887

01:01:06,309 --> 01:01:04,490

and so at this time crew Dragon freedom

888

01:01:09,289 --> 01:01:06,319

is

889

01:01:11,930 --> 01:01:09,299

378 meters away from the International

890

01:01:13,670 --> 01:01:11,940

Space Station so we are standing by for

891

01:01:16,309 --> 01:01:13,680

confirmation that we have exited the

892

01:01:19,490 --> 01:01:16,319

approach ellipsoid we are expecting that

893

01:01:21,890 --> 01:01:19,500

about five six minutes from now so we

894

01:01:24,890 --> 01:01:21,900

are getting closer but as you mentioned

895

01:01:26,510 --> 01:01:24,900

we can continue to see Dragon get

896

01:01:28,370 --> 01:01:26,520

smaller as

897

01:01:31,309 --> 01:01:28,380

in this view from the International

898

01:01:33,770 --> 01:01:31,319

Space Station again there are four crew

899

01:01:36,109 --> 01:01:33,780

members inside crew Dragon Freedom that

900

01:01:39,349 --> 01:01:36,119

includes NASA astronauts Chell lingrin

901  
01:01:41,270 --> 01:01:39,359  
Bob Heinz and Jessica Watkins as well as

902  
01:01:43,490 --> 01:01:41,280  
European Space Agency astronauts

903  
01:01:45,349 --> 01:01:43,500  
Samantha Christopher ready they have

904  
01:01:48,410 --> 01:01:45,359  
been on board the International Space

905  
01:01:49,910 --> 01:01:48,420  
Station for 170 days now after they

906  
01:01:52,789 --> 01:01:49,920  
launched from the Kennedy Space Center

907  
01:01:55,549 --> 01:01:52,799  
in Florida on April 27th

908  
01:01:57,950 --> 01:01:55,559  
as I mentioned earlier in the webcast at

909  
01:01:59,870 --> 01:01:57,960  
this point I I would imagine that the

910  
01:02:01,670 --> 01:01:59,880  
astronauts are excited to come home it

911  
01:02:04,190 --> 01:02:01,680  
has been nearly six months since they've

912  
01:02:05,990 --> 01:02:04,200  
seen their families but I would also

913  
01:02:07,609 --> 01:02:06,000

imagine that this moment is pretty

914

01:02:10,309 --> 01:02:07,619

Bittersweet

915

01:02:11,569 --> 01:02:10,319

um you know they have done they've

916

01:02:13,329 --> 01:02:11,579

worked really hard while on station

917

01:02:16,910 --> 01:02:13,339

they've done lots and lots of science

918

01:02:18,710 --> 01:02:16,920

Sandra mentioned that they have what was

919

01:02:20,450 --> 01:02:18,720

the number that you had earlier it was

920

01:02:22,010 --> 01:02:20,460

thousands of orbits I can't remember

921

01:02:24,049 --> 01:02:22,020

quite what it was off the top of my head

922

01:02:27,289 --> 01:02:24,059

but they have traveled so far during

923

01:02:29,030 --> 01:02:27,299

their six-month stay up on station and

924

01:02:31,190 --> 01:02:29,040

it's their home away from home at this

925

01:02:33,109 --> 01:02:31,200

point so I'm sure they're very much

926  
01:02:35,690 --> 01:02:33,119  
looking forward to getting back to their

927  
01:02:37,789 --> 01:02:35,700  
families here on Earth but I'm sure that

928  
01:02:38,120 --> 01:02:37,799  
you know the next basically five and a

929  
01:02:39,349 --> 01:02:38,130  
half hours

930  
01:02:41,569 --> 01:02:39,359  
[Applause]

931  
01:02:44,450 --> 01:02:41,579  
um are bittersweet because it's their

932  
01:02:46,130 --> 01:02:44,460  
last visit uh and there we actually um

933  
01:02:49,069 --> 01:02:46,140  
if you look at the Dragon capsule there

934  
01:02:52,190 --> 01:02:49,079  
we can actually see the the thrusting uh

935  
01:02:53,390 --> 01:02:52,200  
inaction of those Draco uh thrusters

936  
01:02:56,089 --> 01:02:53,400  
that we were mentioning before that's

937  
01:02:58,490 --> 01:02:56,099  
what dragon is using to uh maneuver away

938  
01:03:03,230 --> 01:02:58,500

from the space station

939

01:03:07,789 --> 01:03:05,390

but just to jump back to your point on

940

01:03:10,250 --> 01:03:07,799

the numbers so uh they again have been

941

01:03:21,349 --> 01:03:10,260

on board station for 170 days they have

942

01:03:25,849 --> 01:03:23,690

Freedom SpaceX on dragging to ground

943

01:03:35,089 --> 01:03:25,859

come check on the cabin mic came through

944

01:03:40,010 --> 01:03:37,490

that was just a quick com check now that

945

01:03:42,109 --> 01:03:40,020

uh the crew members are Doffing or

946

01:03:44,809 --> 01:03:42,119

taking off their spacesuits they no

947

01:03:46,730 --> 01:03:44,819

longer have that in-air communication

948

01:03:48,349 --> 01:03:46,740

because their helmets are off so they're

949

01:03:51,049 --> 01:03:48,359

going to be using the in-cabin

950

01:03:52,309 --> 01:03:51,059

microphone to communicate with ground

951  
01:04:00,789 --> 01:03:52,319  
teams

952  
01:04:00,799 --> 01:04:17,450  
good to hear you on dragging the ground

953  
01:04:21,950 --> 01:04:19,849  
so we are standing by for confirmation

954  
01:04:23,510 --> 01:04:21,960  
that the crew has exited the approach

955  
01:04:25,010 --> 01:04:23,520  
ellipsoid

956  
01:04:27,829 --> 01:04:25,020  
um we're expecting that to happen about

957  
01:04:30,289 --> 01:04:27,839  
five minutes from now and again this is

958  
01:04:32,450 --> 01:04:30,299  
a imaginary shape around the space

959  
01:04:35,990 --> 01:04:32,460  
station that is two kilometers by two

960  
01:04:38,569 --> 01:04:36,000  
kilometers by four kilometers and any

961  
01:04:41,030 --> 01:04:38,579  
spacecraft that enter in to this

962  
01:04:43,970 --> 01:04:41,040  
imaginary shape have to be in a 24-hour

963  
01:04:45,470 --> 01:04:43,980

safe free drift trajectory which just

964

01:04:47,210 --> 01:04:45,480

means the spacecraft would not cross

965

01:04:49,789 --> 01:04:47,220

into that approach ellipsoid for at

966

01:04:52,370 --> 01:04:49,799

least 24 hours even if it lost all of

967

01:04:54,650 --> 01:04:52,380

its maneuvering for some reason so we

968

01:04:56,270 --> 01:04:54,660

are continuing to stand by for

969

01:04:57,710 --> 01:04:56,280

confirmation that we've exited that

970

01:05:00,470 --> 01:04:57,720

approach ellipsoid about four minutes

971

01:05:02,569 --> 01:05:00,480

from now but I did just want to finish

972

01:05:05,030 --> 01:05:02,579

up on the numbers here because it's it's

973

01:05:07,549 --> 01:05:05,040

really pretty staggering when you think

974

01:05:11,930 --> 01:05:07,559

about it so the crew has orbited the

975

01:05:14,390 --> 01:05:11,940

earth 2000 720 times during their 170

976  
01:05:17,750 --> 01:05:14,400  
days on orbit the International Space

977  
01:05:20,569 --> 01:05:17,760  
Station is traveling 17 500 miles per

978  
01:05:22,970 --> 01:05:20,579  
hour which means that the crew orbits

979  
01:05:26,569 --> 01:05:22,980  
the earth every 90 minutes and sees a

980  
01:05:29,950 --> 01:05:26,579  
Sunset and a sunrise every 45 minutes so

981  
01:05:33,890 --> 01:05:29,960  
that equates to over 72 million miles

982  
01:05:38,569 --> 01:05:33,900  
traveled in the last six ish months that

983  
01:05:43,069 --> 01:05:40,789  
once again that's a live view from the

984  
01:05:46,250 --> 01:05:43,079  
International Space Station looking at

985  
01:05:48,670 --> 01:05:46,260  
crew Dragon freedom with our four

986  
01:05:51,470 --> 01:05:48,680  
through four astronauts on board

987  
01:05:53,809 --> 01:05:51,480  
they have gotten out of their seats they

988  
01:05:56,690 --> 01:05:53,819

are Doffing or taking off their suits

989

01:05:59,089 --> 01:05:56,700

and they're able to basically hang out

990

01:06:00,230 --> 01:05:59,099

uh for a couple hours before they have

991

01:06:02,089 --> 01:06:00,240

to

992

01:06:06,049 --> 01:06:02,099

um you know put their suits back on for

993

01:06:08,630 --> 01:06:06,059

the re-entry phase of their return home

994

01:06:10,370 --> 01:06:08,640

now this view because the sun is shining

995

01:06:12,829 --> 01:06:10,380

on it and dragon is getting further and

996

01:06:15,470 --> 01:06:12,839

further away from the station it's hard

997

01:06:17,510 --> 01:06:15,480

to make out the specific features but

998

01:06:20,510 --> 01:06:17,520

the nose cone at this point is still

999

01:06:23,150 --> 01:06:20,520

open that won't close until a little bit

1000

01:06:26,870 --> 01:06:23,160

later on when we are closer to the

1001  
01:06:29,150 --> 01:06:26,880  
re-entry portion the trunk is also still

1002  
01:06:30,349 --> 01:06:29,160  
attached that is a portion that we will

1003  
01:06:32,750 --> 01:06:30,359  
jettison

1004  
01:06:35,450 --> 01:06:32,760  
from the capsule in order to expose the

1005  
01:06:36,890 --> 01:06:35,460  
heat shield which will be utilized that

1006  
01:06:39,829 --> 01:06:36,900  
YouTube will be utilized for that

1007  
01:06:42,049 --> 01:06:39,839  
atmospheric re-entry

1008  
01:06:43,970 --> 01:06:42,059  
we're about three minutes away from the

1009  
01:06:45,950 --> 01:06:43,980  
point at which we will exit the approach

1010  
01:06:47,930 --> 01:06:45,960  
ellipsoid But continuing to hear good

1011  
01:06:51,410 --> 01:06:47,940  
call outs that everything is proceeding

1012  
01:06:53,930 --> 01:06:51,420  
as expected today we are targeting a

1013  
01:06:57,049 --> 01:06:53,940

Splashdown off the coast of Jacksonville

1014

01:07:01,130 --> 01:06:57,059

later this afternoon that Splash Zone is

1015

01:07:03,770 --> 01:07:01,140

targeted for 1 55 PM Pacific time

1016

01:07:05,450 --> 01:07:03,780

and we also did hear that the boat is

1017

01:07:07,609 --> 01:07:05,460

already out there in place in

1018

01:07:09,950 --> 01:07:07,619

preparation for crew 4 to splash down

1019

01:07:13,130 --> 01:07:09,960

the boat that's being utilized today is

1020

01:07:20,150 --> 01:07:13,140

Megan after uh Crew 2 astronaut Megan

1021

01:07:25,970 --> 01:07:22,490

just as a reminder for those uh tuning

1022

01:07:27,770 --> 01:07:25,980

in recently uh the dragon Freedom

1023

01:07:30,170 --> 01:07:27,780

spacecraft has separated from the

1024

01:07:32,990 --> 01:07:30,180

International Space Station uh in total

1025

01:07:35,630 --> 01:07:33,000

it will be completing four departure

1026

01:07:37,190 --> 01:07:35,640

Burns uh basically all designed to

1027

01:07:39,890 --> 01:07:37,200

increase the distance between the

1028

01:07:42,470 --> 01:07:39,900

spacecraft and the space station

1029

01:07:44,690 --> 01:07:42,480

um and and then once that is complete as

1030

01:07:48,049 --> 01:07:44,700

Sandra just mentioned we'll begin that

1031

01:07:49,370 --> 01:07:48,059

re-entry portion in total the astronauts

1032

01:07:52,250 --> 01:07:49,380

will have about five and a half hours

1033

01:07:53,990 --> 01:07:52,260

between undocking and Splashdown so

1034

01:08:02,270 --> 01:07:54,000

relatively speaking a pretty short

1035

01:08:08,809 --> 01:08:06,589

dragon is now 860 meters away from space

1036

01:08:10,789 --> 01:08:08,819

station and you can see in this view

1037

01:08:13,370 --> 01:08:10,799

here from the International Space

1038

01:08:15,950 --> 01:08:13,380

Station that dragon is continuing to get

1039

01:08:17,689 --> 01:08:15,960

smaller and smaller as it backs away

1040

01:08:19,010 --> 01:08:17,699

from the space station

1041

01:08:21,410 --> 01:08:19,020

um expecting the call out that we've

1042

01:08:45,590 --> 01:08:21,420

exited the approach ellipsoid in about a

1043

01:08:45,600 --> 01:08:51,410

okay

1044

01:08:51,420 --> 01:08:57,289

[Music]

1045

01:09:01,189 --> 01:08:59,510

so we are waiting for that call out that

1046

01:09:07,430 --> 01:09:01,199

dragon is outside of the approach

1047

01:09:13,610 --> 01:09:10,010

and everything has been moving along

1048

01:09:15,410 --> 01:09:13,620

pretty smoothly so far today we are just

1049

01:09:17,209 --> 01:09:15,420

waiting for that call out here any

1050

01:09:19,729 --> 01:09:17,219

moment from now that the crew has exited

1051

01:09:23,870 --> 01:09:19,739

the approach ellipsoid they are about

1052

01:09:26,390 --> 01:09:23,880

980 meters away from the space station

1053

01:09:28,490 --> 01:09:26,400

as we mentioned earlier everything is

1054

01:09:30,950 --> 01:09:28,500

carefully choreographed both approaching

1055

01:09:33,470 --> 01:09:30,960

and departing the space station uh

1056

01:09:35,689 --> 01:09:33,480

fortunately for us because it has been a

1057

01:09:38,090 --> 01:09:35,699

long couple of uh a long few days I

1058

01:09:41,570 --> 01:09:38,100

should say the departure phase is a lot

1059

01:09:44,030 --> 01:09:41,580

faster moving than the approach so we

1060

01:09:45,950 --> 01:09:44,040

are able to uh basically the crew as I

1061

01:09:48,890 --> 01:09:45,960

mentioned before will only have about

1062

01:09:51,410 --> 01:09:48,900

five and a half hours between uh the

1063

01:09:52,630 --> 01:09:51,420

undocking and the Splashdown of their

1064

01:09:55,189 --> 01:09:52,640

spacecraft

1065

01:09:58,490 --> 01:09:55,199

and all in all that's a pretty short

1066

01:10:01,550 --> 01:09:58,500

journey of course we are at the mercy of

1067

01:10:03,950 --> 01:10:01,560

orbital mechanics so it all depends on

1068

01:10:06,110 --> 01:10:03,960

where the station is and where we are

1069

01:10:08,330 --> 01:10:06,120

targeting a Splashdown

1070

01:10:10,250 --> 01:10:08,340

um and basically the time that it takes

1071

01:10:14,390 --> 01:10:10,260

to get from that point to the Splashdown

1072

01:10:16,790 --> 01:10:14,400

point of course it's I would imagine the

1073

01:10:18,290 --> 01:10:16,800

astronauts might prefer a shorter trip

1074

01:10:20,810 --> 01:10:18,300

home because again they get to see their

1075

01:10:22,970 --> 01:10:20,820

their family sooner but it all kind of

1076

01:10:25,209 --> 01:10:22,980

depends so for those that have tuned in

1077

01:10:27,770 --> 01:10:25,219

for our departure and Splashtown

1078

01:10:29,510 --> 01:10:27,780

webcasts previously sometimes they're a

1079

01:10:31,310 --> 01:10:29,520

little longer but this one is only about

1080

01:10:36,590 --> 01:10:31,320

five and a half hours in total for this

1081

01:10:44,410 --> 01:10:39,290

and we are hearing confirmation that

1082

01:11:10,790 --> 01:10:47,209

it is on a 24-hour safe free drift

1083

01:11:16,250 --> 01:11:13,250

there on your screen is SpaceX core Jake

1084

01:11:21,290 --> 01:11:19,130

and freedom SpaceX repeating my last

1085

01:11:23,450 --> 01:11:21,300

dragon has exited the approach ellipsoid

1086

01:11:32,770 --> 01:11:23,460

and is on a 24-hour safe free drift

1087

01:11:37,669 --> 01:11:35,330

and SpaceX Freedom copies out of the

1088

01:11:41,149 --> 01:11:37,679

approach to ellipsoid and 24 hour free

1089

01:11:41,159 --> 01:11:44,930

good words

1090

01:11:50,510 --> 01:11:47,870

and dragon Freedom has now exited the

1091

01:11:52,430 --> 01:11:50,520

approach ellipsoid or AE which is

1092

01:11:54,350 --> 01:11:52,440

another imaginary shape this time a

1093

01:11:55,850 --> 01:11:54,360

three-dimensional ellipsoid that

1094

01:11:58,010 --> 01:11:55,860

measures four kilometers by two

1095

01:12:00,229 --> 01:11:58,020

kilometers by two kilometers and the

1096

01:12:02,270 --> 01:12:00,239

same family as the keep out sphere one

1097

01:12:04,550 --> 01:12:02,280

of the key differences with the AES that

1098

01:12:04,960 --> 01:12:04,560

Vehicles outside it have to be on what

1099

01:12:12,590 --> 01:12:04,970

we call

1100

01:12:12,600 --> 01:12:18,770

foreign

1101

01:12:22,910 --> 01:12:20,689

so again one of those key differences

1102

01:12:46,970 --> 01:12:22,920

Freedom SpaceX one more note we are

1103

01:12:52,250 --> 01:12:49,790

so again dragon has now exited the

1104

01:12:53,750 --> 01:12:52,260

approach ellipsoid and as I was saying

1105

01:12:55,970 --> 01:12:53,760

one of those key differences with the

1106

01:12:58,250 --> 01:12:55,980

approach ellipsoid is that Vehicles

1107

01:13:04,310 --> 01:12:58,260

outside it have to be on what we call a

1108

01:13:12,350 --> 01:13:06,890

he tell uh just one more follow-on we

1109

01:13:12,360 --> 01:13:19,430

deactivating thanks

1110

01:13:23,689 --> 01:13:21,770

and so you did hear those words back and

1111

01:13:26,689 --> 01:13:23,699

forth from the ground here in Hawthorne

1112

01:13:28,850 --> 01:13:26,699

to the crew on freedom namely the

1113

01:13:31,070 --> 01:13:28,860

commander Chell lingrin just letting

1114

01:13:32,930 --> 01:13:31,080

them know that the big loop is going to

1115

01:13:34,669 --> 01:13:32,940

be deactivated and that happens because

1116

01:13:37,250 --> 01:13:34,679

once we cross out of the approach

1117

01:13:41,570 --> 01:13:37,260

ellipsoid we're no longer in integrated

1118

01:13:43,010 --> 01:13:41,580

operations with NASA and SpaceX so now

1119

01:13:44,450 --> 01:13:43,020

that we're out of the approach ellipsoid

1120

01:13:46,669 --> 01:13:44,460

they were just letting the crew know

1121

01:13:48,830 --> 01:13:46,679

that that was the case so again we have

1122

01:13:50,870 --> 01:13:48,840

exited the approach ellipsoid so this

1123

01:13:53,390 --> 01:13:50,880

means the spacecraft would not cross

1124

01:13:55,729 --> 01:13:53,400

into the approach ellipsoid for at least

1125

01:13:58,610 --> 01:13:55,739

24 hours if it lost all maneuvering

1126

01:14:00,169 --> 01:13:58,620

because it is in that 24 hour safe free

1127

01:14:03,050 --> 01:14:00,179

drift trajectory

1128

01:14:05,570 --> 01:14:03,060

and now that NASA astronauts Chell

1129

01:14:07,850 --> 01:14:05,580

Lindgren Bob Heinz and Jessica Watkins

1130

01:14:10,010 --> 01:14:07,860

as well as European Space Agency

1131

01:14:12,050 --> 01:14:10,020

astronaut Samantha Christopher ready

1132

01:14:14,209 --> 01:14:12,060

have Departed the International Space

1133

01:14:16,250 --> 01:14:14,219

Station it will take them about five and

1134

01:14:19,370 --> 01:14:16,260

a half hours until they make their way

1135

01:14:20,810 --> 01:14:19,380

back to Earth next up the crew will doff

1136

01:14:23,689 --> 01:14:20,820

or excuse me they already have doctor

1137

01:14:25,790 --> 01:14:23,699

taken off their spacesuits uh to settle

1138

01:14:28,070 --> 01:14:25,800

in for their flight home and today

1139

01:14:30,410 --> 01:14:28,080

targeted dragon is targeting a

1140

01:14:33,110 --> 01:14:30,420

Splashdown off of the coast you see our

1141

01:14:35,689 --> 01:14:33,120

recovery vessel there it'll be splashing

1142

01:14:38,750 --> 01:14:35,699

down off the coast of Florida at 1 55

1143

01:14:41,510 --> 01:14:38,760

p.m Pacific followed by the crew getting

1144

01:14:44,570 --> 01:14:41,520

picked up at Sea by one of that by that

1145

01:14:47,330 --> 01:14:44,580

recovery vessel you just saw and as they

1146

01:14:48,890 --> 01:14:47,340

rest up our teams here in Hawthorne will

1147

01:14:52,010 --> 01:14:48,900

continue to keep an eye on the weather

1148

01:14:55,550 --> 01:14:52,020

to ensure a safe return to Earth for

1149

01:14:57,590 --> 01:14:55,560

Dragon in our four crew 4 astronauts and

1150

01:14:59,870 --> 01:14:57,600

though our coverage here in Hawthorne is

1151

01:15:02,209 --> 01:14:59,880

concluding for now we'll turn it over to

1152

01:15:04,250 --> 01:15:02,219

the NASA team in Houston to take us

1153

01:15:07,010 --> 01:15:04,260

through the next phases of the crew 4

1154

01:15:09,470 --> 01:15:07,020

mission NASA TV will stay on the air for

1155

01:15:11,450 --> 01:15:09,480

a continuous live coverage along crew

1156

01:15:14,450 --> 01:15:11,460

Forest journey home and for those of you

1157

01:15:16,070 --> 01:15:14,460

watching online on NASA's YouTube take a

1158

01:15:17,750 --> 01:15:16,080

look at the description below the video

1159

01:15:20,750 --> 01:15:17,760

there you'll be able to find the new

1160

01:15:22,250 --> 01:15:20,760

link for the crew for Coast phase live

1161

01:15:25,070 --> 01:15:22,260

coverage will continue at that new

1162

01:15:27,890 --> 01:15:25,080

location here shortly and if you're

1163

01:15:29,570 --> 01:15:27,900

watching on NASA TV you won't notice a

1164

01:15:32,030 --> 01:15:29,580

change whatsoever as coverage will

1165

01:15:34,189 --> 01:15:32,040

continue meanwhile spacex's YouTube

1166

01:15:37,250 --> 01:15:34,199

channel will join live coverage starting

1167

01:15:39,229 --> 01:15:37,260

roughly one hour prior to Splashdown and

1168

01:15:43,310 --> 01:15:39,239

as always you can find Mission updates

1169

01:15:46,430 --> 01:15:43,320

on Twitter at Nasa at SpaceX and on the

1170

01:15:47,990 --> 01:15:46,440

web at nasa.gov thanks for watching this