

A photograph of the Space Shuttle Columbia being mated to the External Tank and Solid Rocket Boosters on the Vehicle Assembly Building's crawler-transporter. The shuttle is white with a purple and orange stripe. The crawler-transporter is green and has multiple levels of scaffolding. The background is a clear blue sky.

NASA LIVE

LAUNCH TO THE
INTERNATIONAL SPACE STATION

1
00:00:27,429 --> 00:00:17,250

[Music]

2
00:00:32,870 --> 00:00:30,870

it is midday at the baikonur cosmodrome

3
00:00:35,110 --> 00:00:32,880

in kazakhstan where an american

4
00:00:38,150 --> 00:00:35,120

astronaut and two russian cosmonauts are

5
00:00:40,549 --> 00:00:38,160

sitting atop the 160-foot tall soyuz

6
00:00:44,389 --> 00:00:40,559

booster ready to launch about an hour

7
00:00:48,790 --> 00:00:44,399

from now at 2 42 a.m central times 7 42

8
00:00:51,029 --> 00:00:48,800

gmt 12 42 p.m over in baikonur this is a

9
00:00:54,069 --> 00:00:51,039

live view of that soyuz rocket on the

10
00:00:56,389 --> 00:00:54,079

site 31 launch pad in baikonur this is

11
00:00:59,110 --> 00:00:56,399

the third crude launch on the upgraded

12
00:01:00,950 --> 00:00:59,120

soyuz 2.1a booster which made its first

13
00:01:02,549 --> 00:01:00,960

crude flight with the soyuz spacecraft

14

00:01:04,789 --> 00:01:02,559

to the international space station in

15

00:01:06,630 --> 00:01:04,799

april of just last year

16

00:01:08,550 --> 00:01:06,640

today a team of launch controllers are

17

00:01:10,310 --> 00:01:08,560

watching over all systems aboard the

18

00:01:12,789 --> 00:01:10,320

rocket which at this point is fully

19

00:01:14,789 --> 00:01:12,799

fueled and ready for launch

20

00:01:15,990 --> 00:01:14,799

we haven't tracked any issues throughout

21

00:01:17,830 --> 00:01:16,000

the day

22

00:01:19,670 --> 00:01:17,840

which began with fuel and oxidizer

23

00:01:22,149 --> 00:01:19,680

loading some hours ago they just

24

00:01:24,070 --> 00:01:22,159

completed a leak check on the soyuz

25

00:01:25,990 --> 00:01:24,080

spacecraft and as we speak the three

26
00:01:27,910 --> 00:01:26,000
crew members inside are going through

27
00:01:29,350 --> 00:01:27,920
leak checks on their sokol launch and

28
00:01:31,510 --> 00:01:29,360
entry suits

29
00:01:33,429 --> 00:01:31,520
good morning good afternoon good evening

30
00:01:34,950 --> 00:01:33,439
wherever you are in the world from the

31
00:01:36,950 --> 00:01:34,960
international space station flight

32
00:01:38,950 --> 00:01:36,960
control room this is mission control

33
00:01:40,870 --> 00:01:38,960
houston i'm dan hewitt i'll be taking

34
00:01:42,310 --> 00:01:40,880
you throughout the soyuz launch and its

35
00:01:45,109 --> 00:01:42,320
flight to the international space

36
00:01:46,950 --> 00:01:45,119
station later on this morning

37
00:01:48,630 --> 00:01:46,960
here inside the room

38
00:01:51,030 --> 00:01:48,640

flight controllers are looking over the

39

00:01:53,510 --> 00:01:51,040

systems on board as they prepare for the

40

00:01:56,310 --> 00:01:53,520

arrival of three new crew members

41

00:01:58,230 --> 00:01:56,320

flying up on the soyuz ms-18

42

00:02:01,510 --> 00:01:58,240

the soyuz population is going to be

43

00:02:03,429 --> 00:02:01,520

increasing from 7 to 10 for a few days

44

00:02:05,830 --> 00:02:03,439

with the addition of nasa astronaut mark

45

00:02:08,389 --> 00:02:05,840

vande high russian cosmonaut pyotr

46

00:02:10,550 --> 00:02:08,399

dubrov and russian cosmonaut and soyuz

47

00:02:12,949 --> 00:02:10,560

commander oleg novitskiy

48

00:02:15,270 --> 00:02:12,959

these three are about to begin their

49

00:02:17,270 --> 00:02:15,280

planned two orbit flight to the station

50

00:02:19,110 --> 00:02:17,280

with the docking scheduled a little more

51
00:02:22,229 --> 00:02:19,120
than three hours about three hours and

52
00:02:27,589 --> 00:02:22,239
25 minutes after launch at 607 am

53
00:02:28,790 --> 00:02:27,599
central time 1107 gmt 407 pm in baikonur

54
00:02:31,350 --> 00:02:28,800
where we have

55
00:02:36,710 --> 00:02:31,360
nasa and roscosmos support teams and

56
00:02:40,869 --> 00:02:38,949
soyuz ms-18 spacecraft is going to be

57
00:02:43,509 --> 00:02:40,879
docking with the rassvet module it's on

58
00:02:45,589 --> 00:02:43,519
the nader or the earth-facing side of

59
00:02:47,830 --> 00:02:45,599
the russian segment just under the zarya

60
00:02:49,670 --> 00:02:47,840
module you can see in this graphic here

61
00:02:51,990 --> 00:02:49,680
we're going to have four russian

62
00:02:54,630 --> 00:02:52,000
vehicles attached to the station just a

63
00:02:56,949 --> 00:02:54,640

few hours from now so use ms-18 the one

64

00:02:58,470 --> 00:02:56,959

currently on the pad and bound for the

65

00:03:00,630 --> 00:02:58,480

station

66

00:03:03,030 --> 00:03:00,640

and they're going to join the seven

67

00:03:05,190 --> 00:03:03,040

current station residents on board

68

00:03:08,790 --> 00:03:05,200

starting off with nasa astronaut kate

69

00:03:10,390 --> 00:03:08,800

rubins russian cosmonaut sergey kujkov

70

00:03:12,710 --> 00:03:10,400

and russian cosmonaut and soyuz

71

00:03:15,110 --> 00:03:12,720

commander sergey rzhikov they've been

72

00:03:18,550 --> 00:03:15,120

on board since they arrived in the soyuz

73

00:03:20,869 --> 00:03:18,560

ms-17 last october and also on board

74

00:03:23,190 --> 00:03:20,879

right now are the four spacex dragon

75

00:03:25,190 --> 00:03:23,200

crew one astronauts who've been on board

76
00:03:27,270 --> 00:03:25,200
the station since november

77
00:03:29,350 --> 00:03:27,280
and that's three nasa astronauts shanna

78
00:03:31,430 --> 00:03:29,360
walker victor glover and the crew on

79
00:03:34,710 --> 00:03:31,440
commander mike hopkins and they were

80
00:03:36,309 --> 00:03:34,720
joined by jaxa astronaut suicina gucci

81
00:03:39,190 --> 00:03:36,319
shannon walker is going to be taking

82
00:03:41,270 --> 00:03:39,200
over as the expedition 65 station

83
00:03:43,589 --> 00:03:41,280
commander the change of command ceremony

84
00:03:46,550 --> 00:03:43,599
coming up on april 15th a little over a

85
00:03:48,869 --> 00:03:46,560
day prior to rubens gucciferkov and

86
00:03:51,030 --> 00:03:48,879
rizhikov undocking from the station and

87
00:03:53,110 --> 00:03:51,040
returning to earth aboard their soyuz

88
00:03:54,789 --> 00:03:53,120

spacecraft

89

00:03:56,070 --> 00:03:54,799

here in houston

90

00:03:57,750 --> 00:03:56,080

team in mission control is going to be

91

00:03:59,429 --> 00:03:57,760

monitoring today's launch getting

92

00:04:02,149 --> 00:03:59,439

updates on the flight from their russian

93

00:04:03,830 --> 00:04:02,159

counterparts flight director paul kanya

94

00:04:05,589 --> 00:04:03,840

is going to be leading the teams for

95

00:04:08,390 --> 00:04:05,599

launch and through the first

96

00:04:10,550 --> 00:04:08,400

hours of the soyuz flight and the capcom

97

00:04:14,949 --> 00:04:10,560

right now is andreas mogensen andy

98

00:04:17,349 --> 00:04:14,959

mogensen from the european space agency

99

00:04:19,030 --> 00:04:17,359

during the soyuz has climbed to orbit

100

00:04:21,030 --> 00:04:19,040

tracking and telemetry's down link to

101

00:04:22,550 --> 00:04:21,040

ground stations along the flight path

102

00:04:24,550 --> 00:04:22,560

and all of it gets routed here to the

103

00:04:27,670 --> 00:04:24,560

russian mission control center in

104

00:04:29,749 --> 00:04:27,680

koryoff just outside of moscow we'll be

105

00:04:32,390 --> 00:04:29,759

seeing a lot of this room over the next

106

00:04:34,070 --> 00:04:32,400

couple of hours

107

00:04:36,070 --> 00:04:34,080

and as we will be with you for the next

108

00:04:37,830 --> 00:04:36,080

couple of hours if you have any

109

00:04:39,430 --> 00:04:37,840

questions about today's launch the

110

00:04:41,110 --> 00:04:39,440

docking the rendezvous anything about

111

00:04:42,390 --> 00:04:41,120

the international space station that you

112

00:04:45,350 --> 00:04:42,400

want to ask us

113

00:04:46,950 --> 00:04:45,360

hop on twitter use the hashtag ask nasa

114

00:04:52,469 --> 00:04:46,960

and i'll do my best to get through as

115

00:04:56,710 --> 00:04:54,629

today's launch is marking the second

116

00:04:58,550 --> 00:04:56,720

flight into space for nasa astronaut

117

00:05:01,909 --> 00:04:58,560

mark vande high this is going to be the

118

00:05:03,189 --> 00:05:01,919

first for cosmonaut pyotr dubrov uh he's

119

00:05:05,029 --> 00:05:03,199

on the right there

120

00:05:07,670 --> 00:05:05,039

and then this is going to be the third

121

00:05:11,110 --> 00:05:07,680

space flight for the ms-18 commander and

122

00:05:13,110 --> 00:05:11,120

russian cosmonaut oleg novitskiy

123

00:05:15,749 --> 00:05:13,120

this expedition also going to be

124

00:05:18,310 --> 00:05:15,759

celebrating the anniversary of a very

125

00:05:22,260 --> 00:05:18,320

important milestone in human space

126

00:05:28,550 --> 00:05:26,469

[Music]

127

00:05:32,310 --> 00:05:28,560

and he was the first

128

00:05:34,870 --> 00:05:32,320

on april 12 1961 jurgy garan became the

129

00:05:37,430 --> 00:05:34,880

first human to make that slow trek to

130

00:05:39,270 --> 00:05:37,440

the top end of a rocket bound to hurl

131

00:05:42,070 --> 00:05:39,280

him into the heavens and into the

132

00:05:52,000 --> 00:05:42,080

distant frontier of space and it was a

133

00:06:01,130 --> 00:05:58,710

[Music]

134

00:06:09,510 --> 00:06:01,140

wishing you a good flight

135

00:06:11,510 --> 00:06:09,520

[Music]

136

00:06:13,430 --> 00:06:11,520

riding on technology still in its

137

00:06:15,670 --> 00:06:13,440

nascent stages until this point

138

00:06:18,550 --> 00:06:15,680

developed in the throes of conflict yuri

139

00:06:22,250 --> 00:06:18,560

took to the skies ascending into orbit

140

00:06:25,670 --> 00:06:22,260

for 108 minutes of history

141

00:06:30,150 --> 00:06:27,510

and then after hurtling back through the

142

00:06:32,309 --> 00:06:30,160

earth's atmosphere yuri ejected from his

143

00:06:34,390 --> 00:06:32,319

space harbinger and parachuted down to

144

00:06:36,710 --> 00:06:34,400

the kazakh steppe

145

00:06:39,189 --> 00:06:36,720

at that moment he was transformed into a

146

00:06:41,749 --> 00:06:39,199

hero for the soviet union and the

147

00:06:45,590 --> 00:06:41,759

forerunner for humans kinds ventures

148

00:06:49,749 --> 00:06:47,749

and though he was taken from us too soon

149

00:06:51,990 --> 00:06:49,759

those that look to slip the bonds of

150

00:06:54,390 --> 00:06:52,000

gravity and reach beyond a terrestrial

151
00:06:57,430 --> 00:06:54,400
home will forever revere what he

152
00:06:57,440 --> 00:07:07,510
for once again yuri was the first

153
00:07:12,390 --> 00:07:10,710
the expedition 65 cruise soyuz launch is

154
00:07:13,990 --> 00:07:12,400
going to honor the anniversary of

155
00:07:15,830 --> 00:07:14,000
gagarin's historic flight with the

156
00:07:17,350 --> 00:07:15,840
mission patch adorning the fairing of

157
00:07:20,710 --> 00:07:17,360
their launch vehicle

158
00:07:23,270 --> 00:07:20,720
the design of the soyuz ms-18 patch

159
00:07:26,550 --> 00:07:23,280
incorporates a banner depicting

160
00:07:29,029 --> 00:07:26,560
the years 1961 and 2021 flanking the

161
00:07:31,440 --> 00:07:29,039
number 60 symbolizing the 60th

162
00:07:37,430 --> 00:07:31,450
anniversary of human spaceflight

163
00:07:40,150 --> 00:07:37,440

[Music]

164

00:07:42,629 --> 00:07:40,160

but right now on board the soyuz today

165

00:07:44,309 --> 00:07:42,639

is a nasa astronaut he's making a second

166

00:07:46,390 --> 00:07:44,319

long duration flight to the space

167

00:07:48,629 --> 00:07:46,400

station so let's kick things off by

168

00:07:51,760 --> 00:07:48,639

learning a little bit more about mark

169

00:07:57,430 --> 00:07:56,629

[Music]

170

00:07:59,909 --> 00:07:57,440

so

171

00:08:01,830 --> 00:07:59,919

arriving at the space station

172

00:08:03,430 --> 00:08:01,840

something i'll never forget is looking

173

00:08:06,390 --> 00:08:03,440

over my left shoulder out the window in

174

00:08:08,950 --> 00:08:06,400

the soyuz where it was either a view of

175

00:08:10,629 --> 00:08:08,960

the earth or blackness of space

176
00:08:12,469 --> 00:08:10,639
and then all of a sudden i could see a

177
00:08:13,830 --> 00:08:12,479
solar array getting chills even thinking

178
00:08:14,950 --> 00:08:13,840
about it right now it was this beautiful

179
00:08:16,230 --> 00:08:14,960
gold

180
00:08:18,629 --> 00:08:16,240
massive i mean

181
00:08:21,189 --> 00:08:18,639
you don't ever train and see a solar

182
00:08:22,869 --> 00:08:21,199
array at full scale here and so there it

183
00:08:23,830 --> 00:08:22,879
was and the russian commander sitting to

184
00:08:25,510 --> 00:08:23,840
my right

185
00:08:27,350 --> 00:08:25,520
i had to really pay close attention and

186
00:08:29,029 --> 00:08:27,360
i was supposed to be too but as soon as

187
00:08:31,510 --> 00:08:29,039
i saw the solarize i broke the silence

188
00:08:32,310 --> 00:08:31,520

and said wow and he was like

189

00:08:35,620 --> 00:08:32,320

so

190

00:08:42,709 --> 00:08:35,630

excited

191

00:08:44,149 --> 00:08:42,719

[Music]

192

00:08:46,310 --> 00:08:44,159

the freedom of motion inside of the

193

00:08:48,150 --> 00:08:46,320

space station is huge

194

00:08:50,630 --> 00:08:48,160

and then working was busy it was

195

00:08:51,990 --> 00:08:50,640

definitely very busy i got up there when

196

00:08:54,870 --> 00:08:52,000

a spacex

197

00:08:56,870 --> 00:08:54,880

dragon spacecraft is docked just because

198

00:08:58,389 --> 00:08:56,880

there's a lot of science that requires

199

00:09:00,870 --> 00:08:58,399

return and things have to be done in a

200

00:09:02,949 --> 00:09:00,880

very specific timeline it was very

201
00:09:04,870 --> 00:09:02,959
fast-paced immediately

202
00:09:05,990 --> 00:09:04,880
and the space station is very unique

203
00:09:08,310 --> 00:09:06,000
because

204
00:09:10,230 --> 00:09:08,320
on the space station orbit is really a

205
00:09:11,430 --> 00:09:10,240
continuous freefall

206
00:09:13,509 --> 00:09:11,440
and because of that you can have some

207
00:09:15,670 --> 00:09:13,519
very unstable structures that might not

208
00:09:17,590 --> 00:09:15,680
be able to stay together if you're on

209
00:09:19,670 --> 00:09:17,600
the ground they can stay together on the

210
00:09:21,430 --> 00:09:19,680
space station flames behave differently

211
00:09:24,070 --> 00:09:21,440
because combustion on the ground

212
00:09:25,990 --> 00:09:24,080
requires drawing in all these rich gases

213
00:09:27,829 --> 00:09:26,000

into the flame because the hot

214

00:09:29,110 --> 00:09:27,839

combustion gases go up and away but

215

00:09:30,710 --> 00:09:29,120

there's no up and away on the space

216

00:09:32,389 --> 00:09:30,720

station all directions are equal as far

217

00:09:34,150 --> 00:09:32,399

as that's concerned so that behaves

218

00:09:35,910 --> 00:09:34,160

differently there's all kinds of

219

00:09:37,110 --> 00:09:35,920

different phenomena that we can

220

00:09:39,110 --> 00:09:37,120

experiment with that's why it's a

221

00:09:40,550 --> 00:09:39,120

wonderful laboratory many many different

222

00:09:43,030 --> 00:09:40,560

experiments some of those experiments

223

00:09:44,389 --> 00:09:43,040

actually have to do with us as the test

224

00:09:45,910 --> 00:09:44,399

subjects because we're trying to

225

00:09:47,670 --> 00:09:45,920

understand how to have people safely

226

00:09:49,269 --> 00:09:47,680

travel for longer and longer distances

227

00:09:50,870 --> 00:09:49,279

too that's just a sub part of all the

228

00:09:52,310 --> 00:09:50,880

science we're doing on the space station

229

00:09:54,949 --> 00:09:52,320

some people have talked about at some

230

00:09:56,550 --> 00:09:54,959

point in the expedition feeling like

231

00:09:58,630 --> 00:09:56,560

it's time to go home but for me there

232

00:10:00,310 --> 00:09:58,640

was always another spacewalk or another

233

00:10:02,310 --> 00:10:00,320

vehicle capture that was coming up so it

234

00:10:06,710 --> 00:10:02,320

always felt like suddenly i was going

235

00:10:10,450 --> 00:10:09,110

i'm mark vandehei and i'm a nasa

236

00:10:18,790 --> 00:10:10,460

astronaut

237

00:10:24,310 --> 00:10:21,750

and mark is just one of the three flying

238

00:10:28,389 --> 00:10:24,320

into space today so now let's dive in

239

00:10:33,190 --> 00:10:30,470

born in virginia then raised in new

240

00:10:35,430 --> 00:10:33,200

jersey and minnesota mark vanda earned a

241

00:10:37,590 --> 00:10:35,440

bachelor of science in physics from st

242

00:10:39,750 --> 00:10:37,600

john's university and a master of

243

00:10:42,150 --> 00:10:39,760

science in applied physics from stanford

244

00:10:45,030 --> 00:10:42,160

university he was commissioned in the

245

00:10:47,750 --> 00:10:45,040

u.s army through the rotc program and

246

00:10:50,949 --> 00:10:47,760

served as a combat engineer

247

00:10:53,430 --> 00:10:50,959

in 1999 he became an assistant professor

248

00:10:56,230 --> 00:10:53,440

of physics at the united states military

249

00:10:58,310 --> 00:10:56,240

academy in west point

250

00:11:01,590 --> 00:10:58,320

vanda high reported to the johnson space

251
00:11:04,150 --> 00:11:01,600
center in houston in july 2006 to serve

252
00:11:05,670 --> 00:11:04,160
as a capsule communicator or capcom in

253
00:11:08,630 --> 00:11:05,680
mission control

254
00:11:11,750 --> 00:11:08,640
selected in june 2009 as one of nine

255
00:11:13,670 --> 00:11:11,760
members of the 20th nasa astronaut class

256
00:11:14,389 --> 00:11:13,680
vanda high first launched to the space

257
00:11:20,230 --> 00:11:14,399
station

258
00:11:22,150 --> 00:11:20,240
aboard soyuz ms-06 on september 13 2017.

259
00:11:25,750 --> 00:11:22,160
serving as a flight engineer during

260
00:11:28,710 --> 00:11:25,760
expeditions 53 and 54 he conducted four

261
00:11:32,630 --> 00:11:28,720
spacewalks spending a total of 26 hours

262
00:11:34,550 --> 00:11:32,640
and 42 minutes outside the space station

263
00:11:36,790 --> 00:11:34,560

during his mission the crew marked the

264

00:11:39,670 --> 00:11:36,800

beginning of the first long-term

265

00:11:41,829 --> 00:11:39,680

increase in crew size on the u.s segment

266

00:11:44,069 --> 00:11:41,839

enabling nasa to double the time

267

00:11:46,949 --> 00:11:44,079

dedicated to research and achieve a

268

00:11:48,150 --> 00:11:46,959

record-setting 100 hours of research in

269

00:11:50,590 --> 00:11:48,160

one week

270

00:11:53,670 --> 00:11:50,600

so far vanda high has logged a total of

271

00:11:55,829 --> 00:11:53,680

168 days in space

272

00:11:57,990 --> 00:11:55,839

and mark vande high is a flight engineer

273

00:12:00,629 --> 00:11:58,000

for today's launch he seated to the

274

00:12:03,750 --> 00:12:00,639

right of the soyuz commander roscosmos

275

00:12:06,470 --> 00:12:03,760

cosmonaut oleg novitskiy

276

00:12:08,710 --> 00:12:06,480

born in chairven in the minsk region of

277

00:12:10,710 --> 00:12:08,720

bella russia oleg novitskiy attended

278

00:12:13,190 --> 00:12:10,720

military pilot school and became

279

00:12:15,030 --> 00:12:13,200

certified as a pilot engineer

280

00:12:17,590 --> 00:12:15,040

he went on to graduate from the yuri

281

00:12:19,829 --> 00:12:17,600

gagarin air force academy and earned a

282

00:12:21,590 --> 00:12:19,839

master's degree in state and municipal

283

00:12:24,150 --> 00:12:21,600

administration from the russian

284

00:12:26,069 --> 00:12:24,160

presidential academy of national economy

285

00:12:28,150 --> 00:12:26,079

and public administration

286

00:12:30,550 --> 00:12:28,160

before becoming a cosmonaut he was a

287

00:12:33,269 --> 00:12:30,560

qualified paratrooper instructor a

288

00:12:35,910 --> 00:12:33,279

military diver and a class 2 military

289

00:12:37,990 --> 00:12:35,920

pilot with a total of 700 hours of

290

00:12:39,910 --> 00:12:38,000

flight time

291

00:12:42,949 --> 00:12:39,920

selected as a cosmonaut candidate in

292

00:12:45,990 --> 00:12:42,959

2007 nowitzki qualified as a test

293

00:12:49,829 --> 00:12:46,000

cosmonaut in 2009. his first space

294

00:12:52,310 --> 00:12:49,839

flight was a soyuz tma-06m commander and

295

00:12:53,750 --> 00:12:52,320

a flight engineer during expeditions 33

296

00:12:55,750 --> 00:12:53,760

and 34.

297

00:12:59,030 --> 00:12:55,760

his second flight to space was aboard

298

00:13:00,870 --> 00:12:59,040

soyuz ms-03 where he served again as a

299

00:13:04,069 --> 00:13:00,880

soyuz commander and a flight engineer

300

00:13:05,670 --> 00:13:04,079

for expeditions 50 and 51.

301
00:13:07,829 --> 00:13:05,680
while aboard the space station he

302
00:13:09,750 --> 00:13:07,839
supported arrivals of multiple cargo

303
00:13:11,990 --> 00:13:09,760
vehicles and performed science

304
00:13:14,710 --> 00:13:12,000
experiments the russian iss research

305
00:13:18,550 --> 00:13:14,720
program novitskiy has a combined total

306
00:13:21,110 --> 00:13:18,560
of over 339 days in space

307
00:13:23,829 --> 00:13:21,120
oleg novitskiy is serving as the soyuz

308
00:13:25,829 --> 00:13:23,839
ms-18 commander and will serve aboard

309
00:13:29,030 --> 00:13:25,839
the international space station as an

310
00:13:31,670 --> 00:13:29,040
expedition 65 flight engineer and seated

311
00:13:35,430 --> 00:13:31,680
to his left is first-time flyer rose

312
00:13:38,389 --> 00:13:35,440
cosmos cosmonaut pyotr dubrov

313
00:13:40,470 --> 00:13:38,399

born in khabarovsk russia pyotr dubrov

314

00:13:42,949 --> 00:13:40,480

graduated from the school of information

315

00:13:44,710 --> 00:13:42,959

technologies and continued his studies

316

00:13:47,350 --> 00:13:44,720

at the khabarov state technical

317

00:13:49,670 --> 00:13:47,360

university graduating with a specialty

318

00:13:51,509 --> 00:13:49,680

in software for computing machines and

319

00:13:54,310 --> 00:13:51,519

automated systems

320

00:13:56,949 --> 00:13:54,320

dubrov also studied and received his

321

00:13:59,269 --> 00:13:56,959

master of sports in parachute jumping

322

00:14:01,269 --> 00:13:59,279

and his early career included serving as

323

00:14:04,629 --> 00:14:01,279

a software engineer at the khabarovsk

324

00:14:07,269 --> 00:14:04,639

railways at dalcombe bank and at cbos

325

00:14:10,230 --> 00:14:07,279

development international

326
00:14:12,790 --> 00:14:10,240
beginning his cosmonaut training in 2012

327
00:14:15,189 --> 00:14:12,800
dubrov was certified as a test cosmonaut

328
00:14:17,269 --> 00:14:15,199
in july 2014

329
00:14:20,629 --> 00:14:17,279
assigned to his first space flight as a

330
00:14:22,710 --> 00:14:20,639
member of the expedition 6465 crew he

331
00:14:28,790 --> 00:14:22,720
will serve as a flight engineer aboard

332
00:14:33,030 --> 00:14:30,870
and we're back now with a quick live

333
00:14:34,710 --> 00:14:33,040
look inside the capsule you can see the

334
00:14:37,189 --> 00:14:34,720
commander there in the center seat oleg

335
00:14:39,430 --> 00:14:37,199
novitskiy and at the top of your screen

336
00:14:41,509 --> 00:14:39,440
is pyotr dubrov in the left seat today

337
00:14:42,949 --> 00:14:41,519
and just a reminder a little bit later

338
00:14:45,829 --> 00:14:42,959

in the program we'll be taking your

339

00:14:48,069 --> 00:14:45,839

questions so hop over to twitter use the

340

00:14:50,150 --> 00:14:48,079

hashtag ask nasa and keep sending those

341

00:14:58,550 --> 00:14:50,160

in

342

00:15:01,030 --> 00:14:58,560

star city russia the commander oleg

343

00:15:02,150 --> 00:15:01,040

novitskiy was able to describe his

344

00:15:03,990 --> 00:15:02,160

inspiration

345

00:15:08,310 --> 00:15:04,000

for the selection of the crew zero g

346

00:15:13,670 --> 00:15:10,870

for the weightlessness indicator i do

347

00:15:15,829 --> 00:15:13,680

have it with me this is one of the

348

00:15:17,110 --> 00:15:15,839

heroes of our nice

349

00:15:19,829 --> 00:15:17,120

cartoon

350

00:15:21,990 --> 00:15:19,839

kitten gaff

351
00:15:23,750 --> 00:15:22,000
yes it is him

352
00:15:27,829 --> 00:15:23,760
especially this year i believe has been

353
00:15:29,509 --> 00:15:27,839
40 years since this cartoon came out

354
00:15:32,550 --> 00:15:29,519
and the

355
00:15:38,829 --> 00:15:32,560
story is that the puppy is waiting at

356
00:15:45,110 --> 00:15:42,470
space and here's a closer look at gav or

357
00:15:48,150 --> 00:15:45,120
woof the kitten star of the

358
00:15:51,189 --> 00:15:48,160
russian animated series made from 1976

359
00:15:53,269 --> 00:15:51,199
to 1982 about a siamese kitten and you

360
00:15:55,350 --> 00:15:53,279
will see that floating

361
00:15:57,509 --> 00:15:55,360
just in front of

362
00:15:59,509 --> 00:15:57,519
the commander's chair right in front of

363
00:16:01,110 --> 00:15:59,519

oleg and we'll see that float once they

364

00:16:08,150 --> 00:16:01,120

separate from the third stage of the

365

00:16:12,150 --> 00:16:10,150

but continuing to get views inside the

366

00:16:14,150 --> 00:16:12,160

capsule and of the

367

00:16:16,230 --> 00:16:14,160

soyuz rocket on the launch pad there in

368

00:16:18,949 --> 00:16:16,240

baikonur we're going to continue to

369

00:16:20,870 --> 00:16:18,959

check in on mark vande hi oleg novitskiy

370

00:16:23,269 --> 00:16:20,880

and pyotr duprov as they get ready to

371

00:16:26,310 --> 00:16:23,279

launch the international space station

372

00:16:28,230 --> 00:16:26,320

and right now we are 41 minutes and 30

373

00:16:30,470 --> 00:16:28,240

seconds away

374

00:16:35,110 --> 00:16:30,480

launch is time to take place at exactly

375

00:16:39,110 --> 00:16:35,120

242 and 41 seconds central at 7 42 and

376

00:16:41,269 --> 00:16:39,120

41 seconds gmt for 12 42 and 41 seconds

377

00:16:43,030 --> 00:16:41,279

over in baikonur

378

00:16:45,990 --> 00:16:43,040

and as i said we're going to be

379

00:16:48,230 --> 00:16:46,000

answering some of your questions so

380

00:16:49,910 --> 00:16:48,240

let's go ahead and start taking a couple

381

00:16:53,910 --> 00:16:49,920

of those now and you can keep sending

382

00:16:56,790 --> 00:16:53,920

them in using the hashtag ask nasa

383

00:16:59,269 --> 00:16:56,800

our first one comes from kate who wanted

384

00:17:00,710 --> 00:16:59,279

to know how long can the station provide

385

00:17:03,910 --> 00:17:00,720

life support

386

00:17:06,230 --> 00:17:03,920

to more than seven astronauts at once

387

00:17:10,150 --> 00:17:06,240

that's a really great question kate we

388

00:17:12,390 --> 00:17:10,160

don't have a specific amount of time

389

00:17:14,549 --> 00:17:12,400

this is going to be a handover with 10

390

00:17:16,150 --> 00:17:14,559

people on board so that does put a

391

00:17:18,630 --> 00:17:16,160

little bit more of a strain on your

392

00:17:21,029 --> 00:17:18,640

resources but thankfully we have what we

393

00:17:22,069 --> 00:17:21,039

call regenerative life support so we're

394

00:17:23,429 --> 00:17:22,079

able to

395

00:17:25,590 --> 00:17:23,439

recycle

396

00:17:26,870 --> 00:17:25,600

a lot of the oxygen we actually generate

397

00:17:28,549 --> 00:17:26,880

oxygen

398

00:17:30,710 --> 00:17:28,559

from water which we have more than

399

00:17:32,710 --> 00:17:30,720

enough on on board the space station and

400

00:17:35,270 --> 00:17:32,720

then you have other life support

401
00:17:38,070 --> 00:17:35,280
responsible for scrubbing carbon dioxide

402
00:17:40,789 --> 00:17:38,080
and also providing drinking water and we

403
00:17:43,510 --> 00:17:40,799
have enough food and other consumables

404
00:17:44,630 --> 00:17:43,520
on board to last for several months and

405
00:17:47,190 --> 00:17:44,640
so

406
00:17:49,350 --> 00:17:47,200
more than enough on board to to keep

407
00:17:51,909 --> 00:17:49,360
these 10 crew members going for a couple

408
00:17:54,630 --> 00:17:51,919
of days and also we'll have plenty when

409
00:17:57,029 --> 00:17:54,640
we do the crew 2 crew 1 handover where

410
00:17:59,110 --> 00:17:57,039
we'll bump all the way up to 11 on board

411
00:18:01,909 --> 00:17:59,120
for a couple of days

412
00:18:02,789 --> 00:18:01,919
uh our next question comes from whitney

413
00:18:04,630 --> 00:18:02,799

who

414

00:18:06,710 --> 00:18:04,640

said silly question but wanted to know

415

00:18:08,630 --> 00:18:06,720

how many flight suits do they give you

416

00:18:11,270 --> 00:18:08,640

and you ever actually use all of those

417

00:18:13,350 --> 00:18:11,280

pockets happy launch day

418

00:18:15,270 --> 00:18:13,360

it's gonna differ for the astronauts

419

00:18:17,510 --> 00:18:15,280

they do get a couple just in case any

420

00:18:19,590 --> 00:18:17,520

get damaged or dirty

421

00:18:21,029 --> 00:18:19,600

and i will tell you from personal

422

00:18:23,190 --> 00:18:21,039

experience you do end up using a lot of

423

00:18:25,110 --> 00:18:23,200

those pockets you also end up forgetting

424

00:18:26,870 --> 00:18:25,120

stuff in those pockets only to find it

425

00:18:29,190 --> 00:18:26,880

several months later when you put the

426

00:18:32,549 --> 00:18:29,200

flight suit back on

427

00:18:34,630 --> 00:18:32,559

all right and we'll do one more

428

00:18:36,710 --> 00:18:34,640

at least one more this one uh from

429

00:18:39,510 --> 00:18:36,720

chrissy who wanted to know what will the

430

00:18:41,510 --> 00:18:39,520

sleeping arrangements be on the station

431

00:18:42,549 --> 00:18:41,520

with 10 people and we get this question

432

00:18:45,590 --> 00:18:42,559

a lot

433

00:18:48,390 --> 00:18:45,600

um so right now we have seven crew

434

00:18:50,150 --> 00:18:48,400

quarters uh kind of the individual sleep

435

00:18:52,470 --> 00:18:50,160

stations for crew members on board the

436

00:18:54,230 --> 00:18:52,480

space station we just installed a new

437

00:18:57,909 --> 00:18:54,240

one just this week inside of the

438

00:18:59,350 --> 00:18:57,919

columbus module so with the extra three

439

00:19:01,350 --> 00:18:59,360

they do what's essentially called a

440

00:19:03,510 --> 00:19:01,360

campout they find

441

00:19:05,669 --> 00:19:03,520

space in the different modules where

442

00:19:07,430 --> 00:19:05,679

they'll set up a temporary spot where

443

00:19:08,950 --> 00:19:07,440

they can attach their sleeping bag to

444

00:19:11,350 --> 00:19:08,960

the wall

445

00:19:13,510 --> 00:19:11,360

and they just kind of camp out there for

446

00:19:14,870 --> 00:19:13,520

a couple of days the crew on board works

447

00:19:17,270 --> 00:19:14,880

with flight controllers here on the

448

00:19:18,950 --> 00:19:17,280

ground to pick those spots um to give

449

00:19:20,310 --> 00:19:18,960

the astronauts as much privacy as

450

00:19:24,390 --> 00:19:20,320

possible when they don't have their own

451

00:19:26,950 --> 00:19:24,400

crew quarters and it is just temporary

452

00:19:28,310 --> 00:19:26,960

um our next one comes from alejandro

453

00:19:30,230 --> 00:19:28,320

wants to know how much gravity the

454

00:19:32,549 --> 00:19:30,240

astronauts have during takeoffs how many

455

00:19:35,430 --> 00:19:32,559

g's are they pulling with the soyuz it's

456

00:19:37,590 --> 00:19:35,440

a fairly benign ride up hill

457

00:19:40,470 --> 00:19:37,600

they'll pull about three or four g's at

458

00:19:42,470 --> 00:19:40,480

a maximum on the on the way up

459

00:19:43,270 --> 00:19:42,480

primarily once they're under the power

460

00:19:45,350 --> 00:19:43,280

of

461

00:19:48,070 --> 00:19:45,360

that second and third stage

462

00:19:50,070 --> 00:19:48,080

um so not too bad they typically pull a

463

00:19:53,029 --> 00:19:50,080

little bit more on the way home but the

464

00:19:55,669 --> 00:19:53,039

ride up pretty smooth with those liquid

465

00:19:57,190 --> 00:19:55,679

fuel boosters powering them up the whole

466

00:19:58,870 --> 00:19:57,200

way

467

00:20:02,549 --> 00:19:58,880

and we'll go ahead and take

468

00:20:03,990 --> 00:20:02,559

one more this one from get well wiccans

469

00:20:06,950 --> 00:20:04,000

wants to know is the soyuz rocket a

470

00:20:09,190 --> 00:20:06,960

one-time use or are there reusable parts

471

00:20:10,630 --> 00:20:09,200

the rocket itself is a one-time use it's

472

00:20:12,789 --> 00:20:10,640

an expendable

473

00:20:15,990 --> 00:20:12,799

so all these different rocket parts will

474

00:20:16,870 --> 00:20:16,000

either fall to the ground

475

00:20:19,830 --> 00:20:16,880

in

476

00:20:21,909 --> 00:20:19,840

the vast expanse of kazakhstan

477

00:20:24,390 --> 00:20:21,919

or in some of the cases like the very

478

00:20:27,350 --> 00:20:24,400

upper stage burn up upon re-entry in the

479

00:20:31,350 --> 00:20:29,510

but keep sending those questions uh so

480

00:20:33,510 --> 00:20:31,360

now we're giving you some video here

481

00:20:35,350 --> 00:20:33,520

this is from yesterday

482

00:20:41,100 --> 00:20:35,360

where russian orthodox priests did the

483

00:20:46,549 --> 00:20:44,870

[Music]

484

00:20:48,710 --> 00:20:46,559

and this is done

485

00:20:50,789 --> 00:20:48,720

prior to every single flight

486

00:20:52,710 --> 00:20:50,799

uh blessing of the rocket and then it

487

00:20:54,710 --> 00:20:52,720

typically will do a blessing of some of

488

00:20:57,029 --> 00:20:54,720

the the pad engineers and some of the

489

00:21:11,669 --> 00:20:57,039

other officials and then moving over to

490

00:21:16,870 --> 00:21:13,669

today's activities in baikonur though

491

00:21:19,350 --> 00:21:16,880

began several hours ago the crew was

492

00:21:23,029 --> 00:21:19,360

woken up in the cosmonaut hotel in

493

00:21:26,230 --> 00:21:25,190

there is room here

494

00:21:28,630 --> 00:21:26,240

in a

495

00:21:30,070 --> 00:21:28,640

time-honored tradition as you can see

496

00:21:32,310 --> 00:21:30,080

our commander doing here before

497

00:21:33,350 --> 00:21:32,320

departing the three crew members signed

498

00:21:35,029 --> 00:21:33,360

the door

499

00:21:39,750 --> 00:21:35,039

of the rooms they occupied at the

500

00:21:39,760 --> 00:21:47,669

it's looking good

501
00:21:52,630 --> 00:21:49,669
for novitskiy this is his third time

502
00:21:54,390 --> 00:21:52,640
signing for dubrov his first as he's the

503
00:21:56,070 --> 00:21:54,400
rookie amongst the crew and the mark

504
00:21:57,110 --> 00:21:56,080
vanderheim about to make his second

505
00:21:58,950 --> 00:21:57,120
flight

506
00:22:00,710 --> 00:21:58,960
aboard a soyuz spacecraft and to the

507
00:22:03,110 --> 00:22:00,720
international space station this was his

508
00:22:08,390 --> 00:22:03,120
second time signing a door inside the

509
00:22:12,470 --> 00:22:11,110
they were woken up at about 305 a.m

510
00:22:15,669 --> 00:22:12,480
local time

511
00:22:19,710 --> 00:22:15,679
over in baikonur it was about 505 pm

512
00:22:26,950 --> 00:22:19,720
uh central time here in houston or

513
00:22:31,029 --> 00:22:28,950

okay follow me now

514

00:22:32,950 --> 00:22:31,039

this one then just about three hours

515

00:22:37,730 --> 00:22:32,960

after waking up the crew departed the

516

00:22:42,950 --> 00:22:41,590

[Music]

517

00:22:44,950 --> 00:22:42,960

you can see

518

00:22:47,190 --> 00:22:44,960

six flight suits there so the prime crew

519

00:22:49,190 --> 00:22:47,200

in front the backup crew behind them

520

00:22:51,430 --> 00:22:49,200

that's nasa astronaut and mclean russian

521

00:22:55,110 --> 00:22:51,440

cosmonaut anton shkaplerov and another

522

00:22:57,430 --> 00:22:55,120

russian cosmonaut oleg artemyev

523

00:22:59,830 --> 00:22:57,440

the backup crew stays in quarantine with

524

00:23:02,789 --> 00:22:59,840

the prime crew throughout their stay

525

00:23:05,350 --> 00:23:02,799

in the cosmonaut hotel and their final

526

00:23:07,029 --> 00:23:05,360

time in russia beforehand

527

00:23:10,070 --> 00:23:07,039

and they're with them as they go through

528

00:23:13,029 --> 00:23:10,080

their final suit up and rides out to the

529

00:23:16,710 --> 00:23:15,029

again another time-honored tradition of

530

00:23:19,110 --> 00:23:16,720

flying aboard the soyuz the russian

531

00:23:21,510 --> 00:23:19,120

orthodox freeze blessing the crew as

532

00:23:23,830 --> 00:23:21,520

they make their way out of the hotel and

533

00:23:32,110 --> 00:23:23,840

get ready to board a bus and head over

534

00:23:37,990 --> 00:23:33,430

[Music]

535

00:23:42,230 --> 00:23:40,310

and so after a quick shower they wave

536

00:23:43,510 --> 00:23:42,240

farewell to those that are gathered at

537

00:23:45,430 --> 00:23:43,520

the hotel

538

00:23:47,350 --> 00:23:45,440

those for a few final photos and then

539

00:23:49,350 --> 00:23:47,360

board the bus

540

00:23:52,070 --> 00:23:49,360

and then they are bound for what's known

541

00:23:54,470 --> 00:23:52,080

as building 254 or the suit up and

542

00:23:57,750 --> 00:23:54,480

integration building

543

00:23:59,830 --> 00:23:57,760

the cosmonaut hotel on the very edge of

544

00:24:00,710 --> 00:23:59,840

the town of baikonur

545

00:24:04,390 --> 00:24:00,720

just

546

00:24:06,549 --> 00:24:04,400

outside of the cosmodrome grounds proper

547

00:24:09,510 --> 00:24:06,559

it's about a 40-minute ride from their

548

00:24:11,350 --> 00:24:09,520

hotel out to the suit-up building

549

00:24:12,870 --> 00:24:11,360

and all this happening about three hours

550

00:24:15,269 --> 00:24:12,880

after they woke up

551
00:24:40,810 --> 00:24:15,279
about 605 in the morning so an early

552
00:24:45,430 --> 00:24:43,990
[Applause]

553
00:24:47,269 --> 00:24:45,440
[Music]

554
00:25:00,210 --> 00:24:47,279
good morning

555
00:25:09,990 --> 00:25:02,549
[Applause]

556
00:25:11,669 --> 00:25:10,000
and so once they arrived at the

557
00:25:14,230 --> 00:25:11,679
integration and suit up facility

558
00:25:16,710 --> 00:25:14,240
building 254 the crew underwent some

559
00:25:18,310 --> 00:25:16,720
final medical exams and then suited up

560
00:25:20,230 --> 00:25:18,320
in their soca launch and entry suits

561
00:25:22,630 --> 00:25:20,240
they're in these throughout all of the

562
00:25:24,950 --> 00:25:22,640
dynamic phases of flight so they're

563
00:25:27,350 --> 00:25:24,960

essentially wearing these in their very

564

00:25:28,870 --> 00:25:27,360

quick about three hour and 25 minute

565

00:25:30,710 --> 00:25:28,880

journey up to the space station so

566

00:25:36,290 --> 00:25:30,720

they're wearing them now

567

00:25:40,149 --> 00:25:38,230

[Applause]

568

00:25:42,470 --> 00:25:40,159

and these soca launch and entry suits

569

00:25:43,669 --> 00:25:42,480

are primarily worn if you're familiar

570

00:25:44,710 --> 00:25:43,679

with

571

00:25:46,070 --> 00:25:44,720

a lot of

572

00:25:48,710 --> 00:25:46,080

the different space vehicles you're

573

00:25:50,789 --> 00:25:48,720

wearing these suits during the ride and

574

00:25:52,669 --> 00:25:50,799

they're there to protect you in the

575

00:25:55,110 --> 00:25:52,679

event of what's called a cabin

576

00:25:57,750 --> 00:25:55,120

depressurization so if for whatever

577

00:26:00,630 --> 00:25:57,760

reason a spacecraft were to lose

578

00:26:03,430 --> 00:26:00,640

the integrity of its hole if the cabin

579

00:26:05,909 --> 00:26:03,440

were to go down to vacuum these suits

580

00:26:08,230 --> 00:26:05,919

are connected to breathing air and can

581

00:26:09,669 --> 00:26:08,240

pressurize to protect the crew

582

00:26:11,430 --> 00:26:09,679

in the event that something like that

583

00:26:13,110 --> 00:26:11,440

happens and that's why we have them wear

584

00:26:15,510 --> 00:26:13,120

these throughout all of what we call the

585

00:26:18,470 --> 00:26:15,520

dynamic phases of things like a launch

586

00:26:20,710 --> 00:26:18,480

or any time you're rendezvousing docking

587

00:26:24,950 --> 00:26:20,720

undocking and then coming home crew

588

00:26:27,110 --> 00:26:24,960

members will be wearing these suits

589

00:26:29,350 --> 00:26:27,120

the small blue knob you can see right at

590

00:26:32,149 --> 00:26:29,360

the top part of the chest is used to

591

00:26:34,230 --> 00:26:32,159

adjust the pressure once they go through

592

00:26:37,350 --> 00:26:34,240

the inflation or the pressurization of

593

00:26:41,110 --> 00:26:39,110

and after they get suited up and we'll

594

00:26:43,669 --> 00:26:41,120

see it in just a moment

595

00:26:45,909 --> 00:26:43,679

uh each of the crew members goes and

596

00:26:47,510 --> 00:26:45,919

gets a quick uh pressure check or a leak

597

00:26:49,430 --> 00:26:47,520

check on these suits

598

00:26:51,029 --> 00:26:49,440

and so we'll be able to see them uh

599

00:26:52,789 --> 00:26:51,039

inflate a bit but

600

00:26:54,630 --> 00:26:52,799

again for for mark vanda high this is

601
00:26:59,750 --> 00:26:54,640
the second time he's done this exact

602
00:27:01,830 --> 00:27:00,870
again so

603
00:27:03,830 --> 00:27:01,840
after

604
00:27:06,310 --> 00:27:03,840
they get the suits on they move over to

605
00:27:07,750 --> 00:27:06,320
get a pressure check just again to make

606
00:27:10,070 --> 00:27:07,760
sure that the suit is free from leaks

607
00:27:12,630 --> 00:27:10,080
they each get into basically a mock-up

608
00:27:14,149 --> 00:27:12,640
of a soyuz seat so what you're looking

609
00:27:17,350 --> 00:27:14,159
at is what it looks like once they're

610
00:27:19,590 --> 00:27:17,360
inside the capsule itself

611
00:27:23,510 --> 00:27:19,600
they're assisted by suit techs

612
00:27:24,950 --> 00:27:23,520
who then connect their suits to a

613
00:27:27,269 --> 00:27:24,960

simulated line

614

00:27:29,029 --> 00:27:27,279

to pressurize the suit and start flowing

615

00:27:30,950 --> 00:27:29,039

breathing air throughout it and so

616

00:27:32,870 --> 00:27:30,960

you'll see once they get locked in the

617

00:27:34,149 --> 00:27:32,880

suits will kind of puff up

618

00:27:36,630 --> 00:27:34,159

and that's how you can know that they're

619

00:27:38,789 --> 00:27:36,640

pressurized it's easier to see

620

00:27:40,549 --> 00:27:38,799

if you pay attention around the leg area

621

00:27:41,750 --> 00:27:40,559

and you'll see everything looks a little

622

00:27:53,890 --> 00:27:41,760

bit

623

00:28:05,430 --> 00:27:55,430

[Music]

624

00:28:08,789 --> 00:28:07,510

again the crew goes through this one at

625

00:28:10,710 --> 00:28:08,799

a time

626

00:28:13,029 --> 00:28:10,720

while all this is happening and we'll

627

00:28:15,669 --> 00:28:13,039

see in just a few moments there's a pane

628

00:28:16,950 --> 00:28:15,679

of glass to help maintain that strict

629

00:28:19,190 --> 00:28:16,960

quarantine

630

00:28:20,870 --> 00:28:19,200

that's true for all crew members

631

00:28:22,230 --> 00:28:20,880

spending long duration flights on board

632

00:28:23,669 --> 00:28:22,240

the space station

633

00:28:25,909 --> 00:28:23,679

it's not something that we've

634

00:28:27,909 --> 00:28:25,919

implemented just in the last year in the

635

00:28:29,909 --> 00:28:27,919

current pandemic climate

636

00:28:31,350 --> 00:28:29,919

a quarantine has been standard for crew

637

00:28:34,070 --> 00:28:31,360

members bound for the international

638

00:28:35,510 --> 00:28:34,080

space station for many years

639

00:28:36,870 --> 00:28:35,520

as

640

00:28:39,029 --> 00:28:36,880

they're

641

00:28:40,310 --> 00:28:39,039

essentially launching into a closed

642

00:28:42,149 --> 00:28:40,320

environment

643

00:28:43,590 --> 00:28:42,159

and one of the

644

00:28:45,750 --> 00:28:43,600

negative effects of living in

645

00:28:48,149 --> 00:28:45,760

microgravity for a long time can

646

00:28:49,909 --> 00:28:48,159

actually suppress your immune system and

647

00:28:52,389 --> 00:28:49,919

so we want to make sure crew members are

648

00:28:54,389 --> 00:28:52,399

as healthy as possible not bringing

649

00:28:55,750 --> 00:28:54,399

any cold bugs or anything like that up

650

00:28:57,750 --> 00:28:55,760

there with them so they're kept in a

651
00:28:59,909 --> 00:28:57,760

very strict quarantine

652
00:29:01,750 --> 00:28:59,919

access to the crew is extremely limited

653
00:29:03,990 --> 00:29:01,760

in the in this time

654
00:29:05,750 --> 00:29:04,000

and it's typically about the two weeks

655
00:29:06,870 --> 00:29:05,760

right before they lift off this is the

656
00:29:08,549 --> 00:29:06,880

same for

657
00:29:10,389 --> 00:29:08,559

crew members flying on a soyuz

658
00:29:12,310 --> 00:29:10,399

spacecraft it's the same

659
00:29:15,110 --> 00:29:12,320

that we've been putting crew members for

660
00:29:17,830 --> 00:29:15,120

that have flown up on the spacex dragon

661
00:29:22,230 --> 00:29:17,840

in the last on the demo 2 and the crew 1

662
00:29:22,240 --> 00:29:41,590

[Music]

663
00:29:41,600 --> 00:29:50,150

um

664

00:29:50,160 --> 00:30:09,190

[Music]

665

00:30:09,200 --> 00:30:14,630

yes

666

00:30:14,640 --> 00:30:27,669

[Music]

667

00:30:37,350 --> 00:30:29,830

and then once their suits were confirmed

668

00:30:43,110 --> 00:30:40,230

we became very close to you to the whole

669

00:30:46,870 --> 00:30:44,070

and

670

00:30:50,470 --> 00:30:46,880

we are always here to support you if you

671

00:31:16,549 --> 00:30:53,430

it's the most important thing to

672

00:31:22,310 --> 00:31:19,110

the rocket and the boosters are in good

673

00:31:25,190 --> 00:31:22,320

technical condition

674

00:31:26,950 --> 00:31:25,200

everything is working nominally

675

00:31:31,590 --> 00:31:26,960

and i wish you

676

00:31:38,310 --> 00:31:34,310

i know you have done everything that has

677

00:31:41,110 --> 00:31:38,320

to be done during your preparation stage

678

00:31:44,950 --> 00:31:41,120

and we'll continue talking to you

679

00:31:49,830 --> 00:31:47,669

as a facility center program will be a

680

00:31:53,669 --> 00:31:49,840

little bit more full

681

00:31:57,830 --> 00:31:55,909

you will not be bored

682

00:32:01,990 --> 00:31:57,840

hopefully you will find

683

00:32:05,990 --> 00:32:02,000

some time to rest and of course

684

00:32:09,029 --> 00:32:06,000

continue supporting each other

685

00:32:11,190 --> 00:32:09,039

and stay good friends director of human

686

00:32:12,710 --> 00:32:11,200

spaceflight happy leaders i want to wish

687

00:32:19,190 --> 00:32:12,720

you all the best

688

00:32:22,549 --> 00:32:20,630

it's been a pleasure watching you guys

689

00:32:24,870 --> 00:32:22,559

get ready for this mission we're looking

690

00:32:27,110 --> 00:32:24,880

forward to seeing you on orbit and uh

691

00:32:29,430 --> 00:32:27,120

you have people across the globe waiting

692

00:32:33,750 --> 00:32:29,440

to support you on anything you need so

693

00:32:37,350 --> 00:32:35,990

and again so they were able to talk to a

694

00:32:39,430 --> 00:32:37,360

number of folks

695

00:32:41,830 --> 00:32:39,440

inside after confirming their suits for

696

00:32:44,070 --> 00:32:41,840

leak free speaking with

697

00:32:46,310 --> 00:32:44,080

sergey korsakoff a cosmonaut who was

698

00:32:49,190 --> 00:32:46,320

assigned to the flight up until the swap

699

00:32:51,509 --> 00:32:49,200

for mark vanda high also speaking to

700

00:32:54,149 --> 00:32:51,519

dimitri orgozin and sergey krikalov from

701
00:32:57,350 --> 00:32:54,159
rose cosmos and ken bowsox and joel

702
00:32:59,909 --> 00:32:57,360
montalbano of nasa

703
00:33:01,909 --> 00:32:59,919
after that though they were able to

704
00:33:04,389 --> 00:33:01,919
board their bus that happened right

705
00:33:06,950 --> 00:33:04,399
about 8 56 a.m friday morning in

706
00:33:14,460 --> 00:33:06,960
baikonur for the ride out to launch pad

707
00:33:18,850 --> 00:33:16,700
[Applause]

708
00:33:22,789 --> 00:33:18,860
[Music]

709
00:33:27,990 --> 00:33:24,950
and launch pad 31 a little bit further

710
00:33:30,789 --> 00:33:28,000
away than gagarin start where

711
00:33:32,630 --> 00:33:30,799
for years crews have launched

712
00:33:35,669 --> 00:33:32,640
from baikonur to the international space

713
00:33:38,549 --> 00:33:35,679

station took them about 70 minutes

714

00:33:40,070 --> 00:33:38,559

to get over to the pad the crew members

715

00:33:41,990 --> 00:33:40,080

being helped

716

00:33:44,230 --> 00:33:42,000

again in the soca launch and entry suits

717

00:34:00,300 --> 00:33:44,240

to make their way to the rocket and head

718

00:34:29,510 --> 00:34:05,830

[Music]

719

00:34:34,869 --> 00:34:31,669

and then once at the pad the crew

720

00:34:37,349 --> 00:34:34,879

climbing a small flight of stairs

721

00:34:39,270 --> 00:34:37,359

getting set up taking a few final photos

722

00:34:41,750 --> 00:34:39,280

and waving goodbye

723

00:34:43,909 --> 00:34:41,760

to officials from rose cosmos and nasa

724

00:34:45,909 --> 00:34:43,919

gathered to see the crew members off

725

00:34:48,149 --> 00:34:45,919

where they head into the elevator the

726

00:34:49,990 --> 00:34:48,159

ride up to the top of the soyuz rocket

727

00:34:53,030 --> 00:34:50,000

to board their capsule

728

00:34:55,430 --> 00:34:53,040

this all took place about two hours ago

729

00:34:57,190 --> 00:34:55,440

and since then the crew has been

730

00:34:59,190 --> 00:34:57,200

in their seats

731

00:35:01,589 --> 00:34:59,200

again oleg novitskiy is in the center

732

00:35:03,270 --> 00:35:01,599

seats he's the commander of the soyuz

733

00:35:05,270 --> 00:35:03,280

spacecraft

734

00:35:08,470 --> 00:35:05,280

piotr dubrov in the left seat mark

735

00:35:09,990 --> 00:35:08,480

vanderhei in the right

736

00:35:12,390 --> 00:35:10,000

since they've been on board they've gone

737

00:35:13,670 --> 00:35:12,400

through a number of pre-launch checks

738

00:35:15,910 --> 00:35:13,680

confirming

739

00:35:18,230 --> 00:35:15,920

a good leak check on the soyuz capsule

740

00:35:21,430 --> 00:35:18,240

itself also doing leak checks on their

741

00:35:23,589 --> 00:35:21,440

suits continuing to speak with the pad

742

00:35:26,390 --> 00:35:23,599

engineers and the launch teams down in

743

00:35:27,829 --> 00:35:26,400

baikonur as they continue to count down

744

00:35:30,310 --> 00:35:27,839

towards launch

745

00:35:32,950 --> 00:35:30,320

back now though with a live view of that

746

00:35:35,270 --> 00:35:32,960

soyuz the ms-18 spacecraft and the soyuz

747

00:35:36,870 --> 00:35:35,280

rocket on the launch pad and baikonur

748

00:35:40,470 --> 00:35:36,880

and if you're just now joining us a

749

00:35:43,430 --> 00:35:40,480

reminder liftoff is scheduled 2 42 a.m

750

00:35:49,349 --> 00:35:45,510

that's 7 42

751
00:35:52,390 --> 00:35:49,359
gmt or 12 42 p.m over in baikonur and as

752
00:35:58,069 --> 00:35:52,400
of right now we are 22 minutes and five

753
00:36:04,310 --> 00:36:00,870
and as we continue to count down let's

754
00:36:23,589 --> 00:36:04,320
first explore the soyuz spacecraft in a

755
00:36:28,790 --> 00:36:26,150
the whole soyuz spacecraft is 24.5 feet

756
00:36:31,030 --> 00:36:28,800
long with an overall volume of 177 cubic

757
00:36:33,109 --> 00:36:31,040
feet and comprised of three modules the

758
00:36:35,190 --> 00:36:33,119
descent module situated in the middle of

759
00:36:36,710 --> 00:36:35,200
the soyuz vehicle contains customized

760
00:36:38,550 --> 00:36:36,720
seats for the crew members during launch

761
00:36:40,150 --> 00:36:38,560
entry and landing and contains all the

762
00:36:42,310 --> 00:36:40,160
controls and displays necessary for the

763
00:36:44,230 --> 00:36:42,320

flight it also houses life support

764

00:36:45,750 --> 00:36:44,240

systems batteries for the re-entry and

765

00:36:47,349 --> 00:36:45,760

landing in the parachute and soft

766

00:36:49,030 --> 00:36:47,359

landing rocket engines that slow the

767

00:36:51,670 --> 00:36:49,040

soyuz just before touchdown as a

768

00:36:53,349 --> 00:36:51,680

spacecraft lands in kazakhstan

769

00:36:55,270 --> 00:36:53,359

there are eight hydrogen peroxide

770

00:36:56,870 --> 00:36:55,280

thrusters located on the module which

771

00:36:58,870 --> 00:36:56,880

are used to control the spacecraft's

772

00:37:01,589 --> 00:36:58,880

orientation or attitude during the

773

00:37:03,109 --> 00:37:01,599

descent until parachute deployment

774

00:37:04,710 --> 00:37:03,119

the descent module also contains a

775

00:37:06,470 --> 00:37:04,720

guidance navigation and control system

776

00:37:08,550 --> 00:37:06,480

used to maneuver the vehicle during the

777

00:37:10,710 --> 00:37:08,560

descent phase of the mission this

778

00:37:13,270 --> 00:37:10,720

descent module is 7.3 feet long with a

779

00:37:16,230 --> 00:37:13,280

diameter of 7.1 feet and a habitable

780

00:37:17,670 --> 00:37:16,240

volume of 124 cubic feet it is the only

781

00:37:20,150 --> 00:37:17,680

portion of the soyuz that survives the

782

00:37:22,710 --> 00:37:20,160

return to earth the orbital module at

783

00:37:24,950 --> 00:37:22,720

the top is 9.8 feet long it connects to

784

00:37:26,230 --> 00:37:24,960

the descent module via pressurized hatch

785

00:37:27,750 --> 00:37:26,240

this is where the crew has a small

786

00:37:29,109 --> 00:37:27,760

amount of room to move around following

787

00:37:30,310 --> 00:37:29,119

launch during the flight to the space

788

00:37:32,230 --> 00:37:30,320

station

789

00:37:34,150 --> 00:37:32,240

it has a docking mechanism hatch and

790

00:37:36,150 --> 00:37:34,160

rendezvous antennas located at the front

791

00:37:37,750 --> 00:37:36,160

end the docking mechanism is used to

792

00:37:39,270 --> 00:37:37,760

dock with the space station and the

793

00:37:40,390 --> 00:37:39,280

hatch allows entry into the orbiting

794

00:37:42,069 --> 00:37:40,400

complex

795

00:37:43,670 --> 00:37:42,079

the rendezvous antennas are used by the

796

00:37:45,829 --> 00:37:43,680

automated docking system which uses

797

00:37:47,109 --> 00:37:45,839

radar to maneuver toward the station for

798

00:37:48,630 --> 00:37:47,119

docking

799

00:37:50,150 --> 00:37:48,640

there is also a forward-looking window

800

00:37:52,069 --> 00:37:50,160

in the module that the crew can use to

801
00:37:54,230 --> 00:37:52,079
take manual measurements of distance and

802
00:37:55,750 --> 00:37:54,240
closing speed with a laser rangefinder

803
00:37:58,150 --> 00:37:55,760
in the event of failure of the

804
00:38:00,069 --> 00:37:58,160
rendezvous radar system

805
00:38:01,990 --> 00:38:00,079
the propulsion module houses the oxygen

806
00:38:04,390 --> 00:38:02,000
storage tanks the main engine and the

807
00:38:06,150 --> 00:38:04,400
attitude control thrusters avionics and

808
00:38:07,829 --> 00:38:06,160
communication and control equipment the

809
00:38:09,589 --> 00:38:07,839
propulsion portion of this module

810
00:38:11,030 --> 00:38:09,599
handles all orbital maneuvers including

811
00:38:13,109 --> 00:38:11,040
those needed for the rendezvous with the

812
00:38:14,550 --> 00:38:13,119
space station and the new orbit burn at

813
00:38:16,069 --> 00:38:14,560

the end of the spacecraft's mission

814

00:38:17,670 --> 00:38:16,079

before they are deployed the two solar

815

00:38:19,670 --> 00:38:17,680

arrays are folded against the body of

816

00:38:21,510 --> 00:38:19,680

the propulsion module which along with

817

00:38:23,670 --> 00:38:21,520

the orbital module separates from the

818

00:38:26,630 --> 00:38:23,680

descent module after the orbit burn the

819

00:38:28,550 --> 00:38:26,640

solar panels span almost 35 feet

820

00:38:30,150 --> 00:38:28,560

the entire spacecraft serves not only as

821

00:38:31,829 --> 00:38:30,160

a crew transport vehicle to and from the

822

00:38:33,829 --> 00:38:31,839

space station but also as an emergency

823

00:38:35,109 --> 00:38:33,839

return vehicle in the unlikely event the

824

00:38:42,710 --> 00:38:35,119

crew needs to leave the station

825

00:38:47,030 --> 00:38:44,790

and we'll be going through the soyuz

826

00:38:49,109 --> 00:38:47,040

spacecraft in a little bit more detail

827

00:38:51,109 --> 00:38:49,119

as we continue to watch it fly up to the

828

00:38:52,550 --> 00:38:51,119

international space station

829

00:38:54,790 --> 00:38:52,560

for now though let's take a couple of

830

00:38:56,470 --> 00:38:54,800

moments if you have any questions about

831

00:38:58,150 --> 00:38:56,480

the launch or the flight today or

832

00:39:01,510 --> 00:38:58,160

anything about the space station jump

833

00:39:03,109 --> 00:39:01,520

onto twitter use the hashtag asknasa and

834

00:39:05,430 --> 00:39:03,119

we will try and knock out as many of

835

00:39:08,230 --> 00:39:05,440

these as we can this morning so let's do

836

00:39:10,150 --> 00:39:08,240

a few more uh this first one up from

837

00:39:11,349 --> 00:39:10,160

tristan tristan

838

00:39:13,190 --> 00:39:11,359

wanted to know what are the main things

839

00:39:16,550 --> 00:39:13,200

to look for in order to have a

840

00:39:17,510 --> 00:39:16,560

successful launch it's a great question

841

00:39:21,270 --> 00:39:17,520

so

842

00:39:23,829 --> 00:39:21,280

this is essentially a three-stage

843

00:39:27,030 --> 00:39:23,839

flight to orbit today the whole thing

844

00:39:28,950 --> 00:39:27,040

over in just under nine minutes

845

00:39:30,950 --> 00:39:28,960

we'll look for a couple of key events

846

00:39:33,829 --> 00:39:30,960

i'll outline those for you real quick so

847

00:39:36,310 --> 00:39:33,839

about one minute 54 seconds into flight

848

00:39:37,910 --> 00:39:36,320

the launch escape tower will jettison if

849

00:39:40,550 --> 00:39:37,920

you look at this view of the rocket it's

850

00:39:44,390 --> 00:39:40,560

the very narrow part at the very top

851
00:39:46,870 --> 00:39:44,400
that's in place to uh detach and

852
00:39:48,950 --> 00:39:46,880
pull the capsule away from the rocket in

853
00:39:51,510 --> 00:39:48,960
the event there's any issue on the way

854
00:39:53,750 --> 00:39:51,520
uphill that will detach at one minute 54

855
00:39:56,390 --> 00:39:53,760
seconds and just four seconds later the

856
00:39:58,630 --> 00:39:56,400
first stage will separate now the first

857
00:40:01,109 --> 00:39:58,640
stage on the soyuz spacecraft are four

858
00:40:03,430 --> 00:40:01,119
strap-on boosters on the very bottom

859
00:40:05,589 --> 00:40:03,440
they're firing along with the second

860
00:40:07,190 --> 00:40:05,599
stage for about the first two minutes

861
00:40:09,109 --> 00:40:07,200
into flight

862
00:40:11,109 --> 00:40:09,119
shortly after that about 30 seconds

863
00:40:12,470 --> 00:40:11,119

later the launch shroud

864

00:40:13,990 --> 00:40:12,480

so the

865

00:40:16,630 --> 00:40:14,000

white part of the rocket just below the

866

00:40:18,790 --> 00:40:16,640

launch escape tower that will break off

867

00:40:21,750 --> 00:40:18,800

and that will unveil essentially the

868

00:40:24,470 --> 00:40:21,760

soyuz spacecraft uh to the vacuum of

869

00:40:27,030 --> 00:40:24,480

space that not that's there to protect

870

00:40:29,750 --> 00:40:27,040

it uh in the denser parts of earth's

871

00:40:31,430 --> 00:40:29,760

atmosphere as the rocket climbs uphill

872

00:40:34,150 --> 00:40:31,440

the second stage will shut down four

873

00:40:36,230 --> 00:40:34,160

minutes 37 seconds into flight and then

874

00:40:39,109 --> 00:40:36,240

it will separate

875

00:40:41,109 --> 00:40:39,119

at four minutes and 48 seconds

876

00:40:43,270 --> 00:40:41,119

after that of the lower skirt of the

877

00:40:47,270 --> 00:40:43,280

third stage will jettison and that will

878

00:40:50,150 --> 00:40:47,280

continue to fire until just before nine

879

00:40:52,069 --> 00:40:50,160

minutes into flight and so we're really

880

00:40:53,750 --> 00:40:52,079

looking for all those different staging

881

00:40:55,829 --> 00:40:53,760

events to take place

882

00:40:57,430 --> 00:40:55,839

and then we're going to look for

883

00:40:59,829 --> 00:40:57,440

what's called a

884

00:41:02,069 --> 00:40:59,839

a good orbital insertion that'll be the

885

00:41:07,670 --> 00:41:02,079

primary thing we want to hear at the

886

00:41:13,430 --> 00:41:11,430

all right our next question comes

887

00:41:15,670 --> 00:41:13,440

uh from brian who wanted to know will

888

00:41:17,750 --> 00:41:15,680

the launch be occurring at the time the

889

00:41:20,950 --> 00:41:17,760

space station passes over the launch

890

00:41:23,670 --> 00:41:20,960

site like it does from the cape

891

00:41:26,550 --> 00:41:23,680

it's a little bit different for this one

892

00:41:28,710 --> 00:41:26,560

as it's timed extremely specifically in

893

00:41:30,790 --> 00:41:28,720

order for the soyuz to make this uh this

894

00:41:32,950 --> 00:41:30,800

kind of fast track a tour of it

895

00:41:36,630 --> 00:41:32,960

rendezvous at the time of the launch the

896

00:41:40,230 --> 00:41:36,640

station will be about 259 miles over

897

00:41:42,950 --> 00:41:40,240

northern uzbekistan it'll be about 335

898

00:41:44,550 --> 00:41:42,960

miles behind the soyuz as it leaves the

899

00:41:46,150 --> 00:41:44,560

launch pad

900

00:41:48,470 --> 00:41:46,160

but then during that ascent space

901
00:41:51,030 --> 00:41:48,480
station will actually leapfrog in front

902
00:41:52,069 --> 00:41:51,040
of the soyuz during the climb to orbit

903
00:41:52,870 --> 00:41:52,079
so

904
00:41:55,430 --> 00:41:52,880
when

905
00:41:57,270 --> 00:41:55,440
the soyuz launches station will be a

906
00:41:59,589 --> 00:41:57,280
little bit behind it but by the time

907
00:42:01,910 --> 00:41:59,599
soyuz hits orbit station will be a

908
00:42:04,150 --> 00:42:01,920
little bit in front of it that's a great

909
00:42:07,109 --> 00:42:04,160
question but it is timed extremely

910
00:42:09,670 --> 00:42:07,119
specifically so they can make this quick

911
00:42:11,670 --> 00:42:09,680
uh to orbit about three hour 25 minute

912
00:42:14,309 --> 00:42:11,680
rendezvous

913
00:42:15,829 --> 00:42:14,319

um our next question comes from

914

00:42:18,309 --> 00:42:15,839

blockbuster wants to know what is the

915

00:42:21,109 --> 00:42:18,319

docking in english time i'm assuming you

916

00:42:23,750 --> 00:42:21,119

mean utc or greenwich mean time that is

917

00:42:25,349 --> 00:42:23,760

a great question and that's a pretty

918

00:42:27,109 --> 00:42:25,359

easy answer because that's the same time

919

00:42:29,829 --> 00:42:27,119

that we use onboard the international

920

00:42:34,470 --> 00:42:29,839

space station docking today is scheduled

921

00:42:35,910 --> 00:42:34,480

to take place at 1107 and 51 seconds gmt

922

00:42:37,589 --> 00:42:35,920

it's the same

923

00:42:39,910 --> 00:42:37,599

time zone that they use onboard the

924

00:42:41,750 --> 00:42:39,920

space station and that we follow at all

925

00:42:44,950 --> 00:42:41,760

of the different flight control rooms

926

00:42:47,510 --> 00:42:44,960

around the world just to stay in sync

927

00:42:48,870 --> 00:42:47,520

our next question comes from nick who

928

00:42:50,230 --> 00:42:48,880

wanted to know which three russian

929

00:42:52,150 --> 00:42:50,240

vehicles are already docked to the

930

00:42:54,230 --> 00:42:52,160

station and what is the station's

931

00:42:55,349 --> 00:42:54,240

maximum crew capacity during crew

932

00:42:57,430 --> 00:42:55,359

rotation

933

00:42:59,190 --> 00:42:57,440

well there are three other russian

934

00:43:01,990 --> 00:42:59,200

spacecraft currently docked to the

935

00:43:03,990 --> 00:43:02,000

station two of them are progress or

936

00:43:05,510 --> 00:43:04,000

cargo spacecraft

937

00:43:08,550 --> 00:43:05,520

and one is another

938

00:43:10,230 --> 00:43:08,560

crude vehicle we have the progress 75

939

00:43:13,190 --> 00:43:10,240

and 77

940

00:43:15,109 --> 00:43:13,200

docked to uh the earth-facing port onsen

941

00:43:17,109 --> 00:43:15,119

and also uh the very aft at the very

942

00:43:19,750 --> 00:43:17,119

back part of the station and the soyuz

943

00:43:21,829 --> 00:43:19,760

ms-17 which carried kate rubins and her

944

00:43:23,990 --> 00:43:21,839

russian cosmonaut colleagues

945

00:43:25,190 --> 00:43:24,000

up to the space station about six months

946

00:43:27,670 --> 00:43:25,200

ago

947

00:43:30,630 --> 00:43:27,680

is already docked and then pretty soon

948

00:43:32,870 --> 00:43:30,640

um at the rassvet module or the mini

949

00:43:35,349 --> 00:43:32,880

research module number one in about two

950

00:43:37,109 --> 00:43:35,359

and a half hours or three about three

951
00:43:40,390 --> 00:43:37,119
and a half hours after launch we'll have

952
00:43:43,190 --> 00:43:40,400
the soyuz ms-18 spacecraft the most

953
00:43:45,670 --> 00:43:43,200
we've had before

954
00:43:48,470 --> 00:43:45,680
when we were doing these handovers i was

955
00:43:51,510 --> 00:43:48,480
about nine and we're going to have 10 uh

956
00:43:54,150 --> 00:43:51,520
when we have two soyuz spacecraft and

957
00:43:56,870 --> 00:43:54,160
the crew on dragon attached i will go up

958
00:43:59,270 --> 00:43:56,880
to 11 and that's expected to be about

959
00:44:01,349 --> 00:43:59,280
the max that we'll see for these crew

960
00:44:03,190 --> 00:44:01,359
handover periods in the future that'll

961
00:44:04,950 --> 00:44:03,200
happen anytime we do what's called a

962
00:44:07,030 --> 00:44:04,960
direct handover

963
00:44:08,950 --> 00:44:07,040

when a new crew launches and arrives at

964

00:44:12,150 --> 00:44:08,960

the international space station before

965

00:44:14,550 --> 00:44:12,160

another crew leaves

966

00:44:16,790 --> 00:44:14,560

all right our next question comes from

967

00:44:18,390 --> 00:44:16,800

chris davies wants to know is there any

968

00:44:20,309 --> 00:44:18,400

plans to have a russian join a crew

969

00:44:21,990 --> 00:44:20,319

dragon flight at this stage to return

970

00:44:23,910 --> 00:44:22,000

the favor for the many years of

971

00:44:26,390 --> 00:44:23,920

americans on soyuz

972

00:44:29,670 --> 00:44:26,400

great question chris and there

973

00:44:31,589 --> 00:44:29,680

absolutely is um it's fully our

974

00:44:34,230 --> 00:44:31,599

intention to fly

975

00:44:36,069 --> 00:44:34,240

what we call mixed crews so having

976

00:44:37,510 --> 00:44:36,079

at least an american and a russian on

977

00:44:39,430 --> 00:44:37,520

every spacecraft going to the

978

00:44:41,589 --> 00:44:39,440

international space station

979

00:44:43,430 --> 00:44:41,599

the russian cosmonauts receive much more

980

00:44:45,589 --> 00:44:43,440

extensive training and have a lot more

981

00:44:47,430 --> 00:44:45,599

expertise on the russian segment which

982

00:44:50,069 --> 00:44:47,440

is functionally one half of the

983

00:44:51,589 --> 00:44:50,079

international space station and the same

984

00:44:53,750 --> 00:44:51,599

is true for

985

00:44:56,309 --> 00:44:53,760

american astronauts and the us segments

986

00:44:58,630 --> 00:44:56,319

so to just put us in the best possible

987

00:45:00,550 --> 00:44:58,640

posture to continue operating the space

988

00:45:02,230 --> 00:45:00,560

station safely

989

00:45:04,390 --> 00:45:02,240

and just have really the best people

990

00:45:06,550 --> 00:45:04,400

always on hand for the job

991

00:45:09,030 --> 00:45:06,560

we fully intend to see our russian

992

00:45:12,150 --> 00:45:09,040

counterparts join us pretty soon

993

00:45:13,510 --> 00:45:12,160

on the u.s commercial crew vehicles that

994

00:45:15,030 --> 00:45:13,520

are currently

995

00:45:17,270 --> 00:45:15,040

flying to the space station like the

996

00:45:18,790 --> 00:45:17,280

crew one currently docked

997

00:45:21,670 --> 00:45:18,800

all right let's do one more for right

998

00:45:25,349 --> 00:45:21,680

now this one comes from diane who wants

999

00:45:27,510 --> 00:45:25,359

to know do soyuz also use rp1 as fuel

1000

00:45:30,069 --> 00:45:27,520

does he use the same oxidizer that

1001

00:45:31,829 --> 00:45:30,079

falcon 9 used to launch crew one

1002

00:45:34,390 --> 00:45:31,839

it's extremely similar

1003

00:45:36,390 --> 00:45:34,400

it is essentially rp1 which is just a

1004

00:45:37,910 --> 00:45:36,400

refined form of kerosene that's very

1005

00:45:39,430 --> 00:45:37,920

commonly used

1006

00:45:41,349 --> 00:45:39,440

in a lot of rocket engines there are

1007

00:45:44,710 --> 00:45:41,359

some slight differences

1008

00:45:47,109 --> 00:45:44,720

between the refining process between the

1009

00:45:49,349 --> 00:45:47,119

fuel used in the russian spacecraft and

1010

00:45:51,030 --> 00:45:49,359

in the falcon 9 in america

1011

00:45:52,950 --> 00:45:51,040

but for most purposes they're

1012

00:45:55,670 --> 00:45:52,960

essentially the same and they both use

1013

00:45:57,270 --> 00:45:55,680

the same oxidizer liquid oxygen

1014

00:45:59,349 --> 00:45:57,280

the rp one and

1015

00:46:00,630 --> 00:45:59,359

the liquid oxygen is used for all three

1016

00:46:03,430 --> 00:46:00,640

stages

1017

00:46:05,670 --> 00:46:03,440

of the soyuz launch vehicle

1018

00:46:07,990 --> 00:46:05,680

the soyuz spacecraft itself uses what's

1019

00:46:10,309 --> 00:46:08,000

called hyper golf fuels or fuels that

1020

00:46:13,829 --> 00:46:10,319

don't need an ignition source for all of

1021

00:46:16,150 --> 00:46:13,839

its maneuvers once it reaches on orbit

1022

00:46:19,589 --> 00:46:16,160

that'll do it for now for our questions

1023

00:46:21,910 --> 00:46:19,599

if you have any more remember to keep on

1024

00:46:24,150 --> 00:46:21,920

getting over to twitter use that hashtag

1025

00:46:25,510 --> 00:46:24,160

ask nasa we'll get through a few more in

1026

00:46:27,030 --> 00:46:25,520

the launch show and then we'll get

1027

00:46:30,230 --> 00:46:27,040

through a whole bunch once we're on

1028

00:46:32,390 --> 00:46:30,240

orbit for a rendezvous and docking

1029

00:46:34,790 --> 00:46:32,400

but for now continuing with our live

1030

00:46:36,870 --> 00:46:34,800

coverage of launch mark vande high oleg

1031

00:46:39,109 --> 00:46:36,880

novitskiy and pyotr dubrov to the

1032

00:46:41,510 --> 00:46:39,119

international space station getting

1033

00:46:43,510 --> 00:46:41,520

great views of the soyuz on the launch

1034

00:46:46,150 --> 00:46:43,520

pad and it's clear skies so should have

1035

00:46:48,550 --> 00:46:46,160

a great view for launch today as of

1036

00:46:51,190 --> 00:46:48,560

right now we are just 11 minutes and 11

1037

00:46:55,270 --> 00:46:51,200

seconds away from liftoff again that's

1038

00:46:59,109 --> 00:46:55,280

time for 2 42 a.m central time 242 and

1039

00:47:02,870 --> 00:46:59,119

41 seconds to be exact 12 42 and 41

1040

00:47:05,349 --> 00:47:02,880

seconds over there in baikonur

1041

00:47:06,870 --> 00:47:05,359

the spacecraft was mated to its booster

1042

00:47:09,510 --> 00:47:06,880

and the three stages were joined

1043

00:47:11,670 --> 00:47:09,520

together earlier this week on monday

1044

00:47:13,910 --> 00:47:11,680

then just 24 hours later on tuesday the

1045

00:47:16,150 --> 00:47:13,920

rocket began its trek to the launch pad

1046

00:47:18,630 --> 00:47:16,160

taking off right at about 7am baikonur

1047

00:47:20,230 --> 00:47:18,640

time then arriving less than two hours

1048

00:47:21,750 --> 00:47:20,240

later where it was raised to its

1049

00:47:23,750 --> 00:47:21,760

vertical position for the final

1050

00:47:25,670 --> 00:47:23,760

pre-launch preparations

1051
00:47:28,230 --> 00:47:25,680
as of right now it's poised for launch

1052
00:47:30,069 --> 00:47:28,240
with the three crew members aboard soyuz

1053
00:47:31,750 --> 00:47:30,079
spacecraft sits high above those three

1054
00:47:33,910 --> 00:47:31,760
different stages that we walked through

1055
00:47:36,069 --> 00:47:33,920
a little bit earlier which uses that

1056
00:47:39,030 --> 00:47:36,079
kerosene or rp1

1057
00:47:40,230 --> 00:47:39,040
and liquid oxygen as the propellant

1058
00:47:42,630 --> 00:47:40,240
for now though why don't we take a

1059
00:47:46,390 --> 00:47:42,640
little bit deeper dive into the soyuz

1060
00:47:51,829 --> 00:47:49,190
the soyuz rocket stands 162 feet tall

1061
00:47:53,589 --> 00:47:51,839
weighs about 640 000 pounds and consists

1062
00:47:55,510 --> 00:47:53,599
of the soyuz spacecraft inside a

1063
00:47:59,430 --> 00:47:55,520

protective shroud at the top and the

1064

00:48:01,349 --> 00:47:59,440

three-stage soyuz 2.1a booster below

1065

00:48:03,109 --> 00:48:01,359

the first stage has four liquid engines

1066

00:48:05,109 --> 00:48:03,119

strapped to the side of the core vehicle

1067

00:48:08,150 --> 00:48:05,119

each will burn for one minute and 58

1068

00:48:09,990 --> 00:48:08,160

seconds before they drop away

1069

00:48:11,670 --> 00:48:10,000

the core engine of the first stage also

1070

00:48:13,910 --> 00:48:11,680

serves as the second stage and continues

1071

00:48:15,750 --> 00:48:13,920

to burn until 4 minutes and 57 seconds

1072

00:48:17,349 --> 00:48:15,760

into the flight

1073

00:48:18,870 --> 00:48:17,359

the third stage has a single engine that

1074

00:48:21,030 --> 00:48:18,880

will ignite before the separation of the

1075

00:48:23,270 --> 00:48:21,040

second stage helping to push it away

1076
00:48:25,750 --> 00:48:23,280
safely it will burn until the 8 minutes

1077
00:48:27,190 --> 00:48:25,760
and 46 seconds mark of the flight and at

1078
00:48:28,710 --> 00:48:27,200
that point the soyuz spacecraft will

1079
00:48:42,150 --> 00:48:28,720
separate from the third stage having

1080
00:48:46,230 --> 00:48:43,990
and continuing to get a look at that

1081
00:48:49,430 --> 00:48:46,240
soyuz rocket on the pad again launching

1082
00:48:51,589 --> 00:48:49,440
from site 31 at the baikonur cosmodrome

1083
00:48:53,990 --> 00:48:51,599
in kazakhstan we're under 10 minutes

1084
00:48:56,549 --> 00:48:54,000
away we're just nine minutes four

1085
00:48:59,190 --> 00:48:56,559
seconds three seconds two seconds no

1086
00:49:03,510 --> 00:48:59,200
seconds away from launch continuing to

1087
00:49:05,589 --> 00:49:03,520
march uh towards that two 242 and 41

1088
00:49:07,589 --> 00:49:05,599

second am central time

1089

00:49:10,950 --> 00:49:07,599

7 42 and

1090

00:49:21,750 --> 00:49:10,960

41 seconds gmt so we're continuing to

1091

00:49:26,470 --> 00:49:24,630

and as mentioned a little bit earlier

1092

00:49:28,309 --> 00:49:26,480

representatives from nasa and rose

1093

00:49:30,150 --> 00:49:28,319

cosmos are going to be watching the

1094

00:49:32,549 --> 00:49:30,160

launch unfold as they have with all of

1095

00:49:34,870 --> 00:49:32,559

the events so far today just a short

1096

00:49:37,990 --> 00:49:34,880

distance away from the launch pad over

1097

00:49:39,910 --> 00:49:38,000

there in baikonur for a quick update on

1098

00:49:42,870 --> 00:49:39,920

the activities and how everything's been

1099

00:49:45,349 --> 00:49:42,880

going let's go now to nasa public

1100

00:49:47,430 --> 00:49:45,359

affairs officer the one and only mr rob

1101

00:49:49,349 --> 00:49:47,440

navies rob

1102

00:49:51,829 --> 00:49:49,359

as the countdown here in the central

1103

00:49:53,589 --> 00:49:51,839

asian desert reaches its final minutes

1104

00:49:55,589 --> 00:49:53,599

we are compelled to take a look back at

1105

00:49:57,670 --> 00:49:55,599

the historic symmetry of this flight to

1106

00:50:00,470 --> 00:49:57,680

the international space station with

1107

00:50:01,589 --> 00:50:00,480

events that transpired here 60 years ago

1108

00:50:04,309 --> 00:50:01,599

today

1109

00:50:06,870 --> 00:50:04,319

on april 9 1961

1110

00:50:09,030 --> 00:50:06,880

yuri gagarin was formally and secretly

1111

00:50:11,910 --> 00:50:09,040

selected to become the first human to

1112

00:50:13,589 --> 00:50:11,920

fly in space over his backup cosmonaut

1113

00:50:16,150 --> 00:50:13,599

german titos

1114

00:50:18,549 --> 00:50:16,160

the final decision was made collectively

1115

00:50:20,950 --> 00:50:18,559

by the iconic sergey karlios the great

1116

00:50:24,069 --> 00:50:20,960

designer and the head of cosmonaut

1117

00:50:26,470 --> 00:50:24,079

training at that time nikolai kamana

1118

00:50:29,349 --> 00:50:26,480

and 60 years ago today

1119

00:50:32,549 --> 00:50:29,359

the final mating of the vostok k rocket

1120

00:50:34,870 --> 00:50:32,559

and the vot 1 spacecraft took place not

1121

00:50:36,710 --> 00:50:34,880

far from where we are at this hour

1122

00:50:39,190 --> 00:50:36,720

setting the stage for its roll out to

1123

00:50:42,470 --> 00:50:39,200

the launch pad two days later

1124

00:50:45,990 --> 00:50:42,480

today here at site 31 a more powerful

1125

00:50:47,349 --> 00:50:46,000

soyuz 2.1a booster stands fully fueled

1126

00:50:49,910 --> 00:50:47,359

to send vanda

1127

00:50:52,710 --> 00:50:49,920

novitskiy and dugrov to a city in the

1128

00:50:54,870 --> 00:50:52,720

sky the orbital laboratory that is the

1129

00:50:56,549 --> 00:50:54,880

international space station

1130

00:50:59,190 --> 00:50:56,559

with everything proceeding smoothly

1131

00:51:00,950 --> 00:50:59,200

toward launch and history in the air

1132

00:51:02,390 --> 00:51:00,960

that's it from the baikonur cosmodrome

1133

00:51:04,069 --> 00:51:02,400

in kazakhstan

1134

00:51:06,069 --> 00:51:04,079

now back to you at mission control in

1135

00:51:08,309 --> 00:51:06,079

houston

1136

00:51:09,990 --> 00:51:08,319

according to the schedule control is on

1137

00:51:13,190 --> 00:51:10,000

board and i will provide the running

1138

00:51:15,510 --> 00:51:13,200

commentary of the launch as big one copy

1139

00:51:26,549 --> 00:51:15,520

everything is good on board and we are

1140

00:51:31,430 --> 00:51:28,870

we are just six and a half minutes away

1141

00:51:33,430 --> 00:51:31,440

from launch continuing to hear calms

1142

00:51:37,270 --> 00:51:33,440

between the soyuz commander oleg

1143

00:51:39,190 --> 00:51:37,280

novitskiy and the block house engineers

1144

00:51:40,950 --> 00:51:39,200

down there at baikonur

1145

00:51:43,349 --> 00:51:40,960

as you can see the crew has closed their

1146

00:51:45,030 --> 00:51:43,359

visors that's novitskiy on the bottom of

1147

00:51:46,790 --> 00:51:45,040

your screen he's in the center seat the

1148

00:51:49,589 --> 00:51:46,800

soyuz commander

1149

00:51:51,270 --> 00:51:49,599

at the top is pyotr dubrov he's in the

1150

00:51:58,230 --> 00:51:51,280

left seat you can essentially think of

1151
00:52:02,630 --> 00:52:00,069
we just got confirmation the launch key

1152
00:52:04,549 --> 00:52:02,640
has been inserted and one of potentially

1153
00:52:07,510 --> 00:52:04,559
the coolest things in all of space

1154
00:52:09,670 --> 00:52:07,520
flight there is an actual physical key

1155
00:52:13,430 --> 00:52:09,680
that is inserted and used to initiate

1156
00:52:18,470 --> 00:52:15,910
at this point the first and second stage

1157
00:52:20,470 --> 00:52:18,480
engines are primed and ready for launch

1158
00:52:22,230 --> 00:52:20,480
telemetry has been confirmed and

1159
00:52:23,670 --> 00:52:22,240
received from the rocket again that's

1160
00:52:25,670 --> 00:52:23,680
going to be sending telemetry to ground

1161
00:52:27,510 --> 00:52:25,680
sights all throughout the ride uphill

1162
00:52:29,109 --> 00:52:27,520
which is expected to take just under

1163
00:52:31,270 --> 00:52:29,119

nine minutes we're looking for third

1164

00:52:58,069 --> 00:52:31,280

stage separation about eight minutes and

1165

00:52:58,079 --> 00:53:09,510

time

1166

00:53:09,520 --> 00:53:16,069

of flight engineer and commander

1167

00:53:19,990 --> 00:53:17,670

you just heard combustion chamber

1168

00:53:21,829 --> 00:53:20,000

nitrogen purge so they use nitrogen

1169

00:53:23,510 --> 00:53:21,839

inert gas

1170

00:53:26,710 --> 00:53:23,520

to flow through the combustion chamber

1171

00:53:29,349 --> 00:53:26,720

and purge any vapors or other remnants

1172

00:53:31,589 --> 00:53:29,359

before they start the full flow of fuel

1173

00:53:34,069 --> 00:53:31,599

and oxidizer to the engines

1174

00:53:36,069 --> 00:53:34,079

and using a refined version of kerosene

1175

00:53:38,230 --> 00:53:36,079

and liquid oxygen to power all of the

1176
00:53:48,309 --> 00:53:38,240
stages all three first second and third

1177
00:53:52,470 --> 00:53:50,710
just as a quick reminder as we get up to

1178
00:53:54,710 --> 00:53:52,480
the four minute mark

1179
00:53:56,790 --> 00:53:54,720
when we launch the space station will be

1180
00:54:00,069 --> 00:53:56,800
flying just over northern uzbekistan

1181
00:54:03,190 --> 00:54:00,079
about 335 miles behind the soyuz

1182
00:54:05,750 --> 00:54:03,200
spacecraft as it leaves the launch pad

1183
00:54:08,470 --> 00:54:05,760
and then by the time it makes the 8

1184
00:54:10,230 --> 00:54:08,480
minute 49 second ride into orbit the

1185
00:54:10,950 --> 00:54:10,240
station will have leapfrogged ahead of

1186
00:54:39,990 --> 00:54:10,960
it

1187
00:54:44,870 --> 00:54:42,470
wonder three minutes and 20 seconds away

1188
00:54:46,390 --> 00:54:44,880

we're awaiting the call that the

1189

00:54:47,990 --> 00:54:46,400
boosters fuel tanks are being

1190

00:54:49,670 --> 00:54:48,000
pressurized for flight this will just

1191

00:54:51,349 --> 00:54:49,680
help optimize

1192

00:54:53,190 --> 00:54:51,359
the flow of all of the fuel to the

1193

00:54:55,430 --> 00:54:53,200
rocket engines helps add a little bit of

1194

00:54:57,990 --> 00:54:55,440
structural support as well to the rocket

1195

00:54:59,589 --> 00:54:58,000
oxide and fuel drain and safety valves

1196

00:55:01,829 --> 00:54:59,599
are closed

1197

00:55:06,789 --> 00:55:01,839
ground cylinder oxidizer nitrogen to the

1198

00:55:11,910 --> 00:55:08,390
and at this point terminating some of

1199

00:55:13,750 --> 00:55:11,920
the propellant feeds to the rocket

1200

00:55:16,069 --> 00:55:13,760
two things to keep an eye on as we

1201
00:55:17,829 --> 00:55:16,079
continue to count down there are two

1202
00:55:19,589 --> 00:55:17,839
umbilical towers

1203
00:55:21,990 --> 00:55:19,599
really those two ground structures

1204
00:55:23,829 --> 00:55:22,000
attach to the rocket itself

1205
00:55:27,190 --> 00:55:23,839
that taller one's going to separate at

1206
00:55:29,829 --> 00:55:27,200
about 35 seconds before launch and the

1207
00:55:31,589 --> 00:55:29,839
smaller one about midway up the rocket

1208
00:55:35,510 --> 00:55:31,599
will separate and once you see that

1209
00:55:38,069 --> 00:55:35,520
separate for 15 seconds away from launch

1210
00:55:41,829 --> 00:55:38,079
booster propel antenna pressurization

1211
00:55:45,349 --> 00:55:43,510
so there's that call out the booster

1212
00:55:47,670 --> 00:55:45,359
tanks are now being pressurized for

1213
00:55:49,990 --> 00:55:47,680

flight again just helping the to

1214

00:55:52,470 --> 00:55:50,000

optimize and facilitate the flow of fuel

1215

00:55:55,430 --> 00:55:52,480

to those engines in the first and second

1216

00:55:58,789 --> 00:55:55,440

stage which will fire simultaneously to

1217

00:57:03,430 --> 00:55:58,799

begin the initial flight into orbit

1218

00:57:08,390 --> 00:57:06,230

55 seconds away from launch we saw oleg

1219

00:57:19,510 --> 00:57:08,400

novitskiy there in the center seat his

1220

00:57:19,520 --> 00:57:23,589

terminated

1221

00:57:27,829 --> 00:57:25,430

and right at 35 seconds the first

1222

00:57:29,510 --> 00:57:27,839

umbilical tower separating the vehicle

1223

00:57:35,190 --> 00:57:29,520

on internal power

1224

00:57:40,630 --> 00:57:36,710

so the ground propellant feed to the

1225

00:57:43,589 --> 00:57:40,640

rocket has now completely terminated

1226
00:57:46,549 --> 00:57:43,599
auto sequence initiated second umbilical

1227
00:57:50,390 --> 00:57:46,559
separated 15 seconds from launch command

1228
00:57:50,400 --> 00:58:01,829
second umbilical tower separate

1229
00:58:06,470 --> 00:58:03,750
and liftoff

1230
00:58:13,109 --> 00:58:06,480
so use ms-18 on its way to the

1231
00:58:18,070 --> 00:58:16,230
10 seconds the booster parameters are

1232
00:58:19,670 --> 00:58:18,080
nominal everything is good on board

1233
00:58:21,829 --> 00:58:19,680
[Music]

1234
00:58:25,589 --> 00:58:21,839
very nominal performance the first stage

1235
00:58:27,430 --> 00:58:25,599
delivering 930 000 pounds of thrust

1236
00:58:32,870 --> 00:58:27,440
from those four first stage boosters and

1237
00:58:37,430 --> 00:58:34,470
30 seconds

1238
00:58:40,549 --> 00:58:37,440

into the flight the parameters of the

1239

00:58:41,910 --> 00:58:40,559

booster are nominal everything is fine

1240

00:58:44,309 --> 00:58:41,920

on boards

1241

00:58:47,349 --> 00:58:44,319

40 seconds uh

1242

00:58:50,150 --> 00:58:47,359

the vehicle is stable everything is good

1243

00:58:51,829 --> 00:58:50,160

on board

1244

00:58:53,990 --> 00:58:51,839

continuing to hear good performance

1245

00:58:55,510 --> 00:58:54,000

calls a quick look inside the capsule

1246

00:58:57,270 --> 00:58:55,520

you can see

1247

00:58:59,030 --> 00:58:57,280

the crew strapped in and monitoring

1248

00:59:00,630 --> 00:58:59,040

displays as they continue on their way

1249

00:59:02,230 --> 00:59:00,640

up hill

1250

00:59:10,309 --> 00:59:02,240

just past the one minute mark into

1251

00:59:14,789 --> 00:59:12,710

70 seconds into the flight

1252

00:59:21,430 --> 00:59:14,799

everything is nominal

1253

00:59:25,030 --> 00:59:23,030

at this point the space station has

1254

00:59:26,789 --> 00:59:25,040

already flown over the baikonur

1255

00:59:34,549 --> 00:59:26,799

cosmodrome and now making its way in

1256

00:59:39,190 --> 00:59:36,870

roughly 90 seconds into flight the soyuz

1257

00:59:41,349 --> 00:59:39,200

rocket already moving more than 2100

1258

00:59:43,750 --> 00:59:41,359

miles per hour already about 10 million

1259

00:59:46,710 --> 00:59:43,760

10 miles downrange the flight of

1260

00:59:49,990 --> 00:59:46,720

parameters of the booster are nominal

1261

00:59:56,309 --> 00:59:50,000

the crew is steering well at 10

1262

01:00:05,510 --> 00:59:58,549

okay if you have received the

1263

01:00:09,670 --> 01:00:07,589

and right on time we see first stage

1264

01:00:11,829 --> 01:00:09,680

separation the coryof cross those four

1265

01:00:13,829 --> 01:00:11,839

strap-on boosters separating now the

1266

01:00:17,829 --> 01:00:13,839

single core stage continuing to power

1267

01:00:18,710 --> 01:00:17,839

the soyuz spacecraft into flight

1268

01:00:20,710 --> 01:00:18,720

cod

1269

01:00:24,069 --> 01:00:20,720

just before that the

1270

01:00:26,390 --> 01:00:24,079

launch escape tower was also jettisoned

1271

01:00:28,150 --> 01:00:26,400

soyuz does maintain escape capability

1272

01:00:29,829 --> 01:00:28,160

all the way to flight though the stage

1273

01:00:32,150 --> 01:00:29,839

able to use

1274

01:00:34,309 --> 01:00:32,160

for a short time small boosters on the

1275

01:00:36,549 --> 01:00:34,319

shroud itself and then once the shroud

1276

01:00:39,750 --> 01:00:36,559

detaches able to use boosters on the

1277

01:00:45,910 --> 01:00:44,150

so the shroud jettison is confirmed

1278

01:00:48,150 --> 01:00:45,920

we have

1279

01:00:50,069 --> 01:00:48,160

controlled descent

1280

01:00:51,910 --> 01:00:50,079

and so we heard confirmation the launch

1281

01:00:54,950 --> 01:00:51,920

round has jettison in this animation you

1282

01:00:57,109 --> 01:00:54,960

can see the soyuz spacecraft now exposed

1283

01:01:01,390 --> 01:00:57,119

continuing under the power of the second

1284

01:01:07,030 --> 01:01:04,950

180 seconds into the flight

1285

01:01:09,109 --> 01:01:07,040

uh vehicle stabilization is performing

1286

01:01:15,349 --> 01:01:09,119

nominally and the crew is feeling well

1287

01:01:19,670 --> 01:01:17,030

second stage is going to continue to

1288

01:01:21,510 --> 01:01:19,680

fire until four minutes and 37 seconds

1289

01:01:22,829 --> 01:01:21,520

into flight so about another minute and

1290

01:01:25,750 --> 01:01:22,839

20

1291

01:01:28,309 --> 01:01:25,760

seconds the second stage

1292

01:01:44,069 --> 01:01:28,319

thrusters are functioning nominally

1293

01:01:50,829 --> 01:01:45,670

getting some views from the spacecraft

1294

01:01:55,510 --> 01:01:53,430

230 seconds because stabilization is

1295

01:01:56,710 --> 01:01:55,520

performing nominally everything is good

1296

01:01:58,309 --> 01:01:56,720

on board

1297

01:02:01,190 --> 01:01:58,319

at this point the vehicle's already

1298

01:02:04,309 --> 01:02:01,200

accelerated to just about 6 400 miles

1299

01:02:11,270 --> 01:02:04,319

per hour about 172 miles down range from

1300

01:02:16,630 --> 01:02:13,750

150 seconds into the flight

1301
01:02:21,430 --> 01:02:16,640
pitch your end roll nominal everything

1302
01:02:27,029 --> 01:02:25,270
the patreon roll calls relating to the

1303
01:02:28,950 --> 01:02:27,039
the attitude or which way the vehicle is

1304
01:02:30,789 --> 01:02:28,960
pointing hearing nominal is what we want

1305
01:02:32,309 --> 01:02:30,799
to continue to hear on the way uphill

1306
01:02:33,349 --> 01:02:32,319
everything continuing to perform

1307
01:02:36,390 --> 01:02:33,359
normally

1308
01:02:55,270 --> 01:02:36,400
with the soyuz spacecraft and the rocket

1309
01:02:55,280 --> 01:03:00,829
second stage separation is

1310
01:03:05,190 --> 01:03:03,430
confirmed and so we heard good

1311
01:03:07,589 --> 01:03:05,200
confirmation second stage is shut down

1312
01:03:09,750 --> 01:03:07,599
and separated you saw a piece fly off

1313
01:03:11,829 --> 01:03:09,760

there that was the lower skirt of the

1314

01:03:13,670 --> 01:03:11,839

third stage that was jettisoned right on

1315

01:03:15,589 --> 01:03:13,680

time as it was supposed to organization

1316

01:03:18,870 --> 01:03:15,599

is performing nominally and everything

1317

01:03:22,710 --> 01:03:20,630

so he's now being propelled by the

1318

01:03:25,829 --> 01:03:22,720

single engine of the third stage

1319

01:03:27,430 --> 01:03:25,839

providing about 67 000 pounds of thrust

1320

01:03:29,029 --> 01:03:27,440

this is going to continue to burn for

1321

01:03:32,150 --> 01:03:29,039

about four minutes it's going to shut

1322

01:03:35,029 --> 01:03:32,160

down at 8 minutes and 46 seconds into

1323

01:03:39,670 --> 01:03:37,670

into this light the third stage is

1324

01:03:50,349 --> 01:03:39,680

functioning nominally everything is good

1325

01:03:55,510 --> 01:03:53,270

350 seconds into the flight

1326
01:04:21,990 --> 01:03:55,520
everything is nominal

1327
01:04:27,670 --> 01:04:25,829
380 seconds into the flight third stage

1328
01:04:29,829 --> 01:04:27,680
thrusters are functioning nominally the

1329
01:04:40,789 --> 01:04:29,839
crew feeling well

1330
01:04:45,270 --> 01:04:43,510
400 seconds into the flight the vehicle

1331
01:04:48,309 --> 01:04:45,280
is stable

1332
01:04:50,470 --> 01:04:48,319
everything is good on board

1333
01:04:53,190 --> 01:04:50,480
now just about two minutes left a little

1334
01:04:55,750 --> 01:04:53,200
under two minutes of power on the third

1335
01:04:57,750 --> 01:04:55,760
stage

1336
01:04:59,990 --> 01:04:57,760
once it shuts down and separates just a

1337
01:05:01,750 --> 01:05:00,000
few seconds later the soyuz spacecraft

1338
01:05:03,670 --> 01:05:01,760

will be flying free

1339

01:05:06,309 --> 01:05:03,680

and a series of pre-programmed commands

1340

01:05:08,789 --> 01:05:06,319

will execute deploying a number of the

1341

01:05:11,029 --> 01:05:08,799

appendages of the antennas

1342

01:05:13,589 --> 01:05:11,039

and the solar arrays needed to power the

1343

01:05:15,270 --> 01:05:13,599

spacecraft on its way to the station

1344

01:05:17,990 --> 01:05:15,280

and the number of antennas will also

1345

01:05:19,990 --> 01:05:18,000

deploy for communications and tracking

1346

01:05:21,829 --> 01:05:20,000

including those that will be responsible

1347

01:05:23,910 --> 01:05:21,839

for communicating with the station as

1348

01:05:27,510 --> 01:05:23,920

the soyluz makes its automated rendezvous

1349

01:05:30,230 --> 01:05:29,430

seven and a half minutes since launch we

1350

01:05:31,990 --> 01:05:30,240

have

1351
01:05:34,150 --> 01:05:32,000
about a minute twenty a minute thirty

1352
01:05:34,950 --> 01:05:34,160
left until the third stage has done its

1353
01:05:53,670 --> 01:05:34,960
job

1354
01:06:00,630 --> 01:05:56,069
third stage thrusters are functioning

1355
01:06:07,270 --> 01:06:02,390
now in the final minute of powered

1356
01:06:10,230 --> 01:06:09,190
coming up soon we'll see third stage

1357
01:06:13,829 --> 01:06:10,240
shutdown

1358
01:06:15,430 --> 01:06:13,839
separation 190 seconds into the flight

1359
01:06:17,270 --> 01:06:15,440
vehicle stabilization is performing

1360
01:06:19,910 --> 01:06:17,280
nominally and everything is good on

1361
01:06:22,309 --> 01:06:19,920
board we'll look to confirm good orbital

1362
01:06:24,950 --> 01:06:22,319
insertion essentially

1363
01:06:26,309 --> 01:06:24,960

confirming that the spacecraft is in the

1364

01:06:35,029 --> 01:06:26,319

intended

1365

01:06:39,990 --> 01:06:36,789

and now standing by for third stage

1366

01:06:53,160 --> 01:06:40,000

separation shutdown and separation

1367

01:07:02,069 --> 01:06:58,309

[Music]

1368

01:07:06,470 --> 01:07:02,079

is confirmed our congratulations and now

1369

01:07:16,789 --> 01:07:06,480

moscow mcc moscow will talk to you

1370

01:07:16,799 --> 01:07:27,990

moscow

1371

01:07:33,430 --> 01:07:30,950

so we saw a good shutdown and separation

1372

01:07:35,910 --> 01:07:33,440

of the third stage

1373

01:07:37,670 --> 01:07:35,920

solar array has deployed standing by for

1374

01:07:54,549 --> 01:07:37,680

confirmation that all antennas have

1375

01:07:54,559 --> 01:08:02,870

foreign

1376

01:08:07,670 --> 01:08:04,950

i am ready to

1377

01:08:23,349 --> 01:08:07,680

provide the data as per

1378

01:08:28,390 --> 01:08:25,590

i am ready to give you data

1379

01:08:30,149 --> 01:08:28,400

page 36 yes we are standing by for the

1380

01:08:31,510 --> 01:08:30,159

first measurement

1381

01:08:44,870 --> 01:08:31,520

data from you

1382

01:08:44,880 --> 01:08:49,349

uh will be the dynamic ops

1383

01:08:54,390 --> 01:08:51,669

command will be sent via carell command

1384

01:08:56,630 --> 01:08:54,400

readily read the link

1385

01:09:00,390 --> 01:08:56,640

so everything was on time uh they are

1386

01:09:01,829 --> 01:09:00,400

there it was on time yes it is confirmed

1387

01:09:03,669 --> 01:09:01,839

you are standing by for the first

1388

01:09:06,229 --> 01:09:03,679

measurement from you

1389

01:09:09,189 --> 01:09:06,239

here's the first measurement at the time

1390

01:09:13,510 --> 01:09:09,199

10 52 28

1391

01:09:16,630 --> 01:09:13,520

the essa pressure 8 0 1 by all pressure

1392

01:09:21,110 --> 01:09:16,640

8 23

1393

01:09:23,030 --> 01:09:21,120

in power power pressure 8 891

1394

01:09:24,070 --> 01:09:23,040

in the instrument compartment and i'm

1395

01:09:27,590 --> 01:09:24,080

ready

1396

01:09:29,669 --> 01:09:27,600

to give you the data perform

1397

01:09:34,349 --> 01:09:29,679

number three

1398

01:09:37,430 --> 01:09:34,359

go ahead 17 17.7 18

1399

01:09:44,829 --> 01:09:37,440

17.3 19.

1400

01:09:46,390 --> 01:09:44,839

272 number 20 0.8 21 1.2 22

1401

01:09:47,820 --> 01:09:46,400

325

1402

01:10:05,510 --> 01:09:47,830

23

1403

01:10:08,950 --> 01:10:06,870

now please check

1404

01:10:13,189 --> 01:10:08,960

the indicators

1405

01:10:17,430 --> 01:10:15,030

and so we're continuing to get a lot of

1406

01:10:19,350 --> 01:10:17,440

comps between the soyuz spacecraft and

1407

01:10:21,270 --> 01:10:19,360

the russian mission control center in

1408

01:10:23,669 --> 01:10:21,280

karioff hearing them

1409

01:10:26,790 --> 01:10:23,679

call cosbeck that is the the call sign

1410

01:10:30,229 --> 01:10:26,800

for the the soyuz spacecraft with

1411

01:10:33,350 --> 01:10:30,239

commander oleg novitskiy

1412

01:10:34,470 --> 01:10:33,360

uh we did hear a good confirmation of

1413

01:10:36,070 --> 01:10:34,480

all solar

1414

01:10:37,990 --> 01:10:36,080

both solar arrays and all of the

1415

01:10:41,189 --> 01:10:38,000

appendages so all of the antennas did

1416

01:10:43,350 --> 01:10:41,199

deploy successfully so we had a nominal

1417

01:10:45,830 --> 01:10:43,360

flight on the way uphill we had a good

1418

01:10:47,750 --> 01:10:45,840

orbital insertion the initial orbit for

1419

01:10:51,990 --> 01:10:47,760

the soyuz spacecraft today is right at

1420

01:11:04,950 --> 01:10:52,000

around 200 kilometers by 242 kilometers

1421

01:11:08,790 --> 01:11:07,350

manifold switch over will be after the

1422

01:11:10,310 --> 01:11:08,800

first

1423

01:11:31,990 --> 01:11:10,320

burn

1424

01:11:37,510 --> 01:11:36,229

11 26 40 is the time yes correct of the

1425

01:11:41,910 --> 01:11:37,520

switchover

1426

01:11:49,590 --> 01:11:43,910

there will be selection of the first

1427

01:11:49,600 --> 01:11:58,709

and what page of the procedure is that

1428

01:12:20,950 --> 01:12:00,870

so the first manifold will be selected

1429

01:12:27,110 --> 01:12:24,310

0 0. it is also recorded

1430

01:12:30,950 --> 01:12:27,120

40 page 45

1431

01:12:37,590 --> 01:12:32,950

yes that's correct now compass of the

1432

01:12:40,229 --> 01:12:37,600

second orbit 12 14 is the time copy 12

1433

01:12:41,430 --> 01:12:40,239

14 second compass yes

1434

01:12:44,149 --> 01:12:41,440

that's correct

1435

01:12:44,950 --> 01:12:44,159

from input 2 you will have

1436

01:12:48,870 --> 01:12:44,960

to

1437

01:12:52,870 --> 01:12:48,880

activate a display tv

1438

01:12:58,310 --> 01:12:54,870

so the command that should be sent is

1439

01:13:00,790 --> 01:12:58,320

there three yes display uh relay is

1440

01:13:03,030 --> 01:13:00,800

there three commands and

1441

01:13:12,870 --> 01:13:03,040

you will have to activate the com assets

1442

01:14:11,189 --> 01:13:15,030

so that's all i have for now

1443

01:14:11,199 --> 01:14:19,189

is

1444

01:14:19,199 --> 01:14:39,750

zero zero

1445

01:14:39,760 --> 01:14:54,149

foreign

1446

01:14:59,189 --> 01:14:57,110

helmet really shoulder straps and you

1447

01:15:03,270 --> 01:14:59,199

can also deactivate the

1448

01:15:09,990 --> 01:15:07,270

pressure helmets to open and

1449

01:15:12,310 --> 01:15:10,000

we're going to release the straps and

1450

01:15:14,550 --> 01:15:12,320

decorate the thermal control centers the

1451

01:15:16,630 --> 01:15:14,560
vehicle and session completely

1452

01:15:19,990 --> 01:15:16,640
guys this is uh

1453

01:15:23,430 --> 01:15:21,030
well first of all i'd like to

1454

01:15:25,270 --> 01:15:23,440
congratulate you on this successful

1455

01:15:27,510 --> 01:15:25,280
vehicle orbital insertion all the

1456

01:15:30,790 --> 01:15:27,520
telemetry parameters are nominal and

1457

01:15:33,510 --> 01:15:30,800
other than that everything is fine uh so

1458

01:15:35,350 --> 01:15:33,520
uh your goal to

1459

01:15:50,630 --> 01:15:35,360
proceed with all the work that you have

1460

01:15:50,640 --> 01:15:57,510
currently

1461

01:15:57,520 --> 01:16:17,110
11.03

1462

01:16:20,470 --> 01:16:18,550
all right so we've been hearing a lot of

1463

01:16:22,630 --> 01:16:20,480

chatter between the soyuz ms-18

1464

01:16:24,390 --> 01:16:22,640

spacecraft and the russian mission

1465

01:16:26,709 --> 01:16:24,400

control center and coryoff again the

1466

01:16:29,270 --> 01:16:26,719

crew safely on the orbit

1467

01:16:31,830 --> 01:16:29,280

the soyuz spacecraft deployed all of its

1468

01:16:34,550 --> 01:16:31,840

solar arrays and antennas following a

1469

01:16:35,750 --> 01:16:34,560

flawless flight uphill we do have a

1470

01:16:37,430 --> 01:16:35,760

little bit of time we should be getting

1471

01:16:39,350 --> 01:16:37,440

some launch replays pretty soon so in

1472

01:16:41,910 --> 01:16:39,360

the meantime we'll take some more ask

1473

01:16:43,430 --> 01:16:41,920

nasa questions uh this first one's

1474

01:16:45,510 --> 01:16:43,440

asking how long are these astronauts

1475

01:16:47,669 --> 01:16:45,520

going to stay on board the international

1476

01:16:50,229 --> 01:16:47,679

space station well most flights

1477

01:16:51,669 --> 01:16:50,239

typically last about six months

1478

01:16:53,270 --> 01:16:51,679

as of right now

1479

01:16:55,110 --> 01:16:53,280

these three currently plan to stay about

1480

01:16:57,510 --> 01:16:55,120

six months a little more than six months

1481

01:17:00,149 --> 01:16:57,520

onboard the international space station

1482

01:17:01,350 --> 01:17:00,159

and that's a typical stay the spacecraft

1483

01:17:02,470 --> 01:17:01,360

itself

1484

01:17:03,669 --> 01:17:02,480

has a

1485

01:17:04,550 --> 01:17:03,679

uh

1486

01:17:10,390 --> 01:17:04,560

on

1487

01:17:11,910 --> 01:17:10,400

so that's typically a max that a crew

1488

01:17:14,070 --> 01:17:11,920

will stay on board the international

1489

01:17:17,189 --> 01:17:14,080

space station obviously you have the

1490

01:17:19,990 --> 01:17:17,199

capability to sometimes swap seats

1491

01:17:21,030 --> 01:17:20,000

depending on how the flights downhill

1492

01:17:23,030 --> 01:17:21,040

or down

1493

01:17:24,390 --> 01:17:23,040

down the schedule take place

1494

01:17:26,709 --> 01:17:24,400

but for right now these crew members

1495

01:17:28,790 --> 01:17:26,719

scheduled to spend about six months on

1496

01:17:30,709 --> 01:17:28,800

board the station

1497

01:17:32,950 --> 01:17:30,719

this next question asks why does the

1498

01:17:35,030 --> 01:17:32,960

dragon journey take more time than the

1499

01:17:36,950 --> 01:17:35,040

soyuz that's a great question

1500

01:17:39,030 --> 01:17:36,960

and a lot of it comes down to

1501

01:17:40,709 --> 01:17:39,040

the difficulties that come with orbital

1502

01:17:42,870 --> 01:17:40,719

mechanics

1503

01:17:44,630 --> 01:17:42,880

it you have to launch at very precise

1504

01:17:46,470 --> 01:17:44,640

times to make journeys like the one

1505

01:17:48,229 --> 01:17:46,480

we're seeing today

1506

01:17:50,950 --> 01:17:48,239

and it's only been possible through

1507

01:17:53,110 --> 01:17:50,960

years of evolution

1508

01:17:55,910 --> 01:17:53,120

and a lot of lessons learned on behalf

1509

01:17:58,390 --> 01:17:55,920

of the russian rocket scientists and the

1510

01:18:00,630 --> 01:17:58,400

flight planners typically for many years

1511

01:18:02,310 --> 01:18:00,640

the soyuz took about two days

1512

01:18:04,229 --> 01:18:02,320

to arrive at the international space

1513

01:18:06,550 --> 01:18:04,239

station and

1514

01:18:08,390 --> 01:18:06,560

after they have any issues with any of

1515

01:18:09,430 --> 01:18:08,400

their burns or their engine firings on

1516

01:18:11,669 --> 01:18:09,440

the way

1517

01:18:13,990 --> 01:18:11,679

to the space station today they would

1518

01:18:16,630 --> 01:18:14,000

default into what is

1519

01:18:18,630 --> 01:18:16,640

a 34 orbit rendezvous which takes about

1520

01:18:20,870 --> 01:18:18,640

two days to get there so

1521

01:18:22,790 --> 01:18:20,880

it really just comes down to really

1522

01:18:24,229 --> 01:18:22,800

understanding the capabilities of the

1523

01:18:26,870 --> 01:18:24,239

spacecraft

1524

01:18:28,390 --> 01:18:26,880

and once you get that you can try to to

1525

01:18:30,229 --> 01:18:28,400

narrow down there are there are also a

1526

01:18:32,470 --> 01:18:30,239

lot of other things that come into play

1527

01:18:33,990 --> 01:18:32,480

when you plot out how long it's going to

1528

01:18:36,550 --> 01:18:34,000

take you to get there

1529

01:18:38,229 --> 01:18:36,560

um typically the shortest that a dragon

1530

01:18:39,669 --> 01:18:38,239

spacecraft will be able to make it to

1531

01:18:41,669 --> 01:18:39,679

the space station is going to be about

1532

01:18:43,669 --> 01:18:41,679

six to eight hours right now

1533

01:18:45,510 --> 01:18:43,679

but again has to be

1534

01:18:47,750 --> 01:18:45,520

at a very specific time with the space

1535

01:18:49,110 --> 01:18:47,760

station at a very specific place and if

1536

01:18:51,189 --> 01:18:49,120

it's any longer than that we'll

1537

01:18:53,430 --> 01:18:51,199

typically extend that out just to make

1538

01:18:55,750 --> 01:18:53,440

sure that the crew has time to sleep and

1539

01:18:58,470 --> 01:18:55,760

we're not trying to keep them up for

1540

01:19:00,470 --> 01:18:58,480

you know 12 to 14 hours straight before

1541

01:19:02,390 --> 01:19:00,480

they try to dock a spacecraft to the

1542

01:19:03,910 --> 01:19:02,400

space station

1543

01:19:07,110 --> 01:19:03,920

all right this next one

1544

01:19:08,470 --> 01:19:07,120

asks how do you make oxygen on the space

1545

01:19:10,070 --> 01:19:08,480

station that's a great question i

1546

01:19:12,630 --> 01:19:10,080

mentioned that a little bit earlier that

1547

01:19:15,830 --> 01:19:12,640

we're able to recycle a lot of the the

1548

01:19:18,070 --> 01:19:15,840

life support systems uh we make oxygen

1549

01:19:20,470 --> 01:19:18,080

through a process called electrolysis

1550

01:19:23,189 --> 01:19:20,480

and that's where you basically take a

1551

01:19:25,189 --> 01:19:23,199

water molecule and you split it use

1552

01:19:28,070 --> 01:19:25,199

electricity and you separate it into its

1553

01:19:29,910 --> 01:19:28,080

parts water is made up of hydrogen and

1554

01:19:32,149 --> 01:19:29,920

oxygen h₂o

1555

01:19:35,350 --> 01:19:32,159

and you can either take that excess

1556

01:19:37,030 --> 01:19:35,360

hydrogen and vent it off board or

1557

01:19:38,709 --> 01:19:37,040

you can put it through a different

1558

01:19:41,110 --> 01:19:38,719

process we have a technology

1559

01:19:42,550 --> 01:19:41,120

demonstration on board called sabati a

1560

01:19:44,630 --> 01:19:42,560

which takes

1561

01:19:45,990 --> 01:19:44,640

the excess hydrogen from when we make

1562

01:19:48,390 --> 01:19:46,000

oxygen by

1563

01:19:52,149 --> 01:19:48,400

separating the water molecules and you

1564

01:19:53,750 --> 01:19:52,159

combine it with co2 carbon dioxide that

1565

01:19:55,669 --> 01:19:53,760

gets scrubbed out of the air the

1566

01:19:57,590 --> 01:19:55,679

astronauts are exhaling

1567

01:19:59,750 --> 01:19:57,600

and if you take that excess hydrogen and

1568

01:20:02,790 --> 01:19:59,760

combine it with co2 you can make more

1569

01:20:04,149 --> 01:20:02,800

h2o and so the goal is to eventually get

1570

01:20:06,950 --> 01:20:04,159

to a point where you have what's called

1571

01:20:09,350 --> 01:20:06,960

a closed loop life support system where

1572

01:20:10,709 --> 01:20:09,360

you're able to just kind of constantly

1573

01:20:12,470 --> 01:20:10,719

cycle through

1574

01:20:14,470 --> 01:20:12,480

all of your breathing gases all of your

1575

01:20:15,990 --> 01:20:14,480

water that you're launching

1576
01:20:17,430 --> 01:20:16,000
so you don't have to launch a bunch of

1577
01:20:19,189 --> 01:20:17,440
reserves

1578
01:20:21,270 --> 01:20:19,199
we're still perfecting a lot of those

1579
01:20:22,790 --> 01:20:21,280
technologies that's really why the

1580
01:20:24,790 --> 01:20:22,800
international space station is so

1581
01:20:27,990 --> 01:20:24,800
important because we can do that just

1582
01:20:29,350 --> 01:20:28,000
250 miles above our heads and really

1583
01:20:31,750 --> 01:20:29,360
make sure that we understand those

1584
01:20:33,590 --> 01:20:31,760
technologies very well before we start

1585
01:20:35,750 --> 01:20:33,600
sending crew members to the moon

1586
01:20:37,110 --> 01:20:35,760
eventually onto mars where

1587
01:20:39,910 --> 01:20:37,120
when you're going to mars you're talking

1588
01:20:41,750 --> 01:20:39,920

about about a three year round trip and

1589

01:20:45,430 --> 01:20:41,760

you have to make absolute sure that all

1590

01:20:49,830 --> 01:20:47,830

um our next question asks which docking

1591

01:20:51,510 --> 01:20:49,840

port on the space station are they going

1592

01:20:53,590 --> 01:20:51,520

to dock to they are headed for the

1593

01:20:56,310 --> 01:20:53,600

rasviet module it's also known as mini

1594

01:20:58,870 --> 01:20:56,320

research module number one and it's on

1595

01:21:00,629 --> 01:20:58,880

the earth-facing side of the zarya the

1596

01:21:03,910 --> 01:21:00,639

functional cargo block module on the

1597

01:21:05,669 --> 01:21:03,920

russian segment that's the only one open

1598

01:21:07,430 --> 01:21:05,679

on the space station right now you can

1599

01:21:09,910 --> 01:21:07,440

see what it's going to look like a

1600

01:21:12,310 --> 01:21:09,920

little bit later this morning the soyuz

1601

01:21:13,830 --> 01:21:12,320

ms-18 with the arrow there

1602

01:21:14,950 --> 01:21:13,840

it's not there yet but that's what it's

1603

01:21:16,950 --> 01:21:14,960

going to look like and that's the

1604

01:21:19,750 --> 01:21:16,960

rossviet port that you can see it

1605

01:21:24,390 --> 01:21:22,310

our next question comes from shane i

1606

01:21:26,229 --> 01:21:24,400

want to know how fast are they traveling

1607

01:21:27,270 --> 01:21:26,239

roughly right now so right now they're

1608

01:21:29,990 --> 01:21:27,280

traveling

1609

01:21:31,910 --> 01:21:30,000

at about 17 000 miles an hour a little

1610

01:21:32,629 --> 01:21:31,920

bit over

1611

01:21:34,390 --> 01:21:32,639

but

1612

01:21:36,870 --> 01:21:34,400

they're essentially going orbital

1613

01:21:40,070 --> 01:21:36,880

velocity so at the altitude they're at i

1614

01:21:41,669 --> 01:21:40,080

will start out at about 16 700 miles an

1615

01:21:44,149 --> 01:21:41,679

hour or so and then they'll continue to

1616

01:21:46,790 --> 01:21:44,159

increase their speed through a series of

1617

01:21:48,390 --> 01:21:46,800

what's called delta velocity burns by

1618

01:21:50,550 --> 01:21:48,400

increasing their speed they're able to

1619

01:21:52,950 --> 01:21:50,560

raise their orbit until they're roughly

1620

01:21:54,310 --> 01:21:52,960

on the exact same orbital

1621

01:21:56,629 --> 01:21:54,320

height and trajectory as the

1622

01:21:59,430 --> 01:21:56,639

international space station which itself

1623

01:22:01,669 --> 01:21:59,440

is about 260 miles over the earth right

1624

01:22:03,590 --> 01:22:01,679

now by that point they'll be traveling

1625

01:22:07,430 --> 01:22:03,600

closer to about 17

1626

01:22:12,390 --> 01:22:09,990

our next question is who will then be

1627

01:22:14,470 --> 01:22:12,400

the next iss commander who's the next

1628

01:22:15,750 --> 01:22:14,480

space station commander that's a great

1629

01:22:17,830 --> 01:22:15,760

question

1630

01:22:19,669 --> 01:22:17,840

so right now on board

1631

01:22:22,709 --> 01:22:19,679

the the space station

1632

01:22:25,750 --> 01:22:22,719

it's sergey or sergey rizhikov

1633

01:22:27,750 --> 01:22:25,760

he's actually going to hand off command

1634

01:22:28,950 --> 01:22:27,760

to shannon walker one of the crew one

1635

01:22:31,590 --> 01:22:28,960

astronauts

1636

01:22:33,510 --> 01:22:31,600

uh just about a week from now just

1637

01:22:35,590 --> 01:22:33,520

before he comes home along with sergey

1638

01:22:37,270 --> 01:22:35,600

kuch fairkoff and

1639

01:22:39,270 --> 01:22:37,280

kate rubens

1640

01:22:40,790 --> 01:22:39,280

and so he's going to be handing off to

1641

01:22:42,950 --> 01:22:40,800

shanna walker she's on the right side of

1642

01:22:45,350 --> 01:22:42,960

this picture in the front row and she'll

1643

01:22:47,910 --> 01:22:45,360

be the commander for a couple of days

1644

01:22:50,310 --> 01:22:47,920

until the crew 2 mission launches to the

1645

01:22:51,750 --> 01:22:50,320

space station at which point she will be

1646

01:22:54,310 --> 01:22:51,760

handing off to

1647

01:22:56,709 --> 01:22:54,320

aki hoshide from the japan aerospace

1648

01:22:58,870 --> 01:22:56,719

exploration agency and then he'll be the

1649

01:23:01,110 --> 01:22:58,880

commander for several months during

1650

01:23:03,830 --> 01:23:01,120

expedition 65

1651
01:23:05,750 --> 01:23:03,840
and then towards the end of that flight

1652
01:23:07,669 --> 01:23:05,760
he'll hand off to

1653
01:23:10,070 --> 01:23:07,679
tomorrow pesquet of the european space

1654
01:23:12,470 --> 01:23:10,080
agency who will be the commander

1655
01:23:17,189 --> 01:23:12,480
for a couple of weeks at the very end of

1656
01:23:23,189 --> 01:23:20,390
all right our next question asked

1657
01:23:24,470 --> 01:23:23,199
why do russian rockets launch from

1658
01:23:26,229 --> 01:23:24,480
kazakhstan

1659
01:23:28,070 --> 01:23:26,239
uh that's a great question and it goes

1660
01:23:30,470 --> 01:23:28,080
back to the very beginning of the

1661
01:23:31,750 --> 01:23:30,480
russian space program the very early

1662
01:23:33,830 --> 01:23:31,760
days

1663
01:23:35,910 --> 01:23:33,840

when the

1664

01:23:37,830 --> 01:23:35,920

space program was starting up i'm going

1665

01:23:46,950 --> 01:23:37,840

to cut that off and we are going to some

1666

01:23:46,960 --> 01:24:12,450

thank now

1667

01:24:12,460 --> 01:24:35,430

[Music]

1668

01:24:40,229 --> 01:24:37,830

and that was our first replay that

1669

01:24:42,709 --> 01:24:40,239

launched taking place right on time at 7

1670

01:24:45,030 --> 01:24:42,719

42 and 41 seconds gmt

1671

01:24:47,030 --> 01:24:45,040

12 42 and 41 seconds in baikonur we

1672

01:25:05,190 --> 01:24:47,040

should have four replays coming to you

1673

01:26:00,229 --> 01:25:20,030

[Music]

1674

01:26:20,709 --> 01:26:02,600

so

1675

01:26:25,189 --> 01:26:22,550

and that was replay two again we're

1676
01:26:26,709 --> 01:26:25,199
expecting four of these launch replays

1677
01:26:29,510 --> 01:26:26,719
for you this morning

1678
01:26:32,470 --> 01:26:29,520
it was a very smooth 8 minute and 49

1679
01:26:35,510 --> 01:26:32,480
second ride uphill all three stages

1680
01:27:23,610 --> 01:26:35,520
performing as expected delivering soyuz

1681
01:27:52,950 --> 01:27:35,970
[Music]

1682
01:27:52,960 --> 01:27:56,860
so

1683
01:28:10,810 --> 01:28:09,510
[Music]

1684
01:28:19,000 --> 01:28:10,820
yoga

1685
01:28:37,100 --> 01:28:31,030
[Music]

1686
01:28:55,750 --> 01:28:37,110
so

1687
01:28:55,760 --> 01:29:05,990
[Music]

1688
01:29:11,990 --> 01:29:09,669

and three down one more to go for launch

1689

01:29:12,870 --> 01:29:12,000

replay again launch took place right on

1690

01:29:17,270 --> 01:29:12,880

time

1691

01:29:22,470 --> 01:29:17,280

at 7 42 and 41 seconds gmt 12 42 and 41

1692

01:29:26,550 --> 01:29:24,070

flawless ride to orbit the crew

1693

01:29:40,560 --> 01:29:26,560

continuing to orb the earth this time

1694

01:29:40,570 --> 01:29:56,149

[Music]

1695

01:30:00,790 --> 01:29:58,229

all right and so that was our final

1696

01:30:03,590 --> 01:30:00,800

launch replay so we are going to bring a

1697

01:30:05,590 --> 01:30:03,600

close to our launch coverage

1698

01:30:07,510 --> 01:30:05,600

at this time the crew continuing their

1699

01:30:09,189 --> 01:30:07,520

ride uphill they're about seven minutes

1700

01:30:11,110 --> 01:30:09,199

away from their first major burn to

1701
01:30:12,390 --> 01:30:11,120
start catching up with the international

1702
01:30:15,189 --> 01:30:12,400
space station

1703
01:30:17,510 --> 01:30:15,199
and as long as everything goes well with

1704
01:30:19,510 --> 01:30:17,520
this and the

1705
01:30:20,629 --> 01:30:19,520
following burns we're looking at a

1706
01:30:23,270 --> 01:30:20,639
docking

1707
01:30:24,149 --> 01:30:23,280
just about two hours and 52 minutes from

1708
01:30:25,350 --> 01:30:24,159
now

1709
01:30:27,510 --> 01:30:25,360
and so

1710
01:30:32,790 --> 01:30:27,520
run through our continuing coverage for

1711
01:30:36,310 --> 01:30:34,310
and so we'll go off the air for a little

1712
01:30:39,430 --> 01:30:36,320
bit we'll be back for docking coverage

1713
01:30:43,110 --> 01:30:39,440

all these times central u.s time at 5 15

1714

01:30:48,550 --> 01:30:43,120

a.m and we expect docking at about 607

1715

01:30:50,229 --> 01:30:48,560

a.m central time or 1107 a.m or 1107 gmt

1716

01:30:52,870 --> 01:30:50,239

following that we'll have a video file

1717

01:30:54,790 --> 01:30:52,880

with all of the best launch feeds uh

1718

01:30:56,709 --> 01:30:54,800

giving you some replays while we wait

1719

01:30:58,790 --> 01:30:56,719

for the hatch opening we'll come back

1720

01:31:00,870 --> 01:30:58,800

live in the air at 7 30 a.m central

1721

01:31:04,149 --> 01:31:00,880

we're tracking to a hatch opening right

1722

01:31:06,550 --> 01:31:04,159

around 8 a.m central time and then we'll

1723

01:31:08,310 --> 01:31:06,560

wrap up the day with one final video

1724

01:31:11,030 --> 01:31:08,320

file giving you the highlights from

1725

01:31:12,790 --> 01:31:11,040

everything docking hatch opening

1726

01:31:14,550 --> 01:31:12,800

everything that unfolded today

1727

01:31:17,189 --> 01:31:14,560

delivering three new crew members to the

1728

01:31:19,510 --> 01:31:17,199

space station so

1729

01:31:21,910 --> 01:31:19,520

that'll do it for right now keep sending

1730

01:31:23,510 --> 01:31:21,920

in those questions using the hashtag ask

1731

01:31:24,390 --> 01:31:23,520

nasa we'll get through a whole bunch

1732

01:31:26,149 --> 01:31:24,400

more

1733

01:31:28,229 --> 01:31:26,159

once we get to our rendezvous and

1734

01:31:30,390 --> 01:31:28,239

docking show i do want to thank you for

1735

01:31:31,990 --> 01:31:30,400

tuning in staying up late or waking up

1736

01:31:34,629 --> 01:31:32,000

early to

1737

01:31:36,870 --> 01:31:34,639

catch three crew members flying to the

1738

01:31:39,110 --> 01:31:36,880

international space station we'll be

1739

01:31:42,070 --> 01:31:39,120

back in just a little while to show you

1740

01:31:45,110 --> 01:31:42,080

docking live as we get ready to increase

1741

01:31:47,030 --> 01:31:45,120

the population on station from seven all

1742

01:31:48,790 --> 01:31:47,040

the way up to ten

1743

01:31:49,910 --> 01:31:48,800

so a lot more exciting stuff still to

1744

01:31:51,590 --> 01:31:49,920

come

1745

01:31:54,070 --> 01:31:51,600

so one more time thank you for tuning in

1746

01:32:05,110 --> 01:31:54,080

we'll be back in just a couple hours

1747

01:32:09,590 --> 01:32:07,590

and i have a feather

1748

01:32:11,270 --> 01:32:09,600

in my right hand a hammer

1749

01:32:12,870 --> 01:32:11,280

i guess one of the reasons

1750

01:32:15,430 --> 01:32:12,880

we got here today was because of a

1751

01:32:17,830 --> 01:32:15,440

gentleman named galileo a long time ago

1752

01:32:20,390 --> 01:32:17,840

who made a rather significant discovery

1753

01:32:21,990 --> 01:32:20,400

about falling objects in gravity fields

1754

01:32:23,669 --> 01:32:22,000

and we thought that