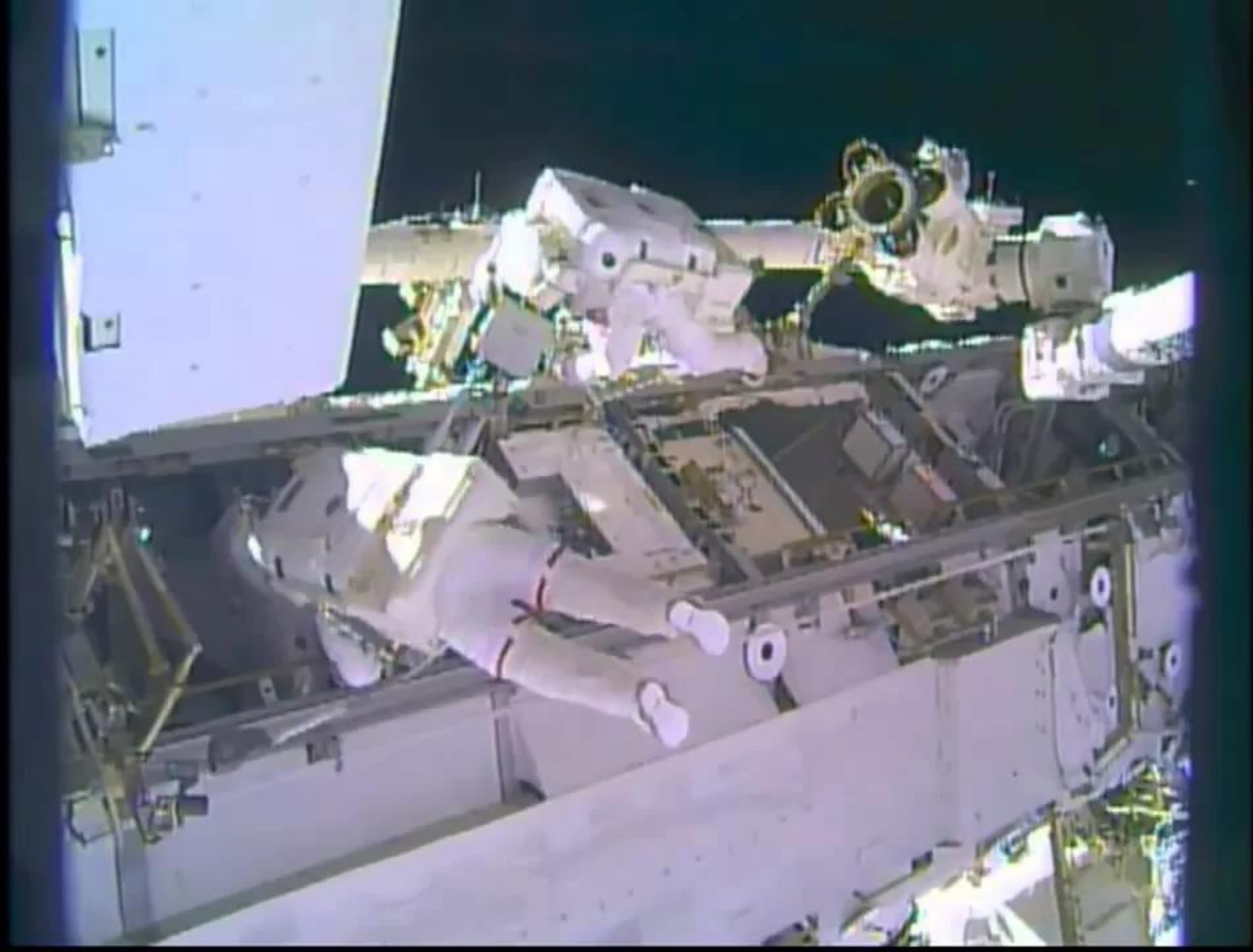

1
00:00:06,710 --> 00:00:05,269
okay guys when you're ready we have a go

2
00:00:08,549 --> 00:00:06,720
for egress

3
00:00:10,310 --> 00:00:08,559
so hopper we see that the hatch thermal

4
00:00:13,990 --> 00:00:10,320
cover is already open and you have a go

5
00:00:25,109 --> 00:00:15,910
after that go for egress let's go to

6
00:00:28,710 --> 00:00:27,189
okay hopper as you're exiting just

7
00:00:31,269 --> 00:00:28,720
remember the

8
00:00:42,709 --> 00:00:31,279
sharp edge on the port half portion of

9
00:00:46,470 --> 00:00:44,869
and our first view of mike hopkins as he

10
00:00:49,670 --> 00:00:46,480
begins to make his way out of the quest

11
00:00:51,590 --> 00:00:49,680
airlock's crew lock section

12
00:00:53,670 --> 00:00:51,600
spacewalk officer allison bolinger

13
00:00:56,069 --> 00:00:53,680

reports we're running at the moment at

14
00:00:59,110 --> 00:00:56,079
the outset of today's spacewalk about 17

15
00:01:03,349 --> 00:00:59,120
minutes ahead of the day

16
00:01:03,359 --> 00:01:09,510
copy hopper

17
00:01:09,520 --> 00:01:18,230
15 on the forward one

18
00:01:18,240 --> 00:01:22,950
sensational space run to the robot

19
00:01:22,960 --> 00:01:27,270
thank you

20
00:01:31,749 --> 00:01:29,429
okay good morning nikki

21
00:01:34,630 --> 00:01:31,759
i'm at the robotics workstation and i

22
00:01:40,149 --> 00:01:34,640
will start the step one of

23
00:01:45,670 --> 00:01:42,389
happy you are go through step five

24
00:01:45,680 --> 00:01:51,109
good morning go for through to step five

25
00:01:55,190 --> 00:01:52,870
it's like christmas morning opening up a

26
00:01:57,030 --> 00:01:55,200
little present here

27
00:01:58,789 --> 00:01:57,040
almost yeah

28
00:02:01,429 --> 00:01:58,799
okay everything looks good in the bag

29
00:02:03,429 --> 00:02:01,439
nothing seems to be floating out

30
00:02:06,709 --> 00:02:03,439
i see the 1.5

31
00:02:09,669 --> 00:02:06,719
inch ammonia n2 vent tool

32
00:02:11,670 --> 00:02:09,679
pocket label f it looks like

33
00:02:13,830 --> 00:02:11,680
perfect rick and that's what we're

34
00:02:15,190 --> 00:02:13,840
expecting and go ahead and stow that

35
00:02:17,190 --> 00:02:15,200
event tool

36
00:02:20,229 --> 00:02:17,200
on your mini workstation as needed for

37
00:02:20,239 --> 00:02:29,190
and is your motion complete quiche

38
00:02:39,830 --> 00:02:31,670

i should help you here comes the sun

39
00:02:44,390 --> 00:02:42,390
a signature shot from external cameras

40
00:02:46,150 --> 00:02:44,400
on the truss of the station as rick

41
00:02:47,990 --> 00:02:46,160
mastracchio moves down the starboard

42
00:02:49,350 --> 00:02:48,000
truss of the complex to join mike

43
00:02:52,710 --> 00:02:49,360
hopkins

44
00:02:54,390 --> 00:02:52,720
with sunrise just over the horizon the

45
00:02:59,350 --> 00:02:54,400
international space station flying over

46
00:02:59,360 --> 00:03:05,589
no problem we got plenty of consumables

47
00:03:11,750 --> 00:03:07,750
coffee that wheels

48
00:03:16,309 --> 00:03:14,070
and our limiting consumable is a battery

49
00:04:16,310 --> 00:03:16,319
on hopper at 8 35 so we're looking good

50
00:04:21,670 --> 00:04:18,710
flying high over peru mike hopkins

51
00:04:23,670 --> 00:04:21,680
wielding the pump module the spare pump

52
00:04:26,950 --> 00:04:23,680
as he is being maneuvered into position

53
00:04:29,350 --> 00:04:26,960
by koichi wakata operating the robot arm

54
00:04:31,670 --> 00:04:29,360
the canadarm2 from the robotics

55
00:04:35,590 --> 00:04:31,680
workstation inside the destiny

56
00:04:35,600 --> 00:04:49,510
that would be awkward yeah

57
00:04:52,870 --> 00:04:50,950
this just wraps around one of these hand

58
00:04:54,830 --> 00:04:52,880
rails at the base of the frame i guess

59
00:04:58,710 --> 00:04:54,840
right that's right the middle uh the

60
00:05:00,230 --> 00:04:58,720
long the long flap at the bottom

61
00:05:01,029 --> 00:05:00,240
wrapped around and i think there was

62
00:05:10,710 --> 00:05:01,039
some

63
00:05:14,390 --> 00:05:12,150

so if you're happy i'll just start

64
00:05:17,990 --> 00:05:14,400
heading back

65
00:05:22,830 --> 00:05:18,000
okay uh hopper the joe case is complete

66
00:05:27,990 --> 00:05:26,070
okay we copy that rick and uh

67
00:05:29,350 --> 00:05:28,000
we copy your inventory that looks like a

68
00:05:31,909 --> 00:05:29,360
good config

69
00:05:34,870 --> 00:05:31,919
and um we need to also grab hopper

70
00:05:34,880 --> 00:05:39,029
probably

71
00:05:49,350 --> 00:05:41,350
and we'd like you to attach that safety

72
00:05:55,670 --> 00:05:53,189
hopkins is repositioning the pump module

73
00:05:58,309 --> 00:05:55,680
the new spare so that it is in the

74
00:06:00,950 --> 00:05:58,319
correct orientation for its installation

75
00:06:02,870 --> 00:06:00,960
in the starboard truss slot

76
00:06:05,749 --> 00:06:02,880
on the international space station this

77
00:06:08,469 --> 00:06:05,759
places the quick disconnect connector

78
00:06:09,909 --> 00:06:08,479
points toward his head and the bolts

79
00:06:11,749 --> 00:06:09,919
toward his feet

80
00:06:13,749 --> 00:06:11,759
that he will be working on once it

81
00:06:15,270 --> 00:06:13,759
slides into place in its installation

82
00:06:16,790 --> 00:06:15,280
slot in bay

83
00:07:22,150 --> 00:06:16,800
one on the s-1 truss of the

84
00:07:26,870 --> 00:07:25,510
okay all right twitch are you with us

85
00:07:29,189 --> 00:07:26,880
i'm with you guys

86
00:07:32,629 --> 00:07:29,199
all right

87
00:07:37,110 --> 00:07:32,639
okay you can jump station ask

88
00:07:43,589 --> 00:07:39,270

i probably gonna need you to pitch up a

89
00:07:43,599 --> 00:07:59,110
i'm in motion

90
00:08:06,070 --> 00:08:01,830
yeah good motion

91
00:08:09,430 --> 00:08:07,909
just hold that attitude mike you look

92
00:08:11,510 --> 00:08:09,440
good

93
00:08:13,749 --> 00:08:11,520
when you get closer we'll maybe tweak it

94
00:08:23,510 --> 00:08:13,759
continue ask kuichi

95
00:08:26,230 --> 00:08:24,950
once you get yourself lined up with the

96
00:08:27,029 --> 00:08:26,240
bulbs

97
00:08:30,230 --> 00:08:27,039
okay

98
00:08:49,750 --> 00:08:30,240
at 15 centimeters hopper let's continue

99
00:08:49,760 --> 00:09:00,550
are you going forward

100
00:09:19,190 --> 00:09:03,910
okay i'm ready oh that's so much easier

101
00:09:23,590 --> 00:09:21,750
a very delicate process of sliding the

102
00:09:25,990 --> 00:09:23,600
spare pump

103
00:09:29,030 --> 00:09:26,000
onto these guide rails making sure that

104
00:09:37,910 --> 00:09:29,040
pins and alignment guides are carefully

105
00:09:43,750 --> 00:09:39,430
i believe it's got to go in maybe

106
00:09:43,760 --> 00:09:50,389
there you go

107
00:09:54,389 --> 00:09:53,269
and houston if you're there

108
00:09:58,550 --> 00:09:54,399
you have a

109
00:10:06,389 --> 00:10:01,430
gta is complete and koichi we uh hear

110
00:10:06,399 --> 00:10:14,069
okay here is the gca complete

111
00:10:14,079 --> 00:10:18,470
and the brakes are on upper

112
00:10:23,829 --> 00:10:20,870
once uh all of the fluid connections are

113
00:10:26,389 --> 00:10:23,839

hooked up to the new pump the spare that

114
00:10:29,190 --> 00:10:26,399
was just installed a short time ago some

115
00:10:33,269 --> 00:10:29,200
35 pounds of ammonia will flow into the

116
00:10:35,190 --> 00:10:33,279
new pump and over a period of hours uh

117
00:10:37,350 --> 00:10:35,200
later in the day

118
00:10:40,150 --> 00:10:37,360
the system will be pressurized with

119
00:10:41,269 --> 00:10:40,160
nitrogen from a nitrogen tank assembly

120
00:10:43,430 --> 00:10:41,279
on the starboard side of the

121
00:10:46,790 --> 00:10:43,440
international space station that stores

122
00:10:49,670 --> 00:10:46,800
nitrogen at 3 000 pounds per square inch

123
00:10:51,750 --> 00:10:49,680
later tonight somewhere in the 8 30 p.m

124
00:10:54,069 --> 00:10:51,760
central time neighborhood the entire

125
00:10:57,110 --> 00:10:54,079
pump will be activated but there will be

126
00:10:59,750 --> 00:10:57,120
a an operation called a bump test that

127
00:11:03,110 --> 00:10:59,760
will be executed right after

128
00:11:05,509 --> 00:11:03,120
the flow of ammonia begins

129
00:11:07,910 --> 00:11:05,519
into the new spare once all the fluid

130
00:11:10,710 --> 00:11:07,920
lines are connected this bump test

131
00:11:12,150 --> 00:11:10,720
essentially is a brief exercise that

132
00:11:14,949 --> 00:11:12,160
will

133
00:11:17,750 --> 00:11:14,959
move the valves internal to the new pump

134
00:11:19,910 --> 00:11:17,760
and check out all of its systems in a

135
00:11:22,230 --> 00:11:19,920
brief preliminary test for the thermal

136
00:11:23,990 --> 00:11:22,240
systems officer here in mission control

137
00:11:25,670 --> 00:11:24,000
to prove that the new pump is alive and

138
00:11:28,470 --> 00:11:25,680

well

139
00:11:31,030 --> 00:11:28,480
another bill kowalski is the spartan

140
00:11:33,190 --> 00:11:31,040
officer uh that is his call sign of the

141
00:11:34,870 --> 00:11:33,200
thermal systems officer here in mission

142
00:11:36,790 --> 00:11:34,880
control for the orbit two team of flight

143
00:11:39,110 --> 00:11:36,800
controllers under the direction of

144
00:11:48,870 --> 00:11:39,120
flight director dina contella

145
00:12:06,310 --> 00:11:56,790
motion

146
00:12:06,320 --> 00:12:10,870
okay help her break that arm

147
00:12:14,230 --> 00:12:12,230
in the true definition of the

148
00:12:16,790 --> 00:12:14,240
international space station a japanese

149
00:12:19,269 --> 00:12:16,800
astronaut operating a canadian arm with

150
00:12:21,670 --> 00:12:19,279
the assistance of a russian cosmonaut

151
00:12:24,710 --> 00:12:21,680
to help two american astronauts in the

152
00:12:26,710 --> 00:12:24,720
void of space conducting this spacewalk

153
00:12:28,389 --> 00:12:26,720
a true international effort to restore

154
00:12:37,030 --> 00:12:28,399
full cooling capability to the

155
00:12:45,829 --> 00:12:39,590
this is mission control houston

156
00:12:45,839 --> 00:12:50,829
yeah we don't have uh your cameras right

157
00:12:50,839 --> 00:13:01,910
now okay

158
00:13:11,350 --> 00:13:05,430
and i still see some coming out

159
00:13:11,360 --> 00:13:21,509
it looks small smoke

160
00:13:25,590 --> 00:13:23,509
houston we see snow we see the

161
00:13:27,829 --> 00:13:25,600
snowflakes coming from the aft side

162
00:13:29,990 --> 00:13:27,839
forward looks like your vent is

163
00:13:36,790 --> 00:13:30,000

is coming towards us

164
00:13:36,800 --> 00:13:47,990
after houston can't be that ricky

165
00:13:52,550 --> 00:13:50,949
yeah they're just they're just

166
00:13:56,310 --> 00:13:52,560
completely

167
00:13:56,320 --> 00:14:02,470
copyright

168
00:14:07,350 --> 00:14:04,230
and we have no video rig so we'll just

169
00:14:10,310 --> 00:14:07,360
conti take your continued description

170
00:14:14,069 --> 00:14:11,670
okay

171
00:14:15,670 --> 00:14:14,079
they're pretty good-sized particles

172
00:14:17,269 --> 00:14:15,680
much bigger than anything we've ever

173
00:14:19,509 --> 00:14:17,279
seen

174
00:14:21,590 --> 00:14:19,519
see that big one going by you mike i do

175
00:14:23,750 --> 00:14:21,600
and they're coming uh looks like they're

176
00:14:26,230 --> 00:14:23,760
coming inboard of the pump right all

177
00:14:27,670 --> 00:14:26,240
around the pump module looks like

178
00:14:29,430 --> 00:14:27,680
i can't see them

179
00:14:31,829 --> 00:14:29,440
everywhere where the lightest but

180
00:14:33,670 --> 00:14:31,839
they're hitting the wrist cluster of the

181
00:14:35,430 --> 00:14:33,680
ssrs

182
00:14:37,910 --> 00:14:35,440
they're enveloping mike probably

183
00:14:41,350 --> 00:14:37,920
enveloping me also yes yes they are big

184
00:14:46,870 --> 00:14:42,710
quarter inch

185
00:14:46,880 --> 00:14:53,189
lots of little ones some big ones

186
00:14:56,710 --> 00:14:55,030
this is mission control houston to

187
00:14:59,750 --> 00:14:56,720
quickly recap

188
00:15:02,150 --> 00:14:59,760

after uh utilizing some ingenious

189
00:15:04,949 --> 00:15:02,160
techniques uh mastracchio and hopkins

190
00:15:07,189 --> 00:15:04,959
were able to finally demate

191
00:15:08,710 --> 00:15:07,199
one of the fluid lines hooked up to a

192
00:15:10,870 --> 00:15:08,720
jumper box

193
00:15:13,030 --> 00:15:10,880
an interim a box to maintain the flow of

194
00:15:16,069 --> 00:15:13,040
ammonia through the cooling system in a

195
00:15:19,269 --> 00:15:16,079
liquid state during the swap out of the

196
00:15:21,430 --> 00:15:19,279
old faulty pump module for the new spare

197
00:15:25,750 --> 00:15:21,440
that was installed earlier today during

198
00:15:25,760 --> 00:15:29,829
it spacewalk seem to be sticking though

199
00:15:34,870 --> 00:15:32,069
all over the place here i agree

200
00:15:36,949 --> 00:15:34,880
at the time uh that this bulky uh fluid

201
00:15:38,470 --> 00:15:36,959
line was finally demated from the jumper

202
00:15:42,150 --> 00:15:38,480
box so the crew

203
00:15:43,990 --> 00:15:42,160
noted uh some ammonia flakes emanating

204
00:15:46,949 --> 00:15:44,000
from the female side of the quick

205
00:15:48,790 --> 00:15:46,959
disconnect interface

206
00:15:51,030 --> 00:15:48,800
some of those flakes might have bounced

207
00:15:52,550 --> 00:15:51,040
off their suits so we'll determine that

208
00:15:53,990 --> 00:15:52,560
a bit later

209
00:15:56,790 --> 00:15:54,000
the flight control team now in the

210
00:15:58,550 --> 00:15:56,800
process of uh determining uh whether or

211
00:16:00,870 --> 00:15:58,560
not to hook up

212
00:16:07,509 --> 00:16:00,880
this particular line to the new spare it

213
00:16:10,949 --> 00:16:09,430

okay guys we have a go to continue with

214
00:16:14,230 --> 00:16:10,959
the just a piece of that forward white

215
00:16:17,509 --> 00:16:14,240
band visible our next step is mating

216
00:16:19,910 --> 00:16:17,519
the m4 to the pump module so uh

217
00:16:29,910 --> 00:16:19,920
we're working to get in position to mate

218
00:16:33,590 --> 00:16:32,230
thermal systems officer here reports no

219
00:16:35,189 --> 00:16:33,600
leakage

220
00:16:37,509 --> 00:16:35,199
through any of the

221
00:16:39,910 --> 00:16:37,519
four fluid lines now hooked up to the

222
00:16:47,030 --> 00:16:39,920
spare pump module

223
00:16:52,150 --> 00:16:49,030
and guys next step is

224
00:16:57,110 --> 00:16:52,160
to finger start the p clamp on the m4

225
00:17:03,990 --> 00:17:00,629
okay am i clear to release my red

226
00:17:04,000 --> 00:17:07,750
affirmative

227
00:17:07,760 --> 00:17:12,390
yankee take your right office

228
00:17:16,829 --> 00:17:14,710
are you ready for gca

229
00:17:20,949 --> 00:17:16,839
i'm ready hopper

230
00:17:23,590 --> 00:17:20,959
okay station started

231
00:17:27,029 --> 00:17:23,600
about uh 20 centimeters

232
00:17:28,950 --> 00:17:27,039
station stabber 20 centimeters

233
00:17:30,789 --> 00:17:28,960
ingress is clear

234
00:17:36,390 --> 00:17:30,799
here comes the 20 centimeter motion to

235
00:17:41,990 --> 00:17:39,270
the crew was exposed to some dissipation

236
00:17:44,710 --> 00:17:42,000
of flakes of ammonia from the female

237
00:17:48,150 --> 00:17:44,720
side of the quick disconnect connection

238
00:17:50,150 --> 00:17:48,160

line uh from that m4 line and so they

239
00:17:52,789 --> 00:17:50,160
inspected one another a short time ago

240
00:17:55,750 --> 00:17:52,799
during a loss of signal period uh they

241
00:17:58,470 --> 00:17:55,760
reported no apparent ammonia on each

242
00:18:00,549 --> 00:17:58,480
other's suits but because of the

243
00:18:02,230 --> 00:18:00,559
exposure the flight rules call for them

244
00:18:04,710 --> 00:18:02,240
to maintain

245
00:18:07,830 --> 00:18:04,720
a bake out if you will to enable any

246
00:18:10,630 --> 00:18:07,840
residual ammonia to dissipate from their

247
00:18:22,950 --> 00:18:10,640
suits before they re-enter the

248
00:18:27,830 --> 00:18:25,430
all of the early indications suggest

249
00:18:30,470 --> 00:18:27,840
that the newly installed pump is in good

250
00:18:33,350 --> 00:18:30,480
shape we should have no

251
00:18:34,870 --> 00:18:33,360
no issues with its pressurization and

252
00:18:36,470 --> 00:18:34,880
its activation

253
00:18:38,470 --> 00:18:36,480
later today which will involve the

254
00:18:39,510 --> 00:18:38,480
spin-up of an impeller

255
00:18:41,430 --> 00:18:39,520
to begin

256
00:18:43,350 --> 00:18:41,440
exercising all of the valves and the

257
00:18:44,789 --> 00:18:43,360
internal mechanisms of the pump

258
00:18:46,150 --> 00:18:44,799
connected

259
00:18:47,669 --> 00:18:46,160
over center

260
00:18:50,230 --> 00:18:47,679
houston you got yourself a new pump

261
00:18:53,110 --> 00:18:50,240
module congratulations and all five

262
00:18:54,870 --> 00:18:53,120
electrical connections are now uh mated

263
00:18:56,470 --> 00:18:54,880

so the crew breathes through that

264
00:18:58,230 --> 00:18:56,480
activity

265
00:19:23,750 --> 00:18:58,240
all five electrical connections have

266
00:19:49,270 --> 00:19:25,590
it motion be good motion

267
00:19:49,280 --> 00:19:53,350
20 centimeters

268
00:19:57,350 --> 00:19:55,190
so the only thing i see kind of a loose

269
00:20:00,070 --> 00:19:57,360
tool that long duration tie down to by

270
00:20:01,990 --> 00:20:00,080
mike's left hand

271
00:20:04,310 --> 00:20:02,000
other than that i don't see any tools

272
00:20:07,510 --> 00:20:04,320
other than the fish stringer in a

273
00:20:10,789 --> 00:20:08,710
yeah go ahead and grab that long

274
00:20:12,310 --> 00:20:10,799
duration tie down to other rick and uh

275
00:20:15,510 --> 00:20:12,320
put on either the fish stringer or

276
00:20:17,270 --> 00:20:15,520
backpack back with the cedar guard

277
00:20:18,789 --> 00:20:17,280
thanks hucky

278
00:20:22,230 --> 00:20:18,799
looks like you want to shop all these

279
00:20:34,149 --> 00:20:24,950
one last look

280
00:20:37,190 --> 00:20:35,669
houston from the airlock we'd just like

281
00:20:39,990 --> 00:20:37,200
to say thanks to all the great folks

282
00:20:41,590 --> 00:20:40,000
that all doing all this hard work to uh

283
00:20:43,909 --> 00:20:41,600
get your space station back up and

284
00:20:45,990 --> 00:20:43,919
running

285
00:20:50,149 --> 00:20:46,000
no thank you guys

286
00:20:55,110 --> 00:20:52,149
yeah i'd just like to add to that uh

287
00:20:57,029 --> 00:20:55,120
fantastic work

288
00:21:00,870 --> 00:20:57,039

merry christmas to

289
00:21:04,230 --> 00:21:02,390
it took a couple of weeks to get her

290
00:21:06,630 --> 00:21:04,240
done

291
00:21:07,430 --> 00:21:06,640
but we got it

292
00:21:09,190 --> 00:21:07,440
okay

293
00:21:13,590 --> 00:21:09,200
copy that uh

294
00:21:20,310 --> 00:21:16,070
i gotta get the thermal cover here copy

295
00:21:25,350 --> 00:21:22,950
words of congratulations from mike