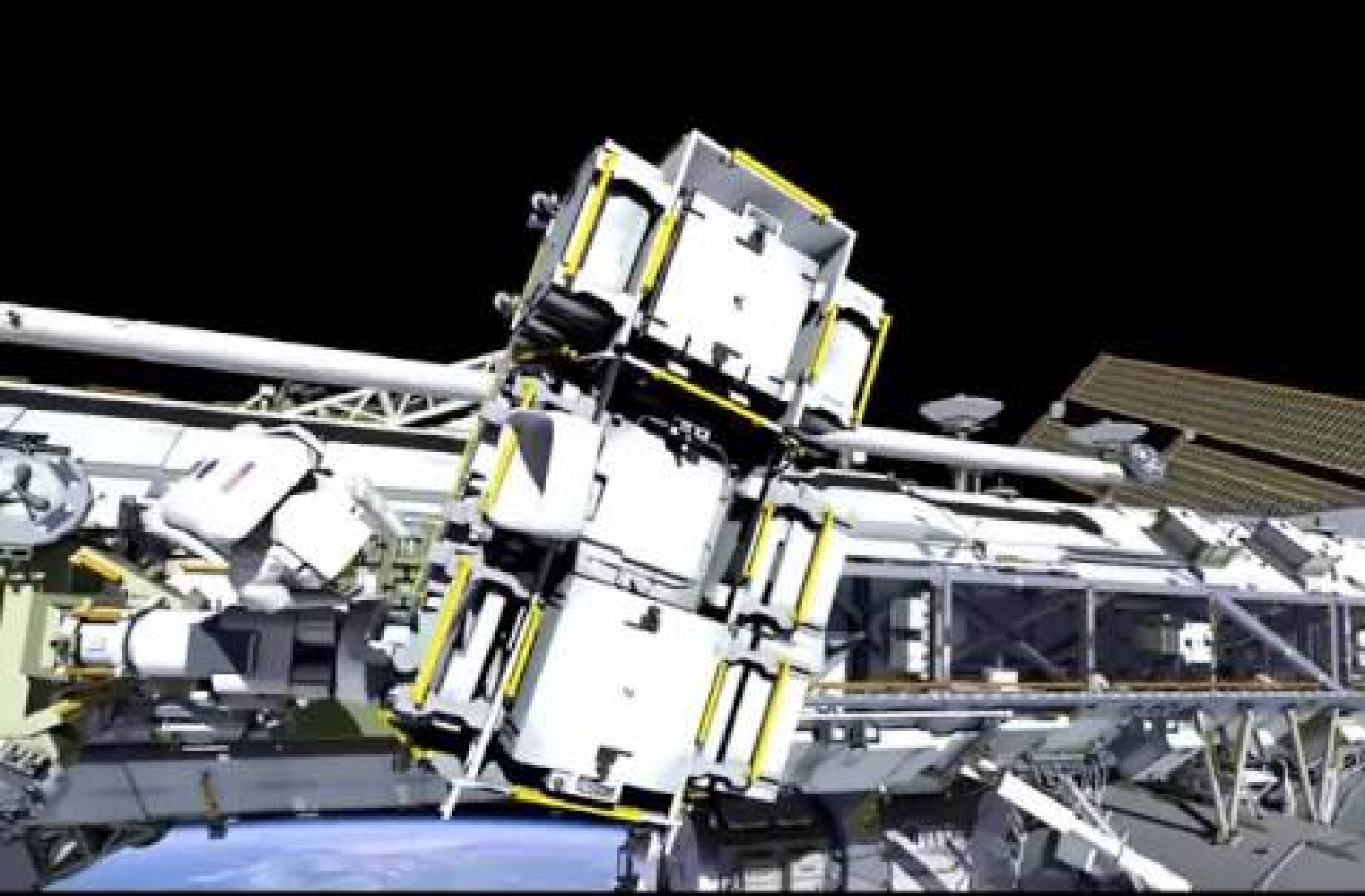

1
00:00:07,030 --> 00:00:05,110
good afternoon from the johnson space

2
00:00:09,990 --> 00:00:07,040
center i'm dan hewitt and welcome to

3
00:00:11,430 --> 00:00:10,000
today's eva briefing we're here to learn

4
00:00:13,669 --> 00:00:11,440
about two spacewalks that are on the

5
00:00:15,190 --> 00:00:13,679
horizon for the expedition 50 crew

6
00:00:17,510 --> 00:00:15,200
making some important upgrades to the

7
00:00:19,670 --> 00:00:17,520
station's electrical power system here

8
00:00:21,510 --> 00:00:19,680
to tell us more today i'm joined by my

9
00:00:22,950 --> 00:00:21,520
panelists to my left starting off with

10
00:00:24,710 --> 00:00:22,960
kenny todd

11
00:00:26,790 --> 00:00:24,720
the operations integration manager for

12
00:00:28,390 --> 00:00:26,800
the international space station program

13
00:00:29,830 --> 00:00:28,400

just next to him our two lead flight

14
00:00:31,589 --> 00:00:29,840
directors starting off with judd

15
00:00:35,030 --> 00:00:31,599
freiling will be the lead for the

16
00:00:37,110 --> 00:00:35,040
spacewalk this friday u.s eva number 38

17
00:00:40,549 --> 00:00:37,120
next to him gary horlocker will be the

18
00:00:42,229 --> 00:00:40,559
flight director for eva 39 next friday

19
00:00:44,549 --> 00:00:42,239
and on the end to walk us through the

20
00:00:48,150 --> 00:00:44,559
fine details of the spacewalks is keith

21
00:00:49,990 --> 00:00:48,160
johnson the lead spacewalk officer

22
00:00:51,990 --> 00:00:50,000
as usual we'll hear from each of our

23
00:00:53,830 --> 00:00:52,000
briefers today and then open things up

24
00:00:56,229 --> 00:00:53,840
for questions here in the room on the

25
00:00:57,830 --> 00:00:56,239
phone bridge and via social media so

26
00:00:59,430 --> 00:00:57,840
with that let's go ahead and kick it off

27
00:01:01,590 --> 00:00:59,440
kenny take it away

28
00:01:03,430 --> 00:01:01,600
thanks dan and uh certainly happy new

29
00:01:06,870 --> 00:01:03,440
year to you all

30
00:01:08,710 --> 00:01:06,880
um things are going very well on or on

31
00:01:10,469 --> 00:01:08,720
board the international space station

32
00:01:12,710 --> 00:01:10,479
we're currently in the middle of what we

33
00:01:16,390 --> 00:01:12,720
refer to as increment 50

34
00:01:19,510 --> 00:01:16,400
had a very uh busy december time frame

35
00:01:21,910 --> 00:01:19,520
um that uh that really started with uh

36
00:01:25,030 --> 00:01:21,920
with the the launch and the birthing of

37
00:01:28,149 --> 00:01:25,040
the htv cargo module

38
00:01:30,390 --> 00:01:28,159

the crew jumped into that right away and

39
00:01:32,149 --> 00:01:30,400
has done a lot of cargo ops also there's

40
00:01:35,109 --> 00:01:32,159
a lot of science on board that

41
00:01:36,950 --> 00:01:35,119
particular vehicle and so a lot of a lot

42
00:01:39,190 --> 00:01:36,960
of good science getting done during

43
00:01:40,789 --> 00:01:39,200
during the month of december

44
00:01:43,030 --> 00:01:40,799
the crew um

45
00:01:45,910 --> 00:01:43,040
shane and peggy and tomah on the on the

46
00:01:48,469 --> 00:01:45,920
us operational segment and uh sergei

47
00:01:51,510 --> 00:01:48,479
andrei and oleg on the on the russian

48
00:01:53,510 --> 00:01:51,520
segment have been doing a fantastic job

49
00:01:56,149 --> 00:01:53,520
got a little bit of downtime but not a

50
00:01:57,910 --> 00:01:56,159
whole lot before moving into the into

51
00:01:59,350 --> 00:01:57,920
the preparations for this these

52
00:02:03,109 --> 00:01:59,360
spacewalks that are they're going to

53
00:02:05,270 --> 00:02:03,119
happen over the next seven or eight days

54
00:02:07,429 --> 00:02:05,280
the the ground teams

55
00:02:09,589 --> 00:02:07,439
on the back end of december were also

56
00:02:11,830 --> 00:02:09,599
very busy

57
00:02:13,589 --> 00:02:11,840
one of our primary missions for for this

58
00:02:16,470 --> 00:02:13,599
for this htv

59
00:02:19,270 --> 00:02:16,480
flight was to install the lithium-ion

60
00:02:21,670 --> 00:02:19,280
batteries and and last week

61
00:02:23,190 --> 00:02:21,680
our robotics teams the the ground the

62
00:02:25,670 --> 00:02:23,200
ground teams

63
00:02:28,390 --> 00:02:25,680

the operations the engineering and

64
00:02:30,309 --> 00:02:28,400
safety teams all did did great work over

65
00:02:31,750 --> 00:02:30,319
the last week and a half

66
00:02:33,270 --> 00:02:31,760
moving these batteries and getting them

67
00:02:35,350 --> 00:02:33,280
installed where they where they need to

68
00:02:37,750 --> 00:02:35,360
be in order for us to go to go do these

69
00:02:38,710 --> 00:02:37,760
evas i can't say enough about about the

70
00:02:40,309 --> 00:02:38,720
work that

71
00:02:41,750 --> 00:02:40,319
that that team's done over the last week

72
00:02:43,750 --> 00:02:41,760
and a half

73
00:02:45,670 --> 00:02:43,760
while a lot of folks were off

74
00:02:47,190 --> 00:02:45,680
celebrating holidays they were they were

75
00:02:48,710 --> 00:02:47,200
here getting getting it done and getting

76
00:02:51,270 --> 00:02:48,720
us in a good position to be ready to do

77
00:02:52,790 --> 00:02:51,280
these space walks so the guys did a did

78
00:02:55,430 --> 00:02:52,800
a great job

79
00:02:57,830 --> 00:02:55,440
once uh once we get this eva done uh

80
00:02:59,910 --> 00:02:57,840
here on friday they'll be right back at

81
00:03:01,910 --> 00:02:59,920
it again moving batteries getting them

82
00:03:03,589 --> 00:03:01,920
positioned where they need to be on the

83
00:03:07,350 --> 00:03:03,599
other channel that we're we're going to

84
00:03:09,750 --> 00:03:07,360
go out go out onto to next week so

85
00:03:11,910 --> 00:03:09,760
as far as looking forward here in

86
00:03:14,630 --> 00:03:11,920
january it's going to be a very very

87
00:03:15,589 --> 00:03:14,640
busy next few months obviously the first

88
00:03:17,110 --> 00:03:15,599

couple of weeks we're going to be

89
00:03:20,070 --> 00:03:17,120
talking a lot about

90
00:03:21,990 --> 00:03:20,080
walks and robotics here in the program

91
00:03:23,750 --> 00:03:22,000
uh towards the end of the month

92
00:03:25,670 --> 00:03:23,760
we're going to be

93
00:03:26,949 --> 00:03:25,680
getting getting into more of a visiting

94
00:03:30,070 --> 00:03:26,959
vehicle flow

95
00:03:31,670 --> 00:03:30,080
the the htv cargo ship we'll uh we're

96
00:03:33,990 --> 00:03:31,680
planning right now to

97
00:03:35,350 --> 00:03:34,000
to turn it loose around around the 27th

98
00:03:37,589 --> 00:03:35,360
of january

99
00:03:39,589 --> 00:03:37,599
if everything holds to schedule

100
00:03:41,670 --> 00:03:39,599
shortly after that

101
00:03:42,869 --> 00:03:41,680
it's sounding like probably january 31st

102
00:03:46,710 --> 00:03:42,879
we'll

103
00:03:48,869 --> 00:03:46,720
departing from the

104
00:03:51,830 --> 00:03:48,879
the dc nader port

105
00:03:53,990 --> 00:03:51,840
that that vehicle is 64 p

106
00:03:56,390 --> 00:03:54,000
and then we'll turn our attention

107
00:03:59,110 --> 00:03:56,400
probably around the second or

108
00:04:02,149 --> 00:03:59,120
about the second week of february we'll

109
00:04:04,309 --> 00:04:02,159
we'll start planning for for a spacex

110
00:04:05,990 --> 00:04:04,319
dragon arrival

111
00:04:07,429 --> 00:04:06,000
we've uh we've been working with that

112
00:04:09,509 --> 00:04:07,439
team as

113
00:04:11,190 --> 00:04:09,519

as as they've continued to recover from

114
00:04:13,830 --> 00:04:11,200
the issue that they had back in

115
00:04:15,589 --> 00:04:13,840
september and and currently we're we're

116
00:04:18,310 --> 00:04:15,599
all planning to uh to a date of

117
00:04:20,870 --> 00:04:18,320
launching on on the 8th of of february

118
00:04:22,950 --> 00:04:20,880
uh birthing on the 11th so that's our

119
00:04:24,710 --> 00:04:22,960
current plan today and and

120
00:04:26,070 --> 00:04:24,720
all the different teams are working to

121
00:04:27,110 --> 00:04:26,080
that so

122
00:04:31,510 --> 00:04:27,120
um

123
00:04:33,990 --> 00:04:31,520
the that particular mission the spacex

124
00:04:35,590 --> 00:04:34,000
mission we'll plan for about 30 days got

125
00:04:37,830 --> 00:04:35,600
a lot of science on that particular

126
00:04:39,990 --> 00:04:37,840
flight a lot of time constrained science

127
00:04:42,310 --> 00:04:40,000
so we are going to be doing a lot of

128
00:04:44,469 --> 00:04:42,320
work in a very short period of time uh

129
00:04:46,950 --> 00:04:44,479
when when dragons on board

130
00:04:49,350 --> 00:04:46,960
in addition to that we need to

131
00:04:51,270 --> 00:04:49,360
to get the port cleared because uh in

132
00:04:52,469 --> 00:04:51,280
the march time frame we'll be be ready

133
00:04:55,830 --> 00:04:52,479
to welcome

134
00:04:57,430 --> 00:04:55,840
a cygnus module to the to the to the

135
00:04:59,189 --> 00:04:57,440
station as well so

136
00:05:01,189 --> 00:04:59,199
we're very excited about the next couple

137
00:05:03,749 --> 00:05:01,199
two or three months here uh relative to

138
00:05:06,310 --> 00:05:03,759

the usos visiting vehicle traffic

139
00:05:07,909 --> 00:05:06,320
as far as uh the russian segment as as

140
00:05:09,029 --> 00:05:07,919
most of you know our russian colleagues

141
00:05:10,469 --> 00:05:09,039
are continuing

142
00:05:12,150 --> 00:05:10,479
continuing to

143
00:05:15,350 --> 00:05:12,160
to work their plans for recovery from

144
00:05:17,590 --> 00:05:15,360
the issue that they had with 65p

145
00:05:18,390 --> 00:05:17,600
we're still working to finalize dates

146
00:05:20,790 --> 00:05:18,400
for

147
00:05:22,550 --> 00:05:20,800
then their next set of flights

148
00:05:25,749 --> 00:05:22,560
that involve

149
00:05:28,390 --> 00:05:25,759
a progress which is 66p and then the uh

150
00:05:31,990 --> 00:05:28,400
the next crude soyuz vehicle which is

151
00:05:33,350 --> 00:05:32,000
50f so um we're we're still working to

152
00:05:35,990 --> 00:05:33,360
uh to

153
00:05:38,870 --> 00:05:36,000
with them to to finalize those dates

154
00:05:40,469 --> 00:05:38,880
but uh but back to where we are today um

155
00:05:43,029 --> 00:05:40,479
a lot of work's been done to get us

156
00:05:45,189 --> 00:05:43,039
ready to go to go do these evas

157
00:05:47,110 --> 00:05:45,199
um installing these lithium-ion

158
00:05:49,029 --> 00:05:47,120
batteries very very important for the

159
00:05:50,950 --> 00:05:49,039
program it's a nice

160
00:05:53,029 --> 00:05:50,960
step up from a technology standpoint it

161
00:05:54,550 --> 00:05:53,039
gives a little give us a little longer

162
00:05:57,110 --> 00:05:54,560
life life

163
00:06:00,309 --> 00:05:57,120

on the batteries going forward

164
00:06:02,870 --> 00:06:00,319
we can get them to orbit with a lot less

165
00:06:05,670 --> 00:06:02,880
volume and mass and so again just a lot

166
00:06:07,350 --> 00:06:05,680
of upside to us stepping up to this to

167
00:06:09,270 --> 00:06:07,360
this technology so

168
00:06:12,629 --> 00:06:09,280
we're looking forward to to completing

169
00:06:14,870 --> 00:06:12,639
the installation with these evas

170
00:06:16,790 --> 00:06:14,880
we at this this morning's mission

171
00:06:20,230 --> 00:06:16,800
management team meeting we did our

172
00:06:22,790 --> 00:06:20,240
standard eva readiness review and

173
00:06:23,990 --> 00:06:22,800
coming out of that review uh the

174
00:06:25,670 --> 00:06:24,000
certainly the

175
00:06:26,950 --> 00:06:25,680
the suits are ready

176
00:06:28,870 --> 00:06:26,960
i feel like the

177
00:06:30,870 --> 00:06:28,880
the team is certainly ready and the iss

178
00:06:33,430 --> 00:06:30,880
is in the right configuration so the

179
00:06:35,749 --> 00:06:33,440
entire partnership was was go and

180
00:06:37,270 --> 00:06:35,759
and we're ready to go to the cba so with

181
00:06:39,189 --> 00:06:37,280
that i'll let talk to you a little bit

182
00:06:40,469 --> 00:06:39,199
about about the specifics

183
00:06:42,629 --> 00:06:40,479
thanks kenny

184
00:06:45,110 --> 00:06:42,639
let's see the space walkers for us

185
00:06:47,510 --> 00:06:45,120
spacewalk 38 will be nasa astronauts

186
00:06:49,830 --> 00:06:47,520
shane kimbrough and peggy whitson

187
00:06:52,629 --> 00:06:49,840
they're scheduled to egress the quest

188
00:06:53,909 --> 00:06:52,639

airlock friday january 6th starting at 6

189
00:06:55,589 --> 00:06:53,919
10

190
00:06:57,270 --> 00:06:55,599
local time central

191
00:06:59,270 --> 00:06:57,280
this will be shane's

192
00:07:01,029 --> 00:06:59,280
third space walk in peggy's seventh

193
00:07:02,790 --> 00:07:01,039
spacewalk

194
00:07:05,909 --> 00:07:02,800
assisting them will be

195
00:07:07,029 --> 00:07:05,919
european space agency astronaut tomo

196
00:07:10,070 --> 00:07:07,039
pasquez

197
00:07:12,390 --> 00:07:10,080
and russian cosmonaut oleg novinsky

198
00:07:15,510 --> 00:07:12,400
they'll be helping shane and peggy

199
00:07:17,189 --> 00:07:15,520
suit up prior to their egress

200
00:07:19,270 --> 00:07:17,199
as kenny mentioned the the major

201
00:07:21,589 --> 00:07:19,280
objective this space walk is to complete

202
00:07:23,110 --> 00:07:21,599
the replacement of the uh nickel

203
00:07:24,870 --> 00:07:23,120
hydrogen batteries that are currently on

204
00:07:27,029 --> 00:07:24,880
board the station with lithium-ion

205
00:07:28,070 --> 00:07:27,039
batteries on the three alpha power

206
00:07:31,029 --> 00:07:28,080
channel

207
00:07:32,390 --> 00:07:31,039
and that that replacement started new

208
00:07:35,189 --> 00:07:32,400
year's eve

209
00:07:36,070 --> 00:07:35,199
december 31st

210
00:07:38,150 --> 00:07:36,080
so

211
00:07:40,710 --> 00:07:38,160
six batteries six lithium-ion batteries

212
00:07:41,830 --> 00:07:40,720
and six adapter plates uh were brought

213
00:07:42,950 --> 00:07:41,840

up on

214
00:07:47,909 --> 00:07:42,960
the

215
00:07:51,270 --> 00:07:47,919
konatori 6 or hdv6

216
00:07:53,110 --> 00:07:51,280
that arrived on station december 13th

217
00:07:54,150 --> 00:07:53,120
i think we have a video that kind of

218
00:07:55,990 --> 00:07:54,160
shows the

219
00:07:57,189 --> 00:07:56,000
robotics operations what's been

220
00:07:59,990 --> 00:07:57,199
happening

221
00:08:01,589 --> 00:08:00,000
just a taste of that

222
00:08:04,309 --> 00:08:01,599
that video

223
00:08:06,150 --> 00:08:04,319
here it is there we go

224
00:08:09,110 --> 00:08:06,160
so this just gives you an idea this is

225
00:08:10,790 --> 00:08:09,120
uh the the dexterous manipulator that's

226
00:08:13,830 --> 00:08:10,800
going into the external pallet that was

227
00:08:15,749 --> 00:08:13,840
delivered on contouring 6

228
00:08:17,029 --> 00:08:15,759
grabbing one of the lithium ion

229
00:08:18,309 --> 00:08:17,039
batteries

230
00:08:21,990 --> 00:08:18,319
with its

231
00:08:26,070 --> 00:08:22,000
arm 2 and then maneuvering over to the

232
00:08:27,830 --> 00:08:26,080
iea for the 3 alpha power channel

233
00:08:30,309 --> 00:08:27,840
it's going to install it to a slot that

234
00:08:32,630 --> 00:08:30,319
was previously left open

235
00:08:33,509 --> 00:08:32,640
in place and then i'll go go over and

236
00:08:35,430 --> 00:08:33,519
grab

237
00:08:38,790 --> 00:08:35,440
another battery that's one of the nickel

238
00:08:42,870 --> 00:08:40,550

take that out from the iea and then

239
00:08:45,910 --> 00:08:42,880
replace that put it on the the external

240
00:08:52,710 --> 00:08:45,920
pallet that was uh was

241
00:08:56,230 --> 00:08:54,710
uh each of the uh the eight power

242
00:08:58,230 --> 00:08:56,240
channels that the the station has

243
00:09:00,389 --> 00:08:58,240
contain three strings of batteries uh

244
00:09:02,710 --> 00:09:00,399
each battery string contains two nickel

245
00:09:04,550 --> 00:09:02,720
hydrogen battery units in series uh and

246
00:09:06,949 --> 00:09:04,560
each of those two nickel hydrogen

247
00:09:09,269 --> 00:09:06,959
batteries uh pairs will be replaced by

248
00:09:10,150 --> 00:09:09,279
one lithium-ion battery and one adapter

249
00:09:11,990 --> 00:09:10,160
plate

250
00:09:13,750 --> 00:09:12,000
to complete the power circuit

251
00:09:15,509 --> 00:09:13,760
there's a data link cable between the

252
00:09:18,230 --> 00:09:15,519
adapter plate and the lithium-ion

253
00:09:20,470 --> 00:09:18,240
battery and that provides additional

254
00:09:22,550 --> 00:09:20,480
battery parameter insight and the top of

255
00:09:25,509 --> 00:09:22,560
the adapter plate can be used as a

256
00:09:27,350 --> 00:09:25,519
storage spot for an old depleted nickel

257
00:09:28,790 --> 00:09:27,360
hydrogen battery

258
00:09:30,710 --> 00:09:28,800
let's see so with that i'll hand it over

259
00:09:33,590 --> 00:09:30,720
to gary horlocker who is the lead flight

260
00:09:35,110 --> 00:09:33,600
director for us spacewalk39

261
00:09:36,630 --> 00:09:35,120
okay thank you judd good afternoon

262
00:09:39,030 --> 00:09:36,640
everybody

263
00:09:40,389 --> 00:09:39,040

once eva one is complete the flight

264
00:09:41,990 --> 00:09:40,399
control team will go ahead and power up

265
00:09:43,110 --> 00:09:42,000
those new batteries verify everything

266
00:09:45,110 --> 00:09:43,120
looks good

267
00:09:46,470 --> 00:09:45,120
and then configure channel 3a back to a

268
00:09:48,630 --> 00:09:46,480
nominal configuration where it's

269
00:09:50,070 --> 00:09:48,640
supporting its own loads again

270
00:09:53,030 --> 00:09:50,080
at that point the team will shift its

271
00:09:54,389 --> 00:09:53,040
focus uh over to the 1a channel

272
00:09:56,389 --> 00:09:54,399
we have about a week's worth of work to

273
00:09:58,710 --> 00:09:56,399
get it prepared

274
00:09:59,910 --> 00:09:58,720
to send our guys out for the eva number

275
00:10:03,110 --> 00:09:59,920
two

276
00:10:04,710 --> 00:10:03,120
so starting saturday afternoon

277
00:10:06,949 --> 00:10:04,720
the robotics team will do a couple get

278
00:10:09,750 --> 00:10:06,959
ahead activities while we wait for those

279
00:10:11,910 --> 00:10:09,760
1a batteries uh to drain off and be in a

280
00:10:14,069 --> 00:10:11,920
good configuration to start the robotics

281
00:10:16,230 --> 00:10:14,079
they'll go ahead and release one of the

282
00:10:18,630 --> 00:10:16,240
two bolts on each of the lithium ion

283
00:10:20,069 --> 00:10:18,640
batteries on the ep and that'll get them

284
00:10:21,430 --> 00:10:20,079
ahead

285
00:10:23,590 --> 00:10:21,440
for a couple days down the road when

286
00:10:25,269 --> 00:10:23,600
they're about to go

287
00:10:27,910 --> 00:10:25,279
transition those batteries from the ep

288
00:10:30,230 --> 00:10:27,920

over to the new channel

289
00:10:31,910 --> 00:10:30,240
sunday afternoon the 1a old batteries

290
00:10:33,350 --> 00:10:31,920
should be all drained off and it'd be in

291
00:10:35,190 --> 00:10:33,360
a good configuration for the main

292
00:10:37,269 --> 00:10:35,200
robotics to begin

293
00:10:39,269 --> 00:10:37,279
and that team will take about four to

294
00:10:41,190 --> 00:10:39,279
five days to remove five of the old

295
00:10:43,750 --> 00:10:41,200
batteries from the 1a channel

296
00:10:46,389 --> 00:10:43,760
and install three the three new lithium

297
00:10:47,910 --> 00:10:46,399
ion batteries into that channel

298
00:10:50,150 --> 00:10:47,920
and once that's complete we'll be in a

299
00:10:52,710 --> 00:10:50,160
good configuration to send our space

300
00:10:56,870 --> 00:10:52,720
walkers out the door next friday

301
00:10:59,750 --> 00:10:56,880
to go ahead and do spacewalk number two

302
00:11:02,069 --> 00:10:59,760
for that spacewalk shane will be ev1

303
00:11:04,310 --> 00:11:02,079
that'll be his fourth spacewalk and

304
00:11:05,910 --> 00:11:04,320
tomorrow will be ev2 and that'll be his

305
00:11:08,230 --> 00:11:05,920
first spacewalk

306
00:11:10,230 --> 00:11:08,240
and again inside we'll have peggy and

307
00:11:12,150 --> 00:11:10,240
oleg helping out with both the suit up

308
00:11:14,870 --> 00:11:12,160
before the eva as well as the d suit

309
00:11:16,710 --> 00:11:14,880
after the eva

310
00:11:17,430 --> 00:11:16,720
the main objectives eva 2 are the same

311
00:11:19,430 --> 00:11:17,440
as

312
00:11:21,750 --> 00:11:19,440
eva1 effectively the crew is going to go

313
00:11:23,030 --> 00:11:21,760

out install the three adapter plates

314
00:11:24,310 --> 00:11:23,040
into the

315
00:11:26,230 --> 00:11:24,320
1 8 channel

316
00:11:27,829 --> 00:11:26,240
and again we're only leaving one old

317
00:11:29,829 --> 00:11:27,839
battery behind on this channel so

318
00:11:31,350 --> 00:11:29,839
they'll relocate that old

319
00:11:32,790 --> 00:11:31,360
old battery on top of one of the new

320
00:11:34,470 --> 00:11:32,800
adapter plates

321
00:11:37,030 --> 00:11:34,480
and once those tasks are complete the

322
00:11:38,550 --> 00:11:37,040
main objectives will be complete

323
00:11:40,389 --> 00:11:38,560
and as always if we have extra time

324
00:11:42,710 --> 00:11:40,399
we'll we'll go look at some of our

325
00:11:46,150 --> 00:11:42,720
get-ahead tasks that that we have in our

326
00:11:49,430 --> 00:11:48,069
after the eva we'll basically do the

327
00:11:51,110 --> 00:11:49,440
same thing flight control team will go

328
00:11:52,629 --> 00:11:51,120
ahead and activate those batteries check

329
00:11:55,190 --> 00:11:52,639
them out make sure everything looks good

330
00:11:58,150 --> 00:11:55,200
and then return channel 1a back to a

331
00:11:59,509 --> 00:11:58,160
normal configuration

332
00:12:02,230 --> 00:11:59,519
at that point there's still a little bit

333
00:12:04,150 --> 00:12:02,240
more robotic work to do

334
00:12:06,150 --> 00:12:04,160
we'll have three old batteries

335
00:12:07,350 --> 00:12:06,160
on the spdm

336
00:12:09,350 --> 00:12:07,360
being held they were waiting for the

337
00:12:10,710 --> 00:12:09,360
adapter plates to be removed from the ep

338
00:12:12,389 --> 00:12:10,720

so now there's there's a home to put

339
00:12:13,910 --> 00:12:12,399
those in for disposal

340
00:12:16,310 --> 00:12:13,920
and so the team will go ahead and take a

341
00:12:17,829 --> 00:12:16,320
couple days to install those into the ep

342
00:12:19,990 --> 00:12:17,839
and that'll put the ep in a good

343
00:12:21,430 --> 00:12:20,000
configuration to be installed back into

344
00:12:24,550 --> 00:12:21,440
htv for

345
00:12:26,629 --> 00:12:24,560
its release later in january

346
00:12:27,990 --> 00:12:26,639
and so with that i'll hand it over to

347
00:12:31,829 --> 00:12:28,000
keith and give you some more details

348
00:12:35,509 --> 00:12:34,710
okay thank you gary

349
00:12:40,550 --> 00:12:35,519
so

350
00:12:44,069 --> 00:12:40,560
this is uscva 38 and 39 it's the 196th

351
00:12:48,550 --> 00:12:44,079
and 197th space station assembly and

352
00:12:50,310 --> 00:12:48,560
maintenance eva for the the us team

353
00:12:52,629 --> 00:12:50,320
let's see we spent a lot of time in

354
00:12:54,230 --> 00:12:52,639
preparation for the cva working with the

355
00:12:55,829 --> 00:12:54,240
robotics team

356
00:12:58,629 --> 00:12:55,839
we went through all the nominal

357
00:13:01,190 --> 00:12:58,639
scenarios and all the the the backup

358
00:13:03,110 --> 00:13:01,200
scenarios and we came up with

359
00:13:05,750 --> 00:13:03,120
quite a list of

360
00:13:07,430 --> 00:13:05,760
failure trees to address should the

361
00:13:10,470 --> 00:13:07,440
robotics have any problems and the good

362
00:13:13,110 --> 00:13:10,480
news is that we got to this point today

363
00:13:15,910 --> 00:13:13,120

um with just one single bolt that's

364
00:13:17,750 --> 00:13:15,920
that's outside the the nominal and we're

365
00:13:19,670 --> 00:13:17,760
preparing to add that into our timeline

366
00:13:21,590 --> 00:13:19,680
to fix but

367
00:13:25,910 --> 00:13:21,600
let's see i'd like to roll my first

368
00:13:29,990 --> 00:13:28,550
shane kimbrough is ev1 as we talked

369
00:13:31,990 --> 00:13:30,000
about he'll have the red stripes he

370
00:13:33,829 --> 00:13:32,000
comes out first peggy will hand him a

371
00:13:36,389 --> 00:13:33,839
crew lock bag and then she'll come out

372
00:13:38,710 --> 00:13:36,399
with him with her own crew lock bag

373
00:13:40,550 --> 00:13:38,720
shane will start translating up

374
00:13:41,750 --> 00:13:40,560
our translation path that we call the

375
00:13:43,990 --> 00:13:41,760
sea to spur

376
00:13:46,150 --> 00:13:44,000
up to phase one of the truss

377
00:13:47,110 --> 00:13:46,160
and then translate out

378
00:13:48,790 --> 00:13:47,120
to

379
00:13:51,110 --> 00:13:48,800
the crew and equipment translation aid

380
00:13:53,350 --> 00:13:51,120
the cedar cart where he'll take his crew

381
00:13:56,550 --> 00:13:53,360
lock bag attach it to

382
00:13:58,550 --> 00:13:56,560
an articulating portable foot restraint

383
00:14:00,389 --> 00:13:58,560
and he'll take that whole bundle and

384
00:14:01,670 --> 00:14:00,399
he'll put it on his body restraint

385
00:14:04,310 --> 00:14:01,680
tether

386
00:14:06,629 --> 00:14:04,320
he'll translate farther out along

387
00:14:08,870 --> 00:14:06,639
the s1 truss

388
00:14:11,750 --> 00:14:08,880

and he'll change over to his second

389
00:14:12,470 --> 00:14:11,760
safety tether and continue out

390
00:14:15,189 --> 00:14:12,480
to

391
00:14:19,110 --> 00:14:15,199
the s4 truss which is where we'll start

392
00:14:25,030 --> 00:14:21,110
while he's doing that

393
00:14:29,030 --> 00:14:26,949
from the airlock

394
00:14:34,310 --> 00:14:29,040
and following him along the same

395
00:14:42,069 --> 00:14:36,790
she'll be going up the c to spur

396
00:14:45,829 --> 00:14:43,750
from there she continues all the way

397
00:14:48,629 --> 00:14:45,839
down to the end

398
00:14:51,269 --> 00:14:48,639
of s1

399
00:14:56,629 --> 00:14:51,279
and hooks up to her second safety tether

400
00:15:00,710 --> 00:14:58,389
once she's up there

401
00:15:02,389 --> 00:15:00,720
she takes her crew lock bag

402
00:15:04,230 --> 00:15:02,399
this contains all the tools she'll need

403
00:15:05,350 --> 00:15:04,240
to get the adapter plates ready for

404
00:15:07,590 --> 00:15:05,360
removal

405
00:15:13,509 --> 00:15:07,600
she temporarily stows it on a set of

406
00:15:18,069 --> 00:15:15,269
she'll take out a ratchet wrench and the

407
00:15:20,150 --> 00:15:18,079
first thing she does is she releases the

408
00:15:22,710 --> 00:15:20,160
torque on the adapter plates

409
00:15:24,150 --> 00:15:22,720
with a ratchet wrench

410
00:15:26,949 --> 00:15:24,160
and she'll work her way around and

411
00:15:39,509 --> 00:15:26,959
release all of the bolts

412
00:15:43,749 --> 00:15:41,829
in this video you can see the three old

413
00:15:45,430 --> 00:15:43,759

nickel hydrogen batteries to peggy's

414
00:15:46,790 --> 00:15:45,440
left in the view

415
00:15:52,829 --> 00:15:46,800
those are stored

416
00:15:57,189 --> 00:15:54,710
meanwhile

417
00:15:58,470 --> 00:15:57,199
back on the integrated equipment

418
00:16:00,629 --> 00:15:58,480
assembly

419
00:16:02,470 --> 00:16:00,639
shane will be taking his articulating

420
00:16:04,389 --> 00:16:02,480
portable foot restraint

421
00:16:06,829 --> 00:16:04,399
putting it in position where he'll use

422
00:16:09,670 --> 00:16:06,839
it he'll take the crew lock bag

423
00:16:11,509 --> 00:16:09,680
off and position it this has the tools

424
00:16:14,230 --> 00:16:11,519
in it that are needed for

425
00:16:17,350 --> 00:16:14,240
uh installation of the adapter plates

426
00:16:19,030 --> 00:16:17,360
on the integrated equipment assembly

427
00:16:21,590 --> 00:16:19,040
when shane's done with that we'll

428
00:16:24,470 --> 00:16:21,600
install some what we call scoops they're

429
00:16:26,790 --> 00:16:24,480
uh oru handling devices

430
00:16:28,790 --> 00:16:26,800
that's the first battery we'll move

431
00:16:31,269 --> 00:16:28,800
that from there he'll go up to

432
00:16:32,710 --> 00:16:31,279
the exposed pallet with peggy

433
00:16:34,310 --> 00:16:32,720
and the two of them will release the

434
00:16:36,550 --> 00:16:34,320
first adapter plate they'll put it on

435
00:16:38,870 --> 00:16:36,560
their body restraint tether

436
00:16:40,710 --> 00:16:38,880
and release the second adapter plate

437
00:16:42,790 --> 00:16:40,720
shane has that on his

438
00:16:45,509 --> 00:16:42,800

body restraint tether and then the two

439
00:16:57,990 --> 00:16:45,519
of them will make their way back out

440
00:17:09,990 --> 00:17:00,150
once they're at the work site

441
00:17:16,630 --> 00:17:12,390
peggy will hand him

442
00:17:21,510 --> 00:17:19,029
he'll drive two bolts

443
00:17:23,429 --> 00:17:21,520
to install that then we have the data

444
00:17:24,630 --> 00:17:23,439
link cable that the two of them will

445
00:17:26,630 --> 00:17:24,640
work together

446
00:17:29,830 --> 00:17:26,640
to attach the first

447
00:17:31,270 --> 00:17:29,840
lithium-ion battery to an adapter plate

448
00:17:32,950 --> 00:17:31,280
once that's done it gives us an

449
00:17:39,029 --> 00:17:32,960
opportunity to start the checkout

450
00:17:43,510 --> 00:17:40,950
shane egresses

451
00:17:45,750 --> 00:17:43,520
relocates or repositions his

452
00:17:48,150 --> 00:17:45,760
articulating portable foot restraint

453
00:17:53,669 --> 00:17:48,160
gets ready to release the first

454
00:18:02,310 --> 00:17:55,510
once that's released

455
00:18:05,669 --> 00:18:04,549
she holds on to it maintains control of

456
00:18:10,310 --> 00:18:05,679
it

457
00:18:11,669 --> 00:18:10,320
portable foot restraint back over the

458
00:18:13,270 --> 00:18:11,679
adapter plate

459
00:18:20,549 --> 00:18:13,280
once he's there peggy hands in the

460
00:18:30,470 --> 00:18:22,470
and he puts it in position on top of the

461
00:18:38,470 --> 00:18:32,470
from there

462
00:18:45,909 --> 00:18:41,990
takes his adapter plate

463
00:18:48,310 --> 00:18:45,919

and installs it on the iea

464
00:18:51,110 --> 00:18:48,320
once his two bolts are driven

465
00:18:53,430 --> 00:18:51,120
he releases the data link cable and he

466
00:18:55,029 --> 00:18:53,440
and peggy attach it to that lithium-ion

467
00:18:56,470 --> 00:18:55,039
battery

468
00:18:59,110 --> 00:18:56,480
at that point

469
00:19:00,950 --> 00:18:59,120
we have two good battery sets and the

470
00:19:03,029 --> 00:19:00,960
the channel is operable at that point

471
00:19:05,909 --> 00:19:03,039
but we continue on

472
00:19:08,710 --> 00:19:05,919
they release the last nickel hydrogen

473
00:19:08,720 --> 00:19:13,029
on this channel

474
00:19:13,039 --> 00:19:17,909
shane hands it up to peggy

475
00:19:21,750 --> 00:19:19,590
then he repositions the articulating

476
00:19:26,950 --> 00:19:21,760
portable foot restraint

477
00:19:26,960 --> 00:19:32,710
and he installs it

478
00:19:36,150 --> 00:19:34,230
from there the two crew members make

479
00:19:39,990 --> 00:19:36,160
their way back up

480
00:19:47,029 --> 00:19:42,630
and they retrieve the last

481
00:19:50,630 --> 00:19:48,789
they cleans up the work site collects

482
00:19:52,470 --> 00:19:50,640
all the tools

483
00:19:57,270 --> 00:19:52,480
puts the crew lock bag

484
00:20:02,630 --> 00:20:00,150
and the two of them return back out

485
00:20:05,270 --> 00:20:02,640
to the integrated equipment assembly

486
00:20:08,710 --> 00:20:05,280
shane installs the last adapter plate

487
00:20:13,029 --> 00:20:08,720
they hook up the data link cable

488
00:20:17,029 --> 00:20:14,549

of the batteries

489
00:20:20,470 --> 00:20:17,039
on the 3a channel

490
00:20:22,390 --> 00:20:20,480
piggy starts cleanup meanwhile

491
00:20:23,830 --> 00:20:22,400
shane goes to the other side of the

492
00:20:25,990 --> 00:20:23,840
channel

493
00:20:27,990 --> 00:20:26,000
to the 1a side

494
00:20:29,750 --> 00:20:28,000
and he prepares the last

495
00:20:31,669 --> 00:20:29,760
bolt to drive

496
00:20:33,350 --> 00:20:31,679
on the 1a channel the robotics did all

497
00:20:35,029 --> 00:20:33,360
the rest of them

498
00:20:37,029 --> 00:20:35,039
once he's released that bolt they meet

499
00:20:39,510 --> 00:20:37,039
back up again clean up the work site and

500
00:20:40,870 --> 00:20:39,520
they head back to the airlock peggy goes

501
00:20:44,789 --> 00:20:40,880
in first

502
00:20:48,549 --> 00:20:47,110
if we have time at the end of the eva

503
00:20:50,230 --> 00:20:48,559
we'll do some get-aheads but i'll talk

504
00:20:52,950 --> 00:20:50,240
about those in a bit

505
00:20:54,230 --> 00:20:52,960
the second eva is is very similar to the

506
00:20:55,430 --> 00:20:54,240
first dva

507
00:20:57,510 --> 00:20:55,440
um

508
00:20:59,830 --> 00:20:57,520
with the the hopes that the robotics

509
00:21:02,149 --> 00:20:59,840
does all of the the moves and all the

510
00:21:04,310 --> 00:21:02,159
relocations of batteries we hope to have

511
00:21:07,510 --> 00:21:04,320
two open slots instead of one open slot

512
00:21:11,990 --> 00:21:07,520
the way we did on eva 38 i have a video

513
00:21:15,990 --> 00:21:14,230

shane comes out first

514
00:21:17,190 --> 00:21:16,000
on his fourth eva he'll have the red

515
00:21:19,750 --> 00:21:17,200
stripes

516
00:21:20,870 --> 00:21:19,760
uh tomah pesquet this is his first dva

517
00:21:23,110 --> 00:21:20,880
he'll have the

518
00:21:25,430 --> 00:21:23,120
completely white suit they'll do a buddy

519
00:21:27,270 --> 00:21:25,440
check at the airlock

520
00:21:31,830 --> 00:21:27,280
they'll head out the same translation

521
00:21:38,149 --> 00:21:33,510
shane will go out to the integrated

522
00:21:43,350 --> 00:21:40,470
he'll do the same articulating portable

523
00:21:49,990 --> 00:21:43,360
foot restraint setup

524
00:21:53,510 --> 00:21:51,350
you can see that there were two open

525
00:21:55,110 --> 00:21:53,520
slots there the arm is full of batteries

526
00:21:57,830 --> 00:21:55,120
at that point

527
00:22:01,190 --> 00:21:57,840
tomah is up at the exposed pallet

528
00:22:03,270 --> 00:22:01,200
releasing the bolts and preparing

529
00:22:04,710 --> 00:22:03,280
they release the two

530
00:22:06,310 --> 00:22:04,720
adapter plates

531
00:22:07,990 --> 00:22:06,320
and each crew member gets one of the

532
00:22:09,590 --> 00:22:08,000
adapter plates they make their way back

533
00:22:12,070 --> 00:22:09,600
out again

534
00:22:17,350 --> 00:22:12,080
and they follow a very similar eva to

535
00:22:19,830 --> 00:22:19,029
remove

536
00:22:23,430 --> 00:22:19,840
the

537
00:22:26,310 --> 00:22:23,440
old last nickel hydrogen battery

538
00:22:49,590 --> 00:22:26,320

and install it on the adapter plate take

539
00:22:53,350 --> 00:22:51,110
then the crew members will make their

540
00:22:55,990 --> 00:22:53,360
way back up

541
00:22:58,870 --> 00:22:56,000
to the exposed pallet

542
00:23:01,750 --> 00:22:58,880
to retrieve the last

543
00:23:05,430 --> 00:23:03,190
they'll put it on their body restraint

544
00:23:06,789 --> 00:23:05,440
tether they'll retrieve the tools in the

545
00:23:08,710 --> 00:23:06,799
crew lock bag

546
00:23:12,710 --> 00:23:08,720
and do an inventory and then head back

547
00:23:17,430 --> 00:23:14,470
they'll install the last adapter plate

548
00:23:19,510 --> 00:23:17,440
hook up the data link cable

549
00:23:22,630 --> 00:23:19,520
retrieve all the tools

550
00:23:24,630 --> 00:23:22,640
and the crew lock bags

551
00:23:27,990 --> 00:23:24,640
retrieve the articulating portable foot

552
00:23:31,430 --> 00:23:30,230
we'll stow that back on

553
00:23:39,909 --> 00:23:31,440
the crew

554
00:23:42,630 --> 00:23:41,510
then both crew members will make their

555
00:23:44,549 --> 00:23:42,640
way

556
00:23:49,990 --> 00:23:44,559
back to the airlock

557
00:23:50,000 --> 00:23:58,870
followed by shane

558
00:24:04,470 --> 00:24:02,310
and that completes eva2

559
00:24:06,789 --> 00:24:04,480
we expect to have more time

560
00:24:09,350 --> 00:24:06,799
at the end of uh eva 2 to perform the

561
00:24:11,430 --> 00:24:09,360
get-ahead tasks that gary mentioned um

562
00:24:14,390 --> 00:24:11,440
we have a list of uh

563
00:24:16,390 --> 00:24:14,400

of quite a few tasks that

564
00:24:18,230 --> 00:24:16,400
have we have available to us in our job

565
00:24:21,110 --> 00:24:18,240
jar

566
00:24:25,029 --> 00:24:21,120
to start with i'll run a video that will

567
00:24:27,590 --> 00:24:25,039
show you a cable routing task and then

568
00:24:30,149 --> 00:24:27,600
see the light retrieval

569
00:24:33,590 --> 00:24:30,159
and then i'll show some graphics after

570
00:24:37,990 --> 00:24:35,909
our first get ahead

571
00:24:39,830 --> 00:24:38,000
we send the crew members

572
00:24:47,510 --> 00:24:39,840
up to uh

573
00:24:47,520 --> 00:24:51,430
and he's going to climb into

574
00:24:51,440 --> 00:25:00,230
the s0 truss

575
00:25:06,149 --> 00:25:02,950
these are the the mdm

576
00:25:09,110 --> 00:25:06,159
epic cables that will be installed on a

577
00:25:10,870 --> 00:25:09,120
later eva when those mdm's get changed

578
00:25:12,230 --> 00:25:10,880
out we're just pre-positioning them on

579
00:25:15,430 --> 00:25:12,240
this eva

580
00:25:17,909 --> 00:25:15,440
v2 is going to make their way up to

581
00:25:21,590 --> 00:25:17,919
the z1

582
00:25:23,430 --> 00:25:21,600
element in what we call uh the rats nest

583
00:25:25,590 --> 00:25:23,440
and it's called that because of all the

584
00:25:27,990 --> 00:25:25,600
jumble of cables that are are located in

585
00:25:31,110 --> 00:25:28,000
that area and this is where a previous

586
00:25:33,830 --> 00:25:31,120
eva dropped a bundle of cables and

587
00:25:35,430 --> 00:25:33,840
wrapped handrails around

588
00:25:37,510 --> 00:25:35,440

we're going to continue the routing of

589
00:25:39,990 --> 00:25:37,520
those cables by

590
00:25:41,269 --> 00:25:40,000
taking them off of that location

591
00:25:48,710 --> 00:25:41,279
and then

592
00:25:51,750 --> 00:25:50,390
and passing it

593
00:25:53,350 --> 00:25:51,760
inside

594
00:25:56,310 --> 00:25:53,360
the truss

595
00:25:58,230 --> 00:25:56,320
where the other crew member is waiting

596
00:26:04,950 --> 00:25:58,240
we'll take two of the three cables and

597
00:26:10,950 --> 00:26:07,190
once those are handed in the other crew

598
00:26:12,710 --> 00:26:10,960
member will take those cables

599
00:26:14,789 --> 00:26:12,720
and route them

600
00:26:16,870 --> 00:26:14,799
inside

601
00:26:19,190 --> 00:26:16,880
to another set of handrails

602
00:26:20,630 --> 00:26:19,200
and this will just make it easier

603
00:26:22,470 --> 00:26:20,640
for

604
00:26:24,950 --> 00:26:22,480
the eva where they come out to install

605
00:26:26,470 --> 00:26:24,960
these these mdm's

606
00:26:28,230 --> 00:26:26,480
they can just reach in and grab these

607
00:26:35,750 --> 00:26:28,240
cables they'll be wire tied to an

608
00:26:40,310 --> 00:26:37,190
meanwhile

609
00:26:42,230 --> 00:26:40,320
the last cable will be routed over to

610
00:26:46,789 --> 00:26:42,240
another handrail that's uh

611
00:26:51,350 --> 00:26:49,190
and that's one of our get-aheads

612
00:26:53,029 --> 00:26:51,360
that we have on our list

613
00:26:56,710 --> 00:26:53,039

the next

614
00:26:59,190 --> 00:26:56,720
let's see we're also i guess cleaning up

615
00:27:07,909 --> 00:26:59,200
those cables routing them out of the way

616
00:27:12,470 --> 00:27:09,990
the next task that we have is a one crew

617
00:27:13,510 --> 00:27:12,480
member task to retrieve the seat of

618
00:27:15,350 --> 00:27:13,520
light

619
00:27:18,149 --> 00:27:15,360
that's located on

620
00:27:20,389 --> 00:27:18,159
the s3 truss it's internal it has two

621
00:27:22,710 --> 00:27:20,399
electrical connectors i mean sorry one

622
00:27:25,750 --> 00:27:22,720
electrical connector and one bolt to

623
00:27:29,029 --> 00:27:25,760
drive we'll put that in a an oru bag and

624
00:27:29,990 --> 00:27:29,039
bring that back inside

625
00:27:31,990 --> 00:27:30,000
the next

626
00:27:34,870 --> 00:27:32,000
get ahead task that we have on our list

627
00:27:37,029 --> 00:27:34,880
is node three shields we have

628
00:27:39,110 --> 00:27:37,039
two bundle sets i've got some pictures

629
00:27:43,350 --> 00:27:39,120
that i'd like to show

630
00:27:46,389 --> 00:27:43,360
these are intended to in an eventual eva

631
00:27:49,190 --> 00:27:46,399
be placed on the the pma3 or pma

632
00:27:51,430 --> 00:27:49,200
location once that's removed

633
00:27:53,269 --> 00:27:51,440
but they take up a lot of airlock volume

634
00:27:54,870 --> 00:27:53,279
so this eva is a good opportunity

635
00:27:56,710 --> 00:27:54,880
because we're not bringing any hardware

636
00:27:57,669 --> 00:27:56,720
out with us or or in

637
00:27:59,990 --> 00:27:57,679
so

638
00:28:02,870 --> 00:28:00,000

we've taken the time to bundle these up

639
00:28:04,630 --> 00:28:02,880
into what you see in the in the last of

640
00:28:06,470 --> 00:28:04,640
the three pictures there

641
00:28:08,149 --> 00:28:06,480
we've got tethers

642
00:28:10,549 --> 00:28:08,159
wrapped around it pulling it into a

643
00:28:12,789 --> 00:28:10,559
tight bundle so it once it's in the air

644
00:28:15,350 --> 00:28:12,799
lock it takes up a lot of space

645
00:28:18,549 --> 00:28:15,360
so we'd like to get that outside and

646
00:28:20,549 --> 00:28:18,559
tethered outside the airlock

647
00:28:22,630 --> 00:28:20,559
next slide

648
00:28:24,950 --> 00:28:22,640
and this shows the the on orbit video of

649
00:28:26,870 --> 00:28:24,960
what the crew put together

650
00:28:29,269 --> 00:28:26,880
in this bundle

651
00:28:31,029 --> 00:28:29,279
next slide

652
00:28:33,750 --> 00:28:31,039
the crew members will hand this out of

653
00:28:37,190 --> 00:28:33,760
the airlock and it'll go just

654
00:28:38,470 --> 00:28:37,200
aft and zenith of the airlock hatch on

655
00:28:42,710 --> 00:28:38,480
the handrails

656
00:28:46,389 --> 00:28:45,350
the next pictures that i have are the

657
00:28:48,149 --> 00:28:46,399
ams

658
00:28:50,070 --> 00:28:48,159
photo task

659
00:28:52,710 --> 00:28:50,080
the ams is

660
00:28:55,909 --> 00:28:52,720
collecting wonderful science but it's

661
00:28:58,389 --> 00:28:55,919
its cooling system is having problems so

662
00:29:01,190 --> 00:28:58,399
on a future eva crew members plan to go

663
00:29:02,230 --> 00:29:01,200

out here and do a pretty intricate

664
00:29:05,190 --> 00:29:02,240
repair

665
00:29:07,669 --> 00:29:05,200
of the alpha magnetic spectrometer

666
00:29:10,310 --> 00:29:07,679
but in order to do that eva we need to

667
00:29:13,590 --> 00:29:10,320
collect photos of

668
00:29:16,070 --> 00:29:13,600
the external ams to see some of the work

669
00:29:18,070 --> 00:29:16,080
sites and and what needs to be done

670
00:29:20,389 --> 00:29:18,080
and we've provided the crew members on

671
00:29:21,990 --> 00:29:20,399
board with these images and they'll go

672
00:29:23,750 --> 00:29:22,000
up on um

673
00:29:46,070 --> 00:29:23,760
the

674
00:29:49,990 --> 00:29:46,950
and

675
00:29:53,029 --> 00:29:50,000
so we hope to use these pictures to

676
00:29:56,470 --> 00:29:53,039
develop the the eva to repair this

677
00:30:00,630 --> 00:29:57,909
some of the cables that they'll be

678
00:30:04,470 --> 00:30:00,640
looking for to to take pictures

679
00:30:05,830 --> 00:30:04,480
and the last get ahead task that we have

680
00:30:06,950 --> 00:30:05,840
is

681
00:30:09,590 --> 00:30:06,960
the

682
00:30:12,310 --> 00:30:09,600
crew light pan tilt assembly

683
00:30:13,990 --> 00:30:12,320
this was is a failed camera that used to

684
00:30:17,350 --> 00:30:14,000
be up on

685
00:30:18,870 --> 00:30:17,360
the ssrms and the arm removed that and

686
00:30:22,389 --> 00:30:18,880
replaced it on

687
00:30:25,269 --> 00:30:22,399
the mobile transporter relay assembly

688
00:30:26,149 --> 00:30:25,279

and it is so it's pre-positioned there

689
00:30:28,549 --> 00:30:26,159
for the

690
00:30:29,430 --> 00:30:28,559
crew members to bring out a spare

691
00:30:32,389 --> 00:30:29,440
will

692
00:30:34,870 --> 00:30:32,399
remove the failed unit off of the mtra

693
00:30:36,549 --> 00:30:34,880
and replace it with the new unit and

694
00:30:39,269 --> 00:30:36,559
then once that's done

695
00:30:42,070 --> 00:30:39,279
the arm will take that and reinstall it

696
00:30:47,830 --> 00:30:45,190
and that's all i have

697
00:30:49,830 --> 00:30:47,840
okay thank you keith now as is tradition

698
00:30:51,430 --> 00:30:49,840
we'll open up the floor for questions if

699
00:30:54,710 --> 00:30:51,440
you're on the phone bridge and you have

700
00:30:56,549 --> 00:30:54,720
a question press star one to get into

701
00:30:58,149 --> 00:30:56,559
the queue but we'll start here in the

702
00:30:59,750 --> 00:30:58,159
room gina

703
00:31:04,389 --> 00:30:59,760
what are the pros and cons to having

704
00:31:09,110 --> 00:31:07,269
well from uh from an overall efficiency

705
00:31:10,950 --> 00:31:09,120
standpoint uh

706
00:31:11,669 --> 00:31:10,960
when we go outside evas are one of the

707
00:31:13,590 --> 00:31:11,679
most

708
00:31:15,750 --> 00:31:13,600
dangerous things that that we do as a

709
00:31:16,870 --> 00:31:15,760
program so anytime we can

710
00:31:19,269 --> 00:31:16,880
we can

711
00:31:21,830 --> 00:31:19,279
use you station assets that are not the

712
00:31:23,350 --> 00:31:21,840
crew to go do a task then then that's a

713
00:31:25,190 --> 00:31:23,360

certainly certainly something we want to

714
00:31:27,430 --> 00:31:25,200
endeavor to do not just from an

715
00:31:29,110 --> 00:31:27,440
efficiency standpoint but also from a

716
00:31:31,909 --> 00:31:29,120
safety standpoint so

717
00:31:33,590 --> 00:31:31,919
so clearly we'd like to continue to to

718
00:31:34,549 --> 00:31:33,600
learn more and more about how to use

719
00:31:37,110 --> 00:31:34,559
dexter

720
00:31:40,149 --> 00:31:37,120
and our robotics capability and and make

721
00:31:43,029 --> 00:31:40,159
as many of these tasks robotically uh

722
00:31:44,789 --> 00:31:43,039
capable as we can so it's a it's a big

723
00:31:46,630 --> 00:31:44,799
it's a big deal for us every time we do

724
00:31:48,789 --> 00:31:46,640
one of these and and that team is just

725
00:31:50,549 --> 00:31:48,799
continuing to to evolve and get better

726
00:31:51,430 --> 00:31:50,559
at their tasks so it's a it's really

727
00:31:54,950 --> 00:31:51,440
good

728
00:31:57,190 --> 00:31:54,960
between what the astronauts can do and

729
00:31:58,870 --> 00:31:57,200
then what a robot like dexter can do and

730
00:32:01,990 --> 00:31:58,880
how they can work together

731
00:32:03,669 --> 00:32:02,000
absolutely again when you go out eva you

732
00:32:05,110 --> 00:32:03,679
only have so much time to go out and we

733
00:32:08,070 --> 00:32:05,120
never have enough time to do all the

734
00:32:09,110 --> 00:32:08,080
things that we'd like to do so if we can

735
00:32:10,950 --> 00:32:09,120
if we can

736
00:32:12,710 --> 00:32:10,960
partner with the robotics

737
00:32:15,350 --> 00:32:12,720
capability i mean that's the best

738
00:32:18,549 --> 00:32:15,360

solution for for the for the entire

739
00:32:20,230 --> 00:32:18,559
program it allows us to do the things

740
00:32:22,389 --> 00:32:20,240
with evas that we absolutely don't have

741
00:32:24,710 --> 00:32:22,399
a choice to do but our goal would be to

742
00:32:26,830 --> 00:32:24,720
to whittle down that number of things as

743
00:32:29,350 --> 00:32:26,840
we as we move forward in the

744
00:32:31,110 --> 00:32:29,360
program this may be a weird question but

745
00:32:33,190 --> 00:32:31,120
what are the advantages to upgrading to

746
00:32:35,110 --> 00:32:33,200
the lithium batteries

747
00:32:37,669 --> 00:32:35,120
durability length

748
00:32:39,350 --> 00:32:37,679
brightness if you look at the batteries

749
00:32:40,870 --> 00:32:39,360
themselves certainly getting into orbit

750
00:32:42,310 --> 00:32:40,880
we're just getting started on on

751
00:32:45,029 --> 00:32:42,320
changing out these batteries we've got a

752
00:32:47,269 --> 00:32:45,039
lot of batteries on orbit and

753
00:32:49,029 --> 00:32:47,279
with these different sets of arrays and

754
00:32:51,269 --> 00:32:49,039
and uh the batteries themselves volume

755
00:32:53,430 --> 00:32:51,279
wise are smaller they're lighter mass

756
00:32:57,830 --> 00:32:53,440
wise a pair of nickel hydrogens they're

757
00:33:01,750 --> 00:32:57,840
about 730 740 pounds uh one one lithium

758
00:33:04,710 --> 00:33:01,760
ion is uh one lithium ion is 430 pounds

759
00:33:06,310 --> 00:33:04,720
so you can almost get get you know a

760
00:33:08,950 --> 00:33:06,320
three or four hundred pound buyback in

761
00:33:11,509 --> 00:33:08,960
terms of the of the of the the mass that

762
00:33:12,950 --> 00:33:11,519
you have to launch launch to orbit so so

763
00:33:15,110 --> 00:33:12,960

from that standpoint it's much better

764
00:33:17,669 --> 00:33:15,120
capacity wise they're much better

765
00:33:19,430 --> 00:33:17,679
batteries we can go longer

766
00:33:21,990 --> 00:33:19,440
one of the things that

767
00:33:23,990 --> 00:33:22,000
gives us fit sometimes when we have

768
00:33:26,230 --> 00:33:24,000
different vehicles arriving to station

769
00:33:27,509 --> 00:33:26,240
we have to to lock the serges and so

770
00:33:29,750 --> 00:33:27,519
forth and we're always worried about

771
00:33:31,509 --> 00:33:29,760
battery capacity this is something that

772
00:33:34,310 --> 00:33:31,519
with better capacity we don't have to do

773
00:33:35,990 --> 00:33:34,320
as many power downs and so operationally

774
00:33:37,590 --> 00:33:36,000
it's going to be better better off for

775
00:33:40,389 --> 00:33:37,600
us too so

776
00:33:43,029 --> 00:33:40,399
from a cost perspective it's a they're

777
00:33:44,470 --> 00:33:43,039
they're cheaper than the nickel hydrogen

778
00:33:46,470 --> 00:33:44,480
when you when you look at the numbers

779
00:33:48,389 --> 00:33:46,480
and the and the volume of nickel

780
00:33:50,710 --> 00:33:48,399
hydrogens that we'd have to buy versus

781
00:33:53,029 --> 00:33:50,720
the number of lithium ion lithium ions

782
00:33:55,430 --> 00:33:53,039
so so on the cost front it's cheaper as

783
00:33:59,430 --> 00:33:57,590
also uh one of the other things that as

784
00:34:00,149 --> 00:33:59,440
we started down this path that

785
00:34:03,909 --> 00:34:00,159
of

786
00:34:06,070 --> 00:34:03,919
things we started looking at was was

787
00:34:07,190 --> 00:34:06,080
obsolescence when it comes to nickel

788
00:34:08,710 --> 00:34:07,200

hydrogen

789
00:34:10,550 --> 00:34:08,720
we were starting to run into some some

790
00:34:12,950 --> 00:34:10,560
parts issues on the on the nickel

791
00:34:14,389 --> 00:34:12,960
hydrogen side so again it just made all

792
00:34:16,069 --> 00:34:14,399
the sense in the world when we when we

793
00:34:19,109 --> 00:34:16,079
went down this path several years ago

794
00:34:20,470 --> 00:34:19,119
and and as somebody mentioned in the in

795
00:34:22,790 --> 00:34:20,480
the mission management team this morning

796
00:34:23,990 --> 00:34:22,800
it's it's nice to see see us culminate

797
00:34:25,190 --> 00:34:24,000
with finally getting these things on

798
00:34:27,430 --> 00:34:25,200
orbit because we they've been in the

799
00:34:28,389 --> 00:34:27,440
queue for quite a while

800
00:34:34,629 --> 00:34:28,399
mark

801
00:34:36,470 --> 00:34:34,639
two questions first as you look ahead

802
00:34:38,869 --> 00:34:36,480
even approximately how long is it going

803
00:34:43,030 --> 00:34:38,879
to take to replace all 48 if i have the

804
00:34:45,589 --> 00:34:44,550
we'll be doing this over the next couple

805
00:34:47,109 --> 00:34:45,599
of years

806
00:34:49,190 --> 00:34:47,119
we've got another set that we'll have to

807
00:34:50,710 --> 00:34:49,200
do late at the very end this year and

808
00:34:52,550 --> 00:34:50,720
next year a large part of this is when

809
00:34:55,030 --> 00:34:52,560
can we get them to orbit so we'll be

810
00:34:57,030 --> 00:34:55,040
doing this over the next couple of years

811
00:35:00,069 --> 00:34:57,040
swapping these batteries out and

812
00:35:01,910 --> 00:35:00,079
and depending on how these performs they

813
00:35:04,230 --> 00:35:01,920

perform these lithium ions then we'll

814
00:35:06,390 --> 00:35:04,240
start to to figure out how how far these

815
00:35:08,230 --> 00:35:06,400
batteries get us and from a life of the

816
00:35:09,910 --> 00:35:08,240
program standpoint and then and then we

817
00:35:12,310 --> 00:35:09,920
can figure out when to to put in the

818
00:35:13,430 --> 00:35:12,320
next changeouts from a lithium-ion

819
00:35:15,190 --> 00:35:13,440
standpoint

820
00:35:16,390 --> 00:35:15,200
but we'll be looking at nickel hydrogens

821
00:35:18,150 --> 00:35:16,400
and swapping those out for the next

822
00:35:19,270 --> 00:35:18,160
couple of years

823
00:35:21,829 --> 00:35:19,280
and

824
00:35:24,150 --> 00:35:21,839
just regarding the extension

825
00:35:27,910 --> 00:35:24,160
of the station operation

826
00:35:30,150 --> 00:35:27,920
itself the 2020 to 2024 increment that

827
00:35:31,910 --> 00:35:30,160
you're preparing for now that everyone's

828
00:35:35,589 --> 00:35:31,920
signed off on

829
00:35:37,910 --> 00:35:35,599
how essential to making that success

830
00:35:40,550 --> 00:35:37,920
successful or effective

831
00:35:42,310 --> 00:35:40,560
efficient operations is it to have these

832
00:35:44,630 --> 00:35:42,320
new batteries

833
00:35:46,870 --> 00:35:44,640
going into place and

834
00:35:51,430 --> 00:35:46,880
you know if you can take it out to the

835
00:35:53,190 --> 00:35:51,440
possibility of even going beyond 2024

836
00:35:54,950 --> 00:35:53,200
how important is it to have this new

837
00:35:56,470 --> 00:35:54,960
equipment well it's

838
00:35:58,230 --> 00:35:56,480

hugely important for

839
00:35:59,829 --> 00:35:58,240
a lot because of the reasons i mentioned

840
00:36:01,670 --> 00:35:59,839
earlier just the the ease of getting

841
00:36:04,310 --> 00:36:01,680
these to orbit versus getting the others

842
00:36:05,910 --> 00:36:04,320
i mean that's that's up mass cost uh

843
00:36:07,430 --> 00:36:05,920
that that

844
00:36:09,109 --> 00:36:07,440
that's cost avoidance from that

845
00:36:10,470 --> 00:36:09,119
standpoint and as you get deeper into

846
00:36:13,109 --> 00:36:10,480
the program you're looking to reduce

847
00:36:15,109 --> 00:36:13,119
costs you're not trying to increase cost

848
00:36:16,870 --> 00:36:15,119
also the longevity

849
00:36:18,870 --> 00:36:16,880
these lithium ion batteries if we're

850
00:36:21,750 --> 00:36:18,880
looking at maybe nine to ten years

851
00:36:24,390 --> 00:36:21,760
versus the six or so that we look at for

852
00:36:26,230 --> 00:36:24,400
the the nickel hydrogen that's that's a

853
00:36:27,990 --> 00:36:26,240
that in and of itself is going to allow

854
00:36:30,630 --> 00:36:28,000
us to

855
00:36:33,430 --> 00:36:30,640
potentially you know may you know reduce

856
00:36:34,950 --> 00:36:33,440
cost and and make that decision

857
00:36:37,190 --> 00:36:34,960
on downstream once we see how they

858
00:36:38,630 --> 00:36:37,200
perform on orbit but you know we're

859
00:36:40,790 --> 00:36:38,640
we're definitely looking at multiple

860
00:36:43,430 --> 00:36:40,800
years of performance beyond what the

861
00:36:46,950 --> 00:36:43,440
nickel hydrogens do so that's a

862
00:36:50,550 --> 00:36:48,870
okay it doesn't look like we have any

863
00:36:52,230 --> 00:36:50,560

questions on the phone bridge yet again

864
00:36:54,470 --> 00:36:52,240
if you're dialed in and you have one

865
00:36:55,430 --> 00:36:54,480
please press star one to get into the

866
00:36:56,550 --> 00:36:55,440
queue

867
00:36:58,390 --> 00:36:56,560
i guess we can go ahead and take a

868
00:36:59,990 --> 00:36:58,400
couple of questions from social media

869
00:37:01,430 --> 00:37:00,000
real quick haley

870
00:37:02,630 --> 00:37:01,440
awesome so just a reminder keep

871
00:37:04,790 --> 00:37:02,640
submitting your questions with the

872
00:37:05,990 --> 00:37:04,800
hashtag ask nasa we've already got a lot

873
00:37:08,550 --> 00:37:06,000
of great ones

874
00:37:11,510 --> 00:37:08,560
andre on facebook is wondering what will

875
00:37:13,510 --> 00:37:11,520
happen to the old batteries

876
00:37:16,310 --> 00:37:13,520
the old batteries um

877
00:37:18,630 --> 00:37:16,320
there's uh part of them will be um

878
00:37:21,829 --> 00:37:18,640
removed from station with the with on

879
00:37:23,990 --> 00:37:21,839
the htv external pallet once uh once the

880
00:37:25,270 --> 00:37:24,000
evas are completed we'll robotically

881
00:37:27,109 --> 00:37:25,280
take that pallet with some of the old

882
00:37:29,589 --> 00:37:27,119
batteries put it back in the htv and

883
00:37:31,270 --> 00:37:29,599
when we set the htv free here at the end

884
00:37:34,069 --> 00:37:31,280
of the month those batteries will go

885
00:37:35,589 --> 00:37:34,079
with it but but we'll retain

886
00:37:37,510 --> 00:37:35,599
i believe six of them

887
00:37:39,030 --> 00:37:37,520
will remain on station that the right

888
00:37:40,550 --> 00:37:39,040

number three three

889
00:37:42,870 --> 00:37:40,560
three tunnels three and i don't get

890
00:37:44,150 --> 00:37:42,880
disposed of on the pallet with the htv

891
00:37:45,990 --> 00:37:44,160
um when it

892
00:37:47,589 --> 00:37:46,000
re-enters the atmosphere another three

893
00:37:49,589 --> 00:37:47,599
again we just don't have space on the

894
00:37:52,150 --> 00:37:49,599
htv vehicle so they'll be stored on

895
00:37:55,109 --> 00:37:52,160
board permanently paul on twitter is

896
00:38:01,030 --> 00:37:55,119
wondering how are astronauts chosen for

897
00:38:06,710 --> 00:38:03,670
so the the chief of the astronaut office

898
00:38:08,950 --> 00:38:06,720
uh primarily makes uh those decisions in

899
00:38:10,470 --> 00:38:08,960
in consultation with the the lead flight

900
00:38:13,510 --> 00:38:10,480
directors and also

901
00:38:14,630 --> 00:38:13,520
um uh there's a panel of of

902
00:38:15,750 --> 00:38:14,640
eva

903
00:38:17,430 --> 00:38:15,760
instructors

904
00:38:21,670 --> 00:38:17,440
and such that

905
00:38:24,630 --> 00:38:23,270
i think cole meant this one more for the

906
00:38:27,030 --> 00:38:24,640
astronauts but i think it applies to

907
00:38:28,310 --> 00:38:27,040
mission control as well um on twitter

908
00:38:29,990 --> 00:38:28,320
she says i know you have a lot of

909
00:38:31,670 --> 00:38:30,000
important tasks to complete but do you

910
00:38:35,190 --> 00:38:31,680
ever have a chance to just enjoy the

911
00:38:40,230 --> 00:38:38,069
well i i certainly i've got a huge tv in

912
00:38:43,349 --> 00:38:40,240
my office so i live

913
00:38:45,190 --> 00:38:43,359

and it's always good to

914
00:38:47,030 --> 00:38:45,200
keep it in your mind what we do day in

915
00:38:49,349 --> 00:38:47,040
and day out so some of the the views

916
00:38:52,069 --> 00:38:49,359
that we get in what we call the six pack

917
00:38:53,430 --> 00:38:52,079
which has the six different camera views

918
00:38:55,510 --> 00:38:53,440
usually there's one or two of them

919
00:38:57,430 --> 00:38:55,520
trained at the earth and

920
00:38:59,270 --> 00:38:57,440
again it's uh when we got our high

921
00:39:01,670 --> 00:38:59,280
definition capability

922
00:39:03,430 --> 00:39:01,680
cameras on board here

923
00:39:06,630 --> 00:39:03,440
during the last eva it's uh it's

924
00:39:08,069 --> 00:39:06,640
breathtaking to look at that and again

925
00:39:09,589 --> 00:39:08,079
it certainly makes it a little easier to

926
00:39:11,270 --> 00:39:09,599
come in during the day and walk into

927
00:39:13,349 --> 00:39:11,280
your your office that has no windows

928
00:39:15,670 --> 00:39:13,359
when you can look up and see see those

929
00:39:16,950 --> 00:39:15,680
kinds of views uh there on the tv so

930
00:39:18,470 --> 00:39:16,960
anyway i've heard

931
00:39:20,550 --> 00:39:18,480
from the crew members on board there's

932
00:39:21,829 --> 00:39:20,560
nothing it's a it's there's nothing

933
00:39:24,069 --> 00:39:21,839
quite light looking at the earth from

934
00:39:25,589 --> 00:39:24,079
their view um but uh

935
00:39:27,030 --> 00:39:25,599
anyway it's it's pretty cool for those

936
00:39:30,230 --> 00:39:27,040
of us on the ground to get to see a day

937
00:39:31,190 --> 00:39:30,240
in and day out from from there too

938
00:39:32,630 --> 00:39:31,200

all right i think we have one more

939
00:39:34,630 --> 00:39:32,640
follow-up in the room and then we'll be

940
00:39:38,390 --> 00:39:34,640
ready to wrap up mark

941
00:39:40,230 --> 00:39:38,400
yeah thank you mark for aviation again

942
00:39:42,630 --> 00:39:40,240
how does the

943
00:39:45,190 --> 00:39:42,640
choreography the robotic human

944
00:39:47,670 --> 00:39:45,200
choreography that's involved here

945
00:39:49,510 --> 00:39:47,680
so to compare historically with either

946
00:39:51,190 --> 00:39:49,520
other maintenance or other maintenance

947
00:39:53,430 --> 00:39:51,200
and construction

948
00:39:55,990 --> 00:39:53,440
activities of the life of the program i

949
00:39:58,790 --> 00:39:56,000
think i heard some early comments that

950
00:40:00,870 --> 00:39:58,800
you know there's a lot of intricate

951
00:40:02,630 --> 00:40:00,880
work involved in this and i'm just

952
00:40:03,910 --> 00:40:02,640
looking for a sense of what you guys

953
00:40:07,829 --> 00:40:03,920
think is

954
00:40:10,630 --> 00:40:09,430
well i think

955
00:40:12,630 --> 00:40:10,640
throughout through the history of the

956
00:40:14,069 --> 00:40:12,640
program um

957
00:40:15,910 --> 00:40:14,079
you know when we started the program we

958
00:40:18,230 --> 00:40:15,920
were already pretty good at evas i mean

959
00:40:19,910 --> 00:40:18,240
the the team has learned a lot through

960
00:40:22,950 --> 00:40:19,920
the the building a space station but the

961
00:40:25,030 --> 00:40:22,960
reality is is that the the

962
00:40:26,309 --> 00:40:25,040
the eva part of things was pretty well

963
00:40:27,910 --> 00:40:26,319

understood and

964
00:40:29,990 --> 00:40:27,920
people have continued to fine tune that

965
00:40:31,430 --> 00:40:30,000
robotics is an area where if you look

966
00:40:33,990 --> 00:40:31,440
through the history of the program that

967
00:40:35,510 --> 00:40:34,000
that team is has continued to evolve uh

968
00:40:39,109 --> 00:40:35,520
just in terms of their knowledge of how

969
00:40:41,750 --> 00:40:39,119
to how to work with the arm um the uh

970
00:40:43,109 --> 00:40:41,760
when we got dexter again you know you

971
00:40:45,270 --> 00:40:43,119
had an arm and then all of a sudden you

972
00:40:47,430 --> 00:40:45,280
have a hand and fingers too and that's

973
00:40:50,230 --> 00:40:47,440
uh pretty incredible and it's uh it's

974
00:40:52,470 --> 00:40:50,240
just been a learning process and again

975
00:40:54,069 --> 00:40:52,480
you know it's an impressive group and

976
00:40:56,069 --> 00:40:54,079
it's an impressive set of hardware that

977
00:40:58,870 --> 00:40:56,079
our canadian friends have delivered to

978
00:41:01,109 --> 00:40:58,880
the program and um again

979
00:41:03,190 --> 00:41:01,119
we want to continue to try to push

980
00:41:04,630 --> 00:41:03,200
more and more on the robotics side of

981
00:41:06,630 --> 00:41:04,640
things just because

982
00:41:08,710 --> 00:41:06,640
you know if we're not out doing ebas

983
00:41:10,870 --> 00:41:08,720
then that that keeps crews inside to do

984
00:41:12,790 --> 00:41:10,880
science and so that's uh that's what

985
00:41:15,109 --> 00:41:12,800
we're we're trying to push as much as we

986
00:41:17,109 --> 00:41:15,119
possibly can so anyway i just look for

987
00:41:18,870 --> 00:41:17,119
that to continue to grow and now it's

988
00:41:21,910 --> 00:41:18,880

something that we've gotten better at

989
00:41:25,829 --> 00:41:24,390
okay that's it for here in the room i

990
00:41:27,190 --> 00:41:25,839
think we're going to go ahead and wrap

991
00:41:29,430 --> 00:41:27,200
up then

992
00:41:31,349 --> 00:41:29,440
of course his first eva taking place

993
00:41:33,670 --> 00:41:31,359
this friday so be sure to tune in our

994
00:41:37,349 --> 00:41:33,680
coverage on nasa tv is going to kick off

995
00:41:39,030 --> 00:41:37,359
at 4 30 a.m central time 5 30 a.m

996
00:41:40,710 --> 00:41:39,040
eastern as you heard they should be

997
00:41:44,390 --> 00:41:40,720
getting out of the door shortly after

998
00:41:46,950 --> 00:41:44,400
the 6 o'clock hour central 7 a.m eastern

999
00:41:49,990 --> 00:41:46,960
time and as always you can head over to

1000
00:41:51,750 --> 00:41:50,000
our website at nasa.gov station for all

1001
00:41:53,670 --> 00:41:51,760
of the latest updates on these

1002
00:41:55,589 --> 00:41:53,680
spacewalks and everything else taking

1003
00:41:57,349 --> 00:41:55,599
place onboard the international space

1004
00:41:59,109 --> 00:41:57,359
station so be sure to tune in this

1005
00:42:00,710 --> 00:41:59,119
friday and follow along thank you for

1006
00:42:02,550 --> 00:42:00,720
joining us this afternoon and thank you

1007
00:42:07,040 --> 00:42:02,560
to all of my briefers that will do it