
Johnson

1
00:00:05,770 --> 00:00:03,189
good morning and welcome to today's

2
00:00:09,579 --> 00:00:05,780
mission status briefing with us this

3
00:00:11,680 --> 00:00:09,589
morning Gary Hall Locker the sts-134

4
00:00:15,159 --> 00:00:11,690
lead flight director just coming off his

5
00:00:18,700 --> 00:00:15,169
orbit one shift and Heather Hinkle the

6
00:00:21,280 --> 00:00:18,710
principal investigator of storm anger

7
00:00:23,760 --> 00:00:21,290
would you begin believe thank you well

8
00:00:26,740 --> 00:00:23,770
it's really great to be back here folks

9
00:00:28,980 --> 00:00:26,750
as you know the Mission Continues to go

10
00:00:32,589 --> 00:00:28,990
very very well endeavours performing

11
00:00:35,800 --> 00:00:32,599
nearly flawlessly and the crew are doing

12
00:00:37,569 --> 00:00:35,810
incredibly well as as well so we're the

13
00:00:41,200 --> 00:00:37,579

crews about two hours away from hatch

14
00:00:42,760 --> 00:00:41,210
closure as we sit here talking today the

15
00:00:44,500 --> 00:00:42,770
goal of today obviously was to finish up

16
00:00:46,840 --> 00:00:44,510
all the internal work between the two

17
00:00:48,960 --> 00:00:46,850
vehicles and I think Derrick talked to

18
00:00:51,910 --> 00:00:48,970
quite a bit yesterday about the

19
00:00:55,780 --> 00:00:51,920
maintenance on the station sidra the

20
00:00:57,220 --> 00:00:55,790
carbon dioxide removal system so the

21
00:00:59,250 --> 00:00:57,230
crew spent a good chunk of the day

22
00:01:01,510 --> 00:00:59,260
yesterday working on on that they're

23
00:01:02,770 --> 00:01:01,520
taking out one of the beds that we're

24
00:01:04,689 --> 00:01:02,780
going to bring home on the on the

25
00:01:06,820 --> 00:01:04,699
shuttle and and then replace it with a

26
00:01:09,789 --> 00:01:06,830
new one and get it back installed and up

27
00:01:11,289 --> 00:01:09,799
and running so things took a little bit

28
00:01:12,969 --> 00:01:11,299
longer than planned yesterday so we

29
00:01:15,550 --> 00:01:12,979
finished that task up today and

30
00:01:17,230 --> 00:01:15,560
everything is good there we also

31
00:01:19,780 --> 00:01:17,240
finishing up all the cargo transfer

32
00:01:21,520 --> 00:01:19,790
between both vehicles obviously all the

33
00:01:23,170 --> 00:01:21,530
cargo we hauled up to give the station

34
00:01:25,539 --> 00:01:23,180
we need to get on their side of the

35
00:01:27,460 --> 00:01:25,549
hatch and then all the items that they

36
00:01:29,260 --> 00:01:27,470
may need us to bring home need to get

37
00:01:31,570 --> 00:01:29,270
back on the shuttle before they close

38
00:01:33,670 --> 00:01:31,580

the hatches here shortly we also

39
00:01:35,560 --> 00:01:33,680
completed the last of the oxygen

40
00:01:39,940 --> 00:01:35,570
transfer from the shuttle to the station

41
00:01:42,999 --> 00:01:39,950
today and we also managed to reboot the

42
00:01:47,140 --> 00:01:43,009
the stack doing a shuttle reboost using

43
00:01:48,910 --> 00:01:47,150
shuttle propellant we got them about 1.8

44
00:01:52,090 --> 00:01:48,920
foot per second which is just over

45
00:01:55,600 --> 00:01:52,100
another mile an hour and that increased

46
00:01:57,910 --> 00:01:55,610
their altitude by just under about point

47
00:01:59,469 --> 00:01:57,920
six nautical miles so leave them a

48
00:02:02,890 --> 00:01:59,479
little bit higher than when we found

49
00:02:04,749 --> 00:02:02,900
them a week and a half ago and then the

50
00:02:06,999 --> 00:02:04,759
crews also wrapped up some of the EBA

51
00:02:09,100 --> 00:02:07,009
activities in the station airlock and it

52
00:02:11,500 --> 00:02:09,110
cleaned up and partially prepared for

53
00:02:13,600 --> 00:02:11,510
the spacewalk on the following mission

54
00:02:17,330 --> 00:02:13,610
st s

55
00:02:18,710 --> 00:02:17,340
135 here in a month or so the remainder

56
00:02:21,050 --> 00:02:18,720
of the day of course had an attached

57
00:02:22,700 --> 00:02:21,060
closure the the crews going to go and

58
00:02:24,200 --> 00:02:22,710
bring the two space suits from the

59
00:02:27,470 --> 00:02:24,210
airlock on the station back to the

60
00:02:29,270 --> 00:02:27,480
shuttle those are the two that we used

61
00:02:31,550 --> 00:02:29,280
during several of the spacewalks drew

62
00:02:32,810 --> 00:02:31,560
wore one of them and Mike Fink wore the

63
00:02:34,880 --> 00:02:32,820

other so we'll get those back to the

64
00:02:38,090 --> 00:02:34,890
orbiter in case we need them between

65
00:02:41,210 --> 00:02:38,100
hatch closure and landing and will also

66
00:02:42,650 --> 00:02:41,220
be packing double cold bags we do this

67
00:02:45,770 --> 00:02:42,660
pretty much every station flight right

68
00:02:47,480 --> 00:02:45,780
port hatch closure we get numerous

69
00:02:49,520 --> 00:02:47,490
science samples get them in these cold

70
00:02:52,670 --> 00:02:49,530
bags and get them across to the shuttle

71
00:02:55,670 --> 00:02:52,680
and we bring them home for for analysis

72
00:02:57,170 --> 00:02:55,680
here on the ground so once we get the

73
00:02:58,580 --> 00:02:57,180
hatches closed the crew is going to go

74
00:03:00,770 --> 00:02:58,590
ahead and shift gears a little bit focus

75
00:03:02,720 --> 00:03:00,780
in on the undock tomorrow to get the

76
00:03:04,100 --> 00:03:02,730
rendezvous tools check out complete as

77
00:03:06,530 --> 00:03:04,110
well as get the centerline camera

78
00:03:09,920 --> 00:03:06,540
installed and that will put them in good

79
00:03:12,740 --> 00:03:09,930
shape for the undocking and fly around

80
00:03:14,960 --> 00:03:12,750
and storm activities for tomorrow so

81
00:03:17,150 --> 00:03:14,970
what I'd like to do is go ahead and walk

82
00:03:19,010 --> 00:03:17,160
you through a very short video about the

83
00:03:22,280 --> 00:03:19,020
undock and fly around and storm

84
00:03:24,800 --> 00:03:22,290
trajectory if we can get that rolling so

85
00:03:26,840 --> 00:03:24,810
the pilot Greg Johnson will be flying

86
00:03:28,730 --> 00:03:26,850
the orbiter back to about 400 feet and

87
00:03:31,580 --> 00:03:28,740
then initiate the fly around we do the

88
00:03:33,970 --> 00:03:31,590

standard full lap fly around and then

89
00:03:36,290 --> 00:03:33,980
we'll do the sep one burn and that

90
00:03:37,670 --> 00:03:36,300
that'll set us up on our way to the

91
00:03:39,680 --> 00:03:37,680
storm trajectory we're going to be

92
00:03:42,460 --> 00:03:39,690
flying above and behind the space

93
00:03:45,850 --> 00:03:42,470
station will get about just inside

94
00:03:48,260 --> 00:03:45,860
30,000 feet behind the base station and

95
00:03:50,780 --> 00:03:48,270
the storm sensors will be taking data

96
00:03:54,500 --> 00:03:50,790
all the way out to about 20,000 feet

97
00:03:56,900 --> 00:03:54,510
where they'll drop lock and then they'll

98
00:03:58,670 --> 00:03:56,910
be setting up for the requisition here

99
00:04:00,860 --> 00:03:58,680
in just a minute so we'll do another

100
00:04:05,120 --> 00:04:00,870
burn that will bring us down below Space

101
00:04:06,590 --> 00:04:05,130
Station and about 4,000 feet below will

102
00:04:10,550 --> 00:04:06,600
do one more burn that will put us on the

103
00:04:12,320 --> 00:04:10,560
the storm required trajectory and once

104
00:04:13,970 --> 00:04:12,330
we get that burn can play will will be

105
00:04:16,340 --> 00:04:13,980
coming into acquisition range of the

106
00:04:17,870 --> 00:04:16,350
storm sensors they'll start taking data

107
00:04:19,760 --> 00:04:17,880
all the way in will do a burn that will

108
00:04:21,380 --> 00:04:19,770
bring us up towards station will stall

109
00:04:25,070 --> 00:04:21,390
out around a thousand feet below it and

110
00:04:26,390 --> 00:04:25,080
then slowly drift down and away and do a

111
00:04:28,550 --> 00:04:26,400
final step burn

112
00:04:30,020 --> 00:04:28,560
keep tracking the station all the way

113
00:04:33,140 --> 00:04:30,030

out till the sensors drop lock once

114
00:04:35,659 --> 00:04:33,150
again so that's that's what we've got in

115
00:04:37,400 --> 00:04:35,669
store for tomorrow I think at this point

116
00:04:40,510 --> 00:04:37,410
I'll hand it over to Heather to give you

117
00:04:45,020 --> 00:04:40,520
a lot more details on the storm activity

118
00:04:46,909 --> 00:04:45,030
thanks Gary so the storm team we're

119
00:04:51,890 --> 00:04:46,919
really excited to get to our primary

120
00:04:55,640 --> 00:04:51,900
mission activities we are a sensor test

121
00:04:57,920 --> 00:04:55,650
that was created under the orion project

122
00:05:01,370 --> 00:04:57,930
which Orion has now become a part of

123
00:05:03,740 --> 00:05:01,380
NASA's MPCV program so what what the

124
00:05:06,409 --> 00:05:03,750
sensors are if the if the camera could

125
00:05:10,129 --> 00:05:06,419
zoom over here for a moment we're flying

126
00:05:12,379 --> 00:05:10,139
a laser sensor and also a

127
00:05:17,779 --> 00:05:12,389
high-definition camera so the laser

128
00:05:20,960 --> 00:05:17,789
sensor has a shoots a laser at 30 times

129
00:05:23,890 --> 00:05:20,970
per second a flashlight are and it gets

130
00:05:25,850 --> 00:05:23,900
a receipt off of any bright surfaces and

131
00:05:28,400 --> 00:05:25,860
reflectors that are up on the space

132
00:05:30,620 --> 00:05:28,410
station that allows us to do range and

133
00:05:34,129 --> 00:05:30,630
bearing calculations to each of those

134
00:05:36,980 --> 00:05:34,139
reflectors or to station surfaces if you

135
00:05:39,920 --> 00:05:36,990
don't have any cooperative reflectors on

136
00:05:41,899 --> 00:05:39,930
board the camera can be used we're

137
00:05:44,270 --> 00:05:41,909
assessing it as used for a possible back

138
00:05:47,089 --> 00:05:44,280

up as a star tracker for centering off

139
00:05:49,399 --> 00:05:47,099
the station from mid-range distances as

140
00:05:52,939 --> 00:05:49,409
a possible backup star tracker looking

141
00:05:56,270 --> 00:05:52,949
at stars and then for close-in piloting

142
00:05:58,700 --> 00:05:56,280
keys for the orion pilots and astronauts

143
00:06:01,159 --> 00:05:58,710
so those are the sensors that are out in

144
00:06:06,189 --> 00:06:01,169
the payload bay and what they do is that

145
00:06:09,469 --> 00:06:06,199
once they get on the docking axis the

146
00:06:11,689 --> 00:06:09,479
previous mission these five reflective

147
00:06:15,110 --> 00:06:11,699
elements were put on board that reflect

148
00:06:17,750 --> 00:06:15,120
very brightly in the vns wavelength but

149
00:06:19,640 --> 00:06:17,760
are essentially blind to the shuttle

150
00:06:22,640 --> 00:06:19,650
laser sensor so that there's no

151
00:06:25,070 --> 00:06:22,650
interference and with visibility to

152
00:06:27,409 --> 00:06:25,080
these reflective elements and I'll show

153
00:06:29,270 --> 00:06:27,419
some data here in a few minutes the

154
00:06:32,439 --> 00:06:29,280
storm sensors will allow you to be able

155
00:06:37,490 --> 00:06:32,449
to calculate six degree-of-freedom

156
00:06:40,080 --> 00:06:37,500
alignment and ranging and velocity to

157
00:06:42,689 --> 00:06:40,090
your vehicle which can be used for

158
00:06:44,970 --> 00:06:42,699
situational awareness or you could close

159
00:06:52,290 --> 00:06:44,980
the loop around your flight control

160
00:06:54,150 --> 00:06:52,300
system and do automatic docking so the

161
00:06:56,580 --> 00:06:54,160
storm sensors were operated during the

162
00:07:00,060 --> 00:06:56,590
rendezvous as Gary mentioned from about

163
00:07:03,060 --> 00:07:00,070

20,000 feet the laser locked on to the

164
00:07:04,680 --> 00:07:03,070
space station and we were hoping for it

165
00:07:08,159 --> 00:07:04,690
for that and we got a little bit better

166
00:07:10,200 --> 00:07:08,169
than what we were hoping for out of the

167
00:07:12,780 --> 00:07:10,210
sensors that was really exciting so

168
00:07:14,760 --> 00:07:12,790
we're really looking forward to the rear

169
00:07:17,190 --> 00:07:14,770
on oovoo trajectory when we're on an

170
00:07:19,170 --> 00:07:17,200
Orion type approach like Gary showed to

171
00:07:21,450 --> 00:07:19,180
prove again that we can exceed our

172
00:07:25,200 --> 00:07:21,460
expectations for that sensor so if you

173
00:07:27,390 --> 00:07:25,210
could queue up slide one this is sort of

174
00:07:29,460 --> 00:07:27,400
a picture of the docking camera on the

175
00:07:32,190 --> 00:07:29,470
left and then the range and intensity

176
00:07:35,240 --> 00:07:32,200
from the vns image on the right so what

177
00:07:38,700 --> 00:07:35,250
you can see is those three circles

178
00:07:41,040 --> 00:07:38,710
depict where three reflective surfaces

179
00:07:43,379 --> 00:07:41,050
are there the whole space station is

180
00:07:45,360 --> 00:07:43,389
peppered with reflectors different

181
00:07:48,240 --> 00:07:45,370
vehicles that put them up there the

182
00:07:51,840 --> 00:07:48,250
Europeans use reflectors the shuttle TCS

183
00:07:53,969 --> 00:07:51,850
does as well as a Japanese vehicle when

184
00:07:55,920 --> 00:07:53,979
they approach so you can see that it was

185
00:07:58,529 --> 00:07:55,930
able to pick up those reflectors and

186
00:08:00,029 --> 00:07:58,539
then if you provide centroid into those

187
00:08:02,430 --> 00:08:00,039
three you now have very accurate

188
00:08:03,810 --> 00:08:02,440

information about where you are compared

189
00:08:06,150 --> 00:08:03,820
to the vehicle go to the next one please

190
00:08:07,680 --> 00:08:06,160
discuss a little bit further in six

191
00:08:09,779 --> 00:08:07,690
hundred and salt and feet you can see

192
00:08:14,820 --> 00:08:09,789
now there's a little bit more spread and

193
00:08:17,700 --> 00:08:14,830
the reflectors next slide this is

194
00:08:20,610 --> 00:08:17,710
getting real even closer and you can see

195
00:08:23,460 --> 00:08:20,620
it's very locked on to those three you

196
00:08:27,659 --> 00:08:23,470
can pick them out easily as we get a

197
00:08:29,310 --> 00:08:27,669
little closer next 164 feet can see the

198
00:08:31,890 --> 00:08:29,320
camera is picking up a lot more detail

199
00:08:33,750 --> 00:08:31,900
and now in your range and intensity

200
00:08:38,130 --> 00:08:33,760
you'll be starting to see a lot more

201
00:08:40,409 --> 00:08:38,140
detail next getting a little bit closer

202
00:08:43,140 --> 00:08:40,419
I think the last one if you could go to

203
00:08:45,360 --> 00:08:43,150
that is is a pretty neat one where you

204
00:08:48,569 --> 00:08:45,370
could really see how the vns paints you

205
00:08:50,760 --> 00:08:48,579
a three-dimensional picture of what

206
00:08:52,290 --> 00:08:50,770
you're coming in by the intensity and

207
00:08:53,960 --> 00:08:52,300
the range maps you can see there on the

208
00:08:58,730 --> 00:08:53,970
right so the five

209
00:09:01,309 --> 00:08:58,740
white I guess the white circles that you

210
00:09:02,900 --> 00:09:01,319
see in the top right slide those are

211
00:09:05,030 --> 00:09:02,910
these five reflective elements I just

212
00:09:06,920 --> 00:09:05,040
showed you on the docking target and the

213
00:09:08,600 --> 00:09:06,930

real bright kind of bigger one that's a

214
00:09:11,300 --> 00:09:08,610
little bit above those that's the

215
00:09:13,490 --> 00:09:11,310
shuttles TCS reflector so you can see

216
00:09:15,740 --> 00:09:13,500
that real brightly as well and then the

217
00:09:17,960 --> 00:09:15,750
lower one in the range you can see how

218
00:09:20,449 --> 00:09:17,970
powerful the information can be from

219
00:09:22,040 --> 00:09:20,459
this sensor and how you you could use

220
00:09:23,990 --> 00:09:22,050
this for a broader applications other

221
00:09:26,869 --> 00:09:24,000
than just rendezvous and docking you

222
00:09:30,559 --> 00:09:26,879
could use this for imaging for hazard

223
00:09:34,550 --> 00:09:30,569
avoidance for performing landing for use

224
00:09:36,050 --> 00:09:34,560
for vehicle rendezvous and docking of

225
00:09:38,809 --> 00:09:36,060
course as well as things like

226
00:09:43,699 --> 00:09:38,819
deforestation there's just a very broad

227
00:09:46,850 --> 00:09:43,709
application of this technology so that

228
00:09:49,220 --> 00:09:46,860
was my last data slide so we're really

229
00:09:52,040 --> 00:09:49,230
excited for the rear on oovoo whether

230
00:09:57,290 --> 00:09:52,050
its sensors are ready to go and expect

231
00:09:59,869 --> 00:09:57,300
rugged vns data for the rendezvous Betty

232
00:10:01,910 --> 00:09:59,879
another great we'll start with questions

233
00:10:03,619 --> 00:10:01,920
here in Houston please remember to

234
00:10:05,389 --> 00:10:03,629
identify yourself by a name and

235
00:10:09,470 --> 00:10:05,399
organization and please step to the mic

236
00:10:11,900 --> 00:10:09,480
to ask your questions yes Phillips lost

237
00:10:16,129 --> 00:10:11,910
with NASA Space Flight calm for Gary on

238
00:10:19,220 --> 00:10:16,139

the o2 transfer was that was at airlock

239
00:10:22,040 --> 00:10:19,230
tanks and at Mission atmosphere or one

240
00:10:24,410 --> 00:10:22,050
or the other yeah the what we wrapped up

241
00:10:27,170 --> 00:10:24,420
today was actually the internal

242
00:10:29,079 --> 00:10:27,180
atmosphere transfer we we we took care

243
00:10:32,269 --> 00:10:29,089
of the topped off that station tanks

244
00:10:33,949 --> 00:10:32,279
yesterday and if you got the numbers

245
00:10:36,319 --> 00:10:33,959
here if you want them we we transferred

246
00:10:40,579 --> 00:10:36,329
about 17 pounds into the station tanks

247
00:10:42,499 --> 00:10:40,589
and they're all topped off and so for

248
00:10:46,460 --> 00:10:42,509
the internal atmospheric transfer we

249
00:10:49,610 --> 00:10:46,470
provided about 278 pounds of oxygen from

250
00:10:50,900 --> 00:10:49,620
the shuttle tanks to the station so so

251
00:10:54,379 --> 00:10:50,910
that's what we got accomplished here in

252
00:10:56,389 --> 00:10:54,389
the last week and a half thanks and I'm

253
00:10:59,629 --> 00:10:56,399
not sure if this is for for you or for

254
00:11:01,639 --> 00:10:59,639
Heather in the undocking timeline and

255
00:11:03,679 --> 00:11:01,649
the rear onder view timeline that the

256
00:11:06,079 --> 00:11:03,689
henna we got here it talks about the

257
00:11:06,569 --> 00:11:06,089
station going to the dto attitude after

258
00:11:08,699 --> 00:11:06,579
an

259
00:11:12,299 --> 00:11:08,709
is that just a minor difference between

260
00:11:13,979 --> 00:11:12,309
the the undocking attitude the normal

261
00:11:15,689 --> 00:11:13,989
and docking attitude thanks yeah it's

262
00:11:20,189 --> 00:11:15,699
actually just a couple degrees pitched

263
00:11:23,400 --> 00:11:20,199

down and that allows the storm sensors

264
00:11:25,470 --> 00:11:23,410
to acquire the the key reflective

265
00:11:26,939 --> 00:11:25,480
targets on their really the Russian side

266
00:11:29,519 --> 00:11:26,949
of the vehicles were coming from behind

267
00:11:32,669 --> 00:11:29,529
and below so they get their initial

268
00:11:35,280 --> 00:11:32,679
acquisition accomplished in Lafayette

269
00:11:38,039 --> 00:11:35,290
any more details a minute early we

270
00:11:40,259 --> 00:11:38,049
weren't really needing that kind of a

271
00:11:41,789 --> 00:11:40,269
special attitude hold until that the

272
00:11:44,220 --> 00:11:41,799
flight slipped into the time frame where

273
00:11:46,799 --> 00:11:44,230
the ATV was docked to the aft end and it

274
00:11:49,350 --> 00:11:46,809
blocked off most of the reflectors that

275
00:11:51,720 --> 00:11:49,360
were back there and of course not

276
00:11:53,220 --> 00:11:51,730
knowing we had improved the sensor in

277
00:11:54,929 --> 00:11:53,230
orbit yet we want to give ourselves the

278
00:11:58,949 --> 00:11:54,939
best chance of having those reflectors

279
00:12:01,049 --> 00:11:58,959
pointing toward the shuttle as it came

280
00:12:05,129 --> 00:12:01,059
in so we'd have the best look angles to

281
00:12:08,939 --> 00:12:05,139
those reflectors and so station agreed

282
00:12:11,549 --> 00:12:08,949
to hold that attitude for us to increase

283
00:12:12,960 --> 00:12:11,559
our chances of getting that and we have

284
00:12:16,229 --> 00:12:12,970
no doubts any more based on what we saw

285
00:12:20,039 --> 00:12:16,239
for rendezvous okay do we have other

286
00:12:23,579 --> 00:12:20,049
questions Robert Robert problem with

287
00:12:25,619 --> 00:12:23,589
collectspace.com I think for Gary first

288
00:12:28,169 --> 00:12:25,629

a couple questions about things that

289
00:12:30,030 --> 00:12:28,179
were in the execute package today there

290
00:12:33,629 --> 00:12:30,040
was an area of interest I guess for the

291
00:12:35,819 --> 00:12:33,639
fly around on the ATV just describe what

292
00:12:38,729 --> 00:12:35,829
what it is and why they need imagery of

293
00:12:41,400 --> 00:12:38,739
it yeah can touch on that I don't know

294
00:12:43,979 --> 00:12:41,410
too many of the details but I know when

295
00:12:46,319 --> 00:12:43,989
they when they initially launched and

296
00:12:48,509 --> 00:12:46,329
separated from their launch vehicle they

297
00:12:51,350 --> 00:12:48,519
saw something a little bit off nominal

298
00:12:53,729 --> 00:12:51,360
and so they want to get some images of

299
00:12:57,119 --> 00:12:53,739
kind of the aft end of the vehicle where

300
00:12:58,829 --> 00:12:57,129
it was attached to launch vehicle and

301
00:13:01,319 --> 00:12:58,839
see if they can get some some kind of

302
00:13:04,379 --> 00:13:01,329
indication of help them explain what

303
00:13:05,489 --> 00:13:04,389
they saw on launch day so we're going to

304
00:13:07,919 --> 00:13:05,499
take about 10 minutes out of the

305
00:13:09,419 --> 00:13:07,929
45-minute fly around and go ahead and

306
00:13:12,299 --> 00:13:09,429
focus in on that area and get a bunch of

307
00:13:13,859 --> 00:13:12,309
imagery forum and then we'll go ahead

308
00:13:16,420 --> 00:13:13,869
and configure back and get the rest of

309
00:13:18,970 --> 00:13:16,430
our normal fly around photos thanks

310
00:13:21,100 --> 00:13:18,980
and for Heather there's also a note

311
00:13:24,250 --> 00:13:21,110
about the docking camera not being

312
00:13:26,560 --> 00:13:24,260
available to storm ops can you share

313
00:13:31,360 --> 00:13:26,570

what what impact that has if any on the

314
00:13:33,430 --> 00:13:31,370
dtl sure thanks we had an issue with the

315
00:13:36,760 --> 00:13:33,440
data recorder that records the camera

316
00:13:39,040 --> 00:13:36,770
data during some docs activities we

317
00:13:40,930 --> 00:13:39,050
pulled data off our recorders and we

318
00:13:44,050 --> 00:13:40,940
were seeing some strange behaviors

319
00:13:46,780 --> 00:13:44,060
during that time so we added a checkout

320
00:13:49,329 --> 00:13:46,790
activity on flight day 13 and when we

321
00:13:51,730 --> 00:13:49,339
were trying to perform that activity the

322
00:13:55,290 --> 00:13:51,740
data recorder would not complete its

323
00:13:57,730 --> 00:13:55,300
initialization so at this point it looks

324
00:14:00,340 --> 00:13:57,740
likely that we won't be able to record

325
00:14:03,040 --> 00:14:00,350
any docking camera data on the undock

326
00:14:04,900 --> 00:14:03,050
andrey rendezvous so that's that's a big

327
00:14:06,880 --> 00:14:04,910
disappointment to the Storn team we're

328
00:14:08,860 --> 00:14:06,890
really fortunate that we got great data

329
00:14:11,050 --> 00:14:08,870
on rendezvous we met about two thirds of

330
00:14:13,360 --> 00:14:11,060
our objectives already there were some

331
00:14:16,180 --> 00:14:13,370
lighting objectives that we didn't get

332
00:14:18,280 --> 00:14:16,190
to see Sun entering and exiting the

333
00:14:19,720 --> 00:14:18,290
field of view and a few other of the

334
00:14:22,870 --> 00:14:19,730
harsh lighting conditions we are hoping

335
00:14:26,829 --> 00:14:22,880
to assess with the camera it we have

336
00:14:29,190 --> 00:14:26,839
procedures prepared for drew that if the

337
00:14:31,840 --> 00:14:29,200
recorder comes up nominally tomorrow

338
00:14:34,240 --> 00:14:31,850

he'll follow a different set of

339
00:14:37,090 --> 00:14:34,250
procedures than if it if it does not

340
00:14:39,100 --> 00:14:37,100
initialize correctly tomorrow then he'll

341
00:14:41,579 --> 00:14:39,110
have to go and run a couple of extra

342
00:14:45,400 --> 00:14:41,589
steps to power some things down for us

343
00:14:48,490 --> 00:14:45,410
and in the larger sense of the full test

344
00:14:50,380 --> 00:14:48,500
will that lack of a lack of data mean

345
00:14:53,740 --> 00:14:50,390
that you need another qualification run

346
00:14:55,530 --> 00:14:53,750
to fully test out this system or what it

347
00:14:58,000 --> 00:14:55,540
whatever you get will be sufficient

348
00:15:01,510 --> 00:14:58,010
whatever we get will be sufficient and

349
00:15:04,360 --> 00:15:01,520
the the rear on oovoo was most designed

350
00:15:06,730 --> 00:15:04,370
for the vns to meet the vns objectives

351
00:15:09,490 --> 00:15:06,740
so we have our primary objective coming

352
00:15:11,800 --> 00:15:09,500
up at that long range on the rear on

353
00:15:14,199 --> 00:15:11,810
oovoo trajectory for the vns and it was

354
00:15:15,639 --> 00:15:14,209
another opportunity to try to expand the

355
00:15:17,530 --> 00:15:15,649
range of lighting conditions that we

356
00:15:19,150 --> 00:15:17,540
would see on orbit that's one of those

357
00:15:21,460 --> 00:15:19,160
real tricky things to simulate on the

358
00:15:23,560 --> 00:15:21,470
ground with cameras as much as you try

359
00:15:26,220 --> 00:15:23,570
Sun simulators and there's that

360
00:15:29,500 --> 00:15:26,230
harshness of the orbital shadowing and

361
00:15:30,280 --> 00:15:29,510
lighting conditions we got to see a lot

362
00:15:31,749 --> 00:15:30,290
of those

363
00:15:34,629 --> 00:15:31,759

types of things during rendezvous we saw

364
00:15:37,840 --> 00:15:34,639
some good Sun glints and some of those

365
00:15:40,410 --> 00:15:37,850
other things we saw a sunset on the

366
00:15:44,019 --> 00:15:40,420
station that we we got during rendezvous

367
00:15:47,410 --> 00:15:44,029
so we we were fortunate that we got as

368
00:15:50,530 --> 00:15:47,420
much as we did and I think we'll we feel

369
00:15:52,389 --> 00:15:50,540
will have been able to assess enough to

370
00:15:55,420 --> 00:15:52,399
feel that camera will be a good camera

371
00:15:58,389 --> 00:15:55,430
to use for Orion and one last question

372
00:16:00,370 --> 00:15:58,399
for Gary do you have transfer totals how

373
00:16:03,999 --> 00:16:00,380
much was moved cargo lies between

374
00:16:08,579 --> 00:16:04,009
shuttle and station I do not but we can

375
00:16:11,499 --> 00:16:08,589
easily get those for you okay Denise

376
00:16:16,780 --> 00:16:11,509
Denise Chow space.com are a question for

377
00:16:18,129 --> 00:16:16,790
Heather for the the storm sensors other

378
00:16:19,509 --> 00:16:18,139
than the five reflectors that were put

379
00:16:20,680 --> 00:16:19,519
on the docking target from the last

380
00:16:22,300 --> 00:16:20,690
mission is there anything else that

381
00:16:25,569 --> 00:16:22,310
would need to be added to the station

382
00:16:30,069 --> 00:16:25,579
for it to be used with the MPCV or Orion

383
00:16:32,769 --> 00:16:30,079
capsule at this point no I think that

384
00:16:35,680 --> 00:16:32,779
the fact that storm has proven that that

385
00:16:38,710 --> 00:16:35,690
the sensor can lock on is further than

386
00:16:40,210 --> 00:16:38,720
five kilometers out allows them to have

387
00:16:42,970 --> 00:16:40,220
the good relative navigation information

388
00:16:45,460 --> 00:16:42,980

they need to target their burns for prox

389
00:16:47,230 --> 00:16:45,470
ops and approaching station for docking

390
00:16:49,090 --> 00:16:47,240
so that was that was the biggest thing

391
00:16:51,400 --> 00:16:49,100
to prove out there's no light our

392
00:16:54,280 --> 00:16:51,410
sensors today that go anywhere near five

393
00:16:56,050 --> 00:16:54,290
kilometers and so to have that proven

394
00:16:59,829 --> 00:16:56,060
out and to a lot of those models to go

395
00:17:01,720 --> 00:16:59,839
feed back into the MV cv project and to

396
00:17:04,840 --> 00:17:01,730
know that the surfaces are reflective

397
00:17:07,480 --> 00:17:04,850
enough as is at those ranges that was

398
00:17:09,909 --> 00:17:07,490
that was a big thing to go and prove and

399
00:17:11,380 --> 00:17:09,919
then a question for Gary I must wonder

400
00:17:13,090 --> 00:17:11,390
if you could share some of your thoughts

401
00:17:17,199 --> 00:17:13,100
on them endeavor and docking for the

402
00:17:20,730 --> 00:17:17,209
final time thanks sure so um obviously

403
00:17:23,199 --> 00:17:20,740
you know we've been focusing on this

404
00:17:26,260 --> 00:17:23,209
very long very complex mission for a

405
00:17:28,449 --> 00:17:26,270
long time and you know I think it's

406
00:17:30,039 --> 00:17:28,459
really going to hit home after endeavor

407
00:17:34,360 --> 00:17:30,049
sitting on the runway there hopefully in

408
00:17:36,580 --> 00:17:34,370
Florida and in a couple days but you

409
00:17:38,320 --> 00:17:36,590
know she's really been a great ship like

410
00:17:40,000 --> 00:17:38,330
I said almost performed flawlessly his

411
00:17:42,100 --> 00:17:40,010
flight really the only a couple little

412
00:17:44,470 --> 00:17:42,110
issues we saw we're really nits

413
00:17:46,299 --> 00:17:44,480

and you know it is a real testament to

414
00:17:48,669 --> 00:17:46,309
the KSC team that prepares the vehicles

415
00:17:50,890 --> 00:17:48,679
that that we go off and execute these

416
00:17:53,140 --> 00:17:50,900
missions with so so it's going to be

417
00:17:55,270 --> 00:17:53,150
it's going to be sad to see see retire

418
00:17:59,430 --> 00:17:55,280
but I can think of a better mission for

419
00:18:02,289 --> 00:17:59,440
for her to have her last flight with so

420
00:18:04,299 --> 00:18:02,299
any additional questions here in Houston

421
00:18:06,480 --> 00:18:04,309
a cig none we'll move on to put

422
00:18:10,000 --> 00:18:06,490
reporters on the phone bridge marker oh

423
00:18:12,460 --> 00:18:10,010
yes thanks mark row for aviation week

424
00:18:15,310 --> 00:18:12,470
and I have two questions the first one

425
00:18:17,770 --> 00:18:15,320
is for Gary locker I just wondered

426
00:18:22,020 --> 00:18:17,780
if the reboost was part of the

427
00:18:26,880 --> 00:18:22,030
preparations for the Soyuz 27 s mission

428
00:18:30,370 --> 00:18:26,890
coming up in June or some other reason

429
00:18:31,930 --> 00:18:30,380
yeah so you know the space station you

430
00:18:33,850 --> 00:18:31,940
think that vehicles come in and going on

431
00:18:36,520 --> 00:18:33,860
a regular basis the progress ships for

432
00:18:40,480 --> 00:18:36,530
the Soyuz vehicles as well as shuttles

433
00:18:41,860 --> 00:18:40,490
and you know HD vs etc so you know

434
00:18:43,390 --> 00:18:41,870
stations got to look at this from a

435
00:18:45,490 --> 00:18:43,400
long-term perspective so they're always

436
00:18:48,250 --> 00:18:45,500
looking at you know making sure that the

437
00:18:50,799 --> 00:18:48,260
vehicles in front of them especially the

438
00:18:52,770 --> 00:18:50,809

soils like you mentioned are going to be

439
00:18:55,600 --> 00:18:52,780
have the right conditions for their

440
00:18:59,049 --> 00:18:55,610
re-entry and landing that's key so

441
00:19:00,100 --> 00:18:59,059
between a TV being there I think they're

442
00:19:03,039 --> 00:19:00,110
going to be there about another month

443
00:19:05,440 --> 00:19:03,049
and with the orbiter there they

444
00:19:07,810 --> 00:19:05,450
basically they already had a plan to

445
00:19:10,720 --> 00:19:07,820
manager their altitude to meet all

446
00:19:13,090 --> 00:19:10,730
everybody's requirements and then they

447
00:19:14,770 --> 00:19:13,100
were able to go ahead and accept a

448
00:19:16,870 --> 00:19:14,780
little bit of reboost from us as well

449
00:19:19,600 --> 00:19:16,880
and still make everything work out down

450
00:19:21,190 --> 00:19:19,610
down the road so you know it's it's just

451
00:19:23,650 --> 00:19:21,200
a constant thing you do it space station

452
00:19:25,810 --> 00:19:23,660
is you continue to work your altitude

453
00:19:28,270 --> 00:19:25,820
and all your your vehicles come in and

454
00:19:30,940 --> 00:19:28,280
go in so really nothing unique here it's

455
00:19:32,200 --> 00:19:30,950
just we were able to provide a little

456
00:19:35,730 --> 00:19:32,210
bit of propellant a little bit of help

457
00:19:38,980 --> 00:19:35,740
to him and so it worked out really well

458
00:19:42,810 --> 00:19:38,990
okay thank you I had a question for

459
00:19:45,480 --> 00:19:42,820
Heather Hinkle I've heard that the storm

460
00:19:49,720 --> 00:19:45,490
sensors that are being tested could be

461
00:19:51,280 --> 00:19:49,730
part of the Cirrus bricks mission I

462
00:19:53,680 --> 00:19:51,290
think I said that right that was

463
00:19:55,630 --> 00:19:53,690

announced last week or the asteroid

464
00:19:58,180 --> 00:19:55,640
sample return mission

465
00:20:01,240 --> 00:19:58,190
I just wondered if that was so and if

466
00:20:05,380 --> 00:20:01,250
correct how how the sensors might be

467
00:20:07,540 --> 00:20:05,390
used well i guess thanks for the

468
00:20:09,550 --> 00:20:07,550
question we actually received some

469
00:20:13,330 --> 00:20:09,560
emails from that group during this

470
00:20:15,010 --> 00:20:13,340
mission asking how it how's everything

471
00:20:18,400 --> 00:20:15,020
going we're really looking forward to

472
00:20:20,440 --> 00:20:18,410
using a sensor we've chosen the vns as

473
00:20:22,660 --> 00:20:20,450
our proxy up sensor for this mission and

474
00:20:24,520 --> 00:20:22,670
we'd really like to hear about how

475
00:20:26,830 --> 00:20:24,530
things went and share some data with you

476
00:20:30,670 --> 00:20:26,840
or if you could share some data with us

477
00:20:32,350 --> 00:20:30,680
and so we sort of said everything's

478
00:20:34,600 --> 00:20:32,360
going great and we love to meet with you

479
00:20:38,140 --> 00:20:34,610
but you got to get wait till after the

480
00:20:41,470 --> 00:20:38,150
mission we're pretty busy with all the

481
00:20:44,050 --> 00:20:41,480
preparing for all this but as you saw

482
00:20:46,420 --> 00:20:44,060
from the very last light especially if

483
00:20:48,460 --> 00:20:46,430
you went would approach something that

484
00:20:51,010 --> 00:20:48,470
had no reflective elements on it for you

485
00:20:52,660 --> 00:20:51,020
the vns can paint you a complete

486
00:20:54,880 --> 00:20:52,670
three-dimensional picture of where

487
00:20:57,700 --> 00:20:54,890
you're going so I think we will have a

488
00:21:00,430 --> 00:20:57,710

lot of really great data that we can

489
00:21:02,860 --> 00:21:00,440
hopefully find a way to do some great

490
00:21:04,510 --> 00:21:02,870
sharing with that project and they can

491
00:21:06,520 --> 00:21:04,520
utilize that to help build some

492
00:21:09,460 --> 00:21:06,530
algorithms we're also working with

493
00:21:12,310 --> 00:21:09,470
another gutter group building another

494
00:21:14,470 --> 00:21:12,320
vns and the same sort of purpose which

495
00:21:16,420 --> 00:21:14,480
would be where you don't have any

496
00:21:18,910 --> 00:21:16,430
reflective surfaces that you've put on

497
00:21:21,430 --> 00:21:18,920
there in known locations and you have to

498
00:21:23,650 --> 00:21:21,440
use that raw three-dimensional range and

499
00:21:27,330 --> 00:21:23,660
intensity image to do europe your

500
00:21:30,640 --> 00:21:27,340
ranging and approach information with

501
00:21:34,060 --> 00:21:30,650
and I meant it if I might follow on that

502
00:21:36,880 --> 00:21:34,070
does that mean you're going to sort of

503
00:21:40,600 --> 00:21:36,890
look into the possibility of using the

504
00:21:45,160 --> 00:21:40,610
sensors for that mission or that's to be

505
00:21:48,850 --> 00:21:45,170
determined way down the road so I'm not

506
00:21:52,900 --> 00:21:48,860
sure I understood your question yo yet

507
00:21:54,970 --> 00:21:52,910
way I see the storm group yeah I just

508
00:21:57,880 --> 00:21:54,980
wondered if the storm sensors were a

509
00:22:01,390 --> 00:21:57,890
possible part of that mission or it they

510
00:22:05,320 --> 00:22:01,400
will be used as part of that fight okay

511
00:22:07,750 --> 00:22:05,330
so I understand so the storm vns sensor

512
00:22:09,130 --> 00:22:07,760
is the particular one that there that

513
00:22:14,080 --> 00:22:09,140

they have chosen to use for their

514
00:22:17,740 --> 00:22:14,090
mission so I the storm mission has sort

515
00:22:21,280 --> 00:22:17,750
of proven out in space the ability to

516
00:22:24,820 --> 00:22:21,290
track surfaces to provide this very high

517
00:22:27,460 --> 00:22:24,830
highly accurate three-dimensional image

518
00:22:29,560 --> 00:22:27,470
of what you're approaching and I think

519
00:22:32,370 --> 00:22:29,570
that they'll find that the data is going

520
00:22:38,680 --> 00:22:32,380
to be extremely useful for their mission

521
00:22:42,880 --> 00:22:38,690
thank you Dad it mark yes sir thank you

522
00:22:46,360 --> 00:22:42,890
Steven Clark I think so for taking my

523
00:22:48,850 --> 00:22:46,370
call you are one of you refresh us on on

524
00:22:53,440 --> 00:22:48,860
which crew members play what roles on

525
00:22:56,170 --> 00:22:53,450
the storm we rendezvous do box and Mark

526
00:22:58,120 --> 00:22:56,180
Kelly switch positions in terms of who's

527
00:23:03,610 --> 00:22:58,130
overseeing the piloting duties during

528
00:23:06,100 --> 00:23:03,620
that Rwanda reproach yeah so so box will

529
00:23:07,660 --> 00:23:06,110
be on the controls once we open the

530
00:23:10,030 --> 00:23:07,670
hooks and start backing endeavour away

531
00:23:12,610 --> 00:23:10,040
from the space station he'll he'll be a

532
00:23:14,920 --> 00:23:12,620
controlling it flying it back out on the

533
00:23:16,960 --> 00:23:14,930
v-bar till till he gets about 400 feet

534
00:23:18,940 --> 00:23:16,970
or so and then it'll initiate the fly

535
00:23:20,320 --> 00:23:18,950
around activity and he will be in

536
00:23:24,910 --> 00:23:20,330
control the vehicle for the whole fly

537
00:23:26,680 --> 00:23:24,920
around one step one is complete box a

538
00:23:28,810 --> 00:23:26,690

marker in a swap positions and mark will

539
00:23:32,280 --> 00:23:28,820
be flying the storm rerun of a

540
00:23:34,990 --> 00:23:32,290
trajectory and doing all those burns oh

541
00:23:38,050 --> 00:23:35,000
and I'm sorry I guess the obviously

542
00:23:40,270 --> 00:23:38,060
Drew's going to be our key guy on the

543
00:23:42,490 --> 00:23:40,280
storm laptop and and all the stored

544
00:23:45,190 --> 00:23:42,500
procedures these are he's our go-to guy

545
00:23:52,080 --> 00:23:45,200
for storms so until that's going to play

546
00:23:55,120 --> 00:23:52,090
out all right thank you Bill Harwood

547
00:23:57,190 --> 00:23:55,130
yeah thanks 24 for Heather you mentioned

548
00:23:58,660 --> 00:23:57,200
that this has possible applications for

549
00:24:00,880 --> 00:23:58,670
displacement is this something that a

550
00:24:05,010 --> 00:24:00,890
commercial manned spacecraft provider

551
00:24:09,070 --> 00:24:05,020
could licensed for use yes absolutely

552
00:24:11,950 --> 00:24:09,080
this has very valid application for any

553
00:24:13,600 --> 00:24:11,960
space vehicle trying to perform the

554
00:24:17,410 --> 00:24:13,610
function of rendezvous and docking

555
00:24:19,780 --> 00:24:17,420
either with another vehicle or trying to

556
00:24:22,010 --> 00:24:19,790
land it on a surface or to rendezvous

557
00:24:23,980 --> 00:24:22,020
into close proximity with

558
00:24:26,720 --> 00:24:23,990
something else that's out in space

559
00:24:28,490 --> 00:24:26,730
Thanks and then the standard reporter

560
00:24:30,500 --> 00:24:28,500
question is there a cost that goes with

561
00:24:34,750 --> 00:24:30,510
this test today the hardware and what is

562
00:24:37,370 --> 00:24:34,760
costs put it together yeah the that

563
00:24:41,300 --> 00:24:37,380

putting together the sensor sort of came

564
00:24:43,610 --> 00:24:41,310
from three different flavors the Orion

565
00:24:46,550 --> 00:24:43,620
project there's always a set of

566
00:24:48,800 --> 00:24:46,560
non-recurring engineering costs to get

567
00:24:52,730 --> 00:24:48,810
your foundry set up to build your very

568
00:24:56,210 --> 00:24:52,740
high highly technical detector that

569
00:24:58,160 --> 00:24:56,220
detects the laser light so there's that

570
00:25:01,490 --> 00:24:58,170
sort of underlying cost that's a

571
00:25:05,120 --> 00:25:01,500
one-time thing then the work to put the

572
00:25:07,760 --> 00:25:05,130
actual unit together test the unit and

573
00:25:09,560 --> 00:25:07,770
also the camera that was paid for under

574
00:25:12,890 --> 00:25:09,570
Orion as well under a different contract

575
00:25:15,380 --> 00:25:12,900
and then Lockheed Martin actually

576
00:25:17,990 --> 00:25:15,390
purchased the vns unit and is letting

577
00:25:20,120 --> 00:25:18,000
the government borrow it to fly on storm

578
00:25:22,550 --> 00:25:20,130
and then it will go back to their ground

579
00:25:26,390 --> 00:25:22,560
facility in Denver where they'll

580
00:25:29,570 --> 00:25:26,400
recreate the about 200 feet in storm

581
00:25:32,660 --> 00:25:29,580
trajectory from rendezvous and docking

582
00:25:35,390 --> 00:25:32,670
on the vivar and use that to update

583
00:25:39,220 --> 00:25:35,400
models and to practice their GNC

584
00:25:44,420 --> 00:25:39,230
algorithms so it's sort of a

585
00:25:46,910 --> 00:25:44,430
conglomeration of cost well no I

586
00:25:48,260 --> 00:25:46,920
understand that what number is there out

587
00:25:55,910 --> 00:25:48,270
there however you want to characterize

588
00:25:58,220 --> 00:25:55,920

it let's see it's in the order of tens

589
00:26:00,560 --> 00:25:58,230
of millions by the time you add in all

590
00:26:06,320 --> 00:26:00,570
the non-recurring engineering the unit

591
00:26:09,800 --> 00:26:06,330
itself is was less than two million

592
00:26:13,250 --> 00:26:09,810
dollars i believe and then the cost to

593
00:26:17,000 --> 00:26:13,260
do all of the preparation of the unit

594
00:26:19,490 --> 00:26:17,010
the tech the qualification testing for

595
00:26:21,140 --> 00:26:19,500
environmental certifying it to fly in

596
00:26:26,100 --> 00:26:21,150
the shuttle that was under 10 million

597
00:26:31,880 --> 00:26:28,560
okay I believe we know how we have no

598
00:26:34,500 --> 00:26:31,890
further questions so on the transfer

599
00:26:36,570 --> 00:26:34,510
question we we don't have a number from

600
00:26:38,789 --> 00:26:36,580
late today earlier in the crew day that

601
00:26:41,730 --> 00:26:38,799
was about eighty-two percent complete we

602
00:26:46,410 --> 00:26:41,740
expect some fresher numbers in a tag up

603
00:26:49,410 --> 00:26:46,420
a little bit later today that will

604
00:26:52,350 --> 00:26:49,420
conclude today's briefing you can follow

605
00:26:57,120 --> 00:26:52,360
activities of endeavor and the