1
00:01:10,799 --> 00:01:17,350
oh

2
00:01:17,360 --> 00:01:59,830
in the house

3
00:02:09,510 --> 00:02:02,069
good morning discovery a little stevie

4
00:02:13,589 --> 00:02:11,350
and mark that's what i call wake up

5
00:02:16,229 --> 00:02:13,599
music we're all wide eyes

6
00:02:35,430 --> 00:02:16,239
but still here now thanks a lot

7
00:02:40,070 --> 00:02:37,990
as steve uh as you're going into

8
00:02:42,630 --> 00:02:40,080
observation 1-4 we'd like for you to

9
00:02:44,229 --> 00:02:42,640
disconnect the j2 connector on the power

10
00:02:47,430 --> 00:02:44,239
interface box and we'll see if that

11
00:02:51,670 --> 00:02:49,030
okay and

12
00:02:53,030 --> 00:02:51,680
you see a decent image of the comment on

13
00:02:55,190 --> 00:02:53,040

your screen right now is it just too

14
00:03:24,390 --> 00:02:55,200
messy to see

15
00:03:30,949 --> 00:03:26,710
discovery houston we have the parameters

16
00:03:49,190 --> 00:03:30,959
for an upcoming maneuver at 15 colon 3-0

17
00:03:53,589 --> 00:03:51,430
discovery houston just let you know that

18
00:03:55,589 --> 00:03:53,599
the ground is about to initiate a fuel

19
00:03:59,670 --> 00:03:55,599
cell purge and with that

20
00:04:01,509 --> 00:03:59,680
the planning shift is heading off and

21
00:04:03,270 --> 00:04:01,519
wayne hale is here and

22
00:04:05,190 --> 00:04:03,280
billy mack will be talking to you and

23
00:04:06,550 --> 00:04:05,200
for us it was rather exciting to have

24
00:04:08,309 --> 00:04:06,560
the opportunity

25
00:04:10,390 --> 00:04:08,319
to talk to you

26
00:04:15,429 --> 00:04:10,400
at the beginning of your wake up and

27
00:04:19,189 --> 00:04:17,909
okay mark uh we copy that we appreciate

28
00:04:21,030 --> 00:04:19,199
all y'all's work through the night to

29
00:04:22,310 --> 00:04:21,040
replay our days i know we have some busy

30
00:04:24,390 --> 00:04:22,320
days and y'all go through a lot of

31
00:04:26,469 --> 00:04:24,400
efforts with the fao and

32
00:04:27,990 --> 00:04:26,479
all the different payloads to try to get

33
00:04:30,150 --> 00:04:28,000
it all organized and we sure do

34
00:04:32,070 --> 00:04:30,160
appreciate that too bad we don't get to

35
00:04:33,510 --> 00:04:32,080
talk to you a little bit more before you

36
00:04:50,710 --> 00:04:33,520
sign off but i know you're ready to go

37
00:05:01,510 --> 00:04:52,230
hello

38
00:05:03,749 --> 00:05:01,520

us we read new uh loud claire

39
00:05:06,070 --> 00:05:03,759
i see you pretty well you know you're

40
00:05:08,830 --> 00:05:06,080
seems to having fun you look pretty good

41
00:05:13,350 --> 00:05:08,840
from up from here how we

42
00:05:17,590 --> 00:05:15,110
well with this inclination we've gone

43
00:05:19,909 --> 00:05:17,600
have many many passes over canada so far

44
00:05:21,430 --> 00:05:19,919
we'll have many more and i've had a

45
00:05:23,350 --> 00:05:21,440
fabulous look at

46
00:05:26,070 --> 00:05:23,360
most parts of canada now good shots of

47
00:05:28,390 --> 00:05:26,080
vancouver calgary and edmonton beautiful

48
00:05:30,710 --> 00:05:28,400
uh view of montreal this morning

49
00:05:32,469 --> 00:05:30,720
and maritimes a couple days ago so we've

50
00:05:34,390 --> 00:05:32,479
had a great time

51
00:05:35,909 --> 00:05:34,400
looking at canada from up here

52
00:05:37,670 --> 00:05:35,919
good i'm very happy for you you have

53
00:05:40,790 --> 00:05:37,680
been a very patient man you're a bit

54
00:05:43,510 --> 00:05:40,800
like me you had to wait 14 years before

55
00:05:48,070 --> 00:05:43,520
you managed to go there i had to wait 30

56
00:05:51,189 --> 00:05:49,430
that's why you're leading us and i'm

57
00:05:53,430 --> 00:05:51,199
just a follower i'm only halfway behind

58
00:05:55,430 --> 00:05:53,440
you there

59
00:05:57,909 --> 00:05:55,440
so uh

60
00:05:59,430 --> 00:05:57,919
you're doing some pretty important

61
00:06:01,590 --> 00:05:59,440
experiment uh

62
00:06:02,790 --> 00:06:01,600
there for for us can you describe some

63
00:06:07,110 --> 00:06:02,800

of it for

64
00:06:09,670 --> 00:06:07,120
for other canadians who are watching

65
00:06:11,830 --> 00:06:09,680
sure in fact the main experiments that

66
00:06:13,670 --> 00:06:11,840
i'm involved in up here is testing what

67
00:06:15,189 --> 00:06:13,680
we call the microgravity vibration

68
00:06:17,189 --> 00:06:15,199
isolation mode

69
00:06:19,029 --> 00:06:17,199
and this is a system that isolates

70
00:06:20,790 --> 00:06:19,039
experiments fluid physics material

71
00:06:22,710 --> 00:06:20,800
science experiments protein crystal

72
00:06:24,070 --> 00:06:22,720
growth experiments of the type that

73
00:06:26,469 --> 00:06:24,080
we're going to do on the space station

74
00:06:28,309 --> 00:06:26,479
starting sometime after next year it

75
00:06:29,670 --> 00:06:28,319
isolates them from the vibrations that

76
00:06:31,590 --> 00:06:29,680
are

77
00:06:33,430 --> 00:06:31,600
in the spacecraft itself

78
00:06:35,350 --> 00:06:33,440
you spend a fair bit of effort getting

79
00:06:37,110 --> 00:06:35,360
experiments into the nice environment

80
00:06:39,189 --> 00:06:37,120
here in space to add to the kind of

81
00:06:41,350 --> 00:06:39,199
things you can do at laps on the ground

82
00:06:42,790 --> 00:06:41,360
and now this last little bit actually

83
00:06:44,710 --> 00:06:42,800
just cleans the environment up for the

84
00:06:46,309 --> 00:06:44,720
experiments uh just that last little

85
00:06:48,790 --> 00:06:46,319
tweak to get it right down to the micro

86
00:06:49,830 --> 00:06:48,800
g acceleration level

87
00:06:52,230 --> 00:06:49,840
and i

88
00:06:54,309 --> 00:06:52,240

understand that you had some uh

89
00:06:56,550 --> 00:06:54,319
experiment with some students from

90
00:06:59,029 --> 00:06:56,560
saskatchewan the other day

91
00:07:00,790 --> 00:06:59,039
so was it all right yes there was 20

92
00:07:02,390 --> 00:07:00,800
students that talked to me a day or two

93
00:07:03,909 --> 00:07:02,400
ago and they had a

94
00:07:06,150 --> 00:07:03,919
good set of questions all ready to go

95
00:07:09,830 --> 00:07:06,160
and i enjoyed that very much

96
00:07:12,390 --> 00:07:09,840
good then are you using canadarm

97
00:07:13,830 --> 00:07:12,400
you know the our arm that

98
00:07:15,749 --> 00:07:13,840
we see

99
00:07:17,029 --> 00:07:15,759
being used in this trip so do you use

100
00:07:20,390 --> 00:07:17,039
the one that

101
00:07:23,909 --> 00:07:21,990
yeah in fact we use the canada arm on

102
00:07:26,469 --> 00:07:23,919
the very first day of the flight uh you

103
00:07:28,309 --> 00:07:26,479
know a few hours after an orbit here to

104
00:07:30,550 --> 00:07:28,319
launch the crystal spa satellite which

105
00:07:32,790 --> 00:07:30,560
is co-orbiting with us about 40 miles

106
00:07:34,309 --> 00:07:32,800
behind us right now and it's actually

107
00:07:36,070 --> 00:07:34,319
doing a lot of measurements of the upper

108
00:07:37,749 --> 00:07:36,080
atmosphere to better understand the

109
00:07:38,790 --> 00:07:37,759
dynamics of the upper atmosphere and the

110
00:07:41,189 --> 00:07:38,800
ozone

111
00:07:42,710 --> 00:07:41,199
problem in the upper atmosphere

112
00:07:44,950 --> 00:07:42,720
we will use it again towards the end of

113
00:07:46,230 --> 00:07:44,960

the visor retrieve that and in between

114
00:07:50,070 --> 00:07:46,240
we've used it on a couple other

115
00:07:53,270 --> 00:07:51,350
well hey there's a great privilege for

116
00:07:54,710 --> 00:07:53,280
me to be able to be up here representing

117
00:07:55,990 --> 00:07:54,720
canada

118
00:07:57,830 --> 00:07:56,000
and i've

119
00:07:59,189 --> 00:07:57,840
enjoyed the work with the space agency

120
00:08:00,950 --> 00:07:59,199
for a number of years getting up there

121
00:08:02,070 --> 00:08:00,960
and i think it's a great privilege to uh

122
00:08:03,990 --> 00:08:02,080
i'm very honored to be up here

123
00:08:05,749 --> 00:08:04,000
representing canada and we do get a

124
00:08:07,990 --> 00:08:05,759
chance to talk to marco now and again

125
00:08:09,990 --> 00:08:08,000
mark i know now and again uh he's

126
00:08:12,070 --> 00:08:10,000
actually uh the capcom on the planning

127
00:08:13,589 --> 00:08:12,080
shift and so we typically get to say

128
00:08:15,110 --> 00:08:13,599
speak a little bit to him in the evening

129
00:08:17,110 --> 00:08:15,120
and sometimes early in the morning when

130
00:08:20,230 --> 00:08:17,120
we get up and we get up basically around

131
00:08:24,390 --> 00:08:20,240
two or three in the morning your time

132
00:08:27,189 --> 00:08:24,400
so i wish you a very safe return and

133
00:08:29,029 --> 00:08:27,199
you would say hello to your fellow uh

134
00:08:31,670 --> 00:08:29,039
astronauts who are

135
00:08:33,990 --> 00:08:31,680
americans and uh you know we're very

136
00:08:36,149 --> 00:08:34,000
pleased to see a canadian with them and

137
00:08:37,110 --> 00:08:36,159
we can work with the americans very well

138
00:08:39,110 --> 00:08:37,120

uh

139
00:08:43,990 --> 00:08:39,120
most of the time and i can say that i

140
00:08:47,430 --> 00:08:45,590
well for sure in fact the experiments

141
00:08:49,110 --> 00:08:47,440
that i'm doing here on the isolation

142
00:08:51,030 --> 00:08:49,120
mount and the fluid physics experiments

143
00:08:52,710 --> 00:08:51,040
we're doing on it are really all being

144
00:08:53,750 --> 00:08:52,720
done in collaboration with our nasa

145
00:08:54,949 --> 00:08:53,760
colleagues

146
00:08:56,470 --> 00:08:54,959
and the work that i've been involved in

147
00:08:59,030 --> 00:08:56,480
on the mere space station has also been

148
00:09:00,710 --> 00:08:59,040
with the support of nasa so it's a

149
00:09:03,190 --> 00:09:00,720
it's very good the working relationship

150
00:09:04,630 --> 00:09:03,200
with nasa and i'm sure it'll continue

151
00:09:06,630 --> 00:09:04,640
for the years to come as we get into the

152
00:09:09,269 --> 00:09:06,640
space station era

153
00:09:12,230 --> 00:09:09,279
so have a safe journey my friend

154
00:09:12,240 --> 00:09:15,269
thank you

155
00:09:19,509 --> 00:09:16,949
astronaut steve robinson used the

156
00:09:21,990 --> 00:09:19,519
special telescope uh to zoom in on hale

157
00:09:23,670 --> 00:09:22,000
bop steve tell us about that first about

158
00:09:25,350 --> 00:09:23,680
that telescope and what are we learning

159
00:09:26,790 --> 00:09:25,360
about comet hail bob that was so

160
00:09:29,110 --> 00:09:26,800
exciting to all of us when we saw it

161
00:09:33,509 --> 00:09:29,120
from earth that uh we we couldn't learn

162
00:09:38,310 --> 00:09:35,190
well john we think it's pretty exciting

163
00:09:40,949 --> 00:09:38,320

too uh we have a small telescope that we

164
00:09:42,630 --> 00:09:40,959
that is mounted not outside uh our crew

165
00:09:44,310 --> 00:09:42,640
cabin here back in the payload bay but

166
00:09:46,710 --> 00:09:44,320
right right in here right in this area

167
00:09:48,630 --> 00:09:46,720
about uh 10 feet to my right there's a

168
00:09:50,150 --> 00:09:48,640
window looking out the side hatch this

169
00:09:52,630 --> 00:09:50,160
is the hatch that we climbed in the

170
00:09:55,110 --> 00:09:52,640
shuttle with and this is a telescope

171
00:09:57,670 --> 00:09:55,120
with about a seven inch uh diameter

172
00:09:59,509 --> 00:09:57,680
mirror uh or lens that is and it

173
00:10:01,509 --> 00:09:59,519
attaches to the side hatch and looks out

174
00:10:03,670 --> 00:10:01,519
the window the telescope's about two and

175
00:10:05,509 --> 00:10:03,680
a half feet long and just about the

176
00:10:07,030 --> 00:10:05,519
diameter of the window we point the

177
00:10:08,550 --> 00:10:07,040
whole shuttle we don't point just the

178
00:10:10,070 --> 00:10:08,560
telescope we point the whole shuttle of

179
00:10:11,990 --> 00:10:10,080
the comet

180
00:10:14,710 --> 00:10:12,000
and then it has a very highly

181
00:10:17,430 --> 00:10:14,720
intensified uh

182
00:10:18,550 --> 00:10:17,440
ccd camera that has a digital camera on

183
00:10:20,949 --> 00:10:18,560
the back of it

184
00:10:22,870 --> 00:10:20,959
and it's enabled to look at the comet in

185
00:10:24,710 --> 00:10:22,880
the ultraviolet spectrum and that is

186
00:10:27,190 --> 00:10:24,720
something we cannot do from earth

187
00:10:28,949 --> 00:10:27,200
because the atmosphere protects

188
00:10:30,790 --> 00:10:28,959

us earthlings and everything on the

189
00:10:31,590 --> 00:10:30,800
earth from the ultraviolet rays of the

190
00:10:33,509 --> 00:10:31,600
sun

191
00:10:35,829 --> 00:10:33,519
but it also keeps us from learning about

192
00:10:37,990 --> 00:10:35,839
the ultraviolet spectrum of astronomical

193
00:10:39,590 --> 00:10:38,000
bodies like the comet hail bob

194
00:10:41,110 --> 00:10:39,600
we've got we've asked our viewers to

195
00:10:42,790 --> 00:10:41,120
join in with questions and we've got a

196
00:10:45,430 --> 00:10:42,800
great one from a 12 year old aaron

197
00:10:48,230 --> 00:10:45,440
hendry sent us an email asking if hale

198
00:10:52,310 --> 00:10:48,240
bop looks the same from up there as it

199
00:10:55,990 --> 00:10:53,910
eric that's an excellent question and

200
00:10:58,069 --> 00:10:56,000
there's a question i had until about a

201
00:11:01,030 --> 00:10:58,079
few days ago when i was able to see

202
00:11:03,030 --> 00:11:01,040
hillbop through the telescope here now

203
00:11:05,670 --> 00:11:03,040
one thing is back in march or so hillbop

204
00:11:07,030 --> 00:11:05,680
was nearer to the earth and to the sun

205
00:11:09,269 --> 00:11:07,040
and so we were able to see it more

206
00:11:11,269 --> 00:11:09,279
brightly and it had a longer tail

207
00:11:13,430 --> 00:11:11,279
uh now it's about twice as far away from

208
00:11:15,750 --> 00:11:13,440
the sun as it was then so it's not as

209
00:11:18,389 --> 00:11:15,760
bright the tail is not as big but still

210
00:11:19,350 --> 00:11:18,399
it's it's relatively close to us

211
00:11:21,110 --> 00:11:19,360
and

212
00:11:23,269 --> 00:11:21,120
we can see it much more clearly from

213
00:11:25,509 --> 00:11:23,279

space because the atmosphere doesn't

214
00:11:27,030 --> 00:11:25,519
diffuse the light and also you don't

215
00:11:28,310 --> 00:11:27,040
have to get up real early in the morning

216
00:11:31,430 --> 00:11:28,320
like you do you're going around the

217
00:11:33,190 --> 00:11:31,440
earth so many so so fast that you can

218
00:11:35,190 --> 00:11:33,200
stay in bed to a reasonable time of day

219
00:11:36,069 --> 00:11:35,200
i know you'll appreciate this eric

220
00:11:38,710 --> 00:11:36,079
and

221
00:11:40,790 --> 00:11:38,720
comment

222
00:11:43,509 --> 00:11:40,800
thanks steve one of the main purposes of

223
00:11:46,069 --> 00:11:43,519
this flight is to test the new japanese

224
00:11:47,750 --> 00:11:46,079
robot arm i call it the mini arm it goes

225
00:11:49,670 --> 00:11:47,760
out at the end of i guess the other

226
00:11:51,990 --> 00:11:49,680
robot arm it would be attached to the

227
00:11:54,069 --> 00:11:52,000
international space station someday to

228
00:11:56,310 --> 00:11:54,079
repair and replace pieces of the new

229
00:11:58,310 --> 00:11:56,320
international space station without

230
00:12:00,630 --> 00:11:58,320
making astronauts like you go outside to

231
00:12:06,550 --> 00:12:00,640
do it what do you think of the robot arm

232
00:12:11,509 --> 00:12:08,829
well john we've had a really

233
00:12:13,430 --> 00:12:11,519
educational uh

234
00:12:15,670 --> 00:12:13,440
experience in flying this arm for the

235
00:12:18,470 --> 00:12:15,680
first time you're right this is the uh

236
00:12:20,069 --> 00:12:18,480
the prototype for this small fine arm as

237
00:12:21,110 --> 00:12:20,079
it's called it will go on the end of a

238
00:12:23,110 --> 00:12:21,120

long

239
00:12:25,269 --> 00:12:23,120
arm that will go on the japanese

240
00:12:27,030 --> 00:12:25,279
experiment module when the international

241
00:12:29,670 --> 00:12:27,040
space station is put together up to that

242
00:12:31,430 --> 00:12:29,680
point so this is in a few years from now

243
00:12:33,190 --> 00:12:31,440
and this is the flight test of the small

244
00:12:34,470 --> 00:12:33,200
fine arms so it's quite dexterous in

245
00:12:37,110 --> 00:12:34,480
other words it could do a lot of things

246
00:12:38,949 --> 00:12:37,120
with this with its uh joints it's fairly

247
00:12:40,550 --> 00:12:38,959
small it's only about

248
00:12:42,550 --> 00:12:40,560
a meter and a half to two meters long

249
00:12:43,990 --> 00:12:42,560
depending on how you stretch it out but

250
00:12:45,750 --> 00:12:44,000
it has uh

251
00:12:47,030 --> 00:12:45,760
six degrees of freedom in the joints in

252
00:12:48,870 --> 00:12:47,040
other words you can move it around just

253
00:12:50,150 --> 00:12:48,880
about like your arm it's almost hard to

254
00:12:51,590 --> 00:12:50,160
talk about the arm without taking your

255
00:12:52,949 --> 00:12:51,600
arm out and moving it around because

256
00:12:54,389 --> 00:12:52,959
that's just about what you do with the

257
00:12:55,430 --> 00:12:54,399
hand controllers

258
00:12:56,310 --> 00:12:55,440
and uh

259
00:12:58,550 --> 00:12:56,320
dan

260
00:13:00,710 --> 00:12:58,560
and i have had a great time first of all

261
00:13:03,030 --> 00:13:00,720
training for the flight we've gone to

262
00:13:04,949 --> 00:13:03,040
the tokyo area twice to train on the

263
00:13:06,870 --> 00:13:04,959

japanese hardware we have lots of

264
00:13:08,790 --> 00:13:06,880
japanese software and hardware here in

265
00:13:10,790 --> 00:13:08,800
houston or down in houston that we've

266
00:13:12,790 --> 00:13:10,800
trained on for many months and finally

267
00:13:14,870 --> 00:13:12,800
it's been a really great experience to

268
00:13:16,310 --> 00:13:14,880
come up and test the space hardware

269
00:13:17,190 --> 00:13:16,320
that's going to be

270
00:13:19,350 --> 00:13:17,200
built

271
00:13:20,949 --> 00:13:19,360
in in final form for the international

272
00:13:22,550 --> 00:13:20,959
space station in a couple years and let

273
00:13:24,550 --> 00:13:22,560
me just say that we've learned a lot

274
00:13:26,790 --> 00:13:24,560
about the arm yes a couple of surprises

275
00:13:28,870 --> 00:13:26,800
but in general it's really worked great

276
00:13:31,190 --> 00:13:28,880
a fine piece of engineering this viewer

277
00:13:32,949 --> 00:13:31,200
wants to know what kind of philosophical

278
00:13:34,470 --> 00:13:32,959
thoughts come to mind when you're in

279
00:13:39,590 --> 00:13:34,480
space maybe thoughts that wouldn't come

280
00:13:42,949 --> 00:13:41,269
that's an easy one john lots of them do

281
00:13:44,949 --> 00:13:42,959
when you look out the window the first

282
00:13:47,269 --> 00:13:44,959
time you look out there

283
00:13:49,430 --> 00:13:47,279
to me the first thing that really

284
00:13:51,829 --> 00:13:49,440
occurred to me was how small each of us

285
00:13:53,829 --> 00:13:51,839
humans really are the heavens

286
00:13:55,590 --> 00:13:53,839
are very large they're huge

287
00:13:57,189 --> 00:13:55,600
and the earth is huge

288
00:13:58,230 --> 00:13:57,199

and when we're on the ground we tend to

289
00:13:59,670 --> 00:13:58,240
think

290
00:14:01,350 --> 00:13:59,680
you know we're busy and we're

291
00:14:02,949 --> 00:14:01,360
responsible and we have lots to do and

292
00:14:05,269 --> 00:14:02,959
we tend to think that we're the center

293
00:14:06,310 --> 00:14:05,279
of importance and you sort of have to

294
00:14:07,670 --> 00:14:06,320
but

295
00:14:09,910 --> 00:14:07,680
let me tell you when you get ready for a

296
00:14:10,550 --> 00:14:09,920
space flight you realize that first of

297
00:14:12,150 --> 00:14:10,560
all

298
00:14:14,550 --> 00:14:12,160
thousands of people are helping you get

299
00:14:16,550 --> 00:14:14,560
ready for the flight and assuring your

300
00:14:18,870 --> 00:14:16,560
safety and doing the engineering and all

301
00:14:21,030 --> 00:14:18,880
the checks and you're the beneficiary of

302
00:14:23,430 --> 00:14:21,040
that then you get up above the earth you

303
00:14:26,150 --> 00:14:23,440
look down on the beautiful earth

304
00:14:28,949 --> 00:14:26,160
and you see evidence of

305
00:14:31,110 --> 00:14:28,959
of mankind down on the earth both good

306
00:14:33,269 --> 00:14:31,120
and bad and you look out in the heavens

307
00:14:34,790 --> 00:14:33,279
you see the comet you see the moon you

308
00:14:36,629 --> 00:14:34,800
see the stars

309
00:14:38,069 --> 00:14:36,639
rising and setting over the earth's limb