1
00:00:07,349 --> 00:00:02,310
station houston on space for ground two

2
00:00:07,359 --> 00:00:11,910
we're ready for the event houston

3
00:00:15,669 --> 00:00:14,150
bbc in the live stargazing series this

4
00:00:18,950 --> 00:00:15,679
is houston please call station for a

5
00:00:26,230 --> 00:00:21,189
station this is bbc live stargazing

6
00:00:29,349 --> 00:00:27,910
and bbc we've got you loud and clear

7
00:00:32,470 --> 00:00:29,359
welcome aboard the international space

8
00:00:36,229 --> 00:00:34,549
well thank you commander the wheelock

9
00:00:38,709 --> 00:00:36,239
flight engineer scott kelly and flight

10
00:00:40,869 --> 00:00:38,719
engineer dr shannon walker thank you for

11
00:00:42,389 --> 00:00:40,879
speaking to us today um where are you

12
00:00:46,869 --> 00:00:42,399
flying over right now and how is the

13
00:00:50,229 --> 00:00:49,029

well the views are always spectacular

14
00:00:52,310 --> 00:00:50,239
and we're just coming down on a

15
00:00:56,150 --> 00:00:52,320
descending node right around vancouver

16
00:01:04,469 --> 00:00:57,910
and how long does it take you to

17
00:01:09,750 --> 00:01:07,429
we're traveling at 17 500 miles per hour

18
00:01:10,870 --> 00:01:09,760
about 28 000 kilometers

19
00:01:13,270 --> 00:01:10,880
per hour

20
00:01:16,870 --> 00:01:13,280
and so we orbit the earth once every 90

21
00:01:21,990 --> 00:01:19,350
and uh colonel willock you're commanding

22
00:01:28,230 --> 00:01:22,000
iss expedition 25 what will be the

23
00:01:32,469 --> 00:01:29,910
well probably the biggest highlight is

24
00:01:35,030 --> 00:01:32,479
uh our crew is finally here that to

25
00:01:37,670 --> 00:01:35,040
compliment us and complete our crew

26
00:01:39,590 --> 00:01:37,680
for our uh the rest of our journey here

27
00:01:41,830 --> 00:01:39,600
and um our highlight is really full

28
00:01:43,429 --> 00:01:41,840
utilization of the space station as an

29
00:01:45,350 --> 00:01:43,439
orbiting laboratory

30
00:01:48,789 --> 00:01:45,360
we've got uh several laboratories on

31
00:01:51,749 --> 00:01:48,799
board over 130 science experiments going

32
00:01:55,830 --> 00:01:51,759
on and we're very excited about getting

33
00:02:00,389 --> 00:01:58,469
yes uh dr walker i heard you actually

34
00:02:02,310 --> 00:02:00,399
talking down to houston before we we

35
00:02:04,149 --> 00:02:02,320
linked up and you were talking about um

36
00:02:06,550 --> 00:02:04,159
where to put sample bottles i think it

37
00:02:08,869 --> 00:02:06,560
was could you tell me a little bit about

38
00:02:09,990 --> 00:02:08,879

what scientific experiments you plan to

39
00:02:14,150 --> 00:02:10,000
do when you're on board the space

40
00:02:19,350 --> 00:02:16,630
we've got a number of scientific

41
00:02:21,670 --> 00:02:19,360
experiments from just about every

42
00:02:22,790 --> 00:02:21,680
scientific field from material science

43
00:02:27,430 --> 00:02:22,800
to

44
00:02:29,270 --> 00:02:27,440
biology and human physiology and so a

45
00:02:31,750 --> 00:02:29,280
lot of what i'm doing actually is the

46
00:02:34,070 --> 00:02:31,760
human physiology size where i'm using

47
00:02:35,990 --> 00:02:34,080
myself as a i'm being used as a test

48
00:02:40,309 --> 00:02:36,000
subject to study some of the effects of

49
00:02:44,550 --> 00:02:42,790
yeah and uh scott kelly i know that one

50
00:02:46,390 --> 00:02:44,560
of the highlights when you're up there

51
00:02:47,830 --> 00:02:46,400
or i suppose it's i don't know what to

52
00:02:49,830 --> 00:02:47,840
call it a highlight would be the last

53
00:02:51,990 --> 00:02:49,840
visit of the space shuttle to the

54
00:02:53,509 --> 00:02:52,000
station i think your brother is flying

55
00:02:58,790 --> 00:02:53,519
the space shuttle endeavour up there

56
00:03:04,070 --> 00:03:00,550
yeah that's correct uh my brother will

57
00:03:05,430 --> 00:03:04,080
be the the commander of uh space shuttle

58
00:03:07,670 --> 00:03:05,440
mission that actually brings the alpha

59
00:03:09,670 --> 00:03:07,680
magnetic spectrometer

60
00:03:11,830 --> 00:03:09,680
to the international space station which

61
00:03:25,350 --> 00:03:11,840
is a very uh

62
00:03:34,149 --> 00:03:27,350
for the last time will you be sad to see

63
00:03:39,270 --> 00:03:35,910

well you know i think

64
00:03:41,670 --> 00:03:39,280
most astronauts feel a little bit uh

65
00:03:43,910 --> 00:03:41,680
you know nostalgic when we think about

66
00:03:46,390 --> 00:03:43,920
these uh space shuttles that have been

67
00:03:49,110 --> 00:03:46,400
really um

68
00:03:51,830 --> 00:03:49,120
significant part of our space program

69
00:03:54,470 --> 00:03:51,840
but you know if we're going to move on

70
00:03:55,910 --> 00:03:54,480
uh beyond low earth orbit uh we need to

71
00:03:57,990 --> 00:03:55,920
build another vehicle because the space

72
00:03:59,190 --> 00:03:58,000
shuttle can't go there so it's you know

73
00:04:00,630 --> 00:03:59,200
something that

74
00:04:02,470 --> 00:04:00,640
that we might feel a little bit sad

75
00:04:07,429 --> 00:04:02,480
about but at the same time we understand

76
00:04:12,149 --> 00:04:09,190
yeah how is it i think

77
00:04:14,949 --> 00:04:12,159
have you all flown on the soyuz and the

78
00:04:16,870 --> 00:04:14,959
shuttle i wondered how those vehicles

79
00:04:18,710 --> 00:04:16,880
felt you know how different they are to

80
00:04:24,550 --> 00:04:18,720
to get into space and come back to earth

81
00:04:29,030 --> 00:04:26,550
you know um

82
00:04:31,270 --> 00:04:29,040
both uh doug and i have flown on both

83
00:04:32,870 --> 00:04:31,280
the the shuttle and the soyuz and this

84
00:04:35,270 --> 00:04:32,880
is shannon's first flight and she's

85
00:04:38,469 --> 00:04:35,280
flown up on the on the soyuz neither of

86
00:04:39,749 --> 00:04:38,479
nor doug or i have flown down so

87
00:04:42,150 --> 00:04:39,759
um

88
00:04:44,469 --> 00:04:42,160

you know the the space shuttle is a uh

89
00:04:47,749 --> 00:04:44,479
you know multi-mission spacecraft that

90
00:04:49,430 --> 00:04:47,759
can do a lot of things um

91
00:04:51,350 --> 00:04:49,440
a lot of different types of missions

92
00:04:55,430 --> 00:04:51,360
it's very complicated

93
00:04:56,629 --> 00:04:55,440
uh the soyuz is uh you know much simpler

94
00:04:58,710 --> 00:04:56,639
and it does

95
00:05:01,110 --> 00:04:58,720
a few things very very well one of which

96
00:05:02,390 --> 00:05:01,120
is getting people to and from space

97
00:05:03,909 --> 00:05:02,400
um

98
00:05:05,830 --> 00:05:03,919
it's uh

99
00:05:07,990 --> 00:05:05,840
you know much different in how it flies

100
00:05:09,990 --> 00:05:08,000
how it launches it's more you know it's

101
00:05:11,749 --> 00:05:10,000
a rocket that's uh or a capsule that's

102
00:05:12,629 --> 00:05:11,759
on the top of a rocket versus on the

103
00:05:15,670 --> 00:05:12,639
side

104
00:05:18,150 --> 00:05:15,680
the shuttle reenters and lands

105
00:05:21,670 --> 00:05:18,160
in a gliding fashion whereas the soyuz

106
00:05:22,710 --> 00:05:21,680
lands on land under parachutes so it's a

107
00:05:26,790 --> 00:05:22,720
much

108
00:05:30,310 --> 00:05:26,800
their uh advantages and both also have

109
00:05:31,189 --> 00:05:30,320
some uh small disadvantages

110
00:05:33,749 --> 00:05:31,199
yeah

111
00:05:35,670 --> 00:05:33,759
you know you know i am envy you all uh a

112
00:05:38,469 --> 00:05:35,680
lot i mean i remember the the first

113
00:05:40,310 --> 00:05:38,479

shuttle flight back in 81 and i remember

114
00:05:43,590 --> 00:05:40,320
i actually read recently that john young

115
00:05:45,990 --> 00:05:43,600
when he landed uh columbia turned to bob

116
00:05:47,590 --> 00:05:46,000
crippen and said you know bob

117
00:05:49,590 --> 00:05:47,600
we're really not that far away from the

118
00:05:52,150 --> 00:05:49,600
stars and i thought that reflected

119
00:05:54,390 --> 00:05:52,160
beautifully that the optimism in the in

120
00:05:55,990 --> 00:05:54,400
the 80s you know 20 years after gagarin

121
00:05:57,909 --> 00:05:56,000
first launched into space and here is

122
00:06:00,390 --> 00:05:57,919
this beautiful aircraft flying into

123
00:06:02,309 --> 00:06:00,400
space and back again do you think that

124
00:06:04,309 --> 00:06:02,319
we are closer to the stars now than we

125
00:06:12,230 --> 00:06:04,319
were in the in the early 80s when the

126
00:06:16,469 --> 00:06:14,550
um yes i believe that we are in uh and

127
00:06:18,309 --> 00:06:16,479
actually that's that's part of the the

128
00:06:20,629 --> 00:06:18,319
next the next uh

129
00:06:22,950 --> 00:06:20,639
chapter in this in this story that nasa

130
00:06:24,230 --> 00:06:22,960
is writing uh just being able to look

131
00:06:26,550 --> 00:06:24,240
forward now

132
00:06:29,029 --> 00:06:26,560
uh using what research we're doing doing

133
00:06:30,950 --> 00:06:29,039
here on the space station uh to project

134
00:06:33,909 --> 00:06:30,960
ourselves further out into our solar

135
00:06:36,469 --> 00:06:33,919
system uh to try to discover new things

136
00:06:38,309 --> 00:06:36,479
about these materials about new vehicles

137
00:06:40,309 --> 00:06:38,319
uh propulsion systems

138
00:06:42,629 --> 00:06:40,319

uh life support systems and things like

139
00:06:43,270 --> 00:06:42,639
that and so and so we're looking beyond

140
00:06:48,629 --> 00:06:43,280
and

141
00:06:54,629 --> 00:06:51,830
yeah i i wonder if you know if we had a

142
00:06:56,390 --> 00:06:54,639
a kennedy today a kennedy-like speech

143
00:06:59,189 --> 00:06:56,400
that said you know we choose to go to

144
00:07:01,029 --> 00:06:59,199
mars before this decade is out uh do you

145
00:07:03,350 --> 00:07:01,039
think that we've been a position to do

146
00:07:05,189 --> 00:07:03,360
that do we know enough to to make that

147
00:07:11,350 --> 00:07:05,199
next great leap into the solar system

148
00:07:14,469 --> 00:07:12,390
you know i think there are certain

149
00:07:16,790 --> 00:07:14,479
things we're learning on the the

150
00:07:19,189 --> 00:07:16,800
space station here that particularly

151
00:07:21,830 --> 00:07:19,199
with regards to

152
00:07:23,909 --> 00:07:21,840
you know how humans

153
00:07:25,909 --> 00:07:23,919
react and how they can be protected

154
00:07:27,990 --> 00:07:25,919
against long-duration space flight so i

155
00:07:29,749 --> 00:07:28,000
think we do have a little bit more to

156
00:07:32,230 --> 00:07:29,759
learn we're also learning a lot about

157
00:07:33,430 --> 00:07:32,240
how to operate systems

158
00:07:36,150 --> 00:07:33,440
um

159
00:07:38,629 --> 00:07:36,160
life support systems other systems here

160
00:07:41,110 --> 00:07:38,639
that are required for long duration

161
00:07:43,110 --> 00:07:41,120
uh long distance space flight so you

162
00:07:45,350 --> 00:07:43,120
know this is a laboratory that does many

163
00:07:47,430 --> 00:07:45,360

things and that's one of them

164
00:07:48,790 --> 00:07:47,440
you know someday when we do go to mars

165
00:07:51,350 --> 00:07:48,800
the things we learn here on the

166
00:07:53,749 --> 00:07:51,360
international space station will be uh

167
00:07:55,029 --> 00:07:53,759
critical to that effort

168
00:07:56,469 --> 00:07:55,039
you know however

169
00:07:58,550 --> 00:07:56,479
you know if we had a lot of money to

170
00:08:00,550 --> 00:07:58,560
throw at it i i think

171
00:08:02,469 --> 00:08:00,560
and i'm somewhat of an optimist that uh

172
00:08:04,309 --> 00:08:02,479
you know anything is within our our

173
00:08:06,710 --> 00:08:04,319
grasp and i think we could

174
00:08:08,869 --> 00:08:06,720
um you know go to mars just like we went

175
00:08:09,749 --> 00:08:08,879
to the moon in a very short period of

176
00:08:12,790 --> 00:08:09,759
time

177
00:08:15,510 --> 00:08:12,800
in the 1960s so i think it is within our

178
00:08:18,869 --> 00:08:15,520
capability to do that if we if we chose

179
00:08:24,710 --> 00:08:21,749
and and what would you say to people who

180
00:08:27,029 --> 00:08:24,720
may not see that the value of of manned

181
00:08:29,110 --> 00:08:27,039
space flight of manned exploration now

182
00:08:30,950 --> 00:08:29,120
how would you uh from from that

183
00:08:33,589 --> 00:08:30,960
wonderful view up there i mean you're at

184
00:08:35,430 --> 00:08:33,599
the frontier at the moment of of our

185
00:08:37,829 --> 00:08:35,440
well you're at the human from sphere

186
00:08:43,509 --> 00:08:37,839
what about people who don't think that

187
00:08:47,190 --> 00:08:45,590
well i think

188
00:08:49,350 --> 00:08:47,200

one thing that's important to get across

189
00:08:51,670 --> 00:08:49,360
is how human exploration of space has

190
00:08:53,750 --> 00:08:51,680
touched everybody's live lives on the

191
00:08:55,110 --> 00:08:53,760
earth there are so many spin-offs and

192
00:08:56,470 --> 00:08:55,120
technological developments that have

193
00:08:59,030 --> 00:08:56,480
come out of the space program and the

194
00:09:01,910 --> 00:08:59,040
human space flight program in particular

195
00:09:03,430 --> 00:09:01,920
so even though they may not see a direct

196
00:09:04,630 --> 00:09:03,440
connection there are a lot of things

197
00:09:06,470 --> 00:09:04,640
that

198
00:09:08,070 --> 00:09:06,480
have made life on earth a whole lot

199
00:09:09,829 --> 00:09:08,080
better and we need to bring that out so

200
00:09:11,829 --> 00:09:09,839
they can understand that it is important

201
00:09:13,350 --> 00:09:11,839
it is a very important

202
00:09:14,949 --> 00:09:13,360
scientific endeavor it's a very

203
00:09:16,550 --> 00:09:14,959
important technological endeavor and

204
00:09:18,710 --> 00:09:16,560
it's a very important human endeavor

205
00:09:21,190 --> 00:09:18,720
because as humans we need to keep moving

206
00:09:22,949 --> 00:09:21,200
forward as a society and not stagnate so

207
00:09:26,310 --> 00:09:22,959
we need to uh keep pushing the

208
00:09:29,990 --> 00:09:27,829
yeah you know i couldn't agree with you

209
00:09:32,070 --> 00:09:30,000
more uh dr walker and i know that you

210
00:09:34,150 --> 00:09:32,080
managed to co-manage nasa's on orbit

211
00:09:36,310 --> 00:09:34,160
engineering office for for a while i

212
00:09:37,910 --> 00:09:36,320
mean i suppose those are the skills that

213
00:09:39,269 --> 00:09:37,920

we've developed in building the space

214
00:09:42,070 --> 00:09:39,279
station those are the skills we will

215
00:09:49,030 --> 00:09:42,080
need to fly beyond near earth orbit in

216
00:09:52,949 --> 00:09:51,350
exactly um one of the the key things is

217
00:09:55,509 --> 00:09:52,959
learning how to deal with problems

218
00:09:56,870 --> 00:09:55,519
because things always um

219
00:09:58,470 --> 00:09:56,880
well a lot of things go wrong things

220
00:10:00,710 --> 00:09:58,480
don't go as planned and you've got to be

221
00:10:02,949 --> 00:10:00,720
able to deal with them

222
00:10:04,870 --> 00:10:02,959
expeditiously and in whatever manner you

223
00:10:06,470 --> 00:10:04,880
have you don't always have all the tools

224
00:10:08,630 --> 00:10:06,480
on board that you need or would like to

225
00:10:10,150 --> 00:10:08,640
have to solve problems and so being able

226
00:10:18,790 --> 00:10:10,160
to

227
00:10:21,990 --> 00:10:20,389
yes because it's uh

228
00:10:23,509 --> 00:10:22,000
interesting that i'm really looking

229
00:10:25,910 --> 00:10:23,519
forward to the next miles mission which

230
00:10:27,190 --> 00:10:25,920
is the the curiosity rover which is

231
00:10:28,710 --> 00:10:27,200
going to go out there and search for

232
00:10:31,430 --> 00:10:28,720
life on mars

233
00:10:33,190 --> 00:10:31,440
do you see that program those robotic

234
00:10:36,310 --> 00:10:33,200
exploration programs hopefully as

235
00:10:43,030 --> 00:10:36,320
precursors for the manned landing and

236
00:10:47,269 --> 00:10:45,030
i think the robotic exploration that

237
00:10:48,790 --> 00:10:47,279
we're doing is very important and

238
00:10:51,030 --> 00:10:48,800

i think it's also

239
00:10:53,670 --> 00:10:51,040
important to not frame

240
00:10:55,030 --> 00:10:53,680
the exploration um

241
00:10:57,190 --> 00:10:55,040
i guess debate of whether or not we

242
00:11:00,389 --> 00:10:57,200
should do it is human exploration versus

243
00:11:02,710 --> 00:11:00,399
robotic exploration because

244
00:11:04,550 --> 00:11:02,720
both sides of the equation have

245
00:11:06,230 --> 00:11:04,560
definite advantages and yes we do need

246
00:11:07,509 --> 00:11:06,240
to send robotic explorers out there

247
00:11:09,750 --> 00:11:07,519
we've learned so much from all our

248
00:11:11,350 --> 00:11:09,760
rovers and all our probes that have gone

249
00:11:13,509 --> 00:11:11,360
to the other planets

250
00:11:16,230 --> 00:11:13,519
but we also need to send people there as

251
00:11:19,110 --> 00:11:16,240
well to look and see with our own eyes

252
00:11:26,550 --> 00:11:20,630
and could i ask you dr walker is this

253
00:11:30,470 --> 00:11:28,069
yes this is this is my first trip into

254
00:11:34,310 --> 00:11:32,710
and then i know that you worked um i was

255
00:11:36,069 --> 00:11:34,320
looking through your your biography you

256
00:11:39,030 --> 00:11:36,079
worked on an awful lot of space shuttle

257
00:11:41,670 --> 00:11:39,040
missions as a flight controller um

258
00:11:43,670 --> 00:11:41,680
how how does it feel to make that leap

259
00:11:45,590 --> 00:11:43,680
from being involved in the space program

260
00:11:47,350 --> 00:11:45,600
on the ground to actually

261
00:11:53,030 --> 00:11:47,360
getting into earth orbit and looking

262
00:11:57,829 --> 00:11:55,030
it was a very interesting transition

263
00:11:59,670 --> 00:11:57,839

going from operations and then into the

264
00:12:01,190 --> 00:11:59,680
engineering side the problem solving so

265
00:12:03,430 --> 00:12:01,200
i saw a completely different side of the

266
00:12:04,870 --> 00:12:03,440
hardware and then on

267
00:12:07,030 --> 00:12:04,880
being as an astronaut back on the

268
00:12:08,389 --> 00:12:07,040
operations side so i've

269
00:12:10,470 --> 00:12:08,399
done a lot of things but it's been

270
00:12:12,949 --> 00:12:10,480
absolutely fantastic to actually

271
00:12:15,350 --> 00:12:12,959
be up here and

272
00:12:17,110 --> 00:12:15,360
live and work on the laboratory that i

273
00:12:20,629 --> 00:12:17,120
spent so much of my life uh helping to

274
00:12:24,790 --> 00:12:22,389
and uh kind of wheeler i know that

275
00:12:26,949 --> 00:12:24,800
you're a very experienced aviator i

276
00:12:29,190 --> 00:12:26,959
think that i read you've flown almost 50

277
00:12:31,590 --> 00:12:29,200
different aircraft in in your time but i

278
00:12:33,590 --> 00:12:31,600
i have to ask you because my growing up

279
00:12:36,949 --> 00:12:33,600
my um view of the space program i was

280
00:12:38,550 --> 00:12:36,959
born in 1968 it was really the old right

281
00:12:41,430 --> 00:12:38,560
stuff days you know jaeger and the

282
00:12:43,269 --> 00:12:41,440
mercury seven astronauts i mean today is

283
00:12:45,590 --> 00:12:43,279
it becoming more routine or is this

284
00:12:52,150 --> 00:12:45,600
still that element of the right stuff

285
00:12:56,230 --> 00:12:53,829
well i think it's uh i think it's

286
00:12:58,389 --> 00:12:56,240
becoming more of an uh an attainable

287
00:13:00,790 --> 00:12:58,399
dream for young our young

288
00:13:03,110 --> 00:13:00,800

people and ours our young students

289
00:13:04,389 --> 00:13:03,120
uh when i was i was nine when we landed

290
00:13:07,269 --> 00:13:04,399
men on the moon

291
00:13:09,829 --> 00:13:07,279
and apollo 11 and uh and i remember

292
00:13:11,750 --> 00:13:09,839
those days and i was i felt like such an

293
00:13:14,790 --> 00:13:11,760
ordinary kid from such an ordinary

294
00:13:16,870 --> 00:13:14,800
little place that uh that that dream of

295
00:13:17,750 --> 00:13:16,880
being an astronaut was way too big for

296
00:13:19,030 --> 00:13:17,760
me

297
00:13:20,870 --> 00:13:19,040
and um

298
00:13:23,350 --> 00:13:20,880
and of course i i never you know

299
00:13:25,509 --> 00:13:23,360
projecting myself out 30 or 40 years i

300
00:13:28,550 --> 00:13:25,519
never dreamed that i would be here

301
00:13:30,710 --> 00:13:28,560
um and i think that's uh uh that over

302
00:13:33,509 --> 00:13:30,720
time that's a disservice we've done to

303
00:13:35,110 --> 00:13:33,519
uh some of our our our youth and i think

304
00:13:38,150 --> 00:13:35,120
we're getting better with that that it's

305
00:13:40,230 --> 00:13:38,160
uh it's uh people are realizing that it

306
00:13:42,470 --> 00:13:40,240
really is just taking ordinary people

307
00:13:44,550 --> 00:13:42,480
with the with an extraordinary dream

308
00:13:46,829 --> 00:13:44,560
that uh to come together to solve these

309
00:13:48,710 --> 00:13:46,839
problems uh to work together to move

310
00:13:51,350 --> 00:13:48,720
forward and

311
00:13:53,750 --> 00:13:51,360
and i think there are there's uh more of

312
00:13:56,870 --> 00:13:53,760
our society and more of our young people

313
00:13:58,550 --> 00:13:56,880

a larger segment that uh really is

314
00:14:00,790 --> 00:13:58,560
beginning to believe in themselves and

315
00:14:03,110 --> 00:14:00,800
believe in their in this program

316
00:14:05,189 --> 00:14:03,120
and in uh space exploration

317
00:14:07,030 --> 00:14:05,199
in that this type of dream is attainable

318
00:14:10,870 --> 00:14:07,040
for them so i think it's i think things

319
00:14:15,269 --> 00:14:13,030
yeah you know i couldn't agree more i do

320
00:14:17,590 --> 00:14:15,279
think the space program is the the

321
00:14:20,389 --> 00:14:17,600
the ultimate human achievement i i

322
00:14:22,470 --> 00:14:20,399
genuinely do because it is still

323
00:14:23,990 --> 00:14:22,480
difficult isn't it i mean

324
00:14:25,750 --> 00:14:24,000
i know that you guys with your

325
00:14:27,750 --> 00:14:25,760
professionalism are given the appearance

326
00:14:29,350 --> 00:14:27,760
of it being routine a routine thing to

327
00:14:32,710 --> 00:14:29,360
get into orbit and come back to earth

328
00:14:34,389 --> 00:14:32,720
again safely but it how difficult is it

329
00:14:35,990 --> 00:14:34,399
up there you know how difficult is it to

330
00:14:37,350 --> 00:14:36,000
deal with problems and

331
00:14:39,110 --> 00:14:37,360
and fly that

332
00:14:43,670 --> 00:14:39,120
beautiful aircraft back to earth which i

333
00:14:47,750 --> 00:14:45,670
well actually it's it's i'm smiling

334
00:14:48,550 --> 00:14:47,760
because it's it's a lot of fun and and

335
00:14:52,870 --> 00:14:48,560
uh

336
00:14:55,350 --> 00:14:52,880
always has a surprise waiting around

337
00:14:58,470 --> 00:14:55,360
every corner for us and um of course you

338
00:14:59,350 --> 00:14:58,480

may have followed the pump module uh

339
00:15:01,590 --> 00:14:59,360
um

340
00:15:03,670 --> 00:15:01,600
uh situation that we had back in the end

341
00:15:06,790 --> 00:15:03,680
of july when we had to do those three

342
00:15:09,509 --> 00:15:06,800
emergency uh our contingency spacewalks

343
00:15:12,550 --> 00:15:09,519
uh to get that pump module replaced and

344
00:15:14,949 --> 00:15:12,560
um it's just interesting um the the

345
00:15:18,310 --> 00:15:14,959
things that happened up here because of

346
00:15:21,670 --> 00:15:18,320
uh the exposure to radiation longer long

347
00:15:23,430 --> 00:15:21,680
term uh exposure to radiation uh the the

348
00:15:25,350 --> 00:15:23,440
heating and cooling of this vehicle and

349
00:15:27,189 --> 00:15:25,360
everything that's outside because we're

350
00:15:29,509 --> 00:15:27,199
orbiting the earth once every 90 minutes

351
00:15:31,829 --> 00:15:29,519
every every 45 minutes we're getting a

352
00:15:33,269 --> 00:15:31,839
sunrise or a sunset and then direct

353
00:15:35,590 --> 00:15:33,279
sunlight we're seeing temperatures

354
00:15:36,710 --> 00:15:35,600
anywhere between 250 and 300 degrees

355
00:15:39,749 --> 00:15:36,720
fahrenheit

356
00:15:42,150 --> 00:15:39,759
and then when we go into eclipse on the

357
00:15:43,870 --> 00:15:42,160
backside of the earth the temperatures

358
00:15:47,430 --> 00:15:43,880
can plummet to

359
00:15:49,590 --> 00:15:47,440
275 300 degrees below zero and so when

360
00:15:51,670 --> 00:15:49,600
you have mechanical systems and and

361
00:15:54,310 --> 00:15:51,680
pieces of hardware that are experiencing

362
00:15:56,230 --> 00:15:54,320
that type of heating and cooling uh

363
00:15:58,310 --> 00:15:56,240

things go wrong and things don't act as

364
00:15:59,990 --> 00:15:58,320
they should and

365
00:16:01,749 --> 00:16:00,000
and so it's it's very very interesting

366
00:16:03,189 --> 00:16:01,759
and it's it's a it's a wonderful

367
00:16:06,629 --> 00:16:03,199
wonderful place

368
00:16:09,749 --> 00:16:06,639
for a problem-solving mind and because

369
00:16:11,590 --> 00:16:09,759
it never ceases to uh to disappoint us

370
00:16:14,790 --> 00:16:11,600
with the uh with the situations that

371
00:16:19,110 --> 00:16:17,110
and if you refer to spacewalks there i

372
00:16:21,350 --> 00:16:19,120
mean are they genuinely a different

373
00:16:23,430 --> 00:16:21,360
feeling from being inside the shuttle or

374
00:16:24,470 --> 00:16:23,440
inside the space station do you really

375
00:16:27,110 --> 00:16:24,480
feel that

376
00:16:29,189 --> 00:16:27,120
you know a closer connection i suppose

377
00:16:32,949 --> 00:16:29,199
with the earth floating down there below

378
00:16:37,269 --> 00:16:34,790
you really do there's a

379
00:16:39,030 --> 00:16:37,279
the the gains get cranked up quite a bit

380
00:16:41,749 --> 00:16:39,040
when you open that hatch and the only

381
00:16:43,910 --> 00:16:41,759
thing uh between you and the vacuum of

382
00:16:46,310 --> 00:16:43,920
space is that thin visor

383
00:16:48,389 --> 00:16:46,320
uh it's a it's a real eye-opening

384
00:16:50,150 --> 00:16:48,399
experience and it takes a little bit of

385
00:16:52,310 --> 00:16:50,160
time to kind of get your mind around it

386
00:16:54,310 --> 00:16:52,320
and i don't know if i suppose that it

387
00:16:55,189 --> 00:16:54,320
you never really do

388
00:17:00,470 --> 00:16:55,199

quite

389
00:17:02,629 --> 00:17:00,480
how profound it is what you're doing

390
00:17:06,069 --> 00:17:02,639
so it takes a little bit more focus when

391
00:17:08,870 --> 00:17:06,079
you're outside and of course it uh

392
00:17:10,789 --> 00:17:08,880
it's the most encouraging part of doing

393
00:17:12,549 --> 00:17:10,799
a spacewalk is knowing

394
00:17:14,630 --> 00:17:12,559
uh that you've got a team of people

395
00:17:16,390 --> 00:17:14,640
behind you and you can hear them in your

396
00:17:17,590 --> 00:17:16,400
headset and that's very very comforting

397
00:17:26,549 --> 00:17:17,600
because

398
00:17:30,470 --> 00:17:28,630
well station we've run out of time but

399
00:17:32,470 --> 00:17:30,480
it was a real pleasure talking to you

400
00:17:40,710 --> 00:17:32,480
all thank you i think you are genuinely

401
00:17:44,150 --> 00:17:42,470
well thank you very much for joining us

402
00:17:46,789 --> 00:17:44,160
and uh it's a real pleasure for us to

403
00:17:48,710 --> 00:17:46,799
talk to you today

404
00:17:50,549 --> 00:17:48,720
perfect

405
00:17:53,909 --> 00:17:50,559
station this is houston acr that

406
00:17:57,990 --> 00:17:56,070
thank you bbc live stargazing series