
PAO

1
00:00:04,230 --> 00:00:02,550
hey everybody welcome to mission control

2
00:00:06,710 --> 00:00:04,240
houston i'm dan hewitt public affairs

3
00:00:08,310 --> 00:00:06,720
officer here at nasa i'm joined today by

4
00:00:11,030 --> 00:00:08,320
richard watson one of the spacesuit

5
00:00:13,110 --> 00:00:11,040
engineers uh also here in houston

6
00:00:13,990 --> 00:00:13,120
working for nasa at the johnson space

7
00:00:15,829 --> 00:00:14,000
center

8
00:00:17,910 --> 00:00:15,839
we're here to talk today to bunker hill

9
00:00:19,029 --> 00:00:17,920
elementary from my hometown middletown

10
00:00:21,189 --> 00:00:19,039
delaware

11
00:00:23,029 --> 00:00:21,199
really excited to take some questions

12
00:00:24,150 --> 00:00:23,039
from the students there give you guys a

13
00:00:26,470 --> 00:00:24,160

little bit of insight of what we're

14
00:00:27,990 --> 00:00:26,480
doing here at nasa these days

15
00:00:29,990 --> 00:00:28,000
and anything else you know if you're

16
00:00:31,990 --> 00:00:30,000
excited about space we want to know we

17
00:00:33,510 --> 00:00:32,000
want to answer those questions so

18
00:00:35,030 --> 00:00:33,520
just real quick a bit about the room

19
00:00:36,950 --> 00:00:35,040
we're in the international space station

20
00:00:39,630 --> 00:00:36,960
flight control room this is a room

21
00:00:41,990 --> 00:00:39,640
that's staffed by people 24 hours a day

22
00:00:44,950 --> 00:00:42,000
365 days a year

23
00:00:46,389 --> 00:00:44,960
always monitoring systems always flying

24
00:00:47,910 --> 00:00:46,399
literally they're the ones flying

25
00:00:50,150 --> 00:00:47,920
controlling the international space

26
00:00:51,510 --> 00:00:50,160
station which actually a lot of you as

27
00:00:53,189 --> 00:00:51,520
long as you've been alive this is

28
00:00:55,350 --> 00:00:53,199
something really exciting to remember

29
00:00:58,150 --> 00:00:55,360
there have been people in space

30
00:01:00,150 --> 00:00:58,160
so really cool fact um since the year

31
00:01:01,910 --> 00:01:00,160
2000 human beings have lived in space

32
00:01:03,270 --> 00:01:01,920
and this is where we talk to them we

33
00:01:05,270 --> 00:01:03,280
monitor them we help them out through

34
00:01:07,350 --> 00:01:05,280
their daily process so richard thank you

35
00:01:08,789 --> 00:01:07,360
for joining me here today uh i know

36
00:01:10,870 --> 00:01:08,799
we're real excited to take your

37
00:01:16,230 --> 00:01:10,880
questions uh so as soon as you guys are

38
00:01:19,990 --> 00:01:17,990

what is the most important job in

39
00:01:23,109 --> 00:01:20,000
mission control

40
00:01:25,030 --> 00:01:23,119
hi uh who was that question from

41
00:01:27,109 --> 00:01:25,040
tennessee harper ah well thanks so

42
00:01:29,190 --> 00:01:27,119
that's a great question um so there's a

43
00:01:31,749 --> 00:01:29,200
lot of different jobs in mission control

44
00:01:33,350 --> 00:01:31,759
we have folks uh that are working

45
00:01:35,270 --> 00:01:33,360
to go through and actually control the

46
00:01:36,870 --> 00:01:35,280
vehicle and its attitude and how it's

47
00:01:37,910 --> 00:01:36,880
flying across the sky there are folks

48
00:01:40,390 --> 00:01:37,920
working

49
00:01:42,550 --> 00:01:40,400
on the uh on the actual environmental

50
00:01:44,630 --> 00:01:42,560
control systems uh that keep the the

51
00:01:45,990 --> 00:01:44,640
astronauts safe inside the vehicle um

52
00:01:47,510 --> 00:01:46,000
there are folks that are coordinating

53
00:01:49,429 --> 00:01:47,520
what the astronauts are doing inside the

54
00:01:51,590 --> 00:01:49,439
vehicle uh with their science

55
00:01:53,270 --> 00:01:51,600
experiments so a lot of different jobs

56
00:01:55,190 --> 00:01:53,280
and i think the biggest thing to realize

57
00:01:58,069 --> 00:01:55,200
is that it's a team effort and so to

58
00:01:59,749 --> 00:01:58,079
call one person the most important um in

59
00:02:01,510 --> 00:01:59,759
some ways that it makes

60
00:02:03,109 --> 00:02:01,520
it seem like that person does everything

61
00:02:04,950 --> 00:02:03,119
by themselves and there's one guy that

62
00:02:06,149 --> 00:02:04,960
or one guy or girl that's really kind of

63
00:02:07,749 --> 00:02:06,159

bringing everything together and that's

64
00:02:08,710 --> 00:02:07,759
the flight director and so they're

65
00:02:10,150 --> 00:02:08,720
probably

66
00:02:11,750 --> 00:02:10,160
kind of like the quarterback or the

67
00:02:14,070 --> 00:02:11,760
conductor of the symphony that's

68
00:02:16,229 --> 00:02:14,080
happening there but they they can't do

69
00:02:17,750 --> 00:02:16,239
that they do without everybody else so

70
00:02:19,670 --> 00:02:17,760
there's one one person that's really

71
00:02:21,190 --> 00:02:19,680
kind of running the show and making sure

72
00:02:22,710 --> 00:02:21,200
everything's going smoothly and that's

73
00:02:24,630 --> 00:02:22,720
the flight director

74
00:02:26,550 --> 00:02:24,640
but that person really what they're

75
00:02:27,430 --> 00:02:26,560
doing is really coordinating everybody

76
00:02:29,430 --> 00:02:27,440
else

77
00:02:31,270 --> 00:02:29,440
so the team is really more important

78
00:02:32,790 --> 00:02:31,280
than any one individual but that

79
00:02:34,470 --> 00:02:32,800
individual is the one that's really

80
00:02:36,390 --> 00:02:34,480
responsible for the whole room kind of

81
00:02:37,910 --> 00:02:36,400
brings them all together yeah all right

82
00:02:42,710 --> 00:02:37,920
great question let's move on to the next

83
00:02:46,390 --> 00:02:44,229
hi um

84
00:02:48,790 --> 00:02:46,400
astronauts have to train

85
00:02:51,509 --> 00:02:48,800
um before they go to space so

86
00:02:54,550 --> 00:02:51,519
what type of training do they do

87
00:02:56,710 --> 00:02:54,560
at mission control ah great question

88
00:02:58,630 --> 00:02:56,720

so yeah astronauts do train they do um

89
00:03:00,149 --> 00:02:58,640
several years of training before they

90
00:03:02,390 --> 00:03:00,159
get assigned to a flight just to

91
00:03:04,229 --> 00:03:02,400
familiarize themselves with nasa and

92
00:03:06,070 --> 00:03:04,239
they actually train a lot before they

93
00:03:08,309 --> 00:03:06,080
even come to nasa so they're very good

94
00:03:09,350 --> 00:03:08,319
at something they do beforehand but when

95
00:03:11,270 --> 00:03:09,360
they actually come in they're going to

96
00:03:12,869 --> 00:03:11,280
go through and and see things like how

97
00:03:14,149 --> 00:03:12,879
do they get up and down from space so

98
00:03:15,110 --> 00:03:14,159
what vehicle are they going to actually

99
00:03:15,990 --> 00:03:15,120
ride in

100
00:03:17,830 --> 00:03:16,000
they're going to go through and get

101
00:03:19,589 --> 00:03:17,840
training on on the the vehicle that

102
00:03:21,509 --> 00:03:19,599
they're inside of and how that vehicle

103
00:03:23,990 --> 00:03:21,519
operates and then also not only that

104
00:03:25,190 --> 00:03:24,000
vehicle but also the vehicle the iss

105
00:03:27,270 --> 00:03:25,200
that they're they're going to be

106
00:03:28,949 --> 00:03:27,280
operating so emergency procedures so

107
00:03:29,990 --> 00:03:28,959
what do you do if there's a fire

108
00:03:31,350 --> 00:03:30,000
they're going to be going through and

109
00:03:32,949 --> 00:03:31,360
trying to learn about the experiments

110
00:03:34,470 --> 00:03:32,959
they're specifically doing

111
00:03:36,070 --> 00:03:34,480
how do they go through and just keep the

112
00:03:37,750 --> 00:03:36,080
station running i'm learning to do

113
00:03:40,070 --> 00:03:37,760

things like just normal things like we

114
00:03:42,390 --> 00:03:40,080
take kind of for granted like how to go

115
00:03:43,830 --> 00:03:42,400
to the bathroom how to eat how to change

116
00:03:45,030 --> 00:03:43,840
clothes how to wash your clothes where

117
00:03:46,470 --> 00:03:45,040
do you sleep

118
00:03:48,229 --> 00:03:46,480
you have to do all these things a little

119
00:03:49,750 --> 00:03:48,239
bit differently in space

120
00:03:52,070 --> 00:03:49,760
than we do here on the ground and so

121
00:03:54,229 --> 00:03:52,080
they they get to learn about

122
00:03:56,149 --> 00:03:54,239
all of that some of it happens

123
00:03:58,949 --> 00:03:56,159
in mission control itself most of it

124
00:04:01,270 --> 00:03:58,959
happens outside of mission control

125
00:04:02,789 --> 00:04:01,280
over in the mock-up simulators

126
00:04:05,030 --> 00:04:02,799
or sitting down with some some great

127
00:04:06,789 --> 00:04:05,040
folks that train them specifically there

128
00:04:08,070 --> 00:04:06,799
and you want them to learn in the spot

129
00:04:09,990 --> 00:04:08,080
where they're going to be operating so

130
00:04:12,070 --> 00:04:10,000
normally it's it's a place that looks a

131
00:04:13,990 --> 00:04:12,080
lot like the international space station

132
00:04:15,270 --> 00:04:14,000
and we call it a mock-up that that

133
00:04:17,189 --> 00:04:15,280
people learn at

134
00:04:19,030 --> 00:04:17,199
yeah and i mean and it's not just here

135
00:04:20,710 --> 00:04:19,040
in houston it's an international space

136
00:04:22,550 --> 00:04:20,720
station so these astronauts actually

137
00:04:24,870 --> 00:04:22,560
train all over the world you got to

138
00:04:26,230 --> 00:04:24,880

remember like like richard said they'll

139
00:04:27,670 --> 00:04:26,240
train for a couple of years so when they

140
00:04:29,590 --> 00:04:27,680
get assigned they'll train for about two

141
00:04:31,430 --> 00:04:29,600
years just for a six month flight so

142
00:04:32,710 --> 00:04:31,440
it's a lot it's actually a lot like what

143
00:04:34,950 --> 00:04:32,720
you guys are doing it can be a lot of

144
00:04:36,150 --> 00:04:34,960
classrooms it's a lot of tests a lot of

145
00:04:37,909 --> 00:04:36,160
things like that to make sure they're

146
00:04:39,590 --> 00:04:37,919
ready and they do it all over the globe

147
00:04:41,510 --> 00:04:39,600
so they also have to learn how to speak

148
00:04:43,510 --> 00:04:41,520
different languages it's it's very

149
00:04:46,230 --> 00:04:43,520
difficult but as they'll all tell you

150
00:04:48,310 --> 00:04:46,240
it's very rewarding once you're up there

151
00:04:51,189 --> 00:04:48,320
next question guys

152
00:04:55,030 --> 00:04:53,030
what are the biggest changes in the new

153
00:04:57,749 --> 00:04:55,040
spacesuit

154
00:04:59,270 --> 00:04:57,759
great question um so we have a couple of

155
00:05:02,070 --> 00:04:59,280
different spacesuits that are kind of on

156
00:05:04,390 --> 00:05:02,080
the new side of things uh so um

157
00:05:05,990 --> 00:05:04,400
spacesuits are a little bit like cars

158
00:05:08,950 --> 00:05:06,000
and so like a

159
00:05:11,270 --> 00:05:08,960
toyota prius and a ford f250 truck are

160
00:05:12,469 --> 00:05:11,280
both both types of cars but they do

161
00:05:13,510 --> 00:05:12,479
different jobs and they do them

162
00:05:15,670 --> 00:05:13,520
differently

163
00:05:18,469 --> 00:05:15,680

so i work what's called on the orion

164
00:05:19,909 --> 00:05:18,479
vehicle and that vehicle is a capsule

165
00:05:21,510 --> 00:05:19,919
and so the biggest thing for that suit

166
00:05:23,029 --> 00:05:21,520
is a launch entry

167
00:05:25,590 --> 00:05:23,039
kind of thing so it's going to protect

168
00:05:27,670 --> 00:05:25,600
us if the vehicle for some reason has

169
00:05:28,790 --> 00:05:27,680
something bad happening with it the new

170
00:05:30,469 --> 00:05:28,800
things with that one is how it

171
00:05:32,469 --> 00:05:30,479
integrates with the vehicle

172
00:05:33,990 --> 00:05:32,479
and how how it's comfortable

173
00:05:35,749 --> 00:05:34,000
when you're when you're wearing it there

174
00:05:37,670 --> 00:05:35,759
and what it does if you get into an

175
00:05:39,909 --> 00:05:37,680
emergency there's another suit called

176
00:05:42,469 --> 00:05:39,919
the z2 suit which is more to go walk

177
00:05:44,950 --> 00:05:42,479
around on the moon or on mars or

178
00:05:48,070 --> 00:05:44,960
go do some work outside of the vehicle

179
00:05:49,189 --> 00:05:48,080
so that suit is is fun and neat too and

180
00:05:49,909 --> 00:05:49,199
that one

181
00:05:53,590 --> 00:05:49,919
it

182
00:05:55,510 --> 00:05:53,600
you're outside working

183
00:05:58,070 --> 00:05:55,520
so our bodies need some some interesting

184
00:06:01,029 --> 00:05:58,080
things we really like birth as a place

185
00:06:03,909 --> 00:06:01,039
to go through and have it protect us

186
00:06:05,830 --> 00:06:03,919
down here so the temperature on earth is

187
00:06:07,830 --> 00:06:05,840
very good for humans the fact there's

188
00:06:10,230 --> 00:06:07,840

oxygen for us to breathe that's that's

189
00:06:11,510 --> 00:06:10,240
pretty important

190
00:06:13,110 --> 00:06:11,520
and then the

191
00:06:14,390 --> 00:06:13,120
the pressure itself

192
00:06:16,070 --> 00:06:14,400
it's really scary actually out in a

193
00:06:18,230 --> 00:06:16,080
vacuum of space

194
00:06:20,309 --> 00:06:18,240
your blood essentially boils

195
00:06:21,830 --> 00:06:20,319
which is which is very dangerous so you

196
00:06:24,469 --> 00:06:21,840
need a suit to go through and protect

197
00:06:26,710 --> 00:06:24,479
you from that or a spacecraft to go help

198
00:06:28,390 --> 00:06:26,720
us with that so as you're protecting

199
00:06:30,150 --> 00:06:28,400
though you want to be able to do useful

200
00:06:32,710 --> 00:06:30,160
work so being able to move your gloves

201
00:06:33,670 --> 00:06:32,720
move your arms legs bend down pick up a

202
00:06:35,189 --> 00:06:33,680
rock

203
00:06:36,870 --> 00:06:35,199
move a box around

204
00:06:38,629 --> 00:06:36,880
those are all things that you you want

205
00:06:40,390 --> 00:06:38,639
to be able to do but you also have to

206
00:06:42,070 --> 00:06:40,400
protect the person so working with both

207
00:06:44,230 --> 00:06:42,080
of those things together to do the job a

208
00:06:45,590 --> 00:06:44,240
little better so we put different

209
00:06:47,430 --> 00:06:45,600
features in the suit to go through and

210
00:06:49,430 --> 00:06:47,440
make it easier to move so that's the

211
00:06:50,950 --> 00:06:49,440
biggest things on on the new suit are

212
00:06:53,270 --> 00:06:50,960
flames that make it easier to move and

213
00:06:54,710 --> 00:06:53,280

also how we get in and out so

214
00:06:57,350 --> 00:06:54,720
originally right now we kind of have a

215
00:06:59,270 --> 00:06:57,360
shirt and pants design on our curtain

216
00:07:01,830 --> 00:06:59,280
current emu

217
00:07:03,670 --> 00:07:01,840
our space station uh the white puffy

218
00:07:05,029 --> 00:07:03,680
suit that they go out the door in you

219
00:07:05,990 --> 00:07:05,039
pull on your pants and then you pull on

220
00:07:08,790 --> 00:07:06,000
your shirt and then you pull on your

221
00:07:10,550 --> 00:07:08,800
helmet and gloves uh the new suit that

222
00:07:12,790 --> 00:07:10,560
goes outside would actually have you

223
00:07:13,670 --> 00:07:12,800
climbing in a hatch in the back of the

224
00:07:15,749 --> 00:07:13,680
suit

225
00:07:17,189 --> 00:07:15,759
kind of like the backpack opens up and

226
00:07:19,350 --> 00:07:17,199
then you climb down in it and that makes

227
00:07:21,189 --> 00:07:19,360
it a lot quicker a lot easier it's also

228
00:07:22,550 --> 00:07:21,199
a lot lighter too because i mean that if

229
00:07:23,990 --> 00:07:22,560
you i don't know if you guys have seen

230
00:07:25,510 --> 00:07:24,000
it but that big white spacesuit i mean

231
00:07:28,070 --> 00:07:25,520
it weighs how many a couple hundred

232
00:07:29,589 --> 00:07:28,080
pounds yeah about 350 out the door and

233
00:07:31,749 --> 00:07:29,599
it'll be it'll be tough to walk around

234
00:07:33,189 --> 00:07:31,759
on mars with it's less gravity but you

235
00:07:35,189 --> 00:07:33,199
know there's still quite a bit of weight

236
00:07:39,270 --> 00:07:35,199
yeah yeah all right very good question

237
00:07:43,670 --> 00:07:40,950
hi i'm matthew james

238
00:07:49,510 --> 00:07:45,430

how are you so

239
00:07:51,270 --> 00:07:49,520
good how about you um my question is how

240
00:07:53,350 --> 00:07:51,280
do you like the new look of the z2

241
00:07:56,070 --> 00:07:53,360
spacesuit uh the new look of the z2

242
00:07:57,670 --> 00:07:56,080
space yeah so we actually had um a neat

243
00:07:59,430 --> 00:07:57,680
competition that some folks got to go

244
00:08:01,029 --> 00:07:59,440
through and do or they they went online

245
00:08:03,270 --> 00:08:01,039
they came up with a couple of

246
00:08:05,749 --> 00:08:03,280
neat paint jobs for the outside of the

247
00:08:08,150 --> 00:08:05,759
suit and uh had a lot of people come in

248
00:08:10,710 --> 00:08:08,160
and vote uh on what

249
00:08:12,230 --> 00:08:10,720
on which which suit was gonna be

250
00:08:13,830 --> 00:08:12,240
the one that was the coolest looking and

251
00:08:15,189 --> 00:08:13,840
so they they've got to pick one of those

252
00:08:16,950 --> 00:08:15,199
and that one that one came out looking

253
00:08:19,270 --> 00:08:16,960
real nice yeah i remember setting that

254
00:08:20,390 --> 00:08:19,280
up because i mean so much of because you

255
00:08:22,150 --> 00:08:20,400
know you're a spacesuit engineer

256
00:08:23,430 --> 00:08:22,160
designer that you don't always get to

257
00:08:24,950 --> 00:08:23,440
design something just because it looks

258
00:08:25,749 --> 00:08:24,960
cool you know like first and foremost

259
00:08:27,189 --> 00:08:25,759
you got to make sure it's going to be

260
00:08:29,189 --> 00:08:27,199
safe it's going to work all that you

261
00:08:31,510 --> 00:08:29,199
know boring but like the stuff you

262
00:08:32,550 --> 00:08:31,520
really need so i remember when they when

263
00:08:33,909 --> 00:08:32,560

it got brought up they were really

264
00:08:34,949 --> 00:08:33,919
excited because i was like we we get to

265
00:08:36,870 --> 00:08:34,959
make this

266
00:08:38,389 --> 00:08:36,880
and it can look cool like so it was it

267
00:08:39,430 --> 00:08:38,399
was a really i know it was an awesome

268
00:08:41,190 --> 00:08:39,440
thing for the design it was a really

269
00:08:42,949 --> 00:08:41,200
cool thing for us too we always love

270
00:08:44,470 --> 00:08:42,959
like you know hearing what you guys

271
00:08:46,230 --> 00:08:44,480
think and you know letting you kind of

272
00:08:47,990 --> 00:08:46,240
have a voice in what we're doing here so

273
00:08:49,430 --> 00:08:48,000
um i was i was really excited with how

274
00:08:50,870 --> 00:08:49,440
it came out yeah i think they may have

275
00:08:53,110 --> 00:08:50,880
some folks in the room there with them

276
00:08:55,430 --> 00:08:53,120
actually uh linda hughes and jenny furl

277
00:08:56,949 --> 00:08:55,440
from ilc that actually are helpful maybe

278
00:08:58,790 --> 00:08:56,959
helping out get their work on that suit

279
00:09:01,350 --> 00:08:58,800
as well up there they they work on the

280
00:09:03,430 --> 00:09:01,360
uh the emu so it's it's pretty cool what

281
00:09:05,269 --> 00:09:03,440
they have going on um out there in

282
00:09:08,070 --> 00:09:05,279
delaware all right

283
00:09:12,070 --> 00:09:08,080
let's keep it going

284
00:09:19,110 --> 00:09:15,509
hello my name is casey stevens and i was

285
00:09:21,910 --> 00:09:19,120
wondering what is the purpose of

286
00:09:24,389 --> 00:09:21,920
mission control ah great question so

287
00:09:26,870 --> 00:09:24,399
mission control uh we're uh here to go

288
00:09:29,269 --> 00:09:26,880

through and help out people uh on orbit

289
00:09:30,870 --> 00:09:29,279
and so um originally so if you actually

290
00:09:32,550 --> 00:09:30,880
need somebody commanding things and

291
00:09:34,790 --> 00:09:32,560
watching things because if all the

292
00:09:36,389 --> 00:09:34,800
astronauts were doing um in space was

293
00:09:38,550 --> 00:09:36,399
watching the vehicle

294
00:09:40,070 --> 00:09:38,560
they wouldn't be very effective at going

295
00:09:42,070 --> 00:09:40,080
through and actually

296
00:09:43,509 --> 00:09:42,080
doing their job up there so

297
00:09:45,350 --> 00:09:43,519
there are some systems that we can sit

298
00:09:47,590 --> 00:09:45,360
down here on the ground and monitor and

299
00:09:49,509 --> 00:09:47,600
watch for them and also be working ahead

300
00:09:51,509 --> 00:09:49,519
of them a little bit so

301
00:09:53,829 --> 00:09:51,519
you'd like to when the astronaut goes to

302
00:09:54,949 --> 00:09:53,839
perform a task already know what you're

303
00:09:57,269 --> 00:09:54,959
going to do

304
00:09:58,550 --> 00:09:57,279
something goes wrong how are you going

305
00:09:59,590 --> 00:09:58,560
to respond

306
00:10:01,750 --> 00:09:59,600
so that's

307
00:10:03,750 --> 00:10:01,760
mission control is is really important

308
00:10:05,190 --> 00:10:03,760
because it's thinking ahead

309
00:10:06,630 --> 00:10:05,200
it's it's going through and making sure

310
00:10:07,990 --> 00:10:06,640
everything is streamlined everything is

311
00:10:10,069 --> 00:10:08,000
working properly

312
00:10:11,430 --> 00:10:10,079
anticipating problems realizing what a

313
00:10:13,110 --> 00:10:11,440

problem if it does come up is it

314
00:10:14,310 --> 00:10:13,120
important or not there's some things

315
00:10:15,750 --> 00:10:14,320
that could come up that we have real

316
00:10:17,110 --> 00:10:15,760
good workarounds for that we aren't

317
00:10:18,949 --> 00:10:17,120
going to actually do anything maybe the

318
00:10:20,310 --> 00:10:18,959
answer is hey that's okay we can keep

319
00:10:21,190 --> 00:10:20,320
going but we don't want everybody to

320
00:10:22,870 --> 00:10:21,200
stop

321
00:10:25,030 --> 00:10:22,880
for a problem that we could just say hey

322
00:10:26,790 --> 00:10:25,040
we can take care of that later

323
00:10:27,829 --> 00:10:26,800
so that that really is the big thing is

324
00:10:29,750 --> 00:10:27,839
going through and making things

325
00:10:31,110 --> 00:10:29,760
streamline making things

326
00:10:33,030 --> 00:10:31,120
actually going to work effectively

327
00:10:35,030 --> 00:10:33,040
together on orbit so that we are able to

328
00:10:37,670 --> 00:10:35,040
go through and really use the valuable

329
00:10:39,430 --> 00:10:37,680
resources that is time on orbit is such

330
00:10:41,430 --> 00:10:39,440
an important thing because it costs a

331
00:10:43,190 --> 00:10:41,440
lot of time and money to get somebody up

332
00:10:44,470 --> 00:10:43,200
there and we want them to be effective

333
00:10:46,150 --> 00:10:44,480
up there and that's really what this

334
00:10:47,350 --> 00:10:46,160
allows us to do yeah pretty much do

335
00:10:48,949 --> 00:10:47,360
everything we can down here on the

336
00:10:51,030 --> 00:10:48,959
ground let the astronauts do astronaut

337
00:10:53,910 --> 00:10:51,040
stuff and stuff only they can do so

338
00:11:01,269 --> 00:10:53,920

that's i mean that's perfect explanation

339
00:11:06,470 --> 00:11:04,069
what does the new or vine space suit do

340
00:11:09,190 --> 00:11:06,480
and why is it so special

341
00:11:11,750 --> 00:11:09,200
great question thanks um so originally

342
00:11:12,710 --> 00:11:11,760
what we we used in shuttle was a similar

343
00:11:17,509 --> 00:11:12,720
suit

344
00:11:18,230 --> 00:11:17,519
worked kind of like a a scuba tank

345
00:11:20,310 --> 00:11:18,240
that

346
00:11:21,829 --> 00:11:20,320
encapsulated your whole body basically

347
00:11:23,750 --> 00:11:21,839
oxygen came in

348
00:11:25,430 --> 00:11:23,760
in just a line that was had high

349
00:11:27,110 --> 00:11:25,440
pressure in there and then we breathed

350
00:11:29,430 --> 00:11:27,120
on that line

351
00:11:31,590 --> 00:11:29,440
and it vented off into the cabin

352
00:11:33,990 --> 00:11:31,600
it wasn't um it wasn't a part of the

353
00:11:36,230 --> 00:11:34,000
original shell design so it was kind of

354
00:11:37,910 --> 00:11:36,240
added on after the fact so it didn't

355
00:11:39,430 --> 00:11:37,920
integrate as well as we would have liked

356
00:11:40,870 --> 00:11:39,440
with the actual vehicle and the way the

357
00:11:43,110 --> 00:11:40,880
vehicle operates

358
00:11:45,269 --> 00:11:43,120
this suit is new because it actually has

359
00:11:47,269 --> 00:11:45,279
the ability to keep doing the job like

360
00:11:48,949 --> 00:11:47,279
the shuttle jaw suit did

361
00:11:51,509 --> 00:11:48,959
but it also has the ability to tie

362
00:11:54,150 --> 00:11:51,519
directly into the

363
00:11:56,310 --> 00:11:54,160

vehicle systems to go through and take

364
00:11:59,190 --> 00:11:56,320
and deliver oxygen directly to the crew

365
00:12:00,710 --> 00:11:59,200
member but then also pull off the co2 um

366
00:12:02,069 --> 00:12:00,720
to pull off the water they're producing

367
00:12:04,310 --> 00:12:02,079
as they may sweat

368
00:12:06,470 --> 00:12:04,320
and uh to go return it back around so

369
00:12:08,389 --> 00:12:06,480
it's really tying it back in together

370
00:12:10,629 --> 00:12:08,399
with with the vehicle is what's kind of

371
00:12:12,310 --> 00:12:10,639
special about this one we've looked at a

372
00:12:13,670 --> 00:12:12,320
couple of different things

373
00:12:14,790 --> 00:12:13,680
about different missions we could

374
00:12:17,750 --> 00:12:14,800
support

375
00:12:19,829 --> 00:12:17,760
like could you do a spacewalk if an

376
00:12:21,670 --> 00:12:19,839
emergency happened we're not sure if

377
00:12:23,190 --> 00:12:21,680
we're going to do that yet but we're

378
00:12:24,870 --> 00:12:23,200
continuing to look at that one but

379
00:12:26,629 --> 00:12:24,880
really the the key with this one is

380
00:12:27,990 --> 00:12:26,639
trying to protect the crew

381
00:12:29,829 --> 00:12:28,000
when it's coming back in and if you were

382
00:12:31,269 --> 00:12:29,839
to go into a crash landing

383
00:12:32,870 --> 00:12:31,279
trying to make sure that they they can't

384
00:12:34,550 --> 00:12:32,880
get hurt in there

385
00:12:36,389 --> 00:12:34,560
is different than we did in shuttle so

386
00:12:39,190 --> 00:12:36,399
the new things about this one are better

387
00:12:40,870 --> 00:12:39,200
crew protection on landing and better

388
00:12:42,150 --> 00:12:40,880

tying into the vehicle so that we get a

389
00:12:44,230 --> 00:12:42,160
system that's

390
00:12:46,069 --> 00:12:44,240
lightweight and simple and very reliable

391
00:12:47,670 --> 00:12:46,079
is really where we're going all right

392
00:12:48,870 --> 00:12:47,680
very very good question very good

393
00:12:56,629 --> 00:12:48,880
question all right let's go on to the

394
00:13:00,710 --> 00:12:59,269
hi i'm emma and what happened on the iss

395
00:13:02,069 --> 00:13:00,720
this morning were the astronauts in

396
00:13:04,230 --> 00:13:02,079
danger

397
00:13:06,550 --> 00:13:04,240
i'll i'm gonna uh the iss this morning

398
00:13:07,990 --> 00:13:06,560
with the ammonia so okay yeah and that

399
00:13:10,550 --> 00:13:08,000
order dan somebody is somebody's been

400
00:13:13,110 --> 00:13:10,560
following along no so early this morning

401
00:13:14,310 --> 00:13:13,120
i was about 3 a.m central time 4 a.m uh

402
00:13:16,230 --> 00:13:14,320
where you guys were so you're all

403
00:13:20,790 --> 00:13:16,240
probably still asleep i was until i got

404
00:13:22,949 --> 00:13:20,800
woken up um we had an alarm go off and

405
00:13:24,310 --> 00:13:22,959
mission control is great at monitoring

406
00:13:26,230 --> 00:13:24,320
everything that's happening on board the

407
00:13:27,750 --> 00:13:26,240
international space station

408
00:13:29,590 --> 00:13:27,760
they have these sensors throughout

409
00:13:31,590 --> 00:13:29,600
everything on board so if something

410
00:13:33,110 --> 00:13:31,600
starts to look you know we call it off

411
00:13:34,949 --> 00:13:33,120
nominal but if something starts to look

412
00:13:37,750 --> 00:13:34,959
wrong we can get ahead of it we can make

413
00:13:39,750 --> 00:13:37,760

sure the crew is safe so they are there

414
00:13:41,829 --> 00:13:39,760
are these things called ammonia pumps

415
00:13:44,710 --> 00:13:41,839
and i'll try not to get too you know

416
00:13:46,389 --> 00:13:44,720
early technical but basically um all the

417
00:13:48,550 --> 00:13:46,399
stuff on the station generates a lot of

418
00:13:50,949 --> 00:13:48,560
heat so we have these

419
00:13:52,470 --> 00:13:50,959
lines that take that heat and dissipate

420
00:13:54,470 --> 00:13:52,480
it out into space so things don't

421
00:13:57,110 --> 00:13:54,480
overheat basically just keeping them

422
00:13:59,030 --> 00:13:57,120
functioning keeping them safe and one of

423
00:14:00,550 --> 00:13:59,040
the issues with that is ammonia is very

424
00:14:02,150 --> 00:14:00,560
poisonous to us so we have a lot of

425
00:14:04,389 --> 00:14:02,160
safeguards in place to make sure the

426
00:14:05,829 --> 00:14:04,399
astronauts never get exposed to it but

427
00:14:07,750 --> 00:14:05,839
there's always a chance and we always

428
00:14:10,150 --> 00:14:07,760
prepare for that chance

429
00:14:12,150 --> 00:14:10,160
and so there were some indications that

430
00:14:14,629 --> 00:14:12,160
there may have been ammonia getting into

431
00:14:16,470 --> 00:14:14,639
the crew's atmosphere so as soon as we

432
00:14:19,590 --> 00:14:16,480
saw those indications we made sure the

433
00:14:20,949 --> 00:14:19,600
crew don some emergency breathing masks

434
00:14:22,949 --> 00:14:20,959
they went over to what we call the

435
00:14:25,590 --> 00:14:22,959
russian segment where there is no

436
00:14:27,430 --> 00:14:25,600
ammonia used and they sealed it off so

437
00:14:29,590 --> 00:14:27,440
we can actually seal off each part of

438
00:14:31,670 --> 00:14:29,600

the international space station

439
00:14:33,670 --> 00:14:31,680
with just doors in between each one so

440
00:14:35,269 --> 00:14:33,680
just in case something happens they can

441
00:14:37,670 --> 00:14:35,279
isolate that and they can still be on

442
00:14:39,110 --> 00:14:37,680
the station they're still totally safe

443
00:14:40,790 --> 00:14:39,120
so they went over to the russian segment

444
00:14:42,870 --> 00:14:40,800
they sealed everything up all six of

445
00:14:44,069 --> 00:14:42,880
them been hanging out there all morning

446
00:14:45,670 --> 00:14:44,079
and the team here in mission control

447
00:14:47,350 --> 00:14:45,680
continue to look at all the data

448
00:14:49,430 --> 00:14:47,360
everything they've looked at so far is

449
00:14:51,189 --> 00:14:49,440
indicating that there was no ammonia so

450
00:14:52,710 --> 00:14:51,199
it's probably just a false alarm but

451
00:14:55,350 --> 00:14:52,720
they're still investigating what made

452
00:14:57,269 --> 00:14:55,360
that sensor trip and you know what led

453
00:14:59,590 --> 00:14:57,279
to the pressure change that they saw

454
00:15:01,350 --> 00:14:59,600
which initially led to this decision

455
00:15:02,790 --> 00:15:01,360
but that's kind of where we are now

456
00:15:04,629 --> 00:15:02,800
right now the crew is still inside the

457
00:15:05,910 --> 00:15:04,639
russian segment but they're just kind of

458
00:15:07,750 --> 00:15:05,920
hanging out kind of enjoying an

459
00:15:09,350 --> 00:15:07,760
unscheduled off day

460
00:15:11,350 --> 00:15:09,360
as all of their science experiments and

461
00:15:13,030 --> 00:15:11,360
everything are back on the u.s segment

462
00:15:15,269 --> 00:15:13,040
the teams here in mission control doing

463
00:15:17,509 --> 00:15:15,279

a great job uh as just like the

464
00:15:19,910 --> 00:15:17,519
astronauts they train for years and

465
00:15:22,389 --> 00:15:19,920
years to be able to do their job

466
00:15:24,230 --> 00:15:22,399
so they know exactly what to do

467
00:15:26,230 --> 00:15:24,240
and they're going to continue looking at

468
00:15:28,069 --> 00:15:26,240
everything they're going to get them

469
00:15:30,629 --> 00:15:28,079
back over to the us segment as quickly

470
00:15:33,030 --> 00:15:30,639
as they can but again crew doing fine a

471
00:15:35,110 --> 00:15:33,040
little bit of an off day uh but looking

472
00:15:36,710 --> 00:15:35,120
like not a problem just a little bit of

473
00:15:38,150 --> 00:15:36,720
a false alarm

474
00:15:40,790 --> 00:15:38,160
someone's following along though i like

475
00:15:44,790 --> 00:15:40,800
that that's great yeah all right next

476
00:15:49,590 --> 00:15:47,350
hi my name is dave dawkins and my

477
00:15:51,990 --> 00:15:49,600
question is how does nasa tell time when

478
00:15:53,670 --> 00:15:52,000
the iss is in space

479
00:15:54,949 --> 00:15:53,680
great question so if

480
00:15:56,470 --> 00:15:54,959
you think about it we're going around

481
00:15:58,710 --> 00:15:56,480
the earth there and we're not really in

482
00:16:01,030 --> 00:15:58,720
any one time zone for very long and a

483
00:16:03,590 --> 00:16:01,040
lot of times

484
00:16:05,110 --> 00:16:03,600
every time zone we're doing laps pretty

485
00:16:07,110 --> 00:16:05,120
pretty quickly so we use a couple of

486
00:16:08,790 --> 00:16:07,120
different um times to go through and

487
00:16:11,110 --> 00:16:08,800
help us out so one of them is mission

488
00:16:13,269 --> 00:16:11,120

elapsed time that we go through and

489
00:16:15,670 --> 00:16:13,279
track with so we say hey we launched it

490
00:16:17,269 --> 00:16:15,680
this time how many hours has it been

491
00:16:19,430 --> 00:16:17,279
since we last

492
00:16:21,990 --> 00:16:19,440
left the earth another one we go through

493
00:16:23,350 --> 00:16:22,000
is phase elapsed time or p-e-t pet

494
00:16:25,110 --> 00:16:23,360
would be going through and saying all

495
00:16:27,430 --> 00:16:25,120
right we're going to start this activity

496
00:16:30,550 --> 00:16:27,440
so that may be a spacewalk it may be

497
00:16:32,150 --> 00:16:30,560
a specific section of the mission like a

498
00:16:33,990 --> 00:16:32,160
docking

499
00:16:35,350 --> 00:16:34,000
event or some other thing that would go

500
00:16:36,870 --> 00:16:35,360
through and say hey this is how long

501
00:16:38,710 --> 00:16:36,880
we've been in there

502
00:16:40,069 --> 00:16:38,720
another one would be greenwich mean time

503
00:16:41,430 --> 00:16:40,079
or gmt

504
00:16:43,590 --> 00:16:41,440
which allows us to go through and say

505
00:16:44,470 --> 00:16:43,600
hey there's one spot in england and that

506
00:16:46,150 --> 00:16:44,480
time

507
00:16:48,069 --> 00:16:46,160
is going to be kind of how the standard

508
00:16:50,470 --> 00:16:48,079
that all of us

509
00:16:52,069 --> 00:16:50,480
use to go through and measure there it's

510
00:16:53,590 --> 00:16:52,079
really important to go through and use a

511
00:16:55,509 --> 00:16:53,600
consistent one

512
00:16:57,430 --> 00:16:55,519
for folks on on orbit

513
00:16:58,949 --> 00:16:57,440

to go through and say all right so when

514
00:17:01,110 --> 00:16:58,959
we go to bed we can go through and do

515
00:17:02,790 --> 00:17:01,120
there and they'll shift around

516
00:17:04,309 --> 00:17:02,800
some for different events because

517
00:17:06,230 --> 00:17:04,319
sometimes they want to be during the day

518
00:17:08,470 --> 00:17:06,240
here in houston sometimes they want to

519
00:17:10,069 --> 00:17:08,480
be during the day in russia especially

520
00:17:11,909 --> 00:17:10,079
if they're doing a launching or landing

521
00:17:13,350 --> 00:17:11,919
event that they want certain lighting

522
00:17:14,949 --> 00:17:13,360
conditions for

523
00:17:16,789 --> 00:17:14,959
or if they want to have certain lighting

524
00:17:19,750 --> 00:17:16,799
conditions on orbit or certain things

525
00:17:21,909 --> 00:17:19,760
there so they can manipulate it some

526
00:17:24,789 --> 00:17:21,919
back and forth and sometimes

527
00:17:26,630 --> 00:17:24,799
you need to hop between houston time and

528
00:17:28,150 --> 00:17:26,640
and the mission time

529
00:17:29,350 --> 00:17:28,160
because really for a lot of folks you

530
00:17:30,870 --> 00:17:29,360
know going through and saying all right

531
00:17:33,029 --> 00:17:30,880
are people going to be awake at that

532
00:17:34,870 --> 00:17:33,039
time what time do i need to come in

533
00:17:37,669 --> 00:17:34,880
because most of us here in houston don't

534
00:17:39,590 --> 00:17:37,679
think um in our day-to-day lives in that

535
00:17:41,350 --> 00:17:39,600
way but when we walk into

536
00:17:42,950 --> 00:17:41,360
this environment we really do have to go

537
00:17:45,510 --> 00:17:42,960
through and think about how they are in

538
00:17:48,070 --> 00:17:45,520

orbit and less about our daily lives at

539
00:17:49,830 --> 00:17:48,080
home yeah i mean there's so there are

540
00:17:52,070 --> 00:17:49,840
three different shifts here just in

541
00:17:53,669 --> 00:17:52,080
mission control houston um that actually

542
00:17:55,750 --> 00:17:53,679
kind of structure themselves around the

543
00:17:57,750 --> 00:17:55,760
crew's day which they follow that gmt

544
00:17:59,990 --> 00:17:57,760
time so the first

545
00:18:01,830 --> 00:18:00,000
shift in mission control houston

546
00:18:03,590 --> 00:18:01,840
actually comes in around 11 p.m or

547
00:18:05,909 --> 00:18:03,600
midnight every single day and that's

548
00:18:07,830 --> 00:18:05,919
when their work day starts so it can be

549
00:18:08,950 --> 00:18:07,840
a lot of pretty crazy overnight hours

550
00:18:11,350 --> 00:18:08,960
for some of these people but that's

551
00:18:12,789 --> 00:18:11,360
because that gmt that's kind of that's

552
00:18:15,750 --> 00:18:12,799
that greenwich mean time that's that

553
00:18:17,750 --> 00:18:15,760
zero you know time if you look at time

554
00:18:19,830 --> 00:18:17,760
zones and everything and that's the

555
00:18:22,710 --> 00:18:19,840
agreed upon time that we have that we

556
00:18:24,310 --> 00:18:22,720
follow for activities our colleagues and

557
00:18:25,909 --> 00:18:24,320
in europe at their control center and

558
00:18:28,390 --> 00:18:25,919
russia at their control center and also

559
00:18:30,870 --> 00:18:28,400
japan so massive time differences so we

560
00:18:32,310 --> 00:18:30,880
all kind of need to agree okay you know

561
00:18:33,750 --> 00:18:32,320
we need to just follow this one it's

562
00:18:35,110 --> 00:18:33,760
going to be some rough hours for some

563
00:18:37,190 --> 00:18:35,120

people but

564
00:18:38,310 --> 00:18:37,200
we make do and it hasn't been an issue

565
00:18:39,750 --> 00:18:38,320
and it makes scheduling everything a

566
00:18:45,510 --> 00:18:39,760
whole lot easier

567
00:18:49,190 --> 00:18:47,990
hi i'm julius francis carter and this is

568
00:18:51,830 --> 00:18:49,200
my question

569
00:18:54,470 --> 00:18:51,840
the orion spacecraft is designed to take

570
00:18:56,390 --> 00:18:54,480
astronauts and humans further into space

571
00:18:58,789 --> 00:18:56,400
and other planets will you have to

572
00:19:01,590 --> 00:18:58,799
design the space suits different because

573
00:19:04,150 --> 00:19:01,600
of this ah great question um the answer

574
00:19:05,909 --> 00:19:04,160
is yes so we we always try and design

575
00:19:07,990 --> 00:19:05,919
around where we're going and what we're

576
00:19:09,909 --> 00:19:08,000
doing um so

577
00:19:12,150 --> 00:19:09,919
what you're what you're trying to do

578
00:19:13,669 --> 00:19:12,160
does absolutely change where you go

579
00:19:14,710 --> 00:19:13,679
where you go with the suit

580
00:19:17,590 --> 00:19:14,720
so

581
00:19:19,270 --> 00:19:17,600
the big thing for us right now with um

582
00:19:21,270 --> 00:19:19,280
with looking at going beyond low earth

583
00:19:22,950 --> 00:19:21,280
orbit it changes the amount of time that

584
00:19:24,390 --> 00:19:22,960
if there's a problem

585
00:19:26,390 --> 00:19:24,400
how long we have to be in the suit if we

586
00:19:27,990 --> 00:19:26,400
try and come home so right now if you're

587
00:19:30,070 --> 00:19:28,000
on iss and you have to come home you can

588
00:19:31,430 --> 00:19:30,080

really be home in a few hours

589
00:19:33,350 --> 00:19:31,440
it's really not

590
00:19:35,190 --> 00:19:33,360
a huge amount of time

591
00:19:37,190 --> 00:19:35,200
if you are on the up far side of the

592
00:19:38,870 --> 00:19:37,200
moon where you just left to go to the

593
00:19:40,070 --> 00:19:38,880
moon or your gifts you'll have to go to

594
00:19:42,070 --> 00:19:40,080
mars

595
00:19:44,070 --> 00:19:42,080
the the amount of time you might have to

596
00:19:46,390 --> 00:19:44,080
go through and spend in the suit to come

597
00:19:47,830 --> 00:19:46,400
back becomes a real big driver so that's

598
00:19:48,870 --> 00:19:47,840
one of the the things we're looking at

599
00:19:50,630 --> 00:19:48,880
right now is that if you had to be

600
00:19:53,430 --> 00:19:50,640
locked up in a suit

601
00:19:55,750 --> 00:19:53,440
for for six or seven days what happens

602
00:19:57,350 --> 00:19:55,760
um and it's funny because we can get

603
00:20:01,270 --> 00:19:57,360
food and water in there but it's it's

604
00:20:04,470 --> 00:20:02,870
that come back out how do you go through

605
00:20:06,390 --> 00:20:04,480
and how do you go you're in this little

606
00:20:09,029 --> 00:20:06,400
sealed up volume inside a suit

607
00:20:12,630 --> 00:20:09,039
and coming back in inside the vehicle it

608
00:20:15,029 --> 00:20:12,640
it can get pretty gross pretty fast

609
00:20:16,870 --> 00:20:15,039
wonders of space flight sometimes yep so

610
00:20:18,630 --> 00:20:16,880
that's the big one there so and also if

611
00:20:21,190 --> 00:20:18,640
you're going inside staying inside the

612
00:20:22,710 --> 00:20:21,200
vehicle so some of our missions um so if

613
00:20:24,149 --> 00:20:22,720

you go look at like when we went to the

614
00:20:25,590 --> 00:20:24,159
moon the first time the first few times

615
00:20:26,870 --> 00:20:25,600
we went to the moon

616
00:20:29,029 --> 00:20:26,880
apollo 8

617
00:20:31,590 --> 00:20:29,039
apollo

618
00:20:33,430 --> 00:20:31,600
10 when we went through and did some of

619
00:20:34,950 --> 00:20:33,440
the testing out there where we actually

620
00:20:36,789 --> 00:20:34,960
flew by the moon we actually didn't go

621
00:20:38,310 --> 00:20:36,799
under the surface we didn't land all the

622
00:20:39,590 --> 00:20:38,320
way we didn't go out of the vehicle and

623
00:20:41,270 --> 00:20:39,600
so we didn't have a suit that would go

624
00:20:42,630 --> 00:20:41,280
out of the vehicle

625
00:20:44,149 --> 00:20:42,640
but we still went there to go through

626
00:20:46,549 --> 00:20:44,159
and prove the systems out so if we did

627
00:20:48,549 --> 00:20:46,559
something similar in the future you'd

628
00:20:50,390 --> 00:20:48,559
have a suit that could go help you get

629
00:20:51,909 --> 00:20:50,400
home but wouldn't necessarily walk on

630
00:20:53,750 --> 00:20:51,919
the on the surface

631
00:20:54,789 --> 00:20:53,760
so you'd bring different suits for those

632
00:20:56,149 --> 00:20:54,799
jobs

633
00:20:57,990 --> 00:20:56,159
and right now we're working mainly on

634
00:21:00,070 --> 00:20:58,000
the suit that would go through and take

635
00:21:01,909 --> 00:21:00,080
you around and not so much on the suit

636
00:21:03,990 --> 00:21:01,919
that's doing the walking is not included

637
00:21:06,230 --> 00:21:04,000
on in that plan so the z2 would be the

638
00:21:08,549 --> 00:21:06,240

one that would be kind of walking around

639
00:21:09,909 --> 00:21:08,559
and the suit i'm i'm working on more is

640
00:21:11,909 --> 00:21:09,919
the one that stays in the vehicle and if

641
00:21:13,990 --> 00:21:11,919
there's an emergency outside we may try

642
00:21:21,270 --> 00:21:14,000
and go out and fix something all right

643
00:21:26,310 --> 00:21:24,070
my name is haley and i want to know will

644
00:21:28,470 --> 00:21:26,320
we be able to live a healthy and long

645
00:21:31,110 --> 00:21:28,480
life in space

646
00:21:33,669 --> 00:21:31,120
great question haley um a lot of really

647
00:21:36,149 --> 00:21:33,679
smart people have the same question

648
00:21:37,750 --> 00:21:36,159
uh so what we've got up to this point is

649
00:21:39,830 --> 00:21:37,760
we actually have a real interesting

650
00:21:41,909 --> 00:21:39,840
study going on right now or just getting

651
00:21:43,270 --> 00:21:41,919
ready to start in 2015 here with the

652
00:21:45,190 --> 00:21:43,280
kelly brothers

653
00:21:47,029 --> 00:21:45,200
to go up and try and look at what is

654
00:21:49,110 --> 00:21:47,039
long duration space flight

655
00:21:50,470 --> 00:21:49,120
happens we have twin brothers that are

656
00:21:51,590 --> 00:21:50,480
getting ready one of them is going to

657
00:21:53,909 --> 00:21:51,600
stay here on earth and the other is

658
00:21:54,710 --> 00:21:53,919
going up to stay on on station for one

659
00:21:56,390 --> 00:21:54,720
year

660
00:21:58,870 --> 00:21:56,400
so looking at the differences between

661
00:22:00,789 --> 00:21:58,880
two very similar people i mean so twin

662
00:22:03,270 --> 00:22:00,799
brothers how much more similar can you

663
00:22:05,110 --> 00:22:03,280

get than that in terms of you know uh

664
00:22:06,630 --> 00:22:05,120
their their life and and what their

665
00:22:08,630 --> 00:22:06,640
genetic code is

666
00:22:10,470 --> 00:22:08,640
is is very similar and getting to see

667
00:22:12,310 --> 00:22:10,480
what that that exposure to space for a

668
00:22:14,950 --> 00:22:12,320
long time is we really haven't had

669
00:22:18,149 --> 00:22:14,960
anybody in zero g um for for more than

670
00:22:19,750 --> 00:22:18,159
about five it's 534 days is the record

671
00:22:21,990 --> 00:22:19,760
for one of the russians i think yeah i

672
00:22:23,909 --> 00:22:22,000
think that's roughly the record there's

673
00:22:25,750 --> 00:22:23,919
been a couple of people there are four

674
00:22:27,750 --> 00:22:25,760
russians who have spent longer than 12

675
00:22:28,789 --> 00:22:27,760
months or longer in space at any one

676
00:22:30,470 --> 00:22:28,799
time

677
00:22:32,950 --> 00:22:30,480
but i mean some of the stuff that we've

678
00:22:35,190 --> 00:22:32,960
learned so our astronauts on the station

679
00:22:37,590 --> 00:22:35,200
now go there for about six months which

680
00:22:39,029 --> 00:22:37,600
is still a significant amount of time

681
00:22:41,270 --> 00:22:39,039
and it's long enough for your body to

682
00:22:43,669 --> 00:22:41,280
start to adapt that's one of the the

683
00:22:46,230 --> 00:22:43,679
great advantages and disadvantages of

684
00:22:47,990 --> 00:22:46,240
the human body is we adapt very quickly

685
00:22:49,750 --> 00:22:48,000
which is great you know when you're

686
00:22:52,070 --> 00:22:49,760
evolving to harsh conditions down here

687
00:22:53,990 --> 00:22:52,080
on earth in space it can actually kind

688
00:22:55,590 --> 00:22:54,000

of work against us because things start

689
00:22:57,750 --> 00:22:55,600
you start to lose things when you're

690
00:22:59,110 --> 00:22:57,760
floating around in this in microgravity

691
00:23:01,590 --> 00:22:59,120
your body says well i don't need these

692
00:23:03,750 --> 00:23:01,600
legs anymore so you'll start to lose

693
00:23:05,830 --> 00:23:03,760
your bone mass your muscles will start

694
00:23:07,510 --> 00:23:05,840
to wither away and that can be really

695
00:23:08,870 --> 00:23:07,520
serious it isn't so much of a problem

696
00:23:10,549 --> 00:23:08,880
when you're just floating around because

697
00:23:12,870 --> 00:23:10,559
you don't really need your legs but

698
00:23:14,470 --> 00:23:12,880
let's say you're going to mars

699
00:23:16,310 --> 00:23:14,480
and that flight is going to take several

700
00:23:18,630 --> 00:23:16,320
months maybe a year or longer just to

701
00:23:19,510 --> 00:23:18,640
get there if you arrive and you can't

702
00:23:21,669 --> 00:23:19,520
walk

703
00:23:23,110 --> 00:23:21,679
it's not going to be much of a mission

704
00:23:24,549 --> 00:23:23,120
so that's i mean that's some of the

705
00:23:26,070 --> 00:23:24,559
stuff that we're really tackling we're

706
00:23:27,350 --> 00:23:26,080
really learning a lot about on the

707
00:23:28,789 --> 00:23:27,360
station and we've come up with some

708
00:23:31,350 --> 00:23:28,799
really great stuff we actually have

709
00:23:33,830 --> 00:23:31,360
astronauts that come back now that are

710
00:23:35,110 --> 00:23:33,840
even stronger and have even more muscle

711
00:23:37,830 --> 00:23:35,120
mass in their legs than they did when

712
00:23:40,230 --> 00:23:37,840
they left a lot of that is the exercise

713
00:23:41,669 --> 00:23:40,240

that we have them do these astronauts

714
00:23:43,269 --> 00:23:41,679
i don't know about you guys but if i had

715
00:23:45,669 --> 00:23:43,279
to exercise two and a half hours every

716
00:23:47,510 --> 00:23:45,679
single day i might go crazy and that's

717
00:23:49,590 --> 00:23:47,520
what they have to do just just just to

718
00:23:51,110 --> 00:23:49,600
stay healthy so when they come back on

719
00:23:53,430 --> 00:23:51,120
earth they don't have to go through

720
00:23:55,510 --> 00:23:53,440
months of rehab so we're learning

721
00:23:57,350 --> 00:23:55,520
tremendous amounts of stuff just from

722
00:23:58,710 --> 00:23:57,360
our normal expeditions and as richard

723
00:24:00,549 --> 00:23:58,720
was telling you this one year mission

724
00:24:01,750 --> 00:24:00,559
coming up there's going to be one

725
00:24:03,909 --> 00:24:01,760
american and one russian they're going

726
00:24:05,269 --> 00:24:03,919
to spend an entire year in space it's a

727
00:24:07,029 --> 00:24:05,279
pretty long time

728
00:24:09,269 --> 00:24:07,039
and we're looking to learn a whole lot

729
00:24:14,070 --> 00:24:09,279
more

730
00:24:18,549 --> 00:24:16,710
hi my name is eden rambo and my question

731
00:24:20,789 --> 00:24:18,559
is do you ever get nervous when the

732
00:24:22,950 --> 00:24:20,799
astronauts report a problem

733
00:24:25,990 --> 00:24:22,960
do you ever get nervous i think always

734
00:24:28,390 --> 00:24:26,000
there's a a little bit of oh no what

735
00:24:30,549 --> 00:24:28,400
what's going on um it's funny i more

736
00:24:33,029 --> 00:24:30,559
work on the the building of stuff is

737
00:24:34,630 --> 00:24:33,039
kind of where my area is so

738
00:24:36,549 --> 00:24:34,640

i most of the time don't get to be the

739
00:24:38,630 --> 00:24:36,559
one operating the system or going

740
00:24:39,830 --> 00:24:38,640
through and actually using it we we try

741
00:24:41,990 --> 00:24:39,840
and create great things that the

742
00:24:43,990 --> 00:24:42,000
astronauts can find useful and then they

743
00:24:46,390 --> 00:24:44,000
come back and tell us hey was this this

744
00:24:48,310 --> 00:24:46,400
it or not and so um

745
00:24:50,630 --> 00:24:48,320
one of one of the older engineers always

746
00:24:52,070 --> 00:24:50,640
told me that when you design build test

747
00:24:54,710 --> 00:24:52,080
certify something and get ready to fly

748
00:24:55,909 --> 00:24:54,720
it you only know how the designers think

749
00:24:57,669 --> 00:24:55,919
it works

750
00:24:59,430 --> 00:24:57,679
when it goes actually in orbit and it's

751
00:25:00,710 --> 00:24:59,440
actually being used you learn how things

752
00:25:03,430 --> 00:25:00,720
really work

753
00:25:05,590 --> 00:25:03,440
and so sometimes our our astronauts come

754
00:25:07,750 --> 00:25:05,600
back and say hey this works differently

755
00:25:10,149 --> 00:25:07,760
than you thought it did and it makes us

756
00:25:12,710 --> 00:25:10,159
think very hard and and go back and look

757
00:25:14,549 --> 00:25:12,720
and say do we really believe um what

758
00:25:16,549 --> 00:25:14,559
we've always thought we believed because

759
00:25:18,630 --> 00:25:16,559
it is different on on the ground we work

760
00:25:21,269 --> 00:25:18,640
really hard to simulate things in a way

761
00:25:23,350 --> 00:25:21,279
so they'll match things on orbit um but

762
00:25:25,190 --> 00:25:23,360
we have to be very careful uh to go

763
00:25:27,430 --> 00:25:25,200

through and say that our assumptions

764
00:25:29,029 --> 00:25:27,440
change things um so like i normally

765
00:25:30,789 --> 00:25:29,039
assume when i go to turn a bolt the

766
00:25:32,310 --> 00:25:30,799
bolt's going to turn

767
00:25:34,870 --> 00:25:32,320
in space that's not a very good

768
00:25:36,310 --> 00:25:34,880
assumption because the if i go to turn a

769
00:25:38,070 --> 00:25:36,320
bolt on the space station the space

770
00:25:40,310 --> 00:25:38,080
station is a lot bigger than me and

771
00:25:42,310 --> 00:25:40,320
every action has an equal and opposite

772
00:25:44,710 --> 00:25:42,320
reaction and so the bolt instead of me

773
00:25:46,230 --> 00:25:44,720
turning it it's going to turn me

774
00:25:47,269 --> 00:25:46,240
and so it's that kind of thing that when

775
00:25:49,510 --> 00:25:47,279
you

776
00:25:51,190 --> 00:25:49,520
have an expectation

777
00:25:52,549 --> 00:25:51,200
it's not always fulfilled so we've

778
00:25:54,390 --> 00:25:52,559
learned some things

779
00:25:56,310 --> 00:25:54,400
recently about suits

780
00:25:58,789 --> 00:25:56,320
and how water flows in different places

781
00:26:00,789 --> 00:25:58,799
and where water moves around inside the

782
00:26:03,830 --> 00:26:00,799
suit that that operate differently than

783
00:26:06,390 --> 00:26:03,840
we had thought for years um had operated

784
00:26:08,310 --> 00:26:06,400
and it wasn't anything that the physics

785
00:26:10,149 --> 00:26:08,320
were all there to go through and physics

786
00:26:12,630 --> 00:26:10,159
still worked like it was supposed to it

787
00:26:14,149 --> 00:26:12,640
was really our understanding

788
00:26:15,430 --> 00:26:14,159

of what happened that so when somebody

789
00:26:17,830 --> 00:26:15,440
comes back and says hey i have this

790
00:26:19,190 --> 00:26:17,840
problem we have to work really hard to

791
00:26:20,630 --> 00:26:19,200
go through and ask every question of

792
00:26:22,710 --> 00:26:20,640
like well do we really know what we

793
00:26:27,750 --> 00:26:22,720
think we know

794
00:26:31,830 --> 00:26:29,990
hi my name is carson russo and my

795
00:26:33,750 --> 00:26:31,840
question was do you think a man will

796
00:26:36,390 --> 00:26:33,760
ever step foot on mars

797
00:26:37,430 --> 00:26:36,400
great question absolutely yes

798
00:26:39,750 --> 00:26:37,440
yes

799
00:26:41,669 --> 00:26:39,760
we don't know exactly the time the date

800
00:26:43,350 --> 00:26:41,679
we don't have it scheduled right now

801
00:26:46,710 --> 00:26:43,360
saying hey this you know

802
00:26:48,390 --> 00:26:46,720
2013 or 2017 2018 there we're going

803
00:26:50,390 --> 00:26:48,400
there but that's really why we're here

804
00:26:52,870 --> 00:26:50,400
this is what we do this is where we want

805
00:26:54,870 --> 00:26:52,880
to go is to go through and explore

806
00:26:56,470 --> 00:26:54,880
so yep i

807
00:26:58,470 --> 00:26:56,480
echo that 100

808
00:26:59,830 --> 00:26:58,480
we will definitely walk on mars

809
00:27:02,390 --> 00:26:59,840
all right i think we got time for one

810
00:27:04,149 --> 00:27:02,400
more question

811
00:27:05,990 --> 00:27:04,159
thank you

812
00:27:07,750 --> 00:27:06,000
hi my name is isabella hoover and my

813
00:27:09,590 --> 00:27:07,760

question is how big is the orion

814
00:27:11,430 --> 00:27:09,600
spacesuit and what does it have on it

815
00:27:14,070 --> 00:27:11,440
how big is it oh great question so it's

816
00:27:15,430 --> 00:27:14,080
going to be your size is the answer

817
00:27:17,669 --> 00:27:15,440
whoever we're really building these

818
00:27:19,190 --> 00:27:17,679
suits around the people themselves

819
00:27:20,710 --> 00:27:19,200
so when we did shuttle we were doing a

820
00:27:22,310 --> 00:27:20,720
lot of suits

821
00:27:24,070 --> 00:27:22,320
with off the rock kind of sizing so we

822
00:27:25,990 --> 00:27:24,080
can kind of fit people into standard

823
00:27:27,750 --> 00:27:26,000
sizes with smaller crews and less

824
00:27:29,350 --> 00:27:27,760
mission durations it really makes sense

825
00:27:31,430 --> 00:27:29,360
to go through and more tailor things

826
00:27:32,710 --> 00:27:31,440
down to the individual astronauts we're

827
00:27:34,470 --> 00:27:32,720
going to try and go everything from a

828
00:27:36,070 --> 00:27:34,480
first percentile female

829
00:27:38,549 --> 00:27:36,080
which is a little under

830
00:27:40,149 --> 00:27:38,559
five foot tall to a 99th percentile

831
00:27:42,389 --> 00:27:40,159
american male which is about six foot

832
00:27:43,510 --> 00:27:42,399
six so all different sizes great

833
00:27:47,430 --> 00:27:43,520
question

834
00:27:49,269 --> 00:27:47,440
that's all the time we have

835
00:27:50,950 --> 00:27:49,279
so i want to thank everybody there at

836
00:27:52,230 --> 00:27:50,960
bunker hill elementary for your

837
00:27:54,149 --> 00:27:52,240
questions it's been great having you

838
00:27:56,549 --> 00:27:54,159

join us here in mission control houston

839
00:27:58,630 --> 00:27:56,559
i really appreciate it um always good to

840
00:28:00,230 --> 00:27:58,640
see again people from my hometown

841
00:28:02,630 --> 00:28:00,240
richard thank you for joining me i hope

842
00:28:04,149 --> 00:28:02,640
you guys got some good answers

843
00:28:06,070 --> 00:28:04,159
if you have any other questions i'm just

844
00:28:07,830 --> 00:28:06,080
a phone call away so just let me know

845
00:28:09,750 --> 00:28:07,840
thanks so much for mission control