
HATCH
EXIT
NOD 1

1
00:00:11,320 --> 00:00:02,720
station this is Houston are you ready

2
00:00:13,669 --> 00:00:11,330
for the event absolutely we are ready

3
00:00:15,410 --> 00:00:13,679
University of california-davis this is

4
00:00:19,040 --> 00:00:15,420
Mission Control Houston please call

5
00:00:20,810 --> 00:00:19,050
station for a voice check station this

6
00:00:26,810 --> 00:00:20,820
is Steve Robinson with students at UC

7
00:00:28,640 --> 00:00:26,820
Davis comm tech we have you loud and

8
00:00:30,439 --> 00:00:28,650
clear UC Davis we don't know a Steve

9
00:00:36,850 --> 00:00:30,449
Robinson but we know it's Stevie Ray is

10
00:00:40,940 --> 00:00:36,860
he there I told you not to say that

11
00:00:44,380 --> 00:00:40,950
hello butch I'm Sam hi Terry welcome to

12
00:00:46,760 --> 00:00:44,390
UC Davis in Northern California where

13
00:00:49,670 --> 00:00:46,770

although this is a historically

14
00:00:52,910 --> 00:00:49,680
agricultural school where the sounds may

15
00:00:56,020 --> 00:00:52,920
be more cowbell instead of rockets

16
00:00:58,819 --> 00:00:56,030
rocket sounds we have a very vital and

17
00:01:00,740 --> 00:00:58,829
exciting and robots robust program in

18
00:01:03,080 --> 00:01:00,750
aerospace and mechanical engineering and

19
00:01:05,630 --> 00:01:03,090
we have an entire room full of students

20
00:01:09,980 --> 00:01:05,640
you're dying to ask a question how you

21
00:01:11,690 --> 00:01:09,990
guys doing today we're doing outstanding

22
00:01:14,710 --> 00:01:11,700
and I personally speak cowbell so I

23
00:01:24,410 --> 00:01:14,720
understand I understand all the to go

24
00:01:26,660 --> 00:01:24,420
okay hello my name is ASA squirrel do

25
00:01:30,020 --> 00:01:26,670
you think humans have the capability to

26
00:01:34,609 --> 00:01:30,030
achieve deep space travel before 2024

27
00:01:36,710 --> 00:01:34,619
and as technology advances do we would

28
00:01:44,330 --> 00:01:36,720
we see NASA cut down on human space

29
00:01:45,830 --> 00:01:44,340
travel well I think part of that depends

30
00:01:48,380 --> 00:01:45,840
on your definition of deep space travel

31
00:01:54,319 --> 00:01:48,390
if you mean beyond the moon we certainly

32
00:01:55,969 --> 00:01:54,329
have the capability for that the if you

33
00:01:57,050 --> 00:01:55,979
define it as going to the moon we we did

34
00:01:58,639 --> 00:01:57,060
that program and only eight and a half

35
00:02:00,530 --> 00:01:58,649
years so that's something we can do if

36
00:02:02,179 --> 00:02:00,540
by deep space you mean going to Jupiter

37
00:02:03,889 --> 00:02:02,189
or the outer edges of the solar system

38
00:02:06,139 --> 00:02:03,899

that's probably not going to happen in

39
00:02:08,690 --> 00:02:06,149
less than ten years but those are things

40
00:02:10,070 --> 00:02:08,700
that I think that we can do one of the

41
00:02:11,660 --> 00:02:10,080
technologies that's going to be really

42
00:02:13,670 --> 00:02:11,670
important in the coming decades and

43
00:02:15,349 --> 00:02:13,680
centuries is to develop space

44
00:02:17,449 --> 00:02:15,359
propulsion technology that lets us go

45
00:02:19,699 --> 00:02:17,459
faster with chemical rockets you can

46
00:02:21,500 --> 00:02:19,709
only go so fast and with an electrical

47
00:02:22,940 --> 00:02:21,510
propulsion system you can go much faster

48
00:02:25,220 --> 00:02:22,950
and get places farther away so I think

49
00:02:26,599 --> 00:02:25,230
that's something that in the in the

50
00:02:27,770 --> 00:02:26,609
future needs to be addressed if we're

51
00:02:40,490 --> 00:02:27,780
really going to go out and explore the

52
00:02:41,629 --> 00:02:40,500
solar system and beyond thank you good

53
00:02:44,690 --> 00:02:41,639
morning and Gwen Giorno

54
00:02:54,289 --> 00:02:44,700
my name is Marc Wong Kyle what is a

55
00:02:56,240 --> 00:02:54,299
typical day like on the ISS hey mark a

56
00:02:57,530 --> 00:02:56,250
typical day more that that's that's a

57
00:02:59,720 --> 00:02:57,540
question that you can't really answer

58
00:03:00,319 --> 00:02:59,730
specifically I mean every day is

59
00:03:02,330 --> 00:03:00,329
different

60
00:03:04,339 --> 00:03:02,340
you know we every day we eat of course

61
00:03:06,800 --> 00:03:04,349
every day we actually work out and do

62
00:03:08,449 --> 00:03:06,810
some kind of physical exercise where the

63
00:03:11,030 --> 00:03:08,459

resistive exercise or aerobic training

64
00:03:13,129 --> 00:03:11,040
that's almost every single day so those

65
00:03:15,020 --> 00:03:13,139
things are pretty pretty common but the

66
00:03:16,610 --> 00:03:15,030
rest of the day very very different from

67
00:03:18,199 --> 00:03:16,620
day to day it's sometimes when we're

68
00:03:19,699 --> 00:03:18,209
doing experiments you know we're the

69
00:03:21,439 --> 00:03:19,709
hands and eyes and arms of the

70
00:03:23,300 --> 00:03:21,449
scientists that are on the on earth and

71
00:03:25,879 --> 00:03:23,310
we're employing and doing their

72
00:03:28,369 --> 00:03:25,889
experiments for them here in in the ISS

73
00:03:29,719 --> 00:03:28,379
other days we're working on our space

74
00:03:31,420 --> 00:03:29,729
walking suits getting them ready to go

75
00:03:33,860 --> 00:03:31,430
outside here in a couple of weeks and

76
00:03:36,110 --> 00:03:33,870
another day we're fixing the space potty

77
00:03:37,250 --> 00:03:36,120
because it broke so it it varies from

78
00:03:39,469 --> 00:03:37,260
day to day and that's really the

79
00:03:41,839 --> 00:03:39,479
exciting thing about being here is that

80
00:03:44,030 --> 00:03:41,849
we have such a variety of opportunities

81
00:03:46,009 --> 00:03:44,040
and things to be involved with which

82
00:03:48,490 --> 00:03:46,019
makes it just that much more exciting so

83
00:03:56,340 --> 00:03:48,500
every day is different

84
00:04:00,700 --> 00:03:59,500
anyway when we get to the end of the

85
00:04:02,650 --> 00:04:00,710
questions if there's time we want to

86
00:04:05,080 --> 00:04:02,660
hear more about your EBA is coming up I

87
00:04:06,280 --> 00:04:05,090
know that that's got to be a big on your

88
00:04:09,310 --> 00:04:06,290

riding right now but right now here's

89
00:04:11,950 --> 00:04:09,320
Chris for another question hi I'm Chris

90
00:04:13,810 --> 00:04:11,960
checkers Ola and for Samantha how do you

91
00:04:16,960 --> 00:04:13,820
see radiation protection technology

92
00:04:25,840 --> 00:04:16,970
currently on the ISS evolving as we move

93
00:04:26,830 --> 00:04:25,850
into the future hey Chris thanks for the

94
00:04:29,740 --> 00:04:26,840
question

95
00:04:31,330 --> 00:04:29,750
well on on the ISS the radiation

96
00:04:33,430 --> 00:04:31,340
environment as I'm sure you know it's

97
00:04:34,930 --> 00:04:33,440
not it's not that bad at all because

98
00:04:36,910 --> 00:04:34,940
we're pretty you know you are in

99
00:04:38,560 --> 00:04:36,920
low-earth orbit we're still quite close

100
00:04:40,090 --> 00:04:38,570
to the surface of the earth and we are

101
00:04:43,900 --> 00:04:40,100
still protected by the Earth's magnetic

102
00:04:46,210 --> 00:04:43,910
field and so of course some measures of

103
00:04:49,060 --> 00:04:46,220
simple passive protection that we have

104
00:04:51,670 --> 00:04:49,070
on board are enough to keep us safe and

105
00:04:53,770 --> 00:04:51,680
protected however as we go further out

106
00:04:55,630 --> 00:04:53,780
as we venture out beyond low-earth orbit

107
00:04:57,850 --> 00:04:55,640
and into deep space as Jerry was

108
00:05:00,940 --> 00:04:57,860
mentioning before finding new ways of

109
00:05:03,520 --> 00:05:00,950
protecting ourselves from radiation that

110
00:05:05,170 --> 00:05:03,530
is certainly one of the most important

111
00:05:06,970 --> 00:05:05,180
technological challenges we have to

112
00:05:09,700 --> 00:05:06,980
solve right now and in my opinion is the

113
00:05:11,650 --> 00:05:09,710

biggest showstopper so I guess there's

114
00:05:13,810 --> 00:05:11,660
two ways either we we learn how to

115
00:05:16,720 --> 00:05:13,820
modify our bodies you know with with

116
00:05:18,820 --> 00:05:16,730
medicines with drugs with you know

117
00:05:21,100 --> 00:05:18,830
biomedical technologies that were not so

118
00:05:23,610 --> 00:05:21,110
susceptible to radiation or probably

119
00:05:26,380 --> 00:05:23,620
we'll have to go into active magnetic

120
00:05:28,840 --> 00:05:26,390
shielding technologists so do the same

121
00:05:30,580 --> 00:05:28,850
artificially as the Earth's magnetic

122
00:05:40,659 --> 00:05:30,590
field does for us when we are on earth

123
00:05:42,240 --> 00:05:40,669
or in low-earth orbit thank you and so

124
00:05:46,810 --> 00:05:42,250
then for the next student on the list

125
00:05:50,380 --> 00:05:46,820
and with me so we great hello my name is

126
00:05:52,330 --> 00:05:50,390
Ahmed my question is for Terry how long

127
00:05:54,280 --> 00:05:52,340
do you experience high g-forces during

128
00:05:55,960 --> 00:05:54,290
launch and landing and what kind of

129
00:06:02,409 --> 00:05:55,970
process do you go through between launch

130
00:06:05,770 --> 00:06:02,419
and docking so launch on the shuttle and

131
00:06:08,380 --> 00:06:05,780
the Soyuz I flown on both vehicles we're

132
00:06:09,399 --> 00:06:08,390
a little bit different but but close the

133
00:06:11,109 --> 00:06:09,409
Soyuz was a little bit

134
00:06:13,419 --> 00:06:11,119
IRG force I think we get up to right

135
00:06:16,029 --> 00:06:13,429
right around four G's and the thing that

136
00:06:17,739 --> 00:06:16,039
really stands out on the Soyuz is you go

137
00:06:20,199 --> 00:06:17,749
you get up to these three or four G's

138
00:06:22,479 --> 00:06:20,209

and then it's staging it's a bang

139
00:06:24,939 --> 00:06:22,489
instantly bang and that's Stevie Ray

140
00:06:26,559 --> 00:06:24,949
about everybody get ready for a for a

141
00:06:31,419 --> 00:06:26,569
little bang here anyway that's not the

142
00:06:33,729 --> 00:06:31,429
story for later but it feels like the

143
00:06:34,989 --> 00:06:33,739
rocket broke and then it lights up again

144
00:06:37,119 --> 00:06:34,999
and you're kicked back in your seat so

145
00:06:38,529 --> 00:06:37,129
the Soyuz is a pretty amazing ride but

146
00:06:41,249 --> 00:06:38,539
the total g-force was about three to

147
00:06:43,659 --> 00:06:41,259
four and it's about the same on reentry

148
00:06:45,219 --> 00:06:43,669
unless we go into what's called a

149
00:06:47,139 --> 00:06:45,229
ballistic reentry and then that can be

150
00:06:48,669 --> 00:06:47,149
usually around nine GS I think

151
00:06:54,369 --> 00:06:48,679
Samantha's our expert on that but mine

152
00:06:56,919 --> 00:06:54,379
G's is roughly ballistic reentry so it's

153
00:06:58,779 --> 00:06:56,929
similar as I was an f-16 pilot and Butch

154
00:07:00,729 --> 00:06:58,789
and Samantha are both pilots too so and

155
00:07:02,319 --> 00:07:00,739
the f16 nine G's was your limit but that

156
00:07:04,389 --> 00:07:02,329
was from your head down to your toes

157
00:07:06,459 --> 00:07:04,399
access and then a rocket

158
00:07:08,499 --> 00:07:06,469
it's from your chest to the to your back

159
00:07:10,389 --> 00:07:08,509
axis so it's a little bit easier to take

160
00:07:12,369 --> 00:07:10,399
in the in a in a rocket but it's still a

161
00:07:13,779 --> 00:07:12,379
lot and the thing about landing is it's

162
00:07:16,059 --> 00:07:13,789
after six months of weightlessness

163
00:07:18,309 --> 00:07:16,069

so you haven't felt gravity at all and

164
00:07:19,689 --> 00:07:18,319
so I think the sensation is it really

165
00:07:22,959 --> 00:07:19,699
makes a big impression even though the

166
00:07:24,639 --> 00:07:22,969
number is not that big for document oh

167
00:07:26,769 --> 00:07:24,649
geez you're basically weightless you

168
00:07:28,329 --> 00:07:26,779
feel a little bit of banging but it's

169
00:07:32,109 --> 00:07:28,339
just a very small amount that's not like

170
00:07:32,909 --> 00:07:32,119
g-forces that you're feeling then okay

171
00:07:35,649 --> 00:07:32,919
thank you

172
00:07:41,499 --> 00:07:35,659
only net sixteen pilot would say 9 G's

173
00:07:44,079 --> 00:07:41,509
isn't that much all right yeah Sumati

174
00:07:46,209 --> 00:07:44,089
and the question for butch what what you

175
00:07:48,969 --> 00:07:46,219
say was the pivotal moment in your

176
00:07:49,809 --> 00:07:48,979
career that led you to be where you are

177
00:07:56,619 --> 00:07:49,819
today

178
00:07:58,869 --> 00:07:56,629
that is an ISS effect astronaut the

179
00:08:00,479 --> 00:07:58,879
pivotal moment in my career that allowed

180
00:08:04,389 --> 00:08:00,489
me to be here right now

181
00:08:06,459 --> 00:08:04,399
well I'd say the day I was assigned to

182
00:08:08,919 --> 00:08:06,469
this position that was pivotal and then

183
00:08:10,600 --> 00:08:08,929
if I went back don't get assigned if

184
00:08:13,659 --> 00:08:10,610
you're not selected as an astronaut to

185
00:08:16,029 --> 00:08:13,669
begin with that was pivotal if I wasn't

186
00:08:18,339 --> 00:08:16,039
a test pilot school graduate because I

187
00:08:20,319 --> 00:08:18,349
say F behind as a pilot to be a shuttle

188
00:08:22,730 --> 00:08:20,329

pilot if I'd never gotten selected to be

189
00:08:24,680 --> 00:08:22,740
a test pilot that was pivotal if then

190
00:08:26,480 --> 00:08:24,690
avy hadn't expected me to come into the

191
00:08:30,080 --> 00:08:26,490
Navy and actually start pilot training

192
00:08:31,400 --> 00:08:30,090
that was pretty pivotal graduated

193
00:08:37,159 --> 00:08:31,410
college which there was question about

194
00:08:38,839 --> 00:08:37,169
one point where I would and you know

195
00:08:40,399 --> 00:08:38,849
going all the way back if I didn't ever

196
00:08:42,100 --> 00:08:40,409
learn cursive writing how to add and

197
00:08:53,000 --> 00:08:42,110
subtract in third grade

198
00:08:55,280 --> 00:08:53,010
that was pretty pivotal as well it's a

199
00:08:58,100 --> 00:08:55,290
long process to get to get to make your

200
00:08:58,550 --> 00:08:58,110
dreams come true okay Bush that was

201
00:09:02,990 --> 00:08:58,560
great

202
00:09:08,000 --> 00:09:03,000
I guess the day you were born all right

203
00:09:10,400 --> 00:09:08,010
here's Kim Jing oh my name is Kimberly

204
00:09:11,810 --> 00:09:10,410
on this question is for Samantha I was

205
00:09:13,550 --> 00:09:11,820
living what's your favorite science

206
00:09:22,280 --> 00:09:13,560
experiment that you've worked on on the

207
00:09:25,340 --> 00:09:22,290
ISS hey Kimberly thanks

208
00:09:27,889 --> 00:09:25,350
you know what I'm like a hands-on person

209
00:09:29,269 --> 00:09:27,899
so I really really enjoy like when we

210
00:09:31,460 --> 00:09:29,279
have experiments when there is like a

211
00:09:33,139 --> 00:09:31,470
complex setup or you know you have to

212
00:09:35,960 --> 00:09:33,149
really dig into it there's a lot of

213
00:09:38,600 --> 00:09:35,970

hands-on work to do and maybe that you

214
00:09:41,420 --> 00:09:38,610
can also follow on as the experiment

215
00:09:44,030 --> 00:09:41,430
progresses so some examples recently

216
00:09:46,100 --> 00:09:44,040
I've done teri and I actually have done

217
00:09:48,650 --> 00:09:46,110
the first session of an experiment

218
00:09:50,870 --> 00:09:48,660
called airway monitoring in which we

219
00:09:53,569 --> 00:09:50,880
will actually for the first time study

220
00:09:55,850 --> 00:09:53,579
the gaseous exchange in our lungs and

221
00:09:58,310 --> 00:09:55,860
how that is affected by being in

222
00:10:01,069 --> 00:09:58,320
microgravity and that was a very complex

223
00:10:03,769 --> 00:10:01,079
that I mean it took several hours to you

224
00:10:04,970 --> 00:10:03,779
know connect a lot of cables and you

225
00:10:07,280 --> 00:10:04,980
know make sure that we are we're all

226
00:10:08,870 --> 00:10:07,290
good to go and we could actually do it

227
00:10:11,210 --> 00:10:08,880
again and that's gonna be even more

228
00:10:13,130 --> 00:10:11,220
interested interesting in the airlock

229
00:10:14,990 --> 00:10:13,140
and we will actually lower the pressure

230
00:10:18,170 --> 00:10:15,000
because they want to see how a lower

231
00:10:20,060 --> 00:10:18,180
pressure will affect again respiration

232
00:10:22,730 --> 00:10:20,070
and gaseous exchange in the lungs and

233
00:10:25,040 --> 00:10:22,740
that's because possibly one day habitats

234
00:10:26,900 --> 00:10:25,050
on the moon or habitats on Mars will be

235
00:10:28,730 --> 00:10:26,910
at lower pressure than we you know the

236
00:10:34,180 --> 00:10:28,740
atmospheric pressure we're at on earth

237
00:10:38,740 --> 00:10:36,250
hi my name is Donald and I have a

238
00:10:40,060 --> 00:10:38,750

question for Terry how does NASA know

239
00:10:41,740 --> 00:10:40,070
when the space station is struck by

240
00:10:43,480 --> 00:10:41,750
debris that it's too small to track and

241
00:10:48,190 --> 00:10:43,490
how do you inspect the exterior of the

242
00:10:49,450 --> 00:10:48,200
space station for damage that's a great

243
00:10:52,290 --> 00:10:49,460
question and getting ready for our

244
00:10:54,190 --> 00:10:52,300
spacewalks one of the briefing

245
00:10:56,170 --> 00:10:54,200
presentations they give us I was reading

246
00:10:57,700 --> 00:10:56,180
last night is all the different debris

247
00:10:59,260 --> 00:10:57,710
strikes on the outside so that when

248
00:11:00,850 --> 00:10:59,270
you're spacewalking you grab on to

249
00:11:02,700 --> 00:11:00,860
something you don't want to grab the

250
00:11:05,770 --> 00:11:02,710
sharp edge and cut your spacesuit so

251
00:11:07,420 --> 00:11:05,780
there are hundred there's thousands of

252
00:11:10,030 --> 00:11:07,430
little tiny Nick's on the outside of the

253
00:11:12,610 --> 00:11:10,040
space station some of those are caused

254
00:11:15,130 --> 00:11:12,620
by paint chips left from satellites from

255
00:11:16,420 --> 00:11:15,140
decades ago they're still in orbit some

256
00:11:18,370 --> 00:11:16,430
of those are caused by dust flying

257
00:11:19,810 --> 00:11:18,380
around the solar system the good news is

258
00:11:22,360 --> 00:11:19,820
we can't track those things but they're

259
00:11:24,280 --> 00:11:22,370
so small they don't really cause us a

260
00:11:26,790 --> 00:11:24,290
lot of problems and the space station is

261
00:11:29,500 --> 00:11:26,800
designed with a thin aluminum shield

262
00:11:32,260 --> 00:11:29,510
maybe 10 or 20 centimeters above the

263
00:11:34,090 --> 00:11:32,270

surface of the station that when those

264
00:11:35,950 --> 00:11:34,100
little things hit that's supposed to

265
00:11:38,890 --> 00:11:35,960
protect the the pressurized shell from

266
00:11:40,900 --> 00:11:38,900
that and the big things that really do

267
00:11:43,120 --> 00:11:40,910
matter we can track and occasionally we

268
00:11:44,110 --> 00:11:43,130
maneuver to avoid those items and

269
00:11:46,390 --> 00:11:44,120
everyone says well maybe once a month

270
00:11:47,680 --> 00:11:46,400
we'll get a we'll get a call from the

271
00:11:49,660 --> 00:11:47,690
ground hey we're tracking this piece of

272
00:11:52,060 --> 00:11:49,670
debris and usually we don't maneuver for

273
00:11:53,860 --> 00:11:52,070
it but sometimes we do and so the big

274
00:11:55,480 --> 00:11:53,870
things we know about this is good the

275
00:11:58,030 --> 00:11:55,490
small things we have small debris

276
00:12:01,030 --> 00:11:58,040
shielding and when they hit nothing bad

277
00:12:02,530 --> 00:12:01,040
happens it's that in between size of

278
00:12:04,180 --> 00:12:02,540
things that are big enough to do some

279
00:12:06,460 --> 00:12:04,190
damage but in but we're not we can't

280
00:12:07,780 --> 00:12:06,470
quite track them yet if it's an orbit we

281
00:12:09,010 --> 00:12:07,790
could probably track it but if it's

282
00:12:10,150 --> 00:12:09,020
coming from outside of the orbit you

283
00:12:12,670 --> 00:12:10,160
know from asteroid belt or something

284
00:12:14,350 --> 00:12:12,680
those are the things we worry about the

285
00:12:16,150 --> 00:12:14,360
good news is a pilot we talked about the

286
00:12:17,410 --> 00:12:16,160
big sky theory it's a big sky and

287
00:12:19,870 --> 00:12:17,420
usually you don't run in anything else

288
00:12:21,880 --> 00:12:19,880

and if the sky is big space is really

289
00:12:23,079 --> 00:12:21,890
really really big so the odds of us

290
00:12:25,570 --> 00:12:23,089
hitting something like that are really

291
00:12:28,000 --> 00:12:25,580
small but there is a risk there in the

292
00:12:29,320 --> 00:12:28,010
in the space between big things you

293
00:12:34,150 --> 00:12:29,330
could track and little things that don't

294
00:12:40,010 --> 00:12:37,400
hello my name is Kasumi I have a

295
00:12:43,400 --> 00:12:40,020
question for butch how do you overcome

296
00:12:50,960 --> 00:12:43,410
like fatigue or losing focus during your

297
00:12:52,790 --> 00:12:50,970
mission how do you overcome fatigue well

298
00:12:55,940 --> 00:12:52,800
I try to get a lot of sleep and that is

299
00:12:57,829 --> 00:12:55,950
that is important and it's very easy not

300
00:12:59,720 --> 00:12:57,839
to get enough asleep up here there's so

301
00:13:01,699 --> 00:12:59,730
much to do so much continuum and you can

302
00:13:03,170 --> 00:13:01,709
work 24 hours a day literally and never

303
00:13:04,940 --> 00:13:03,180
get everything done so you really have

304
00:13:07,160 --> 00:13:04,950
to budget your time and the ground you

305
00:13:08,540 --> 00:13:07,170
know NASA all the people that support

306
00:13:09,889 --> 00:13:08,550
the ground support us on the ground and

307
00:13:11,990 --> 00:13:09,899
do our scheduling they they're very

308
00:13:13,519 --> 00:13:12,000
helpful in that respect they schedule us

309
00:13:14,870 --> 00:13:13,529
for our for our downtime and they

310
00:13:16,820 --> 00:13:14,880
actually pay us back sometimes when we

311
00:13:18,740 --> 00:13:16,830
work over so that's what one very

312
00:13:20,540 --> 00:13:18,750
important thing but also I mean it is it

313
00:13:23,240 --> 00:13:20,550

is something that we've all prepared

314
00:13:25,730 --> 00:13:23,250
ourselves for for four months before we

315
00:13:27,170 --> 00:13:25,740
ever got up here as mentally be mentally

316
00:13:29,210 --> 00:13:27,180
strong because you have to be because

317
00:13:31,370 --> 00:13:29,220
all day every day there's very important

318
00:13:33,290 --> 00:13:31,380
things going on and you have to be keyed

319
00:13:34,910 --> 00:13:33,300
in and like I said getting your rest

320
00:13:36,410 --> 00:13:34,920
enables you to do that and just

321
00:13:38,120 --> 00:13:36,420
maintaining the focus maintaining the

322
00:13:43,810 --> 00:13:38,130
focus maintaining the focus keep telling

323
00:13:49,460 --> 00:13:46,519
hi everyone my name is Esteban and I'd

324
00:13:50,420 --> 00:13:49,470
like to ask a question for butch I was

325
00:13:52,070 --> 00:13:50,430
wondering if you could discuss the

326
00:14:01,570 --> 00:13:52,080
complications that arise when trying to

327
00:14:06,980 --> 00:14:03,699
complications with 3d printing you know

328
00:14:09,470 --> 00:14:06,990
what we did here last month was just

329
00:14:10,760 --> 00:14:09,480
baby steps you know we've got plastics

330
00:14:12,740 --> 00:14:10,770
and we're coming in and they're the

331
00:14:14,810 --> 00:14:12,750
ground are up lending the print sample

332
00:14:16,310 --> 00:14:14,820
they're the information the the the

333
00:14:18,920 --> 00:14:16,320
sketches if you will for the printer to

334
00:14:20,269 --> 00:14:18,930
do and there wasn't much complications

335
00:14:22,790 --> 00:14:20,279
associated with that other than

336
00:14:24,380 --> 00:14:22,800
sometimes the sample because of you know

337
00:14:26,900 --> 00:14:24,390
as you start to learn how close does the

338
00:14:29,300 --> 00:14:26,910

needle get to the to the plate before

339
00:14:30,530 --> 00:14:29,310
you can actually bond it to the plate

340
00:14:32,480 --> 00:14:30,540
and we had a couple of samples it

341
00:14:34,490 --> 00:14:32,490
actually did bond and stick to the plate

342
00:14:35,960 --> 00:14:34,500
and I couldn't get them off without a

343
00:14:37,790 --> 00:14:35,970
lot of force and of course part of the

344
00:14:40,130 --> 00:14:37,800
plate comes off then so getting that

345
00:14:41,750 --> 00:14:40,140
just right where because in zero-g

346
00:14:43,490 --> 00:14:41,760
obviously there's no gravity to hold it

347
00:14:45,590 --> 00:14:43,500
to the plate so it has to stick there

348
00:14:47,330 --> 00:14:45,600
until the entire print is complete but

349
00:14:48,830 --> 00:14:47,340
it can't stick too tight or you

350
00:14:50,210 --> 00:14:48,840
can't get it off like I said so that was

351
00:14:51,740 --> 00:14:50,220
one of the main things that we overcame

352
00:14:52,910 --> 00:14:51,750
and we sort of stepping stone and

353
00:14:55,550 --> 00:14:52,920
learned a little bit as we went through

354
00:14:56,990 --> 00:14:55,560
it and eventually got to the point where

355
00:14:58,910 --> 00:14:57,000
we didn't have the stick itch and the

356
00:15:00,290 --> 00:14:58,920
things came out pretty pretty easily but

357
00:15:02,870 --> 00:15:00,300
in this stage yeah that's that's pretty

358
00:15:04,280 --> 00:15:02,880
much the the gist of the of the

359
00:15:12,380 --> 00:15:04,290
difficulties if you will that we've had

360
00:15:13,490 --> 00:15:12,390
to date thank you very much thanks hi my

361
00:15:15,560 --> 00:15:13,500
name is Regan Phyllis and I have a

362
00:15:16,850 --> 00:15:15,570
question for Terry how did you

363
00:15:19,130 --> 00:15:16,860

physically prepare yourself for your

364
00:15:20,690 --> 00:15:19,140
trip to space how does your body reacted

365
00:15:22,610 --> 00:15:20,700
to microgravity and what preparations

366
00:15:27,920 --> 00:15:22,620
will you make to readapt when you return

367
00:15:30,170 --> 00:15:27,930
to Earth that's a great question

368
00:15:32,210 --> 00:15:30,180
physical training is an important part

369
00:15:34,190 --> 00:15:32,220
of what we do they have a we have a gym

370
00:15:35,930 --> 00:15:34,200
at in Houston and the astronaut gym is

371
00:15:38,600 --> 00:15:35,940
always full of guys in there lifting

372
00:15:40,430 --> 00:15:38,610
weights doing aerobics you want to get

373
00:15:42,260 --> 00:15:40,440
yourself as strong as you can especially

374
00:15:43,850 --> 00:15:42,270
to do spacewalks because that that

375
00:15:46,190 --> 00:15:43,860
spacesuit that we get in weighs about

376
00:15:48,200 --> 00:15:46,200
three or 400 pounds on earth and it's a

377
00:15:49,670 --> 00:15:48,210
beast and it's pressurized and it's just

378
00:15:51,800 --> 00:15:49,680
really difficult to move around on that

379
00:15:53,510 --> 00:15:51,810
thing especially for the six or eight or

380
00:15:55,130 --> 00:15:53,520
really probably over ten hours by the

381
00:15:57,710 --> 00:15:55,140
time we do our pre breathing and so on

382
00:16:00,350 --> 00:15:57,720
so being a ready for spacewalks requires

383
00:16:02,810 --> 00:16:00,360
that you be strong and then getting your

384
00:16:04,820 --> 00:16:02,820
body ready to combat weightlessness

385
00:16:06,350 --> 00:16:04,830
requires it be strong too because you

386
00:16:08,800 --> 00:16:06,360
you have a tendency to lose muscle and

387
00:16:12,710 --> 00:16:08,810
bone so you want to start from a good

388
00:16:14,600 --> 00:16:12,720

starting point for that and and just

389
00:16:15,860 --> 00:16:14,610
overall health I think it would not be

390
00:16:17,180 --> 00:16:15,870
this would not be a good experience if

391
00:16:19,670 --> 00:16:17,190
you came up here just as an unhealthy

392
00:16:22,010 --> 00:16:19,680
person there's a lot of nuances that

393
00:16:24,080 --> 00:16:22,020
microgravity affects your body that was

394
00:16:26,930 --> 00:16:24,090
one of your questions for me I felt

395
00:16:29,090 --> 00:16:26,940
stuffy like my head the fluid kind of

396
00:16:30,710 --> 00:16:29,100
floats up on earth with gravity all the

397
00:16:32,960 --> 00:16:30,720
fluid float gets pulled down your feet

398
00:16:34,640 --> 00:16:32,970
and on space it kind of floats up and so

399
00:16:37,610 --> 00:16:34,650
I sound like I have it just a little bit

400
00:16:38,750 --> 00:16:37,620
of a cold I don't it's just you're you

401
00:16:40,580 --> 00:16:38,760
kind of feel like that a lot of

402
00:16:41,600 --> 00:16:40,590
everybody space gets puffy and you look

403
00:16:44,210 --> 00:16:41,610
a little bit different when you're in

404
00:16:46,760 --> 00:16:44,220
space that's one of the things that

405
00:16:48,380 --> 00:16:46,770
affects you eyesight can get worse

406
00:16:51,290 --> 00:16:48,390
thankfully knock on wood so if our mind

407
00:16:53,150 --> 00:16:51,300
hasn't but it's probably well a little

408
00:16:54,800 --> 00:16:53,160
bit I mean ever over six months folks

409
00:16:56,600 --> 00:16:54,810
eyesight 10 tends to get a little bit

410
00:16:58,130 --> 00:16:56,610
worse and that's one of the big things

411
00:16:59,970 --> 00:16:58,140
that we're studying now is the effects

412
00:17:01,650 --> 00:16:59,980
of eyesight on that

413
00:17:03,869 --> 00:17:01,660

the one thing Samantha talked earlier

414
00:17:05,970 --> 00:17:03,879
about radiation is a way that it affects

415
00:17:08,010 --> 00:17:05,980
your body and unfortunately you don't

416
00:17:09,539 --> 00:17:08,020
know how it really affects it and when

417
00:17:12,059 --> 00:17:09,549
you get back or maybe years later you

418
00:17:13,919 --> 00:17:12,069
may have effects from that we have a

419
00:17:15,449 --> 00:17:13,929
Earth's magnetic field protecting us but

420
00:17:18,360 --> 00:17:15,459
when we fly over this thing called the

421
00:17:19,949 --> 00:17:18,370
South Atlantic anomaly which is a place

422
00:17:23,159 --> 00:17:19,959
in the South Atlantic where the Earth's

423
00:17:26,279 --> 00:17:23,169
core is deformed and the magnetic field

424
00:17:28,350 --> 00:17:26,289
dips I've noticed this a bunch of time

425
00:17:29,490 --> 00:17:28,360
so if my eyes are closed as we're going

426
00:17:32,310 --> 00:17:29,500
over that like if we're going over that

427
00:17:34,200 --> 00:17:32,320
at bedtime I'll see a flash and that's a

428
00:17:38,220 --> 00:17:34,210
heavy particle hitting your eye nerve

429
00:17:39,960 --> 00:17:38,230
and yeah or we're talking about how many

430
00:17:41,010 --> 00:17:39,970
folks have seen and and so on but that's

431
00:17:42,870 --> 00:17:41,020
something that I've noticed especially

432
00:17:44,310 --> 00:17:42,880
in that area so radiation effect is

433
00:17:47,430 --> 00:17:44,320
something that affects you but you don't

434
00:17:49,320 --> 00:17:47,440
really know it right away so there it's

435
00:17:50,850 --> 00:17:49,330
an interesting thing the most important

436
00:17:53,669 --> 00:17:50,860
point here is that the station has shown

437
00:17:57,120 --> 00:17:53,679
that we can live and work in space and

438
00:17:58,680 --> 00:17:57,130

adapt to it very well it's amazing how

439
00:18:00,480 --> 00:17:58,690
quickly and how well the human body can

440
00:18:02,610 --> 00:18:00,490
adapt and live and so we've kind of

441
00:18:04,020 --> 00:18:02,620
proven that we can go beyond and start

442
00:18:05,279 --> 00:18:04,030
exploring the solar system that's I

443
00:18:06,600 --> 00:18:05,289
think one of the most important

444
00:18:20,010 --> 00:18:06,610
accomplishments to the space station

445
00:18:25,270 --> 00:18:22,780
okay hi everyone my name is Melvin

446
00:18:27,610 --> 00:18:25,280
Lorenzo and my question is for butch how

447
00:18:30,190 --> 00:18:27,620
lightly how lively is the communication

448
00:18:33,100 --> 00:18:30,200
between the American side of the ISS and

449
00:18:35,200 --> 00:18:33,110
other countries and that question is

450
00:18:38,530 --> 00:18:35,210
sort of from the false ammonia leak

451
00:18:48,850 --> 00:18:38,540
alarm that occurred mid-june right and

452
00:18:50,110 --> 00:18:48,860
the response time okay if I understand

453
00:18:51,310 --> 00:18:50,120
your question correctly are you talking

454
00:18:53,290 --> 00:18:51,320
about the communication between the

455
00:18:54,430 --> 00:18:53,300
segment's here correct as far as our

456
00:18:57,220 --> 00:18:54,440
Russian crewmates is that what the

457
00:19:01,720 --> 00:18:57,230
question was about oh yeah that in just

458
00:19:04,300 --> 00:19:01,730
other countries I guess well primarily

459
00:19:06,400 --> 00:19:04,310
our communication is with Mission

460
00:19:09,820 --> 00:19:06,410
Control Houston we also have a Mission

461
00:19:13,300 --> 00:19:09,830
Control Center in in Munich our overfull

462
00:19:16,360 --> 00:19:13,310
fan joven near Munich also communication

463
00:19:19,240 --> 00:19:16,370

or a Mission Control Center and in scuba

464
00:19:21,850 --> 00:19:19,250
Japan also we have the payload

465
00:19:24,700 --> 00:19:21,860
operations are out of Huntsville Alabama

466
00:19:25,840 --> 00:19:24,710
and also Moscow so we actually speak to

467
00:19:27,310 --> 00:19:25,850
all of these different centers

468
00:19:29,830 --> 00:19:27,320
throughout the day specifically when we

469
00:19:32,290 --> 00:19:29,840
have the ammonia event the u.s. segment

470
00:19:33,400 --> 00:19:32,300
if it's a if it's an emergency that

471
00:19:34,900 --> 00:19:33,410
having to do with the u.s. segment

472
00:19:36,460 --> 00:19:34,910
Mission Control Houston

473
00:19:38,770 --> 00:19:36,470
takes the lead has the lead for those

474
00:19:40,210 --> 00:19:38,780
and we talk directly to them and for the

475
00:19:42,220 --> 00:19:40,220
ammonia vent we had you know we have

476
00:19:43,540 --> 00:19:42,230
intercom system we immediately informed

477
00:19:45,040 --> 00:19:43,550
our Russian crewmates what was taking

478
00:19:46,810 --> 00:19:45,050
place of course they also get the

479
00:19:48,310 --> 00:19:46,820
warning time they have the display they

480
00:19:50,620 --> 00:19:48,320
can look at and see what the caution is

481
00:19:52,360 --> 00:19:50,630
as well and we've trained together many

482
00:19:54,130 --> 00:19:52,370
times in the months preceding our our

483
00:19:56,230 --> 00:19:54,140
arrival here and we've trained for these

484
00:19:58,270 --> 00:19:56,240
specific scenarios and we just actually

485
00:20:00,010 --> 00:19:58,280
just went back and enacted our training

486
00:20:01,810 --> 00:20:00,020
our memorized response and stuff we did

487
00:20:02,980 --> 00:20:01,820
initially and then continued didn't

488
00:20:04,330 --> 00:20:02,990

finally got into the books and started

489
00:20:06,250 --> 00:20:04,340
stepping through those procedures and

490
00:20:07,660 --> 00:20:06,260
working together as a team not just the

491
00:20:09,910 --> 00:20:07,670
team onboard but also the team on the

492
00:20:11,770 --> 00:20:09,920
ground as we lay Azon back and forth and

493
00:20:13,480 --> 00:20:11,780
it actually worked out according to the

494
00:20:14,650 --> 00:20:13,490
book pretty much some little deviations

495
00:20:15,820 --> 00:20:14,660
here and there we had a great debrief

496
00:20:17,650 --> 00:20:15,830
and and had a lot of good lessons

497
00:20:19,420 --> 00:20:17,660
learned from the event and hopefully

498
00:20:21,510 --> 00:20:19,430
we'll do better if it were ever happened

499
00:20:25,060 --> 00:20:21,520
again hopefully that doesn't happen

500
00:20:26,620 --> 00:20:25,070
thank you hey butch and Sam and Terry TV

501
00:20:28,430 --> 00:20:26,630
we're almost out of time to get up about

502
00:20:30,320 --> 00:20:28,440
a minute and a half here

503
00:20:31,670 --> 00:20:30,330
and before I I'm gonna ask you just one

504
00:20:33,590 --> 00:20:31,680
last question and ask you to talk about

505
00:20:36,260 --> 00:20:33,600
your EBA but while we still have

506
00:20:45,800 --> 00:20:36,270
everybody let's uh let's thank the crew

507
00:20:47,690 --> 00:20:45,810
of the ISS particular smiling face is

508
00:20:50,030 --> 00:20:47,700
here thanks very much so tell us a

509
00:20:53,750 --> 00:20:50,040
little about your EBA as we as we head

510
00:20:54,980 --> 00:20:53,760
over the horizon here I'll talk about

511
00:20:56,870 --> 00:20:54,990
that real quick

512
00:20:58,580 --> 00:20:56,880
in fact butch and I were doing surgery

513
00:21:00,920 --> 00:20:58,590

on one of our spacesuits today on these

514
00:21:02,570 --> 00:21:00,930
fine small bolts and washers deep in the

515
00:21:05,450 --> 00:21:02,580
bowels of it we have three spacewalks

516
00:21:06,920 --> 00:21:05,460
planned starting in two weeks and we're

517
00:21:08,690 --> 00:21:06,930
basically going to be cable guys for

518
00:21:10,580 --> 00:21:08,700
much of them on the first one we're

519
00:21:13,130 --> 00:21:10,590
gonna be routing cables from right back

520
00:21:15,770 --> 00:21:13,140
here to right up one module down to

521
00:21:17,630 --> 00:21:15,780
prepare the docking rings for the future

522
00:21:19,160 --> 00:21:17,640
American crude vehicles that will be

523
00:21:20,660 --> 00:21:19,170
coming in the coming year so we have to

524
00:21:21,920 --> 00:21:20,670
get ready for these vehicles to come and

525
00:21:24,530 --> 00:21:21,930
we're laying down a lot of cables for

526
00:21:27,680 --> 00:21:24,540
those the robotic arm that's been here

527
00:21:29,990 --> 00:21:27,690
for almost 15 years needs some grease so

528
00:21:32,780 --> 00:21:30,000
I'm gonna one of my tasks is to put some

529
00:21:35,210 --> 00:21:32,790
lubrication in the in the in the arm and

530
00:21:39,620 --> 00:21:35,220
give it a little bit more cowbell and

531
00:21:41,120 --> 00:21:39,630
then the finally VA is going to be c2 v2

532
00:21:44,900 --> 00:21:41,130
we call it and that's gonna be laying

533
00:21:47,720 --> 00:21:44,910
down more cable so we got 400 feet about

534
00:21:49,790 --> 00:21:47,730
120 meters of cable on that one and it's

535
00:21:51,440 --> 00:21:49,800
it's it's putting an antenna out on the

536
00:21:53,210 --> 00:21:51,450
porch side and on the starboard side of

537
00:21:54,770 --> 00:21:53,220
the station again to get ready for this

538
00:21:56,810 --> 00:21:54,780

commercial vehicle so most of what we're

539
00:21:58,430 --> 00:21:56,820
doing is prepping the station is really

540
00:21:59,870 --> 00:21:58,440
going through the next year is going to

541
00:22:01,760 --> 00:21:59,880
be kind of a reconfiguring we're going

542
00:22:03,590 --> 00:22:01,770
to move a module or two and get ready

543
00:22:05,300 --> 00:22:03,600
for the new American crewed vehicle so

544
00:22:09,800 --> 00:22:05,310
that it's not assembly but I call it

545
00:22:11,270 --> 00:22:09,810
reconfiguration thanks TV you guys are

546
00:22:12,200 --> 00:22:11,280
our heroes thanks very much for what

547
00:22:14,510 --> 00:22:12,210
you're doing we're gonna be watching

548
00:22:15,800 --> 00:22:14,520
your ev8 have a great day we're we

549
00:22:24,410 --> 00:22:15,810
talking about you all day long

550
00:22:26,960 --> 00:22:24,420
see you later see you guys station this

551
00:22:32,510 --> 00:22:26,970
is Houston ACR thank you that concludes

552
00:22:34,130 --> 00:22:32,520
our event Thank You University of

553
00:22:35,720 --> 00:22:34,140
california-davis station we are now