



1
00:00:04,950 --> 00:00:03,189
well good morning i'm pat ryan with the

2
00:00:07,430 --> 00:00:04,960
nasa public affairs office here at the

3
00:00:09,350 --> 00:00:07,440
johnson space center in houston we're in

4
00:00:12,070 --> 00:00:09,360
the international space station flight

5
00:00:14,709 --> 00:00:12,080
control room joining me is a brian awe

6
00:00:17,430 --> 00:00:14,719
who is a pluto flight controller

7
00:00:19,830 --> 00:00:17,440
what is a pluto flight controller brian

8
00:00:22,470 --> 00:00:19,840
it's an acronym it stands for plug-in

9
00:00:23,429 --> 00:00:22,480
port utilization officer

10
00:00:24,950 --> 00:00:23,439
and

11
00:00:26,790 --> 00:00:24,960
we provide

12
00:00:28,310 --> 00:00:26,800
plug-in services to the crew to make

13
00:00:30,310 --> 00:00:28,320

sure the equipment that they use on a

14

00:00:32,950 --> 00:00:30,320

day-to-day basis is compatible with

15

00:00:35,670 --> 00:00:32,960

other equipment and we contrive a plan

16

00:00:38,150 --> 00:00:35,680

on where to plug that equipment in

17

00:00:41,110 --> 00:00:38,160

and in addition to that we provide

18

00:00:42,389 --> 00:00:41,120

it support for the crew the the network

19

00:00:45,029 --> 00:00:42,399

support

20

00:00:47,910 --> 00:00:45,039

for an operations local area network

21

00:00:49,029 --> 00:00:47,920

that the crew uses to get their

22

00:00:50,709 --> 00:00:49,039

morning

23

00:00:52,709 --> 00:00:50,719

messages

24

00:00:54,229 --> 00:00:52,719

procedures

25

00:00:56,709 --> 00:00:54,239

their daily plan and what they're

26

00:00:59,750 --> 00:00:56,719

supposed to do for the day

27

00:01:01,990 --> 00:00:59,760

and that's also how they um

28

00:01:03,510 --> 00:01:02,000

contact home that we've got an ip phone

29

00:01:05,509 --> 00:01:03,520

that they can use through the network

30

00:01:07,109 --> 00:01:05,519

that they can call anybody in the world

31

00:01:08,950 --> 00:01:07,119

you're supporting pretty much everything

32

00:01:10,550 --> 00:01:08,960

that goes on onboard the station

33

00:01:12,950 --> 00:01:10,560

operations

34

00:01:15,190 --> 00:01:12,960

we're not doing commanding of the ship

35

00:01:17,749 --> 00:01:15,200

just the operations support

36

00:01:23,270 --> 00:01:17,759

so that's who we are and uh we're ready

37

00:01:26,550 --> 00:01:25,030

so hi i'm cole nelson from stonewash

38

00:01:27,830 --> 00:01:26,560

high school and i was wondering what are

39

00:01:29,830 --> 00:01:27,840

some of your favorite and least favorite

40

00:01:32,550 --> 00:01:29,840

parts about working for nasa

41

00:01:34,310 --> 00:01:32,560

the probably the most favorite part is

42

00:01:36,390 --> 00:01:34,320

really it's the awesome people that

43

00:01:38,630 --> 00:01:36,400

we've got working here we've got some

44

00:01:41,350 --> 00:01:38,640

incredibly smart folks

45

00:01:44,789 --> 00:01:41,360

and the teamwork that goes into making

46

00:01:46,950 --> 00:01:44,799

space flight happen is is just amazing

47

00:01:48,789 --> 00:01:46,960

uh the least favorite of all my

48

00:01:51,830 --> 00:01:48,799

activities here is catching up all the

49

00:01:54,149 --> 00:01:51,840

paperwork we have to document what we do

50

00:01:55,749 --> 00:01:54,159

that's how we carry forward

51

00:01:58,389 --> 00:01:55,759

the the

52

00:01:59,350 --> 00:01:58,399

solutions to problems we've solved and

53

00:02:01,510 --> 00:01:59,360

also

54

00:02:03,830 --> 00:02:01,520

uh carry forward the information for the

55

00:02:06,789 --> 00:02:03,840

future generations to use so yeah

56

00:02:08,469 --> 00:02:06,799

that paperwork's necessary

57

00:02:11,190 --> 00:02:08,479

go ahead next

58

00:02:20,550 --> 00:02:12,790

hi

59

00:02:23,910 --> 00:02:20,560

is very stressful

60

00:02:26,869 --> 00:02:23,920

no not really uh not no more stressful

61

00:02:29,190 --> 00:02:26,879

than let's say taking your driving test

62

00:02:31,670 --> 00:02:29,200

you first of all you have to learn

63

00:02:33,990 --> 00:02:31,680

uh you know about your mission and and

64

00:02:35,030 --> 00:02:34,000

we study each mission each phase of that

65

00:02:37,509 --> 00:02:35,040

flight

66

00:02:40,390 --> 00:02:37,519

in great detail we practice it

67

00:02:41,670 --> 00:02:40,400

we go through simulation sims as we call

68

00:02:44,949 --> 00:02:41,680

them

69

00:02:47,030 --> 00:02:44,959

we review the results of those sims

70

00:02:50,229 --> 00:02:47,040

to get better

71

00:02:51,270 --> 00:02:50,239

it's a kind of a maricopa when when you

72

00:03:00,790 --> 00:02:51,280

you

73

00:03:03,830 --> 00:03:00,800

the mission

74

00:03:06,229 --> 00:03:03,840

uh or watching a rocket launch it's it's

75

00:03:07,270 --> 00:03:06,239

just a matter of fact so you know that's

76

00:03:09,670 --> 00:03:07,280

you know when you go to take your

77

00:03:11,990 --> 00:03:09,680

driver's test now you got to show the

78

00:03:13,589 --> 00:03:12,000

the the evaluator that you you did a

79

00:03:21,589 --> 00:03:13,599

good job in learning what you were

80

00:03:25,910 --> 00:03:23,750

omar high school and my question is how

81

00:03:28,550 --> 00:03:25,920

often do you face emergencies and what

82

00:03:30,710 --> 00:03:28,560

are the most common types of emergencies

83

00:03:32,949 --> 00:03:30,720

well thankfully we don't encounter that

84

00:03:35,670 --> 00:03:32,959

many emergencies um

85

00:03:38,390 --> 00:03:35,680

the the most frequent that we see on the

86

00:03:41,030 --> 00:03:38,400

space station itself are those involving

87

00:03:43,509 --> 00:03:41,040

smoke detection uh the smoke detectors

88

00:03:45,589 --> 00:03:43,519

are devices uh you have to pull air

89

00:03:47,430 --> 00:03:45,599

through them so they can detect the

90

00:03:50,630 --> 00:03:47,440

smoke particles

91

00:03:54,789 --> 00:03:50,640

and every once in a while we'll get a

92

00:03:57,190 --> 00:03:54,799

thankfully to now a false alarm

93

00:03:59,509 --> 00:03:57,200

but when when they do sound the alarm

94

00:04:01,990 --> 00:03:59,519

everybody stops what they're doing here

95

00:04:04,390 --> 00:04:02,000

in mission control and we help guide

96

00:04:07,030 --> 00:04:04,400

the crew through the

97

00:04:09,750 --> 00:04:07,040

isolating where the the

98

00:04:11,270 --> 00:04:09,760

signal is is being enunciated from which

99

00:04:13,509 --> 00:04:11,280

module

100

00:04:16,949 --> 00:04:13,519

the alarm is going off in and we also

101
00:04:19,990 --> 00:04:16,959
have information uh ready for the crew

102
00:04:23,110 --> 00:04:20,000
if to help them work through

103
00:04:25,270 --> 00:04:23,120
any extinguishing actions uh any actions

104
00:04:27,350 --> 00:04:25,280
they have to take to put out a fire if

105
00:04:29,110 --> 00:04:27,360
it were actual and we also have

106
00:04:31,510 --> 00:04:29,120
information ready for the crew so that

107
00:04:33,270 --> 00:04:31,520
if they have to evacuate the station

108
00:04:35,590 --> 00:04:33,280
they can do that safely

109
00:04:37,350 --> 00:04:35,600
but as you say it's it's not come to

110
00:04:38,550 --> 00:04:37,360
that although occasionally fire alarms

111
00:04:41,189 --> 00:04:38,560
do go off

112
00:04:43,670 --> 00:04:41,199
those alarms go off because some sort of

113
00:04:45,350 --> 00:04:43,680

particle has has come through them and

114

00:04:47,350 --> 00:04:45,360

other particles that are not part of

115

00:04:49,350 --> 00:04:47,360

smoke can sometimes set them off and

116

00:04:52,790 --> 00:04:49,360

that's usually what we see dust and and

117

00:04:55,030 --> 00:04:52,800

then uh human skin is the real tiny tiny

118

00:04:57,430 --> 00:04:55,040

flakes in micro g they tend to float

119

00:04:59,590 --> 00:04:57,440

there's they don't settle for the floor

120

00:05:03,430 --> 00:04:59,600

and as the air current pulls those

121

00:05:06,150 --> 00:05:03,440

through the the uh the smoke detector uh

122

00:05:07,670 --> 00:05:06,160

they they sound a false alarm yeah

123

00:05:11,430 --> 00:05:07,680

okay

124

00:05:15,110 --> 00:05:13,350

hi i'm riley nelson from snohomish high

125

00:05:17,590 --> 00:05:15,120

school and my question is in your

126
00:05:19,029 --> 00:05:17,600
opinion what is the biggest uh challenge

127
00:05:21,590 --> 00:05:19,039
facing the future of american man's

128
00:05:23,430 --> 00:05:21,600
space flight oh riley unfortunately i

129
00:05:26,710 --> 00:05:23,440
don't think that's with inside the space

130
00:05:28,390 --> 00:05:26,720
program it's we've got a political and

131
00:05:29,670 --> 00:05:28,400
socio-economic

132
00:05:32,150 --> 00:05:29,680
uh

133
00:05:35,110 --> 00:05:32,160
issue that face that the space

134
00:05:38,469 --> 00:05:35,120
administration is facing on on

135
00:05:42,070 --> 00:05:38,479
first of all identifying a a

136
00:05:44,150 --> 00:05:42,080
mission for nasa and then as we go about

137
00:05:46,150 --> 00:05:44,160
trying to satisfy that mission

138
00:05:49,189 --> 00:05:46,160

it's working

139

00:05:50,870 --> 00:05:49,199

to inform the the legislators that

140

00:05:52,310 --> 00:05:50,880

you know it's going to cost a little bit

141

00:05:54,230 --> 00:05:52,320

more than we thought because the

142

00:05:57,029 --> 00:05:54,240

problems are are

143

00:05:59,510 --> 00:05:57,039

greater than than we imagined

144

00:06:01,670 --> 00:05:59,520

so it it's the the funding now the

145

00:06:03,189 --> 00:06:01,680

technical stuff we've got really smart

146

00:06:07,110 --> 00:06:03,199

engineers some of the brightest people

147

00:06:09,670 --> 00:06:07,120

in in the world and and we also have a a

148

00:06:12,309 --> 00:06:09,680

knowledge bank of universities that we

149

00:06:14,469 --> 00:06:12,319

we pose problems to and let them work

150

00:06:17,590 --> 00:06:14,479

out issues so the technical stuff is

151

00:06:20,870 --> 00:06:17,600

actually easy it's the funding for

152

00:06:22,710 --> 00:06:20,880

nasa that is the the biggest problem the

153

00:06:28,870 --> 00:06:22,720

biggest hurdle

154

00:06:33,430 --> 00:06:30,870

hi i'm sarah aldrich from lynn ritzville

155

00:06:35,270 --> 00:06:33,440

high school and my question is

156

00:06:37,510 --> 00:06:35,280

where do you see pluto going in the

157

00:06:39,029 --> 00:06:37,520

future are there any changes being made

158

00:06:41,510 --> 00:06:39,039

to it or

159

00:06:42,950 --> 00:06:41,520

oh sarah we're actually one of the the

160

00:06:44,950 --> 00:06:42,960

youngest

161

00:06:46,309 --> 00:06:44,960

flight controller disciplines here at

162

00:06:49,270 --> 00:06:46,319

nasa

163

00:06:51,909 --> 00:06:49,280

we started just a few years ago uh when

164

00:06:53,589 --> 00:06:51,919

the we migrated a network over that used

165

00:06:56,870 --> 00:06:53,599

to fly in the shuttle

166

00:06:57,990 --> 00:06:56,880

uh it was a little coax network and and

167

00:06:59,350 --> 00:06:58,000

it was

168

00:07:02,150 --> 00:06:59,360

strictly

169

00:07:04,150 --> 00:07:02,160

uh contained onboard the station we'd

170

00:07:06,150 --> 00:07:04,160

get the crew their procedures and a

171

00:07:08,629 --> 00:07:06,160

morning message and and that was about

172

00:07:11,990 --> 00:07:08,639

it now the crew can dial anywhere around

173

00:07:14,550 --> 00:07:12,000

the world uh we've got a huge movie

174

00:07:16,550 --> 00:07:14,560

library that that

175

00:07:19,430 --> 00:07:16,560

is part of the network now

176

00:07:22,950 --> 00:07:19,440

uh we're looking for more and more ways

177

00:07:25,350 --> 00:07:22,960

to utilize the the i.t resources to

178

00:07:27,430 --> 00:07:25,360

offload the cruise so we can actually do

179

00:07:28,390 --> 00:07:27,440

some of their work uh down here on the

180

00:07:32,070 --> 00:07:28,400

ground

181

00:07:34,469 --> 00:07:32,080

so we the plutos are are looking forward

182

00:07:37,029 --> 00:07:34,479

to actually migrating to the long

183

00:07:39,350 --> 00:07:37,039

duration missions through orion and and

184

00:07:41,110 --> 00:07:39,360

the other deep space missions

185

00:07:43,589 --> 00:07:41,120

uh probably one of the biggest problems

186

00:07:45,909 --> 00:07:43,599

that that uh we're faced with right now

187

00:07:48,309 --> 00:07:45,919

is increasing crew autonomy so we're

188

00:07:51,029 --> 00:07:48,319

looking at trying to enhance the

189

00:07:53,830 --> 00:07:51,039

programs that the crews use as a

190

00:07:56,309 --> 00:07:53,840

knowledge base so that they can

191

00:07:59,589 --> 00:07:56,319

become more autonomous to themselves

192

00:08:02,469 --> 00:07:59,599

they don't rely uh like the station guys

193

00:08:04,869 --> 00:08:02,479

do on mission control quite so much

194

00:08:07,110 --> 00:08:04,879

uh the more intelligence that they have

195

00:08:09,270 --> 00:08:07,120

tools that that that are uh

196

00:08:11,749 --> 00:08:09,280

computer-based to help them work through

197

00:08:14,469 --> 00:08:11,759

problems uh without

198

00:08:17,510 --> 00:08:14,479

earth's call coming that's 20 minutes

199

00:08:19,029 --> 00:08:17,520

away to solve their problems it is one

200

00:08:21,029 --> 00:08:19,039

of the big things we're studying right

201
00:08:22,629 --> 00:08:21,039
now yeah what you're referring to is

202
00:08:25,189 --> 00:08:22,639
that on future missions when we go to

203
00:08:27,270 --> 00:08:25,199
mars for example it takes about 20

204
00:08:30,309 --> 00:08:27,280
minutes for a voice message to get from

205
00:08:32,149 --> 00:08:30,319
earth to mars so if houston called them

206
00:08:33,430 --> 00:08:32,159
it would take 20 minutes to get there

207
00:08:35,269 --> 00:08:33,440
and then when they

208
00:08:36,870 --> 00:08:35,279
had an answer it would take 20 more

209
00:08:38,790 --> 00:08:36,880
minutes to get back

210
00:08:41,829 --> 00:08:38,800
so crews can't

211
00:08:43,430 --> 00:08:41,839
be have to rely on people on the ground

212
00:08:45,030 --> 00:08:43,440
to do things for them right away they

213
00:08:47,269 --> 00:08:45,040

have to become more self-sufficient in

214

00:08:49,670 --> 00:08:47,279

the future yes yes especially in

215

00:08:51,829 --> 00:08:49,680

emergencies they need answers now so

216

00:08:53,509 --> 00:08:51,839

we'll have tools developed to help

217

00:08:55,269 --> 00:08:53,519

through that problem

218

00:08:56,630 --> 00:08:55,279

we're also looking into different ways

219

00:08:59,430 --> 00:08:56,640

of helping them

220

00:09:01,350 --> 00:08:59,440

for their experiment problems

221

00:09:04,150 --> 00:09:01,360

if something's not going exactly right

222

00:09:05,190 --> 00:09:04,160

they can they can hit up a knowledge

223

00:09:07,269 --> 00:09:05,200

base

224

00:09:09,350 --> 00:09:07,279

that will help them resolve the issue

225

00:09:10,630 --> 00:09:09,360

and and then get the the experiment back

226

00:09:12,790 --> 00:09:10,640

on track

227

00:09:17,030 --> 00:09:12,800

okay next question

228

00:09:21,590 --> 00:09:19,030

hello my name is hudo from inglemoor

229

00:09:23,509 --> 00:09:21,600

high school and if my understanding of

230

00:09:26,230 --> 00:09:23,519

pluto is correct then i have two

231

00:09:28,710 --> 00:09:26,240

different questions the first one is how

232

00:09:31,269 --> 00:09:28,720

is wiring in space different from

233

00:09:33,350 --> 00:09:31,279

writing from

234

00:09:35,670 --> 00:09:33,360

a fire second question is what kind of

235

00:09:38,150 --> 00:09:35,680

training like electrical engineering do

236

00:09:39,350 --> 00:09:38,160

you need to do your job

237

00:09:42,230 --> 00:09:39,360

the

238

00:09:45,190 --> 00:09:42,240

we do have numerous electrical engineers

239

00:09:47,030 --> 00:09:45,200

that are pluto's we also have computer

240

00:09:48,389 --> 00:09:47,040

engineers and then computer science

241

00:09:50,070 --> 00:09:48,399

majors

242

00:09:52,870 --> 00:09:50,080

that are part of the pluto team and we

243

00:09:55,430 --> 00:09:52,880

kind of teach each other the side that

244

00:09:57,590 --> 00:09:55,440

we're we're not as strong in or or where

245

00:09:58,949 --> 00:09:57,600

our undergrad work uh

246

00:10:02,630 --> 00:09:58,959

was not

247

00:10:04,710 --> 00:10:02,640

uh the wiring on board the space station

248

00:10:07,990 --> 00:10:04,720

is it's direct current

249

00:10:10,630 --> 00:10:08,000

so it's very simple circuits

250

00:10:12,949 --> 00:10:10,640

it's no different it follows a very very

251
00:10:14,470 --> 00:10:12,959
strict code

252
00:10:16,710 --> 00:10:14,480
to use the term that they use in the

253
00:10:19,430 --> 00:10:16,720
construction industries

254
00:10:21,990 --> 00:10:19,440
so that the it's done correctly and it's

255
00:10:24,150 --> 00:10:22,000
verified and it's and it's very

256
00:10:27,590 --> 00:10:24,160
uh forgiving to

257
00:10:29,110 --> 00:10:27,600
uh faults that may may occur uh we try

258
00:10:32,150 --> 00:10:29,120
to keep it as safe as we can for the

259
00:10:35,509 --> 00:10:32,160
crew the big problem that we see with

260
00:10:36,310 --> 00:10:35,519
electrical current in microgravity

261
00:10:39,509 --> 00:10:36,320
is

262
00:10:40,389 --> 00:10:39,519
its ability to spark

263
00:10:43,990 --> 00:10:40,399

and

264

00:10:45,590 --> 00:10:44,000

voltage

265

00:10:48,630 --> 00:10:45,600

and the current that is

266

00:10:50,310 --> 00:10:48,640

passing through a wire

267

00:10:52,470 --> 00:10:50,320

at a certain level it will create a

268

00:10:54,870 --> 00:10:52,480

spark in space

269

00:10:56,310 --> 00:10:54,880

that's not good because those sparks

270

00:10:59,590 --> 00:10:56,320

usually contain

271

00:11:00,710 --> 00:10:59,600

very small particles of molten metal

272

00:11:01,990 --> 00:11:00,720

and

273

00:11:03,750 --> 00:11:02,000

with

274

00:11:06,230 --> 00:11:03,760

in micro g that that actually could

275

00:11:09,350 --> 00:11:06,240

float and get into the crew's eyes

276
00:11:10,310 --> 00:11:09,360
and because there's a lack of convection

277
00:11:12,710 --> 00:11:10,320
cooling

278
00:11:14,630 --> 00:11:12,720
the metal is going to stay hotter longer

279
00:11:16,230 --> 00:11:14,640
so it has the potential to burn the crew

280
00:11:17,750 --> 00:11:16,240
members so we have to understand that

281
00:11:19,509 --> 00:11:17,760
and and

282
00:11:21,670 --> 00:11:19,519
put in counter measures to help the crew

283
00:11:23,030 --> 00:11:21,680
stay safe for when they're connecting

284
00:11:24,710 --> 00:11:23,040
disconnecting

285
00:11:26,470 --> 00:11:24,720
make sure you de-energize circuits and

286
00:11:28,389 --> 00:11:26,480
there's some some common sense stuff

287
00:11:32,069 --> 00:11:28,399
like that that the crew practices before

288
00:11:33,910 --> 00:11:32,079

they go and we also include

289

00:11:35,750 --> 00:11:33,920

messages inside the procedures when

290

00:11:37,990 --> 00:11:35,760

they're connecting disconnecting stuff

291

00:11:41,190 --> 00:11:38,000

to make sure that they follow the right

292

00:11:47,509 --> 00:11:41,200

steps to do that safely

293

00:11:51,110 --> 00:11:49,910

hello my name is ben beck from newport

294

00:11:53,509 --> 00:11:51,120

high school

295

00:11:55,750 --> 00:11:53,519

and so i'm wondering if um

296

00:11:58,310 --> 00:11:55,760

will there be less astronauts in space

297

00:12:00,870 --> 00:11:58,320

in the future as wireless instrumental

298

00:12:02,389 --> 00:12:00,880

instrumentation system technology grows

299

00:12:05,430 --> 00:12:02,399

in the future

300

00:12:07,190 --> 00:12:05,440

no we've got several projects right now

301

00:12:09,350 --> 00:12:07,200

that utilize the wireless

302

00:12:11,670 --> 00:12:09,360

instrumentation system even to go

303

00:12:14,790 --> 00:12:11,680

outside the station now

304

00:12:17,350 --> 00:12:14,800

we've got a the current system is is two

305

00:12:19,269 --> 00:12:17,360

phase we have an internal section

306

00:12:21,509 --> 00:12:19,279

and an external section that measures

307

00:12:25,990 --> 00:12:21,519

vibrations through the station we're

308

00:12:31,030 --> 00:12:28,310

evas when the crew actually goes outside

309

00:12:32,949 --> 00:12:31,040

eva we can talk to them wireless

310

00:12:34,550 --> 00:12:32,959

we can see their video that comes back

311

00:12:36,949 --> 00:12:34,560

in wireless

312

00:12:39,829 --> 00:12:36,959

so actually what that's going to do is

313

00:12:42,230 --> 00:12:39,839

is make us able to assist the crew in

314

00:12:44,629 --> 00:12:42,240

more ways from the ground versus have

315

00:12:47,030 --> 00:12:44,639

cutting down the crew

316

00:12:49,590 --> 00:12:47,040

the to to get the crew

317

00:12:51,590 --> 00:12:49,600

more engaged in different projects we're

318

00:12:53,269 --> 00:12:51,600

using our technology

319

00:12:55,910 --> 00:12:53,279

to offload the crew so that they can

320

00:12:56,629 --> 00:12:55,920

spend more time doing the actual science

321

00:13:01,590 --> 00:12:56,639

and

322

00:13:01,600 --> 00:13:06,310

okay thank you

323

00:13:11,670 --> 00:13:07,990

hi i'm jacob from view harbor high

324

00:13:14,710 --> 00:13:11,680

school and um my questions were uh what

325

00:13:16,790 --> 00:13:14,720

is being done to standardize like uh

326

00:13:19,590 --> 00:13:16,800

data and electrical connections with the

327

00:13:22,550 --> 00:13:19,600

international uh different devices

328

00:13:24,470 --> 00:13:22,560

and um my second question is uh what

329

00:13:27,110 --> 00:13:24,480

specific challenges do you face

330

00:13:30,550 --> 00:13:27,120

uh with uh earth to space communications

331

00:13:33,110 --> 00:13:30,560

versus long-range earth communications

332

00:13:35,750 --> 00:13:33,120

the the the connectors and everything uh

333

00:13:37,430 --> 00:13:35,760

that we use actually are standard

334

00:13:39,910 --> 00:13:37,440

nasa has a

335

00:13:42,150 --> 00:13:39,920

a document that controls

336

00:13:44,870 --> 00:13:42,160

each connector how it is used which one

337

00:13:46,870 --> 00:13:44,880

is used for what purpose and the voltage

338

00:13:49,670 --> 00:13:46,880

and because we were actually running two

339

00:13:51,750 --> 00:13:49,680

systems we've got a 28 volt system that

340

00:13:53,509 --> 00:13:51,760

operates and we have a 120 volt dc

341

00:13:55,189 --> 00:13:53,519

system that operates

342

00:13:57,509 --> 00:13:55,199

so those are well defined there's an

343

00:13:58,949 --> 00:13:57,519

interface control document that's that's

344

00:14:02,150 --> 00:13:58,959

its title

345

00:14:03,670 --> 00:14:02,160

that specify what type of connectors and

346

00:14:06,870 --> 00:14:03,680

and

347

00:14:07,910 --> 00:14:06,880

get these to make sure that things do

348

00:14:11,590 --> 00:14:07,920

connect

349

00:14:14,069 --> 00:14:11,600

now for the communications question

350

00:14:15,990 --> 00:14:14,079

even today we have a

351
00:14:17,110 --> 00:14:16,000
about a two to two and a half second

352
00:14:20,150 --> 00:14:17,120
delay

353
00:14:22,470 --> 00:14:20,160
in the time it takes communications to

354
00:14:24,069 --> 00:14:22,480
reach from here let's say at mission

355
00:14:26,230 --> 00:14:24,079
control in houston

356
00:14:28,710 --> 00:14:26,240
up to the tdrs satellites and then over

357
00:14:31,350 --> 00:14:28,720
to the space station

358
00:14:33,990 --> 00:14:31,360
so even with that delay it it does cause

359
00:14:36,710 --> 00:14:34,000
problems uh some of the problems we

360
00:14:39,910 --> 00:14:36,720
encounter is pluto's uh with the crew

361
00:14:42,710 --> 00:14:39,920
using software that may be communicating

362
00:14:44,710 --> 00:14:42,720
via this tdrs network to the ground

363
00:14:46,949 --> 00:14:44,720

through the ku system

364

00:14:48,790 --> 00:14:46,959

that the software doesn't tolerate those

365

00:14:51,829 --> 00:14:48,800

delays so we've

366

00:14:52,790 --> 00:14:51,839

we've got to work through

367

00:15:33,269 --> 00:14:52,800

a

368

00:15:36,470 --> 00:15:33,279

time

369

00:15:39,269 --> 00:15:36,480

delay and the software doesn't crash

370

00:15:40,790 --> 00:15:39,279

because of that delay so yeah we will we

371

00:15:41,829 --> 00:15:40,800

have both software and hardware

372

00:15:44,629 --> 00:15:41,839

solutions

373

00:15:50,870 --> 00:15:44,639

to those problems

374

00:15:53,670 --> 00:15:52,710

hi i'm nick mcgill from bellevue high

375

00:15:55,269 --> 00:15:53,680

school

376

00:15:56,870 --> 00:15:55,279

what means of propulsion are you

377

00:15:58,790 --> 00:15:56,880

currently considering using on the

378

00:16:00,949 --> 00:15:58,800

manned mission of mars

379

00:16:03,350 --> 00:16:00,959

well right now to get off the earth we

380

00:16:04,310 --> 00:16:03,360

have to use chemical rockets

381

00:16:05,749 --> 00:16:04,320

there's

382

00:16:08,389 --> 00:16:05,759

several different

383

00:16:10,949 --> 00:16:08,399

schools of thought on you know which

384

00:16:14,470 --> 00:16:10,959

rocket engine should run on kerosene or

385

00:16:17,350 --> 00:16:14,480

or liquid hydrogen and liquid oxygen and

386

00:16:19,749 --> 00:16:17,360

and others or even alcohol

387

00:16:21,350 --> 00:16:19,759

but we do have several different ion

388

00:16:24,150 --> 00:16:21,360

thrusters

389

00:16:27,350 --> 00:16:24,160

that folks have been working on

390

00:16:30,230 --> 00:16:27,360

and we just need to get funding so that

391

00:16:31,829 --> 00:16:30,240

we can push to get much larger ion

392

00:16:33,590 --> 00:16:31,839

thrusters

393

00:16:35,110 --> 00:16:33,600

and

394

00:16:38,389 --> 00:16:35,120

they're actually

395

00:16:41,110 --> 00:16:38,399

large enough to propel something from

396

00:16:43,990 --> 00:16:41,120

let's say a high earth orbit out to mars

397

00:16:46,550 --> 00:16:44,000

and then actually back

398

00:16:48,949 --> 00:16:46,560

so it's a combination chemical and then

399

00:16:53,829 --> 00:16:48,959

ion thrusters

400

00:16:57,670 --> 00:16:55,990

my name is eric peterson i am from

401
00:17:00,150 --> 00:16:57,680
charles right academy

402
00:17:03,350 --> 00:17:00,160
and i want us to know what is the most

403
00:17:05,829 --> 00:17:03,360
stressful mission you've participated in

404
00:17:07,590 --> 00:17:05,839
oh eric uh let's see

405
00:17:10,390 --> 00:17:07,600
well i mean pluto's really don't get

406
00:17:13,189 --> 00:17:10,400
involved and and you know the things

407
00:17:16,230 --> 00:17:13,909
so

408
00:17:17,510 --> 00:17:16,240
actually the the most stressful i'll

409
00:17:19,189 --> 00:17:17,520
kind of break that down into two

410
00:17:21,510 --> 00:17:19,199
different ways um

411
00:17:24,470 --> 00:17:21,520
the complexity of the the 12a and the

412
00:17:26,230 --> 00:17:24,480
128.1 mission back in and i think march

413
00:17:27,990 --> 00:17:26,240

of 2006

414

00:17:30,870 --> 00:17:28,000

uh were just

415

00:17:33,190 --> 00:17:30,880

a ton of work for the pluto's the the

416

00:17:34,230 --> 00:17:33,200

crew was the shuttle mission was taking

417

00:17:37,350 --> 00:17:34,240

up

418

00:17:39,750 --> 00:17:37,360

a uh parts of the the truss the solar

419

00:17:41,750 --> 00:17:39,760

arrays and as they reconfigured and

420

00:17:44,830 --> 00:17:41,760

attached the new arrays

421

00:17:47,350 --> 00:17:44,840

the uh the power buses were actually

422

00:17:49,350 --> 00:17:47,360

being reconfigured

423

00:17:50,630 --> 00:17:49,360

so in order to make sure that the crew

424

00:17:53,510 --> 00:17:50,640

had

425

00:17:55,590 --> 00:17:53,520

their on-board services literally

426

00:17:58,070 --> 00:17:55,600

the power that they needed to

427

00:18:00,950 --> 00:17:58,080

to conduct all these activities

428

00:18:04,230 --> 00:18:00,960

we had to come up with a plan to

429

00:18:06,390 --> 00:18:04,240

move things from one bus to another in a

430

00:18:09,350 --> 00:18:06,400

different power channel and and then we

431

00:18:11,830 --> 00:18:09,360

literally managed that on an eva by eva

432

00:18:14,549 --> 00:18:11,840

basis when the crew was out literally

433

00:18:16,150 --> 00:18:14,559

switching these connections right so we

434

00:18:18,870 --> 00:18:16,160

we had to keep flight the flight

435

00:18:20,870 --> 00:18:18,880

director and and appraised of what

436

00:18:23,270 --> 00:18:20,880

services he did have and what he didn't

437

00:18:27,029 --> 00:18:25,029

the uh the

438

00:18:30,070 --> 00:18:27,039

perhaps one of the most fatiguing

439

00:18:32,710 --> 00:18:30,080

missions a different word there

440

00:18:36,070 --> 00:18:32,720

was the 1j mission where the crew took

441

00:18:38,630 --> 00:18:36,080

up the the japanese kibo module

442

00:18:41,350 --> 00:18:38,640

that mission was 16 days long

443

00:18:43,750 --> 00:18:41,360

and we had sliding shifts from launch

444

00:18:46,470 --> 00:18:43,760

until they landed

445

00:18:48,549 --> 00:18:46,480

and we extended that mission uh by

446

00:18:51,990 --> 00:18:48,559

another couple of days because we had to

447

00:18:52,870 --> 00:18:52,000

put in a a a fourth eva

448

00:18:55,270 --> 00:18:52,880

and

449

00:18:57,830 --> 00:18:55,280

at the end of those 16 days

450

00:18:59,270 --> 00:18:57,840

with not being able to stay on the same

451
00:19:01,909 --> 00:18:59,280
sleep schedule

452
00:19:04,950 --> 00:19:01,919
i was both physically and mentally just

453
00:19:06,870 --> 00:19:04,960
fatigued that was a long time to spend

454
00:19:09,430 --> 00:19:06,880
nine hours a shift

455
00:19:11,830 --> 00:19:09,440
every day coming into mission control

456
00:19:13,190 --> 00:19:11,840
and then making sure nothing went wrong

457
00:19:16,630 --> 00:19:13,200
so yeah that

458
00:19:18,470 --> 00:19:16,640
two different kind of ways but yeah it's

459
00:19:29,990 --> 00:19:18,480
those are my most memorable missions

460
00:19:33,830 --> 00:19:32,230
stevens high school and my question was

461
00:19:35,830 --> 00:19:33,840
what are the greatest dangers that you

462
00:19:38,070 --> 00:19:35,840
have faced in missions and what are the

463
00:19:41,029 --> 00:19:38,080

greatest dangers nasa now faces in

464

00:19:43,270 --> 00:19:41,039

regard to space travel

465

00:19:44,789 --> 00:19:43,280

oh let's see for mission controllers my

466

00:19:47,029 --> 00:19:44,799

greatest danger is just getting in

467

00:19:49,830 --> 00:19:47,039

traffic and getting to work

468

00:19:52,470 --> 00:19:49,840

driving yes yeah the uh

469

00:19:54,870 --> 00:19:52,480

the crew unfortunately is faced with a

470

00:19:57,190 --> 00:19:54,880

very hostile and an unforgiving

471

00:19:58,630 --> 00:19:57,200

environment out in space that's why they

472

00:20:00,310 --> 00:19:58,640

have the controllers down here on the

473

00:20:01,830 --> 00:20:00,320

ground looking over their shoulder we

474

00:20:03,590 --> 00:20:01,840

actually do more

475

00:20:05,190 --> 00:20:03,600

to operate the space station than the

476
00:20:07,029 --> 00:20:05,200
crew actually does

477
00:20:09,350 --> 00:20:07,039
we keep track of all of the

478
00:20:11,350 --> 00:20:09,360
environmental controls the power

479
00:20:13,510 --> 00:20:11,360
generation the thermal

480
00:20:16,149 --> 00:20:13,520
rejection the heat that's generated by

481
00:20:17,669 --> 00:20:16,159
all the electric equipment that's used

482
00:20:19,990 --> 00:20:17,679
and then all the stuff that the crew

483
00:20:21,270 --> 00:20:20,000
uses to to accomplish their tasks and

484
00:20:23,510 --> 00:20:21,280
and even

485
00:20:25,669 --> 00:20:23,520
monitoring uh some of the experiments

486
00:20:28,710 --> 00:20:25,679
which could be potentially very

487
00:20:32,310 --> 00:20:28,720
dangerous if if they they ran unchecked

488
00:20:36,710 --> 00:20:34,549

and because of that again this go back

489

00:20:38,470 --> 00:20:36,720

to that crew autonomy stuff we're trying

490

00:20:39,510 --> 00:20:38,480

to work on programs that will help the

491

00:20:41,830 --> 00:20:39,520

crew

492

00:20:44,549 --> 00:20:41,840

uh to operate

493

00:20:46,310 --> 00:20:44,559

just among themselves uh instead of

494

00:20:48,149 --> 00:20:46,320

relying so much on mcc so we're

495

00:20:50,710 --> 00:20:48,159

developing a lot of those autonomy

496

00:20:52,950 --> 00:20:50,720

programs and we actually do experiments

497

00:20:54,549 --> 00:20:52,960

with the crew

498

00:20:57,190 --> 00:20:54,559

where we

499

00:21:00,149 --> 00:20:57,200

simulate not being able to talk to earth

500

00:21:01,750 --> 00:21:00,159

except maybe once five minutes for

501
00:21:04,149 --> 00:21:01,760
every hour

502
00:21:07,270 --> 00:21:04,159
on these experiment type days

503
00:21:09,430 --> 00:21:07,280
so it's it's pretty neat to see and get

504
00:21:10,710 --> 00:21:09,440
feedback from the crew on how things did

505
00:21:13,190 --> 00:21:10,720
or didn't work

506
00:21:14,870 --> 00:21:13,200
uh so that we can tailor you know our

507
00:21:17,510 --> 00:21:14,880
operations here on the ground to help

508
00:21:20,070 --> 00:21:17,520
them better clearly the environment for

509
00:21:22,710 --> 00:21:20,080
them there is dangerous but there are so

510
00:21:24,310 --> 00:21:22,720
many systems that are built into

511
00:21:27,029 --> 00:21:24,320
this vehicle

512
00:21:28,789 --> 00:21:27,039
along with the the backup for control

513
00:21:31,350 --> 00:21:28,799

that comes down here that on a

514

00:21:34,470 --> 00:21:31,360

day-to-day basis as they go about their

515

00:21:36,230 --> 00:21:34,480

jobs it's really not an issue but

516

00:21:37,990 --> 00:21:36,240

the crew members are also very well

517

00:21:40,470 --> 00:21:38,000

trained to respond to anything that does

518

00:21:42,549 --> 00:21:40,480

happen yes they they are well versed in

519

00:21:44,390 --> 00:21:42,559

the emergency response to all of the

520

00:21:45,909 --> 00:21:44,400

systems on board

521

00:21:48,070 --> 00:21:45,919

and as a matter of fact the controllers

522

00:21:50,070 --> 00:21:48,080

here on the ground most often will know

523

00:21:51,990 --> 00:21:50,080

when something is going wrong before the

524

00:21:53,350 --> 00:21:52,000

crew will and and

525

00:21:56,149 --> 00:21:53,360

that's that's

526

00:21:59,430 --> 00:21:56,159

why we're here and for every person that

527

00:22:01,909 --> 00:21:59,440

you see sitting in mission control

528

00:22:05,029 --> 00:22:01,919

on the tv screen there's usually

529

00:22:07,590 --> 00:22:05,039

sometimes two three or even four people

530

00:22:10,950 --> 00:22:07,600

sitting in a what we call the back room

531

00:22:13,029 --> 00:22:10,960

uh supporting the the lead controller in

532

00:22:15,029 --> 00:22:13,039

in the the flight control room here with

533

00:22:17,830 --> 00:22:15,039

the flight director so there's there's

534

00:22:19,669 --> 00:22:17,840

definitely multiple sets of eyes uh

535

00:22:21,990 --> 00:22:19,679

watching over the crew and making sure

536

00:22:23,909 --> 00:22:22,000

that the vehicle is safe for them

537

00:22:25,190 --> 00:22:23,919

okay i think do we have time for one

538

00:22:26,950 --> 00:22:25,200

more

539

00:22:29,110 --> 00:22:26,960

no i think we're we don't have time for

540

00:22:30,870 --> 00:22:29,120

one more okay i'm told uh brian thanks

541

00:22:32,470 --> 00:22:30,880

very much it's some really interesting

542

00:22:34,390 --> 00:22:32,480

information and

543

00:22:36,390 --> 00:22:34,400

and i hope that you guys in washington

544

00:22:38,310 --> 00:22:36,400

uh got the answers that you were looking

545

00:22:40,149 --> 00:22:38,320

for and we sure appreciate the questions