



1
00:00:13,270 --> 00:00:12,070
why did you want to be an astronaut

2
00:00:15,110 --> 00:00:13,280
uh

3
00:00:17,910 --> 00:00:15,120
well i told you i used to draw these

4
00:00:19,910 --> 00:00:17,920
little rockets when i was a kid

5
00:00:22,070 --> 00:00:19,920
and i followed through as many of the

6
00:00:24,470 --> 00:00:22,080
moon missions i remember a couple more

7
00:00:27,429 --> 00:00:24,480
than others and did that make me want to

8
00:00:29,429 --> 00:00:27,439
be an astronaut i i don't know i was

9
00:00:32,709 --> 00:00:29,439
i was enthralled by it at the time i

10
00:00:34,389 --> 00:00:32,719
think it it made me interested in space

11
00:00:37,510 --> 00:00:34,399
it make made me want to understand

12
00:00:39,350 --> 00:00:37,520
things that are larger than life

13
00:00:41,590 --> 00:00:39,360

and i think that's why i wanted to go

14

00:00:43,510 --> 00:00:41,600

fly for the navy and land a plane on

15

00:00:44,389 --> 00:00:43,520

aircraft carrier

16

00:00:45,510 --> 00:00:44,399

i had

17

00:00:47,110 --> 00:00:45,520

when i was in college some co-op

18

00:00:49,270 --> 00:00:47,120

assignments in a nuclear power plant i

19

00:00:51,670 --> 00:00:49,280

just had this

20

00:00:54,470 --> 00:00:51,680

this desire to understand things that

21

00:00:55,910 --> 00:00:54,480

just seemed too big to be understandable

22

00:00:58,549 --> 00:00:55,920

and maybe that's where my desire to be

23

00:01:00,389 --> 00:00:58,559

an astronaut came from i want to learn

24

00:01:02,389 --> 00:01:00,399

more about the the whole chris ferguson

25

00:01:03,830 --> 00:01:02,399

story start by telling me about your

26

00:01:05,830 --> 00:01:03,840

hometown and what it was like for you

27

00:01:06,710 --> 00:01:05,840

growing up in philadelphia

28

00:01:08,469 --> 00:01:06,720

sure

29

00:01:10,310 --> 00:01:08,479

as you said philadelphia was my hometown

30

00:01:12,789 --> 00:01:10,320

i was fortunate enough to be

31

00:01:14,149 --> 00:01:12,799

i was born raised and got to spend you

32

00:01:16,310 --> 00:01:14,159

know all of my grade school and high

33

00:01:18,070 --> 00:01:16,320

school years in one place which is which

34

00:01:20,789 --> 00:01:18,080

was really nice we had close knit

35

00:01:22,789 --> 00:01:20,799

community uh in northeast philadelphia

36

00:01:24,789 --> 00:01:22,799

still keep in touch with a lot of a lot

37

00:01:26,469 --> 00:01:24,799

of the neighbors and uh and friends from

38

00:01:28,149 --> 00:01:26,479

high school

39

00:01:31,270 --> 00:01:28,159

went to school not too far away in

40

00:01:33,670 --> 00:01:31,280

downtown philadelphia at drexel

41

00:01:35,590 --> 00:01:33,680

and very fond of those days i was a big

42

00:01:38,310 --> 00:01:35,600

philly sports fan you know love the

43

00:01:41,270 --> 00:01:38,320

phillies love the eagles love the flyers

44

00:01:43,429 --> 00:01:41,280

go flyers um

45

00:01:45,830 --> 00:01:43,439

and uh and then we you know when when

46

00:01:47,910 --> 00:01:45,840

navy time came uh we moved out and

47

00:01:50,149 --> 00:01:47,920

really i have a lot of family back there

48

00:01:52,789 --> 00:01:50,159

and we missed the area uh but haven't

49

00:01:54,630 --> 00:01:52,799

been that back there in about 27 years

50

00:01:56,870 --> 00:01:54,640

right now but a lot of fond memories did

51
00:01:58,149 --> 00:01:56,880
you got a chance to see it from space

52
00:02:00,149 --> 00:01:58,159
yeah i did

53
00:02:02,230 --> 00:02:00,159
on my last flight we tried to

54
00:02:03,990 --> 00:02:02,240
uh it was it was during the wintertime

55
00:02:06,069 --> 00:02:04,000
and winter winter's always cloudy but

56
00:02:08,550 --> 00:02:06,079
there was a particularly clear day

57
00:02:09,669 --> 00:02:08,560
and i noticed just prior to landing we

58
00:02:11,670 --> 00:02:09,679
were going to make a pass that was going

59
00:02:12,550 --> 00:02:11,680
to take us close to philadelphia

60
00:02:14,309 --> 00:02:12,560
and

61
00:02:15,510 --> 00:02:14,319
you don't spend a lot of time you wish

62
00:02:16,470 --> 00:02:15,520
you spent more time looking out the

63
00:02:18,070 --> 00:02:16,480

window while you're up there but you

64

00:02:19,670 --> 00:02:18,080

just unfortunately don't have the time

65

00:02:20,710 --> 00:02:19,680

to spend looking out the window but this

66

00:02:23,430 --> 00:02:20,720

was an

67

00:02:25,510 --> 00:02:23,440

hour that we had and uh

68

00:02:26,949 --> 00:02:25,520

i remember coming up on the great lakes

69

00:02:30,390 --> 00:02:26,959

and

70

00:02:32,390 --> 00:02:30,400

thinking well we're gonna we're getting

71

00:02:34,309 --> 00:02:32,400

closer and uh

72

00:02:35,670 --> 00:02:34,319

but little did i know how how close we

73

00:02:37,509 --> 00:02:35,680

really were because i was able to look

74

00:02:38,710 --> 00:02:37,519

out while we were over the great lakes

75

00:02:40,710 --> 00:02:38,720

and i saw

76

00:02:43,110 --> 00:02:40,720

the chesapeake bay

77

00:02:45,350 --> 00:02:43,120

the virginia coast i saw manhattan

78

00:02:46,869 --> 00:02:45,360

island long island and eventually honed

79

00:02:49,110 --> 00:02:46,879

my way and this is over the great lakes

80

00:02:51,589 --> 00:02:49,120

i was able to pick all this out

81

00:02:53,430 --> 00:02:51,599

uh eventually found what i thought was

82

00:02:55,589 --> 00:02:53,440

the philadelphia area and we ended up

83

00:02:57,509 --> 00:02:55,599

passing about 100 miles to the north but

84

00:02:58,790 --> 00:02:57,519

it was it was oblique enough that you

85

00:03:01,110 --> 00:02:58,800

could look out and you could you could

86

00:03:03,190 --> 00:03:01,120

make out so yes i did find philadelphia

87

00:03:05,589 --> 00:03:03,200

from space you could recognize it even

88

00:03:07,750 --> 00:03:05,599

at 100 miles you know what sticks out

89

00:03:09,750 --> 00:03:07,760

the rivers stick out the airports stick

90

00:03:11,430 --> 00:03:09,760

out you can find so i define you know

91

00:03:12,790 --> 00:03:11,440

exactly as the international airport

92

00:03:14,390 --> 00:03:12,800

there's northeast philadelphia airport

93

00:03:15,670 --> 00:03:14,400

use the airports they help bridges help

94

00:03:18,070 --> 00:03:15,680

too

95

00:03:19,110 --> 00:03:18,080

how do you feel like the people and the

96

00:03:21,430 --> 00:03:19,120

place

97

00:03:23,670 --> 00:03:21,440

help make you the person that you are

98

00:03:25,509 --> 00:03:23,680

well i owe a lot to my parents of course

99

00:03:26,869 --> 00:03:25,519

you know my parents extraordinarily

100

00:03:29,110 --> 00:03:26,879

supportive unfortunately i lost my

101
00:03:31,350 --> 00:03:29,120
father at a very young age i was 20 when

102
00:03:33,030 --> 00:03:31,360
he passed away and a lot of folks have

103
00:03:35,270 --> 00:03:33,040
said to me said what would your father

104
00:03:37,190 --> 00:03:35,280
think if if he could see you today and

105
00:03:39,270 --> 00:03:37,200
he would have just he would have loved

106
00:03:41,589 --> 00:03:39,280
every moment of this i'm certain of it

107
00:03:44,229 --> 00:03:41,599
uh my mom marianne she's was an

108
00:03:45,910 --> 00:03:44,239
incredible source of support uh they

109
00:03:47,509 --> 00:03:45,920
they worked very hard to put me through

110
00:03:49,830 --> 00:03:47,519
a parochial school

111
00:03:52,149 --> 00:03:49,840
in the philadelphia area which uh you

112
00:03:54,229 --> 00:03:52,159
know it's private school and it's uh

113
00:03:55,750 --> 00:03:54,239

it's not trivial i mean

114

00:03:57,509 --> 00:03:55,760

it's even more difficult i think today

115

00:03:59,429 --> 00:03:57,519

to maintain that kind of tuition uh

116

00:04:01,589 --> 00:03:59,439

going through uh

117

00:04:03,350 --> 00:04:01,599

in in high school but uh i owe an

118

00:04:04,949 --> 00:04:03,360

enormous amount to my parents and of

119

00:04:07,030 --> 00:04:04,959

course i said i went to a parochial

120

00:04:09,910 --> 00:04:07,040

school archbishop bryan high school st

121

00:04:12,229 --> 00:04:09,920

martha grade school uh up there and uh

122

00:04:14,229 --> 00:04:12,239

still to this day uh keep in touch with

123

00:04:17,030 --> 00:04:14,239

uh with several of the teachers and have

124

00:04:19,189 --> 00:04:17,040

had a chance to thank them personally uh

125

00:04:20,390 --> 00:04:19,199

for the inspiration that they gave me

126
00:04:22,069 --> 00:04:20,400
although they didn't know it and i

127
00:04:24,710 --> 00:04:22,079
didn't know it at the time

128
00:04:27,189 --> 00:04:24,720
how they inspired me to continue

129
00:04:29,030 --> 00:04:27,199
my down my path where i enjoyed math i

130
00:04:32,150 --> 00:04:29,040
enjoyed science biology physics my

131
00:04:33,189 --> 00:04:32,160
favorite subjects going through school

132
00:04:35,510 --> 00:04:33,199
take me

133
00:04:37,030 --> 00:04:35,520
on the rest of that that trip

134
00:04:39,110 --> 00:04:37,040
after high school and going on to

135
00:04:40,950 --> 00:04:39,120
college and in your professional career

136
00:04:44,070 --> 00:04:40,960
in the navy how did you what did you do

137
00:04:45,350 --> 00:04:44,080
to end up being an astronaut at nasa

138
00:04:47,270 --> 00:04:45,360

i remember in college i had a big

139

00:04:49,110 --> 00:04:47,280

decision to make it was

140

00:04:50,710 --> 00:04:49,120

i knew i was going into the navy and i

141

00:04:52,310 --> 00:04:50,720

didn't know whether i wanted to fly or

142

00:04:53,909 --> 00:04:52,320

if i wanted to become a nuclear power

143

00:04:55,510 --> 00:04:53,919

officer and

144

00:04:57,430 --> 00:04:55,520

a nuclear reactor

145

00:04:58,550 --> 00:04:57,440

officer on an aircraft carrier or a

146

00:05:01,670 --> 00:04:58,560

submarine

147

00:05:02,629 --> 00:05:01,680

and it was uh one of our summer we

148

00:05:04,870 --> 00:05:02,639

called them

149

00:05:07,670 --> 00:05:04,880

cruises as a midshipmen where they

150

00:05:09,670 --> 00:05:07,680

exposed you to these various facets of

151
00:05:11,670 --> 00:05:09,680
navy life and it was after one of those

152
00:05:15,510 --> 00:05:11,680
they said well i think i'd i'd like to

153
00:05:18,230 --> 00:05:15,520
fly so that cemented it right there

154
00:05:20,469 --> 00:05:18,240
you know about that time

155
00:05:22,469 --> 00:05:20,479
a movie like the right stuff came out

156
00:05:24,469 --> 00:05:22,479
and i always had a fascination about

157
00:05:25,990 --> 00:05:24,479
naval aviation

158
00:05:29,029 --> 00:05:26,000
and then i learned that a lot of the

159
00:05:31,670 --> 00:05:29,039
early astronauts were navy pilots

160
00:05:32,469 --> 00:05:31,680
they all went to navy test pilot school

161
00:05:35,029 --> 00:05:32,479
so

162
00:05:37,990 --> 00:05:35,039
i i began to

163
00:05:39,909 --> 00:05:38,000

never with the intent of ending up as an

164

00:05:41,749 --> 00:05:39,919

astronaut i began to put myself in these

165

00:05:45,189 --> 00:05:41,759

positions so i could go to test pilot

166

00:05:47,430 --> 00:05:45,199

school i could get an advanced degree

167

00:05:49,029 --> 00:05:47,440

at the navy's postgraduate school just

168

00:05:51,029 --> 00:05:49,039

to put myself

169

00:05:52,950 --> 00:05:51,039

close enough that if the opportunity

170

00:05:53,990 --> 00:05:52,960

arose i could apply to to be an

171

00:05:58,309 --> 00:05:54,000

astronaut

172

00:06:00,070 --> 00:05:58,319

and everything worked out uh really well

173

00:06:01,590 --> 00:06:00,080

you know military service is challenging

174

00:06:02,550 --> 00:06:01,600

on the family

175

00:06:04,870 --> 00:06:02,560

but

176

00:06:06,309 --> 00:06:04,880

my career those arduous deployments were

177

00:06:07,350 --> 00:06:06,319

spaced out just enough that we could

178

00:06:08,309 --> 00:06:07,360

recover

179

00:06:11,029 --> 00:06:08,319

and

180

00:06:14,309 --> 00:06:11,039

ended up doing a 26-year career of

181

00:06:16,469 --> 00:06:14,319

course selected to nasa um after

182

00:06:17,510 --> 00:06:16,479

after about 14 years of it

183

00:06:19,510 --> 00:06:17,520

so

184

00:06:21,590 --> 00:06:19,520

it just worked out

185

00:06:23,430 --> 00:06:21,600

i was very fortuitous that things worked

186

00:06:26,469 --> 00:06:23,440

out the way they did for me

187

00:06:28,309 --> 00:06:26,479

you didn't go to be a navy flyer so you

188

00:06:30,629 --> 00:06:28,319

could become an astronaut

189

00:06:32,629 --> 00:06:30,639

i understand it no absolutely not i

190

00:06:34,230 --> 00:06:32,639

wanted to land it i wanted to land a jet

191

00:06:36,230 --> 00:06:34,240

at an aircraft carrier i wanted to see

192

00:06:39,430 --> 00:06:36,240

if i could do that

193

00:06:43,830 --> 00:06:41,189

that worked out really well spent some

194

00:06:47,189 --> 00:06:43,840

time met some fantastic people in in two

195

00:06:50,710 --> 00:06:47,199

different squadrons vf11 vf211

196

00:06:54,309 --> 00:06:52,390

just enjoy the living daylights out of

197

00:06:56,309 --> 00:06:54,319

that enjoy the engineering aspect enjoy

198

00:06:59,029 --> 00:06:56,319

being a test pilot

199

00:07:01,189 --> 00:06:59,039

and the whole science side of flying

200

00:07:03,029 --> 00:07:01,199

worked in with weapon separation there's

201
00:07:05,510 --> 00:07:03,039
a whole science to making sure that a

202
00:07:07,270 --> 00:07:05,520
missile or a bomb separates correctly

203
00:07:09,029 --> 00:07:07,280
from an airplane because the aerodynamic

204
00:07:10,550 --> 00:07:09,039
forces are very high they could cause to

205
00:07:12,469 --> 00:07:10,560
push it back up and you don't want

206
00:07:14,390 --> 00:07:12,479
anything like that just loved the

207
00:07:16,790 --> 00:07:14,400
aerodynamic side of things

208
00:07:20,550 --> 00:07:16,800
but didn't do it to be an astronaut it

209
00:07:25,589 --> 00:07:23,029
the navy career that you had has its

210
00:07:27,990 --> 00:07:25,599
share of dangers you ended up in a job

211
00:07:30,790 --> 00:07:28,000
as an astronaut that has its own unique

212
00:07:32,870 --> 00:07:30,800
set of dangers too chris what is it that

213
00:07:35,749 --> 00:07:32,880

you think that we're getting or learning

214

00:07:38,870 --> 00:07:35,759

as a result of flying people in space

215

00:07:41,430 --> 00:07:38,880

that makes it worth doing this yeah

216

00:07:44,550 --> 00:07:41,440

well i think we're explorers by nature

217

00:07:46,230 --> 00:07:44,560

um you know you look at the early uh

218

00:07:47,749 --> 00:07:46,240

magellan columbus

219

00:07:50,230 --> 00:07:47,759

you know we we just

220

00:07:52,230 --> 00:07:50,240

these people have this inherent desire

221

00:07:54,790 --> 00:07:52,240

to understand the unknown

222

00:07:56,070 --> 00:07:54,800

so they they get in a ship and they and

223

00:07:58,390 --> 00:07:56,080

they go and they're just going to see

224

00:08:00,550 --> 00:07:58,400

what they find

225

00:08:03,029 --> 00:08:00,560

we have done fantastic things in space i

226
00:08:05,909 --> 00:08:03,039
mean we have brought we've brought the

227
00:08:07,029 --> 00:08:05,919
globe together uh

228
00:08:08,550 --> 00:08:07,039
in space in the form of the

229
00:08:10,790 --> 00:08:08,560
international space station where we

230
00:08:13,589 --> 00:08:10,800
formally had these conglomerates in

231
00:08:14,869 --> 00:08:13,599
russia and europe japan united states

232
00:08:16,629 --> 00:08:14,879
that had their independent space

233
00:08:18,710 --> 00:08:16,639
programs but we've managed to bring them

234
00:08:20,950 --> 00:08:18,720
all together so we speak a common

235
00:08:23,430 --> 00:08:20,960
language the interfaces all work

236
00:08:25,110 --> 00:08:23,440
together

237
00:08:26,710 --> 00:08:25,120
and we all we all did that because we

238
00:08:29,749 --> 00:08:26,720

agreed to cooperate

239

00:08:32,469 --> 00:08:29,759

internationally on the space station

240

00:08:34,389 --> 00:08:32,479

you know as far as uh what ultimately

241

00:08:36,230 --> 00:08:34,399

will this buy this i'd like to think

242

00:08:38,230 --> 00:08:36,240

number one it inspires a generation of

243

00:08:41,589 --> 00:08:38,240

young folks i mean i was inspired by

244

00:08:43,190 --> 00:08:41,599

what we did in apollo i can hope that

245

00:08:44,630 --> 00:08:43,200

young folks today see what what's

246

00:08:46,710 --> 00:08:44,640

happening on the space station the

247

00:08:48,870 --> 00:08:46,720

medical research that we're doing

248

00:08:50,150 --> 00:08:48,880

the the research that we're doing on the

249

00:08:52,070 --> 00:08:50,160

environment

250

00:08:54,630 --> 00:08:52,080

our ability to

251

00:08:57,030 --> 00:08:54,640

clean our own air to take urine and

252

00:08:59,190 --> 00:08:57,040

recycle it and reuse it these closed

253

00:09:00,470 --> 00:08:59,200

system things are very consistent with

254

00:09:01,670 --> 00:09:00,480

some of the

255

00:09:03,430 --> 00:09:01,680

environmental issues that we're going to

256

00:09:05,670 --> 00:09:03,440

face on the planet earth

257

00:09:07,910 --> 00:09:05,680

over the next 100 years or so and we're

258

00:09:10,630 --> 00:09:07,920

pioneering all these in space right now

259

00:09:13,430 --> 00:09:10,640

we're learning how to support humans in

260

00:09:15,509 --> 00:09:13,440

in very unforgiving environments

261

00:09:17,590 --> 00:09:15,519

so i mean i could continue

262

00:09:19,829 --> 00:09:17,600

the list goes on uh but

263

00:09:21,269 --> 00:09:19,839

you know we just have we have a home up

264

00:09:22,630 --> 00:09:21,279

there and we're destined to be up there

265

00:09:24,550 --> 00:09:22,640

and we're destined to go beyond low

266

00:09:31,509 --> 00:09:24,560

earth orbit perhaps set up a colony on

267

00:09:35,509 --> 00:09:33,269

you're one of four crew members on the

268

00:09:37,430 --> 00:09:35,519

final flight of space shuttle atlantis

269

00:09:40,230 --> 00:09:37,440

chris give me a summary of the work

270

00:09:42,790 --> 00:09:40,240

that's planned for sts-135 and what your

271

00:09:44,870 --> 00:09:42,800

job's going to be um sure

272

00:09:47,829 --> 00:09:44,880

of course 135 wasn't really a planned

273

00:09:50,070 --> 00:09:47,839

mission until well very recently it was

274

00:09:51,670 --> 00:09:50,080

supposed to be a rescue mission

275

00:09:53,110 --> 00:09:51,680

since the orbiter was ready they were

276

00:09:55,110 --> 00:09:53,120

stacking and processing it just like it

277

00:09:56,710 --> 00:09:55,120

was a regular flight they said well you

278

00:09:58,230 --> 00:09:56,720

know if we put an mplm in the back if we

279

00:09:59,829 --> 00:09:58,240

load it up with cargo we can probably

280

00:10:01,590 --> 00:09:59,839

get an extra year's worth of provisions

281

00:10:03,110 --> 00:10:01,600

up to the space station so

282

00:10:05,509 --> 00:10:03,120

i think that's how the evolution of

283

00:10:07,990 --> 00:10:05,519

sts-135 came about

284

00:10:10,949 --> 00:10:08,000

as far as what we're doing big picture

285

00:10:13,110 --> 00:10:10,959

we're delivering about 17 000 pounds of

286

00:10:15,030 --> 00:10:13,120

cargo in an mplm

287

00:10:17,269 --> 00:10:15,040

we're also going to deliver a robotics

288

00:10:18,710 --> 00:10:17,279

refueling mileage module which

289

00:10:20,470 --> 00:10:18,720

which is a

290

00:10:23,110 --> 00:10:20,480

fisher-price play toy if you will for

291

00:10:24,550 --> 00:10:23,120

the uh for the special purpose dexterous

292

00:10:26,230 --> 00:10:24,560

manipulator

293

00:10:28,150 --> 00:10:26,240

and we'll be bringing home a pump module

294

00:10:29,910 --> 00:10:28,160

that failed uh on the space station

295

00:10:31,910 --> 00:10:29,920

about six months ago

296

00:10:33,430 --> 00:10:31,920

so that's that's big picture um we're

297

00:10:34,630 --> 00:10:33,440

also going to bring back a lot of cargo

298

00:10:35,910 --> 00:10:34,640

a lot of uh

299

00:10:37,829 --> 00:10:35,920

spare things that have been in the space

300

00:10:39,190 --> 00:10:37,839

station in an effort to clean it out a

301

00:10:40,870 --> 00:10:39,200

little bit there's a lot of space

302

00:10:42,870 --> 00:10:40,880

shuttle related items that we keep up

303

00:10:44,150 --> 00:10:42,880

there uh permanently from flight to

304

00:10:46,949 --> 00:10:44,160

flight

305

00:10:48,790 --> 00:10:46,959

reason to have them up there so we'll

306

00:10:51,190 --> 00:10:48,800

bring a lot of those home as well so

307

00:10:53,269 --> 00:10:51,200

largely it's a cargo mission uh it's an

308

00:10:54,550 --> 00:10:53,279

effort to posture the space station for

309

00:10:56,150 --> 00:10:54,560

about a year

310

00:10:58,230 --> 00:10:56,160

put it in a good position until we can

311

00:11:00,389 --> 00:10:58,240

get our commercial

312

00:11:01,990 --> 00:11:00,399

cargo resupply system up and running so

313

00:11:04,550 --> 00:11:02,000

you're making the most of the the

314

00:11:07,350 --> 00:11:04,560

shuttle's capacity both up and down uh

315

00:11:08,870 --> 00:11:07,360

absolutely i i i've i the final numbers

316

00:11:10,150 --> 00:11:08,880

are not in but i'm under the

317

00:11:12,710 --> 00:11:10,160

understanding this will be one of the

318

00:11:14,470 --> 00:11:12,720

heaviest mplms that have ever gone up

319

00:11:16,069 --> 00:11:14,480

and it will be the heaviest mplm that

320

00:11:17,829 --> 00:11:16,079

will have come back

321

00:11:19,350 --> 00:11:17,839

now there are only four people on the

322

00:11:21,350 --> 00:11:19,360

crew for this mission what that's

323

00:11:23,430 --> 00:11:21,360

unusual what's the difference it's very

324

00:11:24,550 --> 00:11:23,440

unusual i think the last time we've done

325

00:11:27,190 --> 00:11:24,560

this

326
00:11:28,870 --> 00:11:27,200
was back in the mid 80s sts-6 i believe

327
00:11:29,829 --> 00:11:28,880
we had four crew members

328
00:11:32,470 --> 00:11:29,839
um

329
00:11:34,150 --> 00:11:32,480
now that's half the answer we've we've

330
00:11:36,389 --> 00:11:34,160
had shuttles that have been crewed by

331
00:11:38,069 --> 00:11:36,399
four people they were space station

332
00:11:39,750 --> 00:11:38,079
rotation missions so in addition to the

333
00:11:40,630 --> 00:11:39,760
four shuttle crew members we also had

334
00:11:42,230 --> 00:11:40,640
three

335
00:11:44,230 --> 00:11:42,240
space station crew members so there were

336
00:11:46,310 --> 00:11:44,240
seven bodies on board the shuttle but

337
00:11:47,910 --> 00:11:46,320
three of them were destined for uh for

338
00:11:48,949 --> 00:11:47,920

rotation on the space station so you

339

00:11:50,790 --> 00:11:48,959

really couldn't consider them a

340

00:11:53,509 --> 00:11:50,800

full-time shuttle crew but we'll only

341

00:11:55,110 --> 00:11:53,519

have four bodies there all four will be

342

00:11:57,110 --> 00:11:55,120

on the flight deck so this will be the

343

00:11:59,350 --> 00:11:57,120

first time that the mid deck will uh

344

00:12:00,870 --> 00:11:59,360

will actually be empty for launch

345

00:12:01,990 --> 00:12:00,880

at least devoid of astronauts we're

346

00:12:04,949 --> 00:12:02,000

going to fill the

347

00:12:07,190 --> 00:12:04,959

uh the the seats with bags if you will

348

00:12:09,269 --> 00:12:07,200

just take more cargo up there

349

00:12:12,069 --> 00:12:09,279

but this is this is very unusual and it

350

00:12:15,509 --> 00:12:12,079

brings a lot of a lot of interesting

351

00:12:17,110 --> 00:12:15,519

challenges associated with it a lot of

352

00:12:18,310 --> 00:12:17,120

emergency procedures that we practice

353

00:12:20,069 --> 00:12:18,320

for example

354

00:12:21,750 --> 00:12:20,079

have some actions on the mid-deck and

355

00:12:23,509 --> 00:12:21,760

we've had to work around those a little

356

00:12:24,389 --> 00:12:23,519

bit with with a limited number of crew

357

00:12:26,710 --> 00:12:24,399

members

358

00:12:28,550 --> 00:12:26,720

why just four this time

359

00:12:31,110 --> 00:12:28,560

uh well it has to do with the fact that

360

00:12:33,430 --> 00:12:31,120

there is no rescue um shuttle for this

361

00:12:34,949 --> 00:12:33,440

flight of course since columbia we've uh

362

00:12:37,750 --> 00:12:34,959

we've had a very

363

00:12:40,470 --> 00:12:37,760

engaging program of inspection and the

364

00:12:42,550 --> 00:12:40,480

capability to rescue a crew in the event

365

00:12:47,590 --> 00:12:42,560

that the shuttle incurred some launch

366

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

since there is no backup shuttle for

367

00:12:53,829 --> 00:12:51,600

this we have to rely on an alternate

368

00:12:56,550 --> 00:12:53,839

means uh to get the to get the

369

00:12:58,790 --> 00:12:56,560

astronauts back and they will be through

370

00:13:00,629 --> 00:12:58,800

the normal rotation of soyuz vehicles

371

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

that that come up to deliver new crew

372

00:13:03,670 --> 00:13:01,600

members

373

00:13:06,949 --> 00:13:03,680

now we launch about four soyuz's per

374

00:13:08,550 --> 00:13:06,959

year uh with an alternating uh crews of

375

00:13:11,350 --> 00:13:08,560

three on them so there's always six

376

00:13:14,230 --> 00:13:11,360

people aboard the space station

377

00:13:16,150 --> 00:13:14,240

in the event for some reason atlantis uh

378

00:13:18,710 --> 00:13:16,160

does incur some type of damage that

379

00:13:21,269 --> 00:13:18,720

would prevent it from being a successful

380

00:13:23,910 --> 00:13:21,279

re-entry vehicle will stay aboard the

381

00:13:27,350 --> 00:13:23,920

station and will wait for that rotation

382

00:13:29,030 --> 00:13:27,360

of soyuz's to uh to come up

383

00:13:30,949 --> 00:13:29,040

instead of coming up with three people

384

00:13:33,269 --> 00:13:30,959

however they'll come up with two which

385

00:13:35,990 --> 00:13:33,279

will leave an empty space for uh one of

386

00:13:38,230 --> 00:13:36,000

the the shuttle crew members to get back

387

00:13:40,949 --> 00:13:38,240

it's a it's a well thought out but

388

00:13:43,110 --> 00:13:40,959

lengthy rescue process

389

00:13:44,310 --> 00:13:43,120

the first crew member would return about

390

00:13:45,509 --> 00:13:44,320

80 days

391

00:13:47,189 --> 00:13:45,519

after

392

00:13:48,870 --> 00:13:47,199

the space station the space shuttle was

393

00:13:51,189 --> 00:13:48,880

stranded and the last crew member would

394

00:13:53,110 --> 00:13:51,199

be about 340 days so close to a year on

395

00:13:54,230 --> 00:13:53,120

orbit but it's a very low likelihood

396

00:13:56,310 --> 00:13:54,240

scenario

397

00:13:58,310 --> 00:13:56,320

if you believe the statisticians about 1

398

00:14:00,150 --> 00:13:58,320

in 560

399

00:14:03,269 --> 00:14:00,160

is what they calculate the need for

400

00:14:05,269 --> 00:14:03,279

shuttle rescue would be so like then one

401
00:14:07,030 --> 00:14:05,279
at a time you and your crew members

402
00:14:09,750 --> 00:14:07,040
would take advantage of that empty seat

403
00:14:11,670 --> 00:14:09,760
on the soyuz to come down

404
00:14:13,829 --> 00:14:11,680
how do you feel about flying on a

405
00:14:16,069 --> 00:14:13,839
possibility of flying on a soyuz vehicle

406
00:14:17,430 --> 00:14:16,079
and of spending a few extra months in

407
00:14:19,590 --> 00:14:17,440
space

408
00:14:21,750 --> 00:14:19,600
well i think uh you know we take these

409
00:14:24,230 --> 00:14:21,760
things in stride i mean we've all

410
00:14:26,230 --> 00:14:24,240
accepted this i think it would in an

411
00:14:27,590 --> 00:14:26,240
interesting sort of way it would be an

412
00:14:29,670 --> 00:14:27,600
easy way to get a space station

413
00:14:31,350 --> 00:14:29,680

increment without the year and a half of

414

00:14:32,790 --> 00:14:31,360

or the two and a half years of training

415

00:14:34,310 --> 00:14:32,800

uh not of course that we would want

416

00:14:36,230 --> 00:14:34,320

anything like that because there are

417

00:14:37,430 --> 00:14:36,240

people that have trained for years for

418

00:14:39,670 --> 00:14:37,440

those positions and we certainly

419

00:14:41,430 --> 00:14:39,680

wouldn't want to take them uh from them

420

00:14:45,189 --> 00:14:41,440

but as far as the preparations that have

421

00:14:45,990 --> 00:14:45,199

gone uh on to get us ready

422

00:14:51,110 --> 00:14:46,000

the

423

00:14:51,910 --> 00:14:51,120

engineering safety committee

424

00:14:54,310 --> 00:14:51,920

has

425

00:14:57,030 --> 00:14:54,320

put together an excellent plan

426
00:14:59,269 --> 00:14:57,040
that showed the off the space

427
00:15:00,550 --> 00:14:59,279
missions directorate that we are ready

428
00:15:03,509 --> 00:15:00,560
to do this

429
00:15:05,590 --> 00:15:03,519
we have we have extra russian language

430
00:15:09,030 --> 00:15:05,600
training we've received extra space

431
00:15:11,110 --> 00:15:09,040
station systems training uh we've

432
00:15:14,310 --> 00:15:11,120
we've been fitted for circle suits and

433
00:15:17,110 --> 00:15:14,320
ielks the the seat that

434
00:15:17,829 --> 00:15:17,120
we return in on the soyuz

435
00:15:19,910 --> 00:15:17,839
so

436
00:15:21,750 --> 00:15:19,920
this has been well thought out we're

437
00:15:23,509 --> 00:15:21,760
very well prepared

438
00:15:25,910 --> 00:15:23,519

you know we wouldn't necessarily be

439

00:15:29,430 --> 00:15:25,920

considered full-time russian soyuz crew

440

00:15:31,990 --> 00:15:29,440

members but we could fulfill a role as a

441

00:15:33,430 --> 00:15:32,000

rescuee with very little difficulty so

442

00:15:34,949 --> 00:15:33,440

it's a well thought out plan you've been

443

00:15:36,550 --> 00:15:34,959

asking people about what it's like to

444

00:15:37,990 --> 00:15:36,560

come home on the soyuz

445

00:15:39,829 --> 00:15:38,000

i have and

446

00:15:41,509 --> 00:15:39,839

it floats around our office a little bit

447

00:15:42,870 --> 00:15:41,519

what it's like to come back i think it

448

00:15:44,790 --> 00:15:42,880

would be an interesting experience of

449

00:15:46,310 --> 00:15:44,800

course we'd much rather come back on our

450

00:15:48,710 --> 00:15:46,320

space shuttle but we're prepared to come

451
00:15:50,230 --> 00:15:48,720
back on the soyuz if we have to

452
00:15:51,990 --> 00:15:50,240
each of the members of your crew has

453
00:15:54,310 --> 00:15:52,000
been to the space station at least once

454
00:15:56,710 --> 00:15:54,320
before and sandy magnus has completed a

455
00:15:59,110 --> 00:15:56,720
long duration mission there how's all

456
00:16:01,269 --> 00:15:59,120
that experience helped you guys in

457
00:16:03,350 --> 00:16:01,279
getting ready for this flight

458
00:16:05,269 --> 00:16:03,360
uh tell you sandy's experience on board

459
00:16:07,509 --> 00:16:05,279
has just proven to be invaluable of

460
00:16:11,350 --> 00:16:07,519
course she went up with with me and our

461
00:16:13,430 --> 00:16:11,360
crew on sts 126. so i'm very familiar

462
00:16:14,150 --> 00:16:13,440
with sandy

463
00:16:15,910 --> 00:16:14,160

and

464

00:16:19,749 --> 00:16:15,920

she really brings

465

00:16:22,230 --> 00:16:19,759

just a wide array of skills uh with you

466

00:16:23,590 --> 00:16:22,240

know based upon her time on board so if

467

00:16:25,990 --> 00:16:23,600

sandy says something about the space

468

00:16:27,509 --> 00:16:26,000

station we generally listen to it

469

00:16:28,949 --> 00:16:27,519

of course every other crew member has

470

00:16:30,710 --> 00:16:28,959

also been the station now the

471

00:16:32,069 --> 00:16:30,720

configuration has changed a little bit

472

00:16:33,749 --> 00:16:32,079

over the years

473

00:16:36,150 --> 00:16:33,759

so i think we're all

474

00:16:38,389 --> 00:16:36,160

eagerly anticipating seeing what the

475

00:16:40,870 --> 00:16:38,399

space station looks like today but we

476
00:16:43,030 --> 00:16:40,880
have been able to

477
00:16:44,470 --> 00:16:43,040
wave a little bit of our our training by

478
00:16:47,110 --> 00:16:44,480
virtue of some of the experience that

479
00:16:48,710 --> 00:16:47,120
we've had and and that's also been kind

480
00:16:51,910 --> 00:16:48,720
of a crucial component of having this

481
00:16:54,629 --> 00:16:51,920
crew of four is that we do since we do

482
00:16:56,949 --> 00:16:54,639
have uh some experience on the station

483
00:16:59,509 --> 00:16:56,959
already we've been able to absorb a lot

484
00:17:00,310 --> 00:16:59,519
of that added training uh

485
00:17:02,550 --> 00:17:00,320
and

486
00:17:05,110 --> 00:17:02,560
actually cancel some of it because we've

487
00:17:07,510 --> 00:17:05,120
been up there before and we are familiar

488
00:17:09,189 --> 00:17:07,520

what are you looking forward to about

489

00:17:10,630 --> 00:17:09,199

that's different on the station to see

490

00:17:12,309 --> 00:17:10,640

this time around i want the million

491

00:17:13,669 --> 00:17:12,319

dollar view out of the cupola that's

492

00:17:16,230 --> 00:17:13,679

what i want to see

493

00:17:17,990 --> 00:17:16,240

um when i was up there last node three

494

00:17:20,549 --> 00:17:18,000

wasn't there the cupola was not there

495

00:17:24,230 --> 00:17:20,559

the pmm was not there so the station has

496

00:17:26,630 --> 00:17:24,240

expanded um in in a lot of uh in a lot

497

00:17:28,870 --> 00:17:26,640

of great ways but of course that cupola

498

00:17:31,830 --> 00:17:28,880

uh is is a view to behold and i'm

499

00:17:34,310 --> 00:17:31,840

looking forward to experiencing that

500

00:17:36,310 --> 00:17:34,320

as you said this flight carries well a

501
00:17:38,150 --> 00:17:36,320
shuttle full of supplies for the

502
00:17:39,750 --> 00:17:38,160
international space station

503
00:17:41,350 --> 00:17:39,760
give us a sense of the kinds of

504
00:17:43,110 --> 00:17:41,360
different things that you and your

505
00:17:44,470 --> 00:17:43,120
crewmates are bringing to orbit this

506
00:17:46,390 --> 00:17:44,480
time

507
00:17:47,990 --> 00:17:46,400
of course we have the mplm the mplm will

508
00:17:50,070 --> 00:17:48,000
have about fifteen thousand pounds of

509
00:17:51,669 --> 00:17:50,080
cargo inside it and we have the mid deck

510
00:17:54,070 --> 00:17:51,679
and the mid deck will hold about another

511
00:17:56,310 --> 00:17:54,080
eight thousand pounds of cargo in the

512
00:18:13,029 --> 00:17:56,320
mplm i looked at the list uh yesterday

513
00:18:17,909 --> 00:18:15,350

a lot of environmental supplies of

514

00:18:20,630 --> 00:18:17,919

course we have the urine processor on

515

00:18:21,990 --> 00:18:20,640

board and that requires a

516

00:18:25,190 --> 00:18:22,000

fairly

517

00:18:27,990 --> 00:18:25,200

scheduled and systematic delivery of

518

00:18:30,470 --> 00:18:28,000

filter tanks what they call them rftas

519

00:18:31,510 --> 00:18:30,480

it's a kind of a it's a urine collection

520

00:18:33,270 --> 00:18:31,520

tank

521

00:18:34,230 --> 00:18:33,280

so we'll be taking a six or seven of

522

00:18:36,070 --> 00:18:34,240

those

523

00:18:37,750 --> 00:18:36,080

um a lot of other components for the

524

00:18:39,510 --> 00:18:37,760

environmental system

525

00:18:41,590 --> 00:18:39,520

i think a hydrogen dome on there which

526

00:18:45,830 --> 00:18:41,600

is a part of the the oga the oxygen

527

00:18:49,669 --> 00:18:47,750

other components just for daily life

528

00:18:51,990 --> 00:18:49,679

aboard the space station we'll be

529

00:18:53,909 --> 00:18:52,000

bringing back an awful lot as well we

530

00:18:56,310 --> 00:18:53,919

bring back a heat exchanger and then as

531

00:18:59,510 --> 00:18:56,320

i mentioned a lot of the components that

532

00:19:01,350 --> 00:18:59,520

were were stationed full time aboard

533

00:19:02,870 --> 00:19:01,360

the iss

534

00:19:04,549 --> 00:19:02,880

just to support the space shuttle we can

535

00:19:06,390 --> 00:19:04,559

bring that all back with us so like i

536

00:19:08,390 --> 00:19:06,400

said in addition to delivering awful a

537

00:19:09,590 --> 00:19:08,400

lot of cargo we're also hoping to

538

00:19:12,150 --> 00:19:09,600

offload

539

00:19:14,390 --> 00:19:12,160

trash maybe things that

540

00:19:17,190 --> 00:19:14,400

could be repaired and sent back up on

541

00:19:20,870 --> 00:19:17,200

the atv or the hdb at a later date

542

00:19:23,270 --> 00:19:20,880

now the logistics modules the mplms have

543

00:19:25,990 --> 00:19:23,280

been installed on the underside of unity

544

00:19:27,830 --> 00:19:26,000

lately on the underside of harmony on

545

00:19:30,549 --> 00:19:27,840

the node two but this would be the first

546

00:19:33,750 --> 00:19:30,559

time you have to install one while that

547

00:19:35,830 --> 00:19:33,760

pmm is in place how does that or does it

548

00:19:38,789 --> 00:19:35,840

change the how you go about installing

549

00:19:40,630 --> 00:19:38,799

an mplm with that new component there

550

00:19:41,669 --> 00:19:40,640

the the installation procedures are very

551
00:19:43,190 --> 00:19:41,679
similar

552
00:19:44,870 --> 00:19:43,200
what what's interesting and i didn't

553
00:19:46,310 --> 00:19:44,880
realize this until

554
00:19:48,549 --> 00:19:46,320
until we got into the planning of the

555
00:19:50,710 --> 00:19:48,559
mission is the space station software

556
00:19:52,870 --> 00:19:50,720
was never designed to accommodate more

557
00:19:55,110 --> 00:19:52,880
than one logistics module it always

558
00:19:57,350 --> 00:19:55,120
assumed there would be one on board

559
00:19:59,909 --> 00:19:57,360
of course with the pmm there permanently

560
00:20:01,669 --> 00:19:59,919
that is one logistics module so we're

561
00:20:02,549 --> 00:20:01,679
going to add another one and we've had

562
00:20:04,630 --> 00:20:02,559
to

563
00:20:06,390 --> 00:20:04,640

perform a little i guess sleight of hand

564

00:20:07,990 --> 00:20:06,400

to get the space station to believe that

565

00:20:10,470 --> 00:20:08,000

there's actually two logistics modules

566

00:20:11,990 --> 00:20:10,480

on board and i i think the ultimate plan

567

00:20:14,149 --> 00:20:12,000

will be that we'll time share

568

00:20:16,789 --> 00:20:14,159

communication with them so

569

00:20:19,110 --> 00:20:16,799

we can turn one on so it can not be

570

00:20:20,390 --> 00:20:19,120

monitored for health and status by the

571

00:20:22,470 --> 00:20:20,400

the iss

572

00:20:24,149 --> 00:20:22,480

uh computers and then we'll turn that

573

00:20:25,750 --> 00:20:24,159

one off and turn the other one on so

574

00:20:27,669 --> 00:20:25,760

that's been the one interesting facet

575

00:20:29,029 --> 00:20:27,679

but as far as procedurally uh we're

576

00:20:30,310 --> 00:20:29,039

going to pull it out of the payload bay

577

00:20:32,630 --> 00:20:30,320

and install it

578

00:20:34,870 --> 00:20:32,640

on the the node 2 which is the most

579

00:20:37,029 --> 00:20:34,880

forward most module on the nader port on

580

00:20:39,190 --> 00:20:37,039

the bottom which will be it'll look uh

581

00:20:41,270 --> 00:20:39,200

just like the pmm it'll be about well 40

582

00:20:43,029 --> 00:20:41,280

or 50 feet forward of it though so it

583

00:20:44,789 --> 00:20:43,039

doesn't interfere with the arm

584

00:20:47,190 --> 00:20:44,799

operations or

585

00:20:48,950 --> 00:20:47,200

no no we don't anticipate it

586

00:20:50,789 --> 00:20:48,960

well another big event that is happening

587

00:20:53,430 --> 00:20:50,799

on this flight on flight day five is

588

00:20:54,710 --> 00:20:53,440

going to be a spacewalk uh although this

589

00:20:56,549 --> 00:20:54,720

one's going to be conducted by two of

590

00:20:59,190 --> 00:20:56,559

the station crew members rather than

591

00:21:01,110 --> 00:20:59,200

shuttle crew members uh why why the

592

00:21:02,630 --> 00:21:01,120

change in assignment yeah

593

00:21:05,669 --> 00:21:02,640

again we get back to the four crew

594

00:21:08,789 --> 00:21:05,679

members we just don't have the resources

595

00:21:11,110 --> 00:21:08,799

usually when you stage an eva uh when a

596

00:21:13,190 --> 00:21:11,120

shuttle is there it's a it's an all

597

00:21:14,310 --> 00:21:13,200

hands evolution with six or seven crew

598

00:21:15,990 --> 00:21:14,320

members

599

00:21:18,950 --> 00:21:16,000

if you just kind of count the bodies you

600

00:21:21,110 --> 00:21:18,960

have someone has to suit up the uh the

601
00:21:23,270 --> 00:21:21,120
eva crewmembers to get them out the door

602
00:21:25,110 --> 00:21:23,280
somebody is usually the choreographer

603
00:21:27,110 --> 00:21:25,120
that what we call the iv

604
00:21:28,710 --> 00:21:27,120
intravehicular officer aboard the

605
00:21:31,110 --> 00:21:28,720
shuttles that's two

606
00:21:32,870 --> 00:21:31,120
we usually have two more uh bodies

607
00:21:35,029 --> 00:21:32,880
supporting the eba

608
00:21:36,950 --> 00:21:35,039
for robotics because usually most ebas

609
00:21:39,510 --> 00:21:36,960
do need some form of robotic support and

610
00:21:41,110 --> 00:21:39,520
and this eva is no exception so you can

611
00:21:43,510 --> 00:21:41,120
see just by counting we've already used

612
00:21:45,830 --> 00:21:43,520
up our four crew members right there

613
00:21:47,430 --> 00:21:45,840

so we thought what a what a better

614

00:21:49,029 --> 00:21:47,440

resource to use than the station crew

615

00:21:52,390 --> 00:21:49,039

members that are already there which of

616

00:21:54,149 --> 00:21:52,400

course are mike fossum and ron garan and

617

00:21:56,070 --> 00:21:54,159

it was a kind of a marriage made in

618

00:21:57,750 --> 00:21:56,080

heaven ron and mike have have done an

619

00:21:58,789 --> 00:21:57,760

eva together before

620

00:22:02,310 --> 00:21:58,799

they're very

621

00:22:03,350 --> 00:22:02,320

they're experienced so it just seemed to

622

00:22:06,470 --> 00:22:03,360

work out

623

00:22:08,950 --> 00:22:06,480

perfectly to to bring the station crew

624

00:22:11,350 --> 00:22:08,960

member into the shuttle

625

00:22:13,270 --> 00:22:11,360

docked operations and let them do the

626

00:22:14,870 --> 00:22:13,280

eva so that's how we that's how we

627

00:22:16,549 --> 00:22:14,880

focused on that when shuttle crew

628

00:22:18,390 --> 00:22:16,559

members have done spacewalks station

629

00:22:20,230 --> 00:22:18,400

crew members have been part of the team

630

00:22:22,710 --> 00:22:20,240

as well so it's it's just a

631

00:22:24,230 --> 00:22:22,720

rearrangement of the assignment uh yes

632

00:22:26,870 --> 00:22:24,240

well um

633

00:22:28,630 --> 00:22:26,880

in a lot of these eba situations some of

634

00:22:30,310 --> 00:22:28,640

the station crew members will will

635

00:22:31,909 --> 00:22:30,320

progress during the eva with their with

636

00:22:33,350 --> 00:22:31,919

their normal timeline and not be too

637

00:22:35,190 --> 00:22:33,360

involved

638

00:22:36,789 --> 00:22:35,200

occasionally we will bring them in and

639

00:22:38,630 --> 00:22:36,799

they will be involved however usually in

640

00:22:40,950 --> 00:22:38,640

the suit up and the the iv portion of

641

00:22:43,510 --> 00:22:40,960

things but now i mean we are just one

642

00:22:45,350 --> 00:22:43,520

we're one integral team um all eight of

643

00:22:46,549 --> 00:22:45,360

us uh if you will while we're uh while

644

00:22:48,149 --> 00:22:46,559

we're on board

645

00:22:50,149 --> 00:22:48,159

okay so what's going to happen during

646

00:22:52,310 --> 00:22:50,159

this spacewalk when fossum and garen go

647

00:22:54,870 --> 00:22:52,320

outside uh what are they gonna do and

648

00:22:57,430 --> 00:22:54,880

what part are you going to play okay

649

00:22:59,430 --> 00:22:57,440

well first since my part comes in early

650

00:23:01,590 --> 00:22:59,440

uh we'll get them all suited up in the

651
00:23:03,990 --> 00:23:01,600
airlock and we'll get their tools on

652
00:23:06,230 --> 00:23:04,000
board we'll let them uh let them get out

653
00:23:07,510 --> 00:23:06,240
and then i'm essentially free for the

654
00:23:09,830 --> 00:23:07,520
balance of the six hours of the

655
00:23:11,430 --> 00:23:09,840
spacewalk i'll probably go into the mplm

656
00:23:12,870 --> 00:23:11,440
and start transferring a lot of the

657
00:23:16,070 --> 00:23:12,880
elements out

658
00:23:19,190 --> 00:23:16,080
what mike and ron are tasked to do with

659
00:23:20,310 --> 00:23:19,200
rex walheim acting as the iv who will be

660
00:23:22,950 --> 00:23:20,320
on the shuttle

661
00:23:25,909 --> 00:23:22,960
he'll be a choreograph uh choreographing

662
00:23:28,149 --> 00:23:25,919
the uh the uh the eva for them uh their

663
00:23:30,149 --> 00:23:28,159

first task is to get

664

00:23:32,230 --> 00:23:30,159

a pump module that failed on the space

665

00:23:34,950 --> 00:23:32,240

station several months ago and bring

666

00:23:36,470 --> 00:23:34,960

that back uh put it in the payload bay

667

00:23:39,430 --> 00:23:36,480

so we can bring it back to earth and do

668

00:23:41,590 --> 00:23:39,440

a postmortem and find out how it failed

669

00:23:43,750 --> 00:23:41,600

we'll also take this robotics refueling

670

00:23:45,510 --> 00:23:43,760

module that i mentioned this uh

671

00:23:48,149 --> 00:23:45,520

this activity center for the special

672

00:23:51,029 --> 00:23:48,159

purpose textures manipulator and we'll

673

00:23:53,350 --> 00:23:51,039

put that on the space station after we

674

00:23:54,149 --> 00:23:53,360

put the the pump module in the payload

675

00:23:56,950 --> 00:23:54,159

bay

676

00:23:58,549 --> 00:23:56,960

and then they'll relocate that

677

00:23:59,750 --> 00:23:58,559

robotic utility module at some later

678

00:24:02,630 --> 00:23:59,760

date so we're just going to put it in

679

00:24:04,789 --> 00:24:02,640

temporary location

680

00:24:06,630 --> 00:24:04,799

after that a lot of the tasks have have

681

00:24:08,549 --> 00:24:06,640

been up in the air uh right now we're

682

00:24:11,590 --> 00:24:08,559

scheduled to change a camera one of the

683

00:24:12,630 --> 00:24:11,600

station cameras has a uh has a a zoom

684

00:24:14,630 --> 00:24:12,640

issue

685

00:24:17,029 --> 00:24:14,640

so we're going to change that

686

00:24:19,110 --> 00:24:17,039

there's also an issue with another small

687

00:24:21,669 --> 00:24:19,120

payload we'll need to open it up and

688

00:24:23,190 --> 00:24:21,679

expose it to space

689

00:24:24,710 --> 00:24:23,200

a lot of priorities have been coming and

690

00:24:27,510 --> 00:24:24,720

going i have a feeling that the final

691

00:24:29,110 --> 00:24:27,520

eba won't completely come together until

692

00:24:32,070 --> 00:24:29,120

just weeks before the launch and that's

693

00:24:34,310 --> 00:24:32,080

not out of the question or out of

694

00:24:35,830 --> 00:24:34,320

that happens a lot it does so this is

695

00:24:38,710 --> 00:24:35,840

not unusual and the crew has been

696

00:24:43,909 --> 00:24:40,789

interestingly

697

00:24:46,789 --> 00:24:43,919

rex walheim and sandy magnus are our

698

00:24:48,630 --> 00:24:46,799

eva crew members in the event we need

699

00:24:50,070 --> 00:24:48,640

an eva for any reason of course it's not

700

00:24:52,549 --> 00:24:50,080

planned right now but you always have to

701
00:24:55,909 --> 00:24:52,559
have that capability just in case

702
00:24:58,470 --> 00:24:55,919
since rex and mike are essentially gone

703
00:25:01,350 --> 00:24:58,480
either in russia or on orbit now in the

704
00:25:03,430 --> 00:25:01,360
case of iran we are continuing to

705
00:25:04,870 --> 00:25:03,440
develop this eva for them that sandy and

706
00:25:06,630 --> 00:25:04,880
rex will continue to develop the

707
00:25:09,990 --> 00:25:06,640
procedures and the plans and run in the

708
00:25:11,510 --> 00:25:10,000
neutral buoyancy lab to mature this eva

709
00:25:13,830 --> 00:25:11,520
completely in the absence of the people

710
00:25:16,149 --> 00:25:13,840
who will actually do it so we have the

711
00:25:18,470 --> 00:25:16,159
capability to continually adjust our

712
00:25:19,830 --> 00:25:18,480
agenda during that spacewalk right up

713
00:25:21,909 --> 00:25:19,840

until the time we launch it's nice

714

00:25:23,669 --> 00:25:21,919

flexibility dan it's actually a very

715

00:25:26,390 --> 00:25:23,679

nice plan yes

716

00:25:27,590 --> 00:25:26,400

as you said and after the spacewalk

717

00:25:30,310 --> 00:25:27,600

pretty much everybody's going to be

718

00:25:32,470 --> 00:25:30,320

devoting their time to the transfer work

719

00:25:34,310 --> 00:25:32,480

which almost sounds like packing up a

720

00:25:36,470 --> 00:25:34,320

whole house and moving it while you're

721

00:25:38,230 --> 00:25:36,480

moving another whole house in at the

722

00:25:40,549 --> 00:25:38,240

same time

723

00:25:42,710 --> 00:25:40,559

what is involved here in terms of not

724

00:25:45,110 --> 00:25:42,720

just moving items but

725

00:25:47,830 --> 00:25:45,120

knowing where they're supposed to go and

726

00:25:49,029 --> 00:25:47,840

what is where at any given time

727

00:25:50,950 --> 00:25:49,039

yeah as i said

728

00:25:52,789 --> 00:25:50,960

you know at last count it was about 15

729

00:25:54,870 --> 00:25:52,799

000 pounds of stuff needs to come out

730

00:25:57,350 --> 00:25:54,880

something like 12 or 13 000 pounds needs

731

00:25:59,830 --> 00:25:57,360

to go in and it all it doesn't come in

732

00:26:02,710 --> 00:25:59,840

large one thousand pound chunks uh it

733

00:26:03,669 --> 00:26:02,720

comes in a series of small twenty pound

734

00:26:04,870 --> 00:26:03,679

bags

735

00:26:07,350 --> 00:26:04,880

so

736

00:26:10,070 --> 00:26:07,360

in terms of transfer items this npm will

737

00:26:12,310 --> 00:26:10,080

have about fifty percent more items just

738

00:26:13,669 --> 00:26:12,320

by item number and how do you keep track

739

00:26:15,190 --> 00:26:13,679

of all that that was the question that

740

00:26:17,750 --> 00:26:15,200

you asked i'll tell you there's a

741

00:26:20,470 --> 00:26:17,760

outstanding team of folks on the ground

742

00:26:22,549 --> 00:26:20,480

who who know exactly what's in the mplm

743

00:26:25,110 --> 00:26:22,559

they've labeled everything appropriately

744

00:26:27,510 --> 00:26:25,120

we have daily list updates

745

00:26:29,750 --> 00:26:27,520

and we take the bag with the location

746

00:26:31,430 --> 00:26:29,760

code on it we go put it in that location

747

00:26:32,710 --> 00:26:31,440

in the space station

748

00:26:34,310 --> 00:26:32,720

typically while we're there we'll pick

749

00:26:35,990 --> 00:26:34,320

up something else that's labeled for

750

00:26:38,789 --> 00:26:36,000

return we'll bring it back and and we'll

751

00:26:40,149 --> 00:26:38,799

stage it so we'll try to slowly transfer

752

00:26:42,230 --> 00:26:40,159

things out of the mplm while

753

00:26:45,590 --> 00:26:42,240

simultaneously bringing

754

00:26:48,390 --> 00:26:45,600

things back in it's it's an incredibly

755

00:26:50,149 --> 00:26:48,400

uh efficient process but you would never

756

00:26:52,870 --> 00:26:50,159

know it to look at it on the first

757

00:26:54,710 --> 00:26:52,880

couple days it's only until the last day

758

00:26:56,710 --> 00:26:54,720

or so that it really begins to come

759

00:26:59,029 --> 00:26:56,720

together and you realize that slowly but

760

00:27:01,269 --> 00:26:59,039

surely bag by bag you're you're doing

761

00:27:03,430 --> 00:27:01,279

this giant uh

762

00:27:06,789 --> 00:27:03,440

dance as you get things in and out of

763

00:27:08,710 --> 00:27:06,799

the mplm and it's complicated as if it

764

00:27:11,110 --> 00:27:08,720

needs to be complicated by the fact that

765

00:27:13,430 --> 00:27:11,120

in the mplm things are packed in front

766

00:27:15,830 --> 00:27:13,440

of other things and and you've got to

767

00:27:17,590 --> 00:27:15,840

move stuff out in order to create room

768

00:27:19,669 --> 00:27:17,600

for the things that are coming up back

769

00:27:21,590 --> 00:27:19,679

yeah exactly they do try to pack the

770

00:27:23,350 --> 00:27:21,600

mplms such that the things that you need

771

00:27:24,710 --> 00:27:23,360

first are on the front

772

00:27:25,990 --> 00:27:24,720

um

773

00:27:27,430 --> 00:27:26,000

and

774

00:27:29,830 --> 00:27:27,440

you want to pack the things that are on

775

00:27:32,149 --> 00:27:29,840

the front as soon as you remove the the

776
00:27:33,909 --> 00:27:32,159
transferred item before you can rotate

777
00:27:36,789 --> 00:27:33,919
these racks down to get access to the

778
00:27:38,549 --> 00:27:36,799
things uh that are on the back and what

779
00:27:40,789 --> 00:27:38,559
has actually made this mpl more unique

780
00:27:42,389 --> 00:27:40,799
than others is that typically like i

781
00:27:45,350 --> 00:27:42,399
said you could move things in thousand

782
00:27:47,029 --> 00:27:45,360
pound chunks by taking an entire rack

783
00:27:50,230 --> 00:27:47,039
and moving out and installing it in a

784
00:27:52,549 --> 00:27:50,240
location uh on the space station and for

785
00:27:54,310 --> 00:27:52,559
the first time in my memory we're

786
00:27:57,350 --> 00:27:54,320
actually not transferring a whole rack

787
00:27:59,190 --> 00:27:57,360
it this is all bag by bag by bag by bag

788
00:28:02,470 --> 00:27:59,200

all the racks that are in the mplm will

789

00:28:04,149 --> 00:28:02,480

stay in there so no big packages they're

790

00:28:05,669 --> 00:28:04,159

all small packages it's going to take a

791

00:28:07,350 --> 00:28:05,679

lot of coordination and this is going to

792

00:28:08,950 --> 00:28:07,360

go on for several days

793

00:28:10,950 --> 00:28:08,960

we have about three and a half days

794

00:28:14,630 --> 00:28:10,960

devoted to it if you had to tally it up

795

00:28:16,710 --> 00:28:14,640

in man hours it's about 140 man hours

796

00:28:18,870 --> 00:28:16,720

we have some support from our russian uh

797

00:28:21,590 --> 00:28:18,880

crew members because we're just uh

798

00:28:23,350 --> 00:28:21,600

flat short-handed up there so uh it's a

799

00:28:26,149 --> 00:28:23,360

it's a multinational event to get that

800

00:28:28,230 --> 00:28:26,159

mplm uh emptied and refilled again

801
00:28:29,269 --> 00:28:28,240
when that's all done the joint timeline

802
00:28:30,789 --> 00:28:29,279
is over

803
00:28:32,549 --> 00:28:30,799
you and your three crewmates are going

804
00:28:34,389 --> 00:28:32,559
to mark a milestone with the last

805
00:28:36,310 --> 00:28:34,399
undocking of a space shuttle from the

806
00:28:38,549 --> 00:28:36,320
international space station

807
00:28:41,110 --> 00:28:38,559
is there anything special on the plan

808
00:28:42,470 --> 00:28:41,120
for the undocking operation itself as

809
00:28:44,070 --> 00:28:42,480
atlantis

810
00:28:45,190 --> 00:28:44,080
finishes the shuttle's mission at the

811
00:28:47,990 --> 00:28:45,200
station

812
00:28:50,230 --> 00:28:48,000
well i i we we do have uh we have one

813
00:28:52,310 --> 00:28:50,240

thing on the docket that is unique

814

00:28:54,070 --> 00:28:52,320

and uh for the undocking we'll back out

815

00:28:55,190 --> 00:28:54,080

to about 600 feet

816

00:28:56,870 --> 00:28:55,200

and uh

817

00:28:57,909 --> 00:28:56,880

these plans are well and work and i

818

00:29:00,230 --> 00:28:57,919

think that they'll actually come to

819

00:29:02,230 --> 00:29:00,240

fruition at that point uh the space

820

00:29:04,710 --> 00:29:02,240

station control team will yaw the space

821

00:29:07,029 --> 00:29:04,720

station 90 degrees so for the first time

822

00:29:09,190 --> 00:29:07,039

in a very long time and maybe forever

823

00:29:11,909 --> 00:29:09,200

we'll have a real nice view of the side

824

00:29:13,430 --> 00:29:11,919

of the space station we've all been very

825

00:29:16,389 --> 00:29:13,440

accustomed to these views where the

826

00:29:19,190 --> 00:29:16,399

space shuttle will do a 360 degree fly

827

00:29:23,190 --> 00:29:19,200

around but it always flies around along

828

00:29:25,190 --> 00:29:23,200

the axis of the station so we have great

829

00:29:26,789 --> 00:29:25,200

views but they're the same repetitive

830

00:29:28,310 --> 00:29:26,799

views from the same access we always see

831

00:29:30,230 --> 00:29:28,320

the front we always see the back and you

832

00:29:32,230 --> 00:29:30,240

see the top and the bottom now what

833

00:29:34,070 --> 00:29:32,240

we'll do is we'll rotate the station 90

834

00:29:37,029 --> 00:29:34,080

degrees to the side and we'll fly around

835

00:29:38,070 --> 00:29:37,039

that way so we get to see the side views

836

00:29:39,110 --> 00:29:38,080

and

837

00:29:40,710 --> 00:29:39,120

it'll be

838

00:29:42,950 --> 00:29:40,720

i'm sure they'll make some spectacular

839

00:29:45,430 --> 00:29:42,960

photos but it also has a very sound

840

00:29:47,830 --> 00:29:45,440

engineering value in that prolonged

841

00:29:50,230 --> 00:29:47,840

exposure to the space environment does

842

00:29:52,230 --> 00:29:50,240

eventually wear on these items

843

00:29:54,870 --> 00:29:52,240

there's little micro meteoroid orbital

844

00:29:56,710 --> 00:29:54,880

debris hits around station that we can

845

00:29:58,950 --> 00:29:56,720

document very well

846

00:30:00,470 --> 00:29:58,960

but we haven't seen the cytostation in

847

00:30:02,149 --> 00:30:00,480

quite a while so

848

00:30:04,789 --> 00:30:02,159

we're certainly hoping that this will

849

00:30:07,029 --> 00:30:04,799

this will come too and and i think it

850

00:30:09,590 --> 00:30:07,039

will be a real nice cap because we just

851
00:30:12,230 --> 00:30:09,600
really won't have many options like this

852
00:30:13,750 --> 00:30:12,240
uh in the future and being that it's the

853
00:30:15,990 --> 00:30:13,760
last shuttle to leave we should take

854
00:30:18,310 --> 00:30:16,000
full advantage of it along with that

855
00:30:19,830 --> 00:30:18,320
documentation is there anything else

856
00:30:23,029 --> 00:30:19,840
you're going to be keeping your eyes

857
00:30:25,350 --> 00:30:23,039
peeled for as you make that the last fly

858
00:30:27,590 --> 00:30:25,360
around in the final separation well i'm

859
00:30:31,029 --> 00:30:27,600
sure there'll be a lot of

860
00:30:35,190 --> 00:30:33,029
reflections on

861
00:30:36,710 --> 00:30:35,200
on the history of the shuttle and the

862
00:30:38,710 --> 00:30:36,720
space station of course the station

863
00:30:41,269 --> 00:30:38,720

couldn't exist in the current form that

864

00:30:42,870 --> 00:30:41,279

it is today without the shuttle that did

865

00:30:44,230 --> 00:30:42,880

the lion's share of the the heavy

866

00:30:46,549 --> 00:30:44,240

hauling up there

867

00:30:48,310 --> 00:30:46,559

um you know as far as we're keeping our

868

00:30:49,669 --> 00:30:48,320

eye out for we want to make sure sandy's

869

00:30:50,950 --> 00:30:49,679

on the right side of the hatch of course

870

00:30:52,230 --> 00:30:50,960

she enjoyed her time on the space

871

00:30:53,590 --> 00:30:52,240

station but we're really going to need

872

00:30:54,950 --> 00:30:53,600

her we're going to be very busy after we

873

00:30:57,669 --> 00:30:54,960

undock and we want to make sure

874

00:30:59,909 --> 00:30:57,679

everybody's on board so uh it'll be an

875

00:31:01,750 --> 00:30:59,919

emotional moment i think for for a lot

876

00:31:04,310 --> 00:31:01,760

of folks who have seen

877

00:31:06,950 --> 00:31:04,320

the shuttle essentially build the better

878

00:31:08,630 --> 00:31:06,960

part of space station and to know that

879

00:31:09,990 --> 00:31:08,640

this will be the the final time it

880

00:31:11,509 --> 00:31:10,000

leaves

881

00:31:16,870 --> 00:31:11,519

and i'm sure we'll have some good words

882

00:31:20,549 --> 00:31:18,470

when you were assigned to this flight it

883

00:31:21,990 --> 00:31:20,559

was a rescue flight for the last shuttle

884

00:31:24,630 --> 00:31:22,000

mission and it was supposed to have

885

00:31:26,950 --> 00:31:24,640

already flown by now but schedules have

886

00:31:28,950 --> 00:31:26,960

changed of course um what was your

887

00:31:30,870 --> 00:31:28,960

reaction as you realize that

888

00:31:32,470 --> 00:31:30,880

hey i'm on the last space shuttle

889

00:31:34,950 --> 00:31:32,480

admission

890

00:31:37,750 --> 00:31:34,960

well there wasn't an alleluia moment if

891

00:31:39,830 --> 00:31:37,760

you will i mean this came in a

892

00:31:41,669 --> 00:31:39,840

a whisper

893

00:31:44,070 --> 00:31:41,679

that perhaps we would try to fly this

894

00:31:46,549 --> 00:31:44,080

last flight but it wasn't funded

895

00:31:48,789 --> 00:31:46,559

uh it was a long shot you know you're

896

00:31:50,789 --> 00:31:48,799

going to train for a rescue mission and

897

00:31:53,110 --> 00:31:50,799

then maybe we'll upgrade you somewhere

898

00:31:56,310 --> 00:31:53,120

near the end and it eventually built in

899

00:31:58,870 --> 00:31:56,320

a crescendo uh that that occurred over a

900

00:32:00,870 --> 00:31:58,880

period of of maybe nine months well

901
00:32:03,669 --> 00:32:00,880
even after we were assigned in training

902
00:32:05,909 --> 00:32:03,679
as a as a crew

903
00:32:07,750 --> 00:32:05,919
at which point i would say we were 50 50

904
00:32:09,509 --> 00:32:07,760
at best now

905
00:32:10,230 --> 00:32:09,519
as we approach launch i'd say the odds

906
00:32:12,149 --> 00:32:10,240
are

907
00:32:14,310 --> 00:32:12,159
slightly better but i still won't

908
00:32:17,590 --> 00:32:14,320
believe it until the srbs fire and and

909
00:32:20,310 --> 00:32:17,600
we're on our way but

910
00:32:22,070 --> 00:32:20,320
you know the realization of um

911
00:32:23,830 --> 00:32:22,080
and the significance of being on the

912
00:32:24,710 --> 00:32:23,840
last space shuttle flight

913
00:32:25,830 --> 00:32:24,720

um

914

00:32:29,190 --> 00:32:25,840

is

915

00:32:31,750 --> 00:32:29,200

it's it's an honor um but it's not one

916

00:32:33,430 --> 00:32:31,760

that that i think anyone else felt like

917

00:32:35,110 --> 00:32:33,440

we're particularly qualified for

918

00:32:36,470 --> 00:32:35,120

certainly i mean there's a lot of great

919

00:32:37,909 --> 00:32:36,480

folks on our office

920

00:32:39,669 --> 00:32:37,919

any one of which

921

00:32:40,789 --> 00:32:39,679

could assume this role

922

00:32:42,389 --> 00:32:40,799

and uh

923

00:32:44,870 --> 00:32:42,399

some of which could probably do a much

924

00:32:48,230 --> 00:32:44,880

better job but but you know being what

925

00:32:50,630 --> 00:32:48,240

it is uh this is where we are um we'll

926

00:32:53,269 --> 00:32:50,640

we'll rise to the occasion and we we do

927

00:32:55,669 --> 00:32:53,279

consider ourselves extraordinarily uh

928

00:32:57,669 --> 00:32:55,679

fortunate well people would want to know

929

00:33:00,710 --> 00:32:57,679

is is there a special sense of of honor

930

00:33:03,350 --> 00:33:00,720

or responsibility of being one of the

931

00:33:04,950 --> 00:33:03,360

being the last crew yeah

932

00:33:06,630 --> 00:33:04,960

um i'll tell you

933

00:33:09,990 --> 00:33:06,640

pulling off a mission with a crew of

934

00:33:10,950 --> 00:33:10,000

fours is uh is going to be challenging

935

00:33:13,750 --> 00:33:10,960

um

936

00:33:14,630 --> 00:33:13,760

that said we're heads down and marching

937

00:33:15,990 --> 00:33:14,640

forward

938

00:33:18,470 --> 00:33:16,000

um

939

00:33:20,470 --> 00:33:18,480

someday the realization that this may

940

00:33:23,350 --> 00:33:20,480

and likely will be the last flight will

941

00:33:27,029 --> 00:33:25,669

i would like to defer that emotion until

942

00:33:29,029 --> 00:33:27,039

after the wheels are stopped on the

943

00:33:30,310 --> 00:33:29,039

runway

944

00:33:32,389 --> 00:33:30,320

because at that point i think the

945

00:33:33,669 --> 00:33:32,399

finality of everything will truly will

946

00:33:34,549 --> 00:33:33,679

truly hit us

947

00:33:36,630 --> 00:33:34,559

um

948

00:33:38,630 --> 00:33:36,640

are there inklings of

949

00:33:40,549 --> 00:33:38,640

that right now you know do we see that

950

00:33:43,909 --> 00:33:40,559

right now that hey you know this this

951
00:33:46,549 --> 00:33:43,919
could likely be it and you might luckily

952
00:33:48,789 --> 00:33:46,559
be on the final shuttle flight yes it's

953
00:33:51,509 --> 00:33:48,799
starting to creep in but we try to push

954
00:33:54,149 --> 00:33:51,519
that to the side and we want to execute

955
00:33:56,950 --> 00:33:54,159
this mission as safely as

956
00:33:59,029 --> 00:33:56,960
any shuttle mission that has preceded it

957
00:34:01,269 --> 00:33:59,039
now the end of the program does mean a

958
00:34:03,430 --> 00:34:01,279
lot of changes at nasa including some

959
00:34:05,990 --> 00:34:03,440
layoffs and including shutting down some

960
00:34:08,149 --> 00:34:06,000
historical facilities and and you

961
00:34:09,270 --> 00:34:08,159
are seeing that every day in your

962
00:34:10,950 --> 00:34:09,280
training

963
00:34:12,869 --> 00:34:10,960

what's your feeling about the decision

964

00:34:14,710 --> 00:34:12,879

that was made to stop flying these

965

00:34:16,790 --> 00:34:14,720

vehicles

966

00:34:19,349 --> 00:34:16,800

well

967

00:34:21,750 --> 00:34:19,359

let me touch on your point about

968

00:34:23,270 --> 00:34:21,760

the layoffs

969

00:34:25,829 --> 00:34:23,280

you know i've underestimated a few

970

00:34:29,030 --> 00:34:25,839

things about this flight one of them was

971

00:34:30,629 --> 00:34:29,040

the the impact of uh watching a lot of

972

00:34:32,629 --> 00:34:30,639

friends and

973

00:34:34,389 --> 00:34:32,639

watching a lot of people who you know

974

00:34:36,950 --> 00:34:34,399

have worked long and hard on the shuttle

975

00:34:41,510 --> 00:34:38,710

move on

976
00:34:42,389 --> 00:34:41,520
and it has actually added a little bit

977
00:34:44,230 --> 00:34:42,399
to

978
00:34:46,310 --> 00:34:44,240
the workload if you will because there's

979
00:34:48,149 --> 00:34:46,320
a certain compulsion you want to thank

980
00:34:49,430 --> 00:34:48,159
everyone you know you want to tell them

981
00:34:51,030 --> 00:34:49,440
that their time and their service has

982
00:34:52,310 --> 00:34:51,040
been so appreciated

983
00:34:54,389 --> 00:34:52,320
um

984
00:34:55,270 --> 00:34:54,399
and and they know that but you still

985
00:34:57,430 --> 00:34:55,280
feel

986
00:34:59,190 --> 00:34:57,440
like there's a certain

987
00:35:01,349 --> 00:34:59,200
there's a certain part of you

988
00:35:03,349 --> 00:35:01,359

that wants to to thank them for what

989

00:35:06,870 --> 00:35:03,359

they've done and we do try to take the

990

00:35:11,430 --> 00:35:09,510

just recently we were at

991

00:35:13,430 --> 00:35:11,440

an evolution at the kennedy space center

992

00:35:15,270 --> 00:35:13,440

called ceit it's crew element

993

00:35:18,069 --> 00:35:15,280

integration test

994

00:35:20,870 --> 00:35:18,079

while we were there a rather large

995

00:35:21,990 --> 00:35:20,880

layoff occurred and we were in a room

996

00:35:23,190 --> 00:35:22,000

where

997

00:35:27,030 --> 00:35:23,200

that

998

00:35:28,630 --> 00:35:27,040

was going to be the last day for several

999

00:35:31,670 --> 00:35:28,640

people who invite who introduced

1000

00:35:33,670 --> 00:35:31,680

themselves to us as you know i'm

1001
00:35:35,750 --> 00:35:33,680
i'm so-and-so and and i've been working

1002
00:35:37,670 --> 00:35:35,760
here at the kennedy space center for 43

1003
00:35:40,870 --> 00:35:37,680
years and that just takes you back it's

1004
00:35:43,670 --> 00:35:40,880
like wow after 43 years

1005
00:35:46,150 --> 00:35:43,680
so it has it's been an emotional time

1006
00:35:48,550 --> 00:35:46,160
for the people of course who are getting

1007
00:35:50,230 --> 00:35:48,560
ready to leave and it's been kind of a

1008
00:35:52,390 --> 00:35:50,240
you know it's been emotional for the

1009
00:35:54,390 --> 00:35:52,400
crew to to to see them go because you

1010
00:35:56,230 --> 00:35:54,400
know they have families

1011
00:35:58,390 --> 00:35:56,240
a lot of them have

1012
00:35:59,829 --> 00:35:58,400
they're well provided for and

1013
00:36:02,230 --> 00:35:59,839

they're very they have very marketable

1014

00:36:05,430 --> 00:36:02,240

skills so they're they're finding jobs

1015

00:36:07,270 --> 00:36:05,440

but it does it does affect you

1016

00:36:09,270 --> 00:36:07,280

um i hope i've answered your question in

1017

00:36:10,470 --> 00:36:09,280

there somewhere well recognizing all of

1018

00:36:12,390 --> 00:36:10,480

that

1019

00:36:13,750 --> 00:36:12,400

which is is undeniable

1020

00:36:15,829 --> 00:36:13,760

how do you feel about the decision that

1021

00:36:17,829 --> 00:36:15,839

was made okay it's time to stop flying

1022

00:36:18,630 --> 00:36:17,839

these vehicles yeah

1023

00:36:20,950 --> 00:36:18,640

well

1024

00:36:23,990 --> 00:36:20,960

uh it was a tough one uh but the

1025

00:36:27,910 --> 00:36:24,000

decision was made in 2003 so we've known

1026

00:36:31,030 --> 00:36:29,670

there's two camps out there one camp

1027

00:36:33,510 --> 00:36:31,040

says you can continue flying the

1028

00:36:36,230 --> 00:36:33,520

shuttles for another 10 years

1029

00:36:38,069 --> 00:36:36,240

no problem they're healthy they're you

1030

00:36:40,470 --> 00:36:38,079

know relatively young they were designed

1031

00:36:43,670 --> 00:36:40,480

for a hundred flights some of them have

1032

00:36:45,910 --> 00:36:43,680

have only flown 33 35 flights

1033

00:36:47,670 --> 00:36:45,920

um but they were designed to fly 100

1034

00:36:50,069 --> 00:36:47,680

flights over a 20-year period now we're

1035

00:36:51,750 --> 00:36:50,079

now 30 years into the program so there

1036

00:36:52,870 --> 00:36:51,760

are other issues that you deal with

1037

00:36:54,150 --> 00:36:52,880

aside from

1038

00:36:56,470 --> 00:36:54,160

the fact that you haven't flown as many

1039

00:36:58,150 --> 00:36:56,480

flights on them that you would think

1040

00:37:00,069 --> 00:36:58,160

obsolescence is a big one you know we

1041

00:37:01,750 --> 00:37:00,079

have a lot of elements in the space

1042

00:37:03,190 --> 00:37:01,760

shuttle which are difficult to maintain

1043

00:37:05,270 --> 00:37:03,200

because they were built with technology

1044

00:37:07,670 --> 00:37:05,280

that was 35 years old

1045

00:37:09,430 --> 00:37:07,680

there's a life and fatigue

1046

00:37:10,950 --> 00:37:09,440

items there's some areas of the space

1047

00:37:15,030 --> 00:37:10,960

shuttle that we really haven't delved

1048

00:37:17,190 --> 00:37:15,040

into to inspect in a very long time

1049

00:37:20,150 --> 00:37:17,200

while you you hate to see

1050

00:37:23,670 --> 00:37:20,160

old airplanes retire old airplanes

1051

00:37:25,589 --> 00:37:23,680

and old rockets do become old and you

1052

00:37:27,349 --> 00:37:25,599

begin to wonder whether the risk of them

1053

00:37:29,109 --> 00:37:27,359

getting old is worth

1054

00:37:31,109 --> 00:37:29,119

the reward of continuing for an

1055

00:37:33,270 --> 00:37:31,119

additional 10 or 15 years or what have

1056

00:37:34,230 --> 00:37:33,280

you so i certainly understand the

1057

00:37:36,230 --> 00:37:34,240

decision

1058

00:37:38,310 --> 00:37:36,240

i understand there are many different

1059

00:37:39,990 --> 00:37:38,320

opinions out there on whether we can

1060

00:37:42,470 --> 00:37:40,000

continue to fly them longer but the

1061

00:37:43,349 --> 00:37:42,480

decision was made eight years ago

1062

00:37:47,270 --> 00:37:43,359

and

1063

00:37:48,950 --> 00:37:47,280

we've had time to prepare

1064

00:37:50,790 --> 00:37:48,960

and to ask you about some of the

1065

00:37:52,790 --> 00:37:50,800

elements in the patch that's on your

1066

00:37:55,270 --> 00:37:52,800

shirt now that was designed knowing this

1067

00:37:57,430 --> 00:37:55,280

would be the last mission

1068

00:37:59,190 --> 00:37:57,440

some of those elements are are

1069

00:38:00,710 --> 00:37:59,200

emblematic of that right

1070

00:38:03,670 --> 00:38:00,720

well we tried to

1071

00:38:05,349 --> 00:38:03,680

without being overt about it insinuate

1072

00:38:06,950 --> 00:38:05,359

that this was in fact the last flight

1073

00:38:09,349 --> 00:38:06,960

and hence the omega

1074

00:38:12,630 --> 00:38:09,359

interestingly the patch was designed by

1075

00:38:15,750 --> 00:38:12,640

rex walheim's wife margie who just did a

1076

00:38:18,390 --> 00:38:15,760

fantastic job on it so we didn't want to

1077

00:38:20,950 --> 00:38:18,400

to be too far out there but we did want

1078

00:38:23,510 --> 00:38:20,960

the subtlety to come through and you

1079

00:38:25,270 --> 00:38:23,520

know when somebody looks at the sts-135

1080

00:38:27,510 --> 00:38:25,280

patch they said oh yeah it's the omega

1081

00:38:29,270 --> 00:38:27,520

that's the last flight

1082

00:38:31,030 --> 00:38:29,280

what do you think are some of the most

1083

00:38:32,790 --> 00:38:31,040

significant moments in space shuttle

1084

00:38:36,470 --> 00:38:32,800

history

1085

00:38:38,390 --> 00:38:36,480

i'll tell you definitely sts-1

1086

00:38:40,390 --> 00:38:38,400

i was a i was a college student at the

1087

00:38:42,230 --> 00:38:40,400

time and

1088

00:38:45,349 --> 00:38:42,240

this is a vehicle that the first time it

1089

00:38:47,270 --> 00:38:45,359

ever lifted off the pad it was occupied

1090

00:38:49,190 --> 00:38:47,280

by two folks

1091

00:38:51,109 --> 00:38:49,200

two brave folks john young

1092

00:38:53,109 --> 00:38:51,119

bob crippen

1093

00:38:54,710 --> 00:38:53,119

and you just looked at it on the pad and

1094

00:38:56,870 --> 00:38:54,720

you said this looks like no other rocket

1095

00:38:58,550 --> 00:38:56,880

that i've ever seen before it's a you

1096

00:38:59,910 --> 00:38:58,560

know got huge boosters a tank in the

1097

00:39:02,150 --> 00:38:59,920

middle and it's got the equivalent of an

1098

00:39:04,310 --> 00:39:02,160

airliner hanging off the side and even

1099

00:39:06,069 --> 00:39:04,320

though today by today's standards it's

1100

00:39:08,470 --> 00:39:06,079

it's very common site we're used to

1101
00:39:10,069 --> 00:39:08,480
seeing it you know by the early 80s

1102
00:39:12,710 --> 00:39:10,079
standards it was completely

1103
00:39:14,790 --> 00:39:12,720
revolutionary and to know that it wasn't

1104
00:39:16,630 --> 00:39:14,800
really wasn't going to fly a test flight

1105
00:39:18,390 --> 00:39:16,640
it had flown some gliding landings but

1106
00:39:20,230 --> 00:39:18,400
it hadn't flown a real test flight and

1107
00:39:22,390 --> 00:39:20,240
the first time it was going to fly

1108
00:39:25,750 --> 00:39:22,400
it was going to have two two people on

1109
00:39:27,430 --> 00:39:25,760
board that was a was a major milestone

1110
00:39:28,390 --> 00:39:27,440
you know of course the shuttles also

1111
00:39:30,390 --> 00:39:28,400
delivered

1112
00:39:32,150 --> 00:39:30,400
many of the

1113
00:39:35,030 --> 00:39:32,160

the great observatories

1114

00:39:38,630 --> 00:39:35,040

um you know magellan compton gamma ray

1115

00:39:40,630 --> 00:39:38,640

uh the chandra x-ray uh telescope of

1116

00:39:43,349 --> 00:39:40,640

course hubble uh

1117

00:39:45,589 --> 00:39:43,359

some monumental and uh

1118

00:39:47,510 --> 00:39:45,599

scientific breakthroughs as far as

1119

00:39:49,750 --> 00:39:47,520

observatories have been launched so uh

1120

00:39:52,150 --> 00:39:49,760

there's a lot of major milestones

1121

00:39:54,310 --> 00:39:52,160

how does atlantis uh stick out in that

1122

00:39:57,109 --> 00:39:54,320

what what's atlantis place in all that

1123

00:39:59,589 --> 00:39:57,119

history well i i looked a little bit

1124

00:40:01,030 --> 00:39:59,599

into atlantis history and it's very

1125

00:40:04,150 --> 00:40:01,040

interesting of course his first flight

1126
00:40:06,550 --> 00:40:04,160
was uh 1985 it it launched some of these

1127
00:40:10,150 --> 00:40:06,560
observatories the compton gamma ray

1128
00:40:11,430 --> 00:40:10,160
observatory it launched magellan um it

1129
00:40:13,270 --> 00:40:11,440
was actually

1130
00:40:15,750 --> 00:40:13,280
the most frequent visitor to mir i

1131
00:40:18,309 --> 00:40:15,760
didn't know that we had we had a phase

1132
00:40:20,790 --> 00:40:18,319
one program in the 90s where we visited

1133
00:40:23,910 --> 00:40:20,800
the russian mir space station and

1134
00:40:25,270 --> 00:40:23,920
atlantis made seven of the 11 trips back

1135
00:40:27,190 --> 00:40:25,280
and forth so

1136
00:40:28,950 --> 00:40:27,200
atlantis really became the cornerstone

1137
00:40:31,030 --> 00:40:28,960
of

1138
00:40:32,790 --> 00:40:31,040

docking operations with an orbiting

1139

00:40:34,390 --> 00:40:32,800

space vehicle and of course it factored

1140

00:40:36,950 --> 00:40:34,400

heavily into the construction of the

1141

00:40:39,510 --> 00:40:36,960

international space station

1142

00:40:41,990 --> 00:40:39,520

last hubble servicing mission uh there's

1143

00:40:44,309 --> 00:40:42,000

a lot of claims to fame for atlantis and

1144

00:40:47,430 --> 00:40:44,319

we'll try to send it off in good fashion

1145

00:40:48,790 --> 00:40:47,440

on the point about the the space station

1146

00:40:50,069 --> 00:40:48,800

what kind of space station do you think

1147

00:40:52,069 --> 00:40:50,079

we'd have today

1148

00:40:53,750 --> 00:40:52,079

if we hadn't had the space shuttle to

1149

00:40:55,109 --> 00:40:53,760

use to build it it'd be a lot smaller

1150

00:40:57,430 --> 00:40:55,119

that's for sure

1151

00:40:58,870 --> 00:40:57,440

um and i saw an interesting statistic

1152

00:41:00,870 --> 00:40:58,880

the other day that really hit home with

1153

00:41:02,470 --> 00:41:00,880

me and

1154

00:41:04,069 --> 00:41:02,480

i'll give it to you just because it does

1155

00:41:06,710 --> 00:41:04,079

factor into this whole space station

1156

00:41:07,829 --> 00:41:06,720

discussion you know of all the launchers

1157

00:41:11,829 --> 00:41:07,839

in the world

1158

00:41:12,950 --> 00:41:11,839

apollo gemini mercury proton

1159

00:41:15,349 --> 00:41:12,960

zenit

1160

00:41:16,950 --> 00:41:15,359

long march from every country

1161

00:41:17,990 --> 00:41:16,960

and every space launch that has ever

1162

00:41:20,390 --> 00:41:18,000

occurred

1163

00:41:22,150 --> 00:41:20,400

if you had to add together all the mass

1164

00:41:24,230 --> 00:41:22,160

that's been taken into low earth orbit

1165

00:41:25,510 --> 00:41:24,240

the space shuttles have delivered more

1166

00:41:27,430 --> 00:41:25,520

than half of it

1167

00:41:29,030 --> 00:41:27,440

i mean that is impressive if you think

1168

00:41:30,390 --> 00:41:29,040

about it

1169

00:41:33,030 --> 00:41:30,400

and it gets even more impressive when

1170

00:41:34,870 --> 00:41:33,040

you talk about what has been returned

1171

00:41:37,030 --> 00:41:34,880

from orbit of course there's very few

1172

00:41:38,309 --> 00:41:37,040

vehicles that can bring stuff back

1173

00:41:39,990 --> 00:41:38,319

from space

1174

00:41:42,069 --> 00:41:40,000

in most cases

1175

00:41:43,349 --> 00:41:42,079

in the case of trash or spent satellites

1176

00:41:45,030 --> 00:41:43,359

they usually just burn up as they

1177

00:41:46,710 --> 00:41:45,040

re-enter the atmosphere

1178

00:41:49,510 --> 00:41:46,720

but the space shuttle has the capability

1179

00:41:51,109 --> 00:41:49,520

to bring a lock back and of all the mass

1180

00:41:53,190 --> 00:41:51,119

that's been brought back from low earth

1181

00:41:54,630 --> 00:41:53,200

orbit the space shuttle has brought 97

1182

00:41:55,430 --> 00:41:54,640

percent of it back

1183

00:41:56,870 --> 00:41:55,440

so

1184

00:41:59,109 --> 00:41:56,880

to get to your point about what would

1185

00:42:00,950 --> 00:41:59,119

the space station look like well

1186

00:42:02,470 --> 00:42:00,960

did the lion share the hauling i mean

1187

00:42:04,150 --> 00:42:02,480

the space station was built with the

1188

00:42:07,030 --> 00:42:04,160

space shuttle

1189

00:42:08,470 --> 00:42:07,040

in mind and the modules all fit in the

1190

00:42:10,950 --> 00:42:08,480

bay

1191

00:42:12,790 --> 00:42:10,960

i think space station is close to 900

1192

00:42:14,309 --> 00:42:12,800

000 pounds right now

1193

00:42:16,069 --> 00:42:14,319

most of it delivered by the space

1194

00:42:18,069 --> 00:42:16,079

shuttle i don't think the station would

1195

00:42:19,990 --> 00:42:18,079

look anything remotely close to what it

1196

00:42:22,630 --> 00:42:20,000

does today if it weren't for the show

1197

00:42:23,910 --> 00:42:22,640

well then after sts-135 it's then going

1198

00:42:26,390 --> 00:42:23,920

to be up to spaceships from other

1199

00:42:29,589 --> 00:42:26,400

nations and perhaps private industry to

1200

00:42:31,750 --> 00:42:29,599

get cargo and crews up there

1201
00:42:33,589 --> 00:42:31,760
as an american astronaut how do you feel

1202
00:42:34,870 --> 00:42:33,599
about the future for the international

1203
00:42:37,430 --> 00:42:34,880
space station

1204
00:42:39,270 --> 00:42:37,440
well station has a bright future

1205
00:42:41,030 --> 00:42:39,280
you know the construction is done so

1206
00:42:42,710 --> 00:42:41,040
everything that the shuttle needed to do

1207
00:42:44,630 --> 00:42:42,720
is done

1208
00:42:46,309 --> 00:42:44,640
so uh

1209
00:42:47,829 --> 00:42:46,319
it's really logistic support at this

1210
00:42:49,670 --> 00:42:47,839
point and i think our commercial

1211
00:42:50,950 --> 00:42:49,680
partners can can pull that off of course

1212
00:42:55,349 --> 00:42:50,960
it's they haven't demonstrated that

1213
00:42:57,670 --> 00:42:55,359

capability yet but uh spacex orbital um

1214

00:42:59,589 --> 00:42:57,680

are making strides in that direction uh

1215

00:43:02,309 --> 00:42:59,599

spacex has had a successful orbital

1216

00:43:04,870 --> 00:43:02,319

flight uh and it's at actually had a

1217

00:43:06,309 --> 00:43:04,880

re-entry uh that was very successful as

1218

00:43:08,710 --> 00:43:06,319

well where it landed in the pacific

1219

00:43:09,750 --> 00:43:08,720

ocean so we we are making steps in that

1220

00:43:12,790 --> 00:43:09,760

direction of course we have our

1221

00:43:15,030 --> 00:43:12,800

international partners too atv

1222

00:43:18,069 --> 00:43:15,040

the autonomous transfer vehicle

1223

00:43:20,390 --> 00:43:18,079

which is a european product and htv

1224

00:43:23,190 --> 00:43:20,400

is a japanese product which have

1225

00:43:25,430 --> 00:43:23,200

performed flawlessly as well so as far

1226

00:43:26,950 --> 00:43:25,440

as the long-term health at the space

1227

00:43:30,069 --> 00:43:26,960

station i think it's positioned very

1228

00:43:33,430 --> 00:43:30,079

well logistically sts-135 will get it in

1229

00:43:35,349 --> 00:43:33,440

that great shape uh just to count

1230

00:43:37,750 --> 00:43:35,359

you know we always uh hope for the best

1231

00:43:39,589 --> 00:43:37,760

plan for the worst so we'll put a a

1232

00:43:40,710 --> 00:43:39,599

bunch of things on station to get in a

1233

00:43:42,870 --> 00:43:40,720

good spot

1234

00:43:44,150 --> 00:43:42,880

just in case we have some hiccups along

1235

00:43:45,430 --> 00:43:44,160

the way for some of our commercial

1236

00:43:47,510 --> 00:43:45,440

providers

1237

00:43:50,309 --> 00:43:47,520

what's your favorite memory from the

1238

00:43:51,990 --> 00:43:50,319

space shuttle era yeah i had to think

1239

00:43:55,349 --> 00:43:52,000

really hard about this one there's a lot

1240

00:43:57,430 --> 00:43:55,359

of them and a lot of them just involve

1241

00:43:58,870 --> 00:43:57,440

the thrill of getting to fly on a couple

1242

00:44:01,430 --> 00:43:58,880

space shuttle flights

1243

00:44:03,430 --> 00:44:01,440

but if i think about it in terms of

1244

00:44:05,349 --> 00:44:03,440

engineering challenge

1245

00:44:07,349 --> 00:44:05,359

things that were really out there

1246

00:44:09,109 --> 00:44:07,359

real-time planning how did the shuttle

1247

00:44:12,470 --> 00:44:09,119

demonstrate its flexibility as a

1248

00:44:14,790 --> 00:44:12,480

reusable spacecraft i'd have to focus on

1249

00:44:18,150 --> 00:44:14,800

sts-49 where

1250

00:44:19,829 --> 00:44:18,160

we had a problem uh grabbing an intelsat

1251
00:44:21,990 --> 00:44:19,839
satellite the grapple fixture of course

1252
00:44:23,910 --> 00:44:22,000
the inlet set satellite was stuck in a

1253
00:44:26,630 --> 00:44:23,920
bad orbit and we had to go do something

1254
00:44:28,710 --> 00:44:26,640
about it so we sent three space walkers

1255
00:44:30,630 --> 00:44:28,720
out unprecedented never never done that

1256
00:44:32,870 --> 00:44:30,640
before and they just stood in the

1257
00:44:35,030 --> 00:44:32,880
payload bay and they just grabbed this

1258
00:44:36,870 --> 00:44:35,040
huge satellite and they plugged it in

1259
00:44:39,109 --> 00:44:36,880
and they did all the work they needed to

1260
00:44:41,829 --> 00:44:39,119
do to it and send it on its way and i

1261
00:44:43,910 --> 00:44:41,839
think that just epitomized uh the

1262
00:44:44,950 --> 00:44:43,920
flexibility of what the space shuttle is

1263
00:44:47,030 --> 00:44:44,960

all about

1264

00:44:48,790 --> 00:44:47,040

how is the work of the shuttle program

1265

00:44:50,550 --> 00:44:48,800

going to be remembered

1266

00:44:52,550 --> 00:44:50,560

something like that do you think

1267

00:44:53,510 --> 00:44:52,560

well i think uh

1268

00:44:56,309 --> 00:44:53,520

you know shuttle program is

1269

00:44:57,910 --> 00:44:56,319

extraordinarily flexible you know we

1270

00:45:00,150 --> 00:44:57,920

i think when we started we didn't really

1271

00:45:02,950 --> 00:45:00,160

have the space station and we it was it

1272

00:45:03,829 --> 00:45:02,960

was in mind but it wasn't on paper

1273

00:45:05,030 --> 00:45:03,839

and

1274

00:45:06,950 --> 00:45:05,040

of course

1275

00:45:08,550 --> 00:45:06,960

the way that the mirror program was

1276

00:45:10,790 --> 00:45:08,560

brought in in the middle again

1277

00:45:13,030 --> 00:45:10,800

demonstrates how flexible it was we had

1278

00:45:15,670 --> 00:45:13,040

this platform that could go up and down

1279

00:45:17,510 --> 00:45:15,680

on a routine basis and

1280

00:45:19,430 --> 00:45:17,520

we didn't quite know exactly what we

1281

00:45:21,829 --> 00:45:19,440

were going to do with it for its 20 or

1282

00:45:23,829 --> 00:45:21,839

30 or 40 year history but we have

1283

00:45:26,150 --> 00:45:23,839

managed to adapt it to be so many

1284

00:45:28,309 --> 00:45:26,160

different things over that period of

1285

00:45:30,150 --> 00:45:28,319

years i think that if you look back on

1286

00:45:32,550 --> 00:45:30,160

it you would say that that is its true

1287

00:45:34,390 --> 00:45:32,560

hallmark is its flexibility

1288

00:45:36,630 --> 00:45:34,400

remember where you were when sts-1 took

1289

00:45:37,589 --> 00:45:36,640

off you betcha i remember exactly where

1290

00:45:40,870 --> 00:45:37,599

i was

1291

00:45:42,230 --> 00:45:40,880

at director university

1292

00:45:44,550 --> 00:45:42,240

and

1293

00:45:47,670 --> 00:45:44,560

i was a mechanical engineer i wanted to

1294

00:45:49,190 --> 00:45:47,680

be a pilot i wasn't pilot at the time

1295

00:45:50,950 --> 00:45:49,200

but uh

1296

00:45:53,109 --> 00:45:50,960

and i was just fascinated by this kind

1297

00:45:54,470 --> 00:45:53,119

of stuff ever since the apollo days i

1298

00:45:56,390 --> 00:45:54,480

remember being you know a kid and

1299

00:45:57,829 --> 00:45:56,400

drawing these apollo rockets

1300

00:45:59,670 --> 00:45:57,839

and you know here was something

1301
00:46:01,190 --> 00:45:59,680
completely different you know that said

1302
00:46:02,470 --> 00:46:01,200
it was a couple boosters with a tank in

1303
00:46:03,990 --> 00:46:02,480
the middle and this equivalent of an

1304
00:46:05,589 --> 00:46:04,000
airliner hanging on the side it was the

1305
00:46:06,550 --> 00:46:05,599
most ungainly thing you could ever

1306
00:46:08,150 --> 00:46:06,560
imagine

1307
00:46:10,550 --> 00:46:08,160
and boy i wanted to see this thing

1308
00:46:12,150 --> 00:46:10,560
launch so i i go from class to class i

1309
00:46:14,230 --> 00:46:12,160
think there was one cancellation where

1310
00:46:16,150 --> 00:46:14,240
they scrubbed it for 24 hours and you

1311
00:46:17,190 --> 00:46:16,160
know i'd kind of try to update myself

1312
00:46:18,550 --> 00:46:17,200
and and

1313
00:46:21,030 --> 00:46:18,560

you know i remember watching it on this

1314

00:46:22,309 --> 00:46:21,040

color television in one of the lounges

1315

00:46:23,190 --> 00:46:22,319

at school there

1316

00:46:24,790 --> 00:46:23,200

and

1317

00:46:26,630 --> 00:46:24,800

i remember my first reaction remember

1318

00:46:28,950 --> 00:46:26,640

how the apollo would kind of lumber off

1319

00:46:31,109 --> 00:46:28,960

the pad it was this slow build-up of

1320

00:46:33,349 --> 00:46:31,119

momentum and the space shuttle just it

1321

00:46:35,190 --> 00:46:33,359

just jumped off the launch pad by

1322

00:46:36,470 --> 00:46:35,200

contrast and then of course it went

1323

00:46:38,470 --> 00:46:36,480

through this pre-programmed roll

1324

00:46:39,990 --> 00:46:38,480

maneuver and nobody really knew what to

1325

00:46:41,109 --> 00:46:40,000

expect i mean we had never seen it

1326
00:46:43,430 --> 00:46:41,119
before we didn't know what it was

1327
00:46:44,790 --> 00:46:43,440
supposed to do and after seeing it pop

1328
00:46:47,589 --> 00:46:44,800
off the pad like that and go through

1329
00:46:49,190 --> 00:46:47,599
this roll motion i mean i was like

1330
00:46:51,270 --> 00:46:49,200
i don't think it's supposed to do that

1331
00:46:52,870 --> 00:46:51,280
of course it was and and the rest is

1332
00:46:54,390 --> 00:46:52,880
history but i remember exactly where i

1333
00:46:56,069 --> 00:46:54,400
was for the first launch

1334
00:46:57,990 --> 00:46:56,079
destinations for the space shuttle have

1335
00:47:01,190 --> 00:46:58,000
changed a lot in the 30 years since

1336
00:47:03,109 --> 00:47:01,200
sts-1 kicked off that era

1337
00:47:05,750 --> 00:47:03,119
where do you think we're going in the

1338
00:47:08,150 --> 00:47:05,760

next era of space exploration yeah

1339

00:47:09,670 --> 00:47:08,160

that's that's a tough one i don't know i

1340

00:47:10,870 --> 00:47:09,680

if you had asked me two years ago i say

1341

00:47:12,150 --> 00:47:10,880

we're going back to the moon and we're

1342

00:47:13,750 --> 00:47:12,160

going to stay there for a long period of

1343

00:47:16,309 --> 00:47:13,760

time of course

1344

00:47:18,550 --> 00:47:16,319

that was project consolation that since

1345

00:47:19,910 --> 00:47:18,560

has been canceled

1346

00:47:22,630 --> 00:47:19,920

i believe there's an asteroid in our

1347

00:47:24,230 --> 00:47:22,640

future don't really know

1348

00:47:25,670 --> 00:47:24,240

i think that the moon is a great

1349

00:47:28,470 --> 00:47:25,680

destination i think that we should

1350

00:47:30,710 --> 00:47:28,480

consider that um ultimately

1351

00:47:32,309 --> 00:47:30,720

i'd love to see us shoot for mars of

1352

00:47:33,589 --> 00:47:32,319

course mars is always 20 years in the

1353

00:47:35,510 --> 00:47:33,599

future and that's where it's been for

1354

00:47:36,470 --> 00:47:35,520

the last 40 years it's been 20 years in

1355

00:47:38,549 --> 00:47:36,480

the future

1356

00:47:39,910 --> 00:47:38,559

i think we belong on mars

1357

00:47:41,270 --> 00:47:39,920

and i assume you're referring to human

1358

00:47:42,950 --> 00:47:41,280

exploration

1359

00:47:45,270 --> 00:47:42,960

and i'd like to consider that as a