1
00:00:07,110 --> 00:00:04,789
this is the sts-133 interview with

2
00:00:09,350 --> 00:00:07,120
mission commander steve lindsay uh steve

3
00:00:11,110 --> 00:00:09,360
uh tell us about uh the place that you

4
00:00:12,390 --> 00:00:11,120
consider to be your hometown and and

5
00:00:14,070 --> 00:00:12,400
what it was like

6
00:00:16,390 --> 00:00:14,080
growing up there how did place influence

7
00:00:18,790 --> 00:00:16,400
who you've become um well i was born and

8
00:00:20,950 --> 00:00:18,800
raised in uh temple city california uh

9
00:00:22,870 --> 00:00:20,960
which is a small uh suburb of los

10
00:00:24,630 --> 00:00:22,880
angeles and uh

11
00:00:26,310 --> 00:00:24,640
i think the way it influenced me was a

12
00:00:28,390 --> 00:00:26,320
even though it's a suburb of a very big

13
00:00:29,830 --> 00:00:28,400

city it was a kind of a small town kind

14
00:00:31,990 --> 00:00:29,840
of life we had

15
00:00:34,069 --> 00:00:32,000
you know a couple elementary schools one

16
00:00:35,750 --> 00:00:34,079
high school one junior high and so

17
00:00:37,270 --> 00:00:35,760
everybody knew everybody a fairly small

18
00:00:39,350 --> 00:00:37,280
school

19
00:00:41,510 --> 00:00:39,360
i think it influenced me in that

20
00:00:42,790 --> 00:00:41,520
it was a it was a small community with a

21
00:00:44,389 --> 00:00:42,800
lot of parents that were interested in

22
00:00:46,229 --> 00:00:44,399
what their kids were doing

23
00:00:48,150 --> 00:00:46,239
and teachers that were as well and the

24
00:00:49,910 --> 00:00:48,160
schools were good i learned a lot from

25
00:00:50,869 --> 00:00:49,920
the schools learned a lot socially as

26
00:00:52,790 --> 00:00:50,879
well as

27
00:00:54,549 --> 00:00:52,800
intellectually and and was encouraged

28
00:00:56,150 --> 00:00:54,559
from the very beginning from from all

29
00:00:57,670 --> 00:00:56,160
the people that i knew to you know go

30
00:01:01,189 --> 00:00:57,680
off and do whatever it is i wanted to do

31
00:01:03,750 --> 00:01:01,199
just work hard for it so i think uh uh

32
00:01:06,630 --> 00:01:03,760
kind of small town values and ethics and

33
00:01:08,390 --> 00:01:06,640
uh and drive were taught for me at a

34
00:01:11,510 --> 00:01:08,400
very early age and i think that kind of

35
00:01:12,550 --> 00:01:11,520
set the course for me from then on

36
00:01:14,950 --> 00:01:12,560
did you

37
00:01:16,870 --> 00:01:14,960
have you had occasion to to see that

38
00:01:18,950 --> 00:01:16,880

area from space on on on any of your

39
00:01:20,070 --> 00:01:18,960
past space flights and if so

40
00:01:21,590 --> 00:01:20,080
tell us about

41
00:01:23,590 --> 00:01:21,600
maybe the first time that you can recall

42
00:01:25,190 --> 00:01:23,600
that that happened well i've uh pretty

43
00:01:27,190 --> 00:01:25,200
much every flight i've been on i've seen

44
00:01:28,870 --> 00:01:27,200
los angeles from space it's pretty hard

45
00:01:30,630 --> 00:01:28,880
to pick out exactly my community i've

46
00:01:31,670 --> 00:01:30,640
gotten the binoculars on it a few times

47
00:01:34,069 --> 00:01:31,680
to try to

48
00:01:36,149 --> 00:01:34,079
try to pick out um you know landmarks

49
00:01:38,550 --> 00:01:36,159
that are near my house so it's really

50
00:01:40,230 --> 00:01:38,560
neat to see it from space i it's

51
00:01:41,590 --> 00:01:40,240
actually any place on earth the first

52
00:01:43,990 --> 00:01:41,600
time you see it from space is something

53
00:01:45,510 --> 00:01:44,000
i'll never forget i remember on my first

54
00:01:48,069 --> 00:01:45,520
flight we uh

55
00:01:50,389 --> 00:01:48,079
during ascent we uh

56
00:01:52,230 --> 00:01:50,399
we climb up basically uh heads down so

57
00:01:54,789 --> 00:01:52,240
we're going in upside down as we climb

58
00:01:57,030 --> 00:01:54,799
out of the atmosphere

59
00:01:58,630 --> 00:01:57,040
and it but but we're nose highest you

60
00:02:01,590 --> 00:01:58,640
can't all you can see is the space so

61
00:02:03,749 --> 00:02:01,600
you see in blue blue blue and then black

62
00:02:05,590 --> 00:02:03,759
but uh about six minutes or so under the

63
00:02:06,950 --> 00:02:05,600

flight we actually or a little bit

64
00:02:09,109 --> 00:02:06,960
before that we actually do a rolled

65
00:02:11,350 --> 00:02:09,119
heads up so we transition our

66
00:02:13,190 --> 00:02:11,360
communications from a ground site to a

67
00:02:14,949 --> 00:02:13,200
satellite and so we roll the heads up so

68
00:02:16,949 --> 00:02:14,959
we can get antennas on it during that

69
00:02:19,190 --> 00:02:16,959
world heads up is really the first time

70
00:02:20,550 --> 00:02:19,200
you get to see the earth from space is

71
00:02:22,390 --> 00:02:20,560
you know just right and beginning to

72
00:02:24,070 --> 00:02:22,400
acid and i will never forget

73
00:02:25,750 --> 00:02:24,080
that first roll and rolled i was sitting

74
00:02:27,270 --> 00:02:25,760
in the pilot seater rolled my way so i

75
00:02:28,710 --> 00:02:27,280
could see the earth coming up and seeing

76
00:02:30,630 --> 00:02:28,720
the earth from space for the first time

77
00:02:31,990 --> 00:02:30,640
that was very memorable so you know

78
00:02:33,990 --> 00:02:32,000
things like your hometown are very

79
00:02:35,830 --> 00:02:34,000
memorable but just seeing the earth and

80
00:02:37,750 --> 00:02:35,840
the beauty of the earth and and that

81
00:02:39,670 --> 00:02:37,760
it's actually round like they say in the

82
00:02:40,869 --> 00:02:39,680
geography books

83
00:02:44,550 --> 00:02:40,879
it really is true and that's that's

84
00:02:47,030 --> 00:02:44,560
something i won't ever ever forget okay

85
00:02:49,350 --> 00:02:47,040
every accomplishment began

86
00:02:50,710 --> 00:02:49,360
begins with some form of motivation

87
00:02:52,229 --> 00:02:50,720
you've been an astronaut for more than

88
00:02:53,990 --> 00:02:52,239

10 years

89
00:02:55,509 --> 00:02:54,000
talk to us a little bit about

90
00:02:57,830 --> 00:02:55,519
what things

91
00:02:59,270 --> 00:02:57,840
specifically motivated you to pursue

92
00:03:00,309 --> 00:02:59,280
this line of work

93
00:03:02,710 --> 00:03:00,319
well

94
00:03:04,550 --> 00:03:02,720
probably a couple of things

95
00:03:07,190 --> 00:03:04,560
growing up i think one of my big role

96
00:03:09,670 --> 00:03:07,200
models was my father and my mother but

97
00:03:11,750 --> 00:03:09,680
my father professionally was a was an

98
00:03:13,350 --> 00:03:11,760
engineer my father

99
00:03:15,830 --> 00:03:13,360
started out as

100
00:03:17,430 --> 00:03:15,840
essentially in depression they were

101
00:03:19,509 --> 00:03:17,440
more or less sharecroppers ever in their

102
00:03:22,309 --> 00:03:19,519
own land and they farmed and

103
00:03:24,149 --> 00:03:22,319
and he uh went off to uh

104
00:03:26,630 --> 00:03:24,159
you know went to one room schoolhouse

105
00:03:28,070 --> 00:03:26,640
did graduate from high school but he was

106
00:03:30,309 --> 00:03:28,080
you know working as a truck driver and a

107
00:03:32,550 --> 00:03:30,319
farmer and then he got drafted went to

108
00:03:34,470 --> 00:03:32,560
the korean war came back on the gi bill

109
00:03:36,710 --> 00:03:34,480
and got his engineering degree to make a

110
00:03:38,390 --> 00:03:36,720
really long story short and so he's an

111
00:03:39,910 --> 00:03:38,400
electrical engineer and i think watching

112
00:03:44,630 --> 00:03:39,920
him

113
00:03:46,470 --> 00:03:44,640

that gave me an early interest i think

114
00:03:48,710 --> 00:03:46,480
in math and science and in particular

115
00:03:50,390 --> 00:03:48,720
wanting to pursue engineering so i i

116
00:03:51,589 --> 00:03:50,400
pretty much decided early into high

117
00:03:53,270 --> 00:03:51,599
school that i kind of wanted to be an

118
00:03:54,869 --> 00:03:53,280
engineer but the other thing i really

119
00:03:56,470 --> 00:03:54,879
want to do is i wanted to be a pilot i

120
00:03:57,750 --> 00:03:56,480
wanted to fly airplanes i suppose like a

121
00:03:59,030 --> 00:03:57,760
lot of kids

122
00:04:00,550 --> 00:03:59,040
i thought that was pretty cool but i

123
00:04:03,030 --> 00:04:00,560
thought it was pretty cool wanted to fly

124
00:04:05,670 --> 00:04:03,040
airplanes and and i got to thinking

125
00:04:07,270 --> 00:04:05,680
about um you know how can i

126
00:04:10,309 --> 00:04:07,280
what can i do that will allow me to

127
00:04:11,910 --> 00:04:10,319
pursue both of those things and so i

128
00:04:13,429 --> 00:04:11,920
obviously need to go to college and get

129
00:04:14,869 --> 00:04:13,439
an engineering degree

130
00:04:16,550 --> 00:04:14,879
but i also need to figure out well how

131
00:04:19,509 --> 00:04:16,560
am i going to fly airplanes i can't

132
00:04:21,909 --> 00:04:19,519
afford to pay for flying airplanes but

133
00:04:24,150 --> 00:04:21,919
so then i was on a actually a high

134
00:04:26,629 --> 00:04:24,160
school trip a uh when i was i think a

135
00:04:28,629 --> 00:04:26,639
sophomore in high school and

136
00:04:30,629 --> 00:04:28,639
and we were with a group of kids was the

137
00:04:32,629 --> 00:04:30,639
with when i was in the band and and we

138
00:04:34,390 --> 00:04:32,639

traveled to colorado springs and we went

139
00:04:35,909 --> 00:04:34,400
and visited a place uh called the air

140
00:04:39,350 --> 00:04:35,919
force academy that i had actually never

141
00:04:40,870 --> 00:04:39,360
heard of and uh went and saw that and

142
00:04:42,710 --> 00:04:40,880
learned it was an engineering school you

143
00:04:45,030 --> 00:04:42,720
a very difficult engineering school but

144
00:04:46,310 --> 00:04:45,040
also learned that you know you graduate

145
00:04:49,110 --> 00:04:46,320
as an air force officer and if you're

146
00:04:50,469 --> 00:04:49,120
qualified and if you do well in a school

147
00:04:52,390 --> 00:04:50,479
you have an opportunity to go to pilot

148
00:04:53,830 --> 00:04:52,400
training and learn to fly airplanes so i

149
00:04:55,990 --> 00:04:53,840
thought well this is perfect for me

150
00:04:57,909 --> 00:04:56,000
because i it does the two things that i

151
00:05:00,550 --> 00:04:57,919
really want to do and so

152
00:05:01,830 --> 00:05:00,560
i went to the air force academy um i was

153
00:05:03,590 --> 00:05:01,840
fortunate enough to get selected for

154
00:05:05,350 --> 00:05:03,600
that and uh graduated from there and

155
00:05:07,350 --> 00:05:05,360
then i went to pilot training and

156
00:05:09,110 --> 00:05:07,360
so then i started flying airplanes and i

157
00:05:11,350 --> 00:05:09,120
was operational fighter pilot for

158
00:05:13,350 --> 00:05:11,360
several years and an instructor pilot i

159
00:05:16,070 --> 00:05:13,360
really enjoyed that i really enjoyed the

160
00:05:17,670 --> 00:05:16,080
flying i've been flying for

161
00:05:18,469 --> 00:05:17,680
almost 30 years now and i still love it

162
00:05:19,909 --> 00:05:18,479
but

163
00:05:22,310 --> 00:05:19,919

after i'd been doing that for about four

164
00:05:23,909 --> 00:05:22,320
years you know i was thinking well

165
00:05:26,070 --> 00:05:23,919
i'm doing a lot of flying but i haven't

166
00:05:28,070 --> 00:05:26,080
had a chance yet to really apply my

167
00:05:30,390 --> 00:05:28,080
engineering background and my love of

168
00:05:31,670 --> 00:05:30,400
math and science um and how can i do

169
00:05:34,550 --> 00:05:31,680
that and

170
00:05:35,909 --> 00:05:34,560
talk to some folks i i kind of

171
00:05:37,909 --> 00:05:35,919
learned about the job of being an

172
00:05:40,390 --> 00:05:37,919
experimental test pilot an experimental

173
00:05:41,430 --> 00:05:40,400
test pilot what what they do is they

174
00:05:43,670 --> 00:05:41,440
they

175
00:05:44,950 --> 00:05:43,680
their job is to translate between the

176
00:05:46,629 --> 00:05:44,960
engineers that are developing and

177
00:05:47,990 --> 00:05:46,639
building the aircraft and the systems

178
00:05:49,909 --> 00:05:48,000
and the operators that are using the

179
00:05:51,590 --> 00:05:49,919
systems well i've been an operator

180
00:05:53,350 --> 00:05:51,600
so if i'd be a test pilot then i can

181
00:05:55,830 --> 00:05:53,360
help bridge that gap and i can actually

182
00:05:56,950 --> 00:05:55,840
apply my engineering education to flying

183
00:05:59,189 --> 00:05:56,960
and so i

184
00:06:01,189 --> 00:05:59,199
um i applied for i was fortunate to

185
00:06:02,629 --> 00:06:01,199
accept accepted by the air force to go

186
00:06:04,790 --> 00:06:02,639
to graduate school and then to test

187
00:06:06,550 --> 00:06:04,800
ballot school i completed that course

188
00:06:07,350 --> 00:06:06,560

and became an experimental test pilot

189
00:06:08,710 --> 00:06:07,360
where

190
00:06:11,110 --> 00:06:08,720
i was uh

191
00:06:12,950 --> 00:06:11,120
again applying engineering and flying

192
00:06:15,510 --> 00:06:12,960
together and doing a job that was just

193
00:06:16,309 --> 00:06:15,520
it was just a fantastic job

194
00:06:18,070 --> 00:06:16,319
so

195
00:06:20,469 --> 00:06:18,080
i got i got through that process been a

196
00:06:21,909 --> 00:06:20,479
test pilot for several years and

197
00:06:25,510 --> 00:06:21,919
and

198
00:06:26,390 --> 00:06:25,520
this way but kind of realized that well

199
00:06:28,309 --> 00:06:26,400
you know

200
00:06:30,150 --> 00:06:28,319
if if i were to apply to the astronaut

201
00:06:31,430 --> 00:06:30,160
program an astronaut's job is very

202
00:06:33,510 --> 00:06:31,440
similar to this

203
00:06:36,390 --> 00:06:33,520
you know you combine flying and

204
00:06:38,469 --> 00:06:36,400
technology and science and engineering

205
00:06:39,830 --> 00:06:38,479
all of those things together you just do

206
00:06:42,390 --> 00:06:39,840
it a little bit faster and a little bit

207
00:06:44,309 --> 00:06:42,400
higher than flying airplanes and so i

208
00:06:45,990 --> 00:06:44,319
decided well what the heck i'm qualified

209
00:06:47,749 --> 00:06:46,000
it might as well apply

210
00:06:50,070 --> 00:06:47,759
or say could say is no which i figured

211
00:06:51,830 --> 00:06:50,080
they would and uh so i applied was

212
00:06:53,589 --> 00:06:51,840
fortunate enough to get uh selected for

213
00:06:55,270 --> 00:06:53,599

this and here i am

214
00:06:57,589 --> 00:06:55,280
um so pretty much my whole career i've

215
00:06:58,950 --> 00:06:57,599
been able to combine my education and

216
00:07:00,390 --> 00:06:58,960
flying the two things that i love

217
00:07:02,390 --> 00:07:00,400
together and so that's

218
00:07:04,950 --> 00:07:02,400
kind of a really long answer to how i

219
00:07:06,950 --> 00:07:04,960
ended up where i am today

220
00:07:08,710 --> 00:07:06,960
specifically about the experimental test

221
00:07:10,710 --> 00:07:08,720
pilot

222
00:07:12,390 --> 00:07:10,720
portion of your career was some part of

223
00:07:14,230 --> 00:07:12,400
wanting to do that

224
00:07:16,070 --> 00:07:14,240
the opportunity

225
00:07:17,589 --> 00:07:16,080
to discover i mean because basically

226
00:07:21,029 --> 00:07:17,599
you're doing something you're testing

227
00:07:22,710 --> 00:07:21,039
things and and you you may be the first

228
00:07:23,909 --> 00:07:22,720
to put your hand on

229
00:07:26,710 --> 00:07:23,919
yeah

230
00:07:29,749 --> 00:07:26,720
absolutely and it's really exciting to

231
00:07:31,670 --> 00:07:29,759
to do the first of something and you

232
00:07:34,070 --> 00:07:31,680
know the first time you test this system

233
00:07:35,589 --> 00:07:34,080
the first time you test this weapon or

234
00:07:38,469 --> 00:07:35,599
the first time you take the airplane to

235
00:07:40,230 --> 00:07:38,479
this speed or this number of g's or this

236
00:07:42,309 --> 00:07:40,240
altitude and things like that

237
00:07:44,950 --> 00:07:42,319
that's exciting but also what's exciting

238
00:07:46,230 --> 00:07:44,960

about it to me is you do all of this

239
00:07:48,629 --> 00:07:46,240
work beforehand you don't do this

240
00:07:50,150 --> 00:07:48,639
haphazardly we don't just go out and you

241
00:07:52,629 --> 00:07:50,160
know take an airplane okay let's go to

242
00:07:55,029 --> 00:07:52,639
800 knots and see what happens what we

243
00:07:56,550 --> 00:07:55,039
do is we do a very calculated build up

244
00:07:58,629 --> 00:07:56,560
approach to that we start out in the

245
00:08:00,390 --> 00:07:58,639
wind tunnel we look and see how is this

246
00:08:01,589 --> 00:08:00,400
airplane going to fly under these

247
00:08:03,670 --> 00:08:01,599
conditions what are the things we need

248
00:08:05,029 --> 00:08:03,680
to be concerned about we worry about the

249
00:08:07,110 --> 00:08:05,039
flying qualities in other words how that

250
00:08:09,029 --> 00:08:07,120
airplane handles can can you fly it is

251
00:08:11,189 --> 00:08:09,039
it controllable at what speed will

252
00:08:13,430 --> 00:08:11,199
things start to come apart you do this

253
00:08:14,070 --> 00:08:13,440
all these calculations and experimental

254
00:08:18,390 --> 00:08:14,080
and

255
00:08:20,070 --> 00:08:18,400
before you actually take the airplane

256
00:08:21,830 --> 00:08:20,080
out and take it to that endpoint you

257
00:08:24,469 --> 00:08:21,840
know if you're going for a

258
00:08:26,710 --> 00:08:24,479
let's say a mach 2 test point you don't

259
00:08:29,270 --> 00:08:26,720
start it going at mach 2 you build up

260
00:08:32,230 --> 00:08:29,280
you start you may go to mock point a and

261
00:08:34,630 --> 00:08:32,240
mach 1 and build up so for me

262
00:08:36,070 --> 00:08:34,640
the the interesting part was not just

263
00:08:38,709 --> 00:08:36,080

being the first one to do that but it's

264
00:08:40,949 --> 00:08:38,719
putting it all together it's

265
00:08:43,509 --> 00:08:40,959
developing a flight a flight test

266
00:08:46,389 --> 00:08:43,519
profile uh tying the engineering and the

267
00:08:47,990 --> 00:08:46,399
science into the flying and bringing it

268
00:08:50,550 --> 00:08:48,000
all together so you can do it safely and

269
00:08:52,710 --> 00:08:50,560
effectively and so because the ultimate

270
00:08:55,670 --> 00:08:52,720
goal in my mind as a test pilot was them

271
00:08:57,110 --> 00:08:55,680
to not get surprised at the end

272
00:08:58,550 --> 00:08:57,120
now unfortunately

273
00:09:00,870 --> 00:08:58,560
the nature of the game is i often got

274
00:09:02,230 --> 00:09:00,880
surprised at the end but but you try to

275
00:09:04,150 --> 00:09:02,240
avoid doing that and so it's that

276
00:09:06,070 --> 00:09:04,160
process and in the process of doing that

277
00:09:08,389 --> 00:09:06,080
also working with a team of folks with

278
00:09:10,550 --> 00:09:08,399
very diverse backgrounds to

279
00:09:12,070 --> 00:09:10,560
to watch this team come to come together

280
00:09:13,350 --> 00:09:12,080
and figure out how to do these complex

281
00:09:15,750 --> 00:09:13,360
activities and do them safely and

282
00:09:17,670 --> 00:09:15,760
successfully so it's really the process

283
00:09:21,430 --> 00:09:17,680
also that was really i really loved

284
00:09:26,310 --> 00:09:23,750
tell us how you would characterize uh

285
00:09:28,230 --> 00:09:26,320
the value of education uh in your life

286
00:09:29,670 --> 00:09:28,240
and what it's what it's meant to your

287
00:09:31,750 --> 00:09:29,680
life

288
00:09:34,389 --> 00:09:31,760

education is critical no matter what you

289
00:09:37,350 --> 00:09:34,399
do your education is critical because

290
00:09:39,350 --> 00:09:37,360
what education does is it is it enables

291
00:09:41,269 --> 00:09:39,360
you to do things in the future you need

292
00:09:43,269 --> 00:09:41,279
to have that foundation of education and

293
00:09:45,110 --> 00:09:43,279
it's really for two purposes number one

294
00:09:47,910 --> 00:09:45,120
in my job having the engineering and

295
00:09:49,670 --> 00:09:47,920
science background enable me to to take

296
00:09:51,670 --> 00:09:49,680
it to the next level and do those things

297
00:09:52,949 --> 00:09:51,680
i need to do and for example when i'm on

298
00:09:54,310 --> 00:09:52,959
a space flight and working on an

299
00:09:55,670 --> 00:09:54,320
experiment or doing something

300
00:09:56,949 --> 00:09:55,680
operationally

301
00:09:58,310 --> 00:09:56,959
to understand the science and

302
00:10:00,470 --> 00:09:58,320
engineering behind it so that when

303
00:10:02,230 --> 00:10:00,480
things don't go as expected you can

304
00:10:04,069 --> 00:10:02,240
change your course of action or you can

305
00:10:06,230 --> 00:10:04,079
understand why and know okay well if i

306
00:10:09,030 --> 00:10:06,240
go back and do it this way this should

307
00:10:10,150 --> 00:10:09,040
work or i'll try this so that piece of

308
00:10:12,310 --> 00:10:10,160
education is really important because

309
00:10:14,069 --> 00:10:12,320
you got to have the the the background

310
00:10:15,670 --> 00:10:14,079
no matter what you're doing to know how

311
00:10:17,590 --> 00:10:15,680
to do it the other thing that's

312
00:10:19,430 --> 00:10:17,600
important about an education i think is

313
00:10:21,509 --> 00:10:19,440

it's it usually happens early in your

314
00:10:22,310 --> 00:10:21,519
career you know high school college time

315
00:10:23,910 --> 00:10:22,320
frame

316
00:10:25,269 --> 00:10:23,920
and when you get that first degree out

317
00:10:26,870 --> 00:10:25,279
of college

318
00:10:28,710 --> 00:10:26,880
it's it's a difficult thing to do you

319
00:10:31,110 --> 00:10:28,720
have to go through typically a four-year

320
00:10:33,670 --> 00:10:31,120
plus process to get there and what it

321
00:10:35,829 --> 00:10:33,680
does is it establishes that you can

322
00:10:37,430 --> 00:10:35,839
start something and finish it start

323
00:10:39,910 --> 00:10:37,440
something difficult and complex and

324
00:10:40,790 --> 00:10:39,920
finish it and it sets of course on your

325
00:10:43,030 --> 00:10:40,800
life

326
00:10:45,030 --> 00:10:43,040
of or a track record that you can start

327
00:10:46,870 --> 00:10:45,040
and finish something so so so for an

328
00:10:48,949 --> 00:10:46,880
employer obviously looking at that

329
00:10:50,470 --> 00:10:48,959
saying this person has graduated so that

330
00:10:52,710 --> 00:10:50,480
i know they can go through this complex

331
00:10:54,710 --> 00:10:52,720
task and complete it it also sets in

332
00:10:56,310 --> 00:10:54,720
your mind that i'm going to go here i'm

333
00:10:58,150 --> 00:10:56,320
going to set a difficult goal and i'm

334
00:10:59,590 --> 00:10:58,160
going to achieve that goal so for both

335
00:11:02,150 --> 00:10:59,600
of those purposes education i think is

336
00:11:03,750 --> 00:11:02,160
very important and it's it's the key and

337
00:11:07,269 --> 00:11:03,760
it's the foundation in which you start

338
00:11:08,790 --> 00:11:07,279

building any kind of professional career

339
00:11:10,150 --> 00:11:08,800
everyone

340
00:11:12,069 --> 00:11:10,160
on this crew has been to the space

341
00:11:13,990 --> 00:11:12,079
station including three crew members

342
00:11:16,949 --> 00:11:14,000
who've completed long durations uh

343
00:11:19,430 --> 00:11:16,959
flights on iss how much of a benefit

344
00:11:22,230 --> 00:11:19,440
will will that be to having their

345
00:11:25,350 --> 00:11:22,240
combined experiences uh to successfully

346
00:11:27,190 --> 00:11:25,360
completing this mission well we do have

347
00:11:29,030 --> 00:11:27,200
a lot of uh space station experience

348
00:11:31,430 --> 00:11:29,040
we're probably one of the more unique

349
00:11:32,949 --> 00:11:31,440
shuttle shuttle crews in that number one

350
00:11:34,389 --> 00:11:32,959
we're all experienced we've all flown in

351
00:11:35,430 --> 00:11:34,399
space before and

352
00:11:37,269 --> 00:11:35,440
three of us

353
00:11:39,269 --> 00:11:37,279
mike nicole and tim have done long

354
00:11:40,949 --> 00:11:39,279
duration flights on space station so

355
00:11:42,630 --> 00:11:40,959
they're intimately familiar with space

356
00:11:44,949 --> 00:11:42,640
station and actually all three of them

357
00:11:46,870 --> 00:11:44,959
flew very recently at the space station

358
00:11:49,190 --> 00:11:46,880
and so they they know the ins and outs

359
00:11:51,910 --> 00:11:49,200
and it's very valuable um that will help

360
00:11:53,910 --> 00:11:51,920
us a lot in this flight um the the

361
00:11:55,990 --> 00:11:53,920
danger of having an all-experienced crew

362
00:11:58,150 --> 00:11:56,000
is we are all experienced and so we have

363
00:11:59,030 --> 00:11:58,160

to really watch and make sure that we're

364
00:12:00,710 --> 00:11:59,040
uh

365
00:12:02,230 --> 00:12:00,720
that we're confident but don't get too

366
00:12:03,430 --> 00:12:02,240
confident and that's true of anything i

367
00:12:04,790 --> 00:12:03,440
mean

368
00:12:05,990 --> 00:12:04,800
you may have may not have heard this

369
00:12:08,389 --> 00:12:06,000
before but

370
00:12:10,710 --> 00:12:08,399
the most dangerous uh aircraft is one

371
00:12:12,870 --> 00:12:10,720
that has two instructor pilots in it uh

372
00:12:14,069 --> 00:12:12,880
the more experience you have the the

373
00:12:15,509 --> 00:12:14,079
more you have to watch out for

374
00:12:17,269 --> 00:12:15,519
complacency and things like that so the

375
00:12:18,470 --> 00:12:17,279
experience is invaluable

376
00:12:20,230 --> 00:12:18,480
as we're going through training we're

377
00:12:21,750 --> 00:12:20,240
figuring out how to do things each one

378
00:12:23,990 --> 00:12:21,760
of us can actually be up there and

379
00:12:25,269 --> 00:12:24,000
visualize how this is going to work

380
00:12:26,550 --> 00:12:25,279
before we get up there because we've

381
00:12:27,670 --> 00:12:26,560
seen it before we know what it's going

382
00:12:29,190 --> 00:12:27,680
to feel like

383
00:12:30,470 --> 00:12:29,200
we know what the experience is like and

384
00:12:32,230 --> 00:12:30,480
we know what we need to do to get the

385
00:12:34,629 --> 00:12:32,240
job done

386
00:12:35,910 --> 00:12:34,639
but but at the same token we also are

387
00:12:37,110 --> 00:12:35,920
all recognizing that we're going to

388
00:12:38,629 --> 00:12:37,120

watch out for each other we're going we

389
00:12:40,870 --> 00:12:38,639
work as a team we're going to back each

390
00:12:43,269 --> 00:12:40,880
other up with our crew coordination

391
00:12:46,069 --> 00:12:43,279
and not allow the complacency that could

392
00:12:48,389 --> 00:12:46,079
come with experience to uh to cause

393
00:12:50,230 --> 00:12:48,399
problems so experience is great it's

394
00:12:52,069 --> 00:12:50,240
really important it helps us design our

395
00:12:53,910 --> 00:12:52,079
mission as is most efficiently and as

396
00:12:56,150 --> 00:12:53,920
effectively as possible but it's also

397
00:12:57,990 --> 00:12:56,160
something we watch out for and and want

398
00:12:59,350 --> 00:12:58,000
to make sure we keep a balance between

399
00:13:01,670 --> 00:12:59,360
that and

400
00:13:03,590 --> 00:13:01,680
you know focusing on on being very uh

401
00:13:06,710 --> 00:13:03,600
meticulous and thorough in our planning

402
00:13:09,110 --> 00:13:06,720
and in our operations

403
00:13:11,030 --> 00:13:09,120
the the content of this mission has has

404
00:13:13,269 --> 00:13:11,040
been through some changes since you

405
00:13:15,030 --> 00:13:13,279
first started training for

406
00:13:17,190 --> 00:13:15,040
tell us how that's impacted the training

407
00:13:19,350 --> 00:13:17,200
flow and and the adjustments the crew

408
00:13:21,829 --> 00:13:19,360
has had to make well it's you know we

409
00:13:22,790 --> 00:13:21,839
started out as a as an eight-day mission

410
00:13:24,710 --> 00:13:22,800
um

411
00:13:27,430 --> 00:13:24,720
we're just gonna go up uh dock with

412
00:13:28,550 --> 00:13:27,440
space station offload some payloads and

413
00:13:30,790 --> 00:13:28,560

uh

414
00:13:32,790 --> 00:13:30,800
using robotic procedures doing a lot of

415
00:13:35,430 --> 00:13:32,800
transfer and basically leaf station and

416
00:13:36,790 --> 00:13:35,440
the best logistics state possible

417
00:13:37,829 --> 00:13:36,800
because when we were originally assigned

418
00:13:39,189 --> 00:13:37,839
we were going to be the very last

419
00:13:41,350 --> 00:13:39,199
shuttle mission so we wanted to leave

420
00:13:44,550 --> 00:13:41,360
space station the best state possible

421
00:13:46,870 --> 00:13:44,560
it's since evolved to uh they've added a

422
00:13:48,949 --> 00:13:46,880
couple of spacewalks to our flight

423
00:13:50,710 --> 00:13:48,959
so what we've had to do is lengthen the

424
00:13:54,310 --> 00:13:50,720
mission from eight days to 11 days

425
00:13:56,389 --> 00:13:54,320
nominal with a plus one if we need it

426
00:13:57,910 --> 00:13:56,399
we're having to pick up and train those

427
00:13:59,350 --> 00:13:57,920
two spacewalks which we hadn't been

428
00:14:00,949 --> 00:13:59,360
training for before we've also added a

429
00:14:03,509 --> 00:14:00,959
whole bunch of robotics that go along

430
00:14:05,750 --> 00:14:03,519
with that as a result of that i've had

431
00:14:07,590 --> 00:14:05,760
to move crew members

432
00:14:09,269 --> 00:14:07,600
into different tasks to make the

433
00:14:10,949 --> 00:14:09,279
timeline fit to make that happen so

434
00:14:12,790 --> 00:14:10,959
we're in the process of

435
00:14:15,110 --> 00:14:12,800
going through that we had to redo our

436
00:14:17,110 --> 00:14:15,120
training we had to

437
00:14:19,670 --> 00:14:17,120
take another about added about another

438
00:14:22,069 --> 00:14:19,680

six week slip to deal with all the

439
00:14:23,670 --> 00:14:22,079
spacewalk training so the the

440
00:14:25,910 --> 00:14:23,680
the biggest impact i think to the whole

441
00:14:29,110 --> 00:14:25,920
train flow has been the number of uh

442
00:14:31,430 --> 00:14:29,120
nbls neutral buoyancy lab runs the uh in

443
00:14:33,590 --> 00:14:31,440
the water to train for those spacewalks

444
00:14:35,350 --> 00:14:33,600
so but we've we've got a good plan in

445
00:14:36,870 --> 00:14:35,360
place we have a good schedule in place

446
00:14:38,550 --> 00:14:36,880
and uh we've worked out all those

447
00:14:39,990 --> 00:14:38,560
details and so it's just going to take

448
00:14:41,430 --> 00:14:40,000
us a little bit longer to get there but

449
00:14:44,710 --> 00:14:41,440
we still have a good plan and feel

450
00:14:46,310 --> 00:14:44,720
pretty comfortable with what we're doing

451
00:14:47,990 --> 00:14:46,320
how would you characterize uh the

452
00:14:50,230 --> 00:14:48,000
contributions of the thousands of people

453
00:14:52,470 --> 00:14:50,240
that work behind the scenes uh for every

454
00:14:54,389 --> 00:14:52,480
mission to ensure the success

455
00:14:55,350 --> 00:14:54,399
of the mission uh and the safety of the

456
00:14:58,069 --> 00:14:55,360
crew

457
00:15:01,189 --> 00:14:58,079
what do you say about their contribution

458
00:15:02,949 --> 00:15:01,199
well i guess what i would say is that

459
00:15:05,110 --> 00:15:02,959
coming into this mission you know my

460
00:15:06,949 --> 00:15:05,120
theme with my crew and with everybody i

461
00:15:09,750 --> 00:15:06,959
talk to is particularly as the shuttle

462
00:15:11,829 --> 00:15:09,760
program winds down is is that

463
00:15:14,310 --> 00:15:11,839

this mission in this flight is not about

464
00:15:15,189 --> 00:15:14,320
us this is not about the crew we're

465
00:15:18,470 --> 00:15:15,199
we're

466
00:15:20,069 --> 00:15:18,480
enough to get to go execute the mission

467
00:15:21,670 --> 00:15:20,079
um you know from

468
00:15:23,430 --> 00:15:21,680
from space if you will but we have a

469
00:15:24,710 --> 00:15:23,440
huge team of mission control folks that

470
00:15:27,269 --> 00:15:24,720
are executing on the ground in

471
00:15:29,990 --> 00:15:27,279
engineering support we have a huge team

472
00:15:32,389 --> 00:15:30,000
um all across it at the various human

473
00:15:35,430 --> 00:15:32,399
space flight centers whether it be uh

474
00:15:37,749 --> 00:15:35,440
you know michoud at the at the tank

475
00:15:40,069 --> 00:15:37,759
tank assembly

476
00:15:41,749 --> 00:15:40,079
we have processing we have huntsville

477
00:15:43,670 --> 00:15:41,759
stannis that's doing the engine testing

478
00:15:45,509 --> 00:15:43,680
huntsville that's managing the external

479
00:15:46,230 --> 00:15:45,519
tank and the solid rocket boosters we

480
00:15:48,069 --> 00:15:46,240
have

481
00:15:49,590 --> 00:15:48,079
multiple contractors that are that are

482
00:15:51,189 --> 00:15:49,600
working all this in this and we have the

483
00:15:52,790 --> 00:15:51,199
space shuttle program that's managing as

484
00:15:53,670 --> 00:15:52,800
long as as well as the space station

485
00:15:55,590 --> 00:15:53,680
program

486
00:15:57,110 --> 00:15:55,600
in all of these companies involved and

487
00:15:59,430 --> 00:15:57,120
it's really all about the huge teams so

488
00:16:01,350 --> 00:15:59,440

when you see a mission go off

489
00:16:03,030 --> 00:16:01,360
you're seeing the astronauts maybe on tv

490
00:16:04,470 --> 00:16:03,040
but that's not what the mission is about

491
00:16:06,550 --> 00:16:04,480
the mission is really about those

492
00:16:08,629 --> 00:16:06,560
thousands of people and so

493
00:16:10,310 --> 00:16:08,639
what i emphasize it's not about us it's

494
00:16:11,990 --> 00:16:10,320
about this team and when you only when

495
00:16:14,710 --> 00:16:12,000
you watch something it's similar when i

496
00:16:16,550 --> 00:16:14,720
was a test pilot only in smaller teams

497
00:16:19,269 --> 00:16:16,560
when you watch this team of diverse

498
00:16:20,710 --> 00:16:19,279
people across the country come together

499
00:16:23,269 --> 00:16:20,720
and put together something as

500
00:16:25,590 --> 00:16:23,279
unbelievably complex as a space mission

501
00:16:27,910 --> 00:16:25,600
put it all together and then execute it

502
00:16:30,069 --> 00:16:27,920
and make it look easy so the public

503
00:16:31,749 --> 00:16:30,079
watching thinks oh this is really you

504
00:16:33,269 --> 00:16:31,759
know this is routine this is easy well

505
00:16:34,710 --> 00:16:33,279
those of us that are in it know it's

506
00:16:37,350 --> 00:16:34,720
anything but but it's all this

507
00:16:39,910 --> 00:16:37,360
preparation the dedication of folks

508
00:16:42,389 --> 00:16:39,920
that that really make this happen when i

509
00:16:45,110 --> 00:16:42,399
first got here to johnson space center

510
00:16:46,710 --> 00:16:45,120
almost 15 15 years ago

511
00:16:47,910 --> 00:16:46,720
i remember walking around the center and

512
00:16:49,269 --> 00:16:47,920
i was about after i'd been here about

513
00:16:50,790 --> 00:16:49,279

six months i got to know a lot of people

514
00:16:51,749 --> 00:16:50,800
around the center

515
00:16:56,550 --> 00:16:51,759
and

516
00:16:57,910 --> 00:16:56,560
here as well as a kennedy space center

517
00:16:59,189 --> 00:16:57,920
we were just there

518
00:17:01,910 --> 00:16:59,199
and and all the other centers i've been

519
00:17:03,590 --> 00:17:01,920
to is how motivated everybody is people

520
00:17:04,390 --> 00:17:03,600
are not here for the money people are

521
00:17:06,390 --> 00:17:04,400
here

522
00:17:07,909 --> 00:17:06,400
because it's about something that's much

523
00:17:09,590 --> 00:17:07,919
much bigger than them and that's in it

524
00:17:10,549 --> 00:17:09,600
that makes it a really exciting place to

525
00:17:12,630 --> 00:17:10,559
work so

526
00:17:14,309 --> 00:17:12,640
when we go and execute a robotics task

527
00:17:16,390 --> 00:17:14,319
or do something on orbit what i'm really

528
00:17:18,549 --> 00:17:16,400
thinking is well we're executing but

529
00:17:20,390 --> 00:17:18,559
we're just doing the final we're just

530
00:17:22,150 --> 00:17:20,400
showing the final product and it

531
00:17:23,990 --> 00:17:22,160
represents all of these sounds of people

532
00:17:25,590 --> 00:17:24,000
so i feel like when we fly

533
00:17:29,510 --> 00:17:25,600
we're there representing all these other

534
00:17:34,070 --> 00:17:32,549
if your launch schedule holds um you're

535
00:17:35,990 --> 00:17:34,080
scheduled to be on board space station

536
00:17:38,150 --> 00:17:36,000
right around the the time of the 10th

537
00:17:40,310 --> 00:17:38,160
anniversary of the arrival of expedition

538
00:17:43,750 --> 00:17:40,320

one uh the crew that established uh

539
00:17:45,590 --> 00:17:43,760
continuous human presence on iss

540
00:17:47,990 --> 00:17:45,600
discuss the significance of

541
00:17:50,070 --> 00:17:48,000
their milestone and

542
00:17:52,390 --> 00:17:50,080
the station's importance to the future

543
00:17:54,150 --> 00:17:52,400
of space flight

544
00:17:56,470 --> 00:17:54,160
well it's interesting can i look back to

545
00:17:58,070 --> 00:17:56,480
uh when that happened that that they

546
00:18:00,630 --> 00:17:58,080
went up there i'd only been here a few

547
00:18:02,390 --> 00:18:00,640
years when expedition won shep's crew

548
00:18:04,070 --> 00:18:02,400
went up there

549
00:18:05,990 --> 00:18:04,080
and i was also involved in a very early

550
00:18:07,430 --> 00:18:06,000
space station assembly i delivered the

551
00:18:08,549 --> 00:18:07,440
airlock on my first flight to space

552
00:18:10,150 --> 00:18:08,559
station

553
00:18:12,070 --> 00:18:10,160
and and i remember going up the space

554
00:18:14,390 --> 00:18:12,080
station then and it just barely started

555
00:18:15,990 --> 00:18:14,400
and i remember thinking about all of the

556
00:18:17,750 --> 00:18:16,000
missions and all the components we still

557
00:18:19,110 --> 00:18:17,760
had to fly up there to fully build this

558
00:18:20,630 --> 00:18:19,120
thing out and

559
00:18:22,310 --> 00:18:20,640
at times it seemed like we were never

560
00:18:24,390 --> 00:18:22,320
going to get there it was just there

561
00:18:26,150 --> 00:18:24,400
were so many missions

562
00:18:27,669 --> 00:18:26,160
every time we launched a mission we'd

563
00:18:29,350 --> 00:18:27,679

have you know little things we have to

564
00:18:31,590 --> 00:18:29,360
work at every time they put a component

565
00:18:33,350 --> 00:18:31,600
on space station

566
00:18:36,150 --> 00:18:33,360
one thing you'll learn when you go from

567
00:18:37,909 --> 00:18:36,160
the engineering or design phase assembly

568
00:18:39,350 --> 00:18:37,919
and build to actually

569
00:18:41,510 --> 00:18:39,360
operations is

570
00:18:43,430 --> 00:18:41,520
a module never works like you think it's

571
00:18:44,470 --> 00:18:43,440
going to and you always get surprised

572
00:18:45,590 --> 00:18:44,480
and that's just the nature of the

573
00:18:46,710 --> 00:18:45,600
business because it's never been it's

574
00:18:48,950 --> 00:18:46,720
one of those things never been done

575
00:18:51,110 --> 00:18:48,960
before and every time we're learning

576
00:18:53,110 --> 00:18:51,120
when i look back at it now and see this

577
00:18:54,789 --> 00:18:53,120
fully assembled space station operating

578
00:18:57,350 --> 00:18:54,799
with six people which we just went to

579
00:19:00,070 --> 00:18:57,360
last year and doing all the science and

580
00:19:02,390 --> 00:19:00,080
stuff like that i'm i'm just amazed at

581
00:19:03,750 --> 00:19:02,400
what this big team has accomplished and

582
00:19:05,909 --> 00:19:03,760
i'm really excited about what it's going

583
00:19:07,029 --> 00:19:05,919
to accomplish in the future so it's

584
00:19:09,110 --> 00:19:07,039
for me

585
00:19:10,390 --> 00:19:09,120
getting up to getting to getting an

586
00:19:12,230 --> 00:19:10,400
opportunity to go up there again which i

587
00:19:14,070 --> 00:19:12,240
never thought was going to happen and

588
00:19:15,750 --> 00:19:14,080

see this fully assembled space station

589
00:19:17,750 --> 00:19:15,760
i've worked on most of my professional

590
00:19:20,310 --> 00:19:17,760
career here at nasa is just going to be

591
00:19:22,150 --> 00:19:20,320
really something fantastic to see and i

592
00:19:25,029 --> 00:19:22,160
hope i hope the rest of the world

593
00:19:26,710 --> 00:19:25,039
appreciates what we have i suspect i

594
00:19:28,870 --> 00:19:26,720
know the future of space station has not

595
00:19:30,230 --> 00:19:28,880
been written but i also know that space

596
00:19:32,789 --> 00:19:30,240
station is going to contribute things we

597
00:19:35,750 --> 00:19:32,799
have no idea of today and we've already

598
00:19:40,150 --> 00:19:37,270
tell us about the key objectives if you

599
00:19:42,150 --> 00:19:40,160
would of sts-133

600
00:19:47,270 --> 00:19:42,160
our primary objective the way i describe

601
00:19:51,750 --> 00:19:49,190
basically leave space station in the

602
00:19:53,830 --> 00:19:51,760
best possible shape for the next era

603
00:19:55,510 --> 00:19:53,840
which is the arrow when we're no longer

604
00:19:56,710 --> 00:19:55,520
flying space shuttles and have huge

605
00:19:59,430 --> 00:19:56,720
amounts of

606
00:20:01,270 --> 00:19:59,440
up mass we can take up the space station

607
00:20:03,510 --> 00:20:01,280
so along those lines what we're doing is

608
00:20:04,950 --> 00:20:03,520
we're delivering logistics and supplies

609
00:20:07,750 --> 00:20:04,960
and doing some

610
00:20:09,830 --> 00:20:07,760
maintenance and some some outfitting to

611
00:20:12,070 --> 00:20:09,840
leave it in the best condition we can

612
00:20:14,230 --> 00:20:12,080
with what we can carry up so we're

613
00:20:16,789 --> 00:20:14,240

carrying up a full mid deck of

614
00:20:19,029 --> 00:20:16,799
some payloads with some science payloads

615
00:20:20,950 --> 00:20:19,039
and logistics payloads in our payload

616
00:20:23,110 --> 00:20:20,960
bay we have a

617
00:20:25,750 --> 00:20:23,120
pmm which is a stands for permanent

618
00:20:27,830 --> 00:20:25,760
multi-purpose module it's essentially an

619
00:20:29,190 --> 00:20:27,840
mplm which is the

620
00:20:31,590 --> 00:20:29,200
pressurized cargo carrier that we've

621
00:20:33,909 --> 00:20:31,600
been using on space station for several

622
00:20:37,110 --> 00:20:33,919
years to haul logistics up and down the

623
00:20:39,270 --> 00:20:37,120
difference being is our this mplm has

624
00:20:40,470 --> 00:20:39,280
been modified into this pmm and what

625
00:20:42,710 --> 00:20:40,480
they've done is they've put into

626
00:20:44,310 --> 00:20:42,720
additional micro meteorite shielding up

627
00:20:46,390 --> 00:20:44,320
in it and a few other internal

628
00:20:47,990 --> 00:20:46,400
modifications the objective is we're

629
00:20:49,270 --> 00:20:48,000
gonna we're going to put it on space

630
00:20:51,430 --> 00:20:49,280
station robotically and we're going to

631
00:20:53,110 --> 00:20:51,440
leave it there so not only will be full

632
00:20:54,470 --> 00:20:53,120
of supplies for the space station it

633
00:20:56,630 --> 00:20:54,480
could it will also serve in the future

634
00:20:58,230 --> 00:20:56,640
as a closet for space station for

635
00:20:59,750 --> 00:20:58,240
stowage which is something that that

636
00:21:01,590 --> 00:20:59,760
they always need up on space station

637
00:21:03,270 --> 00:21:01,600
we're always short of and so we're going

638
00:21:04,950 --> 00:21:03,280

to put it up there and leave it the

639
00:21:06,630 --> 00:21:04,960
other thing we're carrying is a is

640
00:21:09,430 --> 00:21:06,640
something called an express logistics

641
00:21:11,990 --> 00:21:09,440
carrier what that is is a big

642
00:21:13,510 --> 00:21:12,000
external pallet and it has a several

643
00:21:16,470 --> 00:21:13,520
places for

644
00:21:18,390 --> 00:21:16,480
for payloads or or spares for the

645
00:21:20,710 --> 00:21:18,400
external components on space station in

646
00:21:23,590 --> 00:21:20,720
fact our elc is going to have a

647
00:21:25,830 --> 00:21:23,600
a larger radiator an ammonia radiator

648
00:21:27,830 --> 00:21:25,840
that we use to reject heat from all of

649
00:21:29,190 --> 00:21:27,840
our electrical boxes on the outside of

650
00:21:31,750 --> 00:21:29,200
space stations we're carrying a spare

651
00:21:33,270 --> 00:21:31,760
one in case one breaks on space station

652
00:21:34,870 --> 00:21:33,280
they can install later and we're going

653
00:21:36,230 --> 00:21:34,880
to take that uh

654
00:21:38,310 --> 00:21:36,240
that carrier and we're going to install

655
00:21:40,070 --> 00:21:38,320
it on the space station trust and so

656
00:21:41,510 --> 00:21:40,080
those are the things in our payload

657
00:21:44,149 --> 00:21:41,520
bay for the for the spacewalks

658
00:21:46,310 --> 00:21:44,159
themselves we're doing several tasks of

659
00:21:48,230 --> 00:21:46,320
outfitting the space station

660
00:21:49,830 --> 00:21:48,240
doing some what we call cats and dogs

661
00:21:51,350 --> 00:21:49,840
clean up work

662
00:21:54,230 --> 00:21:51,360
taking care of some

663
00:21:55,750 --> 00:21:54,240

insulation issues working on some

664
00:21:57,909 --> 00:21:55,760
various components that need to be doing

665
00:22:00,149 --> 00:21:57,919
and it's just a whole list of kind of

666
00:22:01,510 --> 00:22:00,159
cats and dogs tasks that we'll be doing

667
00:22:03,909 --> 00:22:01,520
in addition

668
00:22:06,230 --> 00:22:03,919
uh and as mission commander uh tell us

669
00:22:09,430 --> 00:22:06,240
about what your key responsibilities uh

670
00:22:11,750 --> 00:22:09,440
will be uh for ascent and then on on on

671
00:22:14,470 --> 00:22:11,760
orbit too well my my primary job as

672
00:22:16,390 --> 00:22:14,480
commander as i see it is uh you know i'm

673
00:22:17,590 --> 00:22:16,400
responsible for for the overall you know

674
00:22:19,990 --> 00:22:17,600
the training

675
00:22:22,149 --> 00:22:20,000
the safety is my number one safety of

676
00:22:23,270 --> 00:22:22,159
the crew and the conduct of the mission

677
00:22:24,390 --> 00:22:23,280
the accomplishment of the mission

678
00:22:27,350 --> 00:22:24,400
objectives

679
00:22:29,669 --> 00:22:27,360
that's my global responsibility um and

680
00:22:32,630 --> 00:22:29,679
that's what's most important so

681
00:22:35,350 --> 00:22:32,640
in that context my primary job as i see

682
00:22:37,909 --> 00:22:35,360
it is to enable the rest of the crew to

683
00:22:40,310 --> 00:22:37,919
do their jobs and i try to make sure

684
00:22:42,149 --> 00:22:40,320
that the specific things are are

685
00:22:43,510 --> 00:22:42,159
generally speaking being done by them

686
00:22:44,710 --> 00:22:43,520
and not by me

687
00:22:46,149 --> 00:22:44,720
um you have other people doing the

688
00:22:47,590 --> 00:22:46,159

robotics have other people doing the

689
00:22:49,110 --> 00:22:47,600
spacewalks now

690
00:22:50,950 --> 00:22:49,120
specifically

691
00:22:52,630 --> 00:22:50,960
with only a six person crew or even a

692
00:22:53,830 --> 00:22:52,640
seven person crew i can't it's not like

693
00:22:55,669 --> 00:22:53,840
i can go up there and just let everybody

694
00:22:58,710 --> 00:22:55,679
else do the work they still still need

695
00:23:00,950 --> 00:22:58,720
me to do work too and so on as in i'll

696
00:23:03,110 --> 00:23:00,960
be in the in the left seat

697
00:23:05,190 --> 00:23:03,120
and i have again responsibility for

698
00:23:08,070 --> 00:23:05,200
conduct of the asset

699
00:23:10,149 --> 00:23:08,080
so i kind of run the flow um i run the

700
00:23:11,909 --> 00:23:10,159
ascent i uh i have specific

701
00:23:13,510 --> 00:23:11,919
responsibilities with several of the

702
00:23:15,190 --> 00:23:13,520
systems like the computers and the life

703
00:23:16,230 --> 00:23:15,200
support systems and the flight control

704
00:23:17,909 --> 00:23:16,240
system

705
00:23:20,070 --> 00:23:17,919
i'm primarily responsible for all the

706
00:23:22,549 --> 00:23:20,080
navigation guidance and control you know

707
00:23:24,630 --> 00:23:22,559
where we're going uh you know how we're

708
00:23:26,390 --> 00:23:24,640
doing on our trajectories what do we do

709
00:23:27,990 --> 00:23:26,400
if we have zero one two or three engines

710
00:23:30,230 --> 00:23:28,000
out you know those sorts of failures

711
00:23:31,990 --> 00:23:30,240
dealing with those and in making sure we

712
00:23:33,909 --> 00:23:32,000
go through our procedures effectively

713
00:23:36,870 --> 00:23:33,919

and efficiently and and and basically

714
00:23:38,950 --> 00:23:36,880
run the crew through those procedures

715
00:23:40,950 --> 00:23:38,960
same thing on entry except i'm coming in

716
00:23:43,750 --> 00:23:40,960
and in the end on entry i'll be doing

717
00:23:45,269 --> 00:23:43,760
the manual landing of the orbiter on

718
00:23:47,430 --> 00:23:45,279
orbit um

719
00:23:49,029 --> 00:23:47,440
on flight day two where we inspect the

720
00:23:52,230 --> 00:23:49,039
outside of the orbiter using the orbit

721
00:23:53,830 --> 00:23:52,240
boom sensor system to look at the

722
00:23:55,669 --> 00:23:53,840
thermal protection system and make sure

723
00:23:58,470 --> 00:23:55,679
it's uh it's healthy and again before

724
00:24:00,310 --> 00:23:58,480
deorbit um i'm one of the three space

725
00:24:02,789 --> 00:24:00,320
shuttle robotic arm operators so along

726
00:24:05,269 --> 00:24:02,799
with my pilot eric bowe and

727
00:24:06,950 --> 00:24:05,279
and mission specialist al drew the three

728
00:24:09,350 --> 00:24:06,960
of us will be doing all the space

729
00:24:11,669 --> 00:24:09,360
shuttle robotics work um

730
00:24:13,510 --> 00:24:11,679
to inspect the orbiter as well as space

731
00:24:16,310 --> 00:24:13,520
station robot or space shuttle robotics

732
00:24:17,590 --> 00:24:16,320
work in support of the space walks and

733
00:24:19,350 --> 00:24:17,600
activities while we're docked to the

734
00:24:20,870 --> 00:24:19,360
space station

735
00:24:23,269 --> 00:24:20,880
for rendezvous

736
00:24:25,909 --> 00:24:23,279
i do the manual phase where i take over

737
00:24:27,510 --> 00:24:25,919
the vehicle at about 2000 feet away from

738
00:24:28,870 --> 00:24:27,520

space station

739
00:24:30,950 --> 00:24:28,880
fly up to a position underneath the

740
00:24:33,430 --> 00:24:30,960
space station do a

741
00:24:34,630 --> 00:24:33,440
something called a rpm rotational pitch

742
00:24:39,029 --> 00:24:34,640
maneuver

743
00:24:40,630 --> 00:24:39,039
is just a 360 backflip so that the space

744
00:24:43,110 --> 00:24:40,640
station crew can take pictures of our

745
00:24:45,110 --> 00:24:43,120
tiles and make sure they're okay from a

746
00:24:46,950 --> 00:24:45,120
thermal protection system standpoint and

747
00:24:49,430 --> 00:24:46,960
i'll fly around in front of the vehicle

748
00:24:50,710 --> 00:24:49,440
and manually fly in to do the docking so

749
00:24:53,669 --> 00:24:50,720
that's the other thing that i do on

750
00:24:55,269 --> 00:24:53,679
orbit um during the dock phase

751
00:24:58,310 --> 00:24:55,279
i'll be involved with transfer as is the

752
00:25:00,310 --> 00:24:58,320
rest of the crew robotics supporting all

753
00:25:02,630 --> 00:25:00,320
of the space walks but i'm i'm not doing

754
00:25:03,750 --> 00:25:02,640
the space walks and all the a whole

755
00:25:05,830 --> 00:25:03,760
bunch of other things that are on the

756
00:25:09,269 --> 00:25:05,840
timeline so that's kind of in a nutshell

757
00:25:14,470 --> 00:25:11,110
you and your crew are also scheduled to

758
00:25:17,269 --> 00:25:14,480
deliver um r2 or robonaut 2 uh to the

759
00:25:19,350 --> 00:25:17,279
station um can you tell us about uh what

760
00:25:21,430 --> 00:25:19,360
you know about r2 and what it's uh what

761
00:25:23,669 --> 00:25:21,440
its purpose and it is on station and how

762
00:25:26,390 --> 00:25:23,679
it will be utilized well our

763
00:25:28,710 --> 00:25:26,400

rto robonaut is a uh is kind of a joint

764
00:25:29,590 --> 00:25:28,720
venture between nasa and general motors

765
00:25:31,669 --> 00:25:29,600
and

766
00:25:33,350 --> 00:25:31,679
it's what it really is is a technology

767
00:25:36,870 --> 00:25:33,360
demonstrator of a

768
00:25:39,029 --> 00:25:36,880
humanoid like our robot has articulating

769
00:25:41,190 --> 00:25:39,039
joints that hands that move just like

770
00:25:43,830 --> 00:25:41,200
your hands do and elbow joints and

771
00:25:45,909 --> 00:25:43,840
shoulder joints it's just a torso on up

772
00:25:47,990 --> 00:25:45,919
it has cameras

773
00:25:51,110 --> 00:25:48,000
for views and and it's uh it's going up

774
00:25:51,830 --> 00:25:51,120
on a pallet in our in our pmm

775
00:25:53,510 --> 00:25:51,840
and

776
00:25:54,630 --> 00:25:53,520
probably it won't get it won't get

777
00:25:56,230 --> 00:25:54,640
installed and checked out while we're

778
00:25:58,070 --> 00:25:56,240
there but probably within the next six

779
00:26:00,230 --> 00:25:58,080
months they'll pull it out and

780
00:26:01,909 --> 00:26:00,240
put it in a rack and hook it all up and

781
00:26:04,390 --> 00:26:01,919
it's designed to be controlled you know

782
00:26:08,549 --> 00:26:04,400
by the crew or remotely from the ground

783
00:26:10,149 --> 00:26:08,559
and it's just it's a kind of a first

784
00:26:11,750 --> 00:26:10,159
human human-like

785
00:26:13,430 --> 00:26:11,760
android kind of thing where they're

786
00:26:15,190 --> 00:26:13,440
going to

787
00:26:17,110 --> 00:26:15,200
technology demonstrate and and do

788
00:26:19,269 --> 00:26:17,120

various tasks probably mechanical tasks

789
00:26:21,190 --> 00:26:19,279
at first check motion they want to see

790
00:26:22,390 --> 00:26:21,200
they've been tested on the ground

791
00:26:24,710 --> 00:26:22,400
but they want to see how it's going to

792
00:26:27,990 --> 00:26:24,720
work in a 0g environment and then

793
00:26:30,070 --> 00:26:28,000
as far as what we'll do in the future um

794
00:26:32,149 --> 00:26:30,080
big part of it is going to be well what

795
00:26:33,990 --> 00:26:32,159
tasks are best for a robot to do you

796
00:26:35,830 --> 00:26:34,000
know obviously we know that the best

797
00:26:37,590 --> 00:26:35,840
task for a computer to do

798
00:26:40,070 --> 00:26:37,600
that a computer can do better in humans

799
00:26:42,390 --> 00:26:40,080
is repetitive math tasks and things like

800
00:26:43,830 --> 00:26:42,400
that that we tend to you can't do all

801
00:26:45,750 --> 00:26:43,840
day every day but a computer can and

802
00:26:48,070 --> 00:26:45,760
won't bother them so looking for tasks

803
00:26:50,789 --> 00:26:48,080
where a robot can assist

804
00:26:53,029 --> 00:26:50,799
humans up in space or or act robotically

805
00:26:54,549 --> 00:26:53,039
on their own so it'll be a technology

806
00:26:56,710 --> 00:26:54,559
demonstrator as far as what all

807
00:26:57,990 --> 00:26:56,720
objectives it will eventually get

808
00:26:59,990 --> 00:26:58,000
that's one of those things i think we're

809
00:27:02,149 --> 00:27:00,000
going to learn as we go as they operate

810
00:27:04,149 --> 00:27:02,159
it and and try various different things

811
00:27:06,630 --> 00:27:04,159
and i would imagine that it will take us

812
00:27:07,990 --> 00:27:06,640
to places we couldn't imagine so it'll

813
00:27:08,710 --> 00:27:08,000

be it'll be interesting to watch how

814
00:27:12,870 --> 00:27:08,720
that

815
00:27:15,590 --> 00:27:12,880
it and and where it ends up being

816
00:27:17,029 --> 00:27:15,600
because i i suspect that how we think

817
00:27:19,350 --> 00:27:17,039
we're going to operate right now is

818
00:27:21,110 --> 00:27:19,360
probably wrong because we just don't

819
00:27:23,669 --> 00:27:21,120
know we haven't done it before

820
00:27:27,190 --> 00:27:25,350
on the same day that

821
00:27:29,510 --> 00:27:27,200
that you docked a station

822
00:27:31,830 --> 00:27:29,520
the crew is scheduled to move the elc

823
00:27:34,149 --> 00:27:31,840
for out of discovery's payload bay and

824
00:27:35,750 --> 00:27:34,159
attach it to the station uh temporarily

825
00:27:37,750 --> 00:27:35,760
can you walk us through that process and

826
00:27:39,750 --> 00:27:37,760
tell us who's going to be involved and

827
00:27:41,110 --> 00:27:39,760
sure what sure that's uh that's going to

828
00:27:42,870 --> 00:27:41,120
make actually our flight day 3 our

829
00:27:44,950 --> 00:27:42,880
docking day a very challenging day a

830
00:27:46,870 --> 00:27:44,960
very busy day so we're going to we're

831
00:27:48,710 --> 00:27:46,880
going to dock once we dock and it's

832
00:27:50,470 --> 00:27:48,720
about a six hour process from starting

833
00:27:51,669 --> 00:27:50,480
the rendezvous till docking maybe a

834
00:27:53,269 --> 00:27:51,679
little bit more

835
00:27:54,789 --> 00:27:53,279
once we dock we'll do pressure and leak

836
00:27:56,230 --> 00:27:54,799
checks and once those are good we'll

837
00:27:57,669 --> 00:27:56,240
open the hatches

838
00:27:59,110 --> 00:27:57,679

we'll get we'll get together do a quick

839
00:28:01,269 --> 00:27:59,120
safety briefing and then immediately

840
00:28:02,630 --> 00:28:01,279
we're going to jump into this elc4 task

841
00:28:04,630 --> 00:28:02,640
and what's unique about it is it goes

842
00:28:06,789 --> 00:28:04,640
out on s3 which is way out on the

843
00:28:08,470 --> 00:28:06,799
starboard side of the truss

844
00:28:09,750 --> 00:28:08,480
to get it there is a little bit tricky

845
00:28:11,510 --> 00:28:09,760
though

846
00:28:13,510 --> 00:28:11,520
we can't pull it out of the payload bay

847
00:28:15,430 --> 00:28:13,520
with a shuttle arm because the station

848
00:28:17,269 --> 00:28:15,440
structure's in the way

849
00:28:19,990 --> 00:28:17,279
so the space station arm is actually

850
00:28:22,950 --> 00:28:20,000
going to reach in and uh and as soon as

851
00:28:24,630 --> 00:28:22,960
after we dock i have a couple of a

852
00:28:25,990 --> 00:28:24,640
couple of shuttle crew members are going

853
00:28:27,750 --> 00:28:26,000
to go over

854
00:28:30,789 --> 00:28:27,760
work on the space station arm i

855
00:28:32,710 --> 00:28:30,799
mentioned that my pilot eric myself and

856
00:28:33,510 --> 00:28:32,720
al drew are the shuttle arm operators

857
00:28:35,909 --> 00:28:33,520
well

858
00:28:37,909 --> 00:28:35,919
mike nicole and tim

859
00:28:39,590 --> 00:28:37,919
are this are the station arm operators

860
00:28:41,510 --> 00:28:39,600
and in this case

861
00:28:42,310 --> 00:28:41,520
nicole and

862
00:28:44,070 --> 00:28:42,320
tim

863
00:28:46,470 --> 00:28:44,080

are going to go over and they're going

864
00:28:49,110 --> 00:28:46,480
to jump on the space station arm

865
00:28:51,269 --> 00:28:49,120
and i'm going to have eric and al on the

866
00:28:52,630 --> 00:28:51,279
space shuttle arm so what happens is

867
00:28:54,149 --> 00:28:52,640
nicole and tim will use the space

868
00:28:57,029 --> 00:28:54,159
station arm pull it out of the payload

869
00:28:59,510 --> 00:28:57,039
bay get it to a position then

870
00:29:01,510 --> 00:28:59,520
then uh eric and al are going to grapple

871
00:29:02,710 --> 00:29:01,520
it so you're now your double grapple and

872
00:29:04,310 --> 00:29:02,720
grapple with the shuttle arms or

873
00:29:06,149 --> 00:29:04,320
grappled on two sides

874
00:29:07,590 --> 00:29:06,159
then uh then they're gonna let go with

875
00:29:09,590 --> 00:29:07,600
the space station arm and they actually

876
00:29:11,269 --> 00:29:09,600
have to reposition the arm in another

877
00:29:12,389 --> 00:29:11,279
location do what's called a walk-off

878
00:29:14,310 --> 00:29:12,399
they'll

879
00:29:17,190 --> 00:29:14,320
the space station has uh

880
00:29:20,149 --> 00:29:17,200
has end effectors on on both ends and so

881
00:29:21,669 --> 00:29:20,159
it can actually um it's it's it's fixed

882
00:29:23,110 --> 00:29:21,679
on one end and moving on the other end

883
00:29:25,510 --> 00:29:23,120
they can actually go to a new grapple

884
00:29:26,470 --> 00:29:25,520
location grapple it twice and release

885
00:29:28,149 --> 00:29:26,480
this end

886
00:29:30,389 --> 00:29:28,159
walk it closer to the location need to

887
00:29:33,269 --> 00:29:30,399
go to and then after they do this walk

888
00:29:35,909 --> 00:29:33,279

off they'll re-grab that

889
00:29:38,149 --> 00:29:35,919
logistics carrier and then

890
00:29:40,630 --> 00:29:38,159
then tim it out or

891
00:29:42,310 --> 00:29:40,640
eric and al will release

892
00:29:43,990 --> 00:29:42,320
and then they will maneuver it and

893
00:29:45,990 --> 00:29:44,000
finally put it in place on space station

894
00:29:48,549 --> 00:29:46,000
using the space station arm so it's it's

895
00:29:51,110 --> 00:29:48,559
we call it a double walk-off um and uh

896
00:29:53,590 --> 00:29:51,120
so it's a it's a it's a it's a it's a

897
00:29:55,830 --> 00:29:53,600
complex uh choreography between the two

898
00:29:57,430 --> 00:29:55,840
arms and the two crews

899
00:29:58,950 --> 00:29:57,440
to do that and it'll take quite a while

900
00:30:00,630 --> 00:29:58,960
all the way up to a lot of sleep time to

901
00:30:02,389 --> 00:30:00,640
do it okay

902
00:30:05,269 --> 00:30:02,399
what level of involvement will the

903
00:30:07,750 --> 00:30:05,279
station crew have in in the docked

904
00:30:09,909 --> 00:30:07,760
operations and how critical are they to

905
00:30:12,950 --> 00:30:09,919
the success of completing the mission

906
00:30:14,470 --> 00:30:12,960
station crew is critical we uh

907
00:30:16,710 --> 00:30:14,480
my philosophy and the way i've always

908
00:30:19,190 --> 00:30:16,720
worked in in pretty much every crew does

909
00:30:21,029 --> 00:30:19,200
is uh when we get we dock and we open

910
00:30:22,549 --> 00:30:21,039
hatches we consider ourselves one crew

911
00:30:24,710 --> 00:30:22,559
not two crews

912
00:30:26,230 --> 00:30:24,720
everything we're very very integrated in

913
00:30:27,990 --> 00:30:26,240

our operations

914
00:30:29,269 --> 00:30:28,000
because they're so complex there's so

915
00:30:31,029 --> 00:30:29,279
much going on

916
00:30:33,350 --> 00:30:31,039
for example

917
00:30:35,830 --> 00:30:33,360
when we do their our first spacewalks

918
00:30:39,029 --> 00:30:35,840
which has a lot of space station

919
00:30:41,350 --> 00:30:39,039
robotic arm activity associated with it

920
00:30:42,870 --> 00:30:41,360
we'll have a space station

921
00:30:46,630 --> 00:30:42,880
our space

922
00:30:48,549 --> 00:30:46,640
our ssrms space station robotic arm team

923
00:30:49,669 --> 00:30:48,559
is going to consist of a of a shuttle

924
00:30:51,510 --> 00:30:49,679
and a station crew member it's going to

925
00:30:53,110 --> 00:30:51,520
be mike barrett

926
00:30:54,630 --> 00:30:53,120
and shannon walker who's already up on

927
00:30:56,870 --> 00:30:54,640
space station working together to

928
00:30:59,110 --> 00:30:56,880
operate that space station arm with our

929
00:31:01,269 --> 00:30:59,120
transfer activities with

930
00:31:04,310 --> 00:31:01,279
all of the work we do on the space walks

931
00:31:05,750 --> 00:31:04,320
with the suit prep and eva preparations

932
00:31:08,230 --> 00:31:05,760
and things like that the space station

933
00:31:10,230 --> 00:31:08,240
crews intimately involved

934
00:31:12,310 --> 00:31:10,240
my other philosophy with with with

935
00:31:13,909 --> 00:31:12,320
operations on space station is

936
00:31:15,590 --> 00:31:13,919
we're going to come with the the shuttle

937
00:31:18,070 --> 00:31:15,600
crew comes as the most with the most

938
00:31:20,389 --> 00:31:18,080

recent knowledge and training in

939
00:31:22,070 --> 00:31:20,399
specific tasks but the space station

940
00:31:24,470 --> 00:31:22,080
crew has the benefit of having the most

941
00:31:26,630 --> 00:31:24,480
experience on the actual space station

942
00:31:27,590 --> 00:31:26,640
equipment so what i try to do is i try

943
00:31:29,830 --> 00:31:27,600
to team

944
00:31:31,430 --> 00:31:29,840
the shuttle crew which has the this task

945
00:31:33,750 --> 00:31:31,440
knowledge with the space station crew

946
00:31:35,269 --> 00:31:33,760
which has the expertise

947
00:31:36,870 --> 00:31:35,279
team them together have them work

948
00:31:39,269 --> 00:31:36,880
together now you have the best of both

949
00:31:41,269 --> 00:31:39,279
worlds and hopefully between the two of

950
00:31:42,710 --> 00:31:41,279
them you get to end up with a cohesive

951
00:31:44,870 --> 00:31:42,720
team that has

952
00:31:46,549 --> 00:31:44,880
you know where one plus one is more than

953
00:31:48,310 --> 00:31:46,559
two it's three or four

954
00:31:50,950 --> 00:31:48,320
and let them work as a team so we're

955
00:31:52,710 --> 00:31:50,960
intimately involved back and forth were

956
00:31:54,470 --> 00:31:52,720
i think of us as one crew rather than

957
00:31:57,590 --> 00:31:54,480
two crew and philosophy works pretty

958
00:32:01,750 --> 00:31:59,669
much the same as you did with explaining

959
00:32:03,190 --> 00:32:01,760
how to get the elc-4 out of the payload

960
00:32:05,269 --> 00:32:03,200
band attached to the station could you

961
00:32:07,269 --> 00:32:05,279
do the same with the pmm and and tell us

962
00:32:09,110 --> 00:32:07,279
specifically where it's going to be

963
00:32:10,149 --> 00:32:09,120

attached to

964
00:32:12,310 --> 00:32:10,159
um

965
00:32:15,029 --> 00:32:12,320
it's a little bit simpler robotically

966
00:32:16,789 --> 00:32:15,039
than what we did for the elc

967
00:32:19,029 --> 00:32:16,799
mike and tim are going to go over on

968
00:32:21,350 --> 00:32:19,039
this space station arm and they're going

969
00:32:22,789 --> 00:32:21,360
to grapple the pmm which is sitting in

970
00:32:24,549 --> 00:32:22,799
our payload bay

971
00:32:26,950 --> 00:32:24,559
prior to doing that we're actually going

972
00:32:28,549 --> 00:32:26,960
to hand off our over to boom setzer

973
00:32:30,230 --> 00:32:28,559
system and the reason we're doing that

974
00:32:30,870 --> 00:32:30,240
is for well there's a couple reasons one

975
00:32:34,630 --> 00:32:30,880
is

976
00:32:36,710 --> 00:32:34,640
um the over the obss as we call it sits

977
00:32:38,470 --> 00:32:36,720
right along the edge of the payload bay

978
00:32:39,990 --> 00:32:38,480
and we want to move it out of the way so

979
00:32:41,909 --> 00:32:40,000
that we have more clearance as we pull

980
00:32:44,310 --> 00:32:41,919
this really big payload out of the

981
00:32:45,990 --> 00:32:44,320
payload bay lateral because we only have

982
00:32:47,909 --> 00:32:46,000
a few inches of clearance as we pull it

983
00:32:50,470 --> 00:32:47,919
out so we're going to do this hand off

984
00:32:52,389 --> 00:32:50,480
of obss and essentially what happens is

985
00:32:54,149 --> 00:32:52,399
we grapple that obsess with the space

986
00:32:56,950 --> 00:32:54,159
station arm pull it out put it into

987
00:32:58,630 --> 00:32:56,960
position we do a double grapple with a

988
00:33:01,190 --> 00:32:58,640

shuttle arm

989
00:33:03,590 --> 00:33:01,200
grab it and then the space station arm

990
00:33:06,230 --> 00:33:03,600
releases and then we maneuver that uh

991
00:33:07,990 --> 00:33:06,240
oriented moon sensor system

992
00:33:10,710 --> 00:33:08,000
out of the way and in a good viewing

993
00:33:12,070 --> 00:33:10,720
location for evas and for pmm and a

994
00:33:12,789 --> 00:33:12,080
bunch of other robotics we're going to

995
00:33:13,909 --> 00:33:12,799
do

996
00:33:15,830 --> 00:33:13,919
then they're going to go in and they're

997
00:33:17,750 --> 00:33:15,840
going to grab that pmm they're going to

998
00:33:19,990 --> 00:33:17,760
pull it out of the payload bay and we're

999
00:33:22,870 --> 00:33:20,000
going to stick it on node 1 nader which

1000
00:33:23,990 --> 00:33:22,880
is the we docked a node 2 now node 1 is

1001
00:33:26,470 --> 00:33:24,000
the furthest one and that's where we

1002
00:33:28,310 --> 00:33:26,480
used to talk to before we got the uh all

1003
00:33:29,669 --> 00:33:28,320
of the other equipment up there are we

1004
00:33:31,509 --> 00:33:29,679
used to die i'm sorry we used to dock at

1005
00:33:33,190 --> 00:33:31,519
the front of the lab now we dock from

1006
00:33:35,430 --> 00:33:33,200
the node two but node one is where we

1007
00:33:36,710 --> 00:33:35,440
used to always put the mplms until

1008
00:33:38,470 --> 00:33:36,720
recently

1009
00:33:40,070 --> 00:33:38,480
but we're going to put it there node 1

1010
00:33:41,830 --> 00:33:40,080
nader so it'll be in a permanent

1011
00:33:43,509 --> 00:33:41,840
location up there so robotically just

1012
00:33:46,070 --> 00:33:43,519
comes out of the payload bay

1013
00:33:48,310 --> 00:33:46,080

they move it move it to aft on the space

1014
00:33:50,789 --> 00:33:48,320
station and stick it on node 1. once we

1015
00:33:52,950 --> 00:33:50,799
get it attached there they'll release it

1016
00:33:55,029 --> 00:33:52,960
with the arm once it's attached with the

1017
00:33:56,789 --> 00:33:55,039
common birthing mechanism system

1018
00:33:58,470 --> 00:33:56,799
um and we'll do pressure checks

1019
00:34:00,389 --> 00:33:58,480
overnight we'll make sure it's holding

1020
00:34:01,990 --> 00:34:00,399
good pressure and then the next day

1021
00:34:03,909 --> 00:34:02,000
eric beau is going to go over there with

1022
00:34:05,750 --> 00:34:03,919
scott kelly again an iss and a shuttle

1023
00:34:07,269 --> 00:34:05,760
crew member and they're going to do

1024
00:34:08,869 --> 00:34:07,279
what's called vestibule outfitting and

1025
00:34:10,869 --> 00:34:08,879
that's where they

1026
00:34:13,589 --> 00:34:10,879
open the hatches they they make

1027
00:34:15,990 --> 00:34:13,599
connections um power and and data

1028
00:34:17,990 --> 00:34:16,000
connections between the module and the

1029
00:34:19,750 --> 00:34:18,000
space station turn everything on turn

1030
00:34:21,829 --> 00:34:19,760
the fans on get it activated get the

1031
00:34:24,149 --> 00:34:21,839
final hatch open so that we can start

1032
00:34:27,190 --> 00:34:24,159
doing the logistics and start using it

1033
00:34:31,669 --> 00:34:29,829
this is your your first uh mission since

1034
00:34:33,589 --> 00:34:31,679
sds-121 it's been a while you've been

1035
00:34:35,430 --> 00:34:33,599
chief of the astronaut office for you

1036
00:34:37,349 --> 00:34:35,440
were there for three years

1037
00:34:39,190 --> 00:34:37,359
what's it been like getting back into

1038
00:34:41,510 --> 00:34:39,200

this training thing this training flow

1039
00:34:43,109 --> 00:34:41,520
thing is has it has it been difficult or

1040
00:34:45,190 --> 00:34:43,119
is it kind of like a muscle memory once

1041
00:34:47,190 --> 00:34:45,200
you once you learn how to write it you

1042
00:34:48,710 --> 00:34:47,200
never you never forget well it's been

1043
00:34:52,230 --> 00:34:48,720
interesting because i

1044
00:34:53,589 --> 00:34:52,240
after i flew sts-121 and i i uh

1045
00:34:55,750 --> 00:34:53,599
i got offered

1046
00:34:58,310 --> 00:34:55,760
the astronaut office chief position i

1047
00:34:59,990 --> 00:34:58,320
took that with the intent of

1048
00:35:02,150 --> 00:35:00,000
the intent of never flying again i

1049
00:35:03,270 --> 00:35:02,160
thought i was done flying as it turns

1050
00:35:06,630 --> 00:35:03,280
out

1051
00:35:08,470 --> 00:35:06,640
other people had different plans for me

1052
00:35:10,310 --> 00:35:08,480
so when it got assigned so

1053
00:35:11,829 --> 00:35:10,320
you know for the last three years as

1054
00:35:14,470 --> 00:35:11,839
chief i was involved in every single

1055
00:35:17,109 --> 00:35:14,480
space station and space shuttle mission

1056
00:35:19,670 --> 00:35:17,119
you know intimately except i was working

1057
00:35:21,190 --> 00:35:19,680
as a manager and working at really from

1058
00:35:23,030 --> 00:35:21,200
the ground side during the execution of

1059
00:35:25,750 --> 00:35:23,040
the missions and kind of keeping an eye

1060
00:35:27,589 --> 00:35:25,760
on the training but um you know i was i

1061
00:35:30,310 --> 00:35:27,599
was enabling other crews to do these

1062
00:35:31,829 --> 00:35:30,320
jobs not me and so i kind of and other

1063
00:35:34,310 --> 00:35:31,839

than going in the simulator once in a

1064
00:35:35,829 --> 00:35:34,320
while as an instructor pilot um just to

1065
00:35:37,589 --> 00:35:35,839
see how crews were doing and providing

1066
00:35:39,270 --> 00:35:37,599
some feedback uh you know as they're as

1067
00:35:41,030 --> 00:35:39,280
they're going through their training or

1068
00:35:42,870 --> 00:35:41,040
or maybe end up upgrading a new space

1069
00:35:45,270 --> 00:35:42,880
shuttle commander or something i wasn't

1070
00:35:46,710 --> 00:35:45,280
really i wasn't at all staying current

1071
00:35:48,950 --> 00:35:46,720
in the simulator and current in the

1072
00:35:50,790 --> 00:35:48,960
latest things and so when i got assigned

1073
00:35:52,310 --> 00:35:50,800
to this flight i kind of had to going to

1074
00:35:54,230 --> 00:35:52,320
start over and i was wondering myself

1075
00:35:55,910 --> 00:35:54,240
you know i wonder how much i remember or

1076
00:35:58,710 --> 00:35:55,920
what's you know how much i'm not going

1077
00:36:00,390 --> 00:35:58,720
to but it is most of it is very similar

1078
00:36:02,069 --> 00:36:00,400
to what i did before so

1079
00:36:03,750 --> 00:36:02,079
most of it came back i was a little

1080
00:36:05,430 --> 00:36:03,760
rusty on some things but it all came

1081
00:36:07,510 --> 00:36:05,440
back pretty quickly

1082
00:36:08,710 --> 00:36:07,520
but believe it or not in three years and

1083
00:36:10,870 --> 00:36:08,720
we've been doing flying shuttles for

1084
00:36:13,030 --> 00:36:10,880
almost 30 years now it's amazing how

1085
00:36:14,950 --> 00:36:13,040
much stuff changes in three years do the

1086
00:36:16,390 --> 00:36:14,960
little things that change and sometimes

1087
00:36:18,870 --> 00:36:16,400
i find myself

1088
00:36:20,710 --> 00:36:18,880

well we need to do this because of i was

1089
00:36:22,150 --> 00:36:20,720
for example we were just down at kennedy

1090
00:36:24,310 --> 00:36:22,160
space center looking at the orbiter and

1091
00:36:25,750 --> 00:36:24,320
i was looking at some uh some switches

1092
00:36:27,430 --> 00:36:25,760
on the aft panel that controlled some

1093
00:36:29,030 --> 00:36:27,440
payload bay lights and

1094
00:36:30,710 --> 00:36:29,040
you know said well yeah i mean this

1095
00:36:32,230 --> 00:36:30,720
controls this light and this light and

1096
00:36:34,390 --> 00:36:32,240
then the folks at kennedy space center

1097
00:36:36,550 --> 00:36:34,400
are telling me oh well we removed those

1098
00:36:38,790 --> 00:36:36,560
lights you know two or three flows again

1099
00:36:40,310 --> 00:36:38,800
go you know like a year ago and i didn't

1100
00:36:42,150 --> 00:36:40,320
even realize they'd removed the lights

1101
00:36:44,069 --> 00:36:42,160
and so some of those things have changed

1102
00:36:46,550 --> 00:36:44,079
or sometimes i'll remember well we did

1103
00:36:47,670 --> 00:36:46,560
it this way and then i realized well no

1104
00:36:49,349 --> 00:36:47,680
that was

1105
00:36:51,030 --> 00:36:49,359
you know six years ago we don't do it

1106
00:36:53,109 --> 00:36:51,040
that way anymore so

1107
00:36:55,190 --> 00:36:53,119
i just haven't been having a brush up on

1108
00:36:56,790 --> 00:36:55,200
or relearn those things that have

1109
00:36:58,390 --> 00:36:56,800
changed but for the most part it's all

1110
00:37:00,550 --> 00:36:58,400
come back to me and i've had i have a

1111
00:37:02,150 --> 00:37:00,560
great crew that's experienced and they

1112
00:37:04,310 --> 00:37:02,160
watch out for me and

1113
00:37:06,790 --> 00:37:04,320

make sure they they get get me up to

1114
00:37:09,510 --> 00:37:06,800
speed with the latest so uh so it's it's

1115
00:37:11,349 --> 00:37:09,520
been it's been a it's been a

1116
00:37:12,790 --> 00:37:11,359
you know a few challenges there but for

1117
00:37:15,510 --> 00:37:12,800
the most part it's been a really uh

1118
00:37:18,150 --> 00:37:15,520
really fun transition and uh in terms of

1119
00:37:19,430 --> 00:37:18,160
uh in terms of stress this is a lot less

1120
00:37:20,829 --> 00:37:19,440
stressful than

1121
00:37:22,390 --> 00:37:20,839
being cheap to the

1122
00:37:25,910 --> 00:37:22,400
office

1123
00:37:27,670 --> 00:37:25,920
i can imagine so there's no comparison

1124
00:37:29,430 --> 00:37:27,680
none at all

1125
00:37:31,349 --> 00:37:29,440
okay

1126
00:37:33,990 --> 00:37:31,359
uh after your work on station is

1127
00:37:37,510 --> 00:37:34,000
complete you'll undock from station and

1128
00:37:39,030 --> 00:37:37,520
prepare for your trip back to earth

1129
00:37:41,190 --> 00:37:39,040
it might be one of the last

1130
00:37:42,710 --> 00:37:41,200
opportunities that that that anybody

1131
00:37:44,310 --> 00:37:42,720
gets a chance to see

1132
00:37:46,069 --> 00:37:44,320
station from that vantage point from

1133
00:37:48,470 --> 00:37:46,079
inside of a shuttle as you sit here

1134
00:37:49,589 --> 00:37:48,480
today trying to imagine

1135
00:37:52,150 --> 00:37:49,599
what that's going to be like what what

1136
00:37:55,670 --> 00:37:52,160
what comes to your mind

1137
00:37:57,829 --> 00:37:55,680
what what comes to my mind is uh

1138
00:37:59,829 --> 00:37:57,839

and what i and i i tell the new

1139
00:38:01,030 --> 00:37:59,839
astronauts when i was chief you know

1140
00:38:03,030 --> 00:38:01,040
before they're going up on their first

1141
00:38:04,870 --> 00:38:03,040
flights i tell them that there's some

1142
00:38:06,069 --> 00:38:04,880
things you should do uh when you're up

1143
00:38:08,069 --> 00:38:06,079
there obviously you're up there to

1144
00:38:09,990 --> 00:38:08,079
accomplish an objective to accomplish

1145
00:38:11,589 --> 00:38:10,000
the mission and that's your primary

1146
00:38:13,270 --> 00:38:11,599
that's primary that's the only reason

1147
00:38:14,870 --> 00:38:13,280
you're really going you're not going to

1148
00:38:16,630 --> 00:38:14,880
experience we don't we don't fly into

1149
00:38:18,790 --> 00:38:16,640
space to experience space it's not a

1150
00:38:19,990 --> 00:38:18,800
tourist ride it's not a it's not a jury

1151
00:38:21,750 --> 00:38:20,000
right we're there to accomplish an

1152
00:38:24,950 --> 00:38:21,760
objective and that's the satisfaction is

1153
00:38:26,630 --> 00:38:24,960
getting difficult objectives done but

1154
00:38:27,910 --> 00:38:26,640
a byproduct going up there is you do get

1155
00:38:29,910 --> 00:38:27,920
to experience it one of the things i

1156
00:38:32,630 --> 00:38:29,920
tell new astronauts is is make some

1157
00:38:34,390 --> 00:38:32,640
memories in your mind you know remember

1158
00:38:35,910 --> 00:38:34,400
doing this remember what it was like to

1159
00:38:37,270 --> 00:38:35,920
do this remember what this remember what

1160
00:38:38,630 --> 00:38:37,280
it looked like the first time you looked

1161
00:38:40,390 --> 00:38:38,640
at the earth remember when you what it

1162
00:38:42,470 --> 00:38:40,400
looked like when you looked at something

1163
00:38:43,750 --> 00:38:42,480

significant to you like your hometown or

1164
00:38:45,430 --> 00:38:43,760
something like that

1165
00:38:46,790 --> 00:38:45,440
so i think when we undock and fly around

1166
00:38:49,030 --> 00:38:46,800
space station

1167
00:38:51,030 --> 00:38:49,040
what i'll be trying to do is

1168
00:38:53,190 --> 00:38:51,040
is remembering what it looks like

1169
00:38:56,470 --> 00:38:53,200
capture some moments that i won't ever

1170
00:38:58,390 --> 00:38:56,480
forget because we can capture it on film

1171
00:39:00,069 --> 00:38:58,400
and you can get we've got great cameras

1172
00:39:02,230 --> 00:39:00,079
we get great pictures and we will get

1173
00:39:04,790 --> 00:39:02,240
great pictures but that still doesn't do

1174
00:39:07,030 --> 00:39:04,800
it justice what what it actually is when

1175
00:39:08,550 --> 00:39:07,040
you actually see it

1176
00:39:10,310 --> 00:39:08,560
every time i've come back from a space

1177
00:39:13,670 --> 00:39:10,320
flight about usually about two weeks

1178
00:39:15,270 --> 00:39:13,680
later it's i i wake up asking myself was

1179
00:39:16,710 --> 00:39:15,280
i really there because it's so different

1180
00:39:19,510 --> 00:39:16,720
than being on earth

1181
00:39:22,069 --> 00:39:19,520
it's it and i can't even describe it in

1182
00:39:24,230 --> 00:39:22,079
words but it's just so unique so what i

1183
00:39:26,150 --> 00:39:24,240
will be trying to do is we undock

1184
00:39:28,470 --> 00:39:26,160
besides making sure we do it right and

1185
00:39:30,550 --> 00:39:28,480
and safely and successfully is is trying

1186
00:39:31,910 --> 00:39:30,560
to capture that mental picture what

1187
00:39:33,829 --> 00:39:31,920
space station looks like i'm really

1188
00:39:36,150 --> 00:39:33,839

looking forward to seeing the space

1189
00:39:38,470 --> 00:39:36,160
station which is at least twice the size

1190
00:39:41,510 --> 00:39:38,480
as it was last time i saw it and to see

1191
00:39:43,910 --> 00:39:41,520
it all built up after these 10 years of

1192
00:39:45,510 --> 00:39:43,920
wondering whether you know when is it

1193
00:39:46,470 --> 00:39:45,520
are we going to get this done can we get

1194
00:39:48,550 --> 00:39:46,480
this done

1195
00:39:49,990 --> 00:39:48,560
all of these modules can't possibly fit

1196
00:39:51,750 --> 00:39:50,000
together that was my thinking because

1197
00:39:53,510 --> 00:39:51,760
you we never end and tested the whole

1198
00:39:54,950 --> 00:39:53,520
space station because we'd had

1199
00:39:57,349 --> 00:39:54,960
elements up there while the elements

1200
00:39:58,790 --> 00:39:57,359
were still being built and for it to for

1201
00:40:00,390 --> 00:39:58,800
you to go up the first time and

1202
00:40:02,390 --> 00:40:00,400
everything put together still just

1203
00:40:07,910 --> 00:40:02,400
amazes me and so i'm looking forward to

1204
00:40:13,510 --> 00:40:10,630
this mission is scheduled right now to

1205
00:40:15,510 --> 00:40:13,520
be one of the final shuttle flights

1206
00:40:18,870 --> 00:40:15,520
what does it mean to you to have had a

1207
00:40:20,870 --> 00:40:18,880
part in the space shuttle program

1208
00:40:23,589 --> 00:40:20,880
it's something that's considered

1209
00:40:26,550 --> 00:40:23,599
an american institution

1210
00:40:28,550 --> 00:40:26,560
well i consider myself very fortunate

1211
00:40:29,750 --> 00:40:28,560
and uh considered a privilege to be part

1212
00:40:31,670 --> 00:40:29,760
of this team

1213
00:40:33,750 --> 00:40:31,680

the space shuttle when i think space

1214
00:40:35,750 --> 00:40:33,760
shuttle i don't think about a vehicle i

1215
00:40:38,309 --> 00:40:35,760
think about team i think about people

1216
00:40:39,750 --> 00:40:38,319
that's what it's really about

1217
00:40:40,870 --> 00:40:39,760
the space shuttle is an incredible

1218
00:40:41,910 --> 00:40:40,880
vehicle

1219
00:40:44,230 --> 00:40:41,920
you know

1220
00:40:45,750 --> 00:40:44,240
first started flying 30 years ago but

1221
00:40:47,910 --> 00:40:45,760
even if you look at today i'm still

1222
00:40:49,750 --> 00:40:47,920
amazed at the technology

1223
00:40:52,470 --> 00:40:49,760
to build something that could carry this

1224
00:40:55,109 --> 00:40:52,480
much payload into orbit and uh you know

1225
00:40:57,829 --> 00:40:55,119
take off vertically land on a right

1226
00:40:59,510 --> 00:40:57,839
runway serve as a a rocket ship an

1227
00:41:02,390 --> 00:40:59,520
orbiting laboratory

1228
00:41:03,510 --> 00:41:02,400
you know a docking ship a uh robotics

1229
00:41:05,589 --> 00:41:03,520
platform

1230
00:41:08,309 --> 00:41:05,599
and land like an airplane i mean that's

1231
00:41:09,990 --> 00:41:08,319
pretty incredible and so that's uh

1232
00:41:11,670 --> 00:41:10,000
i consider an honor to be a part of it

1233
00:41:13,190 --> 00:41:11,680
to be involved essentially with the last

1234
00:41:15,030 --> 00:41:13,200
half of the space shuttle program and

1235
00:41:17,270 --> 00:41:15,040
seeing all this happen and then

1236
00:41:19,270 --> 00:41:17,280
to take this space shuttle

1237
00:41:21,270 --> 00:41:19,280
and do things with it we never intended

1238
00:41:23,829 --> 00:41:21,280

to do and then eventually build this

1239
00:41:25,270 --> 00:41:23,839
fantastic space station that is kind of

1240
00:41:27,510 --> 00:41:25,280
the legacy of the space shuttle that's

1241
00:41:29,349 --> 00:41:27,520
going to live beyond the shuttle um

1242
00:41:31,030 --> 00:41:29,359
that's what i think about it so it's

1243
00:41:32,870 --> 00:41:31,040
it's important to me i feel very

1244
00:41:35,430 --> 00:41:32,880
privileged i think it's

1245
00:41:37,910 --> 00:41:35,440
a unique part in our history that

1246
00:41:39,510 --> 00:41:37,920
i feel very privileged to be a part of

1247
00:41:41,750 --> 00:41:39,520
much like probably the folks felt like

1248
00:41:43,589 --> 00:41:41,760
that were involved in apollo or or

1249
00:41:46,550 --> 00:41:43,599
gemini or mercury or any big program

1250
00:41:52,150 --> 00:41:49,589
you've flown on discovery several times

1251
00:41:55,750 --> 00:41:52,160
i believe iphone on discovery twice and

1252
00:41:56,470 --> 00:41:55,760
one more to come here okay uh

1253
00:41:58,470 --> 00:41:56,480
it's

1254
00:42:01,910 --> 00:41:58,480
the most accomplished orbiter in the

1255
00:42:02,950 --> 00:42:01,920
fleet um if you had to compile a list of

1256
00:42:04,069 --> 00:42:02,960
just

1257
00:42:06,230 --> 00:42:04,079
based on

1258
00:42:07,589 --> 00:42:06,240
on off the top of your head knowledge of

1259
00:42:08,309 --> 00:42:07,599
what you know about what discovery is

1260
00:42:09,750 --> 00:42:08,319
done

1261
00:42:12,069 --> 00:42:09,760
if you have to compile a list of its

1262
00:42:14,470 --> 00:42:12,079
greatest hits so to speak

1263
00:42:16,390 --> 00:42:14,480

tell me which missions

1264
00:42:18,150 --> 00:42:16,400
or events

1265
00:42:20,230 --> 00:42:18,160
would have to be on that list well

1266
00:42:22,069 --> 00:42:20,240
there's a lot the ones i'll focus on

1267
00:42:24,069 --> 00:42:22,079
though are the ones that

1268
00:42:25,829 --> 00:42:24,079
that i think of and there's you know

1269
00:42:27,270 --> 00:42:25,839
it's been some some of the deployment of

1270
00:42:29,829 --> 00:42:27,280
the great observatories and things like

1271
00:42:31,190 --> 00:42:29,839
that and um but what i think about is is

1272
00:42:32,309 --> 00:42:31,200
it's uh

1273
00:42:33,910 --> 00:42:32,319
um

1274
00:42:36,390 --> 00:42:33,920
it's flown all three of the return to

1275
00:42:38,230 --> 00:42:36,400
flight missions um

1276
00:42:39,430 --> 00:42:38,240
you know and probably the the most

1277
00:42:41,589 --> 00:42:39,440
difficult

1278
00:42:43,430 --> 00:42:41,599
parts in the in the shuttle program

1279
00:42:45,510 --> 00:42:43,440
we're recovering from the two accidents

1280
00:42:47,190 --> 00:42:45,520
we had and

1281
00:42:48,950 --> 00:42:47,200
you know those were very traumatic times

1282
00:42:49,990 --> 00:42:48,960
i wasn't here for challenger but i you

1283
00:42:52,069 --> 00:42:50,000
know talking to the folks that were

1284
00:42:53,349 --> 00:42:52,079
around i know how traumatic that was i

1285
00:42:54,790 --> 00:42:53,359
was here in the middle of the whole

1286
00:42:56,150 --> 00:42:54,800
columbia thing

1287
00:42:57,510 --> 00:42:56,160
and recovered from that and actually

1288
00:42:58,790 --> 00:42:57,520

flew the second return to flight test

1289
00:43:00,710 --> 00:42:58,800
mission

1290
00:43:03,270 --> 00:43:00,720
after columbia

1291
00:43:04,470 --> 00:43:03,280
in those missions you know recovering

1292
00:43:06,630 --> 00:43:04,480
basically

1293
00:43:08,950 --> 00:43:06,640
recovering the program from from a

1294
00:43:10,870 --> 00:43:08,960
disaster and getting it back on track

1295
00:43:12,390 --> 00:43:10,880
again i think that's what discovery will

1296
00:43:14,710 --> 00:43:12,400
be remembered for

1297
00:43:16,630 --> 00:43:14,720
at least in my mind and as as the most

1298
00:43:18,790 --> 00:43:16,640
significant because

1299
00:43:20,470 --> 00:43:18,800
you know this deploying

1300
00:43:21,990 --> 00:43:20,480
it's flowing all kinds of fantastic

1301
00:43:23,589 --> 00:43:22,000
missions i mean i also got to fly it

1302
00:43:24,950 --> 00:43:23,599
with the you know as a pilot on the

1303
00:43:26,630 --> 00:43:24,960
flight with john glenn and that was a

1304
00:43:28,790 --> 00:43:26,640
really neat flight to be on but those

1305
00:43:30,150 --> 00:43:28,800
return to flight test missions

1306
00:43:31,589 --> 00:43:30,160
you know by accomplishing those

1307
00:43:34,309 --> 00:43:31,599
successfully

1308
00:43:36,710 --> 00:43:34,319
into unknown after an accident and

1309
00:43:39,190 --> 00:43:36,720
uncertainty on whether in in you know

1310
00:43:41,030 --> 00:43:39,200
uncertainty not just in have we made the

1311
00:43:43,030 --> 00:43:41,040
repairs necessary

1312
00:43:45,109 --> 00:43:43,040
to continue flying this as safe as we

1313
00:43:47,670 --> 00:43:45,119

can but also

1314
00:43:49,589 --> 00:43:47,680
to get our confidence back after after a

1315
00:43:51,430 --> 00:43:49,599
major accident that we could continue we

1316
00:43:53,109 --> 00:43:51,440
can still operate this vehicle safely

1317
00:43:55,510 --> 00:43:53,119
and successfully and we can still do our

1318
00:43:56,950 --> 00:43:55,520
job those missions were turning points

1319
00:43:59,030 --> 00:43:56,960
because when they were successful they

1320
00:44:00,710 --> 00:43:59,040
allowed us to continue the space shuttle

1321
00:44:02,150 --> 00:44:00,720
program in the case of columbia they

1322
00:44:03,670 --> 00:44:02,160
allowed us to continue space station

1323
00:44:05,670 --> 00:44:03,680
assembly and complete space station

1324
00:44:07,910 --> 00:44:05,680
assembly so those are the missions in my

1325
00:44:09,349 --> 00:44:07,920
mind that are the most significant about

1326
00:44:11,589 --> 00:44:09,359
discovery but discovery it seems like

1327
00:44:13,270 --> 00:44:11,599
discovery's been around and hit

1328
00:44:14,950 --> 00:44:13,280
almost every major thing that's happened

1329
00:44:16,470 --> 00:44:14,960
in the shuttle program and it's just you

1330
00:44:17,990 --> 00:44:16,480
know it's just luck of the draw just

1331
00:44:19,670 --> 00:44:18,000
works out that way because of the

1332
00:44:21,349 --> 00:44:19,680
processing flow

1333
00:44:22,710 --> 00:44:21,359
but it's it's it's interesting that

1334
00:44:24,630 --> 00:44:22,720
discovery's done all those things which

1335
00:44:25,910 --> 00:44:24,640
i think is why it's really appropriate i

1336
00:44:31,270 --> 00:44:25,920
think the discovery ends up the

1337
00:44:35,190 --> 00:44:33,430
how would you characterize

1338
00:44:38,790 --> 00:44:35,200

what space shuttle has meant to the

1339
00:44:45,349 --> 00:44:38,800
advancement of human space exploration

1340
00:44:55,750 --> 00:44:47,430
i think

1341
00:44:57,829 --> 00:44:55,760
of uh you know launching like a rocket

1342
00:45:00,230 --> 00:44:57,839
landing like an airplane

1343
00:45:01,190 --> 00:45:00,240
i think that model will be used in the

1344
00:45:02,870 --> 00:45:01,200
future

1345
00:45:03,990 --> 00:45:02,880
and i think in and i don't know how many

1346
00:45:06,309 --> 00:45:04,000
years in the future that's really going

1347
00:45:07,190 --> 00:45:06,319
to be 50 years 100 years you pick your

1348
00:45:08,870 --> 00:45:07,200
time

1349
00:45:11,109 --> 00:45:08,880
i think someday we'll be going in and

1350
00:45:13,270 --> 00:45:11,119
out of low earth orbit in that manner

1351
00:45:15,349 --> 00:45:13,280
and and using using our infrastructure

1352
00:45:17,349 --> 00:45:15,359
of runways and you know taking off and

1353
00:45:19,349 --> 00:45:17,359
landing and going into space that way so

1354
00:45:20,790 --> 00:45:19,359
that model will be used

1355
00:45:22,309 --> 00:45:20,800
um

1356
00:45:24,150 --> 00:45:22,319
what with the space

1357
00:45:26,390 --> 00:45:24,160
the space shuttle i think was way way

1358
00:45:28,230 --> 00:45:26,400
ahead of its time in in that we

1359
00:45:29,030 --> 00:45:28,240
developed that very early

1360
00:45:30,710 --> 00:45:29,040
um

1361
00:45:32,950 --> 00:45:30,720
we're able to do that successfully with

1362
00:45:34,630 --> 00:45:32,960
the shuttle but in the process of doing

1363
00:45:35,990 --> 00:45:34,640

that we ended up with a very complex

1364
00:45:37,829 --> 00:45:36,000
vehicle

1365
00:45:39,670 --> 00:45:37,839
difficult to maintain

1366
00:45:40,870 --> 00:45:39,680
complex to operate and that was a

1367
00:45:41,990 --> 00:45:40,880
byproduct of that so i think in the

1368
00:45:43,349 --> 00:45:42,000
future we'll do that but i think we'll

1369
00:45:45,510 --> 00:45:43,359
learn all of these things from the

1370
00:45:47,510 --> 00:45:45,520
shuttle and the next vehicle we build

1371
00:45:49,270 --> 00:45:47,520
hopefully will be simpler and simpler to

1372
00:45:51,030 --> 00:45:49,280
operate and we'll learn a lot from that

1373
00:45:53,030 --> 00:45:51,040
the way i describe the space shuttle to

1374
00:45:55,109 --> 00:45:53,040
others is when you really look at the

1375
00:45:56,870 --> 00:45:55,119
space shuttle and its capability you can

1376
00:45:59,109 --> 00:45:56,880
do everything

1377
00:46:00,950 --> 00:45:59,119
everything you can think of in space

1378
00:46:02,870 --> 00:46:00,960
except for one thing it can't leave low

1379
00:46:04,550 --> 00:46:02,880
earth orbit but it can do everything

1380
00:46:07,190 --> 00:46:04,560
else it can do robotics it can do

1381
00:46:08,630 --> 00:46:07,200
science it can do it can go dock you

1382
00:46:11,109 --> 00:46:08,640
know when you talk with a space station

1383
00:46:13,349 --> 00:46:11,119
in the end you have to maintain a

1384
00:46:15,510 --> 00:46:13,359
a three inch corridor in one degree of

1385
00:46:17,510 --> 00:46:15,520
attitude error and you can easily fly

1386
00:46:19,430 --> 00:46:17,520
the shuttle manually and maintain that i

1387
00:46:22,150 --> 00:46:19,440
mean that's unbelievable for a

1388
00:46:23,990 --> 00:46:22,160

you know for a you know 120 ton vehicle

1389
00:46:27,510 --> 00:46:24,000
to be able to do that so it can do

1390
00:46:30,309 --> 00:46:27,520
everything except leave low earth orbit

1391
00:46:32,790 --> 00:46:30,319
and so in terms of capabilities of a uh

1392
00:46:34,069 --> 00:46:32,800
of a spacecraft in low earth orbit i

1393
00:46:36,150 --> 00:46:34,079
don't think there's going to be another

1394
00:46:37,990 --> 00:46:36,160
one that's ever going to match the

1395
00:46:39,670 --> 00:46:38,000
versatility

1396
00:46:41,430 --> 00:46:39,680
of the space shuttle and i think that's

1397
00:46:43,030 --> 00:46:41,440
the legacy

1398
00:46:44,550 --> 00:46:43,040
all the things we've the systems we've

1399
00:46:46,710 --> 00:46:44,560
developed and things we've done on space

1400
00:46:50,309 --> 00:46:46,720
station on space shuttle

1401
00:46:52,390 --> 00:46:50,319
have all had um impacts in our society i

1402
00:46:54,309 --> 00:46:52,400
mean literally any room you walk in

1403
00:46:56,150 --> 00:46:54,319
anything you do during the day you can

1404
00:46:57,430 --> 00:46:56,160
point at things in that room and say

1405
00:46:59,109 --> 00:46:57,440
that came out of the space program this

1406
00:47:01,190 --> 00:46:59,119
came from shuttle this came from apollo

1407
00:47:02,550 --> 00:47:01,200
this came from space station and you can

1408
00:47:03,670 --> 00:47:02,560
see it all around you now the public's

1409
00:47:05,910 --> 00:47:03,680
not real

1410
00:47:07,349 --> 00:47:05,920
uh aware of all of that but all of this

1411
00:47:08,790 --> 00:47:07,359
stuff that we use

1412
00:47:10,790 --> 00:47:08,800
all of it came from it and it's very

1413
00:47:12,230 --> 00:47:10,800

hard to measure but it's all there if

1414
00:47:13,990 --> 00:47:12,240
you really think about it and i think

1415
00:47:16,069 --> 00:47:14,000
that's the legacy i think it'll it's the

1416
00:47:17,670 --> 00:47:16,079
legacy is all these things came out of