1
00:00:19,990 --> 00:00:17,269
why did you want to be an astronaut

2
00:00:22,390 --> 00:00:20,000
when i was three years old i remember

3
00:00:24,390 --> 00:00:22,400
watching people walk on the moon

4
00:00:26,230 --> 00:00:24,400
and i knew right then and there that's

5
00:00:27,589 --> 00:00:26,240
something i wanted to do

6
00:00:29,269 --> 00:00:27,599
so

7
00:00:31,830 --> 00:00:29,279
what nasa does

8
00:00:34,790 --> 00:00:31,840
is to inspire the next generation of

9
00:00:36,470 --> 00:00:34,800
explorers and i'm i'm living proof and

10
00:00:40,229 --> 00:00:36,480
this happens all the time

11
00:00:42,470 --> 00:00:40,239
we have such a captivating mission

12
00:00:45,910 --> 00:00:42,480
in what we're doing and people around

13
00:00:48,630 --> 00:00:45,920

the planet know who nasa is who we are

14
00:00:51,189 --> 00:00:48,640
and what we do and it's great to be part

15
00:00:52,630 --> 00:00:51,199
of that team and i was really thrilled

16
00:00:56,389 --> 00:00:52,640
to know that there was room for me at

17
00:00:58,470 --> 00:00:56,399
nasa and i'm hoping to be able to to say

18
00:01:00,310 --> 00:00:58,480
to everyone out there that hey there's

19
00:01:04,390 --> 00:01:00,320
room for you at nasa you got to study

20
00:01:06,469 --> 00:01:04,400
hard work hard and uh and hopefully

21
00:01:08,710 --> 00:01:06,479
what we're doing now inspires even the

22
00:01:10,870 --> 00:01:08,720
next generation of explorers well let's

23
00:01:13,030 --> 00:01:10,880
use your story as an example here start

24
00:01:14,390 --> 00:01:13,040
by telling me about your hometown and

25
00:01:15,670 --> 00:01:14,400
what it was like for you growing up

26
00:01:17,830 --> 00:01:15,680
around pittsburgh pennsylvania

27
00:01:19,109 --> 00:01:17,840
pittsburgh pennsylvania finest city on

28
00:01:21,749 --> 00:01:19,119
the planet earth

29
00:01:25,190 --> 00:01:21,759
and it's a great place to grow up

30
00:01:25,990 --> 00:01:25,200
people work hard and value education

31
00:01:28,469 --> 00:01:26,000
there's

32
00:01:30,149 --> 00:01:28,479
so many cultural and educational

33
00:01:32,149 --> 00:01:30,159
resources in the city

34
00:01:33,830 --> 00:01:32,159
and i was the oldest of nine kids we

35
00:01:35,749 --> 00:01:33,840
didn't have a lot of money but we're

36
00:01:37,990 --> 00:01:35,759
still able to spend time in planetariums

37
00:01:41,510 --> 00:01:38,000
and the museums and the science centers

38
00:01:43,670 --> 00:01:41,520

that are all over the city i had a

39
00:01:45,429 --> 00:01:43,680
benefit and blessing to be able to

40
00:01:47,030 --> 00:01:45,439
to to go to

41
00:01:48,630 --> 00:01:47,040
a private high school

42
00:01:51,350 --> 00:01:48,640
i had to work on the weekends to make it

43
00:01:53,190 --> 00:01:51,360
happen but the school made it work too

44
00:01:54,950 --> 00:01:53,200
and i had a great excellent

45
00:01:56,630 --> 00:01:54,960
education in high school

46
00:01:58,389 --> 00:01:56,640
studying science and math and all the

47
00:02:00,550 --> 00:01:58,399
things that really excited me as well as

48
00:02:02,709 --> 00:02:00,560
english and language turns out that

49
00:02:03,510 --> 00:02:02,719
those are those are important too

50
00:02:04,469 --> 00:02:03,520
and

51
00:02:06,709 --> 00:02:04,479
so i

52
00:02:09,350 --> 00:02:06,719
was able through air force rotc

53
00:02:11,589 --> 00:02:09,360
scholarship attend mit the massachusetts

54
00:02:12,949 --> 00:02:11,599
institute of technology where we really

55
00:02:15,110 --> 00:02:12,959
started to get into rockets and

56
00:02:17,589 --> 00:02:15,120
airplanes and i couldn't have been more

57
00:02:20,309 --> 00:02:17,599
happier and then the jobs that i've had

58
00:02:22,229 --> 00:02:20,319
in the air force you know flying in high

59
00:02:24,550 --> 00:02:22,239
performance airplanes attending the air

60
00:02:26,550 --> 00:02:24,560
force test pilot school as an engineer

61
00:02:29,030 --> 00:02:26,560
and then getting to go to you know work

62
00:02:31,030 --> 00:02:29,040
here at nasa i mean it's been one dream

63
00:02:34,229 --> 00:02:31,040

job after another it sounds like you

64
00:02:35,910 --> 00:02:34,239
have a pretty strong feeling that

65
00:02:37,110 --> 00:02:35,920
the people in the place where you grew

66
00:02:39,670 --> 00:02:37,120
up were

67
00:02:40,710 --> 00:02:39,680
instrumental in making you the person

68
00:02:41,670 --> 00:02:40,720
you are

69
00:02:44,630 --> 00:02:41,680
i was

70
00:02:47,750 --> 00:02:44,640
the oldest of nine kids my parents

71
00:02:49,830 --> 00:02:47,760
worked very hard to make sure that

72
00:02:51,589 --> 00:02:49,840
that we had the best education possible

73
00:02:53,750 --> 00:02:51,599
and i'm always very thankful to my

74
00:02:56,869 --> 00:02:53,760
parents and my grandparents as well as

75
00:02:58,550 --> 00:02:56,879
my friends and family along the way and

76
00:03:00,470 --> 00:02:58,560
then there's always the the special

77
00:03:01,990 --> 00:03:00,480
teachers the mentors that we we've all

78
00:03:05,030 --> 00:03:02,000
had that we remember

79
00:03:07,750 --> 00:03:05,040
and so my goal now is to be that kind of

80
00:03:11,030 --> 00:03:07,760
person and help the you know the the

81
00:03:14,470 --> 00:03:11,040
people that come after me to be as good

82
00:03:16,949 --> 00:03:14,480
of a mentor or or to give encouragement

83
00:03:19,350 --> 00:03:16,959
uh be an inspiration and that's how i

84
00:03:21,430 --> 00:03:19,360
can pay back those those those teachers

85
00:03:22,949 --> 00:03:21,440
that had patience and boy that had a lot

86
00:03:24,229 --> 00:03:22,959
of patience with me

87
00:03:26,390 --> 00:03:24,239
did you get it

88
00:03:28,550 --> 00:03:26,400

you must have had a good chance to see

89
00:03:29,830 --> 00:03:28,560
the area from space oh my god being up

90
00:03:32,149 --> 00:03:29,840
there for a year

91
00:03:35,030 --> 00:03:32,159
yes we would fly over and i try to catch

92
00:03:35,990 --> 00:03:35,040
a view of the pirates game or steelers

93
00:03:38,630 --> 00:03:36,000
game

94
00:03:40,390 --> 00:03:38,640
in the new stadiums that we have but

95
00:03:42,710 --> 00:03:40,400
i was able to take some really nice

96
00:03:44,390 --> 00:03:42,720
photos of the area it's kind of tough

97
00:03:46,550 --> 00:03:44,400
finding any particular spot on the

98
00:03:48,630 --> 00:03:46,560
planet when you're traveling 17 500

99
00:03:50,309 --> 00:03:48,640
miles an hour but if you've been up

100
00:03:51,990 --> 00:03:50,319
there for a while like we were on the

101
00:03:53,509 --> 00:03:52,000
international space station you get to

102
00:03:55,429 --> 00:03:53,519
know our planet pretty well and know

103
00:03:57,190 --> 00:03:55,439
some of the tricks so we would be

104
00:03:59,270 --> 00:03:57,200
screaming in coming from the north to

105
00:04:02,309 --> 00:03:59,280
the south over lake erie i could find

106
00:04:03,830 --> 00:04:02,319
interstate 79 i-79 and find the three

107
00:04:05,589 --> 00:04:03,840
rivers in the greater international

108
00:04:07,429 --> 00:04:05,599
airport pittsburgh international airport

109
00:04:09,190 --> 00:04:07,439
click click so i was even able to see my

110
00:04:10,710 --> 00:04:09,200
dad's house my mom my mom and dad's

111
00:04:13,110 --> 00:04:10,720
house from space

112
00:04:14,630 --> 00:04:13,120
and uh so that's one of my my treasured

113
00:04:16,870 --> 00:04:14,640

photos

114
00:04:20,150 --> 00:04:16,880
uh you mentioned that you went to a

115
00:04:23,590 --> 00:04:20,160
private high school in pittsburgh and

116
00:04:25,430 --> 00:04:23,600
from there uh out into the world tel

117
00:04:26,830 --> 00:04:25,440
fill in the details on that tell me

118
00:04:28,790 --> 00:04:26,840
about your education and your

119
00:04:31,749 --> 00:04:28,800
professional course that led you to

120
00:04:34,390 --> 00:04:31,759
becoming an astronaut yeah so

121
00:04:36,469 --> 00:04:34,400
and and i i try to share this with kids

122
00:04:38,230 --> 00:04:36,479
it's like find something you like and

123
00:04:40,790 --> 00:04:38,240
then just go for it and be the best at

124
00:04:42,390 --> 00:04:40,800
it because you know i really enjoyed

125
00:04:45,510 --> 00:04:42,400
rockets and airplanes that's all i could

126
00:04:46,950 --> 00:04:45,520
think about and so i wanted to go to

127
00:04:48,469 --> 00:04:46,960
this high school because they had a good

128
00:04:50,469 --> 00:04:48,479
science program and maybe they'll teach

129
00:04:51,830 --> 00:04:50,479
me about rockets and airplanes well they

130
00:04:54,390 --> 00:04:51,840
didn't teach me so much about rockets

131
00:04:56,150 --> 00:04:54,400
and airplanes but the fundamentals that

132
00:04:58,310 --> 00:04:56,160
i needed to have like

133
00:05:00,070 --> 00:04:58,320
algebra and calculus and all those

134
00:05:01,510 --> 00:05:00,080
things and once i got those and all of a

135
00:05:04,469 --> 00:05:01,520
sudden i could understand the rocket

136
00:05:06,150 --> 00:05:04,479
equation and go from there and as well

137
00:05:08,469 --> 00:05:06,160
as other things that turns out to be

138
00:05:10,469 --> 00:05:08,479

really important in my life

139
00:05:12,469 --> 00:05:10,479
that for example the fundamentals of

140
00:05:14,310 --> 00:05:12,479
language how do we speak english and

141
00:05:15,510 --> 00:05:14,320
what are the parts of a sentence what do

142
00:05:17,350 --> 00:05:15,520
i need to know that for rockets and

143
00:05:18,790 --> 00:05:17,360
airplanes well because i understood

144
00:05:20,150 --> 00:05:18,800
language because i had a strong

145
00:05:23,350 --> 00:05:20,160
background

146
00:05:25,749 --> 00:05:23,360
for languages even though i didn't

147
00:05:28,550 --> 00:05:25,759
do very well on my grades

148
00:05:30,710 --> 00:05:28,560
but by taking that background the fundam

149
00:05:32,870 --> 00:05:30,720
that fundament is really important

150
00:05:34,629 --> 00:05:32,880
because uh you know five years of latin

151
00:05:36,070 --> 00:05:34,639
helped me understand russian and because

152
00:05:38,070 --> 00:05:36,080
i understood russian

153
00:05:40,950 --> 00:05:38,080
though my first opportunities to fly in

154
00:05:43,350 --> 00:05:40,960
space were with the russians aboard the

155
00:05:45,029 --> 00:05:43,360
soyuz spacecraft because turns out that

156
00:05:47,510 --> 00:05:45,039
language is really important in the

157
00:05:49,350 --> 00:05:47,520
ability to communicate so boy that was

158
00:05:52,310 --> 00:05:49,360
something that wasn't right in my mind

159
00:05:53,670 --> 00:05:52,320
of rockets and airplanes directly but i

160
00:05:54,870 --> 00:05:53,680
learned russian so i could talk about

161
00:05:59,029 --> 00:05:54,880
the russian rockets and russian

162
00:06:02,390 --> 00:05:59,039
airplanes and that was my my in to for

163
00:06:04,070 --> 00:06:02,400

nasa so whatever academics you have

164
00:06:05,830 --> 00:06:04,080
you've got to really you know do your

165
00:06:07,670 --> 00:06:05,840
best at and learn the most because the

166
00:06:09,430 --> 00:06:07,680
more you know the more opportunity you

167
00:06:11,510 --> 00:06:09,440
have the more opportunity to do the

168
00:06:13,350 --> 00:06:11,520
things that you that you like so i

169
00:06:14,710 --> 00:06:13,360
studied really hard

170
00:06:16,469 --> 00:06:14,720
tried my best to get good grades and

171
00:06:18,629 --> 00:06:16,479
i'll tell you what i got i got a couple

172
00:06:21,110 --> 00:06:18,639
d's in there and a c once things like

173
00:06:22,230 --> 00:06:21,120
that so it's not like i've always been

174
00:06:24,550 --> 00:06:22,240
perfect

175
00:06:25,749 --> 00:06:24,560
but it's along the way that when you

176
00:06:29,510 --> 00:06:25,759
learn

177
00:06:31,189 --> 00:06:29,520
how to arise above it that gives you

178
00:06:33,430 --> 00:06:31,199
some really good lessons in life because

179
00:06:35,189 --> 00:06:33,440
nobody has the the perfect smooth life

180
00:06:36,870 --> 00:06:35,199
it's how we handle defeat sometimes it

181
00:06:38,390 --> 00:06:36,880
defines us well that got you ready for

182
00:06:40,150 --> 00:06:38,400
the next step take us through those next

183
00:06:42,390 --> 00:06:40,160
steps on to college in the air force all

184
00:06:43,909 --> 00:06:42,400
right so uh i needed to go to college i

185
00:06:45,510 --> 00:06:43,919
wanted to go college study rockets and

186
00:06:47,510 --> 00:06:45,520
airplanes so i looked through the course

187
00:06:49,990 --> 00:06:47,520
catalogs and there's a couple colleges

188
00:06:51,270 --> 00:06:50,000

that that fit the fit the bill and then

189
00:06:53,110 --> 00:06:51,280
but i had to figure out how to pay for

190
00:06:55,189 --> 00:06:53,120
it because i didn't have any money and

191
00:06:57,110 --> 00:06:55,199
the air force was offering a scholarship

192
00:06:59,189 --> 00:06:57,120
scholarships at the time said hey four

193
00:07:01,110 --> 00:06:59,199
years of college and we'll you've served

194
00:07:03,350 --> 00:07:01,120
with us for four years and you have a

195
00:07:04,950 --> 00:07:03,360
job as soon as you get out and

196
00:07:07,110 --> 00:07:04,960
we'll pay for your college you have to

197
00:07:09,430 --> 00:07:07,120
come up with room and board i said fine

198
00:07:10,230 --> 00:07:09,440
i can flip hamburgers for room and board

199
00:07:13,270 --> 00:07:10,240
and

200
00:07:14,870 --> 00:07:13,280
boy

201
00:07:17,029 --> 00:07:14,880
it was it was amazing because i got to

202
00:07:17,830 --> 00:07:17,039
study about rockets and airplanes

203
00:07:19,430 --> 00:07:17,840
and

204
00:07:21,830 --> 00:07:19,440
planetary science in there too because

205
00:07:23,909 --> 00:07:21,840
that was a lot of fun but air force paid

206
00:07:26,950 --> 00:07:23,919
for that and i was but they also gave me

207
00:07:27,749 --> 00:07:26,960
leadership training and a job when i got

208
00:07:30,629 --> 00:07:27,759
out

209
00:07:32,469 --> 00:07:30,639
and so i went off to pilot training

210
00:07:34,950 --> 00:07:32,479
right away from the air force from the

211
00:07:37,270 --> 00:07:34,960
from college and it turns out after six

212
00:07:38,629 --> 00:07:37,280
or seven months uh the air force and i

213
00:07:41,029 --> 00:07:38,639

both agreed that i wasn't going to be

214
00:07:43,110 --> 00:07:41,039
the god's gift to to aviation that i

215
00:07:44,950 --> 00:07:43,120
thought it was going to be and i wasn't

216
00:07:46,950 --> 00:07:44,960
destined to become a fighter pilot so i

217
00:07:48,469 --> 00:07:46,960
washed out of pilot training

218
00:07:49,909 --> 00:07:48,479
can you imagine how

219
00:07:51,350 --> 00:07:49,919
disappointing that was it was on my

220
00:07:54,790 --> 00:07:51,360
birthday too

221
00:07:56,710 --> 00:07:54,800
and uh so uh we picked up the pieces and

222
00:07:58,790 --> 00:07:56,720
i asked the air force we'll find try to

223
00:08:00,629 --> 00:07:58,800
make me an engineer so i went and

224
00:08:04,150 --> 00:08:00,639
started working on spacecraft

225
00:08:06,950 --> 00:08:04,160
engineering in los angeles and that

226
00:08:09,270 --> 00:08:06,960
just as bad as i was as a as a potential

227
00:08:10,230 --> 00:08:09,280
fighter pilot it turns out that perhaps

228
00:08:12,070 --> 00:08:10,240
i was

229
00:08:14,550 --> 00:08:12,080
that good as a as an engineer and i

230
00:08:16,869 --> 00:08:14,560
found my my niche and what i was able to

231
00:08:18,230 --> 00:08:16,879
do and uh air force agreed and they said

232
00:08:19,670 --> 00:08:18,240
well you're pretty good at this

233
00:08:21,270 --> 00:08:19,680
engineering stuff so why don't you

234
00:08:24,150 --> 00:08:21,280
become a flight test engineer help us

235
00:08:26,469 --> 00:08:24,160
fly and test new airplanes and so i was

236
00:08:27,909 --> 00:08:26,479
able to do that for a while

237
00:08:29,589 --> 00:08:27,919
as a

238
00:08:31,029 --> 00:08:29,599

student at the air force test pilot

239
00:08:32,709 --> 00:08:31,039
school and

240
00:08:33,990 --> 00:08:32,719
so that was amazing i mean i knew i was

241
00:08:35,829 --> 00:08:34,000
in the right place because you know i

242
00:08:37,269 --> 00:08:35,839
like rockets and airplanes i said all

243
00:08:39,350 --> 00:08:37,279
right your job today

244
00:08:42,949 --> 00:08:39,360
is to come up with a plan we're going to

245
00:08:44,790 --> 00:08:42,959
give you an f-16 fully loaded with gas

246
00:08:46,310 --> 00:08:44,800
a front seater guys sit in the front to

247
00:08:48,310 --> 00:08:46,320
take off and land you get to do

248
00:08:51,350 --> 00:08:48,320
everything else that was my job for the

249
00:08:53,910 --> 00:08:51,360
day was to go fly an f-16 go supersonic

250
00:08:55,590 --> 00:08:53,920
go low level and to put the airplane

251
00:08:57,590 --> 00:08:55,600
through its paces and understand what it

252
00:08:59,670 --> 00:08:57,600
is to fly in a high performance fighter

253
00:09:01,990 --> 00:08:59,680
so that i could be a better engineer in

254
00:09:03,190 --> 00:09:02,000
testing out the f-16 i mean so i knew i

255
00:09:04,230 --> 00:09:03,200
was in the right spot i mean how many

256
00:09:07,269 --> 00:09:04,240
kids who are

257
00:09:10,389 --> 00:09:07,279
22 23 years old get a chance to do that

258
00:09:12,070 --> 00:09:10,399
so that was uh that was amazing uh

259
00:09:13,350 --> 00:09:12,080
step and so we were testing new

260
00:09:17,110 --> 00:09:13,360
airplanes

261
00:09:19,430 --> 00:09:17,120
i was testing f-16s and new

262
00:09:21,110 --> 00:09:19,440
and new things that went on to f-16s new

263
00:09:22,389 --> 00:09:21,120

radar systems and things like that and

264
00:09:25,590 --> 00:09:22,399
then the japanese were building a

265
00:09:27,430 --> 00:09:25,600
version of x f-16 well this this ability

266
00:09:29,670 --> 00:09:27,440
to communicate and other languages came

267
00:09:32,550 --> 00:09:29,680
to play and therefore said wait a second

268
00:09:35,030 --> 00:09:32,560
you test f-16s and you speak japanese

269
00:09:35,910 --> 00:09:35,040
so they sent me over to japan and uh it

270
00:09:37,910 --> 00:09:35,920
was

271
00:09:38,630 --> 00:09:37,920
working with our japanese partners in

272
00:09:43,509 --> 00:09:38,640
the

273
00:09:44,949 --> 00:09:43,519
for first test flights of a brand new

274
00:09:46,790 --> 00:09:44,959
airplane

275
00:09:48,470 --> 00:09:46,800
uh across the planet you know somewhere

276
00:09:50,550 --> 00:09:48,480
on the other halfway around the world

277
00:09:52,070 --> 00:09:50,560
was really exciting at that point nasa

278
00:09:54,630 --> 00:09:52,080
said hey why don't you come work with us

279
00:09:56,310 --> 00:09:54,640
and go fly in the space shuttle so

280
00:09:57,910 --> 00:09:56,320
now and then i reflect on my birthday

281
00:09:59,750 --> 00:09:57,920
that happened when i got washed out of

282
00:10:01,509 --> 00:09:59,760
pilot training and i think it was for

283
00:10:04,550 --> 00:10:01,519
the best

284
00:10:06,470 --> 00:10:04,560
you ended up being a job where not

285
00:10:08,150 --> 00:10:06,480
unlike maybe some of your previous jobs

286
00:10:11,829 --> 00:10:08,160
where there's a certain element of

287
00:10:13,829 --> 00:10:11,839
danger to what you're doing that is not

288
00:10:15,990 --> 00:10:13,839

not there for most people

289
00:10:18,230 --> 00:10:16,000
mike what is it that you feel that is

290
00:10:19,269 --> 00:10:18,240
that we get as a result of flying people

291
00:10:22,389 --> 00:10:19,279
in space

292
00:10:24,949 --> 00:10:22,399
that makes it worth taking that risk

293
00:10:27,350 --> 00:10:24,959
you know it's only recently since i've

294
00:10:28,630 --> 00:10:27,360
had children of my own that i realized

295
00:10:31,030 --> 00:10:28,640
that this what i've been doing is

296
00:10:34,069 --> 00:10:31,040
dangerous i mean i

297
00:10:35,190 --> 00:10:34,079
understood it but maybe not inside and

298
00:10:37,350 --> 00:10:35,200
uh

299
00:10:38,710 --> 00:10:37,360
i would tell my mom for example about

300
00:10:40,710 --> 00:10:38,720
some of the things i was doing because i

301
00:10:43,030 --> 00:10:40,720
thought it was fun she said oh that's so

302
00:10:43,990 --> 00:10:43,040
dangerous really

303
00:10:46,470 --> 00:10:44,000
so uh

304
00:10:48,310 --> 00:10:46,480
and in fact you know she would she would

305
00:10:50,630 --> 00:10:48,320
become more nervous about it than than i

306
00:10:53,190 --> 00:10:50,640
was and now i kind of understand that

307
00:10:55,350 --> 00:10:53,200
and i understand that what we do is is

308
00:10:57,269 --> 00:10:55,360
is a big risk and that wouldn't just

309
00:11:00,550 --> 00:10:57,279
affect us but our families our loved

310
00:11:02,790 --> 00:11:00,560
ones um and the and our whole team if

311
00:11:05,110 --> 00:11:02,800
something uh bad were to happen but you

312
00:11:07,030 --> 00:11:05,120
know what what this danger this risk

313
00:11:09,590 --> 00:11:07,040

that we're taking has high benefits high

314
00:11:11,350 --> 00:11:09,600
payoffs already you know the technology

315
00:11:13,430 --> 00:11:11,360
that we have here with our little

316
00:11:15,829 --> 00:11:13,440
smartphones and everything like that and

317
00:11:17,509 --> 00:11:15,839
personal computers and and wireless

318
00:11:19,350 --> 00:11:17,519
internet and all these things that we

319
00:11:22,150 --> 00:11:19,360
that we worry about now

320
00:11:24,790 --> 00:11:22,160
all that technology really came

321
00:11:26,470 --> 00:11:24,800
when we invested in our space program

322
00:11:29,509 --> 00:11:26,480
and when we had to miniaturize our

323
00:11:31,829 --> 00:11:29,519
electronics and this is providing a

324
00:11:35,110 --> 00:11:31,839
strong engine for our economy it's

325
00:11:36,710 --> 00:11:35,120
making life and productivity and

326
00:11:39,670 --> 00:11:36,720
better on planet earth

327
00:11:41,269 --> 00:11:39,680
my children have a farther

328
00:11:43,509 --> 00:11:41,279
longer range of educational

329
00:11:45,829 --> 00:11:43,519
opportunities from the internet and from

330
00:11:49,430 --> 00:11:45,839
educational tv shows that were able to

331
00:11:50,790 --> 00:11:49,440
record on a dvr at home

332
00:11:53,430 --> 00:11:50,800
even 10 years ago we wouldn't even know

333
00:11:55,110 --> 00:11:53,440
what dvr was all this technology has a

334
00:11:57,509 --> 00:11:55,120
basis so that

335
00:11:59,269 --> 00:11:57,519
in the space program so

336
00:12:01,670 --> 00:11:59,279
these risks that we're taking is making

337
00:12:03,030 --> 00:12:01,680
life on planet earth better and and

338
00:12:04,870 --> 00:12:03,040

we're going to continue doing this in

339
00:12:05,990 --> 00:12:04,880
the countries like the united states

340
00:12:11,430 --> 00:12:06,000
that take this risk you're going to

341
00:12:14,470 --> 00:12:12,790
mike you're a member of the crew of

342
00:12:16,629 --> 00:12:14,480
sts-134

343
00:12:18,310 --> 00:12:16,639
first time on a shuttle flight summarize

344
00:12:19,350 --> 00:12:18,320
the goals of this mission and tell me

345
00:12:22,310 --> 00:12:19,360
what you're going to be doing on the

346
00:12:24,470 --> 00:12:22,320
mission absolutely i've been here at

347
00:12:26,870 --> 00:12:24,480
nasa for 14 years i've spent a year in

348
00:12:29,190 --> 00:12:26,880
space but i've never launched on or

349
00:12:31,750 --> 00:12:29,200
landed on a space shuttle before so it

350
00:12:35,509 --> 00:12:31,760
was with great surprise and pleasure

351
00:12:37,750 --> 00:12:35,519
that i got assigned to sts-134

352
00:12:40,470 --> 00:12:37,760
commanded by mark kelly and

353
00:12:42,870 --> 00:12:40,480
got the really great crew my job on on

354
00:12:45,190 --> 00:12:42,880
the mission is to be first and foremost

355
00:12:47,670 --> 00:12:45,200
ms-1 what does ms-1 mean mission

356
00:12:50,470 --> 00:12:47,680
specialist number one i sit up on the

357
00:12:53,910 --> 00:12:50,480
flight deck in the cockpit and help with

358
00:12:55,829 --> 00:12:53,920
launching and landing of this complex

359
00:12:57,990 --> 00:12:55,839
aerospace vehicle it's really amazing

360
00:12:59,350 --> 00:12:58,000
what the shuttle can do so i like to

361
00:13:01,670 --> 00:12:59,360
think that some of the skills that i

362
00:13:04,310 --> 00:13:01,680
learned in flying as a flight engineer

363
00:13:06,790 --> 00:13:04,320

in the soyuz i'm helping my shuttle

364
00:13:08,949 --> 00:13:06,800
friends work on i'm also privileged to

365
00:13:12,069 --> 00:13:08,959
be a spacewalker on this mission

366
00:13:13,990 --> 00:13:12,079
ev2 so we have drew feustel as our lead

367
00:13:16,310 --> 00:13:14,000
spacewalker

368
00:13:18,150 --> 00:13:16,320
i'm right after him and we have greg

369
00:13:20,949 --> 00:13:18,160
shamatof who i flew with on expedition

370
00:13:24,470 --> 00:13:20,959
18 and the three of us are going to

371
00:13:25,990 --> 00:13:24,480
perform four space walks on sts-134

372
00:13:28,069 --> 00:13:26,000
we've got cargo to deliver to the

373
00:13:30,230 --> 00:13:28,079
station too right it's a very important

374
00:13:33,670 --> 00:13:30,240
mission in terms of science the alpha

375
00:13:35,110 --> 00:13:33,680
magnetic spectrometer is uh going to sit

376
00:13:37,509 --> 00:13:35,120
on the outside of the international

377
00:13:40,470 --> 00:13:37,519
space station and collect some amazing

378
00:13:43,430 --> 00:13:40,480
data so we get to carry the ams

379
00:13:45,430 --> 00:13:43,440
magnetic spectrometer up into space we

380
00:13:49,269 --> 00:13:45,440
pick it up with the robot arm hand it

381
00:13:50,949 --> 00:13:49,279
off to the station robot arm and dock it

382
00:13:53,189 --> 00:13:50,959
and sit it on top of the international

383
00:13:56,389 --> 00:13:53,199
space station and it's going to look up

384
00:13:57,269 --> 00:13:56,399
to the heavens and just receive whatever

385
00:13:58,629 --> 00:13:57,279
super

386
00:14:01,189 --> 00:13:58,639
particles

387
00:14:02,790 --> 00:14:01,199
decide to arrive and what we're going to

388
00:14:04,470 --> 00:14:02,800

be able to detect some things that we've

389
00:14:08,550 --> 00:14:04,480
never seen before and understand the

390
00:14:10,389 --> 00:14:08,560
universe a lot better thanks to ams

391
00:14:12,389 --> 00:14:10,399
almost everyone on this crew has been to

392
00:14:13,189 --> 00:14:12,399
this space station before

393
00:14:16,949 --> 00:14:13,199
and

394
00:14:19,350 --> 00:14:16,959
done long duration missions you've

395
00:14:21,590 --> 00:14:19,360
commanded this space station before

396
00:14:23,670 --> 00:14:21,600
how does that kind of experience benefit

397
00:14:24,949 --> 00:14:23,680
this crew as you get ready to to fly

398
00:14:27,590 --> 00:14:24,959
this mission

399
00:14:29,430 --> 00:14:27,600
it's definitely a privilege

400
00:14:30,949 --> 00:14:29,440
to fly with people with a lot of

401
00:14:33,110 --> 00:14:30,959
different experience

402
00:14:34,230 --> 00:14:33,120
and together it's we have a really

403
00:14:36,310 --> 00:14:34,240
strong team

404
00:14:39,110 --> 00:14:36,320
and we have a lot to do in a short

405
00:14:40,310 --> 00:14:39,120
amount of time so having everybody

406
00:14:45,350 --> 00:14:40,320
up

407
00:14:47,430 --> 00:14:45,360
abilities to handle space flight is

408
00:14:48,949 --> 00:14:47,440
really going to help us ensure success

409
00:14:51,670 --> 00:14:48,959
for this mission

410
00:14:53,189 --> 00:14:51,680
having completed two long-term missions

411
00:14:55,509 --> 00:14:53,199
on the station

412
00:14:58,389 --> 00:14:55,519
what are your expectations as you think

413
00:15:01,509 --> 00:14:58,399

about making a short visit this time

414
00:15:02,870 --> 00:15:01,519
well it's uh it's definitely a different

415
00:15:06,069 --> 00:15:02,880
life

416
00:15:08,470 --> 00:15:06,079
flying aboard a space shuttle and one of

417
00:15:10,550 --> 00:15:08,480
the biggest differences though is that

418
00:15:12,470 --> 00:15:10,560
we're in it for the sprint we used to

419
00:15:14,790 --> 00:15:12,480
say the space station missions are more

420
00:15:18,150 --> 00:15:14,800
like a marathon you know pace ourselves

421
00:15:20,150 --> 00:15:18,160
for six months uh get a lot done but uh

422
00:15:22,949 --> 00:15:20,160
don't burn yourself out because six

423
00:15:24,949 --> 00:15:22,959
months in space is a long time and i saw

424
00:15:27,509 --> 00:15:24,959
that twice but for the space shuttle

425
00:15:29,509 --> 00:15:27,519
mission we only have 12-13 days to get

426
00:15:32,389 --> 00:15:29,519
everything done and there's a lot on our

427
00:15:34,389 --> 00:15:32,399
plates so every minute is accounted for

428
00:15:36,629 --> 00:15:34,399
and we're going to be busy we won't have

429
00:15:38,310 --> 00:15:36,639
time to stop and smell the roses get

430
00:15:39,749 --> 00:15:38,320
weekends off and things like that like

431
00:15:40,550 --> 00:15:39,759
we do aboard the international space

432
00:15:42,150 --> 00:15:40,560
station

433
00:15:44,550 --> 00:15:42,160
it's going to be very exciting going to

434
00:15:46,470 --> 00:15:44,560
be very busy and i'm really glad that my

435
00:15:48,790 --> 00:15:46,480
colleagues all have had experience

436
00:15:50,629 --> 00:15:48,800
before so they know what uh what to

437
00:15:52,310 --> 00:15:50,639
expect when you're up in space your body

438
00:15:54,150 --> 00:15:52,320

behaves differently

439
00:15:55,590 --> 00:15:54,160
you might get spaces for the first

440
00:15:57,749 --> 00:15:55,600
couple days well we all know where we

441
00:16:00,470 --> 00:15:57,759
stand with that and we'll be able to hit

442
00:16:01,749 --> 00:16:00,480
the ground running or floating

443
00:16:03,590 --> 00:16:01,759
well the station's going to be a little

444
00:16:04,949 --> 00:16:03,600
different than when you left it too

445
00:16:06,790 --> 00:16:04,959
right

446
00:16:09,590 --> 00:16:06,800
well i think the biggest difference two

447
00:16:11,189 --> 00:16:09,600
biggest differences for me are first

448
00:16:14,550 --> 00:16:11,199
there's gonna be six people aboard the

449
00:16:17,269 --> 00:16:14,560
space station uh my crew expedition 18

450
00:16:18,870 --> 00:16:17,279
we were the last three person crew now

451
00:16:21,110 --> 00:16:18,880
now there's six people aboard the space

452
00:16:23,269 --> 00:16:21,120
station and i'm really proud of that but

453
00:16:25,350 --> 00:16:23,279
it'd be great to see it but we'll also

454
00:16:28,949 --> 00:16:25,360
be able to see outside a lot better with

455
00:16:30,230 --> 00:16:28,959
the cupola on node 3 and looking out

456
00:16:31,430 --> 00:16:30,240
above our

457
00:16:34,470 --> 00:16:31,440
planet earth

458
00:16:35,350 --> 00:16:34,480
with a full panoramic high definition

459
00:16:37,990 --> 00:16:35,360
video

460
00:16:39,590 --> 00:16:38,000
real thing

461
00:16:41,910 --> 00:16:39,600
and that's that's going to be a real

462
00:16:43,670 --> 00:16:41,920
treat and i think that's where if mark

463
00:16:45,590 --> 00:16:43,680

kelly needs to find me somewhere that's

464
00:16:46,550 --> 00:16:45,600
i think he'll he'll know exactly where

465
00:16:48,310 --> 00:16:46,560
to head

466
00:16:49,829 --> 00:16:48,320
let's talk a little bit more about what

467
00:16:51,189 --> 00:16:49,839
you're bringing up to the space station

468
00:16:53,749 --> 00:16:51,199
what you're delivering to the space

469
00:16:56,230 --> 00:16:53,759
station you've got the express logistics

470
00:16:58,150 --> 00:16:56,240
carrier three tell me about what that is

471
00:17:00,150 --> 00:16:58,160
what it's going to do well it has one of

472
00:17:03,110 --> 00:17:00,160
the most exciting names in the business

473
00:17:05,350 --> 00:17:03,120
express logistics carrier number three

474
00:17:08,309 --> 00:17:05,360
but it's really important for the space

475
00:17:10,870 --> 00:17:08,319
station we have obviously by by its name

476
00:17:12,630 --> 00:17:10,880
we have other express logistics carriers

477
00:17:15,590 --> 00:17:12,640
and what we're doing is setting up the

478
00:17:18,230 --> 00:17:15,600
space station to last until 2020 and

479
00:17:20,949 --> 00:17:18,240
perhaps beyond so in order for a large

480
00:17:22,949 --> 00:17:20,959
aerospace complex vehicle like the

481
00:17:25,350 --> 00:17:22,959
international space station to last a

482
00:17:27,750 --> 00:17:25,360
long time without a heavy lift vehicle

483
00:17:29,750 --> 00:17:27,760
like the shuttle to deliver spares spare

484
00:17:32,630 --> 00:17:29,760
parts because things do break out over

485
00:17:34,310 --> 00:17:32,640
time we have all the spare parts of the

486
00:17:36,150 --> 00:17:34,320
station already

487
00:17:39,029 --> 00:17:36,160
bolted onto the outside of this big

488
00:17:40,950 --> 00:17:39,039

frame structure and then our job in fact

489
00:17:43,029 --> 00:17:40,960
it's one of my jobs as a robotic arm

490
00:17:45,830 --> 00:17:43,039
operator is to take the express

491
00:17:47,270 --> 00:17:45,840
logistics carrier number three elc-3 out

492
00:17:49,510 --> 00:17:47,280
of the payload bay

493
00:17:51,750 --> 00:17:49,520
hand it off to the station arm and then

494
00:17:53,909 --> 00:17:51,760
it gets docked onto the outside

495
00:17:55,350 --> 00:17:53,919
of the international space station and

496
00:17:57,750 --> 00:17:55,360
it's going to just stay there it has

497
00:17:59,270 --> 00:17:57,760
power and data so we can keep keep track

498
00:18:00,870 --> 00:17:59,280
of all the things on the outside of it

499
00:18:02,789 --> 00:18:00,880
but just say something breaks on the

500
00:18:05,110 --> 00:18:02,799
international space station we'll be

501
00:18:07,669 --> 00:18:05,120
able to with a combination of robotics

502
00:18:09,909 --> 00:18:07,679
and extra vehicular activity space walks

503
00:18:11,430 --> 00:18:09,919
we'll be able to fix whatever breaks on

504
00:18:13,350 --> 00:18:11,440
board the international space station so

505
00:18:16,789 --> 00:18:13,360
we got all of our spares sitting on our

506
00:18:18,310 --> 00:18:16,799
back porch outside is that a as

507
00:18:21,430 --> 00:18:18,320
comparatively speaking is that a

508
00:18:23,270 --> 00:18:21,440
complicated robotics task for you to uh

509
00:18:26,390 --> 00:18:23,280
for the to hand this off to another

510
00:18:27,990 --> 00:18:26,400
robotic arm well uh for me robotics is

511
00:18:30,310 --> 00:18:28,000
always tough but

512
00:18:32,390 --> 00:18:30,320
no actually the task itself thanks to

513
00:18:33,270 --> 00:18:32,400

our great robotics team here on the

514
00:18:35,830 --> 00:18:33,280
ground

515
00:18:37,110 --> 00:18:35,840
is going to be relatively easy easy the

516
00:18:37,990 --> 00:18:37,120
trick is that we have to thread the

517
00:18:40,630 --> 00:18:38,000
needle

518
00:18:42,070 --> 00:18:40,640
between the sides of the payload bay

519
00:18:44,549 --> 00:18:42,080
we have the docking structure in front

520
00:18:46,710 --> 00:18:44,559
of us the multi-billion dollar alpha

521
00:18:48,870 --> 00:18:46,720
magnetic spectrometer behind us so the

522
00:18:50,549 --> 00:18:48,880
tolerances are really tight

523
00:18:53,430 --> 00:18:50,559
it's uh so we're going to be kind of a

524
00:18:56,230 --> 00:18:53,440
glorified crane operator picking up the

525
00:18:58,390 --> 00:18:56,240
elc number three and uh handing it off

526
00:18:59,830 --> 00:18:58,400
but we we don't have very much room for

527
00:19:00,950 --> 00:18:59,840
error

528
00:19:03,350 --> 00:19:00,960
we've talked

529
00:19:05,029 --> 00:19:03,360
been a minute ago about the ams i'd like

530
00:19:06,789 --> 00:19:05,039
to get you to give us some more details

531
00:19:10,310 --> 00:19:06,799
what does the alpha magnetic

532
00:19:12,630 --> 00:19:10,320
spectrometer do when it gets installed

533
00:19:14,950 --> 00:19:12,640
up on the starboard side of the truss

534
00:19:17,270 --> 00:19:14,960
the alpha magnetic spectrometer it's

535
00:19:20,070 --> 00:19:17,280
really amazing it was made by the same

536
00:19:21,510 --> 00:19:20,080
team it's an international collaboration

537
00:19:24,630 --> 00:19:21,520
all over the world i mean it's a

538
00:19:26,230 --> 00:19:24,640

planetary group of scientists that are

539
00:19:28,310 --> 00:19:26,240
really trying to understand the universe

540
00:19:30,310 --> 00:19:28,320
around us this group

541
00:19:32,710 --> 00:19:30,320
is kind of stationed at

542
00:19:34,870 --> 00:19:32,720
cern which is

543
00:19:37,669 --> 00:19:34,880
the center for european research for

544
00:19:40,230 --> 00:19:37,679
particle physics and but it's it's even

545
00:19:44,230 --> 00:19:40,240
beyond europe and uh those guys are

546
00:19:45,430 --> 00:19:44,240
really uh experts at uh making particle

547
00:19:47,590 --> 00:19:45,440
detectors

548
00:19:49,510 --> 00:19:47,600
so the alpha magnetic spectrometer

549
00:19:52,470 --> 00:19:49,520
actually is a series

550
00:19:54,470 --> 00:19:52,480
as well it's a it's a incredible puzzle

551
00:19:56,470 --> 00:19:54,480
how they put it all together of six or

552
00:19:58,310 --> 00:19:56,480
seven detectors that can detect

553
00:19:59,990 --> 00:19:58,320
different things about particles that

554
00:20:02,470 --> 00:20:00,000
are traveling close to the speed of

555
00:20:05,110 --> 00:20:02,480
light some of them have a charge so you

556
00:20:07,029 --> 00:20:05,120
have the magnetic part that can trap the

557
00:20:08,950 --> 00:20:07,039
trap them or at least deflect them

558
00:20:10,149 --> 00:20:08,960
enough and by how much they deflect you

559
00:20:11,510 --> 00:20:10,159
can tell how big they are and what

560
00:20:13,990 --> 00:20:11,520
they're made out of

561
00:20:15,590 --> 00:20:14,000
and but some are not charged i mean they

562
00:20:17,350 --> 00:20:15,600
have no charge so the magnet part won't

563
00:20:18,390 --> 00:20:17,360

affect them and yet we'll be able to

564
00:20:20,630 --> 00:20:18,400
detect

565
00:20:22,549 --> 00:20:20,640
particles that are going so fast and

566
00:20:23,549 --> 00:20:22,559
have so much energy or so much mass

567
00:20:26,470 --> 00:20:23,559
maybe even

568
00:20:28,390 --> 00:20:26,480
anti-particles such as anti-matter we'll

569
00:20:31,029 --> 00:20:28,400
be able to detect little little pieces

570
00:20:32,549 --> 00:20:31,039
that are going super super fast and

571
00:20:36,789 --> 00:20:32,559
learn more about the universe as it

572
00:20:39,350 --> 00:20:36,799
turns out we only know about 15 of what

573
00:20:41,190 --> 00:20:39,360
the universe is made of there's 85 that

574
00:20:43,350 --> 00:20:41,200
percent of the entire universe we don't

575
00:20:45,990 --> 00:20:43,360
know now 100 years ago scientists were

576
00:20:47,590 --> 00:20:46,000
saying oh we know everything we

577
00:20:49,430 --> 00:20:47,600
we just now the next 100 years of

578
00:20:51,190 --> 00:20:49,440
physics we're just going to be you know

579
00:20:54,149 --> 00:20:51,200
sharpening our pencils for the last

580
00:20:57,590 --> 00:20:54,159
decimal point now the particle physics

581
00:20:59,909 --> 00:20:57,600
and and physics in general are really uh

582
00:21:02,470 --> 00:20:59,919
really flabbergasted they are very

583
00:21:04,070 --> 00:21:02,480
frustrated on how much they don't know

584
00:21:05,909 --> 00:21:04,080
and yet the more we know about the

585
00:21:07,990 --> 00:21:05,919
physical world around us the better

586
00:21:09,669 --> 00:21:08,000
better it makes life here on planet

587
00:21:11,190 --> 00:21:09,679
earth the guys that you know benjamin

588
00:21:13,190 --> 00:21:11,200

franklin out there with his kite and

589
00:21:15,270 --> 00:21:13,200
finding out about electricity in the

590
00:21:17,350 --> 00:21:15,280
18th century we understood electric

591
00:21:18,789 --> 00:21:17,360
started to understand electricity now

592
00:21:20,789 --> 00:21:18,799
you know all of our houses have

593
00:21:22,549 --> 00:21:20,799
electricity we take that for granted

594
00:21:25,350 --> 00:21:22,559
made life better and that happened just

595
00:21:26,549 --> 00:21:25,360
in my grandparents lifetime and then in

596
00:21:29,029 --> 00:21:26,559
the early

597
00:21:31,510 --> 00:21:29,039
uh 20th century we decided we learned

598
00:21:33,430 --> 00:21:31,520
about this thing called an atom and and

599
00:21:35,510 --> 00:21:33,440
the nucleus now we have nuclear energy

600
00:21:39,750 --> 00:21:35,520
which helps uh make life on our planet

601
00:21:42,070 --> 00:21:39,760
better by giving us a source of of power

602
00:21:43,669 --> 00:21:42,080
who knows what ams is going to decide or

603
00:21:46,070 --> 00:21:43,679
what's going to what it's who knows what

604
00:21:47,430 --> 00:21:46,080
the ams is going to fight what is it

605
00:21:49,110 --> 00:21:47,440
looking is it looking for anything in

606
00:21:51,830 --> 00:21:49,120
particular or just to characterize

607
00:21:53,110 --> 00:21:51,840
whatever happens by whatever happens by

608
00:21:54,549 --> 00:21:53,120
because you don't we don't even know

609
00:21:56,310 --> 00:21:54,559
what's out there we know some of this

610
00:21:59,270 --> 00:21:56,320
stuff but there's other stuff that we

611
00:22:01,830 --> 00:21:59,280
don't know we spent uh we as humans uh

612
00:22:05,430 --> 00:22:01,840
mainly the the folks at cern and europe

613
00:22:07,590 --> 00:22:05,440

have uh have this huge atomic collider

614
00:22:09,990 --> 00:22:07,600
and they're they're spinning you know

615
00:22:11,830 --> 00:22:10,000
they're spinning charged particles in a

616
00:22:13,510 --> 00:22:11,840
big circle and putting them together and

617
00:22:16,789 --> 00:22:13,520
seeing what comes out and they got some

618
00:22:19,029 --> 00:22:16,799
really high energies and and uh but the

619
00:22:20,070 --> 00:22:19,039
energies that they're making

620
00:22:23,029 --> 00:22:20,080
which is

621
00:22:25,350 --> 00:22:23,039
you know world record uh and and and

622
00:22:27,350 --> 00:22:25,360
really amazing is nothing to compare

623
00:22:29,990 --> 00:22:27,360
what happens when you clash a neutron

624
00:22:32,789 --> 00:22:30,000
star into a white dwarf or two galaxies

625
00:22:33,990 --> 00:22:32,799
colliding so those kind of things we

626
00:22:36,070 --> 00:22:34,000
can't even re

627
00:22:38,549 --> 00:22:36,080
replicate on planet earth and there's no

628
00:22:40,710 --> 00:22:38,559
way we can but you know it's happening

629
00:22:43,430 --> 00:22:40,720
out there in the cosmos and we'll have

630
00:22:45,830 --> 00:22:43,440
now an instrument for particle physics

631
00:22:48,149 --> 00:22:45,840
to be able to look and peer and learn

632
00:22:49,750 --> 00:22:48,159
more about our universe i've read that

633
00:22:52,710 --> 00:22:49,760
they're looking for data to help

634
00:22:53,990 --> 00:22:52,720
understand the origins of the universe i

635
00:22:55,990 --> 00:22:54,000
think that is that a fair way to

636
00:22:57,909 --> 00:22:56,000
characterize the significance of what's

637
00:22:59,029 --> 00:22:57,919
happening here that's only one of the

638
00:23:01,270 --> 00:22:59,039

aspects

639
00:23:03,510 --> 00:23:01,280
not just the origins of the universe but

640
00:23:06,070 --> 00:23:03,520
what the universe is even made out of we

641
00:23:08,470 --> 00:23:06,080
have this whole quandary now in particle

642
00:23:10,549 --> 00:23:08,480
physics of this dark matter and this

643
00:23:12,710 --> 00:23:10,559
stuff called even dark energy we have a

644
00:23:13,510 --> 00:23:12,720
name for it but we have no idea what it

645
00:23:17,110 --> 00:23:13,520
is

646
00:23:19,430 --> 00:23:17,120
magnetic spectrometer will help us

647
00:23:21,110 --> 00:23:19,440
understand all of that better

648
00:23:23,029 --> 00:23:21,120
the mechanics of it how does it get out

649
00:23:24,789 --> 00:23:23,039
of the payload bay and up where it needs

650
00:23:26,710 --> 00:23:24,799
to go to do the work i have to really

651
00:23:29,750 --> 00:23:26,720
commend the engineers and the the

652
00:23:33,190 --> 00:23:29,760
scientific teams that have put together

653
00:23:36,310 --> 00:23:33,200
as about as plug and play as you can get

654
00:23:39,029 --> 00:23:36,320
once the alpha magnetic spectrometer

655
00:23:41,350 --> 00:23:39,039
launches with us in the payload bay a

656
00:23:44,070 --> 00:23:41,360
few minutes after we get into orbit i

657
00:23:46,950 --> 00:23:44,080
have the privilege of of uh opening up a

658
00:23:48,470 --> 00:23:46,960
laptop and and connecting it you know

659
00:23:51,430 --> 00:23:48,480
connecting it turning it on for the

660
00:23:53,269 --> 00:23:51,440
first time in space and then uh and then

661
00:23:54,950 --> 00:23:53,279
but when we dock to the international

662
00:23:56,950 --> 00:23:54,960
space station so we'll take care of it

663
00:23:58,070 --> 00:23:56,960

for four or five days aboard endeavor

664
00:24:00,149 --> 00:23:58,080
and then once we dock with the

665
00:24:01,909 --> 00:24:00,159
international space station

666
00:24:04,549 --> 00:24:01,919
my colleagues will reach in with the

667
00:24:06,870 --> 00:24:04,559
robot arm the shuttle robot arm

668
00:24:08,789 --> 00:24:06,880
and just like we did with the lc3 lift

669
00:24:10,870 --> 00:24:08,799
it out of the payload bay stick it out

670
00:24:12,870 --> 00:24:10,880
into space then the station robot arm

671
00:24:14,149 --> 00:24:12,880
will come and grab it and put it on the

672
00:24:16,390 --> 00:24:14,159
out out

673
00:24:19,750 --> 00:24:16,400
board truss the international space

674
00:24:21,029 --> 00:24:19,760
station and the station is was designed

675
00:24:23,430 --> 00:24:21,039
with

676
00:24:26,549 --> 00:24:23,440
universal adapters so it has a little

677
00:24:28,390 --> 00:24:26,559
claw that grabs pulls it in and then

678
00:24:30,390 --> 00:24:28,400
electrical and data connectors come

679
00:24:32,710 --> 00:24:30,400
right up and connect and it's plug and

680
00:24:35,909 --> 00:24:32,720
play ready to go they'd have power and

681
00:24:38,230 --> 00:24:35,919
data and and that's what made the

682
00:24:39,909 --> 00:24:38,240
alpha magnetic spectrometer possible

683
00:24:42,230 --> 00:24:39,919
they could not have built a spacecraft

684
00:24:44,310 --> 00:24:42,240
unless it was the space station large

685
00:24:46,789 --> 00:24:44,320
enough to support the power and data

686
00:24:48,230 --> 00:24:46,799
needs that the ams has

687
00:24:50,390 --> 00:24:48,240
just to detect all the things that it

688
00:24:52,390 --> 00:24:50,400

does but yet it's just another payload

689
00:24:54,950 --> 00:24:52,400
for the international

690
00:24:57,350 --> 00:24:54,960
space station which is so big and large

691
00:24:59,269 --> 00:24:57,360
and it provides space station provide

692
00:25:00,630 --> 00:24:59,279
even more science for life on planet

693
00:25:02,630 --> 00:25:00,640
earth

694
00:25:04,310 --> 00:25:02,640
you mentioned a moment ago that the plan

695
00:25:05,830 --> 00:25:04,320
for this mission calls for four space

696
00:25:08,070 --> 00:25:05,840
walks they're going to be conducted by

697
00:25:10,230 --> 00:25:08,080
three different pairs of space walkers

698
00:25:12,470 --> 00:25:10,240
and you're involved in that

699
00:25:15,590 --> 00:25:12,480
what is your role on the team

700
00:25:17,909 --> 00:25:15,600
as it relates to all four of these evas

701
00:25:19,110 --> 00:25:17,919
yeah i really liked how commander kelly

702
00:25:21,990 --> 00:25:19,120
put her put

703
00:25:24,950 --> 00:25:22,000
the team together and how he built off

704
00:25:27,269 --> 00:25:24,960
of all of our strengths and uh and the

705
00:25:29,990 --> 00:25:27,279
things that we don't do so well so we

706
00:25:32,630 --> 00:25:30,000
have a amazing space walking team

707
00:25:35,110 --> 00:25:32,640
there's only three of us and uh and yet

708
00:25:36,789 --> 00:25:35,120
there's four evas and each eva each

709
00:25:38,789 --> 00:25:36,799
spacewalk requires two people so the

710
00:25:42,230 --> 00:25:38,799
person who isn't outside doing the

711
00:25:43,990 --> 00:25:42,240
spacewalk is actually inside uh kind of

712
00:25:45,590 --> 00:25:44,000
running the space walk

713
00:25:48,070 --> 00:25:45,600

managing the timeline reading the

714
00:25:50,310 --> 00:25:48,080
procedures looking ahead to see

715
00:25:52,310 --> 00:25:50,320
what to do in case of a contingency and

716
00:25:54,230 --> 00:25:52,320
managing the timeline when we go out

717
00:25:55,669 --> 00:25:54,240
especially for american spacewalks we

718
00:25:57,510 --> 00:25:55,679
don't have the procedure in front of us

719
00:25:59,750 --> 00:25:57,520
we have a lot memorized but we don't

720
00:26:01,590 --> 00:25:59,760
know everything and

721
00:26:04,310 --> 00:26:01,600
and we don't have a wrist watch to know

722
00:26:07,269 --> 00:26:04,320
how much time we have left and then and

723
00:26:09,190 --> 00:26:07,279
then so the person inside uh coordinates

724
00:26:11,990 --> 00:26:09,200
all of that and works closely with our

725
00:26:14,870 --> 00:26:12,000
our wonderful eva team on the ground and

726
00:26:16,950 --> 00:26:14,880
and together uh all of us work together

727
00:26:18,549 --> 00:26:16,960
to accomplish the mission and i'm very

728
00:26:22,710 --> 00:26:18,559
impressed with the

729
00:26:24,789 --> 00:26:22,720
complexity of shuttle-based spacewalks

730
00:26:26,549 --> 00:26:24,799
we have a lot of time as a shuttle crew

731
00:26:28,230 --> 00:26:26,559
to really get ready for

732
00:26:29,909 --> 00:26:28,240
for some space walks we're practicing

733
00:26:32,870 --> 00:26:29,919
nine or ten times in the pool for each

734
00:26:35,909 --> 00:26:32,880
spacewalk that we that we perform for as

735
00:26:38,149 --> 00:26:35,919
a station guy as a former station guy

736
00:26:40,710 --> 00:26:38,159
each spacewalk we had maybe one or two

737
00:26:43,430 --> 00:26:40,720
practices in the uh in the pool and then

738
00:26:46,310 --> 00:26:43,440

we went out and did it and uh now it's

739
00:26:48,549 --> 00:26:46,320
uh and and they weren't as complex or as

740
00:26:50,070 --> 00:26:48,559
difficult as the space walks we have for

741
00:26:51,830 --> 00:26:50,080
the shuttle based and

742
00:26:52,950 --> 00:26:51,840
so it's it's it's definitely i think a

743
00:26:54,710 --> 00:26:52,960
higher

744
00:26:56,549 --> 00:26:54,720
the next level of

745
00:26:58,710 --> 00:26:56,559
of focus and we we've learned that

746
00:27:00,630 --> 00:26:58,720
through the shuttle program over time so

747
00:27:02,390 --> 00:27:00,640
on the first base walk i get to be the

748
00:27:03,750 --> 00:27:02,400
ivy internal

749
00:27:05,669 --> 00:27:03,760
uh

750
00:27:08,230 --> 00:27:05,679
in vehicle i guess

751
00:27:09,590 --> 00:27:08,240
intravehicular so i get to be inside the

752
00:27:10,789 --> 00:27:09,600
and and help

753
00:27:12,950 --> 00:27:10,799
help

754
00:27:14,310 --> 00:27:12,960
andrew feustel drew feustel and greg

755
00:27:16,470 --> 00:27:14,320
shamatoff

756
00:27:19,430 --> 00:27:16,480
to go out and work on our first eva

757
00:27:21,750 --> 00:27:19,440
that's greg's first eva by the way and

758
00:27:23,750 --> 00:27:21,760
ever and drew had some time on the

759
00:27:25,430 --> 00:27:23,760
hubble space telescope and i had you

760
00:27:27,350 --> 00:27:25,440
know six space walks on the from the

761
00:27:29,510 --> 00:27:27,360
international space station so this is

762
00:27:31,350 --> 00:27:29,520
uh greg's first spacewalk and i i

763
00:27:32,950 --> 00:27:31,360

promised him even when we were flying

764
00:27:34,630 --> 00:27:32,960
together on expedition 18 it's like i

765
00:27:36,549 --> 00:27:34,640
love to be there for the first time you

766
00:27:38,470 --> 00:27:36,559
get to go out we never knew that he was

767
00:27:39,750 --> 00:27:38,480
going to actually have that chance so i

768
00:27:41,590 --> 00:27:39,760
can't wait to give him a welcoming

769
00:27:43,350 --> 00:27:41,600
speech

770
00:27:45,029 --> 00:27:43,360
so let me interrupt you for a second

771
00:27:46,870 --> 00:27:45,039
because as you mentioned you've got

772
00:27:49,269 --> 00:27:46,880
space walking experience you did six of

773
00:27:51,029 --> 00:27:49,279
them but they were all in russian

774
00:27:53,350 --> 00:27:51,039
spacesuits off of the international

775
00:27:55,830 --> 00:27:53,360
space station

776
00:27:58,070 --> 00:27:55,840
as you look toward doing them now in the

777
00:27:59,990 --> 00:27:58,080
american space suit what what's the big

778
00:28:03,029 --> 00:28:00,000
difference that you that you foresee

779
00:28:05,110 --> 00:28:03,039
well i i definitely um am privileged to

780
00:28:07,430 --> 00:28:05,120
have a chance to to be in the russian

781
00:28:09,590 --> 00:28:07,440
orlan spacesuit and have had a chance to

782
00:28:11,269 --> 00:28:09,600
to perform six spacewalks i never

783
00:28:14,149 --> 00:28:11,279
thought i was going to get one spacewalk

784
00:28:16,070 --> 00:28:14,159
ever much less six in a russian suit but

785
00:28:18,950 --> 00:28:16,080
the the amazing uh part of it is that

786
00:28:21,590 --> 00:28:18,960
the orlan is is very

787
00:28:23,669 --> 00:28:21,600
um robust it's very

788
00:28:26,389 --> 00:28:23,679

capable and the russians have been

789
00:28:30,149 --> 00:28:26,399
working with uh orlan's uh versions of

790
00:28:33,430 --> 00:28:30,159
orlan uh since 1970s and so it's a it's

791
00:28:35,350 --> 00:28:33,440
a very trusted and veteran spacesuit it

792
00:28:37,590 --> 00:28:35,360
runs on the inside though when you're

793
00:28:40,070 --> 00:28:37,600
pressurized about six pounds per square

794
00:28:42,950 --> 00:28:40,080
inch the american space suit is called

795
00:28:45,350 --> 00:28:42,960
the extra vehicular mobility unit

796
00:28:46,870 --> 00:28:45,360
mobility is the key word for me with the

797
00:28:48,870 --> 00:28:46,880
american spacesuit when i put on the

798
00:28:50,310 --> 00:28:48,880
american spacesuit it's only running

799
00:28:52,070 --> 00:28:50,320
about four pounds per square inch and

800
00:28:54,630 --> 00:28:52,080
all of a sudden i got a lot more

801
00:28:55,750 --> 00:28:54,640
mobility the gloves the american gloves

802
00:28:58,789 --> 00:28:55,760
are

803
00:29:01,350 --> 00:28:58,799
hand crafted by uh by our team from the

804
00:29:03,350 --> 00:29:01,360
east coast and they're they fit

805
00:29:05,830 --> 00:29:03,360
like a glove the russians are pretty

806
00:29:08,230 --> 00:29:05,840
much size one or size two disposable

807
00:29:09,990 --> 00:29:08,240
gloves these american gloves that cost

808
00:29:13,029 --> 00:29:10,000
more but they give us

809
00:29:14,549 --> 00:29:13,039
so much more ability to manipulate

810
00:29:17,110 --> 00:29:14,559
things so when we're building the

811
00:29:20,149 --> 00:29:17,120
complex parts of the space station we

812
00:29:21,909 --> 00:29:20,159
needed an emu where zorlon is good for

813
00:29:24,549 --> 00:29:21,919

routine maintenance on the outside where

814
00:29:25,269 --> 00:29:24,559
you don't need to have such dexterity so

815
00:29:27,990 --> 00:29:25,279
it's

816
00:29:30,310 --> 00:29:28,000
each suit has its role each suit has its

817
00:29:32,870 --> 00:29:30,320
benefits but now i get to

818
00:29:34,710 --> 00:29:32,880
get a chance to be in an american suit

819
00:29:35,909 --> 00:29:34,720
to go outside well as you say for the

820
00:29:37,110 --> 00:29:35,919
first space walk you're going to be

821
00:29:39,590 --> 00:29:37,120
inside

822
00:29:41,990 --> 00:29:39,600
helping greg and drew as they work

823
00:29:44,389 --> 00:29:42,000
describe what's on the schedule for eva

824
00:29:48,070 --> 00:29:44,399
number one yes uh one of our highest

825
00:29:51,029 --> 00:29:48,080
mission priorities is to uh is to set up

826
00:29:53,830 --> 00:29:51,039
to retrieve and set up new versions of

827
00:29:55,510 --> 00:29:53,840
uh an experiment called missy which is a

828
00:29:57,750 --> 00:29:55,520
materials experiment aboard the

829
00:30:01,190 --> 00:29:57,760
international space station

830
00:30:02,310 --> 00:30:01,200
in the past you might recall nasa

831
00:30:03,269 --> 00:30:02,320
along with

832
00:30:09,190 --> 00:30:03,279
our

833
00:30:11,510 --> 00:30:09,200
put materials out into space

834
00:30:13,269 --> 00:30:11,520
and to test new materials and new

835
00:30:15,350 --> 00:30:13,279
computer chips and things like that to

836
00:30:18,149 --> 00:30:15,360
see how they would handle space flight

837
00:30:20,070 --> 00:30:18,159
and the radiation environment as well as

838
00:30:22,389 --> 00:30:20,080

you know what's going on in the high

839
00:30:24,789 --> 00:30:22,399
temperatures cool temperatures and we

840
00:30:27,110 --> 00:30:24,799
had the long duration exposure facility

841
00:30:28,870 --> 00:30:27,120
back in the early part of shuttle days

842
00:30:30,470 --> 00:30:28,880
and so these misses have been really

843
00:30:32,549 --> 00:30:30,480
able to

844
00:30:33,909 --> 00:30:32,559
with the space shuttle by sticking on

845
00:30:38,230 --> 00:30:33,919
them out on the international space

846
00:30:39,590 --> 00:30:38,240
station really low cost but high benefit

847
00:30:42,149 --> 00:30:39,600
the industry has been able to make

848
00:30:44,470 --> 00:30:42,159
better satellites and better materials

849
00:30:46,549 --> 00:30:44,480
on you know for the satellites for all

850
00:30:47,750 --> 00:30:46,559
the way from solar arrays to the paint

851
00:30:49,590 --> 00:30:47,760
that they use on the outside of

852
00:30:52,070 --> 00:30:49,600
satellites so it's helped our industry a

853
00:30:54,950 --> 00:30:52,080
lot a lot by understanding how the

854
00:30:56,470 --> 00:30:54,960
materials and behave in the in the space

855
00:30:58,950 --> 00:30:56,480
environment so we're going to take missy

856
00:31:01,669 --> 00:30:58,960
number seven uh home there's two

857
00:31:03,909 --> 00:31:01,679
of them 7a and 7b they're big suitcases

858
00:31:06,870 --> 00:31:03,919
like this they're they fold open and

859
00:31:08,710 --> 00:31:06,880
close like a book and

860
00:31:10,070 --> 00:31:08,720
greg and andrew are going to put them

861
00:31:12,789 --> 00:31:10,080
off on their

862
00:31:14,630 --> 00:31:12,799
body restraint tether brt on the side

863
00:31:15,830 --> 00:31:14,640

and go back to the shuttle payload bay

864
00:31:17,669 --> 00:31:15,840
and put them on the outside of the

865
00:31:20,310 --> 00:31:17,679
payload base we're actually bringing

866
00:31:22,710 --> 00:31:20,320
cargo home and scientific experiments

867
00:31:25,509 --> 00:31:22,720
home and then we're going to take out

868
00:31:27,350 --> 00:31:25,519
two new missy's missy number eight which

869
00:31:28,630 --> 00:31:27,360
is a regular sized missy then we have a

870
00:31:30,470 --> 00:31:28,640
smaller one

871
00:31:31,590 --> 00:31:30,480
that doesn't require any electrical

872
00:31:33,909 --> 00:31:31,600
power

873
00:31:37,110 --> 00:31:33,919
it's called mini missy and we're going

874
00:31:39,190 --> 00:31:37,120
to crew's going to put mini missy in and

875
00:31:41,269 --> 00:31:39,200
as well as missy number eight and we're

876
00:31:43,190 --> 00:31:41,279
going to continue on with that that

877
00:31:45,909 --> 00:31:43,200
round of experiments so when they finish

878
00:31:47,430 --> 00:31:45,919
then with the missy exchange their next

879
00:31:48,870 --> 00:31:47,440
task is to get ready for the second

880
00:31:50,789 --> 00:31:48,880
spacewalk right

881
00:31:52,470 --> 00:31:50,799
right the second spacewalk we're going

882
00:31:55,110 --> 00:31:52,480
to charge our ammonia lines for the

883
00:31:56,630 --> 00:31:55,120
international space station and so uh

884
00:31:58,710 --> 00:31:56,640
we'll talk a little bit more about that

885
00:32:01,590 --> 00:31:58,720
later but we're going to do some setup

886
00:32:04,710 --> 00:32:01,600
tasks get get a few jumpers ready and

887
00:32:06,549 --> 00:32:04,720
then we're actually going to

888
00:32:08,070 --> 00:32:06,559

upgrade our wireless communication

889
00:32:10,230 --> 00:32:08,080
system aboard the international space

890
00:32:12,950 --> 00:32:10,240
station one of the things when we were

891
00:32:15,990 --> 00:32:12,960
designing the space station we

892
00:32:18,789 --> 00:32:16,000
we had no idea what was to come in the

893
00:32:20,630 --> 00:32:18,799
future of wireless communications and

894
00:32:22,310 --> 00:32:20,640
now we're able to communicate with all

895
00:32:24,470 --> 00:32:22,320
of our payloads that are on the outside

896
00:32:26,870 --> 00:32:24,480
of the space station wirelessly and it

897
00:32:28,389 --> 00:32:26,880
saves us mass and energy and things like

898
00:32:30,389 --> 00:32:28,399
that just like most people at home have

899
00:32:32,870 --> 00:32:30,399
a wireless network and we certainly do

900
00:32:34,789 --> 00:32:32,880
here at nasa so on the outboard of the

901
00:32:36,389 --> 00:32:34,799
space station we have to add

902
00:32:38,549 --> 00:32:36,399
some more antennas

903
00:32:40,710 --> 00:32:38,559
for our wireless network system so we

904
00:32:43,350 --> 00:32:40,720
can talk to things such as the payloads

905
00:32:44,230 --> 00:32:43,360
aboard elc number three

906
00:32:47,509 --> 00:32:44,240
so

907
00:32:50,230 --> 00:32:47,519
drew and greg are going to open up

908
00:32:53,350 --> 00:32:50,240
a few panels on the lab from the outside

909
00:32:55,509 --> 00:32:53,360
and connect some some wires run run the

910
00:32:57,509 --> 00:32:55,519
cables up to the antennas connect new

911
00:32:59,509 --> 00:32:57,519
antennas on the outside of handrails and

912
00:33:01,669 --> 00:32:59,519
that's going to take a couple hours to

913
00:33:03,269 --> 00:33:01,679

do something like that that's relatively

914
00:33:05,669 --> 00:33:03,279
routine maintenance but it has a big

915
00:33:07,110 --> 00:33:05,679
impact on the on the space station

916
00:33:08,950 --> 00:33:07,120
communications

917
00:33:10,950 --> 00:33:08,960
and when it comes time for the second

918
00:33:12,710 --> 00:33:10,960
space walk a couple of days later you're

919
00:33:15,269 --> 00:33:12,720
gonna swap spots with greg and you're

920
00:33:17,350 --> 00:33:15,279
going outside with drew so what are what

921
00:33:19,350 --> 00:33:17,360
are the jobs for you and drew feustel

922
00:33:21,990 --> 00:33:19,360
when you go out on eba number two yes

923
00:33:22,789 --> 00:33:22,000
building on the success of eva one we

924
00:33:25,190 --> 00:33:22,799
hope

925
00:33:26,070 --> 00:33:25,200
we're going to go out and we have two

926
00:33:29,110 --> 00:33:26,080
main

927
00:33:31,350 --> 00:33:29,120
jobs for eva number two and both of them

928
00:33:33,269 --> 00:33:31,360
are for the long duration maintenance of

929
00:33:36,070 --> 00:33:33,279
the international space station since

930
00:33:37,990 --> 00:33:36,080
we're the last shuttle-based eva we're

931
00:33:39,590 --> 00:33:38,000
doing things in advance for routine

932
00:33:42,389 --> 00:33:39,600
preventative maintenance just like with

933
00:33:45,190 --> 00:33:42,399
our automobile so while drew is working

934
00:33:48,070 --> 00:33:45,200
mainly with charging our ammonia system

935
00:33:50,630 --> 00:33:48,080
and this isn't the your household and

936
00:33:53,029 --> 00:33:50,640
household cleaner ammonia this is uh you

937
00:33:55,029 --> 00:33:53,039
know high high-grade industrial ammonia

938
00:33:56,950 --> 00:33:55,039

so we have to be super careful uh not to

939
00:33:58,710 --> 00:33:56,960
get it on us or to spill it

940
00:34:00,870 --> 00:33:58,720
because it's it's quite dangerous if we

941
00:34:03,590 --> 00:34:00,880
brought it back inside but we're going

942
00:34:05,430 --> 00:34:03,600
to recharge the ammonia lines for our

943
00:34:06,789 --> 00:34:05,440
air conditioning it's not internal air

944
00:34:09,030 --> 00:34:06,799
conditioning but mainly it's the

945
00:34:10,869 --> 00:34:09,040
external thermal control loop

946
00:34:12,790 --> 00:34:10,879
and so we have a small leak in there

947
00:34:14,470 --> 00:34:12,800
that's been known for a long time and

948
00:34:16,230 --> 00:34:14,480
just like any car you have to recharge

949
00:34:17,669 --> 00:34:16,240
your air conditioning you know system

950
00:34:19,990 --> 00:34:17,679
every couple years well we won't have

951
00:34:23,030 --> 00:34:20,000
the shuttle in a couple years so we're

952
00:34:25,349 --> 00:34:23,040
we're preemptively going to charge up

953
00:34:26,710 --> 00:34:25,359
fully charge up our ammonia system while

954
00:34:28,389 --> 00:34:26,720
we can because there's a series of

955
00:34:30,310 --> 00:34:28,399
jumpers that we have to go across

956
00:34:32,470 --> 00:34:30,320
including the rotating

957
00:34:35,190 --> 00:34:32,480
solar alpha rotary joint so we have some

958
00:34:37,030 --> 00:34:35,200
jumpers which connecting two lines so we

959
00:34:38,869 --> 00:34:37,040
have a series of hoses that will fully

960
00:34:41,190 --> 00:34:38,879
charge our ammonia system while drew is

961
00:34:43,990 --> 00:34:41,200
doing that i get to do

962
00:34:44,950 --> 00:34:44,000
a lubrication job so

963
00:34:51,030 --> 00:34:44,960

add some

964
00:34:52,869 --> 00:34:51,040
solar alpha rotary joint which we found

965
00:34:54,629 --> 00:34:52,879
the original design

966
00:34:58,950 --> 00:34:54,639
had some

967
00:35:01,670 --> 00:34:58,960
expecting and it started to grind our

968
00:35:04,550 --> 00:35:01,680
joint so we've since then of every

969
00:35:07,190 --> 00:35:04,560
couple years started to add some some

970
00:35:08,230 --> 00:35:07,200
grease on it and it rotates great

971
00:35:10,310 --> 00:35:08,240
however

972
00:35:12,230 --> 00:35:10,320
we won't have that ability so much in

973
00:35:13,910 --> 00:35:12,240
the future so while drew's working with

974
00:35:16,150 --> 00:35:13,920
the ammonia system i'll be lubricating

975
00:35:18,470 --> 00:35:16,160
the outside of the solar alpha rotary

976
00:35:20,390 --> 00:35:18,480
joint so it can last you know the five

977
00:35:21,750 --> 00:35:20,400
ten years no problem that's going to get

978
00:35:23,910 --> 00:35:21,760
you out on a part of the station where

979
00:35:24,790 --> 00:35:23,920
you haven't been before absolutely not

980
00:35:26,390 --> 00:35:24,800
and

981
00:35:29,589 --> 00:35:26,400
all of these you know

982
00:35:32,710 --> 00:35:29,599
all of our work on eva2 is very far out

983
00:35:35,109 --> 00:35:32,720
on the port truss so it's a long way to

984
00:35:36,950 --> 00:35:35,119
get there and a long way back but the

985
00:35:40,069 --> 00:35:36,960
view is going to be amazing

986
00:35:41,589 --> 00:35:40,079
for eva 3 you and drew are going to be

987
00:35:42,470 --> 00:35:41,599
trying out a

988
00:35:44,790 --> 00:35:42,480

new

989
00:35:46,630 --> 00:35:44,800
protocol for the pre-breathe that's

990
00:35:48,630 --> 00:35:46,640
designed to help purge nitrogen from

991
00:35:50,870 --> 00:35:48,640
your blood streams before the spacewalk

992
00:35:52,950 --> 00:35:50,880
begins uh describe a little bit about

993
00:35:54,230 --> 00:35:52,960
what this new procedure is going to be

994
00:35:56,630 --> 00:35:54,240
yes

995
00:35:59,589 --> 00:35:56,640
when as i mentioned earlier the american

996
00:36:01,750 --> 00:35:59,599
spacesuit runs at roughly uh a pressure

997
00:36:03,670 --> 00:36:01,760
inside of four pounds per square inch

998
00:36:06,630 --> 00:36:03,680
normal atmospheric pressure here on

999
00:36:08,150 --> 00:36:06,640
planet earth is about 14.7 pounds per

1000
00:36:10,550 --> 00:36:08,160
square inch so we're running at a lower

1001
00:36:13,109 --> 00:36:10,560
pressure but it's pure oxygen

1002
00:36:15,670 --> 00:36:13,119
so like most deep-sea divers we have to

1003
00:36:17,670 --> 00:36:15,680
be careful as we go from a

1004
00:36:18,710 --> 00:36:17,680
higher pressure to a lower pressure and

1005
00:36:19,910 --> 00:36:18,720
back

1006
00:36:21,030 --> 00:36:19,920
so that

1007
00:36:26,069 --> 00:36:21,040
the

1008
00:36:28,150 --> 00:36:26,079
doesn't bubble off like a can of soda

1009
00:36:31,109 --> 00:36:28,160
pop when you open it up the bubbles come

1010
00:36:33,750 --> 00:36:31,119
everywhere that would give us the bends

1011
00:36:34,710 --> 00:36:33,760
so in order to avoid the bends uh from

1012
00:36:36,630 --> 00:36:34,720
running a

1013
00:36:39,030 --> 00:36:36,640

suit at four pounds per square inch we

1014
00:36:41,030 --> 00:36:39,040
have a pre-breathed protocol where we

1015
00:36:43,349 --> 00:36:41,040
breathe oxygen for

1016
00:36:45,349 --> 00:36:43,359
for for a period of time

1017
00:36:46,630 --> 00:36:45,359
well we've gotten smart about this it

1018
00:36:48,390 --> 00:36:46,640
used to be that we would have to just

1019
00:36:50,790 --> 00:36:48,400
stay in our suit mind our own business

1020
00:36:52,630 --> 00:36:50,800
and sit there for four hours breathing

1021
00:36:54,950 --> 00:36:52,640
pure oxygen

1022
00:36:56,710 --> 00:36:54,960
that was the old old kind of protocol

1023
00:36:58,069 --> 00:36:56,720
then we realized that we can actually

1024
00:37:00,630 --> 00:36:58,079
take uh

1025
00:37:03,190 --> 00:37:00,640
if we did this work in an environment

1026
00:37:05,190 --> 00:37:03,200
that was uh that was at a

1027
00:37:08,630 --> 00:37:05,200
high like a higher altitude so to speak

1028
00:37:11,190 --> 00:37:08,640
or less less air so less pressure of air

1029
00:37:13,589 --> 00:37:11,200
air pressure like a 10.1 pounds per

1030
00:37:15,349 --> 00:37:13,599
square inch instead of 14.7 that would

1031
00:37:17,349 --> 00:37:15,359
make our pre-breathe time in the suit

1032
00:37:19,670 --> 00:37:17,359
less well now we're even smarter saying

1033
00:37:22,230 --> 00:37:19,680
well if you actually exercise

1034
00:37:24,310 --> 00:37:22,240
while you're on pure oxygen you can you

1035
00:37:26,069 --> 00:37:24,320
can even have a smaller pre-breathe time

1036
00:37:28,470 --> 00:37:26,079
and now we're taking it even to another

1037
00:37:30,230 --> 00:37:28,480
level for for this where we're actually

1038
00:37:31,910 --> 00:37:30,240

doing some exercise while we're in the

1039
00:37:34,310 --> 00:37:31,920
suit so we're combining the best of both

1040
00:37:36,630 --> 00:37:34,320
worlds and hopefully save the amount of

1041
00:37:38,710 --> 00:37:36,640
pre-breathe time the amount of oxygen

1042
00:37:40,630 --> 00:37:38,720
that we're that we're using which is a

1043
00:37:42,390 --> 00:37:40,640
consumable every

1044
00:37:44,710 --> 00:37:42,400
every molecule of oxygen we have to

1045
00:37:47,190 --> 00:37:44,720
bring up with us in one form or another

1046
00:37:50,069 --> 00:37:47,200
up into space so this way we're going to

1047
00:37:53,109 --> 00:37:50,079
save our time save our oxygen and still

1048
00:37:55,670 --> 00:37:53,119
be just as safe and so the science

1049
00:37:57,910 --> 00:37:55,680
medical science continues to amaze me so

1050
00:37:59,589 --> 00:37:57,920
the the t the try out of this new

1051
00:38:01,910 --> 00:37:59,599
procedure comes as you get ready for

1052
00:38:03,430 --> 00:38:01,920
space walk number three what are you and

1053
00:38:04,390 --> 00:38:03,440
drew going to do outside on that

1054
00:38:05,670 --> 00:38:04,400
adventure

1055
00:38:08,550 --> 00:38:05,680
well we're

1056
00:38:10,550 --> 00:38:08,560
it's amazing what uh the canadian robot

1057
00:38:13,829 --> 00:38:10,560
arm canada arm number two can do aboard

1058
00:38:16,950 --> 00:38:13,839
the international space station it uh it

1059
00:38:18,230 --> 00:38:16,960
both ends uh are fully functional so

1060
00:38:20,230 --> 00:38:18,240
that

1061
00:38:22,230 --> 00:38:20,240
and not stationary so you can actually

1062
00:38:24,230 --> 00:38:22,240
inch worm across the space station we

1063
00:38:27,270 --> 00:38:24,240

have a little train for it so we can put

1064
00:38:28,790 --> 00:38:27,280
the arm can grab on to to a grapple

1065
00:38:30,870 --> 00:38:28,800
fixture and then the other end can grab

1066
00:38:32,630 --> 00:38:30,880
onto a grapple fixture the arm moves

1067
00:38:35,589 --> 00:38:32,640
back and forth up and down the truss

1068
00:38:37,829 --> 00:38:35,599
it's really amazing it's a incredible

1069
00:38:39,829 --> 00:38:37,839
crane that we need to help build the

1070
00:38:41,030 --> 00:38:39,839
space station well the problem is the

1071
00:38:43,270 --> 00:38:41,040
truss

1072
00:38:45,510 --> 00:38:43,280
ends at a certain spot and we can only

1073
00:38:47,510 --> 00:38:45,520
reach to some parts of the space station

1074
00:38:49,829 --> 00:38:47,520
we can't reach to the other parts

1075
00:38:51,750 --> 00:38:49,839
especially the russian parts well uh

1076
00:38:53,910 --> 00:38:51,760
some really smart engineers on the

1077
00:38:55,829 --> 00:38:53,920
russian side and american side said yeah

1078
00:38:57,109 --> 00:38:55,839
well we can just put a grapple fixture

1079
00:38:59,510 --> 00:38:57,119
out at the

1080
00:39:01,430 --> 00:38:59,520
right on the fgb which is the functional

1081
00:39:03,190 --> 00:39:01,440
cargo block which is pretty much where

1082
00:39:04,870 --> 00:39:03,200
the american and russian parts of the

1083
00:39:06,710 --> 00:39:04,880
space station meet and then we can

1084
00:39:09,109 --> 00:39:06,720
actually reach out and help help our

1085
00:39:11,750 --> 00:39:09,119
russian partners with new modules and

1086
00:39:12,630 --> 00:39:11,760
extend our reach of our of our our robot

1087
00:39:14,710 --> 00:39:12,640
arm

1088
00:39:17,109 --> 00:39:14,720

so drew and i are

1089
00:39:19,109 --> 00:39:17,119
going to go out and

1090
00:39:21,670 --> 00:39:19,119
take a payload

1091
00:39:23,109 --> 00:39:21,680
excuse me power data and grapple fixture

1092
00:39:25,829 --> 00:39:23,119
pdgf

1093
00:39:28,390 --> 00:39:25,839
and install it on the outside of the of

1094
00:39:30,630 --> 00:39:28,400
the functional cargo block the fgb

1095
00:39:32,630 --> 00:39:30,640
and uh compared to our other space walks

1096
00:39:33,510 --> 00:39:32,640
this is just going out the door

1097
00:39:36,230 --> 00:39:33,520
and

1098
00:39:38,950 --> 00:39:36,240
moving along outside for a very short

1099
00:39:42,550 --> 00:39:38,960
period of you know very short distance

1100
00:39:43,589 --> 00:39:42,560
but it's a pdgs are very big so we're

1101
00:39:45,430 --> 00:39:43,599
going to actually

1102
00:39:47,109 --> 00:39:45,440
tend it between us because there's no

1103
00:39:48,630 --> 00:39:47,119
weight right so we're going to float it

1104
00:39:50,870 --> 00:39:48,640
between us make sure it doesn't float

1105
00:39:53,109 --> 00:39:50,880
away we'll have some tethers on it and

1106
00:39:55,829 --> 00:39:53,119
take it to the outside of the fgb

1107
00:39:57,910 --> 00:39:55,839
and bolt it down and then the tough part

1108
00:40:00,069 --> 00:39:57,920
is for the power and data so we have to

1109
00:40:02,950 --> 00:40:00,079
connect the power and data lines uh the

1110
00:40:05,030 --> 00:40:02,960
long cables back to the american segment

1111
00:40:07,589 --> 00:40:05,040
and node one in the lab so it's going to

1112
00:40:09,670 --> 00:40:07,599
be pretty pretty exciting to do that

1113
00:40:12,230 --> 00:40:09,680

it's going to be a shorter spacewalk i

1114
00:40:14,069 --> 00:40:12,240
think uh in terms of complexity but its

1115
00:40:16,309 --> 00:40:14,079
importance to the space station i think

1116
00:40:19,349 --> 00:40:16,319
is uh is going to be shown in the future

1117
00:40:21,190 --> 00:40:19,359
when when the canada arm you know is uh

1118
00:40:22,630 --> 00:40:21,200
is helping out on you know touching

1119
00:40:24,950 --> 00:40:22,640
things on the service module that's

1120
00:40:27,349 --> 00:40:24,960
amazing now the this

1121
00:40:28,710 --> 00:40:27,359
third eva was a relatively late addition

1122
00:40:30,309 --> 00:40:28,720
to your flight

1123
00:40:33,990 --> 00:40:30,319
what were the circumstances on orbit

1124
00:40:36,309 --> 00:40:34,000
that forced this job onto sts-134

1125
00:40:38,630 --> 00:40:36,319
well the expedition crew aboard the

1126
00:40:40,390 --> 00:40:38,640
international space station last summer

1127
00:40:42,550 --> 00:40:40,400
was getting ready to do the exact same

1128
00:40:44,150 --> 00:40:42,560
spacewalk but then

1129
00:40:46,710 --> 00:40:44,160
right before they were about to go out

1130
00:40:49,109 --> 00:40:46,720
the door one of the

1131
00:40:51,750 --> 00:40:49,119
pump modules for our space station air

1132
00:40:54,870 --> 00:40:51,760
conditioning system went out so we sent

1133
00:40:56,470 --> 00:40:54,880
doug wheelock and tracy caldwell outside

1134
00:40:59,510 --> 00:40:56,480
with shannon walker running the robot

1135
00:41:02,150 --> 00:40:59,520
arm inside and they were able to save

1136
00:41:04,710 --> 00:41:02,160
the space station and make that major

1137
00:41:07,349 --> 00:41:04,720
repair in real time well unfortunately

1138
00:41:09,510 --> 00:41:07,359

doug and and tracy didn't have a chance

1139
00:41:11,990 --> 00:41:09,520
to to do the original spacewalk that

1140
00:41:14,069 --> 00:41:12,000
they were planning for and so

1141
00:41:15,829 --> 00:41:14,079
what we were able to do is extend our

1142
00:41:16,630 --> 00:41:15,839
mission

1143
00:41:18,710 --> 00:41:16,640
and

1144
00:41:20,870 --> 00:41:18,720
complete this task so because we had

1145
00:41:23,990 --> 00:41:20,880
time in our training schedule and a

1146
00:41:26,309 --> 00:41:24,000
chance to to to you know fit right into

1147
00:41:29,510 --> 00:41:26,319
our schedule so we're able to do that

1148
00:41:32,470 --> 00:41:29,520
then the fourth space walk uh is for you

1149
00:41:34,470 --> 00:41:32,480
and greg to go outside

1150
00:41:37,270 --> 00:41:34,480
what's on the schedule for this last

1151
00:41:39,910 --> 00:41:37,280
planned spacewalk and in particular uh

1152
00:41:41,670 --> 00:41:39,920
you're leaving the orbital boom sensor

1153
00:41:44,069 --> 00:41:41,680
system behind

1154
00:41:46,150 --> 00:41:44,079
well my previous spacewalks uh on this

1155
00:41:47,750 --> 00:41:46,160
mission you know i'll be going out with

1156
00:41:48,790 --> 00:41:47,760
one of hubble's finest you know drew

1157
00:41:50,710 --> 00:41:48,800
feustel

1158
00:41:54,069 --> 00:41:50,720
who's an experienced space walker for

1159
00:41:56,390 --> 00:41:54,079
sure and our lead spacewalker but

1160
00:41:58,150 --> 00:41:56,400
greg and i we've we've flown together

1161
00:41:59,829 --> 00:41:58,160
before for months aboard the

1162
00:42:01,910 --> 00:41:59,839
international space station and i was

1163
00:42:03,589 --> 00:42:01,920

always i knew that was one of his dreams

1164
00:42:05,430 --> 00:42:03,599
to go out on a spacewalk little did i

1165
00:42:06,870 --> 00:42:05,440
dream that i'd be going out on a

1166
00:42:09,349 --> 00:42:06,880
spacewalk with him for a second

1167
00:42:12,710 --> 00:42:09,359
spacewalk so i'm excited about this the

1168
00:42:15,589 --> 00:42:12,720
obss orbiter boom sensor system we're

1169
00:42:17,829 --> 00:42:15,599
going to be focusing on the boom part

1170
00:42:19,589 --> 00:42:17,839
and most people can remember the

1171
00:42:22,710 --> 00:42:19,599
excitement we had a few years ago when

1172
00:42:23,750 --> 00:42:22,720
we were extending a solar array and it

1173
00:42:27,270 --> 00:42:23,760
ripped

1174
00:42:28,870 --> 00:42:27,280
and we sent scott parazynski way out on

1175
00:42:32,230 --> 00:42:28,880
the solar array which is far away from

1176
00:42:34,550 --> 00:42:32,240
the space truss structure on not just a

1177
00:42:36,790 --> 00:42:34,560
robot arm but the robot arm was holding

1178
00:42:38,870 --> 00:42:36,800
this long boom kind of a stick

1179
00:42:40,870 --> 00:42:38,880
and then scott was at the end of the

1180
00:42:42,230 --> 00:42:40,880
stick and we were kind of moving the arm

1181
00:42:45,349 --> 00:42:42,240
out so he could

1182
00:42:47,349 --> 00:42:45,359
work on the uh the solar array and uh we

1183
00:42:49,270 --> 00:42:47,359
had some pretty insightful managers

1184
00:42:51,670 --> 00:42:49,280
saying hey you know that that boom

1185
00:42:54,230 --> 00:42:51,680
system is not just good for examining

1186
00:42:55,990 --> 00:42:54,240
the outside of the space shuttle so

1187
00:42:57,589 --> 00:42:56,000
doing the inspection so we can come home

1188
00:42:59,750 --> 00:42:57,599

safely

1189
00:43:02,230 --> 00:42:59,760
but maybe it's also good for the space

1190
00:43:04,550 --> 00:43:02,240
station so when the shuttle program is

1191
00:43:06,550 --> 00:43:04,560
uh is ending they're they're saying well

1192
00:43:08,069 --> 00:43:06,560
you know hey you need one of those that

1193
00:43:09,990 --> 00:43:08,079
boom thing that you're carrying around

1194
00:43:12,470 --> 00:43:10,000
you mind if we keep it

1195
00:43:14,950 --> 00:43:12,480
and a shuttle guy said well uh we're not

1196
00:43:16,870 --> 00:43:14,960
gonna need it so so we made provisions

1197
00:43:19,829 --> 00:43:16,880
to leave it aboard uh the international

1198
00:43:21,589 --> 00:43:19,839
space station and uh we have to do some

1199
00:43:24,150 --> 00:43:21,599
surgery on it and that's where dr

1200
00:43:26,470 --> 00:43:24,160
shamatov comes and uh will will shine

1201
00:43:28,230 --> 00:43:26,480
the most uh because we have a several

1202
00:43:29,910 --> 00:43:28,240
different kind of grapple fixtures where

1203
00:43:31,510 --> 00:43:29,920
we have a shuttle arm based grapple

1204
00:43:33,270 --> 00:43:31,520
fixture which is kind of small and then

1205
00:43:35,829 --> 00:43:33,280
we have the larger

1206
00:43:37,190 --> 00:43:35,839
uh canada arm 2 kind of grapple fixture

1207
00:43:39,270 --> 00:43:37,200
so we're going to

1208
00:43:41,190 --> 00:43:39,280
once we get the boom

1209
00:43:43,030 --> 00:43:41,200
on these racks on the outside on the

1210
00:43:45,270 --> 00:43:43,040
truss of the space station it's going to

1211
00:43:47,750 --> 00:43:45,280
sit right there proudly on the front top

1212
00:43:48,630 --> 00:43:47,760
of the of the truss of the space station

1213
00:43:51,270 --> 00:43:48,640

and

1214
00:43:53,990 --> 00:43:51,280
once once that's set then we're going to

1215
00:43:55,349 --> 00:43:54,000
go get another big payload data grapple

1216
00:43:57,270 --> 00:43:55,359
fixture i don't know why i'm carrying so

1217
00:43:58,710 --> 00:43:57,280
many of these on this mission but we're

1218
00:44:01,990 --> 00:43:58,720
going to get another

1219
00:44:04,069 --> 00:44:02,000
large grapple fixture and we're going to

1220
00:44:06,069 --> 00:44:04,079
uh carefully unbolt the one that's up

1221
00:44:07,270 --> 00:44:06,079
there the shuttle-based one

1222
00:44:09,589 --> 00:44:07,280
actually they're going to let us use

1223
00:44:10,790 --> 00:44:09,599
scissors on this mission

1224
00:44:11,829 --> 00:44:10,800
space scissors well you have to be

1225
00:44:13,750 --> 00:44:11,839
careful because you don't want to cut

1226
00:44:15,750 --> 00:44:13,760
your suit that would be bad so we're

1227
00:44:18,150 --> 00:44:15,760
actually i get the hand dr shamatov the

1228
00:44:21,030 --> 00:44:18,160
scissors and he's going to carefully cut

1229
00:44:22,550 --> 00:44:21,040
the the cord that the electrical power

1230
00:44:25,109 --> 00:44:22,560
cord um

1231
00:44:26,710 --> 00:44:25,119
off of the shuttle base grapple fixture

1232
00:44:28,470 --> 00:44:26,720
we're going to put in the big uh then

1233
00:44:30,870 --> 00:44:28,480
bolt on the the big

1234
00:44:33,190 --> 00:44:30,880
station base so now the station arm

1235
00:44:35,430 --> 00:44:33,200
could be able to grapple uh this boom

1236
00:44:37,030 --> 00:44:35,440
not just at the end but uh not just at

1237
00:44:38,790 --> 00:44:37,040
the middle but also at the end and

1238
00:44:40,550 --> 00:44:38,800

extend our reach so someday we don't

1239
00:44:42,550 --> 00:44:40,560
know when we're going to need it but

1240
00:44:45,349 --> 00:44:42,560
someday it may be very useful to have a

1241
00:44:46,630 --> 00:44:45,359
this this extra reach

1242
00:44:48,710 --> 00:44:46,640
for our arm

1243
00:44:50,230 --> 00:44:48,720
to help repair the space station you

1244
00:44:52,069 --> 00:44:50,240
never know what uh what's going to

1245
00:44:53,670 --> 00:44:52,079
happen and all that's going to be after

1246
00:44:55,990 --> 00:44:53,680
the shuttle is done using it for the

1247
00:44:58,790 --> 00:44:56,000
inspection sure so that's why it's our

1248
00:45:00,870 --> 00:44:58,800
last uh our last spacewalk so right

1249
00:45:04,550 --> 00:45:00,880
before our last spacewalk we're going to

1250
00:45:07,190 --> 00:45:04,560
use the boom to inspect our endeavor

1251
00:45:09,270 --> 00:45:07,200
the thermal control system so that we so

1252
00:45:10,069 --> 00:45:09,280
we can come home safely once we're sure

1253
00:45:12,230 --> 00:45:10,079
that

1254
00:45:13,750 --> 00:45:12,240
we have a nice clean inspection then

1255
00:45:15,270 --> 00:45:13,760
we're going to

1256
00:45:17,270 --> 00:45:15,280
put the boom on the station the next

1257
00:45:19,030 --> 00:45:17,280
very next day and leave a couple days

1258
00:45:20,870 --> 00:45:19,040
later

1259
00:45:22,870 --> 00:45:20,880
during the rendezvous and docking on

1260
00:45:24,470 --> 00:45:22,880
your arrival but then again during

1261
00:45:25,829 --> 00:45:24,480
undocking and

1262
00:45:28,069 --> 00:45:25,839
fly around you're going to be gathering

1263
00:45:30,790 --> 00:45:28,079

data for a development test objective

1264
00:45:32,790 --> 00:45:30,800
that's known as storm which stands for

1265
00:45:34,870 --> 00:45:32,800
sensor test for orion relative

1266
00:45:36,550 --> 00:45:34,880
navigation risk mitigation

1267
00:45:38,550 --> 00:45:36,560
now this will include something brand

1268
00:45:40,710 --> 00:45:38,560
new this this shuttle is going to

1269
00:45:42,150 --> 00:45:40,720
re-rendezvous with the station after it

1270
00:45:43,990 --> 00:45:42,160
flies away

1271
00:45:46,069 --> 00:45:44,000
fill us in on what this uh what this

1272
00:45:48,390 --> 00:45:46,079
test is about and and and how you're

1273
00:45:50,630 --> 00:45:48,400
going to go about gathering the data

1274
00:45:52,150 --> 00:45:50,640
well one of the most uh complex things

1275
00:45:54,870 --> 00:45:52,160
to do with uh

1276
00:45:57,270 --> 00:45:54,880
in in space flight is the whole orbital

1277
00:45:59,190 --> 00:45:57,280
dynamics because you're going 17 500

1278
00:46:01,270 --> 00:45:59,200
miles an hour around the planet and

1279
00:46:03,750 --> 00:46:01,280
you're trying to catch up with with

1280
00:46:05,430 --> 00:46:03,760
another thing that's going 17 500 miles

1281
00:46:07,109 --> 00:46:05,440
an hour you want to make sure you get

1282
00:46:09,190 --> 00:46:07,119
the orbits just right because orbits

1283
00:46:12,550 --> 00:46:09,200
aren't perfectly circular

1284
00:46:14,870 --> 00:46:12,560
and it's a it's a real trick and it's a

1285
00:46:16,790 --> 00:46:14,880
and it's really high technology and and

1286
00:46:19,190 --> 00:46:16,800
being able to dock with things in space

1287
00:46:21,829 --> 00:46:19,200
was one of the things that we had to

1288
00:46:24,069 --> 00:46:21,839

prove to ourselves in the gemini program

1289
00:46:25,670 --> 00:46:24,079
that was one of the major missions so

1290
00:46:27,589 --> 00:46:25,680
now we still do it but it doesn't mean

1291
00:46:30,870 --> 00:46:27,599
it's not difficult

1292
00:46:33,349 --> 00:46:30,880
so each and every system that we have i

1293
00:46:35,990 --> 00:46:33,359
mean we've used several aboard the space

1294
00:46:38,950 --> 00:46:36,000
shuttle the russians have had to evolve

1295
00:46:41,190 --> 00:46:38,960
their uh their system called coors uh to

1296
00:46:42,950 --> 00:46:41,200
be able to to have these rendezvous well

1297
00:46:46,230 --> 00:46:42,960
with orion

1298
00:46:48,550 --> 00:46:46,240
and future space vehicles we're actually

1299
00:46:50,950 --> 00:46:48,560
putting the next level of technology the

1300
00:46:53,030 --> 00:46:50,960
next level of sensors into place so that

1301
00:46:55,349 --> 00:46:53,040
we have something that's lighter

1302
00:46:59,190 --> 00:46:55,359
more capable and

1303
00:47:01,670 --> 00:46:59,200
costs less power and uh and and energy

1304
00:47:03,829 --> 00:47:01,680
to to run and yet puts us exactly where

1305
00:47:05,750 --> 00:47:03,839
we need to be in space at the right time

1306
00:47:08,710 --> 00:47:05,760
for rendezvous so we're carrying those

1307
00:47:10,950 --> 00:47:08,720
sensors aboard with us and uh so for our

1308
00:47:13,190 --> 00:47:10,960
first rendezvous it's important

1309
00:47:15,990 --> 00:47:13,200
so we're going to rendezvous shuttle

1310
00:47:18,470 --> 00:47:16,000
style and we've gotten that down pat

1311
00:47:20,549 --> 00:47:18,480
we have some an amazing team that

1312
00:47:22,710 --> 00:47:20,559
that runs rendezvous all the way from

1313
00:47:23,990 --> 00:47:22,720

training to to rendezvous with all the

1314
00:47:26,710 --> 00:47:24,000
different sensors that we use for

1315
00:47:29,030 --> 00:47:26,720
shuttle but those sensors are big we

1316
00:47:31,030 --> 00:47:29,040
have to do a lot of work as

1317
00:47:32,950 --> 00:47:31,040
as crew members to integrate them all

1318
00:47:34,790 --> 00:47:32,960
but it works it works great so we're

1319
00:47:36,630 --> 00:47:34,800
going to not mess with success we're

1320
00:47:39,910 --> 00:47:36,640
going to do a normal docking with the

1321
00:47:41,190 --> 00:47:39,920
normal shuttle with the normal shuttle

1322
00:47:43,589 --> 00:47:41,200
systems

1323
00:47:45,430 --> 00:47:43,599
storm will be there watching so drew is

1324
00:47:47,910 --> 00:47:45,440
going to be at the storm laptop making

1325
00:47:50,390 --> 00:47:47,920
sure that storm is seeing everything and

1326
00:47:51,430 --> 00:47:50,400
so the the engineers and the scientists

1327
00:47:54,069 --> 00:47:51,440
on the ground are going to be able to

1328
00:47:55,430 --> 00:47:54,079
get some good data from that but then

1329
00:47:57,270 --> 00:47:55,440
at the end of the mission since we've

1330
00:47:59,109 --> 00:47:57,280
already docked with space station got

1331
00:48:00,470 --> 00:47:59,119
all of our objectives out of the way did

1332
00:48:02,309 --> 00:48:00,480
their what

1333
00:48:04,069 --> 00:48:02,319
what we came to do then we're going to

1334
00:48:05,349 --> 00:48:04,079
come back and we're going to rendezvous

1335
00:48:07,750 --> 00:48:05,359
in a different way we're going to come

1336
00:48:09,910 --> 00:48:07,760
in rendezvous kind of the apollo style

1337
00:48:11,910 --> 00:48:09,920
you know the old-fashioned way but which

1338
00:48:14,230 --> 00:48:11,920

is great for capsules and for our next

1339
00:48:16,790 --> 00:48:14,240
spacecraft it's going to be more of a

1340
00:48:18,870 --> 00:48:16,800
rendezvous that that's that way so we

1341
00:48:21,349 --> 00:48:18,880
have the the storm is going to be

1342
00:48:23,430 --> 00:48:21,359
helping lead us and we will use the

1343
00:48:25,270 --> 00:48:23,440
shuttle sensors more as a backup and

1344
00:48:26,710 --> 00:48:25,280
we'll see where storm takes us and it

1345
00:48:28,870 --> 00:48:26,720
will get some great data some really

1346
00:48:30,870 --> 00:48:28,880
good practical operations

1347
00:48:32,390 --> 00:48:30,880
not just for the the sensors but for the

1348
00:48:34,790 --> 00:48:32,400
team on the ground so that we're ready

1349
00:48:35,990 --> 00:48:34,800
for the next for the next spacecraft

1350
00:48:38,870 --> 00:48:36,000
when it comes

1351
00:48:40,390 --> 00:48:38,880
now sts-134 is the last flight of

1352
00:48:42,309 --> 00:48:40,400
shuttle endeavour

1353
00:48:44,950 --> 00:48:42,319
apart from endeavour being

1354
00:48:47,270 --> 00:48:44,960
the shuttle that you fly on

1355
00:48:49,990 --> 00:48:47,280
where do what do you see this ship's

1356
00:48:51,750 --> 00:48:50,000
place being in the history of human

1357
00:48:52,790 --> 00:48:51,760
space flight

1358
00:48:56,390 --> 00:48:52,800
well

1359
00:48:59,190 --> 00:48:56,400
i take a a long view of of what we've

1360
00:49:01,190 --> 00:48:59,200
done so far and and where we're going i

1361
00:49:04,309 --> 00:49:01,200
firmly believe that

1362
00:49:05,750 --> 00:49:04,319
that human beings will not stay long on

1363
00:49:07,829 --> 00:49:05,760

planet earth and that there's a whole

1364
00:49:10,630 --> 00:49:07,839
universe out there to explore

1365
00:49:12,230 --> 00:49:10,640
and we're going to send people back to

1366
00:49:14,309 --> 00:49:12,240
the moon we're going to have colonies on

1367
00:49:16,950 --> 00:49:14,319
the moon we're going to go to mars and

1368
00:49:19,670 --> 00:49:16,960
boy i can't wait to to learn someday

1369
00:49:22,549 --> 00:49:19,680
that that we have human beings around

1370
00:49:24,710 --> 00:49:22,559
other others in old other solar systems

1371
00:49:26,790 --> 00:49:24,720
it might be pie in the sky but

1372
00:49:28,790 --> 00:49:26,800
you know our population is already six

1373
00:49:31,190 --> 00:49:28,800
billion on this planet and there's just

1374
00:49:31,990 --> 00:49:31,200
going to be a lot of demand for more

1375
00:49:32,950 --> 00:49:32,000
room

1376
00:49:40,309 --> 00:49:32,960
and

1377
00:49:42,470 --> 00:49:40,319
amazing resources out there in space on

1378
00:49:45,030 --> 00:49:42,480
the moon for example that haven't been

1379
00:49:47,750 --> 00:49:45,040
tapped and that will not hurt the

1380
00:49:50,549 --> 00:49:47,760
environment and and uh won't hurt other

1381
00:49:53,430 --> 00:49:50,559
people i mean it's uh it's gonna be

1382
00:49:55,030 --> 00:49:53,440
it's gonna be a a major change in what

1383
00:49:57,589 --> 00:49:55,040
human beings are doing

1384
00:50:00,150 --> 00:49:57,599
so a really small piece of that story is

1385
00:50:01,349 --> 00:50:00,160
going to be you know the endeavors last

1386
00:50:03,589 --> 00:50:01,359
mission

1387
00:50:05,910 --> 00:50:03,599
but the space shuttle program i think

1388
00:50:07,829 --> 00:50:05,920

will definitely be remembered for the

1389
00:50:09,670 --> 00:50:07,839
amazing things that it's that it has

1390
00:50:11,910 --> 00:50:09,680
done having come from a capsule

1391
00:50:13,589 --> 00:50:11,920
background with the soyuz which if you

1392
00:50:15,349 --> 00:50:13,599
all remember apollo soyuz they're

1393
00:50:17,990 --> 00:50:15,359
roughly comparable vehicles

1394
00:50:19,589 --> 00:50:18,000
capsule-based technology

1395
00:50:22,309 --> 00:50:19,599
space shuttle was just absolutely

1396
00:50:24,150 --> 00:50:22,319
amazing in terms of what it can do how

1397
00:50:27,829 --> 00:50:24,160
much how many people it can take up how

1398
00:50:30,710 --> 00:50:27,839
much cargo i mean and and the complexity

1399
00:50:32,630 --> 00:50:30,720
that it had especially for its time uh

1400
00:50:34,950 --> 00:50:32,640
fly-by-wire systems all these things we

1401
00:50:36,870 --> 00:50:34,960
take for granted today you know 30 or 40

1402
00:50:38,710 --> 00:50:36,880
years later in our airplanes well the

1403
00:50:41,109 --> 00:50:38,720
space shuttle was among the first to do

1404
00:50:43,589 --> 00:50:41,119
and it did and did well space shuttle

1405
00:50:46,069 --> 00:50:43,599
also built you know humanity's first

1406
00:50:48,710 --> 00:50:46,079
outpost to the stars the international

1407
00:50:50,470 --> 00:50:48,720
space station that's uh that's a great

1408
00:50:53,190 --> 00:50:50,480
legacy and everything that we've learned

1409
00:50:55,109 --> 00:50:53,200
along the way all the technology all of

1410
00:50:56,710 --> 00:50:55,119
the science that we've been bringing

1411
00:50:58,470 --> 00:50:56,720
that we've been able to bring in in

1412
00:51:00,309 --> 00:50:58,480
these past years

1413
00:51:02,549 --> 00:51:00,319

with the space shuttle i think is going

1414
00:51:05,270 --> 00:51:02,559
to be is going to be remembered very

1415
00:51:07,270 --> 00:51:05,280
nicely in in the history books

1416
00:51:08,549 --> 00:51:07,280
you're going to be flying this mission

1417
00:51:10,790 --> 00:51:08,559
right around

1418
00:51:12,790 --> 00:51:10,800
the 50th anniversary of the first human

1419
00:51:14,870 --> 00:51:12,800
space flight by yuri gagarin which is

1420
00:51:16,710 --> 00:51:14,880
also the 30th anniversary of the first

1421
00:51:18,390 --> 00:51:16,720
space shuttle flight

1422
00:51:20,829 --> 00:51:18,400
right around the 50th anniversary of the

1423
00:51:23,589 --> 00:51:20,839
first american space flight by alan

1424
00:51:25,589 --> 00:51:23,599
shepard what are your thoughts about you

1425
00:51:26,309 --> 00:51:25,599
being in space at the time that we're

1426
00:51:28,950 --> 00:51:26,319
all

1427
00:51:30,710 --> 00:51:28,960
thinking about these historic events

1428
00:51:32,710 --> 00:51:30,720
it's um

1429
00:51:34,230 --> 00:51:32,720
it's humbling because i was you know

1430
00:51:36,150 --> 00:51:34,240
when i was growing up

1431
00:51:37,750 --> 00:51:36,160
i was watching people walk on the moon

1432
00:51:39,750 --> 00:51:37,760
and i looked and said well that's

1433
00:51:41,430 --> 00:51:39,760
something i really want to do and to

1434
00:51:43,349 --> 00:51:41,440
actually be part of the space program

1435
00:51:46,150 --> 00:51:43,359
and especially on a historical mission

1436
00:51:48,069 --> 00:51:46,160
like we are it's just uh i could never

1437
00:51:49,030 --> 00:51:48,079
have imagined that that would that i'd

1438
00:51:50,790 --> 00:51:49,040

be there

1439
00:51:52,150 --> 00:51:50,800
so when i'm up there i i think it's

1440
00:51:53,190 --> 00:51:52,160
going to it's going to hit me pretty

1441
00:51:55,109 --> 00:51:53,200
hard

1442
00:51:57,030 --> 00:51:55,119
we've got to focus on the mission and

1443
00:51:58,470 --> 00:51:57,040
we'll get our job done but there might

1444
00:51:59,910 --> 00:51:58,480
be a few moments where i'm probably out

1445
00:52:01,349 --> 00:51:59,920
there looking out the window saying my

1446
00:52:03,510 --> 00:52:01,359
goodness

1447
00:52:06,630 --> 00:52:03,520
we've come an awful long way in that 50

1448
00:52:08,309 --> 00:52:06,640
years from yuri gagarin's capsule to the

1449
00:52:09,510 --> 00:52:08,319
international space station

1450
00:52:12,150 --> 00:52:09,520
much farther do you think we're going to

1451
00:52:14,790 --> 00:52:12,160
go in the in the 50 years ahead of us

1452
00:52:16,230 --> 00:52:14,800
the sky's the limit and i really hope

1453
00:52:19,270 --> 00:52:16,240
our country

1454
00:52:20,470 --> 00:52:19,280
understands the the value of exploration

1455
00:52:22,790 --> 00:52:20,480
and uh

1456
00:52:25,349 --> 00:52:22,800
and the value of the unknown that we

1457
00:52:27,190 --> 00:52:25,359
that uh that's out there i mean it's a

1458
00:52:29,270 --> 00:52:27,200
i've had the

1459
00:52:31,510 --> 00:52:29,280
blessing of being able to be in space

1460
00:52:33,109 --> 00:52:31,520
for a whole year of my life you know 10

1461
00:52:34,870 --> 00:52:33,119
of the space station's lifetime i've

1462
00:52:37,270 --> 00:52:34,880
been there and i've had a chance to

1463
00:52:39,349 --> 00:52:37,280

reflect and look how big the universe is

1464
00:52:40,150 --> 00:52:39,359
and how small our planet is

1465
00:52:41,910 --> 00:52:40,160
and

1466
00:52:43,030 --> 00:52:41,920
looking saying wow my goodness why are

1467
00:52:47,030 --> 00:52:43,040
we

1468
00:52:48,230 --> 00:52:47,040
exploring and finding new things and

1469
00:52:50,150 --> 00:52:48,240
making

1470
00:52:51,190 --> 00:52:50,160
life better for human beings

1471
00:52:52,870 --> 00:52:51,200
and

1472
00:52:55,589 --> 00:52:52,880
as well as the

1473
00:52:57,990 --> 00:52:55,599
the the principles that we stand for in

1474
00:53:00,390 --> 00:52:58,000
the united states in terms of of

1475
00:53:02,870 --> 00:53:00,400
democracy and individual freedoms and

1476
00:53:04,230 --> 00:53:02,880
rights heck that's something i think are