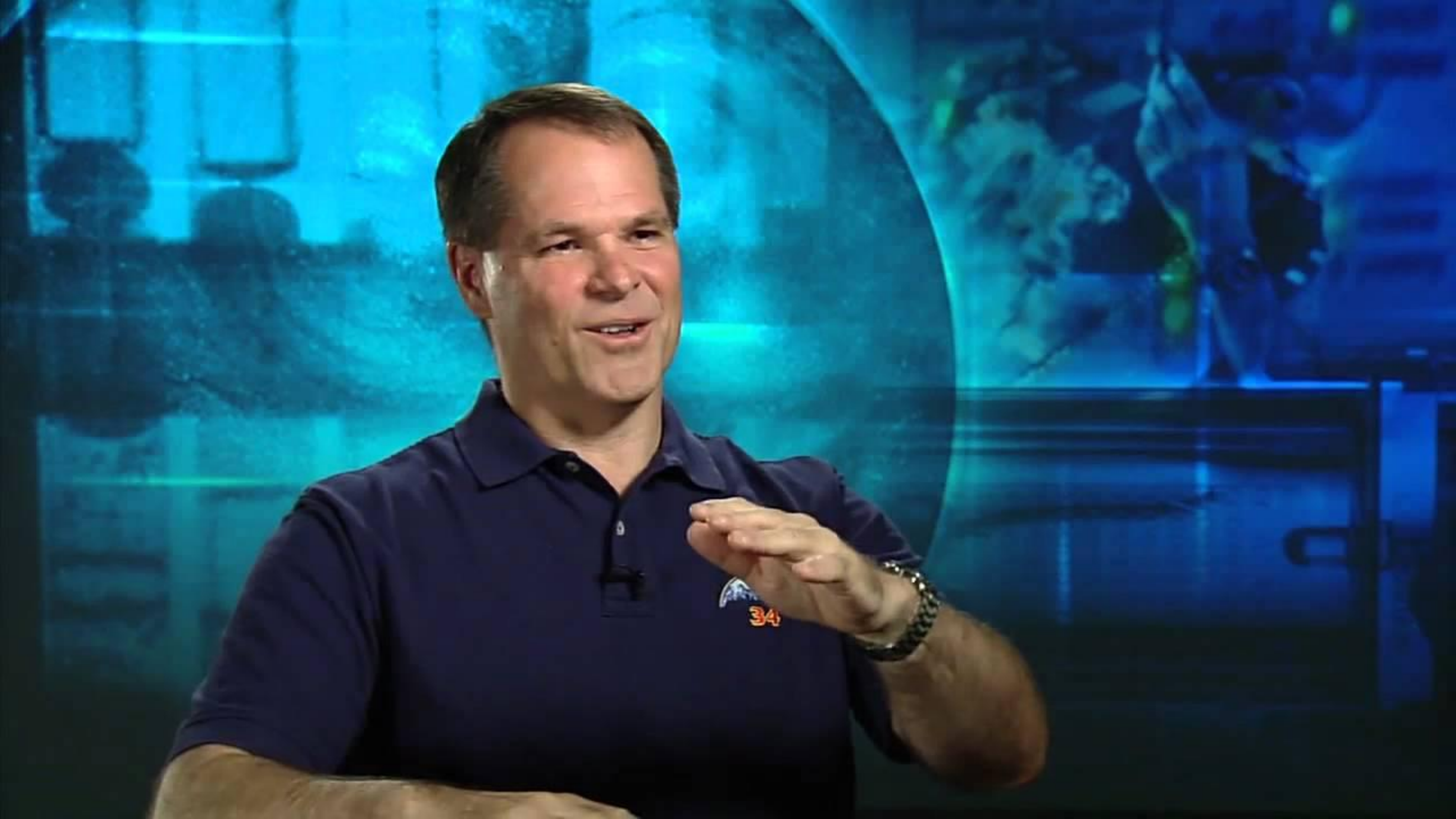

1
00:00:11,009 --> 00:00:09,520
why did you want to be an astronaut my

2
00:00:14,070 --> 00:00:11,019
first day

3
00:00:15,240 --> 00:00:14,080
just was toward toward flying and being

4
00:00:17,400 --> 00:00:15,250
a being a pilot

5
00:00:18,420 --> 00:00:17,410
I had older brothers who were interested

6
00:00:21,300 --> 00:00:18,430
in aviation

7
00:00:23,190 --> 00:00:21,310
my oldest brother David gave me a ride

8
00:00:25,909 --> 00:00:23,200
when I was about 14 years old for the

9
00:00:28,410 --> 00:00:25,919
very first time in a small plane and

10
00:00:31,740 --> 00:00:28,420
about the same time I stumbled onto a

11
00:00:34,320 --> 00:00:31,750
book called carrying the fire written by

12
00:00:36,540 --> 00:00:34,330
Michael Collins and it was the first

13
00:00:37,860 --> 00:00:36,550

book I ever read and I turned right back

14
00:00:39,689 --> 00:00:37,870
to the first page and just started

15
00:00:42,270 --> 00:00:39,699
reading it again because I just enjoyed

16
00:00:45,750 --> 00:00:42,280
it so much and I was fascinated by the

17
00:00:49,740 --> 00:00:45,760
things he talked about and at that point

18
00:00:51,630 --> 00:00:49,750
as a boy and you know small-town Indiana

19
00:00:57,170 --> 00:00:51,640
I just thought boy I just would really

20
00:00:59,520 --> 00:00:57,180
love to be a pilot as a career so I

21
00:01:02,910 --> 00:00:59,530
started working in a grocery store I

22
00:01:04,979 --> 00:01:02,920
happened to to have a grocery in my town

23
00:01:07,530 --> 00:01:04,989
who had his own airplane and so he was

24
00:01:09,090 --> 00:01:07,540
really willing to give me a job give me

25
00:01:11,100 --> 00:01:09,100
all the hours I needed to pay for flying

26
00:01:13,670 --> 00:01:11,110
lessons and so that worked out well for

27
00:01:16,560 --> 00:01:13,680
me and and I got my license early and

28
00:01:19,139 --> 00:01:16,570
went on to you know to study aerospace

29
00:01:21,539 --> 00:01:19,149
engineering and to become an Air Force

30
00:01:23,160 --> 00:01:21,549
pilot some you know some of it's just

31
00:01:24,630 --> 00:01:23,170
lucky kind of the way it works out but I

32
00:01:26,130 --> 00:01:24,640
was able to fulfill that dream of being

33
00:01:29,459 --> 00:01:26,140
an Air Force pilot and a fighter pilot

34
00:01:32,069 --> 00:01:29,469
and then after some years of that and I

35
00:01:33,630 --> 00:01:32,079
like test pilot test pilot is next so I

36
00:01:35,880 --> 00:01:33,640
was able to combine you know the

37
00:01:37,499 --> 00:01:35,890
academics of the engineering with what

38
00:01:39,450 --> 00:01:37,509

the operational skills of flying going

39
00:01:41,819 --> 00:01:39,460
to test pilot school and just kind of

40
00:01:43,200 --> 00:01:41,829
found myself in a position where NASA

41
00:01:45,330 --> 00:01:43,210
was actually willing to look at the

42
00:01:47,580 --> 00:01:45,340
application one day and they looked at

43
00:01:49,440 --> 00:01:47,590
it a few times and put it away before

44
00:01:51,059 --> 00:01:49,450
they finally looked at at one time and

45
00:01:52,200 --> 00:01:51,069
said well we've already hired all the

46
00:01:55,529 --> 00:01:52,210
guys that were better in him they're

47
00:01:57,480 --> 00:01:55,539
already here already so I was lucky

48
00:01:59,969 --> 00:01:57,490
enough to get into the Corps at that

49
00:02:01,559 --> 00:01:59,979
point so it just it just started out

50
00:02:04,080 --> 00:02:01,569
with the fascination with flying really

51
00:02:06,690 --> 00:02:04,090
and I was just lucky to get get into the

52
00:02:09,120 --> 00:02:06,700
astronaut business you mentioned you

53
00:02:10,590 --> 00:02:09,130
grew up in small town in Indiana tell me

54
00:02:12,270 --> 00:02:10,600
about tell us about your hometown what

55
00:02:16,290 --> 00:02:12,280
it was like for you growing up there so

56
00:02:18,720 --> 00:02:16,300
a small town of about 2,000 people just

57
00:02:21,990 --> 00:02:18,730
a typical small town it was mostly

58
00:02:24,180 --> 00:02:22,000
agricultural I lived on a farm literally

59
00:02:25,380 --> 00:02:24,190
until I was about five and then we moved

60
00:02:28,120 --> 00:02:25,390
into the city

61
00:02:29,320 --> 00:02:28,130
into the center of the small town and my

62
00:02:34,450 --> 00:02:29,330
dad worked in the automotive business

63
00:02:37,600 --> 00:02:34,460

and informing both and so the friends

64
00:02:40,290 --> 00:02:37,610
there were all people who had you know

65
00:02:44,470 --> 00:02:40,300
kind of the same the same economic

66
00:02:48,010 --> 00:02:44,480
status and kind of kind of ideals and

67
00:02:50,290 --> 00:02:48,020
stuff as I did and it was just a nice

68
00:02:52,390 --> 00:02:50,300
little town I went to kindergarten with

69
00:02:55,660 --> 00:02:52,400
the same kids that I graduated from high

70
00:02:59,080 --> 00:02:55,670
school with you know those years later

71
00:03:03,040 --> 00:02:59,090
and so it was a very close close-knit

72
00:03:04,630 --> 00:03:03,050
community hard hardworking and kind of

73
00:03:07,210 --> 00:03:04,640
knew how to take take care of themselves

74
00:03:09,460 --> 00:03:07,220
I would say were you able to pick it out

75
00:03:13,600 --> 00:03:09,470
as you flew over it on your first flight

76
00:03:16,030 --> 00:03:13,610
I was not and the reason is because we

77
00:03:19,390 --> 00:03:16,040
launched it about midnight from Florida

78
00:03:22,750 --> 00:03:19,400
and why don't one of the interesting

79
00:03:25,840 --> 00:03:22,760
things about orbital dynamics is we we

80
00:03:27,190 --> 00:03:25,850
had an orbit that took us into the

81
00:03:29,800 --> 00:03:27,200
darkness as we crossed the equator

82
00:03:31,930 --> 00:03:29,810
northbound and into the daylight as we

83
00:03:33,820 --> 00:03:31,940
crossed the equator southbound for the

84
00:03:35,640 --> 00:03:33,830
whole two weeks so even though the

85
00:03:37,720 --> 00:03:35,650
Earth's is rotating underneath you

86
00:03:40,210 --> 00:03:37,730
everything we saw in the northern

87
00:03:42,580 --> 00:03:40,220
hemisphere was dark and and lit in the

88
00:03:45,130 --> 00:03:42,590

southern so I'll be able to improve on

89
00:03:48,210 --> 00:03:45,140
that with a five month stay on the space

90
00:03:50,740 --> 00:03:48,220
station I could see for example

91
00:03:53,830 --> 00:03:50,750
Indianapolis and Fort Wayne and Lake

92
00:03:56,080 --> 00:03:53,840
Michigan Chicago until roughly where it

93
00:03:57,820 --> 00:03:56,090
was but I wasn't able to pick out the

94
00:04:00,520 --> 00:03:57,830
town itself and I'm hoping to be able to

95
00:04:02,020 --> 00:04:00,530
do that on my long trip what is it about

96
00:04:04,780 --> 00:04:02,030
that place and the people that were

97
00:04:07,949 --> 00:04:04,790
there that you think helped you make you

98
00:04:10,300 --> 00:04:07,959
the person that you are well I think

99
00:04:12,160 --> 00:04:10,310
they all they all thought you know you

100
00:04:14,949 --> 00:04:12,170
could you could carry your weight and

101
00:04:17,320 --> 00:04:14,959
you were capable everybody you know gave

102
00:04:18,880 --> 00:04:17,330
you the benefit of the doubt if you you

103
00:04:20,320 --> 00:04:18,890
know if I wanted to work in the grocery

104
00:04:21,990 --> 00:04:20,330
store and go take flying lessons there

105
00:04:27,340 --> 00:04:22,000
was somebody wanted to give me a job

106
00:04:29,920 --> 00:04:27,350
doing that everybody is pretty

107
00:04:32,170 --> 00:04:29,930
hard-working academically and everything

108
00:04:37,089 --> 00:04:32,180
the school the school was a good example

109
00:04:38,380 --> 00:04:37,099
for me academically and just kind of you

110
00:04:38,890 --> 00:04:38,390
know was willing to boost me out of the

111
00:04:41,080 --> 00:04:38,900
nest

112
00:04:46,570 --> 00:04:41,090
the time comes to send me off to college

113
00:04:48,370 --> 00:04:46,580

and it was good to have role models I

114
00:04:51,249 --> 00:04:48,380
knew a lot of the other parents you know

115
00:04:54,790 --> 00:04:51,259
for my 8 mice because I was there with

116
00:04:55,990 --> 00:04:54,800
them you know oh my oh my adolescent

117
00:04:57,640 --> 00:04:56,000
life there I get to know a lot of the

118
00:05:00,700 --> 00:04:57,650
parents of the kids and brothers and

119
00:05:02,800 --> 00:05:00,710
sisters and I think all those influences

120
00:05:05,680 --> 00:05:02,810
and that stability was a was a good

121
00:05:07,360 --> 00:05:05,690
thing was a good thing for me you

122
00:05:09,610 --> 00:05:07,370
touched on a couple of the high points

123
00:05:11,800 --> 00:05:09,620
may ask you to fill in some of the the

124
00:05:14,529 --> 00:05:11,810
meat on the bones of your education and

125
00:05:17,020 --> 00:05:14,539
then your professional career as you as

126
00:05:20,080 --> 00:05:17,030
you left small-town Indiana that led you

127
00:05:23,320 --> 00:05:20,090
ultimately to become an astronaut so you

128
00:05:25,629 --> 00:05:23,330
want me to kind of head through yeah my

129
00:05:27,100 --> 00:05:25,639
college career after high school all the

130
00:05:31,689 --> 00:05:27,110
way back to there huh that was a few

131
00:05:33,370 --> 00:05:31,699
years back so I kind of I came to came

132
00:05:34,810 --> 00:05:33,380
out of there I had a pilot's license

133
00:05:37,089 --> 00:05:34,820
actually when I graduated from high

134
00:05:38,560 --> 00:05:37,099
school just just because that was that

135
00:05:42,670 --> 00:05:38,570
was my thing that was kind of my little

136
00:05:45,969 --> 00:05:42,680
dream and I applied for ROTC

137
00:05:49,930 --> 00:05:45,979
scholarships and was able to was able to

138
00:05:52,360 --> 00:05:49,940

get an or OTC agreement to go to go to

139
00:05:53,860 --> 00:05:52,370
the University and then write into an

140
00:05:54,909 --> 00:05:53,870
Air Force Commission after that so I

141
00:05:56,770 --> 00:05:54,919
went to Notre Dame

142
00:06:00,279 --> 00:05:56,780
I'm a journey row space engineering

143
00:06:01,750 --> 00:06:00,289
there so it's a lot of you know a lot of

144
00:06:03,790 --> 00:06:01,760
things to learn about flying in the

145
00:06:05,050 --> 00:06:03,800
engineering field too that were included

146
00:06:07,000 --> 00:06:05,060
and just you know getting I'll see a

147
00:06:09,640 --> 00:06:07,010
private pilot's license so I kind of

148
00:06:11,290 --> 00:06:09,650
just continued that track after that I

149
00:06:14,050 --> 00:06:11,300
went to Columbus Air Force Base in

150
00:06:15,939 --> 00:06:14,060
Mississippi and became became an Air

151
00:06:17,969 --> 00:06:15,949
Force pilot went through the t37 and

152
00:06:20,589 --> 00:06:17,979
t-38 curriculum it's about a year and

153
00:06:23,200 --> 00:06:20,599
after the pilot training then I got

154
00:06:24,670 --> 00:06:23,210
assigned to an f15 in Germany between

155
00:06:27,279 --> 00:06:24,680
the time you graduate and you actually

156
00:06:28,810 --> 00:06:27,289
get there there's there's more fighter

157
00:06:31,839 --> 00:06:28,820
late in training and then there's some

158
00:06:33,370 --> 00:06:31,849
f15 what we call the place the specific

159
00:06:35,800 --> 00:06:33,380
training just learning about the

160
00:06:37,719 --> 00:06:35,810
airplane in Arizona that I did and some

161
00:06:40,540 --> 00:06:37,729
survival training and some water and

162
00:06:42,100 --> 00:06:40,550
some you know POWs raining and stuff so

163
00:06:45,219 --> 00:06:42,110

about a year later then I finally got to

164
00:06:46,899 --> 00:06:45,229
Germany and flew f-15s in Germany for

165
00:06:50,409 --> 00:06:46,909
three years you know the height of the

166
00:06:52,090 --> 00:06:50,419
high it was 84 to 87 so kind of the

167
00:06:53,770 --> 00:06:52,100
height of the Cold War kind kind

168
00:06:55,960 --> 00:06:53,780
time never solve myself in the future

169
00:06:56,650 --> 00:06:55,970
flying in a Soyuz that at that point

170
00:06:59,950 --> 00:06:56,660
I'll tell you that

171
00:07:02,140 --> 00:06:59,960
and after that went to Iceland and flew

172
00:07:05,050 --> 00:07:02,150
in the 57th fighter interceptor squadron

173
00:07:08,410 --> 00:07:05,060
in Iceland for a couple years several

174
00:07:11,590 --> 00:07:08,420
times joining up won the wings of Soviet

175
00:07:14,500 --> 00:07:11,600
bears bear bombers as they crossed then

176
00:07:16,600 --> 00:07:14,510
worked in the North Atlantic so that was

177
00:07:20,010 --> 00:07:16,610
that was interesting after that I went

178
00:07:22,390 --> 00:07:20,020
on to test pilot school then in

179
00:07:24,700 --> 00:07:22,400
California at Edwards Air Force Base and

180
00:07:27,520 --> 00:07:24,710
after test pilot school that's a

181
00:07:29,800 --> 00:07:27,530
one-year program in 1990 I went back to

182
00:07:31,750 --> 00:07:29,810
Eglin Air Force Base in Florida back out

183
00:07:33,700 --> 00:07:31,760
to the east and did weapons development

184
00:07:36,940 --> 00:07:33,710
testing there for about three and a half

185
00:07:38,920 --> 00:07:36,950
years so the weapons weapons testing is

186
00:07:40,930 --> 00:07:38,930
never boring we had a lot of really

187
00:07:43,330 --> 00:07:40,940
early morning takeoffs out over the sea

188
00:07:45,580 --> 00:07:43,340

and doing doing a lot of tests so on the

189
00:07:48,550 --> 00:07:45,590
things that didn't work right about

190
00:07:50,500 --> 00:07:48,560
maybe 25% of the time and that and that

191
00:07:52,510 --> 00:07:50,510
was our job to see if we could make them

192
00:07:55,660 --> 00:07:52,520
work right so so that was a very

193
00:07:59,920 --> 00:07:55,670
interesting job there they took it kind

194
00:08:01,570 --> 00:07:59,930
of a strange turn after that I was made

195
00:08:03,760 --> 00:08:01,580
aware of a possibility of going to get a

196
00:08:07,180 --> 00:08:03,770
PhD in aerospace engineering at the Air

197
00:08:08,860 --> 00:08:07,190
Force Institute of Technology and I had

198
00:08:10,180 --> 00:08:08,870
that kind of make a tough little

199
00:08:12,250 --> 00:08:10,190
decision there about whether I wanted to

200
00:08:13,600 --> 00:08:12,260
go do that or not and after giving it

201
00:08:15,190 --> 00:08:13,610
some thought I decided to go ahead and

202
00:08:16,930 --> 00:08:15,200
do that so I went to the Air Force

203
00:08:19,060 --> 00:08:16,940
Institute of Technology spent three

204
00:08:21,760 --> 00:08:19,070
years there doing a PhD in astronautical

205
00:08:23,380 --> 00:08:21,770
engineering and then following that went

206
00:08:25,240 --> 00:08:23,390
to the Air Force test pilot school as an

207
00:08:27,460 --> 00:08:25,250
instructor and I stayed there as an

208
00:08:29,140 --> 00:08:27,470
instructor was a it was a really great

209
00:08:31,750 --> 00:08:29,150
job there but I was coming up on the end

210
00:08:33,640 --> 00:08:31,760
of it anyway when I came to NASA so the

211
00:08:36,670 --> 00:08:33,650
timing worked out well but at the time I

212
00:08:39,430 --> 00:08:36,680
was flying gliders with students up into

213
00:08:41,050 --> 00:08:39,440

hatchapee on usually one day a week and

214
00:08:43,810 --> 00:08:41,060
the other days I was flying an f15 and

215
00:08:45,430 --> 00:08:43,820
the f16 teaching students flight test

216
00:08:47,980 --> 00:08:45,440
techniques that Edwards Air Force Base

217
00:08:51,550 --> 00:08:47,990
so that was the last job I had just

218
00:08:53,590 --> 00:08:51,560
before coming to NASA to fly in space as

219
00:08:55,840 --> 00:08:53,600
you're doing now is to take on a job

220
00:08:58,270 --> 00:08:55,850
that has risks associated with it that

221
00:09:00,579 --> 00:08:58,280
most people don't ever have to face some

222
00:09:03,430 --> 00:09:00,589
people would ask you why you do it I'm

223
00:09:05,590 --> 00:09:03,440
gonna be one of them tell me what is it

224
00:09:05,860 --> 00:09:05,600
that you think that we we all of us what

225
00:09:08,500 --> 00:09:05,870
do we

226
00:09:11,260 --> 00:09:08,510
yet or learn as a result of flying

227
00:09:15,130 --> 00:09:11,270
people in space that you think makes it

228
00:09:18,070 --> 00:09:15,140
worth taking that risk well I think

229
00:09:21,750 --> 00:09:18,080
ultimately people want to go to space

230
00:09:24,340 --> 00:09:21,760
you know and so to get out there

231
00:09:27,310 --> 00:09:24,350
somebody's just got a head that way

232
00:09:29,530 --> 00:09:27,320
and and put it to the test at some point

233
00:09:31,660 --> 00:09:29,540
just just like when you know we expanded

234
00:09:33,940 --> 00:09:31,670
across the country and really went to

235
00:09:36,910 --> 00:09:33,950
all corners of the earth I think it's in

236
00:09:39,400 --> 00:09:36,920
our human nature to want to do it you

237
00:09:41,710 --> 00:09:39,410
know yourself as a person no matter how

238
00:09:43,360 --> 00:09:41,720

many times you go to somebody else's

239
00:09:46,630 --> 00:09:43,370
slide presentation about their trip to

240
00:09:49,030 --> 00:09:46,640
Paris it's not the same as getting your

241
00:09:52,269 --> 00:09:49,040
family making a big investment in

242
00:09:55,810 --> 00:09:52,279
airfare and time off and really going

243
00:09:57,820 --> 00:09:55,820
out there and experiencing that because

244
00:10:01,000 --> 00:09:57,830
we really are all about the human

245
00:10:03,280 --> 00:10:01,010
experience so that's you know that's

246
00:10:05,110 --> 00:10:03,290
what takes us there I think an

247
00:10:07,630 --> 00:10:05,120
interesting little piece of information

248
00:10:10,329 --> 00:10:07,640
is that when if you if you ask somebody

249
00:10:13,300 --> 00:10:10,339
you know about the first time we went to

250
00:10:15,160 --> 00:10:13,310
the moon few people think about the

251
00:10:17,949 --> 00:10:15,170
robotic missions to the moon that

252
00:10:20,110 --> 00:10:17,959
preceded Neil Armstrong and Buzz Aldrin

253
00:10:22,480 --> 00:10:20,120
and Mike Collins go into the moon they

254
00:10:25,329 --> 00:10:22,490
usually just jump right to the point

255
00:10:27,850 --> 00:10:25,339
where oh we finally got to the moon when

256
00:10:29,620 --> 00:10:27,860
in the in reality we had several

257
00:10:31,840 --> 00:10:29,630
robotics missions of the US wasn't even

258
00:10:33,670 --> 00:10:31,850
the first one to the moon robotically so

259
00:10:35,620 --> 00:10:33,680
they don't really think about those now

260
00:10:37,240 --> 00:10:35,630
those robotic missions are super

261
00:10:39,460 --> 00:10:37,250
important to us and they teach us how to

262
00:10:42,120 --> 00:10:39,470
get there but I think that the human the

263
00:10:44,890 --> 00:10:42,130

emotional connection comes about because

264
00:10:46,900 --> 00:10:44,900
we we see ourselves out there we project

265
00:10:49,300 --> 00:10:46,910
ourselves out there and and we really

266
00:10:53,380 --> 00:10:49,310
want to go explore on our own have a

267
00:10:56,500 --> 00:10:55,120
you're getting ready to launch to the

268
00:10:59,860 --> 00:10:56,510
International Space Station for

269
00:11:01,810 --> 00:10:59,870
expeditions 33 and 34 Kevin what are the

270
00:11:04,900 --> 00:11:01,820
goals of your flight and what are your

271
00:11:06,670 --> 00:11:04,910
jobs going to be in space well of course

272
00:11:09,550 --> 00:11:06,680
the goal the goal of the flight is just

273
00:11:11,710 --> 00:11:09,560
to fly a safe and productive flight and

274
00:11:13,380 --> 00:11:11,720
carry out you know the plan that the

275
00:11:17,110 --> 00:11:13,390
increment managers put out there for us

276
00:11:18,670 --> 00:11:17,120
we have a lot of visiting vehicles that

277
00:11:20,769 --> 00:11:18,680
will come and go could be like up to

278
00:11:24,639 --> 00:11:20,779
including our arrival and departure may

279
00:11:28,329 --> 00:11:24,649
be like 13 traffic movements and 15 and

280
00:11:29,800 --> 00:11:28,339
150 days so just like one one every 12

281
00:11:34,449 --> 00:11:29,810
days and that adds that adds a lot of

282
00:11:36,790 --> 00:11:34,459
overhead to the flight we have we have

283
00:11:38,560 --> 00:11:36,800
the the robotics involved in some of the

284
00:11:40,240 --> 00:11:38,570
tracking captures of the new vehicles to

285
00:11:41,769 --> 00:11:40,250
look forward to so that's kind of a

286
00:11:43,870 --> 00:11:41,779
that's kind of something we're

287
00:11:46,810 --> 00:11:43,880
anticipating and of course the progress

288
00:11:48,819 --> 00:11:46,820

is coming and going and taking taking

289
00:11:50,410 --> 00:11:48,829
care of the space station all the

290
00:11:52,810 --> 00:11:50,420
purpose of that is relate to get that

291
00:11:54,670 --> 00:11:52,820
they get the science going it's now

292
00:11:56,769 --> 00:11:54,680
we're in the utilization phase and

293
00:11:58,060 --> 00:11:56,779
getting the science rolling at full

294
00:12:00,460 --> 00:11:58,070
speed so we've done a lot of preparation

295
00:12:02,920 --> 00:12:00,470
in anticipation of the science we're

296
00:12:06,250 --> 00:12:02,930
going to be doing I'll fly up on October

297
00:12:08,920 --> 00:12:06,260
15th departing from Kazakhstan with Oleg

298
00:12:10,480 --> 00:12:08,930
novitskiy and Evgeny tarelkin and we'll

299
00:12:13,060 --> 00:12:10,490
go up and join sunny Williams and Aki

300
00:12:14,740 --> 00:12:13,070
hosi today and yuri malenchenko who have

301
00:12:18,579 --> 00:12:14,750
been on board already as part of

302
00:12:21,550 --> 00:12:18,589
expedition 33 and then unfortunately the

303
00:12:23,829 --> 00:12:21,560
some delays and some previous flights

304
00:12:25,090 --> 00:12:23,839
have have made it so that the overlap

305
00:12:27,340 --> 00:12:25,100
with them is only about three and a half

306
00:12:29,949 --> 00:12:27,350
weeks so we'll have a pretty intense

307
00:12:31,750 --> 00:12:29,959
period of handover in there with 33 and

308
00:12:34,329 --> 00:12:31,760
then we'll be a three-man crew

309
00:12:36,850 --> 00:12:34,339
expedition 34 three-man crew for about

310
00:12:39,370 --> 00:12:36,860
three and a half weeks and then welcome

311
00:12:40,840 --> 00:12:39,380
aboard Chris Hadfield Tom Marshburn and

312
00:12:44,470 --> 00:12:40,850
Roman Romanenko

313
00:12:46,990 --> 00:12:44,480

for the 34 expedition 34 six-man phase

314
00:12:48,880 --> 00:12:47,000
which sometimes we call 34 6 nowadays

315
00:12:53,380 --> 00:12:48,890
the new new lingo and will stay until

316
00:12:55,509 --> 00:12:53,390
March so the goals we've got some space

317
00:12:58,210 --> 00:12:55,519
station maintenance activities plans

318
00:13:01,150 --> 00:12:58,220
some some kind of periodic maintenance

319
00:13:03,189 --> 00:13:01,160
that we've we've trained for but really

320
00:13:05,050 --> 00:13:03,199
the emphasis will be on getting getting

321
00:13:07,180 --> 00:13:05,060
the science rolling and getting as much

322
00:13:08,680 --> 00:13:07,190
utilization out of the flight as we can

323
00:13:10,960 --> 00:13:08,690
you've seen this Space Station before

324
00:13:12,730 --> 00:13:10,970
you were there on your first flight what

325
00:13:16,060 --> 00:13:12,740
are you looking forward to about the

326
00:13:18,760 --> 00:13:16,070
space station this time around well when

327
00:13:20,590 --> 00:13:18,770
I was there before third let's see node

328
00:13:23,080 --> 00:13:20,600
three was not there yet and of course

329
00:13:25,000 --> 00:13:23,090
with that the cupola was not there so

330
00:13:27,400 --> 00:13:25,010
I'm really looking forward to see in

331
00:13:28,840 --> 00:13:27,410
that I think though that I'll also look

332
00:13:31,690 --> 00:13:28,850
at the space station in a whole new way

333
00:13:34,750 --> 00:13:31,700
this time I was a pilot on Discovery on

334
00:13:36,400 --> 00:13:34,760
my first flight and as a has a space

335
00:13:38,680 --> 00:13:36,410
shuttle crew member you have a lot of

336
00:13:42,880 --> 00:13:38,690
emphasis on the shuttle aspects of the

337
00:13:45,850 --> 00:13:42,890
flight and the very very high high tempo

338
00:13:48,070 --> 00:13:45,860

of the shuttle visit and you don't

339
00:13:50,620 --> 00:13:48,080
really get to appreciate all that the

340
00:13:52,090 --> 00:13:50,630
space station has to offer in fact while

341
00:13:54,220 --> 00:13:52,100
while you're visiting there they kind of

342
00:13:55,750 --> 00:13:54,230
bring things down to a level so that

343
00:13:57,040 --> 00:13:55,760
they can accommodate you as a visiting

344
00:13:59,320 --> 00:13:57,050
crew and you don't really get to see

345
00:14:00,850 --> 00:13:59,330
what it's like to live there and work

346
00:14:02,710 --> 00:14:00,860
there day-to-day so I'm really looking

347
00:14:05,920 --> 00:14:02,720
forward to that I'm looking forward to

348
00:14:07,390 --> 00:14:05,930
the extended stay there as well as a

349
00:14:09,250 --> 00:14:07,400
shuttle visitor you have very very

350
00:14:11,560 --> 00:14:09,260
little spare time you can measure

351
00:14:13,300 --> 00:14:11,570
literally an hour's a small fraction of

352
00:14:15,340 --> 00:14:13,310
a of a whole day of free time while

353
00:14:18,640 --> 00:14:15,350
you're docked so I'm looking forward to

354
00:14:20,470 --> 00:14:18,650
some some Sunday afternoons seeing the

355
00:14:22,360 --> 00:14:20,480
whole planet and doing some things I

356
00:14:24,520 --> 00:14:22,370
didn't get to do before and I should

357
00:14:27,310 --> 00:14:24,530
mention also that this flight will be in

358
00:14:31,000 --> 00:14:27,320
a Soyuz which for me is a very exciting

359
00:14:34,240 --> 00:14:31,010
thing I was a pilot and test pilot as a

360
00:14:36,760 --> 00:14:34,250
profession before coming to NASA and it

361
00:14:37,390 --> 00:14:36,770
was fantastic to get to experience a

362
00:14:39,550 --> 00:14:37,400
space shuttle

363
00:14:41,590 --> 00:14:39,560

but I have to tell you too that I'm

364
00:14:43,930 --> 00:14:41,600
really looking forward to seeing the way

365
00:14:46,390 --> 00:14:43,940
a Soyuz operates it's a whole different

366
00:14:47,830 --> 00:14:46,400
way to skin the cat to get you to space

367
00:14:50,710 --> 00:14:47,840
station and get you home the rendezvous

368
00:14:52,180 --> 00:14:50,720
is very different the flight in route is

369
00:14:54,450 --> 00:14:52,190
very different and the trip home is very

370
00:14:57,730 --> 00:14:54,460
different as you can imagine so I've

371
00:14:59,410 --> 00:14:57,740
really really loved learning about the

372
00:15:01,420 --> 00:14:59,420
Soyuz and I'm looking forward to to that

373
00:15:03,640 --> 00:15:01,430
aspect to the flight as well the flight

374
00:15:06,520 --> 00:15:03,650
not just the Soyuz aspect but a lot of

375
00:15:08,230 --> 00:15:06,530
it is an excitement to be involved in a

376
00:15:10,090 --> 00:15:08,240
project that's making use of the

377
00:15:12,880 --> 00:15:10,100
expertise and assets from people all

378
00:15:15,040 --> 00:15:12,890
over the world yeah the the space

379
00:15:18,860 --> 00:15:15,050
station it's it's like this is a great

380
00:15:21,380 --> 00:15:18,870
point the space station is really a huge

381
00:15:24,320 --> 00:15:21,390
very unique cooperative effort between

382
00:15:25,850 --> 00:15:24,330
all these countries we we do a lot in

383
00:15:27,890 --> 00:15:25,860
them we get the Olympics coming up for

384
00:15:29,600 --> 00:15:27,900
example which is which is a an

385
00:15:31,010 --> 00:15:29,610
international thing but it's it's more

386
00:15:32,900 --> 00:15:31,020
you know it's a competitive event

387
00:15:36,260 --> 00:15:32,910
between nations and this this space

388
00:15:39,230 --> 00:15:36,270

station really represents to me the very

389
00:15:41,450 --> 00:15:39,240
first big cooperative effort between the

390
00:15:44,270 --> 00:15:41,460
most affluent nations on this planet

391
00:15:47,300 --> 00:15:44,280
coming together to do something all

392
00:15:51,560 --> 00:15:47,310
toward one goal and the space station

393
00:15:54,320 --> 00:15:51,570
because it's made up of components from

394
00:15:58,160 --> 00:15:54,330
ISA and from Jax and the canadian space

395
00:16:01,070 --> 00:15:58,170
agency Roscosmos and nasa everybody has

396
00:16:03,410 --> 00:16:01,080
a piece of this puzzle for example

397
00:16:05,210 --> 00:16:03,420
United States provides power almost all

398
00:16:08,990 --> 00:16:05,220
the power for the space station we

399
00:16:11,120 --> 00:16:09,000
provide this very awesome s-band and

400
00:16:13,400 --> 00:16:11,130
kayuu band comm assets which all the

401
00:16:15,080 --> 00:16:13,410
partners use by the same token when we

402
00:16:17,540 --> 00:16:15,090
want to reboost the russian segment

403
00:16:19,700 --> 00:16:17,550
provides us with a reboost to space they

404
00:16:21,590 --> 00:16:19,710
provide progress and of course crew

405
00:16:24,290 --> 00:16:21,600
transportation at the moment to get us

406
00:16:26,840 --> 00:16:24,300
there the Canadians have built the

407
00:16:28,820 --> 00:16:26,850
canadarm2 which allows us to accept

408
00:16:30,560 --> 00:16:28,830
these visiting vehicles now this new

409
00:16:32,260 --> 00:16:30,570
generation of commercial visiting

410
00:16:35,900 --> 00:16:32,270
vehicles that we have coming aboard and

411
00:16:40,040 --> 00:16:35,910
the science in the in the Japanese Kibo

412
00:16:41,810 --> 00:16:40,050
and Columbus is absolutely you know it's

413
00:16:43,220 --> 00:16:41,820

it's a world-class science if you can

414
00:16:46,730 --> 00:16:43,230
call that that since it's off the world

415
00:16:48,890 --> 00:16:46,740
but it's absolutely very classy very

416
00:16:50,780 --> 00:16:48,900
classy Space Station and really proud to

417
00:16:52,940 --> 00:16:50,790
be part of that with all these these

418
00:16:55,640 --> 00:16:52,950
partners you mentioned a couple of the

419
00:16:58,130 --> 00:16:55,650
the pieces fill us in on the rest of

420
00:17:00,470 --> 00:16:58,140
what is there right now so the scene if

421
00:17:03,830 --> 00:17:00,480
you will arrive at now the scene right

422
00:17:06,020 --> 00:17:03,840
now is Space Station you know is it's

423
00:17:07,040 --> 00:17:06,030
really all put together the Russians are

424
00:17:10,130 --> 00:17:07,050
getting ready to launch

425
00:17:11,900 --> 00:17:10,140
I think know maybe through it in a

426
00:17:13,640 --> 00:17:11,910
year's time or so and we'll add one more

427
00:17:16,150 --> 00:17:13,650
research module but we've got

428
00:17:18,530 --> 00:17:16,160
essentially thirteen or fourteen

429
00:17:20,120 --> 00:17:18,540
components depending on you know exactly

430
00:17:23,960 --> 00:17:20,130
which ones you count up there right now

431
00:17:25,820 --> 00:17:23,970
we have on the US side the major

432
00:17:27,470 --> 00:17:25,830
laboratories conducting the research we

433
00:17:29,480 --> 00:17:27,480
have Destiny and we have Kibo on the

434
00:17:32,240 --> 00:17:29,490
Japanese side and we have Columbus on

435
00:17:34,520 --> 00:17:32,250
the European side and those are

436
00:17:35,840 --> 00:17:34,530
the internal internal you know modules

437
00:17:37,610 --> 00:17:35,850
where we conduct experiments and the

438
00:17:40,190 --> 00:17:37,620

Russian side they do a lot of their

439
00:17:43,190 --> 00:17:40,200
research in the service modules as the

440
00:17:45,620 --> 00:17:43,200
and they also do some in in Rus Viet and

441
00:17:47,990 --> 00:17:45,630
poies as well so they have a few smaller

442
00:17:49,700 --> 00:17:48,000
research modules to sprinkle their their

443
00:17:51,170 --> 00:17:49,710
science around so that's where we're

444
00:17:53,420 --> 00:17:51,180
getting all the bulk of the research

445
00:17:56,680 --> 00:17:53,430
done interior to the space station

446
00:17:59,450 --> 00:17:56,690
of course we have some habitation

447
00:18:01,070 --> 00:17:59,460
available to us now node node one is

448
00:18:03,860 --> 00:18:01,080
where we do a lot of the habitation

449
00:18:05,540 --> 00:18:03,870
functions we exercise now and we use the

450
00:18:07,640 --> 00:18:05,550
restroom and that sort of thing and node

451
00:18:10,340 --> 00:18:07,650
node three that's where the region or

452
00:18:15,200 --> 00:18:10,350
the equalists mostly is living nowadays

453
00:18:22,130 --> 00:18:15,210
- for for for our environment control

454
00:18:23,750 --> 00:18:22,140
and let's see what else we have on the

455
00:18:25,640 --> 00:18:23,760
exterior of the space station now we

456
00:18:27,980 --> 00:18:25,650
have a lot of platforms that have

457
00:18:32,180 --> 00:18:27,990
science on them we have the gym exposed

458
00:18:34,220 --> 00:18:32,190
facility that that has some even NASA

459
00:18:36,680 --> 00:18:34,230
payloads outside

460
00:18:40,070 --> 00:18:36,690
for example maxy and x-rays and I all

461
00:18:41,750 --> 00:18:40,080
sky x-ray detector on the outside we're

462
00:18:44,330 --> 00:18:41,760
getting ready to take up scan testbed on

463
00:18:46,040 --> 00:18:44,340

HTV which will go on like an external

464
00:18:47,510 --> 00:18:46,050
with just logistics platform out there

465
00:18:49,490 --> 00:18:47,520
and of course how a magnetic

466
00:18:51,770 --> 00:18:49,500
spectrometer sitting out on the

467
00:18:56,690 --> 00:18:51,780
starboard side as well so the whole

468
00:18:58,340 --> 00:18:56,700
thing is as a as a big as a this big

469
00:18:59,720 --> 00:18:58,350
conglomeration of these plans that have

470
00:19:01,670 --> 00:18:59,730
come together for the last couple of

471
00:19:03,890 --> 00:19:01,680
decades now and all out they're really

472
00:19:05,840 --> 00:19:03,900
really getting some good science done I

473
00:19:07,610 --> 00:19:05,850
guess we got that airlock sitting over

474
00:19:09,260 --> 00:19:07,620
there two quests just in case we need

475
00:19:11,630 --> 00:19:09,270
that that serves a special function for

476
00:19:13,220 --> 00:19:11,640
us we do do some maintenance and keep

477
00:19:15,560 --> 00:19:13,230
the suits ready to go so that we can go

478
00:19:18,430 --> 00:19:15,570
outside if we want to and I think that

479
00:19:21,170 --> 00:19:18,440
kind of that kind is the big picture of

480
00:19:25,550 --> 00:19:21,180
the module set and and you point out the

481
00:19:28,850 --> 00:19:25,560
the pretty broad variety of apparatus

482
00:19:32,660 --> 00:19:28,860
that are there for science how do you

483
00:19:35,180 --> 00:19:32,670
explain to people the potential for what

484
00:19:41,000 --> 00:19:35,190
new things might be able to be learned

485
00:19:43,010 --> 00:19:41,010
in all of those various places well just

486
00:19:45,200 --> 00:19:43,020
being outside the atmosphere for example

487
00:19:46,070 --> 00:19:45,210
as is one step toward getting some

488
00:19:48,290 --> 00:19:46,080

science done with

489
00:19:50,330 --> 00:19:48,300
with the x-ray Observatory with Alpha

490
00:19:52,190 --> 00:19:50,340
Magnetic Spectrometer looking at the

491
00:19:54,320 --> 00:19:52,200
space environment in terms of plasma

492
00:19:56,930 --> 00:19:54,330
we're learning a lot just being out

493
00:19:58,820 --> 00:19:56,940
there we're learning a lot just from the

494
00:20:00,740 --> 00:19:58,830
fact that we've built this thing it's

495
00:20:04,220 --> 00:20:00,750
it's an engineering testbed if you will

496
00:20:06,650 --> 00:20:04,230
for a vehicle that operates and exists

497
00:20:08,960 --> 00:20:06,660
in space the types of materials we've

498
00:20:11,900 --> 00:20:08,970
used to build the space station are

499
00:20:14,180 --> 00:20:11,910
important to us for when we build a

500
00:20:16,670 --> 00:20:14,190
vehicle that actually departs you know

501
00:20:18,170 --> 00:20:16,680
earth and goes way far away because it's

502
00:20:20,690 --> 00:20:18,180
nice to be here just outside our

503
00:20:22,970 --> 00:20:20,700
atmosphere we can make changes if we

504
00:20:25,340 --> 00:20:22,980
want take things up bring them down we

505
00:20:27,320 --> 00:20:25,350
can send we have Missi also as an

506
00:20:29,180 --> 00:20:27,330
experiment which is a materials for ISS

507
00:20:30,860 --> 00:20:29,190
experiment that sits outside and we can

508
00:20:34,040 --> 00:20:30,870
put these things outside and look at how

509
00:20:35,180 --> 00:20:34,050
materials degrade or or how they huddle

510
00:20:36,710 --> 00:20:35,190
they whether if you will the space

511
00:20:40,040 --> 00:20:36,720
environment so we can learn a lot about

512
00:20:42,020 --> 00:20:40,050
being out there the biggest you know the

513
00:20:45,050 --> 00:20:42,030

biggest component my mind still is the

514
00:20:46,790 --> 00:20:45,060
microgravity environment though the

515
00:20:49,400 --> 00:20:46,800
microgravity is just so much different

516
00:20:50,720 --> 00:20:49,410
than than what we experienced here on

517
00:20:52,730 --> 00:20:50,730
earth you know from the time you get up

518
00:20:54,350 --> 00:20:52,740
in the morning you can not even open

519
00:20:57,590 --> 00:20:54,360
your eyes and you know where the gravity

520
00:21:00,980 --> 00:20:57,600
vector is and the things you do in your

521
00:21:02,990 --> 00:21:00,990
daily life things like just the reason

522
00:21:05,690 --> 00:21:03,000
you shake orange juice is because it you

523
00:21:06,920 --> 00:21:05,700
know it settles out into layers and that

524
00:21:08,780 --> 00:21:06,930
sort of thing and that that sort of

525
00:21:11,300 --> 00:21:08,790
thing doesn't happen in space it's just

526
00:21:13,070 --> 00:21:11,310
very many unique things the way

527
00:21:15,680 --> 00:21:13,080
convection works and those sorts of

528
00:21:17,150 --> 00:21:15,690
things that allow us to be in an

529
00:21:19,190 --> 00:21:17,160
environment where sometimes we can see

530
00:21:23,210 --> 00:21:19,200
effects though that we don't otherwise

531
00:21:25,460 --> 00:21:23,220
see down here on the planet and they're

532
00:21:27,980 --> 00:21:25,470
they're really stumbling on to some

533
00:21:31,400 --> 00:21:27,990
really interesting things out there

534
00:21:32,750 --> 00:21:31,410
sometimes even in experiments where they

535
00:21:34,370 --> 00:21:32,760
don't think they will they might see a

536
00:21:37,100 --> 00:21:34,380
phenomenon happen and go after and

537
00:21:39,860 --> 00:21:37,110
investigate it and learn a lot so it's

538
00:21:41,960 --> 00:21:39,870

it's that that really unique environment

539
00:21:44,390 --> 00:21:41,970
that is just completely different than

540
00:21:46,280 --> 00:21:44,400
down here on the planet now one of the

541
00:21:48,200 --> 00:21:46,290
important areas of concentration in

542
00:21:50,800 --> 00:21:48,210
science is figuring out how that

543
00:21:53,420 --> 00:21:50,810
environment affects the human body and

544
00:21:56,300 --> 00:21:53,430
finding out what the the bad effects are

545
00:21:58,940 --> 00:21:56,310
and how you respond to give me two or

546
00:21:59,840 --> 00:21:58,950
three examples of the the kinds of human

547
00:22:01,340 --> 00:21:59,850
life sciences

548
00:22:05,330 --> 00:22:01,350
research that you're gonna be doing on

549
00:22:06,950 --> 00:22:05,340
this trip yeah so in addition to being

550
00:22:08,659 --> 00:22:06,960
working crew members a lot of times we

551
00:22:10,190 --> 00:22:08,669
were asked to be subjects for

552
00:22:12,049 --> 00:22:10,200
experiments and they'll they'll take a

553
00:22:13,430 --> 00:22:12,059
really hard look at us before we go

554
00:22:16,039 --> 00:22:13,440
after we'd come home see how we've

555
00:22:19,279 --> 00:22:16,049
changed and then in some cases actually

556
00:22:22,909 --> 00:22:19,289
can look at us during the expedition as

557
00:22:25,730 --> 00:22:22,919
well I've had oh you know probably tens

558
00:22:28,460 --> 00:22:25,740
in tens of hours in an MRI machines and

559
00:22:33,649 --> 00:22:28,470
stuff too to characterize my muscular

560
00:22:35,120 --> 00:22:33,659
skeletal system bone structure spacing

561
00:22:36,230 --> 00:22:35,130
between vertebrae and those sorts of

562
00:22:38,360 --> 00:22:36,240
things and then we'll look at those

563
00:22:40,250 --> 00:22:38,370

again when we come and come back you

564
00:22:42,350 --> 00:22:40,260
can't have an MRI machine in space but

565
00:22:44,029 --> 00:22:42,360
we do have ultrasound up there we have a

566
00:22:45,830 --> 00:22:44,039
spinal ultrasound experiment we're doing

567
00:22:47,390 --> 00:22:45,840
where we can look at those distances and

568
00:22:48,919 --> 00:22:47,400
send the data back to the ground so that

569
00:22:50,870 --> 00:22:48,929
they can see how things change

570
00:22:52,190 --> 00:22:50,880
does it change early in the flight does

571
00:22:55,940 --> 00:22:52,200
it change constantly throughout the

572
00:22:57,919 --> 00:22:55,950
flight and that sort of thing another

573
00:23:00,370 --> 00:22:57,929
interesting thing is that as humans were

574
00:23:02,779 --> 00:23:00,380
kind of programmed to the length of our

575
00:23:05,210 --> 00:23:02,789
solar day you know the Sun comes up the

576
00:23:07,580 --> 00:23:05,220
Sun Goes Down therefore your circadian

577
00:23:09,620 --> 00:23:07,590
rhythm is is forced to stay in tune with

578
00:23:11,899 --> 00:23:09,630
that and one things they can look at in

579
00:23:15,049 --> 00:23:11,909
space where we don't have that normal

580
00:23:17,990 --> 00:23:15,059
solar day in orbit then they can look at

581
00:23:20,060 --> 00:23:18,000
how our circadian rhythm would like to

582
00:23:23,899 --> 00:23:20,070
flow in some cases with sleep shifting

583
00:23:25,370 --> 00:23:23,909
if if we didn't have that so several

584
00:23:27,590 --> 00:23:25,380
times in flight they'll wear a holder

585
00:23:30,140 --> 00:23:27,600
monitor for a test to hold or monitor to

586
00:23:32,659 --> 00:23:30,150
just look at heart rhythms and also my

587
00:23:34,490 --> 00:23:32,669
my activity and act to watch to monitor

588
00:23:37,399 --> 00:23:34,500

my activity in space and then they can

589
00:23:39,320 --> 00:23:37,409
look and see how my circadian rhythm was

590
00:23:41,840 --> 00:23:39,330
was impacted by sleep shifting and get

591
00:23:44,360 --> 00:23:41,850
some really good data out of that one

592
00:23:47,450 --> 00:23:44,370
more I might mention is it's not on

593
00:23:49,460 --> 00:23:47,460
humans but it's it's for humans as an

594
00:23:52,610 --> 00:23:49,470
experiment I've been trained to do for

595
00:23:54,380 --> 00:23:52,620
the for the for JAXA which is

596
00:23:58,520 --> 00:23:54,390
looking at some medaka fish who happen

597
00:24:00,710 --> 00:23:58,530
to have a bone similar to mammals the

598
00:24:02,000 --> 00:24:00,720
way their bone is created and lost and

599
00:24:04,760 --> 00:24:02,010
we'll be looking at these fish in the

600
00:24:07,520 --> 00:24:04,770
microgravity environment and it'll be

601
00:24:10,820 --> 00:24:07,530
really great information for

602
00:24:12,230 --> 00:24:10,830
osteoporosis research so that's it's

603
00:24:13,090 --> 00:24:12,240
kind of human science but it's going to

604
00:24:15,700 --> 00:24:13,100
be done on that

605
00:24:17,680 --> 00:24:15,710
on the fish in this case not from the

606
00:24:19,810 --> 00:24:17,690
point of view of somebody who has spent

607
00:24:22,450 --> 00:24:19,820
time off of the planet one of the few

608
00:24:24,129 --> 00:24:22,460
hundred people who have done that give

609
00:24:27,070 --> 00:24:24,139
me a sense of what you think it is we

610
00:24:29,590 --> 00:24:27,080
need to learn about how people live in

611
00:24:31,210 --> 00:24:29,600
that environment to maximize our chances

612
00:24:33,879 --> 00:24:31,220
for being successful when we go out

613
00:24:35,620 --> 00:24:33,889

there when we go further away well

614
00:24:36,879 --> 00:24:35,630
certainly like I mentioned before we

615
00:24:39,060 --> 00:24:36,889
really need to understand the

616
00:24:44,529 --> 00:24:39,070
environment the radiation environment

617
00:24:46,090 --> 00:24:44,539
the justjust all the things about space

618
00:24:48,789 --> 00:24:46,100
weather and those kinds of things that

619
00:24:51,340 --> 00:24:48,799
we can learn I think a really big one

620
00:24:53,799 --> 00:24:51,350
too is is still the human human health

621
00:24:57,759 --> 00:24:53,809
if you're going to go to Mars and come

622
00:25:00,430 --> 00:24:57,769
home with the current you know thruster

623
00:25:02,139 --> 00:25:00,440
technology and kind of fuels we have

624
00:25:03,759 --> 00:25:02,149
it's going to take a long time to get

625
00:25:06,580 --> 00:25:03,769
there a long time to come back and I

626
00:25:08,499 --> 00:25:06,590
don't really think we're ready yet to go

627
00:25:10,240 --> 00:25:08,509
to Mars land and get out there and you

628
00:25:11,830 --> 00:25:10,250
know really go to work yet there's

629
00:25:14,560 --> 00:25:11,840
there's some recovery time involved

630
00:25:17,740 --> 00:25:14,570
we've made some huge huge steps forward

631
00:25:19,930 --> 00:25:17,750
we have an exercise machine on board now

632
00:25:21,639 --> 00:25:19,940
on Space Station that has made a huge

633
00:25:25,539 --> 00:25:21,649
difference in the health of astronauts

634
00:25:27,610 --> 00:25:25,549
coming home in terms of bone bone loss

635
00:25:29,350 --> 00:25:27,620
and and muscle density but we still have

636
00:25:32,490 --> 00:25:29,360
a lot of things to learn I think about

637
00:25:35,259 --> 00:25:32,500
the neurovestibular and just kind of

638
00:25:37,960 --> 00:25:35,269

sensory functions how to how to handle

639
00:25:39,610 --> 00:25:37,970
those I'm doing an experiment too it's a

640
00:25:41,740 --> 00:25:39,620
it's an early one called manual control

641
00:25:43,570 --> 00:25:41,750
where I'll fly just before the flight

642
00:25:47,080 --> 00:25:43,580
I'll have a chance in a motion based

643
00:25:49,539 --> 00:25:47,090
simulator to land aircraft to maneuver a

644
00:25:51,310 --> 00:25:49,549
rover on a planet and a low gravity

645
00:25:54,490 --> 00:25:51,320
planet do dockings on the planet and

646
00:25:56,700 --> 00:25:54,500
also driving a car and then I'll do that

647
00:25:59,799 --> 00:25:56,710
the day I come home and they'll compare

648
00:26:02,409 --> 00:25:59,809
performance and then recovery time get

649
00:26:04,600 --> 00:26:02,419
some idea of kind of what what kind of

650
00:26:06,940 --> 00:26:04,610
hits were taking in terms of hey you've

651
00:26:08,590 --> 00:26:06,950
been in microgravity now for six six

652
00:26:11,320 --> 00:26:08,600
months what kind of tasks can you

653
00:26:13,899 --> 00:26:11,330
actually accomplish safely so all these

654
00:26:16,119 --> 00:26:13,909
things are taking us towards humans

655
00:26:17,560 --> 00:26:16,129
being able to make this journey when you

656
00:26:21,009 --> 00:26:17,570
get to your destination and be very

657
00:26:22,419 --> 00:26:21,019
functional get a lot of work done be be

658
00:26:25,090 --> 00:26:22,429
happy enough to get back on a spacecraft

659
00:26:27,140 --> 00:26:25,100
and of course come back to earth at the

660
00:26:29,299 --> 00:26:27,150
end having completed the mission

661
00:26:32,780 --> 00:26:29,309
maybe maybe one more thing - you know

662
00:26:35,299 --> 00:26:32,790
we're looking right now at some space

663
00:26:37,520 --> 00:26:35,309

refueling and fuel transfer capabilities

664
00:26:39,289 --> 00:26:37,530
on the space station those will be

665
00:26:41,360 --> 00:26:39,299
important you know if from an

666
00:26:43,070 --> 00:26:41,370
engineering point of view to making

667
00:26:45,500 --> 00:26:43,080
those kinds of big leaps out to the

668
00:26:47,120 --> 00:26:45,510
other places too so you know almost

669
00:26:48,740 --> 00:26:47,130
everything we do on the space station

670
00:26:51,440 --> 00:26:48,750
you could point to it and say that is

671
00:26:54,770 --> 00:26:51,450
going to help us get to Mars if that's

672
00:26:57,080 --> 00:26:54,780
the next step or or beyond someday you

673
00:26:59,630 --> 00:26:57,090
touch on the point that I wanted to get

674
00:27:01,240 --> 00:26:59,640
you - there are a lot of modules on the

675
00:27:03,440 --> 00:27:01,250
space station that are packed with

676
00:27:05,930 --> 00:27:03,450
specialized gear that supports

677
00:27:09,020 --> 00:27:05,940
scientific research and disciplines

678
00:27:10,430 --> 00:27:09,030
other than human life sciences tell me

679
00:27:11,960 --> 00:27:10,440
about a few of those kinds of

680
00:27:13,730 --> 00:27:11,970
experiments that you've been preparing

681
00:27:16,340 --> 00:27:13,740
to work on on this flight

682
00:27:19,220 --> 00:27:16,350
well we have you know it's it's really a

683
00:27:21,049 --> 00:27:19,230
broad spectrum I think from my point I

684
00:27:22,880 --> 00:27:21,059
was an aerospace kind of a fluids

685
00:27:26,270 --> 00:27:22,890
engineer so we have a lot of really

686
00:27:28,610 --> 00:27:26,280
engineering fluids experiments one

687
00:27:30,590 --> 00:27:28,620
problem we might have now on earth is if

688
00:27:33,409 --> 00:27:30,600

you have a tank that's got fluid and an

689
00:27:36,049 --> 00:27:33,419
air mixed in it and you want to you want

690
00:27:37,520 --> 00:27:36,059
to you're lucky in your car because your

691
00:27:39,620 --> 00:27:37,530
fuel is always on the bottom of the tank

692
00:27:41,900 --> 00:27:39,630
we're not that lucky in space we have to

693
00:27:43,669 --> 00:27:41,910
design a tank so that that fuel is

694
00:27:45,169 --> 00:27:43,679
always ready by the pump there to be

695
00:27:47,480 --> 00:27:45,179
pulled down the line and sent to the

696
00:27:49,130 --> 00:27:47,490
engine or to to whatever kind of device

697
00:27:51,110 --> 00:27:49,140
that's going to drive so the fluids

698
00:27:53,840 --> 00:27:51,120
research they're doing I think is very

699
00:27:56,210 --> 00:27:53,850
interesting so we have we have some

700
00:27:58,909 --> 00:27:56,220
experiments set up to do that combustion

701
00:28:00,470 --> 00:27:58,919
experiments we we all love we all love

702
00:28:02,330 --> 00:28:00,480
fire I think all humans love are

703
00:28:05,180 --> 00:28:02,340
fascinated by it and things burn

704
00:28:07,130 --> 00:28:05,190
differently in space than they do down

705
00:28:09,710 --> 00:28:07,140
here on the planet with with the lack of

706
00:28:12,380 --> 00:28:09,720
convection and the different mechanism

707
00:28:17,480 --> 00:28:12,390
for feeding oxygen to the to the flame

708
00:28:19,880 --> 00:28:17,490
so that that will can continue in in the

709
00:28:21,260 --> 00:28:19,890
Japanese rack also one of the things

710
00:28:24,049 --> 00:28:21,270
that will continue as a Marangoni

711
00:28:26,480 --> 00:28:24,059
experiment which is they can build a

712
00:28:28,549 --> 00:28:26,490
column of fluid very close very similar

713
00:28:30,650 --> 00:28:28,559

to water between a couple plates that

714
00:28:32,690 --> 00:28:30,660
just makes a bridge in space something

715
00:28:34,880 --> 00:28:32,700
you can't possibly do on earth you can

716
00:28:38,060 --> 00:28:34,890
you you've seen the bubbles that we

717
00:28:39,590 --> 00:28:38,070
float sometimes in the cabin just in a

718
00:28:40,400 --> 00:28:39,600
glob and we like to take our pictures

719
00:28:41,960 --> 00:28:40,410
with them and that

720
00:28:43,880 --> 00:28:41,970
sort of thing but they actually do it in

721
00:28:45,260 --> 00:28:43,890
the rack and then by changing

722
00:28:48,620 --> 00:28:45,270
temperatures at the ends of the plates

723
00:28:52,310 --> 00:28:48,630
they get flow patterns inside this water

724
00:28:54,530 --> 00:28:52,320
bridge and there are theories about why

725
00:28:56,420 --> 00:28:54,540
it happens but but it's still being

726
00:28:58,990 --> 00:28:56,430
investigated and it can make a big

727
00:29:01,160 --> 00:28:59,000
difference if it can be applied to

728
00:29:02,630 --> 00:29:01,170
spacecraft of the future and stuff like

729
00:29:03,440 --> 00:29:02,640
feeding pumps and that's where so things

730
00:29:03,830 --> 00:29:03,450
she just never know what you're gonna

731
00:29:07,130 --> 00:29:03,840
find

732
00:29:09,490 --> 00:29:07,140
it sounds like quite a variety there is

733
00:29:12,170 --> 00:29:09,500
a wide wide variety every rack is

734
00:29:14,030 --> 00:29:12,180
different and the scientists who've

735
00:29:16,640 --> 00:29:14,040
developed these all these different

736
00:29:19,040 --> 00:29:16,650
experiments they come from all over the

737
00:29:20,900 --> 00:29:19,050
world - what's it like for you to get to

738
00:29:24,290 --> 00:29:20,910

work with that kind of variety of

739
00:29:26,390 --> 00:29:24,300
researcher mm-hmm it's very very

740
00:29:30,380 --> 00:29:26,400
interesting I just had a briefing

741
00:29:32,510 --> 00:29:30,390
yesterday where the scientists taught me

742
00:29:35,060 --> 00:29:32,520
here in the US but flew over from

743
00:29:37,910 --> 00:29:35,070
Germany just for the expressed purposes

744
00:29:40,760 --> 00:29:37,920
of teaching me about a certain rackets

745
00:29:42,350 --> 00:29:40,770
the material science lab and I'm going

746
00:29:43,940 --> 00:29:42,360
to be doing some cleaning functions in

747
00:29:46,280 --> 00:29:43,950
there in that thing to get it ready for

748
00:29:48,050 --> 00:29:46,290
for a follow-on experiment so he came

749
00:29:49,820 --> 00:29:48,060
all the way over from Germany is a

750
00:29:52,700 --> 00:29:49,830
German national and came came to teach

751
00:29:55,460 --> 00:29:52,710
me and Japan when we're there the weeks

752
00:29:58,130 --> 00:29:55,470
that were training they will come from

753
00:29:59,990 --> 00:29:58,140
all corners of the country to present to

754
00:30:01,940 --> 00:30:00,000
us their their vision for their

755
00:30:04,490 --> 00:30:01,950
experiment and of course for many of

756
00:30:07,220 --> 00:30:04,500
them this is this is their life effort

757
00:30:08,810 --> 00:30:07,230
the particular research field the

758
00:30:11,900 --> 00:30:08,820
opportunity for them to get to see it

759
00:30:14,390 --> 00:30:11,910
happen on the space station of course

760
00:30:16,820 --> 00:30:14,400
really really excites them and we get to

761
00:30:18,590 --> 00:30:16,830
be their hands so you can see it in

762
00:30:20,540 --> 00:30:18,600
their in their eyes and their enthusiasm

763
00:30:22,460 --> 00:30:20,550

so it's a great thing to get to meet

764
00:30:24,710 --> 00:30:22,470
them to really understand what it is

765
00:30:25,910 --> 00:30:24,720
that they'd like to do and we know that

766
00:30:29,600 --> 00:30:25,920
they would love to go do it themselves

767
00:30:32,270 --> 00:30:29,610
and you know maybe maybe someday down

768
00:30:34,460 --> 00:30:32,280
down the road we'll be able to get up

769
00:30:36,590 --> 00:30:34,470
there and back quickly and and more what

770
00:30:39,380 --> 00:30:36,600
more citizens and scientists can get up

771
00:30:41,540 --> 00:30:39,390
there and do their own projects station

772
00:30:44,060 --> 00:30:41,550
crewmembers have got other work to do

773
00:30:45,230 --> 00:30:44,070
apart from the science you're the people

774
00:30:47,860 --> 00:30:45,240
who are there and so you're responsible

775
00:30:51,920 --> 00:30:47,870
to take care of the station itself

776
00:30:53,390 --> 00:30:51,930
what's a day like for a crew member what

777
00:30:54,550 --> 00:30:53,400
are the kind of things do you have to

778
00:30:59,720 --> 00:30:54,560
take care

779
00:31:02,030 --> 00:30:59,730
well a typical day we we go in a

780
00:31:03,290 --> 00:31:02,040
schedule if it's just a typical kind of

781
00:31:05,480 --> 00:31:03,300
science day we don't have a vehicle

782
00:31:07,040 --> 00:31:05,490
docking that's all driven by orbital

783
00:31:09,110 --> 00:31:07,050
dynamics when it's going to arrive and

784
00:31:10,940 --> 00:31:09,120
when it needs to depart so a lot of that

785
00:31:13,880 --> 00:31:10,950
stuff takes you out of the normal day

786
00:31:16,940 --> 00:31:13,890
but if if everything is quieted down a

787
00:31:18,260 --> 00:31:16,950
bit and you're just on a normal normal

788
00:31:18,860 --> 00:31:18,270

work week we're going to get up at 6

789
00:31:22,070 --> 00:31:18,870
a.m.

790
00:31:24,380 --> 00:31:22,080
only in Greenwich Mean Time so somewhere

791
00:31:26,510 --> 00:31:24,390
around midnight or 1 a.m. Houston time

792
00:31:28,370 --> 00:31:26,520
and start start our day and we came to

793
00:31:31,460 --> 00:31:28,380
work a morning a long morning shift and

794
00:31:33,050 --> 00:31:31,470
then an afternoon shift we spend a good

795
00:31:35,090 --> 00:31:33,060
deal of time they give us a course some

796
00:31:36,650 --> 00:31:35,100
time for post leap activities and

797
00:31:38,210 --> 00:31:36,660
hygiene and that sort of thing just to

798
00:31:40,790 --> 00:31:38,220
get ready for the day chance to have a

799
00:31:41,930 --> 00:31:40,800
bite to eat and then you have a

800
00:31:44,090 --> 00:31:41,940
conference with the ground

801
00:31:46,010 --> 00:31:44,100
I haven't taken good look at the

802
00:31:47,990 --> 00:31:46,020
schedule for the day making sure that if

803
00:31:50,840 --> 00:31:48,000
you have anything time critical perhaps

804
00:31:53,060 --> 00:31:50,850
a ham radio call with a school at an

805
00:31:55,010 --> 00:31:53,070
instant you fly over then you need you

806
00:31:56,900 --> 00:31:55,020
need to be there at that point in time

807
00:31:58,370 --> 00:31:56,910
where it's not going to happen so you

808
00:31:59,660 --> 00:31:58,380
want to look at time critical events

809
00:32:01,190 --> 00:31:59,670
things that are coordinated with the

810
00:32:05,720 --> 00:32:01,200
ground make sure you fully understand

811
00:32:07,220 --> 00:32:05,730
the day and gather up tools it's kind of

812
00:32:08,960 --> 00:32:07,230
say goodbye to your crew members because

813
00:32:11,420 --> 00:32:08,970

the space station is so big we can go to

814
00:32:13,160 --> 00:32:11,430
all the corners now sometimes I've heard

815
00:32:14,660 --> 00:32:13,170
that you don't even see see other crew

816
00:32:17,750 --> 00:32:14,670
members the entire day until dinnertime

817
00:32:19,160 --> 00:32:17,760
again so you you get out there and you

818
00:32:21,650 --> 00:32:19,170
start you start turning the wrench in

819
00:32:23,630 --> 00:32:21,660
whichever particular rack you have and

820
00:32:25,850 --> 00:32:23,640
keeping an eye on the day and on a

821
00:32:29,210 --> 00:32:25,860
typical day they'll they try to assign

822
00:32:31,130 --> 00:32:29,220
six and a half hours of real no kiddin

823
00:32:32,960 --> 00:32:31,140
this is not preparation stuff this is

824
00:32:36,470 --> 00:32:32,970
actually you're at the rack getting the

825
00:32:39,770 --> 00:32:36,480
work done so it's somewhere in there a

826
00:32:43,100 --> 00:32:39,780
little break for lunch also usually

827
00:32:45,980 --> 00:32:43,110
morning or afternoon the crew members

828
00:32:48,290 --> 00:32:45,990
will have an exercise session which is

829
00:32:49,580 --> 00:32:48,300
two and a half hours of exercise now so

830
00:32:52,520 --> 00:32:49,590
that's what we're up to in terms of

831
00:32:55,280 --> 00:32:52,530
keeping our health and fitness so that's

832
00:32:56,720 --> 00:32:55,290
that's worked into the day at the end of

833
00:32:58,640 --> 00:32:56,730
the day you have another planet another

834
00:33:00,560 --> 00:32:58,650
caught a daily planning conference in

835
00:33:03,950 --> 00:33:00,570
the evening with with mission controls

836
00:33:05,360 --> 00:33:03,960
all across the world and talk about the

837
00:33:07,730 --> 00:33:05,370
way the day went maybe a little worried

838
00:33:09,440 --> 00:33:07,740

about tomorrow and then some

839
00:33:11,840 --> 00:33:09,450
quiet time to catch up maybe make some

840
00:33:13,010 --> 00:33:11,850
notes do a few of the things that you

841
00:33:16,669 --> 00:33:13,020
didn't get chance to do during the day

842
00:33:18,530 --> 00:33:16,679
and and then turn in at 9:30 and you're

843
00:33:21,500 --> 00:33:18,540
the one's eyes out person I know the

844
00:33:24,590 --> 00:33:21,510
ones who are responsible to to hop to

845
00:33:26,030 --> 00:33:24,600
anytime something breaks yes and it does

846
00:33:30,010 --> 00:33:26,040
happen yeah it does

847
00:33:32,360 --> 00:33:30,020
it does happen thing things do break

848
00:33:34,370 --> 00:33:32,370
absolutely and impossible to anticipate

849
00:33:36,470 --> 00:33:34,380
that so I'm sure there will be a

850
00:33:40,100 --> 00:33:36,480
surprise or two and the in our

851
00:33:42,169 --> 00:33:40,110
expedition some things that have needed

852
00:33:43,640 --> 00:33:42,179
some work in history and then if

853
00:33:45,260 --> 00:33:43,650
something breaks on board you might need

854
00:33:46,910 --> 00:33:45,270
to fly it up when a progress get a

855
00:33:48,500 --> 00:33:46,920
component up there so there are a few

856
00:33:51,110 --> 00:33:48,510
things up there that will meet me when I

857
00:33:54,560 --> 00:33:51,120
get there that I've been trained trained

858
00:33:56,870 --> 00:33:54,570
to work on one of them is the high data

859
00:33:59,419 --> 00:33:56,880
rate high rate comm system a Newcomb

860
00:34:02,180 --> 00:33:59,429
system that will multiply by 10 the rate

861
00:34:03,860 --> 00:34:02,190
that we can push data to the ground so

862
00:34:06,110 --> 00:34:03,870
that's a big thing more video channels

863
00:34:08,119 --> 00:34:06,120

more audio channels and it allows some

864
00:34:10,909 --> 00:34:08,129
commanding through the kayuu band system

865
00:34:12,260 --> 00:34:10,919
from the ground up to so as you know the

866
00:34:13,940 --> 00:34:12,270
state of the art and electronics is

867
00:34:15,409 --> 00:34:13,950
changing rapidly so it's changed a lot

868
00:34:17,359 --> 00:34:15,419
since we first designed the space

869
00:34:19,609 --> 00:34:17,369
station and this will be this will be a

870
00:34:22,820 --> 00:34:19,619
really big upgrade to get that going

871
00:34:25,520 --> 00:34:22,830
so I've had some training on changing

872
00:34:27,320 --> 00:34:25,530
out heat exchangers and the airlock

873
00:34:29,780 --> 00:34:27,330
there's those or one of those is kind of

874
00:34:31,580 --> 00:34:29,790
like 6-7 years it needs to be done ever

875
00:34:34,550 --> 00:34:31,590
every once in a while and that's a

876
00:34:36,260 --> 00:34:34,560
couple days work so you go around and

877
00:34:37,730 --> 00:34:36,270
pick up those those kinds of cats and

878
00:34:40,520 --> 00:34:37,740
dogs and make sure you keep the space

879
00:34:43,070 --> 00:34:40,530
station in working order you mentioned

880
00:34:45,619 --> 00:34:43,080
that the the time that you're up there

881
00:34:47,750 --> 00:34:45,629
part of it is called expedition 33 even

882
00:34:50,030 --> 00:34:47,760
the rest of its expedition 34 and when

883
00:34:52,909 --> 00:34:50,040
it becomes expedition 34 you become the

884
00:34:55,099 --> 00:34:52,919
station commander does that make your

885
00:34:58,370 --> 00:34:55,109
life different than when you were a

886
00:35:00,560 --> 00:34:58,380
flight engineer well I'm looking forward

887
00:35:02,180 --> 00:35:00,570
to that time when sunny is the commander

888
00:35:05,510 --> 00:35:02,190

and I'm a flight engineer learning from

889
00:35:09,650 --> 00:35:05,520
her and seeing how how everything is run

890
00:35:11,630 --> 00:35:09,660
and I know her very well and I'm hoping

891
00:35:13,460 --> 00:35:11,640
that just every everything she does up

892
00:35:15,349 --> 00:35:13,470
there I'm just so gonna be so happy to

893
00:35:16,609 --> 00:35:15,359
do it the same way and continue so I

894
00:35:19,490 --> 00:35:16,619
don't think will change station

895
00:35:21,170 --> 00:35:19,500
operations one little bit when sunny

896
00:35:24,049 --> 00:35:21,180
leaves as

897
00:35:26,660 --> 00:35:24,059
no my crewmates or all all could be

898
00:35:28,250 --> 00:35:26,670
commanders of course themselves they're

899
00:35:31,730 --> 00:35:28,260
all you know self-starters and very

900
00:35:35,000 --> 00:35:31,740
motivated and excellent technically and

901
00:35:37,099 --> 00:35:35,010
very you know very friendly to each

902
00:35:39,349 --> 00:35:37,109
other and everything so I don't really

903
00:35:43,460 --> 00:35:39,359
have a big job to do and in terms of

904
00:35:47,120 --> 00:35:43,470
running the shop my idea or my primary

905
00:35:49,010 --> 00:35:47,130
you know my primary goal would just be

906
00:35:50,569 --> 00:35:49,020
to monitor the crew make sure

907
00:35:53,089 --> 00:35:50,579
everybody's happy with the tasks they

908
00:35:54,920 --> 00:35:53,099
have things run smoothly with the ground

909
00:35:57,140 --> 00:35:54,930
make sure you know if grounds concerned

910
00:35:59,359 --> 00:35:57,150
about something try to try to help them

911
00:36:01,849 --> 00:35:59,369
come up with a plan to to kind of get

912
00:36:04,549 --> 00:36:01,859
things and in the normal again and and

913
00:36:07,819 --> 00:36:04,559

make things just run smoothly on board I

914
00:36:09,170 --> 00:36:07,829
am you know tasked with keeping an eye

915
00:36:11,540 --> 00:36:09,180
out for the safety of the crew of course

916
00:36:14,750 --> 00:36:11,550
and the safety of the vehicle first of

917
00:36:18,230 --> 00:36:14,760
all and making making sure we we have no

918
00:36:20,780 --> 00:36:18,240
compromises on board so we'll we'll do

919
00:36:22,160 --> 00:36:20,790
that and if anybody has any issues with

920
00:36:24,109 --> 00:36:22,170
anything hopefully they'll bring them to

921
00:36:27,170 --> 00:36:24,119
me and and we'll find a good resolution

922
00:36:30,620 --> 00:36:27,180
and get back to having the fun that that

923
00:36:32,930 --> 00:36:30,630
we're really anticipating having so it

924
00:36:35,690 --> 00:36:32,940
turns out almost the exact middle of

925
00:36:37,010 --> 00:36:35,700
your time on orbit on this mission he's

926
00:36:38,870 --> 00:36:37,020
gonna come right around the Christmas

927
00:36:40,910 --> 00:36:38,880
and New Year's holidays what are your

928
00:36:43,789 --> 00:36:40,920
thoughts about being in space on those

929
00:36:46,819 --> 00:36:43,799
occasions you know it's not it's not too

930
00:36:48,440 --> 00:36:46,829
too big a deal for me I've been in

931
00:36:50,960 --> 00:36:48,450
Mission Control actually on Christmas

932
00:36:53,210 --> 00:36:50,970
Day and had a chance to talk with the

933
00:36:55,099 --> 00:36:53,220
crews on the holidays and and they love

934
00:36:57,470 --> 00:36:55,109
they love being up there probably the

935
00:36:59,839 --> 00:36:57,480
biggest thing is asking forgiveness from

936
00:37:02,299 --> 00:36:59,849
our families you know but they know how

937
00:37:04,309 --> 00:37:02,309
special it is how long we've waited to

938
00:37:06,950 --> 00:37:04,319

do this kind of thing and though they'll

939
00:37:09,289 --> 00:37:06,960
forgive us this one time around we hope

940
00:37:11,839 --> 00:37:09,299
to have you know a little bit of

941
00:37:13,910 --> 00:37:11,849
festivities on board tried to plan ahead

942
00:37:15,589 --> 00:37:13,920
a little bit to have some things up

943
00:37:18,260 --> 00:37:15,599
there to make it seem seem like the

944
00:37:20,359 --> 00:37:18,270
holidays and when New Year's rolls

945
00:37:22,609 --> 00:37:20,369
around I'm gonna I'm gonna do my best to

946
00:37:24,470 --> 00:37:22,619
be well-rested and try to see some

947
00:37:26,240 --> 00:37:24,480
fireworks as we pass through those

948
00:37:28,190 --> 00:37:26,250
midnight time zones around the planet

949
00:37:31,670 --> 00:37:28,200
and see if we can pick up any of that

950
00:37:33,079 --> 00:37:31,680
from space but yeah I think it'll I

951
00:37:34,520 --> 00:37:33,089
think it'll be fun it'll be a nice

952
00:37:38,420 --> 00:37:34,530
little break

953
00:37:40,160 --> 00:37:38,430
the 32s crew my two cosmonaut buddies

954
00:37:42,530 --> 00:37:40,170
and I it'll be kind of about halfway

955
00:37:44,570 --> 00:37:42,540
between October you know an hour come

956
00:37:47,420 --> 00:37:44,580
home and March so it'll be a nice nice

957
00:37:50,300 --> 00:37:47,430
little gap in there and we'll enjoy it

958
00:37:53,050 --> 00:37:50,310
the plan for any station increment has

959
00:37:55,190 --> 00:37:53,060
to be flexible to accommodate unusual

960
00:37:57,080 --> 00:37:55,200
circumstances you've made a reference to

961
00:37:59,170 --> 00:37:57,090
that earlier that includes the need for

962
00:38:00,470 --> 00:37:59,180
crew members to have to go work outside

963
00:38:02,839 --> 00:38:00,480

tell me

964
00:38:04,910 --> 00:38:02,849
as of now what's the space spacewalk

965
00:38:07,220 --> 00:38:04,920
planned for your increment who would go

966
00:38:09,710 --> 00:38:07,230
outside and for what purpose

967
00:38:14,630 --> 00:38:09,720
great question still shaping up at this

968
00:38:18,140 --> 00:38:14,640
point we we are fortunate with with

969
00:38:21,770 --> 00:38:18,150
sunny and Aki right now during the 32

970
00:38:25,430 --> 00:38:21,780
timeframe are planning to go outside and

971
00:38:27,260 --> 00:38:25,440
do Evo 18 so they've been trained to do

972
00:38:29,690 --> 00:38:27,270
that Joe acaba will still be on board at

973
00:38:32,210 --> 00:38:29,700
that point and if if that all goes well

974
00:38:35,530 --> 00:38:32,220
and they've taken care of that then we

975
00:38:40,790 --> 00:38:35,540
and we don't have a schedule DVA in the

976
00:38:42,890 --> 00:38:40,800
33 34 a timeframe at this point Chris

977
00:38:47,599 --> 00:38:42,900
Hadfield and Tom Marshburn have been

978
00:38:49,400 --> 00:38:47,609
training to do Evo 18 tasks as well just

979
00:38:52,040 --> 00:38:49,410
in case of visiting vehicles or some

980
00:38:52,940 --> 00:38:52,050
some other you know maybe sunny and

981
00:38:54,710 --> 00:38:52,950
knock you will have to go out and do

982
00:38:56,780 --> 00:38:54,720
some other Eevee a for something or Jan

983
00:38:58,220 --> 00:38:56,790
outside so if those tasks that they're

984
00:39:01,430 --> 00:38:58,230
planning to do haven't been done yet

985
00:39:04,640 --> 00:39:01,440
then we'll do those in probably late

986
00:39:06,500 --> 00:39:04,650
January February timeframe with Chris

987
00:39:08,690 --> 00:39:06,510
Hadfield and Tom Marshburn and there are

988
00:39:11,810 --> 00:39:08,700

some robotics involved in that and so my

989
00:39:14,150 --> 00:39:11,820
duties would be the suit up IV and and

990
00:39:16,700 --> 00:39:14,160
work in the robotics for those two guys

991
00:39:18,980 --> 00:39:16,710
at one time we had an Eevee a 19 in

992
00:39:21,950 --> 00:39:18,990
there I'm hoping it comes back at this

993
00:39:24,140 --> 00:39:21,960
point it hasn't Chris Hadfield and I

994
00:39:26,120 --> 00:39:24,150
trained for Eevee a 19 and then we've

995
00:39:27,680 --> 00:39:26,130
been all the way through the CVA

996
00:39:32,000 --> 00:39:27,690
assessment and we're ready to go do that

997
00:39:35,320 --> 00:39:32,010
it it's dependent on SpaceX to taking up

998
00:39:38,839 --> 00:39:35,330
a pair of like picnic size table

999
00:39:40,280 --> 00:39:38,849
radiator grapple bars that come up on

1000
00:39:43,150 --> 00:39:40,290
the outside of SpaceX 2 and they

1001
00:39:45,560 --> 00:39:43,160
probably will arrive when were there but

1002
00:39:46,790 --> 00:39:45,570
they with with the numbers of visiting

1003
00:39:47,960 --> 00:39:46,800
vehicles they've decided to go ahead and

1004
00:39:49,910 --> 00:39:47,970
push that Eevee a night

1005
00:39:52,550 --> 00:39:49,920
Dean downstream to another expedition

1006
00:39:54,320 --> 00:39:52,560
further out it would be taking those

1007
00:39:56,240 --> 00:39:54,330
grapple bars off and stowing them on the

1008
00:39:59,120 --> 00:39:56,250
back of the trucks using robotics and

1009
00:40:01,580 --> 00:39:59,130
just putting those away so so that one

1010
00:40:05,060 --> 00:40:01,590
that one left out of our increment we

1011
00:40:08,750 --> 00:40:05,070
are all happy to go out we are doing NBL

1012
00:40:11,480 --> 00:40:08,760
runs and and training in the virtual

1013
00:40:13,490 --> 00:40:11,490

reality lab for all contingencies and if

1014
00:40:17,120 --> 00:40:13,500
the needs there will we'll all be happy

1015
00:40:19,400 --> 00:40:17,130
to step outside and and have a day with

1016
00:40:21,440 --> 00:40:19,410
a spacewalk I think everybody yeah

1017
00:40:24,080 --> 00:40:21,450
presents that opinion I'm ready to go

1018
00:40:25,730 --> 00:40:24,090
all you have to do is ask yes the space

1019
00:40:28,400 --> 00:40:25,740
station these days is getting supplies

1020
00:40:31,160 --> 00:40:28,410
delivered by a small fleet of unmanned

1021
00:40:33,140 --> 00:40:31,170
cargo ships and as you made reference

1022
00:40:34,940 --> 00:40:33,150
there's maybe a half a dozen or so that

1023
00:40:36,740 --> 00:40:34,950
could be showing up during the time that

1024
00:40:40,099 --> 00:40:36,750
you're gonna be there tell me about

1025
00:40:41,810 --> 00:40:40,109
those different ships that supplied not

1026
00:40:44,000 --> 00:40:41,820
only the ships that come from the

1027
00:40:45,830 --> 00:40:44,010
station partners themselves but from

1028
00:40:48,109 --> 00:40:45,840
commercial companies including a new one

1029
00:40:50,690 --> 00:40:48,119
the the Cygnus ship that might make its

1030
00:40:53,510 --> 00:40:50,700
first demonstration flight while you're

1031
00:40:55,370 --> 00:40:53,520
there okay yeah well we'll just start

1032
00:40:58,130 --> 00:40:55,380
out with the progress is the one that

1033
00:41:03,170 --> 00:40:58,140
comes and goes the most often when we

1034
00:41:05,349 --> 00:41:03,180
arrive 48p will be will be there and 49p

1035
00:41:08,000 --> 00:41:05,359
will get there just just after we've

1036
00:41:10,609 --> 00:41:08,010
arrived and annan docked to the aft side

1037
00:41:12,740 --> 00:41:10,619
of the of the russian segment and and

1038
00:41:15,079 --> 00:41:12,750

during our increment 50p will come and

1039
00:41:17,120 --> 00:41:15,089
go in 51 p will arrive so several

1040
00:41:19,160 --> 00:41:17,130
movements of progress is on the progress

1041
00:41:23,450 --> 00:41:19,170
docking points ports on the Russian

1042
00:41:26,450 --> 00:41:23,460
segment the ATV the European ATV is

1043
00:41:29,570 --> 00:41:26,460
scheduled to have departed before we get

1044
00:41:31,460 --> 00:41:29,580
there it's there at this point and HTV

1045
00:41:34,339 --> 00:41:31,470
will have come and gone as well the

1046
00:41:37,550 --> 00:41:34,349
Japanese vehicle that goes on the nadir

1047
00:41:40,820 --> 00:41:37,560
node to port on the Russian or on the US

1048
00:41:43,339 --> 00:41:40,830
segment node too so that'll be going so

1049
00:41:45,920 --> 00:41:43,349
and then and at the back end of our

1050
00:41:49,250 --> 00:41:45,930
flight there will be another launch of

1051
00:41:51,140 --> 00:41:49,260
an at your pian ATV and it will be in

1052
00:41:52,780 --> 00:41:51,150
space when we depart to come home but it

1053
00:41:54,980 --> 00:41:52,790
won't have docked yet so it will be

1054
00:41:56,630 --> 00:41:54,990
loitering in just a few thousand

1055
00:41:57,800 --> 00:41:56,640
kilometers behind space station waiting

1056
00:41:59,870 --> 00:41:57,810
for us to get out of the way so I can

1057
00:42:01,700 --> 00:41:59,880
come in and dock so that's just luck of

1058
00:42:03,800 --> 00:42:01,710
the draw we won't CH TVs or

1059
00:42:05,510 --> 00:42:03,810
a TVs with the current point so of

1060
00:42:07,609 --> 00:42:05,520
course that that could always change and

1061
00:42:11,060 --> 00:42:07,619
we've had some pretty extensive training

1062
00:42:13,310 --> 00:42:11,070
on though it's just just in case so then

1063
00:42:14,810 --> 00:42:13,320

the other commercial vehicles that are

1064
00:42:17,180 --> 00:42:14,820
just getting up and running right now

1065
00:42:19,820 --> 00:42:17,190
are the dragon which has made one visit

1066
00:42:22,520 --> 00:42:19,830
already and there should be a dragon on

1067
00:42:24,980 --> 00:42:22,530
board space station when we dock with

1068
00:42:27,650 --> 00:42:24,990
our Soyuz and we should get the chance

1069
00:42:30,910 --> 00:42:27,660
to see that on board and be there when

1070
00:42:32,599 --> 00:42:30,920
it's released and it comes back to earth

1071
00:42:33,859 --> 00:42:32,609
further downstream

1072
00:42:35,720 --> 00:42:33,869
right now we're book keeping the

1073
00:42:39,220 --> 00:42:35,730
possibility for another dragon or

1074
00:42:41,780 --> 00:42:39,230
orbital to come at a later date

1075
00:42:43,540 --> 00:42:41,790
downstream so about that about the

1076
00:42:46,370 --> 00:42:43,550
December November December timeframe

1077
00:42:48,170 --> 00:42:46,380
possibility of seeing either one of

1078
00:42:51,410 --> 00:42:48,180
those vehicles again those are both

1079
00:42:54,079 --> 00:42:51,420
again grappled if they fly up underneath

1080
00:42:58,010 --> 00:42:54,089
the space station just within reach of

1081
00:43:02,030 --> 00:42:58,020
our canadarm2 robotic arm we'll fly over

1082
00:43:05,870 --> 00:43:02,040
top of a pan and grapple that that that

1083
00:43:08,089 --> 00:43:05,880
vehicle and berth it to the bottom port

1084
00:43:12,589 --> 00:43:08,099
on node two I'd enter the US segment and

1085
00:43:15,140 --> 00:43:12,599
have access to the cargo so we would

1086
00:43:16,910 --> 00:43:15,150
love to see any of those of course the

1087
00:43:19,160 --> 00:43:16,920
the dragon had a great flight last time

1088
00:43:20,510 --> 00:43:19,170

and one of these days the Cygnus will

1089
00:43:22,160 --> 00:43:20,520
get up there as well too and it'd be

1090
00:43:24,320 --> 00:43:22,170
great to be great to see both of those

1091
00:43:27,260 --> 00:43:24,330
vehicles during a flight and you've

1092
00:43:29,750 --> 00:43:27,270
trained for that to be the arm operator

1093
00:43:33,710 --> 00:43:29,760
for those arrivals right yes yeah so

1094
00:43:35,480 --> 00:43:33,720
we've all of us get a big big smattering

1095
00:43:38,089 --> 00:43:35,490
of training not only in the grapple

1096
00:43:39,530 --> 00:43:38,099
itself but the arrival procedures we we

1097
00:43:41,810 --> 00:43:39,540
do have a panel to command the vehicle

1098
00:43:44,000 --> 00:43:41,820
from one board so we can send it away if

1099
00:43:46,070 --> 00:43:44,010
we want or make it hold and those sorts

1100
00:43:47,540 --> 00:43:46,080
of things so we get a lot of the

1101
00:43:51,440 --> 00:43:47,550
extensive training when it's rendezvous

1102
00:43:53,420 --> 00:43:51,450
and it's its grapple and berthing so but

1103
00:43:54,740 --> 00:43:53,430
if any luck we'll get the hands on the

1104
00:43:57,530 --> 00:43:54,750
controller's at some point and bring one

1105
00:43:59,450 --> 00:43:57,540
of those aboard the landscape of space

1106
00:44:01,160 --> 00:43:59,460
flight has changed an awful lot in just

1107
00:44:04,160 --> 00:44:01,170
the last few years you got commercial

1108
00:44:06,500 --> 00:44:04,170
companies flying not just governments

1109
00:44:09,320 --> 00:44:06,510
and and you've got sovereign nations

1110
00:44:12,109 --> 00:44:09,330
working together in cooperation rather

1111
00:44:15,680 --> 00:44:12,119
than competing with one another is that

1112
00:44:17,870 --> 00:44:15,690
a kind of an arrangement a model that

1113
00:44:21,079 --> 00:44:17,880

you see continuing off into the future I

1114
00:44:24,140 --> 00:44:21,089
think absolutely I see no end to that I

1115
00:44:26,329 --> 00:44:24,150
think it's it's been really kind of an

1116
00:44:30,470 --> 00:44:26,339
evolution that that we won't go back on

1117
00:44:32,420 --> 00:44:30,480
so some some of those functions mmm like

1118
00:44:35,059 --> 00:44:32,430
taking taking cargo to and from

1119
00:44:36,950 --> 00:44:35,069
low-earth orbit NASA has really

1120
00:44:40,040 --> 00:44:36,960
developed well you know in the last few

1121
00:44:42,230 --> 00:44:40,050
decades and NASA is about sharing those

1122
00:44:44,809 --> 00:44:42,240
technologies and and making it so that

1123
00:44:47,059 --> 00:44:44,819
we can we can do it cheaper and we can

1124
00:44:49,490 --> 00:44:47,069
we can spread out spread out the tasking

1125
00:44:51,770 --> 00:44:49,500
a little bit and allow NASA to go on and

1126
00:44:53,690 --> 00:44:51,780
do a few few other things that are

1127
00:44:55,700 --> 00:44:53,700
really you know more cutting-edge

1128
00:44:57,800 --> 00:44:55,710
something a commercial company wouldn't

1129
00:44:59,720 --> 00:44:57,810
wouldn't dare to invest in at this point

1130
00:45:02,030 --> 00:44:59,730
we can do that with our our NASA

1131
00:45:05,089 --> 00:45:02,040
research and then the the joint the

1132
00:45:07,210 --> 00:45:05,099
international cooperation I don't see

1133
00:45:11,809 --> 00:45:07,220
that stopping either we've we've made

1134
00:45:13,160 --> 00:45:11,819
just so many so many advances in being

1135
00:45:16,220 --> 00:45:13,170
able to work it out this is something

1136
00:45:18,020 --> 00:45:16,230
you know just most people don't

1137
00:45:19,940 --> 00:45:18,030
appreciate how hard it is in different

1138
00:45:21,530 --> 00:45:19,950

languages and different cultures with

1139
00:45:23,270 --> 00:45:21,540
different budgets and different national

1140
00:45:26,599 --> 00:45:23,280
objectives and different national

1141
00:45:28,880 --> 00:45:26,609
perspectives even to bring countries

1142
00:45:31,579 --> 00:45:28,890
together to make to make one thing like

1143
00:45:33,980 --> 00:45:31,589
the Space Station happen but I think now

1144
00:45:36,500 --> 00:45:33,990
that we've seen it our other big goals

1145
00:45:39,920 --> 00:45:36,510
are other big steps out into the cosmos

1146
00:45:42,170 --> 00:45:39,930
will be as a planet and not not just as

1147
00:45:44,210 --> 00:45:42,180
a nation what is it that we're learning

1148
00:45:47,230 --> 00:45:44,220
on these missions to the International

1149
00:45:50,870 --> 00:45:47,240
Space Station that's going to prepare us

1150
00:45:51,710 --> 00:45:50,880
humans for the exploration of space well

1151
00:45:55,790 --> 00:45:51,720
beyond Earth

1152
00:45:57,410 --> 00:45:55,800
yeah just every single thing we we do up

1153
00:46:00,470 --> 00:45:57,420
there whether it's again the material

1154
00:46:04,339 --> 00:46:00,480
science for spacecraft development

1155
00:46:07,670 --> 00:46:04,349
whether it's communications systems we

1156
00:46:10,190 --> 00:46:07,680
have on the HTV we have a very large

1157
00:46:12,920 --> 00:46:10,200
payload going up called scan scan

1158
00:46:16,270 --> 00:46:12,930
testbed and it's going to look at a new

1159
00:46:20,270 --> 00:46:16,280
way to make radios work in space

1160
00:46:21,859 --> 00:46:20,280
software-defined radio technology so we

1161
00:46:23,240 --> 00:46:21,869
may be looking at kind of even a

1162
00:46:27,309 --> 00:46:23,250
different concept in how we operate

1163
00:46:29,540 --> 00:46:27,319

communications in the future again the

1164
00:46:33,320 --> 00:46:29,550
the ability of the humans

1165
00:46:34,880 --> 00:46:33,330
to do not only function in space but be

1166
00:46:36,380 --> 00:46:34,890
very functional when they arrive at

1167
00:46:38,410 --> 00:46:36,390
their destination those are the kinds of

1168
00:46:41,300 --> 00:46:38,420
things we're learning from the science

1169
00:46:44,660 --> 00:46:41,310
fuel technologies fuel transfer

1170
00:46:46,160 --> 00:46:44,670
technologies and all the things we can

1171
00:46:48,260 --> 00:46:46,170
learn about the space environment are